High-Tech Commodities List for Exportation to Russia

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Category 3 - Electronics

3A991 Electronic devices and components.

a. "Microprocessor microcircuits", "microcomputer microcircuits", and microcontroller microcircuits having any of the following:

1. A performance speed of 5 GFLOPS or more and an arithmetic logic unit withan access width of 32 bit or more;
2. A clock frequency rate exceeding 25 MHz; or
3. More than one data or instruction bus or serial communication port that provides a direct external interconnection between parallel "microprocessormicrocircuits" with a transfer rate of 2.5 Mbyte/s;

b. Storage integrated circuits, as follows:

1. Electrically erasable programmable read-only memories (EEPROMs) with a storage capacity;
   a. Exceeding 16 Mbits per package for flash memory types; or
   b. Exceeding either of the following limits for all other EEPROM types:
      1. Exceeding 1 Mbit per package; or
      2. Exceeding 256 kbit per package and a maximum access time ofless than 80 ns;
2. Static random access memories (SRAMs) with a storage capacity:
   a. Exceeding 1 Mbit per package; or
   b. Exceeding 256 kbit per package and a maximum access time of lessthan 25 ns;

c. Analog-to-digital converters having any of the following:

1. A resolution of 8 bit or more, but less than 12 bit, with an output rate greaterthan 200 Mega Samples Per Second (MSPS);
2. A resolution of 12 bit with an output rate greater than 10^5 Mega Samples per Second (MSPS);
3. A resolution of more than 12 bit but equal to or less than 14 bit with an outputrate greater than 10 Mega Samples per Second (MSPS); or
4. A resolution of more than 14 bit with an output rate greater than 2.5 Mega Samples Per Second (MSPS);

d. Field programmable logic devices having a maximum number of single-ended digital input/outputs between 200 and 700;

e. Fast Fourier Transform (FFT) processors having a rated execution time for a 1,024point complex FFT of less than 1 ms;

f. Custom integrated circuits for which the function is unknown, or the control status ofthe equipment in which the integrated circuits will be used is unknown to the manufacturer, having any of the following:

1. More than 144 terminals; or
2. A typical “basic propagation delay time” of less than 0.4 ns;

g. Traveling-wave “vacuum electronic devices”, pulsed or continuous wave, as follows:
   1. Coupled cavity devices, or derivatives thereof;
   2. Devices based on helix, folded waveguide, or serpentine waveguide circuits, or derivatives thereof, having any of the following:
      a. An “instantaneous bandwidth” of half an octave or more and average power (expressed in kW) times frequency (expressed in GHz) of morethan 0.2; or
      b. An “instantaneous bandwidth” of less than half an octave; and averagepower (expressed in kW) times frequency (expressed in GHz) of morethan 0.4;

h. Flexible waveguides designed for use at frequencies exceeding 40 GHz;

i. Surface acoustic wave and surface skimming (shallow bulk) acoustic wave devices, having either of the following:
   1. A carrier frequency exceeding 1 GHz; or
   2. A carrier frequency of 1 GHz or less; and
      a. A “frequency side-lobe rejection” exceeding 55 dB;
      b. A product of the maximum delay time and bandwidth (time in microseconds and bandwidth in MHz) of more than 100; or
      c. A dispersive delay of more than 10 microseconds;

Technical Note: For the purpose of 3A991.i 'Frequency side-lobe rejection' is themaximum rejection value specified in data sheet.

j. “Cells” as follows:
   1. “Primary cells” having an “energy density” of 550 Wh/kg or less at 293 K(20°C);
   2. “Secondary cells” having an “energy density” of 350 Wh/kg or less at 293 K (20°C);

Note: 3A991.j does not control batteries, including single cell batteries.

Technical Notes:
1. For the purpose of 3A991.j energy density (Wh/kg) is calculated from the nominal voltage multiplied by the nominal capacity in ampere-hours (Ah) divided by the mass in kilograms. If the nominal capacity is not stated, energydensity is calculated from the nominal voltage squared then multiplied by thedischarge duration in hours divided by the discharge load in Ohms and the mass in kilograms.
2. For the purpose of 3A991.j, a “cell” is defined as an electrochemical device,which has positive and negative electrodes, and electrolyte, and is a source of electrical energy. It is the basic building block of a battery.
3. For the purpose of 3A991.j.1, a “primary cell” is a “cell” that is not designed to be charged by any other source.
4. For the purpose of 3A991.j.2, a “secondary cell” is a “cell” that is designedto be charged by an external electrical source.

k. "Superconductive" electromagnets or solenoids specially designed to be fullycharged or discharged in less than one minute, having all of the following:

Note: 3A991.k does not control "superconductive" electromagnets or solenoidsdesigned for Magnetic Resonance Imaging (MRI) medical equipment.

1. Maximum energy delivered during the discharge divided by the duration of the discharge of more than 500 kJ per minute;
2. Inner diameter of the current carrying windings of more than 250 mm; and
3. Rated for a magnetic induction of more than 8T or "overall current density" inthe winding of more than 300 A/mm^2;

l. Circuits or systems for electromagnetic energy storage, containing components manufactured from "superconductive" materials specially designed for operation at temperatures below the "critical temperature" of at least one of their "superconductive" constituents, having all of the following:

1. Resonant operating frequencies exceeding 1 MHz;
2. A stored energy density of 1 MJ/m3 or more; and
3. A discharge time of less than 1 ms;

m. Hydrogen/hydrogen-isotope thyratrons of ceramic-metal construction and rate for apeak current of 500 A or more;

n. Not used;

o. Solar cells, cell-interconnect-coverglass (CIC) assemblies, solar panels, and solararrays, which are "space qualified" and not controlled by 3A001.e.4.

3A992 General purpose "electronic assemblies", modules and equipment.

a. Electronic test equipment, other than those specified in the CML[1] or in ECL[2];

b. Digital instrumentation magnetic tape data recorders having any of the following characteristics;

1. A maximum digital interface transfer rate exceeding 60 Mbit/s and employing helical scan techniques;
2. A maximum digital interface transfer rate exceeding 120 Mbit/s and employing fixed head techniques; or
3. "Space qualified";

1 CML - Common Military List

2 ECL – Export Control List for Dual Use Items and Technology

c. Equipment, with a maximum digital interface transfer rate exceeding 60 Mbit/s, designed to convert digital video magnetic tape recorders for use as digital

instrumentation data recorders;

d. Non-modular analog oscilloscopes having a bandwidth of 1 GHz or greater;

e. Modular analog oscilloscope systems having either of the following characteristics:

1. A mainframe with a bandwidth of 1 GHz or greater; or
2. Plug-in modules with an individual bandwidth of 4 GHz or greater;

f. Analog sampling oscilloscopes for the analysis of recurring phenomena with an effective bandwidth greater than 4 GHz;

g. Digital oscilloscopes and transient recorders, using analog-to-digital conversion techniques, capable of storing transients by sequentially sampling single-shot inputsat successive intervals of less than 1 ns (greater than 1 Giga Samples per Second (GSPS)), digitizing to 8 bits or greater resolution and storing 256 or more samples.

Note: 3A992 controls the following specially designed components for analog oscilloscopes:
1. Plug-in units;
2. External amplifiers;
3. Pre-amplifiers;
4. Sampling devices;
5. Cathode ray tubes.

3A999 Specific processing equipment, other than those specified in the CML or in ECL, as follows:

a. Frequency changers capable of operating in the frequency range from 300 up to 600 Hz, other than those specified in the CML or in ECL;

b. Mass spectrometers, other than those specified in the CML or in ECL;

c. All flash x-ray machines, or components of pulsed power systems designed thereof, including Marx generators, high power pulse shaping networks, high voltage capacitors, and triggers;

d. Pulse amplifiers, other than those specified in the CML or in ECL;

e. Electronic equipment for time delay generation or time interval measurement, asfollows:

1. Digital time delay generators with a resolution of 50 nanoseconds or less overtime intervals of 1 microsecond or greater; or

2. Multi-channel (three or more) or modular time interval meter and chronometry equipment with resolution of 50 nanoseconds or less over time intervals of 1 microsecond or greater;

f. Chromatography and spectrometry analytical instruments.

3B991 Equipment for the manufacture of electronic components or materials, as follows andspecially designed components and accessories therefor.

a. Equipment specially designed for the manufacture of electron tubes, optical elementsand specially designed components therefor controlled by 3A001 or 3A991;

b. Equipment specially designed for the manufacture of semiconductor devices, integrated

circuits and “electronic assemblies”, as follows, and systems incorporatingor having the characteristics of such equipment:

Note: 3B991.b. also controls equipment used or modified for use in the manufacture of other devices, such as imaging devices, electro-optical devices,acoustic-wave devices.

1. Equipment for the processing of materials for the manufacture of devices and components as specified in the heading of 3B991.b, as follows:

Note: 3B991 does not control quartz furnace tubes, furnace liners, paddles, boats (except specially designed caged boats), bubblers, cassettes or crucibles speciallydesigned for the processing equipment controlled by 3B991.b.1.

a. Equipment for producing polycrystalline silicon and materials controlledby 3C001;

b. Equipment specially designed for purifying or processing III/V and II/VI semiconductor materials controlled by 3C001, 3C002, 3C003, 3C004, or 3C005 except crystal pullers, for which see 3B991.b.1.c below;

c. Crystal pullers and furnaces, as follows:

Note: 3B991.b.1.c does not control diffusion and oxidation furnaces.

1. Annealing or recrystallizing equipment other than constant temperature furnaces employing high rates of energy transfercapable of processing wafers at a rate exceeding 0,005 m^2 perminute;
2. “Stored program controlled” crystal pullers having any of the following characteristics:
   a. Rechargeable without replacing the crucible container;
   b. Capable of operation at pressures above 2.5 x 105 Pa; or
   c. Capable of pulling crystals of a diameter exceeding 100 mm;

d. “Stored program controlled” equipment for epitaxial growth having anyof the following characteristics:

1. Capable of producing silicon layer with a thickness uniform to lessthan ± 2.5 % across a distance of 200 mm or more;
2. Capable of producing a layer of any material other than silicon witha thickness uniformity across the wafer of equal to or better than± 3.5 %; or
3. Rotation of individual wafers during processing;

e. Molecular beam epitaxial growth equipment;

f. Magnetically enhanced “sputtering” 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;
2. Beam energy (accelerating voltage) exceeding 200 keV;
3. Optimised to operate at a beam energy (accelerating voltage) ofless than 10 keV; or
4. Capable of high energy oxygen implant into a heated “substrate”;

h. “Stored program controlled” equipment for the selective removal (etching) by means of anisotropic dry methods (e.g., plasma), as follows:

1. “Batch types” having either of the following:
   a. End-point detection, other than optical emission spectroscopytypes; or
   b. Reactor operational (etching) pressure of 26.66 Pa or less;
2. “Single wafer types” having any of the following:
   a. End-point detection, other than optical emission spectroscopytypes;
   b. Reactor operational (etching) pressure of 26.66 Pa or less; or
   c. Cassette-to-cassette and load locks wafer handling;

Notes:
1. “Batch types” refers to machines not speciallydesigned 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, flow rates.
2. “Single wafer types” refers to machines specially designed for production processing of single wafers. Thesemachines may use automatic wafer handling techniques toload a single wafer into the equipment for processing. Thedefinition includes equipment that can load and process several wafers but where the etching parameters, e.g., RF power or end point, can be independently determined for each individual wafer.

i. “Chemical vapor deposition” (CVD) equipment, e.g., plasma-enhanced CVD (PECVD) or photo-enhanced CVD, for semiconductor device manufacturing, having either of the following capabilities, for depositionof oxides, nitrides, metals or polysilicon:

1. “Chemical vapor deposition” equipment operating below 105 Pa;or
2. PECVD equipment operating either below 60 Pa or having automatic cassette-to-cassette and load lock wafer handling;

Note: 3B991.b.1.i does not control low pressure “chemical vapor deposition” (LPCVD) systems or reactive “sputtering” equipment.

j. Electron beam systems specially designed or modified for mask makingor semiconductor device processing having any of the following characteristics:

1. Electrostatic beam deflection;
2. Shaped, non-Gaussian beam profile;
3. Digital-to-analog conversion rate exceeding 3 MHz;
4. Digital-to-analog conversion accuracy exceeding 12 bit; or
5. Target-to-beam position feedback control precision of 1micrometer or finer;

Note: 3B991.b.1.j does not control electron beam deposition systemsor general purpose scanning electron microscopes.

k. Surface finishing equipment for the processing of semiconductor wafersas follows:

1. Specially designed equipment for backside processing of wafers thinner than 100 micrometer and the subsequent separation thereof;or

2. Specially designed equipment for achieving a surface roughness ofthe active surface of a processed wafer with a two-sigma value of 2micrometer or less, total indicator reading (TIR);

Note: 3B991.b.1.k does not control single-side lapping and polishing equipment for wafer surface finishing.

l. Interconnection equipment which includes common single or multiple vacuum chambers specially designed to permit the integration of any equipment controlled by 3B991 into a complete system;

m. "Stored program controlled" equipment using "lasers" for the repair or trimming of "monolithic integrated circuits" with either of the following characteristics:

1. Positioning accuracy less than ± 1 micrometer; or
2. Spot size (kerf width) less than 3 micrometer.

Technical Note: For the purpose of 3B991.b.1, '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 kinetic energy of the impacting ions is sufficient to cause target surface atoms to be released and deposited on the substrate. (Note: Triode, magnetron or radio frequency sputtering to increase adhesion of coating and rate of deposition are ordinary modifications of the process.).

