

Chemical Vessels and Process Equipment



Over the last two decades thermoplastic sheet has become the most versatile construction material for chemical vessels and other process equipment.

With their exceptional chemical resistance, impact resistance and ease of transport and installation, chemical vessels manufactured from fabricated thermoplastic sheets have now set the standards by which performance is judged.

At Dotmar, we have introduced the latest internationally accepted design codes together with advanced structural analysis techniques to produce chemical vessels that are designed and manufactured to meet your long-term performance requirements.

UNSURPASSED...Quality, reliability, availability.



DOTMAR... your partner in performance engineering plastics.

Our solutions provide the following benefits:

- Design by professional engineers utilising the standards DVS 2205 or EN12573 in conjunction with advanced Finite Element Analysis techniques specifically tailored for plastics.
- Fabrication by Australian welders trained and certified to German standards and state of the art PLC controlled sheet welding machines.
- Custom sizing and shapes to suit your exact application requirements.
- A continuous line of Quality assurance according to ISO 9001:2000 that includes the resin supplier, sheet manufacturer, sheet supplier and the fabricator.
- Ability to incorporate, where required, your choice of reinforcement E.g.300 plus Mild Steel, Stainless, Aluminium or FRP to Australian structural standards including AS3990, AS4100, AS1664 (Aluminium) and BS4994 (FRP).

Dotmar offer the widest range of pressed and extruded thermoplastic sheets in various sizes and thicknesses.

QUALITY ASSURANCE



The manufacture of Rochling and Dotmar's range of thermoplastics and PVC sheet is externally monitored by the German company SKZ (Sueddeutsches Kunststoff-Zentrum). This independent company, approved for monitoring under German Law, ensures the sheet material for our chemical vessels and associated structures is of the highest consistent quality.

CONSTRUCTION MATERIALS

POLYSTONE® PG100 (PIPE) HDPE HDPE - High Density Polyethylene

Polystone® PG100 exhibits outstanding properties that deliver tangible benefits to the fabrication industry. Polystone® PG100 (Pipe Grade) is approved for chemical engineering and tank building and meet the strict requirements set for pipe-grade PE. Offering peace of mind in terms of performance and safety, Polystone® PG100 is the logical choice.

WHY POLYSTONE® PG 100 (Pipe Grade)

- 100% weld integrity with PE100 pipe
- Superior, long term material strength
- Exceptional weld strength
- Degauged material from PE80 and standard HDPE
- Construction of higher tanks
- Superior acid resistance
- Improved environmental stress cracking resistance – up to 100 times better than standard HDPE
- Shorter welding times and easier bending of thinner sheets
- Weatherproof with exceptional UV stability

THE MATERIAL OF CHOICE FOR CHEMICAL TANK BUILDING



IMPROVED HOOP STRENGTH

• PE 80

- Service life:
50 years
- Temperature:
20 °C



8 MPa

• POLYSTONE® PG100

- Service life:
50 years
- Temperature:
20 °C



10 MPa

IMPROVED CREEP MODULUS VALUE

• PE 80

- Service life:
1 year
- Temperature:
50 °C
- Applied stress value:
0,5 MPa



180 MPa

• POLYSTONE® PG100

- Service life:
1 year
- Temperature:
50 °C
- Applied stress value:
0,5 MPa



205 MPa

REDUCED WALL THICKNESSES:

Exemplary wall thickness calculation (Min. thickness of cylinder wall)

- Internal Diameter: 4000mm
- Internal Hydrostatic pressure: 0,06 MPa
- Service Life: 25 years
- Service Temperature: 30 °C

• PE 80

42mm

• POLYSTONE® PG100

33mm

**COMPLIANT WITH THE DVS STANDARD AND
RITA (RÖCHLING'S INTEGRATED TANK BUILDING ASSISTANT)**

CONSTRUCTION MATERIALS

POLYSTONE® P300 HDPE High Density Polyethylene

Polystone® 300 is manufactured to produce longer molecules than those found in the low density PE utilised in roto-moulding. The longer molecule results in a higher molecular weight and hardness, and more knots and eyes between the molecules which increases the strength and toughness of the material.

Properties:

- High molecular weight
- High strength
- High elongation at break
- Application temperature range from -50°C to $+90^{\circ}\text{C}$
- Good electrical insulation properties
- Very good chemical resistance
- Very low water absorption

POLYSTONE® PP Polypropylene

Polystone® PP-H is an Isotactic polypropylene which is the only form of the material which provides the higher crystallinity necessary for tank building and other structural applications.

Properties:

- Broad chemical resistance
- Greater rigidity and strength, than HDPE
- Higher melting temperature (between 160°C and 165°C)
- Greater dimensional stability in heat
- Good electrical insulation properties
- Lower oxidation resistance

TROVIDUR® PVC Polyvinylchloride

As opposed to HDPE and PP-H, PVC is a predominantly amorphous plastic that displays chemical resistance in the few areas where the aforementioned polymers experience problems, e.g. Sodium Hypochlorite.

