

## SCHEDULES

### [<sup>F1</sup>SCHEDULE 2A

Regulation 21

#### Critical-industry goods and critical-industry technology

##### Textual Amendments

- F1** Sch. 2A inserted (1.3.2022) by [The Russia \(Sanctions\) \(EU Exit\) \(Amendment\) \(No. 3\) Regulations 2022 \(S.I. 2022/195\)](#), reg. 1(2), [Sch.](#) (with reg. 11)

## PART 1

### Interpretation

1.—(1) A thing is specified in this Schedule if it is specified in Parts [<sup>F2</sup>1A] to 8, and a reference in any note in this Schedule to a thing being “controlled” or subject to “controls” is to be read as a reference to it being specified.

(2) In this Schedule, defined terms are printed in quotation marks.

(3) Terms printed in quotation marks and not defined in this Schedule have the meaning given to them in—

- (a) Schedules 2 and 3 of the Export Control Order 2008, or
- (b) Annex I of the Dual-Use Regulation,

as applicable.

##### Textual Amendments

- F2** Word in [Sch. 2A para. 1\(1\)](#) substituted (29.10.2022) by [The Russia \(Sanctions\) \(EU Exit\) \(Amendment\) \(No. 15\) Regulations 2022 \(S.I. 2022/1110\)](#), reg. 1(2)(b), [Sch. 3 para. 7](#)

2.—(1) In this Schedule—

[<sup>F3</sup>“controlled materials” means controlled energetic materials specified in 1C011, 1C111, 1C239 of Annex I of the Dual-Use Regulation and ML8 in Schedule 2 to the Export Control Order 2008;]

“dynamic adaptive routing” means automatic rerouting of traffic based on sensing and analysis of current actual network conditions, but does not include cases of routing decisions taken on predefined information;

“fluoride fibres” means fibres manufactured from bulk fluoride compounds;

“hybrid computer” means equipment that can—

- (a) accept data,
- (b) process data, in both analogue and digital representation, and

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

(c) provide output of data;

“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;

“stored program controlled” means a control using instructions stored in an electronic storage that a processor can execute in order to direct the performance of predetermined functions, and equipment may be “stored program controlled” whether the electronic storage is internal or external to the equipment;

“terminal interface equipment” means equipment at which information enters or leaves the telecommunication systems, for example a telephone, data device, computer, or facsimile device.

(2) For the purposes of this Schedule, the interpretative notes set out in Table 1 apply.

**Table 1**

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**Interpretative notes**

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*“multi-data-stream processing” refers to the “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:*

*Single Instruction Multiple Data (SIMD) architectures such as vector or array processors;*

*Multiple Single Instruction Multiple Data (MSIMD) architectures;*

*Multiple Instruction Multiple Data (MIMD) architectures, including those that are tightly coupled, closely coupled or loosely coupled;*

*structured arrays of processing elements, including systolic arrays.*

*“data signalling rate” means the rate, as defined in International Telecommunications Union 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.*

*When determining the “data signalling rate”, servicing and administrative channels shall be excluded.*

*It is the maximum one-way rate, i.e., the maximum rate in either transmission or reception.*

*“spectral efficiency” is a figure of merit parametrized to characterize the efficiency of transmission system that uses complex modulation schemes such as QAM (quadrature amplitude modulation), Trellis coding, QSPK (Q-phased shift key), etc.. It is defined as the Digital transfer rate (bits/second) divided by 6dB spectrum bandwidth (Hz).*

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**Textual Amendments**

**F3** Words in Sch. 2A para. 2 inserted (15.7.2022) by [The Russia \(Sanctions\) \(EU Exit\) \(Amendment\) \(No. 11\) Regulations 2022 \(S.I. 2022/792\)](#), regs. 2, **12(2)** (with reg. 13)

#### Textual Amendments

- F2** Word in [Sch. 2A para. 1\(1\)](#) substituted (29.10.2022) by [The Russia \(Sanctions\) \(EU Exit\) \(Amendment\) \(No. 15\) Regulations 2022 \(S.I. 2022/1110\)](#), reg. 1(2)(b), [Sch. 3 para. 7](#)
- F3** Words in [Sch. 2A para. 2](#) inserted (15.7.2022) by [The Russia \(Sanctions\) \(EU Exit\) \(Amendment\) \(No. 11\) Regulations 2022 \(S.I. 2022/792\)](#), regs. 2, [12\(2\)](#) (with reg. 13)

## [<sup>F4</sup>PART 1A

### Special materials and related equipment

#### Textual Amendments

- F4** [Sch. 2A Pts. 1A, 1B](#) inserted (15.7.2022) by [The Russia \(Sanctions\) \(EU Exit\) \(Amendment\) \(No. 11\) Regulations 2022 \(S.I. 2022/792\)](#), reg. 1(2), [Sch. 1](#) (with reg. 13)

### Microorganisms and Toxins

| <i>Item</i>  | <i>Regulation 53A applies?</i> |
|--|--------------------------------|
| 1B999 Specific processing equipment as follows:  |                                |
| a. Electrolytic cells for fluorine “production”;   |                                |
| b. Particle accelerators;  |                                |
| c. Industrial process control hardware/systems designed for power industries;  |                                |
| d. Freon and chilled water-cooling systems capable of continuous cooling duties of 100,000 BTU/hr (29.3 kW) or greater;  |                                |
| e. Equipment for the “production” of structural composites, fibres, prepregs and preforms.   |                                |
| 1C990 Fibrous and filamentary materials for “use” in “composite” structures and with a specific modulus of $3.18 \times 10^6$ m or greater and a specific tensile strength of $7.62 \times 10^4$ m or greater. | Yes                            |
| 1C992 Commercial charges and devices containing energetic materials, and nitrogen trifluoride in a gaseous state.  | Yes                            |
| <i>Note: For the purposes of this entry the mass of the non-controlled substance in any ‘mixture’ is omitted when determining the total mass of the controlled material.</i>                                   |                                |
| These items are as follows:  | Yes                            |
| a. Shaped charges specially designed for oil well operations, utilising one charge functioning along a single axis, that upon detonation produce a hole, and   |                                |
| a.1. Contain any formulation of controlled materials;  |                                |

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

| <i>Item</i>  | <i>Regulation<br/>53A<br/>applies?</i> |
|--|--|
| a.2. Have only a uniform shaped conical liner with an included angle of 90 degrees or less;  |  |
| a.3. Contain more than 0.010 kg but less than or equal to 0.090 kg of “controlled materials”; and  |  |
| a.4. Have a diameter not exceeding [ <sup>F5</sup> 11.43 cm/] 4.5 inches;  |  |
| b. Shaped charges specially designed for oil well operations containing less than or equal to 0.010 kg of controlled materials;  | Yes                                    |
| c. Detonation cord or shock tubes containing less than or equal to 0.064 kg per meter (300 grains per foot) of controlled materials;   | Yes                                    |
| d. Cartridge power devices, that contain less than or equal to 0.70 kg of controlled materials in the deflagration material;   | Yes                                    |
| e. Oil well cartridges, that contain less than or equal to 0.015 kg of “controlled materials”;   | Yes                                    |
| f. Commercial prefabricated slurries and emulsions containing less than or equal to 10.0 kg and less than or equal to thirty-five percent by weight of materials controlled by ML8 in Schedule 2 of the Export Control Order 2008;   | Yes                                    |
| g. Cutters and severing tools containing less than or equal to 3.5 kg of controlled materials;   | Yes                                    |
| h. Pyrotechnic devices when designed exclusively for commercial purposes (e.g., theatrical stages, motion picture special effects, and fireworks displays) and containing less than or equal to 3.0 kg of controlled materials;  | Yes                                    |
| i. Other commercial explosive devices and charges not controlled by 1C992.a to.h. containing less than or equal to 1.0 kg of controlled materials.<br><br><i>Note: 1C992.i includes automotive safety devices; extinguishing systems; cartridges for riveting guns; explosive charges for agricultural, oil and gas operations, sporting goods, commercial mining, or public works purposes; and delay tubes used in the assembly of commercial explosive devices.</i> | Yes                                    |
| j. Nitrogen trifluoride (NF <sub>3</sub> ) in a gaseous state - Nitrogen trifluoride (CAS RN 7783-54-2)  |  |
| 1C996 Hydraulic fluids containing synthetic hydrocarbon oils, having all the following characteristics:  | Yes                                    |
| a. A flash point exceeding 477 K (204 degrees C);  |  |
| b. A pour point at 239 K ( -34 degrees C) or less;   |  |
| c. A viscosity index of 75 or more; and  |  |
| d. A thermal stability at 616 K (343 degrees C).   |  |
| 1C997 Ammonium nitrate, including fertilisers and fertiliser blends containing more than 15% by weight ammonium nitrate, except liquid fertilisers (containing   |  |

| <i>Item</i>  | <i>Regulation<br/>53A<br/>applies?</i> |
|--|--|
| any amount of ammonium nitrate) or dry fertilisers containing less than 15% by weight ammonium nitrate   |  |
| 1C998 Non fluorinated polymeric substances as follows:<br><br>a. Polyarylene ether ketones, as follows:<br><br>a.1 Polyether ether ketone (PEEK);<br><br>a.2. Polyether ketone ketone (PEKK);<br><br>a.3. Polyether ketone (PEK);<br><br>a.4. Polyether ketone ether ketone ketone (PEKEKK); | Yes                                    |
| 1C999 Specific materials, as follows:  |  |
| a. Hardened steel and tungsten carbide precision ball bearings (3mm or greater diameter);  | Yes                                    |
| b. 304 and 316 stainless steel plate;  |  |
| c. Monel plate;  |  |
| d. Tributyl phosphate;   |  |
| e. Nitric acid in concentrations of 20 weight percent or greater;  |  |
| f. Fluorine;   |  |
| g. Alpha emitting radionuclides,   |  |
| [ <sup>F6</sup> Aromatic polyamides (aramids) not controlled by 1C010, 1C210 or 1C990, presented in any of the following forms—  |  |
| (a) primary forms;   |  |
| (b) filament yarn or monofilaments;  |  |
| (c) filament tows;   |  |
| (d) rovings;   |  |
| (e) staple or chopped fibres;  |  |
| (f) fabrics;   |  |
| (g) pulp or flocks.  |  |
| Nanomaterials as follows—  |  |
| (a) semiconductor nanomaterials;   |  |
| (b) composite-based nanomaterials;   |  |
| (c) any of the following carbon-based nanomaterials—   |  |
| (i) carbon nanotubes;  |  |
| (ii) carbon nanofibres;  |  |

