WALLCOLMONOY
HI TEMP BRAZING ALLOYS

WALLCOLMONOY CORP. (USA)
TECHNICAL DATA SHEET

The comprehensive range of Nicrobraz Stop-Off products meet the needs of almost all applications

Nicrobraz® Stop-Off™ Materials

Aid in Brazing and Heat Treating Operations by Preventing Unwanted Filler Metal Flow and the Accidental Fusing Together of Parts

Description:

Nicrobraz Stop-Off materials are designed to protect metal surfaces from the flow of molten brazing filler metal, or to prevent metal surfaces from adhering to each other in furnace brazing operations.

The various Nicrobraz Stop-Off materials differ in composition, type, and, to some extent, purpose. It should be noted that all stop-off materials are extremely effective and should not be allowed to find their way into joints which are to be brazed. Should this happen, brazing will not occur.

Nicrobraz Green Stop-Off and Yellow Stop-Off are essentially surface-active materials which prevent high-temperature-molten filler metal from bonding to a protected surface, either by penetration or by flowing under the stop-off.

Nicrobraz Red, White, Orange, and Blue Stop-Off materials act as parting compounds, designed to prevent mating surfaces from being brazed together. They effectively prevent the flow of filler metal into unwanted areas. However, on the rare occasion when furnace atmosphere conditions are extremely good, filler metal may be able to creep under the stop-off layer. These stop-off materials are generally effective in any type of brazing atmosphere, including vacuum, and with any type of base metal. Nicrobraz Orange and Blue Stop-Off are recommended for very-high-vacuum applications and for use with reactive metals such as titanium, zirconium, and similar base metals.

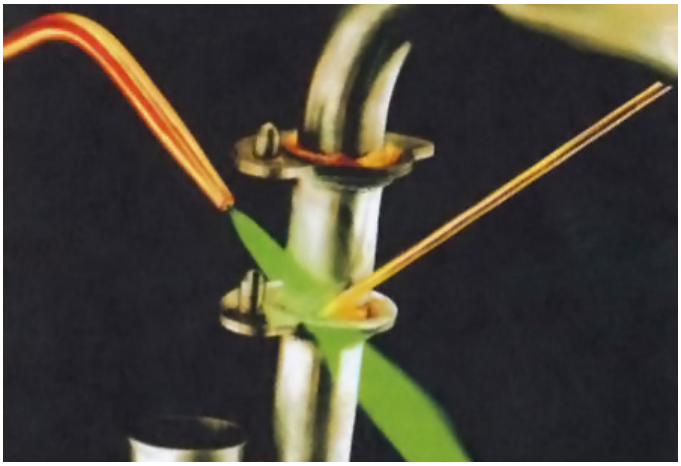
Nicrobraz Stop-Offs come in several forms, as shown in the table on page 2. The solvent-based Type I materials are flammable, and should be handled as such. Normal caution should be exercised in their use. They should only be used in well ventilated areas. The water-based Type II products may be preferable, since they have no objectionable smell and are not flammable. (Read the material safety data sheet, before use, for further instructions on using and storing these materials.)

Stop-Offs are being used successfully in brazing, both in controlled-atmosphere furnaces and with flux and torches, as well as in molten-salt dip brazing of aluminum. Specific mineral fluxes, however, may react with stop-off compounds, resulting in reduced effectiveness of the stop-offs, or in more difficult removal of the flux residue. To be effective, in all cases, the stop-off must completely cover the desired surface; no base metal should be visible through the stop-off.

Nicrobraz Stop-Off™

GENERAL USE	FORMS	CONTAINER SIZES
Green Surface protection. Prevents filler metal from bonding to a protected surface. May also be used as a masking agent when thermal spraying metallic coatings.	**Type I** (solvent base)	1, 3, and 230 Kg
	Type II (water base)	1, 3, and 275 Kg
	Felt-Tip Pen	10 mL pens (12 in a box)
Yellow General-purpose stop-off used in controlled atmosphere furnace and torch brazing, as well as in molten salt bath dip brazing. Can be used on almost any base metal, except reactive metals.	**Type II** (water base)	1.5 Kg
White Acts as a parting compound. Special grade designed for furnace brazing, prevents accidental brazing of mating surfaces, stacked parts or parts to fixtures. Prevents flow of brazing filler metal. Easy to remove.	**Powder** (used alone or with Nicrobraz Cement)	1, 25, and 100 Kg drum
	Type I (solvent base)	1 Kg
	Type II (water base)	1.5 Kg
Red Acts as a parting compound and filler metal barrier. Works on any base-metal surface. Designed for furnace use. Residue is easily removed. Soluble in dilute acid.	**Type II** (water base)	1 Kg
Orange Prevents accidental brazing of mating surfaces and unwanted flow of filler metal. Special formula for very high vacuum furnace applications and for use with titanium and zirconium. Used in super-plastic forming operations.	**Type I** (solvent base)	3 Kg
Blue Performs in extremely high temperatures. Formulated for use on reactive base metals such as titanium and zirconium.	**Type II** (water base)	1 Kg

