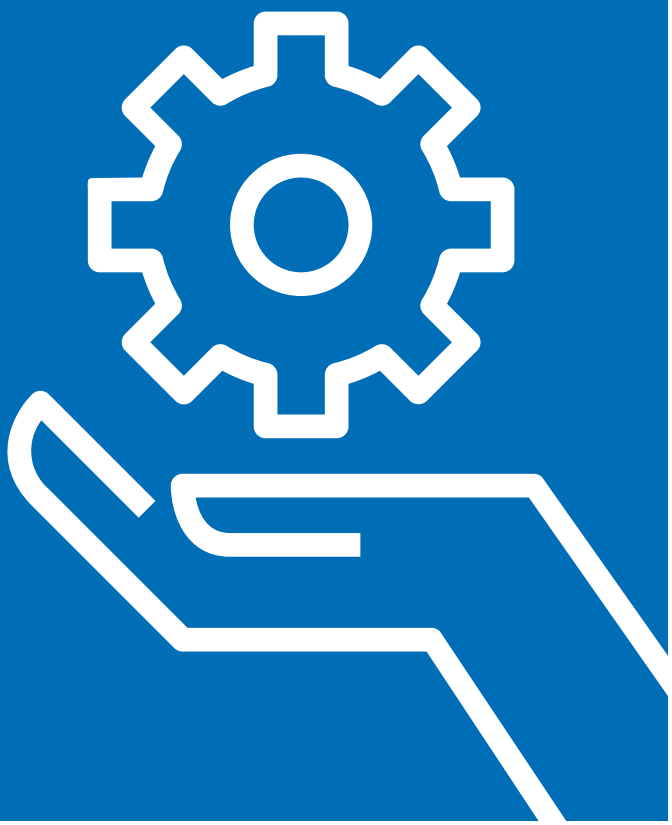
Röchling

Industrial

Processing instructions

Polystone® CubX®



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Polystone® CubX®

Areas of application

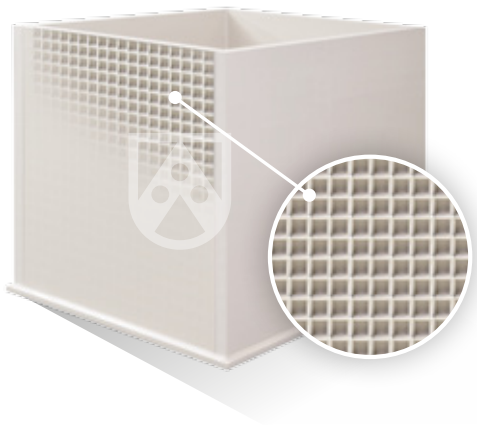
The main areas of application of Polystone® P CubX®, Polystone® PPs CubX® and Polystone® P CubX® white UV are surface treatment plants, electroplating plants, pre-treatment plants and the use as supplementary equipment for chemical plants (e.g. covers, floors, and partitions).

Alternative areas of application

There is a wide range of further uses of Polystone® P CubX®, Polystone® PPs CubX® and Polystone® P CubX® white UV in other industrial areas. For example, as equipment for flood protection, in the area of fishery breeding tanks, safety basins and chemical filling stations and not least in industrial housings/cladding (with thermal and acoustic insulation properties) as well as in many swimming pool construction applications (e.g. splash water tanks).

Delivery format

- Full name: Polystone® P CubX®, Polystone® PPs CubX® and Polystone® P CubX® white UV
- Format: 2,000 x 1,500 x 57 mm
- Delivery format: 2,020 x 1,520 x 57 mm
- Design: cross-ribbed twin-wall sheet
- Covering sheets: 6 mm
- Inner lattice structure: compartment size: 50 x 50 mm



Product characteristics

(extract from the technical data sheet)

	Test method	Unit	Value	Value	Value
			Polystone® P CubX®	Polystone® PPs CubX®	Polystone® P CubX® white UV
Properties of the full cross-ribbed twin-wall sheet					
Density	DIN EN ISO 1183	g/cm³	0.3	0.3	0.3
Weight per unit area		kg/m²	17.1	17.67	17.1
Weld strength lattice/covering sheet		MPa	≥ 20	≥ 20	≥ 20
Flatness	DIN EN ISO 15860	mm/m	≤ 3	≤ 3	≤ 3
Properties of the covering sheets					
Density, RT	DIN EN ISO 1183	g/cm³	0.92	0.94	0.92
Notched impact strength, RT	DIN EN ISO 179 EA1	kJ/m²	7.90	4.00	> 30.00
Yield stress, RT	DIN EN ISO 527	N/mm²	34.56	32.00	24.00
Tensile modulus of elasticity, RT	DIN EN ISO 527	MPa	1,700	1,300	1,200

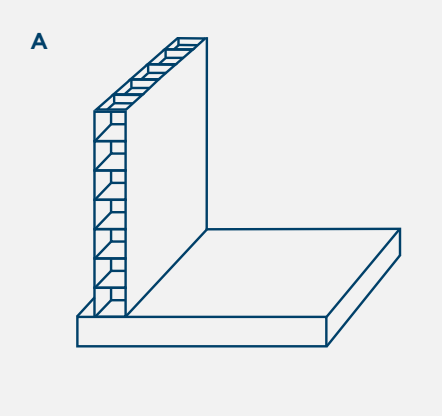
The data stated above are average values verified on the basis of regular static tests. They are in accordance with DIN EN 15860.
These data are provided for information purposes only and shall not be regarded as binding unless expressly agreed in a contract of sales.

