

# North American Crane Rail

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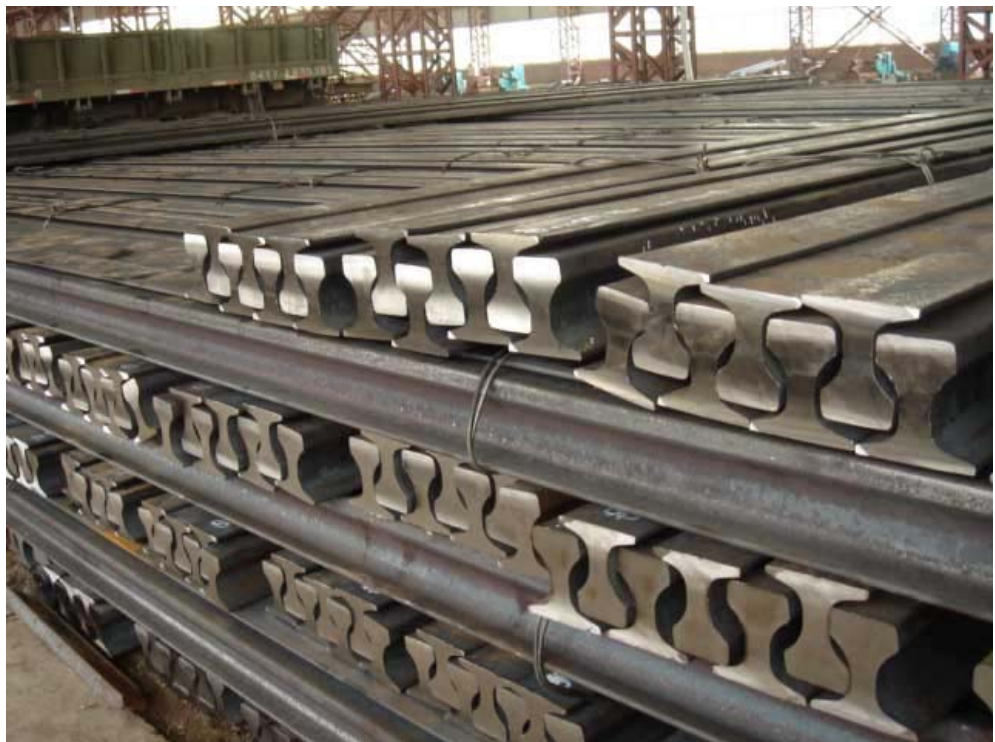
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***Only one company,  
ArcelorMittal,  
produces North  
American crane rails  
to ASTM A759 at its  
mill in Steelton,  
Pennsylvania.***

North American crane rail sections are manufactured to ASTM rail standard #A759 – 10. Only one steel company, ArcelorMittal, remains as a producer of these sections in North America, manufacturing them at its plant in Steelton, PA. The only CR sections currently available from ArcelorMittal USA are: 104CR, 135CR, 171CR and 175CR. (105CR is only rolled in Europe and may not strictly comply with ASTM standards.) All are available in three grades, only two of which are described in ASTM A759, Control Cooled and Head Hardened. The more recent addition of “high carbon” or HC rails has yet to be addressed in the ASTM standard.

Until mid-2007, rails manufactured to ASTM A759, including head hardened rails, were available from Europe. This is no longer the case. There are still some European manufacturers rolling a limited number of crane rails that are similar to North American crane rail geometry, but the chemical and mechanical properties of the rails meet European, not North American standards.

In the past, hardened CR rail sections supplied from the Steelton mill were fully hardened. This process involved fully heat treating the rail in a furnace followed by oil quenching. This process is no longer available from the Steelton



mill since the process could no longer meet modern air emission standards and the rails produced were considered by some as too brittle in the web and flange area.

The standard method of hardening rails at the Steelton plant is now Head Hardening. North American crane rail sections are available from the Steelton mill head hardened in accordance with supplementary requirement S1 of ASTM 759-10. When this option is selected the rail head hardness, as defined by the standard, is to fall within the range of from 321 – 388BHN. The larger crane rail sections, 171CR and 175CR, are somewhat more difficult to head harden. All things being equal, a heavier section will have a lower head hardness value than a comparable lighter section when processed in an equivalent manner.

The strength of the head hardened area of the rail is about 105 - 125ksi yield (165 - 185ksi tensile), but it must be understood that this only applies to a depth of about 3/4" - 1" of the rail head.

The web and flange area of the rail should be considered as equal in strength to that of control cooled rail.

High Carbon rail (0.84 - 0.92% carbon) allows for higher head hardness, but again, the web and flange areas are not affected by the head hardening process. The web and flange areas will have slightly higher strength than standard control cooled rails because of the higher carbon content present.

Careful attention should be paid to the appropriate rail strength values when performing evaluations and designing rails for a particular application. The designer should assume the lowest values of the typical mechanical properties listed in the table below when performing engineering calculations.

The chart lists the current properties of these rail sections as they are rolled by ArcelorMittal at the Steelton facility.

Please contact Gantrex by telephone at 1-800-242-6873, or via our web site at [www.Gantrex.com](http://www.Gantrex.com) for more information or help with your crane rail projects.

Rail Grade	Chemistry*	HEAD		WEB & FLANGE
		Minimum guaranteed mechanical properties	Typical range of mechanical properties	Typical range of mechanical properties
Control Cooled	0.67 ≤ C ≤ 0.84% 0.70 ≤ Mn ≤ 1.10% P ≤ 0.040% S ≤ 0.050% 0.10 ≤ Si ≤ 0.50%	285 BHN	300 - 331 BHN 65 - 90 ksi yield 135 - 160 ksi tensile	300 - 331 BHN 65 - 90 ksi yield 135 - 160 ksi tensile
Head Hardened	0.75 ≤ C ≤ 0.84% 0.70 ≤ Mn ≤ 1.10% P ≤ 0.040% S ≤ 0.050% 0.10 ≤ Si ≤ 0.50%	321 BHN	335 - 375 BHN 105 - 125 ksi yield 165 - 185 ksi tensile	300 - 331 BHN 65 - 90 ksi yield 135 - 160 ksi tensile
High Carbon	0.84 ≤ C ≤ 0.92% 0.70 ≤ Mn ≤ 1.30% P ≤ 0.040% S ≤ 0.050% 0.10 ≤ Si ≤ 0.70%	352 BHN	352 - 410 BHN 115 - 135 ksi yield 175 - 195 ksi tensile	300 - 331 BHN 70 - 95 ksi yield 140 - 165 ksi tensile

\*C = Carbon; Mn = Manganese; P = Phosphorus; S = Sulphur; Si = Silicon

**ArcelorMittal**  
**crane rail grades**  
**and mechanical**  
**properties.**

