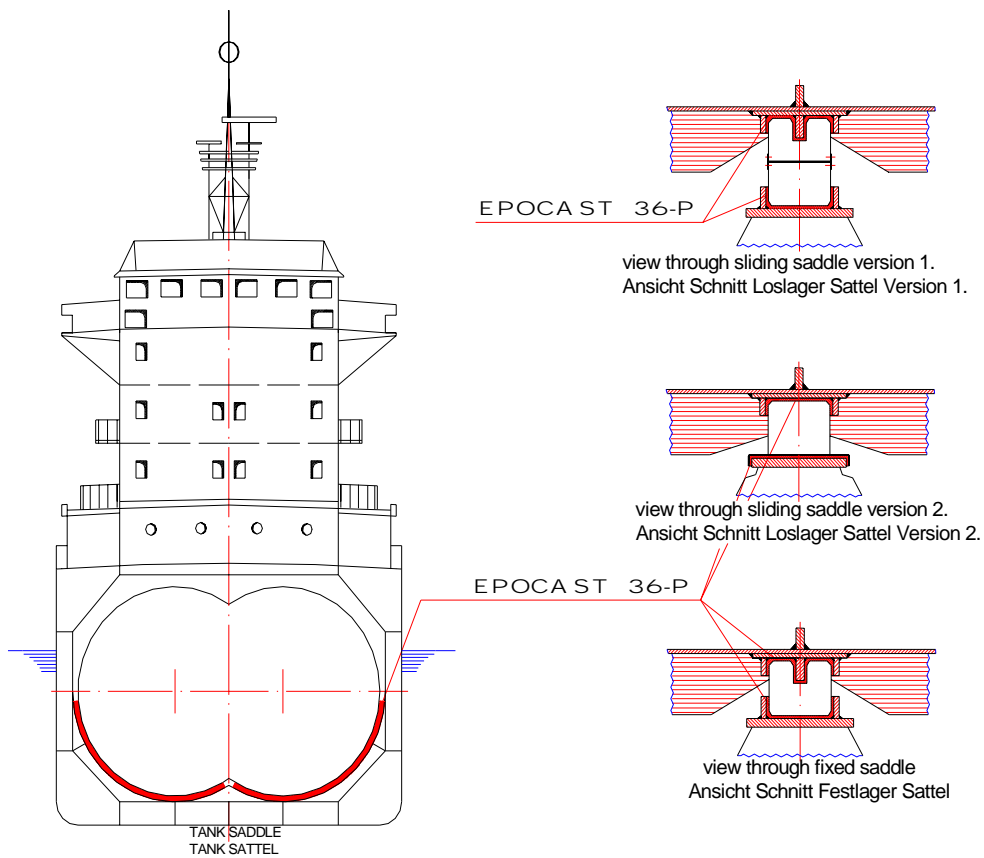


EPOCAST 36-P

TANK INSTALLATION HANDBOOK



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THE EPOCAST 36-P TANK MOUNTING SYSTEM

1.0 INTRODUCTION

EPOCAST 36-P is a trowelable thixotropic 2-component epoxy paste especially developed for installation of LNG/LPG tanks and other containment systems.

EPOCAST 36-P is a further development of our world-wide proven chocking/grouting system **EPOCAST 36** and is everywhere in application where it is not practical to use a free flowing resin.

EPOCAST 36-P can be extremely loaded. It has good adhesive properties, even at very low temperatures.

EPOCAST 36-P has been approved by all major Classification Societies for temperatures from +80 °C to -110 °C.

2.0 TYPE OF APPLICATION

Mounting of LNG/LPG tanks, chemical tanks and other containment systems:

Positioning of laminated wood blocks to tank surfaces and tank saddles, eliminating all precision fitting.

3.0 SPECIAL CHARACTERISTICS AND FEATURES

EPOCAST 36-P will cure at temperatures above 13 °C. With temperatures below 13 °C the hardening process will take substantially longer. External heat can be used to shorten the hardening time.

In the course of the exothermic the chemical reaction will not cause any shrinkage to the end product. It will form a solid chock and is resistant to oil, gas, fresh and sea water, alkaline , acids etc.

4.0 INSTRUCTION PROCEDURE**4.1 MATERIAL REQUIRED****4.1.1. H.A. SPRINGER GMBH SUPPLY**

EPOCAST 36 resin and hardener of sufficient quantity (calculated volume with a surplus of 15%) **EPOCAST 36-P** is manufactured in 8,0 ltr. units incl. hardener.

