ERECTING SILO-TYPE WATER STORAGE TANKS

Manual · Flexible tanks and reservoirs

On-site erection of silo-type water storage tanks, in the order of operations. Groundwork and foundation, assembly of the rings of panels, fitting of the protective felt and liner, tank connectors, filling and fitting of the anti-algae covers.



Technical data

Recommended foundation	Circular slab of C35 concrete at 300 kg/m³, minimum thickness 100 mm, diameter of the storage tank + 600 mm
Sand bed	10 cm minimum
Width of the felt strips	5.25 m
Overlap of the felt strips	25 cm
Liner projection above the wall	Approximately 30 cm
Team	At least 2 people for the felt and the liner
Tools	Speed bit for tightening nuts, long-reach socket, 17 and 19 mm sockets

Before erection

- Check the steel panels as soon as they are received.
- The bolts, nuts and washers are supplied in separate boxes. The hooks for the tensioned anti-algae cover and their nuts must be ordered separately.
- The bolts, nuts and washers have been given a specific anti-corrosion treatment: use only the original bolts, nuts and washers.
- Before erecting the wall and the liner, complete all the groundwork and put all pipelines and fittings in place.
- The liner, still packed, must be inside the footprint of the storage tank before the wall is erected.

Tools: speed bit for tightening nuts, long-reach socket, 17 and 19 mm sockets.



Ratchet wrench and sockets



Power screwdriver

Groundwork and foundation

Location

- The storage tank can be sunk into the ground by approximately 80 cm, which is the height of one ring of panels. The bottom must remain at least 20 cm above the water table.
- Dig an excavation with a diameter 1 m larger than that of the storage tank, to leave a working space of approximately 0.50 m all around.
- For ease of inspection, place the storage tank approximately 1 m from any building or greenhouse wall and approximately 1.5 m from a ditch.

Foundation

- The bottom of the excavation must be level and stable enough to carry the storage tank, the liner and the water.
- A concrete foundation is recommended: a circular slab on which the wall of panels stands, made of C35 ready-mixed concrete at 300 kg/m³, at least 100 mm thick. Its surface must be reasonably smooth and its diameter must exceed that of the storage tank by 600 mm.
- A ring of 30 × 30 × 4 cm concrete slabs, joined together, is also possible.
- The laying surface must be free of any pointed or sharp objects (gravel, rubble, roots, irregularities) that could puncture the liner. Cover it with a layer of sand at least 10 cm thick.

Concrete and sand foundation by tank diameter

Diameter (mm)	Concrete slab diameter (mm)	Concrete required (m³)	Sand required (m³)
1830	2430	0.46	0.13
2740	3340	0.88	0.30
3660	4260	1.42	0.53

Diameter (mm)	Concrete slab diameter (mm)	Concrete required (m^3)	Sand required (m^3)
4570	5170	2.10	0.82
5490	6090	2.91	1.18
6400	7000	3.85	1.61
7320	7920	4.92	2.10
8230	8830	6.12	2.66
9140	9740	7.46	3.28
10,060	10,660	8.92	3.97
10,970	11,570	10.52	4.73
11,890	12,490	12.25	5.55
12,800	13,400	14.11	6.44
13,720	14,320	16.10	7.39
14,630	15,230	18.22	8.41
15,540	16,140	20.47	9.49
16,460	17,060	22.86	10.64
17,370	17,970	25.38	11.85
18,290	18,890	28.02	13.14
19,200	19,800	30.80	14.48
20,120	20,720	33.71	15.89
21,030	21,630	36.75	17.37
21,950	22,550	39.93	18.92
22,860	23,460	43.23	20.52
23,770	24,370	46.67	22.20
24,690	25,290	50.23	23.94
25,600	26,200	53.93	25.75
26,520	27,120	57.76	27.62
27,430	28,030	61.72	29.56
28,350	28,950	65.82	31.56
29,260	29,860	70.04	33.63
30,180	30,780	74.40	35.76

Protecting the bottom ring

The bottom ring must be given an additional durable protective coating on its outer face, and preferably on its inner face too. If the storage tank was not ordered with a pre-protected bottom ring, apply this coating over a primer coat, so that it adheres to the panels.

Erecting the rings of panels

The panels do not all have the same thickness: the thickest form the bottom ring, the thinnest the top ring. They are supplied on a pallet in the order of assembly: the bottom ring is on top. For the stability of the storage tank, erect the wall ring by ring, completing each ring before starting the next.

1. Find the centre of the slab and mark out a circle with chalk to the diameter of the storage tank. Place the liner, still packed, at the centre of the slab.
2. Bottom ring: working clockwise along the marked line, place each panel inside the previous one. Assemble the panels loosely, lining up the holes with a screwdriver if necessary. The bolt heads are on the inside of the storage tank. No bolts are fitted in the bottom row of holes.
3. Check that the bottom ring is perfectly round and tighten a few bolts to hold the panels. Do not tighten all the bolts until erection is complete.
4. Next rings: place each ring outside the ring below, with an overlap, so that rainwater does not seep between the rings. Stagger the joints from one ring to the next, as in a brick wall. Check that each level receives panels of the correct thickness.
5. If the liner is secured with a rope, place the hooks at the bottom of the last ring, on every other bolt.
6. Once all the rings are in place, check again that the wall is perfectly round, then tighten all the bolts. No bolts are fitted in the top row of holes.



Erecting the rings of panels



Erecting the rings of panels



Erecting the rings of panels



Erecting the rings of panels

Fitting the protective felt

Before fitting, check that:

- every hole in the panels has a bolt, except in the top and bottom rows;
- all the bolt heads are on the inside of the storage tank;
- corners damaged and panel edges distorted during transport have been carefully straightened, so that they do not puncture the liner.

Fitting requires two people: one inside the storage tank, one outside on a ladder.

1. The felt is supplied in strips 5.25 m wide, in a length to suit the height of the storage tank. Lay each strip over the top edge of the wall and secure it with the clamp profile supplied.
2. Work around the storage tank, overlapping the strips by 25 cm, until the panels are completely covered.
3. Check that the felt is flat and free of creases.
4. If a ground felt has been ordered, lay it on the bottom last.



Fitting the protective felt



Fitting the protective felt

Fitting the liner

Depending on the size of the liner, fitting requires at least two people: one inside the storage tank, one outside on a ladder.

1. Check again that the bottom is free of stones and sharp objects, including under the fitters' shoes.
2. Place the liner package against the wall, then unroll and unfold the liner as shown in the drawing on the packaging. If the liner has factory-welded tank connectors, check that they are in the right place.



Unrolling the liner



Unrolling the liner

3. Pass the edge of the liner from the inside to the person outside, then secure it with the clamps. The liner projects approximately 30 cm above the edge of the wall.



Securing the edge of the liner



Securing the edge of the liner

4. Check that the liner has no creases. Its dimensions have a small margin: there is no need to pull it very tight. A liner pulled too tight over the edge of the wall creases on the opposite side: it is then badly fitted, the weight of the water pulls at that point and can cause the wall of panels to collapse.



Liner in place, free of creases



Liner in place, free of creases

5. Once the liner is free of creases, secure it at the top of the wall according to the equipment supplied: tension the colour band with the stainless steel ratchets, or pass the rope through the eyelets and attach it to the hooks.
6. Check the bottom seam of the liner and place it in the corner formed with the wall.

Tank connectors

Three types of tank connector are possible:

- flexible PVC liner sleeve, welded to the liner at the factory or fitted on site by gluing;
- flexible polypropylene (FPP) liner sleeve, welded to the liner at the factory or on site. It cannot be glued;
- flanged mechanical tank connector in rigid PVC, in several sizes.

Flexible PVC liner sleeve



Materials for a flexible PVC liner sleeve

1. Cut a hole in the liner where the pipe passes through.
2. Cut a piece of the neoprene strip supplied to fit the pipe and place it a few centimetres below the end of the pipe.
3. Pull the liner sleeve tightly over the pipe and cut off the excess.
4. On clean, dry surfaces, apply glue to the pipe and the liner sleeve. Press firmly and check that no passage is left for the water.
5. Place the metal hose clamp on the neoprene strip and tighten it firmly with a screwdriver.
6. Wrap the entire assembly with the PVC tape supplied.



