

Restricted

Document No.: BEML/R&D/Torsion Bar/PTS/01

08th May 2020

***Procurement Technical Specification
of
Torsion Bar LH & RH for
BEML Tatra 6x6***



BEML LTD

Ministry of Defence (Govt. of India Undertaking)

R&D (Defence), Palakkad Complex,

Palakkad - , Kerala, India.

Document No.: BEML/R&D/Torsion Bar/PTS/01

***Procurement Technical Specification
of
Torsions Bar LH & RH for
BEML Tatra 6x6***

Approved by			
Checked by			
Prepared by			
	Name	Designation	Signature

CONTENTS

Sl. No.	DESCRIPTION	PAGE NO.
1	INTRODUCTION	05
2	PART NUMBERS	06
3	SPECIFICATION	06
4	TESTING ON THE PRODUCT	08
5	PACKAGING	10
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

BEML Tatra 6x6 vehicle fitted with Torsion Bar LH & RH used in suspension system for best mobility and vehicle comfort.

The front axle is sprung by two longitudinally mounted torsion bars 2 attached in the rear holder of torsion bars 1 (refer below Figure). The front part of the torsion bar is placed in the arm 3 of the torsion bar, which is connected to the half-axle using a pin and a hinge. When changing the length of the hinge, the wheel camber can be adjusted. The suspension is completed with two fluid double-acting telescopic shock absorbers 4.

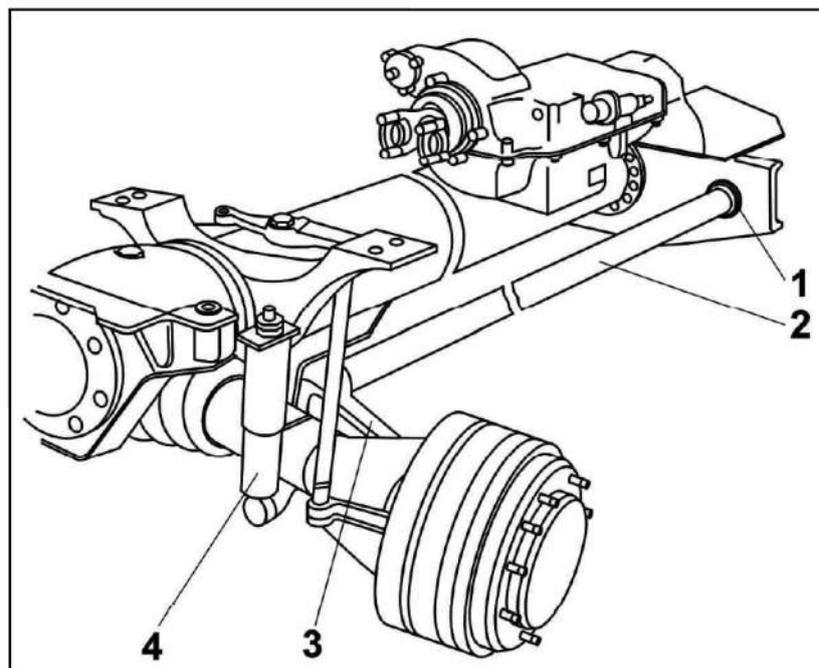


Fig. Suspension of the front axle

2. PART NUMBERS

a) Part No.: 130028660434 - Front Right Torsion Bar (ie: Torsions Bar RH)

- Imported item P/No: 442028660434

b) Part No.: 130028660444 - Front Left Torsion Bar (ie: Torsions Bar LH)

- Imported item P/No: 442028660444

3. SPECIFICATION

Specification as per drawing, product development and testing mentioned in this document should be satisfied and installation & evaluation of Torsions Bar on the Vehicle should be satisfactory.

3.1. Material Specification:

- Shaft Raw material: 39Ni2Cr

3.2. Acceptance Quality Plan:

S.N O.	OPERATION DESCRIPTION	REFERENCE DOCUMEN T	ACCEPTED STANDARD	INSPECTED BY		QUANTUM	REMARKS
				S.I.	T.P.		
1.	VERIFICATION OF RAW MATERIAL		AS PER DRAWING	N	Y	100%	
2.	ROUGH MACHNING/ DRILLING/ TAPPING	DRAWING	DRAWING	Y	N	100%	
3.	HEAT TREATMENT/ HARDENING, TEMPERING	DRAWING	DRAWING	Y	N		HEAT TREATMENT REPORT TO BE FORWARDED
4.	STRAIGHTENING	DRAWING	DRAWING	Y	N	100%	TO BE CHECKED ON FIXTURE
5.	FINAL MACHNING WITH BURNISHING MARGIN	DRAWING	DRAWING	Y	N	100%	

6.	SPLINE ROLLING	DRAWING	DRAWING	Y	N	100%	TO BE CHECKED WITH SPLINE ROLLING GAUGE
7.	BURNISHING	DRAWING	DRAWING /P.O.	Y	Y	100%	DONE BY M.P.I/D.P. TEST
8.	MACHINING INSPECTION	DRAWING	DRAWING	Y	N	100%	
9.	RUBBERIZING	DRAWING	DRAWING	Y	Y	100%	Adhesive to be applied thoroughly throughout the marked surface of Torsion Bar and winding to be carried out without any air gap of the torsion bar surface in the marked area
10.	FINAL INSPECTION DIMENSION/ HARDENESS	DRAWING	DRAWING	Y	N	100%	DIMENSION REPORT TO BE FORWARDED
11.	PACKING/ DESPATCH	PURCHASE ORDER	PURCHASE ORDER	Y	N	100%	Both ends of spline area to be properly applied ¹ grease (of film thickness 0.5 mm) protected from corrosion after machining and protective cover to be provided

3.3 Description detail of the quality assurance plan which will process the torsion bar

- a) Centering- It is the initial process which is to be done on the machine
- b) Rough Machining- It will be done leaving margins for finish machining and burnishing, after heat treatment.
- c) Hardening & Tempering- Heat treatment process will be done in the furnace by hanging the rod inside the furnace keeping the required temperature hours and tempering temperature hours, to reach the hardness of 46-51HRC.
- d) Straightening- Straightening process will be done to achieve the straightness deviation of not more than ± 1.5 mm over the entire length. Checking of straightening will be checked on Fixture. We will check the straightening deviation by keeping the dial gauge on a torsion bar, moving in the circular motion.

