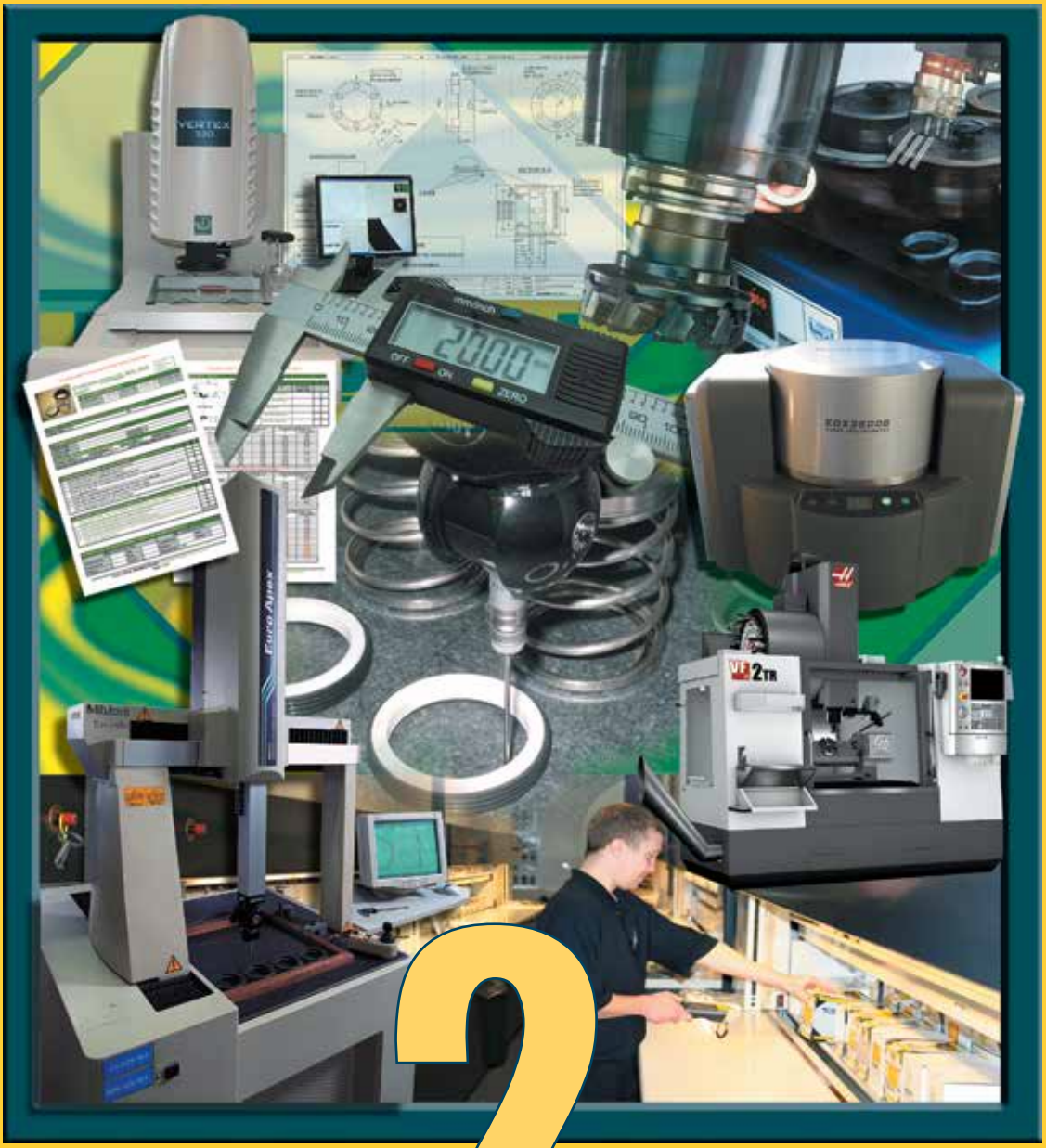
Technical And Material Standards



Section 2

“QUALITY AND RELIABILITY ASSURED”.

QUALITY MECHANICAL SEALS

Quality, Design, Manufacture, Materials, Inspection, Assembly provided by Electronic Systemisation of Product Specification and Supply, are critical to the Mechanical Seal’s Capability, performance and life. Vulcan fully understands the true meaning and importance of Quality and have long practiced the principle of Total Product and Supply Quality, through a dedication to installing built-in reliability and quality into every aspect of our company. Electronic production, inspection and process control is integral to every area of our production and logistics. The foundation for this Total Quality Philosophy is our focus upon investment in and development of world class manufacturing facilities, electronic processes and our Design, Technical and Material Standards.

RELIABLE PRODUCT

There are many alternative mechanical seal suppliers around the world. At first sight, their product may look similar but often lacks the many vital aspects which go to make a Quality Mechanical Seal. Failures in supply, fitting or operation can often result. The key is surety, safety, reliability and the resultant seal capability, performance and life. We pride ourselves on being The Most Cost Competitive, Lowest Total Cost Provider of Quality Mechanical Seals.

Vulcan welcomes visitors to view all of our production and distribution facilities, to see for yourselves the Total Quality and Customer Satisfaction Policy, which is central to our success.

LASER MARKING

Reliable identification of product is useful and can add to seal quality and reliability. Vulcan has invested in, high specification and cost, laser etching machines to mark both elastomer and Stainless Steel components. We provide this as a service to individual customer contract specification and are increasing it’s use throughout our product range.

IN HOUSE PRODUCTION OF QUALITY MATERIALS

Vulcan are the world’s most vertically integrated mechanical seal manufacturer. This has naturally followed from our policy and dedication to specifying optimum material standards. Then developing our in-house manufacture of these materials and subsequent components.

As a result, not only is every Vulcan Standard Mechanical Seal solely produced in our own Vulcan factories but also practically all of our component parts and materials. We consider material manufacture and development to be fundamental to the quality, performance, reliability and economy of our mechanical seals.

SINTERED SILICON CARBIDE MANUFACTURING

Vulcan have for over a decade manufactured Reaction Bonded Silicon Carbide for use within our seals. In 2004, following agreement with a global manufacturer and supplier of Carbides, Vulcan purchased an entire Silicon Carbide production plant, as part of a purchase, installation and technology swap and supply agreement.

As is our practice, we then rapidly developed this plant and facility, adding equipment such as new more efficient furnaces, isostatic presses, over forty CNC internal and external grinders, and a test and electronic inspection facility. We also subsequently opened and developed the in-house expertise and infrastructure to manufacture our own raw material; Sintered Silicon Carbide powder.

Our goals in these developments is not just to become a manufacturer and supplier of Silicon Carbide components but to incorporate the optimum quality materials, reliability and cost control into our mechanical seals.

‘IN-HOUSE’ QUALITY ASSURED

All Vulcan Mechanical Seals are manufactured in Vulcan’s advanced factories, as are practically all our components and materials. We are highly vertically integrated with consequent close control of our production, costs, quality and logistics.

NB Vulcan Mechanical Seals Manufacturing Company Limited is certified to ISO 9001.2008 and our world-wide distribution centres to ISO 9001.2008. Modern, increasingly automated, machinery is utilised to produce our designs, via carefully controlled, advanced management and production procedures. Each stage of production, assembly and inspection, is governed by electronically documented and managed, extensive and intensive, Inspection Systems and Forms.

VULCAN® QUALITY SERVICE

Our Mechanical Seal programme is designed to be totally responsive to all customer requirements. A vast array of types, sizes and materials are held in computer automated stock to enable same day despatch. The seals have been designed for maximum technical efficiency and reliable use. All product and any conceivable information required is provided on our Web Portal.

All components are inspected before supply. Vulcan work to established Quality Control Procedures and the company system, is approved to ISO 9001.2008. Vulcan operate a company T.Q.M. Programme to constantly monitor and improve performance.

Our policy of total customer service is further enhanced by the widest range and largest stock of seals in the market, essentially all Guaranteed Ex-Stock, plus an extensive network of distributors.

VULCAN’S POLICY IS A CONTINUOUS COMMITMENT TO DEVELOPING OUR PRODUCTION, INSPECTION, PRODUCT, PROCESS AND MATERIALS CAPABILITIES,THEN INTEGRATING THESE WITHIN OUR ELECTRONIC SYSTEMS AND LOGISTICS.

Note;
Please note that constantly developing legislation and Vulcan practices, may affect the advice given in this brochure. All of the information supplied within is given in good faith and in Vulcan’s best judgment and is meant for guidance purposes only. We make no warranty that any Vulcan part will perform satisfactorily in a given application and would strongly recommend an independent evaluation prior to acceptance. Vulcan reserves the right to amend all statements, dimensions and technical data without prior notice.

PRINCIPLES OF SHAFT SEALING

PRODUCT INFORMATION

The Vulcan Mechanical Seal Range is divided into four main methods of shaft sealing, namely; Rubber Diaphragm, Rubber Bellows, 'O'-Ring Mounted and P.T.F.E. Wedge seals.

Our extensive Mechanical Seal Range has been designed to service the global pump market and are our seals totally interchangeable with all other manufacturer's equivalent seals, without any modification to the existing seal housings and gland plates. Such is the variety available from Vulcan, we can offer to replace any single spring seal and seat, practically always straight from stock.

Typical designs of each of the main shaft seal groups are;

RUBBER DIAPHRAGM	
RUBBER BELLOWS	
'O'-RING MOUNTED	
P.T.F.E. WEDGE	

DIAPHRAGM SEALING OPERATION

The line drawing above shows the standard section of a Vulcan rubber diaphragm seal. The shaft seal is provided by the rubber diaphragm which is squeezed onto the shaft by the drive ring. Once fitted, the rubber diaphragm will grip the shaft giving a strong static seal and very positive drive, via the drive ring, to the seal face. As there is no relative movement between the shaft and the rubber diaphragm, shaft fretting, wear and hang-up hysteresis are eliminated and the seal can immediately accommodate some shaft run-out and misalignment.

Shaft axial movement and the movement required during the working life of the seal is handled by the elastomer rubber flexing at it's junction point (J on dia). The seal head automatically adjusts to compensate for any face misalignment, usually caused by shaft end float / pump body misalignment.

The closing spring force and the seal pumping pressure force maintain the faces in full contact, whilst the rubber diaphragm acts as an elastomeric bellows providing sustained flexibility. Positive drive of the seal face is transmitted via the drive ring and retaining housing and not via the spring, which merely provides some closing force to the mechanical seal faces. These seals can therefore be used to seal shafts rotating in either direction and in vacuum applications.

RUBBER BELLOWS SEALING OPERATION

Vulcan elastomeric bellows seals are of compact design with a sealing action that provides many benefits. The bellow's high strength and flexibility is the key to the very reliable performance of this type of seal; as it readily accommodates seal misalignment, end-float and seal face wear.

The convoluted bellows profile makes these seals ideal for media prone to clogging or for hygienic applications. Designed for confined spaces and limited gland depths, Vulcan rubber bellows seals are bi-directional in operation and provide secure bellows, for longer life in a wide range of applications.

'O'-RING MOUNTED SEALING OPERATION

Our conical spring, 'O'-Ring mounted, mechanical seals have been designed by Vulcan to have a small cross-section and a complete recessed 'O'-Ring housing.

A narrow seal head width allows the seals to easily fit confined DIN 24960 (EN12756) housings, whilst also providing the benefits of reduced face surface running speed, with increased circulation around the seal faces.

Seal loading is provided by conical springs or wave springs, with conical springs being the most common.

Seal drive is provided by the conical spring tightly gripping the shaft at it's base, or by grub-screws in the case of wave-spring seals.

Conical Spring seals are supplied as standard with right-hand drive springs for clockwise shafts. Left-hand springs for anti-clockwise shaft rotation should be specified on order.

Utilisation of wave spring technology in Vulcan seals allows the design of extremely compact seals, in both the axial and radial directions. Wave springs provide equal loading and deflection at a fraction of the free height when compared to helical springs, making them suitable for limited spaces.

Other main advantages for mechanical seal use are their insensitivity to contaminates, whilst providing straightforward fitting. These main characteristics make wave springs ideal for food, chemical and restricted fitting applications which are prone to clogging.

Our resilient 'O'-Ring mounted seal designs are technically efficient (readily accommodating misalignment and vibration) and are highly versatile. Vulcan offer a wide range of face material combinations and spring / seat sizes to suit most applications. Our design standard of a narrow cross-section head with full recessed 'O'-Ring groove, combined with alternative seal face materials, maximises seal performance and prolongs seal life.

P.T.F.E. WEDGE SEALING OPERATION

The chemically resistant P.T.F.E. component is spring loaded, to force the flexible angular lip of the wedge, into tight contact with the shaft. The same spring force impacts a sufficient load to the rotary face to create a suitable seal interface, with a varied choice of standard stationary seats. The features associated with the wedge seal design make these seals ideally suited for chemical process pumps and many other aggressive media applications.

VULCAN® MECHANICAL SEALS

SERVICE CAPABILITIES

The limits of pressure, temperature and speed are dependant upon the materials specified for the rotary seals and seats, as well as the nature of the media to be sealed. The maximum capabilities of each seal type are shown on the individual data sheets.
Changes in seal operating capabilities are partially a factor of the nature of each seal design but are highly influenced by selection of elastomer type and seal face materials.

