



MATTIFLUXTENACITYTENAC

BRAZING FLUXES

BRAZING FLUXES

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- Mattiflux", Tenacity" and Alu-flo" brazing fluxes are specially formulated proprietary products. They each contain a number of inorganic metal salts.
- In general the products conform to EN 1045.

5 Uses for the Products

Mattiflux[™] fluxes are used in a variety of silver brazing operations. For example, special grades have been formulated for specific parent metals or heating methods.

Tenacity" fluxes are intended for use in specialised silver brazing and high temperature copper brazing applications.

Alu-flo™ fluxes are designed to be used with an aluminum brazing filler metal.

Conditions for Use

These products should be used with a compatible brazing filler metal. Ideally they will be applied as a pre mixed paste which should be brushed onto the joint surfaces prior to assembly and subsequent heating.

These fluxes are used when brazing in air using a hand torch, fixed burner system or high frequency induction equipment.





MATTIFLUX

PRODUCTS

MATTIFLUX™ SILVER BRAZING FLUXES - GENERAL PURPOSE

These products are popular general purpose silver brazing fluxes. When selecting a flux it is important to match its recommended working range with the liquidus temperature of the brazing filler metal.

Mattiflux™ Flux Powder



Recommended for

- A working range of 1020-1470°F
- Use on most common engineering metals (excluding aluminum)
- Excellent flux pick-up onto warmed brazing distributors and end users. rod when using 'hot-rodding' technique
- Can be used on stainless steel at <1290°F

Description

Mattiflux™ Flux Powder is a globally renowned white silver brazing flux powder. It is a leading brand flux popular with both

This flux conforms to EN1045 FH10.

Flux Characteristics

Fluidity Activity Life

Flux Residue Removal Standard Packaging

Good High

Medium to long 30 min 140°F -----250g 500g 5kg 25kg

Mattiflux™ 100 Flux Paste



Recommended for

- A working range of 1020-1470°F Use on most common engineering metals
- (excluding aluminum) ■ Especially for ferrous materials

Description

Mattiflux™ 100 Flux Paste is an excellent smooth white general purpose silver brazing flux This flux conforms to FN1045 FH10

Flux Characteristics

Fluidity Activity Life

Flux Residue Removal Standard Packaging

Good High Medium to long 30 min **1**40°F

√ 1kg 7kg

MATTIFLUX™SILVER BRAZING FLUX PASTES - SPECIAL PURPOSE

These products are specially modified flux pastes designed for different applications.

Mattiflux™ Low Temperature Grade Flux Paste



- A working range of 1020-1380°F
- Use on most common engineering metals (excluding aluminum)
- Use on copper and copper alloys
- Induction heating, rapid heating cycles
- Application by dipping of components

Mattiflux™ Low Temperature Grade Paste is a thin smooth white paste. It is a general purpose silver brazing flux. This flux conforms to EN1045 FH10.

Flux Characteristics

Fluidity Good Activity High Life Medium

30 min 140°F 💳 🖁 Flux Residue Removal Standard Packaging 1kg 7kg

Mattiflux™ Medium Temperature Grade Flux Paste



Recommended for

- A working range of 1110-1470°F
- Use on most common engineering metals (excluding aluminum)
- Use with lower silver content filler metals Performs well with extended heating and

at the top of its working range

Description

This is a white general purpose silver brazing flux paste. It is intended for use with low silver content filler metals and on components where brazing times will be protracted.

This flux conforms to EN1045 FH10.

Flux Characteristics

Fluidity Activity Life

Flux Residue Removal Standard Packaging

Good High

Medium to long 30 min 140°F 📟 🖁

1kg 5kg

Mattiflux™ High Temperature Grade Flux Paste



Recommended for

(excluding aluminum)

- A working range of 1065-1515°F Use on most common engineering metals
- Has good 'temperature-time stability' and overheat resistance.
- Good vertical hold on components

Description

Mattiflux™ High Temperature Grade Flux Paste is a silver brazing flux, which performs well with extended heating and at the top of its working range.

This flux conforms to EN1045 FH10.