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

| Item   | Regulation<br>53A<br>applies? |
|--|-------------------------------|
| (iii) fullerenes;  |                               |
| (iv) graphenes;  |                               |
| (v) carbon onions.   |                               |
| <i>Notes: For the purpose of the entry above, “nanomaterial” means a material that meets at least one of the following criteria—</i>   |                               |
| (a) it consists of particles, with one or more external dimensions in the size range 1 - 100 nm for more than 1 % of their number size distribution,   |                               |
| (b) it has internal or surface structures in one or more dimensions in the size range 1 - 100 nm, or   |                               |
| (c) it has a specific surface area by volume greater than 60 m <sup>2</sup> /cm <sup>3</sup> , excluding materials consisting of particles with a size lower than 1 nm.]   |                               |
| 1D999 Specific software as follows:  |                               |
| a. “Software” specially designed for industrial process control hardware/systems controlled by 1B999;  |                               |
| b. “Software” specially designed for equipment for the “production” of structural composites, fibres, prepregs and preforms controlled by 1B999.   |                               |
| 1E994 “Technology” for the “development”, “production”, or “use” of fibrous and filamentary materials controlled by 1C990.   | Yes                           |
| [ <sup>F7</sup> “Technology” “required” for the “development”, “production” or “use” of the systems, equipment, components and software specified in the entries above relating to aromatic polyamides and nanomaterials. ]  |                               |
| [ <sup>F8</sup> Rare-earth metals and compounds, either in organic or inorganic form, including mixtures whether or not intermixed or interalloyed.<br><br><i>Note 1: Rare-earth metals and compounds include Scandium, Yttrium, Lanthanum, Cerium, Praseodymium, Neodymium, Promethium, Samarium, Europium, Gadolinium, Terbium, Dysprosium, Holmium, Erbium, Thulium, Ytterbium and Lutetium;</i><br><br><i>Note 2: For the purposes of the prohibition, minerals containing rare-earth metals are excluded;</i><br><br><i>Note 3: the prohibition does not prohibit mixtures in which no individual metal or compound specified in this entry constitutes more than 5% by the weight of the mixture.]</i> |                               |
| [ <sup>F9</sup> Tungsten, tungsten carbide and alloys, not controlled by 1C117 or 1C226 of Annex 1 of the Dual-Use Regulation, containing more than 90 % tungsten by weight.<br><br>Note 1: For the purpose of this control, wire is excluded.   |                               |

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

| <i>Item</i>   | <i>Regulation<br/>53A<br/>applies?</i> |
|---|--|
| Note 2: For the purpose of this control, surgical or medical instruments are excluded.] |  |

#### Textual Amendments

- F5** Word in Sch. 2A Pt. 1A inserted (29.10.2022) by [The Russia \(Sanctions\) \(EU Exit\) \(Amendment\) \(No. 15\) Regulations 2022 \(S.I. 2022/1110\)](#), regs. 1(2)(b), **11(2)**
- F6** Words in Sch. 2A Pt. 1A inserted (16.12.2022) by [The Russia \(Sanctions\) \(EU Exit\) \(Amendment\) \(No. 17\) Regulations 2022 \(S.I. 2022/1331\)](#), reg. 1(2)(b), **Sch. 1 para. 1**
- F7** Words in Sch. 2A Pt. 1A inserted (16.12.2022) by [The Russia \(Sanctions\) \(EU Exit\) \(Amendment\) \(No. 17\) Regulations 2022 \(S.I. 2022/1331\)](#), reg. 1(2)(b), **Sch. 1 para. 2**
- F8** Words in Sch. 2A Pt. 1A inserted (21.4.2023) by [The Russia \(Sanctions\) \(EU Exit\) \(Amendment\) Regulations 2023 \(S.I. 2023/440\)](#), regs. 1(2), **14(1)(a)**
- F9** Words in Sch. 2A Pt. 1A inserted (15.12.2023) by [The Russia \(Sanctions\) \(EU Exit\) \(Amendment\) \(No. 4\) Regulations 2023 \(S.I. 2023/1364\)](#), regs. 1(3), **22(2)**

## PART 1B

### MATERIALS PROCESSING

| <i>Item</i>   | <i>Regulation<br/>53A<br/>applies?</i> |
|---|--|
| <p>2A983 Explosives or detonator detection equipment, both bulk and trace based, consisting of an automated device, or combination of devices for automated decision making to detect the presence of different types of explosives, explosive residue, or detonators as follows and specifically designed components thereof:</p> <p><i>Note: For the purpose of this entry, automated decision making is the ability of the equipment to detect explosives or detonators at the design or operator-selected level of sensitivity and provide an automated alarm when explosives or detonators at or above the sensitivity level are detected. This entry does not control equipment that depends on operator interpretation of indicators such as inorganic/organic colour mapping of the items(s) being scanned.</i></p> <p><i>Note: Explosives or detonation detection equipment in 2A983 includes equipment for screening people, documents, baggage, other personal effects, cargo and/or mail.</i></p> |  |
| a. Explosives detection equipment for automated decision making to detect and identify bulk explosives utilising, but not limited to, x-ray (e.g., computed tomography, dual energy, or coherent scattering), nuclear (e.g. thermal neutron analysis, pulse fast neutron analysis, pulse fast neutron transmission spectroscopy, and gamma resonance absorption), or electromagnetic techniques (e.g. quadropole resonance and dielectrometry).   | Yes                                    |

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

| <i>Item</i>   | <i>Regulation<br/>53A<br/>applies?</i> |
|---|--|
| b. Detonator detection equipment for automated decision making to detect and identify initiation devices (e.g. detonators, blasting caps) utilising, but not limited to, x-ray (e.g. dual energy or computed tomography) or electromagnetic techniques.   | Yes                                    |
| <p>2A984 Concealed object detection equipment operating in the frequency range from 30 GHz to 3000 GHz and having a spatial resolution of 0.1 milliradian up to and including 1 milliradian at a standoff distance of 100 metres; and specially designed components thereof.</p> <p><i>Note: Concealed object detection equipment includes but is not limited to equipment for screening people, documents, baggage, other personal effects, cargo and mail.</i></p> <p><i>Technical Note: The range of frequencies span what is generally considered as the millimetre-wave, submillimetre-wave and terahertz frequency regions.</i></p> | Yes                                    |
| 2A991 Bearings and bearing systems as follows:  |  |
| <p><i>This entry does not control balls with tolerance specified by the manufacturer in accordance with ISO 3290 as grade 5 or worse.</i></p> <p><i>Note (1) (a) DN is the product of the bearing bore diameter in mm and the bearing rotational velocity in rpm.</i></p> <p><i>(b) Operating temperatures include those temperatures obtained when a gas turbine engine has stopped after operation.</i></p> <p><i>(2) Annular Bearing Engineers Committee (ABEC); American National Standards Institute (ANSI); Anti-Friction Bearing Manufacturers Association (AFBMA).</i></p>  |  |
| a. Ball bearings or solid ball bearings, having tolerances specified by the manufacturer in accordance with ABEC 7, ABEC 7P, or ABEC 7T or ISO Standard Class 4 or better (or equivalents) and having any of the following characteristics.   | Yes                                    |
| a.1. Manufactured for “use” at operating temperatures above 573 K (300 degrees C) either by using special materials or by special heat treatment; or  |  |
| a.2. With lubricating elements or component modifications that, according to the manufacturer’s specifications, are specially designed to enable the bearings to operate at speeds exceeding 2.3 million DN.  |  |
| b. Solid tapered roller bearings, having tolerances specified by the manufacturer in accordance with ANSI/AFBMA Class 00 (inch) or Class A (metric) or better (or equivalents) and having any of the following characteristics.   |  |
| <p>b.1. With lubricating elements or component modifications that, according to the manufacturer’s specifications, are specially designed to enable the bearings to operate at speeds exceeding 2.3 million DN; or</p> <p>b.2. Manufactured for “use” at operating temperatures below 219 K (54 degrees C) or above 423 K (150 degrees C).</p>  |  |



| <i>Item</i>  | <i>Regulation<br/>53A<br/>applies?</i> |
|--|--|
| c. Gas-lubricated foil bearing manufactured for “use” at operating temperatures of 561 K (288 °C) or higher and a unit load capacity exceeding 1 MPa.  |  |
| d. Active magnetic bearing systems.  | Yes                                    |
| e. Fabric-lined self-aligning or fabric-lined journal sliding bearings manufactured for “use” at operating temperatures below 219 K(-54 degrees C) or above 423 K (150 degrees C).   |  |
| 2A992 Piping, fittings and valves made of, or lined with stainless, copper-nickel alloy or other alloy steel containing 10% or more nickel and/or chromium as follows:   |  |
| a. Pressure tube, pipe, and fittings of 200 mm (8 in.) or more inside diameter, and suitable for operation at pressures of 3.4 MPa (500 psi) or greater;   |  |
| b. Pipe valves having all of the following characteristics that are not controlled by 2B350.g of Annex I of the Dual-Use Regulation;   |  |
| b.1. A pipe size connection of 200 mm (8 in.) or more inside diameter; and   |  |
| b.2. Rated at 10.3 MPa (1,500 psi) or more.  |  |
| 2A993 Pumps designed to move molten metals by electromagnetic forces.  |  |
| 2A994 Portable electric generators, weighing 2300 kg or less on wheels or transportable in a 2½ ton truck without a special set up requirement and specially designed components thereof.  |  |
| 2A999 Specific processing equipment as follows:  |  |
| a. Bellows sealed valves;  |  |
| <i>TECHNICAL NOTES FOR 2B991 TO 2B999:</i>   |  |
| <i>1. Secondary parallel contouring axes, (e.g., the w-axis on horizontal boring mills or a secondary rotary axis the centre line of which is parallel to the primary rotary axis) are not counted in the total number of contouring axes. Rotary axes need not rotate over 360°. A rotary axis can be driven by a linear device (e.g., a screw or a rack-and-pinion).</i>                             |  |
| <i>2. The number of axes which can be coordinated simultaneously for “contouring control” is the number of axes along or around which, during processing of the workpiece, simultaneous and interrelated motions are performed between the workpiece and a tool. This does not include any additional axes along or around which other relative motions within the machine are performed, such as:</i> |  |
| <i>2.a. Wheel-dressing systems in grinding machines;</i>   | Yes                                    |
| <i>2.b. Parallel rotary axes designed for mounting of separate workpieces;</i>   |  |
| <i>2.c. Co-linear rotary axes designed for manipulating the same workpiece by holding it in a chuck from different ends.</i>   |  |

