



18NiCrMo5

CASE-HARDENING STEELS

Reference standard: UNI 7846:1978 (withdrawn)

W.-Nr.	1.6566	AFNOR	18NCD6
AISI	-	BS	815M17
UNI	18NiCrMo5	JIS	-
DIN	-	Other	17NiCrMo6-4

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Mo	Ni
0.15-0.21 ±0.02	0.15-0.40 ±0.03	0.60-0.90 ±0.04	0.035 max + 0.005	0.035 max + 0.005	0.70-1.00 ±0.05	0.15-0.25 ±0.03	1.20-1.50 ±0.05

Cast analysis composition, % by mass | Second row: permissible deviations of the product analysis

TEMPERATURE IN °C

Hot working	Normalising +N	Core hardening	Carburizing	Carburized surface hardening	Stress relieving +SR
1,100-900 °C	880 °C in air	840-870 °C in oil or polymer	880-930 °C	800-830 °C in oil or polymer	150-180 °C
Machinability annealing +A	Isothermal annealing +I	Annealing +FP	Jominy test-piece hardening	Preheating for welding	Post-weld stress relieving
700 °C, cooling 15 °C/h down to 600 °C then air (max 240 HB)	850 °C, furnace cooling down to 650 °C then air (150-220 HB)	950-1,000 °C rapid cooling	850 °C in water	Welding in the annealed state before carburizing	-

Critical points: AC1 730 · AC3 815 °C | Ms 360 °C in the core, 180 °C in the carburized case

MECHANICAL PROPERTIES

HOT-ROLLED - Longitudinal tensile test at 20 °C							
Mechanical properties on a core-hardened test bar. UNI 7846:1978 for reference only							
Diameter (in mm)		R N/mm²	Rp 0.2 N/mm² min	A% min	C% min	Kcu J min	HB for info.
>	≤						
	11	1,230-1,520	980	8		30	363-432
	30	980-1,270	735	9		32.5	295-373
	63	830-1,130	635	10		35	249-339

TEMPERING TABLE *														
R N/mm²	1,460	1,460	1,450	1,430	1,400	1,360	1,300	1,230	1,150	1,080	1,000	900	790	710
Rp 0.2 N/mm²	1,070	1,120	1,170	1,210	1,210	1,190	1,150	1,100	1,040	960	860	790	700	610
HB	415	415	415	409	404	395	381	362	344	327	301	271	237	218
HRC	44.5	44.5	44.5	44	43.5	42.5	41	39	37	35	32	28	22	
A %	13.5	13.6	13.5	13.2	13.0	12.8	12.8	12.9	13.8	15.0	17.0	19.5	22.0	24.0
Z %	57.0	58.0	59.0	60.0	60.0	60.0	60.0	60.0	61.0	63.0	65.0	68.0	72.0	74.0
Kv J	64	64	62	62	64	46	46	46	75	94	125	148	166	180
HRC case	64	63.5	62	60	59	56								
°C	50	100	150	200	250	300	350	400	450	500	550	600	650	700

* Test condition: Ø 10 mm round bar quenched in oil at 850 °C. Reference values at room temperature; the impact row is a product value, test piece not specified

COLD-DRAWN - Longitudinal tensile test at 20 °C 815M17 BS 970-3:1991 for reference only						
Diameter (in mm)		R N/mm ² min	Rp 0.2 N/mm ² min	A% min	Kv J min	HB min
>	≤					
	19	1,080		8	22	327

FORGED - Longitudinal tensile and impact test at 20 °C UNI 8550:1984 for reference only									
Diameter (in mm)		R N/mm ²	Rp 0.2 N/mm ² min	A% L min	A% T min	A% Q min	Kcu L J min	Kcu T min	HB For info
>	≤								
	11	1,225-1,520	980	8			30.0		361-432
11	25	1,030-1,325	785	9			32.5		311-384
25	40	930-1,230	735	9			32.5		278-363
40	100	785-1,080	590	10			35.0		234-327

L = longitudinal | T = tangential | Q = radial

HARDENABILITY VALUES *															
	1.5	3	5	7	9	11	13	15	20	25	30	35	40	45	50
Min	39	38	36	34	31	29	27	25.5	23	21	20.5	20			
Max	49	48.5	48	46.5	45	43.5	41	40	37	35.5	34.5	33.5	33	32.5	32

* Jominy in HRC UNI 7846:1978 (minimum grain size G5 per UNI 3245), distance from the quenched end in mm

Temperature	Elastic modulus GPa		Mean expansion
° C	E long	G tang	10 ⁻⁶ K ⁻¹ (20 °C → T)
20	210	81	
100			
200			
300			
400			