avista technologies

Product Catalogue 2008

The Electronic Version

Welcome to Avista Technologies

Product Lines:

This is a catalogue covering Avista's main product lines. For a full listing of Avista's products and services, please visit www.avistatech.com

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Visit www.avistatech.com for a list of global offices and distributors.

Welcome to Avista Technologies

Product Catalogue

'Avista Technologies meets the specialised needs of the worldwide membrane separation industry, supplying speciality chemicals and technical support services that keep plants running efficiently.'

Our product catalogue is designed to provide you with all the standard technical information you might need on our products and to give you details on how to contact us for further information or product ordering.

The catalogue has been fully revised and updated to include product datasheets for:

- **Vitec** ® Antiscalants
- **RoClean** Cleaning Chemicals
- **RoCide** ® Biocides
- **RoQuest** ® Coagulants
- **Ancillary Products**
- **Services**

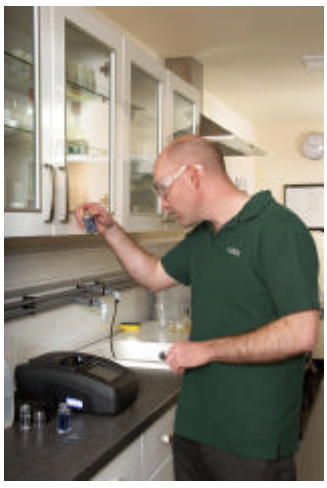
Technical support sections are provided to give advice on all aspects of chemical application and design. In addition case studies are provided to give examples of these applications.

Avista Advisor 3 software user guide manual is included. This provides calculations for ALL products supplied by Avista Technologies. Please contact your local representative for your copy of the new software and training on its use.

Details are also provided on our chemical supply formats and our Quality, Health & Safety and Envrionmental standards.

We hope this catalogue provides all the information you need to design in our products and order them for your system. If there is anything else you need (technical or commercial) please contact us at the number below or at one of our locations shown overleaf.

Avista Technologies
Tel: +44 131 449 6677



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Product Catalogue

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Avista Technologies (UK)	United Kingdom	+ 44 131 449 6677	info@avistatech.co.uk
Avista Technologies, Inc.	United States	+ 1 760 744 0536	info@avistatech.com
Regional Offices and Distributors			
INAQUA Sara doo	Bosnia & Herzegovina	+ 387 35 743 977	sales@inaqua-sara.ba
AcquaLease	Brazil	+ 55 11 56413887	jprs@ig.com.br
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Avista Technologies	Mexico	+ 52 6865687393	avistatc@telnor.net
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Nisco - Inaqua JV Ltd	Russia	+ 7 095 728 4213	g.malakhov@inaquanisco.ru
Chemsbro	Saudia Arabia	+ 966 2660 6802	info@chemsbro.com
Marsi Water	South Africa	+ 27 11 704 4035	marius@marsiwater.com
Park Tank	Singapore	+65 62 84 38 77	afi@pacific.net.sg
Avista Desalination Services	Spain	+ 34 93 817 5242	spain@avistatech.eu
INAQUA Ukraina	Ukraina	+ 40 21 320 1401	ecos@carrier.kiev.ua
Waterbird Water Treatment Chemicals	United Arab Emirates	+ 971 4 340 5961	sales@waterbird.com

Please contact the UK office for details of further agents and supply routes if your product destination is other than those listed above.

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About Avista Technologies

Avista Technologies team of scientists and engineers are dedicated to making water treatment membrane systems operate more cost effectively and efficiently by the application of their formulated chemicals. As membrane systems are our sole focus everyone you meet is a membrane expert and all our time is spent improving membrane system perfomance. This focus has created a tremendous wealth of experience for our customers benefit.

The team utilise our fully equipped laboratories to perform membrane autopsies, foulant studies, coagulant recommendation studies and cleaning trials for clients. In addition they are continually improving the product offering to meet the every growing needs of the markets diverse applications.

'Your RO Solution is either in our lab or our warehouse'

Vitec RoCide RoQuest RoClean
Antiscalant Biocide Coagulant Cleaners

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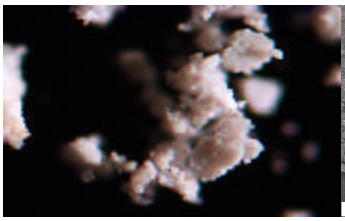
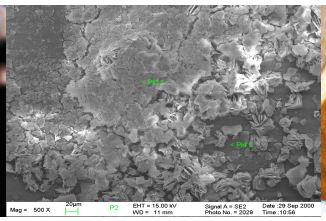
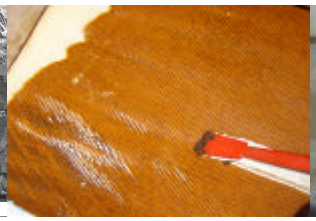
Vitec® Antiscalants

Selection Guide

Without some means of upstream scale inhibition, RO membranes and their flow passages will scale up if the solubility limits of sparingly soluble salts is exceeded. Common examples of scale are calcium carbonate ($CaCO_3$), calcium sulfate ($CaSO_4$), barium sulfate ($BaSO_4$), and strontium sulfate ($SrSO_4$). Less common but equally problematic are silica (SiO_2) and calcium fluoride (CaF) scales.

Avista Technologies provides a range of antiscalants suitable for treating, well, surface, municipal and recycled waters. The ***Avista Advisor*** chemical projection programme is provided to assist customers in selecting the most appropriate antiscalant for the application and to determine the minimum effective dose rate.


Products are available to prevent scaling up to:

CCPP	900	LSI/S&DI	3
$CaSO_4$	7 x Ksp	$BaSO_4$	105 x Ksp
$SrSO_4$	35 x Ksp	SiO_2	250mg/l in brine
CaF	1000 x Ksp		

The table below details the functionality of the antiscalants provided and the table overleaf gives a guide to typical waters each is applied to.

Guide to Selection of Vitec® Antiscalant/Dispersants:										
	Effective against:									
	Scale						Iron	Colloids and Silt	Silica	CC*
Product Name	$CaCO_3$	$CaSO_4$	$SrSO_4$	$CaPO_4$	$BaSO_4$	MgOH				
Vitec 1000	✓									
Vitec 2000	✓	✓	✓	✓	✓	✓	✓	✓		
Vitec 3000	✓	✓	✓		✓			✓		✓
Vitec 4000	✓	✓	✓		✓		✓✓	✓	✓✓	
Vitec 5000♦	✓	✓	✓		✓			✓		✓
Vitec 7000	✓	✓✓	✓		✓			✓		✓

**CC= coagulant compatible*

♦ includes Vitec 5100,5200,5300

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Avista Technologies antiscalants are certified under ANSI/NSF 60 and other national drinking water standards (including the UK drinking water standard) for use in potable water systems. Additionally, the products have been tested to demonstrate compatibility with the major membrane manufacturers' products.

Application	Vitec® Product Suitable for Application				
	2000	3000	4000	5000	7000
Well water	✓	✓		✓	
Open seawater		✓		✓	
Municipal supply		✓		✓	
Surface Water BWRO	✓	✓		✓	
Treated Effluent	✓	✓		✓	
Waste Water	✓	✓			
High Silica BW or SW			✓		
High Sulphate					✓
High pH feed water	✓				

See Also:

Individual product datasheets for particular properties and application notes for each product.

Technical support section (9) which provides information on how antiscalants work, a guide to water sampling for antiscalant projections and system normalisation details so you can monitor your antiscalant effectiveness.

The ***Avista Advisor 3*** software is also available to allow you to calculate your required antiscalant dose.

Avista Technologies can carry out your water analysis or produce your antiscalant projection. For particularly unusual conditions (or highly variable ones) pilot testing can be carried out in our lab or on site.

Product approvals have been granted by water regulators, membrane manufacturers and industry bodies. Please contact your local representative for up to date information.

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Vitec® 1000

Polyacrylic Acid Antiscalant Product Datasheet

Performance:

Vitec® 1000 antiscalant offers a variety of performance and application benefits:

- Inhibits RO membrane scaling caused by the following:

  Calcium Carbonate ($CaCO_3$)
  Calcium Sulfate ($CaSO_4$)
  Barium Sulfate ($BaSO_4$)
  Strontium Sulfate ($SrSO_4$)
  Calcium Fluoride (CaF)

- Compatible with the thin film composite (polyamide) and cellulose acetate RO membranes of the leading manufacturers.

- Certified by Underwriters Laboratories under ANSI/NSF 60 for use in systems producing potable water.

Vitec® 1000 is a liquid antiscalant designed to inhibit scale in cellulose acetate and thinfilm membrane separation systems. The formulation contains a 35% by weight solution of polyacrylic acid that has a tight molecular weight range of 2000.

This product is designed for use in waters that do not have a high potential for colloidal and silt fouling of RO membrane surfaces (i.e. groundwater applications). Vitec ®1000 can be injected neat or diluted and a site-specific dosage can be determined using the Avista Advisor software program.

Application:
Vitec® 1000 performance is achieved when the chemical is injected downstream of multimedia filters and upstream of cartridge filters.

Dosing Guidelines:
The typical dosage ranges are actually between 2 to 5 ppm. A site-specific dose can be determined using the Avista computer program. Like any injected chemical, over or underdosing may cause unnecessary membrane system fouling. Please contact the Avista customer service department for customized dosing instructions.

Dilution:
The maximum dilution for Vitec® 1000 should not exceed 10%. This guideline will protect the effectiveness of the internal bacteriostat, which inhibits bacterial growth within the drum and feed tank.

Packaging and Storage:
Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs.

Specifications	
Appearance:	Clear liquid
pH (10% solution):	3.0 – 5.0
Specific Gravity@20°C:	1.05-1.25

Packaging Formats	Americas	EMEA
Pails	45 lbs	-
Drums	525 lbs	250 kg
IBC's (totes)	2500 lbs	1250 kg

This product should be protected from freezing during storage as the active ingredients may separate under extreme temperatures. If freezing occurs, warm the chemical until it returns to the liquid state and stir to recombine.

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Vitec® 2000

Antiscalant/Dispersant Product Datasheet

Performance:

Vitec® 2000 antiscalant offers a variety of critical performance and application benefits:

- Powerful inhibitor against a variety of carbonate and sulfate scale:

$CaCO_3$	**CCPP>900 (LSI>3.0)**
$CaSO_4$	**3.5xKsp**
$BaSO_4$	**105 x Ksp**
$SrSO_4$	**35 x Ksp**
CaF	**1000 x Ksp**
SiO_2	**120ppm**

- Highly effective in a wide range of feedwater types and pH ranges.
- Dispersant qualities reduce colloidal and silt fouling of membrane surfaces.
- High tolerance for ferrous ion.
- Excellent dispersant for alum particles
- Compatible with all leading RO membranes

Vitec® 2000 is a proprietary liquid antiscalant/dispersant designed to inhibit scale and disperse colloidal particles in cellulose acetate and thinfilm membrane separation systems.

Vitec® 2000 can be injected neat or diluted and can be used in a wide array of feedwater sources including surface or well waters. Dosages can be determined using the ***Avista Advisor*** program and are based on feedwater analysis and specific water treatment system data.

Application:

Optimum Vitec® 2000 performance is achieved when the chemical is injected downstream of multimedia filters and upstream of cartridge filters. In systems using sulfuric acid (H_2SO_4), the best results are obtained when the acid is injected far enough upstream to ensure it is adequately mixed prior to the Vitec® 2000 injection point.

Dosing Guidelines:

The typical dosage range is between 2 to 5 ppm. A site-specific dose can be determined using the Avista Advisor computer program.

Like any injected chemical, over or underdosing may cause unnecessary membrane system fouling. Please contact the Avista customer service department for customized dosing instructions.