2. Masks, mask substrates, mask-making equipment and image transfer equipment for the manufacture of devices and components as specified in theheading of 3B991, as follows:

Note: The term masks refers to those used in electron beam lithography, X-ray lithography, and ultraviolet lithography, as well as the usual ultraviolet and visible photo-lithography.

a. Finished masks, reticles and designs therefor, except:

1. Finished masks or reticles for the production of integrated circuitsnot controlled by 3A001; or

2. Masks or reticles, having both of the following characteristics:

a.Their design is based on geometries of 2.5 micrometer or more; and
b.The design does not include special features to alter the intended use by means of production equipment or "software";

b. Mask substrates as follows:
   1. Hard surface (e.g., chromium, silicon, molybdenum) coated “substrates” (e.g., glass, quartz, sapphire) for the preparation of masks having dimensions exceeding 125 mm x 125 mm; or
   2. Substrates specially designed for X-ray masks;

c. Equipment, other than general purpose computers, specially designed forcomputer aided design (CAD) of semiconductor devices or integrated circuits;

d. Equipment or machines, as follows, for mask or reticle fabrication:
   1. Photo-optical step and repeat cameras capable of producing arrayslarger than 100 mm x 100 mm, or capable of producing a single exposure larger than 6 mm x 6 mm in the image (i.e., focal) plane,or capable of producing line widths of less than 2.5 micrometer in the photoresist on the “substrate”;
   2. Mask or reticle fabrication equipment using ion or “laser” beam lithography capable of producing line widths of less than 2.5 micrometer; or
   3. Equipment or holders for altering masks or reticles or addingpellicles to remove defects;

Note: 3B991.b.2.d.1 and b.2.d.2 do not control mask fabricationequipment using photo-optical methods which was either commercially available before the 1st January 1980, or has a performance no better than such equipment.

e. “Stored program controlled” equipment for the inspection of masks,reticles or pellicles with:
   1. A resolution of 0.25 micrometer or finer; and
   2. A precision of 0.75 micrometer or finer over a distance in one ortwo coordinates of 63.5 mm or more;

Note: 3B991.b.2.e does not control general purpose scanningelectron microscopes except when specially designed andinstrumented for automatic pattern inspection.

f. Align and expose equipment for wafer production using photo-optical orX-ray methods, e.g., lithography equipment, including both projection image transfer equipment and step and repeat (direct step on wafer) or step and scan (scanner) equipment, capable of performing any of the following functions:

Note: 3B991.b.2.f does not control photo-optical contact and proximity mask align and expose equipment or contact image transfer equipment.

   1. Production of a pattern size of less than 2.5 micrometer;
   2. Alignment with a precision finer than ± 0.25 micrometer (3 sigma);
   3. Machine-to-machine overlay no better than ± 0.3 micrometer; or
   4. A light source wavelength shorter than 400 nm;

g. Electron beam, ion beam or X-ray equipment for projection imagetransfer capable of producing patterns less than 2.5 micrometer;

Note: For focused, deflected-beam systems (direct write systems), see 3B991.b.1.j.

h. Equipment using “lasers” for direct write on wafers capable of producingpatterns less than 2.5 micrometer.

3. Equipment for the assembly of integrated circuits, as follows:

a. “Stored program controlled” die bonders having all of the following characteristics:

1. Specially designed for “hybrid integrated circuits”;
2. X-Y stage positioning travel exceeding 37.5 x 37.5 mm; and
3. Placement accuracy in the X-Y plane of finer than ± 10 micrometer;

b. “Stored program controlled” equipment for producing multiple bonds ina single operation (e.g., beam lead bonders, chip carrier bonders, tape bonders);

c. Semi-automatic or automatic hot cap sealers, in which the cap is heated locally to a higher temperature than the body of the package, specially designed for ceramic microcircuit packages controlled by 3A001 and that have a throughput equal to or more than one package per minute.

Note: 3B991.b.3 does not control general purpose resistance type spotwelders.

4. Filters for clean rooms capable of providing an air environment of 10 or less particles of 0.3 micrometer or smaller per 0.02832 m^3 and filter materials therefor.

Technical Note: For the purpose of 3B991, 'stored program controlled' is a control using instructions stored in an electronic storage that a processor can execute in order to direct the performance of predetermined functions. Equipment may be 'stored program controlled' whether the electronic storage is internal or external to the equipment.

3B992 Equipment for the inspection or testing of electronic components and materials, andspecially designed components and accessories therefor.

a. Equipment specially designed for the inspection or testing of electron tubes, optical elements and specially designed components therefor controlled by 3A001 or 3A991;

b. Equipment specially designed for the inspection or testing of semiconductor devices, integrated circuits and “electronic assemblies”, as follows, and systems incorporatingor having the characteristics of such equipment:

Note: 3B992.b also controls equipment used or modified for use in the inspectionor testing of other devices, such as imaging devices, electro-optical devices, acoustic-wave devices.

1. “Stored program controlled” inspection equipment for the automatic detectionof defects, errors or contaminants of 0,6 micrometer or less in or on processedwafers, substrates, other than printed circuit boards or chips, using optical image acquisition techniques for pattern comparison;

Note: 3B992.b.1 does not control general purpose scanning electron microscopes, except when specially designed and instrumented for automatic pattern inspection.

2. Specially designed “stored program controlled” measuring and analysisequipment, as follows:

   a. Specially designed for the measurement of oxygen or carbon content in semiconductor materials;
   b. Equipment for line width measurement with a resolution of 1 micrometer or finer;
   c. Specially designed flatness measurement instruments capable of measuring deviations from flatness of 10 micrometer or less with a resolution of 1 micrometer or finer.

3. “Stored program controlled” wafer probing equipment having any of thefollowing characteristics:
   a. Positioning accuracy finer than 3,5 micrometer;
   b. Capable of testing devices having more than 68 terminals; or
   c. Capable of testing at a frequency exceeding 1 GHz;

4. Test equipment as follows:
   a. “Stored program controlled” equipment specially designed for testing discrete semiconductor devices and unencapsulated dice, capable of testing at frequencies exceeding 18 GHz;

      Technical Note: Discrete semiconductor devices include photocells andsolar cells.

   b. “Stored program controlled” equipment specially designed for testing integrated circuits and “electronic assemblies” thereof, capable of functional testing:

      1. At a “pattern rate” exceeding 20 MHz; or
      2. At a “pattern rate” exceeding 10 MHz but not exceeding 20 MHzand capable of testing packages of more than 68 terminals.

      Notes: 3B992.b.4.b does not control test equipment specially designed for testing:

      1. Memories;

2. “Assemblies” or a class of “electronic assemblies” for homeand entertainment applications; and
3. Electronic components, “electronic assemblies” and integrated circuits not controlled by 3A001 or 3A991 provided such test equipment does not incorporate computingfacilities with “user accessible programmability”.

Technical Note: For purposes of 3B992.b.4.b, “pattern rate” is definedas the maximum frequency of digital operation of a tester. It is therefore equivalent to the highest data rate that a tester can provide in non-multiplexed mode. It is also referred to as test speed, maximumdigital frequency or maximum digital speed.

c. Equipment specially designed for determining the performance of focal-plane arrays at wavelengths of more than 1,200 nm, using “stored program controlled” measurements or computer aided evaluation and having any of the following characteristics:

1. Using scanning light spot diameters of less than 0.12 mm;

2. Designed for measuring photosensitive performance parametersand for evaluating frequency response, modulation transfer function, uniformity of responsivity or noise; or

3. Designed for evaluating arrays capable of creating images withmore than 32 x 32 line elements;

5. Electron beam test systems designed for operation at 3 keV or below, or “laser” beam systems, for non-contactive probing of powered-up semiconductor devices having any of the following:

a. Stroboscopic capability with either beam blanking or detector strobing;

b. An electron spectrometer for voltage measurements with a resolution ofless than 0.5 V; or

c. Electrical tests fixtures for performance analysis of integrated circuits;

Note: 3B992.b.5 does not control scanning electron microscopes, except when specially designed and instrumented for non-contactive probing ofa powered-up semiconductor device.