4.1.2. CONSUMABLE MATERIAL, YARD SUPPLY

- a) Press wood blocks
- b) Stainless steel sliding plate
- c) Plastics gauge to measure the mastic thickness in the saddle

4.1.3. TOOLS; YARD SUPPLY

- a) Ratchet chain block (capacity 1.0 to)
- b) Chain, wire sling and shackle
- c) Trowel (putty knife)
- d) Shore woods
- e) Heating equipment
- f) Wood clamp
- g) Grinding machine
- h) Strip of thin plywood (8 - 10 mm thick)
- i) Contra rotating electric mixing tool
(available from H.A. SPRINGER - KIEL)

5.0 INSTALLATION PROCEDURE**5.1 SLIDING SUPPORT (TANKSIDE)**

5.1.1 Remove grease, oil, mill scale, rust etc. From the foundation area

5.1.2 Determine parameter (using formula on sketch 1). Mark the starting point of the first press block to the final end of the determined length on the surface of the tank.

- 5.1.3 Check the calculated parameter length „Y“ with a test piece of press wood. If necessary correct the press wood blocks to meet required length.
- 5.1.4 Install the jiggging device as per sketch 2
- a) Fix the wood clamp at the bottom of the tank with attachment of shackel and wire sling
 - b) Fix the next wire sling over the neck of the anti-floating block
 - c) Hook both ends of the ratchet chain block into each end of the wire slings
- 5.1.5 Apply **EPOCAST 36-P** (see sketch 3)
- a) On the top surface of the first press wood block with a minimum of 10 mm
 - b) On both sides of the inner girdle over a length of 2 mm and a thickness of 10 mm
- 5.1.6 Press the block firmly in between the girdles at the starting mark. Set shores directly below this block and ensure it is tightly secured (see sketch 2).
- 5.1.7 Set the chain to tension at the centre of the wood block and reconfirm the shores are still firm.
- 5.1.8 Apply now **EPOCAST 36-P** to the endside of this block and the upper surface of the following blocks.
- 5.1.9 Loosen the tension of the chain block and put in position the next wood block. Retension the chain block.
- 5.1.10 Hammer the second block against the first one tight and remove the remaining **EPOCAST 36-P** mastic.
- 5.1.11 Repeat the whole procedure as prescribed before until the final mark of the parameter length is reached.
- 5.1.12 After approx. 20 hours cure time release the tension of the securing device. Use a grinder to smooth the surface (see sketch 4)
- 5.2. FIXED SUPPORT
- 5.2.1 Remove grease, oil, mill scale, rust etc. From the foundation area
- 5.2.2 Determine parameter (using formula on sketch 1). Mark the starting point of the first press block to the final end of the determined length on the surface of the tank.
- 5.2.3 Check the calculated parameter length „Y“ with a test piece of press wood. If necessary correct the press wood blocks to meet required length.
Note: Check on both sides of the girdle.

5.2.4 Install the jiggling device as per sketch 2

- a) Fix the wood clamp at the bottom of the tank with attachment of shackel and wire sling
- b) Fix the next wire sling over the neck of the anti-floating block
- c) Hook both ends of the ratchet chain block into each end of the wire slings

Note: See sketch 5

5.2.5 Apply **EPOCAST 36-P** on left and right side of the press wood with a thickness of 10 - 15 mm (see sketch 6)

5.2.6 Press the first 2 blocks against the tank girdle at the starting mark. Set shores directly below these blocks and ensure it is tightly secured (see sketch 5).

Note: The wood grain must be seen from outside.

5.2.7 Screw the plywood strip against the first 2 press wood blocks to ensure that the load of the chain is distributed equally.

5.2.8 Center the chain block on the plywood strips and pull to tension.

5.2.9 Loosen the tension of the chain and apply **EPOCAST 36-P** to the endside of each block with more mastic on the outside and less towards the inside.

5.2.10 Put on both sides of the girdles 5 to 6 wooden blocks prepared with mastic and tension the chain block.

5.2.11 Hammer the blocks into position and remove the remaining **EPOCAST 36-P**

5.2.12 Repeat the whole procedure as prescribed before until you have reached the final position.

5.2.13 Screw the plywood strip to the end block.

Note: If the plywood strip is not long enough you may extend an additional piece to cover the whole length.

