

# BELZONA® 1111 (SUPER METAL)

## INSTRUCTIONS FOR USE

### 1. TO ENSURE AN EFFECTIVE MOLECULAR WELD

**APPLY ONLY TO CLEAN, FIRM, DRY AND WELL ROUGHENED SURFACES**

- Brush away loose contamination and degrease with a rag soaked in **Belzona® 9111** (Cleaner/degreaser) or any other effective cleaner which does not leave a residue e.g. methyl ethyl ketone (MEK). Use a flame to sweat out oil from deeply impregnated surfaces.
- Roughen surfaces by blast cleaning, deeply scoring or grinding.
- Stabilise cracks by drilling the extremities. Long cracks should be drilled, tapped and bolted every 3-4 inches (77-103 mm).
- Vee-out all cracks using a rotary file.
- Finally degrease again. Use clean rags to avoid spreading contamination.

#### WHERE BELZONA® 1111 SHOULD NOT ADHERE

Brush on a thin layer of **Belzona® 9411** (Release Agent) and allow to dry for 15-20 minutes before proceeding to step 2.

### 2. COMBINING THE REACTIVE COMPONENTS

Transfer the entire contents of the Base and Solidifier modules on to the **Belzona® Working Surface**. Mix thoroughly together to achieve a uniform material free of any streakiness.

#### 1. MIXING AT LOW TEMPERATURES

To ease mixing when the material temperature is below 41°F (5°C), warm the Base and Solidifier modules until the contents attain a temperature of 68-77°F (20-25°C).

#### 2. WORKING LIFE

From the commencement of mixing, **Belzona® 1111** must be used within the times shown below.

Temperature	41°F (5°C)	59°F (15°C)	77°F (25°C)
Use all material within	35 min.	25 min.	15 min.

#### 3. MIXING SMALL QUANTITIES

For mixing small quantities of **Belzona® 1111** use:  
3 parts Base to 1 part Solidifier by volume  
5 parts Base to 1 part Solidifier by weight

#### 4. VOLUME CAPACITY OF MIXED BELZONA® 1111

24.3 cu.in. (398 cm<sup>3</sup>) per kg.

### 3. APPLYING BELZONA® 1111

#### FOR BEST RESULTS

Do not apply when:

- The temperature is below 41°F (5°C) or the relative humidity is above 90%.
- Rain, snow, fog or mist is present.
- There is moisture on the metal surface or is likely to be deposited by subsequent condensation.
- The working environment is likely to be contaminated by oil/grease from adjacent equipment or smoke from kerosene heaters or tobacco smoking.

- Apply the **Belzona® 1111** directly on to the prepared surface with the plastic applicator or spatula provided.
- Press down firmly to fill all cracks, remove entrapped air, and ensure maximum contact with the surface.
- Over cracks, gaps and holes, stipple in **Belzona® 9341** (Reinforcement Tape).
- Contour the **Belzona® 1111** to the correct profile with the plastic applicator or alternatively allow to cure and then machine down.

#### CLEANING

Mixing tools should be cleaned immediately after use with **Belzona® 9111** or any other effective solvent e.g. Methyl ethyl ketone (MEK). Brushes, injection guns, spray equipment and any other application tools should be cleaned using a suitable solvent such as **Belzona® 9121**, MEK, acetone or cellulose thinners.

## 4. COMPLETION OF THE MOLECULAR REACTION

Allow **Belzona® 1111** to solidify as below subjecting it to the conditions indicated.

Temperature	Movement or use involving no loading or immersion	Machining and/or light loading	Full mechanical or thermal loading	Immersion in chemicals
41°F/ 5°C	4 hours	6 hours	4 days	5 days
50°F/10°C	3 hours	4 hours	2 days	4 days
59°F/15°C	2½ hours	3 hours	1½ days	3 days
68°F/20°C	1½ hours	2 hours	1 day	2 days
77°F/25°C	1 hour	1½ hours	20 hours	1½ days
86°F/30°C	¾ hour	1 hour	16 hours	1 day

These times are for a thickness of approximately 0.25 inch (6 mm); they will be reduced for thicker sections and extended for thinner sections.

## 5. EFFECTING THE SECONDARY MOLECULAR REACTION

The mechanical properties, heat resistance and chemical resistance of **Belzona® 1111** will be improved by post curing.

After 2 - 4 hours of applying **Belzona® 1111**, post cure the material using forced air heaters, heat lamps, etc. for a minimum of 4 hours at 140-212°F (60-100°C).

Generally, the higher the post cure temperature adopted, the higher the properties attained.

