

# Turcon® Variseal® M2S



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Single-acting

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Spring-energized plastic U-Cup

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**Material:**

Turcon® and Zurcon®

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## Turcon® Variseal® M2S



### Description

Turcon® Variseal® M2S is a single-acting seal consisting of a U-shaped jacket and a V-shaped corrosion resistant spring. Variseal® M2S has an asymmetric seal profile. The dynamic lip is optimized, offering long service life and a good scraping ability even in media with high viscosity.

Unlike other scrapers the Variseal® M2S offers a functional combination of scraper and seal in one.

The spring cavity can be filled with high temperature HiClean silicone to prevent contamination blocking the cavity.

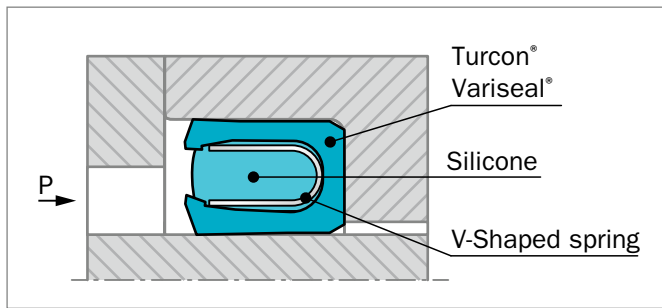


Figure 202: Turcon® Variseal® M2S

### AREAS OF APPLICATION

- Marine environments, able to scrape marine growth
- Subsea environments with high temperature application
- High speed hydraulics in dirty environments
- High temperature applications
- Low temperature and cryogenic applications
- Chemical plant where the lack of any elastomer is a benefit
- Food & Pharmaceutical application where the HiClean version has minimal entrapment areas and is resistant to many CIP/SIP fluids

### ADVANTAGES

- Suitable for reciprocating and light duty rotary movement
- Excellent scraping ability
- Combined scraping and sealing function
- High abrasion resistance
- Turcon has resistance to most fluids and chemicals
- Excellent resistance to aging
- Available for diameters from 3 to 3,200 mm
- Dimensionally stable
- Outstanding sliding and stick-slip properties

### OPERATING CONDITIONS

|                     |                                                                 |                       |
|---------------------|-----------------------------------------------------------------|-----------------------|
| <b>Pressure:</b>    | Maximum dynamic load:                                           |                       |
|                     | 20 MPa                                                          |                       |
|                     | Maximum static load:                                            |                       |
|                     | 40 MPa (207 MPa with customs designs)                           |                       |
| <b>Speed:</b>       | Reciprocating                                                   | up to 15 m/s in T40   |
|                     |                                                                 | up to 2 m/s in Z80    |
|                     | Rotating                                                        | up to 1.27 m/s in T40 |
| <b>Temperature:</b> | -50 °C to +260 °C in T40                                        |                       |
|                     | -45 °C to +260 °C in T40 with HiClean                           |                       |
|                     | -50 °C to +80 °C in Z80                                         |                       |
|                     | -196 °C custom design option available                          |                       |
| <b>Media:</b>       | Fluids of medium to high viscosity or containing hard particles |                       |

### 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 depends on media.



## MATERIALS

All materials used are physiologically safe. They contain no odour 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  
Material code S

For gas applications use:

Seal ring: Zurcon® Z80

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

**Table 179: Turcon® and Zurcon® Materials for Variseal® M2S**

| Material Code<br>Material Description                                                                                                                                                                                                                                                                                                                                    | Operating Temperature*<br>°C | Mating Surface Material                                                                  | MPa max. |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------------------------------------------------------------------------------------------|----------|
| <b>Turcon® T40</b><br>High-grade formulation of virgin polytetrafluoroethylene (PTFE) based material compounded with carbon fiber additive.<br>Excellent wear and low friction characteristics.<br>Suited to reciprocating and rotary applications.<br>Suitable for use in media with poor lubricating properties and for dry-running situations.<br>Color: Black / gray | -60 to +300                  | Steel, hardened<br>Steel, chromeplated                                                   | 40       |
| <b>Zurcon® Z80</b><br>UHMW Polyethylene. Excellent wear and abrasion resistance.<br>Very good lubricity in water based media.<br>Color: Translucent white                                                                                                                                                                                                                | -253 to +80                  | Steel<br>Steel, chromeplated<br>Stainless steel<br>Aluminum<br>Bronze<br>Ceramic coating | 40       |