Flux Characteristics

Fluidity Medium Activity Medium Life Flux Residue Removal

250g 500g 1kg 7kg Standard Packaging

MATTIFLUX

PRODUCTS

MATTIFLUX™ SILVER BRAZING FLUXES — SPECIAL PURPOSE FOR SPECIFIC MARKETS

Mattiflux™ K Grade Flux Powder



Recommended for

- A working range of 1020-1470°F
- Developed for Swiss, German and Austrian markets
- Use on most common engineering metals including copper, brass and steel (excluding aluminum)

Description

Mattiflux** K Grade Flux Powder is a special purpose white silver brazing flux powder. It is exclusively offered in Swiss, German and Austrian markets where its brazing characteristics are preferred.

This flux conforms to EN1045 FH10.

Flux Characteristics

Fluidity Good
Activity High
Life Medium
Flux Residue Removal 30 min 11.

Flux Residue Removal 30 min 140°F 500g 5kg

Mattiflux™ A Grade Flux Paste



Recommended for

- A working range of 1020-1470°F
- Developed for Swiss, German and Austrian markets where its brazing characteristics are preferred
- Use on most common engineering metals (excluding aluminum)

Description

Mattiflux" A Grade Flux Paste is an excellent Fluidity smooth white general purpose silver brazing Activity flux. This flux conforms to **EN1045 FH10**. Life

Flux Characteristics

Fluidity Good
Activity High
Life Medium to long
Flux Residue Removal 30 min \$140°F \tag{140°F}
Standard Packaging 1kg

MATTIFLUX™ SILVER BRAZING FLUXES FOR SPECIAL APPLICATIONS

These products are designed for improved performance on specific metals.

Mattiflux™Stainless Steel Grade Flux Powder



Recommended for

- A working range of 1020-1425°F
- Especially for stainless steel components where a higher fluoride content boosts activity
- Suitable for most common engineering metals and on certain aerospace work

Description

A general purpose silver brazing flux powder, which offers improved fluxing on stainless steel when used with brazing filler metals with a liquidus temperature up to 1335°F. This flux conforms to **EN1045 FH10.**

Flux Characteristics

Fluidity Good
Activity High
Life Medium
Flux Residue Removal 30 min 140°E

Flux Residue Removal 30 min \$\frac{1}{40}^\circ F \rightarrow \frac{1}{500} \frac{5}{500} \frac{5}{5

Mattiflux™Stainless Steel Grade Flux Paste



Recommended for

- A working range of 1020-1425°F
 Especially for stainless steel components where a higher fluoride content boosts activity
- Suitable for most common engineering metals and on certain aerospace work

Description

A general purpose silver brazing flux paste, which offers improved fluxing on stainless steel when used with brazing filler metals with a liquidus temperature up to 1335°F. This flux conforms to **EN1045 FH10**.

Flux Characteristics

Fluidity Good Activity High Life Medium

Flux Residue Removal 30 min \$\int 140^\circ F^\rightarrow \rightarrow \rightar

Mattiflux[™]Aluminum Bronze Grade Flux Paste



Recommended for

- A working range of 1020-1425°F
- Silver brazing of aluminum bronze and copper alloys where the formation of aluminum oxide prevents standard fluxes from working successfully

Description

A specialised silver brazing flux for aluminum bronze and copper alloys with 2-10% aluminum where standard fluxes are unable to dissolve surface aluminum oxide. This flux conforms to EN1045 FH11.

Flux Characteristics

Fluidity Good
Activity High
Life Medium
Flux Residue Removal 30 min \$\infty 140^\circ F^{\text{Terms of }}\infty}
Standard Packaging 1kg



TENACITY"

PRODUCTS

TENACITY™ BRAZING FLUXES - BORON MODIFIED

The addition of elemental boron to brazing fluxes improves filler metal wetting on refractory metals and difficult to wet materials such as tungsten carbide. It should be noted that boron modified fluxes are not suitable for use on low or nickel-free stainless steels if interfacial corrosion is likely to be a hazard in service because they can promote the corrosive mechanism.

Tenacity™ No.6 Flux Powder



Recommended for

- A working range of 1020-1470°F ■ Improving wetting of the filler metal on cemented tungsten carbide
- Tungsten carbide backed PCD
- Grades of cast iron

Description

Tenacity™ No.6 Flux Powder is a brown boron modified flux for use on tungsten carbide and materials containing refractory metals. It has superior fluxing activity to many other products of its type. This flux conforms to EN1045 FH12.

