

Document No.: GA/710/PTS/HYD CYL/TWMP-T90/1104

Date: 19 Feb 2021

***Procurement Technical Specification
of
Hydraulic Lift Cylinders
for
TWMP T90 Mine Plough Project***



BEML LTD

Ministry of Defence (Govt. of India Undertaking)

R&D (Defence), R&D Centre

BEML Nagar, K.G.F - 563 115, Karnataka, India

Document No.: GA/710/PTS/HYD CYL/TWMP-T90/1104

Date: 19 Feb 2021

***Procurement Technical Specification
of
Hydraulic Lift Cylinders
for
TWMP T90 Mine Plough Project***

Approved	19.02.2021	SUNDAR RAJ K
Reviewed	18.02.2021	MADHUSUDHAN BH
Checked	17.02.2021	SETHU MADHAVAN SK
Prepared	16.02.2021	RAGHURAM K
	Date	Name

Revision Details

Rev. No.	Page	Details		Date
		From	To	

CONTENTS

Sl. No.	DESCRIPTION	PAGE NO.
1	INTRODUCTION	05
2	REQUIREMENT SPECIFICATION	05
3	SCOPE OF WORK	08
4	SCOPE OF SUPPLY & DELIVERABLES	09
5	PACKAGING	09
6	OTHER TERMS AND CONDITIONS	10

Note:

This document is restricted proprietary document not to be shared to any firm or organization without prior permission from BEML LTD.

1. INTRODUCTION

Hydraulic System will drive hydraulic lift cylinders. Hyd. Pump will supply the hydraulic oil to the hydraulic lift Cylinders at rated pressure by drawing the oil at atmospheric pressure from the hydraulic tank.

Lift cylinder will be hydraulically actuated from the stowed position to deployed position with the help of hydraulic lift cylinders equipped with suitable control valves.

This document explains the technical specification requirement for Hydraulic lift cylinders and parts.

2. REQUIREMENT SPECIFICATION

Manufacturing, Testing and Supply of Hydraulic Lift Cylinders for the following specifications. Cylinder quantity per equipment is 2 no's.

i) Specifications:

The Hydraulic Lift cylinder design shall be meeting the specification parameters indicated below:

Hydraulic Lift cylinder requirements	
Type	Double acting Cylinder with Trunion mounting provision
Bore Diameter, mm	80
Piston rod diameter, mm	56
Open centre Distance, mm	780
Closed centre Distance, mm	419
Stroke, mm	361
Oil used	OM 15 / Equivalent
Max system Pressure, bar	Working Pressure 200 BAR Relief Pressure 275 BAR
Port Size, A & B	G 3/8 in BSPP
Test point size, A & B	G 3/8 in BSPP

Table 1: Hydraulic Lift cylinder requirements

The supplier shall finalize the Cylinder details and obtain approval from BEML before manufacturing. Supplier should share the detailed part level and assembly level drawings for BEML approval. BEML will hold the IP rights for design of hydraulic lift cylinder. Prior to receipt of PO, Supplier has to sign NDA & NCA.

