Agglomerated Welding Flux BF 16

BF 16

Flux type: **F**luoride-**B**asic

Classification: ISO 14174 – **S A FB 1 55 DC H5 *)**
(EN 760 – **SA FB 1 55 DC H5**)

Characteristics:
A highly basic, agglomerated flux with a chemical composition and a production method, which guarantees almost neutral metallurgical reactions. This flux offers low oxygen and low hydrogen potentials, which permits submerged-arc welding of crack-sensitive heat treatable or heat resistant low-alloy steels and high-alloy martensitic materials. When shape- or build-up welding, for example in turbine rotor or disc repairs, constant chemistry of the deposit and high deposition rates can be achieved, even with multi-wire processes.
BF 16 shows good welding characteristics with smooth tie-in and weld bead appearance without slag inclusions or "tiger-tracks", even when high interpass temperatures are experienced. Slag is self-detaching, including in narrow-groove joints. BF 16 is a next-to-neutral flux, without Cr-, Ni- or Mo-compensation. Due to pre-fused raw materials the alloy vectors of the flux (metallurgical reactions) are constant and nearly independent of the welding parameters.

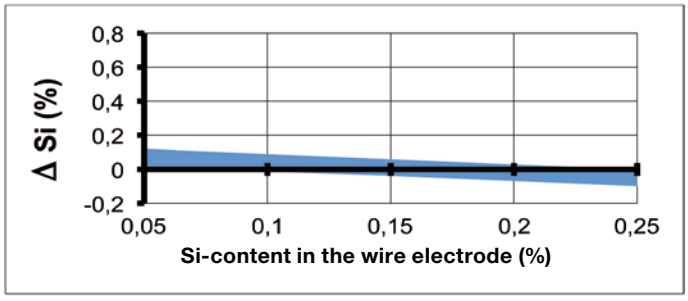
Application:
Designed originally for joining soft-martensitic metal (13Cr4Ni/CA6NM) or shape-welding and surfacing of turbines in combination with solid and metal-powder cored wires such as 410NiMo. Due to its welding characteristics, BF 16 can be combined with many standard low-alloy wires for joining of fine-grained structural steels, heat-resistant or heat-treatable low-alloy CrMo(Ni)-materials as used in the fabrication of components for the chemical / petroleum and power industries.
Also applicable for joining of the new supermartensitic steels 13Cr4.5Ni3Mo together with 13Cr6Ni3Mo-wire.

Characteristic chemical Constituents:

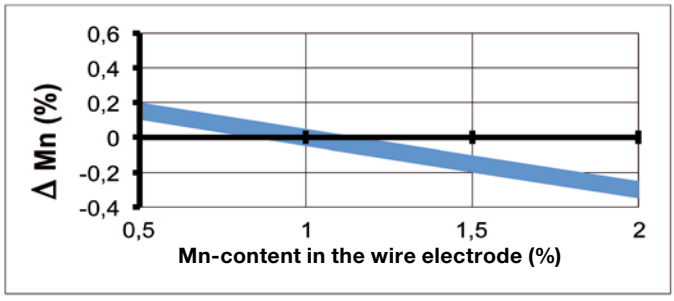
$SiO_2 + TiO_2$	$Al_2O_3 + MnO$	MgO	$CaO + CaF_2$
15 %	20 %	30 %	35 %
Basicity according to Boniszewski: ~3.1			

Metallurgical behaviour acc. to ISO 14174 type of current DC:

Pick-up Silicon



Pick-up / Burn-out Manganese



Sample of 10-layer-pad with **BF 16 + ER 410NiMo**-wire:

Pick up:	C + 0.005/0.01 %	Si + 0.05/0.1 %	Mn + 0.05/0.15 %
Burn–off:	Cr – 0.1/0.3 %	Ni – 0.05/0.2 %	Mo – 0.05/0.2 %

Flux density: 1.1 kg/dm³ (l)

Grain size acc. to ISO 14174: 2 – 20 (Tyler 8 x 65)

Current-carrying capacity: up to 800 A DC using one wire

*) Diffusible hydrogen content H5: determined in deposited metal acc. to the method described in ISO 3690
Type of current DC; redrying conditions 300 – 350 °C.

