

Turcon® Variseal® M2



Single-acting

Spring Energized Plastic U-Cup

Material:

Turcon® and Zurcon®



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Turcon® Variseal® M2



Description

Turcon® Variseal® M2 is a single acting seal consisting of a U-shaped jacket and a V-shaped corrosion resistant spring. Variseal® M2 has an asymmetric seal profile. The optimized front angle offers good leakage control, reduced friction and long service life.

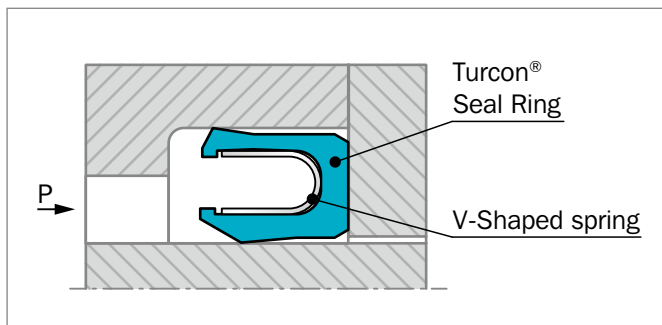


Figure 61: Turcon® Variseal® M2

AREAS OF APPLICATION

- Hydraulic components, e.g. cylinders, valves, pumps, etc.
- Chemical processing equipment
- Pharmaceutical processing
- Food and beverage processing
- Spindle seals for machine tools
- Pneumatics, cylinders and valves

ADVANTAGES

- Suitable for reciprocating and rotary applications
- Low coefficient of friction
- Stick-slip free operating
- High abrasion resistance
- Dimensionally stable
- Resistant to most fluids, chemicals and gases
- Withstands rapid changes in temperature
- No vulcanizing between seal and hardware
- Excellent resistance to aging
- Can be sterilized
- Available in HiClean version
- Interchangeable with O-Ring and Back-up Ring combinations to AS4716 and ISO 6194

OPERATING CONDITIONS

Pressure:	Maximum dynamic load: 20 MPa Maximum static load: 40 MPa (207 MPa with back-up ring)
Speed:	Reciprocating up to 15 m/s Rotating up to 1.27 m/s
Operating temperature:	-70 °C to +300 °C Special Turcon and Zurcon® materials as well as alternative spring materials are available for applications outside this temperature range.
Media compatibility:	Virtually all fluids, chemicals and gases

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time. e.g. the maximum operating speed depends on material type, pressure, temperature and gap value. Temperature range also dependent on media.



GENERAL

Turcon® Variseal® are single acting, spring-energized seals which are used for dynamic and static applications.

Variseal® are effective in a wide range of applications. They are chosen when higher resistance to chemical media is required, if the seal is required to operate in extremes of temperature and/or where good extrusion and compression characteristics are needed.

Turcon® Variseal® designs have three main characteristics:

- Application specific U-shaped seal profile
- Spring geometry suited to the particular application
- Proven high-performance Turcon® or Zurcon® polymers

Standard or custom geometries available in metric, inch and intermediate sizes ranging from 2 to 3,300 mm.

METHOD OF OPERATION

All Variseal® designs included in this catalog have the same operating principle and differ only in their profile form and type of metallic spring used.

The Variseal® spring supplies the load required for sealing at low pressures (Figure 62). The "U" shaped jacket allows fluid pressure to energize the sealing lips, so total sealing pressure rises with increasing operating pressure (Figure 63).

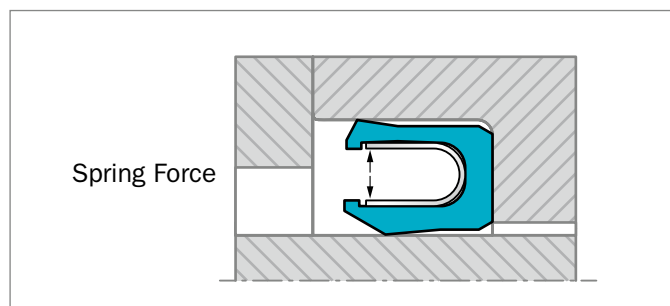


Figure 62: Turcon® Variseal® without system pressure

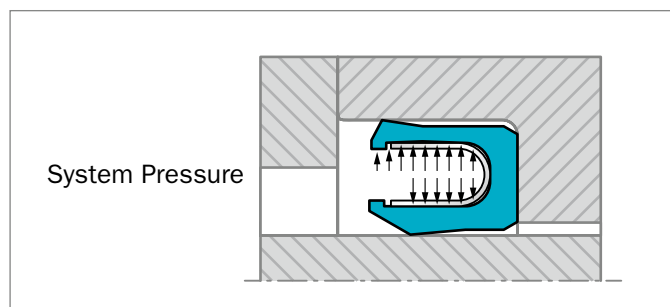


Figure 63: Turcon® Variseal® with system pressure

PERFORMANCE

The different types of Variseal® designs combined with the properties of Turcon® and Zurcon® materials offer design engineers a wide range of solutions to a large number of applications.

