EN

VALVE SEALANTS & COMPONENTS

valgasket division

GLOBAL SEALING SOLUTIONS

CARRARA

CARRARA Global Sealing Solutions, committed to Partnership

Operational Divisions

- **Sealing systems and components for valves**
- **Industrial sealing systems**
- **Environmental services**
- **Engineered yarns for industry**

Carrara is a partner to principal manufacturers of process components for controlling fluids and is authorised both at the main International EPCs, as well as with principle oil and gas players, for the supply of sealing and Environmental Services systems.

- **20.000 m² of protected area**
- **160 employees**
- **Patented products**
- **Frame Agreements with International Clients**

Mission

- Undertake to establish Partnerships with commercial Clients over a long period and cooperate with them in pursuing continuous improvement.
- Supply our Clients with the best technical and logistics solutions at the best price
- Satisfy our Clients by producing efficient Sealing systems.

Assets

To carry out our Mission, Carrara Global Sealing Solutions has equipped itself with spaces for logistics, equipment, management and human resources software, all tailored to the requirements of an ever increasingly competitive and exacting market.

- The large surface area over which the establishment extends allows for an extremely rational flow of raw materials, semi processed materials and of goods, guaranteeing maximum efficiency.
- The equipment for moving, processing, quality control and packaging are all integrated into a process which allows for the management of high volumes of product while preserving their traceability and adherence to standards of quality, and of the consignment times agreed with the Client.
- The use of advanced order management software allows for minimizing manual handling of data in order to guarantee the integrity of every phase of the process.
- The proficiencies of the human resources are constantly verified and integrated within a structured plan with the aim of continuous improvement.

Sealing Solutions

The Valgasket division of Carrara Global Sealing Solutions, dedicated to the production of sealing systems for Industrial Valves. The product range is complete and extensive, including Seats, Balls and Retainers, Shut-offs for Ball Valves, Seats for Gate Valves, Expanding Gates and Through Conduit Gates. Also part of the product range are Ring Joints and Spiral Wound Gaskets, Kammprofiles and Flat Gaskets, O-Ring and Lip Seals together with the range of products in Valvograph Graphite for stems, Seats and Shut-offs, rated as Low Emission and Fire Safe, available in dimensions from 8 mm up to 2,000 mm.

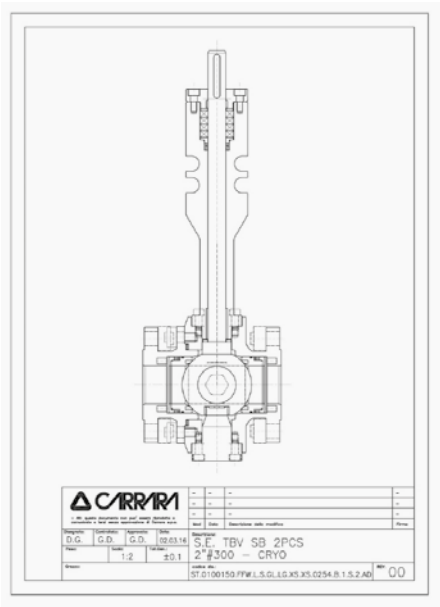
Partnership

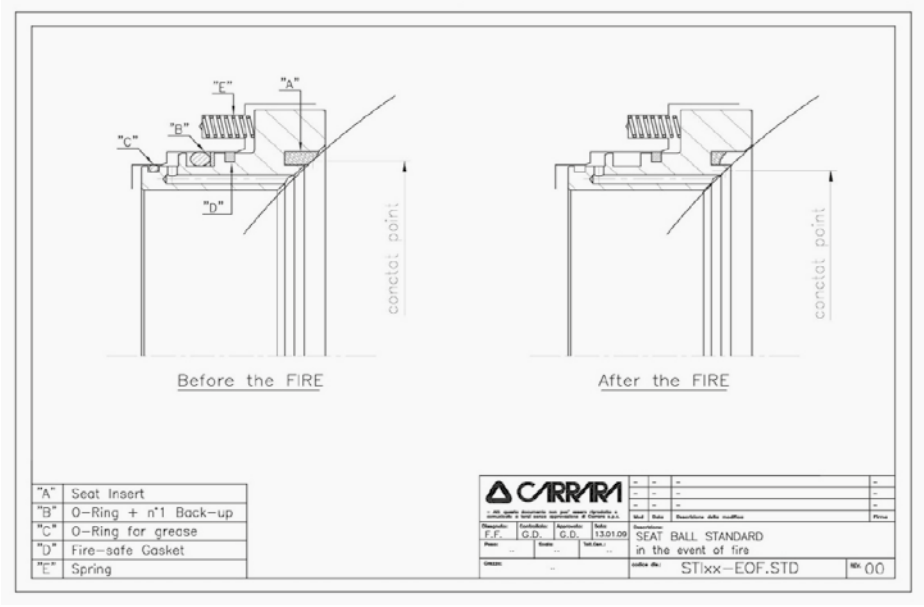
Carrara Global Sealing Solutions, Partner for winning together!
Carrara operates with Clients in a global and competitive market to win with them, and triumph together. For this, we offer competence and reliability in the modern role of Partner in the Supply Chain.

Co-Engineering

Carrara Global Sealing Solutions, value seals!

The Valgasket Division of Carrara Global Sealing Solutions makes available to Clients the decades of experience acquired by our Technical Staff for the joint development of sealing solutions with high added value.

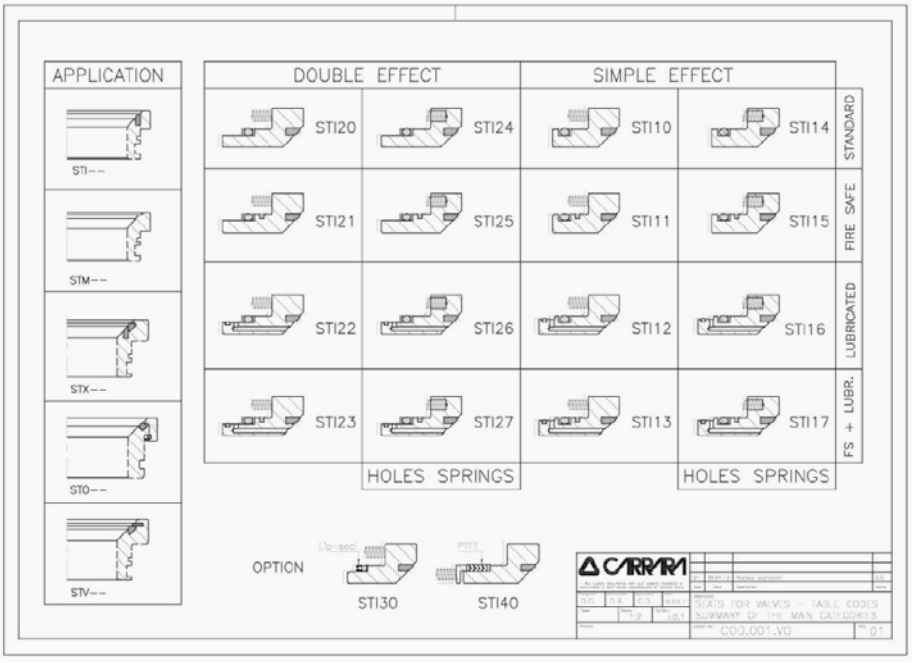




Co-Design

Carrara Global Sealing Solutions, quality seals!

The selection of a number of seat details, and that of the sealing materials, at times requires supplementary analysis and discussions in order to ensure that all is in agreement with the project specifications, and with the fluids to be contained. The Technical Staff at Carrara Global Sealing Solutions will always offer you the best assistance with the right amount of support for a correct solution.



Ready to Install

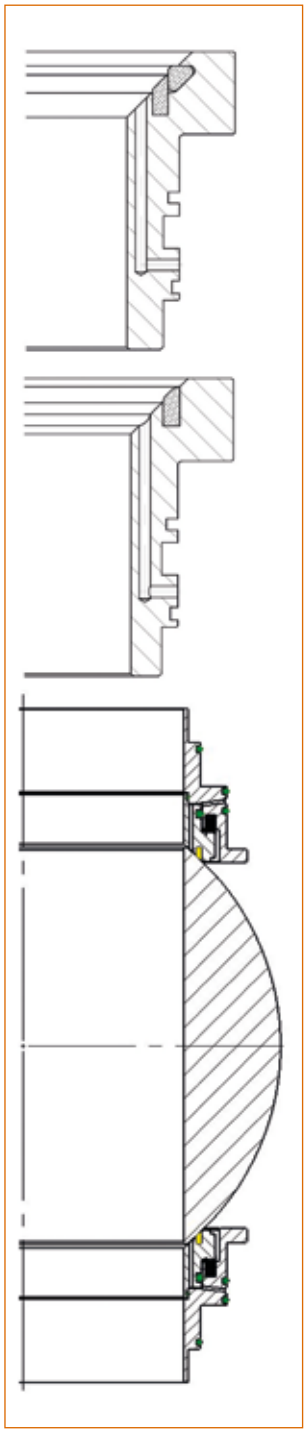
Client Oriented Strategy
The Carrara Sealing Global Solutions Valgasket Division sales programme is oriented towards maximum flexibility in order to satisfy all Client requests.