Step 2



Step 3



Step 4



Step 5



Step 6

Flexible polypropylene (FPP) liner sleeve



Materials for a flexible polypropylene liner sleeve

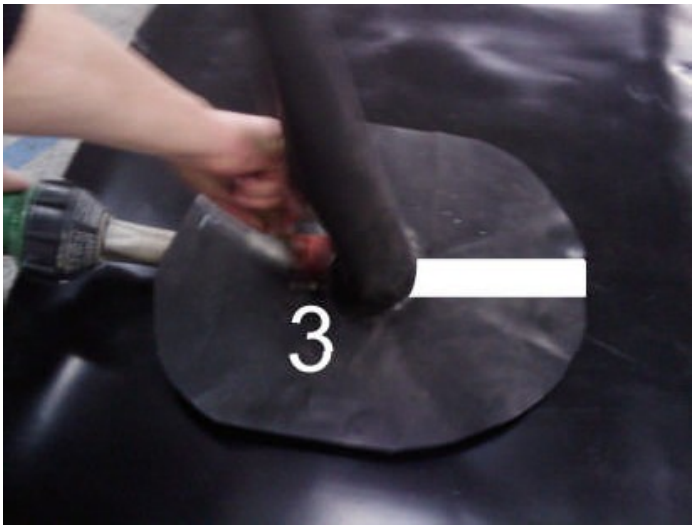
1. Cut a hole in the liner where the pipe passes through.
2. Cut a piece of the neoprene strip supplied to fit the pipe and place it a few centimetres below the end of the pipe.
3. Pull the liner sleeve tightly over the pipe and cut off the excess.
4. On clean, dry surfaces, place the roller against the liner sleeve (mark 1). With the hot air gun held under the liner sleeve, work towards one end, pressing firmly and rolling continuously (mark 2).
5. Do the same on the other side of the liner sleeve (mark 3), then all around the pipe to make it watertight (mark 4).
6. Weld the liner sleeve completely to the liner, one half then the other.
7. Place the metal hose clamp on the neoprene strip and tighten it firmly with a screwdriver.
8. Wrap the entire assembly with the PVC tape supplied.



Mark 1



Mark 2



Mark 3



Mark 4

Flanged mechanical tank connector

1. Using the counter-flange supplied with the tank connector, mark the position of the screws on the liner, then pierce the liner with a punch or similar tool.
2. Apply sealant (not supplied) to the inside and outside of the screw holes in the flange.
3. Fit the liner, aligning its holes with those of the flange. Position the counter-flange, then insert and tighten the screws.
4. Cut out the liner where the pipe passes through and remove the excess sealant.

Filling

Without an anti-algae cover, the storage tank can be filled. If an anti-algae cover has been ordered, first read its fitting instructions (next section).

1. When the water reaches approximately 10 cm, enter the storage tank and check that the bottom seam of the liner is correctly placed in the corner formed with the wall. If necessary, lift the liner slightly and push it back into place with your foot.
2. The weight and pressure of the water then hold the liner in place.

3. Partly backfill the working space around the storage tank with sand or compacted soil, to take up the lateral thrust of the water. Do not backfill completely: the storage tank needs time and space to settle until it is completely full.



Placing the bottom seam



Start of filling

Anti-algae covers

Tensioned cover

1. If the centre pole (option, see D04-SILO-FT-004) has been ordered, find the centre of the storage tank and set up the pole there. Secure the top of the pole with the rope supplied.
2. Spread the cover evenly over the whole diameter of the storage tank.
3. Connect the cover to the hooks by passing the elastic band or rope supplied through the eyelets. Check that the tension is evenly distributed.



Tensioned cover



Fitting a tensioned cover

Floating cover

The floating cover has sewn sleeves, spaced 1.5 m apart over its whole length, and a sleeve around its edge. PVC tubes with a diameter of 40 to 50 mm, not supplied, are inserted into them. Order tubes with one tapered end, which fit into each other and are glued together. The end caps for the tubes are not supplied.

1. Outside the storage tank, insert the tubes into the sleeves along the length of the cover. Plug their ends so that water does not get in.
2. Roll the cover from both sides towards the middle and tie it with a rope.
3. Carry the cover into the storage tank and place it in the centre, then unroll it towards both sides.
4. Inside the storage tank, insert the edge tube into its sleeve and tie it to the cover with a rope.

Handle the tubes with care so as not to damage the liner.

PVC tubes for the floating cover by tank diameter

Diameter (mm)	Number of sleeves	Total PVC tube length (m)
7320	4	49
8230	5	58
9140	6	68
10,060	6	82
10,970	7	93
11,890	7	104
12,800	8	122
13,720	9	137
14,630	9	150
15,540	10	170
16,460	10	188
17,370	11	205
18,290	12	226
19,200	12	247
20,120	13	267
21,030	14	285
21,950	14	315
22,860	15	337
23,770	15	358
24,690	16	389
25,600	17	415
26,520	17	439
27,430	18	470
28,350	18	501
29,260	19	528
30,180	20	559

Diameter (mm)	Number of sleeves	Total PVC tube length (m)
33,000	22	656
35,000	23	715



Fitting a floating cover



Fitting a floating cover

Related documents : D04-SILO-FT-001, D04-SILO-FT-004