

**Wallé® 华乐密封**  
SEALING SOLUTIONS



**精诚合作 Sincere Cooperation**  
**Win-Win Sharing**  
**共享 双赢**

**东莞市华乐密封技术开发有限公司**

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★提供密封专业方案  
Provide professional solutions for sealing

★减少泄漏 保护环境  
Reduce leakage to protect the environment

★降低设备运作成本  
Reduce equipment operating costs

**东莞市华乐密封技术开发有限公司**

Dongguan Walle Sealing Technology Development Co.,Ltd.

## GreatSeal®应用领域 GreatSeal® in the Application field



航空航天工程/Aerospace Engineering;  
 运输设备 (重型卡车, 汽车, 船舶, 列车)  
 / Transportation equipment (heavy trucks, automotive, marine, rail);  
 顶级赛车/ High-performance racing;  
 建筑设备/ Construction equipment;  
 食品和饮料加工设备/ Food and beverage processing equipment;  
 医疗设备, 仪器/ Medical instrumentation;  
 液相色谱仪/ Liquid chromatography;  
 电子半导体设备/ Semiconductor manufacturing equipment;  
 石油化工, 天然气设备/ Petroleum and chemical process equipment;  
 泵, 阀门, 机械密封/ Pumps, valves, compressors and mechanical seals;  
 柴油机, 压缩机/ Dieselmotoren, Compressoren;  
 液压, 气动元件及自动化设备  
 / Hydraulic and Pneumatic components, Automation Equipment;  
 离心机/centrifuge 计量泵/ metering pump 贴片机/chip mounter;  
 计量阀/ metering valve 点胶阀/ dispensing valve 点胶机/ dispenser;  
 智能机器人制造业/ smart robots 涂覆机/ coating machine;  
 机床, 旋转部件及搅拌机/ Machine tools, Rotating parts and mixers.

### 概述

GreatSeal®是一种单作用, 弹簧施力的密封件, 用于动态和静态运动。GreatSeal®在广泛的应用中是十分有效的。适用于要求具有较好的耐化学介质的性能时, 或者要求密封件工作在极端温度下, 以及用于需要良好的挤压和压缩性能的情况。

#### GreatSeal®有3种主要的设计特性:

1. 使用特殊的U形密封外形
2. 弹簧的几何形状适合特别用途
3. 经过验证的高性能的PTFE聚合物

标准产品的直径从2mm直到2500mm(8'2"), 连同定制的中间规格、英制规格或特殊几何形状。

#### 工作方式

样本中包括的所有GreatSeal®具有相同的工作原理, 不同处仅是它们的外形形状和所使用的金属弹簧的类型。

GreatSeal®弹簧提供在低压下密封所需要的载荷(图1), U形外套允许流体压力对密封唇施力, 所以随着工作压力的提高, 总的密封压力升高 (图2)。

#### General

GreatSeal®are single-acting, spring-energized seals which are used for dynamic and static movements. GreatSeal®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 where good extrusion and compression characteristics are needed.

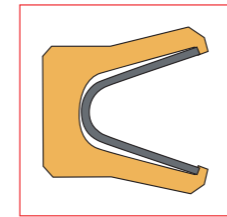
#### GreatSeal® have three main design characteristics:

1. Application specific U-shaped seal profile
2. Spring geometry suited to the particular application
3. Proven high-performance PTFE polymers Standard products are available from 2 mm up to 2500 mm (8' 2") in diameter along with custom manufactured intermediate sizes, inch (imperial) sizes or special geometries.

#### Method of Operation

All GreatSeal® included in this catalogue have the same operating principle and difference only in their profile form and type of metallic spring used.

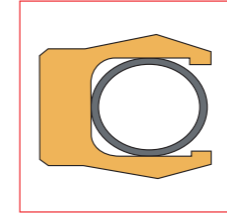
The GreatSeal® spring supplies the payload for sealing at low pressures (Figure 1). The "U" shaped allows fluid pressure to force the sealing lips, so total sealing pressure rises with increasing operating pressure (Figure 2).



#### V型弹簧 / V Series (Cantilever)



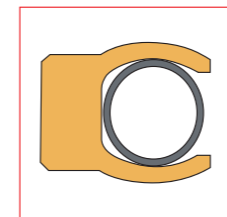
V型弹簧的 GreatSeal®是一种单作用密封件, 由一个U形密封外壳和一个V型耐腐蚀弹簧组成。V型弹簧的 GreatSeal®的轮廓形状是不对称的, 其动态唇形状坚实, 带有经过优化的前角, 提供了良好的泄漏控制, 从而降低了摩擦, 延长了寿命。  
 V series GreatSeal® is a single-acting seal consisting of a U-shaped jacket and a V-shaped corrosion resistant spring. V series GreatSeal® has an asymmetric seal profile. The heavy profile of its dynamic lip with an optimized front angle offers good leakage control, reduced friction and long service life.



#### C型弹簧(斜体) / C Series (Canted coil)



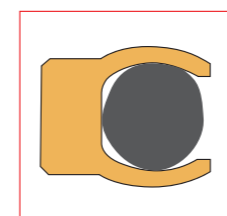
C型弹簧的 GreatSeal®是一种单作用密封件, 由一个U形密封外壳和C型弹簧耐腐蚀弹簧组成。在GreatSeal®中的C型弹簧提供几乎恒定的负载, 不受硬件、间隙、偏心和密封磨损的影响。  
 C Series GreatSeal® is a single-acting seal consisting of a U-shaped jacket and a corrosion resistant C Series spring. The C Series spring in the GreatSeal® are providing an almost constant load irrespective of hardware, tolerances, eccentricity and seal wear.



#### H型弹簧 / H Series (Helica)

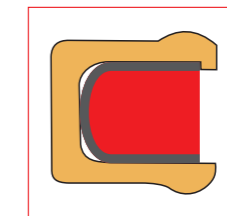


H型弹簧的 GreatSeal®是一种单作用密封件, 由一个U形密封外壳和一个螺旋绕制的耐腐蚀弹簧组成。H型弹簧的 GreatSeal®的螺旋状弹簧负载大, 在低压下, 甚至在真空中都具有非常好的密封完整性。H型弹簧的 GreatSeal®适合静态用途, 特别是在低速用途使用效果十分理想。  
 H Series GreatSeal® is a single-acting seal consisting of a U-shaped jacket and a helical wound corrosion resistant spring. The helical ribbon spring of H Series GreatSeal® has a high spring loading, which gives excellent sealing integrity at low pressure and even in vacuum. H Series GreatSeal® is suitable for static applications and ideal in low speed applications.



#### O型圈 / O RING

GreatSeal®密封圈可以通过选择人工橡胶O型圈代替金属弹簧, 例如丁腈胶, 氢化丁腈, 氟胶和其他材料橡胶。  
 The GreatSeal® can be ordered with optional elastomeric O-Ring energizers in place of the metallic spring. A wide variety of elastomers such as nitrile, HNBR, FKM and another rubber material.



#### 填充硅树脂 / Silicone Filled

Walle®可提供弹簧型腔填充有FDA级硅材料的系列密封圈。由于污染物不会残留在弹簧型腔内, 这样密封圈可用于食品加工, 生物制药等领域, 还有其他材料可供选择。  
 The GreatSeal® can be supplied with an FDA-approved grade of silicone filled into the spring cavity. The elastomer ensures that no contaminants can become trapped in the spring cavity, allowing the seal to be used in food processing and clean-in place applications. Other material are available.

## 性能 Performance

- 极好的密封性能  
Excellent seal performance
- 非常耐磨损  
High abrasion resistance
- 及其好的耐腐蚀性  
Highly resistant to chemical influence
- 优越的耐高温性能 -253~+300°C  
High temperature capabilities -253~+300°C
- 能够承受200MP以上的高压  
Sustain up to 200MP high pressure
- 摩擦系数小  
Low friction
- 抗间隙挤出非常好  
No extrusion into gap
- 抗老化性能好  
Good aging resistance
- 有很好的自润滑和干摩擦性能  
Good self-lubrication and friction performance
- 结构紧凑, 安装简单  
Compact form, Simple installation

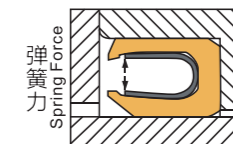
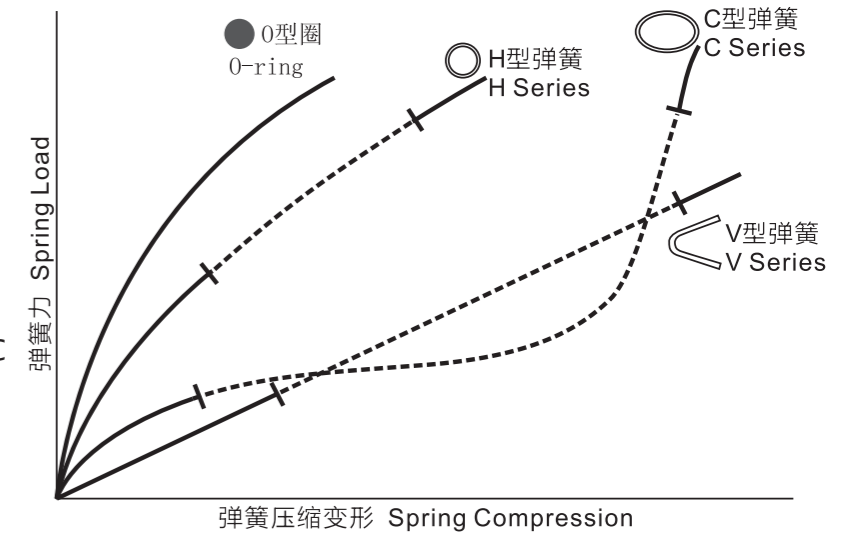


图1 无系统压力时的GreatSeal®  
Fig.1 GreatSeal® without system pressure

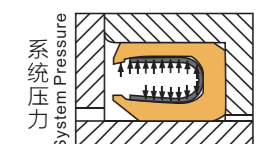


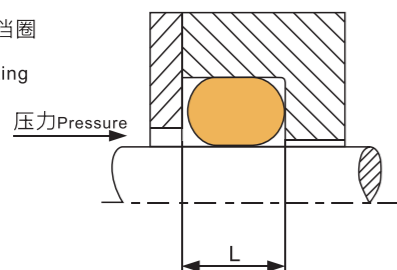
图2 有系统压力时的GreatSeal®  
Fig.2 GreatSeal® with system pressure

GreatSeal® 可替换O型圈使用 Greatseals can be used replace of O ring

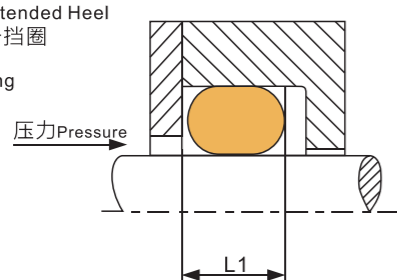
除了旋转GreatSeal®以外，所有的GreatSeal®都能够带延长密封跟部端，作为替换现有的O形圈沟槽（带或不带挡圈）的品种。All GreatSeal® types except the Roto GreatSeal® can be supplied with an extended heel as an alternative to existing O-Ring groove versions,(with or without back-up ring)

该品种也建议用于高压用途或者当挤压间隙大于规定值时使用。This version is recommended also for high-pressure applications or when the extrusion gap is larger than prescribed.

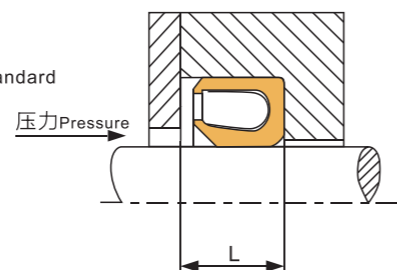
标准 Standard  
O形圈沟槽 不带挡圈  
O-Ring groove  
without Back-up Ring



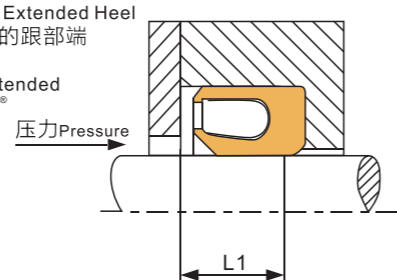
延长的跟部端 Extended Heel  
O形圈沟槽 带1个挡圈  
O-Ring groove  
with a Back-up Ring



标准 Standard  
沟槽用于标准  
GreatSeal®  
Groove with standard  
GreatSeal®



延长的跟部端 Extended Heel  
沟槽用于延长的跟部端  
GreatSeal®  
Groove with extended  
heel GreatSeal®



一般设计说明 General Design Instructions

用于活塞杆密封件的引入倒角 Lead-in Chamfer for Rod Seals

为了避免在安装时损坏活塞杆密封件，在活塞杆（见图1）上必须设计有引入倒角和圆形的边缘，如果仍未安装上，则需要使用安装工具。

To avoid damage to the rod seal during installation, lead-in chamfers and rounded edges must be designed into the rod (Figure 1). If this is not possible, an installation tool will be required.

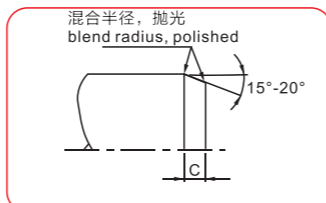


图1 用于活塞杆密封件的引入倒角  
Figure 1 Lead-in chamfer for rod seals

用于活塞密封件的引入倒角 Lead-in Chamfer for Piston Seals

为了避免在安装时损坏活塞密封件，在缸孔（见图2）上必须提供引入倒角和圆形的边缘，如果仍未安装上，则需要使用安装工具。

To avoid damage to the piston seal during installation, lead-in chamfers and rounded edges must be provided on the bores and cylinders (Figure 2). If this is not possible, an installation tool must be used.

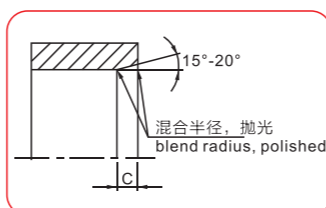


图2 用于活塞密封件的引入倒角  
Figure 2 Lead-in chamfer for piston seals

引入倒角(C)的最短长度取决于密封件的系列，见下表  
The minimum length of the lead-in chamfer (C) depends on the series of the seal as shown in the following table.

活塞杆上的引入倒角 Lead-in Chamfer on Rods

最短的长度C(mm) Length C minimum(mm)	GreatSeal®系列号 GreatSeal® Series No.
4.0	RV_0
5.0	RV_1
5.0	RV_2
7.5	RV_3
12.0	RV_4
12.0	RV_5

引入倒角(C)的最短长度取决于密封件的系列，见下表  
The minimum length of the lead-in chamfer (C) depends on the series of the seal as shown in the following table.

活塞杆上的引入倒角 Lead-in Chamfer on Pistons

最短的长度C(mm) Length C minimum(mm)	GreatSeal®系列号 GreatSeal® Series No.
4.0	PV_0
5.0	PV_1
5.0	PV_2
7.5	PV_3
12.0	PV_4
12.0	PV_5

表面粗糙度 Surface Roughness

介质 Media	建议的最高表面粗糙度 μm Recommended Maximum Surface Roughness μm		
	旋转表面 Rotary Surface	往复表面 Reciprocating Surface	静态沟槽表面 Static Groove Surface
低温和低分子气体:氢, 氦, 氟利昂, 氧, 氮 Cryogenic and low molecular gases:Hydrogen, Helium, Freon, Oxygen,Nitrogen	Rmax=1.0 μm Rz=0.63 μm Ra=0.1 μm	Rmax=2.5 μm Rz=1.6 μm Ra=0.2 μm	Rmax=3.5 μm Rz=2.2 μm Ra=0.3 μm
低黏度流体:水, 酒精, 联氨, 特种液压工作油, 气体, 氮, 天然气, 空气 Low viscosity fluids:Water, Alcohols, Hydrazine, Gaseous,nitrogen, Natural gas, Skydrol, air	Rmax=2.5 μm Rz=1.6 μm Ra=0.2 μm	Rmax=3.5 μm Rz=2.2 μm Ra=0.3 μm	Rmax=5.0 μm Rz=3.5 μm Ra=0.6 μm
高黏度流体:液压油, 原油, 齿轮油, 密封剂, 粘接剂, 奶制品 High viscosity fluids:Hydraulic oils, Crude oil, Gear oil, Sealants, Glue, Milkproducts	Rmax=2.5 μm Rz=1.6 μm Ra=0.2 μm	Rmax=4.0 μm Rz=2.5 μm Ra=0.4 μm	Rmax=6.5 μm Rz=5.0 μm Ra=0.8 μm

动态配合零件密封表面硬度 Dynamic Hardware Sealing Surface Finish Hardness

一般来说，密封表面的硬度越高，整体的密封性能就越好，良好的硬度可以减少磨损并增加密封寿命，慢速到中速往复运动中，推荐使用40Rockwell C（或以上硬度）。

理想硬度是60到70 Rockwell C。推荐使用中速到调整直线或旋转运动，在阳极化处理后的坚硬表面须做抛光处理。

As a general rule, the lower the sealing surface finish, the better the overall seal performance that can be expected, lower finish value reduces wear and increases seal life. A 40 Rockwell C hardness or greater is recommended for slow to moderate reciprocating motion.

