

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>
CATEGORY 6 – SENSORS AND LASERS	
6A	Systems, Equipment and Components
DL6A001	Acoustic systems, equipment and components, as follows:
	a. Marine acoustic systems, equipment and specially designed components therefor, as follows:
	1. Active (transmitting or transmitting-and-receiving) systems, equipment and specially designed components therefor, as follows:
	<u>Note</u> <i>Category Code 6A001.a.1. does not include equipment as follows:</i>
	a. <i>Depth sounders operating vertically below the apparatus, not including a scanning function exceeding $\pm 20^\circ$, and limited to measuring the depth of water, the distance of submerged or buried objects or fish finding;</i>
	b. <i>Acoustic beacons, as follows:</i>
	1. <i>Acoustic emergency beacons;</i>
	2. <i>Pingers specially designed for relocating or returning to an underwater position.</i>
	a. Wide-swath bathymetric survey systems designed for sea bed topographic mapping and having all of the following:
	1. Designed to take measurements at an angle exceeding 20° from the vertical;
	2. Designed to measure depths exceeding 600 m below the water surface; <u>and</u>
	3. Designed to provide any of the following:
	a. Incorporation of multiple beams any of which is less than 1.9° ;
	<u>or</u>
	b. Data accuracies of better than 0.3% of water depth across the

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	<p data-bbox="571 304 1385 371">swath averaged over the individual measurements within the swath;</p> <p data-bbox="453 412 1331 445">b. Object detection or location systems having any of the following:</p> <ol data-bbox="496 463 1385 1189" style="list-style-type: none"> <li data-bbox="496 463 1046 497">1. A transmitting frequency below 10 kHz; <li data-bbox="496 515 1385 618">2. Sound pressure level exceeding 224 dB (reference 1 μPa at 1 m) for equipment with an operating frequency in the band from 10 kHz to 24 kHz inclusive; <li data-bbox="496 636 1385 739">3. Sound pressure level exceeding 235 dB (reference 1 μPa at 1 m) for equipment with an operating frequency in the band between 24 kHz and 30 kHz; <li data-bbox="496 757 1385 837">4. Forming beams of less than 1° on any axis and having an operating frequency of less than 100 kHz; <li data-bbox="496 855 1385 936">5. Designed to operate with an unambiguous display range exceeding 5,120 m; <u>or</u> <li data-bbox="496 954 1385 1057">6. Designed to withstand pressure during normal operation at depths exceeding 1,000 m and having transducers with any of the following: <ol data-bbox="531 1075 1385 1189" style="list-style-type: none"> <li data-bbox="531 1075 1072 1108">a. Dynamic compensation for pressure; <u>or</u> <li data-bbox="531 1126 1385 1189">b. Incorporating other than lead zirconate titanate as the transduction element; <p data-bbox="453 1232 1385 1373">c. Acoustic projectors, including transducers, incorporating piezoelectric, magnetostrictive, electrostrictive, electrodynamic or hydraulic elements operating individually or in a designed combination and having any of the following:</p> <p data-bbox="493 1391 580 1424"><u>Note 1</u></p> <p data-bbox="493 1442 1385 1583"><i>Whether acoustic projectors, including transducers, specially designed for other equipment is included in Category Code 6A001.c. is determined by whether the other equipment is included in that Category Code.</i></p> <p data-bbox="493 1601 580 1635"><u>Note 2</u></p> <p data-bbox="493 1653 1385 1767"><i>Category Code 6A001.a.1.c. does not include electronic source which direct the sound vertically only, or mechanical (e.g., air gun or vapour-shock gun) or chemical (e.g., explosive) sources.</i></p> <ol data-bbox="496 1785 1385 2022" style="list-style-type: none"> <li data-bbox="496 1785 1385 1888">1. An instantaneous radiated ‘acoustic power density’ exceeding 0.01 mW/mm²/Hz for devices operating at frequencies below 10 kHz; <li data-bbox="496 1906 1385 2022">2. A continuously radiated ‘acoustic power density’ exceeding 0.001 mW/mm²/Hz for devices operating at frequencies below 10 kHz; <u>or</u>

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	<p data-bbox="491 304 692 338"><u>Technical Note</u></p> <p data-bbox="491 353 1390 465"><i>'Acoustic power density' is obtained by dividing the output acoustic power by the product of the area of the radiating surface and the frequency of operation.</i></p> <p data-bbox="491 481 1043 515">3. Side-lobe suppression exceeding 22 dB;</p> <hr/> <p data-bbox="454 553 1390 734">d. Acoustic systems, equipment and specially designed components for determining the position of surface vessels or underwater vehicles designed to operate at a range exceeding 1,000 m with a positioning accuracy of less than 10 m rms (root mean square) when measured at a range of 1,000 m;</p> <p data-bbox="491 750 560 784"><u>Note</u></p> <p data-bbox="491 799 987 833"><i>Category Code 6A001.a.1.d. includes:</i></p> <p data-bbox="491 857 1390 969">a. <i>Equipment using coherent "signal processing" between two or more beacons and the hydrophone unit carried by the surface vessel or underwater vehicle;</i></p> <p data-bbox="491 985 1390 1052">b. <i>Equipment capable of automatically correcting speed-of-sound propagation errors for calculation of a point.</i></p> <hr/> <p data-bbox="416 1090 1390 1202">2. Passive (receiving, whether or not related in normal application to separate active equipment) systems, equipment and specially designed components therefor, as follows:</p> <hr/> <p data-bbox="454 1240 1227 1274">a. Hydrophones having any of the following characteristics:</p> <p data-bbox="491 1290 560 1323"><u>Note</u></p> <p data-bbox="491 1339 1390 1451"><i>Whether hydrophones specially designed for other equipment is included in Category Code 6A001.a.2.a is determined by whether the other equipment is included in that Category Code.</i></p> <p data-bbox="491 1467 1390 1998"> 1. Incorporating continuous flexible sensing elements; 2. Incorporating flexible assemblies of discrete sensing elements with either a diameter or length less than 20 mm and with a separation between elements of less than 20 mm; 3. Having any of the following sensing elements: <ul style="list-style-type: none"> <li data-bbox="531 1697 751 1731">a. Optical fibres; <li data-bbox="531 1747 1390 1859">b. 'Piezoelectric polymer films' other than polyvinylidene fluoride (PVDF) and its co-polymers {P(VDF-TrFE) and P(VDF-TFE)}; <u>or</u> <li data-bbox="531 1874 1023 1908">c. 'Flexible piezoelectric composites'; 4. A 'hydrophone sensitivity' better than -180 dB at any depth with no acceleration compensation; </p>

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	<p>5. Designed to operate at depths exceeding 35 m with acceleration compensation; <u>or</u></p> <p>6. Designed for operation at depths exceeding 1,000 m;</p> <p><u>Technical Notes</u></p> <p>1. ‘Piezoelectric polymer film’ sensing elements consist of polarised polymer film that is stretched over and attached to a supporting frame or spool (mandrel).</p> <p>2. ‘Flexible piezoelectric composite’ sensing elements consist of piezoelectric ceramic particles or fibres combined with an electrically insulating, acoustically transparent rubber, polymer or epoxy compound, where the compound is an integral part of the sensing elements.</p> <p>3. ‘Hydrophone sensitivity’ is defined as twenty times the logarithm to the base 10 of the ratio of rms output voltage to a 1 V rms reference, when the hydrophone sensor, without a pre-amplifier, is placed in a plane wave acoustic field with an rms pressure of 1 μPa. For example, a hydrophone of –160 Db (reference 1 V per μPa) would yield an output voltage of 10^{-8} V in such a field, while one of –180 dB sensitivity would yield only 10^{-9} V output. Thus, –160 dB is better than –180 dB.</p>
	<p>b. Towed acoustic hydrophone arrays having any of the following:</p> <p>1. Hydrophone group spacing of less than 12.5 m or ‘able to be modified’ to have hydrophone group spacing of less than 12.5 m;</p> <p>2. Designed or ‘able to be modified’ to operate at depths exceeding 35 m;</p> <p><u>Technical Note</u></p> <p>‘Able to be modified’ in Category Codes 6A001.a.2.b.1. and 2. means having provisions to allow a change of the wiring or interconnections to alter hydrophone group spacing or operating depth limits. These provisions are: spare wiring exceeding 10% of the number of wires, hydrophone group spacing adjustment blocks or internal depth limiting devices that are adjustable or that control more than one hydrophone group.</p> <p>3. Heading sensors specified in Category Code 6A001.a.2.d.;</p> <p>4. Longitudinally reinforced array hoses;</p> <p>5. An assembled array of less than 40 mm in diameter; <u>or</u></p> <p>7. Hydrophone characteristics specified in Category Code 6A001.a.2.a.;</p>
	<p>c. Processing equipment, specially designed for towed acoustic hydrophone arrays, having “user accessible programmability” and</p>

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	time or frequency domain processing and correlation, including spectral analysis, digital filtering and beamforming using Fast Fourier or other transforms or processes;
	<p>d. Heading sensors having all of the following:</p> <ol style="list-style-type: none"> 1. An accuracy of better than $\pm 0.5^\circ$; <u>and</u> 2. Designed to operate at depths exceeding 35 m or having an adjustable or removable depth sensing device in order to operate at depths exceeding 35 m;
	<p>e. Bottom or bay cable systems having any of the following:</p> <ol style="list-style-type: none"> 1. Incorporating hydrophones specified in Category Code 6A001.a.2.a.; <u>or</u> 2. Incorporating multiplexed hydrophone group signal modules having all of the following characteristics: <ol style="list-style-type: none"> a. Designed to operate at depths exceeding 35 m or having an adjustable or removable depth sensing device in order to operate at depths exceeding 35 m; <u>and</u> b. Capable of being operationally interchanged with towed acoustic hydrophone array modules;
	<p>f. Processing equipment, specially designed for bottom or bay cable systems, having “user accessible programmability” and time or frequency domain processing and correlation, including spectral analysis, digital filtering and beamforming using Fast Fourier or other transforms or processes;</p>
	<p>b. Correlation-velocity and Doppler-velocity sonar log equipment, designed to measure the horizontal speed of the equipment carrier relative to the sea bed, as follows:</p>
	<ol style="list-style-type: none"> 1. Correlation-velocity sonar log equipment having any of the following characteristics: <ol style="list-style-type: none"> a. Designed to operate at distances between the carrier and the sea bed exceeding 500 m; <u>or</u> b. Having speed accuracy better than 1% of speed;
	<ol style="list-style-type: none"> 2. Doppler-velocity sonar log equipment having speed accuracy better than 1% of speed.
	<p><u>Note 1</u></p> <p><i>Category Code 6A001.b. does not include depth sounders limited to any of the following:</i></p>

