Drinking Water Standards of BIS (IS: 10500: 1991)

S.No	Parameters	Desirable limits mg/l	Permissible limits mg/l
Essential Characteristics			
1	Colour Hazen unit	5	25
2	Odour	Unobjectionable	-
3	taste	agreeable	-
4	Turbidity (NTU)	5	10
5	pH	6.5-8.5	No relaxation
6	Total Hardness, $CaCO_3$	300	600
7	Iron (Fe)	0.3	1.0
8	Chloride (Cl)	250	1000
9	Residual Free Chlorine	0.2	-
10	Fluoride (F)	1.0	1.5
Desirable Characteristics			
11	Dissolved Solids	500	2000
12	Calcium (Ca)	75	200
13	Magnesium (Mg)	30	100
14	Copper (Cu)	0.05	1.5
15	Manganese (Mn)	0.1	0.3
16	Sulphate (SO_4)	200	400
17	Nitrate (NO_3)	45	100
18	Phenolic compounds	0.001	0.002
19	Mercury (Hg)	0.001	No relaxation
20	Cadmium (Cd)	0.01	No relaxation
21	Selenium (Se)	0.01	No relaxation
22	Arsenic (As)	0.05	No relaxation
23	Cyanide (CN)	0.05	No relaxation
24	Lead (Pb)	0.05	No relaxation
25	Zinc (Zn)	5.0	15
26	Hexavelant Chromium	0.05	No relaxation
27	Alkalinity	200	600
28	Aluminum (Al)	0.03	0.2
29	Boron (B)	1.0	5.0
30	Pesticides	Absent	0.001

NTU = Nephelometric Turbidity Unit

Safe limits for Electrical Conductivity for Irrigation Water

S.No.	Nature of soil	Crop growth	Upper permissible safe limit of Electrical Conductivity in water µmhos/cm at 25˚C
1	Deep black soil and alluvial soils having clay content more than 30% soils that are fairly to moderately well drained.	Semi-tolerant	1500
		Tolerant	2000
2	Heavy textured soils having clay contents of 20-30% soils that are well drained internally and have good surface drainage system.	Semi-tolerant	2000
		Tolerant	4000
3	Medium textured soils having clay 10-20% internally very well drained and having good surface drainage system.	Semi-tolerant	4000
		Tolerant	6000
4	Light textured soils having clay less than 10% soil that have excellent internally and surface drainage system.	Semi-tolerant	6000
		Tolerant	8000

Guidelines for Evaluation of Quality of Irrigation Water

Water class	Sodium (Na) %	Electrical Conductivity µmhos/cm at 25˚C	Alkalinity hazards	
			SAR	RSC (meq/1)
Excellent	<20	<250	<10	<1.25
Good	20-40	250-750	10-18	1.25-2.0
Medium	40-60	750-2250	18-26	2.0-2.5
Bad	60-80	2250-4000	>26	2.5-3.0
Very bad	>80	>4000	>26	>3.0

Rating of irrigation water based on Boron concentration in the water, (U.S. Salinity Laboratory Staff)

Class of water	Boron concentration, mg/l		
	Sensitive Crops	Semi-tolerant crops	Tolerant crops
Excellent	< 0.33	< 0.67	< 1.00
Good	0.33 – 0.67	0.67 – 1.33	1.00 – 2.00
Permissible	0.67 – 1.00	1.33 – 2.00	2.00 – 3.00
Doubtful	1.00 – 1.25	2.00 – 2.50	3.00 – 3.75
unsuitable	> 1.25	> 2.50	> 3.75

Trace elements tolerance for irrigation waters (Environment Studies Board, 1973)

Trace Element	Trace elements tolerance limit mg/l	
	Acid soils or all soils in continuous use	Fine textured alkaline soils
Aluminium	5.00	20.00
Arsenic	0.10	2.00
Beryllium	0.10	0.50
Boron	0.50	1.00
Cadmium	0.01	0.05
Chromium	0.10	1.00
Cobalt	0.05	5.00
Copper	0.20	5.00
Iron	5.00	20.00
Lead	5.00	10.00
Lithium	2.50	2.50
Manganese	0.20	10.00
Molybdenum	0.01	0.01
Nickel	0.20	2.00
Vanadium	0.10	1.00
Zinc	2.00	10.00