Seats
The seats may be supplied with only the thermoplastic insert or, in the case of metal to metal seals, with elastomeric or fired inserts.
Carrara has available the best materials and suppliers for thermoplastic substances (PTFE, RPTFE, DEVLON, NYLON, PEEK and
KEL-F), for FKM AED mixes and for the nickel plating, carburation and welding filling treatments.

Equipped Seats
The seats can also be supplied with secondary seating equipment and with energizing elements.

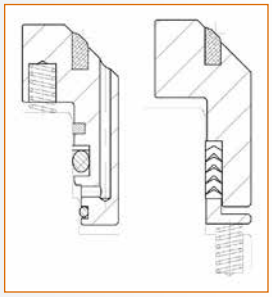
Kit
The supply of a kit complete with double seat and ball, is the Full supply option which permits optimization of the primary seal profiles.

Adaptation of Seat - Ball
For each supply option, the Seat - Ball Adaptation service is always advised as it allows for arriving at the highest level of precision and quality.

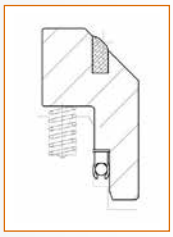


Seat Equipment

- **O-Ring** Are available for specific Oil & Gas applications, or HNBR and FKM, as well as special ones in FFKM and FKM with AED certificate.
- **Back-Up** Are made out of different thermoplastic materials and installed in some cases in endless form.
- **Springs and Spring Retainers**
  The springs and spring retainers are available in all materials and the Carrara Technical Department may be consulted regarding their design.



- **Fire Safe Valvograph** The original Valvograph graphite rings are available in sizes from 10 up to 2,300 mm in the basic or energized versions.



- **Secondary seal in Chevron Shape thermo-polymer material** producible in all materials with Carrara design or custom made.
- **Lip Seal** Are available in different combinations of design, thermo-polymeric energizing materials to adapt to any configuration of seal.
- **Secondary seals in Valvograph Controller Back graphite**
  The Controller Back line of seals is ideal for the range of pressures from 150 to 2500 psi.

Valve Seats and Components

Standard seat design

Design: this configuration, available in sizes from ½" up to 60", has been developed on the basis of the standard dimensions of Ball Valve bodies. It is capable of absolving the seal, both in normal conditions, and in the most severe at high temperature and in aggressive environments. We have a vast stock of materials available in order to guarantee rapid consignment. It is possible to customize the design of the seat if the dimensions are within the standard of stock blanks.

Applications: These seats are used in Side Entry valves, in the Floating and Trunnion models.

V-ring seat design

Design: This design requires the use of a 98 shore elastomer for the seal between the seat and the ball. Ordinarily, this configuration was aimed at low pressure services, but recent progress has allowed for an extension of use to high pressure services also. We can supply all the necessary information for a correct selection of the elastomer on the basis of requested chemical compatibility.

Cryogenic design

Design: The main characteristic of this design is that of allowing a seal down to -196°C. A special procedure was developed to obtain the best performance from the material, through correct insertion of the soft element. Our technical department is able to offer support in the development of the critical sizes and to indicate the seat and ball finish to maximise the performance of the sealing system. The most common combination of materials is F316 + PCTFE +Lip Seal. We have successfully tested a new material named V10, applicable down to -260°C.

Applications: This particular design is specific for cryogenic services in applications with LNG at the plant and during transport.

Metal-to-metal design

Design: The metal to Metal Design consists in production of the primary seals through direct contact of seat and ball. The O-Ring, as well as Lip Seal or the graphite, may be used as secondary seals depending on the applications. The coatings on the part in contact are normally made with Tungsten or Chrome Carbide using the HVOF procedure. We are able to supply various designs to guarantee the best performance for every circumstance.

Applications: These seats are used for services at high pressure and with abrasive fluids, a circumstance in which the soft insert could easily be damaged. The product could be used up to 400°C depending on the grade of the material.

Top-entry seat design

Design: This configuration, which requires a higher seat, is made up of one or two distinct pieces and may be supplied with any soft insert from Nylon to Peek, and with special surface coatings depending on the specific applications. Normally, these seats, produced both with normal or exotic materials, are made with a connector to facilitate assembly and to guarantee the necessary space for movement of the ball.

Applications: The main characteristic of the Top Entry valve is that or allowing ordinary maintenance or the substitution of seats, and of the ball, without removing the valve from the line. These seats can be used for all pressure ratings.

Gate valve seat design

Design: The seat has a frontal seal section made up of 1 or 2 inserts of different materials. The seal may also be metallic using Stellite or TCC. To facilitate assembly and maintenance in line, the design normally

includes “wings”. These seats can be made in sizes from ½” to 72” in all materials.

Applications: The Gate Valves are ordinarily used in oil and gas pipelines and in industrial plant.

Valve Seats and Components

Balls

The supply of balls, in ordinary or exotic materials and fashioned with ENP, Tungsten Carbide or Stellite, allows for supplying the complete seat-ball Kit, which directly releases the Carrara establishment from adaptation actions for the two parts. The balls may be standard, but also according to the Client's design.

Bodies and closures

In order to offer a complete service, we carry out the mechanical processing of valve "Bodies and Closures" over the complete range of sizes from 8" to 36".

Expanding gates and through conduit gates

The expanding gates design allows for a seal between the seats and the gate, be that at low or high pressures. The excellence of the seal is guaranteed by the perfect contact between the parts, allowing for its use in the most severe conditions.

The through conduit cut off is the perfect solution for downstream pipe applications. It floats towards the second seat making the seal. It normally works with a soft insert seat to guarantee a perfect seal even at low pressure.


Valgasket
MNT

Setting Valve

seals for valves

The stampding division for **Valvograph** graphite seals of Carrara Global Sealing Solutions combines a large production capacity with a high level of flexibility and includes in its range seals certified for stems, closures and seats, which meet the most stringent requirements regarding runaway emmission controls and of purity of the materials.

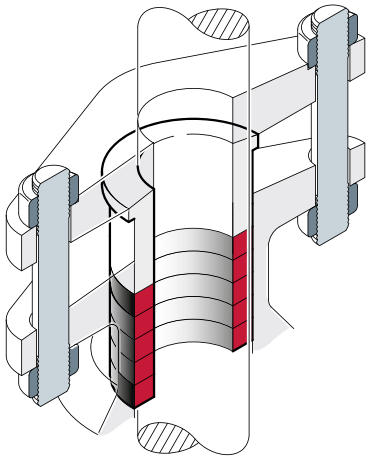
PGT3 GR8622
PGT4 GR8622

PGT3 GR8622 is the full braided graphite rings stem seal certified API 622 which guarantees a maintenance of the low emission profile of the valve, even under maintenance with the GR8622 braid.

PGT4 GR8622 is the certified low emission stem seal complying with API 622 e ISO 15848 Standards which makes a valid solution for reducing the type of seal used for the first use on new valves. Indeed, it can be used as much in the context of Oil & Gas and Chemicals, as in high pressure and temperature steam applications.

Approvals

- ISO 15848 C01 BH
- ISO 15848 C02 BH
- API 622 3rd Edition
- Fire Test API 589
- CorrosionTest
- Weight Loss Test
  EN 14772, section 6.7



Temperature
-200°C up to 650°C, having limitations at 450°C with weakly oxidizing fluids and hot air

Pressure range
All Pressure Classes are covered up to API 10000 psi

Ph Range
0 ÷ 14 except for strong oxidants

Full low emission approvals

Low Emission ZONE

PGT3 GR8622 and PGT4 GR8622 are the seal sets with low emission approval, be that in compliance with Standard API 622 3rd Edition or with Standard ISO 15848 (400°C, BH seal class, endurance class C01 and C02), to offer the maximum certified cover with a single seal.

