Laboratory	**Central Dockyard Laboratory, Naval Dockyard, Building No. 43, Naval Dockyard, Visakhapatnam, Andhra Pradesh**		
Accreditation Standard	**ISO/IEC 17025: 2005**		
Discipline	**Chemical Testing**	**Issue Date**	**29.02.2016**
Certificate Number	**T-1207**	**Valid Until**	**28.02.2018**
Last Amended on	**-**	**Page**	**1 of 4**

S. No.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
I.	**LUBRICANTS**			
1.	**Oils & lubricants**	'K' Viscosity	IS 1448 (Part 25): 1976 (RA 2002)	2.5 cSt to 362 cSt
		Water Content	IS 1448 (Part 40): 1987 (RA 2010)	0.05 % to 10 %
		Flash Point (PMCC)	IS 1448 (Part 21): 2012	Ambient to 170 °C
		Flash Point (COC)	IS 1448 (Part 69): 2013	80 °C to 300 °C
		Total Acid Number (TAN)	IS 1448 (Part 1/Sec I): 2002	(0.01 to 70) mgKOH/g
		Total Base Number (TBN)	IS 1448 (Part 1/Sec II): 2002	(1.0 to 20) mgKOH/g
		Wear Metal Analysis (Cu, Fe, Sn, Pb, Zn, Ag, Ca, Na, Si, Al, Cd, Mg, Ni, B, Cr, Mn, P, Ti, Ba, Mo, V)	ASTM D5185-05	1 mg/kg to 900 mg/kg
		Wear Debris Analysis	ISO 4406: 1999	Qualitative
		Mechanical Impurities	GOST 6370: 1983	0.01 % to 5 %
		Particulate matter in Hydraulic Fluid	Defence standard 05-46 / Issue. 2: 1982 / ISO 11500: 1997	NAS Code 0 to 12 of size Range: 5 µ to 100 µ ISO Code: 0 to 28 of size Range 4 µ to 14 µ
II.	**WATER**			
1.	**Coolants**	pH	IS 3025 (Part 11): 1983	1 to 14
		Chlorides	IS 3025 (Part 32): 1988	1 mg/l to 500 mg/l
		Total Hardness	IS 3025 (Part 21): 1983	1 mg/l to 500 mg/l

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2.	**De Mineral Water**	pH	IS 3025 (Part 11): 1983	1 to 14
		Chlorides	IS 3025 (Part 32): 1988	1 mg/l to 10 mg/l
		Total Hardness	IS 3025 (Part 21): 1983	1 mg/l to 15 mg/l
		Specific conductivity	IS 3025 (Part 14): 1983	1 µS/cm to 200 µS/cm
III.	**PAINTS & SURFACE COATING**			
1.	**Paints & Enamels**	Volatile Matter	IS 101 (Part 2/Sec II): 1987 (RA 2001)	20 % to 40 %
		Wt. in Kg / 10lt.	IS 101 (Part 1/Sec VII): 1987 (RA 1999)	9 kg/10 l to 14 kg/10 l
		Consistency	IS 3944: 1982 (RA 2000)	30 s to 120 s
		Flexibility & Adhesion (Bend test)	IS 101 (Part 5/Sec II): 1987 (RA 1999)	Indicative
		Resistance to Sea Water	IS 101 (Part 7/Sec I): 1989	Indicative
		Resistance to Sea Water (Salt Spray)	IS 101 (Part 6/Sec I): 1988 (RA 2000)	Indicative
		Colour	IS 5: 1999 (RA 2000) IS 101 (Part 4/Sec 2): 1989	Comparison
		Flash Point	IS 101 (Part 1/Sec VI): 1987 (RA 1999)	20 °C to 50 °C
IV.	**METALS & ALLOYS**			
1.	**Copper & Its alloy**	Tin Lead Zinc	ND(V)/CDL/TMV/4500/01 Issue. 01 Dated. 21-02-2014	0.01 % to 10 % 0.01 % to 15 % 0.01 % to 40 %

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	Copper & Its alloy	Phosphorous	ND(V)/CDL/TMV/4500/01	0.01 % to 1 %
		Manganese	Issue. 01 Dated. 21-02-2014	0.01 % to 5.5 %
		Magnesium		0.001 % to 0.15 %
		Iron		0.01 % to 6.0 %
		Nickel		0.01 % to 33.0 %
		Silicon		0.01 % to 6.0 %
		Aluminium		0.01 % to 11 %
		Titanium		0.001 % to 1.3 %
		Arsenic		0.001 % to 0.2 %
		Sulphur		0.01 % to 0.2 %
		Bismuth		0.01 % to 2 %
		Chromium		0.01 % to 0.19 %
2.	**Aluminium & Its Alloys**	Silicon	ASTM E 1251: 2011	0.01 % to 20.00 %
		Iron		0.01 % to 4.00 %
		Copper		0.01 % to 0.50 %
		Manganese		0.01 % to 5 %
		Magnesium		0.01 % to 10 %
		Chromium		0.001 % to 0.5 %
		Nickel		0.01 % to 2.8 %
		Zinc		0.01 % to 9 %
		Titanium		0.001 % to 1.0 %
		Lead		0.001 % to 1.8 %
		Tin		0.01 % to 2.0 %
		Vanadium		0.001 % to 0.15 %
		Zirconium		0.001 % to 0.30 %
3.	**Titanium & Its alloys**	Aluminium	ND(V)/CDL/TMV/4500/02	1.1 % to 8.1 %
		Tin	Issue. 01 Dated. 03-07-2015	0.001 to 11.1 %
		Zirconium		0.001 to 2.0 %
		Molybdenum		0.001 to 5.0 %
		Vanadium		0.01 to 5.6 %
		Carbon		0.001 to 0.04 %
		Chromium		0.001 to 3.0 %
		Nickel		0.01 to 0.6 %
		Iron		0.01 to 3.1 %

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	Titanium & Its alloys	Copper	ND(V)/CDL/TMV/4500/02	0.01 to 1.0 %
		Manganese	Issue. 01 Dated. 03-07-2015	0.01 to 6.0 %
		Silicon		0.01 to 0.6 %
4.	**Low alloy steel**	Carbon	IS 8811: 1998	0.05 % to 1.5 %
		Silicon		0.08 % to 1.7 %
		Manganese		0.15 % to 2.5 %
		Sulphur		0.003 % to 0.12 %
		Phosphorus		0.005 % to 0.08 %
		Chromium		0.08 to 5.5 %
		Nickel		0.01 % to 6.5 %
		Molybdenum		0.15 % to 1.4 %
		Copper		0.15 % to 0.80 %
		Vanadium		0.004 % to 0.80 %
		Titanium		0.05 % to 0.80 %
5.	**Austenitic Stainless Steel**	Carbon	IS 9879: 1998	0.002 % to 1.70 %
		Silicon		0.005 % to 4.00 %
		Manganese		0.001 % to 19.00 %
		Sulphur		0.005 % to 0.10 %
		Phosphorus		0.001 % to 0.07 %
		Chromium		6.00 % to 30.00 %
		Nickel		1.5 % to 22.00 %
		Molybdenum		0.005 % to 3.00 %
		Copper		0.5 % to 8.00 %
		Vanadium		0.005 % to 0.90 %
		Titanium		0.001 % to 0.45 %
		Niobium		0.08 % to 2.80 %
		Aluminum		0.001 % to 0.045 %
		Tungsten		0.02 % to 0.50 %

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