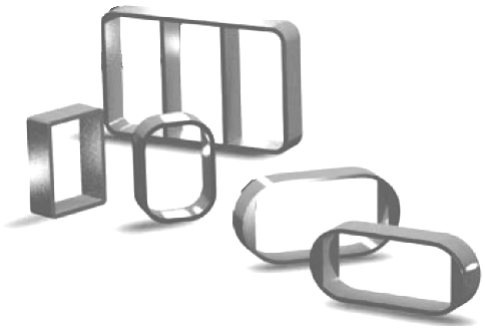
Installation Instructions for GK Packing System TYPE EMC SPK

Application and validity: Type-tested, electromagnetically compatible (EMC) feedthrough system for undersea cables in class A divisions (bulkhead and deck installation).
GK EMC feedthroughs consist of a GK EMC metal frame (system depth 80 mm) and a GK EMC sealing system (halogen-free modules and accessories; with metal cushioning and/or metal foils).
GK EMC feedthroughs meet the integrity and isolation criteria of class A divisions. Maximum line operating temperature 90°C. All work is carried out in accordance with current welding and assembly instructions and should only be implemented by trained personnel in compliance with legal regulations. Depending on requirements, feedthroughs are either fully or partially insulated. Fire resistance classes A-0 and A-15 to A-60 are provided with fire protection insulation according to the insulation drawing. National VG standards and/or specific building regulations must be taken into account and, where appropriate, the regulations of the responsible flag state administrations must be observed. Information, recommendations, instructions, technical drawings, certificates, insulation instructions, training and inspections are available upon request from Roxtec GmbH (technic-germany@roxtec.com or www.gkmarine.de).

EMC GK frame with EMC KAD as a tightening element



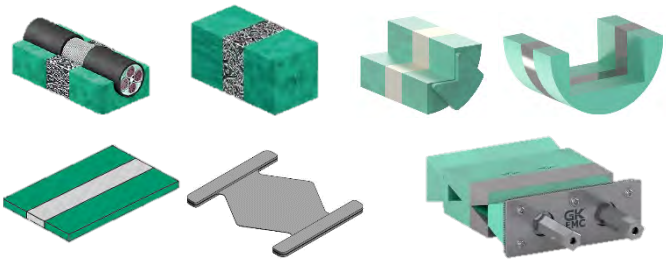
The choice of frame type, size and material depends on the local requirements for the feedthrough.

The frame is available in: stainless steel or aluminum

Type EMC SPK:-F;-30;-S50;-S70 T=80 mm and BTB (Back to Back)
Seal type: EMC wedge-shaped seal (EMC KAD)
Frame sizes: 2, 4, 6 & 8, single, bundle and multiple frames

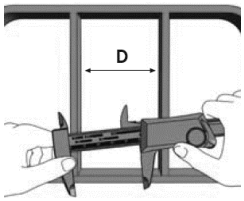
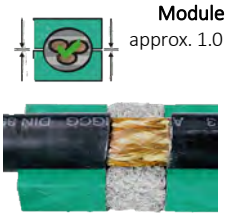
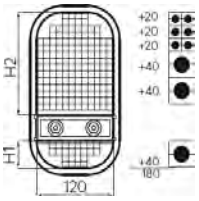
Type EMC SPKh-120 and-BTB
Seal type: EMC wedge-shaped seal (EMC KAD)
Frame sizes: 2, 4, 6 & 8, single frames

EMC GK sealing system components



Line modules:	"EMC MH" (metal cushioning)
Filling modules:	"EMC FM" (metal cushioning)
Anchoring disks:	"EMC VAS" (stainless steel)
spacer plates:	"EMC ZWP" (metal foil)
Radius adapter:	"EMC ADTP" (metal foil or metal cushioning)
Wedge-shaped seal:	"EMC KAD" (metal foil, EMC seal)

EMC installation instructions at a glance: Five steps for safe feedthroughs

				
1. Packing frame: Measurements & preparations	2. Lines: Measurement & stripping	3. Modules: Size and diameter	4. Feedthrough: Filling & packing levels	5. Completing the frame: EMC-KAD & seal

Recommended tools

Test mandrel
GK caliper

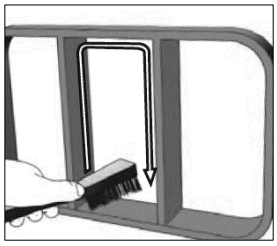
Rubber mallet, ratchet, size 15 wrench & Torx key T15

Pressing tool (VPH)
Anchor claw (VASK)

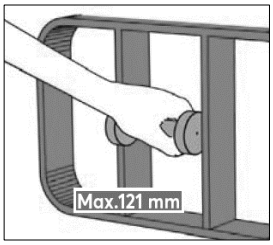
Assembly plates (MOB)
W=15, 25, 35 & 55

KAD screw adapter

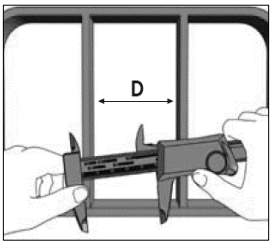
1. Packing chambers: Measurements & preparations



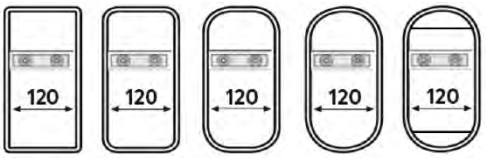
Clean the frame. The bare metal must be exposed on contact surfaces. After the frames have been welded in divisions, it may be necessary to pickle and passivate them.



Quick check of the chamber dimensions with a GK test mandrel (121.0) or suitable measuring equipment.



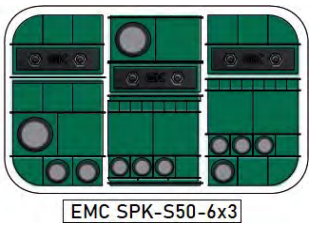
Tolerances for chamber dimensions "D" ±1.0mm



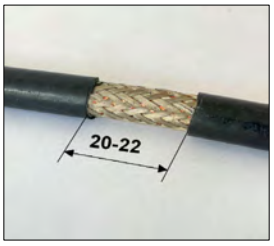
SPK SPK-S30 SPK-S50 SPK-S70 SPKh-120

In particular, single frames and the outer chambers of bundle frames tend to warp due to the welding process. Deviations from the tolerance should be eliminated before the lines are inserted. If in doubt, determine the exact value using suitable measuring equipment.
A tolerance of ±1.0 mm is required for a gas- and watertight seal.

2. Cable: Arrangement and preparation (stripping of the cable sheath)



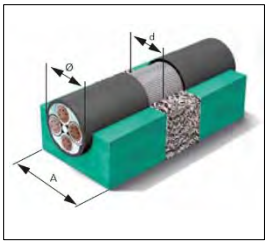
Determine the planning of module assignment using Roxtec Transit Designer™ (RTD) or manually using GK planning sheets.
Guide lines straight through the frame. Align large or rigid lines according to the module position in the frame and position the wedge-shaped seal between the lines (center of the frame).



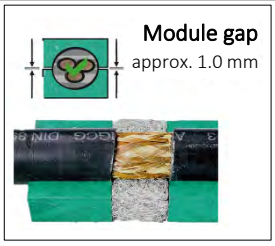
Arrange the cables in layers and carefully trace the edge of the frame onto the cables using a suitable marker. The mark has a significant influence when opening the cable insulation for the cable sheath, which is used to make contact with the GK-EMC modules.

To create a safe EMC feedthrough, the cables must be precisely stripped (20-22 mm) in the middle of the 80 mm deep frame. Starting from the first mark, two additional marks are made at 30 mm and 50 mm. The insulation is stripped between these marks using a suitable tool.