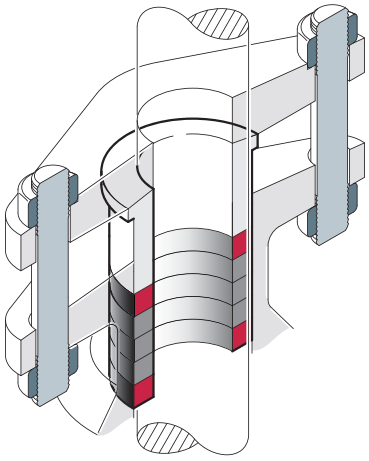
Applications

PGT3 GR8622 e PGT4 GR8622 are the **Valvograph** graphite seal sets for Gate, Globe, Butterfly, Ball and Oil & Gas e Chemical Service Control valves, yet applicable with all industrial fluids compatible with graphite, allowing for the use of a single seal for all applications.

CONTROLLER ONE EVOLUTION
CONTROLLER 2 EVOLUTION

CONTROLLER EVOLUTION.
The CONTROLLER family seal sets EVOLUTION are designed to meet the demand for reliable products conforming with the TA LUFT Low Emission requirements.

CONTROLLER ONE EVOLUTION
Is the seal set with "Cup & Cone" configuration having rings at diversified densities, specifically for valves undergoing frequent movement but usable for all applications.



CONTROLLER 2 EVOLUTION
Is the seal set, the rings of which, with a squared section, are made in the W configuration at controlled densities, usable for all critical applications.

Temperature
-200°C up to 650°C, having limitations at 450°C with weakly oxidizing fluids and hot air

Pressure range
All Pressure Classes are covered up to API 10000 psi

Ph Range
0 ÷ 14 except for strong oxidants

Approvals

- **TA LUFT VDI 2440**
- **Weight Loss Test EN 14772, section 6.7**

Controller One Evolution

Controller 2 Evolution

Low Emission Design

Low Emission reliability over time
The CONTROLLER EVOLUTION seal sets are made with GR80SGR packing and Valvograph graphite rings with a high level of purity. Both the products are treated with oxidation and corrosion inhibitors, and show a very low Sulphur and Halogen content. The high quality level of the materials selected for production of the CONTROLLER EVOLUTION range is the main requisite for guaranteeing low emission reliability over time.

Differing densities
Thanks to the stamping technique at differing densities and to the W shape, jointly with the use of the special GR80SGR packing, the CONTROLLER EVOLUTION sets have a modest wear coefficient, cause of the reduction of gasket compression during activation of the valve, delaying the need for resealing during operation.

GR80SGR OXY

Oxygen service

GR80SGR OXY is the **Valvograph** packing in graphite, BAM approved for Industrial Valve Oxygen applications.

The packing is made with spun expanded graphite yarn of the maximum purity and enriched with oxidation retardant.
It is this very characteristic, along with the care with which it is made, which confers on GR80SGR OXY the exceptional resistance to contact with oxygen, both in liquid and in gaseous form.
Each production batch can be evaluated according to ASTM G136 to determine the quantity of residual soluble compounds, and to guarantee the extreme cleanliness of the products.

Approvals

- AIT greater than 500°C
- Artificial ageing: 100 hrs at 325°C and 250 Bar
- AIT of the aged sample greater than 500°C
- Impact with gaseous oxygen at 300°C
- Impact with liquid oxygen

BAM approved for Oxygen Services

Product range with BAM approval for oxygen applications

GR80SGR OXY
GR80SGR OXY packing is available in packaging of 1.0, 2.5 and 5.0 kg in all the sections, for maintenance activities on oxygen application lines.

CONTROLLER 2 EVO OXY
The CONTROLLER 2 EVO OXY set in graphite is made up of packing rings such as Top & Bottom and of pressed graphite rings. The pressed rings also have BAM approval.

CONTROLLER 3 OXY
The CONTROLLER 3 OXY set in graphite is wholly made up of packing rings GR80SGR OXY stamped.

V48Z OXY e V48ZN OXY

Single rings in graphite and reinforces graphite such as static seals for valves.

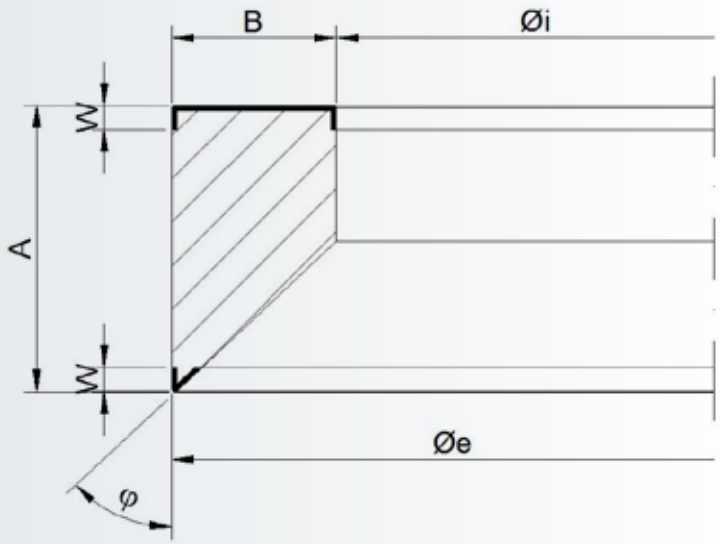
SW316G OXY
Wound metal with filter in graphite for the valve bonnet and the line flange.

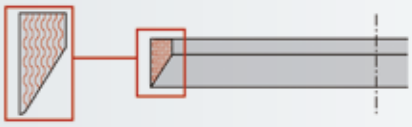
HOCKDRUCK
Gaskets in graphite for the valve bonnet and line flanges.

STEELGRAPH

for Pressure Seal Gates and Check Valves

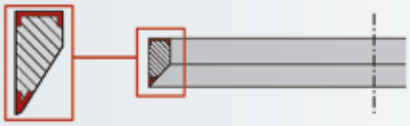
The **Steelgraph** gaskets for pressure seal Gate and Check Valve are made of **Valvograph** graphite and steel in different combinations to offer elasticity and resistance. The graphite with oxidation retardants guarantee an exceptional service life thanks to their lack of sensitivity to thermal cycles.





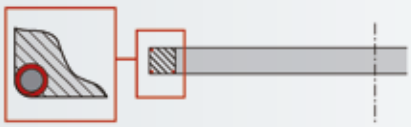
Steelgraph G11

G11 is the gasket produced by stamping **Valvograph** graphite, supported by metal layers. An ultra-resistant solution.



Steelgraph G22

G22 is obtained by stamping **Valvograph** graphite simultaneously with metallic covers, sized in thickness and rounded edge corners as a function of the valve rating and its size, always to guarantee the maximum resistance to extrusion and an exceptional elasticity.



Steelgraph G33

G33 iis a gasket obtained by stamping **Valvograph** graphite with the insertion of metallic rings at the corners. This solution, especially useful for rectangular and square section gaskets, is advised for high and medium pressure calorific power station heat exchangers.

Temperatura

-200°C up to 650°C, having limitations at 450°C with weakly oxidizing fluids and hot air

Pressure range

Up to 1.500 bar

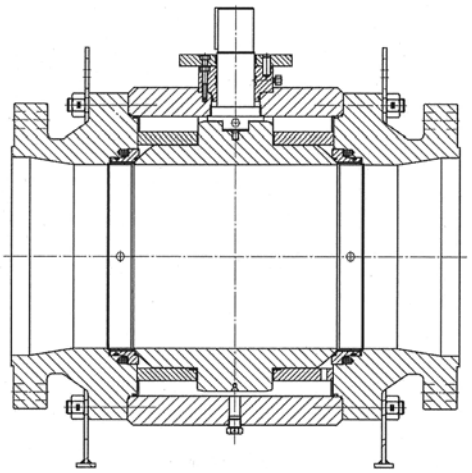
Ph Range

0 ÷ 14 except for strong incompatible oxidants and fluids

Valvograph Rings

Graphite	C content > 99.00 %				
	Ash content < 1,00%				
	Treatment with passive corrosion Inhibitor				
Dimensions mm	from 10 up to 2300 mm				
	Standard production tolerances				
	Diam. Internal	Diam. External	Thickness	Strip	Density
up to 250	+0,20	0,00			
	0,00	-0,10	+/-0,20		
from 251 to 500	+0,25	0,00			
	0,00	-0,25	+/-0,20		
from 501 to 750	0,30	0,00		0,00	1,25
	0,00	-0,30	+/-0,25	÷	÷
from 751 to 1000	0,40	0,00			
	0,00	-0,40	+/-0,25	-0,25	1,65
from 1001 to 1250	0,45	0,00			
	0,00	-0,45	+/-0,30		
from 1251 to 2300	+0,50	0,00			
	0,00	-0,50	+/-0,30		

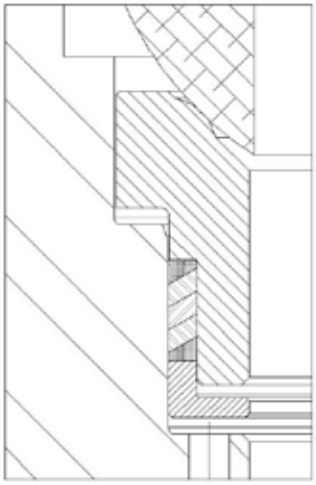
The **Valvograph** graphite gaskets, made of graphite enriched with oxidation retardant and corrosion inhibitor, comply with EN14772, ASTM F2168 and BAM requirements for oxygen applications. The Valvograph gaskets are available in sizes from 10 to 2,300 mm in different densities depending on the technical requirements of the Client and the application.

