

**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 9 — AEROSPACE AND PROPULSION</b>	
<b>9A</b>	<b>Systems, Equipment and Components</b>
	<p><b><u>N.B.</u></b> <i>For propulsion systems designed or rated against neutron or transient ionising radiation, see Division 2 of Part I of this Schedule.</i></p>
DL9A001	<p>Aero gas turbine engines having any of the following:</p> <p><b><u>N.B.</u></b> <i>See also Category Code 9A101.</i></p> <p>a. Incorporating any of the “technologies” specified in Category Code 9E003.a.; <u>or</u></p> <p><i>Note</i> <i>Category Code 9A001.a. does not include aero gas turbine engines which meet all of the following:</i></p> <p style="padding-left: 40px;"><i>a. Certified by the civil aviation authority in a “participating state”; and</i></p> <p style="padding-left: 40px;"><i>b. Intended to power non-military manned aircraft for which any of the following has been issued by a “participating state” for the aircraft with this specific engine type:</i></p> <p style="padding-left: 80px;"><i>1. A civil type certificate; or</i></p> <p style="padding-left: 80px;"><i>2. An equivalent document recognised by the International Civil Aviation Organisation (ICAO).</i></p> <p>b. Designed to power an aircraft to cruise at Mach 1 or higher for more than thirty minutes.</p>
DL9A002	<p>Marine gas turbine engines’ with an ISO standard continuous power rating of 24,245 kW or more and a specific fuel consumption not exceeding 0.219 kg/kWh in the power range from 35% to 100%, and specially designed assemblies and components therefor.</p>

<i>Product Code</i>	<i>Item Description</i>
	<p><u>Note</u></p> <p><i>The term ‘marine gas turbine engines’ includes those industrial, or aero-derivative, gas turbine engines adapted for a ship’s electric power generation or propulsion.</i></p>
DL9A003	<p>Specially designed assemblies and components, incorporating any of the “technologies” specified in Category Code 9E003.a., for gas turbine engine propulsion systems and having any of the following:</p> <p>a. Specified in Category Code 9A001; <u>or</u></p> <p>b. Whose design or production origins are either non-“participating states” or unknown.</p>
DL9A004	<p>Space launch vehicles and “spacecraft”.</p> <p><b><u>N.B.</u></b></p> <p><b><i>See also Category Code 9A104.</i></b></p> <p><u>Note</u></p> <p><i>Category Code 9A004 does not include payloads.</i></p> <p><b><u>N.B.</u></b></p> <p><b><i>For products contained in “spacecraft” payloads, see the appropriate Categories.</i></b></p>
DL9A005	<p>Liquid rocket propulsion systems containing any of the systems or components specified in Category Code 9A006.</p> <p><b><u>N.B.</u></b></p> <p><b><i>See also Category Codes 9A105 and 9A119.</i></b></p>
DL9A006	<p>Systems and components specially designed for liquid rocket propulsion systems, as follows:</p> <p><b><u>N.B.</u></b></p> <p><b><i>See also Category Codes 9A106, 9A108 and 9A120.</i></b></p> <p>a. Cryogenic refrigerators, flightweight dewars, cryogenic heat pipes or cryogenic systems specially designed for use in space vehicles and capable of restricting cryogenic fluid losses to less than 30% per year;</p> <p>b. Cryogenic containers or closed-cycle refrigeration systems capable of providing temperatures of 100 K (–173°C) or less for “aircraft” capable of sustained flight at speeds exceeding Mach 3, launch vehicles or “spacecraft”;</p> <p>c. Slush hydrogen storage or transfer systems;</p>

<i>Product Code</i>	<i>Item Description</i>
	<p>d. High pressure (exceeding 17.5 MPa) turbo pumps, pump components or their associated gas generator or expander cycle turbine drive systems;</p> <p>e. High-pressure (exceeding 10.6 MPa) thrust chambers and nozzles therefor;</p> <p>f. Propellant storage systems using the principle of capillary containment or positive expulsion (i.e., with flexible bladders);</p> <p>g. Liquid propellant injectors, with individual orifices of 0.381 mm or smaller in diameter (an area of <math>1.14 \times 10^{-3} \text{ cm}^2</math> or smaller for non-circular orifices) and specially designed for liquid rocket engines;</p> <p>h. One-piece carbon-carbon thrust chambers or one-piece carbon-carbon exit cones with densities exceeding <math>1.4 \text{ g/cm}^3</math> and tensile strengths exceeding 48 MPa.</p>
DL9A007	<p>Solid rocket propulsion systems having any of the following:</p> <p><b><u>N.B.</u></b>  <b><i>See also Category Codes 9A107 and 9A119.</i></b></p> <p>a. Total impulse capacity exceeding 1.1 MNs;</p> <p>b. Specific impulse of 2.4 kNs/kg or more when the nozzle flow is expanded to ambient sea level conditions for an adjusted chamber pressure of 7MPa;</p> <p>c. Stage mass fractions exceeding 88% and propellant solid loadings exceeding 86%;</p> <p>d. Components specified in Category Code 9A008; <u>or</u></p> <p>e. Insulation and propellant bonding systems using direct-bonded motor designs to provide a ‘strong mechanical bond’ or a barrier to chemical migration between the solid propellant and case insulation material.</p> <p><b><u>Technical Note</u></b>  ‘Strong mechanical bond’ means bond strength equal to or more than propellant strength.</p>
DL9A008	<p>Components specially designed for solid rocket propulsion systems, as follows:</p> <p><b><u>N.B.</u></b>  <b><i>See also Category Code 9A108.</i></b></p> <p>a. Insulation and propellant bonding systems using liners to provide a ‘strong mechanical bond’ or a barrier to chemical migration between the solid propellant and case insulation material;</p> <p><b><u>Technical Note</u></b>  ‘Strong mechanical bond’ means bond strength equal to or more than</p>

