

## Agglomerated Welding Flux BF 6.30 MW

**Flux type:** Aluminate-Basic

**Classification:** ISO 14174 – S A AB 1 66 AC H5\*

**Characteristics:**

A semi-basic flux for joint welding of high-quality steel pipes for pipeline transportation systems in the oil and gas industries. Especially recommended for multi-wire (3 up to 5 wires) submerged arc processes in the two-run technique. Very good weld appearance and slag release providing flat welds with low reinforcement and flat weld interfaces free from undercut. High grain hardness and resistance to abrasion and a low consumption rate with

good flux feeding properties in the transport and recovery system.

As a result of low hydrogen levels (less than 5 ml/100 g in the weld deposits) and oxygen levels of about 350 ppm as well as uniform metallurgical behavior with low silicon and manganese pick-up, constant mechanical properties are obtained even when welding thick-walled tubes in the two-run technique.

**Application:**

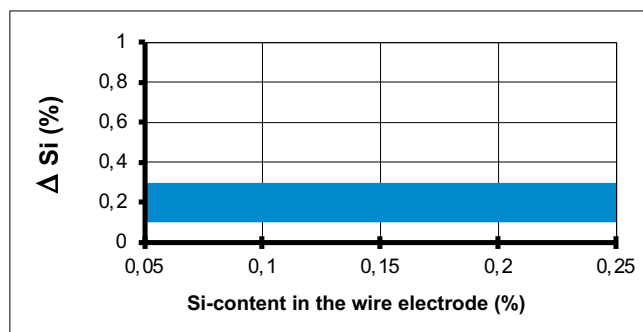
Production of longitudinal steel pipe grades L360 or X52 to L555 or X80 according to ISO 3183/API Spec. 5L.

**Characteristic chemical Constituents:**

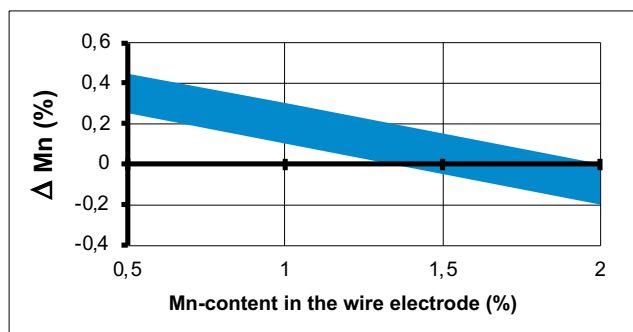
SiO <sub>2</sub> + TiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub> + MnO	CaO + MgO	CaF <sub>2</sub>
20 %	30 %	20 %	20 %
Basicity according to Boniszewski: ~1.5			

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

**Pick-up Silicon**



**Pick-up/Burn-out Manganese**



**Flux density:** 0.95 kg/dm<sup>3</sup> (l)

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

**Current-carrying capacity:** up to 1,500 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	AWS A5.17/.23			
BA-S2	EM12(K)	ISO 14171-A: S 38 3 AB S2	F48A3-EM12(K)	F7A2-EM12(K)
BA-S2Si	EM12K	ISO 14171-A: S 38 3 AB S2Si	F48A3-EM12K	F7A2-EM12K
BA-S3Si	EH12K	ISO 14171-A: S 46 4 AB S3Si	F55A4 / F49P4-EH12K	F8A4 / F7P4-EH12K
BA-S2Mo	EA2	ISO 14171-A: S 50 4 AB S2Mo	F62A4-EA2-A2	F9A4 / P4-EA2-A2
BA-S3Mo	EA4	ISO 14171-A: S 50 3 AB S3Mo	F62A4 / P4-EA4-A4	F9A4 / P4-EA4-A4
BA-S3NiMo1	EF3	ISO 14171-A: S 55 4 AB S3Ni1Mo	F62A4-EF3-F3	F9A4 / P4-EF3-F3
BA-S4MoSi	EA3K	ISO 14341-A: S 50 2 AB G4Mo	F62A4-EA3K-A3	F9A4-EA3K-A3