Elastomer selection primarily sets temperature and chemical resistance;

Material	Standard Recommendation	Temperature Range
Nitrile	For general duties	-30°C to +120°C -22°F to +248°F
Ethylene Propylene	For general duties especially hot water	-40°C to +140°C -40°F to +284°F
Viton®	For general chemical applications	-30°C to +230°C -22°F to +446°F
Neoprene	For refrigeration applications	-50°C to +100°C -58°F to +212°F
FEP/PFA	For near universal chemical resistance	-60°C to +205/260°C -76°F to +401/500°F
Kalrez®	For absolute chemical and temperature capability	-50°C to +310°C -58°F to +590°F

Differing face material combinations affect seal capability, performance and life. Their PV (Pressure X Velocity) value largely determines the suitability of material combinations of seal faces and specifically the amount of heat generated at the faces. The ability of the face material to resist wear increases the life of the seal particularly in abrasive applications.
Vulcan offer face combinations, from Carbon, solid Ceramic and Stainless Steel materials, as standard. We recommend fine-grained, Reaction-Bonded Silicon Carbide as the superior "hard face" material, to be used for both faces for maximum wear resistance, or to run against Carbon for ultimate PV capability.

IMPORTANT NOTE

All information in this brochure is given in good faith, but without warranty, and is based on our functional evaluations, experience and published technical data.

As such all data and recommendations shown in this brochure are indicative only. Particularly, any application data should not be used in conjunction as maximums applicable in any application. Service and equipment conditions greatly affect product capability and performance.
All specifications, dimensions and data may change without notice. You should confirm any necessary detail with our technical specialists or distributors.

We reserve the right to change specifications without notice.

The purchaser should thoroughly test any application and independently conclude satisfactory performance of the product, for his intended use.
Vulcan Engineering Limited and any associated companies, accept no claim(s) for legal action rising as a result of the information contained in this document, and shall not be liable for the misuse of the full, or any part of the document, over and above its intended use for information on Vulcan products only.

BRAND NAMES ®

All brand names and product names used in this catalogue are trade names, service marks, trade marks or registered trade marks of their respective owners.
All products are manufactured to Vulcan drawings.
Use of other brand names is for informational purposes only.

SEAT SELECTION

Correct seat selection lays the foundation for maximising seal performance. Preferred seat types are shown with each seal. However, the large majority of seats will track with practically any seal, thereby giving a maximum range of possible combinations.

Seat housings, for all Vulcan seats, are recommended to have a machined lead in of 1.5 to 2.0 mm (0.060" x 0.080") at 20 to 30 degrees angle.

PRINCIPLE ADVANTAGES OF SINGLE SPRING MECHANICAL SEALS

- Single Spring – gives superior axial and angular flexibility. The seal's design compensates for misalignment and machinery tolerances.
- Non-clogging – large single spring, plus free-movement of the elastomer rubber shaft seal, combats seal failure through build up of solid material.
- Self-adjusting – the flexible moving rubber shaft seals accommodate shaft end float and take up wear.
- Minimal Wear – strong static seal to the shaft minimises shaft fretting.
- Versatile – Compact in design and simple to fit. Standard designs and sizes for all common imperial, metric and DIN 24960 (EN12756) housings are standard.
- Extremely cost effective – low capital cost, proven reliability of design, easy to fit and accommodating in use, excellent seal performance and ex-stock service on a complete range of seal types, materials and sizes, make Vulcan single spring seals the choice for the majority of applications.
- Large diameter spring wire – can withstand a great deal of corrosion.

PRINCIPLE ADVANTAGES OF MULTIPLE SPRING SEALS

- Even Face Loading Circumferentially – from the seal face closing forces exerted by the individual springs.
- Shorter Axial Space – multiple springs require less axial length to provide the required face closing forces, allowing for shorter seal working length designs, compared to single coil spring seals.
- More Even Face Closing Pressure - multiple small springs are not as susceptible to distortion at high speeds as are larger single springs. As a result, they will exert a more even closing face pressure on the seal ring at all times.
- Vulcan Designs – routinely seal the multiple springs out of the fluid thus minimising the potential for corrosion and/or clogging.

PRINCIPLE ADVANTAGES OF WAVE-SPRING SEALS

- Very Short Working Length – wave-springs are superior to coil springs, especially single springs, in certain applications because they provide lower working heights with the same force.
- Consistent Lower Force On Seal Faces – a very low spring rate, with an extremely flat load deflection curve, can be designed by incorporating a multiple turn wave-spring, leading to potential increased seal life.
- Hygienic – wave-springs eliminate the need to drill blind holes for multiple springs, that will trap product, which along with their non-clogging operation, facilitates wave-springs specification in hygienic duties.
- More Suitable For Highly Viscous Products – especially coagulating or crystallising media, such as heavy slurry or high viscosity sugar applications, as the spring will not become clogged.
- Vulcan Designs – minimise the potential for wave-spring fracture and failure. Single turn wave-springs have over-lapping ends. Our sinusoidal wave-springs are one piece with no weld spots, which are weak-points at the point of maximum stress.

STANDARD MECHANICAL SEAL MATERIALS SPECIFICATIONS

The following table highlights the Metallurgical and Face Materials offered as standard for the Vulcan stock range of Mechanical Seals. Any other material you may require is usually available, often from stock and always to production. Further stock material information is shown on each Type page; otherwise please contact us. All Face Material grades shown below are detailed on pages 14 and 15. The Metallurgical Grades shown are standard international grades of Stainless Steel and of Hastelloy C ; namely Hastelloy Grade 276.

Brochure Section	Seal Type	Material							
		Spring	Other Metal Parts	Carbon	Ceramic	Silicon Carbide		Tungsten Carbide **	
						Rotary	Stationary	Rotary	Stationary
Conical Spring	7D	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	8B	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	8	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	8DIN	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	82	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	9	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	12	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	12DIN	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	126	316SS	316SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	13	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	13DIN	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
Elastomeric Bellows	14 SERIES	304SS	304SS	M106K+	V99 CER	WNV2	VES2	Ni10	Ni6
	19 SERIES	304SS	304SS	M106K+	V99 CER	WNV2	VES2	Ni10	Ni6
	1511/J	304SS	304SS	M106K+	V99 CER	WNV2	VES2	Ni10	Ni6
	1520/H	304SS	304SS	M106K+	V99 CER	WNV2	VES2	Ni10	Ni6
	1724/L/S	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
Parallel Spring Diaphragm	10/20	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	11/22	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	U11	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	11J/20H	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	24/L/S	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
Balanced Diaphragm	A1	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	A2/H	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	A4/J	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	A5/J	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
Parallel Spring 'O'-Ring	95	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	96	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	97	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	98	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
Multiple Spring	1609/1609S	HC276	316SS	FH82Z5	V99 CER	WNV2	WNV2	Ni10	Ni6
	1609B/1609BS	HC276	316SS	FH82Z5	V99 CER	WNV2	WNV2	Ni10	Ni6
	1645/1645S	HC276	316SS	FH82Z5	V99 CER	WNV2	WNV2	Ni10	Ni6
	1645B/1645BS	HC276	316SS	FH82Z5	V99 CER	WNV2	WNV2	Ni10	Ni6
	1659/1659S	HC276	316SS	FH82Z5	V99 CER	WNV2	WNV2	Ni10	Ni6
	1659B/1659BS	HC276	316SS	FH82Z5	V99 CER	WNV2	WNV2	Ni10	Ni6
	40L/S	HC276	316SS	M825	V99 CER	WNV2	WNV2	Ni10	Ni6
	55B	HC276	316SS	M825	V99 CER	WNV2	WNV2	Ni10	Ni6
Wave Spring Seals	1677	PH17-7	316SS	M825	V99 CER	WNV2	WNV2	Ni10	Ni6
	1677M	PH17-7	316SS	M825	V99 CER	WNV2	WNV2	Ni10	Ni6
	1678	PH17-7	316SS	M825	V99 CER	WNV2	WNV2	Ni10	Ni6
	1688	PH15-7	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
Water Pump Seals	18	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	60/65	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	70/75	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
Type 06 Seals	06	316SS	316SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
Seals for Food, Beverage And Dairy Industries	NO PREFIX	304SS	304SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	W - PREFIX	316SS	316SS	M106K+	V99 CER	VES2	VES2	Ni10	Ni6
	Y - PREFIX	316SS	316SS	M825	V99 CER	WNV2	WNV2	Ni10	Ni6
Stationaries	23	N/A	N/A	N/A	V99 CER	N/A	WNV2	N/A	Ni6
	25	N/A	N/A	N/A	V99 CER	N/A	WNV2	N/A	Ni6
	32	N/A	N/A	N/A	V99 CER	N/A	WNV2	N/A	Ni6
	ALL REST	N/A	N/A	M106K+	V99 CER	N/A	VES2	N/A	Ni6

VULCAN® ELASTOMERS

In order to ensure absolute cost and quality control, all standard secondary seal materials are manufactured in-house by Vulcan (except for 'O'-Rings). We compound and manufacture the final elastomer and then mould our components, from moulds produced in our own machine shops. The Vulcan factories' moulding section utilises modern moulding machinery and techniques to produce any and all elastomeric components required for our seals, or as specials to customer needs. Vulcan thus, uniquely in the mechanical seal industry, produce all our standard elastomer components, through final compounding of elastomer material, vulcanisation, oven curing, production of moulds, moulding, final curing and automatic flash removal.

NITRILE RUBBER VULCAN® GRADE VN19 SPECIFICATION

MATERIAL ANALYSIS

Acrylonitrile Butadiene Rubber	50.2%
Filler	36.6%
Plasticizer	7.5%
Activators	4%
Vulcanizing agents	0.3%
Accelerator	1.4%

PROPERTIES
Original

Hardness (Shore A ASTM D2240):	70 ±5
Tensile Strength (ASTM D412):	≥11 Mpa / 1.595 ksi
Elongation at Break (%) (ASTM D412):	≥220

Heat Ageing in hot air at 100°C / 212°F for 24hr (ASTM D573)

Tensile Strength change (%):	≥ -15
Elongation at Break change (%):	≥ -35
Hardness (Shore A) change (%)	≥+10

Fluid Immersion in ASTM3 oil at 100°C / 212°F for 24hr (ASTM D472)

Hardness (Shore A) change (%)	-3 ~ +7
Volume change (%):	-8~+6

E.P.D.M RUBBER VULCAN® GRADE VEP.MAR.4045 SPECIFICATION

MATERIAL ANALYSIS

Ethylene Propylene Rubber	51.92 %
Filler	42.06 %
Plasticizer	2.34 %
Activators	2.6 %
Accelerator	1.08 %

PROPERTIES
Original

Specific Gravity (ASTM D1817):	1.12 /1.18
Hardness (Shore A ASTM D2240):	70.0 ±5
Tensile Strength (ASTM D412):	≥14 Mpa/ 1.740 ksi
Elongation at Break (%) (ASTM D412):	≥200
Britlesness Temperature °C / °F	-55 /-67

Heat Ageing in hot air at 150°C / 302°F for 24hr

Elongation at Break change (%):	-20

NEOPRENE RUBBER VULCAN® GRADE VNE11 SPECIFICATION

MATERIAL ANALYSIS

Neoprene®	12%
Magnesium Oxide	4%
Zinc Oxide	5%
H.A. Carbon Black	20%
S.R. Carbon Black	40%
Di- Octyl-Phthalate	15%
D.D Accelerator	1%
C.B.S Accelerator	1%
E.T Accelerator	0.5%
Sulphur	0.5%
Stearic Acid	1%

PROPERTIES
Original

Specific Gravity (ASTM D1817):	1.5
Hardness: Shore A (ASTM D2240):	70
Tensile Strength (ASTM D412):	11.3 Mpa / 1.638 ksi
Elongation at Break (%) (ASTM D412):	480

Heat Ageing in hot Air at 100°C / 212°F for 70hr (ASTM D573)

Hardness change points shore A:	+2
Elongation change (%):	-20
Tensile strength change:	-0.48 Mpa / 0.069 ksi
Weight loss grams:	Negligible

Fluid Immersion in ASTM 3 oil at 100°C / 212°F for 70hr (ASTM D471)

Hardness change points shore A:	-26.1
Elongation change:	-2.0 Mpa / 0.290 ksi
Tensile Strength change:	-3.0 Mpa / 0.435 ksi

FEP SILICONE / VITON®

FEP Encapsulated Silicone or Viton® 'O'-Rings are available, usually from stock. Please refer to our Vulcan Chem-Rings Brochure for further Technical and Material Information.
Please contact our Commercial Technical Department for advice on fitting FEP/PFA Encapsulated 'O'-Rings to mechanical seals. Vulcan fit only upon production or supply as separate.

VITON® RUBBER VULCAN® GRADE V3F.FE2602 SPECIFICATION

MATERIAL ANALYSIS

Viton®	69%
S.F Carbon Black	15%
Magnesium Oxide	5%
Calcium Hydroxide	7%
NN-Dicinnamal-1,6-hexamethylenediamine	2.5%
Carnauba wax	1.5%

PROPERTIES
Original

Hardness: Shore A (ASTM D2240):	70 ±5
Tensile Strength (ASTM D412):	≥10 Mpa / 1.450 ksi
Elongation at Break (%) (ASTM D412):	≥220

Heat ageing in hot air at 200°C / 392°F for 24hr (ASTM D573)

Elongation change (%):	≥ -30
Tensile Strength change:	≥ -20 Mpa / 2.900 ksi
Hardness change (%)	≥ (0 ~ +10)

Fluid Immersion in ASTM3 oil for 70hr at 150°C / 302°F (ASTM D471)

Volume change (%):	-3 ~ -5

Notes:

Vulcan compound has Viton® mixing content of 66% plus. The Fluoro-Elastomer Rubber content is of course vital for the chemical and heat resistant properties of the elastomer.
Beware of "Viton®" rubbers with incorrect Fluoro-Elastomer content, sometimes only 30% or even less. It is important to obtain the correct quality content specification.
True Viton® requires a minimum content of 66% Viton®.

