OERLIKON

Shipbuilding

www.oerlikon-welding.com

AIR LIQUIDE
WELDING

OERLIKON solutions for the Shipbuilding Industry

Introduction

Air Liquide SA, with its headquarters in Paris, France, is one of Europe's larger multinational companies with a consolidated turnover of €11.9 billion in 2009.

Air Liquide Welding, with a sales turnover of ~ €440million, is represented throughout the world by individual ALW companies with a brand portfolio optimised locally to the needs of all types of customers. OERLIKON brand is an important part of this portfolio and has a long and distinguished history of innovation in welding products. These ALW companies are involved in many different areas of OERLIKON product design, development and application. The research and development centre, AL CTAS, is located in Paris and is the largest privately owned centre for welding R&D. This facilitates the rapid transfer and implementation of important innovations and advances in welding technology throughout the whole of the OERLIKON global network. The utilisation of the strengths and experience of this network enables OERLIKON to maintain its position and international reputation for innovative leadership at the forefront of advanced welding technology in both welding consumables and increasingly equipment and processes.

With this background, OERLIKON has generated a proven history of supplying welding consumables on an ongoing basis for the most demanding and critical applications, particularly in the energy sector to industries such as offshore oil and gas and nuclear power generation. OERLIKON has continued to work closely with owners, construction contractors and fabricators to supply customised solutions through performance and innovation by developing and supplying welding consumables and processes capable of meeting the stringent mechanical property specifications and increasingly the demands for enhanced welding productivity.

The results of this process of ongoing innovation and product development are demonstrated by the range of OERLIKON welding consumables, specifically tailored for the high productivity requirements of the shipbuilding industry. OERLIKON welding consumables are now accompanied by extensive ranges of high quality arc welding and cutting equipment, manual through to fully automated installations, flame and workplace products.

OERLIKON and the shipbuilding industry

The value of international expertise:

Quality

OERLIKON has a total commitment to quality. The product ranges are manufactured in group production facilities, all of which are ISO certified. Detailed certification for welding consumables is supplied as a matter of routine and customers' special quality requirements for increased frequency of batch testing or specialised certification are also readily accommodated.

Large single batches of welding consumables, with specialised testing, are regularly supplied to customers in the shipbuilding industry.

Technical Service

OERLIKON's involvement with its products does not stop at manufacture. OERLIKON provides a close and detailed participation with the application of products, right from the initial selection to welding characteristics on site.

A team of highly qualified engineers is ready to respond, with the objective of providing technologically relevant and practical solutions. For technically demanding applications, please consult OERLIKON Technical service.

A large information base is at the service of every customer to ensure the most cost effective selection of process and welding procedure to meet the needs of any application.

Flexibility

The OERLIKON product range is continuously developing in response to changing technological requirements. As new steel types are developed and used, as new more demanding applications are developed, so OERLIKON reacts to provide the right products, regularly meeting with engineering departments and major manufacturers at the design stage to ensure optimum welding solutions.

Information

All OERLIKON products are backed by a full technical information package, which is available in printed or electronic format, on the OERLIKON web sites. Product information is written to enable the professional welding engineer to select the correct OERLIKON product for the application.

In order to elaborate the technology of the product range in more detail, technical articles are available in the journal of OERLIKON's welding and cutting expertise, "Competence".

Track Record

OERLIKON is a technological innovator and major supplier of welding products to the shipbuilding industry. A track record of highly successful products combining quality and technology with technical service has been firmly established.

For details of the complete product range, consult www.oerlikon-welding.com

Shipbuilding Manufacturing Process

Order → Design → Purchasing & procurement → Preparation of Material & Fabrication → Assembly of 2D Blocks, then 3D blocks

OERLIKON Welding Consumables

Grand Block Assembly | Outfitting | Erection | Test & Trials | **DELIVERY**

1 Stock yard and plate receipt

2 Plate and profile cutting & welding

› Panel production

› Panel line

› Plate joining - butt welding:

- Submerged arc
  OP 180S, OP 139, OP 192/OE-S2 & OE-S2Mo
- SAW One Sided Welding
- OERLIKON FMI process
  OP 122/A105, FC 35.25-2D, 3D, 4D
- Multi wire welding
  OP 122/OE-S2Mo
  OP 192/OE-SD3 1Ni ¼Mo
  OP 121TT/FLUXOCORD 31HD
- Backing flux
  OP 10U

3 Stiffeners

› Downhand and standing fillet welding

› Hole and shape cutting:

- Submerged arc
  OP 191, OP181/ OE-S2, tandem, twin, tandem/twin
- MAG flux cored wire
  FLUXOFIL19HD

4 Stiffener assembly

› Downhand, standing and positional fillet welding

› Hole and shape cutting:

- MIG/MAG flux cored wires
  FLUXOFIL 19HD, 14HD, 20HD, 21HD
  FLUXOFIL 31 (root pass on KERALINE ceramic backing)
  CITOFLUX R00C, CITOFLUX R00
- Submerged arc
  OP 191, OP 181/OE-S2

5 Unit/module construction multi positional fillet and joint welding

› MIG/MAG flux cored wires:
FLUXOFIL 19HD, 14HD, 20HD, 21HD
FLUXOFIL 31 (root pass on KERALINE ceramic backing)
CITOFLUX R00C, CITOFLUX R00

› Submerged arc:
OP 180S, OP 139, OP 192 / OE-S2 & OE-S2Mo
OP 191, OP 181/OE-S2

› MMA:
SPEZIAL, SUPERCITO 7018S, TENAX 35S

6 Dry dock

› Unit assembly:

- MIG/MAG flux cored wires
  FLUXOFIL 19HD, 14HD, 20HD, 21HD
  CITOFLUX R00C & CITOFLUX R00
  KERALINE ceramic backing
- Submerged arc
  OP 180S, OP 139, OP 192 / OE-S2 & OE-S2Mo
  OP191, OP 181/OE-S2
- MMA
  SPEZIAL, SUPERCITO 7018S, TENAX 35S

7 Pipe shop

› Boilers, tanks, pipe work, connectors, tube to flange:

- MIG/MAG metal cored wires
  FLUXOFIL M8, M10 & CITOFLUX M00
- MIG/MAG solid wires
  CARBOFIL 1 & CARBOFIL 1A

8 Outfitting

› Stainless applications

- Flux cored wires
  FLUXINOX
- MIG
  INERTFIL, INERTROD
- MMA
  SUPRANOX, BASINOX

9 See OERLIKON Market Solution “Offshore Oil & Gas”

Guide to OERLIKON consumable designations for shipbuilding applications

A selection of key OERLIKON welding consumables for Shipbuilding Applications.

For further details of the complete range consult www.oerlikon-welding.com website.

Range	Key Features	Main Applications
Cored Wires		
FLUXOFIL	Flux and metal cored wires, mixed shielding gases & CO_2. Seamless, coppered, very low hydrogen characteristic. Precision layer wound on baskets.	Wide range of C-Mn, structural and low alloy steels. Excellent for hardenable steels. Semi and fully automatic applications.
FLUXINOX	Stainless steel. Flux cored wires, mixed shielding gases, ferrite controlled.	Joining 300 series, buffer layers and cladding.
FLUXINOX PF	Stainless steel. Flux cored wires for positional applications.	300 series, pipe work and assembly.
CITOFLUX	Flux and metal cored wires, mixed shielding gases & CO_2. Rutile and basic types, high deposition rates.	Wide range of C-Mn, structural and low alloy steels, range includes wires for fast fillet welding and joint filling.
CRISTAL	Rutile flux and metal cored wires with reduced welding fume.	Improved welder environment, confined working spaces.
MIG/MAG		
CARBOFIL	C-Mn & low alloy ferritic steel wires, copper coated, all formats.	Wide range of C-Mn, structural and low alloy steels.
INERTFIL	Solid stainless steel 300 series alloy wires, bright finished.	Stainless and heat resistant steels, e.g 300 series.
ALUFIL	Solid aluminium alloy wires, bright finished.	Aluminium alloys, e.g. 5000 series.
TIG		
CARBOROD	C-Mn & low alloy ferritic steel rods, copper coated.	Wide range of C-Mn, structural and low alloy steels.
INERTROD	Solid coin stamped with alloy grade stainless steel 300 series alloy rods, bright finished.	Stainless and heat resistant steels, e.g 300 series.
ALUROD	Solid aluminium alloy rods, bright finished.	Aluminium alloys, e.g. 5000 series.
Submerged Arc Fluxes		
OP 191	Rutile agglomerated flux, B.I.=0.4, manganese and silicon pick up.	Twin and multi-wire fast fillet welding of shipbuilding steels.
OP 192	Semi basic agglomerated flux, B.I.=1.3, neutral.	Twin and multi-wire fast joint welding of shipbuilding steels.
OP 180S	Aluminate basic agglomerated flux, B.I.=1.2, manganese pick up.	Twin and multi-wire welding including both sides in one pass.
OP 181	Aluminate rutile agglomerated flux, B.I.=0.4, silicon pick up.	Twin and multi-wire fast fillet welding of shipbuilding steels.
OP 139	Aluminate basic agglomerated flux, B.I.=1.5, high speed.	High deposition rate processes, multi-wire joint filling.
OP 122	Fluoride basic agglomerated flux, B.I.=1.7, low consumption.	Fast, multi-wire fillet welding.
OP 121TT	Agglomerated fluoride basic flux, B.I.=3.1, low hydrogen controlled. Multi-wire, AC/DC.	Wide range of C-Mn, structural and low alloy steels. High toughness, ISO-V & CTOD tested. High productivity.
OP 10U	Agglomerated, optimised grain size distribution.	Backing flux applications, used with Keraline ceramics.
DryBag	Vacuum packaging system for OERLIKON SAW fluxes. Variety of formats: 25, 500 and 800 kg.	Eliminates flux re-conditioning prior to use even following extended transport or use in high humidity regions.
MMA		
FINCORD	Rutile RR thicker coated electrode, versatile and easy to use.	Excellent for downhand fillet welding.
OVERCORD	Rutile cellulosic coated electrode, all positional including vertically down.	Assembly work, tolerant to primed plate.
FERROMATIC	Rutile coated high efficiency, easy striking and smooth operation.	Fillet welding during assembly.
FEBAMATIC	Basic coated high efficiency, easy striking and smooth operation.	Fillet welding, tough deposit, tolerant to primed plate.
TENAX	Low hydrogen (-18) coated C-Mn and low alloy compositions.	Thicker section tough joints in structural steels and low alloy steels.
SPEZIAL	Low hydrogen (-16) double coated C-Mn deposit, smooth operation.	Versatile basic electrode, gap bridging, ISO-V to -20 °C.
SUPERCITO	Low hydrogen (-18) coated C-Mn and low alloy compositions.	Thicker section tough joints in structural steels, ISO-V to -40 °C.
SUPRANOX	Rutile (-16/17) coated stainless steels. Fine spray arc metal transfer. Easy slag release.	Stainless and heat resistant steels, e.g 300 series. widest range of stainless applications.
BASINOX	Basic (-15) coated, low hydrogen, low oxygen weld metal. Full range, ferrite controlled. Root penetration.	Stainless and heat resistant steels, e.g 300 series. Thick sections, positional pipework.

