Laboratory	**Bharat Forge Ltd.- Metallurgical Lab, Mundhwa, Pune, Maharashtra**
Accreditation Standard	**ISO/IEC 17025: 2005**
Certificate Number	**TC-6609** ***(in lieu of T-2114)*** **Page 1 of 2**
Validity	**21.12.2017 to 20.12.2019** **Last Amended on --**

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection

MECHANICAL TESTING

I.	**MECHANICAL PROPERTIES OF METALS**			
1.	**Metallic Material**	**Tensile Test**		
		0.2% Proof Stress	ASTM A 370-2017, ASTM E8 / E 8M -2016A, JIS Z 2241:2011, ISO 6892-1:2016, IS 1608:2005 (RA 2010)	2 kN to 250 kN load
		Ultimate Tensile Strength		
		% Elongation		5 % to 40 %
		% Reduction in Area		15 % to 80 %
		Charpy Impact	ASTM E 23 -2016B, JIS Z 2242 :2005, ISO 148 (Part 1): 2017 IS 1499:1977 (RA 2009)	2.5 J to 360 J -60 °C to +80 °C
		Izod Impact	BS131 (Part 1): 1961, IS 1598:1977 (RA 2009)	10 J to 150 J
		Brinell Hardness	ASTM E 10-2017, ISO 6506-1-2014, IS 1500 (Part 1): 2013	95 HBW to 650 HBW 10/3000
		Rockwell Hardness	ASTM E 18-2017, ISO-6508-1-2016, IS1586 (Part 1): 2012	20 HRA to 95 HRA 20 HRB to 100 HRB 20 HRC to 70 HRC 70 to 94 HR 15 N 42 to 86 HR 30 N 20 to 77 HR 45 N
		Micro Vickers Hardness	ASTM E 384 -2016 ISO 6507-1-2005	HV (0.5,1) Upto 1100 HV
		Effective Case Depth measurement	DIN EN 10328-2005 (By micro hardness method)	HV (0.5,1) Upto 6.0 mm

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
II.	**METALLOGRAPHY TEST**			
1.	**Metallic Material**	Grain Size Untwined Grains	ASTM E 112-2013 ISO 643:2015 (By Comparison method)	100 X (ASTM plate I & IV)
		Depth of Decarburized Layer	ASTM E1077-2014 SAE J 419-1983 (By Microscopic method) (By Hardness traverse method)	100 X 0.01 mm to 1.0 mm
		Inclusion rating	ASTME 45-2013 (Comparison Method), IS 4163:2004 ISO 4967-2013 (Comparison method)	100 X
		Macro etch	ASTM E381-2017	Qualitative
2.	**Ferrous Material, Aluminum Alloys & Titanium Alloys**	Microstructure Examination	ASM Hand Book Vol.9-2004 Atlas of Microstructure Vol.7, 8th edition 1972	50 X to 500 X

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