



National Accreditation Board for Testing and Calibration Laboratories

(A Constituent Board of Quality Council of India)



SCOPE OF ACCREDITATION

Laboratory Name ADVANCE METALLURGICAL SERVICES, A1-265/12 , BANK OF BARODA LANE, VADODARA, GUJARAT, INDIA

Accreditation Standard ISO/IEC 17025:2017

Certificate Number TC-5651 Page No. : 1 / 21

Validity 24/04/2019 to 23/04/2021 Last Amended on 29/04/2019

| S.No | Discipline / Group | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing/ Limits of Detection |
|---------------------------|---------------------------|----------------------------|-------------------------|---|---------------------------------------|
| Permanent Facility | | | | | |
| 1 | CHEMICAL- METALS & ALLOYS | Aluminium & its Alloys | Bismuth (Bi) | ASTM E1251: 2017 | 0.03 % to 0.40 % |
| 2 | CHEMICAL- METALS & ALLOYS | Aluminium & its Alloys | Chromium (Cr) | IS 11035:1984 (Reaffirmed 2010) / ASTM E1251: 2017 | 0.03 % to 0.30 % |
| 3 | CHEMICAL- METALS & ALLOYS | Aluminium & its Alloys | Copper (Cu) | IS 11035:1984 (Reaffirmed 2010) / ASTM E1251: 2017 | 0.2 % to 5.5 % , 0.2 % to 6.0 % |
| 4 | CHEMICAL- METALS & ALLOYS | Aluminium & its Alloys | Iron (Fe) | IS 11035:1984 (Reaffirmed 2010) / ASTM E1251: 2017 | 0.03 % to 1.0 %,0.3 % to 0.5 % |
| 5 | CHEMICAL- METALS & ALLOYS | Aluminium & its Alloys | Lead (Pb) | ASTM E1251: 2017 | 0.08 % to 0.2 % |
| 6 | CHEMICAL- METALS & ALLOYS | Aluminium & its Alloys | Magnesium (Mg) | IS 11035:1984 (Reaffirmed 2010) / ASTM E1251: 2017 | 0.09 % to 1.2 %,0.1 % to 1.2 % |
| 7 | CHEMICAL- METALS & ALLOYS | Aluminium & its Alloys | Manganese (Mn) | IS 11035:1984 (Reaffirmed 2010) / ASTM E1251: 2017 | 0.1 % to 0.8 % |
| 8 | CHEMICAL- METALS & ALLOYS | Aluminium & its Alloys | Nickel (Ni) | ASTM E1251: 2017 | 0.010 % to 0.50 % |
| 9 | CHEMICAL- METALS & ALLOYS | Aluminium & its Alloys | Tin (Sn) | ASTM E1251: 2017 | 0.01 % to 0.20 % |
| 10 | CHEMICAL- METALS & ALLOYS | Aluminium & its Alloys | Titanium (Ti) | IS 11035:1984 (Reaffirmed 2010) / ASTM E1251: 2017 | 0.010 % to 0.25 % ,0.10 % to 0.15 % |



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| 11 | CHEMICAL- METALS & ALLOYS | Aluminium & its Alloys | Zinc (Zn) | IS 11035:1984 (Reaffirmed 2010) / ASTM E1251: 2017 | 0.010 % to 0.25 % |
| 12 | CHEMICAL- METALS & ALLOYS | Carbon Steel (low carbon, medium carbon & high carbon steel | Aluminum (Al) | ASTM E 415-2017 / IS 8811-1998: 2018 | 0.01 % to 0.05 % |
| 13 | CHEMICAL- METALS & ALLOYS | Carbon Steel (low carbon, medium carbon & high carbon steel | Boron (B) | ASTM E 415-2017 / IS 8811-1998: 2018 | 0.005 % to 0.008 % |
| 14 | CHEMICAL- METALS & ALLOYS | Carbon Steel (low carbon, medium carbon & high carbon steel | Carbon (C) | ASTM E 415-2017 / IS 8811-1998: 2018 | 0.02 % to 1.59 % |
| 15 | CHEMICAL- METALS & ALLOYS | Carbon Steel (low carbon, medium carbon & high carbon steel | Chromium (Cr) | ASTM E 415-2017 / IS 8811-1998: 2018 | 0.02 % to 1.40 % |
| 16 | CHEMICAL- METALS & ALLOYS | Carbon Steel (low carbon, medium carbon & high carbon steel | Copper (Cu) | ASTM E 415-2017 / IS 8811-1998: 2018 | 0.09 % to 0.5 % |
| 17 | CHEMICAL- METALS & ALLOYS | Carbon Steel (low carbon, medium carbon & high carbon steel | Manganese (Mn) | ASTM E 415-2017 / IS 8811-1998: 2018 | 0.2 % to 1.50 % |
| 18 | CHEMICAL- METALS & ALLOYS | Carbon Steel (low carbon, medium carbon & high carbon steel | Molybdenum (Mo) | ASTM E 415-2017 / IS 8811-1998: 2018 | 0.03 % to 0.5 % |
| 19 | CHEMICAL- METALS & ALLOYS | Carbon Steel (low carbon, medium carbon & high carbon steel | Nickel (Ni) | ASTM E 415-2017 / IS 8811-1998: 2018 | 0.07 % to 3.50 % |
| 20 | CHEMICAL- METALS & ALLOYS | Carbon Steel (low carbon, medium carbon & high carbon steel | Niobium (Nb) | ASTM E 415-2017 / IS 8811-1998: 2018 | 0.001 % to 0.100 % |