The ideal hardness is 60 to 70 Rockwell C. Hardness in this range is recommended for moderate to high speed linear or rotary motion. Hard anodized surface finish must be polished after anodizing.

用于卡扣接头的半-开放式沟槽设计 Half-Open Groove Design for Snap Fitting

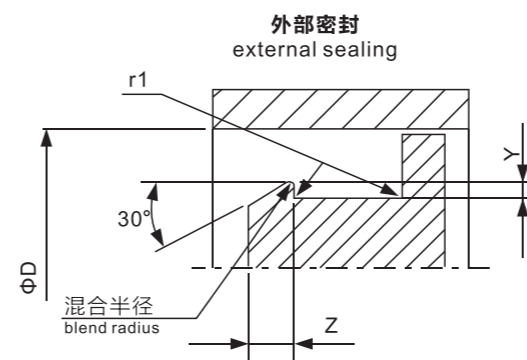


图3/Fig.3 沟槽设计 Groove design

沟槽设计的尺寸（卡扣接头-外部密封）图3 /Fig.3  
Dimensions for Groove Design(Snap Fitting - External Sealing)

外部密封系列号 External sealing Walle Series No.	台阶高度 Step Height	倒角长度 Chamfer length	半径 Radius
V	C	H	r1
PV_0	PC_0	PH_0	0.4
PV_1	PC_1	PH_1	0.6
PV_2	PC_2	PH_2	0.7
PV_3	PC_3	PH_3	0.8
PV_4	PC_4	PH_4	0.9
PV_5	PC_5	PH_5	1.5

①Y max=0.035xD

注意：不是始终都可能达到推荐的“台阶高度”的，如有疑问，请联系本公司。

Note: It is not always possible to reach recommended "Step height". In case of doubt, please contact on Walle Sealing Solutions.

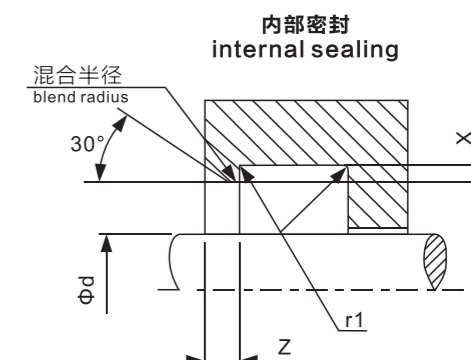


图4/Fig.4 沟槽设计 Groove design

沟槽设计的尺寸（卡扣接头-内部密封）图4/Fig.4  
Dimensions for Groove Design(Snap Fitting - Internal Sealing)

内部密封系列号 Internal sealing Walle Series No.	台阶高度 Step Height	倒角长度 Chamfer length	半径 Radius
V	C	H	r1
RV_0	RC_0	RH_0	0.4
RV_1	RC_1	RH_1	0.6
RV_2	RC_2	RH_2	0.7
RV_3	RC_3	RH_3	0.8
RV_4	RC_4	RH_4	0.9
RV_5	RC_5	RH_5	1.5

①X max=0.02xD

安装在封闭式沟槽中 Installation in Closed Grooves

为了GreatSeal®的安装简单，我们建议把开放式沟槽或者半-开放式沟槽设计在壳体中。安装在封闭式沟槽中是可行的，取决于活塞杆和孔的直径，见下表。  
For simple installation of the GreatSeal®, we recommend that the grooves be opening or that a half-split groove be designed into the housing. Installation in closed grooves is possible, depending on the rod and bore diameter, as shown in the following tables.

注意：旋转GreatSeal®密封件只能安装在开放式沟槽中。  
Note: Roto GreatSeal® seals only can be installed in split grooves.

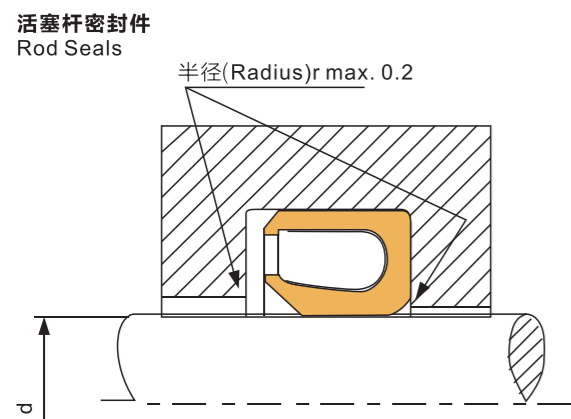


图5 安装在封闭式沟槽中  
Fig.5 Installation in closed grooves

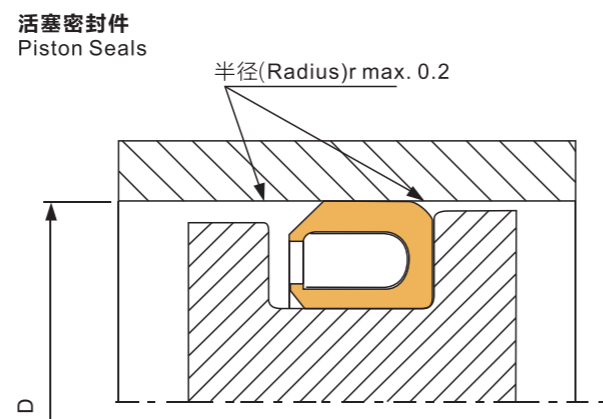


图6 安装在封闭式沟槽中  
Fig.6 Installation in closed grooves

在封闭式沟槽中安装V型GreatSeal®  
Installation of GreatSeal® V

系列号 Series No.	dmin.mm
RV_0	30.0
RV_1	70.0
RV_2	110.0
RV_3	300.0
RV_4	500.0

在封闭式沟槽中安装V型GreatSeal®  
Installation of GreatSeal® V

系列号 Series No.	dmin.mm
PV_0	35.0
PV_1	50.0
PV_2	70.0
PV_3	105.0
PV_4	140.0

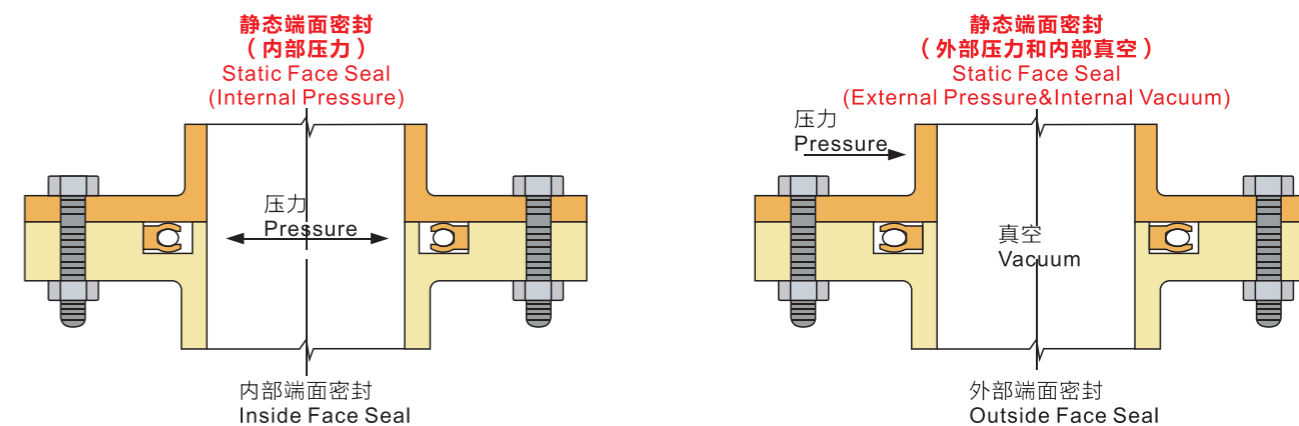
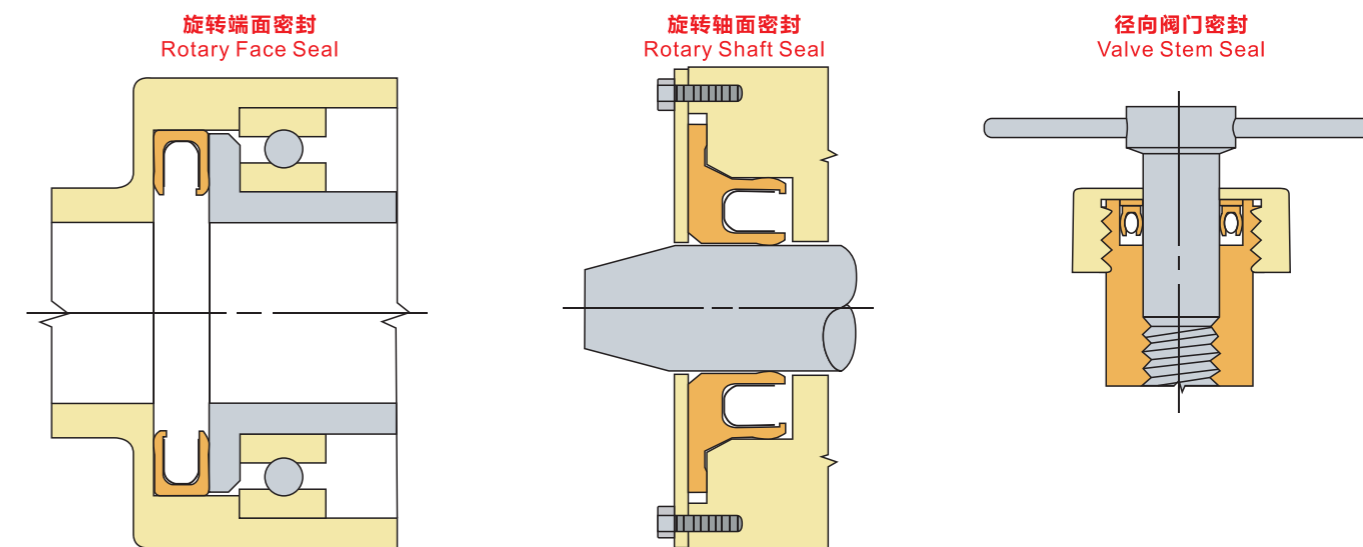
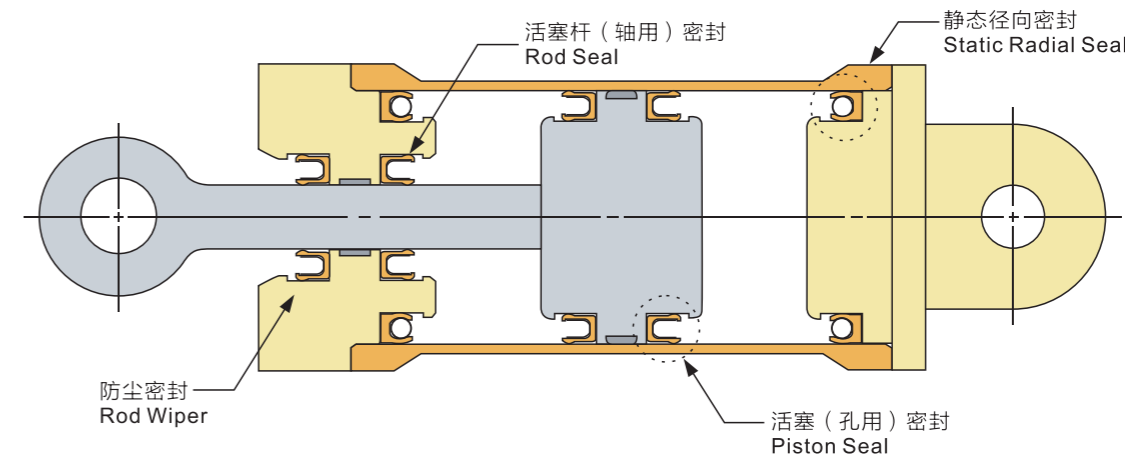
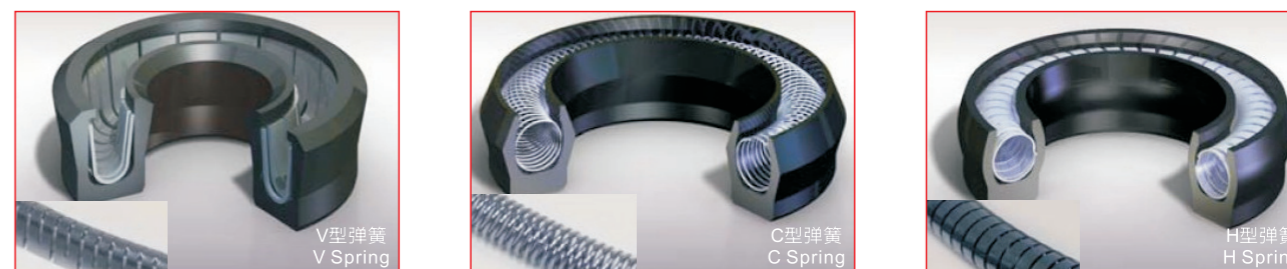
在封闭式沟槽中安装C型GreatSeal®和H型GreatSeal®  
Installation of GreatSeal® C and GreatSeal® H in closed grooves

系列号 Series No.	dmin.mm
RC_0 & RH_0	25.0
RC_1 & RH_1	65.0
RC_2 & RH_2	110.0
RC_3 & RH_3	230.0
RC_4 & RH_4	400.0
RC_5 & RH_5	700.0

在封闭式沟槽中安装C型GreatSeal®和H型GreatSeal®  
Installation of GreatSeal® C and GreatSeal® H in closed grooves

系列号 Series No.	dmin.mm
RC_0 & PH_0	20.0
RC_1 & PH_1	30.0
RC_2 & PH_2	45.0
RC_3 & PH_3	60.0
RC_4 & PH_4	95.0
RC_5 & PH_5	300.0

典型安装 Typical Installations



封闭式沟槽安装 Closed Gland Installation

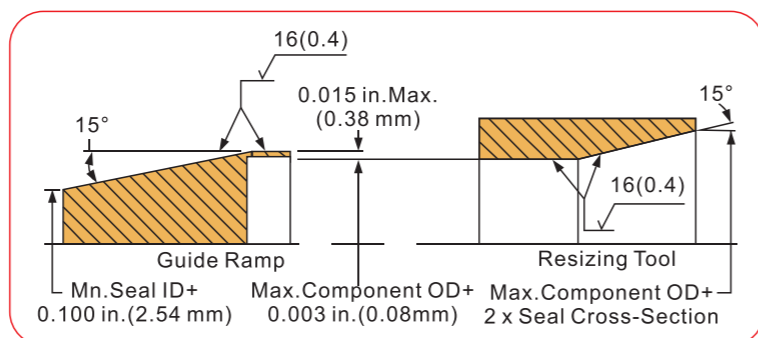


封闭式沟槽 Closed Gland

孔用密封的安装方法 (Piston Seal Installation)

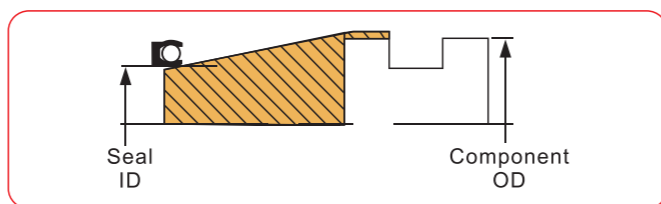
如右图所示：斜面引导工具与校正工具来协助密封圈安装在封闭式沟槽内。

The guide ramp and resizing tool can be assisted in installing the Seal into a fully closed gland.



