

Laboratory **Bansal Calibration Services, 49/39, Site-IV, Industrial Area Sahibabad, Ghaziabad, Uttar Pradesh**

Accreditation Standard **ISO/IEC 17025: 2005**

Certificate Number **TC-6455 (in lieu of T-2680 & T-2681)**

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Validity **14.10.2017 to 13.10.2019**

Last Amended on **30.10.2017**

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

I.	METALS & ALLOYS						
1.	Cast Iron	Carbon	ASTM E 1999:2011	1.9 % to 3.8 %			
		Silicon		0.15 % to 2.5 %			
		Manganese		0.03 % to 1.8 %			
		Chromium		0.25 % to 2.0 %			
		Molybdenum		0.01 % to 1.2 %			
		Nickel		0.02 % to 2.0 %			
		Copper		0.015 % to 0.75 %			
		Titanium		0.003 % to 0.12 %			
		Vanadium		0.008 % to 0.22 %			
		Magnesium		0.032 % to 0.04 %			
		Cerium		0.064 % to 0.08 %			
		2.			Carbon	ASTM E 415:2015	0.050 % to 1.2 %
					Silicon		0.050 % to 1.30 %
Manganese	0.050 % to 2.1 %						
Phosphorus	0.001 % to 0.08 %						
Sulphur	0.001 % to 0.07 %						
Aluminium	0.01 % to 0.150 %						
Chromium	0.026 % to 10.0 %						
Nickel	0.037 % to 4.10 %						
Molybdenum	0.004 % to 1.10 %						
Copper	0.022 % to 0.53 %						
Niobium	0.009 % to 0.05 %						
Titanium	0.0015 % to 0.015 %						
Vanadium	0.002 % to 0.250 %						
Boron	0.0002 % to 0.015						
Arsenic	0.002 % to 0.02 %						
Cobalt	0.005 % to 0.04 %						
Tin	0.003 % to 0.05 %						
Zirconium	0.002 % to 0.008 %						

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3.	Stainless Steel	Niobium	ASTM E 1086:2014	0.002 % to 0.085 %
		Carbon		0.010 % to 0.20 %
		Silicon		0.37 % to 1.20 %
		Manganese		0.01 % to 2.0 %
		Phosphorus		0.003 % to 0.050 %
		Sulphur		0.003 % to 0.20 %
		Chromium		10.0 % to 26 %
		Molybdenum		0.01 % to 3.07 %
		Nickel		0.30 % to 14.0 %
		Cobalt		0.005 % to 0.32 %
		Aluminium		0.004 % to 0.049 %
		Copper		0.008 % to 0.500 %
		Vanadium		0.0002 % to 0.050 %
4.		Titanium	ASTM E 1251:2011	0.0010 % to 0.150 %
		Boron		0.0010 % to 0.030 %
		Silicon		0.005 % to 17.0 %
		Iron		0.005 % to 1.0 %
		Copper		0.002 % to 2.86 %
		Manganese		0.005 % to 0.60 %
		Magnesium		0.001 % to 1.2 %
		Nickel		0.001 % to 1.80 %
		Zinc		0.001 % to 1.60 %
		Titanium		0.002 % to 0.25 %
		Cadmium		0.001 % to 0.005 %
		Cobalt		0.001 % to 0.02 %
		Lead		0.005 % to 0.14 %
5.		Tin		0.0055 % to 0.24 %
		Zinc		0.003 % to 40 %
		Lead		0.0003 % to 4.81 %
		Tin		0.005 % to 16.00 %
		Phosphorus		0.002 % to 0.30 %
		Manganese		0.005 % to 4.34 %
		Iron		0.007 % to 5.54 %

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		Nickel	SOP/OES-Cu/019	0.01 % to 30.61%
		Silicon	Issue No.1/ Dated 11.01.2013	0.008 % to 0.60 %
		Magnesium		0.001 % to 0.024 %
		Chromium		0.002 % to 1.28 %
		Antimony		0.0035 % to 0.05 %
		Bismuth		0.0006 % to 0.10 %
		Silver		0.0005 % to 0.04 %
		Cobalt		0.001 % to 0.55 %
		Aluminium		0.0005 % to 6.38 %
		Niobium		0.15 % to 0.18 %
		Cadmium		0.0010 % to 0.010 %
II.	PAINTS & SURFACE COATING			
1.		Zinc Mass Coating	IS 6745:1972 (RA 2006)	50 gm/m ² to 1000 gm/m ²
		Adhesion Test (Cross Hatch Test)	ISO 2409:2007	Qualitative Visual Observation
III.	CORROSION TESTS			
1.	Painted & Coated Products	Salt Spray Test	ASTM B-117: 2016 JIS Z 2371: 2000	Qualitative Visual Observation

