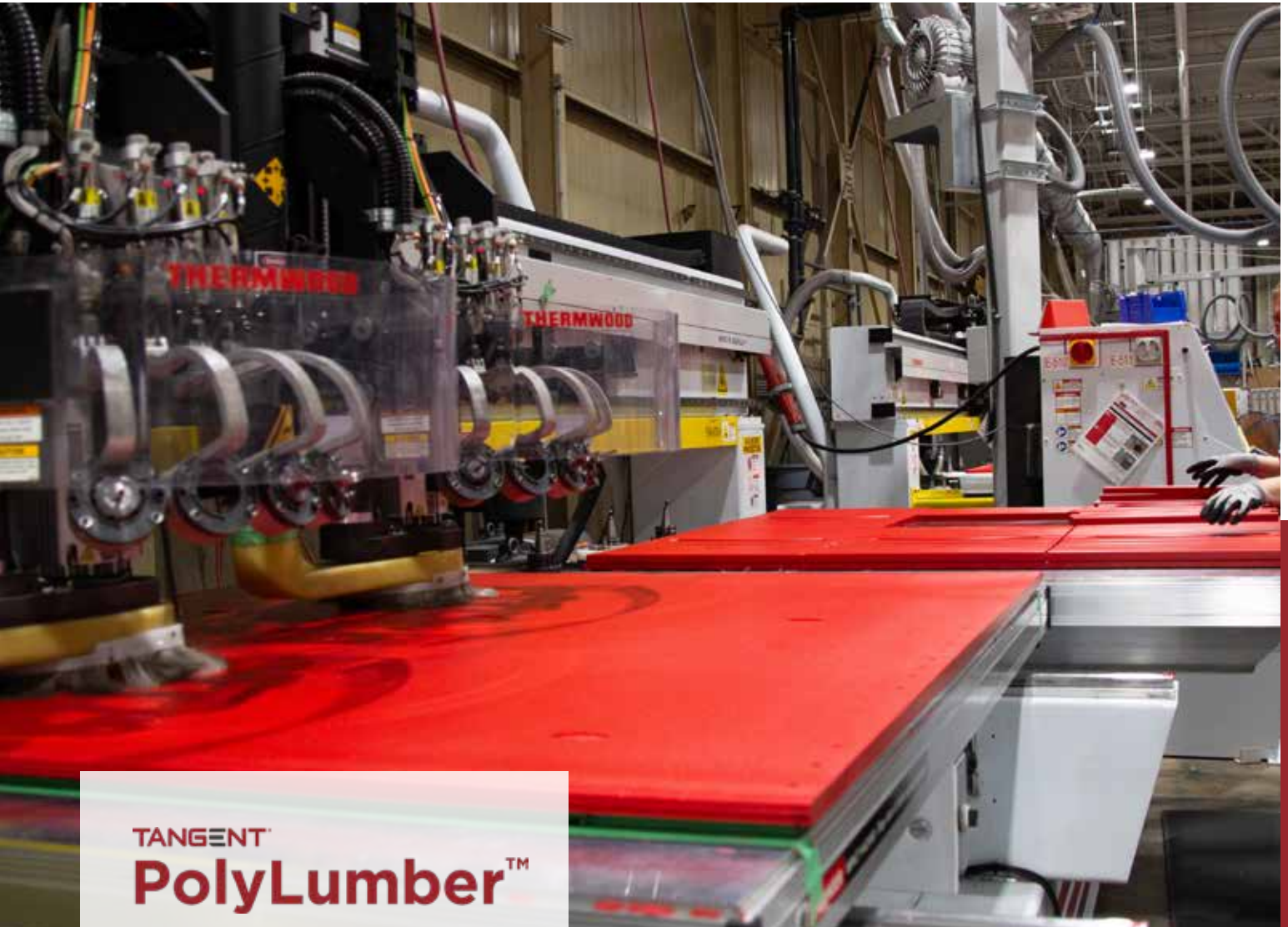


TANGENT®



TANGENT®
PolyLumber™

TANGENT®
PolySheet™

HDPE

FABRICATION GUIDE





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WHY TANGENT®?



CONFIDENTLY DURABLE

No rotting, splintering or peeling with materials that stand the test of time. Our products can withstand year round weather and endure the harshest of environments.



LASTING BEAUTY

Our boards are manufactured with UV stabilizers throughout so they will never require painting, staining or sealing.



SUSTAINABLY MADE

Our boards don't need to be treated like wood and are environmentally-friendly. Made from recycled materials, our lumber won't leach chemicals into our environment.



EASE OF CARE

Our products are resistant to marine borers and insects. Also impervious to moisture, Tangent® materials are truly a low-maintenance product.



MADE IN THE USA

Our products are made in the United States. With quality that is second to none, our quality and engineering teams test our products against over 15 ASTM standards.

INTRODUCTION

TANGENT®

Tangent® materials develops high-performance HDPE products engineered for durability, consistency, and longterm reliability. This Fabrication Guide serves as a technical reference to support professional fabricators, engineers, and designers in achieving optimal results. Within these pages, you'll find recommended machining parameters, fastening techniques, and design considerations developed through years of material innovation and field experience.

We are ready to provide the technical guidance needed to ensure your project's success. Please contact us at TechnicalService@tangentmaterials.com or 630.264.1110





TANGENT® PRODUCTS

TANGENT® PolySheet™	TANGENT® PolyLumber™	PolySheet U	Comparison Chart
Technical Data Standard Specs	Technical Data Standard Specs	Technical Data Standard Specs	Comparing Material Types



Tangent® Materials is a privately held company located in Aurora, IL, within the Chicago metropolitan area. The current leadership at Tangent® has been producing innovative plastic lumber and structural timber products for over 20 years. Founded in 2003, Tangent Technologies is committed to **leading innovation in the plastic lumber industry** through engineering processes and new product development.

Tangent® focuses on delivering quality value propositions with a custom-engineered and tailored solution to meet your unique project specifications. Our sales and marketing teams strategically work to increase customer satisfaction and expand our reach as an industry leader. Tangent® manufactures hundreds of sizes and styles of extrusions, including structural lumber engineered for applications such as fencing and decking, to bridge fender systems and more.

Durable, versatile, low cost, abrasion and chemically resistant plastic material

Tangent PolySheet™ is a high-density sheet and the ideal alternative material for a variety of applications. Available for multiple application types, our durable, all-weather sheet offers unparalleled design versatility compared to traditional lumber. Our extensive CNC capabilities enable us to cut Tangent®'s HDPE sheet into custom parts, streamlining your supply chain and minimizing scrap.

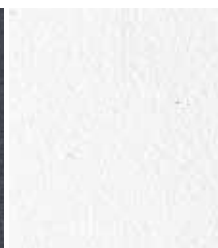
Our sheet resists water, mildew, moisture, insects, and chemicals. Repellent to most surface stains, our high-density sheet is low-maintenance and never requires painting, staining, or waterproofing.



Black



Gray



White

DETAILS

COLOR

Black, Gray, White

SHEET

Finished edges

GRADE

Standard Sheet

TEXTURE / SURFACE

Haircell

SIZES

Thickness: 1/2", 3/4", 1"

Width: 48", 54", 60"

Length: 96", 120"



CONFIDENTLY DURABLE

No rotting, splintering or peeling with materials that stand the test of time.



SUSTAINABLY MADE

Our products won't leach chemicals into our environment.



EASE OF CARE

Impervious to moisture, Tangent materials are truly a low-maintenance product.



MADE IN THE USA

Our products are made in the United States.

Suitability and Limitations

These products have greater impact resistance than wood but conversely less rigidity, and therefore prior to use a thorough design engineering study must be performed to determine the suitability of High Density Sheet in any critical application.

Fabrication is similar to wood and normal woodworking tools can be used. One should be advised that by transforming the product by drilling holes and routing edges the integrity and strength of the part can be altered. Eye protective wear, dusk masks, gloves and normal safety precautions must be used when handling and fabricating the product.

Inherent in High Density Sheet products, you will observe a greater coefficient of thermal expansion than stiffer wood products. Therefore, when designing your application, an accommodation must be made to properly allow for expected expansion and contraction over the length of the product.

Static electricity is a naturally occurring phenomenon to all resin based products. On extremely dry days there is the potential to experience a small static shock if you walk across a High Density Sheet product and touch a conducting surface such as a metal fixture. This is comparable to walking across your carpet and receiving a static shock when you touch the door handle. We do not warranty against static electricity as it is a natural occurring phenomenon and is not a manufacturing defect.

During winter conditions, you might find any surface made from High Density Sheet to be slippery in snow, wet and frost conditions. Unlike most other surfaces, you can easily spread rock salt or calcium chloride to restore decent traction and melt the frost or ice layer with no harmful effect to the High Density Sheet products.

Fabrication Recommendations

Tolerance Information

- ± 5% for gauges 1/4 in. up to 1 in.

Cutting and Sawing

Tangent PolySheet[™] High Density Polyethylene (HDPE) Sheet can be cut using full range of saw types. Follow recommendations by tooling manufacturers for 'soft plastics.'

Drilling

Standard twist drills work well. A negatively ground rake angle prevents drill jamming.

Turning

Turn using as low a feed as possible with a large cutting depth. Indexable inserts can help provide a smooth cut.

Milling and Routing

High RPM equipment typically used for metals works well. Feed rates between 10 and 16 per minute are recommended.

Conduct a Pre-production Trial

Without scorching or melting the material.

Hardware

Stainless steel fasteners and hardware recommended as well as screws designed for plastics. Allow for thermal expansion and contraction depending on temperature.

Warranty

Tangent[®] Materials, the manufacturer of Tangent PolySheet[™] High Density Polyethylene (HDPE) Sheet products, offers a limited warranty:

(a) What this Limited Warranty Covers: This Limited Warranty covers substantial defects directly caused by termite and fungal decay as set forth below.

(b) How Long This Limited Warranty Lasts: Subject to the terms and conditions of the Limited Product Warranty, Tangent (hereinafter "Manufacturer," "We" or "Us") warrants to the original consumer ("Consumer" or "You" of Tangent[®] Materials, ("Products")) that, in normal applications the Products will not rot, splinter, decay or suffer structural damage directly from termites or fungal decay under normal use for a period of (50) years from the date of purchase (the "Warranty Period").

Tangent[®] Materials does not recommend or approve this product for all end use applications. The appropriate national and local code authorities should be consulted for safety, suitability and applicability for intended use prior to purchasing product. (See full warranty details).

This guideline and summary is intended to provide the distributor, installer and end user with basic guidelines and technical specifications for designing and properly installing the High Density Sheet products. However, the installer and/or purchaser of any High Density Sheet product is solely responsible for interpreting specific job conditions and determining the engineering design and suitability of end use and application of any High Density Sheet product. Adherence to applicable building and safety codes for specific locations and applications of this product are the sole responsibility of the installer and/or purchaser. In no event shall Tangent[®] Materials, the manufacturer of Tangent PolySheet[™] High Density Polyethylene (HDPE) Sheet products, be liable for labor, installation, reinstallation or for any indirect, punitive, exemplary or consequential damages of any kind whatsoever from the provisions of this information.

This revision 1.9 [07/20/26] supersedes all other High Density Sheet technical data sheets.

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STPS001-090126

Tangent PolySheet[™] High Density Polyethylene (HDPE) Sheet is a durable, all-weather sheet that is non-foamed and annealed, creating an incredibly strong board that is able to span greater lengths and exhibits high impact resistance. Resistant to water, mildew, moisture, stains, insects and chemicals, our sheet works easily with CNCs and common woodworking tools.

Common Applications

- Outdoor Furniture & Kitchens
- Outdoor Cabinetry & Storage
- Marine & Watercraft
- Golf Courses, Parks & Playgrounds
- Travel Trailer & RV
- Site Amenities & Signage
- Landscape Architecture



TECHNICAL INFORMATION

Physical	Normal Value	(English)	Normal Value	SI	Test Methods
Density	0.955	g/cm ³	0.955	g/cm ³	ASTM D792
Environmental Stress-Cracking Resistance (ESCR)					ASTM D1693
122°F (50°C), 100% Igepal, F50	>1000	hr	>1000	hr	
Mechanical	Normal Value	(English)	Normal Value	SI	Test Methods
Tensile Strength					ASTM D638
Yield	3920	psi	27.0	MPa	
Break	3770	psi	26.0	MPa	
Tensile Elongation					ASTM D638
Yield	9.0	%	9.0	%	
Break	920	%	920	%	
Flexural Modulus - 2% Secant	150000	psi	1030	MPa	ASTM D790B
Hardness	Normal Value	(English)	Normal Value	SI	Test Methods
Durometer Hardness (Shore D)	58		58		ASTM D2240
Thermal	Normal Value	(English)	Normal Value	SI	Test Methods
Deflection Temperature Under Load					ASTM D648
66 psi (0.45 MPa), Unannealed	163	°F	73.0	°C	
Vicat Softening Temperature	264	°F	129	°C	ASTM D1525

Suitability and Limitations

These products have greater impact resistance than wood but conversely less rigidity, and therefore prior to use a thorough design engineering study must be performed to determine the suitability of High Density Sheet in any critical application.

Fabrication is similar to wood and normal woodworking tools can be used. One should be advised that by transforming the product by drilling holes and routing edges the integrity and strength of the part can be altered. Eye protective wear, dusk masks, gloves and normal safety precautions must be used when handling and fabricating the product.

Inherent in High Density Sheet products, you will observe a greater coefficient of thermal expansion than stiffer wood products. Therefore, when designing your application, an accommodation must be made to properly allow for expected expansion and contraction over the length of the product.

Static electricity is a naturally occurring phenomenon to all resin based products. On extremely dry days there is the potential to experience a small static shock if you walk across a High Density Sheet product and touch a conducting surface such as a metal fixture. This is comparable to walking across your carpet and receiving a static shock when you touch the door handle. We do not warranty against static electricity as it is a natural occurring phenomenon and is not a manufacturing defect.

During winter conditions, you might find any surface made from High Density Sheet to be slippery in snow, wet and frost conditions. Unlike most other surfaces, you can easily spread rock salt or calcium chloride to restore decent traction and melt the frost or ice layer with no harmful effect to the High Density Sheet products.

Fabrication Recommendations

Tolerance Information

- ± 5% for gauges 1/4in. up to 3/4in.

Approximate Weight

- 1/2 in. (12.7 mm) – 90 lbs (40.8 kg)
- 3/4 in. (19 mm) – 135 lbs (61.2 kg)

Cutting and Sawing

Tangent PolySheet™ High Density Polyethylene (HDPE) Sheet can be cut using full range of saw types. Follow recommendations by tooling manufacturers for 'soft plastics.'

Drilling

Standard twist drills work well. A negatively ground rake angle prevents drill jamming.

Turning

Turn using as low a feed as possible with a large cutting depth. Indexable inserts can help provide a smooth cut.

Milling and Routing

High RPM equipment typically used for metals works well. Feed rates between 10 and 16 per minute are recommended.

Conduct a Pre-production Trial

without scorching or melting the material.

Hardware

Stainless steel fasteners and hardware recommended as well as screws designed for plastics. Allow for thermal expansion and contraction depending on temperature.

Warranty

Tangent® Materials, the manufacturer of Tangent PolySheet™ High Density Polyethylene (HDPE) Sheet products, offers a limited warranty:

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Tangent® Materials does not recommend or approve this product for all end use applications. The appropriate national and local code authorities should be consulted for safety, suitability and applicability for intended use prior to purchasing product. (See full warranty details).

This guideline and summary is intended to provide the distributor, installer and end user with basic guidelines and technical specifications for designing and properly installing the High Density Sheet products. However, the installer and/or purchaser of any High Density Sheet product is solely responsible for interpreting specific job conditions and determining the engineering design and suitability of end use and application of any High Density Sheet product. Adherence to applicable building and safety codes for specific locations and applications of this product are the sole responsibility of the installer and/or purchaser. In no event shall Tangent® Materials, the manufacturer of Tangent PolySheet™ High Density Polyethylene (HDPE) Sheet products, be liable for labor, installation, reinstallation or for any indirect, punitive, exemplary or consequential damages of any kind whatsoever from the provisions of this information.

This revision 2.0 [09/01/26] supersedes all other High Density Sheet technical data sheets.

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STPS003 HDS TDS_090126

Section 1: Product Identification and Emergency Information

Product Description:	Polysheet HDPE	Address:	1001 Sullivan Rd. Aurora, IL 60506
Chemical Description:	Polyethylene (CAS #: 9002-88-4), Polyethylene Hexene Copolymer (CAS #: 25213-02-9), Additives	Phone Number:	Tangent - 630.264.1110
Supplier:	Tangent	CAS Number:	-
MSDS Number:	None	Date Revised:	04/03/26

Section 2: Material Identification and Information

Non-Hazardous Ingredients:	Polyethylene (CAS #: 9002-88-4), Polyethylene Hexene Copolymer (CAS #: 25213-02-9), Additives. Additives may include color pigments, UV stabilizers, antioxidants, slip agent, and foam agents which could be formulated in PE.
Hazardous Ingredients:	No Hazardous Ingredients

Section 3: Physical and Chemical Characteristics

Appearance:	Non-Translucent, Colored	Solubility in Water:	Negligible
Odor:	Slight	Evaporative Rate:	Negligible
Boiling Point:	N/A	Vapor Density (air = 1):	N/A
Melting Point:	266°F (130°C)	Evaporation Point:	N/A
Vapor Pressure (mm HG):	N/A		

Section 4: Fire and Explosion Hazard Data

Flash Point:	640°F (338°C)
Auto-Ignition Temperature:	824°F (440°C)

Section 4: Fire and Explosion Hazard Data (cont.)

Flammable Limits (LEL):	N/A
Flammable Limits (UEL):	N/A
Extinguishing Media:	Carbon dioxide, foam, dry chemical and water spray
Special Fire Fighting Instructions:	Use self-contained breathing apparatus. Use standard chemical fire fighting procedures.
Unusual Fire and Explosion Hazards:	Exposure to fire can generate toxic fumes. High dust levels may create potential for explosion.
NFPA Hazard ID:	Health: 1, Flammability: 1, Reactivity: 0

Section 5: Stability and Reactivity

Chemical Stability:	This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
Reactivity:	Not reactive with water or air
Hazardous Reactions:	Dust may create static discharge, risk of dust-air explosion increase with the presents of flammable vapors. Polyethylene may react and be degraded by Organic Chlorides, Hydrocarbons and certain halogens
Conditions to avoid:	Processing polyethylene at over 300°C may emit various oligomers, waxes and oxygenated hydrocarbons as well as carbon dioxide, carbon monoxide and small amounts of other organic vapors (Inhalation of these gases may be hazardous

Section 6: Accidental Release Measures

	Material in sheet form and is not subject to spills.
Personal precautions:	Sweep up to prevent a slipping hazard avoid breathing dust, avoid dust formation.
Environmental precautions:	Do not contaminate surface water do not flush down drains
Method of cleanup:	Clean up by using brooms or vacuum dust accumulation should not be blown around using compressed air as this could cause a static charge resulting in an explosion

Section 7: Health Hazard Data

Primary Routes of Entry:	Inhalation or ingestion of dust
Health Hazards:	Dust may cause irritation of the mouth, nose, throat and eyes.
Medical Conditions Aggravated by Exposure:	Some long-term breathing conditions can be aggravated by exposing to dust from this product.
Emergency First Aid Procedures:	Seek medical assistance for further treatment, observation and support if necessary.
Eye Contact:	Do not rub eyes. Remove contact lenses. Pour gentle stream of warm water through affected area. Contact physician if further treatment is necessary.
Skin Contact:	Run a gentle stream of water over irritated area for 15 minutes. Mild soap may be used. Contact physician if further treatment is necessary.
Inhalation:	Move person to fresh air. Seek medical attention.
Ingestion:	Seek medical attention.

