

SCHEDULE 1

Article 1(2)

PROHIBITED GOODS–MISCELLANEOUS CONTENTS

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PART I

GROUP A

GOODS SPECIFIED BY REFERENCE TO HEADINGS AND SUB- HEADINGS OF THE COMBINED NOMENCLATURE (“CN”)

<i>CN Heading and Sub-heading No.</i>	<i>Description of Goods</i>
1002 Live bovine animals	W
0103 Live swine	W
010410 Live sheep	W
ex 0206 Bovine offal	E
ex 0210 Protein derived from bovine offal	E
ex 0504 Bovine offal	E
ex 0511 Bovine offal and protein derived from such offal	E
ex 2301 Protein derived from bovine offal	E
ex 2309 Feeding stuff containing bovine offal or protein derived from such offal	E

GROUP B

ANTIQUES

Any goods manufactured or produced more than 50 years before the date of exportation W except

- (1) postage stamps and other articles of philatelic interest;
- (2) birth, marriage or death certificates or other documents relating to the personal affairs of the exporter or the spouse of the exporter;
- (3) letters or other writings written by or to the exporter or the spouse of the exporter; and
- (4) any goods exported by, and being the personal property of, the manufacturer or producer thereof, or the spouse, widow or widower of that person.

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GROUP C

STEEL PRODUCTS PROHIBITED TO BE EXPORTED TO THE UNITED STATES OF AMERICA OR THE COMMONWEALTH OF PUERTO RICO

The products specified in Annex I to the following Community instruments on the restriction of exports of certain steel products to the United States of America or the Commonwealth of Puerto Rico:

- Council Regulation (EEC) No. 3722/89(1)
- Council Regulation (EEC) No. 3723/89(2)
- Commission Decision No. 3724/89/ECSC(3)

PART II

Note: The goods in this Part are for convenience specified by reference to the classification system used by the Department of Trade and Industry for export control purposes.

GROUP 1

Note: Goods specified in the heads of this Group may also be specified in Groups 3E, 3F and 3G of this Part of this Schedule.

Military aircraft and helicopters, Arms and related material, Ammunition, Military Stores and Appliances, and Security and Para-Military Equipment

ML1	Small arms and machine guns, the following: and specially designed components therefor— <ul style="list-style-type: none">(a) Rifles, carbines, revolvers, pistols, machine pistols and machine guns C(b) Smooth-bore weapons specially designed for military use C(c) Weapons using caseless ammunition C except— air weapons (other than those declared by the Firearms (Dangerous Air Weapons) Rules 1969(4) to be specially dangerous).
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(1) O.J. No. L368, 18.12.89, p.1.
(2) O.J. No. L368, 18.12.89, p.16.
(3) O.J. No. L368, 18.12.89, p.21.
(4) S.I. 1969/47.

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PL5018	Smooth-bore weapons other than those specially designed for military use except— air weapons (other than those declared by the Firearms (Dangerous Air Weapons' Rules 1969 to be specially dangerous).	C
PL5003	Mountings for machine guns	C
ML2	Large calibre armament or weapons and projectors the following: and specially designed components and specially designed ODMA software therefor— (a) Guns, howitzers, cannon, mortars, tank destroyers, projectile launchers, military flame throwers, recoilless rifles (b) Military smoke, gas and pyrotechnic projectors or generators	C C
ML3	Ammunition, including projectiles, and specially designed components and specially designed ODMA software therefor, for the equipment mentioned in entries ML1, ML2 and ML26	C
PL5021	Ammunition, including projectiles, and specially designed components and specially designed ODMA software therefor, for the equipment specified in entry PL5018	C
ML4	Bombs, torpedoes, rockets and missiles, the following: and specially designed components and specially designed ODMA software therefor— (a) Bombs, torpedoes, grenades (including smoke grenades), smoke canisters, rockets, mines, missiles, depth	A

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charges, fire bombs,
incendiary bombs and
military demolition
charges, devices and
kits, pyrotechnic flare
signals for military use,
cartridges and simulators

(b) Apparatus and A
devices specially
designed for the
handling, control,
activation, powering
with one time operational
output, launching, laying,
sweeping, discharging,
detonation or detection
of items specified in head
(a)

(c) Military fuel C
thickeners, including
compounds (eg octal)
or mixtures of such
compounds (eg napalm)
specifically formulated
for the purpose of
producing materials
which, when added to
petroleum products,
provide gel-type
incendiary material for
use in bombs, projectiles,
flamethrowers or other
implements of war

PL5019 Radomes specially designed to C
withstand a combined thermal
shock greater than 41.8 kJ/
m accompanied by a peak
overpressure of greater than 49
kPa

PL5005 Apparatus and devices C
specially designed for the
refuelling or disruption of
items specified in head (a) of
entry ML4 in this Group and
specially designed components
therefor

PL5006 Apparatus and devices C
specially designed for dealing
with improvised explosive
devices or with other explosive

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devices not specified in head (a) of entry ML4, and specially designed ODMA software therefor

In this entry “improvised explosive devices” means devices placed or fabricated in an improvised manner incorporating destructive, lethal, noxious, pyrotechnic or incendiary chemicals, designed to destroy, disfigure or harass. They may incorporate military stores, but are normally devised from non-military components.

PL5026

Quartz crystals and assemblies thereof in worked, semi-finished, or mounted form, specially designed for equipment specified in entry ML4 in this Group, which have any of the following characteristics–

- (a) Radiation hardened C
- (b) An operating temperature range wider than 120° C C
- (c) Rated to have an acceleration sensitivity of less than 1×10^{-9} : of the operating frequency per g (where $g=9.81$ metres/sec²) over a vibration test frequency range from 10 Hz to 2 KHz sinewave and with a maximum level of acceleration not exceeding 20 g C

PL5024

Electrical pulsers capable of precisely timed, multiple initiations of explosives, controlled to ten microseconds or less, capable of delivering an output current greater than 100 amperes into a load of less than 40 ohms, and specially designed components and equipment therefor C

ML5	Fire control systems and sub-systems, specially designed for military use, the following: and specially designed components and accessories and specially designed ODMA software therefor–	
	(a) Fire control, gun laying, night sighting, missile tracking and guidance equipment and target surveillance equipment	A
	(b) Range, position and height finders, spotting instruments, detection, recognition or identification equipment and sensor integration equipment	A
	(c) Electronic, electro-optic, gyroscopic, acoustic and optical aiming or sighting devices	C
	(d) Bomb sights, bombing computers, gun sights and periscopes	C
ML6	Vehicles specially designed or modified for military use, the following: and specially designed components and specially designed ODMA software therefor–	
	(a) Tanks and self-propelled guns	C
	(b) Military type armed or armoured vehicles, and vehicles fitted with mounting for arms	C
	(c) Armoured railway trains	C
	(d) Military half-tracks	C
	(e) Military type recovery vehicles	C
	(f) Gun-carriers and tractors specially	C

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- designed for towing
artillery
- (g) Trailers specially C
designed to carry
ammunition
- (h) Amphibious and deep C
water fording military
vehicles
- (i) Military mobile repair C
shops specially designed
to service military
equipment
- (j) All other military A
vehicles specially
designed or modified for
military use, including
tank transporters,
tracked amphibious
cargo carriers, high
speed tractors and heavy
artillery transporters
- (k) Pneumatic tyre C
casings of a kind
specially constructed to
be bullet proof or to run
when deflated
- (l) Engines for the C
propulsion of the
vehicles specified in
heads (a) to (j), and
specially designed
components therefor
- (m) Tyre inflation C
pressure control systems,
operated from inside a
moving vehicle, specially
designed or modified for
military use
- (n) Large deflection C
suspensions specially
designed or modified for
military use

In this entry “specially modified for military use” means a structural, electrical or mechanical modification which entails replacing a component with at least one specially

ML7

designed military component, or adding at least one such component.

Toxicological agents and tear gas and related equipment, components, materials and technology the following: and specially designed ODMA software therefor—

(a) Biological agents, chemical agents and radioactive materials adapted for use in war to produce casualties in humans or animals, or to damage crops C

(aa) Tear gases and riot control agents, the following—

(1) Bromobenzyl cyanide (CR) C

(2) oChlorobenzylidenemalononitrile (CS) C

(3) Phenylacetyl chloride (w-Chloroacetophenone) (CN) C

(b) Equipment specially designed and intended for the dissemination of the materials specified in head (a) C

(c) Equipment specially designed and intended for defence against the materials specified in head (a) and for their detection and identification C

(d) Components specially designed for the items specified in head (b) or (c) C

(e) Biopolymers specially designed or processed for detection and identification of chemical warfare (CW) agents C

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specified in head (a) and the cultures of specific cells used to produce them

(f) Biocatalysts for decontamination and degradation of CW agents, and biological systems therefor, the following—

(1) biocatalysts, C
specially designed for decontamination and degradation of CW agents described in head (a) resulting from directed laboratory selection or genetic manipulation of biological systems;

(2) biological systems, C
the following: expression vectors, viruses or cultures of cells containing the genetic information specific to the production of biocatalysts specified in subhead (f)(1)

(g) Technology, the following—

(1) technology for the D
development, production or use of toxicological agents, related equipment or components, agents, or materials specified in heads (a) to (d), or of tear gas

(2) technology for the development, production or use of biopolymers, and cultures of specific cells to produce them, specified in head (e) D

(3) technology D
exclusively for the incorporation of biocatalysts specified

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in subhead (f)(1)
into military carrier
substances or military
material

(h) Noxious chemicals,
the following—

- (1) Bromobenzyl cyanide C
- (2) oChlorobenzylidene malononitrile C
(oChlorobenzal malononitrile)
- (3) monoChloromethyl chloroformate C
- (4) 2-Chlorotriethylamine C
- (5) Dibenzoxazepine C
- (6) Dibromodimethyl ether C
- (7) Dichloromodimethyl ether C
- (8) 2:2'-Dichlorotriethylamine C
- (9) Diphenylaminechloroarsine C
- (10) Diphenylchloroarsine C
- (11) Diphenylcyanoarsine C
- (12) Ethyl NN-dimethylphosphoramidocyanidate C
- (13) Ethyldibromoarsine C
- (14) Ethyldichloroarsine C
- (15) Lewisite (chlorovinyl dichloroarsine and dichlorodivinyldichloroarsine) C
- (16) Methyldichloroarsine C
- (17) Mustard gas (dichlorodiethyl sulphide) C
- (18) Phenylcarbylamine chloride C

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(phenylaminocarbonyl chloride)	
(19) Phenylacyl chloride (w-Chloroacetophenone)	C
(20) Phenyldibromoarsine	C
(21) Phenyldichloroarsine	C
(22) Pinacolyl methylphosphonofluoridate	C
(23) isoPropyl methylphosphonofluoridate	C
(24) 2:2:2" Trichlorotriethylamine	C

In this entry–

“anti-idiotypic antibodies” means antibodies which bind to the specific antigen binding sites of other antibodies;

“biocatalysts” means enzymes and other biological compounds which bind to and accelerate the degradation of CW agents;

“biopolymers” means the following biological macromolecules:

- (1) enzymes;
- (2) antibodies, monoclonal, polyclonal or anti-idiotypic;
- (3) specially designed or specially processed receptors;

“enzymes” means biocatalysts for specific chemical or biochemical reactions;

“expression vectors” means carriers (eg plasmid or virus) which

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are used to introduce genetic material into host cells;

“monoclonal antibodies” means proteins which bind to one antigenic site and are produced by a single clone of cells;

“polyclonal antibodies” means a mixture of proteins which bind to the specific antigen and are produced by more than one clone of cells;

“receptors” means biological macromolecular structure capable of binding ligands, the binding of which affects physiological functions;

“riot control agents” means substances which produce temporary, irritating or disabling physical effects which disappear within minutes of removal from exposure.

“tear gases” means gases which produce temporary, irritating or disabling physical effects which disappear within minutes of removal from exposure;

PL5009

Explosives and propellants, and related substances and software, the following—

(a) Explosives as defined in section 3 of the Explosives Act 1875⁽⁵⁾ except those specially designed for toys, novelty goods and display fireworks

C

(5) 1875 c. 17. In this entry—

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- (b) Military propellants and fuels not elsewhere specified in this Schedule A
 - (c) Military pyrotechnics C
 - (d) Additives, precursors, stabilisers and specially designed software, for any of the materials specified in heads (a) to (c) above (inclusive) A
- ML9 Vessels (including ships) of war and special naval equipment, the following: and specially designed components and specially designed ODMA software therefor–
- (a) Combatant vessels or vessels (surface or underwater) specially designed or modified for offensive or defensive action, whether or not converted to non-military use and regardless of current state of repair or operating condition C
 - (b) Engines, the following–
 - (1) diesel engines specially designed for submarines with both of the following characteristics C
 - (A) a power output of 1.12 MW (1,500 hp) or more;
 - (B) a rotary speed of 700 rev/min or more;
 - (2) electric motors, specially designed for submarines, having all of the following characteristics C
 - (A) a power output of more than 0.75 MW (1,000 hp);
 - (B) quick reversing;

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- (C) liquid cooled;
- (D) totally enclosed;
- (3) non-magnetic diesel engines specially designed for military purposes with a power output of 37.3 kW (50 hp) or more C
- (c) Underwater detection devices specially designed for military purposes and controls thereof C
- (d) Submarine and torpedo nets C
- (e) Compasses and equipment therefor and ship's course indicators, specially designed for submarines C
- (f) Hull penetrators and connectors specially designed for military purposes that enable interaction with equipment external to a vessel C
- (g) Silent bearings specially designed for military purposes and equipment containing those bearings C

ML10

Aircraft and helicopters, unmanned airborne vehicles, aero-engines and aircraft or helicopter equipment, associated equipment and components, specially designed for military purposes, the following: and specially designed ODMA software therefor—

- (a) Combat aircraft and helicopters and other aircraft and helicopters specially designed for military purposes, including military A

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reconnaissance, assault, military training and logistic support and all aircraft and helicopters having special structural features such as multiple hatches, special doors, ramps and reinforced floors, for transporting and airdropping troops, military equipment and supplies, and specially designed components therefor

(b) Aero-engines specially designed or adapted for use with aircraft and helicopters specified in head (a) of this entry, and specially designed components therefor A

(c) Unmanned airborne vehicles, including remotely piloted air vehicles (RPVs), and autonomous, programmable vehicles specially designed or modified for military purposes, and their launchers, ground support and associated equipment for command and control A

(d) Airborne equipment, including airborne refuelling equipment, specially designed for use with the aircraft and helicopters and the aero-engines specified in head (a) or (b) of this entry, and specially designed components therefor C

(e) Pressure refuellers, pressure refuelling equipment, equipment specially designed to facilitate operations in confined areas and C

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ground equipment,
developed specially for
aircraft and helicopters
specified in head (a) of
this entry, or for aero-
engines specified in head
(b) of this entry

(f) Pressurised breathing C
equipment and partial
pressure suits for use in
aircraft and helicopters,
anti-g suits, military
crash helmets and
protective masks, liquid
oxygen converters used
for aircraft, helicopters
and missiles, catapults
and cartridge actuated
devices utilised in
emergency escape of
personnel from aircraft
and helicopters

(cont.) (g) Parachutes
used for combat
personnel, cargo
dropping and aircraft
deceleration, the
following–

(1) parachutes for–

(a) pin point dropping of C
rangers

(b) dropping of C
paratroopers

(2) cargo parachutes C

(3) paragliders C
(drag parachutes,
drogue parachutes for
stabilisation and attitude
control of dropping
bodies, e.g., recovery
capsules, ejection seats,
bombs)

(4) drogue parachutes C
for use with ejection seat
systems for deployment
and inflation sequence
regulation of emergency
parachutes

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	(5) recovery parachutes for guided missiles, drones and space vehicles	C
	(6) approach parachutes and landing deceleration parachutes	C
	(7) other military parachutes	C
	(h) Automatic piloting systems for parachuted loads; equipment specially designed or modified for military purposes for controlled opening jumps at any height, including oxygen equipment	C
ML11	Electronic equipment specially designed for military use and specially designed components and specially designed ODMA software therefor	A
ML12	Photographic and electro-optical imaging equipment, the following: and specially designed components and specially designed software therefor—	
	(a) Air reconnaissance cameras and associated equipment designed for military purposes	C
	(b) Other cameras and electro-optical imaging devices, including infrared and imaging radar sensors, whether recording or transmitting via data link, designed for military including reconnaissance purposes	C
	(c) Specialised equipment for the cameras and electro-optical imaging devices specified in head (b) above designed to make the recorded or	C

	transmitted information militarily useful	
	(d) Film processing and printing machines designed for military purposes	C
ML13	Special armoured equipment, the following:	
	(a) Armoured plate	C
	(b) Combinations and constructions of metallic and non-metallic materials specially designed to provide ballistic protection for military systems	C
	(c) Military helmets	C
	(d) Body armour, bullet- proof or bullet-resistant clothing, flack suits and specially designed components therefor	C
PL5014	Specially designed components for the equipment specified in entry ML13 head (a), (b) or (c), in this Group	C
ML14	Specialised equipment for military training or for simulating military scenarios, and specially designed components and accessories and specially designed ODMA software therefor	C
ML15	Military infrared, thermal imaging and image intensifier equipment, and specially designed components and specially designed ODMA software therefor	C
ML16	Forgings, castings and semi- finished products specially designed for products specified in entry ML1, ML2, ML3, ML4, ML6 or ML10 above	C
PL5020	Forgings, castings and semi- finished products specially designed for products specified	C

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ML17	<p>in entry PL5003, PL5005, PL5006 or PL5018 above</p>	<p>Miscellaneous equipment and materials, the following: and specially designed components and specially designed ODMA software therefor:</p>	C
	<p>(a) Self-contained diving and underwater swimming apparatus, the following—</p>		
	<p>(1) closed and semi-closed circuit (rebreathing) apparatus</p>		C
	<p>(2) specially designed components for use in the conversion of open-circuit apparatus to military use</p>		C
	<p>(3) articles designed exclusively for military use with self-contained diving and underwater swimming apparatus</p>		C
	<p>(b) Firearms silencers (mufflers)</p>		C
	<p>(c) Power-controlled searchlights and control units therefor, designed for military use</p>		C
	<p>(d) Construction equipment built to military specifications, specially designed for airborne transport</p>		C
	<p>(e) External fittings, coatings and treatments for the suppression of acoustic, radar, infrared and other emissions, specially designed for military use</p>		C
	<p>(f) Field engineer equipment specially designed for use in a combat zone</p>		C
PL5002	Telescopic sights for firearms		C

ML18	Equipment and technology for the production of items specified in this Group, the following: and specially designed ODMA software therefor– (a) Specially designed or modified production equipment for the production of products specified in this Group and specially designed components therefor (b) Specially designed environmental test facilities, and specially designed equipment therefor, for the certification, qualification, or testing of products specified in this Group (c) Production technology, even if the equipment with which such technology is to be used is not specified in this Group (d) Technology specific to the design of, the assembly of components into, and the operation, maintenance and repair of, complete production installations even if the components themselves are not specified in this Group In this entry “production” means design, examination, manufacture, testing and checking.	A A B B
PL5017	Equipment and technology for the development of the goods specified in this Group and specially designed ODMA software therefor	C
ML20	Cryogenic and superconductive equipment,	

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the following: and specially designed components and accessories and specially designed ODMA software therefor—

(a) Equipment specially designed or configured to be installed in a vehicle for military ground, marine, airborne or space applications and capable of operating while in motion and of producing or maintaining temperatures below 103 K (−170°C) C

(b) Superconductive electrical equipment (rotating machinery and transformers) designed for operation at temperatures below 103 K (−170°C), and which are specially designed or configured to be installed in a vehicle for military ground, marine, airborne or space applications and capable of operating while in motion C

except direct-current hybrid homopolar generators that have single-pole normal metal armatures which rotate in a magnetic field produced by superconducting windings, provided those windings are the only superconducting component in the generator.

ML22 Electrically triggered shutters of the photochromic or electro-optical type having a shutter speed of less than 100 microseconds, and specially designed ODMA software therefor; except shutters specially designed for high-speed cameras C

ML23 Directed energy weapons (DEW) systems, the following:

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and specially designed components and specially designed ODMA software therefor—

- (a) Laser systems specially designed for destruction or effecting mission-abort of a target C
- (b) Particle beam systems capable of destruction or effecting mission-abort of a target C
- (c) High power radio-frequency (RF) systems capable of destruction or effecting mission-abort of a target C
- (d) Specially designed components for systems specified in head (a), (b) or (c) above, including
 - (1) prime power generation, energy storage, switching, power conditioning and fuel-handling equipment C
 - (2) target acquisition and tracking sub-systems C
 - (3) sub-systems capable of assessing target damage, destruction or mission-abort C
 - (4) beam-handling, propagation and pointing equipment C
 - (5) equipment with rapid beam slew capability for rapid multiple target operations C
 - (6) adaptive optics C
 - (7) current injectors for negative hydrogen ion beams which provide average injection currents over 50 mA with beam brightness (defined as current divided by the

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the product of orthogonal transverse, normalised root mean square emittances) greater than 40 A/(cm² mrad²) at kinetic energies of more than 20 keV

(8) specially designed components for the equipment specified in sub-heads (1) to (7) above C

(e) Equipment specially designed for the detection and identification of, and defence against, systems specified in head (a), (b) or (c) above, and specially designed ODMA software therefor C

(f) Physical test models and related documentation for the systems, equipment and components specified in heads (a) to (e) above C

ML24

Software not elsewhere specified, the following–

(a) Software specially designed for:

(1) modelling, simulation or evaluation of military weapon systems C

(2) development, monitoring, maintenance or up-dating of software embedded in military weapon systems C

(3) modelling or simulating military operation scenarios, not specified in entry ML14 in this group C

(4) Command, Communications, Control and Intelligence (C₃I) applications C

	(b) Software for determining the effects of conventional, nuclear, chemical or biological warfare weapons	C
ML26	Kinetic energy weapon systems and associated equipment, the following: and specially designed components and specially designed ODMA softwaretherefor–	
	(a) Kinetic energy weapons systems specially designed for destruction or effecting mission-abort of a target	C
	(b) Specially designed test and evaluation facilities and test models, including diagnostic instrumentation and targets, for dynamic testing of kinetic energy projectiles and systems	C
	(c) Specially designed subsystems for systems specified in head (a) or (b) above, including the following	C
	(1) launch-propulsion-subsystems capable of accelerating masses larger than 0.1 g to velocities in excess of 1.6 km/s, in single or rapid fire modes;	
	(2) prime power generation, energy storage, thermal management, conditioning, switching and fuel-handling equipment;	
	(3) target acquisition, tracking, fire control and damage assessment subsystems;	
	(4) homing seeker, guidance and divert	

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PL5001	<p>propulsion (lateral acceleration) subsystems for projectiles.</p> <p>Security and para-military police equipment, the following—</p> <ul style="list-style-type: none"> (a) Acoustic devices represented by the manufacturers or suppliers thereof as suitable for riot control purposes, and specialised components therefor (b) Anti-riot shields and components therefor (c) Leg-irons, shackles (excluding handcuffs) and gangchains, specially designed for restraining human beings (d) Portable anti-riot devices for administering an electric shock or an incapacitating substance, and specialised components therefor (e) Water cannon and components therefor (f) Riot control vehicles which have been specially designed or modified to be electrified to repel boarders 	<p>C</p> <p>C</p> <p>C</p> <p>C</p> <p>C</p> <p>C</p>
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GROUP 2

ATOMIC ENERGY MINERALS AND MATERIALS AND
NUCLEAR FACILITIES, EQUIPMENT AND APPLIANCES

Note 1: For the purposes of this Group “crude forms” and “semi-fabricated forms” have the same meaning as in Group 3H.

Note 2: Goods specified in this Group may also be specified in Group 3 of this Part of this Schedule.

GROUP 2A

Atomic Energy Minerals and Materials

A1	Special and other fissile materials	C
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except–

(1) when contained in a sensing component or instrument, up to three effective grammes;

(2) when contained in heart pacemakers.

In this entry–

“special fissile materials” means plutonium-239, uranium-233, uranium enriched in the isotopes 235 or 233, and any material containing the foregoing;

“uranium enriched in the isotopes 235 or 233” means uranium containing the isotopes 235 or 233, or both, in an amount such that the abundance ratio of the sum of these isotopes to the isotope 238 is more than the ratio of the isotope 235 to the isotope 238 occurring in nature (isotopic ratio 0.72 per cent);

“other fissile materials” means previously separated americium-242m, curium-245 and -247, californium-249 and -251, neptunium-237, isotopes of plutonium other than -239 and any material containing the foregoing;

“effective gramme” of special or other fissile material means

(a) for plutonium isotopes and uranium-233, the isotope weight in grammes;

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(b) for uranium enriched 1 per cent or greater in the isotope U-235, the element weight in grammes multiplied by the square of its enrichment expressed as a decimal weight fraction;

(c) for uranium enriched below 1 per cent in the isotope U-235, the element weight in grammes multiplied by 0.0001;

(d) for americium-242m, curium-245 and -247, californium-249 and -251 and neptunium-237, the isotope weight in grammes multiplied by 10;

“previously separated” means the application of any process intended to increase the concentration of the controlled isotope.

A2

Natural and depleted uranium, in any form, or incorporated in any substance in which the concentration of uranium exceeds 0.05%, by weight

C

In this entry–

“natural uranium” means uranium containing the mixtures of isotopes occurring in nature.

“depleted uranium” means uranium depleted in the isotope 235 below that occurring in nature.

PL6001

Source material, the following–

Thorium, in any form, or incorporated in any substance in which the concentration of thorium exceeds 0.05%

C

	except alloys containing less than 5% thorium.	
A3	Deuterium, heavy water, deuterated paraffins, and simple or complex lithium deuterides, and mixtures and solutions containing deuterium, in which the isotopic ratio of deuterium to hydrogen exceeds 1:5,000	C
PL6012	Compounds of deuterium	C
A4	Zirconium metal, alloys containing more than 50% zirconium by weight, compounds in which the ratio of hafnium content to zirconium content is less than one part to five hundred parts by weight, and goods composed wholly of any such metal, alloy or compound except— Zirconium in the form of foil or strip having a thickness not exceeding 0.01 mm.	C
A5	Nickel powder and porous nickel metal, the following— (a) Powder with a nickel content of 99% or more and a mean particle size of less than 100 micrometres, whether compacted or not (b) Porous nickel metal material produced from materials specified in head (a) above except single porous nickel metal sheets not exceeding 930 cm ² intended for use in batteries for civil applications	C C
PL6011	Graphite, nuclear-grade, having a purity level of less than 5 parts per million boron	C

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A7	<p>equivalent and with a density greater than 1.5 gcm³</p> <p>Lithium, the following—</p> <ul style="list-style-type: none"> (a) Lithium metal, and hydrides and alloys containing lithium enriched in the lithium-6 isotope to a concentration higher than 7.5% on an atom percentage basis C (b) Any other materials containing lithium enriched in the 6 isotope (including compounds, mixtures and concentrates) C <p>except—</p> <p>lithium enriched in the 6 isotope incorporated in thermoluminescent dosimeters.</p>
A8	<p>Hafnium, the following—</p> <p>Hafnium metal, and alloys and compounds of hafnium containing more than 60% hafnium by weight, in crude, fabricated or semi-fabricated form C</p>
A9	<p>Beryllium, the following—</p> <ul style="list-style-type: none"> (a) Beryllium and alloys containing more than 50 per cent of beryllium, in crude or semi-fabricated forms C (b) Beryllium compounds C (c) Manufactures of any of the foregoing except metal windows for medicalX-ray machines and oxide shapes in fabricated or semi-fabricated forms specially designed for electronic component parts or as substrates for electronic circuits C
PL6002	<p>Fluorine C</p>

PL6003	Chlorine trifluoride	C
A12	<p>Tritium, and compounds and mixtures containing tritium in which the ratio of tritium to hydrogen by atoms exceeds 1 part in 1,000, and products containing one or more of the foregoing</p> <p>except</p> <p>(i) labelled compounds not exceeding 100 curies activity (in this exception “labelled compounds” means compounds in which one of the atoms is a different isotope from that found normally);</p> <p>(ii) tritium contained in luminous paint, self-luminous products, gas and aerosol detectors, electron tubes, lighting or static elimination devices, ion generating tubes, detector cells of gas chromatography devices, and calibration standards;</p> <p>(iii) compounds and mixtures of tritium, where the separation of the constituents cannot result in the evolution of an isotopic mixture of hydrogen in which the ratio of tritium to hydrogen by atoms exceeds 1 part in 1,000.</p>	C
A14	<p>Specially designed or prepared materials for the separation of isotopes of natural uranium, depleted uranium and special and other fissile materials, including specially designed chemical exchange resins</p> <p>Note 1: see entries A1 and A2 in this Group for the special and other fissile materials to which this entry refers.</p>	C

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	Note 2: for isotopic separation plants, see the entry in Group 2B relating thereto.	
A15	Wet proofed platinised catalysts specially designed or prepared for promoting hydrogen isotope exchange between hydrogen and water for the recovery of tritium from heavy water or for heavy water production	C
PL6005	Calcium containing less than 100 parts per million by weight of impurities other than magnesium and less than 10 parts per million by weight of boron	C
PL6006	Alloys containing a higher percentage of magnesium than of any other element and 10% or more of lithium	C
PL6014	UF ₆ -resistant fully fluorinated hydrocarbon polymers specially prepared for the manufacture of gaseous diffusion barriers, having a purity of 99.9 per cent or more, a particle size less than 10 microns and a high degree of particle size uniformity	C

GROUP 2B

Nuclear Facilities, Equipment and Appliances

B1	Plant for the separation of isotopes of natural and depleted uranium, and other fissile materials, and specially designed or prepared equipment and components therefor, the following— (a) Plant specially designed for separating isotopes of natural and depleted uranium, and other fissile materials, the following—	
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- (1) Gaseous diffusion separation plant C
- (2) Gas centrifuge separation plant C
- (3) Aerodynamic separation plant C
- (4) Chemical exchange separation plant C
- (5) Ion-exchange separation plant C
- (6) Atomic vapour laser isotopic separation plant C
- (7) Molecular laser isotopic separation plant C
- (8) Plasma separation plant C
- (9) Electromagnetic separation plant C
- (b) Equipment and components, the following: specially designed or prepared for—
 - (1) Gaseous diffusion separation process—
 - (A) Valves wholly made of or lined with aluminium, aluminium alloys, nickel or alloy containing 60% or more nickel, 40 mm or more in diameter, with bellows seals C
 - (B) Blowers and compressors (turbo, centrifugal and axial flow types) wholly made of or lined with aluminium, aluminium alloys, nickel or alloy containing 60% or more nickel and having a capacity of 1,000 litres per minute or more, including compressor seals C

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- (C) Gaseous diffusion barriers made of porous metallic, polymer or ceramic materials resistant to corrosion by UF₆ with a pore size under 100 nm, a thickness of 5 mm or less, and, for tubular forms, a diameter of 25 mm or less C
- (D) Gaseous diffuser housings C
- (E) Heat exchangers made of aluminium, copper, nickel or alloys containing more than 60% nickel, or combinations of these metals as clad tubes, designed to operate at sub-atmospheric pressure with a leak rate that limits the pressure rise to less than 10 Pa (0.1 millibar) per hour under a pressure differential of 100 kPa (1 bar) C
- (2) Gas centrifuge separation process–
- (A) Gas centrifuges C
- (B) Complete rotor assemblies C
- (C) Rotor tube cylinders with a thickness of 12 mm or less, a diameter of between 75 mm and 400 mm, made from any of the following high strength-to-density ratio materials–
- (a) Maraging steel capable of an ultimate tensile strength of 2.05 GN/m² or more C
- (b) Aluminium alloys capable of an ultimate C

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tensile strength of 460
MN/m² or more

or

(c) Fibrous and filamentary materials with a specific modulus of more than 3.18×10^6 m and a specific tensile strength greater than 76.2×10^3 m C

(D) Magnetic suspension bearings consisting of an annular magnet suspended within a housing containing a damping medium, and having the magnet coupling with a pole piece or second magnet fitted to the top cap of the rotor C

(E) Specially prepared bearings comprising a pivot-cup assembly mounted on a damper C

(F) Rings or bellows with a wall thickness of 3 mm or less and a diameter of between 75 mm and 400 mm and designed to give local support to a rotor tube or to join a number together, made from any of the following high strength-to-density ratio materials—

(a) Maraging steel capable of an ultimate tensile strength of 2.05 GN/m² or more C

(b) Aluminium alloys capable of an ultimate tensile strength of 460 MN/m² or more C

or

(c) Fibrous and filamentary materials C

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with a specific modulus of more than 3.18×10^6 m and a specific tensile strength greater than 76.2×10^3 m

(G) Baffles of between 75 mm and 400 mm diameter for mounting inside a rotor tube, made from any of the following high strength-to-density ratio materials–

(a) Maraging steel C
capable of an ultimate tensile strength of 2.05 GN/m² or more

(b) Aluminium alloys C
capable of an ultimate tensile strength of 460 MN/m² or more

(c) Fibrous and C
filamentary materials with a specific modulus of more than 3.18×10^6 m and a specific tensile strength greater than 76.2×10^3 m

(H) Top and bottom caps of between 75 mm and 400 mm diameter to fit the ends of a rotor tube, made from any of the following high strength-to-density ratio materials–

(a) Maraging steel C
capable of an ultimate tensile strength of 2.05 GN/m² or more

(b) Aluminium alloys C
capable of an ultimate tensile strength of 460 MN/m² or more

or

(c) Fibrous and C
filamentary materials with a specific modulus

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of more than 3.18×10^6
and a specific tensile
strength greater than 76.2
 $\times 10^3$ m

(I) Molecular pumps C
comprised of cylinders
having internally
machined or extruded
helical grooves and
internally machined
bores

(J) Ring-shaped motor C
stators for multiphase AC
hysteresis or reluctance
motors for synchronous
operation within a
vacuum in the frequency
range of 600 to 2,000 Hz
and a power range of 50
to 1,000 Volt-Amps

(K) Frequency changers C
specially designed or
prepared to supply motor
stators for gas centrifuge
enrichment, having
all of the following
characteristics, and
specially designed
components therefor—

(a) Multiphase output of
600 to 2,000 Hz;

(b) Frequency control
better than 0.1%;

(c) Harmonic distortion
of less than 2%; and

(d) An efficiency greater
than 80%;

(3) Aerodynamic
separation process—

(A) Separation nozzles C
consisting of slit-shaped,
curved channels having
a radius of curvature less
than 1 mm and having
a knife-edge contained
within the nozzle which
separates the gas flowing

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- through the nozzle into two streams
- (B) Tangential inlet flow-driven cylindrical or conical tubes, specially designed for uranium isotope separation C
- (C) UF⁶-hydrogen helium compressors wholly made of or lined with aluminium, aluminium alloys, nickel or alloy containing 60% or more nickel, including compressor seals C
- (D) Aerodynamic separation element housing, designed to contain vortex tubes or separation nozzles C
- (E) Heat exchangers made of aluminium, copper, nickel, or alloys containing more than 60% nickel, or combinations of these metals as clad tubes, designed to operate at pressures of 600 kPa (6 bar) or less C
- (4) Chemical exchange separation process–
- (A) Fast-exchange liquid-liquid centrifugal contactors or fast exchange liquid-liquid pulse columns made of fluorocarbon lined materials C
- (B) Electrochemical reduction cells designed to reduce uranium from one valence state to another C
- (5) Ion-exchange separation process– Fast reacting ion-exchange resins, pellicular and reticulated resins C

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in which the active chemical exchange groups are limited to a coating on the surface of an inert particle or fibre

(6) Atomic vapour laser isotopic separation process—

(A) High power electron beam guns with total power of more than 50 kW and strip or scanning electron beam guns with a delivered power of more than 2.5 kW/cm for use in uranium vaporization systems C

(B) Trough shaped crucible and cooling equipment for molten uranium C

(C) Product and tails collector systems made of or lined with materials resistant to the heat and corrosion of uranium vapour C

(D) Lasers and components designed for atomic vapour laser isotopic separation, the following—

(a) Lasers to pump dye lasers—

(1) Copper vapour lasers of 40 W or more C

(2) Argon ion lasers of more than 40 W C

(3) ND:YAG lasers that can be frequency doubled and thereby have an average power of more than 40 W C

(b) Other lasers and accessories—

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- (1) Tunable pulsed dye laser amplifiers and oscillators C
except—
single mode oscillators, with an average power of more than 30W, a repetition rate of more than 1 kHz and a wavelength between 500 nm and 700 nm.
- (2) Modulators for controlling and modifying dye laser bandwidth C
- (3) Tunable pulsed single mode dye oscillators capable of an average power of more than 1W, and having a repetition rate of more than 1 KHz, a pulse width less than 100 ns, a wavelength between 500 nm and 700 nm and frequency modulation for bandwidth expansion C
- (7) Molecular laser isotopic separation process—
 - (A) Para-hydrogen Raman shifters designed to operate at 16 micrometres output wavelength and at a repetition rate of more than 250 Hz C
 - (B) Supersonic expansion nozzles designed for UF⁶ carrier gas C
 - (C) Uranium fluoride (UF⁵) product filter collectors C
 - (D) Equipment for fluorinating UF⁵ to UF⁶ C
 - (E) UF⁶ carrier gas compressors wholly C

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made of or lined with aluminium, aluminium alloys, nickel or alloy containing 60% or more nickel, including compressor seals

(F) Lasers designed for molecular laser isotopic separation, the following—

(a) Alexandrite lasers C
with a bandwidth of 0.005 nm (3.0 GHz) or less, a repetition rate of more than 125 Hz, and an average power of more than 30W

(b) Pulsed carbon dioxide C
lasers with a repetition rate of more than 250 Hz, an average power of more than 1.2 kW and a pulse length less than 200 ns

(c) Pulsed excimer lasers C
(XeF, XeCl, KrF) with a repetition rate of more than 250 Hz and an average power of more than 250W

(8) Plasma separation process—

(A) Product and tails C
collectors made of or lined with materials resistant to the heat and corrosion of uranium vapour

(B) Radio frequency C
ion excitation coils for frequencies of more than 100 kHz and capable of handling more than 40 kW power

(C) Microwave
power sources and superconductive electromagnets designed for use in the plasma

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separation process, the following—

(a) Microwave power sources of more than 30 GHz and greater than 50 kW for ion production C

(b) Solenoidal superconductive electromagnets of more than 30 cm inner diameter, with a magnetic field of more than 2 T and uniform to better than 1% over the central 80% of the inner volume C

(9) Taking on-line samples of feed, product or tails from UF⁶ gas streams—

UF⁶ mass spectrometers/ ion sources having all of the following characteristics C

(A) Unit resolution for mass of more than 320 amu;

(B) Ion sources constructed of or lined with nichrome or monel, or nickel plated;

(C) Electron bombardment ionization sources; and

(D) Collector systems suitable for isotopic analysis.

PL6013

(turbo, centrifugal and axial flow types) wholly made of or lined with nickel alloy, phosphor bronze, stainless steel, aluminium or aluminium alloy, corrosion resistant to uranium hexafluoride (UF₆) or hydrogen fluoride (HF) and having a capacity of 1,000 litres per minute or greater, C

including compressor
seals

B2

Specially designed or prepared equipment and components, for plant for the reprocessing of irradiated nuclear reactor fuel elements, the following—

(a) Fuel element chopping or shredding machines, ie remotely operated equipment to cut, chop, shred or shear irradiated nuclear reactor fuel assemblies, bundles or rods C

(b) Dissolvers (ie criticality safe tanks) specially designed or prepared for the dissolution of irradiated nuclear reactor fuel, which are capable of withstanding hot, highly corrosive liquids, and which can be remotely loaded and maintained C

(c) Counter-current solvent extractors and ion-exchange processing equipment, specially designed or prepared for use in a plant for the reprocessing of irradiated natural uranium, depleted uranium or special or other fissile materials C

(d) Process control instrumentation specially designed or prepared for monitoring or controlling the reprocessing of irradiated source or special or other fissile materials C

In this entry “plant for the reprocessing of irradiated nuclear reactor fuel elements” includes equipment and components which normally come into direct contact

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with and directly control the irradiated fuel and the major nuclear material and fission product processing streams.

Note 1: See also entry PL6016 in this Group.

Note 2: For process control equipment for Lithium, see entry PL6010 in this Group.

PL6016

Specially designed or prepared equipment and components, for plant for the reprocessing of irradiated nuclear reactor fuel elements, the following—

- (a) Holding or storage vessels resistant to the corrosive effects of nitric acid C
- (b) Systems for the conversion of plutonium nitrate to plutonium oxide C
- (c) Systems for the production of plutonium metal C

In this entry “plant for the reprocessing of irradiated nuclear reactor fuel elements” includes equipment and components which normally come into direct contact with and directly control the irradiated fuel and the major nuclear material and fission product processing streams.

B3

Nuclear reactors, ie reactors capable of operation so as to maintain a controlled, self-sustaining fission chain reaction, and equipment and components specially designed or prepared for use in connection with a nuclear reactor, the following—

- (a) Pressure vessels and metal vessels as complete units or as parts therefor, which are specially C

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designed or prepared to contain the core of a nuclear reactor and are capable of withstanding the operating pressure of the primary coolant, including the top plate for a reactor pressure vessel

(b) Fuel element handling equipment, including reactor fuel charging and discharging machines C

(c) Control rods specially designed or prepared for the control of the reaction rate in a nuclear reactor, the neutron absorbing part and the support or suspension structures therefor, and control rod guide tubes C

(d) Electronic controls for controlling the power levels in nuclear reactors, including reactor control rod drive mechanisms and radiation detection and measuring instruments to determine neutron flux levels C

(e) Pressure tubes specially designed or prepared to contain fuel elements and the primary coolant in a nuclear reactor at an operating pressure in excess of 50 bars (atmospheres) C

(f) Coolant pumps specially designed or prepared for circulating the primary coolant of nuclear reactors C

(g) Internals specially designed or prepared for the operation of a nuclear reactor, including but not C

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limited to core support structures, thermal shields, baffles, core grid plates and diffuser plates

(h) Heat exchangers C

In this entry a “nuclear reactor” means the items within or attached directly to the reactor vessel, the equipment which controls the level of power in the core, and the components which normally contain, come into direct contact with or control the primary coolant of the reactor core.

B4 Plant specially designed for the fabrication of nuclear reactor fuel elements and specially designed equipment therefor C

Note: A plant for the fabrication of nuclear reactor fuel elements includes equipment which (1) normally comes into direct contact with or directly processes or controls the production flow of nuclear materials, (2) seals the nuclear material within the cladding, (3) checks the integrity of the cladding or the seal, or (4) checks the finish treatment of the solid fuel.

B5 Plant for the production of heavy water, deuterium or deuterium compounds, and specially designed or prepared equipment and components therefor, the following—

(a) Plant for the production of heavy water, deuterium or deuterium compounds, the following—

(1) Hydrogen sulphide-water exchange plant C

(2) Ammonia-hydrogen exchange plant C

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(3) Hydrogen distillation plant C

(b) Equipment and components, the following: designed for–

(1) Hydrogen sulphide-water exchange process–

(A) Tray exchange towers C

(B) Hydrogen sulphide gas compressors C

(2) Ammonia-hydrogen exchange process–

(A) High-pressure ammonia-hydrogen exchange towers C

(B) High-efficiency stage contactors C

(C) Submersible stage recirculation pumps C

(D) Ammonia crackers designed for pressures of more than 3 MPa (30 bar) C

(3) Hydrogen distillation process–

(A) Hydrogen cryogenic distillation towers and cold boxes designed for operation below 35 K C

(B) Turboexpanders or turboexpander-compressor sets designed for operation below 35 K C

(4) Heavy water concentration process to reactor grade level (99.75% deuterium oxide)–

(A) Water distillation towers containing specially designed packings C

(B) Ammonia distillation towers containing C

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	<p>specially designed packings</p> <p>(C) Catalytic burners for conversion of fully enriched deuterium to heavy water C</p> <p>(D) Infrared absorption analysers capable of on-line hydrogen-deuterium ratio analysis where deuterium concentrations are equal to or more than 90% C</p>
B6	<p>Plant for the production of uranium hexafluoride (UF⁶) and specially designed or prepared equipment and components therefor, the following—</p> <p>(a) Plant for the production of UF⁶ C</p> <p>(b) Equipment and components specially designed or prepared for UF⁶ production, the following—</p> <p>(1) Fluorination and hydrofluorination screw and fluid bed reactors and flame towers C</p> <p>(2) Distillation equipment for the purification of UF⁶ C</p>
PL6015	<p>Equipment for the handling or processing of UF⁶, and specially designed components therefor made from or lined with UF⁶ resistant materials, the following—</p> <p>(a) Feed autoclaves for passing UF⁶ to gaseous diffusion or centrifuge cascades C</p> <p>(b) Desublimers or cold traps used to remove UF⁶ C</p>

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	from gaseous diffusion or centrifuge cascade	
	(c) Product and tails stations for trapping and transferring UF ⁶ into containers	C
	(d) Liquefaction stations where UF ⁶ gas is compressed and cooled to form liquid UF ⁶	C
	(e) Piping systems and header systems for handling UF ⁶ within gaseous diffusion or centrifuge cascades	C
	(f) Vacuum manifolds, vacuum headers and vacuum pumps having a suction capacity of 5 m ³ /minute or more	C
C1	Neutron generator systems, including tubes, designed for operation without an external vacuum system and utilizing electrostatic acceleration to induce a tritium-deuterium nuclear reaction	C
C2	Power generating or propulsion equipment specially designed or adapted for use with military, space, marine or mobile nuclear reactors	C
C3	Electrolytic cells for the production of fluorine with a production capacity greater than 250 g of fluorine per hour	C
C4	Equipment specially designed or prepared for the separation of isotopes of lithium, the following—	
	(a) Packed liquid-liquid exchange columns specially designed for lithium amalgams	C
	(b) Amalgam pumps	C

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	(c) Amalgam electrolysis cells	C
	(d) Evaporators for concentrated lithium hydroxide solution	C
C5	Equipment specially designed for the production or recovery of tritium	C
C6	Frequency changers (converters or inverters) specially designed or prepared to supply motor stators for gas centrifuge enrichment, having all the following characteristics, and specially designed components therefor	C
	(a) A multi-phase electrical output of between 600 to 2,000 Hz;	
	(b) Frequency control better than 0.1%;	
	(c) Harmonic distortion of less than 2%;	
	(d) An efficiency greater than 80%.	
PL6007	Equipment specially designed for the manufacture or assembly of gas centrifuges capable of the enrichment or separation of isotopes, and specially designed parts, components and equipment therefor (For gas centrifuge plant, see entry B1, plant for separation of isotopes, in this Group.)	C
PL6008	Mass spectrometers and mass spectrometer sources designed for measuring the isotopic composition of uranium hexafluoride (UF ⁶) gas, uranium and uranyl compounds	C
PL6009	Pressure gauges capable of measuring pressures to 100 Torr (13332.2 N/m ²) or less having sensing elements of	C

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- titanium alloys and superalloys–
 - (i) surface preparation D
 - (ii) strain rate D
 - (iii) temperature D
 - (iv) pressure D
- (3) diffusion bonding of superalloys and titanium alloys–
 - (i) surface preparation D
 - (ii) temperature D
 - (iii) pressure D
- (4) direct-acting hydraulic pressing of aluminium alloys, and titanium alloys–
 - (i) pressure D
 - (ii) cycle time D
- (5) hot isostatic densification of titanium alloys, aluminium alloys and superalloys–
 - (i) temperature D
 - (ii) pressure D
 - (iii) cycle time D

In this entry–

- (a) “hot die forging” means a deformation process where die temperatures are at the same nominal temperature as the workpiece and exceed 850 K (577°C);
- (b) “superplastic forming” means a deformation process using heat for metals that are normally characterised by low values of elongation (less than 20%) at the breaking point as determined at room temperature by

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conventional tensile strength-testing, in order to achieve elongations during processing which are at least 2 times those values;

(c) “diffusion bonding” means a solid-state molecular joining of at least two separate metals into a single piece with a joint strength equivalent to that of the weakest material;

(d) “direct-acting hydraulic pressing” means a deformation process which uses a fluid-filled flexible bladder in direct contact with the workpiece;

(e) “hot isostatic densification” means a process of pressurizing a casting at temperatures exceeding 375 K (102°C) in a closed cavity through various media (gas, liquid, solid particles, etc) to create equal force in all directions to reduce or eliminate internal voids in the casting;

PL7031

Production equipment for inert gas and vacuum atomising processes, specially designed components therefor and related technology, the following—

(a) Production equipment A designed or modified for inert gas and vacuum atomising processes to achieve sphericity and uniform size of particles in metal powders, whatever the type of metal and whether or not the powder is specified in this Schedule, and

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	specially designed components therefor	
	(b) Technology for inert gas and vacuum atomising processes to achieve sphericity and uniform size of particles in metal powders, whatever the type of metal and whether or not the powder is specified in this Schedule	B
PL7027	Flow forming machines and machines combining the functions of spin forming and flow forming, having both the following characteristics: and specially designed components and specially designed software therefor	A
	(a) specially designed or adapted for use with numerical or computer controls;	
	(b) having more than two axes which can be co-ordinated simultaneously for contouring control.	
IL1080	Specially designed equipment, tooling and fixtures and technology for the manufacture or measuring of gas turbine blades or vanes, the following: and specially designed components and accessories therefor and specially designed ODMA software for the equipment, components and accessories–	
	(1) Specially designed equipment, tooling, fixtures, components and accessories, the following–	
	(a) Blade or vane aerofoil or root automatic measuring equipment	C
	(b) Precision vacuum investment casting	C

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- equipment, including
core-making equipment
- (c) Small-hole drilling equipment for producing holes having depth more than four times their diameter and less than 0.76 mm (0.03 inch) in diameter C
- (d) Directional solidification casting equipment and directional recrystallization equipment C
- (e) Segmented cast blade or vane bonding equipment C
- (f) Integral blade-and-disc casting equipment C
- (g) Blade or vane coating equipment, except furnaces, molten-metal baths and ion-plating baths C
- (h) Ceramic blade or vane moulding and finishing machines C
- (i) Moulds, cores and tooling for the manufacture and finishing of—
- (1) cast hollow turbine blades or vanes C
- (2) turbine blades or vanes produced by powder compaction C
- (j) Composite metal turbine blade or vane moulding and finishing machines C
- (k) Inertial blade or vane welding machines C
- (l) Machinery and equipment for the manufacture of blades or vanes in the compressor C

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section of aircraft or aircraft-derived gas turbine engines where the technology is the same as for the manufacture of blades or vanes in the turbine section

(2) Technology (except installation, operation and maintenance technology) for use of the following equipment

(a) Blade or vane belt grinding machines D

(b) Blade or vane edge radiusing machines D

(c) Blade or vane aerofoil milling or grinding machines D

(d) Blade or vane blank performing machines D

(e) Blade or vane rolling machines D

(f) Blade or vane aerofoil shaping machines except metal removing types D

(g) Blade or vane root grinding machines D

(h) Blade or vane aerofoil scribing equipment D

(i) Machinery and equipment for the manufacture of blades or vanes in the compressor section of aircraft or aircraft-derived gas turbine engines where the technology is the same as for the manufacture of blades or vanes in the turbine section D

In this entry—

“manufacture” or “making” includes refurbishing.