Product packaging
Welding consumables


2008-677


3551-46

Flux cored wire

2004-114

Drums (ROUNDPACK)

Heavy duty cardboard drums

- 200 kg - 300 kg formats
- 100% recyclable
- Reliable rapid pay off at high wire feed speeds
- Fitted sling points for handling safety

Spool - 100% recyclable

- S200 5 kg
- B300 16 kg
- B570 80 kg

Easy opening box /
Bulk supply without boxes


2006-203

TIG

Rods

- 1.6, 2.0 & 2.4 mm diameters in 1 m length
- Full range of compositions
- Alloy grades are coin stamped
- Bright finished
- Fully certificated


2006-940

MMA

Standard Packaging

- Reliable protective packaging for most applications
- 3 packets per outer carton
- Packet weight ~5 kg


2006-937

Vacuum Packaging

- No re-conditioning required before use
- No quivers or holding ovens are required
- Ideal for on site applications
- Simplified QA procedures


2006-939


2009-012

DRY

- Pack contents ~1 kg
- Supplied in outer cartons ~15 kg

VPMD

- Pack contents ~3 kg
- Supplied in outer cartons ~15 kg

SAW

Fluxes

Sacks

- Weld sealed
- 100% recyclable (“4”)
- Easy to handle
- Effective flux protection from the environment
- Supply: 1 tonne (40 sacks x 25 kg) per pallet


2006-943_ret

DRY BAG

This new packaging solution has been developed by the Air Liquide Welding research teams for OERLIKON submerged arc welding fluxes. DRYBAG packaging system features:

- Triple layer composite technology system
- Fully moisture proof
- Low vacuum
- Protection from atmospheric humidity
- Designed for the most hostile ambient conditions
- Protection during extended transport and storage
- Supply: 1 tonne (40 sacks x 25 kg DRYBAG) per pallet

2007-474

2006-936

Wires

- Spool B450 25 kg
- 100% recyclable
- Supply: 1 tonne (40 coils x 25 kg) per pallet
- Spool B570 90 kg

Selection Guide

Selected OERLIKON Consumables for the Shipbuilding Industry - All weld metal properties

	AWS	EN ISO	Shielding Gas	C	Mn	Si	S	P
FLUX CORED WIRES								
FLUXOFIL 14HD	A5.20: E71T1-1M-JH4	17632-A: T 46 3 P M 1 H5	M21	0.05	1.4	0.5	<0.010	<0.010
FLUXOFIL 19HD	A5.20: E71T1-1C-JH4	17632-A: T 46 3 P C 1 H5	C1	0.05	1.3	0.5	<0.010	<0.010
FLUXOFIL 20HD	A5.29: E81T1-Ni1M-JH4	17632-A: T 46 4 1Ni P M 1 H5	M21	0.06	1.3	0.4	<0.010	<0.010
FLUXOFIL 21HD	A5.29: E81T1-Ni1C-JH4	17632-A: T 46 4 1Ni P C 1 H5	C1	0.07	1.4	0.4	<0.010	<0.010
CRISTAL F119	A5.20: E71T1-1C-JH4	17632-A: T 46 3 P C 1 H5	C1	0.03	1.5	0.5	<0.010	<0.010
CITOFLUX R00	A5.20: E71T1-1M-JH4	17632-A: T 42 3 P M 1 H5	M21	0.05	1.4	0.5	<0.025	<0.020
CITOFLUX R00C	A5.20: E71T1-1C-JH4	17632-A: T 42 3 P C 1 H5	C1	0.05	1.2	0.35	<0.025	<0.020
CITOFLUX R82	A5.29: E81T1-Ni1M-H4	17632-A: T 46 5 1Ni P M 1 H5	M21	0.05	1.3	0.4	<0.010	<0.010
FLUXOFIL 31	A5.20: E70T- 5M-JH4	17632-A: T 42 4 B M 2 H5	M21	0.05	1.2	0.3	<0.010	<0.010
METAL CORED WIRES								
FLUXOFIL M10	A5.18: E70C 6M H4	17632-A: T 46 4 M M 1 H5	M21	0.08	1.5	0.4	<0.010	<0.010
FLUXOFIL M10PG	A5.18: E70C GM H4	17632-A: T 46 4 M M 1 H5	M21	0.04	1.8	0.8	<0.010	<0.010
CITOFLUX M00	A5.18: E70C 6M H4	17632-A: T 46 4 M M 1 H5	M21	0.04	1.7	0.5	<0.020	<0.020
MIG/MAG								
CARBOFIL 1	A5.18: ER 70S - 6	14341-A: G 42 4 M G3Si1	M21	0.08	1.1	0.6	<0.025	<0.025
CARBOFIL 1A	A5.18: ER 70S - 6	14341-A: G 46 4 M G4Si1	M21	0.08	1.3	0.7	<0.025	<0.025
CARBOFIL 1A Gold	A5.18: ER 70S - 6	14341-A: G 46 4 M G4Si1	M21	0.08	1.3	0.7	<0.025	<0.025
SUBMERGED ARC								
OP 191/OE-S1	A5.17: F7A0 EL 12	756: S 4T A AR S1	-	0.03	0.9	0.8	-	-
OP 191/OE-S2	A5.17: F7A0 EM 12K	756: S 4T A AR S2	-	0.025	1.1	0.5	-	-
OP 192/OE-S2	A5.17: F7A2 F7P4-EM12K	756: S 42 3 AB S2	-	0.03	1.5	0.6	-	-
OP 192/OE-S2Mo	A5.23: F8A3 F8P2-EA2 A2	756: S 46 2 AB S2 Mo	-	0.04	1.5	0.6	-	-
OP 192 / OE SD3 1Ni½Mo	A5.23:F8A4-EG-G	756: S 50 4 AB S0	-	0.07	1.6	0.5	-	-
OP 181/OE-S1	A5.17: F7A0 EL 12	760: SA AR 1 88 AC	-	0.03	1.1	0.6	-	-
OP 181/OE-S2	A5.17: F7A0 EM 12K	760: SA AR 1 88 AC	-	0.04	1.3	0.6	-	-
OP 180S/OE-S1	A5.17: F7A0-F7PZ EL12	-	-	0.05	1	0.2	-	-
OP 180S/OE-S2	A5.17: F7A0 EM12K	-	-	0.05	1.4	0.3	-	-
OP 180S/OE-S2Mo	A5.25: F8A0 EA2-A2	760: SA FB 1 67 AC	-	0.05	1.4	0.3	-	-
OP 139/OE-S2	A5.17:F7A5 EM12K	-	-	0.06	1.3	0.3	-	-
OP 139/OE-S2Mo	A5.23: F8A5 EA2-A2	760: SA AB 167 AC H5	-	0.06	1.3	0.3	-	-
OP 121TT/OE S2Mo	A5.23: F8P4 EA2-A2	760: SA FB 1 65 AC H5	-	0.07	0.9	0.2	-	-
OP 122/FLUXOCORD 35.25	-	-	-	0.05	1.2	0.2	-	-
OP 122/FLUXOCORD 35.25-2D	-	-	-	0.05	1.2	0.2	-	-
OP 122/FLUXOCORD 35.25-2D-2/3	-	-	-	0.05	1.2	0.2	-	-
OP 10U Backing flux	-	760: SA CS 1	-	-	-	-	-	-
MMA								
FINCORD	A5.1: E6013	2560-A: E42 0 RR 12	-	0.08	0.6	0.45	-	-
OVERCORD	A5.1: E6013	2560-A: E38 0 RC 11	-	0.08	0.5	0.3	-	-
FERROMATIC 160	A5.1: E7024	2560-A: E42 0 RR 73	-	0.1	0.9	0.45	-	-
FERROMATIC 180	A5.1: E7024	2560-A: E42 0 RR 73	-	0.1	0.9	0.4	-	-
CITORAPID 160W	A5.1: E6027	2560-A: E38 2 RA 73	-	0.06	0.8	0.26	-	-
FEBAMATIC 160S	A5.1: E7028	2560-A: E42 4 B 53 H5	-	0.1	1.1	0.6	-	-
TENAX 35S	A5.1: E7018-1-H4	2560-A: E42 5 B 32 H5	-	0.08	1.4	0.4	<0.015	<0.020
SPEZIAL	A5.1: E7016-H8	2560-A: E38 2 B 12 H10	-	0.06	0.9	0.7	<0.015	<0.025
SUPERCITO 7018S	A5.1: E7018-1-H4	2560-A: E42 6 B 32 H5	-	0.08	1.2	0.4	<0.015	<0.020
ASSOCIATED APPLICATIONS								
ALUMINIUM ALLOYS: MIG								
ALUFIL AlMg4.5Mn	A5.10: ER 5183	18273: S Al 5183	I	-	0.8	0.3	-	-
ALUMINIUM ALLOYS: TIG								
ALUROD AlMg4.5Mn	A5.10: ER 5183	18273: S Al 5183	I	-	0.8	0.3	-	-
STAINLESS STEELS: FLUX CORED WIRES								
FLUXINOX 316L PF	A5.22: E316LT1-1 A5.22: E316LT1-4	17633-A: T 19 12 3 L P M1 17633-A: T 19 12 3 L P C1	M21 C1	<0.04 <0.04	1.4 1.4	0.6 0.6	-	-
FLUXINOX 309L PF	A5.22: E309LT1-1 A5.22: E309LT1-4	17633-A: T 23 12 L P M1 17633-A: T 23 12 L P C1	M21 C1	<0.04 <0.04	0.7 0.7	0.6 0.6	-	-
FLUXINOX 309LMo PF	A5.22: E309LMoT1-1 A5.22: E309LMoT1-4	17633-A: T 23 12 2 L P M1 17633-A: T 23 12 2 L P C1	M21 C1	<0.04 <0.04	1.5 1.5	0.7 0.7	-	-
FLUXINOX 307 PF	A5.22: ~307T1-G	17633-A: T 18 8 Mn P M1 17633-A: T 18 8 Mn P C1	M21 C1	<0.1 <0.1	6.5 6.5	0.7 0.7	-	-
FLUXINOX 22.9.3L PF	A5.22 : E2209T1-1 A5.22 : E2209T1-4	17633-A: T 22 9 3 N L P M1 17633-A: T 22 9 3 N L P C1	M21 C1	<0.04 <0.04	0.8 0.8	0.5 0.5	-	-
STAINLESS STEELS: MMA								
SUPRANOX 316L	A5.4: E316L-17	1600: E 19 12 3 L R 1 2	-	<0.03	0.8	0.9	-	-
BASINOX 316L	A5.4: E316L-15	1600: E 19 12 3 L B 4 2	-	<0.025	1	0.3	-	-
SUPRANOX 309L	A5.4: E309L-17	1600: E 23 12 L R 1 2	-	<0.03	0.7	0.9	-	-
BASINOX 309L	A5.4: E309L-15	1600: E 23 12 L B 1 2	-	0.025	1.4	0.35	-	-
SUPRANOX 309LMo	A5.4: E309LMo-17	1600: E 23 12 2 L R 1 2	-	<0.03	0.7	0.9	-	-
BASINOX 309LMo	A5.4: E309LMo-15	1600: E 23 12 2 L B 1 2	-	0.025	1.4	0.4	<0.025	<0.030
SUPERCHROMAX R	A5.4: ~ E307L-17	1600: E 18 8 Mn R 1 2	-	0.14	6	1.2	-	-
BASINOX 307	A5.4: E307L-15	1600: E 18 9 Mn Mo B 1 2	-	0.08	4	0.5	<0.030	<0.030
SUPRANOX 22.9.3L	A5.4: 22 09-16	1600: E 22 9 3 N L R 1 2	-	<0.04	1.6	1	-	-
BASINOX 22.9.3N	A5.4: E2209-15	1600: E 22 9 3 NL B 2 2	-	<0.04	1.3	0.36	<0.020	<0.020
STAINLESS STEELS: MIG								
INERTFIL 316LSi	A5.9: ER 316LSi	14343-A:G 19 12 3 L Si	M13	0.02	1.4	0.85	<0.020	<0.025
INERTFIL 309L	A5.9: ER 309L	14343-A:G 23 12 L	M13	0.02	1.8	0.45	<0.020	<0.025
INERTFIL 309LMo	A5.9: ~ER 309LMo	14343-A:G 23 12 2 L	M13	0.02	1.6	0.45	<0.020	<0.025
INERTFIL 307	A5.9: ~ER 307	14343-A:G 18 8 Mn	M13	0.1	7	0.8	<0.025	<0.030
INERTFIL 22.9.3L	A5.9: ER 2209	14343-A:G 22 9 3 N L	M13	0.02	1.7	0.5	<0.020	<0.025
STAINLESS STEELS: TIG								
INERTROD 316LSi	A5.9: ER 316LSi	14343-A:W 19 12 3 L Si	I	0.02	1.4	0.85	<0.020	<0.025
INERTROD 309L	A5.9: ER 309L	14343-A:W 23 12 L	I	0.02	1.8	0.45	<0.020	<0.025
INERTROD 309LMo	A5.9: ER 309LMo	14343-A:W 23 12 2 L	I	0.02	1.6	0.45	<0.020	<0.025
INERTROD 307	A5.9: ER 307	14343-A:W 18 8 Mn	I	0.1	7	0.8	<0.025	<0.030
INERTROD 22.9.3L	A5.9: ER 2209	14343-A:W 22 9 3 N L	I	0.02	1.7	0.5	<0.020	<0.025

