

CAF<sup>®</sup> 33

## Industrial range

## Description

**CAF 33** is a room temperature curing silicone elastomer:

- ACETIC.
- NON FLOWING.
- BLACK, WHITE, TRANSLUCENT.

## Examples of applications

This product is more specifically intended for industrial customers who use it for bonding/sealing in various applications:

- Automotive:
  - sealing on engines,
  - bonding/sealing of sunroofs.
- Domestic appliances:
  - bonding of oven door brackets,
  - sealing of washing machine tanks.
- Aeronautic:
  - miscellaneous bonding applications.
- Industry:
  - sealing of molding compartments,
  - bonding of HCR silicones,
  - sealing of industrial rotary machines (pumps, turbines, compressors).

## Advantages

- Resists very high temperatures.
- Good dielectric properties.
- Adhesion to many surfaces.
- High resistance to chemical agents.
- Resistance to water and humidity.

## Characteristics

**1. Processing/Curing**

Processing is particularly easy since the product is delivered ready to use. Application can be carried out manually or using robotize application equipment.

The **CAF 33** bead is applied onto one of the two joint surfaces. Assembly must be carried out before the product has formed a skin.

It is recommended not to exert an immediate strain on the assembly.

Curing

Curing of **CAF 33** starts as soon as the product comes into contact with atmospheric humidity.

|                                      |     |
|--------------------------------------|-----|
| Skin formation time*, min.....       | 6   |
| Cure rate of 2 mm thickness*, h..... | 6   |
| Cured thickness after 24 h*, mm..... | 4,3 |

\*Temperature 23 °C - relative humidity 50 %

The cure rate increases with temperature and hygrometry.

*Comment:* it is recommended to apply the product to clean, dry surfaces.

*Examples:* curing time for 2 mm thickness, according to temperature and hygrometry:

| Temperature            | 25 °C |     |     | 50 °C |     |     | 90 °C  |        | 110 °C | 103 °C |
|------------------------|-------|-----|-----|-------|-----|-----|--------|--------|--------|--------|
| Relative humidity in % | 25    | 50  | 70  | 25    | 50  | 70  | 25     | 50     | 70     | 20     |
| 2 mm cured thickness   | 14 h  | 6 h | 4 h | 4 h   | 2 h | 2 h | 50 min | 30 min | 17 min | 16 min |

## 2. Properties before curing

Appearance ..... non flowing paste

Colors ..... black, white, translucent

Cure type ..... acetic

Flowability, in mm ..... ≤ 2  
(Standard BOEING S 7502, NMRPS 459)

Extrusion, g/min ..... 50  
(Standard NMRPS 495 A, 3 mm / 3 bars)

Specific gravity at 25 °C ..... 1.04  
(Standards ISO R 1183, DIN 53479, NMRPS703)

## 3. Properties after curing

3.1. Specific gravity at 25 °C ..... 1.05  
(Standards ISO 2781, ASTM D 297, BS 903 Part A1)

### 3.2. Mechanical properties after 7 days

Shore A hardness ..... 25  
(Standards ISO R 868, DIN 53505, ASTM D 2240  
BS 903 Part A7, NFT 46003, NMRPS 471)

Modulus at 100 % elongation, MPa ..... 0.6  
(Standard ISO R 37 (H2), DIN 53504, ASTM D 412  
BS 903 Part A2, NFT 46002 (H2), NMRPS 470)

Tensile strength, MPa ..... 2.5  
(Standards ISO R 37 (H2), DIN 53504, ASTM D 412  
BS 903 Part A2, NFT 46002 (H2), NMRPS 470)

Elongation at break, % ..... 500  
(Standards ISO R 37 (H2), DIN 53504, ASTM D 412  
BS 903 Part A2, NFT 46002 (H2), NMRPS 470)

Tear strength, kN/m ..... 5.4  
(Standards ASTM D 624 specimen 1, NMRPS 492)

### 3.3. Thermal properties or heat stability

Tests carried out on **CAF 33** Black

Lower temperature limits  
Brittle point temperature ..... – 65 °C  
(Measured using differential calorimetric analysis)

Upper limit in use

Maximum recommended temperature in use:

continuous ..... + 250 °C  
(on 2 mm thick film, 1000 h)

peak ..... + 300 °C  
(on 2 mm thick film, 72 h)

**N.B.:** These thermal values are not absolute limits. They represent the range within which initial mechanical properties are not modified by more than 50 %.

Furthermore, for peak uses, exposure for periods less than 72 h, allow higher maximum temperatures.

Thermal conductivity:

Tests carried out on the **CAF 33** Translucent

Thermal conductivity at 30 °C, W/m.K ..... 0.20  
(Standard NF X 10021)

Thermal conductivity at 150 °C, W/m.K ..... 0.16  
(Standard NF X 10021)

### 3.4. Resistance to chemicals

Tests carried out on 2 mm thick films, cured for 7 days at room temperature

#### Resistance to oils after 70 h immersion in the oil at 150 °C

(Standards ISO R 1817, D 471, NMRPS 525)

| Oil type                | Bulk Swelling (%) | Shore A hardness (points) | Modulus at 100% elongation (MPa) | Tensile strength (MPa) | Elongation at break (%) |
|-------------------------|-------------------|---------------------------|----------------------------------|------------------------|-------------------------|
| Without oil             | /                 | 26                        | 0.56                             | 2.4                    | 435                     |
| ELF Prestigrade 15 W 40 | 20                | 10                        | 0.25                             | 1.4                    | 550                     |
| TEXACO 10 W 30          | 25                | 7                         | 0.3                              | 1.5                    | 580                     |
| ELF Compet. SX 5 W 30   | 30                | 7                         | 0.2                              | 1.0                    | 460                     |

#### Resistance to anti-freeze

Tests carried out after 7 days in boiling RVI anti-freeze

| Immersion in boiling RVI anti-freeze | Bulk Swelling (%) | Shore A hardness (points) | Modulus at 100% elongation (MPa) | Tensile strength (MPa) | Elongation at break (%) |
|--------------------------------------|-------------------|---------------------------|----------------------------------|------------------------|-------------------------|
| Before immersion                     | 0                 | 26                        | 0.58                             | 2.2                    | 435                     |
| After 7 days immersion               | 2.8               | 23                        | 0.54                             | 2.2                    | 450                     |

**Resistance to chemicals**

Tests carried out after 5 000 h immersion at room temperature

| Product               | Bulk Swelling (%) | Variation in tensile strength (%) | Variation in elongation at break (%) |
|-----------------------|-------------------|-----------------------------------|--------------------------------------|
| 12 % Citric acid      | – 0.1             | – 0.3                             | 0                                    |
| 12 % Lactic acid      | + 0.3             | + 4                               | + 10                                 |
| 2 % Hydrochloric acid | – 0.1             | – 8                               | – 8                                  |
| 12 °Cl Bleach         | – 1               | – 20                              | – 15                                 |
| 25 % Caustic soda     | – 7               | – 15                              | – 15                                 |
| 25 % Sodium carbonate | – 0.2             | – 12                              | – 10                                 |
| 25 % Sodium chloride  | – 0.1             | 0                                 | 0                                    |

**3.5. Compression set**

Testing to measure the ability of the product to recover its initial state after compression.

(0 % = integral recovery)

(100 % = no elastic recovery of the product)

(Standards ASTM D 395 (specimen 1, method B), ISO R 815, NF T 46011,

NMRPS 523)

| Curing time of films at room temperature | Test temperature on stack compressed to 25 % for 3 days | Compression set |
|------------------------------------------|---------------------------------------------------------|-----------------|
| 3 days                                   | 150 °C                                                  | 54 %            |

**3.6. Adhesion properties**

Shear strength, MPa ..... 1.4  
(Aluminum specimens AG3, joint 1 mm thick, NPRPS 748)

Type of cohesive failure, % ..... 100

Primerless self-adhesion on..... glass, enamel, ceramics, epoxy paint, polyester

Adhesion with primer

- Stainless steel, aluminum ..... primer PM 820

- ABS ..... primer PP 878

# CAF® 33

- Polymethyl methacrylate..... primer 131
- Composites filled to 30 % with glass fiber ..... primer PP 878  
(polyamide, polyester, polypropylene)

Adhesion to glass with immersion in various chemicals (4 months immersion)

- in isopropyl alcohol ... 100 % cohesive failure
- in ammonia solution at 20 % ..... ditto
- in triethanol amine ..... ditto
- in sodium chloride at 20 % ..... ditto
- in concentrated acetic acid ..... ditto
- in hydrochloric acid at 20 % ..... ditto
- in nitric acid at 20 % ..... ditto

## 3.7. Dielectric properties

Dielectric strength, KV/mm..... 19  
(Standards NF C 26225, ASTM D 419), IEC 243)

Dielectric constant at 1MHz..... 2.8  
(Standards NF C 26230, ASTM D 150, IEC 250)

Dielectric dissipation factor at 1MHz...  $2 \times 10^{-3}$   
(Standards NF C 26250, ASTM D 150, IEC 250)

Volume resistivity,  $\Omega \cdot \text{cm}$ .....  $1 \times 10^{14}$   
(Standards NF C 26215, ASTM D 257, IEC 93)

## Packaging

- 100 g tubes on pallets of 1600 units (black and white).
- 310 ml cartridges on pallets of 1200 units.
- 25 kg tins on pallets of 10 units (only black).
- 210 kg drums on pallets of 4 units.

## Storage and shelf life

When stored in its original unopened packaging at a temperature of between + 2 °C and + 30 °C, **CAF 33** can be used for up to 24 months from its date of manufacture (expiry date).

Comply with storage instructions and expiry date marked on the packaging.

Past this date, Bluestar Silicones no longer guarantees that the product meets the sales specifications.

## Safety

Consult the Safety Data Sheet for **CAF 33**.

# CAF® 33

Visit our website [www.bluestarsilicones.com](http://www.bluestarsilicones.com)

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