## SPRING MATERIALS

The standard spring material for Turcon® Variseal® is stainless steel (spring code S). Two further materials are available for the specific applications, as detailed in the table below.

**Table 180: Spring Material**

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

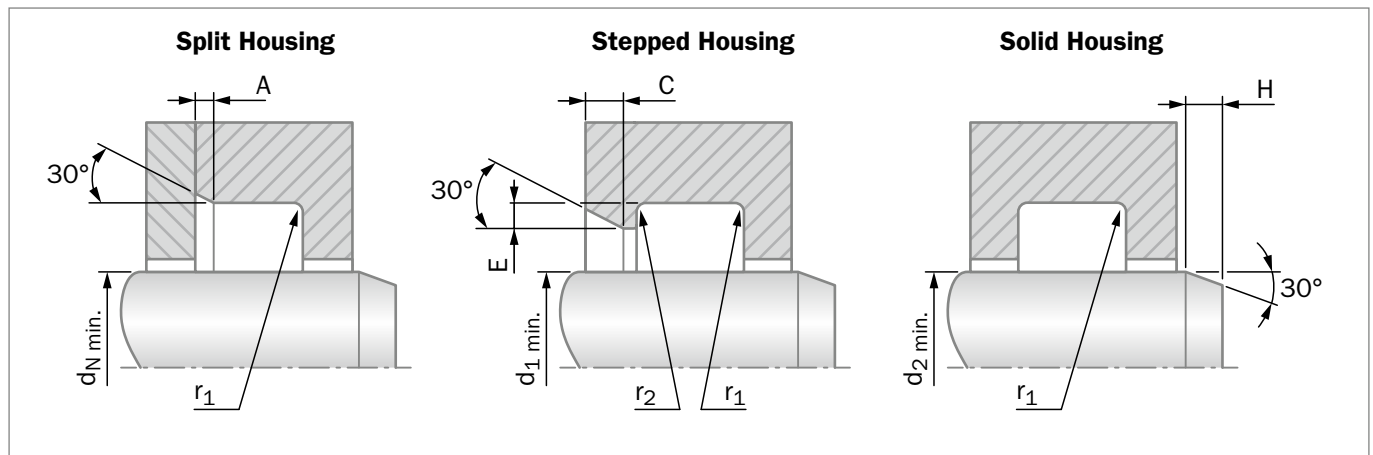


Figure 203: Variseal Groove Configurations

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

**Table 181: Dimensions for Groove Designs**

| Series | Rod Groove Dimensions |                                     |                         |                                     |                             |                         |
|--------|-----------------------|-------------------------------------|-------------------------|-------------------------------------|-----------------------------|-------------------------|
|        | A<br>Chamfer          | r <sub>1</sub><br>Maximum<br>Radius | C<br>Minimum<br>Chamfer | r <sub>2</sub><br>Maximum<br>Radius | E<br>Minimum<br>Step Height | H<br>Minimum<br>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 182: Groove Design for Rod**

| Series | Rod Diameter Recommendations                |                                               |                                             |
|--------|---------------------------------------------|-----------------------------------------------|---------------------------------------------|
|        | Split Groove<br>Ø d <sub>N</sub><br>Minimum | Stepped Groove<br>Ø d <sub>1</sub><br>Minimum | Solid Groove<br>Ø d <sub>2</sub><br>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

