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# Corian Acrylic Solid Surface – Technical Material Specification

## 1.0 Material Overview & Common Uses

Corian is a non-porous, homogeneous acrylic solid surface material composed of approximately 33% acrylic polymer (polymethyl methacrylate, PMMA) and 67% natural mineral fillers (alumina trihydrate). It was first commercialized by DuPont in 1967 and is now manufactured by DuPont de Nemours, Inc. The material is cast into sheets and cured, resulting in a seamless, repairable, and thermoformable surface.

Common industrial and architectural applications include: kitchen and bathroom countertops, commercial reception desks, healthcare wall cladding (due to its non-porous and antimicrobial properties), laboratory benchtops, retail display fixtures, and architectural features such as curved panels and integrated sinks. Its ability to be thermoformed allows for complex 3D shapes without visible seams.

## 2.0 Core Technical Properties & Sizing

- Density: 1.74 g/cm<sup>3</sup> (1740 kg/m<sup>3</sup>) – consistent across all colours and thicknesses.
- Tensile strength: 39 MPa (ASTM D638).
- Flexural strength: 62 MPa (ASTM D790).
- Modulus of elasticity: 8.3 GPa (ASTM D790).
- Hardness: Rockwell M-90 (ASTM D785).
- Coefficient of thermal expansion:  $3.6 \times 10^{-5}$  /°C (ASTM D696).
- Maximum continuous service temperature: 100°C (212°F) – short-term exposure to 150°C (302°F) is acceptable for thermoforming.
- Thermal conductivity: 0.37 W/(m·K).
- Standard sheet sizes: 3048 mm × 762 mm (120 in × 30 in) and 3658 mm × 914 mm (144 in × 36 in).
- Standard thicknesses: 6.4 mm (1/4 in), 12.7 mm (1/2 in), and 19.1 mm (3/4 in). Custom thicknesses available up to 25.4 mm (1 in).
- Thickness tolerance: ±0.5 mm for sheets up to 12.7 mm; ±0.8 mm for sheets 19.1 mm and above.
- Flatness tolerance: maximum warp of 1.6 mm over 914 mm (36 in) length (ASTM D4812).
- Surface finish: standard matte gloss level of 15–25 gloss units at 60° (ASTM D523). High-gloss finish available via polishing.
- Colour consistency:  $\Delta E \leq 1.0$  between batches (CIE Lab colour space, D65 illuminant).

## 3.0 Processing, Machinability & Application

Corian is machinable using standard woodworking and metalworking tools. It is non-abrasive to tooling but generates fine dust that requires proper extraction. All machining must be performed dry or with minimal mist cooling to avoid thermal shock. The material is thermoplastic and can be thermoformed at 150–170°C (302–338°F) for 10–15 minutes per 6.4 mm thickness.

- Cutting: Use carbide-tipped circular saw blades with 80–100 teeth and a triple-chip grind geometry. Feed rate: 3–5 m/min at 3000–4000 RPM. Avoid climb cutting to prevent chipping.

- Routing: Use 1/2 in (12.7 mm) diameter carbide spiral up-cut bits. Feed rate: 2–4 m/min at 18,000–22,000 RPM. Depth of cut per pass: 3 mm maximum.
- Drilling: Use high-speed steel (HSS) or carbide twist drills with a 118° point angle. Peck drilling recommended for holes deeper than 10 mm. Spindle speed: 2000–3000 RPM.
- Sanding: Use 80-grit to 120-grit aluminium oxide sandpaper for shaping, then progress to 220-grit, 400-grit, and 800-grit for polishing. Wet sanding is recommended for final stages to reduce dust.
- Joining: Use Corian-branded adhesive (methyl methacrylate-based) applied to clean, dry surfaces. Clamp with uniform pressure of 0.5–1.0 MPa for 30 minutes at 20°C. Full cure strength achieved after 24 hours.
- Thermoforming: Preheat sheet to 150–170°C in a convection oven for 10–15 minutes per 6.4 mm thickness. Form over a male or female mould using vacuum or pressure. Cool to below 50°C before demoulding.
- Edge finishing: Use a 1/4 in (6.4 mm) radius round-over bit for eased edges. For polished edges, sand sequentially from 120-grit to 800-grit, then buff with a lambswool pad and polishing compound.
- CNC machining: Use a vacuum table for workholding. Spindle speed: 12,000–18,000 RPM. Feed rate: 3–6 m/min. Use compressed air for chip evacuation; avoid coolant to prevent staining.