Properties:

- High mechanical strength, rigidity and toughness
- Relatively high service temperature (-10°C to 70°C)
- Very high acid resistance
- Physiologically harmless
- Good abrasion strength
- Very good UV resistance
- Excellent sterilizing
- Slightly inflammable

POLYSTONE® PVDF Polyvinylidene fluoride

Polystone® PVDF (polyvinylidene fluoride) is a semi crystalline thermoplastic that belongs to the group of polymers containing fluorine. The strong bonding between the very electro-negative fluorine and the carbon is the reason for the extremely high chemical resistance of PVDF.

Properties:

- High mechanical strength, rigidity and toughness
- Relatively high service temperature range (-10°C to 150°C)
- Very high acid resistance
- Physiologically harmless
- Good abrasion strength
- Very good UV resistance
- Excellent sterilizing
- Slightly inflammable

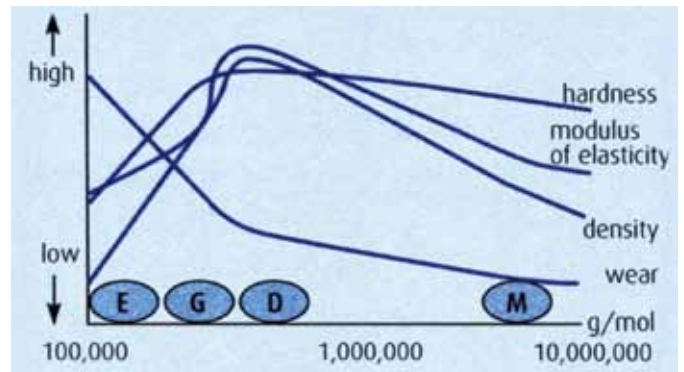


DENSITY - HIGH VS LOW

WHY IT MATTERS

Physical properties of most plastics are greatly dependant on the length of the molecular chains and density, especially in relation to PE.

HDPE (or PE-HD) is polymerised under low pressure allowing longer molecules to form with an increase in crystallinity. The situation is exactly the reverse in the case of LDPE (or PE-LD) as utilised in roto-moulding. Consequently, LDPE, utilised in roto-moulding, has a lower crystallinity leading to a lower elastic modulus, hardness and ultimate strength than HDPE.



Important material properties as a function of the molar mass.

ESCR

ENVIRONMENTAL STRESS CRACKING RESISTANCE

ESCR	Standard PE-HD	PE 80	PE100
Min. required values (DVS) [hrs]	-	100	300
Typical values [hrs]	10...50	100...400	>1000



Stress cracking reduces tank & vessel integrity resulting in structural failure.

DESIGN

ASSURANCE OF QUALITY AND SAFETY

Over the last five years Dotmar has extended its design capabilities from standard mathematical analysis methodology that meets both the DVS 2205 and EN 12573 guidelines to proprietary Finite Element analysis techniques specifically tailored for thermoplastics. In this way, we are able to produce designs for a variety of structures that meet the requirements of these codes whilst remaining efficient, commercially viable and quality assured.

BUTT-WELDING

CHANGING THE FACE OF THERMOPLASTIC FABRICATION

The utilisation of modern, PLC controlled Butt-welding machines not only reduces the labour component of manufacturing chemical vessels, it also provides for higher KNOWN weld strengths according to DVS and DIN tables. This allows optimum sheet thicknesses to be utilised.

In addition to straight cylinders, cones and other shapes can be welded with ease.



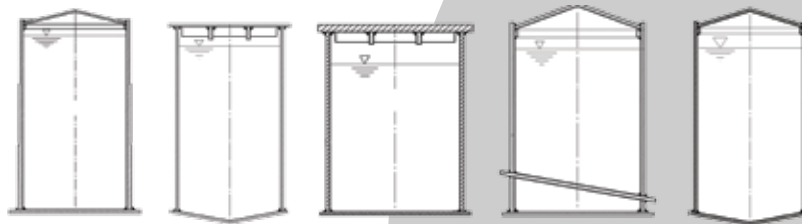
TYPES OF CHEMICAL VESSELS

CYLINDRICAL

Cylindrical vessels are, by nature, the most efficient items to produce in terms of material usage and labour. Vessels can be from 500 litres in capacity to 150,000 litres, with your specified diameter and height combination.



Our standard cylindrical vessel designs



RECTANGULAR

Whilst cylindrical tanks are more efficient, we recognise our customers often have to fit their vessels into confined spaces. In these instances, we can design a rectangular (or other shaped vessels) to meet your exact size requirements.

Recently, Dotmar had manufactured the largest rectangular vessels ever built in Australia at 26m long, 3.2m deep and 2.2m wide.



TANK INSERTS

For existing concrete or steel tanks, PP-H inserts can be provided that allow protection of the existing tank structure whilst enabling leakage detection – now a requirement of many EPA authorities.



The Tank and Vessel Enquiry Form can be downloaded from the Dotmar website at www.dotmar.com.au/solutions/fabrication.