Eutectrode®

High performance Manual Metal Arc electrodes for repair, joining, rebuilding and wearfacing applications

- Low-heat input welding for safe, reliable repairs
- Anti-wear protective coatings, for longer-lasting parts
- Ease of use, even in difficult positions
- For cost-saving, industrial maintenance solutions

Stronger, with Castolin Eutectic

Castolin Eutectic®
Manuel Metal Arc Process

When an electric arc is struck between a flux coated electrode and a workpiece, the core wire tip and the workpiece surface melt to form a liquid weld pool. Simultaneously the flux coating decomposes into a gas shield and slag to protect the solidifying weld pool from the surrounding atmosphere. After cooling, the slag cover must be chipped off the weld bead and wire brushed before welding the next electrode.

- Equipment is simple, inexpensive & often portable
- No extra shielding gases or fluxes required
- Process consumables tolerate air currents even on-site
- Suitable for areas with limited access
- Practical solutions for most industrial metals & alloys

Safety & Ease of Use

Because EutecTrodes are used every day by our 50,000 customers, we know the importance to develop safe, easy-to-use welding electrodes, especially for repairs in awkward positions, on contaminated base metals or difficult on-site conditions.

Unique Wearfacing Alloys

Solid MIG / MAG / TIG wires are only manufactured in standard metallurgical alloys which can be cast and easily drawn down to final diameters. The EutecTrode® electrode concept completely overcomes such limitations and unique wearfacing alloys have been formulated with high density, ultra-hard micro constituents in ferrous or non-ferrous matrices. Thus the wide EutecTrode® alloy range provides cost effective solutions for most wear problems found in industry.
Wear Analysis

The latest state-of-the-art testing machines and facilities are essential to accurately monitor wear phenomena and understand the complex relationship between chemistry, process and application. We work with world experts in Technical Universities for testing and modelling in addition to having fully equipped laboratories with electron microscopes and wear test facilities.

EutecTrode® Manufacturing Facilities

The EutecTrode® range of high performance electrode formulations are developed and manufactured in Castolin Eutectic’s own modern plants using specially designed production equipment and procedures in accordance with ISO 9001 and EN 29001 quality assurance standards.

Each EutecTrode® batch after precision extrusion and baking, is weld tested for consistent chemistry, properties & usability before marking and protective packaging for stock.
Crack repairs and joining with Maximum Safety Margin

Low heat input for safer welds

Our EutecTrode® flux coatings are specially formulated to ensure that the workpiece is heated as little as possible during welding. This reduces many risks such as: weld metal dilution, grain growth, formation of brittle phases, hot cracking of the weld, residual stresses, deformation, distortion, undercutting, burn-through and electrode overheating, which can cause breakdown of the flux coating leading to costly stub end losses.

Welding unknown or dissimilar steels

It’s a common problem: a broken machine needs mending quickly, but it’s often not clear which metal is involved. You rarely have time to find out and yet a safe reliable repair is needed. Special low heat input EutecTrodes such as Xuper 680 S are the answer. This tried and tested all-round electrode ensures the strongest welds even if the steel is unknown or when dissimilar steels with very different properties require joining.

Welding Contaminated Cast irons

The brittle contaminated nature of cast iron has given it a justifiable reputation for being difficult or impossible to weld. However, Castolin Eutectic’s research and extensive practical experience has lead to the development of a range of EutecTrodes which facilitate “cold” welding of most cast iron grades, without preheating and yet resulting in crack free, easily machinable weld deposits.
### Technical Data

