

**THE SCHEDULE OF THE STRATEGIC GOODS (CONTROL) ORDER 2009**

PART II

DUAL-USE GOODS THE EXPORT, TRANSHIPMENT OR BRINGING IN  
TRANSIT OF WHICH, AND TECHNOLOGY THE EXPORT OR  
TRANSMISSION OF WHICH, REQUIRE A PERMIT

*Division 2 – List of Dual-Use Goods*

<i>Product Code</i>	<i>Item Description</i>
<b>CATEGORY 2 – MATERIALS PROCESSING</b>	
<b>2A</b>	<b>Systems, Equipment and Components</b>
	<p><b><u>N.B.</u></b> <i>For quiet running bearings, see Division 2 of Part I of this Schedule.</i></p>
DL2A001	<p>Anti-friction bearings and bearing systems, as follows, and components therefor:</p> <p><u>Note</u> <i>Category Code 2A001 does not include balls with tolerances specified by the manufacturer in accordance with ISO 3290 as grade 5 or worse.</i></p> <p>a. Ball bearings and solid roller bearings having all tolerances specified by the manufacturer in accordance with ISO 492 Tolerance Class 4 (or ANSI/ABMA Std 20 Tolerance Class ABEC-7 or RBEC-7, or other national equivalents), or better, and having both rings and rolling elements (ISO 5593) made from monel or beryllium;</p> <p><u>Note</u> <i>Category Code 2A001.a. does not include tapered roller bearings.</i></p> <p>b. Other ball bearings and solid roller bearings having all tolerances specified by the manufacturer in accordance with ISO 492 Tolerance Class 2 (or ANSI/ABMA Std 20 Tolerance Class ABEC-9 or RBEC-9, or other national equivalents) or better;</p> <p><u>Note</u> <i>Category Code 2A001.b. does not include tapered roller bearings.</i></p> <p>c. Active magnetic bearing systems using any of the following:</p> <ol style="list-style-type: none"> <li>1. Materials with flux densities of 2.0 T or greater and yield strengths greater than 414 MPa;</li> <li>2. All-electromagnetic 3D homopolar bias designs for actuators; <u>or</u></li> </ol>

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	3. High temperature (450 K (177°C) and above) position sensors.
DL2A225	<p>Crucibles made of materials resistant to liquid actinide metals, as follows:</p> <p>a. Crucibles having both of the following characteristics:</p> <ol style="list-style-type: none"> <li>1. A volume of between 150 cm<sup>3</sup> and 8,000 cm<sup>3</sup>; and</li> <li>2. Made of or coated with any of the following materials, having a purity of 98% or greater by weight: <ol style="list-style-type: none"> <li>a. Calcium fluoride (CaF<sub>2</sub>);</li> <li>b. Calcium zirconate (metazirconate) (CaZrO<sub>3</sub>);</li> <li>c. Cerium sulphide (Ce<sub>2</sub>S<sub>3</sub>);</li> <li>d. Erbium oxide (erbia) (Er<sub>2</sub>O<sub>3</sub>);</li> <li>e. Hafnium oxide (hafnia) (HfO<sub>2</sub>);</li> <li>f. Magnesium oxide (MgO);</li> <li>g. Nitrided niobium-titanium-tungsten alloy (approximately 50% Nb, 30% Ti, 20% W);</li> <li>h. Yttrium oxide (yttria) (Y<sub>2</sub>O<sub>3</sub>); <u>or</u></li> <li>i. Zirconium oxide (zirconia) (ZrO<sub>2</sub>);</li> </ol> </li> </ol> <p>b. Crucibles having both of the following characteristics:</p> <ol style="list-style-type: none"> <li>1. A volume of between 50 cm<sup>3</sup> and 2,000 cm<sup>3</sup>; <u>and</u></li> <li>2. Made of or lined with tantalum, having a purity of 99.9% or greater by weight;</li> </ol> <p>c. Crucibles having all of the following characteristics:</p> <ol style="list-style-type: none"> <li>1. A volume of between 50 cm<sup>3</sup> and 2,000 cm<sup>3</sup>;</li> <li>2. Made of or lined with tantalum, having a purity of 98% or greater by weight; <u>and</u></li> <li>3. Coated with tantalum carbide, nitride, boride, or any combination thereof.</li> </ol>
DL2A226	<p>Valves having all of the following characteristics:</p> <ol style="list-style-type: none"> <li>a. A 'nominal size' of 5 mm or greater;</li> <li>b. Having a bellows seal; <u>and</u></li> <li>c. Wholly made of or lined with aluminium, aluminium alloy, nickel, or nickel alloy containing more than 60% nickel by weight.</li> </ol> <p><u>Technical Note</u>  <i>For valves with different inlet and outlet diameters, the 'nominal size' in</i></p>

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	<i>Category Code 2A226 refers to the smallest diameter.</i>
<b>2B</b>	<b>Test, Inspection and Production Equipment</b>
	<p><u>Technical Notes</u></p> <ol style="list-style-type: none"> <li>1. <i>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></li> <li>2. <i>For the purposes of Category 2B, 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 movement within the machine are performed such as:</i> <ol style="list-style-type: none"> <li>a. <i>Wheel-dressing systems in grinding machines;</i></li> <li>b. <i>Parallel rotary axes designed for mounting of separate workpieces;</i></li> <li>c. <i>Co-linear rotary axes designed for manipulating the same workpiece by holding it in a chuck from different ends.</i></li> </ol> </li> <li>3. <i>Axis nomenclature shall be in accordance with International Standard ISO 841, ‘Numerical Control Machines — Axis and Motion Nomenclature’.</i></li> <li>4. <i>For the purposes of Category Codes 2B001 to 2B009, a “tilting spindle” is counted as a rotary axis.</i></li> <li>5. <i>‘Stated positioning accuracy’ derived from measurements made according to ISO 230/2 (1988) or national equivalents may be used for each machine tool model as an alternative to individual machine tests. ‘Stated positioning accuracy’ means the accuracy value provided to the competent authorities of the country in which the exporter is established as representative of the accuracy of a specific machine model.</i> <p><i>Determination of ‘Stated Positioning Accuracy’</i></p> <ol style="list-style-type: none"> <li>a. <i>Select five machines of a model to be evaluated;</i></li> <li>b. <i>Measure the linear axis accuracies according to ISO 230/2 (1988);</i></li> <li>c. <i>Determine the A-values for each axis of each machine. The method of calculating the A-value is described in the ISO standard;</i></li> <li>d. <i>Determine the mean value of the A-value of each axis. This mean value <math>\hat{A}</math> becomes the stated value of each axis for the model (<math>\hat{A}_x \hat{A}_y \dots</math>);</i></li> <li>e. <i>Since the Category 2 list refers to each linear axis there will be as many stated values as there are linear axes;</i></li> <li>f. <i>If any axis of a machine model included under Category Code 2B001.a.</i></li> </ol> </li> </ol>