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	<p><i>a. Measuring the depth of water;</i></p> <p><i>b. Measuring the distance of submerged or buried objects; <u>or</u></i></p> <p><i>c. Fish finding.</i></p> <p><u>Note 2</u></p> <p><i>Category Code 6A001.b. does not include equipment specially designed for installation on surface vessels.</i></p>
DL6A002	<p>Optical sensors or equipment and components therefor, as follows:</p> <p><u>N.B.</u></p> <p><i>See also Category Code 6A102.</i></p> <p>a. Optical detectors, as follows:</p> <p>1. “Space-qualified” solid-state detectors, as follows:</p> <p>a. “Space-qualified” solid-state detectors, having all of the following:</p> <ol style="list-style-type: none"> 1. A peak response in the wavelength range exceeding 10 nm but not exceeding 300 nm; <u>and</u> 2. A response of less than 0.1% relative to the peak response at a wavelength exceeding 400 nm; <p>b. “Space-qualified” solid-state detectors, having all of the following:</p> <ol style="list-style-type: none"> 1. A peak response in the wavelength range exceeding 900 nm but not exceeding 1,200 nm; <u>and</u> 2. A response “time constant” of 95 ns or less; <p>c. “Space-qualified” solid-state detectors having a peak response in the wavelength range exceeding 1,200 nm but not exceeding 30,000 nm;</p> <p>2. Image intensifier tubes and specially designed components therefor, as follows:</p> <p><u>Note</u></p> <p><i>Category Code 6A002.a.2. does not include non-imaging photomultiplier tubes having an electron sensing device in the vacuum space limited solely to any of the following:</i></p> <ol style="list-style-type: none"> <i>a. A single metal anode; <u>or</u></i> <i>b. Metal anodes with a centre to centre spacing greater than 500 μm.</i> <p><u>Technical Note</u></p> <p><i>‘Charge multiplication’ is a form of electronic image amplification and is defined as the generation of charge carriers as a result of an impact</i></p>

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	<p data-bbox="451 302 1385 405"><i>ionisation gain process. ‘Charge multiplication’ sensors may take the form of an image intensifier tube, solid state detector or ‘focal plane array’.</i></p> <p data-bbox="451 445 1139 479">a. Image intensifier tubes having all of the following:</p> <ol data-bbox="496 499 1385 1081" style="list-style-type: none"> <li data-bbox="496 499 1385 566">1. A peak response in the wavelength range exceeding 400 nm but not exceeding 1,050 nm; <li data-bbox="496 589 1385 835">2. Electron image amplification using any of the following: <ol data-bbox="531 640 1385 835" style="list-style-type: none"> <li data-bbox="531 640 1385 707">a. A microchannel plate with a hole pitch (centre-to-centre spacing) of 12 µm or less; <u>or</u> <li data-bbox="531 730 1385 835">b. An electron sensing device with a non-binned pixel pitch of 500 µm or less, specially designed or modified to achieve ‘charge multiplication’ other than by a microchannel plate; <u>and</u> <li data-bbox="496 857 1385 1081">3. Any of the following photocathodes: <ol data-bbox="531 909 1385 1081" style="list-style-type: none"> <li data-bbox="531 909 1385 976">a. S-20, S-25 or multialkali photocathodes with a luminous sensitivity exceeding 350 µA/lm; <li data-bbox="531 999 1385 1032">b. GaAs or GaInAs photocathodes; <u>or</u> <li data-bbox="531 1055 1385 1081">c. Other ‘III-V compound’ semiconductor photocathodes; <p data-bbox="571 1104 635 1137"><i><u>Note</u></i></p> <p data-bbox="571 1160 1385 1263"><i>Category Code 6A002.a.2.a.3.c. does not include compound semiconductor photocathodes with a maximum radiant sensitivity of 10 mA/W or less.</i></p> <p data-bbox="451 1301 1139 1335">b. Image intensifier tubes having all of the following:</p> <ol data-bbox="496 1355 1385 1780" style="list-style-type: none"> <li data-bbox="496 1355 1385 1422">1. A peak response in the wavelength range exceeding 1,050 nm but not exceeding 1,800 nm; <li data-bbox="496 1444 1385 1691">2. Electron image amplification using any of the following: <ol data-bbox="531 1496 1385 1691" style="list-style-type: none"> <li data-bbox="531 1496 1385 1563">a. A microchannel plate with a hole pitch (centre-to-centre spacing) of 12 µm or less; <u>or</u> <li data-bbox="531 1585 1385 1691">b. An electron sensing device with a non-binned pixel pitch of 500 µm or less, specially designed or modified to achieve ‘charge multiplication’ other than by a microchannel plate; <u>and</u> <li data-bbox="496 1713 1385 1780">3. ‘III-V compound’ semiconductor (e.g., GaAs or GaInAs) photocathodes and transferred electron photocathodes; <p data-bbox="531 1803 595 1836"><i><u>Note</u></i></p> <p data-bbox="531 1859 1385 1962"><i>Category Code 6A002.a.2.b.3. does not include compound semiconductor photocathodes with a maximum radiant sensitivity of 15 mA/W or less.</i></p> <p data-bbox="451 2000 1043 2033">c. Specially designed components, as follows:</p>

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	<p>1. Microchannel plates having a hole pitch (centre-to-centre spacing) of 12 µm or less;</p> <p>2. An electron sensing device with a non-binned pixel pitch of 500 µm or less, specially designed or modified to achieve ‘charge multiplication’ other than by a microchannel plate;</p> <p>3. “III-V compound” semiconductor (e.g., GaAs or GaInAs) photocathodes and transferred electron photocathodes;</p> <p><u>Note</u></p> <p><i>Category Code 6A002.a.2.c.3. does not include compound semiconductor photocathodes designed to achieve a maximum radiant sensitivity of any of the following:</i></p> <p><i>a. 10 mA/W or less at the peak response in the wavelength range exceeding 400 nm but not exceeding 1,050 nm; <u>or</u></i></p> <p><i>b. 15 mA/W or less at the peak response in the wavelength range exceeding 1,050 nm but not exceeding 1,800 nm.</i></p>
	<p>3. Non-“space-qualified” “focal plane arrays”, as follows:</p> <p><u>N.B.</u></p> <p><i>Silicon and other material based ‘microbolometer’ non-“space-qualified” “focal plane arrays” are only specified in Category Code 6A002.a.3.f.</i></p> <p><u>Technical Notes</u></p> <p><i>Linear or two-dimensional multi-element detector arrays are referred to as “focal plane arrays”;</i></p> <p><u>Note 1</u></p> <p><i>Category Code 6A002.a.3. includes photoconductive arrays and photovoltaic arrays.</i></p> <p><u>Note 2</u></p> <p><i>Category Code 6A002.a.3. does not include:</i></p> <p><i>a. Multi-element (not to exceed 16 elements) encapsulated photoconductive cells using either lead sulphide or lead selenide.</i></p> <p><i>b. Pyroelectric detectors using any of the following:</i></p> <ol style="list-style-type: none"> <i>1. Triglycine sulphate and variants;</i> <i>2. Lead-lanthanum-zirconium titanate and variants;</i> <i>3. Lithium tantalate;</i> <i>4. Polyvinylidene fluoride and variants; <u>or</u></i>

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	<p>5. <i>Strontium barium niobate and variants.</i></p> <p>c. <i>“Focal plane arrays” specially designed or modified to achieve ‘charge multiplication’ and limited by design to have a maximum radiant sensitivity of 10 mA/W or less for wavelengths exceeding 760 nm, having all of the following:</i></p> <ol style="list-style-type: none"> 1. <i>Incorporating a response limiting mechanism designed not to be removed or modified; <u>and</u></i> 2. <i>Any of the following:</i> <ol style="list-style-type: none"> a. <i>The response limiting mechanism is integral to or combined with the detector element; <u>or</u></i> b. <i>The ‘focal plane array’ is only operable with the response limiting mechanism in place.</i> <p><u>Technical Note</u></p> <p><i>A response limiting mechanism integral to the detector element is designed not to be removed or modified without rendering the detector inoperable.</i></p> <p><u>Technical Note</u></p> <p><i>‘Charge multiplication’ is a form of electronic image amplification and is defined as the generation of charge carriers as a result of an impact ionisation gain process. ‘Charge multiplication’ sensors may take the form of an image intensifier tube, solid state detector or ‘focal plane array’.</i></p>
	<p>a. Non-“space-qualified” “focal plane arrays”, having all of the following:</p> <ol style="list-style-type: none"> 1. Individual elements with a peak response within the wavelength range exceeding 900 nm but not exceeding 1,050 nm; <u>and</u> 2. Any of the following: <ol style="list-style-type: none"> a. A response “time constant” of less than 0.5 ns; <u>or</u> b. Specially designed or modified to achieve ‘charge multiplication’ and having a maximum radiant sensitivity exceeding 10 mA/W;
	<p>b. Non-“space-qualified” “focal plane arrays”, having all of the following:</p> <ol style="list-style-type: none"> 1. Individual elements with a peak response in the wavelength range exceeding 1,050 nm but not exceeding 1,200 nm; <u>and</u> 2. Any of the following: <ol style="list-style-type: none"> a. A response “time constant” of 95 ns or less; <u>or</u> b. Specially designed or modified to achieve ‘charge multiplication’ and having a maximum radiant sensitivity

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	exceeding 10 mA/W;
	<p>c. Non-“space-qualified” non-linear (2-dimensional) “focal plane arrays”, having individual elements with a peak response in the wavelength range exceeding 1,200 nm but not exceeding 30,000 nm;</p> <p><u><i>N.B.</i></u></p> <p><i>Silicon and other material based ‘microbolometer’ non-“space-qualified” ‘focal plane arrays’ are only specified in Category Code 6A002.a.3.f.</i></p>
	<p>d. Non-“space-qualified” linear (1-dimensional) “focal plane arrays”, having all of the following:</p> <ol style="list-style-type: none"> 1. Individual elements with a peak response in the wavelength range exceeding 1,200 nm but not exceeding 3,000 nm; <u>and</u> 2. Any of the following: <ol style="list-style-type: none"> a. A ratio of ‘scan direction’ dimension of the detector element to the ‘cross-scan direction’ dimension of the detector element of less than 3.8; <u>or</u> b. Signal Processing In The Element (SPRITE); <p><u><i>Note</i></u></p> <p><i>Category Code 6A002.a.3.d. does not include “focal plane arrays” (not to exceed 32 elements) having detector elements limited solely to germanium material.</i></p> <p><u><i>Technical Note</i></u></p> <p><i>For the purposes of Category Code 6A002.a.3.d., ‘cross-scan direction’ is defined as the axis parallel to the linear array of detector elements and the ‘scan direction’ is defined as the axis perpendicular to the linear array of detector elements.</i></p>
	<p>e. Non-“space-qualified” linear (one-dimensional) “focal plane arrays”, having individual elements with a peak response in the wavelength range exceeding 3,000 nm but not exceeding 30,000 nm;</p>
	<p>f. Non-“space-qualified” non-linear (2-dimensional) infrared “focal plane arrays” based on ‘microbolometer’ material, having individual elements with an unfiltered response in the wavelength range equal to or exceeding 8,000 nm but not exceeding 14,000 nm;</p> <p><u><i>Technical Note</i></u></p> <p><i>For the purposes of Category Code 6A002.a.3.f. ‘microbolometer’ is defined as a thermal imaging detector that, as a result of a temperature change in the detector caused by the absorption of infrared radiation, is used to generate any usable signal.</i></p>