Dilution:

The maximum dilution for Vitec® 2000 should not exceed 10%. This guideline will protect the effectiveness of the internal bacteriostat, which inhibits bacterial growth within the drum and feed tank.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	Light amber liquid
pH (10% solution):	4.5 –5.5
Specific Gravity@20°C:	1.15± 0.05

Packaging Formats	Americas	EMEA
Pails	45 lbs	23 kg
Drums	500 lbs	230 kg
IBC's (totes)	2500 lbs	1100 kg

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Vitec® 3000

Antiscalant/Dispersant Product Datasheet

Performance:

Vitec® 3000 antiscalant offers a variety of critical performance and application benefits:

- Powerful inhibitor against a variety of carbonate and sulfate scale:

$CaCO_3$	**CCPP>900 (LSI>2.5)**
$CaSO_4$	**3.5xKsp**
$BaSO_4$	**105 x Ksp**
$SrSO_4$	**20 x Ksp**
CaF	**1000 x Ksp**
SiO_2	**120ppm**

- Highly effective in a wide range of feedwater types and pH ranges.
- Crystal modification property distorts inorganic salt crystal growth, reducing system fouling.
- Compatible with polyelectrolyte coagulants
- Threshold scale inhibition at low dosage rates allows economical system operation.

NSF Certified to NSF/ANSI 60

DRINKING WATER TREATMENT ADDITIVES CLASSIFIED BY NSF INTERNATIONAL TO NSF/ANSI 60 ON SEPTEMBER 2004 AS STANDARD DRINKING WATER TREATMENT CHEMICAL FOR USE IN REVERSE OSMOSIS SYSTEMS AT A MAXIMUM LEVEL OF 7 mg/l

Vitec® 3000 is a proprietary liquid antiscalant/dispersant designed to inhibit scale and disperse colloidal particles in cellulose acetate and thinfilm membrane separation systems. The formulation has been certified by the National Sanitation Foundation (NSF) under ANSI/NSF Standard 60 for use in producing potable water.

This formulation is compatible with organic coagulants. Coagulants may be indirectly present in municipal feed waters or directly present as a result of coagulation or flocculation treatments upstream of the reverse osmosis system.

Vitec® 3000 can be injected neat or diluted and can be used in a wide array of feedwater sources.

Application:

Optimum Vitec® 3000 performance is achieved when the chemical is injected downstream of multimedia filters and upstream of cartridge filters.

Dosing Guidelines:

The typical dosage range is between 2 to 5 ppm. A site-specific dose can be determined using the ***Avista Advisor*** computer program. Like any injected chemical, over or underdosing may cause unnecessary membrane system fouling. Please contact the Avista customer service department for customized dosing instructions.

Dilution:

Vitec® 3000 should be diluted with demineralized water or RO permeate. If neither of these water sources is available, softened water may be substituted. The dilution for Vitec® 3000 should not exceed 1% by weight (dilutions below 10% by weight must use DI quality water). This guideline will protect the effectiveness of the internal bacteriostat, which inhibits bacterial growth within the drum and feed tank.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	Light amber liquid
pH (as supplied):	9.8 –11.8
Specific Gravity@20°C:	1.25± 0.05

Packaging Formats	Americas	EMEA
Pails	45 lbs	23 kg
Drums	500 lbs	230 kg
IBC's (totes)	2500 lbs	1100 kg

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Vitec® 4000

Antiscalant/Dispersant Product Datasheet

Performance:

Vitec® 4000 antiscalant offers a variety of critical performance and application benefits:

- Protects membranes from silica scale when used in accordance with published limitations of 250 ppm of SiO_2 in the RO concentrate.
- Certified by the National Sanitation Foundation (NSF) under ANSI/NSF 60 for use in systems producing potable water.
- Powerful inhibitor against a variety of carbonate and sulfate scale:

$CaCO_3$	**CCPP>900 (LSI>2.5)**
$CaSO_4$	**3.5xKsp**
$BaSO_4$	**105 x Ksp**
$SrSO_4$	**20 x Ksp**
CaF	**1000 x Ksp**
SiO_2	**120ppm**

- Dispersant qualities reduce colloidal and silt fouling of membrane surfaces.
- Excellent dispersant for alum particles.
- Compatible with all leading RO membranes.

NSF Certified to NSF/ANSI 60

DRINKING WATER TREATMENT ADDITIVES CLASSIFIED BY NSF INTERNATIONAL TO NSF/ANSI 60 ON SEPTEMBER 2004 AS STANDARD DRINKING WATER TREATMENT CHEMICAL FOR USE IN REVERSE OSMOSIS SYSTEMS AT A MAXIMUM LEVEL OF 7 mg/l

Vitec® 4000 is a proprietary liquid antiscalant designed to inhibit silica, sulfate, and carbonate scales and disperse colloidal particles in cellulose acetate and thinfilm membrane separation systems.

This formulation is unique in that it inhibits silica scaling at higher concentrations than typical antiscalants, a feature which may allow significantly increased RO system recovery in high silica feedwaters. It retains its performance even in RO concentrate streams containing up to 4 ppm of ferrous iron.

Application:

Optimum Vitec 4000 performance is achieved when the chemical is injected downstream of multimedia filters and upstream of cartridge filters. In systems using sulfuric acid (H2SO4), the best results are obtained when the acid is injected far enough upstream to ensure it is adequately mixed prior to the Vitec 4000 injection point.

Dosing Guidelines:

Typical dosage ranges are between 2 to 5 ppm. A site-specific dose can be determined using the Avista computer program.

Like any injected chemical, over or under dosing may cause unnecessary membrane system fouling. Please contact the Avista customer service department for advice.

Dilution:

The maximum dilution for Vitec 4000 should not exceed 10%. This guideline will protect the effectiveness of the internal bacteriostat, which inhibits bacterial growth within the drum and feed tank.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	Light amber liquid
pH (as supplied):	4.5 –6.5
Specific Gravity@20°C:	1.15± 0.05

Packaging Formats	Americas	EMEA
Pails	45 lbs	23 kg
Drums	500 lbs	230 kg
IBC's (totes)	2500 lbs	1100 kg

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Vitec® 5000

Antiscalant Product Datasheet

Performance:

Vitec® 5000 antiscalant offers a variety of performance and application benefits:

- Powerful inhibitor against a variety scales including:
  - **$CaCO_3$**
  - **CCPP>900**
  - **(LSI>2.8)**
  - **$CaSO_4$**
  - **3.0xKsp**
  - **$BaSO_4$**
  - **105 x Ksp**
  - **$SrSO_4$**
  - **20 x Ksp**
  - **CaF**
  - **1000 x Ksp**
  - **SiO_2**
  - **120ppm**
- Highly effective at low dose rates in a wide range of feedwater types and pH ranges.
- Compatible with polyelectrolyes
- Provides both scale and inorganic fouling control
- Compatible with all membrane types

Vitec® 5000 is a liquid antiscalant/dispersant blended to inhibit scale and disperse colloidal particles in cellulose acetate and thinfilm membrane separation systems. The formulation has been approved for use in drinking water by the UK Secretary of State.

This formulation is its compatible with Avista Technologies organic coagulants.

Application:
Optimum Vitec 5000 performance is achieved when the chemical is injected upstream of the membrane system and where possible of cartridge filters.

Dosing Guidelines:
The typical dosage range is between 2 to 5 ppm. A site-specific dose can be determined using the **Avista Advisor** computer program. Like any injected chemical, over or underdosing may cause unnecessary membrane system fouling. Please contact the Avista customer service department for site specific dosing instructions.

Dilution:
If dilution is required, Vitec 5000 should be diluted with demineralized water or RO permeate. If neither of these water sources is available, softened water may be substituted. The dilution for Vitec 5000 should not exceed 10% by weight.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	Light amber liquid
pH (10% solution):	2.0 – 3.0
Specific Gravity@20°C:	1.17± 0.05

Packaging Formats	Americas	EMEA
Pails	45 lbs	23 kg
Drums	500 lbs	230 kg
IBC's (totes)	2500 lbs	1100 kg

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Vitec® 5100

Antiscalant Product Datasheet

Performance:

Vitec® 5100 antiscalant offers a variety of performance and application benefits:

- Powerful inhibitor against a variety scales including:

$CaCO_3$	**CCPP>900 (LSI>2.8)**
$CaSO_4$	**3.0 x Ksp**
$BaSO_4$	**105 x Ksp**
$SrSO_4$	**20 x Ksp**
CaF	**1000 x Ksp**
SiO_2	**120ppm**

- Highly effective at low dose rates in a wide range of feedwater types and pH ranges.
- Compatible with polyelectrolyes
- Provides both scale and inorganic fouling control
- Compatible with all membrane types

Vitec® 5100 is a liquid antiscalant/dispersant blended to inhibit scale and disperse colloidal particles in cellulose acetate and thinfilm membrane separation systems. The formulation has been certified by the National Sanitation Foundation (NSF) under ANSI/NSF Standard 60 for use in producing potable water.

This formulation is its compatible with Avista Technologies organic coagulants.

Application:
Optimum Vitec 5100 performance is achieved when the chemical is injected upstream of the membrane system and where possible of cartridge filters.

Dosing Guidelines:
The typical dosage range is between 2 to 10 ppm. A site-specific dose can be determined using the **Avista Advisor** computer program. Please contact the Avista customer service department for site specific dosing instructions.

Dilution:
If dilution is required, Vitec 5100 should be diluted with demineralized water or RO permeate. If neither of these water sources is available, softened water may be substituted. The dilution for Vitec 5100 should not exceed 10% by weight.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	Clear yellow liquid
pH (2% solution):	5.5 – 6.5
Specific Gravity@20°C:	1.1± 0.05

Packaging Formats	Americas	EMEA
Pails	45 lbs	23 kg
Drums	500 lbs	230 kg
IBC's (totes)	2500 lbs	1100 kg

NSF Certified to NSF/ANSI 60

DRINKING WATER TREATMENT ADDITIVES CLASSIFIED BY NSF INTERNATIONAL TO NSF/ANSI 60 ON SEPTEMBER 2006 AS STANDARD DRINKING WATER TREATMENT CHEMICAL FOR USE IN REVERSE OSMOSIS SYSTEMS AT A MAXIMUM LEVEL OF 13 mg/l

10/08

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Vitec® 5200

Antiscalant Product Datasheet

Performance:

Vitec® 5200 antiscalant offers a variety of performance and application benefits:

- Powerful inhibitor against a variety scales including:
  - **$CaCO_3$** — **CCPP>900 (LSI>2.8)**
  - **$CaSO_4$** — **3.0 x Ksp**
  - **$BaSO_4$** — **105 x Ksp**
  - **$SrSO_4$** — **20 x Ksp**
  - **CaF** — **1000 x Ksp**
  - **SiO_2** — **120ppm**
- Highly effective at low dose rates in a wide range of feedwater types and pH ranges.
- Compatible with polyelectrolyes
- Provides both scale and inorganic fouling control
- Compatible with all membrane types

Vitec® 5200 is a liquid antiscalant/dispersant blended to inhibit scale and disperse colloidal particles in cellulose acetate and thinfilm membrane separation systems.

This formulation is its compatible with Avista Technologies organic coagulants.

Application:
Optimum Vitec 5200 performance is achieved when the chemical is injected upstream of the membrane system and where possible of cartridge filters.

Dosing Guidelines:
The typical dosage range is between 3 to 10 ppm. A site-specific dose can be determined using the **Avista Advisor** computer program. Please contact the Avista customer service department for site specific dosing instructions.