PERFLUORO ELASTOMERS

Vulcan utilise Kalrez® as standard but can offer any brand of supplied Perfluoro elastomer to meet your requirements and specifications. Please refer to the relevant manufacturer's Technical Information.

VULCAN® FACE MATERIALS

A seal's capability, performance and life is significantly influenced by the grade, quality and combination of face materials used. Vulcan's policy is to therefore only utilise the best grades of face materials and to control their specification and manufacture from raw powder.

As such, Vulcan manufacture in-house all of our hard face materials. Silicon Carbide (both Reaction Bonded and Sintered) and Tungsten Carbide (Nickel and Cobalt bound) are produced by Vulcan in all stages, from raw powder to final ground and lapped component.

Extensive research and technological development, allied to advanced manufacturing techniques and facilities, with intensive Quality Control and testing, has enabled Vulcan to produce materials which exceed the standards supplied from competitors, even specialist, international Tungsten Carbide / Silicon Carbide manufacturers. Vulcan also specify and fit 99.5% Purity Alumina Ceramic, as standard, to all seal/seat types. Practically all of our "single spring seal" competitors utilise the lower cost and quality 95 / 96% purity ceramic and may only offer 99.5%, for improved capability and performance, at a premium cost.

Vulcan Grade M106K+ is a machined resin grade fitted to many of our standard Seals giving significant improvements compared to the common competitor standard carbons seen. Our policy is to specify and utilise as standard, only the best quality on all our face materials.

CARBON GRADES SPECIFICATION:

CARBON GRADE	FH82Z5	M825	M106K+	M106D
	Triple Phenolic Resin Impregnated Carbon / Graphite	Double Phenolic Resin Impregnated Carbon / Graphite FDA Compliant	Double Phenolic Resin Impregnated Carbon / Graphite	Antimony metal impregnated Carbon / Graphite
Flexural Strength	≥75 Mpa / 10.877 ksi	≥65 Mpa / 9.427 ksi	≥65 Mpa / 9.427 ksi	≥65Mpa / 9.427 ksi
Compressive (Bending Fracture Strength)	≥250 Mpa / 36.259 ksi	≥200 Mpa / 29.007 ksi	≥200 Mpa / 29.007 ksi	≥220 Mpa / 31.908 ksi
Density	1.70 - 1.90 g/cm3 / 0.061 - 0.068 lb/in³	1.76 g/cm3 / 0.063 lb/in³	1.76 g/cm3 / 0.063 lb/in³	2.3g/cm3 / 0.083 lb/in³
Hardness	≈100 Hs	≥85 Hs	≥85 Hs	≥80Hs
Porosity	≤2.0%	≤2.0%	≤2.0%	≤2.0%
Temperature Limit	200°C / 392°F	200°C / 392°F	200°C / 392°F	350°C / 662°F
Coefficient of Thermal Expansion	4.7 x 10-6/°C (20- 200°C)	5.0 x 10-6/°C (20- 200°C)	5.0 x 10-6/°C (20- 200°C)	5.0 x 10-6/°C (20- 200°C)

Notes:

1. The seal face material grade fitted to all Vulcan's standard seals is shown on the material specification chart shown on page 12 of this brochure.
2. M825 is N.W.C. approved for use in contact with potable water and is F.D.A. / E.C. regulation number 1935 / 2004 compliant.
3. Usually any material may be specified to be incorporated with any Vulcan seal, sometimes at additional cost.

CERAMIC GRADE V99 CER HIGH PURITY ALUMINA CERAMIC

DESCRIPTION		
Purity	> 99.30%	
Density	3.85 - 3.90 g/cm³ / 0.139 - 0.140 lb/in³	
Apparent Porosity	0.04	
Hardness	> 90 Hs	
Bond Strength	> 3000 Kgf/cm² / 42660 lb/in²z	
Sample Dried At 110°C / 230°F		
Silica	0.15%	(Si02)
Titania	< 0.01%	(Ti02)
Ferric Oxide	0.04%	(Fe203)
Lime	0.04%	(Ca0)
Magnesia	0.55%	(Mg0)
Potash	< 0.01%	(K20)
Soda	< 0.03%	(Na20)
Phosphorus Pentoxide	< 0.02%	(P205)
Chromium Sesquioxide	< 0.01%	(Cr203)
Manganic Oxide	< 0.01%	(Mn304)
Zirconia	< 0.02%	(Zr02)
Hafnia	< 0.01%	(Hf02)
Lead Monoxide	< 0.02%	(Pb0)
Barium Oxide	< 0.01%	(Ba0)
Strontia	< 0.01%	(Sr0)
Stannic Oxide	< 0.01%	(Sn02)
Loss on Ignition at 1025 Deg C.	0.04%	
Approx. Sulphur Trioxide After L.O.I. and Fusion	< 0.05%	(S03)
Alumina	99.35%	(Al203)

M106D ANTIMONY CARBON

Antimony metal impregnated Carbon is a stronger, higher density grade of Carbon, with greater wear and temperature resistance compared to many resin impregnated carbons.

It is important to consider, before use of Antimony impregnated Carbon, the potential health hazards posed by the Antimony metal leaching from the Carbon into the media. In no instance should a mechanical seal with an Antimony Carbon component be considered to be used on process equipment involved in food, beverage or ingredient production, for humans or animals, in our opinion.

Antimony impregnated Carbon offers greater performance in applications where there is poor, or even temporarily absent, lubrication and cooling to the seal faces, or the media is high temperature. Such applications could be self-priming pumps where dry start-up is possible, boiler feed water pumps, or medias such as volatile solvents or volatile petrochemicals that provide very poor lubrication to the sealing faces.

If in doubt whether to specify Antimony Carbon, please contact our Technical Commercial Department for advice.

VULCAN® FACE MATERIALS

SILICON CARBIDE GRADES SPECIFICATION:

SILICON CARBIDE GRADE MATERIAL SPECIFICATION	VES2	WHV2	WNV2	CPV1	
	REACTION BONDED SILICON CARBIDE	SINTERED SILICON CARBIDE GRAPHITE LOADED	SINTERED SILICON CARBIDE	POROUS SINTERED SILICON CARBIDE	
Purity ; % Pure Silicon Carbide	≥88	Sic – 80-85 Graphite – 15-20	≥99	≥98	%
Hardness (Vickers 0.5)	≥2200 / 3129	≥2400 / 3413	≥2600 / 3698	≥2600 / 3698	Kg/mm² / lb/in²
Compressive Strength	≥2000 / 290	≥2000 / 290	≥3600 / 319	≥2000 / 290	Mpa / ksi
Fracture Strength	≥4 / 0.580	≥3.2 / 0.464	≥3.2 / 0.464	≥3.2 / 0.464	Mpa / ksi
Flexural Strength	≥350 / 50.763	≥280 / 40.610	≥400 / 58.015	≥240/34.809	Mpa / ksi
Density	≥3.00 / 0.108	≥3.0 / 0.108	≥3.10 / 0.111	≥3.0 / 0.108	gm/cc / lb/in³
Grain Size	≤15 / 0.0006	5-500 / 0.002 - 0.02	≤5 / 0.0002	<5	µm / ins
Thermal Conductivity	150	≥110	110	≥90	W/m.k
Thermal Expansion	4.4	≤4.1	≥4.7	≥4.7	10-6/°C
Porosity	0	≤3.0	≤0.2	4-12	%
Youngs Modulus	≥350 / 50763	≥400 / 58015	≥410 / 59465	≥400 / 58015	Gpa / ksi
Poisson Ratio	0.15	0.15	0.16	0.16	
Maximum Working Temperature	1300°C / 2372°F	1600°C/2912°F	1700°C / 2552°F	1600°C / 2912°F	°C / °F
Typical Pore Size	N/A	N/A	N/A	40-75 / 0.0016 - 0.003	µm / ins

Notes:

Vulcan manufacture and stock Reaction Bonded and Sintered Silicon Carbide. As such we supply both Reaction Bonded and Sintered Silicon Carbide as standard, so please check the stock code or specify should you require a specific grade.

TUNGSTEN CARBIDE GRADES SPECIFICATIONS

Ni10 NICKEL BASED T.C MATERIAL SPECIFICATION:		
Chemical Composition (by Weight)		
Tungsten Carbide:	90%	(+/- 0.25%)
Nickel:	10%	(+/- 0.25%)
DESCRIPTION		
Hardness Hv30	1300-1400	
Density	14.4-14.6 gm/cc / 0.520 - 0.527 lb/in³	
Ultimate Compressive Strength	> 600,000 psi	
Ultimate Tensile Strength	> 200,000 psi	
Modulus of Elasticity	99.8 x 10^6psi	

Ni6 NICKEL BASED T.C. MATERIAL SPECIFICATION		
Chemical Composition (by Weight)		
Tungsten Carbide:	94%	(+/- 0.25%)
Nickel:	6%	(+/- 0.25%)
DESCRIPTION		
Hardness Hv30	1425-1575	
Density	14.8 -15 gm/cc / 0.535 - 0.541 lb/in³	
Ultimate Compressive Strength	680,000 psi	
Ultimate Tensile Strength	210,000 psi	
Modulus of Elasticity	94 x 10^6psi	

Notes:

Vulcan have set exceptional standards for Quality in our Tungsten Carbide production and routinely produce to our specification of A02, B02, C02 standard.

Fine grain Tungsten Carbide is both more expensive to purchase and difficult to process. However, it produces the finest, most uniform, grain structure and best quality Tungsten Carbide. Beware of Tungsten Carbides manufactured from re-cycled powder, which are lower cost to produce but have reduced product material matrix integrity and performance capability.

Our Tungsten Carbide Quality is governed by and microscopically inspected to ISO 4505:1978, whereby minute pores up to 10 micron / 0.0004 ins (A), 10-25 micron /0.0004 - 0.0009 ins (B) and free Carbon inclusions (C) are classified on a scale from 1 to 8.

NI-RESIST GRADE SPECIFICATION

NI-RESIST SPECIFICATION	
Carbon [C]:	2.8%
Silicon [Si]:	2.5%
Manganese [Mn]	1.0%
Phosphorus[P]	0.2%
Nickel [Ni]:	20.0%
Chromium [Cr]:	2.0%
Magnesium [Mg]:	0.1%
Iron [Fe]:	Balance
MATERIAL PROPERTIES	
Tensile Strength 1000lb./sq. in.	60
Hardness: HB	175
Thermal Expansion (32°-212°F) x 10-6in./(in.)(°F):	10.4
Density lb/cu. In.	0.286
Melting Point °F/°C	2250/1232

FACE PV VALUES AND CHART

The selection of the optimum face material combination is primarily dependent upon the application conditions and is vital for optimal seal performance and life. Most particularly, this primarily sets or limits the seals capability / suitability for any given application, along with the seals design.
Seal face PV values effectively set the limits of a seal face combination, due to the relationship between maximum operational pressure and circumferential speed, dictating the performance and life of a seal.
Seal PV charts have been created in each standard seal section of this brochure to establish a guidance, theoretical maximum, pressure value, for all standard material face combinations.

VULCAN FOLLOW IMECHE (INSTITUTE OF MECHANICAL ENGINEERS) GUIDELINES AND THEREFORE DON'T RECOMMEND UTILISATION OF UN-BALANCED SEALS BEYOND THE PUBLISHED PRESSURE LIMITS. WE THEREFORE STRONGLY RECOMMEND INDIVIDUAL TESTING / MONITORING FOR ANY PROPOSED APPLICATION.

The tables below are to be used in conjunction with the PV charts, where the relevant multiplying factors are applied to arrive at the seal's maximum pressure rating. See **"How to Determine Maximum Operating Pressure"** below by way of an illustrative example.

APPLICATION CONDITIONS TABLE

FACTOR	SELECTION CRITERIA	MULTIPLIER
PRODUCT FLUID	Lubricating fluids	x 1.00
	Aqueous solutions / Water	x 0.85
TEMPERATURE	Below 70°C (158°F)	x 1.00
	Between 71°C and 120°C (160°F and 248°F)	x 0.85
	Between 121°C and 175°C (250°F and 347°F)	x 0.75
	Over 176°C (349°F)	x 0.60
SPEED	Up to 1750 R.P.M.	x 1.00
	1750 R.P.M. to 3600 R.P.M.	x 0.80

FACE AND SEAT MATERIAL COMBINATIONS

MATERIAL FACE COMBINATIONS	MULTIPLIER
Carbon vs Reaction Bonded Silicon Carbide	x 0.90
Carbon vs Tungsten Carbide	x 0.90
Carbon vs Ceramic	x 0.50
Tungsten Carbide vs Tungsten Carbide	x 0.50
Sintered Silicon Carbide vs Sintered Silicon Carbide	x 0.41
Carbon vs Stainless Steel	x 0.30
Reaction Bonded Silicon Carbide vs Reaction Bonded Silicon Carbide	x 0.50
Sintered Silicon Carbide vs Reaction Bonded Silicon Carbide	x 0.41
Carbon vs Sintered Silicon Carbide	x 0.85

"HOW TO DETERMINE MAXIMUM OPERATING PRESSURE"

The maximum operating pressures shown in the chart apply to a Carbon face running against a Reaction Bonded Silicon Carbide seat.
The ratings given, in this and all P.V. value charts shown in this brochure and Vulcan's Technical Literature , assumes stable operation, at the speeds shown, in a clean, cool, lubricating, non-volatile fluid, with adequate flush rate.

