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Because the standard configuration of the silo delivery varies from country to country, the delivery contents may be different to what has been described in this manual.

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IMPORTANT TO REMEMBER - READ FIRST

1. After taking delivery, open the package and lift the superimposed wall and roof plates apart from each other in order to avoid oxidation. Perform the acceptance inspection in accordance with the packing list.
2. Follow the instructions carefully to ensure that the silo is erected smoothly and swiftly.
3. Remember to use sealing mastic. If the time from delivery to erection is long, store the mastic at an even temperature.
4. Follow carefully the assembly instructions for the roof.
5. Use only proper lifting gear that is in good condition for the lifting operations. Do not exceed the maximum allowed loads for the lifting gear.
6. Refer to the figure at the beginning of the main instructions for the material strengths of the silo's wall elements.
7. See the figure at the beginning of the main instruction for the strengths of the vertical supports . The strengths of the vertical supports are shown on the right side of the image.
8. The silo assembly must be performed with hydraulic jacks. It is not possible to install the silo from above with a crane.
9. Before starting the installation work, find out what equipment is included in the silo in question.
(For example, ladders, rest levels, roof ladders, conveyor supports, other equipment)

Before starting the installation, read the installation instructions related to the equipment as well and plan the work order for the installation of the equipment. (This helps to avoid extra work and to install silo equipment at the most affordable installation height.)

ASSEMBLING THE STOCK SILO

Check the contents of the delivery and compare it with the packing list immediately upon arrival, before starting the assembly. Advise the factory of any missing items. The factory is responsible for correcting any defective/incomplete delivery, but it is not obliged to compensate any other costs incurred.

NOTE!

Read the instructions several times before starting the erection in order to memorize the names of the components and the assembly order. To avoid problems, carry out the assembly in stages as described below.

The conveyor to be installed on top of the silo must be supported on the centre of the roof so that the load is not only on the pipe joint of the hub cover.

Maximum permissible static actuator load that can be applied to the roof hub: 1,800 kg.

CONCRETING THE FOUNDATION (SEE FOUNDATION DRAWINGS)

The thickness of the foundation slab shall be determined by the size of the silo, the standardised structural drawing and the soil quality at the site. At a low-lying site, where presence of groundwater is likely to cause problems, we recommend raising the height of foundation by laying crushed-run aggregate and concreting the foundation to as high as possible. The foundation of the silo must always be provided with ground frost insulation and subsoil drainage.

Attaching the silo to the foundation, grouting and damp proofing: see the foundation drawings for the silo. (No aftercasting is carried out on the foundation in a silo with ventilation floor)

For building permission and other regulations you need to contact your local building authority.

The foundation must be straight and flat (Flatness requirement ± 3 mm).

NOTE! *) Tighten all bolts firmly to their prescribed tightness. For M10 bolts of strength class 8.8 the correct tightening torque is 50 Nm. The fastest way to tighten the bolts is to use a pneumatic turn-screw or a cordless drill.

The lifting operations needed for the silo assembly can be performed using a crane, inspected and suitable for assembly work.

The installation of the topmost wall row starts when the concreting of the foundation is completed. The wall row is assembled on top of the foundation.