ii) Overview of Hydraulic lift cylinder

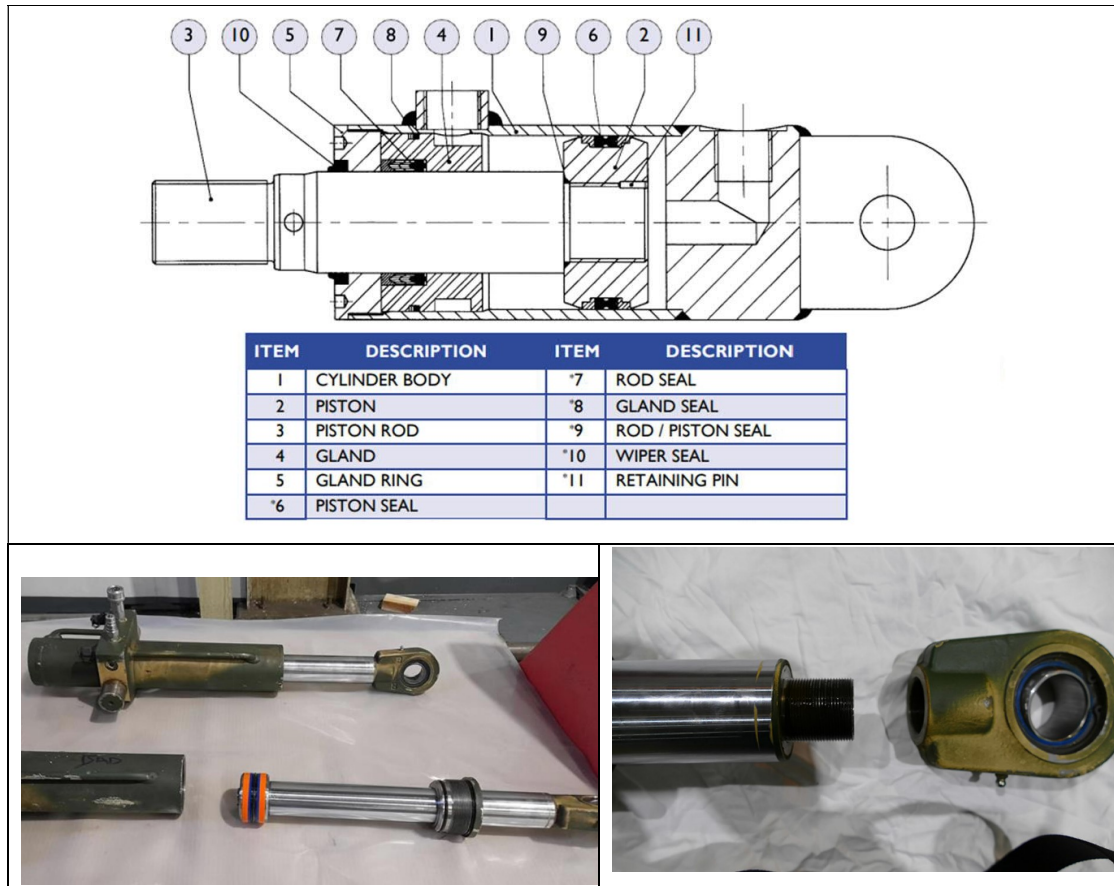


Table 1a: Overview of Hydraulic lift cylinder

iii) Material Specifications:

The material listed below shall be used for the development. However for any deviation in the material or usage of alternate material, prior approval to be taken from BEML.

i. **Barrel / Tube:** (material yield strength to be min. 450 MPa)

- Mandrel drawn Stress Relieved tubing conforming to ASTM A 513 SAE 1026 or Equivalent.
- Tube ID – surface finish < 0.4 Ra with Honing finish.

ii. **Piston rod:** (material yield strength to be min. 498 MPa)

- a. Rod material 20MnV6 hard chrome plated with minimum thickness of 38 microns to be deposited in multiple layers.
- b. Supplier has to submit the samples of salt spray test with test certificate as per ISO 9226:2012 to ensure the chrome plating strength.

iii. **Piston:**

- a. C45 IS: 1570 or Equivalent.

iv. **End plates:**

- a. Closed forged and machined C45 IS: 1570

v. **Piston, Rod Seals, O-Rings & Backup rings:**

- a. Reputed make like NOK / Merkel / Parker / Hallite & SUPPLIER should share the seal drawings with BEML before assembly.
- b. Seals type: Reputed make, to be specified for application between -30 deg C to 120 deg C temperature range

vi. **Fasteners:**

High tensile Hex / Socket head cap screws 10.9 / 12.9 grade from reputed make like TVS / UNBRAKO

vii. **Bearings:**

Maintenance free Spherical Bearings with SKF / ELGES / IKO / LS make as per standards. SUPPLIER has to share the drawings for approval before assembly.

viii. Cylinder Eye End:

As per the technical requirement the cylinder eye end shall consist of spherical bearing with details as mentioned below.