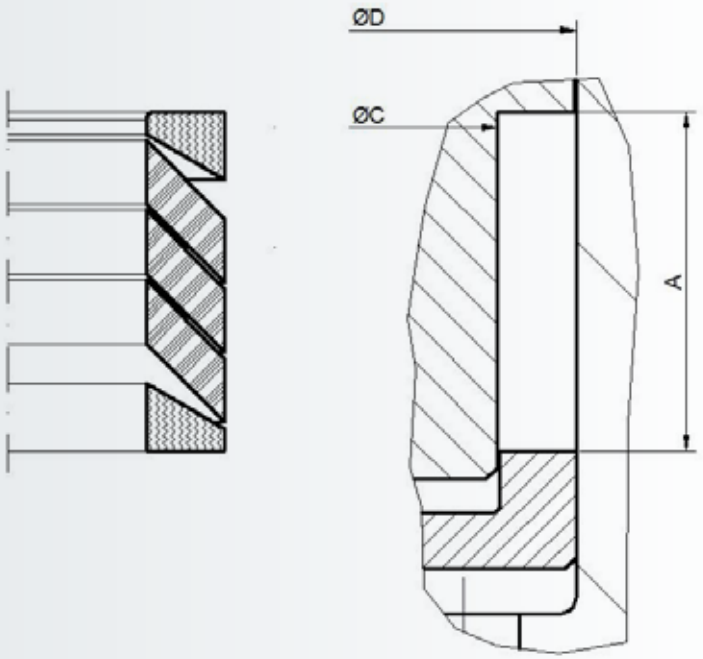


CONTROLLER BACK

for seats with HT applications

The **Valvograph** energized Controller Back graphite gaskets guarantee an exceptional service life thanks to their lack of sensitivity to thermal cycles. Suitable for all pressure ratings, the energized Controller Back gaskets are available as different models and designs.





Controller Back,
full control of the seal.

The seals energized by the Controller Back line are designed with different profiles and different materials to meet the design requirements for ball valves operating at high temperatures.

Energization

The Controller Back seals are made of expanded mineral graphite, conforming with EN 14772, with energizing elements in different metallic materials.

Temperature

With weakly oxidising agents, hot air and combusted gas, the temperature must be limited to 450°C.
The maximum operational service temperature is 600°C with a peak limit for brief exposures of 650°C.

Pressure range

The gamma Controller Back covers the entire range of pressure up to the 2500 psi class.

Range of Ph

The graphite is not compatible with strong oxidants. The metallic insert must be compatible with the service fluid. Carrara uses graphite which is suitable for cryogenic uses and oxygen applications.

O-Rings

Carrara Global Sealing Solutions, in its product range, offers a vast range of O-Rings completely dedicated to manufacturers of ball valves. In addition to the usual materials, you can find black GLT FKM with Anti-Explosive Decompression AED certification. Carrara is also able to supply limited quantities of items, meeting the needs of the market specialized in the production of both large and small series of valves. The Carrara Global Sealing Solutions Technical Department is available to its Clients for suggestions on dimensions of the channels and verification of thermal-chemical compatibility.

Main Features	HNBR 90			FKM 90			FKM GLT-ED 90		
	ref	*U.M.*	*Value*	*ref*	*U.M.*	*Value*	*ref*	*U.M.*	*Value*
Tensile Strength	DIN53 504	N/mm2	23	ASTM D 412	Mpa	12,9	ISO 37 - Typ	N/mm2	17
Elongation at break	DIN53 504	%	77	ASTM D 412	%	140	ISO 37 - Typ	%	135
Minimum Temperature		°C	-30		°C	-20		°C	-30
Maximum Temperature		°C	150		°C	220		°C	220
Peak Temperature (short time)		°C	165		°C	250		°C	240

Sour Gas is a gas with significant Hydrogen Sulphide H2S content.
Depending on the concentration of H2S, very negative effects may arise on the elastomers if the selection of the compound has not been appropriate, causing embrittlement of the O-Ring which would lose its elastic properties and its sealing capacity. In these applications, the temperature has a significant effect on the overall seal. In general, it is estimated that for each 10°C increase in temperature, the chemical reaction rate doubles.

Different aspects must be taken into consideration for a correct selection of O-Rings:

- The primary fluids with which the seal will be in contact (primary chemical compatibility).
- The secondary fluids (lubricants or other) with which the seal will be in contact (secondary chemical compatibility).
- Suitability of the materials at extreme application temperatures, hot and cold.
- The presence of external contaminants such as abrasives.

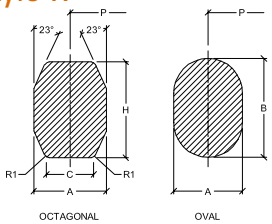
For a correct life expectancy, excessive deterioration of the O-ring must be avoided, verifying that, amongst other things, conditions do not apply causing:

- Significant variation of volume
- Significant increase or decrease in hardness
- Significant variation of resistance to traction

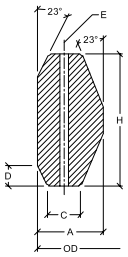
The use of an O-ring at low temperature is governed by the Glass Transition Temperature TG, which is specific to the mixture. The effects of excessive cooling are normally to be considered as reversible when the temperature climbs back up beyond the TG, while the effects of excessive heating are irreversible. Whenever the O-ring is to be used beyond extreme temperatures, also in chemically severe environments such as Sour Gas and Amino environments, selection of the correct compound becomes of really essential importance.

Planisteel RJ

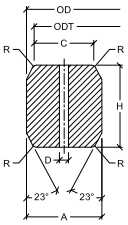
Style R



Style RX



Style BX



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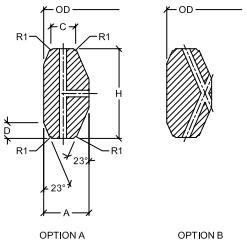
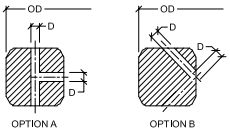
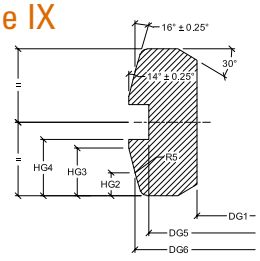


Style SBX



Style IX



Ring Joint Carrara **Planisteel RJ**, are produced in compliance to the standards API 6A and ASME B16.20 for applications at elevated temperature and pressure. The surfaces of contact between the gasket and the flange must be shaped carefully in order to guarantee the maximum performance of the gasket. Thanks to our modern equipments and the particular cure dedicated in the production, we succeed to guarantee hardness and tolerances truly perfect.

Ring Joint **Carrara Planisteel RJ** are available in all stainless steels and in all alloy.

