

<b>Quality</b>	<b>X210Cr12</b>	Supply conditions:
According to standards	UNI EN ISO 4957: 2002	Annealed
Number	<b>1.2080</b>	

## Chemical composition

C%	Si%	Mn%	P% max	S% max	Cr%
1,90-2,20	0,10-0,60	0,20-0,60	0,030	0,030	11,0-13,0
± 0.05	± 0.03	± 0.04	+ 0.005	+ 0.005	± 0.15

Product deviations are allowed

## Temperature °C

Hot-forming	Stress-relieving after machining and before quenching	Pre-heating	Quenching <sup>1)</sup>	Quenching <sup>2)</sup>	Tempering for <sup>1)</sup> and <sup>2)</sup>
1050-950	650 furnace cooling to 320, then air	400, pause, then 800, pause, then ▲ <sup>1)</sup> or <sup>2)</sup>	▲ 940-970 oil or polymer s.b. 500-550	▲ 960 air or s.b. (220-250) forthickness < 25 mm	150-300 calm air minimum 2 cycles
Soft annealing	Isothermal annealing	Pre-heating welding	Stress-relieving after welding		
790-820 calm air	850 furnace cooling to 770, pause, furnace cooling 10 °C/h to 720, then air	250-300	650 furnace cooling		
(HB max 248)	HB max 240)	<b>Ac1</b>	<b>Ac3</b>	<b>Ms</b>	<b>Mf</b>
		800	830	200	-10 <sup>b)</sup>

<sup>b)</sup> subcooling  
s.b. = salt bath

the symbol ▲ indicates the temperature rise to ..... °C ▲

## Table of tempering after quenching at 970 °C in oil

HB	730	722	722	706	688	662	634	615	577	543	496	432
HRC	64.5	64	64	63	62	60.5	59	58	56	54	51	46
N/mm <sup>2</sup>							2420	2330	2160	2010	1820	152
Tempering at °C	50	100	150	200	250	300	350	400	450	500	550	600

<b>Modulus of elasticity</b>	longitudinal GPa	210
<b>Modulus of elasticity</b>	tangential GPa	80
<b>Thermal expansion</b>	10 <sup>-6</sup> • K <sup>-1</sup>	10.5    11.0    11.0    11.5    12.0    12.0
<b>Thermal conductivity</b>	W/(m•K)	20
<b>Specific heat capacity</b>	J/(Kg•K)	460
<b>Specific electric resist.</b>	Ohm•mm <sup>2</sup> /m	0.65
<b>Electrical conductivity</b>	Siemens•m/mm <sup>2</sup>	1.54
<b>Density</b>	Kg/dm <sup>3</sup>	7.70
Testing at	°C	20    100    200    300    400    500    600

## Cold-work tool steels

- indeformable steel with excellent wear resistance
- very resistant to compression, marked lack of deformation
- good abrasion resistance
- indeformable during heat treatment
- suitable for nitriding treatments and/or P.V.D. (Physical Vapour Deposition)
- for grinding, it is recommended to use soft grinding wheels with an open structure, with abundant cooling and light removal
- applications: *dies in the ceramics sector, drawing dies, shears, rollers and cylinders for cold rolling mills, wire guide tools, cutting tools, sintering dies, high quantity efficiency dies, dies for plastics, dies for cold-drawing, broaches and timber millings*