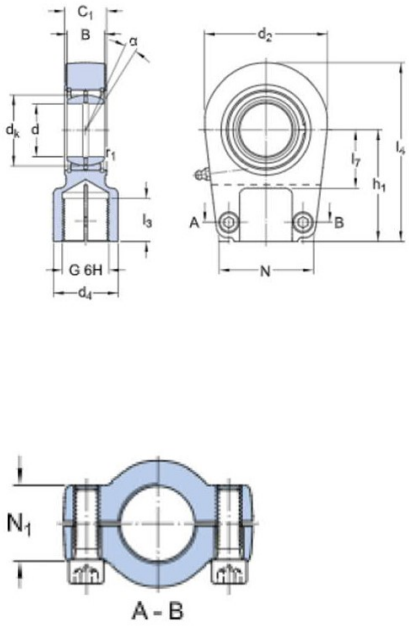
	<p>Cylinder EYE SIR 40 ES</p>																														
<p>DIMENSIONS</p> <table border="1"> <tbody> <tr><td>d</td><td>40 mm</td></tr> <tr><td>d₂</td><td>max. 96 mm</td></tr> <tr><td>B</td><td>28 mm</td></tr> <tr><td>G</td><td>M 35x1.5</td></tr> <tr><td>C₁</td><td>max. 35.5 mm</td></tr> <tr><td>h₁</td><td>85 mm</td></tr> <tr><td>α</td><td>7 °</td></tr> <tr><td>d_k</td><td>53 mm</td></tr> <tr><td>d₄</td><td>max. 50.5 mm</td></tr> <tr><td>l₃</td><td>min. 36 mm</td></tr> <tr><td>l₄</td><td>max. 136 mm</td></tr> <tr><td>l₇</td><td>min. 44 mm</td></tr> <tr><td>N</td><td>max. 76 mm</td></tr> <tr><td>N₁</td><td>max. 35.5 mm</td></tr> <tr><td>r₁</td><td>min. 0.6 mm</td></tr> </tbody> </table>	d	40 mm	d ₂	max. 96 mm	B	28 mm	G	M 35x1.5	C ₁	max. 35.5 mm	h ₁	85 mm	α	7 °	d _k	53 mm	d ₄	max. 50.5 mm	l ₃	min. 36 mm	l ₄	max. 136 mm	l ₇	min. 44 mm	N	max. 76 mm	N ₁	max. 35.5 mm	r ₁	min. 0.6 mm	
d	40 mm																														
d ₂	max. 96 mm																														
B	28 mm																														
G	M 35x1.5																														
C ₁	max. 35.5 mm																														
h ₁	85 mm																														
α	7 °																														
d _k	53 mm																														
d ₄	max. 50.5 mm																														
l ₃	min. 36 mm																														
l ₄	max. 136 mm																														
l ₇	min. 44 mm																														
N	max. 76 mm																														
N ₁	max. 35.5 mm																														
r ₁	min. 0.6 mm																														

Table 1b: Cylinder eye end details

3. Acceptance Test Plan (ATP):

The following tests shall be conducted at the supplier's premises / NABL accredited Test Lab as per BEML standard IP1008-C or equivalent IS standard in presence BEML Quality Reps.

- Visual examination test
- Internal leakage test
- Packing drag test

iv. Proof pressure test

v. Load cycling test

Upon successful completion of Individual Cylinder Acceptance Test, the cylinders can be dispatched to BEML along with relevant test certificates and documents. Supplier has to submit Lift cylinder Acceptance Test Plan, Cylinder assemblies & sub-assemblies detailed drawings & Piston rod seal with groove details for BEML approval.

Further, the final acceptance of cylinder are subjected to performance testing of proto cylinders (2 no's) in BEML, R&D Lab at KGF.