<i>Product Code</i>	<i>Item Description</i>
	<p><i>propellant strength.</i></p> <p>b. Filament-wound “composite” motor cases exceeding 0.61 m in diameter or having ‘structural efficiency ratios (PV/W)’ exceeding 25 km; <i>Technical Note</i> <i>‘Structural efficiency ratio (PV/W)’ is the burst pressure (P) multiplied by the vessel volume (V) divided by the total pressure vessel weight (W).</i></p> <p>c. Nozzles with thrust levels exceeding 45 kN or nozzle throat erosion rates of less than 0.075 mm/s;</p> <p>d. Movable nozzle or secondary fluid injection thrust vector control systems capable of any of the following: 1. Omni-axial movement exceeding <math>\pm 5^\circ</math>; 2. Angular vector rotations of <math>20^\circ/\text{s}</math> or more; <u>or</u> 3. Angular vector accelerations of <math>40^\circ/\text{s}^2</math> or more.</p>
DL9A009	<p>Hybrid rocket propulsion systems having any of the following: <b><u>N.B.</u></b> <b><i>See also Category Codes 9A109 and 9A119.</i></b></p> <p>a. Total impulse capacity exceeding 1.1 MNs; <u>or</u> b. Thrust levels exceeding 220 kN in vacuum exit conditions.</p>
DL9A010	<p>Specially designed components, systems and structures for launch vehicles, launch vehicle propulsion systems or “spacecraft”, as follows: <b><u>N.B.</u></b> <b><i>See also Category Codes 1A002 and 9A110.</i></b></p> <p>a. Components and structures each exceeding 10 kg and specially designed for launch vehicles manufactured using metal “matrix”, “composite”, organic “composite”, ceramic “matrix” or intermetallic reinforced materials specified in Category Code 1C007 or 1C010; <i>Note</i> <i>The weight cut-off is not relevant for nose cones.</i></p> <p>b. Components and structures, specially designed for launch vehicle propulsion systems specified in Category Codes 9A005 to 9A009 manufactured using metal “matrix”, “composite”, organic “composite”, ceramic “matrix” or intermetallic reinforced materials, specified in Category Code 1C007 or 1C010;</p> <p>c. Structural components and isolation systems specially designed to control</p>

<i>Product Code</i>	<i>Item Description</i>
	actively the dynamic response or distortion of “spacecraft” structures;
	d. Pulsed liquid rocket engines with thrust-to-weight ratios equal to or more than 1 kN/kg and a response time (the time required to achieve 90% of total rated thrust from start-up) of less than 30 ms.
DL9A011	Ramjet, scramjet or combined cycle engines and specially designed components therefor. <b><u>N.B.</u></b> <b><i>See also Category Codes 9A111 and 9A118.</i></b>
DL9A012	“Unmanned aerial vehicles” (“UAVs”), associated systems, equipment and components, as follows:
	a. “UAVs” having any of the following: <ol style="list-style-type: none"> <li>1. An autonomous flight control and navigation capability (e.g., an autopilot with an Inertial Navigation System); <u>or</u></li> <li>2. Capability of controlled-flight out of the direct vision range involving human operator (e.g., televisual remote control);</li> </ol>
	b. Associated systems, equipment and components, as follows:
	1. Equipment specially designed for remotely controlling the “UAVs” specified in Category Code 9A012.a.;
	2. Guidance or control systems, other than those specified in Category 7A and specially designed for integration into “UAVs” specified in Category Code 9A012.a.;
	3. Equipment and components, specially designed to convert a manned “aircraft” to a “UAV” specified in Category Code 9A012.a.;
	4. Air breathing reciprocating or rotary internal combustion type engines, specially designed or modified to propel “UAVs” at altitudes above 50,000 feet (15,240 metres).
DL9A101	Turbojet and turbofan engines (including turbocompound engines), other than those specified in Category Code 9A001, as follows:
	a. Engines having both of the following characteristics: <ol style="list-style-type: none"> <li>1. Maximum thrust value greater than 400 N (achieved un-installed) excluding civil certified engines with a maximum thrust value greater than 8,890 N (achieved un-installed); <u>and</u></li> <li>2. Specific fuel consumption of 0.15 kg/N/hr or less (at maximum continuous power at sea level static and standard conditions);</li> </ol>

