1.1 Connecting coupling **MKC-2** (coupling) is designed to transmit torque with compensation of radial, axial and angular misalignments of shafts to be connected, from a drive to pumps, compressors and other rotating equipment. The coupling is used in units with short (1…40 mm) spacing between the ends of the shafts to be connected.

1.2. The coupling is designed for indoor use in macroclimatic regions with temperate and cold climates.

MEMO: In case when coupling is to be used in another climatic zone, it should be taken into account when ordering.

1.3. Spark safety elements are provided in design, making it possible to use the coupling in Ex-zones.

1.4. The **MKO-2-XXX** coupling structure of symbols includes:

«MKO» – is a special designed compensating coupling (flexible coupling)

«2» – double row (two rows of plate packs)

«XXX» – is a power index = N x 1000 n, where **«N»** is transmission power, Kw and **«n»** is coupling rate speed, rev/min.

2.1 Purpose factors and constructive factors are given in the Table 1.

Factor name	Coupling size-series									
	МКС2-67	**МКС2-84**	**МКС2-105**	**МКС2-270**	**МКС2-420**	**МКС2-670**	**МКС2-1050**	**МКС2-1340**	**МКС2-1670**	**МКС2-2700**
Transmitted torque, N×m - nominal - maximum short-term	 630 1 575	 800 2 000	 1 000 2 500	 2 500 6 250	 4 000 10 000	 6 300 15 750	 10 000 25 000	 12 500 31 250	 16 000 40 000	 25 000 50 000
Allowable speed (without balancing requirements), r/s (rpm)	116,67 (7 000)	108,33 (6 500)	108,33 (6 500)	100 (6 000)	90 (5 400)	71,67 (4 300)	70 (4 200)	60 (3 600)	60 (3 600)	50 (3 000)
Allowable radial displacement of shaft axes*, mm - when putting into operating	0,1								0,15	
- in continuous operation **	2,0	2,0	2,2	1,7	2,0	1,7	1,8	1,8	1,8	1,8
Allowable inter-misalignment of half-coupling ends, for maximum diameter*, mm - when putting into operation	0,1								0,15	
- in continuous operation**	1,9	1,9	2,6	2,4	3,2	3,2	3,8	3,5	3,8	3,8
Allowable axial displacement of shafts, mm	± 2,5	± 2,5	± 3,6	± 3,6	± 3,6	± 3,6	± 3,6	± 3,6	± 3,6	± 3,6
Coupling overall dimension, mm: - diameter, nor more than - length *	 155 160	 170 160	 190 220	 220 250	 255 316	 285 340	 315 340	 340 340	 350 400	 365 428
Mass, kg*	14	18	21	29	61	80	100	100	110	110

* The parameters are given for reference

** In case of mutual axial shaft misalignment not exceeding 75% of the maximum allowable tolerance

Detailed information about relation of allowable axial and angular misalignments of shafts is given in the diagram (appendix B, figure B.1).

Actual parameters of every coupling (allowable radial deflection of shaft axes and allowable inter-misalignment of half-coupling ends) are given in particular coupling certificate.

2.2. Reliability rates

The reliability of the coupling under the conditions and modes of operation, specified in Table 1, has the following rates:

• Average MTBF (Mean Time Between Failures) is at least 50 000 hours

• Average total lifetime is at least 9 years

MEMO: *Occurrence and development of fatigue cracks in plates (flexible elements) is a criterion for failure.*

DESIGN AND OPERATING PRINCIPLE

3.1. Design description

3.1. The coupling is a torsional rigid all-metal device purported to compensate misalignments and axial displacements of shafts to be connected by means of elastic deformations of the plates (flexible elements).

