



IS 12146:1987 Specification for Carbon-Manganese steel forgings for pressure vessels

Pressure vessels are essential components in a variety of industries, including aerospace, chemical processing, oil and gas, energy, and pharmaceuticals. These structures are designed to hold gases or liquids at a pressure significantly different from the ambient pressure.

Pressure vessels are designed with specific properties to safely contain gases or liquids at high pressures and, in some cases, at extreme temperatures. These properties ensure that the vessels can handle stress, prevent leaks, and maintain integrity over time. The important properties required for designing pressure vessels are **Strength and Durability, Corrosion Resistance, working temperature range, to withstand the designated pressure**, light weight and susceptible to fracture toughness, thermal conductivity and Resistance to environmental factors.

The pressure vessels can be made with variety of the materials such as **Carbon steel**, Stainless steel, Aluminium alloys, Nickel alloys, Titanium alloys, High strength Low alloy steels (HSLA), copper and copper alloys, carbon fibre composites, Glass fibre Reinforced Plastic (GFRP), Ceramic Matrix Composites etc.

The Indian Standard, IS 12146: 1987 specifies the requirements for in process controls such as **chemical composition, control on refining** steel making process and including forging criteria for attaining the homogeneous properties. The standard also emphasises on **heat treatment process** to achieve the noble properties based on the design requirements of the pressure vessels.

This standard not only specify physical and mechanical parameters like workmanship, freedom from defects, **yield strength and tensile strength** but also specify the **Non-destructive** test methods such as **Ultrasonic testing** to detect invisible defects from outside of the product surface which ensure **durability and to withstand the working temperature** range without any failures during the operation of pressure vessels. The inspection clause specifies the methodology of inspection against to the requirements of the above standard.