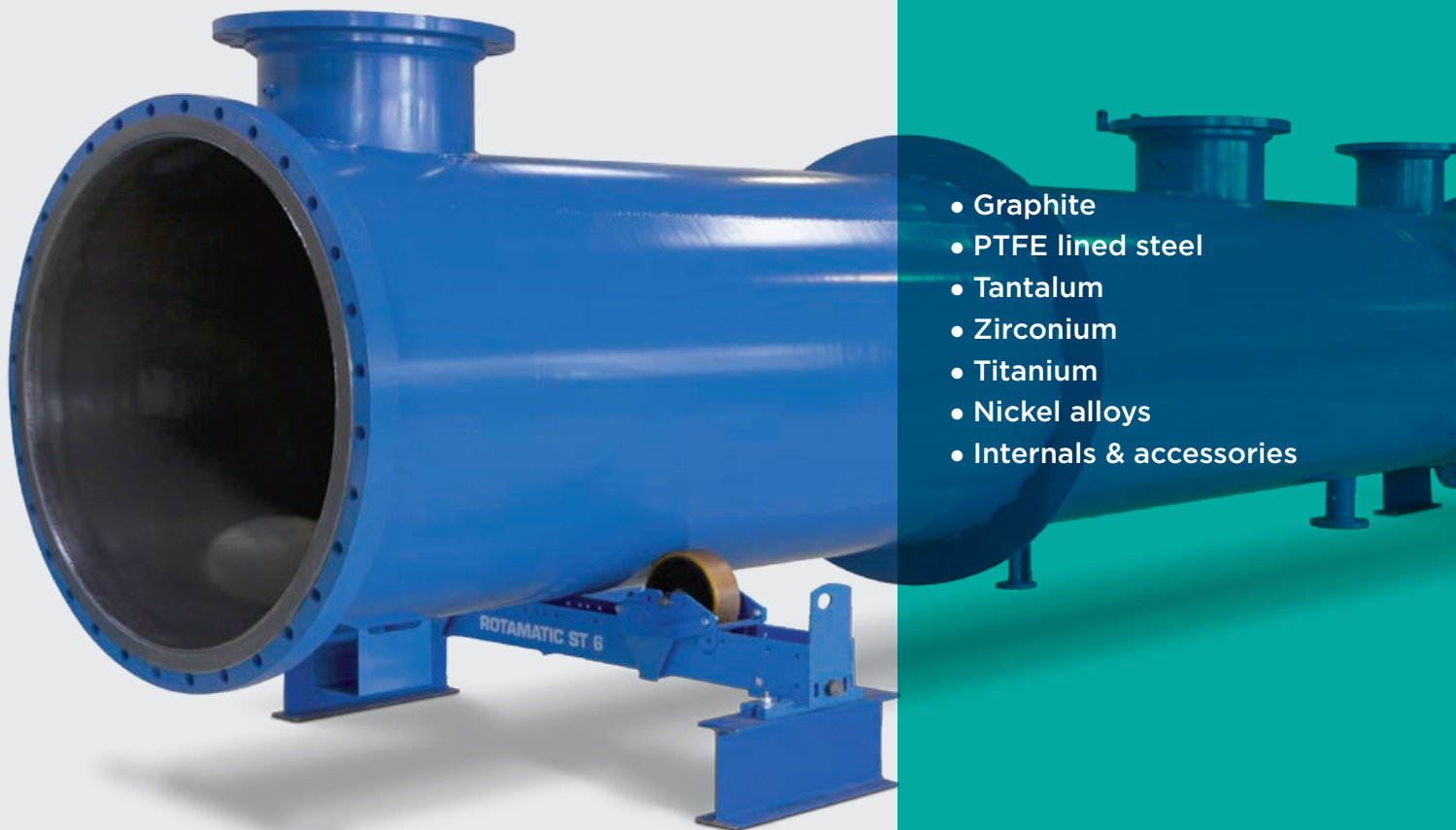




CORROSION RESISTANT

REACTORS  
COLUMNS  
VESSELS



- Graphite
- PTFE lined steel
- Tantalum
- Zirconium
- Titanium
- Nickel alloys
- Internals & accessories

# WORLDWIDE LEADER IN CORROSION-RESISTANT PROCESS EQUIPMENT, WITH A SOLUTION-ORIENTED APPROACH

The Mersen AntiCorrosion Equipment activity is internationally recognized for its expertise in the design and manufacture of process equipment, manufactured from corrosion resistant materials (graphite, silicon carbide, tantalum, zirconium, PTFE). Mersen also has an in-depth knowledge of the process technologies requiring our AntiCorrosion Equipment and can provide offers from the basic equipment up to skid-mounted turn-key process packages.

