100% Silicone Sealant – Technical Material Specification

1.0 Material Overview & Common Uses

100% silicone sealant is a one-component, moisture-curing, elastomeric sealant composed primarily of polydimethylsiloxane (PDMS) polymers, crosslinkers, and reinforcing fillers. It contains no solvents, urethanes, or acrylics, and cures by reacting with atmospheric humidity to form a flexible, durable rubber seal.

- Primary applications include sealing joints in building envelopes (windows, doors, curtain walls), sanitary sealing in kitchens and bathrooms, bonding and sealing in HVAC ductwork, and gasketing in electrical enclosures.
- Commonly used in automotive assembly for weatherstripping and windshield bonding, and in marine applications for above-waterline sealing.
- Available in neutral cure (non-corrosive to metals) and acetoxy cure (releases acetic acid, not for use on copper, brass, or natural stone).

2.0 Core Technical Properties & Sizing

- Density (uncured): 1.02 – 1.05 g/cm³ at 25°C.
- Tensile strength (cured): 1.5 – 2.5 MPa (ASTM D412).
- Elongation at break: 300 – 600% (ASTM D412).
- Hardness (Shore A): 20 – 30 (ASTM D2240).
- Service temperature range: -50°C to +200°C continuous, intermittent up to 250°C.
- Tack-free time: 10 – 30 minutes at 23°C / 50% RH (varies by formulation).
- Full cure time: 24 hours per 3 mm depth at 23°C / 50% RH.
- Standard packaging: 300 ml cartridges (plastic or aluminum), 600 ml sausage packs, 20 L pails, and 200 L drums.
- Shelf life: 12 months from date of manufacture when stored below 30°C.

3.0 Processing, Machinability & Application

100% silicone sealant is applied using manual or pneumatic caulking guns, bulk dispensing equipment, or robotic applicators. Surface preparation is critical for adhesion: substrates must be clean, dry, and free of oil, grease, dust, and loose particles. Priming is required on porous substrates (concrete, masonry, wood) and some plastics.

- Application temperature range: +5°C to +40°C (substrate and ambient). Do not apply below dew point.
- Tooling must be completed within 5 minutes of application using a spatula or tooling agent (soapy water or isopropyl alcohol).
- For structural glazing applications, use only neutral-cure silicone with documented adhesion testing per ASTM C1135.
- Do not thin or dilute with solvents; this will compromise cure and mechanical properties.
- For thick-section applications (> 10 mm depth), use a two-part silicone system to ensure complete cure.
- Cured silicone can be cut with a sharp knife or razor blade; it cannot be sanded or machined effectively.

4.0 Common Defects & Quality Control

- Reject if sealant has visible skinning or partial cure inside the cartridge (indicates cap failure or age degradation).
- Reject if sealant exhibits phase separation (liquid exudate on surface) or excessive oil bleed-out.
- Reject if cured sealant shows cracking, cohesive failure, or adhesion loss within 7 days of application under standard conditions.
- Reject if uncured sealant has lumps, grittiness, or foreign particles visible to the naked eye.
- Acceptable joint dimensions: width-to-depth ratio between 2:1 and 3:1 for dynamic joints; maximum depth 12 mm for single-stage application.
- Perform adhesion pull-off test per ASTM C794 on representative substrate samples before production runs.

5.0 Storage, Handling & WHMIS Guidelines

- Store in a cool, dry area below 30°C and out of direct sunlight. Do not freeze (some formulations may be damaged below 5°C).
- Maintain relative humidity below 70% in storage area to prevent premature curing of opened containers.
- Follow FIFO (First-In, First-Out) inventory rotation; shelf life is 12 months from date of manufacture.
- WHMIS 2015 Classification: Not classified as hazardous under normal use. However, acetoxy-cure formulations release acetic acid vapour during cure – use in well-ventilated areas.
- Mandatory PPE: Wear nitrile gloves to prevent skin contact; safety glasses recommended during application. If skin contact occurs, wash with soap and water.
- In case of eye contact, flush with water for 15 minutes and seek medical attention.
- Dispose of cured silicone as non-hazardous industrial waste per local regulations. Uncured material should be cured before disposal.