

Brazing Technology

Joining Solutions...



*Stronger, with
Castolin Eutectic*



Bonding and Surfacing Technology



BUREAU VERITAS
Certification



Certificación Certification

Concedida a / Awarded to

CASTOLIN IBERICA SLU

C/ SAN RAFAEL, 6, POL. IND. ALCOBENDAS, 28108, ALCOBENDAS, MADRID
C/ ISAAC PERAL, 10-12, POL. IND. EL FRONTAL, 28816, VALDEAVERO, MADRID

Bureau Veritas certifica que el Sistema de Gestión ha sido auditado y encontrado conforme con los requisitos de la norma:

Bureau Veritas certify that the Management System has been audited and found to be in accordance with the requirements of standard:

NORMA / STANDARD

ISO 9001:2008

El Sistema de Gestión se aplica a:

Scope of certification:

COMERCIALIZACIÓN Y DISTRIBUCIÓN DE PRODUCTOS Y EQUIPOS PARA LA TECNOLOGÍA DE LA UNIÓN Y PROTECCIÓN SUPERFICIAL, PROYECCIÓN TÉRMICA, SOLDADURA Y OTROS PROCESOS DE PROTECCIÓN DE METALES, ASÍ COMO TAMBIEN LA REALIZACIÓN DE TRABAJOS A CLIENTES CON CUALQUIERA DE LOS ANTERIORES PROCESOS.

COMERCIALIZACIÓN AND DISTRIBUTION OF PRODUCTS AND EQUIPMENT FOR JOINING AND SURFACING TECHNOLOGIES. THERMAL, SPRAYING, WELDING, BRAZING AND OTHER METAL PROTECTON PROCESSES, AS WELL AS THE EXECUTION OF WORKS THAN FOR CLIENTS USING ANY OD THE AVOBE MENTIONED PROCESSES

Número del Certificado
Certificate Number

ES049172-1

Director General / General Manager
Bureau Veritas Certification, S.A.

Aprobación original :
Original approval date :

06/03/2010

Certificado en vigor:
Effective date:

09/03/2013

Caducidad del certificado:
Certificate expiration date:

08/03/2016

Este certificado está sujeto a los términos y condiciones generales y particulares de los servicios de certificación
This certificate is valid, subject to the general and specific terms and conditions of certification services

Managing Office/ Oficina Central: Bureau Veritas Certification, S.A.
Issuing Office Oficina de emisión: Bureau Veritas Certification, S.A.
C/ Valportillo Primera 22-24, Edificio Ceoba, Pol. Ind. La granja, 28108 Alcobendas Madrid



ENAC
CERTIFICACIÓN
Nº 04/C-SC004

Our Brazing Tradition

Over 100 years ago in 1906, Mr. Wasserman started his business with the development, production and sales of brazing fluxes.

In the following years, Castolin was formed and began to develop new low temperature and eutectic brazing alloys. Castolin was not only revolutionary in terms of its developments, in patents and in manufacturing processes, but also in training salesmen and customers on the brazing and soldering methods. Castolin Eutectic has always been years ahead of the competition. For example, Castolin developed the first non-corrosive aluminium fluxes in the 60's, the first aluminium pastes in the 70's and the first nickel pastes in the late 70's. These products were 15 to 20 years before their time.

Castolin has patented over 200 products in its history and is still developing and improving products and processes for its customers today.

Castolin Eutectic, with its 100 years tradition of developing and innovating soldering and brazing solutions, is the right partner for you.



Pictures of our beginnings

Index

	Page
Tradition.....	1
R&D / Technical support.....	2
Production.....	3
Training.....	4
Local Support.....	5
Why brazing?.....	6-7
What about standards?.....	8
Introduction to Brazing.....	9
Brazing Product Range.....	10
European Norms.....	11
Table of Cadmium Free Silver Alloys.....	12
Brazing, Our Difference, Your Excellence.....	13-14
Copper-Phosphorus alloys.....	15
Other alloys.....	16
Soft Soldering Alloys/ Aluminium alloys.....	17
GasFlux.....	18
Pastes.....	19-21
Fluxes.....	22-24
GreenBraz range.....	25
Foils.....	26
PreFormed.....	27
Wearfacing solutions.....	28
Surfacing Products.....	29-35

R&D / Technical support

Castolin Eutectic employs many engineers and technicians solely focused on solving the technical problems of our customers. The main research and development laboratory for brazing product within Castolin Eutectic is close to Paris, France.

This laboratory is one of the most advanced brazing technology research laboratories in Europe.

This facility is equipped for in-depth studies of all types of brazing and soldering applications and problems or challenges. Castolin Eutectic not only has scanning electron microscopes, sample preparation equipment viscosimeters, thermal analytical equipment and many other specialised equipment, but also has a well trained and customer oriented technical team.

Our team has examined over 3'500 metallurgical samples in the last 15 years, identifying the root causes of problems as well as recommending the required solutions.

As a Castolin Eutectic customer, you will receive the absolute best care and service to ensure the quality and efficiency of your production.

Castolin Eutectic brazing R&D Center in France is also ISO certified.



Production



Castolin has been producing soldering and brazing products for over 100 years. Today, we have some of the most modern production equipment available. Although, many companies have outsourced their production or are simply reselling soldering and brazing products, Castolin Eutectic is dedicated to keeping the production in-house and in Europe.

By having a wide range of products made in-house, Castolin Eutectic is able to offer excellent service and technical support to its customers. By developing and producing our own products, we are able to control the quality of every step in the production process.

Castolin Eutectic uses only high quality raw materials. Every batch is strictly controlled and tested.

Additionally, by having our own production in

Europe, we are able to adapt our products to the needs of the customers and get the product to any address in Europe within 24 hours if needed.

Training

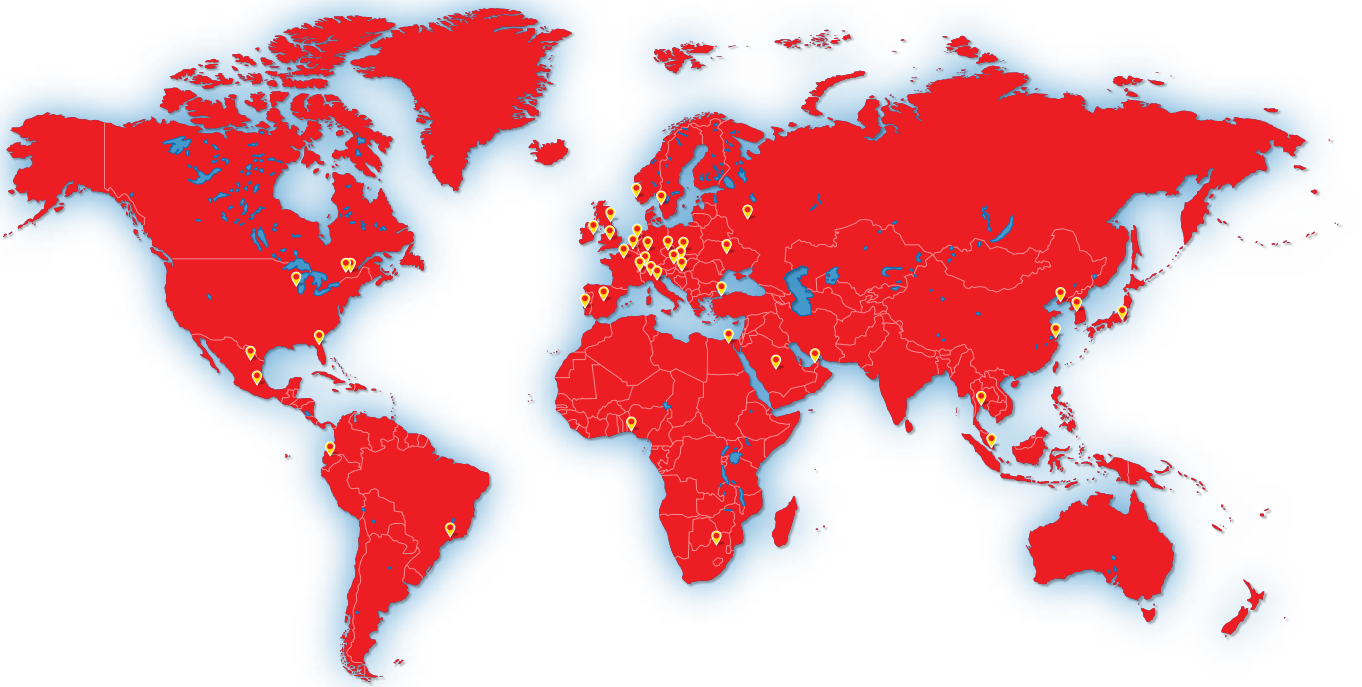
At Castolin Eutectic, we offer a wide range of brazing, welding, and thermal spray training courses. These courses can be designed according to the needs of each customer. There are training sessions for managers, engineers and technicians.

The training courses about brazing and soldering teach the basics about joint design, pre-cleaning, flux selection, alloy selection, process parameters, flux removal, etc.

Each course is composed of theoretical as well as practical training. Castolin Eutectic can offer these courses in almost every European country. The courses are carried out in our own in-house training facilities, with qualified instructors or with our trainers at your location.



Local Support



Castolin Eutectic has a presence in almost all European countries. With over 350 sales engineers travelling around Europe everyday, we are able to provide unbeatable service to our customers. We can literally be at 90 % of customers in Europe within 2 hours, this allows us to give unsurpassed service and support.



We supply all technical documentation and material safety data sheets in local languages. Our salesmen all live in their territories and speak local dialects and understand local cultures. We manage warehouses and keep stocks adapted to local requirements in every European country (including the new countries).

Our 350 sales engineers are supported by over 50 process and application experts. These experts are multi-lingual and communicate daily with our 4 production centers and research laboratories.



Why brazing?

1. Brazing is a proven method

Brazing has been around for 1000's of years. Brazed joints have been used in plumbing, air-conditioning, heating, electronics and numerous other applications for a very long time. A brazed joint will last a life time and is proven to do so. Other materials such as plastic have not been around long enough to make the same claims.

Additionally, with brazing if you do not get it right the first time you can reheat the joint and repair it without having to disassemble or completely reinstall the affected parts. You can be assured that when brazing, you are using the most reliable joining solution on the market.



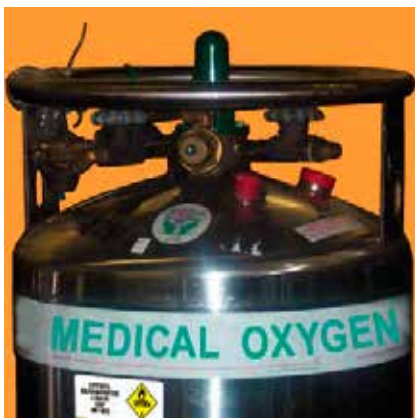
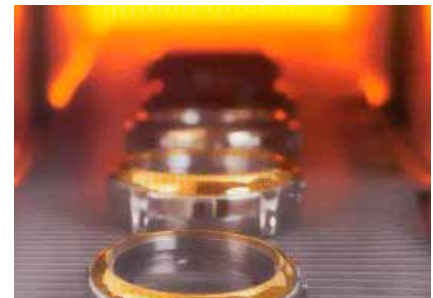
2. Brazing provides high strength joints

With the proper joint design and correct selection of brazing materials, brazed joints will be stronger than the base materials being joined.

Fact : Carbide tools are some of the most abused tools and must withstand the highest amount of push, pull and impact. Most carbide tools rely on brazing processes to keep the carbide segments in place.

3. Esthetics

The perfect capillarity of brazing, and more particularly of silver brazing, returns practically invisible joints and brazed connections. This is why brazing is used where the appearance of the parts is of primary importance, for example goldsmithery, jewellery, musical instruments, spectacle industry, chandelier factory, sculptures, aeronautics, etc...



4. Safety

Only brazing can truly ensure leak free joints in critical applications such as flammable gasses or medical gas installations. Therefore, many standards require that such critical installations are brazed.



5. Brazing is hygienic

Did you know that plastic tubes and joints almost always contain millions of bacteria called Legionella and these are the source of Legionnaires' disease? Legionnaires' disease is an unusual and serious form of pneumonia caused by inhalation of water droplets containing the bacteria Legionella pneumophila. Tests have shown that brazed copper tubes contain much lower concentrations of bacteria, which means more safety for you and your family.

Further information are available on www.castolin.com

6. Brazing can be used on dissimilar metals and materials

With brazing materials and processes, practically all metals can be joined. Also, non-metals like glass or ceramics can be joined with brazing processes. The ability to join different materials easily makes the design, development and production of new products possible.

We have more and more customers asking for Al-Cu joining solutions. This can easily be done with a number of Castolin products like 190.



7. Brazing can be used for low cost repairs as well as high volume production

Brazing is a low cost process that requires very low investment in equipment. In fact, for just 20 euros you can start brazing today.

Brazing is excellent for high volume products as the use of pastes, rings and wire allow for excellent automation possibilities. In most applications, brazing joints cost less than 0,05 euros. Compared to alternative solutions, brazing is not just better mechanically but also financially.

8. Brazing is Easy

Castolin Eutectic teaches thousands of people every year how to braze.

It literally takes less than one hour to teach someone how to perform basic brazing operations. The ease of brazing should allow companies to be flexible in their production as well as have little problem finding brazers. Castolin Eutectic's range of products makes brazing easy by creating products that allow for a wide range of error by the brazer.



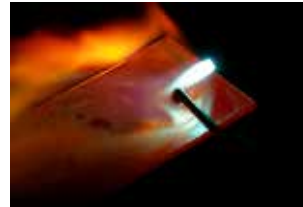
What about standards?

In most countries around the world standards have been established for all types of materials and processes. These standards are needed for health and safety as well as to establish certain mechanical or chemical properties. Castolin Eutectic is a supporter of standards and complies with standards such as EN Norms, DIN Norms, ISO Norms, etc.

On the other hand, we would like to point out that although norms are needed, not all products with the same standard are created equally.

Did you know that products as basic as Copper Phosphorus brazing alloys within the same standard can have totally different brazing behaviours including different wetting and flow characteristics?

For example in picture 1 and 2, you can see the Castolin Non-Sparkling alloy RB 5246 compared to a “Sparkling” product from a competitor. RB 5246 has much better wetting and a smoother flow than the other alloy within the same standard.



Picture 1:
RB 5246: Non-Sparkling, excellent wetting and smooth flow



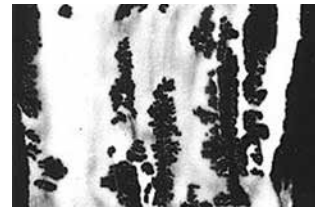
Picture 2:
Competitors CuP Alloy: Sparkling, poor wetting

Did you know that fluxes in the same standard can also have very different characteristics?

For example 1802 N Atmosin is in the same standard as many competitive fluxes. In picture 3, you can see that 1802 N Atmosin has greater activity and flows out extremely well compared to a competitive product in picture 4 that is not active at the same temperature as 1802 N Atmosin and does not sufficiently flow out on the surface. This type of flux can be the cause of leaks and low strength joints due to entrapped flux and lack of wetting and flow by the filler material.



Picture 3:
1802 N Atmosin: Excellent flow and wetting



Picture 4:
Flux without Atmosin: Poor flow and wetting

Did you know that flux coated rods with the same normed flux from different manufacturers almost always have different performances?

In picture 5, you see a clean melting and easy flowing flux coating from Castolin Eutectic. This flux coating remains clean during the entire heating process and the residues are easy to remove.

In picture 6, you can observe the flux coating from a competitor whose flux is burnt, the alloy does not flow properly and the flux residue is very difficult to remove.



Picture 5:
Clean Melting of Castolin Flux Coating



Picture 6:
Burning of Competitive Flux Coating

Introduction to Brazing

1. Joint Design

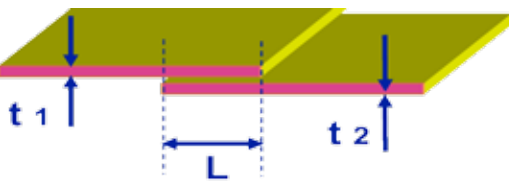
Joint design is a key component in creating excellent brazed joints. The two most commonly used joint types are the butt joints and the lap joints.

BUTT JOINT (Fig. 1)



Tensile stresses are predominately found in butt joints.

LAP JOINT (Fig. 2)



Shear stresses are predominately found in lap joints. Most brazed joints perform better with lap joint designs and are therefore most commonly used.

Note : The general rule of thumb for lap joint design is that the overlap L should be > 3 times the thickness of the thinnest partner or a minimum of 5 mm.

Note : The gaps in both joints should typically be between 0,05 mm and 0,25 mm depending on ability to control the gaps and the desired brazing temperatures.

Note : Be sure to remove all sharp edges and burrs from the parts to be joined.

2. Pre-Cleaning

It is imperative to remove all oil, dirt, rust, adhesives, etc. from the pieces to be joined. There are a number of ways to pre-clean the base metals prior to the brazing process. This includes washing, pickling, blasting, and polishing.

One example for pre-cleaning copper tubes before soldering or brazing is by using CastoNet. CastoNet is a metalfree abrasive pad that will have copper tubes shining in seconds.

3. Filler Metal

When choosing the right filler metal, one must identify which filler metals are compatible with the base metals in question, which melting ranges are acceptable for the given joint gaps as well as which brazing temperature limitation could be used for the base metals.

For your reference, a brazing alloy selection chart for standard materials can be found on the following pages.

4. Flux Selection

Flux selection is widely confirmed to be the most important of the parameters for soldering and brazing. A good flux should offer the following characteristics :

- Cleaning - To dissolve or transform oxides on the base metal. This allows a perfect metallurgical bond between base metal and filler metal for maximum strength.
- Temperature Indicator - Once the activity range of the flux is reached, it will melt and the colour will change. The alloy can then be applied.
- Protection - To provide a protective shield for the filler alloy during fusion. This protection prevents the redevelopment of oxides during the brazing process. This means that the flux must not burn or lose its effectiveness during the brazing operation.
- Wetting - To promote the flow of molten filler alloy on the base metal.

Did you know that poorly formulated fluxes can limit the flow of the alloy as well as cause flux entrapment which often leads to leaky joints?

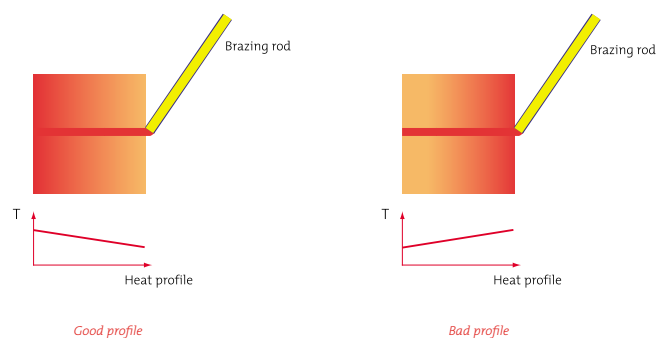
Castolin fluxes contain a special additive called Atmosin that "Activates" the flow of flux and allows the alloy to move freely as well as basically eliminates potential flux entrapment.

5. Heating Process

Correct heating is also very important for good brazing results. In capillary brazing,

the alloy will flow where the heat is. All parts to be joined must be evenly heated, with a slightly higher temperature opposite the side where the brazing alloy will be applied.

For more questions about brazing, please contact your local Castolin company.



Brazing Product Range



European Norms

Boric Acid & Borax free

Keen to follow the current and future REACH legislation and to find answers to environmental constraints applied to our sector, Castolin Eutectic developed a Brazing product range containing no boric acid or borax. The new line is called GreenBraz and is composed of powder fluxes, paste fluxes and brazing rods

Cadmium free

Cadmium is considered eco-toxic and so this is the first reason why Castolin Eutectic developed cadmium-free products. Cadmium is used in batteries, plastics, pigments and metal coatings. Cadmium can enter into the environment through landfills, poor waste disposal methods, when burning coal for energy, etc. The particles can travel far before falling to the ground or water and each year many tons of cadmium are discharged into our seas and oceans. Environmental pressures to eliminate the use of cadmium in industrial goods have been growing and the European Union created several directives to prevent the use of such hazardous substances. Furthermore, cadmium has already been banned from Aerospace, Automotive, Medical and Potable Water applications.

What is REACH?

REACH is a new European Community Regulation on chemicals and their safe use. It deals with the Registration, Evaluation, Authorisation and Restriction of Chemical substances. The aim of REACH is to improve the protection of human health and the environment through the better and earlier identification of the intrinsic properties of chemical substances. At the same time, innovative capability and competitiveness of the EU chemicals industry should be enhanced.



RoHS



The Directive on the Restriction of the use of certain Hazardous substances in electrical and electronic equipment was adopted in February 2003 by the European Union. This directive restricts the use of six hazardous materials in the manufacture of various types of electronic and electrical equipment. It is closely linked with the Waste Electrical and Electronic Equipment Directive which sets collection, recycling and recovery targets for electrical goods and is part of a legislative initiative to solve the problem of huge amounts of toxic waste. Castolin Eutectic products are certified to comply with this directive.



FLUXES TAILORED TO EACH APPLICATION. CONTACT YOUR APPLICATIONS SPECIALIST

Table of Cadmium Free Silver Alloys (CadFree™)

"CASTOLIN REFERENCE BARE"	"CASTOLIN REFERENCE COATED"	% AG	MELTING RANGE	ISO 17672 NORM	COATING COLOUR	APPLICATIONS
CADMIUM FREE ALLOYS						
181	181 F	20	725-810	---	WHITE	Brass coloured deposits / decoration/ significant clearance
1655	1655 XFC	34	630-730	AG134	WHITE	Poorly adjusted parts / domestic appliances
1665	1665 XFC	40	640-700	AG140	WHITE	Medical fluid pipelines
1666	1666 XFC	45	660-700	AG145	LIGHT GREEN	Facilities and equipment in the food sector
1812	1812 XFC	56	608-630	---	WHITE	Food sector, medical instruments, high precision joints
1800	1020 XFC	57	625-640	AG156	PINK	Food sector, medical instruments
INDUSTRIAL CADMIUM FREE RANGE						
38220 BL	38220 F	20	690-810	---	WHITE	Good wetting and fluidity, recommended for copper and brass, with the exception of aluminium
38225 BL	38225 F	25	680-760	AG125	WHITE	Provides for clean brazing
38230 BL	38230 F	30	665-755	AG130	WHITE	Ideal for brazing joints in the refrigeration sector
38235 BL	38234F	34	630-730	AG134	WHITE	Ideal for brazing joints in the refrigeration sector
38240 BL	38240F	40	650-710	AG140	WHITE	Ideal for any type of brazing, except for aluminium, high fluidity
38245 BL	38245 F	45	640-680	AG145	WHITE	Applied on brazing in the electronics, food sectors
38249 BL	38249 F	49	680-705	AG449	WHITE	Alloy specially designed for tool manufacturing. High performance and low melting point
38256 BL	38256 F	56	620-655	AG156	WHITE	Exceptionally low melting point requiring less workpiece heat input

Note : According to the RoHS standard, only CadFree™ alloy should be used in specific industries. Castolin Eutectic products are certified to be RoHS compliant.

Typical Applications include

Plumbing, air-conditioning, food industry, automotive, medical instruments, cutting tools, refrigeration, etc.

Castolin®

Specialist in quality joining

BRAZING

OUR DIFFERENCE, YOUR EXCELLENCE



■ **Maintenance Difference.**

Brazed joints do not need a "maintenance" inspection.

■ **Lifetime Difference.**

A brazed joint is eternal: brazed joint, joint forgotten!

■ **Safety Difference.**

Castolin Eutectic brazing guarantees the maximum joint resistance.

Pressure / Fire

Corrosion / Hygiene

■ **Professionalism Difference.**

With Castolin Eutectic, become a specialist in quality joining.

■ **Price Difference.**

We'll talk about it in 10 years

■ **Ecological difference.**

The brazed copper has a low impact on health and ecology in construction.



Capillarity brazing definition

Capillarity brazing is the joining of metals where the brazing material is heated and distributed between 2 or more parts to be joined by capillary action. The brazing metal is heated above its melting point (liquidus) whilst it is protected under an appropriate atmosphere with deoxidising agents, permitting the wetting on the base material, and then, the joint is left to cool.

Capillary brazing is a proven method

Capillary brazing has been around for 1000's of years. Brazed joints have been used in plumbing, air-conditioning, heating, electronics and numerous other applications for 30 years or more. A brazed joint will last a life time and is proven to do so. Other materials such as plastic have not been around long enough to make the same claims.

Additionally, with capillary brazing if you do not get it right the first time you can reheat the joint and repair it without having to disassemble or completely reinstall the affected parts. You can be assured that when you are doing capillary brazing, you are using the most reliable joining solution on the market.

Brazing provides high strength joints

With the proper joint design and correct selection of brazing materials, brazed joints will be stronger than the base materials being joined.

Fact : Carbide tools are some of the most abused tools and must withstand the highest amount of push, pull and impact. Most carbide tools rely on brazing processes to keep the carbide segments in place.

Esthetics

The perfect capillarity of brazing, and more particularly of silver brazing, returns practically invisible joints and brazed connections. This is why capillary brazing is used where the appearance of the parts is of primary importance.



Safety

Only brazing can truly ensure leak free joints in critical applications such as flammable gasses or medical gas installations. Therefore, many standards require that such critical installations are brazed capillary.

Brazing is hygienic

Did you know that plastic tubes and joints almost always contain millions of bacteria called Legionella and these are the source of Legionnaires' disease?

Legionnaires' disease is an unusual and serious form of pneumonia caused by inhalation of water droplets containing the bacteria Legionella pneumophila.

Tests have shown that capillary brazed copper tubes contain much lower concentrations of bacteria, which means more safety for you and your family.



Capillary brazing can be used for low cost repairs as well as high volume production

Capillary brazing is a low cost process that requires very low investment in equipment. In fact, for just 20 euros you can start brazing today. Brazing is excellent for high volume products as the use of pastes, rings and wire allow for excellent automation possibilities. In most applications, capillary brazing joints cost less than 0,05

euros. Compared to alternative solutions, capillary brazing is not just better mechanically but also financially.

Brazing is Easy

Castolin Eutectic teaches thousands of people every year how to braise.

It literally takes less than one hour to teach someone how to perform basic brazing operations. The ease of brazing should allow companies to be flexible in their production as well as have little problem finding brazers. Castolin Eutectic's range of products makes capillary brazing easy by creating products that allow for a wide range of error by the brazer.



Copper-Phosphorus alloys

CASTOLIN EUTECTIC REFERENCE	% AG	MELTING RANGE °C	ISO 17672 NORM	APPLICATIONS
RB 5246	0	710-770	CUP 182	Self-fluxing alloy, for copper brazing. Plumbing, heating and gas installations.
RB 5280	2	645-810	CUP 280	Self-fluxing alloy, for copper brazing. Self-fluxing alloy, for copper brazing in all positions. Heat exchangers, socket and overlapping joints, electrical equipment, etc.
RB 5286	5	645-815	CUP 281	Self-fluxing alloy for capillary joining of copper and its alloys Refrigeration, heat exchangers Gas facilities.
RB 5283	15	645-800	CUP 284	Self-fluxing alloy with a high silver content and maximum capillarity. Rotors, cryogenic applications, refrigeration, sensors, etc.
RB 5098	5*	650-820	---	Self-fluxing alloy with silver surfacing, for improved performance. Air conditioning and refrigeration piping.
38118 XFC	18	645	CUP 286	Coated alloy, particularly designed for copper-brass, brass-brass accurate joining applications. Maximum fluidity and capillarity.

Note: When copper phosphorus alloys are used on copper-copper joints, there is no need to use a flux. However, this is required for copper-bronze or copper-brass joints and the recommended flux is 1802 Atmosin or similar.

The use of copper-phosphorus alloys is not recommended on steels or stainless steels given the risk of fragile surfaces as a result of the joining process.

Applications:

Plumbing, air conditioning, refrigeration, electric motor production, transformer production.

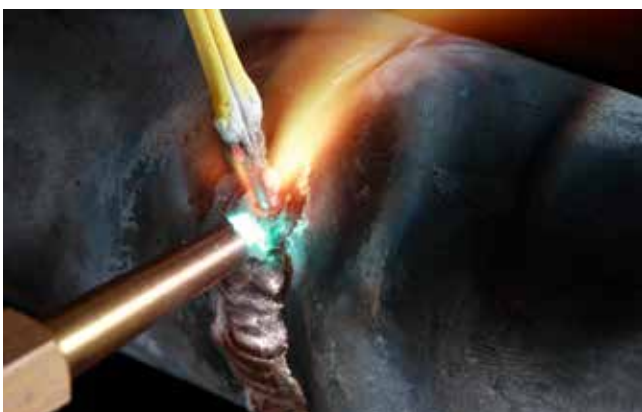


Other alloys

CASTOLIN EUTECTIC REFERENCE	COMPOSITION				MELTING RANGE °C	APPLICATIONS
	Cu	Ag	Zn	Others		
16	48	1	---	Ni9	890 - 910	High mechanical resistance on steels
18	59	1	40	---	850 - 890	Joining of galvanized steel, copper / piping
146	60	---	---	---	870 - 910	Repairs of copper, cast iron and steel parts
185	48	---	---	Ni10	890 - 915	Wearfacing, gear wheels, shafts
201	60	---	40	---	875 - 895	Beaded brazed joints
38439	60	---	39	Ni1	870 - 890	Repairs of copper, cast iron and steel parts
38440	60	---	40	Si	875-895	Beaded brazed joints
38442	48	---	42	Ni10	890-920	Wearfacing, gear wheels, shafts
7915	48	---	41	NiSi	890-920	Wearfacing, gear wheels, shafts

Note : When using brass alloys at high temperature, flux is required. Fluxes 18,16 and 185 are excellent choices depending on base metals.

Brazing of galvanized steel with a rod and flux 18



Applications :

Production of:

- Cutting tools
- Metal furniture
- Metal structures

Rebuilding of pinions, repairs of casting defects.

Soft Soldering Alloys

CASTOLIN EUTECTIC REFERENCE	COMPOSITION				MELTING RANGE °C	FEATURES	APPLICATIONS
	Sn	Pb	Cu	Ag			
157	96	---	---	4	221	High mechanical resistance	Capillary joints of stainless, ferrous and copper materials
3234 RT	99,3	---	0,7	---	227	High mechanical resistance	Capillary joints of stainless, ferrous and copper materials
5423 BC	97	---	3	---	227-310	High mechanical resistance	Capillary joints of stainless, ferrous and copper materials
RD 30	30	70	---	---	183-255	Extensive melting range	Copper and ferrous material joints.
BC 4299G	50	50	---	---	183-215	Extensive melting range	Copper and ferrous material joints.
3333	67	33	---	---	183-192	Low melting point	Joints where a low melting point is required.

AluTin 51 L is a specially formulated solder flux for aluminium alloys. AluTin 51 L flux can be used with 1827 alloy or basically all Sn based brazing alloys.

Note : According to the RoHS standard, only lead and cadmium free alloys should be used in specific industries. Castolin Eutectic products are certified to be RoHS compliant.

Typical Applications include

Plumbing, electronics, solar, hobby, refrigeration and air-conditioning.



Aluminium alloys

CASTOLIN EUTECTIC REFERENCE	COMPOSITION		MELTING RANGE °C	APPLICATIONS
	Al	Others		
21	95	Si 5	570-620	Repairs of casings, metalwork
190	86	Si 12	576-582	Box weldments and construction with profiled sections
ALLOYS FOR INDUSTRIAL RANGE ALUMINIUM				
38512	86	Si 12	576-581	Brazing of aluminium and its alloys, repairs of radiators
38505	95	Si 5	570-620	Repairs of gear casings, metalwork
38522	22	Zn 78	430-460	Brazing of aluminium and its alloys, repairs of small items, electrical joints
38502	2	Zn 97,5	380-410	Soldering of aluminium and its alloys, repairs to extremely small items



Top quality consumables and equipment for strong manual and automatic brazing

GasFlux



BRAZING



- GasFlux process
- GasFlux equipment
- GasFlux liquid



Brazing pastes - the automation solution

Brazing pastes are the best choice for automated processes for many reasons. Pastes allow the user to :

- Reduce filler metal consumption
- Have a perfect flux / metal ratio
- Apply the filler metal and flux at high speeds
- Apply with filler metal and flux in fully automated one step process
- Reduce the rejection rate
- Apply the filler metal and flux in places where a rod or wire cannot reach

Castolin Eutectic pastes distinguish themselves from the competition by having :

- Maximum paste stability
- Optimised dispensing characteristics
- Easy clean-up with water (hands, tools)
- Minimum development of smoke (furnace brazing)
- Binder does not influence brazing process
- Maximum capillarity
- Highest quality metal powder
- Simple flux residue removal

Solar Cast

Pasta de soldadura blanda diseñada específicamente para la unión de los colectores para paneles solares. 100% libre de halógenos.

SolarCast



BRAZING

Tecnología de recargue y unión

- La pasta de soldadura SolarCast es no corrosiva y no revaporizante. Esta pasta ha sido certificada por el instituto SPF para la Tecnología Solar de Suiza .
- Su intervalo de fusión es 230-250°C





SolarCast 5 is the first certified brazing paste for Solar absorber brazing. Until now, all brazing pastes cause damage to the absorber coating in hotwater solar panels. This damage is caused by corrosive binders and fluxes used in standard pastes. Even the so called “non-corrosive” pastes have been found to damage the absorber surfaces. This damage is caused by vaporation of the binder and flux during brazing process and in operation of the solar panel. SolarCast 5 is the first and only paste tested in a laboratory and proven not to destroy the absorber coating.

Aluminium brazing paste
ideal for all types of application

XuperBraze 190 PA



- XuperBraze 190 PA has 40% less flux for less flux residue.
- It has 40% more alloy for less paste consumption, and has absolute minimal separation for more flexible production processes.
- XuperBraze 190 PA has a totally inert binder that leaves no residue after brazing.

Castolin Eutectic®
Eutectic Castolin

BRASAGE

Silver pastes

PRODUCT	AG	ZN	CU	SN	SOL. °C	LIQ. °C
181	20	Bal.	46	---	740	835
1666	45	Bal.	25	2	660	700
1800	57	Bal.	22	5	625	665
CastoSil S	56	Bal.	22	5	620	650



Aluminium pastes

PRODUCT	AL	SI	ZN	SOL. °C	LIQ. °C
190	Bal.	12	---	576	582
192	2	---	Bal.	380	410



View of the three components of the paste

Soldering Pastes

PRODUCT	SN	AG	CU	PB	SOL. °C	LIQ. °C	TYPE OF RESIDUE
157	Bal.	3,5	---	---	221	221	Corrosive residue
CastoTin 1	Bal.	---	---	50	183	215	Corrosive residue
CastoTin 2	Bal.	---	---	---	232	232	Corrosive residue
Cast 1	Bal.	---	5	---	230	240	Non-corrosive residue
SP 5243	Bal.	---	3	---	227	310	Non-corrosive residue



Applications :

Production of:

- Weapon cutting tools
- Automobile items
- Hot water boilers
- Radiators

Repairs to anti-friction bearings

Fluxes

What is a flux?

A carefully engineered chemical product used for removing metal oxides from the surface of metal parts to be joined. This removal or cleaning process takes place during the brazing operation. The selection of the optimal flux for the application, base metal and brazing alloy is essential for successful brazing operations !



What are the functions of a good flux?

- Surface cleaning : it removes oxides on the base metal. This allows a perfect metallurgical bond between the base metal and the filler metal for maximum strength joints.
- Wetting : it promotes the flow of the molten filler alloy on the base metal.
- Protection : it provides a protective shield for the filler alloy and the base metal during fusion to prevent oxidation.
- Temperature Indicator : once the activity range of the flux is reached, it will melt and become transparent. The alloy can now be applied.



1802 HF Atmosin, the flux for induction applications

1802 HF Atmosin is formulated for use with induction processes. This flux has excellent heat resistance and does not spit or pop during rapid heating.



1802 HF Atmosin is formulated for use with induction processes. This flux has excellent heat resistance and does not spit or pop during rapid heating.



The base materials remain completely clean with 1802 HF Atmosin.



Perfect joints at all times with 1802 HF Atmosin.



Albro flux

Albro flux particularly designed for aluminium bronze brazing with silver alloys. Sole and exclusive flux used mainly in the naval industry.

ActivaTec 1000 Flux

ActivaTec 1000 Flux particularly designed for joints of stainless steel base material with silver alloys. Free of boric acid, this flux meets future European regulations. Easy removal of waste, water soluble.

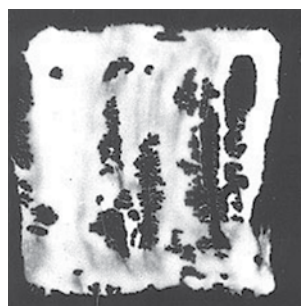
The perfect solution for stainless steel all joints involving stainless steel.



The Atmosin "Effect"

Castolin Eutectic fluxes are specially formulated to make brazing processes easy. Decades of research and testing have resulted in excellent Castolin Eutectic flux products that are known throughout the world.

The Atmosin "Effect", is caused by an active ingredient that promotes wetting and flowing of silver brazing alloys. Atmosin creates a unified flux barrier that removes oxides, prevents redevelopment of oxides and induces excellent wetting. Atmosin prevents the contracting or dripping of the flux during brazing operation, which causes gaps in brazed joints or limits the capillary action of the silver alloy.





Flux without Atmosin



Flux with Atmosin

Fluxes - product overview

FLUXES	FORM	NORM : EN 1045 EN 29454	DIN 8511 DIN 1707	ACTIVE TEMP. °C	DILUANT
FLUX DE CUIVRE					
16	Paste	FH21	F-SH 2	700 – 1000	Water
18	Paste	FH21	F-SH 2	700 – 1100	Water
BRAZING FLUXES					
AluTin 51 L	Liquid	2.1.2	F-SW 24	120 – 350	-
157	Liquid	3.1.1	F-SW 12	150 – 450	Water
157 NC	Liquid	3.1.1	F-SW 21		
197 C	Paste	1.1.3	F-SW 27	150 – 300	Ethanol
ALUMINIUM FLUXES					
190	Powder	FL10	F-LH 1	500 – 700	Water
190 NHR	Powder	FL20	F-LH 2	560 – 590	Water
190 PF	Powder	FL10	F-LH 1	560 – 590	Water
SILVER FLUXES					
ActivaTec 1000 	Paste	FH10	F-SH 1	400 – 800	Water
181 Atmosin	Powder	FH10	F-SH 1	550 – 900	Water
181 PF Atmosin	Paste	FH10	F-SH 1	550 – 900	Water
1703 PF	Paste	FH12	F-SH 1	550 – 900	Water
1802 Atmosin	Powder	FH10	F-SH 1	400 – 780	Water
1802 HF Atmosin	Powder	FH10	F-SH 1	450 – 850	Water
1802 N Atmosin	Powder	FH10	F-SH 1	380 – 720	Water
1802 PF Atmosin	Paste	FH10	F-SH 1	420 – 820	Water
Albro	Paste	FH11	F-SH 1A	400 – 820	Water
808 PF 	Paste	FH10	F-SH 1	500 – 800	Water

FLUXES - INDUSTRY RANGE

FLUX	FORM	ACTIVITY RANGE	NORM EN 1045	APPLICATIONS	THINNER
FP 38920	White paste	420-820	FH10	Ferrous materials, copper materials, alloys with a high silver content	Water
FX 38906	White powder	380-720	FH10	Stainless steels, ferrous materials, copper materials.	Water
FX 38913	White powder	450-850	FH10	Ferrous materials, copper materials, alloys with a high silver content	Water
FP 38952	White paste	490-650	FL20	Aluminium brazing	Water
FX 38955	White powder	550-600	FL10	Aluminium brazing	Water
FP 38957	White paste	550-600	FL20	Aluminium brazing	Water

GreenBraz fluxes are formulated WITH NO boric acid so as to meet future European standards.

TYPE	PRODUCT NAME	FORM	PACKAGING	ACTIVE TEMP. RANGE °C	NF EN 1045
GREEN FLUX	181 Atmosin	Powder	250 g	550 - 900	FH20
			750 g		
	1802 Atmosin	Powder	250 g	400 - 800°	FH10
			750 g		
	181 PF Atmosin	Paste	250 g	550 - 900	FH20
			1 kg		
	1802 PF Atmosin	Paste	250 g	420 - 820	FH10
			1 kg		
	ActivaTec 1000	Paste	250 g	400 - 800	FH10
			1 kg		



TYPE	PRODUCT NAME	FORM	PACKAGING	ACTIVE TEMP. RANGE °C	NF EN 1045
GREEN FLUX	FP 38978	Paste	1 kg	800 - 1000	FH21
	FP 38971	Paste	1 kg	700 - 1000	FH21
	FX 38972	Powder	1 kg	550 - 900	FH21
	FX 38973	Powder	1 kg	420 - 820	FH10
	FP 38917	Paste	1 kg	400 - 900	FH12
	FP 38917D	Paste	1 kg	400 - 900	FH12
	FP 38970	Paste	1 kg	400 - 820	FH11
	FP 38974	Paste	1 kg	550 - 900	FH20
	FP 38975	Paste	1 kg	420 - 820	FH10
	FP 38976	Paste	1 kg	400 - 800	FH10

Foils



CASTOLIN EUTECTIC REFERENCE	% AG	MELTING RANGE °C	NORM ISO 17672
DMIUM FREE SILVER FOILS (INDUSTRIAL RANGE)			
38220L	40	640-700	---
38245L	45	640-680	AG145
38249 L	49	680-705	AG449
38256L	56	620-655	AG156
TRIMETAL FOIL (INDUSTRIAL RANGE)			
8270 LAM	49	670-690	
CUP FOILS (CLASSIC RANGE)			
1803DL	15	645-800	CUP 281
ALUMINIUM FOILS (INDUSTRIAL RANGE)			
38512L		576-581	AL-112

Applications :

Production of:

- Wapon cutting tools
- Automobile items
- Electric motors
- Transformers

Preformed



CASTOLIN EUTECTIC REFERENCE	% AG	MELTING RANGE °C	NORM ISO 17672
CADMIUM FREE SILVER ALLOYS			
38235 R	34	630-730	AG134
38240 R	40	640-700	AG140
38245 R	45	660-700	AG145
38255 R	56	608-630	AG156
CUP/CUPAG ALLOYS			
5246 R	0	710-770	CUP 182
5280 R	2	645-810	CUP 280
5286 R	5	645-815	CUP 281
5283 R	15	645-800	CUP 284
5288 R	18	645	CUP 286
ALUMINIUM ALLOYS			
38512 R	AlSi 12	576-581	
38522 R	ZnAl 22	430-460	

Rings

We produce tailor-made rings with fluxes on the inside or solid rings for any type of manufacturing application, either in a furnace, induction furnace or with a flame.

Applications :

Production of:

- Automobile items
- Air conditioning
- Refrigeration
- Boilers
- Radiators

Wearfacing solutions

Wear Protection Experts

Castolin Eutectic is the worldwide leader in providing wearfacing, repair and joining solutions. Each solution is designed for specific industrial wear or joining problems.

Castolin Eutectic studies and offers solutions against adhesion, abrasion and surface fatigue problems. As experts in Tribology, Castolin Eutectic is sure to have the right solution to your wear problems.

Tribology

It is a study that deals with the design, friction, wear and lubrication of interacting surfaces in relative motion.



Worm Screw Surfacing

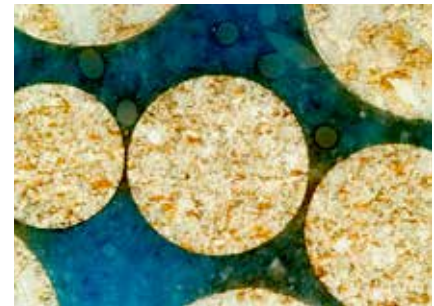
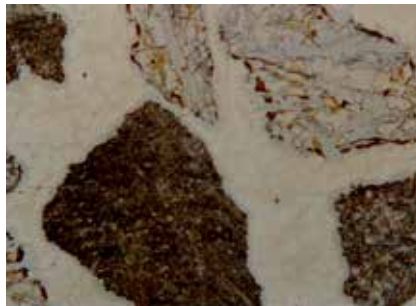
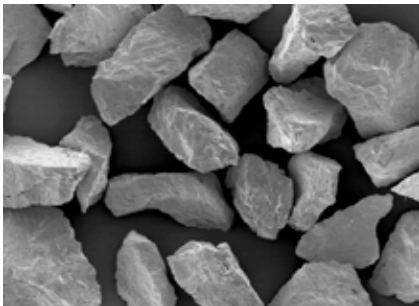


Advantages of Braze Wearfacing

Brazed coatings offer unique advantages compared to welded coatings. These advantages are :

- Less heat affected zones
- No structural or metallurgical changes in base metal
- Less heating of matrix
- Little or no embrittlement of matrix alloy
- Less dissolution of carbides
- No expensive equipment required
- Can be applied anywhere and at anytime
- No shielding gas required

Surfacing Products



Basis of the wear protection

Key to wear prevention is the identification of the type and cause of wear. The type of abrasive particles, carrier and the impact angles play an important role in preventing wear. The graph below shows the surfacing types required depending on the impact angle

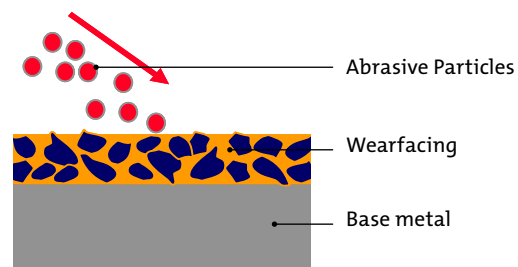
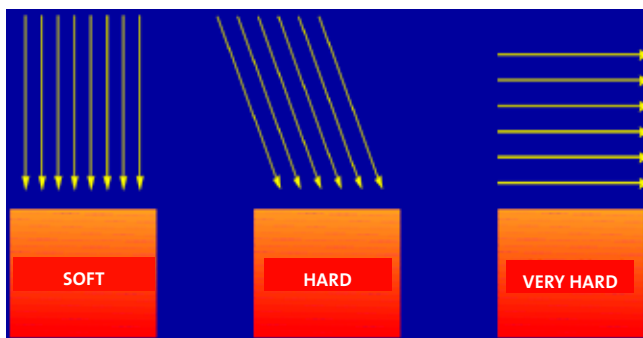
Abrasion resistant surfacing.

Castolin offers solutions for all wear types.

Abrasion is the most common form of wear, and that is why the products found in this catalogue focus on this problem. For further information

regarding solutions for abrasion and other types of wear and hard surfacing, contact your local Castolin office.

Effective abrasion resistant surfacing will have evenly distributed hard phases and clearance between each hard phase must be less than the size of abrasive particles.

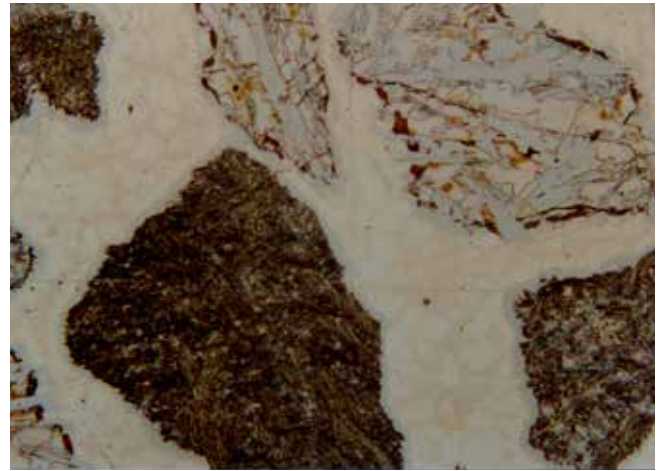


Worm Screw Surfacing



Surfacing wire

Castolin TeroCote 7888 T

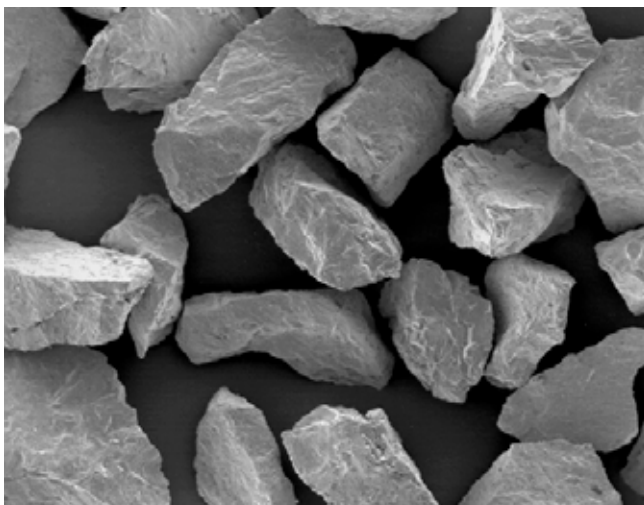


TeroCote 7888 T

7888 T is a high-performance anti-wear product in the form of a flexible cord, comprising a nickel cored wire, covered with an elastic binder containing a mixture of carbides and nickel alloy powder.

Tungsten carbides used in 7888 T

7888 T deposits an extremely durable protective coating comprising a dense mass of ultra-hard tungsten carbides embedded in a tough nickel-chromium alloy matrix. This structure offers extremely effective protection against erosive and abrasive attack by a wide variety of materials.



Tungsten carbides used in 7888 T

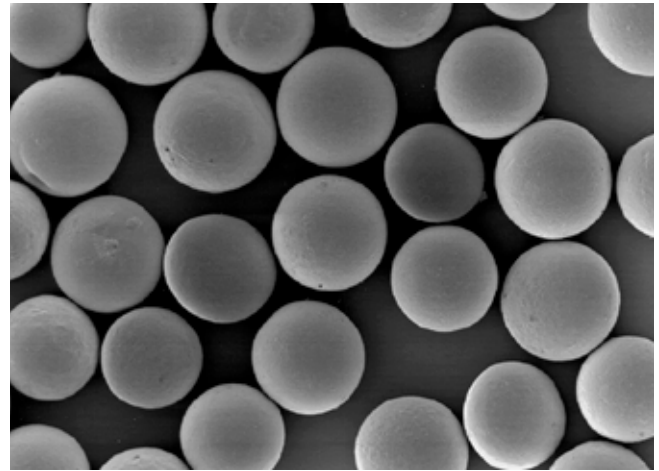
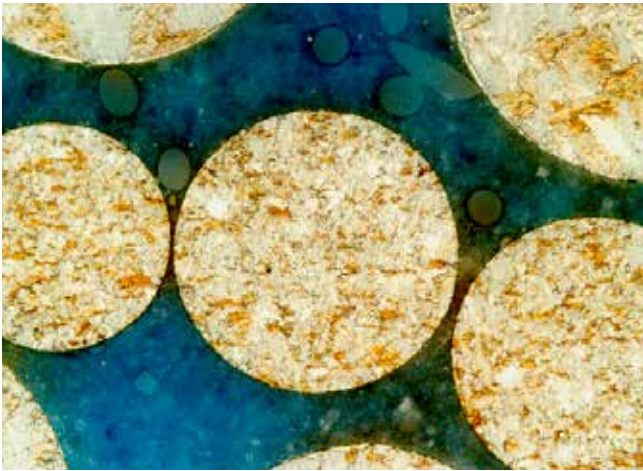
Properties

Hardness, matrix (HV 30) :	~400
Micro-hardness, carbides (HV1) :	>2300
Carbide granulometry - 5,0 mm :	0,2 - 0,7
Carbide granulometry - 6,0 mm :	5,0
Carbide granulometry - 8,0 mm :	1,2
Max. service Temperature (°C):	~700

Industry Examples

- Mining and earth moving : ripper teeth.
- Oil exploration and extraction : drill bits, stabilizers.
- Brick and cement making : mixer and scraper blades, extrusion press screws.
- Mineral processing : conveyor or decanter screws, pump rotors and sleeves
- Iron and steel : guides and scraper blades.
- Agriculture : cutting edges on plough shares.

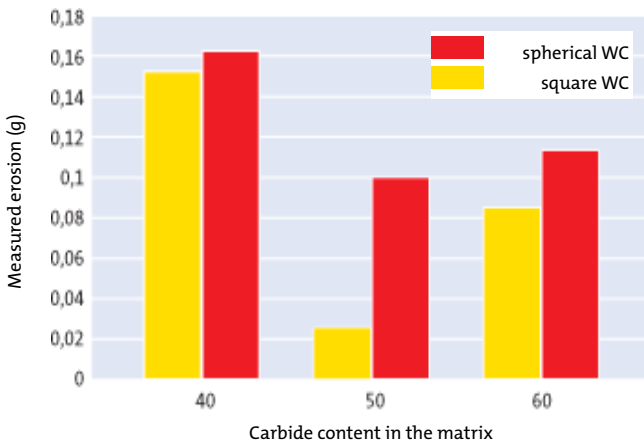
Castolin TeroCote 7888 SH



TeroCote 7888 SH

TeroCote 7888 SH is a high-performance anti-wear product in the form of a flexible cord, comprising a nickel cored wire, covered with an elastic binder containing a mixture of spherical carbides and nickel alloy powder.

Spherical carbides give a denser carbide distribution and improved carbide bonding in the matrix. Spherical carbides also offer abrasive particles a smaller area to attack.



External studies have proven that spherical carbides can outperform irregular shaped carbides under specific conditions.

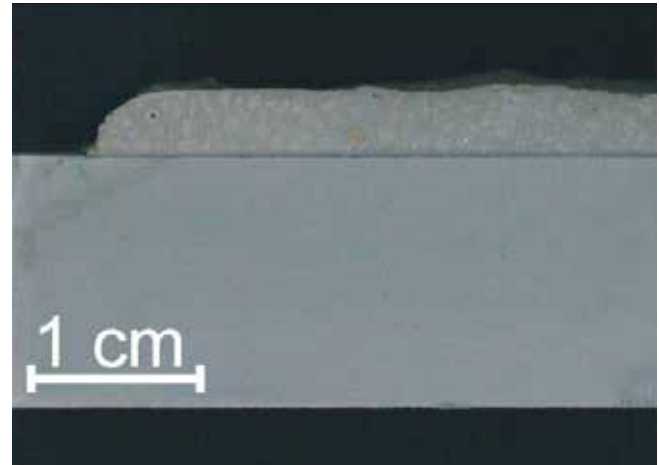
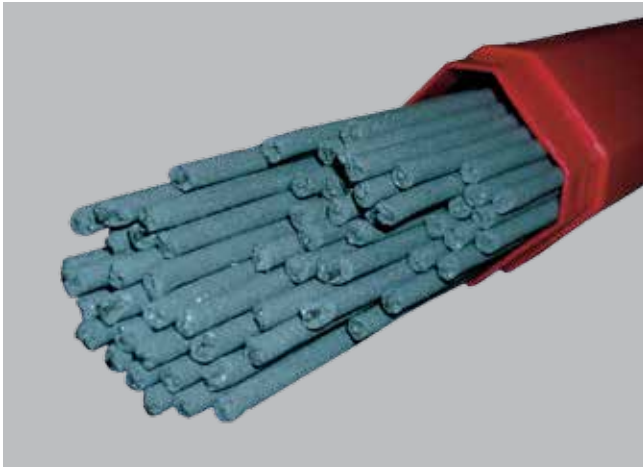
Properties

