PRODUCT CATALOG

BAVARIA SCHWEISSTECHNIK

Your partner for

Submerged Arc Welding

Electro Slag Welding

SAW / ESW technology for your application

Notes for users

The following information and technical data have been compiled to assist in selecting the most suitable wire-/flux-combination for each specific SA welding and ES welding requirement. Exact specific application as well as approvals should be discussed with us before use.
The properties listed in this booklet are characteristic values in the as-welded and/or post-weld heat-treated condition based on laboratory and approval tests. For multi-run technique they are based on the all-weld metal test specimen according to EN ISO 14171 using the test assembly in accordance with EN ISO 15792-1 (type 1.3) or AWS A5.17/A5.17M and A5.23/A5.23M when mentioned. For two-run technique the test assembly used is in accordance with EN ISO 15792-2 (type 2.5).
The European standards applying to the wire and fluxes for submerged-arc welding (SAW) or electroslag welding (ES) are comparable to the corresponding ASME/AWS codes AWS A5.17/A5.17M and A5.23/A5.23M for carbon and low-alloy steel electrodes or AWS A5.9/A5.9M for stainless steel electrodes and AWS A5.14/A5.14M for nickel-base electrodes.
The properties as stated in the technical data sheets are indicative and should not be considered as guaranteed.

When welding in single- or two-run technique, mixing with the parent material and the heat input influences the mechanical properties of the weld joint. Thus, selection of the appropriate wire-/flux-combination as well as procedure tests before use are crucial, including for approved wire/flux combinations. Details are available on request.

The national and international safety and health standards on the subject and the Material Safety Data Sheets must be strictly observed.

All information and data are based on knowledge at time of going to press (July 2023). Subject to change without notice.

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WIRE ELECTRODES AND TIG WIRE RODS

STORE AND HANDLE

The perfect combination

The requirements placed on weld joints are as diverse as the applications in which they are used – so the only way to create the perfect connection is to use suitable filler materials tailored to the needs of each application.

Bavaria Schweisstechnik offers a comprehensive range of agglomerated and fused fluxes and matching welding wires, meaning you're sure to find the right flux-wire combination for you – no matter whether the weld joint needs to withstand the climatic conditions in a pipeline, meet the stringent safety standards imposed for off-shore wind turbines, or reliably connect high-strength steels in the automotive engineering industry.

If you cannot find what you're looking for in our range, simply contact us as we would be glad to sit down with you to find your ideal solution. As an independent, medium-sized company, Bavaria Schweisstechnik has its own production plant that provides the renowned "Made in Bavaria" quality and enables us to respond quickly and flexibly to your needs. What's more, we have also continually expanded our storage capacity, meaning our products are generally available from stock.

Our portfolio is rounded off by MIG wires and TIG rods, giving you a complete and carefully coordinated range of products designed to produce the very best results, each and every time.

Top-quality weld joints

Thanks to our rigorous quality standards, the fluxes, wires and rods from Bavaria Schweisstechnik always create weld joints of the finest quality.

- **Our own production plant in Unterschleißheim, Germany**
- **Intensive product monitoring throughout the process**
- **The origin of all raw materials can be traced back in detail**
- **All products have consistent, reliable properties**

High productivity when welding

Bavaria Schweisstechnik's products represent the perfect blend of premium weld joints and economical processing.

- **The right flux size for any requirement**
- **Optimal welding speed and power load**
- **Efficient, problem-free processing**
- **Minimal reworking required**
- **No imperfections such as pores or cold cracks**

Bavaria Schweisstechnik is certified to EN ISO 9001:2015 and recognised as a manufacturer of filler materials in accordance with the relevant VdTÜV (German Association of Technical Inspection Agencies) regulations. Various quality control companies have inspected and audited our work and confirmed the success of our quality management system. Of course, the users themselves ultimately also confirm the high quality of our products, as our filler materials regularly satisfy custom specifications set by customers from a wide range of industries.

Passing on the baton to the second generation – in 2009, Hubert and Robert Lettner took over the company from their father and have continued to expand the business ever since.

A real passion for submerged-arc welding

The high quality of our fluxes and filler materials is underpinned by decades of expertise in this field. Bavaria Schweisstechnik was founded in 1985 and is now being managed by the second generation of the family. Our philosophy has always been to focus on quality and put the customer and their needs at the heart of what we do, and that remains unchanged to this day. The success of our premium solutions is down to our own production site in Unterschleißheim, smart testing and inspection technology, and a real love of and eye for detail when it comes to all aspects of manufacturing and product development.

A dependable partner for submerged-arc welding

Today, Bavaria Schweisstechnik is a specialist in flux and wires, with many manufacturers of filler materials selling our products under their own brand name.

- Owner-operated family-run company
- Production site in Unterschleißheim
- Comprehensive expertise in industry-specific solutions
- We treat customers as partners and respond to their requests quickly and flexibly
- Reliable delivery across the globe

Long-standing expertise for our customers

1985 – Bavaria Schweisstechnik GmbH founded in Unterschleißheim

1993 – Lloyd Register Quality System introduced to assure and verify product quality and consistency

1994 – Medium basic fluxes for pipe production in the oil and gas industry launched

1995 – ISO 9000 (subsequently 9001) replaces the Lloyd Register Quality System

2000 – Bavaria Schweisstechnik's products are now available in more than 25 countries

2005 – Finished product storage capacity is increased to 1,300 tonnes

2007 – Products for deposition welding using ESW and submerged-arc welding technology developed and manufactured

On land, in water and in the air

Every industry has its own specific requirements, so we have designed our range to provide the ideal wire/flux combination for your needs, even for unusual applications, right across the globe.
Whether you're dealing with evermore stringent quality requirements from new types of steel or working in booming sectors such as renewable energy – Bavaria Schweisstechnik's filler materials for submerged-arc welding are dependable solutions and suitable for a wide range of applications, from off-shore wind parks and pipelines to the chemical and steel construction industries. No matter whether you're using unalloyed, low-alloy or high-alloy steels, weld joints made using our products are ones you can rely on.

More than just flux

Whilst high-quality fluxes and wires are cornerstones of first-rate weld seams, you cannot achieve a perfect connection if you do not also have the right services to complement it. Bavaria Schweisstechnik is at your side with a carefully chosen, holistic portfolio, ensuring your submerged-arc welding results are always second to none.

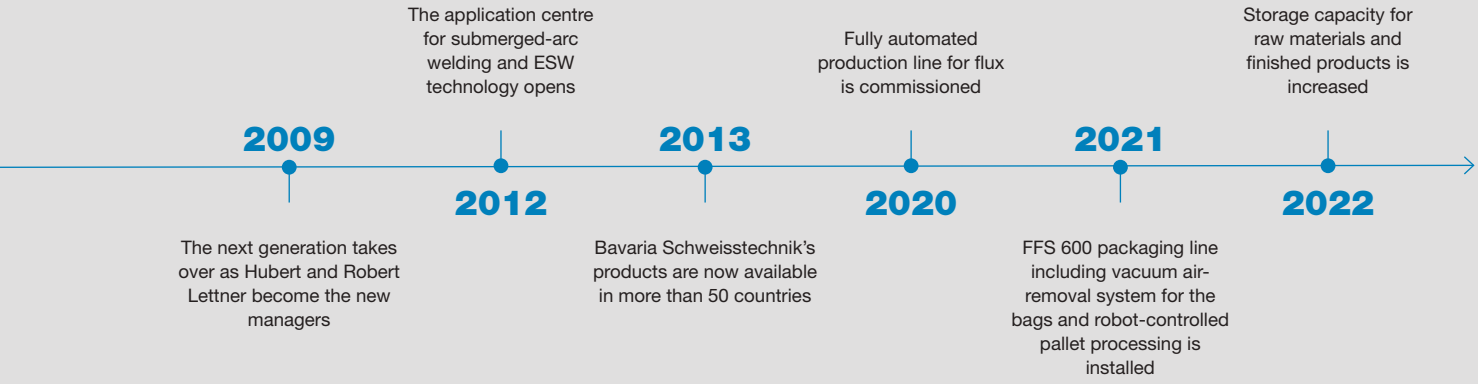
Leverage our expertise to create the perfect solution

Submerged-arc welding is a complex technique as it is used to weld many different steels and is subject to demanding requirements in the various applications. That's why our experienced engineers and technicians will gladly work hand in hand with you to find the solution that works best for you. We take a holistic approach, looking at everything from the right combination of wire and flux to the best processing parameters for your circumstances. We'll be by your side throughout, answering any questions you may have about the application, including on site at your premises if desired.
If our portfolio doesn't have what you're looking for, we'll develop a bespoke flux with the appropriate filler materials for your specific requirements.

Sophisticated logistics concept ensures a reliable supply

We currently supply customers in more than 60 countries across the globe with flux and filler materials from our headquarters in Unterschleißheim, including for the most challenging of applications.

- Deliveries by land, sea and air
- Different sizes and types of packaging to cover all requirements
- Very stable supplies thanks to continuous expansion of storage capacity
- All our products are generally available from stock
- Fast deliveries
- End-to-end shipping solutions (exports/logistics/deliveries)



Normative references of this product catalogue

The information and data sheets in this brochure are based on the relevant normative references of European and US publications and standards at the time of going to press. The normative references are cited at the appropriate locations in the technical data sheets and in the text. The references and publications are as follows:

EN 10204	Metallic products – Types of inspection documents.
EN 13479	Welding consumables – General product standard for filler metals and fluxes for fusion welding of metallic materials
EN 14532-1	Welding consumables – Part 1: Primary methods and conformity assessment of consumables for steel, nickel and nickel alloys
EN ISO 544	Welding consumables – Technical delivery conditions for filler material and fluxes – Type of product, dimensions, tolerances and marking
EN ISO 3690	Welding and allied processes – Determination of hydrogen in deposited weld metal arising from the use of covered electrodes for welding mild and low alloy steels
EN ISO 9692-2	Welding and allied processes – Joint preparation – Part 2: Submerged arc welding of steels
EN ISO 13916	Welding – Measurement of preheating temperature, interpass temperature and preheat maintenance temperature
EN ISO 14171	Welding consumables – Solid wire electrodes, tubular cored electrodes and electrode/flux combinations for SAW of non alloy and fine grain steels – Classification
EN ISO 14174	Welding consumables – Fluxes for SA and ES welding – Classification
EN ISO 14341	Welding consumables – Wire electrodes and weld deposits for gas shielded metal arc welding of non alloy and fine grain steels – Classification
EN ISO 14343	Welding consumables – Wire electrodes, strip electrodes, wires and rods for arc welding of stainless and heat resisting steels – Classification
EN ISO 14344	Welding consumables – Procurement of filler materials and fluxes
EN ISO 15792-1	Welding consumables – Test methods – Part 1: Preparation of all-weld metal test pieces and specimens in steel, nickel and nickel alloys
EN ISO 15792-2	Welding consumables – Test methods – Part 2: Preparation of single-run and two-run technique test pieces and specimens in steel
EN ISO 18274	Welding consumables – Solid wire electrodes, solid strip electrodes, solid wires and solid rods for fusion welding of nickel and nickel alloys – Classification
EN ISO 24598	Welding consumables – Solid wire electrodes, tubular cored electrodes and electrode/flux combinations for SAW of creep-resisting steels – Classification
EN ISO 26304	Welding consumables – Solid wire electrodes, tubular cored electrodes and electrode/flux combinations for SAW of high strength steels – Classification

AWS Spec A5.01/A5.01M	Welding Consumables – Procurement of Filler Metals and Fluxes
AWS Spec A5.09/A5.09M	Specification for Bare Stainless Steel Welding Electrodes and Rods
AWS Spec A5.14/A5.14M	Specification for Nickel and Nickel-Alloy Bare Welding Electrodes and Rods
AWS Spec A5.17/A5.17M	Specification for Carbon Steel Electrodes and Fluxes for SAW
AWS Spec A5.23/A5.23M	Specification for Low Alloy Steel Electrodes and Fluxes for SAW


WELDING FLUX
BAVARIA
SCHWEISSTECHNIK

Agglomerated Welding Flux BF 1

Flux type: Aluminate-Rutile
Classification: ISO 14174 – S A AR 1 76 AC H5*

Characteristics:
Designed for all SAW-processes and welding of ordinary carbon-manganese, low alloy structural and boiler quality steels with yield strength up to 355 MPa (t < 25 mm) in combination with wire grades S1, S2, S2Mo and SCrMo1. The flux is suitable for high speed welding (up to 2 m/min.) and provides very good weld bead appearance and excellent slag release even with small angle preparation and fillet welds. The chemical nature of BF 1 flux provides high resistance to cracking on single pass applications. Additional features are resistance to porosity when welding rusty plates, heavy scale or other contaminations of plate surfaces (e.g. special primer-coatings) and low sensitivity to arc blow.

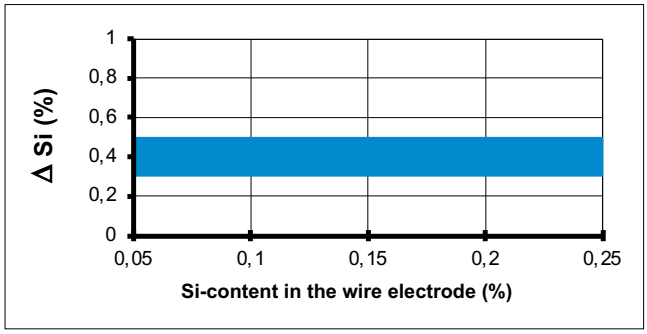
Application:
Preferentially used for single-run, two-run and fillet SA-welding. Main fields of application include structural steelwork, thin-walled containers, LP-gas cylinders and fin-tube walls.

Characteristic chemical Constituents:

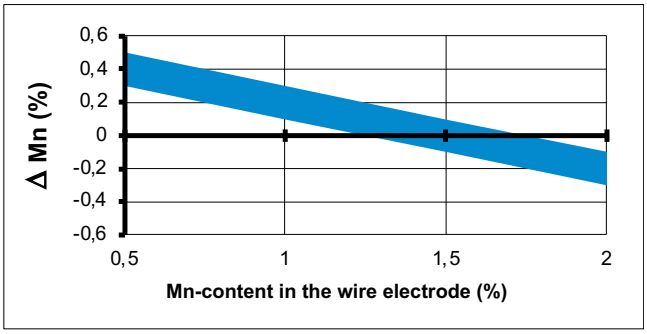
$SiO_2 + TiO_2$	$Al_2O_3 + MnO$	CaO + MgO	CaF_2
25 %	55 %	5 %	10 %
Basicity according to Boniszewski: ~0.6			

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

Pick-up Silicon



Pick-up/Burn-out Manganese



Flux density: 1.0 kg/dm³ (l)
Grain size acc. to ISO 14174: 2–16; 2–12; 2–20
Current-carrying capacity: up to 800 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 150–200 °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 A AR S1	F48A0-EL12	F7AZ-EL12
BA-S2	EM12(K)	ISO 14171-A: S 42 0 AR S2	F48A0-EM12(K)	F7AZ-EM12(K)
BA-S2Si	EM12K	ISO 14171-A: S 42 2 AR S2Si	F48A2-EM12K	F7A0-EM12K
BA-S2Mo	EA2	ISO 14171-A: S 46 2 AR S2Mo	F55A2-EA2-A2	F8A0-EA2-A2
BA-S2NiCu	EG	ISO 14171-A: S 46 A AR S2Ni1Cu	F55A2-EG-G	F8A0-EG-G
BA-S2CrMo1	EB2	ISO 24598-A: S SCrMo1 AR	F55PZ-EB2-B2	F8PZ-EB2-B2

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 ISO 24598-A	AWS A5.17/.23			
BA-S2	EM12(K)	ISO 14171-A: S 3T 2 AR S2	F43TA2-EM12(K)	F6TA0-EM12(K)
BA-S2Si	EM12K	ISO 14171-A: S 3T 2 AR S2Si	F43TA2-EM12K	F6TA0-EM12K
BA-S2Mo	EA2	ISO 14171-A: S 4T 2 AR S2Mo	F49TA2-EA2	F7TA0-EA2
BA-S4Mo	EA3	ISO 14171-A: S 5T 2 AR S4Mo	F55TA2-EA3	F8TA0-EA3
BA-S2CrMo1	EB2		F49TPZ-EB2	F7TPZ-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-S1	EL12	0.04–0.08	0.3–0.6	0.8–1.1				
BA-S2	EM12(K)	0.04–0.08	0.3–0.6	1.0–1.4				
BA-S2Si	EM12K	0.04–0.08	0.4–0.8	1.0–1.4				
BA-S2Mo	EA2	0.04–0.08	0.3–0.7	1.0–1.4	0.4–0.6			
BA-S2Ni1Cu	EG	0.04–0.08	0.3–0.9	0.8–1.5		0.65–0.90	0.4	0.4–0.65
BA-S2CrMo1	EB2	0.04–0.08	0.3–0.7	0.9–1.3	0.4–0.6		1.0	

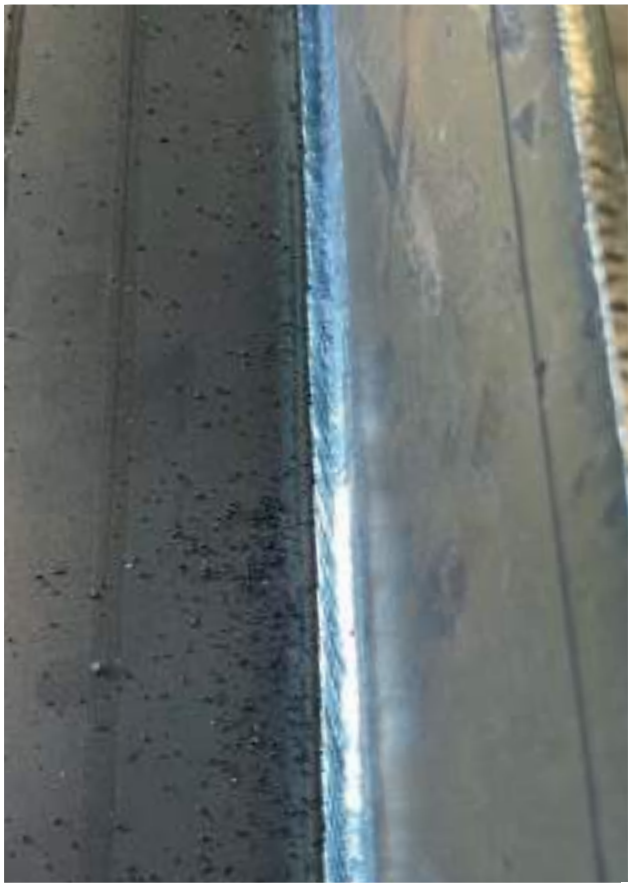
BF 1

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-S1	EL12	U	>400	>510	>24	>70	>40			
BA-S2	EM12(K)	U	>420	>530	>22	>70	>47			
BA-S2Si	EM12K	U	>430	>540	>22	>70	>47	>27		
BA-S2Mo	EA2	U	>480	>580	>20	>60	>47	>27		
BA-S2Ni1Cu	EG	U	>460	>570	>20	>70	>40	>27		
BA-S2CrMo1	EB2	A*	>470	>570	>20	>50				

Post Weld Heat Treatment: * 680 °C/10 h

Packaging: 27.5 kg PE-Bags or 500–1,250 kg Big Bags
Storage: 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:
150–200 °C effective flux temperature



BF 1 + EA2 Wire Electrodes for Fin Tube Welding

Characteristic for BF 1
- high speed welding
- no undercuts
- weld surface (not too concave)
- low flux consumption

Agglomerated Welding Flux BF 2.1

Flux type: Aluminate-Rutile
Classification: ISO 14174 – S A AR 1 76 AC H5*

Characteristics:
BF 2.1 is an agglomerated welding flux with the characteristic of an Aluminate-Rutile Type. Designed for all SAW-processes and welding of ordinary carbon-manganese, low alloy structural and boiler quality steels with yield strength up to 355 MPa (t < 25 mm) in combination with wire grades S2, S2Si. The flux is suitable for high speed welding (up to 2.2 m/min.) and provides very good weld bead appearance and excellent slag release even with small angle preparation and fillet welds. The chemical nature of BF 2.1 flux provides high resistance to cracking on single pass applications. Additional features are resistance to porosity when welding rusty plates, heavy scale or other contaminations of plate surfaces (e.g. special primer-coatings) and low sensitivity to arc blow.