IL1081

Specially designed or modified equipment, tools, dies, moulds and fixtures for the manufacture or inspection of aircraft, airframe structures or aircraft fasteners, the following: and specially designed components and accessories therefor and specially designed ODMA software for the equipment, components and accessories—

(a) Equipment, tools, dies, moulds or fixtures for:

(1) hydraulic stretch forming—

(i) whose machine motions or forces are digitally controlled or controlled by electrical analogue devices C

or

(ii) which are capable of thermal-conditioning the workpiece C

(2) the milling of aircraft skins or spars, except those which do not present an improvement on machinery in production ten years preceding the year of export C

(b) Tools, dies, moulds or fixtures for—

(1) diffusion bonding C

(2) superplastic forming C

(3) hot die forging C

(4) direct-acting hydraulic pressing of aluminium alloys and titanium alloys C

(5) the manufacture, inspection, inserting or securing of specially C

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designed high-strength
aircraft fasteners

The definitions in entry
IL1001 of the processes and
control of the metal working
manufacturing technologies
mentioned above, apply also
for the purposes of this entry.

IL1086

Specially designed or modified
equipment, tools, dies, moulds,
fixtures and gauges for the
manufacture or inspection of
aircraft and aircraft-derived
gas turbine engines, the
following: and specially
designed components and
accessories and specially
designed ODMA software for
the equipment, components
and accessories–

(a) Equipment, tools,
dies, moulds, fixtures and
gauges–

(1) for automated C
production inspection

(2) for automated C
welding

(b) Tools, dies, fixtures
and gauges–

(1) for solid-state joining C
by inertial welding or
thermal bonding

(2) for manufacture C
and inspection of high-
performance gas turbine
bearings

(3) for rolling specially C
configured rings such as
nacelle rings

(4) for forming and C
finishing turbine discs

(c) Compressor or C
turbine disc broaching
machines

This head includes only
broaching machines specially
designed for the manufacture

	of aircraft or aircraft-derived gas turbine engines and not general purpose broaching machines specially adapted for that purpose.	
IL1088	<p>Gear making or finishing machinery, the following–</p> <ul style="list-style-type: none">(a) Bevel gear making machinery, the following–<ul style="list-style-type: none">(1) gear grinding machinery (non-generating type) C(2) other machinery capable of the production of bevel gears of module finer than 0.5 mm (diametrical pitch finer than 48) and meeting a quality standard better than DIN 58405 Class 6 C(b) Machinery capable of producing gears in excess of AGMA quality level 13 or equivalent C <p>For the purposes of this entry DIN 3963 Class 4 shall be considered equivalent to AGMA quality level 13.</p>	
IL1091	<p>Numerical control units, numerically controlled machine tools, components, specially designed parts and sub-assemblies, software and technology, the following–</p> <ul style="list-style-type: none">(a) Numerical control units for machine tools, having any of the following characteristics, and specially designed ODMA software and specially designed components therefor–<ul style="list-style-type: none">(1) more than three interpolating axes can be co-ordinated simultaneously for contouring control W	

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(2) two or three interpolating axes can be co-ordinated simultaneously for contouring control and

(A) the smallest programmable increment, namely the input resolution, for any linear axis is less than 0.001 mm W

NOTE: In case of units with only two linear axes one of them may have a smallest programmable increment of less than 0.001 mm but not less than 0.0005 mm.

(B) interpolation of third order or higher is possible (e.g. spline or involute interpolation) W

(C) word size of more than 32 bit (excluding parity bits) W

(D) capable of real-time processing of data to modify, during the machining operation, tool path, feed rate and spindle data by either-

(a) automatic calculation and modification of part programme data for machining in two or more axes by means of measuring cycles and access to source data W

or

(b) adaptive control, with more than one physical variable measured and processing by means of a computing model (strategy) to change one or more machining instructions to optimize the process W

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(E) capable of receiving W
directly (on-line) and
processing computer
aided design (CAD) data
for internal preparation
of machine instructions

except–

numerical control units which
are either:

(a) modified for and
incorporated in machines
not specified in this
Schedule; or

(b) specially designed for
machines not specified in
this Schedule;

(b) Machine tools, for
removing, cutting or
spark eroding metals,
ceramics or composites,
the following–

(1) machine tools W
for turning which
have all the following
characteristics

(A) according to the
manufacturer's technical
specifications, can be
equipped with numerical
control units specified
in head (a) above, even
when not equipped with
such units at delivery;

(B) have two or more
axes which can be co-
ordinated simultaneously
for contouring control;

(C) have any of the
following–

(a) two or more
contouring rotary axes;

(b) run out (out-of-true
running) less (better)
than 0.0008 mm total
indicator reading (TIR);

(c) camming (axial
displacement) less

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(better) than 0.0008 mm total indicator reading (TIR); or

(d) the positioning accuracies, with all compensations available, are better than—

(1) overall positioning along any linear axis of—

(A) 0.006 mm for a total length of axis travel L equal to or shorter than 500 mm; or

(B) $(0.006 + 0.001 \times (L - 500)/500)$ mm if L is longer than 500 mm and shorter than 5,500 mm; or

(C) 0.016 mm if L is equal to or longer than 5,500 mm; or

(2) of any rotary axis, 0.001°;

(2) machine tools for milling which have all the following characteristics

(A) according to the manufacturer's technical specifications, can be equipped with numerical control units specified in head (a) above, even when not equipped with such units at delivery;

(B) have two or more axes which can be coordinated simultaneously for contouring control;

(C) have any of the following—

(a) two or more contouring rotary axes;

(b) one or more contouring tilting spindles;

W

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(c) run out (out-of-true running) less (better) than $2 \times D \times 10^{-5}$ mm total indicator reading (TIR) where D equals the diameter of the spindle in mm;

(d) the positioning accuracies, with all compensations available, are better than—

(1) overall positioning along any linear axis of—

(A) 0.006 mm, if none of the axes exceeds a total length of axis travel L of 650 mm;

(B) if the total length of axis travel L of any axis is longer than 650 mm, 0.008 mm or $(0.008 + 0.0015 \times (L - 500)/500)$ mm whichever is higher, for axes up to 5,500 mm of travel; or

(C) 0.023 mm for any axis the total length L of which is equal to or longer than 500 mm; or

(2) of any rotary axis, 0.0010 or

(e) a motor power of any spindle of more than 75 kW;

(3) machine tools for grinding which have all the following characteristics

(A) according to the manufacturer's technical specifications, can be equipped with numerical control units specified in head (a) above, even when not equipped with such units at delivery;

(B) have two or more axes which can be coordinated simultaneously for contouring control;

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(C) have any of the following—

(a) two or more contouring rotary axes;

(b) one or more contouring tilting spindles;

(c) run out (out-of-true running) less (better) than 0.0008 mm total indicator reading (TIR);
or

(d) the positioning accuracies, with all compensations available, are better than—

(1) overall positioning along any linear axis of—

(A) 0.004 mm, for a total length of axis travel L equal to or shorter than 300 mm;

(B) $(0.004 + 0.001 \times (L - 300)/300)$ mm if L is longer than 300 mm, and shorter than 3,300 mm; or

(C) 0.014 mm if L is equal to or longer than 3,300 mm; or

(2) of any rotary axis, 0.001°;

except—
tool or cutter grinding machines having all the following characteristics—

(a) no more than four axes can be co-ordinated simultaneously for contouring control;

(b) no more than two rotary axes can be co-ordinated simultaneously for contouring control;

(c) run out (out-of-true running) more (worse) than 0.0008 mm total indicator reading (TIR);

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(d) the positioning accuracies, with all compensations available, are not better than:

(1) overall positioning along any linear axis of 0.004 mm; or

(2) of any rotary axis, 0.001°; and

(e) a maximum slide travel along any axis of less than 200 mm;

(4) electrical discharge machines (EDM) of the wire feed type which have five or more contouring axes and which can be equipped with one of the following—

(A) numerical control units specified in head (a) above even when not equipped with such units at delivery W

(B) electronic controllers specified in head (b) in entry IL1391 inGroup 3D W

(5) electrical discharge machines (EDM) of the non-wire type which have two or more contouring rotary axes and which can be equipped with one of the following—

(A) numerical control units specified in head (a) above even when not equipped with such units at delivery W

(B) electronic controllers specified in head (b) in entry IL1391 inGroup 3D W

(6) machine tools for removing metals, ceramics or composites, W

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having all the following characteristics

(A) acting by means of—

(a) water or other liquid jets, whether or not employing abrasive additives;

(b) electron beam; or

(c) laser beam; and

(B) according to the manufacturer's technical specifications, can be equipped with numerical control units specified in head (a) above, even when they are not equipped with such units at delivery; and

(C) having two or more rotary axes which—

(a) can be co-ordinated simultaneously for contouring control; and

(b) have a positioning accuracy of better than 0.01°;

(c) Technology for—

(1) the development of numerical control units for machine tools specified in head (a) above D,I,L,Y

(2) the production of numerical control units which have either of the following characteristics:

(A) specified in head (a) above D,I,L,Y

(B) containing a microprocessor with both of the following D,I,L,Y

(a) a word length of 32 bit; and

(b) a bus architecture of 32 bit;

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(3) the development of numerically controlled machine tools for removing, cutting or spark eroding metals, ceramics or composites specified in head (b) above D,I,L,Y

(4) the production of numerically controlled machine tools which have either of the following characteristics—

(A) specified in head (b) above D,I,L,Y

(B) a positioning accuracy along any linear axis of better than 0.02 mm D,I,L,Y

(5) the development of components specified in head (d) or (e) below D,I,L,Y

(6) the production of components or sub-assemblies, which have either of the following characteristics—

(A) specified in head (d) or sub-head (e)(2) below D,I,L,Y

(B) not specified in sub-head (d)(2) or (d)(3) below D,I,L,Y

(7) the development of interactive graphics as an integrated part in numerical control units for preparation or modification of part programmes D,I,L,Y

(8) the development of generators of machine tool instructions (eg part programmes) from design data residing inside numerical control units D,I,L,Y

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(9) the incorporation of expert systems for advanced decision support of shop floor operations D,I,L,Y

(10) the development of flexible manufacturing units used with the software specified in sub-head (b)(5)(E) in entry IL1566 in Group 3G D,I,L,Y

(d) Components and specially designed parts for machine tools specified in head (b) above, the following—

(1) spindle assemblies, consisting of spindles and bearings as a minimal assembly, with run-out (out-of-true running) less than—

(A) 0.0008mm total indicator reading (TIR) for machine tools for turning or grinding W

(B) $2 \times D \times 10^{-5}$ mm total indicator reading (TIR), where D equals the diameter of the spindle in mm, for machine tools for milling W

(2) linear position feedback units (eg inductive type devices, graduated scales, laser or infrared systems) having, with compensation, an overall accuracy better than $\pm (0.0015 + L \times 10^{-6})$ mm, where L equals the effective length in mm of the linear measurement W

(3) rotary position feedback units (eg inductive type devices, graduated scales, laser or infrared systems) having, W

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with compensation, an accuracy better than $\pm 0.00025^\circ$

(4) slide way assemblies consisting of a minimal assembly of ways, bed and slide with all of the following characteristics W

(A) a yaw, pitch or roll of less than 2 seconds of arc, total indicator reading (TIR);

(B) a horizontal straightness of less than 0.004mm; and

(C) a vertical straightness of less than 0.004mm;

(5) ball screws, having all of the following characteristics W

(A) a sum of tolerance of mean travel deviation (e) and half the travel variation (Vu) less than $(0.0025 + 5 \times 10^{-6} \times L)$ mm, where L is the useful travel in mm of the ball screw;

(B) a tolerance of travel variation (V300) within 300mm travel of the ball screw less than 0.004mm; and

(C) a run-out (out-of-true running) of the journal diameter related to the screw shaft outer diameter less than 0.005mm total indicator reading (TIR), at an axial distance of 3 or more times the screw shaft outer diameter from the end of the journal;

(6) single point diamond cutting tool inserts having all of the following characteristics W

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(A) a flawless and chip-free cutting edge when magnified 400 times in any direction;

(B) a cutting radius out-of-roundness less than 0.002mm total indicator reading (TIR); and

(C) a cutting radius between 0.1 and 5.0mm;

(7) linear induction motors used as drives for slides having all the following characteristics

W

(A) a stroke longer than 200mm for linear slides;

(B) a nominal force rating above 45 N; and

(C) a minimal controlled incremental movement less than 0.001mm for linear motion;

(e) Specially designed components or sub-assemblies, capable of upgrading, according to the manufacturer's specifications, numerical control units, machine tools or feed-back devices to or above the levels specified in head (a) or (b), or in sub-head (d)(2) or (d)(3) above, the following–

(1) printed circuit boards with mounted components and softwaretherefor

W

(2) compound rotary tables

W

In this entry–

“accuracy”, usually measured in terms of inaccuracy, means the maximum deviation, positive or negative, of

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an indicated value from an accepted standard or true value;

“adaptive control” means (cont.) a control system that adjusts the response from conditions detected during the operation;

“camming” (axial displacement) means axial displacement in one revolution of the main spindle measured in a plane perpendicular to the spindle faceplate, at a point next to the circumference of the spindle faceplate;

“compound rotary table” means a table allowing the workpiece to rotate and tilt about two non-parallel axes, which can be co-ordinated simultaneously for contouring control;

“contouring control” means two or more numerically controlled motions operating in accordance with instructions that specify the next required position and the required feed rates to that position. These feed rates are varied in relation to each other so that a desired contour is generated;

“numerical control” means the automatic control of a process performed by a device that makes use of numeric data usually introduced as the operation is in progress;

“positioning accuracy” of numerically controlled machine tools is to be

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determined and presented in accordance with ISO/DIS 230/2, paragraph 2.13, in conjunction with the requirements below:

(a) test conditions:—

(1) for 12 hours before and during measurements, the machine tools and accuracy measuring equipment will be kept at the same ambient temperature. During the premeasurement time the slides of the machine will be continuously cycled in the same manner that the accuracy measurements will be taken;

(2) the machine shall be equipped with any mechanical, electronic, or software compensation to be exported with the machine;

(3) accuracy of measuring equipment for the measurements shall be at least 4 times more accurate than the expected machine tool accuracy;

(4) power supply for slide drives shall be the following:—

(A) line voltage variation shall not be greater than ± 10 per cent of nominal rated voltage;

(B) frequency variation shall not be greater than ± 2 Hz of normal frequency;

(C) lineouts or interrupted service are not permitted.

(b) test programme:—

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(1) feed rate (velocity of slides) during measurement shall be the rapid traverse rate; NOTE: In case of machine tools which generate optical quality surfaces, the feed rate shall be equal to or less than 50mm per minute;

(2) measurements shall be made in an incremental manner from one limit of the axis travel to the other without returning to the starting position for each move to the target position;

(3) axes not being measured shall be retained at mid travel during test of an axis.

(c) presentation of test results:–

the results of the measurements must include:–

(1) position accuracy (A); and

(2) the mean reversal error (B);

“run out” (out-of-true running) means radial displacement in one revolution of the main spindle measured in a plane perpendicular to the spindle axis at a point on the external or internal revolving surface to be tested;

“tilting spindle” means a tool holding spindle which alters, during the machining process, the angular position of its centre line with respect to any other axis.

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“machine tools for removing, cutting or spark eroding metal, ceramics or composites” are the following:

(a) machine tools for turning, including–

(1) horizontal turning machines;

(2) vertical turning machines;

(3) turning centres, with or without milling or grinding options;

(4) machines for generating optical quality surfaces;

(b) machine tools for milling, including–

(1) boring machines;

(2) boring-milling machines;

(3) milling machines;

(4) machining centres, with or without turning or grinding options;

(5) machine tools for routing;

(c) machine tools for grinding, with or without milling or turning options, including–

(1) jig grinding machines;

(2) contour grinding machines;

(3) tool and cutter grinding machines;

(d) machine tools using electric discharge for machining;

(e) other machines tools, as follows:

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(1) water and other liquid jet machines;

(2) electron beam cutting machines; or

(3) ser cutting machines.

Any term used in this entry shall bear the meaning it has in entry IL1565 and entry IL1566 in Group 3G.

PL7005

Machines, internal grinding, (except hand-held drills) of the kind incorporating, or specially designed for the utilisation of, grinding heads designed or rated for operation at speeds in excess of 120,000 revolutions per minute

W

IL1099

Dimensional inspection systems or devices, the following: and specially designed components and specially designed ODMA software therefor—

(a) Manual dimensional inspection machines with two or more axes, and having a measurement uncertainty equal to or less (better) than $(0.25 + L/1000)$ micrometre in any axis (L is measured length in mm)

C

except optical comparators.

(b) Computer controlled or numerically controlled dimensional inspection machines having both of the following characteristics

C

(1) two or more axes;

(2) a one dimensional (1D) length measurement uncertainty equal to or less (better) than $(1.5 + L/1000)$ micrometre tested with a probe of an accuracy of less (better)

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than 0.2 micrometre (L is measured length in mm);

(c) Linear angular displacement measuring devices, the following—

(1) linear measuring instruments having any of the following characteristics—

(A) non-contact type measuring systems with a resolution equal to or less than 0.2 micrometre within a measuring range up to 0.2mm C

(B) linear voltage differential transformer systems having both of the following characteristics C

(a) linearity equal to or less (better) than 0.1% within a measuring range up to and including 5mm; and

(b) drift equal to or less (better) than 0.1% per day at a standard ambient test room temperature \pm 1K; or

(C) measuring systems having both the following characteristics C

(a) contain a laser;

(b) maintain for at least 12 hours, over a temperature range of \pm 1K around a standard temperature and at a standard pressure—

(1) a resolution over their full scale of \pm 0.1 micrometre or better; and

(2) a measurement uncertainty equal to or less (better) than $(0.2 +$

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L/2000) micrometre (L is measured length in mm);

(2) angular measuring instruments having an angular position deviation equal to or less (better) than 0.00025° C

except—

optical instruments, such as autocollimators, using collimated light to detect angular displacement of a mirror;

(d) Systems for simultaneous linear-angular inspection of hemishells, having both of the following characteristics C

(1) measurement uncertainty along any linear axis equal to or less (better) than 3.5micrometre per 5mm;

(2) angular position deviation equal to or less (better) than 0.02°

NOTE:

Specially designed ODMA software for the systems described in this head includes software for simultaneous measurement of wall thickness and contour.

In this entry—

“angular position deviation” means the maximum difference between angular position and the actual, very accurately measured angular position, after the workpiece mount of the table has been turned out of its initial position;

“linearity” (usually measures in terms of

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non-linearity) means the maximum deviation of the actual characteristic (average of upscale and downscale readings), positive or negative, from a straight line so positioned as to equalise and minimise the maximum deviations;

“measurement uncertainty” means the characteristic parameter which specifies in what range about the output value the correct value of the measurable variable lies with a confidence level of 95%. It includes the uncorrected systematic deviations, the uncorrected backlash and the random deviations;

“resolution” means the least increment of a measuring device; on digital instruments, the least significant bit.

GROUP 3B

Chemical and Petroleum Equipment

IL1131	Pumps (except vacuum pumps) C designed to move molten metals by electro-magnetic forces
PL7029	Equipment for the production and handling of goods specified in PL7028, specially designed components therefor and related technology, the following: <ul style="list-style-type: none"> (a) Equipment, A excluding mixers, for the production, handling and acceptance testing of goods specified in PL7028, and specially

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	designed components therefor	
	(b) Technology for the production of goods specified in PL7028	B
PL7030	Mixers designed for propellants specified in PL5009 or PL7028, having all the following characteristics: and specially designed components therefor	A
	(a) with provision for mixing under vacuum in the range zero to 13.326 kPa with temperature control capability of the mixing chamber;	
	(b) having either of the following characteristics;	
	(i) having explosion proof electric or hydraulic motor;	
	(ii) having an emergency system to open the system to atmosphere in the case of fire in the mixing chamber; and	
	(c) being either of the following types:	
	(i) batch mixers having a total volumetric capacity of 110 litres or more, or	
	(ii) continuous mixers.	

GROUP 3C

Electrical and Power-Generating Equipment

IL1205	Electro-chemical, semiconductor and radioactive devices for the direct conversion of chemical, solar or nuclear energy to electrical energy, the following—	
	(a) Electro-chemical devices, the following:	

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and specially designed components therefor–

(1) fuel cells operating at temperatures of 523 K (250°C) or less, including regenerative cells, ie cells for generating electric power, to which all the consumable components are supplied from outside the cell C

Note: the temperature of 523 K or less refers to the fuel cell and not to the fuel conditioning equipment, which may be either an ancillary or an integral part of the fuel cell battery and which may operate at over 523 K.

(2) primary cells (non-rechargeable) and batteries, having any of the following characteristics–

(i) reserve (water, electrolyte or thermally activated) batteries possessing a means of activation and having a rated unactivated storage life of three years or more at an ambient temperature of 297 K (24°C)

(ii) utilizing lithium or calcium (including alloys in which lithium or calcium are constituents) as electrodes and having an energy density at a discharge current equal to C/24 hours (C being the nominal capacity at 297 K (24°C) in ampere-hours) of more than 300 watt-hours per kilogramme at 297 C

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K (24°C) and more than 100 watt-hours per kilogramme at 244 K (−29°)

Note: Energy density is obtained by multiplying the average power in watts (average voltage in volts times average current in amperes) by the duration of the discharge in hours to 80% of the open-circuit voltage and dividing by the total mass of the cell (or battery) in kilogrammes;

(iii) using an air electrode C together with either lithium or aluminium counter-electrodes and having a power output of 5 kilowatts or more or an energy output of 5 kilowatt-hours or more

(3) secondary (rechargeable) cells and batteries having either of the following characteristics after more than 20 charge/discharge cycles at a discharge current equal to C/5 hours (C being the nominal capacity in ampere-hours)–

(i) utilizing nickel C and hydrogen as the active constituents and having an energy density of 55 watt hours per kilogramme or more at 297 K (24°C)

(ii) utilizing lithium or C sodium as electrodes or reactants and having an energy density of 55 watt-hours per kilogramme or more

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at the rated operating temperature

Note: Energy density is obtained by multiplying the average power in watts (average voltage in volts times average current in amperes) by the duration of the discharge in hours to 75% of the open-circuit voltage and divided by the total mass of the cell (or battery) in kilogrammes;

(4) molten salt electrolyte cells and batteries which normally operate at temperatures of 773 K (500°C) or below C

(b) Photo-voltaic cells, the following: and specially designed components therefor–

(1) cells with a power output of 140 W or more per sq m under 1 kW per sq m tungsten 2,800 K (2,527°C) illumination C

(2) all gallium arsenide photo-voltaic cells including those having a power output of less than 40 W per sq m measured using the technique in sub-head (1) to this head C

(3) cells with a power output of 4.5 kW or more per sq m under 100 kW per sq m silicon carbide at 1,750 K(1,477°C) illumination C

(4) electromagnetic cells (including laser) and ionized particle radiation resistant cells C

(c) Power sources based on radio-active materials C

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systems other than
nuclear reactors

except—

(i) those having an output power of less than 0.5 W and a total weight (force) of more than 890 N (90.7 kg);

(ii) those specially designed and developed for medical use within the human body.

There are excluded from this entry cells and power source devices, the following: and specially designed components therefor—

(a) fuel cells specified in sub-head (a)(1) above, provided they are not space qualified, with a maximum output power more than 10 kilowatts and which use gaseous pure hydrogen and oxygen/air reactants, alkaline electrolyte and a catalyst supported by carbon either pressed on a metal mesh electrode or attached to a conducting porous plastic;

(b) lithium primary (non-rechargeable) cells or batteries specified in sub-head (a)(2)(ii) which:

(1) are specially designed for consumer applications; or

(2) are specially designed for civil applications and have a nominal capacity less than or equal to 35 ampere-hours and discharge current of less than $C/10$ hours (C as defined for the purpose of sub-head (a)(2)(ii)).

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(c) lithium secondary (rechargeable) cells and batteries specified in sub-head (a)(3)(ii) above which:

(1) are specially designed for consumer applications;

(2) have a nominal capacity less than or equal to 0.5 ampere-hour and an energy density of less than 40 watt-hours per kilogramme at 273 K (0°C) and a discharge current of less than C/10 hours (C as defined for the purpose of sub-head (a)(3));

(d) sodium secondary (rechargeable) cells and batteries specified in sub-head (a)(3)(ii) above which are specially designed for consumer or civil industrial applications and which are not space qualified.

In this entry “space qualified” refers to products which are stated by the manufacturer as designed and tested to meet the special electrical, mechanical or environmental requirements for use in rockets, satellites or high-altitude flight systems operating at altitudes of 100 km or more.

GROUP 3D

General Industrial Equipment

IL1310	Systems and components specially designed for producing metal alloys, metal alloy powder or alloyed materials specified in entry IL1610 in Group 3H	C
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PL7019

Vacuum or controlled environment (inert gas) induction furnaces having either uncooled or gas cooled induction coils 300 mm or less in diameter and capable of operating above 850°C

L,I,S,Y

IL1312

Isostatic presses, the following: and specially designed dies, moulds, components, accessories and controls and specially designed ODMA software therefor–

(a) Those having a controlled thermal environment within the closed cavity and possessing an inside chamber dimension of 127 mm or more C

(b) Those having any of the following characteristics:

(1) Maximum working pressure exceeding 207 MPa C

(2) A maximum inside chamber dimension exceeding 406 mm, when the controlled thermal environment which can be achieved and maintained exceeds 1,773 K (1,500°C) C

or

(3) Having a facility for hydrocarbon impregnation and removal of resultant gaseous degradation products C

In this entry “isostatic presses” are equipment capable of pressurising a closed cavity through various media (gas, liquid, solid particles, etc) to create equal pressure in all

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directions within the cavity upon a workpiece or material.

The “inside chamber dimension” is the internal dimension of the chamber in which both the working temperature and the working pressure are achieved and does not include fixtures. That dimension is the smaller of either the inside diameter of the pressure chamber or the inside diameter of the insulated furnace chamber.

PL7032

Isostatic presses having all of the following characteristics: and specially designed dies, moulds, components, accessories, controls and software therefor

A

(a) a maximum working pressure of 69 MPa or greater;

(b) designed to achieve and maintain a controlled thermal environment of 873K (600°C) or greater; and

(c) possessing an inside chamber dimension of 254 mm or greater.

In this entry “isostatic presses” are equipment capable of pressurising a closed cavity through various media (gas, liquid, solid particles, etc) to create equal pressure in all directions within the cavity upon a workpiece or material.

The “inside chamber dimension” is the internal dimension of the chamber in which both the working temperature and the working pressure are achieved and does not include fixtures. That dimension will be the smaller of either the inside diameter of the pressure chamber or the

- inside diameter of the insulated furnace chamber.
- IL1353 Manufacturing and testing equipment for optical fibre, optical cable and other cables, the following: and specially designed components and specially designed ODMA software therefor–
- (a) Equipment specially designed to manufacture cable specified in head (a) or (d) of entry IL1526 in Group 3F C
 - (b) Equipment specially designed to manufacture optical fibre specified in entry IL1526 in Group 3F C
 - (c) Equipment specially designed to manufacture optical fibre preforms specified in entry IL1767 in Group 3I C
 - (d) Optical fibre and optical fibre preform characterisation equipment using semiconductor lasers for the testing of optical fibres or optical fibre preforms at operating wavelengths exceeding 1,000 nm C
- IL1355 Equipment for the manufacture or testing of electronic components and materials, the following: and specially designed components and accessories and specially designed ODMA software therefor–
- (a) Equipment specially designed for the manufacture or testing of electron tubes or optical elements specified in entry IL1555, IL1556 or IL1558 in Group 3F, C

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and specially designed components therefor

(b) Equipment which is specially designed for the manufacture or testing of semiconductor devices, integrated circuits and assemblies, systems which incorporate or have the characteristics of such equipment and equipment which is used or capable of being modified for use in the manufacture or testing of imaging devices, electro-optical devices and acoustic wave devices (except quartz furnace tubes, furnace liners, paddles, boats other than specially designed caged boats, bubblers, cassettes and crucibles specially designed for the equipment specified in this head), the following—

(1) Equipment for the processing of materials for the manufacture of electronic components and materials, the following—

(a) Equipment for producing polycrystalline silicon specified in head (f) to entry IL1757 of Group 3I C

(b) Equipment specially designed for purifying or processing III/V and II/VI semiconductor materials specified in entry IL1757 of Group 3I, except crystal pullers C

(c) Crystal pullers and furnaces, the following—

(1) Annealing or recrystallising equipment other than constant C

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temperature furnaces
employing high rates of
energy transfer capable
of processing wafers at
a rate exceeding 5,000
mm² /min

(2) Stored programme
controlled crystal
pullers having any
of the following
characteristics–

(A) Rechargeable C
without replacing the
crucible container

(B) Capable of operation C
at pressures above 250
kPa

or

(C) Capable of pulling C
crystals of a diameter
exceeding 100 mm
diffusion and oxidation
furnaces.

except–

(d) Stored programme
controlled equipment for
epitaxial growth having
any of the following
characteristics–

(1) Capable of producing C
a layer thickness
uniformity across the
wafer of equal to or
better than ±3.5%

(2) Rotation of individual C
wafers during processing

or

(3) Metallo-organic C
chemical vapour
deposition (MOCVD)
reactors

(e) Molecular beam C
epitaxial growth
equipment

(f) Magnetically C
enhanced sputtering

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equipment with specially designed integral load locks capable of transferring wafers in an isolated vacuum environment

(g) Equipment specially designed for ion implantation, ion-enhanced or photo-enhanced diffusion, having any of the following characteristics—

- (1) Patterning capability C
- (2) Accelerating voltage for more than 200 keV C

or

- (3) Capable of high energy oxygen implant into a heated substrate C

(h) Stored programme controlled equipment for the selective removal (etching) by means of anisotropic dry methods (eg plasma), the following—

- (1) Batch types having either of the following characteristics—
 - (A) End-point detection, other than optical emission spectroscopy types C

or

- (B) Reactor operational (etching) pressure of 26.66 Pa or less C

(2) Single wafer types having any of the following characteristics—

- (A) End-point detection, other than optical emission spectroscopy types C

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(B) Reactor operational (etching) pressure of 26.66 Pa or less C

or

(C) Cassette-to-cassette and load locks wafer handling C

(i) Chemical vapour deposition (CVD) equipment, eg plasma-enhanced CVD (PECVD) or photo-enhanced CVD, for semiconductor device manufacturing, having either of the following capabilities, for deposition of oxides, nitrides, metals or polysilicon–

(1) Chemical vapour deposition equipment operating below 105 Pa C

or

(2) PECVD equipment operating either below 60 Pa or having automatic cassette-to-cassette and load lock wafer handling C

except–
low pressure chemical vapour deposition (LPCVD) systems or reactive sputtering equipment.

(j) Electron beam systems specially designed or modified for mask making or semiconductor device processing, having any of the following characteristics–

(1) Electrostatic beam deflection C

(2) Shaped, non-Gaussian beam profile C

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- (3) Digital-to-analogue conversion rate exceeding 3 MHz C
- (4) Digital-to-analogue conversion accuracy exceeding 12 bit C
- or C
- (5) Target-to-beam position feedback control precision of 1 micrometre or finer
- except—
electron beam deposition systems or general purpose scanning electron microscopes.
- (k) Surface finishing equipment for the processing of semiconductor wafers, the following—
- (1) Specially designed equipment for backside processing of wafers thinner than 100 micrometre and the subsequent separation thereof C
- (2) Specially designed equipment for achieving a surface roughness of the active surface of a processed wafer with a two-sigma value of 2 micrometre or less, total indicator reading (TIR) C
- except—
single-side lapping and polishing equipment for wafer surface finishing.
- (l) Interconnection equipment which is specially designed to permit the integration of any equipment specified in this entry into a complete system, and common single C

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or multiple vacuum chambers

(m) Stored programme controlled equipment using lasers for the repair or trimming of monolithic integrated circuits, when such equipment has either of the following characteristics—

(1) A positioning accuracy less than ± 1 micrometre C

or C
(2) A spot size (kerf width) less than 3 micrometre

(2) Masks, mask substrates, mask-making equipment and image transfer equipment for the manufacture of electronic devices or components, the following—

(a) Finished masks and reticles, and designs therefor C

except—

(1) Finished masks or reticles, for the production of integrated circuits not specified in Part II of this Schedule;

(2) Masks or reticles, having both of the following characteristics—

(A) Their design is based on geometries of 2.5 micrometre or more; and

(B) The design does not include special features to alter the intended use by means of production equipment or software.

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(b) Mask substrates, the following—

(1) Hard surface (eg chromium, silicon, molybdenum) coated substrates (eg glass, quartz, sapphire) for the preparation of masks having dimensions exceeding 125 mm × 125 mm; C

(2) Substrates specially designed for X-ray masks C

(c) Equipment specially designed for computer aided design (CAD) of semiconductor devices or integrated circuits C

except—

general purpose computers which are not specially designed for computer aided design of semiconductor devices or integrated circuits.

(d) Equipment for mask or reticle fabrication, the following—

(1) Photo-optical step and repeat cameras capable of producing arrays larger than 100 mm × 100 mm, or capable of producing a single exposure larger than 6 mm × 6 mm in the image (ie focal) plane, or capable of producing line widths of less than 2.5 micrometre in the photoresist on the substrate C

(2) Mask or reticle fabrication equipment using ion or laser beam lithography capable of producing line widths of less than 2.5 micrometre C

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(3) Equipment for altering masks or reticles or adding pellicles to remove defects C

except—

(i) mask fabrication equipment using photo-optical methods, which was commercially available before 1st January 1980:

(ii) mask fabrication equipment using photo-optical methods, which has a performance level no better than equipment referred to in exception (i) above.

(e) Stored programme controlled equipment for the inspection of masks, reticles or pellicles with both of the following characteristics C

(1) A resolution of 250 nanometre or finer; and

(2) A precision of 750 nanometre or finer over a distance in one or two co-ordinates of 63.5 mm or more.

except—

general purpose scanning electron microscopes except when specially designed and instrumented for automatic pattern inspection.

(f) Align and expose equipment for wafer production using photo-optical methods, including both projection image transfer equipment and step and repeat equipment, capable of performing any of the following functions—

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(1) Production of a pattern size of less than 2.5 micrometre C

(2) Alignment with a precision finer than ± 250 nanometre(3 sigma) C

(3) Machine-to-machine overlay no better than ± 300 nanometre C

except—
photo-optical contact and proximity mask align and expose equipment and contact image transfer equipment.

(g) Electron beam, ion beam or X-ray equipment for projection image transfer capable of producing patterns less than 2.5 micrometre C

(h) Equipment using lasers for direct write on wafers capable of producing patterns less than 2.5 micrometre C

(3) Stored programme controlled inspection equipment using optical image acquisition techniques for pattern comparison for the automatic detection of defects, errors or contaminants of 600 nanometre or less in or on processed wafers or substrates C

except—

(i) equipment for printed circuit boards or chips;

(ii) general purpose scanning electron microscopes, other than those specially designed and instrumented for automatic pattern inspection.

(4) Specially designed stored programme controlled measuring and analysis equipment, the following—

(a) Equipment for the measurement of oxygen or carbon content in semiconductor materials C

(b) Equipment for line width measurement with a resolution of 1 micrometre or finer C

(c) Flatness measurement instruments capable of measuring deviations from flatness of 10 micrometre or less with a resolution of 1 micrometre or finer C

(5) Equipment for the assembly of integrated circuits, the following—

(a) Stored programme controlled die bonders having all of the following characteristics— C

(1) Specially designed for hybrid integrated circuits;

(2) X-Y stage positioning travel exceeding 37.5×37.5 mm;

(3) Placement accuracy in the X-Y plane of finer than ± 10 micrometre.

(b) Stored programme controlled equipment for producing multiple bonds in a single operation (eg beam lead bonders, chip carrier bonders, tape bonders) C

(c) Semi-automatic or automatic hot cap sealers, in which the cap is heated locally to a C

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higher temperature than the body of the package, specially designed for ceramic microcircuit packages specified in head (b) to entry IL1564 in Group 3F and which have a throughput equal to or more than one package per minute

except—
general purpose
resistance type spot
welders.

(6) Stored programme controlled wafer probing equipment having any of the following characteristics—

(A) Positioning accuracy C
finer than 2.5 micrometre

(B) Capable of testing C
devices having more than
68 terminals

or C
(C) Capable of testing at
a frequency exceeding 1
GHz

(7) Test equipment, the following—

(A) Stored programme C
controlled equipment
specially designed
for testing discrete
semiconductor devices
(including photocells
and solar cells) and
unencapsulated dice,
capable of testing at
frequencies over 18 GHz

(B) Stored programme
controlled equipment
specially designed for
testing integrated circuits
and assemblies thereof,
capable of functional
testing—

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(a) At a pattern rate exceeding 20 MHz C

or

(b) At a pattern rate exceeding 10 MHz but not exceeding 20 MHz and capable of testing packages of more than 68 terminals C

except the following—

1. equipment specially designed for testing integrated circuits not specified in entry IL1564 in Group 3F;
2. test equipment specially designed for testing assemblies or a class of assemblies for home and commercial entertainment applications;
3. test equipment specially designed for testing electronic components, assemblies and integrated circuits not specified in entry IL1564 in Group 3F provided such test equipment does not incorporate computing facilities with user accessible programmability.

(C) Equipment specially designed for determining the performance of focal-plane arrays at wavelengths of more than 1,200 nm, using stored programme controlled measurements or computer aided evaluation and having any of the following characteristics—

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- (a) Using scanning light spot diameters under 120 nanometre C
 - (b) Designed for measuring photosensitive performance parameters and for evaluating frequency response, modulation transfer function, uniformity of responsivity or noise C
 - or C
 - (c) Designed for evaluating arrays capable of creating images with more than 32×32 line elements C
 - (8) Filters for clean rooms, capable of providing an air environment of 10 or less particles of 300 nanometre or smaller per 28.32 litres, and filter materials therefor C
 - (9) Electron beam test systems, capable of operating at or below 3 keV, for non-contactive probing of powered-up semiconductor devices having any of the following characteristics–
 - (A) Stroboscopic capability with either beam blanking or detector strobing C
 - (B) An electron spectrometer for voltage measurements with a resolution of less than 500 mV C
 - or C
 - (C) Electrical tests fixtures for performance analysis of integrated circuits
- except–

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scanning electron microscopes, other than when specially designed and instrumented for non-contactive probing of a powered-up semiconductor device.

(10) Stored programme controlled multifunctional focussed ion beam systems specially designed for manufacturing, repairing, physical layout analysis and testing of masks or semiconductor devices and having either of the following characteristics—

(A) Target-to-beam position feedback control precision of 1micrometre or finer

or

(B) Digital-to-analogue conversion accuracy exceeding 12 bit

(11) Particle measuring systems employing lasers designed for measuring particle size and concentration in air, having both of the following characteristics—

(A) Capable of measuring particle sizes of 200nanometre or less at a flow rate of 28.32litres/min or more

and

(B) Capable of characterising Class 10 clean air or better

In this entry, references to—

“masks” are to masks used in ultraviolet photo-lithography,

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visible light photolithography, electron beam lithography, X-ray lithography, and ultraviolet lithography;

“batch types” of equipment are to those types which are not specially designed for production processing of single wafers. Such machines can process two or more wafers simultaneously with common process parameters, e.g. RF power, temperature, etch gas species or flow rates;

“single wafer types” of machine are to machines which are specially designed for the production processing of single wafers and include—

(i) machines which use automatic wafer handling to load single wafers; and

(ii) machines which can load and process several wafers for simultaneous processing but in which the etching parameters can be determined separately for each wafer;

“stored program controlled equipment” are to equipment controlled by using instructions stored in electronic storage which a processor can execute in order to direct the performance of predetermined functions;

“magnetically enhanced sputtering equipment” are to equipment incorporating a cathode

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assembly having an integral magnetic structure for enhancing the plasma intensity.

IL1357

Equipment for the production of fibres specified in entry IL1763 in Group 3I or their composites, the following: and specially designed components and accessories and specially designed ODMA software therefor—

(a) Filament winding machines of which the motions for positioning, wrapping and winding fibres are co-ordinated and programmed in three or more axes, specially designed to fabricate composite structures or laminates from fibrous and filamentary materials; and co-ordinating and programming controltherefor A

(b) Tape-laying machines of which the motions for positioning and laying tape and sheets are co-ordinated and programmed in two or more axes, specially designed for the manufacture of composite airframes and missile structures A

(c) Multidirectional, multidimensional weaving machines and interlacing machines, including adapters and modification kits, for weaving, interlacing or braiding fibres to manufacture composite structures, except textile machinery which has not been modified for the above end-uses A

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(d) Specially designed or adapted equipment for the production of fibrous and filamentary materials specified in head (a) or (b) in entry IL1763 in Group 3I, the following—

(1) equipment for converting polymeric fibres (such as polyacrylonitrile, rayon, or polycarbosilane) including special provision to strain the fibre during heating A

(2) equipment for the vapour deposition of elements or compounds on heated filamentary substrates A

(3) equipment for the wet-spinning of refractory ceramics (such as aluminium oxide) A

(e) Specially designed or adapted equipment for special fibre surface treatment or for producing prepregs and preforms specified in head (c) in entry IL1763 in Group 3I A

NOTE

Specially designed or adapted components and accessories for the machines specified in this entry include, but are not limited to, moulds, mandrels, dies, fixtures and tooling for pressing, curing, carbonising, graphitising, casting, sintering or bonding of preforms, composite structures, laminates and manufactures thereof specified in head (d) to entry IL1763 in Group 3I.

PL7045

Technology for the regulation of temperature, pressure or atmosphere in autoclaves or B

- hydroclaves, being equipment specified in entry IL1357 head (e), for the production of composites or partially processed composites
- IL1358 Equipment specially designed for the manufacture or testing of magnetic recording media specified in entry IL1572 in Group 3G, the following: and specially designed components and specially designed ODMA software therefor—
- (a) Equipment which incorporates specially designed modifications for the application of magnetic coating to flexible disk recording media with a packing density exceeding 2,460 bit per cm C
 - (b) Equipment specially designed for the application of magnetic coating to non-flexible (rigid) disk type recording media not excepted in paragraph (vi) of head (d) of entry IL1572 in Group 3G C
 - (c) Stored programme controlled equipment for monitoring, grading, exercising or testing recording media, other than tape, specified in head (d) of entry IL1572 in Group 3G C
- except—
- diskette unit test equipment.
- IL1361 Test facilities and equipment for the design or development of aircraft organs turbine aero-engines, the following: and specially designed components and accessories and specially

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designed ODMA software therefor—

(a) Wind tunnels for speeds of Mach0.9 or greater A

(b) Devices for simulating flow-environments of Mach5 and above, regardless of the actual Mach number at which the devices operate, including hot shot tunnels, plasma arc tunnels, shock tubes, shock tunnels, gas tunnels and light gas guns C

(c) Wind tunnels and devices, other than two dimensional (2-D) sections that have unique capabilities for simulating Reynolds number flow in excess of 25×10^6 , at transonic velocities C

(d) Automated control systems, instrumentation (including sensors) and automated data-acquisition equipment, specially designed for use with wind tunnels and devices specified in head (a), (b) or (c) above C

(e) Models, specially designed for use with wind tunnels or with the devices specified in head (b) or (c) above, of aircraft, helicopters, airfoils, spacecraft, space-launch vehicles, rockets or surface-effect vehicles specified in the entries in Groups 1 and 3E relating thereto or of surface-effect vehicles specified in head (b) of C

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entry IL1416 relating to vessels

(f) Specially designed electromagnetic interference and electromagnetic pulse (EMI/EMP) simulators C

(g) Specially designed test facilities and equipment for the development of gas turbine aero-engines and components, the following—

(1) special test facilities capable of applying dynamic flight loads, measuring performance or simulating the design operating environments for rotating assemblies or aero-engines C

(2) test facilities, test rigs and simulators for measuring combustion system and hot gas flow path performance, heat transfer and durability for static assemblies and aero-engine components C

(3) specially designed test rigs, equipment or modified gas turbine engines which are utilized for development of gas turbine aero-engine internal flow systems (gas path seals, air-oil seals and disc cavity flow fields) C

PL7040

Test benches and test stands for solid or liquid propellant rockets or rocket motors, the following: and specially designed software therefor—

(a) those capable of more than 90kN (20,000lbs) of thrust A

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	(b) those capable of simultaneously measuring the three axial thrust components	A
PL7041	Environmental chambers and anechoic chambers, having both the following characteristics: and specially designed software therefor	A
	(a) capable of simulating either:	
	(i) altitudes of 15,000 metres or greater; or	
	(ii) temperatures in the range from minus 50°C or below to plus 125°C or higher; and	(b)
	(i) in the case of environmental chambers, providing vibration environments of 10g RMS or greater between 20Hz and 2,000Hz and imparting forces of 6kN or greater; or	
	(ii) in the case of anechoic chambers, providing acoustic environments having either of the following characteristics:	
	(1) an overall sound pressure level of 140dB or greater (referenced to $2 \times 10^{-5} \text{ (N/m}^2\text{)}$); or	
	(2) a rated power output of 4kW or greater.	
IL1362	Vibration test equipment and components and software therefor, the following—	
	(a) Vibration test equipment using digital control techniques, with a thrust of 50kN (11,250lbs) or more, and specially designed components and specially	A

designed software
therefor

(b) High intensity C
acoustic test equipment
capable of producing an
overall sound pressure
level of 140dB or greater
(referenced to $2 \times$
 10^{-5} N/m²) or with a
rated output of 4kW or
greater and specially
designed components
and specially designed
ODMA software therefor

except–

analogue equipment.

