

Agglomerated Welding Flux BF 5.1

Flux type: Aluminate-Basic

Classification: ISO 14174 – S A AB 1 67 AC H5*

Characteristics:

A neutral, semi-basic agglomerated flux of the aluminate basic type suitable for joint welding of low-alloy structural steels, fine-grained steels and pipe steel qualities. Designed for DC and AC welding.

BF 5.1 is suitable for the two-run or multi-layer technique using single or multi-wire processes. The flux shows constant metallurgical characteristics (low Silicon and Manganese pick-up). In combination with appropriate wires, such as Mo-, Ni- or NiMo-alloyed types, uniform mechanical properties with low temperature toughness are achieved. Slag-detachability, even in narrow-groove welds of thick-walled sections, or at high preheating

temperature (> 250 °C), together with finely rippled weld bead performance and smooth tie-ins, even when fillet welding using high currents, are additional features of the flux.

BF 5.1 is formulated to achieve very low diffusible hydrogen levels (< 4 ml/100 g weld deposit). The chemical composition of the flux and its alloy vector have been designed for achieving large amount of acicular ferrite with typical standard wires.

Application:

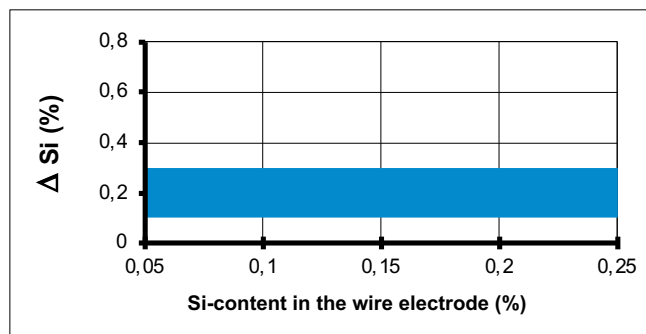
SA-welding of low-alloy structural steels (Y.S. up to 420 MPa), boiler and vessel materials, high-strength ship steels such as EH36; fine-grain structural steels up to Y.S. 460 MPa and pipe steel qualities up to X70 grade (ISO 3183/API-5L).

Characteristic chemical Constituents:

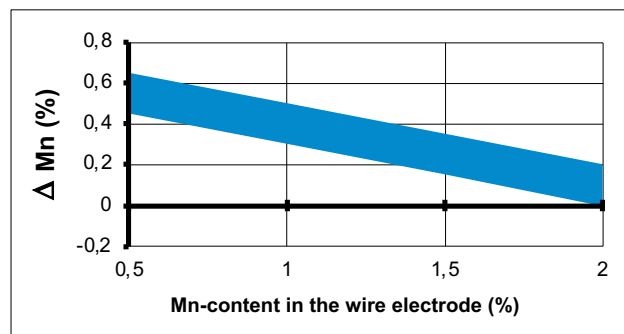
SiO ₂ + TiO ₂	Al ₂ O ₃ + MnO	CaO + MgO	CaF ₂
20 %	30 %	30 %	15 %
Basicity according to Boniszewski: ~1.7			

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

Pick-up Silicon



Pick-up/Burn-out Manganese



Flux density: 1.1 kg/dm³ (l)

Grain size acc. to ISO 14174: 3–20 (Tyler 8 × 48)

Current-carrying capacity: up to 1,000 A (DC or AC) 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 200–250 °C

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

Wire electrode		Test assembly ISO 15792-1: type 1.3	AWS A5.17M/5.23M	AWS A5.17/5.23
ISO 14171-A ISO 24598-A	AWS A5.17/.23			
BA-S1	EL12	ISO 14171-A: S 38 3 AB S1	F48A3-EL12	F7A2-EL12
BA-S2	EM12(K)	ISO 14171-A: S 42 4 AB S2	F48A4/F43P4-EM12(K)	F7A4/F6P4-EM12(K)
BA-S3	EH10K	ISO 14171-A: S 46 5 AB S3	F55A5/F49P5-EH10K	F8A6/F7P6-EH10K
BA-S2Si	EM12K	ISO 14171-A: S 42 5 AB S2Si	F48A5/P5-EM12K	F7A6/P6-EM12K
BA-S3Si	EH12K	ISO 14171-A: S 46 5 AB S3Si	F55A5/F49P5-EH12K	F8A6/F7P6-EH12K
BA-S2Mo	EA2	ISO 14171-A: S 46 4 AB S2Mo	F55A4/P4-EA2-A2	F8A4/P4-EA2-A2
BA-S3Mo	EA4	ISO 14171-A: S 50 4 AB S3Mo	F62A4/P4-EA4-A3	F9A4/P4-EA4-A3
BA-S2Ni1	ENi1	ISO 14171-A: S 42 7 AB S2Ni1	F49A7/P7-ENi1-Ni1	F7A10/P10-ENi1-Ni1
BA-S2Ni2	ENi2	ISO 14171-A: S 46 7 AB S2Ni2	F55A7/F49P7-ENi2-Ni2	F8A10/F7P10-ENi2-Ni2
BA-S3NiMo1	EF3	ISO 14171-A: S 50 4 AB S3Ni1Mo	F62A4/P4-EF3-F3	F9A5/P5-EF3-F3
BA-S2NiCu	EG	ISO 14171-A: S 46 4 AB S2Ni1Cu	F55A4-EG-G	F8A4-EG-G
BA-S2CrMo1	EB2	ISO 24598-A: S SCrMo1 AB	F55P4-EB2-B2	F8P4-EB2-B2

