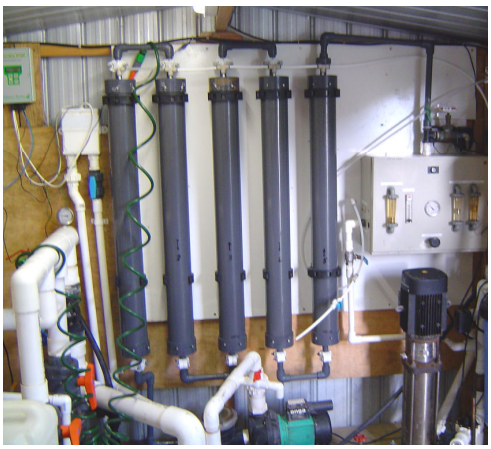
HIGH PURITY WATER SYSTEMS: REVERSE OSMOSIS DEIONISATION

SITE INSTALLATIONS



Anthony Preston Ltd *Po Box 38-106 Howick, Phone (09) 534 5127, Fax (09) 535 6353*

REVERSE OSMOSIS

(REDUCES TDS BY 98%)

AQUAPRO COMPACT & COMMERCIAL RO UNITS

DEIONISATION

(REDUCES CONDUCTIVITY TO <1 MICROSIEMEN)

KLEENPLUS APP68 RO DI UNIT
KLEENPLUS MB' SERIES DI TANKS

Kleen-*Plus*®

COMBINED REVERSE OSMOSIS/DEIONISATION

REVERSE OSMOSIS REDUCES TDS BY 98%
DEIONISATION POLISHES WATER TO BELOW 1 MICROSIEMEN
(EXTENDS DI RESIN LIFE BY A FACTOR OF 30-50 TIMES)

KLEENPLUS RO DI UNITS APP77,APP77A

Kleen-*Plus*®

Degrees of Water Quality

(In terms of Ionic load as measured by Total Dissolved Solids)

TYPE OF WATER	TDS	CONDUCTIVITY (microseimens)	RESISTIVITY (megohms)
Theoretical maximum quality attainable (calculated)	0	.04	26
Water after 28 distillation in quartz	.02	.05	23
Water treated by mixed-bed deionizer system	.03	0.6	18
Water after three distillations in quartz	.25	.5	2
Water after three distillations in glass	.5	1	1
Rain water in equilibrium with carbon dioxide in an unpolluted atmos-phere	.7	1.4	0.7
Water after a single distillation in glass (normally called distilled water)	1	2	0.5
Water treated by multi-column deionizer system	3.5	7	0.15

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HIGH PURITY WATER

Laboratory use

Water quality "norms" for purified water have been established by a number of professional organizations, including the American Chemical Society (ACS), the American Society for Testing and Materials (ASTM), the National Committee for Clinical Laboratory Standards (NCCLS) which is now CLSI, and the U.S. Pharmacopeia (USP).
The ASTM, NCCLS, and ISO 3696 classify purified water into Grade 1-3 or Types I-IV depending upon the level of purity. These organizations have similar, although not identical parameters for highly purified water.
Regardless of which organization's water quality norm is used, even Type I water may require further purification depending upon the specific laboratory application. For example, water that is being used for molecular biology experiments needs to be DNase or RNase-free, which requires special additional treatment or functional testing. Water for microbiology experiments needs to be completely sterile, which is usually accomplished by autoclaving. Water used to analyze trace metals may require elimination of trace metals to a standard beyond that of the Type I water norm.

Conductivity of ultra-pure water is 5.5×10^{-6} $S \cdot m^{-1}$ (18 MΩ cm) and is due only to H^+ and OH^- ions produced in the water dissociation equilibrium. This low conductivity is only achieved, however, in the presence of dissolved monoatomic gases. Completely de-gassed ultra-pure water has conductivity of 1.2×10^{-4} $S \cdot m^{-1}$, whereas upon equilibration to the atmosphere it is 7.5×10^{-5} $S \cdot m$ due to dissolved CO_2 in it. The highest grades of ultrapure water should not be stored in glass or plastic containers because these container materials leach (release) contaminants at very low concentrations. Storage vessels made of silica are used for less demanding applications and vessels of ultrapure tin are used for the highest purity applications.