3.1.2. The coupling **(Figure 1)** comprises motor hub **1**, mechanism hubs assembly **2**, bolts **5**, and spring washers **6.**

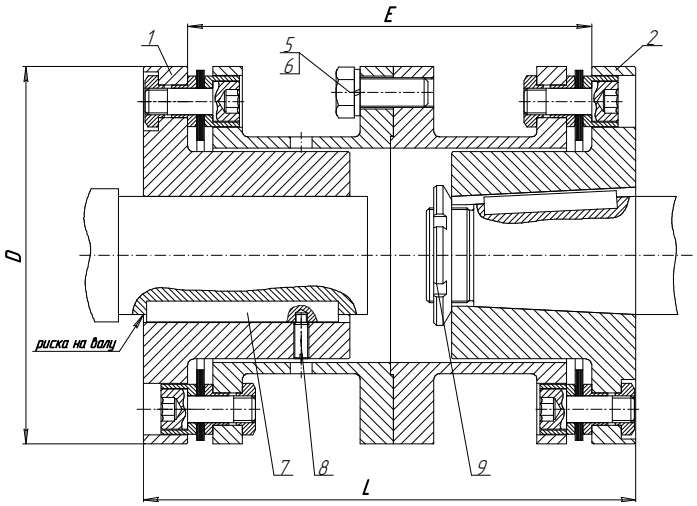

Figure 1

3.1.3. Motor hub **1** is fixed on the cylindrical shaft end of the motor by prismatic key **7** and screw **8 (Fig. 1).** Motor hub assembly **1 (Fig. 2)** comprises motor hub **10**, spacer **11**, plate

(flexible element) assembly **13** and nuts **12**. Plate (flexible element) assembly **13** is attached to hub **10** and spacer **11** by nuts **12** alternately connected with hub **10** and spacer **11 (Fig. 2).**

3.1.4 Mechanism hub **2** is fixed on the cylindrical mechanism shaft end by prismatic key and (if provided) nut **9 (Fig. 1).** Mechanism hub assembly **2 (Fig. 3)** comprises mechanism hub **14**, spacer **15**, plate (flexible element) assemble **13** and nuts **16.** Plate (flexible element) assemble **13** is attached to mechanism hub **14** and spacer **15** by nuts **16** alternately connected with hub **14** and spacer **15 (Fig. 3).**

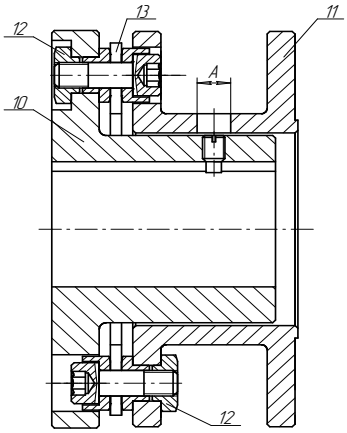

Figure 2

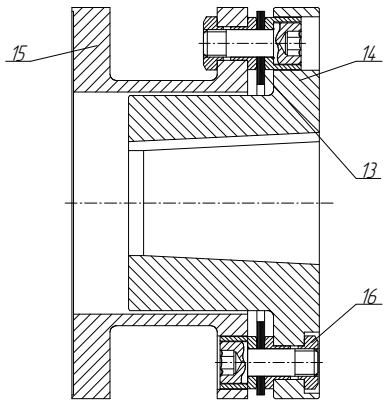

Figure 3

3.1.5. After hubs were fitted on the motor/mechanism shafts and the aggregate alignment was carried out, spacer **11** of motor hub **1** and spacer **15** of mechanism hub **2** should be fastened by bolts **5** and washers **6**.

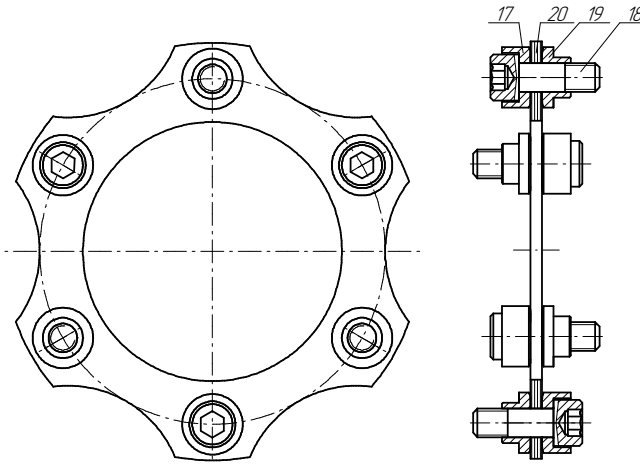

Figure 4

3.1.6. Each plate pack unit **(Fig. 4)** comprises plate pack **20**, screws **18**, bushings **19** and transfer rings **17**. The plate pack is interchangeable and can be supplied as a spare part for coupling repair.