Section 8: Precautions for Safe Handling and Use

In case of spills or accidental release:	Waste material must be disposed of in accordance with applicable federal, state and local environmental control regulations.
Waste Disposal Methods:	Material should be disposed of through an approved waste management facility.
Precautions to be taken in handling and storage:	Store at less than 120°F (49°C). Store away from heat or open flame. Store away from strong oxidants or alkalies. Store flat and supported across entire span.
Other Precautions and/or Special Hazards:	Use gloves to protect against physical irritation or injury if required by handling and fabricating conditions. Use standard safety glasses with side shields when handling or fabricating the product. Application of this product generates dust, use an appropriate NIOSH-approved particulate filter respirator.

Section 9: Control and Protective Measures

Respiratory Protection:	None, unless machining material. A properly fitting NIOSH approved dust mask must be worn when machining this material.
Ventilation:	Machine this product only in well ventilated areas. Dust collection systems are recommended.
Protective Gloves:	Use gloves to protect against physical irritation or injury if required by handling and fabricating conditions.
Eye Protection:	Wear safety glasses with side shields when nailing, cutting or machining this product.
Other Protective Clothing and Equipment:	Wear clean body-covering clothing.
Hygienic Work Practices:	Wash hands before eating, drinking or smoking.

Section 10: Transport & Removal

Transport:	This product is not subject to any regulations as far as national or international transport is concerned. No dangerous product in respect to / according to transport regulations Notice/symbol transport containers: none No dangerous product in respect to / according to transport regulations Notice/symbol transport containers: none Special marking for containers: none Proper shipping name: not regulated Since empty containers retain product residue, follow hazard precautions even after container is emptied.
Disposal Considerations:	Waste must be recycled or incinerated at approved facilities or disposed of at refuse tips in accordance with federal, state and local regulations. Waste key for the unused product: EAK-Code 120 105 Waste name: waste of Polyethylene
Ecological Information:	Material is not readily biodegradable. Material is not expected to be harmful to aquatic organisms. Mobility: not applicable Accumulation: not applicable Eco-toxicity: not applicable

Section 11: Regulatory Information

SARA 311/312 Categories:	1) Immediate (Acute) Health Effects: No 2) Delayed (Chronic) Health Effects: No 3) Fire Hazard: No 4) Sudden Release of Pressure Hazard: No 5) Reactivity Hazard: No
California Proposition 65:	This product in its NATURAL form does not contain any chemicals known to the state of California to cause cancer, birth or any other reproductive defects
United States TSCA Inventory (TSCA)	All components of this product are in compliance with the inventory listing requirements of the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory..
Other Precautions and/or Special Hazards:	Use gloves to protect against physical irritation or injury if required by handling and fabricating conditions. Use standard safety glasses with side shields when handling or fabricating the product. Application of this product generates dust, use an appropriate NIOSH-approved particulate filter respirator.

Section 12: Other Information

Information Source and References:	Information contained herein is accurate to the best of our knowledge. Tangent® makes no warranty of any kind, express or implied, concerning the safe use of this material. Existing laws and regulations are to be observed by the user of our products within their own responsibility.
Special Considerations:	Exposure to the Hazardous Combustion and Decomposition Products as described in SDS Sections 5 and 10 may be linked with various acute and chronic health effects. These effects include irritation of eyes and upper respiratory tract primarily from the aldehydes, breathing difficulties, systemic toxicity such as liver, kidney, and central nervous system effects. Polyethylene fines and dust particles are listed as a Class I combustible dust by the National Fire Protection Association (see NFPA-68, Table F.1). For additional information on control of static and minimizing potential dust and fire hazards, refer to NFPA-654, "Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing and Handling of Combustible Particulate Solids, 2006 Edition".

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Section 11: Regulatory Information

SARA 311/312 Categories:	1) Immediate (Acute) Health Effects: No 2) Delayed (Chronic) Health Effects: No 3) Fire Hazard: No 4) Sudden Release of Pressure Hazard: No 5) Reactivity Hazard: No
California Proposition 65:	This product in its NATURAL form does not contain any chemicals known to the state of California to cause cancer, birth or any other reproductive defects
United States TSCA Inventory (TSCA)	All components of this product are in compliance with the inventory listing requirements of the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory..
Other Precautions and/or Special Hazards:	Use gloves to protect against physical irritation or injury if required by handling and fabricating conditions. Use standard safety glasses with side shields when handling or fabricating the product. Application of this product generates dust, use an appropriate NIOSH-approved particulate filter respirator.

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Why Tangent®?

Tangent® Materials is a privately held company located in Aurora, IL within the Chicago metropolitan area. The current leadership at Tangent® Materials has been recycling plastic and producing innovative recycled plastic lumber and structural timber products for over 20 years. Founded in 2003, Tangent® Materials is committed to **leading innovation in the recycled plastic lumber industry** through engineering processes and new product development.

Tangent® Materials focuses on delivering quality value propositions with a custom engineered and tailored solution to meet your unique project specifications. Our sales and marketing teams strategically work to increase customer satisfaction and expand our reach as an industry leader. Tangent manufactures hundreds of sizes and styles of extrusions, including structural lumber engineered for specific customer applications from bridge fendering systems to marine pilings and more.

What type of finish?

Matte finish on both sides of the sheet.

What colors are available?

Tangent PolySheet™ ST is available in Black, Gray and White

What sizes are available?

Thickness: 1/2", 3/4", 1"
Width: 48", 54", 60"
Length: 96", 120"

Does Tangent® expand and contract?

Yes, at a rate of 6×10^{-5} in./in./°F degrees, changing approximately 1/32 inch for every foot of length or width over a 40°F temperature change. Please refer to thermal expansion/contraction worksheet.
Please call Customer Service at 630.264.1110

What are the features and benefits of Tangent PolySheet™ products?

- Environmentally stabilized – UV stabilized and waterproof
- No volatile organic compounds (VOCs)
- Chemical-resistant and easy to clean
- Will not rust, delaminate or rot
- No finishing or painting required
- Works like wood
- Easy to fabricate
- High-impact strength
- Little to no maintenance
- Qualifies for LEED points

Can I use a CNC machine?

Yes

Can I use glue or paint?

Gluing is not recommended. Because Tangent PolySheet™ products are designed to resist water and grime, they cannot be painted and the use of adhesives is not recommended. It is preferable to mechanically fasten or weld. Specialized welding equipment and rods, designed for use with polymer sheets, are available.

Will the material produce dust when fabricating?

No, only small shavings that can be recycled.

How can the material be fabricated and finished?

Use standard woodworking tools: table saws, table routers, drills, blades and bits. Carbide router bits with two to four flutes are recommended. For more information, please refer to the fabrication brochures

Can I use Tangent PolySheet™ for a countertop?

It has been used as a countertop in some applications such as labs, but it is not recommended for a countertop.

How to clean and maintain?

- **General Cleaning:** Clean surfaces using a soap and water solution with a soft sponge or a plasticbristle brush. A soft-bristled toothbrush is effective for reaching tight spaces. To eliminate dust, rinse the area with cold, clean water.
- **Deep Cleaning:** A pressure washer can effectively deep clean all Tangent® Materials products on its lowest PSI setting. Pressure washers exceeding 1500 PSI are not recommended. Maintain a distance of at least 12 inches between the tip of the pressure washer and the surface to avoid damage.

STAIN	RECOMMENDED CLEANING PROCESS
Pencil Marks	Use a mild dish detergent and water to saturate the stain. Rinse clean with water.
Ink/Marker	Saturate the stain with a mild dish detergent and water, then rinse. For tougher stains, use acetone or isopropyl alcohol to gently wipe the surface.
Grease or Oil Stain	Use a mild dish detergent and water to saturate the stain. Rinse clean with water. Acetone, isopropyl alcohol to gently wipe the surface. For grease that's been soaked in the plastic, try soaking the area/container in a 1:1 solution of vinegar & water for ~30min. Rinse with dish soap and water, dry, and then apply a baking soda paste to the area. Let that sit for 10-20 min, brush with a soft brush, rinse with water. Lastly, try rubbing alcohol or vodka if stains persists.
Embedded Dirt	Use a mild dish detergent to saturate the area. Scrub with a soft-bristled brush and rinse clean with water. Acetone, isopropyl alcohol to gently wipe the surface.
Wine	Use a mild dish detergent to saturate the area. Scrub with a soft-bristled brush and rinse clean with water.
Chewing Gum	Use a plastic putty knife to gently pry up hard pieces. Clean fine debris and crevices with a soft brush and acetone, then rinse with water.
Bird Droppings	Use a mild dish detergent to saturate the area. Scrub with a soft-bristled brush and rinse clean with water.
Stains and Scuffs	A foam eraser sponge may be used for stubborn marks.
Iron and Rust	For tough iron and rust stains, try soaking the area/container in a 1:1 solution of vinegar & water for ~30min. Scrub with a soft-bristled brush. Rinse with dish soap and water.

What are common applications?

- Bow Pulpit
- Countertops
- Frames and Trim
- Furniture
- Grab Rails and Handles
- Hatches and Doors
- Rod and Cup Holders
- Steps and Dock Boxes
- Tray Tables

How to care and store?

- Store the sheets flat on a level surface
- Keep away from teak oil and other products that can stain the finish
- Use china markers or water-based markers to draw patterns
- Pen marks can usually be removed with household cleaners
- Keep away from heat sources that exceed 180°F
- Because there is no grain, parts can be cut from any area of the sheet
- Save the scraps for small parts, shims, spacers and plugs
- Remnants may be eligible for recycling; contact your distributor or Tangent® for details

Tangent PolyLumber™ Data Sheet

Premium Recycled Plastic Lumber is manufactured from purified blends of post-consumer, pre-consumer and/or virgin HDPE (high-density polyethylene) base resins.

Additional proprietary additives are compounded into each product as the customer specifies for their unique application. Antioxidant processing aids, UV-inhibited pigments, foaming agents and other compounds are introduced pending the end use and customer needs.

FEATURES

- Manufactured to exacting specifications.
- Essentially maintenance free due to exceptional resistance to moisture, fading, insects, splintering, warping and other common outcomes from environmental stress that one observes with common wood or wood fiber composite products.
- Requires no waterproofing, staining or other common reoccurring maintenance other than the occasional washing with soap and water to remove dirt and debris if desired.
- UV-resistant pigments create a very color stable material that can withstand prolonged sun and weather exposure.