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

| <i>Item</i>   | <i>Regulation<br/>53A<br/>applies?</i> |
|---|--|
| 3. <i>Axis nomenclature shall be in accordance with International Standard ISO 841:2001, Industrial automation systems and integration - Numerical control of machines - Coordinate system and motion nomenclature.</i>   | Yes                                    |
| 4. <i>A “tilting spindle” is counted as a rotary axis.</i>  | Yes                                    |
| 5. <i>‘Stated “unidirectional positioning repeatability”’ may be used for each specific machine model as an alternative to individual machine tests, and is determined as follows:</i>  | Yes                                    |
| 5.a. <i>Select five machines of a model to be evaluated;</i>  | Yes                                    |
| 5.b. <i>Measure the linear axis repeatability (<math>R_{\uparrow}, R_{\downarrow}</math>) according to ISO 230-2:2014 and evaluate “unidirectional positioning repeatability” for each axis of each of the five machines;</i>   | Yes                                    |
| 5.c. <i>Determine the arithmetic mean value of the “unidirectional positioning repeatability”-values for each axis of all five machines together. These arithmetic mean values “unidirectional positioning repeatability” ( ) become the stated value of each axis for the model...)( x, y, ...);</i>   | Yes                                    |
| 5.d. <i>Since the Category 2 list refers to each linear axis there will be as many ‘stated “unidirectional positioning repeatability”’ values as there are linear axes;</i>   | Yes                                    |
| 5.e. <i>If any axis of a machine model not controlled by 2B001.a. to 2B001.c. has a ‘stated “unidirectional positioning repeatability”’ equal to or less than the specified “unidirectional positioning repeatability” of each machine tool model plus 0.7 <math>\mu\text{m}</math>, the builder should be required to reaffirm the accuracy level once every eighteen months.</i>  | Yes                                    |
| 6. <i>For the purpose of 2B, measurement uncertainty for the “unidirectional positioning repeatability” of machine tools, as defined in the International Standard ISO 230-2:2014, shall not be considered.</i>   | Yes                                    |
| 7. <i>For the purpose of 2B, the measurement of axes shall be made according to test procedures in 5.3.2. of ISO 230-2:2014. Tests for axes longer than 2 meters shall be made over 2 m segments. Axes longer than 4 m require multiple tests (e.g., two tests for axes longer than 4 m and up to 8 m, three tests for axes longer than 8 m and up to 12 m), each over 2 m segments and distributed in equal intervals over the axis length. Test segments are equally spaced along the full axis length, with any excess length equally divided at the beginning, in between, and at the end of the test segments. The smallest “unidirectional positioning repeatability”-value of all test segments is to be reported.</i> | Yes                                    |
| 2B991 Numerical control units for machine tools and “numerically controlled” machine tools as follows:  |  |
| a. Numerical control units for machine tools:   |  |
| a.1. Having four interpolating axes that can be coordinated simultaneously for “contouring control”; or   |  |
| a.2. Having two or more axes that can be coordinated simultaneously for contouring control and a minimum programmable increment better (less) than 0.001 mm;  |  |

| <i>Item</i>   | <i>Regulation<br/>53A<br/>applies?</i> |
|---|--|
| a.3. “Numerical control” units for machine tools having two, three or four interpolating axes that can be coordinated simultaneously for contouring control and capable of receiving directly (online) and processing computer aided design (CAD) data for internal preparation of machine instructions; or |  |
| b. Motion control boards specially designed for machine tools and having any of the following characteristics:  |  |
| b.1. Interpolation in more than four axes;  |  |
| b.2. Capable of “real-time processing” of data to modify tool path, feed rate and spindle data, during the machining operation, by any of the following:  |  |
| b.2.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; or   |  |
| b.2.b. “Adaptive control” with more than one physical variable measured and processed by means of a computing model (strategy) to change one or more machining instructions to optimise the process.  |  |
| b.3. Capable of receiving and processing CAD data for internal preparation of machine instructions; or  |  |
| c. “Numerically controlled” machine tools that, according to the manufacturer’s technical specifications, can be equipped with electronic devices for simultaneous “contouring control” in two or more axes and that have both of the following characteristics:  |  |
| c.1. Two or more axes that can be coordinated simultaneously for contouring control; and  |  |
| c.2. Positioning accuracies according to ISO 230/2 (2006), with all compensations available:  |  |
| c.2.a. Better than [ <sup>F10</sup> 15µm] along any linear axis (overall positioning) for grinding machines;  |  |
| c.2.b. Better than [ <sup>F10</sup> 15µm] along any linear axis (overall positioning) for milling machines; or  |  |
| c.2.c. Better than [ <sup>F10</sup> 15µm] along any linear axis (overall positioning) for turning machines; or  |  |
| d. Machine tools, as follows, for removing or cutting metals, ceramics or composites, that, according to the manufacturer’s technical specifications, can be equipped with electronic devices for simultaneous “contouring control” in two or more axes:  |  |
| d.1. Machine tools for turning, grinding, milling or any combination thereof, having two or more axes that can be coordinated simultaneously for “contouring control” and having any of the following characteristics:  |  |
| d.1.a. One or more contouring tilting spindles;   |  |
| <i>Note: 2B991.d.1.a. applies to machine tools for grinding or milling only.</i>  |  |

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

| Item  | Regulation<br>53A<br>applies? |
|---|-------------------------------|
| d.1.b. Camming (axial displacement) in one revolution of the spindle less (better) than 0.0006 mm total indicator reading (TIR);<br><br><i>Note: 2B991.d.1.b. applies to machine tools for turning only.</i>  |                               |
| d.1.c. Run out (out of true running) in one revolution of the spindle less (better) than 0.0006 mm total indicator reading (TIR);   |                               |
| d.1.d. The positioning accuracies with all compensations available, are less (better) than: 0.001° on any rotary axis;  |                               |
| d.2. Electrical discharge machines (EDM) of the wire feed type that have five or more axes that can be coordinated simultaneously for “contouring control”.   | Yes                           |
| 2B992 Non “numerically controlled” machine tools for generating optical quality surfaces as follows and specially designed components therefor.   |                               |
| a. Turning machines using a single point cutting tool and having all of the following characteristics:  |                               |
| a.1. Slide positioning accuracy less (better) than 0.0005 mm per 300 mm of travel;  |                               |
| a.2. Bidirectional slide positioning repeatability less (better) than 0.00025 mm per 300 mm of travel;  |                               |
| a.3. Spindle “run out” and “camming” less (better) than 0.0004 mm total indicator reading (TIR);  |                               |
| a.4. Angular deviation of the slide movement (yaw, pitch and roll) less (better) than 2 seconds of arc, TIR, over full travel; and  |                               |
| a.5. Slide perpendicularity less (better) than 0.001 mm per 300 mm of travel;<br><br><i>Technical Note: The bidirectional slide positioning repeatability (R) of an axis is the maximum value of the repeatability of positioning at any position along or around the axis determined using the procedure and under the conditions specified in Part 2.11 of ISO 230/2: 1988.</i> |                               |
| b. Fly cutting machines having all of the following characteristics:  |                               |
| b.1. Spindle “run out” and “camming” less (better) than 0.0004 mm TIR; and  |                               |
| b.2. Angular deviation of slide movement (yaw, pitch and roll) less (better) than 2 seconds of arc, TIR, over full travel.  |                               |
| 2B993 Gearmaking and/or finishing machinery capable of producing gears to a quality level of better than AGMA 11.   | Yes                           |
| 2B996 Dimensional inspection or measuring systems or equipment as follows.  |                               |
| a. Manual dimensional inspection machines, having both of the following characteristics:  |                               |
| a.1. Two or more axes; and  |                               |

| Item  | Regulation<br>53A<br>applies? |
|---|-------------------------------|
| a.2. A measurement uncertainty equal to or less (better) than $(3 + L/300)$ micrometre in any axes (L measured length in mm).   |                               |
| 2B997 “Robots” that are capable of employing feedback information in real-time processing from one or more sensors to generate or modify “programs” or to generate or modify numerical program data.  |                               |
| 2B998 Assemblies, circuit boards or inserts as follows specially designed for machine tools controlled by 2B991, or for equipment controlled by 2B993, 2B996 or 2B997.  | Yes                           |
| a. Spindle assemblies, consisting of spindles and bearings as a minimal assembly, with radial (“run out”) or axial (“camming”) axis motion in one revolution of the spindle less (better) than 0.0006 mm total indicator reading (TIR);   |                               |
| b. Single point diamond cutting tool inserts, having all of the following characteristics:  |                               |
| b.1. Flawless and chip free cutting edge when magnified 400 times in any direction;   |                               |
| b.2. Cutting radius from 0.1 to 5 mm inclusive; and   |                               |
| b.3. Cutting radius out of roundness less (better) than 0.002 mm TIR.   |                               |
| c. Specially designed printed circuit boards with mounted parts or components 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 2B991, 2B993, 2B996, 2B997, or 2B998. | Yes                           |
| 2B999 Specific processing equipment, as follows:  |                               |
| a. Isostatic presses;   |                               |
| b. Bellows manufacturing equipment, including hydraulic forming equipment and bellows forming dies;   |                               |
| c. Laser welding machines;  |                               |
| d. MIG welders;   |                               |
| e. E-beam welders;  |                               |
| f. Monel equipment, including valves, piping, tanks and vessels;  |                               |
| g. 304 and 316 stainless steel valves, piping, tanks and vessels;   |                               |
| <i>Note: Fittings are considered part of “piping” for purposes of 2B999.g.</i>  |                               |
| h. Mining and drilling equipment, as follows:   |                               |
| h.1. Large boring equipment capable of drilling holes greater than [F1161cm/two feet] in diameter;  |                               |
| h.2. Large earth-moving equipment used in the mining industry;  |                               |
| i. Electroplating equipment designed for coating parts with nickel or aluminium;  |                               |

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

| <i>Item</i>  | <i>Regulation<br/>53A<br/>applies?</i> |
|--|--|
| j. Pumps designed for industrial service and for “use” with an electrical motor of 5 HP or greater;  |  |
| k. Vacuum valves, piping, flanges, gaskets and related equipment specially designed for use in high-vacuum service;  |  |
| l. Spin forming and flow forming machines;   |  |
| m. Centrifugal multiplane balancing machines;  |  |
| n. Austenitic stainless-steel plate, valves, piping, tanks and vessels.<br>2D983 “Software” specially designed or modified for the “development”, “production” or “use” of equipment controlled by 2A983.  |  |
| 2D984 “Software” required for the “development”, “production” or “use” of concealed object detection equipment controlled by 2A984.  | Yes                                    |
| 2D991 “Software” specially designed for the “development”, “production” or “use” of equipment controlled by 2B991, 2B993, or 2B996, 2B997, and 2B998.  | Yes                                    |
| 2D992 Specific “software”, as follows (see List of Items Controlled).  |  |
| a.1. For flexible manufacturing units (FMUs) which consist at least of   |  |
| (1) A machine tool described in 2B001.c. of Annex I of the Dual-Use Regulation; and  |  |
| (2) A dimensional inspection machine described in Category 2 of Annex I of the Dual-Use Regulation, or another digitally controlled measuring machine controlled by an entry in Category 2 of Annex I of the Dual-Use Regulation; and                          | Yes                                    |
| a.2. Capable of generating or modifying, in “real-time processing”, programs or data by using the signals obtained simultaneously by means of at least two detection techniques, such as:  | Yes                                    |
| a.2.a. Machine vision (optical ranging);   | Yes                                    |
| a.2.b. Infrared imaging;   | Yes                                    |
| a.2.c. Acoustical imaging (acoustical ranging);  | Yes                                    |
| a.2.d. Tactile measurement;  | Yes                                    |
| a.2.e. Inertial positioning;   | Yes                                    |
| a.2.f. Force measurement; and  | Yes                                    |
| a.2.g. Torque measurement.   | Yes                                    |
| <i>Note: 2D992.a. does not control “software” which only provides rescheduling of functionally identical equipment within “flexible manufacturing units” using prestored part programs and a prestored strategy for the distribution of the part programs.</i> |  |
| 2D993 “Software” specially designed or modified for the “development”, “production” or “use” of items controlled by 2A992 or 2A993.  |  |

