

Low hydrogen consumables backing

Introduction

Low hydrogen consumables, are essentially used to weld, high strength steels, thick sections and heavily restrained parts, because they are susceptible to cold cracking, also known as hydrogen assisted cracking. How to identify a situation, where low hydrogen consumable is needed, how to store the consumable and what is cold cracking is explained in this technical sheet.

Cold cracking

Cold cracking is shown by the apparition of cracks, immediately or after a few minutes, sometimes even hours, after the welding is finished. The cracks appear generally in the heat affected zone (HAZ), but it can also appear at the weld.

The defect occurs as the result of three aspects, presence of hydrogen in the welded joint, if the equivalent carbon present in the material is higher than 0.4%, the solicitation of residual tensions and extern tensions caused by the contractions of cooling and the hardness of the joint.

To avoid this problem there are two major solutions, pre-heating the base material in order to reduce the speed of cooling, preventing the formation of martensite on the weld and allowing hydrogen to be removed from the weld or using a low hydrogen consumable.

In some cases pre-heating is impossible, thus it is necessary to only use a low hydrogen consumable, or an austenitic electrode.



1 – Electrodes stored in a special case



2 – Oven used to dry wet electrodes

Low hydrogen consumable

A Low hydrogen consumable, is usually defined as having less than 16 milliliters of hydrogen per 100 grams of weld metal, in some cases it has to have less than 8 ml per 100 grams of weld metal to be considered a low hydrogen consumable, it depends on the use the material will have. Electrodes with the American standard, AWS, come with a designation HX, where X is the ml of hydrogen per 100 grams of weld metal. Electrodes normally come as H16, H8, H4 and H2. Some electrodes come with an "R" at the end of their designation, this "R" means that the electrode coating is better, so it's harder for it to be affect by moisture, these electrodes can be safe to use for 10 hours, while normal electrodes can only be used up to 2 hours.

Usually the electrodes come sealed in a box, with a controlled atmosphere, but after the box is opened, the consumable begin to acquire humidity from the air, so there is a need to dry it before using it again, for most of the electrodes, reheating is a solution, but for some there is a need to maintain them in a oven.