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| 21 | CHEMICAL- METALS & ALLOYS | Carbon Steel (low carbon, medium carbon & high carbon steel | Nitrogen (N) | ASTM E 415: 2018 | 0.010 % to 0.02 % |
| 22 | CHEMICAL- METALS & ALLOYS | Carbon Steel (low carbon, medium carbon & high carbon steel | Phosphorus (P) | ASTM E 415-2017 / IS 8811-1998: 2018 | 0.009 % to 0.1 % |
| 23 | CHEMICAL- METALS & ALLOYS | Carbon Steel (low carbon, medium carbon & high carbon steel | Silicon (Si) | ASTM E 415-2017 / IS 8811-1998: 2018 | 0.03 % to 1.50 % |
| 24 | CHEMICAL- METALS & ALLOYS | Carbon Steel (low carbon, medium carbon & high carbon steel | Sulphur (S) | ASTM E 415-2017 / IS 8811-1998: 2018 | 0.005 % to 0.05 % , 0.007 % to 0.5 % |
| 25 | CHEMICAL- METALS & ALLOYS | Carbon Steel (low carbon, medium carbon & high carbon steel | Vanadium (V) | ASTM E 415-2017 / IS 8811-1998: 2018 | 0.003 % to 0.3 % , 0.001 % to 0.25 % |
| 26 | CHEMICAL- METALS & ALLOYS | Copper & its Alloys | Aluminum (Al) | BS EN 15079: 2015 | 0.010 % to 0.25 % |
| 27 | CHEMICAL- METALS & ALLOYS | Copper & its Alloys | Antimony (Sb) | BS EN 15079: 2015 | 0.03 % to 0.15 % |
| 28 | CHEMICAL- METALS & ALLOYS | Copper & its Alloys | Arsenic (As) | BS EN 15079: 2015 | 0.010 % to 0.250 % |
| 29 | CHEMICAL- METALS & ALLOYS | Copper & its Alloys | Bismuth (Bi) | BS EN 15079: 2015 | 0.010 % to 0.100 % |
| 30 | CHEMICAL- METALS & ALLOYS | Copper & its Alloys | Cobalt (Co) | BS EN 15079: 2015 | 0.010 % to 0.03 % |
| 31 | CHEMICAL- METALS & ALLOYS | Copper & its Alloys | Iron (Fe) | BS EN 15079: 2015 | 0.010 % to 0.40 % |
| 32 | CHEMICAL- METALS & ALLOYS | Copper & its Alloys | Lead (Pb) | BS EN 15079: 2015 | 0.06 % to 11.0 % |



