AISI 1018 Mild/Low Carbon Steel

Applications of AISI 1018 Mild/Low Carbon Steel

Introduction

AISI 1018 mild/low carbon steel has excellent weldability and produces a uniform and harder case and it is considered as the best steel for carburized parts. AISI 1018 mild/low carbon steel offers a good balance of toughness, strength and ductility. Provided with higher mechanical properties, AISI 1018 hot rolled steel also includes improved machining characteristics and Brinell hardness.

Specific manufacturing controls are used for surface preparation, chemical composition, rolling and heating processes. All these processes develop a supreme quality product that are suited to fabrication processes such as welding, forging, drilling, machining, cold drawing and heat treating.

Chemical Composition

Element	Content
Carbon, C	0.14 - 0.20 %
Iron, Fe	98.81 - 99.26 % (as remainder)
Manganese, Mn	0.60 - 0.90 %
Phosphorous, P	≤ 0.040 %
Sulfur, S	≤ 0.050 %

Physical Properties	Metric	Imperial
Density	7.87 g/cc	0.284 lb/in^3

Mechanical Properties	Metric	Imperial
Hardness, Brinell	126	126
Hardness, Knoop (Converted from Brinell hardness)	145	145
Hardness, Rockwell B (Converted from Brinell hardness)	71	71
Hardness, Vickers (Converted from Brinell hardness)	131	131
Tensile Strength, Ultimate	440 MPa	63800 psi
Tensile Strength, Yield	370 MPa	53700 psi
Elongation at Break (In 50 mm)	15.0 %	15.0 %
Reduction of Area	40.0 %	40.0 %
Modulus of Elasticity (Typical for steel)	205 GPa	29700 ksi
Bulk Modulus (Typical for steel)	140 GPa	20300 ksi
Poissons Ratio (Typical For Steel)	0.290	0.290
Machinability (Based on AISI 1212 steel. as 100% machinability)	70 %	70 %

Shear Modulus (Typical for steel)		80.0 GPa	11600 ksi

Electrical Properties	Metric	English	Comments
Electrical resistivity @0°C (32°F)	0.0000159 Ω-cm	0.0000159 Ω-cm	annealed condition
@100 °C/ 212 °F	0.0000219 Ω-cm	0.0000219 Ω-cm	annealed condition
@ 200 °C/392 °F	0.0000293 Ω-cm	0.0000293 Ω-cm	annealed condition

Machining

The machinability of AISI 1018 mild/low carbon steel is graded at 78% of B1112.

Weldability

AISI 1018 mild/low carbon steel can be instantly welded by all the conventional welding processes. Welding is not recommended for AISI 1018 mild/low carbon steel when it is carbonitrided and carburized.

Low carbon welding electrodes are to be used in the welding procedure, and post-heating and pre-heating are not necessary. Pre-heating can be performed for sections over 50 mm. Post-weld stress relieving also has its own beneficial aspects like the pre-heating process.

Heat Treatment

The heat treatment for AISI 1018 mild/low carbon steel consists of the following processes:

Normalizing

•AISI 1018 mild/low carbon steel should be heated at 890°C – 940°C and then cooled in still air.

Forging

•This process requires heating between 1150°C – 1280°C and AISI 1018 mild/low carbon steel is held until the temperature becomes constant.

•900°C is the minimum temperature required for the forging process.

•The steel is then cooled in air after this process.

Tempering

•AISI 1018 mild/low carbon steel is tempered at between 150°C – 200°C for improvement of case toughness. This process has little or no effect on hardness.

•The occurrence of grinding cracks is reduced when AISI 1018 mild/low carbon steel is tempered at the above mentioned temperature.

Annealing

•The AISI 1018 mild/low carbon steel is heated at 870°C – 910°C and allowed to cool in a furnace

Stress Relieving

•500°C – 700°C is required to relieve stress in AISI 1018 mild/low carbon steel that is later cooled down in still air.

Case Hardening

•This process requires heating to be carried out between 780°C – 820°C. AISI 1018 mild/low carbon steel is then quenched in water.

Core Refining

•This is an optional process that requires heating at 880°C – 920°C.

•AISI 1018 mild/low carbon steel after being heated is moistened in oil or water.

Carburizing

•Carburizing takes place at 880°C – 920°C.

Applications of AISI 1018 Mild/Low Carbon Steel

•It is used in bending, crimping and swaging processes.

•Carburized parts that include worms, gears, pins, dowels, non-critical components of tool and die sets, tool holders, pinions, machine parts, ratchets, dowels and chain pins use AISI 1018 mild/low carbon steel.

•It is widely used for fixtures, mounting plates and spacers.

•It is suitably used in applications that do not need high strength of alloy steels and high carbon.

•It provides high surface hardness and a soft core to parts that include worms, dogs, pins, liners, machinery parts, special bolts, ratchets, chain pins, oil tool slips, tie rods, anchor pins, studs etc.

•It is used to improve drilling, machining, threading and punching processes.

•It is used to prevent cracking in severe bends.