## 6. APPLICATION OF A FURTHER LAYER OF BELZONA® 1111

When a further layer of **Belzona® 1111** is required, this should be applied as soon as possible after the first layer. Once **Belzona® 1111** has become dimensionally stable then the surface must be roughened otherwise intercoat adhesion will be impaired.

### HEALTH & SAFETY INFORMATION

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Belzona® 1111 - Instructions For Use - (Page 2)

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BS EN ISO 9002 : 1994  
Certificate No. Q09335



Printed in England Publication No. 03-7-01



## Accessories

# INSTRUCTIONS FOR USE

### **BELZONA® 9111** (Cleaner/Degreaser)

#### Degreasing Non-porous Surfaces

##### a) Smooth Surfaces

Wipe thoroughly with a clean rag moistened with **Belzona® 9111**. Change the rag and repeat the process until the rag appears perfectly clean after wiping the surface. Avoid spreading the contamination by cleaning only small areas at a time.

##### b) Rough Surfaces

Brush the **Belzona® 9111** copiously over the surface, using a stiff bristled brush. Continue until the **Belzona® 9111** runs off uncontaminated.

#### Degreasing Porous Surfaces:

Note: When oil and grease are deeply impregnated into the substrate, there is no successful method of removing this. The technique below will, however, remove surface oil and grease.

- Mix **Belzona® 9111** with talcum powder or sawdust to form a "sloppy" paste.
- Spread the paste over area to be degreased.
- Leave for 30 minutes and then sweep away.
- Check the surface for cleanliness and if necessary, repeat steps (b) and (c).

#### Cleaning Equipment

- Mixing tools, plastic spatulas, applicators and working surfaces should be cleaned immediately after use using a rag soaked in **Belzona® 9111** and then left to dry before re-use (see Drying Times).
- Application tools such as brushes, injection guns, spray units and other application equipment should be cleaned using a suitable solvent such as **Belzona® 9121**, methyl ethyl ketone (MEK), acetone or cellulose thinners.

#### Drying Times

Drying time will vary with the porosity of the substrate and the ambient temperature. The table below gives a guide to the drying time of a thin film of **Belzona® 9111** on a smooth non-porous surface.

Temperature of Substrate	Drying Time
86°F (30°C)	25 minutes
68°F (20°C)	30 minutes
50°F (10°C)	45 minutes
41°F ( 5°C)	60 minutes

To accelerate drying, the following actions are recommended:-

- Cold surfaces should be warmed before using **Belzona® 9111**.
- Excess **Belzona® 9111** should be removed with a clean cloth or paper towel where possible. This should be carried out by dabbing rather than rubbing the surface, to avoid contamination of the surface by fibres.
- Compressed air should be blown over the treated surface, taking care to ensure that there is an oil filter in the line.

#### Suitability

There is a possibility of **Belzona® 9111** attacking certain types of plastic, and painted surfaces. In cases of doubt, it is strongly recommended that a small portion be tested for solvent attack. If any stickiness is evident after wiping with **Belzona® 9111**, an alternative cleaning agent such as methyl ethyl ketone or white spirit must be used, having once again checked for compatibility.

## **BELZONA® 9411** (Release Agent)

### **Application to Non-porous Surfaces**

- a) Shake the unit before use.
- b) Apply a thin even coat using a soft bristled brush.
- c) Allow to dry before allowing contact with any Belzona® Product (see "Drying Times").

### **Application to Porous Surfaces**

- a) Seal the porous surface with a suitable lacquer and allow to dry.
- b) Shake the unit of **Belzona® 9411**.
- c) Apply a thin even coat to the lacquered surface and allow to dry.

### **Typical Drying Times**

Drying times are dependent on the thickness of **Belzona® 9411** applied and air movement, as well as the temperature of the substrate. They may be significantly extended where a thick layer is applied to a cold substrate in still conditions.

Typically at 68°F (20°C) **Belzona® 9411** will be dry for overcoating in 15 - 20 minutes.

Surfaces less than 41°F (5°C) should always be warmed before using **Belzona® 9411**.

### **Coverage Rate**

As a practical guideline, a coverage rate of 40 sq.ft. (3.7 m<sup>2</sup>) per unit should be aimed for on smooth steel substrates. On rough or irregular surfaces, this coverage rate could be reduced by as much as 50%.

### **Suitability**

**Belzona® 9411** may attack certain types of plastic. In cases of doubt, test a small area for solvent attack.

### **Removal of Belzona® 9411**

Where it is necessary to remove the dried film of **Belzona® 9411**, wipe over the surface with a rag soaked in **Belzona® 9111**.