Tolerance Limits for Industrial Effluence (IS : 2490, Part-I-1981)

S. No.	Characteristic	Maximum tolerance limits for industrial effluents discharged (mg/l)			
		Into inland surface water	**Into public sewers**	**On land for irrigation**	**Marine/Coastal Area**
1	Colour and Odour	Absent	-	Absent	Absent
2	Suspended solids	100	600	200	a)For Process waste water 100 b)For cooling water effluent 10 percent above total suspended matter of effluent
3	Particle size of suspended solids	Shall pass 850 micron IS Sieve	-	-	a)Floatable solids, solids max. 3 mm b)Settleable solids max 856 microns
4	Dissolved solids (inorganic)	2100	2100	2100	
5	pH value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
6	Temperature ˚C	Shall not exceed 40 in any section of the stream within 15 meters down stream from the effluent outlet	45 at the point of discharge	-	-
7	Oil and grease	10	20	10	20
8	Total residual chlorine	1.0	-	-	1.0
9	Ammonical nitrogen (as N)	50	50	-	50
10	Total kjeldahl nitrogen (as N)	100	-	-	100
11	Free ammonia (as NH_3)	5.0	-	-	5.0
12	Biochemical Oxygen Demand (5 days at 20˚C)	30	350	100	100
13	Chemical Oxygen Demand	250	-	-	250

14	Arsenic (as As)	0.2	0.2	0.2	0.2
15	Mercury (as Hg)	0.01	0.01	-	0.01
16	Lead (as Pb)	0.1	1.0	-	2.0
17	Cadmium (as Cd)	2	1.0	-	2.0
18	Hexavelant Chromium (as Cr^{+6})	0.1	2.0	-	1.0
19	Total Chromium (as Cr)	2.0	2.0	-	2.0
20	Copper (as Cu)	3.0	3.0	-	30
21	Zinc (as Zn)	5	15	-	15
22	Selenium (as Se)	0.05	0.05	-	0.05
23	Nickel (as Ni)	3.0	3.0	-	-
24	Boron (as B)	2.0	2.0	2.0	-
25	Percent sodium	-	60	60	-

Effects of water quality parameters of water being used in industries

S.No.	Parameters	Prescribed limits IS:10500, 1991		Probable effects
		Desirable limit	Permissible limit	
1	pH value	6.5	8.2	Low pH increases corrosion of concrete, pH 7.0 is required for most industry, pH 2.7- 7.2 advised for carbonated beverage industry.
2	Total dissolved solids, mg/l	50	3000	Causes foaming in boilers and solids interfere with clearness, colour or taste of finished products. Low TDS value are required in most industries. High TDS leads to corrosion.
3	Iron mg/l	0.1	2.0	Recommended value for food processing units is 0.2, for paper and photographic industry iron of 0.1 mg/l is recommended iron less than 0.1 mg/l is recommended in cooling waters.
4	Chloride mg/l	25	200	Significantly effect the rate of corrosion of steel and Aluminum.
5	Fluoride mg/l	0.2	1.0	Harmful in industries involved in production of food beverages, pharmaceuticals and medical items.
6	Calcium mg/l	20	500	High calcium leads to spots on films. Have undesirable effects like forming scale, precipitates and curds in industry. It may interferes in formation of emulsions and processing of colloids upsetting fermentation process, and electroplating rinsing operation.
7	Magnesium mg/l	5	30	-
8	Sulphate mg/l	25	250	Increases corrosiveness of water towards concrete, low sulphates (20 mg/l) is recommended for sugar industries.
9	Nitrate mg/l	15	30	Injurious to dyeing of wool and silk fabrics and harmful in fermentation process for brewing, Nitrate in some water protects metal in boilers from inter-crystalline cracking.
10	Copper mg/l	0.01	0.5	Copper is undesirable in food industry as it has colour reactions and impart fishy taste to finished products. Affects smoothness and brightness of

				metal deposits in metal plating, baths.
11	Chromium mg/l	N.A.	N.A.	It is a corrosion inhibitor.
12	Zinc	N.A.	N.A.	Zinc bearing water should not be used in Acid drinks like lemonade.
13	Lead	N.A.	N.A.	Traces of lead in metal plating baths will affect smoothness and brightness of deposits.