

Filler Materials for Submerged Arc Welding

Over 120 Wire / Flux Combinations
from the Joining Specialist





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Böhler Welding

Lasting Connections

As a pioneer in welding consumables for the joining of metals, Böhler Welding offers a globally unique and customer-focused portfolio for Lasting Connections. The extensive range of approximately 2.000 products is continuously aligned with latest industry specifications and customer requirements, certified by leading approval authorities, and thereby accredited for even the most challenging applications.

Your submerged arc welding specialist

Böhler Welding offers a vast range of products for the joining of materials with the submerged arc welding process. They are fully developed in-house and are manufactured in our specialized production unit in Hamm, Germany. The product range comprises over 120 wire/flux combinations covering non-alloyed, weather resisting, high strength, low-temperature and creep resistant steel, all types of stainless steel, as well as nickel-base alloys. All over the world, these are applied in demanding industrial segments, such as power generation, the process and chemical industries, up and downstream offshore fabrication, pipe mills, the nuclear industry, wind tower production and civil engineering.

Our clients benefit from a partner with:

- the highest expertise in joining, rendering the best application support globally available
- specialized and best in class product solutions for their local and global challenges
- an absolute focus on customer needs and their success
- a worldwide presence through factories, offices and distributors

Extra productivity from cored wires

The range of products for non- and low-alloyed steels, features a number of wire / flux combinations with cored wires under the name BÖHLER SUBARC. These provide extra productivity, due to the higher deposition rate of cored wires compared to solid wires.

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Customer driven development with productivity in mind

Our submerged arc wire/flux combinations are developed with a clear customer focus – mostly in co-operation with key fabricators in their industry segments. Their specific process and weld metal requirements form the basis for the development of new or adapted combinations, which are normally field-tested for the target application at the customer's.

Welding productivity is a crucial focus area in R&D and in our contacts with fabricators. In our philosophy, our wire/flux combinations must not only satisfy weld requirements, but at the same

time improve the economy of the submerged arc welding processes applied by our clients. In this respect, the on-site productivity audits performed worldwide by our team of specialized application engineers are an appreciated service. These audits have the aim to identify the potential for productivity increase and often result in adaptation of the welding process itself (e.g. to twin or tandem heads), the choice of different consumables and – in some cases – in the development of a completely new filler metal e.g. a wire/flux combination.

Application services – our added value

We offer more than best-in-class welding consumables, because in practice, only perfect welds and highest process efficiency count. We are able to guarantee this through outstanding application support for all common arc welding processes and for customers in all branches of industry, worldwide. The three main pillars of our application services are:

- Product and technical consultation
- Process optimization
- Education and training

These services are offered on-site at the customers premises or at one of our own Welding Academies.

Quality & HSEE

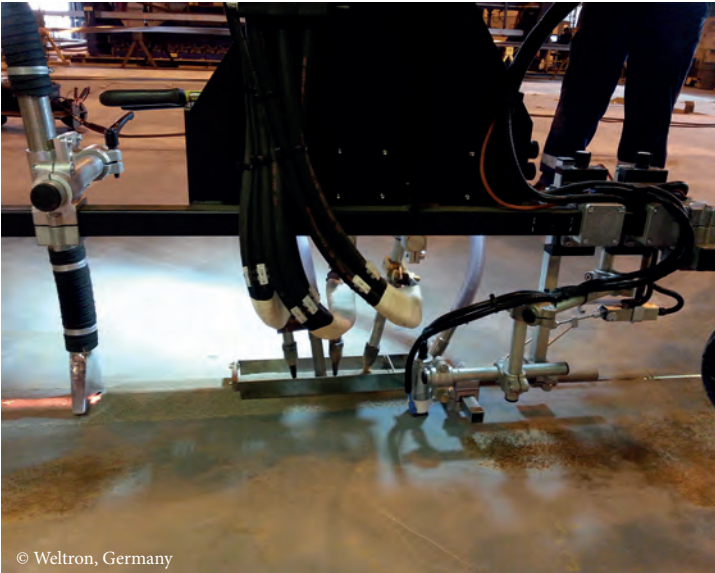
As part of voestalpine AG, Böhler Welding fully commits to the philosophies of quality, health & safety and environmental & energy management systems. Our Global Quality & HSEE function ensures the implementation and maintenance of a multi-site management system comprising ISO 9001, ISO 14001 and ISO 45001. In addition, voestalpine Böhler Welding is committed to implement ISO 50001 standards for all European manufacturing plants.

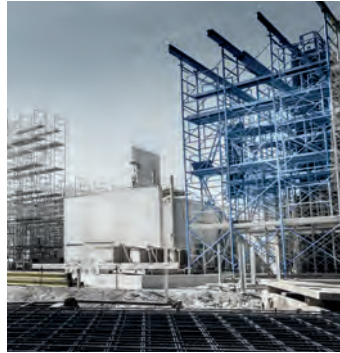
Productive packaging options

Also our submerged arc product packaging is designed for maximum welding productivity. Next to standard 25 kg spools, wires can be supplied on spool bodies with a filling content of 100, 300, 350 and even 1000 kg to reduce downtime with high duty cycle welding systems. Fluxes can be ordered in standard 25 kg bags or sealed metal drums, but also in BigBags with 500 or 1000 kg filling content. The same flux packaging forms can be ordered in DRY SYSTEM – our special moisture proof packaging line for fluxes. With DRY SYSTEM, the flux stays factory dry and can be used without re-baking.