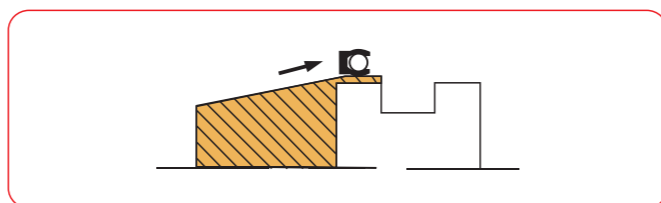
斜面引导工具与校正工具 Stretching Guide Ramp and Resizing Tool

1.先将密封圈预热（可放入油，烘箱或者水里）。预热至150摄氏度（300°F），使密封圈软化后套入斜面引导工具。  
STEP 1: Firstly, preheating the seal to as much as 150°C (300°F) in either oil, oven or water, it will be softer seal and aiding in guide ramp and installing the seal.



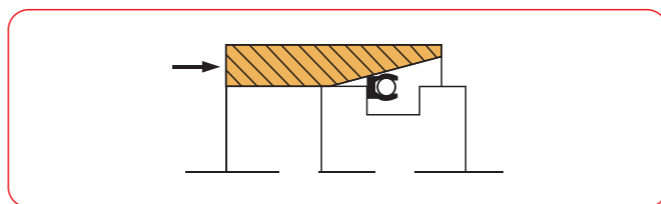
Place on Guide Ramp

2.将密封圈沿斜面引导工具推入密封沟槽内。  
STEP 2: Push the seal over the guide ramp and into the groove.



Push Seal

3.用校正工具将密封圈校正压缩至原始直径大小。  
STEP 3: Slide the resizing tool over the seal to compress the seal to its original diameter.

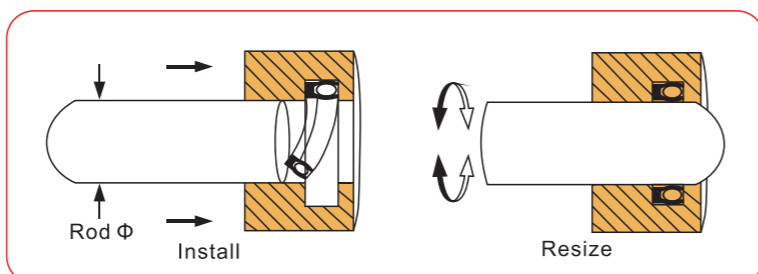


Compress Seal

轴用密封圈安装方法 Rod Seal Installation

1.用钝角的一端将密封圈推入沟槽内。  
STEP 1: Push the seal into the groove with one end with an obtuse angle.

2.用带有圆角的一端将密封圈校正。  
STEP 2: Correct the seal with the rounded end of the tool.



Rod Seal Installation in Solid Gland

延长密封跟部端和背压环 Extended Heel and Back-Up Ring

用于密封高温和/或高压液体或气体情况下，在高压和高速往复运动条件下，也需要小心注意。在压力下，PTFE可以流进咬合间隙里，动态往复运动增加咬合，在动态情况下，如果压力、温度和咬合一定，咬合会在摩擦与压力相等的情况下停止，然而，循环情况可以导致咬合持续，导致密封圈的过早破坏。所以需要延长密封圈根部端或者增加挡圈部分 如图1、2所示

Back-Up Rings are used when sealing fluids or gases at high temperature and high pressure combinations. Careful attention is also required at high pressure and high speed reciprocation conditions. We strongly advise to contact our technical support for further assistance. So it need to extended the seals' heel or add Back-Up Ring. Refer to fig.1、2

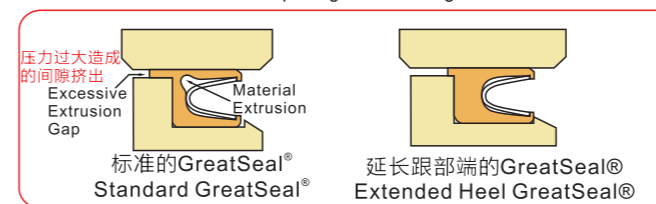


图1(fig.1)

直角背压环 (图3) Rectangular Back-Up Ring (fig. 3)

在低压和低于250°C温度下的大多数情况下，直角背压环会保护密封圈不被咬合，这些背压环是根据径向槽的宽度精确制造而成，背压环材料应当比密封圈材料有更高的抗咬合能力。

In most applications with lower pressure and temperatures below 250°C, a rectangular backup will secure the seal for extrusion. Such backup rings are machined to fit exactly in the radial groove width. The material should be a compound with a higher extrusion resistance than the seal's material.

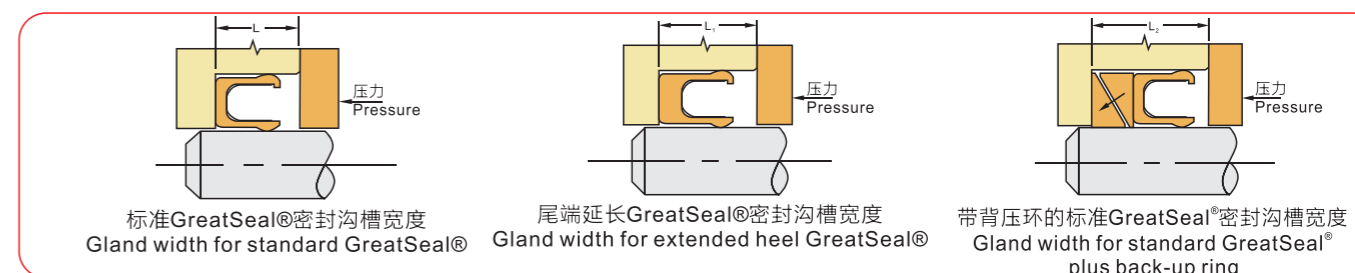


图2(fig.2)

咬合由以下因素决定 (Extrusion is a function off):

- 咬合间隙的大小 the size of the extrusion gap
- 温度 the temperature
- 系统压力 the system pressure
- 表面速度 (往复运动) surface speed (reciprocating movements)

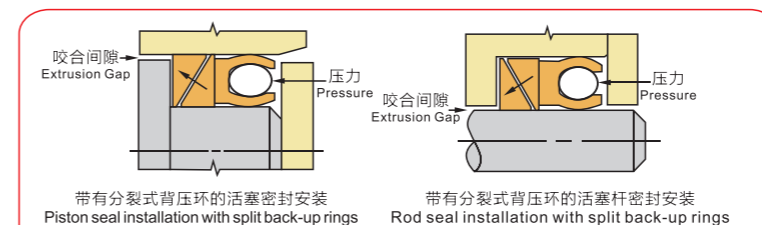
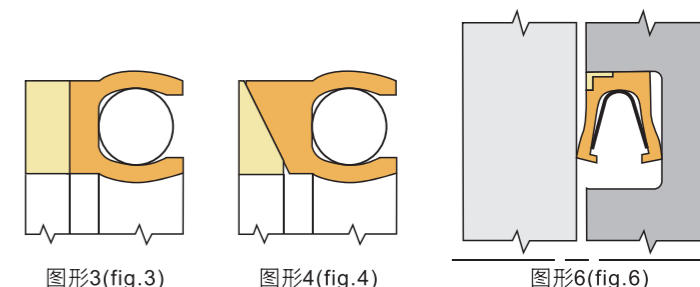
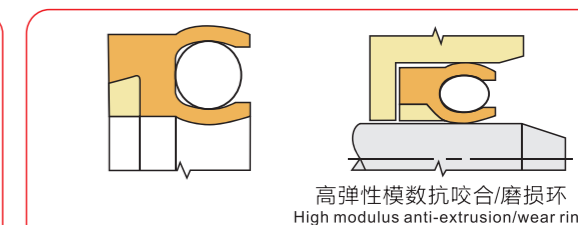


图5(fig.5)



其他常用类型 Other Types

三角形背压环 (图4) Triangular Back-Up Ring (fig.4)

在某些情况下，高温先于高压时，推荐使用三角形背压环。In some cases where a high temperature precedes a high pressure it is recommended to use a triangular backup.

双三角形背压环能闭合咬合间隙，并防止密封圈咬合 (图5) Double Triangular Back-Up Ring closing the extrusion gap and preventing extrusion of the seal. (fig. 5)

在极度高压和高温条件下，建议使用一组双三角背压环，将背压环的90°角面向咬合间隙安装非常重要。当系统压力导致径向沟槽尺寸改变出现时，通常使用这种类型的背压环。

For extreme high pressure and temperature combinations it is recommended to use a set of two triangular back up rings. It is very important to assemble the 90° corner of the backup ring towards the extrusion gap. This type of backup ring is often used when the radial groove dimension changes as a result of the system pressure.

L型背压环 (图6) L-shaped Back-Up Ring (fig. 6)

L型背压环用于防止极度高压和高温同时出现时的咬合状况，它能够在高达+300°C和极端压力，比如20Mpa和非常大的咬合间隙下，保护PTFE密封圈。

The L-shaped backup ring is used for preventing extrusion at extreme high pressure and high temperature combinations. It is capable of securing PTFE seals up to + 300°C and extreme pressures, such as 20 MPa, with very large extrusions gaps.

常用标准的GreatSeal® General Standard GreatSeal®

径向 Radial	标准唇 Standard Lip	内刮油唇 Skived I.D.Lip	外刮油唇 Skived O.D.Lip
标准跟部端L宽度 Standard Heel L Width			
零件号 Seal Design	V10	V11	V12
延伸的跟部端L1宽度 Extended Heel L1 Width			
零件号 Seal Design	V20	V21	V22
法兰边跟部端H1宽度 Flanged Heel H1 Width			其它形状 Other Form
零件号 Seal Design	V30	V31	

径向 Radial	标准唇 Standard Lip	内刮油唇 Skived I.D.Lip	外刮油唇 Skived O.D.Lip
标准L宽度 Standard Heel L Width			
零件号 Seal Design	C10	C11	C12
延伸的跟部端L1宽度 Extended Heel L1 Width			
零件号 Seal Design	C20	C21	C22
法兰边跟部端H1宽度 Flanged Heel H1 Width			其它形状 Other Form
零件号 Seal Design	C30	C31	

径向 Radial	标准唇 Standard Lip	内刮油唇 Skived I.D.Lip	外刮油唇 Skived O.D.Lip
标准跟部端L宽度 Standard Heel L Width			
零件号 Seal Design	H10	H11	H12
延伸的跟部端L1宽度 Extended Heel L1 Width			
零件号 Seal Design	H20	H21	H22
法兰边跟部端H1宽度 Flanged Heel H1 Width			其它形状 Other Form
零件号 Seal Design	H30	H31	



技术数据 Technical Data

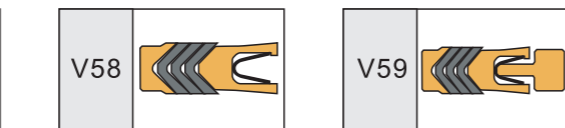
**工作压力 Operating pressure**  
 最大动态负载(Maximum dynamic load): 45MPa(450bar,6527psi)  
 最大静态负载(Maximum static load): 60MPa(600bar,8702psi)  
**速度 Speed**  
 往复运动达(Reciprocating up to):15m/s(49ft/sec)  
 旋转运动达(Rotating up to):1m/s(3ft/sec)  
**工作温度 Operating temperature**  
 -70°C(-94°F)至+260°C(+500°F)  
 特殊PTFE以及替换的弹簧材料适合该温度范围之外的用途。  
 Special PTFE materials as well alternative spring materials are available for applications outside this temperature range.  
**介质相容性 Media compatibility:**所有流体, 化学制品和气体及高黏度或者含有颗粒的流体介质  
 (All fluids, chemicals and gases. Fluids of medium to high viscosity or containing hard particles.)  
**注意:** 当用于高温时, 压力和速度应降低  
 Note: At high temperatures operating pressures and speeds should be lower.

技术数据 Technical Data

**工作压力 Operating pressure**  
 最大动态负载(Maximum dynamic load): 20MPa(200bar,2900psi)  
 最大静态负载(Maximum static load): 60MPa(600bar,8702psi)  
**速度 Speed**  
 往复运动达(Reciprocating up to):15m/s(49ft/sec)  
 旋转运动达(Rotating up to):1m/s(3ft/sec)  
**工作温度 Operating temperature**  
 -70°C(-94°F)至+230°C(+446°F)  
**介质相容性 Media compatibility:**所有流体, 化学制品和气体  
 (Virtually all fluids, chemicals and gases.)  
**注意:** 当用于高温时, 压力和速度应降低  
 Note: At high temperatures operating pressures and speeds should be lower.

技术数据 Technical Data

**工作压力 Operating pressure**  
 最大动态负载(Maximum dynamic load): 20MPa(200bar,2900psi)  
 最大静态负载(Maximum static load): 80MPa(800bar,11603psi)  
**速度 Speed**  
 往复运动达(Reciprocating up to):5m/s(16ft/sec)  
 旋转运动达(Rotating up to):0.1m/s(0.3ft/sec)  
**工作温度 Operating temperature**  
 -120°C(-248°F)至+260°C(+500°F)  
**介质相容性 Media compatibility:**所有流体, 化学制品和气体  
 (Virtually all fluids, chemicals and gases.)  
**注意:** 对于这些参数以外的应用场合, 请咨询本公司。  
 Note: Please Contact on Walle Sealing Solutions for applications outside these parameters.



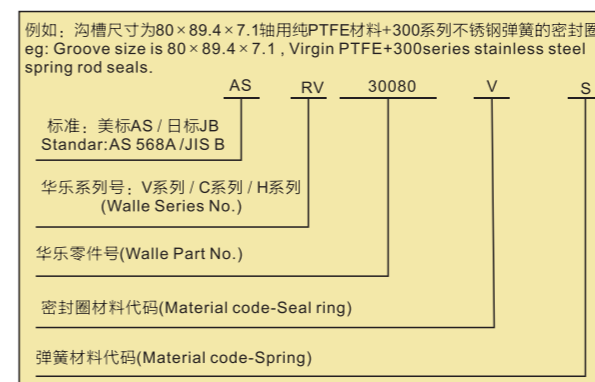
弹簧材料选择指南 Spring Materials Selection Guide

介质 Media	弹簧材料 Spring materials	弹簧订货代号 Spring order lode
用于普通用途, 例如油, 油脂, 空气, 水, 蒸气, 溶剂, 食品, 药品, 气体 For General use e.g. Oil, Grease, Air, Water, steam, Solvents, Food, drugs, Gas	300系列不锈钢 (301 304 316) 300Series Stainless steel	S
用于腐蚀介质, 例如酸, 腐蚀剂, 海水 For use in corrosive media e.g. Acids, Caustics, Seawater	哈氏合金 Hastelloy C-276	H
用于石油化工用途, 例如原油, 含硫天然气 For petrochemical use e.g. Crude oil, Sour gas	游丝合金 Elgiloy	E
用于高温耐腐蚀场合, 例如航空, 石油, 天然气, 化工, 核工业等 For use in high temperature and Corrosion resistance occasion, such as aerospace, oil, gas, chemical, nuclear industry, etc.	因科耐尔合金 Inconel	I

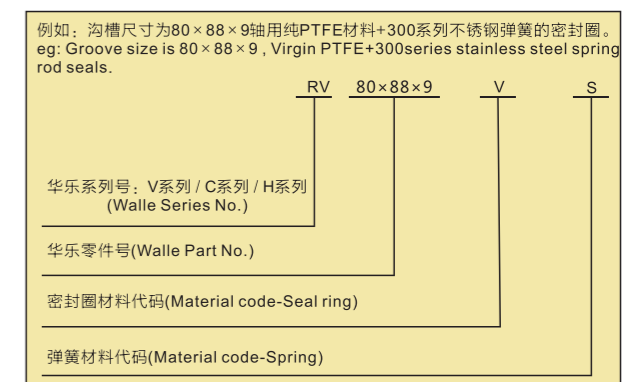
密封材料选择指南 Material Selection Guide-Seal ring

材料代码 Material code	颜色 Colour	温度范围 Temperature Range	材料说明 Material Description
V	白色 White	+260°--253°	纯PTFE: 特别适用于轻型到中等动态和静态应用, 有限的抗磨损和抗热性, 低气体渗透率, 良好的低温特性, 中等到极端的真空应用, FDA(食品药品认证)。 Virgin PTFE: Excellent for light to moderate dynamic and static service. Limited wear and heat resistance. Low gas permeability. Good cryogenic properties. Moderate to hard vacuum service. FDA approved.
B	棕褐色 Tan	+260°--200°	PTFE填充青铜粉: 用于液压的标准材料, 抗压强度高, 滑动特性好, 耐磨损, 耐挤压, 抗挤出性好(不建议在海水中使用)。 Bronze filled PTFE: Standard material for hydraulics, high compressive strength, good sliding and wear properties, good extrusion resistance.
G	灰色 Gray	+260°--200°	自润滑玻璃填充PTFE: 坚硬, 长久耐磨, 良好的耐热性, 推荐高压使用。注意: 在高表面速度下, 对软金属有一定的研磨性。 Lubricated Glass Filled PTFE: Tough, long wearing, heat resistant. Recommended for high pressure hydraulic service. Caution: Can be abrasive running against soft metals at high surface speeds.
C	黑色 Black	+260°--200°	聚合物填充PTFE: 在高温高压和高转速下有极好的耐磨性, 特别适合水和水溶性溶液较好的应用, 在干式或恶劣的润滑条件下, 对软金属有研磨作用。 Polymer: Filled PTFE Excellent wear material for higher temperatures, pressures and speeds. Excellent in water and water base solutions. Superior in dry or poor lubricated applications. Can be abrasive running against soft metals.
P	棕褐色 Tan	+260°--200°	聚合物填充PTFE: 超强的抗热和抗磨损性, 无研磨性, 建议使用在软金属上的中速到高速动态应用。 Polymer Filled PTFE: Superior heat and wear resistance. Non-abrasive. Recommended for moderate to high speed dynamic service running against soft metals.
U	白色 White	+80°--200°	合成UHMW-PE(高密度聚乙烯): 极好的抗磨损和研磨性, 有限的加热和耐化学性, FDA(食品认证)。 Formulated UHMW: Extremely good wear and abrasion resistance, but limited heat and chemical resistance. Meets FDA requirements.
H	金黄色 Gold	+80°--200°	合成UHMW-PE(高密度聚乙烯): 相当坚硬, 长期耐磨损, 但有限的抗热和耐化学性, 特别适合研磨介质, 建议在艰苦条件下的长期耐磨损寿命。 Formulated UHMW: Extremely tough, long wearing but limited heat and chemical resistance. Particularly suitable for abrasive media. Recommended for long wear life under severe conditions.
K	棕褐色 Tan	+316°--73°	纯PEEK(聚醚醚酮): 高模量材料, 极佳的耐热性, 推荐使用作为背压环或其它特别应用。 Virgin Polyaryletherketone: A high modulus material with excellent high temperature resistance. Recommended for back-up rings and for special applications.