The most important characteristics of Variseal® designs are listed below:

- Very low coefficient of friction
- Good dynamic and static sealing
- Capable of sealing at high speeds up to 15 m/s
- Almost universal chemical compatibility
- Operating temperature of -253 °C up to +300 °C
- Very good thermal resistance
- Properties unaffected by contact with chemicals
- Good aging characteristics
- Low compression set
- Capable of withstanding high pressures above 200 MPa (2,000 bar / 29,000 psi) when using Back-up Rings
- Very good dry-running properties
- Can be installed in grooves according to AS4716 (Mil-G-5514 is an old spec) and DIN 3771



MATERIALS

All materials used are physiologically safe. They contain no odor or taste-affecting substances.

The following material combination has proved effective for most fluid applications:

Seal ring: Turcon® T40

Spring: Stainless Steel Material No. AISI 301
Code S

For gas application use:

Seal ring: Turcon® T05/Zurcon® Z80

For use in accordance with the demands of the "Food and Drug Administration", suitable materials are available on request.

Table 40: Turcon® and Zurcon® Materials for Variseal® M2

Material Code	Material Description	Operating Temp. * °C	Mating Surface Material	MPa max.
Turcon® T05	Premium grade modified PTFE. Light duty material with greater wear resistance than Turcon T01. Reciprocating and slow rotary applications. Color: Turquoise	-200 to + 260	Steel Steel, chromeplated Cast iron Stainless steel Aluminum Bronze Alloys	20
Turcon® T40	High-grade formulation of virgin polytetrafluoroethylene (PTFE) based material compounded with carbon fiber additive. Excellent wear and low friction characteristics. Suited to reciprocating and rotary applications. Suitable for use in media with poor lubricating properties and for dry-running situations. Color: Black / gray	-60 to + 300	Steel, hardened Steel, chromeplated	40
Zurcon® Z80	UHMW Polyethylene. Excellent wear and abrasion resistance. Very good lubricity in water based media. Color: Translucent white	-253 to + 80	Steel Steel, chromeplated Stainless steel Aluminum Bronze Ceramic coating	40

* Depending on media.
☐ Highlighted material is standard.

**Spring Materials**

The standard spring material for Turcon® Variseal® is stainless steel (spring code S).

Table 41: Spring Material

Media	Spring materials	Spring order code
For General use e.g. Oil Grease Air Water, steam Solvents Food, drugs Gas	Stainless steel DIN Mat No. 1.4310/1.4319 AISI 301/302 UNS 30100	S (Standard spring material)
For use in corrosive media e.g. Acids Caustics Seawater	Hastelloy® C-276 DIN Mat No. 2.4819 UNS N10276	H
For petrochemical use e.g. Crude oil Sour gas	Elgiloy® 1) DIN Mat No. 2.4711 UNSR30003	E

* Hastelloy is a registered trademark of Haynes International, Inc.

* Elgiloy is a registered trademark of the Elgiloy Specialty Metals
Alternative brand may be used.