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	<p><i>to 2B001.c. or 2B201 has a stated accuracy <math>\hat{A}</math> of 6 microns for grinding machines and 8 microns for milling and turning machines or better, the manufacturer should be required to reaffirm the accuracy level once every eighteen months.</i></p>
DL2B001	<p>Machine tools and any combination thereof, for removing (or cutting) metals, ceramics or “composites”, which, according to the manufacturer’s technical specification, can be equipped with electronic devices for “numerical control”, and specially designed components as follows:</p> <p><b><u>N.B.</u></b></p> <p><b><i>See also Category Code 2B201.</i></b></p> <p><b><i>For optical finishing machines, see Category Code 2B202.</i></b></p> <p><u>Note 1</u></p> <p><i>Category Code 2B001 does not include special purpose machine tools limited to the manufacture of gears. <b>For such machines see Category Code 2B003.</b></i></p> <p><u>Note 2</u></p> <p><i>Category Code 2B001 does not include special purpose machine tools limited to the manufacture of any of the following:</i></p> <ul style="list-style-type: none"> <li><i>a. Crankshafts or camshafts;</i></li> <li><i>b. Tools or cutters;</i></li> <li><i>c. Extruder worms; <u>or</u></i></li> <li><i>d. Engraved or faceted jewellery parts.</i></li> </ul> <p><u>Note 3</u></p> <p><i>A machine tool having at least two of the three turning, milling or grinding capabilities (e.g., a turning machine with milling capability), shall be treated as coming within those entries in Category Codes 2B001.a, .b and .c that are applicable to its capabilities.</i></p>
	<p>a. Machine tools for turning, having all of the following:</p> <ol style="list-style-type: none"> <li>1. Positioning accuracy with “all compensations available” equal to or less (better) than 6 <math>\mu\text{m}</math> according to ISO 230/2 (1988) or national equivalents along any linear axis; <u>and</u></li> <li>2. Two or more axes which can be coordinated simultaneously for “contouring control”;</li> </ol> <p><u>Note</u></p> <p><i>Category Code 2B001.a. does not include turning machines specially designed for producing contact lenses having all of the following:</i></p> <ul style="list-style-type: none"> <li><i>a. Machine controller limited to using ophthalmic based “software”</i></li> </ul>

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	<p data-bbox="496 304 995 338"><i>for part programming data input; <u>and</u></i></p> <p data-bbox="461 353 772 387"><i>b. No vacuum chucking.</i></p> <p data-bbox="384 427 1123 461"><b>b. Machine tools for milling having any of the following:</b></p> <ol data-bbox="426 479 1385 1211" style="list-style-type: none"> <li data-bbox="426 479 815 512">1. Having all of the following: <ol data-bbox="464 533 1385 725" style="list-style-type: none"> <li data-bbox="464 533 1385 636">a. Positioning accuracy with “all compensations available” equal to or less (better) than 6 µm according to ISO 230/2 (1988) or national equivalents along any linear axis; <u>and</u></li> <li data-bbox="464 656 1385 725">b. Three linear axes plus one rotary axis which can be coordinated simultaneously for “contouring control”;</li> </ol> </li> <li data-bbox="426 745 1385 815">2. Five or more axes which can be coordinated simultaneously for “contouring control”;</li> <li data-bbox="426 835 1385 981">3. A positioning accuracy for jig boring machines, with “all compensations available”, equal to or less (better) than 4 µm according to ISO 230/2 (1988) or national equivalents along any linear axis; <u>or</u></li> <li data-bbox="426 1001 1385 1211">4. Fly cutting machines having all of the following: <ol data-bbox="464 1048 1385 1211" style="list-style-type: none"> <li data-bbox="464 1048 1385 1120">a. Spindle “run-out” and “camming” less (better) than 0.0004 mm TIR; <u>and</u></li> <li data-bbox="464 1140 1385 1211">b. Angular deviation of slide movement (yaw, pitch and roll) less (better) than 2 seconds of arc, TIR over 300 mm of travel;</li> </ol> </li> </ol> <p data-bbox="384 1247 1137 1281"><b>c. Machine tools for grinding having any of the following:</b></p> <ol data-bbox="426 1299 1385 1637" style="list-style-type: none"> <li data-bbox="426 1299 1385 1547">1. Having all of the following: <ol data-bbox="464 1350 1385 1547" style="list-style-type: none"> <li data-bbox="464 1350 1385 1456">a. Positioning accuracy with “all compensations available” equal to or less (better) than 4 µm according to ISO 230/2 (1988) or national equivalents along any linear axis; <u>and</u></li> <li data-bbox="464 1476 1385 1547">b. Three or more axes which can be coordinated simultaneously for “contouring control”; <u>or</u></li> </ol> </li> <li data-bbox="426 1568 1385 1637">2. Five or more axes which can be coordinated simultaneously for “contouring control”;</li> </ol> <p data-bbox="426 1657 488 1691"><u>Note</u></p> <p data-bbox="426 1711 1347 1744"><i>Category Code 2B001.c. does not include grinding machine as follows:</i></p> <ol data-bbox="464 1765 1385 2022" style="list-style-type: none"> <li data-bbox="464 1765 1385 1973">a. <i>Cylindrical external, internal, and external-internal grinding machines having all of the following:</i> <ol data-bbox="502 1850 1385 1973" style="list-style-type: none"> <li data-bbox="502 1850 1002 1883">1. <i>Limited to cylindrical grinding; <u>and</u></i></li> <li data-bbox="502 1904 1385 1973">2. <i>Limited to a maximum workpiece capacity of 150 mm outside diameter or length.</i></li> </ol> </li> <li data-bbox="464 1993 1385 2022">b. <i>Machines designed specifically as jig grinders that do not have a z-</i></li> </ol>

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	<p><i>axis or a w-axis, with a positioning accuracy with “all compensations available” less (better) than 4 μm according to ISO 230/2 (1988) or national equivalents.</i></p> <p><i>c. Surface grinders.</i></p> <p>d. Electrical discharge machines (EDM) of the non-wire type which have two or more rotary axes which can be coordinated simultaneously for “contouring control”;</p> <p>e. Machine tools for removing metals, ceramics or “composites” having all of the following:</p> <ol style="list-style-type: none"> <li>1. Removing material by means of any of the following: <ol style="list-style-type: none"> <li>a. Water or other liquid jets, including those employing abrasive additives;</li> <li>b. Electron beam; <u>or</u></li> <li>c. “Laser” beam; <u>and</u></li> </ol> </li> <li>2. Having two or more rotary axes and all of the following: <ol style="list-style-type: none"> <li>a. Can be coordinated simultaneously for “contouring control”; <u>and</u></li> <li>b. A positioning accuracy of less (better) than 0.003°;</li> </ol> </li> </ol> <p>f. Deep-hole-drilling machines and turning machines modified for deephole-drilling, having a maximum depth-of-bore capability exceeding 5 m and specially designed components therefor.</p>
DL2B002	<p>Numerically controlled optical finishing machine tools equipped for selective material removal to produce non-spherical optical surfaces and having all of the following characteristics:</p> <ol style="list-style-type: none"> <li>a. Finishing the form to less (better) than 1.0 μm;</li> <li>b. Finishing to a roughness less (better) than 100 nm rms;</li> <li>c. Four or more axes which can be coordinated simultaneously for “contouring control”; <u>and</u></li> <li>d. Using any of the following processes: <ol style="list-style-type: none"> <li>1. Magnetorheological finishing (‘MRF’);</li> <li>2. Electrorheological finishing (‘ERF’);</li> <li>3. ‘Energetic particle beam finishing’;</li> <li>4. ‘Inflatable membrane tool finishing’; <u>or</u></li> <li>5. ‘Fluid jet finishing’.</li> </ol> </li> </ol> <p><u>Technical Note</u></p> <p><i>For the purposes of Category Code 2B002:</i></p>

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	<ol style="list-style-type: none"> <li>1. 'MRF' is a material removal process using an abrasive magnetic fluid whose viscosity is controlled by a magnetic field.</li> <li>2. 'ERF' is a removal process using an abrasive fluid whose viscosity is controlled by an electric field.</li> <li>3. 'Energetic particle beam finishing' uses Reactive Atom Plasmas (RAP) or ion-beams to selectively remove material.</li> <li>4. 'Inflatable membrane tool finishing' is a process that uses a pressurized membrane that deforms to contact the workpiece over a small area.</li> <li>5. 'Fluid jet finishing' makes use of a fluid stream for material removal.</li> </ol>
DL2B003	<p>"Numerically controlled" or manual machine tools, and specially designed components, controls and accessories therefor, specially designed for the shaving, finishing, grinding or honing of hardened (<math>R_c = 40</math> or more) spur, helical and double-helical gears with a pitch diameter exceeding 1,250 mm and a face width of 15% of pitch diameter or larger finished to a quality of AGMA 14 or better (equivalent to ISO 1328 class 3).</p>
DL2B004	<p>Hot "isostatic presses", having all of the following, and specially designed components and accessories therefor:</p> <p><b><u>N.B.</u></b></p> <p><b><i>See also Category Codes 2B104 and 2B204.</i></b></p> <ol style="list-style-type: none"> <li>a. A controlled thermal environment within the closed cavity and a chamber cavity with an inside diameter of 406 mm or more; <u>and</u></li> <li>b. Having any of the following: <ol style="list-style-type: none"> <li>1. A maximum working pressure exceeding 207 MPa;</li> <li>2. A controlled thermal environment exceeding 1,773 K (1,500°C); <u>or</u></li> <li>3. A facility for hydrocarbon impregnation and removal of resultant gaseous degradation products.</li> </ol> </li> </ol> <p><b><u>Technical Note</u></b></p> <p><i>The inside chamber dimension is that of the chamber in which both the working temperature and the working pressure are achieved and does not include fixtures. That dimension will be the smaller of either the inside diameter of the pressure chamber or the inside diameter of the insulated furnace chamber, depending on which of the two chambers is located inside the other.</i></p> <p><b><u>N.B.</u></b></p> <p><b><i>For specially designed dies, moulds and tooling see Category Codes 1B003, 9B009 and Division 2 of Part I of this Schedule.</i></b></p>
DL2B005	<p>Equipment specially designed for the deposition, processing and in-process control of inorganic overlays, coatings and surface modifications, as follows,</p>

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	for non-electronic substrates, by processes shown in the Table and associated Notes following Category Code 2E003.f., and specially designed automated handling, positioning, manipulation and control components therefor:
	<p>a. Chemical vapour deposition (CVD) production equipment having all of the following:</p> <p><b><u>N.B.</u></b></p> <p><b><i>See also Category Code 2B105.</i></b></p> <p>1. A process modified for one of the following:</p> <ul style="list-style-type: none"> <li>a. Pulsating CVD;</li> <li>b. Controlled nucleation thermal deposition (CNTD); <u>or</u></li> <li>c. Plasma enhanced or plasma assisted CVD; <u>and</u></li> </ul> <p>2. Having any of the following:</p> <ul style="list-style-type: none"> <li>a. Incorporating high vacuum (equal to or less than 0.01 Pa) rotating seals; <u>or</u></li> <li>b. Incorporating <i>in situ</i> coating thickness control;</li> </ul>
	b. Ion implantation production equipment having beam currents of 5 mA or more;
	<p>c. Electron beam physical vapour deposition (EB-PVD) production equipment incorporating power systems rated for over 80 kW and having any of the following:</p> <ul style="list-style-type: none"> <li>1. A liquid pool level “laser” control system which regulates precisely the ingots feed rate; <u>or</u></li> <li>2. A computer controlled rate monitor operating on the principle of photo-luminescence of the ionised atoms in the evaporant stream to control the deposition rate of a coating containing two or more elements;</li> </ul>
	<p>d. Plasma spraying production equipment having any of the following:</p> <ul style="list-style-type: none"> <li>1. Operating at reduced pressure controlled atmosphere (equal to or less than 10 kPa measured above and within 300 mm of the gun nozzle exit) in a vacuum chamber capable of evacuation down to 0.01 Pa prior to the spraying process; <u>or</u></li> <li>2. Incorporating <i>in situ</i> coating thickness control;</li> </ul>
	e. Sputter deposition production equipment capable of current densities of 0.1 mA/mm <sup>2</sup> or higher at a deposition rate of 15 µm/h or more;
	f. Cathodic arc deposition production equipment incorporating a grid of electromagnets for steering control of the arc spot on the cathode;

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	<p>g. Ion plating production equipment allowing for the <i>in situ</i> measurement of any of the following:</p> <ol style="list-style-type: none"> <li>1. Coating thickness on the substrate and rate control; <u>or</u></li> <li>2. Optical characteristics.</li> </ol> <p><u>Note</u></p> <p><i>Category Code 2B005 does not include chemical vapour deposition, cathodic arc, sputter deposition, ion plating or ion implantation equipment specially designed for cutting or machining tools.</i></p>
DL2B006	<p>Dimensional inspection or measuring systems, equipment and “electronic assemblies”, as follows:</p> <p>a. Computer controlled or “numerically controlled” co-ordinate measuring machines (CMM), having a three dimensional (volumetric) maximum permissible error of indication (MPE<sub>E</sub>) at any point within the operating range of the machine (i.e., within the length of axes) equal to or less (better) than <math>(1.7 + L/1,000) \mu\text{m}</math> (L is the measured length in mm), tested according to ISO 10360-2 (2001);</p> <p><b><u>N.B.</u></b></p> <p><b><i>See also Category Code 2B206.</i></b></p> <p>b. Linear and angular displacement measuring instruments, as follows:</p> <p>1. ‘Linear displacement’ measuring instruments having any of the following:</p> <p><u>Technical Note</u></p> <p><i>For the purpose of Category Code 2B006.b.1., ‘linear displacement’ means the change of distance between the measuring probe and the measured object.</i></p> <ol style="list-style-type: none"> <li>a. Non-contact type measuring systems with a “resolution” equal to or less (better) than 0.2 <math>\mu\text{m}</math> within a measuring range up to 0.2 mm;</li> <li>b. Linear voltage differential transformer systems having all of the following: <ol style="list-style-type: none"> <li>1. “Linearity” equal to or less (better) than 0.1% within a measuring range up to 5 mm; <u>and</u></li> <li>2. Drift equal to or less (better) than 0.1% per day at a standard ambient test room temperature <math>\pm 1</math> K;</li> </ol> </li> <li>c. Measuring systems having all of the following: <ol style="list-style-type: none"> <li>1. Containing a “laser”; <u>and</u></li> <li>2. Maintaining, for at least 12 hours at a temperature range of <math>20 \pm</math></li> </ol> </li> </ol>

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	<p>1°C, all of the following:</p> <ul style="list-style-type: none"> <li>a. A “resolution” over their full scale of 0.1 µm or less (better); <u>and</u></li> <li>b. Capable of achieving a “measurement uncertainty”, when compensated for the refractive index of air, equal to or less (better) than <math>(0.2 + L/2,000)</math> µm (L is the measured length in mm); <u>or</u></li> <li>d. “Electronic assemblies” specially designed to provide feedback capability in systems specified in Category Code 2B006.b.1.c.;</li> </ul> <p><u>Note</u></p> <p><i>Category Code 2B006.b.1. does not include measuring interferometer systems, with an automatic control system that is designed to use no feedback techniques, containing a “laser” to measure slide movement errors of machine-tools, dimensional inspection machines or similar equipment.</i></p> <hr/> <p>2. Angular displacement measuring instruments having an “angular position deviation” equal to or less (better) than 0.00025°;</p> <p><u>Note</u></p> <p><i>Category Code 2B006.b.2. does not include optical instruments, such as autocollimators, using collimated light (e.g., laser light) to detect angular displacement of a mirror.</i></p> <hr/> <p>c. Equipment for measuring surface irregularities, by measuring optical scatter as a function of angle, with a sensitivity of 0.5 nm or less (better).</p> <p><u>Note</u></p> <p><i>Machine tools which can be used as measuring machines are included under Category Code 2B006 if they meet or exceed the criteria specified for the machine tool function or the measuring machine function.</i></p>
DL2B007	<p>“Robots” having any of the following characteristics and specially designed controllers and “end-effectors” therefor:</p> <p><b><u>N.B.</u></b></p> <p><b><i>See also Category Code 2B207.</i></b></p> <ul style="list-style-type: none"> <li>a. Are capable in real time of full three-dimensional image processing or full three-dimensional ‘scene analysis’ to generate or modify “programmes” or to generate or modify numerical programme data;</li> </ul> <p><u>Technical Note</u></p> <p><i>The ‘scene analysis’ limitation does not include approximation of the third dimension by viewing at a given angle, or limited grey scale interpretation for the perception of depth or texture for the approved</i></p>