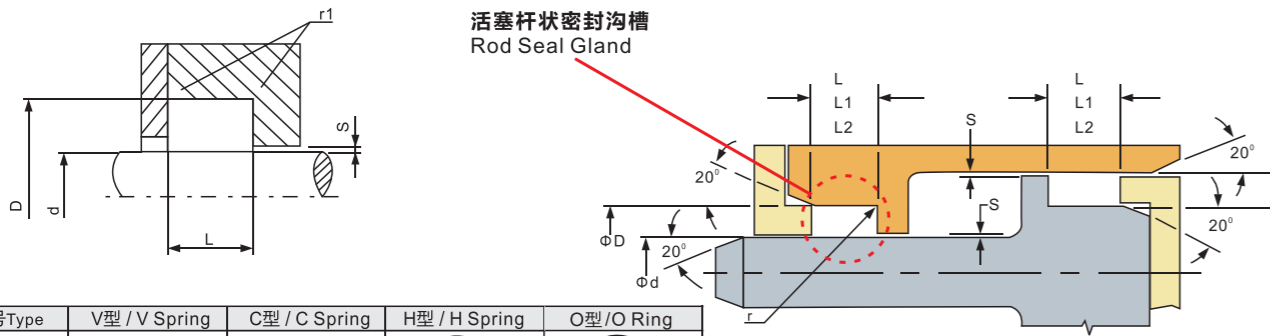
标准选型 Standard Option



非标准选型 Non Standard Option



开放式沟槽 Split groove

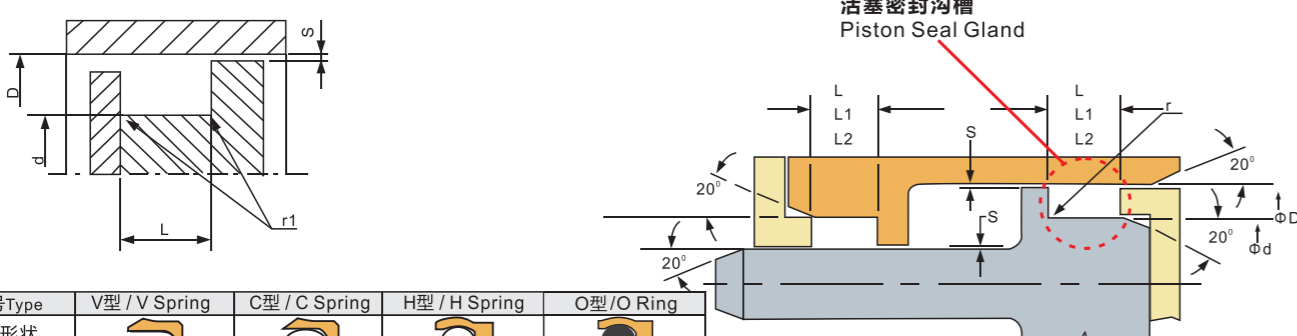


型号Type	V型 / V Spring	C型 / C Spring	H型 / H Spring	O型 / O Ring
截面形状 Profile form				
华乐系列号 Walle Series No.	RV	RC	RH	RO

安装尺寸 Installation Dimensions

华乐系列号针对型号 Walle Series No. for types			活塞杆直径 Rod Diameter d H9mm		沟槽直径 Groove Diameter	沟槽宽度 Groove Width	倒圆 Radius	径向间隙 Radial Clearance S max. *mm			
V型 V Spring	C型 C Spring	H型 H Spring	标准范围 Standard Range	扩展范围 Extended Range	D H9 mm	L+0.2 mm	r1 max. mm	<2MPa (20bar)	<10MPa (100bar)	<20MPa (200bar)	<40MPa (400bar)
RV-0	RC-0	RH-0	3.0-9.9	3.0-40.0	d + 2.9	2.4	0.4	0.20	0.10	0.08	0.05
RV-1	RC-1	RH-1	10.0-19.9	6.0-200.0	d + 4.5	3.6	0.4	0.25	0.15	0.10	0.07
RV-2	RC-2	RH-2	20.0-39.9	10.0-400.0	d + 6.2	4.8	0.6	0.35	0.20	0.15	0.08
RV-3	RC-3	RH-3	40.0-119.9	20.0-700.0	d + 9.4	7.1	0.8	0.50	0.25	0.20	0.10
RV-4	RC-4	RH-4	120.0-630.0	35.0-1600.0	d + 12.2	9.5	0.8	0.60	0.30	0.25	0.12
RV-5	RC-5	RH-5	1000.0-2500.9	80.0-2500.0	d + 19.0	15.0	0.8	0.90	0.50	0.40	0.20

开放式沟槽 Split groove

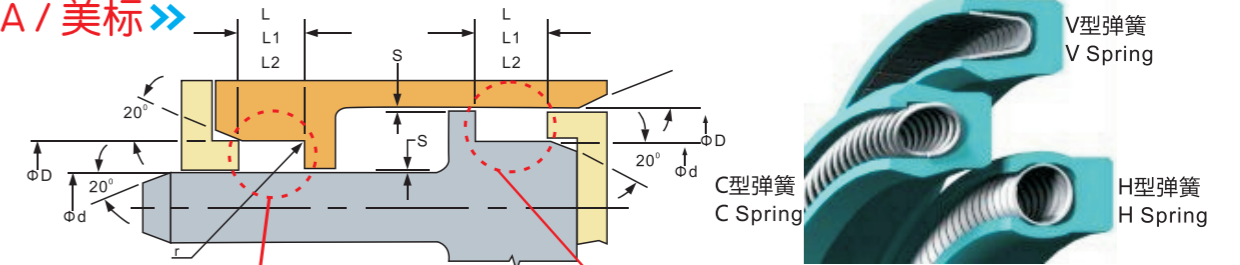


型号Type	V型 / V Spring	C型 / C Spring	H型 / H Spring	O型 / O Ring
截面形状 Profile form				
华乐系列号 Walle Series No.	PV	PC	PH	PO

安装尺寸 Installation Dimensions

华乐系列号针对型号 Walle Series No. for types			缸径 Bore Diameter D H9mm		沟槽直径 Groove Diameter	沟槽宽度 Groove Width	倒圆 Radius	径向间隙 Radial Clearance S max. *mm			
V型 V Spring	C型 C Spring	H型 H Spring	标准范围 Standard Range	扩展范围 Extended Range	d H9 mm	L+0.2 mm	r1 max. mm	<2MPa (20bar)	<10MPa (100bar)	<20MPa (200bar)	<40MPa (400bar)
PV-0	PC-0	PH-0	6.0-13.9	6.0-40.0	D-2.9	2.4	0.4	0.20	0.10	0.08	0.05
PV-1	PC-1	PH-1	14.0-24.9	10.0-200.0	D-4.5	3.6	0.4	0.25	0.15	0.10	0.07
PV-2	PC-2	PH-2	25.0-45.9	16.0-400.0	D-6.2	4.8	0.6	0.35	0.20	0.15	0.08
PV-3	PC-3	PH-3	46.0-124.9	28.0-700.0	D-9.4	7.1	0.8	0.50	0.25	0.20	0.10
PV-4	PC-4	PH-4	125.0-630.0	45.0-1600.0	D-12.2	9.5	0.8	0.60	0.30	0.25	0.12
PV-5	PC-4	PH-5	1000.0-2500.0	1000.0-2500.0	D-19.0	15.0	0.8	0.90	0.50	0.40	0.20

AS 568A / 美标



型号Type	V型 / V Spring	C型 / C Spring	H型 / H Spring	O型 / O Ring
截面形状 Profile form				
华乐系列号 Walle Series No.	RV	RC	RH	RO

型号Type	V型 / V Spring	C型 / C Spring	H型 / H Spring	O型 / O Ring
截面形状 Profile form				
华乐系列号 Walle Series No.	PV	PC	PH	PO

活塞杆/轴用密封圈沟槽尺寸(Rod Seals)

活塞杆直径 Rod Diameter d h9 mm	沟槽直径 Groove Diameter D H9 mm	沟槽宽度 Groove Width L+0.2 mm	华乐零件号 Walle Part No.
3.0	5.9	2.4	000030
4.0	6.9	(3.8)	000040
5.0	7.9	(5.2)	000050
6.0	8.9	(5.2)	000060
8.0	10.9	(5.2)	000080
10.0	14.5	(5.0)	100100
12.0	16.5	(5.0)	100120
14.0	18.5	(6.4)	100140
15.0	19.5	(6.4)	100150
16.0	20.5	(6.4)	100160
18.0	22.5	(6.4)	100180
20.0	26.2	(6.2)	200200
22.0	28.2	(6.2)	200220
25.0	31.2	(7.6)	200250
28.0	34.2	(7.6)	200280
30.0	36.2	(7.6)	200300
32.0	38.2	(7.6)	200320
35.0	41.2	(7.6)	200350
36.0	42.2	(7.6)	200360
40.0	49.4	(9.0)	300400
42.0	51.4	(9.0)	300420
45.0	54.4	(9.0)	300450
48.0	57.4	(9.0)	300480
50.0	59.4	(9.0)	300500
52.0	61.4	(9.0)	300520
55.0	64.4	(9.0)	300550
56.0	65.4	(9.0)	300560
60.0	69.4	(9.0)	300600
63.0	72.4	(9.0)	300630
65.0	74.4	(9.0)	300650
70.0	79.4	(10.9)	300700
75.0	84.4	(10.9)	300750
80.0	89.4	(10.9)	300800
85.0	94.4	(10.9)	300850
90.0	99.4	(10.9)	300900
95.0	104.4	(10.9)	300950
100.0	109.4	(10.9)	301000
105.0	114.4	(10.9)	301050
110.0	119.4	(10.9)	301100
115.0	124.4	(10.9)	301150
120.0	132.2	(12.3)	401200
125.0	137.2	(12.3)	401250
130.0	142.2	(12.3)	401300
135.0	147.2	(12.3)	401350
140.0	152.2	(12.3)	401400
150.0	162.2	(12.3)	401500
160.0	172.2	(12.3)	401600
170.0	182.2	(12.3)	401700
180.0	192.2	(12.3)	401800
190.0	202.2	(12.3)	401900
200.0	212.2	(15.1)	402000
210.0	222.2	(15.1)	402100
220.0	232.2	(15.1)	402200
230.0	242.2	(15.1)	402300
240.0	252.2	(15.1)	402400
250.0	262.2	(15.1)	402500
280.0	292.2	(15.1)	402800
300.0	312.2	(15.1)	403000
320.0	332.2	(15.1)	403200
350.0	362.2	(15.1)	403500
360.0	372.2	(15.1)	403600
400.0	412.2	(15.1)	404000

活塞/孔用密封圈沟槽尺寸(Piston Seals)

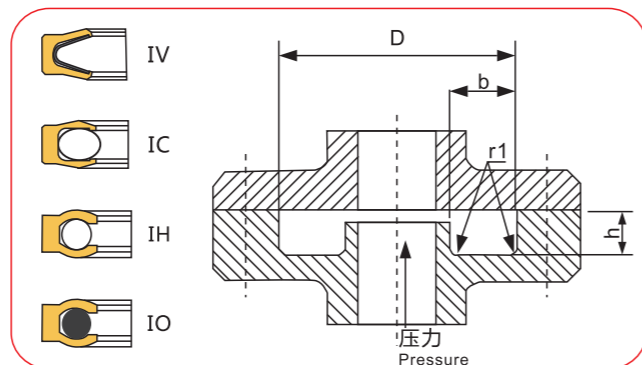
活塞直径 Bore Diameter D H9 mm	沟槽直径 Groove Diameter d h9 mm	沟槽宽度 Groove Width L+0.2 mm	华乐零件号 Walle Part No.
6.0	3.1	2.4	000060
8.0	5.1	(3.8)	000080
10.0	7.1	(5.2)	000100
12.0	9.1	(5.2)	000120
14.0	9.5	(5.0)	100140
15.0	10.5	(5.0)	100150
16.0	11.5	(6.4)	100160
18.0	13.5	(6.4)	100180
20.0	15.5	(6.4)	100200
22.0	17.5	(6.4)	100220
25.0	18.8	(6.2)	200250
28.0	21.8	(6.2)	200280
30.0	23.8	(6.2)	200300
32.0	25.8	(7.6)	200320
35.0	28.8	(7.6)	200350
40.0	33.8	(7.6)	200400
42.0	35.8	(7.6)	200420
45.0	38.8	(7.6)	200450
48.0	38.6	(9.0)	300480
50.0	40.6	(9.0)	300500
52.0	42.6	(9.0)	300520
55.0	45.6	(9.0)	300550
56.0	46.6	(9.0)	300560
60.0	50.6	(9.0)	300600
63.0	53.6	(9.0)	300630
65.0	55.6	(9.0)	300650
70.0	60.6	(10.9)	300700
75.0	65.6	(10.9)	300750
80.0	70.6	(10.9)	300800
85.0	75.6	(10.9)	300850
90.0	80.6	(10.9)	300900
95.0	85.6	(10.9)	300950
100.0	90.6	(10.9)	301000
110.0	100.6	(10.9)	301100
115.0	105.6	(10.9)	301150
120.0	110.6	(10.9)	301200
125.0	112.8	(12.3)	401250
130.0	117.8	(12.3)	401300
135.0	122.8	(12.3)	401350
140.0	127.8	(12.3)	401400
150.0	137.8	(12.3)	401500
160.0	147.8	(12.3)	401600
170.0	157.8	(12.3)	401700
180.0	167.8	(12.3)	401800
190.0	177.8	(12.3)	401900
200.0	187.8	(12.3)	402000
210.0	197.8	(12.3)	402100
220.0	207.8	(12.3)	402200
230.0	217.8	(12.3)	402300
240.0	227.8	(15.1)	402400
250.0	237.8	(15.1)	402500
280.0	267.8	(15.1)	402800
300.0	287.8	(15.1)	403000
320.0	307.8	(15.1)	403200
350.0	337.8	(15.1)	403500
400.0	387.8	(15.1)	404000
420.0	407.8	(15.1)	404200
450.0	437.8	(15.1)	404500
480.0	467.8	(15.1)	404800
500.0	487.8	(15.1)	405000

AS 568A / 美标 >>



IH 型  
H Spring

内部端面密封-用于内部压力  
(Inside Face Seal-For Internal pressure)



安装尺寸 Installation Dimensions

华乐系列号针对型号 Walle Series No. for types			沟槽外侧直径 Groove Outside Diameter D H11 mm		沟槽宽度b Groove Width b mm	沟槽深度 h Groove Depth h		倒圆 Radius r1mm
V型 V Spring	C型 C Spring	H型 HS pring	推荐的范围 Recommended Range	扩展的范围 Extended Range	min	h mm	公差 mm	max.
IV-0	IC-0	IH-0	10-13.9	10-40	2.4	1.45	+0.03	0.4
IV-1	IC-1	IH-1	14-24.9	13-200	3.6	2.25	+0.05	0.4
IV-2	IC-2	IH-2	25-45.9	18-400	4.8	3.10	+0.08	0.6
IV-3	IC-3	IH-3	46-124.9	28-700 <sup>1)</sup>	7.1	4.70	+0.10	0.8
IV-4	IC-4	IH-4	125-999.9 <sup>**]</sup>	45-100 <sup>**]</sup>	9.5	6.10	+0.15	0.8
IV-5	IC-5	IH-5	1000-2500 <sup>***]</sup>	110-2500 <sup>***]</sup>	15.0	9.50	+0.20	0.8

针对直径大于600mm,最小b=8.0mm 针对直径大于600mm,最小b=11.0mm 针对直径大于1000mm,最小b=18.0mm <sup>1)</sup>根据要求提供 For diameters above 600 mm b min. = 8.0 mm For diameters above 600 mm b min. = 11.0 mm For diameters above 1000 mm b min. = 18.0 mm <sup>1)</sup>Available on request

沟槽外侧直径 Groove Outside Diameter D H11 mm	沟槽宽度 Groove Width b mm	沟槽深度 Groove Depth h mm	华乐零件号 Walle Part No.
10.0	2.4	1.45	000100
12.0	2.4	1.45	000120
14.0	3.6	2.25	100140
15.0	3.6	2.25	100150
16.0	3.6	2.25	100160
18.0	3.6	2.25	100180
20.0	3.6	2.25	100200
22.0	3.6	2.25	100220
25.0	4.8	3.10	200250
28.0	4.8	3.10	200280
30.0	4.8	3.10	200300
32.0	4.8	3.10	200320
35.0	4.8	3.10	200350
36.0	4.8	3.10	200360
40.0	4.8	3.10	200400
42.0	4.8	3.10	200420
45.0	4.8	3.10	200450
48.0	7.1	4.70	300480
50.0	7.1	4.70	300500
52.0	7.1	4.70	300520
55.0	7.1	4.70	300550
56.0	7.1	4.70	300560
60.0	7.1	4.70	300600
63.0	7.1	4.70	300630
65.0	7.1	4.70	300650
70.0	7.1	4.70	300700
75.0	7.1	4.70	300750
80.0	7.1	4.70	300800
85.0	7.1	4.70	300850
90.0	7.1	4.70	300900
95.0	7.1	4.70	300950

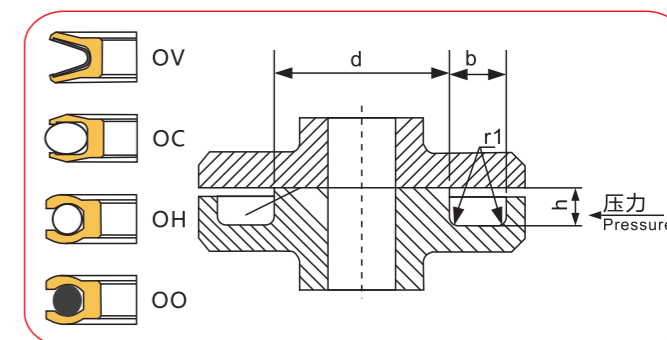
能够提供达到500mm直径的所有中间尺寸。>500mm直到2500mm直径, 根据要求供货。<sup>1)</sup>沟槽深度的公差, 见表。  
All intermediate sizes up to 500 mm diameter can be supplied. Sizes > 500 mm diameter up to 2500 mm diameter on request. <sup>1)</sup>Tolerances for groove depth, see Table.

AS 568A / 美标 >>



OV 型  
V Spring

外部端面密封-用于外部压力/真空  
(Outside Face Seal-For External pressure/Vacuum)



安装尺寸 Installation Dimensions

华乐系列号针对型号 Walle Series No. for types			沟槽内侧直径 Groove inside Diameter d H11 mm		沟槽宽度b Groove Width b mm	沟槽深度 h Groove Depth h		倒圆 Radius r1mm
V型 V Spring	C型 C Spring	H型 HS pring	推荐的范围 Recommended Range	扩展的范围 Extended Range	min	h mm	公差 mm	max.
OV-0	OC-0	OH-0	3-9.9	3-40	2.4	1.45	+0.03	0.4
OV-1	OC-1	OH-1	10-19.9	8-200	3.6	2.25	+0.05	0.4
OV-2	OC-2	OH-2	20-39.9	12-400	4.8	3.10	+0.08	0.6
OV-3	OC-3	OH-3	40-119.9	20-700 <sup>1)</sup>	7.1	4.70	+0.10	0.8
OV-4	OC-4	OH-4	120-999.9 <sup>**]</sup>	35-100 <sup>**]</sup>	9.5	6.10	+0.15	0.8
OV-5	OC-5	OH-5	1000-2500 <sup>***]</sup>	80-2500 <sup>***]</sup>	15.0	9.50	+0.20	0.8

针对直径大于600mm,最小b=8.0mm 针对直径大于600mm,最小b=11.0mm 针对直径大于1000mm,最小b=18.0mm <sup>1)</sup>根据要求提供 For diameters above 600 mm b min. = 8.0 mm request For diameters above 600 mm b min. = 11.0 mm For diameters above 1000 mm b min. = 18.0 mm <sup>1)</sup>Available on request

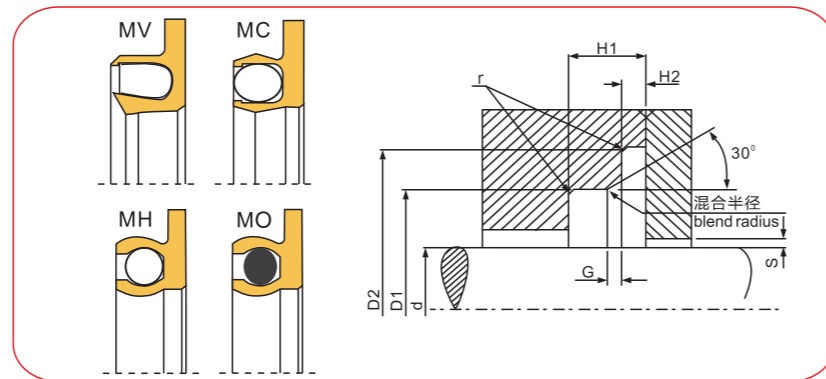
华乐件号, 用于外部压力/真空 Walle Part numbers for External Pressure / Vacuum

沟槽内侧直径 Groove Inside Diameter d H11 mm	沟槽宽度 Groove Width b mm	沟槽深度 Groove Depth h mm	华乐零件号 Walle Part No.
4.0	2.4	1.4	000040
5.0	2.4	1.4	000050
6.0	2.4	1.4	000060
8.0	2.4	1.4	000080
10.0	3.6	2.2	100100
12.0	3.6	2.2	100120
14.0	3.6	2.2	100140
15.0	3.6	2.2	100150
16.0	3.6	2.2	100160
18.0	3.6	2.2	100180
20.0	4.8	3.1	200200
22.0	4.8	3.1	200220
25.0	4.8	3.1	200250
28.0	4.8	3.1	200280
30.0	4.8	3.1	200300
32.0	4.8	3.1	200320
35.0	4.8	3.1	200350
36.0	4.8	3.1	200360
40.0	7.1	4.7	300400
42.0	7.1	4.7	300420
45.0	7.1	4.7	300450
48.0	7.1	4.7	300480
50.0	7.1	4.7	300500
52.0	7.1	4.7	300520
55.0	7.1	4.7	300550
56.0	7.1	4.7	300560
60.0	7.1	4.7	300600
63.0	7.1	4.7	300630
65.0	7.1	4.7	300650
70.0	7.1	4.7	300700
75.0	7.1	4.7	300750
80.0	7.1	4.7	300800
85.0	7.1	4.7	300850

沟槽内侧直径 Groove Inside Diameter d H11 mm	沟槽宽度 Groove Width b mm	沟槽深度 Groove Depth h mm	华乐零件号 Walle Part No.
90.0	7.1	4.7	300900
95.0	7.1	4.7	300950
100.0	7.1	4.7	301000
105.0	7.1	4.7	301050
110.0	7.1	4.7	301100
115.0	7.1	4.7	301150
120.0	9.5	6.1	401200
125.0	9.5	6.1	401250
130.0	9.5	6.1	401300
135.0	9.5	6.1	401350
140.0	9.5	6.1	401400
150.0	9.5	6.1	401500
160.0	9.5	6.1	401600
170.0	9.5	6.1	401700
180.0	9.5	6.1	401800
190.0	9.5	6.1	401900
200.0	9.5	6.1	402000
210.0	9.5	6.1	402100
220.0	9.5	6.1	402200
230.0	9.5	6.1	402300
240.0	9.5	6.1	402400
250.0	9.5	6.1	402500
280.0	9.5	6.1	402800
300.0	9.5	6.1	403000
320.0	9.5	6.1	403200
350.0	9.5	6.1	403500
360.0	9.5	6.1	403600
400.0	9.5	6.1	404000
420.0	9.5	6.1	404200
450.0	9.5	6.1	404500
480.0	9.5	6.1	404800
500.0	9.5	6.1	405000

能够提供达到500mm直径的所有中间尺寸; >500mm直到2500mm直径, 根据要求供货。<sup>1)</sup>沟槽深度的公差, 见表。  
All intermediate sizes up to 500 mm diameter can be supplied. Sizes > 500 mm diameter up to 2500 mm diameter on request. <sup>1)</sup>Tolerances for groove depth, see Table.

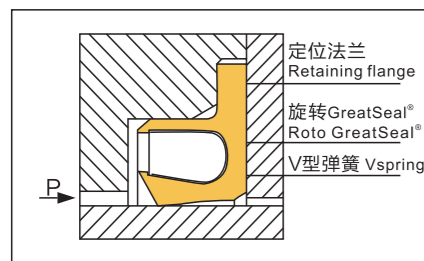
## 旋转GreatSeal® / Roto GreatSeal®



## 安装尺寸 Installation Dimensions

华乐系列号针对型号 Walle Series No. for types			活塞杆直径 Rod Diameter df&h9 mm		沟槽直径 Groove Diameter		沟槽宽度 Groove Width		引入倒角 Introduced Chamfer	倒圆 Radius	径向间隙 Radial Clearance Smax. mm		
V型 V Spring	C型 C Spring	H型 H Spring	标准范围 Standard Range	扩展范围 Extended Range	D1 H9 mm	D2 H10 mm	H1 mm	H2 mm	G mm	rmax. mm	<2MPa (20bar)	<10MPa (100bar)	<20MPa (200bar)
MV-1	MC-1	MH-1	5.0-19.9	20.0-200.0	d+5.0	d+9.0	3.6	0.85 <sub>+0<sup>-0.1</sup></sub>	0.8	0.3	0.25	0.15	0.10
MV-2	MC-2	MH-2	20.0-39.9	10.0-400.0	d+7.0	d+12.5	4.8	1.35 <sub>+0<sup>-0.15</sup></sub>	1.1	0.4	0.35	0.20	0.15
MV-3	MC-3	MH-3	40.0-399.9	20.0-700.0	d+10.5	d+17.5	7.1	1.80 <sub>+0<sup>-0.20</sup></sub>	1.4	0.5	0.50	0.25	0.20
MV-4	MC-4	MH-4	400.0-999.9	35.0-999.9	d+14.0	d+22.0	9.5	2.80 <sub>+0<sup>-0.20</sup></sub>	1.6	0.5	0.60	0.30	0.25

<sup>1</sup>根据要求提供 <sup>2</sup>对于直径大于标准范围的请和本公司联系。  
Available on request 2) For diameters larger than the standard range contact Walle



### 旋转GreatSeal®的安装(Installation of Roto GreatSeal®)

旋转GreatSeal®应当只能安装在开放工沟槽中。  
为了配合同心和无应力，按照下面的步骤进行安装：

- ①把密封放入开放式沟槽中
- ②配上盖，先不拧紧
- ③安装轴
- ④把盖固定在体上

GreatSeal® should only be installed in split grooves.

Carry out installation following the steps below for a concentric and strain-free fit:

- ①Place seal in the open groove
- ②Fit the cover and secure loosely
- ③Install shaft
- ④Tighten cover onto block

### 轴支承和径向间隙(Shaft Bearing and Radial Clearance)

密封件不能作为密封和支承合在一起使用，因为密封功能将下降。  
建议密封件用滚子或滑动轴承来导向，容许的偏心度详见表1。  
Seals should not be used jointly as a seal and bearing as the sealing function will be reduced. It is recommended that the seals are guided with a roller or a slide bearing. Acceptable eccentricity is detailed in table 1.

## 技术数据 Technical Data

### 工作压力 Operating pressure

最大动态负载(Maximum dynamic load):  
15MPa(150bar,2175psi)

最大静态负载(Maximum static load):  
25MPa(250bar,3626psi)

### 速度 Speed

往复运动达(Reciprocating up to):10m/s(33ft/sec)

旋转运动达(Rotating up to):2m/s(6.5ft/sec)

### 工作温度 Operating temperature

-100℃(-148°F)至+260℃(+500°F)

介质相容性 Media compatibility:几乎所有流体，化学制品和气体。  
(Virtually all fluids, chemicals and gases.)

注意:在高温下，压力和速度要降低。

Note:At high temperatures operating pressures and speeds are lower.

表1 容许的偏心度，针对旋转GreatSeal®  
Table 1 Permissible Eccentricity for Roto GreatSeal®

华乐系列号 Walle Series No.	容许的最大偏差 mm Max. allowable deviation mm
MV-1	0.05
MV-2	0.10
MV-3	0.15
MV-4	0.20

## 旋转GreatSeal® 标准选型 / Roto GreatSeal® standard option

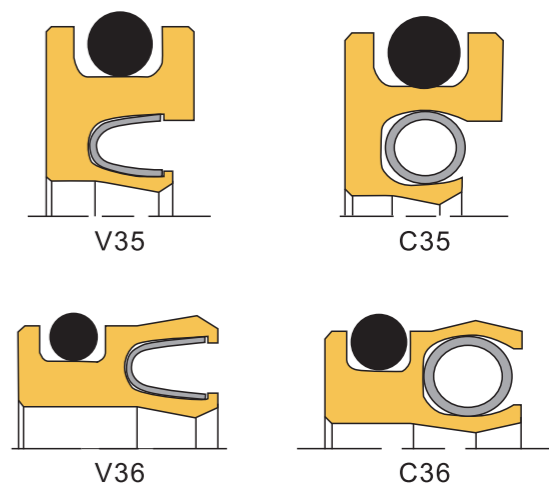
活塞杆直径 Rod Diameter	沟槽直径 Groove Diameter	沟槽宽度 Groove Width	华乐零件号 Walle Part No.
d f&h9 mm	D1 H9 mm	H1 min. mm	
5.0	10.0	3.6	100050
6.0	11.0	3.6	100060
8.0	13.0	3.6	100080
10.0	15.0	3.6	100100
12.0	17.0	3.6	100120
14.0	19.0	3.6	100140
15.0	20.0	3.6	100150
16.0	21.0	3.6	100160
18.0	23.0	3.6	100180
20.0	27.0	4.8	200200
22.0	29.0	4.8	200220
25.0	32.0	4.8	200250
28.0	35.0	4.8	200280
30.0	37.0	4.8	200300
32.0	39.0	4.8	200320
35.0	42.0	4.8	200350
36.0	43.0	4.8	200360
40.0	50.5	7.1	300400
42.0	52.5	7.1	300420
45.0	55.5	7.1	300450
48.0	58.5	7.1	300480
50.0	60.5	7.1	300500
52.0	62.5	7.1	300520
55.0	65.5	7.1	300550
56.0	66.5	7.1	300560
60.0	70.5	7.1	300600
63.0	73.5	7.1	300630
65.0	75.5	7.1	300650
70.0	80.5	7.1	300700
75.0	85.5	7.1	300750
80.0	90.5	7.1	300800
85.0	95.5	7.1	300850
90.0	100.5	7.1	300900

活塞杆直径 Rod Diameter	沟槽直径 Groove Diameter	沟槽宽度 Groove Width	华乐零件号 Walle Part No.
d f&h9 mm	D1 H9 mm	H1 min. mm	
95.0	105.5	7.1	300950
100.0	110.5	7.1	301000
105.0	115.5	7.1	301050
110.0	120.5	7.1	301100
115.0	125.5	7.1	301150
120.0	130.5	7.1	301200
125.0	135.5	7.1	301250
130.0	140.5	7.1	301300
135.0	145.5	7.1	301350
140.0	150.5	7.1	301400
150.0	160.5	7.1	301500
160.0	170.5	7.1	301600
170.0	180.5	7.1	301700
180.0	190.5	7.1	301800
190.0	200.5	7.1	301900
200.0	210.5	7.1	302000
210.0	220.5	7.1	302100
220.0	230.5	7.1	302200
230.0	240.5	7.1	302300
240.0	250.5	7.1	302400
250.0	260.5	7.1	302500
280.0	290.5	7.1	302800
300.0	310.5	7.1	303000
320.0	330.5	7.1	303200
350.0	360.5	7.1	303500
360.0	370.5	7.1	303600
400.0	414.0	9.5	404000
420.0	434.0	9.5	404200
450.0	464.0	9.5	404500
480.0	494.0	9.5	404800
500.0	514.0	9.5	405000
600.0	614.0	9.5	406000
700.0	714.0	9.5	407000

## 配合表面材料 Mating Surface Materials

旋转运动的密封要求非常好的配合表面，建议最低硬度为55 HRC，淬火深度至少0.3mm。对有镀层的表面要特别注意，并且要求通过镀层有良好的散热。

Sealing of applications with rotating movements require very good mating surfaces. A minimum hardness 55 HRC is recommended to a hardening depth of at least 0.3 mm. Particular attention must be paid to coated surfaces and good heat dissipation through the coating is required.

