



The effects of alloying elements in corrosion resisting and heat resisting alloy weld metal

- **Al** Aluminum
 - Aluminum is not usually used in weld metal because the efficiency of transfer from electrode to weld metal is very low
- **C** Carbon
 - A strong austenite former.
- **Cb** Columbium
 - Forms very stable carbides. Added to weld metal to stabilize the carbon and prevent harmful carbide precipitation. Used in some applications because it increases the strength of the weld metal at elevated temperatures. Tends to form ferrite.
- **Co** Cobalt
 - Used to increase the strength of the weld metal at high temperatures, particularly in the super alloys. It is very similar to nickel, an austenite former.
- **Cr** Chromium
 - Imparts corrosion and scaling resistance to stainless weld metal. In amounts up to 16% in straight chromium weld metals it makes the material air hardenable. It forms carbides and causes formation of ferrite. Little or no increase in strength at elevated temperatures is obtained from chromium alone.
- **Cu** Copper
 - Not often used, it imparts age hardening properties to chromium-nickel weld metals. Copper will improve the resistance to corrosion by sulphur acids, such as sulphuric acid.



- **Mn** Manganese
 - Used largely as a weld metal deoxidizer; Manganese behaves about half as strong as nickel, as an austenite former.
- **N** Nitrogen
 - Recovery of nitrogen in weld metal is erratic and cannot be depended upon for the properties it imparts to certain base steels.
- **Ni** Nickel
 - Nickel is the primary austenite former; it helps to improve the corrosion resistance against non-oxidizing media. Used in high temperature weld metals for strength and assistance in providing scaling resistance.
- **P** Phosphorus
 - This residual element (never deliberately added) is very potent in increasing weld metal cracking in austenitic welds.
- **S** Sulphur
 - Another residual element in weld metal. High sulphur contents promote weld metal porosity.
- **Se** Selenium
 - This element along with sulphur may be added to the base steel to improve machinability. The addition of either alloy increases the difficulty of obtaining porosity free welds.
- **Si** Silicon
 - Primarily used as a weld metal deoxidizer. Tends to increase weld metal cracking in austenitic welds. It is a ferrite former.
- **Ti** Titanium
 - Cannot be satisfactorily used in manual arc welding because it is burned out during transfer from electrode to weld.