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	<p><i>tasks (2½ D).</i></p> <p>b. Specially designed to comply with national safety standards applicable to potentially explosive munitions environments;</p> <p><u>Note</u></p> <p><i>Category Code 2B007.b. does not include “robots” specially designed for paint-spraying booths.</i></p> <p>c. Specially designed or rated as radiation-hardened to withstand a total radiation dose greater than <math>5 \times 10^3</math> Gy (silicon) without operational degradation; <u>or</u></p> <p><u>Technical Note</u></p> <p><i>The term Gy (silicon) refers to the energy in Joules per kilogram absorbed by an unshielded silicon sample when exposed to ionizing radiation.</i></p> <p>d. Specially designed to operate at altitudes exceeding 30,000 m.</p>
DL2B008	<p>Assemblies or units, specially designed for machine tools, or dimensional inspection or measuring systems and equipment, as follows:</p> <p>a. Linear position feedback units (e.g., inductive type devices, graduated scales, infrared systems or “laser” systems) having an overall “accuracy” less (better) than <math>(800 + (600 \times L \times 10^{-3}))</math> nm (L equals the effective length in mm);</p> <p><u>N.B.</u></p> <p><i>For “laser” systems see also Note to Category Codes 2B006.b.1.c. and d.</i></p> <p>b. Rotary position feedback units (e.g., inductive type devices, graduated scales, infrared systems or “laser” systems) having an “accuracy” less (better) than 0.00025°;</p> <p><u>N.B.</u></p> <p><i>For “laser” systems see also Note to Category Code 2B006.b.2.</i></p> <p>c. “Compound rotary tables” and “tilting spindles”, capable of upgrading, according to the manufacturer’s specifications, machine tools to or above the levels specified in Category 2B.</p>
DL2B009	<p>Spin-forming machines and flow-forming machines, which, according to the manufacturer’s technical specification, can be equipped with “numerical control” units or a computer control and having all of the following:</p> <p><u>N.B.</u></p> <p><i>See also Category Codes 2B109 and 2B209.</i></p>

<i>Product Code</i>	<i>Item Description</i>
	<p>a. Two or more controlled axes of which at least two can be coordinated simultaneously for “contouring control”; <u>and</u></p> <p>b. A roller force more than 60 kN.</p> <p><u>Technical Note</u></p> <p><i>For the purpose of Category Code 2B009, machines combining the function of spin-forming and flow-forming are regarded as flow-forming machines.</i></p>
DL2B104	<p>“Isostatic presses”, other than those specified in Category Code 2B004, having all of the following:</p> <p><u>N.B.</u></p> <p><i>See also Category Code 2B204.</i></p> <p>a. Maximum working pressure of 69 MPa or greater;</p> <p>b. Designed to achieve and maintain a controlled thermal environment of 873 K (600°C) or greater; <u>and</u></p> <p>c. Possessing a chamber cavity with an inside diameter of 254 mm or greater.</p>
DL2B105	<p>Chemical Vapour Deposition (CVD) furnaces, other than those specified in Category Code 2B005.a., designed or modified for the densification of carbon-carbon composites.</p>
DL2B109	<p>Flow-forming machines, other than those specified in Category Code 2B009, and specially designed components as follows:</p> <p><u>N.B.</u></p> <p><i>See also Category Code 2B209.</i></p> <p>a. Flow-forming machines having all of the following:</p> <ol style="list-style-type: none"> <li>1. According to the manufacturer’s technical specification, can be equipped with “numerical control” units or a computer control, even when not equipped with such units; <u>and</u></li> <li>2. With more than two axes which can be coordinated simultaneously for “contouring control”;</li> </ol> <p>b. Specially designed components for flow-forming machines specified in Category Code 2B009 or 2B109.a.</p> <p><u>Note</u></p> <p><i>Category Code 2B109 does not include machines that are not usable in the production of propulsion components and equipment (e.g., motor cases) for systems specified in Category Code 9A005, 9A007.a. or 9A105.a.</i></p> <p><u>Technical Note</u></p>

<i>Product Code</i>	<i>Item Description</i>
	<i>Machines combining the function of spin-forming and flow-forming are for the purpose of Category Code 2B109 regarded as flow-forming machines.</i>
DL2B116	<p>Vibration test systems, equipment and components therefor, as follows:</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 10 g rms between 20 Hz and 2 kHz while 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 bandwidth’’ greater than 5 kHz designed for use with vibration test systems specified in Category Code 2B116.a.;</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 Category Code 2B116.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 Category Code 2B116.a.</p> <p><u>Technical Note</u>  <i>In Category Code 2B116, ‘bare table’ means a flat table, or surface, with no fixture or fittings.</i></p>
DL2B117	Equipment and process controls, other than those specified in Category Code 2B004, 2B005.a., 2B104 or 2B105, designed or modified for densification and pyrolysis of structural composite rocket nozzles and re-entry vehicle nose tips.
DL2B119	<p>Balancing machines and related equipment, as follows:</p> <p><b><u>N.B.</u></b>  <b><i>See also Category Code 2B219.</i></b></p> <p>a. Balancing machines 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; <u>and</u></li> <li>4. Capable of balancing to a residual specific unbalance of 0.2 g mm per</li> </ol>

<i>Product Code</i>	<i>Item Description</i>
	<p>kg of rotor mass;</p> <p><u>Note</u></p> <p><i>Category Code 2B119.a. does not include balancing machines designed or modified for dental or other medical equipment.</i></p> <p>b. Indicator heads designed or modified for use with machines specified in Category Code 2B119.a.</p> <p><u>Technical Note</u></p> <p><i>Indicator heads are sometimes known as balancing instrumentation.</i></p>
DL2B120	<p>Motion simulators or rate tables having all of the following characteristics:</p> <p>a. Two axes or more;</p> <p>b. Slip rings capable of transmitting electrical power and/or signal information; <u>and</u></p> <p>c. Having any of the following characteristics:</p> <p>1. For any single axis having all of the following:</p> <p>a. Capable of rates of 400 degrees/s or more, or 30 degrees/s or less; <u>and</u></p> <p>b. A rate resolution equal to or less than 6 degrees/s and an accuracy equal to or less than 0.6 degrees/s;</p> <p>2. Having a worst-case rate stability equal to or better (less) than plus or minus 0.05% averaged over 10 degrees or more; <u>or</u></p> <p>3. A positioning accuracy equal to or less (better) than 5 arc second.</p> <p><u>Note</u></p> <p><i>Category Code 2B120 does not include rotary tables designed or modified for machine tools or for medical equipment. <b>For machine tool rotary tables see Category Code 2B008.</b></i></p>
DL2B121	<p>Positioning tables (equipment capable of precise rotary positioning in any axes), other than those specified in Category Code 2B120, having all the following characteristics:</p> <p>a. Two axes or more; <u>and</u></p> <p>b. A positioning accuracy equal to or less (better) than 5 arc second.</p> <p><u>Note</u></p> <p><i>Category Code 2B121 does not include rotary tables designed or modified for machine tools or for medical equipment. <b>For machine tool rotary tables see Category Code 2B008.</b></i></p>
DL2B122	<p>Centrifuges capable of imparting accelerations above 100 g and having slip</p>

