



MAZAGON DOCK SHIPBUILDERS LIMITED

(A Govt. Of India Undertaking)

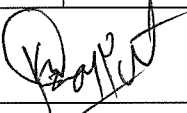

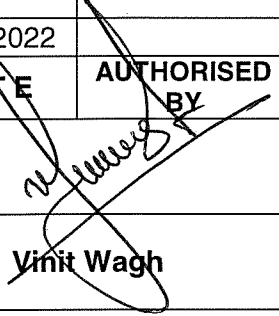
SHIPBUILDING DESIGN ENGINEERING  
DOCKYARD ROAD, MUMBAI - 400 010

SCOPE OF WORK FOR INDIGENISATION PRODUCT DEVELOPMENT

SELF CONTAINED UNDERWATER AIR BREATHING APPARATUS

(QUANTITY: 1 Set.)

DOCUMENT NO.	:	DR/F/IND/2102
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REV	DESCRIPTION	DATE	AUTHORISED BY
1	Separate Documents for Scope of Work and Technical Specification prepared	27-10-2022	MDL
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**DESIGN OUTFIT**

**SCUBA**

**SOW NO.** DR/F/IND/2102

**REV. NO.** 1

**DATE** 25/07/2022

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## **INTRODUCTION**

1. These technical specifications relate to Design, Manufacture and Supply of one number of Self Contained Underwater Air breathing Apparatus under Indigenisation project.

2. Each ship is equipped with underwater breathing apparatus along with accessories for search & rescue operations. The requirement of Self Contained Underwater Air Breathing Apparatus (SCUBA) is to enable a diver to breathe underwater using this set to a depth of 55 meters. The equipment is required for undertaking a diving operation in Water/ Sea and to assist the diver to undertake the task in a safe and hazard-free manner. Each set of Self-contained Underwater Air Breathing apparatus (SCUBA) consists of following major components:

- (a) FULL FACE MASKS & BREATHING VALVES
- (b) REGULATORS
- (c) CYLINDERS
- (d) CARRYING SYSTEM



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## TECHNICAL REQUIREMENTS

1. **OBJECTIVE:-** Under MDL's indigenization initiative, we intend to develop and manufacture Self Contained Underwater Air breathing Apparatus to be used on board Indian Naval Ships. MDL seeks to partner with a design cum production partner to enable MDL to develop the product.

2. **RESPONSIBILITY:-** The firm will be responsible for Design, Manufacture and Supply of Self Contained Underwater Air breathing Apparatus along with its associated auxiliaries/accessories/controls etc., necessary for meeting the envisaged performance of search & rescue operations

3. **ITEMS TO BE INDIGENISED AND SUPPLIED:-**

1 Set of Self-Contained Underwater Air Breathing Apparatus (SCUBA) consisting of following major components:

- (e) FULL FACE MASKS & BREATHING VALVES
- (f) REGULATORS
- (g) CYLINDERS
- (h) CARRYING SYSTEM

4. **Technical Specifications of SCUBA:**

Self-Contained Underwater Air Breathing Apparatus (SCUBA) is used to enable a diver to dive upto depths of 55 mts. As the name suggests the equipment is self-contained in terms of air supply for the diver and has an inbuilt capacity to regulate air pressure in accordance with the depth of dive.

The SCUBA set should indicate the reserve air pressure and should also supply air for inflation of the Buoyancy Jacket for emergency ascent to the surface. The equipment is required to supply continuous compensated air to a diver at the depth he is diving.

The characteristics of each sub-assemblies of Self Contained Underwater Air Breathing Apparatus (SCUBA) are as follow: -

a) **Full Facemask.** The facemask should be with breathing valve assembly and have a positive pressure (of at least 01 Mili Bar) inside. The mask should have provision to integrate with 'Underwater Communication System' (DUCS as well as WUCS) and should fit on the divers face without any ingress of water. The straps should hold the mask in place even in strong current (2 – 3 knots).

(b) **Octopus Assembly.** An additional mouth piece with associated demand valve should be provided for use in emergency in case air supply to facemask fails or for use by the buddy diver.

(c) **Cylinder Pack assembly.** Compressed air cylinder pack with neck fitting of control valve should be provided.

(d) **Harness.** The Harness basic structure should be comfortable to wear and should have provision for mounting air cylinders and other accessories on the set. Harness to have adjustable straps and belt so as to make a snug fit and ensure hands free movement of the diver.

(e) **Regulator Assembly.** A pressure compensated regulator unit should be with first stage reducer assembly to convert cylinder HP pressure to low pressure.



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(f) **Buoyancy Compensating Devices (BCD)**. A BCD associated to the set shall be fitted with inflation option through main cylinders, separate cylinder and mouthpiece. Deflation should be through a corrugated hose fastened with a Velcro in a direction that does not disturb the diver. Emergency whistle and pockets/ recess for detachable weight should be available. Additional demand valve with ergonomic safe grip mouthpiece for use by diver / buddy in an emergency should be inbuilt in the BCD. The BCD should have a suitable arrangement for fitment of cylinders in case the harness is not being used.

(g) **Dimensions**.

(a)	Type of cylinders	Twin cylinder configuration
(b)	Nominal Capacity twin cylinders	At least 08-12 litres
(c)	Working pressure	300 bars
(d)	Air Capacity of set after charging	At least 3300 litres
(e)	Test pressure	450 bars
(f)	Pressure compensated	At least 75 meters
(g)	Life of main equipment viz., cylinders, regulator, harness gauges etc	Cylinders at least 25 Yrs and other accessories / fittings at least 10 years
(h)	Total Weight on Surface	Not exceeding 22 Kg

All above items are to be indigenised and item wise minimum 50% local content is required.

(h) **Performance Test:** Following performance test will be required to be carried out by the firm on the product. The list indicates minimum requirement and any other mandatory tests required by standards shall also be performed by the firm.

**Regulator test:**

Dynamic & static pressure test at various pressures  
High pressure leakage  
Spiromatic test report

**Breathing Valve test**

Exhalation pressure  
Face piece leakage  
Static facepiece pressure  
1<sup>st</sup> breath activation  
High pressure leakage  
Safety valve (breathing valve)  
Spiromatic test report

**Face Mask**

Visual test  
Leakage test  
Complete mask (HP, MP & LP)

**Cylinder pack**

Leakage test, no bubbles during 30 seconds



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## BCD

Leakage test at 150 bar during 10 minutes

5. **APPLICABLE STANDARDS:** - Following standards / specifications or their equivalent International Standards as per their latest issues/versions shall be applicable.

S No.	Standards/Specification Title
i.	Latest MILSEC/ HSE/ NATO performance standards for Under water diving equipments
ii.	Certification as per ISI/ ISO/ Lloyds/ EN250/ DNV or equivalent Standards for HP cylinders, rubberised HP/ LP pipes, Buoyancy Jacket and other materials.(e.g. EN 250, EN 1809, ISO 9809-2, PED 201/68/EU (formerly 97/23/EC), EC directive 89/68/EEC for personal protection equipment, etc)

## Diving Equipment and Accessories

### PRE-QUALIFICATION CRITERIA

The determination of eligibility will take into account the technical and experience capabilities and past performance of the participating firm along with financial status; it will be based upon an examination of documentary evidence of the participating firm qualifications submitted by the participating firm as well as such other information, as the MDL deems necessary and appropriate. The participating firm willing to associate with MDL should meet the following Pre-Qualification Criteria. The firm's response could be liable for rejection in case of not meeting the Technical, commercial and financial qualification criteria as enumerated in the succeeding paragraphs.

#### **1. Technical:**

- a) The firm responding to tender should have domain expertise and experience in design, manufacture & supply of underwater diving equipment or high pressure cylinders, valves, face masks or specialised safety equipment used for firefighting or rescue operations. Firm has to submit documentary evidence (PO copies, WDCs/ Seller Tax invoice/ TPI release note, Appreciation letter etc.) in support of the same.
- b) Firm to essentially submit the following:
  - i. Technical response to technical requirement projected in this document and readiness to undertake the project. A brief to be submitted as to how the firm will be executing the project
  - ii. Company Profile.
  - iii. List of infrastructure/equipment held by them along with details of their manufacturing facilities.
  - iv. Details of personnel (Project Management Team) with designation, qualification and experience to determine their capabilities.
  - v. ISO 9001:2015 or equivalent certificate
  - vi. Participating firm should submit the pointwise compliance to all points in SOW. Deviation if any may be indicated with justifiable reason. Acceptance of the same will be at the discretion of MDL. Preference will be given to the firm, who will be ready to invest higher percentage towards prototype development.

2. **Commercial Qualification:** - Firms shall not be under a declaration of ineligibility issued by Govt. of India / State govt. / Public Sector Undertakings etc.

The firms shall submit the following as a part of commercial qualification.

- a) Shop & Establishment registration certificate.
- b) Certificate of Incorporation.
- c) Registration certificate from local bodies for conducting business.

- d) MSME certificate if applicable
- e) GST certificate

**3. Financial Qualification: -**

- a. Firms / consortiums (put together) shall have Average Annual turnover of Rs.5 Cr (min) during the last three years ending as on 31 Mar 2022 to participate in this tender.
- b. The firms shall enclose with its Proposal, certificate issued by Chartered Accountant with their seal and signature, stating the firms net worth & turnover during the past three years. Firm to submit Balance Sheet and Profit and Loss statement for last 3 years.
- c. Bidder shall demonstrate access to unutilized line of credit / overdraft facility / cash credit facility from its consortium of banks. Alternatively or complimentary should demonstrate liquid asset in form of cash / marketable securities in its balance sheet.