

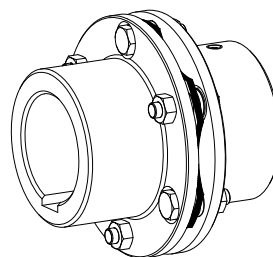


# RADEX<sup>®</sup>-N

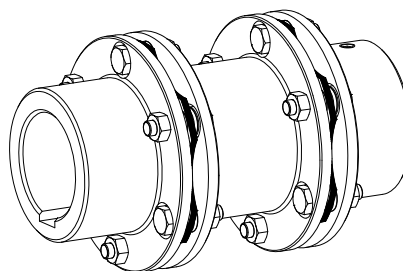
Steel laminae couplings types

NN, NANA 1 to 4,  
NENA 1 and 2, NENE 1  
NNZ, NNW

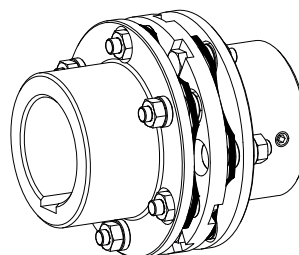
according to Standard 94/9/EC  
(ATEX 95) for finish bored, pilot  
bored and unbored couplings



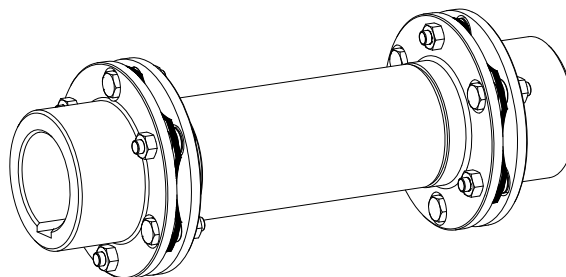
**RADEX<sup>®</sup>-N type NN**



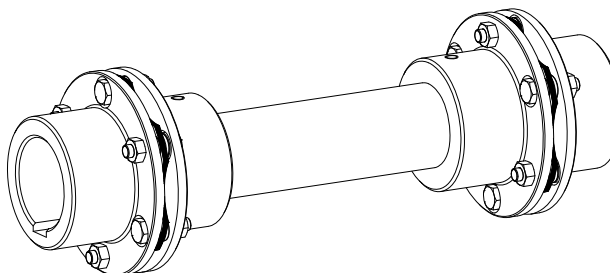
**RADEX<sup>®</sup>-N type NANA 1**



**RADEX<sup>®</sup>-N type NNZ**



**RADEX<sup>®</sup>-N type NANA 4**



**RADEX<sup>®</sup>-N type NNW**



**RADEX®-N** is a torsionally stiff, flexible steel laminae coupling which is able to compensate for shaft misalignment caused by, for example, thermal expansion.

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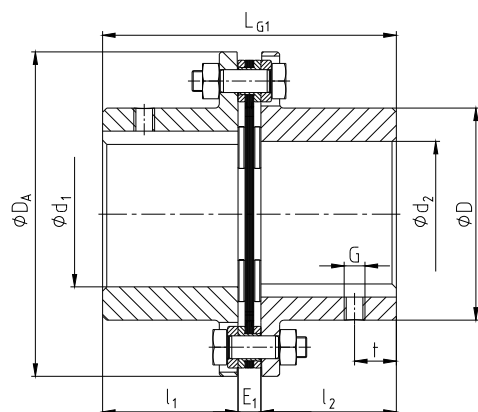
### 5 Enclosure A

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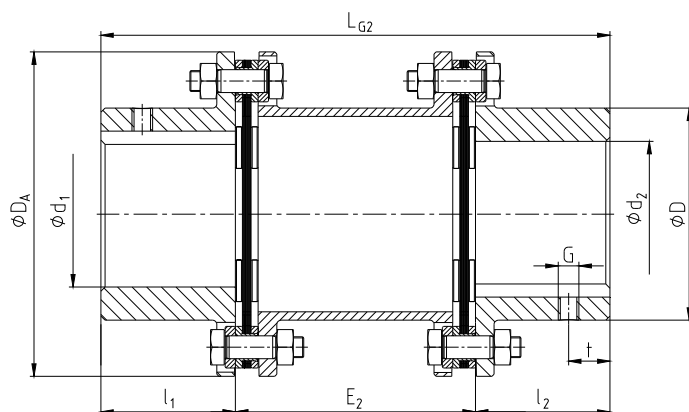
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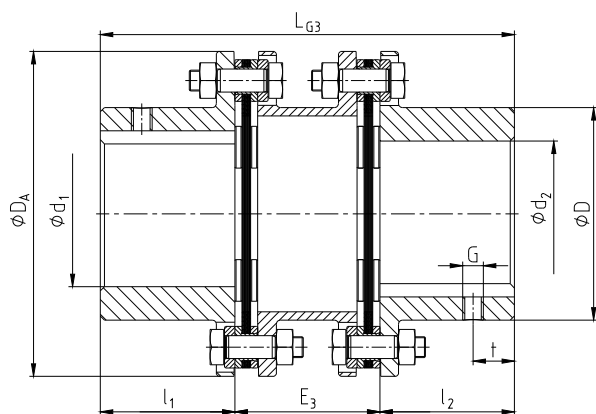
**1 Technical Data**



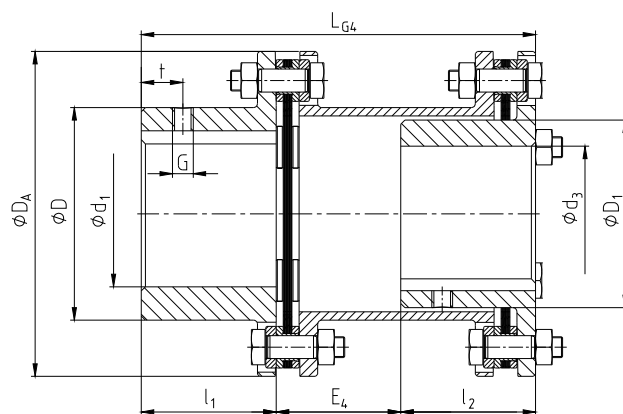
picture 1: RADEX®-N type NN



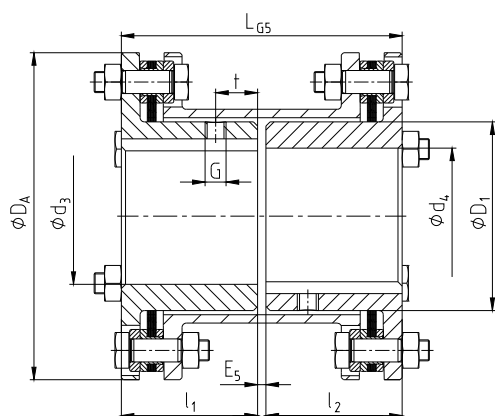
picture 2: RADEX®-N type NANA 1



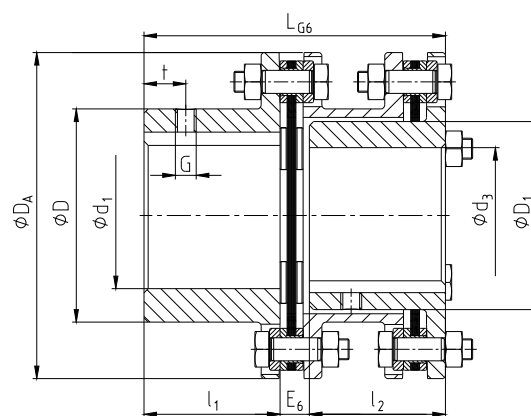
picture 3: RADEX®-N type NANA 2



picture 4: RADEX®-N type NENA 1



picture 5: RADEX®-N type NENE 1



picture 6: RADEX®-N type NENA 2

**Dimensions of the couplings see table 1, sheet 4.**



## 1 Technical Data

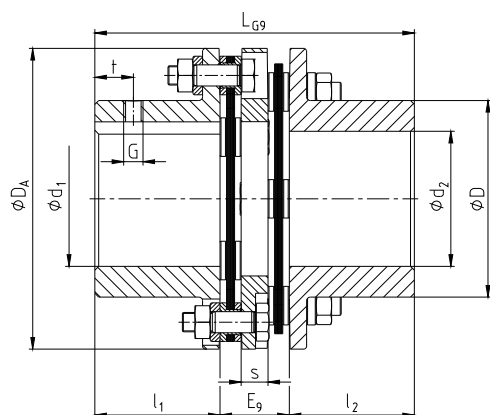
**Table 1: types NN - NANA 1 - NANA 2 - NENA 1 - NENE 1 - NENA 2**

RADEX®-N Size	Max. finish bore [mm]		Dimensions [mm]																
			General																
	d <sub>1</sub> , d <sub>2</sub>	d <sub>3</sub> , d <sub>4</sub>	D	D <sub>1</sub>	D <sub>A</sub>	I <sub>1</sub> , I <sub>2</sub>	L <sub>G1</sub>	E <sub>1</sub>	L <sub>G2</sub>	E <sub>2</sub>	L <sub>G3</sub>	E <sub>3</sub>	L <sub>G4</sub>	E <sub>4</sub>	L <sub>G5</sub>	E <sub>5</sub>	L <sub>G6</sub>	E <sub>6</sub>	
20	20	-	32	-	56	20	45	5	100	60	-	-	-	-	-	-	-	-	
25	25	-	40	-	68	25	56	6	110	60	-	-	-	-	-	-	-	-	
35	35	-	54	-	82	40	86	6	150	70	-	-	-	-	-	-	-	-	
38	38	-	58	-	94	45	98	8	170	80	-	-	-	-	-	-	-	-	
42	42	-	68	-	104	45	100	10	170	80	-	-	-	-	-	-	-	-	
50	50	-	78	-	126	55	121	11	206	96	-	-	-	-	-	-	-	-	
60	60	55	88	77	138	55	121	11	206	96	170	60	160	50	114	4	124	14	
70	70	65	102	90	156	65	141	11	246	116	200	70	190	60	134	4	144	14	
80	80	75	117	104	179	75	164	14	286	136	233	83	220	70	154	4	167	17	
85	85	80	123	112	191	80	175	15	300	140	246	86	232	72	164	4	178	18	
90	90	85	132	119	210	80	175	15	300	140	251	91	233	73	166	6	184	24	
105	105	90	147	128	225	90	200	20	340	160	281	101	263	83	186	6	204	24	
115	115	100	163	145	265	100	223	23	370	170	309	109	288	88	206	6	227	27	
135	135	115	184	160	305	135	297	27	520	250	-	-	-	-	-	-	-	-	
136	135	-	180	-	300	135	293	23	Indicated by the customer										
156	150	-	195	-	325	150	327	27											
166	165	-	225	-	350	165	361	31											
186	180	-	250	-	380	185	401	31											
206	200	-	275	-	420	200	437	37											
246	240	-	320	-	500	240	524	44											
286	280	-	383	-	567	280	612	52											
336	330	-	445	-	660	330	718	58											
138	135	-	180	-	300	135	293	23											
158	150	-	195	-	325	150	327	27											
168	165	-	225	-	350	165	361	31											
188	180	-	250	-	380	185	401	31											
208	200	-	275	-	420	200	437	37											
248	240	-	320	-	500	240	524	44											
288	280	-	383	-	567	280	612	52											
338	330	-	445	-	660	330	718	58											

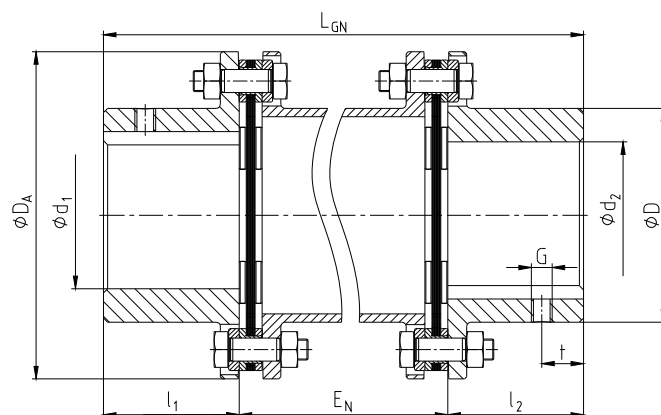
Dimensions for setscrew see table 4 (dimension G and t).



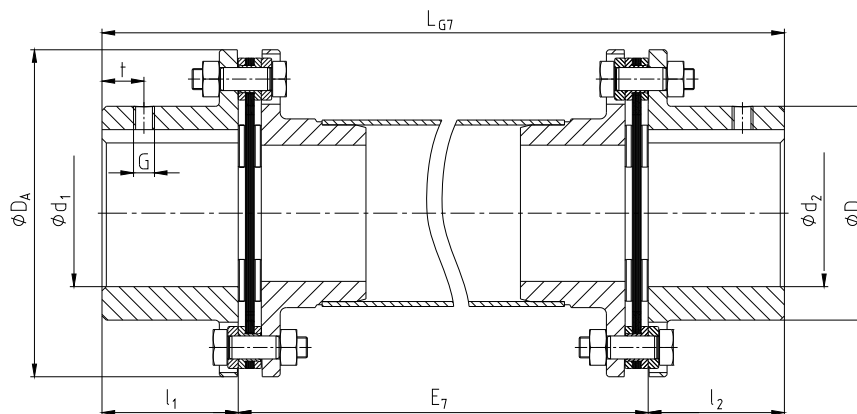
**1 Technical Data**



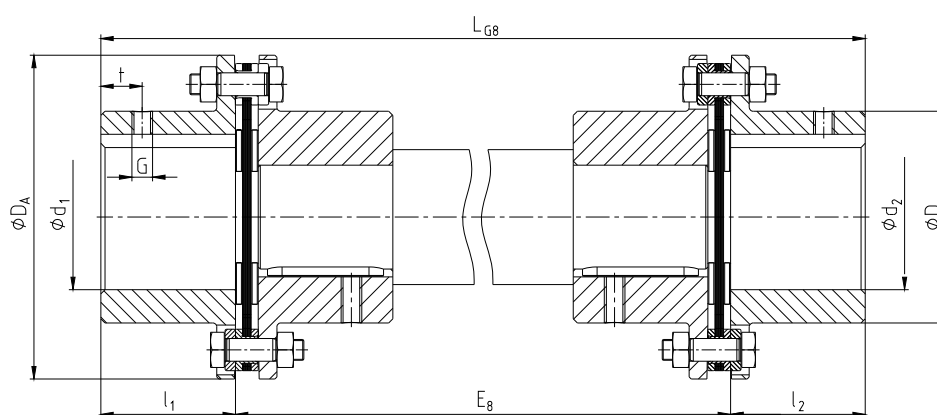
picture 7: RADEX®-N type NNZ



picture 8: RADEX®-N type NANA 3



picture 9: RADEX®-N type NANA 4



picture 10: RADEX®-N type NNW

**Dimensions of the couplings see table 2, sheet 6.**



## 1 Technical Data

**Table 2: types NNZ - NANA 3 - NANA 4 - NNW**

RADEX®-N Size	Max. finish bore [mm] d <sub>1</sub> , d <sub>2</sub>	Dimensions [mm]									
		General									
		D	D <sub>A</sub>	I <sub>1</sub> , I <sub>2</sub>	L <sub>G7</sub>	E <sub>7</sub>	L <sub>G8</sub>	E <sub>8</sub>	L <sub>G9</sub>	E <sub>9</sub>	s
20	20	32	56	20	$L_{G7} = E_7 + I_1 + I_2$	Intermediate shaft dimension According to customer specification	$L_{G8} = E_8 + I_1 + I_2$	Intermediate shaft dimension According to customer specification	58	18	8
25	25	40	68	25					70	20	8
35	35	54	82	40					102	22	10
38	38	58	94	45					118	28	12
42	42	68	104	45					124	34	14
50	50	78	126	55					144	34	12
60	60	88	138	55					144	34	12
70	70	102	156	65					166	36	14
80	80	117	179	75					-	-	-
85	85	123	191	80					-	-	-
90	90	132	210	80					-	-	-
105	105	147	225	90					-	-	-
115	115	163	265	100					-	-	-
135	135	184	305	135					-	-	-
136	135	180	300	135					-	-	-
156	150	195	325	150					-	-	-
166	165	225	350	165					-	-	-
186	180	250	380	185					-	-	-
206	200	275	420	200					-	-	-
246	240	320	500	240					-	-	-
286	280	383	567	280					-	-	-
336	330	445	660	330					-	-	-
138	135	180	300	135					-	-	-
158	150	195	325	150					-	-	-
168	165	225	350	165					-	-	-
188	180	250	380	185					-	-	-
208	200	275	420	200					-	-	-
248	240	320	500	240					-	-	-
288	280	383	567	280					-	-	-
338	330	445	660	330					-	-	-

Further Dimensions of the type NANA 3 ( $L_{GN}$  and  $E_N$ ) see table 3.  
Dimensions for setscrew see table 4 (dimension G and t).

**Table 3: further dimensions of the type NANA 3**

RADEX®-N Size	42		50			60			70			80			
$L_{GN}$	190	230	210	250	290	210	250	290	230	270	310	250	290	330	400
$E_N$	100	140	100	140	180	100	140	180	100	140	180	100	140	180	250

RADEX®-N Size	85				90			105			115		135
$L_{GN}$	260	300	340	410	300	340	410	320	360	430	380	450	520
$E_N$	100	140	180	250	140	180	250	140	180	250	180	250	250

RADEX®-N Size	136	156	166	186	208	246	286	336	138	158	168	188	208	248	288	338
$L_{GN}$	On request of customer															
$E_N$																



## 1 Technical Data

**Table 4: setscrew dimensions**

RADEX®-N Size	20	25	35	38	42	50	60	70	80	85	90	105	115
G	M5	M5	M6	M6	M8	M8	M8	M10	M10	M10	M12	M12	M12
t	6	8	15	15	20	20	20	20	20	25	25	30	30

RADEX®-N Size	135	136	156	166	186	206	246	286	336	138	158	168	188	208	248	288	338
G	nach Kundenwunsch																
t																	

**Table 5: torque and speed**

RADEX®-N Size	20	25	35	38	42	50	60	70	80	85
Torque [Nm]	T <sub>KN</sub>	15	30	60	120	180	330	690	1100	2400
	T <sub>Kmax.</sub>	30	60	120	240	360	660	1380	2200	4800
	T <sub>KW</sub>	5	10	20	40	60	110	230	370	800
Max. speed n [1/min.]	20000	16000	13000	12000	10000	8000	6700	5900	5100	4750

RADEX®-N Size	90	105	115	135	136	156	166	186	206	246
Torque [Nm]	T <sub>KN</sub>	4500	5100	9000	12000	17500	25000	35000	42000	90000
	T <sub>Kmax.</sub>	9000	10200	18000	24000	35000	50000	70000	84000	180000
	T <sub>KW</sub>	1500	1700	3000	4000	8750	12500	17500	21000	45000
Max. speed n [1/min.]	4300	4000	3400	3000	3800	3500	3300	3000	2800	2300

RADEX®-N Size	286	336	138	158	168	188	208	248	288	338
Torque [Nm]	T <sub>KN</sub>	150000	210000	23000	33000	45000	56000	70000	120000	280000
	T <sub>Kmax.</sub>	300000	420000	46000	66000	90000	112000	140000	240000	560000
	T <sub>KW</sub>	75000	105000	11500	16500	22500	28000	35000	60000	140000
Max. speed n [1/min.]	2000	1800	3800	3500	3300	3000	2800	2300	2000	1800



**RADEX®-N couplings with attached parts that can generate heat, sparks and static charging (e. g. combinations with brake drums, brake disks, overload systems like torque limiters, impellers etc.) are not allowed for the use in hazardous areas. A separate checking must be made.**

## 2 Hints

### 2.1 Coupling Selection



#### CAUTION!

**For a continuous and troublefree operation of the coupling it must be designed according to the selection instructions (according to DIN 740 part 2) for the particular application (see RADEX®-N catalogue).**

**Please take into account the critical whirling speed of the types NANA 4 and NNW.**

**If the operating conditions (performance, speed, changes at engine and machine) change, the coupling selection must be checked again.**

**Please make sure that the technical data regarding torque only refers to the laminae sets.**

**The transmissible torque of the shaft/hub connection must be checked by the orderer, and he is responsible for the same.**

For drives with endangered torsional vibration (drives with periodical load on torsional vibration) it is necessary to make a torsional vibration calculation to ensure a perfect selection. Typical drives with endangered torsional vibration are e. g. drives with diesel engines, piston pumps, piston compressors etc. On request KTR makes the coupling selection and the torsional vibration calculation.

Schutzvermerk ISO 16016 beachten.	Gezeichnet:	27.02.12 Pz/Wb	Ersatz für:	KTR-N vom 17.08.10
	Geprüft:	27.02.12 Pz	Ersetzt durch:	



## 2 Hints

### 2.2 General Hints

Please read through these mounting instructions carefully before you set the coupling into operation.  
Please pay special attention to the safety instructions!



The **RADEX®-N** coupling is suitable and approved for the use in hazardous areas.  
When using the coupling in hazardous areas please observe the special hints and instructions regarding safety in enclosure A.

The mounting instructions are part of your product. Please keep them carefully and close to the coupling.  
The copyright for these mounting instructions remains with **KTR Kupplungstechnik GmbH**.

### 2.3 Safety and Advice Hints



**DANGER!**

**Danger of injury to persons.**



**CAUTION!**

**Damages on the machine possible.**



**ATTENTION!**

**Pointing to important items.**



**PRECAUTION!**

**Hints concerning explosion protection.**

### 2.4 General Hints of Danger



**DANGER!**

**With assembly, operation and maintenance of the coupling it has to be made sure that the entire drive train is protected against unintentional engagement. You can be seriously hurt by rotating parts. Please make absolutely sure to read through and observe the following safety instructions.**

- All operations on and with the coupling have to be performed taking into account "safety first".
- Please make sure to disengage the power pack before you perform your work.
- Protect the power pack against unintentional engagement, e. g. by providing hints at the place of engagement or removing the fuse for current supply.
- Do not touch the operation area of the coupling as long as it is in operation.
- Please protect the coupling against unintentional touch. Please provide for the necessary protection devices and caps.

### 2.5 Proper Use

You may only assemble, operate and maintain the coupling if you

- have carefully read through the mounting instructions and understood them
- had technical training
- are authorized to do so by your company

The coupling may only be used in accordance with the technical data (see table 1 to 5 in chapter 1).

Unauthorized modifications on the coupling design are not admissible. We do not take any warranty for resulting damages. To further develop the product we reserve the right for technical modifications.

The **RADEX®-N coupling** described in here corresponds to the technical status at the time of printing of these mounting instructions.

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 27.02.12 Pz/Wb	Ersatz für: KTR-N vom 17.08.10
	Geprüft: 27.02.12 Pz	Ersetzt durch:





## 2 Hints

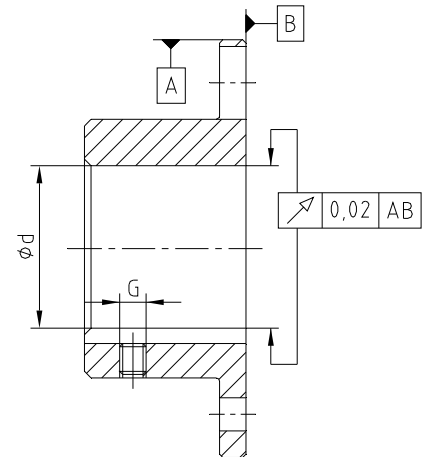
### 2.6 Hint regarding the Finish Bore



#### **DANGER!**

The maximum permissible bore diameters  $d$  (see table 1 and 2 in chapter 1 - Technical Data) must not be exceeded. If these figures are disregarded, the coupling may tear. Rotating particles may cause serious danger.

- Flange hub bores machined by the customer have to observe concentric running or axial running, respectively (see picture 11).
- Please make absolutely sure to observe the figures for  $d_{max}$ .
- Carefully align the flange hubs when the finish bores are brought in.
- Please provide for a setscrew acc. to DIN EN ISO 4029 with cup point or an end plate for the axial fastening of the flange hubs.



picture 11: concentric running and axial running



#### **CAUTION!**

The orderer is responsible for all subsequently made machinings to unbored or pilot bored and to finish machined coupling parts and spare parts. KTR does not assume any warranty claims resulting from insufficient refinish.



#### **PRECAUTION!**

Any mechanical rework to couplings that are used in hazardous areas require an explicit release by KTR.

The orderer must send a drawing to KTR acc. to which the manufacture must be made. KTR checks this drawing and returns it to the orderer with approval.

KTR supplies unbored or pilot bored coupling parts and spare parts on explicit customer's request. These parts are additionally labelled with the symbol

**Table 6: setscrews DIN EN ISO 4029**

RADEX®-N Size	20	25	35	38	42	50	60	70	80	85	90	105	115
Dimension G [mm]	M5	M5	M6	M6	M8	M8	M8	M10	M10	M10	M12	M12	M12
Tightening torque $T_A$ [Nm]	2	2	4,8	4,8	10	10	10	17	17	17	40	40	40

RADEX®-N Size	135	136	156	166	186	206	246	286	336	138	158	168	188	208	248	288	338
Dimension G [mm]	On request of customer																
Tightening torque $T_A$ [Nm]																	

## 3 Storage

The coupling hubs are supplied in preserved condition and can be stored at a dry and roofed place for 6 - 9 months.



#### **CAUTION!**

Humid storage rooms are not suitable.

Please make sure that there is no condensation. The best relative air humidity is under 65%.

Schutzvermerk ISO 16016 beachten.	Gezeichnet: 27.02.12 Pz/Wb Geprüft: 27.02.12 Pz	Ersatz für: KTR-N vom 17.08.10 Ersetzt durch:
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## 4 Assembly

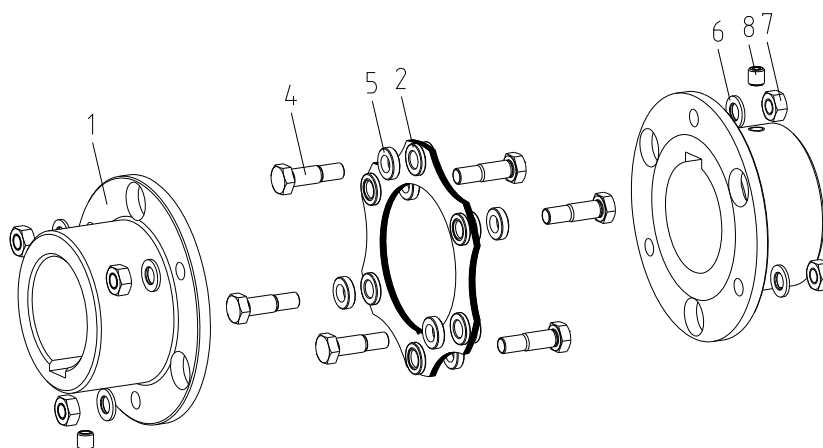
Basically the coupling is supplied in individual parts. Before assembly the coupling has to be controlled for completeness.

### 4.1 Components of the Couplings

#### Components of RADEX®-N type NN

Component	Quantity	Designation	Component	Quantity	Designation
1	2	Flange hub <sup>1)</sup>	5	s. table 7	Distance sleeve
2	1	Laminae package	6	s. table 7	Washer
3	-	Spacer	7	s. table 7	Hexagon nut/Clamping nut
4	s. table 7	Fitting screw	8	2	Setscrew DIN EN ISO 4029

1) Clamping ring hub (frictionally engaged shaft-hub-connection) on request

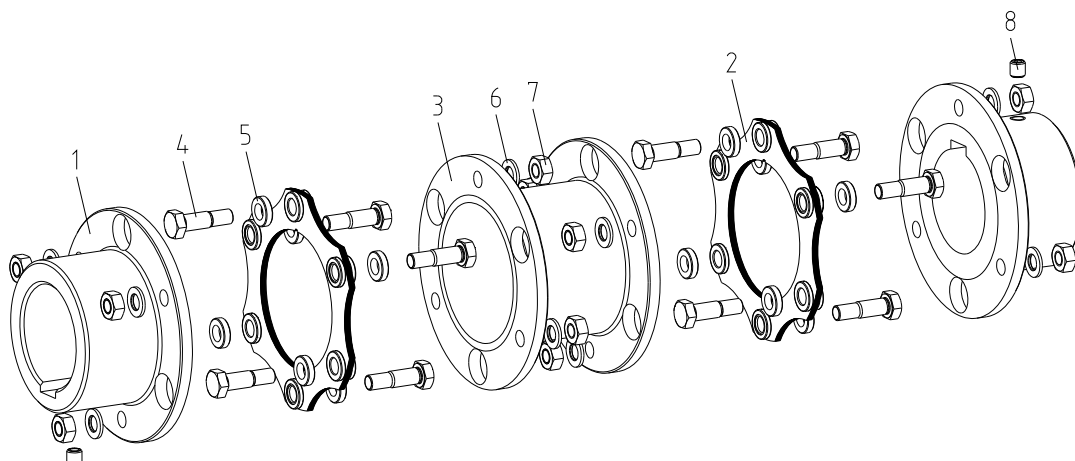


picture 12: RADEX®-N type NN

#### Components of RADEX®-N type NANA 1 to 3 - NENA1 and 2 - NENE 1

Component	Quantity	Designation	Component	Quantity	Designation
1	2	Flange hub <sup>1)</sup>	5	s. table 7	Distance sleeve
2	2	Laminae package	6	s. table 7	Washer
3	1	Spacer	7	s. table 7	Hexagon nut/Clamping nut
4	s. table 7	Fitting screw	8	2	Setscrew DIN EN ISO 4029

1) Clamping ring hub (frictionally engaged shaft-hub-connection) on request



picture 13: RADEX®-N type NANA 1 (example)



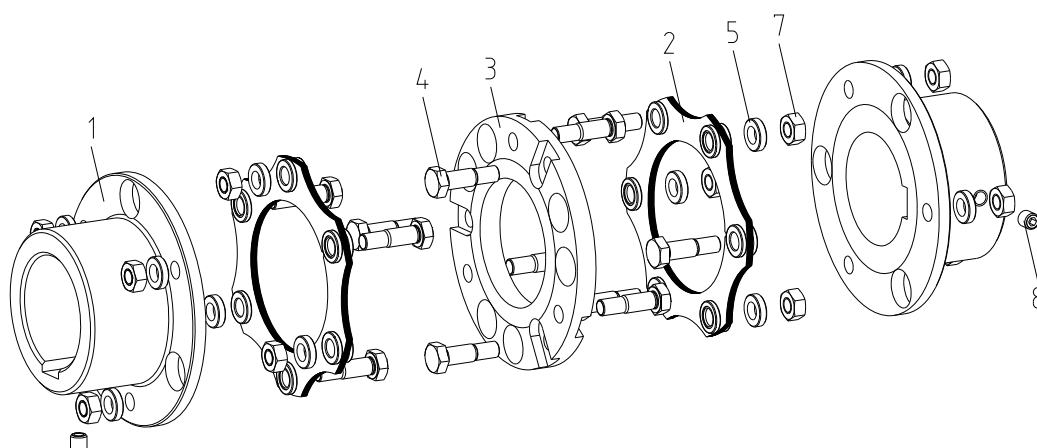
## 4 Assembly

### 4.1 Components of the Couplings

#### Components of RADEX®-N type NNZ

Component	Quantity	Designation	Component	Quantity	Designation
1	2	Flange hub <sup>1)</sup>	5	s. table 7	Distance sleeve
2	2	Laminae package	6	s. table 7	Washer
3	1	Spacer	7	s. table 7	Hexagon nut/Clamping nut
4	s. table 7	Fitting screw	8	2	Setscrew DIN EN ISO 4029

1) Clamping ring hub (frictionally engaged shaft-hub-connection) on request

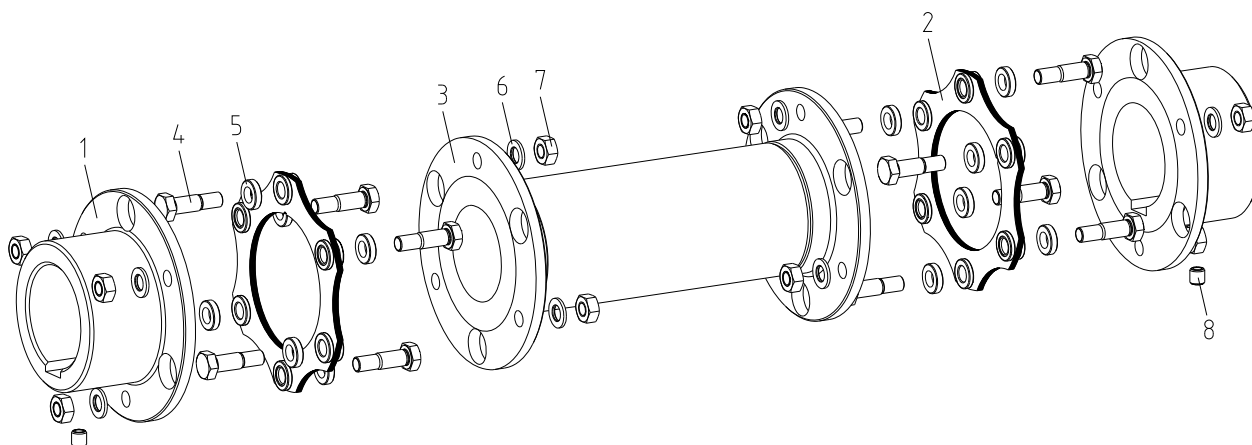


picture 14: RADEX®-N type NNZ

#### Components of RADEX®-N type NANA 4

Component	Quantity	Designation	Component	Quantity	Designation
1	2	Flange hub <sup>1)</sup>	4	s. table 7	Fitting screw
2	2	Laminae package	5	s. table 7	Distance sleeve
3	1	Intermediate shaft pipe with 2 spec. flange hubs - welded	6	s. table 7	Washer
			7	s. table 7	Hexagon nut/Clamping nut
			8	2	Setscrew DIN EN ISO 4029

1) Clamping ring hub (frictionally engaged shaft-hub-connection) on request



picture 15: RADEX®-N type NANA 4



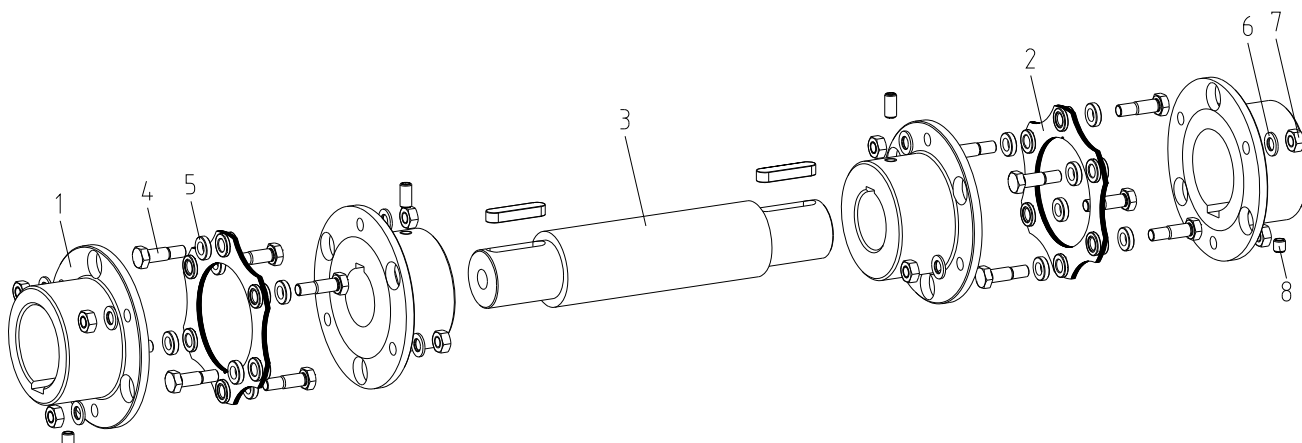
## 4 Assembly

### 4.1 Components of the Couplings

#### Components of RADEX®-N type NNW

Component	Quantity	Designation	Component	Quantity	Designation
1	4	Flange hub <sup>1)</sup>	5	s. table 7	Fitting screw
2	2	Laminae package	6	s. table 7	Washer
3	1	Intermediate shaft with 2 feather keys	7	s. table 7	Hexagon nut/Clamping nut
4	s. table 7	Fitting screw	8	2	Setscrew DIN EN ISO 4029

1) Clamping ring hub (frictionally engaged shaft-hub-connection) on request



picture 16: RADEX®-N type NNW

**Table 7: Quantity of the single parts**

RADEX®-N Size	20	25	35	38	42	50	60	70	80	85
Fitting screw (pos. 4) <sup>1)</sup>	4	4	4	4	4	4	6	6	6	6
Distance sleeve (pos. 5) <sup>1)</sup>	4	4	4	4	4	4	6	6	-	-
Washer (pos. 6) <sup>1) 2)</sup>	-	-	-	-	-	-	-	-	6	6
Hexagon nut/clamping nut (pos. 7) <sup>1)</sup>	4	4	4	4	4	4	6	6	6	6

RADEX®-N Size	90	105	115	135	136	156	166	186	206	246
Fitting screw (pos. 4) <sup>1)</sup>	6	6	6	6	6	6	6	6	6	6
Distance sleeve (pos. 5) <sup>1)</sup>	-	-	-	-	-	-	-	-	-	-
Washer (pos. 6) <sup>1) 2)</sup>	6	6	6	6	-	6	-	-	-	-
Hexagon nut/clamping nut (pos. 7) <sup>1)</sup>	6	6	6	6	6	6	6	6	6	6

RADEX®-N Size	286	336	138	158	168	188	208	248	288	338
Fitting screw (pos. 4) <sup>1)</sup>	6	6	8	8	8	8	8	8	8	8
Distance sleeve (pos. 5) <sup>1)</sup>	-	-	-	-	-	-	-	-	-	-
Washer (pos. 6) <sup>1) 2)</sup>	-	-	-	8	-	-	-	-	-	-
Hexagon nut/clamping nut (pos. 7) <sup>1)</sup>	6	6	8	8	8	8	8	8	8	8

1) quantity each laminae package

2) with size 156 and 158 washer under the screw head



## 4 Assembly

### 4.2 Assembly of the Flange Hub



#### ATTENTION!

We recommend to check bores, shaft, keyway and feather key for dimensional accuracy before assembly.

Heating the flange hubs slightly (approx. 80 °C) allows for an easier installation onto the shaft.



#### PRECAUTION!

Please pay attention to the danger of ignition in hazardous areas.



#### DANGER!

Touching the heated flange hubs causes burns.  
We would recommend to wear safety gloves.



#### CAUTION!

During the assembly please make sure that the E dimension (see table 1 and 2) is observed, so that the coupling parts do not contact each other during the operation.  
Disregarding this hint may cause damage on the coupling.

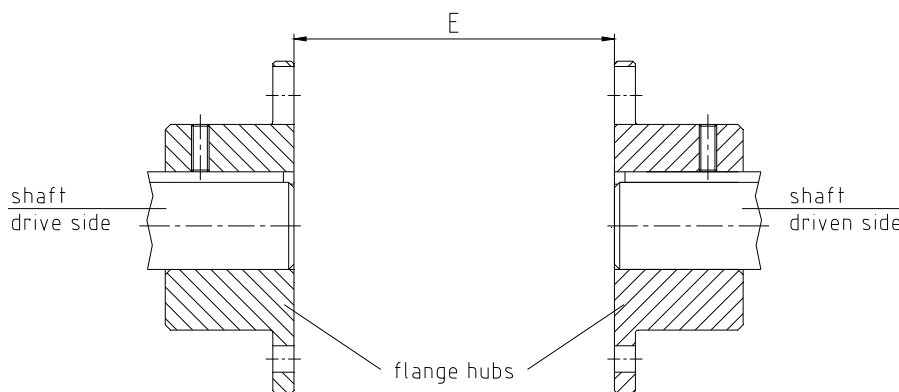
For the axial alignment of the coupling the dimensions E (see table 1 and 2) are decisive. In order to adjust the right dimension E you should proceed as follows:

- Push the flange hubs onto the shafts of the drive and driven side.
- The inner side of the flange hubs must end flushly with the front sides of the shafts (see picture 17).
- Move the power packs in axial direction until you have reached dimension E (see table 1 or 2).
- Secure the flange hubs by tightening the setscrews DIN EN ISO 4029 with cup point (see table 6).



#### ATTENTION!

For the applications in hazardous areas the setscrews to fasten the hubs as well as all screw connections have to be secured against self-slackening additionally, e. g. by glueing with Loctite (medium-tight).



picture 17: assembly of the flange hubs

### Disassembly:



#### DANGER!

Falling parts can lead to personal injury or damage to the machine.  
Secure the driving parts during disassembly.

- Untighten the setscrew in the hub and unscrew it by 2 – 3 convolutions.
- Pull the hub from the shaft.



## 4 Assembly

### 4.3 Assembly of the Clamping Ring Hub



#### CAUTION!

The stiffness and dimensions of the shafts (here specifically hollow shafts) have to be selected in a way that sufficient safety against plastic deformation is ensured (if necessary, consult with company KTR).



#### ATTENTION!

We recommend to check bores and shafts for dimensional accuracy before assembly.



#### CAUTION!

During the assembly please make sure that the E dimension (see table 1 and 2) is observed, so that the coupling parts do not contact each other during the operation. Disregarding this hint may cause damage on the coupling.

For the axial alignment of the coupling the dimensions E (see table 1 and 2) are decisive. In order to adjust the right dimension E you should proceed as follows:

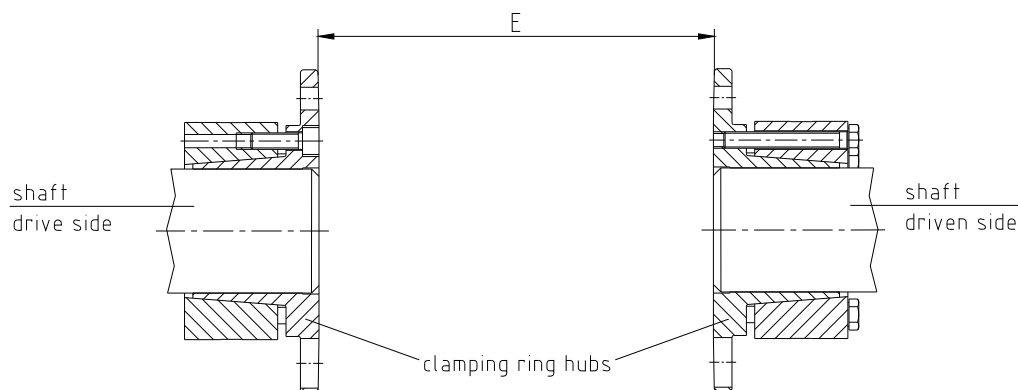
- Clean and degrease the hub bore and shaft, afterwards lubricate with a thin-bodied oil (e. g. Castrol 4 in 1 or Klüber Quietsch-Ex).



#### CAUTION!

**Oils and greases containing molybdenum disulfide or other high-pressure additives as well as internal lubricants must not be used.**

- Slightly detach the clamping screw and pull the clamping ring from the hub only marginally to make sure that the clamping ring is loosened.
- Push the clamping ring hubs onto the shafts of the drive and driven side.
- The inner side of the clamping ring hubs must end flushly with the front sides of the shafts (see picture 18).
- Move the power packs in axial direction until you have reached dimension E (see table 1 or 2).
- Tighten the clamping screws evenly crosswise at first to 1/3 and afterwards 2/3 of the full tightening torque (see table 8). Afterwards tighten the clamping screws crosswise to the full tightening torque. The process needs to be repeated until the tightening torque is achieved for all screws.



picture 18: assembly of the clamping ring hub



## 4 Assembly

### 4.3 Assembly of the Clamping Ring Hub

**Table 8: tightening torques of clamping screws**

Size	35	38	42	50	60	70	80	85	90	105	115	135
Clamping screws	M5	M6	M6	M8	M8	M10	M12	M12	M12	M12	M12	M16
Tightening torque $T_A$ [Nm]	8,5	14	14	35	35	35	69	120	120	120	120	295



#### CAUTION!

After the startup of the coupling the tightening torques of the screws has to be inspected during the usual inspection intervals.



#### ATTENTION!

##### Selection of clamping hubs

With the use in explosion-proof areas the clamping hubs have to be selected in a way that the difference between the peak torque of the machine including all operation parameters and the frictionally engaged torque of the clamping hub is at least a service factor of  $s = 2$ .



#### ATTENTION!

For the applications in hazardous areas the setscrews to fasten the hubs as well as all screw connections have to be secured against self-slackening additionally, e. g. by glueing with Loctite (medium-tight).

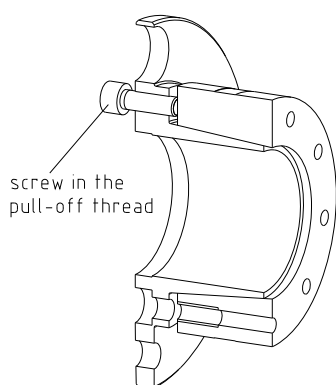
### Disassembly:



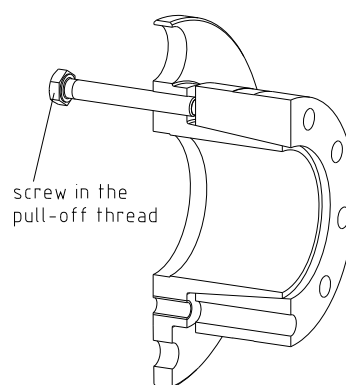
#### DANGER!

Falling parts can lead to personal injury or damage to the machine.  
Secure the driving parts during disassembly.

- Evenly detach the clamping screws successively. Each screw must be detached only half a rotation each revolution. Unscrew all clamping screws by 3 - 4 convolutions.
- Remove the screws situated next to the pull-off threads and screw them into the respective pull-off threads until they fit close.
- The clamping ring is detached by a crosswise and stepwise tightening of the screws in the pull-off threads.



picture 19: disassembly clamping ring hub type 6.0



picture 20: disassembly clamping ring hub type 6.5

- In case of a repeated assembly the hub bore and shaft have to be cleaned and afterwards lubricated with a thin-bodied oil (e. g. Castrol 4 in 1 or Klüber Quitsch EX). The same applies for the taper surfaces of clamping ring hub and clamping ring.



#### CAUTION!

If these hints are not observed, the operation of the coupling may be damaged.



## 4 Assembly

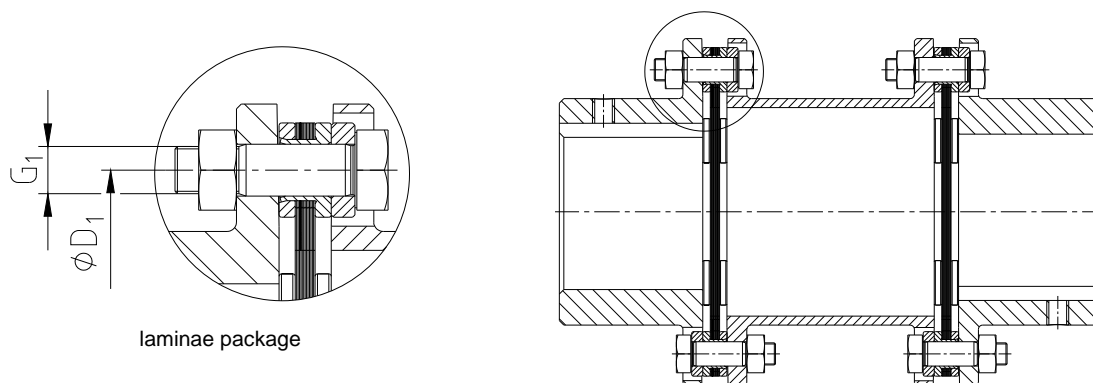
### 4.4 Assembly of Laminae Packages, RADEX®-N size 20 - 135



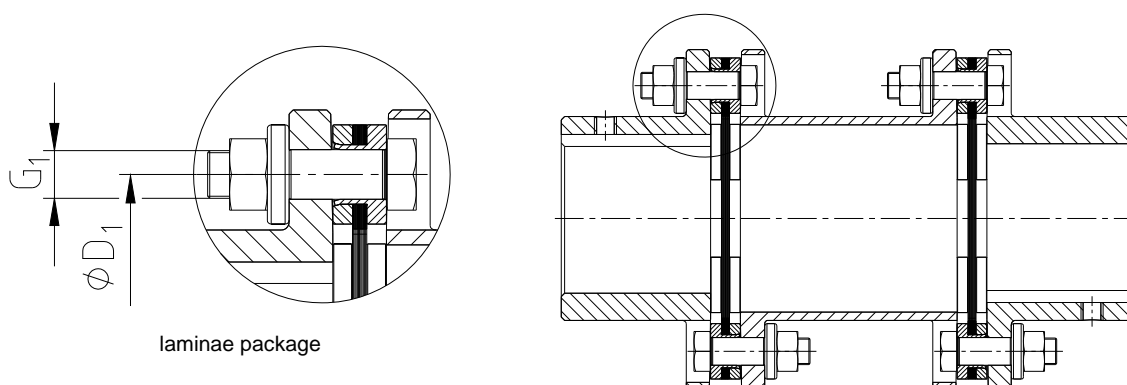
#### CAUTION!

For the assembly please make sure that the laminae packages are assembled in axial direction free from distortion. Disregarding this hint may cause damage on the coupling.

- Clean and degrease the contact surfaces of screw connections on the flange hub, laminae package and spacer.
- Please assemble the laminae packages and the spacer (see picture 21 and 22, respectively). For type NN only 1 laminae package is used (no spacer).
- Screw the components hand-tight initially, the fitting screws to be assembled reciprocally (see picture 21 or 22, respectively).
- Tighten the hexagon nuts one after the other and in several revolutions to the tightening torque mentioned in table 12. Secure the fitting screw against twisting.



picture 21: assembly of the laminae packages RADEX®-N size 20 - 70



picture 22: assembly of the laminae packages RADEX®-N size 80 - 135

**Table 9:**

RADEX®-N Size	20	25	35	38	42	50	60	70	80	85	90	105	115	135
Pitch circle Ø D <sub>1</sub>	44	53	67	75	85	100	112	128	148	158	170	185	214	240





## 4 Assembly

### 4.5 Assembly of Laminae Packages, RADEX®-N size 136 - 336 and 138 - 338



#### CAUTION!

For the assembly please make sure that the laminae packages are assembled in axial direction free from distortion. Disregarding this hint may cause damage on the coupling.

- Clean and degrease the contact surfaces of screw connections on the flange hub, laminae package and spacer as well as the threads of the clamping nut and fitting screw.
- Please assemble the laminae packages and the spacer part (see picture 23). For type NN only 1 laminae package is used (no spacer).
- Screw the components hand-tight initially, the fitting screws to be assembled reciprocally (see picture 23). With size 156 and 158 use washer under the screw head.
- Pressure screws in the clamping nut must not jut out the pressure side (see picture 24).



#### CAUTION!

All components must lay on each other without any gap.

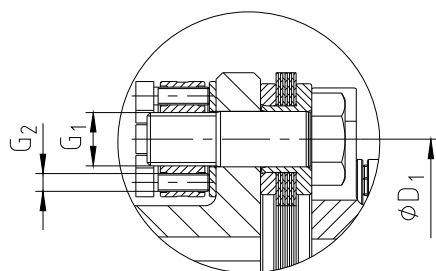
- Afterwards turn back the clamping nut until there is a gap of 1 – 2 mm (see picture 24).
- Tighten the pressure screws marked in picture 26 hand-tight.
- Tighten these screws (see picture 26) at half the tightening torque according to table 11 and afterwards at the full tightening torque according to table 11.
- Now tighten all pressure screws one after another and with several revolutions until all screws have achieved the full tightening torque (picture 27).



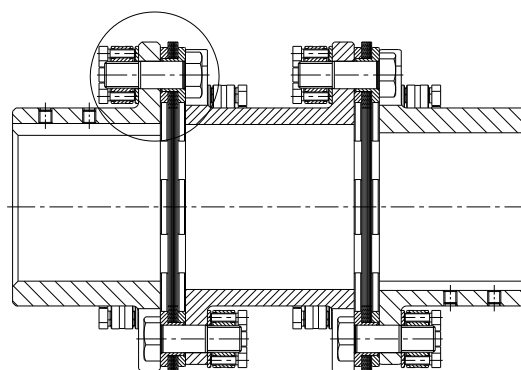
#### CAUTION!

The pressure screws must not bear on the heads after assembly (see picture 25).

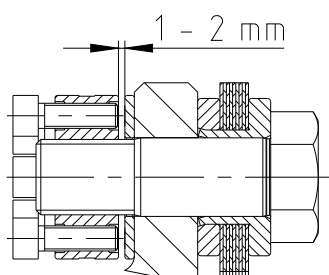
- Mount all clamping nuts at the coupling in this way.



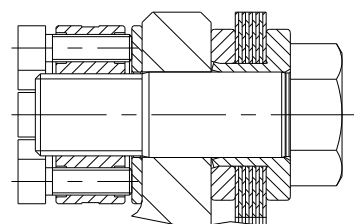
laminae package



picture 23: assembly of the laminae packages RADEX®-N size 136 - 336 and 138 - 338



picture 24

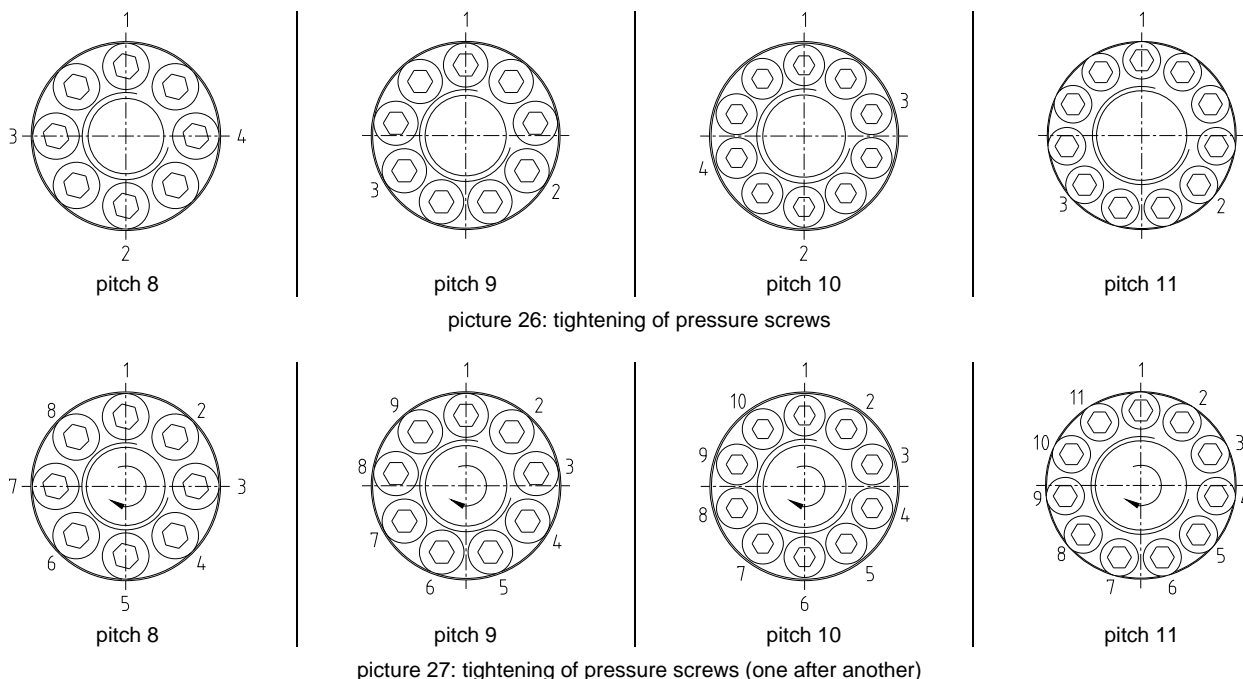


picture 25



## 4 Assembly

### 4.5 Assembly of Laminae Packages, RADEX®-N size 136- 338 and 138 - 338



**Table 10:**

RADEX®-N Size	136 / 138	156 / 158	166 / 168	186 / 188	206 / 208	246 / 248	286 / 288	336 / 338
Pitch circle Ø D <sub>1</sub>	240	260	290	320	350	410	480	550

### Disassembly:



#### **DANGER!**

Falling parts can lead to personal injury or damage to the machine.  
Secure the driving parts during disassembly.

- Untighten the pressure screws of the clamping nut with several revolutions by a quarter revolution until all screws are released from tension.



#### **CAUTION!**

Do not relieve and unscrew individual pressure screws completely in any case.

- Turn down the clamping nuts and remove the discs.



## 4 Assembly

### 4.6 Tightening Torques of Screw Connections at the Laminae Package

**Table 11: tightening torques of screw connections at the laminae package**

RADEX®-N Size	20	25	35	38	42	50	60
Dimension G <sub>1</sub> [mm]	M5	M6	M6	M8	M8	M10	M8
Tightening torque T <sub>A</sub> [Nm]	8,5	14	14	35	35	69	33

RADEX®-N Size	M70	80	85	90	105	115	135
Dimension G <sub>1</sub> [mm]	M10	M10	M12	M16	M16	M20	M24
Tightening torque T <sub>A</sub> [Nm]	65	65	115	280	280	550	900

RADEX®-N Size	136 / 138	156 / 158	166 / 168	186 / 188	206 / 208	246 / 248	286 / 288	336 / 338
Dimension G <sub>1</sub> [mm]	M24	M27	M27	M27	M30	M36	M42	M48
Dimension G <sub>2</sub> [mm]	8 x M8	9 x M8	9 x M8	9 x M8	8 x M10	8 x M12	10 x M12	11 x M12
Pressure screw G <sub>2</sub> Tightening torque T <sub>A</sub> [Nm]	30	30	30	30	60	105	105	105



#### CAUTION!

Having set the coupling into operation, the tightening torque of the screw connections has to be investigated at regular maintenance intervals.

## 4 Assembly

### 4.7 Displacements - Alignment of the Couplings

The displacement figures shown in table 12 offer sufficient safety to compensate for environmental influences like, for example, heat expansion or lowering of foundation.



#### CAUTION!

In order to ensure a long lifetime of the coupling and to avoid dangers regarding the use in hazardous areas, the shaft ends must be accurately aligned.



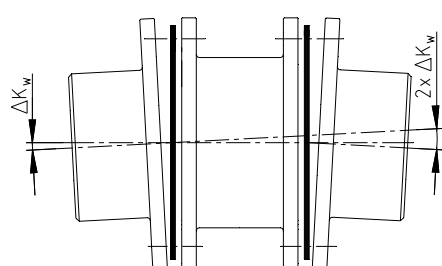
Please absolutely observe the displacement figures indicated (see table 12). If the figures are exceeded, the coupling is damaged.

The exacter the alignment of the coupling, the higher is its lifetime.

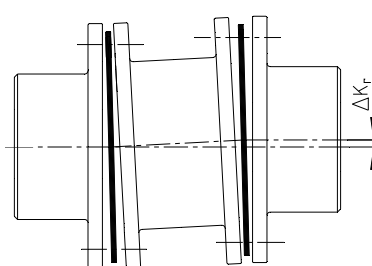
In case of a use in hazardous areas for the explosion group IIC (marking II 2GD c IIC T X), only the half displacement figures (see table 12) are permissible.

#### Please note:

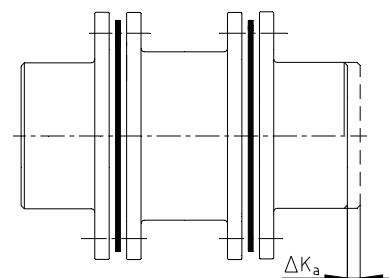
- The displacement figures mentioned in table 12 are maximum figures which must not arise in parallel. In case of a simultaneous radial, axial and angular displacement, these values must be reduced (see picture 29).
- Please check with a dial gauge, ruler or feeler whether the permissible displacement figures of table 12 can be observed.



angular displacements



radial displacements



axial displacements

picture 28: displacements

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## 4 Assembly

### 4.7 Displacements - Alignment of the Couplings

Example for the misalignment combinations given in picture 29:

Example 1:

$$\Delta K_r = 10\%$$

$$\Delta K_w = 80\%$$

$$\Delta K_a = 10\%$$

Example 2:

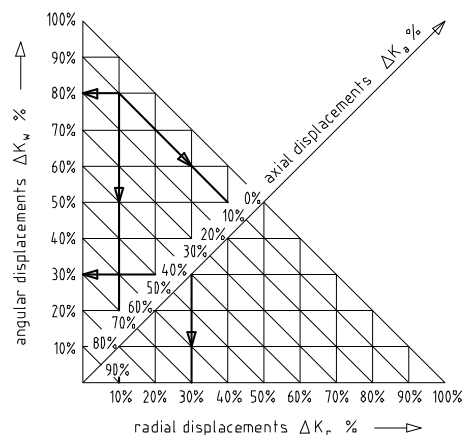
$$\Delta K_r = 30\%$$

$$\Delta K_w = 30\%$$

$$\Delta K_a = 40\%$$

$$\Delta K_{\text{total}} = \Delta K_a + \Delta K_r + \Delta K_w \leq 100\%$$

picture 29:  
combinations of  
displacement



**Table 12: displacement figures**

RADEX®-N Size	Type NN $\Delta K_a$ [mm], (axial)	Type NANA1/NANA2 $\Delta K_a$ [mm], (axial)	Type NN $\Delta K_r$ [mm], (radial)	Type NANA1 $\Delta K_r$ [mm], (radial)	Type NANA2 $\Delta K_r$ [mm], (radial)	Type NN/NANA1/NANA2 $\Delta K_w$ [°], (angular) *
20	0,60	1,2	-	0,5	0,1	1,0
25	0,80	1,6	-	0,5	0,2	1,0
35	1,00	2,0	-	0,5	0,2	1,0
38	1,20	2,4	-	0,6	0,3	1,0
42	1,40	2,8	-	0,6	0,3	1,0
50	1,60	3,2	-	0,8	0,4	1,0
60	1,00	2,0	-	1,7	1,0	1,0
70	1,10	2,2	-	2,1	1,2	1,0
80	1,30	2,6	-	2,5	1,5	1,0
85	1,30	2,6	-	2,5	1,5	1,0
90	1,00	2,0	-	2,0	1,4	1,0
105	1,20	2,4	-	2,5	1,6	1,0
115	1,40	2,8	-	2,0	1,3	1,0
135	1,75	3,5	-	4,0	-	1,0
136	1,85	3,7	-	$\Delta K_r = \tan \Delta K_w \times (E_2 - E_1)$	$\Delta K_r = \tan \Delta K_w \times (E_3 - E_1)$	0,7
156	2,10	4,2	-			0,7
166	2,25	4,5	-			0,7
186	2,40	4,8	-			0,7
206	2,60	5,2	-			0,7
246	3,00	6,0	-			0,7
286	3,35	6,7	-			0,7
336	3,75	7,5	-			0,7
138	1,30	2,6	-			0,5
158	1,40	2,8	-			0,5
168	1,50	3,0	-			0,5
188	1,60	3,2	-			0,5
208	1,75	3,5	-			0,5
248	2,00	4,0	-			0,5
288	2,25	4,5	-			0,5
338	2,50	5,0	-			0,5

\* each laminae package

### 4.9 Spares Inventory, Customer Service Addresses

A basic requirement to guarantee the operational readiness of the coupling is a stock of the most important spare parts on site.

Contact addresses of the KTR partners for spare parts and orders can be obtained from the KTR homepage under [www.ktr.com](http://www.ktr.com).

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## 5 Enclosure A

### Hints and Instructions Regarding the Use in Hazardous Areas

type NN: flange hub / laminae package / flange hub

type NANA 1 to 3, NENA 1 and 2, NENE 1: flange hub / laminae package / spacer /  
laminae package / flange hub

type NANA 4: flange hub / laminae package / flange hub spec. / intermediate shaft pipe / flange hub spec. /  
laminae package / flange hub (flange hub spec. with welded intermediate shaft pipe)

type NNZ: flange hub / laminae package / spacer / laminae package / flange hub

type NNW: flange hub / laminae package / flange hub / intermediate shaft / flange hub /  
laminae package / flange hub

RADEX®-N only with spacer made from steel.

### 5.1 Selection of the Coupling Size

If the coupling is used in explosion proof areas, the size must be selected in a way that there is a minimum safety of  $s = 2,0$  from the unit torque to the nominal torque of the coupling.

### 5.2 Use in Hazardous Areas According to the Regulations

#### Conditions of operation in hazardous locations

RADEX®-N couplings are suitable for the use according to EC standard 94/9/EC.

#### 1. Industry (with the exception of mining)

- device class II of category 2 and 3 (*coupling is not approved for device class 1*)
- media class G (gases, fogs, steams), zone 1 and 2 (*coupling is not approved for zone 0*)
- **media class D (dusts), zone 21 and 22 (coupling is not approved for zone 20)**
- explosion class IIC (*explosion class IIA and IIB are included in IIC*)

#### Temperature class:

Temperature class	Ambient temperature	Max. surface temperature <sup>1)</sup>
T2, T1	- 30 °C to + 280 °C	280 °C <sup>2)</sup>
T3	- 30 °C to + 190 °C	200 °C <sup>2)</sup>
T4	- 30 °C to + 125 °C	135 °C <sup>2)</sup>
T5	- 30 °C to + 90 °C	100 °C
T6	- 30 °C to + 75 °C	85 °C

#### Explanation:

The maximum surface temperatures result from each the maximum permissible ambient or operating temperature  $T_a$  plus the maximum temperature increase  $\Delta T$  of 10 K which has to be taken into account.

- 1) The ambient or operating temperature  $T_a$ , respectively, is limited to + 280 °C by the permissible permanent operating temperature.
- 2) The maximum surface temperature of 110 °C applies for the use in locations which are potentially subject to dust explosion, too.

#### 2. Mining

Device class I of category M2 (coupling is not approved for device category M1).

Permissible ambient temperature - 30 °C to + 140 °C.

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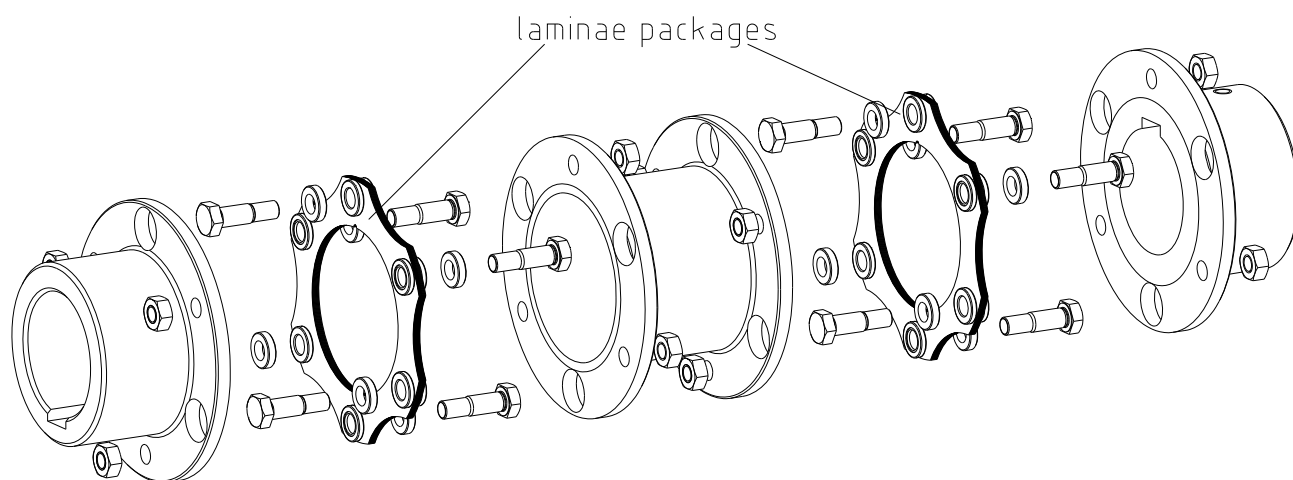


## 5 Enclosure A

Hints and Instructions Regarding the Use in  Hazardous Areas

### 5.3 Control Intervals for Couplings in Hazardous Areas

Explosion group	Control intervals
3G 3D	For couplings which are classified in category 3G or 3D the operating and assembly instructions that are usual for standard operation apply. During the standard operation which has to be subject to the analysis of danger of ignition the couplings are free from any ignition source. Merely the temperature increase produced by proper heating and depending on the coupling type has to be considered: for RADEX®-N: $\Delta T = 10\text{ K}$
II 2GD c IIB T1, T2, T3, T4, T5, T6	A checking of the circumferential backlash and a visual check of the laminae package must be effected after 3,000 operating hours for the first time, after 6 months at the latest. If you note an unconsiderable or no wear at the laminae package after this first inspection, the further inspections can be effected, in case of the same operating parameters, respectively after 6,000 operating hours or after 18 months at the latest. If you note a considerable wear during the first inspection, so that a change of the laminae package would be recommended, please find out the cause according to the table „Breakdowns“, as far as possible. The maintenance intervals must be adjusted according to the changed operating parameters.
II 2GD c IIC T1, T2, T3, T4, T5, T6	A checking of the circumferential backlash and a visual check of the laminae package must be effected after 2,000 operating hours for the first time, after 3 months at the latest. If you note an unconsiderable or no wear at the laminae package after this first inspection, the further inspections can be effected, in case of the same operating parameters, respectively after 4,000 operating hours or after 12 months at the latest. If you note a considerable wear during the first inspection, so that a change of the laminae package would be recommended, please find out the cause according to the table „Breakdowns“, as far as possible. The maintenance intervals must be adjusted according to the changed operating parameters.



picture 30: RADEX®-N type NANA 1

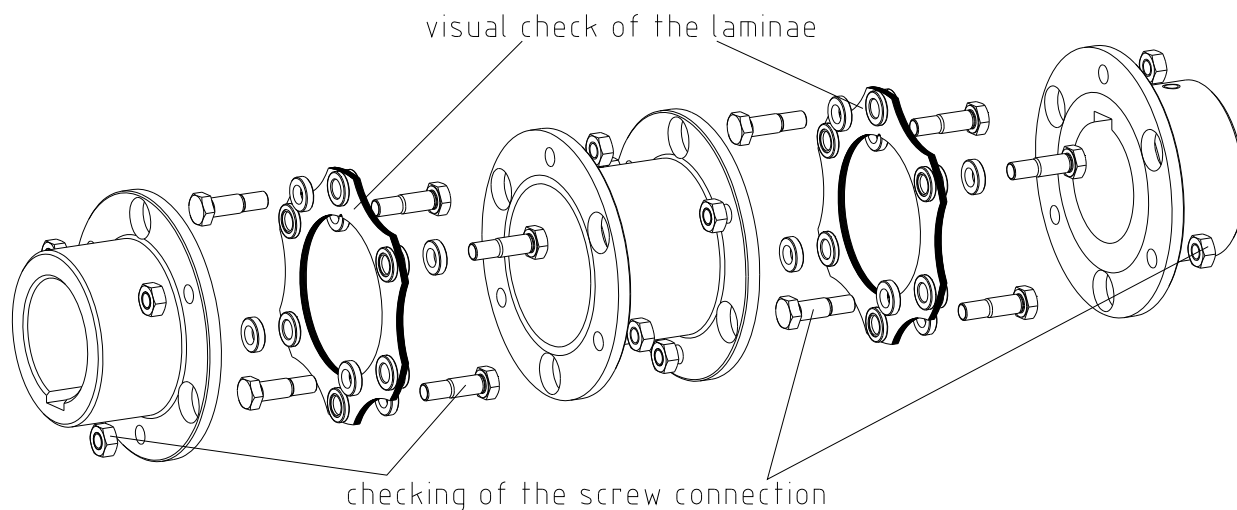


## 5 Enclosure A

Hints and Instructions Regarding the Use in  Hazardous Areas

### 5.4 Visual Check and Measures

During the visual control the laminae packages must be checked concerning cracks and detached fitting screws. Detached fitting screws must be tightened with the screw tightening torque to be observed (see table 11). Laminae packages and fitting screws showing cracks must be exchanged immediately, irrespective of the inspection intervals.



picture 31: RADEX®-N type NANA 1



#### CAUTION!

In order to ensure a long lifetime of the coupling and to avoid dangers regarding the use in hazardous areas, the shaft ends must be accurately aligned. Please absolutely observe the displacement figures indicated (see table 12). If the figures are exceeded, the coupling is damaged.