1) NACE-approval



Groove Design

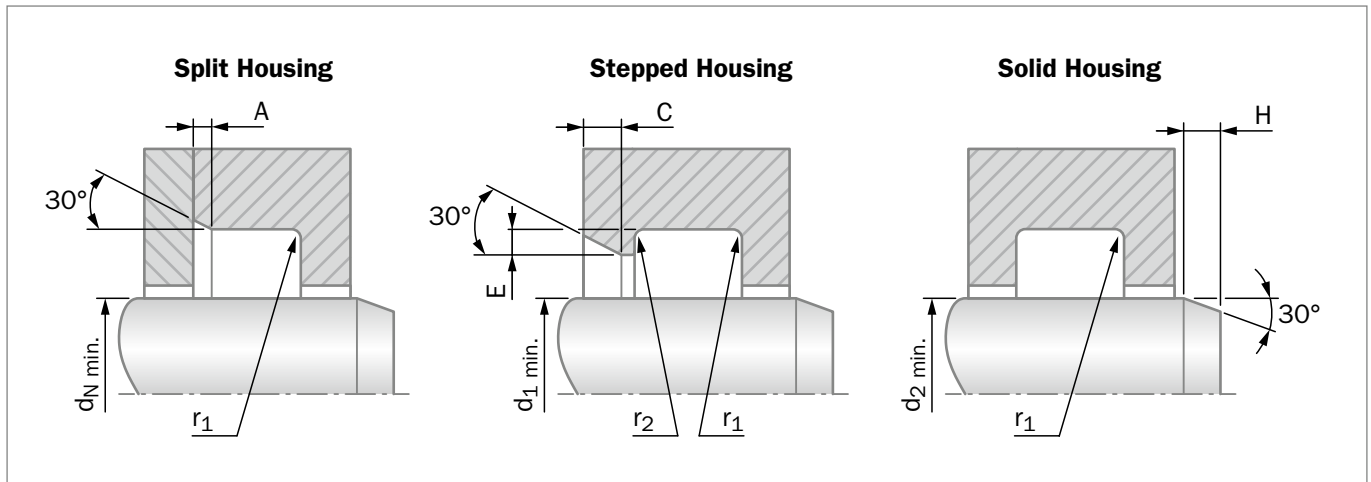


Figure 64: Variseal Groove Configurations

Installation lead-in chamfers and steps to include blend radii and are to be polished.

Table 42: Dimensions for Groove Designs

Series	Rod / Piston Groove Dimensions					
	A Chamfer	r ₁ Maximum Radius	C Minimum Chamfer	r ₂ Maximum Radius	E Minimum Step Height	H Minimum Chamfer
000	0.25 / 0.38	0.25	0.70	0.13	0.40	1.20
100	0.38 / 0.51	0.38	1.10	0.13	0.60	1.50
200	0.38 / 0.51	0.38	1.25	0.18	0.70	2.50
300	0.51 / 0.69	0.38	1.40	0.25	0.80	4.50
400	0.51 / 0.69	0.51	1.60	0.25	0.90	6.00
500	0.76 / 1.02	0.51	2.60	0.38	1.50	11.00

Table 43: Groove Design for Rod

Series	Rod Diameter Recommendations		
	Split Groove Ø d _N Minimum	Stepped Groove Ø d ₁ Minimum	Solid Groove Ø d ₂ Minimum
000	3.00	20.00	31.75
100	6.00	30.00	69.85
200	10.00	35.00	111.13
300	20.00	40.00	298.45
400	35.00	45.00	495.30
500	80.00	80.00	762.00



■ Installation Recommendation

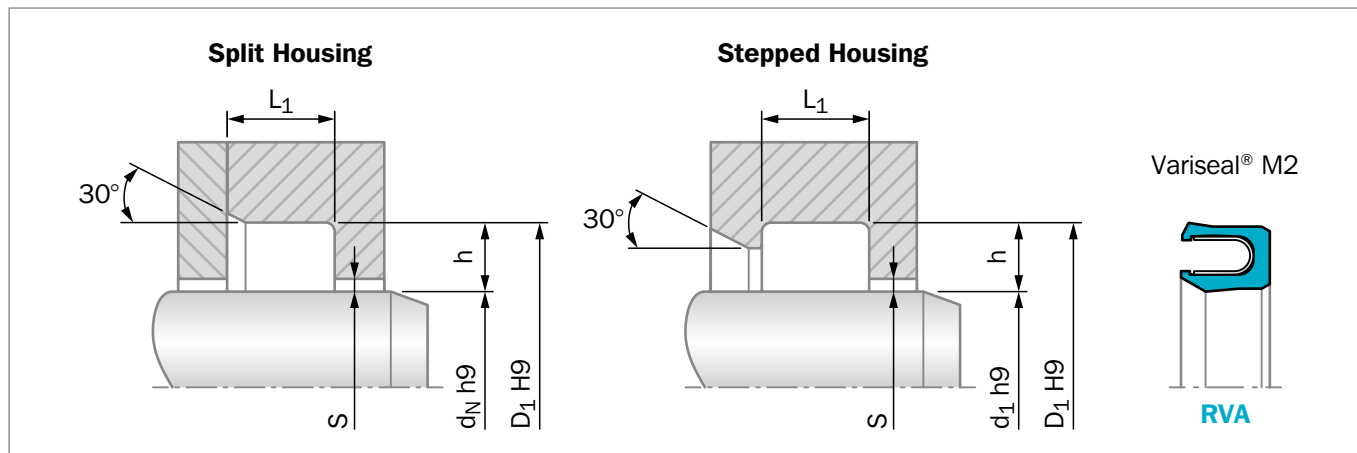


Figure 65: Installation Drawing (see Figure 64 for additional groove details)

