SOLYS VEOLIA

TERION™

Plug & Play RO-CEDI Demineralisation Solution for the Power Industry

WATER TECHNOLOGIES

Meeting the water challenges in the Power Industry

Today's challenge of generating sustainable power at competitive prices is growing right along with the worldwide demand.

Continuous challenges include improvement of plants' productivity, protecting valuable assets and maintaining consistent, uninterrupted operation.

Owners need to minimize their capital, installation and operating expenses while providing quality product water for high-pressure boilers and/or gas turbine injection, among other applications.

In a sector where both cost reduction and the quality of demineralized water is key to prevent scaling and corrosion of generation assets, more and more plants are using other source waters instead of potable to avoid rising costs.

A greater flexibility and the latest digital innovations to guarantee security and simplicity is the winning combination for them.

Veolia Water Technologies, as an expert in industrial water treatment solutions, has developed TERION™, its range of plug and play standard integrated RO CEDI systems, which meet the needs of the power industry players when they have to produce high quality demineralized water to protect their revenue generating assets!

Industry Requirements

- Constant high product water quality meeting the low level of conductivity, silica, sodium, TOC and potassium required by the Power Industry
- Production continuity
- Cost effectiveness
- Easy installation and maintenance
- Security and reduced risks

Applications

The TERION range produces high purity water, particularly suitable for:

- Power applications
  - Boiler feed
  - Turbine injection
- Industrial process water (microelectronics, f&B, Utilities....)

TERION™

The Plug & Play single-skid RO CEDI solution for demineralised water production

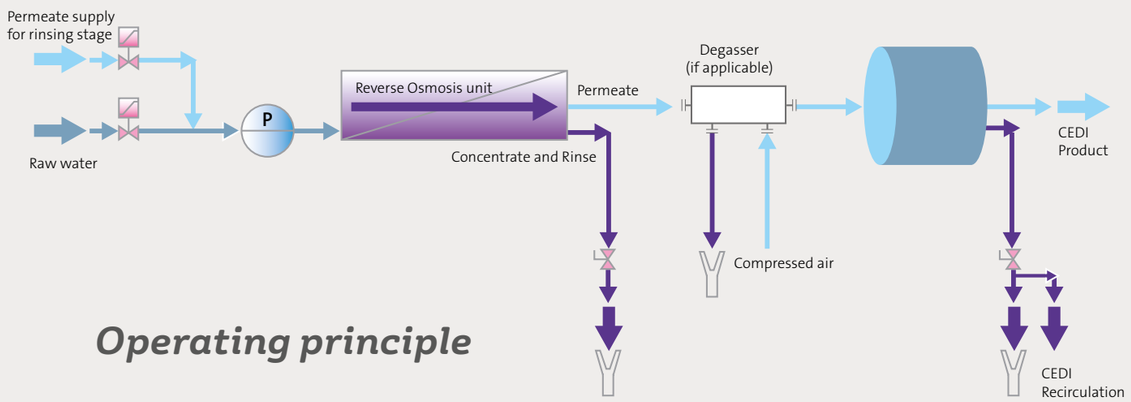
Fully designed and standardized thanks to Veolia Water technologies proven expertise, the new product TERION combines a single pass reverse osmosis and continuous electrodeionization to **produce high grade demineralized water** adapted for power applications and especially for **boiler feed and turbine injection**.
Including high quality RO and CEDI technologies, instrumentation and control panel **on one single skid**, Terion differs from most of the products in the marketplace offering separate RO and EDI skids,hence higher costs of installation.

Cost effectiveness
- Low installation and operation costs
- Standardized design
- Reliability of operation
- High quality products
- Short lead and delivery time (optimized supply chain)
- Easily duplicable
- Technical and engineering documents available from tender phase

High availability and performance
- Nearly a continuous process since no need to stop for regeneration
- No Acid or Caustic regeneration chemicals required -> improved safety on site
- Filter to protect RO of possible risk coming from raw water
- High efficiency motors and VFD (Variable Frequency Device) pumps to save up to 50% on electrical power
- Individual Power panel for each CEDI modules -> high reliability
- Easy access for maintenance, specific measurement and operation
- Global service offer

Plug & Play unit
- Reduced installation time and commissioning
- Pre-assembled and pre-tested in the workshop
- 100% containerized
- Quicker start of demin water

Remote Monitoring
- AQUAVISTA™ enabled for remote monitoring and in depth operator training
- Easy access to information and simple operation thanks to advanced programing of the PLC
- User friendly HMI



Operating principle

A full TERION™ range to suit your needs

Terion enables to remove over 99.9% of dissolved inorganics and over 99% of large dissolved organics to produce demineralized water meeting the most stringent specifications in silica, sodium, potassium and TOC levels.