<i>Product Code</i>	<i>Item Description</i>
	b. Engines designed or modified for use in “missiles” or unmanned aerial vehicles specified in Category Code 9A012.
DL9A102	<p>‘Turboprop engine systems’ specially designed for unmanned aerial vehicles specified in Category Code 9A012, and specially designed components therefor, having a ‘maximum power’ greater than 10 kW.</p> <p><i>Note</i></p> <p><i>Category Code 9A102 does not include civil certified engines.</i></p> <p><i>Technical Notes</i></p> <p>1. For the purposes of Category Code 9A102 a ‘turboprop engine system’ incorporates all of the following:</p> <p>a. Turboshaft engine; <i>and</i></p> <p>b. Power transmission system to transfer the power to a propeller.</p> <p>2. For the purposes of Category Code 9A102 the ‘maximum power’ is achieved uninstalled at sea level standard conditions.</p>
DL9A104	<p>Sounding rockets, capable of a range of at least 300 km.</p> <p><b><u>N.B.</u></b></p> <p><b><i>See also Category Code 9A004.</i></b></p>
DL9A105	<p>Liquid propellant rocket engines, as follows:</p> <p><b><u>N.B.</u></b></p> <p><b><i>See also Category Code 9A119.</i></b></p> <p>a. Liquid propellant rocket engines usable in “missiles”, other than those specified in Category Code 9A005, having a total impulse capacity equal to or greater than 1.1 MNs;</p> <p>b. Liquid propellant rocket engines, usable in complete rocket systems or unmanned aerial vehicles, capable of a range of 300 km, other than those specified in Category Code 9A005 or 9A105.a., having a total impulse capacity equal to or greater than 0.841 MNs.</p>
DL9A106	<p>Systems or components, other than those specified in Category Code 9A006 as follows, specially designed for liquid rocket propulsion systems:</p> <p>a. Ablative liners for thrust or combustion chambers, usable in “missiles”, space launch vehicles specified in Category Code 9A004 or sounding rockets specified in Category Code 9A104;</p> <p>b. Rocket nozzles, usable in “missiles”, space launch vehicles specified in Category Code 9A004 or sounding rockets specified in Category Code</p>

<i>Product Code</i>	<i>Item Description</i>
	<p>9A104;</p> <p>c. Thrust vector control subsystems, usable in “missiles”;</p> <p><i>Technical Note</i></p> <p><i>Examples of methods of achieving thrust vector control specified in Category Code 9A106.c. are:</i></p> <ol style="list-style-type: none"> <li>1. Flexible nozzle;</li> <li>2. Fluid or secondary gas injection;</li> <li>3. Movable engine or nozzle;</li> <li>4. Deflection of exhaust gas stream (jet vanes or probes); <u>or</u></li> <li>5. Thrust tabs.</li> </ol>
	<p>d. Liquid and slurry propellant (including oxidisers) control systems, and specially designed components therefor, usable in “missiles”, designed or modified to operate in vibration environments greater than 10 g rms between 20 Hz and 2 kHz.</p> <p><i>Note</i></p> <p><i>The only servo valves and pumps specified in Category Code 9A106.d., are:</i></p> <ol style="list-style-type: none"> <li>a. Servo valves designed for flow rates equal to or greater than 24 litres per minute, at an absolute pressure equal to or greater than 7 MPa, that have an actuator response time of less than 100 ms;</li> <li>b. Pumps, for liquid propellants, with shaft speeds equal to or greater than 8,000 rpm or with discharge pressures equal to or greater than 7 MPa.</li> </ol>
DL9A107	<p>Solid propellant rocket engines, usable in complete rocket systems or unmanned aerial vehicles, capable of a range of 300 km, other than those specified in Category Code 9A007, having total impulse capacity equal to or greater than 0.841 MNs.</p> <p><b><u>N.B.</u></b></p> <p><b><i>See also Category Code 9A119.</i></b></p>
DL9A108	<p>Components, other than those specified in Category Code 9A008, usable in “missiles”, as follows, specially designed for solid rocket propulsion systems:</p> <ol style="list-style-type: none"> <li>a. Rocket motor cases and “insulation” components therefor;</li> <li>b. Rocket nozzles;</li> </ol>

