

Laboratory **ECON Laboratory and Consultancy, Village-Khabarwala, Post-Jaintanwala, Garhi Cantt., Dehradun, Uttarakhand**

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

Certificate Number **TC-5507**

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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
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CHEMICAL TESTING

I.	WATER			
1.	Potable, Domestic, Surface, Ground, Process Water	Organoleptic & Physical Parameters		
		pH @25 °C	IS 3025 (Part 11):1984 (RA 2012)	2 to 12
		Conductivity	IS 3025 (Part 14):1984 (RA 2002)	2 µmhos/cm to 5000 µmhos/cm
		Temperature	IS 3025 (Part 9):1984	1°C to 100°C
		Turbidity	IS 3025 (Part 09):1984 (RA 2002)	1 NTU to 100 NTU
		Total Dissolved Solids	IS 3025 (Part 16):1984 (RA 2006)	5 mg/L to 5000 mg/L
		Total Suspended Solids	IS 3025 (Part 17):1984 (RA 1996)	5 mg/L to 5000 mg/L
		Hardness as CaCO ₃	IS 3025 (Part 21):1984 (RA 2009)	2 mg/L to 2000 mg/L
		Acidity as CaCO ₃	APHA-22 nd Ed 2012-2310 B Titrimetric Method	2 mg/L to 1000 mg/L
		Alkalinity as CaCO ₃	IS 3025 (Part 23):1986 (RA 2003)	2 mg/L to 1000 mg/L
		Chloride as Cl	IS 3025 (Part 32):1988 (RA 2009)	2 mg/L to 1000 mg/L
		Chlorine (Free Residual)	IS 3025 (Part 26):1986 (RA 2009)	0.1 mg/L to 5 mg/L
		Fluoride as F	IS 3025 (Part 60):2008	0.2 mg/L to 10 mg/L
		Nitrate (NO ₃)	IS 3025 (Part 34):1988 (RA 2009)	0.5 mg/L to 100 mg/L
		Dissolved Oxygen (DO)	APHA-22 nd Ed 2012-4500C	1 mg/L to 15 mg/L
		Ammonia (NH ₃ -N)	IS 3025 (Part 34):1988 (RA 2009)	0.4 mg/L to 30 mg/L

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		Phosphorous (P)	APHA-22 nd Ed 2012-4500 P D Stannous Chloride Method	0.2 mg/L to 10 mg/L
		Sulphate as SO ₄	IS 3025 (Part 24):1986 (RA 2009)	2 mg/L to 500 mg/L
		Silica (SiO ₂)	IS 3025 (Part 35):1988 (RA 2003)	1 mg/L to 50 mg/L
		Calcium as Ca	IS 3025 (Part 40):1991 (RA 2009)	1 mg/L to 600 mg/L
		Chromium (Hexavalent)	IS 3025 (Part 52):2003	0.05 mg/L to 5 mg/L
		Iron as Fe	IS 3025 (Part 53):1988 (RA 2009)	0.05 mg/L to .10 mg/L
		Magnesium as Mg	IS 3025 (Part 46):(RA 2009)	1.0 mg/L to 1000 mg/L
		Sodium as Na	IS 3025 (Part 45):1993 (RA 1999)	1.0 mg/L to 500 mg/L
		Potassium	IS 3025 (Part 45):1993 (RA 1999)	1.0 mg/L to 100 mg/L
II.	POLLUTION AND ENVIRONMENT			
1.	Waste Water/ Effluent Water	pH	APHA-22 nd Ed 2012 – 4500 H ⁺ B	2 to 12
		Conductivity	APHA-22 nd Ed 2012-2510 B	200 µmhos/cm to 10000 µmhos/cm
		Turbidity	APHA-22 nd Ed 2012- 2130 B Nephelometric Method	1 NTU to 1000 NTU
		Total Dissolved Solids	APHA-22 nd Ed 2012- 2540 C 180°C	5 mg/L to 10000 mg/L
		Total Suspended Solids	APHA-22 nd Ed 2012- 2540 D 103-105°C	5 mg/L to 5000 mg/L
		Solids- Fixed & Volatile	APHA-22 nd Ed 2012- 2540 E 550°C	5 mg/L to 5000 mg/L
		Hardness as CaCO ₃	APHA-22 nd Ed 2012-2340 C EDTA Method	2 mg/L to 2000 mg/L