Material may fade slightly over the entire service life of the product, but nothing compared to the typical weathered fading of wood and wood composite products.

Property	ASTM Method	Units	Value
Specific Gravity	D611-13	lbs/in ³	0.0216-0.0275*
Water Absorption	D570-98	%	<1
Stress @ 3% Strain** Flexural Property	D6109-05	psi	1,414
Secant Modulus @ 1% Strain** Flexural Property	D6109-055	psi	77,067
Coefficient of Thermal Expansion	D6341-98	in/in/°F	0.000064
Screw Withdrawal	D6117-05	lbf	583
Fire Testing	E84	Class	C

*Lower density may occur in larger cross sections

**Testing performed on samples of 2" x 3" nominal size

TAILORED OPTIONS

Tangent® currently makes over three hundred custom shapes in-house and we can customize a unique shape to meet your requirements.

The popular wood tones are all available as standard colors such as: Cedar, Weathered Wood, Sand, Tudor Brown, Gray, Light Gray, Cherrywood, Light Oak, Sand, Bright White and Black. Custom colors can be made available and may require the use of virgin HDPE to meet color specification of bright colors.

- Wood Grain - Multi-tone extrusions with wood-like cross sectional grains. Generates highlights between dark and light tones throughout the board. A varied but consistent look that creates depth in tone similar to wood finishes.
- A Multitude of Finishes - Many different embossed surfaces available for wood-like textures to finish the look and feel.
- Fabrication - Full CNC and traditional fabrication tools to customize the finish parts you need.

TYPICAL APPLICATIONS

Extremely well-suited for exterior applications where resistance to weathering and minimal maintenance is required but the high value appearance must be maintained such as color stability and surface finish over the useful service life.

Used in a multitude of commercial fabricated applications, our dimensional lumber is well suited for site amenities, casual furniture, playground equipment, agriculture, spa & pool, golf course and marine.

SUITABILITY & LIMITATIONS

These products have greater impact resistance than wood but conversely less rigidity and therefore prior to use a thorough design engineering study must be performed to determine the suitability of dimensional lumber in any critical application.

Fabrication is similar to wood and normal woodworking tools can be used. One should be advised that by transforming the product by drilling holes and routing edges, the integrity and strength of the part can be altered. Protective eye wear, dust masks, gloves and normal safety precautions must be used when handling and fabricating the product. (See MSDS sheet for more details.)

You will observe a greater coefficient of thermal expansion in dimensional lumber products than stiffer wood products. Therefore when designing your application an accommodation must be made to properly allow for expected expansion and contraction over the length of the product.

Static electricity is a naturally occurring phenomenon to all resin-based products. On dry days there is potential to experience a static shock if you walk across Dimensional Lumber and touch a conducting surface such as a metal fixture. The physics is similar to walking across a carpet and receiving a shock when you touch a door handle. We do not warranty against static electricity as it is naturally occurring and is not a manufacturing defect. Contact our technical sales reps to learn how to minimize the generation of static electricity through product selection, available additives and construction details.

During winter conditions, you might find any surface made from dimensional lumber to be slippery in snow, wet and frost conditions. Unlike most other surfaces you can easily spread rock salt or calcium chloride to restore decent traction and melt the frost or ice layer with no harmful effect to the dimensional lumber product.

WARRANTY

Tangent® offers a limited warranty that this product will not rot, splinter, decay or suffer structural damage directly from termites or fungal decay under normal use. Tangent® does not recommend or approve this product for all end use applications. The appropriate national and local code authorities should be consulted for safety, suitability and applicability for intended use prior to purchasing product. (See Full Warranty for details)

This guideline and summary is intended to provide the distributor, installer and end user with basic guidelines and technical specifications for designing and properly installing the dimensional lumber products. However, the installer and/or purchaser of any dimensional lumber product is solely responsible for interpreting specific job conditions, and determining the engineering design and suitability of end use and application of any dimensional lumber product.

Adherence to applicable building and safety codes for specific locations and applications of this product are the sole responsibility of the installer and/or purchaser. In no event shall Tangent the manufacturer of the dimensional lumber products be liable for labor, installation, re-installation or for any indirect, punitive, exemplary or consequential damages of any kind whatsoever from the provisions of this information.

This revision 2.1 [4/16/26] supersedes all other dimensional lumber technical data sheets.

WOODGRAIN

Check with your sales representative to see if these color options are available in the profile you are looking for.



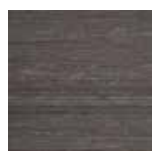
Seashell



Birchwood



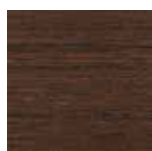
Driftwood Gray



Coastal Gray



Antique Mahogany



Brazilian Walnut



Natural Teak



Walnut

NEW for 2026



Nature



Weathered Teak



Licorice

STANDARD



Bright White



Ivory



Light Gray



Gray



Weathered Wood



Cherrywood



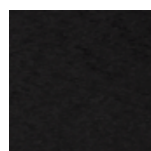
Cedar



Bright Cedar



Cardinal Red



Black



Milwaukee Brown



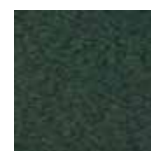
Tudor Brown



Blue



Patriot Blue



Turf Green

BRIGHTS



Pink



Bright Red



Bright Orange



Lemon Yellow



Tropical Lime
Green



Aruba Blue



Powder Blue



Purple

**Our woodgrain colors are patented. Colors may vary between monitors and printers.*

TFL001-0526326

Tangent PolySheet™ VS. Tangent PolyLumber™

TANGENT®
PolySheet™

TANGENT®
PolyLumber™



Base Material Composition

HDPE
with colorants and UV inhibitors

HDPE
with colorants and UV inhibitors

Outdoor Performance

Color fastness* 10+ years

Color fastness* 10+ years

Durability when exposed to extreme climates, salt water or high moisture.

Excellent

Excellent

Surface Texture

Orange peel finish

Ranging from light texture to
wood-like embossing
available

Cut Edge, Texture of Edge

Glossy smooth & consistent

Smooth with matte finish

Material Technical Aspects

Non-foamed and annealed
for high density and greater
span capability

Dense with superior
core structure

Material Offerings

Available in 3 colors

Sheet is available up to 48"
wide, 96" length, and 1/2",
3/4" & 1" thickness

Available in limitless
color options with over
150 profile sizes and
unlimited lengths

Fabrication & Assembly in Shop

Easy to use, cut, drill and
fabricate. Screw hold is excellent.
Due to high density, may require
more force to route and drill than
dimensional lumber

Fabricates like traditional
materials, with traditional
methods - easy to cut,
drill and fabricate

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**Color fastness numbers are estimates and not warrantable. For the most up-to-date information, please reach out to your Tangent® Materials representative.*

RFL010-063026

630.264.1110 | 1001 Sullivan Rd., Aurora, IL 60506 | tangentmaterials.com

TANGENT®

At Tangent®,
we strive to be the
***preferred partner in
High Performance
Synthetic Materials,***
delivering an exceptional
material value proposition
to end consumers while
maintaining a commitment
to innovation, exceptional
customer experience,
and sustainability.

APPLICATIONS

INDUSTRIAL



COMMERCIAL



RESIDENTIAL





PPE GUIDELINES

Tangent PolyLumber™ and PolySheet™ products are widely used for cutting, machining, welding, and fabrication. While these HDPE-based materials are low-hazard on their own, the processes used to shape and join them can introduce risks from heat, fumes, particulates, and tool operation. The PPE guidelines below outline the protections needed to ensure safe and efficient work practices.

Recommendations:

- Eye Protection - ANSI Z87.1 certified
- Safety or Steel Toe footwear
- Dust mask and open air or ventilated workspaces recommended