6. “Stored program controlled” multifunctional focused ion beam systems specially designed for manufacturing, repairing, physical layout analysis andtesting of masks or semiconductor devices and having either of the following characteristics:

a. Target-to-beam position feedback control precision of 1 micrometer or finer; or

b. Digital-to-analog conversion accuracy exceeding 12 bit;

7. Particle measuring systems employing “lasers” designed for measuring particlesize and concentration in air having both of the following characteristics:
   a. Capable of measuring particle sizes of 0,2 micrometer or less at a flowrate of 0,02832 m3 per minute or more; and
   b. Capable of characterizing Class 10 clean air or better.

Technical Note: For the purpose of 3B992, “stored program controlled” is a control using instructions stored in an electronic storage that a processor can execute in order todirect the performance of predetermined functions. Equipment may be “stored programcontrolled” whether the electronic storage is internal or external to the equipment.

3C991 Positive resists designed for semiconductor lithography specially adjusted(optimised) for use at wavelengths between 370 and 193 nm.

3D991 “Software” specially designed for the “development”, “production”, or “use” of electronic devices or components controlled by 3A991, general purpose electronic equipment controlled by 3A992, or manufacturing and test equipment controlled by 3B991 and 3B992; or “software” specially designed for the “use” of equipment controlled by 3B001.g and 3B001.h.

3E991 “Technology” for the “development”, “production” or “use” of electronic devices orcomponents controlled by 3A991, general purpose electronic equipment controlled by3A992, or manufacturing and test equipment controlled by 3B991 or 3B992, or materials controlled by 3C991.

Category4 – Computers

Note: Category 4 does not control goods for the personal use of the natural persons.

4A994 Computers, “electronic assemblies” and related equipment, not controlled by 4A001or 4A003, and specially designed components therefor.

Note: The control status of the “digital computers” and related equipment described in4A994 is determined by the control status of other equipment or systems provided:

a. The “digital computers” or related equipment are essential for the operation of the other equipment or systems;

b. The “digital computers” or related equipment are not a “principal element” of the other equipment or systems; and

N.B.1: The control status of “signal processing” or “image enhancement” equipment specially designed for other equipment with functions limited to those required for the other equipment is determined by the control status of the other equipment even if it exceeds the “principal element” criterion.

N.B.2: For the control status of “digital computers” or related equipment for telecommunications equipment, see Category 5.Part 1 (Telecommunications).

c. The “technology” for the “digital computers” and related equipment is determined by 4E.

a. Electronic computers and related equipment, and “electronic assemblies” and specially designed components therefor, rated for operation at an ambient temperature above 343 K (70°C);

b. “Digital computers”, including equipment of “signal processing” or image enhancement”, having an “Adjusted Peak Performance” (“APP”) equal to or greater than 0.0128 Weighted TeraFLOPS (WT);

c. “Electronic assemblies” that are specially designed or modified to enhance performance by aggregation of processors, as follows:

1. Designed to be capable of aggregation in configurations of 16 or more processors;

2. Not used;

Note 1: 4A994.c applies only to “electronic assemblies” and programmable interconnections with a “APP” not exceeding the limits in 4A994.b, when shipped as unintegrated “electronic assemblies”. It does not apply to “electronic assemblies” inherently limited by nature of their design for use as related equipment controlled by 4A994.k.

Note 2: 4A994.c does not control any “electronic assembly” specially designedfor a product or family of products whose maximum configuration does not exceed the limits of 4A994.b.

d. Not used;

e. Not used;

f. Equipment for “signal processing” or “image enhancement” having an “Adjusted Peak Performance” (“APP”) equal to or greater than 0.0128 Weighted TeraFLOPS WT;

g. Not used;

h. Not used;

i. Equipment containing “terminal interface equipment” exceeding the limits in 5A991;

Technical Note: For the purpose of 4A994.i, “terminal interface equipment”means equipment at which information enters or leaves the telecommunication system, e.g. telephone, data device, computer, etc.

j. Equipment specially designed to provide external interconnection of “digital computers” or associated equipment that allows communications at data rates exceeding 80 Mbyte/s.

Note: 4A994.j does not control internal interconnection equipment (e.g., backplanes, buses) passive interconnection equipment, “network accesscontrollers” or “communication channel controllers”.

Technical Note: For the purpose of 4A994.j, “communication channel controllers” is the physical interface which controls the flow of synchronous or asynchronous digital information. It is an assembly that can be integrated into computer or telecommunications equipment to provide communications access.

k. “Hybrid computers” and “electronic assemblies” and specially designed components therefor containing analog-to-digital converters having all of the following characteristics:

1. 32 channels or more; and
2. A resolution of 14 bit (plus sign bit) or more with a conversion rate of 200 000 Hz or more.

4D993 “Program” proof and validation “software”, “software” allowing the automatic generation of “source codes”, and operating system “software” that are specially designedfor “real-time processing” equipment.

a. “Program” proof and validation “software” using mathematical and analytical techniques and designed or modified for “programs” having more than 500 000 “source code” instructions;

b. “Software” allowing the automatic generation of “source codes” from data acquired on line from external sensors described in the ECL; or

c. Operating system “software” specially designed for “real-time processing” equipment that guarantees a “global interrupt latency time” of less than 20 microseconds.

Technical Note: For the purpose of 4D993, 'global interrupt latency time' is the time taken by the computer system to recognise an interrupt due to the event, service the interrupt and perform a context switch to an alternate memory-resident task waiting on theinterrupt.

4D994 “Software” other than that controlled in 4D001 specially designed or modified for the “development”, “production” or “use” of equipment controlled by 4A101, 4A994.

4E992 “Technology” for the “development”, “production” or “use” of equipment controlledby 4A994, or “software” controlled by 4D993 or 4D994.

4E993 “Technology” for the “development” or “production” of equipment designed for 'multi-data-stream processing'.

Technical Note: For the purpose of 4E992, “multi-data-stream processing” is a microprogram or equipment architecture technique that permits simultaneous processing of two or more data sequences under the control of one or more instruction sequences by means such as:

1. Single Instruction Multiple Data (SIMD) architectures such as vector or array processors;
2. Multiple Single Instruction Multiple Data (MSIMD) architectures;
3. Multiple Instruction Multiple Data (MIMD) architectures, including those that are tightly coupled, closely coupled or loosely coupled; or
4. Structured arrays of processing elements, including systolic arrays.

Category 5. Part 1 – Telecommunications

Note: Category 5.Part 1 does not control goods for the personal use of the natural persons.

5A991 Telecommunication equipment.

a. Any type of telecommunications equipment, not controlled by 5A001.a, specially designed to operate outside the temperature range from 219 K (-54°C) to 397 K (124°C).

b. Telecommunication transmission equipment and systems, and specially designed components and accessories therefor, having any of the following characteristics, functions or features:

Note: Telecommunication transmission equipment:

a. Categorised as follows, or combinations thereof:
   1. Radio equipment (e.g., transmitters, receivers and transceivers);
   2. Line terminating equipment;
   3. Intermediate amplifier equipment;
   4. Repeater equipment;
   5. Regenerator equipment;
   6. Translation encoders (transcoders);
   7. Multiplex equipment (statistical mutiplex included);
   8. Modulators/demodulators (modems);
   9. Transmultiplex equipment (see CCITT Rec. G701);
   10. “Stored program controlled” digital cross-connection equipment;
   11. “Gateways” and bridges;
   12. “Media access units”; and

b. Designed for use in single or multi-channel communication via any of the following:
   1. Wire (line);
   2. Coaxial cable;
   3. Optical fibre cable;
   4. Electromagnetic radiation; or
   5. Underwater acoustic wave propagation.