3.2. Operation principle

3.2.1. Torque transmission between hubs is carried out by frictional forces (between end surfaces of spacers **11/15**) provided by stretching of bolts **5**.

3.2.2. The torque transmission by flexible element is carried out by means of the tension and compression efforts of its section between screws **18** alternately connected to hub **1** and spacer **11** (for the motor hub) or hub **2** and spacer **15** (for the mechanism hub) **(Fig. 1).**

3.2.3. In the event of an emergency damage to the plate pack (flexible element pack), torque can be transmitted for a short time by screws **18 (Fig. 4**) with reset rings **17**. The reset rings are the spark-protecting elements.

3.2.4. Alignment of spacers **11** and **15** relative to each other is ensured by a fit in the centering band.

3.2.5. Compensation of deviation in the relative position of the shafts is carried out by means of complex deformation of each link of plates (flexible elements) in both packs.

4.1. Standard supply assembly of MKC-2 type coupling consists of:

- Coupling
- Packing pan (box)
- Given maintenance guidance – 1 copy to 1 address
- Registration certificate- 1 copy for each coupling

4.2. The following can be supplied on request:

- Ready-assembled plate pack unit
- Device for spacer unit mounting
- Shaft alignment device
- Hub puller

IMORTANT

Any work performance with the coupling should be guided by an assembly drawing and given maintenance guidance.

MEMO: *When exchange of plate pack 20 is needed, it is necessary to contact with a coupling manufacturer.*

5.1. Preparation for the installation

5.1.1. Unbox, degrease and examine the coupling.

5.1.2. Unscrew bolts 5 and washers 6 from the spacer 15 (Fig. 1) and detach hubs 1 and 2.

5.1.3. In the case when coupling with machining allowance is delivered, bore the hubs and machine the key-ways in the following order:

- Detach spacer **11** and plate (flexible element) **13 (Fig. 5)** from motor hub **10**. To do this, unscrew nuts **12** fixing hub **10** with plate (flexible element) **13**. Do not unscrew nuts **12** fixing spacer **11** with plate (flexible element) **13**.

- Bore the hub hole. The key-way in the motor hub **10** must be carried out so it is located opposite the one of the holes **A** of spacer **11 (Fig. 2)**. The relative position of parts at initial assembly is fixed by marks. In the motor hub make a threated hole for screw **8** intended to fix possible axial displacements of the motor-hub. The hole must be located opposite hole **8** of spacer **11**.

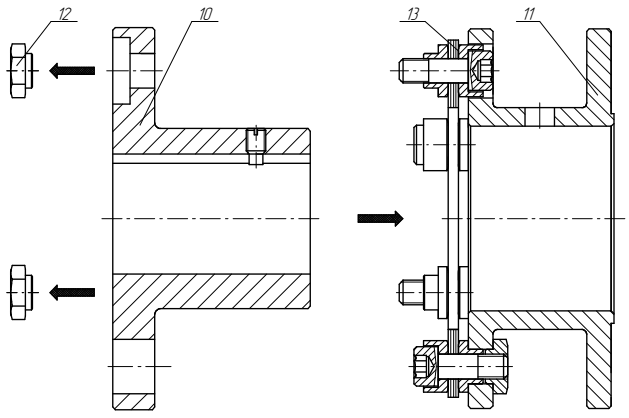

Figure 5

- Detach spacer 15 and plate (flexible element) 13 (Fig. 6) from motor hub 14. To do this, unscrew nuts 16 fixing hub 14 with plate (flexible element) 13. Do not unscrew nuts 16 fixing spacer 15 with plate (flexible element) 13.

- Bore the hub hole. Machine the keyway of the mechanism hub. If there is no nut fixing the hub in axial direction, make a threaded hole in the mechanism hub for the screw 8 (Fig. 1) intended to fix possible axial displacements of the mechanism hub.

