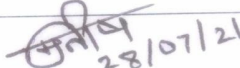
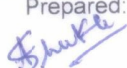
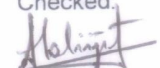


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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company	<u>SPECIFICATION FOR GENERAL STRUCTURAL STEEL FOR COMPONENTS OF 3PHASE TRACTION MOTOR TYPE 6FRA-6068 / 6FXA-7059</u>																				
	1.0 SCOPE :																				
	1.1 The material covered by this specification are required to be used in manufacture of 3-phase Traction Motor type 6FRA-6068 / 6FXA-7059. The material shall comply with this specification instructions in chemical composition, mechanical properties and all other listed requirements.																				
2.0 Governing Standard :																					
2.1 The material shall conform to IS: 2062 '92 Grade Fe 410 WB IS:2062-2011, Gr.250BR (Killed) or latest version.																					
3.0 Technical Requirement:																					
3.1 Chemical Composition: The chemical composition shall be generally specified in IS:2062 '92 Gr. Fe 410 WB IS:2062-2011, Gr.250BR (Killed) or latest version. The material when supplied shall have the following chemical composition.																					
<table border="1"> <thead> <tr> <th></th> <th></th> <th>Variation over the Max. specified limit in %</th> </tr> </thead> <tbody> <tr> <td>C</td> <td>0.22 (Max)</td> <td>0.02</td> </tr> <tr> <td>Mn</td> <td>1.50 (Max)</td> <td>0.05</td> </tr> <tr> <td>P</td> <td>0.045 (Max)</td> <td>0.005</td> </tr> <tr> <td>S</td> <td>0.045 (Max)</td> <td>0.005</td> </tr> <tr> <td>Si</td> <td>0.4 (Max)</td> <td>0.03</td> </tr> </tbody> </table>						Variation over the Max. specified limit in %	C	0.22 (Max)	0.02	Mn	1.50 (Max)	0.05	P	0.045 (Max)	0.005	S	0.045 (Max)	0.005	Si	0.4 (Max)	0.03
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3.2 Mechanical Properties :																					
3.2.1 Mechanical Properties Test : The mechanical properties shall be generally specified in IS:2062 '92 Gr. Fe 410 WB IS:2062-2011, Gr.250BR (Killed) or latest version. The material when supplied shall have the following mechanical properties.																					
Revision : 01 Date: 28/07/2021	Distribution TXM QMX TME TSD	Qty. 1 1 1 1	Approved :  28/07/21 (Manish Verma) Prepared:  (Abhishek Shukla) Checked:  (Abhijit Jain) Date 28.07.2021																		

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Tensile Strength	-	410 N/mm ² (min)
Yield Strength	-	<20mm(t) = 250N/mm ² (min) 20-40mm(t) = 240 N/mm ² (min) >40mm(t) = 230 N/mm ² (min)
Elongation	-	23%
Impact Strength	-	27 J
Bend test (Internal dia)	-	2t (min)

4.0 Test and Test Methods

4.1 Sampling :

The sampling for the tests shall be as follows :

Sl. No.	TESTS	No. of Samples for Test in Prototype Test	No. of Samples for Test in Routine Test
1	Dimension	100% of offered Qty.	20% of offered Qty.
2	Concentricity (If called in drawing)	-do-	-do-
3	Chemical analysis	2 nos. or 4% whichever is more, test piece from test coupon in each heat treatment batch.	2 nos. or 4% whichever is more, test piece from test coupon in each heat treatment batch.
4	Tensile Strength yield strength & Elongation %	-do-	-do-
5	Impact Test	2 nos. or 4% whichever is more, test piece from test coupon in each heat treatment batch.	2 nos. or 4% whichever is more, test piece from test coupon in each heat treatment batch.
6	Bend Test	-do-	-do-

4.2 Metallurgical test certificate for prototype and bulk supplies shall be from raw material manufacturer (Mill TC) / NABL approved laboratory.

4.3 Freedom from defects

4.3.1 All finished components shall be reasonably free from surface flows, laminations, rough / lagged and imperfect edges and all other harmful defects.

4.3.2 Minor surface defects may be removed by the manufacturer by grinding provided the thickness is not reduced locally by more than 4% below the minimum specified thickness.

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED It must not be used directly or indirectly in any way detrimental to the interest of the company	5.0 <u>Marking :</u> Each components shall be legibly marked with the following information. i) Grade of Steel ii) Number of identification mark, by which it can be traced from which metal it was made. iii) Manufacturer's name, Sl. No. and batch No. etc.		
	6.0 <u>Information for tenderer</u> 6.1 The tenderers shall study carefully the drawing and specifications before they submit their offers. 6.2 The tenderers shall note that BHEL do not undertake to supply drawings for jigs and fixtures, tooling's, templates and / or process sheets or any other such details. 7.0 <u>Deviations:</u> While submitting the offer the tenderer shall furnish a list of deviations, if any, from this specification / concerned drawing. 8.0 <u>Packing :</u> 8.1 The components shall be suitably packed to prevent transit / long storing damage. 8.2 The components shall coated with antirust varnish / compound after inspection. 8.3 Varnished components shall be wrapped in polythene paper followed by corrugated paper. 8.4 The wrapped components shall finally be sealed in the polythene bag. 8.5 The sealed components shall be finally packed in wooden box filled with saw dust to prevent transit damage of machined surface. 9.0 <u>Ultrasonic Test:</u> Supplier shall use ultrasonic tested plates before manufacturing the tension bars, cross piece and accessory bars. The plates shall be free from any internal harmful defects/ cracks. The test results/ records to be shown to the inspecting authority. However during prototype and routine test, ultrasonic test to be carried out on 100% offered quantity at firm's premises. The cost of such tests to be borne by the suppliers. Firm shall provide all facilities free of cost to the inspecting authority at his works. 10.0 <u>Reference:</u> This specification is equivalent to CLW's specification no. 4TMS.096.055 ALT.-5.		