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		Acidity as CaCO ₃	APHA-22 nd Ed 2012-2310 B Titration Method	5 mg/L to 1000 mg/L
		Alkalinity as CaCO ₃	APHA-22 nd Ed 2012-.2320 B Titration r Method	5 mg/L to 1000 mg/L
		Chloride as Cl	APHA-22 nd Ed 2012- 4500-CL B Argentometric Method	20 mg/L to 1000 mg/L
		Chlorine (Free Residual)	APHA-22 nd Ed 2012-4500 Cl-F- PD Ferrous Tritmetric Method	0.1 mg/L to 5 mg/L
		Fluoride as F	APHA-22 nd Ed 2012-4500-D SPANDS Method	0.2mg/L to 10 mg/L
		Dissolved Oxygen (DO)	APHA-22 nd Ed 2012-4500 - OC Winkler Method with Azide Modification	1 mg/L to 10 mg/L
		Nitrate (NO ₃)	IS 3025 (Part -34), 1988 RA2009	0.5 mg/L to 100 mg/L
		Ammonia (NH ₃ -N)	IS 3025 (Part -34), 1988 RA2009	0.4 mg/L to 30 mg/L
		Phosphorous (P)	APHA-22 nd Ed 2012-4500 P D Stannous Chloride Method	0.5 mg/L to 10 mg/L
		Sulphate as SO ₄	APHA-22 nd Ed 2012-4500SO ₄ ⁻² E Turbidity Method	2 mg/L to 100 mg/L
		Silica (SiO ₂)	APHA-22 nd Ed 2012-4500-SiO ₂ -C Molybdosilicate Method	1 mg/L to 50 mg/L
		Calcium as Ca	APHA-22 nd Ed 2012-3500Ca-B EDTA Method	1 mg/L to 600 mg/L
		Chromium (Hexavalent)	APHA-22 nd Ed 2012-3500Cr-B, Calorimetric Method	0.05 mg/L to 5 mg/L

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Convenor**

**Alok Jain
Program Director**

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		Iron as Fe	APHA-22nd Ed 2012-3500Fe-B Phenanthroline Method	0.1mg/L to 10 mg/L
		Magnesium as Mg	APHA-22nd Ed 2012-3500-Mg B Calculation Method	2mg/L to 500 mg/L
		Sodium	APHA-22nd Ed 2012-3500Na-B Flame Photometric Method	5mg/L to 500 mg/L
		Potassium	APHA-22nd Ed 2012-3500K-B Flame Photometric Method	2 mg/L to 200 mg/L
		Chemical Oxygen Demand (COD)	APHA-22 nd Ed 2012- 5220B Open Reflux Method	5mg/L to 100000 mg/L
		Biochemical Oxygen Demand (BOD)	IS 3025 (P-44)-1993 (RA-1999) Ad.1 BOD 3-days at 27 °C	3mg/L to 50000 mg/L
		Oil & Grease	APHA-22 nd Ed 2012- 5520B Partition Gravimetric Method	5 mg/L to 100 mg/L
		Phenolic Compounds as C ₆ H ₅ OH	APHA-22 nd Ed 2012-5530D	0.5 mg/L to 10 mg/L
III.	ATMOSPHERIC POLLUTION			
1.	Ambient Air	Particulate Matter PM-2.5	As per SOP ECON/Pm2.5/01-2015 manual Volume 1 /Gravimetric method	10 µg/m ³ to 500 µg/m ³
		Particulate Matter PM10	IS 5182 (Part -23) 2004	5 µg/m ³ to 1000 µg/m ³
		Sulphur Dioxide	IS 5182 (Part -2) 2001	6 µg/m ³ to 1050 µg/m ³
		Oxides of Nitrogen	IS 5182 (Part -6) 1975	5 µg/m ³ to 750 µg/m ³
		Ozone	IS 5182 (Part -9) 1975	1 µg/m ³ to 200 µg/m ³
		Carbon Monoxide as CO	ECON/STP/AIR/02	4.0 PPM to 200 PPM
2.	Stack Emissions	Particulate Matter	IS 11255 (Part 1) 1985	5 mg/m ³ to 1000 mg/nm ³
		Sulphur Dioxide	IS 11255 (Part 2) 1985	3 mg/m ³ to 500 mg/m ³