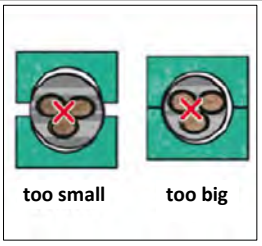
3. Selecting the EMC modules and adapters

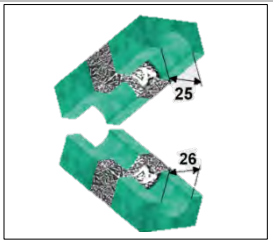


In order to determine the EMC modules, the average cable outer diameter and the shield diameter must be determined precisely and the modules must then be procured according to the order. For procurement purposes, the edge dimensions of the modules (module size) and the determined diameters must be specified as follows: e.g. EMC MH-40/31-28.
(Module size A=40 mm, cable Ø=31 mm, sheath d=28 mm)

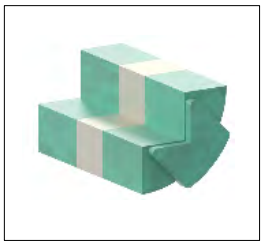


Check the fit of both module halves on the cables. It should not be possible to compress a gap of approx. 1 mm between the module halves by hand. To ensure a gas- and watertight seal, the modules selected must not be too large or too small



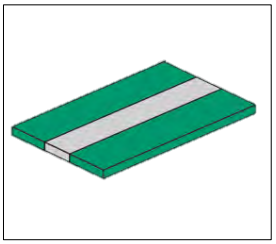


The nominal diameter of both module halves may differ by a maximum of one size.
e.g. EMC MH-40/26-19 &
EMC MH-40/25-19)



Selecting an adapter for radial frames: "EMC ADTP" are occupied by "EMC MH" module halves or "EMC FM" filling modules.

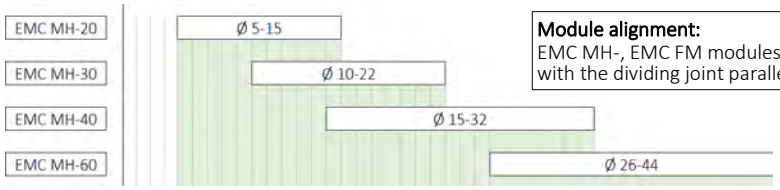
EMC filling modules fill the rows if no additional cables are present and are aligned with the imprint parallel to the frame width.



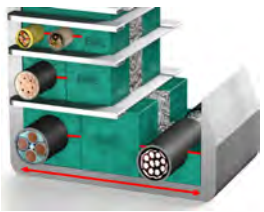
"EMC ZWP-3,-5 & -10 spacer plates)" fill the frame and enable the required pack height to be reached or modules to be anchored with "EMC VAS".

3.1 "EMC MH" module halves; selecting the modules and adapters

"EMC MH" GK module halves are available in four block sizes with partially overlapping internal diameters.



Module alignment:
EMC MH-, EMC FM modules are to be arranged with the dividing joint parallel to the frame width.

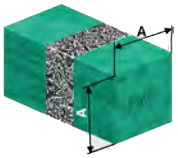


3.2 "EMC FM" filling modules

Filling modules supplement the packing rows when no additional lines are available.

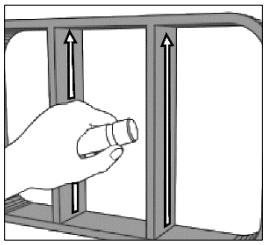
Edge length AXA			
20	30	40	60
Depth 80 mm			

Sample designation: EMC FM-20/00

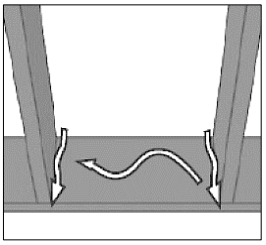


3.3 Assembly grease (only use GK assembly grease)

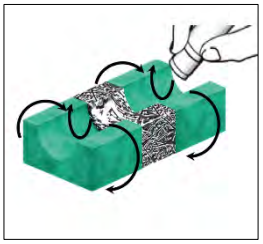
The following is important to ensure a tight seal: Lightly and evenly coat the contact surfaces of all system components (except metal foils and metal cushioning) with assembly grease. It is particularly important to grease the 90° corners of the frame!



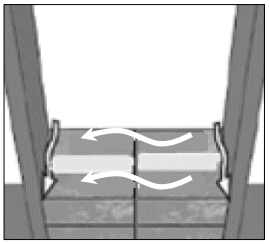
All horizontal surfaces of the frame.