Standard materials

ASME B16.20

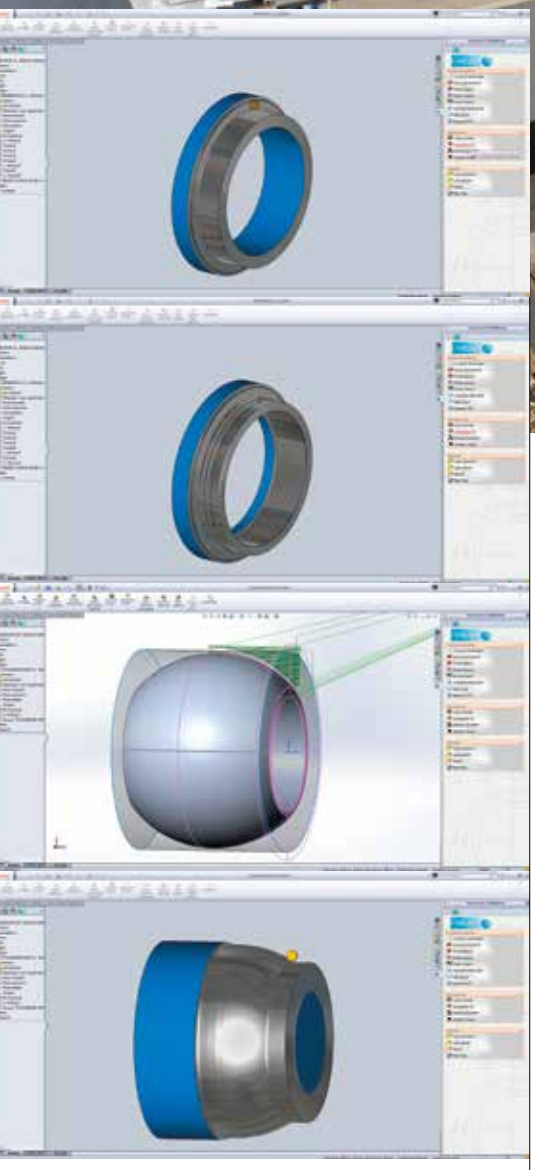
ASTM	DIN No	**Max HB**	Max HV	Material Code
Soft Iron	1.1003	90	56	D
Low CS	1.0038	120	78	F
4-6 Cr 1/2 Mo	1.7362	130	72	F5
AISI 410	1.4000	170	86	S 410
AISI 304	1.4301	160	83	S 304
AISI 316	1.4401	160	83	S 316
AISI 347	1.4550	160	83	S 347

References

RJ Style	Gasket Standard	Flange Standard
R RX BX SRX SBX	ASME B16.20 API Specification 6A	ASME B16.5 B16.47 series A and B API Specification 6B
IX	Norsok L-005	Norsok L-005

	TYPE R ASME B16.5					TYPE R API 6B					TYPE R ASME B16.47		
Ring Size	150	300/600	900	1500	2500	720/960	2000	3000	5000	10000	150	300/600	900
R11		1/2											
R12			1/2	1/2									
R13		3/4			1/2								
R14			3/4	3/4									
R15	1												
R16		1	1	1	3/4	1	1	1	1				
R17	1 1/4												
R18		1 1/4	1 1/4	1 1/4	1	1 1/4	1 1/4	1 1/4	1 1/4				
R19	1 1/2												
R20		1 1/2	1 1/2	1 1/2		1 1/2	1 1/2	1 1/2	1 1/2				
R21					1 1/4								
R22	2												
R23		2			1 1/2	2	2						
R24			2	2				2	2				
R25	2 1/2												
R26		2 1/2			2	2 1/2	2 1/2						
R27			2 1/2	2 1/2				2 1/2	2 1/2				
R28					2 1/2								
R29	3												
R30		3											
R31		3	3			3	3	3					
R32					3								
R33	3 1/2												
R34		3 1/2											
R35				3					3				
R36	4												
R37		4	4			4	4	4	3 1/2				
R38					4								
R39				4					4				
R40	5												
R41		5	5			5	5	5					
R42					5								
R43	6												
R44				5					5				
R45		6	6			6	6	6					
R46				6					6				
R47					6								
R48	8												
R49		8	8			8	8	8					
R50				8					8				
R51					8								
R52	10												
R53		10	10			10	10	10					
R54				10					10				
R55					10								
R56	12												
R57		12	12			12	12	12				12	12
R58				12									
R59	14												
R60					12								
R61		14				14	14	14				14	
R62			14										14
R63				14									
R64	16												
R65		16				16	16					16	
R66			16					16					16
R67				16									
R68	18												
R69		18				18	18					18	
R70			18					18					18
R71				18									
R72	20												
R73		20				20	20					20	
R74			20					20					20
R75				20									
R76	24												
R77		24										24	
R78			24										24
R79				24									
R80												22	
R81													22
R82										1			
R84										1 1/2			
R85										2			
R86										2 1/2			
R87										3			
R88										4			
R89										3 1/2			
R90										5			
R91										10			
R92													
R93												26	
R94												28	
R95												30	
R96												32	
R97												34	
R98												36	
R99							8	8					
R100													26
R101													28
R102													30
R103													32
R104													34
R105													36

Production



Production

Research and development: The search for new objectives

For us, technology is one of the best vehicles for working better and faster. For this reason, our Production Team uses the CAD-CAM system to minimize both errors and mechanical processing times.

This has already allowed us to achieve excellent results which have lately been improved with the introduction of a Wi-Fi connection in support of the engineering and production departments. Thanks to constant investment, both in software and in new machines, we are able to keep production constantly monitored as well as the state of advancement of orders, enabling us to comply with consignment terms and to offer an ever better service in meeting the requirements of our Clients.

Quality

Quality: our mission

Every process of the activity is controlled by the procedures, which guarantee traceability of data, of materials and of the finished product.

Carrara Global Sealing Solutions operates with its own qualified personnel complying with the Client Control Plan (ITP) carrying out non-destructive tests to guarantee the quality of our products.

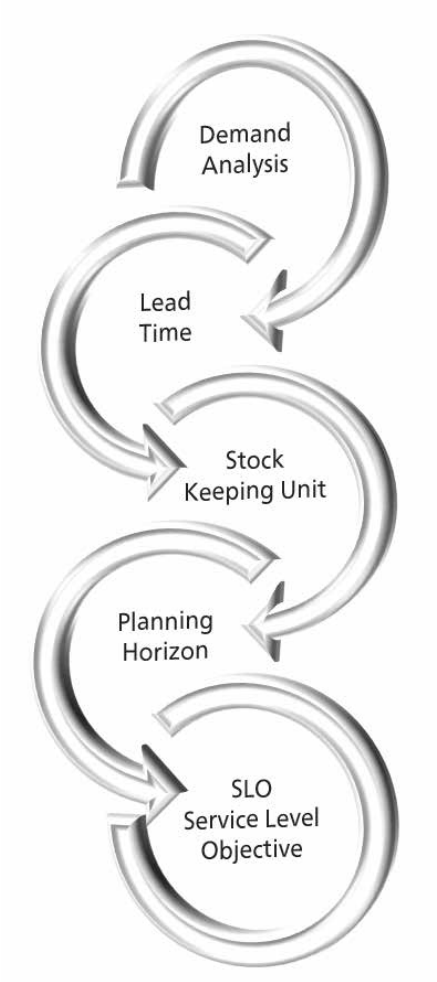
- PMI Positive Material Identification
- VT Visual Testing
- PT Penetrating liquids
- UT Ultrasounds
- HT Hardness Test

Surface treatments

Thanks to experienced built up over the years and a close collaboration with our Partners, Carrara Global Sealing Solutions is able to offer quality surface treatments.

- Nickel plating ENP, at thicknesses on request 25÷80 µm and standard hardness 600÷700 HV with maximum of 1.100 HV.
- Welded surfaces with thicknesses up to 5mm in AISI410 - AISI316 - INC625 - INY825 and STELLITE in all grades. As opposed to other surface treatments, the welded surfaces need mechanical preparation which takes into account possible warping and sufficient excess metal.
- Carburation, for metal to metal seals in thicknesses of 150÷400 µm, in the TCC version with Tungsten Carbide (200-220°C) and CCC with Chromium Carbide at higher temperatures.

Stock Policy Inventory Management



Stock Policy Inventory Management

Carrara Global implements a Stock Policy Inventory in order always to offer the best Lead Time to its Clients.

The team, permanently assigned to this activity, analyses the request, which is integrated by the Stock Frame Agreement entered into with the Clients, in order to determine the number of items and the quantity to retain in stock.

Traceability and Transfer Stamping

The management of high stock levels of metallic blanks, thermoplastic materials, O-rings and other valve components requires the team to keep to procedures which preserve the traceability of the products. For this reason, Carrara Global Sealing Solutions has chosen to certify these processes, already included in ISO9001, and to make them subject to surveillance by third parties.

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD Industrie Service

CERTIFICATE

The Certification Body
of TÜV SÜD Industrie Service GmbH

certifies that

CARRARA S.p.A.
Via Provinciale 1/E
I-25030 Adro (BS)

as a company of machining of products

implemented and operates a

Qualified Procedure in accordance with the
Pressure Equipment Directive 2014/68/EU,
Annex I, Paragraph 3.1.5 as well as AD 2000 HP 0, Paragraph 4.2.2.

