

# CROMAX<sup>®</sup> 280X

## RELATED SPECIFICATIONS:

Europe	EN 20MnV6
Germany	DIN 20MnV6
Great Britain	BS 55M
France	AFNOR E420
USA	ASTM A572

## DESCRIPTION:

**Cromax<sup>®</sup> 280X** is based on a low carbon, micro-alloyed steel combining high strength with excellent machinability and weldability. For < 90 mm, yield and tensile strength are 20% higher than is normal for hard-chrome bars based on low-carbon weldable steel. This improvement is achieved without detriment to machinability or weldability.

In comparison with standard products, the superior properties profile of Cromax 280X offers a number of potential advantages in the design and manufacture of fluid-powered cylinders, not the least of which is the possibility to downsize piston rods without loss of load-bearing capacity, thereby reducing weight and cost.

## TYPICAL CHEMICAL ANALYSIS:

C %	Si %	Mn %	S %	V %	C.E. %(*)
0.18	0.35	1.55	0.025	0.11	0.55 max

\*C.E. = % C + % Mn/6 + (%Cu + Ni)/15 + (%Cr + Mo + % V)/5

## MECHANICAL PROPERTIES:

Size Ø mm	Yield stress ReH,N/nn2, min.	Ultimate tensile Stress, Rm,N/nn2	Elongation A5, %, min.	Hardness HB	Toughness KV, Joule, min.
<20	520	650-800	12	200-240	No guarantee
20-90	520	650-800	19	200-240	27 at 20°C
>90	440	550-700	19	180-230	No guarantee (*)

\*Base steel meeting KV<sup>3</sup>27J at -20°C can be supplied by special arrangement.

## CHROME LAYER:

For Ø ≥ 20 mm, the chrome layer thickness is 20 µm min. For smaller sizes, the minimum thickness is 15 µm.

## SURFACE ROUGHNESS:

The surface roughness (Ra) is always less than 0.2 µm and normally in the range 0.05-0.15 µm. Rt (ISO) is always less than 2.0 µm and normally in the range 0.5-1.5 µm.

## SURFACE HARDNESS:

The chrome layer hardness is 850 HV<sub>0.1</sub> min.

## STRAIGHTNESS:

For  $\varnothing < 30$  mm, the maximum deviation is 0.1 mm/0.5m. The maximum deviation for larger diameters is 0.1 mm/1.0 m.

### ROUNDNESS:

The out of roundness is maximised at 50% of the diameter tolerance interval.

### DIAMETER TOLERANCE:

ISO f7 is standard. Other tolerances can be supplied upon request (narrowest range is ISO level 7 – 0.1mm).

### TOLERANCE RANGES:

Size, mm	ISO f7. $\mu\text{m}$	
	Upper	lower
10 - 18	- 16	- 34
>18 - 30	- 20	- 41
>30 - 50	- 25	- 50
>50 - 80	- 30	- 60
>80 - 120	- 36	- 71
>120	- 43	- 83

### WELDABILITY:

Cromax 280X has excellent weldability. However, for  $\varnothing > 90$  mm. preheating to 150-200°C is recommended. Suitable consumables are OK 48.00/38.84 for MMA welding and OK 12.64 for MAG welding (shielding gas 80% Ar, 20% CO<sub>2</sub>).

Cromax 280X can normally be friction welded without difficulty.

### MACHINING:

Specific machining recommendations for turning and threading of Cromax 280X are tabulated below.

Operation parameters	Rough turning	Fine turning	Threading
Feed, mm/r	0.3 - 0.6	0.05 - 0.3	—
Cut depth, mm	2 - 5	0.2 - 2.0	—
Tool (coated)	ISO P15 - P 30	ISO P10 - P15	ISO P20 - P30
Speed, m/min	280-350	350-400	200-230

## CORROSION RESISTANCE:

The chromium layer generated in hard-chrome plating contains micro-cracks. Hence, the corrosion resistance afforded by hard-chrome plating is limited. Fundia's Cromax products are characterised by a controlled micro-crack distribution, which provides for superior corrosion resistance.

Most test specifications for hard-chrome products are based on salt-spray testing following the ISO 9227 standard or its equivalents (see below), combined with evaluation according to ISO 10289.

ISO 9227	ASTM	DIN 50021	Salt spray type
NSS	B 117	SS	Neutral
AASS	B 287	ESS	Acetic acid
CASS	B 368	CASS	Copper-accelerated acetic acid

While the correlation between these methods is not always clear, our experience is that a given of corrosion is reached 2-3 times as fast in the AASS test as in NSS-testing.

Cromax in standard execution is guaranteed to attain rating 9 or better after 40 h in AASS test. The same rating will be achieved in NSS test after about 100 h.

## DELIVERY LENGTHS:

Production lengths are between 3.6-7.6m. Standard is 6.1 0.1/-0m with the following exceptions. For diameters  $\leq 20$ mm, the production length is 3.6 + 0.1/-0m. For diameters 20 and 22mm, the standard production lengths are 5.0 +0.1/-0m and 5.5 0.1/-0m respectively. Bars with length 7.6 +0.1/-0m can only be supplied for diameters between 40-80mm.

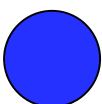
The "unchromed length" of each bar, i.e. the distance at each end over which the chrome layer properties and tolerances can not be guaranteed, is at most 0.15m per end, i.e. 0.3m in total per bar.

Fixed, cut lengths can be supplied if required, but at a price premium.

## PACKAGING:

Blue plastic sleeve in wooden boxes. Every Cromax bar is marked with product and batch information so as to facilitate full traceability.

## COLOUR CODE: BLUEBELL



## CROMAX® 280 Size Range

Diameter

mm	inches
10	
12	
14	
15.875	5/8
16	
18	
19	
19.05	3/4
20	
22	
22.225	7/8
25	
25.4	1
28	
28.575	1 1/8
30	
31.75	1 1/4
32	
33	
34.925	1 3/8
35	
36	
38.1	1 1/2
40	
41.2	

Diameter

mm	inches
44.45	1 3/4
47.625	1 7/8
50	
50.8	2
53.975	2 1/8
55	
56	
57.15	2 1/4
60	
60.3	
63.5	2 1/2
65	
69.85	2 3/4
70	
76.2	3
80	
82.55	3 1/4
88.9	3 1/2
90	
95.25	3 3/4
100	
101.6	4
114.3	4 1/2
127	5