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	<p data-bbox="453 315 1385 387">g. Non-“space-qualified” “focal plane arrays” having all of the following:</p> <ol data-bbox="496 405 1385 656" style="list-style-type: none"> <li data-bbox="496 405 1385 477">1. Individual detector elements with a peak response in the wavelength range exceeding 400 nm but not exceeding 900 nm; <li data-bbox="496 495 1385 602">2. Specially designed or modified to achieve ‘charge multiplication’ and having a maximum radiant sensitivity exceeding 10 mA/W for wavelengths exceeding 760 nm; <u>and</u> <li data-bbox="496 620 858 656">3. Greater than 32 elements; <p data-bbox="376 689 1385 761">b. “Monospectral imaging sensors” and “multispectral imaging sensors” designed for remote sensing applications and having any of the following:</p> <ol data-bbox="419 779 1385 1223" style="list-style-type: none"> <li data-bbox="419 779 1385 851">1. An Instantaneous-Field-Of-View (IFOV) of less than 200 μrad (microradians); <u>or</u> <li data-bbox="419 869 1385 940">2. Specified for operation in the wavelength range exceeding 400 nm but not exceeding 30,000 nm and having all the following: <ol data-bbox="453 958 1385 1223" style="list-style-type: none"> <li data-bbox="453 958 1158 994">a. Providing output imaging data in digital format; <u>and</u> <li data-bbox="453 1012 1385 1223">b. Any of the following: <ol data-bbox="496 1066 1385 1223" style="list-style-type: none"> <li data-bbox="496 1066 817 1102">1. “Space-qualified”; <u>or</u> <li data-bbox="496 1120 1385 1223">2. Designed for airborne operation, using other than silicon detectors, and having an IFOV of less than 2.5 mrad (milliradians). <p data-bbox="376 1256 1385 1292">c. ‘Direct view’ imaging equipment incorporating any of the following:</p> <ol data-bbox="419 1310 1385 1525" style="list-style-type: none"> <li data-bbox="419 1310 1385 1382">1. Image intensifier tubes specified in Category Code 6A002.a.2.a. or 6A002.a.2.b.; <li data-bbox="419 1400 1385 1471">2. “Focal plane arrays” specified in Category Code 6A002.a.3 or 6A002.e.; <u>or</u> <li data-bbox="419 1489 1227 1525">3. Solid state detectors specified in Category Code 6A002.a.1.; <p data-bbox="416 1543 612 1579"><u>Technical Note</u></p> <p data-bbox="416 1597 1385 1740"><i>‘Direct view’ refers to imaging equipment that presents a visual image to a human observer without converting the image into an electronic signal for television display, and that cannot record or store the image photographically, electronically or by any other means.</i></p> <p data-bbox="416 1758 480 1794"><u>Note</u></p> <p data-bbox="416 1812 1385 1883"><i>Category Code 6A002.c. does not include equipment as follows, when incorporating other than GaAs or GaInAs photocathodes:</i></p> <ol data-bbox="416 1901 1385 2022" style="list-style-type: none"> <li data-bbox="416 1901 1385 1973">a. <i>Industrial or civilian intrusion alarm, traffic or industrial movement control or counting systems;</i> <li data-bbox="416 1991 707 2022">b. <i>Medical equipment;</i>

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	<p><i>c. Industrial equipment used for inspection, sorting or analysis of the properties of materials;</i></p> <p><i>d. Flame detectors for industrial furnaces;</i></p> <p><i>e. Equipment specially designed for laboratory use.</i></p> <p>d. Special support components for optical sensors, as follows:</p> <p>1. “Space-qualified” cryocoolers;</p> <p>2. Non-“space-qualified” cryocoolers, having a cooling source temperature below 218 K (–55°C), as follows:</p> <p>a. Closed cycle type with a specified Mean-Time-To-Failure (MTTF), or Mean-Time-Between-Failures (MTBF), exceeding 2,500 hours;</p> <p>b. Joule-Thomson (JT) self-regulating minicoolers having bore (outside) diameters of less than 8 mm;</p> <p>3. Optical sensing fibres specially fabricated either compositionally or structurally, or modified by coating, to be acoustically, thermally, inertially, electromagnetically or nuclear radiation sensitive;</p> <p>e. “Space qualified” “focal plane arrays” having more than 2,048 elements per array and having a peak response in the wavelength range exceeding 300 nm but not exceeding 900 nm.</p>
DL6A003	<p>Cameras, systems or equipment, and components therefor, as follows:</p> <p><u>N.B.</u></p> <p><i>See also Category Code 6A203.</i></p> <p><u>N.B.</u></p> <p><i>For cameras specially designed or modified for underwater use, see Category Codes 8A002.d. and 8A002.e.</i></p> <p>a. Instrumentation cameras and specially designed components therefor, as follows:</p> <p><u>Note</u></p> <p><i>Instrumentation cameras, specified in Category Codes 6A003.a.3. to 6A003.a.5., with modular structures should be evaluated by their maximum capability, using plug-ins available according to the camera manufacturer’s specifications.</i></p> <p>1. High-speed cinema recording cameras using any film format from 8 mm to 16 mm inclusive, in which the film is continuously advanced throughout the recording period, and that are capable of recording at framing rates exceeding 13,150 frames/s;</p>

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	<p><u>Note</u></p> <p><i>Category Code 6A003.a.1. does not include cinema recording cameras designed for civil purposes.</i></p>
	<p>2. Mechanical high-speed cameras, in which the film does not move, capable of recording at rates exceeding 1,000,000 frames/s for the full framing height of 35 mm film, or at proportionately higher rates for lesser frame heights, or at proportionately lower rates for greater frame heights;</p>
	<p>3. Mechanical or electronic streak cameras having writing speeds exceeding 10 mm/μs;</p>
	<p>4. Electronic framing cameras having a speed exceeding 1,000,000 frames/s;</p>
	<p>5. Electronic cameras, having all of the following:</p> <ul style="list-style-type: none"> a. An electronic shutter speed (gating capability) of less than 1 μs per full frame; <u>and</u> b. A read out time allowing a framing rate of more than 125 full frames per second;
	<p>6. Plug-ins, having all of the following characteristics:</p> <ul style="list-style-type: none"> a. Specially designed for instrumentation cameras which have modular structures and which are specified in Category Code 6A003.a.; <u>and</u> b. Enabling these cameras to meet the characteristics specified in Category Code 6A003.a.3., 6A003.a.4., or 6A003.a.5., according to the manufacturer's specifications;
	<p>b. Imaging cameras, as follows:</p> <p><u>Note</u></p> <p><i>Category Code 6A003.b. does not include television or video cameras specially designed for television broadcasting.</i></p>
	<p>1. Video cameras incorporating solid state sensors, having a peak response in the wavelength range exceeding 10 nm, but not exceeding 30,000 nm and having all of the following:</p> <ul style="list-style-type: none"> a. Having any of the following: <ul style="list-style-type: none"> 1. More than 4×10^6 "active pixels" per solid state array for monochrome (black and white) cameras; 2. More than 4×10^6 "active pixels" per solid state array for colour cameras incorporating three solid state arrays; <u>or</u> 3. More than 12×10^6 "active pixels" for solid state array colour

<i>Product Code</i>	<i>Item Description</i>
	<p>cameras incorporating one solid state array; <u>and</u></p> <p>b. Having any of the following:</p> <ol style="list-style-type: none"> 1. Optical mirrors specified in Category Code 6A004.a.; 2. Optical control equipment specified in Category Code 6A004.d.; <p><u>or</u></p> <ol style="list-style-type: none"> 3. The capability for annotating internally generated ‘camera tracking data’; <p><u>Technical Note</u></p> <ol style="list-style-type: none"> 1. For the purpose of this entry, digital video cameras should be evaluated by the maximum number of “active pixels” used for capturing moving images. 2. For the purpose of this entry, ‘camera tracking data’ is the information necessary to define camera line of sight orientation with respect to the earth. This includes: 1) the horizontal angle the camera line of sight makes with respect to the earth’s magnetic field direction and; 2) the vertical angle between the camera line of sight and the earth’s horizon.
	<ol style="list-style-type: none"> 2. Scanning cameras and scanning camera systems, having all of the following: <ol style="list-style-type: none"> a. A peak response in the wavelength range exceeding 10 nm, but not exceeding 30,000 nm; b. Linear detector arrays with more than 8,192 elements per array; <u>and</u> c. Mechanical scanning in one direction;
	<ol style="list-style-type: none"> 3. Imaging cameras incorporating image intensifier tubes specified in Category Code 6A002.a.2.a. or 6A002.a.2.b.;
	<ol style="list-style-type: none"> 4. ‘Imaging cameras’ incorporating “focal plane arrays” having any of the following: <ol style="list-style-type: none"> a. Incorporating “focal plane arrays” specified in Category Codes 6A002.a.3.a. to 6A002.a.3.e.; b. Incorporating “focal plane arrays” specified in Category Code 6A002.a.3.f.; c. Incorporating “focal plane arrays” specified in Category Code 6A002.a.3.g.; <u>or</u> d. Incorporating “focal plane arrays” specified in Category Code 6A002.e.; <p><u>Note 1</u></p> <p>‘Imaging cameras’ specified in Category Code 6A003.b.4, include</p>