Flux Characteristics

Fluidity Good Activity High Life Medium 30 min 140°F 🚟 🐰 Flux Residue Removal Standard Packaging 500g 4kg

No.6 Flux Paste



Recommended for

- A working range of 1020-1470°F ■ Improving wetting of the filler metal on cemented tungsten carbide
- Tungsten carbide backed PCD
- Grades of cast iron

Description

Tenacity™ No.6 Flux Paste is a brown boron modified flux for use on tungsten carbide and materials containing refractory metals. It has superior fluxing activity to many other products of its type.

This flux conforms to EN1045 FH12.

Flux Characteristics

Fluidity Good Activity High Medium Life 30 min **1**140°F ₩ Flux Residue Removal Standard Packaging 500g



Tenacity™ No.5A Flux Powder



Recommended for

- A working range of 1110-1650°F Improving wetting of the filler metal on cemented tungsten carbide
- Tungsten carbide backed PCD
- Refractory metals
- overheat resistance.

Description

Tenacity™ No.5A Flux Powder is designed for Fluidity use on stainless steel, tungsten carbide and materials containing refractory metals in instances where there is a need for a higher temperature flux with improved wetting. Has good 'temperature-time stability' and This flux conforms to EN1045 FH12.

Flux Characteristics

Medium to low Activity High Life Long Flux Residue Removal NaOH === ₹ 500g Standard Packaging

Tenacity™ No.3A Flux Paste



Recommended for

- A working range of 1110-1600°F Improving wetting of the filler metal on cemented tungsten carbide
- Tungsten carbide backed PCD
- Grades of cast iron

Description

Tenacity™ No.3A Flux Paste is a nonstandard boron modified flux for use on stainless steel, tungsten carbide and materials containing refractory metals. This flux conforms to AMS 3411 / EN1045 FH12

Flux Characteristics

Fluidity Good Activity High Medium 30 min **1**40°F 🚟 🐰 Flux Residue Removal Standard Packaging

TENACITY"

PRODUCTS

TENACITY™ BRAZING FLUXES - MEDIUM AND HIGH TEMPERATURE

These products are designed for components requiring extended heating cycles, low silver or copper-based brazing filler metals.

Tenacity™ No.4A Flux Powder



Recommended for

- A working range of 1110-1560°F
- Silver brazing where a higher working range flux is needed such as with lower silver content filler metals
- $\hfill\blacksquare$ Brazing large copper alloy components
- Phosphorus containing filler metals

Description

Tenacity" No.4A Flux Powder is a medium temperature flux intended for use with lower silver content brazing filler metals or where a higher working range flux is needed.

This flux conforms to EN1045 FH10.

Flux Characteristics

Fluidity Good Activity High Life Mediu

Life Medium to long
Flux Residue Removal NaOH Standard Packaging 500g

Tenacitv™ No.5 Flux Powder



Recommended for

- A working range of 1110-1650°F
- Prolonged heating operations
- Large assemblies in steel or copper
- Stainless steel above 1290°F
- Controlling filler metal spread

Description

Tenacity™ No. 5 Flux Powder is a high temperature silver brazing flux with a long life and wide working range. It is restrictive when molten and forms insoluble glass-like residues.

This flux conforms to EN1045 FH10.

Flux Characteristics

Standard Packaging

250g 500g 5kg

250g 500g

Tenacity™ No.20 Flux Powder



Recommended for

- A working range of 1380-1830°F
- $\hfill\blacksquare$ Bronze or braze welding operations
- $\hfill \blacksquare$ Copper, mild and low alloy steels
- Use with copper-based filler metals

Description

Tenacity" No.20 Flux Powder is a high temperature flux designed for bronze welding/braze welding/brazing with Argentel" brass type filler metals.

This flux conforms to EN1045 FH21.

Flux Characteristics

Fluidity Medium to low
Activity High
Life Medium to long
Flux Residue Removal

Tenacity™ No.125 Flux Powder



Recommended for

- A working range of 1380-2190°F
- Use on mild and low alloy steels and tungsten carbide
- Use with copper-based brazing filler metals
- JM Bronze[™] filler metals such as F Bronze[™]

Description

Tenacity[®] No. 125 Flux Powder is a high temperature flux powder suitable for use with Argentel[®] and JM Bronze[®] filler metals This flux conforms to **EN1045 FH21**.