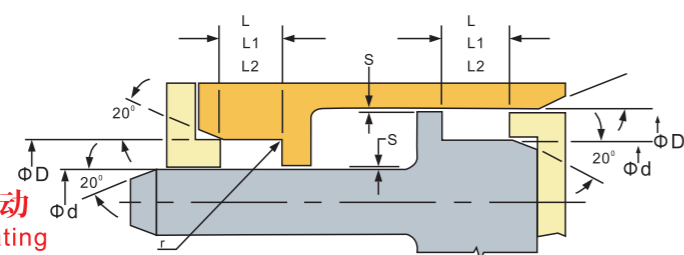


## JIS B / 日标 >>



V型弹簧 GreatSeal®  
V Spring GreatSeal®

往复运动  
Reciprocating



C型弹簧 GreatSeal®  
C Spring GreatSeal®



H型弹簧 GreatSeal®  
H Spring GreatSeal®

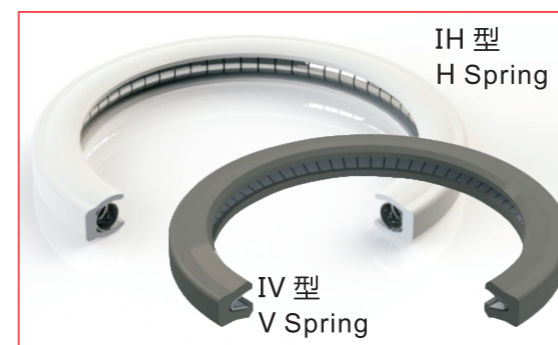
型号Type	V型 / V Spring	C型 / C Spring	H型 / H Spring	O型 / O Ring
截面形状 Profile form				
华乐系列号 Walle Series No.	RV	RC	RH	RO

型号Type	V型 / V Spring	C型 / C Spring	H型 / H Spring	O型 / O Ring
截面形状 Profile form				
华乐系列号 Walle Series No.	PV	PC	PH	PO

d h9 mm	D H9 mm	L+0.2 mm	华乐零件号 Walle Part No.	
3.00	6.00	(2.5) (3.9) 5.4	000030	
4.00	7.00		000040	
5.00	8.00		000050	
6.00	9.00		000060	
7.00	10.00		000070	
8.00	11.00		000080	
9.00	12.00		000090	
10.00	13.00		000100	
10.00	14.00		100100A	
11.00	15.00		100110	
11.20	15.20	100112		
12.00	16.00	100120		
12.50	16.50	100125		
14.00	18.00	100140		
15.00	19.00	100150		
16.00	20.00	100160		
18.00	22.00	100180		
20.00	24.00	100200		
21.00	25.00	100210		
22.00	26.00	100220		
22.00	28.00	(3.2) (4.4) 6.0	200220A	
22.40	28.40		200224	
24.00	30.00		200240	
25.00	31.00		200250	
25.50	31.50		200255	
26.00	32.00		200260	
28.00	34.00		200280	
29.00	35.00		200290	
29.50	35.50		200295	
30.00	36.00		200300	
31.00	37.00		200310	
31.50	37.50		200315	
32.00	38.00		200320	
34.00	40.00		200340	
35.00	41.00		200350	
35.50	41.50		200355	
36.00	42.00		200360	
38.00	44.00		200380	
39.00	45.00		200390	
40.00	46.00		200400	
41.00	47.00		200410	
42.00	48.00		200420	
44.00	50.00		200440	
45.00	51.00		200450	
46.00	52.00		200460	
48.00	54.00		200480	
49.00	55.00		200490	
50.00	56.00		200500	
48.00	58.00		(4.7) (6.0) 7.8	300480A
50.00	60.00			300500A
52.00	62.00	300520		
53.00	63.00	300530		
55.00	65.00	300550		
56.00	66.00	300560		
58.00	68.00	300580		
60.00	70.00	300600		
62.00	72.00	300620		
63.00	73.00	300630		
65.00	75.00	300650		
67.00	77.00	300670		
70.00	80.00	300700		
28.00	30.00	(7.5) (9.0) 11.5		300710
29.00	31.00			300750
30.00	32.00			300800
31.00	33.00			300850
32.00	34.00			300900
33.00	35.00			300950
34.00	36.00			301000
35.00	37.00			301020
36.00	38.00			301050
37.00	39.00		301100	
38.00	40.00		301110	
39.00	41.00		301120	
40.00	42.00		301150	
41.00	43.00		301200	
42.00	44.00		301250	
43.00	45.00		301300	
44.00	46.00		301320	
45.00	47.00		301350	
46.00	48.00		3001400	
47.00	49.00		3001450	
48.00	50.00		3001500	
150.00	165.00		(7.5) (9.0) 11.5	4001500A
155.00	170.00			4001550
160.00	175.00			4001600
165.00	180.00			4001650
170.00	185.00			4001700
175.00	190.00			4001750
180.00	195.00			4001800
185.00	200.00	4001850		
190.00	205.00	4001900		
195.00	210.00	4001950		
200.00	215.00	4002000		
205.00	220.00	4002050		
209.00	224.00	4002090		
210.00	225.00	4002100		
215.00	230.00	4002150		
220.00	235.00	4002200		
225.00	240.00	4002250		
230.00	245.00	4002300		
235.00	250.00	4002350		
240.00	255.00	4002400		
245.00	260.00	4002450		
250.00	265.00	4002500		
255.00	270.00	4002550		
260.00	275.00	4002600		
265.00	280.00	4002650		
270.00	285.00	4002700		
275.00	290.00	4002750		
280.00	295.00	4002800		
285.00	300.00	4002850		
290.00	305.00	4002900		
295.00	310.00	4002950		
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315.00	330.00	4003150		
320.00	335.00	4003200		
335.00	350.00	4003350		
340.00	355.00	4003400		
355.00	370.00	4003550		
360.00	375.00	4003600		
375.00	390.00	4003750		
385.00	400.00	4003850		
400.00	415.00	4004000		

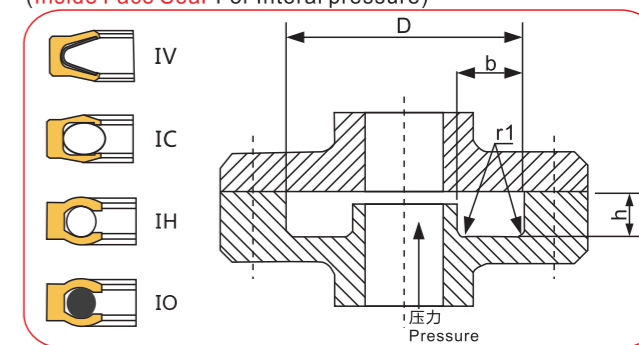
d h9 mm	D H9 mm	L+0.2 mm	华乐零件号 Walle Part No.
71.00	81.00	(7.5) (9.0) 11.5	300710
75.00	85.00		300750
80.00	90.00		300800
85.00	95.00		300850
90.00	100.00		300900
95.00	105.00		300950
100.00	110.00		301000
102.00	112.00		301020
105.00	115.00		301050
110.00	120.00		301100
112.00	122.00		301120
115.00	125.00		301150
120.00	130.00		301200
125.00	135.00		301250
130.00	140.00		3001300
132.00	142.00	3001320	
135.00	145.00	3001350	
140.00	150.00	3001400	
145.00	155.00	3001450	
150.00	160.00	3001500	
150.00	165.00	(11.0) (13.0) 17.0	4001500A
155.00	170.00		4001550
160.00	175.00		4001600
165.00	180.00		4001650
170.00	185.00		4001700
175.00	190.00		4001750
180.00	195.00		4001800
185.00	200.00		4001850
190.00	205.00		4001900
195.00	210.00		4001950
200.00	215.00		4002000
205.00	220.00		4002050
209.00	224.00		4002090
210.00	225.00		4002100
215.00	230.00		4002150
220.00	235.00		4002200
225.00	240.00		4002250
230.00	245.00		4002300
235.00	250.00		4002350
240.00	255.00		4002400
245.00	260.00		4002450
250.00	265.00		4002500
255.00	270.00		4002550
260.00	275.00		4002600
265.00	280.00		4002650
270.00	285.00		4002700
275.00	290.00		4002750
280.00	295.00		4002800
285.00	300.00		4002850
290.00	305.00		4002900
295.00	310.00	4002950	
300.00	315.00	4003000	
315.00	330.00	4003150	
320.00	335.00	4003200	
335.00	350.00	4003350	
340.00	355.00	4003400	
355.00	370.00	4003550	
360.00	375.00	4003600	
375.00	390.00	4003750	
385.00	400.00	4003850	
400.00	415.00	4004000	

## JIS B / 日标 >>



沟槽外侧直径 Groove Outside Diameter	沟槽宽度 Groove Width	沟槽深度 Groove Depth	华乐零件号 Walle Part No.
D H11(mm)	b(mm)	h(mm)	
9.00	2.5	1.4	000090
10.00	2.5	1.4	000100
11.00	2.5	1.4	000110
12.00	2.5	1.4	000120
13.00	2.5	1.4	000130
14.00	3.2	1.8	100140
15.00	3.2	1.8	100150
15.20	3.2	1.8	100152
16.00	3.2	1.8	100160
16.50	3.2	1.8	100165
18.00	3.2	1.8	100180
19.00	3.2	1.8	100190
20.00	3.2	1.8	100200
22.00	3.2	1.8	100220
24.00	3.2	1.8	100240
25.00	3.2	1.8	100250
26.00	3.2	1.8	100260
28.00	4.7	2.7	200280
29.50	4.7	2.7	200295
30.00	4.7	2.7	200300
31.00	4.7	2.7	200310
31.50	4.7	2.7	200315
32.00	4.7	2.7	200320
34.00	4.7	2.7	200340
35.00	4.7	2.7	200350
35.50	4.7	2.7	200355
36.00	4.7	2.7	200360
37.00	4.7	2.7	200370
37.50	4.7	2.7	200375
39.00	4.7	2.7	200390
40.00	4.7	2.7	200400
41.00	4.7	2.7	200410
41.50	4.7	2.7	200415
42.00	4.7	2.7	200420
44.00	4.7	2.7	200440
45.00	4.7	2.7	200450
46.00	4.7	2.7	200460
47.00	4.7	2.7	200470
48.00	4.7	2.7	200480
50.00	4.7	2.7	200500
51.00	4.7	2.7	200510
52.00	4.7	2.7	200520
54.00	4.7	2.7	200540
55.00	4.7	2.7	200550
56.00	4.7	2.7	200560
58.00	7.5	4.6	300580
60.00	7.5	4.6	300600
62.00	7.5	4.6	300620
63.00	7.5	4.6	300630
65.00	7.5	4.6	300650
66.00	7.5	4.6	300660
68.00	7.5	4.6	300680
70.00	7.5	4.6	300700
72.00	7.5	4.6	300720
73.00	7.5	4.6	300730
75.00	7.5	4.6	300750
77.00	7.5	4.6	300770
80.00	7.5	4.6	300800
81.00	7.5	4.6	300810
85.00	7.5	4.6	300850

## 内部端面密封-用于内部压力 (Inside Face Seal-For Internal pressure)

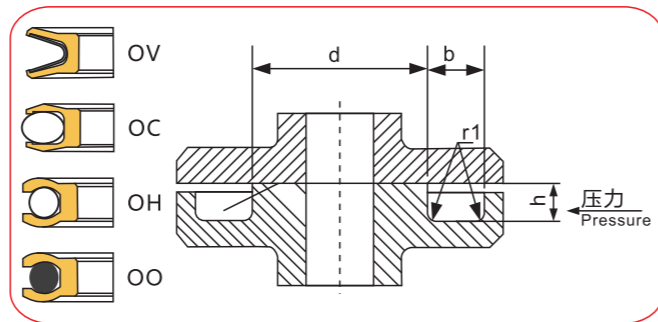


沟槽外侧直径 Groove Outside Diameter	沟槽宽度 Groove Width	沟槽深度 Groove Depth	华乐零件号 Walle Part No.
D H11(mm)	b(mm)	h(mm)	
90.00	7.5	4.6	300900
95.00	7.5	4.6	300950
100.00	7.5	4.6	301000
105.00	7.5	4.6	301050
110.00	7.5	4.6	301100
112.00	7.5	4.6	301120
115.00	7.5	4.6	301150
120.00	7.5	4.6	301200
122.00	7.5	4.6	301220
125.00	7.5	4.6	301250
130.00	7.5	4.6	301300
135.00	7.5	4.6	301350
140.00	7.5	4.6	301400
142.00	7.5	4.6	301420
145.00	7.5	4.6	301450
150.00	7.5	4.6	301500
155.00	7.5	4.6	301550
160.00	7.5	4.6	301600
165.00	11.0	6.9	401650
170.00	11.0	6.9	401700
175.00	11.0	6.9	401750
180.00	11.0	6.9	401800
185.00	11.0	6.9	401850
190.00	11.0	6.9	401900
195.00	11.0	6.9	401950
200.			

