EagleBurgmann
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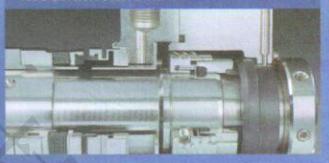
安装使用说明书
推进型集装密封
Installation, operating and maintenance instructions pusher cartridge mechanical seals.

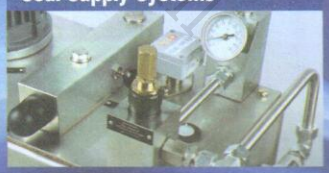
Mechanical seals



Magnetic Couplings

Carbon Floating Ring Seals

Seal Supply Systems



关键词和标识

在文中会使用以下重要信息和标识：

“注意，文中的这部分内容需要您特别的注意。”

危险 会导致人员伤害或死亡。

警告 冒险进入会导致人员严重伤害或死亡。

小心 不安全的操作方法有可能导致人员伤害或设备损坏。

注意 有潜在危险。
如果不加防护，您的产品或其周围部件可能会损坏。

重要 此内容是特别有用的信息。

本说明书在使用现场是必备的，供装配、操作和管理人员使用。
请您仔细阅读此使用说明，并遵守下列事项所包含的信息：

■安全 ■运输/储存 ■产品相关信息
■安装 ■运行 ■服务

如有任何不清楚之处请务必与伊格尔博格曼联系！

目　录

安全事项

用户现场组装、拆卸、启动和维护伊格尔博格曼机械密封的所有人员必须读懂说明书，安全注意事项，明确安全意识。

博格曼机械密封是高质量产品（通过ISO9001）具有较高的工作可靠性，但如果使用不当或未经专业人员操作也会引起密封失效。

要求用户了解安全程序，机械密封失效可能对环境造成的不良影响。要以适当的安全措施保证工作人员安全。

不允许有任何影响机械密封**安全性的操作**发生。

未经授权，**不得**对机械密封结构进行修改。

机械密封的安装、运行、维护、拆卸或维修，必须由经过**授权、培训和指导的人员**进行；如果相关人员对于密封和系统经验较少，伊格尔博格曼可以提供相应的培训。

相关人员的**责任必须明确**，防止由于责任不明造成**安全隐患**。

只有密封处于**非工作状态**和**无压**的情况下，才**允许**对机械密封进行维护操作。

警告

在**有害物质**中使用的机械密封**必须经过适当的清洗**，以确保不会对人和环境造成危险。

除了在本说明中提到的事项，**工作人员的保护和事故防范的规定**必须要遵守。

工作人员的保护说明

警告

如果**被密封的介质**或提供**冲洗的液体**符合**有害物质**管理规定，则要遵守对**危险物质的操作**（应符合国家规定）和**事故防范的管理规定**。

被密封的介质或**冲洗的液体**会因密封**失效**而溢出。要考虑到泄漏介质的妥善处理。用户要控制泄漏量，为了防止对人员和环境造成伤害和污染，**用户需要提供防止介质溅起的保护**以及配戴护目镜。

用户必须**检查**机械密封**泄漏的原因**，以及采取相应的安全措施以防止对**人员**的伤害或环境的污染。

防爆说明

因机械密封属于**机械部件**，所以不在防爆认证范围内。

如果设备涉及防爆的温度等级要求时，由安装机械密封的设备制造商提供。

如果最终用户需要防爆认证，必须明确提出，伊格尔博格曼将提供额外的说明。

运输/储存

运输

如果合同没有约定，将使用伊格尔博格曼标准的包装，它适用于货车、火车或飞机之类干式运输。必须遵守包装上警示的标识和说明。

另外，也可以使用海运包装。

对接货检查的说明：

- 检查外包装是否有可见的损坏。
- 小心打开包装。不要损坏和丢失个别提供的零部件。
- 检查所交货物是否完整（交货单）。如果零部件有损坏和丢失，请您立即以书面形式通知供应商。

运输及储存期间要防止机械密封损坏。要保存好包装箱，以备再次发送密封使用。

注意

如果机械密封安装在设备上，与设备一起运输，要采取措施，防止因设备轴变形、振动、串动而损坏机械密封。

因运输保护不足而引起的机械密封损坏，不在我们的担保范围。

储存及长期储存

以下的推荐条款适用于，已经交付的和储存在**未损坏的原有包装**中的，以及已经安装在设备当中的（例如泵、压缩机和反应釜等），但必须是未投入运行的。

作为设备组成部分的机械密封是经过超精加工制造的，是受检的机械部分。在设备启动和持续运行阶段，以及储存期间（特别是作为备件），检验操作采取某些措施以保持密封的完全有效。

摩擦副材料和弹性元件会发生材料特性和基于时间的变化（变形、老化），它们会降低密封的有效性。**遵守储存规则可避免这种情况发生。**

储存机械需要在其外包裹防蒸汽塑料膜，并添加干燥剂（如硅胶）。

储存机械密封的最优条件

- 无尘
- 合适的通风
- 恒温
- 相对空气湿度低于65%，
- 温度在15℃到25℃之间。

避免密封处在下列情况：

- 直接暴露在热源下（太阳，加热）
- **紫外线光源**（卤素或荧光灯，太阳光，电弧焊）
- 存在**臭氧**或臭氧变化的情况（电弧焊，水银荧光灯，高电压设备，电动机）

*有导致弹性材料**脆裂的危险**

机械密封的两种存在方式：

储存在库房　　**安装在设备上**，但没有运行

储存在库房

⚠ 重要

储存密封要将其放在原有包装中,并放在水平面上。

· 应该定期检查包装是否有损坏。
· 每隔8周，需检查一下包装内的湿度，并做记录。
★若显示的空气**相对湿度 > 50%**，需重新检查包装，如果密封需要换新包装，请与**最近的博格曼服务中心**取得联系。

在最优条件下储存，并且没有使用的机械密封，需注意以下几点：
· 为安全考虑，3年没有使用的机械密封，需将此机械密封发到伊格尔博格曼公司，或最近的服务中心，做以下修复：
★更换所有的胶圈及弹簧。
★检查及修复动静环的平面度。
★做静压试验。