	HEAT EXCHANGERS	REACTORS, VESSELS AND COLUMNS	PIPING BELLOWS ACCESSORIES	PROCESS TECHNOLOGIES
GRAPHITE	 BLOCKS, CUBIC AND TUBES		 RUPTURE DISCS	 <b>FEEDSTOCK</b>
SILICON CARBIDE	 BLOCKS AND TUBES			
TANTALUM	 TUBES AND BAYONETS		 TANTALUM SMALL PARTS	H <sub>2</sub> SO <sub>4</sub>
ZIRCONIUM	 ZIRCONIUM			HCl
TITANIUM	 TITANIUM			Cl <sub>2</sub>
NICKEL ALLOYS	 NICKEL ALLOYS			HBr
PTFE		 PTFE	 PIPING AND BELLOWS	Br <sub>2</sub>
<b>AFTER-SALES SERVICE</b>				P <sub>2</sub> O <sub>5</sub>
				FeCl <sub>3</sub>
				Brine
				Flue Gas
				<b>PROCESS FUNCTIONS</b>
				Absorption
				Burner
				Concentration
				Dilution
				Gas Drying
				Distillation/ Desorption/Stripping
				Gas cleaning / Vent treatment
				Inorganic removal
				Organic removal
				Production
				Temp. Control
				Vaporizer
				Vacuum system

# 01 LARGE COLUMNS, PRESSURE VESSELS AND REACTORS DESIGNED TO MEET YOUR NEEDS

Mersen designs and manufactures distillation and absorption columns in graphite, PTFE lined steel, tantalum, titanium, zirconium and nickel alloys.

Our columns are manufactured in accordance with the following international construction codes: ASME, EN13445, CODAP, AD 2000-Merkblatt

Whatever the constraints of your process, we have the solution within our extensive range of materials.

	GRAPHITE	PTFE LINED STEEL	METALS
DESIGN PRESSURE	max 3bar	10barG	30barG and above
VACUUM RESISTANCE	OK	Optional	OK for clad or solid options Possible for loose lined option (with convolutions and vacuum pins)
DESIGN TEMPERATURE	Up to 400°C	230°C	300°C
SEALING	Gasket between sections (max 2.5m)	No gasket required (max 1.5m)	Welding or gasket when required
MAXIMUM DIAMETER	Up to 2,500 mm diameter (80") higher diameter on special request	<1,600 mm (64") in seamless PTFE >1,600 mm (64") welded PTFE	no limit based on design
PERMEABILITY	Impregnated graphite	PTFE natural permeability	None
APPLICATION	Stripping, absorption, gas cleaning		
CHEMICALS COMPOUNDS	HCl, HF, H <sub>2</sub> SO <sub>4</sub> , HBr		Tantalum for HCl process Zirconium for acetic acid process Titanium for various processes

# 02

## GRAPHILOR® COLUMNS

Mersen graphite columns offer reliable and corrosion-resistant solutions for the processes in the organic and inorganic chemical industries.

The columns are manufactured with Graphilor® an exclusive impregnated graphite developed by Mersen.



### WHY MERSEN GRAPHILOR® COLUMN?

- High corrosion-resistance to all acids (HCl, H<sub>2</sub>SO<sub>4</sub>, HF, H<sub>2</sub>SiF<sub>6</sub>, H<sub>3</sub>PO<sub>4</sub>, monochloroacetic acid...) thanks to a variety of impregnated graphite grades (XBS, XC)
- Maximum temperature design : 400°C
- Conductive material versus non-conductive plastic solutions
- Customized designs with large diameters (up to 2.5 meters)
- Mechanical design by FEA (ANSYS)

## GRAPHITE COLUMNS

Mersen Graphilor® columns are typically used for :

- Absorption
- Desorption / Distillation / Stripping
- Purification of flue gas

## TECHNICAL CHARACTERISTICS

- Inside columns diameter: from 250mm to 2,500mm
- Minimum nozzle diameter: DN25
- Maximum operating temperature: up to 400°C when Graphilor® XC is selected
- Maximum operating pressure: 3 barG

