AJAX
FASTENERS

Welding of Fasteners

This discussion outlines the metallurgical aspects of fusion welding processing. Recent remarkable advances have given welding a more reliable position in the metal industry. It has become common practice to shape and prepare metal parts and then join them by welding to produce engineering structures.

The aim of this outline is not to describe in detail the equipment and technique but to reveal the metallurgical features that affect the satisfactory welding of fasteners. Also to consider the hazards and safety precautions that need to be considered when welding fasteners to a variety of structures.

Fusion welding is defined as a group of processes in which metals are joined by bringing them to the molten state at the abutting surfaces and the importance of the effect of heat in all welding operations must be recognised. Welding is usually employed to unite like metals where the joining is required to develop strength and transmit stress. In the case of fasteners these are made from different steels and can create a problem of loss of strength, embrittlement from hydrogen or quench hardness.

In most cases carbon steels are used in the structures and to a great extent mild steel is the main structural component.

To weld fasteners in a satisfactory manner, it is essential to know the composition of the steel fastener.

The two elements in the composition of steel are important and affect the weld area.

Steel with a carbon content greater than 0.39% is not suitable for welding without special pre-heat with or without post heating.

Steel with a sulphur content greater than 0.050% are not suitable for welding as both porosity and cracking can occur.

Fasteners fall into a number of general categories namely:

1. Low tensile bolts - mild steel As 1111, 1559, 1390
2. High tensile bolts - steel containing 0.4% carbon
   AS 1110, 1252, 2465
3. Low tensile nuts - sulphurised mild steel
   AS 1112 - Property Class 5
4. High tensile nuts - steel containing 0.4% carbon and sulphur
   AS 1112 - Property Class 8, 10 and 12

AJAX
FASTENERS

Welding of Fasteners

1. Low Tensile Bolts

The welding of low tensile bolts made from mild steel is easily achieved by following the welding procedures for mild steel. One note of caution is that when cold worked mild steel bolts are welded the tensile of the bolt can be lowered by the stress relieving effect of the heat generated by the welding process.

2. High Tensile Bolts (not recommended)

The welding of high tensile steels is not easily performed. It is necessary to pre-heat with or without post heat the weld area to remove any of the harmful effects from welding which affects the quality of the finished joint. The weldability of this grade of steel depends upon the carbon content of the bolt steel because the rapid cooling may produce martensite structures, and the formation of these structures tends to make the weld area hard, brittle and have undesirable characteristics.

3 & 4. Nuts

In the case of both low and high tensile nuts the amount of sulphur present in the steel can have the most deleterious affect on welding, because of porosity and the hot shortness imposed on the zone of fusion during solidification and cooling through the range of hot shortness when stresses can produce cracking in the metal.

A range of **Weld Nuts** is available, made from a weldable steel for use with resistance welders.

When considering welding make sure you contact Ajax for advice on the particular application.