(c) Ground vibration C
(including modal survey)
test equipment that
uses digital control
techniques, and specially
designed components
and specially designed
ODMA software therefor

IL1363

Specially designed water
tunnel equipment, components,
accessories and databases for
the design and development
of vessels, the following: and
specially designed ODMA
software therefor–

(a) Automated control C
systems, instrumentation
(including sensors)
and data acquisition
equipment specially
designed for water
tunnels

(b) Automated equipment C
to control air pressure
acting on the surface
of the water in the
test section during the
operation of the water
tunnel

(c) Components and
accessories for water
tunnels, the following–

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- (1) balance and support systems C
- (2) automated flow or noise measuring devices C
- (3) models of hydrofoil vessels, surface-effect vehicles, SWATH vessels and specially designed equipment and components specified in heads (a), (b), (c), (e), (f), (g) and (h) in entry IL1416 in Group 3E for use in water tunnels C
- (d) Databases generated by use of equipment specified in this entry C

In this entry “database” shall have the same meaning as in entry IL1566 in Group 3G.

IL1370

Machine tools for generating optical quality surfaces, specially designed components and accessories therefor, the following: and specially designed ODMA software therefor—

- (a) Turning machines using a single point cutting tool and having all of the following characteristics C
 - (1) slide positioning accuracy less (better) than 0.0005mm per 300mm of travel total indicator reading (TIR);
 - (2) slide positioning repeatability less (better) than 0.00025mm per 300mm of travel total indicator reading (TIR);
 - (3) spindle runout (radial and axial) less than 0.0004mm total indicator reading (TIR);
 - (4) angular deviation of the slide movement

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(yaw, pitch and roll) less (better) than 2 seconds of arc total indicator reading (TIR) over full travel;

(5) slide perpendicularity less than 0.001 mm per 300 mm of travel total indicator reading (TIR);

(b) Fly cutting machines C
having both of the following characteristics

(1) spindle run-out (radial and axial) less than 0.0004 mm total indicator reading (TIR);

(2) angular deviation of slide movement (yaw, pitch and roll) less (better) than 2 seconds of arc total indicator reading (TIR) over full travel;

(c) Specially designed components, the following—

(1) spindle assemblies, C
consisting of spindles and bearings as a minimal assembly

except—

those assemblies with axial and radial axis motion measured along the spindle axis in one revolution of the spindle equal to or greater (worse) than 0.0008 mm total indicator reading (TIR);

(2) linear induction C
motors used as drives for slides, having all the following characteristics

(A) stroke longer than 200 mm;

(B) nominal force rating greater than 45 N;

(C) minimum controlled incremental movement less than 0.001 mm;

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- (d) Specially designed accessories, namely single point diamond cutting tool inserts having all the following characteristics
 - (1) flawless and chip-free cutting edge when magnified 400 times in any direction;
 - (2) cutting radius between 0.1 and 5 mm;
 - (3) cutting radius out-of-roundness less than 0.002 mm total indicator reading (TIR).

IL1371

Anti-friction bearings, the following—

- (a) Ball and roller bearings having an inner bore diameter of 10 mm or less and tolerances of ABEC 5, RBEC 5 or better and either of the following characteristics—
 - (1) made of special materials, that is to say, with rings, balls or rollers made from any steel alloy or other material (including but not limited to high-speed tool steels, Monel metal, beryllium, metalloids, ceramics and sintered metal composites), except the following: low-carbon steel, SAE-52100 high carbon chromium steel, SAE-4615 nickel molybdenum steel, AISI-440C (SAE-51440C) stainless steel (or national equivalents)

or

- (2) manufactured for use at normal operating temperatures over 150°C

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either by use of special materials or by special heat treatment

(b) Ball and roller bearings (exclusive of separable ball bearings and thrust ball bearings) having an inner bore diameter exceeding 10 mm and having tolerances of ABEC 7, RBEC 7 or better and either of the following characteristics—

(1) made of special materials, that is to say with rings, balls or rollers made from any steel alloy or other material (including but not limited to high-speed tool steels, Monel metal, beryllium, metalloids, ceramics and sintered metal composites), except the following: low-carbon steel, SAE-52100 high carbon chromium steel, SAE-4615 nickel molybdenum steel, AISI-440C (SAE-51440C) stainless steel (or national equivalents) C

or

(2) manufactured for use at normal operating temperatures over 150°C either by use of special materials or by special heat treatment C

(c) Ball and roller bearings having tolerances better than ABEC 7 C

(d) Gas-lubricated foil bearings C

(e) Bearing parts usable only for bearings specified in this entry, the C

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	<p>following: outer rings, inner rings, retainers, balls, rollers and sub- assemblies</p> <p>There shall be excluded from this entry hollow bearings.</p>	
IL1385	<p>Specially designed production equipment for compasses, gyroscopes (gyros), accelerometers and inertial equipment, specified in entry IL1485 in Group 3E</p>	A
PL7044	<p>Equipment and facilities specially designed for the production of the following goods:</p> <p>(a) goods specified in the following entries, heads or sub-heads in this Schedule:</p> <p>(i) IL1465</p> <p>(ii) IL1746, sub-head (k) (1)</p> <p>(iii) PL7017</p> <p>(iv) PL7018</p> <p>(v) PL7026</p> <p>(b) gas turbine aero engines certified or uncertified with 8.89 kN (2000 lbs) thrust or less (uninstalled) and with a thrust specific fuel consumption for maximum power at sea level static, standard atmosphere, equal to or less than 0.046 kg/N/hr (0.45 lb/lbf/hr)</p>	A A A A A A
IL1388	<p>Specially designed equipment for the deposition, processing and in-process control of inorganic overlays, coatings and surface modifications, for non-electric substrates by processes specified in entry IL1389 in this Group, the following: and specially</p>	

designed automated handling, positioning, manipulation and control components and specially designed ODMA software therefor—

(a) Stored programme controlled chemical vapour deposition (CVD) production equipment with both of the following characteristics—

(1) process modified for one of the following—

(a) pulsating CVD;

(b) controlled nucleation thermal decomposition (CNTD); or

(c) plasma enhanced or plasma assisted CVD; and

(2) having any of the following characteristics—

(a) incorporating high vacuum (less than or equal to 10^{-7} atm) rotating seals;

(b) operating at reduced pressure (less than 1 atm); or

(c) incorporating in situ coating thickness control;

(b) Stored programme controlled ion implantation production equipment having beam currents of 5 mA or higher

(c) Stored programme controlled electron beam physical vapour deposition (EB-PVD) production equipment with either of the following characteristics

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- (i) incorporating power systems greater than 80 kW; or
- (ii)
 - (1) incorporating power systems greater than 50 kW; and
 - (2) having both of the following characteristics:
 - (a) incorporating a liquid pool level laser control system which regulates precisely the ingots feed rate; and
 - (b) incorporating a computer controlled rate monitor operating on the principle of photoluminescence of the ionised atoms in the vaporant stream to control the deposition rate of a coating containing two or more elements.
 - (d) Stored programme controlled plasma spraying production equipment having any of the following characteristics—
 - (1) operating at atmospheric pressure discharging molten or partially molten material particles into air or inert gas (shrouded torch) at nozzle exit gas velocities greater than 750 m/sec calculated at 293 K at 1 atmosphere C
 - (2) operating at reduced measure controlled atmosphere (less than or equal to 100 millibar (0.1 atm) measured above and within 30 cm of the gun nozzle exit) in a C

vacuum chamber capable of evacuation down to 10^{-4} millibar prior to the spraying process at reduced measure controlled atmosphere (less than or equal to 100 millibar (0.1 atm) measured above and within 30 cm of the gun nozzle exit) in a vacuum chamber capable of evacuation down to 10^{-4} millibar prior to the spraying process

(3) incorporating in situ coating thickness control C

(e) Stored programme controlled sputter deposition production equipment capable of current densities of $5\text{mA}/\text{cm}^2$ or higher at a deposition rate of 10 micrometres/hr or higher C

(f) Stored programme controlled cathodic arc deposition production equipment with either of the following characteristics—

(1) incorporating target areas larger than 45.6cm^2 C

or

(2) incorporating a magnetic field steering control of the arc spot on the cathode C

(g) Deposition process or surface modification equipment for stored programme controlled production processing which enables the combining of any individual deposition processes specified in C

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heads (a) to (f) above
(inclusive) so as to
enhance the capability of
such individual processes

For the purpose of this entry
“stored programme controlled”
means controlled by using
instructions stored in an
electronic storage which a
processor can execute in order
to direct the performance of
predetermined functions.

IL1389

Technology and specially
designed ODMA software
therefor, the following—

(a) Technology for D
application to non-
electronic devices
designed to achieve, by
any process specified
in column 1 of the
Table below on any
substrate specified in
that part of column 2 of
the Table which relates
to that process, any
inorganic overlay coating
or inorganic surface
modification coating
specified in that part of
column 3 of the Table
which relates to that
substrate

except that this head does not
include technology for single
stage pack cementation of solid
airfoils.

(b) Specially designed
ODMA software for the
technology included in
head (a) D

Note: The processes included
in column 1 are defined in
Notes A(a)–(i) below. Other
terms used in the Table are
defined in Notes B(1)–(8)
below.

Table

<i>1. Coating process</i>	<i>2. Substrate</i>	<i>3. Resultant coating</i>
A. chemical vapour deposition (CVD)	superalloys	aluminides for internal surfaces, alloyed aluminides or noble metal modified aluminides
	titanium or titanium alloys	carbides aluminides or alloyed aluminides
	ceramics	silicides or carbides,
	carbon-carbon, carbon-ceramic, or metal matrix composites	silicides, carbides mixtures thereof or dielectric layers
	copper or copper alloys	tungsten or dielectric layers
B. electron-beam physical vapour deposition (EB-PVD)	silicon carbide or cemented tungsten carbide	carbides, tungsten, mixtures thereof or dielectric layers
	superalloys	alloyed silicides, alloyed aluminides MCrAlX (except CoCrAlY which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluminium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia) or mixtures thereof (including mixtures of the above with silicides or aluminides)
	ceramics	silicides or modified zirconia (except calcia-stabilized zirconia)
	aluminium alloys	MCrAlX (except CoCrAlY which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluminium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia) or mixtures thereof
	corrosion resistant steel	MCrAlX (except CoCrAlY which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluminium and less than 2 weight per cent of yttrium) modified zirconia

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<i>1. Coating process</i>	<i>2. Substrate</i>	<i>3. Resultant coating</i> (except calcia-stabilized zirconia)
	carbon-carbon, carbon-ceramic, or metal matrix composites	silicides, carbides, mixtures thereof or dielectric layers
	copper or copper alloys	tungsten or dielectric layers
	silicon carbide or cemented tungsten carbide	carbides, tungsten, mixtures thereof or dielectric layers
C. electro-phoretic deposition	superalloys	alloyed aluminides or noble metal modified aluminides
D. pack cementation	superalloys	alloyed aluminides or noble metal modified aluminides
(see also A above)	carbon-carbon, carbon-ceramic or metal matrix composites	silicides, carbides or mixtures thereof
	aluminium alloys	aluminides or alloyed aluminides
E. plasma spraying (high velocity or low pressure only)	superalloys	MCrAlX (except CoCrAlY which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluminium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia) or mixtures thereof
	aluminium alloys	MCrAlX (except CoCrAlY which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluminium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia), silicides or mixtures thereof
	corrosion resistant steel	MCrAlX (except CoCrAlY which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluminium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia) or mixtures thereof
	titanium or titanium alloys	carbides or oxides

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<i>1. Coating process</i>	<i>2. Substrate</i>	<i>3. Resultant coating</i>
F. slurry deposition	refractory metals carbon-carbon, carbon-ceramic or metal matrix composites	fused silicides or fused aluminides silicides, carbides or mixtures thereof
G. sputtering (high rate reactive or radio frequency only)	superalloys	alloyed silicides, alloyed aluminides noble metal modified aluminides, MCrAlX (except CoCrAlY which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluminium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia), platinum or mixtures thereof (including mixtures of the above with silicides or aluminides)
	ceramics	silicides, platinum or mixtures thereof
	aluminium alloys	MCrAlX (except CoCrAlY which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluminium and less than 2 weight per cent of yttrium), modified zirconia (except calcia-stabilized zirconia) or mixtures thereof
	corrosion resistant steels	MCrAlX (except CoCrAlY which contains less than 22 weight per cent of chromium and less than 12 weight per cent of aluminium and less than 2 weight per cent of yttrium) modified zirconia (except calcia-stabilized zirconia) or mixtures thereof
	titanium or titanium alloys	borides or nitrides
	carbon-carbon, carbon-ceramic or metal matrix composites	silicides, carbides, mixtures thereof or dielectric layers
	copper or copper alloys	tungsten or dielectric layers
	silicon carbide or cemented tungsten carbide	carbides, tungsten or dielectric layers
H. ion implantation	high temperature bearing steels	tantalum, chromium or niobium (columbium)

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1. Coating process	2. Substrate	3. Resultant coating
	beryllium or beryllium alloys	borides
	carbon-carbon, carbon-ceramic or metal matrix	silicides, carbides, mixtures thereof or dielectric layers
	titanium or titanium alloys	borides or nitrides
	silicon nitride or cemented tungsten carbide	nitrides, carbides or dielectric layers
	sensor window materials transparent to electromagnetic waves, as follows: silica, alumina, silicon, germanium, zinc sulphide, zinc selenide or gallium	arsenide dielectric layers

Notes:

A. The definitions of processes specified in column 1 of the Table are as follows:

(a) “Chemical Vapour Deposition” (CVD) is an overlay coating or surface modification coating process wherein a metal, alloy, composite or ceramic is deposited upon a heated substrate. Gaseous reactants are reduced or combined in the vicinity of a substrate resulting in the deposition of the desired elemental, alloyed or compounded material on the substrate. Energy for this decomposition or chemical reaction process is provided by the heat of the substrate.

(1) CVD includes the following processes: out-of-pack, pulsating, controlled nucleation thermal decomposition (CNTD), plasma enhanced or plasma assisted processes.

(2) “Pack” means a substrate immersed in a powder mixture.

(3) The gaseous material utilized in an out-of-pack process is produced using the same basic reactions and parameters as the pack cementation process, except that the substrate to be coated is not in contact with the powder mixture.

(b) “Electron beam physical vapour deposition” (EB PVD) is an overlay coating process conducted in a vacuum chamber, wherein an electron beam is directed onto the surface of a coating material causing vaporization of the material and resulting in condensation of the resultant vapours onto a substrate positioned appropriately, and includes a case where gases are added to the chamber during the processing.

(c) “Electrophoretic deposition” is a surface modification coating or overlay coating process in which finely divided particles of a coating material suspended in a liquid dielectric medium migrate under the influence of an electrostatic field and are deposited on an electronically conducting substrate.

NB: Heat treatment of parts after coating materials have been deposited on the substrate, in order to obtain the desired coating, is an essential step in the process.

(d) “Pack cementation” is a surface modification coating or overlay coating process wherein a substrate is immersed in a powder mixture, a so-called pack, that consists of:

(1) the metallic powders that are to be deposited (usually aluminium, chromium, silicon or combinations thereof);

(2) an activator (normally a halide salt); and

(3) an inert powder, most frequently alumina.

The substrate and powder mixture is contained within a retort which is heated to between 1030 K to 1375 K for sufficient time to deposit the coating.

(e) “Plasma spraying” is an overlay coating process wherein a gun (spray torch), which produces and controls a plasma, accepts powder coating materials, melts them and propels them towards a substrate, whereon an integrally bonded coating is formed.

(1) “High velocity plasma spraying” means such spraying at more than 750 metres per second.

(2) “Low pressure plasma spraying” means such spraying at less than ambient atmospheric pressure.

(f) “Slurry deposition” is a surface modification coating or overlay coating process wherein a metallic or ceramic powder with an organic binder is suspended in a liquid and is applied to a substrate by either spraying, dipping or painting; subsequently air or oven dried, and heat treated to obtain the desired coating.

(g) “Sputtering” is an overlay coating process wherein positively charged ions are accelerated by an electric field towards the surface of a target (coating material). The

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kinetic energy of the impacting ions is sufficient to cause target surface atoms to be released and deposited on the substrate.

NB: Triode, magnetron or radio frequency sputtering to increase adhesion of coating and rate of deposition are included.

(h) "Ion implantation" is a surface modification coating process in which the element to be alloyed is ionized, accelerated through a potential gradient and implanted into the surface region of the substrate. It includes processes in which the source of the ions is a plasma surrounding the substrate and processes in which ion implantation is performed simultaneously with electron beam physical vapour deposition or sputtering.

(i) "Cathodic arc deposition" employs a cathode which is consumable and has an arc discharge established on the surface by a momentary contact of ground trigger. Arc spots form and begin to erode randomly but uniformly the cathode surface creating a highly ionised plasma. The anode can be either a cone attached to the periphery of the cathode through an insulator or the chamber can be used as an anode. Substrates appropriately positioned receive deposits from the ionised plasma. Substrate biasing is used for non-line-of-sight deposition. A gas can be introduced in the vicinity of the substrate surface in order to react during deposition to synthesise compound coatings.

B. The definitions of other terms used in the Table are as follows—

- (1) "Coating process" includes coating repair and refurbishing as well as original coating.
- (3) Multiple stage coatings in which an element or elements are deposited prior to application of the aluminide coating, even if these elements are deposited by another coating process, are included in the term "alloyed aluminide coating", but the multiple use of single-stage pack cementation processes to achieve alloyed aluminides is not included in the term "alloyed aluminide coating".
- (3) Multiple-stage coatings in which the noble metal or noble metals are laid down by some other coating process prior to application of the aluminide coating are included in the term "noble metal modified aluminide coating".
- (4) "Mixtures" consist of infiltrated material, graded compositions, co-deposits and multilayer deposits and are obtained by one or more of the coating processes specified in this Table.
- (5) "MCrAlX" refers to an alloy where M equals cobalt, iron, nickel or combinations thereof and X equals hafnium, yttrium, silicon or other minor additions in various proportions and combinations.
- (6) "Aluminium alloys" as a substrate in this Table means alloys usable at temperatures above 500 K (227°C).
- (7) "Corrosion resistant steel" means such steel as complies with AISI (American Iron and Steel Institute) 300 series or equivalent national standard for steels.
- (8) "Refractory metals" as a substrate in this Table means the following metals and their alloys: niobium (columbium), molybdenum, tungsten and tantalum.

PL7033	CVD Furnaces designed or modified for the densification of carbon-carbon composites, and specially designed components and specially designed software therefor	A
IL1391	Robots, robot controllers and robot end-effectors, the following: and specially designed components and specially designed ODMA software therefor—	C
	(a) Robots having any of the following characteristics—	
	(1) capable of employing feedback information in real-time processing from vision systems to generate or modify	

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programmes or to
generate or modify
numerical programme
data

except—

(A) those capable of
processing no more than
100,000 pixels using
an industrial television
camera, or no more than
65,536 pixels using a
solid-state camera;

(B) those using a single-
scene analysis processor
having neither a word
size of more than 32 bit
(excluding parity bits)
nor parallel processing
for the same task;

(C) those having
software not capable of
full three-dimensional
mathematical modelling
or full three-dimensional
scene analysis; NOTE:
The above exception
includes approximation
of the third dimension
by viewing at a given
angle, and limited grey
scale interpretation for
the perception of depth or
texture for the approved
tasks (21/2D);

(D) those having
no user-accessible
programmability other
than by input reference
images through the
system's camera; or

(E) those capable of no
more than one scene
analysis every 0.1
second;

The exceptions in paragraphs
(A), (B), (C), (D) and (E)
above do not apply to
technological documents the
information in which includes

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information relating to goods excluded by paragraphs (A), (B), (C), (D) or (E) other than that necessary for the operation, repair or maintenance of the robot.

(2) specially designed to comply with national safety standards applicable to explosive munitions environments C

(3) incorporating means of protecting hydraulic lines against externally induced punctures caused by ballistic fragments (eg, incorporating self-sealing lines) and designed to use hydraulic fluids with flash points higher than 839K (566°C) C

(4) specially designed for underwater use (namely incorporating special techniques or components for sealing, pressure compensation or corrosion resistance) C

(5) operable at altitudes exceeding 30,000 m C

(6) specially designed for outdoor applications and meeting military specifications therefor C

(7) specially designed or rated for operating in an electro-magnetical pulse (EMP) environment C

(8) specially designed or rated as radiation-hardened beyond that necessary to withstand normal industrial (namely non-nuclear industry) ionising radiation C

(9) equipped with precision measuring C

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devices specified in entry
IL1099 in Group 3A

(10) specially designed to C
move autonomously its
entire structure through
three-dimensional space
in a simultaneously co-
ordinated manner

except–

(A) systems in which
the robot moves along a
fixed path;

(B) robots specially
designed for household
use or those modified
from household robots
for educational purposes
(pre-university), if not
specified elsewhere in
this entry;

(b) Electronic controllers C
or end-effectors specially
designed for robots
specified in head (a)
above

GROUP 3E

**Aircraft, Spacecraft, Marine Equipment and Ships
(Other than Warships and Naval Equipment)**

IL1401 Reciprocating diesel
engine development
and production
technologies,
including specially
designed software, the
following–

(a) Development D
and production
technology,
including
specially
designed
software, for
reciprocating
diesel engine
ground vehicle
propulsion

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systems having
all of the
following
characteristics—

(1) a box volume
of 1.2m³ or less;

(2) an overall
power output
of more than
750 kW based
on 80/1269/
EEC, ISO 2534
or national
equivalents;

(3) a power
density of more
than 700 kW/m³
of box volume.

(b) Development and production
technology for solid or dry
film cylinder wall lubrication
permitting operation at
temperatures in excess of
723 K (450°C) measured on the
cylinder wall at the top limit of
travel of the top ring of the piston D

(c) Production technology
for specially designed
components for high output
diesel engines, the following:

(1) Production technology for
any specially designed
components when used in low
heat rejection D

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engines and
employing
ceramic material
specified in entry
IL1733

(2) Production D
technology for
turbocharger
systems with
single-stage
compressors
and having all
of the following
characteristics

(A) operating at
pressure ratios of
4:1 or higher;

(B) A mass flow
in the range from
30 to 130 kg per
minute; and

(C) Variable flow
area capability
within the
compressor or
turbine sections;

(3) Production D
technology
for diesel fuel
injection systems
having all of
the following
characteristics

(A) Maximum
fuel injection
pressure of 1×10^8 pascal (1,000
bar) or more;

(B) Injection
amount in excess
of 230 mm^3
injection per
cylinder;

(C) Injection
nozzle hole of
0.254 mm or
less;

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(D) Capability to complete fuel injection in 30 crank angle degrees or less;

(E) Electronic features for control of the fuel injection quantity, timing and duration throughout the engine speed and load range, through the use of appropriate sensors; and

(F) Designed for engines of more than eight cylinders.

In this entry–

“box volume” means the product of three dimensions at right angles to each other measured in the following way–

Length: the length of the crankshaft from front flange to flywheel face;

Width: the greatest of the following:

(a) the outside dimension from valve cover to valve cover;

(b) the dimension of the outside edges of

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the cylinder heads; or
(c) the diameter of the flywheel housing;
Height: the greater of the following:
(a) the dimension of the crankshaft centreline to the top plane of the valve cover (or cylinder head) plus 2 times the stroke; or
(b) the diameter of the flywheel housing;

“high output diesel engines” means diesel engines with a specified brake mean effective pressure of 180 kPa or more at a speed of 2,300 rpm, provided the rated speed is 2,300 rpm or more.

IL1416

Vessels (including ships and surface-effect vehicles), water-screw propellers and hub assemblies, water-screw propeller systems, moisture and particulate separator systems and specially designed components, the following—

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(a) Hydrofoil vessels with automatically controlled foil systems which are capable of speeds of above 40 knots in rough water (Sea State Five) S,I(b) Surface-effect vehicles C

except hovercraft having all the following characteristics:

(1) designed to carry fewer than 5 passengers including the driver;

(2) dry mass less than 500 kg;

(3) maximum speed less than 50 knots (90 km/h) at Sea State 0;

(4) not designed for operation above Sea State 3;

(c) SWATH vessels having underwater hulls whose cross-sectional area varies along the longitudinal axis between points two major diameters from the bow and two major diameters from the stern C

(d) Ships and vessels fitted with any of the following—

(1) equipment specified in Group 1, in entry S,I

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IL1485 in this
Group or in entry
IL1501, IL1502
or IL1510 in
Group 3F

(2) degaussing S,I
facilities

or

(3) closed C
ventilation
systems designed
into the vessel
which are
designed to
maintain air
purity and
positive pressure
regardless of
the conditions
external to
the vessel
except where
those closed
ventilation
systems are
specially
designed for and
incorporated
in the vessel's
medical facilities
only

(e) Water-screw
propellers and
hub assemblies,
the following—

(1) C
supercavitating
propellers
rated at greater
than 7.46 MW
(10,000 hp)

(2) C
controllable-
pitch propellers
and hub
assemblies rated
at above 29.83
MW (40,000 hp)
capacity

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(f) Water-screw propeller systems, the following—

(1) contrarotating propeller systems rated at greater than 14.92 MW (20,000 hp) C

(2) ventilated, base-ventilated and super-ventilated propeller systems and semi-submerged propeller systems (or surface propellers) rated at more than 2.24 MW (3,000 hp) C

(3) systems employing pre-swirl and post-swirl techniques for smoothing the flow into a propeller so as to improve propulsive efficiency of—

(i) SWATH vessels, hydrofoil vessels, and surface-effect vessels C

or

(ii) other vessels whose propeller rotational speed is above 200 rpm, or having propellers with a rating exceeding 44.74 MW (60,000 hp) per shaft C

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(4) pumpjet systems C

(g) Moisture and particulate separator systems which are capable of removing 99.9 per cent of particles larger than 2 micrometres in diameter with a maximum pressure loss of 1.6 kPa (16 millibar) for gas turbine engine air inlets C

(gg) Technology for moisture and particulate separator systems specified inhead (g) above, the following–

(1) technology for preventing water leakage around the filter stages D

(2) technology for integrating the components of such a system D

(h) Specially designed components for vessels specified in head (a), (b) or (c) above, the following–

(1) advanced hull forms which incorporate any of the following–

(i) stepped hulls for hydrofoil vessels C

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- (ii) hulls for air cushion vehicles with trapezoidal platforms C
- (iii) hulls for surface effect vehicles with catamaran-like sidewalls C
- (iv) hulls for wing-in ground effect vehicles C
- (v) underwater hulls and struts for SWATH vessels C
- (2) fully submerged subcavitating or supercavitating hydrofoils C
- (3) lightweight structural components for SWATH vessels, hydrofoil vessels and surface effect vehicles, constructed using anisotropic, orthotropic or sandwich construction methods C

In this subhead–

“anisotropic construction methods” means the use of fibre reinforcing members aligned so that the load-carrying ability of the structure can be primarily orientated in the direction of expected stress.

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“orthotropic construction methods” means the means of stiffening plates, in which the structural members are at right angles to each other.

“sandwich construction methods” means the use of structural members or plates which are fabricated and permanently affixed in layers to enhance their strength and reduce their weight.

(4) flexible skirts, seals and fingers for surface effect vehicles C

(5) systems for automatically controlling the stability of SWATH vessels, hydrofoil vessels or surface-effect vehicles C

(6) power transmission shaft systems which incorporate composite material components, for SWATH vessels, hydrofoil vessels or surface effect vehicles C

(7) lightweight, high capacity C

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(K factor greater than 150) gearing (planetary, cross-connect and multiple input/output gears and bearings) for SWATH vessels, hydrofoil vessels and surface effect vehicles

(8) water-cooled electrical propulsion machinery (motor and generator), including AC-AC synchronous and AC-DC systems, sectored-disc and concentric-drum rotors for DC homopolar machines, for SWATH vessels, hydrofoil vessels and surface effect vehicles C

(9) superconducting electrical propulsion machinery for SWATH vessels, hydrofoil vessels and surface effect vehicles C

(10) lift fans for surface-effect vehicles, rated at greater than 300 kW (400 hp) C

(11) waterjet propulsor systems rated at an input of 2.24 MW (3,000 hp) or greater for C

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hydrofoil vessels
or surface-effect
vehicles

In this entry “pumpjet systems” means propulsion systems which utilise divergent nozzle and flow conditioning vane techniques to improve propulsive efficiency or reduce propulsion generated underwater radiated noise.

PL7009

Other vessels (including ships), the following: and specially designed components therefor—

(a) Vessels I
having special structural features for landing personnel and/or vehicles on a beach

(b) Vessels I
capable of supporting helicopter operations and maintenance

(c) Vessels I
capable of submerging

(d) Vessels I
not elsewhere specified in this Part of this Schedule of below 100 tonnes GRT including inflatable craft in an inflated or uninflated state except light vessels,

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	fire floats and dredgers	
	(e) Ships with decks and platforms specially strengthened to receive weapons	S,L
IL1417	Submersible systems, including those incorporated in a submersible vehicle, and specially designed components, the following: and specially designed ODMA software therefor—	
	(a) Automatically-controlled atmosphere-regeneration systems specially designed or modified for submersible vehicles which, in a single chemical-reaction cycle, ensure carbon dioxide removal and oxygen renewal	C
	(b) Systems specially designed or modified for the automated control of the motion of a submersible vehicle using navigation data and having closed-loop servo-controls so as to—	

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- (1) enable the vehicle to move within 10m of a predetermined point in the water column C
- (2) maintain the position of the vehicle within 10m of a predetermined point in the water column C
- (3) maintain the position of the vehicle within 10m while following a cable on or under the sea bed C

except—

automated control systems incorporated in underwater bulldozers or trench-cutters not capable of operating at depths greater than 100 metres and possessing only negative buoyancy.

(c) Underwater vision systems, the following—

- (1) television systems (comprising camera, lights, monitor and signal transmission equipment) specially designed or modified for remote operation with a submersible vehicle, having a limiting C

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resolution, when measured in the air, of more than 500 lines or underwater television cameras having a limiting resolution, when measured in the air, of more than 600 lines, using IEEE Standard 208/1960 or any equivalent standard

(2) systems specially designed or modified for remote operation with a submersible vehicle employing techniques to minimize the effects of back-scatter including range-gated illuminators and laser systems C

except—

television cameras used merely through a porthole.

(d) Remotely controlled articulated manipulators specially designed or modified for use with submersible vehicles and having any of the following characteristics—

(1) systems which control C

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the manipulator using information from sensors which measure force or torque applied to an external object, distance from an external object, or tactile sense between the manipulator and an external object

except systems where force or torque are only measured and then displayed to the operator.

(2) controlled by proportional master-slave techniques or by using a dedicated stored-programme computer C

(3) capable of exerting a force of 250N or more or a torque of 250Nm or more and using titanium based alloys of fibrous and filamentary composite materials in their structural members C

(e) Photographic cameras and associated equipment specially designed or modified for underwater use, having a film format of 35mm or larger, and

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capable of any of the following—

- (1) film advancement of more than 5 frames per second C
- (2) annotating the film with data provided by a source external to the camera C
- (3) taking more than 400 full frame exposures without changing the film C
- (4) autofocus or remote focusing specially designed or modified for use under water C
- (5) automatic back focal distance correction C
- (6) passive or automatic compensation control specially designed to permit underwater camera housings to be useable at depths exceeding 1,000m C
- (7) titanium underwater camera housing specially designed for depths exceeding 1,000m C
- (8) automatic exposure control by using sensing C

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devices in or external to the camera if the camera is capable of operating at depths of more than 300m

(f) Light systems specially designed or modified for underwater use, the following—

(1) stroboscopic lights capable of—

(A) light output energy of more than 250 Joules per flash C

(B) flash rates of more than 5 flashes per second at a light output energy of more than 10 Joules per flash C

(2) other lights and associated equipment, designed for operation with equipment specified in sub-head (e)(1) or (e)(8) above C

(g) Specially designed components for the equipment specified in heads (a) to (f) above C

(h) Air-independent power systems specially designed for

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underwater use
and specially
designed
components
therefor, the
following—

(1) Brayton,
Stirling or
Rankine Cycle
Engine air-
independent
power systems
having any of
the following
characteristics—

(A) specially C
designed
chemical
scrubber or
absorber sub-
systems to
remove carbon
dioxide, carbon
monoxide and
particulates from
recirculated
engine exhaust

(B) specially C
designed sub-
systems for
utilising a
monoatomic gas

(C) specially C
designed devices
for underwater
noise reduction
in frequencies
less than 10KHz,
or special
mounting
devices for shock
mitigation

(D) specially C
designed systems
for pressurising
products of
reaction or for
fuel reformation,
specially
designed systems

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for the storage of products of the reaction, and specially designed systems for discharging the products of the reaction against a pressure of 100kPa (1 bar) or more

(2) Diesel Cycle C
Engine air-independent systems having all of the following characteristics

(A) specially designed chemical scrubber or absorber sub-systems to remove carbon dioxide, carbon monoxide and particulates from recirculated engine exhaust;

(B) specially designed sub-systems for utilising a monoatomic gas;

(C) specially designed devices for underwater noise reduction in frequencies less than 10kHz, or special mounting devices for shock mitigation;

(D) specially designed exhaust systems that do not continuously

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exhaust products
of combustions;

(3) Alkaline,
phosphoric acid
or ion exchange
membrane
fuel cell air-
independent
power systems
with an output
exceeding 2kW
and operating at
a temperature of
less than 523K
having any of
the following
characteristics—

(A) specially C
designed
enclosures for
underwater noise
reduction in
frequencies less
than 10kHz, or
special mounting
devices for shock
mitigation

(B) specially C
designed systems
for pressurising
products of
reaction or for
fuel reformation,
specially
designed systems
for the storage
of products of
the reaction,
and specially
designed
systems for
discharging the
products of the
reaction against
a pressure of
100kPa (1 bar) or
more

(4) Specially C
designed
components for
sub-systems

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specified in sub-head (h)(1)(C), (h)(2)(C) or (h)(3)(A) above

(i) Technology, the following—

(A) technology D
for air-independent power systems specified in sub-head (h)(1), (h)(2) or (h)(3) above

(B) technology D
for sub-systems and specially designed components specified in sub-head (h)(1)(A), (h)(1)(B), (h)(1)(C), (h)(3)(A) or (h)(4) above

(C) technology D
for sub-systems specified in sub-head (h)(2)(A), (h)(2)(B) or (h)(2)(C) above

In this entry “limiting resolution” in television is a measure of resolution usually expressed in terms of the maximum number of lines per picture height discriminated on a test chart.

IL1418

Deep submergence vehicles and autonomous submersible vehicles, the following—

(a) Deep submergence vehicles, manned or unmanned, tethered or C

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untethered,
capable of
operating at
depths exceeding
1,000m, and
specially
designed or
modified
associated
systems and
equipment
therefor,
including the
following—

(1) pressure
housings or
pressure hulls;

(2) propulsion
motors and
thrusters;

(3) hull
penetrators or
connectors.

(b) Other C
manned
underwater
vehicles
which are able
to operate
autonomously
for ten hours or
more, provided
their maximum
range underwater
exceeds 15
nautical miles

In this entry—

“operate
autonomously”
means operate
fully submerged,
without snorkel,
all systems
working and
cruising at the
minimum speed
at which the
submersible
can safely
control its depth

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dynamically by using its depth planes only, with no need for a support vessel or support base on the surface, sea-bed or shore, and containing a propulsion system for submerged or surface use;

“range” means half the maximum distance the vehicle can cover.

- IL1431 Marine gas turbine engines (marine propulsion or shipboard power generation engines), whether originally designed as such or adapted for such use, and specially designed components therefor C
- Note: for the purpose of this entry “shipboard power generation” does not include offshore platform applications.
- IL1460 Aircraft and helicopters, including tilt wing and tilt rotor aircraft, aero-engines and aircraft and helicopter equipment, and technology therefor, the following— C
- (a) Aircraft and helicopters, except those which do not contain equipment

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specified in
Group 1 or in the
entries IL1485
or IL1501 in
Groups 3E and
3F and which are
of types which
are in bona fide
normal civil use

(b) Technology
for aircraft
and helicopter
airframes
(including
airframes for
tilt wing and tilt
rotor aircraft),
for aircraft
propellers, and
for aircraft
and helicopter
airframe,
aircraft-propeller
and helicopter-
rotor-systems
components,
and specially
designed
ODMA software
therefor, the
following—

(1) design B
technology using
computer-aided
aerodynamic
analyses for
integration of
the fuselage,
propulsion
system and
lifting and
control surfaces
to optimize
aerodynamic
performance
throughout the
flight regime of
an aircraft

(2) technology
for the design
of active flight

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control, the
following—

(i) technology D
for configuration
design for inter-
connecting
multiple
microelectronic
processing
elements (on-
board computers)
to achieve high-
speed data
transfer and
high-speed data
integration for
control law
implementation

(ii) technology D
for control law
compensation for
sensor location
and dynamic
airframe
loads, namely
compensation for
sensor vibration
environment and
for variation of
sensor location
from centre of
gravity

(iii) technology D
for electronic
management
of systems
redundancy and
data redundancy
for fault
detection, fault
tolerance and
fault isolation

except—
technology
for the design
of physical
redundancy
in hydraulic
or mechanical
systems or in
electrical wiring;

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(iv) technology D
for design of
flight controls
which permit
in-flight
reconfiguration
of force and
moment controls

(3) design B
technology for
integration of
flight control,
navigation and
propulsion
control data
into a flight
management
system for flight
path optimization

(4) design
technology for
protection of
avionic and
electrical sub-
systems against
electromagnetic
pulse (EMP) and
electromagnetic
interference
(EMI) hazards
from sources
external to the
aircraft, the
following—

(i) technology B
for design
of shielding
systems

(ii) technology B
for the
configuration
design of
hardened
electrical circuits
and sub-systems

(iii) technology B
for determination
of hardening
criteria for the
above

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(5) technology D
for the design,
production and
reconstruction
of adhesively
bonded airframe
structural
members
designed to
withstand
operational
temperatures in
excess of 120°C

except—

airframe structural
members for engine
nacelles and thrust
reversers.

(6) technology D
for the
design and
production of
propeller blades
constructed
wholly or partly
of composite
materials,
and specially
designed hubs
therefor

except—

technology for the
production of propeller
blades—

(a) constructed
wholly of wood
or glass-fibre-
reinforced
plastics ;

(b) constructed
mainly of wood
or glass-fibre-
reinforced
plastics and
which use other
materials only in
the leading edge
or tip; or

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(c) constructed mainly of glass-fibre-reinforced or carbon-fibre reinforced plastics.

(7) technology D
for the design and production of digital electronic synchrophasers specially designed for propellers; technology for the design of digital electronic controls for propellers; and technology for the production of digital electronic controls for the propeller blades and hubs specified in sub-head (b)(6) above

(8) technology D
for the design and production of active laminar flow control lifting surfaces including design data used to substantiate the design approach

(9) technology D
for the development of helicopter multi-axis fly-by-light or fly-by-wire controllers which combine the functions of at least two of the following into

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one controlling element

(i) collective controls;

(ii) cyclic controls;

(iii) yaw controls.

(10) technology D
for the development of circulation controlled anti-torque or directional control systems for helicopters

Note:

“Circulation-controlled anti-torque and directional control systems” utilise air blown over aerodynamic surfaces to increase or control the forces generated by the surfaces. Buried fan-in-fin anti-torque designs fitted or not fitted with guide vanes such as the fenestron are excluded from this subhead.

(11) technology D
for the development of helicopter rotor blades incorporating variable geometry airfoils utilizing trailing edge flaps or tabs or pivoted nose

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droop, which can be controlled in position in flight

(12) technology D
for the development of active control of helicopter blades and other surfaces used to generate aerodynamic forces and moments

Note: “Active control” (of helicopter blades and other surfaces used to generate aerodynamic forces and moments) functions to prevent undesirable helicopter vibrations, structural loads or helicopter rotor dynamic behaviour by autonomously processing outputs from multiple sensors and then providing necessary preventive commands to effect automatic control.

(13) technology D
for the development and production of integrated automatic propulsion and airfoil control

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systems for tilt
wing and tilt
rotor aircraft

(c) Helicopter C
power transfer
systems and
technology
therefor

except—

(i) helicopter
power transfer
systems for
use in civil
helicopters only,
the following—

(1) those
which have
been in
civil use
in civil
helicopters
for more
than eight
years;

(2) those
which do
not contain,
and
were not
fabricated
utilizing,
any of the
technologies
shown in
Table 2
below;

(3)
those for
replacement
in or
servicing
of specific,
previously
exported
helicopters;

(ii) technological
documents
resulting from
helicopter
powertransfer
system
performance

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and installation design studies; fabrication technology, or overhaul and refurbishing technology for specific helicopter power transfer systems in civil use in civil helicopters for more than eight years, unless listed in Table 2 below. Note: Documents resulting from helicopter power transfer system performance and installation design studies do not include documents containing technology for: computer-aided design (CAD); computer aided design/manufacturing (CAD/CAM); or parametric performance analysis, engine analysis and selection, or component design utilizing unpublished technical data.

(d) Gas turbine engines and auxiliary power units (APUs) for use in aircraft or helicopters and technology therefor except—

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(i) those for use in civil aircraft or civil helicopters only, the following—

(1) jet, turboprop and turboshaft aircraft engines in civil use in civil aircraft or civil helicopters for more than eight years;

(2) gas turbine powered aircraft APUs in civil use in bona fide civil aircraft or civil helicopters for more than eight years;

(ii) technological documents resulting from aircraft performance and installation design studies; fabrication technology, or overhaul and refurbishing technology for specific gas turbine aero-engines or gas turbine powered aircraft APUs in civil use in civil aircraft or civil helicopters for

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more than twelve years, unless listed in Table 1 below.

Note: Aircraft performance and installation design studies does not include technology for: computer-aided design (CAD); computer-aided design/manufacturing (CAD/CAM); or parametric engine performance analysis, engine cycle analysis and selection, or component aerodynamic design utilizing unpublished technical data.

(e) Specially designed components for gas turbine engines APUs and helicopter power transfer systems specified in heads (c) and (d) above, the following—

- (1) embodying C
technologies listed in Table 1 or 2 below
- (2) hot-section C
components
- (3) engine C
control system components
- (4) gas turbine C
engine or APU rotor system

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components
(including
bearings)

NOTES:

1. The period of civil use referred to in heads (c) and (d) above begins with the date that the particular engine or helicopter power transfer system (model and specifications) or its most recent modification was certified as airworthy for commercial service or commercial navigability under the standards and requirements of the government of the country in which it was manufactured: modification does not include minor safety or operational changes which do not significantly enhance the performance of a particular gas turbine aero-engine or improve its reliability. For the purposes of this entry:
- (a) A gas turbine aero-engine which is recertified as the result of incorporating any technology listed in Table 1 below is to be treated as a newly certified engine. Recertification which does not result from incorporation of such technology, or modifications which do not require recertification by national authorities, will not affect the period of civil use of the engine;
 - (b) Modification of a gas turbine APU by incorporation of any technology listed in Table 1 will cause it to be treated as a new APU. Other modifications will not affect the period of civil use of the APU.
 - (c) Modification of a helicopter power transfer system by incorporation of any technology listed in Table 2 will restart the period of civil use for the helicopter power transfer system as though it were newly certified in a helicopter. Other modifications will not affect the period of civil use of the helicopter power transfer system.

2. This entry does not include gas turbine engines, APUs and helicopter power transfer systems for civil use and modifications (and technology therefor) certified or recertified for civil use, as described in Note 1 prior to the 1st January 1979, other than: Helicopters over 4,530 kg empty weight, and power transmissions systems therefor.

Note: Empty weight is understood to include normal installation and normal minimum crew, but does not include fuel or payload.

Aero-engines, the following—

- (i) Piston engines;
- (ii) Jet engines of less than 2,625 kg thrust;
- (iii) Turboprop or turboshaft engines of less than 2,500 horsepower or with a residual thrust of less than 453 kg.

3. Head (d) above does not include those engines which contain none of the technologies listed in Table 1 below for use in civil aircraft or civil helicopters.

Table 1

Technology relating to the following

I. Materials and manufacturing procedures

Ceramic, ceramic-composite or composite hot-section components (combustor, turbine blades and vanes, seals, discs, flow path)

Turbine blades on basis of directional solidification or monocrystal technology

- directional solidification
- monocrystal technology

Turbine blades consisting of several parts connected by diffusion bonding

Fibre technology in frames or in highly stressed discs, castings, blades and vanes

Protective coating technology for air-cooled turbine blades and vanes with internal and external cooling passages and their related flow paths capable of operating in high gas temperature environments (in excess of 1,499°C), irrespective of the actual gas temperature environment in

whcih they will be used, involving applications of metallic or ceramic materials by vapour, pack, plasma, electron beam, sputtering or sintering processes

Metallic coatings

- plasma sprayed
- other

Ceramic Coatings

Application of powder metallurgy for fan compressor and turbine blades or vanes; discs, wheels, reduction gears, engine main shafts and frames

- discs
- fan, compressor and turbine blades or vanes, wheels, reduction gears, engine main shafts and frames

Cooled components on basis of electrostream or laser drilling methods;

- electrostream drilling
- laser drilling

Electron beam drilling for small holes in turbine blades and vanes

Titanium or superalloy-casting on basis of centrifugal techniques

Ceramic core casting technology for casting holes in turbine blades and vanes

II. Construction methods

Adjustable flow path geometry and associated control system for:

- fans
- gas generator turbine(s)
- fan/power turbine(s)
- propelling nozzles

(Adjustable flow path geometry and associated control systems do not include: inlet guide vanes, variable pitch fans, variable stators or bleed valves for compressors.)

Full authority or hybrid digital electronic control and respective sensor equipment

High temperature (capable of utilizing gases heated above 1,100°C) heat exchangers for preheating compressor exit air

Combustors with combustion in several stages

Maintenance of compressor or turbine tip clearance through methods employing active compensating casing technology:

- compressor alone
- turbine alone
- compressor and turbine

Ceramic bearings

Nozzles with thrust vectoring (not including reverse thrust)

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Table 2

Technology relating to the following

I. Materials and manufacturing procedures

A. Rotor heads, containing:

- Hot-isostatically pressed materials

B. Gear boxes, containing:

- Navikoff-type gears
- Gears or gear support structures based on materials applying directional solidification or monocrystal technology
- High contact-ratio double-helical (arrow-shaped) gears
- Fibre technology
- Hot-isostatically pressed components
- Gear tooth surfaces hardened by vacuum carburizing or ion nitriding

C. Drive shaft systems containing super-critical drive shafts

II. Construction methods

A. Components fabricated by diffusion bonding

B. High-survivability loss-of-lubrication technology for high-speed bearings (DN equal to or greater and 2.4 million where D is expressed in millimetres and N in rpm)

In this entry—

“civil aircraft” and “civil helicopters” means only those types of civil aircraft and civil helicopters which are listed by designation in published airworthiness certification lists by the civil aviation authorities to fly commercial civil internal and external routes or for normal civil, private or business use.

“helicopter power transfer systems” means all those components which transfer power from the engine to the main and tail rotor blade(s).

Note: Aero-engines, APUs or helicopter power transfer systems which have any special

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	feature designed for a military application are specified in the entry ML10 in Group 1.	
PL7026	Propulsion equipment and components therefor, the following—	
	ramjet engines	A
	scramjet engines	A
	pulsejet engines	A
	combined cycle engines	A
	devices to regulate combustion in goods specified in head (a), (b), (c) or (d) above	A
	specially designed components for goods specified in head (a), (b), (c), (d) or (e) above	A
PL7010		L,Z
PL7016		W
PL7011		L,I,Y,Z
IL1465	Spacecraft and launch vehicles, the following—	
	(a) spacecraft, manned or unmanned (not including their payloads)	A
	except scientific mission space probes which do not contain equipment specified in head (c) below or elsewhere in this Schedule.	
	(b) Launch vehicles	A
	(c) Propulsion systems, guidance equipment, attitude control equipment and on-board communications equipment for remote control of equipment specified in heads (a) or (b) above	A
	(d) Specially designed components for equipment specified in head (a), (b) or (c) above	A

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	In this entry “spacecraft” means active and passive satellites and space probes.	
PL7017	Liquid and slurry propellant control systems, having both the following characteristics and specially designed components therefor, except pumps and servo valves (a) designed for propellants and related substances specified in PL5009 or PL7028; (b) designed or modified to operate in environments of more than 10 g RMS between 20 Hz and 2000 Hz	A
PL7018	Pumps and servo valves for liquid and slurry propellant systems, having all the following characteristics (a) designed for propellants and related substances specified in PL5009 or PL7028; and (b) designed or modified to operate in environments of more than 10 g RMS between 20 Hz and 2000 Hz; and (c) (i) in the case of servo valves, having both the following characteristics: (1) having an actuator response time of less than 100×10^{-3} seconds; and (2) designed for a flow rate of 24 litres per minute or greater at an absolute pressure of 7000 kPa (1000psi) or greater; or	A

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- (ii) in the case of pumps, having both the following characteristics:
 - (1) a shaft speed of 8000 r.p.m. or greater; and
 - (2) providing a discharge pressure of 7000 kPa (1000psi) or greater.