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		Oxides of Nitrogen (as NO _x)	IS 11255 (Part 7) 2005	1 mg/m ³ to 500 mg/m ³
		Carbon Monoxide as CO	IS 13270 1992, (RA2003)	1 PPM to 400 PPM
		Carbon Dioxide as CO ₂	IS 13270 1192, (RA2003)	1 % to 15%
3.	Soil	pH	IS 2720 (Part- 26) -1987	2 to 12
		Conductivity	ECON/STP/03 based on GOI Manual-2011	5 µmhos/cm to 10000 µmhos/cm
		Moisture Content	IS 2720 (Part- 2) 1973	1% to 80%
		Organic Carbon and Organic Matter	IS 2720 (Part- 22) 1972	1% to 80%
		Bulk Density	IS 2720 (Part -3):1980	1 to 5
		Sodium	ECON/STP/06 based on GOI Manual-2011	1 mg/L to 1000 mg/Kg
		Potassium	ECON/STP/07 based on GOI Manual-2011	1 mg/L to 1000 mg/Kg
		Phosphorous	ECON/STP/10 based on GOI Manual-2011	1 mg/L to 1000 mg/Kg
		Nitrogen	ECON/STP/17 based on GOI Manual-2011	1 mg/L to 25 %
		Calcium	ECON/STP/08 based on GOI Manual-2011	1 mg/L to 1000 mg/Kg
		Magnesium	ECON/STP/08 based on GOI Manual-2011	1 mg/L to 1000 mg/Kg
IV.	BUILDING MATERIAL			
1.	Ordinary Portland Cement OPC & PSC	Loss on Ignition	IS 4032: 1985 (RA 2014) Amd. 2	1 % to 5 %
		Silicon Dioxide	IS 4032: 1985 (RA 2014) Amd. 2	15 % to 35 %
		Aluminium Oxide	IS 4032: 1985 (RA 2014) Amd. 2	2 % to 5 %
		Iron Oxide	IS 4032: 1985 (RA 2014) Amd. 2	2 % to 10 %

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		Calcium Oxide	IS 4032: 1985 (RA 2014) Amd. 2	35 % to 70 %
		Magnesium Oxide	IS 4032: 1985 (RA 2014) Amd. 2	1 % to 10 %
		Sulphuric Anhydride	IS 4032: 1985 (RA 2014) Amd. 2	1 % to 5 %
		Insoluble Residue	IS 4032: 1985 (RA 2014) Amd. 2	1 % to 5 %
		Total Chloride	IS 4032: 1985 (RA 2014) Amd. 2	0.01 % to 0.1 %
2.	Portland Pozzolana Cement (PPC)	Loss on Ignition	IS 4032: 1985 (RA 2014) Amd. 2	1 % to 5 %
		Magnesium Oxide	IS 4032: 1985 (RA 2014) Amd. 2	1 % to 10 %
		Sulphuric anhydride	IS 4032: 1985 (RA 2014) Amd. 2	1 % to 5 %
		Insoluble Residue	IS 4032: 1985 (RA 2014) Amd. 2	20 % to 35 %
3.	Concrete	Sulphate	BS 1881 (Part 124): 1988	0.05 % to 5 %
		Chloride	BS 1881 (Part 124): 1988	0.05 % to 5 %
V.	METALS & ALLOYS			
1.	Mild Steel	Carbon	IS 228 (Part 1): 1987 (RA 2012)	0.05 % to 1.3 %
		Sulphur	IS 228 (Part 9): 1987 (RA 2014)	0.01 % to 5 %
		Silicon	IS 228 (Part 8): 1987 (RA 2014)	0.05 % to 5.0 %
		Manganese	IS 228 (Part 2): 1987 (RA 2012)	0.1 % to 2.0 %
		Phosphorous	IS 228 (Part 3): 1987 (RA 2012)	0.01 % to 0.5 %
2.	Stainless Steel	Nickel	IS 228 (Part-5):1987 (RA 2014)	1 % to 12 %