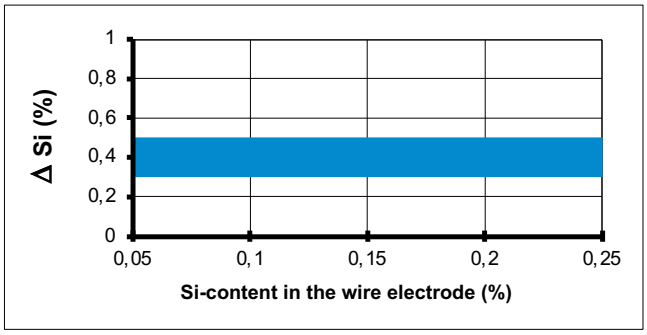
Application:
Preferentially used for single-run, two-run and fillet SA-welding. Main fields of application include structural steelwork, thin-walled containers, LP-gas cylinders and lightning towers.

Characteristic chemical Constituents:

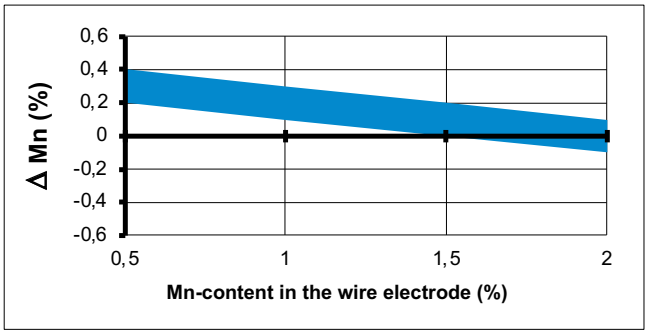
$SiO_2 + TiO_2$	$Al_2O_3 + MnO$	$CaO + MgO$	CaF_2
25 %	50 %	10 %	10 %
Basicity according to Boniszewski: ~0.8			

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

Pick-up Silicon



Pick-up/Burn-out Manganese



Flux density: 1.0 kg/dm³ (l)
Grain size acc. to ISO 14174: 4–14
Current-carrying capacity: up to 800 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 150–200 °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-S2	EM12(K)	ISO 14171-A: S 42 0 AR S2	F48A0-EM12(K)	F7AZ-EM12(K)
BA-S2Si	EM12K	ISO 14171-A: S 42 2 AR S2Si	F48A2-EM12K	F7A0-EM12K

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 AR S2	F43TA2-EM12(K)	F6TA0-EM12(K)
BA-S2Si	EM12K	ISO 14171-A: S 3T 2 AR S2Si	F43TA2-EM12K	F6TA0-EM12K

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)	0.04 – 0.08	0.4 – 0.8	1.0 – 1.4				
BA-S2Si	EM12K	0.04 – 0.08	0.4 – 0.8	1.0 – 1.4				

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)	U	> 420	> 530	> 22	> 70	> 47			
BA-S2Si	EM12K	U	> 430	> 540	> 22	> 80	> 50	> 27		

Packaging: 27.5 kg PE-Bags or 500 – 1,250 kg Big Bags
Storage: Unopened originally packed flux bags can be stored up to one year in dry storage
Redrying conditions specific to the flux:
150 – 200 °C effective flux temperature

Agglomerated Welding Flux BF 3

Flux type: Aluminate-Basic
Classification: ISO 14174 – S A AB 1 67 AC H5*

Characteristics:
BF 3 is an agglomerated aluminate-basic flux with high current-carrying capacity, specially designed for the welding of windmill towers using tandem – arc. It is also suitable for joint welding of unalloyed and low alloy structural steels, pipe steels, boiler steels and fine grain steels. The flux is suitable for single and multilayer welding of longitudinal, circumferential and fillet welds. It can be used for single, tandem, twin and multi wire welding systems. Excellent slag removal in narrow groove welds of thick wall sections. Typical characteristic of this flux is a medium Mn and Si pick up as well as very low diffusible hydrogen level. It is suitable for both AC and DC welding.

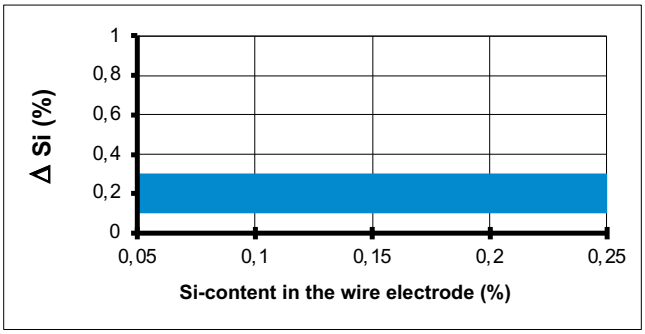
Application:
Joint welding of no alloy and low alloy structural steels acc. to. EN 10025. Fine grain steels with Ys < 420 MPa and boiler steels such as P265GH (H II) and 16Mo3.

Characteristic chemical Constituents:

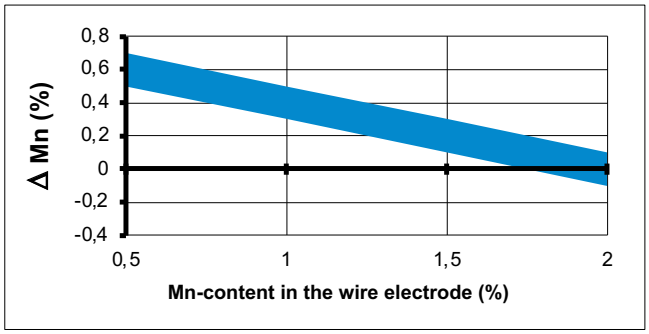
$SiO_2 + TiO_2$	$Al_2O_3 + MnO$	CaO + MgO	CaF_2
20 %	40 %	25 %	10 %
Basicity according to Boniszewski: ~1.9			

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: 2–20
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-S1	EL12	ISO 14171-A: S 38 2 AB S1	F48A2-EL12	F7A0-EL12
BA-S2	EM12(K)	ISO 14171-A: S 42 4 AB S2	F48A4/P4-EM12(K)	F7A4/P4-EM12(K)
BA-S2Si	EM12K	ISO 14171-A: S 42 4 AB S2Si	F48A4/P4-EM12K	F7A4/P4-EM12K
BA-S3Si	EH12K	ISO 14171-A: S 46 4 AB S3Si	F55A4/F48P4-EH12K	F8A4/F7P4-EH12K
BA-S2Mo	EA2	ISO 14171-A: S 46 4 AB S2Mo	F55A4/P4-EA2-A2	F8A4/P4-EA2-A2

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-S1	EL12	ISO 14171-A: S 2T 2 AB S1	F43TA2-EL12	F6TA0-EL12
BA-S2	EM12(K)	ISO 14171-A: S 3T 2 AB S2	F49TA2-EM12(K)	F7TA0-EM12(K)
BA-S2Si	EM12K	ISO 14171-A: S 3T 2 AB S2Si	F49TA2-EM12K	F7TA0-EM12K
BA-S3Si	EH12K	ISO 14171-A: S 4T 3 AB S3Si	F55TA3-EH12K	F8TA2-EH12K
BA-S2Mo	EA2	ISO 14171-A: S 4T 2 AB S2Mo	F55TA2-EA2	F8TA2-EA2

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-S1	EL12	0.05–0.08	0.2–0.4	0.9–1.3			
BA-S2	EM12(K)	0.05–0.08	0.2–0.4	1.4–1.8			
BA-S2Si	EM12K	0.05–0.08	0.2–0.5	1.4–1.8			
BA-S3Si	EH12K	0.05–0.08	0.2–0.5	1.6–2.0			
BA-S2Mo	EA2	0.04–0.08	0.2–0.4	1.3–1.7	0.5		

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	U	>400	>510	>24	>80	>47			
BA-S2	EM12(K)	U	>420	>500	>22	>100	>70	>50	>27	
		S*	>400	>490	>22	>110	>80	>60	>30	
BA-S2Si	EM12K	U	>430	>520	>22	>100	>70	>50	>27	
		S*	>400	>490	>22	>110	>80	>60	>30	
BA-S3Si	EH12K	U	>470	>560	>22	>120	>90	>70	>35	
		S*	>400	>490	>22	>130	>100	>80	>40	
BA-S2Mo	EA2	U	>490	>570	>20	>100	>80	>30		
		S**	>470	>570	>22	>110	>70	>30		

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

Agglomerated Welding Flux BF 3.5

Flux type: Aluminate-Basic
Classification: ISO 14174 – S A AB 1 67 AC H5*

Characteristics:
BF 3.5 is an agglomerated welding flux of the aluminate basic type. It is suitable for joint welding of low alloy structural steels, pipe steels, boiler steels and fine grain steels. The flux is suitable for single and multilayer welding of longitudinal and circumferential and fillet welds. It can be used for single, tandem, twin and multi wire welding systems. Excellent slag removal in narrow groove welds of thick wall sections. Typical characteristic of this flux is a medium Mn and Si pick up as well as very low diffusible hydrogen level. It is suitable for both AC and DC welding.

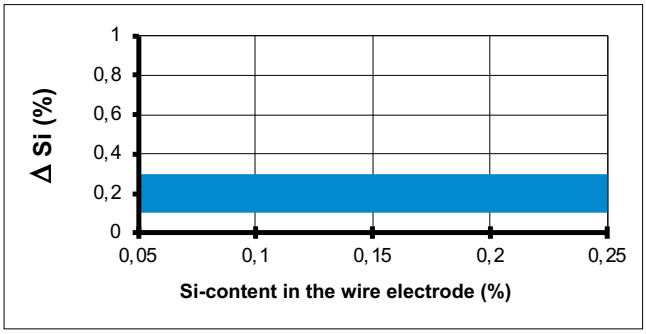
Application:
Joint welding of non-alloy and low alloy structural steels acc. to. EN 10025. Fine-grain structural steels with YS < 420 MPa and boiler steels such as P265GH (H II) and 16Mo3.

Characteristic chemical Constituents:

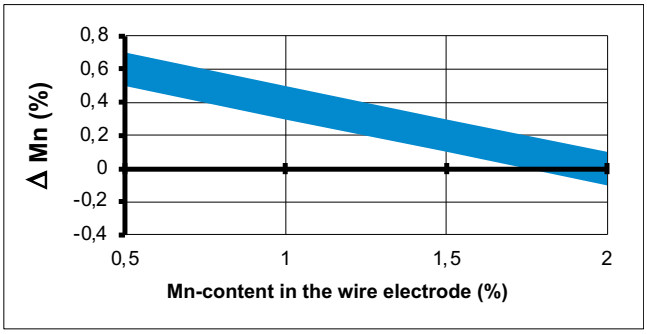
$SiO_2 + TiO_2$	$Al_2O_3 + MnO$	$CaO + MgO$	CaF_2
20 %	30 %	30 %	15 %
Basicity according to Boniszewski: ~1.7			

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: 2–16 (Tyler 10×65)
Current-carrying capacity: up to 1,500 A (DC or AC) using one wire
Packaging: 25 kg PE-Bags or 500–1,250 kg Big Bags
Storage: 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

Redrying conditions specific to the flux:
200–250 °C effective flux temperature

* 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		RSG / ISO 15792-1: type 1.3	AWS A5.17M / 5.23M	AWS A5.17 / 5.23
ISO 14171-A	ISO 14171-A			
BA-S1	EL12	ISO 14171-A: S 38 2 AB S1	F48A2-EL12	F7A0-EL12
BA-S2	EM12(K)	ISO 14171-A: S 42 4 AB S2	F48A4 / P4-EM12(K)	F7A4 / P4-EM12(K)
BA-S2Si	EM12K	ISO 14171-A: S 42 4 AB S2Si	F48A4 / P4-EM12K	F7A4 / P4-EM12K
BA-S3Si	EH12K	ISO 14171-A: S 46 4 AB S3Si	F55A4 / F48P4-EH12K	F8A5 / F7P4-EH12K
BA-S2Mo	EA2	ISO 14171-A: S 46 3 AB S2Mo	F55A4 / P4-EA2-A2	F8A2 / P2-EA2-A2
BA-S2NiCu	EG	ISO 14171-A: S 46 3 AB S2Ni1Cu	F55A3 / F49P3-EG-G	F8A2 / F7P2-EG-G

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-S1	EL12	ISO 14171-A: S 2T 2 AB S1	F43TA2-EL12	F6TA2-EL12
BA-S2	EM12(K)	ISO 14171-A: S 3T 2 AB S2	F49TA2-EM12(K)	F7TA2-EM12(K))
BA-S2Si	EM12K	ISO 14171-A: S 3T 2 AB S2Si	F49TA2-EM12K	F7TA2-EM12K
BA-S2Mo	EA2	ISO 14171-A: S 4T 2 AB S2Mo	F55TA2-EA2	F8TA2-EA2

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-S1	EL12	0.05–0.08	0.2–0.4	0.9–1.3			
BA-S2	EM12(K)	0.05–0.08	0.2–0.4	1.1–1.5			
BA-S2Si	EM12K	0.05–0.08	0.2–0.5	1.1–1.5			
BA-S3Si	EH12K	0.05–0.08	0.3–0.5	1.5–1.9			
BA-S2Mo	EA2	0.04–0.08	0.2–0.4	1.1–1.5	0.5		
BA-S2NiCu	EG	0.05–0.08	0.3–0.5	1.1–1.5		0.8	Cr: 0.20–0.40 Cu: 0.40–0.65

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	-30 °C -22 °F	-40 °C -40 °F	-51 °C -60 °F
BA-S1	EL12	AW	>400	>500	>24	>70	>50			
BA-S2	EM12(K)	AW	>420	>500	>22	>100	>70	>60	>47	
		S*	>390	>490	>22	>100	>70	>60	>47	
BA-S2Si	EM12K	AW	>430	>500	>22	>100	>70	>60	>47	
		S*	>400	>490	>22	>100	>70	>60	>47	
BA-S3Si	EH12K	AW	>470	>560	>22	>100	>80	>60	>47	
		S*	>400	>500	>22	>100	>80	>60	>27	
BA-S2Mo	EA2	AW	>490	>570	>20	>100	>80	>47		
		S	>470	>550	>22	>100	>80	>47		
BA-S2NiCu	EG	AW	>470	>550	>22	>100	>70	>47		

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

Agglomerated Welding Flux BF 4

Flux type: Aluminate-Basic
Classification: ISO 14174 – S A AB 1 76 AC

Characteristics:
Versatile flux for joint welding and surfacing with wire or strip electrodes. BF 4 is suitable for high-speed welding of butt and fillet welds with single and multi-wire processes. Smooth weld bead appearance with flat weld interfaces free from undercut, self de-slagging without any slag residuals, high current carrying capacity and low flux consumption (wire/flux ratio 1:0,9) are other special features of BF 4. Uniform mechanical property performance and low diffusible hydrogen levels make BF 4 flux suitable for most of the SAW processes with its wide range of applications.

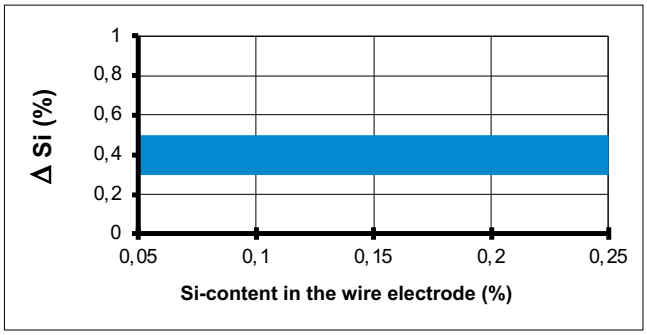
Application:
Joint welding of non-alloy and low alloy structural steels such as S 355 J2 G3 (St 52-3N) acc. to EN 10025, boiler steels such as P265GH (H II) and 16Mo3/A335 Gr. P1, as well as fine-grain structural steels with yield strength up to 420 MPa (t < 50 mm) in combination with compatible wires such as S2 or S2Mo. Surfacing with special hard facing wires and strips, including metal powder-cored wires (MPCW)

Characteristic chemical Constituents:

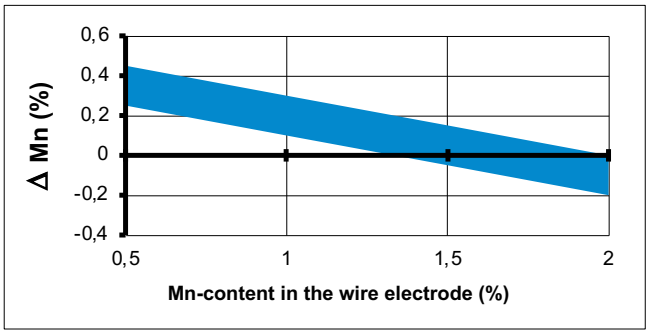
$SiO_2 + TiO_2$	$Al_2O_3 + MnO$	CaO + MgO	CaF_2
30 %	30 %	25 %	12 %
Basicity according to Boniszewski: ~1.1			

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

Pick-up Silicon



Pick-up/Burn-out Manganese



Flux density: 1 kg/dm³ (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

BF 4 with tubular wire Ø 4.00 type 18.8.6 L

Excellent weld bead appearance, also in rail crossings and bends

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 42 3 AB S2	F48A3-EM12(K)	F7A2-EM12(K)
BA-S2Mo	EA2	ISO 14171-A: S 46 3 AB S2Mo	F55A3-EA2-A2	F8A2-EA2-A2

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-S2Mo	EA2	ISO 14171-A: S 4T 2 AB S2Mo	F49TA2-EA2	F7TA0-EA2

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)	0.04–0.8	0.4–0.8	1.0–1.4			
BA-S2Mo	EA2	0.04–0.08	0.4–0.8	1.0–1.4	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	>24	>80	>60	>50	>30	
		S*	>360	>480	>25	>90	>70	>60	>40	
BA-S2Mo	EA2	AW	>470	>570	>20	>80	>60	>50	>30	
		S**	>440	>540	>22	>90	>70	>60	>40	

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

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.

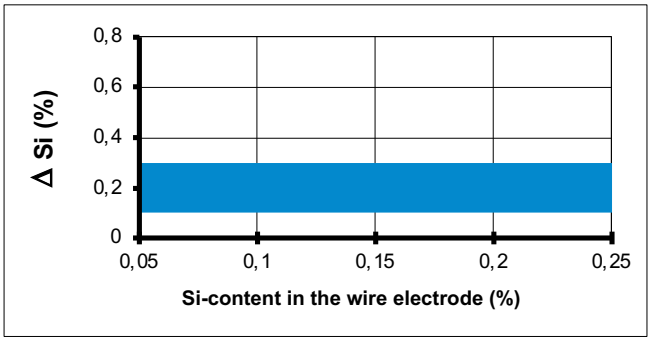
Application:
SA-welding of low-alloy structural steels (Y.S. up to 420 MPa), boiler and vessel materials, high-strength ship steels such as EH36; fine-grain structural steels up to Y.S. 460 MPa and pipe steel qualities up to X70 grade (ISO 3183/API-5L).

Characteristic chemical Constituents:

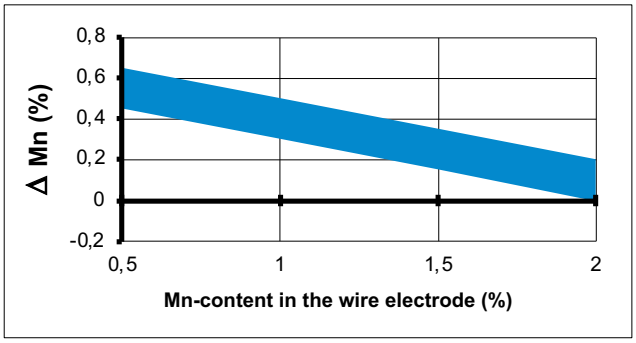
$SiO_2 + TiO_2$	$Al_2O_3 + MnO$	CaO + MgO	CaF_2
20 %	30 %	30 %	15 %
Basicity according to Boniszewski: ~1.7			

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

Agglomerated Welding Flux BF 6.30

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 petroleum and natural gas industries. Especially recommended for single and multi-wire (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 undercuts. 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.

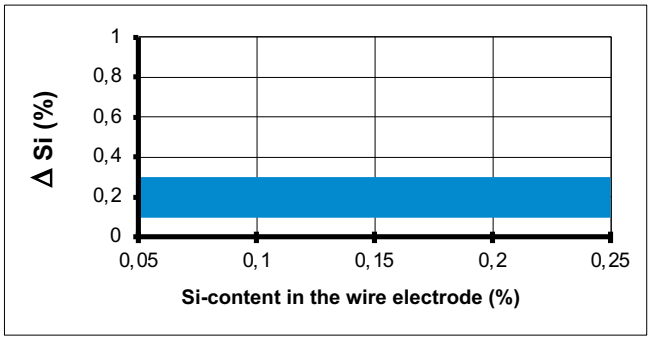
Application:
Production of longitudinal and spiral welded steel pipe grades L360 or X52 to L555 or X80 according to ISO 3183/API Spec. 5L.

Characteristic chemical constituents:

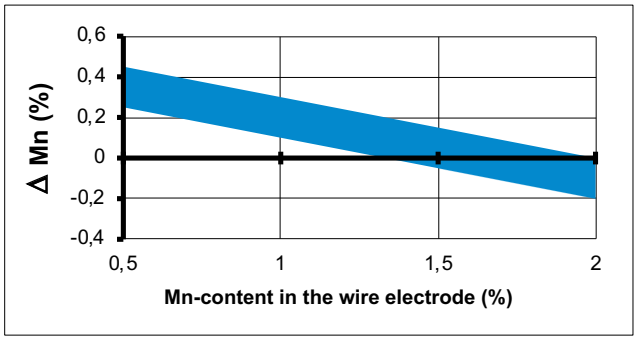
$SiO_2 + TiO_2$	$Al_2O_3 + MnO$	CaO + MgO	CaF_2
20 %	35 %	20 %	20 %
Basicity according to Boniszewski: ~1.4			

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

Pick-up Silicon



Pick-up/Burn-out Manganese



Flux density: 0.95 kg/dm³ (l)
Grain size acc. to ISO 14174: 2–20 (Tyler 8×65)
Current-carrying capacity: 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	AWS A5.17/.23			
BA-S2	EM12(K)	ISO 14171-A: S 42 3 AB S2	F48A3-EM12(K)	F7A2-EM12(K)
BA-S2Si	EM12K	ISO 14171-A: S 42 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 46 3 AB S2Mo	F55A3/P3-EA2-A2	F8A2/P2-EA2-A2
BA-S3Mo	EA4	ISO 14171-A: S 50 3 AB S3Mo	F55A3/P3-EA4-A4	F8A2/P2-EA4-A4
BA-S3NiMo1	EF3	ISO 14171-A: S 50 3 AB S3Ni1Mo	F62A3-EF3-F3	F9A2-EF3-F3
BA-S4MoSi	EA3K	ISO 14341-A: S 50 0 AB G4Mo	F62A2-EA3K-A3	F9A0-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-EG

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

Wire electrode		YS MPa	UTS MPa	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[1)]	EM12	>400	>500	>80	>50	>27			
BA-S2Si[1)]	EM12K	>400	>500	>80	>50	>27			
BA-S3Si[1)]	EH12K	>460	>560	>100	>80	>70	>40		
BA-S2Mo[2)]	EA2	>560	>630	>100	>90	>60	>40		
BA-S3Mo[2)]	EA4	>570	>650	>110	>90	>70	>50		
BA-S3NiMo1[2)]	EF3	>560	>650	>110	>90	>70	>60		
BA-S2MoTiB[3)]	EA2TiB	>560	>630	>130		>90	>80	>70	>60
BA-S3MoTiB[3)]	EG	>570	>650	>130		>90	>80	>70	>60

[1)] Low Si-base material up to X60 acc. to API Spec. 5L
[2)] Si-deoxidized base material X65 and higher acc. to API Spec. 5L
[3)] 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.

BF 6.30

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	Ti 0.05	

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	>420	>510	>25	>110	>90	>70	>47	
BA-S2Si	EM12K	AW	>420	>510	>25	>110	>90	>70	>47	
BA-S3Si	EH12K	AW	>470	>550	>25	>130	>90	>80		> 47
BA-S2Mo	EA2	AW	>490	>580	>23	>120	>80	>70	>47	
BA-S3Mo	EA4	AW	>520	>610	>22	>100	>70	>60	>47	
BA-S3NiMo1	EF3	AW	>580	>680	>20	>120	>80	>70	>47	
		S*	>560	>660	>20	>130	>90	>60	>47	
BA-S4MoSi	EA3K	AW	>540	>630	>20	> 80	>47	>27		

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

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

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.

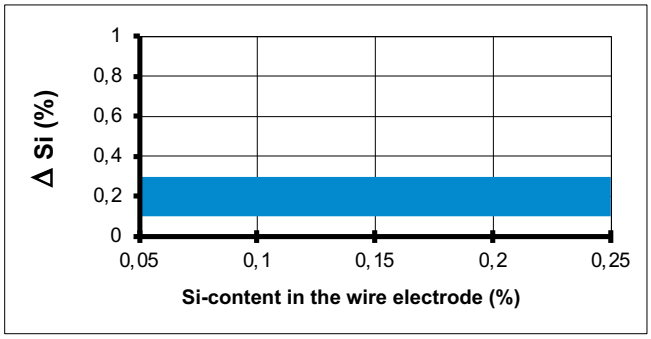
Application:
Production of longitudinal steel pipe grades L360 or X52 to L555 or X80 according to ISO 3183/API Spec. 5L.

Characteristic chemical Constituents:

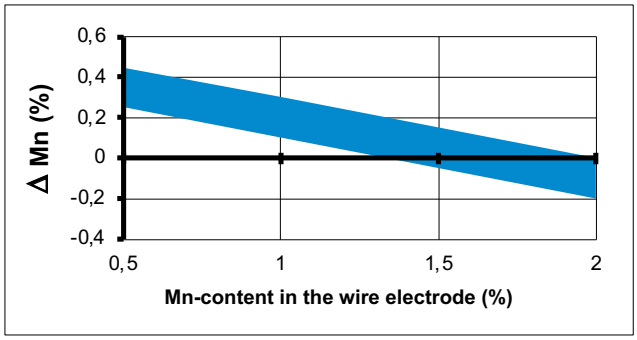
$SiO_2 + TiO_2$	$Al_2O_3 + MnO$	CaO + MgO	CaF_2
20 %	30 %	20 %	20 %
Basicity according to Boniszewski: ~1.5			

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

Pick-up Silicon



Pick-up/Burn-out Manganese



Flux density: 0.95 kg/dm³ (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

BF 6.30 MW

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[1)]	EM12(K)	>400	>500	>22	>80	>50	>27			
BA-S2Si[1)]	EM12K	>400	>500	>22	>80	>50	>27			
BA-S3Si[1)]	EH12K	>460	>560	>22	>100	>80	>70	>40		
BA-S2Mo[2)]	EA2	>560	>630	>17	>100	>90	>60	>40		
BA-S3Mo[2)]	EA4	>570	>650	>17	>110	>90	>70	>50		
BA-S3NiMo1[2)]	EF3	>560	>650	>17	>110	>90	>70	>60		
BA-S2MoTiB[3)]	EA2TiB	>560	>630	>17	>130		>90	>80	>70	>60
BA-S3MoTiB[3)]	EG	>570	>650	>17	>130		>90	>80	>70	>60
BA-S4MoSi[3)]	EA3K	>570	>650	>17	>110	>90	>70	>50		

[1)] Low Si-base material up to X60 acc. to API Spec. 5L
[2)] Si-deoxidized base material X65 and higher acc. to API Spec. 5L
[3)] Low temperature toughness: BA-S2MoTiB better suitable for base mateial 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

Agglomerated Welding Flux BF 6.5

Flux type: Fluoride-Basisch
Classification: ISO 14174 – S A FB 1 67 AC H5*

Characteristics:
A semi-basic multi-purpose flux suitable for single and multi-wire (up to 5 wires) SAW-processes. The flux exhibits good weldability characteristics over a wide range of welding parameters and is characterized by a low consumption rate. BF 6.5 is especially recommended for longitudinal pipe fabrication (two-run or multi-layer technique) due to its high welding speed characteristic. Weld bead performance and slag release, even in narrow gaps, are excellent providing flat welds with low reinforcement and flat weld interfaces free from undercuts. The flux shows a high 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 (max.5ml/100g), oxygen levels of about 350 ppm and low nitrogen levels (max. 70 ppm) in the weld deposits, uniform mechanical properties with low temperature toughness are obtained.

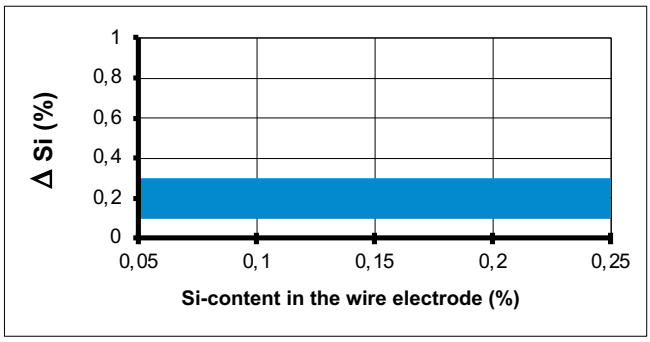
Application:
Manufacture of helical (spiral) and longitudinal seam steel pipes in grades L360 or X52 to L555 or X80 according to ISO 3183/API Spec. 5L with appropriate filler metals. Non-alloy and low-alloy structural steels acc. to EN 10025; boiler steels such as 16Mo3/A335 Gr. P1 and 13CrMo4- 5/A387Gr. 12; fine-grain structural steels with yield strengths up to 700 MPa observing the specific material requirements.

Characteristic chemical Constituents:

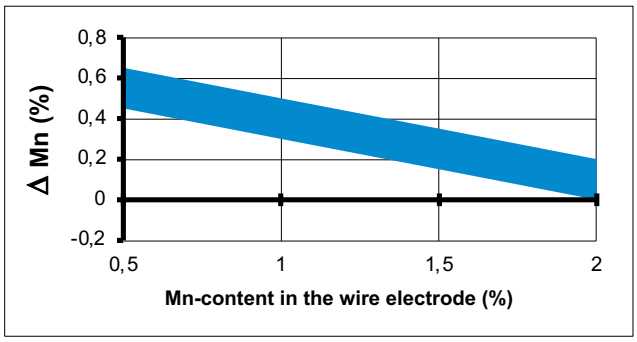
$SiO_2 + TiO_2$	$Al_2O_3 + MnO$	$CaO + MgO$	CaF_2
20 %	30 %	25 %	17 %
Basicity according to Boniszewski: ~1.7			

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

Pick-up Silicon



Pick-up/Burn-out Manganese



Flux density: 0.95 kg/dm³ (l)
Grain size acc. to ISO 14174: 2–20 (Tyler 8×65)
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 300–350 °C

All-weld metal multiple pass classification of wire-flux combinations for welding pipe steels:

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 4 FB S2	F48A4/P4-EM12(K)	F7A4/P4-EM12(K)
BA-S2Si	EM12K	ISO 14171-A: S 38 4 FB S2Si	F48A4/P4-EM12K	F7A4/P4-EM12K
BA-S3	EH10K	ISO 14171-A: S 46 4 FB S3	F55A4-EH10K	F8A4-EH10K
BA-S3Si	EH12K	ISO 14171-A: S 46 4 FB S3Si	F55A4-EH12K	F8A4-EH12K
BA-S2Mo	EA2	ISO 14171-A: S 46 3 FB S2Mo	F55A3/P3-EA2-A2	F8A2/P2-EA2-A2
BA-S3Mo	EA4	ISO 14171-A: S 50 3 FB S3Mo	F62A4-EA4-A4	F9A4-EA4-A4
BA-S2Ni1	ENi1	ISO 14171-A: S 42 6 FB S2Ni1	F49A6/P6-ENi1-Ni1	F7A8/P8-ENi1-Ni1
BA-S3NiMo1	EF3	ISO 14171-A: S 50 4 FB S3Ni1Mo	F62A4-EF3-F3	F9A4-EF3-F3

Two-run classification of wire-flux combinations for welding pipe steels:

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-S2Si	EM12K	ISO 14171-A: S 3T 2 FB S2Si	F43TA3-EM12K	F6TA8-EM12K
BA-S3Si	EH12K	ISO 14171-A: S 4T 3 FB S3Si	F49TA3-EH12K	F7TA2-EH12K
BA-S2Mo	EA2	ISO 14171-A: S 5T 2 FB S2Mo	F62TA3-EA2	F9TA2-EA2
BA-S3Mo	EA4	ISO 14171-A: S 5T 3 FB S3Mo	F62TA3-EA4	F9TA2-EA4
BA-S3NiMo1	EF3	ISO 14171-A: S 5T 3 FB S3Ni1Mo	F62TA3-EF3	F9TA2-EF3
BA-S2MoTiB	EA2TiB	ISO 14171-A: S 5T 5 FB S2MoTiB	F62TA5-EA2TiB	F9TA6-EA2TiB
BA-S3MoTiB	EG	ISO 14171-A: S 5T 5 FB SZ	F62TA5-EG	F9TA6-EG

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

Wire electrode		Yield strength N/mm²	Tensile strength	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-S2Si [1]	EM12K	>400	>500	>100	>80	>50			
BA-S3Si [1]	EH12K	>460	>560	>100	>90	>60	>27		
BA-S2Mo [2]	EA2	>560	>620	>100	>80	>50			
BA-S3Mo [2]	EA4	>570	>650	>100	>90	>60	>27		
BA-S3NiMo	EF3	>570	>650	>100	>90	>70	>27		
BA-S2MoTiB [3]	EA2TiB	>560	>630	>100	>90		>80	>60	>50
BA-S3MoTiB [3]	EG	>570	>650	>100	>90		>80	>60	>50

[1] Low Si-base material up to X60 acc. to API Spec. 5L
[2] Si-deoxidized base material X65 and higher acc. to API Spec. 5L
[3] 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.

BF 6.5

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	0.2–0.4	1.2–1.6			
BA-S2Si	EM12K	0.05–0.08	0.2–0.5	1.2–1.6			
BA-S3	EH10K	0.05–0.08	0.2–0.4	1.5–1.8			
BA-S3Si	EH12K	0.05–0.08	0.2–0.5	1.5–1.8			
BA-S2Mo	EA2	0.05–0.08	0.2–0.4	1.2–1.6	0.4–0.6		
BA-S3Mo	EA4	0.05–0.08	0.2–0.4	1.5–1.8	0.4–0.6		
BA-S2Ni1	ENi1	0.05–0.08	0.2–0.4	1.2–1.6		0.8	
BA-S3NiMo1	EF3	0.05–0.08	0.2–0.5	1.5–1.8		0.8–1.0	
BA-S2MoTiB	EA2TiB	0.04–0.07	0.2–0.5	1.2–1.6	0.4–0.6	Ti 0.05	B 0.005
BA-S3MoTiB	EG	0.04–0.07	0.2–0.5	1.4–1.8	0.4–0.6	Ti 0.05	B 0.005
BA-S2CrMo1	EB2	0.05–0.08	0.2–0.4	1.1–1.5	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)				
						RT	-20 °C -4 °F	-30 °C -22 °F	-40 °C -40 °F	-60 °C -76 °F
BA-S2/S2Si	EM12(K)	AW	>400	>510	>24	>120	>80	>60	>47	
BA-S3Si	EH12K	AW	>470	>560	>23	>100	>80	>60	>60	
BA-S2Mo	EA2	AW	>500	>590	>22	>90	>60	>47		
		S*	>480	>570	>22	>80	>70	>47		
BA-S3Mo	EA4	AW	>540	>630	>20	>80	>70	>47		
BA-S2Ni1	ENi1	AW	>430	>520	>22	>100	>90		>70	>47
		S**	>400	>510	>22	>100	>90		>80	>47
BA-S3NiMo1	EF3	AW	>610	>720	>20	>100	>70	>60	>47	
		S**	>570	>650	>20	>100	>70	>60	>47	
BA-S2CrMo1	EB2	A***	>400	>500	>20	>90	-10°C>40			

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

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

Packaging: 25 kg PE-Bags or 500–1,250 kg Big Bags
Storage: 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:
300–350 °C effective flux temperature

Agglomerated Welding Flux BF 6.9 HELIX

Flux type: Aluminate-Basic
Classification: ISO 14174 – S A AB 1 67 AC H5*

Characteristics:
A semi-basic flux suitable for high speed welding with single and multi-wire submerged-arc processes.
BF 6.9 HELIX is designed for spiral pipe fabrication employing the two-run technique. Weld bead performance and slag release are excellent providing flat welds with low reinforcement and flat weld interfaces free from undercut. The flux shows a high resistance to pock-marks, flux-abrasion and a low consumption rate with good flux feeding properties in the transport and recovery system. As a result of low hydrogen levels (max. 5 ml/100g), oxygen levels of about 350 ppm and low nitrogen levels in the weld deposits, uniform mechanical properties with low temperature toughness are obtained. Due to achievable low hardness levels the weld deposits made with the flux BF 6.9 HELIX are also resistant to sour gas environment.

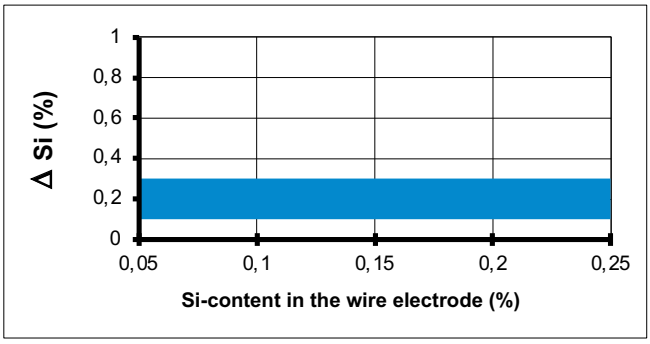
Application:
Low-alloy structural steels up to 500 N/mm2, boiler steels and especially pipe steel qualities acc. to EN 10208-2/API-5L/5LX/5LS up to X 80 with special low-alloy filler materials.

