

## ANNEX I

## ANNEX I

**GOODS AND TECHNOLOGY REFERRED TO IN ARTICLES 2 AND 3**

All goods and technology listed in Annex I to Regulation (EC) No 428/2009.

## ANNEX Ia

**GOODS AND TECHNOLOGY REFERRED TO IN ARTICLES 2 AND 3**

Other items, materials, equipment, goods and technology which could contribute to North Korea's nuclear-related, other weapons of mass destruction-related or ballistic missile-related programmes.

1. Unless otherwise stated, reference numbers used in the column entitled “Description” refer to the descriptions of dual use items and technology set out in Annex I to Regulation (EC) No 428/2009.
2. A reference number in the column entitled “Related item from Annex I to Regulation (EC) No 428/2009” means that the characteristics of the item described in the column “Description” lie outside the parameters set out in the description of the dual use entry referred to.
3. Definitions of terms between “single quotation marks” are given in a technical note to the relevant item.
4. Definitions of terms between “double quotation marks” can be found in Annex I to Regulation (EC) No 428/2009.

**GENERAL NOTES**

1. The object of the prohibitions contained in this Annex should not be defeated by the export of any non-prohibited goods (including plants) containing one or more prohibited components when the prohibited component or components are the principal element of the goods and can feasibly be removed or used for other purposes.

*N.B.: In judging whether the prohibited component or components are to be considered the principal element, it is necessary to weigh the factors of quantity, value and technological know-how involved and other special circumstances which might establish the prohibited component or components as the principal element of the goods being procured.*

2. Goods specified in this Annex include both new and used goods.

**GENERAL TECHNOLOGY NOTE (GTN)**(To be read in conjunction with Part C)

1. The sale, supply, transfer or export of “technology” which is “required” for the “development”, “production” or “use” of goods the sale, supply, transfer or export of which is prohibited in Part A (Goods) below, is prohibited in accordance with the provisions of Part B.
2. The “technology” “required” for the “development”, “production” or “use” of prohibited goods remains under prohibition even when applicable to non-prohibited goods.

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3. Prohibitions do not apply to that “technology” which is the minimum necessary for the installation, operation, maintenance (checking) and repair of those goods which are not prohibited.
4. Prohibitions on “technology” transfer do not apply to information “in the public domain”, to “basic scientific research” or to the minimum necessary information for patent applications.

A. GOODS

**NUCLEAR MATERIALS, FACILITIES, AND EQUIPMENT**

I.A0.

GOODS

No	Description	Related item from Annex I to Regulation (EC) No 428/2009
I.A0.001	Hollow cathode lamps as follows: a. Iodine hollow cathode lamps with windows in pure silicon or quartz; b. Uranium hollow cathode lamps.	
I.A0.002	Faraday isolators in the wavelength range 500 nm – 650 nm	
I.A0.003	Optical gratings in the wavelength range 500 nm – 650 nm	
I.A0.004	Optical fibres in the wavelength range 500 nm – 650 nm coated with anti-reflecting layers in the wavelength range 500 nm – 650 nm and having a core diameter greater than 0,4 mm but not exceeding 2 mm.	
I.A0.005	Nuclear reactor vessel components and testing equipment, other than those specified in 0A001, as follows: a. Seals; b. Internal components;	0A001

	c. Sealing, testing and measurement equipment.	
I.A0.006	Nuclear detection systems, other than those specified in 0A001.j. or 1A004.c., for detection, identification or quantification of radioactive materials or radiation of nuclear origin and specially designed components thereof. <i>N.B: For personal equipment refer to I.A1.004 below.</i>	0A001.j. 1A004.c.
I.A0.007	Bellows-sealed valves other than those specified in 0B001.c.6., 2A226 or 2B350, made of aluminium alloy or stainless steel type 304, 304L or 316L.	0B001.c.6.2A226 2B350
I.A0.008	Laser mirrors, other than those specified in 6A005.e., consisting of substrates having a thermal expansion coefficient of $10^{-6} \text{ K}^{-1}$ or less at 20 °C (e.g. fused silica or sapphire). <i>Note: This item does not cover optical systems specially designed for astronomical applications, except if the mirrors contain fused silica.</i>	0B001.g.5. 6A005.e.
I.A0.009	Laser lenses, other than those specified in 6A005.e.2, consisting of substrates having a thermal expansion coefficient of $10^{-6} \text{ K}^{-1}$ or less at 20 °C (e.g. fused silica).	0B001.g. 6A005.e.2.
I.A0.010	Pipes, piping, flanges, fittings made of, or lined with nickel, or nickel alloy containing more than 40 % nickel by weight, other than those specified in 2B350.h.1.	2B350
I.A0.011	Vacuum pumps other than those specified in 0B002.f.2. or 2B231, as follows:	0B002.f.2. 2B231

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	<p>a. Turbo-molecular pumps having a flow-rate equal to or greater than 400 l/s;</p> <p>b. Roots type vacuum roughing pumps having a volumetric aspiration flow-rate greater than 200 m<sup>3</sup>/h;</p> <p>c. Bellows-sealed, scroll, dry compressor, and bellows-sealed, scroll, dry vacuum pumps.</p>	
I.A0.012	Shielded enclosures for the manipulation, storage and handling of radioactive substances (hot cells).	0B006
I.A0.013	“Natural uranium” or “depleted uranium” or thorium in the form of metal, alloy, chemical compound or concentrate and any other material containing one or more of the foregoing, other than those specified in 0C001.	0C001
I.A0.014	Detonation chambers having a capacity of explosion absorption of more than 2,5 kg TNT equivalent.	

## SPECIAL MATERIALS AND RELATED EQUIPMENT

### I.A1.

#### GOODS

No	Description	Related item from Annex I to Regulation (EC) No 428/2009
I.A1.001	Bis(2-ethylhexyl) phosphoric acid (HDEHP or D2HPA) Chemical Abstract Number (CAS): [CAS 298-07-7] solvent in any quantity, with a purity greater than 90 %.	

I.A1.002	Fluorine gas CAS: [7782-41-4], with a purity of at least 95 %.	
I.A1.003	<p>Ring-shaped seals and gaskets, having an inner diameter of 400 mm or less, made of any of the following materials:</p> <p>a. Copolymers of vinylidene fluoride having 75 % or more beta crystalline structure without stretching;</p> <p>b. Fluorinated polyimides containing 10 % by weight or more of combined fluorine;</p> <p>c. Fluorinated phosphazene elastomers containing 30 % by weight or more of combined fluorine;</p> <p>d. Polychlorotrifluoroethylene (PCTFE, e.g. Kel-F®);</p> <p>e. Fluoro-elastomers (e.g., Viton®, Tecnoflon®);</p> <p>f. Polytetrafluoroethylene (PTFE).</p>	1A001
I.A1.004	Personal equipment for detecting radiation of nuclear origin, other than that specified in 1A004.c., including personal dosimeters.	1A004.c.
I.A1.005	Electrolytic cells for fluorine production, other than those specified in 1B225, with an output capacity greater than 100 g of fluorine per hour.	1B225
I.A1.006	Catalysts, other than those specified in 1A225 or 1B231, containing platinum, palladium or rhodium, usable for promoting the hydrogen isotope exchange reaction	1A225 1B231

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	between hydrogen and water for the recovery of tritium from heavy water or for the production of heavy water.	
I.A1.007	<p>Aluminium and its alloys, other than those specified in 1C002.b.4. or 1C202.a, in crude or semi-fabricated form having either of the following characteristics:</p> <p>a. “Capable of” an ultimate tensile strength of 460 MPa or more at 293 K (20 °C); or</p> <p>b. Having a tensile strength of 415 MPa or more at 298 K (25 °C).</p> <p><i>Technical note: The phrase alloys “capable of” encompasses alloys before or after heat treatment.</i></p>	1C002.b.4. 1C202.a.
I.A1.008	<p>Magnetic metals, of all types and of whatever form, other than those specified in 1C003.a. having an “initial relative permeability” of 120 000 or more and a thickness between 0,05 mm and 0,1 mm.</p> <p><i>Technical note: Measurement of “initial relative permeability” must be performed on fully annealed materials.</i></p>	1C003.a.
I.A1.009	<p>“Fibrous or filamentary materials” or prepregs, other than those specified in 1C010.a., 1C010.b., 1C210.a. or 1C210.b. as follows:</p> <p>a. Aramid “fibrous or filamentary materials” having either of the following characteristics:</p> <p>1.A “specific modulus” exceeding</p>	1C010.a. 1C010.b. 1C210.a. 1C210.b.