To determine the maximum operating pressure for a specific duty, simply multiply the value obtained, from the graph for a particular seal size and type, by the appropriate factors given in the tables.

For Example:

Seal Type:	2.000" Type 20
Face Combination:	Carbon / Ceramic.
Speed:	1450 R.P.M.
Temperature:	50°C (122°F)
Media:	Water

Obtain the nominal pressure rating from the Seal Type PV Chart (for a Diaphragm Seal Type) where the 2.000" shaft size line intersects the seal type line. Go across to find the pressure (i.e. 9 bar).
Then apply the multiplying factors from the table to obtain the final approximated guidance maximum pressure value.

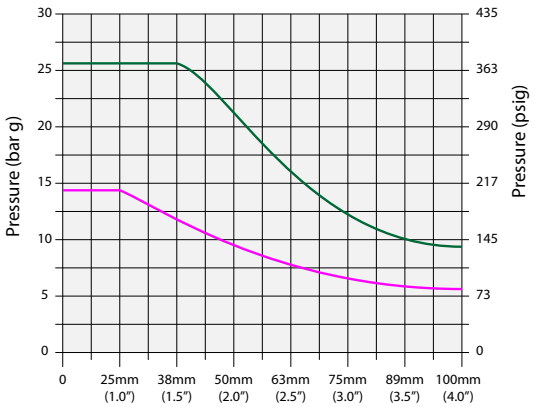


CHART BASED UPON: CARBON VS REACTION BONDED SILICON CARBIDE SEAL FACES

10/20/11/22/24 A1/A2/A4/A5

For this example the "Approximated Guidance Maximum Pressure Value" would be;
9 Bar (from PV Chart) x 0.50 (Face Materials) x 1.00 (Speed) x 1.00 (Temperature) x 0.85 (Fluid Type) = 4.2 Bar

Note.
Our policy is one of continuous technical and efficiency improvement. As such, all specifications may be subject to change without prior notice. Please note that due to the many application variants affecting seal performance, these charts are for guidance only. Theoretical PV values are based on a seal life of 9000 hours and were calculated from Vulcan's (and available published) technical data, knowledge and judgment.

MECHANICAL SEAL TESTING

Vulcan have designed, specified and installed a unique, tri-parate, static air pressure test rig, into our seal assembly department. This is utilised, partly for seal testing purposes, but primarily to sample inspect and test seals, from production. In addition, we can offer 100% batch inspection and test, to agreed parameters, as part of our supply to individual customer contracts and specification.

The Vulcan mechanical seal design types shown in this brochure have been tested on our rotary test facilities. The seal performance data produced support Vulcan's published Maximum Recommend Operating Parameters, which can be calculated for each seal type using the provided PV Charts in combination with the Application Conditions and Material Combination Multiplying Factors, please refer to page 16 for a full explanation on how these are calculated.

ELECTRONIC INSPECTION

Vulcan are and have long been passionate about the benefits, for Seal Quality Assurance and Performance Improvement, of automated, electronic imaging, sizing and analytical machines.

We routinely and systematically electronically inspect at each stage of manufacture, assembly and supply, from incoming materials to final bar-coded despatch.

MATERIAL TESTING

Our policy has always been to specify the best quality elastomer and seal face materials, as they are the very essence of "what actually seals". To support and ensure this and as an integral part of our new material / production developments, we have extensive material test facilities.

This programme of in-house face materials development and manufacture has successfully led to a range of Silicon Carbide materials, for instance, becoming a major separate materials business, within The Vulcan Group.

FITTING ADVICE

FITTING INSTRUCTIONS FOR ROTARY MECHANICAL SEALS; PLEASE OBSERVE THE FOLLOWING RULES;

EQUIPMENT CONDITION

- Check the condition of the equipment shaft and bearings for the following:
- Shaft diameter is within tolerance +/- 0.05mm (+/- 0.002").
- Shaft run out is less than 0.1mm (0.004") for shaft speeds up to and including 1800 R.P.M. and less than 0.05mm (0.002") for shaft speeds greater than 1800 R.P.M.
- Shaft max. ovality (concentricity) +/- 0.025mm (+/- 0.001")
- Shaft bearing clearances should not permit lateral axial movements exceeding 0.12mm (0.005") i.e. Shaft End Float should be less than 0.12mm (0.005")
- Shaft surface finish, should be a maximum of 0.3/0.6 Rm.
- Seat housing diameter tolerance should be within +/-0.05mm (+/-0.002") Make sure the seat housing surfaces are free from damage or corrosion.

PREPARATION

- There are no sharp edges, burns, scratches or corrosion where the seal must pass over. It is recommended that the shaft is chamfered at the end to aid assembly. A typical lead in of 2.5mm(0.098") x 10 degree angle for seal sizes up to 63.5mm (2.500") and 4mm x 10 degree angle for seal sizes over 63.5mm (2.500") is satisfactory.
- Do not place face(s) down on any surface unless protected by clean cloth or paper.

ENSURE THE EQUIPMENT OPERATING CONDITIONS DO NOT EXCEED THE SEALS DESIGN PARAMETERS.

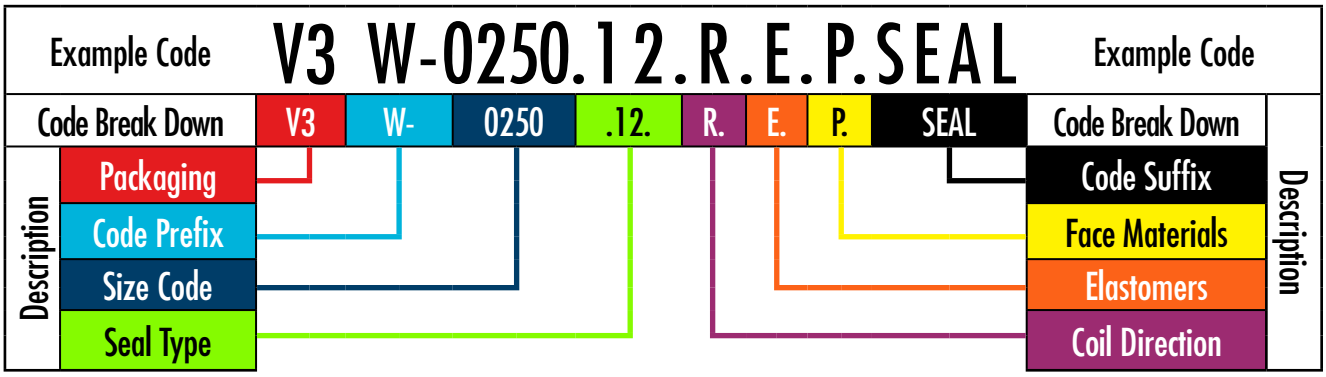
INSTALLATION OF SEAL AND SEAT

- Extreme cleanliness and care is essential during installation. When ready to use, lay parts onto a clean flat surface and remove protective wrapping. Take care not to cut or damage any seal parts, as these can easily be damaged if mishandled.
- SEAT: Lightly lubricate the seat elastomer and housing with clean water, alcohol or other elastomer compatible liquid. Press fit the stationary seat into the gland plate and check the face is square to the gland plate face, utilizing a small hand press or pillar of a drilling machine if necessary. Protect the seat face first with a suitable plastic material. Place onto the shaft the assembled gland plate and stationary seat.
- SEAL: Lightly lubricate the sleeve and the neck of the seal elastomer with clean water or soft soap. Light oil may be used with elastomers, other than Ethylene Propylene (E.P.). Fitting with grease may prevent a bellows or diaphragm seal from gripping the shaft. Use grease, if you prefer, solely on 'O'-Rings.
- Slide onto the shaft the rotary seal and set to the correct working length. If necessary, gently turning the seal as it slides (in a direction opposite to the direction of the coil, if the seal is a Conical Spring Seal). If the seal is fitted with grub-screws, tighten uniformly and lock with thread sealant, if considered desirable. Carefully clean both seal faces to remove all traces of grease.
- Assemble the equipment in the normal manner. Finally bolt the gland plate to the stuffing box in an even manner, to the correct necessary torque. Turn the shaft by hand to check that it will turn freely with no obstructions.

ENSURE THAT THE EQUIPMENT IS PRIMED BEFORE START-UP

VULCAN® SEAL / SEAT CODING SYSTEM

UNDERSTANDING VULCAN SEAL CODES:



Packaging
This is always a two digit code, which relates to the product packaging. See Product Packaging Prefix Code explanation in the table below.

Code Prefix
This section primarily specifies the metallurgy. It can also specify if FDA and E.C. Regulation material compliance is required or if specific customer product marking is required. Please refer to Code Prefix key below. Please note that a requirement for a non-standard product type will usually result in minimum order requirements and production lead times.

Size Code
The shaft size, expressed in millimetres is converted to a standard four digit code. For example; 1.000" = 25.4mm = 0254 or 20mm = 0200

For stepped shaft assemblies, the assembly size code is always derived from the larger shaft size, usually found under the rotary. For example; Major shaft size 30mm and shaft size under seat 25mm; Size Code = 0300. For ease, please use the Size Code as specified in the Size Code column on each dimensional table shown.

Seal Type
This denotes the Rotary and Seat Type combination, Rotary or Seat only, Type. Seal Types are shown within this brochure and upon the Price List Cover Sheets and Headers.

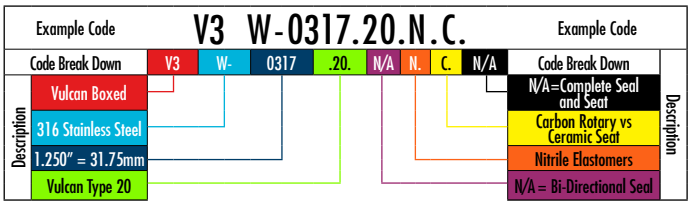
Coil Direction
For direction dependent seals, the first letter will be L. or R. referring to a left-hand (anti-clockwise) or right-hand (standard clockwise) shaft spring and direction of shaft rotation. For bi-directional seals this letter is omitted.

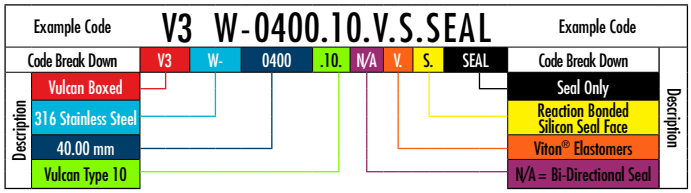
Elastomers
One or two letters which specify the elastomer, or gaskets fitted, as shown in the "Secondary Seal (Elastomer or Gaskets) Material Code Key" (see page opposite).

Face Materials
For a complete rotary and seat combination; a compound material code is used. For Rotary or Seat only code; a material specific code is used. Please refer to Face Materials table on opposite page.

Code Suffix
This suffix section is only used for part assemblies or components. Thus if it is left blank, the code is for a complete rotary and seat. This suffix is primarily used as .SEAL and .STAT to signify the code is for the rotary or stationary seat part only.

EXAMPLE CODES BREAK DOWN





PRODUCT PACKAGING PREFIX CODE KEY

DESCRIPTION	PREFIX
Vulcan Screen Printed Individual Mechanical Seal Packaging[1]	V3
Vulcan Screen Printed Bulk Mechanical Seal Packaging	V4
Plain White Individual Mechanical Seal Packaging[2]	VW
Plain White Bulk Mechanical Seal Packaging	V2

[1] Please note, This type of packaging is currently in the form of tubes with plastic lids. However, Vulcan are phasing out tubes, to be replaced with superior individual boxes.

[2] Please also note that Vulcan can offer to label any product with your own product code and description, upon agreement. Please advise your labelling requirements upon order placement.

PRODUCT CODES PREFIX KEY

PREFIX MEANING	PREFIX
ALL METAL PARTS 304SS	NO PREFIX
ALL METAL PARTS 316SS	W-
ALL METAL PARTS HASTELLOY C276	H-
ALL METAL PARTS DUPLEX	D-
ALL METAL PARTS BRASS	B-
FDA /E.C. REGULATION COMPLIANT (1935/2009)	Y-
MARKED PRODUCT	E-

GUARANTEED STOCK MATERIALS KEY

The Guaranteed Stock materials for the seals found in Brochure Sections 11a and 11b are shown utilising a key system. All letters utilised are Vulcans standard material, elastomer and face material combination codes, as Illustrated upon this and the opposite page. Please note that the material codes shown in section 11, are to show the Guaranteed Stock materials only. Stock materials thus selected by Vulcan are either a direct replacement to the O.E.M. materials, or are our chosen superior replacement. Other materials are available, often from stock, please enquire.