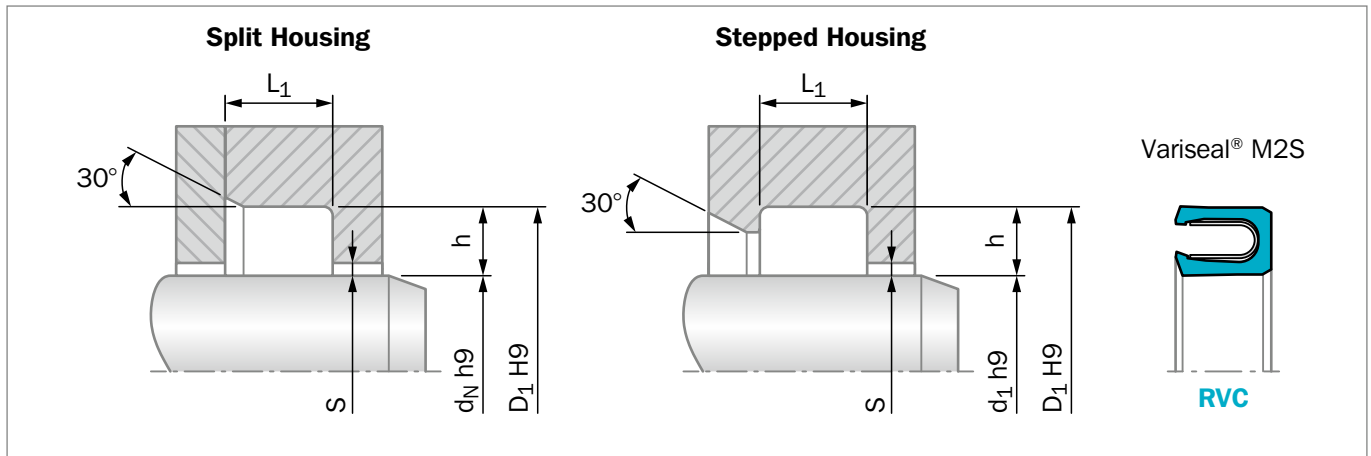


Figure 204: Installation Drawing

**Table 183: Installation Dimensions**

| Series No. | Rod Diameter<br>$d_N / d_1$ h9 |                | Groove Depth<br>h | Groove Diameter<br>$D_1$ H9 | Groove Width<br>$L_1$ +0.2 | Radial Clearance<br>$S_{max.}$ |        |        |        |
|------------|--------------------------------|----------------|-------------------|-----------------------------|----------------------------|--------------------------------|--------|--------|--------|
|            | Standard Range                 | Extended Range |                   |                             |                            | 2 MPa                          | 10 MPa | 20 MPa | 40 MPa |
| RVC0       | 3 - 9.9                        | 3 - 40         | 1.45              | $d_N / d_1 + 2.9$           | 2.4                        | 0.20                           | 0.10   | 0.08   | 0.05   |
| RVC1       | 10 - 19.9                      | 6 - 200        | 2.25              | $d_N / d_1 + 4.5$           | 3.6                        | 0.25                           | 0.15   | 0.10   | 0.07   |
| RVC2       | 20 - 39.9                      | 10 - 400       | 3.10              | $d_N / d_1 + 6.2$           | 4.8                        | 0.35                           | 0.20   | 0.15   | 0.08   |
| RVC3       | 40 - 119.9                     | 20 - 700       | 4.70              | $d_N / d_1 + 9.4$           | 7.1                        | 0.50                           | 0.25   | 0.20   | 0.10   |
| RVC4       | 120 - 999.9                    | 35 - 1,600     | 6.10              | $d_N / d_1 + 12.2$          | 9.5                        | 0.60                           | 0.30   | 0.25   | 0.12   |
| RVC5       | 1,000 - 2,500                  | 80 - 2,500     | 9.50              | $d_N / d_1 + 19.0$          | 15.0                       | 0.90                           | 0.50   | 0.40   | 0.20   |

