

## HEAT TREATMENT TERMS

**ANNEALING** was the first form of heat treatment applied to ferrous metals. It is essentially the softening of a base metal to make it more malleable. The process involves a controlled heating and slow cooling which induces softness. Additionally, the process removes gases, relieves stresses and enhances the mechanical properties in alloyed steels. This is generally performed at temperatures around 700°C.

**NORMALIZING** is much like annealing, but the cooling process is much faster. This results in increased strength but less ductility in the metal. It also produces a higher yield strength with greater tensile strength, and in most instances, a higher impact resistance.

**SOLUTION HEAT TREATMENT** is performed on certain types of austenitic stainless steels to prevent decay in weldment. This is done at very high temperatures (e.g. 1050°C) and the cooling is very rapid.

**QUENCH HARDENING** is a process of cooling heated metal to room temperature by immersion in liquid or gaseous cooling medium. This method provides greater strength and hardness than slow cooling, but it is accompanied by brittleness.

**TEMPERING** is employed after steels have been fully hardened and are too brittle to be of any practical use. Tempering reduces the brittleness and relieves internal stresses. Tempering is actually a re-heating and slow cooling process. The cooling is accurately controlled to impart certain characteristics to the base metal.

**STRESS RELIEVING** (Postweld Heat Treatment) is the heating of steel to a relatively high temperature (e.g. 590°C - 700°C) shortly after welding, and maintaining that temperature for a specific period of time. The purpose is to reduce internal stresses, caused by welding, quench hardening or by cold working. It also has an advantageous effect on the elasticity, ductility and strength of the metal.

**PREHEATING** is a very effective means of preventing weld metal or base metal cracking. It is the application of heat to the base metal prior to a welding or cutting operation. It does not change the properties of the steel, but it is advisable under certain conditions to drive off moisture and helps to ensure even expansion to eliminate undesirable stresses. Concurrent heating during welding (also referred to as preheating) retards the cooling thus preventing the formulation of an under bead crack.