1. Employing digital techniques, including digital processing of analog signals, and designed to operate at a “digital transfer rate” at the highest multiplex level exceeding 45 Mbit/s or a “total digital transfer rate” exceeding 90 Mbit/s;

   Note: 5A991.b.1 does not control equipment specially designed to beintegrated and operated in any satellite system for civil use.

2. Modems using the “bandwidth of one voice channel” with a “data signalling rate” exceeding 9,600 bits per second;

3. Being “stored program controlled” digital cross connect equipment with “digital transfer rate” exceeding 8.5 Mbit/s per port.

4. Being equipment containing any of the following:
   a. "Network access controllers" and their related common medium having a “digital transfer rate” exceeding 33 Mbit/s; or
   b. “Communication channel controllers” with a digital output having a “data signalling rate” exceeding 64,000 bit/s per channel;

Note: If any uncontrolled equipment contains a "network access controller", it cannot have any type of telecommunications interface, except those described in, but not controlled by 5A991.b.4.

5. Employing a "laser" and having any of the following characteristics:

   a. A transmission wavelength exceeding 1,000 nm; or
   b. Employing analog techniques and having a bandwidth exceeding 45 MHz;
   c. Employing coherent optical transmission or coherent optical detection techniques (also called optical heterodyne or homodyne techniques);
   d. Employing wavelength division multiplexing techniques; or
   e. Performing "optical amplification";

6. Radio equipment operating at input or output frequencies exceeding:

   a. 31 GHz for satellite-earth station applications; or
   b. 26.5 GHz for other applications;

   Note: 5A991.b.6 does not control equipment for civil use when conforming with an International Telecommunications Union (ITU)allocated band between 26.5 GHz and 31 GHz.

7. Being radio equipment employing any of the following:
   a. Quadrature-amplitude-modulation (QAM) techniques above level 4 if the "total digital transfer rate" exceeds 8.5 Mbit/s;
   b. QAM techniques above level 16 if the "total digital transfer rate" is equal to or less than 8.5 Mbit/s;
   c. Other digital modulation techniques and having a "spectral efficiency" exceeding 3 bit/s/Hz; or
   d. Operating in the 1.5 MHz to 87.5 MHz band and incorporating adaptive techniques providing more than 15 dB suppression of an interfering signal.

   Notes:

   1. 5A991.b.7 does not control equipment specially designed to be integrated and operated in any satellite system for civil use.
   2. 5A991.b.7 does not control radio relay equipment for operation inan International Telecommunications Union (ITU) allocated band:
      a. Having any of the following:
         1. Not exceeding 960 MHz; or
         2. With a "total digital transfer rate" not exceeding 8.5 Mbit/s; and
      b. Having a "spectral efficiency" not exceeding 4 bit/s/Hz.

c. "Stored program controlled" switching equipment and related signalling systems, having any of the following characteristics, functions or features, and specially designed components and accessories therefor:

Note: Statistical multiplexers with digital input and digital output which provide

switching are treated as 'stored program controlled' switches.

1. “Data (message) switching” equipment or systems designed for “packet-mode operation”, electronic assemblies and components therefor, other than those specified in the CML or in ECL.
2. Not used;
3. Routing or switching of “datagram” packets;

Note: 5A991.c.3 does not control networks restricted to using only“network access controllers” or to “network access controllers” themselves.

4. Not used;
5. Multi-level priority and pre-emption for circuit switching;

Note: 5A991.c.5 does not control single-level call preemption.

6. Designed for automatic hand-off of cellular radio calls to other cellular switches or automatic connection to a centralised subscriber data base commonto more than one switch;
7. Containing “stored program controlled” digital cross connect equipment with “digital transfer rate” exceeding 8.5 Mbit/s per port.
8. “Common channel signalling” operating in either non-associated orquasi-associated mode of operation;
9. “Dynamic adaptive routing”;
10. Being packet switches, circuit switches and routers with ports or lines exceeding any of the following:
    a. A “data signalling rate” of 64,000 bit/s per channel for a ‘communications channel controller’; or

    Note: 5A991.c.10.a does not control multiplex composite links composed only of communication channels not individually controlled by 5A991.b.1.

    b. A “digital transfer rate” of 33 Mbit/s for a “network access controller” and related common media;

    Note: 5A991.c.10 does not control packet switches or routers with ports orlines not exceeding the limits in 5A991.c.10.

11. “Optical switching”;
12. Employing “Asynchronous Transfer Mode” (“ATM”) techniques.

d. Optical fibres and optical fibre cables of more than 50 m in length designed for single mode operation;

e. Centralised network control having all of the following characteristics:
    1. Receives data from the nodes; and
    2. Process these data in order to provide control of traffic not requiring operator decisions, and thereby performing “dynamic adaptive routing”;

Note 1: 5A991.e does not include cases of routing decisions taken on predefinedinformation.

Note 2: 5A991.e does not preclude control of traffic as a function of predictablestatistical traffic conditions.

f. Phased array antennas, operating above 10.5 GHz, containing active elements and distributed components, and designed to permit electronic control of beam shaping and pointing, except for landing systems with instruments meeting International Civil Aviation Organization (ICAO) standards (microwave landing systems (MLS)).

g. Mobile communications equipment other than those specified in the CML or in ECL, electronic assemblies and components therefor; or

h. Radio relay communications equipment designed for use at frequencies equal to or exceeding 19.7 GHz and components therefor, other than those specified in the CML or in ECL.

Technical Note: For the purpose of 5A991:

1) "Asynchronous transfer mode" ("ATM") is a transfer mode in which the information is organised into cells; it is asynchronous in the sense that the recurrence of cells depends on the required or instantaneous bit rate.
2) "Bandwidth of one voice channel" is data communication equipment designed to operate in one voice channel of 3,100 Hz, as defined in CCITT Recommendation G.151.
3) "Communications channel controller" is the physical interface that controls the flow of synchronous or asynchronous digital information. It is an assembly that can be integrated into computer or telecommunications equipment to provide communications access.
4) "Datagram" is a self-contained, independent entity of data carrying sufficient information to be routed from the source to the destination data terminal equipment without reliance on earlier exchanges between this source and destination data terminal equipment and the transporting network.
5) "Fast select" is a facility applicable to virtual calls that allows data terminal equipment to expand the possibility to transmit data in call set-up and clearing "packets" beyond the basic capabilities of a virtual call.
6) "Gateway" is the function, realised by any combination of equipment and "software", to carry out the conversion of conventions for representing, processing or communicating information used on one system into the corresponding, but different conventions used in another system.
7) "Integrated Services Digital Network" (ISDN) is a unified end-to-end digital network, in which data originating from all types of communication (e.g., voice, text, data, still and moving pictures) are transmitted from one port (terminal) in the exchange (switch) over one access line to and from the subscriber.
8) "Packet" is a group of binary digits including data and call control signals that is switched as a composite whole. The data, call control signals, and possible error

control information are arranged in a specified format.

9) "Common channel signalling" means the transmission of control information (signalling) via a separate channel than that used for the messages. The signalling channel usually controls multiple message channels.