KEY ICON	DESCRIPTION
X	Circular icons indicate which elastomers are guaranteed in stock, i.e. "V" for Viton, "N" for Nitrile and "E" for E.P.
X	Hexagonal icons indicate the rotary and stationary face combination codes which are guaranteed in stock. i.e, "C" for Carbon vs Ceramic.
316	Rectangular grey icons indicates the metallurgy utilised within the Guaranteed Stock seals.

VULCAN® SEAL / SEAT CODING SYSTEM

ROTARY AND STATIONARY FACE COMBINATION CODES:

SEAT FACE MATERIAL

ROTARY FACE MATERIAL	ROTARY ONLY CODE	ANTIMONY CARBON M106D	CARBON M106K+	CARBON FH82Z5	CARBON M825 FDA	CERAMIC 95%	CERAMIC V99	LEAD BRONZE	STAINLESS STEEL*	NI-RESIST NIA436-84	CHROME OXIDE COATED*	VES2 REACTION BONDED SILICON CARBIDE	WNV2 SINTERED SILICON CARBIDE	WHV2 SINTERED SILICON CARBIDE GRAPHITE LOADED	CPV1 POROUS SINTERED SILICON CARBIDE	TUNGSTEN CARBIDE Ni6
STATIONARY ONLY CODE		L	P	BI	RD	CJ	A	CB	Q	F	O	S	R	TT	PP	H
ANTIMONY CARBON M106D	A					AJ	A	AE	AQ	N	AM	AD	AS	AT	AU	AH
CARBON M106K+	C					CJ	C	CB	Q	F	O	D	CS	CT	CU	E
CARBON FH82Z5	IB					IJ	IB	IE	IQ	IF	IM	IS	IR	IT	IP	IH
CARBON M825 FDA	DB					DJ	DB	DE	DQ	DF	DM	DS	DR	DT	DP	DH
CERAMIC 95%	JC	JA	JC	JI	JD							JS	JR	JT	JP	JH
CERAMIC V99	B	BA	B	BI	BD	BJ	BB					BG	BR	BT	BP	BH
LEAD BRONZE	CH	EA	EC	EI	ED	EJ	EB	EE	EQ	CF	EM	ES	ER	ET	EP	CH
STAINLESS STEEL*	P	AP	P	QI	QD			QE			QM	PS	QR	QT	QP	QH
NI-RESIST NiA436-84	K	L	K	FI	FD			FE			FM					FH
CHROME OXIDE COATED*	M	MA	M	MI	MD	MJ	MB	ME			MM	MS	MR	MT	MP	MH
VES2 REACTION BONDED SILICON CARBIDE	S	TA	T	SI	SD	SJ	G					S	SR	ST	SP	I
WNV2 SINTERED SILICON CARBIDE	R	SA	SC	RI	RD	RJ	SG					SS	R	RT	RP	RH
WHV2 SINTERED SILICON CARBIDE GRAPHITE LOADED	TT	TN	TC	TI	TD	TJ	TB					TS	TR	TT	TP	TH
CPV1 POROUS SINTERED SILICON CARBIDE	PP	PA	PC	PI	PD	PJ	PB					PE	PR	PT	PP	PH
TUNGSTEN CARBIDE Ni10	H	HA	U	HI	HD	HJ	HC					J	HR	HT	HP	H

Notes; * Stainless Steel Grade - The grade of Stainless Steel is specified by the code Prefix.

SECONDARY SEAL (ELASTOMER OR GASKETS) MATERIAL CODE KEY

ELASTOMERS CODE	MATERIAL
A	AFLAS® RUBBER ELASTOMERS
B	COMBINED P.T.F.E. WEDGE AND VITON® 'O'-RING P.T.F.E. GASKET ON SEAT
C	COMBINED P.T.F.E. WEDGE AND NEOPRENE 'O'-RING. P.T.F.E. GASKET ON SEAT
D	COMBINED P.T.F.E. WEDGE AND NEOPRENE 'O'-RING. NEOPRENE 'O'-RING ON SEAT
E	E.P. RUBBER ELASTOMERS
E1**	E.P. RUBBER 'O'-RINGS WITH P.T.F.E. BACKUP RING
EN*	DOUBLE SEAL, WITH E.P. ELASTOMERS INBOARD AND NITRILE OUTBOARD
F	FEP/SILICONE ENCAPSULATED 'O'-RINGS
G	FEP/VITON® ENCAPSULATED 'O'-RING
GV	DOUBLE SEAL: FEP/VITON® ENCAPSULATED 'O'-RING INBOARD/STD VITON® OUTBOARD
H	HNBR TERBAN® RUBBER BELLOWS OR 'O'-RINGS
J	PFA/SILICONE ENCAPSULATED 'O'-RINGS
K	PERFLUROELASTOMER TO YOUR SPECIFICATION
M	EXPANDED GRAPHITE
N	NITRILE RUBBER ELASTOMERS
N1**	NITRILE RUBBER 'O'-RINGS WITH P.T.F.E. BACKUP RING
O	NEOPRENE RUBBER ELASTOMERS
P	P.T.F.E. WEDGES OR GASKETS
Q	NEOPRENE RUBBER ELASTOMERS ON ROTARY P.T.F.E. GASKET ON SEAT
S	SILICONE RUBBER ELASTOMERS
T	E.P. ELASTOMER ON ROTARY WITH P.T.F.E. GASKET SEAT
U	GLASS FILLED P.T.F.E. WEDGES AND GASKETS
V	VITON® ELASTOMERS
V1**	VITON® 'O'-RINGS WITH P.T.F.E. BACKUP RING
W	VITON® ELASTOMERS ON ROTARY WITH P.T.F.E. GASKET SEAT
X	NO ELASTOMER FITTED
Y	P.T.F.E. WEDGE ROTARY, WITH VITON® 'O'-RING ON SEAT
Z	P.T.F.E. WEDGE ROTARY, WITH NITRILE 'O'-RING ON SEAT

Notes:
There are a large number of Secondary Seal Material Combinations available; the table to the left shows the most common only. Please contact us for further information on any other requirements.

* Double Secondary Seal Material Codes – As shown in the table on the left, double seal material codes are a combination of two single elastomer codes. The first letter signifies the inboard material and the second letter the outboard material.

** N1, E1, V1 Elastomer 'O'-Ring with P.T.F.E. backup ring – The 1 after standard Secondary Material code signifies requirement for P.T.F.E. backup ring.

UNIT CONVERSION CHARTS

Mass/Force/Torque

IMPERIAL	METRIC	METRIC
2.2 lb	1 kg	1000 g
1 lb	4.44 N	0.454 kg
1 N	0.102 kg	101.97 g

Speed

IMPERIAL	METRIC
1 ft/s	= 0.3048 m/s
1m/s	= 2.237mph
Convert RPM to M/S	m/s = (rpm/60) x (shaft diameter(m) x 3.142)
Convert M/S to RPM	rpm = (m/s x 60) / (shaft diameter(m) x 3.142)

Pressure

METRIC / IMPERIAL OR THE REVERSE	
1 psi	0.06895 bar
1 psi	6.89 kpa
14.5 psi	1 bar
0.145 psi	1 kpa

Flow and Volume

METRIC / IMPERIAL OR THE REVERSE	
1m³/s	1000 l/s
1m³/h	4.40 Gpm (US)
1 l/s	3.6 m³/h
1 cc/s	0.061 in³
3.785 Litres	1 US Gallon
1 Litre	0.264 US Gallon

Length

IMPERIAL	METRIC	METRIC	METRIC
1 in	25.4 mm	2.54 cm	0.0254 M
1 ft	304.8 mm	30.48 cm	0.3048 M
METRIC	**IMPERIAL**	**IMPERIAL**	**IMPERIAL**
1 mm	0.0394”	0.0032 ft	0.00109 yd
1 cm	0.394”	0.0328 ft	0.01090 yd
1 meter	1.094 yd	3.2800 ft	1.09400 yd

Temperature

°C	°F
-50 °C	-58 °F
-45 °C	-49 °F
-40 °C	-40 °F
-35 °C	-31 °F
-30 °C	-22 °F
-25 °C	-13 °F
-20 °C	-4 °F
-15 °C	5 °F
-10 °C	14 °F
-5 °C	23 °F
0 °C	32 °F
5 °C	41 °F
10 °C	50 °F
15 °C	59 °F
20 °C	68 °F
25 °C	77 °F
30 °C	86 °F
35 °C	95 °F
40 °C	104 °F
45 °C	113 °F
50 °C	122 °F
55 °C	131 °F
60 °C	140 °F
65 °C	149 °F
70 °C	158 °F
75 °C	167 °F
80 °C	176 °F
85 °C	185 °F
90 °C	194 °F
95 °C	203 °F
100 °C	212 °F
105 °C	221 °F
110 °C	230 °F
115 °C	239 °F
120 °C	248 °F
125 °C	257 °F
130 °C	266 °F
135 °C	275 °F
140 °C	284 °F
145 °C	293 °F
150 °C	302 °F
155 °C	311 °F
160 °C	320 °F
165 °C	329 °F
170 °C	338 °F
175 °C	347 °F
180 °C	356 °F
185 °C	365 °F
190 °C	374 °F
195 °C	383 °F
200 °C	392 °F
205 °C	401 °F
210 °C	410 °F
215 °C	419 °F
220 °C	428 °F
225 °C	437 °F
230 °C	446 °F
235 °C	455 °F
240 °C	464 °F

METRIC / IMPERIAL SIZE CODES

SHAFT SIZE			SIZE
IMPERIAL		METRIC	CODE
3/8	0.375	9.53	0095
7/16	0.438	11.11	0111
1/2	0.500	12.70	0127
9/16	0.563	14.29	0143
5/8	0.625	15.88	0158
11/16	0.688	17.46	0175
3/4	0.750	19.05	0191
13/16	0.813	20.64	0206
7/8	0.875	22.23	0222
15/16	0.938	23.81	0238
1	1.000	25.40	0254
1.1/16	1.063	26.99	0270
1.1/8	1.125	28.58	0286
1.3/16	1.188	30.16	0301
1.1/4	1.250	31.75	0317
1.5/16	1.313	33.34	0333
1.3/8	1.375	34.93	0349
1.7/16	1.438	36.51	0365
1.1/2	1.500	38.10	0381
1.9/16	1.563	39.69	0397
1.5/8	1.625	41.28	0412
1.11/16	1.688	42.86	0428
1.3/4	1.750	44.45	0444
1.13/16	1.813	46.04	0460
1.7/8	1.875	47.63	0476
1.15/16	1.938	49.21	0492
2	2.000	50.80	0508
2.1/16	2.063	52.39	0524
2.1/8	2.125	53.98	0539
2.3/16	2.188	55.56	0555
2/1/4	2.250	57.15	0571

SHAFT SIZE			SIZE
IMPERIAL		METRIC	CODE
2.5/16	2.313	58.74	0587
2.3/8	2.375	60.33	0603
2.7/16	2.438	61.91	0619
2.1/2	2.500	63.50	0635
2.9/16	2.563	65.09	0651
2.5/8	2.625	66.68	0666
2.11/16	2.688	68.26	0683
2.3/4	2.750	69.85	0698
2.13/16	2.813	71.44	0714
2.7/8	2.875	73.03	0730
2.15/16	2.938	74.61	0746
3	3.000	76.20	0762
3.1/16	3.063	77.79	0778
3.1/8	3.125	79.38	0794
3.3/16	3.188	80.96	0809
3.1/4	3.250	82.55	0825
3.5/16	3.313	84.14	0841
3.3/8	3.375	85.73	0857
3.7/16	3.438	87.31	0873
3.1/2	3.500	88.90	0889
3.9/16	3.563	90.49	0905
3.5/8	3.625	92.08	0921
3.11/16	3.688	93.66	0937
3.3/4	3.750	95.25	0952
3.13/16	3.813	96.84	0968
3.7/8	3.875	98.43	0984
3.15/16	3.938	100.01	1000
4	4.000	101.60	1016
4.1/16	4.063	103.19	1032
4.1/8	4.125	104.78	1048
4.3/16	4.188	106.36	1064

SHAFT SIZE			SIZE
IMPERIAL		METRIC	CODE
4.1/4	4.250	107.95	1079
4.5/16	4.313	109.54	1095
4.3/8	4.375	111.13	1111
4.7/16	4.438	112.71	1127
4.1/2	4.500	114.30	1143
4.9/16	4.563	115.89	1159
4.5/8	4.625	117.48	1175
4.11/16	4.688	119.06	1191
4.3/4	4.750	120.65	1206
4.13/16	4.813	122.24	1222
4.7/8	4.875	123.83	1238
4.5/16	4.938	125.41	1254
5	5.000	127.00	1270
5.1/16	5.063	128.59	1286
5.1/8	5.125	130.18	1302
5.3/16	5.188	131.76	1318
5.1/4	5.250	133.35	1333
5.5/16	5.313	134.94	1349
5.3/8	5.375	136.53	1365
5.7/16	5.438	138.11	1381
5.1/2	5.500	139.70	1397
5.9/16	5.563	141.29	1413
5.5/8	5.625	142.88	1429
5.11/16	5.688	144.46	1445
5.3/4	5.750	146.05	1460
5.13/16	5.813	147.64	1476
5.7/8	5.875	149.23	1492
5.15/16	5.938	150.81	1508
6	6.000	152.40	1524
6.1/2	6.500	165.10	1651
7	7.000	177.80	1778