安装在设备上的机械密封

⚠ 重要

不允许“长期”储存机械密封。

如果要在此状况下长期储存机械密封，必须与伊格尔博格曼联系。
· **不要使用有腐蚀性的防护剂。**
*可能损害胶圈弹簧

有些情况下，因为新工厂建立需要很长时间，有时候会超过机械密封的保存期，如2-3年。
如果机械密封一直没有使用，并且**时间超过3年**，请将此机械密封发回伊格尔博格曼工厂或服务中心，做进一步的检查及修复。
因不正确的储存，造成的机械密封损害，**不在伊格尔博格曼的担保范围内。**

产品信息

如果机械密封安装在设备上，与设备一起运输，要采取措施，防止因设备轴变形、振动、串动而损坏机械密封。
因运输保护不足而引起的机械密封损坏，不在我们的担保范围。

制造商和原产地

上海博格曼有限公司
上海闵行文井路127-8号
中国

材质

机械密封的材质取决于实际应用工况并在合同中确定，并在随机文件中附有图纸及零件清单。

指定应用条件

机械密封是针对**指定**应用条件使用的专用设计。**不同的使用条件**或超过指定的应用范围，我们会认为它与指定的应用情况**相悖并确定它是不可靠的**，由此产生的结果我们不对此负责。

如果机械密封在图纸所述的**限定条件之外**运行，我们会认为它与指定的**应用情况相悖**。

机械密封若确实要在不同的条件下或不同的工况当中运行，那么伊格尔博格曼必须要求对随后使用的安全性进行确认。

*运行条件的**改变必须**要形成文件形式。

运行工况及极限

⚠ 注意

可以在伊格尔博格曼集装密封装配图纸或设备制造商的说明文件中找到有关运行工况的信息。**在伊格尔博格曼的产品样本中可以找到机械密封的使用极限。要避免机械密封在使用时，同时处于多个极限之下。**

应该由**伊格尔博格曼人员**或其他得到**授权的人员**对机械密封进行**选型**，其中包括密封的类型、对工况的适宜性以及材质。由**未得到授权的人员**而造成的密封选型错误，伊格尔博格曼**不对此负责。**

图纸和明细栏

集装密封装配图
机械密封的设计和使用说明只能以最新版本的集装密封装配原图为基础和根本。

安装空间和连接尺寸

有效的安装空间由腔体设计尺寸决定。在机械密封安装之前，需要根据伊格尔博格曼的图纸仔细核对所有连接尺寸。

机械密封的冲洗方案

机械密封必须完全一直的处于液体润滑的环境下。机械密封必须在合适的介质工况下运行，密封介质不可以损坏机械密封，如化学的（如腐蚀、脆化），物理的（如冲刷，磨损）。
为了机械密封的安全运转，需按照**API610/682**，给机械密封配备最合适的**密封系统**，这样才能保证机械密封最好是运转。
如果需要密封系统，请联系伊格尔博格曼。

泄露

由于**物理**和技术的原因，机械密封作为**动态密封**是**不可能零泄露**的。密封的设计、制造误差、运行工况以及设备的运转质量等都会影响密封的泄露量。**相对于**其他的密封系统，**机械密封的泄露量是很微小的。**

机械密封运行过程中，会发生泄露增加的现象。

如果泄漏量没有减少或出现其他故障，机械密封要停止运行并拆卸检查。
机械密封泄漏的可能是液体，也可能是气体，这取决于所密封的介质。
在大气侧，机械密封的泄露必须排出，并妥善处理。

⚠重要

与泄漏出的介质接触的零件，必须要耐蚀或得到充分地保护。

⚠警告

密封介质和冲洗液应符合**有害物质管理规定**，要遵守**危险物质操作指导说明**（必须符合国家法规）和**事故预防管理规定。**

安装

装配工具说明

用于清洗：
· 酒精
· 无纺布（不能掉绒！）

用于清除硅油：
· 绵纸（不能掉绒！）
· 干净的棉手套

用于润滑：
· 合适的润滑剂
· 润滑剂要与所有的介质相容（如被密封介质、封液、冲洗液或冷却介质等），不能腐蚀辅助密封或与其接触的零件。

⚠注意

乙丙类辅助密封件绝对**不能**与**矿物油基类润滑剂**接触（发生通胀、分解）。

· 用合适的合成润滑剂对辅助密封元件进行润滑。
如**TURMOPOL GREASE SH 2D**，制造商：LUBRICANT CONSULT(LUBCON)。
· 合适的润滑剂（符合FDA）。
如**TURMSILON GTI 5000**，制造商：LUBRICANT CONSULT(LUBCON)。
· 肥皂水可用于润滑橡胶波纹管密封和辅助密封元件。

⚠注意

清除硅油：
· 润滑剂中不能含有硅油和含氟类化合物。

用于安装：
· 一套六角扳手
· 一套双头扳手
· 扭矩扳手
· 启O型圈用工具

用于密封：
· 管路螺纹连接用密封剂，如**LOCTITE Nr. 266**，制造商：LOCTITE公司

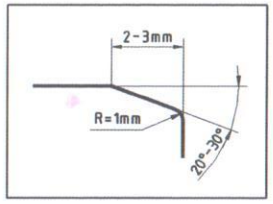
用于固定：
· 应用于螺柱、螺栓等，如**LOCTITE Nr. 243**，制造商：LOCTITE公司

装配前的准备

⚠注意

为了**防止**损坏机械密封，在完成下面所描述的工作前，**请不要从包装中取出机械密封。**

检查设备方面的内容包括：



- **倒角**（滑动锥面，如2mm/30°或符合EN12756标准）
- **圆滑过渡**
- **配合面**和与O型圈接触面
  粗糙度**Ra =1.6 μ m**(=N7=CLA63)
- 与机械密封接触的轴表面
  粗糙度**Ra= 0.8 μ m**(=N6=CLA32)

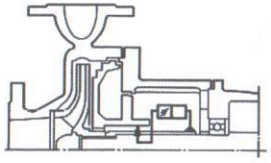
检查设备：
- 与机械密封接触表面是否有损坏。
- 配合尺寸，与轴线的垂直度和径向跳动。
- 安装时旋向一定与图纸对应，若有不明确请联系博格曼。

轴承的规格和质量也对密封的运转有影响。

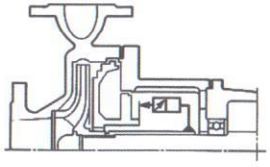
机械密封安装前，需要检查以下内容：
- 轴的同轴度
- 轴相对于设备腔体的跳动

必须考虑的允许的最大轴向位移，所以必须阅读相关说明。
轴的跳动值（根据DIN ISO 5199）：
- 轴径50mm以下：最大0.05mm
- 轴径50mm—100mm：最大0.08mm
- 轴径大于100mm：最大0.1mm

轴向的同轴度和跳动按伊格尔博格曼所述执行。



密封腔体内表面相对于轴的**同轴度**：
- 密封**带**泵效环：最大0.1mm
- 密封**不带**泵效环：最大0.2mm



密封腔体垂直接触面相对于轴线的**跳动**（根据DIN ISO 5199）：
- 轴转速≤750rpm：最大0.2mm
- 轴转速为1000rpm：最大0.15mm
- 轴转速为1500rpm：最大0.08mm
- 轴转速为3000rpm：最大0.025mm

在设备上安装机械密封时，请按照具体情况，应用伊格尔博格曼给出的数值：
- 准备安装工作位置，拿走不需要的工具、剪切工具及脏的布料等。
- 用一块洁净的非纤维纸板覆盖工作台面。

装配/安装

机械密封作为集装部件，在制造商处已预先安装，所以在安装过程中不需要任何的调整。本文件只提供有关安装和拆卸的必要信息。

安装过程必须遵循装配图进行。

设备制造商要根据设备的设计来决定密封安装次序。

*在机械密封安装过程中，**设备制造商要参照说明准备使用辅助工具（夹紧及固定装置）。**

⚠
- 机械密封必须要在无尘的条件下非常仔细谨慎的安装。
- 避免轴的不必要转动（可能会损坏密封面）。
- 不能强行安装。
- 避免敲打密封！对机械密封的破坏会造成运行中的危险。
- 遵守技术图纸的有关内容，如有必要请您联系伊格尔博格曼。

安装**次序**
- 确保所有接触周围机械零件的密封件都已安装。
- 打开密封包装
  *如有必要使用合适的辅助工具（如吊车、提升设备、抬起装置、起吊螺栓等）。

⚠注意

要遵守事故防范管理规定。

- 请检查轴套内的O型圈是否已经安装！
  如果没有特别的说明，在安装过程中要用合适的润滑剂轻微润滑下列零件：
  ○安装机械密封时，轴套内的O型圈
  ○轴上安装机械密封的部位
  ○环座类零件
  *润滑剂要与所有的介质相容（如被密封介质、冲洗或冷却介质等），不能腐蚀辅助密封或与其接触的零件。
  ***乙丙类辅助密封件**绝对**不能**与**矿物油基类润滑剂接触**（发生通胀、分解）。
- 去除扭矩传递机构处，轴套和轴间接触部位的油污。
- 将整套集装密封安装至轴上。

⚠注意

避免敲击机械密封！机械密封的损坏会对机械密封的运行造成不良影响。

- 将机械密封安装至设备腔体中，辅助系统接口的布置请参照随机图纸。
- 在设备上进一步的安装（如将机械密封安装在设备腔体及轴上）和调整（如轴承间隙等）请参照设备制造商的使用说明及集装密封装配图。

⚠注意

移开止动垫片并妥善保管，以备密封拆卸时使用。如果机械密封已安装在设备上，在运输交货时，止动垫片务必一同交付给最终用户。

设备的进一步安装必须要参照设备制造商的使用说明。
用于防止污染的螺塞或塑料塞只能在辅助系统管路安装时移走。

接口连接

*在安装过程中，要按照机械密封上打印的接口标识进行连接，不能互换。

⚠注意

螺纹的密封剂（聚四氟乙烯带等）如果进入密封腔体会危害密封的使用功能。如果螺纹接口是开放的，必须保证密封剂不能进入机械密封。

接口标识：

- 冲洗液入口：FI
- 冲洗液出口：FO
- 缓冲液入口：BI
- 缓冲液出口：BO
- 急冷液入口：QI
- 急冷液出口：QO

接口管路：

- 使用一定规格截面的不锈钢或耐蚀材质的钢管。
  - ◎液体管路：最小18×1.5mm
  - ◎气体管路：最小12×1.5mm
  - ◎脉冲管路：最小12×1.5mm
- 彻底清洁管路。
- 锁紧所有的管路连接。
- 按逐渐上升的方式安装管路，尽可能短、方便，以利于管路自排气。
- 避免气体滞留管路，必要时可设置排气口。
- 弯折处使用弯管。
- 用合适的夹头固定管路。

⚠注意

如果需要在进入密封腔的管路上安装截止开关，那么需要使用带有转动锁的球阀。

运行

安全运行

⚠注意

如果出现与运行工况发生偏离或超出密封使用极限的紧急情况，机械密封必须拆卸下来并在制造商或最近的服务中心检查。

机械密封在每一个运行阶段，都要处于被密封介质润滑的状态，特别是在设备启动和停止的阶段。设备在设计的过程中要考虑到此问题。

干运转引起的损伤不在博格曼担保之内。

⚠重要

如果被密封介质在设备或冲洗停止的阶段，有固化的现象或凝结的趋势，那么密封腔内要使用合适的清洗液冲洗。流量和液体由用户决定，同时要兼顾对密封材质的腐蚀性。

如果注意机械密封的运行极限值并按照此使用说明中提到的内容执行，那么可　以实现机械密封的无故障运行。

启动

启动前安全检查

- 是否移走止动垫片
- 扭矩传递部件是否安装紧固
- 各接口气密性。
- 排漏口不污染环境。

为保证机械密封安全运行，需有符合API610/682冲洗方案。

- 用工艺流体清洗设备和密封腔体。
- 彻底排空密封腔体和循环系统。
- 设备短暂的启动后重复排空过程几次，直到设备停机。

●现在密封可以准备运行了。

服务

维修

正确使用的机械密封很少需要维修，但磨损件除外。
机械密封的泄漏量
日常操作包括以下项目：
- 温度。
- 机械密封泄漏。

应该在成套设备检修的过程中检查机械密封。我们建议您由伊格尔博格曼的专业人员对密封进行检查。
如果机械密封在成套设备检修的过程中拆卸下来，那么动静环需要在制造商处重新研磨检测，弹性密封环和弹簧应该更换。

密封失效说明

尝试定义失效种类并记录。
- 大量泄漏时，记录泄漏量的变化情况。记录操作条件的变化并停止设备运行。
  *如果持续大量泄漏，证明机械密封已经损坏。
- 如果有不允许的温升情况出现，安全起见请立即停止运行设备。

如果发生了故障，而你不能独立解决，或者故障原因不明，请立即联系最近的伊格尔博格曼办事处、服务中心或伊格尔博格曼总部。

对于质量保证期内的伊格尔博格曼机械密封，只有在得到制造商的批准或有伊格尔博格曼代表在现场时，才能对其拆卸。

售后服务

伊格尔博格曼客户服务部门提供关于密封技术的全面服务，包括：咨询，工程方案，标准化，安装，订购以及密封技术研讨小组对损伤分析。

联系方式已在伊格尔博格曼的设计手册及各种宣传资料上列出，以及下列网站中。
www.eagleburgmann.com

修复

如果机械密封需要维修，最好将完整的机械密封送至制造商，确定需要维修的部分和需要替换的零件，保证密封良好性能。
如果不得不在现场进行维修（如没有备件，运输路途遥远，客户的问题），可在洁净的场所，由用户方经培训的人员在伊格尔博格曼的技术指导下进行。

拆卸

⚠
- 按说明停止设备运转，冷却，泄压，并保证不再有剩余压力。
- 当设备停止运行且没有压力的情况下，才能对密封进行操作。
- 泄压并排干机械密封冲洗液。
- 机械密封表面没有残余物料。如有必要，可排干设备,并冲洗干净。
- 切断设备电源，防止其意外启动。
- 注意安全事项（安全数据单）。

⚠重要

当拆卸密封时，请您务必遵守下列事项：
- 事故预防管理规定
- 有害物质操作管理规定

⚠警告

在有害物质中使用的机械密封必须充分清洗，并保证不会对人员和环境造成伤害和污染。

⚠重要

机械密封发回伊格尔博格曼工厂时，包装上必须有以下内容：
- 在易于观察处，有可明显判断是否有有害物质的标志。
- 包括密封介质或封液的安全数据清单。

⚠重要

如果被密封介质在设备或冲洗停止的阶段，有固化的现象或凝结的趋势，那么密封腔内要使用合适的清洗液冲洗。流量和液体由用户决定，同时要兼顾对密封材质的腐蚀性。

从设备上拆卸机械密封的要求依赖于设备的设计，应该由设备制造商决定。
*如果设备制造商要求使用辅助工具（如夹具、垫片等），要根据设备制造商的具体说明使用。

- 拆卸机械密封冲洗管路，需要排干液体并将其妥善处理。
- 清洗和干燥机械密封，排干液体并将其妥善处理。
- 安装止动垫片到轴套槽内并拧紧螺钉。

⚠注意

凹端紧定螺钉只能使用一次。重复使用可能使传动失效。

- 松开所有集装密封与设备零件连接的螺栓。
- 按照相反的步骤（安装）拆下机械密封。

⚠注意

所有PTFE零件只能使用1次。

备件

- 只能使用伊格尔博格曼原装的备件，否则：
  - ◎可能导致密封失效，危害人员和环境。
  - ◎伊格尔博格曼质量担保不再有效。
- 为了快速更换，应该有一套完整的备件。

咨询和订货所需的信息

当需要对密封进行咨询或订购时，请提供如下细节资料：

- 伊格尔博格曼合同编号
- 机械密封图号：见随机文件
- 按照图纸确定零件序号、名称、零件数量。

上海博格曼有限公司地址

伊格尔·博格曼中国
上海博格曼有限公司
中国上海文井路127-8号
电话 +86 (021)-64620550
传真 +86 (021)-64300219 64638163（Sales Dept.）

机械密封的处理

通常情况下，博格曼机械密封在彻底清洗后能够容易地处理。

- 分类后的金属部件(钢，不锈钢，非二价重金属)可以归入切削金属废料类。
- 陶瓷材料（合成石墨，陶瓷，碳化物）归入垃圾类。通常将它们与安装腔体分离。
- 合成材料/塑料（橡胶，PTFE）归入特殊垃圾类。

⚠小心

切忌燃烧含氟材料！

⚠重要

有些归入不同类的合成材料可以回收。

版权

Keywords and Symbols

Following symbols for particularly important information are used:

"Attention, please pay special attention to these sections of text".

DANGER! Draws attention to a direct hazard that will lead to injury or death of persons.

WARNING! Draws attention to the risk that a hazard could lead to serious injury or death of persons.

CAUTION! Draws attention to a hazard or unsafe method of working that could lead to personal injury or damage to equipment.

ATTENTION! Identifies a potentially dangerous situation. If it is not avoided the product or something in its vicinity could be damaged.

IMPORTANT! Identifies tips for use and other particularly useful information.

These instructions are intended for the assembly, operating and supervising personnel and should be kept at hand on site.
PLEASE READ this manual carefully and OBSERVE the information contained as to:
►Safety ►Transport / Storage ►Information about the product
►Installation ►Operation ►Servicing
If there are any unclear points please contact EagleBurgmann by all means!

Table of Contents

GENERAL SAFETY NOTES

⚠

- Any person being involved in assembly, disassembly, start-up, operation and maintenance of the mechanical seal must have read and understood this operating manual and in particular the safety notes. We recommend the user to have this confirmed.
- Mechanical seals are manufactured to a high quality level and they have a high working reliability. Yet, if they are not operated within their intended purpose or handled inexpertly they may create risks.
- The machine has to be set up in such a way that seal leakage can be led off and disposed of properly and that any personal injury caused by spurting product in the event of a seal failure is avoided.
- Any operation mode that affects the **operational safety** of the mechanical seal is not permitted.
- Unauthorised modifications or alterations of the mechanical seal are **not permitted**.
- Mechanical seals must be installed, operated, maintained and removed by **authorised, trained and supervised qualified personnel only**. In case the personnel has no long years of experience in handling with and operating of mechanical seals and their supply systems, for this purpose EagleBurgmann offers corresponding seminars for achieving of the required knowledge.
- The **responsibilities** for the respective jobs to be done **have to be determined clearly and observed** in order to prevent ambiguous competencies from the point of **security.**
- **Any work** to be done on the mechanical seal is **generally** only **permitted** when the seal is **neither operating nor pressurised**.

⚠ WARNING!

Seals that have been used with **hazardous substances must be properly cleaned** so that there is no possible danger to people or to the environment.

Apart from the notes given in this manual the general **regulations for worker's protection and those for prevention of accidents** have to be observed.

Instructions for worker's protection

⚠ **⚠ WARNING!**

- If the medium to be sealed and/or the supply liquid is subject to the Hazardous Substances Regulation, the instructions for handling dangerous substances (accord with national regulation) and the accident prevention regulations have be observed.
- **Medium to be sealed** and/or **supply medium may escape** if the seal **fails**. Injury of persons and environment may be **prevented by the user** providing for splash protection and wearing of safety goggles. Care has to be taken by the user for **proper disposal** of the leakage. The user has to control these measures.
- The user has to check what effects a failure of the mechanical seal might have and what safety measures have to be taken to prevent personal injury or damage to the environment.

Notes on explosion protection

Mechanical seals are **mechanical parts**, which are put in circulation for general technical purposes. They are no components within the meaning of Directive 94/9/EC.

The respective probation as to explosion protection for the provided temperature class must be carried out during the conformity assessment of the machine, into which the mechanical seal is installed, by the machine manufacturer.

In case the assessment is carried out by the end user, the respective additional operating manual has to be requested from EagleBurgmann.

TRANSPORT / STORAGE

Transport

If not specified differently by contract the EagleBurgmann standard packaging is used which is suitable for dry transport by truck, train or plane. The warning signs and notes on the packaging must be observed.

In addition seaworthy packaging may become necessary.

Notes for income inspection:
- Check packaging for visible damage.
- Open packaging carefully. Do not damage or lose parts supplied separately.
- Check if consignment is complete (delivery note). Inform the supplier immediately in writing if parts are damaged or missing.

The mechanical seal has to be protected from damage during transport and storage. The transport case in which the seal is supplied is well suited for this purpose and should be kept for a possible return transport.

⚠ ATTENTION!

If the machine as well as the mechanical seal installed into the machine are transported together, the shaft must be protected from deflection at all times, shocks and axial displacement by means of a suitable machine support.
Damage at the mechanical seal caused by insufficient protection during transport is excluded from the warranty.

Storage, "mothballing" (long term storage)

The following recommendations apply to all mechanical seals which have been supplied and stored in their **undamaged original packaging**, as well as to seals which have been installed in a machine (e.g. pump, compressor, agitator, etc.) but have not yet been put into operation.

Mechanical seals and spare parts are super finished and repeatedly tested machine elements. For storage special conditions have to be followed.

Sliding materials and elastomers are subject to material-specific and time-based alterations (distortion, ageing) which might reduce the full efficiency of the mechanical seals. Hence, this may be avoided by observing the storage instructions.
For the stock keeping of elastomers special conditions are required. For all rubber-elastic parts the rules of DIN 7716 resp. of ISO 2230-1973 (E) are valid.

Optimum conditions for storing of mechanical seals
- dust free
- moderately ventilated
- constant temperature
  - relative air humidity below 65 %,
  - temperature between 15 °C and 25 °C.

Protect the seal from
- direct exposure to heat (sun, heating)
- **ultraviolet light** (halogen or fluorescent lamps, sunlight, arc welding)
- presence or development of **ozone** (arc welding, mercury vapour lamps, high-voltage devices, electric motors)
- **risk of embrittlement** of elastomeric materials

It must be recognised that a difference exists between:

Mechanical seal stored in the stock room

Mechanical seal installed in the machine, but not yet in operation

Mechanical seal in the stock

IMPORTANT!

Store the seal in the original packaging lying on a flat surface.

- Check the packaging periodically for damage.
- Sealings packed in plastic-foil with humidity indicators have to be checked every 8 weeks. The check has to be recorded.
  ›Packagings **exceeding 50% rel. humidity** values have to be sent to the manu facturer or the **nearest EagleBurgmann service centre** for inspection and new packaging.

Unused stored mechanical seal under optimum conditions:

- For reasons of safety reasons, after 3 years from delivery of the mechanical seal the mechanical seal should be returned to EagleBurgmann resp. nearest EagleBurgmann service centre for
  ›Exchange of all secondary seals and springs
  ›Verification of the flatness of the faces
  ›Perhaps static pressure test.

Mechanical seal installed into the machine

ATTENTION!

"**Mothballing**" (long term storage) of the mechanical seals is **not allowed**.

In case of a "mothballing" (long term storage) of complete machines with mechanical seals installed EagleBurgmann has to be contacted.

- **Do not** use corrosion protection agents.
  *Risk of deposition and possibly chemical attack of the secondary seals.

Due to longer erecting times of newly designed plant the period between delivery of the mechanical seal and its installation and start-up in the machine may exceed a period of 2-3 years.

If the delay is longer than 3 years and before the planned start-up of the plant the seal has to be dismantled sent to the manufacturer or the nearest EagleBurgmann service centre where it can be checked and reconditioned, if necessary.

EagleBurgmann do **not accept any warranty** for damage caused by **improper** storage.