Yellow Stop-Off™



Yellow Stop-Off for Torch Brazing
image source: AWS Brazing Handbook P. 238

Description:

This is a general purpose water-base stop-off used in controlled-atmosphere furnace work to prevent the molten filler metal from flowing into unwanted areas such as threads, holes and cast surfaces. This product combines the protection offered by the Nicrobraz Green Stop-Off material with the ease of removal of the Nicrobraz White Stop-Off products.

Recommended Uses:

It can be used with almost any type of base metal (except reactive metals, such as titanium and zirconium), brazing method, or filler metal. It is effective with nickel, copper and silver brazing filler metals. Yellow Stop-Off Type II can be used with flux for controlled-atmosphere furnace and torch brazing, as well as molten-salt-dip brazing of aluminum. When flux is used, the stop-off layer should be heavy and the flux layer thin. A heavy layer of flux will lower the effectiveness of the stop-off.

Removal Procedures:

Any Yellow Stop-Off residue remaining after brazing is not harmful to surfaces and does not need to be removed. However, if removal is desired, the brazement can be blasted, wire brushed, or etched in a solution of deionized or distilled water, 10% nitric acid, and 2% hydrofluoric acid heated to 65°C (150°F) or in a molten-salt cleaning bath.

Green Stop-Off™

Green Stop-Off pen in use

Description:

Designed for all-purpose use, Nicrobraz Green Stop-Off can be used with almost any type of base metal (except reactive metals, such as titanium and zirconium), any brazing method, or any brazing filler metal. It is the finest surface-protection agent made, and as such, provides the best assurance you can get that filler metal will not reach any protected metal surface. By confining the filler metal to joint areas, the amount of required filler metal may be greatly reduced. In addition to its primary function of protection against brazing filler metal where it is not wanted, it is used to protect areas not meant to be overlaid when flame spraying metallic coatings.

Nicrobraz Green Stop-Off will not contaminate the atmospheres used in general furnace brazing applications. It comes in various forms, as described below.

Liquid, Type I (solvent-base):

Nicrobraz Green Stop-Off can be thinned to any viscosity desired with standard lacquer thinners or acetone. It is usually applied by brushing, which assures accurate placement and excellent control of quantity. Screen printing, spraying, or dipping may also be used, after obtaining the proper viscosity for these methods. Whichever method is used, extreme care should be exercised in application, to prevent contaminating the brazed joint. Nicrobraz Green Stop-Off, as has been stressed earlier, is supremely effective as a barrier against filler metals. When a flux is used (as in torch brazing), the stop-off layer should be heavy and the flux layer thin. A heavy layer of flux will lower the effectiveness of the stop-off layer. (When using flux, Nicrobraz Yellow Stop-Off is generally most effective.)

Type II (water-base):
This is identical to the Type I Nicrobraz Green Stop-Off in performance and recommended uses. It differs in that it is a water-base material requiring less frequent agitation, has greater covering capacity, is practically odorless, and is not flammable.

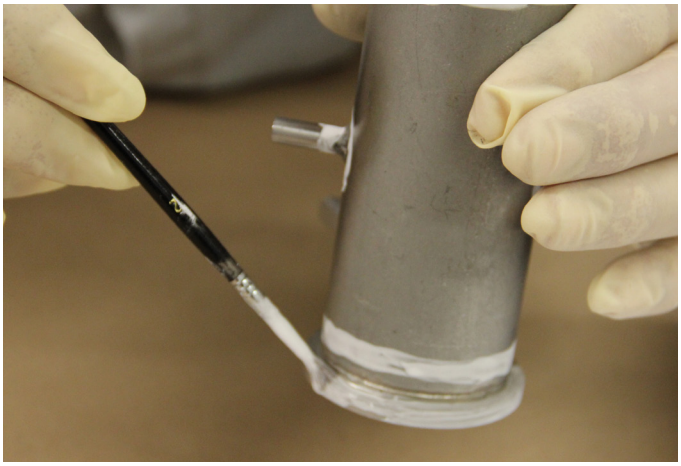
Green Stop-Off (Type I) felt-tip pen:
This is the easiest-to-use form. Besides making barriers against the flow of molten metals with the stroke of a pen, it can be used for making heat-resistant markings on any metal surface. Markings will survive temperatures through 1650°C (3000°F) in the brazing furnace.

