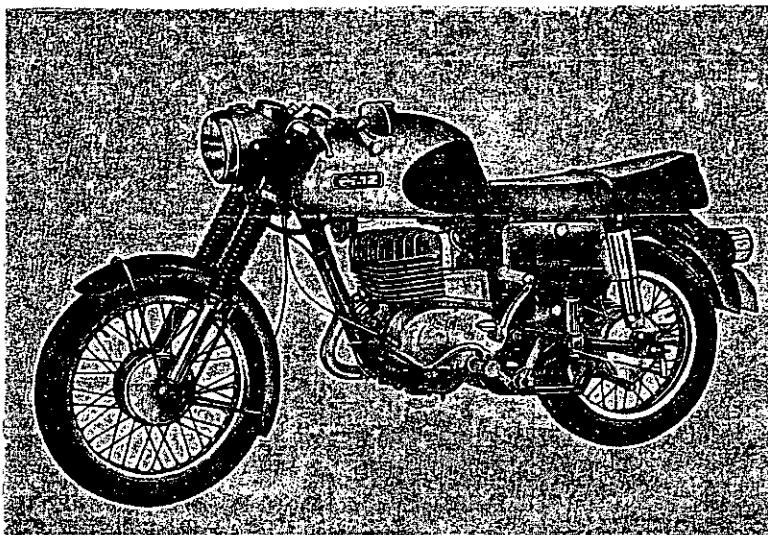


Service Manual



ETS 250 Trophy-Sport And tuned engine ES250/2 (21HP)

**Supplement to
Repair Manual ES175/2 - 250/2**

Edition 1970

REPAIR MANUAL

MZ-Motorcycle

ETS 250 Trophy-Sport

and tuned engine ES 250/2 (21 HP)

**Supplement to
Repair Manual ES 175/2 - 250/2**

**With 28 figures
and 3 drawings of special tools**

Edition 1970

VEB MOTORRADWERK ZSCHOPAU

The Motorcycle ETS 250 Trophy-Sport is a product of
VEB MOTORRADWERK ZSCHOPAU

All rights reserved



VEB FACHBUCHVERLAG LEIPZIG

Dead line: March 25 th, 1969

Composition and print: Buchdruckerei Wilhelm Hoppe, Borsdorf-Leipzig — III/18/328

KG 3/23/70

RH ETS 250 Trophy-Sport, englisch

In order to meet the wishes of many MZ-Enthusiasts from all over the world, MZ has developed a new Sport-Machine —

the ETS 250 Trophy-Sport.

The basic structure of this machine is the well known ES 250-2. For this reason you can generally rely on the repair manual of the ES 175-2 — ES 250-2, concerning all kinds of repair work.

Therefore you are recommended to consult the repair manual ES 175-2 — 250-2 simultaneously.

Under "Technical Data" you will find a brief description of important data.

VEB MOTORRADWERK ZSCHOPAU

— Service/Dept. —

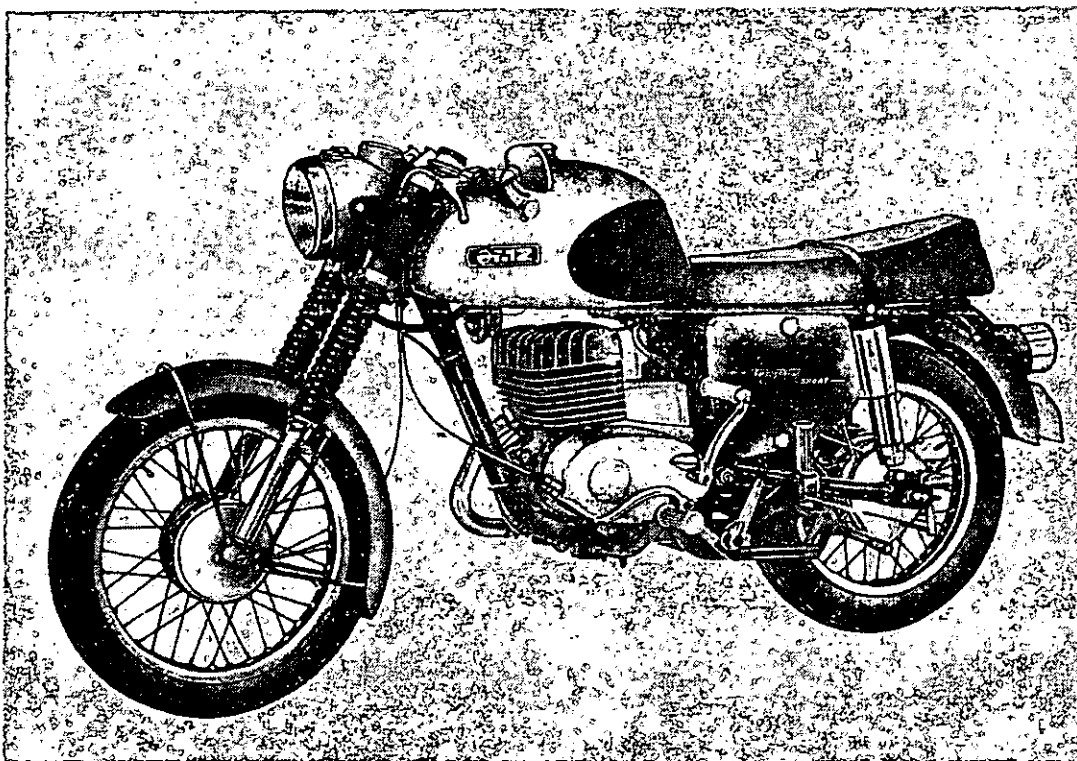


Fig. 1. ETS 250 Trophy-Sport

INDEX

	Page
1. Technical Data	5
1.1. Engine	5
1.2. Carburettor	5
1.3. Electrical equipment	5
1.4. Gear box	5
1.5. Power train	6
1.6. Chassis	6
1.7. Dimensions and weights	6
1.8. Capacities	6
1.9. Top speed	7
1.10. Diagram	7
2. Fuel and Lubricants	8
2.1. Fuel	8
2.2. Engine oil	8
2.3. Mixing ratio	8
2.4. Gear box and power train lubricants	8
2.5. Lubricants for cycle parts	8
2.6. Shockabsorber-fluid capacities (front and rear)	8
3. Engine dismantling	9
4. Engine reassembly	9
4.1. Crankshaft	9
4.2. Cylinder	9
4.3. Compression ratio checking	10
4.4. Measurement of combustion chamber	10
5. Electrical equipment	11
5.1. Timing	11
5.2. Headlamp	12
5.3. Headlamp adjustment	12
6. Intake system	13
7. Carburettor	13
7.1. Carburettor basic adjustment	13
8. Chassis	13
8.1. Frame	13
8.2. Checking of steering bearings	13
8.3. Steering head bearings adjustment	14
8.4. Stanchion removal	14
8.5. Telescopic front fork repairwork	15
8.6. Stanchions reassembly	17
8.7. Shockabsorber capacity checking	18
8.8. Petrol tank, dual seat, tool box	18
8.9. Silencer	19
9. Suspension unit repairwork	19
10. Index of special tools	19
11. Drawings of special tools	20

1. Technical Data

1.1. Engine ETS 250 Trophy - Sport

System	Two-stroke, loop scavenging
Cooling	Air cooled
Number of cylinders	Single cylinder
Stroke/Bore	65/69
Capacity	243 cc
Compression ratio	9.5 to 10 : 1
Compression volume of cylinder head (assembled)	approx. 27 cc
Max. performance at 5000 to 5500 r.p.m.	14.0 KW = 21 HP SAE
Max. torque at 4700 to 5000 r.p.m.	2.7 KPM
Lubrication	Petrol-Oil mixture 33 : 1 by two-stroke oil
Connecting-rod bearings	Big end — needle bearing (K 28 × 35 × 20) small end — needle bearing (KK 18 × 22 × 24 F)
Main bearings	2 bearings 6305 C 003 f 1 bearing 6302
Main bearings lubricant	Gear-box oil
Piston	with 3 compression rings, locating pegs (Z-rings)
Piston weight c/w rings, gudgeon pin and locating pegs	360 ^{±5} g
Square fin cylinder	Light alloy with cast-in special iron liner
Port openings in °	Intake port 155° Transfer port 118° Exhaust port 170°
Petrol	Premium grade fuel only!

1.2. Carburettor BVF 28 1-3 (Starting device)

Diameter	28 mm
Main jet	115
Needle jet	67
Needle type	C 5 with 5 notches
Needle position seen from top	3 rd to 4 th notch ¹⁾ (4 th for running-in)
Starter jet	100
Pilot jet	40
Float valve	18
Air adjusting screw	2 to 3 turns open
Transfer channel diam.	1.5 mm
Idle-speed channel diam.	0.8 mm

¹⁾ CAUTION: For correct adjustment under normal riding conditions, the spark plug face is very important. It should be slightly coated with soot and show a light brown colour!