Further details are described in the arrangement No. 722117403
dated 2016-10-20.

The certificate is valid through October 2019.

The validity of this certificate is connected to a valid certification in accordance with
ISO 9001:2008.

Certificate No.: DGR-0036-QS-W 771/2016/MUC
Munich, November 07th, 2016

Certification Body
Material and Welding Technology

(M. Strobel)

EQ2713208

TÜV SÜD Industrie Service GmbH, Westendstr. 199, 80686 Munich, Germany

Metallic materials

The main metals for production of the retainers are low alloys and austenites, but are often made out of Duplex and nickel alloys.
The main Standards of reference are the ASTMs:

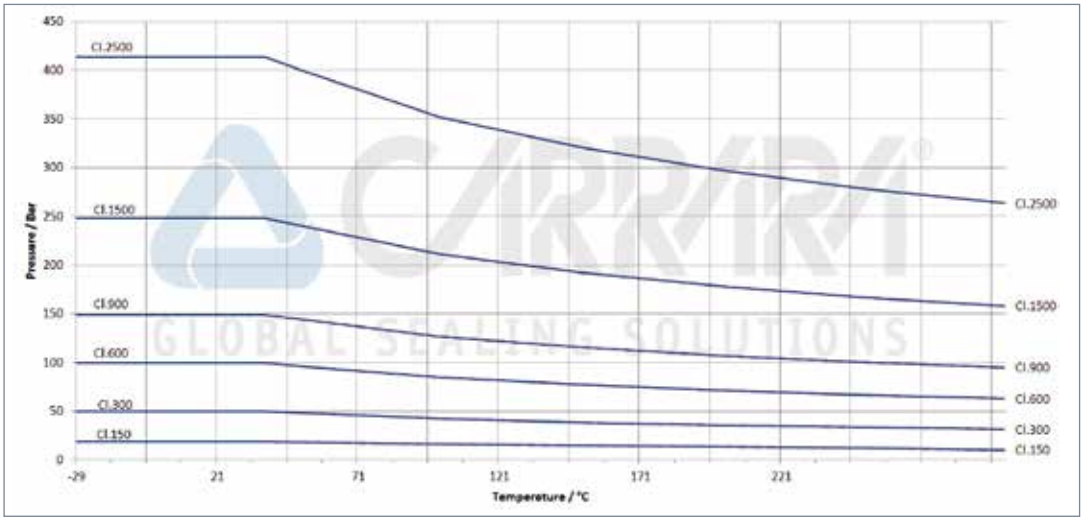
• A350 • A182 • B564

A105/A105N	A182 F6A	A182 F44	INCOLOY 800	MONEL 400
A350 LF2	A182 F6NM	A182 F51	INCOLOY 825	MONEL 500K
A350 LF3	A469 F60	A182 F53	INCONEL 600	STELLITE GR6
AISI 410	A182 F316/L	A182 F55	INCONEL 625	STELLITE GR12
AISI 4130	A182 F316LN	A182 F60	INCONEL 718	BRONZO
AISI 4140	17-4-PH	XM19	HASTELLOY C276	TITANIO

				ASTM Tensile Properties		
				Tensile Strength, min ksi [MPa]	*Yield Strength, 0.2 %,Offset, min ksi (MPa)*	*Elongation in 2 in. [50 mm] or 4D,min %*
Common Name	**Forging Spec.**	**UNS**	**W.N.**			
Carbon Steel	A105N	K03504	1.0460	70 [485]	36 [250]	30
Low Temp Carbon Steel	A350-LF2	K03011	1.0566	70–95[485–655]	36 [250]	22
Inox 316	A182-F316	S31600	1.4401	75 [515]	30 [205]	30
Duplex 2205	A182-F51	S31803	1.4462	90 [620]	65 [450]	25
Super Duplex 2507	A182-F53	S32750	1.4410	116 [800]	80 [550]	15
Super Duplex F55	A182-F55	S32760	1.4501	109–130[750–895]	80 [550]	25
Super inox 6Mo	A182-F44	S31254	1.4574	94 [650]	44 [300]	35
Monel 400	B564-N04400	N04400	2.4858	70 [483]	25 [172]	35
Incoloy 825	B564-N08825	N08825	2.4858	85 [586]	35 [241]	30
Inconel 625	B564-N06625	N06625	2.4856	120 [827]	60 [414]	30
Hast. C-276	B564-N10276	N10276	2.4819	100 [690]	41 [283]	40
Titanium	B381-Gr2	R50400	3.7035	50 [345]	40 [275]	20

The values indicated in the table are obtainable from the ASTMs. The diagrams indicated below are illustrative of the behaviour of the material in the range P bar - T°C. These are completely approximate and must not replace a direct consultation of ASME B16.34.

On the basis of ASME B16.34, each group of materials may be used in specific ranges of P bar – T°C.
The curves indicated in the diagrams show, for each class of valve pressure, the maximum pressure and temperature value which can be satisfied by the material (design conditions).

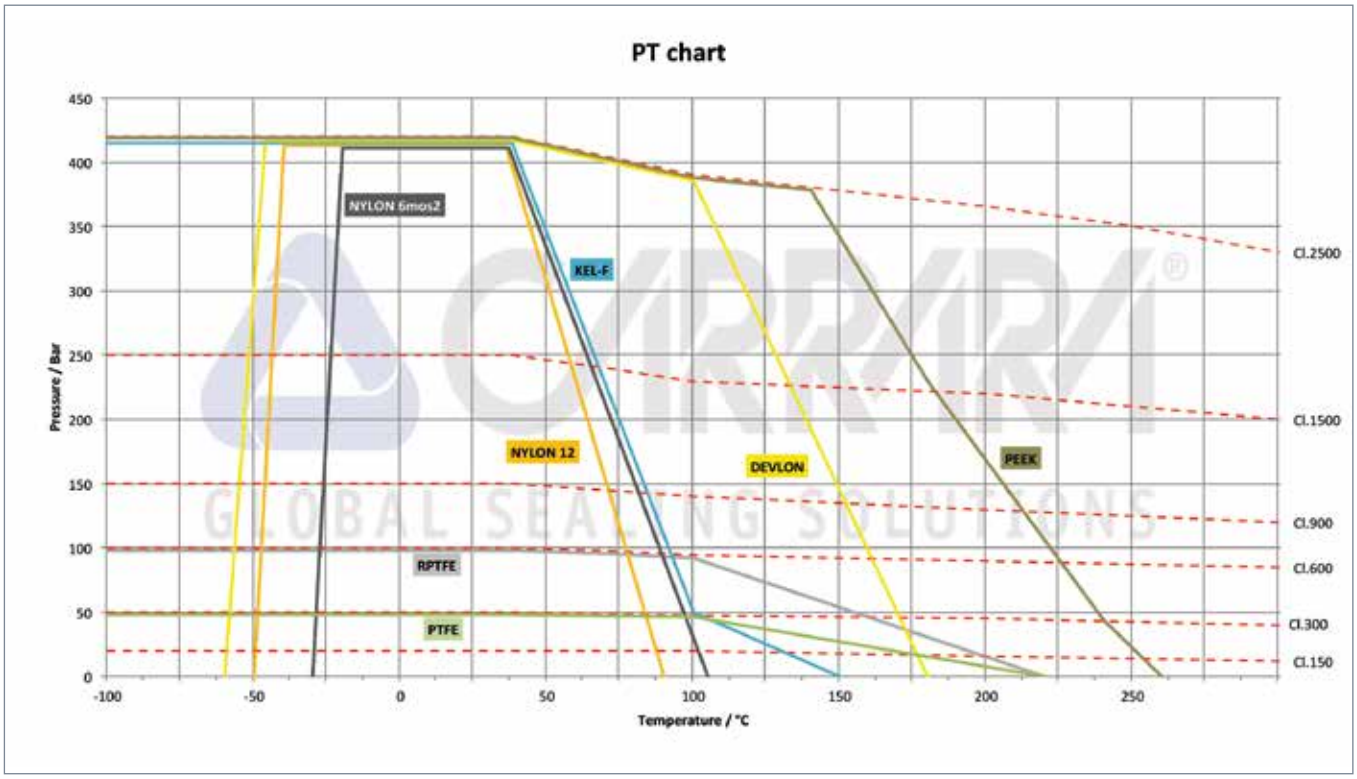


Techno-polymers

The Carrara Global Sealing Solutions Valgasket division has forged very strong partnerships with manufacturers of virgin and charged techno-polymers, always to offer the best material in accordance with the project specifications and the requirements of the Client. Thanks to the dedicated procedures, refined over the years, the preparation of the insert and its insertion are done with maximum care, always to guarantee maximum quality.