<table>
<thead>
<tr>
<th>EutecTrode® range for crack repair and joining</th>
<th>Technical Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low alloy steel</td>
<td>Cold welding of old, oily, contaminated grey cast irons. Non conductive version for limited accessibility. Deposits are machinable.</td>
</tr>
</tbody>
</table>
| High alloy steel                              | Tensile strength Rm: 250-300 N/mm²  
                                         | Hardness: 100-130 HV30 |
| Stainless steel                              | Welding of tin or phosphor bronzes with low preheat e.g. pump rotors also for dissimilar joining of bronze to steel or cast iron. |
| Nickel alloys                                | Tensile strength Rm: 770-850 N/mm²  
                                         | Yield strength Rp 0.2 > 640 N/mm²  
                                         | Hardness: 240-280 HV30 |
| Copper alloys                                | Highest strength, crack resistant repairs on wide range of difficult-to-weld steels of unknown composition or dissimilar joints e.g. tool and die work. |
| Aluminium alloys                             | Tensile strength Rm: 250-300 N/mm²  
                                         | Hardness: 100-140 HB |
| Stainless steels                             | For repairing highly stressed steel components where a balance of both strength and ductility is needed for crack resistance and lower distortion. |
| Cold welding of old, oily, contaminated grey cast irons. Non conductive version for limited accessibility. Deposits are machinable. |  |
| Tensile strength Rm: 700-740 N/mm²  
                                         | Yield strength Rp 0.2 > 640 N/mm²  
                                         | Hardness: 240-280 HV30 |
| Low alloy steel                               | Welding of a wide range of bronzes alloyed with aluminium, manganese and nickel. Deposits are easily machinable and resist cavitation and salt water corrosion. |
| High alloy steel                              | Tensile strength Rm: 630-770 N/mm²  
                                         | Hardness: 150-230 HB |
| Stainless steel                              | Cold welding of high strength, nodular cast irons and joining them to steel. Deposits are highly crack resistant. |
| Nickel alloys                                | Tensile strength Rm: 470-550 N/mm²  
                                         | Hardness: 150-190 HV30 |
| Copper alloys                                | Cold welding of spheroidal graphite castings where positional ease of use and machinability are important. Joins cast iron to most ferrous, copper and nickel based alloys. |
| Aluminium alloys                             | Tensile strength Rm: 370-440 N/mm²  
                                         | Hardness: 130-170 HV30 |
| Stainless steel                              | For easy to use joining in all position of common construction steels, steels and pipes where good gap building and vertical down capabilities are needed. |
| Welding of Inconel nickel alloys, duplex and super austenitic stainless steels, for high temperature, corrosion resistant joints. |  |
| Tensile strength Rm: 650-800 N/mm²  
                                         | Elongation A5: 25%  
                                         | Impact KV: >140 J 20°C |
| Castinox D                                    | Repair or joining refractory stainless steels where oxidation resistance required up to 1100 °C e.g. furnace parts. |
| Tensile strength Rm: >550 N/mm²  
                                         | Elongation A5: 25%  
                                         | Impact KV: >140 J 20°C |

The above product technical properties are based on Castolin Eutectic quality assurance standards and procedures for use. Procedures and applications other than those specified may alter these properties.
Wear facing for longer service life

Application Engineered coatings

EutecTrodes are just one way of applying our renowned TeroCote® anti-wear protective coatings. TeroCote® alloys offer durable protection because each forms a deposit structure which provides optimum resistance against a specific type of wear, or combination of wear phenomena. Extensive research helps us to identify the most appropriate alloy type, size and distribution of complex phases developed for each application, while our manufacturing experience ensures that each electrode, when used with the appropriate welding procedure, will deliver the required service properties.

XHD - Xtra High Deposition Rate

Fast deposition rates allow a given job to be completed more quickly. This means the welder can maintain a higher level of concentration which in turn leads to better welds. Fast deposition rates also move the arc energy more quickly over the workpiece, which further reduces local heat input.

Rebuilding worn components

Severe wear in just one small area of a component can make it inoperable, despite the fact that the part may still be largely intact. However, worn parts can be easily rebuilt with EutecTrodes which provide a suitable match with the base metal in terms of mechanical properties and appearance, while also creating a suitable substrate onto which TeroCote® wear-resistant coatings can be applied.

Welding aids

CutTrode 01 is recommended for cutting and piercing (left). ChamferTrode 03/04 gouging electrodes are ideal for weld preparation, particularly on old, oil contaminated base materials (right).
## EutecTrode® range for anti-wear protective coating