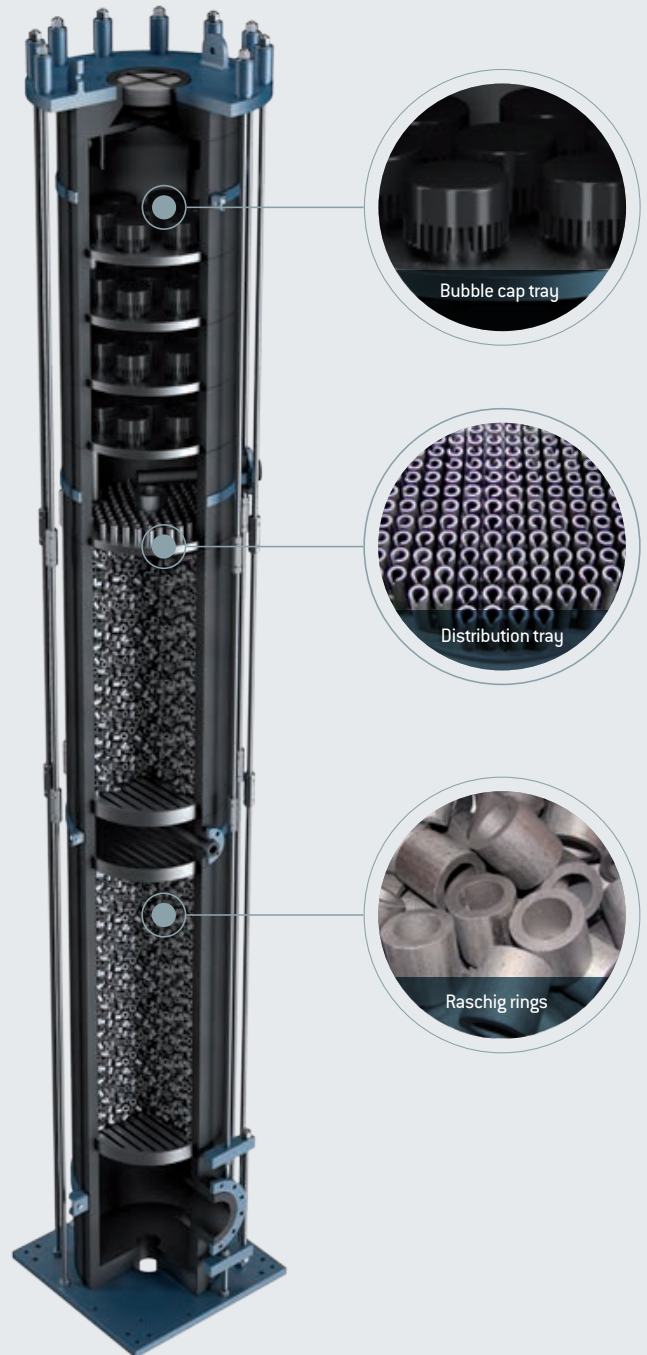
## GRAPHITE INTERNALS

Based on customer's drawings or process requirement, we supply internals :

- Distribution trays
- Sieve or Bubble cap trays
- Raschig rings

## MERSEN GRAPHITE RASCHIG RINGS - TECHNICAL CHARACTERISTICS

- Withstand high temperatures (max 200°C)
- Resist thermal shocks
- Perfectly resistant to almost all industrial corrosive agents