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| 33 | CHEMICAL- METALS & ALLOYS | Copper & its Alloys | Manganese (Mn) | BS EN 15079: 2015 | 0.005 % to 0.02 % |
| 34 | CHEMICAL- METALS & ALLOYS | Copper & its Alloys | Nickel (Ni) | BS EN 15079: 2015 | 0.02 % to 0.07 % |
| 35 | CHEMICAL- METALS & ALLOYS | Copper & its Alloys | Phosphorous (P) | BS EN 15079: 2015 | 0.007 % to 0.30 % |
| 36 | CHEMICAL- METALS & ALLOYS | Copper & its Alloys | Silicon (Si) | BS EN 15079: 2015 | 0.010 % to 0.25 % |
| 37 | CHEMICAL- METALS & ALLOYS | Copper & its Alloys | Tin (Sn) | BS EN 15079: 2015 | 1.50 % to 12.0 % |
| 38 | CHEMICAL- METALS & ALLOYS | Copper & its Alloys | Zinc (Zn) | BS EN 15079: 2015 | 0.12 % to 34.0 % |
| 39 | CHEMICAL- METALS & ALLOYS | Nickel & its Alloys | Aluminum (Al) | ASTM E3047: 2016 | 0.02 % to 0.2 % |
| 40 | CHEMICAL- METALS & ALLOYS | Nickel & its Alloys | Carbon (C) | ASTM E3047: 2016 | 0.08 % to 0.20 % |
| 41 | CHEMICAL- METALS & ALLOYS | Nickel & its Alloys | Chromium | ASTM E3047: 2016 | 15.92 % to 22.44 % |
| 42 | CHEMICAL- METALS & ALLOYS | Nickel & its Alloys | Cobalt (Co) | ASTM E3047: 2016 | 0.03 % to 1.5 % |
| 43 | CHEMICAL- METALS & ALLOYS | Nickel & its Alloys | Copper (Cu) | ASTM E3047: 2016 | 0.010 % to 34.0 % |
| 44 | CHEMICAL- METALS & ALLOYS | Nickel & its Alloys | Iron (Fe) | ASTM E3047: 2016 | 1.8 % to 20.0 % |
| 45 | CHEMICAL- METALS & ALLOYS | Nickel & its Alloys | Manganese (Mn) | ASTM E3047: 2016 | 0.4 % to 1.5 % |
| 46 | CHEMICAL- METALS & ALLOYS | Nickel & its Alloys | Molybdenum (Mo) | ASTM E3047: 2016 | 0.010 % to 40.00 % |



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| 47 | CHEMICAL- METALS & ALLOYS | Nickel & its Alloys | Silicon (Si) | ASTM E3047: 2016 | 0.02 % to 0.5 % |
| 48 | CHEMICAL- METALS & ALLOYS | Stainless Steels & its Alloy | Carbon (C) | IS:9879-1998(RA2015) / ASTM E 1086: 2014 | 0.010 % to 0.350 % |
| 49 | CHEMICAL- METALS & ALLOYS | Stainless Steels & its Alloy | Chromium (Cr) | IS:9879-1998(RA2015) / ASTM E 1086: 2014 | 5.0 % to 25.0 % , 17.0 % to 26.0 % |
| 50 | CHEMICAL- METALS & ALLOYS | Stainless Steels & its Alloy | Copper (Cu) | IS:9879-1998(RA2015) / ASTM E 1086: 2014 | 0.05 % to 1.8 % , 0.02 % to 0.3 % |
| 51 | CHEMICAL- METALS & ALLOYS | Stainless Steels & its Alloy | Manganese (Mn) | IS:9879-1998(RA2015) / ASTM E 1086: 2014 | 0.2 % to 5.0 % ,0.2 % to 2.2 % |
| 52 | CHEMICAL- METALS & ALLOYS | Stainless Steels & its Alloy | Molybdenum (Mo) | IS:9879-1998(RA2015) / ASTM E 1086: 2014 | 0.2 % to 3.0 % ,0.01 % to 3.0% |
| 53 | CHEMICAL- METALS & ALLOYS | Stainless Steels & its Alloy | Nickel (Ni) | IS:9879-1998(RA2015) / ASTM E 1086: 2014 | 2.0 % to 16.0 % , 7.5 % to 16.0 % |
| 54 | CHEMICAL- METALS & ALLOYS | Stainless Steels & its Alloy | Nitrogen (N) | IS 228 part 23: 2014 | 0.015 % to 0.10 % |
| 55 | CHEMICAL- METALS & ALLOYS | Stainless Steels & its Alloy | Phosphorus (P) | IS:9879-1998(RA2015) / ASTM E 1086: 2014 | 0.01 % to 0.1 % ,0.01 % to 0.2 % |
| 56 | CHEMICAL- METALS & ALLOYS | Stainless Steels & its Alloy | Silicon (Si) | IS:9879-1998(RA2015) / ASTM E 1086: 2014 | 0.2 % to 0.8 % , 0.2 % to 1.0 % |
| 57 | CHEMICAL- METALS & ALLOYS | Stainless Steels & its Alloy | Sulphur (S) | IS:9879-1998(RA2015) / ASTM E 1086: 2014 | 0.005 % to 0.025 %0.005 % to 0.08 % |