	ASTM Test Method	Unit	PTFE	R-PTFE 20%carbon +5%graph	DEVLON V-API	NYLON 6 MoS2	NYLON 12	PEEK	KEL-F
Tensil strength 23°C	D638	Mpa			79,92	85	60	96,5	36,5
	D1457	N/mm^2	30	15					
Compressive strength	D695	MPa			140	96		118	180
		N/mm^2	4,5	7					
Coefficien of friction	D3028(1)		0,05	0,06	0,15	0,2	0,17	0,18	0,27
MAX Service temperature (short term)	D570	°C	260	260	190	160	130	250	150
MAX Service temperature (long term)	D570	°C	220	220	125	105	90	310	205
MIN Service temperature	D570	°C	-200	-200	-100	-30	-50	-65	-250

Materials	PTFE	R-PTFE 20%carbon +5%graph	DEVLON V-API	NYLON 6 MoS2	NYLON 12	PEEK	KEL-F



The values indicated are taken from the data sheets of techno-polymer manufacturers and from the applicative experienced gained. These are to be considered as guidance only on the behaviour of techno-polymers indicated, and must not be used as a discriminatory element for selection of the product for a specific application without supplementary verification. Carrara Spa accepts no responsibility deriving from improper use of this data, which may be changed without obligation of forewarning.

Expanded Mineral Graphite

Expanded graphite is of mineral origin. The product is obtained through lamination without addition of binders to the flakes deriving from the thermal expansion of the graphite grain.

With graphite laminate, it is possible to produce the yarns for production of the packing and the rings preformed through pressing .

The yarn, which can be reinforced with a single metallic thread or with a special cage, is obtained by applying a particular process on the graphite laminate. The packing made out of this material is extremely flexible and easy to use, and it can be used, depending on the model, in all pressure classes of industrial valves.

The rings, pre-formed in different shapes and sizes can be produced at different densities and energized to withstand the highest pressures.

The chemical characteristics

Expanded mineral graphite is qualified by the mass content of carbon C and the ash residue (ash content) after combustion and by the limitation of the agents responsible for galvanic corrosion, in other words, sulphur and halogens. To obtain the values of limited detrimental materials, the graphite must undergo de-sulphuring and de-halogenic processes.

Detrimental Materials		
Element		
Sulfur	S	700 ppm
Total Halogens (Chlorine, Bromine and Fluorine)		310 ppm
Chlorine	Cl	50 ppm
Bromine	Br	10 ppm
Fluorine	F	10 ppm

Typical Detrimental Materials limitation table

Corrosion inhibitors and Oxidation Retardants

Finally, in order to increase the quality further, the graphites can be enriched with passive corrosion inhibitors and oxidation retardants. The first further reduces the risk of galvanic corrosion when the gasket is installed, while the second influences the rate of weight loss (oxidation) of the graphite at high temperatures.

The use of oxidation retardants does not change the graphite use temperature limits but slows the process of oxidation, allowing a gasket to remain in service for a longer time, or to withstand brief thermal excursions up to 650°C. with moderate damage. It should be noted, that as against elastomers, for which the temporary exceeding of the temperature limits causes irreversible damage to the gasket, the graphite reacts at peak temperature, temporarily increasing the rate of oxidation. When the temperature returns within the limits, the gasket is not compromised.

The resistance to oxidation is measured by the EN14772 test for combustion in air at a temperature of 670°C, to confirm that the rate of loss of weight does not exceed 4% per hour (TGA test).

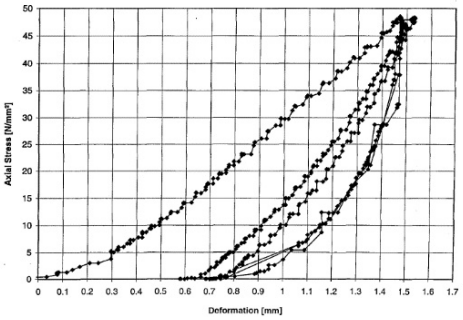
graphite service temperature range				
cryogenic	oxygen	weak oxidizers	regular service	peak limit short time
-196°C	300°C	450°C	600°C	650°C

The Mechanical Characteristics

Less attention on the other hand is paid to the mechanical characteristics of the graphite laminate, or in other words, to its tensile strength. The resistance of the graphite laminate to traction, other than to the process of lamination, is strictly correlated to the dimension and the consistency of the flakes which, in turn, depend on the mesh of the graphite grain. Graphite laminates, laminated to a higher quality, display a resistance to traction 2 to 4 times greater than industrial laminates commonly available on the market.

Significant values of resistance to traction result in a greater elasticity of the products derived from them, be they yarns or pressed rings.

Mechanical behaviour of the graphite packings

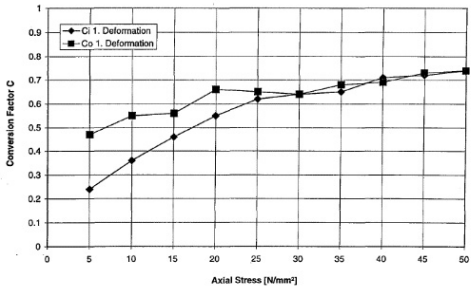


Valvograph rings

The expanded graphite packings Carrara Valvograph, which can be manufactured with density 1.40 ÷ 1.80 g/cm3, show a compression line almost linear.

About the square section graphite rings, when the axial load is 45÷50 N/mm2 the compression is around 15% of the unloaded ring height

and the final recovery 10%



The radial stress is lower than the axial stress and their relation isn't linear. The radial conversion factors Co and Ci converge only when the axial stress is higher 25÷30 MPa.

These factors can be modified changing the rings design or giving them some energization.

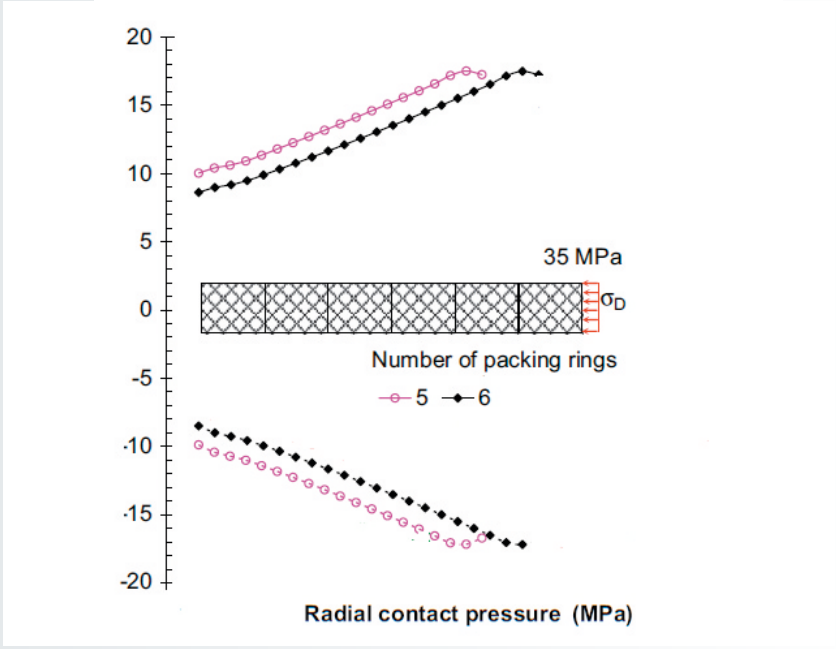
The use of graphite packings

The graphite packings Valvograph are widely used in the industrial valves as stem seals, clozures and seats seals.

In these different applications the packing shows a standard behaviour which is an helpful guideline to design the sealing system.

Stem Graphite Packings

The graphite sealing set for stem is usually composed by several rings and the best configuration includes 5 or 6 rings. In fact radial stress distribution along the stem is regressive and tipically the first rings under the gland give the most part of this stress.



Clozure Graphite Seals

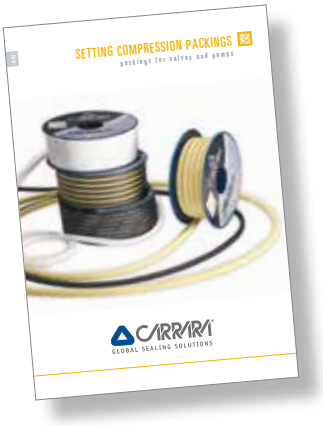
These gaskets are installed as single rings and the distribution of the radial stress is really omogeneous. These gaskets can be energized to improve the recovery and change the conversion factors Co and Ci.