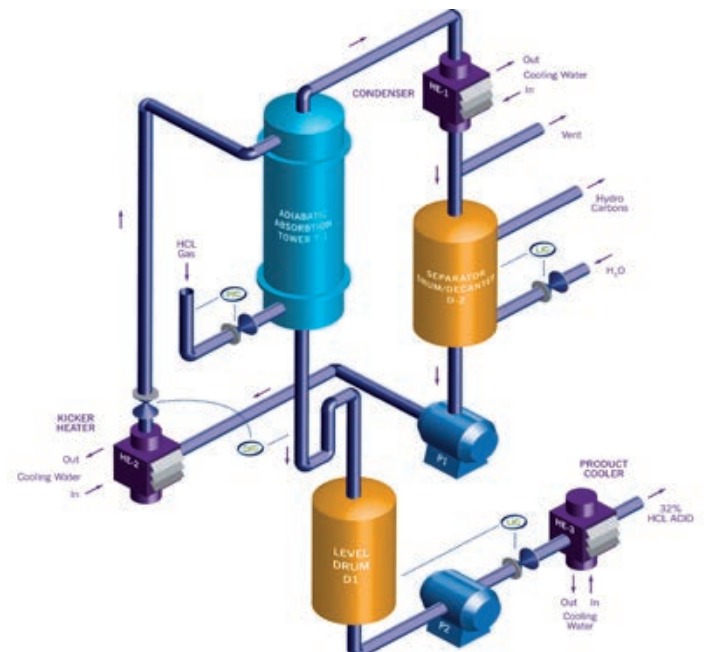


## FOCUS APPLICATION

# HCl ADIABATIC ABSORPTION

The industry of halogenated products releases gaseous effluents loaded with corrosive components such as hydrogen chloride (HCl), bromide (HBr) or fluoride (HF). The scrubbing of these acidic gases with water is a common application for our atmospheric packed columns manufactured from Graphilor® where very low emission levels are required. A valuable aqueous acid solution is also recovered, which can easily be stored at ambient conditions.

It covers many requirements in the field of VCM, PVC, TDI and other similar industries.



# 03

## ARMYLOR® COLUMNS

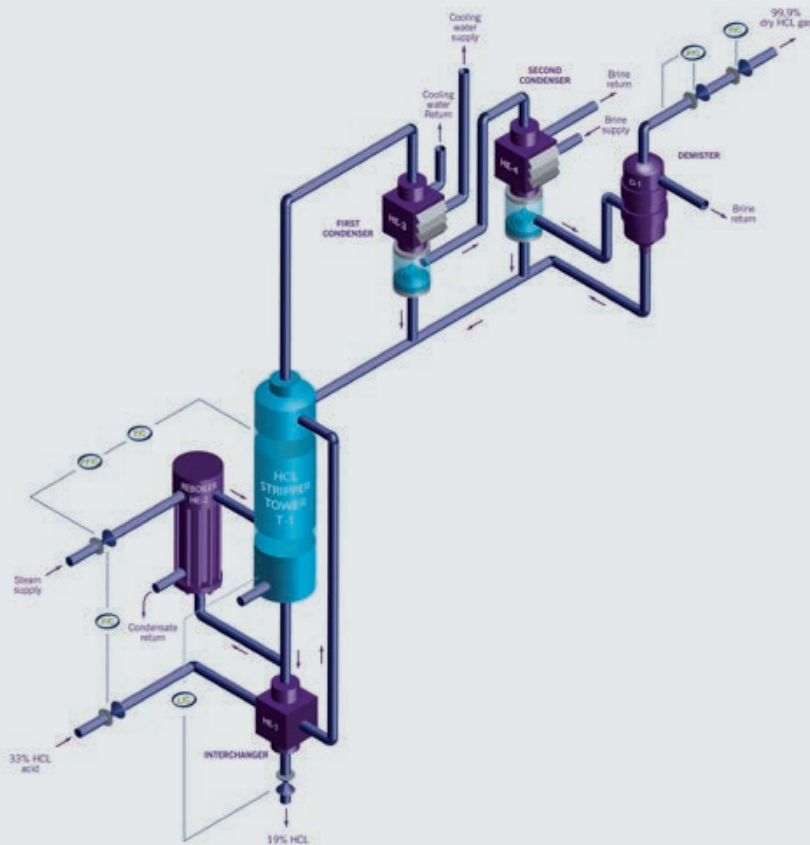
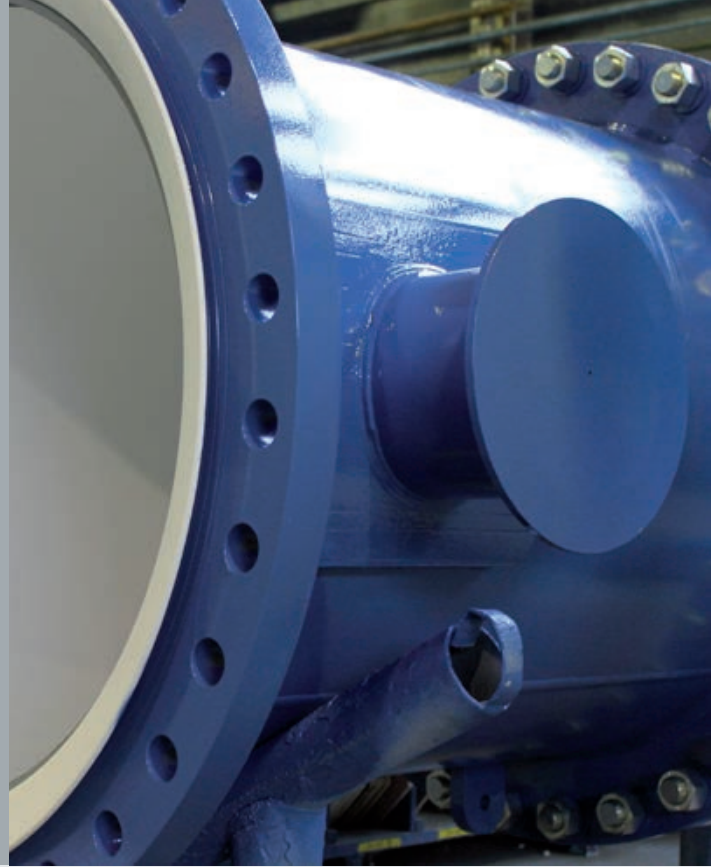
Armylor® **PTFE loose lined** columns combine the corrosion resistance of PTFE and the safety of the seamless lining process together with the mechanical resistance of the steel shell.

