# Technical Data, Measures and Adjusting Values

| Job No. |
|---|
| 03–0 |

*Change: x*

## Grinding repair sizes of crankshaft, OM 636 and OM 621

| Standard version and repair sizes | Colour | Main bearing journals | | | | Crank pins | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Dia. of journal | | Width of journal at fitted bear. | | Dia. of pin | | Width of pin | |
| Model | | OM 636 | OM 621 | OM 636 | OM 621 | OM 636 | OM 621 | OM 636 | OM 621 |
| Standard size | colourless | 54.96 / 54.94 | 69.96 / 69.94 | 37.000 / 37.025 | 34.000 / 34.025 | 49.96 / 49.94 | 51.96 / 51.94 | 34.000 / 34.100 | 32.000 / 32.100 |
| Repair size I | red | 54.71 / 54.69 | 69.71 / 69.69 | 37.000 / 37.025 | 34.000 / 34.025 | 49.71 / 49.69 | 51.71 / 51.69 | 34.000 | 32.000 |
| Repair size II | white | 54.46 / 54.44 | 69.46 / 69.44 | up to | up to | 49.46 / 49.44 | 51.46 / 51.44 | up to | up to |
| Repair size III | amber | 54.21 / 54.19 | 69.21 / 69.19 | 37.500 / 37.525 | 34.500 / 34.525 | 49.21 / 49.19 | 51.21 / 51.19 | 34.400 | 32.300 |
| Repair size IV | blue | 53.96 / 53.94 | 68.96 / 68.94 | — | — | 48.96 / 48.94 | 50.96 / 50.94 | — | — |

**Note:** Strictly adhere to the repair sizes listed in this table, all pins or journals must, of course, be ground to the same size. Further, do not fail to observe the fillet radii on the journals and pins, when re-grinding, these being 2,5—3 mm.

## Machining tolerances for main bearing journals and crank pins

| Model | | OM 636 | OM 621 |
|---|---|---|---|
| Permissible out-of-round of journals and pins | | 0.008 | 0.005 |
| Permissible taper of journals and pins | | 0.01 | 0.01 |
| Permissible misalignment of the pins with respect to the journals, referred to the bearing length | | 0.01 | 0.01 |
| Permissible out-of-true of the centre journal, when supported on the outer journals | | 0.02 | 0.02 |
| Permissible out-of-true of the fitted bear. journal | | 0.015 | 0.015 |
| Permissible vertical out-of-true of the flywheel flange, referred to the main bearing journals | | 0.02 | 0.02 |
| Permissible lateral out-of-true of the flywheel flange, referred to the three main bearing journals, measured at the outer diameter | | 0.02 | 0.01 |
| Fillet radii on the journals and pins | | 2.5–3 | 2.5–3 |
| Hardness of journals and pins | Scleroscope values | 68–74 | 68–74 |
| | Rockwell values Rc | 55–62 | 55–61 |
| Permissible unbalance of crankshaft, the crankshaft is balanced together with the flywheel | | 20 cmg | 15 cmg |

## Bearing clearance of crankshaft

| | Radial | | Axial | |
|---|---|---|---|---|
| Model | OM 636 | OM 621 | OM 636 | OM 621 |
| Main bearings | 0.05–0.07 | 0.045–0.065 | 0.05–0.08 | x 0.01–0.175 [1]) |
| Big end bearings | 0.05–0.07 | 0.045–0.065 | new 0.10–0.21<br>after repairs up to 0.5 | new 0.12–0.259 |

[1]) Max. axial clearance for repairs for unscored thrust collars 0.3 mm

## Main bearings

| Model | | OM 636 | OM 621 |
|---|---|---|---|
| Housing bore | | 59.500–59.519 | 74.500–74.519 |
| Permiss. out-of-round of housing bore | | 0.015 | 0.01 |
| Permiss. taper of housing bore | | 0.015 | 0.01 |
| Crush of bearing shells | | x ± 0.00 up to + 0.025 | |
| Dia. of main bearings with fitted shells | Standard size | 54.990–55.020 | 69.99–70.02 |
| | Repair size I | 54.74 –54.77 | 69.74–69.77 |
| | Repair size II | 54.49 –54.52 | 69.49–69.52 |
| | Repair size III | 54.24 –54.27 | 69.24–69.27 |
| | Repair size IV | 53.99 –54.02 | 68.99–69.02 |

**For the OM 636:** re-machine the lateral butting face of the fitted bearing, corresponding to the width of the fitted bearing journal, so that the specified axial clearance of the crankshaft of 0.05–0.08 mm is guaranteed.
**For the OM 621:** the butting plates for the centre main bearing cap (fitted bearing) are available in thicknesses from 1.96–2.31, mm graduated by 0.05 mm.

x **The engine OM 621 is now provided with fitted collar bearing shell sections in the cylinder crankcase and in the crankshaft bearing cap. In case of repairs, be sure to install two fitted collar bearing sections. (For details refer to Job No. 03–9.)**

## Dimensions of the connecting rods

| Model | | OM 636 | OM 621 |
|---|---|---|---|
| Basic bore for the big end bearings | | 54.000<br>54.019 | 55.600<br>55.619 |
| Basic bore for the small end bushing | Standard size | 25.000<br>25.021 | 29.000<br>29.021 |
| | Repair size | 25.500<br>25.521 | 29.500<br>29.521 |
| Permiss. out-of-round of the basic bore for big end bearing and small end bushing | | 0.01 | 0.01 |
| Permissible taper of the basic bore for big end bearing and small end bushing | | 0.01 | 0.01 |
| Distance from centre of bore to centre of bore (see Figure 03–13/1) | | 193.95<br>194.05 | 148.95<br>149.05 |
| x Width of connecting rods | | 33.800<br>33.784 | 31.880<br>31.841 |
| Permiss. weight difference of the complete set of connecting rods within an engine | | 10 g | 5 g |
| Permissible deviation from parallelism of axis, referred to a length of 100 mm | | 0.03 | 0.03 |
| Permissible twist, referred to a length of 100 mm | | 0.1 | 0.1 |

## Big end bearings

| | | | | | | |
|---|---|---|---|---|---|---|
| Crush of the bearing shells | | + 0.01 | | | | |
| Dia. of the big end bearings with fitted shells | Model | Standard size | Repair sizes | | | |
| | | | I | II | III | IV |
| | OM 636 | 49.99 / 50.02 | 49.74 / 49.77 | 49.49 / 49.52 | 49.24 / 49.27 | 48.99 / 49.02 |
| | OM 621 | 51.99 / 52.02 | 51.74 / 51.77 | 51.49 / 51.52 | 51.24 / 51.27 | 50.99 / 51.02 |

## Small end bushes

| | | | | | |
|---|---|---|---|---|---|
| Outer dia. of the small end bush | Model | Standard size | | Repair size I | |
| | OM 636 | 25.048 / 25.035 | | 25.548 / 25.535 | |
| | OM 621 | 29.048 / 29.035 | | 29.548 / 29.535 | |
| Inner dia. of the small end bush | | Rough-turned | Finished | Rough-turned | Finished |
| | OM 636 | 21.500 / 21.552 | 22.007 / 22.013 | 21.500 / 21.552 | 22.007 / 22.013 |
| | OM 621 | 25.500 / 25.552 | 26.012 / 26.018 x | 25.500 / 25.552 | 26.012 / 26.018 x |
| Overlap of small end bush in the connecting rod | OM 636 | min. + 0.03 | | | |
| | OM 621 | min. + 0.03 | | | |

## Piston pins

| Colour identification | Model | Piston pin dia. | Bore of small end bush | Running clear. | Bore in piston |
|---|---|---|---|---|---|
| Black | OM 636 | 21.997 / 21.994 | 22.007 / 22.010 | 0.010–0.016 | 21.990 / 21.993 |
| | OM 621 | 25.997 / 25.994 | 26.012 / 26.018 x | 0.015–0.024 x | 25.990 / 25.993 |
| White | OM 636 | 22.000 / 21.997 | 22.010 / 22.013 | 0.010–0.016 | 21.993 / 21.996 |
| | OM 621 | 26.000 / 25.997 | 26.012 / 26.018 x | 0.012–0.021 x | 25.993 / 25.996 |

## Connecting rod bolts

| Colour identification | bolt dia. | |
|---|---|---|
| | OM 636 | OM 621 |
| Colourless | 10.008 / 10.001 | 10.013 / 10.006 |
| White | 10.016 / 10.009 | 10.021 / 10.014 |

**Note:** Select connecting rod bolt to ensure firm seat in the bore of the connecting rod.

The connecting rod bolts are tightened without lock, with an elongation of 0.1 mm (see Job No. 03–5, item 22, page 03–5/4).

## Pistons

| Type | Dia. of the available pistons | | | | | |
|---|---|---|---|---|---|---|
| | Standard size | Intermediate size | Rep. size I | Rep. size II | Rep. size III | Rep. size IV |
| 636.915 | 73.44<br>73.45<br>73.46 | — | 73.94<br>73.95<br>73.96 | 74.44<br>74.45<br>74.46 | 74.94<br>74.95<br>74.96 | 75.44<br>75.45<br>75.46 |
| all other types of the OM 636 | 74.94<br>74.95<br>74.96 | — | 75.44<br>75.45<br>75.46 | 75.94<br>75.95<br>75.96 | 76.44<br>76.45<br>76.46 | 76.94<br>76.95<br>76.96 |
| 621.910 | 84.94<br>84.95<br>84.96 | 85.19<br>85.20<br>85.21 | 85.44<br>85.45<br>85.46 | 85.94<br>85.95<br>85.96 | 86.44<br>86.45<br>86.46 | 86.94<br>86.95<br>86.96 |
| 621.912 x<br>621.913 x<br>621.914 x | 86.93<br>86.94<br>86.95 | 87.18<br>87.19<br>87.20 | 87.43<br>87.44<br>87.45 | 87.93<br>87.94<br>87.95 | 88.43<br>88.44<br>88.45 | —<br>—<br>— |
| Piston Clearance: OM 636 and OM 621, type 621.910 = 0.06 mm<br>OM 621, types 621.912, 913 and 914 = 0.07 mm | | | | | | |
| Permissible weight difference of pistons within one engine | OM 636 and OM 621 = 4 grams | | | | | |

## Piston rings for the OM 621

| Type | Piston ring | Groove I | Grooves II and III | Groove IV |
|---|---|---|---|---|
| 621.910 | Size and Part No. | compression ring<br>10 f 85/77, 6×2 JF/CrS<br>001 037 79 16 | compression ring<br>10 f 85/77, 6×2 JF<br>001 037 84 16 | slotted oil control ring<br>PC 86 Oil with expander<br>85/78, 6×5<br>001 037 74 18 |
| | Ring gap | 0.55–0.70 | 0.45–0.60 | 0.25–0.60 |
| | Side clearance | 0.06–0.087 | Groove II 0.06–0.087<br>Groove III 0.045–0.072 | 0.045–0.072 |
| 621.912 x<br>621.913 x<br>621.914 x | Size and Part No. | compression ring<br>87/79.6×2 f<br>St 12 JF/CrS<br>004 037 06 16 | compression ring<br>87/79.6×2 f St 10 JF<br>004 037 11 16 | PC bevel ring with expander, chrome-plated,<br>87/80.9 x 5<br>002 037 34 18 |
| | Ring gap | 0.55–0.75 | 0.45–0.60 | 0.25–0.60 |
| | Side clearance | 0.045–0.072 | | |

## Pistons and piston rings for the OM 636

| Type | | | 636.915 | All other types | | |
|---|---|---|---|---|---|---|
| Piston make part No. | | | Mahle 636 030 15 17 | Mahle 681 030 00 17 [1] | Mahle 636 030 37 17 [1] | 636 030 47 17 [1] |
| Piston rings | compression ring | groove I | 10 f 73.5/67.1×2.5 KE 54 N 276 | 10 f 75/68.4×2.5 I F/Cr part No. 001 037 19 16 | 10 f 75/68.4×2 I F/Cr part No. 001 037 26 16 | |
| | top ring | groove II | 11 f 73.5/67.1×2.5 KE 54 N 277 | compression ring 10 f 75/68.4×2.5 I F KE 54 N 276 | compression ring 10 f 75/68.4×2 I F part No. 002 037 16 16 | |
| | top ring | groove III | | | | |
| | slotted oil control ring | groove IV | 40 f 73.5/67.1×5 KE 54 N 280 | 40 f 75/68.4×5 KE 54 N 280 | slotted oil control ring with Goetze expander part No. 001 037 22 18 [2] | |
| | slotted oil control ring | groove V | 40 f 73.5/67.1×5 FS C KE 54 N 280 | 40 f 75/68.4×5 FS C KE 54 N 280 | | |
| Piston ring clearances | ring gap | groove I | 0.30–0.45 | 0.40–0.55 | 0.45–0.60 | |
| | | groove II | | 0.30–0.45 | 0.40–0.55 | |
| | | groove III | | | | |
| | | groove IV | 0.25–0.40 | | | |
| | | groove V | | | | |
| | side clearance | groove I | 0.060–0.087 | 0.045–0.072 | | |
| | | groove II | | | | |
| | | groove III | 0.045–0.072 | | | |
| | | groove IV | 0.035–0.062 | 0.035–0.062 | | |
| | | groove V | | | | |

[1] For replacements only install the Mahle piston, part No. 636 030 47 17 or optionally, the Nüral piston part No. 636 030 68 17 (piston clearance: 0.06 mm).

[2] If in groove IV, a slotted oil control ring of the designation 40 f 75/68.4×5 KE 54 N 280 had been installed before, an oil control ring with Goetze expander part No. 001 037 22 18 may be installed.
If high mileages are involved, it is best to install a complete Goetze expander set.

**Note:** the designation of the pistons and piston rings only refers to the standard size, whereas the ring gap and side clearance values are applicable to all repair sizes.
On principle, the pistons are supplied with rings. The piston ring installation measures are indicated only if for exceptional cases 1 piston ring must be replaced.

### Control measures with the piston installed

For the OM 636: if in TDC position, the piston may be above or below the separating surface by not more than 0.3 mm; for the OM 621: projection above the separating surface ranges from 0.7 to 1.2 mm; a definite value should be identical for all 4 cylinders.

Regarding the OM 621: the distance (d) between piston head recess and front face of the burner of the pre-chamber must not be lower than 1.35 mm (see Figure 01–1/10).

The max. distance between the piston head and the bottom of the recess for the burner amounts to 6.8 to 6.95 mm.

The distance (c) between front face of the burner of the pre-chamber and the separating surface of the cylinder head must not exceed 5.9 mm (see Figure 01–1/10).

Thickness of the cylinder head gasket, if installed, i. e., pressed = 1.7±0.05 mm.

## Flywheel

| Model | Part No. of the flywheel with starter ring gear | Dimensions of the flywheel in mm (see Fig. 03–19/1) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | a | b | | c | D | d | $d_1$ |
| | | | distance, if new | min. permiss. distance, for repairs | | | | |
| OM 636 | 636 030 07 05 Unimog flywheel 278 mm dia. | 33±0.1 | 17.0 | * | 8.0 | 245.36 / 245.30 | 270.000 / 270.052 | 236+0.2 |
| | 636 030 00 05 Flywheel 250 mm dia. | 29±0.1 | 15.0 | 14.0 | 8.0 | 245.36 / 245.30 | 235.000 / 235.046 | 205+0.2 |
| | 636 030 03 05 Flywheel for passenger cars 256 mm dia. | 29±0.1 | 15.5 | 14.0 | 8.0 | 245.36 / 245.30 | | |
| OM 621 x | 621 030 03 05 (621.910) (621.914) | 29+0.1 | 12.5 | 11.5 | 8.5 | 230.356 / 230.284 | | |
| | 621 030 10 05 (621.913) | | | | | | | |
| | 621 030 09 05 (621.912) | | 18.5 | 17.5 | 9.0 | 260.396 / 260.315 | | |

* Stock removal by remachining the clutch (A) or decreasing "b" is permissible only until grazing between clutch driven plate and fitted bolts or nuts is safely avoided (see Figure 03–19/1).

**List of installed flywheels in engines of the individual types** (see Job No. 03–16).

## Ring gear of the flywheel

| Model | Flywheel dia. for the seat of the ring gear | Inner dia. of ring gear | Overlap | No. of teeth | Width of ring gear | Perm. lateral out-of-true fitted ring gear | Fitting of the ring gear |
|---|---|---|---|---|---|---|---|
| OM 636 | 245.360 / 245.300 | 245.000 / 245.115 | 0.360 / 0.185 | 92 | 15 | 0.4 | at 180–200 ° C |
| OM 621 x | 621.910 / 621.914 — 230.356 / 230.284 | 230.000 / 230.115 | 0.356 / 0.169 | 94 | 12–0.1 | | up to max. 200 ° C |
| | 621.913 — 230.356 / 230.284 | 230.000 / 230.046 | 0.356 / 0.238 | | 12–0.2 | | |
| | 621.912 — 230.396 / 260.315 | 260.000 / 260.052 | 0.396 / 0.263 | 96 | | | |