

**STANDARD REFERENCE:**
**UNI EN 10087: 1998 (Hot-rolled products) | UNI EN 10277-3: 2008 (Bright products)**
**RODACCIAI REFERENCES AND COMPARABLE STANDARDS**

EUROPE		ITALY	GERMANY		FRANCE	UK	USA
EN 10087: 1998 EN 10277-3: 2008		(UNI 4838-80)	(DIN 1651-88)		(NF A 35-562-86)	(BS 970 pt.3-91)	ASTM A 29
Grade	N°		Werkstoff	N°			
46S20	1.0727	-	45 S 20	1.0727	-	-	-

**CHEMICAL COMPOSITION (CAST ANALYSIS) (%)**

C	Si / max	Mn	P / max	S
0,42÷0,50	0,40	0,70÷1,10	0,06	0,15÷0,25

**MECHANICAL PROPERTIES - AS ROLLED CONDITION**

Size mm	as Rolled and/or as Rolled + Turned (+SH)		as Rolled and/or as Rolled + Turned + Quenched + Tempered (+SH +QT)		
	Hardness HB*	R <sub>m</sub> (MPa)	Rp <sub>0,2</sub> (MPa) min	R <sub>m</sub> (MPa)	A <sub>5</sub> (%) min
≥5 ≤10	-	590÷800**	490	700÷850	12
>10 ≤16	-	590÷780**	490	700÷850	12
>16 ≤40	175÷225	590÷760	430	650÷800	13
>40 ≤63	172÷216	580÷730	370	630÷780	14
>63 ≤100	166÷211	560÷710	370	630÷780	14

\* For reference only \*\*Values valid only for hot rolled products  
For size <5 mm the mechanical properties may be agreed at the time of enquiry and order

**MECHANICAL PROPERTIES - COLD DRAWN CONDITION**

Size mm	Cold Drawn (+C)			Cold Drawn + Quenched + Tempered (+C +QT)			Quenched + Tempered + Cold Drawn (+QT +C )		
	Rp <sub>0,2</sub> (MPa) min	R <sub>m</sub> (MPa)	A <sub>5</sub> (%) min	Rp <sub>0,2</sub> (MPa) min	R <sub>m</sub> (MPa)	A <sub>5</sub> (%) min	Rp <sub>0,2</sub> (MPa) min*	R <sub>m</sub> (MPa)	A <sub>5</sub> (%) min
≥5 ≤10	570	740÷980	5	-	-	-	595	850÷1000	8
>10 ≤16	470	690÷930	6	-	-	-	560	800÷950	9
>16 ≤40	400	640÷880	7	430	650÷800	13	490	700÷850	10
>40 ≤63	380	610÷850	8	370	630÷780	14	490	700÷850	11
>63 ≤100	340	580÷820	8	370	630÷780	14	455	650÷850	11

\*For reference only  
For size <5 mm the mechanical properties may be agreed at the time of enquiry and order

**WORKING TEMPERATURES RECOMMENDED**

Operation	Hot forgings deformation	Normalizing	Soft annealing	Quenching in oil or water	Tempering
°C	950÷1200	850÷880	650÷700	840÷870	540÷680

rev. 04/2013

**FREE-CUTTING STEELS**  
**DIRECT-HARDENING**

Rodacciai name

**46S20**
**1302**