Pre-treated water feeding the TERION unit will initially pass through a 5µm cartridge filter to protect RO from any possible solid matter. The water will then pass through an array of high rejection low energy RO membranes for removal of organics and main dissolved salts before salinity polishing through enhanced performance CEDI stacks. When required, 2 inlet injection points allow easy pretreatment conditioning from the customer.

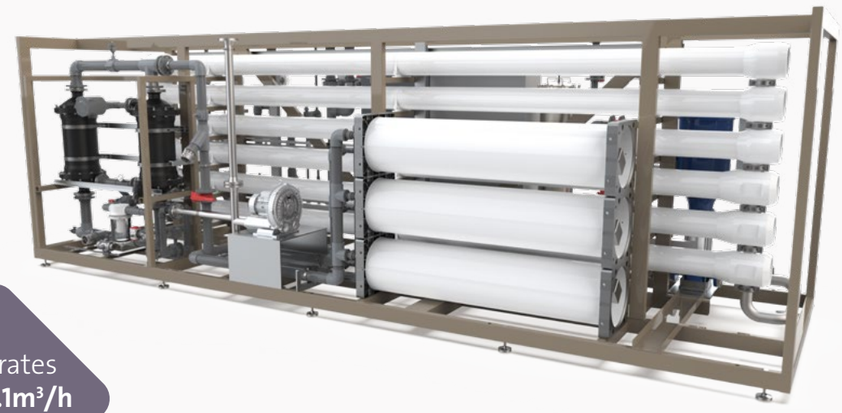
A chemical free alternative may be possible using CO_2 membrane degasser and pretreated softened water.

Terion is available in five skid mounted units ranging from **5.1 m³/h to 52.7 m³/h** (depending upon inlet water quality) and in two different versions - standard and premium- as a function of the treated water targets. With Terion, Veolia Water Technologies offer a **larger range of product than the main competitor** (6 to 50m³/h for VWT vs 9-26m³/h).

With a modular frame, Terion takes advantage of common components and piping layout across different models to harmonize skid configuration.

Flexibility given by options

- Different versions, well water or surface water inlet, standard or premium product water quality
- Ready for manual CIP
- Two chemical injection points (no dosing sets)
- CO_2 removal membrane degasser. including a blower for the biggest units
- Feed water pH probe
- Automatic Valve for RO Flushing using permeate
- Witnessed Factory Acceptance Test (FAT) incl wet tests to reduce on site testing



Flow rates from **5.1m³/h** to **52.7m³/h**

Key Features and Performances

System Operating Parameters

Model	Unit	6200	12500	25000	37500	50000
Permeate flowrate @ 12°C*	m³/h	5.1-6.6	10.1-13.2	20.9-26.4	30.1-39.5	45-52.7
Feed water flowrate @ 12°C*	m³/h	7.5-9.2	14.9-18.5	30.9-37	44.5-55.5	66.7-74
Typical Design flux	l/m²/h	Well Water : 28 -Surface Water : 25				
RO Recovery(2)	%	75-80				
CEDI Recovery(2)	%	90-95				
Installed power(2)	kW	21	25	53	77	87

(1): Typical flow rates mentioned here are based on surface water (for the minimum flow) and well water (for the maximum flow).
(2): Flow rates and installed power depend on feed water quality and temperature. RO and CEDI projections to be performed based on project data.

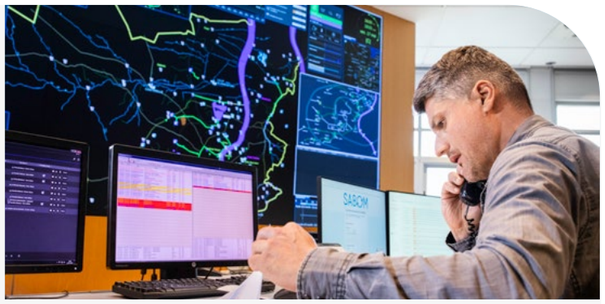
System Dimensions

Model	Unit	6200	12500	25000	37500	50000
Length	mm	5800	7450	7450	7450	7450
Width	mm	1750	1750	2150	2150	2150
Height	mm	2270	2270	2420	2420	2420
Empty weight	kg	2048	2919	4884	6295	7673
Operating Max weight	kg	2781	3608	6160	7725	9434
Configuration RO-CEDI		110X3- VNX28X1	210X4 - VNX55X1	320X5 - VNX55X2	420X6 - VNX55X3	630X6 - VNX55X4