Dilution:
If dilution is required, Vitec 5200 should be diluted with demineralized water or RO permeate. If neither of these water sources is available, softened water may be substituted. The dilution for Vitec 5200 should not exceed 25% by weight.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	Light amber liquid
pH (10% solution):	5.5 – 6.5
Specific Gravity@20°C:	1.1± 0.05

Packaging Formats	Americas	EMEA
Pails	-	23 kg
Drums	-	230 kg
IBC's (totes)	-	1100 kg

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Vitec® 5300

Antiscalant Product Datasheet

Performance:

Vitec® 5300 antiscalant offers a variety of performance and application benefits:

- Powerful inhibitor against a variety scales including:
  - **$CaCO_3$** — **CCPP>900 (LSI>2.8)**
  - **$CaSO_4$** — **3.0 x Ksp**
  - **$BaSO_4$** — **105 x Ksp**
  - **$SrSO_4$** — **20 x Ksp**
  - **CaF** — **1000 x Ksp**
  - **SiO_2** — **120ppm**
- Highly effective at low dose rates in a wide range of feedwater types and pH ranges.
- Compatible with polyelectrolyes
- Provides both scale and inorganic fouling control
- Compatible with all membrane types

Vitec® 5300 is a liquid antiscalant/dispersant blended to inhibit scale and disperse colloidal particles in cellulose acetate and thinfilm membrane separation systems.

This formulation is its compatible with Avista Technologies organic coagulants.

Application:
Optimum Vitec 5300 performance is achieved when the chemical is injected upstream of the membrane system and where possible of cartridge filters.

Dosing Guidelines:
The typical dosage range is between 3 to 10 ppm. A site-specific dose can be determined using the **Avista Advisor** computer program. Please contact the Avista customer service department for site specific dosing instructions.

Dilution:
This product should be used 'neat'. If dilution is required then contact your Avista representative for advice.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	Light amber liquid
pH (10% solution):	5.5 – 6.5
Specific Gravity@20°C:	1.05± 0.05

Packaging Formats	Americas	EMEA
Pails	-	23 kg
Drums	-	230 kg
IBC's (totes)	-	1100 kg

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Vitec®7000

Calcium Sulphate Antiscalant Dispersant

Performance:

Vitec® 7000 antiscalant offers a variety of critical performance and application benefits:

- Powerful inhibitor against a variety of carbonate and sulfate scales:

$CaCO_3$	**CCPP>900 (LSI>2.5)**
$CaSO_4$	**6.0xKsp**
$BaSO_4$	**105 x Ksp**
$SrSO_4$	**20 x Ksp**
CaF	**1000 x Ksp**
SiO_2	**120ppm**

- Highly effective in a wide range of feedwater types and pH ranges.
- Crystal modification property distorts inorganic salt crystal growth, reducing system fouling.
- Compatible with polyelectrolyte coagulants
- Threshold scale inhibition at low dosage rates allows economical system operation.

Vitec® 7000 is a proprietary liquid antiscalant/dispersant designed to inhibit scale and disperse colloidal particles in cellulose acetate and thinfilm membrane separation systems. This formulation is an especially effective calcium sulfate ($CaSO_4$) scale inhibitor, allowing up to 6 times saturation.

Vitec® 7000 is compatible with organic coagulants and can be injected neat or diluted in a wide array of feedwater sources.

Application:

Optimum Vitec® 7000 performance is achieved when the chemical is injected downstream of multimedia filters and upstream of cartridge filters.

Dosing Guidelines:

The typical dosage range is between 2 to 5 ppm. A site-specific dose can be determined using the ***Avista Advisor*** computer program. Like any injected chemical, over or underdosing may cause unnecessary membrane system fouling. Please contact the Avista customer service department for advice.

Dilution:

The dilution for Vitec® 7000 should not exceed 10%. This guideline will protect the effectiveness of the internal bacteriostat, which inhibits bacterial growth within the drum and feed tank.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	Clear liquid
pH (10% solution):	5.0 – 6.0
Specific Gravity@20°C:	1.2± 0.05

Packaging Formats	Americas	EMEA
Pails	45 lbs	23 kg
Drums	500 lbs	230 kg
IBC's (tote bins)	2500 lbs	1100 kg

This product should be protected from freezing during storage as the active ingredients may separate under extreme temperatures. If freezing occurs, warm the chemical until it returns to the liquid state and stir to recombine.

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RoClean
Liquid and Powder Cleaners

Product Selection Guide

Avista Technologies provide a wide range of specially formulated cleaners to tackle all common membrane foulants. These foulants include metals, inorganic scales, silt, organics and biological material. The table below summarises the application of each product and a more detailed description is given overleaf.

All products are applied as dilute solutions made up with permeate or good quality potable water. All products are readily mixed / dissolved for use. The solutions are optimally applied heated to the maximum temperature and re-circulation rate specified by the membrane type.

For use on : Cellulose Acetate Membranes / For use on : Polyamide Membranes			***Fouling :***					
			Metals	**Scale**		**Silt**	**Organics**	
Product Name			**Iron, Manganese and Aluminium.**	**Calcium Carbonate**	**Sulphate Scales**		**Non Biological**	**Biological**
RoClean L211	✓				✓	✓	✓	✓
RoClean L212	✓					✓✓	✓	✓
RoClean L403	✓	✓	✓	✓				
RoClean L404	✓	✓	✓	✓				
RoClean L607		✓				✓	✓	✓
RoClean L811	✓				✓✓			
RoClean P111	✓				✓	✓	✓	✓✓
RoClean P112	✓					✓	✓	✓✓
RoClean P303	✓	✓	✓	✓				
RoClean P507		✓				✓	✓	✓
RoClean P703	✓	✓	✓✓					
RoClean P911	✓					✓✓	✓	✓

✓ = Effective

✓✓ = Optimum

Avista Technologies technical staff are always available to advise on product choice for each application. Cleaning trials can also be carried out in our off-site 'OSCAR' facilities or on our cell test equipment to demonstrate effectiveness prior to application on site. This can be helpful in determining whether a broad-spectrum cleaner or targeted cleaner is most effective in removing the foulant on the membrane.

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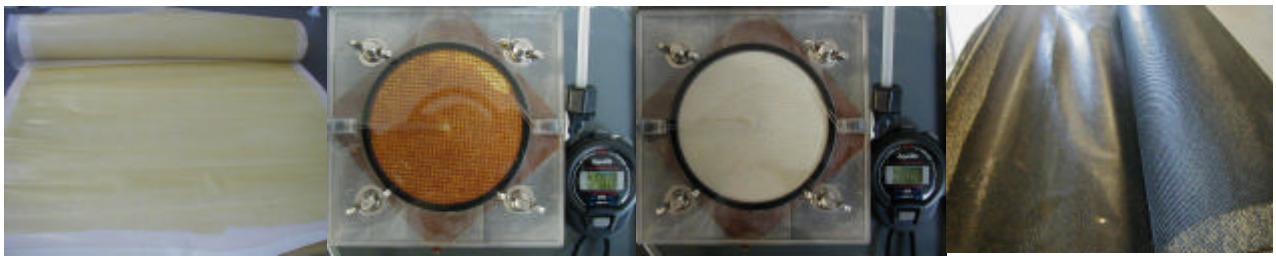
Product Approvals

For drinking water applications many of the products have received approvals from the US National Sanitation Foundation (NSF) under NSF/ANSI Standard 60 and from the Secretary of State (in the UK). Please contact Avista for an up to date list of products which can be applied to drinking water systems.

To facilitate effluent discharge a number of variations on the products are available for installations where EDTA or phosphate cannot be discharged.



See Also:

Individual product datasheets for properties, packaging and application data.

Avista Advisor 3 for selection of products and calculation of quantities to apply.

Chemical application advice for clean in place design advice and chemical selection advice.

Avista Technologies can carry out cell test cleans or full membrane cleans to determine which product provides the best cleaning performance. Site supervision is also available for clean in place activities.

Product approvals have been granted by water regulators, membrane manufacturers and industry bodies. Please contact your local representative for up to date information.

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RoClean L102

Low pH RO Membrane Cleaner - Liquid

Performance:

RoClean L102 offers an array of performance benefits:

- Effective against **biological** foulants and for element preservation.
- Compatible with the thinfilm (polyamide) elements produced by the major membrane manufacturers.
- Contains a special blend of biodispersant agents.
- Highly buffered to resist pH changes during the usage process.
- Can be used in conjunction with other applicable cleaners to remove combination foulants.
- Temperature compensated to maintain optimum pH over a wide temperature range.

RoClean L102 is a low pH liquid formulation designed to remove biological foulants from spiral wound thinfilm elements or to preserve elements for storage.

It is important to remove scale and metal deposits from membrane surfaces before application of RoClean L102. This can be accomplished with RoClean L403, RoClean P303 or RoClean L811. Avista personnel can assist with product selection.

Elements preserved with RoClean L102 and shipped via common carrier do not require a corrosive label. A third party, independent laboratory has confirmed that a 2% solution of RoClean L102 is not corrosive.

Use Instructions:

Below is a summary of the RoClean L102 cleaning guidelines. For detailed procedures, please consult the Avista technical bulletin entitled "Cleaning of Spiral Wound Membrane Systems".

1. Fill the cleaning tank to the desired volume with RO permeate or DI water. Heat the solution to the maximum acceptable temperature (see membrane manufacturer guidelines, or use 50°C) as this will dramatically increase the cleaning efficiency. Add sufficient RoClean L102 to create a 2% wt/wt solution if the fouling is moderate/severe or 1% if the fouling is mild. Recycle the solution through the cleaning tank to ensure adequate mixing.

2. Recirculate the cleaning solution through each RO system stage, one at a time, for a minimum of 60 minutes at the flow rate recommended by the membrane manufacturer. If that rate is not known, use the guidelines listed below:

Element Diameter	Flowrate per Vessel, gpm (m^3/hr)
4”	10 (2.4)
8”	40 (9)

3. If the membranes are heavily fouled and the recirculated cleaning solution becomes discolored or turbid, discard as much as 15% of the solution volume. Heavily fouled elements may also benefit from a soak period (up to 8 hours).

4. Monitor the pH of the solution during the cleaning process. If the pH remains in the desired range of 2 and the solution is not turbid, it may be used to clean subsequent stages. In the unlikely event that the pH rises above 3, prepare a new batch and repeat steps 1-4.

5. When the clean is completed, rinse the membranes by recirculating RO permeate through each pressure vessel.

Packaging and Storage:

Standard regional pack sizes are listed below.

Specifications	
Appearance:	Amber liquid
pH (2% solution):	2.0 –3.0
Density (kg/litre):	1.05± 0.05

Packaging Formats	Americas	EMEA
Cubitainer	1 USG	-
Pails	45 lbs	20 kg
Drums	500 lbs	200 kg
IBC’s (totebins)	2500 lbs	-

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RoClean L211

High pH RO Membrane Cleaner - Liquid

Performance:

RoClean L211 offers an array of performance benefits:

- Contains a proprietary blend of buffers, low foaming surfactants and chelants to dissolve **organic foulants** and disperse **colloidal particles**.
- Compatible with the thinfilm (polyamide) elements of all the major membrane manufacturers.
- NSF Certified for off-line use in systems producing drinking water.
- Highly buffered to resist pH changes during the cleaning process.
- Superior results, especially when compared to generic cleaners.
- Can be used in conjunction with other applicable cleaners as shown in the Avista cleaner selection guide.
- Temperature compensated to maintain optimum pH over a wide temperature range.

NSF Certified to NSF/ANSI 60

DRINKING WATER TREATMENT ADDITIVES CLASSIFIED BY NATIONAL SANTATION FOUNDATION.® TO ANSI/NSF 60 ON OCTOBER 2007 AS STANDARD DRINKING WATER TREATMENT CHEMICAL FOR USE OFF-LINE IN REVERSE OSMOSIS SYSTEMS.

RoClean L211 is a high pH, low foaming liquid cleaner formulated to remove silt and organic foulants such as colloidal silica, clays, organic color, and bacterial slime from spiral wound thinfilm elements.

RoClean L211 is highly buffered to resist pH changes during the cleaning process and it contains a proprietary blend of buffers, low foaming surfactants and chelants to dissolve organic foulants and disperse colloidal particles.

Use Instructions:

Below is a summary of the RoClean L211 cleaning guidelines. For detailed procedures, please consult the Avista technical bulletin entitled "Cleaning of Spiral Wound Membrane Systems".