Applications in Main Industry Segments





- Steel construction
- Shipbuilding
- Bridge building
- Wind turbines
- Offshore constructions
- Pipelines
- Pressure vessels
- Mobile construction machinery



Böhler Welding Wire/Flux Combinations

Non-alloyed steel

Product name Classification EN ISO Classification AWS	Application				
	Segment / typical application	Process characteristics	Materials to be welded	ISO-V Min. Temp. (°C)	Approvals
Union S 2 - UV 305 EN ISO 14171-A: S 38 0 AR S2 AWS A5.17: F7AZ-EM12	Power generation Membrane walls	High speed fillet welds	Non-alloyed	no requirements	
Union S 2 - UV 306 EN ISO 14171-A: S 42 3 AR S2 AWS A5.17: F7A2-EM12	General purpose Light constructions	Fillet welds Single run or limited runs.	Non-alloyed	-30	ABS, DNV GL, LR, TÜV, DB, CE
Union S 2 - UV 400 EN ISO 14171-A: S 38 4 AB S2 AWS A5.17: F7A4-EM12	General purpose Light constructions	Universal	Non-alloyed	-40	ABS, BV, DNV GL, LR, TÜV, DB, CE
Union S 2 Si - UV 305 EN ISO 14171-A: S 42 A AR S2Si AWS A5.17: F7AZ-EM12K	Power generation Membrane walls	High speed fillet welds	Non-alloyed	no requirements	
Union S 2 Si - UV 306 EN ISO 14171-A: S 42 3 AR S2Si AWS A5.17: F7A2-EM12K / F7P2-EM12K	General purpose Light constructions	Fillet welds Single run or limited runs.	Non-alloyed	-20	LR, CE
Union S 2 Si - UV 310 P EN ISO 14171-A: S 38 2 AB S2Si / S 3T 0 AB S2Si AWS A5.17: F7A2-EM12K AWS A5.23: F6TA0G-EM12K	Pipe manufacturing	Multi-wire Two run.	X60	-20	
Union S 2 Si - UV 421 TT EN ISO 14171-A: S 42 5 FB S2Si AWS A5.17: F7A8-EM12K / F6P8-EM12K	General purpose	Multi-pass	Non-alloyed	-50	
Union S 3 Si - UV 417 TT EN ISO 14171-A: S 46 6 FB S3Si AWS A5.17: F7A8-EH12K	Wind towers Pipe manufacturing	Multi-wire Multi-pass	Non-alloyed	-60	
Union S 3 Si - UV 419 TT-W EN ISO 14171-A: S 46 6 FB S3Si AWS A5.17: F7A8-EH12K / F7P8-EH12K	Pressure vessels	Multi-pass PWHT up to 12 hours.	Non-alloyed	-60	TÜV

Product name Classification EN ISO Classification AWS	Application				
	Segment / typical application	Process characteristics	Materials to be welded	ISO-V Min. Temp. (°C)	Approvals
Union S 3 Si - UV 421 TT EN ISO 14171-A: S 46 6 FB S3Si AWS A5.17: F7A8-EH12K / F7P8-EH12K	Offshore construction General purpose	Multi-pass S460QL1, CTOD	Non-alloyed	-60	ABS, DNV GL, LR, TÜV, CE
Union S 3 Si - UV 422 TT-LH EN ISO 14171-A: S 46 6 FB S3Si AWS A5.17: F7A8-EH12K / F7P8-EH12K	Offshore construction	High strength, S460	Non-alloyed	-50	
BÖHLER SUBARC T55 HP - UV 306 EN ISO 14171-A: S 50 4 AR T3 H5 AWS A5.17: F7A5-ECG	General purpose. Light constructions	High speed	Non-alloyed	-40	
BÖHLER SUBARC T55 HP - UV 400 EN ISO 14171-A: S 50 6 AB T3 H5 AWS A5.17: F7A8-ECG	General purpose Limited thickness	High productivity	Non-alloyed	-40	
BÖHLER SUBARC T55 HP - UV 421 TT EN ISO 14171-A: S 46 6 FB T3 H5 AWS A5.17: F7A8-EC1 / F7P8-EC1	Offshore fabrication and other heavy constructions	High productivity	S355- S420 (S460)	-60	LR, DNV GL, ABS, TÜV

Low-alloyed steel / HIGH STRENGTH / WEATHER RESISTANT

Product name Classification EN ISO Classification AWS	Application				
	Segment / typical application	Process characteristics	Materials to be welded	ISO-V Min. Temp. (°C)	Approvals
Union S 3 TiB - UV 309 P EN ISO 14171-A: S 5T 5 AB SZ AWS A5.23: F8TA6G-EG	Pipe manufacturing	Two run Multi-wire	X70	-60	TÜV, DB
Union S 3 TiB - UV 310 P EN ISO 14171-A: S 5T 5 AB SZ AWS A5.23: F8TA6G-EG	Pipe manufacturing	Two run Multi-wire	X70	-60	
Union S 3 MoTiB - UV 309 P EN ISO 14171-A: S 5T 5 AB S2MoTiB AWS A5.23: F9TA6G-EA2TiB	Pipe manufacturing	Two run Multi-wire	X65; X80	-60	TÜV, CE
Union S 3 MoTiB - UV 310 P EN ISO 14171-A: S 5T 5 AB S2MoTiB AWS A5.23: F9TA6G-EA2TiB	Pipe manufacturing	Two run Multi-wire	X65; X80	-60	
Union S 3 MoTiB - UV 417 TT EN ISO 14171-A: S 5T 5 AB S2MoTiB AWS A5.23: F9TA6G-EA2TiB	Pipe manufacturing	Two run Multi-wire	X65; X80	-60	
Union S 2 Ni 2,5 - UV 421 TT EN ISO 14171-A: S 46 8 FB S2Ni2 AWS A5.23: F8A10-ENi2-Ni2 / F7P10-ENi2-Ni2	Pressure vessels Offshore constructions	Multi-pass	P460NL1, 12Ni14	-80	ABS, BV, DNV GL, LR, TÜV, DB, CE
Union S 2 Ni 3,5 - UV 421 TT EN ISO 14171-A: S 42 8 FB S2Ni3 AWS A5.23: F7A15-ENi3-Ni3 / F7P15-ENi3-Ni3	Pressure vessels Offshore constructions	Multi-pass	3,5 % Ni steel, 10Ni14	-101°C	
Union S 2 NiCu 1 - UV 306 EN ISO 14171-A: S 42 2 FB S2Ni1Cu AWS A5.23: F7A0-EG-G	General purpose Light constructions	Fillet welds Single run or limited runs	Weather resistant	-10	
Union S 2 NiCu 1 - UV 400 EN ISO 14171-A: S 42 3 FB S2Ni1Cu AWS A5.23: F7A2-EG-G	General purpose Light constructions	Fillet welds Multi-pass	Weather resistant	-30	