PL7037 Vehicles designed or modified for the ground support of goods specified in IL1465 A

In this entry “ground support” means support in the form of transport, handling, control, activation or launching equipment for land or sea based goods.

IL1485 Inertial navigation systems, inertial equipment, gyroscopes (gyros) and accelerometers, and specially designed ODMA software therefor, the following: and specially designed components therefor—

(a) Gyro compasses with provision for determining and transmitting ship’s level reference data (roll, pitch) in addition to own ship’s course data C

(b) Integrated digital flight instrument systems which include gyrostabilisers or automatic digital flight control systems for aircraft and specially designed ODMA software for the integration thereof A

except—
(1) flight instrument systems integrated solely for VOR/ILS or MLS navigation and approaches;

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(2) integrated flight instrument systems which—

- (i) have been in normal civil use for more than two years; and
- (ii) are standard equipment of civil aircraft and civil helicopters;

An “integrated flight instrument system” means a primary instrument and display system using digital data processing techniques to provide manoeuvre guidance information

(c) Gyro-astro compasses A and other devices which derive position or orientation by means of automatically tracking celestial bodies

(d) Gyro-stabilisers used C for other purposes than aircraft control

except

- (1) those for stabilising an entire surface vessel;
- (2) those which have been in normal civil use for more than two years;

(e) Automatic pilots C used for purposes other than aircraft control and specially designed ODMA software for the integration thereof

except—

marine types for surface vessels;

(f) Accelerometers designed for use in inertial navigation systems or in guidance systems of all types, having either

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of the following characteristics—

(1) a threshold of 0.05 g or less A

(2) a non-linearity of less than 0.25 per cent of the full scale output A

(g) Gyros with a rated free directional drift rate (rated free precession) of less than 0.5° (1 sigma or root mean square value) per hour in a 1 g environment A

(h) Continuous output accelerometers and gyros, specified to function at acceleration levels greater than 100 g A

(i) Inertial or other equipment using accelerometers specified in head (f) or (h) above or gyros specified in head (g) or (h) above, and systems incorporating such equipment, and specially designed ODMA software for the integration thereof A

(j) Specially designed test calibration and alignment equipment for goods specified in heads (a) to (i) above A

GROUP 3F

Note: Goods specified in the heads of this Group may also be specified in Group 1 of this Part of this Schedule

Electronic equipment including Communications, Radar, and Scientific Instruments and Apparatus

PL7004	Electrical or electronic equipment, whether or not separately specified in an entry in this Schedule, in respect of which a certificate has been issued to the knowledge of the	W
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IL1501

exporter by or on behalf of the Secretary of State to the effect that the equipment to which the certificate relates meets or has been modified or designed to meet government standards concerned with the limitation of compromising electromagnetic radiation

Navigation, direction finding, radar and airborne communication equipment and technology, the following—

(a) Airborne communication equipment having any of the following characteristics: and specially designed components and specially designed ODMA software therefor,

(1) designed to operate at frequencies greater than 156 MHz C

(2) incorporating facilities for—

(i) the rapid selection of more than 200 channels per equipment; or C

(ii) equipment using frequency synthesis techniques except equipment operating in the frequency range of 108 to 137 MHz with 760 channels or fewer at not less than 25kHz spacing, and which has been in normal civil use for at least one year; C

(3) rated for continuous operation over a range of ambient temperatures extending from below -55°C to above $+55^{\circ}\text{C}$ C

(4) designed for modulating methods C

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employing any form of digital modulation using time and frequency redundancy such as Quantized Frequency Modulation (QFM) except— equipment which does not have the characteristics referred to in sub-head (a)(4) above and
(a) is to equip civil aircraft, or
(b) is normal standard equipment incorporated in civil aircraft.

(b) Navigation and direction finding equipment and technology, the following and specially designed components and specially designed ODMA software and specialised testing, calibrating and training/simulating equipment therefor—

(1) airborne navigation equipment and direction finding equipment and technology, the following—

(i) equipment designed to make use of Doppler frequency phenomena, except navigation equipment to be installed in civil aircraft or civil helicopters, and which is normal standard equipment

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of a type
installed in
civil aircraft
or civil
helicopters

(ia) technology for navigation equipment using Doppler frequency phenomena B

(ii) equipment utilising the constant velocity or the rectilinear propagation characteristics of electromagnetic waves having frequency less than 4×10^{14} Hz (0.75 micrometres) except— A

(a) standard commercial airborne equipment needed to equip civil aircraft or civil helicopters or as normal standard equipment incorporated in civil aircraft or civil helicopters being exported for civil commercial use provided such equipment is in conformity with ICAO standards and assures no functions exceeding those resulting from such standards, is not designed to make use of hyperbolic grids at frequencies greater than 3 MHz;

Note: Normal standard equipment includes Marker beacons ILS, VOR (OMNI), Omega, Loran A and B; or (b) Loran C equipment having all of the following characteristics:

(a) it has been in normal civil use for

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- a period of more than one year;
- (b) it is standard commercial equipment:
 - (1) needed to equip civil aircraft or civil helicopters; or
 - (2) incorporated in civil aircraft or civil helicopters;
- (c) it is equivalent in all characteristics and performances to standard equipment of aircraft not specified in entry IL1460 in Group 3E;
- (d) it is in conformity with ICAO standards;
- (e) it is not designed to make use of hyperbolic grids at frequencies higher than 3 MHz;
- (f) it does not contain electronic equipment which:
 - (1) can compute the position of the aircraft in one co-ordinate system when furnished position information in another co-ordinate system (namely co-ordinate conversion equipment);

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(2) is specified in entry IL1565 in Group 3G; (3) has been in normal civil use for a period of less than one year

or

(c) direction finding equipment specially designed for search and rescue purposes and operating at a frequency of 121.5 MHz or 243 MHz, and personal locator beacons operating in this form (which may also have an additional channel selectable for voice mode only);

(iii) radio altimeters, the following—

(a) pulse modulated A

(b) frequency modulated A

having a displayed electrical output accuracy better than ± 0.914 m over the range between 0 and 30.4 m or better than $\pm 3\%$ above 30.4 m except— standard commercial airborne equipment needed to equip civil aircraft or civil helicopters or as normal standard equipment incorporated in civil aircraft or civil helicopters being exported for civil commercial use, provided such equipment is equivalent in all characteristics and

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performance to standard equipment of aircraft not specified in entry IL1460 in Group 3E, and which are frequency-modulated radio altimeters which have been in normal civil use for a period of more than one year;

(c) frequency modulated A
which have been in
normal civil use for less
than one year

(iiia) technology for B
radio altimeters referred
to in sub-head (b)(1)(ii)
(b) above even when
excluded from that sub-
head

(iv) direction finding A
equipment operating at
frequencies greater than
5 MHz

(v) equipment rated for A
continuous operation
over a range of ambient
temperatures extending
from below -55°C to
above $+55^{\circ}\text{C}$

(2) Ground and marine C
equipment for use with
airborne navigation
equipment utilising the
constant velocity or the
rectilinear propagation
characteristics of electro-
magnetic waves having
a frequency less than
 4×10^{14} Hz (0.75
micrometres)

except— C
ground and marine
equipment for use with
airborne navigation
equipment using the
constant velocity or
rectilinear propagation
characteristics of electro-
magnetic waves having
a frequency less than 4

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$\times 10^{14}$ (wavelength 0.75 micrometre), provided, in the case of ground equipment, it is for use at civil airports or for civil use in association with civil airborne equipment, and—

- (1) is in conformity with ICAO standards and assures no function exceeding those resulting from such standards; and
- (2) is not designed to make use of hyperbolic grids at frequencies greater than 3 MHz;

(3) ground and marine direction finding equipment operating at frequencies greater than 30 MHz

except—

equipment, other than single side band equipment, operating at frequencies up to 157 MHz and employing a loop system or a system employing a number of spaced vertical aerials uniformly disposed around the circumference of a circle, excluding electronically commutated types;

(4) timing receivers whose only function is automatically providing time derived from satellite signals to within 1 millisecond of universal Co-ordinate Time (UCT) or better

C

(5) ground or marine navigation and geodetic positioning systems designed for use with satellite-provided timing

C

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positioning or navigation information

except— C
equipment which can only be used with TRANSIT satellite systems or other systems not also specified elsewhere in this Schedule, and which is also not specified in sub-head (b)(4) above. There shall be excluded from sub-heads (b)(4) and (5) global positioning satellite receivers which have all of the following characteristics:

- (1) capable only of processing the L1 channel (also called the Standard Positioning Service (SPS channel));
- (2) capable of only the Short-Term Code (Coarse Acquisition Code (C/A)) code with short term generation cycle;
- (3) no decryption capabilities;
- (4) including no cesium beam standards; and
- (5) including no null steerable antennae

(c) Radar equipment and specially designed components, specialised testing, calibrating and training/simulating equipment and specially designed software therefor, the following—

- (1) airborne radar equipment

except—
airborne civil weather-radar conforming to

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international standards for civil weather radar provided it does not include any of the following characteristics—

- (a) phased array antennas;
- (b) frequency agility;
- (c) spread spectrum; or
- (d) any signal processing specially designed for tracking of vehicles.

(2) ground and marine radar equipment, the following—

(i) equipment operating at a frequency not in normal civil use or at a frequency of more than 10.5 GHz A

(ii) equipment operating at a frequency of less than 1.5 GHz and having a peak output power from the transmitter greater than 2.5 MW; or operating at a frequency within the range of 1.5 to 3.5 GHz and having a peak output power from the transmitter greater than 1.5 MW; or operating at a frequency within the range of 3.5 to 6 GHz and having a peak output power from the transmitter greater than 1 MW; or operating at a frequency within the range of 6 to 10.5 GHz and having a peak output power from the transmitter greater than 500 kW A

(iii) equipment operating at a frequency of less A

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than 3.5 GHz and having an 80 per cent or better probability of detection for a 10 sq.m. target at a free space range of 250 nautical miles; or operating at a frequency within the range of 3.5 to 10.5 GHz and having an 80 per cent or better probability of detection for 10 sq.m. target at a free space range of 100 nautical miles

(iv) equipment utilising other than pulse modulation with a constant or staggered pulse repetition frequency, in which the carrier frequency of the transmitted signal is not changed deliberately between groups of pulses, from pulse to pulse, or within a single pulse A

except commercial civil airport radar using a carrier frequency that may change from pulse to pulse between two fixed frequencies separated in time and in frequency by constant magnitudes A

(v) equipment utilising a Doppler technique for any purpose other than M.T.I. systems using a conventional double or triple pulse delay line cancellation technique A

except those utilised for surveillance and control radar for aerial navigation in civil airports

(vi) equipment including any digital signal A

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processing techniques
used for automatic target
tracking, or having a
facility for electronic
tracking

(vii) equipment including A
signal processing
techniques (other than
those specified in sub-
head (c)(2)(vi) above,
which have been in
normal civil use for a
period of less than two
years)

(viii) equipment ground A
radar, having been in
commercial use for a
period of less than one
year

There shall be excluded
from head (c), secondary
radar equipment specially
designed for civil air traffic
identification and control
purposes.

The following shall be
excluded from this entry—

(a) equipment assemblies
for civil marine
automatic radar plotting
aids or electronic
relative motion analyzers
designed to achieve the
requirements published
by the International
Maritime Organization
in accordance with the
Safety of Life at Sea
(SOLAS) Conventions,
provided the designed
tracking speeds do not
exceed relative values of
greater than 150 knots
(77.1 metres/second);

(b) ground radar of
the hand-held and
automobile-mounted type
used for vehicle speed
monitoring by police
authorities and operating

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in the frequency band
from 10.5 to 10.55 GHz;

In this entry the terms “civil aircraft” and “civil helicopters” include only those types of civil aircraft and civil helicopters which are listed by designation in published airworthiness certification lists by any civil aviation authority to fly commercial civil internal and external routes or for normal civil, private or business use.

IL1502

Communication, detection or tracking equipment of a kind using ultra-violet radiation, infrared radiation or ultrasonic waves, and specially designed components and specially designed software therefor except— C

(1) the following ultrasonic devices—

(a) operating in contact with a controlled material to be inspected;

(b) used for industrial cleaning, sorting or materials handling;

(c) used for emulsification;

(d) used for homogenisation;

(e) used in simple educational devices;

(f) used in simple entertainment devices;

(2) underwater ultrasonic communications systems which do not have any of the following—

(a) electronic beam steering;

(b) encryption techniques; or

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- (c) a carrier frequency outside the range from 20 to 60 kHz;
- (3) the following equipment—
 - (a) industrial equipment employing cells not specified in the entry IL1548;
 - (b) industrial and civilian intrusion alarm, traffic and industrial movement control and counting systems;
 - (c) medical equipment;
 - (d) industrial equipment used for inspection, sorting or analysis of the properties of materials;
 - (e) simple educational devices which employ photocells;
 - (f) simple devices for entertainment or for home use which employ photocells;
 - (g) flame detectors for industrial furnaces;
 - (h) equipment for non-contact temperature measurement for laboratory or industrial purposes using a single detector cell with no scanning of the detector;
 - (i) instruments capable of measuring radiated power or energy having a response time constant exceeding 10 ms;
 - (j) equipment designed for measuring radiated power or energy for laboratory, agricultural or industrial purposes, using a single detector cell with no scanning of

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the detector, and single detector cell assemblies or probes specially designed therefor, having a response time constant exceeding 1 microsecond;

(k) infrared geodetic equipment, provided that equipment uses a lighting source other than a laser and is manually operated, or uses a lighting source (other than a laser or a light-emitting diode) remote from the measuring equipment;

(l) infrared communication equipment with characteristics not exceeding those referred to in entry IL1519;

(4) the following equipment—

(a) infrared thermal imaging equipment having all the following characteristics:

(1) the detector is a single element;

(2) the detector is neither a charge coupled device (CCD) nor an integrate-while-scan device;

(3) the detector is either:

(i) not cooled; or

(ii) cooled by using a liquid nitrogen Dewar vessel; and

(4) the equipment is:

(i) non-ruggedised, medical equipment; or

(ii) has both of the following:

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(a) a resolution not exceeding 22,500 resolvable elements; and

(b) a Noise Equivalent Temperature Difference (NETD) (or temperature sensitivity) of no less than 1K;

(b) infrared viewing equipment having all the following characteristics:

(1) the detector is a pyroelectric vidicon without reticle;

(2) the equipment is designed for fire fighting and buried body detection; and

(3) the optimal sensitivity is in the wavelength range from 8 to 14 micrometers.

Note: This entry includes infrared or ultra-violet sensing devices not specified in Group 1 of Part II of this Schedule and which contain image intensifiers specified in entry IL 1555 in this Group.

IL1510

Marine or terrestrial acoustic systems or equipment specially designed for detecting or locating underwater or subterranean objects or features or for determining the position of surface or underwater vehicles, the following, and specially designed components and specially designed ODMA software therefor—

(a) Marine systems or equipment—

(1) Active (transmitting or transmitting and receiving) systems or equipment, the following—

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(A) Wide swath bathymetric survey systems capable of both of the following C

(a) Measuring depths of more than 300 m below the water surface; and

(b) Taking measurements at an angle exceeding 10° (0.175 rad) from the vertical

(B) Object detection or location systems having any of the following characteristics—

(a) Transmitting frequency below 15 kHz C

(b) Sound pressure level exceeding 224 dB (reference 1 micropascal at 1 metre) for equipment with an operating frequency at or above 15 kHz and at or below 24 kHz C

(c) Sound pressure level exceeding 235 dB (reference 1 micropascal at 1 metre) for equipment with an operating frequency exceeding 24 but not exceeding 30 kHz C

(d) Transmission bandwidth exceeding $\pm 10\%$ of the design centre frequency C

(e) Designed to withstand pressure during normal operation at depths exceeding 1 km; C

or

(f) Capable of measuring distances over 5 km C

except—

depth sounders operating vertically below the apparatus and which do not include

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a scanning function used solely for measuring the depth of water or the distance of submerged or buried objects or for fish-finding.

(C) Acoustic projectors, including transducers, incorporating piezoelectric, magnetostrictive, electrostrictive, electrodynamic or hydraulic elements operating individually or in a designed combination, other than specially designed components for equipment described elsewhere in this entry, and having any of the following characteristics—

(a) An instantaneous radiated acoustic power density exceeding $10 \text{ W/m}^2/\text{Hz}$ for devices operating at frequencies below 100 kHz C

(b) A continuously radiated acoustic power density exceeding $1 \text{ W/m}^2/\text{Hz}$ C

for devices operating at frequencies below 100 kHz

(c) Designed to withstand pressure during normal operation at depths exceeding 1 km C

(d) Projecting sound with a beamwidth less than 3° (0.0524 rad) for devices operating at frequencies below 100 kHz C

or

(e) With side-lobe suppression exceeding 22 dB C

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except— electronic noise sources for vertical use only, mechanical noise sources or chemical noise sources.

(D) Acoustic systems or equipment for determining the position of surface or underwater vehicles, having any of the following characteristics—

(a) Capable of processing C responses from more than eight beacons in the calculation of a point

(b) Using coherent signal C processing between two or more beacons and the hydrophone unit carried by surface or underwater vehicle

(c) Having devices C for automatically correcting speed-of-sound propagation errors for calculation of a point

(d) Capable of operating C at a range of more than 1 km with a positional accuracy of within 20 m or better when measured at a range of 1 km

(e) Having transducers, C acoustic modules or hydrophones designed to withstand pressure at depths exceeding 1 km

or

(f) Having beacons with either of the following characteristics—

(1) Designed to operate C normally at depths exceeding 1 km

or

(2) Synchronised with C each other using sing-

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around or other self-calibrating techniques

(2) Passive (receiving, whether or not related in normal application to separate active equipment) systems or equipment, the following—

(A) Hydrophones or transducers having either—

(a) Continuous flexible sensors or assemblies of discrete sensors with dimensions under 20 mm which approximate a continuous flexible sensor C

or

(b) Sensors made of materials other than magnetostrictive nickel-iron alloys or rigid piezoelectric ceramics or crystals C

(B) Hydrophones or transducers incorporating sensors made of rigid piezoelectric ceramic or crystals and having any of the following characteristics—

(a) A sensitivity better than -180 dB at any depth with no acceleration compensation C

(b) A sensitivity better than -192 dB with acceleration compensation C

(c) A sensitivity better than -204 dB when designed for normal operation at depths exceeding 100 m C

or

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- (d) Designed for operation at depths exceeding 1 km C
- (C) Towed acoustic hydrophone arrays having any of the following characteristics—
 - (a) Operating at depths exceeding 100 m C
 - (b) Operating at tow speeds over 14.8 km/hour C
 - (c) Using heading sensors—
- (1) Incorporated within the array hosing C
 - (2) Having an accuracy within $\pm 0.5^\circ$ (0.0087 rad) C
 - (d) Hydrophone groups uniformly spaced at less than 25m C
 - (e) An assembled array diameter under 40 mm C
 - (f) Using other than metallic strength members C
 - (g) Multiplexed hydrophone group signals C
 - (h) A configuration for multiple or overlapping acoustic aperture operation C
 - (i) Hydrophone characteristics specified in sub-head (a)(2)(A) or (B) C
- or
- (j) Longitudinally reinforced array-hoses C
- (D) Processing equipment specially designed for acoustic

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- hydrophone or geophone arrays, having any of the following characteristics—
- (a) Electronically-steerable beamforming capabilities C
 - (b) Side-lobe suppression techniques C
 - (c) Real-time at-sea capability to integrate seismic acoustic data received from two or more arrays C
 - (d) Cancellation of array flow or acceleration noise C
 - (e) Either of the following features provided it has user-accessible programmability—
 - (1) Fast Fourier Transform of 1,024 complex points in less than 40 ms C
 - or
 - (2) An equivalent multiply rate exceeding 800,000 operations per second C
 - or
 - (f) User-accessible programmability for—
 - (1) Time domain processing and correlation C
 - or
 - (2) Frequency domain processing and correlation, including spectral analysis, digital filtering and beamforming using Fast Fourier or other transforms or processes C

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(b) Terrestrial systems or equipment having either of the following characteristics—

(1) Capable of conversion by the user to underwater or marine applications specified in this entry C

or

(2) Employing geophones or other transducers specified in this entry C

In this entry—

“acoustic power density” is obtained by dividing the output acoustic power by the product of the area of the radiating surface and the frequency of operation;

the sensitivity of a hydrophone is defined as 20 times the logarithm to the base 10 of the ratio of rms output voltage to a 1 V reference, when the hydrophone sensor, without a pre-amplifier, is placed in a plane wave acoustic field having an rms pressure of 1 micropascal.

IL1516

Receivers, the following: and specially designed components, accessories and specially designed ODMA software therefor—

(a) Digitally controlled radio receivers (whether or not computer controlled) which—

(1) search or scan automatically a part of the electromagnetic spectrum, and indicate or identify the received signals; and

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(2) complete the switching operation in less than 4.5ms C

except–

non-ruggedised, pre-set radio receivers designed for use in civil communications which have 1,000 selective channels or fewer;

(b) Receivers for spread spectrum and frequency agile systems, having a total transmitted bandwidth which is–

(1) 100 or more times the bandwidth of any one information channel; and

(2) in excess of 50 kHz C

(c) Receivers which incorporate digital signal processing C

except–

receivers which are specially designed for internationally allocated civil frequency bands only and which do not permit user-accessible programmability of the digital signal processing circuits.

In this entry–

“spread spectrum” means the technique whereby energy in a narrow-band communication channel is spread over a much wider energy spectrum under the control of a random or pseudo-random bit stream; on receipt, the signal is correlated with the same bit stream to achieve the reverse process of reducing the bandwidth to its original form; by allocating different bit streams to different subscribers transmitting

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simultaneously,
significantly greater use
can be made of available
bandwidth;

“frequency agility”
means a system in
which the transmission
frequency of a single
communication channel
is made to change by
discrete steps under
the control of a similar
bit stream (sometimes
known as frequency
hopping).

IL1517

Radio transmitters, the
following: and specially
designed components therefor—

(a) Transmitters or
transmitter-amplifiers C
designed to operate
at output frequencies
greater than 960 MHz

(b) Transmitters or
transmitter-amplifiers
designed to provide
any of the following
features—

(1) any system of pulse C
modulation (this does
not include amplitude,
frequency or phase-
modulated televisions or
telegraphic transmitters
or pulse-width modulated
sound broadcasting
transmitters)

(2) rated for operation C
over a range of ambient
temperatures extending
from below -40°C to
above $+60^{\circ}\text{C}$

(c) Transmitters for C
spread spectrum and
frequency agile systems
having a total transmitted
bandwidth which is—

(1) 100 or more
times greater than the

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bandwidth of any one information channel; and

(2) in excess of 50 kHz;

There shall be excluded from this entry transmitters or transmitter-amplifiers, or systems containing such equipment, accessories and sub-assemblies therefor, with any of the following characteristics—

(i) specially designed for medical applications and operating at ISM frequencies;

(ii) having an output power of not more than 10 W, which are specially designed for—

(1) industrial or civil intrusion detection and alarm;

(2) industrial and traffic detection, counting, speed measurement, identification and movement control; or

(3) carrying information from equipment within paragraph (a) or (b)(1) or (b)(2) to this exception or the information from environmental, air or water pollution detection or measurement systems.

(iii) transmitters using wideband amplifiers designed for non-frequency agile civil applications.

For the purposes of this entry “spread spectrum” and “frequency agile” are as defined in entry IL1516 above.

PL7003

Burst transmitters and associated receiving equipment (except simple on-line morse or other data signal convertors

W

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or standard items of ADP equipment) and specialized assemblies, sub-assemblies and components therefor

In this entry a “burst transmitter” is any electronic equipment or device for use with radio or other communications systems, whether part of a transmitter or modulation device or ancillary to it, which has a capability to accept and store data (telegraphic, speech or other) and to transmit these at transmission speeds/bit rates which are multiples of the input keying speed/bit rates, the purpose or effect of which is to reduce total message duration time and thus to evade detection by other than the intended recipient.

PL7020

Telemetering and telecontrol equipment suitable for use with aircraft (piloted or pilotless), space vehicles or weapons (guided or unguided), and specially designed test equipment therefor

A

except—

equipment specially designed to be used for remote control of model planes, boats or vehicles and having an electric strength of not more than 200 microvolts per metre at a distance of 500 metres.

IL1519

Telecommunication transmission equipment, measuring and test equipment, the following: and specially designed components, accessories and specially designed ODMA software therefor—

(a) Telecommunication transmission equipment employing digital techniques (including

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the digital processing of analogue signals) and having any of the following characteristics—

(1) designed for a total digital transfer rate which, at the highest multiplex level, exceeds—

(A) 45 Mbit/s C

(B) 8.5 Mbit/s, in the case of stored programme controlled digital cross-connection equipment

or

(C) 90 Mbit/s, to take account of line coding and overhead, for:

(a) line terminating equipment C

(b) intermediate amplifier equipment C

(c) repeater equipment C

(d) regenerator equipment C

(e) translation encoders (transcoders) C

(2) designed for a data signalling rate which exceeds—

(A) 9,600 bit/s, when using the bandwidth of one voice channel C

or

(B) 64,000 bit/s, when using baseband C

or

(3) employing a laser having a transmission wavelength exceeding 1,000nm C

(b) Telecommunication transmission equipment

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employing lasers and
any of the following
techniques–

(1) in the case of C
equipment which has a
bandwidth which exceeds
45 MHz or an operating
wavelength longer than
1,370 nm, analogue
techniques

(2) optical heterodyne C
or homodyne detection
techniques (also
called coherent optical
transmission techniques)

or

(3) wavelength division C
multiplexing techniques

(c) Electronic measuring C
or test equipment,
including bit error
rate test sets, specially
designed for equipment
designed for the total
digital transfer rate
specified in sub-head (a)
(1) above

(d) Technology for D
the development or
production of equipment
employing digital
transmission techniques
for operation at a total
digital transfer rate at the
highest multiplex level
exceeding 8.5 Mbit/s

There shall be excluded from
this entry:

(a) telemetering,
telecommand and
telesignalling equipment
designed for industrial
purposes (being sensing
heads for the conversion
of information into
electrical signals, and
for the systems used
transmitting these
electrical signals long

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distances and translating them into coded data, into control signals and into display signals);

(b) facsimile equipment not specified by entry IL1527 in Group 3F;

(c) equipment employing exclusively the direct current transmission technique.

In this entry:

“data signalling rate” has the meaning as in entry IL1567 in Group 3G;

“telecommunication transmission equipment” means equipment which is—

(a) any, or any combination, of the following:

(1) line terminating equipment;

(2) intermediate amplifier equipment;

(3) repeater equipment;

(4) regenerator equipment;

(5) translation encoders (transcoders);

(6) multiplex equipment;

(7) modulators or demodulators (modems);

(8) transmultiplex equipment; or

(9) stored programme controlled digital cross-connection equipment; and

(b) designed for use in single or multi-channel communication via:

(1) wire (line);

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- (2) coaxial cable;
- (3) optical fibre cable; or
- (4) electromagnetic radiation.

IL1520

Radio relay communication equipment, specially designed test equipment, software and technology, the following: and specially designed components and accessories therefor—

- (a) Radio relay communication equipment designed for use at frequencies exceeding 960 MHz except—
 - (1) microwave radio links for fixed civil installations, which—
 - (A) employ analogue transmission; and
 - (B) are designed for operation at fixed frequencies not exceeding 23.6 GHz;
 - (2) microwave radio links which
 - (A) employ digital transmission techniques;
 - (B) are designed for operation at a total digital transfer rate not exceeding 45 Mbit/s or, taking into account line coding and overhead, 90 Mbit/s;
 - (C) if the total digital transfer rate exceeds 8.5 Mbit/s, do not employ quadrature-amplitude-modulation (QAM) techniques above level 4; and
 - (D) operate at fixed frequencies not exceeding 23.6 GHz;

W

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(3) ground communication radio equipment designed for civil use with temporarily fixed services and at fixed frequencies not exceeding 23.6 GHz with a power output of not more than 5W;

(4) civil sound or television broadcast receiving stations for satellite reception, which—

(A) are designed to comply with ITU standards;

(B) are specially designed for use at fixed frequencies allocated by the International Telecommunications Union (ITU) for civil television or sound radio satellite broadcasting; and

(C) operate at frequencies not exceeding 31 GHz;

(5) equipment which is—

(A) specially designed for the transmission of television signals; and

(B) operates at frequencies not exceeding 23.6 GHz;

(6) equipment which is—

(A) specially designed to be installed and operated in satellite earth stations for the following civil uses—

(a) communication and direct broadcast;

(b) telemetry-tracking-and-command; or

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(c) weather or meteorological purposes; and

(B) designed for an operating frequency not exceeding 31 GHz;

(b) Tropospheric scatter communication equipment C

except—

equipment which has all the following characteristics, namely, that it:

(1) is designed for fixed civil use;

(2) operates at fixed frequencies of 2.7 GHz or less;

(3) uses frequency modulation; and

(4) has a power amplifier output of 10 kW or less;

(c) Stand-alone radio transmission media simulators or channel estimators and specially designed ODMA software therefor, specially designed for testing equipment specified in head (a) or (b) above C

except—

equipment in which the adjustments can only be made manually;

(d) Technology:

(1) for equipment employing quadrature-amplitude-modulation (QAM) techniques or otherwise specified in head (a) above D

except—

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technology for equipment employing quadrature-amplitude-modulation techniques, where such technology is for the installation, operation or maintenance of such equipment;

(2) for equipment specified in paragraph (6) of the exception to head (a) above

except—

technology for the installation, operation or maintenance of such equipment;

(3) for equipment excluded from this entry by paragraph (1) or (2) below

except—

technology for the installation, operation or maintenance of such equipment;

There shall be excluded from this entry—

(1) equipment for civil television transmission or for general commercial traffic, which—

(a) is not designed for operation at a total digital transfer rate exceeding 45 Mbit/s;

(b) does not employ quadrature-amplitude-modulation (QAM) techniques; and

(c) has a maximum operating frequency not exceeding 23.6 GHz;

(2) analogue microwave transmission equipment for civil industrial use (for example, remote

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supervision, control and metering of oil and gas pipelines, use in electricity networks and other civil public utility services including use in telephone channels for the operation of electricity networks and in the engineering service circuits required for the maintenance of telecommunication links), provided the maximum operating frequency does not exceed 23.6 GHz.

PL7008

Tropospheric scatter communication equipment using analogue or digital modulation techniques

L,I

IL1522

Lasers, the following: and specially designed components and accessories therefor including amplification stages—

(a) Gas lasers, the following—

(1) Excimer lasers having any of the following characteristics—

(A) An output wavelength not exceeding 150 nm and having either of the following characteristics—

(a) An output energy exceeding 50 mJ per pulse C

or

(b) An average or continuous wave (CW) output power exceeding 1 W C

(B) An output wavelength exceeding 150 nm but not exceeding 190 nm

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and having either of the following characteristics—

(a) An output energy exceeding 1.5 J per pulse C

or

(b) An average or CW output power exceeding 120 W C

(C) An output wavelength exceeding 190 nm but not exceeding 360 nm and having either of the following characteristic—

(a) An output energy exceeding 5 J per pulse C

or

(b) An average or CW output power exceeding 500 W C

(D) An output wavelength exceeding 360 nm and having either of the following characteristics—

(a) An output energy exceeding 1.5 J per pulse C

or

(b) An average or CW output power exceeding 30 W C

(2) Metal vapour lasers, the following—

(A) Copper (Cu) lasers with an average or CW output power exceeding 20 W C

(B) Gold (Au) lasers with an average or CW output power exceeding 5 W C

(C) Sodium (Na) lasers with an output power exceeding 5 W C

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(3) Carbon monoxide (CO) lasers having either of the following characteristics—

(A) An output energy exceeding 2 J Per pulse and a pulsed peak power exceeding 5,000 W C

or

(B) An average or CW output power exceeding 5,000 W C

(4) Carbon dioxide (CO²) lasers having any of the following characteristics—

(A) A CW output power exceeding 10 kW C

(B) A pulsed output with a pulse duration exceeding 10 microsecond and having either of the following characteristics—

(a) An average output power exceeding 10 kW C

or

(b) A pulse peak power exceeding 100 kW C

(C) A pulsed output (including those which run in a CW mode with pulses superimposed) with a pulse duration not exceeding 10 microsecond but exceeding 500 ns and having either of the following characteristics—

(a) A pulse energy exceeding 5 J C

or

(b) An average output power exceeding 1.2 kW C

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(D) A pulsed output with a pulse duration not exceeding 500 ns and having either of the following characteristics—

(a) A pulse energy exceeding 2 J C

or

(b) An average output power exceeding 1.2 kW C

(5) Chemical lasers, the following—

(A) Hydrogen Fluoride (HF) lasers C

(B) Deuterium Fluoride (DF) lasers C

(C) Oxygen Iodine (O² I) lasers C

(6) Gas discharge and ion lasers, the following—

(A) Nitrogen lasers with either of the following characteristics—

(a) An output energy exceeding 1.5 J per pulse and a pulsed peak power exceeding 120 W C

or

(b) An average or CW output power exceeding 120 W C

(B) Krypton ion or argon ion lasers with either of the following characteristics—

(a) An output energy exceeding 1.5 J per pulse and a pulsed peak power exceeding 30 W C

or

(b) An average or CW output power exceeding 30 W C

(7) Other gas lasers having any of the following characteristics—

(A) An output wavelength not exceeding 150 nm and having either of the following characteristics—

(a) An output energy exceeding 50 mJ per pulse and a pulsed peak power exceeding 1 W C

or

(b) An average or CW output power exceeding 1 W C

(B) An output wavelength exceeding 150 nm but not exceeding 800 nm and having either of the following characteristics—

(a) An output energy exceeding 1.5 J per pulse and a pulsed peak power exceeding 30 W C

or

(b) An average or CW output power exceeding 30 W C

(C) An output wavelength exceeding 800 nm but not exceeding 1,400 nm and having either of the following characteristics—

(a) An output energy exceeding 0.25 J per pulse and a pulsed peak power exceeding 10 W C

or

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(b) An average or CW output power exceeding 10 W C

(D) An output wavelength exceeding 1,400 nm and an average or CW output power exceeding 1 W C

(b) Semiconductor lasers or laser diodes, the following—

(1) Individual semiconductor lasers having either of the following characteristics—

(A) An average output power exceeding 100 mW C

or

(B) A wavelength exceeding 1,000 nm C

(2) Arrays of semiconductor lasers incorporating individual semiconductor lasers, having any of the following characteristics—

(A) An output energy exceeding 500 microjoules per pulse and a pulsed peak power exceeding 10 W C

(B) An average or CW output power exceeding 10 W C

or

(C) A wavelength exceeding 1,000 nm C

(c) Solid state lasers (including titanium-sapphire and alexandrite lasers), the following—

(1) Tunable lasers having any of the following characteristics—

(A) an output wavelength less than 600 nm and having either of the following characteristics—

(a) An output energy exceeding 50 mJ per pulse and a pulsed peak power exceeding 1 W C

or

(b) An average or CW output power exceeding 1 W C

(B) An output wavelength of 600 nm or more but not exceeding 1,400 nm and having either of the following characteristics—

(a) An output energy exceeding 0.5 J per pulse and a pulsed peak power exceeding 20 W C

or

(b) An average or CW output power exceeding 20 W C

(C) An output wavelength exceeding 1,400 nm and having either of the following characteristics—

(a) An output energy exceeding 50 mJ per pulse and a pulsed peak power exceeding 1 W C

or

(b) An average or CW output power exceeding 1 W C

(2) Non-tunable lasers, including rare earth

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- doped solid-state lasers,
the following—
- (A) Ruby lasers having an output energy exceeding 20 J per pulse C
 - (B) Neodymium glass lasers having an output energy exceeding 20 J per pulse C
 - (C) Neodymium doped (other than glass) lasers having an output wavelength between 1,000 nm and 1,100 nm and any of the following characteristics—
 - (a) Pulse-excited and Q-switched, having either of the following characteristics—
 - (1) A single transverse mode output having any of the following characteristics—
 - (A) A peak power exceeding 100 MW C
 - (B) An average output power exceeding 20 W Cor
 - (C) A pulsed energy exceeding 2 J C
 - (2) A multiple-transverse mode output having any of the following characteristics—
 - (A) A peak power exceeding 200MW C
 - (B) An average output power exceeding 50W Cor
 - (C) A pulsed energy exceeding 2J C
 - (b) Pulse-excited (including those which run in a continuously

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excited mode with pulse excitation superimposed), and non-Q-switched, having either of the following characteristics—

(1) A single transverse mode output having either of the following characteristics—

(A) A peak power exceeding 100kW C

or

(B) An average output power exceeding 50W C

(2) A multiple transverse mode output having either of the following characteristics—

(A) A peak power exceeding 1MW C

or

(B) An average power exceeding 500W C

(c) Continuously excited and having either of the following characteristics—

(1) A single transverse mode output having either of the following characteristics—

(A) A peak power exceeding 100kW C

or

(B) An average or CW output power exceeding 50W C

(2) A multiple-transverse mode output having either of the following characteristics—

(A) A peak power exceeding 1MW C

or

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(B) An average or CW C
output power exceeding
500W

(D) Other non-tunable
lasers, having any
of the following
characteristics—

(a) A wavelength less
than 150nm and having
either of the following
characteristics—

(1) An output energy C
exceeding 50mJ per
pulse and a pulsed peak
power exceeding 1W

or

(2) An average or CW C
output power exceeding
1W

(b) A wavelength
of 150nm or more
but not exceeding
800nm and having
either of the following
characteristics—

(1) An output energy C
exceeding 1.5 joules per
pulse and a pulsed peak
power exceeding 30W

or

(2) An average or CW C
output power exceeding
30W

(c) A wavelength
exceeding 800nm
but not exceeding
1,400nm and having
any of the following
characteristics—

(1) Q-switched lasers
with any of the following
characteristics—

(A) An output energy C
exceeding 0.5J per pulse
and a pulsed peak power
exceeding 50W

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(B) An average output power exceeding 10W for single-mode lasers C

or

(C) An average output power exceeding 30W for multimode lasers C

(2) Non-Q-switched lasers with either of the following characteristics—

(A) An output energy exceeding 2J per pulse and a pulsed peak power exceeding 50W C

or

(B) An average or CW output power exceeding 50W C

(d) A wavelength exceeding 1,400nm and having either of the following characteristics—

(1) An output energy exceeding 100mJ per pulse and a pulsed peak power exceeding 1W C

or

(2) An average or CW output power exceeding 1W C

(d) Dye and other liquid lasers, having any of the following characteristics—

(1) A wavelength less than 150nm and having either of the following characteristics—

(A) An output energy exceeding 50mJ per pulse and a pulsed peak power exceeding 1W C

or

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(B) An average or CW C
output power exceeding
1W

(2) A wavelength
of 150nm or more
but not exceeding
800nm, and having
any of the following
characteristics–

(A) An output energy C
exceeding 1.5J per pulse
and a pulsed peak power
exceeding 20W

(B) An average or CW C
output power exceeding
20W

or

(C) A pulsed single C
longitudinal mode
oscillator with an average
output power exceeding
1W and a repetition rate
exceeding 1kHz if the
pulse duration is less than
100ns

(3) A wavelength
exceeding 800nm
but not exceeding
1,300nm, and having
either of the following
characteristics–

(A) An output energy C
exceeding 0.5J per pulse
and a pulsed peak power
exceeding 10W

or

(B) An average or CW C
output power exceeding
10W

(4) A wavelength
exceeding 1,300nm,
and having either
of the following
characteristics–

(A) An output energy C
exceeding 100mJ per

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pulse and a pulsed peak power exceeding 1W

or

(B) An average or CW output power exceeding 1W C

(e) Free electron lasers C

excepted from this entry are helium-neon and helium-cadmium lasers.

In this entry—

“tunable” refers to the ability of a laser to produce an output at any wavelength within its tuning range. A line-selectable laser which can operate only on discrete wavelengths is not tunable;

“specially designed components” includes active and passive components in semi-fabricated forms as well as in fabricated forms;

a “laser” is an assembly of components designed to produce a coherent light which is amplified by stimulated emission of radiation.

Note: Lasers contained in equipment described in other entries in this Schedule are dealt with in the appropriate entry.

PL7021	Laser-radar (lidar) equipment, and specially designed components therefor except— when specially designed for surveying or meteorological observation.	A
IL1526	Optical fibres, optical fibre cables and other cables and	

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components and accessories,
the following—

(a) Unarmoured or C
single-armoured
ocean cable having an
attenuation of 1.62dB/
km (3.0 dB per nautical
mile) or less, measured at
a frequency of 600kHz

(b) Optical-fibre
communication cable
or optical fibres
therefor, having any
of the following
characteristics—

(1) the optical fibre is C
designed for single mode
light propagation

(2) the optical fibre—

(i) is designed for
multimode light
propagation; and

(ii) has an attenuation of C
less than 1.0 dB/km at a
wavelength of 1300nm

(3) the optical fibre is C
capable of withstanding a
proof test tensile strength
of 1.1×10^9 N/m² or
more

(4) the optical fibre is C
specially designed for
underwater use or

(5) the optical fibre C
is specially designed
to be insensitive to
nuclear radiation

except pigtails (that
is to say, pieces of
optical fibre or optical
fibre cable no longer
than 50m, whether
attached to components
or instruments or not)
which are not nuclear
radiation hardened.

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(c) Optical fibres for sensing purposes, having any of the following characteristics—

(1) specially fabricated either compositionally or structurally, or modified by coating to be acoustically, thermally, inertially, electromagnetically or nuclear radiation sensitive C

(2) modified structurally or by coating to have either—

(i) a beat length of more than 50cm (low birefringence), except if designed for operation at wavelengths of less than 650nm; or

(ii) a beat length of less than 5cm (high birefringence) C

(d) Secure communication cable, being either coaxial or multiconductor communication cable protected by mechanical or electrical means from physical damage or intrusion in such a manner that communications security is maintained between terminals without the necessity for encryption C
except cable which is armoured only by either a tough outer sheath or by an electromagnetic screen

(e) Components and accessories specially designed for the optical fibres or cable specified in this entry including C

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fibre-optic bulkhead or hull penetration connectors impervious to leakage at any depth for use in ships or vessels, and multipoint fibre-optic couplers (including T, star, bidirectional and wavelength division multiplexing and demultiplexing couplers) except connectors for use with optical fibres or cable with a repeatable coupling loss of 0.5dB or more.

In this entry–

“beat length” means the distance, over which two orthogonally polarised signals, initially in phase, must pass in order to achieve 2Pi radian(s) phase difference;

“proof test” consists of on-line or off-line production screen testing that dynamically applies a prescribed tensile stress over a 0.5 to 3m length of fibre at a running rate of 2 to 5m/s while passing between capstans approximately 15cm in diameter. The ambient temperature is a nominal 20°C and relative humidity 40%.

IL1527

Cryptographic equipment designed to ensure secrecy of communications (such as telegraphy, telephony, facsimile, video, and data communications) or of stored information; and specially designed components therefor, and software controlling or computers performing the functions of such cryptographic equipment C

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except simple cryptographic devices or equipment ensuring only the privacy of communications, the following—

(a) equipment for voice transmission making use of fixed frequency inversions or fixed band scrambling techniques in which the transposition changes occur not more frequently than once every 10seconds;

(b) standard civil facsimile and video equipment designed to ensure the privacy of communications by an analogue transmission using non-standard practices for intended receivers only (video system equipment effecting the transposition of analogue data);

(c) video systems for pay television and similar restricted audience television, including industrial and commercial television equipment using other than standard commercial sweep systems

Note 1. This entry includes video systems which, for secrecy purposes, use digital techniques (conversion of an analogue, ie video or facsimile signal into a digital signal).

Note 2. Digital computers and digital differential analysers (incremental computers) designed or modified for, or combined with, any cypher machines, cryptographic equipment devices or techniques including software,

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IL1529	<p>microprogramme control (firmware).</p> <p>Electronic equipment for testing, or measuring for microprocessor or microcomputer development, the following: and specially designed software therefor—</p> <p>(a) Any testing or measuring equipment—</p> <p>(1) not specified in any other entry in this Schedule C</p> <p>(2) designed for use at frequencies exceeding 18GHz C</p> <p>except the following equipment having a maximum specified operating frequency of 26.5GHz or less—</p> <p>(1) power meters;</p> <p>(2) broadband noise sources;</p> <p>(3) noise figure meters;</p> <p>(b) Logic analysers having any of the following characteristics: and specially designed accessories and specially designed components therefor—</p> <p>(1) more than a total 64 channels C</p> <p>(2) a synchronous (state) channel sampling rate of more than 50MHz C</p> <p>(3) an asynchronous (timing) channel sampling rate of more than 200MHz C</p> <p>(4) probe interfaces and inverse assemblers, except those designed for use with a microprocessor C</p>
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or microcomputer
microcircuit family
which contains at least
one microprocessor
or microcomputer
microcircuit that is not
specified in entry IL1564

(c) Caesium frequency C
standards having
both of the following
characteristics

(1) designed as reference
standards for laboratory
use;

(2) either of the
following:

(A) a long-term drift
(ageing) over 24 hours or
more of 1 part or less in
 10^{10} ; or

(B) a short-term drift 12
(instability) over a period
from 1 to 100seconds of
1 part or less in 10

(d) Equipment containing
Caesium frequency
standards, having
any of the following
characteristics–

(1) designed for mobile C
use and having a long-
term drift (ageing)
over 24 hours or more of
1 part or less in 10^9

(2) designed for fixed C
ground use and having a
long-term drift (ageing)
over 24 hours or more of
5 parts or less in 10^{10}

(3) a short-term drift C
(instability) over a period
from 1 to 100seconds of
1 part or less than 10^{12}

(e) Comb frequency C
generators designed
for use at frequencies
exceeding 12.5GHz

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(f) Specially calibrated microwave instrumentation receivers capable of measuring amplitude and phase simultaneously and designed for use at frequencies exceeding 1GHz C

(g) Digital counters, the following—

(1) those capable of performing frequency measurements above 20GHz C

(2) those capable of performing either the frequency or the change in phase or frequency within a pulse (pulse frequency profiling) using either internally or externally gated sampling intervals of 100ns or less C

(3) those capable of measuring burst frequencies exceeding 250MHz for a burst duration of less than 2ms C

(i) Digital voltage measuring equipment capable of more than 1,000 readings per second with a resolution of more than 4½ digits, not including changes in range or polarity C

except—

(A) visual quantisation apparatus capable of providing an average value, displayed or not, of the results of the measurement;

(B) multichannel analysers of all types used in nuclear experimentation;

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(C) industrial telemeasuring devices in which a pre-set storage value is used as a basis for measuring.

(j) General purpose data communication protocol analysers, testers and simulators for X.25 level 3 and above as well as Integrated Service Digital Network protocols (CCITT-ISO) C

(k) Microprocessor or microcomputer development instruments or systems (including specially designed accessories and personality modules) which are capable of developing software or programming microcircuits specified in entry IL1564 in Group 3F, the following—

(A) Cross-hosted assemblers and cross-hosted compilers C

(B) Adapter interfaces for prototypes and/or emulation probes C

(C) Debuggers C

except—

1. Personality modules which contain only one of the accessories specified in (A) to (C) above;

2. Microprocessor or microcomputer development instruments or systems having all the following characteristics—

(a) they can be used to develop software for, or to programme a

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family of microprocessor
or microcomputer
microcircuits not
designed or produced
in a country listed in
Schedule 2;

(b) they can be used
only for microprocessor
or microcomputer
microcircuits having
both—

(1) an operand (data)
word length of no more
than 16 bit; and

(2) an arithmetic logic
unit (ALU) not wider
than 32 bit;

(c) the family contains at
least one microprocessor
or microcomputer
microcircuit which is
excluded from entry
IL1564 in Group 3F.

