

# SHAFT END PACKINGS FOR BLENDERS IN CHEMICAL APPARATUS

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Together with the Ukrainian Scientific Research Institute for Chemical Machine Building, the Dzerzhinskkhimmash (Dzerzhinsk Chemical Machines) factory works at devising various types of end packings. At present, five types of shaft end packings for shafts of 20 through 160 mm diameter are included in the manufacturing program.

The universal end packing type UT (Fig. 1) is intended for application in acid and weakly alkaline fluids and gases at pressures of up to 16 kg/cm<sup>2</sup>, in vacua of down to 20 mm Hg and at temperatures ranging from -20 to +250°C.

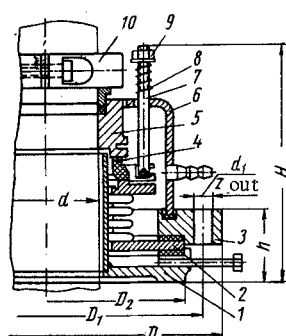


Fig. 1. UT universal end packing.

The packing is made of Kh18N10T steel and consists of a catch 1, a bellows unit 2, which is fastened to the lid of the apparatus by means of a flange 3, a graphite 4 and a metal 5 washer, which together form the friction couple. The washer 5 is fastened to the shaft with a squeeze 10.

The pressure in the friction couple is produced by springs 8 and a transmission rod 7. The pressure is set by means of nuts 9. The friction couple is lubricated and cooled with running water that circulates in the hollow casing 6. The catch keeps the cooling water from flowing into the product to be processed.

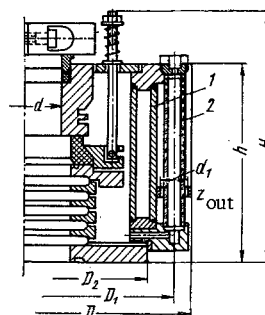


Fig. 2. NT end packing with neutral lubrication.

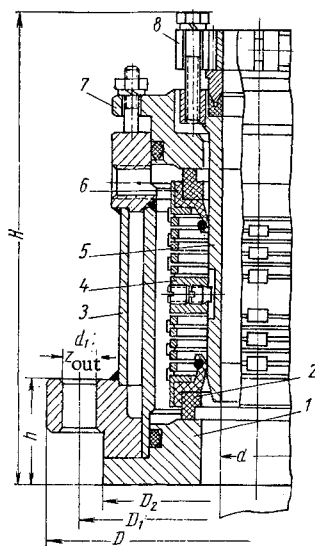


Fig. 3. VT vacuum end packing.

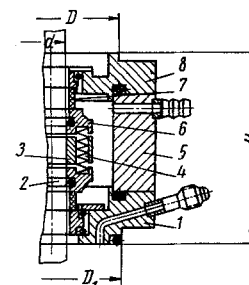


Fig. 4. TD end double packing.

Translated from *Khimicheskoe i Neftyanoe Mashinostroenie*, No. 2, pp. 38-40, February, 1969.