Connection options

Recommended constructive connection types

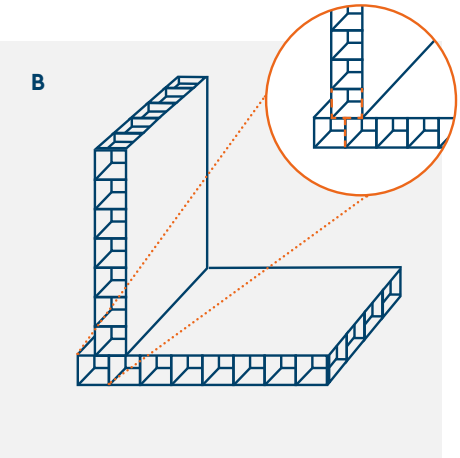
1. Wall/bottom connection

(also applies for cover and partition wall connections as well as edge reinforcements)



Variant A

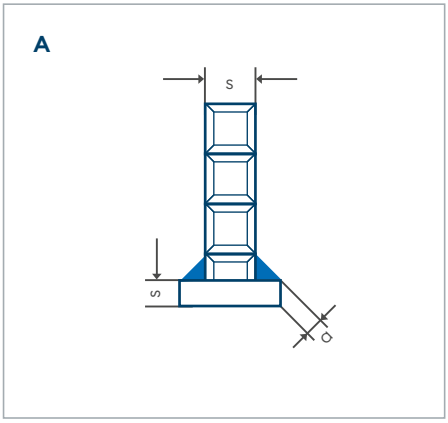
Wall construction Polystone® CubX® with bottom of solid sheet



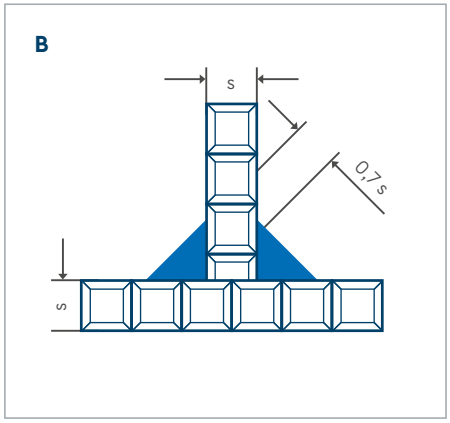
Variant B

Wall and floor made of Polystone® CubX®

1.1 Weld design (wall/bottom)



Double fillet weld



Double fillet weld

Röchling recommends a double fillet weld (see diagram) as connecting seam for the welded connection of Polystone® CubX® sheets with each other as well as for the connection to a solid sheet.

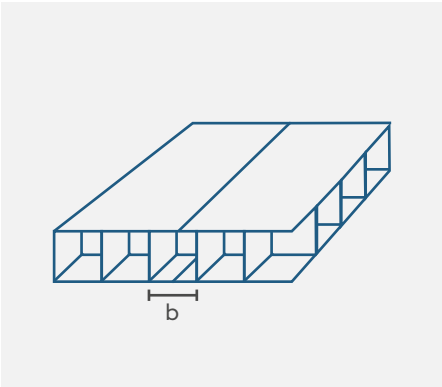
With the a-measure to be calculated with **0.7 x s**, we recommend using an equivalent thickness of **20 mm** when using Polystone® CubX® as a bottom sheet.

Preparations of welds and joining surfaces as well as the actual welding process are to be carried out in accordance with the DVS guideline.

As welding filler, Röchling recommends the use of **Polystone® P copolymer** welding rods.