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		Phosphorous	IS 228 (Part-3):1987 (RA 2012)	0.02 % to 0.05 %
		Carbon	IS 228 (Part 1):1987 (RA 2012) Amd. 1	0.05 % to 0.2 %
		Chromium	IS 228 (Part-6):1987 (RA 2014)	5% to 20 %
		Silicon	IS 228 (Part 8) : 1989 (RA 2014)	0.2 % to 1.0 %
		Manganese	IS 228 (Part 2): 1987 (RA 2012)	0.1 % to 1.5 %
		Sulphur	IS 228 (Part 9): 1987 (RA 2014)	0.01 to 0.5
VI.	METALLIC COATINGS AND TREATMENT SOLUTIONS			
	Steel Products	Mass of Zinc Coating	IS 6745: 1972 (RA 2010) Amd. 5, Cl 5	50 g/m ² to 10000 g/m ²
		Uniformity of Coating	IS 2633: 1986 (RA 2011)	Qualitative Test
2.	Aluminium Products	Thickness of Anodizing Coating	IS 5523: 1983 (RA 2011) Amd.1, Cl. 2.3	(5 to 30) Micron 5 µm to 30 µm,

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AT- SITE				
III.	ATMOSPHERIC POLLUTION			
1.	Noise Ambient	Noise Levels	IS 9876-1981 (RA 1997)	30 dB(A)to 130 dB(A)

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MECHANICAL TESTING

I.	BUILDING MATERIAL			
1.	Ordinary Portland Cement/Portland Slag Cement (OPC/ PSC)	Setting Time Initial	IS 4031 (Part 5): 1988 (RA 2014) Amd.2,	20 min to 600 min
		Final		
		Soundness By Le-chatelier By Autoclave	IS 4031 (Part 3): 1988 (RA 2014) Amd.2	0.5 mm to 10 mm 0.01 % to 2 %
		Compressive Strength 3 Days 7 Days 28 Days	IS 4031 (Part 6): 1988 (RA 2014) Amd.4	5 N/mm ² to 70 N/mm ²
		Fineness By Blain's Air Permeability	IS 4031 (Part 2): 1999 (RA 2013) Amd.1	150 m ² /kg to 400 m ² /kg
		By Dry Sieving	IS 4031 (Part 1): 1996 (RA 2016)	0.05 % to 20 %
		Density	IS 4031 (Part 11): 1988 (RA 2014) Amd.1	2 g/cc to 3.5 g/cc
		Consistency	IS 4031 (Part 4): 1988 (RA 2014) Amd.2	20 % to 40 %
2.	Portland Pozzolana Cement (PPC)	Setting Time Initial	IS 4031 (Part 5): 1988 (RA 2014) Amd.2,	20 min to 600 min
		Final		
		Drying shrinkage	IS 4031(Part 10):1988 (RA 2014)	0.01% to 5.0 %
		Soundness By Le-chatelier By Autoclave	IS 4031 (Part 3): 1988 (RA 2014) Amd.2	0.5 mm to 10 mm 0.01 % to 2 %

