Explosion Protection

The ATEX Directive and the KTR programme for applications with potentially explosive atmospheres
Caution: explosive atmospheres!

There are many things that have to be taken into account when you are designing drive systems for potentially explosive atmospheres. How does the ATEX Directive influence your choice of couplings and cooling systems or hydraulic components and clamping sets? For example, can a selected component be used for the temperature class stipulated? And how should couplings be protected in potentially explosive atmospheres? This brochure provides the answers.

The ATEX Products Directive 2014/34/EU has far-reaching consequences for the selection, installation, operation and maintenance of equipment in potentially explosive atmospheres. In this context, mechanical equipment and components, among other things, are considered and evaluated with regard to potential risk of explosion.

As a leading manufacturer of drive components for the mechanical and plant engineering sectors, we examined the requirements of the ATEX Directive early on and had relevant series from our overall product range inspected by an independent institute with regard to their usability in potentially explosive atmospheres.
A safe bet: KTR’s support for you

Not only do we provide you with information about the specifics of the ATEX Products Directive – we also provide products that allow you to safely plan, design and build your machines and plants.

KTR’s comprehensive product range has been examined and evaluated as compliant with the ATEX Directive. It includes torsionally flexible pin and bush couplings, backlash-free servo couplings, gear, flange, steel lamina and magnetic couplings, and also oil/air coolers.

On the following pages we first of all set out the requirements of ATEX Directive 2014/34/EU, introduce the equipment categories and the zoning and show the standardised marking for components that are used in atmospheres potentially at risk of gas or dust explosions. We then present our products for potentially explosive atmospheres, with their key features and their explosion protection conformity marking.

In addition, we are happy to help you to conform with all other safety standards and advise you about all the required markings. The relevant type examination certificates and assembly instructions can be found at www.ktr.com.
Appendix II of the European Products Directive 2014/34/EU, requires adherence to general safety and health specifications on those machines operating in potentially explosive atmospheres within the EU. These specifications have to be met during the development and production of the products by the manufacturer and be supported by the respective literature, e. g. operating and assembly instructions.

KTR manufactures and supplies a number of couplings and cooling systems that conform to the ATEX standard. However, a basic condition of their explosion-proof operation is the use of the products in accordance with the operating and assembly instructions.

Explosion hazard: Only a few mechanisms are required for an explosion to occur: a flammable material such as gas, mist, vapour or dust in an ignitable concentration, sufficient oxygen and an ignition source such as sparks or a hot surface.

Thus, explosion protection measures are always necessary if

- flammable materials exist
- the distribution of the air may produce a hazardous mixture
- the production of a dangerous and hazardous atmosphere is possible.

Typical ignition sources: Ignition hazard can be generated by sparks from impact, friction or grinding, by temperature increase or as a result of electrostatic charge and can initiate explosions.

Equipment groups and categories: The equipment used in potentially explosive atmospheres are classified in groups I and II. Group I includes underground and surface mining and group II includes gas and dust explosion protection in every other application.

<table>
<thead>
<tr>
<th>Equipment group</th>
<th>Category</th>
<th>Material group</th>
<th>Suitable zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>I (includes equipment intended for use in underground mines and their above-ground facilities)</td>
<td>M1 (corresponds to very high safety)</td>
<td>G (gases)</td>
<td>0, 1, 2</td>
</tr>
<tr>
<td></td>
<td>M2 (corresponds to high safety)</td>
<td>D (dusts)</td>
<td>20, 21, 22</td>
</tr>
<tr>
<td>II (includes equipment intended for use in other areas)</td>
<td>1 (corresponds to very high safety)</td>
<td>G (gases)</td>
<td>1, 2</td>
</tr>
<tr>
<td></td>
<td>2 (corresponds to high safety)</td>
<td>D (dusts)</td>
<td>21, 22</td>
</tr>
<tr>
<td></td>
<td>3 (corresponds to safety with normal operation)</td>
<td>G (gases)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D (dusts)</td>
<td>22</td>
</tr>
</tbody>
</table>

= Potential use of KTR components
Zones: The classification of hazardous areas into zones depends on the probability of how often and of how long a dangerous explosive atmosphere may occur. The zones are differentiated between flammable gases, mists, vapours and dusts.