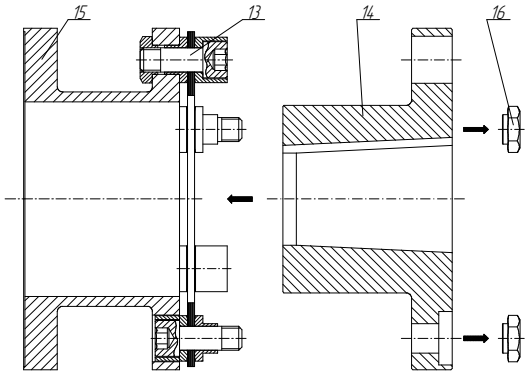

Figure 6

5.1.4. When finalizing, the hub basing must be carried out on surfaces А and Б. Accuracy of basing is 0.03 mm.

MEMO: *The durability and reliability of coupling as well as dynamic loads on the machine shafts supports depend on accuracy of hubs bore.*

5.2. Installation of coupling

5.2.1. Preassemble the motor and mechanism on the machine frame. Set them into operative position.

5.2.2. Check up the side play of the driving machine and motor rotors. Set them into operative position.

5.2.3. For the motor with slider bearings only. Carry out idle start and for steady rotation check the working axial position by issued device of the motor. The circular groove (mark) at the shaft should index with the device indicator. Stop motor and, moving the rotor in axial direction, renew its position to when rotation occurs aligning a circular groove at the shaft with the device indicator.

MEMO: *Exceeding of the rotor axial play of the motor in sliding bearings above allowable axial misalignment of the coupling is not an obstacle for its using, since the relative axial misalignments of shafts to be connected are limited by coupling flexible forces to the allowable values.*

5.2.4. For the pumps with a hydraulic balancing device only. Slide the pump rotor to the suction side up to the end.

5.2.5. Fit hub **2** onto the mechanism shaft and hub **1** on the motor shaft according to procedure as follows:

- Insert bushing key **7** into the motor shaft slot and fit the hub onto the shaft up to the mark. If necessary, heat it up to 80° C-90° C.
- Insert the bushing-key into the mechanism shaft-slot and fit the hub onto the shaft. If necessary, heat it up to 80° C-90° C. Fix hub **2** on the mechanism shaft by nut **9**.

5.2.6. Assemble hubs with plates (flexible elements), matching the relative position of the hub and spacer by marks. Nuts torque is quoted in **Table 2.**

Table 2 (Nx m)

Coupling standart-size series									
MKC2-67	MKC2-84	MKC2-105	MKC2-210	MKC2-420	MKC2-670	MKC2-1050	MKC2-1340	MKC2-1670	MKC2-2700
65^{+5} ($6{,}5^{+0{,}5}$)	65^{+5} ($6{,}5^{+0{,}5}$)	65^{+5} ($6{,}5^{+0{,}5}$)	200^{+20} ($20{,}0^{+2{,}0}$)	280^{+30} ($28{,}0^{+3{,}0}$)	550^{+50} ($55{,}0^{+5{,}0}$)	550^{+50} ($55{,}0^{+5{,}0}$)	550^{+50} ($55{,}0^{+5{,}0}$)	550^{+50} ($55{,}0^{+5{,}0}$)	550^{+50} ($55{,}0^{+5{,}0}$)

Nuts' tightening is a two-step process:

- Step one – tightening with nut torque equals 75% of the above
- Step two – tightening with total torque

5.2.7. To avoid the package splitting, the state of plates (flexible elements) must be controlled. In case when splitting occurs it is necessary to weaken nuts tightening until the shape of the plate (element) and continuity of the package are fully restored. After that the tightening process should be started over.

5.2.8. Fit the motor and mechanism onto the unit frame. Check if hubs installed properly by measuring installation distance **E**. If needed, correct installation by moving half-coupling **1** on the motor shaft.