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| 58 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Ferrous & its Alloys | % Elongation | IS:1608 / ASTM A/SA-370/ ASTM E8/8M/ BS EN ISO 6892(Part-1)/ ASME Sec.IX/ ASTM B557/ IBR REG 1950 AND:2015/ IS-3600(Part-1)/ IS-3600(Part-2)/ IS-3600(Part-3)/ IS-3600(Part-4)/ DIN EN ISO 15614(Part-1&2)/ JISZ-2201/ EN ISO-5178/ EN ISO-4136/ AWS D1.1/ D1.1M/ API-1104/ GOST:1497/ BS EN 10002(Part- 1)/ API 5L:2013/ IS 7307/ IS 7310/ EN 895/ IS:2825/ IS 1865/ IS 1786: 2014 | 1 % to 80 % |



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|------|--|----------------------------|---|---|--|
| 59 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Ferrous & its Alloys | %Reduction of Area , Modulus of Elasticity | IS:1608 / ASTM A/SA-370/ ASTM E8/8M/ BS EN ISO 6892(Part-1)/ ASME Sec.IX/ ASTM B557/ IBR REG 1950 AND:2015/ IS-3600(Part-1)/ IS-3600(Part-2)/ IS-3600(Part-3)/ IS-3600(Part-4)/ DIN EN ISO 15614(Part-1&2)/ JISZ-2201/ EN ISO-5178/ EN ISO-4136/ AWS D1.1/ D1.1M/ API-1104/ GOST:1497/ BS EN 10002(Part- 1)/ API 5L:2013/ IS 7307/ IS 7310/ EN 895/ IS 2825/ IS 1865/ IS 1786: 2014 | 1 % to 80 % |
| 60 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Ferrous & its Alloys | Bend Test | IS:1599/IS:1239/ IS:2329/AWS D1.1/IBR REG 1950 AND:2015/ ASME Sec.IX/ ASTM A /SA-370/ DIN EN ISO 15614(Part-1&2)/ ASTM E190/ ASTM E290/ ISO-5173/ API-1104/ API 5L/IS3600(Part-5)/ IS-3600(Part-6)/ IS-7307/ IS-7310/ ISO 7438/ ASTM A262: 2014 | Qualitative(Maximum Applied Load :400 kN(Mandrel Diameter:4 ,8,10, 12,16, 20 ,24, 3,2,38.1, 40 ,48, 50,60, 90 mm)) |



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| 61 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Ferrous & its Alloys | Tensile Test | IS:1608 / ASTM A/SA-370/ ASTM E8/8M/ BS EN ISO 6892(Part-1)/ ASME Sec.IX/ ASTM B557/ IBR REG 1950 AND:2015/ IS-3600(Part-1)/ IS-3600(Part-2)/ IS-3600(Part-3)/ IS-3600(Part-4)/ DIN EN ISO 15614(Part-1&2)/ JISZ-2201/ EN ISO-5178/ EN ISO-4136/ AWS D1.1/ D1.1M/ API-1104/ GOST:1497/ BS EN 10002(Part- 1)/ API 5L:2013/ IS 7307/ IS 7310/EN 895/ IS 2825/ IS 1865/ IS 1786: 2014 | 0.02 kN to 380 kN |



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|------|--|---|--|---|---|
| 62 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Ferrous & its Alloys | Yield Stress , 0.2% , 0.5% , 1.0% proof Stress | IS 1608 / ASTM A/SA- 370/ ASTM E8/8M/ BS EN ISO 6892(Part-1)/ ASME Sec.IX/ ASTM B557/ IBR REG 1950 AND:2015/ IS- 3600(Part-1)/ IS- 3600(Part-2)/ IS- 3600(Part-3)/ IS- 3600(Part-4)/ DIN EN ISO 15614(Part-1&2)/ JISZ-2201/ EN ISO- 5178/ EN ISO-4136/ AWS D1.1/ D1.1M/ API- 1104/ GOST-1497/BS EN 10002(Part- 1)/ API 5L:2013/ IS 7307/ IS 7310/ EN 895/ IS:2825/ IS 1865/ IS 1786: 2014 | 10 MPa to 1300 MPa |
| 63 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Ferrous base Material , Alloys & Products(Tubes & Pipes) | Flaring Test / Drift Expansion Test | IS-2328-2018/ASTM A 370-18/SA-370- 2018/IS-2335- 2005(RA:2017)//SA 530-18/ISO 8493- 1993(R:2014)/IS::1239 Part -1-2004 (RA:2014)/IS:1239 Part. 2-2004(RA:2015): . | Qualitative(Maximum Applied Load : 400 kN Tube Thickness :- 1mm to 15mm OD : 10mm to 250mm) |