Flux Characteristics

Standard Packaging

Fluidity Medium to low
Activity High
Life Long
Flux Residue Removal
Standard Packaging 400g 4kg

Tenacity™ No.125 Flux Paste



Recommended for

- A working range of 1380-2190°F
- Use on mild and low alloy steels and tungsten carbide
- Use with copper-based brazing filler metals
- JM Bronze[™] filler metals such as F Bronze[™]

Description

Tenacity[®] No. 125 Flux Paste is a high temperature flux paste suitable for use with Argentel[®] and JM Bronze[®] filler metals This flux conforms to **EN1045 FH21**.

Flux Characteristics

Fluidity Medium to low Activity High
Life Long
Flux Residue Removal Standard Packaging 700g



TENACITY

PRODUCTS

SPECIALIZED TENACITY™ FLUXES

These products are designed for niche applications.

Tenacity™ No.2 Modified Flux Powder

April Maller April Maller Bushing Mo. E Whatgar

Recommended for

- A working range of 1020-1470°F
- Flux coating on brazing rods

Description

Tenacity" No. 2 Modified Flux Powder is formulated for use as a flux for coating silver brazing rods. It is a specially milled white flux powder which is active early in its working range.

Conforms to: EN1045 FH10

Flux Characteristics

Fluidity Activity Life

Flux Residue Removal Standard Packaging 25kg

Tenacity™ No.14 Flux Powder



Recommended for

- A working range of 1020-1380°F
- Brass where red staining is a problem
- Being active early in its working rangeLow temperature hand torch brazing
- operations

Description

Tenacity™ No. 14 Flux Powder is a specialised silver brazing flux used on brass where red staining due to oxidation of zinc is a problem.

Conforms to: EN1045 FH10

Flux Characteristics

Fluidity Activity Life

Flux Residue Removal Standard Packaging Medium to low High Medium to low H₂SO₄ Source 500g 5kg

Heating flux to brazing temperatures



The flux becomes white and solidifies as water is driven off



The flux becomes clear and watery as it approaches brazing temperature



Flux protects the component from oxidation as the brazing filler metal flows

ALU-FLO

PRODUCTS

ALU-FLO™ FLUXES FOR BRAZING ALUMINUM

These products are designed for low temperature aluminum brazing in air .

Alu-flo™ No.1 Flux Paste



Recommended for

- A working range of 970-1130°F
- Excellent dispensability
- # Use with aluminum silicon/Alu-flo™ HT filler metals
 - Brazing aluminum < 1130°F.

Description

An active chloride based aluminum brazing flux with corrosive flux residues.

Conforms to: EN1045 FL10

Flux Characteristics

Fluidity Good Activity High Life Medium

Flux Residue Removal 30 min \$\int 140^\circ F \rightarrow \footnote{\text{Standard Packaging}} 1kg

Alu-flo™ No.2 Flux Paste



Recommended for

- A working range of 1065-1110°F
- Excellent dispensability
- Use with aluminum silicon/Alu-flo™ HT filler metals
- Brazing aluminum <1110°F.

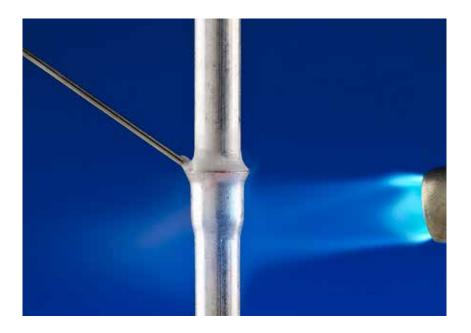
Description

An active fluoride based aluminum brazing flux with non-corrosive flux residues.
Conforms to: EN1045 FL20

Flux Characteristics

Fluidity Good Activity Low Life Low Flux Residue Removal Not possible

Standard Packaging 1kg





MATTIFLUX" TENACITY"

TECHNICAL

THE PURPOSE OF A FLUX

The purpose of a brazing flux is to remove oxides present on the parent materials and the filler metal and those formed during brazing. Fluxes do not prevent oxidation from occurring but a carefully selected flux will remove oxide that is formed during brazing.