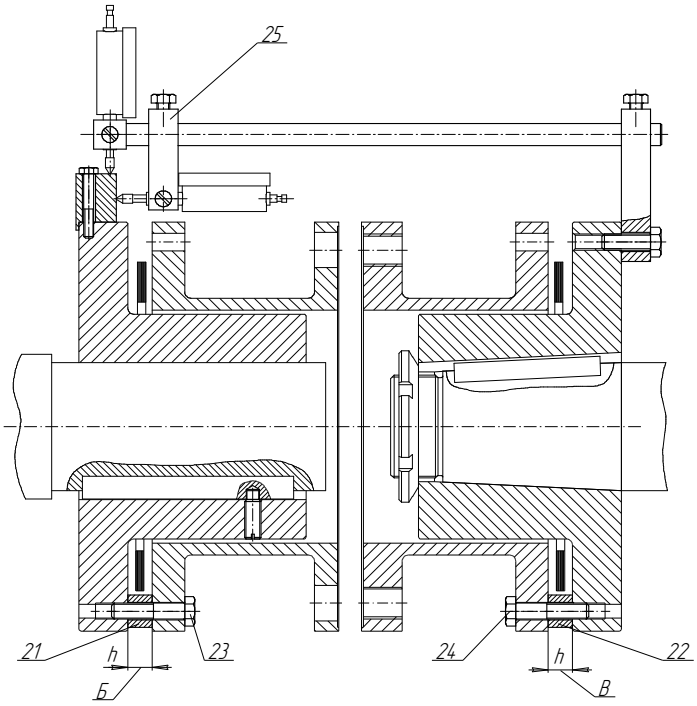

Figure 7

5.2.8. Mount the thrust bushes into the spacing gap **Б** between motor hub **10** and spacer **11** and tight the spacer and the motor hub by screw-bolts **23**. Mount thrust-bushes **22** into the spacing gap **B** between mechanism hub **14** and separator **15** and tight the separator and mechanism hub by screw-bolts **24**.

5.2.9. Fix coupling alignment device **25** on hubs **1, 2**. Make the alignment in accordance with the requirements sated at unit documentation. The shafts axes allowable offsets at final alignment are quoted in **Table 3**.

Table 3

Displacement direction	Value, mm
Radial	0,1
Front (relative beating of half-coupling ends, measured for maximum diameter)	0,1

MEMO: *In units with a radial traverse over 0.1mm it is necessary to make alignment with an accuracy required at normal speed due to preset pre-misalignment entry.*

5.2.10. After alignment complete, unscrew bolts **23**, **24** tightening the motor hub with spacer and mechanism hub with spacer. Remove bushings **21**, **22**. Fix hub **1** on the motor shaft by screw **8**.

5.2.11. Align the spacers with the marks and notch by turning the coupled parts of the coupling. **(Figure 1)**. Fix them by bolts **5** and washers **6**. The bolts torque data is quoted in **Table 4**.

Table 4

	Coupling standard-size series					
	MKC 2–67	**MKC2–105**	**MKC2–270**	**MKC 2-420**	**MKC2–670**	**MKC2–1050**
Torque value, N×M (kgs×m)	75^{+5} ($7{,}5^{+0{,}5}$)	75^{+5} ($7{,}5^{+0{,}5}$)	250^{+20} ($25{,}0^{+2{,}0}$)	350^{+30} ($35{,}0^{+3{,}0}$)	650^{+50} ($65{,}0^{+5{,}0}$)	650^{+50} ($65{,}0^{+5{,}0}$)
Axial dimension of thrust bushings (Figure 7, position 21 and 22, mm)	11,0	11,0	12,0	15,0	16,0	18,0

Requirements:

1. Coupling mounting should be carried out with the switched off driving motor and closed suction and charging gate valves.
2. When aligning the shafts, mounting distance E must be ensured with an accuracy of ±0.5 mm.

MEMO: *In some MKC-2 type couplings, bushings are not used for centering.*

5.3. Removal of coupling

5.3.1. Unscrew the bolts connecting spacers 11, 15. Separate the spacers' flanged joints.

5.3.2. Remove the motor or the mechanism from the unit frame.

5.3.3. Dismount half-couplings 1 and 2 in the following order:

- Unscrew screw **8** from motor hub **10.** Fix remover **26** on hub **10.** Remove the hub from the motor shaft end.
- Unscrew and remove screw-nut **9** fixing mechanism hub**14** axially. Fix remover **26** on hub**14**. Remove the hub from the shaft-end.

Requirements:

- Coupling removal should be carried out with the switched off driving motor and closed suction and charging gate valves.
- During removal, it is necessary to avoid big deformations of plate pack units and details hitting.
- Do not remove the coupling by hammer stroke or in a similar way.