Ni	Cr	Mo	N	Al	Mg	Tensile Strength MPa	Yield Strength MPa	A5 %	ISO-V °C	ISO-V J	
											FLUX CORED WIRES
-	-	-	-	-	-	550-650	>460	>24	-20	>80	FLUXOFIL 14HD
-	-	-	-	-	-	550-650	>460	>24	-20	>80	FLUXOFIL 19HD
<0.9	-	-	-	-	-	570-680	>480	>24	-40	>80	FLUXOFIL 20HD
<0.9	-	-	-	-	-	570-670	>490	>22	-40	>70	FLUXOFIL 21HD
-	-	-	-	-	-	550-650	>460	>22	-20	>55	CRISTAL F119
-	-	-	-	-	-	500-640	>420	>20	-20	>80	CITOFLUX R00
-	-	-	-	-	-	530-680	>460	>20	-20	>50	CITOFLUX R00C
0.85	-	-	-	-	-	550-690	>460	>22	-40	>80	CITOFLUX R82
-	-	-	-	-	-	500-640	>420	>25	-40	>80	FLUXOFIL 31
											METAL CORED WIRES
-	-	-	-	-	-	550-680	>460	>24	-40	80	FLUXOFIL M10
-	-	-	-	-	-	550-680	>460	>24	-40	>60	FLUXOFIL M10PG
-	-	-	-	-	-	530-680	>460	>24	-40	>75	CITOFLUX M00
											MIG/MAG
-	-	-	-	-	-	500-640	>420	>24	-30	>70	CARBOFIL 1
-	-	-	-	-	-	550-680	>460	>24	-30	>80	CARBOFIL 1A
-	-	-	-	-	-	550-680	>460	>24	-30	>80	CARBOFIL 1A Gold
											SUBMERGED ARC
-	-	-	-	-	-	520-650	>400	>22	-20	>27	OP 191/OE-S1
-	-	-	-	-	-	520-650	>400	>22	-20	>27	OP 191/OE-S2
-	-	-	-	-	-	520-620	>430	>24	-30	>70	OP 192/OE-S2
-	-	0.4	-	-	-	560-680	>500	>22	-30	>27	OP 192/OE-S2Mo
0.9	-	0.2	-	-	-	590-680	>500	>22	-40	>50	OP 192/OE SD3 1Ni¼Mo
-	-	-	-	-	-	560-620	>420	>22	-20	>27	OP 181/OE-S1
-	-	-	-	-	-	520-660	>450	>22	-20	>27	OP 181/OE-S2
-	-	-	-	-	-	430-530	>360	>25	-20	>35	OP 180S/OE-S1
-	-	-	-	-	-	520-620	>400	>22	-20	>50	OP 180S/OE-S2
-	-	0.5	-	-	-	600-700	>450	>20	-20	>35	OP 180S/OE-S2Mo
-	-	-	-	-	-	480-510	>400	>27	-40	>40	OP 139/OE-S2
-	-	0.4	-	-	-	570-630	>510	>21	-40	>80	OP 139/OE-S2Mo
-	-	0.5	-	-	-	580-680	>500	>24	-40	>60	OP 121TT/OE S2Mo
-	-	-	-	-	-	520-620	>460	>24	-40	>60	OP 122/FLUXOCORD 35.25
-	-	-	-	-	-	520-620	>460	>24	-40	>60	OP 122/FLUXOCORD 35.25-2D
-	-	-	-	-	-	520-620	>460	>24	-40	>60	OP 122/FLUXOCORD 35.25-2D-2/3
-	-	-	-	-	-	-	-	-	-	-	OP 10U Backing flux
											MMA
-	-	-	-	-	-	500-640	>420	>22	-10	>47	FINCORD
-	-	-	-	-	-	470-600	>380	>22	-10	>47	OVERCORD
-	-	-	-	-	-	510-610	>420	>22	0	>47	FERROMATIC 160
-	-	-	-	-	-	510-610	>420	>22	0	>47	FERROMATIC 180
-	-	-	-	-	-	470-600	>380	>20	-20	>47	CITORAPID 160W
-	-	-	-	-	-	510-610	>420	>26	-40	>80	FEBAMATIC 160S
-	-	-	-	-	-	510-640	>420	>22	-50	>100	TENAX 35S
-	-	-	-	-	-	470-600	>380	>26	-20	>80	SPEZIAL
-	-	-	-	-	-	510-610	>420	>24	-50	>90	SUPERCITO 7018S
											ASSOCIATED APPLICATIONS
											ALUMINIUM ALLOYS: MIG
-	-	-	-	REM	4.5	>275	>125	>17	-	-	ALUFIL AlMg4.5Mn
											ALUMINIUM ALLOYS: TIG
-	-	-	-	REM	4.5	>275	>125	>17	-	-	ALUROD AlMg4.5Mn
											STAINLESS STEELS: FLUX CORED WIRES
19 19	12 12	2.8 2.8	-	-		>510 >510	>320 >320	>30 >30	-196 -196	>27 >27	FLUXINOX 316L PF
24 24	13 13	-	-	-		>520 >520	>320 >320	>30 >30	-60 -60	>32 >32	FLUXINOX 309L PF
24	13 13	2.5 2.5	-	-		>550 >550	>350 >350	>28 >28	20 20	>40 >40	FLUXINOX 309LMo PF
19 19	8.5 8.5	-	-	-		>590 >590	>350 >350	>30 >30	20 20	>40 >40	FLUXINOX 307 PF
22.5 22.5	9 9	3 3	0.1 0.1	-		750-900 750-900	>550 >550	>24 >24	-30 -30	>40 >40	FLUXINOX 22.9.3L PF
											STAINLESS STEELS: MMA
18.5	12	2.7	-	-		>520	>400	>30	-60	>32	SUPRANOX 316L
18.5	11.5	2.7	-	-		>520	>420	>30	-60	>32	BASINOX 316L
24	13	-	-	-		>520	>320	>30	-60	>40	SUPRANOX 309L
22.5	13	-	-	-		>520	>320	>30	20	>60	BASINOX 309L
22.5	13.5	2.6	-	-		>550	>350	>25	-60	>32	SUPRANOX 309LMo
22.5	13	2.5	-	-		>550	>350	>30	20	>60	BASINOX 309LMo
18	8	-	-	-		>650	>400	>30	-60	>32	SUPERCHROMAX R
19.5	9.5	1	-	-		>590	>350	>30	20	>80	BASINOX 307
22.5	9	3	0.15	-		>650	>550	>20	-40	>32	SUPRANOX 22.9.3L
23.2	8.9	2.8	0.13	-		>700	>600	>25	-50	>47	BASINOX 22.9.3N
											STAINLESS STEELS: MIG
19	12.5	2.6	-	-		>510	>350	>30	-120	>32	INERTFIL 316LSi
24	13	-	-	-		>520	>350	>30	-80	>32	INERTFIL 309L
24	13	2.7	-	-		>550	>350	>30	20	>55	INERTFIL 309LMo
19	9	-	-	-		>590	>420	>40	-120	>32	INERTFIL 307
23	9	3	0.15	-		>680	>480	>22	-40	>32	INERTFIL 22.9.3L
											STAINLESS STEELS: TIG
19	12.5	2.6	-	-		>510	>350	>30	-120	>32	INERTROD 316LSi
24	13	-	-	-		>520	>350	>30	-80	>32	INERTROD 309L
24	13	2.7	-	-		>550	>350	>30	20	>55	INERTROD 309LMo
19	9	-	-	-		>590	>420	>40	-120	>32	INERTROD 307
23	9	3	0.15	-		>680	>480	>22	-40	>32	INERTROD 22.9.3L

Classification Society Approvals

Selected OERLIKON Products for the Shipbuilding Industry

Type	AWS	EN ISO	GAS	CE	TÜV	DB	ABS
FLUX CORED WIRES							
FLUXOFIL 14HD	A5.20: E71T1-1M-JH4	17632-A: T 46 3 P M 1 H5	M21	0035-CPD-C302	TÜV	DB	3Y40SA H5
FLUXOFIL 19HD	A5.20: E71T1-1C-JH4	17632-A: T 46 3 P C 1 H5	C1	0035-CPD-C302	TÜV	DB	3Y40SA H5
FLUXOFIL 20HD	A5.29: E81T1-Ni1M-JH4	17632-A: T 46 4 1Ni P C 1 H5	M21	0035-CPD-C302	TÜV	DB	4Y46SA H5
FLUXOFIL 21HD	A5.29: E81T1-Ni1C-JH4	17632-A: T 46 4 1Ni P C 1 H5	C1	0035-CPD-C302	-	-	4Y46SA H5
CRISTAL F119	A5.20: E71T1-1C-JH4	17632-A: T 46 3 P C 1 H5	C1	758: T 46 2 P C 1 H5	0035-CPD-C305	10344.02 / O	42.098.44
CITOFLUX R00	A5.20: E71T1-1M-JH4	17632-A: T 42 3 P M 1 H5	M21	0035-CPD-C302	TÜV	DB	3Y40SA H5
CITOFLUX R00C	A5.20: E71T1-1C-JH4	17632-A: T 42 3 P C 1 H5	C1	0035-CPD-C305	11012.01 / U	42.098.43	3YSA H5 (P)
CITOFLUX R82	A5.29: E81T1-Ni1M-H4	17632-A: T 46 5 1Ni P M 1 H5	M21	0035-CPD-C307	-	-	4Y400SA H5
FLUXOFIL 31	A5.20: E70T- 5M-JH4	17632-A: T 42 4 B M 2 H5	M21	0035-CPD-C302	TÜV	DB	3YSA H5
METAL CORED WIRES							
FLUXOFIL M10	A5.18: E70C 6M H4	17632-A: T 46 4 M M 1 H5	M21	0035-CPD-C302	TÜV	DB	4YSA H5
FLUXOFIL M10PG	A5.18: E70C GM H4	17632-A: T 46 4 M M 1 H5	M21	0035-CPD-C302	-	DB	4YSA H5
CITOFLUX M00	A5.18: E70C 6M H4	17632-A: T 46 4 M M 1 H5	M21	0035-CPD-C305	-	-	3YSA H5 (P)
MIG/MAG							
CARBOFIL 1	A5.18: ER 70S - 6	14341-A: G 42 4 M G3Si1	M21	0035-CPD-301	00265	42.098.02	3YSA
CARBOFIL 1A	A5.18: ER 70S - 6	14341-A: G 46 4 M G4Si1	M21	0035-CPD-301	00266	42.098.01	3YSA
CARBOFIL 1A Gold	A5.18: ER 70S - 6	14341-A: G 46 4 M G4Si1	M21	0035-CPD-C312	11041.00	42.098.17	3YSA
SUBMERGED ARC							
OP 191/OE-S1	A5.17: F7A0 EL 12	756: S 4T A AR S1	-	-	-	-	-
OP 191/OE-S2	A5.17: F7A0 EM 12K	756: S 4T A AR S2	-	-	-	-	-
OP 192/OE-S2	A5.17: F7A2 F7P4-EM12K	-	-	0035-CPD-C304	TÜV	DB	-
OP 192/OE-S2Mo	A5.23: F8A3 F8A3 F8P2-EA2 A2	-	-	-	-	-	-
OP 192 / OE SD3 1Ni¼Mo	A5.23:F8A4-EG-G	756: S 50 4 AB S0	-	0035-CPD-C308	09895	-	-
OP 181/OE-S1			-	0035-CPD-C308	06437	51.098.17	-
OP 181/OE-S2			-	0035-CPD-C308	06438	51.098.17	3YT-3YM
OP 180S/OE-S1	A5.17: F6A0 EL12	-	-	-	-	-	-
OP 180S/OE-S2	A5.17: F7A0 EM12K	-	-	-	-	-	-
OP 180S/OE-S2Mo	A5.25: F8A0 EA2-A2	760: SA FB 1 67 AC	-	0035-CPD-C308	03288	51.098.08	-
OP 139/OE-S2	A5.17:F7A5 EM12K	-	-	0035-CPD-C308	03633	51.098.08	2YT-3YM
OP 139/OE-S2Mo	A5.23: F8A5 EA2-A2	760: SA AB 167 AC H5	-	0035-CPD-C308	03634	-	-
OP 121TT/OE S2Mo	A5.23: F8P4 EA2-A2	760: SA FB 1 65 AC H5	-	0035-CPD-C308	03932	51.098.09	3YM-3YT
OP 122/FLUXOCORD 35.25			-	-	-	-	-
OP 122/FLUXOCORD 35.25-2D			-	0035-CPD-C308	-	51.098.11	3YT
OP 122/FLUXOCORD 35.25-2D-A105			-	0035-CPD-C308	-	51.098.11	3YTM
OP 10U Backing flux	-	760: SA CS 1	-	-	-	-	-
MMA							
FINCORD	A5.1: E6013	2560-A: E42 0 RR 12	-	0035-CPD-C306	00171.10	10.098.64 (P)	2 (P)
OVERCORD	A5.1: E6013	2560-A: E38 0 RC 11	-	0035-CPD-C306	00272.08	10.098.01 (P)	1 (P)
FERROMATIC 160	A5.1: E7024	2560-A: E42 0 RR 73	-	0035-CPD-C306	-	-	-
FERROMATIC 180	A5.1: E7024	2560-A: E42 0 RR 73	-	0035-CPD-C306	-	-	-
CITORAPID 160W	A5.1: E6027	2560-A: E38 2 RA 73	-	0035-CPD-C307	TÜV	DB	3
FEBAMATIC 160S	A5.1: E7028	2560-A: E42 4 B 53 H5	-	0035-CPD-C306	-	-	-
TENAX 35S	A5.1: E7018-1-H4	2560-A: E42 5 B 32 H5	-	0035-CPD-C303	4468.01	10.035.03	4H5-4Y
SPEZIAL	A5.1: E7018-H8	2560-A: E38 2 B 12 H10	-	0035-CPD-C306	00061.12	10.116.07/10.098.07(P)	3H10-3Y (P)
SUPERCITO 7018S	A5.1: E7018-1-H4	2560-A: E42 6 B 32 H5	-	0035-CPD-C307	TÜV	DB	3H5-3Y
ASSOCIATED APPLICATIONS							
ALUMINIUM ALLOYS: MIG							
ALUFIL AlMg4.5Mn	A5.10: ER 5183	18273: S Al 5183	I	0035-CPD-301	03731	61.098.08	-
ALUMINIUM ALLOYS: TIG							
ALUROD AlMg4.5Mn	A5.10: ER 5183	18273: S Al 5183	I	0035-CPD-301	01490	61.098.06	-
STAINLESS STEELS: FLUX CORED WIRES							
FLUXINOX 316L PF	A5.22: E316LT1-1 A5.22: E316LT1-4	17633-A: T 19 12 3 L P M1 17633-A: T 19 12 3 L P C1	M21 C1	0035-CPD-C307 0035-CPD-C307	TÜV TÜV	-	-
FLUXINOX 309L PF	A5.22: E309LT1-1 A5.22: E309LT1-4	17633-A: T 23 12 L P M1 17633-A: T 23 12 L P C1	M21 C1	0035-CPD-C307	TÜV	-	-
FLUXINOX 309LMo PF	A5.22: E309LMoT1-1 A5.22: E309LMoT1-4	17633-A: T 23 12 2 L P M1 17633-A: T 23 12 2 L P C1	M21 C1	-	-	-	-
FLUXINOX 307 PF		17633-A: T 18 8 Mn P M1	M21 C1	-	-	-	-
FLUXINOX 22.9.3L PF	A5.22: E2209TO-1	17633-A: T 22 9 3 N L R M3	M21 C1	0035-CPD-C307	TÜV	-	-
STAINLESS STEELS: MMA							
SUPRANOX 316L	A5.4: E316L-17	1600: E 19 12 3 L R 1 2	-	0035-CPD-C307	TÜV	DB	316L
BASINOX 316L	A5.4: E316L-15	1600: E 19 12 3 L B 4 2	-	0035-CPD-C303	06.339	30.098.09	-
SUPRANOX 309L	A5.4: E309L-17	1600: E 23 12 L R 1 2	-	0035-CPD-C307	TÜV	DB	309L
BASINOX 309L	A5.4: E309L-15	1600: E 23 12 L B 1 2	-	-	-	-	-
SUPRANOX 309LMo	A5.4: E309LMo-17	1600: E 23 12 2 L R 1 2	-	0035-CPD-C307	-	-	-
BASINOX 309LMo	A5.4: E309LMo-15	1600: E 23 12 2 L B 1 2	-	-	-	-	-
SUPERCHROMAX R	A5.4: ~ E307L-17	1600: E 18 8 Mn R 1 2	-	0035-CPD-C307	TÜV	DB	-
BASINOX 307	A5.4: E307L-15	1600: E 18 9 Mn Mo B 1 2	-	-	-	-	-
SUPRANOX RS 22.9.3L	A5.4: 22 09-16	1600: E 22 9 3 N L R 1 2	-	-	-	-	-
BASINOX 22.9.3N	A5.4: E2209-15	1600: E 22 9 3 NL B 2 2	-	-	-	-	-
STAINLESS STEELS: MIG							
INERTFIL 316LSi	A5.9: ER 316LSi	14343-A: G 19 12 3 L Si	M13	0035-CPD-301	02429	43.098.16	-
INERTFIL 309L	A5.9: ER 309L	14343-A: G 23 12 L	M13	-	-	-	-
INERTFIL 309LMo	A5.9: ~ER 309LMo	14343-A: G 23 12 2 L	M13	-	-	-	-
INERTFIL 307	A5.9: ~ER 307	14343-A: G 18 8 Mn	M13	0035-CPD-301	01148	43.098.02	-
INERTFIL 22.9.3L	A5.9: ER 2209	14343-A: G 22 9 3 N L	M13	-	-	-	-
STAINLESS STEELS: TIG							
INERTROD 316LSi	A5.9: ER 316LSi	14343-A: W 19 12 3 L Si	I	0035-CPD-301	11008	43.098.18	-
INERTROD 309L	A5.9: ER 309L	14343-A: W 23 12 L	I	-	-	-	-
INERTROD 309LMo	A5.9: ER 309LMo	14343-A: W 23 12 2 L	I	-	-	-	-
INERTROD 307	A5.9: ER 307	14343-A: W 18 8 Mn	I	0035-CPD-301	01149	43.098.12	-
INERTROD 22.9.3L	A5.9: ER 2209	14343-A: W 22 9 3 N L	I	-	-	-	-

