

GROUP 6 – MISSILE TECHNOLOGY CONTROL REGIME LIST

The definitions set out on page 84 of this guide apply in respect to this Group.

6000. The export of "technology" for the "development", "production" or "use" of products embargoed in Group 6 is controlled except that "technology" which is the minimum necessary for the installation, operation, maintenance (checking) and repair of those products whose export has been authorised.

Controls do not apply to "technology" "in the public domain" or to "basic scientific research".

6001. Complete rocket systems (including ballistic missile systems, space launch vehicles, and sounding rockets) and unmanned air vehicle systems (including cruise missile systems, target drones and reconnaissance drones) capable of delivering at least a 500 kg payload to a range of at least 300 km as well as the specially designed "production facilities" for these systems.

6002. Complete subsystems "usable in" the systems in Item 6001., as follows, as well as the specially designed "production facilities", and "production equipment" therefor:

6002. a. Individual rocket stages;
- b. Reentry vehicles, and equipment designed or modified therefor, as follows:
1. Heat shields and components thereof fabricated of ceramic or ablative materials;
 2. Heat sinks and components thereof fabricated of light-weight, high heat capacity materials;
 3. Electronic equipment specially designed for reentry vehicles;
- c. Solid or liquid propellant rocket engines, having a total impulse capacity of 1.1×10^6 N-sec (2.5×10^5 lb-sec) or greater;
- d. "Guidance sets" capable of achieving system accuracy of 3.33 percent or less of the range (e.g., a CEP of 10 km or less at a range of 300 km);
- e. Thrust vector control sub-systems;
- f. Warhead safing, arming, fuzing and firing mechanisms

Notes to Item 6002.:

1. CEP (circle of equal probability) is a measure of accuracy and is defined as the radius of the circle centered at the target, at a specific range, in which 50 percent of the payloads impact.
2. A "guidance set" integrates the process of measuring and computing a vehicle's position and velocity (i.e. navigation) with that of computing and sending commands to the vehicle's flight control systems to correct the trajectory.
3. Examples of methods of achieving thrust vector control which are covered by 6002.e. include:
 - a. Flexible nozzle;
 - b. Fluid or secondary gas injection;
 - c. Movable engine or nozzle;
 - d. Deflection of exhaust gas stream (jet vanes or probes); or
 - e. Use of thrust tabs.

6003. Propulsion components and equipment "usable in" the systems in Item 6001., as follows, as well as the specially designed "production facilities" and "production equipment" therefor:

6003. a. Lightweight turbojet and turbofan engines (including turbocompound engines) that are small and fuel efficient;

- b. Ramjet/Scramjet/pulse jet/combined cycle engines, including devices to regulate combustion and specially designed components therefor;
- c. Rocket motor cases, "interior lining", "insulation" and nozzles therefor;
- d. Staging mechanisms, separation mechanisms, and interstages therefor;
- e. Liquid and slurry propellant (including oxidizers) control systems, and specially designed components therefor, designed or modified to operate in vibration environments of more than 10 g RMS between 20 Hz and 2,000 Hz;
- f. Hybrid rocket motors and specially designed components therefor.

Notes to Item 6003.:

1. "Production equipment" in the heading to this item includes the following:

Flow-forming machines, and specially designed components and specially designed software therefor, which:

 - a. according to the manufacturer's technical specification, can be equipped with numerical control units or a computer control, even when not equipped with such units at delivery; and
 - b. with more than two axes which can be coordinated simultaneously for contouring control.
- Technical Note:** Machines combining the function of spin-forming and flow-forming are for the purpose of this item regarded as flow-forming machines.
2. Governments may permit the shipment of equipment which is exported as part of a manned aircraft or is in quantities appropriate for replacement parts for manned aircraft.
 3. In Item 6003.c., "interior lining" suited for the bond interface between the solid propellant and the case or insulating liner is usually a liquid polymer based dispersion of refractory or insulating materials. e.g. carbon filled HTPB or other polymer with added curing agents to be sprayed or screeded over a case interior.
 4. In Item 6003. c., "insulation" intended to be applied to the components of a rocket motor, i.e., the case, nozzle inlets, case closures, includes cured or semi-cured compounded rubber sheet stock containing an insulating or refractory material. It may also be incorporated as stress relief boots or flaps.
 5. The only servo valves and pumps covered in 6003.e. above, are the following:
 - a. Servo valves designed for flow rates of 24 liters per minute or greater, at an absolute pressure of 7,000 kPa (1,000 psi) or greater, that have an actuator response time of less than 100 msec;
 - b. Pumps, for liquid propellants, with shaft speeds equal or greater than 8,000 RPM or with discharge pressures equal to or greater than 7,000 kPa (1,000 psi).
 6. Governments may permit the shipment of equipment which is exported as part of a satellite.

6004. Propellants and constituent chemicals for propellants as follows:

6004. a. Propulsive substances:
1. Hydrazine with a concentration of more than 70 percent and its derivatives including monomethylhydrazine (MMH);
 2. Unsymmetric dimethylhydrazine (UDMH);
 3. Ammonium perchlorate;
 4. Spherical aluminum powder with particles of uniform diameter of less than 500×10^{-6} m (500 micrometer) and an aluminum content of 97 percent or greater;
 5. Metal fuels in particle sizes less than 500×10^{-6} m (500 microns), whether spherical, atomized, spheroidal, flaked or ground, consisting of 97 percent or more of any of the following: zirconium, beryllium, boron, magnesium, zinc, and alloys of these: Misch metal;
 6. Nitro-amines (cyclotetramethylene-tetranitramine (HMX), cyclotrimethylenetrinitramine (RDX));
 7. Perchlorates, chlorates or chromates mixed with powdered metals or other high energy fuel components;
 8. Carboranes, decaboranes, pentaboranes and derivatives thereof;
 9. Liquid oxidizers, as follows:
 - i. Dinitrogen trioxide;
 - ii. Nitrogen dioxide/dinitrogen tetroxide;