ASSEMBLING THE SILO

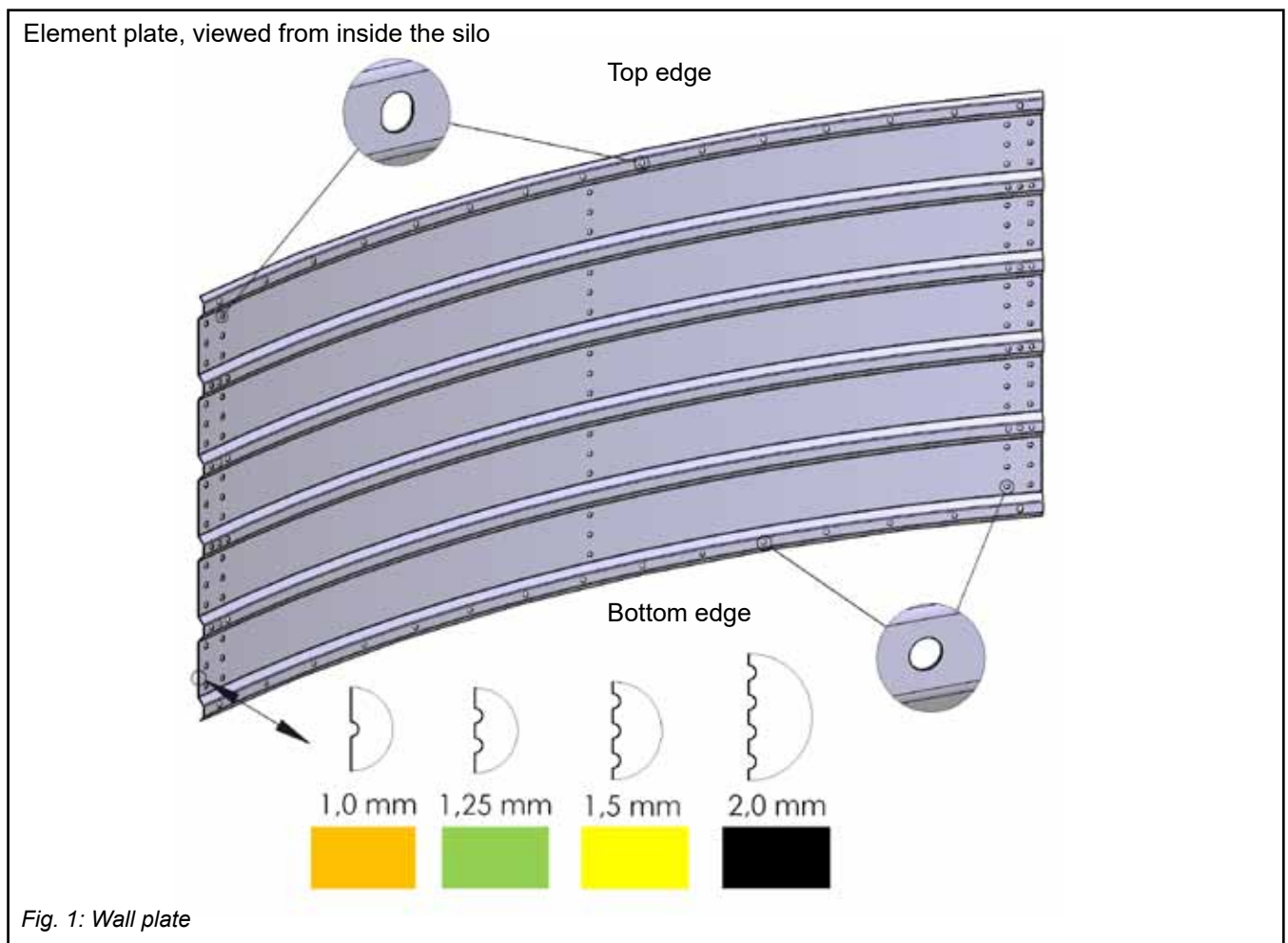
Installing the topmost wall row

Use a mounting punch as an aid. **The long holes shall always remain inside the silo!** See Fig 1.

Fix the wall plates using M10x25 hexagon flange bolts. Place a hexagon flange bolt on the outside and a nut with flange on the inside. If necessary, sealing mastic can also be used for the washers.

Before fixing the wall plates, spread sealing mastic between the hole rows, Fig. 2. The mastic dries quite quickly, so spread it on one plate only at a time. You will need one tube of sealing mastic for two wall plates.

Tighten first the bolts in the bottoms of the wall plate profiles so that they will guide the plates to their correct positions. The tightening should proceed from the centre towards the edges. Before tightening, ensure that the silo stands absolutely straight; otherwise, it will be more difficult to fix the following rows in a level position.