INFORMATION ABOUT THE PRODUCT

All technical information given is based on the results of extensive testing and on our long term practical experience. However, in view of the great diversity of possible applications the technical data can only be taken as being of approximate nature. We can only guarantee the safe and efficient functioning in individual cases if we have been comprehensively informed of the operating conditions to which they will be subject, and if this has been confirmed in a separate written agreement.

Manufacturer and country of origin

Burgmann Shanghai LTD
127-8WenjingRoadMinhang,Shanghai
China

Materials

The materials of the mechanical seal depend on the application and are bound to the customer order. They can be found on the drawing, and/or in the parts lists attached to the documentation.

Designated use

This mechanical seal is **exclusively** designed for the use in the specified application. A **different utilisation** or usage going beyond the specification is considered **contrary to its designated use** and excludes a liability for possible consequences by the manufacturer.

Operation under conditions lying **outside** the limits stated in paragraph **"Operating limits"** is considered contrary to its designated use.

Should the mechanical seal be operated under different conditions or in a different application EagleBurgmann has to confirm that such a change is safe in advance of subsequent operation.
›**Changes** to operating conditions **have to** be documented.

Operating conditions and limits

ATTENTION!

The mechanical seal has to be operated according to the exact operating data given in the seal assembly drawing or, if not mentioned there, as given in the corresponding machine data sheets or in the EagleBurgmann product catalogue. Operation under several catalogue limit values simultaneously must be avoided.

The **selection** of the mechanical seal (type, suitability, materials) should be done **by EagleBurgmann staff** or other **authorised** persons. A wrong selection by unauthorised persons is **not covered by** EagleBurgmann's **warranty**.

Drawings, diagrams

The original assembly drawing in its latest edition (latest revision) only is decisive for both the design of mechanical seal as well as the utilisation of this manual.

Required space, connecting dimensions

The available installation space is decisive for the design of the housing parts. All connecting dimensions have to be checked with regard to the EagleBurgmann drawing before mounting the mechanical seal.

Supply of mechanical seal

The mechanical seal has to be constantly wetted by liquid medium. The medium to be sealed must not damage the mechanical seal neither chemically (e.g. corrosion, embrittlement) nor physically (e.g. erosion, abrasion).

For a safe operation of the mechanical seal we recommend applying **at inboard** the most suitable **type of circulation** described in **API 610 / 682**. This measure protects the seal cavity from deposition of solids.

To operate multiple seals special supply systems are required. Please contact EagleBurgmann.

Emissions

A mechanical seal is a **dynamic seal** that **cannot be free of leakage** due to physical and technical reasons. Seal design, manu¬facture tolerances, operating conditions, running quality of the machine, etc. mainly define the leakage value. In fact, compared to other sealing systems there is few leakage.

During the running-in phase of the mechanical seal an increased leakage may occur.

If the leakage amount does not decrease or if there are other malfunctions the mechanical seal has to be shut down, removed and checked for reasons of safety.

The leakage can be liquid or gaseous. Its aggressiveness corresponds to that of the medium to be sealed.

Leakage of mechanical seal at outboard side has to be drained and disposed of properly.

⚠ IMPORTANT!

Components which may have contact with the leakage have to be corrosion-resistant or have to be adequately protected.

⚠ WARNING!

If the medium to be sealed and/or the supply liquid is subject to the Hazardous Substances Regulation, the instructions for handling dangerous substances (accord with national regulation) and the accident prevention regulations have be observed.

INSTALLATION

General notes dealing with assembly utilities

For cleaning:
- ethyl alcohol
- cellulose-tissue (no rag, no cloth!)

For applications free from silicone:
- cotton-tissue (no rag, no cloth!)
- clean cotton gloves

For lubricating:
- suitable lubricants
- Lubricants must be compatible with all media (e.g. medium to be sealed, supply, flushing and/or cooling medium etc.), with those they get into contact with, and they must not corrode the secondary sealing elements.

⚠ ATTENTION!

Secondary sealing elements made of **EP-rubber** must **never** come into contact **with mineral oil-based lubricants** (swelling, possibly decomposition).

- suitable synthetic lubricant for dynamic elastomeric secondary sealing elements
  e.g. "**TURMOPOL GREASE SH 2 D**" make: Lubricant Consult (LUBCON).
- suitable lubricants (conform with FDA)
  e.g. "**TURMSILON GTI 5000**" make: Lubricant Consult (LUBCON).
- soapy solution or low-tension water for elastomeric bellows seals and static elastomeric secondary sealing elements of seats

⚠ ATTENTION!

For applications free from silicone:
- Lubricants must be free of silicones, fluorinated compounds which are able to migrate, and tensides.

For installation:
- set of hexagon keys
- set of open end or ring spanners
- torque wrench
- O-ring lifter

For sealing:
- Sealing agents for threads for pipe connections, e.g. "**LOCTITE® Nr. 266**" make: LOCTITE Corporation

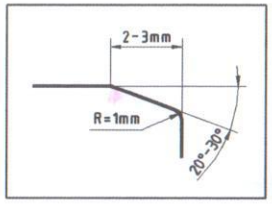
For securing:
- for bolts, set screws etc. use liquid screw retention, e.g. "**LOCTITE® Nr. 243**" make: LOCTITE Corporation

Preparation for assembly

ATTENTION!

To prevent **damage** to the seal, **do not remove it from its packaging** until all the work described below has been **completed**.

Check the parts of the machine for:



- **chamfered edges**
  (sliding cones i.e. 2 mm / 30° or in accordance with EN 12756)
- **radiused transitions**
- **mating fits** and o-ring surfaces:
  fine finished **Ra = 1.6 µm** (= N7 = CLA 63)
- shaft surface in the area of the mechanical seal finished:
  Ra = 0.8 µm (= N6 = CLA 32).

Check on the machine:

- damage of connecting surfaces to the mechanical seal
- mating dimensions, rectangularity and concentricity to the shaft axis
- fix the machine shaft in centric and axial position

Type and quality of the shaft bearing have a major influence on the well-functioning and the service life of the mechanical seal.