JIS B / 日标



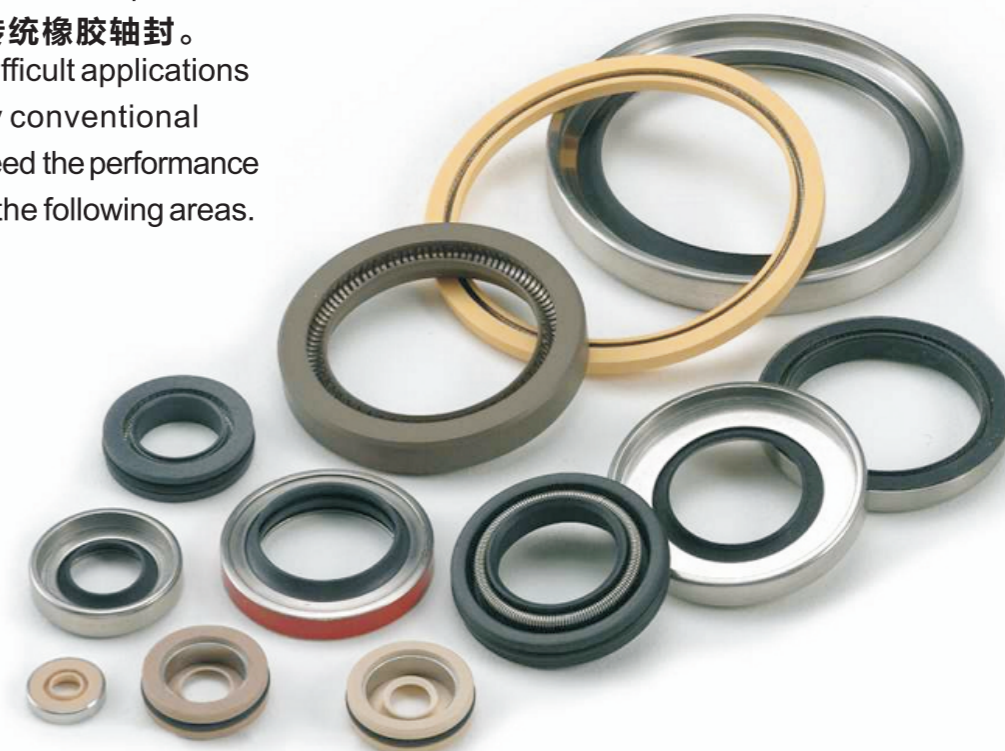
外部端面密封-用于外部压力/真空  
(Outside Face Seal-For External pressure/Vacuum)



沟槽外侧直径 Groove Outside Diameter	沟槽宽度 Groove Width	沟槽深度 Groove Depth	华乐零件号 Walle Part No.
d H11(mm)	b(mm)	h(mm)	
3.00	2.5	1.4	000030
4.00	2.5	1.4	000040
5.00	2.5	1.4	000050
6.00	2.5	1.4	000060
7.00	2.5	1.4	000070
8.00	2.5	1.4	000080
9.00	2.5	1.4	000090
10.00	2.5	1.4	000100
10.00	3.2	1.8	100100A
11.00	3.2	1.8	100110
11.20	3.2	1.8	100112
12.00	3.2	1.8	100120
12.50	3.2	1.8	100125
14.00	3.2	1.8	100140
15.00	3.2	1.8	100150
16.00	3.2	1.8	100160
18.00	3.2	1.8	100180
20.00	3.2	1.8	100200
21.00	3.2	1.8	100210
22.00	3.2	1.8	100220
22.00	4.7	2.7	200220A
22.40	4.7	2.7	200224
24.00	4.7	2.7	200240
25.00	4.7	2.7	200250
25.50	4.7	2.7	200255
26.00	4.7	2.7	200260
28.00	4.7	2.7	200280
29.00	4.7	2.7	200290
29.50	4.7	2.7	200295
30.00	4.7	2.7	200300
31.00	4.7	2.7	200310
31.50	4.7	2.7	200315
32.00	4.7	2.7	200320
34.00	4.7	2.7	200340
35.00	4.7	2.7	200350
35.50	4.7	2.7	200355
36.00	4.7	2.7	200360
38.00	4.7	2.7	200380
39.00	4.7	2.7	200390
40.00	4.7	2.7	200400
41.00	4.7	2.7	200410
42.00	4.7	2.7	200420
44.00	4.7	2.7	200440
45.00	4.7	2.7	200450
46.00	4.7	2.7	200460
48.00	4.7	2.7	200480
49.00	4.7	2.7	200490
50.00	4.7	2.7	200500
48.00	7.5	4.6	300480A
50.00	7.5	4.6	300500A
52.00	7.5	4.6	300520
53.00	7.5	4.6	300530
55.00	7.5	4.6	300550
56.00	7.5	4.6	300560
58.00	7.5	4.6	300580
60.00	7.5	4.6	300600
62.00	7.5	4.6	300620
63.00	7.5	4.6	300630
65.00	7.5	4.6	300650
67.00	7.5	4.6	300670
70.00	7.5	4.6	300700

沟槽外侧直径 Groove Outside Diameter	沟槽宽度 Groove Width	沟槽深度 Groove Depth	华乐零件号 Walle Part No.
d H11(mm)	b(mm)	h(mm)	
71.00	7.5	4.6	300710
75.00	7.5	4.6	300750
80.00	7.5	4.6	300800
85.00	7.5	4.6	300850
90.00	7.5	4.6	300900
95.00	7.5	4.6	300950
100.00	7.5	4.6	3001000
102.00	7.5	4.6	3001020
105.00	7.5	4.6	3001050
110.00	7.5	4.6	3001100
112.00	7.5	4.6	3001120
115.00	7.5	4.6	3001150
120.00	7.5	4.6	3001200
125.00	7.5	4.6	3001250
130.00	7.5	4.6	3001300
132.00	7.5	4.6	3001320
135.00	7.5	4.6	3001350
140.00	7.5	4.6	3001400
145.00	7.5	4.6	3001450
150.00	7.5	4.6	3001500
160.00	11.0	6.9	4001500A
155.00	11.0	6.9	4001550
160.00	11.0	6.9	4001600
165.00	11.0	6.9	4001650
170.00	11.0	6.9	4001700
175.00	11.0	6.9	4001750
180.00	11.0	6.9	4001800
185.00	11.0	6.9	4001850
190.00	11.0	6.9	4001900
195.00	11.0	6.9	4001950
200.00	11.0	6.9	4002000
205.00	11.0	6.9	4002050
209.00	11.0	6.9	4002090
210.00	11.0	6.9	4002100
215.00	11.0	6.9	4002150
220.00	11.0	6.9	4002200
225.00	11.0	6.9	4002250
230.00	11.0	6.9	4002300
235.00	11.0	6.9	4002350
240.00	11.0	6.9	4002400
245.00	11.0	6.9	4002450
250.00	11.0	6.9	4002500
255.00	11.0	6.9	4002550
260.00	11.0	6.9	4002600
265.00	11.0	6.9	4002650
270.00	11.0	6.9	4002700
275.00	11.0	6.9	4002750
280.00	11.0	6.9	4002800
285.00	11.0	6.9	4002850
290.00	11.0	6.9	4002900
295.00	11.0	6.9	4002950
300.00	11.0	6.9	4003000
315.00	11.0	6.9	4003150
320.00	11.0	6.9	4003200
335.00	11.0	6.9	4003350
340.00	11.0	6.9	4003400
355.00	11.0	6.9	4003550
360.00	11.0	6.9	4003600
375.00	11.0	6.9	4003750
385.00	11.0	6.9	4003850
400.00	11.0	6.9	4004000

Great Lip®密封圈能够在传统橡胶密封圈不能使用的场合工作。Great Lip®轴封能够在以下领域中超越传统橡胶轴封。Great Lip® seals solve difficult applications which are not used by conventional elastomer seals. It exceed the performance of elastomer lip-seals in the following areas.



- 超强的抗化学性能  
Greater chemical resistance
- 低摩擦性  
Lower friction
- 能够承受30m/s的表面速度  
Capable of surface speeds to 7000 ft/min.
- 极端工作温度 (-60°C至200°C)  
Works to temperature extremes (-65°F to 450°F)
- 在干式或研磨介质中过长的密封寿命  
Has extended seal life in dry or abrasive media
- 压差可达3.5MPa  
Handles pressure in excess of 500 PSID

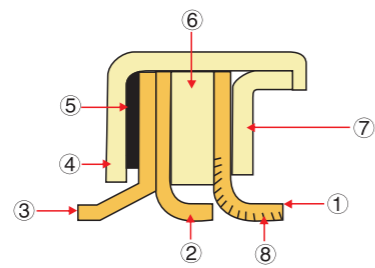


食品级(FDA)GreatCase®

已成功应用在如下场合中  
Successful Applications

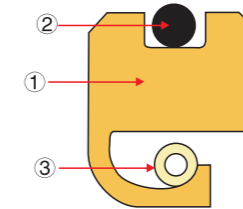
- 液压马达和泵 Hydraulic motors and pumps
- 化工泵 Chemical pumps
- 旋转压缩机 Rotary compressors
- 旋转部件 Rotary unions
- 真空泵 Vacuum pumps
- 风机 Blowers
- 钻探开采心轴 Drilling and tapping spindles
- 高速变速箱 High-speed gearboxes
- 柴油和压缩机曲轴 Crankshafts of engines and compressors
- 机器人 Robotics
- 食品和制药加工设备 Pharmaceutical and food processing equipment
- 搅拌器 Mixers
- 化学加工设备 Chemical processing equipment
- 传动器 Actuators
- 交流发电机及发电机 Alternators and generators
- 雷达和红外线装置 Radar and thermal optical devices
- 电动马达轴 Electric Motor Shafts
- 编码器 Encoders

GreatCase®唇型轴封  
GreatCase® Lip Seal >>



- 1.主密封 Primary element
- 2.辅密封 Secondary element
- 3.防尘圈 Wiper seal
- 4.金属外壳 Outer case
- 5.垫片 Gasket (Fluorocarbon)
- 6.垫圈 Washer
- 7.金属内壳 Inner case
- 8.螺旋回流纹 Helical lines

GreatLip®轴封  
GreatLip® Seal >>



- 1.密封材料 Seal material
- 2.O型圈 O-Ring(Fluorocarbon)
- 3.不锈钢弹簧 Extension spring(Stainless steel)

密封圈型号 Seal Type	密封圈型号 Seal Type	详细应用 Application Details
L1 系列 Series L1	L2 系列 Series L2	L1和L2系列应用广泛，属于经济型产品，在有无润滑的条件下均可使用，可在轴速最高为25m/s，压力为0.7MPa的润滑介质中使用。典型应用：变速箱和环境密封。 Series L1 and L2 are economical GreatLip seal designs employed in a wide range of applications. They are used in lubricated and non-lubricated environments. They can be used at shaft speeds to 5000 ft./min. in lubricated media and pressures to 100 PSID. Maximum PV 75,000 lubricated, 37,500 non-lubricated. Typical applications are: gear boxes and environmental seals.
T1 系列 Series T1	T2 系列 Series T2	T1和T2系列迷宫式油封，可以通过螺旋密封唇把介质甩出。这种设计仅在润滑介质中使用。使用寿命长，轴速最高可达30m/s，不推荐使用在压力超过0.1MPa的环境中。只适用于单向旋转的轴，顺时针或逆时针方向旋转。定制前需先确定轴的运转方向。 Series T1 and T2 incorporate a threaded sealing lip which pumps the media away from the seal. These designs should only be used in lubricating media. These designs offer long life and positive sealing at shaft speeds to 6000 ft./min. They should not be used for pressures greater than 5 PSID. It only used in single rotary shaft, rotate by clockwise or anti clockwise, please confirm the rotary shaft direction before place order.
F1 系列 Series F1	F2 系列 Series F2	F1和F2系列的设计提供了低扭矩，长使用寿命。轴速最高可为30m/s，但不推荐使用在压力超过0.2MPa的环境中，由于密封唇的轻负载，不推荐在泄漏要求高的场合使用。此系列在的环境密封中应用极佳。典型应用：除尘器，心轴和传送密封。 Series F1 and F2 offer low torque and long life. They can be used at shaft speeds to 6000 ft./min., but are not recommended for pressures greater than 25 PSID. Due to their light lip loading, these designs should not be used where a leak-tight seal is required. They are an excellent environmental seal. Maximum PV 75,000 lubricated, 37,500 non-lubricated. Typical applications are: dust/dirt excluders, spindle and conveyer seals.
S1 系列 Series S1	S2 系列 Series S2	S1和S2系列结合了弹簧负载设计，改善了发生轴跳或轴孔不对中时的密封。这类设计能够保证长期的绝对密封，能够在轴速最高10m/s，压力为0.7MPa下工作。典范应用：搅拌机，齿轮箱和螺旋钻。 Series S1 and S2 incorporate spring loading which improves sealing where shaft runout or bore/shaft misalignment exist. These designs offer positive sealing during long term storage. They can be used at shaft speeds to 2000 ft./min. and pressures to 100 PSID. Maximum PV 75,000 lubricated, 37,500 non-lubricated. Typical applications are : mixers, gear boxes and augers.
H2 系列 Series H2	H3 系列 Series H3	H2和H3系列的设计能够在压力为3.5MPa下润滑介质中密封，轴速最高可达20m/s。典型应用：液压马达，液压泵，液压传送装置和其他高压液压设备。 Series H2 and H3 are designed for pressures up to 500 PSID lubricating media, speeds up to 3500 ft./min. Maximum PV 300,000 lubricated, 50,500 non-lubricated. Typical applications are: hydraulic motors, pumps, hydrostatic transmissions and other high pressure hydraulic equipment.
W2 系列 Series W2	W3 系列 Series W3	W2和W3系列的设计结合了迷宫式主密封唇和标准的辅助密封唇。此类设计用来密封润滑介质，静止或短时间内轴速最高可达25m/s，压力最高为1.5MPa，只适用于单向旋转的轴，顺时针或逆时针方向旋转。定制前需先确定轴的运转方向。典型应用：空气压缩机、制冷压缩机和真空泵。 Series W2 and W3 incorporate a threaded primary sealing lip with a standard secondary sealing lip. These series are designed for sealing lubricating media at high speeds 4,500ft./min and pressures up to 250 PSID. Maximum PV 200,000 lubricated. It only used in single rotary shaft, rotate by clockwise or anti clockwise, please confirm the rotary shaft direction before place order. Typical applications are: air compressors, refrigeration compressors and vacuum pumps.

普通温度下密封圈型号 Seal Type For NORMAL Temperatures	详细应用 Application Details
P1 系列 Series P1	P1系列应用广泛，属于经济型产品。在有无润滑环境下均可使用。在润滑介质中轴速最高可达25m/s，压力可到0.5MPa。典型应用：齿轮箱和环境密封。 Series P1 is economical GreatLip® designs employed in a wide range of applications. They are used in lubricated and non-lubricated environments. They can be used at shaft speeds to 5000ft./min. in lubricated media and pressures to 75 PSID. Maximum PV 75,000 lubricated, 37,500 non-lubricated. Typical applications are: gear boxes and environmental seals.
P2 系列 Series P2	P2系列采用重载唇型设计，在气体和研磨介质中性能良好。还具备抗轴跳能力。轴速与压力范围与P1系列相同。建议轴硬度达到55HRC。典型应用：齿轮箱、潜水泵和搅拌机。 Series P2 is modifications of Series P1 which offer longer life and improved sealing of gasses and abrasive media due to their higher lip load. They also offer additional runout capability, They can operate at speeds, pressure and PV as noted in Series P1. Recommended shaft hardness of 55HRC or greater when operating at the higher PV limits. Typical applications are: gear boxes, submersible pumps/ motors, and mixers.
P3 系列 Series P3	P3系列的设计提供了扭矩、长使用寿命。轴速最高可为30m/s，但不推荐使用在压力超过0.2MPa的环境中。由于其唇边轻载荷的设计，不推荐在泄漏要求高的场合使用。此系列在环境密封中应用极佳。典型应用：除尘器、心轴和传送密封。 Series P3 offer low torque and long life. They can be used at shaft speeds up to 6000ft./min. They are not recommended for pressures greater than 25 PSID. Due to light lip loading, this design should not be used where a leak tight seal is required. They are excellent environmental seals. Maximum PV 75,000 lubricated, 37,500 non-lubricated, 37,500 non-lubricated. Typical applications are: dust/dirt excluders, spindle and conveyer seals.
P4 系列 Series P4	P4系列结合了弹簧负载设计，改善了发生轴跳或轴/孔不对中时的密封。这类设计能够保证长期的绝对密封，能够在轴速最高10m/s压力0.5MPa下工作。典型应用：搅拌机、齿轮箱和螺旋钻。 Series P4 incorporate spring loading which improves sealing where shaft runout or bore/shaft misalignment exist. These designs offer positive sealing during long term storage. They can be used at shaft speeds to 2000 ft./min. and pressures to 75 PSID. Maximum PV 75,000 lubricated, 37,500 non-lubricated. Typical applications are: mixers, gear boxes and augers.
P5 系列 Series P5	P5系列设计用于压力高达1.5MP，速度高达17.5m/s的润滑介质中。典型的应用有：液压马达，泵，液压传动和其他高压液压设备。 Series P5 is designed for pressure up to 200 PSID in lubricating media, speed up to 3,500 ft./min. in lubricating media. Maximum PV 200,000 lubricated, 50,500 non-lubricated. Typical applications are: hydraulic motors, pumps, hydrostatic transmissions and other high pressure hydraulic equipment.

GreatLip®系列的密封性能与GreatCase®系列相似，但是在小批量生产时，GreatLip®的价格更低。因为此类密封圈的外径表面较软，在安装时不会划伤密封座且容易装卸。由于密封圈密封，表面较软。在极端温度下，GreatLip®采用了金属环来减少由于环境温度变化对密封产生的影响。

GreatLip® provides similar performance to the GreatCase® seal but it is more economical in smaller quantities. Because the seal has a soft surface on the OD, the seal will not damage the housing and can easily be installed and removed. Due to the seal's soft sealing on the OD, GreatLip® designed for extreme temperatures utilize a metallic support ring to minimize temperature's effect on the seal.