5.3 ANTI FLOATING BLOCK

5.3.1 Clean surfaces of anti-floating-shocks from rust etc.

5.3.2 Grind (cut) surface edges of lower press wood block

5.3.3 Fix a rectangular mould onto the surface of the anti-floating-shock

5.3.4 Apply **EPOCAST 36-P** into the rectangular mould

- 5.3.5 Insert lower block and position it with a hammer
- 5.3.6 After lowering the tank into the saddle, place the upper press wood block onto lower one end, depending on the construction and the distance to the ship's transverse girder fill the space with **EPOCAST 36-P**.
- 5.3.7 After applying of **EPOCAST 36-P** to the front surface of the lower block, the shipyard has to weld the transverse girder to the ship's foundation.

5.4. SUPPORT BEARING (TANK BOTTOM / SHIP'S FOUNDATION)

- 5.4.1 Clean surfaces of support bearing (tank bottom and ship's foundation) from rust etc.
- 5.4.2 Apply **EPOCAST 36-P** to the press wood blocks of the support bearing and fix them into the prearranged support.
- 5.4.3 The blocks will be automatically pressed into the correct position when the tank is lowered into the saddle.

6.0. TANK INSTALLATION

- 6.1. Before starting work with **EPOCAST 36-P** make sure that sufficient **EPOCAST 36-P** is available (calculated volume with a surplus of 15%).
- 6.2. Condition resin up to a temperature of at least 25 - 30 °C to ensure suitable mixing viscosity.
- 6.3. Place a series of mastic balls in intervals of approx. 2 - 3 metres into the tank saddle. Cover the mastic balls with plastic sheets.
Note: Mastic balls are used to determine the distance between saddle and press wood blocks.
- 6.4. Lower the tank into the saddle.
- 6.5. Raise the tank again and measure the height of the squeezed mastic balls. You have now a series of confirmed levels for the application of **EPOCAST 36-P**.
Note: Apply **EPOCAST 36-P** with a margin of approx. 10 - 15 mm to the measured height.
- 6.6. Add hardener completely into the preheated resin and power mix with a contra rotating
- 6.7.1 Fixed Support:
Fill **EPOCAST 36-P** resin/hardener mixture into the saddle with the help of a trowel or putty knife to the specified thickness.

- 6.7.2 Sliding Support:
Fill **EPOCAST 36-P** resin/hardener mixture onto the saddle with the help of a trowel or putty knife to the specified thickness.
Immediately after this bring the steel sliding plate onto the liquid **EPOCAST 36-P** and fix it temporary with 2 wires on the upper part of the tank saddle
- 6.8. Lower the tank and trim off the excess **EPOCAST 36-P** before it hardness. The space between saddle and press wood blocks or tank is 100% filled when the resin has exuded from both sides of the supports and along the whole arc.
- 6.9. Clean tools and putty knife immediately after use with hot water and soap.

7.0 CURE TIME

- 7.1 The minimum ambient temperature in the working area must be at least 13 °C, otherwise the hardening process will nearly stop. In this case external heat becomes necessary to shorten the cure period.

The cure time depends on the ambient temperature and is as follows:

- | | |
|---------------------------------------|-------------|
| - starting to cure after approx. | 4 - 6 hours |
| - ready to take loading after approx. | 72 hours |
| - fully cured after approx. | 7 days |

8.0 PROTECTIVE MEASURES

EPOCAST 36-P hardener is slightly corrosive, therefore wear suitable protective clothing and impermeable gloves when working with **EPOCAST**.

In case of skin or eye contact wash with plenty of water. In case of eye contact after swallowing immediately seek medical advice.