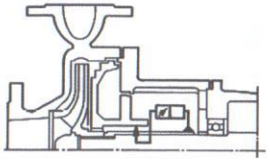
Before the mechanical seal is installed both the
›concentricity accuracy of the shaft
›and the run-out accuracy between shaft and machine housing have to be checked.

The maximum permitted axial displacements have to be considered, and the instructions of the manufacturer have to be observed.

Run-out accuracy of the shaft (acc. to DIN ISO 5199):

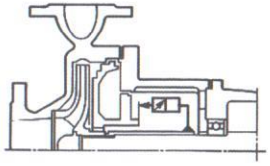
- Shaft diameters up to 50 mm: max. 0.05 mm
- Shaft diameters 50 mm - 100 mm: max. 0.08 mm
- Shaft diameters exceeding 100 mm: max. 0.10 mm

Concentricity and **run out in axial direction** as specified by EagleBurgmann!



Concentricity of the inner surface of the seal chamber to the shaft:

- max. 0.1 mm for seals **with** pumping screw
- max. 0.2 mm for seals **without** pumping screw



Run-out accuracy of the vertical contacting surface between seal chamber and shaft axis (acc. to DIN ISO 5199):

- Shaft speed ≤ 750 rpm: max. 0.2 mm
- Shaft speed 1000 rpm: max. 0.15 mm
- Shaft speed 1500 rpm: max. 0.08 mm
- Shaft speed 3000 rpm: max. 0.025 mm

In case of installation into other machines the shown values apply as directive.

- Prepare the assembly place, take away any un-required tool, cuttings, dirty cleaning wool etc.
- Cover the work bench with a piece of clean, non-fibrous cardboard.

Assembly / installation

The mechanical seal is supplied as a cartridge unit, premounted at works, and does not require any adjustment during installation. This document provides the required information for installation and removal of the cartridge only.

The order of assembly to install the mechanical seal into the machine depends on the design of the machine and has to be determined by the machine manufacturer.
*If the machine manufacturer specified auxiliaries (jigs and fixtures) they have to be used in accordance with the specifications of the manufacturer.

⚠

- The mechanical seal has to be installed under the cleanest conditions and very carefully.
- Avoid unnecessary rotation of the shaft (damage of the sliding faces is possible).
- Never use force during installation.
- Avoid knocking! Damage to mechanical seals has an adverse effect on their safe operation.
- Observe the notes on the current drawing. If necessary, please contact EagleBurgmann.

Possible installation order:

- Make sure that all sealing elements have been installed which contact the surrounding machine parts.
- Unpack the seal.
  ›If necessary, use suitable auxiliaries (e.g. crane, elevating machinery, lifting device, eye bolts etc.).

ATTENTION!

The regulations for the prevention of accidents have to be followed.

- Check, if the O-rings are installed.

If not described otherwise, the following parts have to be moistened slightly with suitable lubricant during installation:
›O-rings in sliding contact with other parts when mounting the mechanical seal,
›shafts in the area of the mechanical seal,
›centring seats (centring diameters) for housing parts.
*Lubricants must be compatible with the medium to be sealed, and they must not corrode the secondary sealing elements.
*Sealing elements made of **EP-rubber** must **never** come into contact **with mineral oil-based lubricants** (swelling, possibly decomposition).

- Feed the complete seal cartridge onto the shaft.

ATTENTION!

Avoid knocking! Damage to mechanical seals has an adverse effect on their safe operation.

- Attach the seal cartridge to the machine housing. The connections for supply and disposal have to be arranged in accordance with view on the drawing.
- Further assembly work (such as mounting the mechanical seal to the machine housing and shaft) and adjustments on the machine (e.g. bearing clearance etc.) in accordance with the operating manual of the machine manufacturer and the seal assembly drawing.

ATTENTION!

Remove the assembly fixture screws and the assembly fixtures and the assembly ring and keep them by all means of a later removal of the seal.

- Any further assembly of the machine must be in accordance with the instructions of the machine manufacturer.
- The screw plugs / plastic inserts which are used for protection against pollution must only be removed directly before the piping is connected.
- Close unused supply connections pressure-tight with threaded plugs.

Supply connections

The supply connections are designed as threaded connections in accordance with DIN ISO 228, part 1.
- Use DIN ISO 228 connecting threads **only** with encased gaskets or with self-sealing pipe unions. Avoid sealing agents for threads (e.g. PTFE-tape) because they may endanger the safe function of the seal if they enter the sealing chamber.
- The supply connections are marked on the mechanical seal and must not be interchanged during installation.

Connection marks
- FLUSHING IN: FI
- FLUSHING OUT: FO
- BARRIER IN: BI
- BARRIER OUT: BO
- QUENCH IN: QI
- QUENCH OUT: QO

Supply piping:
- Use pipes of stainless steel or resistant material with a sufficient cross-section.
  - › Supply piping for liquids: min. 18x1.5 mm
  - › Supply piping for gases: min. 12x1.5 mm
  - › Impulse piping: min. 12x1.5 mm
- Clean the piping **thoroughly**.
- Fasten all pipe connections **pressure-sealed**.
- Install the pipes **continuously rising**, as **short** and as **convenient** as possible for the flow to ensure **self-venting**.
- **Avoid air inclusions** and provide for venting connections, if necessary.
- For turns use pipe bends
- **Fasten** the pipes with appropriate pipe clips.

ATTENTION!

If shutoffs in the piping to the seal are required, ball valves with torsion lock have to be used.

OPERATION

Safe operation

ATTENTION!

If during a case of emergency values deviating from the operating conditions / operating limits the mechanical seal must be removed and checked either at the manufacturer's or at the nearest service centre.

During every state of operation the mechanical seal has to be constantly wetted by the **medium** to be sealed **in its liquid form**, in particular when the machine is **started** or **stopped**. The machine design has to be such to take this necessity into consideration.

Damage due to dry-running is excluded from the warranty.

IMPORTANT!

If the medium to be sealed builds deposits or tends to solidify during cooling down or standstill of the machine the stuffing box has to be flushed with suitable clean liquid. The flow rate and the liquid should be determined by the user considering the chemical resistance of the seal materials.