<i>Product Code</i>	<i>Item Description</i>
	<p>c. Thrust vector control subsystems.</p> <p><i>Technical Note</i></p> <p><i>Examples of methods of achieving thrust vector control specified in Category Code 9A108.c. are:</i></p> <ol style="list-style-type: none"> <li>1. Flexible nozzle;</li> <li>2. Fluid or secondary gas injection;</li> <li>3. Movable engine or nozzle;</li> <li>4. Deflection of exhaust gas stream (jet vanes or probes); <u>or</u></li> <li>5. Thrust tabs.</li> </ol>
DL9A109	<p>Hybrid rocket motors, usable in ‘missiles’, other than those specified in Category Code 9A009, and specially designed components therefor.</p> <p><b><u>N.B.</u></b></p> <p><b><i>See also Category Code 9A119.</i></b></p> <p><i>Technical Note</i></p> <p><i>In Category Code 9A109 ‘missile’ means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km.</i></p>
DL9A110	<p>Composite structures, laminates and manufactures thereof, other than those specified in Category Code 9A010, specially designed for use in space launch vehicles specified in Category Code 9A004 or sounding rockets specified in Category Code 9A104 or the subsystems specified in Category Code 9A005, 9A007, 9A105.a., 9A106 to 9A108, 9A116 or 9A119.</p> <p><b><u>N.B.</u></b></p> <p><b><i>See also Category Code 1A002.</i></b></p>
DL9A111	<p>Pulse jet engines, usable in “missiles” or unmanned aerial vehicles specified in Category Code 9A102, and specially designed components therefor.</p> <p><b><u>N.B.</u></b></p> <p><b><i>See also Category Codes 9A011 and 9A118.</i></b></p>
DL9A115	<p>Launch support equipment, as follows:</p> <ol style="list-style-type: none"> <li>a. Apparatus and devices for handling, control, activation or launching, designed or modified for space launch vehicles specified in Category Code 9A004, unmanned aerial vehicles specified in Category Code 9A012 or sounding rockets specified in Category Code 9A104;</li> <li>b. Vehicles for transport, handling, control, activation or launching, designed or modified for space launch vehicles specified in Category Code 9A004 or sounding rockets specified in Category Code 9A104.</li> </ol>

<i>Product Code</i>	<i>Item Description</i>
DL9A116	Re-entry vehicles, usable in “missiles”, and equipment designed or modified therefor, as follows:
	a. Re-entry vehicles;
	b. Heat shields and components therefor fabricated of ceramic or ablative materials;
	c. Heat sinks and components therefor fabricated of light-weight, high heat capacity materials;
	d. Electronic equipment specially designed for re-entry vehicles.
DL9A117	Staging mechanisms, separation mechanisms, and interstages, usable in “missiles”.
DL9A118	Devices to regulate combustion usable in engines, which are usable in “missiles” or unmanned aerial vehicles specified in Category Code 9A102, specified in Category Code 9A011 or 9A111.
DL9A119	Individual rocket stages, usable in complete rocket systems or unmanned aerial vehicles, capable of a range of 300 km, other than those specified in Category Codes 9A005, 9A007, 9A009, 9A105, 9A107 and 9A109.
DL9A120	Liquid propellant tanks, other than those specified in Category Code 9A006, specially designed for propellants specified in Category Code 1C111 or ‘other liquid propellants’, used in rocket systems capable of delivering at least a 500 kg payload to a range of at least 300 km.  <i>Note</i> <i>In Category Code 9A120 ‘other liquid propellants’ includes, but is not limited to, propellants specified in Division 2 of Part I of this Schedule.</i>
DL9A350	Spraying or fogging systems, specially designed or modified for fitting to aircraft, “lighter-than-air vehicles”, or unmanned aerial vehicles, and specially designed components therefor, as follows:
	a. Complete spraying or fogging systems capable of delivering, from a liquid suspension, an initial droplet ‘VMD’ of less than 50 µm at a flow rate of greater than two litres per minute;
	b. Spray booms or arrays of aerosol generating units capable of delivering, from a liquid suspension, an initial droplet ‘VMD’ of less than 50 µm at a flow rate of greater than two litres per minute;

<i>Product Code</i>	<i>Item Description</i>
	<p>c. Aerosol generating units specially designed for fitting to systems specified in Category Codes 9A350.a. and b.</p> <p><i>Note</i></p> <p><i>Aerosol generating units are devices specially designed or modified for fitting to aircraft such as nozzles, rotary drum atomisers and similar devices.</i></p> <p><i>Note</i></p> <p><i>Category Code 9A350 does not include spraying or fogging systems and components that are demonstrated not to be capable of delivering biological agents in the form of infectious aerosols.</i></p> <p><i>Technical Notes</i></p> <p><i>1. Droplet size for spray equipment or nozzles specially designed for use on aircraft, “lighter-than-air vehicles” or unmanned aerial vehicles should be measured using either of the following:</i></p> <p><i>a. Doppler laser method;</i></p> <p><i>b. Forward laser diffraction method.</i></p> <p><i>2. In Category Code 9A350, ‘VMD’ means Volume Mean Diameter and for water-based systems this equates to Mass Median Diameter (MMD).</i></p>
<b>9B</b>	<b>Test, Inspection and Production Equipment</b>
DL9B001	<p>Equipment, tooling and fixtures specially designed for manufacturing gas turbine blades, vanes or tip shroud castings, as follows:</p> <p>a. Directional solidification or single crystal casting equipment;</p> <p>b. Ceramic cores or shells.</p>
DL9B002	<p>On-line (real time) control systems, instrumentation (including sensors) or automated data acquisition and processing equipment, specially designed for the “development” of gas turbine engines, assemblies or components and incorporating “technologies” specified in Category Code 9E003.a.</p>
DL9B003	<p>Equipment specially designed for the “production” or test of gas turbine brush seals designed to operate at tip speeds exceeding 335 m/s, and temperatures in excess of 773 K (500°C), and specially designed components or accessories therefor.</p>
DL9B004	<p>Tools, dies or fixtures for the solid state joining of “superalloy”, titanium or intermetallic airfoil-to-disk combinations described in Category Code 9E003.a.3. or 9E003.a.6. for gas turbines.</p>