沟槽尺寸 Groove Size

轴径 Shaft Diameter d h9 mm	孔径 Bore Diameter D H9 mm	密封槽宽度 Seal Width L+0.2 mm	华乐件号 Walle Part No.
8	22	7	8-22-7
8	24	7	8-24-7
8	26	7	8-26-7
9	22	7	9-22-7
9	24	7	9-24-7
9	26	7	9-26-7
10	22	7	10-22-7
10	24	7	10-24-7
10	26	7	10-26-7
11	22	7	11-22-7
11	26	7	11-26-7
12	24	7	12-24-7
12	28	7	12-28-7
12	30	7	12-30-7
14	28	7	14-28-7
14	30	7	14-30-7
14	35	7	14-35-7
15	26	7	15-26-7
15	30	7	15-30-7
15	32	7	15-32-7
15	35	7	15-35-7
16	28	7	16-28-7
16	30	7	16-30-7
16	32	7	16-32-7
16	35	7	16-35-7
17	28	7	17-28-7
17	30	7	17-30-7
17	32	7	17-32-7
17	35	7	17-35-7
17	40	7	17-40-7
18	30	7	18-30-7
18	32	7	18-32-7
18	35	7	18-35-7
20	40	7	20-40-7
20	32	7	20-32-7
20	35	7	20-35-7
20	40	7	20-40-7
20	47	7	20-47-7
22	35	7	22-35-7
22	40	7	22-40-7
22	47	7	22-47-7
24	35	7	24-35-7
24	37	7	24-37-7
24	40	7	24-40-7
24	47	7	24-47-7
25	40	7	25-40-7
25	42	7	25-42-7
25	47	7	25-47-7
25	52	7	25-52-7
26	37	7	26-37-7
26	42	7	26-42-7
26	47	7	26-47-7
28	40	7	28-40-7
28	47	7	28-47-7
28	52	7	28-52-7
30	40	7	30-40-7
30	42	7	30-42-7
30	47	7	30-47-7
30	52	7	30-52-7
30	62	8	30-62-8
32	45	7	32-45-7
32	47	7	32-47-7
32	52	7	32-52-7
35	47	7	35-47-7
35	50	7	35-50-7
35	52	7	35-52-7
36	62	8	36-62-8
36	47	7	36-47-7
36	50	7	36-50-7
36	52	7	36-52-7
38	62	8	38-62-8
38	52	7	38-52-7
38	55	8	38-55-8
38	62	8	38-62-8
40	52	7	40-52-7
40	55	8	40-55-8
40	60	8	40-60-8
40	62	8	40-62-8
40	72	8	40-72-8
42	55	8	42-55-8
42	60	8	42-60-8
42	62	8	42-62-8
42	72	8	42-72-8

轴径 Shaft Diameter d h9 mm	孔径 Bore Diameter D H9 mm	密封槽宽度 Seal Width L+0.2 mm	华乐件号 Walle Part No.
45	60	8	45-60-8
45	62	8	45-62-8
45	65	8	45-65-8
45	72	8	45-72-8
48	62	8	48-62-8
48	65	8	48-65-8
48	72	8	48-72-8
50	65	8	50-65-8
50	68	8	50-68-8
50	72	8	50-72-8
50	80	8	50-80-8
52	68	8	52-68-8
52	72	8	52-72-8
55	70	8	55-70-8
55	72	8	55-72-8
55	80	8	55-80-8
55	85	10	55-85-10
56	70	8	56-70-8
56	72	8	56-72-8
56	80	8	56-80-8
56	85	10	56-85-10
58	72	8	58-72-8
58	80	8	58-80-8
60	75	8	60-75-8
60	80	8	60-80-8
60	85	10	60-85-10
60	90	10	60-90-10
62	80	8	62-80-8
62	85	10	62-85-10
62	90	10	62-90-10
63	85	10	63-85-10
63	90	10	63-90-10
65	85	10	65-85-10
65	90	10	65-90-10
65	100	10	65-100-10
68	90	10	68-90-10
68	100	10	68-100-10
70	90	10	70-90-10
70	100	10	70-100-10
72	95	10	72-95-10
72	100	10	72-100-10
75	95	10	75-95-10
75	100	10	75-100-10
78	100	10	78-100-10
80	100	10	80-100-10
80	100	12	80-100-12
85	110	12	85-110-12
85	120	12	85-120-12
90	110	12	90-110-12
90	120	12	90-120-12
95	120	12	95-120-12
95	125	12	95-125-12
100	120	12	100-120-12
100	125	12	100-125-12
100	130	12	100-130-12
105	130	12	105-130-12
105	140	12	105-140-12
110	130	12	110-130-12
110	140	12	110-140-12
115	140	12	115-140-12
115	150	12	115-150-12
120	150	12	120-150-12
120	160	12	120-160-12
125	150	12	125-150-12
125	160	12	125-160-12
130	160	12	130-160-12
130	170	15	130-170-15
138	170	15	138-170-15
140	170	15	140-170-15
145	175	15	145-175-15
150	180	15	150-180-15
160	190	15	160-190-15
170	200	15	170-200-15
180	210	15	180-210-15
190	220	15	190-220-15
200	230	15	200-230-15

沟槽和轴的要求 Housing And Shaft Recommendations

轴的材料和硬度 Shaft Material & Hardness

- 建议使用铸铁和硬化钢。
- 在低压液压油环境下 (0-1.2MPa)，建议轴的硬度达到40至50HRC。在高压液压油，研磨和无润滑的介质和调速轴 (速度为15m/s或者更高) 的环境下，建议轴的硬度应当达到58至65HRC。
- Cast iron or hardenable steel is recommended.
- Shaft hardness of 40 to 58 HRC is recommended for low to moderate hydraulic oil pressure (0-200 PSID). A higher hardness range of 58 to 65 HRC for high pressure hydraulic oil, abrasive or non-lubricating medias, or high speed applications 3000 ft./min. and above.

孔的材料 Bore Material

- 铸铁、钢、铝等其他常用金属和非金属材料均可使用。塑料只能在GreatLIP®中使用。
- Cast iron, steel, aluminum and other are commonly used metallic and nonmetallic materials are acceptable. Plastics are only acceptable for GreatLIP® seals.

轴表面粗糙度 Shaft Surface Roughness

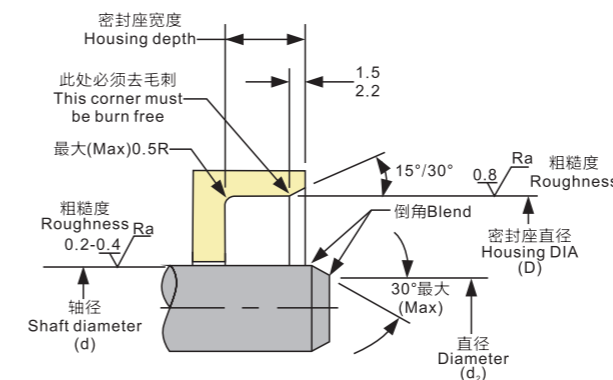
- 轴上与密封圈接触的平面要求达到0.2-0.4umRa。
- The seal contact surface of a plunge ground shaft should be finished to a surface roughness of 8 to 20 u in Ra and be free from machining leads.

孔表面的粗糙度 Bore Surface roughness

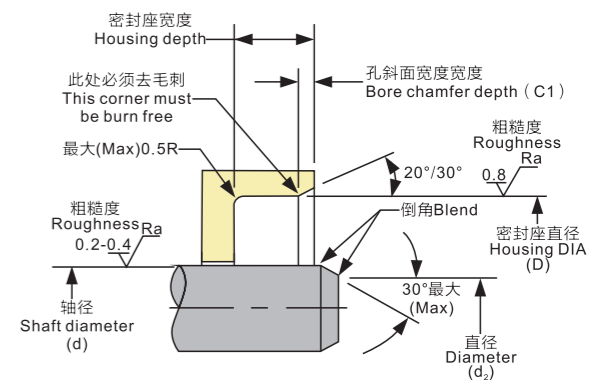
- 为了保证密封效果，孔的抛光要求必须在0.8umRa甚至更好。
- A bore finish of approximately 63 u in Ra or smoother should be maintained to assure proper sealing.

轴的导入斜角 Shaft Lead-In Chamfer

- 轴上应当有一个尺寸为d-d<sub>2</sub>，不含毛刺，尖角，无粗糙机械加工痕迹的斜角。
- The shaft should be provided with a lead-in chamfer with a diametral difference of d-d<sub>2</sub> and be out from burrs, sharp corners and rough machining marks.



GreatCase® 轴封



GreatLip® 轴封

轴的导入斜度 Shaft Lead-In Chamfer

直径 Diameter d	直径 Diameter d-d <sub>2</sub>
Up to 10	1,5 min.
11 to 20	2,0 min.
21 to 30	2,5 min.
31 to 40	3,0 min.
41 to 50	3,5 min.
51 to 70	4,0 min.
71 to 100	4,5 min.
101 to 130	5,0 min.
131 to 180	6,0 min.
181 to 210	6,5 min.

孔公差(Bore Tolerance): H8 轴公差(Shaft Tolerance): h11

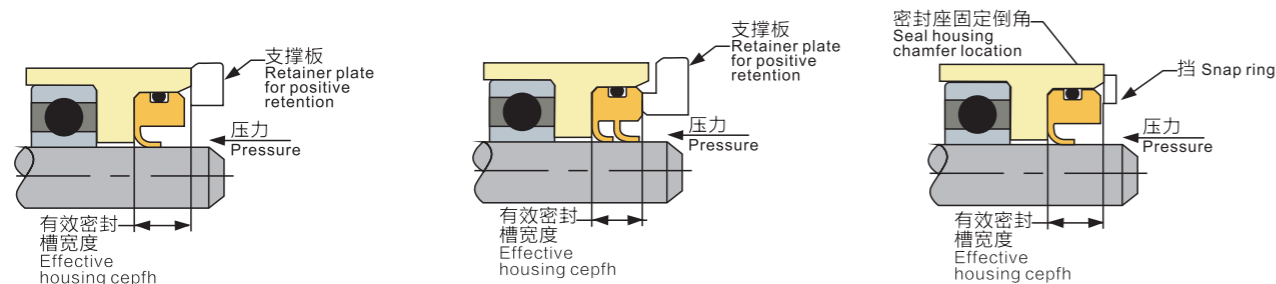
孔的导入斜度 (仅对于GreatLip®而言) Bore Lead-In Chamfer(GreatLip® only)

密封座直径尺寸(Housing Diameter Sizes)	孔斜角尺寸(Bore Chamfer) C <sub>1</sub>
Up 100	1,5/2,0
100 to 200	2,1/2,5

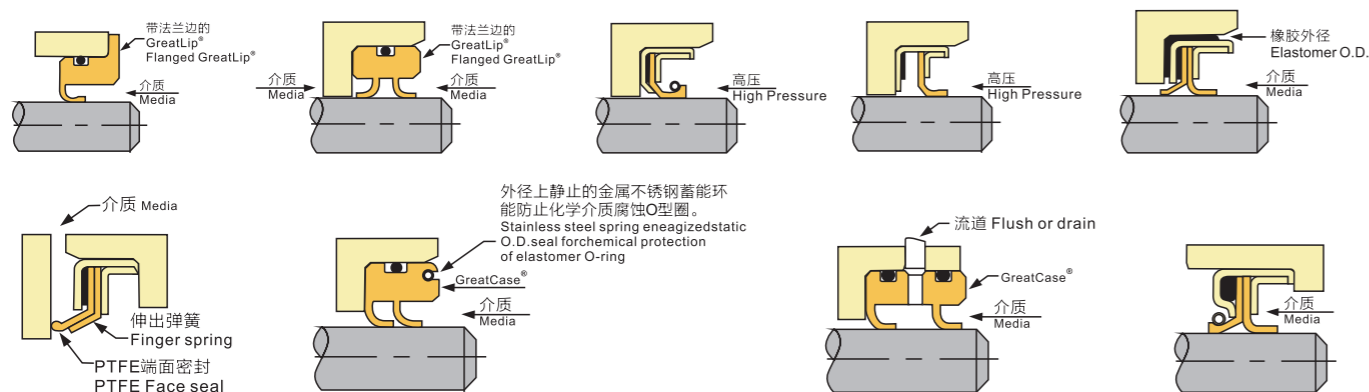
零件变化 Hardware variations >>

密封唇的延伸 Sealing Lip Extension

有的GreatLip®产品结合了2个密封唇,或者包含一个防尘圈, 这些都会造成密封圈宽度的增加。这是设计密封沟槽时, 必须要考虑的。  
GreatLip® seal incorporate two sealing lips, or a wiper seal, which will have seal lip extensions as shown. This must be considered when designing a seal gland.



非标准密封结构 Non-Standard Seal Configurations



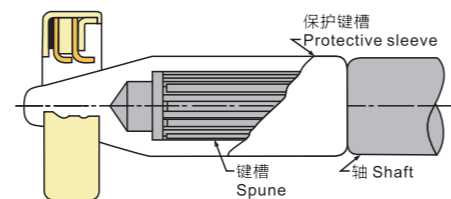
密封圈安装 Seal Installation

在轴穿过密封圈时, 必须小心不要碰坏密封唇。如果能够将轴从大气端穿过密封圈。那安装将变得简单许多, 若不能这样或者轴上有键槽, 花槽, 那请您与我们联系。我们会提供设计和简单的安装工具来保证您安装时, 不会损坏密封圈, GreatCase®和GreatLip®必须平稳, 压入孔中。如图所示的工具会帮助我们简化这个过程。

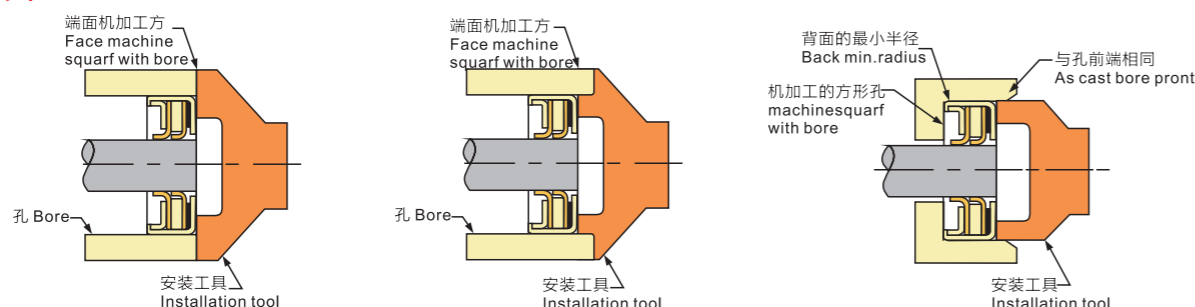
Care must be taken not to damage the sealing lip during the installation of the shaft through the seal. It is much easier to install the seal if the shaft enters the seal from the atmosphere side. If this is not possible, or if the seal must be installed on a shaft which has a keyway or splines, please contact the factory. We can help with the design and manufacture of simple tooling to assure that the seal should be pressed into the bore evenly. A tool, as shown below, simplifies this operation.

安装工具 Installation Tooling

将GreatCase®和GreatLip®装到轴上时必须十分小心, 如果倒角不够大(比密封唇的内径小)或者密封唇要通过花键, 键槽时, 必须要有一个如下图所示的保护装置。此装置可按要求设计。  
Care in essential in the installation of GreatCase® & GreatLip® seals onto the shaft. If chamfer( smaller than I.D. of seal lip element) is not enough big, and/or if lip must pass over spline or keyway, a tapered installation sleeve (shown at right) is necessary. Sleeve design information is available on request.



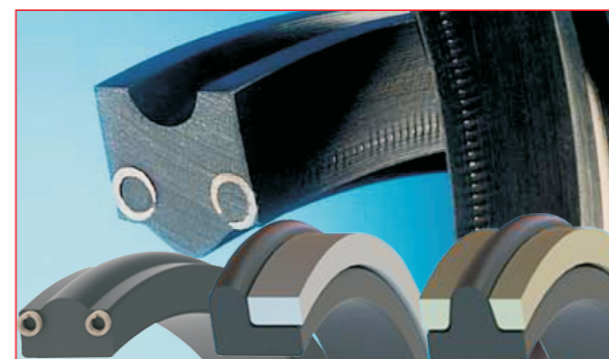
挤压配合工具 Press Fit Tools



O形密封圈 O-Rings



模压橡胶件 Molded Rubber Parts



S型圈\*FS型圈/S Seals\*FS Spring Seals  
T型圈\*L型圈/T Seals\*L Seals



旋转轴封 Rotary shaft seals



骨架油封 Oil seals



组合密封件 Combined seals



聚四氟乙烯密封件 PTFE Seals



聚氨酯密封件 Polyurethane seals