

B. Drive Gear Parts

Crankshaft Grinding Table

Overhaul stage	Crankshaft Journals			Crankpins	
	Diameter of Journals	Journal width at locating bearing	Rear journal width	Crankpin diameter	Crankpin width
Standard size	$\frac{69.96}{69.94}$	$\frac{34.000}{34.025}$	$\frac{34.000}{34.100}$	$\frac{51.96}{51.94}$	$\frac{32.000}{32.100}$
1st Overhaul stage	$\frac{69.71}{69.69}$	to		$\frac{51.71}{51.69}$	32.000
2nd Overhaul stage	$\frac{69.46}{69.44}$			$\frac{51.46}{51.44}$	to
3rd Overhaul stage	$\frac{69.21}{69.19}$			$\frac{51.21}{51.19}$	32.300
4th Overhaul stage	$\frac{68.96}{68.94}$			$\frac{50.96}{50.94}$	

* Graded from 0.1 mm to 0.1 mm according to available thrust washers. (See Crankshaft Bearings, p. 00-2/5)

Machining Tolerances of Crankshaft Journals and Crankpins

Permissible out-of-round tolerance of crankshaft journals and crankpins	0.005	
Permissible conicity	0.01	
Permissible misalignment of crankpins with regard to crankshaft journals, related to bearing length	0.01	
Permissible run-out of center crankshaft journal with crankshaft supported on the outside journals	0.02	
Permissible lateral deflection of locating journal	0.015	
Permissible radial deflection of flywheel flange related to three crankshaft journals	0.02	
Permissible lateral deflection of flywheel flange related to three crankshaft journals	0.01	
Fillet radii at crankshaft journals and crankpins	2.5 — 3	
Hardness of crankshaft journals and crankpins	Scleroscope hardness	68 — 74
	Rockwell hardness	H Rc 55 — 61
Permissible unbalance of crankshaft The crankshaft is balanced together with the front counter-weight and the flywheel	15cmg	

Crankshaft Bearing Play

	Radial play	End play
Crankshaft bearings	0.045 — 0.065	0.040 — 0.096
Connecting-rod bearings	0.045 — 0.065	0.120 — 0.259 repair stage up to 0.5

Crankshaft Bearings

Housing bore	74.500 — 74.519						
Out-of-round tolerance of housing bore	0.01						
Conicity tolerance of housing bore	0.01						
Crush of bearing shell halves	+ 0.01						
Diameter of crankshaft bearings with bearing shell halves installed	Standard size	I	II	III	IV	V	VI
	<u>69.99</u> 70.02	<u>69.74</u> 69.77	<u>69.49</u> 69.52	<u>69.24</u> 69.27	<u>68.99</u> 69.02	—	—
	<u>2.030</u> 2.023	<u>2.080</u> 2.073	<u>2.130</u> 2.123	<u>2.180</u> 2.173	<u>2.230</u> 2.223	<u>2.280</u> 2.273	<u>2.330</u> 2.323
Thickness of thrust washers	<u>2.030</u> 2.023	<u>2.080</u> 2.073	<u>2.130</u> 2.123	<u>2.180</u> 2.173	<u>2.230</u> 2.223	<u>2.280</u> 2.273	<u>2.330</u> 2.323

Dimensions of Connecting Rods

Base bore for connecting rod bearings	<u>55.600</u> 55.619
Base bore for piston pin bushing	Standard size <u>28.000</u> 28.021
	Overhaul stage <u>28.500</u> 28.521
Permissible out-of-roundness of base bore	0.01
Permissible conicity of base bore	0.01
Center-to-center distance of bores	<u>153.95</u> 154.05
Width of connecting rod	<u>31.880</u> 31.841
Permissible difference in weight between connecting rod assemblies in any one engine	5 g
Permissible departure from axial parallelity related to a length of 100 mm	0.03
Permissible longitudinal distortion, related to a length of 100 mm	0.1

Connecting Rod Bearings

Crush of bearing shell halves				+ 0,01	
Diameters of connecting rod bearings with bearing shell halves installed	Overhaul stages				
	Standard size	I	II	III	IV
	$\frac{51.99}{52.02}$	$\frac{51.74}{51.77}$	$\frac{51.49}{51.52}$	$\frac{51.24}{51.27}$	$\frac{50.99}{51.02}$

Piston Pin Bushings

External diameter of piston pin bushings	Standard size		1st Overhaul stage	
	$\frac{28.048}{28.035}$		$\frac{28.548}{28.535}$	
Internal diameter of piston pin bushings	rough-turned	final	rough-turned	final
	$\frac{24.600}{24.730}$	$\frac{25.007}{25.013}$	$\frac{24.600}{24.730}$	$\frac{25.007}{25.013}$
Force-fit dimension of piston pin bushings in connecting rod		minimum + 0.3		
After pressing in the piston pin bushings, the connecting rod should be unstressed for half an hour at 160—180° C.				

Piston Pins

Color code	Diameter of piston pins	Piston pin bushing bore	Clearance	Bore in piston
black	$\frac{24.997}{24.994}$	$\frac{25.007}{25.010}$	0.010 — 0.016	$\frac{24.994}{24.997}$
white	$\frac{25.000}{24.997}$	$\frac{25.010}{25.013}$	0.010 — 0.016	$\frac{24.997}{25.000}$

Connecting Rod Cap Bolts

Shank diameter	plain	$\frac{10.008}{10.001}$
	white	$\frac{10.016}{10.009}$

Pistons

Piston clearance	0.04				
Piston diameter	Cylinder bore less piston clearance				
Pistons available	Standard size	Intermediate stage	1st Overhaul stage	2nd Overhaul stage	3rd Overhaul stage
	84.96	85.21	85.46	85.96	86.46
	84.97	85.22	85.47	85.97	86.47
	84.98	85.23	85.48	85.98	86.48
Permissible difference in weight between the pistons in any one engine			4 g		
Piston ring clearance and gap		Clearance		Gap	
1. Compression ring	10f85 x 77.6 x 2	0.035 — 0.062		0.55 — 0.70	
2. Tapered compression ring	11f85 x 77.6 x 2.5			0.45 — 0.60	
3. Novi stepped ring	85 x 3T 16 Nova			0.30 — 0.45	
4. Novi slotted ring	85 x 5T 17 Nova			0.25 — 0.40	

Flywheel

Clearance between clutch face and clutch clamping face	29 ± 0.1	
Clearance between clutch face and flywheel attaching flange	new	overhaul
	12.5	up to 11.5
Departure from parallel between clutch face and clamping face for the crankshaft flange	0.05 mm at a diameter of 230 mm	

C. Engine Timing

Valves

	Valve head diameter	Shaft diameter	Length	Height of valve head	Valve seat angle	Hardness at valve shaft end
Inlet	$\frac{44.2}{44.1}$	$\frac{8.97}{8.95}$	128	1.5	90° ± 30	H Rc 55-61
Exhaust	$\frac{37.2}{37.1}$	$\frac{9.95}{9.93}$	112.75	2.25		

Valve Springs

	External diameter	Wire gage	Length L unloaded	Length L ₁ depressed under load P ₁		Length L ₂ under final load P ₂	
	mm	mm	mm	mm	kg	mm	kg
Inner	20.7	2.6	42	34.2	8.9	25.7	18.6 ⁺² ₋₁
Outer	30.6	4	47	38.4	23.1	29.9	45.9 ^{+4.5} _{-2.2}

Camshaft and Camshaft Bearings

Overhaul stage	1st Bearing (Timing gear end)		2nd Bearing		3rd Bearing (Flywheel end)	
	Shaft	Bearing	Shaft	Bearing	Shaft	Bearing
Standard size	$\frac{34.975}{34.959}$	$\frac{35.000}{35.016}$	$\frac{44.975}{44.959}$	$\frac{45.000}{45.016}$	$\frac{45.975}{45.959}$	$\frac{46.000}{46.016}$
Intermediate stage	$\frac{34.875}{34.859}$	$\frac{34.900}{34.916}$	$\frac{44.875}{44.859}$	$\frac{44.900}{44.916}$	$\frac{45.875}{45.859}$	$\frac{45.900}{45.916}$
1st Overhaul stage	$\frac{34.725}{34.709}$	$\frac{34.750}{34.766}$	$\frac{44.725}{44.709}$	$\frac{44.750}{44.766}$	$\frac{45.725}{45.709}$	$\frac{45.750}{45.766}$