

# Operation Manual

## Flexible claw couplings made of plastic

according to  
**KWN 22006**



<b>Author:</b>	Dipl.-Ing. . V. Hausdorf	08.02.2005	gez. V. Hausdorf
<b>Approved:</b>	Dr.-Ing. Ch. Spensberger	08.02.2005	gez. Dr.-Ing. Ch. Spensberger
	Name	Date	Signature

### **KWD Kupplungswerk Dresden GmbH**

Löbtauer Straße 45 - D - 01159 Dresden  
Postfach 270144 - D - 01172 Dresden  
Tel.: + 49(0)351 - 4999-0 Fax: + 49(0)351 - 4999-233  
[kwd@kupplungswerk-dresden.de](mailto:kwd@kupplungswerk-dresden.de)  
<http://www.kupplungswerk-dresden.de>

## Table of Contents

<b>MANUFACTURER'S DECLARATION .....</b>	<b>3</b>
<b>1. VALIDITY .....</b>	<b>5</b>
<b>2. GENERAL INFORMATION .....</b>	<b>5</b>
<b>3. SAFETY INFORMATION .....</b>	<b>5</b>
<b>4. TECHNICAL DESCRIPTION/COMPONENTS .....</b>	<b>7</b>
<b>5. STATE OF DELIVERY .....</b>	<b>8</b>
<b>6. ASSEMBLY OF HUBS .....</b>	<b>8</b>
<b>7. ALIGNMENT OF THE DRIVING AND DRIVEN PARTS.....</b>	<b>10</b>
<b>8. USE OF THE COUPLING IN POTENTIALLY EXPLOSIVE ATMOSPHERES.....</b>	<b>12</b>
<b>8.1. PERMISSIBLE MATERIALS .....</b>	<b>12</b>
<b>8.2. WEAR LIMIT .....</b>	<b>13</b>
<b>9. COMMISSIONING .....</b>	<b>14</b>
<b>10. OPERATION.....</b>	<b>15</b>
<b>11. MAINTENANCE AND SPARE PARTS .....</b>	<b>18</b>
<b>12. TRANSPORT AND STORAGE .....</b>	<b>18</b>

## Manufacturer's Declaration



Product: Flexible Claw couplings made of plastic  
EZK according to KWN 22006

In accordance with the EU Machine Directive 98/37/EG, Appendix IIB

we

**KWD**  
**Kupplungswerk Dresden GmbH**  
Löbtauer Straße 45 - D – 01159 Dresden  
P.O. Box 270144 – D – 01172 Dresden

hereby declare, that the

Flexible Claw couplings made of plastic  
according to KWN 22006

described in this operation manual are intended for installation in a machine. Commissioning of the machine is prohibited until it is established whether the machine, in which these components are fitted complies with the EU directive (original issue 89/392/EWG, including all subsequent amendments).

All harmonized standards published by the EU Commission in the Official Gazette of the European Union – insofar as they apply to this product – have been taken into consideration.

Date/ Manufacturer's signature

08.02.2005 signed C. Spensberger

## Safety and Information Symbols



**Danger!**

**Danger of injury to personnel**



**Attention!**

**Follow instructions**

## 1. Validity

These operating instructions apply to all-metal couplings conforming to KWN 21016 and in connection with this KWN.

## 2. General Information

These operating instructions are an integral part of the coupling's scope of supply. They should always be kept near the coupling.

Before the couplings are used, everyone involved in operating the couplings must read the operating instructions. Only an exact knowledge of the operating instructions will allow a trouble-free operation of the coupling. It is in our customer's interest to ensure that all points in the operating instructions are observed by all people responsible for transport, assembly and operation.



We do not accept any liability for damage and malfunctioning resulting from the non-observance of the operating instructions.

The coupling may only be used for the purpose intended by the manufacturer. It is only designed for the applications specified on the assembly drawing. Any deviating operating conditions will require new contractual agreements.

The coupling described here conforms to the technical stage of development at the point of time the operating instructions were written.

We reserve the right to make any alterations we consider necessary to increase performance and safety.

Please contact our factory if you have any technical questions or one of our customer service offices.