10) "Data signalling rate" means the rate, as defined in ITU Recommendation 53-36, taking into account that, for non-binary modulation, baud and bit per second are not equal. Bits for coding, checking and synchronization functions are to be included.

11) "Dynamic adaptive routing" means Automatic rerouting of traffic based on sensing and analysis of current actual network conditions

12) "Media access unit" means equipment that contains one or more communication interfaces ("network access controller", "communications channel controller", modem or computer bus) to connect terminal equipment to a network.

13) "Spectral effiency" is the "digital transfer rate" [bits/s] / 6 dB spectrum bandwidth inHz.

14) "Stored program controlled" is a control using instructions stored in an electronicstorage that a processor can execute in order to direct the performance of predetermined functions. Note: Equipment may be "stored program controlled" whether the electronic storage is internal or external to the equipment.

5B991 Telecommunications test equipment, other than those specified in the CML or in ECL.

5C991 Preforms of glass or of any other material optimised for the manufacture of opticalfibres controlled by 5A991.

5D991 "Software" specially designed or modified for the "development", "production" or"use" of equipment controlled by 5A991 and 5B991, and dynamic adaptive routing software as described as follows:

a. "Software", other than in machine-executable form, specially designed for "dynamic adaptive routing".

b. Not used;

5E991 "Technology" for the "development", "production" or "use" of equipment controlledby 5A991 or 5B991, or "software" controlled by 5D991, and other "technologies" as follows:

a. Specific "technologies" as follows:

1. "Technology" for the processing and application of coatings to optical fibre specially designed to make it suitable for underwater use;

2. "Technology" for the "development" of equipment employing "Synchronous Digital Hierarchy" ("SDH") or "Synchronous Optical Network" ("SONET") techniques.

Technical Note: For the purpose of 5E991:

1) "Synchronous digital hierarchy" (SDH) is a digital hierarchy providing a means to manage, multiplex, and access various forms of digital traffic using a synchronous transmission format on different types of media. The format is based on the Synchronous Transport Module (STM) that is defined by CCITT Recommendation G.703, G.707, G.708, G.709 and others yet to be published. The first level rate of

"SDH" is 155.52 Mbits/s.

2) "Synchronous optical network" (SONET) is a network providing a means to manage, multiplex and access various forms of digital traffic using a synchronous transmission format on fibre optics. The format is the North America version of "SDH" and also uses the Synchronous Transport Module (STM). However, it uses the Synchronous Transport Signal (STS) as the basic transport module with a first level rate of 51.81 Mbits/s. The SONET standards are being integrated into those of "SDH".

Category 5. Part 2 - Information Security

Note: Category 5.Part 2 does not control goods for the personal use of the natural persons.

5A992 Equipment as follows:

a. Not used;
b. Not used;
c. Goods classified as mass market encryption in accordance with Cryptography Note – Note 3 to Category 5. Part 2.

5D992 "Information Security" "software" as follows:

Note: This entry does not control "software" designed or modified to protect against malicious computer damage, e.g., viruses, where the use of "cryptography" is limited to authentication, digital signature and/or the decryption of data or files.

a. Not used;
b. Not used;
c. "Software" classified as mass market encryption software in accordance with Cryptography Note – Note 3 to Category 5. Part 2.

5E992 "Information Security" "technology" according to the General Technology Note, asfollows:

a. Not used;

b. "Technology", other than specified in the CML or in ECL, forthe "use" of mass market goods controlled by 5A992.c or mass market "software" controlled by 5D992.c.

Category 6 – Sensors and Lasers

6A991 Marine or terrestrial acoustic equipment, capable of detecting or locating underwaterobjects or features or positioning surface vessels or underwater vehicles; and specially designed components, other than those specified in the CML or in ECL.

6A992 Optical Sensors as follows:

a. Image intensifier tubes and specially designed components therefor, as follows:
   1. Image intensifier tubes having all the following:
      a. A peak response in wavelength range exceeding 400 nm, but not exceeding 1,050 nm;
      b. A microchannel plate for electron image amplification with a hole pitch (center-to-center spacing) of less than 25 micrometers; and
      c. Having any of the following:
         1. An S-20, S-25 or multialkali photocathode; or
         2. A GaAs or GaInAs photocathode;
   2. Specially designed microchannel plates having both of the following characteristics:
      a. 15,000 or more hollow tubes per plate; and
      b. Hole pitch (center-to-center spacing) of less than 25 micrometers.

b. Direct view imaging equipment operating in the visible or infrared spectrum, incorporating image intensifier tubes having the characteristics listed in 6A992.a.1.

6A993 Cameras as follows:

a. Cameras that meet the criteria of Note 3 to 6A003.b.4.

b. Not used;

6A994 Optics as follows:

a. Optical filters:

   1. For wavelengths longer than 250 nm, comprised of multi-layer optical coatings and having either of the following:

      a. Bandwidths equal to or less than 1 nm Full Width Half Intensity (FWHI) and peak transmission of 90 % or more; or

      b. Bandwidths equal to or less than 0,1 nm FWHI and peak transmission of 50 % or more;

Note: 6A994 does not control optical filters with fixed air gaps or Lyot-type filters.

2. For wavelengths longer than 250 nm, and having all of the following:
   a. Tunable over a spectral range of 500 nm or more;
   b. Instantaneous optical bandpass of 1.25 nm or less;
   c. Wavelength resettable within 0.1 ms to an accuracy of 1 nm or better within the tunable spectral range; and
   d. A single peak transmission of 91 % or more;
3. Optical opacity switches (filters) with a field of view of 30° or wider and a response time equal to or less than 1 ns;

b. "Fluoride fibre" cable, or optical fibres therefor, having an attenuation of less than 4 dB/km in the wavelength range exceeding 1,000 nm but not exceeding 3,000 nm.

Technical Note: For the purpose of 6A994.b "Fluoride fibres" are fibresmanufactured from bulk fluoride compounds.

6A995 "Lasers" as follows:

a. Carbon dioxide (CO_2) "lasers" having any of the following:
   1. A CW output power exceeding 10 kW;
   2. A pulsed output with a "pulse duration" exceeding 10 μs; and
      a. An average output power exceeding 10 kW; or
      b. A pulsed "peak power" exceeding 100 kW; or
   3. A pulsed output with a "pulse duration" equal to or less than 10 μs; and
      a. A pulse energy exceeding 5 J per pulse and "peak power" exceeding 2.5 kW; or
      b. An average output power exceeding 2.5 kW;

b. Semiconductor lasers, as follows:
   1. Individual, single-transverse mode semiconductor "lasers" having:
      a. An average output power exceeding 100 mW; or
      b. A wavelength exceeding 1,050 nm;
   2. Individual, multiple-transverse mode semiconductor "lasers", or arrays of individual semiconductor "lasers", having a wavelength exceeding 1,050 nm;

c. Ruby "lasers" having an output energy exceeding 20 J per pulse;

d. Non-"tunable" "pulsed lasers" having an output wavelength exceeding 975 nm butnot exceeding 1,150 nm and having any of the following:

   1. A "pulse duration" equal to or exceeding 1 ns but not exceeding 1 μs, and having any of the following:
      a. A single transverse mode output and having any of the following:
         1. A "wall-plug efficiency" exceeding 12 % and an "average output power" exceeding 10 W and capable of operating at a pulse repetition frequency greater than 1 kHz; or
         2. An "average output power" exceeding 20 W; or
      b. A multiple transverse mode output and having any of the following:
         1. A "wall-plug efficiency" exceeding 18 % and an "average output power" exceeding 30W;
         2. A "peak power" exceeding 200 MW; or
         3. An "average output power" exceeding 50 W; or

2. A “pulse duration” exceeding 1 μs and having any of the following:
   a. A single transverse mode output and having any of the following:
      1. A “wall-plug efficiency” exceeding 12 % and an “average output power” exceeding 10 W and capable of operating at a pulse repetition frequency greater than 1 kHz; or
      2. An “average output power” exceeding 20 W; or
   b. A multiple transverse mode output and having any of the following:
      1. A “wall-plug efficiency” exceeding 18 % and an “average output power” exceeding 30 W; or
      2. An “average output power” exceeding 500 W;

e. Non-“tunable” continuous wave “(CW) lasers”, having an output wavelength exceeding 975 nm but not exceeding 1,150 nm and having any of the following:
   1. A single transverse mode output and having any of the following:
      a. A “wall-plug efficiency” exceeding 12 % and an “average output power” exceeding 10 W and capable of operating at a pulse repetition frequency greater than 1 kHz; or
      b. An “average output power” exceeding 50 W; or
   2. A multiple transverse mode output and having any of the following:
      a. A “wall-plug efficiency” exceeding 18 % and an “average output power” exceeding 30 W; or
      b. An “average output power” exceeding 500 W;

      Note: 6A995.e.2.b does not control multiple transverse mode, industrial “lasers” with output power less than or equal to 2 kW with a total mass greater than 1,200kg. For the purpose of this note,total mass includes all components required to operate the “laser”, e.g., “laser”, power supply, heat exchanger, but excludes external optics for beam conditioning and/or delivery.

f. Non-“tunable” “lasers”, having a wavelength exceeding 1,400 nm, but not exceeding 1,555 nm and having any of the following:
   1. An output energy exceeding 100 mJ per pulse and a pulsed “peak power” exceeding 1 W; or
   2. An average or CW output power exceeding 1 W;

g. Free electron “lasers”.

Technical Note: For the purpose of 6A995 “Wall-plug efficiency” is defined as theratio of "laser" output power (or "average output power") to total electrical input power required to operate the "laser", including the power supply/conditioning and thermal conditioning/heat exchanger.

6A996 “Magnetometers”, “Superconductive” electromagnetic sensors, and speciallydesigned

components therefor, as follows:

a. “Magnetometers”, other than those specified in the CML or in ECL, having a “sensitivity” lower (better) than 1.0 nT (rms) per squareroot Hz.

Technical Note: For the purposes of 6A996.a, “sensitivity” (noise level) is the root mean square of the device-limited noise floor which is the lowest signal that canbe measured.

b. “Superconductive” electromagnetic sensors, components manufactured from “superconductive” materials:

1. Designed for operation at temperatures below the “critical temperature” of at least one of their “superconductive” constituents (including Josephson effect devices or “superconductive” quantum interference devices (SQUIDS));

2. Designed for sensing electromagnetic field variations at frequencies of 1 KHz or less; and

3. Having any of the following characteristics:
   a. Incorporating thin-film SQUIDS with a minimum feature size of less than 2 μm and with associated input and output coupling circuits;
   b. Designed to operate with a magnetic field slew rate exceeding 1 x 10^6 magnetic flux quanta per second;
   c. Designed to function without magnetic shielding in the earth’s ambient magnetic field; or
   d. Having a temperature coefficient less (smaller) than 0,1 magnetic flux quantum/K.

6A997 Gravity meters (gravimeters) for ground use, other than those specified in the CMLor in ECL, as follows:

a. Having a static accuracy of less (better) than 100 μGal; or
b. Being of the quartz element (Worden) type.

6A998 Radar systems, equipment and major components, other than those specified in theCML or in ECL, and specially designed components therefor, as follows:

a. Airborne radar equipment, other than those specified in the CML or in ECL, and specially designed components therefor.

b. “Space-qualified” “laser” radar or Light Detection and Ranging (LIDAR) equipment specially designed for surveying or for meteorological observation.

c. Millimeter wave enhanced vision radar imaging systems specially designed for rotary wing aircraft and having all of the following:

1. Operates at a frequency of 94 GHz;
2. An average output power of less than 20 mW;
3. Radar beam width of 1 degree; and

4. Operating range equal to or greater than 1,500 m.

6A999 Specific processing equipment, as follows:

a. Seismic detection equipment not controlled by 6A999.c.

b. Radiation hardened TV cameras, other than those specified in the CML or in ECL.

c. Seismic intrusion detection systems that detect, classify and determine the bearing on the source of a detected signal.

6B995 Equipment, including tools, dies, fixtures or gauges, and other specially designedcomponents and accessories therefor, specially designed or modified for any of the following:

a. For the manufacture or inspection of:
   1. Free electron "laser" magnet wigglers;
   2. Free electron "laser" photo injectors;

b. For the adjustment, to required tolerances, of the longitudinal magnetic field of free electron "lasers".

6C992 Optical sensing fibres that are modified structurally to have a "beat length" of lessthan 500 mm (high birefringence) or optical sensor materials not described in 6C002 band having a zinc content of equal to or more than 6 % by "mole fraction."

Technical Note: For the purpose of 6C992:

1) "Mole fraction" is defined as the ratio of moles of ZnTe to the sum of the moles of CdTe and ZnTe present in the crystal.

2) "Beat length" is the distance over which two orthogonally polarised signals, initially in phase, must pass in order to achieve a 2 Pi radian(s) phase difference.

6C994 Optical materials, as follows:

a. Low optical absorption materials, as follows:
   1. Bulk fluoride compounds containing ingredients with a purity of 99.999 % or better; or

      Note: 6C994.a.1 controls fluorides of zirconium or aluminum and variants.

   2. Bulk fluoride glass made from compounds controlled by 6C004.e.1;

b. "Optical fibre preforms" made from bulk fluoride compounds containing ingredients with a purity of 99,999 % or better, "specially designed" for the manufacture of "fluoride fibres" controlled by 6A994.b.

Technical Note: For the purpose of 6C994:

1) "Fluoride fibres" are fibres manufactured from bulk fluoride compounds.

2) "Optical fibre preforms" are bars, ingots, or rods of glass, plastic or other materials that have been specially processed for use in fabricating optical fibres. The characteristics of the preform determine the basic parameters of the resultant drawn optical fibres.

6D991 "Software", other than those specified in the CML or in ECL, specially designed for the "development", "production", or "use" of goods controlled by 6A002, 6A0031, 6A991, 6A996, 6A997, or 6A998.

6D992 "Software" specially designed for the "development" or "production" of equipmentcontrolled by 6A992, 6A994, or 6A995.

6D993 Other "software", as follows:

a. Air Traffic Control (ATC) "software" application "programs" hosted on general purpose computers located at Air Traffic Control centers, and capable of automatically handing over primary radar target data (if not correlated with secondary surveillance radar (SSR) data) from the host ATC center to another ATC center.

b. "Software" specially designed for seismic intrusion detection systems in6A999.c.

c. "Source Code" specially designed for seismic intrusion detection systems in6A999.c.