BV	DNV	GL	LRS	PRS	RMRS	RINA	Type
							FLUX CORED WIRES
SA3Y40M H5	IIIY40MS H5	3Y40H5S	3Y40S H5	3S-3Y40SH5	3S-3Y40S H3	SY40S H5	FLUXOFIL 14HD
SA3Y40M H5	IIIY40MS H5	3Y40H5S	3Y40S H5	3S-3Y40SH5	3S-3Y40S H5	-	FLUXOFIL 19HD
SA4Y46M H5	IVY46MS H5	4Y46H5S	4Y46S H5	-	4Y46S H5	-	FLUXOFIL 20HD
SA4Y46M H5	IVY46MS H5	4Y46H5S	4Y46S H5	-	-	-	FLUXOFIL 21HD
3YSA H5	SA3YM H5 (P)	IIIY40MS H5 (P)	4Y40H5S	3Y40S H5	-	3Y40SHHH	CRISTAL F119
SA3Y40M H5	IIIY40MS H5	3Y40H5S	3Y40S H5	3S-3Y40SH5	3S-3Y40S H5	-	CITOFLUX R00
SA3YM H5 (P)	IIIY40MS H5 (P)	4Y40H5S	3Y40S H5 (P)	-	3Y40SHHH	MR (P)	CITOFLUX R00C
-	IVY46MS H5	-	4Y40S H5	-	-	-	CITOFLUX R82
-	-	3YH5S	3S-3YS-H5	-	-	-	FLUXOFIL 31
							METAL CORED WIRES
SA3Y M H5 KV40	IVY40MS H5	4YH5S	4Y40S H5	-	-	-	FLUXOFIL M10
SA3Y M H5 KV40	IVY40MS H5	4YH5S	4Y40S H5	-	-	-	FLUXOFIL M10PG
SA3YM H5 (P)	IVY42MS H5 (P)	-	4Y40S H5 (P)	-	-	-	CITOFLUX M00
							MIG/MAG
SA3YM	IIIYMS	3YS	3S,3YS H15	-	-	3YS	CARBOFIL 1
SA3YM	IIIYMS	3YS	3S,3YS H15	-	-	-	CARBOFIL 1A
SA3YM	-	3YS	-	-	-	-	CARBOFIL 1A Gold
							SUBMERGED ARC
-	-	-	-	-	-	-	OP 191/OE-S1
-	-	-	-	-	-	-	OP 191/OE-S2
-	-	-	-	-	-	-	OP 192/OE-S2
-	-	-	-	-	-	-	OP 192/OE-S2Mo
-	-	-	-	-	-	-	OP 192 / OE SD3 1Ni¼Mo
-	-	-	-	-	-	-	OP 181/OE-S1
3YTM	IIIYTM	3YTM	3YT, 3YM	-	3YTM	-	OP 181/OE-S2
-	-	-	-	-	-	-	OP 180S/OE-S1
-	-	-	-	-	-	-	OP 180S/OE-S2
-	-	-	-	-	-	-	OP 180S/OE-S2Mo
2YT-3YM	IIIY40TM	2YT-3YM	2YT, 3YM		3YTM		OP 139/OE-S2
-	-	-	-	-	-	-	OP 139/OE-S2Mo
-	-	-	4Y40M, 3Y40T	-	-	-	OP 121TT/OE S2Mo
-	-	-	-	-	-	-	OP 122/FLUXOCORD 35.25
3YTM	IIIY40T	3YT	3YT, 3YM	-	3YTM	-	OP 122/FLUXOCORD 35.25-2D
-	-	3YTM	3YT, 3YM	-	-	-	OP 122/FLUXOCORD 35.25-2D-A105
-	-	-	-	-	-	-	OP 10U Backing flux
							MMA
2	2	2Y	2m	-	-	-	FINCORD
1	1	1	1m	-	-	-	OVERCORD
-	-	-	-	-	-	-	FERROMATIC 160
-	-	-	-	-	-	-	FERROMATIC 180
3	3	3	3m	-	-	-	CITORAPID 160W
3YHHH	3YH5	3Y H5	3Ym-4Y40m-H5	-	3YHHH	-	FEBAMATIC 160S
3YHHH	4YH5	4Y40 H5	DXVuO-BF-3m-3Ym-H5	-		4D/4YDH5	TENAX 35S
3-3YHH	3Y40 H10	3Y H10	3m 3Ym H10	-	3YHH	-	SPEZIAL
33YHHH	4Y40 H5	-	33Y H5	-	-	-	SUPERCITO 7018S
							ASSOCIATED APPLICATIONS
							ALUMINIUM ALLOYS: MIG
-	-	S-AlMg4,5Mn	DXO BF WC/T - 1S NA	-	-	WC	ALUFIL AlMg4.5Mn
							ALUMINIUM ALLOYS: TIG
-	-	-	-	-	-	-	ALUROD AlMg4.5Mn
							STAINLESS STEELS: FLUX CORED WIRES
-	316L		316L-S 316L-S	-	-	-	FLUXINOX 316L PF
-	309L	4332S	SS/CMn	-	-	-	FLUXINOX 309L PF
-	-	-		-	-	-	FLUXINOX 309LMo PF
-	-	-	-	-	-	-	FLUXINOX 307 PF
-	DUPLEX	4462	S31803S	-	-	-	FLUXINOX 22.9.3L PF
							STAINLESS STEELS: MMA
UP	316L	4571	316L	-	-	-	SUPRANOX 316L
-	-	-	-	-	-	-	BASINOX 316L
UP	309L	4332	SS/CMn	-	-	-	SUPRANOX 309L
-	-	-	-	-	-	-	BASINOX 309L
-	309Mo		-	-	-	-	SUPRANOX 309LMo
-	-	-	-	-	-	-	BASINOX 309LMo
-	-	-	-	-	-	-	SUPERCHROMAX R
-	-	-	-	-	-	-	BASINOX 307
2209	DNV	-	-	-	-	2209	SUPRANOX RS 22.9.3L
-	-	-	-	-	-	-	BASINOX 22.9.3N
							STAINLESS STEELS: MIG
-	-	-	-	-	-	-	INERTFIL 316LSi
-	-	-	-	-	-	-	INERTFIL 309L
-	-	-	-	-	-	-	INERTFIL 309LMo
-	-	-	-	-	-	-	INERTFIL 307
-	-	-	-	-	-	-	INERTFIL 22.9.3L
							STAINLESS STEELS: TIG
-	-	-	-	-	-	-	INERTROD 316LSi
-	-	-	-	-	-	-	INERTROD 309L
-	-	-	-	-	-	-	INERTROD 309LMo
-	-	-	-	-	-	-	INERTROD 307
-	-	-	-	-	-	-	INERTROD 22.9.3L

OERLIKON FLUXOFIL cored wires

Product Focus

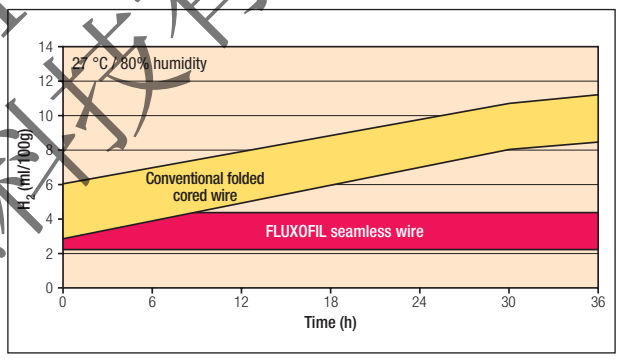
OERLIKON FLUXOFIL flux and metal cored wires are manufactured using seamless tube which is precision filled with the powder core using pharmaceutical manufacturing technology.

The filled tube is then drawn to size and to achieve the degree of reduction to final diameter, there is an intermediate annealing treatment during wire drawing. This heat treatment reduces the moisture content of the core filling to extremely low levels, as any moisture dissociates into hydrogen and oxygen which diffuse through the wall of the tubular wire, driven by the difference in partial pressures. No moisture can then be re-absorbed by the flux core as there is no seam.

The FLUXOFIL wire is drawn to final diameter and is copper coated before being precision layer wound onto metal baskets or into drums.

There are inherent product benefits derived from this special manufacturing route:

- **Isotropic properties:**
  As the properties of the wire are the same in all directions, the wire feeds in a straight line and does not spiral. Additionally, FLUXOFIL cored wires can be copper coated.
- **Moisture content:**
  The very low moisture content of the core filling in the finished product means that the hydrogen potential of FLUXOFIL cored wires is inherently low.



Comparison of the effects of exposure to atmosphere at 27 °C, 80% relative humidity between a FLUXOFIL cored wire and a conventional cored wire. The FLUXOFIL wire remains in the very low diffusible hydrogen condition, even after extended exposure to ambient workshop conditions.

FLUXOFIL - Product Features and User Benefits

Precision filled powder core
Manufactured using pharmaceutical technology

- Arc stability and reproducibility

Manufactured from a solid tube
Isotropic properties

- No seam to open on deformation
- No moisture pick up is possible
- Tolerant to on site use and aggressive climates
- No conditioning treatments are required before use
- Used straight from the carton
- Reproducible “straight feeding” from the gun
- high “stab” accuracy for semi automatic and robotic applications
- Feeds over long distances
- Efficient with remote feeders
- Copper coated
- Improved electrical contact and reduced liner and tip wear

Heat treatment during manufacture
Very low diffusible hydrogen potential

- Reduces propensity to cold/hydrogen induced cracking
- Potential to reduce pre-heat
- Ability to weld hardenable alloy steels is enhanced

Key products: flux cored wires

A selection of key products is shown below. A more complete view of the product range is shown on pages 8-9 or consult the OERLIKON Welding Consumables Product Data handbook for full details.