TABLE 1. Model of Packing

| Model of packing | Pwork, kgf/cm <sup>2</sup> | Dimensions, mm |     |                |                |     |     |                | z  | Weight, kg |
|------------------|----------------------------|----------------|-----|----------------|----------------|-----|-----|----------------|----|------------|
|                  |                            | d              | D   | D <sub>1</sub> | D <sub>2</sub> | H   | h   | d <sub>1</sub> |    |            |
| UT 306           | 6                          | 30             | 160 | 140            | 120            | 150 | 47  | 14             | 4  | 7          |
| UT 3016          | 16                         |                |     |                |                | 180 |     |                |    | 8          |
| UT 403           | 3                          | 40             | 185 | 150            | 128            | 150 | 46  |                | 4  | 9          |
| UT 4016          | 16                         |                |     |                |                | 220 |     |                |    | 10         |
| UT 503           | 3                          | 50             | 205 | 170            | 148            | 180 |     |                | 4  | 10,4       |
| UT 5016          | 16                         |                |     |                |                | 240 |     |                |    | 14         |
| UT 656           | 6                          | 65             | 235 | 200            | 178            | 180 | 48  |                | 18 | 14,9       |
| UT 6516          | 16                         |                |     |                |                | 250 |     |                |    | 16         |
| UT 803           | 3                          | 80             | 260 | 225            | 202            | 200 | 55  |                | 8  | 19         |
| UT 956           | 6                          | 95             | 290 | 255            | 232            | 215 | 60  |                |    | 24,6       |
| UT 1103          | 3                          | 110            | 315 | 280            | 258            | 220 | 58  |                | 8  | 30,2       |
| UT 1303          | 3                          | 130            | 340 | 305            | 282            | 220 | 60  |                |    | 43,3       |
| NT 306           | 6                          | 30             | 160 | 140            | 120            | 150 | 120 | 14             | 4  | 7,5        |
| NT 3016          | 16                         |                |     |                |                |     |     |                |    | 8          |
| NT 406           | 6                          | 40             | 185 | 150            | 128            | 160 | 130 |                | 4  | 9          |
| NT 4016          | 16                         |                |     |                |                |     |     |                |    | 10         |
| NT 503           | 3                          | 50             | 205 | 170            | 148            | 210 | 170 |                | 4  | 13,5       |
| NT 5016          | 16                         |                |     |                |                |     |     |                |    | 15         |
| NT 653           | 3                          | 65             | 235 | 200            | 178            | 210 | 165 |                | 18 | 18         |
| NT 6516          | 16                         |                |     |                |                |     |     |                |    | 20,5       |
| NT 806           | 6                          | 80             | 260 | 225            | 202            | 235 | 185 |                | 8  | 25         |
| NT 8016          | 16                         |                |     |                |                |     |     |                |    | 29         |
| NT 956           | 6                          | 95             | 290 | 255            | 232            | 230 | 180 |                | 8  | 35         |

TABLE 1 (continued)

| Model of packing | Pwork, kgf/cm <sup>2</sup> | Dimensions, mm |     |                |                |     |     |                | z  | Weight, kg |
|------------------|----------------------------|----------------|-----|----------------|----------------|-----|-----|----------------|----|------------|
|                  |                            | d              | D   | D <sub>1</sub> | D <sub>2</sub> | H   | h   | d <sub>1</sub> |    |            |
| NT 1105          | 5                          | 110            | 315 | 280            | 258            | 260 | 205 |                | 4  | 45         |
| NT 1304          | 4                          | 130            | 340 | 305            | 282            | 285 | 230 | 18             |    | 52         |
| VT 30            |                            | 30             | 160 | 140            | 120            | 200 | 32  | 14             | 4  | 14         |
| VT 40            |                            | 40             | 185 | 150            | 128            | 205 |     |                |    | 17         |
| VT 50            |                            | 50             | 205 | 170            | 148            | 215 | 36  |                | 8  | 19         |
| VT 65            |                            | 65             | 235 | 200            | 178            | 230 |     |                |    | 21         |
| VT 80            |                            | 80             | 260 | 225            | 202            | 245 | 36  |                | 8  | 26         |
| VT 95            |                            | 95             | 290 | 255            | 232            | 260 |     |                |    | 36         |
| VT 110           |                            | 110            | 315 | 280            | 258            | 270 | 42  |                | 8  | 43,2       |
| VT 130           |                            | 130            | 340 | 305            | 282            | 300 |     |                |    | 50,5       |
| TD 206           |                            | 20             | 72  | 90             | 110            | 111 |     |                | 14 | 11         |
| TD 256           |                            | 25             |     |                |                |     |     |                |    |            |
| TD 306           |                            | 30             | 100 | 105            | 145            | 123 |     |                | 6  | 17         |
| TD 406           |                            | 40             |     |                |                |     |     |                |    |            |
| TT 303           |                            | 30             | 185 | 150            | 128            | 170 | 55  |                | 4  | 12         |
| TT 403           |                            | 40             | 225 | 170            | 145            | 180 |     |                |    | 18         |
| TT 503           |                            | 50             | 235 | 200            | 178            | 185 | 60  |                | 17 | 25         |
| TT 653           |                            | 65             | 260 | 225            | 202            | 210 |     |                |    | 35         |
| TT 803           |                            | 80             | 290 | 255            | 230            | 230 | 70  |                | 8  | 45         |
| TT 953           |                            | 95             |     |                |                |     |     |                |    | 55         |
| TT 1103          |                            | 110            | 320 | 280            | 258            | 250 |     |                | 8  | 65         |
| TT 1203          |                            | 120            |     |                |                |     |     |                |    |            |

An end packing with neutral lubrication, type NT (Fig. 2) was developed from the UT packing from which the former differs in that it has a water jacket in its body 1 and no catch. The level of the lubricant can be observed through a window 2.