<i>Product Code</i>	<i>Item Description</i>
DL9B005	<p>On-line (real time) control systems, instrumentation (including sensors) or automated data acquisition and processing equipment, specially designed for use with any of the following:</p> <p><b><u>N.B.</u></b></p> <p><b><i>See also Category Code 9B105.</i></b></p> <p>a. Wind tunnels designed for speeds of Mach 1.2 or more;</p> <p><i>Note</i></p> <p><i>Category Code 9B005.a. does not include wind tunnels specially designed for educational purposes and having a ‘test section size’ (measured laterally) of less than 250 mm.</i></p> <p><i>Technical Note</i></p> <p><i>‘Test section size’ means the diameter of the circle, or the side of the square, or the longest side of the rectangle, at the largest test section location.</i></p> <p>b. Devices for simulating flow-environments at speeds exceeding Mach 5, including hot-shot tunnels, plasma arc tunnels, shock tubes, shock tunnels, gas tunnels and light gas guns; <u>or</u></p> <p>c. Wind tunnels or devices, other than two-dimensional sections, capable of simulating Reynolds number flows exceeding <math>25 \times 10^6</math>.</p>
DL9B006	<p>Acoustic vibration test equipment capable of producing sound pressure levels of 160 dB or more (referenced to 20 <math>\mu</math>Pa) with a rated output of 4 kW or more at a test cell temperature exceeding 1,273 K (1,000°C), and specially designed quartz heaters therefor.</p> <p><b><u>N.B.</u></b></p> <p><b><i>See also Category Code 9B106.</i></b></p>
DL9B007	<p>Equipment specially designed for inspecting the integrity of rocket motors using Non-Destructive Test (NDT) techniques other than planar X-ray or basic physical or chemical analysis.</p>
DL9B008	<p>Transducers specially designed for the direct measurement of the wall skin friction of the test flow with a stagnation temperature exceeding 833 K (560°C).</p>
DL9B009	<p>Tooling specially designed for producing turbine engine powder metallurgy rotor components capable of operating at stress levels of 60% of Ultimate Tensile Strength (UTS) or more and metal temperatures of 873 K (600°C) or more.</p>
DL9B010	<p>Equipment specially designed for the production of “UAVs” and associated systems, equipment and components specified in Category Code 9A012.</p>

<i>Product Code</i>	<i>Item Description</i>
DL9B105	<p>Wind tunnels for speeds of Mach 0.9 or more, usable for ‘missiles’ and their subsystems.</p> <p><b><u>N.B.</u></b></p> <p><b><i>See also Category Code 9B005.</i></b></p> <p><u>Technical Note</u></p> <p><i>In Category Code 9B105 ‘missile’ means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km.</i></p>
DL9B106	<p>Environmental chambers and anechoic chambers, as follows:</p> <p>a. Environmental chambers capable of simulating all of the following flight conditions:</p> <ol style="list-style-type: none"> <li>1. Having any of the following: <ol style="list-style-type: none"> <li>a. Altitude equal to greater than 15 km; <u>or</u></li> <li>b. Temperature range of at least 223 K (–50°C) to 398 K (+125°C); <u>and</u></li> </ol> </li> <li>2. Incorporating, or ‘designed or modified’ to incorporate, a shaker unit or other vibration test equipment to produce vibration environments equal to or greater than 10 g rms, measured ‘bare table’, between 20 Hz and 2 kHz imparting forces equal to or greater than 5 kN;</li> </ol> <p><u>Technical Notes</u></p> <ol style="list-style-type: none"> <li>1. <i>Category Code 9B106.a.2. describes systems that are capable of generating a vibration environment with a single wave (e.g., a sine wave) and systems capable of generating a broad band random vibration (i.e., power spectrum);</i></li> <li>2. <i>In Category Code 9B106.a.2., ‘designed or modified’ means the environmental chamber provides appropriate interfaces (e.g., sealing devices) to incorporate a shaker unit or other vibration test equipment as specified in Category Code 2B116.</i></li> <li>3. <i>In Category Code 9B106.a.2., ‘bare table’ means a flat table, or surface, with no fixture or fittings.</i></li> </ol> <p>b. Environmental chambers capable of simulating the following flight conditions:</p> <ol style="list-style-type: none"> <li>1. Acoustic environments at an overall sound pressure level of 140 dB or greater (referenced to 20 µPa) or with a total rated acoustic power output of 4 kW or greater; <u>and</u></li> <li>2. Any of the following: <ol style="list-style-type: none"> <li>a. Altitude equal to greater than 15 km; <u>or</u></li> <li>b. Temperature range from below 223 K (–50°C) to 398 K (+125°C).</li> </ol> </li> </ol>