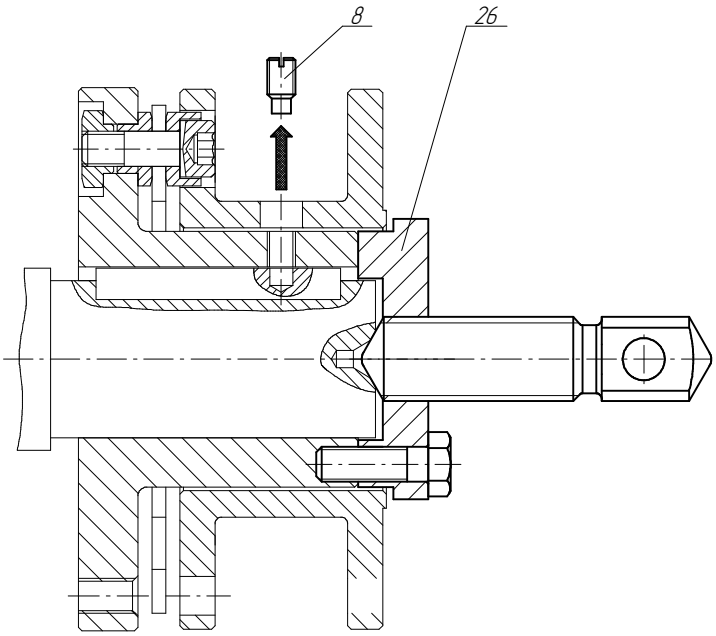

Figure 8

6.1. All users involved into the mounting, operation, maintains and coupling repair must read this instruction carefully and respect it strictly. Noncompliance with the instruction may cause product and material damage as well as injury to the operating personnel.

6.2. All safety/environmental regulations must be met while transporting, mounting, removing, operating and maintaining.

6.3. All lifting gears and load gripping units, if used, must be suitable for the coupling weight.

6.4. No changes must be made to the coupling, besides the processing specified in this instruction.

6.5. If there any visible damage, the coupling must not be mounted and put into operation.

6.6. The coupling cannot be put into process before it's mounted in the suitable housing according to existing standards.

6.7. All coupling technical inspections, its maintenance and repairs must be performed with the machine stopped and the engine turned off.

7.1. During aggregate stops, in the process of current and other repairs, it is necessary to:

- Examine and restore the alignment of aggregate shafts to the values quoted in **Table 3**, as increased radial and angular displacements cause the most dangerous cyclic stresses of flexible elements and are the main reason of reduced reliability and coupling life;
- Check the tightness of nuts;
- Examine the peripheral plates (flexible elements) state in packs **20**.

7.2. The appearance of micro cracks and plastic deformation of plates (flexible elements) in packs **20 (Fig. 4)** is a result of long-term operation of the aggregate with shaft misalignment.

7.3. To restore the coupling workability, it is necessary to restore the shaft alignment of the aggregate to standards quoted in **Table 3** and change plate pack units which have the signs of plastic deformation or damage.

IMPORTANT: *Replacement of the plate packs should be carried out in accordance with the technology of the coupling manufacturer.*

Only spare parts made by the manufacturer must be used. The use of non-original parts can lead to unpredictable accidents.

8.1. Transportation of couplings can be provided by all modes of the covered transport with the observance of shipping rules, which are valid on the appropriate modes of transport.

8.2. Couplings and components should be stored in a dry building away from direct heat.

8.3. For maximum protection, the coupling and components should be stored in the original packaging. If any packaging has been removed or damaged in transit, it should be restored to a secure, safely-packaged condition.

8.4. The coupling should be stored horizontally and should not be stood on end for long periods. Avoid shock during handling and protect against corrosion.

8.5. Always examine parts thoroughly when taking them from storage for signs of damage or deterioration.

9.1. The manufacturer guarantees conformity of the equipment with technical documentation subject to safety rules by the user.

9.2. The warranty period of the coupling is 12 months since the day the coupling is put into operation.

10.1 In some cases at small shaft lengths of the mechanism or the motor it is possible to supply couplings that differ in design from those shown in **Figure 1**. In this case separator **15** is used instead of the mechanism hub spacer. Design of such a coupling is shown in **Figure 9**. In all other respects (such an installation or maintains) follow the requirements of this manual.

