Submerged Arc Wires & Fluxes
For decades, Air Liquide and Oerlikon have contributed significantly to the development of Submerged Arc Welding techniques. Wherever submerged arc welding procedures are used, Oerlikon and BLUESHIELD are recognized for their high quality products, backed by strong technical expertise.

**BLUESHIELD Submerged Arc Wires & Fluxes**

**BLUESHIELD LA 23**
- Agglomerated rutile flux designed for single or 1-3 pass welds at high speed with excellent bead appearance.
- Excellent for high-speed fillet on structural steelworks, beams, small tanks, LPG tanks, and pipe work.
- Used for welding on lightly scaled or moderately rusty materials with single or multiple wires.
- Excellent slag removal and smooth weld bead appearance in fillets and root passes.
- Very good properties at high speed (2 m/min), particularly with two thin wires.
- Suitable on DC or AC, in single or multi-wire up to 1200 A per wire.

**BLUESHIELD LA 46**
- Agglomerated semi-basic flux designed for single or multi pass welds.
- Impact properties down to -40°C (-40°F) with LA 12K wire.
- Used in shipbuilding, piping, tanks and pressure vessel, structural steel and offshore applications where impact properties are important.
- Can be used in single wire or multi wire applications.
- Suitable on DC or AC, in single or multi-wire up to 1000 A per wire.

**BLUESHIELD LA 59**
- Agglomerated fully basic flux designed for multi pass welds.
- Impact properties down to -60°C (-76°F) with LA 12K wire.
- Outstanding for tandem, multi-wire and twin wire welding
- Delivers a weld metal having excellent toughness properties and crack resistance.
- Used in shipbuilding, piping, tanks and pressure vessel, structural steel and offshore applications where impact properties are important.
- It is highly suitable for fillet welds and higher travel speeds up to 1000 mm/min (39 in/min)
- Suitable on DC or AC up to about 1000 A.

**BLUESHIELD LA 100**
- Agglomerated semi-basic flux used to weld 300 series austenitic stainless steels.
- Slightly additive in Cr
- Good mechanical characteristics at very low temperature (-196°C.)
- Suitable in single or multipass in shipbuilding, piping, tanks and pressure vessel.
- Excellent slag removal even in deep grooves, good bead wetting and smooth weld bead appearance.
- Suitable on DC up to 700 A.
Air Liquide offers an extensive line of products for submerged arc applications such as automotive, ship building, structural steel erection, oil platforms, bridges, pipes, containers, heat generators, and power plants.

We invite you to take advantage of BLUESHIELD and Oerlikon's know-how.

Oerlikon Submerged Arc Wires & Fluxes

OERLIKON OP 176
- Agglomerated manganese, silica-type flux for high-speed welding.
- Impact properties down to -30°C (-20°F) with LA 12K wire.
- Good re-circulation characteristics in automated flux recovery and re-circulation systems.
- Suitable for DC and AC for single wire, twin wire, tandem wire and other multi-wire systems.
- Particularly suited to the welding of spirally welded pipe, high-speed small filet weld, and is used for applications where welds are completed in two passes with one pass per side.

Features:
- Excellent bead shape appearance and self-releasing slag
- Stable operating characteristics over a wide range of parameters
- High current carrying capacity
- High-speed small filet welding with single, twin and multi-wire

OERLIKON OP 139
- Aluminate, semi-basic agglomerated flux for welding of carbon steel in single and multi-pass.
- Excellent impact properties down to -30°C (-20°F) with LA 12K wire.
- Suitable for use with both DC and AC and is ideal for single wire, twin wire, tandem arc (DC/AC) and other multi-arc up to 1300 amps.
- Heavy section structural steel, pipework, pressure vessels and process equipment in the power, chemical and petrochemical industries.

Features:
- Good low temperatures toughness and low hydrogen levels (max.: 5ml/100g)
- Very uniform welds, bead profile and excellent slag release
- High currents carrying capacity
- Excellent performance on circumferential welds and high speed on spiral welds

OERLIKON OP 121TT
- Fully basic fluoride-type flux for structural and high strength, fine-grained, low alloy steels requiring high-integrity welds with low temperature impact and CTOD properties.
- Impact properties down to -60°C (-80°F) with OE SD3 wire.
- Deposited weld metal has a low oxygen content optimized at approximately 300 ppm.
- Low hydrogen content and high resistance to moisture pick-up during exposure.
- For the welding of critical components in offshore structures such as oil platform jackets, piles, decks, modules, pressure vessels, and process plants where high resistance to brittle fracture is required.

Features:
- Excellent low temperatures toughness
- Short slag makes welding of small diameter component possible
- Exhibits very stable arc characteristics during use with excellent slag detachment
Cooperation realized on a partnership basis, always lead to success, if knowledge and competence, know-how and experience reasonably complement one another.

The result will be: a complete, high quality product supply for the whole facet of welding engineering, a comprehensive, technical service and development activity together with the dependability of a competent partner.