VULCAN® EQUIVALENT LISTING TO OTHER MAJOR QUALITY BRANDS

BURGMANN®	VULCAN
BT-AR, BT-AR3	Type 18
BT-FN	Type 13
BT-RN	Type 12
H7N	Type 1678
H12N or H17GN	Type 82
H12N6	Type 82S
HJ92N	Type 40L
HJ977GN	Type 40L
M2	Type 9
M2N	Type 9L
M2N4	Type 9S
M3	Type 8B
M3N	Type 8DIN
M3N4	Type 8DINS
M3N24	Type 12DIN
M3N69	Type 127B
M3N86	Type 126
M3S	Consult Vulcan
M32	Type 8
M32N	Type 8DIN
M32N2	Type 12DIN
M32N4	Type 8DINS
M32N9	Type 126L
M32N24	Type 12DIN
M32N69	Type 127B
M32N86	Type 126
M32S	Consult Vulcan
M37	Type 8
M37N	Type 8DIN
M37N4	Type 8DINS
M37G	Type 8
M37GN	Type 8DIN
M37GN4	Type 8DINS
M377	Type 8
M377N	Type 8DIN
M377S6	Type 8W
M7N	Type 1677
M74 or H74	Consult Vulcan
MG1	Type 19
MG12	Type 192
MG13	Type 193
MG1S20	Type 1520
MG1S	Consult Vulcan
MG901	Type 22
MG910	Type 10
MG912	Type 24
MG913	Type 143
MG920	Type 20
MG921	Type 11
MG9S	Consult Vulcan

BURGMANN® SEATS ONLY	VULCAN
G1 or G2	Consult Vulcan
G4	Type 8.STD
G6	Type 8.DINS
G7 And G8	Type 8.BEZ
G9	Type 8.DINL
G12	Type 24.DINS
G13	Type 8B Stat
G15 or G115	Consult Vulcan
G16	Consult Vulcan
G30	Consult Vulcan
G46	Type 24.DINL
G50	Type 20 Stat
G55	Type 11 Stat
G60	Type 19B
G61	Type 24 Stat
G606	Type 8.DINS

AES®	VULCAN
N-B01	Type 18
N-B012	Type 192B
N-B012G	Type 192G
N-B012S	Type 192
N-B012SL	Type 192L
N-B012SS	Type 192S
N-B013	Type 193B
N-B013S	Type 193
N-B013SL	Type 193L
N-B013SS	Type 193S
N-B02	Type 19B
N-B02D	Type 19C
N-B02K	Type 192K
N-B02S	Type 19
N-B02SL	Type 19L
N-B02SS	Type 19S
N-B02W	Type 191
N-B02X / B02XS	Consult Vulcan
N-B03	Type 70
N-B03U	Type 75
N-B04	Type 60
N-B04U	Type 65
N-B05	Type 14DIN
N-B05S	Type 14DINS
N-B052	Type 142DIN
N-B052S	Type 142DINS
N-B053	Type 143DIN
N-B053S	Type 143DINS
N-B06	Type 28
N-B060	Type 282
N-B07	Type 1724
N-B07S	Type 1724S
N-B07SL	Type 1724L
N-B0H	Type 66
N-BP02	Type 1520
N-BP04	Type 1511
N-BP05	Type 1522
N-C01	Type CLAM
N-C02	Type 96
N-C03	Type 97
N-M01	Type 1609
N-M01S	Type 1609S
N-M02	Type 1609B
N-M02S	Type 1609BS
N-M03	Type 1659
N-M03S	Type 1659S
N-M04	Type 1659B
N-M04S	Type 1659BS
N-M05	Type 1645
N-M05S	Type 1645S
N-M06	Type 1645B
N-M06S	Type 1645BS
N-M07	Type 50
N-M010	Type 40
N-M010S1	Type 1663
N-M010S2	Type 1663A
N-M010S3	Type 1662
N-M010S4	Type 1691
N-M010SA	Type 42
N-MP07	Type 912
N-P01	Type 10
N-P01U	Type A1
N-P02	Type 20
N-P02C	Type CAR
N-P02G	Type 207
N-P02U	Type A2
N-P03	Type 24
N-P04	Type 11
N-P04U	Type A4

AES®	VULCAN
N-P05	Type 22
N-P05U	Type A5
N-P06	Type 26
N-P07	Consult Vulcan
N-P08	Type 95
N-P080	Type 98
N-P09	Type 94
N-P09S	Type B94
N-P010	Type 293
N-P011	Type 89
N-S01	Type 8.STD
N-S02	Type 8.DINL
N-S03	Type 8.DINS
N-S04	Type 24 SEAT
N-S040	Type 19B SEAT
N-S05	Type 24.DINL
N-S06	Type 24.DINS
N-S07	Type 21 SEAT
N-S070	Type 31 SEAT
N-S08	Type 25 SEAT
N-S09	Type 23 SEAT
N-S010	Type 24.BEZL
N-S011	Type 32 SEAT
N-S013	Type 24.BEZS
N-S0E	Type 1640
N-S0S / S0SS	Type 86
N-S0Z	Consult Vulcan
N-SAIH	Type 41
N-T01	Type 8
N-T01.DIN	Type 8DIN
N-T01A	Type 8W
N-T01DB	Type 82
N-T01F	Consult Vulcan
N-T01SA	Type 81
N-T02	Type 8B
N-T03	Type 12
N-T03.DIN	Type 12DIN
N-T04	Type 13
N-T04.DIN	Type 13DIN
N-T05 Range	Type 06 Range
N-T06D	Type 135
N-T07	Type 9
N-T07D	Type 9+8.DINL
N-T0R	Type 29
N-T0W	Type 16
N-T0WD	Type 16DOUB
N-T0WDW	Type 297
N-T0WP	Type 16.PLUS
N-W01	Type 1688
N-W01TL	Type 1688Z
N-W02	Type 1688L
N-W03	Type 1688W
N-W03S	Type 1682
N-W04	Type 1688Y
N-W06	Type 1650
N-W07D	Type 1677
N-W07DM	Type 1677M
N-W07DMB	Type 1678
N-W07SD	Type 1633
N-W08	Type 295
N-W09	Type 1655
N-W010	Type 294
N-W011	Type 1683
N-W014	Type 1632
N-W015	Type 1651
N-W016	Type 1680
N-W017	Type 1649
N-W0FA / W0FC	Type 1676
N-W0FB	Consult Vulcan

JOHN CRANE®	VULCAN
1 (USA)	Type A5
1A (UK)	Type A1
2 (UK)	Type A2
2 (USA)	Type A4
4 (UK)	Type 1644
6A	Type 75
6D / 6J	Type 66
8-1	Type 1609S
8-1T	Type 1645S
8B1	Type 1609BS
8B1T	Type 1645BS
9	Type 1609
9T	Type 1645
9BT	Type 1645B
21	Type 11
43 / 043	Consult Vulcan
58B	Type 1659BS
58U	Type 1659S
59B	Type 1659B
59U	Type 1659
80	Type 1688
87	Type 1682
106	Type 65
109	Type 1609
109B	Type 1609B
502	Type 1724
521	Type 24
2100 K	Type 142
2100 N	Type 143
2100 S	Type 14
B43	Consult Vulcan
R00x	Type 95
R10x	Type 96
R20x	Type 97
R30x	Type 95N
R33	Type 1633
R34	Type 1634

CRANE® SEATS ONLY	VULCAN
248X	Type 24.DINL
A	Type 23
BC	Type 24.BEZS
BD	Type 24.BEZL
BO	Type 24.DINS
BP	Type 24.DINL
BS	Type 8.TDP
DF	Type 1688
EI/EJ	Type 1682
FH	Type STAL
H	Type 34
J	Type 33
M	Type 19B
N/NG	Type 20 Stat
P/PP/PG	Type 32
V	Type 25
W/WM	Type 21
X	Type 1644 Stat
Y	Type 36
Z	Type 20 Stat

PILLAR®	VULCAN
CCU	Type 98
CGU	Type 97
US-1	Type 98
US-2	Type 97
US-3	Type 97

M.T.U.®	VULCAN
Europa 1	Type 12DIN
Europa 2	Type 12
Europa 4	Type 8B
FA	Type 18
FG 1	Type 19
FG 2	Type 192
FG 3	Type 193
FP/D	Type 24
FP/T35	Type 11
SIMPLEX	Type 13
SIMPLEX DIN	Type 13DIN
TIPO 1 Stat	Type 19B
TIPO 2 Stat	Type 8.DINS

PAC-SEAL®	VULCAN
Type 8	Type 1609S
Type 9	Type 1609
Type 16	Type 65
Type 21	Type 11
Type 51	Type A5
Type 52	Type 22
Type 68	Type 75

PAC-SEAL® SEATS ONLY	VULCAN
Type 1 CUP	Type 11 Stat
Type 1 O-Ring	Type 31 Stat
Type 3	Type 11 Stat

ROTEN®	VULCAN
Roten® 2	Type 12
Roten® 3	Type 13
Roten® 3Q	Type 13Q
Roten® 5	Type 7
Roten® 5H2	Type 7B
Roten® 7K	Type 1688U
Roten® 7KS	Type 1688
Roten® EHS	Type 40U
Roten® S	Type 50
Uniten® 2	Type 12DIN
Uniten® 2K	Type 126
Uniten® 3	Type 13DIN
Uniten® 3K	Type 130
Uniten® 5	Type 7D
Uniten® 5K	Type 135
Uniten® 7K	Type 1688L

U.S. SEAL® HEADS	VULCAN
Type A	Type 65
Type B	Type 75
Type C	Type 11 / 22
Type D	Type A4
Type E	Type A5
Type G	Type 1511
Type U	Type A1
Type W	Type 1609
Type X	Type 1609S

U.S. SEAL® SEATS ONLY	VULCAN
Type 1	Type 11 Stat
Type 2	Type 11 Stat
Type 3	Type 31 Stat

For a more comprehensive and up to date listing; please see the relevant section of your Vulcan customer portal.
All information contained in this table is supplied in good faith and was considered correct at the time of printing.

This table is presented for your informational use. However, Vulcan cannot entirely guarantee that using this information will always result in an entirely suitable replacement, especially as specifications can change.