## 3. Safety information

The coupling has been constructed in accordance with the latest technological developments and functions reliably when shipped. Unauthorised alterations that impair operational reliability are not permitted and will render the guarantee invalid.

The coupling may only be used and operated under the conditions set down in the supply contract.

The customer must ensure that the people appointed to assemble, operate, upkeep, maintain and repair the coupling have read and understood the operating instructions and observe them in all points in order to:

prevent risks to the health and life of the user and third parties

ensure that the coupling operates reliably

rule out the risk of loss of use or harm to the environment due to incorrect handling.

The job safety rules and environmental regulations relevant to transport, assembly, disassembly, operation, care and maintenance must be observed.

The coupling may only be operated, maintained and repaired by trained and authorised personnel who have received the relevant instructions.

Care must always be taken when operating and working on the couplings and safety must be accorded top priority.



Work on the coupling may only be done when the coupling is idle. It must be ensured that the drive assembly cannot be switched on again unintentionally (e.g. by locking the key-operated switch or removing the fuses in the power supply). A sign indicating that work is being done on the coupling must be placed at the spot where it is switched on.

The drive assembly must be stopped immediately if alterations are found in the coupling during operation, such as e.g. different noises when running.

Appropriate safety devices must be used to guard the coupling against unintentional contact.



When the coupling is being integrated into equipment or systems the manufacturer of the equipment and systems is obliged to include the regulations, information and descriptions from these operating instructions in his own operating instructions.

#### 4. Technical Description/Components

Die flexible jaw couplings consist of the hubs (parts 1+2), spider insert (part 3) and 2 grub screws (parts 4 + 5).

The couplings can also be supplied in various special constructions.

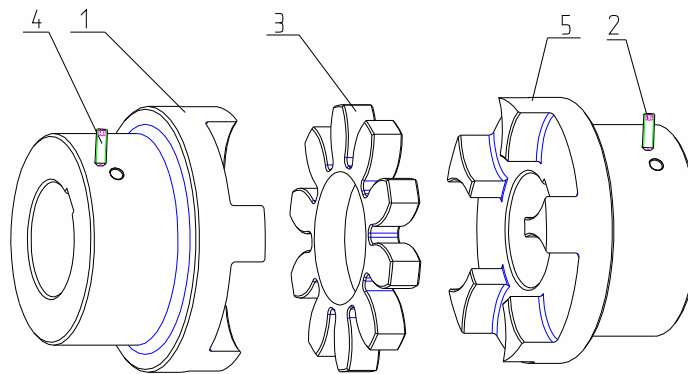


Fig. 1

Flexible jaw couplings are positive-locking, torsionally flexible couplings that also permit radial, axial and angular offset between the driving and driven parts. They are fail-safe.

Two coupling halves with concave jaws are located opposite each other, offset circumferentially by half a pitch. In the space between the jaws there is an involute spider insert with crowned tooth profile.

The spider insert is extremely resistant to wear, oil, ozone and ageing and is distinguished by its resistance to hydrolysis (suitable also for tropical conditions). The high internal damping protects the drive from dynamic overload.

Perfect operation is guaranteed at operating temperatures of  $-30^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$  ( $-22^{\circ}\text{F}$  to  $+176^{\circ}\text{F}$ ) [including short term temperature peaks up to  $+120^{\circ}\text{C}$  ( $248^{\circ}\text{F}$ )].

The progressively rising spring characteristic facilitates a rapid reduction of vibration energy and limits vibration amplitude.

In contrast to other flexible couplings, the elastomeric teeth of the spider insert are not subject to bending stresses, but only to pressure. Accordingly there is less wear and the teeth have a higher load capacity.

The couplings are produced from precision castings, which reduces imbalance and has a positive influence on running characteristics and service life.

A flexible jaw coupling can be installed both horizontally and vertically. The specially machined surfaces facilitate a rapid and reliable alignment of the coupling during installation.

We reserve the right to make technical alterations in the interest of progress.

## 5. State of Delivery

The couplings are supplied in individual parts. The coupling parts have been provided with a corrosion protection wax as a temporary protection against corrosion. Colour lacquering is only provided after prior agreement with the manufacturer.

## 6. Assembly of Hubs

When assembling, observe the safety notes in Chapter 3.



