

TITLE :

PURCHASE SPECIFICATION FOR STEEL SHAFT
FORGINGS FOR LARGE ALTERNATORS

M-1418

G273-017

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1. Reference standard :-

IS : 2004, BS : 29.

2. Material Grade/Designation :-

45C8 (class 4) as per IS : 2004 or equivalent.

3. Chemical Composition :-

	percentage %	Permissible deviation in check analysis %
Carbon	0.4 - 0.5	± 0.03
Manganese	0.6 - 1.3	± 0.04

4 a) Mechanical Properties :-i. Tensile strength : 580 to 700 N/mm²ii. Yield strength : Minimum 318 N/mm²iii. Elongation percent (minimum) : 15%
(Gauge length = $5.65 \sqrt{S_0}$)

iv. Hardness : 170 to 212 BHN

v. Impact value (charpy V-notch at 20°C : 27 J (Longitudinal)
22 J (Tangential)

vi. Local defects such as foreign inclusions, dents etc shall be less than 4mm deep from proof machined surfaces.

b) Other Requirements :-

i. Sufficient discard shall be made from each ingot to secure freedom from piping and excessive segregation.

ii. Forging shall be sound and free from stress of any kind, harmful defects, patching and welding.

5. Heat Treatment :-

i. Normalised

OR

ii. Normalised, hardened and tempered, if required to achieve mechanical properties as given in 4 (a).

(2)

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6. Acceptance Tests :-

- a) Dimensional conformation (for each shaft) – As per drg. on proof machined shaft
- b) Chemical compositions for each shaft – As specified in item (3) [Ⓔ] above. (see note for test samples).
- c) Mechanical properties as per item (4) [Ⓔ] above.

Note:– The sample will be tested for confirmation of item (c) & (d) above by JYOTI LTD. before approval of the shaft, apart from the tests for the same by the supplier of the shaft.

d) Ultrasonic test on each shaft :-

The ultrasonic test is generally carried out as per ASTM : A 388.

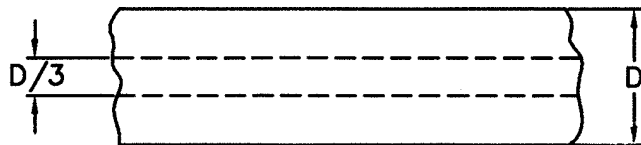
The complete volume of the forging shall be scanned radially and axially using 20 to 30 mm dia, 2 to 4 MHz normal beam probe. Angular probes & other frequencies may also be used for ascertaining the character of defects, if required.

Note:– This test is to be carried out at supplier's works.

7. Acceptance Standard :-

The acceptance standard for ultrasonic testing shall be as follows :

- i. Defect echo less than 20% of calibrated screen height.
- ii. Back wall echo 80% and above when set to 100% in sound area.
- iii. Maximum permissible defect size will be equivalent flaw from 3 ϕ (mm) Flat Bottom Hole.
- iv. Longitudinal defects contained in the D/3 region are acceptable.

8. a) Test Certificate :-

Test certificate shall be supplied in triplicate and shall contain followings :-

- i. Order number
- ii. Purchase specification number.
- iii. Test results as specified in (3), (4) & (7) above.
- iv. Details of heat treatment. [Ⓔ]

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b) Marking :-

Forging shall be legibly stamped with the class, heat number/identification mark.

Note :-

The manufacturers shall provide the material for taking out test samples for testing the mechanical properties of the forgings.

The direction of tests shall be longitudinal (axial) for the test samples taken from one end and tangential (perpendicular to axial) for the test samples taken from the other end of the shaft forging. (Refer Fig. 1 for a typical forging.)

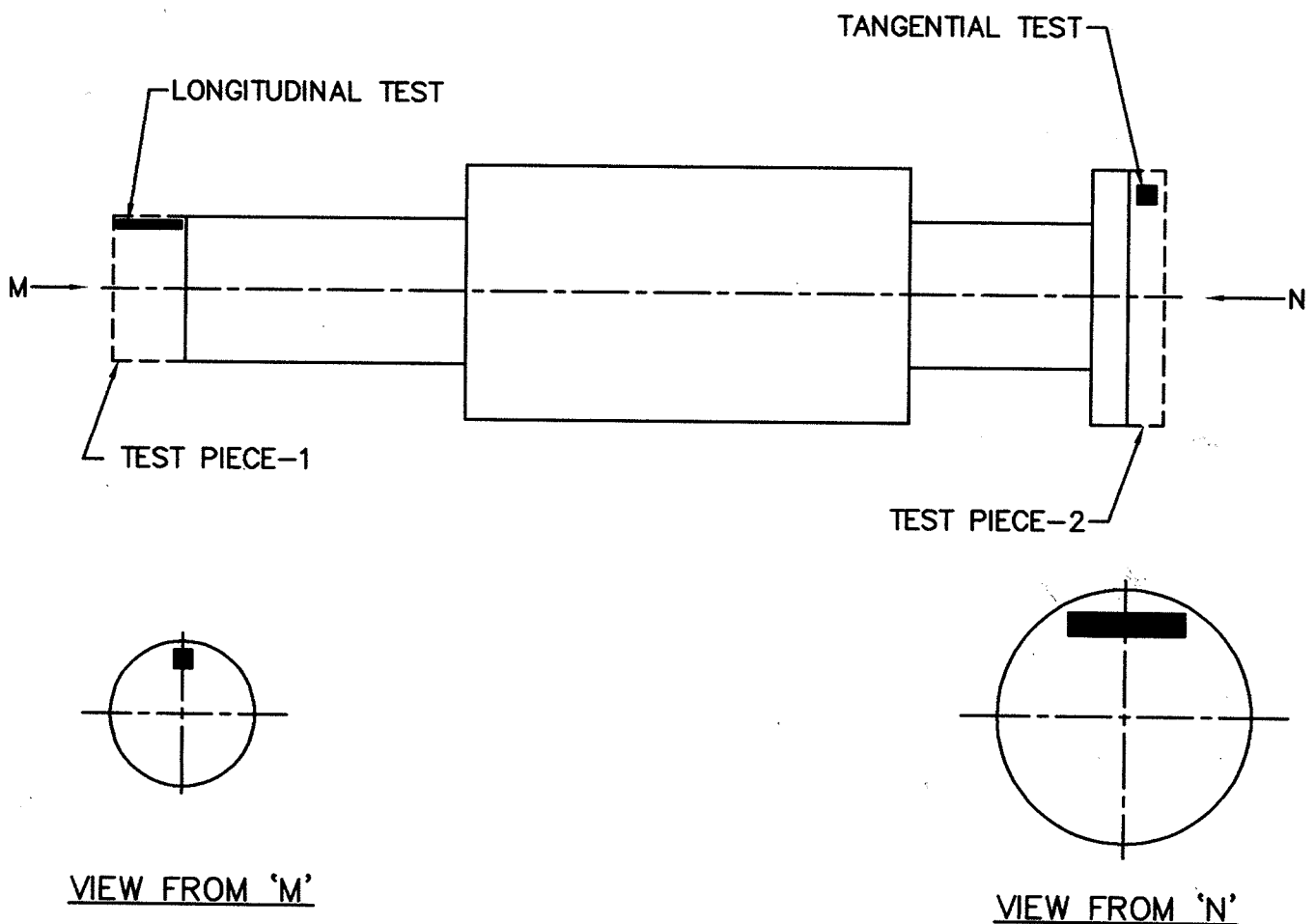


Fig. 1 - Location of test samples for longitudinal and tangential tests for typical shaft forging.

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