## ORDERING EXAMPLE

Turcon® Variseal® M2S, recommended range:

|                         |                                |
|-------------------------|--------------------------------|
| <b>Series:</b>          | RVC3 from Table 183            |
| <b>Rod Diameter:</b>    | $D_N = 80.0$ mm                |
| <b>TSS Part No.:</b>    | RVC300800 from Table 184       |
| <b>Spring Material:</b> | Stainless steel from Table 180 |
| <b>Spring Load:</b>     | Medium                         |

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

**TSS Article No. RVC3 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: RVC5 for diameter 1,200.0 mm

TSS Article No.: RVC5**X1200** - T40SM

**Table 184: Installation Dimensions / TSS Part No.**

| d <sub>N</sub> | D <sub>1</sub> | TSS Part No. | d <sub>N</sub> | D <sub>1</sub> | TSS Part No.     | d <sub>N</sub> | D <sub>1</sub> | TSS Part No.     |
|----------------|----------------|--------------|----------------|----------------|------------------|----------------|----------------|------------------|
| 3.0            | 5.9            | RVC0_0030    | 35.0           | 41.2           | RVC2_0350        | <b>90.0</b>    | <b>99.4</b>    | <b>RVC3_0900</b> |
| 4.0            | 6.9            | RVC0_0040    | <b>36.0</b>    | <b>42.2</b>    | <b>RVC2_0360</b> | 95.0           | 104.4          | RVC3_0950        |
| 5.0            | 7.9            | RVC0_0050    | <b>40.0</b>    | <b>49.4</b>    | <b>RVC3_0400</b> | <b>100.0</b>   | <b>109.4</b>   | <b>RVC3_1000</b> |
| 6.0            | 8.9            | RVC0_0060    | 42.0           | 51.4           | RVC3_0420        | 105.0          | 114.4          | RVC3_1050        |
| 8.0            | 10.9           | RVC0_0080    | <b>45.0</b>    | <b>54.4</b>    | <b>RVC3_0450</b> | <b>110.0</b>   | <b>119.4</b>   | <b>RVC3_1100</b> |
| 10.0           | 14.5           | RVC1_0100    | 48.0           | 57.4           | RVC3_0480        | 115.0          | 124.4          | RVC3_1150        |
| 12.0           | 16.5           | RVC1_0120    | <b>50.0</b>    | <b>59.4</b>    | <b>RVC3_0500</b> | 120.0          | 132.2          | RVC4_1200        |
| 14.0           | 18.5           | RVC1_0140    | 52.0           | 61.4           | RVC3_0520        | <b>125.0</b>   | <b>137.2</b>   | <b>RVC4_1250</b> |
| 15.0           | 19.5           | RVC1_0150    | 55.0           | 64.4           | RVC3_0550        | 130.0          | 142.2          | RVC4_1300        |
| 16.0           | 20.5           | RVC1_0160    | <b>56.0</b>    | <b>65.4</b>    | <b>RVC3_0560</b> | 135.0          | 147.2          | RVC4_1350        |
| 18.0           | 22.5           | RVC1_0180    | 60.0           | 69.4           | RVC3_0600        | <b>140.0</b>   | <b>152.2</b>   | <b>RVC4_1400</b> |
| 20.0           | 26.2           | RVC2_0200    | <b>63.0</b>    | <b>72.4</b>    | <b>RVC3_0630</b> |                |                |                  |
| 22.0           | 28.2           | RVC2_0220    | 65.0           | 74.4           | RVC3_0650        |                |                |                  |
| 25.0           | 31.2           | RVC2_0250    | <b>70.0</b>    | <b>79.4</b>    | <b>RVC3_0700</b> |                |                |                  |
| 28.0           | 34.2           | RVC2_0280    | 75.0           | 84.4           | RVC3_0750        |                |                |                  |
| 30.0           | 36.2           | RVC2_0300    | <b>80.0</b>    | <b>89.4</b>    | <b>RVC3_0800</b> |                |                |                  |
| 32.0           | 38.2           | RVC2_0320    | 85.0           | 94.4           | RVC3_0850        |                |                |                  |

Rod diameters in **bold** type correspond to the recommendations of ISO 3320.

For additional size and part number details please contact your local Customer Solution Center.