



## ULTRAPURE WATER ANALYSIS

### Total Oxidizable Carbon (TOC)

**Technique:** Heat/Persulfate oxidation method

**Information:** Measures the effectiveness of a UPW system in removing organic carbon. The control of organics is essential since organic matters provide nutrients for bacterial growth.

### Total Bacteria By Epifluorescence

**Technique:** Epifluorescence microscope

**Information:** Provides accurate information about actual bacterial content (both viable and non-viable) of a UPW system. Bacteria poses both biological and particulate threat to integrated devices.

### Viable Bacteria By Culture

**Technique:** Incubation and optical microscope

**Information:** Provides bacteria counts in colony-forming units per unit volume

### Total Viable Organisms

**Technique:** Scan RDI

**Information:** Provides bacteria counts based on direct measurements of cell activity and includes bacteria and other live organisms that may be present in biofilm

### Dissolved Silica

**Technique:** Colorimetry heteropoly blue method

**Information:** Early indication of resin bed exhaustion prior to the breakthrough of Na<sup>+</sup>, Cl<sup>-</sup> and other monovalent ions from the resin

### Total Silica

**Technique:** Inductively coupled plasma-mass spectrometry (ICP-MS)

**Information:** All forms of silica are not reactive in the heteropoly method except for dissolved silica. The quantity of total silica in UPW must therefore be verified independently by ICP-MS.

### Ionic (Anions and Cations)

**Technique:** Ion chromatography (IC)

**Information:** Detection of anions and cations at the point-of-use (POU) in rinse bath is recommended to prevent haze formation on wafer surfaces caused by poor rinsing or inadequate exhaust at wet benches

### Trace Metals

**Technique:** Inductively coupled plasma-mass spectrometry (ICP-MS)

**Information:** Provides a comprehensive evaluation of trace impurities in the UPW streams and rinse baths at various locations in the supply and return loops as well as at the POU



# ULTRAPURE WATER ANALYSIS

## Test Parameters, Typical Locations, and Frequency of Monitoring

Type of Water / Analysis	Source	Pre RO	UPW	UPW	UPW	UPW	UPW
	Incoming Feed pre RO filters	Post RO prefilters	Post RO	Post Ion Exchange	Post Final Filter	Return Loop	POU Tools (Recommended)
Resistivity	-	Continuous (Conductivity)	Continuous (Conductivity)	Continuous (Conductivity)	Continuous (Conductivity)	Continuous (Conductivity)	-
TOC	Bi-weekly	Bi-weekly	Continuous	Continuous	Continuous	Continuous	Bi-weekly
Particles LPC	Monthly	Monthly	Monthly	Continuous	Continuous	Continuous	Monthly
Particles SEM	-	-	-	Bi-monthly	Monthly	Bi-monthly	Monthly
Bacteria	Bi-weekly	Bi-weekly	Bi-weekly	Bi-weekly	Weekly	Weekly	Bi-weekly
Dissolved Silica	Monthly	Monthly	Monthly	Continuous	Continuous	Continuous	Monthly
Total Silica	Monthly	Monthly	Monthly	Bi-weekly	Weekly	Weekly	Bi-weekly
NVR	-	-	-	-	Continuous	-	-
Sodium	-	-	-	Continuous	Continuous	Continuous	-
Boron	Monthly	Monthly	Monthly	Profile to determine bed dynamics	Weekly	-	-
Anions and Cations	Monthly	Monthly	Monthly	Bi-weekly	Bi-weekly	Bi-weekly	-
Critical Ions <sup>1</sup>	-	-	-	-	-	-	Bi-weekly
Trace Metals Critical Elements <sup>2</sup>	-	-	-	Bi-weekly	-	-	Bi-weekly
Trace Metals Full Scan	Quarterly	Quarterly	Quarterly	Quarterly	Monthly	Monthly	-

<sup>1</sup> Critical ions include chloride, fluoride, and ammonium

<sup>2</sup> Critical elements include Al, Ca, Cr, Cu, Fe, Mg, Ni, Na, and Zn