		$10 \times 10^6$ m; or “specific tensile strength” exceeding $17 \times 10^4$ m;
b.	Glass “fibrous or filamentary materials” having either of the following characteristics:	
	1.A	“specific modulus” exceeding $3,18 \times 10^6$ m; or
	2.A	“specific tensile strength” exceeding $76,2 \times 10^3$ m;
c.	Thermoset resin- impregnated continuous “yarns”, “rovings”, “tows” or “tapes” with a width of 15 mm or less (once prepregs), made from glass “fibrous or filamentary materials” other than those specified in I.A1.010.a. below.	
d.	Carbon “fibrous or filamentary materials”;	
e.	Thermoset resin- impregnated continuous “yarns”, “rovings”, “tows”, or “tapes”, made from carbon “fibrous or filamentary materials”;	

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	<p>f. Polyacrylonitrile (PAN) continuous “yarns”, “rovings”, “tows” or “tapes”.</p> <p>g. Para-aramid “fibrous or filamentary materials” (Kevlar® and other Kevlar®-like fibres).</p>	
I.A1.010	<p>Resin-impregnated or pitch-impregnated fibres (prepregs), metal or carbon-coated fibres (preforms) or “carbon fibre preforms”, as follows:</p> <p>a. Made from “fibrous or filamentary materials” specified in I.A1.009 above;</p> <p>b. Epoxy resin “matrix” impregnated carbon “fibrous or filamentary materials” (prepregs), specified in 1C010.a., 1C010.b. or 1C010.c., for the repair of aircraft structures or laminates, of which the size of individual sheets does not exceed 50 cm × 90 cm;</p> <p>c. Prepregs specified in 1C010.a., 1C010.b. or 1C010.c., when impregnated with phenolic or epoxy resins having a glass transition temperature (T<sub>g</sub>) less than 433 K (160 °C) and a cure temperature lower than the glass transition temperature.</p>	<p>1C010</p> <p>1C210</p>

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I.A1.011	Reinforced silicon carbide ceramic composites usable for nose tips, re-entry vehicles, nozzle flaps, usable in “missiles”, other than those specified in 1C107.	1C107
I.A1.012	Not used	
I.A1.013	Tantalum, tantalum carbide, tungsten, tungsten carbide and alloys thereof, other than those specified in 1C226, having both of the following characteristics: a. In forms having a hollow cylindrical or spherical symmetry (including cylinder segments) with an inside diameter between 50 mm and 300 mm; <i>and</i> b. A mass greater than 5 kg.	1C226
I.A1.014	“Elemental powders” of cobalt, neodymium or samarium or alloys or mixtures thereof containing at least 20 % by weight of cobalt, neodymium or samarium, with a particle size less than 200 µm. <i>Technical note:</i> <i>“Elemental powder” means a high purity powder of one element.</i>	
I.A1.015	Pure tributyl phosphate (TBP) [CAS No 126-73-8] or any mixture having a TBP content of more than 5 % by weight.	
I.A1.016	Maraging steel, other than those specified by 1C116 or 1C216. <i>Technical notes:</i> <i>I. The phrase maraging steel “capable of” encompasses</i>	1C116 1C216

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	<p><i>maraging steel before or after heat treatment.</i></p> <p>2. <i>Maraging steels are iron alloys generally characterised by high nickel, very low carbon content and the use of substitutional elements or precipitates to produce strengthening and age-hardening of the alloy.</i></p>	
I.A1.017	<p>Metals, metal powders and material as follows:</p> <p>a. Tungsten and tungsten alloys, other than those specified in 1C117, in the form of uniform spherical or atomized particles of 500 µm (micrometre) diameter or less with a tungsten content of 97 % by weight or more;</p> <p>b. Molybdenum and molybdenum alloys, other than those specified in 1C117, in the form of uniform spherical or atomized particles of 500 µm diameter or less with a molybdenum content of 97 % by weight or more;</p> <p>c. Tungsten materials in the solid form, other than those specified in 1C226 having material compositions as follows:</p>	<p>1C117 1C226</p>

	<ol style="list-style-type: none"> <li>1. Tungsten and alloys containing 97 % by weight or more of tungsten;</li> <li>2. Copper infiltrated tungsten containing 80 % by weight or more of tungsten;</li> <li>or</li> <li>3. Silver infiltrated tungsten containing 80 % by weight or more of tungsten.</li> </ol>	
I.A1.018	<p>Soft magnetic alloys, other than those specified in 1C003, having a chemical composition as follows:</p> <ol style="list-style-type: none"> <li>a Iron content between 30 % and 60 %; and</li> <li>b Cobalt content between 40 % and 60 %.</li> </ol>	1C003
I.A1.019	Not used	
I.A1.020	Graphite, other than that specified in 0C004 or 1C107.a, designed or specified for use in Electrical Discharge Machining (EDM) machines	0C004 1C107a

**MATERIALS PROCESSING**

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## I.A2.