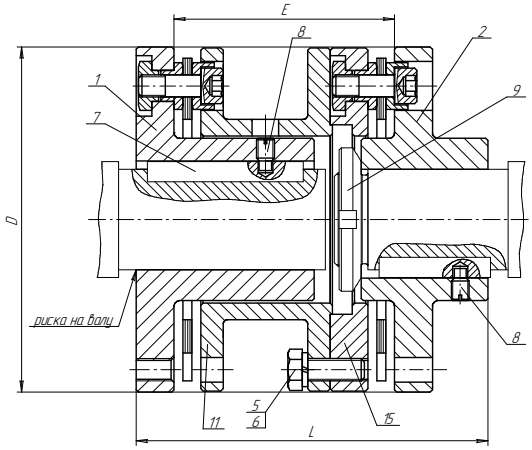

Figure 9

10.2 MKC-2-2700 type coupling design option is shown in **Figure 10**. In this case separator **11** is used instead of the motor half-coupling spacer.

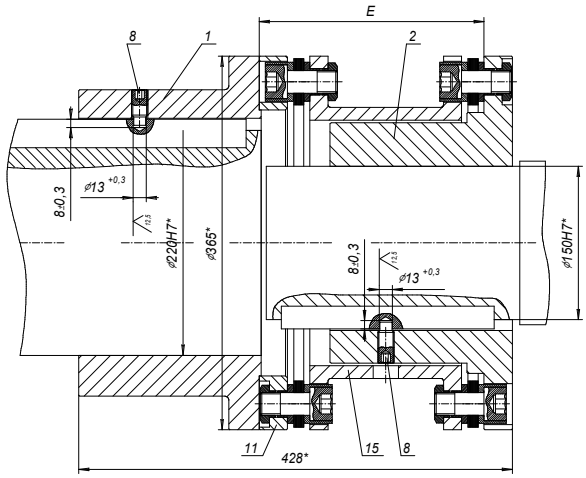

Figure 10

Diagram of half-coupling basing for machining of the setting bore and the key grove