<i>Product Code</i>	<i>Item Description</i>
DL9B115	Specially designed “production equipment” for the systems, subsystems and components specified in Category Code 9A005 to 9A009, 9A011, 9A101, 9A102, 9A105 to 9A109, 9A111 or 9A116 to 9A120.
DL9B116	Specially designed “production facilities” for the space launch vehicles specified in Category Code 9A004, or systems, subsystems, and components specified in Category Code 9A005 to 9A009, 9A011, 9A101, 9A102, 9A104 to 9A109, 9A111, or 9A116 to 9A120.
DL9B117	Test benches and test stands for solid or liquid propellant rockets or rocket motors, having either of the following characteristics: a. The capacity to handle more than 68 kN of thrust; <u>or</u> b. Capable of simultaneously measuring the three axial thrust components.
<b>9C</b>	<b>Materials</b>
DL9C108	“Insulation” material in bulk form and “interior lining”, other than those specified in Category Code 9A008, for rocket motor cases usable in ‘missiles’ or specially designed for ‘missiles’.  <i>Technical Note</i> <i>In Category Code 9C108 ‘missile’ means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km.</i>
DL9C110	Resin impregnated fibre prepregs and metal coated fibre preforms therefor, for composite structures, laminates and manufactures specified in Category Code 9A110, made either with organic matrix or metal matrix utilising fibrous or filamentary reinforcements having a “specific tensile strength” greater than $7.62 \times 10^4$ m and a “specific modulus” greater than $3.18 \times 10^6$ m.  <b><u>N.B.</u></b> <b><i>See also Category Codes 1C010 and 1C210.</i></b>  <i>Note</i> <i>The only resin impregnated fibre prepregs specified in Category Code 9C110 are those using resins with a glass transition temperature (<math>T_g</math>), after cure, exceeding 418K (145°C) as determined by ASTM D4065 or equivalent.</i>
<b>9D</b>	<b>Software</b>
DL9D001	“Software” specially designed or modified for the “development” of equipment or “technology” specified in Category Codes 9A001 to 9A119, Category 9B or Category Code 9E003.
DL9D002	“Software” specially designed or modified for the “production” of

<i>Product Code</i>	<i>Item Description</i>
	equipment specified in Category Codes 9A001 to 9A119 or Category 9B.
DL9D003	<p>“Software” specially designed or modified for the “use” of “Full Authority Digital Electronic Engine Controls” (“FADEC”) for propulsion systems specified in Category 9A or equipment specified in Category 9B, as follows:</p> <p>a. “Software” in digital electronic controls for propulsion systems, aerospace test facilities or air breathing aero-engine test facilities;</p> <p>b. Fault-tolerant “software” used in “FADEC” systems for propulsion systems and associated test facilities.</p>
DL9D004	Other “software”, as follows:
	a. 2D or 3D viscous “software” validated with wind tunnel or flight test data required for detailed engine flow modelling;
	b. “Software” for testing aero gas turbine engines, assemblies or components, specially designed to collect, reduce and analyse data in real time, and capable of feedback control, including the dynamic adjustment of test articles or test conditions, as the test is in progress;
	c. “Software” specially designed to control directional solidification or single crystal casting;
	<p>d. “Software” in “source code”, “object code” or machine code required for the “use” of active compensating systems for rotor blade tip clearance control.</p> <p><i>Note</i></p> <p><i>Category Code 9D004.d. does not include “software” embedded in uncontrolled equipment or required for maintenance activities associated with the calibration or repair or updates to the active compensating clearance control system.</i></p>
	e. “Software” specially designed or modified for the “use” of “UAVs” and associated systems, equipment and components specified in Category Code 9A012.
	f. “Software” specially designed to design the internal cooling passages of aero gas turbine blades, vanes and tip shrouds;
	<p>g. “Software” having all of the following:</p> <ol style="list-style-type: none"> <li>1. Specially designed to predict aero thermal, aeromechanical and combustion conditions in aero gas turbine engines; <u>and</u></li> <li>2. Theoretical modelling predictions of the aero thermal, aeromechanical and combustion conditions, which have been validated with actual aero</li> </ol>

<i>Product Code</i>	<i>Item Description</i>
	gas turbine engine (experimental or production) performance data.
DL9D101	“Software” specially designed or modified for the “use” of goods specified in Category Code 9B105, 9B106, 9B116 or 9B117.
DL9D103	<p>“Software” specially designed for modelling, simulation or design integration of the space launch vehicles specified in Category Code 9A004 or sounding rockets specified in Category Code 9A104, or the subsystems specified in Category Code 9A005, 9A007, 9A105.a., 9A106, 9A108, 9A116 or 9A119.</p> <p><u>Note</u></p> <p>“Software” specified in Category Code 9D103 remains within the description of that Category when combined with specially designed hardware specified in Category Code 4A102.</p>
DL9D104	“Software” specially designed or modified for the “use” of goods specified in Category Code 9A001, 9A005, 9A006.d., 9A006.g., 9A007.a., 9A008.d., 9A009.a., 9A010.d., 9A011, 9A101, 9A102, 9A105, 9A106.c., 9A106.d., 9A107, 9A108.c., 9A109, 9A111, 9A115.a., 9A116.d., 9A117 or 9A118.
DL9D105	9D105 “Software” which coordinates the function of more than one subsystem, specially designed or modified for “use” in space launch vehicles specified in Category Code 9A004 or sounding rockets specified in Category Code 9A104.
<b>9E</b>	<b>Technology</b>
	<p><u>Note</u></p> <p>“Development” or “production” “technology” specified in Category Codes 9E001 to 9E003 for gas turbine engines remains within the description of that Category when used as “use” “technology” for repair, rebuild and overhaul. Excluded from that Category are: technical data, drawings or documentation for maintenance activities directly associated with calibration, removal or replacement of damaged or unserviceable line replaceable units, including replacement of whole engines or engine modules.</p>
DL9E001	“Technology” (according to the General Technology Note) for the “development” of equipment or “software” specified in Category Code 9A001.b., 9A004 to 9A012, 9A350, or Category 9B or 9D.
DL9E002	<p>“Technology” (according to the General Technology Note) for the “production” of equipment specified in Category Code 9A001.b., 9A004 to 9A011, 9A350 or Category 9B.</p> <p><u>N.B.</u></p> <p>For “technology” for the repair of structures, laminates or materials, see</p>