## **Belzona® 9341** (Reinforcement Tape)

### **When using with Belzona® 1000 Series products**

- a) Spread the **Belzona® 1000 Series** product onto a piece of **Belzona® 9341**, previously cut to size.
- b) Press the coated **Belzona® 9341** over the damaged surface or, in the case of pipework, wrap around and pull tight.

In either instance the coated face of the **Belzona® 9341** should be pressed onto the substrate.

- c) Work the **Belzona® 9341** into the **Belzona® 1000 Series** product to ensure complete wetting.
- d) Overcoat with further **Belzona® 1000 Series** product.
- e) Apply subsequent layers of **Belzona® 9341** and **Belzona® 1000 Series** product as required.

### **When using with Belzona® 2000 Series products**

- a) Apply a layer of **Belzona® 2000 Series** product over the damaged area.
- b) Bed in as many widths of **Belzona® 9341** as necessary, and ensure complete wetting out.
- c) Overcoat with a further layer of **Belzona® 2000 Series** product.
- d) Apply subsequent layers of **Belzona® 9341** and **Belzona® 2000 Series** product as required.

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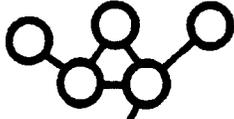
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BS EN ISO 9002 : 1994  
Certificate No. Q/09335



Printed in England Publication No. 64-10-96



# BELZONA® 1221 (SUPER E-METAL)

## INSTRUCTIONS FOR USE

### 1. TO ENSURE AN EFFECTIVE MOLECULAR WELD

#### APPLY ONLY TO CLEAN, FIRM, DRY AND WELL ROUGHENED SURFACES

- Brush away loose contamination and degrease with a rag soaked in **Belzona® 9111** (cleaner/degreaser) or any other effective cleaner which does not leave a residue e.g. methyl ethyl ketone (MEK). Use a flame to sweat out oil from deeply impregnated surfaces.
- Roughen surfaces by blast cleaning, deeply scoring, or grinding.
- Finally degrease again. Use clean rags to avoid spreading contamination.

#### PLUGGING ALL LEAKS

Leakages may be temporarily plugged with lead wool, cork or wooden plugs during surface preparation and application of **Belzona® 1221**.

#### WHERE BELZONA® 1221 SHOULD NOT ADHERE

Brush on a thin layer of **Belzona® 9411** (Release Agent) and allow to dry for 15-20 minutes before proceeding to step 2.

### 2. COMBINING THE REACTIVE COMPONENTS

- Cut off one end of both the Base and Solidifier sachets as close as possible to the seal.
- Using the straight edge of a mixing spatula or other suitable mixing tool squeeze out the entire contents of the sachets onto the **Belzona® Working Surface** provided.
- Mix the two components thoroughly to achieve a uniform material free of any streakiness.

### 1. WORKING LIFE

From the commencement of mixing, **Belzona® 1221** must be used within the times shown below.

Temperature	41°F (5°C)	59°F (15°C)	77°F (25°C)
Use all material within	5 min.	4 min.	3 min.

### 2. MIXING SMALL QUANTITIES

For mixing small quantities of **Belzona® 1221** use:  
1 part Base to 1 part Solidifier by volume  
2 parts Base to 1 part Solidifier by weight

### 3. VOLUME CAPACITY OF MIXED BELZONA® 1221

33.5 cu.in. (550 cm<sup>3</sup>) per kg.  
4.2 cu.in. ( 67 cm<sup>3</sup>) per 125gm. unit

### 3. APPLYING BELZONA® 1221

#### FOR BEST RESULTS

Do not apply when:

- The temperature is below 41°F (5°C) or the relative humidity is above 90%.
- Rain, snow, fog or mist is present.
- There is moisture on the metal surface or is likely to be deposited by subsequent condensation.
- The working environment is likely to be contaminated by oil/grease from adjacent equipment or smoke from kerosene heaters or tobacco smoking.

#### FOR REPAIRING

- Spread the **Belzona® 1221** on to the **Belzona® 9341** (Reinforcement Tape).
- Apply the bandage to the area to be repaired with the coated side adjacent to the substrate.

In the case of pipes, wrap tightly round several times so that the **Belzona® 1221** is forced through to the outside of the **Belzona® 9341**.

- Apply a final coat of **Belzona® 1221** on top of the **Belzona® 9341**.

#### FOR REBUILDING

- a) Apply the **Belzona® 1221** directly on to the prepared surface with the plastic applicator or spatula provided.

Press down firmly to fill all cracks, remove entrapped air, and ensure maximum contact with the surface.

- b) Contour the **Belzona® 1221** to the correct profile or alternatively allow to cure and then machine down.

#### CLEANING

Mixing tools should be cleaned immediately after use with **Belzona® 9111** or any other effective solvent e.g. Methyl ethyl ketone (MEK). Brushes, injection guns, spray equipment and any other application tools should be cleaned using a suitable solvent such as **Belzona® 9121**, MEK, acetone or cellulose thinners.

### 4. COMPLETION OF THE MOLECULAR REACTION

Allow **Belzona® 1221** to solidify as below subjecting it to the conditions indicated.

Temperature	Movement or use involving no loading or immersion	Machining and/or light loading	Full mechanical or thermal loading	Immersion in chemicals
41°F/ 5°C	17 mins.	60 mins.	120 mins.	48 hours
50°F/10°C	16 mins.	50 mins.	100 mins.	36 hours
59°F/15°C	15 mins.	45 mins.	90 mins.	30 hours
68°F/20°C	14 mins.	40 mins.	75 mins.	24 hours
77°F/25°C	13 mins.	35 mins.	60 mins.	20 hours
86°F/30°C	12 mins.	30 mins.	45 mins.	16 hours

These times are for a thickness of approximately 0.25 inch (6 mm); they will be reduced for thicker sections and extended for thinner sections.

### 5. APPLICATION OF A FURTHER LAYER OF BELZONA® 1221

Where this is required, it should be applied no longer than 4 hours after application of the first layer when the ambient temperature is 41 - 86°F (5 - 30°C).

After the maximum overcoating time has elapsed, the solidified **Belzona® 1221** must be roughened before applying further **Belzona® 1000 Series** products, or application of **Belzona® 2000 Series** products.

### 6. APPLICATION OF BELZONA® 1000 SERIES PRODUCTS TO BELZONA® 1221

If a repair involves overcoating of **Belzona® 1221** by other **Belzona® 1000 Series** products, the surface of the **Belzona® 1221** must be allowed to cure to a stage where its surface can be suitably roughened prior to application of other **Belzona® 1000 Series** products.

Do not attempt to apply other **Belzona® 1000 Series** products to **Belzona® 1221** using a "wet on wet" method.



**BELZONA® 1221 IS APPROVED FOR CONTACT WITH POTABLE WATER SUBJECT TO THE FOLLOWING RESTRICTIONS:**

For tank and distribution line use - no greater than 10% of surface area.

For residential use - no greater than 150 sq. in. per residence.

Certified to  
ANSI/NSF 61

#### HEALTH & SAFETY INFORMATION

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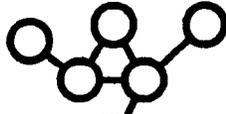
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BS EN ISO 9002 : 1994  
Certificate No. Q/09335



Printed in England Publication No. 09-7-01



# BELZONA® 2311 (SR ELASTOMER)

## INSTRUCTIONS FOR USE

### 1. TO ENSURE AN EFFECTIVE MOLECULAR WELD

#### a) Surface Preparation (i) Metallic Surfaces

Remove all loose surface contamination and degrease with **Belzona® 9111** (Cleaner/Degreaser) or any other effective cleaner which does not leave a residue eg. methyl ethyl ketone (MEK).

Grit blast to a minimum 3 mil (75 microns) profile. Where blasting is not practical, thorough mechanical grinding may be considered, except for applications involving tensile loads, such as expansion joints, and all applications involving immersion and/or fluid flow.

#### (ii) Flexible Surfaces (e.g. rubbers)

**NOTE:** **Belzona® 9111** can draw processing oils and waxes to the surface of some rubbers, particularly when new, which then impairs adhesion of **Belzona® 2311**. Test for this on a small area. If, on rubbing with a rag moistened with **Belzona® 9111**, a greasy film appears, the surface should not be degreased, but simply abraded.

Undercut fine edges with a sharp knife and scuff the surface with a rotary wire brush or suitable roughing tool.

- b) Brush away loose contamination and degrease again with **Belzona® 9111**.
- c) Immediately, apply a thin, even coat of **Belzona® 2911** or **Belzona® 2921** (Elastomer QD Conditioner or Elastomer GP Conditioner) onto the surface. A brush should be used as a stipple to ensure a practical coverage rate of 13 sq.ft (1.25 m<sup>2</sup>) per unit, on steel and most metallic substrates. On well roughened rubber substrates this could be reduced by as much as 50%

The **Belzona®** Conditioner must be touch dry before overcoating with **Belzona® 2311**. This will depend on the **Belzona®** Conditioner selected, prevailing temperature, relative humidity and substrate.

At 68°F (20°C) and 50% relative humidity, the touch dry state will be achieved after the times given below when applied to a steel surface. These times may be extended when applied to rubber substrates.

Conditioner	Touch Dry	Max. Overcoating
<b>Belzona® 2911</b>	20 min.	4 hours

Under no circumstances should application of **Belzona® 2311** take place after the maximum overcoating time.

When using **Belzona® 2311** to overcoat a surface which has been treated with a **Belzona® 1000 Series** product (except **Belzona® 1221** (Super E-Metal), the **Belzona® 1000 Series** product must first be allowed to fully cure, the surface prepared as outlined in section 1 (a) (i), and **Belzona® 2911** applied as outlined in section 1 (c).

Application of **Belzona® 2311** over **Belzona® 1221** can be carried out up to 4 hours after the application of **Belzona® 1221** without the need for abrading and reconditioning.

#### WHERE BELZONA® 2311 SHOULD NOT ADHERE

Brush on a thin layer of **Belzona® 9411** (Release Agent) and allow to dry for 15 - 20 minutes before proceeding to step 2.

### 2. COMBINING THE REACTIVE COMPONENTS

**N.B.** All application tools and equipment should be readily to hand as, from the commencement of mixing, the material will solidify within minutes.

- a) Cut off one end of both the Base and Solidifier sachets as close as possible to the seal.
- b) Using the straight edge of a mixing spatula or another suitable mixing tool squeeze out the contents onto a suitable working surface.
- c) Mix the two components thoroughly to achieve a uniform material free of any streakiness.

#### NOTES:

##### 1. WORKING LIFE

From the commencement of mixing, **Belzona® 2311** must be used within the times shown below:

Temperature	41°F (5°C)	59°F (15°C)	77°F (25°C)
Use all material within	6 min.	4 min.	2 min.

#### VOLUME CAPACITY OF MIXED BELZONA® 2311

4.1 cu.in. (66.5 cm<sup>3</sup>) per 75 g unit.

### 3. APPLYING THE BELZONA® 2311

#### FOR BEST RESULTS

Do not apply when:-

- (i) The temperature is below 41°F(5°C) or the relative humidity is above 90%.
- (ii) Rain, snow, fog or mist is present.
- (iii) There is moisture on the surface or is likely to be deposited by subsequent condensation.
- (iv) The working environment is likely to be contaminated by oil/grease from adjacent equipment or smoke from kerosene heaters or tobacco smoking.

- a) Apply the **Belzona® 2311** to the prepared surface with the plastic applicator or spatula provided. Press down firmly to remove entrapped air and to ensure maximum contact with the surface.
- b) Immediately contour the **Belzona® 2311** to the correct profile with the plastic applicator. Alternatively, press a sheet of polyethylene on to the **Belzona® 2311** and remove it once the **Belzona® 2311** has cured.

#### NOTE: CLEANING

Mixing and application tools should be cleaned immediately after use with **Belzona® 9111** or any other effective solvent e.g. MEK. Brushes, injection guns, spray equipment and other application tools should be cleaned using a suitable solvent such as **Belzona® 9121**, MEK, acetone or cellulose thinners.

### 4. REINFORCING THE BELZONA® 2311

Stipple **Belzona® 9341** (Reinforcing Tape) into the uncured **Belzona® 2311**. Overcoat with further **Belzona® 2311**.

### 5. COMPLETION OF THE MOLECULAR REACTION

Allow **Belzona® 2311** to solidify as below before subjecting it to the conditions indicated:

	Movement or use involving no loading or immersion	Full mechanical or thermal loading	Immersion in chemicals
41°F/ 5°C	60 minutes	4 hours	2 days
50°F/10°C	40 minutes	2 hours	1½ days
59°F/15°C	30 minutes	1½ hours	1 day
68°F/20°C	25 minutes	1 hour	18 hours
77°F/25°C	20 minutes	50 minutes	15 hours
86°F/30°C	15 minutes	40 minutes	12 hours

### 6. STORAGE

Store in a dry environment at a temperature between 41°F (5°C) and 77°F (25°C).

After prolonged storage, or inadvertent storage below 41°F (5°C), the components may feel stiffer than normal. They can be restored to normal by warming to 104°F (40°C) and kneading between the fingers.

**NOTE: Belzona® 2911** has an 18 month shelf life from date of manufacture when stored at 41 - 77°F (5 - 25°C) and must be used before the stated "use by" date.

### 7. OVERCOATING

Application of subsequent layers of **Belzona® 2311** can be carried out up to 24 hours after the previous application without need of any surface treatment other than removal of contamination.

When overcoating aged or weathered **Belzona® 2311** the surface preparation techniques for flexible surfaces described in Section 1 must be followed.

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Printed in England Publication No. 17-2-01