A molten brazing filler metal will only wet and flow over a parent material if both are substantially free of surface oxide. Simply removing surface oxide as part of the pre-cleaning process is not effective, since a new oxide layer is rapidly formed on heating. Thus, to achieve an oxide-free surface, it is necessary either to: -

1 Remove oxide as it is formed by the use of a suitable brazing flux.

2 Overcome oxidation during brazing by heating in a protective atmosphere or vacuum.

3 Use self-fluxing silver/copper/phosphorus filler metals - only applicable when brazing copper to copper.

Flux Performance and Characteristics

Pre-cleaning: Brazing fluxes are only designed to remove oxide films. Where other contaminants such as oil, paint and lacquer are present these should be removed by pre-cleaning before brazing, using either mechanical or chemical methods.

Flux Application Method

It is recommended that flux should be applied as a paste to both joint surfaces before assembly. Application of flux after assembly places great demands on the fluidity of the molten flux and its ability to penetrate capillary joints. Powders should be mixed into a smooth paste of double cream consistency with the addition of a drop or two of liquid detergent.

Working Range and Temperature Effects

If a flux is not heated up to its working range surface oxides will be present on the components and there will be insufficient heat in them to melt the filler metal. The filler metal will not melt and flow on the surface of the components. If a flux is heated beyond its working range it will rapidly become exhausted, the components and flux residues will blacken and the flux will stop working. The brazing filler metal will melt but not flow or wet out on the oxidized metal surfaces.

To be effective the flux must be both molten and active before the brazing filler metal melts, and it must remain active until the brazing filler metal flows through the joint and solidifies on cooling. The working ranges of Johnson Matthey's brazing fluxes are given in the table on page 10. It is good practice to select a flux which is active at least 120°F below the solidus of the brazing filler metal and which is still active at a temperature at least 120°F above the liquidus of the brazing filler metal. This will ensure that the flux is effective during the brazing operation.

Flux Volume

The volume of flux required will vary depending on the nature of the application. Usually it is sufficient to coat the joint faces and the surrounding component surfaces with a layer of paste using a brush. Using an excess of flux is in no way detrimental to the quality of the brazed joint, and can assist flux residue removal. Application of flux to surfaces away from the joint helps to prevent oxidation of the components. The use of too little flux can lead to flux exhaustion resulting in unsound brazed joints. It is, therefore, usually best practice to use too much rather than too little flux.

Flux Fluidity

Molten fluxes exhibit different levels of viscosity, which can change during the heating cycle. In most cases it is desirable to have a fluid flux with low viscosity which allows the filler metal to flow freely and displace the flux. Certain fluxes are less fluid resulting in less filler metal spread beyond the joint area. The more fluid a flux is when molten the easier it will be displaced by the filler metal

Flux Activity

Johnson Matthey Mattiflux[™] and Tenacity[™] fluxes are suitable for use on copper, brass, mild steel and most other common engineering materials. Certain metal oxides are less readily removed by chemical fluxes. In these cases a specialised or more active flux is necessary to break down the oxides formed and allow good filler metal flow and wetting. Special purpose fluxes exist for aluminum bronze, stainless steel, tungsten, molybdenum and tungsten carbide. Silver brazing fluxes are not effective on aluminum, magnesium, titanium or their alloys.

Flux Life

Flux has to remove the oxides on the component and must continue to remove fresh oxide until the completion of the brazing cycle. There is a limit to the amount of oxide that the flux can dissolve. The longer the heating cycle the more likely it is that the flux will become exhausted and the residues and components exhibit a blackened appearance. There is no fixed time for which a flux will be effective since this is dependent on the operating temperature, volume of flux and the type of parent metal.

For short rapid heating cycles it may be possible to use a flux above its recommended maximum working temperature. With long heating cycles additional flux may be added during brazing. However, flux exhaustion may occur and the use of flux with a higher working range would be recommended.

Using Flux as a Temperature Guide

During heating it is possible to use the flux as a temperature guide. Once the flux becomes a clear fluid it is an indication that brazing temperature has been approached.