<i>Product Code</i>	<i>Item Description</i>
	<b>Category Code 1E002.f.</b>
DL9E003	<p>Other “technology”, as follows:</p> <p>a. “Technology” “required” for the “development” or “production” of any of the following gas turbine engine components or systems:</p> <ol style="list-style-type: none"> <li>1. Gas turbine blades, vanes or tip shrouds made from directionally solidified (DS) or single crystal (SC) alloys and having (in the 001 Miller Index Direction) a stress-rupture life exceeding 400 hours at 1,273 K (1,000°C) at a stress of 200 MPa, based on the average property values;</li> <li>2. Multiple domed combustors operating at average burner outlet temperatures exceeding 1,813 K (1,540°C) or combustors incorporating thermally decoupled combustion liners, non-metallic liners or non-metallic shells;</li> <li>3. Components manufactured from any of the following: <ol style="list-style-type: none"> <li>a. Organic “composite” materials designed to operate above 588 K (315°C);</li> <li>b. Metal “matrix” “composite”, ceramic “matrix”, intermetallic or intermetallic reinforced materials specified in Category Code 1C007; <u>or</u></li> <li>c. “Composite” material specified in Category Code 1C010 and manufactured with resins specified in Category Code 1C008.</li> </ol> </li> <li>4. Uncooled turbine blades, vanes, tip-shrouds or other components, designed to operate at gas path total (stagnation) temperatures of 1,323 K (1,050°C) or more at sea-level static take-off (ISA) in a ‘steady state mode’ of engine operation;</li> <li>5. Cooled turbine blades, vanes or tip-shrouds, other than those described in Category Code 9E003.a.1., exposed to gas path total (stagnant) temperatures of 1,643 K (1,370°C) or more at sea-level static take-off (ISA) in a ‘steady state mode’ of engine operation; <p><u>Technical Note</u></p> <p><i>The term ‘steady state mode’ defines engine operation conditions, where the engine parameters, such as thrust/power, rpm and others, have no appreciable fluctuations, when the ambient air temperature and pressure at the engine inlet are constant.</i></p> </li> <li>6. Airfoil-to-disk blade combinations using solid state joining;</li> <li>7. Gas turbine engine components using “diffusion bonding”</li> </ol>

<i>Product Code</i>	<i>Item Description</i>
	“technology” specified in Category Code 2E003.b.;
	8. Damage tolerant gas turbine engine rotating components using powder metallurgy materials specified in Category Code 1C002.b.;
	9. “FADEC” for gas turbine and combined cycle engines and their related diagnostic components, sensors and specially designed components;
	<p>10. Adjustable flow path geometry and associated control systems for:</p> <ul style="list-style-type: none"> <li>a. Gas generator turbines;</li> <li>b. Fan or power turbines;</li> <li>c. Propelling nozzles;</li> </ul> <p><u>Note 1</u></p> <p><i>Adjustable flow path geometry and associated control systems in Category Code 9E003.a.10. do not include inlet guide vanes, variable pitch fans, variable stators or bleed valves for compressors.</i></p> <p><u>Note 2</u></p> <p><i>Category Code 9E003.a.10. does not include “development” or “production” “technology” for adjustable flow path geometry for reverse thrust.</i></p>
	11. Hollow fan blades;
	<p>b. “Technology” “required” for the “development” or “production” of any of the following:</p> <ul style="list-style-type: none"> <li>1. Wind tunnel aero-models equipped with non-intrusive sensors capable of transmitting data from the sensors to the data acquisition system; <u>or</u></li> <li>2. “Composite” propeller blades or propfans capable of absorbing more than 2,000 kW at flight speeds exceeding Mach 0.55;</li> </ul>
	<p>c. “Technology” “required” for the “development” or “production” of gas turbine engine components using “laser”, water jet, Electro-Chemical Machining (ECM) or Electrical Discharge Machines (EDM) hole-drilling processes to produce holes having any of the following:</p> <ul style="list-style-type: none"> <li>1. All of the following: <ul style="list-style-type: none"> <li>a. Depths more than four times their diameter;</li> <li>b. Diameters less than 0.76 mm; <u>and</u></li> <li>c. ‘Incidence angles’ equal to or less than 25°; <u>or</u></li> </ul> </li> <li>2. All of the following:</li> </ul>