In this entry—

“burst frequency”
measurement means the
capability of counter
to start only when the
input signal is present
and stop counting at the
completion of the burst;

“comb frequency
generators” means
apparatus which generate
a spectrum of harmonics;

“family” means a group
of microprocessor
or microcomputer
microcircuits which
have—

(a) the same architecture;

(b) the same basic
instruction set; and

(c) the same basic
technology (eg only
NMOS or only CMOS);

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“frequency (heterodyne) converters” means equipment which down-converts an unknown frequency by mixing it with an accurately known frequency.

This accurately known reference frequency is derived from a crystal, by multiplication of its frequency and passing it through a harmonic generator. By mixing the appropriate harmonic and the unknown frequency, an accurate third frequency results;

“pulse frequency profiling” means the capability of measuring the changes of frequency (or phase) within a pulse as a function of time; such changes in frequency would be present in a transmitted pulse-compression radar pulse (chirp radar).

This profiling may be achieved by internal or external gating. Pulse frequency profiling is not intended to include frequency modulation tolerance while it is being frequency modulated;

“transfer oscillators” means oscillators based on the principle of harmonic mixing. The known reference frequency is derived from a local oscillator instead of from a crystal. The unknown frequency is mixed with the local oscillator frequency, the two are phase-locked by tuning the local oscillator

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and can then be measured
by a counter.

IL1531

Frequency synthesisers, and
equipment containing such
frequency synthesisers, and
technology, the following—

(a) Frequency synthesisers containing frequency standards specified in head (c) in entry IL1529 in Group 3F C

(b) Instrument frequency synthesisers and synthesised signal generators, and specially designed components and accessories therefor, designed for ground use, and producing output frequencies the accuracy of which and the short term and long term stability of which are controlled by, derived from, or disciplined by the input frequency or internal master standard frequency, and having any of the following characteristics—

(1) a maximum synthesised output frequency of more than 550 MHz C

(2) any of the following noise characteristics—

(A) a single sideband (SSB) phase noise better than -120 dBc/Hz when measured at a 20 kHz offset from the carrier frequency C

(B) a single sideband (SSB) phase noise better than -106 dBc/Hz when measured at a 100 Hz offset from the carrier frequency C

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(C) an integrated phase noise better than -60 dBc/Hz referred to a 30kHz band centred on the carrier, excluding the 1Hz band centred on this carrier

or

(D) an integrated AM noise better than -70 dBc/Hz referred to a 30 kHz band centred on the carrier, excluding the 1Hz band centred on this carrier

except—
synthesised signal generators having the characteristics specified in paragraph (1) or (2)(A) above and a maximum synthesised output frequency of 1,400 MHz or a single sideband phase noise of not less than -136 dBc/Hz when measured at an offset of 20 kHz from a carrier frequency of 100 MHz, provided that the technology supplied is the minimum necessary for the installation, operation and maintenance of the generator;

(3) electrically programmable in frequency, with a frequency switching time of less than 5ms

(4) electrically programmable in phase, with a switching time from one selected phase value to another of less than 10ms, except where incorporating pre-emphasis networks from frequency modulation

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(5) a level of spurious components in the output, measured relatively to the selected output frequency, better than—

(A) –60 dB harmonic C

or

(B) –92dB non-harmonic C

(6) more than 3 different selected synthesised output frequencies available simultaneously from one or more outputs C

(7) facilities for pulse modulation of the output frequency C

(c) Airborne communication equipment using frequency synthesisers, the following: and specially designed components and accessories therefor—

(1) equipment designed to receive or transmit frequencies of more than 156 MHz C

(2) equipment which incorporates facilities for the rapid selection of more than 200 channels per item of equipment C

except equipment which operates in the frequency range of 108 to 137 MHz, incorporates facilities for the rapid selection of 760 channels or fewer at not less than 25 kHz channel spacing and has been in normal civil use for at least one year;

(3) equipment with a frequency switching time of less than 10 ms C

(4) frequency synthesisers designed for the airborne communication equipment specified above (whether supplied therewith or separately), exceeding any of the parameters referred to in head (b) above C

(d) Radio transmitters using frequency synthesis and incorporating transmitter drive units, exciters and master oscillators, the following: and specially designed components and accessories therefor—

(1) equipment having an output frequency of more than 550 MHz C

except:

(A) television broadcasting transmitters having all of the following characteristics—

(a) an output frequency not exceeding 960 MHz;

(b) a frequency resolution of not better than 1 kHz; and

(c) there is incorporated in or driving the transmitter a manually-operated frequency synthesiser which has an output frequency not exceeding 120MHz;

(B) ground communication equipment designed for civil use in the land mobile or marine services (for example cellular radio communications systems, amateur radio or

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portable radiophone) and having all the following characteristics—

- (a) an operating frequency of not more than 1.3 GHz;
- (b) a power output of 50 W or less for mobile units, or 300 W or less for fixed units;
- (c) in the case of cellular radio base stations, use of analogue radio transmission only;
- (d) a transmitter frequency switching time of 2 ms or more;
- (e) a frequency resolution of not better than 2.5 kHz;
- (f) none of the features specified in head (c) of entry IL1517 in Group 3F;

(2) equipment having more than three different selected synthesised output frequencies available simultaneously from one or more outputs C

(3) equipment with facilities for pulse modulation of the output frequency of the transmitter or of the incorporated frequency synthesiser C

(4) frequency synthesisers designed for radio transmitters incorporating transmitter drive units, exciters and master oscillators (whether supplied therewith or separately) exceeding any of the parameters referred to in head (b) above C

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except—
those specially
designed for radio
telephones described
in the exception in
paragraph (1)(B) above;

(e) Technology for D
equipment referred to
in paragraph (1)(B)
of the exception to
head (d) above, where
such technology is for
the development or
production of digital
equipment or of specially
designed ODMA
software for use in
digital civil land mobile
networks

There shall be excluded
from this entry equipment in
which the output frequency
is produced by the addition
or subtraction of two or more
crystal oscillator frequencies,
whether or not followed by
multiplication of the result.

In this entry—

“frequency switching
time” means the
maximum time (ie
delay), when switched
from one selected
output frequency to
another selected output
frequency, to reach:

(a) a frequency within
100 Hz of the final
frequency; or

(b) an output level within
1.0 dB of the final output
level;

“frequency synthesiser”
means any kind of
frequency source
or signal generator,
regardless of actual
technique used,
providing a multiplicity

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(c) Swept frequency network analysers or sweep generators, the following—

(1) Those for the automatic measurement of complex equivalent circuit parameters over a range of frequencies and having a maximum operating frequency exceeding 20 GHz; C

(2) Those which cannot be controlled remotely for the measurement of complex equivalent circuit parameters over a range of frequencies and having a maximum operating frequency exceeding 40 GHz C

except—
equipment for continuous wave, point-to-point measurement.

(d) Scalar network analysers having a maximum operating frequency exceeding 20 GHz C

There shall be excluded from this entry—

(a) optical spectrum analysers such as—

(1) prism or grating monochrometers;

(2) optical interferometers;

(3) optical spectrometers;

(b) equipment using only constant percentage bandwidth filters (also known as octave or fractional octave filters);

(c) medical equipment containing, as an integral part, signal analyser.

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In this entry—

“signal analysers” means apparatus capable of measuring and displaying basic properties of the single-frequency components of multi-frequency signals;

“dynamic signal analysers” means signal analysers which use digital sampling and transformation techniques to form a Fourier spectrum display of the given waveform including amplitude and phase information;

“real-time bandwidth” for dynamic signal analysers is the widest frequency range which the analyser can output to display or mass storage without causing any discontinuity in the analysis of the input data. For analysers with more than one channel, the channel configuration yielding the widest real-time bandwidth shall be used to make the calculation;

“frequency span” means the maximum range of the frequency segment displayed.

IL1534

Flatbed microdensitometers (except cathode-ray types), having any of the following characteristics: and specially designed components therefor—

(a) A recording or scanning rate exceeding 5,000 data points per second C

(b) A figure of merit better (less) than 0.1, C

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defined as the product of the density resolution (expressed in density units) and the spatial resolution (expressed in micrometres)

except equipment with a spatial resolution not better (less) than 2 micrometres and a density resolution not better (less) than 0.01 density unit.

(c) An optical density range greater than 0 to 4 C

Note: Density resolution expressed in density units is measured over the optical density range of the instrument.

IL1537

Microwave (including millimetric wave) equipment, capable of operating at frequencies of over 10.5 GHz, the following:

(a) Rigid and flexible waveguides designed for use at frequencies in excess of 26.5 GHz C

(b) Waveguides having a bandwidth ratio above 1.7:1 C

(c) Directional couplers having a bandwidth ratio above 1.7:1 and directivity over the band of 20 dB or more C

(d) Phased array antennae and sub-assemblies, designed to permit electronic control of beam shaping and pointing, and specially designed components therefor, including duplexers, phase shifters and associated high-speed diode switches C

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except—
duplexers and phase shifters specially designed for use in civil television systems and in other civil radar or communication systems not specified elsewhere in this Schedule;

(e) Other antennae specially designed for operation at frequencies above 30 GHz, having a diameter of less than 1 m, and specially designed components therefor C

(f) Microwave assemblies and sub-assemblies (including active circuit elements), capable of being used at frequencies above 23.6 GHz and having circuits fabricated by the same processes as are used in integrated circuit technology C

(g) Microwave assemblies and sub-assemblies, which contain band-pass or band-stop filters and are capable of operating at 23.6 GHz or more C

(h) Amplifiers having an instantaneous bandwidth of more than half an octave (the highest operating frequency being more than 1.5 times the lowest operating frequency) C

except—
parametric or paramagnetic amplifiers which—

(a) are specially designed for medical applications;

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(b) are specially designed for use in simple educational devices (those designed for use in teaching basic principles and demonstrating the operation of those principles in educational institutions), and operate at industrial, scientific or medical (ISM) frequencies; or

(c) have an output power of not more than 10 W and are specially designed for—

(1) systems for the detection of industrial or civilian intrusion and related alarm systems;

(2) traffic or industrial movement control and counting systems;

(3) systems for the detection of environmental pollution of air or water; or

(4) simple educational devices (those designed for use in teaching basic principles and demonstrating the operation of those principles in educational institutions).

PL7022

Solid state switches having all the following characteristics C

(a) an anode peak voltage in the range 2,000 to 6,000 volts; and

(b) an anode peak current rating of 500 amperes or more; and

(c) a turn on time of 1 microsecond or less.

PL7023

Cold cathode tubes and switches, the following—

Status: This is the original version (as it was originally made). This item of legislation is currently only available in its original format.

(a) Triggered spark gaps C
rated for a peak current
of 500 amperes

except—
cold cathode relay tubes
or decade counter tubes.

(b) Cold cathode tubes, C
gas krytron tubes,
vacuum krytron tubes,
tubes which operate in
a manner similar to a
spark gap and contain
three or more electrodes
whether gas-filled or
not, and having both the
following characteristics

(1) Rated for an anode
peak voltage of 2,500
volts or more;

(2) Rated for peak
currents of 100 amperes
or more;

except—
ignitrons,

In this entry—

“triggered spark gap”
means a tube with a
structure consisting of
two opposed anodes
with shapes resembling
flattened hemispheres,
and with one or more
triggering probes placed
approximately in the
centre of one anode.
The structure is sealed
and contains a mixture
of gases, principally
nitrogen, under less than
atmospheric pressure.

IL1548

Photosensitive components,
including linear and focal
plane arrays, the following:
and dice and wafers therefor—

(a) Photosensitive
components, including
photodiodes,
phototransistors,

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photothyristors,
photoconductive
cells and similar
photosensitive
components, having
either of the following
characteristics—

(1) having a peak sensitivity at a wavelength longer than 1,200 nanometres or shorter than 190 nanometres C

or

(2) having a peak sensitivity at a wavelength shorter than 300 nanometres and having an efficiency of less than 0.1 per cent relative to peak response at wavelengths longer than 400 nanometres C

except vacuum photodiodes specially designed for use in spectrophotometry having a peak response at a wavelength shorter than 300 nanometres.

(b) Semiconductor photodiodes and phototransistors with a response time constant of 95 ns or less measured at the operating temperature for which the time constant reaches a minimum C

except semiconductor photodiodes which are not space qualified with a response time constant of 0.5 ns or more and with a peak sensitivity at a wavelength neither longer than 1,050 nm nor shorter than 300 nm.

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(c) Photosensitive components specially designed or rated as electromagnetic, including laser and ionized-particle radiation resistant A

(d) Linear and focal plane arrays (hybrid or monolithic) having the characteristics specified in head (a)(1) or (2) or (b) above, and specially designed components therefor C

There shall be excluded from this entry—

(a) germanium photo devices with a peak sensitivity at a wavelength shorter than 1,750 nanometres;

(b) infrared single or multi-element (not to exceed 16 elements) encapsulated photoconductive cells or pyroelectric detectors using any of the following—

(1) Lead sulphide;

(2) Triglycine sulphate and variants;

(3) Lead-lanthanum-zirconium titanate and variants;

(4) Lithium tantalate;

(5) Polyvinylidene fluoride and variants;

(6) Strontium barium niobate and variants; or

(7) Lead selenide;

(c) single-element encapsulated mercury-cadmium-telluride (HgCdTe) uncooled (295 K ambient temperature

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operation) photo-electromagnetic (pem) or photoconductive (pc) mode photodetectors with a peak sensitivity at a wavelength shorter than 11,000 nanometres.

In this entry—

the “time constant” is the time taken from the application of a light stimulus for the current increment to reach a value of $1-1/e$ times the final value (ie 63 per cent of the final value);

“space qualified” means products which are stated by the manufacturer as designed and tested to meet the special electrical, mechanical or environmental requirements for use in rockets, satellites or high-altitudes flight systems operating at altitudes of 100 km or more.

IL1549

Photomultiplier tubes having any of the following characteristics—

- (a) Solar blind types C
for which the long wavelength cutoff is below 350 nm, where the long wavelength cutoff is defined as 10 per cent of the maximum sensitivity
except—
Photomultiplier tubes specially designed for use in spectrophotometry having a peak sensitivity at a wavelength shorter than 300 nm.
- (b) Having an anode pulse rise time of less than 1 ns C
- (c) Containing microchannel-plate electron multipliers C

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IL1553	Flash discharge type X-ray systems, including tubes, having all of the following characteristics—	C
	(a) Peak power greater than 500 MW;	
	(b) Output voltage greater than 500 kV;	
	(c) Pulse width less than 0.2 microsecond.	
PL7042	Radiographic equipment, the following: and specially designed software therefor—	
	(a) equipment capable of delivering electromagnetic radiation produced by bremsstrahlung from accelerated electrons of 2MeV or greater	A
	(b) equipment using radioactive sources of 1MeV or greater, except those specially designed for medical purposes	A
IL1555	Electron tubes, the following: and specially designed components therefor—	
	(a) Electron tubes for image conversion or intensification (including those designed for streak or framing cameras), incorporating either—	
	(1) microchannel-plate electron multipliers	C
	(2) semi-transparent photocathodes incorporating epitaxially grown layers of compound semiconductors such as gallium arsenide	C
	(b) Electron tubes for television or cameras, having	

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any of the following characteristics—

(1) incorporating microchannel-plate electron multipliers C

(2) coupled with electron tubes specified in head (a) above C

(3) ruggedised and having a maximum length-to-bulb diameter ratio of 5:1 or less C

except—

commercial standard X-ray amplifier tubes.

IL1556

Optical elements and elements for optical tubes, the following—

(a) Non-flexible fused fibre-optic plates or bundles, having all of the following characteristics— C

(1) a fibre pitch (centre-to-centre spacing) of less than 10 micrometres;

(2) a light-absorbing medium surrounding each fibre, or interstitially placed between fibres; and

(3) a diameter greater than 13 mm.

(b) Microchannel-plates for electron image amplification, having both of the following characteristics— C

(1) 15,000 or more hollow tubes per plate; and

(2) hole pitch (centre-to-centre spacing) of less than 25 micrometres.

(c) Semi-transparent photocathodes C

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incorporating
epitaxially grown
layers of compound
semiconductors, such as
gallium arsenide

(d) Diffractive type
optical elements
specially designed for
display screens, with
any of the following
characteristics—

(1) a transmission of C
more than 90 per cent
outside the reflection
band and a reflection or
more than 75 per cent
inside the reflection
band, which has less than
15 nanometres bandwidth
and is matched to the
frequency of the display
light source

(2) a rear projection C
screen brightness
gain of more than 10
times the gain of a
Lambertian scatterer
with an equivalent area,
and less than 10 per cent
variation in brightness
across the exit aperture

or

(3) specially designed for C
use in helmet-mounted
displays

IL1558

Electronic vacuum tubes
(valves) and cathodes,
the following: and other
components specially designed
for those tubes—

(a) Tubes in which space C
charge control is utilized
as the primary functional
parameter, including
triodes and tetrodes, the
following—

(1) tubes rated for
continuous wave
operation having

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either of the following characteristics—

(A) above 4 GHz at maximum rated anode dissipation C

(B) within the frequency range 0.3 to 4 GHz and for which, under any condition of cooling, the product of the maximum rated anode dissipation (expressed in kW) and the square of the maximum frequency (expressed in GHz) at the maximum rated anode dissipation is greater than 10, except tubes specially designed for television transmitters operating in the frequency range of 0.47 to 0.96 GHz and rated for operation without a grid current, for which the product of the rated anode dissipation (expressed in kW) and the square of the maximum frequency (expressed in GHz) may reach 20 C

(2) tubes, rated only for pulse operation, having either of the following characteristics—

(A) above 1 GHz, with maximum peak pulse output power greater than 45 kW C

(B) between 0.3 and 1 GHz and for which, under any condition of cooling, the product of the peak pulse output power (expressed in kW) and the square of the maximum frequency (expressed in GHz) exceeds 45 C

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(3) tubes specially C
designed for use as pulse
modulators for radar
or similar applications,
having a peak anode
voltage rating of 100 kV
or more, or rated for a
peak pulse power of 20
MW or more

except—
tubes specially designed
for civil telecasting
according to CCIR
or OIR standards and
specially designed
components therefor.
The above exception
does not apply to
technological documents
the information in which
includes information
relating to goods
excluded by the above
exception.

(b) Tubes which utilise C
interaction between a
beam of electrons and
microwave elements and
in which the electrons
travel in a direction
perpendicular to the
applied magnetic field,
including magnetrons,
cross-field amplifier
tubes and cross-field
oscillator tubes

except—

(i) fixed frequency
and tunable pulsed
magnetrons and crossed-
field amplifier tubes
which are in normal civil
use, the following—

(1) magnetrons designed
to operate at frequencies
below 3 GHz with a
maximum rated peak
output power of 5 MW or
less, or between 3 to 12
GHz with the product of

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the maximum rated peak output power (expressed in kW) and the frequency (expressed in GHz) less than 4,200 and a frequency tuning time of more than 100 ms;

(2) crossed-field amplifier tubes designed to operate at frequencies below 4 GHz with a maximum rated average output power of 1.2 kW or less, a bandwidth of 200 MHz or less and a gain of less than 15 dB;

(ii) fixed frequency continuous wave magnetrons designed for medical use or for industrial heating or cooking purposes operating at a frequency of $2.375 \text{ GHz} + 0.05 \text{ GHz}$ or $2.45 \text{ GHz} + 0.05 \text{ GHz}$ with a maximum rated output power not exceeding 6 kW or, at a frequency lower than 1 GHz, with a maximum rated output power not exceeding 35 kW;

(c) Tubes which utilise interaction between a beam of electrons and microwave elements or cavities and in which the electrons travel in a direction parallel to the applied magnetic field (eg klystrons or travelling wave tubes) C

except—

(i) continuous wave tubes having all of the following characteristics—

(1) designed for use in civil ground communication;

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(2) instantaneous bandwidth tubes with any of the following sets of characteristics—

(a) tubes with—

(1) an instantaneous bandwidth of half an octave or less, (ie the highest operating frequency is not higher than 1.5 times the lowest operating frequency);

(2) the product of the rated output power (expressed in kW) and the maximum operating frequency (expressed in GHz) does not exceed 0.3;

(b) tubes which—

(1) have an instantaneous bandwidth of 10% or less (ie the highest operating frequency does not exceed 1.1 times the lowest operating frequency);

(2) the product of the rated output power (expressed in kW) and the maximum operating frequency (expressed in GHz) does not exceed 5;

(3) operate in standard international telecommunications bands;

(c) tubes which—

(1) have an instantaneous bandwidth of 3% or less (ie the highest operating frequency does not exceed 1.03 times the lowest operating frequency) (2) the product of the rated output power (expressed in kW) and the maximum

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operating frequency
(expressed in GHz) does
not exceed 25; and

(3) operate in
standard international
telecommunications
bands;

(3) an operating
frequency no higher than
20 GHz;

(4) no multiple grid
including shadow grid
electron guns;

(5) collectors with no
more than two depressed
stages;

(ii) pulsed tubes, having
all of the following
characteristics—

(1) for civil applications;

(2) an instantaneous
bandwidth of half
an octave or less, (ie
the highest operating
frequency is not higher
than 1.5 times the lowest
operating frequency);

(3) collectors with no
more than two depressed
stages;

(4) having either of
the following sets of
characteristics—

(a)

(1) peak saturated output
power not exceeding 1
kW,

(2) an average output
power not exceeding 40
W, and

(3) operating frequency
not exceeding 10 GHz; or

(b)

(1) peak saturated output
not exceeding 100 W,

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(2) an average output power not exceeding 20 W, and

(3) operating frequency between 10 and 20 GHz;

(iii) fixed frequency pulsed tubes, having all of the following characteristics—

(A) for civil applications;

(B) operating frequencies below 3.5 GHz;

(C) having a peak output power of 1.6 MW or less; and

(D) having an operating bandwidth of less than 1%

(iv) tubes, having all of the following characteristics—

(A) used as fixed frequency or voltage tunable oscillator tubes;

(B) designed to operate at frequencies below 20 GHz; and

(C) having a maximum output power of less than 3 W;

(d) Tubes which utilize C interaction between an electron beam and microwave elements or cavities but do not require a magnetic field to control or focus the electron beam, except low power reflex oscillator klystrons designed to operate at frequencies below 20 GHz and at a maximum output power of less than 3 W

(e) Tubes which utilize C interaction between a

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beam of electrons and microwave elements or cavities in which the electrons drift in a direction parallel to the applied magnetic field but also require for their operation a large component of velocity transverse to the direction of the applied magnetic field, including gyrotrons, ubitrons and peniotrons except gyrotron oscillators

(f) Tubes designed to withstand on any axis an acceleration of short duration (shock) greater than 1,000 g C

(g) Tubes designed for operation in ambient temperatures exceeding 437 K C

(h) Tubes of a type specified in head (c), (d) or (e) above, which are designed to operate with no filament or cathode heating element as indicated by the absence of heating supply connections C

(i) Tubes which utilize a modulated beam of electrons striking one or more semiconductor diodes to provide power gain C

(j) Cathodes for electronic vacuum tubes, the following—

(1) Specially designed for tubes specified in heads (a) to (i) C

(2) Impregnated cathodes capable of producing a current density exceeding C

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0.5A/cm² at rated operating conditions

In this entry–

“frequency tuning time” is the time required to change the operating frequency from a starting frequency, through the maximum frequency, through the minimum frequency, and return to the starting frequency ie one complete tuning cycle. Frequency tuning time: $T=1/(2f^0)$ f⁰ : dither rate.

IL1560

High energy storage capacitors, the following–

(a) Capacitors with a repetition rate of less than 10Hz having all of the following characteristics– C

(1) A voltage rating equal to or more than 5 kV;

(2) An energy density equal to or more than 250J/kg; and

(3) A total energy equal to or more than 25kJ.

(b) Capacitors with a repetition rate of 10Hz or more having all of the following characteristics– C

(1) A voltage rating equal to or more than 5kV;

(2) An energy density equal to or more than 50J/kg;

(3) A total energy equal to or more than 100J; and

(4) A charge/discharge cycle life equal to or more than 10,000.

	There shall be excluded from this entry— electrolytic or tantalum capacitors.	
IL1561	Materials specially designed for use as absorbers of electromagnetic waves having frequencies exceeding 2×10^8 Hz and less than 3×10^{12} Hz except the following— (magnetic materials which provide absorption contained in paint are not included in this exception) (a) Hair type absorbers, whether constructed of natural or synthetic fibres, with non-magnetic loading to provide absorption; (b) Absorbers whose incident surface is non-planar in shape, and which have no magnetic loss; (c) Planar absorbers having all of the following characteristics— (1) Made of the following materials— (A) Plastic foam materials (flexible or non-flexible) with carbon-loading, or organic materials, including binders, providing more than 5 per cent echo compared with metal over a bandwidth exceeding ± 15 per cent on the centre frequency of the incident energy and not capable of withstanding temperatures exceeding 450K (177°C); or (B) Ceramic materials providing more than 20 per cent echo compared	A

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with metal over a bandwidth exceeding ± 15 per cent of the centre frequency of the incident energy, and not capable of withstanding temperatures exceeding 800K (527°C);

(2) Their tensile strength is less than 7×10^6 N/m²; and

(3) Their compressive strength is less than 14×10^6 N/m². (Absorption test samples for (c)(1) (A) or (B) above should be a square at least 5 wavelengths (of centre frequency) on a side and positioned in the far field of the radiating element.)

PL7043

Coatings, including paints, for reduced observability, specially designed for reduced or tailored reflectivity or emissivity in the infra red or ultra violet regions of the electromagnetic spectrum, and specially designed software therefor

A

IL1564

Integrated circuits, including packages therefor, assemblies, modules and substrates, the following—

(a) Integrated circuits, the following: and modules and unfinished wafers with a defined pattern in which the function has been determined, which have performances and functions equivalent to integrated circuits specified in this head—

(1) Designed or rated as radiation hardened

A

(2) Rated for operation at an ambient temperature

A

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below 219K (−54°C) or
above 397K (+ 124°C)

except—
audio amplifier or
voltage regulator
integrated circuits,
or integrated circuits
for medical electronic
prostheses or car and
train engine electronics.

(3) Silicon-based
microprocessor
microcircuits,
microcomputer
microcircuits and
microcontroller
microcircuits, including
Digital Signal Processors
(DSP) and Floating
Processor Units
(FPU), having any
of the following
characteristics—

(A) An external data bus C
width of more than 16 bit
with an arithmetic logic
unit with an access width
or more than 32 bit

(B) A maximum clock C
frequency of more than
20MHz;

or C

(C) Random access
storage (RAM) of more
than 512 Bytes within the
package

except—
silicon-based
microcomputer
microcircuits or
microcontroller
microcircuits having
an operand (data) word
length of 8 bit or less.

(4) Silicon-based C
peripheral integrated
circuits specially
designed to support
integrated circuits

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specified in (3) to head
(a) above

(5) Silicon-based storage
integrated circuits, the
following—

(A) Fusible link or C
avalanche breakdown
programmable read only
memories (PROMS)
having a storage capacity
of more than 128 kbits
per package

(B) Electrically erasable C
programmable read only
memories (EEPROMs)
or electrically alterable
read only memories
(EAROMs), having a
storage capacity of more
than 64 kbits per package

(C) Ultra-violet erasable C
programmable read
only memories (UV-
EPROMs) having a
storage capacity of
more than 256 kbits
per package, including
unprogrammable one-
time programmable read-
only memories (OTP
ROMs) which use the
same technology as
UV-EPROMs for their
semiconductor chips, but
have no optical window
for ultra-violet irradiation

(D) Dynamic random
access memories
(DRAMs) having
a storage capacity
exceeding—

(a) 1 Mbit per package C
or C
(b) 256 kbits per package
if they have a maximum
access time of less than
80ns

(E) Static random-access
memories (SRAMs)

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having a storage capacity exceeding either of the following—

(a) 256 kbits per package C

or C

(b) 64 kbits per package if they have a maximum access time of less than 80ns

(6) Converter integrated circuits, the following—

(A) Analogue-to-digital converters having either—

(a) A resolution of 12 bits with a conversion time of less than 500ns C

or C

(b) A resolution of more than 12 bits with a conversion time of less than 5 microseconds

except—
analogue-to-digital converters designed for digital voltmeters which are not specified in entry IL1529 in Group 3F.

(B) Digital-to-analogue converters having either—

(a) A resolution of 12 bits with a maximum settling time to rated linearity of less than—

(1) 500ns for voltage output converters C

or

(2) 25ns for current output converters C

or
(b) A resolution of more than 12 bits, with a maximum settling time to rated linearity of less than—

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(1) 3 microseconds for voltage output converters C

or

(2) 1 microsecond for current output converters C

(7) Optical integrated circuits having any of the following characteristics—

(A) Containing more than 2,048 elements C

(B) Having a peak sensitivity at a wavelength longer than 1,200nm or shorter than 190nm C

(C) Having a peak sensitivity at a wavelength shorter than 300nm and having an efficiency of less than 0.1 per cent relative to peak response at wavelengths longer than 400nm C

(D) Having a response time constant of 95ns or less measured at the operating temperature for which the time constant reaches a minimum C

or

(E) Containing semiconductor lasers specified in entry IL1522 in Group 3F C

except—
optical integrated circuits which are not space qualified and which have both of the following characteristics—

(1) A response time constant of 500 picosecond or more; and

(2) A peak sensitivity at a wavelength neither

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longer than 1,050nm nor shorter than 300nm;

(8) Sample-and-hold integrated circuits having an acquisition time of less than 500ns C

(9) Unprogrammed, silicon-based, programmable gate arrays or logic arrays having both of the following characteristics— C

(A) More than 28 terminals; and

(B) An equivalent gate count of more than 200 per package

(10) Fuzzy logic or neural network integrated circuits C

(11) Integrated circuits designed for Integrated Services Digital Network (ISDN) functions C

Note:

For the purposes of this sub-head, “designed” means that the integrated circuit was manufactured for the specific purpose of providing ISDN functions.

(12) Unfinished wafers C
except—
those with a defined pattern, in which the function has been determined, and not specified in any paragraph of head (a) to this entry.

(13) Integrated circuits, other than those described in (1) to (12) above, having any of the following characteristics—

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(A) Based upon C
any compound
semiconductor

except—
compound
semiconductor integrated
circuits which are
designed for, and
by virtue of circuit
design limited to use
in any of the following
applications—

(1) Civil audio, radio or
TV equipment operating
below 1 GHz; or

(2) Mobile telephone
and cordless telephone
equipment operating
below 1 GHz.

(B) Mixed-signal C
integrated circuits
(combining analogue
and digital functions)
which can operate above
1.2 GHz or which have
a typical basic gate
propagation delay time of
less than 1 ns

(C) Digital (logic) C
integrated circuits having
a typical basic gate
propagation delay time of
less than 1 ns

except—
silicon-based digital
(logic) integrated circuits
with 28 terminals or less.
or

(D) Having more than C
128 terminals

except—
silicon based integrated
circuits having all
of the following
characteristics—

(a) They have no
user-accessible
microprogrammability;

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(b) The design or programme is originated either by the manufacturer alone or in concert with the user of the integrated circuit;

(c) The design and programme are fixed at the time of manufacture;

(d) The design, basic functions and performance of the integrated circuit are for civil end-use; and

(e) They are designed or programmed by the manufacturer for any of the following applications only:

(1) Car electronics (eg entertainment, instrumentation, safety, comfort, operations or pollution control);

(2) Home electronics (eg audio and video equipment, appliances, safety, education, comfort, remote controlled toys or amusement);

(3) Timekeeping applications (eg watches or clocks);

(4) Personal communications up to 150 MHz, including amateur radio communication and intercom;

(5) Cameras specified in this Schedule including cine cameras but excluding imaging microcircuits;

(6) Medical electronic prostheses

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(eg, cardiac pacemakers, hearing aids); or
(7) Civil telephone subscriber sets providing neither ISDN functions nor encryption;

(f) Integrated circuits specified in sub-head (a)(9) or (a)(13) or microcontroller microcircuits or microcomputer microcircuits specified in sub-head (a)(3), having all the following characteristics: provided such items are not specially designed components for equipment specified elsewhere in this Schedule—

(1) They have no user-accessible microprogrammability;

(2) They are for civil end-use and substantially restricted to that application;

(3) The design and programme are originated either by the manufacturer alone or in concert with the user of the integrated circuit;

(4) The manufacturer has established that the design and programme are fixed at the time of manufacture; and

(5) The manufacturer has established that the design, basic functions and performance of the integrated circuit

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are suitable only
for an end-use of a
civil nature.

Note:

Integrated circuits
specially designed for
mobile (radio) telephone
which use frequency
synthesisers are specially
designed components
specified in entry IL1531
in Group 3F.

(b) Ceramic packages
for integrated circuits
designed for hermetically
sealed pin or pad grid
array, leadless carrier
or surface-mounted
configurations, having
either—

(1) Pin, pad or lead C
nominal spacings of less
than 1.25 mm; or

(2) More than 68 C
terminals

(c) Ceramic substrates, C
having more than three
layers of interconnections
not including the ground
plane

(d) Technological D
documents the
information in which
relates to the design,
development or
processing of wafers
or chips for any type
of integrated circuit
specified in this Schedule

Note:

For assemblies, modules, In this entry—
integrated circuits and
substrates, which are specially
designed for or which have the
same functional characteristics
as other equipment, refer to
the entry that specifies such
equipment.

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“assembly” means two or more electronic components connected together to perform a specific function and normally capable of being disassembled;

“basic gate power dissipation” means the power dissipation value corresponding to the basic gate utilized within a family of monolithic integrated circuits. This may be specified, for a given family, either as the power dissipation per typical gate or as the typical power dissipation per gate;

“basic gate propagation delay time” means the propagation delay time value corresponding to the basic gate utilized within a family of monolithic integrated circuits. This may be specified, for a given family, either as the propagation delay time per typical gate or as the typical propagation delay time per gate;

“circuit element” means a single active or passive functional part of an electronic circuit, such as one diode, one transistor, one resistor, one capacitor, etc;

“discrete component” means a separately packaged circuit element with its own external connections;

“film type integrated circuit” means an array of circuit elements and metallic interconnections

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formed by deposition of a film on an insulating substrate;

“hybrid integrated circuit” means any combination of integrated circuits, circuit elements or discrete components connected together to perform a specific function;

“manufacturer” means a person who designs an integrated circuit for an application of his choice and does not include a person who programmes an integrated circuit on behalf of a user;

“microcomputer microcircuit” means a monolithic integrated circuit or multichip integrated circuit containing an arithmetic logic unit (ALU) capable of executing general purpose instructions from an internal storage (or on an internal storage augmented by an external storage) on data contained therein;

“microprocessor microcircuit” means a monolithic integrated circuit or multichip integrated circuit containing an arithmetic logic unit (ALU) capable of executing a series of general purpose instructions from an external storage;

“module” means two or more electronic components connected together to perform a specific function and

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not normally capable of being disassembled;

“monolithic integrated circuit” means a combination of passive or active circuit elements or both which:

(a) is formed by means of diffusion processes, implantation processes or deposition processes in or on a single semiconducting piece of material;

(b) can be considered as indivisibly associated; and

(c) performs the function of a circuit;

“multichip integrated circuit” means two or more monolithic integrated circuits bonded to a common substrate;

“optical integrated circuit” means a monolithic integrated circuit or a hybrid integrated circuit, containing one or more parts designed to function as a photosensor or photoemitter or to perform an optical or electro-optical function;

“speed” means the shortest time required to fetch two operands from an external storage outside any work register, add them and return the result to the same or another external storage location using that addressing mode which yields the shortest execution time;

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“speed-power dissipation product” means the product of the speed and the typical power dissipation which shall be taken at the clock frequency used in the speed computation. The typical power dissipation must be the lowest of the following:

- (a) the specified typical internal power dissipation;
- (b) one half the maximum internal power dissipation;
- (c) the product of the nominal supply voltage and typical total supply current; or
- (d) one half of the product of the nominal supply voltage and maximum total supply current;

“substrate” means a sheet of base material with or without an interconnection pattern and on which or within which discrete components, integrated circuits or both can be located;

“user-accessible microprogrammability” means the facility allowing a user to insert, modify or replace microprogrammes;

“user-accessible programmability” means the facility allowing a user to insert, modify or replace programmes by means other than:

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PL7039	<p>(a) a physical change in wiring or interconnections; or</p> <p>(b) the setting of function controls including entry of parameters.</p> <p>Analogue-to-digital converter A integrated circuits having all of the following characteristics</p> <p>(a) a resolution of 8 bits or more;</p> <p>(b) rated operation in the temperature range from below -54°C to above $+125^{\circ}\text{C}$;</p> <p>(c) hermetically sealed.</p>
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GROUP 3G

Electronic Equipment including Computers, Software and Telecommunications, and Photographic Equipment

IL1565	<p>Electronic computers, related equipment, equipment or systems containing electronic computers, and technology therefor, the following: and specially designed components for such electronic computers and related equipment:</p> <p>(a) analogue computers and related equipment therefor, which are designed or modified</p>
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for use in
airborne
vehicles,
missiles
or space
vehicles and
rated for
continuous
operation at
temperatures
from below
228K
(-45°C) to
above 328K
(+55°C) A

(b) A
equipment
or systems
containing
analogue
computers
specified
in head (a)
above

(c) analogue A
computers
and related
equipment
therefor,
other than
those
specified
in head (a)
above

except—

(1) those
which
neither:

(A) are
capable of
containing
more
than 20
summers,
integrators,
multipliers
or function
generators;

nor

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(B) have facilities for readily varying the interconnections of such components;

(2) those which have all the following characteristics:

(A) they use neither:

(a) optical computation devices; nor

(b) acoustic wave devices specified in entry IL1586 in Group 3G;

(B) the rated errors for summers, inverters and integrators are not less than:

(a) static : 0.01%;

(b) total at 1 kHz: 0.15%;

(C) the rated errors for multipliers are not less than:

(a) static : 0.025%;

(b) total at 1 kHz: 0.25%;

(D) the rated errors

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for fixed
function
generators
(log and
sine/cosine)
are not less
than: static:
0.1%;

(E) they
have no
more
than 350
operational
amplifiers;
and

(F) they
have no
more
than four
integrator
time scales
switchable
during one
programme;

Note

For the purposes
of paragraph (2)
above—

1. the percentage in
sub-paragraph (B)
(a) applies to
the actual output
voltage; all the
other percentages
apply to full
scale, that is,
from maximum
negative to
maximum
positive reference
voltages;
2. total errors at
1 kHz for sub-
paragraphs (B)
(b) and (C)(b)
above are to be
measured with
those resistors
incorporated
in the inverter,

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summer or integrator which provide the least error;

3.

total error measurements include all errors of the unit resulting from, for example, tolerances of resistors and capacitors, tolerances of input and output impedances of amplifiers, the effects of loading, the effects of phase shift or the generating of functions.

(d) hybrid A computers and related equipment therefor, having all the following characteristics

(1) the analogue section is specified in head (c) above;

(2) the digital section has an internal fixed or alterable storage of more than 2,048 bit; and

(3) facilities are included for

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processing
numerical
data
from the
analogue
section in
the digital
section or
vice versa;

(e) digital A
computers
or analogue
computers
specified
in head
(c) above,
containing
equipment
for
interconnecting
analogue
computers
with digital
computers
and whether
or not
contained
in or
associated
with other
equipment
or systems

(f) digital
computers
and related
equipment
therefor,
and having
any of the
following
characteristics—

(1) designed
or modified
for use in
airborne
vehicles,
missiles
or space
vehicles and
rated for
continuous

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operation at
temperatures
from below
228K
(-45°C) to
above 328K
(+ 55°C) A

(2) designed W
or modified
to limit
electromagnetic
radiation
to levels
much less
than those
required by
government
civil
interference
specifications

(3) A
designed as
ruggedised
or radiation-
hardened
equipment
and capable
of meeting
military
specifications
for
ruggedised
or radiation-
hardened
equipment

(4) modified W
for military
use

(5) designed W
or modified
for
certifiable
multi-level
security or
certifiable
user
isolation
applicable
to
government
classified

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material
or to
applications
requiring an
equivalent
level of
security

(g) A
equipment
or systems
containing
digital
computers
specified
in head (f)
above

(h) digital W
computers
and related
equipment
therefor,
other than
those
specified
in head (e)
or (f) above,
whether
or not
contained
in or
associated
with other
equipment
or systems
including

(A) digital
computers
and related
equipment
therefor,
designed or
modified
for—

(a) signal W
processing

(b) image W
enhancement

(c) local W
area
networks

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except data
communication
systems
located
within
a single
piece of
equipment
(e.g.,
television
set, car);

(d) multi- W
data-stream
processing

except
digital
computers
and related
equipment
which:

(a) utilise
staged
(pipelined)
instruction
interpretation
for
conventional
single
instruction
single data
sequence
processing;
or

(b) have an
arithmetical
unit
implemented
with bit-
slice
microprocessor
microcircuits.

(e) W
combined
recognition,
understanding
and
interpretation
of image,
continuous
(connected)

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speech or
connected
work text
other than
signal
processing
or image
enhancement

(f) real time W
processing
of sensor
data having
both the
following
characteristics

(1)
concerning
events
occurring
outside the
computer
using
facility; and

(2)
provided by
equipment
specified
in entry
IL1501,
IL1502 or
IL1510 in
Group 3F;

(h) fault W
tolerance

except:
digital
computers
and related
equipment
which
utilise:

(a) error
detection or
correction
algorithms
in main
storage;

(b) the
interconnection

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of two
digital
computers
so that if
the active
central
processing
unit fails an
idling but
mirroring
central
processing
unit can
continue the
system's
functioning;

(c) the
interconnection
of two
central
processing
units
by data
channels
or by use
of shared
storage
to permit
one central
processing
unit to
perform
other work
until the
second
central
processing
unit fails,
at which
time the
first central
processing
unit takes
over in
order to
continue the
system's
functioning;
or

(d) the
synchronisation
of two

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central
processing
units by
software
so that one
central
processing
unit
recognises
when the
other central
processing
unit
fails and
recovers
tasks from
the failing
unit;

(j) user- W
accessible
microprogrammability

except
digital
computers
and related
equipment
whose user-
accessible
microprogrammability
is limited
to:–

(a) loading,
reloading or
inserting of
microprogrammes
provided
by the
supplier ; or

(b) simple
loading of
microprogrammes
which may
or may not
be provided
by the
supplier
but which
are neither
designed
to be
accessible

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to the
user nor
accompanied
by training
or software
for user
accessibility;

(m) wide W
area
networks

(C) related
equipment,
the
following—

(a) disk
drives
for rigid
magnetic
media (hard
disks) or
non-rigid
magnetic
media
(floppy
disks),
including
cartridge
type
magnetic
disk media,
exceeding
any of the
following
limits—

(1) a gross W
capacity of
165 MByte

(2)
maximum
bit transfer
rate:

(A) for W
disk drives
for rigid
magnetic
media (hard
disks)—10.3
Mbit/s

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(B) for disk drives for non-rigid magnetic media (floppy disks) or cartridge type magnetic disk drives—
16 Mbit/s

W

(3) an access rate of 56 accesses per second

W

(b) disk drives for optical media (write-once-read-multiple-times (WORM) disks) exceeding any of the following limits:—

(1) a net capacity of 3.2 GByte

W

(2) maximum bit transfer rate of 8 Mbit/s

W

(3) an access rate of 15 accesses per second

W

(c) disk drives for erasable optical or magneto-

W

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optical
media

(d) solid W
state storage
equipment,
other
than main
storage,
(also known
as solid
state disks
or RAM
disks)
exceeding a
net capacity
of 2 MByte

(e) input/
output
control units
designed
for use with
disk drives
or solid
state storage
equipment,
with any
of the
following
characteristics—

(1) designed W
for use with
equipment
specified in
paragraph (h)
(C)(a), (b),
(c) or (d)
above

(2) having W
more
than one
independent
read/write
channel

(3) having W
user-
accessible
programmability
or user-
accessible
microprogrammability

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or

(4) having a W
transfer rate
exceeding
16 Mbit/s

(f) magnetic
tape drives
exceeding
either of the
following
limits:

(1) a W
maximum
bit packing
density of
246 bit/mm

or

(2) a W
maximum
bit transfer
rate of 10
Mbit/s

(g) streamer W
tape drives
with a
maximum
bit transfer
rate
exceeding 16
Mbit/s

(h) input/
output
control units
designed
for use
with tape
drives, with
any of the
following
characteristics—

(1) designed W
for use with
tape drives
specified in
paragraph (h)
(C)(f) or (g)
above

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(2) having W
more
than two
independent
read/write
channels

(3) having W
user-
accessible
programmability
or user-
accessible
microprogrammability

or

(4) having a W
transfer rate
exceeding
16 Mbit/s

(i) W
communication
control units
or directly
connected
data channel
combinations,
exceeding
a total
transfer rate
of 3.6 Mbit/
s

(j) W
communication
control
units or
communication
channel
combinations,
having a
maximum
data
signalling
rate for any
communication
channel
exceeding
9,600 bit/s

(k) displays W
or monitors
having more
than 1,024

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resolvable
elements
in the
perpendicular
dimension
and 1,280
resolvable
elements
in the other
dimension
and, except
in the case
of direct
driven video
monitors,
with more
than 256
colours or
shades of
grey

except—

1. displays
or monitors
not
specially
designed for
electronic
computers;

2.
monochrome
displays
for systems
specially
designed for
and limited
to graphic
arts, desktop
publishing,
document
image
publishing
(e.g.,
printing,
publishing)
which have
displays not
exceeding
1,200
resolvable
elements
in the

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perpendicular
dimension
and 1,600
resolvable
elements
in the other
dimension;

(l) graphic W
accelerators
or graphic
coprocessors

There shall be
excluded from
head (h)–

(C) digital
computers
(other
than those
specified in
sub-heads
(h)(A)(d) to
(m) above)
and related,
equipment
therefor,
having
all of the
following
characteristics–

(a) shipped
as complete
systems;

(b) designed
and
announced
by the
manufacturer
for
identifiable
civil use;

(c) not
specially
designed
for any
equipment
specified
in this
Schedule;

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(d) total processing data rate not exceeding 275 Mbit/s;

(e) total connected net capacity of main storage not exceeding 32 MByte;

(f) not including a microprocessor or microcomputer microcircuit with an external data bus width of more than 32 bit or an arithmetic logic unit with an access width of more than 32 bit;

(g) not including related equipment specified in sub-head (h) (C) above other than input/output control unit, magnetic disk drive (hard disk) combinations having all of the following characteristics:

(1) a total connected

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net capacity
not
exceeding 2
GByte;

(2) a
maximum
bit transfer
rate of
any disk
drive not
exceeding
20.6 Mbit/s;
and

(3) no more
than five
independent
disk drives
exceeding a
maximum
bit transfer
rate of 16
Mbit/s;

(h) except in
the case of
workstations
designed for
and limited
to graphic
arts (e.g.,
printing,
publishing),
not having
both of the
following
characteristics—

(1) they are
stand-alone
graphics
work
stations
designed or
modified
for the
generation,
transformation
and display
of twoor
three-
dimensional
vectors; and

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(2) they exceed either of the following limits:

(A) block move data rate of 3 million pixels per second; or

(B) maximum bit transfer rate of the channel for direct access to the main storage (Direct Memory Access (DMA) channel) of 15 Mbit/s; and

(i) not including equipment specified in sub-head (a) (2) of entry IL1519 in Group 3F or in entry IL1567 in this Group;

(D) graphic accelerators or graphic coprocessors not exceeding a block move data rate of 3 million pixels per second;

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(E) related equipment for signal processing or image enhancement or both not exceeding an equivalent multiply rate of 6.5 million operations per second;

(F) related equipment for local area networks, not exceeding a data signalling rate of 20 Mbit/s and having no inter-network gateways, or related equipment specially designed for connecting local area networks within a computer using facility;

(G) digital computers or related equipment therefor, provided that:

(a) they are for medical applications;

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(b) they are substantially restricted to medical applications by reason of their design and performance;

(c) they do not have user-accessible programmability other than that allowing for insertion of the original or modified programmes supplied by the original manufacturer;

(d) in the case of computers or equipment for signal processing, image enhancement or multi-data-stream processing, it

(1) is essential for the medical application; and

(2) is designed or modified for the identifiable and dedicated

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medical
application;

(e) in the
case of
any digital
computer
which is not
designed or
modified
but is
essential for
the medical
application,
it does not
exceed
a total
processing
data rate of
550 Mbit/s;

(H) digital
computers
or related
equipment,
contained
in or
associated
with other
equipment
or systems
where—

(a) the
computer
or related
equipment
is essential
for the
operation of
that other
equipment
or systems;
and

(b) the
computer
or related
equipment
is not a
principal
element of
that other
equipment
or system;

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(j)
Technology,
the
following—

(1)
technology
applicable
to the—

(A) D
development,
production
or use (i.e.,
installation,
operation
and
maintenance)
of electronic
computers
or related
equipment,
whether or
not such
electronic
computers
or related
equipment
are
specified in
this entry

except—

(a)
technology
which
is
unique
to
related
equipment
not
specified
in this
Schedule;
(b) the
minimum
technical
information
necessary
for the
use of
electronic
computers

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or
related
equipment
when
shipped
together
with
or
solely
for use
with
such
electronic
computers
or
related
equipment;
or
(c) the
minimum
technical
information
for the
production
of
electronic
computers
and
related
equipment
not
specified
in sub-
head
(h)
(A) or
related
equipment
excluded
by
exception
(C) to
head
(h),
being
information
relating
to—
(1)
assembling
of
prefabricated
components

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or
sub-
assemblies;
(2)
loading
of
basic
diagnostic
systems
software;
(3)
performing
basic
go/
no go
testing
of
finished
products;
Note:

“assembling”
means
for the
purpose
of this
exception,
the
testing,
and
integrating
into
finished
products,
of
components
and
sub-
assemblies,
including
mounting
components
on to
printed
circuit
boards
or into
other
assemblies.