1.2 Weld design

A) Butt welding



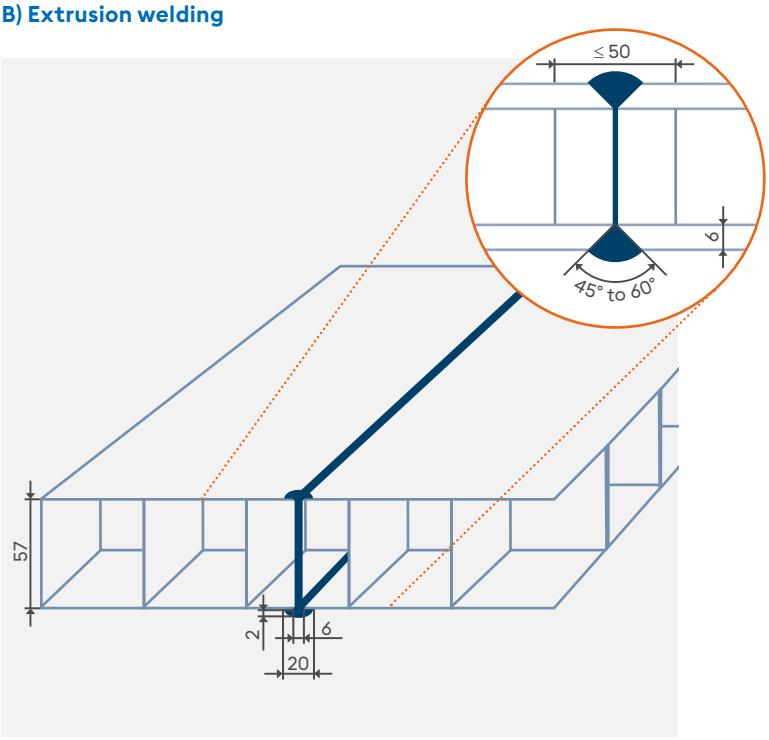
Butt welding

Example of welding

The maximum field sizes (b) of the inner lattice structure resulting in the butt weld area should not exceed 50 mm.

For standard values see “Processing parameters” (p. 10).

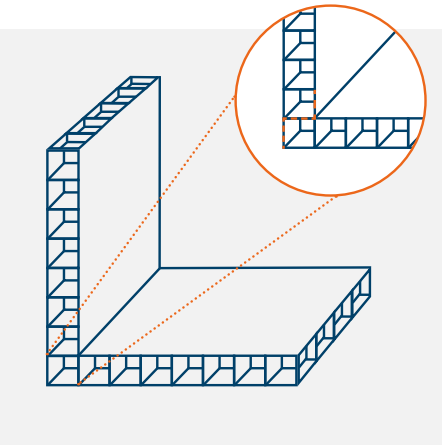
B) Extrusion welding



For standard values see “Processing parameters” (p. 10).

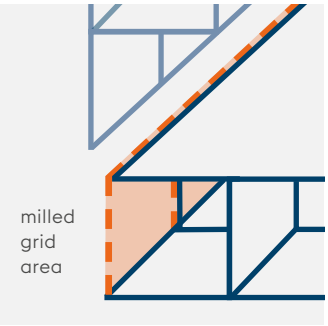
2. Corner joints (vertical tank edges)

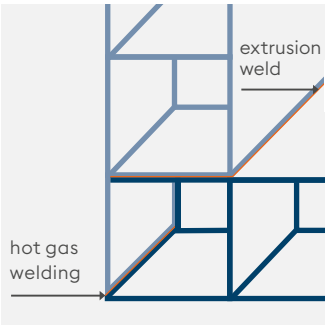
Standard corner

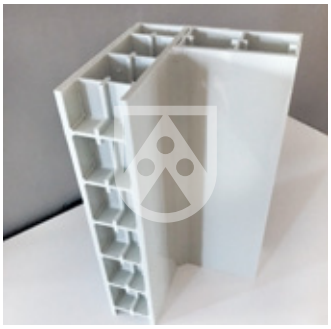


Recommended alternative with a milled or cut-out recess for the production of corner joints with closed edges.
The inner weld is a fillet weld, the outer weld is a V-weld.

2.1 Weld design



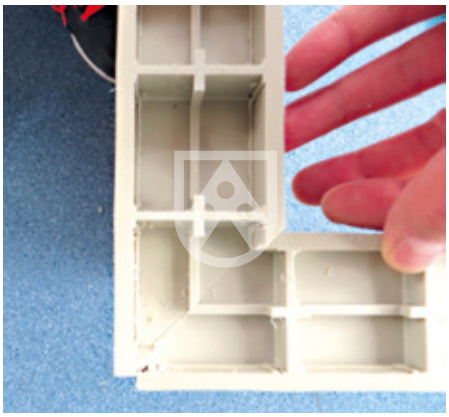


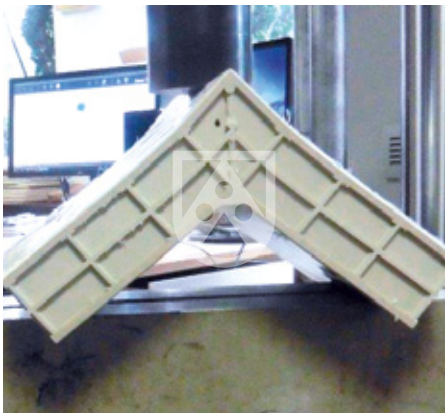


Alternative corner joints

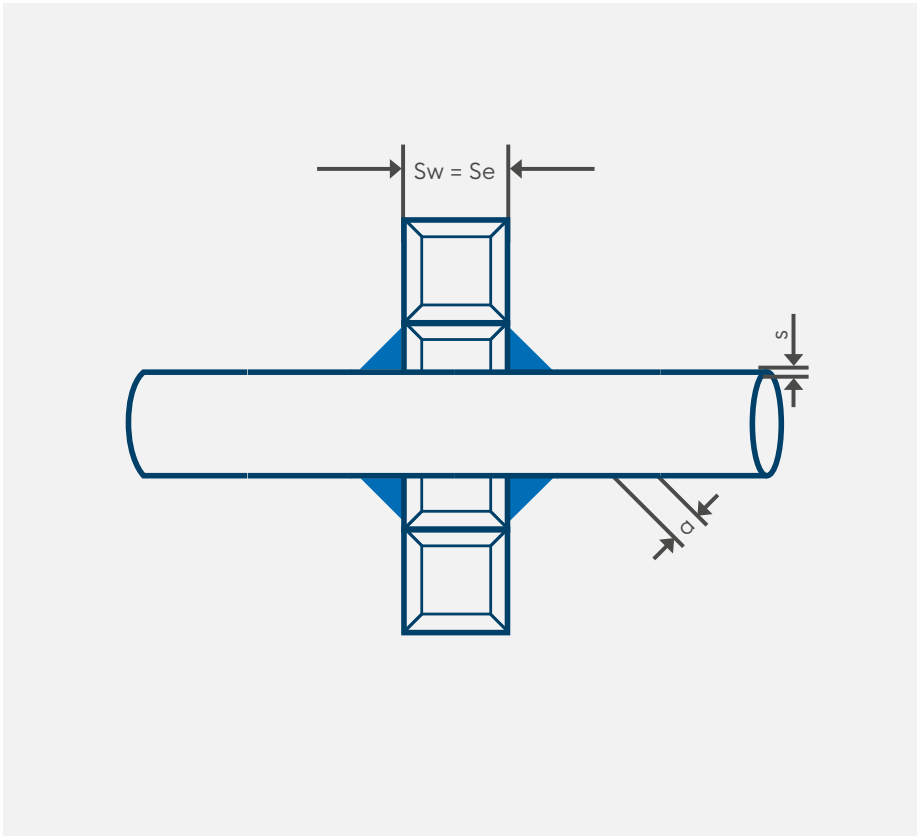
25 degree weld

Attention!
Only with complete welding over the entire 45 degree area.





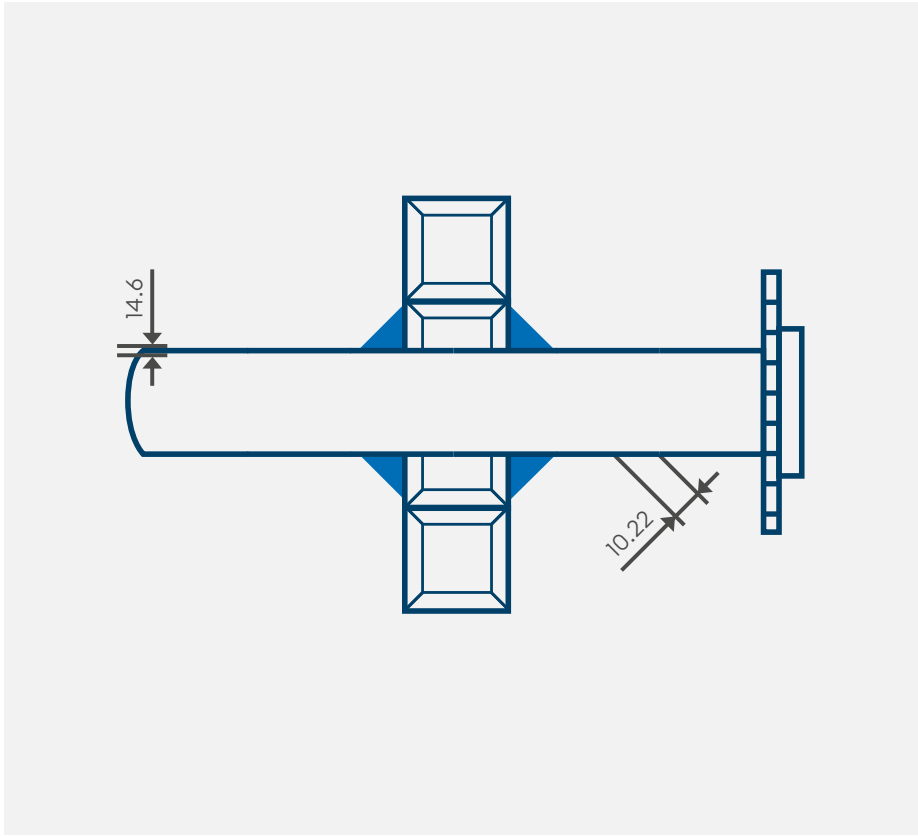
3. Connection of nozzles



For the determination of the a-measure, we recommend the assumption of an equivalent wall thickness of 20 mm for the Polystone® CubX® sheet.

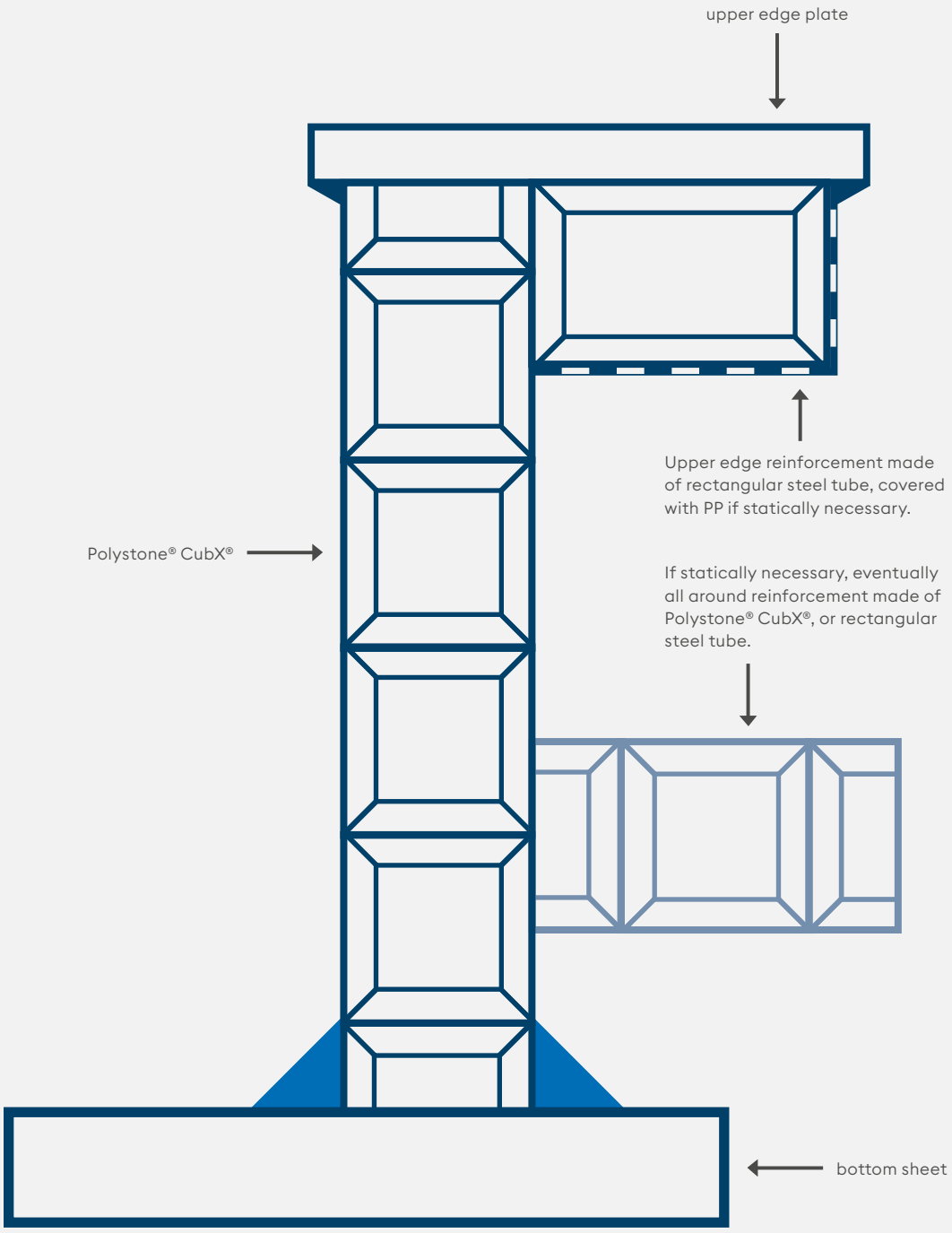
i.e.: Sw = Se

S > Se; a = 0,7 x Se
S < Se; a = 0,7 x S



Example:
Pipe socket (approx. 160 mm) in a Polystone® CubX® tank wall (size in mm)

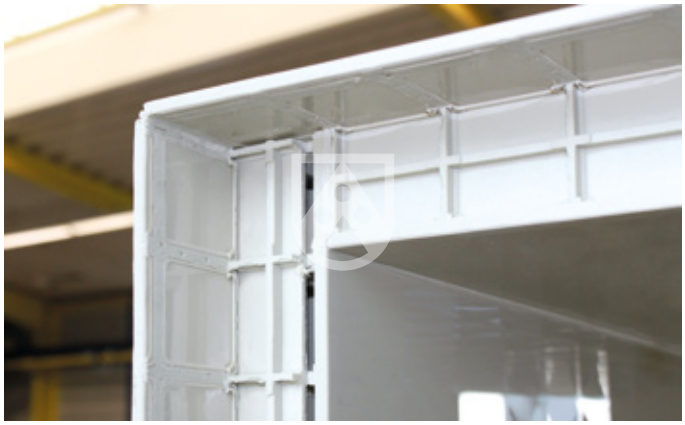
4. Basically tank construction



4.1 Exemplary machined construction designs

Milling cutouts

Milling cutout for nozzels



Cutout for inserted Polystone® P CubX® base sheet

Preparation of a milled flap opening for a fish transport tank

Processing parameters

Heating element butt welding

Standard values recommended by Röchling in accordance with DVS 2207-11 for connecting Polystone® CubX® sheets by means of heating element butt welding

Processing instructions

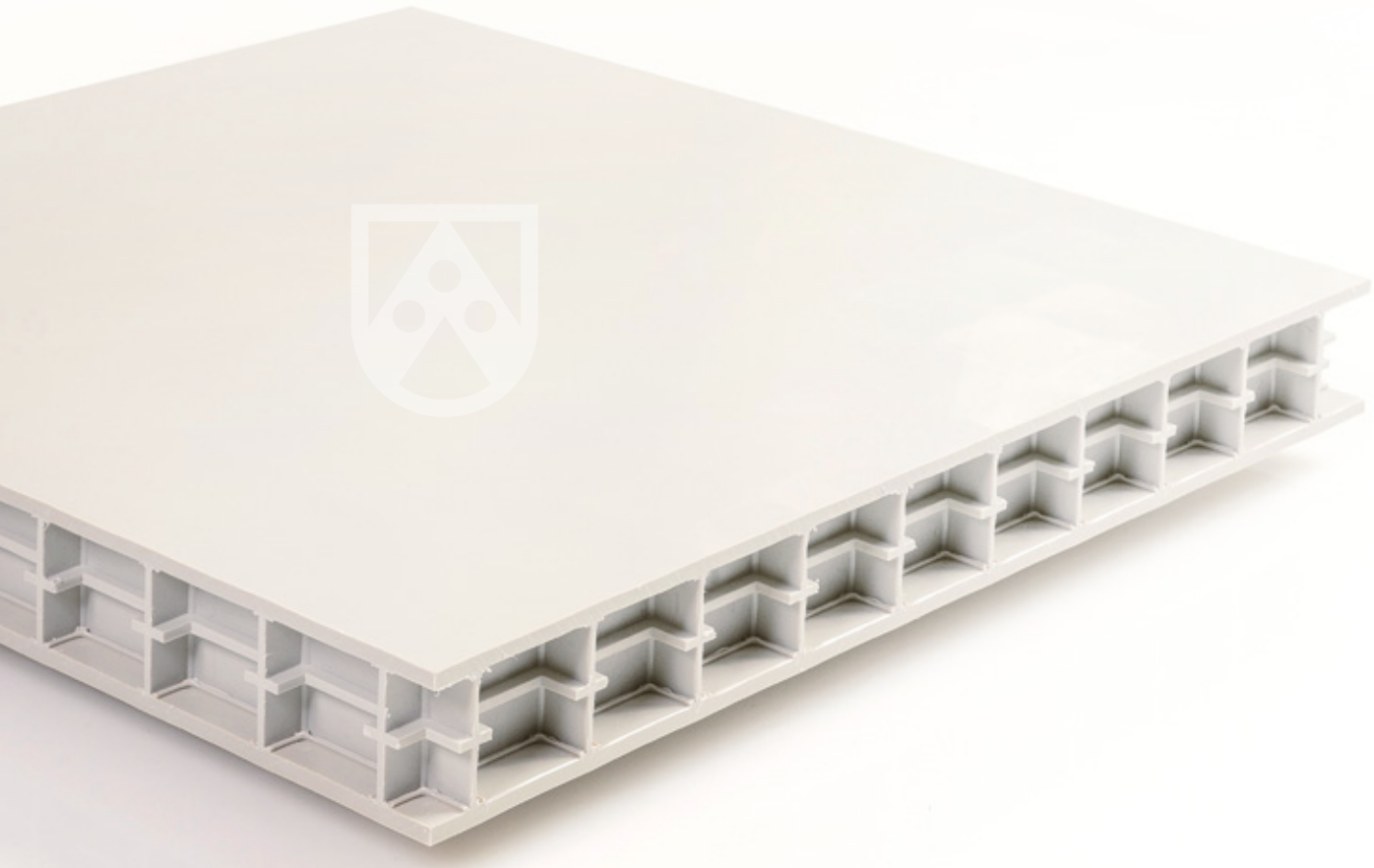
1. Establish permissible working conditions, e.g. a welding tent.
2. Connect the welding equipment to the mains or the AC generator and check proper function.
3. Align and clamp the parts to be welded, e.g. using roller blocks.
4. Seal the pipe ends against draughts.
5. Clean the joint surface in the weld area and beyond using a cleaning agent according to sections 3.2.1 and 3.2.3 with unused, absorbent, lint-free and non-staining paper. Machine the pipe surfaces to be joined, e.g. with a planer.
6. Remove the planer from the pipe welding machine.
7. Remove any swarf in the weld area without touching the joint surfaces.
8. Check the parallelism of the planes by placing the joint surfaces against each other (maximum gap as per Table 1).
9. Check misalignment (maximum 0.1 x wall thickness).
10. Check heating element temperature (210 ± 10°C).
11. Clean the heating element using a cleaning agent according to sections 3.2.1 and 3.2.2 with unused, absorbent, lint-free and non-staining paper. Ventilate after cleaning.
12. Determine the movement pressure/movement force before every weld and document it in the welding protocol.
13. Determine the settings for the equalising pressure, preheating pressure and joining pressure.
14. Define reference values as per Tables 2 or 3.
15. Bring the heating element into the welding position.
16. Equalise the surfaces to the heating element until a bead (in accordance with Table 2 or 3, Column 2) appears.
17. Preheating at reduced pressure ≤ 0.01 N/mm², preheating time as per Table 2 or 3, Column 3.
18. After the end of the preheating phase, detach the joining surfaces to be welded from the heating element and remove the heating element from the welding position.
19. Quickly move the surfaces to be welded together until they are almost touching within the changeover time (Table 2 or 3, Column 4). When they touch, they should be moving at a speed very close to zero. Then immediately start building up the joining pressure in a linear manner during the build-up time (Table 2 or 3, Column 5).
20. After joining at a pressure of 0.10 N/mm², a bead must be present. As per figure 4, K must be > 0 at every location.
21. Cool down under joining pressure as per Table 2 or 3, Column 5.
22. Release the welded parts after the cooling time has elapsed. For workshop tasks see “Joining” in section 4.1.3.
23. Complete the welding protocol.