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| 64 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Ferrous Materials Alloys & Products/Other Non – Ferrous Materials Alloys & Products/Welds & Welded test Specimens | Charpy 'V'Notch Impact Test-25° C to (-)196°C | IS-1757(Part-1)- 2014/ISO-148(Part-1)- 2016/EN ISO 9016- 2012/IS-3600(Part-2)- 1985(RA:2013)/EN 875/BSEN 10045- (Part-1)/IS-3600(Part- 2)-1985-RA: 2013 | 2 Joule to 300 Joule |
| 65 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Ferrous Materials Alloys & Products/Other Non – Ferrous Materials Alloys & Products/Welds & Welded test Specimens | Weldment dimensional measurement by Stereomicroscope software | ASTM E 340- 2015/ASME Sec-IX- 2017: . | Qualitative(Magnificatio n :- 40X to 600X & 0.001mm to 50mm) |
| 66 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Ferrous Materials, Alloys & Products(Tubes & Pipes) | Flattening Test | IS:2328-2018 ASTM A 370-2017 SA 370-2017 IS-2335-2005(RA17) ASTM A 530-2016 SA 530-2017 ASTM A 450- 18 SA 450-2017 IS:3589-2001(RA2017) IS:1239(P1):04(RA14) IS:1239(P2):11(RA16) API 5L:2013 ISO:8492:2013 ASTM A999/A999M:18 ASTM A1016/A1016M:2018a ASTM B111/B111M:2018a: : 2018 | Qualitative(Maximum Applied Load:400 kNTube thickness 1mm to 15mm &OD:- 10mm to 250mm) |



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| 67 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Ferrous Materials,Alloys & Products /Other Non – Ferrous Materials,Alloys & Products /Welds & Welded test Specimens | Rockwell Hardness Testin scale HRA,HRB,HRC | ASTM E18-19/IS- 1586(Part-1)- 2012/ASTM A 370- 2018/ISO:6508-1-: 2016 | 20 HRA to 95 HRA,30 HRB to 100 HRB,20 HRC to 70 HRC |
| 68 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Ferrous Materials,Alloys & ProductsOther Non – Ferrous Materials Alloys & ProductsWelds & Welded test Specimens | Brinel Hardness Test | IS:1500-Part 1- 2013/ASTM E10- 18/ASTM A370-18/EN 1043-(Part- 1)/ISO:6506-1-: 2014 | 30 HBW 2.5/187.5,5/250 to 650 HBW 2.5/187.5,5/250 |
| 69 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Ferrous Materials,Alloys & Products/Other Non – Ferrous Materials Alloys & Products/Welds & Welded test Specimens | Vickers Hardness Test in Scale :- HV1,HV5,HV10,HV30, HV50 | IS-1501(Part-1)- 2013/ASTM E384- 2017/ISO 6507(Part-1)- 2018/DIN EN ISO 15614/(Part-1)- 2017/BS EN ISO 9015(Part-1- 2011)/AWS D 1.1/D1.1M-2015/ASTM E92-17/EN 1043-(Part- 1)/BS EN ISO 9015- Part-1-: 2011 | 40 HV 1,5,10,30,50 to 800 HV 1,5,10,30,50 |
| 70 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | High strength deformed steel bars and wires for concrete Reinforcement | Re-Bend Test | IS:1786-2008-RA: 2013 | Qualitative(Mandrel Dia in mm:- 4,8,10,12,16,20,24,32,3 8.1,40,48,50,60,90) |



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| 71 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | High strength deformed steel bars and wires for concrete Reinforcement | Weight per meter measurement | IS 1786-2008 RA: 2013 | 0.01kg to 30kg |
| 72 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Non Ferrous Materials & its Alloys (Cu / Al / Ni- Base Metals) | % Elongation | IS 1608 / ASTM A/SA-370/ ASTM E8/8M/ BS EN ISO 6892(Part-1)/ ASME Sec.IX/ ASTM B557/ IBR REG 1950 AND:2015/ IS-3600(Part-1)/ IS-3600(Part-2)/ IS-3600(Part-3)/ IS-3600(Part-4)/ DIN EN ISO 15614(Part-1&2)/ JISZ-2201/ EN ISO-5178/ EN ISO-4136/ AWS D1.1/ D1.1M/ API-1104/ GOST:1497/ BS EN 10002(Part- 1)/ API 5L:2013/ IS 7307/ IS 7310/ EN 895/ IS:2825/ IS 1865/ IS 1786: 2014 | 1 % to 80 % |



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|------|--|---|--|--|---|
| 73 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Non Ferrous Materials & its Alloys (Cu / Al / Ni- Base Metals | Bend Test | IS:1599/IS:1239/ IS:2329/AWS D1.1/IBR REG 1950 AND:2015/ ASME Sec.IX/ ASTM A /SA-370/ EN ISO 15614-1-2015 / ASTM E190/ ASTM E290/ ISO-5173/ API-1104/ API 5L/IS3600(Part-5)/ IS-3600(Part-6)/ IS- 7307/ IS-7310/ ISO 7438/ ASTM A262: 2014 | Qualitative(Applied Load :400 kN(Mandrel Diameter:Mandrel Dia in mm :- 4,8,10,12,16, 20,24,32,38.1, 40,48,50,60, 90)) |
| 74 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Non Ferrous Materials & its Alloys (Cu / Al / Ni- Base Metals) | Yield Stress , 0.2% , 0.5% , 1.0% proof Stress | IS 1608 / ASTM A/SA- 370/ ASTM E8/8M/ BS EN ISO 6892(Part-1)/ ASME Sec.IX/ ASTM B557/ IBR REG 1950 AND:2015/ IS- 3600(Part-1)/ IS- 3600(Part-2)/ IS- 3600(Part-3)/ IS- 3600(Part-4)/ DIN EN ISO 15614(Part-1&2)/ JISZ-2201/ EN ISO- 5178/ EN ISO-4136/ AWS D1.1/ D1.1M/ API- 1104/ GOST:1497/ BS EN 10002(Part- 1)/ API 5L:2013/ IS 7307/ IS 7310/ EN 895/ IS:2825/ IS 1865/ IS 1786: 2014 | 10 MPa to 1300 MPa |



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| S.No | Discipline / Group | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing/ Limits of Detection |
|------|--|---|---|---|---------------------------------------|
| 75 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Non Ferrous Materials & its Alloys (Cu / Al / Ni- Base Metals) | %Reduction of Area , Modulus of Elasticity | IS:1608 / ASTM A/SA- 370/ ASTM E8/8M/ BS EN ISO 6892(Part-1)/ ASME Sec.IX/ ASTM B557/ IBR REG 1950 AND:2015/ IS- 3600(Part-1)/ IS- 3600(Part-2)/ IS- 3600(Part-3)/ IS- 3600(Part-4)/ DIN EN ISO 15614(Part-1&2)/ JISZ-2201/ EN ISO- 5178/ EN ISO-4136/ AWS D1.1/ D1.1M/ API- 1104/ GOST:1497/ BS EN 10002(Part- 1)/ API 5L:2013/ IS 7307/ IS 7310/ EN 895/ IS:2825/ IS 1865/ IS:1786 : 2014 | 1 % to 80 % |



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| S.No | Discipline / Group | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing/ Limits of Detection |
|------|--|---|-------------------------|--|---------------------------------------|
| 76 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Non Ferrous Materials & its Alloys (Cu / Al / Ni- Base Metals) | Tensile test | IS 1608 / ASTM A/SA- 370/ ASTM E8/8M/ BS EN ISO 6892(Part-1)/ ASME Sec.IX/ ASTM B557/ IBR REG 1950 AND:2015/ IS- 3600(Part-1)/ IS- 3600(Part-2)/ IS- 3600(Part-3)/ IS- 3600(Part-4)/ DIN EN ISO 15614(Part-1&2)/ JISZ-2201/ EN ISO- 5178/ EN ISO-4136/ AWS D1.1/ D1.1M/ API- 1104/ GOST:1497/ BS EN 10002(Part- 1)/ API 5L:2013/ IS 7307/ IS 7310/ EN 895/ IS:2825/ IS 1865/ IS 1786: 2014 | 0.02 kN to 380 kN |
| 77 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Threaded Fasteners(Bolt/Nut) | Proof Load Test | IS 1376(Part-6)/IS 1367(Part-3)- 2017/ASTM A 370- 2018/ASTM F606- 16/ISO-898 (Part-1)- 2013/SA 193-17 , SA 194-17/ISO-898 (Part- 2): 2013 | Qualitative(Upto 400kN) |



