## FOREWORD

This supplement covers the following engines:

**XUD 9A - Non - Turbo**
**XUD 7TE - Turbo**

As these operations have been performed on an XUD9A engine, some illustrations may differ in detail from the engine being worked on.

**IMPORTANT:** Unless shown otherwise, all dimensions are in millimetres.

**Abbreviations used in this supplement:**

**IN : INLET**

**EX : EXHAUST**

**S : STANDARD**

**SL : SERVICE LIMIT**

**Ø : DIAMETER**

Modifications can affect adjustments and overhaul operations on these engines.

## IDENTIFICATION DATA

### Cylinder Head

Cylinder head height **h** is measured with the camshaft in place fitted with two bearing caps.

**h** is measured in the oil seal lip contact diameter (the largest diameter).

**h nominal: 157.40 to 157.75**

Maximum permissible bow: **0.07** (the camshaft must turn freely)

Maximum permissible gasket face machining: **0.4** in relation to the measured **h** nominal.

Cylinder heads machined undersize are stamped **R** in the area **(a).**

After machining a gasket face, the following operations must be carried out:

- Valve seat machining to re-establish correct recess, (See page 6).
- Replacement of the swirl chambers by service replacement chambers and correction of their protrusion, (See page 7).
- Fitting of **0.4** thick compensation washers under the valve springs.

Cylinder heads with oversize camshaft bearings ( + 0.5) are stamped **1** in the area **(a).**

### Cylinder head gasket

Thickness identification: **b**

Engine identification: **c**

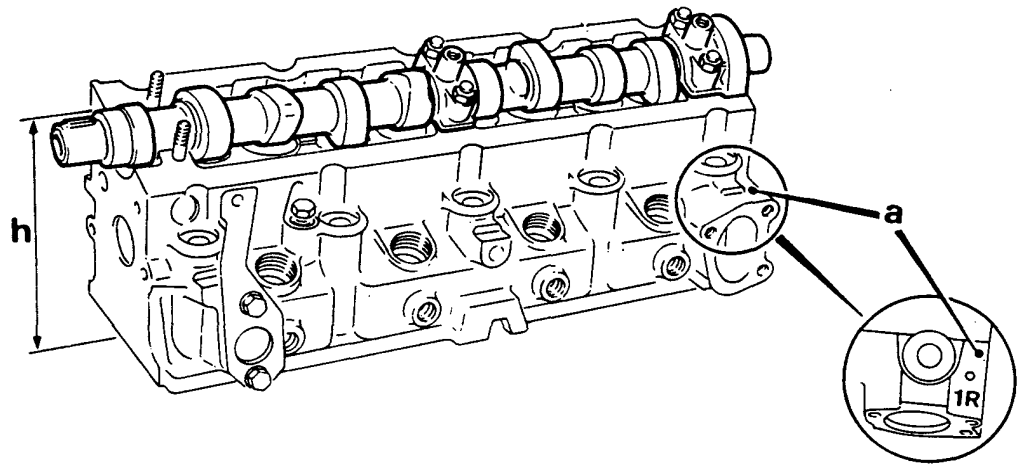
| Engine | Identification(c) | Identification(b) | Thickness |
|---|---|---|---|
| XUD 9A | No notch | 2 notches | 1.61 mm |
| | | 3 notches | 1.73 mm |
| XUD 7TE | 2 notches | 2 notches | 1.65 mm |
| | | 3 notches | 1.80 mm |

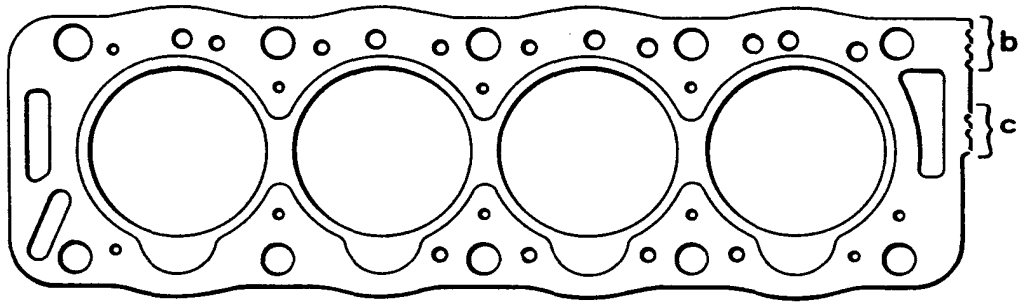
### Camshaft

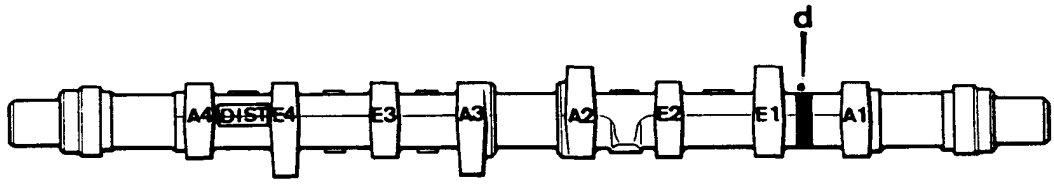
The camshaft for the XUD 7TE engine is identified by a boss between the cams of No.1 cylinder.

Camshafts with **0.5 mm** oversize bearings * are identified by a yellow paint ring **(d)** between the cams of No.1 cylinder.

* These camshafts are fitted only to exchange engines and can be obtained from Parts on special order.

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## IDENTIFICATION DATA

### Valves

| | IN | EX |
|---|---|---|
| Min. length 1 | 112.2 | 112.2 |
| Ø a – 0.015 | 8.005 | 7.985 |
| Ø ± 0.1 | 38.5 | 33 |
| a | 90° | 90° |

**IN:** faces **(x)** and **(y)** can be machined a maximum of 0.2 mm

**EX:** No machining is permissible

### Valve recess

| | IN | EX |
|---|---|---|
| C | 0.5 to 1.05 | 0.9 to 1.45 |

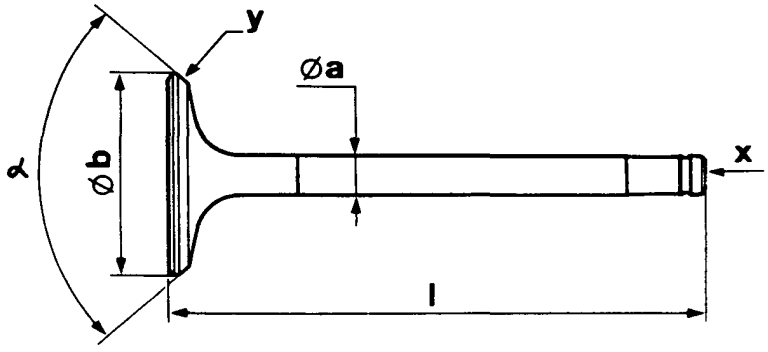
### Valve springs

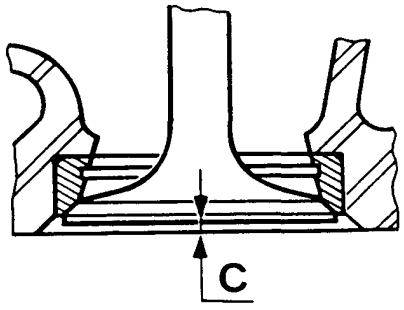
| | |
|---|---|
| Ø d | 29 |
| Ø | 57 |

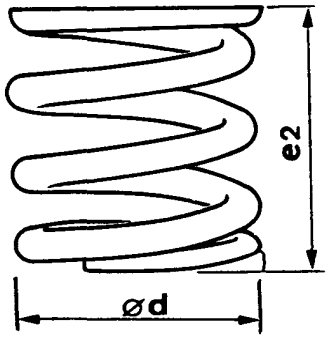
### Valve guides

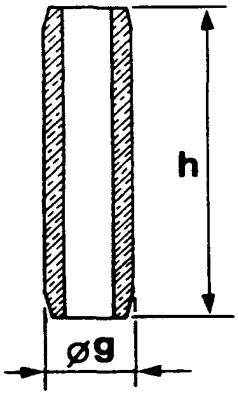
| | Ø f | Ø g | h | j | Ø k |
|---|---|---|---|---|---|
| Tolerance | 0<br>– 0.011 | + 0.032<br>0 | ± 0.25 | ± 0.50 | 0<br>+ 0.2 |
| **S** | 14.02<br>14.13 | 13.981<br>14.051 | 52.00 | 36.50 | 8.02 |
| **SL** – 1 | 14.29 | 14.211 | 52.00 | 36.50 | 8.02 |
| **SL** – 2 | 14.59 | 14.511 | 52.00 | 36.50 | 8.02 |

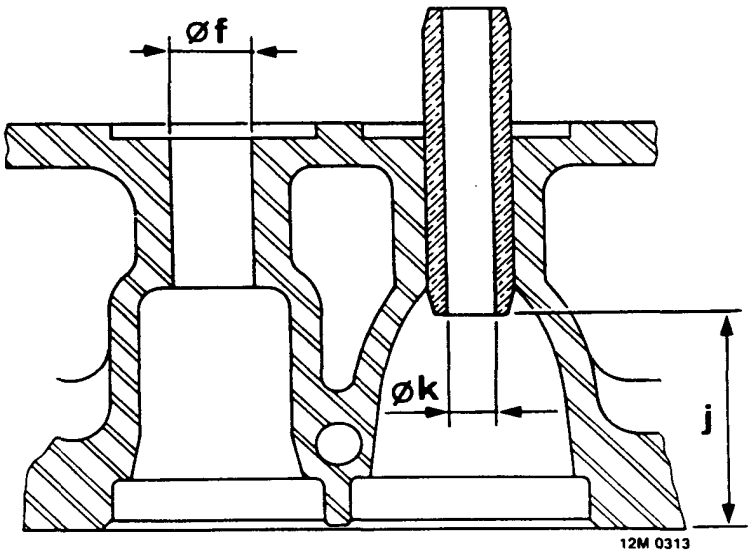
**Ø k** is obtained by machining after fitting in the cylinder head.


y
Øa
α
Øb
x
l


C


e2
Ød


h
Øg


Øf
Øk
j
12M 0313

IDENTIFICATION DATA

**Valve seats**

| | IN | | | |
|---|---|---|---|---|
| | Ø a | Ø b | c | d |
| Tolerance | 0<br>−0.025 | ±0.025 | 0<br>−0.1 | ±0.15 |
| **S** | 40.161<br>40.361 | 40<br>40.2 | 6.25<br>6.45 | 8.267<br>8.467 |
| **SL** −1 | 40.461 | 40.3 | 6.45 | 8.467 |
| **SL** −2 | 40.661 | 40.5 | 6.45 | 8.467 |

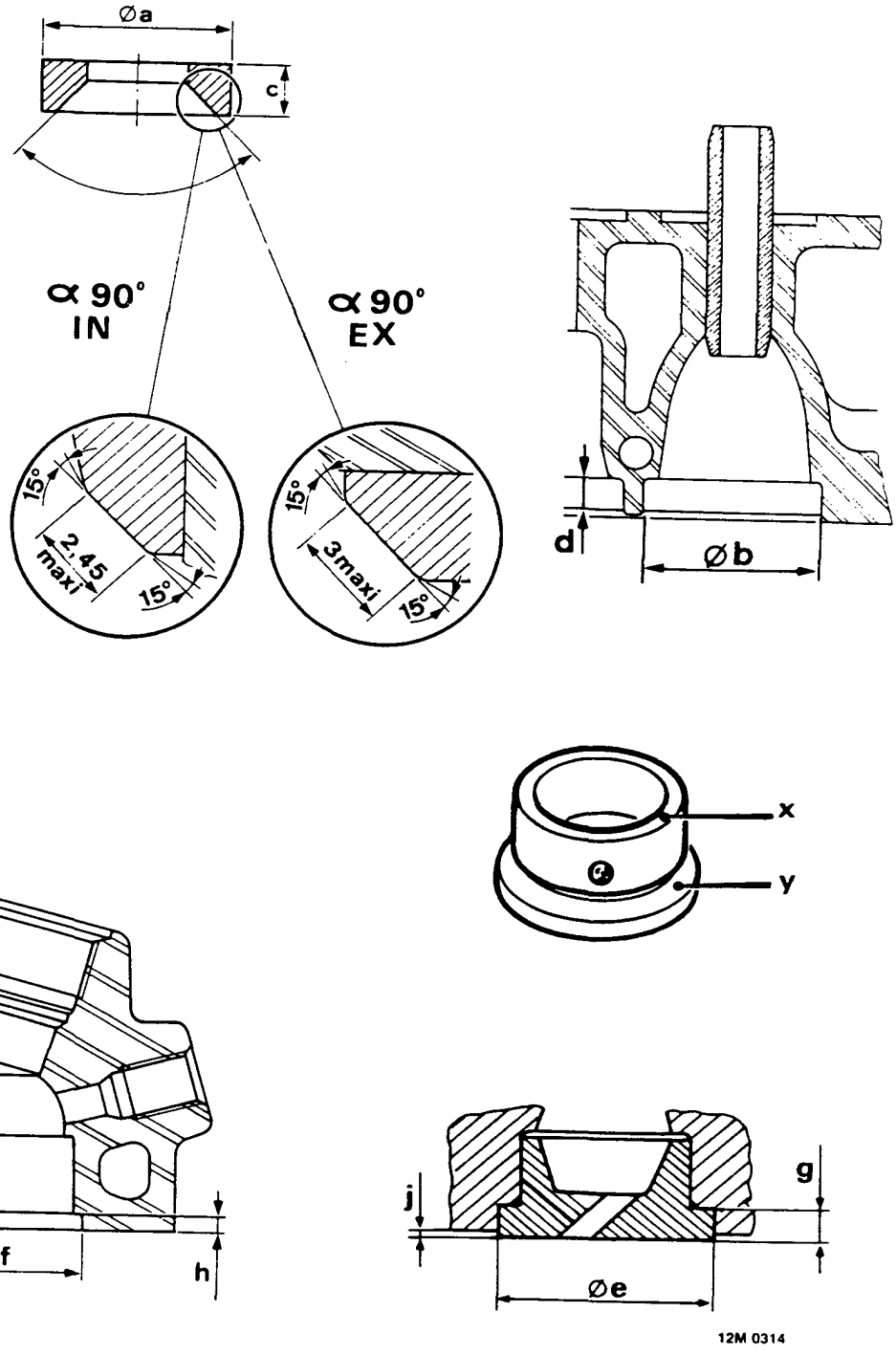
| | EX | | | |
|---|---|---|---|---|
| | Ø a | Ø b | c | d |
| Tolerance | 0<br>−0.025 | ±0.025 | 0<br>−0.1 | ±0.15 |
| **S** | 34.137<br>34.337 | 34<br>34.2 | 6.05<br>6.25 | 8.15<br>8.35 |
| **SL** −1 | 34.437 | 34.3 | 6.25 | 8.35 |
| **SL** −2 | 34.637 | 34.5 | 6.25 | 8.35 |

After fitting valve seats into the cylinder head, machine them according to the drawings opposite.

**Swirl chambers**

| | Ø e | Ø f | g | h |
|---|---|---|---|---|
| Tolerance | +0.099<br>−0.060 | +0.039<br>−0 | +0.020<br>−0.025 | +0.02<br>−0.04 |
| **S** | 32.05<br>32.25 | 32<br>32.2 | 4<br>4.1 | 3.9<br>4 |
| **SL** −1 | 32.45 | 32.4 | 4.2 | 4.1 |
| **SL** −2 | 32.65 | 32.6 | 4.3 | 4.2 |

The protrusion **j** must be between **0 and 0.03 mm.**
Dimension **j** is obtained by machining faces **(x)** and **y**


Øa
c
α 90°
IN
α 90°
EX
15°
2,45
maxi
15°
15°
3maxi
15°
d
Øb
x
y
Øf
h
j
g
Øe
12M 0314

## IDENTIFICATION DATA

### Cylinder/piston matching

| Identification (x) | | Cylinder Ø a Tolerance + 0.018 XUD 7TE | Cylinder Ø a Tolerance + 0.018 XUD 9A | Piston Ø b Tolerance ± 0.009 XUD 7TE | Piston Ø b Tolerance ±0.009 XUD 9A |
|---|---|---|---|---|---|
| **S** | None | 80 | 83 | 79.93 | 82.93 |
| **S** | A1 | 80.03 | 83.03 | 79.96 | 82.96 |
| **SL** – 1 | R1 | 80.20 | 83.20 | 80.13 | 83.13 |
| **SL** – 2 | R2 | 80.50 | 83.50 | 80.43 | 83.43 |
| **SL** – 3 | R3 | 80.80 | 83.80 | 80.73 | 83.73 |

***Note:*** *The piston* **Ø b** must be measured at dimension c

| | XUD 7TE | XUD 9A |
|---|---|---|
| c | 22.50 | 25.00 |

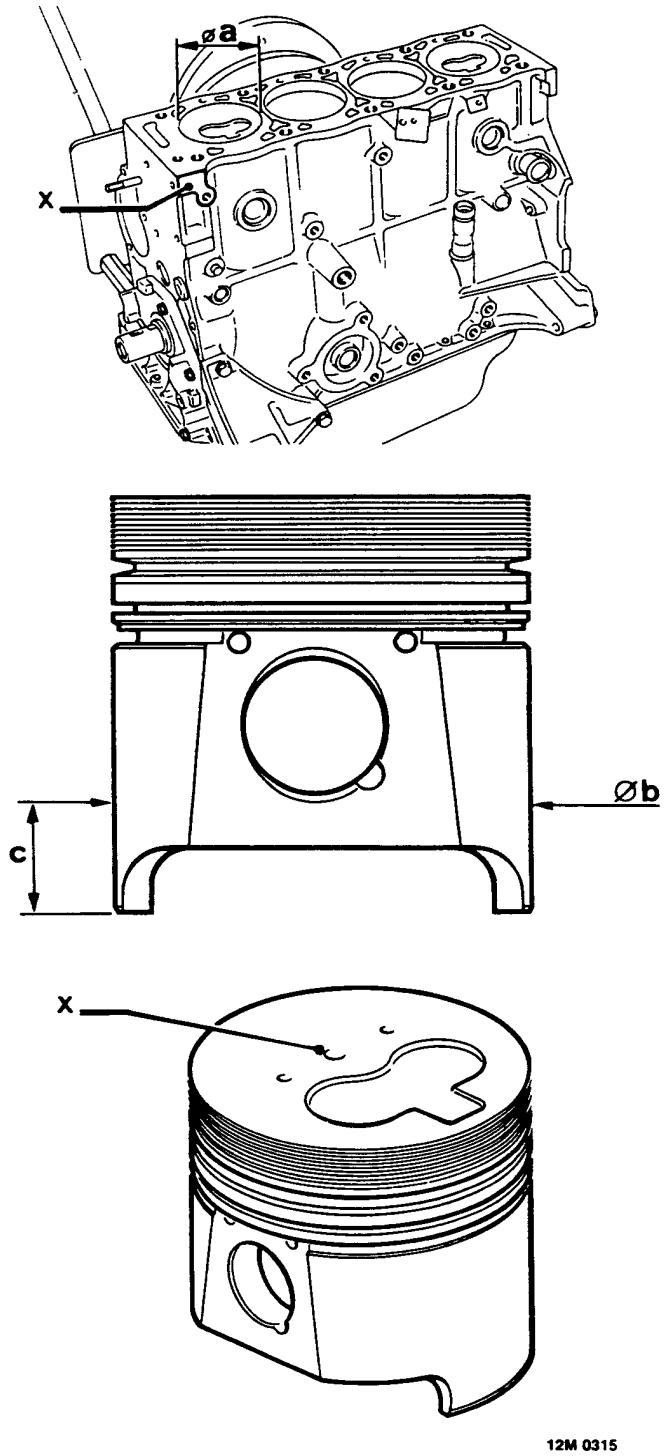
The repair dimension identification **(x)** is stamped on the cylinder block and pistons.

### Gudgeon pin

| | XUD 7TE | XUD 9A |
|---|---|---|
| Ø | 28 | 25 |

### Piston ring gaps

| | XUD 7TE | XUD 9A |
|---|---|---|
| First ring | 0.20 to 0.40 | 0.20 to 0.40 |
| Second ring | 0.20 to 0.35 | 0.15 to 0.35 |
| Oil control ring | 0.10 to 0.35 | 0.10 to 0.30 |


øa
X
Øb
c
X
12M 0315

**IDENTIFICATION DATA**

**Crankshaft**

***Crankpins and journals***

| | Ø a | b | Ø c | d |
|---|---|---|---|---|
| Tolerance | −0<br>−0.016 | ±0.003 | −0<br>−0.019 | ±0.003 |
| **S** | 50.00 | 1.827 | 60.00 | 1.842 |
| **SL − 1** | 49.70 | 1.977 | 59.70 | 1.992 |

***Note:*** *Big end and main bearing shells* **SL − 1** can be identified by white paint **(1)** on the edge of the shell.

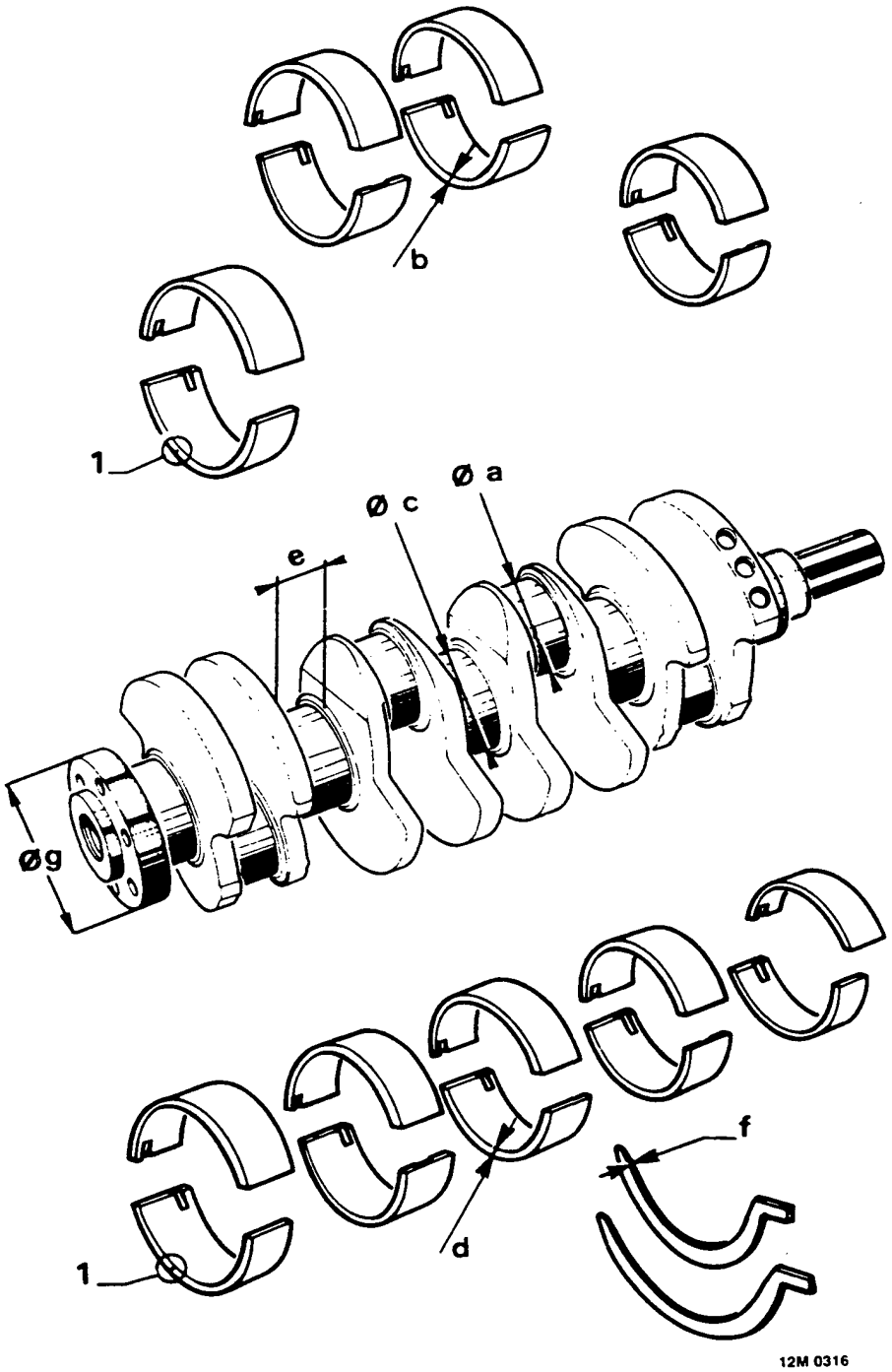
***End float***

End float must be between **0.7** and **0.32 mm.**

| | e | e | f | f |
|---|---|---|---|---|
| | XUD 7TE | XUD 9A | XUD 7TE | XUD 9A |
| Tolerance | +0.05 | +0.05 | ±0.025 | ±0.025 |
| **S** | 25.7 | 26.60 | 1.855 | 2.305 |
| **SL − 1** | 25.9 | 26.80 | 1.955 | 2.405 |
| **SL − 2** | 26.0 | 26.90 | 2.005 | 2.455 |
| **SL − 3** | 26.1 | 27.00 | 2.055 | 2.505 |

***Oil seal contact surface***

| Dimension | Ø g<br>Tolerance −0.087 |
|---|---|
| **S** | 90.0 |
| **SL − 1** | 89.80 |


b
1
Ø a
Ø c
e
Øg
f
d
1
12M 0316