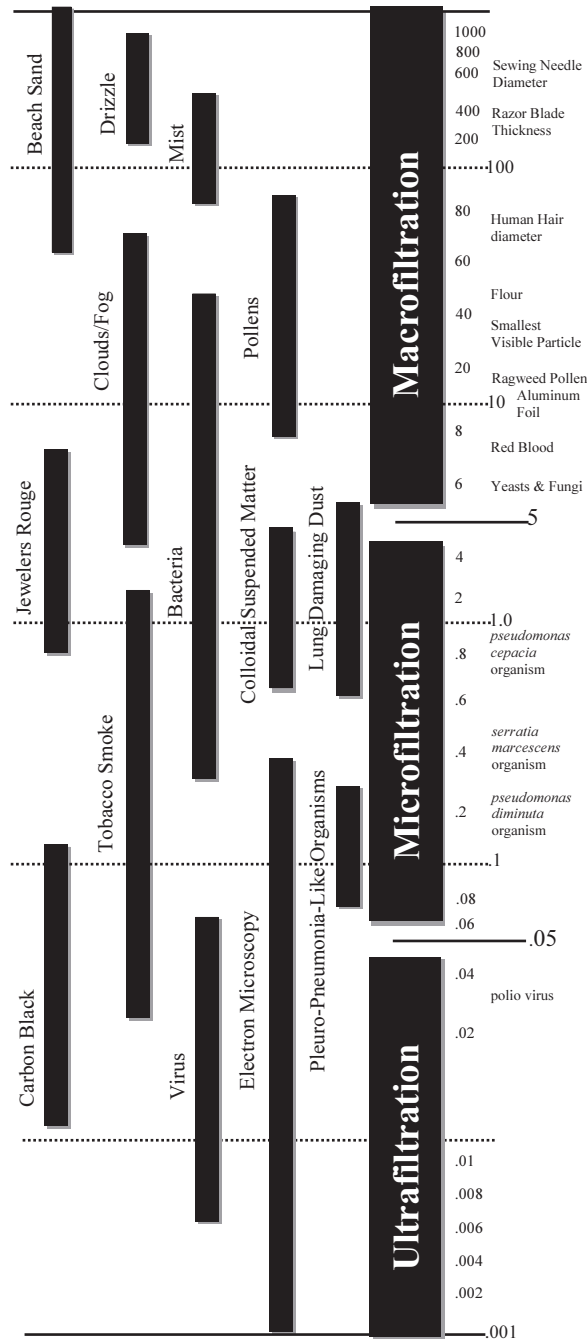


At Total Water Treatment Systems Inc
 We Provide Comprehensive Solutions to
 Our Customers' Water Needs.

Relative Sizes of Particles Key

Micrometers (µm)



Total Water Treatment Systems Inc. was founded over seventy years ago to offer commercial and industrial clients water purification systems that would fit their needs. Our company was built with service as its foundation. Today, we still maintain that every product is only as good as the people behind it. As an employee owned company, we support our service personnel by training them in the most up-to-date technologies in the industry. This enables them to efficiently meet the changing needs of our customers.

We can select from a wide range of manufacturers and suppliers. As your complete water resource, you can concentrate on your business.

Total Water Treatment Systems offers system design and engineering, distribution design, system sanitizations and complete maintenance programs. Additional services include:

- ≈ Water-by-the-gallon or water-by-the-month agreements
- ≈ Portable exchange deionizers and carbon filters
- ≈ Reverse osmosis repair and maintenance
- ≈ Membrane replacement
- ≈ System upgrades and renovations
- ≈ Installation, start-up and operator training
- ≈ 510K medical device supplier
- ≈ Local services
- ≈ 24-hour emergency service
- ≈ Temporary and rental equipment

Services

Ultrapure Water
 Ultrapure water is required for medical, pharmaceutical, dialysis, laboratory, biotech and other industrial processes.

Process Water
 Water used in manufacturing and other industrial processes must be purified to reduce costs and control quality.

Laboratory Water
 Purified water is an essential resource in all laboratory environments. Water is often the major component in such diverse applications as buffer preparation and organ perfusion.

Biotech & Pharma
 Water quality, consistency and reliability are critical issues for biopharmaceutical research, bioproduction and drug discovery.

Hospital Water
 Purified water is a crucial resource in all medical and hospital applications such as hemodialysis, decontamination washers, clean sterilizer reuse and analyzer equipment.

Dialysis Water
 A patient's blood and dialysate are separated only by a thin semi-permeable membrane, making the quality of dialysis water and the dialysate critical.



Fahrenheit / Centigrade Temperature Conversion Chart
Total Water Treatment Resource Guide
 5002 World Dairy Drive • Madison, WI 53718
 1-800-929-2236 • www.total-water.com



Decontamination/Sterilizer Water Quality

- Conductivity..... Better than 200K
 - Reverse osmosis polished by deionized mixed bed resin tanks
- TOC No Standard
- Bacteria Minimum - no std
 - Ultraviolet light and 0.2-micron final filtration

Research Laboratory Standards

Type I Water

- 18.2 MΩ/cm @ 25° C
- TOC <10 PPB

Type II Water

- 5MΩ/cm @ 25° C
- TOC <30 PPB

Type III Water—Reverse Osmosis Water

AAMI Standards

Contaminant	AAMI Suggested Maximum Levels
Aluminum	0.010 mg/L
Antimony	0.006 mg/L
Arsenic	0.005 mg/L
Barium	0.100 mg/L
Beryllium	0.0004 mg/L
Cadmium	0.0010 mg/L
Calcium	2.000 mg/L
Chromium	0.014 mg/L
Copper	0.100 mg/L
Cyanide	0.020 mg/L
Fluoride	0.200 mg/L
Iron	N/A
Lead	0.005 mg/L
Magnesium	4.000 mg/L
Mercury	0.0002 mg/L
Nitrate (as N)	2.000 mg/L
pH	N/A
Potassium	8.000 mg/L
Resistivity	N/A
Selenium	0.090 mg/L
Silver	0.005 mg/L
Sodium	70.000 mg/L
Sulfate	100.00 mg/L
Thallium	0.002 mg/L
Total Dissolved Solids	N/A
Zinc	0.100 mg/L

Conductivity and Resistivity (NaCl and CaCO₃ Solutions at 25° C)

*1 grain per gal = 17.1 ppm (CaCO₃)

**theoretical maximum level

Grains/Gal* as CaCO ₃	ppm as CaCO ₃	ppm NaCl	Conductivity micromhos/cm	Resistivity megohm/cm
99.3	1700	2000	3860	0.00026
74.5	1275	1500	2930	0.00034
49.6	850	1000	1990	0.00050
24.8	425	500	1020	0.00099
9.93	170	200	415	0.0024
7.45	127.50	150	315	0.0032
4.96	85.0	100	210	0.0048
2.48	42.5	50	105	.0095
0.992	17.0	20	42.7	0.023
0.742	12.7	15	32.1	0.031
0.496	8.5	10	21.4	0.047
0.248	4.5	5.0	10.8	0.093
0.099	1.70	2.0	4.35	0.23
0.074	1.27	1.5	3.28	0.30
0.048	0.85	1.0	2.21	0.45
0.025	0.42	0.50	1.13	0.88
0.0099	0.17	0.20	0.49	2.05
0.0076	0.13	0.15	0.38	2.65
0.0050	0.085	0.10	0.27	3.70
0.0025	0.042	0.05	0.16	6.15
0.00099	0.017	0.02	0.098	10.2
0.00070	0.012	0.015	0.087	11.5
0.00047	0.008	0.010	0.076	13.1
0.00023	0.004	0.005	0.066	15.2
0.00021	0.002	0.002	0.059	16.9
0.00006	0.001	0.001	0.057	17.6
none	none	none	0.055	18.3**

Semiconductor

Test	Attainable	Acceptable
Resistivity @ 25° C	18.2	18.2
(% of time)	100	98
TOC (ppb) On-line *	<1	<2
THM (ppb)	<2	<5
Particles— cts/Liter		
SEM	-	-
0.05- 0.1 μm	<300	350
0.1- 0.1 μm	<100	250
0.2- 0.5 μm	<50	100
0.5-1.0 μm	<10	30
>0.1 μm	<10	20
On-Line		
0.05- 0.1 μm	<200	300
0.1- 0.2 μm	<100	100
0.2- 0.5 μm	<10	10
0.5- 1.0 μm	<5	5
> 0.1 μm	<1	1
Oxygen (ppb)		
O ₂ Free System	<10/>1	<10/>1
Bacteria cfu/sample volume		
1 Liter	<1	<1
Silica (ppb)		
Total	<1.0	2.0
Dissolved	<0.1	<0.1

AAMI Bacterial Contamination Limits

Bacteria	AAMI Recommended Limit
Purified Water	<100 cfu/ml
Dialysate	<100 cfu/ml
Endotoxin	AAMI Recommended Limit
Purified Water	<0.25 EU
Dialysate	<0.50 EU

ASTM

Water Specifications			
Water Type	I	II	III
Electrical Resistivity, min (Megohm-cm compensated at 25°C)	18.0	1.00	4.0
Total Organic Carbon, max (ppb)	100	50	200
Sodium, max (ppb)	1	5	10
Chlorides, max (ppb)	1	5	10
Total Silica, max (ppb)	3	3	500
Water Type	A	B	C
Maximum Bacteria Count (cfu/ml)	10/1000 ml	10/100 ml	100/10 ml
Endotoxin (eu/ml)	<0.03	<0.25	N.A.

CLRW (Clinical Laboratory Reagent Water)

Water Specifications		
Water Type	CLRW	SRW
Maximum Bacterial Content, Colony forming units per ml. (cfu/ml)	10	User specified
pH	N.S.	User specified
Minimum Resistivity (megohm-cm at 25°)	10	User specified
Particulate Matter	0.22	User specified
Organic Impurities (TOC)	500 ppb.	User specified

2015 USP 23-NF18

** Guidelines Only

(TOC) Total Organic Carbon	N.S.	500 ppb
Conductivity		1.3 μS/cm @ 25°C 1.1 μS/cm @ 20°C
Bacteria (cfu/ml)		
Purified	100**	100**
WFI	10/100	0.1
Endotoxin (eu/ml) by LAL		
Purified	—	Unchanged
WFI	.25	Unchanged



www.Total-Water.com
1-800-929-2236