<table>
<thead>
<tr>
<th>Explosion range</th>
<th>Zone</th>
<th>Hazardous atmosphere</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas (G)</td>
<td>0</td>
<td>Permanent, long-term or frequent use</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Occasional use</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>No or rare and if so only short-term use</td>
</tr>
<tr>
<td>Dust (D)</td>
<td>20</td>
<td>Permanent, long-term or frequent cloud of dust in the air</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>Occasionally, dust deposits exist in general</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>Should not be expected with normal operation, if so, only short-term</td>
</tr>
</tbody>
</table>

Explosion groups: The explosion groups are split according to how flammable a gas is. As an example, permissible size of insulating surfaces depends on the explosion groups, with increasing specifications from IIA to IIC:
- IIA e.g. methane
- IIB e.g. ethylene, propane
- IIC e.g. hydrogen, acetylene, carbon bisulfide

Temperature classes: The temperature class does not represent the operating temperature of the operating material, e.g. the coupling, but the maximum permissible surface temperature on the operating material. The maximum surface temperature has to fall below the corresponding ignition temperature. Gases and vapours are subdivided into temperature classes depending on the ignition temperature, with increasing specifications from T1 to T6:
- $T_1 \leq 450 \, ^\circ C$
- $T_2 \leq 300 \, ^\circ C$
- $T_3 \leq 200 \, ^\circ C$
- $T_4 \leq 135 \, ^\circ C$
- $T_5 \leq 100 \, ^\circ C$
- $T_6 \leq 85 \, ^\circ C$

Explanation of the identification marks one would find on a ROTEX® coupling:

For further details please have a look at: http://ec.europa.eu/enterprise/sectors/mechanical/documents/guidance/atex/application/
Component protection in potentially explosive atmospheres.

Covers:

If the products are used in locations subject to dust explosion and in mining the user must make sure that there is no accumulation of dust in a dangerous volume between the cover and the component. The component must not operate in an accumulation of dust.

For covers with unlocked openings on the top face no light metals should be used if the products are used as equipment of equipment group II (if possible, from stainless steel).

If the products are used in mining (equipment group I, category M2), the cover must not be made of light metal. In addition, it must be resistant to higher mechanical loads than if it is used as equipment of equipment group II.

The cover required in accordance with DIN EN ISO 12100 (Safety of Machinery) and directive 2014/14/EU and must protect against
- access with the little finger
- falling down of solid foreign objects.

The cover may provide for openings intended for necessary heat dissipation. These openings have to comply with DIN EN ISO 13857.

The cover must be electrically conductive and included in the equipotential bonding.

Painting/coating:

If coated (priming, paintings, etc.) components are used in potentially explosive atmospheres, the requirements on conductivity and coating thickness must be considered. In case of insulating paintings up to 200 µm electrostatic load does not have to be expected. Multiple coatings that are thicker than 200 µm are prohibited for explosion group II C.

Maintenance:

The respective maintenance intervals of the equipment or components must be observed. During the operation of the machine, any changes to running noise of the coupling, or vibration that may arise, must be respected.

Design modifications:

Components with attachments which may produce heat, sparks and static load (e. g. combinations with brake drums or disks, overload systems such as torque limiters, fans, etc.) are not permitted for use in potentially explosive atmospheres. A separate inspection must be performed.
Shaft-hub-connection: If used in potentially explosive atmospheres the clamping ring hubs and clamping hubs without feather key must be selected in a way that there is a minimum safety factor of $s = 2$ between the peak torque of the machine including all operating parameters and the nominal torque and frictional locking torque of the coupling. Clamping hubs without feather key only permissible for use in category 3. The responsibility for the shaft-hub-connection is subject to the customer. Please check the connection carefully.

Component selection: Select the components with a sufficient service factor and choose suitable materials.

Screw connections: Secure all screw connections using a screw lock solution and closely adhere to the recommended tightening torque of the screws.

ATEX marking: KTR parts bear an ATEX marking as follows:

![Example of ATEX marking on the POLY-NORM® shaft coupling]

The customer bears the sole responsibility for all machining processes performed subsequently on unbored or pilot bored as well as finish machined components and spare parts. KTR supplies unbored or pilot bored components and spare parts only upon explicit request of the customer. These parts are additionally labelled with the symbol ☐. KTR does not assume any warranty claims resulting from insufficient remachining. Mechanical remachining on components used in potentially explosive atmospheres must be coordinated with KTR.
## KTR products for potentially explosive atmospheres