Characteristic chemical Constituents:

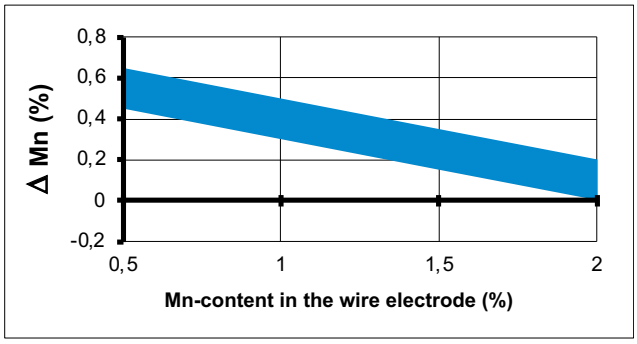
$SiO_2 + TiO_2$	$Al_2O_3 + MnO$	CaO + MgO	CaF_2
25 %	35 %	20 %	20 %
Basicity according to Boniszewski: ~1.2			

Metallurgisches Verhalten nach DIN EN 760:

Pick-up Silicon



Pick-up/Burn-out Manganese



Flux density: 0.95 kg/dm³ (l)
Grain size acc. to ISO 14174: 2–16 (Tyler 10×65)
Current-carrying capacity: 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

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 2 AB S2Mo	F62TA2-EA2	F9TA0-EA2
BA-S3Mo	EA4	ISO 14171-A: S 5T 3 AB S3Mo	F62TA3-EA4	F9TA2-EA4
BA-S3MoTiB	EG	ISO 14171-A: S 5T 5 AB SZ	F62TA5-EG	F9TA6-EG

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

Wire electrode		Yield strength N/mm²	Tensile strength N/mm²	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	EM12(K)	>400	>500	>130	>70	>50			
BA-S2Si	EM12K	>400	>500	>130	>70	>50	>47		
BA-S3Si	EH12K	>460	>560	>130	>80	>50			
BA-S2Mo	EA2	>560	>630	>130	>90	>50	>47		
BA-S3Mo	EA4	>570	>650	>130	>100	>80			
BA-S3MoTiB	EG	>570	>650	>150	>130	>100	>90	>70	>50

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

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-S2Si	EM12K	ISO 14171-A: S 38 3 AB S2Si	F48A3-EM12K	F7A2-EM12K
BA-S3Si	EH12K	ISO 14171-A: S 42 4 AB S3Si	F48A4-EH12K	F7A4-EH12K
BA-S2Mo	EA2	ISO 14171-A: S 46 3 AB S2Mo	F55A3-EA2-A2	F8A2-EA2-A2
BA-S3Mo	EA4	ISO 14171-A: S 50 3 AB S3Mo	F62A3-EA4-A4	F9A2-EA4-A4

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

Wire electrode		C	Si	Mn	Mo	Ni	Cr
BA-S2Si	EM12K	0.05–0.08	0.2–0.5	1.0–1.4			
BA-S3Si	EH12K	0.05–0.08	0.2–0.5	1.4–1.7			
BA-S2Mo	EA2	0.05–0.08	0.2–0.5	1.0–1.4	0.4–0.6		
BA-S3Mo	EA4	0.05–0.09	0.2–0.5	1.3–1.7	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		Yield strength N/mm²	Tensile strength N/mm²	Elong. %	Impact ISO-V (J)				
					RT	-20 °C -4 °F	-30 °C -22 °F	-40 °C -40 °F	-51 °C -60 °F
BA-S2	EM12(K)	>400	>490	>24	>100	>60	>50	>47	
BA-S3Si	EH12K	>470	>560	>23	>130	>80	>70		
BA-S2Mo	EA2	>490	>580	>23	>110	>80	>47		
BA-S3Mo	EA4	>550	>630	>22	>110	>80	>47		

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

Agglomerated Welding Flux BF 8.13

Flux type: Calcium-Silicate
Classification: ISO 14174 – S A CS 3 CCrMo AC

Characteristics:
Agglomerated and active SAW flux (C, Cr, Mo alloying characteristic) designed for hardfacing, and joint welding of low alloyed wire electrodes.

BF 8.13 shows constant chemical reactions as typical for a Bavaria-alloyed flux.

Further information on request.

Characteristic chemical Constituents:

SiO_2 +Al_2O_3 + TiO_2	CaO + MgO	CaF_2
55 %	25 %	10 %
Basicity according to Boniszewski: ~1.7		

Flux density: 1.2–1.3 kg/dm³ (l)
Grain size acc. to ISO 14174: 2–16 (Tyler 10×65)
Current-carrying capacity: 800 A DC using one wire 4.0 mm
Packaging: 25 kg PE-Bags, drums 25 kg

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:
150–200 °C effective flux temperature

Chemical composition
(characteristical values in wt. %)

Weld Metal	Wire	C	Mn	Si	Cr	Mo
1L	BA-S2	0.12	1.3	0.6	1.3	0.15
2L	BA-S2	0.12	1.5	0.7	1.7	0.20
3L	BA-S2	0.12	1.7	0.9	1.8	0.25

Mechanical properties
(characteristical values)

Wire	Heat treatment	Hardness
L1 – BA-S2	As welded	270 HB
L2 – BA-S2	As welded	330 HB
L3 – BA-S2	As welded	340 HB

Agglomerated Welding Flux BF 8.50

Flux type: Fluoride-Basic
Classification: ISO 14174 – S A FB 1 55 DC

Characteristics:
A semi–basic, agglomerated, flux for shape – and overlay welding with single or multiwire (TWIN-ARC) submerged-arc processes. BF 8.50 shows stable metallurgical reactions and constant operating characteristics over a wide current range, also when AC-power is applied.
Low flux consumption, high resistance to porosity as well as low hydrogen potential and low sensitivity to arc-blow are typical for this flux.
The weld deposits exhibit smooth surface, good wetting and self-lifting slag detachability without “tiger-tracks”, even at high welding temperature (> 300°C).
BF 8.50 is a non-alloyed, neutral flux with little pick-up of silicon and neutral manganese reactions (see chemical composition of weld pads)

Application:
The flux can be welded DC (electrode positive or negative) or AC in combination with appropriate solid or, especially, metal-powder cored wires as commonly used for hardfacing.
BF 8.50 is formulated specifically for build-up or shape-welding (in combination with standard CMn-/CMo-/CCr- Mo-wires) to restore worn surface to proper dimensions, or to profile the shape of a section.
This flux is not formulated for joining or groove welding. For these applications the basic fluxes BF 5.1, BF 10, BF 10 MW , BF 16 or WP 380 (> 5 % Cr-alloys) are recommended.

Characteristic chemical Constituents:

$SiO_2 + TiO_2$	$Al_2O_3 + MnO$	CaO + MgO	CaF_2
20 %	20 %	35 %	20 %
Basicity according to Boniszewski: ~2.5			

Flux density: 0.95 kg/dm³ (l)
Grain size acc. to ISO 14174: 2–20
Current-carrying capacity: up to 1,000 A (DC or AC) using one wire
Packaging: 25 kg PE-Bags or 25 kg Alpha Dry Alu-Bag

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:
300–350 °C effective flux temperature

Agglomerated Welding Flux BF 10

Flux type: Fluoride-Basic
Classification: ISO 14174 – S A FB 1 55 AC H5*

Characteristics:
BF 10 is a fluoride-basic flux with high basicity and low impurity levels such as P and S. As a result of low oxygen levels in the weld deposits uniform mechanical properties with high toughness values at low temperature are achieved. Because of the almost neutral slag-reactions the chemical analysis of the weld metal can be excellently controlled through the selection of appropriate wire electrodes.
BF 10 is suitable for welding on D.C. and A.C. using single and tandem wire processes.

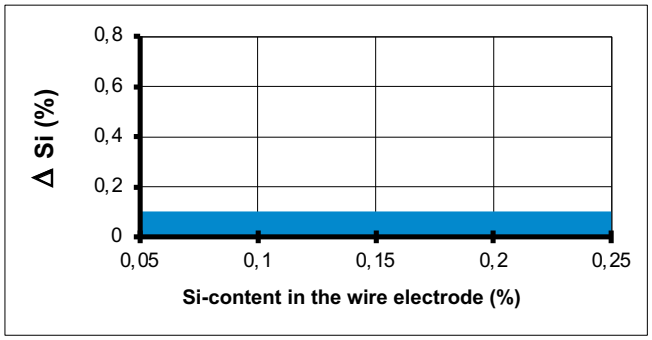
Application:
Low hydrogen levels after redrying and optimum mechanical properties, whilst observing recommended heat control, enable the welding of:
- thick-walled constructional steels with yield strengths of up to 420 MPa
- offshore applications up to 460 MPa yield strength on steels such as BS 4360-Grade 50 D and S355 2G3 acc. to DIN EN 10025 (previous designation St 52-3N)
- fine grain structural steels for low temperature requirements with impact toughness at – 60°C or below
- high tensile fine grain steels such as S690QL1 and N-A-XTRA 70
- boiler and vessel steels such as 16Mo3/A204 Gr. A, 13CrMo4-5/A387 Gr. 12 or 10CrMo9-10/A387 Gr. 22

Characteristic chemical Constituents:

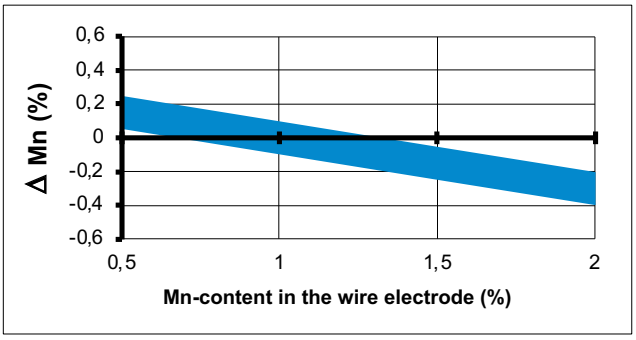
$SiO_2 + TiO_2$	$Al_2O_3 + MnO$	$CaO + MgO$	CaF_2
15 %	20 %	40 %	25 %
Basicity according to Boniszewski: ~3.0			

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

Pick-up Silicon



Pick-up/Burn-out Manganese



Flux density: 0.95 kg/dm³ (l)
Grain size acc. to ISO 14174: 2–20 (Tyler 8×65)
Current-carrying capacity: up to 800 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 300–350 °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 EN 14295 ISO 26304-A	AWS A5.17/.23			
BA-S2	EM12(K)	ISO 14171-A: S 38 6 FB S2	F48A6/P6-EM12(K)	F7A8/P8-EM12(K)
BA-S3	EM10K	ISO 14171-A: S 46 6 FB S3	F55A6/F49P6-EH10K	F8A8/F7P8-EH10K
BA-S3Si	EH12K	ISO 14171-A: S 46 6 FB S3Si	F55A6/F49P6-EH12K	F8A8/F7P8-EH12K
BA-S2Mo	EA2	ISO 14171-A: S 46 4 FB S2Mo	F55A4/F49P4-EA2-A2	F8A4/F7P4-EA2-A2
BA-S2Ni1	ENi1	ISO 14171-A: S 42 7 FB S2Ni1	F49A7/P7-ENi1-Ni1	F7A10/P10-ENi1-Ni1
BA-S2Ni2	ENi2	ISO 14171-A: S 46 8 FB S2Ni2	F55A7/F49P7-ENi2-Ni2	F8A10/F7P10-ENi2-Ni2
BA-S2Ni3	ENi3	ISO 14171-A: S 50 8 FB S2Ni3	F55A7/P7-ENi3-Ni3	F8A10/P10-ENi3-Ni3
BA-S3NiMo1/4	ENi5	ISO 14171-A: S 46 6 FB S3Ni1Mo0,2	F55A6/P6-ENi5-Ni5	F8A8/P8-ENi5-Ni5
BA-S3NiMo1	EF3	ISO 26304-A: S 55 6 FB S3Ni1Mo	F62A6/P6-EF3-F3	F9A8/P8-EF3-F3
BA-S3NiCrMo2,5	EM2 mod.	ISO 14171-A: S 50 6 FB S3Ni1,5Mo	F62P6-EM2mod.-M2	F9P8-EM2mod.-M2
BA-S3NiCrMo2,5	EM4 mod.	ISO 26304-A: S 69 6 FB S3Ni2,5CrMo	F76A6/P6-EM4 mod.-M4	F11A8/P8-EM4 mod.-M4
BA-S2CrMo1	EB2(R)	ISO 24598-A: S SCrMo1 FB	F55P2-EB2R-B2R	F8P0-EB2R-B2R
BA-S1CrMo2	EB3(R)	ISO 24598-A: S SCrMo2 FB	F55P2-EB3R-B3R	F8P0-EB3R-B3R

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)	0.05–0.09	0.1–0.3	0.8–1.2			
BA-S3	EH10K	0.05–0.09	0.1–0.3	1.1–1.5			
BA-S3Si	EH12K	0.05–0.09	0.2–0.5	1.2–1.6			
BA-S2Mo	EA2	0.05–0.09	0.1–0.3	0.8–1.2	0.5		
BA-S2Ni1	ENi1	0.05–0.09	0.1–0.3	0.8–1.4		1.0	
BA-S2Ni2	ENi2	0.05–0.09	0.1–0.3	0.8–1.4		2.0	
BA-S2Ni3	ENi3	0.05–0.09	0.1–0.3	0.8–1.2		3.0	
BA-S3NiMo1/4	ENi5	0.05–0.09	0.2–0.4	1.1–1.5	0.25	1.0	
BA-S3NiMo1	EF3	0.05–0.09	0.1–0.3	1.2–1.6	0.5	1.0	
BA-S3NiMo1,5	EM2 mod.	0.05–0.09	0.1–0.3	1.2–1.6	0.4	1.6	
BA-S3NiCrMo2,5	EM4 mod.	0.05–0.09	0.1–0.3	1.2–1.6	0.5	2.5	0.5
BA-S2CrMo1	EB2	0.05–0.09	0.1–0.3	0.5–0.9	0.5		1.2
BA-S1CrMo2	EB3	0.05–0.09	0.1–0.3	0.4–0.7	1.0		2.3

BF 10

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	-20 °C -4 °F	-40 °C -40 °F	-60 °C -76 °F	-80 °C -112 °F
BA-S2	EM12(K)	AW	>400	>490	>26	>120	>100	>70	>60	
BA-S3	EH10K	AW	>450	>530	>25	>120	>100	>80	>60	
		S*	>390	>500	>28	>120	>100	>80	>60	
BA-S3Si	EH12K	AW	>470	>550	>25	>120	>100	>80	>60	
		S*	>430	>530	>26	>120	>100	>90	>70	
BA-S2Mo	EA2	AW	>490	>570	>23	>100	>90	>50		
		S**	>440	>530	>24	>100	>90	>60		
BA-S2Ni1	ENi1	AW	>440	>540	>26	>160	>140	>120	>90	
BA-S2Ni2	ENi2	AW	>470	>550	>25	>160	>140	>120	>80	>47
		S*	>420	>520	>26	>160	>140	>120	>90	>47
BA-S2Ni3	ENi3	AW	>490	>590	>24	>160	>150	>120	>100	>60
		S*	>470	>560	>25	>160	>150	>120	>100	>60
BA-S3NiMo1/4	ENi5	AW	>470	>560	>26	>160	>140	>120	>100	
		S*	>450	>540	>26	>160	>150	>120	>100	
BA-S3NiMo1	EF3	AW	>570	>670	>22	>140	>110	>80	>47	
		S*	>550	>640	>22	>150	>110	>80	>47	
BA-S3NiMo1,5	EM2mod.	AW	>590	>690	>22	>140	>100	>80		
		S***	>570	>660	>22	>150	>100	>70		
BA-S3NiCrMo2,5	EM4mod.	AW	>690	>820	>18	>140	>90	>70	>47	
BA-S2CrMo1	EB2	A ****	>420	>520	>22	>100	>47			
BA-S1CrMo2	EB3	A ****	>440	>540	>23	>100	>47			

Post Weld Heat Treatment: * 590 °C/15 h; ** 620 °C/15 h; *** 605 °C/2 h; **** 700 °C/10 h

Packaging: 25 kg Alpha Dry Alu-Bag
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:
300–350°C effective flux temperature

Agglomerated Welding Flux BF 10 MW

Flux type: Fluoride-Basic
Classification: ISO 14174 – S A FB 1 55 AC H5*

Characteristics:
BF 10 MW is a fluoride-basic flux with high basicity and low impurity levels such as P and S. As a result of low oxygen levels in the weld deposits uniform mechanical properties with high toughness values at low temperature are achieved. Designed for multi wire application where high deposition rate as well as good slag removal is required this flux shows excellent weldability and weld bead appearance.
BF 10 MW is suitable for welding on D.C. and A.C. using single, tandem and Multi-Wire processes.

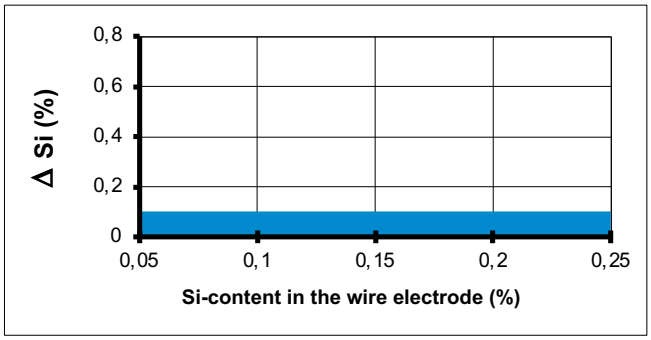
Application:
Low hydrogen levels after redrying and optimum mechanical properties, whilst observing recommended heat control, enable the welding of:
- thick-walled constructional steels with yield strengths of up to 420 MPa
- offshore applications up to 550 MPa yield strength on steels such as BS 4360-Grade 50 D and S355 2G3 acc. to DIN EN 10025 (previous designation St 52-3N)
- fine grain structural steels for low temperature requirements with impact toughness at – 60°C or below
- high tensile fine grain steels such as S690QL1 and N-A-XTRA 70
- boiler and vessel steels such as 16Mo3/A204 Gr. A, 13CrMo4-5/A387 Gr. 12 or 10CrMo9-10/A387 Gr. 22

Characteristic chemical Constituents:

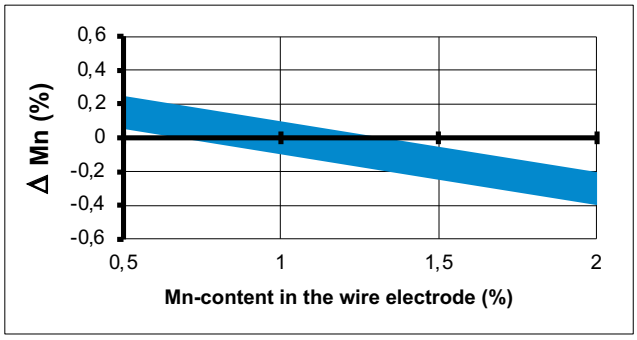
$SiO_2 + TiO_2$	$Al_2O_3 + MnO$	$CaO + MgO$	CaF_2
15 %	20 %	35 %	30 %
Basicity according to Boniszewski: ~3.2			

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

Pick-up Silicon



Pick-up/Burn-out Manganese



Flux density: 0.95 kg/dm³ (l)
Grain size acc. to ISO 14174: 2–20 (Tyler 8×65)
Current-carrying capacity: up to 800 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 300–350 °C

BF 10 MW

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 EN 14295 ISO 26304-A	AWS A5.17/.23			
BA-S2	EM12(K)	ISO 14171-A: S 38 6 FB S2	F48A6/P6-EM12(K)	F7A8/P8-EM12(K)
BA-S2Si	EH12	ISO 14171-A: S 38 6 FB S2Si	F48A6/P6-EM12K	F7A8/P8-EM12K
BA-S3Si	EH12K	ISO 14171-A: S 46 6 FB S3Si	F55A6/F55P6-EH12K	F8A8/F8P8-EH12K
BA-S2Mo	EA2	ISO 14171-A: S 46 4 FB S2Mo	F55A4/F49P4-EA2-A2	F8A4/F7P4-EA2-A2
BA-S2Ni1	ENi1	ISO 14171-A: S 42 7 FB S2Ni1	F49A7/P7-ENi1-Ni1	F7A10/P10-ENi1-Ni1
BA-S2Ni2	ENi2	ISO 14171-A: S 46 8 FB S2Ni2	F55A7/F49P7-ENi2-Ni2	F8A10/F7P10-ENi2-Ni2
BA-S2Ni3	ENi3	ISO 14171-A: S 50 8 FB S2Ni3	F55A7/P7-ENi3-Ni3	F8A10/P10-ENi3-Ni3
BA-S2NiCu	EG	ISO 14171-A: S 46 5 FB S2Ni1Cu	F55A5-EG-G	F8A6/-EG-G
BA-S3NiMo1/4	ENi5	ISO 14171-A: S 46 6 FB S3Ni1Mo0,2	F55A6/P6-ENi5-Ni5	F8A8/P8-ENi5-Ni5
BA-S3NiMo1	EF3	ISO 26304-A: S 55 6 FB S3Ni1Mo	F62A6-/P6-EF3-F3	F9A8/P8-EF3-F3
BA-S3NiCrMo2,5	EM4 mod.	ISO 26304-A: S 69 6 FB- S3Ni2,5CrMo	F76A6/P6-EM4 mod.-M4	F11A8/P8-EM4 mod.-M4