#### 4.0 Common Defects & Quality Control

- Reject if surface contains visible pinholes, bubbles, or voids greater than 0.5 mm in diameter when viewed under 2x magnification.
- Reject if colour variation exceeds  $\Delta E > 1.0$  compared to approved colour standard (CIE Lab, D65).
- Reject if sheet thickness deviates more than  $\pm 0.5$  mm for nominal thickness  $\leq 12.7$  mm, or  $\pm 0.8$  mm for  $> 12.7$  mm.
- Reject if warp exceeds 1.6 mm over a 914 mm straightedge placed on the concave side.
- Reject if surface gloss variation exceeds  $\pm 5$  gloss units from the specified standard (measured at 60°).
- Reject if any edge chipping or delamination is visible along cut edges after fabrication.
- Reject if adhesive joints show visible lines, bubbles, or colour mismatch after curing (visual inspection under 500 lux lighting).
- Reject if thermoformed parts exhibit surface blisters, orange peel texture, or thickness reduction greater than 15% in any area.
- Acceptable surface scratches: up to 0.1 mm depth and 25 mm length, provided they are removable by sanding with 400-grit paper.

#### 5.0 Storage, Handling & WHMIS Guidelines

Corian sheets are stable under normal warehouse conditions but must be protected from moisture, direct sunlight, and extreme temperatures. The material is classified as non-hazardous under WHMIS 2015, but dust generated during machining is a respiratory irritant and may contain crystalline silica from fillers.

- Store sheets flat on a clean, dry surface. Maximum stack height: 20 sheets for 6.4 mm thickness, 15 sheets for 12.7 mm, and 10 sheets for 19.1 mm. Use slip sheets between layers to prevent surface marring.
- Storage temperature: 10–35°C. Avoid exposure to temperatures above 50°C to prevent warping. Relative humidity: 30–70% non-condensing.
- Shelf life: Indefinite when stored under recommended conditions. No FIFO rotation required unless material is pre-finished or coated.
- WHMIS 2015 classification: Not classified as a hazardous product under the Hazardous Products Regulations (HPR). However, dust generated during machining is classified as a nuisance dust (CAS 14808-60-7 for crystalline silica).
- Mandatory PPE during machining: NIOSH-approved N95 respirator or half-face respirator with P100 filters, safety glasses with side shields, hearing protection (earplugs or earmuffs), and cut-resistant gloves (ANSI A2 or higher).
- Ventilation: Use local exhaust ventilation (LEV) with a minimum capture velocity of 1 m/s at the point of dust generation.

Maintain airborne dust levels below 3 mg/m<sup>3</sup> (total dust) and 0.05 mg/m<sup>3</sup> (respirable crystalline silica) as per Ontario Regulation 490/09.

- Spill procedure: For uncured adhesive (methyl methacrylate), contain with inert absorbent (e.g., vermiculite) and dispose as hazardous waste. For solid material, sweep or vacuum (HEPA-filtered) – do not use compressed air.
- First aid: If dust contacts eyes, flush with water for 15 minutes. If skin irritation occurs, wash with mild soap and water. If inhaled, move to fresh air. Seek medical attention if symptoms persist.
- Disposal: Corian scrap is non-hazardous and can be recycled through DuPont's Corian Recycling Program or disposed as industrial solid waste per local regulations. Adhesive waste must be handled as hazardous waste.

**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.