4. SCOPE OF WORK

- i. Manufacture & Supply of Cylinder as per BEML Drawing to part number 710 SD 02019. Cylinder Fittings to part number 710HS00103 to be fitted and assembled on Cylinder to part number 710 SD 02019
- ii. The exact external mounting arrangements, dimensions, port size & type, pipes and locations shall be decided mutually and shall submit the technical compliance proposal against tender enquiry.
- iii. The manufacturing drawings along with Bill of material shall be submitted for BEML approval before take up for manufacturing.
- iv. Cylinder Testing & Acceptance: The supplier shall test the Cylinder for functioning as per the ATP (refer SI No.3). All the test reports & test certificates from NABL certified labs.

5. SCOPE OF SUPPLY & DELIVERABLES:

On receipt of PO, Supplier has to acknowledge and come out with an action plan for development and supply of the following cylinders with BEML P/Ns.

SL No.	Description	BEML P/N
1	Assy Hydraulic Lift Cylinder	710 SD 02019
2	Cylinder Fittings Assy	710 HS 00103

Table 2: Scope of Supply

1) Technical documents (Qty/ Set each)

- a) Design document including detailed drawings in 3D & 2D along with BOM.

- b) Technical Manuals covering parts catalogue, assembly & dismantling procedures, Special Maintenance tools (SMT's), Special Maintenance Equipment (STE's) etc., with Illustration.
- 2) Reports of the Factory Acceptance Test (FAT), test certificates, material certificates, results and check sheets for individual components & assemblies shall be provided along with the supply (NABL certified labs).
- 3) Two set of soft copies and hard copy of all above documents in English and all manufacturing drawings including seal kit to be provided.

5.1 DELIVERY SCHEDULE:

As per the terms & conditions mentioned in Purchase Order.

6. PACKAGING:

- 1. Deliverables of the Hydraulic cylinder assy. should be packed suitably.
- 2. The OEM shall provide all packing, crating and markings in accordance with the requirements. When handing over the complete set and the spare parts, special tools and testing equipment.
- 3. The OEM shall provide the instruction for proper storage, handling and logistic functions of components supplied by the OEM.
- 4. All items shall be labeled with the maker's name and the type and form of the piece or item, discrete serial number and rating, and the data of manufacture of the particular piece of equipment.

7. OTHER TERMS AND CONDITIONS

7.1 Warranty

Warranty: The material should be guaranteed for a minimum period of 24 Months from the date of commissioning or 30 months from the date of supply and defects if any arising out of faulty material, Design workmanship shall be replaced / rectified by bidder free of cost.

The OEM shall be responsible for any defect or failure of supplied aggregates, special tools, test and diagnostic equipment, maintenance and unit exchange spares due to defective design, material or workmanship.

The repair and/or replacement of failed components and installation of repaired/replaced components shall be taken by the OEM on his own charge at the Site (BEML' works, India).

The OEM shall bear all duties and taxes, freight charges and all other expenses involved in collection of defective components and equipment from the Site, and transportation to the manufacturer's works in India or abroad and its return to Site after repairs.

Further, OEM should do any design modification required to any components or equipment as a consequence of failure analysis and modification shall be carried out free of charge.

The OEM shall carry out all replacement and repairs under the warranty promptly and satisfactorily on notification of the defect by BEML immediately.

7.2 Materials and Workmanship

The OEM shall be responsible for meeting the requirement of constructional details, materials & workmanship. All materials and workmanship shall be in every respect in accordance with the proven up-to- date best practice.

All the components used in the construction of this supply shall be from fresh and present stock and not from older stocks. OEM shall provide necessary material certificate to this effect.

100% visual inspection of all components shall be carried out and the components/assemblies shall be free from any defect. Stage inspection to be carried out. All threaded fasteners should turn freely without jamming and to be lubricated wherever called for.

7.3PRODUCT SUPPORT:

The OEM shall be required to confirm that he is in a position to provide product support in terms of maintenance, material, and spares for a period of minimum 20 years from the date of supply. The OEM must provide at least 2 Years notice to BEML before closing the production line so as to enable “LIFE TIME BUY” of all the material & spares before closure of the production line. All upgrades & modifications carried out on the equipment during the life cycle must be intimated to buyer.