<i>Product Code</i>	<i>Item Description</i>
	rings capable of transmitting electrical power and signal information.
DL2B201	<p>Machine tools and any combination thereof, other than those specified in Category Code 2B001, as follows, for removing or cutting metals, ceramics or “composites”, which, according to the manufacturer’s technical specification, can be equipped with electronic devices for simultaneous “contouring control” in two or more axes:</p> <p>a. Machine tools for milling, having any of the following characteristics:</p> <ol style="list-style-type: none"> <li>1. Positioning accuracies with “all compensations available” equal to or less (better) than 6 <math>\mu\text{m}</math> according to ISO 230/2 (1988) or national equivalents along any linear axis; <u>or</u></li> <li>2. Two or more contouring rotary axes;</li> </ol> <p><i>Note</i></p> <p><i>Category Code 2B201.a. does not include milling machines having the following characteristics:</i></p> <ol style="list-style-type: none"> <li>a. <i>X-axis travel greater than 2 m; <u>and</u></i></li> <li>b. <i>Overall positioning accuracy on the x-axis more (worse) than 30 <math>\mu\text{m}</math>.</i></li> </ol> <p>b. Machine tools for grinding, having any of the following characteristics:</p> <ol style="list-style-type: none"> <li>1. Positioning accuracies with “all compensations available” equal to or less (better) than 4 <math>\mu\text{m}</math> according to ISO 230/2 (1988) or national equivalents along any linear axis; <u>or</u></li> <li>2. Two or more contouring rotary axes.</li> </ol> <p><i>Note</i></p> <p><i>Category Code 2B201.b. does not include the following grinding machines:</i></p> <ol style="list-style-type: none"> <li>a. <i>Cylindrical external, internal, and external-internal grinding machines having all of the following characteristics:</i> <ol style="list-style-type: none"> <li>1. <i>Limited to a maximum workpiece capacity of 150 mm outside diameter or length; <u>and</u></i></li> <li>2. <i>Axes limited to x, z and c;</i></li> </ol> </li> <li>b. <i>Jig grinders that do not have a z-axis or a w-axis with an overall positioning accuracy less (better) than 4 <math>\mu\text{m}</math> according to ISO 230/2 (1988) or national equivalents.</i></li> </ol> <p><i>Note 1</i></p> <p><i>Category Code 2B201 does not include special purpose machine tools limited to the manufacture of any of the following parts:</i></p>

<i>Product Code</i>	<i>Item Description</i>
	<p>a. Gears;</p> <p>b. Crankshafts or camshafts;</p> <p>c. Tools or cutters;</p> <p>d. Extruder worms.</p> <p><u>Note 2</u></p> <p><i>A machine tool having at least two of the three turning, milling or grinding capabilities (e.g., a turning machine with milling capability) shall be treated as coming within those entries in Category Code 2B001.a. or 2B201.a. or .b. that are applicable to its capabilities.</i></p>
DL2B204	<p>“Isostatic presses”, other than those specified in Category Code 2B004 or 2B104, and related equipment, as follows:</p> <p>a. “Isostatic presses” having both of the following characteristics:</p> <ol style="list-style-type: none"> <li>1. Capable of achieving a maximum working pressure of 69 MPa or greater; <u>and</u></li> <li>2. A chamber cavity with an inside diameter in excess of 152 mm;</li> </ol> <p>b. Dies, moulds and controls, specially designed for “isostatic presses” specified in Category Code 2B204.a.</p> <p><u>Technical Note</u></p> <p><i>In Category Code 2B204, the inside chamber dimension is that of the chamber in which both the working temperature and the working pressure are achieved and does not include fixtures. That dimension will be the smaller of either the inside diameter of the pressure chamber or the inside diameter of the insulated furnace chamber, depending on which of the two chambers is located inside the other.</i></p>
DL2B206	<p>Dimensional inspection machines, instruments or systems, other than those specified in Category Code 2B006, as follows:</p> <p>a. Computer controlled or numerically controlled dimensional inspection machines having both of the following characteristics:</p> <ol style="list-style-type: none"> <li>1. Two or more axes; <u>and</u></li> <li>2. A one-dimensional length “measurement uncertainty” equal to or less (better) than <math>(1.25 + L/1,000)</math> <math>\mu\text{m}</math> tested with a probe of an “accuracy” of less (better) than <math>0.2 \mu\text{m}</math> (L is the measured length in mm) (Ref. VDI/VDE 2617 Parts 1 and 2);</li> </ol> <p>b. Systems for simultaneous linear-angular inspection of hemishells, having both of the following characteristics:</p> <ol style="list-style-type: none"> <li>1. “Measurement uncertainty” along any linear axis equal to or less</li> </ol>

<i>Product Code</i>	<i>Item Description</i>
	<p>(better) than 3.5 µm per 5 mm; <u>and</u></p> <p>2. “Angular position deviation” equal to or less than 0.02°.</p> <p><u>Note 1</u></p> <p><i>Machine tools that can be used as measuring machines are included if they meet or exceed the criteria specified for the machine tool function or the measuring machine function.</i></p> <p><u>Note 2</u></p> <p><i>A machine specified in Category Code 2B206 is included in that Category Code if it exceeds the specifications stated therein anywhere within its operating range.</i></p> <p><u>Technical Notes</u></p> <p>1. <i>The probe used in determining the measurement uncertainty of a dimensional inspection system is that described in VDI/VDE 2617 parts 2, 3 and 4.</i></p> <p>2. <i>All parameters of measurement values in Category Code 2B206 represent plus/minus i.e., not total band.</i></p>
DL2B207	<p>“Robots”, “end-effectors” and control units, other than those specified in Category Code 2B007, as follows:</p> <p>a. “Robots” or “end-effectors” specially designed to comply with national safety standards applicable to handling high explosives (e.g., meeting electrical code ratings for high explosives) in their country of manufacture;</p> <p>b. Control units specially designed for any of the “robots” or “end-effectors” specified in Category Code 2B207.a.</p>
DL2B209	<p>Flow forming machines, spin forming machines capable of flow forming functions, other than those specified in Category Code 2B009 or 2B109, and mandrels, as follows:</p> <p>a. Machines having both of the following characteristics:</p> <ol style="list-style-type: none"> <li>1. Three or more rollers (active or guiding); <u>and</u></li> <li>2. Which, according to the manufacturer’s technical specification, can be equipped with “numerical control” units or a computer control;</li> </ol> <p>b. Rotor-forming mandrels designed to form cylindrical rotors of inside diameter between 75 mm and 400 mm.</p> <p><u>Note</u></p> <p><i>Category Code 2B209.a. includes machines which have only a single roller designed to deform metal plus two auxiliary rollers which support the</i></p>

<i>Product Code</i>	<i>Item Description</i>
	<i>mandrel, but do not participate directly in the deformation process.</i>
DL2B219	<p>Centrifugal multiplane balancing machines, fixed or portable, horizontal or vertical, as follows:</p> <p>a. Centrifugal balancing machines designed for balancing flexible rotors having a length of 600 mm or more and having all of the following characteristics:</p> <ol style="list-style-type: none"> <li>1. Swing or journal diameter greater than 75 mm;</li> <li>2. Mass capability of from 0.9 kg to 23 kg; <u>and</u></li> <li>3. Capable of balancing speed of revolution greater than 5,000 rpm;</li> </ol> <p>b. Centrifugal balancing machines designed for balancing hollow cylindrical rotor components and having all of the following characteristics:</p> <ol style="list-style-type: none"> <li>1. Journal diameter greater than 75 mm;</li> <li>2. Mass capability of from 0.9 kg to 23 kg;</li> <li>3. Capable of balancing to a residual imbalance equal to or less than 0.01 kg × mm/kg per plane; <u>and</u></li> <li>4. Belt drive type.</li> </ol>
DL2B225	<p>Remote manipulators that can be used to provide remote actions in radiochemical separation operations or hot cells, having either of the following characteristics:</p> <p>a. A capability of penetrating 0.6 m or more of hot cell wall (through-the-wall operation); <u>or</u></p> <p>b. A capability of bridging over the top of a hot cell wall with a thickness of 0.6 m or more (over-the-wall operation).</p> <p><i><u>Technical Note</u></i></p> <p><i>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>
DL2B226	<p>Controlled atmosphere (vacuum or inert gas) induction furnaces, and power supplies therefor, as follows:</p> <p><b><u>N.B</u></b></p> <p><b><i>See also Category 3B.</i></b></p> <p>a. Furnaces having all of the following characteristics:</p> <ol style="list-style-type: none"> <li>1. Capable of operation above 1,123 K (850°C);</li> <li>2. Induction coils 600 mm or less in diameter; <u>and</u></li> </ol>

<i>Product Code</i>	<i>Item Description</i>
	<p>3. Designed for power inputs of 5 kW or more;</p> <p>b. Power supplies, with a specified power output of 5 kW or more, specially designed for furnaces specified in Category Code 2B226.a.</p> <p><u>Note</u>  <i>Category Code 2B226.a. does not include furnaces designed for the processing of semiconductor wafers.</i></p>
DL2B227	<p>Vacuum or other controlled atmosphere metallurgical melting and casting furnaces and related equipment, as follows:</p> <p>a. Arc remelt and casting furnaces having both of the following characteristics:</p> <ol style="list-style-type: none"> <li>1. Consumable electrode capacities between 1,000 cm<sup>3</sup> and 20,000 cm<sup>3</sup>; <u>and</u></li> <li>2. Capable of operating with melting temperatures above 1,973 K (1,700°C);</li> </ol> <p>b. Electron beam melting furnaces and plasma atomisation and melting furnaces, having both of the following characteristics:</p> <ol style="list-style-type: none"> <li>1. A power of 50 kW or greater; <u>and</u></li> <li>2. Capable of operating with melting temperatures above 1,473 K (1,200°C);</li> </ol> <p>c. Computer control and monitoring systems specially configured for any of the furnaces specified in Category Code 2B227.a. or .b.</p>
DL2B228	<p>Rotor fabrication or assembly equipment, rotor straightening equipment, bellows-forming mandrels and dies, as follows:</p> <p>a. Rotor assembly equipment for assembly of gas centrifuge rotor tube sections, baffles, and end caps;</p> <p><u>Note</u>  <i>Category Code 2B228.a. includes precision mandrels, clamps, and shrink fit machines.</i></p> <p>b. Rotor straightening equipment for alignment of gas centrifuge rotor tube sections to a common axis;</p> <p><u>Technical Note</u>  <i>Equipment specified in Category Code 2B228.b. normally consists of precision measuring probes linked to a computer that subsequently controls the action of, e.g., pneumatic rams used for aligning the rotor tube sections.</i></p>

<i>Product Code</i>	<i>Item Description</i>
	<p>c. Bellows-forming mandrels and dies for producing single-convolution bellows.</p> <p><u>Technical Note</u></p> <p><i>In Category Code 2B228.c. the bellows have all of the following characteristics:</i></p> <ol style="list-style-type: none"> <li>1. Inside diameter between 75 mm and 400 mm;</li> <li>2. Length equal to or greater than 12.7 mm;</li> <li>3. Single convolution depth greater than 2 mm; <u>and</u></li> <li>4. Made of high-strength aluminium alloys, maraging steel or high strength “fibrous or filamentary materials”.</li> </ol>
DL2B230	<p>“Pressure transducers” capable of measuring absolute pressures at any point in the range 0 Pa to 13 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 aluminium, aluminium alloy, nickel or nickel alloy with more than 60% nickel by weight; <u>and</u></li> <li>b. Having either of the following characteristics: <ol style="list-style-type: none"> <li>1. A full scale of less than 13 kPa and an ‘accuracy’ of better than <math>\pm 1\%</math> of full-scale; <u>or</u></li> <li>2. A full scale of 13 kPa or greater and an ‘accuracy’ of better than <math>\pm 130</math> Pa.</li> </ol> </li> </ol> <p><u>Technical Note</u></p> <p><i>For the purposes of Category Code 2B230, ‘accuracy’ includes non-linearity, hysteresis and repeatability at ambient temperature.</i></p>
DL2B231	<p>Vacuum pumps having all of the following characteristics:</p> <ol style="list-style-type: none"> <li>a. Input throat size equal to or greater than 380 mm;</li> <li>b. Pumping speed equal to or greater than <math>15 \text{ m}^3/\text{s}</math>; <u>and</u></li> <li>c. Capable of producing an ultimate vacuum better than 13 mPa.</li> </ol> <p><u>Technical Notes</u></p> <ol style="list-style-type: none"> <li>1. The pumping speed is determined at the measurement point with nitrogen gas or air.</li> <li>2. The ultimate vacuum is determined at the input of the pump with the input of the pump blocked off.</li> </ol>
DL2B232	<p>Multistage light gas guns or other high-velocity gun systems (coil, electromagnetic, and electrothermal types, and other advanced systems) capable of accelerating projectiles to 2 km/s or greater.</p>
DL2B350	<p>Chemical manufacturing facilities, equipment and components, as follows:</p>

<i>Product Code</i>	<i>Item Description</i>
	<p>a. Reaction vessels or reactors, with or without agitators, with total internal (geometric) volume greater than 0.1 m<sup>3</sup> (100 litres) and less than 20 m<sup>3</sup> (20,000 litres), where all surfaces that come in direct contact with the chemical(s) being processed or contained are made from any of the following materials:</p> <ol style="list-style-type: none"> <li>1. Alloys with more than 25% nickel and 20% chromium by weight;</li> <li>2. Fluoropolymers;</li> <li>3. Glass (including vitrified or enamelled coating or glass lining);</li> <li>4. Nickel or alloys with more than 40% nickel by weight;</li> <li>5. Tantalum or tantalum alloys;</li> <li>6. Titanium or titanium alloys;</li> <li>7. Zirconium or zirconium alloys; <u>or</u></li> <li>8. Niobium (columbium) or niobium alloys;</li> </ol>
	<p>b. Agitators for use in reaction vessels or reactors specified in Category Code 2B350.a.; and impellers, blades or shafts designed for such agitators, where all surfaces of the agitator that come in direct contact with the chemical(s) being processed or contained are made from any of the following materials:</p> <ol style="list-style-type: none"> <li>1. Alloys with more than 25% nickel and 20% chromium by weight;</li> <li>2. Fluoropolymers;</li> <li>3. Glass (including vitrified or enamelled coatings or glass lining);</li> <li>4. Nickel or alloys with more than 40% nickel by weight;</li> <li>5. Tantalum or tantalum alloys;</li> <li>6. Titanium or titanium alloys;</li> <li>7. Zirconium or zirconium alloys; <u>or</u></li> <li>8. Niobium (columbium) or niobium alloys;</li> </ol>
	<p>c. Storage tanks, containers or receivers with a total internal (geometric) volume greater than 0.1 m<sup>3</sup> (100 litres) where all surfaces that come in direct contact with the chemical(s) being processed or contained are made from any of the following materials:</p> <ol style="list-style-type: none"> <li>1. Alloys with more than 25% nickel and 20% chromium by weight;</li> <li>2. Fluoropolymers;</li> <li>3. Glass (including vitrified or enamelled coatings or glass lining);</li> <li>4. Nickel or alloys with more than 40% nickel by weight;</li> <li>5. Tantalum or tantalum alloys;</li> </ol>