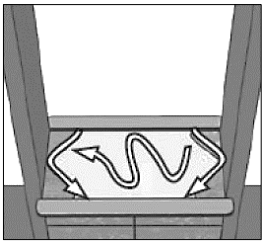
All vertical surfaces of the frame as well as all sharp (90°) corners.



All elastomer surfaces of the EMC modules



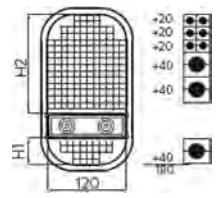
Corners (90°) between the modules and frame



Surface and V contour of the EMC VAS anchoring disk

4. Feedthrough: Filling & packing levels

Filling the packing frames with modules ensures the certified fire resistance class (through additional fire protection insulation) and pressure resistance. The frame is filled until packing height "H" is reached. Two "EMC MH" module halves are required to form a seal around each line. If pressurization is required (gas and water pressure), only one block size should be used in each row of modules. If there are a large number of lines, four small "EMC MH" modules can be used in addition to the large "EMC MH" modules (e.g. 2x40 & 4x20). Filling modules
"EMC FM" and "EMC ZWP" spacer plates completely fill the frame. Each row ends with an "EMC VAS" metal anchoring disk.



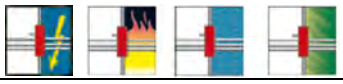
Determining packing height "H" without wedge-shaped seal "EMC KAD"

Protection against fire, gas and water pressure
As well as magnetic influences

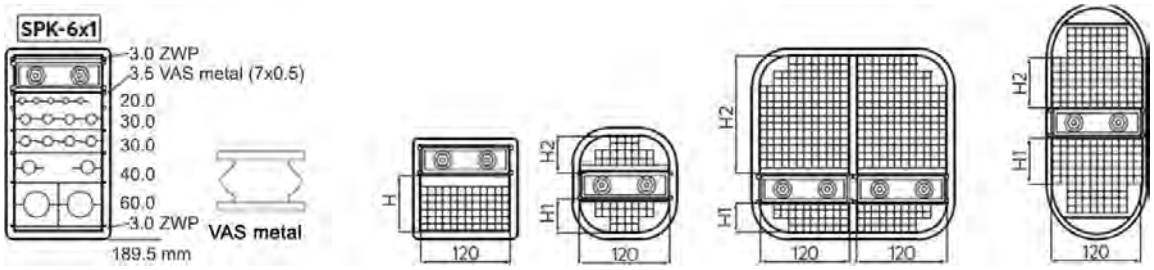
4.1 Required packing height "H"=H1+H2 (Fire resistance class A-0 to A-60)

EMC VAS

VAS metal anchoring disk (0.5 mm)
<u>When</u> gas and water pressure tightness is required



Anchoring disks:
0.5 mm is allowed for EMC VAS when determining "H".



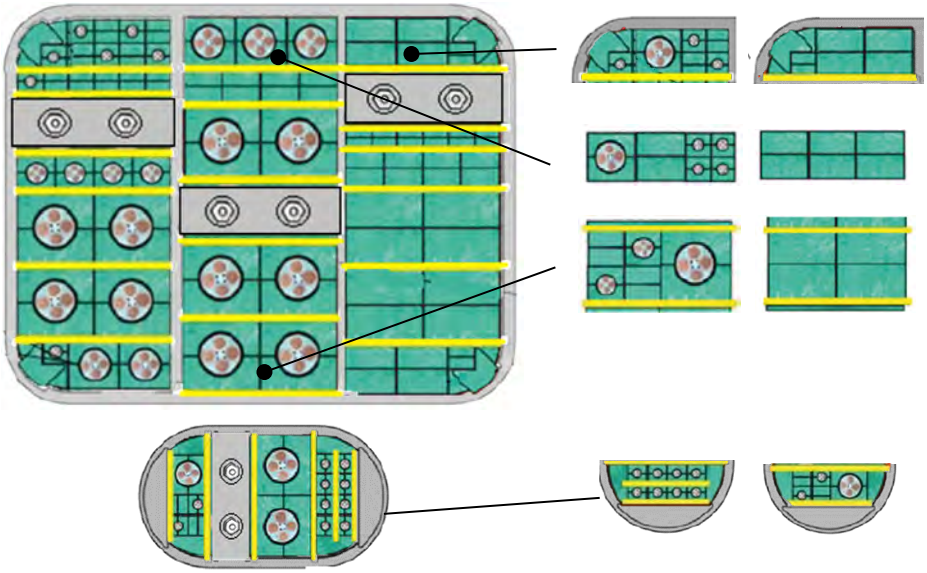
Frame type	**EMC SPK/-S30, -S50 & S70**			**EMC SPKh-120**			
Frame size	**4**	**6**	**8**	**2**	**4**	**6**	**8**
Packing height "H" when **<u>no</u>** pressure requirements apply	120 – 125	180 – 190	240 – 255	60 – 63	120 – 125	180 – 190	240 – 255
Packing height "H" when pressure requirements apply	120 – 125	185 – 190	250 – 255	60 – 63	120 – 125	185 – 190	250 – 255