### WHY MERSEN ARMYLOR® COLUMN?

- Armylor® is a heavy duty, seamless PTFE liner
- Wide corrosion resistance range (resistant to all known chemicals with the exception of alkaline metals and fluorine at high temperature)
- Dual protection design for extreme corrosion process: PFA coating together with PTFE liner
- Vacuum withstanding with graphite sleeves
- Thermal shock resistance

## TECHNICAL CHARACTERISTICS

- PTFE liner thickness : 4mm standard and up to 10mm for heavy duty
- Seamless liners up to 64" / DN1600mm and welded liners over 64" / DN 1600mm
- Maximum pressure : up to 10 bars
- Maximum temperature range : -50°C to 230°C
- Option : Vacuum resistance system to withstand partial vacuum
- Option : Dual protection design (ECTFE or PFA +PTFE) possible for more severe applications
- Option : Lining with Modified PTFE to limit permeation



## FOCUS APPLICATION STRIPPING HCl

Hydrogen chloride (HCl) gas can be easily recovered from spent recycled hydrochloric acid effluent by a stripping operation performed in our corrosion resistant columns. Our range of high performance materials (Graphilor®, Armylor® PTFE or Tantalum CL-Clad®) can perform in the most severe operating conditions. The HCl gas is desorbed from the liquid to obtain 100% pure concentration. Ultra low dehydration level can easily be met to fulfil the requirement of the most demanding industries such as

- High purity silicon for solar cells
- Electronics applications
- Organic chemistry
- Various metallurgical processes

The best solution to operate at maximum pressure is a column comprising of an internal PFA coating on carbon steel shell, together with a PTFE liner and graphite sleeve.



# 04

## TANTALUM CL-CLAD<sup>®</sup> COLUMNS & REACTORS

CL-Clad<sup>®</sup> is Mersen's patented cladding process.



### WHY MERSEN CL-Clad<sup>®</sup> COLUMN?

- Combination of high corrosion & severe process conditions
- Exceptional corrosion resistance of Tantalum
- Full vacuum applications
- High reliability thanks to metallic design
- Very low maintenance
- Low total cost of ownership
- Safety improvement in sensitive applications