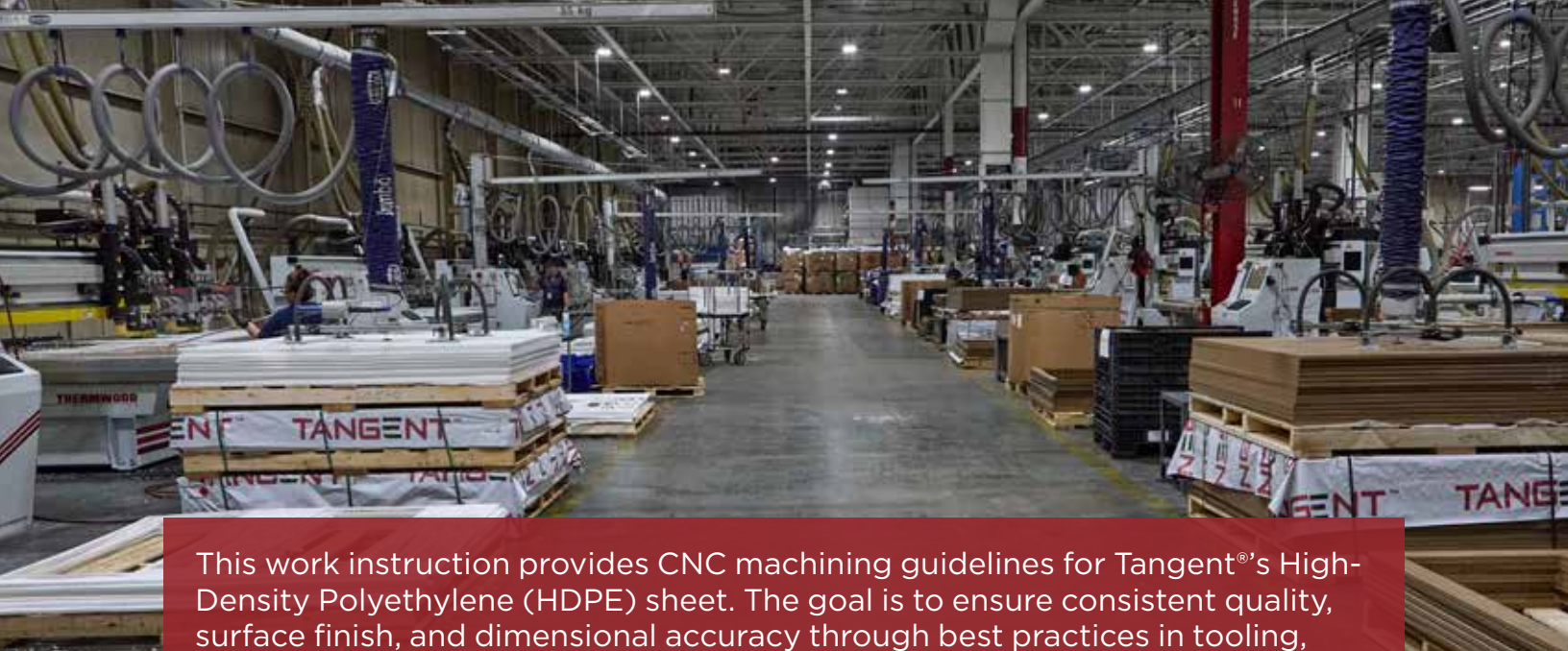
HDPE CNC

MACHINING
GUIDE

TANGENT®

TANGENT®
PolyLumber™

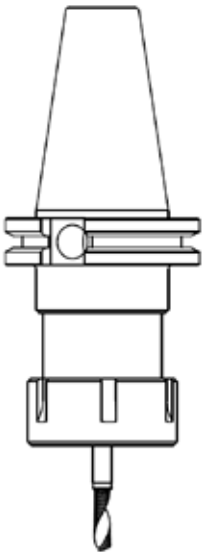
TANGENT®
PolySheet™



This work instruction provides CNC machining guidelines for Tangent®'s High-Density Polyethylene (HDPE) sheet. The goal is to ensure consistent quality, surface finish, and dimensional accuracy through best practices in tooling, setup, and process control.

TOOLS & EQUIPMENT

- CNC Router or Machining Center
- Single Up-Cut O-Flute Router Bits
- Tool Holders and Collets
- Vacuum Table or work holding clamps
- Measurement Tools (calipers, micrometers)



TOOLS SELECTION

Applicaton	Recommended Tool	Notes
≤ ¾" Material	1/4",3/8",1/2" UpCut, Single O-Flute Bit, CEL ¾" to 1-1/2"	Onsrud 63-776 Onsrud 63-783
Profiling	Ball End R-Bit	Reduces chatter and swirl marks
Not Recommended	Compression and down cut router bits	Causes chip evacuation issues

CHIP LOAD CHART

The chart below provides the suggested chip load starting range typical for Tangent HDPE and the tool diameter in use. This calculator provides a starting reference range for shank tools only and assumes the cutting depth equals the tool's cutting diameter. Depending on the depth of cut, this range needs to be further modified as follows:

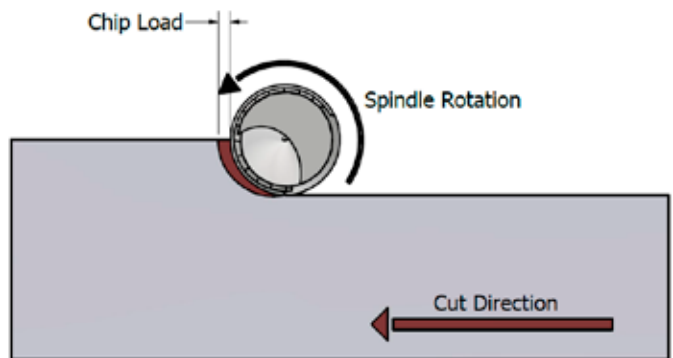
If the cut depth is 2x Tool Diameter, reduce the chip load by 20-25%
If the cut depth is 3x Tool Diameter, reduce the chip load by 40-50%

Tool Diameter	Chipload
1/8"	.004" - .006"
1/4"	.008" - .012"
3/8"	.008" - .012"
1/2"	.010" - .014"

Formulas:

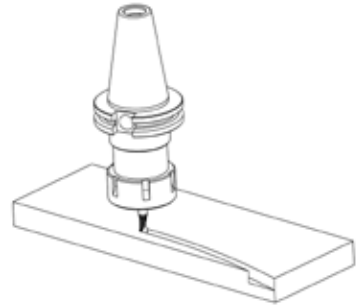
Feed Rate = RPM x number of
flutes x chip load

RPM = feed rate / (number of
flutes x chip load)



CUTTING TECHNIQUE

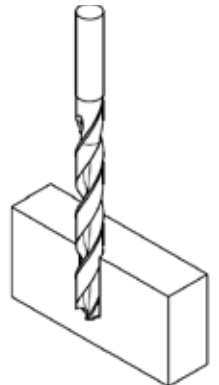
- Use sloping or arcing lead-ins to minimize entry marks.
- Minimize lead-outs to avoid pull stress as the tool exits.
- Climb cutting is recommended over conventional cutting.
- Sufficient work holding allows increased feed speeds & spindle speeds.
- For high-quality cuts, use two passes (e.g., two 3/8" depth cuts for 3/4" material).



DRILLING OPERATIONS

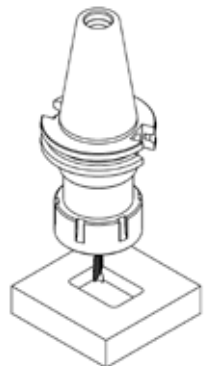
Drill Cycle: Peck Drill
RPM: 4,000 **Feed:** 75 IPM
Peck Depth: .5x – 1x drill diameter

This allows chip evacuation and prevents clogging and chip wrap.



SURFACING & POCKETING

- Begin surfacing from the center of the sheet to reduce bowing.
- Surface both sides, when possible, to balance stress.
- Complete surfacing and pocketing before perimeter cuts.



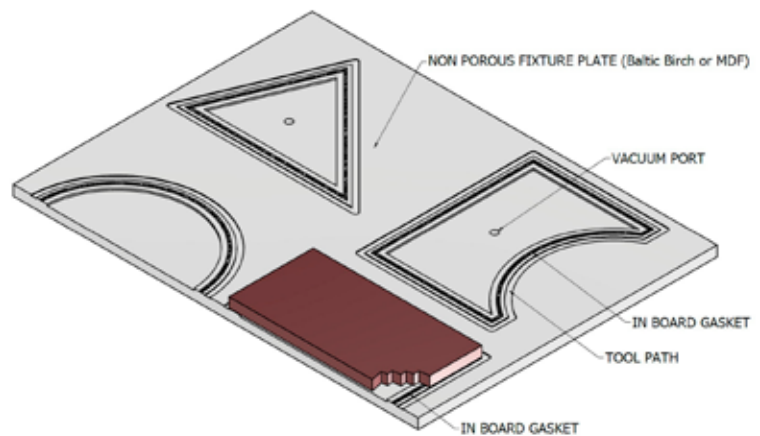
WORK HOLDING

When machining Tangent PolyLumber™ or PolySheet™, it is essential to secure the part firmly to the worktable and reduce vibrations from the high-speed cutting tool. Excess vibration can cause chatter marks and reduced dimensional accuracy due to tool or part deflection.

Dedicated Fixtures

In-board gaskets are ideal for dedicated fixtures used in repetitive part production. An airtight fixture maximizes CNC router vacuum efficiency and ensures consistent part holding. Use Baltic Birch instead of MDF or LDF to maintain a reliable seal.

Adding a slight chamfer to the gasket channel provides clearance for proper gasket seating and accurate Z-zeroing. This prevents the gasket from being pinched between the part and fixture, reducing variation and vacuum leaks.

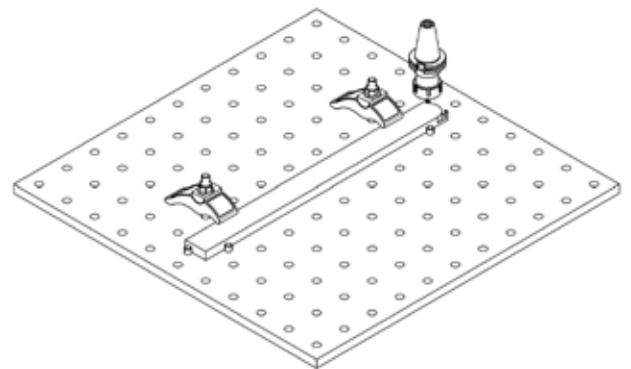


CLAMPING

Top Clamps: Secure a workpiece by clamping down from above.

Cam Clamps: These use a cam lever that, when rotated, creates a clamping force. They are known for their quick operation.

Edge Clamps: Designed to hold the workpiece from the side or edge. They can be effective for securing workpieces of various shapes and sizes.



