1.2 Properties of Steel structures

Properties of Steel

Property	Description	Examples of Steels	Advantages	Applications
Strength	Withstands high loads	High-strength low-alloy (HSLA) steel	Strength	Structural beams
Ductility	Flexibility	HD50 (High Ductility)	Easily shaped into various forms	Ship hulls
Corrosion resistance	Resistance to corrosion in various environments	Stainless steels, such as 304 and 316	Compatible with a wide range of fluids and environments	Food and beverage processing, acidic environments

Property	Description	Examples of Steels	Typical Value Range	Units
Hardness	Resistance to surface deformation	Tool steel (D2)	200 - 1180	Brinell hardness number (kg/mm2)
Tensile Strength	Ability to withstand stretching loads	Chromium vanadium steel (6150)	250 - 600	MPa
Thermal Conductivity	Transmission of heat	Carbon steel (grade C1010)	15 - 45	W/(m•K)
Thermal Expansion	Change in volume with temperature	Austenitic stainless steel (304, 316)	10 - 17	106m/(m•°C)

Steel Type	Corrosion Resistance	Oxidation	Reactivity	Magnetic Properties	Stability
Carbon Steel	Limited	Significant, particularly in moist environments	Reactive with oxygen	Magnetic	Good
Tool steel	Good	Significant, particularly in moist environments	Reactive with oxygen	Magnetic	Good
Austenitic Stainless Steel (304, 316)	Excellent	Minimal, forms passive film	Non-reactive (inert) generally	Non-magnetic	Excellent
Martensitic Stainless Steel (410, 420)	Excellent	Minimal, forms passive film	Non-reactive (inert) generally	Magnetic	Excellent