<table>
<thead>
<tr>
<th>Product</th>
<th>ROTEX®</th>
<th>ROTEX® SP (Non Sparking)</th>
<th>POLY-NORM®</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ATEX marking</strong></td>
<td>On the collar of the hubs (or rolled up on the outside diameter of the hub) on a component (e.g. motor hub)</td>
<td>In the cam base of the coupling (injected into the face of the polyamide area)</td>
<td>On the outside diameter DH</td>
</tr>
<tr>
<td><strong>- without details</strong></td>
<td>Up to ROTEX® 19 and 28 AFN: Only designation. In addition, complete marking on the order confirmation and packaging.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>- short (standard)</strong></td>
<td>From ROTEX® 24 and 38 AFN: II 2GD c IIC T X I M2 c X Only for coupling hubs without feather key: II 3GD c IIC T X</td>
<td>II 2GD IIC T X</td>
<td>II 2GD c IIC T X I M2 c X</td>
</tr>
<tr>
<td><strong>- complete</strong></td>
<td>II 2G c IIC T6, T5 resp. T4 -30 °C ≤ Ta ≤ +65 °C, +80 °C resp. 0 °C II 2D c T110 °C-50 °C ≤ Ta ≤ +90 °C I M2 c -30 °C ≤ Ta ≤ +90 °C Types EN, GN, GND and E4-DKM II 2G c IIC T6, T5, T4 resp. T3 -50 °C ≤ Ta ≤ +65 °C, +80 °C, +115 °C resp. +120 °C II 2D c T140 °C-50 °C ≤ Ta ≤ +120 °C Type ZS-DKM-C II 2G c IIC T6, T5 resp. T4 -30 °C ≤ Ta ≤ +65 °C, +80 °C resp. +90 °C II 2D c T110 °C-30 °C ≤ Ta ≤ +90 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>- others</strong></td>
<td>Other components are marked with designation only (except for elastomers).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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1. Only permissible with coupling hubs made of steel.
2. Only permissible with clamping hubs without feather key.
3. BoWex® type S ... ST (plug-in couplings with steel core and steel hub) as well as type SSR (with supporting circlip) – standard sleeve (material PA, light) or conductive sleeve (PA with carbon fibre, black) – on request.
4. With the BoWex® coupling the demand for explosion protection is only ensured with the use of the electroconductive PA sleeve type C. The coupling hubs made of steel correspond to the standard design and can be combined with various sleeve materials which do not generally comply with the ATEX requirements. For that reason the explosion protection marking is only shown on the respective outer sleeve made of PA.
<table>
<thead>
<tr>
<th><strong>REVOLEX® KX</strong></th>
<th><strong>POLY</strong></th>
<th><strong>BoWex®</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Short, fail-safe, torsionally flexible pin &amp; bush coupling type KX and KK-D, KK-AB and KK-TB</td>
<td>Not fail-safe, torsionally flexible jaw coupling type PKN, PKZ, PKD and PKA</td>
<td>Not fail-safe curved-tooth gear coupling in the material combination nylon/steel for type M; for the design with external sleeve (colour: black) made of electroconductive PA with carbon fibre type C (Ex), size M-14 to M-65 and type GT</td>
</tr>
<tr>
<td>On the outside diameter DH or collar diameter of the pin &amp; bush hubs</td>
<td>On the outside diameter DH of the cams</td>
<td>On the nylon sleeve(6)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Up to BoWex® M-32C on the external sleeve only designation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>From BoWex® M-38C on the face, BoWex® GT on the inside</td>
</tr>
</tbody>
</table>

- **CE II 2G c IIIC T X**
  - I M2 c X
- **CE II 2G c IIIC T6 resp. T5**
  - -30 °C ≤ T ≤ +65 °C resp. + 80 °C
  - I M2 c -30 °C ≤ T ≤ +80 °C
- **CE II 2G c IIIC T6 resp. T5**
  - -30 °C ≤ T ≤ +65 °C resp. +80 °C
  - I M2 c -30 °C ≤ T ≤ +80 °C

- **CE II 2G c IIIC T6, T5 resp. T4**
  - -30 °C ≤ T ≤ +65 °C, +80 °C resp. +100 °C
  - I M2 c -30 °C ≤ T ≤ +100 °C

[Other components are marked with designation only (except for elastomers).]
# KTR products for potentially explosive atmospheres