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)	0.05–0.09	0.1–0.3	0.8–1.2			
BA-S2Si	EM12K	0.05–0.09	0.15–0.5	0.8–1.2			
BA-S3Si	EH12K	0.05–0.09	0.2–0.5	1.2–1.6			
BA-S2Mo	EA2	0.05–0.09	0.1–0.3	0.8–1.2	0.5		
BA-S2Ni1	ENi1	0.05–0.09	0.1–0.3	0.8–1.4		1.0	
BA-S2Ni2	ENi2	0.05–0.09	0.1–0.3	0.8–1.4		2.0	
BA-S2Ni3	ENi3	0.05–0.09	0.1–0.3	0.8–1.2		3.0	
BA-S2NiCu	EG	0.12	0.8	0.5–1.6		0.4–0.8	Cu:0.30–0.75
BA-S3NiMo1/4	ENi5	0.05–0.09	0.2–0.4	1.1–1.5	0.25	1.0	
BA-S3NiMo1	EF3	0.05–0.09	0.1–0.3	1.2–1.6	0.5	1.0	
BA-S3NiCrMo2,5	EM4 mod.	0.05–0.09	0.1–0.3	1.2–1.6	0.5	2.5	0.5

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	-20 °C -4 °F	-40 °C -40 °F	-60 °C -76 °F	-80 °C -112 °F
BA-S2	EM12(K)	AW	>400	>490	>26	>120	>100	>70	>47	
BA-S2Si	EH12(K)	AW	>400	>490	>26	>120	>100	>70	>47	
BA-S3Si	EH12K	AW	>470	>560	>25	>120	>100	>80	>47	
		S*	>470	>560	>26	>120	>100	>90	>47	
BA-S2Mo	EA2	AW	>490	>570	>23	>100	>90	>50		
		S**	>440	>530	>24	>100	>90	>60		
BA-S2Ni1	ENi1	AW	>440	>540	>26	>160	>140	>120	>90	
BA-S2Ni2	ENi2	AW	>470	>550	>25	>160	>140	>120	>80	>47
		S*	>420	>520	>26	>160	>140	>120	>90	>47
BA-S2Ni3	ENi3	AW	>500	>590	>24	>160	>150	>120	>100	>47
		S*	>470	>560	>25	>160	>150	>120	>100	>47
BA-S2NiCu	EG	AW	>460	>550	>24	>140	>120	>80	>47(50°C)	
BA-S3NiMo1/4	ENi5	AW	>480	>560	>26	>160	>140	>120	>47	
		S*	>470	>550	>26	>160	>150	>120	>47	
BA-S3NiMo1	EF3	AW	>570	>670	>22	>140	>110	>80	>47	
		S*	>550	>640	>22	>150	>110	>80	>47	
BA-S3NiCrMo2,5	EM4mod.	AW	>690	>820	>18	>140	>90	>70	>47	

Post Weld Heat Treatment: * 590 °C/15 h; ** 620 °C/15 h

Packaging: 25 kg Alpha Dry Alu-Bag
Storage: 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:
300–350°C effective flux temperature

Agglomerated Welding Flux BF 38

Flux type: Aluminat-Fluoride-Basic
Classification: ISO 14174 – S A AF 2 5644 DC H5*

Characteristics:
Specially designed for welding austenitic and austenitic-ferritic stainless steels (Duplex). This basic, but neutral flux will produce outstanding results in the welding of the standard austenitic and heat-resisting stainless steels, when using the corresponding wire electrodes according to EN ISO 14343 or ASME II C: SFA-5.9. Due to the basic flux characteristics of BF 38 most grades of the 300-stainless steels can be welded using single or multiple wire submerged-arc processes. It is also suited for joint-and overlay welding of nickel alloys, together with corresponding Ni-base wire electrodes.
BF 38 produces smooth flat weld beads when fillet welding. If process characteristic welding parameters are applied a finely ribbed surface along with self-releasing slag is yielded as well as weld beads that are free of slag inclusions. The metallurgical behavior of the flux is neutral (C-neutral, low Si pick-up and low Mn burn-out) without Cr- or other alloy compensation.

Application:
Joint welding and surfacing of:
- Austenitic-ferritic stainless steels (DSS) such as grade 2205 (Duplex S31805/S32205 = 1.4462)
- Austenitic CrNi(Mo)-steels (including Nb/Ti and ELC-grades); resistant against intergranular corrosion in both the as-welded and solution-treated condition
- High-alloy CrNi(Mo)-steels for use at low temperatures and heat resisting steels
- Nickel-base alloys using NiCr- and NiCrMo- wire electrodes acc. to AWS A5.14/EN ISO 18274
- Welding of dissimilar metals such as low alloy steel with stainless steel or special cryogenic steel (e.g. 9 % Ni-steel) in flat or 2G-position

Characteristic chemical Constituents:

$SiO_2 + TiO_2$	$Al_2O_3 + MnO$	CaO + MgO	CaF_2
10 %	35 %	5 %	50 %
Basicity according to Boniszewski: ~1.9			

Flux density: 1.0 kg/dm³ (l)
Grain size acc. to ISO 14174: 2–16 (Tyler 10×65)
Current-carrying capacity: up to 900 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

Chemical composition of all-weld metal acc. to EN ISO 15792-1 and AWS A5.9/5.14:
(characteristical values in wt. %)

Wire electrode		C	Si	Mn	Cr	Ni	Mo	Others
BA-WIRE 308L	ER308L	< 0.03	0.3–0.65	1.0–2.5	19.5–22.0	9.0–11.0		
BA-WIRE 309L	ER309L	< 0.03	0.3–0.65	1.0–2.5	23.0–25.0	12.0–14.0		
BA-WIRE 316L	ER316L	< 0.03	0.3–0.65	1.0–2.5	18.0–20.0	11.0–14.0	2.0–3.0	
BA-WIRE 317L	ER317L	< 0.03	0.3–0.65	1.0–2.5	18.5–20.5	13.0–15.0	3.0–4.0	
BA-WIRE 318	ER318	< 0.08	0.3–0.65	1.0–2.5	18.0–20.0	11.0–14.0	Mo: 2.0 – 3.0	Nb: 8xC/ max 1.0
BA-WIRE 347	ER347	< 0.08	0.3–0.65	1.0–2.5	19.0 – 21.5	9.0–11.0		Nb: 10xC/ max 1.0
BA-WIRE 2209	ER2209	< 0.03	< 0.9	0.5–2.0	21.5–23.5	7.5–9.5	2.5–3.5	N: 0.08–0.2
								Cu < 0.75

Mechanical properties of all-weld metal acc. to EN ISO 15792-1 and AWS A5.9/5.14:
(characteristical values)

Wire electrode		Heat treatment	YS MPa	UTS MPa	Elong. %	Impact ISO-V (J)				
						+20 °C	-40 °C	-60 °C	-120 °C	-196 °C
BA-WIRE 308L	ER308L	AW	> 370	> 560	> 35	> 80				> 40
BA-WIRE 309L	ER309L	AW	> 370	> 520	> 30	> 100				
BA-WIRE 316L	ER316L	AW	> 370	> 520	> 30	> 100				> 40
BA-WIRE 317L	ER317L	AW	> 400	> 600	> 30	> 100		> 60		> 40
BA-WIRE 318	ER318	AW	> 370	> 560	> 25	> 100				
BA-WIRE 347	ER347	AW	> 370	> 560	> 30	> 100				
BA-WIRE 2209	ER2209	AW	> 570	> 750	> 20	> 80		> 50		

Packaging: 20 kg Alpha Dry Alu-Bag
Storage: 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:
300–350°C effective flux temperature

Agglomerated ES-Flux BF 44 for strip cladding

Flux type: Fluoride-Basic
Classification: ISO 14174 – ES A FB 2B 5644 DC

Characteristics:
High basic, agglomerated and neutral flux (without alloy-compensation) designed for overlay welding and joint cladding together with stainless strip electrodes of the Cr–, CrNi(Mo)-steel types. Applicable for ES-process as well as, especially, for use with the ESO® (Extended Stick Out)-cladding system which enables highest possible deposit rates as a result of the Joule heat (I^2R-effect). BF 44 gives excellent slag removal without slag residuals, especially in combination with Nb-alloyed strips, in the first layer on preheated substrates as well as in subsequent layers. The flux has low hydrogen potential, which makes it most suitable for overlay welding of heat resistant steels such as A387-types. Smooth weld bead appearance and notch-free transitions are features achievable with all cladding processes. Low but constant dilution rates can be gained when using process-characteristic welding parameters. BF 44 shows constant chemical reactions as typical for a non-alloyed flux.

Application:
BF 44 can be used for joint cladding and surfacing of chemical plant components and equipments in the nuclear/off- shore fields to yield corrosion resistant deposits in one or more layers. In combination with appropriate strip electrodes of the EQ300/EQ400 series according to A5.9 or according to EN ISO 14343 (EN 12072) constant weld overlays with low dilution rates are achievable.

Further information on request.

Characteristic chemical Constituents:

$SiO_2 + Al_2O_3 + TiO_2$	CaO + MgO	CaF_2
20 %	5 %	70 %
Basicity according to Boniszewski: ~4.6		

Flux density: 1.0–1.1 kg/dm³ (l)
Grain size acc. to ISO 14174: 2–16 (Tyler 10×65)
Current-carrying capacity: up to 1,500 A DC using one strip electrode 60 x 0.5 mm
Packaging: 25 kg Alpha Dry Alu-Bag

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:
300–350 °C effective flux temperature

Strip cladding: BF 44/BA-Strip 309LN/Size: 60 x 0.5 mm

Agglomerated ES-Flux BF 46 for strip cladding

Flux type: Fluoride-Basic
Classification: ISO 14174 – S A FB 2B 5644 DC

Characteristics:
High basic, agglomerated neutral flux (without alloy-compensation) designed for overlay welding and joint cladding together with the typical NiCr(Mo)-strip electrodes of the Alloy 600®, Alloy 625® and other NiCrMo–alloy types. Applicable for the different ElectroSlag (ES)-processes, with or without magnetic steering, as well as for cladding processes which produces higher deposition rates by ES-high speed welding or by the use of the ESO® (Extended Stick Out)-cladding system with the I^2R-effect benefit. BF 46 gives excellent slag removal without slag residuals – in the first layer on preheated substrates as well as in subsequent layers or when joint cladding. Smooth weld bead finish and notch-free transitions are further features when appropriate process parameters are applied. Low and constant dilution rates are observed.

The flux has low hydrogen potential which makes it most suitable for overlay welding of heat resistant substrate materials such as A387-types. BF 46 shows constant chemical reactions as typical for a non-alloyed flux.

Application:
BF 46 can be used for joint cladding and surfacing of chemical plant components and equipments in the nuclear / offshore fields to obtain high NiCr(Mo)-overlays such as Alloy 600®, Alloy 625® and similar Alloys (Alloy 59®,C276®). Dependent on the particular specifications and in combination with appropriate strip electrodes according to ASME II C SFA-5.14 or EN ISO 18274 constant weld overlays with low dilution rates are achieved in single- or multilayers. Strip-dimensions from 20 x 0.5 to 60x0.5 mm can be applied.

Further information on request.

Characteristic chemical Constituents:

$SiO_2 + Al_2O_3 + TiO_2$	CaO + MgO	CaF_2
20 %	5 %	70 %
Basicity according to Boniszewski: ~4.6		

Flux density: 1.1 kg / dm^3 (l)
Grain size acc. to ISO 14174: 2 – 16 (Tyler 10 × 65)
Current-carrying capacity: up to 1,500 A DC using one strip electrode 60 x 0.5 mm
Packaging: 25 kg Alpha Dry Alu-Bag

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:
300 – 350 °C effective flux temperature

Strip cladding: BF 46 / BA-Strip 625 / Size: 60 x 0.5 mm (picture 1) and 30 x 0.5 mm (picture 2)

Agglomerated Welding Flux BF 47

Flux type: Calcium-Silicate
Classification: ISO 14174 – S A CS 2 5644 DC

Characteristics:
Agglomerated and neutral flux (without alloy-compensation) designed for hardfacing, overlay strip welding and joint cladding together with stainless strip electrodes of the Cr-, CrNi(Mo)-steel types. Applicable for SAW-process as well as for use with the ESO® (Extended Stick Out)-cladding system which enables highest possible deposit rates as a result of the Joule heat (I^2R)-effect. BF 47 gives excellent slag removal without slag residuals, in the first layer on preheated substrates as well as in subsequent layers. The flux has low hydrogen potential, which makes it most suitable for overlay welding of heat resistant steels such as A387-types. Smooth weld bead appearance and notch-free transitions are features achievable with all cladding processes. Constant dilution rates can be gained when using process-characteristic welding parameters. BF 47 shows constant chemical reactions as typical for a non-alloyed flux.

Application:
BF 47 can be used for hardfacing, joint cladding and surfacing. In combination with appropriate strip electrodes of the EQ300/EQ400 (without Nb) series according to A5.9 or according to EN ISO 14343 (EN 12072) constant weld overlays are achievable. The flux is highly viscous and creates a reinforcing effect for the weld pool. This characteristic brings exceptional advantages when cladding small-diameter rolls.

Further information on request.

Characteristic chemical Constituents:

$SiO_2 + Al_2O_3 + TiO_2$	CaO + MgO	CaF_2
50 %	30 %	15 %
Basicity according to Boniszewski: ~1.2		

Flux density: 1.0–1.1 kg/dm³ (l)
Grain size acc. to ISO 14174: 2–20 (Tyler 8 × 65)
Current-carrying capacity: 1,500 A DC using one strip electrode 60 x 0.5 mm
Packaging: 25 kg Alpha Dry Alu-Bag

Storage: 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:
150–200 °C effective flux temperature

Agglomerated Welding Flux BF 47 NiMo

Flux type: Calcium-Silicate
Classification: ISO 14174 – S A CS 3 5654 DC

Characteristics:
Agglomerated and active flux (with Cr-compensating & Ni/Mo alloying characteristic) designed for hardfacing, overlay strip welding and joint cladding together with stainless strip electrodes of the Cr-, CrNi(Mo)-steel types. Applicable for SAW–process as well as for use with the ESO® (Extended Stick Out)-cladding system which enables highest possible deposit rates as a result of the Joule heat (I^2R)-effect.
BF 47NiMo gives excellent slag removal without slag residuals, in the first layer on preheated substrates as well as in subsequent layers. The flux has low hydrogen potential, which makes it most suitable for overlay welding of heat resistant steels such as A387-types. Smooth weld bead appearance and notch-free transitions are features achievable with all cladding processes. Constant dilution rates can be gained when using process-characteristic welding parameters. BF 47NiMo shows constant chemical reactions as typical for a Bavaria-alloyed flux.

Application:
BF 47NiMo can be used for hardfacing, joint cladding and surfacing. In combination with appropriate strip electrodes of the EQ300/EQ400 (without Nb) series according to A5.9 or according to EN ISO 14343 (EN 12072) constant weld overlays are achievable. The flux is highly viscous and creates a reinforcing effect for the weld pool. This characteristic brings exceptional advantages when cladding small-diameter rolls.

Further information on request.

Characteristic chemical Constituents:

$SiO_2 + Al_2O_3 + TiO_2$	CaO + MgO	CaF_2
50 %	30 %	15 %
Basicity according to Boniszewski: ~1.2		

Flux density: 1.0–1.1 kg/dm³ (l)
Grain size acc. to ISO 14174: 2–20 (Tyler 8 × 65)
Current-carrying capacity: 1,500 A DC using one strip electrode 60 x 0.5 mm
Packaging: 25 kg Alpha Dry Alu-Bag

Storage: 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:
150–200 °C effective flux temperature

Fused Welding Flux WP 380

Flux type: Calcium-Silicate
Classification:
ISO 14174 (stainless steels) S F CS 2 5742 DC
ISO 14174 (low alloy steels) S F CS 1 63 DC

Characteristics:
Specially designed for welding austenitic stainless steels WP 380 is also suitable for welding both low-alloy steels for use at elevated temperatures as well as the combination with austenitic stainless steels. As a result of the semi- basic flux characteristics crack free welds are obtained for most grades of stainless steels welded with the corresponding wire electrodes. The metallurgical behavior of the flux is neutral (C-neutral, low Si pick-up and low Mn burn-out) without Cr compensation.
It is suitable for welding DC using single or DC/AC for multi-wire processes and produces smooth weld beads free of slag residuals with flat weld interfaces even in narrow gaps and on preheated work pieces.

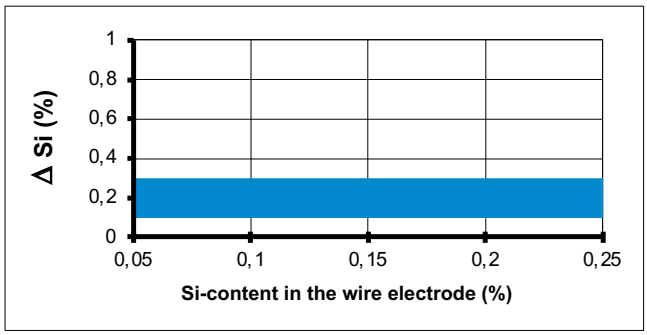
Application:
Joint welding and surfacing of:
- creep-resistant CrMo-steels such as 12CrMo19-5/A355 grade P22-P5 or X20CrMoWV12-1/A351 for boiler, vessel and pipe fabrication
- martensitic and ferritic Cr(NiMo)-steels acc. to EN 10088 with the appropriate wire electrodes in conjunction with the corresponding heat treatments
- austenitic CrNi(Mo)-steels (including ELC-grades) acc. to EN 10088; resistant against intergranular corrosion in both the as-welded and solution-treated condition
- high-alloy CrNi(Mo)-steels for use at low temperatures and heat-resistant steels
- high-alloy Cr(NiMo)-steels in combination with low-alloy steels (dissimilar joints)
- Nickel-base alloys using NiCr- and NiCrMo-wire electrodes acc. to AWS A5.14/EN ISO 18274

Characteristic chemical Constituents:

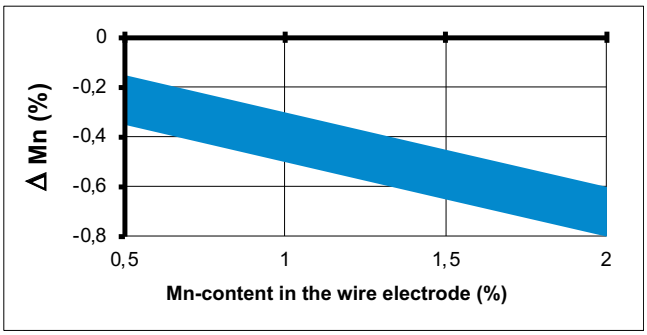
SiO_2	Al_2O_3 + MnO	CaO + MgO	CaF_2
20 %	55 %	35 %	20 %
Basicity according to Boniszewski: ~0.6			

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

Pick-up Silicon



Pick-up/Burn-out Manganese



Flux density: 1.5 kg/dm³ (l)
Grain size acc. to ISO 14174: 1–16 (Tyler 10×65)
Current-carrying capacity: up to 900 A DC using one wire

Chemical composition of all-weld metal acc. to EN ISO 15792-1 and AWS A5.9/5.23/5.14:
(characteristical values in wt. %)