(B) D
development,
production

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or use of
equipment
or systems
specified in
head (b) or
(g) of this
entry

(2)
technology
for the
integration
of—

(A) D
electronic
computers
or related
equipment
specified
in this
Schedule
into other
equipment
or systems,
whether or
not the other
equipment
or systems
are
specified in
this entry

except—
technology
for the
integration
of
computers
or related
equipment
into other
equipment
or systems,
which is
unique
to such
the other
equipment
or systems
provided
that such
other
equipment

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or systems
are not
specified
in this
Schedule;

(B) D
electronic
computers
or related
equipment
not
specified
in this
Schedule,
into
equipment
or systems
specified in
this entry

In this entry—
“access
rate”—
(a) of an
input/output
control unit
drum or
disk drive
combination
(R_{ad}) means
either the
access rate
of an input/
output
control unit
(R_{ac}) or the
sum of the
individual
access
rates of all
independent
seek
mechanisms
(R_{as}),
whichever
is smaller;
Thus: R_{ad}
= $\min (R_{ac};$
SUM $R_{as})$;
(b) of an
input/output

Thus:

$$R_{ad} = \frac{1}{t_{aa}} ;$$

For the
purpose
of this
definition—
“average
access
time” of
a seek
mechanism
(t_{aa}) means
the sum of
the average
seek time
(t_{sa}) and the
latency time
(t_l);
Thus: $t_{aa} =$
 $t_{sa} + t_l$;
“average
seek
time” (t_{sa})
means the
sum of the
maximum
seek time
(t_{smax}) and
twice the
minimum
seek time

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<p>control unit (R_{ac})— (1) with rotational position sensing (rps), means the sum of the individual access rates of all independent seek mechanisms (R_{as}) connected to the control unit; Thus: $R_{ac} =$ SUM R_{as} (with rps); (2) without rotational position sensing (rps), means the number (C) of independent read/ write channels connected to the control unit divided by the least latency time (t_{lmin})</p>	<p>(t_{smin}), divided by three; Thus: $t_{s2} = \frac{t_{smax} + 2t_{smin}}{3}$ “maximum seek time” (t_{smax}) (1) for fixed head devices, is zero; (2) for moving head or moving media devices, means the rated time to move between the two most widely separated tracks; “minimum seek time” (t_{smin}) (1) for fixed head devices, is zero; (2) for moving head or moving media devices, means</p>
---	---

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of any the
connected rated
independent time
seek to
mechanism; move
Thus: from
one
 $R_{ac} = \frac{C}{t_{im,n}}$ (without track
track
to an
(c) of a seek adjacent
mechanism track.
(R_{as}), “latency
means the time” (t^1)
reciprocal means the
of the rotational
average period
access time divided by
(t_{aa}) of twice the
the seek number of
mechanism; independent
read/write
heads per
track;
“analogue
computer”
means
equipment
which can,
in the form
of one
or more
continuous
variables:
(a) accept
data;
(b) process
data; and
(c) provide
output of
data;
“associated”
with
equipment
or systems
means:
(a) can
feasibly be
either:
(1)
removed
from
such
equipment

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or
systems;
or
(2)
used
for
other
purposes;
and

(b) is not essential to the operation of such equipment or systems; “block move data rate” means the maximum number of pixels which can be moved per second from one location to another in the storage which functions as the frame buffer; “computer using facility” means the end-user’s contiguous and accessible facilities:
(a) housing the computer operating area and those end-user functions which are supported

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by the electronic computer and its related equipment; and (b) not extending beyond 1,500 metres in any direction from the centre of the computer operating area;

For the purpose of this definition—	tdmax), means the product of:	tmax), means the product of:
“computer operating area” means the immediately contiguous and accessible area around the electronic computer, where the normal operating, support and service functions take place;	(1) the maximum number of binary digit (bit) positions per unformatted track; and (2) the number of tracks which simultaneously can be read or written, divided by the rotational period;	(1) the maximum bit packing density;
“data device” means equipment capable of transmitting or receiving sequences of digital information;	(b) of a magnetic tape drive (R	(2) the number of data bits per character (ANSI) or per row (ISO); and (3) the maximum tape read/write speed;
“data signalling		“most immediate storage” means the portion of the main storage most directly accessible by the central processing unit: (a) for single

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rate” means that rate as defined in ITU Recommendation 53-36, taking into account that, for non-binary modulation, baud and bit per second are not equal. Binary digits for coding, checking and synchronisation functions are included; NB.: It is either the maximum one-way rate, i.e., the maximum rate in either transmission or reception, whichever is the greater; “digital computer” means equipment which can, in the form of one or more discrete variables: (a) accept data; (b) store data or instructions in fixed or alterable

level main storage, this is the internal storage; (b) for hierarchical main storage, this is: (1) the cache storage; (2) the instruction stack; or (3) the data stack; “multi-data-stream processing” means the microprogramme or equipment architecture technique which permits processing two or more data sequences under the control of one or more instruction sequences by means such as: (a) parallel processing; (b) structured arrays of processing elements; (c) Single Instruction Multiple Data

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(writable) storage devices;
(c) process data by means of a stored sequence of instructions which is modifiable; and
(d) provide output of data;
NB: Modifications of a stored sequence of instructions include replacement of fixed storage devices, but not a physical change in wiring or interconnections; “electronic computer” does not include related equipment which contains an electronic computer, but which lacks user-accessible programmability; “equivalent multiply rate” means the maximum achievable number of multiplication operations

(SIMD) operations; or
(d) Multiple Instruction Multiple Data (MIMD) operations; “net capacity” of a drum, disk or cartridge-type streamer tape drive or a bubble memory, means the total capacity designed to be accessible to the digital computer excluding error control bits;

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which
can be
performed
per second
considering
that, in the
case of
simultaneous
multiplication
operations,
all
multiplication
rates have to
be summed
in order to
arrive at the
equivalent
multiply
rate:
(a)
assuming
 (1)
 optimal
 operand
 locations
 in the
 most
 immediate
 storage;
 and
 (2)
 operand
 lengths
 at
 least
 16
 bit, or
 more
 if this
 allows
 for
 faster
 operation;
 and
(b) ignoring
 (1)
 set-up
 operations;
 (2)
 pipeline
 filling
 operations;

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- (3) initialization;
- (4) interrupts;
- and
- (5) data reordering times;

NB:

Simultaneous multiplication operations can occur because of:

- (a) multiple arithmetic units for operations such as complex multiplication, convolution or recursive filtering;
- (b) parallel pipelining;
- (c) more than one arithmetic unit in one data processing unit;
- or
- (d) more than one data processing unit in one system.

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“fault tolerance” means the ability to perform correctly without human intervention after failure of any assembly, so that there is no single point in the system the failure of which could cause catastrophic failure of the system’s functioning; “gateway” means the function, realised by any combination of equipment and software, of carrying out the conversion of conventions for representing, processing or communicating information used in one system into the corresponding but different conventions used in another system;

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“gross capacity” means the product of:
(a) the maximum number of binary digit (bit) positions per unformatted track; and
(b) the total number of tracks including spare tracks and tracks not accessible to the user;
“hybrid computer” means equipment which can:
(a) accept data;
(b) process data, in both analogue and digital representations; and
(c) provide output of data;
“image digitiser” means a device for directly converting an analogue representation of an image into a digital representation;
“image enhancement” means the processing

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of
externally
derived
information-
bearing
images by
algorithms
such as time
compression,
filtering,
extraction,
selection,
correlation,
convolution
or
transformations
between
domains
(e.g., fast
Fourier
transform
or Walsh
transform).
This does
not include
algorithms
using only
linear or
rotational
transformation
of a single
image,
such as
translation,
feature
extraction,
registration
or false
coloration;
“internetwork
gateway”
means a
gateway for
two systems
which are
themselves
local area
networks,
wide area
networks or
both;
“local area
network”

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means
a data
communication
system
which:
(a) allows
any
number of
independent
data
devices to
communicate
directly
with each
other; and
(b) is
confined
to a
geographical
area of
moderate
size (e.g.,
office
building,
plant,
campus,
warehouse);
“main
storage”
means the
primary
storage
for data or
instructions
for rapid
access by
a central
processing
unit. It
consists of
the internal
storage of
a digital
computer
and any
hierarchical
extension
thereto,
such as
cache
storage
or non-
sequentially

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accessed
extended
storage;
NB:
For
the
determination
of the
size of
main
storage
the
cache
storage
is
excluded,
provided
that:
(a) its
size
does
not
exceed
6.25%
(1/16th)
of the
size of
main
storage excluding
cache
storage;
and
(b)
it is
designed
to
contain
only
data
already
contained
in
main storage;
“maximum
bit packing
density”
means the
density of
recording
specified in
accordance
with the
appropriate

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ANSI
or ISO
Standard
(eg ANSI
X3.14–
1979, ISO
1863–
1975; ANSI
X3.22–
1973, ISO
1873–
1976; ANSI
X3.39–
1973, ISO
3788–
1976; ANSI
X3.48–
1977, ISO
3407–
1976; ANSI
X3.56–
1977, ISO
4057–
1979; ANSI
X3.54–
1976);
“maximum
bit transfer
rate”
(a) of a
drum or
disk drive
(R

an element is
a “principal
element” when its
replacement value
is more than 35%
of the total value
of the system of
which it is an
element. Element
value is the cost
of the element for
the manufacturer
of the system,
or by the system
integrator.
Total value
is the normal
international
selling price to

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unrelated parties
at the point of
manufacture or
consolidation of
shipment;

“real time
processing”
means
processing
of data
by an
electronic
computer in
response to
an external
event
according
to time
requirements
imposed by
the external
event;

“related
equipment”
means the
following
equipment,
contained
in or
associated
with an
electronic
computer:
(a)
equipment
for
interconnecting
analogue
computers
with digital
computers;
(b)
equipment
for
interconnecting
digital
computers;
(c)
equipment
for
interfacing
electronic
computers

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to local area networks or to wide area networks;

(d) communication control units;

(e) other input/output control units;

(f) recording or reproducing equipment; or

(g) displays; “signal processing” means the processing of externally derived information-bearing signals by algorithms such as time compression, filtering, extraction, selection, correlation, convolution or transformations between domains(eg, fast Fourier transform or fast Walsh transform).

“total processing data rate”–

(a) of a single central processing unit, is its

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processing
data rate;
(b) of
multiple
central
processing
units which
do not
share direct
access to
a common
main
storage,
is the
individual
processing
data rate of
each central
processing
unit, ie,
each unit is
separately
treated as
a single
central
processing
unit as in (a)
above;
(c) of
multiple
central
processing
units which
partially
or fully
share direct
access to
a common
main
storage at
any level, is
the sum of:
(1) the
highest
of the
individual
processing
data
rates
of all
central
processing

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units;
and
(2)
0.75
times
the
processing
data
rate of
each
remaining
central
processing
unit,
sharing
the
same
main
storage;

assuming the
configuration of
equipment which
would maximize
this sum of rates.

For the purpose
of this definition—

“processing
data rate”
is the
maximum
of the
floating
point
processing
data rate
(R_f) or the
fixed point
processing
data rate
(R_x).

NB:
The
processing
data
rate
of a
central
processing
unit
implemented
with
two or

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more
microprocessor
microcircuits,
not
including
any
dedicated
microprocessor
microcircuit
used
solely
for
display,
keyboard
or
input/
output
control,
is the
sum
of the
individual
processing
data
rates
of all
these
microprocessor
microcircuits.

“floating
point
processing
data
rate” (R_f) is
the sum of:

(1)
0.85
times
the
number
of bits
in a
fixed
point
instruction
(n_{ix}) or
0.85
times
the
number
of bits
in a
floating

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point
instruction
(n_{if}),
if no
fixed
point
instructions
are
implemented;
(2)
0.15
times
the
number
of bits
in a
floating
point
instruction
(n_{if});
(3)
0.40
times
the
number
of bits
in a
fixed
point
operand
(n_{ox})
or
0.40
times
the
number
of bits
in a
floating
point
operand
(n_{of}),
if no
fixed
point
instructions
are
implemented;
and
(4)
0.15
times
the

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number
of bits
in a
floating
point
operand
(n_{of});
divided
by the
sum
of:
(1)
0.85
times
the
execution
time
for a
fixed
point
addition
(t_{ax}) or
for a
floating
point
addition
(t_{af}),
if no
fixed
point
instructions
are
implemented;
(2)
0.09
times
the
execution
time
for a
floating
point
addition
(t_{af});
and
(3)
0.06
times
the
execution
time
for a
floating

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point
multiplication
(t_{mf})
or for
the
fastest
available
subroutine
(t_{msub})
to
simulate
a
floating
point
multiplication
instruction,
if no
floating
point
multiplication
instructions
are
implemented;

Thus:

$$R_f = \frac{(0.85)n_i + (0.15)n_{if} + (0.40)n_{ax} + (0.15)n_{of}}{(0.85)t_{ax} + (0.09)t_{af} + (0.06)t_{mf}}$$

or if no
fixed point
instructions
are
implemented,
then:

$$R_f = \frac{(1.00)n_{if} + (0.55)n_{of}}{(0.94)t_{af} + (0.06)t_{mf}}$$

or if no
floating
point
multiplication
instructions
are
implemented
($t_{mf} = t_{msub}$)
then:

$$R_f = \frac{(0.85)n_i + (0.15)n_{if} + (0.40)n_{ax} + (0.15)n_{of}}{(0.85)t_{ax} + (0.09)t_{af} + (0.06)t_{msub}}$$

NB: If
a digital
computer
has neither

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floating
point
addition
nor floating
point
multiplication
instructions,
then its
floating
point
processing
data rate
is equal to
zero;
“fixed point
processing
data
rate” (Rx) is
the sum of:
(1)
0.85
times
the
number
of bits
in a
fixed
point
addition
instruction
(n_{iax});
(2)
0.15
times
the
number
of bits
in a
fixed
point
multiplication
instruction
(n_{imx});
and
(3)
0.55
times
the
number
of bits
in a
fixed
point

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operand
(n_{ox});
divided by
the sum of:
(1)
0.85
times
the
execution
time
for a
fixed
point
addition
(t_{ax});
and
(2)
0.15
times
the
execution
time
for a
fixed
point
multiplication
(t_{mx})
or for
the
fastest
available
subroutine
(t_{msub})
to
simulate
a fixed
point
multiplication
instruction
if no
fixed
point
multiplication
instructions
are
implemented;

Thus:

$$R_x = \frac{(0.85)n_{ax} + (0.15)n_{mx} - (0.55)n_{ox}}{(0.85)t_{ax} - 0.15)t_{mx}}$$

or if no
fixed point
multiplication

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instructions
are
implemented
($t_{mx} = t_{msub}$),
then:

$$R_x = \frac{(0.85)n_{iax} + (0.15)n_{imx} + (0.55)n_{iaf}}{(0.85)t_{iax} + 0.15)t_{msub}}$$

NB: If
a digital
computer
has neither
fixed point
addition nor
fixed point
multiplication
instructions,
then its
fixed point
processing
data rate
is equal to
zero.

“number of
bits” in a:
fixed
point
addition
instruction
(n_{iax})—
fixed
point
multiplication
instruction
(n_{imx})—
floating
point
addition
instruction
(n_{iaf})
floating
point
multiplication
instruction
(n_{imf})—

means the
number of
bits in the
appropriate
shortest
single fixed
or floating

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point
instruction
length
which
permits
full direct
addressing
of the main
storage;
NB:1.
When
multiple
instructions
are
required
to
simulate
an
appropriate
single
instruction,
the
number
of bits
in the
above
instructions
is 16
bit
plus
the
number
of bits
(b_{iax} ,
 b_{imx} ,
 b_{iaf} ,
 b_{imf})
which
permits
full
direct
addressing
of the
main
storage.

Thus: $n_{iax} =$
 $16 + b_{iax}$;
 $n_{imx} = 16 +$
 b_{imx}
 $n_{iaf} = 16 +$
 b_{iaf}

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$$n_{imf} = 16 + b_{imf}$$

NB:2.

If the addressing capability of an instruction is expanded by using a base register, then the number of bits in an instruction, fixed or floating point, addition or multiplication, is the number of bits in the instruction with the standard address length including the number of bits necessary to use the base register.

“number of bits in a fixed point operand” (n_{ox}) is
 (a) the shortest

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fixed point
operand
length; or
(b) 16 bit;

whichever
number is higher;
“number
of bits in
a floating
point
operand” (n_{of})
is
(a) the
shortest
floating
point
operand
length; or
(b) 30 bit;
whichever
number is
higher;
and for the
purpose
of these
definitions
“execution
time” is
(a) the time
certified
or openly
published
by the
manufacturer
for the
execution of
the fastest
appropriate
instruction
under the
following
conditions:
(1) no
indexing
or
indirect
operations
are
included;
(2) the
instruction
is in

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the
most
immediate
storage;
(3)
one
operand
is in
the
accumulator
or in a
location
of the
most
immediate
storage
which
is
acting
as the
accumulator;
(4) the
second
operand
is in
the
most
immediate
storage;
and
(5) the
result
is left
in the
accumulator
or the
same
location
in the
most
immediate
storage
which
is
acting
as the
accumulator;

(b) if
only the
maximum
and
minimum
execution

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times of the instructions are published, the sum of:
(1) the maximum execution time of an instruction (t_{\max});
and
(2) twice the minimum exception time of this instruction (t_{\min});

divided by three;
Thus:

$$t = \frac{t_{\max} + 2t_{\min}}{3}$$

(t stands for any of the values t_{ax} , t_{af} , t_{mx} or t_{mf});
(c) for central processing units which simultaneously fetch more than one instruction from one storage location, the average of the execution times when executing instructions fetched from all possible

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locations
within the
stored word;
(d) if the
longest
fixed point
operand
length is
smaller
than 16-
bit, the time
required for
the fastest
available
subroutine
to simulate
a 16 bit
fixed point
operation;

Note: 1.
If the
addressing
capability
of an
instruction
is
expanded
by
using
a base
register,
then
the
execution
time
shall
include
the
time
for
adding
the
content
of the
base
register
to the
address
part
of the
instruction.

2.
When

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calculating
processing
data
rate
for
computers
with
cache
sizes
smaller
than
64
kbytes,
the
execution
time
of the
appropriate
instructions
shall
be
calculated
as
follows:
(cache
hit
rate) ×
(execution
time
when
both
instruction
and
operand
are in
cache
storage)
+ (1 –
cache
hit
rate) ×
(execution
time
when
neither
instruction
nor
operand
are in
cache
storage),
the
“cache

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hit
rate”
being:
1.00
for
cache
size
of
64
kbyte
or
more
0.95
”
“32”
”
0.90
”
“16”
”
0.85
”
“8”
”
0.75
”
“4”
”
0.65
”
“2”
”
0.50
”
“1”
”
The
cache
hit
rate
for
computers
with
cache
sizes
smaller
than
1
kbyte
shall
be
treated

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as
zero.

“total transfer rate”–
(a) of input/output control unit drum, disk or cartridge-type streamer tape drive combinations (R_{tdtot}), is the sum of the individual transfer rates of all input/output control unit drum, disk or cartridge-type streamer tape drive combinations (R_{td}) provided with the system which can be sustained simultaneously, assuming the configuration of equipment which would maximise this sum of rates; Thus:
 $R_{tdtot} = \text{SUM } R_{td}$
(b) of input/output control unit magnetic

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tape
drive
combinations
(R_{ttot})
including
cartridge
tape
streamer
tape
drive
combinations,
means
the
sum
of the
individual
transfer
rates
of all
input/
output
control
unit
magnetic
tape
drive
combinations
(R_{tt})
provided
with
the
system
which
can be
sustained
simultaneously,
assuming
the
configuration
of
equipment
which
would
maximize
this
sum of
rates;
Thus:
 $R_{ttot} =$
SUM
 R_{tt} .

(c) of input/
output or

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communication
control unit
directly
connected
data channel
combinations,
means the
sum of the
individual
transfer
rates of
all data
channels
provided
with the
system
which can
be sustained
simultaneously,
assuming
the
configuration
of
equipment
which
would
maximize
this sum of
rates.

For the purpose
of this definition,
“transfer
rate”–

(1)
of an
input/
output
control
unit
drum
or disk
drive
combination
(R_{id})
other
than a
cartridge-
type
streamer
tape
drive
combination,

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is the smaller of either:

(A) the input/output control unit transfer rate (R_{tc});

or (B) the sum of the individual transfer rates of all independent seek mechanisms (R_{ts});

Thus:

R_{td}
=min
(R_{tc} ,
Sum
 R_{ts})

(2) of an input/output control unit (R_{tc})

(A) with rotational position sensing (rps), is the product of:

(a) the number of independent

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read/
write
channels
(C);
and
(b)
the
highest
maximum
bit
transfer
rate
($R_{tsmaxmax}$)
of
all
independent
seek
mechanisms;
or

(B)
without
rotational
position
sensing
(rps),
is two
thirds
of this
product;

Thus: $R_{tc} =$
 $C \cdot R_{tsmaxmax}$ (with
rps);

$$R_{tc} = \frac{2C \cdot R_{tsmaxmax}}{3} \text{ (without rps)}$$

(without rps)
(3) of an
independent
seek
mechanism
(R_{ts}), is the
product of:

(A)
the
maximum
bit
transfer
rate
(R_{tsmax});
and
(B)
the

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rotational
 period
 (t_r);
 divided
 by the
 sum
 of:
 (A)
 the
 rotational
 period
 (t_r);
 (B)
 the
 minimum
 seek
 time
 (t_{smin});
 and
 (C)
 the
 latency
 time
 (t_l);

Thus:

$$R_{rt} = \frac{R_{t_{smax}} \times t_r}{t_r - t_{smin} + t_l}$$

(4) of an
 input/output
 control unit
 cartridge-
 type
 streamer or
 magnetic
 tape drive
 combination
 (R_{rt}), is the
 product of:

- (1) the
 number
 of
 independent
 read/
 write
 channels
 (C);
 and
- (2) the
 highest
 maximum
 bit

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transfer
rate
($R_{ttmaxmax}$)
of all
tape
drives;

Thus: $R_{tt} =$
 $C.R_{ttmaxmax}$
“minimum seek
time” (t_{smin})—
(1) for
fixed head
devices, is
zero; or
(2) for
moving
head or
moving
media
devices, is
the rated
time to
move from
one track to
an adjacent
track;
“latency,
time” (t^1)
) is the
rotational
period
divided by
twice the
number of
independent
read/write
heads per
track;
“user-
accessible
microprogrammability”
means the
facility
allowing
a user to
insert,
modify
or replace
microprogrammes;
“user-
accessible

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programmability”
means the
facility
allowing
a user to
insert,
modify
or replace
programmes
by means
other than:
(a) a
physical
change in
wiring or
interconnections;
or
(b) the
setting of
function
controls
including
entry of
parameters;
“wide area
network”
means
a data
communication
system
which:
(a) allows
an arbitrary
number of
independent
data
devices to
communicate
with each
other;
(b) may
include
local area
networks;
and
(c) is
designed to
interconnect
geographically
dispersed
facilities.

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IL1566

Any term used in this entry shall bear the meaning it has in entry IL1566 in this Group.

Software and technology therefor, the following:

Note:
Software for equipment described in entry IL1565 is dealt with in this entry. Specially designed ODMA software for equipment described in other entries in this Schedule except entry IL1565, is dealt with in the appropriate entry.

(a)
Software, the following:

(1) software W
designed or modified for any computer that is part of a computer series designed and produced in any country specified in

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Schedule 2
to this Order

except application
software designed
for and limited to:

(A)
accounting,
general
ledger,
inventory
control,
payroll,
accounts
receivable,
personnel
records,
wages
calculation
or invoice
control;

(B) data
and text
manipulation
such as sort/
merge, text
editing,
data entry
or word
processing;

(C) data
retrieval
from
established
data files
for purposes
of report
generation
or inquiry
for the
functions
described in
(A) or (B)
above; or

(D) the non-
real time
processing
of pollution
sensor data
at fixed sites
or in civil

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vehicles
for civil
environmental
monitoring
purposes;

(2) software A
designed or
modified for
the design,
development
or
production
of items
specified
in this
Schedule

(3) software
designed or
modified
for:

(A) hybrid A
computers
specified
in entry
IL1565 in
this Group

(B) one or W
more of the
functions
referred
to in
paragraphs
(A)(a) to
(m) of head
(h) of entry
IL1565 or
for digital
computers
or related
equipment
designed or
modified
for such
functions

except

(a)
specially
designed
software
in

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machine
executable
form
for
digital
computers
and
related
equipment
therefor
which
are
excluded
by
exception
(G) or
(H) to
head
(h) of
entry
IL1565;
(b)
software
for
equipment
specified
in
paragraph (A)
(c) or
(m) of
head
(h) of
entry
IL1565
unless
the
software
performs:

(1) multi-
data-stream
processing
or load
sharing
functions;
or

(2)
datagram or
fast select
functions
as defined
in level III
of CCITT

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X.25 or
equivalent;

(4) software W
for
computer-
aided
design,
manufacture,
inspection
or testing
of items
specified
in this
Schedule

(5) software W
designed or
modified
to provide
certifiable
multi-level
security or
certifiable
user-
isolation
applicable
to
government-
classified
material
or to
applications
requiring an
equivalent
level of
security, or
software to
certify such
software

(6) software
specially
designed for
computer
aided design
(CAD) of
patterned
substrates,
having
any of the
following
characteristics:—

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(A) W
automatically
transforming
schematic
functional
descriptions
into pattern
layouts

(B) W
simulation
of the
performance
of the
circuit
layout

(C) W
automatic
generation
of test
string lists
(i.e., test
vectors) for
substrates
having
more than
two layers
(including
the ground
plane) of
interconnections

(D) W
automatic
placement
or routing
which is
designed for
performing impedance
matching
or crosstalk
analysis and
crosstalk
matching

except
automatic
software
for the
generation
of test string
lists for
continuity

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testing of
substrates.

(7) software
specially
designed
for the
computer
aided
design of
semiconductor
devices or
integrated
circuits
having
any of the
following
characteristics—

(A) W
automatic
transformation
of
schematic
diagrams,
functional
block
descriptions
or logic
diagrams
into
physical
layouts

(B) circuit W
verification
rules

(C) W
automatic
routing for
physical
layout

(D) W
automatic
placement
for physical
layout

(E) W
automatic
generation
of test
vectors;

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or W
(F)
simulation
of the
physically
laid out
circuits

(b)
Software,
the
following:

(1)
development
systems, the
following:

(A)
development
systems
employing
high-level
language
and
designed
for or
containing
programmes
or databases
special
to the
development
or
production
of:

(a) specially W
designed
software
specified
elsewhere
in this
Schedule

(b) software W
specified in
sub-head (a)
(2) or (a)(3)
of this entry,
including
any subset
designed or
modified for
use as part

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of such a
development
system

(B)
development
systems
employing
high-level
language
and
designed
for or
containing
the software
tools and
databases
for the
development
or
production
of software
or any
subset
designed or
modified
for use as
part of a
development
system
such as, or
equivalent
to:

(a) Ada W
Programming
Support
Environment
(APSE)

(b) any
subset of
APSE, the
following:

(1) Kernel W
APSE

(2) Minimal W
APSE

(3) Ada W
compilers
specially
designed
as an

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- integrated subset of APSE
- or
- (4) any other subset of APSE W
- (c) any superset of APSE W
- or W
- (d) any derivative of APSE
- (2) programming systems, the following:
 - (A) cross-hosted compilers and cross-hosted assemblers W
 - (B) compilers or interpreters designed or modified for use as part of a development system specified in sub-head (1) above W
 - (C) disassemblers, decompilers or other software which converts programmes in object or assembly language into a W

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higher level
language

except
simple
debugging
application
software,
such as
mapping,
tracing,
check-point/
restart,
breakpoint,
dumping
and the
display of
the storage
contents
or their
assembly
language
equivalent;

(3) W
diagnostic
systems or
maintenance
systems,
designed or
modified
for use as
part of a
development
system
specified in
sub-head (1)
above

(4)
operating
systems, the
following:

(A)
operating
systems
designed or
modified
for digital
computers
or related
equipment,
exceeding
any of the

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following
limits;

(1) central
processing
unit storage
combinations—

(a) total
processing
data rate of
1,000 Mbit/
s;

(b) total W
connected
capacity
of main
storage of
128 MByte

(2) input/
output
control unit,
drum or
disk drive
combinations—

(a) total
connected
net capacity
of 12
GByte;

(b) W
maximum
bit transfer
rate of any
drum or
disk drive of
25 Mbit/s

(B) W
operating
systems
providing
on-line
transaction
data
processing
which
permits
integrated
teleprocessing
and on-line

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updating of
databases

(5)
application
software,
the
following:

(A) W
software for
cryptologic
or
cryptoanalytic
applications

(B) artificial W
intelligence
software,
including
expert
system
software,
which
enables
a digital
computer
to perform
functions
that are
normally
associated
with human
perception
and
reasoning or
learning

(C) database
management
systems
which are
designed
to handle
distributed
databases
for:

(a) fault W
tolerance
by using
techniques
such as
maintenance
of

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duplicated
databases

or

(b) W
integrating
data at
a single
site from
independent
remote
databases

(D) W
software
designed
to adapt
software
resident on
one digital
computer
for use on
another
digital
computer

except software
to adapt between
two digital
computers not
specified in entry
IL1565.

(E) software W
to provide
adaptive
control
and having
both the
following
characteristics

(a) for
flexible
manufacturing
units
(FMUs)
which
include
equipment
described in
(b)(1) and
(b)(2) of the
definition
of flexible

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manufacturing
unit below;
and
(b)
capable of
generating
or
modifying,
in real time
processing,
programmes
or data by
using the
signals
obtained
simultaneously
by means of
at least two
detection
techniques,
such as:
(1) machine
vision
(optical
ranging);
(2) infrared
imaging;
(3)
acoustical
imaging
(acoustical
ranging);
(4) tactile
measurement;
(5) inertial
positioning;
(6) force
measurement;
(7) torque
measurement;
except
software
which only
provides
rescheduling
of
functionally
identical
equipment
within
flexible
manufacturing
units

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using pre-stored part programmes and a pre-stored strategy for the distribution of the part programmes.

(c) D
Technology applicable to the development, production or use (i.e. installation, operation and maintenance) of software, whether or not the software is specified in this entry

except—

(1) technical data in the public domain;

(2) the minimum technical information necessary for the use of software not specified in this entry.

There shall be excluded from this entry—

1. software not exceeding 5,000

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statements
in source
language,
excluding
data,
provided
that:

- (a) the
software
is
neither
designed
nor
modified
for use
as a
module
of a
larger
software
module
or
system
which
in
total
exceeds
this
limit;
and
- (b) the
software
is not
specified
in sub-
head
(b)(5)
above;

2. software
initially
exported to
a country
specified in
Schedule 2
to this Order
prior to 1st
January,
1984,
provided
that:

- (a) the
software
is

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identical
to and
in the
same
language
form
(source
or
object)
as that
initially
exported,
allowing
minor
updates
for the
correction
of
errors
which
do not
modify
the
initially
exported
functions;
(b) the
accompanying
documentation
does
not
exceed
the
level
of the
initial
export;
and
(c) the
software
is
exported
to the
same
destination
as the
initial
export;

3. the
minimum
technical
information
for the

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use (i.e.
installation,
operation
and
maintenance)
of software
licensed
for export,
when
shipped
together
with or
solely
for use
with such
software; 5.
5. software
which is
either:

- (a)
standard
commercially
available
software:
 - (1)
designed
for
installation
by
the
user
without
further
support
by
the
supplier;
and
 - (2)
designed
for
use
on
digital
computers
and
related
equipment
therefor
which
are
excepted
by

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paragraph (C)
to
head
(h)
of
entry
IL1565
in
this
Group;
and
(3)
generally
available
to
the
public;
or
(b)
software
in the
public
domain.

In this entry:
“adaptive
control”
means a
control
system that
adjusts the
response
from
conditions
detected
during the
operation;
“application
software”
means
software
other than
development
systems,
diagnostic
systems,
maintenance
systems,
operating
systems and
programming
systems
not falling

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within any
of the other
defined
categories
of software;
“cross-
hosted
programming
systems”
means
programming
systems
which
produce
programmes
for a model
of electronic
computer
different
from that
used to
run the
programming
system,
that is, they
have code
generators
for
equipment
different
from
the host
computer;
“database”
means a
collection
of data for
one or more
particular
applications,
which is
physically
located and
maintained
in one
or more
electronic
computers
or related
equipment;
“database
management
systems”

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means
application
software to
manage and
maintain a
database in
one or more
prescribed
logical
structures
for use
by other
application
software
independent
of the
specific
methods
used to
store or
retrieve the
database;
“data
device”
means
equipment
capable of
transmitting
or receiving
sequences
of digital
information;
“development
systems”
means
software
to develop
or produce
software,
including
software
to manage
those
activities.
Examples
of a
development
system are
programming
support
environments,
software
development

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environments
and
programmer-
productivity
aids;
“diagnostic
systems”
means
software
to isolate
or detect
software or
equipment
malfunctions;
“distributed
database”
means a
database
which is
physically
located and
maintained
in part or as
a whole in
two or more
interconnected
electronic
computers
or related
equipment,
so that
inquiries
from one
location
can involve
database
access
in other
interconnected
electronic
computers
or related
equipment;
“flexible
manufacturing
unit” (FMU),
(sometimes
also referred
to as
flexible
manufacturing
system
(FMS) or

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flexible
manufacturing
cell (FMC))
means a
combination
of at least:

(a) a
digital
computer
including
its
own
main
storage
and its
own
related
equipment;

and
(b)
two or
more
of the
following:

(1)
a
machine
tool
for
removing,
cutting
or
spark
eroding
metals,
ceramics
or
composites;

(2)
a
computer
controlled
or
numerically
controlled
dimensional
inspection
machine
or
a
digitally
controlled
measuring

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machine
specified
in
head
(c)
of
entry
IL1099
in
Group
3A;
(3)
a
robot
specified
in
entry
IL1391
in
Group
3D;
(4)
digitally
controlled
equipment
specified
in
entry
IL1080,
IL1081,
IL1086
or
IL1088
in
Group
3A;
(5)
stored-
programme-
controlled
equipment
specified
in
head
(b)
of
entry
IL1355
in
Group
3D;
(6)
digitally

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controlled
equipment
specified
in
entry
IL1357
inGroup
3D;
(7)
digitally
controlled
electronic
equipment
specified
in
entry
IL1529
in
Group
3F;

“generally
available to
the public”
means

(a)
available
at
retail
selling
points,
other
than
those
specializing
in
selling
electronic
computers
to the
general
public
in
model
series
which
are not
excepted
by
paragraph (C)
to
head
(h) of
entry

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IL1565
in this
Group;
and
(b)
sold
from
stock
by
means
of:

- (1)
over-
the-
counter
transactions;
- (2)
mail
order
transactions;
- (3)
telephone
call
transactions;

“high-level
language”
means a
programming
language
that does
not reflect
the structure
of any
one given
electronic
computer
or that of
any one
given class
of electronic
computers;
“maintenance
systems”
means
software to:

- (a)
modify
software
or its
associated
documentation
in
order

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to
correct
faults,
or for
other
updating
purposes;
or
(b)
maintain
equipment;
“on-line
updating”
means
processing
in which the
contents of
a database
can be
amended
within a
period of
time useful
to interact
with an
external
request;
“operating
systems”
means
software to
control:
(a) the
operation
of a
digital
computer
or of
related
equipment;
or
(b) the
loading
or
execution
of
programmes;
“programming
systems”
means
software to
convert a
convenient

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expression
of one
or more
processes
(source
code or
source
language)
into
equipment
executable
form (object
code or
object
language);
“self-hosted
software for
programming
systems”
means
software
to produce
programmes
for the same
model of
electronic
computer
as that used
to run the
programming
system, ie,
they only
have code
generators
for the host
computer;
“standard
commercially
available”
means for
software
that which
is:

- (a)
commonly
supplied
to
general
purchasers
or
users
of
equipment

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in
countries
specified
in
Schedule 2
to this
Order,
but
not
precluding
the
personalization
of
certain
parameters
for
individual
customers
wherever
located;
(b)
designed
and
produced
for
civil
applications;
(c) not
designed
or
modified
for
any
digital
computer
which
is part
of a
digital
computer
series
designed
and
produced
in a
country
specified
in
Schedule 2;
and
(d)
supplied
in a

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commonly
distributed
form.

Any term used
in this entry shall
bear the meaning
it has in entry
IL1565 in this
Group.

IL1567

Stored- W
programme-
controlled,
communication
switching
equipment or
systems and
technology
therefor, the
following:
and specially
designed
components
therefor and
specially
designed ODMA
software for
the use of such
equipment or
systems—

(a)
Communication
equipment
or systems
for data
(message)
switching
(including
those for
local area
networks
or for
wide area
networks)

except data W
(message)
switching
equipment
or systems,
provided
that—

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(1) the
equipment
or
systems
are
designed
for
fixed
civil
use
according
to the
requirements
of
either:

(A)
CCITT
Recommendations
F.1
to
F.79
for
store-
and-
forward
systems
(Volume
II-
Fascicle
II.4,
VIIth
plenary
assembly, 10th-
21st
November
1980);

or
(B)
ICAO
Recommendations
for
store-
and-
forward
civil
aviation
communication
networks
(Annex
10
to
the
Convention

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on
International
Civil
Aviation,
including
all
amendments
agreed
up
to
and
including
14th
December
1981,
published
by
ICAO);

(3) the
maximum
data
signalling
rate
of any
circuit
does
not
exceed
9,600
bit/s;
(4) the
equipment
or
systems
do not
contain
digital
computers
or
related
equipment
specified
in—
(A)
head
(f)
of
entry
IL1565
in
this
Group;
or

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(B)
paragraphs
(a),
(b)
or
(d)
to
(j)
(inclusive)
of
sub-
head
(h)
(A)
of
entry
IL1565;
(5) the
software
supplied:
(A)
is
limited
to
the
minimum
specially
designed
operating
systems,
diagnostic
systems,
maintenance
systems
or
application
software
necessary
for
the
installation,
operation
and
maintenance
of
the
equipment
and
systems
and
is
in
machine

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executable
form;
and
(B)
does
not
include
software—
(a)
specified
in
entry
IL1527
in
Group
3F,
in
sub-
head
(a)
(5)
in
entry
IL1566
in
this
Group
or
in
entry
ML11
in
Group
1,
or
(b)
that
permits
user-
modification
of
generic
software
or
its
associated
documentation;
and
(6) the
equipment
or
systems
are

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designed
for
installation
by the
user
without
support
from
the
supplier;

(b)
Communication
equipment
or systems
for stored-
programme-
controlled
circuit
switching

except— D

(1)
key
telephone
systems,
provided
that—

(A)
access
to
an
external
connection
is
obtained
by
pressing
a
special
button
(key)
on
a
telephone,
rather
than
by
dial
or
key-
pad
as
on

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a
PABX;
(B)
they
are
not
designed
to
be
upgraded
for
use
as
PABXs;
(C)
the
software
supplied:
(a)
is
limited
to
the
minimum
specially
designed
operating
systems,
diagnostic
systems,
maintenance
systems
or
application
software
necessary
for
the
installation,
operation
and
maintenance
of
the
equipment
or
systems,
and
is
in
machine-
executable

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form;
and
(b)
does
not
include
software:
(1)
specified
in
entry
IL1527
in
Group
3F,
in
sub-
head
(a)
(5)
in
entry
IL1566
in
this
Group
or
in
entry
ML11
in
Group
1,
or
(2)
that
permits
user-
modification
of
generic
software
or
its
associated
documentation;
and
(D)
the
equipment
or
systems
are

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designed
for
installation
by
the
user
without
support
from
the
supplier;

(2)
stored-
programme-
controlled
circuit
switching
equipment
or
systems,
provided
that—

(A)
the
equipment
or
systems
are
designed
for
fixed
civil
use
in
stored-
programme-
controlled
telegraph
circuit
switching
for
data;

(C)
the
equipment
or
systems
do
not
contain
digital
computers
or

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related
equipment
specified
in
head
(f)
of
entry
IL1565
or
in
paragraphs
(a)
to
(j)
inclusive
or
paragraph (m)
of
sub-
head
(h)
(A)
of
entry
IL1565;
(D)
the
equipment
or
systems
do
not
have
either
of
the
following
characteristics:
(a)
multi-
level
call
pre-
emption
(including
over-
riding
or
seizing
of
busy
subscriber

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lines,
trunk
circuits
or
switches),
other
than
for
single-
level
call
pre-
emption
(such
as
executive
override);
or
(b)
common
channel
signalling;
(E)
the
maximum
internal
bit
rate
per
channel
does
not
exceed
9,600
bit/
s;
(F)
the
telegraph
circuits
(whether
or
not
operating
as
telephone
circuits)
are
capable
of
carrying
any
type

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of
telegraph
or
telex
signal
compatible
with
a
voice
channel
bandwidth
of
3,100
Hz;
(G)
the
software
supplied:
(a)
is
limited
to
the
minimum
specially
designed
operating
systems,
diagnostic
systems,
maintenance
systems
or
application
software
necessary
for
the
installation,
operation
and
maintenance
of
the
equipment
or
systems
and
is
in
machine-
executable

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form;
and
(b)
does
not
include
software:
(1)
specified
in
entry
IL1527
in
Group
3F
or
in
sub-
head
(a)
(5)
in
entry
IL1566
in
this
Group
or
in
entry
ML11
in
Group
1;
(2)
that
permits
user-
modification
of
generic
software
or
its
associated
documentation;
(H)
the
equipment
or
systems
are
designed

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for
installation
by
the
user
without
support
from
the
supplier;

(3)
stored-
programme-
controlled
telephone
circuit
switching
equipment
or
systems,
provided
that—

(A)
the
equipment
or
systems
are
designed
for
fixed
civil
use
as
space-
division
analogue
exchanges
or
time-
division
analogue
exchanges
which
are
PABXs;

(B)
the
equipment
or
systems
do
not

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contain
digital
computers
or
related
equipment
specified
in
head
(f)
of
entry
IL1565
in
this
Group,
or
in
paragraphs
(a)
to
(j)
inclusive
or
paragraph (m)
of
sub-
head
(h)
(A)
of
entry
IL1565;
(C)
any
communication
channels
or
terminal
devices
used
for
administrative
and
control
purposes:
(a)
can
only
be
used
for
those

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purposes;
and
(b)
do
not
exceed
a
maximum
data
signalling
rate
of
9,600
bits;
(D)
voice
channels
are
limited
to
3,100
Hz;
(F)
the
equipment
or
systems
do
not
have:
(a)
multi-
level
call
pre-
emption
(including
over-
riding
or
seizing
of
busy
subscriber
lines,
trunk
circuits
or
switches)
other
than
for
single-

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level
call
pre-emption
(such as executive override);
or
(b) common channel signalling;
(G) the software supplied:
(a) is limited to the minimum specially designed operating systems, diagnostic systems, maintenance systems or application software necessary for the installation, operation and maintenance of the equipment or systems; and
is in machine-executable form;
and

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(b)
does
not
include
software:
(1)
specified
in
entry
IL1527
in
Group
3F,
or
in
sub-
head
(a)
(5)
in
entry
IL1566
in
this
Group
or
in
entry
ML11
inGroup
1;
or
(2)
that
permits
user-
modification
of
generic
software
or
its
associated
documentation;
and
(H)
the
equipment
or
systems
are
designed
for

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installation
by
the
user
without
support
from
the
supplier;

(4)
stored-
programme-
controlled,
telephone
circuit
switching
equipment
or
systems,
provided
that—

(A)
the
equipment
or
systems
are
designed
for
fixed
civil
use
as
space-
division
digital
exchanges
or
time-
division
digital
exchanges,
which
are
PABXs;

(B)
the
equipment
or
systems
do
not
have

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more
than
512
ports;
(C)
the
equipment
or
systems
do
not
support
any
form
of
Integrated
Services
Digital
Networks;
(D)
the
equipment
or
systems
do
not
contain
digital
computers
or
related
equipment
specified
in
head
(f)
of
entry
IL1565
in
this
Group
or
in
paragraphs
(a)
to
(j)
inclusive
or
paragraph (m)
of
sub-

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head
(h)
(A)
of
entry
IL1565;
(E)
the
PABXs
do
not
have
any
of
the
following
characteristics:
(a)
multi-
level
call
pre-
emption
(including
over-
riding
or
seizing
of
busy
subscriber
lines,
trunk
circuits
or
switches)
other
than
single-
level
call
pre-
emption
(such
as
executive
over-
ride);
(b)
common
channel
signalling;

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(c)
dynamic
adaptive
routing;
(d)
digital
synchronisation
circuitry
which
uses
equipment
specified
in
head
(d)
of
entry
IL1529
in
Group
3F;
(f)
centralised
network
control
which
is:
(A)
based
on
network
management
protocol;
and
(B)
capable
of
receiving
data
from
the
nodes
and
processing
such
data
to
control
traffic
and
directionalise
paths;

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(F)
any
communication
channels
or
terminal
devices
used
for
administrative
and
control
purposes:
(a)
can
only
be
used
for
those
purposes;
and
(b)
do
not
exceed
9,600
bit/
s;
(G)
the
software
supplied—
(a)
is
limited
to
the
minimum
specially
designed
operating
systems,
diagnostic
systems,
maintenance
systems
or
application
software
necessary
for
the

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installation,
operation
and
maintenance
of
the
equipment
or
systems
and
is
in
machine-
executable
form;
(b)
does
not
include
software:
(1)
specified
in
entry
IL1527
in
Group
3F,
or
in
sub-
head
(a)
(5)
in
entry
IL1566
in
this
Group
or
in
entry
ML11
inGroup
1,
or
(2)
that
permits
user-
modification
of

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generic
software
or
its
associated
documentation;
and
(H)
the
equipment
or
systems
are
designed
for
installation
by
the
user
without
support
from
the
supplier;

(c)
Technology
applicable
to the
development,
production,
installation,
operation or
maintenance
of stored-
programme-
controlled,
communication
switching
equipment
or systems
(including
equipment
or systems
referred
to in the
exceptions
to heads
(a) and (b)
above, if the
technology
exceeds the
minimum
technical

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information
necessary
for the
installation,
operation
and
maintenance
of such
equipment
or systems)

In this entry–

“affiliated
equipment”
means the
following
equipment:

- (a)
input/
output
(I/O)
control
units;
- (b)
recording
or
reproducing
equipment;
- (c)
displays;
or
- (d)
other
peripheral
equipment;

“common
channel
signalling”
means a
signalling
method
in which
a single
channel
between
exchanges
conveys,
by means
of labelled
messages,
signalling
information
relating to a

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multiplicity
of circuits
or calls
and other
information
such as that
used for
network
management;
“communication
channel”
means the
transmission
path or
circuit
including
the
terminating
transmission
and
receiving
equipment
(modems)
for
transferring
digital
information
between
distant
locations;
“data
device”
means
equipment
capable of
transmitting
or receiving
sequences
of digital
information;
“data
(message)
switching”
means a
technique,
including
store-and-
forward
or packet
switching,
for:

- (a)
accepting

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data
groups
(including
messages,
packets
or
other
digital
or
telegraphic
information
groups
which
are
transmitted
as a
composite
whole);
(b)
storing
(buffering)
data
groups
as
necessary;
(c)
processing
part
or all
of the
data
groups,
as
necessary,
for the
purpose
of:
(1)
control
(routing,
priority,
formatting,
code
conversion,
error
control,
retransmission
or
journaling);
(2)
transmission;
or

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(3)
multiplexing;
and

(d)
retransmitting
processed
data
groups
when
transmission
or
receiving
facilities
are
available;

“data-
signalling
rate”
means the
maximum
rate in either
transmission
or reception,
taking into
account
that, for
non-binary
modulation,
baud and
bit per
second are
not equal;
(binary
digits for
coding,
checking,
and
synchronization
functions
are
included);
“digital
computer”
means
equipment
which can,
in the form
of one
or more
discrete
variables:

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- (a) accept data;
- (b) store data or instructions in fixed or alterable storage devices;
- (c) process data by means of a stored sequence of instructions which is modifiable;
- and
- (d) provide output of data;

“fast select” means a facility applicable to virtual calls, which allows data terminal equipment to expand the possibility of transmitting data in call set-up and clearing packets beyond the basic capabilities

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of a virtual
call;
“local area
network”
means
a data
communication
system
which:
 (a)
 allows
 any
 number
 of
 independent
 data
 devices
 to
 communicate
 directly
 with
 each
 other;
 and
 (b) is
 confined
 to a
 geographical
 area of
 moderate
 size
 (such
 as an
 office
 building,
 a
 plant,
 a
 campus,
 or a
 warehouse);
“PABX” (private
automatic
branch
exchange)
means an
automatic
telephone
exchange
(whether
or not
incorporating
a position

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for an attendant) designed to provide access to the public network and serving extensions within an institution; “packet” means a group of binary digits (including call control signals and data) which is switched as a composite whole, the call control signals, data and if present error control information being arranged in a specified format; “packet-mode operation” means the transmission of data by means of addressed packets, whereby a transmission channel is occupied for the duration of the packet only and the channel is then available

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for use by
packets
being
transferred
between
different
data
terminal
equipments;
(in certain
data
communication
networks
the data
may be
formatted
into a
packet or
divided
and then
formatted
into a
number of
packets,
either by
the data
terminal
equipment
or by
equipment
within the
network, for
transmission
and
multiplexing
purposes);
“space-
division
analogue
exchange”
means
a space-
division
exchange,
which uses
an analogue
(including
sampled
analogue)
signal
within the
switching
matrix, and

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which can route digital signals, subject to the bandwidth limitations of the equipment; (such exchanges in public networks commonly pass digital data rates of several kilobit per second per voice channel of 3,100 Hz); “space-division digital exchange” means a space-division exchange, which accommodates the transmission through the switching matrix of digital signals requiring a bandwidth wider than a voice channel of 3,100 Hz; “space-division exchange” means an exchange in which different streams

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of data
or voice
signals
are routed
through the
switching
matrix
along
physically
different
paths; (the
signal being
routed
through the
matrix may
be analogue,
such as
conventional
amplitude-
modulation,
or pulse
amplitude-
modulation,
or digital,
such as
pulse code
modulation,
delta
modulations
or data);
“stored-
programme-
controlled
circuit
switching”
means a
technique
(a) for
establishing,
on
demand
and
until
released,
a
direct
(space-
division
switching)
or
logical
(time-
division

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switching)
connection
between
circuits,
and
(b)
which
is
based
on
switching
control
information
derived
from
any
source
or
circuit
and
processed
according
to the
stored
programme
by
one or
more
electronic
computers;

“stored-
programme-
controlled
telegraph
circuit
switching”
means
techniques
essentially
identical
to those
for stored-
programme-
controlled
telephone
circuit
switching,
for
establishing
connections
between
telegraph
(for

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example
telex)
circuits
based
solely on a
subscriber
type of
signalling
information;
“stored-
programme-
controlled
telephone
circuit
switching”
means a
technique
(a) for
establishing
within
an
exchange,
on
demand
and
until
released,
an
exclusive
direct
(space-
division
switching)
or
logical
(time-
division
switching)
connection
between
calling
and
called
telephone
circuits;
(b)
based
solely
on a
subscriber
type
of
telephone

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signalling
information
derived
from
the
calling
circuit;
and
(c)
processed
according
to the
stored
programmes
by
one or
more
electronic
computers;

for this
purpose the
telephone
circuits
may carry
any type
of signal
(including
telephone
or telex),
comparable
with a voice
channel
bandwidth
of 3,100 Hz
or less;
“terminal
device”
means a
data device
which:

(a)
does
not
include
process
control
sensing
and
actuating
devices;
and

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(b) is
capable
of:

- (1)
accepting
or
producing
a
physical
record;
- (2)
accepting
a
manual
input;
or
- (3)
producing
a
visual
output;

for the
purpose
of this
definition a
combination
of such
equipment
(such as a
combination
of printer
and paper
tape punch
or reader)
which is
connected
to a single
data
channel or
communications
channel,
constitutes
a single
terminal
device;
“terminal
exchange”
means an
exchange
which
performs
the function
of one or

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more of the following—
(a) a local exchange used for terminating subscribers' lines;
(b) a remote switching unit which performs some functions of a local exchange and operates under a measure of control from the parent exchange;
or
(c) a local exchange which is used as a switching point for traffic between subordinate local exchanges (and which is generally 2-wire but

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may
also
provide
4-wire
connections
to and
from
the
national
long-
distance
network);

“time-
division
analogue
exchange”
means
a time-
division
exchange in
which the
parameter
associated
with an
individual
segment of
a stream
of data
or voice
signals
varies
continuously;

“time-
division
digital
exchange”
means
a time-
division
exchange in
which the
parameter
associated
with an
individual
segment of
a stream
of data
or voice
signals
is one of
the finite
number of

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digitally
coded
values;
“time-
division
exchange”
means an
exchange
in which
segments
of different
streams
of data or
voice are
interleaved
in time
and routed
through the
switching
matrix
along a
common
physical
path; (the
matrix may
also include
one or more
stages of
space-
division
switching;
and the
signal being
routed
through the
matrix may
be analogue
(such
as pulse
amplitude
modulation)
or digital
(such as
pulse code
modulation,
delta
modulation
or data);
“total data
signalling
rate” means
the sum
of the

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individual
data
signalling
rates of all
communication
channels
which
have been
provided
with the
system
and can be
sustained
simultaneously,
assuming a
configuration
of
equipment
that would
maximize
this sum of
rates;
“transit
exchange”
means an
exchange
that
performs
the function
of a
terminal
exchange
or one or
both of the
following:
(a) a
switching
point
for
traffic
between
other
exchanges
in the
national
network
(otherwise
known
as a
“trunk
exchange”
and
generally

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4-
wire);
or
(b) a
4-wire
exchange
serving
outgoing,
incoming
or
transit
international
calls;

“trunk
circuit”
means a
circuit with
associated
equipment
terminating
in two
exchanges.