## GOODS

No	Description	Related item from Annex I to Regulation (EC) No 428/2009
I.A2.001	<p>Vibration test systems, equipment and components thereof, other than those specified in 2B116:</p> <p>a. Vibration test systems employing feedback or closed loop techniques and incorporating a digital controller, capable of vibrating a system at an acceleration equal to or greater than 0,1 g rms between 0,1 Hz and 2 kHz and imparting forces equal to or greater than 50 kN, measured “bare table”;</p> <p>b. Digital controllers, combined with specially designed vibration test “software”, with a “real-time control bandwidth” greater than 5 kHz designed for use with vibration test systems specified in a.;</p> <p><i>Technical note: “Real-time control bandwidth” is defined as the maximum rate at which a controller can execute complete cycles of sampling, processing data and</i></p>	2B116

**a** Manufacturers calculating positioning accuracy in accordance with ISO 230/2 (1997) should consult the competent authorities of the Member State in which they are established.

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	<p><i>transmitting control signals.</i></p> <p>c. Vibration thrusters (shaker units), with or without associated amplifiers, capable of imparting a force equal to or greater than 50 kN, measured “bare table”, and usable in vibration test systems specified in a.;</p> <p>d. Test piece support structures and electronic units designed to combine multiple shaker units in a system capable of providing an effective combined force equal to or greater than 50 kN, measured “bare table”, and usable in vibration systems specified in a.</p> <p><i>Technical note: “bare table” means a flat table, or surface, with no fixture or fittings.</i></p>	
I.A2.002	Machine tools, other than those specified in 2B001.c. or 2B201.b., for grinding having positioning accuracies with “all compensations available” equal to or less (better) than 15 µm according to ISO 230/2 (1988) <sup>a</sup> or national equivalents along any linear axis.	2B001.c. 2B201.b.
I.A2.002a	Components and numerical controls, specially designed for machine tools specified in 2B001, 2B201, or I.A2.002 above.	
<b>a</b>	Manufacturers calculating positioning accuracy in accordance with ISO 230/2 (1997) should consult the competent authorities of the Member State in which they are established.	

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I.A2.003	<p>Balancing machines and related equipment as follows:</p> <p>a. Balancing machines, designed or modified for dental or other medical equipment, having all the following characteristics:</p> <ol style="list-style-type: none"> <li>1. Not capable of balancing rotors/ assemblies having a mass greater than 3 kg;</li> <li>2. Capable of balancing rotors/ assemblies at speeds greater than 12 500 rpm;</li> <li>3. Capable of correcting unbalance in two planes or more; <i>and</i></li> <li>4. Capable of balancing to a residual specific unbalance of 0,2 g × mm per kg of rotor mass;</li> </ol> <p>b. “Indicator heads” designed or modified for use with machines specified in a. above.</p> <p><i>Technical note:</i></p>	2B119
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	<i>“Indicator heads” are sometimes known as balancing instrumentation.</i>	
I.A2.004	<p>Remote manipulators that can be used to provide remote actions in radiochemical separation operations or hot cells, other than those specified in 2B225, having either of the following characteristics:</p> <p>a. A capability of penetrating a hot cell wall of 0,3 m or more (through the wall operation); or</p> <p>b. A capability of bridging over the top of a hot cell wall with a thickness of 0,3 m or more (over the wall operation).</p> <p><i>Technical note: Remote manipulators provide translation of human operator actions to a remote operating arm and terminal fixture. They may be of master/slave type or operated by joystick or keypad.</i></p>	2B225
I A2.005	<p>Controlled atmosphere heat treatment furnaces or oxidation furnaces capable of operation at temperatures above 400 °C</p> <p><i>Note: This item does not cover tunnel kilns with roller or car conveyance, tunnel kilns with conveyor belt, pusher type kilns or shuttle kilns, specially designed for the production of glass, tableware ceramics or structural ceramics.</i></p>	2B226 2B227
I.A2.006	Not used	
I.A2.007	“Pressure transducers”, other than those defined in 2B230, capable of measuring	2B230

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	<p>absolute pressures at any point in the range 0 to 200 kPa and having both of the following characteristics:</p> <ol style="list-style-type: none"> <li>a. Pressure sensing elements made of or protected by “Materials resistant to corrosion by uranium hexafluoride (UF<sub>6</sub>)”, and</li> <li>b. Having either of the following characteristics: <ol style="list-style-type: none"> <li>1. A full scale of less than 200 kPa and an “accuracy” of better than <math>\pm 1\%</math> of full scale; or</li> <li>2. A full scale of 200 kPa or greater and an “accuracy” of better than 2 kPa.</li> </ol> </li> </ol> <p><i>Technical note: For the purposes of 2B230, “accuracy” includes non-linearity, hysteresis and repeatability at ambient temperature.</i></p>	
I.A2.008	Liquid-liquid contacting equipment (mixer-settlers, pulsed columns, centrifugal contactors); and liquid distributors, vapour distributors or liquid collectors designed for such equipment, where all surfaces that come in direct contact with the chemical(s) being	2B350.e.
<p><b>a</b> Manufacturers calculating positioning accuracy in accordance with ISO 230/2 (1997) should consult the competent authorities of the Member State in which they are established.</p>		



	<p>processed are made from any of the following materials:</p> <ul style="list-style-type: none"> <li>a. Alloys with more than 25 % nickel and 20 % chromium by weight;</li> <li>b. Fluoropolymers;</li> <li>c. Glass (including vitrified or enamelled coating or glass lining);</li> <li>d. Graphite or “carbon graphite”;</li> <li>e. Nickel or alloys with more than 40 % nickel by weight;</li> <li>f. Tantalum or tantalum alloys;</li> <li>g. Titanium or titanium alloys;</li> <li>h. Zirconium or zirconium alloys; or</li> <li>i. Stainless steel.</li> </ul> <p><i>Technical note:</i>  “Carbon graphite” is a composition consisting of amorphous carbon and graphite, in which the graphite content is 8 % or more by weight.</p>	
I.A2.009	<p>Industrial equipment and components, other than those specified in 2B350.d., as follows:</p> <p>Heat exchangers or condensers with a heat transfer surface area greater than 0,05 m<sup>2</sup>, and less than 30 m<sup>2</sup>; and tubes, plates, coils or blocks (cores) designed for such heat exchangers or condensers, where all surfaces that come in direct contact with the fluid(s) are made from any of the following materials:</p> <ul style="list-style-type: none"> <li>a. Alloys with more than 25 % nickel</li> </ul>	2B350.d.

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	<p>and 20 % chromium by weight;</p> <p>b. Fluoropolymers;</p> <p>c. Glass (including vitrified or enamelled coating or glass lining);</p> <p>d. Graphite or “carbon graphite”;</p> <p>e. Nickel or alloys with more than 40 % nickel by weight;</p> <p>f. Tantalum or tantalum alloys;</p> <p>g. Titanium or titanium alloys;</p> <p>h. Zirconium or zirconium alloys;</p> <p>i. Silicon carbide;</p> <p>j. Titanium carbide; or</p> <p>k. Stainless steel.</p> <p><i>Note: This item does not cover vehicle radiators.</i></p> <p><i>Technical note:</i>  <i>The materials used for gaskets and seals and other implementation of sealing functions do not determine the status of control of the heat exchanger.</i></p>	
I.A2.010	<p>Multiple-seal, and seal-less pumps, other than those specified in 2B350.i, suitable for corrosive fluids, with manufacturer's specified maximum flow-rate greater than 0,6 m<sup>3</sup>/hour, or vacuum pumps with manufacturer's specified maximum flow-rate greater than 5 m<sup>3</sup>/hour [measured under standard temperature (273 K or 0 °C) and pressure (101,3 kPa) conditions]; and casings (pump bodies), preformed casing liners, impellers, rotors or jet pump nozzles designed for such pumps, in which all surfaces that come</p>	2B350.i.

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	<p>in direct contact with the chemical(s) being processed are made from any of the following materials:</p> <ul style="list-style-type: none"> <li>a. Alloys with more than 25 % nickel and 20 % chromium by weight;</li> <li>b. Ceramics;</li> <li>c. Ferrosilicon;</li> <li>d. Fluoropolymers;</li> <li>e. Glass (including vitrified or enamelled coatings or glass lining);</li> <li>f. Graphite or “carbon graphite”;</li> <li>g. Nickel or alloys with more than 40 % nickel by weight;</li> <li>h. Tantalum or tantalum alloys;</li> <li>i. Titanium or titanium alloys;</li> <li>j. Zirconium or zirconium alloys;</li> <li>k. Niobium (columbium) or niobium alloys;</li> <li>l. Stainless Steel; or</li> <li>m. Aluminium Alloys.</li> </ul> <p><i>Technical note: The materials used for gaskets and seals and other implementation of sealing functions do not determine the status of control of the pump.</i></p>	
I.A2.011	<p>“Centrifugal separators”, other than those specified in 2B352.c., capable of continuous separation without the propagation of aerosols and manufactured from:</p> <ul style="list-style-type: none"> <li>a. Alloys with more than 25 % nickel and 20 % chromium by weight;</li> </ul>	2B352.c.