Wire electrode		C	Si	Mn	Cr	Ni	Mo	Nb
BA-S2Mo	EA2	< 0.08	< 0.5	< 1.0			0.5	
BA-SCrMo5	EB6	< 0.08	< 0.7	< 0.6	5.5		0.6	
BA-SCrMo9	EB8	< 0.12	< 0.8	< 1.2	8.0–10.0		0.8–1.2	Cu: < 0.35
BA-SCrMo91[1]	EB91	< 0.10	< 0.5	< 1.2	8.5–10.5	0.6	1.0	0.02–0.10 V: 0.2
BA-WIRE 308L	ER308L	< 0.03	< 1.0	< 2.5	19.5–22.0	9.0–11.0		
BA-WIRE 309L	ER309L	< 0.03	< 1.0	< 2.5	23.0–25.0	12.0–14.0		
BA-WIRE 316L[1]	ER316L	< 0.03	< 1.0	< 2.5	18.0–20.0	11.0–14.0	2.0–3.0	
BA-WIRE 318	ER318	< 0.08	< 1.0	< 2.5	18.0–20.0	11.0–14.0	2.0–3.0	8 × C/1.0 max
BA-WIRE 347	ER347	< 0.08	< 1.0	< 2.5	19.0–21.0	9.0–11.0		10 × C/1.0 max
BA-WIRE 2209	ER2209	< 0.03	< 0.9	< 2.0	21.5–23.5	7.5–9.5	2.5–3.5	N: 0.08–0.20
BA-WIRE 276	ERNiCrMo-4	< 0.02	< 0.4	< 1.0	14.5–16.0	> 50.0	15.0–17.0	W ≈ 4/V: 0.35
						Fe ≈ 4.0–7.0		Co < 2.5

Mechanical properties of all-weld metal acc. to EN ISO 15792-1 and AWS A5.9/5.23/5.14:
(characteristical values)

Wire electrode		Heat treatment	0.2 % Proof stress	1.0 % Proof stress	TS MPa	Elong. %	Impact ISO-V (J)		
							RT	-120 °C -184 °F	-196 °C -321 °F
BA-S2Mo	EA2	S	> 440		> 540	> 20	> 90		
BA-SCrMo5	EB6	A	> 470		> 600	> 18	> 70		
BA-SCrMo91[1]	EB91	A	> 540		> 660	> 17	> 47		
BA-WIRE 308L	ER308L	AW	> 340		> 540	> 35	> 70		> 40
		ST1	> 250	> 280	> 520	> 35	> 80		> 50
BA-WIRE 309L[1]	ER309L	AW	> 380		> 580	> 30	> 70		
BA-WIRE 316L	ER316L	AW	> 350	> 380	> 550	> 30	> 70		> 40
		ST2	> 270	> 300	> 520	> 35	> 80		> 50
BA-WIRE 318	ER318	AW	> 370	> 410	> 580	> 30	> 80	> 40	
		ST2	> 290	> 330	> 550	> 35	> 80	> 60	
BA-WIRE 347	ER347	AW	> 360	> 400	> 570	> 30	> 80		> 40
		ST1	> 280	> 310	> 550	> 35	> 80		> 50
BA-WIRE 2209	ER2209	AW	> 550	> 600	> 750	> 25	> 80	-60°C: > 40	
BA-WIRE 276[2]	ERNiCrMo-4	AW	> 400		> 700	> 35	> 80		> 60

[1] Maximum wire diameter 2.4 mm
[2] Maximum wire diameter 2.0 mm
S = stress relieved 620 °C/15 h
A = annealed 740–760°C
ST1 = solution treated 1,050 °C/water
ST2 = solution treated 1,080 °C/water

WP 380

Packaging: 15 kg Alpha Dry Alu-Bag
Storage: Unopened originally packed flux bags can be stored up to one year in dry storage rooms after date of delivery exfactory.

Redrying conditions specific to the flux:
150–200 °C effective flux temperature. Usually, if austenitic stainless steels are to be welded flux redrying can be neglected.

Versatile flux for welding stainless steels, but also suitable for welding Ni-alloys as well as low alloyed steel.

WIRE ELECTRODES AND TIG WIRE RODS

Typical chemical analysis of solid steel wire electrodes for SAW

Symbol		C %	Si %	Mn %	Mo %	Ni %	Cr %	P %	S %	Cu %	Others in wt. %
EN ISO 14171-A EN ISO 14341-A EN ISO 24598-A EN ISO 26304-A	AWS A5.17 / A5.23										
BA-S1	EL12	0.08	0.07	0.44	0.01	0.05	0.04	0.015	0.015	0.14	
BA-S2	EM12(K)	0.11	0.12	1.07	0.01	0.04	0.03	0.007	0.008	0.09	
BA-S3	EH10K	0.11	0.12	1.61	0.03	0.02	0.05	0.015	0.012		
BA-S4	EH14	0.12	0.08	1.9	0.01	0.05	0.04	0.015	0.015	0.14	
BA-S2Si	EM12K	0.09	0.26	0.96	0.03	0.05	0.05	0.008	0.006		
BA-S3Si	EH12K	0.09	0.33	1.57	0.06	0.04	0.03	0.012	0.009		
BA-S2Mo	EA2	0.09	0.16	1.15	0.5	0.01	0.02	0.006	0.005		
BA-S3Mo	EA4	0.1	0.13	1.55	0.49	0.02	0.05	0.014	0.011		
BA-S4Mo	EA3	0.12	0.11	1.9	0.5	0.05	0.06	0.016	0.013		
BA-S2Ni1	ENi1	0.09	0.14	1.05	0.02	0.95	0.02	0.006	0.004	0.08	
BA-S2Ni2	ENi2	0.09	0.15	1.15	0.02	2.2	0.02	0.006	0.005		
BA-S2Ni3	ENi3	0.09	0.13	1.11	0.03	3.15	0.02	0.006	0.003	0.07	
BA-S2NiCu	EG (EW mod.)	0.1	0.23	0.98	0.04	0.78	0.07	0.012	0.01	0.48	
BA-S3NiMo1/4	ENi5	0.11	0.15	1.58	0.23	0.95	0.04	0.005	0.002		
BA-S3NiMo1	EF3	0.12	0.19	1.73	0.53	0.95	0.04	0.009	0.001		
BA-S3NiCrMo2.5	EM4-mod.	0.11	0.17	1.5	0.55	2.4	0.5	0.008	0.009		
BA-S2Ni1Si	ENi1K	0.09	0.65	1.05	0.05	0.09	0.02	0.012	0.01	0.1	
BA-S3TiB	EG	0.08	0.25	1.55	0.01	0.05	0.04	0.009	0.007	0.014	Ti 0.13 / B0.012
BA-S2MoTiB	EA2TiB	0.08	0.25	1.25	0.54	0.05	0.04	0.015	0.015	0.14	Ti 0.14 / B 0.012
BA-S3MoTiB	EG	0.08	0.3	1.48	0.5	0.02	0.03	0.01	0.008		Ti 0.15 / B 0.015
BA-S3Si1	EH11K	0.09	0.95	1.67	0.06	0.04	0.03	0.012	0.009	0.04	
BA-S2MoSi	EA3K mod.	0.1	0.6	1.2	0.5	0.02	0.02	0.01	0.01	0.05	
BA-S4MoSi	EA3K	0.1	0.63	1.82	0.55	0.02	0.02	0.012	0.01	0.1	
BA-S2CrMo1	EB2 (R)	0.1	0.17	0.98	0.52	0.03	1.2	0.008	0.009	0.1	EB2R: As / Sn / Sb each 0.005 / P 0.010 / S 0.010 / Cu 0.15
BA-S1CrMo2	EB3 (R)	0.1	0.18	0.64	1.02	0.02	2.4	0.008	0.007	0.09	EB3R: As / Sn / Sb each 0.005 / P 0.010 / S 0.010 / CU 0.15
BA-SCrMo5	EB6	0.08	0.3	0.5	0.6		6	0.015	0.015	0.14	
BA-SCrMo9	EB8	0.08	0.35	0.5	1		9	0.01	0.01	0.1	
BA-SCrMo91	EB91	0.1	0.25	0.5	1	0.6	8.7	0.008	0.008	0.08	V 0.20 / Nb 0.04

Single values are typical.

TUEV–certification
Approvals apply to the individual wire.

Typical chemical analysis of solid steel wire electrodes for SAW

Symbol		C %	Si %	Mn %	Mo %	Ni %	Cr %	P %	S %	Cu %	Others in wt. %	Material number	Approvals
EN ISO 14343-A EN ISO 18274	AWS A5.9/ A5.14												
BA-WIRE 308H	ER308H	0.05	0.4	1.8	0.2	10	20	0.02	0.013	0.1			
BA-WIRE 308L	ER308L	0.02	0.4	1.8	0.1	10	20	0.02	0.013	0.1		1.4316	TUEV
BA-WIRE 309L	ER309L	0.015	0.4	1.8	0.1	13	23.5	0.02	0.013	0.15		1.4332	TUEV
BA-WIRE 309LMo	ER309LMo	0.018	0.4	1.6	2.7	13.5	23.5	0.02	0.013	0.15			
BA-WIRE 309LNb	ER(309LNb)	0.018	0.3	1.9	0.1	12.5	24	0.02	0.013	0.15	Nb 0.8		
BA-WIRE 310	ER310	0.12	0.3	1.9	0.1	21	26	0.015	0.013	0.2			
BA-WIRE 316H	ER316H	0.05	0.45	1.7	2.5	12.3	19	0.02	0.013	0.15			
BA-WIRE 316L	ER316L	0.015	0.4	1.7	2.7	12	19	0.02	0.013	0.15		1.4430	TUEV
BA-WIRE 317L	ER317L	0.015	0.5	1.9	3.6	13.7	19	0.015	0.013	0.1		1.4438	*
BA-WIRE 318	ER318	0.03	0.45	1.4	2.6	11.5	19	0.015	0.013	0.1	Nb 0.60	1.4576	TUEV
BA-WIRE 320LR	ER320LR	0.015	0.1	1.6	2.5	34.2	19.7	0.01	0.009	3.5	Nb 0.25		
BA-WIRE 347	ER347	0.05	0.4	1.4	0.1	9.8	19.5	0.015	0.014	0.1	Nb 0.60	1.4551	TUEV
BA-WIRE 385	ER385	0.015	0.4	1.9	4.5	25	20	0.015	0.015	1.5			
BA-WIRE 410	ER410	0.1	0.4	0.4	0.2	0.1	13	0.015	0.015	0.2			
BA-WIRE 410NiMo	ER410NiMo	0.03	0.35	0.4	0.6	4.5	12	0.015	0.015	0.2			
BA-WIRE 420	ER420	0.3	0.35	0.45	0.2	0.25	13	0.02	0.02	0.3		1.4007	*
BA-WIRE 430	ER430	0.04	0.35	0.5	0.1	0.1	16.5	0.015	0.015	0.2		1.4015	*
BA-WIRE 2209	ER2209	0.015	0.5	1.6	3.3	9.1	23	0.015	0.012	0.1	N 0.16	1.4462	TUEV
BA-WIRE 2594NL	ER2594	0.015	0.35	0.4	4	9.5	25	0.015	0.012	0.1	N 0.25		
BA-WIRE 82	ERNiCr-3	< 0.1	0.2	3		Bal.	20.5	0.015	0.01	0.2	Nb 2.6/ Ti<0.7/ Fe<3.0	2.4806	*
BA-WIRE 625	ERNiCrMo-3	< 0.1	0.2	0.2	9	Bal.	22	0.014	0.01	0.2	Nb 3.5/ Ti 0.1/ Fe 1.0/ Al 0.1	2.4831	*
BA-WIRE 276	ERNiCrMo-4	0.008	0.03	0.4	15.7	58	15.8	0.005	0.004	0.3	W 3.7/ Fe 5.8/ Co 0.09/ V 0.06		

* Welded SA flux WP 380 if the requirements and characteristics of the base metal are fully considered.

Single values are typical. Further wire electrodes available on request, especially electrodes for hardfacing and coating.

TUEV–certification
Approvals apply to the individual wire.

Typical chemical analysis of solid wire electrodes for MIG / MAG Welding

Symbol		Si %	Mn %	Mo %	Ni %	Cr %	P %	S %	S %	Cu %	Others in wt. %	Material number	Approvals
EN ISO 14343-A EN ISO 18274	AWS A5.9 / A5.14												
BA-MIG 307Si	ER(307)	0.08	0.80	7.0	0.1	8.00	18.50	0.020	0.013	0.20		1.4316	
BA-MIG 308L	ER308L	0.02	0.40	1.8	0.1	10.00	20.00	0.020	0.013	0.10		1.4316	TUEV
BA-MIG 308LSi	ER308LSi	0.02	0.85	1.8	0.1	10.00	20.00	0.020	0.013	0.10			TUEV
BA-MIG 308H	ER308H	0.05	0.40	1.8	0.2	10.00	20.00	0.020	0.013	0.10			
BA-MIG 309L	ER309L	0.015	0.40	1.8	0.1	13.00	23.50	0.020	0.013	0.15		1.4332	TUEV
BA-MIG 309LSi	ER309LSi	0.015	0.80	1.8	0.1	13.00	23.50	0.020	0.013	0.15			TUEV
BA-MIG 309LMo	ER309LMo	0.018	0.40	1.6	2.7	13.50	23.50	0.020	0.013	0.15			
BA-MIG 309LNb	ER(309LNb)	0.018	0.30	1.9	0.1	12.50	24.00	0.020	0.013	0.15	Nb 0.8		
BA-MIG 310	ER310	0.12	0.30	1.9	0.1	21.00	26.00	0.015	0.013	0.20			
BA-MIG 312	ER312	0.1	0.40	1.8	0.15	9.30	29.50	0.020	0.013	0.15			
BA-MIG 316H	ER316H	0.05	0.45	1.7	2.7	12.30	19.00	0.020	0.013	0.15			
BA-MIG 316L	ER316L	0.015	0.40	1.7	2.7	12.00	19.00	0.020	0.013	0.15		1.4430	TUEV
BA-MIG 316LSi	ER316LSi	0.015	0.70	1.9	2.6	11.50	18.40	0.020	0.013	0.15			TUEV
BA-MIG 317L	ER317L	0.015	0.50	1.9	3.6	13.70	19.00	0.015	0.013	0.10		1.4438	
BA-MIG 318	ER318	0.04	0.45	1.7	2.6	12.00	19.00	0.020	0.013	0.15	Nb 0.60		
BA-MIG 318Si	ER318 sim.	0.04	0.80	1.7	2.6	12.00	19.00	0.015	0.013	0.10	Nb 0.60	1.4576	
BA-MIG 347	ER347	0.05	0.40	1.6	0.1	9.80	19.50	0.015	0.014	0.10	Nb 0.60	1.4551	
BA-MIG 347Si	ER347Si	0.05	0.80	1.6	0.1	9.80	19.50	0.015	0.014	0.10	Nb 0.60		
BA-MIG 385	ER385	0.015	0.40	1.9	4.5	25.00	20.00	0.015	0.015	1.50			
BA- MIG 410	ER410	0.1	0.40	0.4	0.2	0.10	13.00	0.015	0.015	0.20			
BA-MIG 410NiMo	ER410NiMo	0.03	0.35	0.4	0.6	4.50	12.00	0.015	0.015	0.20			
BA-MIG 420	ER420	0.3	0.35	0.45	0.25	0.30	13.00	0.020	0.02	0.30		1.4007	
BA-MIG 430	ER430	0.04	0.35	0.5	0.1	0.10	16.50	0.015	0.015	0.15		1.4015	
BA-MIG 2209	ER2209	0.015	0.50	1.6	3.3	9.10	23.00	0.015	0.012	0.10	N 0.16	1.4462	
BA-MIG 2594NL	ER2594	0.015	0.35	0.4	4.0	9.50	25.00	0.015	0.012	0.10	N 0.25		
BA-MIG 82	ERNiCr-3	< 0.1	0.20	3.0		Bal.	20.50	0.015	0.01	0.20	Nb 2.6 / Ti < 0.7 / Fe < 3.0	2.4806	
BA-MIG 625	ERNiCrMo-3	< 0.1	0.20	0.2	9.0	Bal.	22.00	0.014	0.01	0.20	Nb 3.5 / Ti 0.1 / Fe 1.0 / Al 0.1	2.4831	
BA-MIG 276	ERNiCrMo-4	0.008	0.03	0.4	15.7	58.00	15.80	0.005	0.004	0.03	W 3.7 / Fe 5.8 / Co 0.09 / V 0.06		

Single values are typical.

TUEV–certification
Approvals apply to the individual wire.

Typical chemical analysis of solid wire electrodes for MIG Welding

Symbol		Si %	Fe %	Cu %	Mn %	Mg %	Cr %	Zn %	Ti %	Al %	Material number	Approvals
EN ISO 18274	AWS A5.9/ A5.14											
BA-MIG AlSi5	ER4043	5.2	0.19	0.1	0.02	0.012	0.001	0.021	0.015	Rem		
BA-MIG AlMg5	ER5356	0.05	0.12	0.01	0.13	4.7	0.08	0.01	0.1	Rem		
BA-MIG AlMg4.5Mn	ER5183	0.1	0.1	0.05	0.7	4.8	0.1	0.1	0.1	Rem		

Single values are typical.

TUEV–certification
Approvals apply to the individual wire.

Typical chemical analysis of solid TIG wire rods for TIG Welding

Symbol		Si %	Fe %	Cu %	Mn %	Mg %	Cr %	Zn %	Ti %	Al %	Material number	Approvals
EN ISO 18274	AWS A5.9/ A5.14											
BA-TIG AlSi5	ER4043	5.2	0.19	0.1	0.02	0.012	0.001	0.021	0.015	Rem		
BA-TIG AlMg5	ER5356	0.05	0.12	0.01	0.13	4.7	0.08	0.01	0.1	Rem		
BA-TIG AlMg4.5Mn	ER5183	0.1	0.1	0.05	0.7	4.8	0.1	0.1	0.1	Rem		

Single values are typical.

TUEV–certification
Approvals apply to the individual wire.

Typical chemical analysis of solid wire rods for TIG Welding

Symbol		C %	Si %	Mn %	Mo %	Ni %	Cr %	P %	S %	Cu %	Others in wt. %	Material number	Approvals
EN ISO 14343-A EN ISO 18274	AWS A5.9 / A5.14												
BA-TIG 307Si	ER(307)	0.080	0.80	7.00	0.1	8.00	18.50	0.020	0.013	0.20		1.4316	
BA-TIG 308L	ER308L	0.020	0.40	1.80	0.1	10.00	20.00	0.020	0.013	0.10		1.4316	TUEV
BA-TIG308LSi	ER308LSi	0.020	0.85	1.80	0.1	10.00	20.00	0.020	0.013	0.10			TUEV
BA-TIG 308H	ER308H	0.050	0.40	1.80	0.2	10.00	20.00	0.020	0.013	0.10			
BA-TIG 309L	ER309L	0.015	0.40	1.80	0.1	13.00	23.50	0.020	0.013	0.15		1.4332	TUEV
BA-TIG 309LSi	ER309LSi	0.015	0.80	1.80	0.1	13.00	23.50	0.020	0.013	0.15			TUEV
BA-TIG 309LMo	ER309LMo	0.018	0.40	1.60	2.7	13.50	23.50	0.020	0.013	0.15			
BA-TIG 309LNb	ER(309LNb)	0.018	0.30	1.90	0.1	12.50	24.00	0.020	0.013	0.15	Nb 0.8		
BA-TIG 310	ER310	0.120	0.30	1.90	0.1	21.00	26.00	0.015	0.013	0.20			
BA-TIG 312	ER312	0.100	0.40	1.80	0.15	9.30	29.50	0.020	0.013	0.15			
BA-TIG 316H	ER316H	0.050	0.45	1.70	2.7	12.30	19.00	0.020	0.013	0.15			
BA-TIG 316L	ER316L	0.015	0.40	1.70	2.7	12.00	19.00	0.020	0.013	0.15		1.4430	TUEV
BA-TIG 316LSi	ER316LSi	0.015	0.70	1.90	2.6	11.50	18.40	0.020	0.013	0.15			TUEV
BA-TIG 317L	ER317L	0.015	0.50	1.90	3.6	13.70	19.00	0.015	0.013	0.10		1.4438	
BA-TIG 318	ER318	0.040	0.45	1.70	2.6	12.00	19.00	0.020	0.013	0.15	Nb 0.60		
BA-TIG 318Si	ER318 (similar)	0.040	0.80	1.70	2.6	12.00	19.00	0.015	0.013	0.10	Nb 0.60	1.4576	
BA-TIG 347	ER347	0.050	0.40	1.60	0.1	9.80	19.50	0.015	0.014	0.10	Nb 0.60	1.4551	
BA-TIG 347Si	ER347Si	0.050	0.80	1.60	0.1	9.80	19.50	0.015	0.014	0.10	Nb 0.60		
BA-TIG 385	ER385	0.015	0.40	1.90	4.5	25.00	20.00	0.015	0.015	1.50			
BA- TIG 410	ER410	0.100	0.40	0.40	0.2	0.10	13.00	0.015	0.015	0.20			
BA-TIG 410NiMo	ER410NiMo	0.030	0.35	0.40	0.6	4.50	12.00	0.015	0.015	0.20			
BA-TIG 420	ER420	0.300	0.35	0.45	0.25	0.30	13.00	0.020	0.02	0.30		1.4007	
BA-TIG 430	ER430	0.040	0.35	0.50	0.1	0.10	16.50	0.015	0.015	0.15		1.4015	
BA-TIG 2209	ER2209	0.015	0.50	1.60	3.3	9.10	23.00	0.015	0.012	0.10	N 0.16	1.4462	
BA-TIG 2594NL	ER2594	0.015	0.35	0.40	4.0	9.50	25.00	0.015	0.012	0.10	N 0.25		
BA-TIG 82	ERNiCr-3	< 0.1	0.20	3.00		Bal.	20.50	0.015	0.01	0.20	Nb 2.6 / Ti < 0.7 / Fe < 3.0	2.4806	
BA-TIG 625	ERNiCrMo-3	< 0.1	0.20	0.20	9.0	Bal.	22.00	0.014	0.01	0.20	Nb 3.5 / Ti 0.1 / Fe 1.0 / Al 0.1	2.4831	
BA-TIG 276	ERNiCrMo-4	0.008	0.03	0.40	15.7	58.00	15.80	0.005	0.004	0.03	W 3.7 / Fe 5.8 / Co 0.09 / V 0.06		

Single values are typical.