Reference values for the heated plate welding of panels made of polypropylene

Reference values for the heated plate welding of panels made of polypropylene at ambient temperatures up to 40°C and moderate air movement (intermediate values can be interpolated).

Nominal wall thickness s	Equalising	Preheating	Changover	Joining	
	Bead height on heating element at the end of the equalising time (minimum values) (equalising p = 0.10 ± 0.01 N/mm²)	Preheating time (preheating p ≤ 0.01 N/mm²)	Changeover time (maximum time)	Joining pressure build-up time (maximum time, may be up to 50% shorter)	Cooling time (minimum values) under joining pressure p = 0.10 ± 0.01 N/mm²
[mm]	[mm]	[s]	[s]	[s]	[Min]*)
up to 4.5	0.5	up to 53	5	6	6.5
4.5...7	0.5	53...81	5...6	6...7	6.5...9.5
7...12	1.0	81...135	6...7	7...11	9.5...15.5
12...19	1.0	135...206	7...9	11...17	15.5...24
19...26	1.5	206...271	9...11	17...22	24...32
26...37	2.0	271...362	11..14	22...32	32...45
37...50	2.5	362...450	14...17	32...43	45...61
50...70	3.0	450...546	17...22	43	61...85

*) A reduction of the cooling time by up to 50%, i.e. a reduction in joining pressure and the removal of the welded part from the welding machine, is permitted under the following conditions: the joint connection was created under workshop conditions and the removal of the part from the welding machine and its temporary storage (until it has completely cooled down in accordance with column 5) causes only a slight load on the joint connection.



Hot gas extrusion welding

Standard values recommended by Röchling in accordance with DVS 2207-4 for connecting Polystone® CubX® sheets by means of extrusion welding

The following information on directive DVS 2207-4 includes parameter standard values for hot gas extrusion welding. They apply for manual welding using the machinery and equipment specified in directive 2207-4, supplement 1 and the materials listed in Table 1. When welding with automatic welding machines, other parameters may also be used (see section 10.3).

The welding speed depends directly on the melt output, the weld cross-section and the preheating temperature. Based on experience, it should be 200 to 350 mm/min. It must be ensured that the adherends are plasticised 0.5 mm to 1 mm deep at the joint and beyond the seam width (see Section 10.3).

Welding parameters

Material	Abbreviation	Material temperature[1] [°C]	Hot gas temperature[2] [°C]	Hot gas volume[3] [l/min]
High-density polyethylene	PE[4]	210...230	250...300	150...400
Polypropylene Types 1, 2 and 3	**PP-H, PP-B, PP-R**	**210...240**	**250...300**	**150...400**
Unplasticised polyvinyl chloride	PVC-U	190...200	330...360	150...400
Impact-resistant polyvinyl chloride	PVC-HI	170 – 180	280...340	150...400
Chlorinated polyvinyl chloride	PVC-C	195 – 205	300...360	150...400
Polyvinylidene fluoride	PVDF	240...260	280...350	150...400

[1] measured with an insert thermometer at the extrudate outlet of the welding machine
[2] measured 5 mm in the nozzle in the centre of the nozzle opening
[3] drawn-in cold air volume at ambient pressure
[4] PE 63, PE 80 and PE 100

Hot gas welding and hot gas welding with torch separate from filler rod

Standard values recommended by Röchling in accordance with DVS 2207-3 for connecting Polystone® CubX® sheets by means of hot gas welding with a torch separate from the filler rod

The following information on directive DVS 2207-3 includes welding parameter standard values for hot gas welding and hot gas welding with a torch separate from the filler rod. They apply for manual welding using the equipment specified in directive 2207-3, supplement 2 and the materials listed in Table 1. Before applying the parameters, the information provided by the semi-finished product manufacturers must also be taken into account. By matching the parameters of hot gas temperature, gas quantity and welding speed, it must be ensured that the adherends are plasticised at least 0.3 mm deep at the joint.