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	<ul style="list-style-type: none"> <li>b. Fluoropolymers;</li> <li>c. Glass (including vitrified or enamelled coating or glass lining);</li> <li>d. Nickel or alloys with more than 40 % nickel by weight;</li> <li>e. Tantalum or tantalum alloys;</li> <li>f. Titanium or titanium alloys; <i>or</i></li> <li>g. Zirconium or zirconium alloys.</li> </ul> <p><i>Technical note: “Centrifugal separators” include decanters.</i></p>	
I.A2.012	Sintered metal filters, other than those specified in 2B352.d., made of nickel or nickel alloy with more than 40 % nickel by weight.	2B352.d.
I.A2.013	Spin-forming machines and flow-forming machines, other than those specified by 2B009, 2B109 or 2B209 and specially designed components therefor. <i>Technical note: For the purpose of this item, machines combining the functions of spin-forming and flow-forming are regarded as flow-forming machines.</i>	2B009 2B109 2B209
<p><b>a</b> Manufacturers calculating positioning accuracy in accordance with ISO 230/2 (1997) should consult the competent authorities of the Member State in which they are established.</p>		

## ELECTRONICS

### I.A3.

#### GOODS

No	Description	Related item from Annex I to Regulation (EC) No 428/2009
I.A3.001	High voltage direct current power supplies, other than those specified in 0B001.j.5.	0B001.j.5. 3A227

	<p>or 3A227, having both of the following characteristics:</p> <ol style="list-style-type: none"> <li>a. Capable of continuously producing, over a time period of eight hours, 10 kV or more, with output power of 5 kW or more with or without sweeping; and</li> <li>b. Current or voltage stability better than 0,1 % over a time period of four hours.</li> </ol>	
I.A3.002	<p>Mass spectrometers, other than those specified in 0B002.g or 3A233, capable of measuring ions of 200 atomic mass units or more and having a resolution of better than 2 parts in 200, as follows, and ion sources therefor:</p> <ol style="list-style-type: none"> <li>a. Inductively coupled plasma mass spectrometers (ICP/MS);</li> <li>b. Glow discharge mass spectrometers (GDMS);</li> <li>c. Thermal ionisation mass spectrometers (TIMS);</li> <li>d. Electron bombardment mass spectrometers which have a source chamber constructed from, lined with or plated with “materials resistant to corrosion by uranium hexafluoride UF<sub>6</sub>”;</li> <li>e. Molecular beam mass spectrometers having either of</li> </ol>	0B002.g 3A233

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	<p>the following characteristics:</p> <ol style="list-style-type: none"> <li>1. A source chamber constructed from, lined with or plated with stainless steel or molybdenum and equipped with a cold trap capable of cooling to 193 K (– 80 °C) or less; <i>or</i></li> <li>2. A source chamber constructed from, lined with or plated with materials resistant to UF<sub>6</sub>;</li> </ol> <p>f. Mass spectrometers equipped with a micro-fluorination ion source designed for actinides or actinide fluorides.</p>	
I.A3.003	<p>Frequency changers or generators, other than those specified by 0B001.b.13 or 3A225, having all of the following characteristics, and specially designed components and software therefor:</p> <ol style="list-style-type: none"> <li>a. Multiphase output capable of providing a power of 40 W or greater;</li> <li>b. Capable of operating in the frequency range</li> </ol>	0B001.b.13. 3A225

	<p>between 600 and 2 000 Hz; and</p> <p>c. Frequency control better (less) than 0,1 %.</p> <p><i>Technical notes:</i></p> <p>1. <i>Frequency changers are also known as converters, inverters, generators, electronic test equipment, AC power supplies, variable speed motor drives or variable frequency drives.</i></p> <p>2. <i>The functionality specified in this item may be met by certain equipment marketed as; electronic test equipment, AC power supplies, variable speed motor drives or variable frequency drives.</i></p>	
I.A3.004	Spectrometers and diffractometers, designed for the indicative test or quantitative analysis of the elemental composition of metals or alloys without chemical decomposition of the material.	