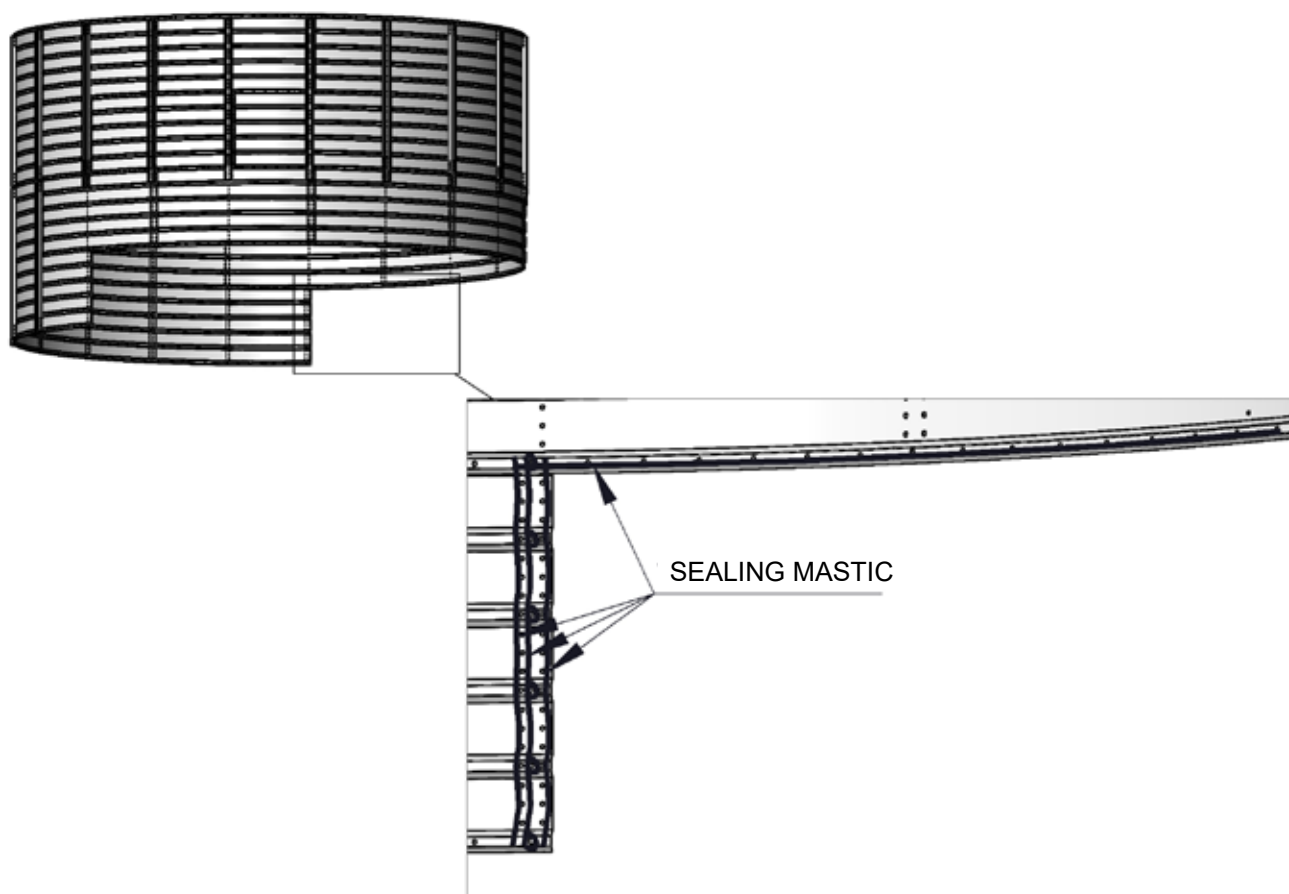
