TETRA S, TETRA V & TETRA SB
Stainless flux cored wires
Welding Alloys Group offer the world’s largest range of flux and metal cored welding wires for low, medium, high alloy hardfacing and cladding applications, mild steel fabrication, also stainless steel, nickel and cobalt based wires using its own manufacturing technology. The company also offers aluminium welding wires and covered electrodes. Advanced quality control systems ensure consumables meet or exceed industry standards while complying with relevant international approvals.

WA Group’s unique expertise comes from years of commitment to research and the development of innovative, highly specialised products and solutions designed to combat wear in a wide range of industrial applications. In addition, the Group offers a wide range of services from its WA Integra™ division. Using WA manufactured products, WA Integra™ engineers are able to provide welding and technical support to industries requiring wear control and performance optimisation, on-site or from one of our strategically located WA Integra™ Service Centres.

This catalogue presents a range of flux cored wires for use in the stainless steel industry. We will gladly examine any special requests, please do not hesitate to contact us.

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### Flux cored wires range

<table>
<thead>
<tr>
<th>TETRA GRADE</th>
<th>AVAILABILITY</th>
<th>TYPICAL CHEMICAL COMPOSITION</th>
<th>TETRA TYPICAL CHEMICAL COMPOSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TETRA S</td>
<td>TETRA V</td>
<td>TETRA (ALL WELD METAL)</td>
</tr>
<tr>
<td></td>
<td>1.0</td>
<td>1.2</td>
<td>1.6</td>
</tr>
<tr>
<td><strong>TETRA SB</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>307-G</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>308L-G</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>309L-G</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>309MoL-G</td>
<td>-</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>310-G</td>
<td>-</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>312-G</td>
<td>-</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>316L-G</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>317L-G</td>
<td>-</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>318L-G</td>
<td>-</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>347L-G</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>20.9.3-G</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>308H-G</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>309H-G</td>
<td>x</td>
<td>x</td>
<td>-</td>
</tr>
<tr>
<td>347H-G</td>
<td>-</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>309HT</td>
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<td>x</td>
<td>x</td>
</tr>
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<td>309LNb</td>
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<td>x</td>
<td>x</td>
</tr>
<tr>
<td>904L-G</td>
<td>-</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>22.9.3L-G</td>
<td>-</td>
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<td>x</td>
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<tr>
<td>465-G</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>329</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>LD62-G</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

*all high carbon grades: Bi <=0,002%

### Advantages and performances

- Welding Alloys Group offer the world’s largest range of flux and metal cored welding wires for low, medium, high alloy hardfacing and cladding applications, mild steel fabrication, also stainless steel, nickel and cobalt based wires using its own manufacturing technology.
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**NOTES:**

- All mechanical properties listed are typical values which may vary substantially with base plate, parameters and other variables out of the manufacturer’s control.
Advantages and performances

Why TETRA range for stainless steel?

TETRA S
- Considerable reduction in moisture pick up
- Insensitivity to gas traces, even at high energy input
- Slag removal improved further
- Mechanical properties well above the requirements of AWS / EN specifications
- Easy welding from 130 A – 24 V to 250 A – 35 V (diam. 1.2 mm)
- Weldable under mixed gas as well as under pure CO2

TETRA V
- Improved weldability in all positions
- Better mechanical properties
- For pipe welding, 5G position included

TETRA SB
- Benefits of an exclusive basic slag system
- Best resistance to hot cracking
- Neat weld beads, free of adherences
- Impact toughness improved by 50 to 100 %
- Excellent proven corrosion resistance
- No interference of embrittlement additives found in rutile slag systems

How to get the best results

Wire extension (Stick-out)
Too long Stick-out (SO) reduces the shielding and penetration. Too short Stick-out can cause porosity and shroud blockage with spatter. Nozzle should be recessed below shroud lip (S) : 5-10 mm

<table>
<thead>
<tr>
<th>Intensity (Ampères)</th>
<th>Typical values</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 - 180 A</td>
<td>20 - 25 mm</td>
</tr>
<tr>
<td>190 - 275 A</td>
<td>20 - 25 mm</td>
</tr>
<tr>
<td>280 - 350 A</td>
<td>20 - 25 mm</td>
</tr>
</tbody>
</table>

Torch Angle 20 - 40°
Always Pull the Arc.

Wire feeding - four feed rolls are better than two
Do not over-tighten feed rolls. Wire must leave welding tip as round and free of cuts as on entry to wire feed rolls. U or V shape rolls are preferable for proper wire feeding.

HEAT INPUT (kJ/cm) = 0.8 x U x I x \frac{60}{V} \times 1000

U = Arc Volts (V) ; I = Arc Amps (A) ; V = Welding speed (cm/min)

Austenitic and ferritic stainless needs to be kept as cold as possible.
No preheating is needed, and keep current and voltage as low as possible.
Faster travel keeps heat input down.

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Performance

TETRA deposition rate is the highest in the industry, commonly three times faster than manual electrodes.
Wire diameter 1.2 mm covers wide range of application cases.

Shielding Gases

<table>
<thead>
<tr>
<th>NF EN ISO 14175</th>
<th>C02 (%)</th>
<th>Ar (%)</th>
<th>Flow Rate (L/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M21</td>
<td>15 &lt; C02 ≤ 25</td>
<td>Rest</td>
<td>12-18</td>
</tr>
<tr>
<td>M20</td>
<td>5 &lt; C02 ≤ 15</td>
<td>Rest</td>
<td>12-18</td>
</tr>
<tr>
<td>C1</td>
<td>100%</td>
<td>-</td>
<td>12-18</td>
</tr>
</tbody>
</table>

The use of all gases in preferences 1 to 3 will give sound weld metal. The carbon content of the weld metal increases marginally with increased CO2 content. Slag detachment behaviour may alter slightly with gas composition and with base metal, particularly when welding stainless to carbon steels.
Welding examples and packaging

Welding positions

<table>
<thead>
<tr>
<th>Standards</th>
<th>EN-ISO</th>
<th>ASME IX</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA</td>
<td>PB</td>
<td>PC</td>
</tr>
</tbody>
</table>

Example of down-hand fillet welding
Position: PB/2F
Current: 220 to 240 V
Voltage: 27 to 29 V
Welding speed: 30 to 35 cm/min
Deposition rate: 4.7 kg/hr (100% arc time)

Example of overhead welding
Position: PD/4F
Current: 160 to 180 A
Voltage: 27 to 27 V
Welding speed: 30 to 40 cm/min
Deposition rate: 4.4 kg/h (100% arc time)

Example of vertical up welding
Position: PF/3G
Current: 140 to 170 A
Voltage: 22 to 23 V
Welding speed: 7 to 15 cm/min
Deposition rate: 3.2 to 3.8 kg/h (100% arc time)

Application examples

Gas cooler in duplex stainless steel.
High pressure reboiler in SS 316L.

Packaging (other packaging available to order)

<table>
<thead>
<tr>
<th>Diameter mm</th>
<th>Spool (to order)</th>
<th>Spool (stock)</th>
<th>Pay off pak (to order)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0, 1.2</td>
<td>5 kg</td>
<td>15 kg</td>
<td>250 kg</td>
</tr>
</tbody>
</table>

The real value of Welding Alloys Cored Wires:
ISO 9001 certified quality system
Our Technical ‘Spark’ Solves Your Industrial Challenges

WA Consumables
The go-to provider of advanced welding consumables

WA Machines
The go-to provider of automated equipment for wear protection

WA Integra™
The go-to provider of engineered wear protection solutions

A worldwide presence

www.welding-alloys.com