The assembly must be done with the utmost care by qualified staff who have been given the relevant instructions.



A sufficient amount of suitable hoists must be available when commencing assembly.



Pay attention to the risk of ignition when assembling in potentially explosive atmospheres!





When assembling, it is essential to adhere to the  $e_1$  distance (see KWN 22006) for the coupling so that the spider insert can remain axially mobile when in operation. Non-observation can result in damage to the coupling during operation.

The following procedure must be followed when assembling the hubs:

Check adherence to the specified combinations of fits - see KWN 22006  
Clean the hub bores and shafts



**Follow the manufacturer's instructions on the right way to handle the solvent.**

- Suitable aids and/or devices must be used to push on the hubs. It is not permissible to drive them on by striking them.
- Heat the hubs to approx. 200°C (392 °F) to make it easier to push them on.



**Guard against burns from hot sections**

Once the coupling hubs have been mounted on the shafts (drive and load side), the coupling's  $e_1$  spacing must be set by pushing the units or the hubs on the shafts.

## 7. Alignment of the Driving and Driven Parts

**Caution:**



To prevent risks when using the coupling in potentially explosive atmospheres and to increase service life, it is essential to align the shaft ends carefully. In doing so, the maximum permissible misalignment values (see page 8) must be observed. Exceeding the values damages the coupling. When used in potentially explosive atmospheres for the explosion group IIC (Marking II 2G c IIC T4 the values must be reduced by 50 % !

The values from table 1 apply to an operating temperature of  $T = +30^{\circ}$



**Caution:**

**If the operating temperature is increased, the maximum permissible radial and angular misalignment values must be multiplied by the temperature factor!**

The conformance to misalignment limits must be checked with a ruler, a dial gauge and a feeler gauge.

The driving and driven parts must be aligned axially, radially and angularly. The alignment must be done in such a way that the remaining shaft misalignment and additional shaft misalignment during operation are equal to or less than the permissible values given in the following tables. The shaft misalignment should be as kept as low as possible because it influences the service life of the spider inserts and the degree of restoring reactions. The permissible values are given in the following tables:

**Permissible shaft misalignment and alignment dimensions**

Coupling size		19	24	28	38	42	48	55	65	75	90
Distance e1 [mm]		16	18	20	24	26	28	30	35	40	45
Dimension s [mm]		2.0	2.0	2.5	3.0	3.0	3.5	4.0	4.5	5.0	5.5
Dimension L [mm]		34	36	38	48	54	58	62	71	80	89
Dimension l <sub>1</sub> [mm]		66	78	90	114	126	140	160	185	210	245
max. axial misalignment											
? K <sub>a</sub> [mm]		1.2	1.4	1.5	1.8	2.0	2.1	2.2	2.6	3.0	3.4
	n (rpm)										
Perm. radial misalignment	1000	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.6
? K <sub>r</sub> [mm] at speed n	1500	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.3	0.4	0.5
Perm. angular misalignment	3000	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.3	
? K <sub>w</sub> * [mm] at speed n	4500	0.1	0.1	0.1	0.2	0.2	0.2	0.2			
	> 6000	0.1	0.1	0.1	0.1	0.1					
	n (rpm)										
perm. angular misalignment ? K <sub>w</sub> [°] at speed n	1000	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	1500	0.3	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.1
	3000	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
	4500	0.2	0.1	0.1	0.1	0.1	0.1	0.1			
	> 6000	0.1	0.1	0.1	0.1	0.1					

**Table 1**

In each case, the characteristic values for axial misalignment ( $\Delta K_a$ ), angular misalignment ( $\Delta K_w$ ) and radial misalignment ( $\Delta K_r$ ) given in the tables are the maximum possible values if only one of these forms of misalignment occurs. If axial and angular misalignment occur together, these must be determined in accordance with their shares in the overall misalignment capacity (see fig. 2) Tabelle 1.

The calculation of axial and angular and radial misalignment capacity when they occur together.

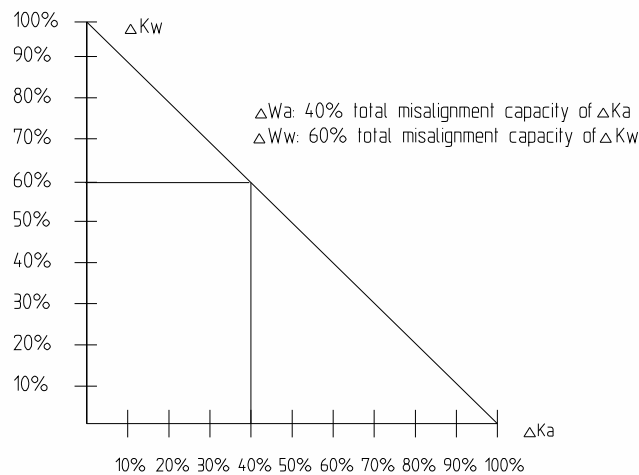


Fig. 2

## 8. Use of the coupling in potentially explosive atmospheres

### 8.1. Permissible Materials



Only the following materials may be used in the explosion groups IIB and IIC:  
 steel, stainless steel, cast iron (GG25) and nodular iron casting (GGG40).  
 Both hubs must always be made of the same material!

Never use couplings made of aluminium pressure diecasting!

## 8.2. Wear limit

The spider insert wear limit is determined by means of a feeler gauge between the spider insert flank and the coupling's jaws (see table 3, fig. 3). When the play between the two components  $> Z \text{ max.} = \text{wear}$ , it is essential to replace the spider insert.

Flexible jaw coupling spider insert	Wear limit Z max. (mm)
A 19	2
A 24	3
A 28	3
A 38	3
A 42	4
A 48	4
A 55	5
A 65	5
A 75	6
A 90	8
A 100	9
A 110	9
A 125	10

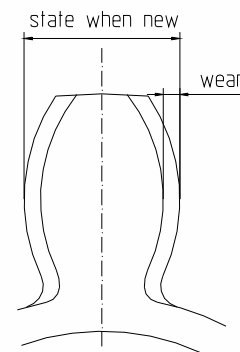


Fig. 3

Table 3

## 9. Commissioning



Before putting into operation for the first time, check that all screwed connections for the  $e_1$  distance are tight and that the hubs are aligned correctly. Correct if necessary. The coupling guard must then be put on to protect against unintentional contact.



In potentially explosive atmospheres the fastening screws to secure the hubs and the fastening screws for the flange couplings must also be protected against falling out by means of a suitable agent (e.g. sticking with Loctite® 270).

The user must put a firm cover on the coupling to protect the coupling against the impact of falling objects in particular. The cover may have regular openings which may not exceed the following dimensions.

	Circular holes Ø (mm)	Rectangular holes Ø (mm)
Top side of the cover	4	4
Side parts of the cover	8	8

Table 4

Its distance from the rotating parts must amount to at least 5 mm. The cover should not be made of light metal and it must be electrically conductive and included in the potential equalization. It is only permissible to remove the coupling guard when the unit has come to a standstill.

## 10. Operation



The coupling must be quiet and shock absorbent in all operating phases. Any deviating characteristics must be regarded as a fault requiring immediate remedy.

While the coupling is in operation, pay attention to:

- changes in running noises
- vibrations and oscillations occurring suddenly.

**If you become aware of irregularities during operation, turn off the drive assembly immediately.**

The cause must be found and eliminated. If the coupling is integrated in a complex plant, check all other components too when searching for the fault.

## Operating faults – Causes and Solutions

Faults	Possible Causes	Hazard warnings in potentially explosive atmospheres	Possible Solutions
Vibrations Changes in running noises	The fastening screws to secure the hub are loose.	Risk of ignition from hot surfaces and sparking.	<ul style="list-style-type: none"> <li>- Shut down the plant.</li> <li>- Check alignment and the coupling's e size and correct if necessary.</li> <li>- Check wear in the spider insert and replace if necessary.</li> <li>- Tighten fastening screws with the tightening torque and use Loctite® to prevent them loosening.</li> </ul>
	Permissible misalignment values exceeded due to alterations in the alignment	High temperatures on the spider insert due to increased churning work lead to risk of ignition	<ul style="list-style-type: none"> <li>- Shut down the plant.</li> <li>- Check alterations in the assembly and remove any found.</li> <li>- Check drive train for damage.</li> <li>- Check coupling's alignment and e size and correct if necessary.</li> <li>- Check wear in the spider insert and replace if necessary.</li> </ul>
	Coupling jaws knock against each other during torque transmission because of increased wear in the spider insert.	Metal contact between jaws causes a risk of ignition due to sparking.	<ul style="list-style-type: none"> <li>- Shut down the plant.</li> <li>- Take off the coupling.</li> <li>- Remove the spider insert.</li> <li>- Check the coupling hubs for damage (jaws, etc.) and replace if necessary.</li> <li>- Replace spider insert.</li> <li>- Check alignment, correct if necessary.</li> <li>- Tighten the fastening screws with the tightening torque and use Loctite® to prevent them loosening.</li> </ul>