1. Fill the cleaning tank to the desired volume with RO permeate or DI water. Heat the solution to 50°C or maximum acceptable temperature (see membrane manufacturer guidelines) as this will dramatically increase the cleaning efficiency. Add sufficient RoClean L211 to create a 2% wt/wt solution if the fouling is moderate/severe or 1% if the fouling is mild. Recycle the solution through the cleaning tank to ensure adequate mixing.

2. Recirculate the cleaning solution through each RO system stage, one at a time, for a minimum of 60 minutes at the flow rate recommended by the membrane manufacturer. If that rate is not known, use the guidelines listed below:

Element Diameter	Flowrate per Vessel, gpm (m^3/hr)
4”	10 (2.4)
8”	40 (9)

3. If the membranes are heavily fouled and the recirculated cleaning solution becomes discolored or turbid, discard as much as 15% of the solution volume. Heavily fouled elements may also benefit from a soak period (up to 8 hours).

4. Monitor the pH of the solution during the cleaning process. If the pH remains in the desired range of 10.5 and the solution is not turbid, it may be used to clean subsequent stages. In the unlikely event that the pH falls below 10, prepare a new batch and repeat steps 1-4.

5. When the clean is completed, rinse the membranes by recirculating RO permeate through each pressure vessel. To comply with NSF standards, the cleaner should be flushed out using 5 bed/volumes of water before putting the system back on-line.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	Amber liquid
pH (2% solution):	10.5 –11.5
Density (kg/litre):	1.05 - 1.2

Packaging Formats	Americas	EMEA
Pails	45 lbs	20 kg
Drums	500 lbs	200 kg
IBC’s (totebins)	2375 lbs	-

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RoClean L212

High pH RO Membrane Cleaner - Liquid

Performance:

RoClean L212 offers an array of performance benefits:

- Compatible with the thinfilm (polyamide) elements of all the major membrane manufacturers.
- NSF Certified for off-line use in systems producing drinking water.
- Contains a proprietary blend of buffers, surfactants and chelants to dissolve **organic** foulants and disperse **colloidal particles**.
- Highly buffered to resist pH changes during the cleaning process.
- Superior results, especially when compared to generic cleaners.
- Can be used in conjunction with other applicable cleaners as shown in the Avista cleaner selection guide.
- Temperature compensated to maintain optimum pH over a wide temperature range.

RoClean L212 is a high pH, liquid cleaner formulated to remove silt and organic foulants such as colloidal silica, clays, organic color, and bacterial slime from spiral wound thinfilm elements.
This liquid is especially effective in removing solids trapped in element feed spacers.

Use Instructions:
Below is a summary of the RoClean L212 cleaning guidelines. For detailed procedures, please consult the Avista technical bulletin entitled "Cleaning of Spiral Wound Membrane Systems".

1. Fill the cleaning tank to the desired volume with RO permeate or DI water. Heat the solution to the maximum acceptable temperature (see membrane manufacturer guidelines, or use 50°C) as this will dramatically increase the cleaning efficiency. Add sufficient RoClean L212 to create a 2% wt/wt solution if the fouling is moderate/severe or 1% if the fouling is mild. Recycle the solution through the cleaning tank to ensure adequate mixing.

2. Recirculate the cleaning solution through each RO system stage, one at a time, for a minimum of 60 minutes at the flow rate recommended by the membrane manufacturer. If that rate is not known, use the guidelines listed below:

Element Diameter	Flowrate per Vessel, gpm (m^3/hr)
4”	10 (2.4)
8”	40 (9)

3. If the membranes are heavily fouled and the recirculated cleaning solution becomes discolored or turbid, discard as much as 15% of the solution volume. Heavily fouled elements may also benefit from a soak period (up to 8 hours).

4. Monitor the pH of the solution during the cleaning process. If the pH remains in the desired range of 11.5 and the solution is not turbid, it may be used to clean subsequent stages. In the unlikely event that the pH falls below 10.5, prepare a new batch and repeat steps 1-4.

5. When the clean is completed, rinse the membranes by recirculating RO permeate through each pressure vessel. To comply with NSF standards, the cleaner should be flushed out using 5 bed/volumes of water before putting the system back on-line.

Packaging and Storage:
Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	Amber liquid
pH (2% solution):	11.7 –12.7
Density (kg/litre):	1.1 - 1.2

Packaging Formats	Americas	EMEA
Pails	45 lbs	20 kg
Drums	500 lbs	200 kg
IBC’s (totebins)	2500 lbs	-

NSF Certified to NSF/ANSI 60

DRINKING WATER TREATMENT ADDITIVES CLASSIFIED BY NATIONAL SANTATION FOUNDATION.® TO ANSI/NSF 60 ON OCTOBER 2007 AS STANDARD DRINKING WATER TREATMENT CHEMICAL FOR USE OFF-LINE IN REVERSE OSMOSIS SYSTEMS.

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RoClean L311

High pH RO Membrane Cleaner - Liquid

Performance:

RoClean L311 offers an array of performance benefits:

- Contains a proprietary blend of buffers, low foaming surfactants and chelants to dissolve **organic foulants** and disperse **colloidal particles**.
- Compatible with the thinfilm (polyamide) elements of all the major membrane manufacturers.
- Highly buffered to resist pH changes during the cleaning process.
- Superior results, especially when compared to generic cleaners.
- Can be used in conjunction with other applicable cleaners as shown in the Avista cleaner selection guide.
- Temperature compensated to maintain optimum pH over a wide temperature range.

RoClean L311 is a high pH, low foaming liquid cleaner formulated to remove silt and organic foulants such as colloidal silica, clays, organic color, and bacterial slime from spiral wound thinfilm elements.

RoClean L311 is highly buffered to resist pH changes during the cleaning process and is recommended for systems with mild fouling or where frequent cleaning is envisaged.

Use Instructions:

Below is a summary of the RoClean L311 cleaning guidelines. For detailed procedures, please consult the Avista technical bulletin entitled "Cleaning of Spiral Wound Membrane Systems".

1. Fill the cleaning tank to the desired volume with RO permeate or DI water. Heat the solution to 50°C or maximum acceptable temperature (see membrane manufacturer guidelines) as this will dramatically increase the cleaning efficiency. Add sufficient RoClean L311 to create a 2% wt/wt solution if the fouling is moderate/severe or 1% if the fouling is mild. Recycle the solution through the cleaning tank to ensure adequate mixing.

2. Recirculate the cleaning solution through each RO system stage, one at a time, for a minimum of 60 minutes at the flow rate recommended by the membrane manufacturer. If that rate is not known, use the guidelines listed below:

Element Diameter	Flowrate per Vessel, gpm (m^3/hr)
4”	10 (2.4)
8”	40 (9)

3. If the membranes are heavily fouled and the recirculated cleaning solution becomes discolored or turbid, discard as much as 15% of the solution volume. Heavily fouled elements may also benefit from a soak period (up to 8 hours).

4. Monitor the pH of the solution during the cleaning process. If the pH remains in the desired range of 10.5 and the solution is not turbid, it may be used to clean subsequent stages. In the unlikely event that the pH falls below 10.5, prepare a new batch and repeat steps 1-4.

5. When the clean is completed, rinse the membranes by recirculating RO permeate through each pressure vessel. To comply with NSF standards, the cleaner should be flushed out using 5 bed/volumes of water before putting the system back on-line.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	Amber liquid
pH (2% solution):	10.5 –11.5
Density (kg/litre):	1.05 - 1.15

Packaging Formats	Americas	EMEA
Pails	-	20 kg
Drums	-	200 kg
IBC’s (totebins)	-	-

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RoClean L403

Low pH RO Membrane Cleaner - Liquid

Performance:

RoClean L403 offers an array of performance benefits:

- Compatible with the thinfilm and cellulose acetate elements.
- NSF Certified for use in RO systems producing drinking water.
- Contains a special blend of buffers, chelants, and reducing agents, to promote the dissolution of metal deposits.
- Superior results to generic citric and hydrochloric acid solutions.
- Highly buffered to resist pH changes during the cleaning process.
- Can be used in conjunction with other applicable cleaners to remove combination foulants.
- Temperature compensated to maintain optimum pH over a wide temperature range.

RoClean L403 is a low pH liquid cleaner designed to remove metal foulants such as iron, manganese, and aluminum as well as calcium carbonate scale deposits from spiral wound thinfilm and cellulose acetate elements.

RoClean L403 has been certified by the National Sanitation Foundation under ANSI/NSF Standard 60 for use as an off-line cleaner in drinking water systems.

Use Instructions:

Below is a summary of the RoClean L403 cleaning guidelines. For detailed procedures, please consult the Avista technical bulletin entitled "Cleaning of Spiral Wound Membrane Systems".

1. Fill the cleaning tank to the desired volume with RO permeate or DI water. Heat the solution to the maximum acceptable temperature (see membrane manufacturer guidelines, or use 50°C) as this will dramatically increase the cleaning efficiency. Add sufficient RoClean L403 to create a 2% wt/wt solution if the fouling is moderate/severe or 1% if the fouling is mild. Recycle the solution through the cleaning tank to ensure adequate mixing.

2. Recirculate the cleaning solution through each RO system stage, one at a time, for a minimum of 60 minutes at the flow rate recommended by the membrane manufacturer. If that rate is not known, use the guidelines listed below:

Element Diameter	Flowrate per Vessel, gpm (m^3/hr)
4”	10 (2.4)
8”	40 (9)

3. If the membranes are heavily fouled and the recirculated cleaning solution becomes discolored or turbid, discard as much as 15% of the solution volume. Heavily fouled elements may also benefit from a soak period (up to 8 hours).

4. Monitor the pH of the solution during the cleaning process. If the pH remains in the desired range of 3 and the solution is not turbid, it may be used to clean subsequent stages. In the unlikely event that the pH rises above 3.5, prepare a new batch and repeat steps 1-4.

5. When the clean is completed, rinse the membranes by recirculating RO permeate through each pressure vessel. To comply with NSF standards, the cleaner should be flushed out with 5 bed/volumes of water before putting the system back on-line.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	Amber liquid
pH (2% solution):	2.5 –3.5
Density (kg/litre):	1.35± 0.05

Packaging Formats	Americas	EMEA
Pails	45 lbs	20 kg
Drums	500 lbs	200 kg
IBC’s (totebins)	2500 lbs	-

NSF Certified to NSF/ANSI 60

DRINKING WATER TREATMENT ADDITIVES CLASSIFIED BY NATIONAL SANTATION FOUNDATION.® TO ANSI/NSF 60 ON OCTOBER 2007 AS STANDARD DRINKING WATER TREATMENT CHEMICAL FOR USE OFF-LINE IN REVERSE OSMOSIS SYSTEMS.

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RoClean L404

Low pH RO Membrane Cleaner - Liquid

Performance:

RoClean L404 offers an array of performance benefits:

- Compatible with the thinfilm and cellulose acetate elements.
- Contains a special blend of buffers, chelants, and reducing agents, to promote the dissolution of metal deposits.
- Superior results in the removal of **metal hydroxides**, **calcium carbonate** and **iron**.
- Highly buffered to resist pH changes during the cleaning process.
- Can be used in conjunction with other applicable cleaners to remove combination foulants.
- Temperature compensated to maintain optimum pH over a wide temperature range.
- Environmental benefits from phosphate and EDTA free formulation

RoClean L404 is a low pH liquid cleaner designed specifically to remove metal foulants such as iron, manganese, and aluminum as well as calcium carbonate scale deposits from spiral wound thinfilm and cellulose acetate elements.

Use Instructions:

Below is a summary of the RoClean L404 cleaning guidelines. For detailed procedures, please consult the Avista technical bulletin entitled "Cleaning of Spiral Wound Membrane Systems".

1. Fill the cleaning tank to the desired volume with RO permeate or DI water. Heat the solution to the maximum acceptable temperature (see membrane manufacturer guidelines, or use 50°C) as this will dramatically increase the cleaning efficiency. Add sufficient RoClean L404 to create a 2% wt/wt solution if the fouling is moderate/severe or 1% if the fouling is mild. Recycle the solution through the cleaning tank to ensure adequate mixing.