** These dimensions are given for unit in operation. All units are suitable for transportation in a container*

Pipes Connections

Model	6200	12500	25000	37500	50000
Feed water	DN40	DN50	DN80	DN100	DN100
CEDI Product (outlet and divert)	DN32	DN50	DN65	DN80	DN100
Product CEDI reject	DN10	DN15	DN15	DN25	DN25
RO Concentrate	DN32	DN32	DN40	DN40	DN65



A global service Offer

Terion, like all Veolia SOLYS standardized plug and play solutions, is delivered, installed and commissioned quickly , enabling industrial manufacturers and Power manufacturers in particular, to reduce their infrastructure and civil engineering costs.

- Most engineering tasks done in advance at the product development stage
- Highly reduced cost of engineering in execution
- Short lead times
- Controlled supply-chain ISO 9001:2015
- Experienced and certified staff for assembly and commissioning

Customer care

Witnessed FAT by end-user :

Final Factory Acceptance Test of the fully pre-tested product are often organised in our workshops with the end-user.

Commissioning support

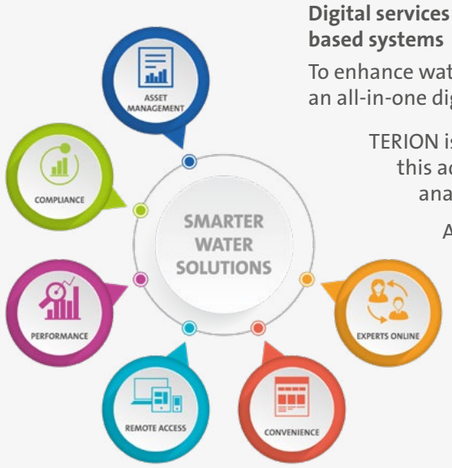
Veolia Water Technologies can offer on-site commissioning support and in-depth operator training.

After-sales service

Local aftermarket service and support teams offer preventive and corrective maintenance programs to ensure the long-term, efficient operation of installed plants.

AQUAVISTA™ for TERION

DIGITAL SERVICES



Digital services for plant performance optimisation. Run on today's most secure cloud-based systems

To enhance water treatment at your facility, Veolia Water Technologies has developed an all-in-one digital service called–AQUAVISTA™.

TERION is AQUAVISTA enabled, which means, that you can decide to benefit from this advanced service (Portal , Insight and Assist) relying on IOT, advanced analytics and Veolia's water treatment expertise.

AQUAVISTA allows for

- remote monitoring of more than 50 parameters of your equipment
- efficient water management thanks to real-time 24/7 alarm
- KPI monitoring for compliance & stable operation
- online support regarding your processes or for troubleshooting and emergency

AQUAVISTA™ will optimise water, energy and chemical consumptions of your equipment while reducing your production downtimes and your non compliance events.

Also available at Veolia Solys

Full standard treatment line TERION + pretreatment

SOLYS can provide the appropriate standard technologies to be used as pre-treatment line upstream of the Terion™, according to the inlet water quality (river, well water, potable water, reuse water).

Raw water →

ACTIFLO Pack
Clarification

possible alternatives: Multiflo Pack , Idraflot

FILTRAFLO Pack
Filtration

possible alternative: Uflex

Ionsoft
Softening

if required

Sirion Mega HF
1 pass RO

if required

NEW TERION

TERION™ complementary products

Cleaning in Place (CIP)
SOLYS can provide the appropriate standard CIP station for cleaning of fouled or scaled RO membranes or CEDI of TERION.

Chemical dosing sets including pump, accessories and tanks, for pretreatment line, antiscalant, acid or soda if applicable

Consumables, spare parts and emergency service kits
A complete set of consumables is available eg. FILO cartridge filters, RO membranes, etc.

HYDREX® chemicals
Hydrex 4000 water treatment chemicals from SOLYS are recommended for optimised operation.

Resourcing the world

Your local contact

Veolia Water Technologies

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http://veoliawatertechnologies.com/en/about-us/multi-local-presence