| <i>Item</i>  | <i>Regulation<br/>53A<br/>applies?</i> |
|--|--|
| 2D994 “Software” specially designed for the “development” or “production” of portable electric generators controlled by 2A994.   |  |
| 2E984 “Technology” required for the “development”, “production” or “use” of equipment controlled by 2A984 or required for the “development” of “software” controlled by 2D984.               | Yes                                    |
| 2E991 “Technology” for the use of equipment controlled by 2B991, 2B993, 2B996, or 2B997.   |  |
| 2E993 “Technology” according to the General Technology Note of Annex I of the Dual-Use Regulation for the “use” of equipment controlled by 2A992 or 2A993.                                   |  |
| 2E994 “Technology” for the “use” of portable electric generators controlled by 2A994.  |  |
| <i>f<sup>F12</sup> Continuous flow reactors and their modular components.</i>  |  |
| <i>Technical note: Continuous flow reactors consist in plug and play systems where reactants are continuously fed into the reactor and the resultant product is collected at the outlet.</i> |  |
| <i>Modular components are fluidic modules, liquid pumps, valves, packed-bed modules, mixer modules, pressure gauges, liquid-liquid separators, etc.</i>                                      |  |
| Nucleic acid assemblers and synthesizers not controlled by 2B352.i, which are partly or entirely automated, and designed to generate nucleic acids greater than 50 bases.                    |  |
| Automated peptide synthesizers capable to work under controlled atmosphere conditions.]]   |  |

#### Textual Amendments

- F10** Word in Sch. 2A Pt. 1B Table substituted (29.10.2022) by The Russia (Sanctions) (EU Exit) (Amendment) (No. 15) Regulations 2022 (S.I. 2022/1110), regs. 1(2)(b), **11(3)(a)**
- F11** Words in Sch. 2A Pt. 1B Table substituted (29.10.2022) by The Russia (Sanctions) (EU Exit) (Amendment) (No. 15) Regulations 2022 (S.I. 2022/1110), regs. 1(2)(b), **11(3)(b)**
- F12** Words in Sch. 2A Pt. 1B Table inserted (21.4.2023) by The Russia (Sanctions) (EU Exit) (Amendment) Regulations 2023 (S.I. 2023/440), regs. 1(2), **14(1)(b)**

## PART 2

### Electronics

#### 3A991 Electronic devices and components

- a. “Microprocessor microcircuits”, “microcomputer microcircuits”, and microcontroller microcircuits having any of the following:

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

- a.1. A performance speed of 5 GFLOPS or more and an arithmetic logic unit with an access width of 32 bit or more;
- a.2. A clock frequency rate exceeding 25 MHz; or
- a.3. More than one data or instruction bus or serial communication port that provides a direct external interconnection between parallel “microprocessor microcircuits” with a transfer rate of 2.5 Mbyte/s;
- b. Storage integrated circuits, as follows:
  - b.1. Electrical erasable programmable read-only memories (EEPROMs) with a storage [<sup>F13</sup>capacity:]
    - b.1.a. Exceeding 16 Mbits per package for flash memory types; or
    - b.1.b. Exceeding either of the following limits for all other EEPROM types:
      - b.1.b.1. Exceeding 1 Mbit per package; or
      - b.1.b.2. Exceeding 256 kbit per package and a maximum access time of less than 80 ns;
  - [<sup>F13</sup>b.2 Static random access memories (SRAMs) with a storage capacity:
    - b.2.a. Exceeding 1 Mbit per package; or
    - b.2.b. Exceeding 256 kbit per package and a maximum access time of less than 25 ns;]
- c. Analog-to-digital converters having any of the following:
  - c.1. A resolution of 8 bit or more, but less than 12 bit, with an output rate greater than 200 [<sup>F14</sup>mega samples] per second;
  - c.2. A resolution of 12 bit with an output rate greater than 105 [<sup>F14</sup>mega samples] per second;
  - c.3. A resolution of more than 12 bit but equal to or less than 14 bit with an output rate greater than 10 [<sup>F14</sup>mega samples] per second; or
  - c.4. A resolution of more than 14 bit with an output rate greater than 2.5 [<sup>F14</sup>mega samples] per second;
- 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 1,024 point complex FFT of less than 1 ms;
- f. Custom integrated circuits for which either the function is unknown, or the control status of the equipment in which the integrated circuits will be used is unknown to the manufacturer, having any of the following:
  - f.1. More than 144 terminals; or
  - f.2. A typical “basic gate propagation delay time” of less than 0.4 ns;
- g. Traveling-wave “vacuum electronic devices,” pulsed or continuous wave, as follows:
  - g.1. Coupled cavity devices, or derivatives thereof;



- g.2. Devices based on helix, folded waveguide, or serpentine waveguide circuits, or derivatives thereof, having either of the following:
  - g.2.a. An “instantaneous bandwidth” of half an octave or more; and
  - g.2.b. The product of the rated average output power (expressed in kW) and the maximum operating frequency (expressed in GHz) of more than 0.2; or
  - g.2.c. An “instantaneous bandwidth” of less than half an octave; and
  - g.2.d. The product of the rated average output power (expressed in kW) and the maximum operating frequency (expressed in GHz) of more than 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 (i.e., “signal processing” devices employing elastic waves in materials), having either of the following:
  - i.1. A carrier frequency exceeding 1 GHz; or
  - i.2. A carrier frequency of 1 GHz or less; and
    - i.2.a. A frequency side-lobe rejection exceeding 55 dB;
    - i.2.b. A product of the maximum delay time and bandwidth (time in  $\mu\text{s}$  and bandwidth in MHz) of more than 100; or
    - i.2.c. A dispersive delay of more than 10  $\mu\text{s}$ ;
- j. Cells as follows:
  - j.1. Primary cells having an energy density of 550 Wh/kg or less at 293 K (20°C);
  - j.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 purposes of 3A991.j energy density (Wh/kg) is calculated from the nominal voltage multiplied by the nominal capacity in ampere-hours divided by the mass in kilograms. If the nominal capacity is not stated, energy density is calculated from the nominal voltage squared then multiplied by the discharge duration in hours divided by the discharge load in Ohms and the mass in kilograms.*
  - 2. For the purposes 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 purposes of 3A991.j.1, a ‘primary cell’ is a ‘cell’ that is not designed to be charged by any other source.*
  - 4. For the purposes of 3A991.j.2, a ‘secondary cell’ is a ‘cell’ that is designed to be charged by an external electrical source.*
- k. “Superconductive” electromagnets or solenoids, specially designed to be fully charged or discharged in less than one minute, having all of the following:

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

**Note:** 3A991.k does not control “superconductive” electromagnets or solenoids specially designed for Magnetic Resonance Imaging (MRI) medical equipment.

- k.1. Maximum energy delivered during the discharge divided by the duration of the discharge of more than 500 kJ per minute;
- k.2. Inner diameter of the current carrying windings of more than 250 mm; and
- k.3. Rated for a magnetic induction of more than 8T or “overall current density” in the winding of more than 300 A/mm<sup>2</sup>;
- l. Circuits or systems designed 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:
  - l.1. Resonant operating frequencies exceeding 1 MHz;
  - l.2. A stored energy density of 1 MJ/m<sup>3</sup> or more; and
  - l.3. A discharge time of less than 1 ms;
- m. Hydrogen/hydrogen-isotope thyatrons of ceramic-metal construction and rated for a peak current of 500 A or more;
- n. Digital integrated circuits based on any compound semiconductor having an equivalent gate count of more than 300 (2 input gates);
- o. “Space qualified” solar cells, cell-interconnect-coverglass (CIC) assemblies, solar panels, and solar arrays;
- [<sup>F15</sup>p. Ceramic frequency filters;
- q. Cermet trimmers.]

**3A992 General purpose electronic equipment, as follows:**

- a. Electronic test equipment;
- b. Digital instrumentation magnetic tape data recorders having any of the following:
  - b.1. A maximum digital interface transfer rate exceeding 60 Mbit/s and employing helical scan techniques;
  - b.2. A maximum digital interface transfer rate exceeding 120 Mbit/s and employing fixed head techniques; or
  - b.3. “Space qualified”;
- c. Equipment having a maximum digital interface transfer rate exceeding 60 Mbit/s and designed to convert digital video magnetic tape recorders for use as digital instrumentation data recorders;
- d. Non-modular analogue oscilloscopes having a bandwidth of 1 GHz or greater;
- e. Modular analogue oscilloscope systems having either of the following:
  - e.1. A mainframe with a bandwidth of 1 GHz or greater; or
  - e.2. Plug-in modules with an individual bandwidth of 4 GHz or greater;
- f. Analogue sampling oscilloscopes for the analysis of recurring phenomena with an effective bandwidth greater than 4 GHz;

g. Digital oscilloscopes and transient recorders, using analogue-to-digital conversion techniques, capable of storing transients by sequentially sampling single-shot inputs at successive intervals of less than 1 ns (greater than 1 giga-sample per second), digitising to 8 bits or greater resolution and storing 256 or more samples.

*Note: This entry controls the following components designed for analogue oscilloscopes:*

1. Plug-in units;
2. External amplifiers;
3. Pre-amplifiers;
4. Sampling devices;
5. Cathode ray tubes.

**3A999 Specific processing equipment as follows.**

- a. Frequency changers capable of operating in the frequency range from 300 up to 600 Hz;
- b. Mass spectrometers;
- c. All flash x-ray machines, and components of pulsed power systems designed therefor, including Marx generators, high power pulse shaping networks, high voltage capacitors, and triggers;
- d. Pulse amplifiers;
- e. Time delay generation or time interval measurement equipment, as follows:
  - [<sup>F16</sup>e.1 Digital time delay generators having a resolution of 50 nanoseconds or less over time intervals of 1 µs or greater; or
  - e.2 Multi-channel (three or more) or modular time interval meter and chronometry equipment having a resolution of 50 ns or less over time intervals of 1 µs or greater;]
- f. Chromatography and spectrometry analytical instruments

**3B991 Equipment for the manufacture of electronic components and materials, and specially designed components therefor.**

- a. Equipment specially designed for the manufacture of electron tubes, optical elements and components controlled by entry 3A001 of Annex I of the Dual-Use Regulation, or entry 3A991;
- b. Equipment for the manufacture of semiconductor devices, integrated circuits and “electronic assemblies”, as follows, and systems incorporating or 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.