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		Compressive Strength 3 Days 7 Days 28 Days	IS 4031 (Part 6): 1988 (RA 2014) Amd.4	5 N/mm ² to 70 N/mm ²
		Fineness By Blain's Air Permeability By Dry Sieving	IS 4031 (Part 2): 1999 (RA 2013) Amd.1 IS 4031 (Part 1): 1996 (RA 2016)	150 m ² /kg to 400 m ² /kg 0.05 % to 20 %
		Density	IS 4031 (Part 11): 1988 (RA 2014) Amd.1	2 g/cc to 3.5 g/cc 0.01 % to 5.0 %
		Consistency	IS 4031 (Part 4): 1988 (RA 2014) Amd.2	20 % to 40 %
3.	Building Bricks (Clay/Fuel Ash-Lime)	Dimension	IS 1077:1992 (RA 2011) Amd. 1 IS 13757: 1993 (RA 2011) Amd 1	1200 mm to 5000 mm
		Water Absorption	IS 3495: 1992 (Part 2) RA 2011	1 % to 40 %
		Efflorescence	IS 3495: 1992 (Part 3) (RA 2011)	Qualitative
		Compressive Strength	IS 3495: 1992 (Part 1) (RA 2011)	5 N/mm ² to 39 N/mm ²
4.	Coarse & Fine Aggregate	Flakiness Index	IS 2386 (Part 1) 1963 (RA 2016) Amd. 4	1 % to 50 %
		Elongation Index	IS 2386 (Part 1): 1963 (RA 2016)	1 % to 50 %
		Bulk Density	IS 2386 (Part 3): 1963 (RA 2016)	0.5 kg/L to 5 kg/L
		Specific Gravity	IS 2386 (Part 3): 1963 (RA 2016)	1.5 to 5
		Water Absorption	IS 2386 (Part 3): 1963 (RA 2016)	0.1 %to 2 %

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		Crushing Value	IS 2386 (Part 4): 1963 (RA 2016) Amd. 3	5 % to 50 %
		Impact Value	IS 2386 (Part 4): 1963 (RA 2016) Amd. 3	5 % to 50 %
		Los Angles Abrasion Value	IS 2386 (Part 4): 1963 (RA 2016) Amd. 3	5 % 50 %
		10 % Fines Value	IS 2386 (Part 4): 1963 (RA 2016) Amd. 3	5 T to 50 T
		Soundness Test	IS 2386 (Part 5): 1963 (RA 2016)	0.1 %to 25 %
		Sieve Analysis	IS 2386 (Part 1): 1963 (RA 2016) Amd. 4	0.1% to 100 %
		Bulking of Sand	IS 2386 (Part 3): 1963 (RA 2016)	1 % to 25 %
		Organic Impurities	IS 2386 (Part 2): 1963 (RA 2016) Amd. 1	Qualitative
		Deleterious Materials		
		Material finer than 75 µm	IS 2386 (Part 1): 1963 (RA 2016) Amd. 4	0.5 % to 5 %
		Clay Lumps	IS 2386 (Part 2): 1963 (RA 2016) 'Amd. 1	0.1% to 10 %
5.	Hardened Concrete	Compressive Strength	IS 516: 1959 RA. 2013 Amd. 2	5 N/mm ² to 80 N/mm ²
II.	MECHANICAL PROPERTIES OF MATERIAL			
1.	High Strength Deformed Steel Bar, Structure Steel, M.S. Pipe, G.I. Pipes, H.D. Wire, Hollow Section	Mass	IS 1786:2008, (RA 3013) Amd.1 IS 1730:1989 (RA. 2009) IS 1732: 1989 (RA. 2009) IS 808:1989 (RA. 2009) Amd.1 IS 4923: 1997 (RA.2009) Amd. 6 IS 1161:2014, IS 1239(Part -1) 2004	0.001 kg to 30 kg