CITOFLUX cored wires were recently introduced to the OERLIKON product range, manufactured using the folded strip technique. This range of gas shielded wires includes, rutile, basic and metal cored wires, bringing another balance of operating characteristics, mechanical properties and deposition rate to the OERLIKON range of cored wires, to meet all fabrication requirements. CITOFLUX rutile cored wires feature enhanced filling of the flux core, which results in increased current carrying capacity, thus increasing welding speed and hence deposition rate.

Flux Cored wires for use with CO_2 Shielding gas

FLUXOFIL 19HD

A seamless rutile flux cored electrode filler wire for gas shielded welding with CO_2. The higher core filling ratio results in increased welding speeds and deposition rate. Used in all positions, FLUXOFIL 19HD deposits C-1.2% Mn steel weld metal with ISO-V deposit toughness down to -20 °C. Optimised operating characteristics in all positions, including vertically up and vertically down, with only one parameter setting. The arc characteristic is smooth and stable with low spatter loss, good slag removal producing finely rippled, pore free welds without undercut.
FLUXOFIL 19HD is fully approved by the main Classification Societies, for full details see p.10-11. Typical applications include flat section pre-assembly, volume section pre-assembly, including positional fillet welding of double wall sections, and outer skin section joints during final assembly.

CRISTAL F119

A low fume rutile flux cored electrode filler wire for gas shielded welding with CO_2 which generates up to 30% less welding fume than similar standard products. The enhanced filling of the flux core results in increased current carrying capacity and hence deposition rate. CRISTAL F119 deposits C-1.2% Mn steel weld metal with ISO-V deposit toughness down to -20 °C. Optimised operating characteristics in all positions, including vertically up and vertically down, with only one parameter setting. The arc characteristic is smooth and stable with low spatter loss, good slag removal producing finely rippled, pore free welds without undercut. CRISTAL F119 is fully approved by the main Classification Societies, for full details see p.10-11. Typical applications include welding in confined spaces, where the reduction in fume emission, in combination with conventional fume extraction at source, results in a significantly improved working environment for the welder.

CITOFLUX R00C

A rutile flux cored electrode filler wire for gas shielded welding with CO_2. The enhanced filling of the flux core results in increased current carrying capacity and hence deposition rate. CITOFLUX R00C deposits C-1.2% Mn steel weld metal with ISO-V deposit toughness down to -20 °C.
Excellent operating characteristics in all positions, including vertically up and vertically down, the arc characteristic is smooth and stable with low spatter loss, good slag removal producing finely rippled, pore free welds without undercut.
CITOFLUX R00C is fully approved by the main Classification Societies, for full details see p.10-11. Typical applications include flat section pre-assembly, volume section pre-assembly, including positional fillet welding of double wall sections, and outer skin section joints during final assembly.

Flux Cored wires for use with Mixed Shielding gases

FLUXOFIL 14HD

A seamless copper coated rutile flux cored electrode filler wire for gas shielded welding with mixed gases, e.g.80%Ar/20%CO_2. The higher core filling ratio results in increased welding speeds and deposition rate.
FLUXOFIL14HD deposits C-1.2% Mn steel weld metal with ISO-V deposit toughness down to -20 °C.
Optimised operating characteristics in all positions, including vertically up and vertically down, with only one parameter setting. The arc characteristic is smooth and stable with low spatter loss, good slag removal producing finely rippled, pore free welds without undercut.
FLUXOFIL 14HD is fully approved by the main Classification Societies, for full details see p.10-11. Typical applications include flat section pre-assembly, volume section pre-assembly, including positional fillet welding of double wall sections, and outer skin section joints during final assembly.

CITOFLUX R00

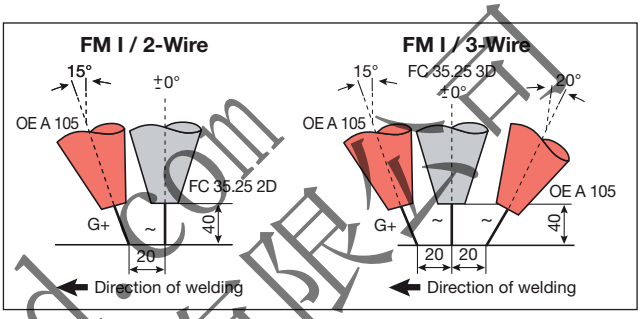
A rutile flux cored electrode filler wire for gas shielded welding with mixed gases, e.g.80%Ar/20%CO_2. The enhanced filling of the flux core results in increased current carrying capacity and hence deposition rate. CITOFLUX R00 deposits C-1.4% Mn steel weld metal with ISO-V deposit toughness down to -20 °C.
Excellent operating characteristics in all positions, including vertically up and vertically down, the arc characteristic is smooth and stable with low spatter loss, good slag removal producing finely rippled, pore free welds without undercut.
CITOFLUX R00 is fully approved by the main Classification Societies, for full details see p.10-11. Typical applications include flat section pre-assembly, volume section pre-assembly, including positional fillet welding of double wall sections, and outer skin section joints during final assembly.

Productivity Focus

The Flux cored Micro Injection (FMI) process

The FMI high productivity process uses a multi-wire tandem submerged arc configuration for welding plate thicknesses <15 mm with a square edge butt and <38 mm with a suitable weld preparation at a deposition rate of up to 40 kg/hour. The FMI process is typically used for flat section pre-assembly applications.

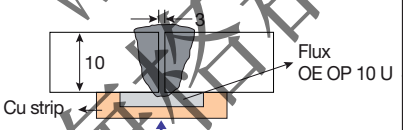
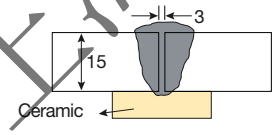
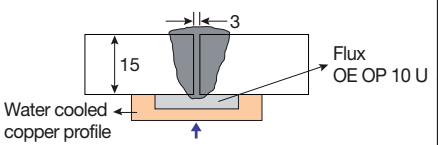
A FLUXOFIL wire is used to achieve the required micro-alloying in combination with either one or two high purity OE-S1 wires, OERLIKON OE-A105. The injection wire, FLUXOCORD 35.25-2D is used as the trail wire when two wire tandem welding or FLUXOCORD 35.25-3D is used as the central wire in a three wire configuration. A medium-basic SAW welding flux OERLIKON OP 122 is used, thus combining good operating characteristics in the multi-wire process with good weld mechanical properties.



Arrangement of wire electrodes and position of the welding head for submerged-arc welding using the FMI process

Single Pass one sided welding

This technique is used when access for the second run is not available, or it is not possible to turn the plates. Consideration can be given to ceramic and Cu rails with flux backing as the means for securing the weld pool. To ensure reliable penetration during welding and more favourable welding of the joint using the square butt weld preparation, the plates are set in position with a gap of 3 mm. The table shows the process-specific data in respect of joint preparation and process parameters for plate thicknesses <15 mm. The weld beads are free of any internal or external welding defects and for all welds, hardness surveys showed the absolute values to be an average of 200 HV 10, thus representing a regular, non-critical level. For the impact toughness of the weld metal, apart from the weld metal composition, there are several influencing factors, such as the number of wire electrodes, plate thickness and type, weld pool backing and heat input per unit length (of weld), however >60 J at -20 °C in the weld metal is achieved at these high deposition rates.

Id. No	Base material	Joint preparation and structure	Welding process and welding consumables		I (A)	U (V)	Vs (cm/min)	E (kJ/cm)	Deposition Rate (kg/h)
1	A		FMI 2-wire	1.Head OE A 105	750 G+	32	100	29,5	20,5
				2. Head FC 35.25-2D	700 ~	36			
2	D 36		Submerged arc single wire	FC 35.25	850 G+	32	40	39,8	13,5
3	A		FMI 2-wire	1. Head OE A 105	950 G+	32	90	43,1	28,5
				2. Head FC 35.25-2D	900 ~	36			

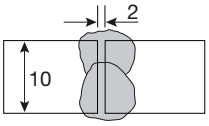
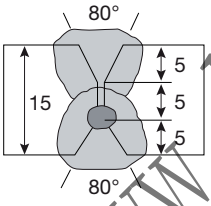
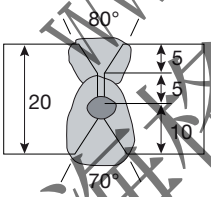
Process-specific data for single-pass one-sided welding at s = 10 to 15 mm (welding flux OERLIKON OP 122)

Two pass welding

The 2-run welding technique can also be used for plates <15 mm using a square edge butt. In this plate thickness range, the impact toughness requirement will determine which weld preparation is necessary. As the degree of dilution is reduced, joint strength is increased and in general, the included angle is 60°- 80°, depending on the wall thickness and suitable joint preparations are both symmetrical and asymmetrical DY seams with a root face of ~6 mm.

The plates are tack welded right through from one side using the MIG process. In this way and apart from clamping, there is also an additional securing effect produced for the weld pool. The tack welded side is generally welded last.

In the table, examples of welds on plates of 10 - 20 mm welded with FMI / 2-wire and 3-wire variants are shown with weld toughness levels >120 J at -20 °C.

Id. No	Base material	Joint preparation and structure	Welding process and welding consumables		I (A)	U (V)	Va (cm/min)	E (kJ/cm)	Deposition Rate (kg/h)
4	D 36		FMI / 2-wire	Layer 1. Head OE A 105	550 G+	32	110	20,4	17
				Layer 2. Head FC 35.25-2D	550 ~	36			
				2nd run 1. Head OE A 105	620 G+	32	110	22,6	18
				2nd run 2. Head FC 35.25-2D	6000 ~	36			
5	D 36		FMI / 3-wire	Layer 1. Head OE A 105	650 G+	32	150	26,5	26,5
				Layer 2. Head FC 35.25-3D	650 ~	35			
				Layer 3. Head OE A 105	650 ~	38			
				2nd run 1. Head OE A 105	800 G+	32	150	31,4	31
				2nd run 2. Head FC 35.25-3D	750 ~	35			
				2nd run 3. Head OE A 105	700 ~	38			
6	H II		FMI / 3-wire	Layer 1. Head OE A 105	780 G+	32	140	33,0	30
				Layer 2. Head FC 35.25-3D	730 ~	35			
				Layer 3. Head OE A 10	700 ~	38			
				2nd run 1. Head OE A 105	950 G+	32	140	40,7	39
				2nd run 2. Head FC 35.25-3D	900 ~	35			
				2nd run 3. Head OE A 105	850 ~	38			

Process-specific data for the two-run welding technique at s = 10 to 20 mm (welding flux OP 122)

Associated Products

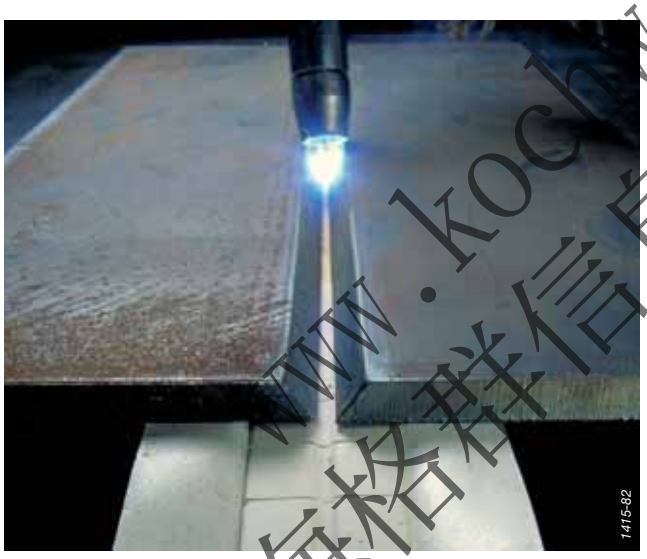
KERALINE CERAMIC BACKING

Welding root runs on ceramic backing is a technique mainly used when single sided welding with MIG solid wire and cored wires. The root is deposited directly onto the ceramic backing and requires no gouging, grinding or post weld dressing.

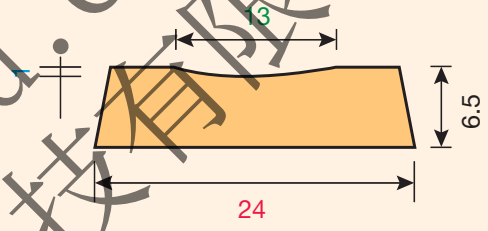
High levels of penetration are achieved and the risk of lack of fusion is minimised to leave a smooth profile of the root pass.

The KERALINE range of ceramic backings is extensive, comprising 14 different profiles, however KERALINE TA 3 and TM 1 are used extensively by shipbuilders.

