

11-14% Manganese Steel Plate

A unique hard, abrasive and work hardening grade, available in full or cut plates

Manganese steel stockholders and suppliers, delivering throughout the UK.

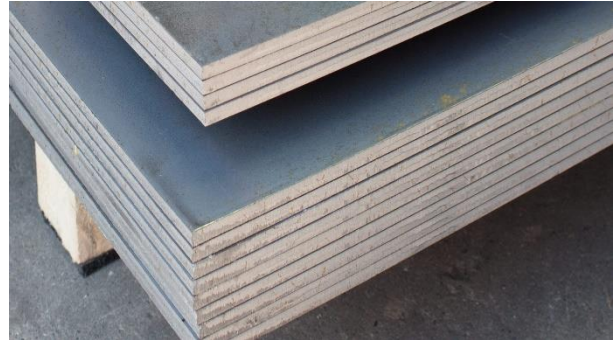
West Yorkshire Steel are suppliers of high manganese steel plate to specification X120Mn12 and 1.3401. As a high manganese steel grade it offers excellent work hardening properties. High manganese steel plate becomes increasingly hard when the surfaces of components are subject to repeated impact or abrasion. Its toughness, derived from high tensile strength and ductility, enables shock loads to be absorbed safely. Lack of lubrication or the intrusion of grit or sand particles does not seriously impair the wearing surfaces of components in contact. These characteristics combine to make high manganese steel plate an ideal steel for use as wearing plates in those situations where abrasion, impact, or lubrication difficulties are encountered. The steel has the unique property in service of rapidly developing a work hardened surface whilst retaining its tough interior.

Related Specifications

X120Mn13 DIN 1.3401 ASTM A128 Grade B2
Hadfield Steel Mangalloy Euronorm
GX120Mn12 CSN 42 920 Z120M12 BS3100 BW10
BS EN 10293

Form of Supply

11%-14% Manganese steel is supplied in plate. It can be supplied as full plates or plasma cut to your specific requirements. High manganese steel still has an important role in many industrial applications. Today production of 11% to 14% manganese steel is now predominantly in sheet and plate. With its unique properties plate thicker than 20mm is not common though production up to 40mm thickness is done. More popular are sheet and plate thicknesses ranging from 2mm to 20mm.



- Plate
- Sheet

Contact our experienced sales team who will assist you with your high manganese steel enquiry.

Applications

The rapidity with which X120Mn12 work hardens make this steel grade suitable for applications where the components must resist wear under conditions of sliding contact, often coupled with heavy pressure and repeated impact. Typical applications are wearing plates, stone or iron chutes, industrial trackwork, anti drill plates such as security doors, shot blasting equipment and tumbling machines.

Typical Analysis

Carbon	1.20%	Silicon	0.15%
Manganese	11.00-14.00%	Sulphur	0.020%
Phosphorous	0.020%		

Supply Condition

Supplied water quenched at 950-1000N/mm² X120Mn12 manganese steel has an austenitic structure and is non magnetic. In its supply condition it has an approximate Brinell hardness of 200HB. In service the material rapidly work hardens, increasing the Brinell hardness figure up to approximately 500HB.

Cutting

If a good edge quality is required plasma arc or laser cutting processes are recommended. Flame cutting is possible but the edge quality is poor. It is possible to shear high manganese steel plate but the blades and machine should be in good condition and the shear should not be operated close to its maximum rated capacity.

Forming

Forming can be carried out without difficulty, as the plate in the supplied condition is ductile. To avoid cracking, edges which have been work hardened by shearing should have a 2mm to 3mm chamfer ground along the edge to be formed. To avoid work hardening forming should be carried out in one operation.

Shearing

Shearing blades must be well sharpened and the machine in good condition. The shear should not be operated close to its maximum rated capacity. To avoid any blade damage avoid re-shearing already sheared edges without prior grinding of the hardened edge.

Drilling

Due to its 11% to 14% manganese content the steel is difficult to drill and will work harden very quickly. Heavy duty and very rigid machinery is required using either armour piercing drills in 8% cobalt high speed steel, or preferably use special drills with replaceable carbide inserts. Try to avoid centre punching or allowing the drill to rub on the surface without the feed being engaged, as this will have the effect of work hardening.

Welding

With a high coefficient of thermal expansion and low thermal conductivity it is liable to distortion due to local overheating and welding should be carried out at a low thermal level. It is recommended to avoid welding at 300°C to 800°C as this can cause embrittlement due to carbide precipitation. Welding should be carried out using such as E308Mo type austenitic stainless consumables. We recommend you contact your welding consumables supplier who should provide you full assistance and information on welding high manganese steel.

Typical/Approximate Mechanical Properties*

Tensile Strength N/mm ² (MPa)	Yield Strength N/mm ² (MPa)	Hardness Brinell (HB)	Elongation %
880	320	320	40

(* supply condition - as rolled)

Typical/Approximate Physical Properties*

Modulus of elasticity 10^3N/mm^2	190
Density kg/dm^3	7.90
Thermal Conductivity W/(m.K)	13.0
Electric resistivity $\text{Ohm.mm}^2/\text{m}$	0.68
Specific heat capacity J/(kg.K)	500

Mean coefficient of thermal expansion (at varying temperatures)

Temperature	20-100°C	20-200°C	20-300°C	20-400°C	20-500°C
10^{-6}m/(m.K)	18.2	19.4	20.8	21.7	20.8

(* supply condition - as rolled)

History

High manganese steel has a history dating back to the late 19th century. Sir Robert Hadfield made the discovery of manganese steel which was one of the first alloy steels. Sir Robert Hadfield was a pioneer in the development of iron and steel technology and the Hadfield Steel foundry grew to be one of the largest steel foundries in the world. He worked constantly in the development of steels such as silicon and alloy steel grades and over the years published many papers on his metallurgical research. In the Metallurgy of Iron & Steel publication in 1928 he is quoted as saying "there is no field in which 'the Art of Scientific Discovery' may be profitably practised and the triumphs of the past prove that, Labor improbus Omnia vincit (hard work conquers all)".

Certification

Manganese steel is commonly available with a 3.1b mill certificate, cast and analysis certificate or a certificate of conformity, please request when placing any orders.

Quality Assured Supply

Manganese steel is supplied in accordance with our ISO 9001:2015 registration.



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