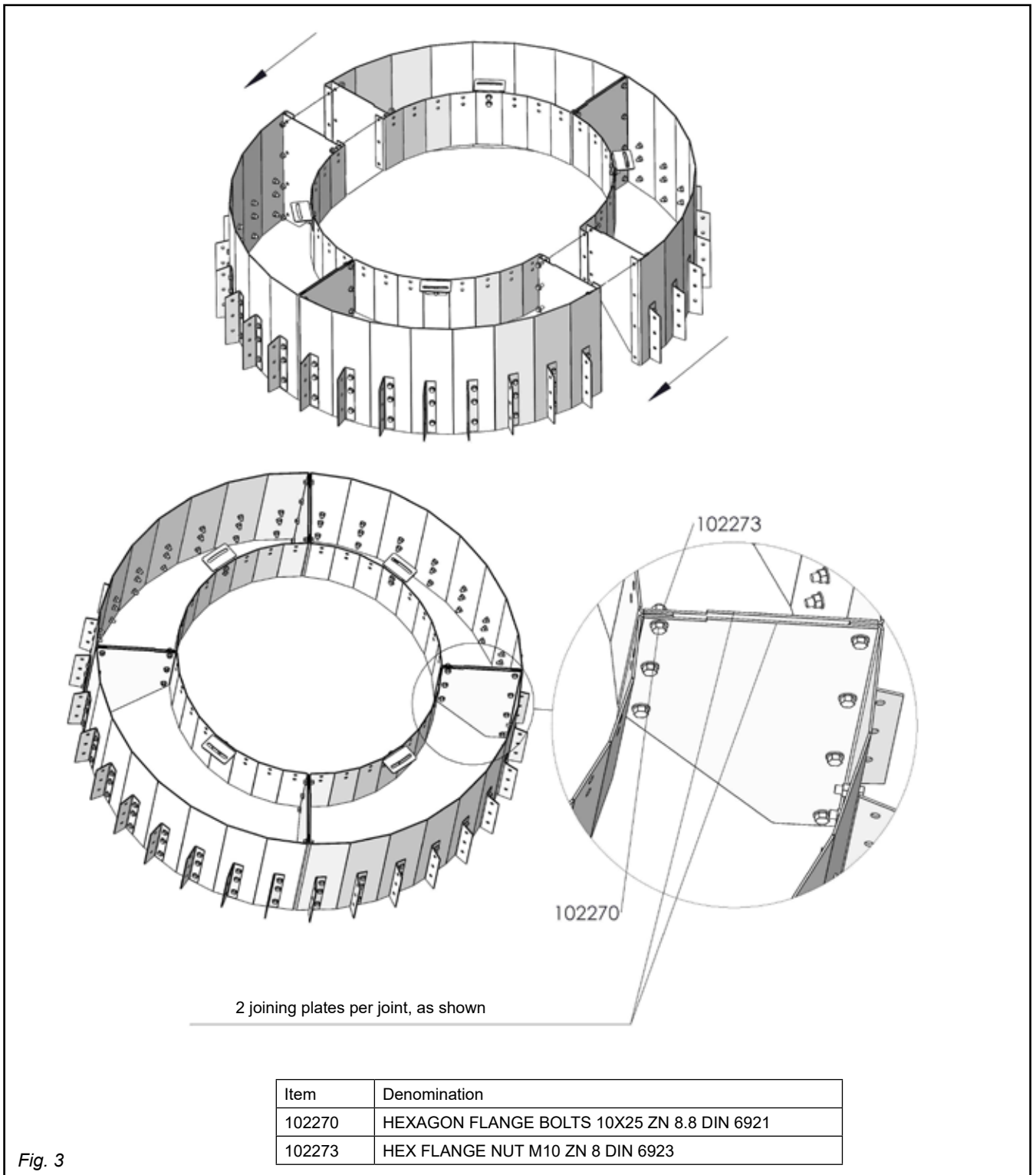