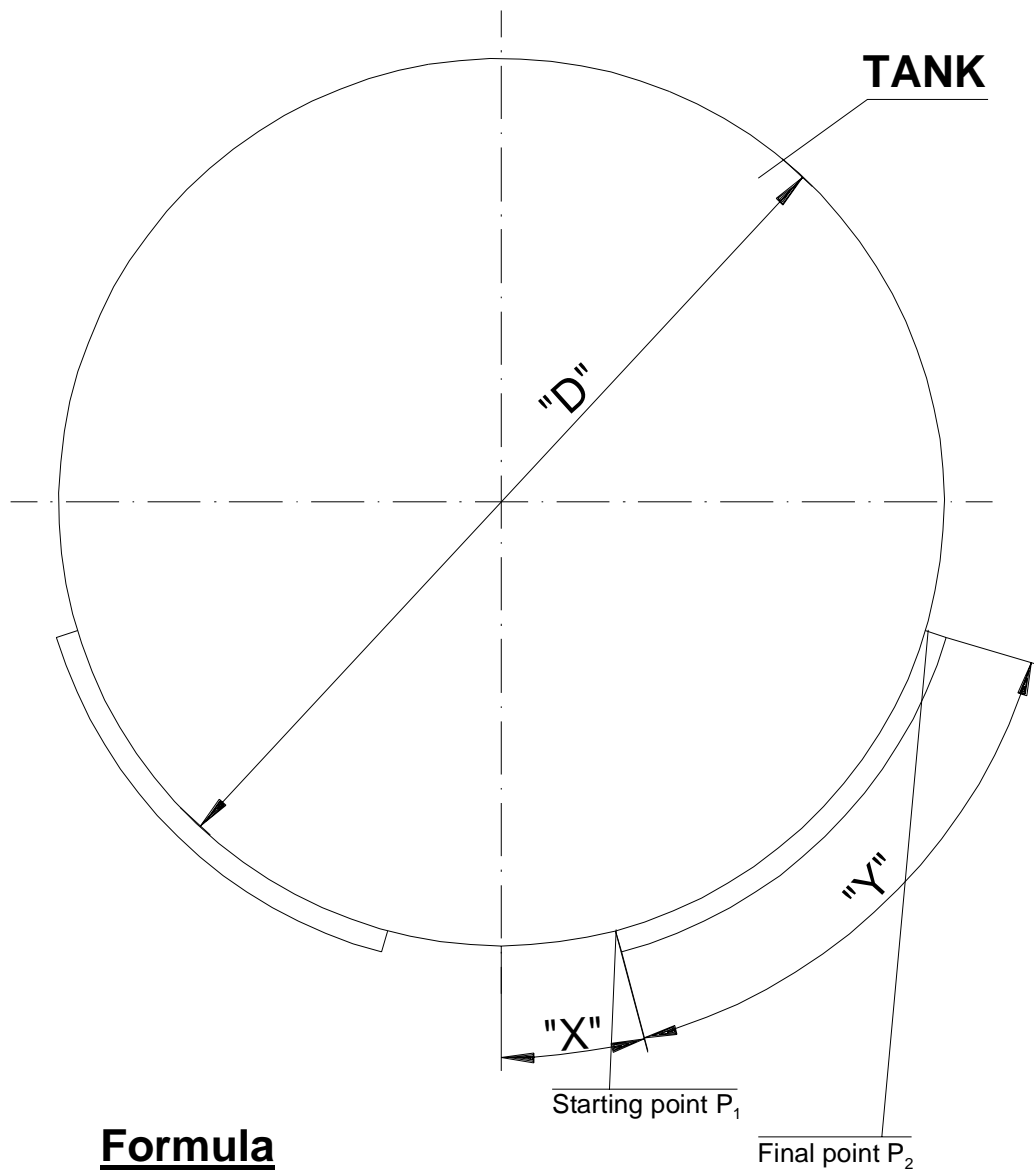
Take off immediately all contaminated clothing.

9.0. SPECIAL INFORMATION

Upon delivery of **EPOCAST 36-P** does not contain any dangerous solvents and is therefore neither explosive nor combustible. Consequently there is no need to exhaust solvent fumes not even in closed rooms, but for the convenience of the worker narrow rooms should have enough ventilation.

Avoid skin contact with the hardener or the resin/hardener mixture.

