

**STANDARD REFERENCE:**

EN ISO 683-3: 2018 (Hot-rolled) | EN 10277: 2018 (Bright products)

**RODACCIAI REFERENCES AND COMPARABLE STANDARDS**

EUROPE		ITALY	GERMANY		FRANCE	UK	USA
EN 10084: 2008 EN 10277-4: 2008		(UNI 7846-78)	(DIN 17200-86)		(NF A 35-551-86)	(BS 970 pt.3-96)	ASTM A 29
Grade	N°		Werkstoff	N°			
C16E	1.1148	-	-	-	-	080M15	1016
C16R	1.1208	-	-	-	-		

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

EUROPE	C	Si	Mn	P / max	S	Cr / max	Mo / max	Ni / max	Cu / max	Al
C16E	0,12÷0,18	0,15÷0,40	0,60÷0,90	0,025	≤ 0,035	0,40	0,10	0,40	0,30	-
C16R					0,020÷0,040					0,020÷0,050

**MECCANICAL PROPERTIES - AS ROLLED CONDITION**

Size	Annealed to maximum hardness requirement (+A)	Normalized (+N)
≤100	≤156	100÷155

**MECHANICAL PROPERTIES - BRIGHT PRODUCTS CONDITION**

Size mm	as Rolled + Turned (+SH)		Cold drawn (+C)			+A**+ Turned (+A+SH)	+A**+ Cold drawn (+A+C)
	Hardness (HB)*	R <sub>m</sub> (MPa)	R <sub>p0,2</sub> (MPa) min	R <sub>m</sub> (MPa)	A <sub>5</sub> (%) min	Hardness (HB) max	Hardness (HB) max
≥ 5 ≤ 10	-	-	400	520÷820	7	-	242
> 10 ≤ 16	-	-	360	500÷800	8	-	238
> 16 ≤ 40	105÷184	350÷620	300	450÷750	9	156	222
> 40 ≤ 63	105÷184	350÷620	260	400÷690	11	156	204
> 63 ≤ 100	105÷184	350÷620	235	360÷620	12	156	184

\* Hardness values valid also in as rolled condition \*\*+A = annealed to maximum hardness requirement  
 For size <5 mm the mechanical properties may be agreed at the time of enquiry and order

**WORKING TEMPERATURES RECOMMENDED**

Operation	Hot forgings deformation	Carburizing temperature	Core quenching temperature	Case quenching temperature	Tempering
°C	900÷1150	880÷920	880÷920	830÷870	150÷200