- b.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 specially designed for the processing equipment

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

b.1.a. Equipment specially designed for producing polycrystalline silicon and materials controlled by entry 3A001 of Annex I of the Dual-Use Regulation;

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

b.1.c. Crystal pullers and furnaces, as follows:

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

b.1.c.1. Annealing or recrystallising equipment other than constant temperature furnaces employing high rates of energy transfer capable of processing wafers at a rate exceeding 0.005 m<sup>2</sup> per minute;

b.1.c.2. “Stored program controlled” crystal pullers having any of the following:

b.1.c.2.a. Rechargeable without replacing the crucible container;

b.1.c.2.b. Capable of operation at pressures above 2.5 x 10<sup>5</sup> Pa; or

b.1.c.2.c. Capable of pulling crystals of a diameter exceeding 100 mm;

b.1.d. “Stored program controlled” equipment for epitaxial growth having any of the following:

b.1.d.1. Capable of producing silicon layer with a thickness uniform to less than ± 2.5% across a distance of 200 mm or more;

b.1.d.2. Capable of producing a layer of any material other than silicon with a thickness uniformity across the wafer of equal to or better than ± 3.5%; or

b.1.d.3. Capable of rotating individual wafers during processing;

b.1.e. Molecular beam epitaxial growth equipment;

b.1.f. Magnetically enhanced ‘sputtering’ equipment with specially designed integral load locks capable of transferring wafers in an isolated vacuum environment;

*Note: ‘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.)*

b.1.g. Equipment specially designed for ion implantation, ion-enhanced or photo-enhanced diffusion, having any of the following:

b.1.g.1. Patterning capability;

b.1.g.2. Beam energy (accelerating voltage) exceeding 200 keV;

b.1.g.3 Optimised to operate at a beam energy (accelerating voltage) of less than 10 keV; or

b.1.g.4. Capable of high energy oxygen implant into a heated “substrate”;  
b.1.h. “Stored program controlled” equipment for selective removal (etching) by means of anisotropic dry methods (e.g., plasma), as follows:

b.1.h.1. ‘Batch types’ having either of the following:

b.1.h.1.a. End-point detection, other than optical emission spectroscopy types; *or*

b.1.h.1.b. Reactor operational (etching) pressure of 26.66 Pa or less;

b.1.h.2. ‘Single wafer types’ having any of the following:

b.1.h.2.a. End-point detection, other than optical emission spectroscopy types;

b.1.h.2.b. Reactor operational (etching) pressure of 26.66 Pa or less;  
*or*

b.1.h.2.c. Cassette-to-cassette and load locks wafer handling;

*Notes: 1. ‘Batch types’ refers to machines 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, flow rates.*

*2. ‘Single wafer types’ refers to machines specially designed for production processing of single wafers. These machines may use automatic wafer handling techniques to load a single wafer into the equipment for processing. The definition 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.*

b.1.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 deposition of oxides, nitrides, metals or polysilicon:

b.1.i.1. “Chemical vapor deposition” equipment operating below  $10^5$  Pa;  
*or*

b.1.i.2. PECVD equipment operating either below 60 Pa (450 millitorr) 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.*

b.1.j. Electron beam systems specially designed or modified for mask making or semiconductor device processing having any of the following:

b.1.j.1. Electrostatic beam deflection;

b.1.j.2. Shaped, non-Gaussian beam profile;

b.1.j.3. Digital-to-analogue conversion rate exceeding 3 MHz;

b.1.j.4. Digital-to-analogue conversion accuracy exceeding 12 bit; *or*

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

b.1.j.5. Target-to-beam position feedback control precision of 1  $\mu\text{m}$  or finer;

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

b.1.k. Surface finishing equipment for the processing of semiconductor wafers as follows:

b.1.k.1. Specially designed equipment for backside processing of wafers thinner than 100  $\mu\text{m}$  and the subsequent separation thereof; *or*

b.1.k.2. Specially designed equipment for achieving a surface roughness of the active surface of a processed wafer with a two-sigma value of 2  $\mu\text{m}$  or less, total indicator reading (TIR);

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

b.1.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;

b.1.m. “Stored program controlled” equipment using “lasers” for the repair or trimming of “monolithic integrated circuits” with either of the following:

b.1.m.1. Positioning accuracy less than  $\pm 1 \mu\text{m}$ ; *or*

b.1.m.2. Spot size (kerf width) less than 3  $\mu\text{m}$ .

b.2. ‘Masks’, ‘mask’ “substrates,” mask-making equipment and image transfer equipment for the manufacture of devices and components as specified in the heading of 3B991, as follows:

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

b.2.a. Finished masks, reticles and designs therefor, except:

b.2.a.1. Finished masks or reticles for the production of integrated circuits not controlled by entry 3A001 of Annex I of the Dual-Use Regulation; *or*

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

b.2.a.2.a. Their design is based on geometries of 2.5  $\mu\text{m}$  or more; and

b.2.a.2.b. The design does not include special features to alter the intended use by means of production equipment or “software”;

b.2.b. Mask “substrates” as follows:

b.2.b.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*

b.2.b.2. “Substrates” specially designed for X-ray masks;

b.2.c. Equipment, other than general purpose computers, specially designed for computer aided design (CAD) of semiconductor devices or integrated circuits;

b.2.d. Equipment or machines, as follows, for mask or reticle fabrication:

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

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

b.2.d.1. Photo-optical step and repeat cameras capable of producing arrays larger 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  $\mu\text{m}$  in the photoresist on the “substrate”;

b.2.d.2. Mask or reticle fabrication equipment using ion or “laser” beam lithography capable of producing line widths of less than 2.5  $\mu\text{m}$ ; or

b.2.d.3. Equipment or holders for altering masks or reticles or adding pellicles to remove defects;

b.2.e. “Stored program controlled” equipment for the inspection of masks, reticles or pellicles with:

b.2.e.1. A resolution of 0.25  $\mu\text{m}$  or finer; and

b.2.e.2. A precision of 0.75  $\mu\text{m}$  or finer over a distance in one or two coordinates of 63.5 mm or more;

**Note:** 3B991.b.2.e does not control general purpose scanning electron microscopes except when specially designed and instrumented for automatic pattern inspection.

b.2.f. Align and expose equipment for wafer production using photo-optical or X-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:

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

b.2.f.1. Production of a pattern size of less than 2.5  $\mu\text{m}$ ;

b.2.f.2. Alignment with a precision finer than  $\pm 0.25 \mu\text{m}$  (3 sigma);

b.2.f.3. Machine-to-machine overlay no better than  $\pm 0.3 \mu\text{m}$ ; or

b.2.f.4. A light source wavelength shorter than 400 nm;

b.2.g. Electron beam, ion beam or X-ray equipment for projection image transfer capable of producing patterns less than 2.5  $\mu\text{m}$ ;

**Note:** For focused, deflected-beam systems (direct write systems), see 3B991.b.1.j or b.10.

b.2.h. Equipment using “lasers” for direct write on wafers capable of producing patterns less than 2.5  $\mu\text{m}$ .

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

b.3.a. “Stored program controlled” die bonders having all of the following:

b.3.a.1. Specially designed for “hybrid integrated circuits”;

b.3.a.2. X-Y stage positioning travel exceeding 37.5 x 37.5 mm; and

b.3.a.3. Placement accuracy in the X-Y plane of finer than  $\pm 10 \mu\text{m}$ ;

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

b.3.b. “Stored program controlled” equipment for producing multiple bonds in a single operation (e.g., beam lead bonders, chip carrier bonders, tape bonders);

b.3.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 entry 3A001 of Annex I of the Dual-Use Regulation and that have a throughput equal to or more than one package per minute.

b.4. Filters for clean rooms capable of providing an air environment of 10 or less particles of 0.3 µm or smaller per 0.02832 m<sup>3</sup> and filter materials therefor.

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

a. Equipment specially designed for the inspection or testing of electron tubes, optical elements and specially designed components therefor, controlled by entry 3A001 of Annex I of the Dual-Use Regulation or 3A991;

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

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

b.1. “Stored program controlled” inspection equipment for the automatic detection of defects, errors or contaminants of 0.6 µm or less in or on processed wafers, “substrates”, other than printed circuit boards or integrated circuits, 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.*

b.2. Specially designed “stored program controlled” measuring and analysis equipment, as follows:

b.2.a. Specially designed for the measurement of oxygen or carbon content in semiconductor materials;

b.2.b. Equipment for line width measurement with a resolution of 1 µm or finer;

b.2.c. Specially designed flatness measurement instruments capable of measuring deviations from flatness of 10 µm or less with a resolution of 1 µm or finer.

b.3. “Stored program controlled” wafer probing equipment having any of the following:

b.3.a. Positioning accuracy finer than 3.5 µm;

b.3.b. Capable of testing devices having more than 68 terminals; *or*

b.3.c. Capable of testing at a frequency exceeding 1 GHz;

b.4. Test equipment as follows:

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



**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

*Technical Note: Discrete semiconductor devices include photocells and solar cells.*

b.4.b. “Stored program controlled” equipment specially designed for testing integrated circuits and “electronic assemblies” thereof, capable of functional testing:

b.4.b.1. At a ‘pattern rate’ exceeding 20 MHz; *or*

b.4.b.2. At a ‘pattern rate’ exceeding 10 MHz but not exceeding 20 MHz and capable of testing packages of more than 68 terminals.

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

1. *Memory;*

2. *“Electronic assemblies” for home and entertainment applications; and*

3. *Electronic components, and integrated circuits not controlled by entry 3A001 of Annex I of the Dual-Use Regulation or 3A991 provided such test equipment does not incorporate computing facilities with “user accessible programmability”.*

*Technical Note: For purposes of 3B992.b.4.b, ‘pattern rate’ is defined as 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, maximum digital frequency or maximum digital speed.*

b.4.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:

b.4.c.1. Using scanning light spot diameters of less than 0.12 mm;

b.4.c.2. Designed for measuring photosensitive performance parameters and for evaluating frequency response, modulation transfer function, uniformity of responsivity or noise; *or*

b.4.c.3. Designed for evaluating arrays capable of creating images with more than 32 x 32 line elements;

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

b.5.a. Stroboscopic capability with either beam blanking or detector strobing;

b.5.b. An electron spectrometer for voltage measurements with a resolution of less than 0.5 V; *or*

b.5.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-contact probing of a powered-up semiconductor device.

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

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

b.6.a. Target-to-beam position feedback control precision of 1 µm or finer; *or*

b.6.b. Digital-to-analogue conversion accuracy exceeding 12 bit;

b.7. Particle measuring systems employing “lasers” designed for measuring particle size and concentration in air having both of the following:

b.7.a. Capable of measuring particle sizes of 0.2 µm or less at a flow rate of 0.02832 m<sup>3</sup> per minute or more; *and*

b.7.b. Capable of characterising Class 10 clean air or better.

**[<sup>F17</sup>3B993 Equipment for the manufacture of Printed Circuit Boards (PCBs) and specially designed components and accessories therefor, as follows:**

- a. Film processing equipment;
- b. Solder mask coating equipment;
- c. Photo plotter equipment;
- d. Plating or electroplating deposition equipment;
- e. Vacuum chambers and presses;
- f. Roll laminators;
- g. Alignment equipment;
- h. Etching equipment.