Fire resistance class:
EMC cable feedthroughs of fire resistance classes A-15 to A-60 are provided with approved fire protection insulation of fire resistance class A-60 in accordance with the valid and current insulation drawings. Detailed insulation instructions and certificates are available from Roxtec GmbH (technic- germany@roxtec.com)

4.2 Module combinations (fire resistance class A-0 to A-60 and gas- and watertightness requirements)

Permissible assignment:

Generally, rows of one block size are created between the VAS; in exceptional cases, one large module may be replaced by four small ones. **EMC ZWP GK spacer plates > 5 mm should be closed with EMC VAS.**

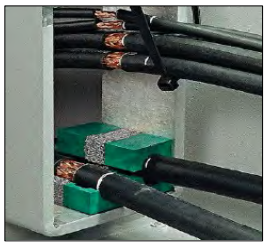


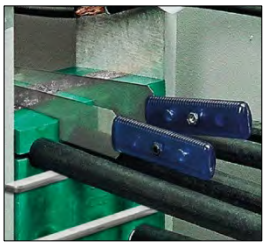
Up to size 40 EMC FM or EMC MH, start without EMC ZWP & EMC ZWP

From size 60 EMC FM or EMC MH, start with EMC ZWP & EMC VAS

In the case of type EMC SPKh, the EMC FM or EMC MH should also be secured with EMC VAS metal in the EMC ADTP radial adapter!

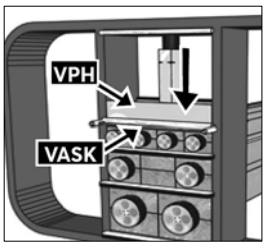
5.1 Completing the frame: Installing EMC modules and accessories & tightening the EMC-KAD



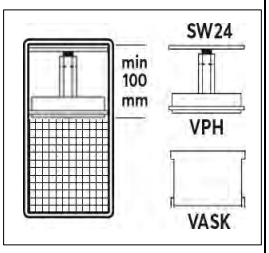


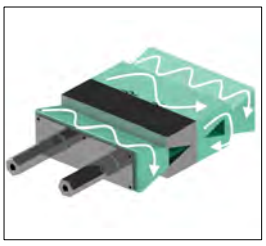
EMC modules are assembled in rows. Each row must be closed off with an "EMC VAS" metal anchoring disk. It is important to prevent the metal cushions from catching in one another or becoming damaged during insertion. For this use the appropriate MOB.
The VASK (T=80) anchor claw is used to secure it

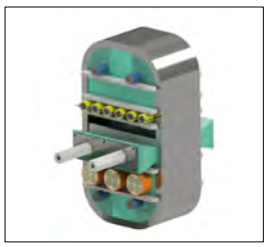
In the case of radial frames or fillings with a high packing height, it is best to install the top row at an early stage and to position the EMC KAD wedge-shaped seal in the middle.