Product name Classification EN ISO Classification AWS	Application				
	Segment / typical application	Process characteristics	Materials to be welded	ISO-V Min. Temp. (°C)	Approvals
Union S 2 NiCu 1 - UV 421 TT EN ISO 14171-A: S 42 4 FB S2Ni1Cu AWS A5.23: F7A4-EG-G	Bridges Railways	Multi-pass	Weather resistant	-40	
BÖHLER SUBARC TNiCu1-M - UV 421 TT EN ISO 14171-A: S 46 4 FB T2Ni1Cu AWS A5.23: F7A4-ECG-G	General purpose Light construc- tions	Fillet welds Multi-pass	Weather resistant	-40	
Union S 2 NiMo 1 - UV 421 TT EN ISO 14171-A: S 50 6 FB SZ2Ni1Mo AWS A5.23: F8A10-ENi1-Ni1 / F8P10-ENi1-Ni1	Offshore fabrication or other heavy constructions	Multi-pass	S460 - S500	-60	ABS, DNV GL, LR
Union S 2 NiMo 1 - UV 420 TTR-C EN ISO 14171-A: S 50 6 FB SZ2Ni1Mo AWS A5.23: F8A8-ENi1-Ni1 / F8P8-ENi1-Ni1	Oil & gas industry	Normalizing, quenching and tempering	Non-alloyed	-40	
BÖHLER SUBARC T60 - UV 421 TT EN ISO 14171-A: S 50 6 FB TZ3Ni1 H5 AWS A5.23: F8A8-ECNi1-Ni1	Oil & gas industry Pipelay	Multi-pass	S460-500	-40	
Union S 3 NiMo 1 - UV 421 TT EN ISO 26304-A: S 55 6 FB S3Ni1Mo AWS A5.23: F9A8-EF3-F3	Pressure vessels Offshore fabrication	Multi-pass	S500 - S550	-50	DNV GL, TÜV, CE
Union S 3 NiMo 1 - UV 419 TT-W EN ISO 26304-A: S 55 6 FB S3Ni1Mo AWS A5.23: F9A8-EF3-F3 / F9P8-EF3-F3	Pressure vessels Offshore fabrication	Multi-pass	S500 - S550	-50	
Union S 3 NiMo 1 - UV 420 TTR EN ISO 26304-A: S 55 4 FB S3Ni1Mo AWS A5.23: F9A8-EF3-F3-N / F9P8-EF3-F3-N	Pressure vessels	Multi-pass	S500 - S550	-50	TÜV, CE
Union S 3 NiMo 1 - UV 420 TTR-C EN ISO 26304-A: S 62 4 FB S3Ni1Mo AWS A5.23: F10A6-EF3-F3 / F9P6-EF3-F3	Oil & gas industry Valves	Multi-pass Cladding PWHT	AISI 8630, 4130	-40	

Low-alloyed steels / HIGH STRENGTH

Product name Classification EN ISO Classification AWS	Application				
	Segment / typical application	Process characteristics	Materials to be welded	ISO-V Min. Temp. (°C)	Approvals
Union S Ni1MoCr - UV 420 TTR-C EN ISO 26304-A: S 62 4 FB SZ3Ni0,9MoCr AWS A5.23: F10A6-EG-G / F9P6-EG-G	Oil & gas industry Valves	Multi-pass Cladding PWHT	AISI 8630, 4130	-40	
Union S 3 NiMo - UV 420 TTR EN ISO 14171-A: S 55 6 FB S3Ni1,5Mo AWS A5.23: F9A8-EG-F1 / F9P8-EG-F1	Pressure vessel (heads)	Multi-pass Normalizing	S355-S420	-40	TÜV, CE
Union S 3 NiMoCr - UV 421 TT EN ISO 26304-A: S 69 6 FB SZ3Ni2,5CrMo AWS A5.23: F11A8-EG-F6 / F11P4-EG-F6	Offshore cranes and other heavy lifting equipment	Multi-pass	S690QL1	-50	ABS, BV, DNV GL, LR, TÜV, DB, CE
Union S 3 NiMoCr - UV 422 TT-LH EN ISO 26304-A: S 69 6 FB SZ3Ni2,5CrMo H5 AWS A5.23: F12A10-EF5-F5-H4	Offshore cranes and other heavy lifting equipment	Multi-pass	S690QL1/ S770QL1	-60	
BÖHLER SUBARC T85 - UV 421 TT EN ISO 26304-A: S 69 6 FB TZ H5 AWS A5.23: F11A10-ECF5-F5 / F11P6-ECF5-F5	Offshore cranes and other heavy lifting equipment	Multi-pass	S690QL1/ S770QL1	-60	
BÖHLER SUBARC T85 - UV 422 TT-LH EN ISO 26304-A: S 79 5 FB TZ H5 AWS A5.23: F12A6-ECF5-F5	Offshore cranes and other heavy lifting equipment	Multi-pass	S770QL1	-50	

Low-alloyed steel / CREEP RESISTANT

Union S 2 Mo - UV 305 EN ISO 14171-A: S 46 0 AR S2Mo AWS A5.23: F8A0-EA2-A2	Power generation Membrane walls	High speed fillet welds	Non-alloyed, 0.5 Mo	no requirements	TÜV, CE
Union MV Mo S - UV 305 EN ISO 24598-A: S T Mo AR AWS A5.23: F8A0-ECA2-A2 / F8P0-ECA2-A2	Power generation Membrane walls	High speed fillet welds	Non-alloyed, 0.5 Mo	no requirements	TÜV