## Two-run classification of wire-flux combinations:

Wire electrode		Two-Run / ISO 15792-2: type 2.5	AWS A5.17M / 5.23M	AWS A5.17 / 5.23
ISO 14171-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 3T 2 AB S2Si	F43TA2-EM12K	F6TA0-EM12K
BA-S3Si	EH12K	ISO 14171-A: S 4T 3 AB S3Si	F49TA3-EH12K	F7TA2-EH12K
BA-S2Mo	EA2	ISO 14171-A: S 5T 3 AB S2Mo	F62TA3-EA2	F9TA2-EA2
BA-S3Mo	EA4	ISO 14171-A: S 5T 3 AB S3Mo	F62TA3-EA4	F9TA2-EA4
BA-S3NiMo1	EF3	ISO 14171-A: S 5T 3 AB S3Ni1Mo	F62TA3-EF3	F9TA2-EF3
BA-S2MoTiB	EA2TiB	ISO 14171-A: S 5T 5 AB S2MoTiB	F62TA5-EA2TiB	F9TA6-EA2TiB
BA-S3MoTiB	EG	ISO 14171-A: S 5T 5 AB SZ	F62TA5-EG	F9TA6-EA3TiB
BA-S4MoSi	EA3K	ISO 14171-A: S 5T 3 AB G4Mo	F62TA3-EA3K	F9TA2-EA3K

## Mechanical Properties of two-run weld metal of pipe steels: (characteristical values)

Wire electrode		YS MPa	UTS MPa	Elong. %	Impact ISO-V (J)					
					RT	± 0 °C +32 °F	-20 °C -4 °F	-30 °C -22 °F	-40 °C -40 °F	-51 °C -60 °F
BA-S2 <sup>1)</sup>	EM12(K)	>400	>500	>22	>80	>50	>27			
BA-S2Si <sup>1)</sup>	EM12K	>400	>500	>22	>80	>50	>27			
BA-S3Si <sup>1)</sup>	EH12K	>460	>560	>22	>100	>80	>70	>40		
BA-S2Mo <sup>2)</sup>	EA2	>560	>630	>17	>100	>90	>60	>40		
BA-S3Mo <sup>2)</sup>	EA4	>570	>650	>17	>110	>90	>70	>50		
BA-S3NiMo1 <sup>2)</sup>	EF3	>560	>650	>17	>110	>90	>70	>60		
BA-S2MoTiB <sup>3)</sup>	EA2TiB	>560	>630	>17	>130		>90	>80	>70	>60
BA-S3MoTiB <sup>3)</sup>	EG	>570	>650	>17	>130		>90	>80	>70	>60
BA-S4MoSi <sup>3)</sup>	EA3K	>570	>650	>17	>110	>90	>70	>50		

<sup>1)</sup> Low Si-base material up to X60 acc. to API Spec. 5L

<sup>2)</sup> Si-deoxidized base material X65 and higher acc. to API Spec. 5L

<sup>3)</sup> Low temperature toughness: BA-S2MoTiB better suitable for base material with higher Mn-content BA-S3MoTiB for base material with lower Mn-content

Mechanical properties are influenced up to 70 % by dilution of base-material.

**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-S2	EM12(K)	0.05–0.08	0.2–0.5	1.0–1.4			
BA-S2Si	EM12K	0.05–0.08	0.3–0.6	1.0–1.4			
BA-S3Si	EH12K	0.05–0.08	0.3–0.6	1.4–1.8			
BA-S2Mo	EA2	0.05–0.08	0.2–0.5	1.1–1.4	0.4–0.6		
BA-S3Mo	EA4	0.05–0.08	0.2–0.5	1.3–1.7	0.4–0.6		
BA-S3NiMo1	EF3	0.05–0.08	0.2–0.5	1.5–1.8	0.4–0.6	0.8–1.0	
BA-S2MoTiB	EA2TiB	0.04–0.07	0.3–0.5	1.0–1.4	0.4–0.6	Ti 0.05	B 0.005
BA-S3MoTiB	EG	0.04–0.07	0.3–0.5	1.2–1.6	0.4–0.6	Ti 0.05	B 0.005
BA-S4MoSi	EA3K	0.05–0.08	0.4–0.8	1.4–1.9	0.4–0.6		

**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)				
						RT	± 0 °C +32 °F	-20 °C -4 °F	-30 °C -22 °F	-40 °C -40 °F
BA-S2	EM12(K)	AW	> 400	> 510	> 25	> 110	> 90	> 70	> 47	
BA-S2Si	EM12K	AW	> 400	> 510	> 25	> 110	> 90	> 70	> 47	
BA-S3Si	EH12K	AW	> 470	> 550	> 25	> 130	> 90	> 80		> 47
BA-S2Mo	EA2	AW	> 540	> 620	> 23	> 120	> 80	> 70	> 47	
BA-S3Mo	EA4	AW	> 550	> 630	> 22	> 100	> 70	> 60	> 47	
BA-S3NiMo1	EF3	AW	> 580	> 680	> 20	> 120	> 80	> 70	> 50	> 47
		S*	> 560	> 660	> 20	> 130	> 90	> 60	> 47	> 47
BA-S4MoSi	EA3K	AW	> 540	> 630	> 20	> 80	> 47	> 47		

Post Weld Heat Treatment: \* 620 °C/2 h

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

**Lagerung:** 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

