

**1081.1.b. con't.**

- c. Having a range of 25 nautical miles or more; **and**
- d. Having a length of 21 m or less;

**Technical Notes:**

1. For the purposes of 1081.1.b., operate autonomously means fully submerged, without snorkel, all systems working and cruising at minimum speed at which the submersible can safely control its depth dynamically by using its depth planes only, with no need for a support vessel or support base on the surface, sea-bed or shore, and containing a propulsion system for submerged or surface use.
  2. For the purposes of 1081.1.b., range means half the maximum distance a submersible vehicle can cover.
- c. Unmanned, tethered submersible vehicles designed to operate at depths exceeding 1,000 m, having any of the following:
    1. Designed for self-propelled manoeuvre using propulsion motors or thrusters controlled by 1081.2.a.2.; **or**
    2. Having a fibre optic data link;
  - d. Unmanned, untethered submersible vehicles, having any of the following:
    1. Designed for deciding a course relative to any geographical reference without real-time human assistance;
    2. Having an acoustic data or command link; **or**
    3. Having a fibre optic data or command link exceeding 1,000 m;
  - e. Ocean salvage systems with a lifting capacity exceeding 5 MN for salvaging objects from depths exceeding 250 m and having any of the following:
    1. Dynamic positioning systems capable of position keeping within 20 m of a given point provided by the navigation system; **or**
    2. Sea-floor navigation and navigation integration systems for depths exceeding 1,000 m with positioning accuracies to within 10 m of a pre-determined point;
  - f. Surface-effect vehicles (fully skirted variety) having all of the following characteristics:
    1. A maximum design speed, fully loaded, exceeding 30 knots in a significant wave height of 1.25 m (Sea State 3) or more;
    2. A cushion pressure exceeding 3,830 Pa; **and**
    3. 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 having any of the following:
    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  $2 \times (\text{displaced volume at the operational design draft})^{2/3}$ .

## 2. Systems and equipment, as follows:

**N.B.:**

For underwater communications systems, see Category 1050 - Telecommunications.

- a. Systems and 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 therefore, using optical fibre and having synthetic strength members;
  - b. Systems specially designed or modified for the automated control of the motion of submersible vehicles controlled by 1081.1. using navigation data and having closed loop servo-controls:
    1. Enabling a vehicle to move within 10 m of a predetermined point in the water column;
    2. Maintaining the position of the vehicle within 10 m of a predetermined point in the water column; **or**
    3. Maintaining 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. Television systems and television cameras, as follows:
      - a. Television systems (comprising camera, monitoring and signal transmission equipment) having a limiting resolution when measured in air of more than 800 lines and specially designed or modified for remote operation with a submersible vehicle;
      - b. Underwater television cameras having a limiting resolution when measured in air of more than 1,100 lines;
      - c. Low light level television cameras specially designed or modified for underwater use containing all of the following:
        1. Image intensifier tubes controlled by 1061.2.a.2.a.; **and**
        2. More than 150,000 "active pixels" per solid state area array;
- 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;
  - e. Photographic still cameras specially designed or modified for underwater use below 150m having a film format of 35 mm or larger, and having any of the following:
    1. Annotation of the film with data provided by a source external to the camera;
    2. Automatic back focal distance correction; **or**
    3. Automatic compensation control specially designed to permit an underwater camera housing to be usable at depths exceeding 1,000 m;