

## WATER QUALITY STANDARDS

### (A) American Society for Testing and Materials (ASTM) D1193-91

Standard specification for Reagent Grade Water				
	Type 1 *	Type 2 **	Type 3 ***	Type 4
Electrical Conductivity Max. ( $\mu\text{S}/\text{cm}$ @ 25°C)	0.056	1.0	0.25	5.0
Electrical Resistivity Min. ( $\text{M}\Omega\text{-cm}$ @ 25°C)	18.0	1.0	4.0	0.2
pH @ 25°C	-	-	-	5.0-8.0
TOC max. $\mu\text{g}/\text{l}$	100	50	200	no limit
Sodium max. $\mu\text{g}/\text{l}$	1	5	10	50
Silica max. $\mu\text{g}/\text{l}$	3	3	500	no limit
Chloride max. $\mu\text{g}/\text{l}$	1	5	10	50

\* Requires the use of a 0.2 $\mu\text{m}$  membrane filter.

\*\* Prepared by distillation.

\*\*\* Requires the use of a 0.45 $\mu\text{m}$  membrane filter.

When bacterial levels need to be controlled, reagent grade types should be further classified as follows:

	Type A	Type B	Type C
Total Bacteria Count max. CFU/100ml	1	10	1000
Endotoxin max. EU/ml	0.03	0.25	-

## 7. WATER QUALITY STANDARDS

### (B) National Committee for Clinical Laboratory Standards (NCCLS) - 1988

	Type I	Type II	Type III
<b>Bacteria (CFU/ml)</b>	< 10	> 1000	N/A
<b>pH</b>	N/A	N/A	5.0-8.0
<b>Resistivity (M<math>\Omega</math>-cm @ 25°C)</b>	> 10 *	> 1	> 0.1
<b>SiO<sub>2</sub> (mg/l)</b>	< 0.05	< 0.1	< 1
<b>Total Solids (mg/l)</b>	0.1	1	5
<b>Total Oxidisable Organic Carbon (mg/l)</b>	< 0.05	< 0.2	< 1

Type I water must be free of particulate matter larger than 0.2  $\mu$ m.

\* Resistivity of Type I must be measured in-line.

N/A = not applicable.

#### Type I

Test methods requiring minimal interference and maximum precision and accuracy, i.e. atomic absorption and flame emission spectrometry, enzymatic procedures sensitive to trace metals, electro-phoretic procedures, high sensitivity chromatographic procedures, buffer solutions, preparation of standard solutions.

#### Type II

General laboratory testing other than above and glasswashing.

#### Type III

Glassware washing, preliminary rinsing of glassware and feedwater for producing higher grade water.

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### (C) College of American Pathologists (CAP) - 1988

Suggested minimum specifications

	Type I	Type II	Type III
<b>Resistivity (M<math>\Omega</math>.cm @ 25°C)</b>			
<b>a. In-line</b>	10.0	-	-
<b>b. Effluent (as used)</b>	-	2.0	0.1
<b>Silicate (mg/l at SiO<sub>2</sub>)</b>	0.05	0.1	1.0
<b>pH</b>	N/A	N/A	5.0-8.0
<b>Microbiological Content</b>	10	1000	N/A

Particulate matter - Type I water should be free of particles (< 500 particles/litre) greater than 0.2 $\mu$ m.

Suggested water quality uses:

Type I: Tissue or cell culture, ultra-micro analysis, critical analytical procedures, standard preparations.

Type II: Most routine laboratory methods, immunology, haematology and other areas.

## 7. WATER QUALITY STANDARDS

### (D) Water Quality Standards for Haemodialysis

Category	Substance	Symbol	AAMI max. level (Also recommended by the RA) *	From EC ** Pharmacopoeia
1	Aluminium	Al	0.01 ppm	0.01 ppm
1	Copper	Cu	0.1 ppm	♦
1	Fluoride	F	0.2 ppm	0.2 ppm
1	Nitrates	NO <sub>3</sub>	2 ppm	2 ppm
1	Sulphate	SO <sub>4</sub>	100 ppm	50 ppm
1	Zinc	Zn	0.1 ppm	0.1 ppm
1	Chloramines		0.1 ppm	
1	Free Chlorine	CL <sub>2</sub>	0.5 ppm	
1	Total Available Chlorine			0.1 ppm
2	Calcium	Ca	2 ppm	2 ppm
2	Magnesium	Mg	4 ppm	2 ppm
2	Potassium	K	8 ppm	2 ppm
2	Sodium	Na	70 ppm	50 ppm
2	Chlorides	Cl		50 ppm
3	Arsenic	As	0.005 ppm	♦
3	Barium	Ba	0.1 ppm	♦
3	Cadmium	Cd	0.001 ppm	♦
3	Chromium	Cr	0.01 ppm	♦
3	Lead	Pb	0.005 ppm	♦
3	Mercury	Hg	0.002 ppm	0.001 ppm
3	Selenium	Se	0.01 ppm	
3	Silver	Ag	0.005 ppm	♦
	pH			6-8 pH
	Oxidisable Substances			nil
	Ammonium			0.2 ppm
	Heavy Metals			0.1 ppm
	Microbial Contamination		TVC < 200 per ml	TVC < 100 per ml
	Endotoxins		10.0 EU/ml	< 0.25 EU/ml

Categories 1 Toxic substances described in Dialysis literature.

2 Non-toxic substances included in dialysis fluid.

3 Substances described as toxic in Drinking Water literature.

\* From a draft document by the Standards Subcommittee of the Renal Association.

\*\* From 'Water for diluting concentrated haemodialysis solutions' Annex to the European Pharmacopoeia Fasciculé 16. (Adopted by the Council of Europe).

♦ Included in the global limit for Heavy Metals

AAMI The Association for the Advancement of Medical Instrumentation (USA) 1981

RA The Renal Association  
EC European Community 1992  
01.01.95

Date: