



## **ELASTIC COUPLINGS SERIES "E" RU-STEEL** **Annex ATEX 95**

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### **1) COUPLING'S CHOICE.**

#### **COUPLING'S CHOICE PARAMETERS IN HAZARDOUS AREAS.**

1.1 In hazardous areas **IT IS RECOMMENDED** once an Elastic Coupling series "E" is selected, to apply suitable service factors. General criteria are listed in the table below.

Anyway, **DO NOT CHOOSE** a service factor **LOWER THAN 2.**

Carefully check that the starting torque does not exceed the nominal torque twice its value, and less than five start-ups per hour; on the contrary, you are kindly requested to contact our Technical Department.

	<b>SAFETY FACTOR</b>	<b>Electrical motor drive or Gas/Steam Turbines</b>	<b>Steam Engines Water Turbines</b>
UNIFORM	<b>Constant Torque</b> Centrifugal Pumps, small convectors, alternators, centrifugal compressors.	<b>2,0</b>	<b>2,2</b>
LIGHT	<b>Non-floating torque</b> Machine tools, screw-pumps, liquid ring compressors.	<b>2,4</b>	<b>2,6</b>
MEDIUM	<b>Floating torque</b> Reciprocating pumps, low viscosity mixers, cranes.	<b>2,8</b>	<b>3,1</b>
HIGH	<b>High torque with extraordinary floating</b> Rotary presses, reciprocating compressors, high viscosity mixers.	<b>3,3</b>	<b>3,5</b>

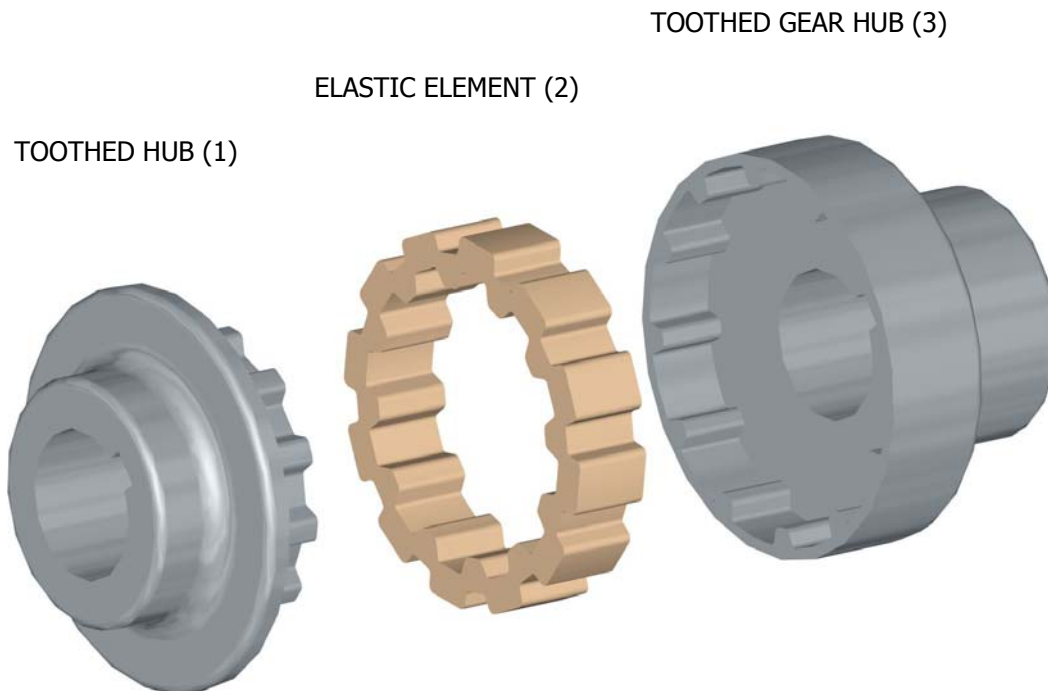


## 2) ASSEMBLY AND ALIGNMENT

### ASSEMBLY RULES AND STARTING ALIGNMENT OF THE COUPLING

Correct starting alignments will allow changing of conditions during operations and thus a long trouble-free life to the coupling.

- 2.1 The hubs,(1), (3), shall be connected so that the shafts' head is aligned with the elastic element.  
N.B. Whereas you are dealing with flanged execution couplings, you will proceed to the fixing by tightening the flange's bolts to the flywheel.
- 2.2 Insert the elastic element (2) on the toothed hub (1). In case of shrink fit connection, it is suggested to wait till the temperature falls down to 45°C.
- 2.3 Proceed now to place the machines by pairing the coupling.
- 2.4 In case of four pieces' couplings, either with spacer or flange, proceed to finish the assembly and tighten the bolts.
- 2.5 Proceed to check the coupling's alignment following the parameters shown in the table on page 3.





### 3) SIMULTANEOUS ALIGNMENT CHECK

#### TO BE CARRIED OUT AFTER THE FIRST START-UP

Some time is likely to go by between the assembly moment and the starting of operations and other factors may occur: structures' settlements and changing of conditions may have compromised the starting alignment. In order to insure a perfect functioning to the Elastic Coupling and to avoid danger in hazardous areas **IT IS RECOMMENDED** to check again all the misalignments, "ANGULAR", "AXIAL", "PARALLEL" before starting the engine; it is suggested to compare the values you found with the table below.

It is recommended to proceed to such a check even after the first start-up.

Coupling Size	Nominal Torque Tkn	Misalignments			Angular clearance
		Angular max	Parallel max	Axial max	
	Nm	°	± mm	mm	mm
60	25	1	0,20	-0/+0,75	+1
80	80	1	0,20	-0/+0,75	+1
100	140	1	0,20	-0/+0,75	+1
120	250	1	0,30	-0/+1	+1
150	400	1	0,30	-0/+1	+1,5
180	700	1	0,30	-0/+1	+1,5
220	1550	1	0,30	-0/+1,5	+1,5
260	2600	1.30	0,30	-0/+1,5	+1,5

**CAUTION:** the indicated values are max. if the others are 0. In case of angular, axial and simultaneous parallel misalignments, you must follow the table below in order to correctly operate.

Max. Simultaneous Misalignments allowed, check tables.

Example 1

Mis. Ang. ° = 25%

Mis. Par. ±mm = 50%

Mis. Axi. mm = 25%

Example 2:

Mis. Ang. ° = 37,5%

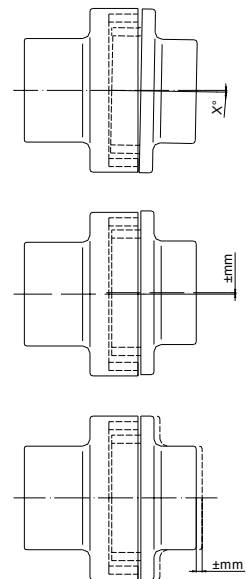
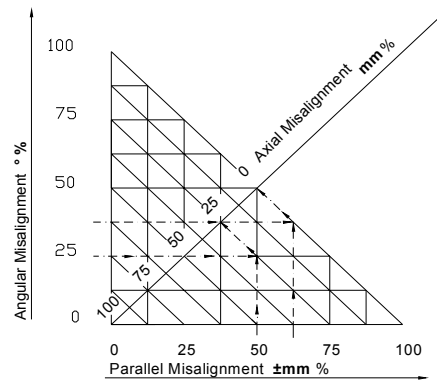
Mis. Par. ±mm = 67,5%

Mis. Axi. mm = 0%

**Mis. Tot. =**

Mis. ang. + Mis. Par. + Mis. Axi. ≤ 100%

**CAUTION** In hazardous areas it is especially recommended to keep a total simultaneous misalignment within 80%.





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#### 4) COUPLING'S PROTECTION

##### COUPLING'S PROTECTION IN HAZARDOUS AREAS

The coupling must be always protected by the user, with a cover (if possible made out of stainless steel) which guards the coupling against falling objects. There can be regular openings in the coverings which may not exceed the diameter of 4mm or, if square-shaped, 4mm each side.

- The distance between the coupling's surface must be min. 5mm
- The protection must be tightened with bolts; it can be removed when the machines are not working and are safe.
- In normal conditions, vibrations or noises should not occur.

#### 5) CHECK INTERVALS

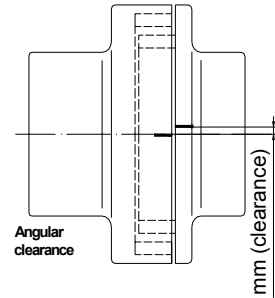
##### CHECKS TO BE CARRIED OUT IN HAZARDOUS AREAS.

A first check must be done after the first 2000 hours of operation or max. after 3 months since it has started working.

- Check the coupling very carefully and make sure that there are not any malfunctions or the like.
- Make sure that the coupling's angular clearance does not exceed 3 times the value indicated in the table on page 3.

-If you don't come up against any problems, it is possible to plan further checks within 4000 hours working or after a year.

On the contrary, if you come across some of the above mentioned problems, immediately proceed to remove the damaged flexible element.



#### 6) EXTRAORDINARY MALFUNCTIONS

##### MAIN CAUSES AND SOLUTIONS

**CAUTION:** If irregularities take place during operation the motor drive must be stopped. The main causes of these malfunctions can be found in the table below and, if possible, resolved. Anyway it is recommended to carefully examine the complete transmission.

Malfunction	Causes	Danger in hazardous areas	Solution
Increase of noisiness during operation or beginning of vibrations	Misalignment	-----	<ol style="list-style-type: none"> <li>1) Put the unit out of operation</li> <li>2) Check coupling parts and exchange damaged coupling parts</li> <li>3) Eliminate the cause of misalignment (ex. Machines' motions, structural failure etc.) and check the left simultaneous misalignments as shown at point 3.</li> <li>4) Plan coupling's checks following the directives at point 5.</li> </ol>
	Wear of elastometer element, no torque transmission since coupling cams slip through	danger of ignition due to hot surfaces	<ol style="list-style-type: none"> <li>1) Put the unit out of operation</li> <li>2) Disassemble the coupling and remove the damaged elastic parts. Check and, if necessary, change other damaged parts</li> <li>3) Insert a new elastic element and re-assemble the coupling</li> <li>4) Check the alignment and correct it ,if necessary, as shown at point 3</li> <li>5) Plan coupling's checks following the directives at point 5. To avoid this problem it is necessary to provide the unit with an automatic switch off system, especially in case of power loosening in the driven unit.</li> </ol>
	Loosening of the fixing dowel, chance of axial movements of the hubs.	-----	<ol style="list-style-type: none"> <li>1) Put the unit out of operation</li> <li>2) Check coupling parts and exchange damaged coupling parts</li> <li>3) Check the alignment and correct it ,if necessary, as shown at point 3.</li> <li>4) Tighten the fixing dowel of the hub.</li> <li>5) To avoid a further loosening it is recommended to use a thread-breaking product.</li> <li>6) Plan coupling's checks following the directives at point 5.</li> </ol>



Malfunction	Causes	Danger in hazardous areas	Solution
Failure of the elastic element	High overload No torque transmission since coupling cams slip through..	Danger of ignition due to hot surfaces	<ol style="list-style-type: none"> <li>1) Put the unit out of operation</li> <li>2) Disassemble the coupling and remove the damaged elastic parts. Check and, if necessary, change other damaged parts</li> <li>3) Insert a new elastic element and re-assemble the coupling</li> <li>4) Check the alignment and correct it ,if necessary, as shown at point 3</li> <li>5) Plan coupling's checks following the directives at point 5. To avoid this problem it is necessary to provide the unit with an automatic switch off system, especially in case of power loosening in the driven unit.</li> </ol>
	Operating parameters do not correspond to the coupling performance. No torque transmission since coupling cams slip through	Danger of ignition due to hot surfaces	<ol style="list-style-type: none"> <li>1) Put the unit out of operation</li> <li>2) Disassemble the coupling and remove the damaged elastic parts.</li> <li>3) Check operating parameters and select a larger coupling (consider installation space).</li> <li>4) Assemble new coupling size .</li> <li>5) Check the alignment as shown in point 3. Plan coupling's checks following the directives at point 5. To avoid this problem it is necessary to provide the unit with an automatic switch off system, especially in case of power loosening in the driven unit.</li> </ol>
	Mistake in service of the unit. Stop of a rotor. No torque transmission since coupling cams slip through	Danger of ignition due to hot surfaces	<ol style="list-style-type: none"> <li>1) Put the unit out of operation</li> <li>2) Disassemble the coupling and remove the damaged elastic parts.</li> <li>3) Check and, if necessary, change other damaged parts.</li> <li>4) Insert a new elastic element and re-assemble the coupling.</li> <li>5) Check the alignment and correct it ,if necessary, as shown at point 3.</li> <li>6) Plan coupling's checks following the directives at point 5. To avoid this problem it is necessary to provide the unit with an automatic switch off system, especially in case of power loosening in the driven unit.</li> </ol>



Malfunction	Causes	Danger in hazardous areas	Solution
Premature wear of elastomer element	Misalignment	-----	<ol style="list-style-type: none"> <li>1) Put the unit out of operation. Disassemble the coupling and remove the damaged elastic parts.</li> <li>2) Check and, if necessary, change other damaged parts</li> <li>3) Insert a new elastic element and re-assemble the coupling</li> <li>4) Eliminate the cause of misalignment (ex. Machines' motions, structural failure etc.) and check the left simultaneous misalignments as shown at point 3.</li> <li>5) Plan coupling's checks following the directives at point 5.</li> </ol>
	e.g. contact of elastic element with aggressive liquids/oils, effecting change of characteristics	-----	<ol style="list-style-type: none"> <li>1) Put the unit out of operation. Disassemble the coupling and remove the damaged elastic parts.</li> <li>2) Check and, if necessary, change other damaged parts</li> <li>3) Insert a new elastic element and re-assemble the coupling</li> <li>4) Check the left simultaneous misalignments as shown a point 3.</li> <li>5) Make sure that further contacts with aggressive elements are excluded.</li> <li>6) Plan coupling's checks following the directives at point 5.</li> </ol>
	Ambient/contact temperatures which are too high for the elastic element, max. permissible -20 °C / +80 °C	Danger of ignition due to hot surfaces	<ol style="list-style-type: none"> <li>1) Put the unit out of operation. Disassemble the coupling and remove the damaged elastic parts.</li> <li>2) Check and, if necessary, change other damaged parts</li> <li>3) Insert a new elastic element and re-assemble the coupling</li> <li>4) Check the left simultaneous misalignments as shown a point 3.</li> <li>5) Check and regulate ambient / contact temperature</li> <li>6) Plan coupling's checks following the directives at point 5.</li> </ol>

## 7) Temperatures OF EXERCISE, ENVIRONMENTAL

RU-STEEL Elastic Transmission Couplings Series "E" are designed to work between -20°C and +80°C. Coupling's surfaces overheating, during operations, is widely influenced by incidental reasons: environmental temperature, high temperatures due to heat conduction, etc. The user shall consider these problems and, if necessary, during the project, provide a cooling system (see coupling's protection with openings, point 4).



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## 8) HAZARDOUS AREAS

CATERGORIES, GROUPS, AND CODES.

HAZARDOUS AREAS previous classifications		Guard level	Group I mine	Group II industry	Explosion Group	Classes of temperature	
Gas	Dust		CATEGORY			T6 ≤ 85°C	T5 ≤ 100°C
Zone 0	Zone 20	Very high. High. Normal.	M1	1	<b>II</b>		
Zone 1	Zone 21		M2	2	<b>IIA</b>	T4 ≤ 135°C	T3 ≤ 200°C
Zone 2	Zone 22			3	<b>IIB</b>	T2 ≤ 300°C	T1 ≤ 450°C
			<b>G</b> for gas	<b>D</b> for dust	<b>G/D</b> both		
					<b>IIC</b>		

Example of a coupling's marking: II 2G/D c IIB T4 -20°C Ta +80

- **"II"** Group
- **"2G/D"** Category as the previous classification zone 1 and zone 21
- **"c"** Type of protection
- **"IIB"** Suitable against explosive gas of group IIB
- **"T4"** Temperature class
- **"Ta from - 20°C to + 80°C"** Environmental temperature

### CAUTION:

RU-STEEL is not taking any responsibilities about the improper use of its product and spare parts or non-original accessories

Issued by	Signature
AQ. Bedin	<i>Bedin Giacomo</i>
Ed. 1 Rev.1	20-05-2004