

# Welding manganese steels



Manganese steel, sometimes called austenitic-manganese steel, 14% manganese steel or Hadfield steel, typically contains 11–14% manganese and 1–1.4% carbon. Certain grades may also contain other minor alloying elements. This steel has an exceptional ability to work-harden during cold work, e. g. high impact and/or high surface pressure. This makes the steel ideal for severe conditions in the crushing and mining industry, in the wear parts of crusher hammers, tumblers, buckets, digger teeth and rail points, for example.

Manganese steel lasts for a long time, but it eventually gets worn. Reconditioning normally takes the form of repairing cracks or breakages, rebuilding metal which has worn away and depositing hard-facing layers to extend the service life of the part.

The weldability of manganese steel is restricted by its tendency to become brittle upon reheating and slow cooling. One rule of thumb is that the interpass temperature must not exceed 200°C. For this reason, very careful control of the heating during welding is essential. These steels should therefore be welded:

- with the lowest possible heat input by using low current
- with stringer beads instead of weaved beads
- where practicable, working with several components at the same time
- the component can be put in cooling water

## Welding manganese steel can involve

- joining manganese steel to unalloyed, low-alloy steel
- joining manganese steel to manganese steel
- rebuilding worn surfaces
- hard-facing to secure initial hardness of the surface

## Joining

To join manganese steels and manganese steels to steels, austenitic stainless consumables should be used to produce a full-strength, tough joint.

Consumables for joining			
Alloy type	SMAW	FCAW	GMAW
18/8/6	OK 67.42 OK 67.45 OK 67.52	OK Tubrodur 14.71 self shielding	OK Autrod 16.95
29/9	OK 68.81 OK 68.82		OK Autrod 16.75

For further product data, see Table 2 on page 91–92.