2. Recirculate the cleaning solution through each RO system stage, one at a time, for a minimum of 60 minutes at the flow rate recommended by the membrane manufacturer. If that rate is not known, use the guidelines listed below:

Element Diameter	Flowrate per Vessel, gpm (m^3/hr)
4”	10 (2.4)
8”	40 (9)

3. If the membranes are heavily fouled and the recirculated cleaning solution becomes discolored or turbid, discard as much as 15% of the solution volume. Heavily fouled elements may also benefit from a soak period (up to 8 hours).

4. Monitor the pH of the solution during the cleaning process. If the pH remains in the desired range of 3.5 and the solution is not turbid, it may be used to clean subsequent stages. In the unlikely event that the pH rises above 4.5, prepare a new batch and repeat steps 1-4.

5. When the clean is completed, rinse the membranes by recirculating RO permeate through each pressure vessel. The cleaner should be flushed with 5 bed/volumes of water before putting the system back on-line.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	Amber liquid
pH (2% solution):	3.5 –4.5
Density (kg/litre):	1.2± 0.05

Packaging Formats	Americas	EMEA
Pails	-	20 kg
Drums	-	200 kg
IBC’s (totebins)	-	-

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RoClean L503

Low pH RO Membrane Cleaner - Liquid

Performance:

RoClean L503 offers an array of performance benefits:

- Formulated to remove **iron, managanese, aluminum** fouling as well as **carbonate** scales.
- Compatible with the thinfilm and cellulose acetate elements.
- Contains a special blend of buffers, chelants, and reducing agents, to promote the dissolution of metal deposits.
- Superior results to generic citric and hydrochloric acid solutions.
- Highly buffered to resist pH changes during the cleaning process.
- Can be used in conjunction with other applicable cleaners to remove combination foulants.
- Temperature compensated to maintain optimum pH over a wide temperature range.

RoClean L503 is a low pH liquid cleaner designed to remove metal foulants such as iron, manganese, and aluminum as well as calcium carbonate scale deposits from spiral wound thinfilm and cellulose acetate elements.

RoClean L503 is buffered to prevent the pH limits of a membrane plant being exceeded in the event of misapplication and is suitable for plants with mild fouling or where frequent cleaning is envisaged.

Use Instructions:

Below is a summary of the RoClean L503 cleaning guidelines. For detailed procedures, please consult the Avista technical bulletin entitled "Cleaning of Spiral Wound Membrane Systems".

1. Fill the cleaning tank to the desired volume with RO permeate or DI water. Heat the solution to the maximum acceptable temperature (see membrane manufacturer guidelines, or use 50°C) as this will dramatically increase the cleaning efficiency. Add sufficient RoClean L403 to create a 2% wt/wt solution if the fouling is moderate/severe or 1% if the fouling is mild. Recycle the solution through the cleaning tank to ensure adequate mixing.

2. Recirculate the cleaning solution through each RO system stage, one at a time, for a minimum of 60 minutes at the flow rate recommended by the membrane manufacturer. If that rate is not known, use the guidelines listed below:

Element Diameter	Flowrate per Vessel, gpm (m^3/hr)
4”	10 (2.4)
8”	40 (9)

3. If the membranes are heavily fouled and the recirculated cleaning solution becomes discolored or turbid, discard as much as 15% of the solution volume. Heavily fouled elements may also benefit from a soak period (up to 8 hours).

4. Monitor the pH of the solution during the cleaning process. If the pH remains in the desired range of 3 and the solution is not turbid, it may be used to clean subsequent stages. In the unlikely event that the pH rises above 3.5, prepare a new batch and repeat steps 1-4.

5. When the clean is completed, rinse the membranes by recirculating RO permeate through each pressure vessel. The cleaner should be flushed out with 5 bed/volumes of water before putting the system back on-line.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	Amber liquid
pH (2% solution):	2.5 –3.5
Density (kg/litre):	1.25± 0.05

Packaging Formats	Americas	EMEA
Pails	45 lbs	20 kg
Drums	500 lbs	200 kg
IBC’s (totebins)	2500 lbs	-

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RoClean L607

Neutral pH RO Membrane Cleaner - Liquid

Performance:

RoClean L607 offers an array of performance benefits:

- Compatible with the cellulose acetate (CA) membranes produced by the major membrane manufacturers.
- Superior results to generic cleaners for the removal of **organic** and **colloidal** foulants.
- A customized blend of buffers and other components to dissolve organic foulants and to disperse colloidal particles.
- Can be used in conjunction with other applicable cleaners as shown in the Avista cleaner selection guide.
- Highly buffered to resist pH changes during the cleaning process.
- Temperature compensated to maintain optimum pH over a wide temperature range.

RoClean L607 is a neutral pH liquid cleaner developed to remove silt and organic foulants such as colloidal silica, clays, organic color and bacterial slime from spiral wound cellulose acetate elements.

This formulation is temperature compensated to ensure that the cleaning solution remains in the effective pH range regardless of variations in solution temperature.

Use Instructions:

Below is a summary of the RoClean L607 cleaning guidelines. For detailed procedures, please consult the Avista technical bulletin entitled "Cleaning of Spiral Wound Membrane Systems".

1. Fill the cleaning tank to the desired volume with RO permeate or DI water. Heat the solution to the maximum acceptable temperature (see membrane manufacturer guidelines, or use 50°C) as this will dramatically increase the cleaning efficiency. Add sufficient RoClean L607 to create a 2% wt/wt solution if the fouling is moderate/severe or 1% if the fouling is mild. Recycle the solution through the cleaning tank to ensure adequate mixing.

2. Recirculate the cleaning solution through each RO system stage, one at a time, for a minimum of 60 minutes at the flow rate recommended by the membrane manufacturer. If that rate is not known, use the guidelines listed below:

Element Diameter	Flowrate per Vessel, gpm (m^3/hr)
4”	10 (2.4)
8”	40 (9)

3. If the membranes are heavily fouled and the recirculated cleaning solution becomes discolored or turbid, discard as much as 15% of the solution volume. Heavily fouled elements may also benefit from a soak period (up to 8 hours).

4. Monitor the pH of the solution during the cleaning process. If the pH remains in the desired range of 7 and the solution is not turbid, it may be used to clean subsequent stages. In the unlikely event that the pH falls below 7, prepare a new batch and repeat steps 1-4.

5. When the clean is completed, rinse the membranes by recirculating RO permeate through each pressure vessel. The system can then be returned to service.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	Clear liquid
pH (2% solution):	7 – 8
Density (kg/litre):	1.2± 0.05

Packaging Formats	Americas	EMEA
Pails	45 lbs	20 kg
Drums	500 lbs	200kg
IBC’s (totebins)	2500 lbs	-

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RoClean L811

High pH RO Membrane Cleaner - Liquid

Performance:

RoClean L811 offers an array of performance benefits:

- Compatible with the thinfilm polyamide elements.
- NSF Certified for off-line use in systems producing drinking water.
- Contains a proprietary blend of buffers and low foaming surfactants and chelants to speed the dissolution of **sulfate scale**.
- Superior results to generic cleaners.
- Highly buffered to resist pH changes during the cleaning process.
- Can be used in conjunction with other applicable cleaners as shown in the Avista cleaner selection guide.
- Temperature compensated to maintain optimum pH over a wide temperature range.

RoClean L811 is a high pH liquid cleaner developed to remove calcium, barium and strontium sulfate scales from spiral wound thinfilm elements.

This formulation is temperature compensated to ensure that the cleaning solution remains in the effective pH range regardless of variations in solution temperature.

Use Instructions:

Below is a summary of the RoClean L811 cleaning guidelines. For detailed procedures, please consult the Avista technical bulletin entitled "Cleaning of Spiral Wound Membrane Systems".

1. Fill the cleaning tank to the desired volume with RO permeate or DI water. Heat the solution to the maximum acceptable temperature (see membrane manufacturer guidelines, or use 50°C) as this will dramatically increase the cleaning efficiency. Add sufficient RoClean L811 to create a 2% wt/wt solution if the fouling is moderate/severe or 1% if the fouling is mild. Recycle the solution through the cleaning tank to ensure adequate mixing.

2. Recirculate the cleaning solution through each RO system stage, one at a time, for a minimum of 60 minutes at the flow rate recommended by the membrane manufacturer. If that rate is not known, use the guidelines listed below:

Element Diameter	Flowrate per Vessel, gpm (m^3/hr)
4”	10 (2.4)
8”	40 (9)

3. If the membranes are heavily fouled and the recirculated cleaning solution becomes discolored or turbid, discard as much as 15% of the solution volume. Heavily fouled elements may also benefit from a soak period (up to 8 hours).

4. Monitor the pH of the solution during the cleaning process. If the pH remains in the desired range of 10.5 and the solution is not turbid, it may be used to clean subsequent stages. In the unlikely event that the pH falls below 10, prepare a new batch and repeat steps 1-4.

5. When the clean is completed, rinse the membranes by recirculating RO permeate through each pressure vessel. To comply with NSF standards, the cleaner should be flushed out using 5 bed/volumes of water before putting the system back on-line.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	Amber liquid
pH (2% solution):	10.0 –11.5
Density (kg/litre):	1.2 - 1.3

Packaging Formats	Americas	EMEA
Pails	45 lbs	20 kg
Drums	500 lbs	200 kg
IBC’s (totebins)	2500 lbs	-

NSF Certified to NSF/ANSI 60

DRINKING WATER TREATMENT ADDITIVES CLASSIFIED BY NATIONAL SANTATION FOUNDATION.® TO ANSI/NSF 60 ON OCTOBER 2007 AS STANDARD DRINKING WATER TREATMENT CHEMICAL FOR USE OFF-LINE IN REVERSE OSMOSIS SYSTEMS.

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RoClean P111

High pH RO Membrane Cleaner - Powder

Performance:

RoClean P111 offers a variety of performance benefits:

- Superior results in the removal of **organic** and **colloidal foulants**, especially when compared to generic solutions.
- Compatible with the thin film (polyamide) elements of all major membrane manufacturers.
- NSF Certified for off-line use in systems producing drinking water.
- Contains a specialized blend of buffers to dissolve organic foulants and disperse colloidal particles.
- Highly buffered to resist pH changes during the cleaning process.
- Temperature compensated to maintain optimum pH over a wide temperature range.

RoClean P111 is a powdered cleaner designed to remove silt and organic foulants such as colloidal silica, clays, organic color and bacterial slime from spiral wound thinfilm polyamide elements. This formulation is temperature compensated to ensure that the cleaning solution remains in the effective pH range regardless of variations in solution temperature.

RoClean P111 has been certified by the National Sanitation Foundation under ANSI/NSF Standard 60 for use as an off-line cleaner in drinking water systems.

Use Instructions:

Below is a summary of the RoClean P111 cleaning guidelines. For detailed procedures, please consult the Avista technical bulletin entitled "Cleaning of Spiral Wound Membrane Systems".

1. Fill the cleaning tank to the desired volume with RO permeate or DI water. Heat the solution to the maximum acceptable temperature (see membrane manufacturer guidelines, or use 50°C) as this will dramatically increase the cleaning efficiency. Add sufficient RoClean P111 to create a 2% wt/wt solution if the fouling is moderate/severe or 1% if the fouling is mild. Recycle the solution through the cleaning tank to ensure adequate mixing.

2. Recirculate the cleaning solution through each RO system stage, one at a time, for a minimum of 60 minutes at the flow rate recommended by the membrane manufacturer. If that rate is not known, use the guidelines listed below:

Element Diameter	Flowrate per Vessel, gpm (m^3/hr)
4”	10 (2.4)
8”	40 (9)

3. If the membranes are heavily fouled and the recirculated cleaning solution becomes discolored or turbid, discard as much as 15% of the solution volume. Heavily fouled elements may also benefit from a soak period (up to 8 hours).