Hardness, matrix (HV ₃₀):	~400
Micro-hardness, carbides (HV ₁):	>2300
Carbide granulometry - 5,0 mm:	0,2 - 0,7
Max. Service Temperature (°C):	~700

Industry Examples

- Mining and earth moving : ripper teeth.
- Oil exploration and extraction : drill bits, stabilizers.
- Brick and cement making : mixer and scraper blades, extrusion press screws.
- Mineral processing : conveyor or decanter screws, pump rotors and sleeves.
- Iron and steel : guides and scraper blades.
- Agriculture : cutting edges on plough shares.

Castolin TeroCote 7620



TeroCote® 7620

7620 is a high-performance anti-wear product in the form of a rod, comprising a nickel rod, covered with an elastic binder containing a mixture of carbides and nickel alloy powder providing effective protection against erosive and abrasive attack by a wide variety of materials. The matrix composition helps to absorb impact and improves resistance to corrosion, while the angular profile of the finely crystallised carbides makes it very difficult to dislocate them from the matrix.

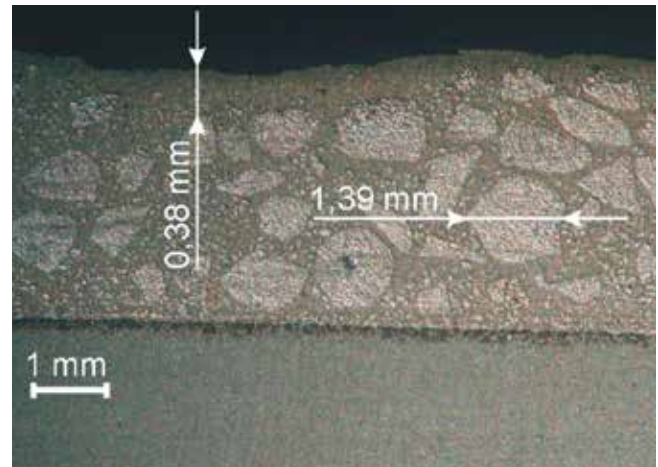
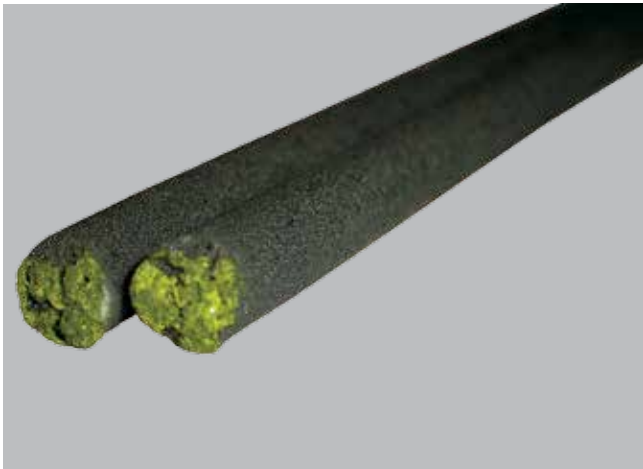
Properties

Hardness, matrix (HV ₃₀):	~400
Micro-hardness, carbides (HV ₁):	>2300
Carbide granulometry - 3,5 mm :	,850
Carbide granulometry - 5,0 mm :	,850
Carbide granulometry - 8,0 mm :	1,500
Max. service Temperature (°C):	~700

Industry Examples

- Mining and earth moving : ripper teeth.
- Oil exploration and extraction : drill bits, stabilizers.
- Brick and cement making : mixer and scraper blades, extrusion press screws.
- Mineral processing : conveyor or decanter screws, pump rotors and sleeves.
- Iron and steel : guides and scraper blades.

Castolin TeroCote 8811



TeroCote 8811

A carbide containing rod for producing the ultimate in abrasion resistance due to the high concentration of hard, wear resistant carbides within a self fluxing metallic matrix. For use on steels, stainless steel and cast iron components using Oxyacetylene, TIG and Eutalloy processes.

This unique alloy form provides a welded protective coating without dilution by the base metal. High density of carbide hard phases. Sound, crack free deposit. No deformation of the workpiece. Rod identification: Dark grey coating.

Properties

Hardness, matrix (HV ₃₀):	~400
Micro-hardness, carbide (HV ₁):	>2300
Carbide granulometry- 5,0 mm:	0,2 - 0,7
Carbide granulometry- 6,0 mm:	5,0
Carbide granulometry- 8,0 mm:	1,2
Max. service Temperature. (°C):	~700

Industry Examples

- Mining and earth moving : ripper teeth.
- Oil exploration and extraction : drill bits, stabilizers.
- Brick and cement making : mixer and scraper blades, extrusion press screws.
- Mineral processing : conveyor or decanter screws, pump rotors and sleeves.
- Iron and steel : guides and scraper blades.
- Agriculture : cutting edges on plough shares.



Castolin Ultimum 8888



Ultimum 8888

Castolin Ultimum 8888 is a composite rod consisting of cemented tungsten carbides embedded in a self-fluxing NiCrBSi-alloy. The coating provided by Castolin Ultimum 8888 is not only protective but is also used as a functional drilling and cutting coating.

This rod is designed for the oxyfuel process. No additional flux is necessary. The flux is formed through the matrix metal itself while fusing the rod.

The cemented tungsten carbides are uniformly distributed in the matrix to get a consistent distribution of carbides in the overlay.

Industry examples

Castolin Ultimum 8888 is mainly used for down hole tools.

Ultimum 8888 is available in four versions:

PRODUCT	CARBIDE SIZE
Ultimum 8888 XFM	0,8-1,6 mm
Ultimum 8888 FM	1,6-3,2 mm
Ultimum 8888 mm	3,2-4,8 mm
Ultimum 8888 GM	4,8-6,4 mm

Advantages

- High Corrosion Resistance
- Self Fluxing Alloy : No fluxes are required.
- Excellent wetting of carbides in matrix
- Finished coating has good cutting characteristics

Ultimum 8888 Cutter



Ultimum 8888 Cutter

Ultimum 8888 Cutter is a self-fluxing NiCrBSi composite rod containing precision cut tetrahedron shaped tungsten carbides.

Castolin 8888 Cutter was specifically designed to have the "Ultimate Cutting Performance".

Only high grade virgin tungsten carbides are used to ensure consistent cutting performance.

This rod is designed for the oxyfuel process. No additional flux is necessary. The flux is formed through the matrix metal itself while fusing the rod.

Industry Examples

Applications :	drilling, grinding and cutting.
Matrix metal :	NiCrBSi-alloy
Hardness :	~45 HRC
Carbide Hardness :	1700 HV

Advantages

- High Corrosion Resistance
- Self Fluxing Alloy : No fluxes are required
- Excellent wetting of carbides in matrix
- Finished coating has good cutting characteristics.
- Can „eat“ away metal, sand, rock, etc....

Stronger, with Castolin Eutectic



Your resource for protection, repair and joining solutions

Statement of Liability: Due to variations inherent in specific applications, the technical information contained herein, including any information as to suggested product applications or results, is presented without representation or warranty, expressed or implied. Without limitation, there are no warranties of merchantability or of fitness for a particular purpose. Each process and application must be fully evaluated by the user in all respects, including suitability, compliance with applicable law and non-infringement of the rights of others, and Messer Eutectic Castolin and its affiliates shall have no liability in respect thereof.



www.castolin.com

www.eutectic.com