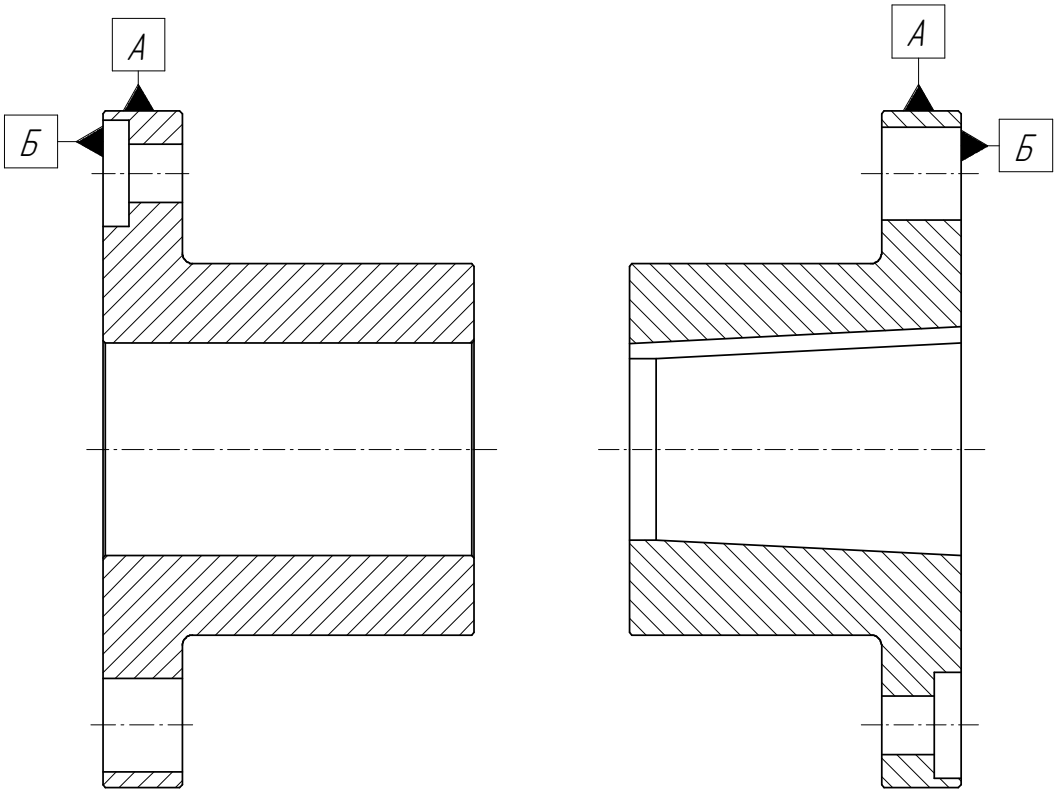

Figure A.1

Diagram of shaft tolerance displacements for MKC-2 type couplings

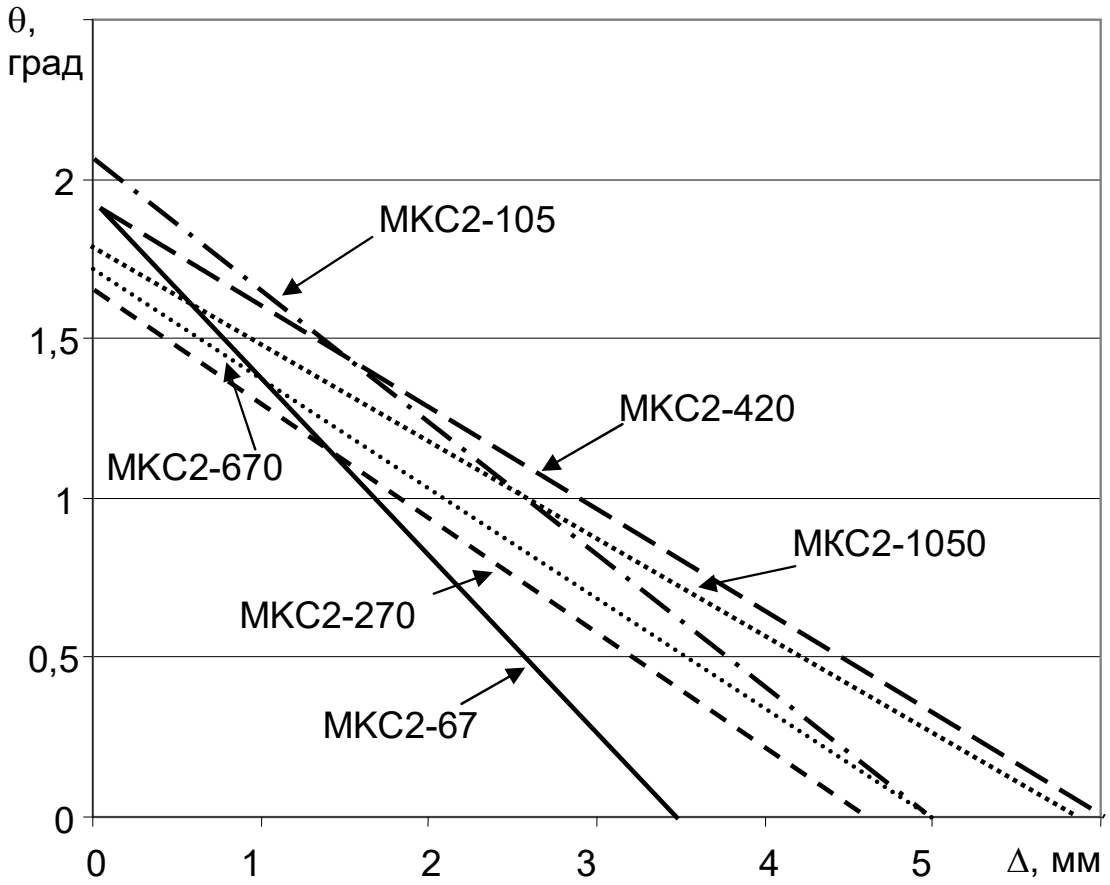

Figure B.1

$\Delta\theta_\Sigma$ – actual spacer angular deflection, degree;
ΔX – axial deflection of shafts, mm.

$$\Delta\theta_\Sigma = \arctan\left(\frac{\Delta Y}{L}\right) + \Delta\theta$$

,

where *L* – interval between springing element packages, mm;
ΔY - radial deflection of shaft axes, mm;
$\Delta\theta$ - angular deflection of shaft axes, degree.

$$\Delta\theta = \arctan\left(\frac{\Delta Z}{D}\right)$$

where ΔZ - half-coupling end beating, measured for diameter D (mm), mm.

Coupling working point (ΔX; $\Delta\theta_\Sigma$) should lie in the field, limited by coordinate axes and appropriate curve.