Application Procedure for Felt-Tip Pen:
Shake pen well before and during use. Ensure that pen is shaken sufficiently to hear the mixing ball rattle, prior to use. To start flow, press pen tip down several times until it is saturated. Draw lines, as with any marker pen, on surfaces that are clean and free of oils, rust or wax. To replenish flow, press down once. Keep capped when not in use.

Removal Procedure:
Nicrobraz Green Stop-Off residue remaining after brazing is not harmful to surfaces and may be removed by any of several methods. (1) vapor blasting, (2) grit blasting, (3) wire brushing, (4) polishing, (5) pickling in a solution of deionized or distilled water, nitric acid (10%), and hydrofluoric acid (2%), heated to 65°C (150°F).

Recommended Uses:
Use Nicrobraz Green Stop-Off to prevent the flow of brazing filler metal into threads, holes, cast surfaces, and the like. It can be used with almost any base metal, ferrous or non-ferrous. The exceptions are reactive metals such as titanium, zirconium, and their alloys (which require Nicrobraz Orange or Blue Stop-Off). Nicrobraz Green Stop-Off holds back any type of brazing filler metal, including nickel-based, copper, silver, etc.

White Stop-Off™



White Stop-Off brushed onto bracket

Description:
Nicrobraz White Stop-Off acts as a parting compound to prevent the accidental brazing of surfaces of adjoining parts being furnace-processed. It also prevents the sintering or cohesion of stacked parts during furnace heat treatment. It is specifically formulated to prevent contamination of either the base metal or filler metal. White Stop-Off may be used in vacuum brazing furnaces without causing contamination or objectionable outgassing. It comes in three forms, as described below.

Powder:
The powder form should be mixed with Nicrobraz 520 solvent-base cement or Nicrobraz 650 water-base cement. Reference specific Technical Data Sheets. The proportions of powder to cement may be varied to get the consistency needed for the intended use. The mixture may be applied by brushing, dipping, or spraying with a paint gun. It should be agitated frequently to keep it in suspension.

Type I (solvent base):
Nicrobraz White Stop-Off when shaken well can be applied by brushing, dipping or spraying. It can be thinned to any desired viscosity with a standard lacquer thinner or acetone, both of which are flammable. The application should be heavy enough so that the base metal cannot be seen through the stop-off.

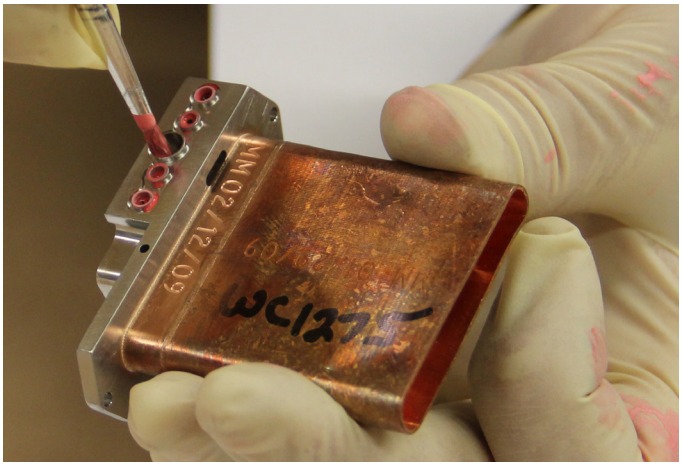
Type II (water-base):
This is a very viscous material that is normally applied with a syringe to areas such as small holes, to prevent filling with brazing filler metal. It can be thinned with deionized or distilled water for brushing, dipping

or spraying. It has excellent covering properties, is practically odorless and is not flammable.

Removal Procedure:

Nicrobraz White Stop-Off remaining after brazing is easily brushed or wiped away. Any Nicrobraz cement used with the stop-off will gas off completely, leaving only the powder residue. To remove from interior surfaces, immerse the piece in a solution of deionized or distilled water, 10% nitric acid, and 2% hydrofluoric acid heated to 65°C (150°F), or in a molten-salt cleaning bath.