If the operation limit values and the instructions given in this manual are followed a trouble-free operation of the mechanical seal can be expected.

Start-up

Safety checks before start-up
- Seal assembly ring of the mechanical seal removed
- Torque transmission between mechanical seal and shaft duly installed
- Supply connections tightened and pressure-sealed
- Disposal connections installed environmentally safe

For a safe operation of the mechanical seal we recommend applying at **inboard** the most suitable **type of circulation** described in **API 610 / 682**. This measure protects the seal cavity from deposition of solids.

- Flood machine and seal cavity (stuffing box) with process fluid.
- Thoroughly vent seal cavity and circulation system.
- After a short start-up period repeat the venting procedure several times with the machine being at standstill.

*Now the seal is ready for operation.

SERVICING

Maintenance

A correctly operated mechanical seal needs **low maintenance**. Wear parts, however, have to be replaced, if necessary.

A duly operation includes a regular check of the following parameters:
- Temperature
- Leakage (drainage) of the mechanical seal

An inspection of the mechanical seal should be carried out along with a revision of the complete plant. We recommend having this inspection performed by EagleBurgmann.

If the mechanical seal is removed during a revision of the plant the sliding faces should be refinished at the manufacturer and both, elastomeric seal rings and springs should be replaced.

Directives in case of failure

Try to define the kind of failure and document it.

- In the event of **excessive leakage** changes in the leakage amount **must** be monitored. If necessary the machine has to be switched off.
- If a constant amount is leaking in a steady flow the mechanical seal is damaged.
- In the event of an **inadmissible temperature rise** the machine **has to** be stopped for safety reasons.

If there is a **malfunction** which you cannot correct on your own, or if the cause of malfunction is not clearly recognisable please immediately contact the nearest **EagleBurgmann agency**, a EagleBurgmann service centre or the EagleBurgmann headquarters.

During the **warranty period** the mechanical seal must only be disassembled with approval of the manufacturer or when a representative is present.

After-sales service by EagleBurgmann

EagleBurgmann's customer service department offers a comprehensive service package covering consultancy, engineering, standardisation, installation, commissioning as well as damage analysis right through to seminars on sealing technology.

Addresses are listed in various EagleBurgmann brochures as well as under **www.eagleburgmann.com**.

Reconditioning (repair)

If **reconditioning** is necessary, the complete **seal** should be sent **to the manufacturer**, as this is the best way to find out which components can be reconditioned or which parts must be replaced in order to ensure an optimum tightness.

If, **for compelling reasons, a reconditioning** has to be carried out **on site** (e.g. no. spare seal on stock, long transport, problems with customs) the seal may be repaired in a clean room by **trained** personnel of the user under the direction of **EagleBurgmann mechanics**.

Disassembly / removal

⚠
- **Stop the machine** as instructed, allow to cool, depressurise it and ensure that pressure cannot build up again!
- **Work** on the mechanical seal **is only permitted** when the machine is at a **standstill** and **depressurised**.
- Depressurise and shut off (or drain) the **supply** of the mechanical seal.
- **There must be no product in the mechanical seal**» if necessary drain the machine and rinse it out!
- **Isolate the machine** to prevent it starting up unexpectedly!
- **Observe the safety notes** (safety data sheets)!

⚠ IMPORTANT!

When removing, please observe **by all means**:
- current accident prevention regulations
- regulations for handling hazardous substances

⚠ WARNING!

Seals that have been used with **hazardous substances must be properly cleaned** so that there is no possible **danger** to people or to the environment.

⚠ IMPORTANT!

The packaging used to transport the seal must
- be identified with the relevant hazard symbol and
- include the safety data sheet for the product and/or supply medium.

⚠ IMPORTANT!

If the medium to be sealed builds deposits or tends to solidify during cooling down or standstill of the machine the stuffing box has to be flushed with suitable clean liquid. The flow rate and the liquid should be determined by the user considering the chemical resistance of the seal materials.

The order of disassembly to remove the mechanical seal out of the machine depends on the design of the machine and should be determined by the machine manufacturer.
›If the machine manufacturer specified auxiliaries (jigs and fixtures) they have to be used in accordance with the specifications of the manufacturer.

- Remove the supply piping to the mechanical seal. Collect drained liquid and dispose of properly.
- Drain the mechanical seal. Collect the drained liquid and dispose of properly.
- Install the assembly ring before the mechanical seal is removed from the machine.
- Unscrew the set screws with cup point and dispose of.

⚠ ATTENTION!

Set screws with cup point must be used **only once**. Repeated fastening endangers the safety of force transmission.

- Loosen all screw connections between seal cartridge and the respective machine parts.
- Remove the mechanical seal in the reverse sequence as described for assembly (set up).

⚠ ATTENTION!

Sealing elements made of PTFE have to be used **only once**.

Spare parts

- Only EagleBurgmann original spare parts must be used. Otherwise
  - ›**Risks** of a seal failure, **endangering** persons and environment.
  - ›The EagleBurgmann guarantee for the mechanical seal **lapses**.
- For a quick exchange a complete **spare seal** should be on stock.

Required details for enquiries and orders

For enquiries and orders the following details are required:

- EagleBurgmann commission no.
- Drawing no. of mechanical seal
- Part item no., designation, material, number of pieces acc. to drawing.

EagleBurgmann

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127-8 Wenjing Road Minhang, Shanghai
POST CODE:200245
Tel +86 (021)64620550
Fax +86 (021)64300219
Http://www.burgmann.com

Disposal of the mechanical seal

Usually, the mechanical seals can be easily disposed of after a thorough cleaning.

- Metal parts (steels, stainless steels, non-ferrous heavy metals) divided into the different groups and sent to scrap metal waste.
- Ceramic sliding materials (synthetic carbons, ceramics, carbides) belong to waste products. They can be separated from their housing materials, as are physiologically recognised as safe.
- Synthetic materials/plastics (elastomers, PTFE) belong to special waste.

⚠ CAUTION!

Material containing fluorine must not be burnt.

⚠ IMPORTANT!

Some of the synthetic materials, divided into the different groups can be recycled.

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