SKETCH NO. 1

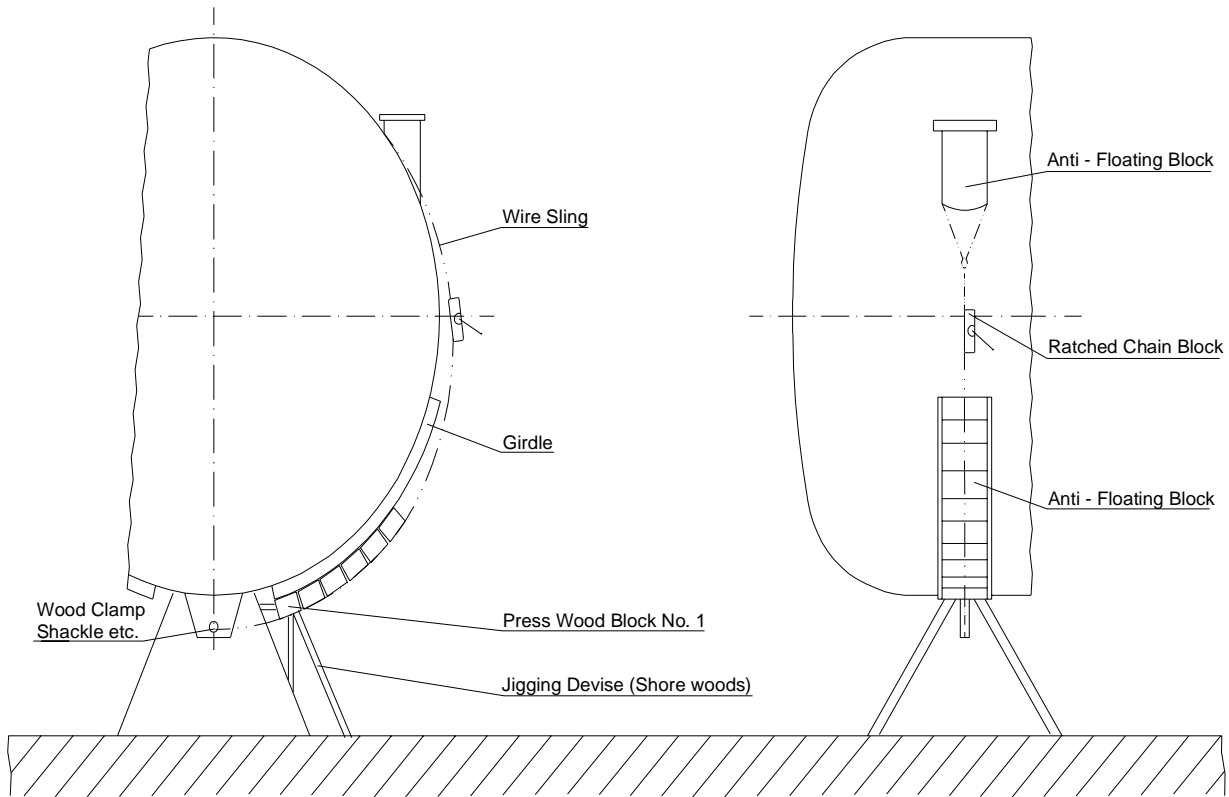


Formula

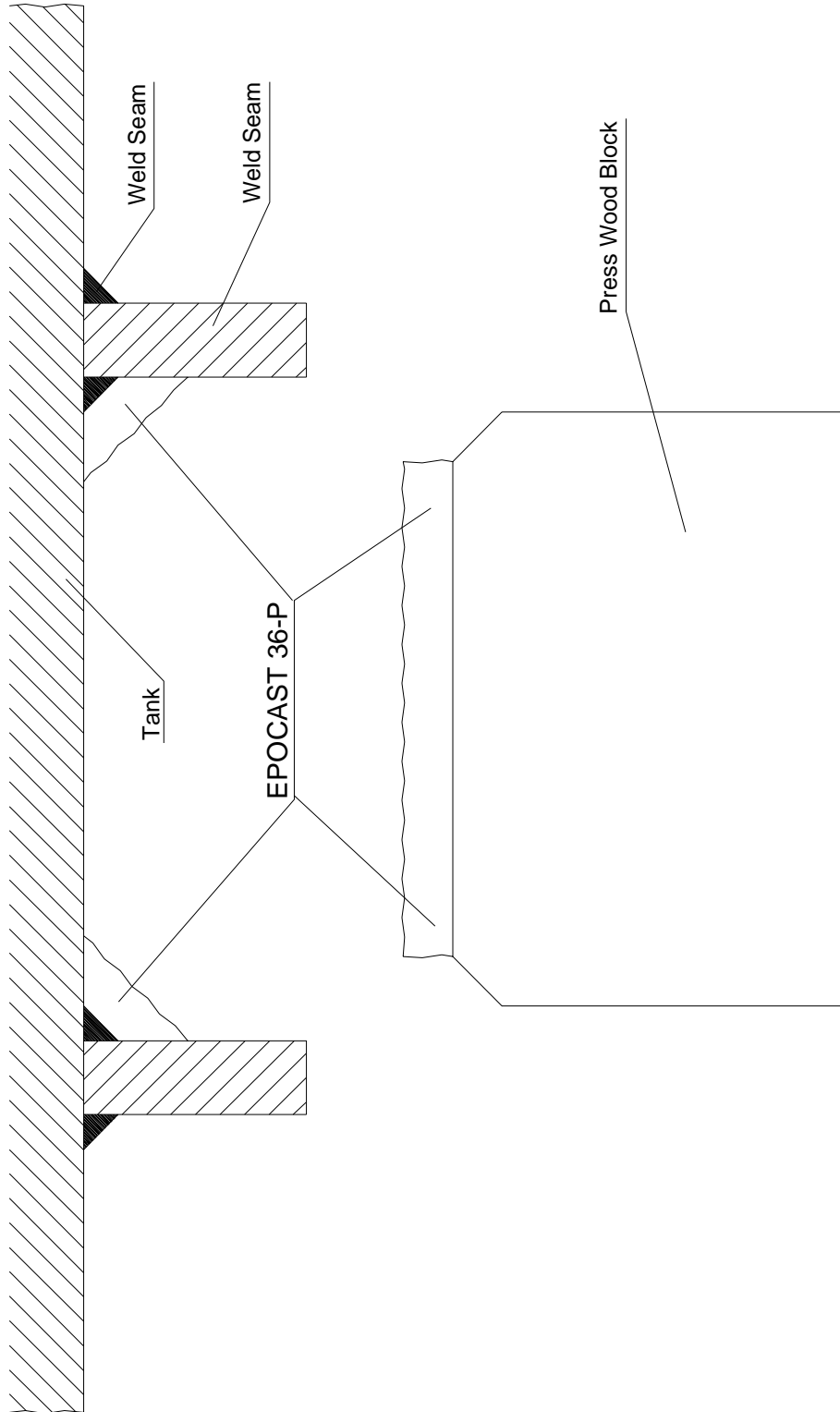
$$P_1 = \frac{D \times 3,14}{360^\circ} \times "X"$$