### 5.5 Permissible Coupling Materials in the Hazardous Area

In the explosion groups **IIB** and **IIC** only the following material combinations may be used:

- steel - steel
- stainless steel - stainless steel


**Aluminium** as coupling material is generally excluded for the explosion area.



## 5 Enclosure A

### Hints and Instructions Regarding the Use in Hazardous Areas

#### 5.6 Marking of Coupling for the Hazardous Area

Couplings for the use in hazardous areas are marked on at least one component completely and on the remaining components at the outside diameter of the hub or on the front side with an  label for the respectively permitted conditions of use. The laminae packages are excluded.

Complete labelling:



II 2G c IIC T6, T5, T4, T3 bzw. T2 -  $30\text{ °C} \leq T_a \leq +75\text{ °C}$ , + 90 °C,  
+ 125 °C, + 190 °C bzw. + 280 °C  
II 2D c T 110 °C -  $30\text{ °C} \leq T_a \leq +100\text{ °C}$  / I M2 c -  $30\text{ °C} \leq T_a \leq +140\text{ °C}$

Short labelling:



II 2GD c IIC T X/I M2 c X

The former marking  
remains valid:



II 2G c IIC T4/T5/T6 -  $30\text{ °C} \leq T_a \leq +80/60/45\text{ °C}$   
II 2D c T 110 °C/I M2 c -  $30\text{ °C} \leq T_a \leq +80\text{ °C}$

The labelling with Explosion Group IIC includes the Explosion Groups IIA and IIB.

If the coupling part is labelled with  in addition to , KTR supplied it unbored or pilot bored.



#### **CAUTION!**

**Any mechanical rework to couplings that are used in hazardous areas require an explicit release by KTR.**

**The orderer must send a drawing to KTR acc. to which the manufacture must be made. KTR checks this drawing and returns it to the orderer with approval.**

#### 5.7 Starting

Before putting the coupling into operation, check the tightness of the setscrews in the flange hubs, the alignment and the distance dimension E and correct, if necessary, and also check all screw connections regarding the stipulated tightening torques dependent on the type of coupling.



If used in hazardous areas the setscrews to fix the flange hub as well as all screw connections must be additionally secured against self-loosening, e. g. glue with Loctite (medium strength).

Last but not least, the coupling protection against unintended contact must be fixed.

The cover must be electrically conductive and be included in the equipotential bonding. Bellhousings (magnesium part below 7,5 %) made from aluminium and damping rings (NBR) can be used as connecting element between pump and electro motor. The cover may only be taken off after having stopped the unit.

During operation, please pay attention to

- strange running noises
- occurring vibrations.

If the couplings are used in dust explosive areas and in mining the user must make sure that there is no accumulation of dust in a critical quantity between the cover and the coupling. The coupling must not operate in an accumulation of dust.





## 5 Enclosure A

### Hints and Instructions Regarding the Use in Hazardous Areas

#### 5.7 Starting

For covers with unlocked openings on the upper side no light metals may be used if the couplings are used as appliances of appliance group II (*if possible, from stainless steel*).

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

The minimum distance „Sr“ of the protection device to the rotating parts must at least correspond to the figures mentioned below.

If the protection device is used as cover, regular openings complying with the explosion protection demands can be made that must not exceed the following dimensions:

Openings	Cover [mm]		
	Top side	Lateral parts	Distance „Sr“
Circular - max. diameter	4	8	≥ 10
Rectangular - max. lateral length	4	8	≥ 10
Straight or curved slot - max. lateral length/height	prohibited	8	≥ 20



#### CAUTION!

**If you note any irregularities at the coupling during operation, the drive unit must be turned off immediately. The cause of the breakdown must be found out with the table „Breakdowns“ and, if possible, be eliminated according to the proposals. The possible breakdowns mentioned can be hints only. To find out the cause all operating factors and machine components must be considered.**

#### Coupling layer:



If coated (priming, painting etc.) couplings are used in hazardous areas, the requirements to conductability and layer thickness must be considered. In case of paintings up to 200 µm no electrostatic load can be expected. Multiple coatings that are thicker than 200 µm are prohibited for explosion group IIC.

#### 5.8 Breakdowns, Causes and Elimination

The below-mentioned errors can lead to an incorrect use of the **RADEX®-N** coupling. In addition to the stipulations in these operating and mounting instructions please make sure to avoid these errors. The errors listed can only be clues to search for the errors. When searching for the error the adjacent components must be generally included.



Due to incorrect use the coupling can become a source of ignition. EC Standard 94/9/EC requires a special care from the manufacturer and the user.

#### General errors incorrect use:

- Important data for the coupling selection was not forwarded.
- The calculation of the shaft/hub connection was not considered.
- Coupling parts with damage occurred during transport are assembled.
- If the heated hubs are assembled, the permissible temperature is exceeded.
- The fits of the parts to be assembled are not coordinated with each other.
- Tightening torques are below/exceeded.



## 5 Enclosure A

### Hints and Instructions Regarding the Use in Hazardous Areas

#### 5.8 Breakdowns, Causes and Elimination


##### Continuation:

- Components are exchanged by mistake/put together incorrectly.
- A wrong or no laminae package is inserted into the coupling.
- No original KTR parts (purchased parts) are used.
- The coupling used/the coupling protection used is not suitable for the operation in hazardous areas and does not correspond to EC Standard 94/9/EC, respectively.
- Maintenance intervals are not observed.

Breakdowns	Causes	Danger hints for hazardous areas	Elimination
Change of the running noises and / or occurring vibrations	Misalignment	---	1) Put the unit out of operation 2) Eliminate the reason for the misalignment (e. g. loose foundation bolts, break of the engine fixing, heat expansion of unit components, change of the assembly dimension E of the coupling) 3) Checking of wear see under point Control
	Loose fitting screws, low micro friction under the screw head and at the steel laminae package	Danger of ignition due to hot surfaces	1) Put the unit out of operation 2) Check coupling parts and exchange damaged coupling parts 3) Tighten the shoulder bolts until reaching the permissible tightening torque 4) Check alignment, correct if necessary
	Loose screws for axial securement of flange hubs	---	1) Put the unit out of operation 2) Check alignment of coupling 3) Tighten the screws to secure the flange hubs and secure against self-loosening 4) Checking of wear see under point Control
Break of the steel laminae package	Break of the steel laminae package due to high shock energy / overload	Danger of ignition due to sparking	1) Put the unit out of operation 2) Disassemble the coupling and remove the rests of the steel laminae packages 3) Check coupling parts and exchange damaged coupling parts 4) Insert steel laminae packages, assemble coupling parts 5) Find out the reason of overload
	Operating parameters do not correspond to the performance of the coupling	Danger of ignition due to sparking	1) Put the unit out of operation 2) Check the operating parameters and select a larger coupling (consider installation space) 3) Assemble new coupling size 4) Check alignment



## 5 Enclosure A

Hints and Instructions Regarding the Use in  Hazardous Areas

### 5.8 Breakdowns, Causes and Elimination

Breakdowns	Causes	Danger hints for hazardous areas	Elimination
Break of the steel laminae package	Mistake in service of the unit	Danger of ignition due to sparking	1) Put the unit out of operation 2) Disassemble the coupling and remove the rests of the steel laminae packages 3) Check coupling parts and exchange damaged coupling parts 4) Insert steel laminae packages, assemble coupling parts 5) Instruct and train the service staff
Cracks in / break of the steel laminae packages / fixing screws	Drive vibrations	Danger of ignition due to sparking	1) Put the unit out of operation 2) Disassemble the coupling and remove the rests of the steel laminae packages 3) Check coupling parts and exchange damaged coupling parts 4) Insert steel laminae packages, assemble coupling parts 5) Check alignment, correct if necessary 6) Find out the reason for the vibrations



If you operate with a worn laminae package (see item 5.2) and the subsequent contact of metal parts a due operation meeting the explosion protection requirements and acc. to Standard 94/9/EC is not ensured.



#### ATTENTION!

**KTR does not assume any liabilities or guarantees regarding the use of spare parts and accessories which are not provided by KTR and for the damages resulting herefrom.**




KTR Kupplungstechnik  
GmbH  
D-48407 Rheine

**RADEX®-N**  
**Operating-/Assembly Instructions**

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**5 Enclosure A**

Hints and Instructions Regarding the Use in  Hazardous Areas

**5.9 EC Certificate of Conformity**

## EC Certificate of Conformity

corresponding to EC Standard 94/9/EC dated 23 March 1994  
and to the legal regulations

The manufacturer - KTR Kupplungstechnik GmbH, D-48432 Rheine - states that the

### **RADEX®-N Steel Laminae Couplings**


described in these mounting instructions and explosion-proof designed correspond to Article 1 (3) b) of Standard 94/9/EC and comply with the general Safety and Health Requirements according to enclosure II of Standard 94/9/EC.


The RADEX®-N steel laminae coupling is in accordance with the specifications of the standard 94/9/EC. One or several standards mentioned in the corresponding EC type test certificate IBExU02ATEXB005\_05 X were in part replaced by updated versions.  
KTR Kupplungstechnik GmbH as the manufacturer confirms that the product mentioned above is in accordance with the specifications of the new standards, too.

According to article 8 (1) of Standard 94/9/EC the technical documentation is deposited with the:

IBExU  
Institut für Sicherheitstechnik GmbH  
Fuchsmühlenweg 7  
  
09599 Freiberg

Rheine, 27.02.12  
Date

i. V.   
Reinhard Wibbeling  
Engineering Manager

i. A.   
Reiner Banemann  
Product Manager