

# Forged Steel Roll Specifications

## GRADE: 2CR (HCR)



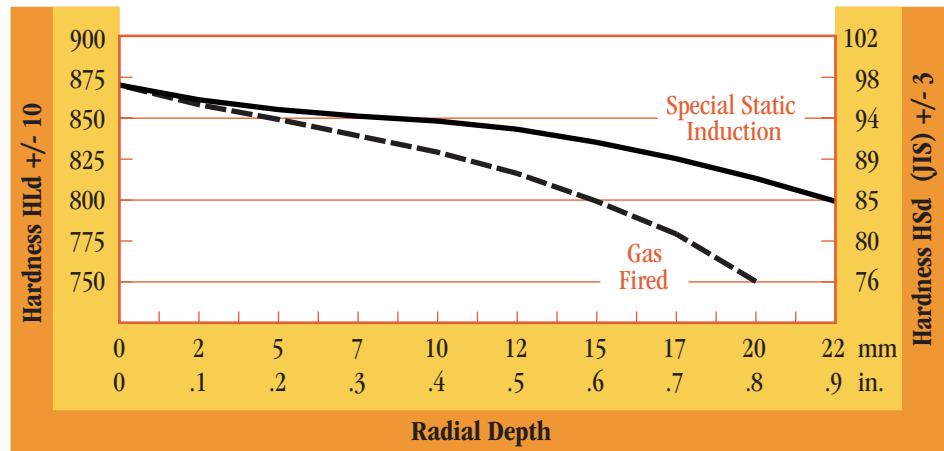
### DESCRIPTION

This low alloy, small diameter (<15", 380 mm) work roll material is used in both ferrous and nonferrous cold mill applications. The 2% chromium alloy (Union Electric Åkers Grade designation "HCR") can be melted using either the electric arc furnace, vacuum degassed, bottom poured or ESR (electroslag remelt) ingot process. The hardening method (gas furnace, special static induction) is determined by the specified depth of hardness profile and the type of mill application.

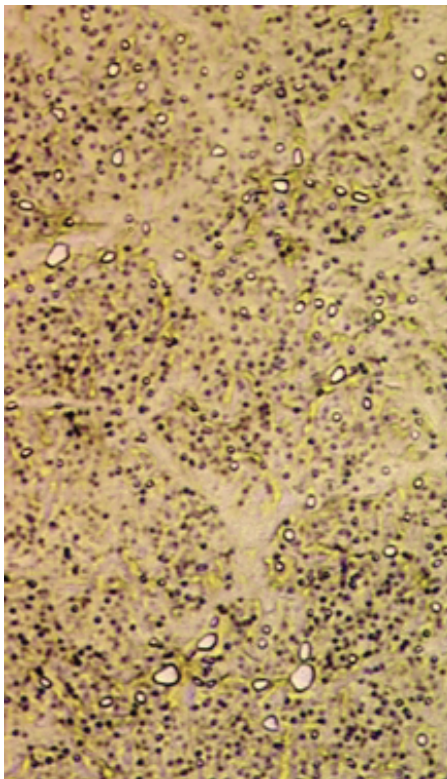
### AIM CHEMISTRY (WT%)

C	Mn	P	S	Si	Cr	Mo	V
.81	.30	.015 max	.012 max	.30	2.42	.19	.06

### DEPTH OF HARDNESS



### MICROSTRUCTURE



1500X

### HEAT TREATMENT CAPABILITY

Decrease from Initial Surface Hardness (Radial Depth)

Hardening Method	20/30 HLd 4/6 Hsd (JIS)	40/50 HLd 8/10 Hsd (JIS)
Gas Fired	0.20" (5 mm)	0.40" (10 mm)
Special Static Induction*	0.50" (13 mm)	0.70" (18 mm)

\*Cryogenic treatment utilized in this method.

### TYPICAL CARBIDE ANALYSIS

Carbide Type	Carbide Hardness (HV)	Surface Area (%)	Average Diameter (μ)	Carbide Density (Carbide/mm <sup>2</sup> )
M <sub>3</sub> C	850-1100	6 - 7	.6	3.0 x 10 <sup>-5</sup>