4. Monitor the pH of the solution during the cleaning process. If the pH remains in the desired range of 10.5 and the solution is not turbid, it may be used to clean subsequent stages. In the unlikely event that the pH falls below 9.5, prepare a new batch and repeat steps 1-4.

5. When the clean is completed, rinse the membranes by recirculating RO permeate through each pressure vessel. To comply with NSF standards, the cleaner should be flushed out using 5 bed/volumes of water before putting the system back on-line.

Packaging and Storage:

Standard regional pack sizes are listed below.

Specifications	
Appearance:	White powder
pH (2% solution):	10.5 –11.5
Density (kg/litre):	1.05± 0.05

Packaging Formats	Americas	EMEA
Pails	45 lbs	20 kg
Fibre Carboy	90 lbs	-
Fibre Drums	350 lbs	-

NSF Certified to NSF/ANSI 60

DRINKING WATER TREATMENT ADDITIVES CLASSIFIED BY NATIONAL SANTATION FOUNDATION.® TO ANSI/NSF 60 ON OCTOBER 2007 AS STANDARD DRINKING WATER TREATMENT CHEMICAL FOR USE OFF-LINE IN REVERSE OSMOSIS SYSTEMS.

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RoClean P112

High pH RO Membrane Cleaner - Powder

Performance:

RoClean P112 offers a variety of performance benefits:

- Superior results in the removal of **silica scales, organic** and **colloidal foulants**, especially when compared to generic solutions.
- Compatible with the thinfilm (polyamide) elements of all major membrane manufacturers.
- NSF Certified for off-line use in systems producing drinking water.
- Contains a specialized blend of buffers and other components to dissolve organic foulants and disperse colloidal particles.
- Highly buffered to resist pH changes during the cleaning process.
- Can be used in conjunction with other applicable cleaners as shown in the Avista cleaner selection guide.
- Temperature compensated to maintain optimum pH over a wide temperature range.

DRINKING WATER TREATMENT ADDITIVES CLASSIFIED BY NATIONAL SANTATION FOUNDATION.® TO ANSI/NSF 60 ON OCTOBER 2007 AS STANDARD DRINKING WATER TREATMENT CHEMICAL FOR USE OFF-LINE IN REVERSE OSMOSIS SYSTEMS.

RoClean P112 is a powdered cleaner designed to remove silt and organic foulants such as colloidal silica, clays, organic color and bacterial slime from spiral wound thinfilm elements.

Extensive field experience and laboratory analyses have shown RoClean P112 is an effective silica scale cleaner. Use of RoClean P112 also avoids the potentially severe safety hazards associated with alternative chemicals commonly used in silica scale removal. These include hydrofluoric acid and ammonium bifluoride solutions.

Use Instructions:

Below is a summary of the RoClean P112 cleaning guidelines. For detailed procedures, please consult the Avista technical bulletin entitled "Cleaning of Spiral Wound Membrane Systems".

1. Fill the cleaning tank to the desired volume with RO permeate or DI water. Heat the solution to 35°C as this will dramatically increase the cleaning efficiency. Add sufficient RoClean P112 to create a 2% wt/wt solution if the fouling is moderate/severe or 1% if the fouling is mild. Recycle the solution through the cleaning tank to ensure adequate mixing.

2. Recirculate the cleaning solution through each RO system stage, one at a time, for a minimum of 60 minutes at the flow rate recommended by the membrane manufacturer. If that rate is not known, use the guidelines listed below:

Element Diameter	Flowrate per Vessel, gpm (m^3/hr)
4”	10 (2.4)
8”	40 (9)

3. If the membranes are heavily fouled and the recirculated cleaning solution becomes discolored or turbid, discard as much as 15% of the solution volume. Heavily fouled elements may also benefit from a soak period (up to 8 hours).

4. Monitor the pH of the solution during the cleaning process. If the pH remains in the desired range of 12 and the solution is not turbid, it may be used to clean subsequent stages. In the unlikely event that the pH falls below 11.5, prepare a new batch and repeat steps 1-4.

5. When the clean is completed, rinse the membranes by recirculating RO permeate through each pressure vessel. The system can then be returned to service.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packing available on request.

Specifications	
Appearance:	Cream powder
pH (2% solution):	12 –12.8
Density (kg/litre):	1.2± 0.05

Packaging Formats	Americas	EMEA
Pails	45 lbs	20 kg
Fibre Carboy	100 lbs	-
Fibre Drums	350 lbs	-

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RoClean P911

High pH RO Membrane Cleaner - Powder

Performance:

RoClean P911 offers a variety of performance benefits:

- Superior results in the removal of **organic** and **colloidal foulants**, especially when compared to generic solutions.
- Compatible with the thinfilm elements of all major membrane manufacturers.
- Contains a specialized blend of buffering agents and other components to dissolve organic foulants and disperse colloidal particles.
- Highly buffered to resist pH changes during the cleaning process.
- Can be used in conjunction with other applicable cleaners as shown in the Avista cleaner selection guide.
- Temperature compensated to maintain optimum pH over a wide temperature range.

RoClean P911 is a high pH powdered cleaner designed to remove silt and organic foulants such as colloidal silica, clays, organic color and bacterial slime from spiral wound thinfilm elements.

On and off-site cleanings have proven that RoClean P911 is often effective when other cleaners have not been able to provide the desired results.

Use Instructions:

Below is a summary of the RoClean P911 cleaning guidelines. For detailed procedures, please consult the Avista technical bulletin entitled "Cleaning of Spiral Wound Membrane Systems".

1. Fill the cleaning tank to the desired volume with RO permeate or DI water. Heat the solution to 35°C as this will dramatically increase the cleaning efficiency. Add sufficient RoClean P911 to create a 2% wt/wt solution if the fouling is moderate/severe or 1% if the fouling is mild. Recycle the solution through the cleaning tank to ensure adequate mixing.

2. Recirculate the cleaning solution through each RO system stage, one at a time, for a minimum of 60 minutes at the flow rate recommended by the membrane manufacturer. If that rate is not known, use the guidelines listed below:

Element Diameter	Flowrate per Vessel, gpm (m^3/hr)
4”	10 (2.4)
8”	40 (9)

3. If the membranes are heavily fouled and the recirculated cleaning solution becomes discolored or turbid, discard as much as 15% of the solution volume. Heavily fouled elements may also benefit from a soak period (up to 8 hours).

4. Monitor the pH of the solution during the cleaning process. If the pH remains in the desired range of 11.5 and the solution is not turbid, it may be used to clean subsequent stages. In the unlikely event that the pH falls below 11, prepare a new batch and repeat steps 1-4.

5. When the clean is completed, rinse the membranes by recirculating RO permeate through each pressure vessel. The system can then be returned to service.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packing available on request.

Specifications	
Appearance:	Cream powder
pH (2% solution):	11.5 –12.8
Density (kg/litre):	1.0± 0.05

Packaging Formats	Americas	EMEA
Pails	45 lbs	20 kg
Fibre Carboy	100 lbs	-
Fibre Drums	350 lbs	-

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RoClean P303

Low pH RO Membrane Cleaner - Powder

Performance:

RoClean P303 offers an array of performance benefits:

- Superior results in the removal of **metals** and **calcium carbonate** scale, especially when compared to generic citric and hydrochloric acid solutions.
- NSF Certified for off-line use in systems producing drinking water.
- Compatible with both thinfilm (polyamide) and cellulose acetate elements.
- Comprised of a proprietary blend of buffers, chelants, surfactants, and dispersants
- Highly buffered to resist pH changes during the cleaning process.
- Can be used in conjunction with other applicable cleaners as shown in the Avista cleaner selection guide.
- Temperature compensated to maintain optimum pH over a wide temperature range.

Certified to NSF/ANSI 60

DRINKING WATER TREATMENT ADDITIVES CLASSIFIED BY NATIONAL SANTATION FOUNDATION.® TO ANSI/NSF 60 ON OCTOBER 2007 AS STANDARD DRINKING WATER TREATMENT CHEMICAL FOR USE OFF-LINE IN REVERSE OSMOSIS SYSTEMS.

RoClean P303 is a low pH powdered cleaner designed to remove metal foulants such as iron, manganese, and aluminum and to remove calcium carbonate scale deposits from spiral wound thinfilm and cellulose acetate elements.

This formulation is temperature compensated to ensure that the cleaning solution remains in the effective pH range regardless of variations in solution temperature.

Use Instructions:

Below is a summary of the RoClean P303 cleaning guidelines. For detailed procedures, please consult the Avista technical bulletin entitled "Cleaning of Spiral Wound Membrane Systems".

1. Fill the cleaning tank to the desired volume with RO permeate or DI water. Heat the solution to the maximum acceptable temperature (see membrane manufacturer guidelines, or use 50°C) as this will dramatically increase the cleaning efficiency. Add sufficient RoClean P303 to create a 2% wt/wt solution if the fouling is moderate/severe or 1% if the fouling is mild. Recycle the solution through the cleaning tank to ensure adequate mixing.

2. Recirculate the cleaning solution through each RO system stage, one at a time, for a minimum of 60 minutes at the flow rate recommended by the membrane manufacturer. If that rate is not known, use the guidelines listed below:

Element Diameter	Flowrate per Vessel, gpm (m^3/hr)
4”	10 (2.4)
8”	40 (9)

3. If the membranes are heavily fouled and the recirculated cleaning solution becomes discolored or turbid, discard as much as 15% of the solution volume. Heavily fouled elements may also benefit from a soak period (up to 8 hours).

4. Monitor the pH of the solution during the cleaning process. If the pH remains in the desired range of 3.5 and the solution is not turbid, it may be used to clean subsequent stages. In the unlikely event that the pH rises above 4, prepare a new batch and repeat steps 1-4.

5. When the clean is completed, rinse the membranes by recirculating RO permeate through each pressure vessel. The system can then be returned to service.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	White powder
pH (2% solution):	2.4 –3.8
Density (kg/litre):	1.05± 0.05

Packaging Formats	Americas	EMEA
Pails	45 lbs	20 kg
Fibre Carboy	90 lbs	-
Fibre Drums	350 lbs	-

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RoClean P507

Neutral pH RO Membrane Cleaner - Powder

Performance:

RoClean P507 offers an array of performance benefits:

- Compatible with the cellulose acetate (CA) membranes produced by the major membrane manufacturers.
- Superior results to generic cleaners for the removal of **organic** and **colloidal** foulants.
- A customized blend of buffers and other components to dissolve organic foulants and to disperse colloidal particles.
- Can be used in conjunction with other applicable cleaners as shown in the Avista cleaner selection guide.
- Highly buffered to resist pH changes during the cleaning process.
- Temperature compensated to maintain optimum pH over a wide temperature range.

RoClean P507 is a neutral pH powder cleaner developed to remove silt and organic foulants such as colloidal silica, clays, organic color and bacterial slime from spiral wound cellulose acetate elements.

This formulation is temperature compensated to ensure that the cleaning solution remains in the effective pH range regardless of variations in solution temperature.

Use Instructions:

Below is a summary of the RoClean P507 cleaning guidelines. For detailed procedures, please consult the Avista technical bulletin entitled "Cleaning of Spiral Wound Membrane Systems".

1. Fill the cleaning tank to the desired volume with RO permeate or DI water. Heat the solution to the maximum acceptable temperature (see membrane manufacturer guidelines, or use 50°C) as this will dramatically increase the cleaning efficiency. Add sufficient RoClean P507 to create a 2% wt/wt solution if the fouling is moderate/severe or 1% if the fouling is mild. Recycle the solution through the cleaning tank to ensure adequate mixing.

2. Recirculate the cleaning solution through each RO system stage, one at a time, for a minimum of 60 minutes at the flow rate recommended by the membrane manufacturer. If that rate is not known, use the guidelines listed below:

Element Diameter	Flowrate per Vessel, gpm (m^3/hr)
4”	10 (2.4)
8”	40 (9)

3. If the membranes are heavily fouled and the recirculated cleaning solution becomes discolored or turbid, discard as much as 15% of the solution volume. Heavily fouled elements may also benefit from a soak period (up to 8 hours).