TUEV–certification
Approvals apply to the individual wire.

STORE AND HANDLE

Store and handle flux correctly

A moisture content that is as low as possible is a basic requirement for a high performance of the welding flux. Therefore, please observe the following information on storage and processing:

Packagaging

For shipping, Bavaria Schweisstechnik generally uses moisture-resistant PE or coated Aluminum Bags (filling capacity 25 kg), steel drums (25 kg) or specially coated Big Bags (400–1,250 kg). In addition, the packaging units on the shipping pallets are wrapped in stretch film. All filler metals are usually delivered on wooden pallets with a net weight of up to 1,250 kg.

Transport

The consumables must be transported in closed vehicles. The delivery must be shrink-wrapped in plastic or stored in dry cardboard boxes or wooden crates on undamaged pallets. Unprotected shipments should not be exposed to direct moisture such as snow and rain. Damaged outer packaging must be repacked within one hour, otherwise, the additional material must be disposed of. A maximum of two pallets may be stacked on top of each other without additional supports.

Storage of welding flux

Only original sealed and intact packaging enables a long shelf life. Storage according to the FIFO principle (first-in/first-out) and separating the goods according to consumables and batches minimize the risk of the shelf life being exceeded.

Basically, the following rules apply to storage:

1. Keep relative humidity as low as possible, but definitely below 70 %.
2. Avoid direct sunlight on the packaging.
3. The storage temperature should be between 10 °C and 30 °C – always store the flux frost-free.
4. Take appropriate measures to ensure that the temperature does not fall below the dew point.
5. Regularly check the storage conditions.
6. Avoid direct contact of the packaging units with floors and walls.
7. Do not stack open pallets - this avoids damage to the packaging.

Even after these periods, the flux can still be used. However, you should subject the flux to a visual inspection and carry out a welding test to ensure that the high quality is still given.

Shelf life of the welding flux provided these storage conditions are observed

- Agglomerated flux: up to one year
- Fused flux: up to two years

Redrying

Despite all measures, flux can absorb more or less moisture from the atmosphere over the period of storage. To avoid this, you should dry the flux before processing.

Recommended temperatures and drying times for Bavaria welding flux:

Flux type	Temperature (°C)	Time (h)
FB	300–350	2–10
AB	200–250	2–10
AR	150–200	2–10
CS	150–200	2–10
AF	300–350	2–10

Especially with the FB (Fluoride-Basic) and AB (Aluminate-Basic) type fluxes packed in standard plastic bags, redrying is recommended to avoid the risk of hydrogen-induced cracking.

Dry the flux in a ventilated oven, avoiding overheating local areas. If the welding flux is dried statically, you should not layer it higher than 50 mm.

Welding flux from Bavaria Schweisstechnik can be redried several times. Please note, however, that the total drying time must not exceed ten hours.

If the dried flux is not used immediately, we recommend storing it at 125–175 °C until use.

Alpha Bags: Save time and effort

Our PE-coated aluminum packaging and our Big Bags with an aluminum inliner (Alpha Bags) are sealed against moisture in such a way that the agglomerated welding flux packed in them can be stored for up to a year and used without re-drying.

Fill the flux into the welding machine immediately after opening. The effective flux temperature should be 125–175°C after homogenization. Should the entire contents of the package not fit into the machine at once, store the remaining flux at the same temperature until use.

Use dry and oil-free air for flux extraction and circulation systems – this will prevent the flux from picking up moisture from there.

The storage and handling recommendations do not release the user from checking the welding consumables for defects before using them.

How to recycle unused flux

Welding flux that is not consumed or melted during the welding process can be collected and reused. Only use suitable wire brushes to avoid contamination of the flux.

By mixing the recycled flux with new, you can achieve a grain size close to the original. The mixing ratio is usually one part of new flux to two parts of the flux in circulation.

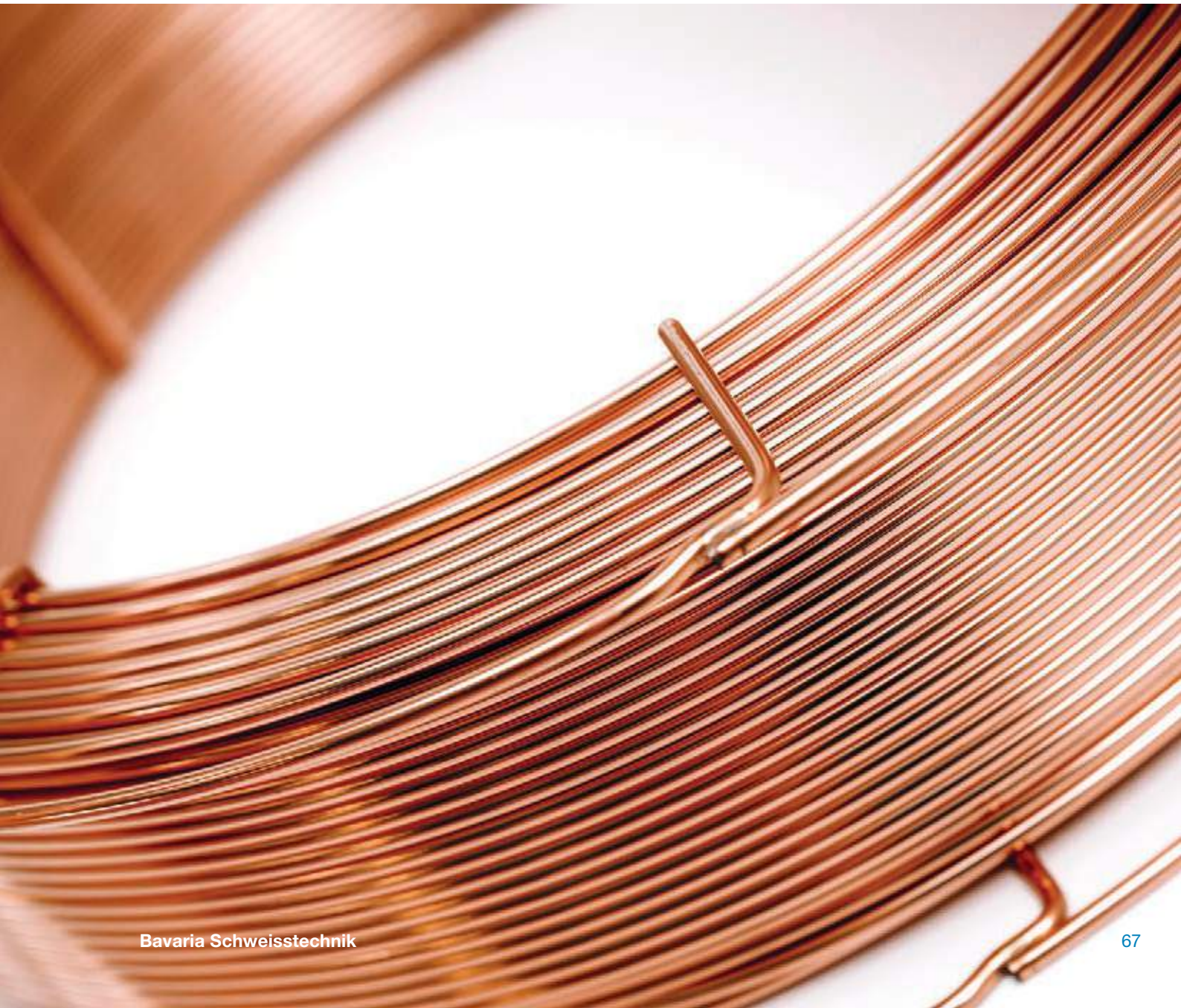
50 % of the flux particles should be larger than 0.5 mm, 100 % smaller than 2.2 mm. Before you reuse the flux that has already been used, remove foreign materials such as scale, slag or other impurities using sieves or dust separators. In this way you get consistently high-quality weld seams with sustainable use of the welding flux.

Store solid wires and rods correctly

In principle, the same recommendations apply to the solid wire and stick electrodes from Bavaria Schweisstechnik as to welding flux. The recommended storage temperature is 15 to 25 °C, the relative humidity should not exceed 60 %. Just as with welding powder, the dew point should not be fallen below. Note that when stored below 10 °C, condensation may form on the surface when the wire packaging is opened in a heated environment.

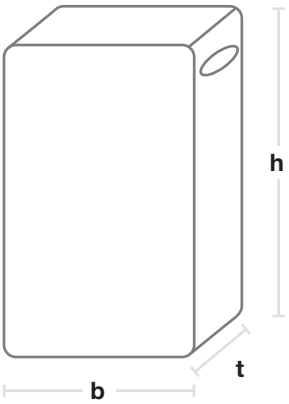
Use only properly stored wires and rods – improper storage and handling can cause rust to form on the electrodes and significantly reduce the quality of the weld.

If these conditions are observed, Bavaria Schweisstechnik solid wires can be stored for up to one year in the unopened and undamaged original packaging



Packaging types for welding flux

Plastic Bag 25 kg

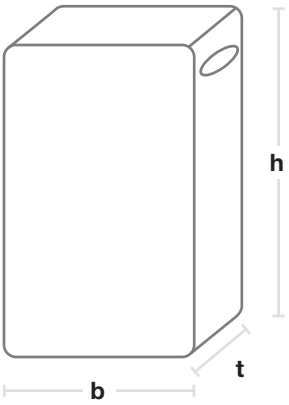


Material:
Polyethylen (PE)

Measures:
b 330 mm
h 630 mm
t 110 mm

Capacity:
max. 25 kg

Aluminium Bag 25 kg

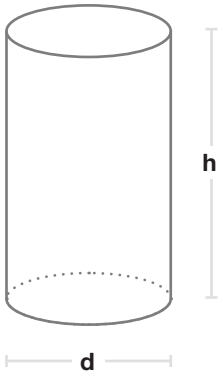


Material:
PE-coated
Aluminium Bag

Measures:
b 330 mm
h 630 mm
t 110 mm

Capacity:
max. 25 kg

Drum 25 kg



Material:
Steel

Measures:
h 445 mm
d 300 mm

Capacity:
max. 25 kg

Big Bag 400–625 kg and 1,000–1,250 kg

Material: Polyprylene fabric (PP)

Big Bag (400–625 kg) / Measures:
910 mm × 910 mm × 600 mm

Big Bag (1000–1250 kg) / Measures:
910 mm × 910 mm × 1,200 mm

Big Bag with Alu-Inliner 400–600 kg and 1,000–1,250 kg

Material: PP fabric with aluminium inliner

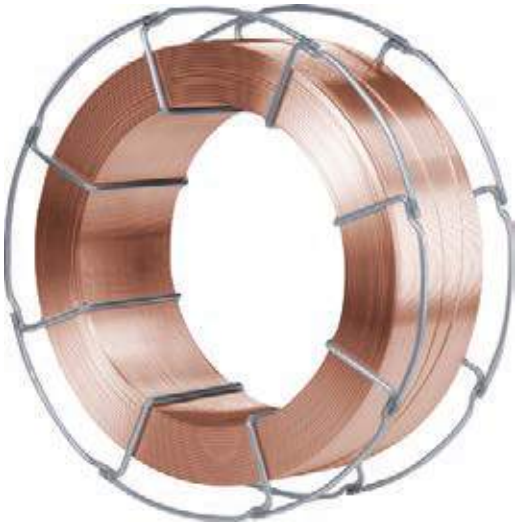
Big Bag (400–625 kg) / Measures:
910 mm x 910 mm x 650 mm

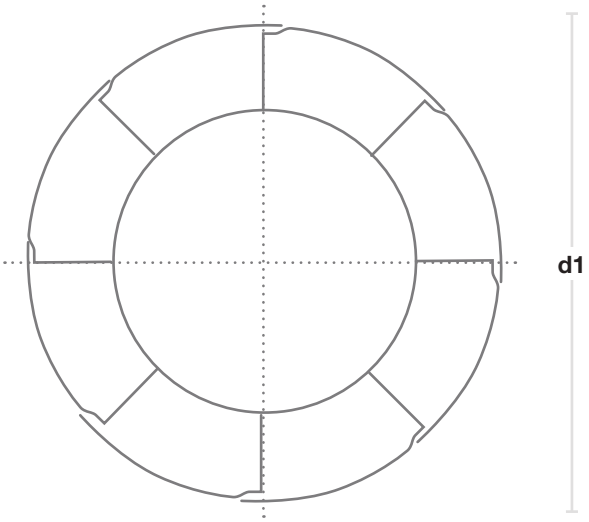
Big Bag (1000–1250 kg) / Measures:
910 mm × 910 mm × 1,200 mm

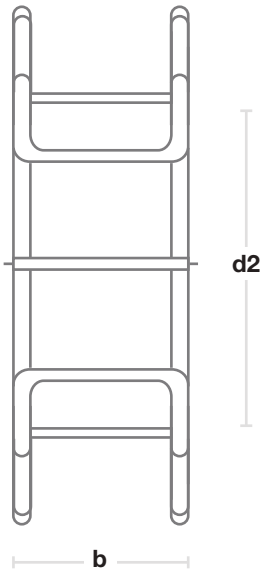
Packaging types for wire electrodes

Spool B300 / BS 300

Material: Steel wire / Aluminium wire





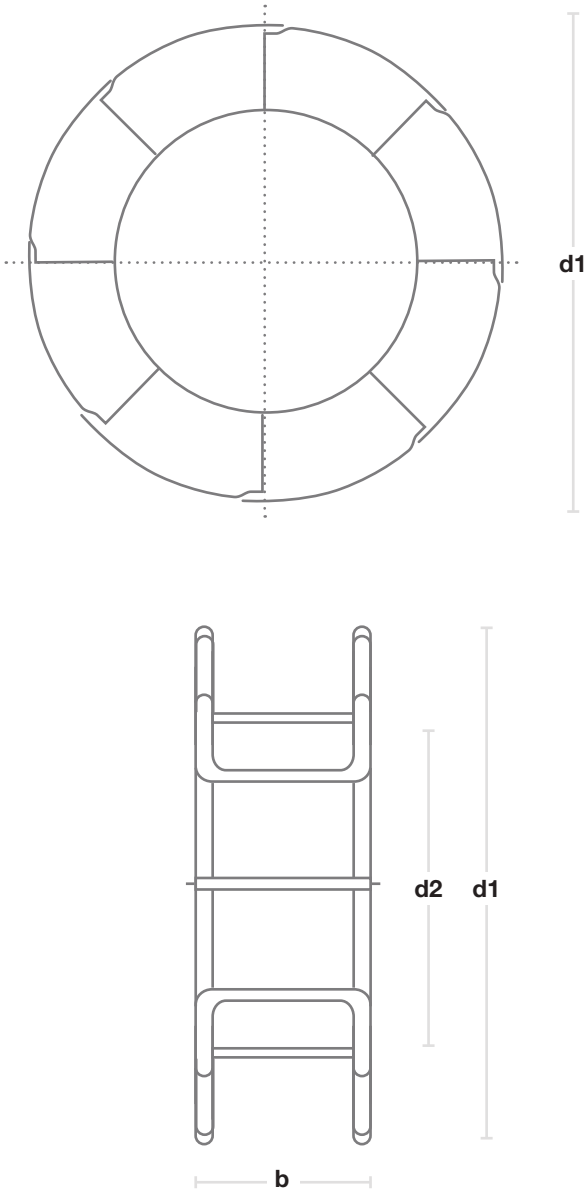


Description	EN ISO 544	Outer Ø d1 in mm	Inner Ø d2 in mm	Other Diam. in mm	Width b in mm	Weight approx. kg
Basket spool	B 300	300	180		100	15/18/20
Basket spool	BS 300	300	51.5		100	7/15/18/20

Spool for solid and metal-powder cored wire electrodes (wire Ø 1.2–5.0 mm)

Spool K415

Material: Steel wire

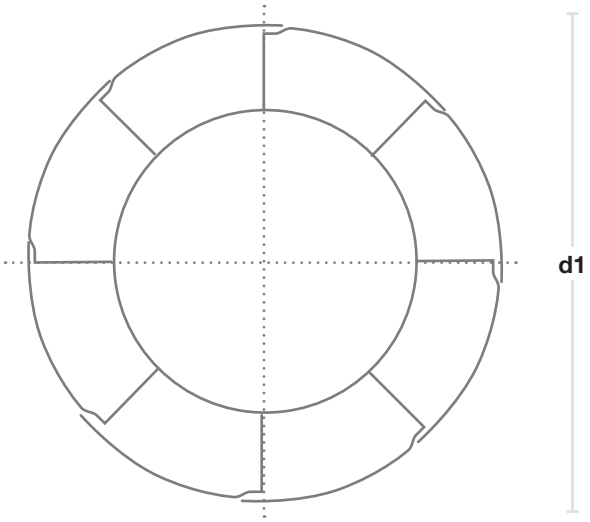


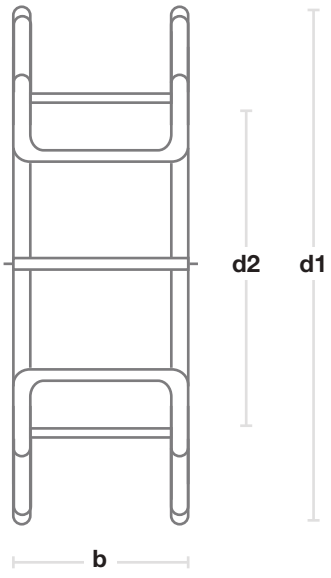
Description	EN ISO 544	Outer Ø d1 in mm	Inner Ø d2 in mm	Width b in mm	Weight approx. kg
Basket spool	B 450	415	308	103	20/25/30

Spool for solid and metal-powder cored wire electrodes (wire Ø: 1.2–5.0 mm)