<table>
<thead>
<tr>
<th>Product</th>
<th>GEARex®</th>
<th>COUNTEX®</th>
<th>RIGIFLEX®-N</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>Gear coupling made of steel with grease lubrication type FA, FB and FAB as well as DA, DB and DAB.</td>
<td>Short, fail-safe, backlash-free, torsionally stiff and double-cardanic shaft encoder coupling sizes 6 to 14.</td>
<td>Backlash-free, torsionally stiff lamina coupling type A. (The coupling meets with the standards of API 610 and optionally API 671.)</td>
</tr>
<tr>
<td><strong>ATEX marking</strong></td>
<td>On the face of the hubs or the outside diameter of the sleeve, respectively.</td>
<td>On the face of the hubs.</td>
<td>On the face of the hubs (or rolled up on the outside diameter of the hubs) on a component (e.g. engine flange hub).</td>
</tr>
<tr>
<td><strong>- without details</strong></td>
<td></td>
<td>Only designation. In addition, complete marking on the order confirmation and packaging.</td>
<td></td>
</tr>
<tr>
<td><strong>- short (standard)</strong></td>
<td></td>
<td>Only on the order confirmation and packaging:</td>
<td></td>
</tr>
</tbody>
</table>
| | CE II 2G c IIC T X  
| | II 2 GD c IIC T X  
| | I M2 c X | CE II 2 GD c IIC T X  
| | I M2 c X | CE II 2G c IIC T X  
| | II 2 GD c IIC T X  
| | I M2 c X (2)  
| | II 3 GD c IIC T X (3) |
| **- complete** | | | |
| | CE II 2G c IIC T6, T5 resp. T4  
| | -30 °C ≤ Tₐ ≤ +65 °C, +80 °C  
| | resp. +90 °C  
| | II 2D c T 110 °C -30 °C ≤ Tₐ ≤ +90 °C  
| | I M2 c -30 °C ≤ Tₐ ≤ +90 °C | CE II 2G c IIC T6, T5, T4 resp. T3  
| | -40 °C ≤ Tₐ ≤ +55 °C, +70 °C,  
| | +105 °C, +160 °C  
| | II 2D c T 110 °C -40 °C ≤ Tₐ ≤ +160 °C  
| | I M2 c -40 °C ≤ Tₐ ≤ +115 °C (2) |
| **- others** | Other components are marked with designation only (except for steel laminas). | |

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(1) For temperature classes T2 and T1 the max. permissible ambient and operating temperature is Tₐ = 280 °C. It is the max. permissible permanent operation temperature at the same time. If necessary, all sizes of RADEX®-N can be designed in conformity with the standards of API 610 or API 671.

(2) Only permissible with coupling hubs made of steel.

(3) Only permissible with clamping hubs without feather key.