### Oerlikon Submerged Arc Wires & Fluxes

#### OERLIKON OP 33
- Fluoride semi-basic type flux for welding austenitic stainless and heat resistant steels.
- Behaves neutrally with regard to carbon content in the filler wire and therefore, extra low-carbon stainless steels can be welded.
- The metallurgical behavior of silicon and manganese is neutral and no burn-out or pick-up of these elements. Suitable for welding extra low carbon stainless steel of type 304L, 316L, 321, 347 and other austenitic Cr-Ni stainless steel.
- Single and multi-pass welding of plate, pipework and vessels in the chemical, petrochemical and power generation industries.

**Features:**
- Excellent stability in chemistry of weld deposit
- Welded seams exhibit a fine smooth rippled appearance
- Weld bead is free from slag residue and requires little or no post-weld cleaning.
- Even blending at the weld toe
- Self-releasing slag

#### OERLIKON OP 76
- Agglomerated fluoride basic type flux for the welding of austenitic and duplex stainless steels, fully austenitic steels and nickel alloys.
- Suitable for use with CrMo low alloy wires where low levels of residual elements are required.
- Behaves neutrally with regard to carbon content.
- The metallurgical behaviour of the flux in respect to silicon and manganese is neutral used in conjunction with duplex stainless steel wire produces weld metal with a PREN value of typically 33.
- For single and multi-pass welding of plate, pipework and vessels in the chemical, petrochemical, marine and power industries.

**Features:**
- Excellent weld bead shape and appearance
- Even blending at the weld toe
- **Bead requiring little or no post weld cleaning**
In our global economy, optimizing your productivity, improving the quality of your products and reducing your operation costs will give you the edge over the competition. This is the Omniweld Integrated Solutions offer. A division of Air Liquide, Omniweld Integrated Solutions is firmly backed by over 100 years of research and expertise in the field of Welding. Omniweld also offers laboratory services for SAW development.

### Technical Information

#### Wire Speed vs Amperage Curve (DC+, 25mm Stick out)

![Wire Speed vs Amperage Curve](image)

#### Wire Speed vs Deposition Rate Curve (DC+, 25mm Stick out)

![Wire Speed vs Deposition Rate Curve](image)
# Comparison Table

**BLUESHIELD & OERLIKON**

<table>
<thead>
<tr>
<th>Flux</th>
<th>Wire</th>
<th>AWS Class</th>
<th>Flux</th>
<th>Flux</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA 23</td>
<td>LA 12K</td>
<td>F7A0-EM12K</td>
<td>781</td>
<td>231, 350, 350M, 282, 585</td>
</tr>
<tr>
<td>LA 46</td>
<td>LA 12K</td>
<td>F7A4-EM12K</td>
<td>860, 865, 880, 960, 980</td>
<td>429, 429M, 439, OK 10.71</td>
</tr>
<tr>
<td>LA 59</td>
<td>LA 12K</td>
<td>F7A6-EM12K F7P6-EM12K</td>
<td>882, 880M, 8500, MIL800</td>
<td>651VF, 656, OK 10.61, 10.62</td>
</tr>
<tr>
<td>LA 100</td>
<td>ER308L-ER309L-ER316L</td>
<td>St-100, BLUEMAX 2000, 801, 802</td>
<td>OK 10.92, OK 10.93, 10.94</td>
<td></td>
</tr>
<tr>
<td>OP 176</td>
<td>LA 12K</td>
<td>F7A2-EM12K</td>
<td>714, 760, 761, 781</td>
<td></td>
</tr>
<tr>
<td>OP 139</td>
<td>LA 12K</td>
<td>F7A2-EM12K, F8A4-EA2-A2</td>
<td>860, 865, 880, 960, 980</td>
<td></td>
</tr>
<tr>
<td>OP 121TT</td>
<td>LA 12K</td>
<td>F7A6-EM12K F7A8-EH12K F8P6-EA2-A2 F9A6-EG-G, F9P6-EG-G</td>
<td>880M, 8500, MIL800</td>
<td>OK 10.61, 10.62</td>
</tr>
<tr>
<td>OP 33</td>
<td>ER308L ER309L ER316L ER347</td>
<td>ER308L ER309L ER316L ER347</td>
<td>ST-100, BLUEMAX 2000</td>
<td>OK 10.92, OK 10.93, 10.94</td>
</tr>
<tr>
<td>OP 76</td>
<td>Austenitic stainless, nickel based, heat resistant steel (CrMo alloy)</td>
<td>ER308L, ER309L, ER347L, ER2209, ERNiCr3, ERNiCrMo3, F8P6-EB3-B3 (High purity)</td>
<td>ST-100, BLUEMAX 2000, BLUEMAX LNS 4462</td>
<td>OK 10.92, OK 10.93, 10.94</td>
</tr>
</tbody>
</table>

This comparison guide is intended as an indication only to other manufacturers products. Every effort has been made to provide the nearest equivalent for each product and flux/wire selection should always be verified depending on application.

For further information or assistance contact Air Liquide at 1-800-817-7697.