$$P_2 = \frac{D \times 3,14}{360^\circ} \times "Y"$$

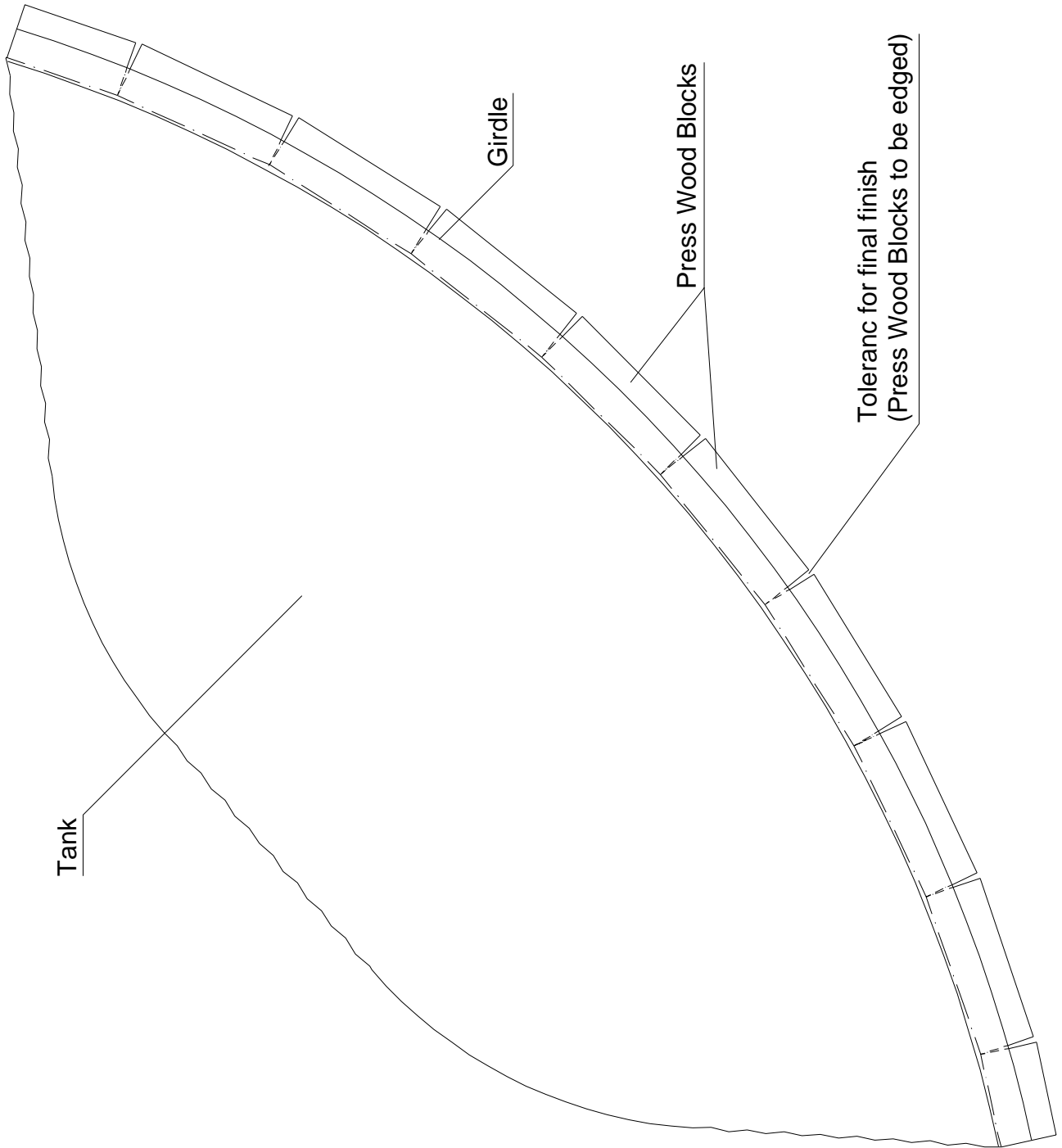
SKETCH NO. 2



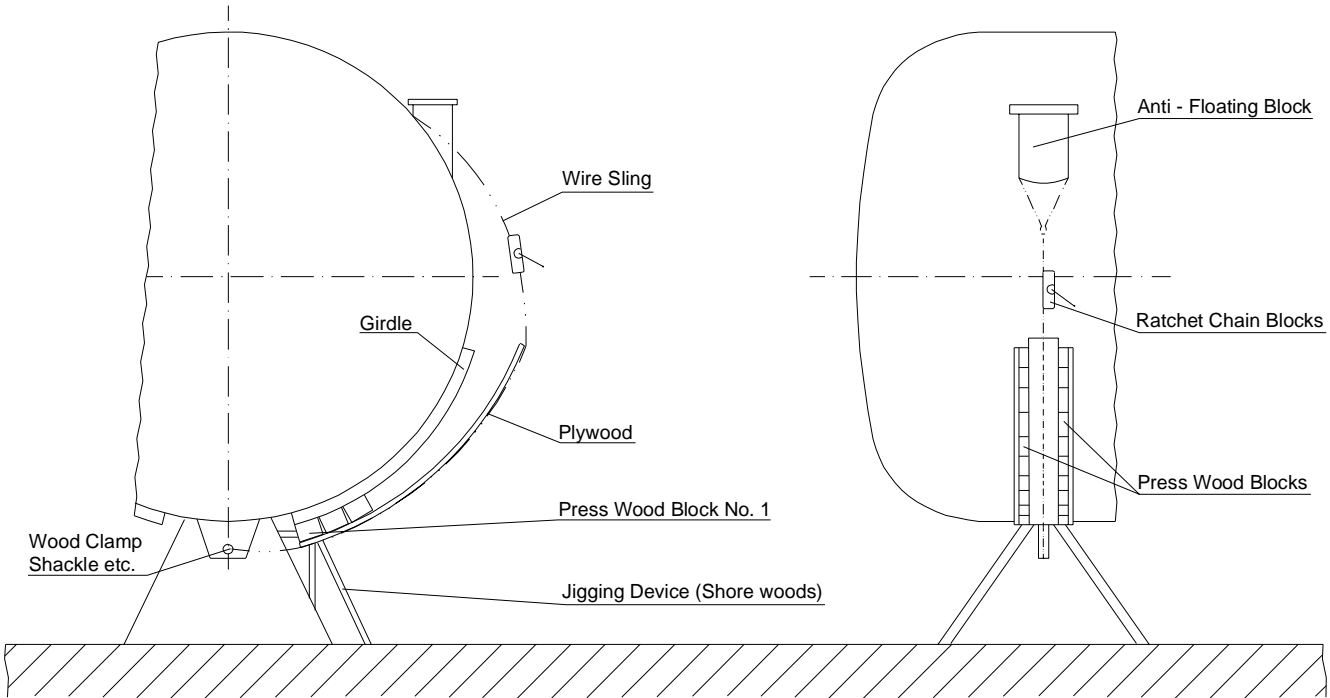
SKETCH NO. 3



SKETCH NO. 4

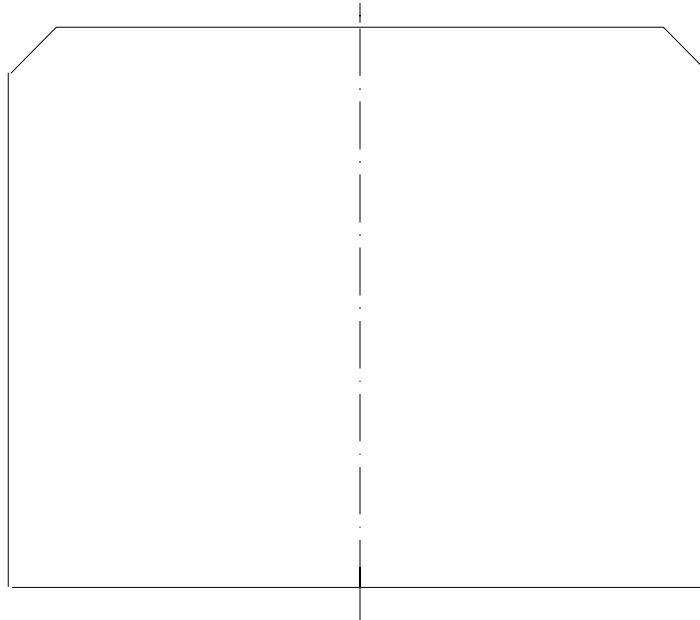