Product name Classification EN ISO Classification AWS	Application				
	Segment / typical application	Process characteristics	Materials to be welded	ISO-V Min. Temp. (°C)	Approvals
Union S 2 Mo - UV 306 EN ISO 14171-A: S 46 2 AR S2Mo AWS A5.23: F8A2-EA2-A2	General purpose Light constructions	Two run	Non-alloyed, 0.5 Mo	-20	TÜV, CE
Union S 2 Mo - UV 309 P EN ISO 14171-A: S 4T 4 AB S2Mo AWS A5.23: F8TA4G-EA2	Pipe manufacturing	Two run Multi-wire	X65	-40	
Union S 2 Mo - UV 310 P EN ISO 14171-A: S 4T 4 AB S2Mo AWS A5.23: F8TA4G-EA2	Pipe manufacturing	Two run Multi-wire	X65	-40	
Union S 2 Mo - UV 400 EN ISO 14171-A: S 46 4 AB S2Mo AWS A5.23: F8A4-EA2-A2	General purpose	Two run	Non-alloyed	-40	ABS, BV, DNV GL, LR, TÜV, DB, CE
Union S 2 Mo - UV 421 TT EN ISO 14171-A: S 46 4 FB S2Mo AWS A5.23: F8A6-EA2-A2 / F8P6-EA2-A2	General purpose	Two run Multi-pass	Non-alloyed S460; 0.5 Mo	-40	LR, TÜV, DB, CE
Union S 3 Mo - UV 420 TTR EN ISO 14171-A: S 46 4 FB S3Mo AWS A5.23: F8A4-EA4-A4 / F8P6-EA4-A4	Pressure vessels	two run Multi-pass PWHT	Non-alloyed S460; 0.5 Mo	PWHT; -40	TÜV, CE
Union S 4 Mo - UV 310 P EN ISO 14171-A: S 4T 4 AB S4Mo AWS A5.23: F8TA4G-EA3	Pipe manufacturing	Two run Multi-wire	X65	-40	
Union S 4 Mo - UV 420 TTR EN ISO 14171-A: S 50 4 FB S4Mo AWS A5.23: F9A4-EA3-A3 / F8P6-EA3-A3	Pressure vessels	Multi-pass	Non-alloyed S460; 0.5 Mo	-40	
Union S 4 Mo - UV 421 TT EN ISO 14171-A: S 50 4 FB S4Mo AWS A5.23: F9A6-EA3-A3 / F8P6-EA3-A3	Pressure vessels	Multi-pass	Non-alloyed S460; 0.5 Mo	-40	

Low-alloyed steel / CREEP RESISTANT

Product name Classification EN ISO Classification AWS	Application				
	Segment / typical application	Process characteristics	Materials to be welded	ISO-V Min. Temp. (°C)	Approvals
Union S 2 CrMo - UV 305 EN ISO 24598-A: S S CrMo1 AR AWS A5.23: F10AZ-EB2R-B2 / F9PZ-EB2R-B2	Power generation Membrane walls	High speed fillet welds	13CrMo45, P11/ P12	no requirements	
Union MV CrMo S - UV 305 EN ISO 24598-A: S T CrMo1 AR AWS A5.23: F10AZ-ECB2-B2 / F9PZ-ECB2-B2	Power generation Membrane walls	High speed fillet welds	13CrMo45, P11/ P12	no requirements	TÜV
Union S 2 CrMo - UV 419 TT-W EN ISO 24598-A: S S CrMo1 FB AWS A5.23: F8P2-EB2R-B2	Pressure vessels	Multi-pass, DC+; PWHT max. 16 hours, 690°C	13CrMo45, P11/ P12	-40	TÜV
Union S 2 CrMo - UV 420 TTR EN ISO 24598-A: S S CrMo1 FB AWS A5.23: F8P4-EB2R-B2R	Pressure vessels High purity	Multi-pass, DC+; PWHT max. 20 hours, 690°C	13CrMo45, P11/ P12	-50	TÜV, CE
Union S 2 CrMo - UV 420 TTR-C EN ISO 24598-A: S S CrMo1 FB AWS A5.23: F8P2-EB2R-B2R	Pressure vessels	Multi-pass, DC+; PWHT 14-26 hours, 690°C, Q+A / N+A	13CrMo45, P11/ P12	-40	
Union S 2 CrMo - UV 420 TTR-W EN ISO 24598-A: S S CrMo1 FB AWS A5.23: F8P4-EB2R-B2R	Pressure vessels High purity	Multi-pass, AC; PWHT max. 24 hours, 690°C	13CrMo45, P11/ P12	-50	
Union S 1 CrMo 2 - UV 305 EN ISO 24598-A: S S CrMo2 FB AWS A5.23: F11AZ-EB3R-B3	Power generation Membrane walls	High speed fillet welds	10CrMo910, P22	no requirements	
Union MV CrMo 9 10 S - UV 305 EN ISO 24598-A: S T CrMo2 AR AWS A5.23: F11AZ-ECB3-B3 / F8PZ-ECB3-B3	Power generation Membrane walls	High speed fillet welds	10CrMo910, P22	no requirements	
Union S 1 CrMo 2 - UV 420 TTR EN ISO 24598-A: S S CrMo2 FB AWS A5.23: F9P2-EB3R-B3R	Pressure vessels Step cooling	Multi-pass, DC+; PWHT max. 6-20 hours, 690°C	10CrMo910, 12CrMo910, P22	-40	TÜV, CE

Product name Classification EN ISO Classification AWS	Application				
	Segment / typical application	Process characteristics	Materials to be welded	ISO-V Min. Temp. (°C)	Approvals
Union S 1 CrMo 2 - UV 420 TTR-C EN ISO 24598-A: S S CrMo2 FB AWS A5.23: F9P2-EB3R-B3R	Pressure vessels	Multi-pass, DC+; PWHT > 14 hrs, 690 °C, N+A, Q+A	10CrMo910, 12CrMo910, P22	-40	
Union S 1 CrMo 2 - UV 420 TTR-W EN ISO 24598-A: S S CrMo2 FB AWS A5.23: F9P2-EB3R-B3R	Pressure vessels Hydro crackers Step cooling	Multi-pass, AC; PWHT 8-32 hours @ 690 °C	10CrMo910, 12CrMo910, P22	-40	TÜV, CE
Union S P 24 - UV 305 EN ISO 24598-A: S S ZCrMo2VNb AR AWS A5.23: F11AZ-EB24-B24	Power generation Membrane walls	High speed fillet welds	P24; 7CrMoVTiB10 -10	no requirements	
Union S 1 CrMo 2 V - UV 430 TTR-W EN ISO 24598-A: S S ZCrMoV2 FB AWS A5.23: F9PZ-EG-G	Pressure vessels Hydro crackers	Multi-pass, AC	2,25Cr - 1Mo - 0.25V	-30	TÜV, CE
Union S 1 CrMo 5 - UV 420 TTR EN ISO 24598-A: S S CrMo5 FB AWS A5.23: F7PZ-EB6-B6	Power generation	Multi-pass, DC+; PWHT	X12CrMo5	+20	
BÖHLER CM 9-UP - Marathon 543 EN ISO 24598-A: S S CrMo9 FB AWS A5.23: F8PZ-EB8-B8	Power generation	Multi-pass, DC+; PWHT	X11CrMo9	+20	
Thermanit MTS 3 - Marathon 543 EN ISO 24598-A: S S CrMo91 FB AWS A5.23: F9PZ-EB91-B91	Power generation	Multi-pass, DC+; PWHT	P91; X10CrMoVNb9-1	+20	TÜV, CE
Thermanit MTS 3 - UV 305 EN ISO 24598-A: S S CrMo91 AR AWS A5.23: F9PZ-EB91-B91	Power generation Membrane walls	High speed fillet welds	P91; X10CrMoVNb9-1	no requirements	
Thermanit MTS 3-LNi - Marathon 543 EN ISO 24598-A: S S ZCrMo91 FB AWS A5.23: F9PZ-EB91-B91	Power generation	Multi-pass, DC+; PWHT; Mn+Ni < 1,0 %	P91; X10CrMoVNb9-1	+20	

Low-alloyed steel / CREEP RESISTANT

Product name Classification EN ISO Classification AWS	Application				
	Segment / typical application	Process characteristics	Materials to be welded	ISO-V Min. Temp. (°C)	Approvals
Thermanit MTS 616 - Marathon 543 EN ISO 24598-A: S S ZCrMoWVNb9 0.5 1.5 FB AWS A5.23: F9PZ-EG [EB91(mod.)]	Power generation	Multi-pass, DC+; PWHT	P92	+20	TÜV, CE
Thermanit MTS 616 - UV 305 EN ISO 24598-A: S S ZCrMoWVNb9 0.5 1.5 AR AWS A5.23: F9PZ-EG [EB91(mod.)]	Power generation Membrane walls	High speed fillet welds	P92	no requirements	
Thermanit MTS 911 - Marathon 543 EN ISO 24598-A: S S ZCrMoWVNb 9 1 1 FB AWS A5.23: F9PZ-EG [EB91(mod.)]	Power generation	Multi-pass, DC+; PWHT	E911, X11CrMoWV Nb9-1-1	+20	TÜV, CE
Thermanit MTS 4 - Marathon 543 EN ISO 24598-A: S S CrMoWV12 FB AWS A5.23: F9PZ-EG-G	Power generation	Multi-pass, DC+; PWHT	X20CrMoWV12-1	+20	TÜV, CE

Martensitic stainless steel

Product name Classification EN ISO Classification AWS	Application				
	Segment / typical application	Process characteristics	Materials to be welded	ISO-V Min. Temp. (°C)	Approvals
Thermanit 13/04 - Marathon 104 EN ISO 14343-A: S 13 4 AWS A5.9: ER410NiMo(mod.)	Hydro turbines Steam power	Joining Cladding	Steels with 13% Cr such as X3CrNiMo13-4	+20	
BÖHLER CN 13/4-UP - BB 203 EN ISO 14343-A: S 13 4 AWS A5.9: ER410NiMo(mod.)	Hydro turbines Steam power	Nice, straight beads Crack resistant	Steels with 13% Cr such as X3CrNiMo13-4	+20	

Ferritic stainless steel

BÖHLER SKWAM-UP - BB 203 EN ISO 14343-A: S Z 17 Mo H AWS A5.9: ER430(mod.)	Gas, water and steam fittings	Nice, straight beads Crack resistant	Cladding. Hardness 320 - 420HB (PWHT, 200HB)	+20	
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Austenitic stainless steel