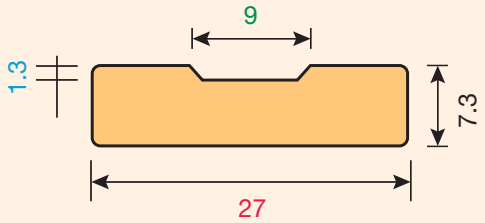
(For more details visit www.oerlikon-welding.com).



KERALINE TA 3 is a ceramic with a 13 mm wide root profile. This ceramic is backed with aluminium tape, which is self supporting once in place. Mainly used when metal cored and solid wire MIG/MAG welding.



KERALINE TM 1 ceramic backing is metallic backed with a 13 mm wide root profile. TM 1 is mainly used when flux cored wire and submerged arc welding and with higher heat inputs and wider root gaps.



ALUMINIUM ALLOYS

5000 series wrought aluminium alloys contain Mg as the major alloying element and are used in shipbuilding, particularly for ferry construction, due to the combination of weight and corrosion resistance. During fabrication using the MIG and TIG processes, attention should be given to shielding gas purity and cleaning techniques.

The CITOWAVE power sources have special operating modes used when welding aluminium alloys, the spray modal and cold double pulse modes, which reduce micro porosity, increase penetration and minimise distortion when welding, see p.18, 19.

MIG/TIG

ALUFIL/ALUROD AlMg4.5Mn are 5183 grade aluminium alloy MIG wire and TIG rod respectively used for welding 5083, and similar alloy grades, requiring a combination of corrosion resistance with high joint strength and toughness

ALUFIL/ALUROD AlMgTi5Mn are 5556A grade aluminium alloy MIG wire and TIG rod respectively used for matching strength joints in 5083 alloy with a very high resistance to marine corrosion.

STAINLESS STEELS

MMA

The SUPRANOX range of rutile coated manual metal arc welding electrodes is designed to enable the diversity of stainless steels - plates, pipes, tubes, castings and forgings - to be welded both to themselves and to each other. Smooth operation in all positions with minimal spatter and near self releasing slag for excellent weld bead appearance and profile. The SUPRANOX range also has a proven resistance to both weld start and weld bead porosity giving high radiographic integrity. This makes these electrodes particularly suitable for the most critical applications.
The SUPRANOX range of MMA welding electrodes is as follows: 308L, RS308L, RS308H, 347, RS347, 316L, RS316L, 317, 318, 309L, RS309L, 309MoL, RS309Mo, 310, RS310 & 904L.

MIG/TIG

A comprehensive range of OERLIKON INERTFIL and INERTROD wires for all applications, e.g. 308L, 347, 316L, 309L & 312.

FCW

A comprehensive range of OERLIKON FLUXINOX stainless cored wires for applications in the primarily down hand, e.g. FLUXINOX 316L and positional e.g. FLUXINOX 316L-PF applications. Including alloys 308L, 308H, 347, 307, 316L, 318, 309L, 309MoL, 22.9.3L and 310.

SAW

OP 33 is a special semi-basic agglomerated flux with a basicity index of 1.8. It is used for the welding of stainless and heat resisting steels. In respect to the carbon content of the weld metal, OP 33 is neutral. Typically used with AWS A5.9 grade 300 series wires, e.g. OE-316L, OE-308L, OE-309LMo

DUPLEX STAINLESS STEELS

Duplex stainless steel (e.g. W.No. 1.4462) is used for pipe lines, vessels and pipe work. Matching consumables are available:

MMA

SUPRANOX RS22.9.3L is an MMA electrode depositing Cr-Ni-Mo-N duplex stainless steel weld metal, highly resistant to intergranular pitting and stress corrosion in the presence of hydrogen containing aqueous solution or wet gases.

MIG/TIG

INERTFIL/INERTROD 22.9.3 are solid wires depositing duplex stainless steel weld metal.

FCW

FLUXINOX 22.9.3L is optimised for down hand fillet welding and FLUXINOX 22.9.3L-PF for positional welding of duplex stainless steels.

SAW

OE-S22 09/OP 33 is used for the high deposition rate welding of duplex stainless steels.

CUPRO-NICKEL ALLOYS

Cupro-nickel alloys are used for anti-fouling pipework

MMA

SUPRANEL NiCu7 is used for the manual welding of cupro-nickel alloys.

MIG/TIG

NIFIL/NIROD NiCu 7 are cupro-nickel MIG and TIG wires used for the welding of 70/30, 80/20 and 90/10 cupro-nickel alloys.

MIG/MAG manual installations

CITOMAG 500W / DV 44i D37 (Thyristor technology)

Optimised performance and advanced functionality:

An established choice for MIG/MAG welding, the proven technology for heavy duty MIG/MAG welding ensures extreme reliability. The use of 6 thyristors gives good welding performance even at low currents when welding in difficult positions. A harness of < 50 m can be used for remote access applications.

Product features and advantages:

- Simple to use,
- Synergic and manual adjustment,
- Digital display and pre-setting,
- Wire feeder 4 rollers,
- Purge gas,
- Wire feed advance without power,
- 2T / 4T / modes,
- Built-in crater filler function,
- Pre-gas, burn back and post gas times adjustment,
- Arc extinction device,
- Adjustable voltage striking,
- Arc dynamics adjustment,
- Missing phase detector,
- Disengageable fan,
- Inversion of polarity,
- 2 lifting eyes,
- Reliability and robustness,
- Multi-voltage.

CITOMAG 380i

CITOMAG 380i is the best technical choice for conventional welding applications. The technology used, inverter and digital control results in better welds with increased welding productivity. The continuous welding adjustment combined with synergic curves and the possibility to memorise the parameters brings both welding comfort and efficiency.

Quality welding

The advanced digital control of the inverter is a guarantee of quality welding:

- Constant penetration: compensate torch movements,
- Easy striking: allows better weld starting,
- Digital arc control: control the current and the voltage during the arc cycle, reducing spatter,
- Hard-Soft Arc selection: to select the arc type that best fits the need, hard for stability, soft for less spatter.

Ergonomic - Versatile

- Soft switching inverter: compact and light power source,
- Modular configuration: separate cooler, trolley, trolley for wire feeder,
- Automation interface: built in automatic interface, V-I regulation through remote control connection.

CITOMAG 380i is particularly well suited for MIG/MAG and flux cored wire welding in the widest range of structural and alloy steel applications. MMA welding functionality is also available for electrode diameters up to 5 mm.

CITOPULS AND CITOWAVE (Inverter technology)

With pulsed current and spray modal, special for aluminum. The state of the art in inverter technology. Highly reliable power sources representing leading edge process development.

CITOPULS MXW

Product features and advantages:

- Regulation and numerical controls: total control of power supply wave forms for an improvement of the processes, and of the thicknesses, and exact parameter reproduction,
- Increased power (Voltage/Current): increases the arc rigidity with pulsed mode, which improves penetration and allows a good fusion of “hard-to-weld” wires,
- More processes: Soft current, Speed Short Arc™ (SSA™), pulsed and MMA,
- More memory: 121 welding programs on CITOPULS MXW for all welding applications; The remote control box also allows memorisation of 10 programs,
- More cycles: 2T / 4T/ Spot weld / Cold Double Pulse current (CDP),
- More options: large options offer in order to make the welding process easier and safer,
- Potentiometer torch.

Process advantages:

This new generation of power sources provides new welding methods able to meet new quality and productivity levels to answer the needs of the shipbuilding industry.

CITOWAVE MXW

Product features and advantages:

Same as the CITOPULS range with in addition:

- Control of aluminium welding (Spray Modal™): special welding transfer which provides reduced porosity and increases the penetration,
- Advanced torch "DIGITAL": a range of ergonomic torches with the possibility on the handle to - select the program number - adjust the wire feed speed - adjust the arc length,
- More processes: Soft current, Pulsed, SSA, SSP, SM,CDP, MIG brazing, MMA, and PR Spray,
- More memory: 153 welding programs on CITOWAVE MXW for all welding applications. The power sources also allow memorisation of 100 programs, selectable from the wire feeder, remote control and CITORCH M E family,
- More controls: parameter monitoring, indication of defects, parameter blocking on several levels, printing, 99 programs, calibration…
- More cycles: 2T / 4T/ Spot weld / Cold Double Pulse current (CDP).

Portable wire feeder DM YARD M

Compact, light (12.5 kg) and rugged wire feeder for MIG/MAG inverter pulsed power sources. The wire feeder can be tailor made for any specific applications, and can be equipped with flow meter, digital display, program management and a double connector for MIG and MMA electrode holders. The design focus combines robustness with lightweight, for safe working in restricted areas, such as inside a hull. Using special cables, welding can take place at 50 m from the power source. In addition to the standard wire feeders for 200 mm and 300 mm spools, the unit dimensions are designed to pass through a manhole. Special wire feeders such as the DMY 4000 WKS are used. The MIG-MAG power sources can be equipped with customised wire feeders for 200 and 300 mm spools and harnesses, and fitted with torches with digital and/or analogic regulation.

Technical specifications:	CITOMAG 380i	CITOMAG 500W	CITOPULS 420	CITOPULS 520	CITOWAVE 400	CITOWAVE 500
Technology	Inverter	Thyristor	Inverter			
Primary power supply (3 phase)	400 V (+/-) 15%	220/230/240/380/ 400/415/440 V	400 V			
Primary consumption @ I max	16.4 kVA	45 A (400 V)	35 A	45 A	35 A	45 A
Welding current	30 A (400 A)	40 A - 520 A	20 A - 420 A	20 A - 500 A	20 A - 400 A	20 A - 500 A
Duty cycle 10 min. cycle (at 40°C)	350 A @ 60%	520 A @ 60%	400 A @ 60%	500 A @ 60%	400 A @ 60%	500 A @ 60%
Suitable wire diameter	0.8 to 1.2 mm	0.8 to 1.6 mm	0.8 to 1.6 mm			
Dimensions (L x W x H)	640 x 250 x 428 mm	1120 x 712 x 1300 mm	845 x 380 x 855 mm			
Net weight	31 kg	185 kg	107 kg			

Process	Definition	Customer advantages	Power source
Speed Short Arc™ (SSA)	The Speed Short Arc™ allows a high travel speed due to a rigid arc and a cold regime. It is very effective for welding thin steel plates, working in position and in closed angle and filling bevels. The SSA™ is used for short circuit welding though the normal globular regime travel speed domain.	■ Increase in travel speed ■ Reduced distortion (thin steel sheets) ■ Suited to welding in position ■ Tolerance and usability	CITOWAVE CITOPULS
Spray Modal™ (SM)	Spray Modal™ is a process that strongly reduces micro porosity and increases penetration. It can be used in all positions and is particularly effective on aluminium sheets greater than 3 mm. Spray-Modal™ uses a low-frequency modulated current which has the effect of removing hydrogen bubbles from the weld pool before solidification.	■ Reduces porosity ■ Increases penetration ■ All-position welding ■ Higher travel speed	CITOWAVE
Soft Silence Pulse™ (SSP)	The Soft Silence Pulse™ is a quieter pulsed mode mainly intended for stainless steel welding applications. The SSP™ produces a softer but very stable arc with good wetting of the weld bead. This waveform significantly reduces spatter and gives a very fine appearance to the weld bead.	■ Reduction of noise ■ Good wetting of the weld bead ■ Reduction of spatter ■ Good weld bead appearance	CITOWAVE
Cold Double Pulse™ (CDP)	The Cold Double Pulse™ produces very high quality welds on thin material while avoiding distortion. CDP™ gives a TIG appearance to the weld and is very effective on very thin aluminium or stainless steel sheet (< 2 mm). The operating technique is made easier due to good control of the weld pool even on badly-prepared sheets. This sequencer mode automatically chains hot arc and cold arc regimes together.	■ Effective on thin sheets ■ Reduces distortion ■ Easy operating technique ■ TIG appearance weld bead	CITOPULS CITOWAVE

Power sources for MMA electrodes


2570-07

OERLIKON propose a wide range of equipment for MMA welding. Here is a selection of units for on site applications in all conditions.

CITOARC 1800i

- Portable unit for light applications, maintenance operations and finishing,
- Generator compatible with a built-in Voltage Reduction Device, for welding all types of MMA electrodes, including cellulosic, with an advanced TIG option,
- Inverter technology.


2007-268

CITOARC 3500i

- Multi-process (MMA, Gouging, TIG DC, MIG) inverter unit,
- Welding MMA electrodes up to Ø 6.3 mm,
- MIG welding with the DV 4004 wire feeder option,
- CC/CV 3phase unit,
- Weighing only 29 kg.


2006-762

CITOARC 1800HPF

- Very light and portable unit for maintenance,
- Ultra flexible for light duty and flexible finishing applications.


2009-092

CITOROD 6500 TH

- For the heaviest duty applications including arc air gouging,
- Thyristor technology,
- Multiprocess (MMA, Gouging, TIG DC, MIG) - 3phase unit,
- Possibility of MIG/MAG welding using DEVIDARC an autonomous wire-feeder.