The end packings of types UT and NT are designed only for vertical shafts of chemical apparatuses. When no cooling water should fall into the apparatus it is advisable to use NT end packings, which have a body with double walls between which the cooling water is circulated. The inner hollow space of the NT packing is filled with a lubricant that is compatible with the medium processed in the apparatus.

VT-type double packings (Fig. 3) can be used for work in a vacuum of down to 3 mm Hg and at temperatures ranging from -20 to +250°C.

The packing consists of a base 1, a body 3, a lid 7, and graphite rings 2 that are pressed into fluoroethylene sleeves 6 which are enclosed in the ring of a split spring 4. The spring together with the sleeves and the graphite rings is mounted to a bush 5 which is held on the shaft by a squeeze 8. The friction couple is lubricated with a neutral liquid that is compatible with the working medium. The entire implement is cooled with water running through the jacket of the body.

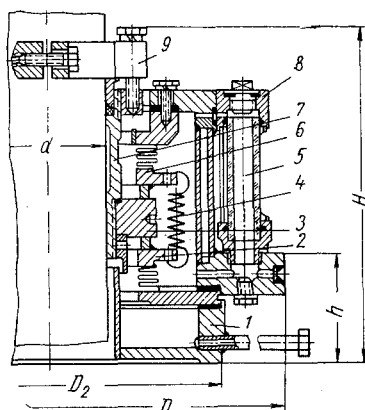


Fig. 5. TT-type thermal oil seal end packing.

Depending on the working medium, which may be acid or weakly alkaline liquids and vapor-gas mixtures, the base and the bush are made of titanium alloys, castalloy, or stainless steel.

Double TD packings (Fig. 4) are intended for the shafts of small apparatuses that work in liquid or gaseous aggressive media at pressures up to 6 kg/cm<sup>2</sup> and temperatures from -20 to + 200°C. The secondary packings are circular SKF-32-rubber gaskets.

The packing is made of Kh18N10T steel and consists of a base 1, a body 5, and a lid 8. Graphite (7) and steel (6) rings, packed against the shaft with rubber gaskets 2, form the friction couple. The pressure in the couple is produced by springs 4 which are guided in a spacer 3 that is mounted to the shaft. The friction couple is lubricated and cooled with running water.

The end packings of the types VT and DT are built to pack vertical, slanting, and horizontal shafts of apparatuses. They can also be used to pack the lower drive shaft. They keep the working medium from escaping into the atmosphere.

The TT double-bellow end packing with thermal oil sealing (Fig.5) can be used at working pressures of up to 3 kg/cm<sup>2</sup> and in vacua of down to 300 mm Hg. The maximum permissible working temperature is + 150°C.

The packing consists of a steel foot 3, a lower (2) and an upper (6) thrust bearing with rings of OTsS 5-5-5 bronze, which with the steel foot form two friction couples. The foot is screwed to a bush 7 which is fastened to the shaft with a squeeze 9. The specific pressure in the friction couple is produced by the springs 4. The body 8 is filled with MS-20 or MK-22 oil (State Standard 1013-49) which forms an oil seal and lubricates the friction surface. For sterilization, the oil is heated with steam which passes through the jacket of the body. Escaping oil is collected in the catch 1. The oil level can be observed through a window 5.

This packing is intended for a sterile sealing of revolving shafts in biochemical apparatuses where the microflora of the surrounding air must not enter into the apparatus nor may the product escape into the atmosphere.

The dimensions of the parts and fittings of the series-produced end packings are listed in Table 1.

To modernize their equipment, chemical enterprises frequently replace simple gaskets by end packings. In such cases, the factory manufactures the packing with the fittings made to special order.