**3B994 Automated optical inspection equipment for testing Printed Circuit Boards (PCBs), based on optical or electrical sensors, and capable to detect any of the following quality defects:**

- a. Spacing, area, volume or height;
- b. Bill boarding;
- c. Components (presence, absence, flipped, offset, polarity, or skew);
- d. Solder (bridging, insufficient solder joints);
- e. Leads (insufficient paste, lifting);
- f. Tombstoning; or
- g. Electrical (shorts, opens, resistance, capacitance, power, grid performance).]

**3C992 Positive resists designed for semiconductor lithography specially adjusted (optimised) for use at wavelengths between 370 and 193 nm.**

**[<sup>F18</sup>3C993 Chemicals and materials of the type used in the production of Printed Circuit Boards (PCBs), as follows:**

- a. PCB composite substrates made of glass fibre or cotton (e.g. FR-4, FR-2, FR-6, CEM-1, G-10, etc.);
- b. Multilayer PCB substrates, containing at least one layer of any of the following materials:
  - b.1. Aluminium;
  - b.2. Polytetrafluoroethylene (PTFE); or

- b.3. Ceramic materials (e.g. alumina, titanium oxide, etc.);
  - c. Etchant chemicals;
    - c.1. Ferric chloride (7705-08-0);
    - c.2. Cupric chloride (7447-39-4);
    - c.3. Ammonium persulphate (7727-54-0);
    - c.4. Sodium persulphate (7775-27-1);
    - c.5. Chemical preparations specially designed for etching and containing any of the chemicals included in c.1 to c.4.
- Note: 3C993.c. does not control “chemical mixtures” containing one or more of the chemicals specified in entry c. in which no individually specified chemical constitutes more than 10 % by the weight of the mixture.
- d. Copper foil with a minimum purity 95 % and of a thickness less than 100 µm;
  - e. Polymeric substances and films thereof of less than 0.5 mm of thickness, as follows:
    - e.1. Aromatic polyimides;
    - e.2. Parylenes;
    - e.3. Benzocyclobutenes (BCBs);
    - e.4. Polybenzoxazoles.]

**3D991 “Software” specially designed for the “development”, “production”, or “use” of electronic devices, or components controlled by entry 3A991 of Annex I of the Dual-Use Regulation, 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 entry 3B001.g and h of Annex I of the Dual-Use Regulation.**

**[<sup>F19</sup>3D992 “Software” specially designed for the test, “development” or “production” of Printed Circuit Boards (PCBs).]**

**3E991 “Technology” for the “development,” “production” or “use” of electronic devices or components controlled by entry 3A991 of Annex I of the Dual-Use Regulation, general purpose electronic equipment controlled by 3A992, or manufacturing and test equipment controlled by 3B991 or 3B992, or materials controlled by 3C992.**

**[<sup>F20</sup>3E992 “Technology” for the “development”, “production” or “use” of Printed Circuit Boards (PCBs).]**

#### Textual Amendments

- F13** Word in Sch. 2A Pt. 2 substituted (29.10.2022) by [The Russia \(Sanctions\) \(EU Exit\) \(Amendment\) \(No. 15\) Regulations 2022 \(S.I. 2022/1110\)](#), regs. 1(2)(b), **11(4)(a)**
- F14** Words in Sch. 2A Pt. 2 substituted (29.10.2022) by [The Russia \(Sanctions\) \(EU Exit\) \(Amendment\) \(No. 15\) Regulations 2022 \(S.I. 2022/1110\)](#), regs. 1(2)(b), **11(4)(c)**
- F15** Words in Sch. 2A Pt. 2 inserted (15.12.2023) by [The Russia \(Sanctions\) \(EU Exit\) \(Amendment\) \(No. 4\) Regulations 2023 \(S.I. 2023/1364\)](#), regs. 1(3), **22(4)**
- F16** Words in Sch. 2A Pt. 2 substituted (21.4.2023) by [The Russia \(Sanctions\) \(EU Exit\) \(Amendment\) Regulations 2023 \(S.I. 2023/440\)](#), regs. 1(2), **14(1)(c)**
- F17** Words in Sch. 2A Pt. 2 inserted (15.12.2023) by [The Russia \(Sanctions\) \(EU Exit\) \(Amendment\) \(No. 4\) Regulations 2023 \(S.I. 2023/1364\)](#), regs. 1(3), **22(5)**

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

- F18** Words in Sch. 2A Pt. 2 inserted (15.12.2023) by [The Russia \(Sanctions\) \(EU Exit\) \(Amendment\) \(No. 4\) Regulations 2023 \(S.I. 2023/1364\)](#), regs. 1(3), **22(6)**
- F19** Words in Sch. 2A Pt. 2 inserted (15.12.2023) by [The Russia \(Sanctions\) \(EU Exit\) \(Amendment\) \(No. 4\) Regulations 2023 \(S.I. 2023/1364\)](#), regs. 1(3), **22(7)**
- F20** Words in Sch. 2A Pt. 2 inserted (15.12.2023) by [The Russia \(Sanctions\) \(EU Exit\) \(Amendment\) \(No. 4\) Regulations 2023 \(S.I. 2023/1364\)](#), regs. 1(3), **22(8)**

## PART 3

### Computers

#### **4A994 Computers, “electronic assemblies” and related equipment, and specially designed components therefor.**

*Note 1: The control status of the “digital computers” and related equipment described in 4A994 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) of Annex I of the Dual-Use Regulation.*

*c. The “technology” for the “digital computers” and related equipment is determined by Category 4E of Annex I of the Dual-Use Regulation.*

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 “signal processing” or “image enhancement” equipment, 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:

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

c.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 designed for 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;
- 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 access controllers” or “communication channel controllers”.*

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

- k.1. 32 channels or more; and
- k.2. A resolution of 14 bit (plus sign bit) or more with a conversion rate of 200,000 [<sup>F21</sup>Hz] or more.

**4D993 “Program” proof and validation “software,” “software” allowing the automatic generation of “source codes,” and operating system “software” that are specially designed for “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 Annex I of the Dual-Use Regulation;
- c. Operating system “software” specially designed for “real-time processing” equipment that guarantees a “global interrupt latency time” of less than 20 µs.

*Note: “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 the interrupt.*

**4D994 Software” other than that controlled in entry 4D001 of Annex I of the Dual-Use Regulation specially designed or modified for the “development”, “production”, or “use” of equipment controlled by entry 4A101 of Annex I of the Dual-Use Regulation, or 4A994. 4E992 “Technology” for the “development,” “production,” or “use” of equipment controlled by 4A994, or “software” controlled by 4D993 or 4D994. 4E993 “Technology” for the “development” or “production” of equipment designed for “multi-data-stream processing.”**

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### Textual Amendments

- F21** Word in Sch. 2A Pt. 3 substituted (21.4.2023) by [The Russia \(Sanctions\) \(EU Exit\) \(Amendment\) Regulations 2023 \(S.I. 2023/440\)](#), regs. 1(2), **14(1)(d)**

## PART 4

### Telecommunications and information security

#### CHAPTER 1

##### Telecommunication equipment

#### **5A991 Telecommunication equipment.**

*Note:*

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. *'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.*
6. *'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.*
  - 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 therefor, having any of the following characteristics, functions or features:
    - 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 multiplex 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.*
- b.1. Employing digital techniques, including digital processing of analogue 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 be integrated and operated in any satellite system for civil use.*
- b.2. Modems using the ‘bandwidth of one voice channel’ with a “data signalling rate” exceeding 9,600 bits per second;
- b.3. Being “stored program controlled” digital cross-connect equipment with “digital transfer rate” exceeding 8.5 Mbit/s per port.
- b.4. Being equipment containing any of the following:
- b.4.a. ‘Network access controllers’ and their related common medium having a “digital transfer rate” exceeding 33 Mbit/s; *or*
  - b.4.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.*

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

b.5. Employing a “laser” and having any of the following:

- b.5.a. A transmission wavelength exceeding 1,000 nm; *or*
- b.5.b. Employing analogue techniques and having a bandwidth exceeding 45 MHz;

**Note:** 5A991.b.5.b does not control commercial TV systems.

- b.5.c. Employing coherent optical transmission or coherent optical detection techniques (also called optical heterodyne or homodyne techniques);
- b.5.d. Employing wavelength division multiplexing techniques; *or*
- b.5.e. Performing optical amplification;

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

- b.6.a. 31 GHz for satellite-earth station applications; *or*
- b.6.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.

b.7. Being radio equipment employing any of the following:

- b.7.a. Quadrature-amplitude-modulation (QAM) techniques above level 4 if the “total digital transfer rate” exceeds 8.5 Mbit/s;
- b.7.b. QAM techniques above level 16 if the “total digital transfer rate” is equal to or less than 8.5 Mbit/s;
- b.7.c. Other digital modulation techniques and having a “spectral efficiency” exceeding 3 bit/s/Hz; *or*
- b.7.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 in an ITU allocated band:

a. Having any of the following:

- a.1. Not exceeding 960 MHz; *or*
- a.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 therefor:



*Note: Statistical multiplexers with digital input and digital output which provide switching are treated as “stored program controlled” switches.*

- c.1. Data (message) switching equipment or systems designed for “packet-mode operation” and electronic assemblies and components therefor,
- c.2. Not used;
- c.3. Routing or switching of ‘datagram’ packets;

*Note: The restrictions in 5A991.c.3 do not apply to networks restricted to using only ‘network access controllers’ or to ‘network access controllers’ themselves.*

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

*Note: 5A991.c.5 does not control single-level call pre-emption.*

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

- c.10.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.*

- c.10.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 or lines not exceeding the limits in 5A991.c.10.*

- c.11. “Optical switching”;
  - c.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:
  - e.1. Receives data from the nodes; and
  - e.2. Process these data in order to provide control of traffic not requiring operator decisions, and thereby performing “dynamic adaptive routing”;

*Note: 5A991.e does not preclude control of traffic as a function of predictable statistical traffic conditions.*

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

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 Organisation (ICAO) standards (microwave landing systems (MLS));

g. Mobile communications equipment and electronic assemblies and components therefor;

h. Radio relay communications equipment designed for use at frequencies equal to or exceeding 19.7 GHz and components therefor.

**5B991 Telecommunications test equipment.**

**5C991 Preforms of glass or of any other material optimised for the manufacture of optical fibres 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 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 controlled by 5A991 or 5B991, or “software” controlled by 5D991, and other “technologies” as follows:**

*Note:*

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 fiber 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’.

a. Specific “technologies” as follows:

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

a.2. “Technology” for the “development” of equipment employing ‘Synchronous Digital Hierarchy’ (‘SDH’) or ‘Synchronous Optical Network’ (‘SONET’) techniques.