<table>
<thead>
<tr>
<th>Product Code</th>
<th>Application</th>
</tr>
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<tbody>
<tr>
<td>2 / 2R</td>
<td>Cold stamping tools, dies, punches, hammers. Deposits are heat treatable and tritridable.</td>
</tr>
<tr>
<td>N 102</td>
<td>Crusher hammers, ripper teeth, grab buckets, drilling equipment where high impact is combined with medium abrasion.</td>
</tr>
<tr>
<td>XHD-646</td>
<td>Ideal for buttering layers and rebuilding hardenable alloy steel or 13% manganese steel. Deposits rapidly work harden.</td>
</tr>
<tr>
<td>Xuper Abratec 5006</td>
<td>For abrasion on low alloy and manganese steels. Ideal for rolling mill entry and exit guides, bulldozer blades, crusher teeth, dragline pumps, etc.</td>
</tr>
<tr>
<td>Xuper Abratec 5088</td>
<td>For low-alloy steels, tool steels and equivalent cast steel. Ideal for deep drilling tools, excavating machines, agricultural machinery, foundry machinery, milling machines, sludge pumps, mixers and screening plant.</td>
</tr>
<tr>
<td>N 1070</td>
<td>Screws, blades, mixers, scrapers, hoppers where extreme abrasion is experienced.</td>
</tr>
<tr>
<td>XHD 6080</td>
<td>High speed steel tools and dies for cutting, trimming, drawing and pressing. Deposits retain high hot hardness</td>
</tr>
<tr>
<td>Xuper Abratec 6088</td>
<td>For low and high-alloy steels (rust-resistant steels), tool steels and cast steel nickel based alloys. Examples: press and conveyor worms, mixer parts, scraper edges parts used in the chemical and food industry.</td>
</tr>
<tr>
<td>35200</td>
<td>Rebuilding worn steel sections and buttering layers prior to anti-wear coatings. Deposit are machinable.</td>
</tr>
<tr>
<td>XHD 6395N</td>
<td>Designed for protective coatings with extreme resistance to abrasion, erosion combined with moderate shock on carbon, alloy, stainless and cast steels.</td>
</tr>
<tr>
<td>6450</td>
<td>For Caterpillar tracks, drive sprocket wheels, conveyor rolls, hammers, cushion layers, crusher hammers, crossing points.</td>
</tr>
<tr>
<td>XHD-6710</td>
<td>Protection against combined abrasion, pressure and low impact such as conveyor components, scraper, dredge pump.</td>
</tr>
<tr>
<td>XHD-6715</td>
<td>Protection against high temperature abrasion and erosion of sinter fan blades, sinter breaker screens, blast furnace cones.</td>
</tr>
<tr>
<td>XHD-6804</td>
<td>Single pass coating of hot working steel up to 650°C such as wire drawing dies, extrusion pistons, trimming dies.</td>
</tr>
<tr>
<td>XHD 6817</td>
<td>For protective overlays or repair of alloy steel components subject to oxidation, corrosion, high temperature use. For joining dissimilar metals: nickel alloys to carbon steel, alloy steels or stainless steels.</td>
</tr>
<tr>
<td>XHD-6865</td>
<td>Special nickel alloy for severe corrosive environment at elevated temperatures like waste incinerators and hot forging equipment.</td>
</tr>
<tr>
<td>XHD-6899</td>
<td>Special nickel alloy to resist thermal and mechanical shocks on high temperature parts like stripper points and shear blades.</td>
</tr>
<tr>
<td>N 9060</td>
<td>Special cobalt alloy for steam and chemical valve seats where higher hot hardness and corrosion resistance are needed.</td>
</tr>
<tr>
<td>N 9080</td>
<td>Special crack resistant cobalt alloy for hot forging tools, trimming dies and cropping blades.</td>
</tr>
<tr>
<td>CaviTec SMA</td>
<td>For preventive maintenance and repair coatings on Francis, Kaplan and pump turbines as well as other hydraulic machine parts subject to wear by cavitation.</td>
</tr>
</tbody>
</table>

### Welding aids

- **CutTrode 01** High speed cutting or piercing of most ferrous or non ferrous metals in all positions
- **ChamferTrode 03/04** Rapid gouging or crack removal on most industrial alloys leaving metallurgically clean surfaces ready for welding 03+(+)/04~.
- **Eutest** Non Destructive Test using die penetrant sprays for easy detection of surface cracks or defects prior to welding repairs.

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The above product technical properties are based on Castolin Eutectic quality assurance standards and procedures for use. Procedures and applications other than those specified may alter these properties.
To obtain perfect welds, you need not only an excellent electrode but also outstanding equipment quality. Castolin Eutectic has developed for you a complete range of MMA power sources starting from 140 Amps to 650 Amps. This wide range will give you the possibility to use welding for your small applications as well as really tough industrial ones.

**UltraMax²**

**Technical data**

- **Welding amperage range**: 5 A - 140 A
- **35% Duty cycle amperage**: 140 A
- **100% Duty cycle amperage**: 100 A (at 40 °C)
- **Open circuit voltage**: 54 V
- **Power supply**: 230 V 50/60 Hz
- **Power at primary (100%)**: 4.6 kVA
- **Fuse rating**: 16 A
- **Protection index**: IP 23
- **Dimensions L x W x H (mm)**: 310 x 120 x 215
- **Weight**: 4.3 Kg

- For MMA and TIG welding with liftarc
- Hot start, arc force control and anti stick function for perfect MMA welding
- TIG welding with constant and pulsed current