6E991 "Technology" for the "development", "production" or "use" of equipment controlled by 6A991, 6A996, 6A997, 6A998 or 6A999.c.

6E992 "Technology" for the "development" or "production" of equipment, materials or"software" controlled by 6A992, 6A994, or 6A995, 6B995, 6C992, 6C994, or 6D993.

6E993 Other "technology" as follows:

a. Optical fabrication technologies for serially producing optical components at a rate exceeding 10 m^2 of surface area per year on any single spindle and having all of the following:

1. Area exceeding 1 m^2; and
2. Surface figure exceeding $\lambda/10$ (rms) at the designed wavelength;

b. "Technology" for optical filters with a bandwidth equal to or less than 10 nm, a field of view (FOV) exceeding 40° and a resolution exceeding 0.75 line pairs per milliradian;

c. "Technology" for the "development" or "production" of cameras controlled by 6A993;

d. "Technology" required for the "development" or "production" of non-triaxial fluxgate "magnetometers" or non-triaxial fluxgate "magnetometer" systems, having any of the following:

1. "Sensitivity" lower (better) than 0.05 nT (rms) per square root Hz at frequencies of less than 1 Hz; or
2. "Sensitivity" lower (better) than 1 x 10^{-3} nT (rms) per square root Hz at frequencies of 1 Hz or more.

e. "Technology" required for the "development" or "production" of infrared up-conversion devices having all of the following:

1. A response in the wavelength range exceeding 700 nm but not exceeding 1,500 nm; and

2. A combination of an infrared photodetector, light emitting diode (OLED), and nanocrystal to convert infrared light into visible light.

Technical Note: For the purposes of 6E993, “sensitivity” (or noise level) is the rootmean square of the device-limited noise floor which is the lowest signal that can be measured.

Category 7 – Navigation and Avionics

7A994 Airborne communication equipment, all "aircraft" inertial navigation systems, andother avionic equipment, including components, other than those specified in the CML or in ECL.

Note 1: 7A994. does not control headsets or microphones.

Note 2: 7A994. does not control goods for the personal use of the natural persons.

7B994 Other equipment specially designed for the test, inspection, or “production” ofnavigation and avionics equipment.

7D994 “Software”, other than specified in the CML or in ECL, for the“development”, “production”, or “use” of navigation, airborne communication and other avionics.

7E994 “Technology”, other than specified in the CML or in ECL, forthe “development”, “production” or “use” of navigation, airborne communication, and other avionics equipment.

Category 8– Marine

8A992 Vessels, marine systems or equipment, and specially designed components therefor,components and accessories as follows:

a. Underwater vision systems, as follows:
   1. Television systems (comprising camera, lights, monitoring and signal transmission equipment) having a limiting resolution when measured in air of more than 500 lines and specially designed or modified for remote operation with a submersible vehicle; or
   2. Underwater television cameras having a limiting resolution when measured in air of more than 700 lines;

   Technical Note: Limiting resolution in television is a measure of horizontal resolution usually expressed in terms of the maximum number of lines per picture height discriminated on a test chart, using IEEE Standard 208/1960 or any equivalent standard.

b. Photographic still cameras specially designed or modified for underwater use, having a film format of 35 mm or larger, and having autofocusing or remote focusing "specially designed" for underwater use;

c. Stroboscopic light systems, specially designed or modified for underwater use, capable of a light output energy of more than 300 J per flash;

d. Other underwater camera equipment, other than those specified in the CML or in ECL;

e. Not used;

f. Vessels (surface or underwater), including inflatable boats, and specially designed components therefor, other than those specified in the CML or in ECL;

Note: 8A992.f does not control vessels on temporary sojourn, used for privatetransport or for the transport of passengers or goods from or through the customs territory of the Union.

g Marine engines (both inboard and outboard) and submarine engines and specially designed components therefor, other than those specified in the CML or in ECL;

h. Self-contained underwater breathing apparatus (scuba gear) and accessories therefor,other than those specified in the CML or in ECL;

i. Life jackets, inflation cartridges, dive compasses and dive computers;

Note: 8A992.i does not control goods for the personal use of the natural persons.

j. Underwater lights and propulsion equipment;

Note: 8A992.j does not control goods for the personal use of the natural persons.

k. Air compressors and filtration system specially designed for filling air cylinders;

8D992 “Software” specially designed or modified for the “development”, “production” or “use” of equipment controlled by 8A992.

8D999 “Software” specially designed for the operation of unmanned submersible vehicles used in the oil and gas industry.

8E992 “Technology” for the “development”, “production” or “use” of equipment controlledby 8A992.

Category 9 – Aerospace and Propulsion

9A990 Diesel engines, and tractors and specially designed components therefor, other than those specified in the CML or in ECL.

a. Diesel engines, other than those specified in the CML or in ECL, for trucks, tractors, and automotive applications, having an overallpower output of 298kW or more.

b. Off highway wheel tractors of carriage capacity 9 t or more; and major componentsand accessories, other than those specified in the CML or in ECL.

c. Road tractors for semi-trailers, with single or tandem rear axles rated for 9 t per axel or more and specially designed major components.

Note: 9A990.b and 9A990.c do not control vehicles on temporary sojourn, usedfor private transport or for the transport of passengers or goods from or through the customs territory of the Union.

9A991 Gas turbine engines and components, other than those specified in the CML or in ECL.

a. Not used.

b. Not used.

c. Aero gas turbine engines and components specially designed therefor.

Note: 9A991.c does not control aero gas turbine engines that are destined for use in civil “aircraft” and that have been in use in bona fide civil “aircraft” formore than eight years.

d. Not used.

e. Pressurised aircraft breathing equipment components specially designed therefor, other than those specified in the CML or in ECL.

9A992 Complete canopies, harnesses, and platforms and electronic release mechanisms therefor, except such types as are in normal sporting use.

9B990 Vibration test equipment and specially designed components, other than those specified in the CML or in ECL.

Note: 9B990 controls only equipment for the “development” or “production”. It doesnot control condition monitoring systems.

9B991 Specially designed “equipment”, tooling or fixtures for manufacturing or measuringgas turbine blades, vanes or tip shroud castings, as follows:

a. Automated equipment using non-mechanical methods for measuring airfoil wallthickness;

b. Tooling, fixtures or measuring equipment for the “laser”, water jet or ECM/EDM hole drilling processes controlled by 9E003.c;

c. Ceramic core leaching equipment;

d. Ceramic core manufacturing equipment or tools;

e. eramic shell wax pattern preparation equipment;

f. Ceramic shell burn out or firing equipment.

9D990 “Software”, other than those specified in the CML or in ECL, for the “development” or “production” of equipment controlled by 9A990 or 9B990

9D991 “Software”, for the “development” or “production” of equipment controlled by 9A991 or 9B991.

9E990 “Technology”, other than those specified in the CML or in ECL, for the “development” or “production” or “use” of equipment controlled by 9A990 or 9B990

9E991 “Technology”, for the “development”, “production” or “use” of equipment controlled by 9A991 or 9B991.

9E993 Other “technology”, not described by 9E003, as follows:

a. Rotor blade tip clearance control systems employing active compensating casing“technology” limited to a design and development data base; or

b. Gas bearing for turbine engine rotor assemblies.’