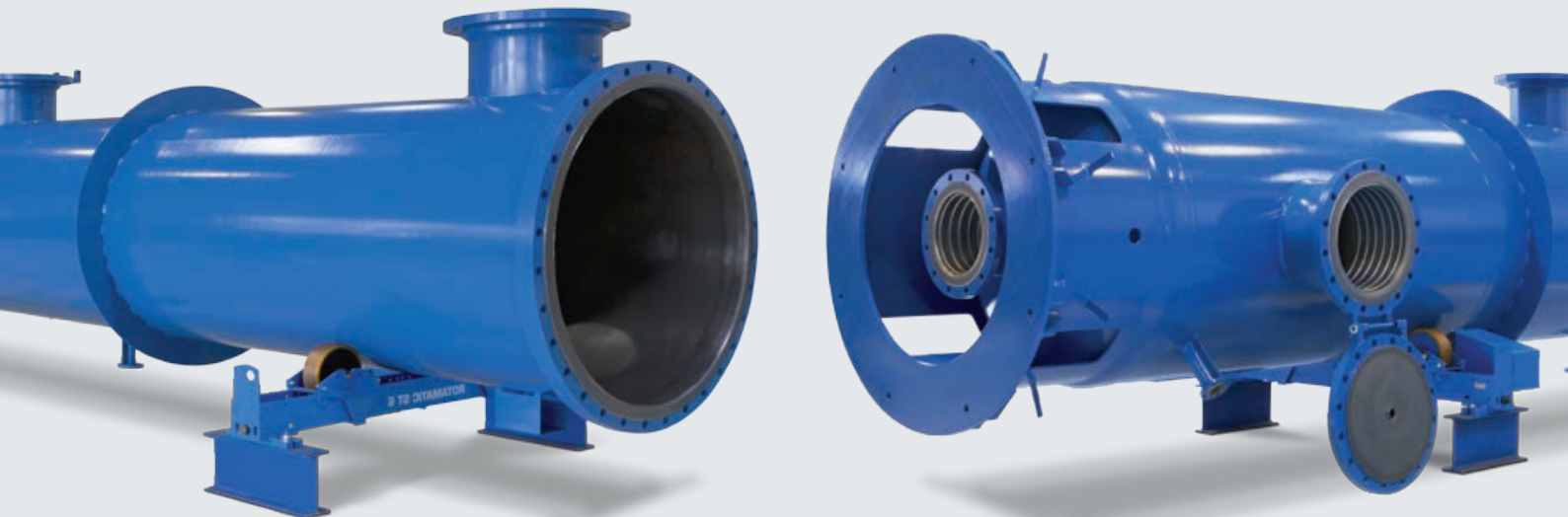


## CL-Clad® TECHNOLOGY

With this process, a thin layer of tantalum is brazed onto the entire surface of a carbon steel base plate. The columns made from such material combine the mechanical resistance of a metallic equipment with the exceptional corrosion resistance of tantalum. As a result, CL-Clad® technology is the most reliable solution to handle highly corrosive processes in the most severe service conditions (high pressure, full vacuum and high temperature).

### TECHNICAL CHARACTERISTICS

- Maximum temperature :300°C
- Range of diameter : from 300 mm up to 3000 mm
- Design pressure : full vacuum up to 30 bars and above.



### FOCUS APPLICATION

## TANTALUM CL-Clad® ARE SUITABLE FOR :

- HCl Stripping at high pressure
- Strong acids processing ( $H_2SO_4$ ,  $HNO_3$ ,  $HBr...$ )
- Multipurpose API Reactors

## HCl STRIPPING AT HIGH PRESSURE

For production of high pressure HCl up to 5barG, the natural permeability of PTFE liner limits the use of Armylor® columns. In such cases, a design with reactive metal layer such as Tantalum appears as the most reliable solution. Mersen has several references of Tantalum CL-Clad® columns working satisfactorily under severe process conditions.

# 05

## METALLIC COLUMNS

A long experience in the design and fabrication of reactive metal equipment combined with an international material sourcing policy allows Mersen to provide quality and cost-effective solutions.



### ZIRCONIUM COLUMNS

Zirconium is suitable in corrosive environments such as formic acid, strong alkaline, hydrochloric acid, salt solution, organics etc., notably for the production of acetic acid where Mersen supplies both solid and explosive clad zirconium columns and vessels.

- Type of columns in the acetic acid process
- drying columns
  - light-end columns

### TITANIUM & NICKEL ALLOYS COLUMNS

For the treatment of coke oven gas, Mersen is specialized in the supply of de-acidification and stripping columns, for the removal of ammonia, sulphur dioxide, cyanuric acid, etc.

# 06

## GRAPHILOR® QUENCH

Mersen provides Graphilor® or metallic quenches for the cooling of hot corrosive gases. Graphilor quench can be combined with a graphite Polybloc.

# 07 INTERNAL AND ACCESSORIES

Mersen supplies various internals manufactured from Graphilor®, Fluoropolymer (PTFE, PVDF), metals (tantalum, titanium, nickel alloys, zirconium), or other materials on request.