- e) Finish Machining- After straightening process, finish machining will be processed.
- f) Spline rolling- Spline rolling will be done on machine with spline rolling machine to achieve the profile of the splines, the required load will be given. Gauges for checking to be made available by the supply firm.
- g) Burnishing- Burnishing will be done with the roller bearing in order to achieve the surface smoothness upto 0.8
- h) Machining inspection- Inspection before the rubberizing will be done by the BEML QC in order to achieve the process of rubberizing.
- i) Rubberizing- Rubberizing will be done with the tape coated with rubber on one side and pasting gum on the other side in order to stick to the torsion bar.

NOTE: Process of *sand blasting* to be carried out.

3.4 List of tooling's/test which is to be done

- 1) Spline rolls.
- 2) Burnishing tool.
- 3) Deformation test fixture.
- 4) Straightening test fixture.
- 5) Deflection test

4. TESTING ON THE PRODUCT:

The following three numbers testing to be carried.

a) Straightening of Torsion Bar

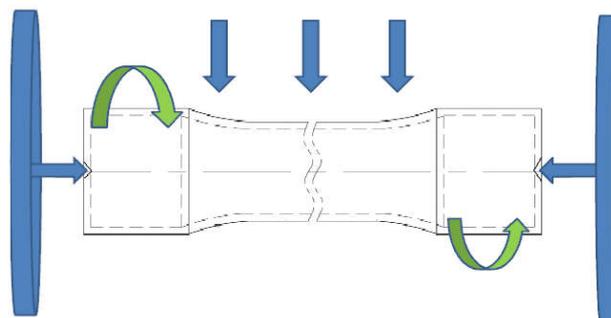


Fig (1): To straighten the torsion bar, we will put the load from top and keep checking straightening, by dial gauge, revolving the torsion.

b) Deformation check of Torsion Bar

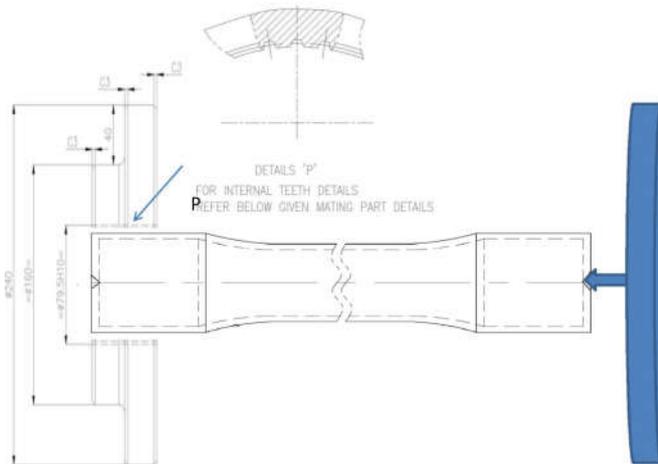
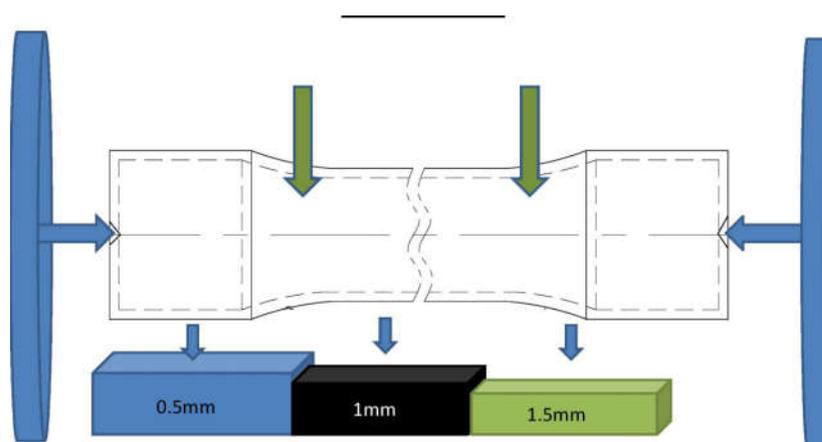


Fig (2): By holding with internal spline fixture mentioned in detail 'P', We will rotate the torsion bar, with a lever, till $38^{\circ}+1^{\circ}$ to check the deformation

c) Deflection Test



Fig(3): Put the load on torsion bar from top and will place a ladder cubes with mentioned height. When we press upto 0.5mm then it should come back 0.5mm and so on.

5. PACKAGING:

- i) Deliverables of the Torsion Bars should be packed suitably.
- ii) The OEM shall provide all packing, crating and markings in accordance with the requirements while handing over the order set.
- iii) The OEM shall provide the instruction for proper storage and data of manufacture of the particular piece of equipment.

6. OTHER TERMS AND CONDITIONS

6.1 Warranty

OEM shall provide warranty for a period of 12 months from the date of fitment on vehicle or 15 months after delivery, whichever comes first.

The OEM shall be responsible for any defect or failure of parts supplied or material or manufacturing the non-conformance or workmanship.

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

6.2 Materials and Workmanship

100% visual inspection of all components shall be carried out and the components shall be free from any defect.