<i>Product Code</i>	<i>Item Description</i>
	<p>a. Depths more than five times their diameter;</p> <p>b. Diameters less than 0.4 mm; <u>and</u></p> <p>c. ‘Incidence angles’ of more than 25°;</p> <p><u>Technical Note</u></p> <p><i>For the purposes of Category Code 9E003.c., ‘incidence angle’ is measured from a plane tangential to the airfoil surface at the point where the hole axis enters the airfoil surface.</i></p> <hr/> <p>d. “Technology” “required” for the “development” or “production” of helicopter power transfer systems or tilt rotor or tilt wing “aircraft” power transfer systems;</p> <hr/> <p>e. “Technology” for the “development” or “production” of reciprocating diesel engine ground vehicle propulsion systems having all of the following:</p> <ol style="list-style-type: none"> <li>1. ‘Box volume’ of 1.2 m<sup>3</sup> or less;</li> <li>2. An overall power output of more than 750 kW based on 80/1269/EEC, ISO 2534 or national equivalents; <u>and</u></li> <li>3. Power density of more than 700 kW/m<sup>3</sup> of ‘box volume’;</li> </ol> <p><u>Technical Note</u></p> <p><i>‘Box volume’ in Category Code 9E003.e. is the product of three perpendicular dimensions measured in the following way:</i></p> <p><u>Length:</u> <i>The length of the crankshaft from front flange to flywheel face;</i></p> <p><u>Width:</u> <i>The widest of any of the following:</i></p> <ol style="list-style-type: none"> <li>a. <i>The outside dimension from valve cover to valve cover;</i></li> <li>b. <i>The dimensions of the outside edges of the cylinder heads; <u>or</u></i></li> <li>c. <i>The diameter of the flywheel housing;</i></li> </ol> <p><u>Height:</u> <i>The largest of any of the following:</i></p> <ol style="list-style-type: none"> <li>a. <i>The dimension of the crankshaft centre-line to the top plane of the valve cover (or cylinder head) plus twice the stroke; <u>or</u></i></li> <li>b. <i>The diameter of the flywheel housing.</i></li> </ol> <hr/> <p>f. “Technology” “required” for the “production” of specially designed components for high output diesel engines, as follows:</p> <ol style="list-style-type: none"> <li>1. “Technology” “required” for the “production” of engine systems having all of the following components employing ceramics materials specified in Category Code 1C007: <ol style="list-style-type: none"> <li>a. Cylinder liners;</li> </ol> </li> </ol>

<i>Product Code</i>	<i>Item Description</i>
	<p>b. Pistons;</p> <p>c. Cylinder heads; <u>and</u></p> <p>d. One or more other components (including exhaust ports, turbochargers, valve guides, valve assemblies or insulated fuel injectors);</p> <p>2. “Technology” “required” for the “production” of turbocharger systems, with single-stage compressors and having all of the following:</p> <p>a. Operating at pressure ratios of 4:1 or higher;</p> <p>b. Mass flow in the range from 30 kg to 130 kg per minute; <u>and</u></p> <p>c. Variable flow area capability within the compressor or turbine sections;</p>
	<p>3. “Technology” “required” for the “production” of fuel injection systems with a specially designed multifuel (e.g., diesel or jet fuel) capability covering a viscosity range from diesel fuel (2.5 cSt at 310.8 K (37.8°C)) down to gasoline fuel (0.5 cSt at 310.8 K (37.8°C)) and having all of the following:</p> <p>a. Injection amount in excess of 230 mm<sup>3</sup> per injection per cylinder; <u>and</u></p> <p>b. Electronic control features specially designed for switching governor characteristics automatically depending on fuel property to provide the same torque characteristics by using the appropriate sensors;</p>
	<p>g. “Technology” “required” for the “development” or “production” of ‘high output diesel engines’ for solid, gas phase or liquid film (or combinations thereof) cylinder wall lubrication and permitting operation to temperatures exceeding 723 K (450°C), measured on the cylinder wall at the top limit of travel of the top ring of the piston.</p> <p><i>Technical Note</i></p> <p><i>‘High output diesel engines’ are diesel engines with a specified brake mean effective pressure of 1.8 MPa or more at a speed of 2,300 rpm, provided the rated speed is 2,300 rpm or more.</i></p>
DL9E101	<p>“Technology” (according to the General Technology Note) for the “development” or “production” of goods specified in Category Code 9A101, 9A102, 9A104 to 9A111 or 9A115 to 9A119.</p>
DL9E102	<p>“Technology” (according to the General Technology Note) for the “use” of space launch vehicles specified in Category Code 9A004, or goods specified in Category Code 9A005 to 9A011, 9A101, 9A102, 9A104 to 9A111, 9A115 to 9A119, 9B105, 9B106, 9B115, 9B116, 9B117, 9D101 or 9D103.</p>