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## CHAPTER 2

### Information security

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**5A992 “Information security” systems, equipment and components, described by entry 5A002 of Annex I of the Dual-Use Regulation and classified under Note 3 to Category 5, Part 2 of Annex I of the Dual-Use Regulation (Cryptography Note).**

**5D992 “Information Security” “software” described by entry 5D002 to Category 5, Part 2 in Annex I of the Dual-Use Regulation and classified under Note 3 to Category 5, Part 2 of Annex I of the Dual-Use Regulation (Cryptography Note).**

*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.*

**5E992 “Information Security” “technology” as follows:**

- a. “Technology” for the “use” of items controlled by 5A992 or “software” controlled by 5D992.
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## PART 5

### Sensors and lasers

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**6A991 Marine or terrestrial acoustic equipment capable of detecting or locating underwater objects or features or positioning surface vessels or underwater vehicles; and specially designed components therefor.**

**6A992 Optical Sensors as follows**

- a. Image intensifier tubes and specially designed components therefor, as follows:
  - a.1. Image intensifier tubes having all the following:
    - a.1.a. A peak response in wavelength range exceeding 400 nm, but not exceeding 1,050 nm;
    - a.1.b. A microchannel plate for electron image amplification with a hole pitch (centre-to-centre spacing) of less than 25 µm; *and*
    - a.1.c. Having any of the following:
      - a.1.c.1. An S-20, S-25 or multialkali photocathode; *or*
      - a.1.c.2. A GaAs or GaInAs photocathode;
  - a.2. Specially designed microchannel plates having both of the following:
    - a.2.a. 15,000 or more hollow tubes per plate; *and*
    - a.2.b. Hole pitch (centre-to-centre spacing) of less than 25 µm.
- 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 entry 6A003.b.4. of Annex I of the Dual-Use Regulation.

**6A994 Optics as follows:**

- a. Optical filters:
  - a.1. For wavelengths longer than 250 nm, comprised of multi-layer optical coatings and having either of the following:
    - a.1.a. Bandwidths equal to or less than 1 nm Full Width Half Intensity (FWHI) and peak transmission of 90% or more; *or*
    - a.1.b. Bandwidths equal to or less than 0.1 nm FWHI and peak transmission of 50% or more;

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

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

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

**6A995 “Lasers” as follows:**

- a. Carbon dioxide (CO<sub>2</sub>) “lasers” having any of the following:
  - a.1. A CW output power exceeding 10 kW;
  - a.2. A pulsed output with a “pulse duration” exceeding 10 µs; and
    - a.2.a. An average output power exceeding 10 kW; or
    - a.2.b. A pulsed “peak power” exceeding 100 kW; or
  - a.3. A pulsed output with a “pulse duration” equal to or less than 10 µs; *and*
    - a.3.a. A pulse energy exceeding 5 J per pulse and “peak power” exceeding 2.5 kW; *or*
    - a.3.b. An average output power exceeding 2.5 kW;
- b. Semiconductor lasers, as follows
  - b.1. Individual, single-transverse mode semiconductor “lasers” having:
    - b.1.a. An average output power exceeding 100 mW; *or*
    - b.1.b. A wavelength exceeding 1,050 nm;
  - b.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 but not exceeding 1,150 nm and having any of the following:
  - d.1. A “pulse duration” equal to or exceeding
    - 1 ns but not exceeding 1 µs, and having any of the following:
      - d.1.a. A single transverse mode output and having any of the following:
        - d.1.a.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 1kHz; *or*
        - d.1.a.2. An “average output power” exceeding 20 W; or

- d.1.b. A multiple transverse mode output and having any of the following:
  - d.1.b.1. A ‘wall-plug efficiency’ exceeding 18% and an “average output power” exceeding 30W;
  - d.1.b.2. A “peak power” exceeding 200 MW; or
  - d.1.b.3. An “average output power” exceeding 50 W; or
- d.2. A “pulse duration” exceeding 1  $\mu$ s and having any of the following:
  - d.2.a. A single transverse mode output and having any of the following:
    - d.2.a.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
    - d.2.a.2. An “average output power” exceeding 20 W; or
  - d.2.b. A multiple transverse mode output and having any of the following:
    - d.2.b.1. A ‘wall-plug efficiency’ exceeding 18% and an “average output power” exceeding 30 W; or
    - d.2.b.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 1,150nm and having any of the following:
  - e.1. A single transverse mode output and having any of the following:
    - e.1.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
    - e.1.b. An “average output power” exceeding 50 W; or
  - e.2. A multiple transverse mode output and having any of the following:
    - e.2.a. A ‘wall-plug efficiency’ exceeding 18% and an “average output power” exceeding 30 W; or
    - e.2.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 2kW 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 1555 nm and having any of the following:
  - f.1. An output energy exceeding 100 mJ per pulse and a pulsed “peak power” exceeding 1 W; or
  - f.2. An average or CW output power exceeding 1 W;
- g. Free electron “lasers”.

**6A996 “Magnetometers”, “Superconductive” electromagnetic sensors, and specially designed components therefor, as follows**

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

- a. “Magnetometers”, having a ‘sensitivity’ lower (better) than 1.0 nT (rms) per square root Hz.

**Technical Note:** For the purposes of 6A996, ‘sensitivity’ (noise level) is the root mean square of the device -limited noise floor which is the lowest signal that can be measured.

- b. “Superconductive” electromagnetic sensors and components manufactured from “superconductive” materials, having all of the following:
  - b.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));
  - b.2. Designed for sensing electromagnetic field variations at frequencies of 1 KHz or less; *and*
  - b.3. Having any of the following:
    - b.3.a. Incorporating thin-film SQUIDS with a minimum feature size of less than 2 µm and with associated input and output coupling circuits;
    - b.3.b. Designed to operate with a magnetic field slew rate exceeding  $1 \times 10^6$  magnetic flux quanta per second;
    - b.3.c. Designed to function without magnetic shielding in the earth’s ambient magnetic field; *or*
    - b.3.d. Having a temperature coefficient less (smaller) than 0.1 magnetic flux quantum/K.

**6A997 Gravity meters (gravimeters) for ground use as follows:**

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

**6A998 Radar systems, equipment and specially designed components therefor, as follows:**

- a. Airborne radar equipment 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. Millimetre wave enhanced vision radar imaging systems specially designed for rotary wing aircraft and having all of the following:
  - c.1. Operates at a frequency of 94 GHz;
  - c.2. An average output power of less than 20 mW;
  - c.3. Radar beam width of 1 degree; and
  - c.4. Operating range equal to or greater than 1500 m.

**6A999 Specific processing equipment, as follows:**

- a. Seismic detection equipment not controlled in paragraph c.
- b. Radiation hardened TV cameras,
- 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 designed components therefor, specially designed or modified for any of the following:**

- a. For the manufacture or inspection of:
  - a.1. Free electron “laser” magnet wigglers;
  - a.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 less than 500 mm (high birefringence) or optical sensor materials not described in entry 6C002.b. of Annex I of the Dual-Use Regulation and having a zinc content of equal to or more than 6% by ‘mole fraction.’**

Note: ‘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.**

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

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

  - a.2. Bulk fluoride glass made from compounds controlled by entry 6C004.e.1 of Annex I of the Dual-Use Regulation;
- 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.

**6D991 “Software,” specially designed for the “development”, “production”, or “use” of items controlled by entries 6A002 and 6A003 of Annex I of the Dual-Use Regulation, 6A991, 6A996, 6A997, or 6A998.**

**6D992 “Software” specially designed for the “development” or “production” of equipment controlled by 6A992, 6A994, or 6A995.**

**6D993 Other “software”.**

- a. Air Traffic Control (ATC) “software” application “programs” hosted on general purpose computers located at Air Traffic Control centres, and capable of automatically handing over primary radar target data (if not correlated with secondary surveillance radar (SSR) data) from the host ATC centre to another ATC centre.
- b. “Software” specially designed for seismic intrusion detection systems in 6A999.c.
- c. “Source Code” specially designed for seismic intrusion detection systems in 6A999.c.

**6E991 “Technology” for the “development”, “production” or “use” of equipment controlled by 6A991, 6A996, 6A997, 6A998 or 6A99.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<sup>2</sup> of surface area per year on any single spindle and having all of the following:
  - a.1. Area exceeding 1 m<sup>2</sup>, and

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

- a.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:
  - d.1. ‘Sensitivity’ lower (better) than 0.05 nT (rms) per square root Hz at frequencies of less than 1 Hz; or
  - d.2. ‘Sensitivity’ lower (better) than  $1 \times 10^{-3}$  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:
  - e.1. A response in the wavelength range exceeding 700 nm but not exceeding 1500 nm; and
  - e.2. A combination of an infrared photodetector, light emitting diode (LED), and nanocrystal to convert infrared light into visible light.

*Technical Note: For the purposes of entry 6E993, ‘sensitivity’ (or noise level) is the root mean square of the device-limited noise floor which is the lowest signal that can be measured.*

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## PART 6

### Navigation and avionics

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**7A994 Navigation direction finding equipment, airborne communication equipment, all aircraft inertial navigation systems, and other avionics equipment, including components, 7B994 Other equipment for the test, inspection, or “production” of navigation and avionics equipment.**

**7D994 “Software” for the “development”, “production”, or “use” of navigation, airborne communication and other avionics.**

**7E994 “Technology” for the “development,” “production” or “use” of navigation, airborne communication, and other avionics equipment.**

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## PART 7

### Marine

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**8A992 Vessels, marine systems or equipment, and specially designed components therefor, and marine boilers and components therefor.**

- a. Underwater vision systems, as follows:

- a.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



a.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 autofocus 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;
- e. Other submersible systems;
- [<sup>F22</sup>f. Vessels (surface or underwater), including inflatable boats, and specially designed components therefor;]
- [<sup>F23</sup>g. Marine engines (both inboard and outboard), and submarine engines, and specially designed components therefor;]
- h. Other self-contained underwater breathing apparatus (scuba gear) and related equipment, ;
- i. Life jackets, inflation cartridges, compasses, wetsuits, masks, fins, weight belts, and dive computers;
- j. Underwater lights and propulsion equipment;
- k. Air compressors and filtration systems, specially designed for filling air cylinders.
- l. Marine boilers designed to have any of the following:
  - l.1. Heat release rate (at maximum rating) equal to or in excess of 190,000 BTU per hour per cubic foot of furnace volume; or
  - l.2. Ratio of steam generated in kg per hour (at maximum rating) to the dry weight of the boiler in kg equal to or in excess of 0.83.
- m. Components for marine boilers described in 8A992.l.

**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.**

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

[<sup>F24</sup>maritime goods and maritime technology within the meaning in regulation 21 (interpretation of Part 5).]

#### Textual Amendments

**F22** Words in [Sch. 2A Pt. 7](#) substituted (21.4.2023) by [The Russia \(Sanctions\) \(EU Exit\) \(Amendment\) Regulations 2023 \(S.I. 2023/440\)](#), [regs. 1\(2\), 14\(1\)\(e\)\(i\)](#)

**F23** Words in [Sch. 2A Pt. 7](#) substituted (21.4.2023) by [The Russia \(Sanctions\) \(EU Exit\) \(Amendment\) Regulations 2023 \(S.I. 2023/440\)](#), [regs. 1\(2\), 14\(1\)\(e\)\(ii\)](#)

**F24** Words in Sch. 2A Pt. 7 inserted (15.7.2022) by The Russia (Sanctions) (EU Exit) (Amendment) (No. 11) Regulations 2022 (S.I. 2022/792), regs. 1(2), 12(4) (with reg. 13)

## PART 8

### Aerospace and Propulsion

#### **9A990 Diesel engines and tractor units, and specially designed components therefor.**

- a. Diesel engines for trucks, tractor units, and automotive applications of continuous power output of 400 BHP (298 kW) or greater (performance based on Society of Automotive Engineers J1349 standard conditions of 100 kPa and 25°C);
- b. Off-road semi-trailer wheeled tractor units of carriage capacity 9 t or more and specially designed components therefor;
- c. On-road semi-trailer tractor units, with single or tandem rear axles rated for 9 t per axel or greater and specially designed components therefor.