Product name Classification EN ISO Classification AWS	Application				
	Segment / typical application	Process characteristics	Materials to be welded	ISO-V Min. Temp. (°C)	Approvals
Thermanit JE-308L - Marathon 213 EN ISO 14343-A: S 19 9 L AWS A5.9: ER308L	Reactors, tanks and other chemical equipment	Fused flux Very good slag removal	AISI 304L; 1.4301	-100 (-196)	TÜV, CE
Thermanit JE-308L - Marathon 431 EN ISO 14343-A: S 19 9 L AWS A5.9: ER308L	Reactors, tanks and other chemical equipment	Thin-fluid Nice bead appearance	AISI 304L; 1.4301	-100 (-196)	TÜV, CE
Thermanit JE-308L - Avesta Flux 805 EN ISO 14343-A: S 19 9 L AWS A5.9: ER308L	Reactors, tanks and other chemical equipment	Cr support	AISI 304L; 1.4301	-100 (-196)	
BÖHLER EAS 2-UP (LF) - BB 203 EN ISO 14343-A: S 19 9 L AWS A5.9: ER308L	Cryogenic	Nice, straight beads Crack resistant	AISI 304L; 1.4301	-196	
Thermanit GE-316L - Marathon 213 EN ISO 14343-A: S 19 12 3 L AWS A5.9: ER316L	Reactors, tanks and other chemical equipment	Fused flux Very good slag release	AISI 316L; 1.4401	-120	DNV GL, LR, TÜV, CE
Thermanit GE-316L - Avesta Flux 805 EN ISO 14343-A: S 19 12 3 L AWS A5.9: ER316L	Reactors, tanks and other chemical equipment	Cr support	AISI 316L; 1.4401	-120 (-196)	
Thermanit GE-316L - Marathon 431 EN ISO 14343-A: S 19 12 3 L AWS A5.9: ER316L	Reactors, tanks and other chemical equipment	Thin-fluid Good bead appearance	AISI 316L; 1.4401	-120 (-196)	TÜV, CE
Avesta 317L/SNR - Avesta Flux 805 EN ISO 14343-A: S 19 13 4 L AWS A5.9: ER317L	Reactors, tanks and other chemical equipment	Cr support	AISI 317L; 1.4436	-100 (-196)	
BÖHLER ASN 5-UP - BB 203 EN ISO 14343-A: S Z18 16 5 NL AWS A5.9: ER317L(mod.)	Reactors, tanks and other chemical equipment	Nice, straight welds Crack resistant	AISI 317L, 317LN; PREN > 33	-196	
Thermanit H-347 - Marathon 213 EN ISO 14343-A: S Z18 16 5 NL AWS A5.9: ER317L(mod.)	Reactors, tanks and other chemical equipment	Fused flux Very good slag release	AISI 347, 321	-50	TÜV, CE

Austenitic stainless steel

Product name Classification EN ISO Classification AWS	Application				
	Segment / typical application	Process characteristics	Materials to be welded	ISO-V Min. Temp. (°C)	Approvals
Thermanit H-347 - Marathon 431 EN ISO 14343-A: S Z18 16 5 NL AWS A5.9: ER317L(mod.)	Reactors, tanks and other chemical equipment	Thin-fluid Good bead appearance	AISI 347, 321	-50	TÜV, CE
Thermanit H-347 - Avesta Flux 805 EN ISO 14343-A: S Z18 16 5 NL AWS A5.9: ER317L(mod.)	Reactors, tanks and other chemical equipment	Cr support	AISI 347, 321	-50	
Thermanit A - Marathon 213 EN ISO 14343-A: S 19 12 3 Nb AWS A5.9: ER318	Reactors, tanks and other chemical equipment	Fused flux Very good slag release	AISI 316Ti	-50	TÜV, CE
Thermanit A - Marathon 431 EN ISO 14343-A: S 19 12 3 Nb AWS A5.9: ER318	Reactors, tanks and other chemical equipment	Thin-fluid Good bead appearance	AISI 316Ti	-50	TÜV, CE
Thermanit A - Avesta Flux 805 EN ISO 14343-A: S 19 12 3 Nb AWS A5.9: ER318	Reactors, tanks and other chemical equipment	Cr support	AISI 316Ti	-50	
Thermanit 17/15 TT - Marathon 104 EN ISO 14343-A: SZ 17 15 Mn W AWS A5.9: EG	Cryogenic	Single and multi-pass welds Fillet welds	X8Ni9, X2CrNiN18-10	-196	
Thermanit 20/16 SM - Marathon 104 EN ISO 14343-A: SZ 22 17 8 4 N L AWS A5.9: EG	Anti magnetic Sea water resistant	Single and multi-pass welds Fillet welds	P501, 1.3964; X2CrNiMnMoNb21 -16-5-3	-100	
Thermanit 20/25 CU - Marathon 104 EN ISO 14343-A: S 20 25 5 Cu L AWS A5.9: ER385	Reactors, tanks and other chemical equipment	Single and multi-pass welds Fillet welds	AISI 904L, 1.4539; PREN > 45	-100	TÜV, CE
Thermanit 25/22 H - Marathon 104 EN ISO 14343-A: S 25 22 2 N L AWS A5.9: ER310(mod.)	Chemical industry Corrosion resistant Urea	Single and multi-pass welds Fillet welds	1.4465	-100	
BÖHLER AM 500-UP - Marathon 104 EN ISO 14343-A: S Z 25 23 3 Mn N L AWS A5.9: EG	Anti magnetic Sea water resistant	Single and multi-pass welds Fillet welds	1.3974; X2CrNiMnMoNb23 -17-6-3	-100	CE, PRS

Duplex stainless steel

Product name Classification EN ISO Classification AWS	Application				
	Segment / typical application	Process characteristics	Materials to be welded	ISO-V Min. Temp. (°C)	Approvals
Avesta LDX 2101 - Avesta Flux 805 EN ISO 14343-A: S 23 7 N L AWS A5.9: ER2307	Chemical tankers Chemical equipment	Cr support	Lean duplex SS such as 1.4162, Outokumpu LDX 2101	-40	
Avesta 2304 - Avesta Flux 805 EN ISO 14343-A: S 23 7 N L AWS A5.9: ER2307	Chemical tankers Chemical equipment	Cr support	Lean duplex SS such as 1.4362, similar grades	-40	
Avesta 2205 - Avesta Flux 805 EN ISO 14343-A: S 22 9 3 N L AWS A5.9: ER2209	Chemical tankers Chemical equipment	Cr support	Duplex SS such as 1.4462; PREN > 35	-40	DNV GL, LR
Thermanit 22/09 - Marathon 431 EN ISO 14343-A: S 22 9 3 N L AWS A5.9: ER2209	Chemical tankers Chemical equipment	Thin-fluid Good bead appearance	Duplex SS such as 1.4462; PREN > 35	-40	
Avesta 2507/P100 CUW - Avesta Flux 805 EN ISO 14343-A: S 25 9 4 N L AWS A5.9: ER2594	Reactors, tanks and other chemical equipment	Cr support	Super duplex SS; PREN > 40	-40	
Thermanit 25/09 CUT - Marathon 431 EN ISO 14343-A: S 25 9 4 N L AWS A5.9: ER2594	Reactors, tanks and other chemical equipment	Thin-fluid Good bead appearance	Super duplex SS; PREN > 40	-40	ABS, BV, DNV GL,