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MECHANICAL TESTING

I. MECHANICAL PROPERTIES OF METALS				
1.	Metal & Alloys & HSD Steel Bar, Welded Plate, Pipe	Tensile Test Tensile Strength, Breaking Load Test Yield stress) / 0.2 % Proof Stress Elongation % Reduction of Area %	IS 1608:2005 (RA 2010) ASTM E-8, ASTM A-370:2017, ASME Sec.-IX:2013	50 N/mm ² to 1500 N/mm ² 40 N/mm ² to 1300 N/mm ² (2 kN to 200 kN/ 0.1 kN) (10 kN to 1000k N/ 0.1 kN) 2 % to 70 % 2 % to 80 % (1 mm to 200 mm/ 0.01 mm)
		Mass per meter	IS 1786:2008 (RA 2013)	0.5 kg/m to 8 kg/m (20 gm to 10 Kg/1gm) (1 mm to 1 Meter/1mm)
		Bend Test, Welded Guided Face, Root, Side Bend	IS:1599:2012, ASME Sec.-IX:2013	Mandrel Size: (4, 6, 8, 10, 12, 16, 20, 24, 36, 40, 48, 60, 100 mm)
		V notch Charpy Test (Up to -60°C)	IS 1757(pt-1)-2014 , ASTM E-23-12C, ASME Sec.-IX:2013	2 to 300 joules (1 to 20J/1J) (20 to 300J/2J)
		V notch Izod Test	IS:1598:1977(Re-2015)	2 to 168 Joules/2J
		Brinell Hardness Test	ASTM E 10-2017 ASTM A 370-2017 IS:1500(Pt-1)-2013	180 to 500 HBW10/3000 180 to 350 HBW5/750/ 0.001 mm
		Rockwell Hardness Test "B" at 100 kg Load "C" at 150 kg Load	ASTM E18-2016 IS:1586 (Pt-1) -2012	25 to 100 HRB/0.1 HRB 25 to 65 HRC/0.1HRC

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		Micro Hardness Vickers HV0.1 HV 0.3 HV0.5 HV1.0	ASTM E 384-11 IS1501 (Part 1): 2013	150 to 800 HV0.1/1HV 50 to 1500 HV0.3/1HV 200 to 850 HV0.5/1HV 90 to 850 HV1/1HV
		Vickers Hardness HV5, HV10		90 to 650 HV5/1HV 90 to 850 HV/1HV
		Flattening Test	IS 2328:2005	50 mm to 300 mm (Qualitative)
		Proof Load Test	IS 1367 (Part t 3 & Part 6): 2002, ISO 898-1:2009	M6, M8, M10, M12, M16, M20 & M24 (Qualitative)
II.	METALLOGRAPHY TEST			
1.	Steel & Alloy	Microstructure Steel & cast Iron,	ASTM Handbook Vol.9 IS 7757:1975	At magnification – Upto 600X/Visual Observation
		Ferrite Grain Size (Carbon Steel Products) Comparison Method	ASTM E -112-13 IS:4748-2009	ASTM No. 1 to 10/ Visual Observation
		Inclusion Rating (Steel Products)	ASTM E 45-2013 Method-A & IS 4163:2004	A,B,C & D Type Thin & Thick Visual Observation
		Case Depth (By Microscopic & Hardness measurement)	IS 6416:1988	0.10 mm to 5 mm / 0.001 mm
		Decarburization Depth by Microscopic Method (Steel Products)	IS 6396:2000	0.01 mm to 1 mm / 0.001 mm
		Macro etch Test (Steel Product)	ASTM E381-2001, IS 13015:1991, ASM Vol.-9	Qualitative

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		Plating Thickness, Paint Thickness on ferrous & Nonferrous metal	ASTM B 487-85(2013), (Microscopic Method)	3 µm to 100 µm Magnification – Upto 600X/Qualification
2.	Steel & Product	IGC (Intergranular Corrosion test) Practice-A Practice-E	ASTM A 262:15	Qualitative
		Pitting Corrosion Test (Method A)	ASTM G 48-11, ASTM G-28-2-2015	Qualitative

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