Regular pre-pressing:
Pre-pressing with the pressing tool (VPH) reduces air gaps and makes further assembly easier. The VPH compresses the module rows. The VASK anchoring claw can be used to secure the compressed modules and must be removed before continuing with assembly







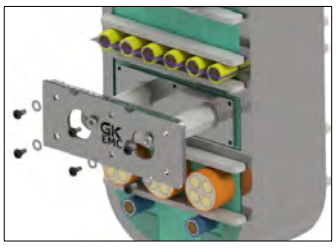
EMC KAD preparation:
Remove the EMC seal and fully release the KAD wedge-shaped seal (H=40 mm). The front and rear wedge must be sufficiently greased; the contact surfaces are light and the metal foil should not be coated with GK assembly grease.

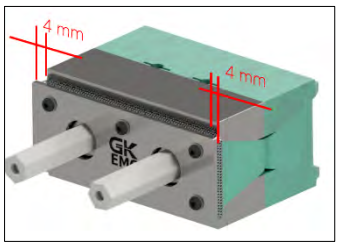
Fully insert the EMC KAD into the EMC packing frame up to the mark between two anchoring disks. The EMC KAD should not be installed last.
Use MOBs to protect the foil.

Continue with assembly until the required packing height H is reached. (see 4.1).
Check the position of the cables and modules and ensure that all modules are between the edges of the EMC VAS. If necessary, realign the modules with the edge of the EMC VAS. Remove the MOBs.

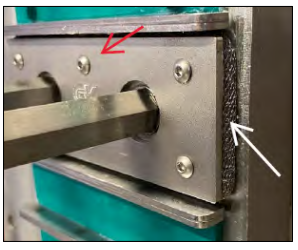
Tighten the KAD nuts evenly (using a wedge tool). Tighten the special nuts as much as possible and finally check both nuts. The tightening process is ok if the special nuts are tightened to the mechanical stop, all visible gaps are closed, lines are firmly clamped between the module halves and GK assembly grease emerges. There should be no modules on the edge of the EMC VAS.

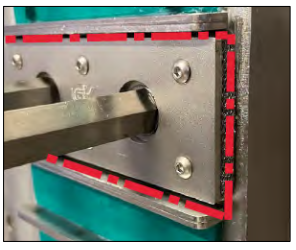
5.2 Completing the frame: Assembly of the EMC seal





Guide the EMC seal across the fully tightened KAD nuts and gradually fully tighten the six screws in a crosswise sequence. The EMC sealing profile should form a complete seal against the metal foil and frame.





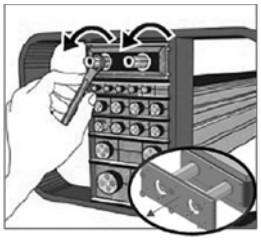
Check that all screws of the EMC seal are fully tightened and that the EMC seal profile forms a complete seal between the front panel and the frame.

Removal and expansion

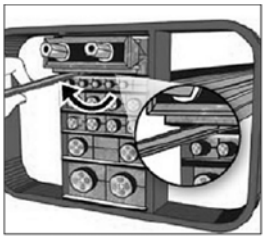
General note:

The (EMC) GK Packing System is a type-tested component relevant to safety in ship design and must be used accordingly. Initial assembly involves significant compression and partial deformation of the plastic material in order to achieve the required fire resistance class and, if necessary, the required compressive strength. Depending on time, temperature and other environmental influences, it may not be possible to reuse the material that has already been installed. Corrections to incorrectly installed feedthroughs should be made promptly after the initial installation, before the lubricant has dried and the installation shows signs of settling.

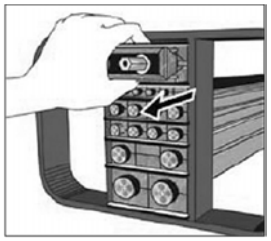
To make changes to the feedthrough, the EMC wedge seal must always be completely removed and reset to a height of 40 mm (see the following note). The GK packing system does not require maintenance or servicing. However, the system should be checked at regular intervals for intactness, damage, corrosion or contamination with harmful substances such as oil, fuel, acids and alkalis, etc., which can impair the safety of the feedthrough. If necessary, the GK packing system must be cleaned or replaced to ensure it is restored to a safe condition.