**SENSORS AND LASERS**

## I.A6.

## GOODS

No	Description	Related item from Annex I to Regulation (EC) No 428/2009
I.A6.001	Yttrium aluminium garnet (YAG) rods.	

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I.A6.002	Optical equipment and components, other than those specified in 6A002 or 6A004.b as follows: Infrared optics in the wavelength range 9 µm – 17 µm and components thereof, including cadmium telluride (CdTe) components.	6A002 6A004.b.
I.A6.003	Wave front corrector systems, other than mirrors specified in 6A004.a, 6A005.e or 6A005.f., for use with a laser beam having a diameter exceeding 4 mm, and specially designed components thereof, including control systems, phase front sensors and “deformable mirrors” including bimorph mirrors.	6A004.a. 6A005.e. 6A005.f.
I.A6.004	Argon ion “lasers”, other than those specified in 0B001.g.5, 6A005 and or 6A205.a., having an average output power equal to or greater than 5 W.	0B001.g.5. 6A005.a.6. 6A205.a.
I.A6.005	Semiconductor “lasers”, other than those specified in 0B001.g.5., 0B001.h.6. or 6A005.b., and components thereof, as follows: a. Individual semiconductor “lasers” with an output power greater than 200 mW each, in quantities larger than 100; b. Semiconductor “laser” arrays having an output power greater than 20 W.  <i>Notes:</i>  1. <i>Semiconductor “lasers” are commonly called “laser” diodes.</i>	0B001.g.5. 0B001.h.6. 6A005.b.



	2. <i>This item does not cover “laser” diodes with a wavelength in the range 1,2 μm – 2,0 μm.</i>	
I.A6.006	Tunable semiconductor “lasers” and tunable semiconductor “laser” arrays, other than those specified in 0B001.h.6. or 6A005.b., of a wavelength between 9 μm and 17 μm, as well as array stacks of semiconductor “lasers” containing at least one tunable semiconductor “laser” array of such wavelength. <i>Note: Semiconductor “lasers” are commonly called “laser” diodes.</i>	0B001.h.6. 6A005.b.
I.A6.007	Solid state “tunable” “lasers”, other than those specified in 0B001.g.5., 0B001.h.6. or 6A005.c.1., and specially designed components thereof as follows: a. Titanium-sapphire lasers, b. Alexandrite lasers.	0B001.g.5. 0B001.h.6. 6A005.c.1.
I.A6.008	Neodymium-doped (other than glass) “lasers”, other than those specified in 6A005.c.2.b., having an output wavelength greater than 1,0 μm but not exceeding 1,1 μm and output energy exceeding 10 J per pulse.	6A005.c.2.b.
I.A6.009	Components of acousto-optics, as follows: a. Framing tubes and solid-state imaging devices having a recurrence frequency equal to or exceeding 1 kHz; b. Recurrence frequency supplies;	6A203.b.4.

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	c. Pockels cells.	
I.A6.010	<p>Radiation-hardened cameras, or lenses thereof, other than those specified in 6A203.c., specially designed, or rated as radiation-hardened, to withstand a total radiation dose greater than <math>50 \times 10^3</math> Gy(silicon) (<math>5 \times 10^6</math> rad (silicon)) without operational degradation.</p> <p><i>Technical note:</i>  <i>The term Gy(silicon) refers to the energy in Joules per kilogram absorbed by an unshielded silicon sample when exposed to ionising radiation.</i></p>	6A203.c.
I.A6.011	<p>Tunable pulsed dye laser amplifiers and oscillators, other than those specified in 0B001.g.5, 6A005 and or 6A205.c., having all of the following characteristics:</p> <ol style="list-style-type: none"> <li>Operating at wavelengths between 300 nm and 800 nm;</li> <li>An average output power greater than 10 W but not exceeding 30 W;</li> <li>A repetition rate greater than 1 kHz; and</li> <li>Pulse width less than 100 ns.</li> </ol> <p><i>Note:</i>  <i>This item does not cover single mode oscillators.</i></p>	0B001.g.5. 6A005 6A205.c.
I.A6.012	<p>Pulsed carbon dioxide “lasers”, other than those specified in, 0B001.h.6., 6A005.d. or 6A205.d., having all of the following characteristics:</p> <ol style="list-style-type: none"> <li>Operating at wavelengths between 9, <math>\mu\text{m}</math> and 11 <math>\mu\text{m}</math>;</li> </ol>	0B001.h.6. 6A005.d. 6A205.d.