Welding parameters

Welding process	Material	Abbreviation	Hot gas temperature[1] [°C]	Hot gas volume flow[2] [Nl/min]	Welding speed[3] [mm/min]	Welding force [N] with stick diameter Ø	
						3 mm	4 mm
Hot gas fan welding (WF)	High-density polyethylene	PE[4]	300...320	40 – 60	70...100	8...10	20...25
	Polypropylene Types 1, 2 and 3	**PP-H, PP-B, PP-R**	**305...315**	**40 – 60**	**60...100**	**8...10**	**20...25**
	Unplasticised polyvinyl chloride	PVC-U	330...350	40 – 60	110...170	8...10	20...25
	Chlorinated polyvinyl chloride	PVC-C	340...360	40 – 60	60...100	15...20	20...25
	Polyvinylidene fluoride	PVDF	350...370	40 – 60	40...60	15...20	25...30
Hot gas string-bead welding (WZ)	High-density polyethylene	PE[4]	300...340	45 – 60	250...350	15...20	25...35
	Polypropylene Types 1, 2 and 3	**PP-H, PP-B, PP-R**	**300...340**	**45 – 60**	**250...350**	**15...20**	**25...35**
	Unplasticised polyvinyl chloride	PVC-U	350...370	45 – 60	250...350	15...20	25...35
	Chlorinated polyvinyl chloride	PVC-C	370...390	45 – 60	180...220	20...25	30...35
	Polyvinylidene fluoride	PVDF	365...385	45 – 60	200...250	20...25	30...35

[1] measured 5 mm in the nozzle in the centre of the main nozzle opening
[2] drawn-in cold air volume at the ambient pressure
[3] drawn-in cold air volume at ambient pressure as a function of the discharge quantity
[4] depending on the welding filler material diameter, the welding temperature and the welding groove geometry
[5] PE 63, PE 80, PE 100

As a filler, Röchling recommends the use of Polystone® P copolymer welding rod.

Polystone® CubX®

True strength comes from within.
Developed for chemical tank and plant construction.

Material

- **Polystone® P CubX®:** Polystone® P (PP), tried-and-tested for decades worldwide in the construction of rectangular and round tanks
- **Polystone® PPs CubX®:** Polystone® PPs, flame retardant (B1) for sensitive areas of application
- **Polystone® P CubX® white UV:** UV-resistant for outdoor use

Product range

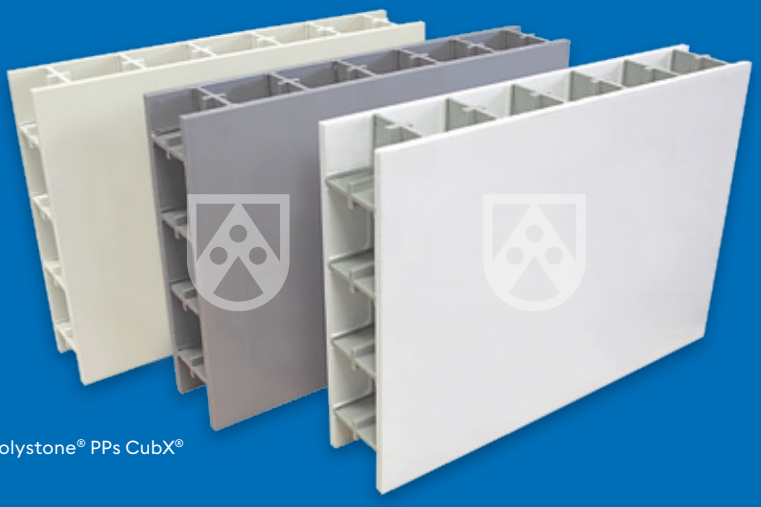
- Dimensions: 2,000 x 1,500 mm
- Thickness: 57 mm
- **Polystone® P CubX®:** Colour grey (RAL 7032) standard from stock, other colours are available on request
- **Polystone® PPs CubX®:** Colour grey (RAL 7037)
- **Polystone® P CubX® white UV:** Colour white (RAL 9010)

Characteristics

- High longitudinal and transversal stiffness
- High chemical resistance
- Light weight, easy handling
- Good thermal insulation
- Easy to weld by means of heating element butt welding, hot gas welding, extrusion welding

Areas of application

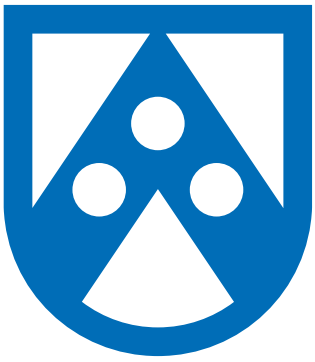
- Rectangular tanks, e.g. for galvanising plants, steel pickling plants, sewage technology, cleaning systems, purification systems, and tank fittings
- Lids and partitions for round tanks
- Enclosures for ventilation systems
- Retrofitting and repair of rectangular tanks
- Additional significant potential in other applications outside the chemical industry, including flood retention, fishery breeding tanks, swimming pool technology, etc.



Polystone® P CubX®

Polystone® PPs CubX®

Polystone® P CubX® white UV



Röchling

Industrial

Röchling Engineering Plastics SE & Co. KG
Röchlingstr. 1
49733 Haren | Germany
T +49 5934 701-0
F +49 5934 701-299
cubx@roechling-plastics.com

Röchling Industrial. Empowering Industry.
www.roechling-industrial.com

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