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| S.No | Discipline / Group | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing/ Limits of Detection |
|------|--|---------------------------------|---|---|---------------------------------------|
| 78 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Threaded Fasteners(Bolt/Nut) | Wedge Tensile Load Test /Full Size- Breaking Tensile Test | IS:1367(Part-6-1994)- RA:2015 /IS:1367 (Part-3-2002)-RS- 2017/ASTM A 370- 2018/ASTM F606- 16/ISO-898 (Part-1)- 2013/ISO-898 (Part-2)- 2013 , /SA 193-17 , SA 194-17: . | Qualitative(Upto 400kN) |
| 79 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Welds & welded test specimen | Tensile | IS1608 / ASTM A/SA- 370/ ASTM E8/8M/ BS EN ISO 6892(Part-1)/ ASME Sec.IX/ ASTM B557/ IBR REG 1950 AND:2015/ IS- 3600(Part-1)/ IS- 3600(Part-2)/ IS- 3600(Part-3)/ IS- 3600(Part-4)/ DIN EN ISO 15614(Part-1&2)/ JISZ-2201/ EN ISO- 5178/ EN ISO-4136/ AWS D1.1/ D1.1M/ API- 1104/ GOST:1497/ BS EN 10002(Part- 1)/ API 5L:2013/ IS 7307/ IS 7310/ EN 895/ IS 2825/ IS 1865/ IS 1786: 2014 | 0.02 kN to 380 kN |



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| S.No | Discipline / Group | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing/ Limits of Detection |
|------|--|---|--|---|---|
| 80 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Welds & Welded test specimens | Bend Test | IS 1599-2012 AWS D1.1:2010 IBR REG 1950 AND 2011 ASME-Sec.IX:2015 ASTM-A-370-2017 SA- 370:2015 EN ISO15614-1- 2015 ASTM E 190-2014 ASTM E 290-2014 ISO-5173:2011 API- 1104:2014 API 5L: 2013 | Qualitative(Maximum Load:400 kN(Mandrel Diameter:4,8,10,12,16, 20,24,32,38.1,40,48,50 ,60,90 mm)) |
| 81 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Welds & Welded test Specimens(i.e Fe/Cu/Ni/Al Base Materials) | Fracture Test | IS 3600(Part-8)- 1985(RA:2013)/ASME- Sec.IX-2017/BS EN ISO 9017-2018/IS 2825:1969(RA:2017)/IB R REG 1950/AWS D1.1-2015/EN 1320: 2013 | Qualitative(0.02 kN to 400 kN) |
| 82 | MECHANICAL- MECHANICAL PROPERTIES OF METALS | Welds & Welded test Specimens(i.e Fe/Cu/Ni/Al Base Materials) | Nick Break Test | IS:3600(Part-8)- 1985(RA:2013)/ASME- Sec.IX-2017/IS:7307- Part- 1:1974/IS:2825:1969(R A:2017)/IBR REG 1950/API 1104/ API 5L- 2013: . | Qualitative(Up to 400kN) |
| 83 | MECHANICAL- METALLOGRAPHY TEST | Austenitic Stainless Steel | Corrosion test in Nitric Acid medium by measurement of loss in mass(Huey test) | IS 10461(Part-1)-1994: RA:2016 | Qualitative(0.5 to 100 Mpy) |