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| b. | A repetition rate greater than 250 Hz;                                  |
| c. | An average output power greater than 100 W but not exceeding 500 W; and |
| d. | Pulse width less than 200 ns.   |

**NAVIGATION AND AVIONICS**

## I.A7.

## GOODS

No	Description	Related item from Annex I to Regulation (EC) No 428/2009
I.A7.001	<p>Inertial navigation systems and specially designed components thereof, as follows:</p> <p>a. Inertial navigation systems which are certified for use on “civil aircraft” by civil authorities of a State participating in the Wassenaar Arrangement, and specially designed components thereof, as follows:</p> <p>1. Inertial navigation systems (INS) (gimballed or strapdown) and inertial equipment designed for “aircraft”, land vehicle, vessels (surface or</p>	<p>7A001 7A003 7A101 7A103</p>

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underwater)  
or  
“spacecraft”  
for  
attitude,  
guidance  
or control,  
having  
any of the  
following  
characteristics,  
and  
specially  
designed  
components  
thereof:

- a. Navigation error (free inertial) subsequent to normal alignment of 0,8 nautical mile per hour (nm/hr) “Circular Error Probable” (CEP) or less (better);  
or
- b. Specified to function at linear acceleration levels exceeding 10 g;

2. Hybrid Inertial Navigation Systems

- |    |   |
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|    | embedded with Global Navigation Satellite System(s) (GNSS) or with “Data-Based Referenced Navigation” (“DBRN”) System(s) for attitude, guidance or control, subsequent to normal alignment, having an INS navigation position accuracy, after loss of GNSS or “DBRN” for a period of up to four minutes, of less (better) than 10 metres “Circular Error Probable” (CEP); |
| 3. | Inertial Equipment for Azimuth, Heading, or North Pointing having any of the following characteristics, and specially   |

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|    | designed components thereof:  |
|    | a. Designed to have an Azimuth, Heading, or North Pointing accuracy equal to, or less (better) than 6 arc minutes RMS at 45 degrees latitude; |
|    | or  |
|    | b. Designed to have a non-operating shock level of at least 900 g at a duration of at least 1 msec.   |
| b. | Theodolite systems incorporating inertial equipment specially designed  |

- for civil surveying purposes and designed to have an Azimuth, Heading, or North Pointing accuracy equal to, or less (better) than 6 arc minutes RMS at 45 degrees latitude, and specially designed components thereof.
- c. Inertial or other equipment using accelerometers specified in 7A001 or 7A101, where such accelerometers are specially designed and developed as MWD (Measurement While Drilling) sensors for use in down-hole well services operations.

*Note: The parameters of a.1. and a.2. are applicable with any of the following environmental conditions:*

1. *Input random vibration with an overall magnitude of 7,7 g rms in the first half hour and a total test duration of one and a half hours per axis in each of the three perpendicular axes, when the random vibration meets the following:*
  - a. *A constant power spectral density (PSD) value of 0,04 g<sup>2</sup>/Hz over a frequency interval*

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|  | <p>of 15 to 1 000 Hz;<br/>and</p> <p>b. The PSD attenuates with a frequency from 0,04 <math>g^2/Hz</math> to 0,01 <math>g^2/Hz</math> over a frequency interval from 1 000 to 2 000 Hz;</p> <p>2. A roll and yaw rate equal to or greater than +2,62 radian/s (150 deg/s); or</p> <p>3. According to national standards equivalent to 1. or 2. above.</p> <p><i>Technical notes:</i></p> <p>1. a.2. refers to systems in which an INS and other independent navigation aids are built into a single unit (embedded) in order to achieve improved performance.</p> <p>2. “Circular Error Probable” (CEP)<br/>– In a circular normal distribution, the radius of the circle containing 50 percent of the individual measurements being made, or the radius of the circle within which there is a 50 percent probability of being located.</p> |
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## I.A9.

## GOODS

No	Description	Related item from Annex I to Regulation (EC) No 428/2009
I.A9.001	Explosive bolts.	

## B. SOFTWARE

No	Description	Related item from Annex I to Regulation (EC) No 428/2009
I.B.001	Software required for the development, production or use of the items in Part A. (Goods).	

## C. TECHNOLOGY

No	Description	Related item from Annex I to Regulation (EC) No 428/2009
I.C.001	Technology required for the development, production or use of the items in Part A. (Goods).	