**PowerMax**

**Technical data**

- **Welding amperage range**: 10 A - 150 A
- **35% Duty cycle amperage**: 140 A
- **100% Duty cycle amperage**: 80 A (at 40 °C)
- **Open circuit voltage**: 92 V
- **Power supply**: 230 V 50/60 Hz
- **Power at primary (100%)**: 3.6 kVA
- **Fuse rating**: 16 A
- **Protection index**: IP 23
- **Dimensions L x W x H (mm)**: 315 x 110 x 200
- **Weight**: 4.7 Kg

- Advanced inverter technology
- Possibility to weld cellulosic electrodes
- Power generator compatible
- TIG DC welding with liftarc

**XuperMax²**

**Technical data**

- **Welding amperage range**: 10 A - 250 A
- **40% Duty cycle amperage**: 250 A
- **100% Duty cycle amperage**: 160 A (at 40°C)
- **Open circuit voltage**: 76 V
- **Power supply**: 3 x 400 V 50/60 Hz
- **Power at primary (100%)**: 12.1 kVA
- **Fuse rating**: 20 A
- **Protection index**: IP 23
- **Dimensions L x W x H (mm)**: 460 x 230 x 325
- **Weight**: 16 Kg

- Suitable for 4mm electrodes
- Remote current control available
- TIG welding with liftarc ignition and constant or pulsed current

**CastoMatec Range**

- 305 / 455/ 650 amps @ 35% duty cycle
- Thyristor controlled DC transformer rectifier unit
- Trolley mounted
- Robust design for heavy industrial use
- Remote control unit FR3-1 optional
- TIG welding with lift arc possible with the 305
- 455 and 655 are suitable for welding and gouging applications
Our mission is to develop applications and solve customer problems. Depending on the customer’s wish, we can transfer this knowledge to him or perform the work for him in our approved CastoLab® Services workshops. CastoLab® Services can develop advanced procedures to allow transfer of complete solutions to end users. CastoLab® Services offer a complete and comprehensive service for the maintenance of machine parts and major components subject to extensive service wear or needing repair. Work can either be undertaken in the CastoLab® Services or alternatively on site. Often the parts being repaired or protected need to be produced on a regular basis, and here “specialist prepared parts” can be produced in unique manufacturing environment, from 10’s of parts to 100,000 parts per year.

Special Oil industry parts protected with CAP®

Repair in difficult conditions

Fan Protected with Powder Coated Wear Plates

Arc Wire Spraying

TeroCote® wearfacing

Precision working

On-site boiler coating

Large CastoLab® Services for major repairs On site Boiler Coating

Your Industry Partner

A century at the forefront of protective materials technology has positioned Castolin Eutectic as the world’s premier industrial partner. Our comprehensive know-how is unrivalled, and our industry partnerships continue to thrive. We provide solutions to all of the major companies operating in industry with global industrial programs for steel, cement, automotive, power, oil, waste & recycling, etc.
Stronger, with Castolin Eutectic

To increase customer know-how in wear technology and repair techniques, we have developed a full line of seminars and training programs, teaching all relevant personnel from welders and engineers to sales teams and managing directors.

The unique TeroLink® database of Castolin Eutectic contains more than 8,000 fully documented approved applications from around the globe. The case studies include photographs, technical data, detailed descriptions and cost saving analyses.

Together with our sister companies in the Messer World, we can offer our customers a very powerful range of products and services. Being Part of the Messer World means:

- Investment of over € 420 million
- More than 6,000 motivated employees
- Over 100 factories to meet customer needs
- Technical sales support in over 120 countries
- 2,000 technical sales people in the field with our customers every day
History of Castolin Eutectic

1906 Foundation of Castolin in Lausanne, Switzerland by Jean-Pierre Wasserman. His stroke of genius: to discover way of welding cast iron at low temperature. In the following years, this innovation was further developed for all industrial metals including aluminum alloys.

1938 First machinable cast iron electrode

1940 Electrode production in USA

1948 First arc electrodes for cutting & gouging

1956 Electrode production in Brazil

1960 First aluminum alloy electrode

1968 Nucleo-C for wearingfacing electrodes

1960's Xuper 680-S

1960's International consolidation under Castolin Eutectic

1970's Xuper 2222

1970's Creation of training centers for Maintenance & Repair technologies

1978 Establishment of World Head Quarters in St-Sulpice, Switzerland

1980's XHD electrode range

1985 RytmArc portable power source

1995 Global Stainless Steel electrode range

1996 First CavTec alloy electrode

2000 Merger with Messer Cutting & Welding and creation of the MEC Group - Messer Eutectic Castolin.

2005 Part of the Messer World

2006 100 years

2009 World's first NanoAlloy electrode

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Stronger with...
Castolin Eutectic

WEAR & FUSION TECHNOLOGY

Ask for a demonstration from our Application Specialists.

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