1.3. Electrical equipment

Ignition Timing	Battery 22° 15' = 3.0 mm b.t.d.c. with fully opened weights in contact breaker assembly
Contact breaker gap	0.3 mm
Spark plug	Isolator M 14/260 or Bosch W 280 T 2, Champion N 3, Auto-Lite AG 901, Lodge 3 HLN
Spark plug gap	0.6 mm
Dynamo	DC, 6 V, 60 W, short output 90 W
Charging control lamp (red)	Built-in speedometer
Regulator cut-out	Type RSC 60/6, under left side panel
Battery	6 V, 12 Ah
Ignition coil	6 V, under left side panel
Headlamp	160 mm diam.
Dimmer switch	On handlebar, left-hand side
Tail lamp c/w stop light	95 mm diam.
Electric horn	Below petrol tank
By pass signal	Operated by button, under dimmer switch
Bulbs	
Double filament	6 V, 35/35 W
Park light	6 V, 4 W, socket BA 9 s
Stop light	6 V, 18 W, socket S 8.5
Rear light	6 V, 5 W, socket S 8
Charging control light	6 V, 1.2 W
Neutral gear light	6 V, 1.2 W
Speedometer light	6 V, 1.2 W

1.4. Gear box

Clutch	At left-hand side of crankshaft, wet type (5 friction plates)
Gear changing	Foot operated, via selector quadrant and drum
Number of speeds	4
Gear ratios	
1 st	2.77 : 1 = 13 : 36 t
2 nd	1.8 : 1 = 15 : 27 t
3 rd	1.23 : 1 = 22 : 27 t
4 th (top)	0.92 : 1 = 25 : 23 t
Bearings on layshaft	6204 (20 × 47 × 14), 6203 (17 × 40 × 12)
Bearings on mainshaft	6203 (17 × 40 × 12), 6204 (20 × 47 × 14)
Neutral indicator	Electrical-light in speedometer (green)

1.5. Power train

Primary drive, gear box: engine	2.43 : 1
by helical gear	28 : 68 t
Secondary drive, gear box: rear wheel	2.14 : 1 = 21 : 45 t
by roller chain	12.7 × 7.75 × 8.51 mm (1/2 × 5/16")
Total transmission ratio	
1 st	14.41 : 1
2 nd	9.37 : 1
3 rd	6.39 : 1
4 th (top)	4.79 : 1

1.6. Chassis

Frame	Single tube frame, welded. Steering head hard soldered Engine in rubber blocks
Steering angle	63°
Castor action	85 mm
Suspension system front	Telescopic front fork with enclosed hydraulic shock absorbers — progressive springs — travel way 145 mm
rear	Suspension units with hydraulic shock absorbers — adjustable springs
Wheels	Spoke wheels with straight spokes
Rim size front	1.60 × 18
rear	2.15 B × 16
Tyres front	2.75-18
rear	3.50-16
Tyre pressure front	1.5 at, approx. 21 lbs
rear	1.9 at, approx. 27 lbs solo 2.1 at, approx. 30 lbs pillion
Brakes	Full width type diam. 160 mm linings 30 mm width

1.7. Dimensions and weights

Wheel base	1380 mm
Overall length	2200 mm
Overall width	
with / without mirror	750/610 mm
Ground clearance	160 mm
Weight	151 kg
Carrying capacity	169 kg
Permissible load	320 kg

1.8. Capacities

Gear box	750 cc gear box oil for summer and winter operation, SAE 40
Petrol tank incl. reserve	approx. 22 litres — 4.8 gallons incl. reserve 1.5 l — 0.33 gal.
Telescopic front fork	215 cc shock absorber fluid per stanchion
Rear suspension units	70 cc shock absorber fluid per unit Viscosity: 1.65 to 1.92° E at 50°C = 8 to 11 c Stokes at 50°C

1.9. Top speed . Approx. 125 kph — 78 mph

We reserve the right to modify or deviate from the specification in the interest of the technical development

1.10. Diagram

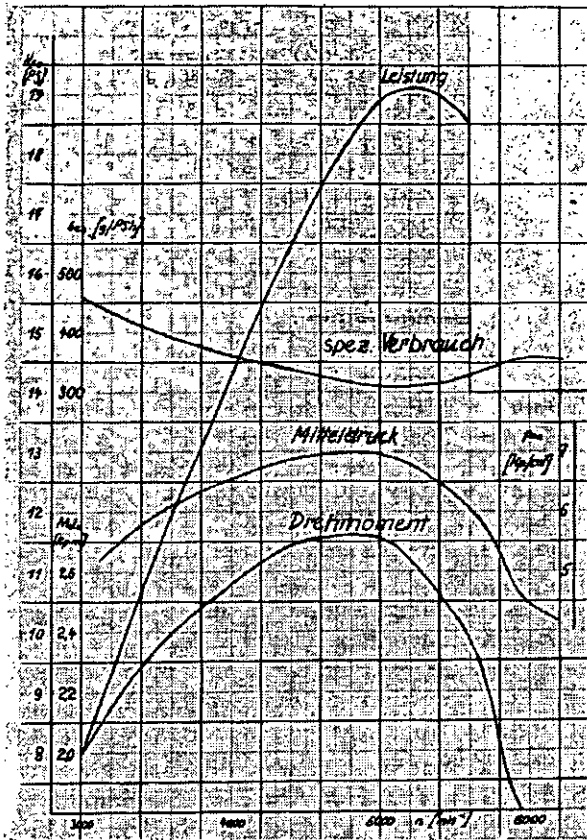


Fig. 2. Performance, specific fuel consumption and torque of ETS Trophy-Sport

Leistung = performance
spez. Verbrauch = specific fuel consumption
Mitteldruck = mean effective pressure
Drehmoment = torque

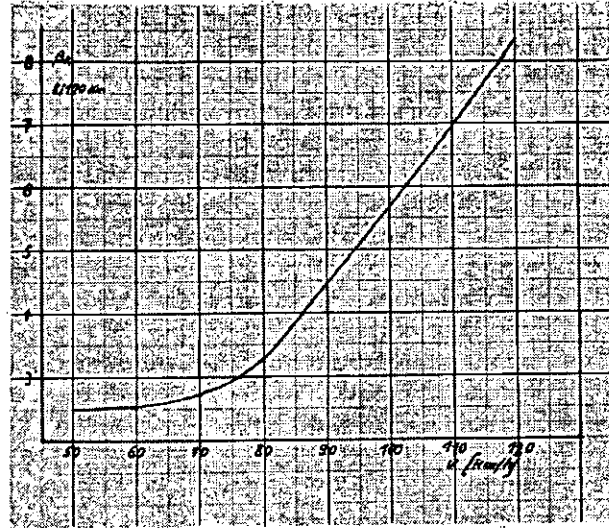


Fig. 3. Road consumption of ETS Trophy-Sport on top gear

2. Fuel and Lubricants

2.1. Fuel

In accordance with the technical layout of the engine, it is recommended, to use Premium Grade Fuel for the best fuel economy and performance.

When using high-grade fuel, carburettor adjustment might be necessary i.e. by changing the position of the needle in accordance with the appearance of the spark plug mouth.

2.2. Engine oil

Big- and small-end bearings of connecting-rod as well as cylinder liner and piston are lubricated by the simple and absolutely safe petroil method.

Due to our many years experience, we recommend the use of special "Two Stroke Oil" exclusively!

CAUTION: Any engine damages caused by the use of others than the recommended "Two Stroke Oil" will not be treated as guarantee claim by the MZ-Service Dept.

Recommended brands: Castrol 2 T, Shell 2 T, Mobilmix TT, BP Energol 2 T, Esso 2 T.

2.3. Mixing ratio

Thorough mixing is very essential, and it is strongly recommended to use the correct mixing ratio of 33 : 1 during the running-in period as well as after the completion of this period (ratio 33 : 1 = 3⁰/₁₀)

CAUTION: No advantage is gained by an increased quantity of oil, which will cause choked silencer and exhaust port, dirty spark plugs and difficult starting.

2.4. Gear box and power train lubricants

Filling quantity for gear box and primary drive is 750 cc of gear box oil SAE 40-grade.

The same quality should be used to lubricate the secondary drive (roller chain).

The bearing 6005 for the rear wheel sprocket as well as steering bearings are greased by Castrol LM, Esso-Multipurpose, Retinax "A" or similar greases.

2.5. Lubricants for cycle parts

All grease points of the chassis, incl. speedometer drive, are lubricated by an oil filled grease gun (SAE 40-grade). The use of any grease is absolutely disapproved, for instance for the swinging fork bolt. The reason is that any grease will choke up the lubrication channels.

Exceptions are the steering as well as wheel bearings, which must be greased in intervalls of 8000 miles by grease recommended under 2.4.

2.6. Shockabsorber-fluid capacities

All shockabsorbers are filled with "Globo" shock-absorber-fluid.