Special steel

Product name Classification EN ISO Classification AWS	Application				
	Segment / typical application	Process characteristics	Materials to be welded	ISO-V Min. Temp. (°C)	Approvals
BÖHLER A 7 CN-UP - BB 203 EN ISO 14343-A: S 18 8 Mn AWS A5.9: ER307(mod.)	Reactors, tanks and other chemical equipment	Nice, straight beads Crack resistant	Dissimilar (SS - CS), Buffer layers	no requirements	
Thermanit 25/14 E-309L - Marathon 213 EN ISO 14343-A: S 23 12 L AWS A5.9: ER309L	Reactors, tanks and other chemical equipment	Fused flux Very good slag release	Dissimilar (SS - CS)	no requirements	TÜV, CE
Thermanit 25/14 E-309L - Marathon 431 EN ISO 14343-A: S 23 12 L AWS A5.9: ER309L	Reactors, tanks and other chemical equipment	Thin-fluid Nice bead appearance	Dissimilar (SS - CS)	no requirements	
Thermanit 25/14 E-309L - Avesta Flux 805 EN ISO 14343-A: S 23 12 L AWS A5.9: ER309L	Reactors, tanks and other chemical equipment	Cr support (dilution)	Dissimilar (SS - CS)	no requirements	
Thermanit 25/14 E-309L - BB 203 EN ISO 14343-A: S 23 12 L AWS A5.9: ER309L	Reactors, tanks and other chemical equipment	Nice, straight beads Crack resistant	Dissimilar (SS - CS)	no requirements	
Avesta P5 - Avesta Flux 805 EN ISO 14343-A: S 23 12 2 L AWS A5.9: ER309LMo (mod.)	Reactors, tanks and other chemical equipment	Cladding 316L	Dissimilar (SS - CS), Cladding 316L	no requirements	DNV GL
Avesta P7 - Avesta Flux 805 EN ISO 14343-A: S 29 9 AWS A5.9: ER312	Reactors, tanks and other chemical equipment	For high dilution with carbon steel	Dissimilar (SS - CS), Puffer	no requirements	

Heat resistant steel

Product name Classification EN ISO Classification AWS	Application				
	Segment / typical application	Process characteristics	Materials to be welded	ISO-V Min. Temp. (°C)	Approvals
Thermanit ATS 4 - Marathon 104 EN ISO 14343-A: S 19 9 H AWS A5.9: ER19-10H	Creep resistant pressure vessels High temperature	Neutral, high-basic flux	304H, 321H, 347H	no requirements	TÜV, CE
Avesta 253 MA - Avesta Flux 805 EN ISO 14343-A: SZ AWS A5.9: EG	Furnaces, combustion chambers, burners	Cr support (dilution)	Outokumpu 253 MA	no requirements	
Thermanit D - Marathon 104 EN ISO 14343-A: S 22 12 H AWS A5.9: ER309(mod.)	Furnaces Heat treatment equipment	Neutral, high-basic flux	1.4828	no requirements	

Nickel-base alloys

Product name Classification EN ISO Classification AWS	Application				
	Segment / typical application	Process characteristics	Materials to be welded	ISO-V Min. Temp. (°C)	Approvals
Thermanit 625 - Marathon 104 EN ISO 18274: Ni 6625 (NiCr22Mo9Nb) AWS A5.14: ERNiCrMo-3	Chemical industry	Multi-pass Nice bead appearance	Nickel-base, Alloy 625	-196	
Thermanit 625 - Marathon 444 EN ISO 18274: Ni 6625 (NiCr22Mo9Nb) AWS A5.14: ERNiCrMo-3	Chemical industry	Multi-pass	Nickel-base, Alloy 625	-196	
Thermanit 625 - Marathon 504 EN ISO 18274: S Ni 6625 (NiCr22Mo9Nb) AWS A5.14: ERNiCrMo-3	Chemical weld overlay	Single run and multipass, nice bead appearance	Nickel-base, Alloy 626	-196	
Thermanit Nicro 82 - Marathon 104 EN ISO 18274: Ni 6082 (NiCr20Mn3Nb) AWS A5.14: ERNiCr-3	Chemical industry	Multi-pass Nice bead appearance	Nickel-base, Alloy 600	-196	
Thermanit Nicro 82 - Marathon 444 EN ISO 18274: Ni 6082 (NiCr20Mn3Nb) AWS A5.14: ERNiCr-3	Chemical industry	Multi-pass	Nickel-base, Alloy 600	-196	TÜV
Thermanit Nimo C 276 - Marathon 104 EN ISO 18274: Ni 6276 (NiCr15Mo16Fe6W4) AWS A5.14: ERNiCrMo-4	Chemical industry LNG tanks	PA,PB,PC AC and DC+ Nice bead appearance	Nickel-base, Alloy 600, 9 %Ni	-196	DNV GL, LR, CE

Böhler Welding SAW Fluxes

Non and low-alloyed steel

Product name Classification EN ISO	Bas.- Index	Characteristics / application	Polarity
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Acid-rutile fluxes