Seat Graphite Seals

These packings are always energized and designed in different shape to meet the specific needs for high temperature and pressure services of the seats. The packings for seats offer a lower sealing surface than the stem sealing, but are able to guarantee the an effectives sealing because their modified shapes influence positively the radial stress distribution.

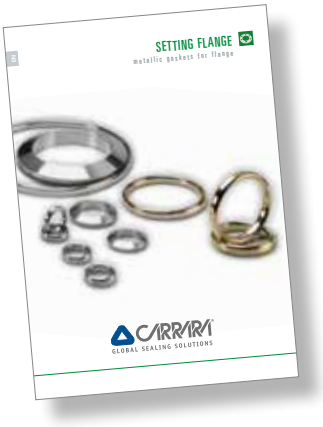
CARRARA, Global Sealing Solutions!

Carrara offers in addition to the Valve Sealing & Components a large product range of seals for pumps, valves and flanges, together with all sealing accessories. Quality of the products, professional technical and commercial assistance, big stock availability and other customized services are the business guidelines to increase the value offered to customers.



Setting Compression Packings
Braided packing for Pumps and Valves

Carrara is one of the leading manufacturers of Braided Packings and Sealing Systems for pumps and valves, for all industrial applications. Through the use of high quality yarns and special manufacturing techniques developed by the R & D division, the Carrara packing are able to guarantee high performance for long time.



Setting Flange
Planisteel® Gaskets for Flanges

The Carrara PlanisteelTM range includes Spiral Wound, Camprofile, Ring Joint and Jacketed gaskets. The **STOCK LIST** is available on www.carrara.it, to find and buy the gaskets ready to be shipped in 24 hours.

Setting Flange
Flat gaskets for Flanges

Carrara product range offers flat gasket sheets and gaskets of the following product families:
- PLANIFLEX® in CSF
- PLANIFLON® in virgin, filled, modified and expanded PTFE
- PLANIGRAPH® in graphite
- PLANIX® in rubber and Mica for high temperatures

Setting Flange
Insulating Sets for Flanges

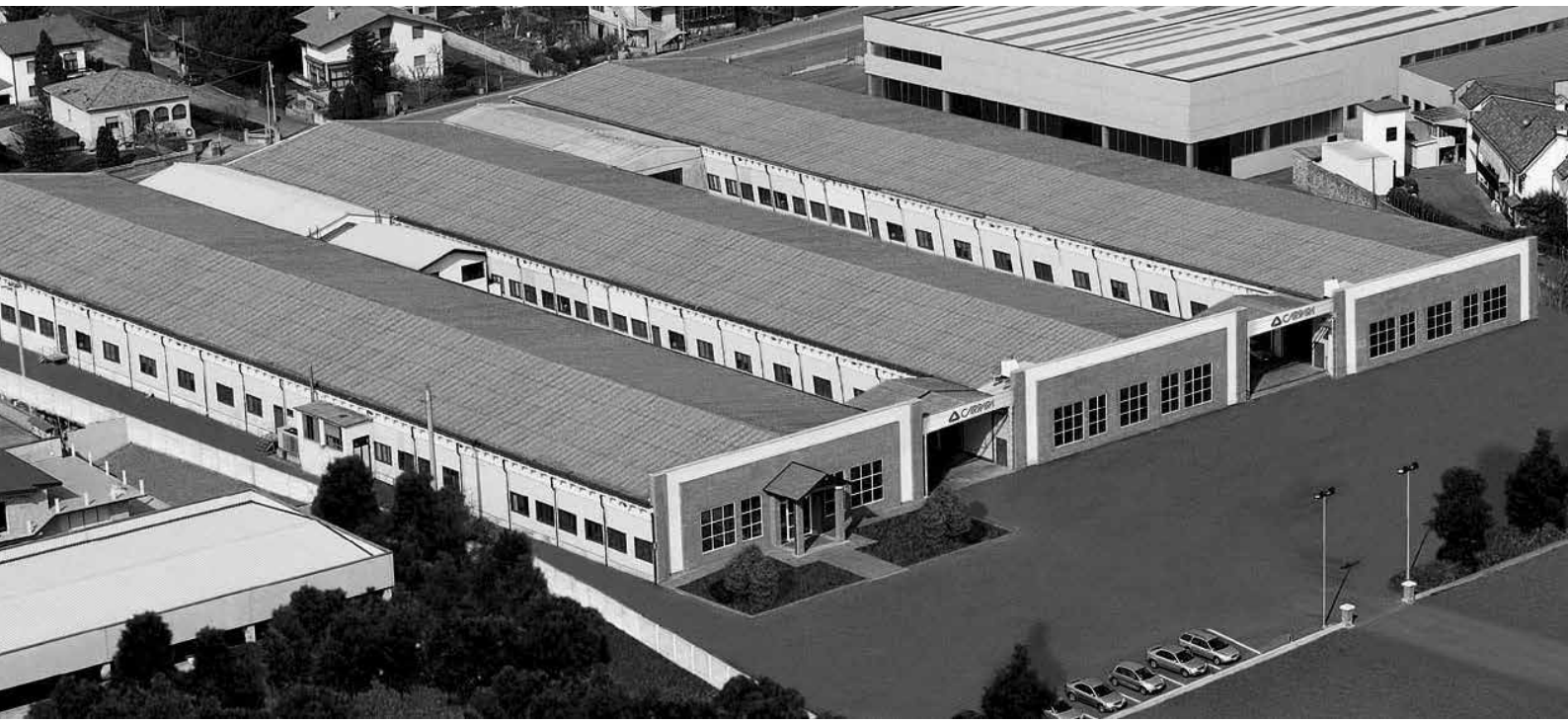
The Insulating sets are used to prevent the flow of static electricity through the pipes. The product range offers a wide range of Carrara Insulating Sets made in high performance materials, suitable for all pressure classes.

Setting Mechanical Seals
Mechanical Seals for Pumps

Carrara offers a complete range of Mechanical Seals single stationary or rotating multiple springs cartridge, high temperature metal bellow seals cartridge and split. The Mechanical Seals Carrara are easy to install and very effective to reduce the maintenance cost.

FERP
Environmental Division

Since 2001 FERP Environmental Division of Carrara is one of the International Leaders in the monitoring of VOC, Steam and Technical Gases. Energy Saving Programs and other high value environmental services for Refining, Power Generation, Off Shore and Petrochemical fields are the core of FERP activities.



The data contained in the technical cards has been collected from tests carried out in the Carrara S.p.a laboratories, from tests carried out in third party laboratories and from the experience garnered from use of the products in industrial applications. The correct selection of the product and its appropriate installation, are determining factors for the efficiency of the said product. Carrara S.p.a accepts no responsibility for damages to property or persons caused by improper use, erroneous use or by use in a non-optimal configuration, of its products. Carrara S.p.a reserves the right to change the technical data published without the requirement of communicating the fact to third parties.

CARRARA®

GLOBAL SEALING SOLUTIONS

www.carrara.it

www.carrara.it

Braided Packings

A wide and certified product range of API 622, ISO 15848, BAM and FDA certified packing for all industrial applications.

Valve Components

Seats for soft or metallic sealing for ball and gate valves, seat/ball kit equipped with all gaskets.

Metallic Flange Gaskets

Planisteel is the range of Spirometallic, Kamprofile and Ring Joints gaskets in compliance with international standards or customised on demand.

Flat Gaskets for Flange

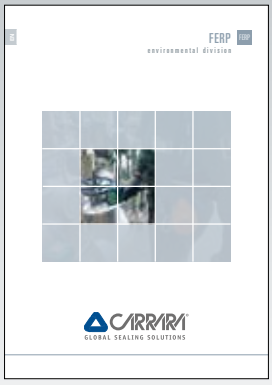
Planigraph, Planiflon and Planiflex gasket sheets and sealing gaskets for all applications.

Mechanical seals

The Single Stationary Multiples Springs Cartridge and Metal Bellows Single Cartridge mechanical seals are the main products in our range.

Insulation Kits

Flange insulation kits for cathodic protection are one of our specialities.



FERP Envir. Division

LDAR and SMART LDAR, monitoring of Tanks and steam systems, 3D environmental consulting.

gfstudio

CARRARA
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