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		Dimension	IS 1730: 1989 (RA. 2009) IS 1732:1989 (RA 2009) IS 808:1989 (RA 2009) Amd. 1 IS 1852:1985 (Part 1) (RA. 2013) Amd.2 IS 1239 (Part -1): 2014, Amd. 4, (RA 2014 IS 1161:2014 IS 4923:1997 (RA 2009) Amd.6	Length: 300 mm to 5000 mm Width: 10 mm to 3500 mm Thickness: 0.05 to 25 mm
		Hardness Test	IS 1586 (Part 1): 2012	HRA: 30 to 88 HRB: 30 to 100 HRC: 20 to 70
2.	Aluminium and Alloys, Bars & Rods (20 mm & Above)	Dimensions	IS 2673:2002 (RA 2007) IS 2676:1981 (RA 2006) IS 2677:1979 (RA 2006) IS 2678:1987 (RA 2006) IS 2826:1986 (RA 2006) IS 3965:1981 (RA 2006) IS 6477:1983 (RA 2010)	Length: 500 mm to 5000 mm, Depth: 0.02 mm to 300 mm, Thickness: 0.01 to 25 mm
		Freedom from Defects	IS 733:1983 (RA 2006) Amd.1 IS 737:2008 (RA 2013) IS 738:1994 (RA 2010) IS 1285:2002 (RA 2013)	Qualitative
3.	Galvanized Steel Sheet (Plain & Corrugated)	Size (Length, Width, Thickness, Depth, Pitch)	IS 277:2003 (RA 2013) Amd. 4	Thickness: 0.05 mm to 5 mm, Length: 500 mm to 5000 mm Width:250 mm to 3000 mm Depth: 8 mm to 25 mm

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		Freedom from Defects	IS 277:2003 (RA 2013) Amd.4 IS 1285: 2002 (RA 2013)	Qualitative
4.	Bentonite	Moisture Content	IS 6186:1986, (RA 2015) (Appendix A-2)	1% to 12 %
		Gel Formation Index	IS 6186:1986, (RA 2015) (Appendix A-4)	Qualitative
		Swelling Power	IS 6186:1986, (RA 2015) (Appendix A-5)	Qualitative
		Fineness by Dry & Wet	IS 6186:1986, (RA 2015) (Appendix A-6)	80%to 100%
		Sand Content	IS 6186:1986, (RA 2015) (Appendix A-9)	0.1 % to 5 %
5.	Soil	Specific Gravity	IS 2720 (Part-3,Sec.-1):1980 (RA 2011)	1to 4
		Water Content	IS 2720 (Part -2):1973, (RA 2015)	1 % to 30 %
		Grain Size Analysis	IS 2720 (Part -4):1985, (RA 2015)	5% to 100 %
		Liquid Limit	IS 2720 (Part -5):1985, (RA 2015)	10% to 50 %
		Plastic Limit	IS 2720 (Part -5):1985, (RA 2015)	0 to 50 %
		Protector Test -Maximum Dry Density- Optimum Moisture Contents	IS 2720 (Part -7):1980, (RA 2011), (Amd. 2) IS 2720 (Part -8):1983, (RA 2015)	1 g/cc to 5 g/cc 1% to 30 %
		California Bearing Ratio	IS 2720 (Part -16):1987, (RA 2011)	1% to 80 %
		Free Swell Index	IS 2720 (Part -40):1977, (RA 2011)	10° to 30°
6.	Bitumen	Specific Gravity	IS 1202:1978, Amd. 2, (RA 2014)	0.01 to 1.1

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		Penetration, mm at 25 (°C)	IS 1203:1978, Amd. 3, (RA 2014)	5 to 100
		Softening Point, °C (Ring & Ball Method)	IS 1205:1978, Amd. 1, (RA 2014)	30°C to 100 °C
		Ductility, cm	IS 1208:1978, Amd. 2, (RA 2014)	4 cm to 150 cm
		Flash Point, °C	IS 1448 (Part -69):2013	50°C to 350 °C
		Fire Point, °C	IS 1448 (Part -69):2013	100°C to 350 °C
		Solubility in Trichloroethylene	IS 1216:1978, Amd.2, (RA 2014)	10 % to 100 %
7.	Bituminous Mix DBM, BC, DBC, BM	Binder Content, %	IRC SP-11	2% to 10 %
		Gradation, % of Aggregate	IS 2386 (Part -1):1963, Amd. 4, (RA 2016)	0.1% to 100 %

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