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	<p><i>“focal plane arrays” combined with sufficient “signal processing” electronics, beyond the read out integrated circuit, to enable as a minimum the output of an analogue or digital signal once power is supplied.</i></p> <p><u>Note 2</u></p> <p><i>Category Code 6A003.b.4.a does not include imaging cameras incorporating linear “focal plane arrays” with 12 elements or fewer, not employing time-delay-and-integration within the element and designed for any of the following:</i></p> <ul style="list-style-type: none"> <i>a. Industrial or civilian intrusion alarm, traffic or industrial movement control or counting systems;</i> <i>b. Industrial equipment used for inspection or monitoring of heat flows in buildings, equipment or industrial processes;</i> <i>c. Industrial equipment used for inspection, sorting or analysis of the properties of materials;</i> <i>d. Equipment specially designed for laboratory use; <u>or</u></i> <i>e. Medical equipment.</i> <p><u>Note 3</u></p> <p><i>Category Code 6A003.b.4.b. does not include imaging cameras having any of the following:</i></p> <ul style="list-style-type: none"> <i>a. A maximum frame rate equal to or less than 9 Hz;</i> <i>b. Having all of the following:</i> <ul style="list-style-type: none"> <i>1. Having a minimum horizontal or vertical ‘Instantaneous-Field-of-View (IFOV)’ of at least 10 mrad/pixel (milliradians/ pixel);</i> <i>2. Incorporating a fixed focal-length lens that is not designed to be removed;</i> <i>3. Not incorporating a ‘direct view’ display; <u>and</u></i> <i>4. Having any of the following:</i> <ul style="list-style-type: none"> <i>a. No facility to obtain a viewable image of the detected field-of-view, <u>or</u></i> <i>b. The camera is designed for a single kind of application and designed not to be user modified; <u>or</u></i> <i>c. The camera is specially designed for installation into a civilian passenger land vehicle of less than 3 tonnes (gross vehicle weight) and having all of the following:</i> <ul style="list-style-type: none"> <i>1. Is only operable when installed in any of the following:</i> <ul style="list-style-type: none"> <i>a. The civilian passenger land vehicle for which it was intended; <u>or</u></i>

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	<p data-bbox="608 304 1390 371"><i>b. A specially designed, authorised maintenance test facility; <u>and</u></i></p> <p data-bbox="571 394 1390 495"><i>2. Incorporates an active mechanism that forces the camera not to function when it is removed from the vehicle for which it was intended.</i></p> <p data-bbox="571 517 783 551"><u><i>Technical Notes</i></u></p> <p data-bbox="571 573 1390 674"><i>1. ‘Instantaneous-Field-of-View (IFOV)’ specified in Category Code 6A003.b.4. Note 3.b. is the lesser figure of the ‘Horizontal IFOV’ or the ‘Vertical IFOV’.</i></p> <p data-bbox="608 696 1390 763"><i>‘Horizontal IFOV’ = horizontal Field of View (FOV)/number of horizontal detector elements</i></p> <p data-bbox="608 786 1390 853"><i>‘Vertical IFOV’ = vertical Field of View (FOV)/number of vertical detector elements</i></p> <p data-bbox="571 875 1390 1043"><i>2. ‘Direct view’ in Category Code 6A003.b.4. Note 3.b. refers to an imaging camera operating in the infrared spectrum that presents a visual image to a human observer using a near-to-eye micro display incorporating any light-security mechanism.</i></p> <p data-bbox="453 1077 544 1111"><u><i>Note 4</i></u></p> <p data-bbox="453 1133 1390 1200"><i>Category Code 6A003.b.4.c. does not include ‘imaging cameras’ having any of the following:</i></p> <p data-bbox="453 1223 847 1256"><i>a. Having all of the following:</i></p> <p data-bbox="496 1279 1390 1402"><i>1. Where the camera is specially designed for installation as an integrated component into indoor and wall-plug-operated systems or equipment, limited by design for a single kind of application, as follows:</i></p> <p data-bbox="528 1435 1390 1503"><i>a. Industrial process monitoring, quality control, or analysis of the properties of materials;</i></p> <p data-bbox="528 1525 1390 1592"><i>b. Laboratory equipment specially designed for scientific research;</i></p> <p data-bbox="528 1615 823 1648"><i>c. Medical equipment;</i></p> <p data-bbox="528 1671 1046 1704"><i>d. Financial fraud detection equipment;</i></p> <p data-bbox="496 1727 1238 1760"><i>2. Is only operable when installed in any of the following:</i></p> <p data-bbox="528 1783 1302 1816"><i>a. The system(s) or equipment for which it was intended; <u>or</u></i></p> <p data-bbox="528 1839 1326 1872"><i>b. A specially designed, authorised maintenance facility; <u>and</u></i></p> <p data-bbox="496 1895 1390 1995"><i>3. Incorporates an active mechanism that forces the camera not to function when it is removed from the system(s) or equipment for which it was intended;</i></p> <p data-bbox="453 2018 1390 2051"><i>b. Where the camera is specially designed for installation into a civilian</i></p>

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	<p><i>passenger land vehicle of less than three tonnes (gross vehicle weight), or passenger and vehicle ferries having a length overall (LOA) 65 m or greater, and having all of the following:</i></p> <ol style="list-style-type: none"> <i>1. Is only operable when installed in any of the following:</i> <ol style="list-style-type: none"> <i>a. The civilian passenger land vehicle or passenger and vehicle ferry for which it was intended; <u>or</u></i> <i>b. A specially designed, authorised maintenance test facility; <u>and</u></i> <i>2. Incorporates an active mechanism that forces the camera not to function when it is removed from the vehicle for which it was intended;</i> <i>c. Limited by design to have a maximum radiant sensitivity of 10 mA/W or less for wavelengths exceeding 760 nm, having all of the following:</i> <ol style="list-style-type: none"> <i>1. Incorporating a response limiting mechanism designed not to be removed or modified; <u>and</u></i> <i>2. Incorporates an active mechanism that forces the camera not to function when the response limiting mechanism is removed; <u>or</u></i> <i>d. Having all of the following:</i> <ol style="list-style-type: none"> <i>1. Not incorporating a ‘direct view’ or electronic image display;</i> <i>2. Has no facility to output a viewable image of the detected field of view;</i> <i>3. The “focal plane array” is only operable when installed in the camera for which it was intended; <u>and</u></i> <i>4. The “focal plane array” incorporates an active mechanism that forces it to be permanently inoperable when removed from the camera for which it was intended.</i>
	<ol style="list-style-type: none"> <i>5. Imaging cameras incorporating solid-state detectors specified by Category Code 6A002.a.1.</i>
DL6A004	<p>Optical equipment and components, as follows:</p> <ol style="list-style-type: none"> a. Optical mirrors (reflectors), as follows: <p><u>N.B.</u></p> <p><i>For optical mirrors specially designed for lithography equipment, see Category Code 3B001.</i></p> 1. “Deformable mirrors” having either continuous or multi-element surfaces, and specially designed components therefor, capable of dynamically repositioning portions of the surface of the mirror at rates exceeding 100 Hz;

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	2. Lightweight monolithic mirrors having an average “equivalent density” of less than 30 kg/m ² and a total mass exceeding 10 kg;
	3. Lightweight “composite” or foam mirror structures having an average “equivalent density” of less than 30 kg/m ² and a total mass exceeding 2 kg;
	4. Beam steering mirrors more than 100 mm in diameter or length of major axis, which maintain a flatness of $\lambda/2$ or better (λ is equal to 633 nm) having a control bandwidth exceeding 100 Hz;
	b. Optical components made from zinc selenide (ZnSe) or zinc sulphide (ZnS) with transmission in the wavelength range exceeding 3,000 nm but not exceeding 25,000 nm and having any of the following: 1. Exceeding 100 cm ³ in volume; <u>or</u> 2. Exceeding 80 mm in diameter or length of major axis and 20 mm in thickness (depth);
	c. “Space-qualified” components for optical systems, as follows:
	1. Lightweighted to less than 20% “equivalent density” compared with a solid blank of the same aperture and thickness;
	2. Raw substrates, processed substrates having surface coatings (single-layer or multi-layer, metallic or dielectric, conducting, semiconducting or insulating) or having protective films;
	3. Segments or assemblies of mirrors designed to be assembled in space into an optical system with a collecting aperture equivalent to or larger than a single optic 1 m in diameter;
	4. Manufactured from “composite” materials having a coefficient of linear thermal expansion equal to or less than 5×10^{-6} in any coordinate direction;
	d. Optical control equipment, as follows:
	1. Specially designed to maintain the surface figure or orientation of the “space-qualified” components specified in Category Code 6A004.c.1. or 6A004.c.3.;
	2. Having steering, tracking, stabilisation or resonator alignment bandwidths equal to or more than 100 Hz and an accuracy of 10 μ rad (microradians) or less;
	3. Gimbals having all of the following:

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	<ul style="list-style-type: none"> a. A maximum slew exceeding 5°; b. A bandwidth of 100 Hz or more; c. Angular pointing errors of 200 μrad (microradians) or less; <u>and</u> d. Having any of the following: <ul style="list-style-type: none"> 1. Exceeding 0.15 m but not exceeding 1 m in diameter or major axis length and capable of angular accelerations exceeding 2 rad (radians)/s²; <u>or</u> 2. Exceeding 1 m in diameter or major axis length and capable of angular accelerations exceeding 0.5 rad (radians)/s²;
	<ul style="list-style-type: none"> 4. Specially designed to maintain the alignment of phased array or phased segment mirror systems consisting of mirrors with a segment diameter or major axis length of 1 m or more;
	<ul style="list-style-type: none"> e. ‘Aspheric optical elements’ having all of the following: <ul style="list-style-type: none"> 1. Largest dimension of the optical-aperture is greater than 400 mm; 2. Surface roughness is less than 1 nm (rms) for sampling lengths equal to or greater than 1 mm; <u>and</u> 3. Coefficient of linear thermal expansion’s absolute magnitude is less than $3 \times 10^{-6}/K$ at 25°C. <p><u>Technical Notes</u></p> <ul style="list-style-type: none"> 1. An ‘aspheric optical element’ is any element used in an optical system whose imaging surface or surfaces are designed to depart from the shape of an ideal sphere. 2. It is not necessary to evaluate the surface roughness of the optical element against the criteria in Category Code 6A004.e.2., unless the optical element was designed or manufactured with the intent to meet, or exceed the control parameter. <p><u>Note</u></p> <p>Category Code 6A004.e. does not include ‘aspheric optical elements’ having any of the following:</p> <ul style="list-style-type: none"> a. Largest optical-aperture dimension less than 1 m and a focal length to aperture ratio equal to or greater than 4.5:1; b. Largest optical-aperture dimension equal to or greater than 1 m and a focal length to aperture ratio equal to or greater than 7:1; c. Designed as Fresnel, flyeye, stripe, prism or diffractive optical elements; d. Fabricated from borosilicate glass having a coefficient of linear thermal expansion greater than $2.5 \times 10^{-6}/K$ at 25°C; <u>or</u>

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	<p><i>e. An x-ray optical element having inner mirror capabilities (e.g., tube-type mirrors).</i></p> <p><u>N.B.</u></p> <p><i>For ‘aspheric optical elements’ specially designed for lithography equipment, see Category Code 3B001.</i></p>
DL6A005	<p>“Lasers”, other than those specified in Category Code 0B001.g.5. or 0B001.h.6., components and optical equipment, as follows:</p> <p><u>N.B.</u></p> <p><i>See also Category Code 6A205.</i></p> <p><u>Note 1</u></p> <p><i>Pulsed “lasers” include those that run in a continuous wave (CW) mode with pulses superimposed.</i></p> <p><u>Note 2</u></p> <p><i>Excimer, semiconductor, chemical, CO, CO₂, and non-repetitive pulsed Nd:glass “lasers” are only specified in Category Code 6A005.d.</i></p> <p><u>Note 3</u></p> <p><i>Category Code 6A005 includes fibre “lasers”.</i></p> <p><u>Note 4</u></p> <p><i>The status of “lasers” incorporating frequency conversion (i.e., wavelength change) by means other than one “laser” pumping another “laser” is determined by applying the parameters for both the output of the source “laser” and the frequency-converted optical output.</i></p> <p><u>Note 5</u></p> <p><i>Category Code 6A005 does not include “lasers” as follows:</i></p> <ul style="list-style-type: none"> <i>a. Ruby with output energy below 20 J;</i> <i>b. Nitrogen;</i> <i>c. Krypton.</i> <p><u>Technical Note</u></p> <p><i>In Category Code 6A005 ‘Wall-plug efficiency’ is defined as the ratio of “laser” output power (or “average output power”) to total electrical input power required to operate the “laser”, including the power supply/conditioning and thermal conditioning/heat exchanger.</i></p>
	<ul style="list-style-type: none"> a. Non-“tunable” continuous wave “(CW lasers)”, having any of the following: <ul style="list-style-type: none"> 1. Output wavelength less than 150 nm and output power exceeding 1 W; 2. Output wavelength of 150 nm or more but not exceeding 520 nm and

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	<p>output power exceeding 30 W;</p> <p><u>Note</u></p> <p><i>Category Code 6A005.a.2. does not control Argon “lasers” having an output power equal or less than 50 W.</i></p> <p>3. Output wavelength exceeding 520 nm but not exceeding 540 nm and having any of the following:</p> <ol style="list-style-type: none"> 1. Single transverse mode output and output power exceeding 50 W; <u>or</u> 2. Multiple transverse mode output and output power exceeding 150 W; <p>4. Output wavelength exceeding 540 nm but not exceeding 800 nm and output power exceeding 30 W;</p> <p>5. Output wavelength exceeding 800 nm but not exceeding 975 nm and any of the following:</p> <ol style="list-style-type: none"> a. Single transverse mode output and output power exceeding 50 W; <u>or</u> b. Multiple transverse mode output and output power exceeding 80 W; <p>6. Output wavelength exceeding 975 nm but not exceeding 1,150 nm and having any of the following:</p> <ol style="list-style-type: none"> a. Single transverse mode output and any of the following: <ol style="list-style-type: none"> 1. ‘Wall-plug efficiency’ exceeding 12% and output power exceeding 100 W; <u>or</u> 2. Output power exceeding 150 W; <u>or</u> b. Multiple transverse mode output and any of the following: <ol style="list-style-type: none"> 1. ‘Wall-plug efficiency’ exceeding 18% and output power exceeding 500 W; <u>or</u> 2. Output power exceeding 2 kW; <p><u>Note</u></p> <p><i>Category Code 6A005.a.6.b. does not include multiple transverse mode, industrial “lasers” with output power exceeding 2 kW and not exceeding 6 kW with a total mass greater than 1,200 kg. For the purpose of this note, total mass includes all components required to operate the “laser”, e.g., “laser”, power supply, heat exchanger, but excludes external optics for beam conditioning and/or delivery.</i></p> <p>7. Output wavelength exceeding 1,150 nm but not exceeding 1,555 nm and any of the following:</p> <ol style="list-style-type: none"> a. Single transverse mode and output power exceeding 50 W; <u>or</u> b. Multiple transverse mode and output power exceeding 80 W; <u>or</u> <p>8. Output wavelength exceeding 1,555 nm and output power exceeding 1 W.</p>

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	<p>b. Non-“tunable” “pulsed lasers” having any of the following:</p> <ol style="list-style-type: none"> 1. Output wavelength less than 150 nm and any of the following: <ol style="list-style-type: none"> a. Output energy exceeding 50 mJ per pulse and “peak power” exceeding 1 W; <u>or</u> b. “Average output power” exceeding 1 W; 2. Output wavelength of 150 nm or more but not exceeding 520 nm and having any of the following: <ol style="list-style-type: none"> a. Output power exceeding 1.5 J per pulse and “peak power” exceeding 30 W; <u>or</u>; b. “Average output power” exceeding 30 W; <p><i>Note</i></p> <p><i>Category Code 6A005.b.2.b. does not include Argon “lasers” having an “average output power” equal to or less than 50 W.</i></p> 3. Output wavelength exceeding 520 nm but not exceeding 540 nm and any of the following: <ol style="list-style-type: none"> a. Single transverse mode output and any of the following: <ol style="list-style-type: none"> 1. Output energy exceeding 1.5 J per pulse and “peak power” exceeding 50 W; <u>or</u> 2. “Average output power” exceeding 50 W; <u>or</u> b. Multiple transverse mode output and any of the following: <ol style="list-style-type: none"> 1. Output energy exceeding 1.5 J per pulse and “peak power” exceeding 150 W; <u>or</u> 2. “Average output power” exceeding 150 W; 4. Output wavelength exceeding 540 nm but not exceeding 800 nm and any of the following: <ol style="list-style-type: none"> a. Output energy exceeding 1.5 J per pulse and “peak power” exceeding 30 W; <u>or</u> b. “Average output power” exceeding 30 W; 5. Output wavelength exceeding 800 nm but not exceeding 975 nm and any of the following: <ol style="list-style-type: none"> a. “Pulse duration” not exceeding 1 μs and any of the following: <ol style="list-style-type: none"> 1. Output energy exceeding 0.5 J per pulse and “peak power” exceeding 50 W; 2. Single transverse mode output and “average output power” exceeding 20 W; <u>or</u> 3. Multiple transverse mode output and “average output power”

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	<p>exceeding 50 W; <u>or</u></p> <p>b. “Pulse duration” exceeding 1 μs and any of the following:</p> <ol style="list-style-type: none"> 1. Output energy exceeding 2 J per pulse and “peak power” exceeding 50 W; 2. Single transverse mode output and “average output power” exceeding 50 W; <u>or</u> 3. Multiple transverse mode output and “average output power” exceeding 80 W; <p>6. Output wavelength exceeding 975 nm but not exceeding 1,150 nm and any of the following:</p> <p>a. “Pulse duration” of less than 1 ns and any of the following:</p> <ol style="list-style-type: none"> 1. Output “peak power” exceeding 5 GW per pulse; 2. “Average output power” exceeding 10 W; <u>or</u> 3. Output energy exceeding 0.1 J per pulse; <p>b. “Pulse duration” exceeding 1 ns but not exceeding 1 μs, and any of the following:</p> <ol style="list-style-type: none"> 1. Single transverse mode output and any of the following: <ol style="list-style-type: none"> a. Peak power” exceeding 100 MW; b. “Average output power” exceeding 20 W limited by design to a maximum pulse repetition frequency less than or equal to 1 kHz; c. ‘Wall-plug efficiency’ exceeding 12%, “average output power” exceeding 100 W and capable of operating at a pulse repetition frequency greater than 1 kHz; d. “Average output power” exceeding 150 W and capable of operating at a pulse repetition frequency greater than 1 kHz; <u>or</u> e. Output energy exceeding 2 J per pulse; <u>or</u> 2. Multiple transverse mode output and any of the following: <ol style="list-style-type: none"> a. “Peak power” exceeding 400 MW; b. ‘Wall-plug efficiency’ exceeding 18% and “average output power” exceeding 500 W; c. “Average output power” exceeding 2 kW; <u>or</u> d. Output energy exceeding 4 J per pulse; <u>or</u> c. “Pulse duration” exceeding 1 μs and any of the following: <ol style="list-style-type: none"> 1. Single transverse mode output and any of the following: <ol style="list-style-type: none"> a. “Peak power” exceeding 500 kW;

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	<ul style="list-style-type: none"> b. ‘Wall-plug efficiency’ exceeding 12% and ‘‘average output power’’ exceeding 100 W; <u>or</u> c. ‘‘Average output power’’ exceeding 150 W; <u>or</u> <p>2. Multiple transverse mode output and any of the following:</p> <ul style="list-style-type: none"> a. ‘‘Peak power’’ exceeding 1 MW; b. ‘Wall-plug efficiency’ exceeding 18% and ‘‘average output power’’ exceeding 500 W; <u>or</u> c. ‘‘Average output power’’ exceeding 2 kW; <p>7. Output wavelength exceeding 1,150 nm but not exceeding 1,555 nm and any of the following:</p> <ul style="list-style-type: none"> a. ‘‘Pulse duration’’ not exceeding 1 μs and any of the following: <ul style="list-style-type: none"> 1. Output energy exceeding 0.5 J per pulse and ‘‘peak power’’ exceeding 50 W; 2. Single transverse mode output and ‘‘average output power’’ exceeding 20 W; <u>or</u> 3. Multiple transverse mode output and ‘‘average output power’’ exceeding 50 W; <u>or</u> b. ‘‘Pulse duration’’ exceeding 1 μs and any of the following: <ul style="list-style-type: none"> 1. Output energy exceeding 2 J per pulse and ‘‘peak power’’ exceeding 50 W; 2. Single transverse mode output and ‘‘average output power’’ exceeding 50 W; <u>or</u> 3. Multiple transverse mode output and ‘‘average output power’’ exceeding 80 W; <u>or</u> <p>8. Output wavelength exceeding 1,555 nm and any of the following:</p> <ul style="list-style-type: none"> a. Output energy exceeding 100 mJ per pulse and ‘‘peak power’’ exceeding 1 W; <u>or</u> b. ‘‘Average output power’’ exceeding 1 W;
	<p>c. ‘‘Tunable’’ ‘‘lasers’’ having any of the following:</p> <p><u>Note</u></p> <p><i>Category Code 6A005.c.1. includes titanium-sapphire (Ti:Al₂O₃), thulium-YAG (Tm:YAG), thulium-YSGG (Tm:YSGG), alexandrite (Cr:BeAl₂O₄) and colour centre ‘‘lasers’’, dye ‘‘lasers’’, and liquid ‘‘lasers’’.</i></p> <p>1. Output wavelength less than 600 nm and having any of the following:</p> <ul style="list-style-type: none"> a. Output energy exceeding 50 mJ per pulse and ‘‘peak power’’ exceeding 1 W; <u>or</u>

