

03-3180 Examining and repairing crankshaft

Operation no. of operation texts and work units or standard texts and flat rates

Data in mm

Permissible out-of-roundness of crankshaft and conrod bearing journals		0.002
Permissible difference in cylinder shape over length of about 54 mm	conrod bearing journals	0.010
	crankshaft bearing journals	0.010
Permissible axial runout of fit bearing		0.02
Fillet radii at the	crankshaft bearing journals	1.9 – 2.1
	conrod bearing journals	1.9 – 2.1
Bearing journals ground and precision-lapped, max. peak-to-valley-height R_z (μm)		0.15
Crankshaft journal \varnothing at front		31.98 – 32.00
Permissible difference in concentricity of front crankshaft journal ²⁾ ³⁾		0.05
Contact surface \varnothing for radial seal at rear		92.874 – 92.928
Permissible difference of rear crankshaft flange	radial ²⁾	0.04
	axial ²⁾	0.015
Permissible difference in concentricity of crankshaft bearing journals ²⁾ ⁴⁾	journals 2, 6	0.07
	journals 3, 4, 5	0.14
Scleroscopic hardness of crankshaft and conrod bearing journals	when new	74 – 84
	limit value	60 ⁵⁾
Permissible imbalance of crankshaft when mounted in journals 2 and 6		100 gmm ⁶⁾

2) When crankshaft mounted on crankshaft bearing journals 1 and 7 and one full revolution.

3) If measurement made when crankshaft installed, eliminate radial bearing play by applying pressure to crankshaft journal.

4) When crankshaft mounted on the crankshaft bearing journals in front of and behind the crankshaft bearing journal to be measured and one full revolution, permissible difference 0.04.

5) The limit value must exist at at least 2/3 of the circumference of the journal.

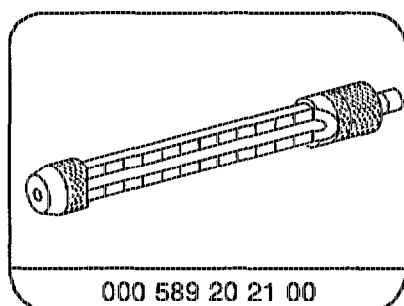
6) Related to 1st and 12th balancing weight at 550 rpm when mounted on 2nd and 6th crankshaft bearing journals.



Note

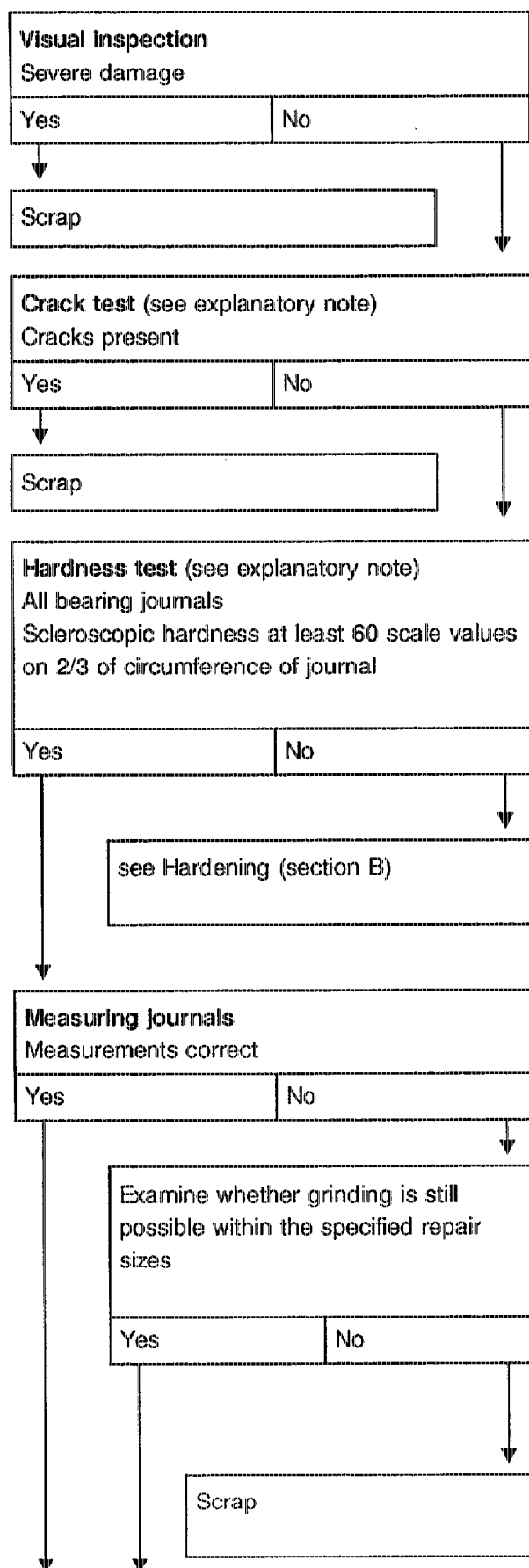
Maximum wear limit of crankshaft and conrod bearing journals 0.02 mm. The repair sizes listed in the table should be adhered to exactly. When re-grinding, it is essential to maintain the fillet radii at the crankshaft and conrod bearing journals.

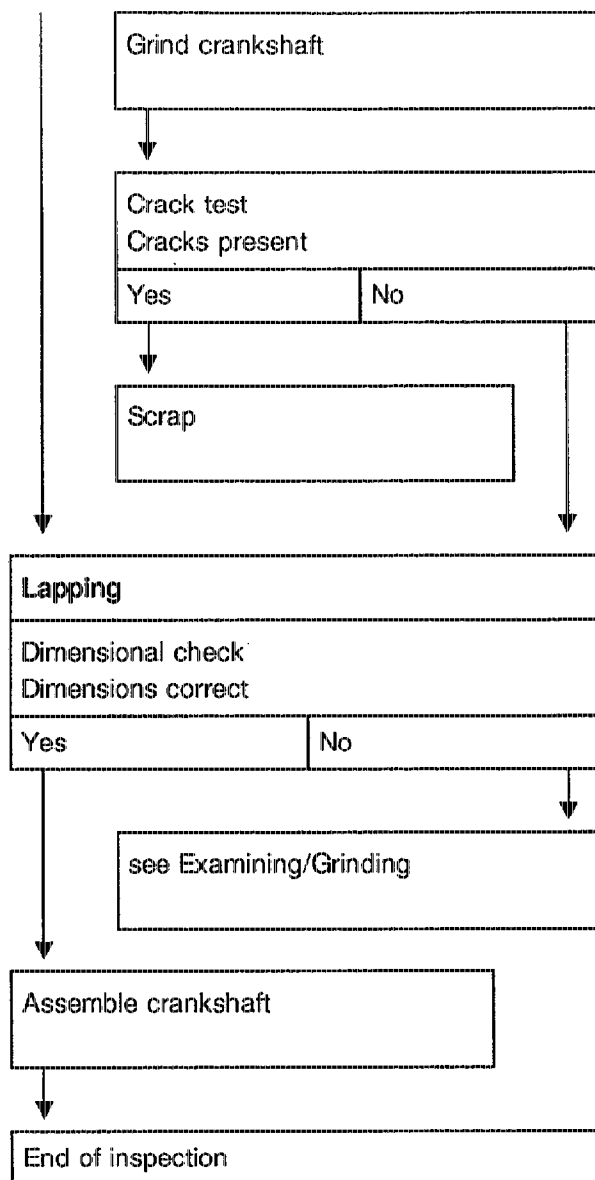
All the radii of the conrod and crankshaft bearings are inductively surface-hardened, at the 2nd, 3rd, 4th, 5th and 6th crankshaft bearings. The running surface for the rear radial seal is inductively hardened to a depth of about 1 – 2 mm.

Special tool**Note**

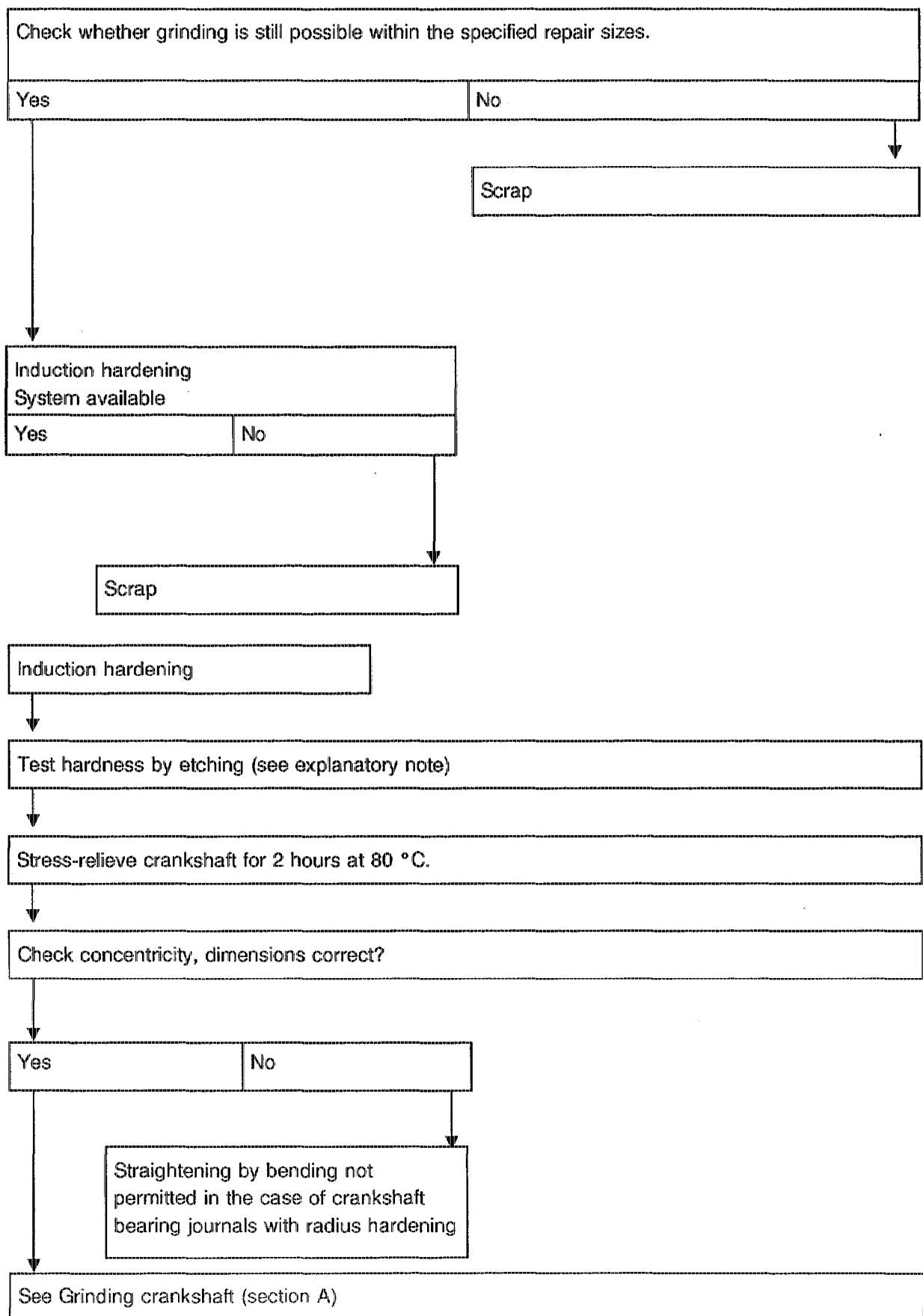
Proceed in the order stated in the diagram overleaf when examining and servicing crankshafts.

A. Examining, grinding





B. Hardening



Explanatory notes of diagram

Crack testing

Clean crankshaft. The bearing journals must be free of oil and grease.

Magnetize crankshaft and apply fluorescent powder (flux).

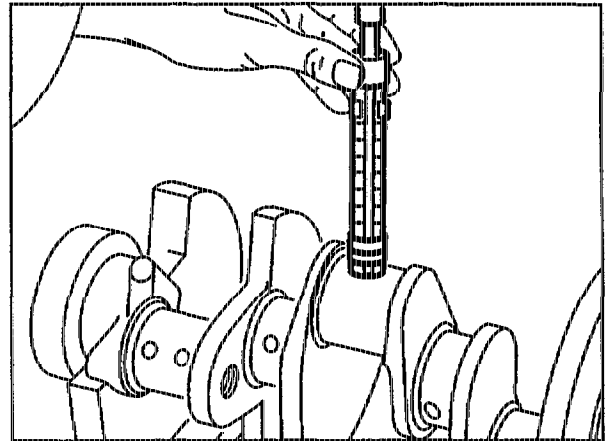
It is also possible to use a dye penetration method (immersing in bath or using a spray can).

Aid: dye, UV oil or fluorescent powder,
cleaning product,
developer

Hardness testing

Test hardness with the drop hardness tester (scleroscopic hardness).

The minimum hardness of 60 scale values must exist at 2/3 of the circumference of the journal.

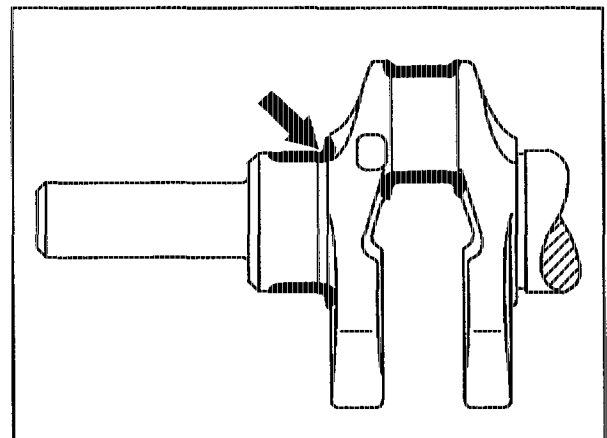


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Hardening

Always harden journals with hardened radii (arrows) inductively.

If this is not possible, scrap crankshaft.



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Inspecting hardening

The setting of the hardening system should be checked by taking metallographic sections in order to achieve proper hardening.

These sections can be taken from test hardenings on scrapped crankshafts.

Check hardening by etching the surface of the journal with a 2 % alcoholic nitric acid (HNO_3).

No dark patches should appear on the surface of the journal.

The hardened radii must be just as bright as the surface of the journal.

The non-hardened radii darken in color.

As a comparison, it is recommended to perform etching on a journal which has been metallographically checked.

Following this, carefully wash off the nitric acid with alcohol.

Corrosion protection

Crankshafts which are not re-installed immediately, must be oiled with a corrosion protection oil.