All-weld metal multiple pass classification of wire-flux combinations:

Wire electrode (ISO 14171-A ISO 24598-A ISO 26304-A ISO 14343-A)	AWS A5.9/5.17/ 5.23	Test assembly ISO 15792-1: type 1.3		AWS A5.17M/5.23M	AWS A5.9/5.17/5.23
BA-S3Si	EH12K	ISO 14171-A-	S 46 6 FB S3Si	F55A6/F48P6-EH12K	F8A8/F7P8-EH12K
BA-S2Ni1	ENi1	ISO 14171-A-	S 42 6 FB S2Ni1	F49A7/P7-ENi1-Ni1	F7A10/P10-ENi1-Ni1
BA-S2Ni2	ENi2	ISO 14171-A-	S 42 8 FB S2Ni2	F49A7/P10-ENi2-Ni2	F7A10/P15-ENi2-Ni2
BA-S3NiMo1	EF3	ISO 14171-A-	S 50 6 FB S3Ni1Mo	F62A5-EF3-F3	F9A6/P8-EF3-F3
BA-S3NiCrMo2,5	EM4 mod.	ISO 26304-A	S 69 6 FB-S3Ni2,5CrMo	F76A7/P7-EM4 mod.-M4	F11A10/P10-EM4 mod.-M4
BA-S1CrMo2	EB3	ISO 24598-A	S CrMo2 FB	F49P3-EB3-B3	F7P2-EB3-B3
S 13 4	ER410NiMo				ER410NiMo

Chemical composition of all-weld metal acc. to EN ISO 15792-1 and AWS A5.17/5.23: (characteristical values in wt. %)

Wire electrode		C	Si	Mn	Mo	Ni	Cr
BA-S3Si	EH12K	0.06-0.09	0.2-0.4	1.2-1.6			
BA-S2Ni1	ENi1	0.06-0.09	0.1-0.35	0.8-1.2		0.8	
BA-S2Ni2	ENi2	0.06-0.09	0.1-0.35	0.8-1.2		1.8	
BA-S3NiMo1	EF3	0.06-0.09	0.1-0.35	1.2-1.6	0.5	0.8	
BA-S3NiCrMo2,5	EM4 mod.	0.06-0.09	0.2-0.4	1.4-1.7	0.5	2.3	0.6
BA-S1CrMo2	EB3	0.06-0.09	0.1-0.3	0.5-0.8	1.0		2.2
S 13 4	ER410NiMo	0.02-0.04	0.1-0.5	0.8-1.2	0.5	4.5	12.0

Mechanical properties of all-weld metal acc. to EN ISO 15792-1 and AWS A5.17/5.23: (characteristical values)

Wire electrode		Heat treatment	YS MPa	UTS MPa	Elong. %	Impact ISO-V (J)				
						-20 °C -4 °F	-30 °C -22 °F	-40 °C -40 °F	-60 °C -76 °F	-73 °C -100 °F
BA-S3Si	EH12K	S *)	>410	>500	>25			>140	>70	
BA-S2Ni1	ENi1	AW	>430	>520	>25					>60
BA-S2Ni2	ENi2	S *)	>400	>500	>26					>70 (>30 – 101 °C)
BA-S3NiMo1	EF3	S *)	>560	>650	>20	>140		>100	>50	
BA-S3NiCrMo2,5	EM4 mod.	S ***)	>730	>820	>15	>100		>80	>60	
BA-S1CrMo2	EB3	A **)	>400	>530	>22	>140	>100	>30		
S 13 4	ER410NiMo	A ****)	>800	>900	>14	>60			>30	
			Hardness 340 – 360 HV10							

Post Weld Heat Treatment: *) 620 °C/1 h **) 690 °C/15 h ***) 605 °C/1 h ****) 590 °C/2 h

Packaging: 25 kg PE-coated Aluminium bags

Storage and redrying:
Unopened originally packed flux bags can be stored up to 2 years in dry storage rooms after date of delivery ex factory.
Redrying conditions specific to the flux: 300 – 350 °C effective flux temperature.