Flux residue removal

In most cases flux residues should be removed after brazing as they can be corrosive. See page 11 for correct removal method.

MATTIFLUX TENACITY

FLUX SELECTOR CHART

Flux plays a vital role in virtually all air brazing processes. Selecting a flux to match the specific requirements of application, brazing filler metal, parent materials and heating methods, is vital to obtain the best possible results. Johnson Matthey offers a wide range of fluxes, which can lead to improved quality through selecting the optimum flux for any application.

Filler Metal Melting Range	Standard Recommendation	Situation Where Alternative Flux May Improve Brazing	Alternative Flux For This Situation	
		For Particular Parent Metals		
Melts below	Mattiflux [™] Flux Powder	For brazing copper and copper alloys	Mattiflux™ Low Temperature Grade Flux Paste	
1380°F	Mattiflux [™] 100 Flux Paste	For brazing ferrous alloys	Mattiflux™ 100 Flux Paste	
		For brazing stainless steel components	Mattiflux [™] Stainless Steel Grade Flux Powder or Paste	
		For copper based parent metals containing 2-10% aluminum	Mattiflux" Aluminum Bronze Grade Flux Paste	
		For tungsten carbide, PCD and cast iron	Tenacity™ No.6 Flux Powder	
		For tungsten carbide, PCD and cast iron where paste is required	Tenacity [™] No.6 Flux Paste	
		For Specific Heating Situations or Application Met	hods	
		Rapid heating cycles – especially induction heating	Mattiflux™ Low Temperature Grade Flux Paste	
		Application by dipping	Mattiflux™ Medium Temperature Grade Flux Paste	
		Where good vertical hold during heating steel components is required	Mattiflux" High Temperature Grade Flux Paste	
		For tungsten carbide, PCD and cast iron where a dispensable grade of paste is required	Tenacity™ No.6 Dispensible Flux Paste	
		Where one flux is required to deal with several different heating methods used in production	Mattiflux" 100 Flux Paste	
		For Particular Parent Metals		
Melts between	Mattiflux™ High Temperature	For stainless steel where overheating occurs	Tenacity™ No. 5 Flux Powder	
1380 and 1425°F	Grade Flux Paste	For large copper alloy components or where extra flux life is needed	Tenacity® No. 4A Flux Powder	
		For Specific Heating Situations or Application Met	hods	
		For rapid heating and shorter heating cycles	Mattiflux [™] Low Temperature Grade Flux Paste	
			Mattiflux [™] Flux Powder	
			Mattiflux™ 100 Flux Paste	
Filler Metal Melting Range	Standard Recommendation	Situation Where Alternative Flux May Improve Brazing	Alternative Flux For This Situation	
		For Particular Parent Metals		
Melts between 1425 and 1650°F	Tenacity™ No 5 Flux Powder	For refractory metals/stainless steel where filler metal wetting is a problem but interfacial	Tenacity [™] No 5A Flux Powder	
		corrosion* is not a factor	(*seek advice on this point)	
		For Specific Heating Situations or Application Met	hods	
	Tenacity™ No 5 Flux Powder	Where overheating or extended heating may occur	Tenacity™ No.125 Flux Powder or Paste	
		For Particular Parent Metals		
Melts between 1650 and 1830	Tenacity [™] No.20 Flux Powder	For tungsten carbide to steel and especially for use with JM Bronze [™] filler metals	Tenacity" No.125 Powder or Paste	
	Tenacity™ No.125 Flux Powder	For mild or carbon steel pipework in bronze or braze welding operations	Tenacity" No.20 Flux Powder	
		For Specific Heating Situations or Application Methods		
Melts between 1560 and 2190°F	Tenacity™ No.125 Flux Powder	Furnace brazing in a reducing atmosphere, partial pressure inert gas or vacuum	Flux is not normally required	





KEY TO FLUX RESIDUE REMOVAL

Residues are generally soluble in hot water (~140°F). Immerse for ~30 minutes.

Residues are virtually insoluble in water. NaOH Immerse in a warm 10% sodium hydroxide solution.



Residues are insoluble in water. Grit blasting or other mechanical means of removal are necessary.

Residues are virtually insoluble in water. H₂SO₄ Immerse in a warm 10% sulfuric acid solution.



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