Telescopic front fork: 215 cc per stanchion

Rear suspension units: 70 cc per shockabsorber

Viscosity of Globo-shockabsorber-fluid: 1.65 to 1.92 °Engler/50 °C = 8 to 11 c Stokes/50 °C.

When changing to an other brand in case of any repair-work, we recommend strongly to train off the rest of the fluid, and to refill with the following brands: Mobilfluid 62, Shell Donax A 1, Castrol Hyspin 45, Esso Estic N 37.

CORRECTION: Please correct in your repair manual for ES 175/2 — 250/2 models the capacity for the rear shockabsorbers from 80 cc to 70 cc (see passages 1.8 and 2.5)

3. Engine dismantling

CAUTION: In accordance with the introduction we describe only operations which are different from these already described in our ES 250/2 repair manual. To make it easier to find the description of repair-work

operations, we are using the same classification already introduced in our ES 175/2 — 250/2 repair manual i.e. passage "Electrical Equipment", you will find under 5 respectively "Chassis" under 8.

4. Engine reassembly

4.1. Crankshaft

The crankshaft of the tuned engine is marked with 250/2 L (circle), and differs from the design used hitherto as follows:

- (1) The diameter of dynamo-side shaft is 20 mm instead of 17 mm formerly. At the same time, the oil seal $20 \times 30 \times 7$, and the oil seal housing 20.1 mm is in use.
- (2) The clutch side shaft has ballrace shaped inner shafts. When reassembling the clutch and primary drive, the thrust washer 22×34 (3) and the distance plate $19 \times 34 \times 3$ (4) with chamfered inside diameter must be used. Otherwise the clearance will enlarge considerably within a short running period. The figures 74 to 76 of ES 175/2—250/2 repair manual refer to this repair-work.

4.2. Cylinder

The cylinder is easily recognized by the shape of the inlet port (A). Due to slightly different casting of the cylinder, the intake manifold is shorter.

Port openings in degrees:

Intake port	155°
Transfer port	118°
Exhaust port	170°

For the tuned engines, pistons marked 69.3 must be used exclusively. They differ from the design used hitherto by locating pegs fastened over the groove for the rings (arrow). The top compression ring is not chromium-plated!

For assembly and reassembly of the crankshaft, piston and cylinder, please consult the passages 4.1 to 4.4 of the ES 175/2—ES 250/2 repair manual.

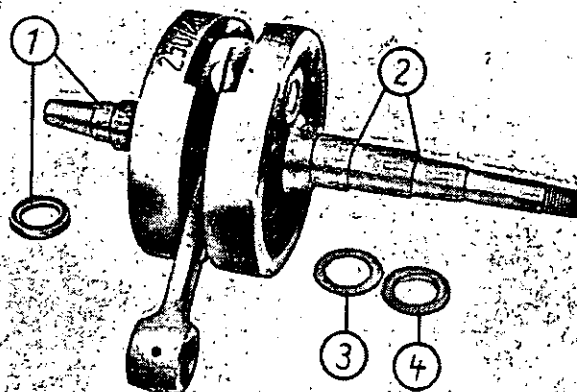


Fig. 4



Fig. 5



Fig. 6

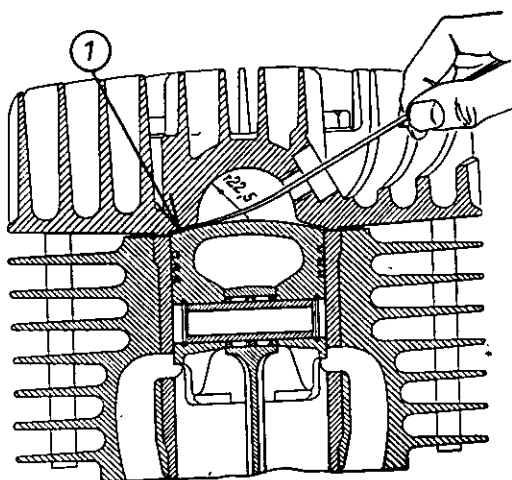


Fig. 7

4.3. Compression ratio checking

In order to avoid the possibility of any unfavourable clearances, causing an incorrect compression ratio of more than 10 : 1, or less than 9.5 : 1, it is necessary that the gap (1) between piston crown, and the inner shape of the cylinder head, must be measured after repair-work.

For measuring this gap, we recommend to use a lead-wire approx. 2 to 2.5 mm diam., which must be inserted through the spark plug hole. By moving the piston to t.d.c. you can easily state the exact clearance after measuring the flattened lead-wire with a sliding caliper or better with a micrometer.

The permissible clearance will be 1.2 to 1.6 mm.

It is important for full engine efficiency to make sure of the a/m clearance.

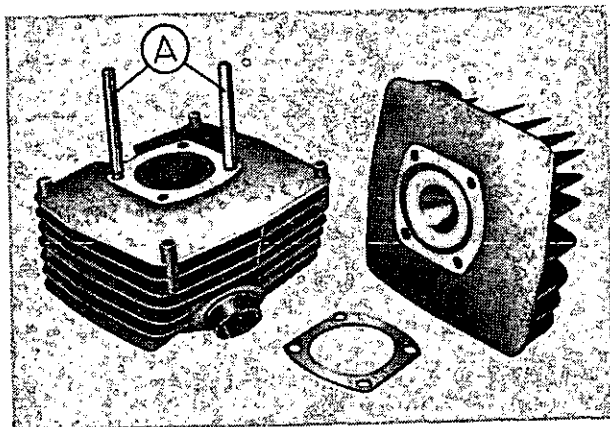


Fig. 8

In order to correct any unfavourable clearance some kind of gaskets must be used, which we have at your disposal in thicknesses of 0.2 and 0.4 mm. To avoid that the mentioned gaskets will slide to an awkward position, two centering thorns must be used (A) — see drawing — for fitting the gaskets and the cylinder head into the correct position. Next, the cylinder must be slightly fastened by two sleeve nuts, approx. 2 kpm, the two centering thorns must be removed and the remaining two sleeve nuts must be fastened in the described way.

The cylinder sleeve nuts have to be tightened now crosswise i.e. 1—3—4—2, in order to make sure that the cylinder head is absolutely tight.

If doubtful it is recommended to recheck again, by using the lead-wire method.

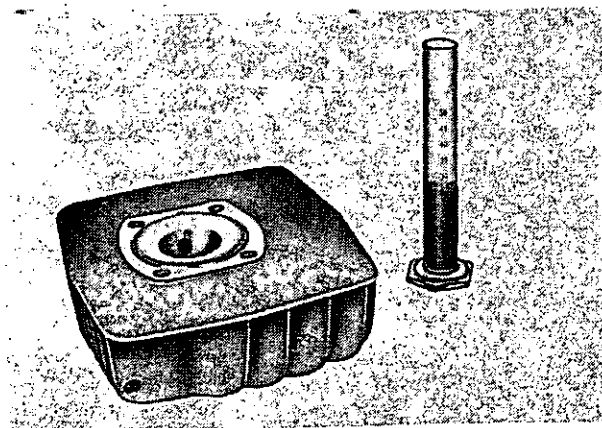


Fig. 9

4.4. Measurement of combustion chamber

With the cylinder head tightly fixed, the combustion chamber capacity will be approx. 27 cc.

When measuring the capacity the piston must be moved to t.d.c., and the engine must be brought to such an inclined position, that the surface of the spark plug hole is absolutely horizontal. For correct measurement so-called gear box flushing oil should be used. Stop pouring the oil when the level reaches the thread of the spark plug hole. Combustion chamber capacity of the removed cylinder head with inserted spark plug is approx. 34.5 cc.

When measuring the removed cylinder head, it is recommended to use fuel. The use of a chemist's measuring glass is preferable.

5. Electrical equipment

5.1. Timing by graduator disk

If the special tool "Timing peg H 8-2104-3" (for spark plug inclined 30°) is not available, timing can be set by using a graduator disk — to be obtained in a stationer's shop. In order to have access to the contact breaker, the disk must have three windows.

The pointer (1), made from wire, should be at least 2.5 to 3 mm thick, to avoid unnoticed bending of the same which will cause timing faults.

Precondition for exact timing is the absolutely correct t.d.c. For granting that, a stop peg for the piston crown is necessary (2).

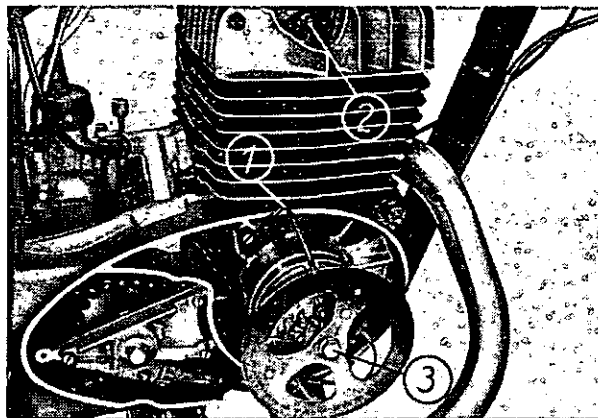


Fig. 10

The mentioned "stop peg" can be easily made from an old spark plug from which the porcelain body is removed, and replaced by a bolt. To let the compressed air escape, the stop peg should have a hole sideways. By fitting a 4 mm adjusting screw into the stop peg, it can be used for any other engine.

After the t.d.c. is fixed by the location bolt — stop peg and location bolt must be absolutely tight — the crankshaft has to be moved anti-clockwise at the armature fastening screw (3) until it touches the stop. The degrees indicated by the pointer must be noted down.

It is recommended to adjust the pointer to any full number. The crankshaft, afterwards is to be moved clockwise until it reaches the right side of the stop, and the degrees and minutes must be noticed again. Exactly in the middle of the segment the pointer has not passed, you will find t.d.c.

Then the stop peg must be removed, and the correct contact breaker gap set to 0.3 mm, by using the feeler gauge (tool kit). The feeler gauge must be neither too loose nor too tight between the contacts. See Fig. 96 and 97, repair manual ES 175/2—250/2.

A timing lamp has to be connected now, and the crankshaft must be moved anti-clockwise — from t.d.c. — for $22^\circ 15'$. Make sure that the weights at contact breaker assembly are fully open. When reaching the position $22^\circ 15'$ b.t.d.c., the lamp should be on.

After finishing this procedure, the piston should be moved again — for your information only — slowly over t.d.c. At the same time it must be observed how many degrees are passed at the pointer, without moving the piston visibly — when changing up and down. The possibility of any kind of adjusting faults — even possible when using the dial-indicator — will not occur when the graduator method is adopted.

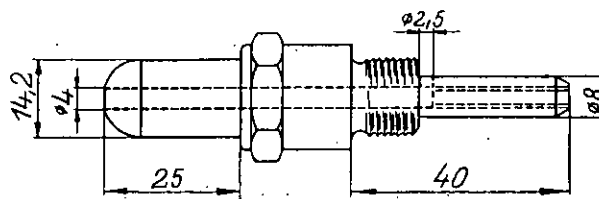


Fig. 11

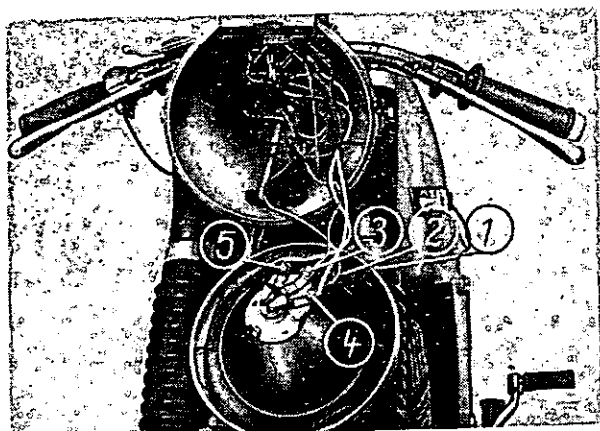


Fig. 12

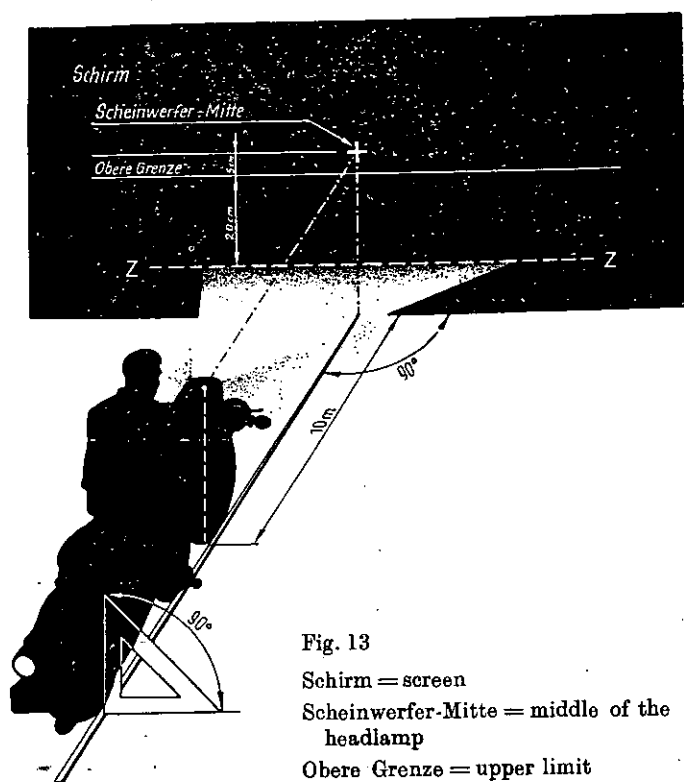


Fig. 13

Schirm = screen

Scheinwerfer-Mitte = middle of the headlamp

Obere Grenze = upper limit

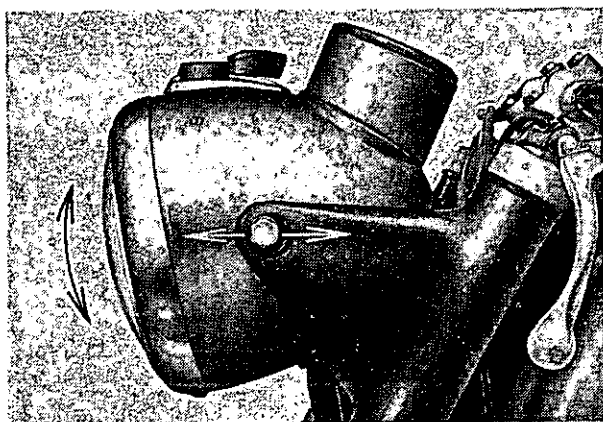


Fig. 14

5.2. Headlamp

To remove the headlamp-rim, the fastening screw (1) must be loosened approx. three turns (do not unscrew entirely). After removing the spring (2), the socket of the double filament bulb 35/35 W can be taken out.

(3) Terminal 57 = Parking light (on terminal 58)

(4) Terminal 56a = Full beam

(5) Terminal 56b = Dimmed beam

For connecting the ignition switch, see Fig. 103, and the other electrical equipment, see wiring diagram Fig. 116 of the repair manual ES 175/2 - 250/2.

The ETS Trophy-Sport is not equipped with trafficators, therefore flasher unit, wires and the 4 A-fuse are not fitted.

The ETS with symmetrical dimmer beam has to be placed in a ten-meter distance from the screen. By using an adjusting-lath and 90° angle, the position must be corrected in accordance with the scheme. One rider must be placed on the machine, and the rear suspension units have to be adjusted to the position "soft". The light-dark line of the dimmed beam must be situated 250 mm below the middle of the headlamp ("Z"-line). When counter-checking this adjustment, the rear suspension units should be adjusted to position "hard", and the second rider must be placed on the dual-seat. In moving up and down slightly, the upper limit must not be exceeded.

5.3. Headlamp adjustment

Re-adjustment, respectively adjustment can be made after loosening the headlamp fastening screws. Altitude of beam by bending up or down, latitude by moving sideways the headlamp. Right and left top-covers have slotted holes for this reason.

6. Intake system

See passage 6 of the repair manual ES 175/2—250/2

7. Carburettor

7.1. Carburettor basic adjustment

Type	BVF 28 N 1-3
Diameter	28 mm
Main jet	115
Needle jet	67
Needle type	C 5
Needle position, seen from top	3 to 4 ¹⁾ (4 for running-in)
Starter jet	100
Pilot jet	40
Float valve	18
Air adjusting screw	2 to turns open
Throttle valve cut-out	3 (30)
Transfer channel diam.	1.5 mm
Idle speed channel diam.	0.8 mm

¹⁾ For correct adjustment under normal riding conditions, the spark plug face is very important. It should be only slightly coated with soot and show a light brown colour!

Apart from the carburettor basic adjustment, described herein, the passage 7 of the repair manual ES 175/2—250/2, should be consulted in any carburettor questions.

Instead of the needle number K 3, Fig. 124, 125 and 126 of the repair manual ES 175/2—250/2, the carburettors of tuned engines are equipped with the conical shaped needle number C 5.

8. Chassis

8.1. Frame

The frames of ES-2 (1) and ETS Trophy/Sport (2) differ slightly from each other. The headlamp fastener (3) as well as the collar (4) on the top steering bearing are abolished. In a special case (possible shortage), the frame of ES-2 models can be used for ETS 250 Trophy-Sport, after the removal of the parts (3) and (4). The fastener for the single seats can remain on the frame.

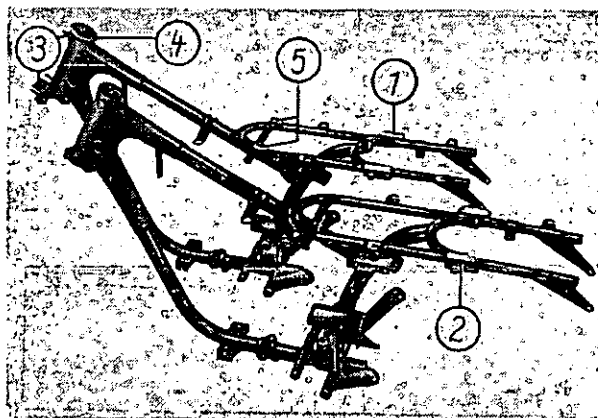


Fig. 15

8.2. Checking of steering head bearings

With the machine on the centre stand — the front wheel must be clear of the ground — checking can be made by moving the mudguard to and fro with one hand and the other hand checking at the same time for excess clearance in the steering head bearings. The bearings should be free and without play.

CAUTION: Do not overtighten or the bearing will be damaged.

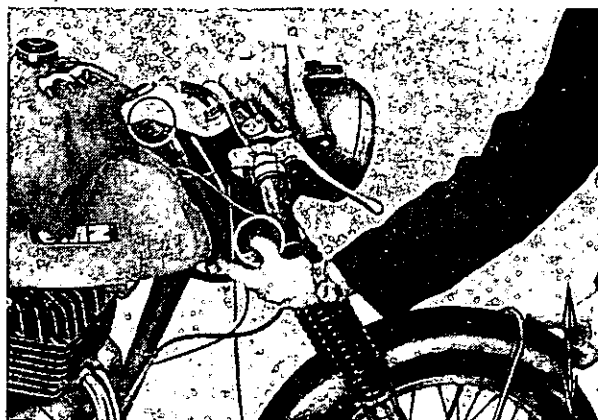


Fig. 16

8.3. Steering head bearings adjustment

Before adjusting the bearings, all screwed connections of the telescopic front fork must be tightened.

First the plastic cover must be removed, by using a bent rod (to pass mudguard and front wheel), inserted through the steering tube. After that the securing plate must be unbent (2) and by using a plug-spanner or ring-spanner 41 mm, the top nut (3) can be tightened. This will prove to be sufficient in most of the cases, because of the free play between sleeve-nut (4), steering tube and top nut (3). Afterwards, fasten the securing plate (2).

For re-adjustment the top lug assembly must be removed, after unscrewing the two cap nuts. Otherwise access to the sleeve-nut is not possible. (6) Top cone, (7) steering race cup, (8) rubber ring at headlamp fastener.

Per steering head bearing, 22 steel balls 6.35 mm diam. Bearings showing any traces of damage, must be replaced by new ones i.e. when replacing top cone or steering race cup, the replacement of steel balls is strongly advised.

During re-assembly the steering head bearings must be grease packed. First insert the middle lug and stem in the steering head, and tighten the sleeve-nut (4) slightly together with top cone and cover by two turns. In order to avoid that steel balls reach the space (9), and lock the steering, the middle lug and stem must hang freely down, when tightening the sleeve nut (4)!

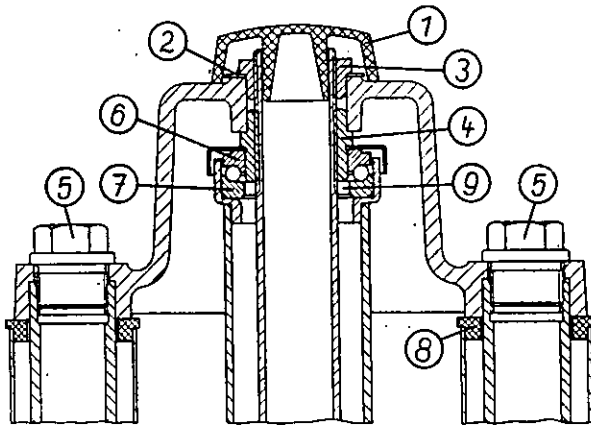


Fig. 17

8.4. Stanchions removal

To remove the stanchions, proceed in this way.

Unscrew the handlebar fastener and put the handlebar on the petrol tank — place a rag underneath. Fasten the front wheel between your knees and remove both cap nuts by using a 24 mm plug-spanner.

CAUTION: The cap nuts (M 27 × 2) are inserted with lacquer during assembly and therefore very tight.

Next, turn the both screws (2) at the middle lug and stem approx. three turns open and proceed in the same way with screw (3). Then remove the wheel spindle nut and withdraw the spindle. The front wheel is now free and can be lifted clear. To remove the mudguard, the gaiter clip screws (4) must be loosened. If the stanchions can not be removed easily, we advise to use the special tool 19-MW 22-1 (see Fig. 24), and to stroke the stanchions through.

It is recommended to mark both stanchions with paint at the front side, to make sure that they will be re-fitted into the former position during re-assembly.

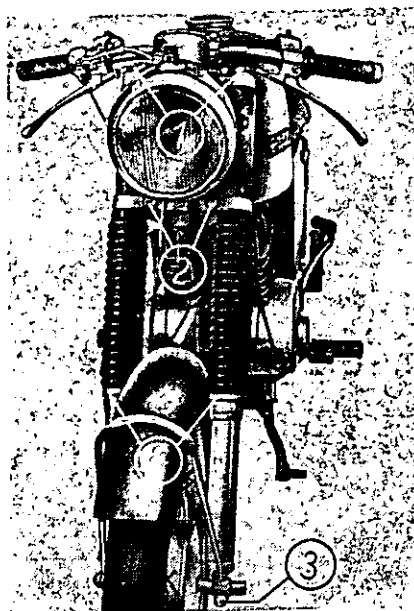


Fig. 18

8.5. Telescopic front fork repair-work

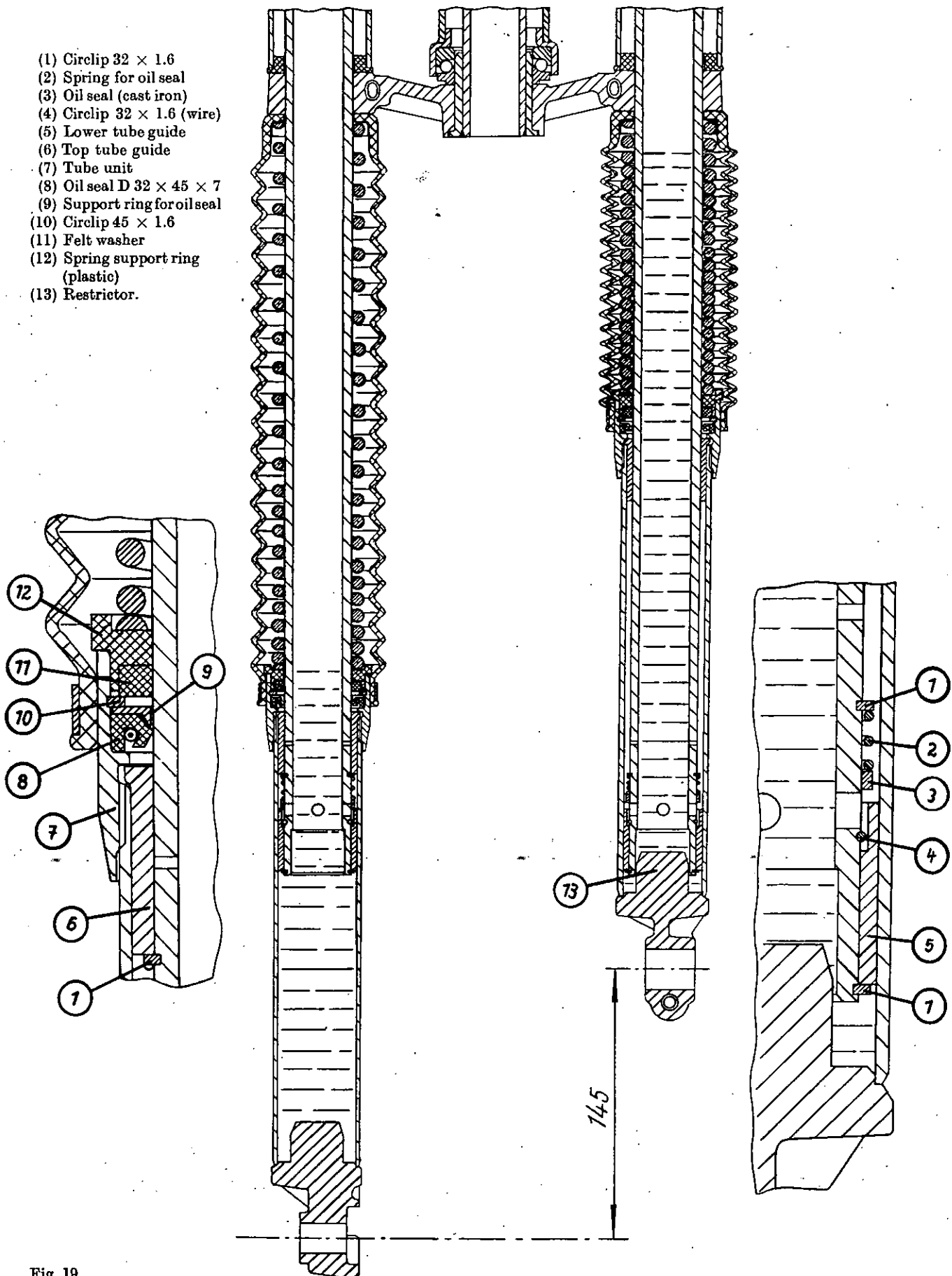


Fig. 19

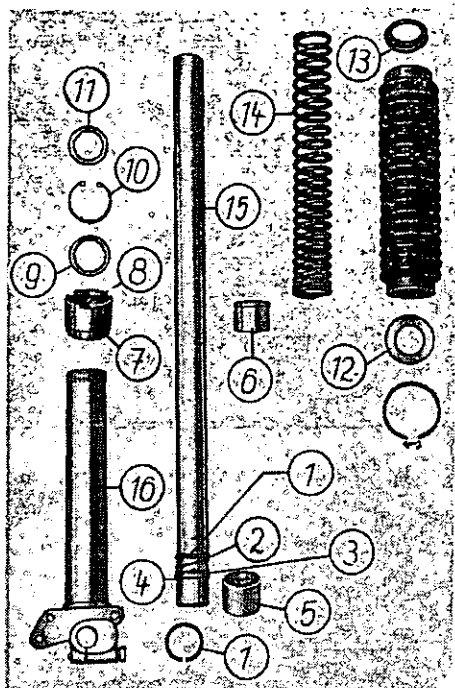


Fig. 20

- (1) Circlip 32×1.6 (4 ×).
 - (2) Spring for oil seal (2 ×)
 - (3) Oil seal — cast iron (2 ×)
Must be free from edges, absolutely plain, and must move freely at the stanchion
 - (4) Circlip 32×1.6
 - (5) Lower tube guide, made of bronze (2 ×)
Upper part should easily move over circlip (4).
Free-play between tube guide and stanchion 0.08 mm to 0.15 mm.
 - (6) Top guide, made of bronze (2 ×)
Free-play between tube guide and stanchion 0.08 to 0.15 mm.
 - (7) Tube nut (thread M 42 × 1) with
 - (8) Oil seal (D 32 × 45 × 7) and
 - (9) Support ring and
 - (10) Circlip (45×1.6) should be inserted as shown in Fig. 19 (2 ×). Please be advised, that within the stanchions, high pressures will be possible, approx. 20 at (290 lbs. sq. in.). The support ring for the oil seal has to support the so-called seal-lip against any deformation. The oil seal will not be worn out before covering approx. 30.000 kms under normal riding conditions.
 - (11) Felt washer (2 ×) is fitted for additional lubrication. Clean out with petrol and lubricate.
 - (12) Spring support ring (plastic) (2 ×)
 - (13) Spring cap (2 ×) fitted inside the rubber cover.
 - (14) Main spring — progressive type — (2 ×), size 274^{+5} mm. Under pre-tension 9 mm and travelway 145 mm, total tension will be 116.9 kp.
 - (15) Stanchion (2 ×), for smooth operation chromium-plated 25 μm thickness.
Diameter of new stanchions in the main working-range (see Fig. 19) : $31.8 \begin{smallmatrix} -0.01 \\ -0.07 \end{smallmatrix}$ mm
- Wear values:**
Diameter (ground), before chromium-plating:
 $31.7 \begin{smallmatrix} -0.009 \\ -0.02 \end{smallmatrix}$ mm
- (16) Right and left bottom member with wheel spindle fastener. Bore-nominal measure: $38.0^{+0.05}$ mm
Wear value: 0.03 mm

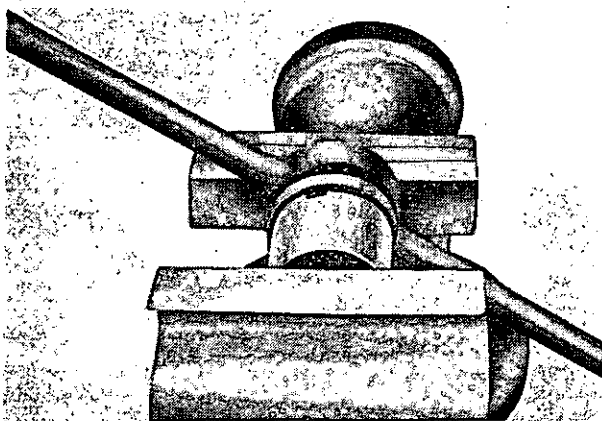


Fig. 21

For fitting the oil seal D 32 × 45 × 7 into the tube nut (7), we advise strongly to use the special tool 19 MW 22-1. When using other devices, the seal might be damaged or deformed and will not be tight.

The use of a hand-lever press or a vice — jaws of it aluminium or copper covered — is advised to fit the seal. Before fitting — grease slightly. For correct assembly see Fig. 18, item 8—10.

Do not straighten stanchions which are damaged in one way or the other. This is entirely useless, because deformed stanchions will never become straight ones again.

If an oil seal must be replaced, the stanchions should be turned for 180°. In this connection we refer to what has been said about marking the stanchions at the front side. When after a considerable mileage the chromium is removed, the stanchions should be replaced by new ones.

The axial play of the stanchions must not exceed 0.05 mm, in putting them between the tips of a lathe or a similar device. The lower tube guide (1) and the parts belonging to it, should be assembled as shown in Fig. 19, (1) to (5).

For fitting the pre-assembled tube nut it is recommended to use the special tool 19 MW 7-4 (2), in order to avoid any damage of the oil seal.

Lubricate before fitting!

It is important to know that the stanchions (1) must not be fixed between the jaws of a vice!

In case of slight traces on the surface, proceed in this manner: Remove the traces with "fine grained" oil stone or a smooth-file in the **working direction** of the stanchions. Clean carefully the stanchions and remove any foreign matter which might damage the surface.

In order to get the cap nut absolutely tight, the thread of the stanchions should be slightly painted with so-called "clear-lacquer". To tighten the cap nut, use the special tool 19 MW 22-1, to avoid any damage of the tube nut. Torque approx. 20 mkp.

Then assemble in this way: Felt ring, spring support ring, spring with rubber cover and spring cap — see Fig. 19.

CAUTION: For tightening the tube nuts and cap nuts use synthetic clear lacquer only — any other leak proof material is absolutely unsuitable, because it will make it very difficult to loosen such connection again!

8.6. Stanchions re-assembly

In order to make it easier to fit the stanchions into the rubber rings at headlamp fastener — please apply a slight cover of engine oil. After that, the thread of special tool 19 MW 22-1 (A) should be engaged to drive in the stanchions. In doing so, the main spring will be pre-tensioned to 9 mm! The stanchion must be kept in this position and the special tool must be replaced by the cap nut. Make sure that the stanchions are in the same position they have been before they were taken off. Note the paint mark!

After completion of this work, mudguard and front wheel can be fitted — but the screws and nuts must not be tightened!

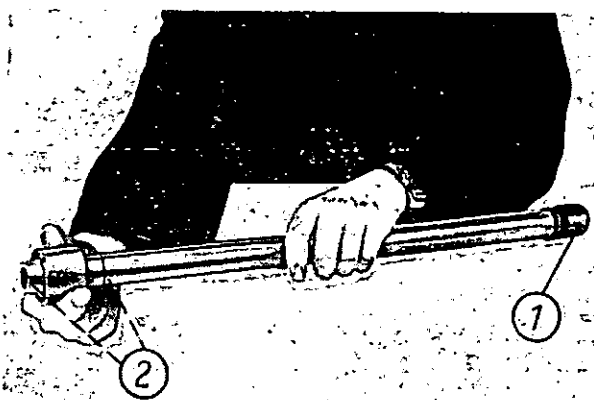


Fig. 22

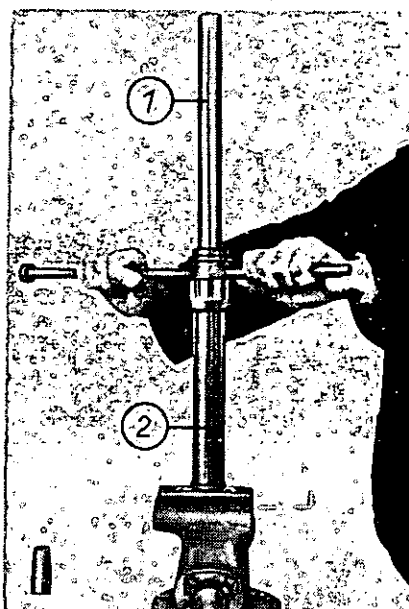


Fig. 23

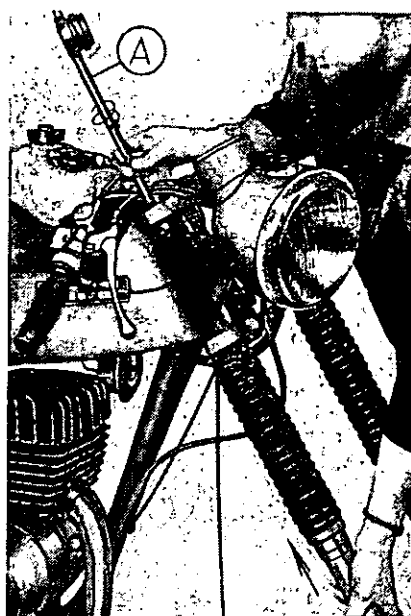


Fig. 24

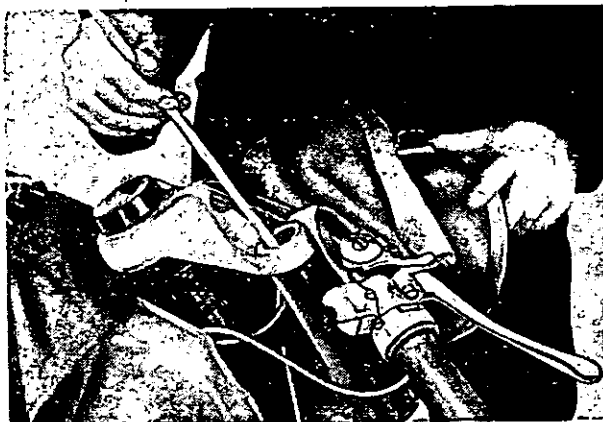


Fig. 25

8.7. Shockabsorber capacity checking

Capacity 215 cc shockabsorber-fluid "Globo" brand per stanchion. When replacing the fluid, for one reason or the other, we recommend to refill the following brands: Mobilfluid 62, Shell Donax A 1, Castrol Hyspin 45 or Esso Estic N 37.

When checking the capacity, a level-meter 4 to 5 mm diam. should be used. With the level-meter placed at the bottom — not at the restrictor — the fluid level must be at the 260 mm mark. See Sig. 19!

The level should be checked only, when an obvious fluid loss is indicated. This telescopic front fork is relatively trouble-free!

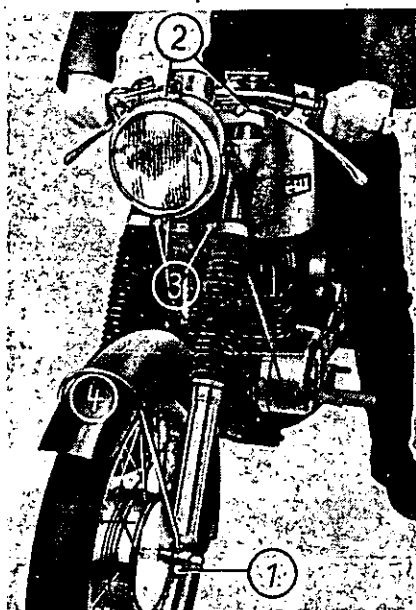


Fig. 26

To make sure that the two stanchions are absolutely parallel with each other — in order to avoid seizures during operation — the telescopic front fork must be powerfully operated several times.

In doing so, make sure that all screws and nuts are not tightened!

Next proceed in the following order:

- (1) Tighten the wheel spindel nut (5 kpm).
- (2) Both cap nuts — slightly coated with lacquer — tighten with 20 kpm.
- (3) Both middle lug and stem bolts, tighten with 10 kpm.
- (4) After the mudguard stay screws are tight, make sure that nothing is in touch with the rubber covers.

Finally operate again the front fork several times and check if it works smooth and is absolutely tight!

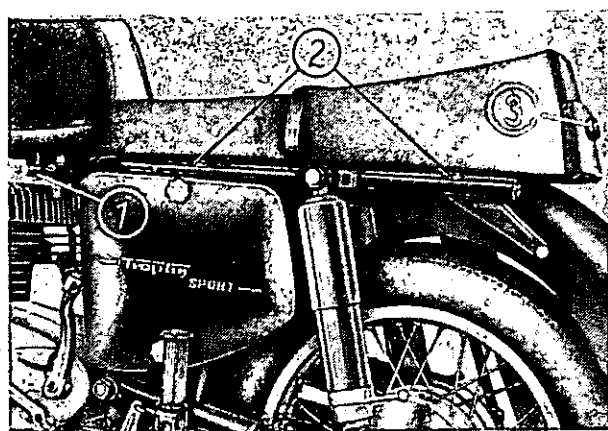


Fig. 27

8.8. Petrol tank, dual seat, tool box

The petrol tank is fitted in rubber blocks at the front. Two screws, spring washers, washers and rubber rings (1), fitted at the rear part, keep the tank in its correct position. The use of the original washers 8.4×25 is strongly recommended, otherwise the tank is labile. After loosening (approx. four turns open) the four fastening screws (2) the dual seat can be withdrawn. Underneath the seat is space enough for one spare tube or similar things (use a plastic bag).

The tool box (3) is equipped with a security lock, to prevent any unauthorized use.

8.9. Silencer

For maintenance and repair-work of the silencer with flat end baffle, please consult the repair manual ES 175/2—250/2 (Fig. 3).

Make always sure that the welding seams of the end baffle and the cover are in one line, in order to have the required 90° angle difference of the nozzles to the holes, which is responsible for full engine efficiency. The pressure value is the same on both silencer-systems and the silencer with flat end baffle has nothing to do with the tuned engines and increased performance.

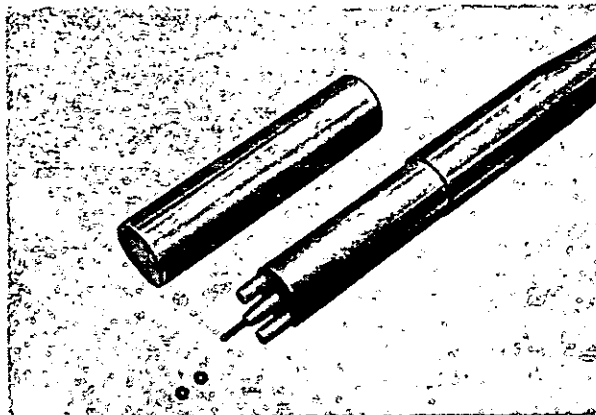


Fig. 28

9. Suspension unit repair-work

See repair manual ES 175/2—250/2.

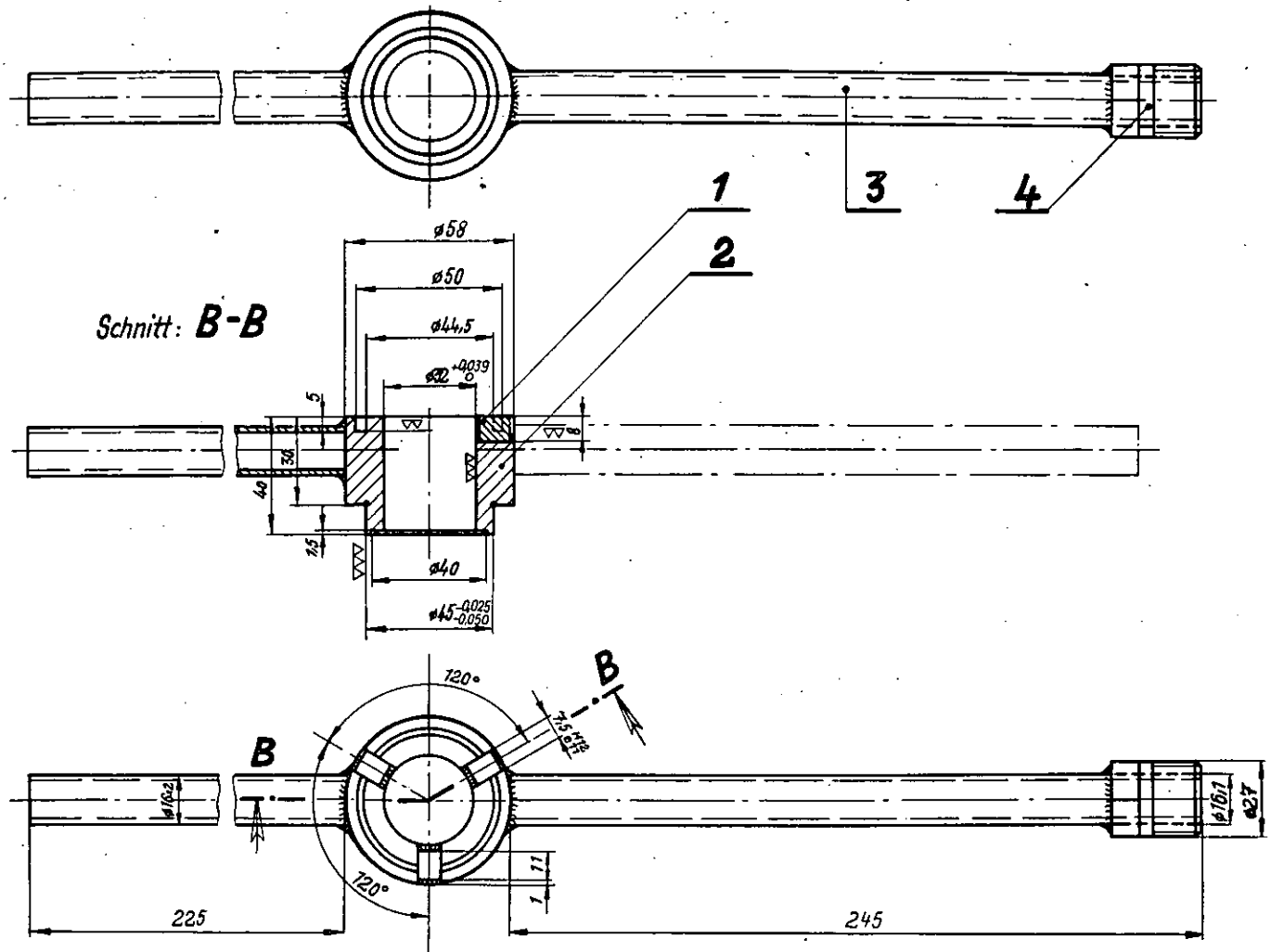
10. Index of special tools

(Additional special tools for ETS and tuned engines only)

1. 19 MW 22-1 Combined assembly spanner
2. 19 MW 7-4 Assembly sleeve for oil seal
3. 05-MV 209-4 Centering thorn for compensation gaskets

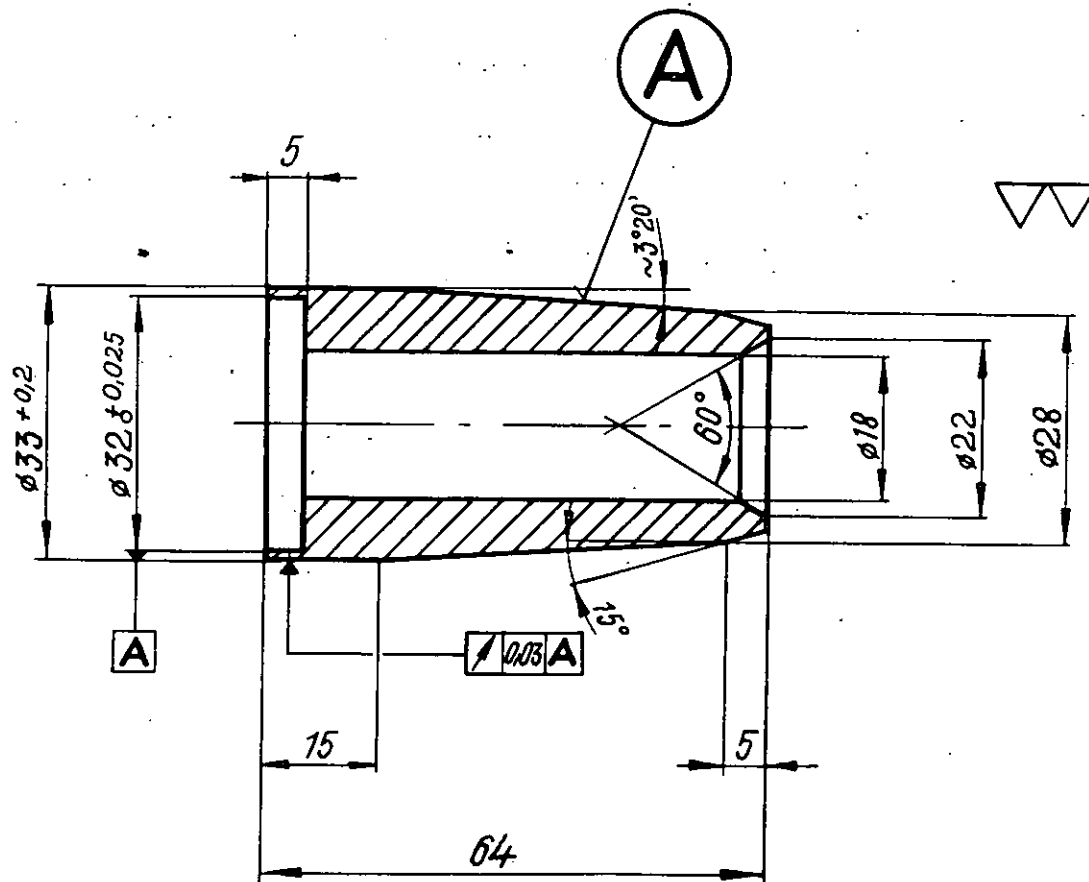
11. Drawings of special tools

1. Combined assembly spanner for telescopic front fork 19 MW 22-1



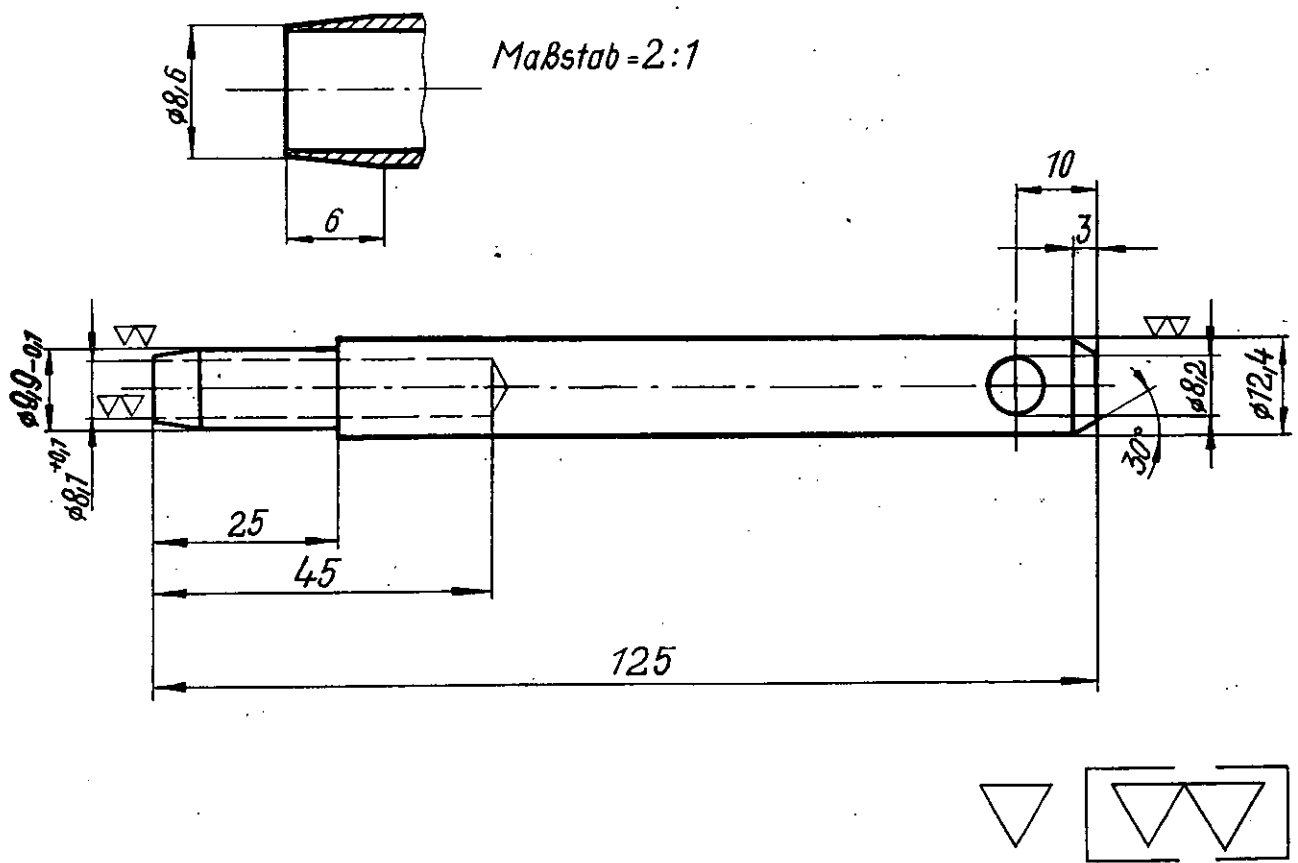
				Design size	Allowance
				7.5 ^{e11}	- 0.08 - 0.17
				7.50 ^{H12}	+ 0.15 0
Part	Number of parts	Description	Material	Rough measures	Remarks
1	3	use cap nut 19-22.073 (M 27 × 2)	C 45	8 × 8 × 15	} Welded parts
2	1		C 45	60 × 45 diam.	
2	2		Tube St. 35		
4	1				

2. Assembly sleeve for oil seal 19 MW7-4



Part	Number of parts	Description	Material	Rough measures	Remarks
	1		C 45	35 × 70 diam.	tempered A = polished

3. Centering thorn for compensation gaskets



Part	Number of parts	Description	Material	Rough measures	Remarks
			C 45	15 × 130 diam.	