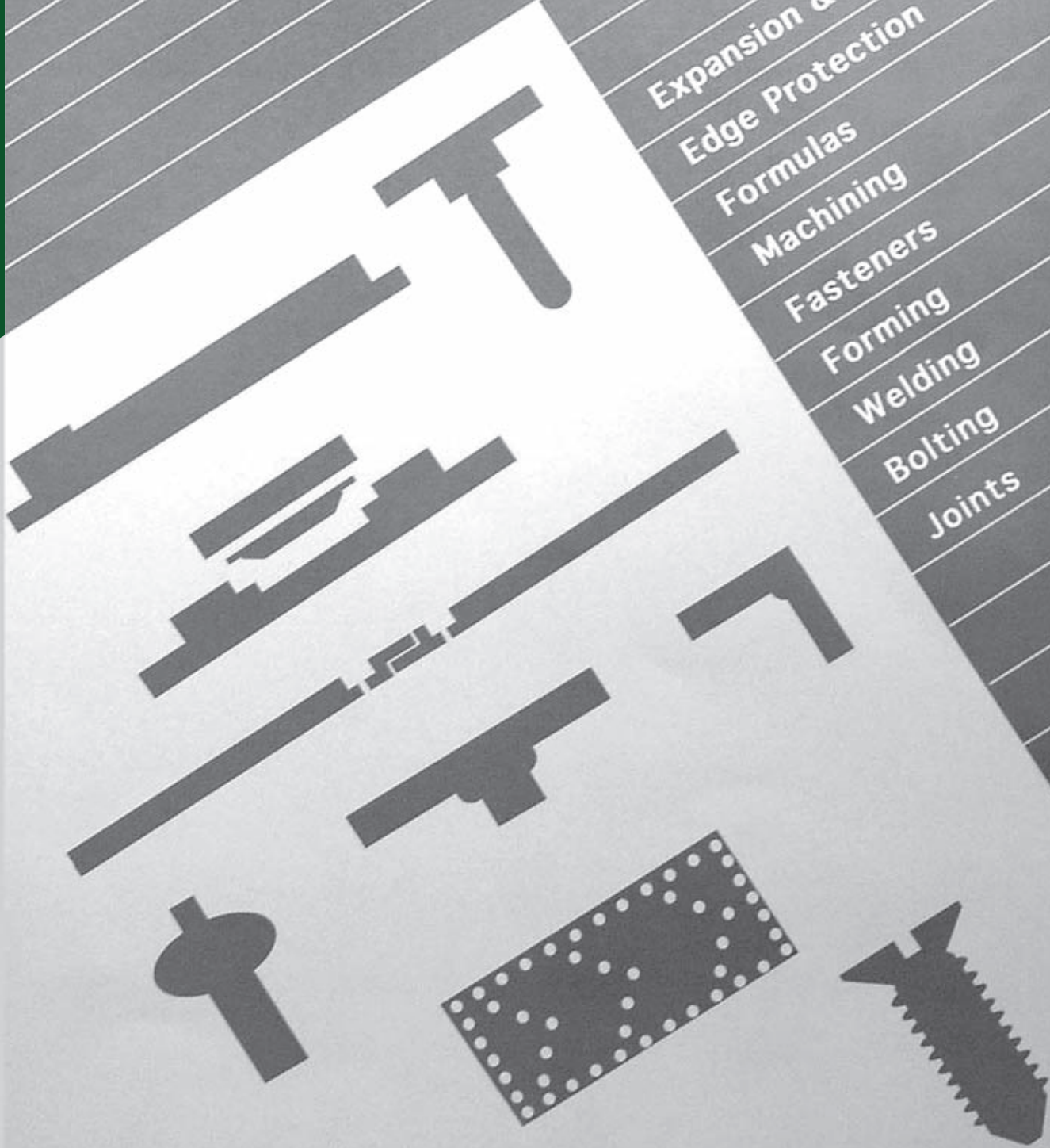


# ULTRAPOLY

**SUPPLY SERVICES LTD**

Phone 0800 102 112 - [www.supplyservices.co.nz](http://www.supplyservices.co.nz)

## UHMWPE INSTALLATION GUIDE



- Expansion & Contraction
- Edge Protection
- Formulas
- Machining
- Fasteners
- Forming
- Welding
- Bolting
- Joints

# EXPANSION/CONTRACTION

It is important to calculate the amount of expansion and contraction that occurs due to temperature change. Use the following formulas to predict expansion and contraction.

Natural UHMWPE =  $1.62 \times 10^{-4}$  m/m/°C

For example:

Length of piece = 3m

Temperature high = 38°C

Temperature low = 2°C

The possible change in room temperature = 36°C

$0.000162 \times 3\text{m} \times 36^\circ\text{C} = 0.017\text{m}$  over the 3m length

Our AR Grade has additives that will decrease the amount of expansion and contraction by almost half. Use the following formula for AR:

AR UHMWPE =  $0.99 \times 10^{-4}$  m/m/°C

For example:

Length of piece = 3m

Temperature high = 38°C

Temperature low = 2°C

The possible change in room temperature = 36°C

$0.000099 \times 3\text{m} \times 36^\circ\text{C} = 0.011\text{m}$  over the 3m length

# FASTENERS

## Standard Bolt

### Advantages:

- Easy to install
- Cost effective
- Readily available
- Easy to remove/replace
- Should be counterbored/countersunk to protect wood



## Shot Bolt

### Advantages:

- One side fastening
- Quick and easy to install



## Weld Washer with Plug

### Advantages:

- No drilling of substrate necessary
- One sided attachment
- Material must be at least 6mm thick
- Plug prevents material hang ups and provides a smooth surface which enhances flow and wear resistance



## Flat Head Bolt

### Advantages:

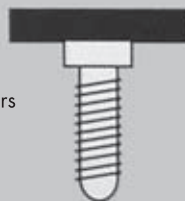
- Easy to install
- Removable
- Should be flush with the surface to prevent turbulence



## Capped Elevator Bolt

### Advantages:

- Easy to install
- Maximum holding power
- Eliminates material hang up on fasteners
- Smooth surface eliminates turbulence
- Available with UHMWPE caps



## Drive Rivet

### Advantages:

- Easy to install
- One sided attachment
- Ideal for blind fastening
- Not for high impact applications
- Not for high volume, wet or slurry applications



## Elevator Bolt

### Advantages:

- Simple to install
- Maximum holding power
- Removable and replaceable



## Stud Weld

### Advantages:

- No drilling substrate
- One sided attachment



# JOINTS

On all joints make sure that the UHMWPE is fastened securely to the substrate. Please review expansion/contraction and bolting patterns data; they are essential to making a joint perform up to expectations.



## Butt Joint

- Requires the least amount of fabrication
- If the joint is not tight, material can work into the seam and gradually pull up the UHMWPE



## 45 Degree Butt Joint

- Easy to fabricate and install
- Very effective when material is constantly flowing in one direction



## Lap Joint

- Best joint for bulk material handling. Prevents material from getting under the sheet. It is helpful to put silicone or caulking in the joint
- Helps prevent material hang up and therefore turbulence
- Most difficult joint to fabricate



## Shingled Joint

- Excellent for hoppers and applications where material is flowing in one direction
- Easy to install
- Works well in applications in which material is expected to expand and contract quite a bit

# FORMING

To minimise residual stresses which can lead to warping and premature failure, it is preferable to heat the part to just above the crystalline melting range of 135°C- 138°C. Lower forming temperatures can be used for non-critical applications. To insure uniform heat, total immersion in an oil bath containing silicone oil or glycerine is recommended. Other methods successfully used include air circulating ovens and infrared heating lamps.

Heat the part to a minimum of 138°C. At 138°C, the shape will become rubbery and translucent. Remove the part from the heat source and form it to the desired contour. The part should be held in place with clamps until completely cool. The moulding form material typically used is wood since it is less thermally conductive than UHMWPE. Using more conductive forms will result in internal part stresses because of rapid heat draw off.

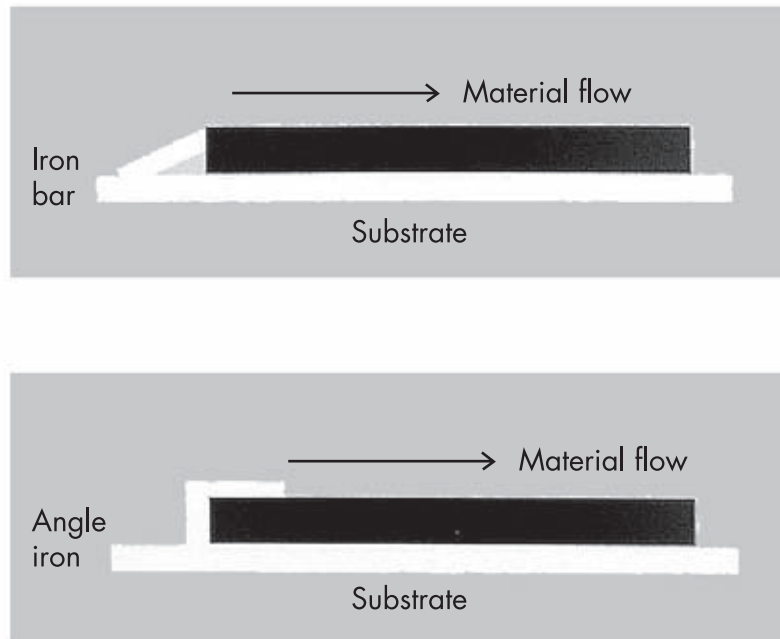
## Examples of commonly formed shapes



\*Due to expansion/contraction, the piece of UHMWPE to be formed must be at least 6% larger than your desired finished part.