2007-478

Technical specifications:		CITOARC 1800i	CITOARC 1800 HPF	CITOARC 3500i	CITOROD 6500 TH
Primary					
Power supply		230 V single-phase	230 V single-phase	400 V three phase	230 - 400 - 440 V three phase
Effective consumption		19 A	15 A	28.5 A	130 - 75 - 68 A
Secondary					
Open circuit voltage		108 V (14 V rest voltage)	44 V	91 V	75 V
Welding current		5 - 160 A	10 - 180 A	5 - 350 A	30 - 630 A
Duty cycle 10 min. cycle (at 40 °C)		160 A at 30%	180 A at 20%	350 A at 35%	630 A at 35%
Diam. Electrode	MMA	1.6 to 4.0 mm	1.6 to 4.0 mm	1.6 to 6.0 mm	1.6 to 6.3 mm
	Gouging	-	-	Up to 6.3 mm	Up to 10 mm
Dimensions (L x W x H)		400 x 180 x 300 mm	170 x 320 x 395 mm	525 x 300 x 390 mm	820 x 510 x 570 mm
Net weight		9 kg	6.6 kg	29 kg	190 kg

Arc equipment for large fabrication sites and shipbuilding

OERLIKON has complete ranges of TIG equipment and Manual Plasma cutting units for all applications.

TIG Welding

CITOTIG

Optimised performance and advanced functionality:

- CITOSTEP double current level function, allows the power input to be changed without interruption when welding,
- Synergic pulse function, for ease of setting the pulsed current parameters,
- Storage facility for welding parameters,
- Reliability designed in with an efficient isolated cooling system which prevents dust and small metal particles from penetrating the machine interior,
- Optional low voltage OCV with Voltage Reduction Device available,
- Generator compatible.

The DC sets are used for TIG welding stainless and structural steels and have the flexibility to weld with all types of MMA welding electrodes, with excellent arc characteristics, in addition the AC/DC installations can be used for welding light alloys.

Technical specifications:	DC welding	
	CITOTIG 200 DC	CITOTIG 400 DC W
Primary		
Power supply	230 V single-phase	400 V three-phase
Consumption	15 A	11 A
Secondary		
Open circuit voltage	80 V	80 V
Welding current	5 - 200 A	5 - 400 A
Duty cycle 10 min. cycle (at 40°C)	200 A at 30%	285 A at 60%
Diam. Electrode	1.6 to 4.0 mm	1.6 to 6.0 mm
Other		
Dimensions (L x W x H)	410 x 180 x 390 mm	500 x 180 x 650 mm
Net weight	15 kg	33 kg
Cooling unit	No	Yes

Plasma Cutting

CITOCUT 10KT

Portable cutting unit

The CITOCUT 10KT offers the possibility for quality cutting due to a powerful inverter module, built-in compressor and a simple digital display.

- Easy to use: simple interface with 1 adjustment knob and 2 selection keys for the parameters.
- Compressor: built in the machine and provides compressed air anywhere, easy for on site cutting.
- Powerful: maximum output current is 30 A. The machine is able to provide a quality cut up to 8 mm thickness.

CITOCUT 40i

Heavy duty portable cutting unit inverter technology

- Heavy duty cycle, 120 A at 60% at 40 °C,
- Quality cut, up to 40 mm,
- Contact cut, distance cut, plasma gouging,
- Blow back start, no HF interference,
- Grid cutting capability,

CITOCUT 40

High duty cycle Transformer

- High cutting capcity: 40 mm with 120 A.
- High duty cycle: 50% at 40 °C.
- 4 steps for setting the current according to the thickness to cut.
- IP 23 for indoor and outdoor applications.

Technical specifications:	CITOCUT 10KT	CITOCUT 40i	CITOCUT 40
Technology	Inverter	Inverter	Transformer
Max. thickness	8 mm	40 mm	35 mm
Primary Power supply	230 V - 50/60 Hz 1 phase	400 V 3 phase	220/230/380/400 V 3 phase
Max. consumption	22.4 A	40 A	40 A (400 V)
Cutting current	10 - 30 A	Up to 120 A	Up to 120 A
Dim. (L x W x H)	450 x 205 x 350 mm	720 x 310 x 430 mm	500 x 855 x 705 mm
Net weight	16 kg	35 kg	125 kg

Cutting & Welding OXYGAS Equipment for Shipyards


2009-474

OERLIKON blowpipes, pressure regulators and gas distribution equipment offer a comprehensive range designed to meet the specific requirements of major shipyards, often established as the equipment of choice by the workforce.
Safe and reliable design is associated with customised and optimised solutions to support the welder and to improve the work place.

Torches & Blowpipes

Cutting and gouging torches

A large range of blowpipes are available for cutting and gouging, covering the different requirements of national standards and custom and practise.
Different fuel gases: acetylene, propane, LNG (methane), ethane, etc.
Various cutting and gouging nozzles (IC - G1 - others).

Some examples:

› COPELMATIC: The unique cutting torch with piezo ignition + adjusting pre-setting + adjusting memory

› SOVAG: Specially designed for demanding working environments, robust and safe


2007-697

› PYRONAVAL: Specifically developed for shipbuilding

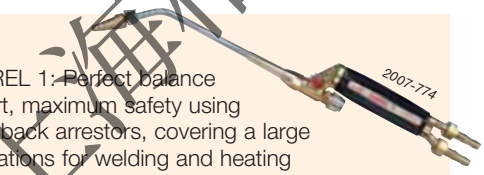
2007-811

Welding and Heating blowpipes

Though a minor activity, manual oxygas welding and heating is often used in shipyards and the range includes either combined blowpipes, with a common shank and related multi function attachments, or mono-function dedicated blowpipes.

Some examples:

› FAREL 0 & FAREL 1: Perfect balance for best comfort, maximum safety using integrated flashback arrestors, covering a large range of applications for welding and heating

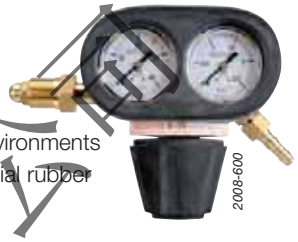

2007-774

› PYRELMATIC: The corresponding application of COPELMATIC for heating: piezo ignition + adjusting pre-setting + adjusting memory

Pressure Regulators

Cylinder gas regulators

DELTAREG B-08 armoured regulators, an ideal solution for severe working environments due to metallic reinforcement and special rubber protection for the pressure gauges.


2008-600

Gas distribution equipment

Oerlikon technical service is able to propose and if necessary customise solutions for indoor and outdoor gas distribution using the most advanced and practical components and assemblies, with safety the primary consideration.

MODULGAS Wall Gas Outlet stations: modular second stage outlet stations suitable for all gases.

› Fixed multiple gas outlet stations and safety devices for piping

› Mobile Multiple Gas outlet stations


2009-472

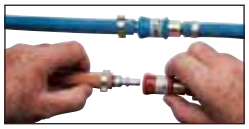
Safety devices and accessories


2004-430/431

› Flash back arrestors SECURTOP 662 and 665

› Quick couplings QUICKMATIC


2004-819


2004-823

› Rubber hoses


0876-71

Fume Extraction
Installations, Equipment and Tooling


2009-469

OERLIKON offers a modern and complete range of solutions for the extraction of welding fumes and air ventilation in order to ensure the workforce an improved working environment in full conformance with current legislation and directives.


2009-051

Solutions for ship building - inside

- High and medium vacuum centralised units from 1.000 to 6.000 m³/h,
- Aspiration arms with filtering units,
- Ergonomic welding stations with fume extraction integrated MIG torches and nozzles,
- Push-Pull plus diluter whole room installations.

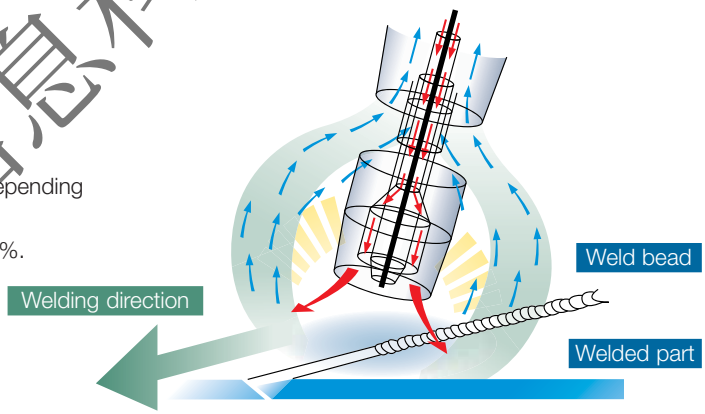
Solutions for ship building - outside

- High and medium vacuum centralised units from 1.000 to 6.000 m³/h,
- Forced ventilation plants,
- MIG torches and nozzles with integrated fume extraction,
- Welding masks with respiration system.

WST: MIG Welding Suction Torches

Indirect fume collection for extraordinary efficiency

The fume collector is fixed and placed 7 cm above the molten pool. From that distance, with an extraction air volume of 80 - 130 m³/h, depending on the type of torch, **the collection zone is larger than with direct collection**, and the percentage of collected fumes is close to 90 - 95%. The collection process has no direct effect on the shielding gas and the **quality of the welds is protected in all welding positions**. Also, the collector is fixed (not adjustable), to guarantee **optimal conditions at all times**.



Centralised high suction units

A range of units for connecting extraction torches to a centralised system, that can handle torch fumes and also ground dust, fumes from collection nozzles and grinders with integrated extraction.

- Central units only 1, supplemented by filtration 2 or in compact version 3
- Suction flow: 1 000 - 2 000 - 3 000 - 4 500 m³/h with 20 000 or 25 000 Pa constant suction.
- The motor power adapts automatically to the number of torches connected to the system.

Equipment for submerged arc welding

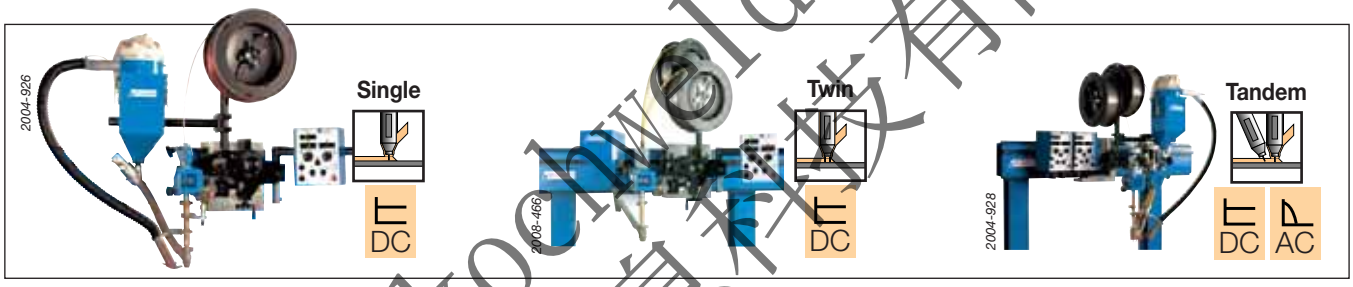
WELDING HEAD

SUBARC 5 standard welding heads

A complete range of high-performance equipment using microprocessor technology to combine performance, flexibility of use and guaranteed high reliability in welding cycle management.

For the most demanding applications, SUBARC 5 is a compact welding and hard surfacing installation. It allows accurate pre-setting and pre-selection of the actual welding current and voltage parameters for excellent arc striking every time:

- **submerged arc welding:**
  - direct current: flat or drooping power source characteristics.
  - alternating current: drooping power source characteristic.
- **MIG/MAG** (spray-arc transfer).
- **Single, twin and tandem options** with flux recycling system.

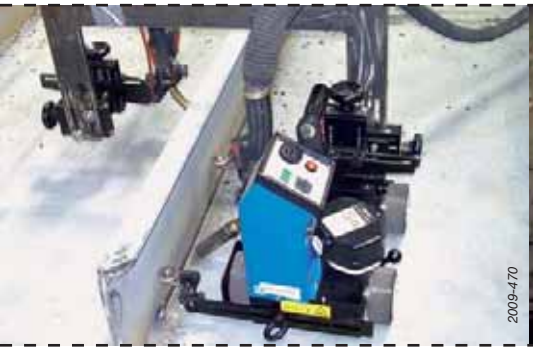


STARMATIC power sources

- Rugged, reliable, suitable for aggressive industrial surroundings.
- Fan-cooled, fitted with thermal cut-out, easy to move using crane or forklift.
- Quick connection to the core of the installation by simple and accessible connectors.
- Remote control system.
- Function type:
  1 - SAW direct current (DC).
  2 - SAW alternative current (AC).
  3 - SAW gouging arc.

	STARMATIC 1303 DC	STARMATIC 1003 AC/DC	
Duty cycle at 100%	1 300 A - 44 V	1 000 A - 44 V	
Welding range	2 DC	1 AC - 1 DC	
Primary power supply	400-440 V 50/60 Hz* three-phase	380/400/415 V 50/60 Hz* three-phase	
Technology	Thyristors	Thyristors	
Power at 100% duty cycle	99 kVA	64.6 kVA	
External-static characteristics		AC	DC
- flat	■	■	■
- drooping	■	■	■
Net weight	483 kg	540 kg	

** For other primary power supply three-phase, consult Air Liquide Welding.*


2009-470


2662-16

SAW self propelled tractor.