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| S.No | Discipline / Group | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing/ Limits of Detection |
|------|--------------------------------|--|--|--|--|
| 84 | MECHANICAL- METALLOGRAPHY TEST | Austenitic stainless steel | Intergranular Corrosion test | ASTM A262: 2015 | Qualitative(Practice A Magnification :- 250x to 500x Practice B,C,F - weight loss/ 0.5 to 100 Mpy Practice E :(Bend Test:1 to 4T/close bend/ Magnification :- 20x) |
| 85 | MECHANICAL- METALLOGRAPHY TEST | Cast Iron | Designation of the Microstructure of graphite in cast iron | IS-7754 - 1975(RA:2018)/ ASTM A247 -17/ ASTM E1245-03(2016): . | Qualitative(Magnification :- 40X to 600X) |
| 86 | MECHANICAL- METALLOGRAPHY TEST | Ferritic stainless steel | Inter granular corrosion test | ASTM A763: 2015 | Qualitative(Practice W Magnification :- 200x to 500x Practice X ,Y& Z weight loss:0.5 to 100 Mpy) |
| 87 | MECHANICAL- METALLOGRAPHY TEST | Ferritic , Duplex steel & Austenitic stainless steel | Corrosion test in media containing sulfuric acid & Corrosion test in a sulphuric acid /copper sulphate medium in the presence of copper turnings(Monypenny Strauss test) | ISO 3651(Part-2)-1988 / IS 10461(Part-2)-1994(RA:2016): . | Qualitative(0.5 to 100Mpy) |



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|------|-------------------------------|---|---------------------------------|--|---|
| 88 | MECHANICAL-METALLOGRAPHY TEST | Ferrous Materials Alloys & Products/ Other Non – Ferrous Materials Alloys & Products/ Welds & Welded test Specimens | Macro etch test | IS 3600(Part-9)-1985(RA:2013)/ASME-Sec.IX-2017/BS EN ISO 5817:2014/IS-2825-1969(RA:2017)/IBR REG 1950/EN ISO 17639/ AWS D 1.1/D1.1M-2015 /ASM Handbook Vol 9-2004/ASTM E340-2015&ASTM E 381-17: 2011 | Qualitative(Magnification :- 7X to 45X) |
| 89 | MECHANICAL-METALLOGRAPHY TEST | Ferrous Materials Alloys & Products/ Other Non – Ferrous Materials Alloys & Products/ Welds & Welded test Specimens | Micro structure analysis | ASM Handbook Vol 9-2004/IS 7739 Part-1 - 1975(RA:2017)& Part-2-1975(RA:2018)/IS:3600 -Part 9-1985(RA:2013) /ASTM E3-11(2017)/ASTM E 407-07(2015)/ASTM A 247-16a/DIN EN ISO 17639:- 2013 | Qualitative(Magnification :- 40X to 600X) |
| 90 | MECHANICAL-METALLOGRAPHY TEST | Micrographic determination of The apparent Grain Size by comparison method | Steels | IS-4748-2009(RA:2017)/ASTM E3/ASTM E112/-13/ISO:643:- 2012 | Qualitative(Magnification :- 100x/ASTM No.-1 to 15) |
| 91 | MECHANICAL-METALLOGRAPHY TEST | Stainless steel and related alloys(Nickel) | Pitting Corrosion test-Method-A | ASTM G48: 11(2015) | Qualitative(ASTM G48 METHOD A) |



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| S.No | Discipline / Group | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing/ Limits of Detection |
|------|--------------------------------|--|--|---|---|
| 92 | MECHANICAL- METALLOGRAPHY TEST | Steel | Case Depth Measurement by microscopic method | IS-6416-1988(RA:2018)/ASTM E1077:: 2014 | Qualitative(Magnification :- 100x/ 0.001mm to 10mm) |
| 93 | MECHANICAL- METALLOGRAPHY TEST | steels | Depth of ecarburization Measurement by microscopic method | IS-6396:2000(RA:2018) / ASTM E1077-14: . | Qualitative(100x/0.1mm to 10mm) |
| 94 | MECHANICAL- METALLOGRAPHY TEST | steels | Non Metallic Inclusion Rating by method A | IS-4163 - 2004(RA:2017) / ASTM E45-18a: . | Qualitative(Method A) |
| 95 | MECHANICAL- METALLOGRAPHY TEST | Wrought ,Nickel Rich ,Chromium -Bearing Alloys | Detecting susceptibility to Intergranular corrosion test Method - A(Ferric sulfate-sulfuric acid test) | ASTM G28: 02(2015) | Qualitative(0.1mdd to 100 Mpy) |



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|----------------------|---------------------------|--|------------------------------|---|---|
| Site Facility | | | | | |
| 1 | CHEMICAL- METALS & ALLOYS | Ferrous & Non Ferrous Metals & its alloy | Cr,Ni,Mo,Cu,Mn,V,Ti,W ,Co,Fe | ASTM E1476: 2012 | Qualitative(Positive material identification test by XRF Method(PMI)) |