USE CLAMPS WITH CAUTION TO AVOID INDUCED STRESS



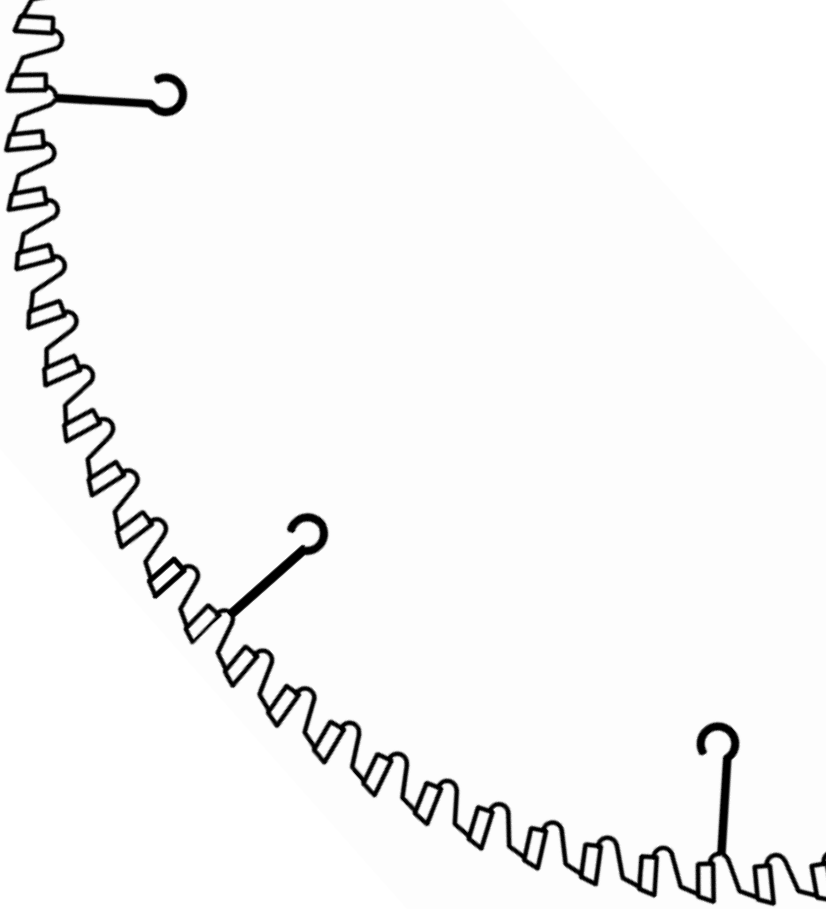
OTHER CONSIDERATIONS

Quick Guide

Proper Tooling	Single-flute O-flute cutters provide the best chip evacuation and reduce heat. Avoid multi-flute end mills, compression router bits, and down cut router bits that cause melting and chip packing.
Control Heat:	Run high feed rates with lower spindle speeds to form solid chips rather than fine dust. Proper chip load is critical to prevent melting and tool buildup. See chip load chart.
Work Holding:	HDPE can warp due to internal stress, so hold it firmly using screws, vacuum tables, or strong clamping. Balance material removal on both sides whenever possible.
Effective Chip Evacuation:	Use compressed air to clear chips and keep temperatures down. Long, stringy chips must be continuously removed to avoid tool interference and part damage.
Tool Path Techniques:	Ramp or helix into the material instead of plunging straight down to reduce heat and tool stress.
Clean Edges:	Use a light finishing pass with a sharp tool or manually remove remaining burrs with a deburring tool.

Machining Induced Stress

Improper Tooling	Dull or unsuitable cutting tools increase cutting forces and heat, introducing stress into the material.
Excessive Heat:	Incorrect spindle speeds or feed rates can generate high temperatures, resulting in thermal stress.
Uneven material removal:	Removing significantly more material from one side creates internal force imbalances, leading to residual stress, warping, and bowing.



SAW CUTTING

Tangent PolyLumber™ or PolySheet™ can be cut using a wide variety of saw types, offering flexibility for different shop setups and project needs. Suitable options include table saws, hand-held power saws, panel saws, optimizing saws, and radial-arm saws, among others. These tools are all capable of producing clean, accurate cuts when used with the proper blade and cutting techniques.

Circular Saws	
Circular Saw Blades	HDPE
Blade Material:	Carbide or PCD Tipped
Tooth Geometry:	Triple-Chip Grind (TCG)
Tooth Pitch:	0.25" - .050"
Hook Angle:	0° - 15°
Cutting Speed ft/min	8ft - 16ft

A close-up photograph of a red Adirondack chair. A person's hand is visible, using a white cloth to wipe the surface of the chair's seat. The chair is made of red plastic slats. In the background, a white building with dark-framed windows is partially visible.

HDPE CARE & CLEANING INSTRUCTIONS

GENERAL CLEANING

Clean surfaces using a soap and water solution with a soft sponge or a plastic bristle brush. A soft-bristled toothbrush is effective for reaching tight spaces. To eliminate dust, rinse the area with cold, clean water.

DEEP CLEANING

A pressure washer can effectively deep clean Tangent PolyLumber™ and PolySheet™ on its lowest PSI setting. Pressure washers exceeding 1500 PSI are not recommended. Maintain a distance of at least 12 inches between the tip of the pressure washer and the surface to avoid damage.

TANGENT® PolyLumber™

TANGENT® PolySheet™



STAINCHART

Stain	Recommended Cleaning Process
Pencil Marks	Use a mild dish detergent and water to saturate the stain. Rinse clean with water.
Ink/Marker	Saturate the stain with a mild dish detergent and water, then rinse. For tougher stains, use acetone or isopropyl alcohol to gently wipe the surface.
Grease/Oil	Use a mild dish detergent and water to saturate the stain. Rinse clean with water. Acetone, isopropyl alcohol to gently wipe the surface. For grease that's been soaked in the plastic, try soaking the area/container in a 1:1 solution of vinegar & water for ~30min. Rinse with dish soap and water, dry, and then apply a baking soda paste to the area. Let that sit for 10-20 min, brush with a soft brush, rinse with water. Lastly, try rubbing alcohol or vodka if stains persists.
Embedded Dirt	Use a mild dish detergent to saturate the area. Scrub with a soft-bristled brush and rinse clean with water. Acetone, isopropyl alcohol to gently wipe the surface.
Wine	Use a mild dish detergent to saturate the area. Scrub with a soft-bristled brush and rinse clean with water
Chewing Gum	Use a plastic putty knife to gently pry up hard pieces. Clean fine debris and crevices with a soft brush and acetone, then rinse with water
Bird Droppings	Use a mild dish detergent to saturate the area. Scrub with a soft-bristled brush and rinse clean with water.
Stains & Scuffs	A foam eraser sponge may be used for stubborn marks.
Iron & Rust	For tough iron and rust stains, try soaking the area/container in a 1:1 solution of vinegar & water for ~30min. Scrub with a soft-bristled brush. Rinse with dish soap and water.

Always read and follow the specific instructions provided by the product manufacturer before using any cleaning product. Always wear approved safety glasses, gloves, a face shield, or goggles when operating cleaning equipment. If you are using cleaning solutions different from those mentioned, it is advisable to test the solution on a small, inconspicuous area of the lumber first to ensure it does not damage the surface. For more information regarding a HDPE Chemical Resistance Guide, please contact your Tangent® representative. For more information, visit tangentmaterials.com

HDPE MATERIAL STORAGE GUIDELINES

DIMENSIONAL LUMBER & SHEET STOCK

High-Density Polyethylene (HDPE) is a durable, low-maintenance material, but proper storage practices protect dimensional integrity, surface quality, and long-term performance. Follow these guidelines for both Tangent PolyLumber™ and Tangent PolySheet™.

General Storage Principles

- Store indoors or under cover whenever possible to minimize UV exposure & thermal cycling.
- Keep materials off the ground using pallets, racks, or elevated supports to prevent moisture contact, contamination, and deformation.
- Maintain a clean, dry storage environment free of oils, solvents, and sharp debris that could scratch or contaminate surfaces.
- Label all material clearly with grade, color, thickness/profile, and date received to support FIFO (first-in, first-out) inventory rotation. Ensure the original product label is always retained and kept with the material.



HDPE Dimensional Lumbers

Tangent PolyLumber™ profiles are particularly susceptible to bowing and warping if not stored properly. Always store material on the skid it ships with to prevent damage.

- Stack PolyLumber™ flat with like sizes together; avoid mixing profile sizes in the same stack, which can cause uneven pressure and warping.
- When storing outdoors temporarily, cover material with the Tangent tarp that ships

with the material and ensure adequate ventilation to prevent heat buildup.

- When stacking full pallets more than two high, use an interlayer pallet by placing an additional pallet upside down on top of the material so that the pallet deck provides full, even support across the load. Do not stack dimensional lumber more than 6 pallets high. Skipping the interlayer pallet when stacking three or more pallets high can cause permanent deformation to the material beneath.

HDPE Sheet Stock

Tangent® PolySheet requires careful handling to prevent bending, surface marring, and edge damage across all thicknesses.

- Always store sheets horizontally on a flat, level surface. Never store sheets vertically or leaned at any angle, as this will cause bowing and permanent deformation.
- Maximum horizontal stack heights by thickness: 0.5” sheet, 11.5” (23 sheets); 0.75” sheet, 11.25” (15 sheets); 1.0” sheet, 12” (12 sheets). Do not exceed these limits, as additional weight can cause permanent deformation to the bottom sheets.
- When stacking full pallets more than two high, use an interlayer pallet by placing an additional pallet upside down on top of the material so that the pallet deck provides full, even support across the load. Failure to use an interlayer pallet when stacking three or more pallets high can result in permanent damage to the sheet material.



QUICKREFERENCE

PARAMETER	DIMENSIONAL LUMBER	SHEET STOCK 0.5"	SHEET STOCK 0.75" / 1.0"
Max Skid Stack Height	6 pallets	6 pallets	6 pallets
Support / Base	Ship skid only	Full surface contact	Full surface contact
Preferred Orientation	Horizontal / flat	Horizontal / flat	Horizontal / flat
Vertical Storage	Not permitted	Not permitted	Not permitted
Masking Film	N/A	Retain until use	Retain until use
Pallet Stacking > 2 High	Interlayer pallet required	Interlayer pallet required	Interlayer pallet required

TANGENT[®]

HDPE DESIGN GUIDE

HDPE is a tough, impact-resistant thermoplastic designed for versatility and longevity. However, its flexibility, creep behavior, and thermal expansion require careful design considerations. The following guidelines will help you create efficient, reliable, and repeatable HDPE fabrications.

TANGENT[®] PolyLumber[™]

TANGENT[®] PolySheet[™]

GENERAL DESIGN

Allow for Flexibility:

HDPE's flexibility helps absorb vibration and impact, but can lead to deflection under load. Avoid relying on the material for rigidity alone; reinforce with framing or embedded metal supports when flatness or stiffness is critical.

Manage Dimensional Changes:

HDPE expands and contracts significantly with temperature. Always include expansion joints, floating panels, or slotted holes to accommodate movement. Rigid joints can lead to warping or cracking.

Distribute Loads Evenly:

Avoid point loads and concentrated stress points.



Use Generous Radii and Fillets:

Sharp internal corners create stress concentrations. Use radii of at least three times the material thickness for improved strength and aesthetics.

Minimize Machining Stress:

Use sharp cutting tools and appropriate feed rates. Avoid overheating the material during machining or routing to prevent distortion.

Design for Ease of Assembly:

Plan joint locations, access holes, and fastener clearances early. HDPE's low-friction surface allows movement, so alignment features such as pins or tabs may be required.