(4) Only permissible with hubs without feather key and without thread for setscrews.
<table>
<thead>
<tr>
<th>RADEX®-N</th>
<th>ROTEX® GS / ROTEX® GS P</th>
<th>RADEX®-NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fail-safe, backlash-free, torsionally stiff steel lamina coupling type NN, NANA 1 to 5, NENA 1 and 2, NENE 1, NNZ, NNW and MK(^{(1)}) with lamina sets made of stainless spring steel</td>
<td>Fail-safe, backlash-free under prestress, torsionally flexible jaw coupling type standard (hub designs 1.0, 1.1, 2.0, 2.1, 2.5, 2.6), clamping ring hubs, Compact, A-H and DKM sizes 5 to 90</td>
<td>Fail-safe, backlash-free, torsionally stiff servo lamina coupling type EK and DK with hubs and spacer made of highly-stiff aluminium (size 42 hubs and spacer made of steel) and lamina sets made of stainless spring steel</td>
</tr>
<tr>
<td>On the face of the hubs (or rolled up on the outside diameter of the hubs) on a component (e. g. engine flange hub)</td>
<td>On the face of the hubs (or rolled up on the outside diameter of the hubs) on a component (e. g. engine flange hub)</td>
<td>On the face of the hubs on a component (e. g. engine flange hub)</td>
</tr>
<tr>
<td>Up to RADEX®-N 25: Only designation. In addition, complete marking on the order confirmation and packaging.</td>
<td>Up to ROTEX® GS 19: Only designation. In addition, complete marking on the order confirmation and packaging.</td>
<td>Up to RADEX®-NC 15: Only designation. In addition, complete marking on the order confirmation and packaging.</td>
</tr>
<tr>
<td>From RADEX®-N 35:</td>
<td>From ROTEX® GS 24:</td>
<td>From RADEX®-NC 20:</td>
</tr>
<tr>
<td>II 2G c IIC T X</td>
<td>II 2G c IIC T X</td>
<td>II 2G c IIC T X</td>
</tr>
<tr>
<td>I M2 c X</td>
<td>Only for clamping hubs without feather key: II 3G c IIC T X (^{(3)})</td>
<td>Only for clamping hubs without feather key: II 3G c IIC T X (^{(3)})</td>
</tr>
<tr>
<td>II 2G c IIC T6, T5, T4, T3 resp. T2 -30°C ≤ T(_a) ≤ +75°C, +90°C, +125°C, +190°C resp. +250°C II 2D c T 110°C -30°C ≤ T(_a) ≤ +100°C I M2 c -30°C ≤ T(_a) ≤ +140°C</td>
<td>II 2G c IIC T6, T5, T4, T3 resp. T4 -30°C ≤ T(_a) ≤ +65°C, +80°C, +90°C resp. +90°C II 2D c T 110°C -30°C ≤ T(_a) ≤ +90°C I M2 c -30°C ≤ T(_a) ≤ +90°C</td>
<td>II 2G c IIC T6, T5, T4, T3 resp. T2 -30°C ≤ T(_a) ≤ +75°C, +90°C, +125°C, +190°C resp. +200°C II 2D c T 110°C -30°C ≤ T(_a) ≤ +100°C I M2 c -30°C ≤ T(_a) ≤ +140°C</td>
</tr>
<tr>
<td>II 2G c IIC T6, T5, T4, T3 resp. T4 -30°C ≤ T(_a) ≤ +65°C, +80°C, +90°C resp. +90°C II 2D c T 110°C -30°C ≤ T(_a) ≤ +90°C I M2 c -30°C ≤ T(_a) ≤ +90°C</td>
<td>II 2G c IIC T6, T5, T4, T3 resp. T4 -30°C ≤ T(_a) ≤ +65°C, +80°C, +90°C resp. +90°C II 2D c T 110°C -30°C ≤ T(_a) ≤ +90°C</td>
<td>II 2G c IIC T6, T5, T4, T3 resp. T2 -30°C ≤ T(_a) ≤ +75°C, +90°C, +125°C, +190°C resp. +200°C II 2D c T 110°C -30°C ≤ T(_a) ≤ +100°C</td>
</tr>
<tr>
<td>II 2G c IIC T6, T5, T4, T3 resp. T4 -30°C ≤ T(_a) ≤ +65°C, +80°C, +90°C resp. +90°C II 2D c T 110°C -30°C ≤ T(_a) ≤ +90°C</td>
<td>II 2G c IIC T6, T5, T4, T3 resp. T4 -30°C ≤ T(_a) ≤ +65°C, +80°C, +90°C resp. +90°C II 2D c T 110°C -30°C ≤ T(_a) ≤ +90°C</td>
<td>II 2G c IIC T6, T5, T4, T3 resp. T2 -30°C ≤ T(_a) ≤ +75°C, +90°C, +125°C, +190°C resp. +200°C II 2D c T 110°C -30°C ≤ T(_a) ≤ +100°C</td>
</tr>
</tbody>
</table>

\(^{(1)}\) Other components are marked with designation only (except for steel laminas).
KTR products for potentially explosive atmospheres