USA SEAL CODES; X-REFERENCE LIST

USA	VULCAN CODE
100	0158.65A.N.C.
100V-CMS	0158.65A.V.C.
101	0191.65D.N.C.
102	0158.A4.N.F.
102V	0158.U11J.V.F.
106	0127.U11.N.F.
108	0317.A5.O.F.
109	0158.A4.N.C.SEAL
112	0191.U11.N.F.
112V-CMS	0191.U11.V.F.
113	0158.75D.N.C.
127	0269.A4.N.F.
128	0191.U11.N.C.
129	0150.A4.N.C.
135	0200.A4.N.C.
136	0300.A4.N.C.
137	0317.A5.N.F.
137V	0317.A5J.V.F.
137V-CMS	0317.A5.V.F.
142	0127.70T.N.C.
147	0444.A4.N.C.SEAL
150	0127.75.N.C.SEAL
153V	0158.M65J.V.E.
154	0349.U11.N.C.SEAL
157	0191.U11.N.C.SEAL
159	0254.THK1.O.F.
162	0127.65.N.C.
163	0127.75.N.C.
172	0349.U11.N.C.SEAL
177	0349.U11.N.C.
177V	0349.U11J.V.C.
177V-CMS	0349.U11.V.C.
177V-SC-SC-CMS	0349.U11.V.S.
185	0317.U11.N.C.
185V	0317.U11J.V.C.
186	0349.A4.N.F.
186V	0349.A4J.V.F.
186V-CMS	0349.A4.V.F.
188	0222.A5.N.C.
188V	0222.A5J.V.C.
193	0508.A4J.O.F.
196	0508.A4.N.C.SEAL
200	0158.65.N.C.
200-EPR	0158.65.E.C.
200V-CMS	0158.65.V.F.
200V-SC-SC	0158.65.V.S.
200A	0158.75E.N.C.
201	0191.65.N.C.
201V-CMS	0191.65.V.C.
201V	0191.65J.V.C.
204	0286.A5.N.C.
204V	0286.A5J.V.C.
205	0444.A5.N.C.
205V	0444.A5J.V.C.
205V-CMS	0444.A5.V.C.
208	0222.U11.N.C.SEAL
210	0349.U11.N.F.
210-TC-SEAT	0349.U11.N.E.
210V-CMS	0349.U11.V.F.
210V	0349.U11J.V.F.
210-EPR	0349.U11J.E.F.
218	0158.65.N.C.SEAL
223	0476.A4.N.C.SEAL
224	0381.A5J.O.F.
229	0222.A5J.N.F.
235	0254.U11.N.C.
235-SC-SC	0254.U11.N.S.
235V	0254.U11J.V.C.
235V-CMS	0254.U11.V.C.
236	0254.A5.N.F.
236V	0254.A5J.V.F.
236V-CMS	0254.A5.V.F.
237	0444.A4.N.C.
237V	0444.A4J.V.C
238	0412.U11.N.C.
238V-CMS	0381.U11.V.C.
238V	0412.U11J.V.F.
238V-SC-SEAT	0412.U11J.V.D.
239	0412.U11.N.F.
239-EPR	0412.U11J.E.F.
239V	0412.U11J.V.F.
245	0254.U11.N.C.
245-EPR	0254.U11.E.C.
245V	0254.U11J.V.C.
245V-CMS	0254.U11.V.C.
246	0317.U11.N.C.
246V	0317.U11J.V.C.
247	0381.U11.N.F.
248	0254.U11.N.F.
248-EPR	0254.U11.E.F.
248V	0254.U11J.V.F.
248V-CMS	0254.U11.V.F.
249	0317.U11.N.C.
249V	0317.U11J.V.F.
250	0222.A4J.N.F.
252	0254.A4J.N.F.
252-EPR	0254.A4J.E.F.
254	0254.A4J.N.F.
258	0381.A5J.N.F.
262	0444.A5J.N.F.
262-EPR	0444.A5J.E.C.
264	0317.A5J.N.F.
265	0191.A4J.N.F.
267	0508.U11.N.C.
267V	0508.U11J.V.C.
267V-SC-SC	0508.U11J.V.S
267V-TC-SEAT	0508.U11J.V.E.
267-SC-SC-CMS	0508.U11.N.S.
267V-CMS	0508.U11.V.C.
268	0603.U11J.N.C.
268-CMS	0603.U11.N.C.
268V	0603.U11J.V.C.
269	0635.U11J.N.C.
269V	0635.U11J.V.C.
270	0730.U11J.N.C.
270-CMS	0730.U11.N.C.
274	0158.A5.N.C.
278	0603.A5J.N.C.
278V	0603.A5J.V.C.
279	0635.A5J.N.C.
288	0444.A4.N.F.
288V	0444.A4J.V.F.
290	0158.U11.N.C.
290V	0158.U11.VC.
298	0127.65.N.C.SEAL
299	0158.65.N.C.SEAL
300	0158.65.N.C.
303	0222.A4.N.F.
303V	0222.A4J.V.F.
305	0381.A5.N.C.
305-EPR	0381.A5.E.C.
305V	0381.A5J.V.C.
309	0222.U11.N.C.
309V	0222.U11J.V.C.
309V-CMS	0222.U11.V.C.
309V-SC-SC-CMS	0222.U11.V.S.
312	0476.U11J.N.F.
312V	0476.U11J.V.F.
321	0698.A5J.N.F.
321-CMS	0698.A5.N.F.
323	0571.A5.N.C.
324	0762.A5J.N.C.
324-CMS	0762.A5.N.C.
327	0539.A5J.N.C.
328	0666.A5J.N.C.
328-CMS	0666.A5.N.C.
329	0730.A5J.N.C.
329-CMS	0730.A5.N.C.
332	0508.U11J.N.F.
336	0539.U11J.N.F.
338	0539.U11J.N.C.
338-EPR	0539.U11J.E.C.
338V	0539.U11J.V.C.
338V-SC-SC	0539.U11J.V.S.
340	0476.U11.N.C.
340-TC-TC	0476.U11.N.H.
340-TC-SC	0476.U11.N.J.
340V	0476.U11J.V.C.
342	0508.A5J.O.F.
347	0381.U11.N.C.
347V-CMS	0381.U11.V.C.
348	0286.U11.N.C.SEAL
348V	0286.U11.V.C.SEAL
349	0635.A5J.N.F.
349V	0635.A5J.V.F.
350	0603.A5J.N.F.
350-CMS	0603.A5.N.F.
350V-TC	0603.A5J.V.E.
351	0571.A5.N.F.
351V	0571.A5J.V.F.
353	0539.A5.N.F.
354	0349.A5.N.C.
355	0286.U11.N.F.
355-SC-SEAT	0286.U11.N.D.
355-SC-SC	0286.U11.N.S.
355V	0286.U11J.V.F.
356	0286.U11.N.C.
356-EPR	0286.U11.E.C.
356-SC-TC	0286.U11.N.I.
356V	0286.U11J.V.C.
357	0254.U11.N.F.
357V	0254.U11J.V.F.
357V-CMS	0254.U11.V.F.
358	0191.U11.N.C.
358V-CMS	0191.U11.V.C.
359	0158.U11.N.C.
359-EPR-CMS	0158.U11.E.C.
359V	0158.U11J.V.C.
360	0254.65.N.C.
360V	0254.65J.V.C.
360V-CMS	0254.65.V.C.
361	0317.A5.N.C.
361-EPR	0317.A5.E.C.
361V	0317.A5J.V.C.
361V-CMS	0317.A5.V.C.
366	0444.A5.N.F.
366V	0444.A5J.V.F.
366-TC-TC	0444.A5.N.H.
366V-CMS	0444.A5.V.F.
370	0254.65.N.F.
371	0381.A4.N.F.
371V	0381.A4J.V.F.
371V-CMS	0381.U11.V.F.
374	0381.A5.N.F.
374V	0381.A5J.V.F.
376	0349.A4.N.C.SEAL
378	0381.U11.N.F.
378V-CMS	0381.U11.V.F.
380	0254.A4.N.C.
380V	0254.A4J.V.C.
380V-CMS	0254.A4.V.C.
381	0317.A4.N.C.
381-SC-SC	0317.A4.N.S.
381-NEO	0317.A4.O.C.
381V	0317.A4J.V.C.
382	0381.A4.N.C.
383	0317.A4.N.F.
383V	0317.A4J.V.F.
384	0286.A5.N.F.
395	0381.A5J.N.C.
395-EPR	0381.A5J.E.C.
397	0254.U11.N.C.SEAL
399	0191.A4.N.C.SEAL
401	0127.U11.N.C.SEAL
416	0317.A4.N.C.SEAL
436	0444.U11J.N.F.
436-SC-SC	0444.U11J.N.S.
436-EPR	0444.U11J.E.F.
436V	0444.U11J.V.E.
445	0508.A4.N.C.
445V	0508.A4J.V.C.
445V-CMS	0508.A4.V.C.
446	0444.U11.N.C.
446-EPR	0444.U11.E.C.
446-SC-SC	0444.U11.N.S.
446-TC-TC	0444.U11.N.H.
446V	0444.U11J.V.C
446V-CMS	0444.U11.V.C.
447	0158.73.N.C.
448	0444.U11.N.F.
448V-CMS	0444.U11.V.F.
449	0444.222.N.WB.
453	0158.73.N.Q.
460	0254.A4.N.F.
460V	0254.A4J.V.F.
460V-CMS	0254.A4.V.F.
461	0412.A4.N.F.
461V	0412.A4J.V.F.
462	0508.A4.N.F.
462V	0508.A4.V.F.
463	0635.A4J.N.F.
463-TC-SC	0635.A4J.N.J.
463V	0635.A4J.V.F.
463-CMS	0635.A4.N.F.
464	0698.A4J.N.F.
464-CMS	0698.A4.N.F.
465	0762.A4J.N.F.
465-CMS	0762.A4.N.F.
466	0317.11T2.N.C.
466V	0317.11H.V.C.
468	0635.A4H.N.C.
469	0635.A4H.N.F.
475	0762.A5J.N.F.
475-CMS	0762.A5.N.F.
477	0508.A5J.N.F.
477-EPR	0508.A5J.E.F
477V	0508.A5J.V.F.
479	0508.A5.N.C.
479V	0508.A5J.V.C.
483	0698.U11J.N.F.
483-EPR	0698.U11J.E.F.
483-CMS	0698.U11.N.F.
483V-TC-SEAT	0698.U11J.V.E.
487	0158.A5.N.F.
491	0349.A4.N.C.
491V	0349.A4J.V.C.
492	0603.U11J.N.F.
492-CMS	0603.U11.N.F.
498	0269.A5.N.F.
499	0254.U11J.N.F.
499-EPR	0254.U11J.E.F.
501	0158.M65.N.C.
507	0158.65.N.F.
507V-CMS	0158.65.V.F.
508	0158.A4.N.C.
508V	0158.A4J.V.C.
510	0317.11T2.N.C.
513V	0476.A5J.V.F.
514	0412.A4.N.C.
514V	0412.A4J.V.C.
515	0381.A5H.N.C.
516	0158.65.N.C.
517	0317.A4J.N.F.
518	0158.65D.N.C.
521	0286.A4T2.N.C.
523	0476.A5.N.C
524	0158.65.N.F.
524-EPR	0158.65.E.F.
525	0317.U11J.N.F.
529	0286.U11J.N.F.
530	0508.A5J.N.C.
532	0508.U11J.N.C.
534	0381.A4J.N.F.
535	0444.A5J.N.C.
537	0539.A5.N.C.
542	0666.A5J.N.F.
542-CMS	0666.A5.N.F.
543	0539.U11.N.F.
543V	0539.U11J.V.F.
544	0412.U11J.N.F.
544V-SC-SC	0412.U11J.V.S.
546	0317.A5J.N.C.
547	0349.U11J.N.F.
548	0254.U11J.N.C.
550	0444.U11J.N.C.
552	0158.U11J.N.C.
553	0381.U11J.N.F.
553-SC-SC	0381.U11J.N.S.
557	0254.A5J.N.C.
578	0222.A4.N.C.SEAL
588	0286.U11J.N.F.
593	0476.A4J.N.F.
594	0603.A4J.N.F.
594-CMS	0603.A4.N.F.
595	0412.A5J.N.C.
598	0317.U11J.N.F.
598-EPR	0317.U11J.E.F.
598-SC-SEAT	0317.U11J.N.D.
598-TC-SEAT	0317.U11J.N.E.
598-SC-SC	0317.U11J.N.S.
601	0191.75.N.C.
601V-CMS	0191.75.V.C.
601V	0191.75J.V.C.
604	0286.A4.N.C.
604-EPR	0286.A4.E.C.
605	0286.A4.N.F.
605V	0286.A4J.V.F.
606	0191.75.N.C.
614	0200.A4.N.F.
614V	0200.A4J.V.F.
617	0222.U11J.N.F.
618	0317.U11J.N.C.
618-TC-TC	0317.U11J.V.H.
628	0158.65J.N.F.
631	0127.U11.N.C.
632	0127.U11.N.F.
633	0158.U11.N.F.
633-EPR-CMS	0158.U11.E.F.
633V	0158.U11J.V.F.
637	0158.65J.N.C.
642	0158.75.N.C.SEAL
647	0191.75.N.C.SEAL
659	0381.U11.N.F.
659-TC	0381.U11.N.E.
659V	0381.U11J.V.F.
659V-CMS	0381.U11.V.F.
677	0349.A5.N.F.
677V	0349.A5J.V.F.
687	0222.U11.N.F.
687V	0222.U11J.V.F.
687V-CMS	0222.U11.V.F.
687V-TC-SEAT	0222.U11J.V.H.
703	0222.A4.N.C.
703V	0222.A4J.V.C.
703V-CMS	0222.A4.V.C.
710	0269.A5.N.C.
711	0158.65A.N.C.
712	0158.75J.N.F.
715	0158.75J.N.C.
732	0158.U11J.N.F.
734	0158.A4J.N.F.
735	0158.A4J.N.C.
738	0158.A5J.N.F.
739	0158.A5J.N.C.
744	0412.A5.N.F.
744V	0412.A5J.V.F.
745	0412.A5.N.C.
745V-CMS	0412.A5.V.C.
745V	0412.A5J.V.C.
750	0191.A4.N.C.
750V-CMS	0191.A4.V.C.
750V	0191.A4J.V.C.
752	0191.A4.N.F.
752V	0191.A4J.V.F.
754	0254.A5.N.C.
754V	0254.A5J.V.C.
754V-CMS	0254.A5.V.C.
756	0317.U11.N.F.
756-EPR	0317.U11.E.F.
756V	0317.U11J.V.F.
758	0381.U11.N.C.
758-EPR	0381.U11J.E.C.
758V-CMS	0381.U11.V.C.
760	0191.65J.N.C.
760V	0191.65J.V.C.

For a more comprehensive and up to date listing; please see the relevant section of your Vulcan customer portal.
All information contained in this table is supplied in good faith and was considered correct at the time of printing.

This table is presented for your informational use. However, Vulcan cannot entirely guarantee that using this information will always result in an entirely suitable replacement, especially as specifications can change.

