Association piston-cy	linder						·
Group No.					0	1	2
Standard dimension S	`+ al			piston dia.	91.98	91.99	92.00
Standard dimension S	ota			cylinder dia.	92.00	92.01	92.02
4	***************************************			piston dia.	92.48	92.49	92.50
1st repair stage + 0.5				cylinder dia.	92.50	92.51	92.52
2nd repair stage + 1.0			piston dia.	92.98	92.99	93.00	
Zna repair stage 11.0				cylinder dia.	93.00	93.01	93.02
Engine	Piston code No.			Piston crown refer to illustration	Spacing between piston crown and parting surface of cylinder crankcase		Compression
	Std	+ 0.5	+ 1.0		Std	+ 0.5 and + 0.1	
116.980 116.981 116.982 116.983 116.980 (SA) 116.981 (USA)	51	52	53	cavity 1 mm deep d = 52 mm 2 valve niches	projection max. 0.75 min. 0.30	projection max. 0.10 recess max. 0.35	9.3
	54	55	56				9.5
116.984 116.985	66 69	67 70	68 71	without cavity 4 valve niches	projection max. 0.75 min. 0.6	projection max. 0.55 min. 0.1	9
116.990 NV 116.991 NV 116.992 NV	57 60	58 61	59 62	cavity 4 mm deep 56 x 84 mm oval	projection max. 0.85	projection max. 0.40	8
116.993 NV	00	01	02	without valve niches	111111. 0.30	min. 010	7.5
116.984 NV 116.985 NV	72	73	74	cavity 5.1 mm deep d = 66 mm 4 valve niches	projection max. 1.05 min. 0.6	projection max. 1.05 min. 0.6	7.5
117.982 117.983	19 25	20 26	21 27	cavity 5.9 mm deep d = 66 mm 2 valve niches	projection max. 0.75 min. 0.30	projection max. 0.25 recess max. 0.20	8.8
117.985 117.986	31 37	32 38	33 39	cavity 5.9 mm deep d = 66 mm 4 valve niches	projection max. 0.75 min. 0.30	projection max. 0.25 recess max. 0.20	8.8
117.981 (ISA) 117.982 (ISA) 117.983 (ISA) 117.984 (ISA)	10 13	11 14	12 15	without cavity without valve niches	recess max. 3.60 min. 3.15	recess max. 4.1 min. 3.65	8.0
117.985 (AUS) J S (USA) 117.986 (AUS) J S (USA)	40 50 ¹) 53 56 60	41 51 54 57 61	42 52 55 58 62	cavity 8.8 mm deep d = 66 mm 4 valve niches	projection max. 0.75 min. 0.30	projection max. 0.25 recess max. 0.20	8.0
117.992 NV 117.993 NV 117.985 NV 117.986 NV	22 ²) 43 ³)	23 44	24 45	cavity 9 mm deep d = 80 mm 4 valve niches	projection max. 0.75 min. 0.30	projection max. 0.25 recess max. 0.20	7.5

Piston with reduced friction capacity (oil ring 008 037 30 18) for (USA) entering production 1979 starting engine No. 117.985—12—043649 and 117.986—12—049507.

2 valve niches.

117.985 NV starting engine end No. 009 551, 117.986 NV starting engine end No. 013 041.

Test values			when new	wear limit
Piston clearance			0.02-0.03	0.08
Max. wear limit of cylinder bores in driving or transverse direction at upp reversing point of 1st piston ring	er		0.10	
Weight difference of pistons in one e	ngine		4 g	10 g
Piston pin dia.		25.99 to 26.00		
Piston pin clearance in connecting ro	d bushing	0.007 to 0.018		
Piston pin clearance in piston	0.002 to 0.012			
	groove 1	engine 116 engine 117	0.30 to 0.45 0.35 to 0.55	1.0
Gap clearance of piston rings	groove 2		0.35 to 0.55	0.8
	groove 3		0.25 to 0.40	0.8
Side clearance of piston rings	groove 1	engine 116 engine 117	0.05 to 0.8 0.06 to 0.9	0.15
Side creatance of pistoff fings	groove 2		0.04 to 0.07	0.08
	groove 3		0.03 to 0.06	0.08

Tightening torque

Connection and make	initial torque	40-50 Nm
Connecting rod nuts	angle of rotation torque	90-100°

Special tools

Expanding pliers for piston rings



000 589 51 37 00

Clamping strap for piston rings

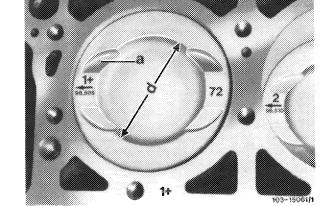


000 589 04 14 00

Note

Standard pistons are subdivided in three tolerance groups (group numbers). They are punched into piston crown as follows:

- 1. Piston dia. e. g. 92.00
- 2. Piston code number e. g. 72
- 3. Group number e. g. 2
- 4. Direction indicating arrow



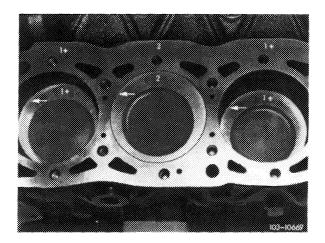
- a Valve depression
- b Cavity dia.

The group number is also punched into cylinder crankcase parting surface.

The group number of pistons (e.g. 2) must be in accord with group number of cylinder bores (series production).

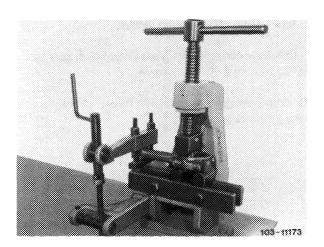
The specified piston clearance will then be maintained.

In the event of repairs, hone all cylinder bores to dimensions of existing pistons plus piston clearance (refer to table).



Removal

- 1 Remove connecting rod with piston in upward direction.
- 2 Remove piston pin lock and force out piston pin.
- 3 Recondition and square connecting rod (03-313).

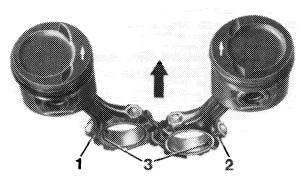


Installation

- 4 Check piston rings of used pistons for gap and end clearance.
- 5 Lubricate piston pins and connecting rod bushings.



6 Mount pistons on connecting rod in such a manner that the arrow points in driving direction and the locking grooves (3) in connecting rod to outer sides of engine.



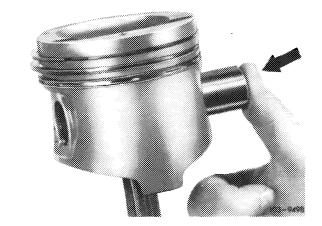
- 1 Connecting rod thrust end
- 3 Locking grooves

100 ~ 9555/1

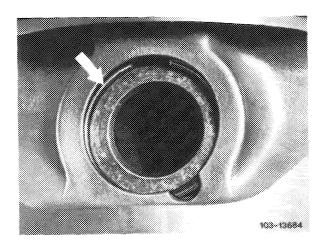
7 Push-in piston pin manually.

Attention!

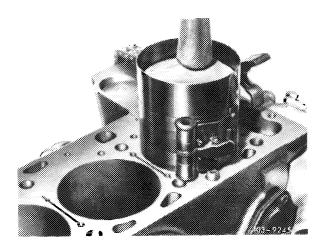
Do not heat piston.



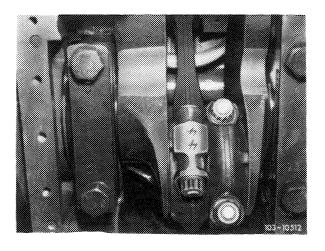
- 8 Insert piston pin lock into groove.
- 9 Lubricate clean cylinder bores, crankpins, connecting rod bearing shells and pistons.
- 10 Distribute gap ends of piston rings uniformly along piston circumference.



11 Mount clamping strap for piston rings and introduce piston with arrow in driving direction.



- 12 Position connecting rod bearing cap with code numbers in relation to each other on connecting rod and tighten connecting rod nuts to 40-50 Nm initial torque and $90-100^{\circ}$ angle of rotation torque.
- 13 Rotate crankshaft and check clearance between piston pin eye and connecting rod.



14 In TDC position of pistons, measure distance between piston crown and cylinder crankcase parting surface (refer to table).