MEGATRAC 6
SUBARC 3C

- Modular S.A. carriage which can be adapted to various applications.
- Flat and angle assembly of plates in all grades and thicknesses.
- Wheel diameter: 150 mm.
- Crabbing arms.


2008-337

MIG/MAG carriages

WELDYCAR

WELDYCAR is a carriage designed for semi-automatic one torch welding operations in various positions (horizontal, inclined plane, vertical).


2008-509

WELDYSTIFFENER

WELDYSTIFFENER is a carriage able to support two MIG/MAG torches. The design is specially made for the welding of Holland profiles (stiffeners) on a plate.

3A WELDING SYSTEM
a new generation of mobile console control device

The 3A Welding System plug & play Mobile Console gives the operator complete mobility and permits the management of both machine and process. This new generation user-friendly interface is easy to use and operators are rapidly able to program the machine efficiently. The multipurpose 3A welding system concept is designed for all arc welding processes, and the equipment remains upgradable with the open architecture.

3A WELDING SYSTEM®
Advanced Automatic Architecture

Advanced mobile console
- Centralised console
- Mobile plug & play system
- User friendly-interface

Automatic machine management
- Process management
- Machine cycle control
- Integrated peripherals

Architecture based on new concept
- Modular and flexible solutions
- Full digital control
- Ready for networking and communication

Mobile console: browsing on the screens with a graphic representation of the machine.

Heavy duty custom machines

OXYTOME / PLASMATOME RS & TWIN RS - CYBERTOME open the way to all oxycutting and plasma arc cutting operations that require the use of machines capable of cutting very wide plates and implementing more complex options.

OXYTOME RS

PLASMATOME TWIN RS

Reinforced structure for OXYTOME / PLASMATOME (RS)
For plates wider than 4 m or for certain equipment, a reinforced structure is used to ensure movement stability and precision.

TWIN RS structure for OXYTOME / PLASMATOME
The TWIN RS structure is designed as a double transversal beam equipped with liner guides and bearing, located in a safety position away from heat radiation. This machine is specially suitable for bevelling head applications requiring a transversal cutting stroke over 4 m or tool holder of 800 mm. Finally, the accuracy of this machine is particulary suitable for HP plasma applications.

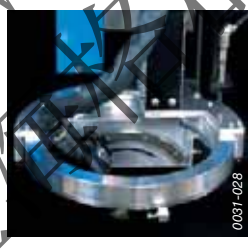
CYBERTOME

Designed as a “machine tool” concept, stated in terms of accuracy and repeatability according to current standards. This design can be modified to accomodate special requirements, and allows sheet metal cutting of 8 m width and more.

Bevelling system

Plasma longitudinal

This system allows the operator to manually tilt the torch in order to work plasma bevels along the longitudinal axis.



Plasma straight

This system is used to work bevels along the axes using a plasma torch. For further details on this option, please contact Oerlikon service.

Plasma bevelling head

System rotation and tilting are entirely servo-controlled by the HPC digital process controller which makes it possible to program a bevel angle change during a run. This light but rugged system guarantees excellent cutting results.

V X K Straight line bevelling unit

For bevelling along the machine axes with mechanical sensing.

V X K endless rotation bevelling unit

Can be fitted on Cybertome Numerical control programs the blowtorches positions. It can work V, X, or K type bevels from 0 to 45° for plates up to 60 mm thick (other possibilities on request).

AZURMATIC cutting tables

3 models of table adapted to the process of cutting

Extraction table for dry cutting

The AZURMATIC table with air extraction offers unrivalled efficiency in terms of fume extraction due to its unique system of transverse extraction ducts.
Robustly designed in one-piece or modular form, the table is divided over its length into 1 metre sections, extraction taking place across the full width of the table on the module in operation only. Mechanical grills actuated by the displacement of the machine provide suction under the sheet at the place of cutting only.
This principle of operation guarantees optimum extraction, irrespective of the size of the sheet being cut, while maintaining a modest extraction air-flow rate.

Technical characteristics:
- Transverse duct extraction system,
- Division into 1 metre sections over the length of the table (500 and 750 mm sections on demand for intensive use),
- Removable slag boxes,
- Removable workpiece supporting frame with flat irons (section 100 x 6 mm) and wire mesh grid (50 x 50 x 5 mm),
- Maximum capacity: sheet up to 300 mm thick.

Constant water level extraction table

Various processes, especially plasma cutting with non-immersed water vortex, require a cutting table with water recovery and fume extraction.

This table provides both possibilities. This process (which is patented) avoids the need for filtering equipment upstream of fume extraction.

Technical characteristics:
- One-piece design divided into 630 mm sections,
- Standard lengths of 3 to 12 m,
- Standard widths: 1.5 - 2 - 2.5 and 3 m,
- Height: 700, 800 or 920 mm
- Maximum capacity: sheet thickness 50 mm.

Variable water level tables

Variable water level tables are specifically intended for immersed plasma cutting.
This procedure limits pollution by solid or gaseous matter and gives protection against audible and visual stress.
It improves accuracy of cutting while limiting distortion caused by heating of the workpiece.

Technical characteristics:
- Modular construction in lengths of 1.5, 1.75 and 2 m,
- Widths to demand,
- Pivoting workpiece support frame for easier, faster cleaning.

Accessories and PPE (Personal Protective Equipment)


2009-471

Air Liquide Welding through WELDLINE offers a wide range of tools and accessories dedicated for welding applications (cables, earth clamps, torches, brushes and hammers, sprays…) as well as personal protective equipment for the welder (gloves, clothing, goggles, mask…) and for the workshop (strips, curtains etc.).

Ovens


2008-574

2008-579

A full range of portable quivers, holding and re-baking ovens for MMA electrodes and hopper ovens for flux.

Cables and connectors

Primary and secondary cables, solid copper meeting the international standards requirements.


2000-174


2007-814

Sprays

Anti-spatter (SPRAYMIG), crack detection products (SKINCRIC), leak detection (BUBBLE).

SPRAYMIG *BUBBLE* *SKINCRIC*

Welder Protection

A complete range of helmets, leather and cotton clothing, glasses, gloves and shoes. The ZEPHYR helmet ensures comfort and protection with a new high performance liquid crystal cell, extra-wide vision and extreme reliability. The ZEPHYR is equipped with a forced air flow system preventing welding fume from infiltrating into the welder's helmet. The filter and protection screen are easy to extract, with pressure on the push button. Adjustable head gear (4 positions) with an optimised design to ensure good protection of the head, and light weight for comfort.


2008-247

OERLIKON

Contacts

BELGIUM
AIR LIQUIDE WELDING BELGIUM SA
Z.I. West Grijpen - Grijpenlaan 5 - 3300 TIENEN
Tel.: +32 16 80 48 20 - Fax: +32 16 78 29 22

CHINA
SAF SHANGHAI REP.OFF.
Rm 722 Pine City Hotel
777 Zhao Jia Bang Lu - SHANGHAI 200032
Tel.: +86 21 64 43 89 69 - Fax: +86 21 64 43 58 97

CZECH REPUBLIC
AIR LIQUIDE CZ S.R.O. - Welding and Cutting
Podnikatelská 565 - Areál SVUM - 190 11 PRAHA 9 - Búchovice
Tel.: +420 274 023 163 - Fax: +420 274 023 233

FRANCE
AIR LIQUIDE WELDING FRANCE
13, rue d'Épluches - BP 70024 Saint-Ouen l'Aumône
95315 CERGY PONTOISE Cedex
Tel.: +33 1 34 21 33 33 - Fax: +33 1 34 21 31 30

GERMANY
OERLIKON SCHWEISSTECHNIK GmbH
Industriestrasse 12 - D-67304 EISENBERG/PFALZ
Tel.: +49 6351 4760 - Fax: +49 6351 476 335

HUNGARY
AIR LIQUIDE HUNGARY - Welding & Cutting
Krisztina krt. 39/b - H-1013 BUDAPEST
Tel.: +36 1 339 8650 - Fax: +36 1 339 8649

ITALY
FRO-AIR LIQUIDE WELDING ITALIA
Via Torricelli 15/A - 37135 VERONA
Tel.: +39 045 82 91 511 - Fax: +39 045 82 91 536

LUXEMBOURG
AIR LIQUIDE WELDING LUXEMBOURG S.A.
5 rue de la Déportation - BP 1385 - L-1415 LUXEMBOURG
Tel.: +352 48 54 56 - Fax: +352 48 54 57

MALAYSIA
SAF-OERLIKON MALAYSIA SDN BHD
No 10, Jalan TPP 5/1
Taman Perindustrian Puchong - 47100 PUCHONG, SELANGOR
Tel.: +603 8060 8638 - Fax: +603 8061 6201

NETHERLANDS
AIR LIQUIDE WELDING NETHERLANDS
Rudonk 6 B - NL 4824 AJ BREDA
Tel.: +31 76 541 00 80 - Fax: +31 76 541 58 96

POLAND
AIR LIQUIDE WELDING POLSKA , SP. Z.o.o
UL. Porcelanowa 10 - 40-246 KATOWICE
Tel.: +48 32 609 04 50 - Fax: +48 32 609 04 60

PORTUGAL
AIR LIQUIDE SOLDADURA LDA
Rua Dr. António Loureiro Borges, 4-2° Arquiparque
Miraflores - 1495-131 ALGÉS
Tel: +351 21 41 64 900 - Fax: +351 21 41 69 40

ROMANIA
DUCTIL
Aleea Industriilor Nr 1 - 120224 BUZAU
Tel.: +40 238 722 058 - Fax: +40 238 716 861

RUSSIA
AIR LIQUIDE WELDING
17 Warontsovskaya Str. - 109147 MOSCOW,
Tel.: +7 495 641 28 98 - Fax: +7 495 641 28 91

SCANDINAVIA
OERLIKON SKANDINAVIEN AB
Krossverksgatan 7 - 216 16 LIMHAMN
Tel.: +46 (0)40 670 15 00 - Fax: +46 (0)40 670 15 01

SLOVAKIA
AIR LIQUIDE WELDING CENTRAL EUROPE S.R.O.
Hlohovecká 6 - 951 41 NITRA - LUŽIANKY
Tel.: +421 37 692 4610 - Fax : + 421 37 651 28 04

SPAIN
OERLIKON SOLDADURA SA
Polígono Industrial la Noria Carretera de Castellon
Km-15.500 - 50730 El Burgo de Ebro - ZARAGOZA
Tel.: +34 976 10 47 00 - Fax: +34 976 10 42 67

SWITZERLAND
OERLIKON SCHWEISSTECHNIK AG
Mandachstrasse 54 - CH 8155 NIEDERHASLI
Tel.:+41 44 3076 111 - Fax: +41 44 3076 112

THAILAND
AIR LIQUIDE WELDING THAILAND Co. Ltd.
40 Moo 6 - Ramindra Road Km 9.5 - KHANNAYAO, BANGKOK 10230
Tel.: +66 29 43 2250 - Fax: +66 29 43 2256

UAE
AIR LIQUIDE WELDING MIDDLE EAST FZE
Jebel Ali free zone warehouse No. FZS1AH05
P.O. BOX 18734 - Jebel Ali - DUBAI
Tel.: +971(0)48861606 - Fax: +971(0)48861608

U. K.
AIR LIQUIDE WELDING Ltd
Low March / London Road - DAVENTRY - Northants NN11 4SD
Tel.: +44 1 327 70 55 11 - Fax: +44 1 327 70 13 10

UKRAINE
AIR LIQUIDE WELDING UKRAINE, Llc.
199, Moskovski avenue, office 339 - 61037 KHARKOV
Tel.: +38 (057) 728 08 52 - Fax : +38 (057) 728 08 53

Contacts for other countries

ALW International Development Department Italy
FRO - AIR LIQUIDE WELDING ITALIA
Via Torricelli15/A
37135 VERONA
Tel.: +39 045 82 91 511- Fax: +39 045 82 91 536

ALW International Development Department France
AIR LIQUIDE WELDING FRANCE
13, rue d'Epluches - Saint Ouen l'Aumône
95315 CERGY-PONTOISE Cedex
Tel.: +33 1 34 21 33 33 - Fax: +33 1 30 37 19 73

ALW International Development Department Switzerland
OERLIKON WELDING LTD
Mandachstrasse 54
CH - 8155 NIEDERHASLI
Tel.: +41 44 3076 111 - Fax: +41 44 3076 212

www.oerlikon-welding.com

AIR LIQUIDE
www.airliquide.com

Air Liquide is the world leader in gases for industry, health and the environment, and is present in over **75 countries** with **43.000 employees**. Oxygen, nitrogen, hydrogen and rare gases have been at the core of Air Liquide's activities since its creation in 1902. Using these molecules, Air Liquide continuously reinvents its business, anticipating the needs of current and future markets. The Group innovates to enable progress, to achieve dynamic growth and a consistent performance. Air Liquide combines many products and technologies to develop valuable applications and services not only for its customers but also for society.