Any term used
in this entry shall
bear the meaning
it has in entry
IL1565 or entry
IL1566 in this
Group.

IL1568

Analogue-
to-digital
and digital-
to-analogue
converters,
position encoders
and transducers,
the following:
and specially
designed
components and
test equipment
therefor—

(a)
Electrical
input type
analogue-
to-digital
converters
having
any of the

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following characteristics–

(1) a C
conversion rate of more than 200,000 complete conversions per second at rated accuracy

(2) an C
accuracy in excess of 1 part in more than 10,000 of full scale over the specified operating temperature range

or

(3) a figure C
of merit of 1×10^8 or more (being the number of complete conversions per second divided by the accuracy)

(b)
Electrical input type digital-to-analogue converter equipment having either of the following characteristics–

(1) A
resolution of 12 bits with a

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maximum settling time to rated linearity of less than—

(A) 25 ns C
for current output type converter equipment

or

(B) 200 ns C
for voltage output type converter equipment

or

(2) A resolution of more than 12 bits with a maximum settling time to rated linearity of less than—

(A) 1 C
microsecond for current output type converter equipment

or

(B) 3 C
microseconds for voltage output type converter equipment

(c) Solid-state C
synchro-to-digital or digital-to-synchro converters and

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resolver-
to-digital
or digital-
to-resolver
converters
(including
multipole
resolvers)
having a
resolution
of better
than ± 1
part in
5,000 per
full synchro
revolution
for single
speed
synchro
systems or
 ± 1 part in
40,000 for
dual speed
systems

(d)
Mechanical
input type
position
encoders
and
transducers,
excluding
complex
servo-
follower
systems, the
following—

(1) rotary
types
having—

(i) a C
resolution
of better
than 1 part
in 265,000
of full scale;
or

(ii) an C
accuracy
better than

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±2.5 arc-seconds

(2) linear displacement types having a resolution of better than 5 micrometres C

(e) Any equipment specified in heads (a) to (d) above (inclusive) which is designed to operate below 218 K (-55°C) or above 398 K (+125°C) C

In this entry—

“settling-time” means the time required for the output to come within one half bit of the final value when switching between any two levels of the converters.

PL7038

Electrical input type analogue-to-digital converter printed circuit boards or modules, having all the following characteristics A

(a) a resolution

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of 8 bits or more;

(b) rated for operation in the temperature range from below -45°C to above $+55^{\circ}\text{C}$;

(c) containing integrated microcircuits specified in PL7039.

IL1571

Magnetometers, magnetometer systems and related equipment, the following: and specially designed components therefor—

(a) C
Magnetometers and magnetometer systems having or capable of having a sensitivity better than ± 1.0 gamma ($\pm 10^{-5}$ oersteds), except magnetometers having sensitivities not better than ± 0.1 gamma ($\pm 10^{-6}$ oersteds) where the

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reading rate
capability
is no faster
than once
per half-
second

(b) C
Magnetometer
test
facilities
able to
control
magnetic
field values
to an
accuracy of
1.0 gamma
(10^{-5}
oersteds) or
less

(c) C
Magnetic
compensation
systems
utilizing
digital
computers,
non-
magnetic
platforms
and
calibration
systems

In this entry–

“sensitivity”
means the
visually
recognized
minimum
sinusoidal
signal in the
frequency
range of
0.025 Hz
to 1.5
Hz when
signal-to-
noise ratio
is higher
than 1;

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“socially designed components” includes non-magnetic pumping lamps and heating coils, cryogenic magnetic componentry, enhanced resonance gases, and any form of dynamic signal-processing gradient compensation provided as part of, or designed for use with, magnetometers specified in this entry. Enhanced resonance gases are gases of isotopes of cesium, rubidium and other metals which exhibit very sharp bands of response to pumping frequencies in optically pumped magnetometers; “magnetometer systems” use magnetic sensors,

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including those designed to operate at cryogenic temperatures, compensation systems, displays, recorders and associated electronics for signal processing, target parameter detection, gradient compensation and dynamic range control.

IL1572

Recording or reproducing equipment, recording media and technology, the following: and specially designed components, accessories and software therefor—

(a) Recording or reproducing equipment using magnetic techniques

except— C

(i) equipment specially designed for—

(1) audio

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programmes
on
tape or
disk;
(2)
analogue
recording
or
reproducing
of
video
programmes
on
tape or
disk,
save
magnetic
heads
mounted
on
servo-
mechanisms
which
include
piezoelectric
transducers
and
have
a gap
width
less
than 0.75
micrometre;
or
(3)
digital
reproducing
(ie
play-
back
only)
of
video
programmes
from
tape or
disk;

(ii)
equipment
specially
designed
to use
magnetic

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card, tag,
label or
bank cheque
recording
media with
a magnetic
surface
area not
exceeding 85
cm² ;
(iii)
analogue
magnetic
tape
recorders,
including
equipment
permitting
the
recording
of digital
signals (eg
using a high
density
digital
recording
(HDDR)
module),
having
all of the
following
characteristics—
(a)
bandwidth
at
maximum
speed
not
exceeding
300
kHz
per
track;
(b)
recording
density
not
exceeding
2,000
magnetic
flux
sine
waves

Status: This is the original version (as it was originally made). This item of legislation is currently only available in its original format.

per
linear
cm per
track;
(c) not
including
recording
or
reproducing
heads
designed
for
use in
equipment
with
characteristics
superior
to
those
defined
in
paragraph (a)
or (b)
above;
(d)
tape
speed
not
exceeding
155
cm/s;
(e)
number
of
recording
tracks,
excluding
audio
voice
track,
not
exceeding
28;
(f)
start-
stop
time
not
less
than
25 ms;
(g)
equipped

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with
tape-
derived
(off-
tape)
servo
speed
control
and
with
a time
displacement
(base)
error,
measured
in
accordance
with
applicable
IRIG
or EIA
documents,
of no
less
than
 ± 1
microsecond;
(h)
using
only
direct
or FM
recording;
(i) not
ruggedized
for
military
use;
(j) not
rated
for
continuous
operation
in
ambient
temperatures
from
below
233K
to
above
328K
(from

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below
–40°C
to
above
+
55°C);
and
(k) not
specially
designed
for
underwater
use;
(iv) digital
recording or
reproducing
equipment
having
all of the
following
characteristics—
(a)
cassette/
cartridge
tape
drives
or
magnetic
tape
drives
which
do not
exceed;
(1)
a
maximum
bit
packing
density
of
131
bit
per
mm
per
track;
or
(2)
a
maximum
bit
transfer
rate

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of
2.66
Mbit/
s;

(b) not
ruggedized
for
military
use;

(c) not
specially
designed
for
underwater
use;

and
(d) not
rated
for
continuous
operation
in
ambient
temperatures
from
below
233K
to
above
328K
(from
below
-40°C
to
above
+
55°C).

(b)
Recording
or
reproducing
equipment
using laser
beams
which
produce
patterns
or images
directly
on the
recording
surface or
reproduce

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from such
surfaces
except— C
(i)
equipment
specially
designed
for the
production
of audio
or video
disk masters
for the
replication
or
entertainment or
education-
type disks;
(ii)
facsimile
equipment
such as
used for
commercial
weather
imagery and
commercial
wire photos
and text;
(iii)
consumer-
type
reproducers
for audio or
video disks
employing
non-
erasable
media;
(iv)
equipment
specially
designed
for gravure
(printing
plate)
manufacturing.
(c) Graphics
instruments
capable of
continuous
direct

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recording
of sine
waves at
frequencies
exceeding
20 kHz

(d) C
Recording
media
used in
equipment
specified in
head (a) or
(b) above

except— D
(i) magnetic
tape having
all of the
following
characteristics—
(a)
specially
designed
for
television
recording
and
reproduction
or for
instrumentation;
(b)
being
a
standard
commercial
product;
(c) not
designed
for
use in
satellite
applications;
(d)
been
in
use in
quantity
for at
least
two
years;

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(e) a
tape
width
not
exceeding
25.4
mm;
(ee) a
tape
length
not
exceeding
6,000
m;
(f) a
magnetic
coating
thickness
not
less
than;
(1)
2.0
micrometres
(0.079
mil)
if
the
tape
length
does
not
exceed
1,450
m;
or
(2)
5.0
micrometres
(0.1975
mil)
if
the
tape
length
does
not
exceed
6,000
m;
(g) a
magnetic
coating

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material
consisting
of
doped
or
undoped
gamma-
ferric
oxide
or
chromium
dioxide;

(h) a
base
material
consisting
only
of
polyester;
(i) a
rated
intrinsic
coercivity
not
exceeding
64
kA/m
(804
oersted);
and
(j) a
retentivity
not
exceeding
0.16 T
(1,600
gauss);

(ii)
magnetic
tape having
all of the
following
characteristics—

(a)
specially
designed
for
television
recording
and
reproduction
or for
instrumentation;

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- (b)
being
a
standard
commercial
product;
- (c)
having
either
of the
following
sets of
characteristics—
 - (1)
 - (A)
a
tape
width
not
exceeding
50.8
mm;
 - (B)
not
designed
for
use
in
satellite
applications;
 - (C)
a
magnetic
coating
material
consisting
of
doped
or
undoped
gamma-
ferric
oxide
or
chromium
dioxide;
 - (D)
a
rated
intrinsic
coercivity
not
exceeding

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64
kA/
m
(804
oersted);
and
(E)
a
tape
length
not
exceeding
1,096
m;
or
(2)
(A)
a
tape
width
not
exceeding
25.4
mm;
(B)
a
magnetic
coating
material
consisting
of
chromium
dioxide;
(C)
a
base
material
consisting
only
of
polyester;
and
(D)
a
rated
intrinsic
coercivity
not
exceeding
60
kA/
m

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- (750
oersted);
- (iii) video
or audio
magnetic
tape having
either of the
following
sets of
characteristics—
- (a)
- (1)
being
contained
in
a
cassette;
- (2)
specially
designed
for
television
or
audio
recording
and
reproduction;
- (3)
being
a
standard
commercial
product;
- (4)
a
rated
intrinsic
coercivity
not
exceeding
128
kA/
m
(1,600
oersted);
- (5)
a
retentivity
not
exceeding
0.30
T

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(3,000
gauss);
(6)
a
tape
length
not
exceeding
650
m;
and

(7)
a
magnetic
coating
thickness
not
less
than
2.0
micrometres;
or

(b)

(1)
a
magnetic
coating
material
consisting
of
undoped
gamma-
ferric
oxide;

(2)
a
rated
intrinsic
coercivity
not
exceeding
28
kA/
m
(350
oersted);

(3)
a
tape
width
not
exceeding
50.8

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mm;
and
(4)
a
base
material
consisting
only
of
polyester;

- (iv)
computer
magnetic
tape having
all of the
following
characteristics—
(a)
designed
for
digital
recording
and
reproduction;
(b) a
magnetic
coating
certified
for a
maximum
packing
density
of
2,460
bit per
cm or
3,560
flux
changes
per cm
along
the
length
of the
tape;
(c) a
magnetic
coating
thickness
not
less
than

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3.6
micrometre;
(d) a
tape
width
not
exceeding
25.4
mm;
(e) a
tape
length
not
exceeding
1,100
m; and
(f) a
base
material
consisting
only
of
polyester;
(v)
computer
flexible
disk
cartridges
having
both
of the
following
characteristics—
(a)
designed
for
digital
recording
and
reproduction;
and
(b) not
exceeding
a
gross
capacity
of 33
million
bit;
(vi) rigid
magnetic
disk
recording

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media
having
all of the
following
characteristics—

(a)
being
a
standard
commercial
product;

(b)
non
servo-
written;

(c) a
packing
density
not
exceeding
866
bit per
cm;

(d) not
exceeding
80
tracks
per
cm;

and
(e)
conforming
to any
of the
following
specifications:

(1)
unrecorded
single
disk
cartridges
(front
loading
(2315-
type))
designed
to
meet
ANSI
X3.52—
1976;

(2)
unrecorded

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single
disk
cartridges
(top
loading
(5440-
type))
designed
to
meet
International
Standard
ISO
3562–
1976;
(3)
unrecorded
six-
disk
packs
(2311
type)
designed
to
meet
ANSI
X3.46–
1974
or
International
Standard
ISO
2864–
1974(E);
or
(4)
unrecorded
eleven-
disk
packs
(2316
type)
designed
to
meet
ANSI
X3.58–
1977
or
International
Standard
ISO

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3564—
1976.

(e)
Technology
for the
development,
production
or use of
recording or
reproducing
equipment
specified in
this entry

except—
(i)
technology,
which is
unique to
equipment
excluded
by any
exception
(i)(1), (i)
(2) or (ii)
or head (a),
or excluded
from heads
(b) or (c) of
this entry,
other than
technology
for the
design or
production
of—

(a)
cylindrical
structures
used
to
record
or
reproduce
video
signals
in a
helical
scan
system
recorder
or

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reproducer;
or
(b)
recorded
alignment
tapes
used
in the
production
of
recording
or
reproducing
equipment;

(ii) the
minimum
technology
necessary
for the
use of
equipment
which is
excluded
under this
entry.

(f)
Technology
for
continuous
coating of
magnetic
tape,
whether
the tape is
specified in
this entry
or not, the
following—

(1) D
technology
for the
formulation
of coating
material

(2) D
technology
for the
application
of coating
material to
the backing

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(g)
Technology
for the
manufacture
of flexible
disk
recording
media,
whether the
media is
specified in
this entry
or not, the
following—

(1) D
technology
for the
formulation
of coating
material

(2) D
technology
for the
application
of coating
material to
the flexible
backing

(h) D
Technology
for the
development
or
production
of rigid disk
recording
media,
whether the
media is
specified in
this entry or
not

In this entry—

“recording
media”
means all
types and
forms of
specialised
media used

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in recording techniques, including but not limited to tapes, drums, disks and matrices;

“recording density” for direct recorders means the recording bandwidth divided by the tape speed;

“recording density” for FM recorders means the sum of the carrier frequency and the deviation divided by the tape speed;

“packing density” for digital recorders means the number of bits per second per track divided by the tape speed.

IL1573

Superconductive electromagnets and solenoids, the following: except when specially designed for magnetic

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resonance
imaging
(MRI) medical
equipment—

(a) Those C
which have
a non-
uniform
distribution
of current-
carrying
windings,
measured
along the
axis of
symmetry,
when
specially
designed
for gyrotron
application

except those rated
for both—

(1)
magnetic
induction of
less than 1
tesla; and

(2) overall
current
density
in the
windings
of less than
10,000 A/
cm² ;

(b) Those C
which are
specially
designed
to be fully
charged or
discharged
in less than
one minute,
provided
that

(1) the
maximum
energy

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delivered during discharge divided by the duration of the discharge is more than 500 kJ per minute;

(2) the inner diameter of the current-carrying windings is more than 6 cm; and

(3) they are rated for magnetic induction of more than 8 tesla or overall current density in the windings of more than 10,000 A/cm².

In this entry “overall current density” means the total number of ampere-turns in the coil (ie the sum of the number of turns multiplied by the maximum current carried by each turn) divided by the total cross-section of the coil (comprising the superconducting filaments, the metallic matrix in which the superconducting

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	filaments are embedded, the encapsulating material, any cooling channels, etc.).	
IL1574	Electronic devices, circuits and systems containing components manufactured from superconductive materials, and specially designed for operation at temperatures below the critical temperature of at least one of their superconductive constituents performing functions such as the following— <ol style="list-style-type: none">(1) electromagnetic sensing and amplification;(2) current switching;(3) frequency selection;(4) electromagnetic energy storage at resonant frequencies above 1 MHz.	C
	There shall be excluded from this entry equipment specially designed for civil research	

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on materials
characterisation
which contain
superconducting
quantum
interference
devices
(SQUIDS), and
which have all
of the following
characteristics—

(a) The
equipment
is of at least
16,400 mm³
volume, and
the SQUID
is attached
in such a
manner that
any attempt
to remove
or modify
the SQUID
for use
elsewhere
would
destroy it;

(b) The
energy
sensitivity
is not better
than 10–28
J per Hz;
and

(c) Magnetic
shielding is
required for
insensitivity
to magnetic
field
fluctuations
external
to the
equipment,
and the
removal
of this
shielding
would

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prevent the
superconducting
magnetic
sensing
circuitry
from
functioning.

Note:

This entry
includes
Josephson-effect
devices and
superconducting
quantum
interference
devices
(SQUIDS).

In this entry—
the “critical
temperature” (sometimes
referred to as
the transition
temperature)
of a specific
superconductive
material means
the temperature
at which the
material loses
all resistance to
the flow of direct
current;

“superconductive”
refers to
materials
(ie metals,
alloys or
compounds)
which can
lose all
electrical
resistance
(ie which
can attain
infinite
electrical
conductivity
and carry
very large
electrical

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currents
without
Joule
heating).
The
superconductive
state of a
material is
individually
characterised
by a critical
temperature,
a critical
magnetic
field,
which is a
function of
temperature,
and a
critical
current
density,
which is
a function
of both
magnetic
field and
temperature.

IL1585

Cameras,
components and
photographic
recording media
therefor, the
following—

(a) High
speed
cinema
recording
cameras and
equipment,
the
following—

(1) Cameras C
in which
the film is
continuously
advanced
throughout
the
recording
period, and

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which are
capable of
recording
at framing
rates
exceeding
13,150
frames per
second,
using any
camera
and film
combination
from the
standard 8
mm to the
90 mm size
inclusive

(2) Special C
optical or
electronic
devices
which
supplement,
replace
or are
interchangeable
with
standard
camera
components
for the
purpose of
increasing
the number
of frames
per second
above the
limit in sub-
head (a) (1)
above

(b) C
Mechanical
high speed
cameras in
which the
film does
not move,
and which
are capable
of recording
at rates

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exceeding
1,000,000
frames per
second for
the full
framing
height of
standard 35
mm wide
photographic
film, or at
proportionately
higher
rates for
lesser frame
heights,
or at
proportionately
lower rates
for greater
frame
heights

(c) Cameras C
incorporating
electron
tubes
specified
in entry
IL1555
in Group
3F, except
television
or video
cameras
specially
designed for
television
broadcasting
use

(d) C
Mechanical
or electronic
streak
cameras
having
writing
speeds of
10 mm/
microsecond
and above

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(e) C

Electronic framing cameras having a speed exceeding 10^6 frames per second

(f) Video cameras incorporating solid state sensors, having any of the following characteristics—

(1) more C

than 4×10^6 active pixels per solid state array for monochrome (black and white) cameras

(2) more C

than 4×10^6 active pixels per solid state array for colour cameras incorporating three solid state arrays

(3) more C

than 12×10^6 active pixels for solid state array colour cameras incorporating one solid state array

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(g) C
Electronic
cameras
having
both of the
following
characteristics

(1) an
electronic
shutter
speed
(gating
capability)
of less
than 10
microseconds
per full
frame;

(2) a read
out time
allowing a
frame rate
of more
than 125
full frames
per second;

(h) Camera C
shutters
with speeds
of 50 ns
or less per
operation,
and
specialised
parts and
accessories
therefor

i) Films, the
following–

(1) having C
a speed of
ISO 10,000
(or its
equivalent)
or better

(2) colour C
film having
a spectral
sensitivity
extending

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beyond
7,200
Angstroms
or below
2,000
Angstroms

(j) Cameras C
incorporating
linear
detector
arrays
exceeding
a size of
4,096
elements
per array
and
mechanical
scanning
in one
direction

In this entry—

“active
pixel” is a
minimum
element of
the solid
state array
(sensor)
which has a
photoelectric
transfer
function and
which is
exposed to
the light.

IL1586

Acoustic wave
devices, the
following:
and specially
designed
components
therefor—

(a) Surface
acoustic
wave and
surface
skimming
(shallow
bulk)

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acoustic
wave
devices
which
permit
direct
processing
of signals,
(including
convolvers,
correlators
(fixed,
programmable
and
memory),
oscillators,
bandpass
filters,
delay lines
(fixed and
tapped) and
non-linear
devices)
having
either of the
following
characteristics—
(1) a carrier C
frequency
of greater
than 400
MHz
(2) a carrier
frequency
of 400 MHz
or less,
(except
those
specially
designed
for home
electronics
and
entertainment
type
applications)
having
any of the
following
characteristics—

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(i) a side-lobe rejection of greater than 45 dB C

(ii) a product of the maximum delay time and the bandwidth (time in microseconds and bandwidth in MHz) greater than 100 C

(iii) a dispersive delay of greater than 10 microseconds C

(iv) an insertion loss of less than 10 dB C

(b) Bulk acoustic wave devices which permit direct processing of signals at frequencies over 1 GHz, including fixed delay lines, non-linear and pulse compression devices C

(c) Acousto-optic signal- C

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processing
devices
employing
an
interaction
between
acoustic
waves (bulk
wave or
surface
wave) and
light waves
which
permit
the direct
processing
of signals
or images,
including
spectral
analysis,
correlation
and
convolution

In this entry
“acoustic wave
devices” means
signal processing
devices
employing
elastic waves
in materials
such as lithium
niobate, lithium
tantalate, bismuth
germanium
oxide, silicon,
quartz, zinc
oxide, aluminium
oxide (sapphire),
gallium arsenide
and alpha-
aluminium
phosphate
(berlinite).

IL1595 Gravity meters A
(gravimeters),
gravity
gradiometers
and specially
designed

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components
therefor

except—

(a) Gravity
meters for
land use
having
either of the
following
characteristics—

(1) static
accuracies
of not less
than 100
microgal; or

(2) being of
the Worden
type;

(b) Marine
gravimetric
systems
having
either of the
following
characteristics—

(1) static
accuracy of
1 milligal or
more; or

(2) an in-
service
(operational)
accuracy of
1 milligal or
more with
a time to
steady state
registration
of two
minutes
or greater
under any
combination
of attendant
corrective
compensations
and
motional
influences.

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GROUP 3H

Metals, Minerals and their Manufactures

In this Group, the following definitions apply

“crude forms” means anodes, balls, bars (including notched bars and wire bars), billets, blocks, blooms, brickets, cakes, cathodes, crystals, cubes, dice, grains, granules, ingots, lumps, pellets, pigs, powder, rondelles, shot, slabs, sponge, sticks;

“semi-fabricated forms” means (whether or not coated, plated, drilled or punched)–

(i) in the form of wrought or worked materials fabricated by rolling, drawing, extruding or grinding, (i.e. angles, channels, circles, discs, dust, flakes, foils and leaf, forging, plate, powder, pressings and stampings, ribbons, rings, rods (including bare welding rods, wire rods, and rolled wire), sections, shapes, sheets, strip, pipe and tubes (including tube rounds, squares, and hollows), drawn or extruded wire);

(ii) cast material produced by casting in sand, die, metal, plaster or other types of moulds, including high pressure castings, sintered forms and forms made by powder metallurgy.

PL7025

Pyrolitic deposition technology and specially designed

components related thereto, the following—

- (a) Technology relating to the production of pyrolytically derived materials formed on a mould, mandrel or other substrate from precursor gases which decompose in the 1,573K (1,300°C) to 3,173K (2,900°C) temperature range at pressures of 130Pa to 20kPa B
- (b) Nozzles specially designed for any of the processes referred to in head (a) A

IL1610

Metal alloys, metal alloy powder or alloyed materials, the following: except metal alloys, metal alloy powder or alloyed materials for coating substrates—

- (a) Metal alloys, the following: when made from a metal alloy powder or particulate material specified in head (b) below—
- (1) Nickel alloys with a stress-rupture life of 10,000 hours or longer at 923K (650°C) and at a stress of 550MPa C
- (2) Cobalt alloys with a stress-rupture life of 10,000 hours or longer at 923K (650°C) and at a stress of 400MPa C
- (3) Niobium alloys with a stress-rupture life of 10,000 hours or longer at 1,073K (800°C) and at a stress of 400MPa C
- (4) Titanium alloys with a stress-rupture life of 10,000 hours or longer C

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at 723K (450°C) and at a stress of 200MPa

(5) Aluminium alloys with a tensile strength of–

(A) 240MPa or more at 473K (200°C) C

or

(B) 415MPa or more at 298K (25°C) C

(6) Magnesium alloys with a tensile strength of 345MPa or more and a corrosion rate of less than 1mm/year in 3% sodium chloride aqueous solution measured in accordance with ASTM standard G–31 or national equivalents C

(b) Metal alloy powder or particulate material having both of the following characteristics C

(1) Made from any of the following composition systems–

(A) Nickel alloys (Ni-Al-X or Ni-X-Al);

(B) Cobalt alloys (Co-Cr-X or Co-X-Cr);

(C) Niobium alloys (Nb-Al-X or Nb-X-Al), Nb-Si-X or Nb-X-Si, Nb-Ti-X or Nb-X-Ti);

(D) Titanium alloys (Ti-Al-X or Ti-X-Al);

(E) Aluminium alloys (Al-Mg-X or Al-X-Mg), Al-Zn-X or Al-X-Zn, Al-Fe-X or Al-X-Fe); or

(F) Magnesium alloys (Mg-Al-X or Mg-X-Al);

(Note: X equals one or more alloying elements.)

and

(2) Made in a controlled environment by any of the following processes—

(A) Vacuum atomisation;

(B) Gas atomisation;

(C) Rotary atomization;

(D) Splat quenching;

(E) Melt spinning and comminution;

(F) Melt extraction and comminution; or

(G) Mechanical alloying.

(c) Alloyed materials, C
in the form of uncomminuted flakes, ribbons or thin rods produced in a controlled environment by splat quenching, melt spinning or melt extraction, used in the manufacture of metal alloy powder or particulate material specified in head (b) above

In this entry—

metal alloys are those containing a higher percentage by weight of the stated metal than of any other element; stress-rupture life should be measured in accordance with ASTM standard E-139 or national equivalents.

IL1631

Magnetic metals and materials, the following—

(a) Those having either of the following characteristics—

(i) Initial relative permeability: 120,000 C

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or more and thickness
0.05mm or less

Note: C

Measurement of initial permeability must be carried out on materials which are fully annealed.

(ii) Remanence: 98.5% or over of maximum magnetic flux for materials having magnetic permeability

(b) Grain-oriented iron alloy sheets or strips of a thickness of 0.1mm or less C

(c) Magnetostrictive alloy having either of the following characteristics—

(1) saturation magnetostriction more than 5×10^{-4} ; C

or

(2) magnetomechanical coupling factor (k) more than 0.8 C

(d) Amorphous alloy strips having both of the following characteristics— C

(1) composition having a minimum 75 per cent by weight of one or more of the elements iron, cobalt and nickel; and

(2) saturation magnetic induction (Bs) of 1.6tesla or more, and either—

(i) strip thickness of 0.020mm or less; or

(ii) electrical resistivity of 2×10^{-4} ohm-cm or more.

IL1672

Nickel or titanium-based alloys in the form of aluminides,

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in crude or semi-fabricated forms, the following: and scrap thereof—

(a) Nickel aluminides containing 10 per cent or more by weight of aluminium C

(b) Titanium aluminides containing 12 per cent or more by weight of aluminium C

IL1675

Superconductive materials and composite conductors, the following—

(a) Superconductive materials of all types, the following C

(1) having a critical temperature, at zero magnetic induction, of 9.85K or higher; and

(2) in quantities of more than 25g;

(b) Superconductive niobium-titanium wire not embedded in a metallic matrix with a cross section area of less than $3.14 \times 10^{-4} \text{ mm}^2$ (ie. 20 micrometre diameter for circular filaments) C

(c) Composite conductors containing at least one superconductive constituent having a critical temperature, at zero magnetic induction, of 9.3K or higher C

except—
such conductors which—

(1) have superconductive filaments embedded in a copper or copper-based mixture matrix; and

(2) have either of the following two sets of characteristics—

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- (A) the superconductive constituent or filament—
- (a) has a cross section area of more than $3.14 \times 10^{-4} \text{ mm}^2$ (ie. 20 micrometre diameter for circular filaments);
 - (b) is either non-coated, or insulated with—
 - (1) varnish;
 - (2) glass fibre;
 - (3) polyamide; or
 - (4) polyimide; and
 - (c) does not remain in the superconductive state when—
 - (1) evaluated in sample lengths of less than 1m; and
 - (2) exposed to a magnetic field with an induction of more than 12tesla at a temperature of 4.2K (-268.95°C);
- or

- (B) the composite conductor contains—
- (a) superconductive niobium-titanium wire with a cross section area of more than $9.5 \times 10^{-5} \text{ mm}^2$ (ie. 11 micrometre diameter for circular filaments); and
 - (b) a total mass (including the mass of the matrix) not exceeding 10kg.

In this entry—

“superconductive” means materials (ie. metals, alloys or compounds) which can lose all

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electrical resistance, ie. which can attain infinite electrical conductivity and carry very large electrical currents without Joule heating. The superconductive state of a material is individually characterised by a critical temperature, a critical magnetic field which is a function of temperature, and a critical current density which is a function of both magnetic field and temperature;

“critical temperature” means the temperature at which the material loses all resistance to the flow of direct current. Critical temperature (sometimes referred to as the transition temperature) is of a specific superconductive material.

PL7035	Tungsten and alloys of tungsten, in the form of uniform spherical or atomised particles of 500micrometre diameter or less with a purity of 97% or greater	A
PL7036	Molybdenum and alloys of molybdenum, in the form of uniform spherical or atomised particles of 500micrometre diameter or less with a purity of 97% or greater	A
PL7001	Aluminium alloys, the following: tubes, bars or forged forms having an outside diameter greater than 75mm and less than 400mm and a tensile strength of 460×10^6 N/m ² or greater	W
PL7002	Maraging steels (steels generally characterised	

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oils, synthetic hydrocarbon oils or silahydrocarbon oils, having all of the following characteristics—

(A) Flash point exceeding 477K (204°C);

(B) Pour point 239K (−34°C) or lower;

(C) Viscosity index 75 or more; and

(D) Thermal stability 616K (343°C);

(Silahydrocarbon oils are those oils which contain exclusively silicon, hydrogen and carbon.) (2) Chlorofluorocarbons having all of the following characteristics—

(A) No flash point;

(B) Autogenous ignition temperature exceeding 977K (704°C);

(C) Pour point 219K (−54°C) or lower;

(D) Viscosity index 80 or more; and

(E) Boiling point 473K (200°C) or higher;

(chlorofluorocarbons are those chemicals

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which contain exclusively carbon, fluorine and chlorine); or

(3) Monomeric or polymeric forms of perfluoropolyalkylether-triazines or perfluoroaliphatic ethers

(b) Lubricating materials containing any of the following compounds or materials as their principal ingredients—

(1) Monomeric or polymeric forms of perfluoropolyalkylether-triazines or perfluoroaliphatic ethers

(2) Phenylene or alkylphenylene ethers or thioethers, or their mixtures, containing more than two ether or thio-ether functions or mixtures thereof

(3) Polychlorotrifluoroethylene (oily and waxy modifications only)

or

(4) Fluorinated silicone fluids with kinematic viscosity of less than $5,000\text{mm}^2/\text{s}$ (5,000 centistokes)

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measured at
298K (25°C)

(c) Damping or
flotation fluids
made of at least
85% of any of
the following
compounds or
materials–

(1) C
Dibromotetrafluoroethane
having a purity
exceeding 99.8%
and containing
less than 25
particles of 200
micrometre or
larger in size per
100ml

(2)
Polychlorotrifluoroethylene
(oily and waxy
modifications
only)

or

(3) C
Polybromotrifluoroethylene

(d) Cooling
fluids made of at
least 85% of any
of the following
compounds or
materials–

(1) Monomeric C
or polymeric
forms of
perfluoropolyalkylether-
triazines or
perfluoroaliphatic
ethers

(2) C
Perfluoroalkylamines

or

(3) C
Perfluorocycloalkanes
or
perfluoroalkanes
with all of

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the following characteristics—

(A) Density at 298K (25°C) of 1.5g/ml or more;

(B) In a liquid state at 273K (0°C); and

(C) Containing 60% or more by weight of fluorine.

In this entry—

(a) Flash point is determined using the Cleveland Open Cup Method described in ASTM D-92 or national equivalents;

(b) Pour point is determined using the method described in ASTM D-97 or national equivalents;

(c) Viscosity index is determined using the method described in ASTM D-2270 or national equivalents;

(d) Thermal stability is determined by the following test procedure or national equivalents: Twenty ml of the fluid under test is placed in a 46ml type 317 stainless

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steel chamber containing one each of 12.5mm (nominal) diameter balls of M-10 tool steel, 52100 steel and naval bronze (60% Cu, 39% Zn, 0.75% Sn). The chamber is purged with nitrogen, sealed at atmospheric pressure and the temperature raised to and maintained at $644 \pm 6\text{K}$ ($371 \pm 6^\circ\text{C}$) for six hours. The specimen will be considered thermally stable if, on completion of the above procedure, all of the following conditions are met:

(1) The loss in weight of each ball is less than $10\text{mg}/\text{mm}^2$ of ball surface;

(2) The change in original viscosity as determined at 311K (38°C) is less than 25%; and

(3) The total acid or base number is less than 0.40;

(e) Autogenous ignition temperature is determined using the method described in

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	ASTM E-659 or national equivalents.	
IL1715	Boron, the following—	
	(a) Boron element (metal) in all forms	C
	(b) Boron compounds, mixtures, and composites containing 5% or more of boron (except pharmaceutical preparations packaged for retail sale), the following—	
	(1) non-ceramic boron-nitrogen compounds (eg borazanes, borazines and boropyrazoyls)	C
	(2) boron hydrides (eg boranes), except sodium boron hydride, potassium boron hydride, monoborane, diborane and triborane	C
	(3) organoboron compounds, including metallo- organoboron compounds	C
PL7006	Boron compounds and mixtures in which the boron-10 isotope comprises more than 20% of the total boron content	W
IL1733	Base materials, non- composite ceramic	

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materials, ceramic-ceramic composite materials and precursor materials for the manufacture of high temperature fine technical ceramic products, the following—

(a) Base materials having all the following characteristics— A

(1) any of the following compositions—

(i) single or complex oxides of zirconium, and complex oxides of silicon or aluminium;

(ii) single or complex borides of zirconium or titanium;

(iii) single or complex carbides of silicon or boron; or

(iv) single or complex nitrides of silicon, boron, aluminium or zirconium;

(2) total metallic impurities, excluding intentional additions, of less than—

(i) 1,000ppm for single oxides or carbides;

(ii) 5,000ppm for complex compounds, single borides or

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single nitrides;
and

(3) average
particle size less
than or equal to
5 micrometres
and no more
than 10% of
the particles
larger than 10
micrometres
except for
zirconia where
these limits are 1
micrometre and
5 micrometres
respectively.

(b) Non- A
composite
ceramic
materials, in
crude or semi-
fabricated form,
composed of
any material
specified in head
(a) above, except
abrasives

(c) Ceramic-
ceramic
composite
materials
containing
finely dispersed
particles or
phases or any
non-metallic
fibrous or
whisker-like
materials,
whether
externally
introduced or
grown in situ

during processing,
where the following
materials form the host
matrix–

(1) all oxides, A
including glasses

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(2) carbides or nitrides of silicon or boron A

(3) borides or nitrides of zirconium or borides, carbides or nitrides of hafnium A

(4) any combination of the materials specified in sub-heads (c)(1) to (3) above A

except—

manufactured products or components not specified elsewhere in this Schedule.

(d) Precursor materials, (ie. special-purpose polymeric or metallo-organic materials for producing any base or phases of the materials specified in head (b) or (c) above), the following—

(1) polycabosilanes and polydiorganosilanes (for producing silicon carbide) A

(2) polysilazanes (for producing silicon nitride) A

(3) polycarbosilazanes for producing ceramics with silicon, carbon A

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and nitrogen
components

In this entry—

(a) a “matrix”
means a
substantially
continuous phase
that fills the
space between
particles,
whiskers or
fibres;

(b) a
“composite”
means a
matrix and an
additional phase
or additional
phases consisting
of particles,
whiskers,
fibres or any
combination
thereof, present
for a specific
purpose or
purposes.

IL1746

Non-fluorinated
polymeric substances,
the following:

(a) Polyimides C
(including
maleimides)

except—
fully cured
polyimide or
polyimide-based
film, sheet, tape
or ribbon having
a maximum
thickness of
0.254mm,
whether or
not coated or
laminated with
heator pressure-
sensitive
resinous
substances of an
adhesive nature,

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which contain
no fibrous
reinforcing
materials, and
which have not
been coated
or laminated
with carbon,
graphite, metals
or magnetic
substances.

(b) C
Polybenzimidazoles

(c) Aromatic C
polyamides,
including
heterocyclic
aromatic
polyamides
characterised as
aromatic owing
to the presence
of a benzene ring

(d) C
Polybenzothiazoles

(e) C
Polyoxadiazoles

(f) C
Polyphosphazenes
(polyphosphonitriles)

(g) C
Polystyrylpyridine
(PSP)

(h) C
Thermoplastic
liquid crystal
copolymer
composed of the
following—

(1) Either of the
following—

(A) Phenylene,
biphenylene or
naphthalene; or

(B) Methyl,
tertiary-butyl
or phenyl
substituted

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phenylene,
biphenylene or
naphthalene; and

(2) Any of the
following acids—

(A) Terephthalic
acid;

(B) 6-hydroxy-2
naphthoic acid;
or

(C) 4-
hydroxybenzoic
acid;

except—
manufactures
thereof, having
both of the
following
characteristics—

(A) A
tensile
modulus of
less than
15GPa
in any
direction;

and
(B)
Specially
designed
for non-
aerospace,
non-
electronic,
civil
applications;

(i) Polybenzoxazoles C

(j) Polyarylene
ether ketones, the
following—

(1) Polyether
ether ketone
(PEEK) C

(2) Polyether
ketone ketone
(PEKK) C

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(3) Polyether ketone (PEK)	C
(4) Polyether ketone ether ketone ketone (PEKEKK)	C
(k) Butadiene polymers, the following—	
(1) Carboxyl terminated polybutadiene (CTPB)	C
(2) Hydroxyl terminated polybutadiene (HTPB)	C
(3) Thiol terminated polybutadiene (TTPB)	C
(4) Vinyl terminated polybutadiene (VTPB)	C
(5) Cyclised 1,2-polybutadiene	C
(6) Mouldable copolymers of butadiene and acrylic acid	C
(7) Mouldable terpolymers of butadiene, acrylonitrile and acrylic acid or any of the homologues of acrylic acid	C
(l) Carboxyl terminated polyisoprene	C
(m) Polyarylene ketones	C
(n) Polyarylene sulphides, except	C

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- polyphenylene
sulphide
- PL7028 Propellants for spacecraft, and related substances, the following: and specially designed software therefor—
- (a) propellants specially designed for goods specified in IL1465 A
 - (b) additives, precursors and stabilisers, for any material specified in head (a) above A
- IL1754 Fluorinated compounds and materials, and manufactures thereof, the following—
- (a) Unprocessed polymeric materials and intermediates, the following—
 - (1) Fluoroelastomeric compounds where the polymer backbone consists of at least 95% of—
 - (A) A combination of two or more of the following monomers— C
 - (a) Tetrafluoroethylene;
 - (b) Vinylidene fluoride;
 - (c) Hexafluoropropylene;

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(d)
Bromotrifluoroethylene;
(e)
Iodotrifluoroethylene;
(f)
Perfluoromethylvinylether;
(g)
Perfluoropropoxypropylvinylether;
except—
the copolymer
of vinylidene
fluoride and
hexafluoropropylene,
or the terpolymer
of vinylidene
fluoride,
hexafluoropropylene
and
tetrafluoroethylene;

(B) A C
copolymer of
tetrafluoroethylene
and propylene;
or

(C) A C
terpolymer of
tetrafluoroethylene,
vinylidene
fluoride and
propylene

(2) Copolymers C
of vinylidene
fluoride having
75% or more
beta crystalline
structure without
stretching

(3) Fluorinated C
silicone
rubbers, and
intermediates for
their production,
containing
30% or more
of combined
fluorine

(4) Fluorinated C
polyimides, and
hexafluoroacetone
and other

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intermediates for their production, containing 30% or more of combined fluorine

(5) Fluorinated phosphazene elastomers, and intermediates for their production, containing 30% or more of combined fluorine C

(b) Manufactures, the following—

(1) Electric wire and cable coated with or insulated with any of the materials specified in sub-head (a)(1)(B) or (a)(1)(C) above C

except—

oil well logging cable;

(2) Seals, gaskets, rods, sheets, sealants or fuel bladders made, to the extent of more than 50%, of any of the compounds specified in sub-head (a)(1), (a)(3), (a)(4) or (a)(5) above, and specially designed for aerospace or aircraft use C

(3) Piezoelectric polymers and copolymers made from C

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vinylidene
fluoride, having
both of the
following
characteristics

(A) In sheet or
film form; and

(B) With a
thickness of
more than 200
micrometre.

(4) Reinforced C
tubing (including
connectors and
fittings for use
with such tubing)
incorporating
coagulated
dispersion
grades of
polytetrafluoroethylene,
copolymers of
tetrafluoroethylene
and
hexafluoropropylene,
or any of the
fluorocarbon
compounds
specified in
sub-head (a)
(1) above
and designed
for operating
(working)
pressures of 21
MPa or more,
whether or
not specially
processed
to make the
flow surfaces
electrically
conductive

IL1757

Compounds and
materials, the
following—

(a) C
Monocrystalline
silicon in the
form of ingots

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(rods), and slices or wafers thereof, having a resistivity of more than 1000 ohm-cm

(b) Gallium of a purity equal to or more than 99.9999% and gallium III/V compounds of any purity level

C

except—

(1) Gallium phosphide; or

(2) Other gallium III/V compounds having all of the following characteristics—

(A) Dislocation density (etch pit density—EPD) exceeding 100 per mm² ;

(B) Carrier concentration exceeding 1×10^{14} per mm³ ; and

(3) Carrier mobility less than 0.3 m² /V-s;

(c) Indium of a purity more than 99.9995% and III-V indium compounds containing more than 1% indium

C

(d) Hetero-epitaxial materials consisting of a monocrystalline insulating substrate

C

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epitaxially
layered with
silicon, III/V
compounds
of gallium or
indium or II/
VI compounds
of sulphur,
selenium or
tellurium

(e) Elemental C
Cadmium (Cd)
and Tellerium
(Te) of purity
levels equal
to or more
than 99.9995%
and cadmium
terullide (CdTe)
compounds of
a purity level
equal to or more
than 99.99% or
single crystals
of cadmium
terullide (CdTe)
of any purity
level

(f) Rods of
polycrystalline
silicon having
either of the
following
characteristics—

(1) Boron C
impurity
concentration
(P-type) equal
to or less than
0.052 parts per
thousand million
atomic

or C
(2) P-type
resistivity equal
to or more than
5,000 ohm-cm

(Purity verified
in accordance
with ASTM

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F574-83 standard or equivalents, and resistivity measured in accordance with ASTM F43-83 standard or equivalents (see also ASTM F723-82 standard for the conversion between resistivity and density of doping agents)).