Two-run classification of wire-flux combinations:

Wire electrode		Two-Run/ISO 15792-2: type 2.5	AWS A5.17M/5.23 M	AWS A5.17/5.23
ISO 14171-A ISO 24598-A	AWS A5.17/.23			
BA-S2	EM12(K)	ISO 14171-A: S 3T 2 AB S2	F43TA2-EM12(K)	F6TA0-EM12(K)
BA-S2Si	EM12K	ISO 14171-A: S 4T 3 AB S2Si	F49TA3-EM12K	F7TA2-EM12K
BA-S3Si	EH12K	ISO 14171-A: S 4T 3 AB S3Si	F55TA3-EH12K	F8TA2-EH12K
BA-S2Mo	EA2	ISO 14171-A: S 4T 3 AB S2Mo	F55TA3-EA2	F8TA2-EA2
BA-S2Ni1	ENi1	ISO 14171-A: S 4T 3 AB S2Ni1	F49TA3-ENi1	F7TA2-ENi1
BA-S2Ni2	ENi2	ISO 14171-A: S 4T 4 AB S2Ni2	F55TA4-ENi2	F8TA4-ENi2
BA-S3NiMo1	EF3	ISO 14171-A: S 5T 3 AB S3Ni1Mo	F62TA3-EF3	F9TA2-EF3
BA-S2CrMo1	EB2	ISO 24598-A: S T CrMo1 AB	F49TA2-EB2	F7TA0-EB2

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	Cu
BA-S2	EM12(K)	0.05–0.08	0.2–0.4	1.1–1.5				
BA-S3	EH10K	0.05–0.08	0.2–0.4	1.5–1.9				
BA-S2Si	EM12K	0.05–0.08	0.3–0.5	1.1–1.5				
BA-S3Si	EH12K	0.05–0.08	0.3–0.5	1.5–1.9				
BA-S2Mo	EA2	0.05–0.08	0.2–0.4	1.1–1.5	0.5			
BA-S3Mo	EA4	0.05–0.08	0.2–0.4	1.5–1.9	0.5			
BA-S2Ni1	ENi1	0.05–0.08	0.2–0.4	1.1–1.5		0.8		
BA-S2Ni2	ENi2	0.05–0.08	0.2–0.4	1.1–1.5		2.0		
BA-S3NiMo1	EF3	0.05–0.08	0.2–0.4	1.5–1.9	0.5	0.9		
BA-S2NiCu	EG	0.05–0.08	0.3–0.5	1.0–1.4		0.8	0.2–0.4	0.4–0.6
BA-S2CrMo1	EB2	0.05–0.08	0.2–0.4	1.0–1.4	0.5		1.0	

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)				
						± 0 °C +32 °F	-20 °C -4 °F	-40 °C -40 °F	-51 °C -60 °F	-73 °C -100 °F
BA-S1	EL12	AW	>400	>490	>24	>80	>60	>47(-30°C)		
BA-S2	EM12(K)	AW	>420	>510	>24	>100	>70	>47		
		S*	>360	>450	>24	>100	>70	>27		
BA-S3	EH10K	AW	>470	>560	>23	>100	>70	>60	>47	
		S*	>400	>490	>23	>110	>80	>60	>47	
BA-S2Si	EM12K	AW	>440	>520	>24	>100	>80	>60	>47	
		S*	>400	>480	>24	>100	>80	>60	>47	
BA-S3Si	EH12K	AW	>470	>560	>23	>120	>100	>80	>47	
		S*	>420	>520	>24	>120	>110	>70	>47	
BA-S2Mo	EA2	AW	>490	>580	>22	>90	>60	>47		
		S**	>470	>560	>22	>100	>70	>27		
BA-S3Mo	EA4	AW	>540	>640	>22	>90	>60	>47		
		S**	>540	>620	>22	>90	>60	>27		
BA-S2Ni1	ENi1	AW	>440	>530	>25		>140	>100	>60	>47
		S*	>400	>490	>26		>150	>120	>110	>47
BA-S2Ni2	ENi2	AW	>480	>580	>22		>140	>100	>60	>47
		S*	>460	>550	>23		>150	>110	>70	>47
BA-S3NiMo1	EF3	AW	>570	>670	>22	>110	>100	>47		
		S*	>570	>670	>22	>120	>110	>47		
BA-S2NiCu1	EG	AW	>470	>570	>23	>90	>70	>47		
BA-S2CrMo1	EB2	S***	>470	>570	>22	>80	>47	>27		

Post Weld Heat Treatment: *580 °C/15 h; **620 °C/15 h; ***690 °C/15 h; 700 °C/2 h

Packaging: 25 kg PE-Bags or 500–1,250 kg Big Bags

Storage and redrying: Unopened originally packed flux bags can be stored up to one year in dry storage rooms after date of delivery ex-factory.

Redrying conditions specific to the flux:

200–250 °C effective flux temperature