Table 44: Installation Dimensions

Series No.	Rod Diameter d_N/d_1 h9		Groove Diameter D_1 H9	Groove Width L_1 +0.2	Radial Clearance S_{max}^*			
	Recommended Range	Extended Range**			<2 MPa	<10 MPa	<20 MPa	<40 MPa
RVA0	3.0 - 9.9	3.0 - 40.0	$d_N/d_1 + 2.9$	2.4	0.20	0.10	0.08	0.05
RVA1	10.0 - 19.9	6.0 - 200.0	$d_N/d_1 + 4.5$	3.6	0.25	0.15	0.10	0.07
RVA2	20.0 - 39.9	10.0 - 400.0	$d_N/d_1 + 6.2$	4.8	0.35	0.20	0.15	0.08
RVA3	40.0 - 119.9	20.0 - 700.0	$d_N/d_1 + 9.4$	7.1	0.50	0.25	0.20	0.10
RVA4	120.0 - 999.0	35.0 - 1,600.0	$d_N/d_1 + 12.2$	9.5	0.60	0.30	0.25	0.12
RVA5	1,000.0 - 2,500.0	80.0 - 2,500.0	$d_N/d_1 + 19.0$	15.0	0.90	0.50	0.40	0.20

* We recommend that the gap dimensions be reduced for temperatures $\geq 80^\circ\text{C}$.

At pressures >40MPa a Back-up Ring would be incorporated and the extrusion gap would not be considered.

** Available on request.

ORDERING EXAMPLE

Turcon® Variseal® M2, recommended range.

Series:	Series RVA3 (from Table 44)
Rod Diameter:	$d_N = 80.0$ mm
TSS Part No.:	RVA300800 (from Table 45)

For other seal and spring materials please contact the Trelleborg Sealing Solutions representative.

TSS Article No.	RVA3 0 0800 - T40 S M
TSS Series No.	_____
Type (Standard)	_____
Rod Diameter x 10**	_____
Quality Index (Standard)	_____
Material Code (Seal Ring)	_____
Material Code (Spring)	_____
Spring Load Medium***	_____

** For diameters $\geq 1,000.0$ mm multiply only by factor 1.

Example: RVA5 for diameter 1,200.0 mm.

TSS Article No.: RVA5X1200 - T40SM according to 15 digit part number system of latest Variseal catalog.

*** M Medium, R HiClean

**Table 45: Installation Dimensions / TSS Part No.**

d_N	D₁	TSS Part No.	d_N	D₁	TSS Part No.	d_N	D₁	TSS Part No.
3.0	5.9	RVA0_0030	32.0	38.2	RVA2_0320	80.0	89.4	RVA3_0800
4.0	6.9	RVA0_0040	35.0	41.2	RVA2_0350	85.0	94.4	RVA3_0850
5.0	7.9	RVA0_0050	36.0	42.2	RVA2_0360	90.0	99.4	RVA3_0900
6.0	8.9	RVA0_0060	40.0	49.4	RVA3_0400	95.0	104.4	RVA3_0950
8.0	10.9	RVA0_0080	42.0	51.4	RVA3_0420	100.0	109.4	RVA3_1000
10.0	14.5	RVA1_0100	45.0	54.4	RVA3_0450	105.0	114.4	RVA3_1050
12.0	16.5	RVA1_0120	48.0	57.4	RVA3_0480	110.0	119.4	RVA3_1100
14.0	18.5	RVA1_0140	50.0	59.4	RVA3_0500	115.0	124.4	RVA3_1150
15.0	19.5	RVA1_0150	52.0	61.4	RVA3_0520	120.0	132.2	RVA4_1200
16.0	20.5	RVA1_0160	55.0	64.4	RVA3_0550	125.0	137.2	RVA4_1250
18.0	22.5	RVA1_0180	56.0	65.4	RVA3_0560	130.0	142.2	RVA4_1300
20.0	26.2	RVA2_0200	60.0	69.4	RVA3_0600	135.0	147.2	RVA4_1350
22.0	28.2	RVA2_0220	63.0	72.4	RVA3_0630	140.0	152.2	RVA4_1400
25.0	31.2	RVA2_0250	65.0	74.4	RVA3_0650			
28.0	34.2	RVA2_0280	70.0	79.4	RVA3_0700			
30.0	36.2	RVA2_0300	75.0	84.4	RVA3_0750			

The rod diameters in bold type correspond to the recommendations of ISO 3320. Other dimensions and all intermediate sizes up to 2,500 mm diameter including imperial (inch) sizes converted to mm, can be supplied.

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