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TECHNICAL SPECIFICATION SHEET

Black Copolymer Polypropylene (PP-C) Welded Tank - 3/4" (19.05 mm) Exterior Wall, UV/AO Stabilized
Welded tank products for DEF / urea (ISO 22241 / AUS 32), water, and industrial fluid service

1. MATERIAL & CONSTRUCTION

Property / Description	Value
Material	Black copolymer polypropylene (PP-C) extruded sheet, UV/AO stabilized
Base Resin	INEOS N00M-00 impact copolymer polypropylene - density 0.902 g/cm ³ (ASTM D792); melt flow rate 0.45 g/10 min at 230°C / 2.16 kg (ASTM D1238) - per resin TDS. Sheet is supplied to CPD as finished, UV-stabilized extruded sheet; CPD performs no compounding or modification of the material.
Surface Finish	Smooth or textured (embossed) finish available for all exterior wall thicknesses - specify on purchase order. Texture is a shallow surface feature and does not alter the material properties listed herein.
UV Stabilization Package	UV/AO (ultraviolet + antioxidant) additive concentrate - Standridge Color Corp. Code 82512, compounded into the PP resin by the sheet supplier at extrusion
Stabilizer Concentrate Details	27% pigment/additive loading in PP carrier resin (carrier: 12 g/10 min melt flow, 0.90 g/cm ³); concentrate density 0.96 g/cm ³ ; melt flow 73 g/10 min; heat stability 450°F (232°C) - stable through extrusion and welding temperatures - per Standridge TDS
Heavy Metals Compliance	CONEG compliant (Pb, Cd, Hg, Cr ⁶⁺ below regulated limits) - per Standridge TDS
Exterior Wall Thickness	0.750 in (19.05 mm) nominal exterior walls; internal partitions 3/8 in to 1/2 in (9.5 to 12.7 mm) per the approved drawing
Density (Base PP Resin)	0.902 g/cm ³ (56.3 lb/ft ³) - resin TDS, ASTM D792
Water Absorption (24 hr immersion)	< 0.02% (essentially non-hygroscopic) - typical for PP sheet, ASTM D570
Fabrication Method	Thermoplastic fusion (hot-gas / extrusion) welded seams
Recyclability	Fully recyclable thermoplastic - Resin Identification Code #5 (PP); mono-material construction (walls and welds are the same polymer, no liners or coatings) supports end-of-life mechanical recycling
Flammability Rating	UL 94 HB (horizontal burn) - resin TDS

2. THERMAL PROPERTIES

Property / Description	Value
Maximum Continuous Service Temperature	180°F (82°C) - typical for PP-C sheet; sustained service above 100°F: see Section 6 derating
Maximum Intermittent (Short-Term) Temperature	200°F (93°C)
Minimum Continuous Service Temperature (Copolymer PP)	-20°F (-29°C) - typical for impact copolymer PP sheet
Recommended Minimum Temperature for Impact Loading	-4°F (-20°C) - resin remains ductile in instrumented impact at -20°C (ASTM D3763) per TDS; impact resistance declines as temperature drops
Brittleness Temperature	-94°F (-70°C) - resin TDS, ASTM D746
Heat Deflection Temperature @ 66 psi (0.455 MPa)	190°F (88°C) - resin TDS, ASTM D648
Heat Deflection Temperature @ 264 psi (1.82 MPa)	136°F (58°C) - resin TDS, ASTM D648
Practical Softening Onset (loss of stiffness)	~250°F (121°C)
Vicat Softening Point	304°F (151°C) - resin TDS, ASTM D1525
Melting Point (Crystalline)	320-338°F (160-170°C) - typical for PP-C
Coefficient of Linear Thermal Expansion (CLTE)	5.5-7.0 × 10 ⁻⁵ in/in/°F (1.0-1.3 × 10 ⁻⁴ mm/mm/°C) - typical for PP sheet, ASTM D696
Thermal Expansion Example (10 ft dimension, 100°F ΔT)	≈ 0.66-0.84 in growth - allow for expansion in fittings & supports
Thermal Conductivity	0.13 BTU·ft/hr·ft ² ·°F (0.22 W/m·K) - typical for PP
Thermal Resistance (R-Value), 3/4" Wall	≈ R-0.49 at k = 0.22 W/m·K (hr·ft ² ·°F/BTU); R-0.5 to R-1.1 across the published PP conductivity range of 0.10-0.22 W/m·K
Specific Heat Capacity	0.46 BTU/lb·°F (1.92 kJ/kg·K)

3. MECHANICAL PROPERTIES (@ 73°F / 23°C)

Property / Description	Value
Tensile Strength	3,660 psi (25.3 MPa) at yield; 3,345 psi (23.1 MPa) at break - resin TDS, ASTM D638 (extruded PP-C sheet typically 3,500-4,500 psi)
Elongation at Yield	9.6% - resin TDS, ASTM D638
Elongation at Break	482% - resin TDS, ASTM D638 (highly ductile failure mode)
Tensile Modulus of Elasticity	160,000-180,000 psi (1,100-1,250 MPa) - typical for PP-C sheet
Flexural Modulus	172,300 psi (1,188 MPa), 1% secant - resin TDS, ASTM D790A
Notched Izod Impact Strength	No break at 73°F (23°C); 2.3 ft-lb/in (12.1 kJ/m ²) at -4°F (-20°C) - resin TDS, ASTM D256. Instrumented impact (ASTM D3763): ductile at both 73°F and -4°F

Rockwell Hardness	R77 - resin TDS, ASTM D785
Shore Hardness	D68-D72 - typical for PP-C
Compressive Strength (10% deformation)	5,500-6,500 psi (38-45 MPa) - typical for PP-C

