

IS 3261:1980 Specification for carbon steel forgings for shipbuilding industry (First Revision)

IS 3261:1980 is an Indian Standard specifying the requirements for *carbon steel forgings* used in the shipbuilding industry. This standard, revised in 1980, provides guidelines for various aspects, including manufacturing, chemical composition, heat treatment, and mechanical testing, ensuring that forgings meet the quality and durability requirements essential for shipbuilding.

1. **Scope:** This standard covers the requirements for 8 grades of carbon steel forgings required for shipbuilding purposes.
2. **Material and Manufacturing:**
 - a) Forgings are made from killed steel via approved methods (e.g., open hearth, electric).
 - b) Hot working is used to shape the forgings, with attention to grain flow for strength.
3. **Chemical Composition:** Specifies allowable elements and permissible variations for carbon, silicon, manganese, sulfur, and phosphorus. It restricts elements like nickel and chromium unless agreed upon by the purchaser.
4. **Heat Treatment:** Defines methods like annealing, normalizing, and tempering for achieving desired mechanical properties. Reheating may be required for further hot working.
5. **Mechanical Testing:**
 - a) **Tensile and Bend Tests:** Standard tests to assess strength, elongation, and ductility. Separate guidelines for different parts like turbine rotors and gear wheels.
 - b) **Batch Testing:** Allowed for small forgings with consistent characteristics.
6. **Inspection and Marking:** Each forging undergoes inspection, and critical parts like turbine rotors may be examined using ultrasonic or magnetic crack detection methods. Forgings passing all tests are marked for compliance.
7. **Certification:** Optionally marked with the ISI Certification Mark, ensuring adherence to quality standards.

This standard ensures that carbon steel forgings used in shipbuilding meet strict quality and durability requirements for safety and performance.