#### **9A991 “Aircraft” and gas turbine engines and components**

- a. Not used;
- [<sup>F25</sup>b. Not used];
- c. Aero gas turbine engines and specially designed components therefor;
- [<sup>F26</sup>d. Not used];
- e. Pressurised aircraft breathing equipment and specially designed components therefor;
- [<sup>F27</sup>f. reciprocating or rotary internal combustion piston engines;
- g. electric engines].

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#### **9B990 Vibration test equipment and specially designed components therefor.**

#### **9B991 “Equipment,” tooling or fixtures specially designed for manufacturing or measuring gas turbine blades, vanes or tip shroud castings, as follows:**

- a. Automated equipment using non-mechanical methods for measuring aerofoil wall thickness;
- b. Tooling, fixtures or measuring equipment for the “laser”, water jet or ECM/EDM hole drilling processes controlled by entry 9E003.c of Annex I of the Dual-Use Regulation;
- c. Ceramic core leaching equipment;
- d. Ceramic core manufacturing equipment or tools;
- e. Ceramic shell wax pattern preparation equipment;
- f. Ceramic shell burn out or firing equipment.

#### **9D990 “Software”, 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”, 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 entry 9E003 of Annex I of the Dual-Use Regulation, as follows:**

- a. Rotor blade tip clearance control systems employing active compensating casing “technology” limited to a design and development data base;
- b. Gas bearing for turbine engine rotor assemblies.]

#### Textual Amendments

- F25** Words in Sch. 2A Pt. 8 substituted (8.3.2022 at 5.00 p.m.) by The Russia (Sanctions) (EU Exit) (Amendment) (No. 6) Regulations 2022 (S.I. 2022/241), regs. 1(2), **14(a)(i)**
- F26** Words in Sch. 2A Pt. 8 substituted (8.3.2022 at 5.00 p.m.) by The Russia (Sanctions) (EU Exit) (Amendment) (No. 6) Regulations 2022 (S.I. 2022/241), regs. 1(2), **14(a)(ii)**
- F27** Words in Sch. 2A Pt. 8 inserted (21.4.2023) by The Russia (Sanctions) (EU Exit) (Amendment) Regulations 2023 (S.I. 2023/440), regs. 1(2), **14(1)(f)**
- F28** Words in Sch. 2A Pt. 8 omitted (8.3.2022 at 5.00 p.m.) by virtue of The Russia (Sanctions) (EU Exit) (Amendment) (No. 6) Regulations 2022 (S.I. 2022/241), regs. 1(2), **14(b)**

#### [<sup>F29</sup>Jet fuel and fuel additives

Any thing falling within a commodity code mentioned in column 1 of the following table.

#### Textual Amendments

- F29** Words and Table in Sch. 2A Pt. 8 inserted (15.7.2022) by The Russia (Sanctions) (EU Exit) (Amendment) (No. 11) Regulations 2022 (S.I. 2022/792), reg. 1(2), **Sch. 2** (with reg. 13)

| Commodity code (1) | Item (2)  |
|--------------------|---|
|                    | Jet fuel (other than kerosene):   |
| 2710 12 70         | —spirit type jet fuel (light oils)  |
| 2710 19 29         | —other than kerosene (medium oils)  |
| 2710 19 21         | —kerosene type jet fuel (medium oils)   |
| 2710 20 90         | —kerosene type jet fuel blended with biodiesel  |
|                    | Oxidation inhibitors  |
|                    | Oxidation inhibitors used in additives for lubricating oils:                          |
| 3811 21 00         | — oxidation inhibitors containing petroleum oils                                      |
| 3811 29 00         | — other oxidation inhibitors  |
| 3811 90 00         | Oxidation inhibitors used for other liquids used for the same purpose as mineral oils |
|                    | Static dissipater additives   |

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

| <i>Commodity code (1)</i> | <i>Item (2)</i>  |
|---------------------------|--|
|                           | Static dissipater additives for lubricating oils:  |
| 3811 21 00                | — containing petroleum oils  |
| 3811 29 00                | — other  |
| 3811 90 00                | Static dissipater additives for other liquids used for the same purpose as mineral oils  |
|                           | Corrosion inhibitors   |
|                           | Corrosion inhibitors for lubricating oils:   |
| 3811 21 00                | — containing petroleum oils  |
| 3811 29 00                | — other  |
| 3811 90 00                | Corrosion inhibitors for other liquids used for the same purpose as mineral oils         |
|                           | Fuel system icing inhibitors (anti-icing additives)                                      |
|                           | Fuel system icing inhibitors for lubricating oils:                                       |
| 3811 21 00                | — containing petroleum oils  |
| 3811 29 00                | — other  |
| 3811 90 00                | Fuel system icing inhibitors for other liquids used for the same purpose as mineral oils |
|                           | Metal de-activators  |
|                           | Metal de-activators for lubricating oils:  |
| 3811 21 00                | —containing petroleum oils   |
| 3811 29 00                | — other  |
| 3811 90 00                | Metal de-activator for other liquids used for the same purpose as mineral oils           |
|                           | Biocide additives  |
|                           | Biocide additives for lubricating oils:  |
| 3811 21 00                | — containing petroleum oils  |
| 3811 29 00                | — other  |
| 3811 90 00                | Biocide additives for other liquids used for the same purpose as mineral oils            |
|                           | Thermal stability improver additives   |
|                           | Thermal stability improver for lubricating oils:   |
| 3811 21 00                | — containing petroleum oils  |
| 3811 29 00                | — other  |

| Commodity code (1) | Item (2)   |
|--------------------|--|
| 3811 90 00         | Thermal stability improver for other liquids used for the same purposes as mineral oils] |

## F30 PART 9

### Miscellaneous items

#### Textual Amendments

**F30** Sch. 2A Pt. 9 inserted (16.12.2022) by The Russia (Sanctions) (EU Exit) (Amendment) (No. 17) Regulations 2022 (S.I. 2022/1331), reg. 1(2)(b), Sch. 1 Pt. 2

1. Equipment for oil production or oil exploration as follows—
  - (a) drill head integrated measurement equipment, including inertial navigation systems for measurement while drilling (MWD);
  - (b) gas monitoring systems and detectors therefor, designed for continuous operation and detection of hydrogen sulphide;
  - (c) equipment for seismological measurements, including reflection seismetics and seismic vibrators;
  - (d) sediment echo sounders.
2. Collector equipment for metal ores in deep seabed.
3. Equipment for the “production” of printed electronics for organic light emitting diodes (OLED), organic field-effect transistors (OFET) or organic photovoltaic cells (OPVC).
4. Equipment for the “production” of microelectromechanical systems (MEMS) using the mechanical properties of silicon, including sensors in chip format like pressure membranes, bending beams or micro adjustment devices.
5. Equipment, specially designed for the production of E-Fuels (electrofuels and synthetic fuels) or ultra efficient solar cells (efficiency > 30 %).
6. Numerical controlled machine tools, having one or more linear axis with a travel length greater than 8000 mm.
7. Advanced materials as follows—
  - (a) materials for cloaking or adaptive camouflage;
  - (b) metamaterials, e.g. with a negative refractive index;
  - (c) high entropy alloys (HEA);
  - (d) Heusler compounds;
  - (e) Kitaev materials, including kitaev spin liquids.
8. Conjugated polymers (conductive, semiconductive, electroluminescent) for printed or organic electronics.
9. Energetic materials as follows and mixtures thereof, except where the material is incorporated in a medical product—
  - (a) ammonium picrate (CAS 131-74-8);
  - (b) black powder;

**Changes to legislation:** There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A. (See end of Document for details)

- (c) hexanitrodiphenylamine (CAS 131-73-7);
- (d) difluoroamine (CAS 10405-27-3);
- (e) nitrostarch (CAS 9056-38-6);
- (f) tetranitronaphthalene;
- (g) trinitroanisole;
- (h) trinitronaphthalene;
- (i) trinitroxylene;
- (j) N-pyrrolidinone; 1-methyl-2-pyrrolidinone (CAS 872-50-4);
- (k) dioctylmaleate (CAS 142-16-5);
- (l) ethylhexylacrylate (CAS 103-11-7);
- (m) triethylaluminium (TEA) (CAS 97-93-8), trimethylaluminium (TMA) (CAS 75-24-1), and other pyrophoric metal alkyls and aryls of lithium, sodium, magnesium, zinc or boron;
- (n) nitroglycerin (or glyceroltrinitrate, trinitroglycerine) (NG) (CAS 55-63-0);
- (o) Ethylenediaminedinitrate (EDDN) (CAS 20829-66-7);
- (p) lead azide (CAS 13424-46-9), normal lead styphnate (CAS 15245-44-0) and basic lead styphnate (CAS 12403-82-6), and primary explosives or priming compositions containing azides or azide complexes;
- (q) diethyldiphenylurea (CAS 85-98-3); dimethyldiphenylurea (CAS 611-92-7); methylethyldiphenyl urea;
- (r) N,N-diphenylurea (unsymmetrical diphenylurea) (CAS 603-54-3);
- (s) methyl-N,N-diphenylurea (methyl unsymmetrical diphenylurea) (CAS 13114-72-2);
- (t) ethyl-N,N-diphenylurea (ethyl unsymmetrical diphenylurea) (CAS 64544-71-4);
- (u) 4-Nitrodiphenylamine (4-NDPA)(CAS 836-30-6);
- (v) 2,2-dinitropropanol (CAS 918-52-5).

*Note: For the purpose of this entry, “medical product” means (1) a pharmaceutical formulation designed for human administration in the treatment of medical conditions, and (2) prepackaged for distribution as a clinical or medical product.*

**10.** “Technology” “required” for the “development”, “production” or “use” of the systems, equipment, components and software specified in paragraphs 1 to 8.

**11.** “Software” specially designed or modified for the “development”, “production” or “use” of the systems, equipment and components specified in paragraphs 3 to 6.

**12.** Nettings, Canopies, Tents, Blankets and Apparel, specially designed for camouflage.]]

#### Textual Amendments

**F31** Sch. 2A Pt. 9 para. 12 inserted (21.4.2023) by The Russia (Sanctions) (EU Exit) (Amendment) Regulations 2023 (S.I. 2023/440), regs. 1(2), 14(1)(g)

**Changes to legislation:**

There are currently no known outstanding effects for the The Russia (Sanctions) (EU Exit) Regulations 2019, SCHEDULE 2A.