

- f. Surface-effect vehicles (fully skirted variety) with a maximum design speed, fully loaded, exceeding 30 knots in a significant wave height of 1.25 m (Sea State 3) or more, a cushion pressure exceeding 3,830 Pa, and a light-ship-to- full-load displacement ratio of less than 0.70;
- g. Surface-effect vehicles (rigid sidewalls) with a maximum design speed, fully loaded, exceeding 40 knots in a significant wave height of 3.25 m (Sea State 5) or more;
- h. Hydrofoil vessels with active systems for automatically controlling foil systems, with a maximum design speed, fully loaded, of 40 knots or more in a significant wave height of 3.25 m (Sea State 5) or more;
- i. Small waterplane area vessels with:
 1. A full load displacement exceeding 500 tonnes with a maximum design speed, fully loaded, exceeding 35 knots in a significant wave height of 3.25 m (Sea State 5) or more; *or*
 2. A full load displacement exceeding 1,500 tonnes with a maximum design speed, fully loaded, exceeding 25 knots in a significant wave height of 4 m (Sea State 6) or more;

Technical Note:

A small waterplane area vessel is defined by the following formula: waterplane area at an operational design draft less than $2 \times$ (displaced volume at the operational design draft)^{2/3}.

1081. 2. Systems or equipment, as follows:

- a. Systems or equipment, specially designed or modified for submersible vehicles, designed to operate at depths exceeding 1,000 m, as follows:
 1. Pressure housings or pressure hulls with a maximum inside chamber diameter exceeding 1.5 m;
 2. Direct current propulsion motors or thrusters;
 3. Umbilical cables, and connectors therefor, using optical fibre and having synthetic strength members;
- b. Systems specially designed or modified for the automated control of the motion of equipment for submersible vehicles embargoed by 1081.1. using navigation data and having closed loop servo-controls to:
 1. Enable a vehicle to move within 10 m of a predetermined point in the water column;
 2. Maintain the position of the vehicle within 10 m of a predetermined point in the water column; *or*
 3. Maintain the position of the vehicle within 10 m while following a cable on or under the seabed;
- c. Fibre optic hull penetrators or connectors;
- d. Underwater vision systems, as follows:
 1. a. Television systems (comprising camera, lights, monitoring and signal transmission equipment) having a limiting resolution when measured in air of more than 500 lines and specially designed or modified for remote operation with a submersible vehicle; *or*
 - b. Underwater television cameras having a limiting resolution when measured in air of more than 700 lines;

Technical Note:

Limiting resolution in television is a measure of horizontal resolution usually expressed in terms of the maximum number of lines per picture height discriminated on a test chart, using IEEE Standard 208/1960 or any equivalent standard.

2. Systems, specially designed or modified for remote operation with an underwater vehicle, employing techniques to minimise the effects of back scatter, including range-gated illuminators or "laser" systems;
3. Low light level television cameras specially designed or modified for underwater use containing:
 - a. Image intensifier tubes embargoed by 1061.2.a.2.a.; and
 - b. More than 150,000 "active pixels" per solid state area array;
- e. Photographic still cameras specially designed or modified for underwater use, having a film format of 35 mm or larger, and:
 1. Annotating the film with data provided by a source external to the camera;

2. Having autofocussing or remote focussing specially designed for underwater use;
3. Having automatic back focal distance correction; *or*
4. Having automatic compensation control specially designed to permit an underwater camera housing to be usable at depths exceeding 1,000 m;
- f. Electronic imaging systems, specially designed or modified for underwater use, capable of storing digitally more than 50 exposed images;
- g. Light systems, as follows, specially designed or modified for underwater use:
 1. Stroboscopic light systems capable of a light output energy of more than 300 J per flash;
 2. Argon arc light systems specially designed for use below 1,000 m;
- h. "Robots" specially designed for underwater use, controlled by using a dedicated stored programme computer:
 1. Having systems that control the "robot" using information from sensors which measure force or torque applied to an external object, distance to an external object, or tactile sense between the "robot" and an external object; *or*
 2. Capable of exerting a force of 250 N or more or a torque of 250 Nm or more and using titanium based alloys or "fibrous or filamentary" "composite" materials in their structural members;
- i. Remotely controlled articulated manipulators specially designed or modified for use with submersible vehicles:
 1. Having systems which control the manipulator using the information from sensors which measure the torque or force applied to an external object, or tactile sense between the manipulator and an external object; *or*
 2. Controlled by proportional master-slave techniques or by using a dedicated stored programme computer, and having 5 degrees of freedom of movement or more;

NOTE:
Only functions having proportional control using positional feedback or by using a dedicated stored programme computer are counted when determining the number of degrees of freedom of movement.
- j. Air independent power systems, as follows, specially designed for underwater use:
 1. Brayton, Stirling or Rankine cycle engine air independent power systems having any of the following:
 - a. Chemical scrubber or absorber systems specially designed to remove carbon dioxide, carbon monoxide and particulates from recirculated engine exhaust;
 - b. Systems specially designed to use a monoatomic gas;
 - c. Devices or enclosures specially designed for underwater noise reduction in frequencies below 10 kHz, or special mounting devices for shock mitigation; *or*
 - d. Systems specially designed:
 1. To pressurise the products of reaction or for fuel reformation;
 2. To store the products of the reaction; and
 3. To discharge the products of the reaction against a pressure of 100 kPa or more;
 2. Diesel cycle engine air independent systems, having all of the following:
 - a. Chemical scrubber or absorber systems specially designed to remove carbon dioxide, carbon monoxide and particulates from recirculated engine exhaust;
 - b. Systems specially designed to use a monoatomic gas;
 - c. Devices or enclosures specially designed for underwater noise reduction in frequencies below 10 kHz or special mounting devices for shock mitigation; and
 - d. Specially designed exhaust systems that do not exhaust continuously the products of combustion;
 3. Fuel cell air independent power systems with an output exceeding 2 kW having either of the following: