
Polyurethane Construction Adhesive – Technical Material Specification

1.0 Material Overview & Common Uses

Polyurethane construction adhesive is a high-strength, moisture-curing, one-component elastomeric polymer adhesive formulated for bonding a wide range of construction materials. It cures by reacting with ambient humidity to form a durable, flexible, and gap-filling bond that resists vibration, impact, and temperature extremes. Common industrial applications include bonding wood, metal, concrete, masonry, rigid foam insulation, fiberglass, and many plastics in structural and non-structural assemblies. It is widely used in framing, sheathing, subflooring, drywall, trim, paneling, and exterior cladding installations where high initial grab and long-term durability are required.

2.0 Core Technical Properties & Sizing

- Density (uncured): 1.10 – 1.25 g/cm³ at 25°C
- Viscosity: 200,000 – 400,000 cP (thixotropic paste, non-sag vertical application up to 3/8 inch bead)
- Solids content: 100% (no solvents or VOCs)
- Open time: 10 – 20 minutes at 23°C / 50% RH (shortens in low humidity or high temperature)
- Fixture time: 30 – 60 minutes (light handling strength)
- Full cure time: 24 – 72 hours depending on joint thickness, humidity, and temperature
- Tensile strength (cured): 400 – 700 psi (2.8 – 4.8 MPa) per ASTM D638
- Shear strength (wood-to-wood): 300 – 500 psi (2.1 – 3.4 MPa) per ASTM D905
- Peel strength (aluminum-to-aluminum): 20 – 40 pli (3.5 – 7.0 N/mm) per ASTM D903
- Elongation at break: 300 – 600%
- Service temperature range: -40°C to +90°C continuous (up to +120°C intermittent)
- Hardness (Shore A): 50 – 70
- Standard packaging: 300 mL sausage packs, 600 mL sausage packs, 10 oz (300 mL) cartridges, 20 oz (600 mL) cartridges, 5-gallon pails, 55-gallon drums
- Shelf life: 12 months from date of manufacture when stored unopened at 15°C – 25°C

3.0 Processing, Machinability & Application

Polyurethane construction adhesive is applied using manual or pneumatic caulking guns, sausage gun applicators, or bulk dispensing equipment. The material is thixotropic and will not sag on vertical surfaces when applied in beads up to 3/8 inch diameter. For optimal bond strength, both substrates must be clean, dry, and free of oil, grease, dust, loose particles, ice, or frost. Porous materials (wood, concrete, masonry) may require priming with a compatible primer or moisture activation if the ambient humidity is below 30% RH. Non-porous materials (metal, glass, some plastics) should be lightly abraded and cleaned with isopropyl alcohol. Apply adhesive in a continuous bead (1/4 to 3/8 inch diameter) along one surface, then press substrates together within the open time. Use clamps, fasteners, or weight to maintain contact pressure until fixture time is achieved. Excess uncured adhesive can be cleaned with mineral spirits or acetone; cured adhesive must be cut or sanded off. Do not apply below 5°C or above 40°C ambient temperature. Do not apply to wet or frozen surfaces. For submerged or continuously wet applications, use a specialized marine-grade polyurethane adhesive.

- Minimum application temperature: 5°C (40°F)
- Maximum application temperature: 40°C (104°F)
- Optimal humidity range: 40% – 70% RH
- Do not thin or dilute with solvents
- Use a pneumatic caulking gun with a 20:1 or 30:1 pressure ratio for high-volume applications
- For bulk dispensing, use a positive-displacement pump with a heated hose (40°C – 50°C) to reduce viscosity
- Clean tools and spills immediately with mineral spirits before adhesive cures

4.0 Common Defects & Quality Control

- Reject if adhesive has separated, gelled, or formed a skin inside the unopened package
- Reject if the package is punctured, leaking, or shows evidence of premature curing
- Reject if the adhesive has a strong ammonia or fishy odor (indicates moisture contamination and degradation)
- Reject if the adhesive is too thick to extrude through a standard 1/4 inch nozzle at 20°C
- Reject if the adhesive fails to form a skin within 60 minutes at 23°C / 50% RH
- Reject if the cured bond shows excessive foaming, bubbles, or a spongy texture (indicates over-application or high humidity)
- Reject if the adhesive does not achieve at least 80% of specified tensile strength after 72 hours cure at standard conditions
- Reject if the adhesive exhibits a Shore A hardness below 45 after full cure
- Reject if the adhesive has been stored outside the recommended temperature range for more than 7 days
- Reject if the adhesive is past its printed shelf life date by more than 30 days

5.0 Storage, Handling & WHMIS Guidelines

- Store in a cool, dry, well-ventilated area at 15°C – 25°C (59°F – 77°F)
- Keep containers tightly sealed when not in use to prevent moisture ingress
- Do not store near heat sources, open flames, or direct sunlight
- Shelf life: 12 months from date of manufacture in unopened containers
- Follow FIFO (First-In, First-Out) inventory rotation
- WHMIS 2015 Hazard Classification: Not classified as a hazardous product under normal use (no GHS pictograms required for cured product). Uncured adhesive may contain diphenylmethane diisocyanate (MDI) – check Safety Data Sheet (SDS) for specific formulation.
- If the formulation contains MDI: Signal word – Danger. Hazard statements – H315 (Causes skin irritation), H317 (May cause an allergic skin reaction), H319 (Causes serious eye irritation), H332 (Harmful if inhaled), H334 (May cause allergy or asthma symptoms or breathing difficulties if inhaled), H335 (May cause respiratory irritation), H351 (Suspected of causing cancer).
- Mandatory PPE when handling uncured adhesive: Nitrile gloves (minimum 0.4 mm thickness), safety glasses with side shields, and long-sleeved clothing. If spraying or working in confined spaces, use a NIOSH-approved organic vapor respirator with P100 particulate filter.
- In case of skin contact: Remove contaminated clothing, wash affected area with soap and water for 15 minutes. Do not use solvents.
- In case of eye contact: Flush with water for at least 15 minutes, lifting upper and lower eyelids. Seek medical attention immediately.
- In case of inhalation: Move to fresh air. If breathing is difficult, administer oxygen. Seek medical attention if symptoms persist.

- Spill management: Contain with inert absorbent material (sand, vermiculite). Collect in sealed containers for disposal per local regulations. Do not flush to drains.
- Dispose of cured adhesive as non-hazardous solid waste. Uncured adhesive must be disposed of as hazardous waste per provincial regulations.
- Keep out of reach of children and unauthorized personnel.

Regulatory Disclaimer: This document is a generic technical material specification provided for educational purposes. The end-user assumes all liability for reviewing, adapting, and validating all tolerances, properties, and safety protocols against specific OEM data sheets and local regulations before deployment.