Consider Dimensional Tolerance Spec.:

Tangent PolyLumber™ or PolySheet™ dimensions may vary by ± 0.06 inch in length, width, and thickness. Design considerations must account for these dimensional tolerances in accordance with the specified manufacturing tolerances.

Consider Long-Term Performance:

HDPE will creep under sustained load. Avoid continuous tension or compression. For outdoor use, ensure designs account for UV exposure and temperature variation.



DESIGN GUIDE

In addition to general design practices, the following considerations will enhance performance, manufacturability, and aesthetic quality when working with Tangent PolyLumber™ and PolySheet™ materials.

DESIGN CONSIDERATIONS

Thermal Expansion	Load Bearing	Fastening
HDPE's coefficient of linear expansion is approximately 0.000064" in/in/°F. Designs must allow for expansion gaps or flexible mounting systems to accommodate this movement.	HDPE is not structural and will deflect under load. Reinforce with framing for long spans. Consult Tangent's Load Deflection Charts for proper spacing and support.	Use pilot holes for all screws and bolts. Oversize clearance holes slightly to allow for expansion. Use coarse-thread stainless-steel fasteners and avoid fine-thread screws.
Tolerances and Dimensional Stability	Aesthetics	Environment
Because HDPE is softer and more flexible than metals, maintaining precision tolerances is more difficult.	HDPE cannot be painted; color and finish are determined by material selection. Use concealed or color-matched fasteners for a clean appearance.	HDPE performs well in wet, marine, or outdoor environments but should be protected from direct flame or high-heat sources.



Design Tip

Allow generous clearance
between mating parts.



THERMAL EXPANSION & CONTRACTION

HDPE's high coefficient of thermal expansion means its size changes noticeably with temperature. Managing this behavior is essential in large assemblies, especially outdoors.

EXPANSION CALCULATION

$$\Delta L = L_0 \times \alpha \times \Delta T$$

Where

- **ΔL** = change in length
- **L_0** = original length
- **α** = coefficient of linear expansion
(.000064 in/in/°F)
- **ΔT** = temperature change (°F)

DESIGN EXAMPLE

A 48-inch HDPE panel exposed to a 100°F temperature change will expand:

$$\Delta L = 48 \times 0.000064 \times 100 = 0.3072"$$

CONTROL STRATEGIES

- Use slotted holes or floating joints
- Avoid rigidly connecting HDPE to metal frames.
- For outdoor assemblies, design for ¼" expansion per 4 ft of length as a general guideline.



TANGENT[®]

FASTENING & ASSEMBLY

TANGENT[®] PolyLumber[™]

TANGENT[®] PolySheet[™]



FASTENING & ASSEMBLY CONSIDERATIONS

Mechanical fastening is the most reliable and versatile method for assembling HDPE components. Proper fastener selection and installation are critical for long-term performance and dimensional stability.

HDPE's low surface energy makes adhesive bonding difficult. Most conventional glues, epoxies, and structural adhesives will not adhere effectively.

ASSEMBLY CONSIDERATIONS

Thermal Movement

- Always design joints to allow expansion and contraction.
- Use slotted holes or floating fasteners in longer boards, and when fastening to dissimilar materials (Steel or Aluminum).

Fastening Sequence

- Consider fastener sequence to prevent warping during assembly.

Multi-Material Assemblies

- When HDPE is combined with metals or composites, you must account for different thermal expansion rates.

DO	DON'T
Allow for thermal expansion in every assembly	Rigidly fix HDPE panels at multiple points
Use rounded edges and smooth transitions.	Use sharp corners or abrupt steps.
Reinforce long spans with steel or aluminum framing	Expect HDPE to act as a load-bearing member
Use stainless steel or coated coarse thread fasteners.	Use untreated carbon steel or fine-thread fasteners.
Use proper pilot holes and washers.	Drive fasteners directly without proper clearance.
Prototype, test, and validate assemblies under real conditions	Skip testing & validation



Fastener Selection

- Use stainless steel or coated hardware to prevent corrosion in outdoor applications.
- Coarse-thread screws perform best due to HDPE's flexibility and creep resistance.
- Type 17-point coarse-thread screws can reduce the need for pilot holes.
- Avoid fine-thread fasteners, which can strip or pull out under load.

Threaded Inserts and Hardware

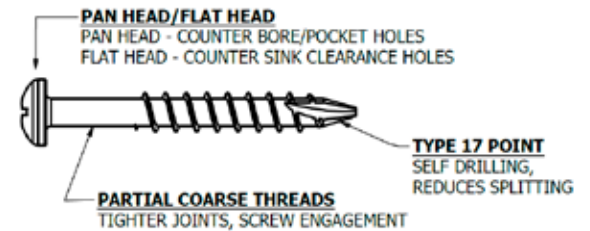
- Heat-set or tapping inserts can be used for components requiring quick or repeated assembly/disassembly.
- Avoid press-fit inserts — HDPE's creep behavior may cause them to loosen over time.

Pilot and Clearance Holes

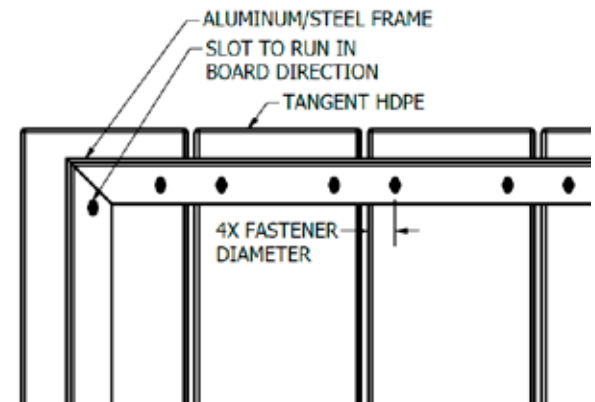
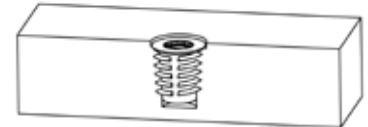
- Pre-drill pilot holes equal to 75–85% of the screw's root diameter.
- Provide loose standard clearance holes to allow for thermal movement.
- Clearance holes in dissimilar materials should be slotted to allow for differing expansion and contraction.
- Maintain a minimum edge distance of 4× the fastener diameter to avoid cracking.

Fastener Torque

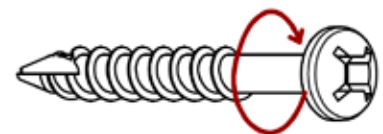
- Do not over-torque; HDPE compresses under load and may deform.
- Please consult your fastener supplier for recommended torque values.



Threaded Tapping Insert



Torque





ADHESIVES

HDPE's low surface energy makes adhesive bonding difficult. Most conventional glues, epoxies, and structural adhesives will not adhere effectively.

FASTENING SEQUENCE

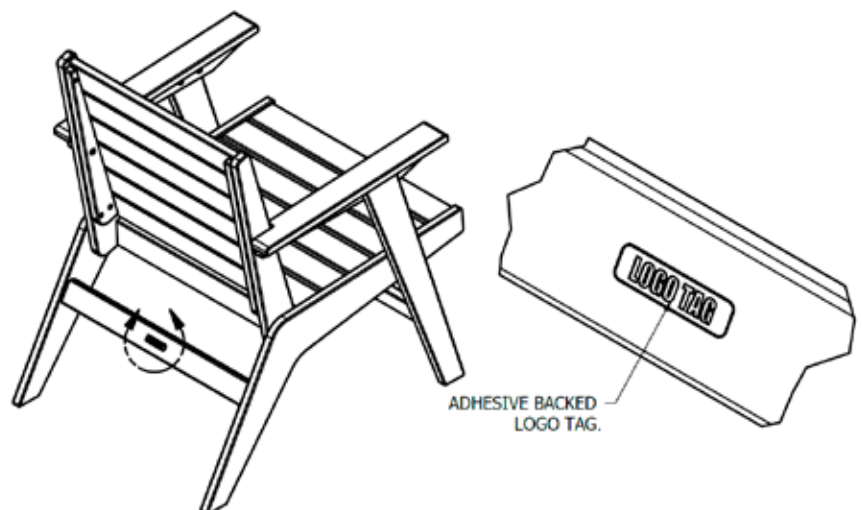
- Consider fastener sequence to prevent warping during assembly.

GENERAL GUIDELINES

- Avoid using adhesives as the primary joining method.
- Surface preparation (e.g., flame or corona treatment) can improve bond strength slightly but adds cost and variability.
- Machined surface may be necessary to aid adhesive performance.

LIMITATIONS

- Bonds remain much weaker than mechanical or welded joints.
- Use only for cosmetic or non-load-bearing applications, such as logo tags.





WELDING

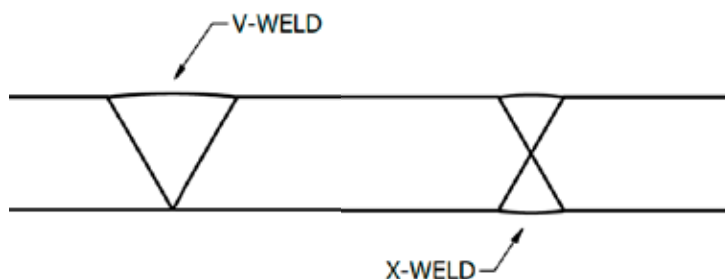
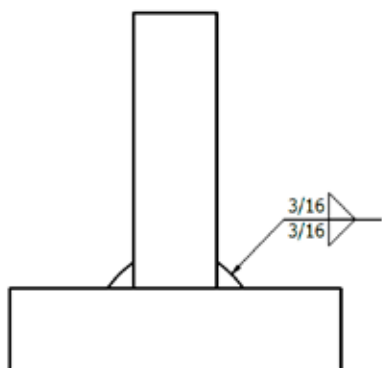
Welding provides permanent joining for HDPE sheet, panel, and structural applications when done correctly.

Hot Gas (Air) Welding:

- Typical air temperature: 570°F (300°C).
- Maintain even heating and consistent speed to avoid weak seams.