SKETCH NO. 5

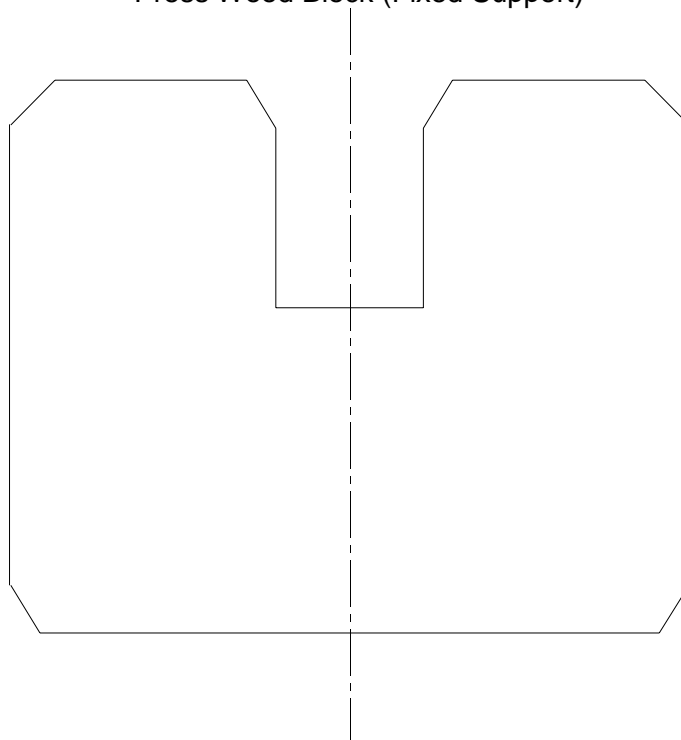


SKETCH NO. 6

Press Wood Block (Sliding Support)

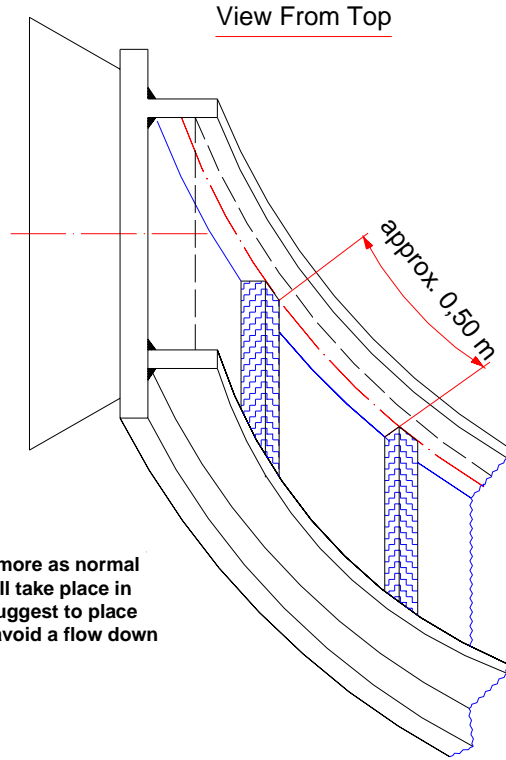


Press Wood Block (Fixed Support)



SKETCH NO. 7

10.0 ADDITIONAL INFORMATION



In case the gap thickness is more as normal and the execution of work will take place in summertime condition, we suggest to place wooden sticks as shown to avoid a flow down of EPOCAST 36-P.

Cross view