<i>Product Code</i>	<i>Item Description</i>
	<p>6. Titanium or titanium alloys;</p> <p>7. Zirconium or zirconium alloys; <u>or</u></p> <p>8. Niobium (columbium) or niobium alloys;</p> <hr/> <p>d. Heat exchangers or condensers with a heat transfer surface area greater than 0.15 m<sup>2</sup>, and less than 20 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 chemical(s) being processed are made from any of the following materials:</p> <ol style="list-style-type: none"> <li>1. Alloys with more than 25% nickel and 20% chromium by weight;</li> <li>2. Fluoropolymers;</li> <li>3. Glass (including vitrified or enamelled coatings or glass lining);</li> <li>4. Graphite or 'carbon graphite';</li> <li>5. Nickel or alloys with more than 40% nickel by weight;</li> <li>6. Tantalum or tantalum alloys;</li> <li>7. Titanium or titanium alloys;</li> <li>8. Zirconium or zirconium alloys;</li> <li>9. Silicon carbide;</li> <li>10. Titanium carbide; <u>or</u></li> <li>11. Niobium (columbium) or niobium alloys;</li> </ol> <hr/> <p>e. Distillation or absorption columns of internal diameter greater than 0.1 m; and liquid distributors, vapour distributors or liquid collectors designed for such distillation or absorption columns, where all surfaces that come in direct contact with the chemical(s) being processed are made from any of the following materials:</p> <ol style="list-style-type: none"> <li>1. Alloys with more than 25% nickel and 20% chromium by weight;</li> <li>2. Fluoropolymers;</li> <li>3. Glass (including vitrified or enamelled coatings or glass lining);</li> <li>4. Graphite or 'carbon graphite';</li> <li>5. Nickel or alloys with more than 40% nickel by weight;</li> <li>6. Tantalum or tantalum alloys;</li> <li>7. Titanium or titanium alloys;</li> <li>8. Zirconium or zirconium alloys; <u>or</u></li> <li>9. Niobium (columbium) or niobium alloys;</li> </ol> <hr/> <p>f. Remotely operated filling equipment in which all surfaces that come in direct contact with the chemical(s) being processed are made from any of</p>

<i>Product Code</i>	<i>Item Description</i>
	<p>the following materials:</p> <ol style="list-style-type: none"> <li>1. Alloys with more than 25% nickel and 20% chromium by weight; <u>or</u></li> <li>2. Nickel or alloys with more than 40% nickel by weight;</li> </ol> <p>g. Valves with nominal sizes greater than 10 mm and casings (valve bodies) or preformed casing liners designed for such valves, in which all surfaces that come in direct contact with the chemical(s) being processed or contained are made from any of the following materials:</p> <ol style="list-style-type: none"> <li>1. Alloys with more than 25% nickel and 20% chromium by weight;</li> <li>2. Fluoropolymers;</li> <li>3. Glass (including vitrified or enamelled coatings or glass lining);</li> <li>4. Nickel or alloys with more than 40% nickel by weight;</li> <li>5. Tantalum or tantalum alloys;</li> <li>6. Titanium or titanium alloys;</li> <li>7. Zirconium or zirconium alloys; <u>or</u></li> <li>8. Niobium (columbium) or niobium alloys;</li> </ol> <p>h. Multi-walled piping incorporating a leak detection port, in which all surfaces that come in direct contact with the chemical(s) being processed or contained are made from any of the following materials:</p> <ol style="list-style-type: none"> <li>1. Alloys with more than 25% nickel and 20% chromium by weight;</li> <li>2. Fluoropolymers;</li> <li>3. Glass (including vitrified or enamelled coatings or glass lining);</li> <li>4. Graphite or ‘carbon graphite’;</li> <li>5. Nickel or alloys with more than 40% nickel by weight;</li> <li>6. Tantalum or tantalum alloys;</li> <li>7. Titanium or titanium alloys;</li> <li>8. Zirconium or zirconium alloys; <u>or</u></li> <li>9. Niobium (columbium) or niobium alloys;</li> </ol> <p>i. Multiple-seal and seal-less pumps, 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 (under standard temperature (273 K (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 in direct contact with the chemical(s) being processed are made from any of the following materials:</p>

<i>Product Code</i>	<i>Item Description</i>
	<ol style="list-style-type: none"> <li>1. Alloys with more than 25% nickel and 20% chromium by weight;</li> <li>2. Ceramics;</li> <li>3. Ferrosilicon;</li> <li>4. Fluoropolymers;</li> <li>5. Glass (including vitrified or enamelled coatings or glass lining);</li> <li>6. Graphite or ‘carbon graphite’;</li> <li>7. Nickel or alloys with more than 40% nickel by weight;</li> <li>8. Tantalum or tantalum alloys;</li> <li>9. Titanium or titanium alloys;</li> <li>10. Zirconium or zirconium alloys; <u>or</u></li> <li>11. Niobium (columbium) or niobium alloys;</li> </ol> <p>j. Incinerators designed to destroy chemicals specified in Category Code 1C350, having specially designed waste supply systems, special handling facilities and an average combustion chamber temperature greater than 1,273 K (1,000°C), in which all surfaces in the waste supply system that come into direct contact with the waste products are made from or lined with any of the following materials:</p> <ol style="list-style-type: none"> <li>1. Alloys with more than 25% nickel and 20% chromium by weight;</li> <li>2. Ceramics; <u>or</u></li> <li>3. Nickel or alloys with more than 40% nickel by weight.</li> </ol> <p><u>Technical Note</u></p> <p><i>‘Carbon graphite’ is a composition of amorphous carbon and graphite, in which the graphite content is 8% or more by weight.</i></p>
DL2B351	<p>Toxic gas monitoring systems, as follows; and dedicated detectors therefor:</p> <ol style="list-style-type: none"> <li>a. Designed for continuous operation and usable for the detection of chemical warfare agents or chemicals specified in Category Code 1C350, at concentrations of less than 0.3 mg/m<sup>3</sup>; <u>or</u></li> <li>b. Designed for the detection of cholinesterase-inhibiting activity.</li> </ol>
DL2B352	<p>Equipment capable of use in handling biological materials, as follows:</p> <ol style="list-style-type: none"> <li>a. Complete biological containment facilities at P3, P4 containment level;</li> </ol> <p><u>Technical Note</u></p> <p><i>P3 or P4 (BL3, BL4, L3, L4) containment levels are as specified in the WHO Laboratory Biosafety manual (3rd edition, Geneva 2004).</i></p>