Extrusion Welding:

- Extrusion welding uses a heated extrusion gun to melt a thermoplastic welding rod and lay the molten material into the joint, creating a strong bond.
- Suitable for thicker materials (>6 mm).
- Use a matching HDPE welding rod.
- Creates robust joints with strength comparable to that of the parent material.



FABRICATION TECHNIQUES

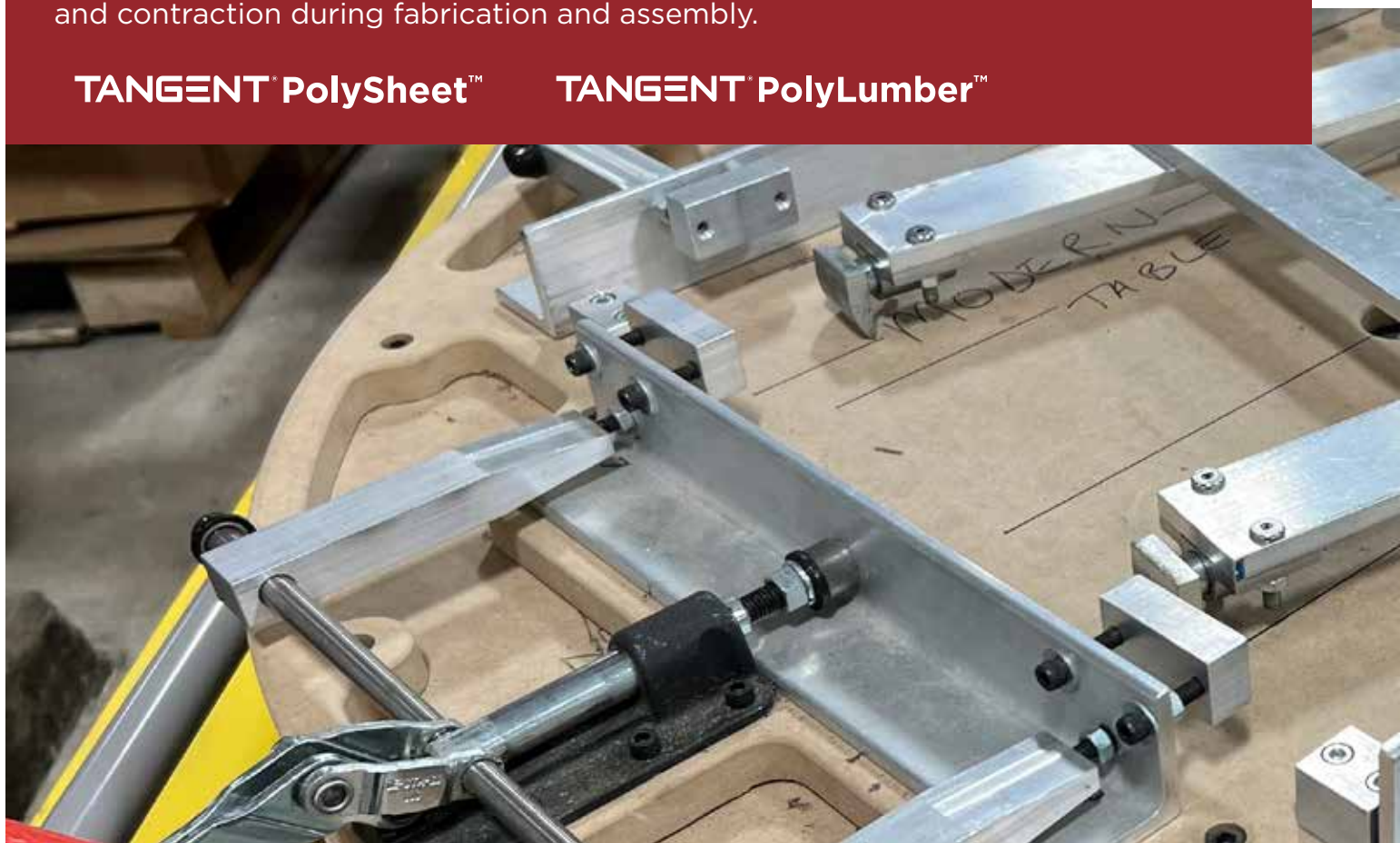
OVERVIEW

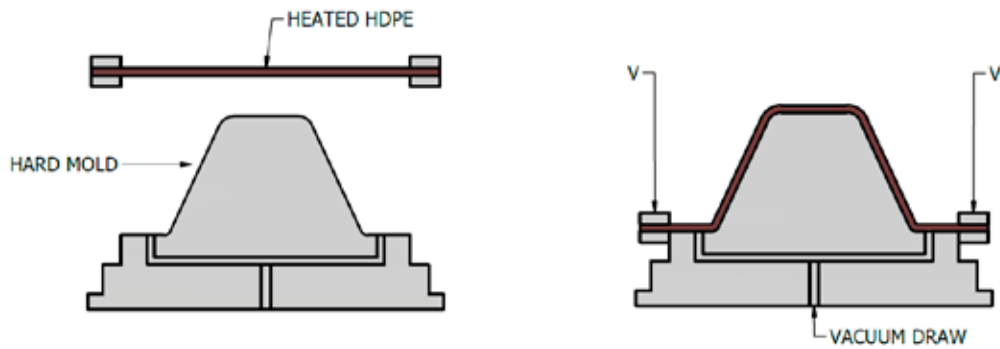
Tangent® HDPE materials can be fabricated using a variety of standard woodworking and thermoplastic techniques. The key to success lies in using controlled heat, proper tooling, and understanding how HDPE responds to temperature, stress, and mechanical load during processing.

This section outlines recommended methods for heat bending, vacuum forming, and drape forming, along with practical guidelines for managing thermal expansion and contraction during fabrication and assembly.

TANGENT® PolySheet™

TANGENT® PolyLumber™





VACUUMFORMING

PROCESS DESCRIPTION

Vacuum forming reshapes heated HDPE sheets over a mold using suction. It is commonly used for creating contoured panels, liners, and enclosures.

EQUIPMENT

- Oven or radiant heater with temperature control
- Vacuum forming table or platen
- Mold made from aluminum, epoxy, or MDF (with vent holes)

PROCEDURE

- Preheat Sheet: Uniformly heat the sheet to 290–310°F (143–155°C).
- Forming Time: Once pliable, immediately place the sheet over the mold and apply vacuum.
- Cooling: Maintain vacuum pressure until the part cools below 180°F (82°C).
- Trimming: Trim edges after full cooling to prevent deformation.

NOTES

- HDPE exhibits high shrinkage during cooling — use **draft angles of at least 3–5°**.
- Ensure even heating to prevent “orange peel” or surface thinning.
- For deep draws, pre-stretch the sheet or use plug-assist forming.



FABRICATION TECHNIQUES

HEATBENDING

Heat-bending allows HDPE sheets or boards to be formed into curves or angles without cracking. Controlled heating softens the material, enabling a clean, uniform bend along the desired axis.

Equipment

- Strip heaters or hot-air guns
- Warming Oven
- Clamping jigs or bending forms

Procedure

Heat Zone: Focus heat evenly along the bend line; use shielding to prevent heat bleed.

PolySheet™ Temperature Range: 270°F–300°F (132°C–150°C)

PolyLumber™ Temperature Range: 235°F–265°F (112°C–129°C) Note: Reduce temperature for PolyLumber™ Woodgrain to maintain embossed pattern on

Bend Angle: Perform bending immediately after heating; maintain pressure until cool.

Cooling: Allow the part to cool naturally at room temperature; forced cooling can cause warping.

Multiple Bends: For complex geometries, form one bend at a time to maintain alignment.

Notes

Avoid overheating — HDPE may bubble or discolor above 320°F (160°C).

Bending thicker sheets ($> \frac{1}{2}$ ") requires extended heating or preheating both sides.

Use bending forms that allow for material spring-back (typically 5–10° correction).





DRAPEFORMING

Process Description

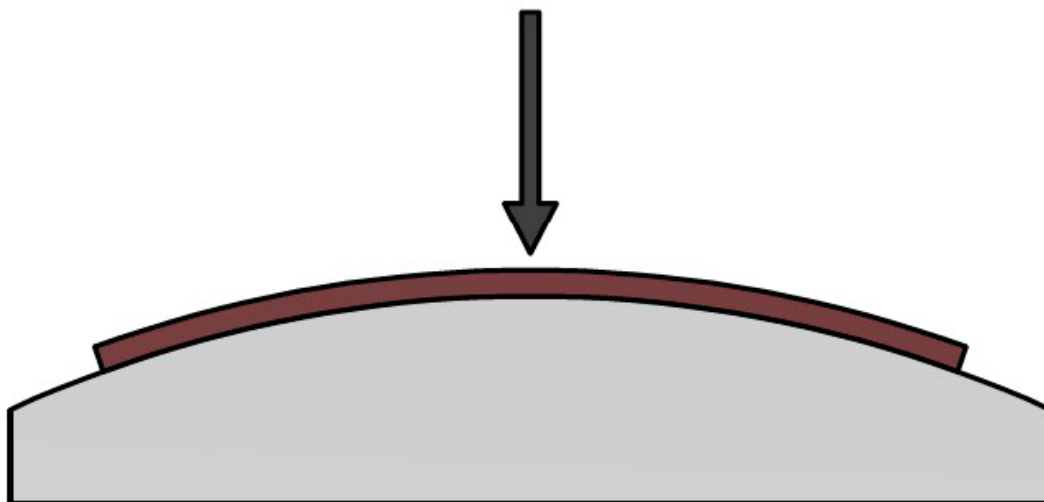
Drape forming uses gravity and heat to shape HDPE sheets over a curved form without vacuum assistance. It's suitable for larger, gentle-radius parts such as signage, furniture components, or marine panels.

Procedure

- Heat Sheet: Uniformly heat to 275–300°F (135–150°C).
- Drape Over Form: Allow the heated sheet to sag naturally over the mold.
- Assist Forming: Apply light pressure or clamping as needed for definition.
- Cooling: Maintain the shape until the temperature drops below 150°F (65°C).

Notes

- Avoid tight-radius bends ($<6\times$ material thickness).
- Use non-stick or release-coated molds.
- For precision forming, carefully control both time and temperature.





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