(g) Compounds C
 having a purity level (based upon the amount of the primary constituent) of 99.5% or more and used as the silicon source in the deposition of epitaxial layers of silicon, silicon oxide or silicon nitride, and dichlorosilane (SiCl₂H₂) having a purity level of 97% or more

(h) Single C
 crystal sapphire substrates

(i) Boron C
 oxide (B² O³) in powder or cast form with a purity of 99.9% or more, containing 1,000 or less parts per million of water

(j) Resist materials, the following—

(1) Negative C
 type resists, optimised for photolithography

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at a wavelength
of less than 350
nm

(2) Positive C
type resists
optimised for
photolithography
at a wavelength
of less than 370
nm

except—
positive type
resists not
optimised
for a specific
wavelength

(3) All resists for C
use with electron
beams or ion
beams with a
sensitivity of 50
microcoulomb/
cm² or less

(4) All resists for C
use with X-rays
with a sensitivity
of 50 mJ/cm² or
less

(5) All resists C
optimised for
surface imaging
technologies,
including
silyated resists

(6) Image C
reversal resists

(k) C
Monocrystalline
lithium niobate

(l) Metallo- C
organic
compounds
of beryllium,
magnesium,
zinc, cadmium,
mercury,
aluminium,
gallium, indium,

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phosphorus,
arsenic or
antimony
having a purity
(metal basis) of
99.999% or more

(m) Hydrides C
of phosphorus,
arsenic,
antimony,
selenium or
tellurium having
a purity of
99.999% or
more, even
diluted in neutral
gases

except—
those with the
addition of 20%
molar or more
of rare gases or
hydrogen.

Notes:

1. Silylation
techniques
are processes
incorporating
oxidation of the
resist surface
to enhance
performance for
both wet and dry
developing.

2. III/V
compounds are
polycrystalline
or binary
or complex
monocrystalline
products
consisting of
elements of
groups IIIA
and VA of
Mendeleev's
periodic
classification
table (gallium
arsenide,
gallium-
aluminium

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arsenide, indium phosphide, etc.).
3. II/VI compounds are polycrystalline or binary or complex monocrystalline products consisting of elements of groups IIB and VIA of Mendeleev's periodic classification table (cadmium telluride, cadmium-mercury telluride, cadmium-zinc telluride, etc.).

PL7034

Graphites, the following:

- (a) fine grain recrystallised bulk graphites having a bulk density of 1.72g/cc or greater, measured at 15°C A
- (b) pyrolytic reinforced graphites A
- (c) fibrous reinforced graphites A

IL1759

Syntactic foam for underwater use and microspheres, the following—

- (a) Syntactic foam having either of the following characteristics—

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(1) designed for marine depths exceeding 1,000 m C

(2) a density less than 0.561 g/cm^3 unless designed for use at marine depths less than 100 m C

(b) Hollow microspheres (microballoons) for use in syntactic foam, having all of the following characteristics— C

(1) made from glass or plastic;

(2) a true particle density of more than 0.16 g/cm^3 and less than 0.41 g/cm^3 ;

(3) a bulk density of more than 0.088 g/cm^3 and less than 0.23 g/cm^3 ;

(4) a compressive strength more than 2.8 MPa;

(5) a particle size range of 20 to 200 micrometre; and

(6) a floater content of at least 94 per cent by volume.

In this entry—

“syntactic foam” means hollow spheres of plastic or glass

- IL1763
- embedded in a resin matrix.
- Fibrous and filamentary materials which may be used in organic matrix, metallic matrix or carbon matrix composite structures or laminates, and such composite structures and laminates and technology therefor, the following: and specially designed ODMA software therefor—
- (a) Fibrous and filamentary materials with specific modulus greater than 3.18×10^6 m and specific tensile strength greater than 7.62×10^4 m A
 - (b) Fibrous and filamentary materials having both of the following characteristics— C
 - (1) specific modulus greater than 2.54×10^6 m; and
 - (2) melting or sublimation point higher than 1,922 K (1,649°C) in an inert environment except—
 - (A) carbon fibres having a specific modulus less than 5.08×10^6 m and a specific

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tensile strength
less than 2.54×10^4 m;

(B)
discontinuous,
multiphase,
polycrystalline
alumina fibres
in chopped fibre
or random mat
form, containing
3% by weight
or more silica,
having a specific
modulus less
than 10×10^6 m;
(C) molybdenum
and molybdenum
alloy fibres;

(D)
discontinuous
ceramic fibres
having their
melting point
or sublimation
point lower
than 2,043K
(1,770°C)
in an inert
environment;

(c) Resin C
or pitch-
impregnated
fibres (prepregs),
metal or carbon-
coated fibres
(preforms) or
carbon fibre
preforms made
with materials
specified in head
(a) or (b) above

(d) Composite C
structures,
laminates and
manufactures
thereof for
products and
components
made either
with an organic

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matrix, a carbon matrix or a metal matrix utilising materials specified in head (a), (b) or (c) above

except—
manufactured products or composites not specified elsewhere in this Schedule.

(e) Technology for fibrous and filamentary materials and for composite structures and laminates, the following—

(1) technology D
which is unique to the spinning and subsequent treatment of precursor materials into fibres specially designed for processing into carbon filamentary materials specified in head (a) or (b) above

(2) technology D
for the production of fibrous and filamentary materials specified in head (a) or (b) above

(3) technology D
for the production of prepregs specified in

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head (c) above
using pressure
impregnation or
chemical vapour
deposition, and
for preforms
specified in
head (c) above
using vacuum
or pressure
impregnation of
chemical vapour
deposition

(4) technology D
for the
development
and production
of composite
structures,
laminates and
manufactures
specified in head
(d) above

(5) technology
for rigidisation
and densification
processes
specially
designed for the
manufacture of
carbon-carbon
composite
materials, the
following—

(i) for D
impregnation,
infiltration or
deposition into
carbon fibre
preforms

(ii) for D
carbonisation

(iii) for D
graphitisation

(iv) for hot D
isostatic pressing

In this entry—

1. the term
“fibrous and

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filamentary
materials”
includes:

- (a)
continuous
monofilaments;
- (b)
continuous
yarns and
rovings;
- (c) tapes,
fabrics,
random
mats and
braids;
- (d)
chopped
fibres,
staple
fibres and
coherent
fibre
blankets;
- (e)
whiskers,
either
monocrystalline
or
polycrystalline,
of any
length;

2. “specific
modulus” is
Young’s modulus
in pascals,
equivalent to
 N/m^2 divided
by specific
weight in N/m^3
measured at a
temperature of
 $(296 \pm 2) K$ ($(23$
 $\pm 2)^\circ C$) and a
relative humidity
of $(50 \pm 5)\%$;

3. “specific
tensile” strength
is ultimate
tensile strength
in pascals,
equivalent to
 N/m^2 divided

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by specific weight in N/m^3 measured at a temperature of (296 ± 2) K (23 ± 2)°C and a relative humidity of $(50 \pm 5)\%$;

4. “carbon fibre preform” means an ordered arrangement of uncoated or coated fibres intended to constitute a framework of a part before the matrix is introduced to form a composite;

5. “matrix” means a substantially continuous phase that fills the space between particles, whiskers or fibres;

6. “composite” means a matrix and an additional phase or additional phases consisting of particles, whiskers, fibres or any combination thereof, present for a specific purpose or purposes.

PL7046

Resaturated pyrolyzed A
(ie carbon-carbon)
materials designed for
use in goods specified
in entry IL1465 or
ML4

IL1767	<p>Preforms of glass or of any other material specially designed for the fabrication of optical fibres specified in head (b) or (c) in entry IL1526 in Group 3F relating to cable and wire</p> <p>In this entry “optical fibre preforms” means bars, ingots, or rods of glass, plastic or other materials which have been specially processed for use in fabricating optical fibres.</p>	C
PL7007	<p>Chemicals, the following—</p> <p>(a) Ammonium hydrogen fluoride A</p> <p>(b) Arsenic trichloride A</p> <p>(c) Benzilic acid A</p> <p>(d) 2-chloroethanol A</p> <p>(e) Diethylaminoethanol A</p> <p>(f) Diethyl ethylphosphonate A</p> <p>(g) Diethyl methylphosphonite A</p> <p>(h) Diethyl-N, N-dimethylphosphoramidate A</p> <p>(i) Diethyl phosphite A</p> <p>(j) Di-isopropylamine A</p> <p>(k) Dimethylamine A</p> <p>(l) Dimethylamine hydrochloride A</p>	

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(m) Dimethyl ethylphosphonate	A
(n) Dimethyl methylphosphonate	A
(o) Dimethylphosphite	A
(p) Ethyl phosphinyl dichloride	A
(q) Ethyl phosphinyl difluoride	A
(r) Ethyl phosphonyl dichloride	A
(s) Ethyl phosphonyl difluoride	A
(t) 3-hydroxy-1-methylpiperidine	A
(u) Hydrogen fluoride	A
(v) Methyl benzilate	A
(w) Methyl phosphinyl dichloride	A
(x) Methyl phosphinyl difluoride	A
(y) Methyl phosphonyl dichloride	A
(z) Methyl phosphonyl difluoride	A
(aa) N,N-diisopropyl-(Beta)-aminoethane thiol	A
(bb) N,N-diisopropyl-(Beta)-amino ethanol	A

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(cc) N,N-diisopropyl-(Beta)-aminoethyl chloride	A
(dd) O-ethyl-2-diisopropylaminoethyl methylphosphonite	A
(ee) Pinacolone	A
(ff) Pinacolyl alcohol	A
(gg) Phosphorus oxychloride	A
(hh) Phosphorus pentachloride	A
(ii) Phosphorus pentasulphide	A
(jj) Phosphorus trichloride	A
(kk) Potassium bifluoride	A
(ll) Potassium cyanide	A
(mm) Potassium fluoride	A
(nn) 3-quinuclidinol	A
(oo) 3-quinuclidone	A
(pp) Sodium bifluoride	A
(qq) Sodium cyanide	A
(rr) Sodium fluoride	A
(ss) Sodium sulphide	A
(tt) Thiodiglycol	A
(uu) Thionyl chloride	A
(vv) Tri-ethanolamine	A

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(ww) Triethyl phosphite	A
(xx) Trimethyl phosphite	A

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Recoilless rifles	ML 2a
Recovery vehicles	ML 6
Refuelling	ML 10c

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Revolvers	ML 1a
Rifles	ML 1a
Riot control equipment	PL 5001
Riot control vehicles, electrified	PL 5001
Rocket launchers	ML 2a
Rockets	ML 4a
Searchlights	ML 17c
Self-propelled guns	ML 6
Semi-finished products	ML 16 and PL 5020
Shackles	PL 5001
Shutters, electronically triggered	ML 22
Sighting devices	ML 5
Silencers, firearm	ML 17b
Silent bearings	ML 9
Small arms	ML 1
Smoke canisters	ML 4a
Smoke generators	ML 2
Smoke grenades	ML 4a
Smoke projectors	ML 2b
Smooth bore weapons	ML 1
Software	ML 24
Stabilisers, explosives	PL 5009
Submarine nets	ML 9
Submarines	ML 9
Superconductive equipment	ML 20
Surface vessels	ML 9
Tank destroyers	ML 2a
Tanks	ML 6
Tear gas	ML 7
Technology for development	PL 5017
Telescopic sights	PL 5002
Thermal imaging equipment	ML 15
Torpedoes	ML 4a
Torpedo nets	ML 9
Toxicological agents	ML 7

Trailers, ammunition	ML 6
Training equipment	ML 14
2:2':2" Trichlorotriethylamine	ML 7
Underwater detection devices	ML 9
Underwater swimming apparatus	ML 17a
Underwater vessels	ML 9
Unmanned airborne vehicles	ML 10
Vehicles	ML 6
Vehicles modified for military use	ML 6
Vessels	ML 9
Water cannon	PL 5001
Weapons using caseless ammunition	ML 1
ATOMIC AND NUCLEAR LISTS—GROUP 2	
Beryllium (metal compounds and products)	A 9
Blowers	PL 6013
Calcium	PL 6005
Chemical exchange separation units	B 1
Chlorine trifluoride	PL 6003
Compressors	PL 6013
Deuterated paraffins	A 3
Deuterium	A 3
Deuterium production plant	B 5
Electrolytic cells (fluorine production)	C 3
Electromagnetic separation units	B 1
Fabrication plant, fuel element	B 4
Fissile materials	A 1
Fluorinated hydrocarbon polymers	PL 6014
Fluorine	PL 6002
Fluorine production	C 3
Frequency changers, gas centrifuge	C 6
Fuel element fabrication plant	B 4
Gas centrifuges	B 1
Gas centrifuges, manufacture	PL 6007
Gaseous diffusion barriers	B 1
Gaseous diffusion housings	B 1

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Gaseous diffusion separation units	B 1
Graphite, nuclear-grade	PL 6011
Hafnium (metal, alloys and compounds)	A 8
Heat exchangers	B 1 and B 3
Heat source materials	A 13
Heavy water	A 3
Heavy water production plant	B 5
Isotope separation equipment, lithium	C 4
Isotope separation, special materials	A 14
Isotopic separation plants	B 1
Jet nozzle separation units	B 1
Laser isotopic separation units	B 1
Lithium (metal, compounds and alloys)	A 7
Lithium isotope separation	C 4
Lithium, process control equipment	PL 6010
Magnesium alloys	PL 6006
Mass spectrometer sources	PL 6008
Mass spectrometers	PL 6008
Materials for isotope separation	A 14
Military nuclear reactors	C 2
Neutron generator systems	C 1
Nickel powder	A 5
Nuclear reactors	B 3
Plants, reprocessing	B 2
Plants, separation	B 1
Plasma separation units	B 1
Plutonium	A 1 and A 13
Porous nickel metal	A 5
Power generating systems, nuclear reactor	C 2
Pressure gauges	PL 6009
Process control equipment	PL 6010
Process control instrumentation	PL 6010
Production equipment, tritium	C 5
Production plant, deuterium	B 5
Production plant, heavy water	B 5

Production plant, uranium hexafluoride	B 6
Propulsion equipment, nuclear	C 2
Reaction generator systems	C 1
Reactors, nuclear	B 3
Recovery equipment, tritium	C 5
Reprocessing plants	B 2
Thorium	PL 6001
Tritium (compounds, mixtures and products)	A 12
Tritium production equipment	C 5
Tritium recovery equipment	C 5
Uranium hexafluoride production plant	B 6
Uranium, natural or depleted	A 1 and A 2
Valves	B 1
Vortex separation units	B 1
Zirconium (metal, compounds, alloys and products)	A 4
INDUSTRIAL LIST–GROUP 3	
A-to-D converters	IL 1564 a, IL 1568, PL 7038 and PL 7039
Absorbers, electromagnetic waves	IL 1561
Absorbers, hair type	IL 1561
Absorbers, non-planar and planar	IL 1561
Absorbers, paint	IL 1561
Accelerometer manufacture	IL 1385
Accelerometers	IL 1485 f
Acoustic positioning systems	IL 1510
Acoustic projectors	IL 1510 a
Acoustic test equipment	IL 1362 b
Acoustic wave devices	IL 1586
Acousto-optic signal-processing devices	IL 1586 c
Active flight control technology	IL 1460 b
ADCs	IL 1564 a, IL 1568, and PL 7038
Aero-engine design	IL 1361
Aero-engine technology	IL 1460
Aero-engines	IL 1460
Air independent power systems	IL 1417 h
Airborne communication equipment	IL 1501 a and IL 1531 c

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Aircraft	IL 1460, PL 7016 and PL 7010
Aircraft components	PL 7011
Aircraft control technology	IL 1460 b
Aircraft design equipment and facilities	IL 1361
Aircraft fastener inspection equipment	IL 1081
Aircraft fastener manufacturing equipment	IL 1081
Aircraft inspection equipment	IL 1081
Aircraft manufacturing equipment	IL 1081
Aircraft propulsion systems technology	IL 1460 b
Aircraft technology	IL 1460 b
Align and expose equipment	IL 1355 b 2
Alloyed materials	IL 1610 c
Altimeters	IL 1501 b
Aluminides of titanium	IL 1672
Aluminium alloys	PL 7001
Ammonium hydrogen fluoride	PL 7007
Amorphous alloy strips	IL 1631 f
Analogue computers	IL 1565
Analogue exchanges	IL 1567 b
Analogue tape recorders	IL 1572 a
Analogue transmission equipment	IL 1519
Analogue to digital converters	IL 1564 a, IL 1568 and PL 7038
Anechoic chambers	PL 7041
Angular measuring instruments	IL 1099 c
Annealing furnaces	IL 1355 b 1
Antennas	IL 1537, IL 1501 and 1520
Application software	IL 1566 a, b
Aromatic polyamides	IL 1746 c
Arsenic trichloride	PL 7007
Articulated manipulators	IL 1417 d
Artificial intelligence	IL 1566 b
Assemblies with mounted components	IL 1564
Assemblies, electronic	IL 1564
ATE	IL 1355 b 7
Atmosphere regeneration systems	IL 1417 a

Autoclave regulation technology	PL 7045
Automatic pilots	IL 1485 e
Automatic test equipment	IL 1355 b 7
Auxiliary power units	IL 1460 d
Base materials	IL 1733
Batteries	IL 1205 a
Bearings, anti-friction	IL 1371
Benzilic acid	PL 7007
Bipolar random access memories	IL 1564 a
Bit-slice microprocessor microcircuits	IL 1564 a
Bonders	IL 1355
Boric oxide	IL 1757 i
Boring mills	IL 1091 b
Boron composites	IL 1715
Boron, compounds and mixtures	IL 1715 and PL 7006
Brayton cycle engines	IL 1417 h
Bubble memory processing equipment	IL 1355 b 1
Bulk acoustic wave devices	IL 1586
Burst transmitters and receivers	PL 7003
Butadiene polymers	IL 1746 k
Cable	IL 1526 and IL 1754 c
Cable manufacturing equipment	IL 1353
Cadmium	IL 1757 e
Calibrating equipment	IL 1529
Cameras	IL 1585
Cameras, underwater	IL 1417 e
Capacitors	IL 1560
Carbon-carbon	PL 7046
Carbon fibre	IL 1763
Carboxyl terminated polybutadienes	IL 1746 k 1
Cathodes	IL 1558
Cathodic arc deposition production equipment	IL 1388 f
Cellular radio communications equipment	IL 1531 d
Centralised network control	IL 1567 b
Ceramic base materials	IL 1733

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Ceramic packages for integrated circuits	IL 1564 b
Ceramic-ceramic composite materials	IL 1733
Channel estimators	IL 1520 b
Characterisation equipment	IL 1353
Chemical vapour deposition (CVD)	IL 1355b 1 and IL 1388 a
Chemical vapour deposition equipment	IL 1355 b 1 and IL 1388 a
Chemicals	PL 7007
2-chloroethanol	PL 7007
Cipher equipment	IL 1527
Civil aviation communication networks	IL 1567 b
Clean air filters	IL 1355 b 8
Closed ventilation systems, marine	IL 1416 d
CMOS monolithic integrated circuits	IL 1564 a
CNC, (computer numerical control)	IL 1091 a
Coating technology	IL 1389
Coatings for reduced visibility	PL 7043
Coaxial cable	IL 1526 d
Cold cathode tubes	PL 7023
Comb frequency generators	IL 1529 e
Combined cycle engines	PL 7026
Combined recognition	IL 1565 h
Combustion system testing	IL 1361
Common channel signalling	IL 1567 b
Communication equipment	IL 1519 and IL 1567
Compass manufacture	IL 1385
Compasses	IL 1485 a
Compilers	IL 1529 k
Components and parts for machine tools	IL 1091 d
Components for aircraft and helicopters	PL 7011
Components, electronic	IL 1564
Composite conductors	IL 1675 c
Composite production equipment	IL 1357
Composite structures	IL 1763 c
Compound semiconductor processing	IL 1355 b 1
Compound semiconductors	IL 1564 a

Computer disc cartridges	IL 1572 d
Computer disc packs	IL 1572 d
Computer tape	IL 1572 d
Computer-aided design of semiconductors	IL 1355 b 2
Computer-aided design software	IL 1566 a
Computer-aided inspection software	IL 1566 a
Computer-aided manufacture software	IL 1566 a
Computer-aided test software	IL 1566 a
Computers	IL 1565
Controllers, robot	IL 1391 b
Converter integrated circuits	IL 1564 a
Converters	IL 1568
Cooling fluids	IL 1710 d
Cross-connect equipment	IL 1519
Crossed-field amplifier tubes	IL 1558 b
Crossed-field oscillator tubes	IL 1558 b
Crucibles	IL 1355 b 1
Cryptographic equipment	IL 1527
Crystal pullers	IL 1355 b 1
CVD, (chemical vapour deposition)	IL 1355, IL 1388 and IL 1389
D-to-A converters	IL 1564 a and IL 1568
DACs	IL 1564 a and IL 1568
Damping fluids	IL 1710 c
Data (message) switching	IL 1565 h 1 and IL 1567
Data communication protocol analysers	IL 1529 j
Database management systems	IL 1566 c
Dayem bridges	IL 1574
Deep submergence vehicles	IL 1418
Definitions, SPC communication switching	IL 1567
Degaussing, vessel	IL 1416 d
Densitometers	IL 1534
Deposition equipment	IL 1388
Depth sounders	IL 1510
Detection equipment	IL 1502
Development systems	IL 1565 h 1 and IL 1566 b

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Device testers	IL 1355 b 7
Di-isopropylamine	PL 7007
Diagnostic systems	IL 1566 b
Die bonders	IL 1355 b 5
Diesel engine technology	IL 1401
Diethyl ethylphosphonate	PL 7007
Diethyl methylphosphonite	PL 7007
Diethyl-N, N-dimethylphosphoramidate	PL 7007
Diethyl-phosphite	PL 7007
Diethylamine hydrochloride	PL 7007
Diethylaminoethanol	PL 7007
Diffraction type optical elements	IL 1556 d
Diffusion bonding technology	IL 1001
Diffusion furnaces	IL 1355 b 1
Digital computer definition	IL 1565
Digital computers	IL 1565 e, f and h
Digital counters	IL 1529 g
Digital exchanges	IL 1567
Digital recording equipment	IL 1572 a
Digital reproducing equipment	IL 1572 a
Digital signal processors	IL 1564 a
Digital synchronising circuitry	IL 1567 b
Digital tape recorders	IL 1565 h and IL 1572 a
Digital to analogue converters, electrical	IL 1568 b
Digital voltage measuring apparatus	IL 1529 i
Digital-to-analogue converters	IL 1564 a and IL 1568
Digitally controlled radio receivers	IL 1531 d
Dimensional inspection systems or devices	IL 1099
Dimethyl ethylphosphonate	PL 7007
Dimethyl methylphosphonate	PL 7007
Dimethylamine	PL 7007
Dimethylphosphite	PL 7007
Direct numerical control (DNC) systems	IL 1091 c
Direction finding equipment	IL 1501 b
Directional couplers	IL 1537 c

Disc cartridges	IL 1572 d
Disc drives	IL 1565 h and IL 1572 a
Disc packs	IL 1572 d
Displays	IL 1565 h
DNC	IL 1091 c
Doppler systems	IL 1501 b and c
DRAMs	IL 1564 a
Drum drives	IL 1565 h
Dry etchers	IL 1355 b 1
DVMs	IL 1529 i
Dynamic adaptive routing	IL 1567 b
Dynamic random access memories	IL 1564 a
Dynamic signal analysers	IL 1533 b
EAROMs	IL 1564 a
Electrical discharge machines (EDM)	IL 1091 b
Electrical, electronic equipment	PL 7004 (reduced electromagnetic radiation)
Electro-chemical devices	IL 1205 a
Electrolyte cells	IL 1205 a
Electron beam deposition systems	IL 1355 b 1 and IL 1388 c
Electron beam microfabrication systems	IL 1355 b 1
Electron beam physical vapour deposition	IL 1388 c
Electron beam test systems	IL 1355 b 9
Electron tubes	IL 1555
Electron tubes for electron streak cameras	IL 1555
Electron tubes for framing cameras	IL 1555
Electron tubes for image conversion	IL 1555 a
Electron tubes for image intensification	IL 1555 a
Electron tubes for television cameras	IL 1555 b
Electron tubes for video cameras	IL 1555 b
Electronic assemblies	IL 1564
Electronic components	IL 1564
Electronic components, manufacture and test	IL 1355
Electronic equipment, reduced radiation	PL 7004
Electronic instruments	IL 1529

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Electronic material, manufacture and test	IL 1355
Electronic vacuum tubes	IL 1558
Elements for optical tubes	IL 1556
Encoders	IL 1568 d
Encryption	IL 1527, IL 1565 and IL 1566
End effectors, robot	IL 1391 c
Environmental chambers	PL 7041
Epitaxial growth equipment	IL 1355 b 1
Ethyl phosphinyl dichloride	PL 7007
Ethyl phosphinyl difluoride	PL 7007
Ethyl phosphonyl dichloride	PL 7007
Ethyl phosphonyl difluoride	PL 7007
Exchanges	IL 1567
Expert systems	IL 1566 b
Facsimile equipment	IL 1519 and IL 1572
Fault tolerance	IL 1565 h
Fibre optic connectors	IL 1526 e
Fibre optics	IL 1526 b and c
Fibre production equipment	IL 1357
Fibre-optic bundles	IL 1556 a
Fibre-optic cable	IL 1526 c and d
Fibre-optic connector manufacture	IL 1359
Fibre-optic couplers	IL 1526 e
Fibre-optic manufacturing equipment	IL 1353
Fibre-optic plates	IL 1556 a
Fibrous and filamentary material production	IL 1357
Fibrous and filamentary materials	IL 1763
Fibrous material production equipment	IL 1357 d
Filament winding machines	IL 1357
Filamentary material production equipment	IL 1357 d
Fish finders	IL 1510
Flash discharge type X-ray systems	IL 1553
Flash discharge type X-ray tubes	IL 1553
Flatbed measurement instruments	IL 1355 b 4
Flatbed microdensitometers	IL 1534

Flexible disc drives	IL 1565 h and IL 1572 a
Flexible disc media	IL 1572 d
Flight data recorders	IL 1572 a
Flight instrument systems	IL 1485 b
Floppy disc drives	IL 1565 h and IL 1572 a
Floppy disc media	IL 1572 d
Flotation fluids	IL 1710 c
Flow forming machines	PL 7031
Fluorinated coated electric wire and cable	IL 1754 c
Fluorinated compounds and manufactures	IL 1754
Focal plane array	IL 1548 d
Frequency agile radio systems	IL 1516 c
Frequency generators	IL 1529 e
Frequency standards	IL 1529 c
Frequency synthesizers	IL 1531
Fuel cells	IL 1205 a
Functional testers	IL 1355 b 7
Furnaces for the densification of composites	PL 7033
Fuzzy logic	IL 1564 a
Gallium	IL 1757 b
Gas turbine blade or vane manufacture	IL 1080
Gas turbine blade or vane technology	IL 1080
Gas turbine blade or vane testing	IL 1080
Gas turbine engine inspection equipment	IL 1086
Gas turbine engine manufacture	IL 1086
Gas turbine engines, marine	IL 1431
Gate arrays	IL 1564
Gear finishing machinery	IL 1088
Gear making machinery	IL 1088
Geodetic equipment	IL 1502
Geodetic positioning systems	IL 1501 b
Geophones	IL 1510
Glass preforms for optical fibres	IL 1767
Global positioning satellite receivers	IL 1501 b
Graphic accelerators	IL 1565 h

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Graphic coprocessors	IL 1565 h
Graphic displays	IL 1565 h
Graphic instruments	IL 1572 c
Graphites	PL 7034
Gravimeters	IL 1595
Gravity gradiometers	IL 1595
Gravity meters	IL 1595
Grinding machines	PL 7005
Ground support vehicles	PL 7037
Ground vibration equipment	IL 1362 c
Gyro-astro compasses	IL 1485 c
Gyro-stabilizers	IL 1485 d
Gyroscopes manufacture	IL 1385
Gyroscopes	IL 1485 g
Gyrotrons	IL 1558 e and IL 1573
Hard surface coated substrates	IL 1355 b 2
Helicopter components	PL 7011
Helicopter power transfer systems	IL 1460 c
Helicopters	IL 1460, PL 7016 and PL 7010
Hemishell inspection systems	IL 1099 d
Hetero-epitaxial materials	IL 1757 d
High energy storage capacitors	IL 1560
High speed cameras	IL 1585
High speed shutters	IL 1585
Hollow microspheres (microballoons)	IL 1759 b
Hot cap sealers	IL 1355 b 5
Hot die forging technology	IL 1001
Hot isostatic densification technology	IL 1001
Hovercraft	IL 1416 b
Hulls	IL 1416 h
Hybrid computers	IL 1565 d
Hybrid integrated circuits	IL 1564
Hydraulic pressing technology	IL 1001
Hydrides	IL 1757 m
Hydroclave regulation technology	PL 7045

Hydrofoil vessels	IL 1416 a
Hydrogen fluoride	PL 7007
Hydrophones	IL 1510
3-hydroxy-1-methylpiperidine	PL 7007
ICs	IL 1564
Image enhancement	IL 1565 h 1
Image transfer equipment	IL 1355 b 2
In-circuit testers	IL 1355 b 7
Incremental recorders	IL 1572 a
Indium	IL 1757 c
Inert gas atomising production equipment	PL 7031 a
Inert gas induction furnaces	PL 7019
Inertial equipment	IL 1485 i
Inertial equipment manufacture	IL 1385
Inertial navigation systems	IL 1485
Inertial test equipment	IL 1385 b
Infrared systems	IL 1502
Infrared thermal imaging equipment	IL 1502
Infrared viewing equipment	IL 1502
Input/output control equipment	IL 1565 h
Instrument frequency synthesizers	IL 1531 b
Instrumentation recorders	IL 1572 a
Instrumentation tape	IL 1572 d
Instruments, electronic	IL 1529
Integrated circuit testers	IL 1355 b 7
Integrated circuits	IL 1564
Interlacing machines	IL 1357
Interpretation of image	IL 1565 h
Ion beam systems	IL 1355 b 10
Ion implantation production equipment	IL 1355 b 1 and IL 1388 b
Ion implantation	IL 1355 b 1 and IL 1388 b
ISDN ICs	IL 1564 a
Isostatic presses	IL 1312 and PL 7032
Jet engine production equipment	PL 7044
Josephson-effect devices	IL 1574

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Key telephone systems	IL 1567 b
Klystrons	IL 1558 c and d
Laser ring gyro test equipment	IL 1385 a
Lasers	IL 1522 a
Launch vehicles	IL 1465 b
Lidar equipment	PL 7021 b
Light systems for underwater use	IL 1417 f
Line-width measurement equipment	IL 1355 b 4
Linear arrays	IL 1548 d
Linear displacement measuring devices	IL 1099 c
Linear induction motors	IL 1370 c
Liquid phase epitaxy (LPE)	IL 1355 b 1
Lithium niobate	IL 1757 k
Lithographic equipment, semiconductor	IL 1355 b 2
Local area networks	IL 1565 h and IL 1567 a
Logic analysers	IL 1529 b
Loran C equipment	IL 1501 b
Low temperature devices	IL 1574
Low temperature superconductive materials	IL 1675
LPE, (liquid phase epitaxy)	IL 1355 b 1
Lubricating fluids	IL 1710 a
Lubricating materials	IL 1710 b
Machine tools	IL 1091 b
Machine tools for grinding	IL 1091 b and PL 7005
Machine tools for removing material	IL 1091 b
Machine tools for turning	IL 1091 b
Machining centres	IL 1091 b
Magnetic compensation systems	IL 1571 c
Magnetic disc coating equipment	IL 1358
Magnetic disc media	IL 1572 d
Magnetic media testing equipment	IL 1358
Magnetic metals	IL 1631
Magnetic tape	IL 1572 d
Magnetic tape recorders	IL 1565 h and IL 1572 a
Magnetometer systems	IL 1571

Magnetometers	IL 1571
Magnetrons	IL 1558 b
Maintenance systems	IL 1566 b
Manned underwater vehicles	IL 1418 b
Maraging steels	PL 7002
Marine systems	IL 1510
Mask aligners	IL 1355 b 2
Mask fabrication equipment	IL 1355 b 2
Mask inspection equipment	IL 1355 b 2
Masks, semiconductor	IL 1355 b 2
Measuring equipment	IL 1529
Memory integrated circuits	IL 1564 a
Metal alloy powder	IL 1610 b
Metal alloy powder production systems and components	IL 1310
Metal alloy production systems and components	IL 1310
Metal alloys	IL 1610 a
Metal oxide semiconductor memories	IL 1564 a
Metal powder compaction technology	IL 1001
Metal-organic chemical vapour deposition	IL 1355 b 1
Metal working technology	IL 1001
Metallo-organic compounds	IL 1757 1
Metallo-organic materials	IL 1733 d
Methyl benzilate	PL 7007
Methyl phosphinyl dichloride	PL 7007
Methyl phosphinyl difluoride	PL 7007
Methyl phosphonyl dichloride	PL 7007
Methyl phosphonyl difluoride	PL 7007
Microchannel plates	IL 1556 b
Microcomputer microcircuits	IL 1564
Microdensitometers	IL 1534
Microprocessor development systems	IL 1529 k and IL 1565 h 1
Microprocessor microcircuits	IL 1564
Microprocessor support integrated circuits	IL 1564 a
Microwave amplifiers	IL 1537 h

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Microwave assemblies	IL 1537
Microwave equipment	IL 1537
Microwave radio links	IL 1520 a
Millimetric wave equipment	IL 1537
Milling machines	IL 1091 b
Mixers for propellants	PL 7030
MOCVD	IL 1355 b 1
Modems	IL 1519 a
Modules	IL 1564
Modules with mounted components	IL 1564
Moisture and particulate separator systems	IL 1416 g
Molecular beam epitaxy (MBE)	IL 1355 b 1
Molybdenum alloy fibre	IL 1763
Molybdenum alloy particles	PL 7036
Molybdenum fibre	IL 1763
Molybdenum particles	PL 7036
Monocrystalline silicon	IL 1757 a
Monolithic integrated circuits	IL 1564
Multi-data-stream processing	IL 1565 h
Multichip integrated circuits	IL 1564
Multiplex equipment	IL 1519
N,N-diisopropyl-(beta)-amino ethanol	PL 7007
N,N-diisopropyl-(beta)-aminoethane thiol	PL 7007
N,N-diisopropyl-(beta)-aminoethyl chloride	PL 7007
Navigation equipment	IL 1501 b
Network analyzers	IL 1533 c
Network management protocol	IL 1567 b
Networking equipment	IL 1565 h
Neural networks	IL 1564 a
Nickel based alloys	IL 1672 b
Niobium-titanium wire	IL 1675 b
NMOS monolithic integrated circuits	IL 1564 a
Non-composite ceramic materials	IL 1733
Non-fluorinated polymeric substances	IL 1746 a
Non-rechargeable batteries	IL 1205 a

Nozzles	PL 7025 a
Numerical control (NC) units	IL 1091 a
Numerically controlled machine tools	IL 1091
O-ethyl-2-di-isopropylaminoethyl methylphosphonite	PL 7007
Ocean cable	IL 1526 a
Operating systems	IL 1566 b
Optical disk drives	IL 1565 h
Optical elements	IL 1556
Optical elements, diffractive type	IL 1556 d
Optical fibre cable	IL 1526 c
Optical fibre characterisation equipment	IL 1353
Optical fibre connectors	IL 1526 e
Optical fibre couplers	IL 1526 e
Optical fibre manufacturing equipment	IL 1353
Optical fibre sensors	IL 1526 d
Optical fibres	IL 1526 c and d
Optical integrated circuits	IL 1564
Optical quality surface manufacture	IL 1370
Oxidation furnaces	IL 1355 b 1
Oxygen/carbon content measuring equipment	IL 1355 b 4
PABXs	IL 1567 b
Packet switching	IL 1567
Panoramic radio receivers	IL 1516 a
Parametric amplifiers	IL 1537 h
Particle measuring systems	IL 1355 b 11
PCBs with mounted components	IL 1564
PCM testers	IL 1519 d
Pellicles	IL 1355 b 2
Peniotrons	IL 1558 e
Peripheral equipment	IL 1565 h
Phase slip devices	IL 1574
Phased array antenna	IL 1537 d
Phosphorus oxychloride	PL 7007
Phosphorus pentachloride	PL 7007

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Phosphorus trichloride	PL 7007
Photo-enhanced reactors	IL 1355 b 1
Photo-voltaic cells	IL 1205 b
Photocathodes	IL 1556 c
Photoconductive cells	IL 1548
Photodiodes	IL 1548
Photographic equipment	IL 1585
Photographic film	IL 1585
Photolithography	IL 1355 b 2
Photomultiplier tubes	IL 1549
Photosensitive components	IL 1548
Phototransistors	IL 1548
Pinacolone	IL 7007
Pinacolyl alcohol	PL 7007
Pipe valves	PL 7017
PLAs	IL 1564
Plasma enhanced chemical vapour deposition	IL 1355 b 1
Plasma etchers, semiconductor	IL 1355 b 1
Plasma spraying production equipment	IL 1388 d
Plasma-enhanced reactors	IL 1355 b 1
PMOS monolithic integrated circuits	IL 1564 a
Polenzimidazoles	IL 1746 b
Polenzothiazoles	IL 1746 d
Polybenzoxozoles	IL 1746 i
Polycrystalline alumina fibre	IL 1763
Polycrystalline silicon	IL 1757 f
Polycrystalline silicon production	IL 1355 b 1
Polyimides	IL 1746 a
Polymeric materials	IL 1733 d and IL 1754 b
Polyoxadiazoles	IL 1746 e
Polyphosphazenes	IL 1746 f
Polyphosphonitriles	IL 1746 f
Polystyrylpyridine (PSP)	IL 1746 g
Position enoders	IL 1568 d
Positioning equipment	IL 1501 b

Positioning systems, acoustic	IL 1510
Potassium bifluoride	PL 7007
Potassium cyanide	PL 7007
Potassium fluoride	PL 7007
Potassium trichloride	PL 7007
Power sources, radio-active	IL 1205 c
Precursor materials	IL 1733
Preform characterisation equipment	IL 1353
Preforms of glass	IL 1767
Presses, isostatic	IL 1312 and PL 7032
Pressure regulators	PL 7017
Primary cells	IL 1205 a
Private automatic exchanges	IL 1567 b
Programmable logic arrays	IL 1564
Programmable read only memories	IL 1564 a
Programming systems	IL 1566 b
PROMs	IL 1564 a
Propellant production equipment	PL 7029 a
Propellants for spacecraft	PL 7028
Propeller hubs	IL 1416
Propellers, marine	IL 1416
Propulsion systems, spacecraft	IL 1465 c
Proximity-effect devices	IL 1574
Pullers, semiconductor crystal	IL 1355 b 1
Pulsejets	PL 7026
Pumpjet systems	IL 1416 f
Pumps	IL 1131 and PL 7018
Pyrolitic deposition systems	PL 7025
Pyrolitic deposition technology	PL 7025 a
Pyrolitic detectors	IL 1548
Quadrature amplitude modulation technology	IL 1520 d
Quartz crystals	PL 5026
Quasiparticle devices or detectors	IL 1574
3-quinuclidinol	PL 7007
3-quinuclidone	PL 7007

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Radar equipment	IL 1501 c
Radiation hard integrated circuits	IL 1564 a
Radio equipment	IL 1520 a, IL 1516, IL 1517 and IL 1531
Radio receivers	IL 1516 and IL 1531 d
Radio relay communication equipment	IL 1520
Radio transmitters	IL 1517 and IL 1531 e
Radiographic equipment	PL 7042
RAMs	IL 1564 a
Ramjets	PL 7026
Random access memories	IL 1564 a
Rankine cycle engines	IL 1417 h
Read only memories	IL 1564 a
Real time processing	IL 1565 h 1
Rechargeable batteries	IL 1205 a
Recording equipment	IL 1572
Recording equipment using lasers	IL 1572 b
Recording media	IL 1572 d
Reproducing equipment	IL 1572
Reproducing equipment using lasers	IL 1572 b
Resaturated pyrolyzed materials	PL 7046
Reserve batteries	IL 1205 a
Resin or pitch-impregnated fibres (prepregs)	IL 1763 d
Resist materials	IL 1757 j
Resolvers, solid state	IL 1568 c
Reticles	IL 1355 b 2
Robot controllers	IL 1391 b
Robots	IL 1391 a
Rocket engine production equipment	PL 7044
ROMs	IL 1564 d
Ruggedized computers	IL 1565 f
Sample and hold integrated circuits	IL 1564 d
Sapphire substrates	IL 1757 h
Satellite communications equipment	IL 1520
Satellite navigation equipment	IL 1501 b
SAWs	IL 1586

Scalar network analyzers	IL 1533 d
Scanning electron microscopes	IL 1355 b 1
Scramjets	PL 7026
Secondary cells	IL 1205 a
Seismic/geophysical recorders	IL 1572 a
SEMs	IL 1355
Semiconductor CAD	IL 1355 b 2
Semiconductor photodiodes	IL 1548 b
Semiconductor phototransistors	IL 1548 b
Semiconductor processing equipments	IL 1355 b 1
Sensors, robot	IL 1391 c
Separator systems, vessel	IL 1416
Ships, craft	IL 1416 and PL 7009
Signal analyzers	IL 1533 a
Signal generators	IL 1529 and IL 1351
Signal processing	IL 1565 h
Signal processing devices	IL 1586
Silicon	IL 1757
Silicon microcomputer microcircuits	IL 1564 a
Silicon microprocessor microcircuits	IL 1564 a
Simulators, EMI/EMP	IL 1361
SIS devices	IL 1574
SNS bridges	IL 1574
Sodium bifluoride	PL 7007
Sodium cyanide	PL 7007
Sodium fluoride	PL 7007
Sodium sulphide	PL 7007
Software	IL 1566
Software definitions	IL 1566
Software, technology	IL 1566 c
Solar cells	IL 1205 b
Solid state storage equipment	IL 1565 h
Solid state switches	PL 7022
Sonar systems	IL 1510
Space division analogue exchanges	IL 1567 b

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Space-division digital exchange	IL 1567
Spacecraft	IL 1465 a
SPC communication switching	IL 1567
SPC communication switching technology	IL 1567 c
SPC telegraph circuit switching	IL 1567 b
SPC telephone circuit switching	IL 1567 b
SPC telephone circuit switching exchanges	IL 1567
Spectrum analyzers	IL 1533
Spread spectrum receivers	IL 1516 c
SPS circuit switching	IL 1565 h l and IL 1567
Sputter deposition production equipment	IL 1388 e
Sputtering equipment	IL 1355 b l and IL 1388 e
SQUIDs	IL 1574
SRAMs	IL 1564 d
Static random access memories	IL 1564 a
Statistical multiplexers	IL 1519 and IL 1567
Steel alloy	PL 7002
Steerable parachutes	PL 7016
Step and repeat cameras	IL 1355 b 2
Stirling cycle engines	IL 1417 h
Storage integrated circuits	IL 1564 a
Store and forward	IL 1567
Stored programme controlled communications	IL 1567
Streak cameras	IL 1585 d
Streamer tape drives	IL 1565 h and IL 1572 a
Submersible systems	IL 1417
Submersibles	IL 1418
Substrates	IL 1564
Superconducting materials	IL 1574
Superconducting quantum interference devices (SQUID)	IL 1754
Superconductive electromagnets	IL 1573
Superconductive materials	IL 1675
Superconductive solenoids	IL 1573
Superplastic forming technology	IL 1001

Support integrated circuits	IL 1564 a
Surface acoustic wave devices	IL 1586
Surface-effect vehicles	IL 1416 b
SWATH vessels	IL 1416 c
Syntactic foam	IL 1759
Synthesized radios	IL 1531
Synthesized signal generators	IL 1531 b
Tantalum	PL 7012
Tantalum crucibles	PL 7012
Tape drives	IL 1565 h and IL 1572 a
Tape-laying machines	IL 1357
Technology (computers)	IL 1565 j
Technology for atomising processes	PL 7031 b
Technology for fibrous and filamentary materials	IL 1763 e
Technology, coating	IL 1389
Technology, communication switching	IL 1567 c
Technology, software	IL 1566 c
Telecommunication transmission equipment	IL 1519
Telecontrol equipment	PL 7020
Telegraph circuit switching	IL 1567 b
Telemetry equipment	PL 7020
Telephone circuit switching	IL 1567 b
Tellurium	IL 1757 e
Terminal exchange	IL 1567
Test benches for rockets/rocket motors	PL 7045
Testing equipment, electronic	IL 1529
Tetrodes	IL 1558 a
Thermoplastic liquid crystal copolyesters	IL 1746 h
Thiodiglycol	PL 7007
Thionyl chloride	PL 7007
Thrusters	IL 1362 a
Time-division analogue exchanges	IL 1567 b
Time-division digital exchange	IL 1567
Timing receivers	IL 1501 b

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Titanium aluminides	IL 1672
Titanium based alloys	IL 1672
Towed hydrophone arrays	IL 1510
Tracking equipment	IL 1502
Transcoders	IL 1519
Transducers	IL 1510 and IL 1568
Transit exchange	IL 1567
Transmission equipment	IL 1519
Transmission media simulators	IL 1520 b
Transmitter-amplifiers	IL 1517
Transmitters	IL 1517
Travelling wave tubes	IL 1558 c
Tri-ethanolamine	PL 7007
Triggered spark gaps	PL 7023
Triethyl phosphate	PL 7007
Trimethyl phosphite	PL 7007
Trimming of monolithic integrated circuits	IL 1355 b l
Triodes	IL 1558 a
Tropospheric scatter communication equipment	IL 1520 and PL 7008
Tubes	IL 1558
Tungsten alloy particles	PL 7035
Tungsten particles	PL 7035
TVRO	IL 1520
Ubitrons	IL 1558 e
Ultrasonic detecting equipment	IL 1502
Ultrasonic equipment	IL 1502
Ultrasonic positioning equipment	IL 1502
Underwater cameras	IL 1417 e
Underwater communication cable	IL 1526 e
Underwater vehicles	IL 1418
Underwater vision systems	IL 1417 c
Unencapsulated integrated circuits	IL 1564 a
Unfinished wafers	IL 1564 a
User-accessible microprogrammability	IL 1565 h
Vacuum atomising production equipment	PL 7031 a

Vacuum induction furnaces	PL 7019
Vacuum photodiodes	IL 1548 a
Valves	PL 7018
Vessel models	IL 1363
Vessel propulsion systems	IL 1416
Vessels	IL 1416 and PL 7007
Vibration test equipment	IL 1362
Video cameras	IL 1585 f
Video recorders	IL 1572 a
Video tape	IL 1572 a and d
Vision systems, robot	IL 1391
Wafer defect inspection equipment	IL 1355 b 3
Wafer polishers	IL 1355 b 1
Wafer probers	IL 1355 b 6
Water tunnels	IL 1363
Waveguides	IL 1537
Waving machines	IL 1357
Weak-link devices	IL 1574
Wide area networks	IL 1565 h and IL 1567 a
Wide swath bathymetric survey systems	IL 1510 a
Winchester disc drives	IL 1565 h and IL 1572 a
Wind tunnel, instrumentation	IL 1361
Wind tunnel, models	IL 1361
Wind tunnels	IL 1361
Wire bonders	IL 1355 b 5
X-ray systems	IL 1553
X-ray tubes	IL 1553
Zone-refining equipment	IL 1355 b 1