4. Monitor the pH of the solution during the cleaning process. If the pH remains in the desired range of 7 and the solution is not turbid, it may be used to clean subsequent stages. In the unlikely event that the pH falls below 7, prepare a new batch and repeat steps 1-4.

5. When the clean is completed, rinse the membranes by recirculating RO permeate through each pressure vessel. The system can then be returned to service.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	white powder
pH (2% solution):	7 – 8
Density (kg/litre):	1.05± 0.05

Packaging Formats	Americas	EMEA
Pails	45 lbs	20 kg
Fibre Carboy	-	-
Fibre Drums	-	-

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RoClean P703

Low pH RO Membrane Cleaner - Powder

Performance:

RoClean P703 offers an array of performance benefits:

- Superior results in the removal of **metals** and **calcium carbonate** scale, especially when compared to generic citric and hydrochloric acid solutions.
- Compatible with the thinfilm (polyamide) and cellulose acetate elements.
- Contains a proprietary blend of buffers, chelants, and reducing agents to promote the dissolution of metal deposits.
- Highly buffered to resist pH changes during the cleaning process.
- Can be used in conjunction with other applicable cleaners as shown in the Avista cleaner selection guide.
- Temperature compensated to maintain optimum pH over a wide temperature range.

RoClean P703 is a low pH powdered cleaner designed to remove iron, manganese, and aluminum deposits from spiral wound thinfilm and cellulose acetate elements.

This formulation is temperature compensated to ensure that the cleaning solution remains in the effective pH range regardless of variations in solution temperature.

Use Instructions:

Below is a summary of the RoClean P703 cleaning guidelines. For detailed procedures, please consult the Avista technical bulletin entitled "Cleaning of Spiral Wound Membrane Systems".

1. Fill the cleaning tank to the desired volume with RO permeate or DI water. Heat the solution to the maximum acceptable temperature (see membrane manufacturer guidelines, or use 50°C) as this will dramatically increase the cleaning efficiency. Add sufficient RoClean P703 to create a 2% wt/wt solution if the fouling is moderate/severe or 1% if the fouling is mild. Recycle the solution through the cleaning tank to ensure adequate mixing.

2. Recirculate the cleaning solution through each RO system stage, one at a time, for a minimum of 60 minutes at the flow rate recommended by the membrane manufacturer. If that rate is not known, use the guidelines listed below:

Element Diameter	Flowrate per Vessel, gpm (m^3/hr)
4”	10 (2.4)
8”	40 (9)

3. If the membranes are heavily fouled and the recirculated cleaning solution becomes discolored or turbid, discard as much as 15% of the solution volume. Heavily fouled elements may also benefit from a soak period (up to 8 hours).

4. Monitor the pH of the solution during the cleaning process. If the pH remains in the desired range of 3 and the solution is not turbid, it may be used to clean subsequent stages. In the unlikely event that the pH rises above 3.5, prepare a new batch and repeat steps 1-4.

5. When the clean is completed, rinse the membranes by recirculating RO permeate through each pressure vessel. The system can then be returned to service.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	Cream powder
pH (2% solution):	2.5 –3.5
Density (kg/litre):	0.95± 0.05

Packaging Formats	Americas	EMEA
Pails	45 lbs	20 kg
Fibre Carboy	-	-
Fibre Drums	-	-

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RoCide® Selection Guide

Non-Oxidising Biocides

Biological fouling of reverse osmosis membranes is one of the most challenging issues faced by operators of membrane separation systems. This is primarily due to the fact that effective biocides must be non-oxidising in order to avoid permanent damage of the polyamide RO membrane layer.

Avista biocides are available to control these organisms whether it be through continuous dosing, intermittent dosing or periodically via a CIP system. Avista Technologies will provide assistance in selecting and optimizing the most appropriate dosing regime for your system.

Avista Technologies provides two types of biocides for use in reverse osmosis systems, RoCide® DB20 and RoCide® IS2. Both formulations are non-oxidizing and EPA registered. They are safe for use with both polyamide and cellulose acetate membranes. However, they are not for online use in systems producing potable water. Both have outstanding environmental properties, degrading rapidly and naturally. This property has made them the chemical of choice, especially for systems operating under strict environmental and discharge regulations.

Shock Treatment and RO Cleaning Applications:

RoCide® DB20 or RoCide® DB5 is used as an intermittent feed for "shock treatment" control or it can be applied as a 'pre-treat' cleaning solution to kill bacterial fungi and algae in membrane systems.

Continuous Injection Biocide:

RoCide® IS2 is a broad-spectrum formulation for use against microbiological contaminants commonly found in RO applications including bacteria, fungi, and algae. RoCide® IS2 is designed for continuous injection into the RO feed stream to provide constant biological control.

It can also be applied as a short or long term membrane preservative or as an intermittent dose.

	Effective Against			CIP	Continuous Dosing	Shock Dosing	Membrane Compatible
Product Name	**Bacteria**	**Fungi**	**Algae**				
RoCide® DB5	✓	✓	✓	✓		✓	✓
RoCide® DB20	✓	✓	✓			✓	✓
RoCide® IS2	✓	✓	✓		✓		✓

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See Also:

Individual product datasheets for particular properties and application notes for each product. Technical support section which provides information on how biocides work, a guide to selecting and optimising biocides and advice on cleaning bacterially fouled systems.

The ***Avista Advisor 3*** software is also available to allow you to estimate your required biocide dose.

Avista Technologies can carry out bacterial analysis (ATP or dip slide) in support of biocide optimisation.

Product approvals have been granted by water regulators, membrane manufacturers and industry bodies. Please contact your local representative for up to date information.

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RoCide® DB5

Non-Oxidising Biocide Product Datasheet

Performance:

RoCide®DB5 biocide offers numerous performance benefits:

- Instantaneous antimicrobial activity as a non-oxidizing slimicide/bactericide.
- Kills bacteria, fungi, and algae.
- Exclusively for use in non-potable applications.
- Compatible with the thinfilm (polyamide) and cellulose acetate membranes.
- Degrades rapidly to comply with strict environmental discharge regulations.
- Can be used in conjunction with other applicable cleaners as shown in the Avista cleaner selection guide.

RoCide®DB5 is a fast acting, non-oxidizing biocide based on a 5% solution of the active ingredient DBNPA (Dibromo nitrilo propionamide). This formulation has almost instantaneous antimicrobial activity combined with rapid chemical breakdown resulting in one of the most cost-effective methods of contamination elimination.

RoCide®DB5 has outstanding environmental properties as it degrades rapidly and naturally. This property has made it the chemical of choice for smaller systems where dosing the more concentrated RoCide® DB20 is inconvenient. This product is not recommended for use in systems producing potable water.

Use Instructions:
There are two options for applying RoCide ®DB5 in reverse osmosis applications:

1. Intermittent Online feed for "shock treatment" control:
This procedure allows biocide use only as needed to control fouling. The dose level and frequency should be optimised to match the bacteriological challenge of the feed water. An initial dose of 200mg/l for one hour per week is a typical start point for optimisation.

2. RO membrane cleaner:
RoCide®DB5 is normally applied as the first stage of cleaning using solutions of 200-800 mg/l depending on the degree of fouling. The solution is circulated through the membranes for 1-3hours. As RoCide® DB5 is a fast acting biocide the biocide is best added in batches of 200mg/l four times during the circulation period.

Packaging and Storage:
Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	Clear yellow liquid
pH (2% solution):	4.5 – 5.5
Specific Gravity@20°C:	1.15± 0.05

Packaging Formats	Americas	EMEA
Pails	-	20 kg
Drums	-	200 kg
IBC's (totes)	-	1000 kg

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RoCide® DB20

Non-Oxidising Biocide Product Datasheet

Performance:

RoCide®DB20 biocide offers numerous performance benefits:

- Certified by the Environmental Protection Agency (EPA) for use in reverse osmosis systems.
- Instantaneous antimicrobial activity as a non-oxidizing slimicide/bactericide.
- Kills bacteria, fungi, and algae.
- Exclusively for use in non-potable applications.
- Compatible with the thinfilm (polyamide) and cellulose acetate membranes.
- Degrades rapidly to comply with strict environmental discharge regulations.
- Can be used in conjunction with other applicable cleaners as shown in the Avista cleaner selection guide.

RoCide®DB20 is a fast acting, non-oxidizing biocide based on a 20% solution of the active ingredient DBNPA (Dibromo nitrilo propionamide). This formulation has almost instantaneous antimicrobial activity combined with rapid chemical breakdown resulting in one of the most cost-effective methods of contamination elimination.

RoCide® DB20 is certified by the EPA for use in reverse osmosis systems and has outstanding environmental properties as it degrades rapidly and naturally. This property has made it the chemical of choice, especially for systems operating under strict environmental and discharge regulations. This product is not recommended for use in systems producing potable water.

Use Instructions:

There are two options for applying RoCide ®DB20 in reverse osmosis applications:

1. Intermittent Online feed for "shock treatment" control:

This procedure allows biocide use only as needed to control fouling. The dose level and frequency should be optimised to match the bacteriological challenge of the feed water. An initial dose of 50mg/l for one hour per week is a typical start point for optimisation.

2. RO membrane cleaner:

RoCide® DB20 is normally applied as the first stage of cleaning using solutions of 50-200 mg/l depending on the degree of fouling. The solution is circulated through the membranes for 1-3hours. As RoCide® DB20 is a fast acting biocide the biocide is best added in batches of 50mg/l four times during the circulation period.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	Clear amber liquid
pH (1% solution):	3.0 – 4.0
Specific Gravity@20°C:	1.25± 0.05

Packaging Formats	Americas	EMEA
Pails	50 lbs	20 kg
Drums	500 lbs	200 kg
IBC's (totes)	2500 lbs	1200 kg

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RoCide® IS2

Non-Oxidising Biocide Product Datasheet

Performance:

RoCide® IS2 offers a variety of performance benefits:

- Broad-spectrum biocide that kills bacteria, fungi, and algae.
- Compatible with polyamide and cellulose acetate membranes.
- Degrades rapidly and naturally to comply with strict environmental discharge regulations.
- Can be used in conjunction with other applicable Avista Technologies chemicals.
- Is removed from the RO permeate stream by ultraviolet sterilization (UV) and mixed bed ion exchange treatment.

RoCide® IS2 is an extremely effective, non-oxidizing biocide based on a 1.5% isothiazolin mixture. It is a broad-spectrum formulation for use against microbiological contaminants commonly found in RO applications including bacteria, fungi, and algae.

RoCide® IS2 is designed to be fed continuously to the reverse osmosis system feedwater and may be used alone or in conjunction with another Avista biocide; RoCide® DB-20.

Alternatively, RoCide® IS2 can be applied intermittently and it is also highly effective as a preservative.

This chemical is formulated specifically for RO systems and is to be used in non-potable applications only.

Use Instructions:

For continuous dosing, RoCide® IS2 should be injected into the RO feedstream at an initial dose of 15 ppm. This dosage should be continued for one to two weeks. After this period, bacterial counts in the feed and concentrate streams may be used to determine when the dosage can be reduced, typically to 5 ppm or less.

Microbiological control is generally achieved when the concentrate bacteria counts fall below those found in the feedstream (taking the concentration factor into account).

Alternatively, RoCide IS2 can be applied intermittently at 50-100ppm for 4-6 hours per week. It is also highly effective for train preservation with the above dose controlling biological growth in offline trains for extended periods.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	Pale blue/green
pH (as supplied):	1.5 – 3.0
Specific Gravity@20°C:	1.05± 0.05

Packaging Formats	Americas	EMEA
Pails	45 lbs	25 kg
Drums	475 lbs	200 kg
IBC's (totes)	2200 lbs	1100 kg

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RoQuest® Coagulant

Selection Guide

Avista Technologies formulates a variety of liquid coagulant/flocculant chemicals under the RoQuest name. RoQuest® 3000 is a blend of organic polymers while the RoQuest® 4000, 5000, and 6000 are a blend of organic coagulants and ferric sulfate.

