

# INVICTA

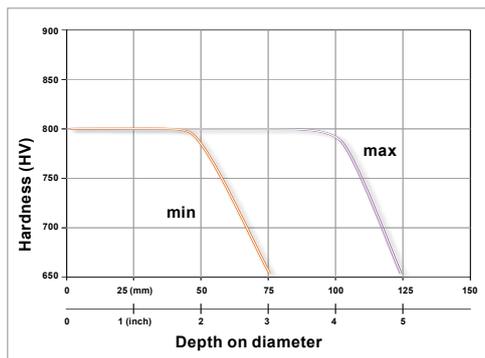
Forged High Speed Steel (HSS)

## Chemical composition (range)

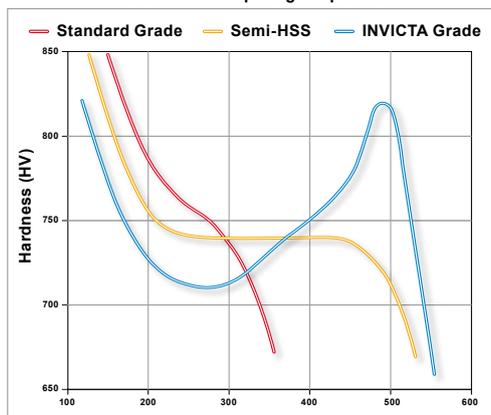
	C	Cr	Mo	V	W
<b>INVICTA</b>	<b>0.8</b>	<b>8</b>	<b>0.5</b>	<b>0.5</b>	<b>0.2</b>
	<b>1.5</b>	<b>13</b>	<b>3.0</b>	<b>3</b>	<b>2</b>

## Properties

Hardness	HV	780-820
Residual stresses	MPa	-300/-400
Yield Strength (core)	MPa	500-700
Young modulus	GPa	210



Hardness vs tempering temperature



## Comparative properties

	Wear resistance	Roughness retention	Resistance to incidents	Campaign length
Standard*	■	■	■	■
INVICTA	■■■■	■■■■	■■■■	■■■■

\* : standard work roll 5% Cr

## Description

Forged high speed steel manufactured according to Union Electric Åkers proprietary specification.

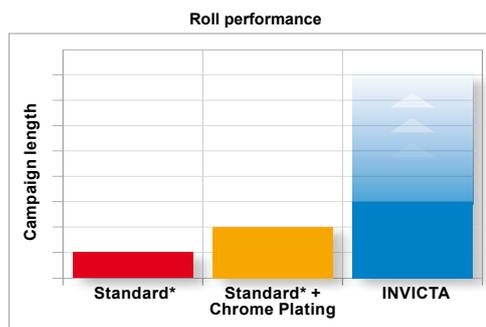
The ingot obtained by electric arc furnace, ladle metallurgy and vacuum degassing is refined by ESR (Electro Slag Remelting).

The ingot is forged with high forging ratio. Preliminary heat treatments are applied on forged blanks to obtain suitable mechanical properties in the core and necks.

The roll barrel is then induction hardened and tempered to obtain a hard and wear resistant surface layer with very low residual stresses, the depth of which can be varied according to requirements by careful selection of the hardening parameters. Furthermore, constant properties are obtained throughout the useful layer. INVICTA rolls display significant secondary hardening that allows an increase in hardness at high temperatures and gives outstanding resistance to mill incidents.

## Applications

Work roll cold strip mills:  
tandem and reversible mills.



Note: Example of mill performance from industrial trials

## Features & Benefits

- Suppression of chrome plating
- Excellent resistance to marks and thermal cracks
- Outstanding resistance to mill incidents
- Extended campaign length