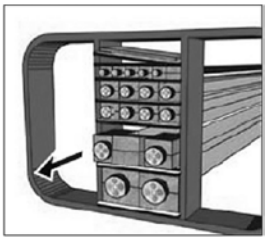
Remove the EMC seal (see section 5.2).
To open the packing chamber, loosen the KAD nuts gradually and loosen the wedges of the EMC KAD seal by hitting the nut(s) with a hammer until the EMC KAD is completely loose.



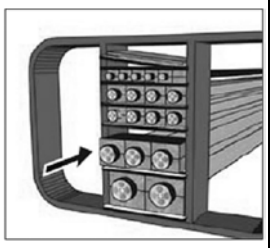
Use a flat object to remove the EMC KAD plates from the EMC VAS so that the EMC KAD has a height of 40 mm.



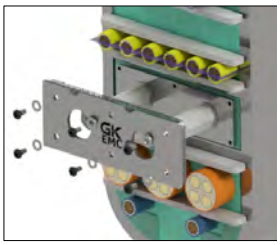
Remove the EMC KAD wedge seal and only reuse it if it is undamaged and fully intact. Flawless EMC VAS seals can be reused.

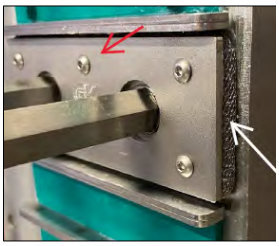


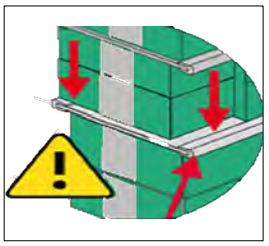
Feedthroughs **without** pressure requirements: Completely fill the relevant row with new EMC modules.
Feedthroughs **with** pressure requirements: Completely fill the frame with new EMC modules and accessories. Use MOB!



Grease the module halves, insert the lower module halves into the frame, insert the upper module halves into the frame at a slight angle, position with light pressure or short hammer blows.







Only use undamaged EMC KAD seals. Regrease the EMC KAD seal prior to assembly. Tighten the special nuts as much as possible in a crosswise sequence; each nut must be checked individually. Assemble the EMC seal (see 5.2); the EMC seal profile must form a continuous all-round seal and should be replaced as necessary!

No modules should make contact with the edge of the EMC VAS. The tightening process is ok if the special nuts are tightened to the mechanical stop, all visible gaps are closed, lines are firmly clamped between the module halves and GK assembly grease emerges. An optimum seal is reached after 24 hours! If necessary, restore/provide fire protection insulation in accordance with certification.

DISCLAIMER

(For GK Packing System Mounting Instruction)

The GK cable and pipe entry sealing system ("the GK Packing System") is manufactured by Roxtec. This GK Packing System is a modular based system of sealing products consisting of different components. Each and every one of the components is necessary for the best performance of the GK Packing System. It has been certified to resist a number of different hazards. Any such certification, and the ability of the GK Packing System to resist such hazards, is dependent on all components that are installed as a part of the GK Packing System. Thus, the certification is not valid and does not apply unless all components installed as part of the GK Packing System are manufactured by or under license from Roxtec ("authorized manufacturer"). Roxtec gives no performance guarantee with respect to the GK Packing System, unless (I) all components installed as part of the GK Packing System are manufactured by an authorized manufact user and (II) the purchaser is in compliance with (a) and (b) below. (a) During storage, the GK Packing System or part thereof shall be kept indoors in its original packaging at room temperature. (b) Installation shall be carried out in accordance with latest GK Packing System Mounting instructions. The product information provided by Roxtec does not release the purchaser of the GK Packing System, or part thereof, from the obligation to independently determine the suitability of the products for the intended process, installation and/or use. Roxtec gives no guarantee for the GK Packing System or any part thereof and assumes no liability for any loss or damage whatsoever, whether direct, indirect, consequential, loss of profit or otherwise, occurred or caused by the GK Packing System or installations containing components not manufactured by an authorized manufacturer. Roxtec expressly excludes any implied warranties of merchantability and fitness for a particular purpose and all other express or implied representations and warranties provided by statute or common law. User determines suitability of the GK Packing System for intended use and assumes all risk and liability in connection therewith. In no event shall Roxtec be liable for consequential, punitive, special, exemplary or incidental damages.

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