UV 305 EN ISO 14174: SA AR 1 76 AC H5	0.6	Fillet welds. Single pass and two run. High welding speed. Membrane walls. Gas bottles. t < 12 mm with non-alloyed and creep resistant wires.	DC+ (AC)
UV 306 EN ISO 14174: SA AR 1 77 AC H5	0.6	General purpose. High welding speed. Non-alloyed steel. t < 25 mm	DC+ (AC)

Aluminate-basic fluxes

UV 309 P EN ISO 14174: SA AB 1 65 AC H5	1.3	Pipe mill flux. Very low hydrogen content and low moisture pick-up. High current carrying capacity. For X42 - X80; Typical wires: Union S2, S2Si, S2Mo, S3NiMo1, S3TiB, S3MoTiB.	DC+ and AC
UV 310 P EN ISO 14174: SA AB 1 55 AC H5	1.5	Pipe mill flux. Very low hydrogen content and low moisture pick-up. "Copper-tested"; For X42 - X80. Typical wires	DC+ and AC
UV 400 EN ISO 14174: SA AB 1 67 AC H5	2	General purpose. For fine-grained steel grades. Typical wires: Union S2, S2Si, S2Mo	DC+ (AC)

Fluorid-basic fluxes

UV 417 TT EN ISO 14174: SA FB 1 55 AC H5	2.7	Highly productive. Multi-wire applications with high toughness (offshore constructions, wind towers, pipe mills). Multi-pass with Union S3Si, S2NiMo1	DC+ (AC)
UV 418 TT EN ISO 14174: SA FB 1 55 AC H5	2.7	Multi-purpose applications with high toughness requirements	DC+ (AC)
UV 421 TT EN ISO 14174: SA FB 1 55 AC H5	2.7	Widest range of wires for applications with the highest toughness requirements. Solid and cored submerged arc wires.	DC+ (AC)
UV 419 TT-W EN ISO 14174: SA FB 1 55 AC	2.6	Multi-purpose applications. Especially for high strength and high toughness requirements (as welded and PWHT).	DC+ (AC)
UV 422 TT-LH EN ISO 14174: SA FB 1 65 DC H4	2.5	For high strength applications. Very low diffusible hydrogen content and good low-temperature impact toughness. Offshore and heavy-lifting constructions, penstocks.	DC+
UV 420 TT-LH (BÖHLER BB 24) EN ISO 14174: SA FB 1 65 DC H5	2.5	Standard basic flux with diffusible hydrogen content < 5 ml/100gr. As welded and stress relieved.	DC+

Product name Classification EN ISO	Bas.- Index	Characteristics / application	Polarity
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Fluorid-basic fluxes

UV 420 TT EN ISO 14174: SA FB 1 65 DC	2.5	Standard basic flux for as welded conditions and PWHT.	DC+
UV 420 TTR EN ISO 14174: SA FB 1 65 DC	2.9	High purity flux for nuclear reactors and creep resistant CrMo applications with Union S2CrMo and S1CrMo2.	DC+
UV 420 TTR-W EN ISO 14174: SA FB 1 65 AC	2.6	High purity flux for nuclear reactors and creep resistant CrMo applications with Union S1CrMo2 and S2CrMo1. Optimized for higher strength and toughness requirements using AC current.	AC (DC+)
UV 420 TTR-C EN ISO 14174: SA FB 1 65 DC	2.6	Flux with high purity. Optimized to maintain (high) strength after PWHT with very long duration. Also for normalizing, quenching and tempering. Reduced carbon loss. Combined with Union S2NiMo1, S3NiMo1, SNi1MoCr, S2CrMo, S1 CrMo2	DC+
UV 430 TTR-W EN ISO 14174: SA FB 1 55 AC	2.8	Pressure vessels in CrMo2V creep resistant steel. Petrochemical industry.	AC (DC+)
Marathon 543 EN ISO 14174: SA FB 1 55 DC H5	3.1	CrMo alloyed creep resistant wire grades especially for P91 and P91. (5%-12% Cr). Power generation	DC+

Stainless steel and nickel-base alloys

Product name Classification EN ISO	Bas.- Index	Characteristics / application	Polarity
Marathon 213 EN ISO 14174: SF CS 2	1.3	Fused flux. For easy slag removal and nice bead appearance. For standard stabilized and non-stabilized stainless wire grades.	DC+
Avesta Flux 805 EN ISO 14174: SA AF 2	2	For a nice welding performance combined with good mechanical properties. Thin-fluid slag for very nice fillet welds. For stabilized and non-stabilized standard stainless wire grades (especially duplex grades). With Cr compensation.	DC+
Marathon 431 (BÖHLER BB 202) (Avesta Flux 807) EN ISO 14174: SA FB 2	2.2	For a nice welding performance combined with good mechanical properties. Thin-fluid slag for very nice fillet welds. For stabilized and non-stabilized standard stainless wire grades (especially duplex grades). Without Cr compensation.	DC+
BÖHLER BB 203 EN ISO 14174: SA FB 2	2.4	Basic flux for good mechanical properties and nice, straight beads. For non-stabilized austenitic and soft martensitic stainless wire grades. Without Cr compensation.	DC+
Marathon 444 EN ISO 14174: SA FB 2	2.8	For nickel-base wire grades. Good mechanical properties and high resistance to hot cracking.	DC+
Marathon 504 EN ISO 14174: SA BA 2	1.0	Neutral flux for nickel-base wire grades, with good mechanical properties and high resistance to hot cracking. Very good slag detachability and nice bead appearance. Especially in weld overlay.	DC+ & AC
Marathon 104 EN ISO 14174: SA FB 2	2.9	Neutral flux for stainless steel and nickel-base wire grades. Good mechanical properties and high resistance to hot cracking. Good slag detachability and nice bead appearance. Especially recommended for LNG applications with Thermanit NiMo C276 and 625.	DC+ & AC

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