<table>
<thead>
<tr>
<th>Product</th>
<th>MINEX®-S</th>
<th>BoWex-ELASTIC®</th>
<th>OAC Oil/air cooler</th>
<th>OPC cooling-pump-unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>Permanent-magnetic synchronous coupling for contactless torque transmission by magnetic forces between internal and external rotor; sizes 22 to 165(^{(1)})</td>
<td>Highly flexible flange couplings types HE, HEW and HEW Compact</td>
<td>Oil/air cooler type OAC with electric or hydraulic drive motor</td>
<td>Cooling-pump-unit type OPC with electric drive motor and hydraulic pump</td>
</tr>
<tr>
<td><strong>ATEX marking</strong></td>
<td>At least on one component complete, on the other components by an (\text{\uparrow}) designation on the outside diameter of the hub or on the face</td>
<td>On the polyamide flange of the elastomer</td>
<td>As per type label on the surface of the cooler grid</td>
<td>As per type label on the surface of the cooler grid</td>
</tr>
<tr>
<td><strong>- without details</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>- short (standard)</strong></td>
<td>Containment shroud metallic (\text{II 2G c IIC T X}) Containment shroud ceramic (\text{II 2G c IIC T X}) Containment shroud carbon fibre reinforced (\text{II 2G c IIC T X})</td>
<td>(\text{II 2G c IIB T X})</td>
<td>(\text{II 2G c IIB+H2 T X}) (\text{II 3D c T X})</td>
<td>(\text{II 2G c IIB+H2 T X}) (\text{II 3D c T X})</td>
</tr>
<tr>
<td><strong>- complete</strong></td>
<td>(\text{II 2G c IIB T6, T5 resp. T4 -30 °C ≤ Ta ≤ +50 °C, +65 °C resp. +80 °C II 2D c T115 °C -30 °C ≤ Ta ≤ +80 °C})</td>
<td>(\text{II 2G c IIB+H2 T X motor: II 2G Ex e II T1-T3 II 3D c T X motor: II 2D Ex ID A21 IP65 T 125 °C})</td>
<td>(\text{II 2G c IIB+H2 T X pumpe: II 2G c IIB T4X electric motor: II 2G Ex de IIB T4-GB})</td>
<td></td>
</tr>
<tr>
<td><strong>- others</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^{(1)}\) For the safe operation of MINEX®-S in potentially explosive atmospheres the temperature during operation must be constantly monitored. The temperature monitoring must automatically switch off the drive before the respective maximum permissible surface temperature is reached. The heat produced on the MINEX®-S magnet coupling, resulting from eddy current losses, must be dissipated permanently (e. g. by partial current of the pumping medium with pumps or sealing liquid).
Items that are not covered by directive 2014/34/EU.

The ATEX Product Directive applies for machines and protection systems. Driving components are not part of this standard.

Definition of devices and components:

- Machines, operating equipment, stationary or mobile equipment, controlling and equipment parts, as well as warning and preventive systems serving to produce, transmit, store, measure, control or convert energy and process materials, either individually or in combination, which have an individual potential ignition source and, as a result, may cause an explosion, are described as “equipment”.
- Components that are necessary for safe operation of equipment, and protection systems with no independent function, are described as “components”.

CLAMPEX® clamping sets:

Use in potentially explosive atmospheres

The power transmission of CLAMPEX® clamping elements is based on the principle of two taper rings twisted into each other. An axial force generated on the rings (by means of several screws) produces surface pressure inside the shaft and outside the hub which allows for frictionally engaged transmission of the torque. Considering all operating data (intended use) a potential source of ignition does not exist. That is why clamping elements do not fall in directive 2014/34/EU.

Due to the aforementioned design of CLAMPEX® clamping elements a failure of components does not have to be expected. A risk only arises if friction heat is generated with slipping of a clamping connection (improper assembly/tightening torques).

Selection of clamping ring hubs, clamping hubs and clamping sets:

If used in potentially explosive atmospheres, the type of clamping set, clamping ring hub (clamping hubs without feather keyway only for use in category 3) and size must be selected such that there is a minimum safety factor of $s = 2$ between the peak torque of the machine including all operating parameters and the nominal torque of the coupling.

Hydraulic components:

KTR bellhousings and foot flanges made of aluminium and cast iron, damping rings type D and DT made of aluminium NBR and damping rods made of steel NR are permissible as connection elements between pump and electric motor (bellhousing and tank). The magnesium share in aluminium is less than 7.5 %.

The user has to observe the following:

- All components have to be included in the equipotential bonding.
- The cover required in accordance with DIN EN ISO 12100 (Safety of Machinery) and directive 2014/14/EU and must protect against
  - access with the little finger
  - falling down of solid foreign objects.
- The disassembly of the components is only permitted at standstill.
- The KTR mounting instructions for bellhousings (KTR standard 41010), damping rings (KTR standard 43010) and foot flanges (KTR standard 41110) have to be observed.
- For mining applications, cast-iron or steel bellhousings must be used.
- For marine applications we also recommend cast iron or steel bellhousings.
Summary of literature

No matter if a perfect drive, a brake that takes effect, space-saving cooling or accurate hydraulics is required, if on land, by sea or at an airy height - KTR’s product portfolio is just as manifold as its applications. The following catalogues and leaflets provide for a survey. Available at www.ktr.com

Product catalogues

Industry leaflets
KTR worldwide:

Algeria
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Algérie Business Center - Pins Montmairies
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