# LEADING EDGE PROTECTION

If the leading edge is exposed it is often necessary to protect against material working its way underneath.



# MACHINING

## Sawing

UHMWPE shapes can be cut with standard power tools, such as band saws or circular saws, having sharp, wide spaced teeth.

	Turning	Band Saw	Circular Saw
Clearance angle (deg)	5-30	15	15
Cut angle (deg)	0-25	5-8	0-5
Feed (mm/rev)	0.1-0.3	Hand	Hand
Cutting speed (m/min)	180-300	900-1800	900-2700

## Milling

Standard milling machines can be employed in the fabrication of shapes. Special machines such as spindle moulders and routers, permit economical production of parts on a large scale basis. To achieve the best possible chip removal, milling tools sufficiently graduated to allow for good tool clearance are recommended.

# DRILLING


UHMWPE shapes can be drilled on a lathe, milling machine or a drill press. With tolerances for good chip removal, local overheating can be avoided in most cases. If cooling is necessary at high cutting speeds, it can be achieved with compressed air, water or diluted soluble oil. When coolants are not used, the drill should be removed frequently to clean out the chips and prevent over heating.

Specifications for Drilling					
Hole Dia (mm)	Angle of Point (deg)	Clearance (deg)	Helix (deg)	Feed (mm/rev)	Cutting Speed (m/min)
<20	60	15-20	0	0.2	75
20-40	120	12-15	0	0.2	75
>40	140	12-15	0	0.4	100


It is essential to use correct hole spacing when fastening UHMWPE to a substrate. Bolt holes should be no further than 25-50mm from the edges. Use the following chart as a guide.

Sheet Thickness	Recommended Spacing of Fasteners (on centres)
6mm	150-200mm
10mm	200-250mm
12mm, 16mm, 20mm	300-400mm
	400-500mm

We recommend the following bolt patterns:



Standard bolting pattern that prevents buckling due to expansion/contraction. It may be necessary to have additional holes, if so, use the chart below to position those holes.



It is possible to attach one end of the UHMWPE on applications when the material is moving in one direction. Attach the leading edge and allow the material to float. Excellent for chain guides. Expansion will occur in one direction only.

Slotted holes are another option, although they are not normally necessary.



# DRILLING

Below are some of the common hole patterns recommended by UltraPoly.

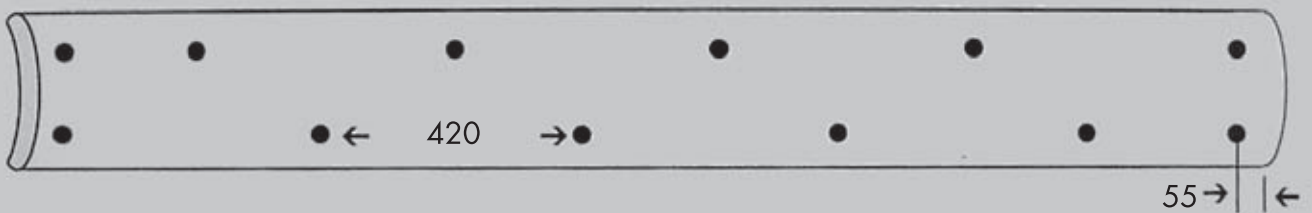
## Top View - Flat

3050mm long x 300mm wide x 40mm thick. Holes are 55mm from each edge.



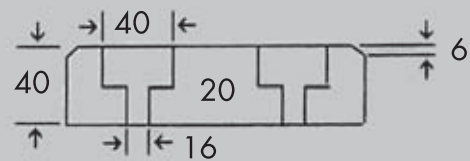
## Top View - Curved Pile Wrap

3050mm long x 300mm wide x 40mm thick. Holes are 55mm from each edge.



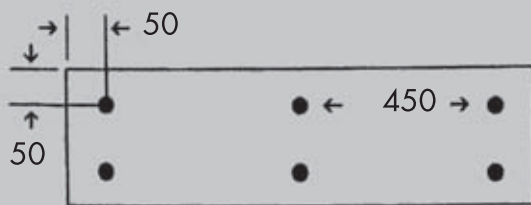
## End View

40mm thick, 6mm chamfer, 40mm dia holes



## Top View

1000mm long x 300mm wide x 40mm thick.



## Top View

600mm square x 40mm thick