Spool K570

Material: Steel wire



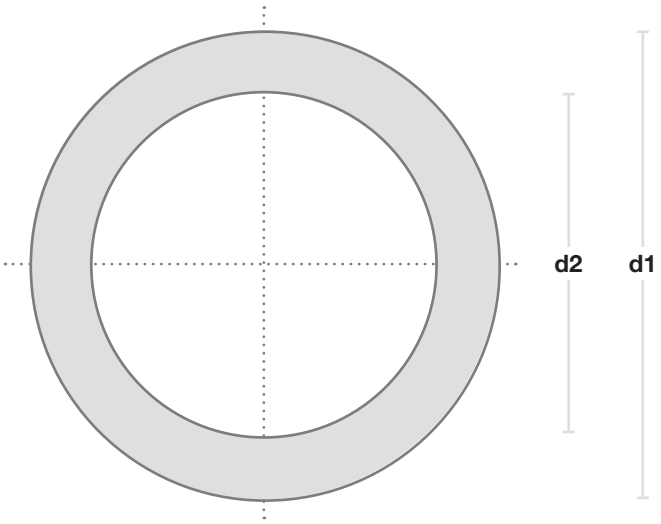


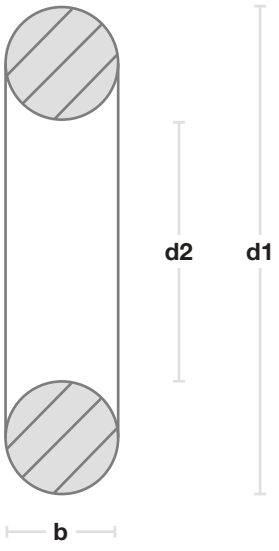
Description	Outer Ø d1 in mm	Inner Ø d2 in mm	Width b in mm	Weight approx. kg
Basket Spool	760	570	115	90–100

Spool for solid and metal-powder cored wire electrodes (wire Ø 1.2–5.0 mm)

Coil R282
E300

Material: –



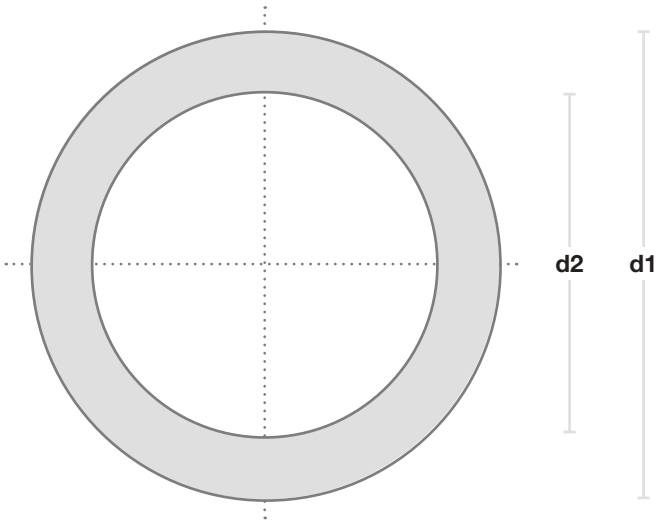


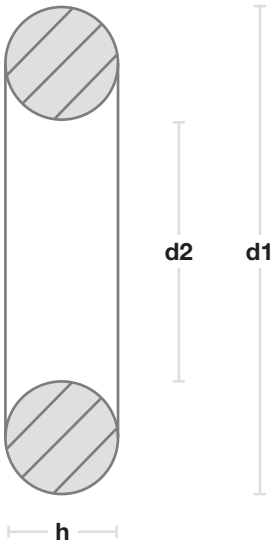
Description	Outer Ø d1 in mm	Inner Ø d2 in mm	Width b in mm	Weight approx. kg
Coil	282	-	65 without cardboard	20
Coil	300	-	95	50

Coil for solid and metal-powder cored wire electrodes (wire Ø 1.2–5.0 mm)

Coil E 570

Material: –



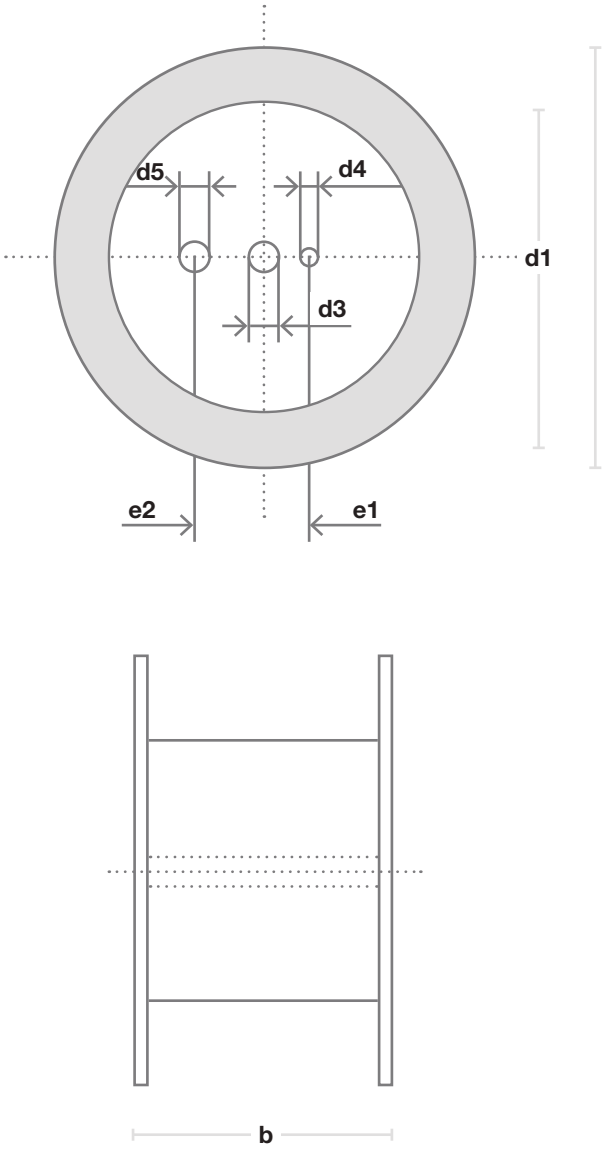


Description	Outer Ø d1 in mm	Inner Ø d2 in mm	Width b in mm	Weight approx. kg
Coil	800	570	100	90–100

Coil for solid and metal-powder cored wire electrodes (wire Ø 1.2–5.0 mm)

Spool G 300

Material: Wood, steel

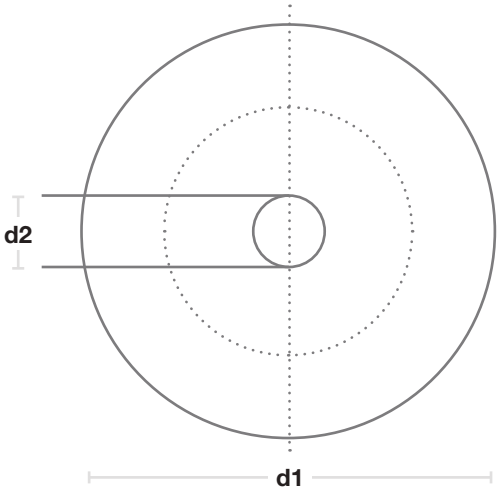


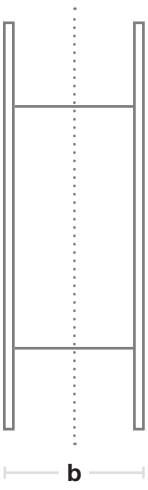
Description	EN ISO 544	Outer Ø d1 in mm	Inner Ø d2 in mm	Width b in mm	Other measures in mm	Weight approx. kg
Spool	S 760 E	760	-	290	d3=40,5/d4=25/d5=35 e1=65/e2=110	250/450
Spool	S 760 A	760	-	345	d3=35/d4=16,7/d5=16,7 e1=63,5/e2=63,5	250/450

Spool for solid and metal-powder cored wire electrodes (wire Ø 1.2–5.0 mm)

Plastic Spool S 200

Material: Steel wire/Aluminium wire



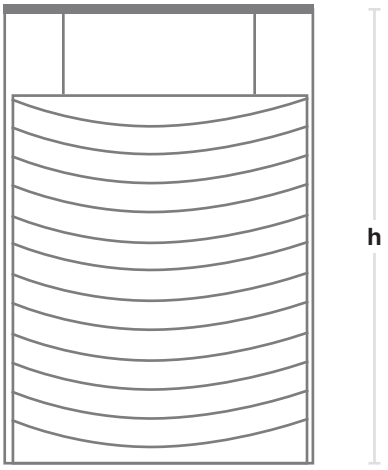


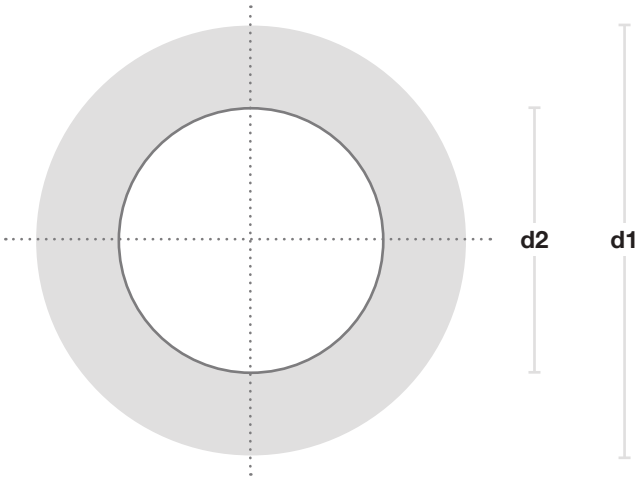
Description	EN ISO 544	Outer Ø d1 in mm	Inner Ø d2 in mm	Width b in mm	Weight approx. kg
Plastic spool	S 200	200	50.5	55	2/5

Spool for solid and metal-powder cored wire electrodes (wire Ø: 0.8–1.6 mm)

Pop drum

Material: Cardboard core



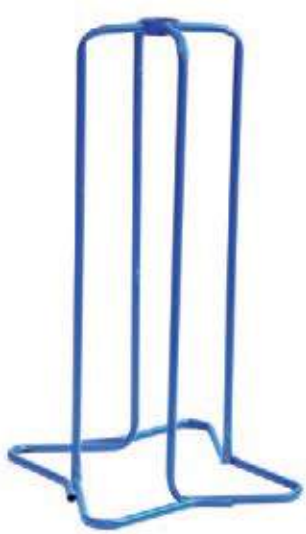


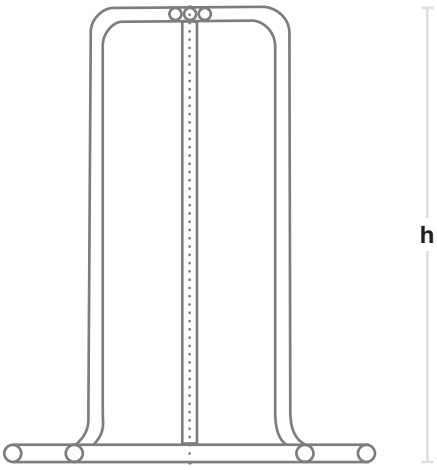
Outer Ø d1 in mm	Inner Ø d2 in mm	Height h in mm	Weight approx. kg
800	500	900	550
800	500	1,350	850–1,000

Pop Drum for solid and metal-powder cored wire electrodes (wire Ø 1.2–5.0 mm)

Spider (one way)

Material: Steel



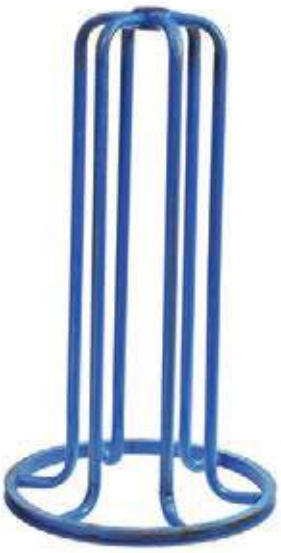


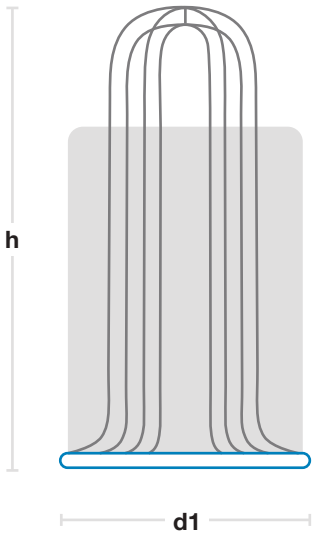
Outer Ø d1 in mm	Inner Ø d2 in mm	Height h in mm	Weight approx. kg
950	500	1,400	max. 1,250

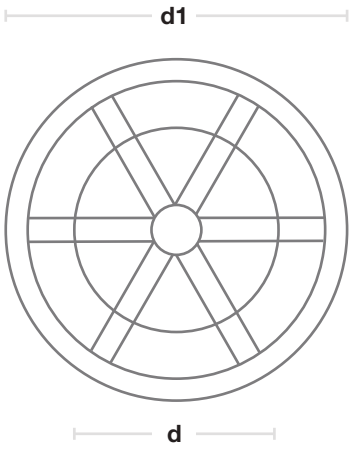
Spider for solid and metal-powder cored wire electrodes (wire Ø 1.2 – 5.0 mm)

Spider (multi use)

Material: Steel





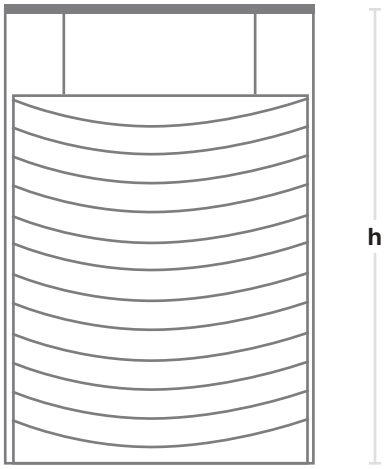


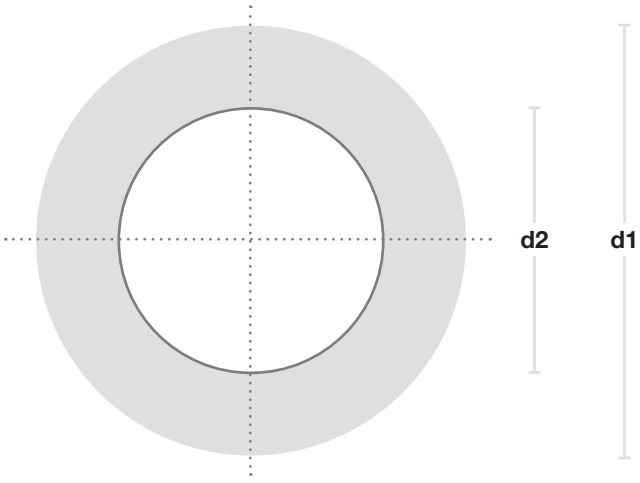
Outer Ø d1 in mm	Inner Ø d2 in mm	Height h in mm	Weight approx. kg
900	480	1,600	max. 1,250

Spider for solid and metal-powder cored wire electrodes (wire Ø 1.2–5.0 mm)

Drum

Material: Cardboard



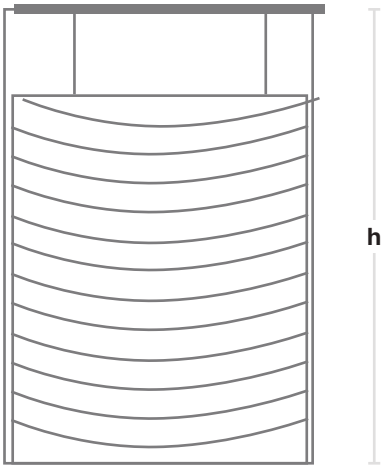


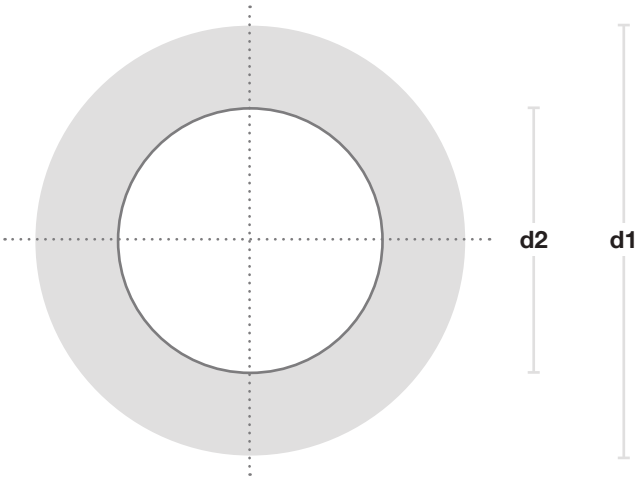
Outer Ø d1 in mm	Inner Ø d2 in mm	Height h in mm	Weight approx. kg
570	315	1,000	max. 400

Drum for solid and metal-powder cored wire electrodes (wire Ø: 2.4 – 5.0 mm)

HPP Drum

Material: Cardboard with cardboard core and aluminum foil incl. metal lid





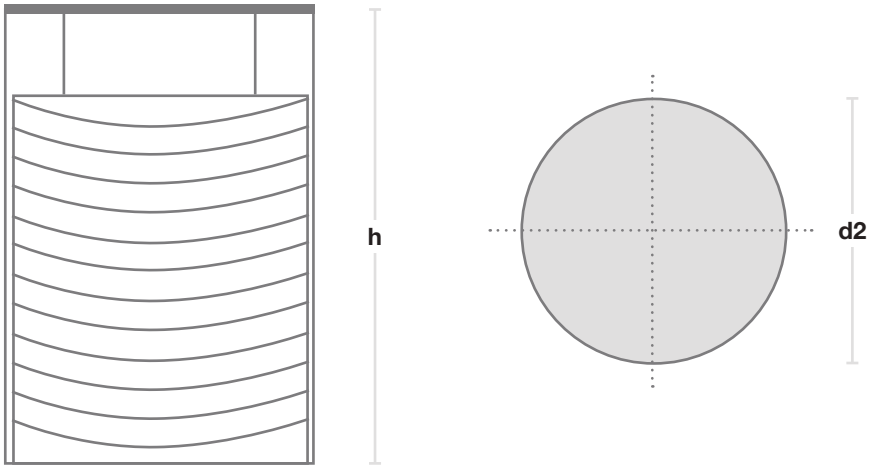
Outer Ø d1 in mm	Inner Ø d2 in mm	Height h in mm	Weight approx. kg
660	350	930	max. 500

Drum for solid and metal-powder cored wire electrodes (wire Ø: 1,2 – 4,8 mm)

The body of the drum is produced with eight layers of first quality kraft. An aluminum foil is applied after the last layer of kraft to avoid hygroscopicity; so it is fully protected and perfectly insulated against the external ambient by preventing airborne moisture absorption.

Round Drum

Material: Cardboard

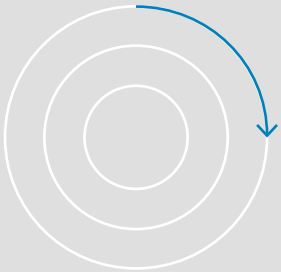


Outside Ø d1 in mm	Height h in mm	approx. kg
750	950	max. 750

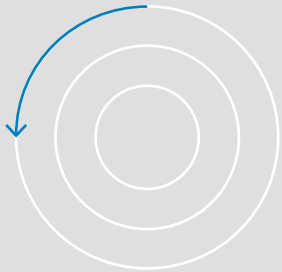
Picture of self-winding spool (wire Ø: ≤ 2.0 mm)

Decoiling directions for spiders and drums available clockwise or anti-clockwise:

Please mark when ordering:



clockwise



anti-clockwise

Packaging can be adjusted on request.

Packaging types for solid wire rods for TIG welding

Cardboard packaging

Description	EN ISO 544	Length in mm	Height in mm	Width in mm	Weight approx. kg
Cardboard box	–	1,035	43	58	2.5/5

Cardboard box for solid wire rods (wire Ø: 1.0–4.0 mm)

BAVARIA SCHWEISSTECHNIK®

BAVARIA SCHWEISSTECHNIK GMBH

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