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	<ul style="list-style-type: none"> b. Average or CW output power exceeding 1 W; 2. Output wavelength of 600 nm or more but not exceeding 1,400 nm and having any of the following: <ul style="list-style-type: none"> a. Output energy exceeding 1 J per pulse and “peak power” exceeding 20 W; <u>or</u> b. Average or CW output power exceeding 20 W; <u>or</u> 3. Output wavelength exceeding 1,400 nm and having any of the following: <ul style="list-style-type: none"> a. Output energy exceeding 50 mJ per pulse and “peak power” exceeding 1 W; <u>or</u> b. Average or CW output power exceeding 1 W;
	<ul style="list-style-type: none"> d. Other “lasers”, not specified in Category Code 6A005.a., 6A005.b. or 6A005.c. as follows:
	<ul style="list-style-type: none"> 1. Semiconductor “lasers”, as follows: <p><i><u>Note 1</u></i></p> <p><i>Category Code 6A005.d.1. includes semiconductor “lasers” having optical output connectors (e.g., fibre optic pigtails).</i></p> <p><i><u>Note 2</u></i></p> <p><i>The status of semiconductor “lasers” specially designed for other equipment is determined by the status of the other equipment.</i></p>
	<ul style="list-style-type: none"> a. Individual single-transverse mode semiconductor “lasers” having any of the following: <ul style="list-style-type: none"> 1. Wavelength equal or less than 1,510 nm and average or CW output power, exceeding 1.5 W; <u>or</u> 2. Wavelength greater than 1,510 nm, and average or CW output power exceeding 500 mW;
	<ul style="list-style-type: none"> b. Individual, multiple-transverse mode semiconductor “lasers” having any of the following: <ul style="list-style-type: none"> 1. Wavelength of less than 1,400 nm and average or CW output power, exceeding 10 W; 2. Wavelength equal to or greater than 1,400 nm and less than 1,900 nm and average or CW output power, exceeding 2.5 W; <u>or</u> 3. Wavelength equal to or greater than 1,900 nm and average or CW output power exceeding 1 W;
	<ul style="list-style-type: none"> c. Individual semiconductor “laser” arrays, having any of the following:

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	<ol style="list-style-type: none"> 1. Wavelength of less than 1,400 nm and average or CW output power, exceeding 80 W; 2. Wavelength of equal to or greater than 1,400 nm and less than 1,900 nm and average or CW output power, exceeding 25 W; <u>or</u> 3. Wavelength equal to or greater than 1,900 nm and average or CW output power, exceeding 10W;
	<ol style="list-style-type: none"> d. ‘Array stacks’ of semiconductor ‘lasers’ containing at least one ‘array’ specified in Category Code 6A005.d.1.c;
	<p><u>Technical Notes</u></p> <ol style="list-style-type: none"> 1. Semiconductor ‘lasers’ are commonly called ‘laser’ diodes. 2. An ‘array’ consists of multiple semiconductor ‘laser’ emitters fabricated as a single chip so that the centres of the emitted light beams are on parallel paths. 3. An ‘array stack’ is fabricated by stacking, or otherwise assembling, ‘arrays’ so that the centres of the emitted light beams are on parallel paths.
	<ol style="list-style-type: none"> 2. Carbon monoxide (CO) ‘lasers’ having any of the following: <ol style="list-style-type: none"> a. Output energy exceeding 2 J per pulse and ‘peak power’ exceeding 5 kW; <u>or</u> b. Average or CW output power exceeding 5 kW;
	<ol style="list-style-type: none"> 3. Carbon dioxide (CO₂) ‘lasers’ having any of the following: <ol style="list-style-type: none"> a. CW output power exceeding 15 kW; b. Pulsed output with a ‘pulse duration’ exceeding 10 μs and any of the following: <ol style="list-style-type: none"> 1. ‘Average output power’ exceeding 10 kW; <u>or</u> 2. ‘Peak power’ exceeding 100 kW; <u>or</u> c. Pulsed output with a ‘pulse duration’ equal to or less than 10 μs and any of the following: <ol style="list-style-type: none"> 1. Pulse energy exceeding 5 J per pulse; <u>or</u> 2. ‘Average output power’ exceeding 2.5 kW;
	<ol style="list-style-type: none"> 4. Excimer ‘lasers’ having any of the following: <ol style="list-style-type: none"> a. Output wavelength not exceeding 150 nm and any of the following: <ol style="list-style-type: none"> 1. Output energy exceeding 50 mJ per pulse; <u>or</u> 2. ‘Average output power’ exceeding 1 W; b. Output wavelength exceeding 150 nm but not exceeding 190 nm and

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	<p>any of the following:</p> <ol style="list-style-type: none"> 1. Output energy exceeding 1.5 J per pulse; <u>or</u> 2. “Average output power” exceeding 120 W; <p>c. Output wavelength exceeding 190 nm but not exceeding 360 nm and any of the following:</p> <ol style="list-style-type: none"> 1. Output energy exceeding 10 J per pulse; <u>or</u> 2. “Average output power” exceeding 500 W; <u>or</u> <p>d. Output wavelength exceeding 360 nm and any of the following:</p> <ol style="list-style-type: none"> 1. Output energy exceeding 1.5 J per pulse; <u>or</u> 2. “Average output power” exceeding 30 W; <p><u>N.B.</u> <i>For excimer ‘lasers’ specially designed for lithography equipment, see Category Code 3B001.</i></p>
	5. “Chemical lasers”, as follows:
	a. Hydrogen Fluoride (HF) “lasers”;
	b. Deuterium Fluoride (DF) “lasers”;
	c. “Transfer lasers”, as follows:
	1. Oxygen Iodine (O ₂ -I) “lasers”;
	2. Deuterium Fluoride-Carbon dioxide (DF-CO ₂) “lasers”;
	<p>6. ‘Non-repetitive pulsed’ Nd: glass “lasers” having any of the following:</p> <ol style="list-style-type: none"> a. “Pulse duration” not exceeding 1 μs and output energy exceeding 50 J per pulse; <u>or</u> b. “Pulse duration” exceeding 1 μs and output energy exceeding 100 J per pulse; <p><u>Note</u> <i>‘Non-repetitive pulsed’ refers to “lasers” that produce either a single output pulse or that have a time interval between pulses exceeding one minute.</i></p>
	e. Components, as follows:
	<p>1. Mirrors cooled either by ‘active cooling’ or by heat pipe cooling;</p> <p><u>Technical Note</u> <i>‘Active cooling’ is a cooling technique for optical components using</i></p>

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	<p><i>flowing fluids within the subsurface (nominally less than 1 mm below the optical surface) of the optical component to remove heat from the optic.</i></p> <p>2. Optical mirrors or transmissive or partially transmissive optical or electro-optical components specially designed for use with specified “lasers”;</p> <p>f. Optical equipment, as follows: <u>N.B.</u> <i>For shared aperture optical elements, capable of operating in “Super-High Power Laser” (“SHPL”) applications, see Division 2 of Part I of this Schedule.</i></p> <p>1. Dynamic wavefront (phase) measuring equipment capable of mapping at least 50 positions on a beam wavefront and any of the following: a. Frame rates equal to or more than 100 Hz and phase discrimination of at least 5% of the beam’s wavelength; <u>or</u> b. Frame rates equal to or more than 1,000 Hz and phase discrimination of at least 20% of the beam’s wavelength;</p> <p>2. “Laser” diagnostic equipment capable of measuring “SHPL” system angular beam steering errors of equal to or less than 10 μrad;</p> <p>3. Optical equipment and components specially designed for a phased-array “SHPL” system for coherent beam combination to an accuracy of $\lambda/10$ at the designed wavelength, or 0.1 μm, whichever is the smaller;</p> <p>4. Projection telescopes specially designed for use with “SHPL” systems.</p>
DL6A006	<p>“Magnetometers”, “magnetic gradiometers”, “intrinsic magnetic gradiometers”, underwater electric field sensors, “compensation systems”, and specially designed components therefor, as follows: <u>Note</u> <i>Category Code 6A006 does not include instruments specially designed for fishery applications or biomagnetic measurements for medical diagnostics.</i></p> <p>a. “Magnetometers” and subsystems, as follows:</p> <p>1. Using “superconductive” (SQUID) “technology” and having any of the following: a. SQUID systems designed for stationary operation, without specially designed subsystems designed to reduce in-motion noise, and having a “noise level” (sensitivity) equal to or lower (better) than 50 fT</p>

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	<p>(rms) per square root Hz at a frequency of 1 Hz; <u>or</u></p> <p>b. SQUID systems having an in-motion-magnetometer “noise level” (sensitivity) lower (better) than 20 pT (rms) per square root Hz at a frequency of 1 Hz and specially designed to reduce in-motion noise;</p> <p>2. Using optically pumped or nuclear precession (proton/Overhauser) “technology” having a “noise level” (sensitivity) lower (better) than 20 pT (rms) per square root Hz;</p> <p>3. Using fluxgate “technology” having a “noise level” (sensitivity) equal to or lower (better) than 10 pT (rms) per square root Hz at a frequency of 1 Hz;</p> <p>4. Induction coil “magnetometers” having a “noise level” (sensitivity) lower (better) than any of the following:</p> <p>a. 0.05 nT rms per square root Hz at frequencies of less than 1 Hz;</p> <p>b. 1×10^{-3} nT (rms) per square root Hz at frequencies of 1 Hz or more but not exceeding 10 Hz; <u>or</u></p> <p>c. 1×10^{-4} nT (rms) per square root Hz at frequencies exceeding 10 Hz;</p> <p>5. Fibre optic “magnetometers” having a “noise level” (sensitivity) lower (better) than 1 nT (rms) per square root Hz;</p> <p>b. Underwater electric field sensors having a “noise level” (sensitivity) lower (better) than 8 nanovolt per metre per square root Hz when measured at 1 Hz;</p> <p>c. “Magnetic gradiometers”, as follows:</p> <p>1. “Magnetic gradiometers” using multiple “magnetometers” specified in Category Code 6A006.a.;</p> <p>2. Fibre optic “intrinsic magnetic gradiometers” having a magnetic gradient field “noise level” (sensitivity) lower (better) than 0.3 nT/m (rms) per square root Hz;</p> <p>3. “Intrinsic magnetic gradiometers”, using “technology” other than fibre-optic “technology”, having a magnetic gradient field “noise level” (sensitivity) lower (better) than 0.015 nT/m (rms) per square root Hz;</p> <p>d. “Compensation systems” for magnetic or underwater electric field sensors resulting in a performance equal to or better than the specified parameters of Category Code 6A006.a., 6A006.b. or 6A006.c.</p>
DL6A007	Gravity meters (gravimeters) and gravity gradiometers, as follows:

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	<p><u>N.B.</u> <i>See also Category Code 6A107.</i></p> <p>a. Gravity meters designed or modified for ground use and having a static accuracy of less (better) than 10 µgal;</p> <p><u>Note</u> <i>Category Code 6A007.a. does not include ground gravity meters of the quartz element (Worden) type.</i></p> <p>b. Gravity meters designed for mobile platforms and having all of the following:</p> <ol style="list-style-type: none"> 1. A static accuracy of less (better) than 0.7 mgal; <u>and</u> 2. An in-service (operational) accuracy of less (better) than 0.7 mgal having a time-to-steady-state registration of less than 2 minutes under any combination of attendant corrective compensations and motional influences; <p>c. Gravity gradiometers.</p>
DL6A008	<p>Radar systems, equipment and assemblies having any of the following characteristics, and specially designed components therefor:</p> <p><u>N.B.</u> <i>See also Category Code 6A108.</i></p> <p><u>Note</u> <i>Category Code 6A008 does not include:</i></p> <ul style="list-style-type: none"> — <i>Secondary surveillance radar (SSR);</i> — <i>Civil Automotive Radar;</i> — <i>Displays or monitors used for air traffic control (ATC) having no more than 12 resolvable elements per mm;</i> — <i>Meteorological (weather) radar.</i> <p>a. Operating at frequencies from 40 GHz to 230 GHz and having any of the following:</p> <ol style="list-style-type: none"> 1. An average output power exceeding 100 mW; <u>or</u> 2. Locating accuracy of 1 m or less (better) in range and 0.2 degree or less (better) in azimuth; <p>b. A tunable bandwidth exceeding $\pm 6.25\%$ of the ‘centre operating frequency’;</p> <p><u>Technical Note</u></p>

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	<i>The ‘centre operating frequency’ equals one half of the sum of the highest plus the lowest specified operating frequencies.</i>
	c. Capable of operating simultaneously on more than two carrier frequencies;
	d. Capable of operating in synthetic aperture (SAR), inverse synthetic aperture (ISAR) radar mode, or sidelooking airborne (SLAR) radar mode;
	e. Incorporating “electronically steerable phased array antennae”;
	f. Capable of heightfinding non-cooperative targets; <i>Note</i> <i>Category Code 6A008.f. does not include precision approach radar (PAR) equipment conforming to ICAO standards.</i>
	g. Specially designed for airborne (balloon or airframe mounted) operation and having Doppler “signal processing” for the detection of moving targets;
	h. Employing processing of radar signals and using any of the following: 1. “Radar spread spectrum” techniques; <u>or</u> 2. “Radar frequency agility” techniques;
	i. Providing ground-based operation with a maximum “instrumented range” exceeding 185 km; <i>Note</i> <i>Category Code 6A008.i. does not include:</i> <i>a. Fishing ground surveillance radar;</i> <i>b. Ground radar equipment specially designed for enroute air traffic control and having all the following:</i> <i>1. A maximum “instrumented range” of 500 km or less;</i> <i>2. Configured so that radar target data can be transmitted only one way from the radar site to one or more civil ATC centres;</i> <i>3. Contains no provisions for remote control of the radar scan rate from the enroute ATC centre; <u>and</u></i> <i>4. Permanently installed;</i> <i>c. Weather balloon tracking radars.</i>
	j. Being “laser” radar or Light Detection and Ranging (LIDAR) equipment and having any of the following: 1. “Space-qualified”; <u>or</u>

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	<p>2. Employing coherent heterodyne or homodyne detection techniques and having an angular resolution of less (better) than 20 μrad (microradians);</p> <p><u>Note</u></p> <p><i>Category Code 6A008.j. does not include LIDAR equipment specially designed for surveying or for meteorological observation.</i></p> <hr/> <p>k. Having “signal processing” subsystems using “pulse compression” and having any of the following:</p> <ol style="list-style-type: none"> 1. A “pulse compression” ratio exceeding 150; <u>or</u> 2. A pulse width of less than 200 ns; <u>or</u> <hr/> <p>l. Having data processing subsystems and having any of the following:</p> <ol style="list-style-type: none"> 1. “Automatic target tracking” providing, at any antenna rotation, the predicted target position beyond the time of the next antenna beam passage; <p><u>Note</u></p> <p><i>Category Code 6A008.l.1. does not include conflict alert capability in ATC systems, or marine or harbour radar.</i></p> <ol style="list-style-type: none"> 2. Calculation of target velocity from primary radar having non-periodic (variable) scanning rates; 3. Processing for automatic pattern recognition (feature extraction) and comparison with target characteristic data bases (waveforms or imagery) to identify or classify targets; <u>or</u> 4. Superposition and correlation, or fusion, of target data from two or more “geographically dispersed” and “interconnected radar sensors” to enhance and discriminate targets. <p><u>Note</u></p> <p><i>Category Code 6A008.l.4. does not include systems, equipment and assemblies used for marine traffic control.</i></p>
DL6A102	<p>Radiation hardened ‘detectors’, other than those specified in Category Code 6A002, specially designed or modified for protecting against nuclear effects (e.g., electromagnetic pulse (EMP), X-rays, combined blast and thermal effects) and usable for “missiles”, designed or rated to withstand radiation levels which meet or exceed a total irradiation dose of 5×10^5 rads (silicon).</p> <p><u>Technical Note</u></p> <p><i>In Category Code 6A102, a ‘detector’ is defined as a mechanical, electrical, optical or chemical device that automatically identifies and records, or registers a stimulus such as an environmental change in pressure or temperature, an electrical or electromagnetic signal or radiation from a</i></p>

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	<i>radioactive material. This includes devices that sense by one time operation or failure.</i>
DL6A107	<p>Gravity meters (gravimeters) and components for gravity meters and gravity gradiometers, as follows:</p> <p>a. Gravity meters, other than those specified in Category Code 6A007.b., designed or modified for airborne or marine use, and having a static or operational accuracy of 7×10^{-6} m/s² (0.7 milligal) or less (better), and having a time-to-steady-state registration of two minutes or less;</p> <p>b. Specially designed components for gravity meters specified in Category Code 6A007.b. or 6A107.a. and gravity gradiometers specified in Category Code 6A007.c.</p>
DL6A108	<p>Radar systems and tracking systems, other than those specified in Category Code 6A008, as follows:</p> <p>a. Radar and laser radar systems designed or modified for use in space launch vehicles specified in Category Code 9A004 or sounding rockets specified in Category Code 9A104;</p> <p><u>Note</u> <i>Category Code 6A108.a. includes the following:</i></p> <p><i>a. Terrain contour mapping equipment;</i></p> <p><i>b. Imaging sensor equipment;</i></p> <p><i>c. Scene mapping and correlation (both digital and analogue) equipment;</i></p> <p><i>d. Doppler navigation radar equipment.</i></p> <p>b. Precision tracking systems, usable for ‘missiles’, as follows:</p> <p>1. Tracking systems which use a code translator in conjunction with either surface or airborne references or navigation satellite systems to provide real-time measurements of in-flight position and velocity;</p> <p>2. Range instrumentation radars including associated optical/infrared trackers with all of the following capabilities:</p> <p>a. Angular resolution better than 3 milliradians;</p> <p>b. Range of 30 km or greater with a range resolution better than 10 m rms; <u>and</u></p> <p>c. Velocity resolution better than 3 m/s.</p> <p><u>Technical Note</u> <i>In Category Code 6A108.b. ‘missile’ means complete rocket systems and</i></p>

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	<i>unmanned aerial vehicle systems capable of a range exceeding 300 km.</i>
DL6A202	Photomultiplier tubes having both of the following characteristics: a. Photocathode area of greater than 20 cm ² ; <u>and</u> b. Anode pulse rise time of less than 1 ns.
DL6A203	Cameras and components, other than those specified in Category Code 6A003, as follows:
	a. Mechanical rotating mirror cameras, as follows, and specially designed components therefor:
	1. Framing cameras with recording rates greater than 225,000 frames per second;
	2. Streak cameras with writing speeds greater than 0.5 mm per microsecond;
	<u>Note</u> <i>In Category Code 6A203.a. components of such cameras include their synchronising electronics units and rotor assemblies consisting of turbines, mirrors and bearings.</i>
	b. Electronic streak cameras, electronic framing cameras, tubes and devices, as follows:
	1. Electronic streak cameras capable of 50 ns or less time resolution;
	2. Streak tubes for cameras specified in Category Code 6A203.b.1.;
	3. Electronic (or electronically shuttered) framing cameras capable of 50 ns or less frame exposure time;
	4. Framing tubes and solid-state imaging devices for use with cameras specified in Category Code 6A203.b.3., as follows:
	a. Proximity focused image intensifier tubes having the photocathode deposited on a transparent conductive coating to decrease photocathode sheet resistance;
	b. Gate silicon intensifier target (SIT) videcon tubes, where a fast system allows gating the photoelectrons from the photocathode before they impinge on the SIT plate;
	c. Kerr or Pockels cell electro-optical shuttering;
	d. Other framing tubes and solid-state imaging devices having a fast-

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	<p>image gating time of less than 50 ns specially designed for cameras specified in Category Code 6A203.b.3.;</p> <p>c. Radiation-hardened TV cameras, or lenses therefor, specially designed or rated as radiation hardened to withstand a total radiation dose greater than 50×10^3 Gy (silicon) (5×10^6 rad (silicon)) without operational degradation.</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 ionising radiation.</i></p>
DL6A205	<p>“Lasers”, “laser” amplifiers and oscillators, other than those specified in Category Codes 0B001.g.5., 0B001.h.6. and 6A005; as follows:</p> <p><u>N.B.</u></p> <p><i>For copper vapour lasers, see Category Code 6A005.b.</i></p> <p>a. Argon ion “lasers” having both of the following characteristics:</p> <ol style="list-style-type: none"> 1. Operating at wavelengths between 400 nm and 515 nm; <u>and</u> 2. An average output power greater than 40 W; <p>b. Tunable pulsed single-mode dye laser oscillators having all of the following characteristics:</p> <ol style="list-style-type: none"> 1. Operating at wavelengths between 300 nm and 800 nm; 2. An average output power greater than 1 W; 3. A repetition rate greater than 1 kHz; <u>and</u> 4. Pulse width less than 100 ns; <p>c. Tunable pulsed dye laser amplifiers and oscillators, having all of the following characteristics:</p> <ol style="list-style-type: none"> 1. Operating at wavelengths between 300 nm and 800 nm; 2. An average output power greater than 30 W; 3. A repetition rate greater than 1 kHz; <u>and</u> 4. Pulse width less than 100 ns; <p><u>Note</u></p> <p><i>Category Code 6A205.c. does not include single mode oscillators.</i></p> <p>d. Pulsed carbon dioxide “lasers” having all of the following characteristics:</p> <ol style="list-style-type: none"> 1. Operating at wavelengths between 9,000 nm and 11,000 nm; 2. A repetition rate greater than 250 Hz;