4. CREEP & LONG-TERM LOAD BEHAVIOR

Property / Description	Value
Creep (Definition for Design)	PP is viscoelastic: under sustained hydrostatic load, apparent stiffness decreases over time. Long-term design uses creep modulus, not short-term modulus.
Creep (Tensile) Modulus @ 1 hr, 73°F	≈ 110,000 psi (750 MPa)
Creep Modulus @ 1,000 hr, 73°F	≈ 60,000-65,000 psi (400-450 MPa)
Creep Modulus @ 10,000 hr (~1.1 yr), 73°F	≈ 50,000 psi (350 MPa)
Long-Term Allowable Design Stress @ 73°F (25-yr basis)	≈ 500-580 psi (3.5-4.0 MPa) - DVS 2205-1 PP-B (block copolymer) creep-rupture basis
Design Stress Derating vs. Temperature	Allowable stress decreases as temperature rises; at 140°F (60°C) long-term allowable stress ≈ 40-50% of the 73°F value
Safety Factor (Static Head, Welded Tanks)	≥ 2.0 applied to creep-rupture strength (typical engineering practice)
Practical Result - 3/4" Wall	Material creep properties are independent of sheet thickness; wall stress is not. Hydrostatic bending stress in a tank wall panel scales with (panel span ÷ wall thickness) ² , so exterior wall thickness and internal partition spacing are sized together per DVS 2205-2 for each tank's dimensions, fluid density (DEF, S.G. 1.09, governs over water) and service temperature, against the long-term allowable stress above. The 3/4 in exterior wall carries ≈ 44% of the bending stress of a 1/2 in wall at the same panel span and liquid head (stress ∝ 1/t ²) and is specified where tank height, panel span or service conditions require.

5. SERVICE FLUID DATA - DEF (AUS 32); OTHER FLUIDS PER NOTES

Property / Description	Value
Chemical Compatibility with DEF (32.5% urea solution)	Excellent - no attack, swelling, or degradation; suitable for continuous immersion. ISO 22241-3 lists polypropylene among recommended DEF-compatible materials
DEF Purity Impact	PP is non-contaminating: no leachable metals (Cu, Zn, Cr, Ni) that poison SCR catalysts
DEF Specific Gravity	1.09 (approx. 9.1 lb/gal)
DEF Freezing Point	12°F (-11°C)
Freeze/Thaw Behavior	DEF expands ~7% on freezing; copolymer PP's low-temperature ductility (to -20°F) tolerates freeze/thaw cycling; headspace/expansion allowance recommended
Recommended DEF Storage Temperature (fluid quality)	12°F to 86°F (-11°C to 30°C); DEF shelf life declines above 86°F
Tank Temperature Capability vs. DEF Requirement	Tank material capability (-20°F to 180°F) exceeds the DEF fluid's own recommended storage window on both ends

6. ENVIRONMENTAL & WEATHERING

Property / Description	Value
UV Resistance	UV/AO-stabilized (Standridge 82512 package, applied by the sheet supplier) for outdoor exposure; antioxidant component protects against thermal-oxidative aging
UV Penetration Depth	UV degradation is confined to a shallow surface layer, typically < 0.5 mm (< 3% of the 3/4" wall); underlying material remains essentially unaffected
Structural Design Life	25 years per DVS 2205-1 creep-rupture methodology at 73°F service temperature; the 3/4" wall satisfies the code allowable (≈500-580 psi) with large margin at DEF hydrostatic loads when sized per Section 4
Expected Service Life - Indoor	In excess of 30 years with proper installation and maintenance
Expected Service Life - Outdoor (black, UV-stabilized)	20 years with proper installation and maintenance
Elevated-Temperature Service & Derating	Sustained service above 73°F reduces allowable stress per DVS 2205 (at 140°F, ≈40-50% of the 73°F value). The 25-yr structural design life remains demonstrable at 140°F at DEF hydrostatic loads; expected service life at sustained 140°F is conservatively 10-15 years. The base resin carries a UL 746B Relative Thermal Index of 120°C (248°F) per TDS. Sustained service above 100°F: consult CPD Engineering.
Warranty (distinct from design / service life)	3-year limited warranty (CPD-POL-001); a 5-year limited warranty (CPD-POL-002) is available at additional cost. Warranty terms are commercial commitments and are distinct from the engineering design-life and service-life estimates above.
Moisture / Humidity	No hydrolysis; negligible water absorption (< 0.02%)
Microbial / Rot Resistance	Inert - does not support microbial growth
Corrosion Resistance	Immune to rust and galvanic corrosion (non-metallic)

NOTES: Base resin data per INEOS Olefins & Polymers USA Technical Data Sheet, N00M-00 Polypropylene Impact Copolymer (injection-molded specimens). UV/AO stabilizer data per Standridge Color Corporation Technical Data Sheet, Code 82512. Both are external supplier documents; the sheet is supplied to CPD as finished, UV-stabilized extruded sheet and CPD does not compound or modify the material. Values marked "typical" are representative of extruded copolymer polypropylene sheet and are validated against published sources (ISO and ASTM standards, DVS 2205 design codes, and independent material datasheets). Long-term design values per DVS 2205 methodology. DEF properties per ISO 22241 and industry references. Surface finish (smooth or textured) affects the sheet surface only; mechanical, thermal, and chemical values are those of the base extruded sheet. Values are provided for engineering reference, not as a guarantee of performance for any specific application. For water, wash-water, and chemical service, material compatibility is confirmed against the resin manufacturer's published data for the fluid, concentration, and service temperature stated on the purchase order.

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