USA SEAL CODES; X-REFERENCE LIST

USA	VULCAN CODE
761	0762.A4J.N.C.
762	0191.65J.N.F.
765	0191.75J.N.C.
766	0191.75J.N.F.
767	0191.11J.N.C.
768	0191.11J.N.F.
771	0191.22J.N.C.
773	0191.22J.N.F.
774	0222.11J.N.F.
775	0222.A4J.N.C.
776	0222.A5J.N.C.
777	0254.65J.N.C.
778	0254.65J.N.F.
779	0254.22M.N.F.
791	0254.A5J.N.F.
791-EPR-TC-SEAT	0254.A5J.E.E.
791-V-TC-SEAT	0254.A5J.V.E.
797	0269.A4J.N.C.
798	0269.A5J.N.C.
799	0269.A5J.N.F.
800	0158.11.N.C.SPEC
801	0286.11J.N.C.
802	0286.A4J.N.C.
804	0317.A4J.N.C.
805	0349.11J.N.C.
806	0349.A4J.N.C.
807	0349.A4J.N.F.
816	0381.11J.N.C.
817	0381.A4J.N.C.
818	0412.11J.N.C.
819	0412.A4J.N.F.
821	0412.A4J.N.C.
822	0412.A5J.N.F.
825	0444.A4J.N.F.
826	0444.A4J.N.C.
828	0476.A4.N.C.
832	0508.A4J.N.F.
833	0508.A4J.N.C.
834	0603.A4J.N.C.
834-CUP SEAT	0603.A4.N.C.
835	0635.A4J.N.C.
835-CUP SEAT	0635.A4.N.C.
836	0698.11J.N.C.
836-CMS	0698.11.N.C.
837	0698.A4J.N.C.
837-CMS	0698.A4.N.C.
838	0698.A5J.N.C.
838-CUP SEAT	0698.A5.N.C.
839	0730.11J.N.F.
839-CUP SEAT	0730.11.N.F.
841	0730.A5J.N.F.
841-CUP SEAT	0730.A5.N.F.
842	0508.11.N.F.
842-TC-SEAT	0508.11.N.E.
843	0508.A5.N.F.
844	0539.11.N.C
846	0571.A4J.N.C.
847	0571.A4J.N.F.
848	0571.A5J.N.C.
849	0571.A5J.N.F.
851	0191.65.N.C.
853	0635.11J.N.F.
853-CUP SEAT	0635.11.N.F.
854	0539.11H.N.C.
855	0539.11H.N.F.
856	0539.A5H.N.C.
857	0539.A5H.N.F.
859-TC-SEAT	0444.A5J.N.E.
864	0349.A5J.N.C.
864V	0349.A5J.V.C.
865	0349.A5J.N.F.
866	0286.A5J.N.C.
867	0286.A5J.N.F.
867-EPR	0286.A5J.E.F.
867V	0286.A5J.V.F.
874	0571.A4.N.C.
882	0158.75.N.C.SEAL
887	0539.112.N.WB.
916	0635.A5J.N.C.
916-CMS	0635.A5.N.C.
921	0191.75.N.F.
933	0158.11.N.C.ZSEAL
935	0222.A5.N.F.
936	0222.A5.N.C.SEAL
937	0254.A5.N.C.SEAL
937V	0254.A5.V.C.SEAL
939	0381.A4.N.C.SEAL
941	0571.A4.N.F.
941V	0571.A4J.V.F.
942	0571.A4.N.C.SEAL
951	0158.11J.V.F.
951-EPR	0158.11J.E.F.
957	0158.65A.N.C
961	0158.75.N.C.
964	0158.75.N.F.
968	0191.65D.N.C.
973	0191.75.N.F.
974	0191.75.N.C.SEAL
975	0254.65.N.C.SEAL
976	0317.A4.N.C.SEAL + 0317.B20.N.C.STAT
977	0317.A4.N.C.SEAL + 0317.B20.N.F.STAT
978	0317.B20.N.C.
979	0317.B20.N.F.
981	0317.A4J.V.F.
1000	0158.75.N.C.
1002	0127.11.N.C.
1012	0127.11.N.C.SPEC
1015	0317.A5.N.C.SEAL
1017	0508.11.N.F.
1017-TC-SEAT	0508.11.N.E.
1050	0127.11.N.C.SEAL
1050-EPR	0127.11.E.C.SEAL
1053	0317.11J.V.F.
1055	0444.11.N.C.SEAL
1057	0539.11J.V.F.
1065	0095.11J.N.C.
1079	0158.11.O.C.
1080	0158.11.O.F.
1081	0317.11.O.C.
1082	0317.11.O.F.
1097	0476.A4.N.F.
1110	0381.22J.N.F.
1110V	0381.22J.V.F.
1128	0317.A4J.O.F.
1145	0508.11J.V.F.
1150	0158.65A.N.E.
1152	0158.75.N.F.
1155	0158.11D.N.C.
1156	0158.11.N.F.
1160	0191.11.N.F.
1167	0286.11.N.F.
1179	0300.A4.N.F.
1179V	0300.A4.V.F.
1185	0317.A5.O.C.
1522	0191.75.N.C.SEAL
1608	0476.11.N.F.
1617	0539.A5J.N.C.
1620	0476.A4J.N.C.
1646	0381.A5J.V.H.
1659	0476.A5J.V.C.
1660	0476.A5J.V.F.
1667	0349.22.N.F.
1667-EPR	0349.22.E.F.
1667V	0349.22.V.F.
1674	0444.22.N.F.
1674-EPR	0444.22.E.F.
1675	0150.A4.N.F.
1676	0571.11J.N.F.
1676-EPR	0571.11J.E.F.
1678	0571.11J.N.C.
1678V	0571.11J.V.C.
1679	0571.11.N.C.
1679V-CMS	0571.11.V.C.
1680	0571.11.N.F.
1680-SC-SC	0571.11.N.S.
1682	0286.11.N.C.
1683	0412.A5J.N.C.
1683V	0412.AJ.V.C.
1685	0508.A5J.N.C.
1686	0539.A4.N.C.
1687	0539.A4.N.F.
1688	0571.A5J.N.C.
1697	0412.A4J.N.F.
1698	0412.A4J.N.C.
1699	0412.A5J.N.F.
1699E-TC	0412.A5J.E.E.
1699V	0412.AJ.V.F.
2000	0158.A4.N.C.
2008	0191.A4.N.C.
2009	0191.A4.N.F.
2010	0191.A4J.N.C.
2011	0191.A4J.N.F.
2012	0191.A5.N.C.
2013	0191.A5.N.F.
2014	0191.A5J.N.C.
2015	0158.A5J.N.F.
2016	0158.A5.N.C.
2017	0158.A5.N.F.
2018	0158.A5J.N.C.
2019	0158.A5J.N.F.
2024	0222.A4.N.C.
2025	0222.A4.N.F.
2026	0222.A4J.N.C.
2027	0222.A4J.N.F.
2027-EPR-TC-SEAT	0222.A4J.E.E.
2027V	0222.A4J.V.F.
2029	0158.A4.N.F.
2002	0158.A4J.N.C.
2003	0158.A4J.N.F.
2029	0222.A5.N.F.
2031	0222.A5J.N.F.
2032	0254.A4.N.F.
2033	0254.A4J.N.C.
2034	0254.A4J.N.F.
2035	0254.A5.N.C.
2036	0254.A5.N.F.
2045	0349.A4.N.C.
2046	0349.A4.N.F.
2047	0349.A4J.N.C.
2047V	0349.A4J.V.C.
2048	0349.A4J.N.F.
2049	0349.A5.N.C.
2049V-CMS	0349.A5.V.C.
2050	0349.A5.N.F.
2055	0412.A4.N.C.
2056	0412.A4.N.F.
2057	0412.A5.N.C.
2058	0412.A5.N.F.
2058V-TC-SEAT	0412.A5.V.E.
2059	0444.A4.N.C.
2060	0444.A4.N.F.
2060-TC-TC	0444.A4.N.H.
2061	0444.A4J.N.C.
2062	0444.A4J.N.F.
2069	0476.A5.N.C.
2070	0476.A5.N.F.
2071	0476.A5J.N.C.
2072	0476.A5J.N.F.
2073	0508.A4.N.C.
2074	0508.A4.N.F.
2075	0508.A4J.N.C.
2076	0508.A4J.N.F.
2077	0508.A5.N.C.
2078	0508.A5.N.F.
2079	0508.A5J.N.F.
2084	0539.A5.N.C.
2085	0539.A5.N.F.
2086	0539.A5J.N.F.
2087	0571.A4.N.C.
2088	0571.A4.N.F.
2089	0571.A4J.N.C.
2090	0571.A4J.N.F.
2091	0571.A5.N.C.
2092	0571.A5.N.F.
2093	0539.A4J.N.C.
2094	0571.A5J.N.F.
2094V	0571.A5J.V.F.
2095	0603.A4J.N.F.
2097	0603.A5J.N.C.
2097-CMS	0603.A5.N.C.
2098	0603.A5J.N.F.
2098V	0603.A5J.V.F.
2098-CMS	0603.A5.N.F.
2101	0635.A5J.N.F.
2101-CUP-SEAT	0635.A5.N.F.
2102	0539.A4J.N.F.
2104	0349.A5.N.C.SEAL
2105	0381.11.N.C.SEAL
2106	0381.A5.N.C.SEAL
2107	0412.11.N.C.SEAL
2108	0444.11.N.C.SEAL
2109-EPR	0444.A5.E.C.SEAL
2111	0508.11.N.C.SEAL
2111V	0508.11.V.C.SEAL
2112	0508.A5.N.C.SEAL
2112V	0508.A5.V.C.SEAL
2114	0476.11J.N.C.
2115	0762.11J.N.F.
2115-TC-SEAT	0762.11J.N.E.
2115-CUP-SEAT	0762.11.N.F.
2116	0762.11J.N.C.
2116-CUP-SEAT	0762.11.N.C.
2117	0381.A5.N.C.
2120	0635.11.N.C.
2133	0508.22.N.C.
2134	0349.22.N.C.
2135	0444.22.N.C.
2142	0444.22.N.C.
2150	0444.22J.N.C.
2151	0444.22J.N.F.
2151-TC-SEAT	0444.22J.N.E.
2151V	0444.22J.V.F.
2155	0269.11J.N.F.
2203	0317.11J.E.F.
2204	0158.65.V.E.
2205	0635.A5J.N.F.
2207	0444.11J.V.E.
2208	0317.11.N.H.
2209	0381.11.N.H.
2210	0444.11.N.E.
2214	0158.11D.E.C.
2216	0254.11.N.H.
2217	0381.11J.N.H.
2219	0508.11.N.H.
2221	0381.22J.E.F.
2223	0381.11J.V.E.
2226	0286.11J.E.E.
2229	0191.11.N.F.
2229V	0191.11.V.F.
2232	0381.11.N.F.
3507	W-0222.A5J.V.J.
3522	W-0508.A5J.N.F.
3530	0571.A5J.V.H.
3537	0571.22.N.C.
3543	W-0412.11.V.E.
3580	0508.11.E.E.
3616	0412.11.E.F.
3625	0254.A5.V.E.
3664	0412.11.N.H.
3674	0508.22.E.F.
3708	0508.A5.N.E.
3772	0412.A4J.V.J.
3773	0571.11.V.H.
3826	0762.A5J.N.C.
3865	0158.75.V.C.
3888	0635.A4J.V.J.
3900	0254.A4.N.F.
3912	0317.11.N.S.
3917	0222.11J.N.C.
3938	0317.A4.V.D.
3985	0191.75.N.C.
3986	0191.75.V.C.
4006	0603.A5.N.E.
4056	0191.75.E.C.
4058	0508.11.V.H.
4100	0381.11.V.C.
4172	0762.A5J.V.F.
4194	0349.A4.V.S.
4246	0317.A4J.N.D.
4263	0286.A5J.V.F.
4272	W-0158.11.N.C.
6002	0666.A4J.V.F.
6094	0476.A4J.V.D.
6155	0698.11J.V.F.
6202	0762.A4J.N.H.
6208	0317.11.N.H.
6210	0444.11.N.H.
6211	0444.11.V.H.
6212	0508.11.N.H.
6213	W-0508.11.V.H.
6216	0158.11.V.H.
6217	W-0444.A4.V.J.
6218	0508.11.V.H.
6219	0762.A4J.N.J.
6222	0381.11.N.S.
6223	0381.11.V.S.
6224	0508.11.V.S.
6232	0762.A4J.V.J.
6259	W-0317.1511.V.C.
6260	W-0317.1511.E.E.
6261	W-0317.1511.E.C.
6264	W-0317.1511.V.C.
6266	W-0317.1511J.N.D.
6315	0254.65.N.C.
6331	0254.A5J.N.F.
7035	0444.11J.E.E.
7305	0191.11.V.S.
7409	W-0381.11.V.C.
7436	0317.11J.E.F.
7520	0150.11.V.F.
7547	0158.11.V.S.
7562	0381.A5J.V.E.
7632	0381.11.E.E.
7736	0444.A5.E.E.
7782	0571.11.N.F.
7787	0412.A5J.E.E.
7792	0381.11.N.I.
7806	0412.11.V.S.
7869	0476.A5.E.E.
7875	0762.11.N.H.
7896	0222.A5J.V.E.
7902	0412.11.V.C
7909	0666.A4J.N.C.
7924	W-0444.A5J.V.D.
7929	0158.75.V.S.
7933	0381.A5.E.E.
7953	0381.11.E.C.
7959	0444.A4J.V.I.
7962	0476.A5J.N.F.
7970	0635.A5J.V.J.
7972	0317.1511.N.S.
7985	0635.A5J.E.E.
7993	0762.A5H. DOUB.N.WB.
8091	0254.1609SJ.V.D.
9313	0254.1609.P.C.SEAL + 0254.11.N.S.STAT
9334	0254.1609.P.C.SEAL + 0254.11.N.S.STAT
FA350	0603.A5.N.C.SEAL
FA350E	0603.A5.E.C.SEAL
FA350V	0603.A5.V.C.SEAL
FA1875	0476.11.N.C.SEAL
FA1875V	0476.11.V.C.SEAL
FA2098	0603.A5.N.C.SEAL
FA2120	0539.11.N.C.SEAL
FA3502	W-0539.A5.N.C.SEAL
T9-1000	0254.1645.P.C.SEAL

For a more comprehensive and up to date listing; please see the relevant section of your Vulcan customer portal.
All information contained in this table is supplied in good faith and was considered correct at the time of printing.

This table is presented for your informational use. However, Vulcan cannot entirely guarantee that using this information will always result in an entirely suitable replacement, especially as specifications can change.