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	<p>3. An average output power greater than 500 W; <u>and</u></p> <p>4. Pulse width of less than 200 ns;</p>
	e. Para-hydrogen Raman shifters designed to operate at 16 micrometre output wavelength and at a repetition rate greater than 250 Hz;
	<p>f. Neodymium-doped (other than glass) ‘lasers’ with an output wavelength between 1,000 nm and 1,100 nm, having either of the following:</p> <p>1. Pulse-excited and Q-switched with a pulse duration equal to or more than 1 ns; and having either of the following:</p> <p>a. A single-transverse mode output with an average output power greater than 40W; <u>or</u></p> <p>b. A multiple-transverse mode output having an average power greater than 50 W; <u>or</u></p> <p>2. Incorporating frequency doubling to give an output wavelength between 500 nm and 550 nm with an average output power of more than 40 W.</p>
DL6A225	<p>Velocity interferometers for measuring velocities exceeding 1 km/s during time intervals of less than 10 microseconds.</p> <p><u>Note</u></p> <p><i>Category Code 6A225 includes velocity interferometers such as VISARs (Velocity interferometer systems for any reflector) and DLIs (Doppler laser interferometers).</i></p>
DL6A226	<p>Pressure sensors, as follows:</p>
	a. Manganin gauges for pressures greater than 10 GPa;
	b. Quartz pressure transducers for pressures greater than 10 GPa.
6B	Test, Inspection and Production Equipment
DL6B004	Optical equipment, as follows:
	a. Equipment for measuring absolute reflectance to an accuracy of $\pm 0.1\%$ of the reflectance value;
	b. Equipment other than optical surface scattering measurement equipment, having an unobscured aperture of more than 10 cm, specially designed for the non-contact optical measurement of a non-planar optical surface figure (profile) to an ‘‘accuracy’’ of 2 nm or less (better) against the required profile.
	<u>Note</u>

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	<i>Category Code 6B004 does not include microscopes.</i>
DL6B007	Equipment to produce, align and calibrate land-based gravity meters with a static accuracy of better than 0.1 mgal.
DL6B008	Pulse radar cross-section measurement systems having transmit pulse widths of 100 ns or less and specially designed components therefor. <u>N.B.</u> <i>See also Category Code 6B108.</i>
DL6B108	Systems, other than those specified in Category Code 6B008, specially designed for radar cross section measurement usable for ‘missiles’ and their subsystems. <u>Technical Note</u> <i>In Category Code 6B108 ‘missile’ means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km.</i>
6C	Materials
DL6C002	Optical sensor materials, as follows:
	a. Elemental tellurium (Te) of purity levels of 99.9995% or more;
	b. Single crystals (including epitaxial wafers) of any of the following: <ol style="list-style-type: none"> 1. Cadmium zinc telluride (CdZnTe), with zinc content of less than 6% by ‘mole fraction’; 2. Cadmium telluride (CdTe) of any purity level; <u>or</u> 3. Mercury cadmium telluride (HgCdTe) of any purity level. <u>Technical Note</u> <i>‘Mole fraction’ is defined as the ratio of moles ZnTe to the sum of moles CdTe and ZnTe present in the crystal.</i>
DL6C004	Optical materials, as follows:
	a. Zinc selenide (ZnSe) and zinc sulphide (ZnS) “substrate blanks” produced by the chemical vapour deposition process and having any of the following: <ol style="list-style-type: none"> 1. A volume greater than 100 cm³; <u>or</u> 2. A diameter greater than 80 mm and a thickness of 20 mm or more;
	b. Boules of any of the following electro-optic materials: <ol style="list-style-type: none"> 1. Potassium titanyl arsenate (KTA);

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	<p>2. Silver gallium selenide (AgGaSe₂); <u>or</u></p> <p>3. Thallium arsenic selenide (Tl₃AsSe₃, also known as TAS);</p>
	<p>c. Non-linear optical materials, having all of the following:</p> <ol style="list-style-type: none"> 1. Third order susceptibility (χ^3) of $10^{-6} \text{ m}^2/\text{V}^2$ or more; <u>and</u> 2. A response time of less than 1 ms;
	<p>d. “Substrate blanks” of silicon carbide or beryllium beryllium (Be/Be) deposited materials exceeding 300 mm in diameter or major axis length;</p>
	<p>e. Glass, including fused silica, phosphate glass, fluorophosphate glass, zirconium fluoride (ZrF₄) and hafnium fluoride (HfF₄) and having all of the following:</p> <ol style="list-style-type: none"> 1. A hydroxyl ion (OH⁻) concentration of less than 5 ppm; 2. Integrated metallic purity levels of less than 1 ppm; <u>and</u> 3. High homogeneity (index of refraction variance) less than 5×10^{-6};
	<p>f. Synthetically produced diamond material with an absorption of less than 10^{-5} cm^{-1} for wavelengths exceeding 200 nm but not exceeding 14,000 nm.</p>
DL6C005	<p>Synthetic crystalline “laser” host material in unfinished form, as follows:</p>
	<p>a. Titanium doped sapphire;</p>
	<p>b. Alexandrite.</p>
6D	Software
DL6D001	<p>“Software” specially designed for the “development” or “production” of equipment specified in Category Code 6A004, 6A005, 6A008 or 6B008.</p>
DL6D002	<p>“Software” specially designed for the “use” of equipment specified in Category Code 6A002.b., 6A008 or 6B008.</p>
DL6D003	<p>Other “software”, as follows:</p>
	<p>a. “Software”, as follows:</p>
	<ol style="list-style-type: none"> 1. “Software” specially designed for acoustic beam forming for the “real time processing” of acoustic data for passive reception using towed hydrophone arrays;
	<ol style="list-style-type: none"> 2. “Source code” for the “real time processing” of acoustic data for passive reception using towed hydrophone arrays;
	<ol style="list-style-type: none"> 3. “Software” specially designed for acoustic beam forming for “real

<i>Product Code</i>	<i>Item Description</i>
	<p>time processing” of acoustic data for passive reception using bottom or bay cable systems;</p> <p>4. “Source code” for “real time processing” of acoustic data for passive reception using bottom or bay cable systems;</p> <p>b. “Software”, as follows:</p> <p>1. “Software” specially designed for magnetic and electric field “compensation systems” for magnetic sensors designed to operate on mobile platforms;</p> <p>2. “Software” specially designed for magnetic and electric field anomaly detection on mobile platforms;</p> <p>c. “Software” specially designed to correct motional influences of gravity meters or gravity gradiometers;</p> <p>d. “Software”, as follows:</p> <p>1. Air Traffic Control (ATC) “software” application “programmes” hosted on general purpose computers located at Air Traffic Control centres and capable of any of the following:</p> <p>a. Processing and displaying more than 150 simultaneous “system tracks”; <u>or</u></p> <p>b. Accepting radar target data from more than four primary radars;</p> <p>2. “Software” for the design or “production” of radomes and having all of the following:</p> <p>a. Specially designed to protect the “electronically steerable phased array “antennae” specified in Category Code 6A008.e.; <u>and</u></p> <p>b. Resulting in an antenna pattern having an ‘average side lobe level’ more than 40 dB below the peak of the main beam level.</p> <p><i>Technical Note</i></p> <p><i>‘Average side lobe level’ in Category Code 6D003.d.2.b. is measured over the entire array excluding the angular extent of the main beam and the first two side lobes on either side of the main beam.</i></p>
DL6D102	<p>“Software” specially designed or modified for the “use” of goods specified in Category Code 6A108.</p>
DL6D103	<p>“Software” which processes post-flight, recorded data, enabling determination of vehicle position throughout its flight path, specially designed or modified for ‘missiles’.</p> <p><i>Technical Note</i></p>

<i>Product Code</i>	<i>Item Description</i>
	<i>In Category Code 6D103 ‘missile’ means complete rocket systems and unmanned aerial vehicle systems capable of a range exceeding 300 km.</i>
6E	Technology
DL6E001	“Technology” (according to the General Technology Note) for the “development” of equipment, materials or “software” specified in Category 6A, 6B, 6C or 6D.
DL6E002	“Technology” (according to the General Technology Note) for the “production” of equipment or materials specified in Category 6A, 6B or 6C.
DL6E003	Other “technology”, as follows:
	a. “Technology”, as follows:
	1. Optical surface coating and treatment “technology” “required” to achieve uniformity of 99.5% or better for optical coatings 500 mm or more in diameter or major axis length and with a total loss (absorption and scatter) of less than 5×10^{-3} ; <u>N.B.</u> <i>See also Category Code 2E003.f.</i>
	2. Optical fabrication “technology” using single point diamond turning techniques to produce surface finish accuracies of better than 10 nm rms on non-planar surfaces exceeding 0.5 m ² ;
	b. “Technology” “required” for the “development”, “production” or “use” of specially designed diagnostic instruments or targets in test facilities for “SHPL” testing or testing or evaluation of materials irradiated by “SHPL” beams;
DL6E101	“Technology” (according to the General Technology Note) for the “use” of equipment or “software” specified in Category Code 6A002, 6A007.b. and c., 6A008, 6A102, 6A107, 6A108, 6B108, 6D102 or 6D103. <u>Note</u> <i>Category Code 6E101 only specifies “technology” for equipment specified in Category Code 6A008 when it is designed for airborne applications and is usable in “missiles”.</i>
DL6E201	“Technology” (according to the General Technology Note) for the “use” of equipment specified in Category Code 6A003, 6A005.a.2., 6A005.b.2., 6A005.b.3., 6A005.b.4., 6A005.b.6., 6A005.c.2. 6A005.d.3.c., 6A005.d.4.c., 6A202, 6A203, 6A205, 6A225 or 6A226.