

Description

Deloro® 50 EXV (also called Deloro® 53) is a nickel base “self-fluxing” alloy with good resistance to abrasion and corrosion. Precise control of chemical composition enables weld deposits and fused coatings with tight hardness requirements under strict process conditions. The alloy was designed for exhaust valves, plungers, seal rings, and other wear applications.

Microstructure

The microstructure consists of a mixture of hard nickel boride, chromium boride, and chromium carbide particles in a Ni-Cr-Fe-Si matrix.

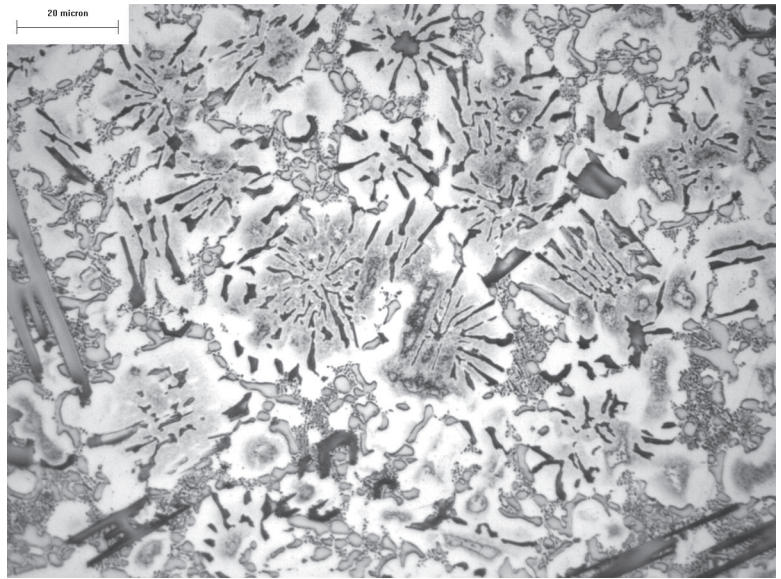


Figure 1: Microstructure of Deloro® 50 EXV. (electrolytic etch 10% CrO₃ @ 2V)

Table 1: Typical Composition (weight %)

B	C	Cr	Fe	Ni	Si
2.5	0.5	11.0	3.2	Bal.	4.0

Table 2: General Properties

Density	7.9 g/cc
Melting Range	975 - 1061 °C
Magnetic Permeability	<0.01 μ
Coefficient of Thermal Expansion (20-800°C)	13.3 μm/m·°C
Typical Hardness of Weld Deposit	51 - 56 HRC 580 - 670 HV1000

Table 3: Typical Powder Properties

Shape	Spherical
Common Size Range	20 - 250 μm
Apparent Density	4.5 g/cc
Hall Flow Rate	15 sec/50g

Table 4: Thermal Properties*

		Bulk Density	Specific Heat	Thermal Diffusivity	Thermal Conductivity
Temperature °C	Method	ρ (g/cm ³)	c_p (J/g-K)	α (mm ² /s)	λ (W/m-K)
25	ASTM E1461	7.88	0.475	2.81	10.5
200	ASTM E1461	7.83	0.525	3.28	13.5
400	ASTM E1461	7.76	0.553	3.86	16.6
600	ASTM E1461	7.69	0.597	4.45	20.4
800	ASTM E1461	7.64	0.626	5.01	24.0

* PTA weld deposit on Fe18Cr8Ni stainless steel

Table 5: Hot Hardness *

Temperature (°C)	Vickers Hardness Number ⁽¹⁾ (kg/mm ²)
25	650
500	540
600	400
700	220
800	80

(1) Nikon QM-1 hot hardness tester (vacuum, diamond indenter, 300g force)

Table 6: Mechanical Properties*

Property	Methods	25°C	400°C
Charpy Impact Test (unnotched)	ASTM E23	1 ft·lb	-----
Longitudinal Tensile Test - YS 0.2% offset	ASTM E8, ASTM A370, E21	-----	-----
Longitudinal Tensile Test - UTS	ASTM E8, ASTM A370, E21	98.5 ksi	114 ksi
Longitudinal Tensile Test - % EL	ASTM E8, ASTM A370, E21	1.6%	2.6%
Longitudinal Tensile Test - % RA	ASTM E8, ASTM A370, E21	<1.0%	1.2%

Specifications:
UNS N99644

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