<i>Product Code</i>	<i>Item Description</i>
	<p>b. Fermenters capable of cultivation of pathogenic “microorganisms”, viruses or capable of toxin production, without the propagation of aerosols, and having a total capacity of 20 litres or more;</p> <p><u>Technical Note</u></p> <p><i>Fermenters include bioreactors, chemostats and continuous-flow systems.</i></p>
	<p>c. Centrifugal separators, capable of continuous separation without the propagation of aerosols, having all the following characteristics:</p> <ol style="list-style-type: none"> <li>1. Flow rate exceeding 100 litres per hour;</li> <li>2. Components of polished stainless steel or titanium;</li> <li>3. One or more sealing joints within the steam containment area; <u>and</u></li> <li>4. Capable of <i>in situ</i> steam sterilisation in a closed state;</li> </ol> <p><u>Technical Note</u></p> <p><i>Centrifugal separators include decanters.</i></p>
	<p>d. Cross (tangential) flow filtration equipment and components as follows:</p>
	<ol style="list-style-type: none"> <li>1. Cross (tangential) flow filtration equipment capable of separation of pathogenic microorganisms, viruses, toxins or cell cultures, without the propagation of aerosols, having both of the following characteristics: <ol style="list-style-type: none"> <li>a. A total filtration area equal to or greater than 1 m<sup>2</sup>; <u>and</u></li> <li>b. Capable of being sterilised or disinfected <i>in situ</i>;</li> </ol> <p><u>Technical Note</u></p> <p><i>In Category Code 2B352.d.1.b. sterilised denotes the elimination of all viable microbes from the equipment through the use of either physical (e.g., steam) or chemical agents. Disinfected denotes the destruction of potential microbial infectivity in the equipment through the use of chemical agents with a germicidal effect. Disinfection and sterilisation are distinct from sanitisation, the latter referring to cleaning procedures designed to lower the microbial content of equipment without necessarily achieving elimination of all microbial infectivity or viability.</i></p> </li> </ol>
	<ol style="list-style-type: none"> <li>2. Cross (tangential) flow filtration components (e.g., modules, elements, cassettes, cartridges, units or plates) with filtration area equal to or greater than 0.2 m<sup>2</sup> for each component and designed for use in cross (tangential) flow filtration equipment specified in Category Code 2B352.d.;</li> </ol> <p><u>Note</u></p> <p><i>Category Code 2B352.d. does not include reverse osmosis equipment,</i></p>

<i>Product Code</i>	<i>Item Description</i>
	<p><i>as specified by the manufacturer.</i></p> <p>e. Steam sterilisable freeze drying equipment with a condenser capacity exceeding 10 kg of ice in 24 hours and less than 1,000 kg of ice in 24 hours;</p> <p>f. Protective and containment equipment, as follows:</p> <p>1. Protective full or half suits, or hoods dependent upon a tethered external air supply and operating under positive pressure;</p> <p><u>Note</u> <i>Category Code 2B352.f.1. does not include suits designed to be worn with self-contained breathing apparatus.</i></p> <p>2. Class III biological safety cabinets or isolators with similar performance standards;</p> <p><u>Note</u> <i>In Category Code 2B352.f.2., isolators include flexible isolators, dry boxes, anaerobic chambers, glove boxes and laminar flow hoods (closed with vertical flow).</i></p> <p>g. Chambers designed for aerosol challenge testing with “microorganisms”, viruses or “toxins”, and having a capacity of 1 m<sup>3</sup> or greater.</p>
<b>2C</b>	<b>Materials</b>
	None.
<b>2D</b>	<b>Software</b>
DL2D001	“Software”, other than that specified in Category Code 2D002, specially designed or modified for the “development”, “production” or “use” of equipment specified in Category Code 2A001 or 2B001 to 2B009.
DL2D002	<p>“Software” for electronic devices, even when residing in an electronic device or system, enabling such devices or systems to function as a “numerical control” unit, capable of co-ordinating simultaneously more than four axes for “contouring control”.</p> <p><u>Note 1</u> <i>Category Code 2D002 does not include “software” specially designed or modified for the operation of machine tools not specified in Category 2.</i></p> <p><u>Note 2</u> <i>Category Code 2D002 does not include “software” for items specified in Category Code 2B002. See Category Code 2D001 for “software” for items</i></p>

<i>Product Code</i>	<i>Item Description</i>
	<b><i>specified in Category Code 2B002.</i></b>
DL2D101	<p>“Software” specially designed or modified for the “use” of equipment specified in Category Code 2B104, 2B105, 2B109, 2B116, 2B117 or 2B119 to 2B122.</p> <p><b><u>N.B.</u></b></p> <p><b><i>See also Category Code 9D004.</i></b></p>
DL2D201	“Software” specially designed for the “use” of equipment specified in Category Code 2B204, 2B206, 2B207, 2B209, 2B219 or 2B227.
DL2D202	“Software” specially designed or modified for the “development”, “production” or “use” of equipment specified in Category Code 2B201.
<b>2E</b>	<b>Technology</b>
DL2E001	“Technology” (according to the General Technology Note) for the “development” of equipment or “software” specified in Category 2A, 2B or 2D.
DL2E002	“Technology” (according to the General Technology Note) for the “production” of equipment specified in Category 2A or 2B.
DL2E003	<p>Other “technology”, as follows:</p> <p>a. “Technology” for the “development” of interactive graphics as an integrated part in “numerical control” units for preparation or modification of part programmes;</p> <p>b. “Technology” for metal-working manufacturing processes, as follows:</p> <p>1. “Technology” for the design of tools, dies or fixtures specially designed for any of the following processes:</p> <p>a. “Superplastic forming”;</p> <p>b. “Diffusion bonding”; <u>or</u></p> <p>c. “Direct-acting hydraulic pressing”;</p> <p>2. Technical data consisting of process methods or parameters as listed below used to control:</p> <p>a. “Superplastic forming” of aluminium alloys, titanium alloys or “superalloys”:</p> <p>1. Surface preparation;</p> <p>2. Strain rate;</p> <p>3. Temperature;</p>

<i>Product Code</i>	<i>Item Description</i>
	<p>4. Pressure;</p> <p>b. “Diffusion bonding” of “superalloys” or titanium alloys:</p> <ol style="list-style-type: none"> <li>1. Surface preparation;</li> <li>2. Temperature;</li> <li>3. Pressure;</li> </ol> <p>c. “Direct-acting hydraulic pressing” of aluminium alloys or titanium alloys:</p> <ol style="list-style-type: none"> <li>1. Pressure;</li> <li>2. Cycle time;</li> </ol> <p>d. “Hot isostatic densification” of titanium alloys, aluminium alloys or “superalloys”:</p> <ol style="list-style-type: none"> <li>1. Temperature;</li> <li>2. Pressure;</li> <li>3. Cycle time;</li> </ol> <p>c. “Technology” for the “development” or “production” of hydraulic stretch-forming machines and dies therefor, for the manufacture of airframe structures;</p> <p>d. “Technology” for the “development” of generators of machine tool instructions (e.g., part programmes) from design data residing inside “numerical control” units;</p> <p>e. “Technology” for the “development” of integration “software” for incorporation of expert systems for advanced decision support of shop floor operations into “numerical control” units;</p> <p>f. “Technology” for the application of inorganic overlay coatings or inorganic surface modification coatings (specified in column 3 of the Table entitled Deposition Techniques) to non-electronic substrates (specified in column 2 of that Table), by processes specified in column 1 of that Table and defined in the Technical Note.</p> <p><i>Note</i></p> <p><i>The Table entitled Deposition Techniques and Technical Note appear after Category Code 2E301.</i></p>
DL2E101	<p>“Technology” (according to the General Technology Note) for the “use” of equipment or “software” specified in Category Code 2B004, 2B009, 2B104, 2B109, 2B116, 2B119 to 2B122 or 2D101.</p>
DL2E201	<p>“Technology” (according to the General Technology Note) for the “use” of equipment or “software” specified in Category Code 2A225, 2A226,</p>

<i>Product Code</i>	<i>Item Description</i>
	2B001, 2B006, 2B007.b., 2B007.c., 2B008, 2B009, 2B201, 2B204, 2B206, 2B207, 2B209, 2B225 to 2B232, 2D201, or 2D202.
DL2E301	“Technology” (according to the General Technology Note) for the “use” of goods specified in Category Codes 2B350 to 2B352.