

[1] **TYPE EXAMINATION CERTIFICATE**



[2] for non-electrical equipment and components
of the Equipment Group I and II, Categories M2 and 2 as well as 3
(Translation)

[3] Type Examination Certificate Number: **IBExU02ATEXB001_05 X**

[4] Equipment / Component: **ROTEX® - torsionally flexible couplings**
of the types

Shaft couplings

design No 001
sizes to 180

Flange couplings

designs AFN No 002, BFN No 004,
CF, CFN No 005, DF, DFN No 006
sizes to 180

Double cardanic couplings

designs DKM and ZS-DKM
sizes to 90

[5] Manufacturer: **KTR Kupplungstechnik GmbH**

[6] Address: **Rodder Damm 170
48432 Rheine
Germany**

[7] The design of the product mentioned under [4] and any permissible variations thereto are specified in the schedule to this Type Examination Certificate.

[8] IBExU Institut für Sicherheitstechnik GmbH certifies that the product mentioned under [4] has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of the product intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The test results are recorded in the Test Reports IB-02-4-151/1 of 8th February 2002, IB-02-4-475 of 15th July 2002, IB-02-4-602 of 30th November 2002, IB-02-4-602/1 of 5th December 2002 and IB-04-4-016/2 of 24th October 2005.


[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with EN 1127-1:1997, EN 1127-2:2002, EN 13463-1:2001 and EN 13463-5:2003.

[10] If the sign "X" is placed after the certificate number and / or the marking mentioned under [12], it indicates that the product is subject to special conditions for safe use specified under [17] in the schedule to this Type Examination Certificate.

[11] This Type Examination Certificate relates only to the design and construction of the product specified. If applicable, further requirements of this Directive apply to the production and supply of this product (for example see under [19]).

[12] The marking of the ROTEX® torsionally flexible couplings of the designs mentioned under [4] can be performed as follows:

 **II 2GD c IIC T X**

 **I M2 c X**

With reference to maximum permissible ambient temperatures resp. operating temperatures T_a and Temperature Classes or maximum surface temperatures, the following marking can also be used in view of the temperature increase of $\Delta T = 20$ K explained under [16]:



II 2G c IIC T6, T5 resp. T4 X
 $-30\text{ °C} \leq T_a \leq +65\text{ °C}, +80\text{ °C resp. }+90\text{ °C}$



II 2D c T 110 °C X
 $-30\text{ °C} \leq T_a \leq +90\text{ °C}$



IM2 c X
 $-30\text{ °C} \leq T_a \leq +90\text{ °C}$

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Freiberg, 24th October 2005

(Prof. Dr. Redeker)

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- Stamp -

Certificates without signature and stamp are not valid.
Certificates may only be duplicated completely and unchanged.
In case of dispute, the German text shall prevail.

Schedule

[13] **Schedule**

[14] to Type Examination Certificate IBExU02ATEXB001_05 X

[15] **Description**

The ROTEX® torsionally flexible couplings are torsionally flexible plug-in jaw type couplings designed for positive torque transmission. They are fail-safe.

Two congruent coupling halves with concave claws on the inside are periphally offset in relation to one another by half a pitch. An involute spider is located between them. The spacers located between two involute spiders are electrically conductive connected with one hub at least.

ROTEX® torsionally flexible couplings are capable of compensating for axial, radial and angular displacements within specified limits.

The numerous designs of the couplings differ in the design of the hubs and the arrangement of various spacers.

The coupling hubs are finish bored according to the documents of the manufacturer.

From the manufacturer the couplings are intended for use in a temperature range T_a from -30 °C to +90 °C (permanent load). But spiders for special areas can also be used at lower as well as higher operating temperatures.

Details are contained in the documents of the manufacturer, which are part of the Test Reports mentioned under [8] and [16].

[16] **Test Report**

The test results including the latest details about the temperature behaviour of the couplings as a basis for this Type Examination Certificate are recorded in the Test Report IB-04-4-016/2 dated 24th October 2005.

For specifying the maximum surface temperatures a temperature increase of $\Delta T = 20$ K against the ambient temperatures resp. operating temperatures T_a have to be taken into account. This temperature increase results from the proved self-heating plus +5 K safety factor.

Summary of test results:

The ROTEX® couplings of the designs mentioned under [4] meet the requirements for non-electrical equipment / components

- of the Equipment Group II, Category 2G.

In view of the temperature increase of $\Delta T = 20$ K the couplings meet according to maximum permissible ambient temperatures resp. operating temperatures T_a the requirements for Temperature Class T6 (for $T_a = 65$ °C), for Temperature Classes T5 (for $T_a = 80$ °C) and for the Temperature Classes T4 to T1 (for $T_a = 90$ °C, is also the maximum permissible temperature for permanent use).

They meet the requirements for use in the Explosion Group IIC. With it, the couplings meet also the requirements for the Explosion Groups IIB and IIA.

- of the Equipment Group II, Category 2D.

At the maximum permissible ambient temperature resp. operating temperature T_a of +90 °C the maximum surface temperature is 110 °C.

- of the Equipment Group I, Category M2.

At the maximum permissible ambient temperature resp. operating temperature T_a of +90 °C the maximum surface temperature, which is permissible for the Category M2, is not attained.

The permissible ambient temperatures resp. operating temperatures T_a depend on the materials used for the involute spiders. They are contained in the respective operating-/installation instruction.

The type of protection "c" (Protection by constructional safety) was used as protective measure.

Note:

This Type Examination Certificate IBExU02ATEXB001_05 X is a summary of Type Examination Certificate IBExU02ATEXB001 X of 8th February 2002 and 1st Addition to Type Examination Certificate IBExU02ATEXB001 X of 5th December 2002. The temperature range T_a was extended. Additionally, based on new results, the value for the temperature increase ΔT , which has to be considered as a result of the self-heating, was reduced to 20 K. Withdrawing the certificates issued up to now is not necessary. Products with markings according to the certificates issued up to now can be supplied furthermore.

[17] Special conditions for safe use

The marking with "T X" means, that for specification of the maximum surface temperature at the coupling the user has to take into account a temperature increase of $\Delta T = 20$ K compared to the ambient temperature resp. operating temperature T_a .

As a rule the surface temperatures resp. the operating temperatures are in the range of -30 °C to $+90$ °C. Spiders for special areas can also be used at lower as well as higher surface temperatures resp. operating temperatures T_a .

For example, the spiders produced from PEEK (PPEK 450G) can be used permanently at temperatures up to 160 °C. In view of the temperature increase of $\Delta T = 20$ K mentioned under [16] no temperatures above 180 °C occur at the coupling during operating at maximum long-term temperatures T_a of 160 °C. The requirements for Temperature Class T3 are met under these operating conditions.

The ROTEX® couplings may only be used if their materials resist to the mechanical and/or chemical influences resp. corrosion under the actual operating conditions, in such a way, that the explosion protection is always ensured.

The ROTEX® couplings have to be provided with solid covers by the user to protect the couplings against falling objects. Openings for necessary heat dissipation can be arranged in these protective covers. Covers of couplings intended for use in the mining industry (Equipment Group I) must withstand higher mechanical loads than the covers of couplings intended for use in the other industries (Equipment Group II). Detailed notes for the design of the cover are stated in the operating-/installation instruction.

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

If the couplings are used in dust explosion hazardous areas, the operator has to observe, that no dusts in dangerous quantities can accumulate between cover and coupling. The coupling must not run in a dust deposit.

For the assembly of screw connections only screws have to be used, which are specified by the manufacturer. When tightening the screws, the torque specified by the manufacturer has to be observed.

All screw connections to fasten the hub onto the shafts have to be protected against self-loosening.

For the use of the couplings in the mining industry, the user is obliged to observe the specifications of the national regulations for mining industry, which are valid for the respective operating area.

[18] Essential safety and health requirements

Confirmed by norms (see [9]).

[19] **Confirmation of the deposit of documents according to Annex VIII of Directive 94/9/EC**

It is confirmed, that the documents for the non-electrical product of the Category 2 mentioned under [4] are deposited under No IB-04-4-016/2 at the NOTIFIED BODY IBExU (EC-Identification No 0637). The deposit of the documents is carried out according to the regulations of Directive 94/9/EC, item 8 (1) b) ii).



(Prof. Dr. Redeker)

Freiberg, 24th October 2005



IBExU

[1] **1st Addition to**
TYPE EXAMINATION CERTIFICATE IBExU02ATEXB001_05 X
(Translation)



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Germany

[5] **Addition/Modification**

1) Double gear elements ROTEX DZ can also be inserted between the two congruent clutch halves as an alternative to the involute spider used till now.

The marking and the special conditions for the use of the equipment mentioned in [2] remain unchanged.

[6] **Test report**

The proof of the explosion protection of the equipment/components mentioned in [2] a) and b) is explained in the Test Report IB-09-4-016 of 15 September 2009. The test documents are part of the Test Report.

[7] **Test result**

IBExU certifies that the equipment mentioned in [2] has been found to comply with the Essential Health and Safety Requirements given in Annex II of the Directive 94/9/EC by compliance with EN 13463-1:2009 and EN 13463-5:2003.

This addition is only valid in combination with the Type Examination Certificate IBExU02ATEXB001_05 X of 24 October 2005.

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Authorised for certifications
- Explosion protection -

Freiberg, 15 September 2009

By order

(Dr. Wagner)

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