This checklist indicates possible causes for the faults. When looking for faults and solutions, take all operating conditions and used components into account. Contact the coupling manufacturer in order to analyse the damage and find a solution.

Faults	Possible Causes	Hazard warnings in potentially explosive atmospheres	Possible Solutions
Fracture in jaws	Operating errors, Coupling blocking Forced rupture of jaws Overload!	Metal contact between the jaws. Risk of ignition due to sparking.	<ul style="list-style-type: none"> <li>- Shut down the plant.</li> <li>- Dismount the coupling.</li> <li>- Check the shafts and feather keys for damage.</li> <li>- Check drive train for damage</li> <li>- Assemble the complete coupling</li> <li>- Check alignment</li> <li>- Tighten the fastening screws with the tightening torque and use Loctite® to prevent them loosening.</li> </ul>
	The parameters for selecting the coupling do not suit the actual operating conditions. Coupling size is too small.		<ul style="list-style-type: none"> <li>- Shut down the plant.</li> <li>- Dismount the coupling.</li> <li>- Check the shafts and feather keys for damage.</li> <li>- Check the operating parameters. Select a harder spider insert or larger coupling.</li> <li>- Check the mounting space when selecting a larger coupling.</li> <li>- Assemble the complete coupling</li> <li>- Check the coupling's alignment and e size and correct if necessary</li> <li>- Tighten the fastening screws with the tightening torque and use Loctite® to prevent them loosening.</li> </ul>
	Increased wear in the spider insert. Jaws knock against each other during torque transmission		<ul style="list-style-type: none"> <li>- Shut down the plant.</li> <li>- Dismount the coupling.</li> <li>- Check the shafts and feather keys for damage.</li> <li>- Check the operating parameters. Select a harder spider insert or larger coupling.</li> <li>- Check the mounting space when selecting a larger coupling.</li> <li>- Assemble the complete coupling</li> <li>- Check the coupling's alignment and e size and correct if necessary</li> <li>- Tighten the fastening screws with the tightening torque and use Loctite® to prevent them loosening.</li> </ul>

## 11. Maintenance and Spare Parts



Before doing any maintenance, repairs or other work, the operator must ensure that the coupling train has stopped completely. The plant must be safeguarded against being switched on again unintentionally. The accident prevention and safety rules must be adhered to.

The flexible jaw coupling is by and large maintenance-free. Maintenance is limited to visual inspections of the spider insert for damage, checking that the screwed connections are tight and that the permissible misalignment is not exceeded. When necessary, replace the spider insert.

When installing and/or using spare parts that we did not supply, remember that we have neither checked nor approved these spare parts and using them might damage the coupling or impair safety. If damage arises out of the use of non-original spare parts or accessories, KWD Kupplungswerk Dresden GmbH will not be liable and no guarantee will apply.

## 12. Transport and Storage

The couplings must be protected during transport from jerks, knocks and shock hazard. To transport or lift the coupling during assembly, use rubber-sheathed loops or other suitable slinging means.

It is not permissible to lift the drive unit by lifting the flexible jaw coupling mounted on it.

The couplings must be stored in a closed room, where they will be protected against atmospheric influences and exposure to dirt, dust, moisture, chemical media, excessive heat and mechanical damage etc. The relative air humidity should not exceed 70%.

The surfaces of unpainted coupling halves are provided with a temporary corrosion prevention effective for 6 months. Other measures must be taken if they are to be stored for a longer period.