Red Stop-Off™



Red Stop-Off applied to small holes on an ultra-cell

Description:

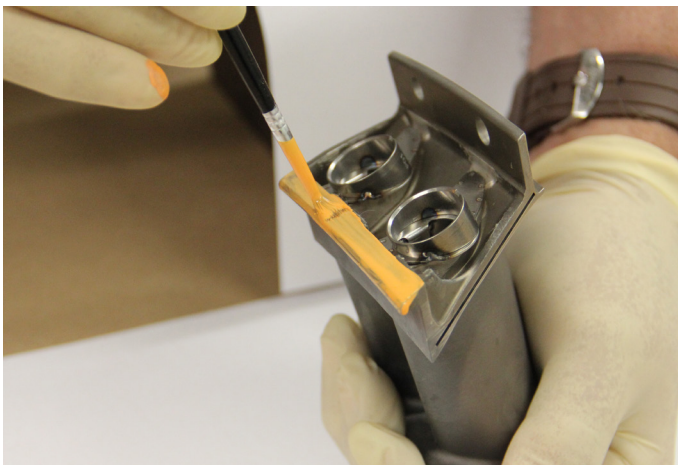
Nicrobraz Red Stop-Off Type II (water base) acts as a parting compound designed for furnace use. It can also act as a barrier against molten brazing filler metal. It works on any base-metal surface and is ideal for furnace work of any kind. It is chemically soluble, which assures complete removal of any remaining residue, making it an excellent choice for use on parts with small internal holes, fine threads, fine wire screens, or other parts with fine details. At high temperatures, it does not contaminate furnace atmospheres, either vacuum or hydrogen, argon, or other gases.

Nicrobraz Red Stop-Off Type II can be thinned to the desired consistency with deionized or distilled water. As with the Nicrobraz Green Stop-Off, brushing is the recommended method of application, however, it can also be applied by spraying, dipping or screen printing. Regardless of the method, care must be taken during application so as not to inhibit the proper brazing of the joint.

Removal Procedure:

Residue remaining after brazing is easily removed by either (1) Brushing where joint design permits, (2) Use of a 10-15% nitric-acid solution, at room temperature to 50°C (120°F) for austenitic stainless steel base metals, or (3) Use of a 10-15% hydrochloric acid solution at room temperature to 50°C (120°F) for low-carbon and alloy steel base metals. Short time immersions in these solutions will not harm austenitic or martensitic stainless steels, or have any detrimental effect on mild steel.

Orange Stop-Off™



Orange Stop-Off brushed on vane segment

Description:

Nicrobraz Orange Stop-Off is specially formulated for use with reactive metals, such as titanium and zirconium, and for use in very-high-vacuum furnaces. It is applied to areas where the flow of filler metal is not wanted, or to surfaces that are not to be joined. Nicrobraz Orange Stop-Off is made from high-purity materials and will not contaminate metals, or a high-vacuum atmosphere. It is also an effective high-temperature lubricant, and will prevent damage to surfaces that are in contact and subject to movement, as in a super-plastic forming operation.

Type I (solvent base):

Nicrobraz Orange Stop-Off can be thinned to any viscosity desired with standard lacquer thinners or solvents. It is usually applied by brushing, which assures accurate placement and excellent control of quantity; but can also be applied by spraying or dipping, after thinning to the proper viscosity for these methods. Whichever method of application is used, care must be taken to assure that none of the stop-off gets into the areas to be brazed.

Removal Procedure:

Residues remaining after brazing can be easily removed by wiping or brushing. The binder gases off completely during the heating cycle, leaving only an easily removed powder.

Blue Stop-Off™

Blue Stop-Off brushed onto surface part

Description:

Nicrobraz Blue Stop-Off Type II (water base) is specially formulated for preventing the flow and adherence of brazing filler metals on reactive base metals, such as titanium and zirconium, and on super alloys. It is also an effective lubricant in super-plastic forming and drawing applications, by preventing damage to contacting surfaces subject to movement. It has excellent covering capacity, is practically odorless, and nonflammable.

Nicrobraz Blue Stop-Off performs in extremely high temperatures and ultra-high vacuum furnace atmospheres. Made of high-purity materials, Nicrobraz Blue Stop-Off will not contaminate metals or high-vacuum atmospheres. It is effective with a wide range of brazing filler metals.

Application Method:

Nicrobraz Blue Stop-Off may be applied using a variety of methods, including brushing, spraying and dipping. Brush application assures the most accuracy and control. When spraying or dipping, the stop-off material should be thinned with deionized or distilled water to the desired consistency.

Removal Procedure:

Residues remaining after brazing can be easily removed by wiping or brushing. The binder gases off completely during the heating cycle, leaving only an easily removed powder.

Safety:

Type I stop offs are solvent based and may have associated physical hazards such as flammability. Type II stop offs are water based and, although not flammable, may have specific hazards which need to be addressed.

Conduct application of stop off compounds in a suitable area taking into consideration the engineering controls which may be required. Read and understand the MSDS before using any stop off product.

The information provided herein is given as a guideline to follow. It is the responsibility of the end user to establish the process information most suitable for their specific application(s). Wall Colmonoy Corporation (USA) assumes no responsibility for failure due to misuse or improper application of this product, or for any incidental damages arising out of the use of this material.

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