- demisters
- spargers
- distributors, re-distributors
- support grids
- packing rings : raschig rings, saddles, structured packing
- special pipes

### MERSEN GRAPHITE RASCHIG RINGS TECHNICAL CHARACTERISTICS

- Withstand high temperatures (max 200°),
- Resist thermal shocks
- Perfectly resistant to almost all industrial corrosive agents

Nominal Size (")	Dimensions OD/IDxL (mm)	Bulk density (kg/m <sup>3</sup> )	Bulk number (pc/m <sup>3</sup> )	Specific Surface (m <sup>2</sup> /m <sup>3</sup> )	Void volume (%)	Packing factor F <sub>F</sub> (m <sup>-1</sup> )
¾"	18/11x18	700	130 800	259	0.62	1070
1"	25/16x25	660	48 800	187	0.65	700
1" ¼"	32/22x32	590	23 200	146	0.68	460
1" ½"	37/25x37	600	15 000	126	0.67	410
2"	51/38x51	500	5 750	92	0.73	230
3"	86/60x86	570	1 200	54	0.69	160





GLOBAL EXPERT IN ELECTRICAL  
POWER AND ADVANCED MATERIALS

**EUROPE**

**FRANCE**

Mersen France Py S.A.S.  
Tel : +33 (0)3 83 81 60 81  
info.pagny@mersen.com

**GERMANY**

Mersen Deutschland  
Linsengericht GmbH  
Tel : +49 (0) 6051 71 037  
info.lsg@mersen.com

**ITALIA**

Mersen Italia S.p.A.  
Tel : +39 02 82 681 31  
ace.italia@mersen.com

**SPAIN**

Mersen Iberica fma, S.A.  
Tel : +34 93 685 7800  
contact.iberica@mersen.com

**THE NETHERLANDS**

Mersen Benelux B.V.  
Tel : +31(0)10 298 30 30  
contact.schiedam@mersen.com

**UNITED KINGDOM**

Mersen UK Teesside Ltd.  
Tel : +44 (0)1642 790100  
ace.uk@mersen.com

**RUSSIA & EASTERN EUROPE**

Tel : +7 (964) 768 14 05  
info.pagny@mersen.com

**TURKEY**

Mersen Istanbul San. Ür. A. Ş.  
Tel : +90 262 751 0262  
sales.istanbul@mersen.com

**ASIA**

**CHINA**

Mersen XIANDA  
Tel : +86 21 5752 7777  
info.xianda@mersen.com

**INDIA**

Mersen India  
Tel : +91 9845331292  
/+91 9840078844  
sales.ace.india@mersen.com

**JAPAN**

MERSEN FMA JAPAN K.K.  
Tel : +81 (3) 5368-3250  
ace.japan@mersen.com

**KOREA**

Mersen Korea Co., Ltd.  
Tel : +82 (0)2 598 0071  
sales.korea@mersen.com

**SOUTH EAST ASIA**

Tel : +91 9500041487  
graphite.sales@framet.com

**NORTH AMERICA**

**USA**

Mersen USA Salem  
Tel : +1 540 389-7535  
sales.salem@mersen.com

**Mersen USA Gonzales**

Tel : +1 225 647-6752  
graphiterepairs.gonzales@mersen.com

**AFRICA**

**MOROCCO**

Mersen Maroc S.A.R.L.  
Tel : + 212 (0) 523 38 30 12  
contact.maroc@mersen.com

**SOUTH AFRICA**

Mersen South Africa, (Pty) Ltd.  
Tel : +27 011 474 0000  
marketing.za@mersen.com

**MIDDLE EAST & AFRICA**

Tel : +33 (0)3 83 81 60 81  
Info.pagny@mersen.com

**SOUTH AMERICA**

**ARGENTINA**

Mersen Argentina, S.A.  
Tel : +54 11 49 18 21 21  
infos.latam@mersen.com

**BRAZIL**

Mersen Do Brasil, Ltda.  
Tel : +55 (11) 4529 1160  
vendas.ace.brasil@mersen.com

**CHILE**

Mersen Chile  
Tel : +56 22 621 5680  
ventas.chile@mersen.com

**COLOMBIA**

Mersen Colombia  
Tel : +57 (1) 3684588  
ace.latam@mersen.com

**MEXICO & LATIN AMERICA**

Mersen Mexico Monterrey  
Tel : +52 (81) 8127 2812  
ace.latam@mersen.com