RoQuest formulations change the behaviour of particles and colloids which normally exhibit negative charges in naturally occurring feed waters. Because like charges repel each other and unlike charges attract each other, the addition of the positively charged RoQuest polymer allows the negatively charged particles to clump together. This creates larger particles which are more readily retained in the multimedia filter (MMF), resulting in improved MMF filtration.

Studies have proven that MMF performance without coagulant addition will remove approximately 35% - 50% of the feed water particulates. A nominal dosage of a RoQuest coagulant may allow the MMF to remove up to 98% of the particulates, resulting in improved effluent turbidity and reduced SDI values. The resulting improvement in filtrate quality positively effects the downstream filtration equipment including reduced cleaning frequencies and longer system run times of membrane systems.

For use in flocculators/clarifiers			***Selection of Coagulants & Flocculants***				
For use in direct filtration applications			**Limits**				
			2 NTU	**<10 units of colour**	**<10 NTU**	**> 10 units of colour**	**>10 NTU**
Product Name							
RoQuest 3000	✓		✓	✓			
RoQuest 4000	✓				✓	✓	
RoQuest 5000	✓				✓	✓	
RoQuest 6000		✓				✓	✓

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See Also:

Individual product datasheets for particular properties and application notes for each product. Technical support section which provides information on how coagulants work, a guide to selecting and optimising coagulant dosing.

The Avista Advisor 3 software is also available to allow you to estimate your required coagulant dose. Jar testing and pilot filtration study services are available, to confirm product effectiveness and dose rates.

Avista Technologies can carry out laboratory jar test studies to compare the relative effectiveness of the coagulants using particle counting and turbidity measurements or SDI. Pilot filters are available to allow side by side trials with various products.

Product approvals have been granted by water regulators, membrane manufacturers and industry bodies. Please contact your local representative for up to date information.

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RoQuest® 3000

Organic Coagulant Product Datasheet

Performance:

RoQuest® 3000 provides an array of performance and application benefits:

- Capable of producing RO quality feedwater in direct filtration applications (i.e. multimedia and sand filters).
- Compatible with thinfilm and cellulose acetate RO membranes.
- Filter-aid properties resist solids breakthrough.
- Low dosage requirements
- Compatible with Avista Technologies antiscalants Vitec 3000, 5000 & 7000.
- Effective over a wide pH range.
- No minimum alkalinity requirements.
- Internal biostat inhibits biological growth in the drum and feed tank.

RoQuest® 3000 contains a blend of organic polymers and is designed to be injected into the feedstream of multimedia and sand filters. This product will enhance the filter performance by further reducing turbidity and color, producing a filtrate that is a more acceptable feedwater quality to downstream reverse osmosis systems.

Best results are achieved with municipally treated feedwaters and raw waters that contain relatively low concentrations of particulates and organic color. Upper raw water limits of turbidity and color for this product are 2.0 NTU and 10 units, respectively.

Use Instructions:
Inject RoQuest 3000 at least 15 feet (5m) upstream of the multimedia filters. This allows proper mixing within the feedstream before introduction into the filter. Do not use static mixers as the shear imparted will degrade the polymers contained in this formulation.

Dosing Guidelines:
Typical RoQuest 3000 dosage is in the range of 0.5 to 4 ppm. For specific dosing calculations, refer to the Avista Dosing Guideline.

Significant overdosing of RoQuest 3000 may cause degradation in the quality of the filtered water. Please contact Avista Technologies for specific dosing instructions.

Dilution:
Prior to injection into the feedstream, the RoQuest 3000 can be diluted at a rate of 25:1 using dechlorinated water. This can improve product effectiveness but is not generally necessary.

Packaging and Storage:
Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

NSF Certified to NSF/ANSI 60

DRINKING WATER TREATMENT ADDITIVES CLASSIFIED BY NSF INTERNATIONAL TO NSF/ANSI 60 ON JUNE 2005 AS STANDARD DRINKING WATER TREATMENT CHEMICAL AT A MAXIMUM LEVEL OF 125 mg/l.

Specifications	
Appearance:	Clear amber liquid
pH (1% solution):	4.0 – 6.0
Specific Gravity@20°C:	1.05± 0.05

Packaging Formats	Americas	EMEA
Pails	45 lbs	23 kg
Drums	475 lbs	220 kg
IBC's (tote bins)	2375 lbs	1100 kg

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RoQuest® 4000

Coagulant Product Datasheet

Performance:

RoQuest® 4000 provides unique performance and application benefits:

- Contains more than 8% soluble ferric ion and less than 0.2% ferrous ion.
- Certified by United Laboratories to ANSI/NSF 60 for use in systems producing potable water.
- Capable of producing RO quality feedwater in multimedia and sand filtration applications
- Compatible with thinfilm (polyamide) and cellulose acetate RO membranes.
- Filter-aid properties resist solids breakthrough in direct filter applications.
- Low dosage requirements
- Compatible with Vitec® 3000, 5000 & 7000 scale inhibitors.
- Effective over a wide pH range.

DRINKING WATER TREATMENT ADDITIVES CLASSIFIED BY NSF INTERNATIONAL TO NSF/ANSI 60 ON JUNE 2005 AS STANDARD DRINKING WATER TREATMENT CHEMICAL AT A MAXIMUM LEVEL OF 285 mg/l.

RoQuest® 4000 contains a blend of organic coagulants and ferric sulfate and is designed to be injected into the feedstream of multimedia and sand filters. This product will enhance the filter performance by further reducing turbidity and color, producing an effluent that is a more acceptable feedwater quality to downstream reverse osmosis systems.

Best results are achieved in raw waters that contain up to 10 NTU turbidity and color units of greater than 10 or in feedwaters in which organic polymers have been under or overdosed.

Use Instructions:

Inject RoQuest® 4000 at least 15 feet (5m) upstream of multimedia filters. Do not use static mixers ahead of the filters as the shear imparted by this equipment will degrade the polymers contained in this formulation.

Dosing Guidelines:

Typical RoQuest ®4000 dosage is in the range of 2 to 25 ppm. Approximately 0.25 ppm of alkalinity expressed as calcium carbonate is required per ppm of RoQuest®4000. Following coagulant addition, a minimum of 25 ppm of residual alkalinity is required.

Significant overdosing of RoQuest® 4000 may cause degradation in the quality of the filtered water. If there are any questions, please contact Avista Technologies for specific dosing instructions.

Dilution:

RoQuest® 4000 should be fed neat if possible. If a dilution is necessary, dilute no more than 4 to 1 with RO permeate or DI water.

Packaging and Storage:

Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Information on drumless or bulk tanker delivery is available on request.

Specifications	
Appearance:	Clear brown liquid
pH (1% solution):	4.0 – 6.0
Specific Gravity@20°C:	1.3-1.4

Packaging Formats	Americas	EMEA
Pails	45 lbs	23 kg
Drums	500 lbs	220 kg
IBC's (tote bins)	2500 lbs	1100 kg

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RoQuest® 5000

Coagulant Product Datasheet

Performance:

RoQuest® 5000 provides unique performance and application benefits:

- Contains more than 9% soluble ferric ion and less than 0.2% ferrous ion.
- Capable of producing RO quality feedwater in multimedia and sand filtration applications.
- Compatible with thinfilm (polyamide) and cellulose acetate RO membranes.
- Filter-aid properties resist solids breakthrough in direct filter applications.
- Low dosage requirements.
- Compatible with Vitec® 3000, 5000 & 7000 scale inhibitors.
- Effective over a wide pH range.

RoQuest® 5000 contains a blend of organic coagulants and ferric sulfate and is designed to be injected into the feedstream of multimedia and sand filters. This product will enhance the filter performance by further reducing turbidity and color, producing an effluent that is a more acceptable feedwater quality to downstream reverse osmosis systems.

Best results are achieved in raw waters that contain up to 10 NTU turbidity and color units of greater than 10 or in feedwaters in which organic polymers have been under or overdosed.

Use Instructions:
Inject RoQuest® 5000 at least 15 feet (5m) upstream of multimedia filters. Do not use static mixers ahead of the filters as the shear imparted by this equipment will degrade the polymers contained in this formulation.

Dosing Guidelines:
Typical RoQuest ®5000 dosage is in the range of 2 to 25 ppm. Approximately 0.25 ppm of alkalinity expressed as calcium carbonate is required per ppm of RoQuest®5000. Following coagulant addition, a minimum of 25 ppm of residual alkalinity is required.

Significant overdosing of RoQuest® 5000 may cause degradation in the quality of the filtered water. If there are any questions, please contact Avista Technologies for specific dosing instructions.

Dilution:
RoQuest® 5000 should be fed neat if possible. If a dilution is necessary, dilute no more than 4 to 1 with RO permeate or DI water.

Packaging and Storage:
Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Please protect this product from freezing.

Specifications	
Appearance:	Clear brown liquid
pH (1% solution):	4.0 – 6.0
Specific Gravity@20°C:	1.3-1.4

Packaging Formats	Americas	EMEA
Pails	45 lbs	23 kg
Drums	500 lbs	220 kg
IBC's (tote bins)	-	-

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RoQuest® 6000

Coagulant Product Datasheet

Performance:

RoQuest®6000 provides unique performance and application benefits:

- Contains more than 9.5% soluble ferric ion and less than 0.2% ferrous ion.
- Certified by United Laboratories to ANSI/NSF 60 for use in systems producing potable water.
- Capable of producing RO quality feedwater in multimedia and sand filtration applications
- Compatible with thinfilm (polyamide) and cellulose acetate RO membranes.
- Filter-aid properties resist solids breakthrough in direct filter applications.
- Low dosage requirements
- Compatible with Vitec® 3000, 5000 & 7000 scale inhibitors.
- Effective over a wide pH range.

RoQuest® 6000 contains a blend of organic coagulants and ferric sulfate and is designed for use as a coagulant and flocculation aid in flocculator-clarifiers.

This product will enhance performance by removing colloids, silt, and many organic molecules, producing an effluent that is a more acceptable feedwater quality to downstream reverse osmosis membranes.

Use Instructions:
Inject RoQuest® 6000 at least 15 feet (5m) upstream of multimedia filters. Do not use static mixers ahead of the filters as the shear imparted by this equipment will degrade the polymers contained in this formulation.

Dosing Guidelines:
Typical RoQuest ®6000 dosage is in the range of 5 to 35 ppm. Approximately 0.25 ppm of alkalinity expressed as calcium carbonate is required per ppm of RoQuest®6000. Following coagulant addition, a minimum of 25 ppm of residual alkalinity is required.

Significant overdosing of RoQuest® 6000 may cause degradation in the quality of the filtered water. If there are any questions, please contact Avista Technologies for specific dosing instructions.

Dilution:
RoQuest® 6000 should be fed neat if possible. If a dilution is necessary, dilute no more than 4 to 1 with RO permeate or DI water.

Packaging and Storage:
Standard regional pack sizes are listed below. Custom packaging can be provided worldwide to meet customer needs. Please protect this product from freezing.

Specifications	
Appearance:	Clear brown liquid
pH (1% solution):	2.0 – 3.0
Specific Gravity@20°C:	1.4-1.6

Packaging Formats	Americas	EMEA
Pails	45 lbs	23 kg
Drums	500 lbs	220 kg
IBC's (tote bins)	2500 lbs	1100 kg

NSF Certified to NSF/ANSI 60

DRINKING WATER TREATMENT ADDITIVES CLASSIFIED BY NSF INTERNATIONAL TO NSF/ANSI 60 ON NOVEMBER 14, 2006 AS STANDARD DRINKING WATER TREATMENT CHEMICAL AT A MAXIMUM LEVEL OF 285 mg/l.

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