Fig. 2: Spreading sealing mastic on the wall plate. If necessary, mastic can also be used on the flange bolts.

GRAIN SILO ROOF HUB D12,1 M22 (A77042)



- The hub is delivered from the factory in two parts.
- Assemble the hub as shown in the illustrations.
- Mountings with M10x25 flange screws.

ROOF BEAM ASSEMBLY D12,1

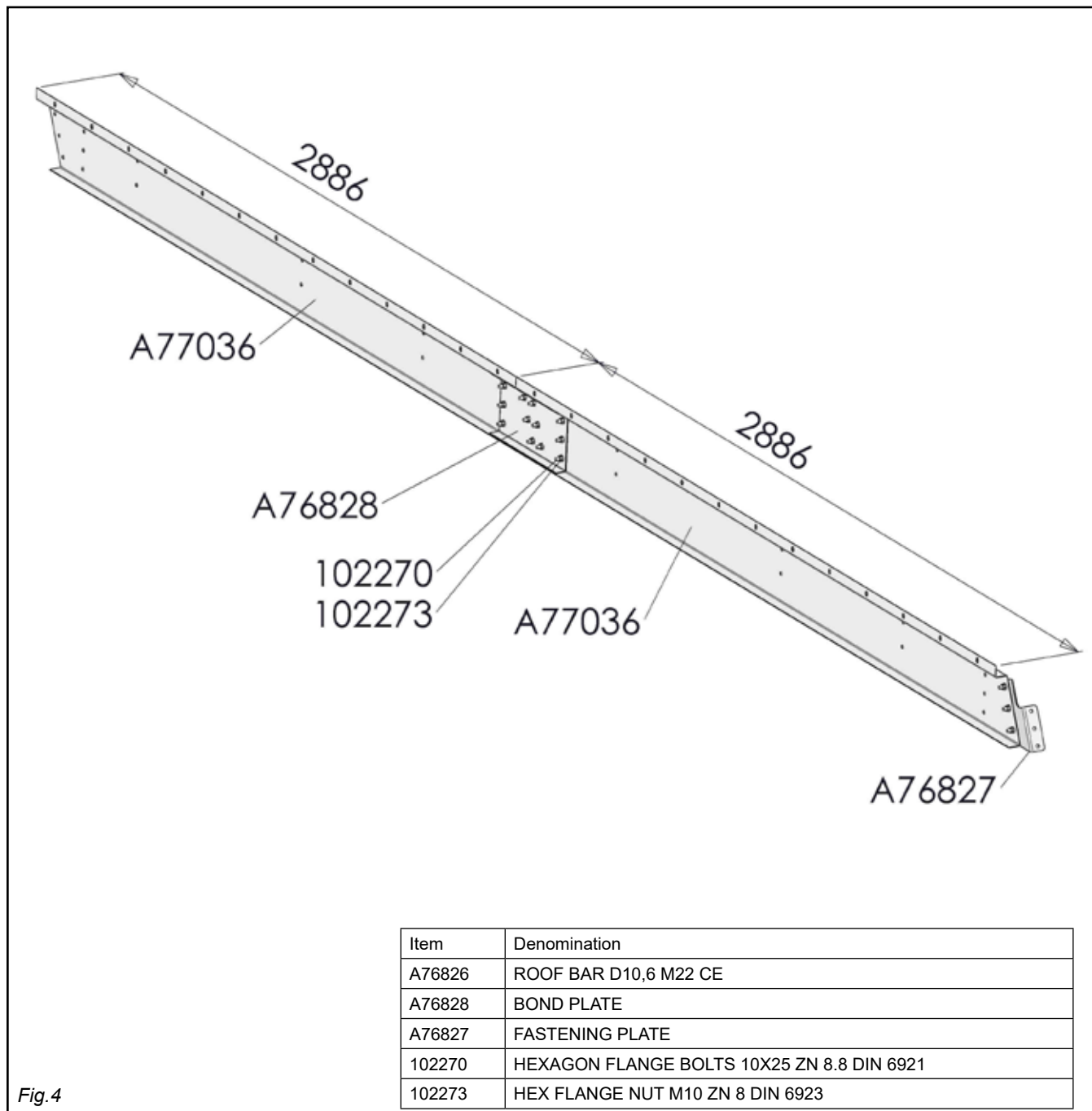
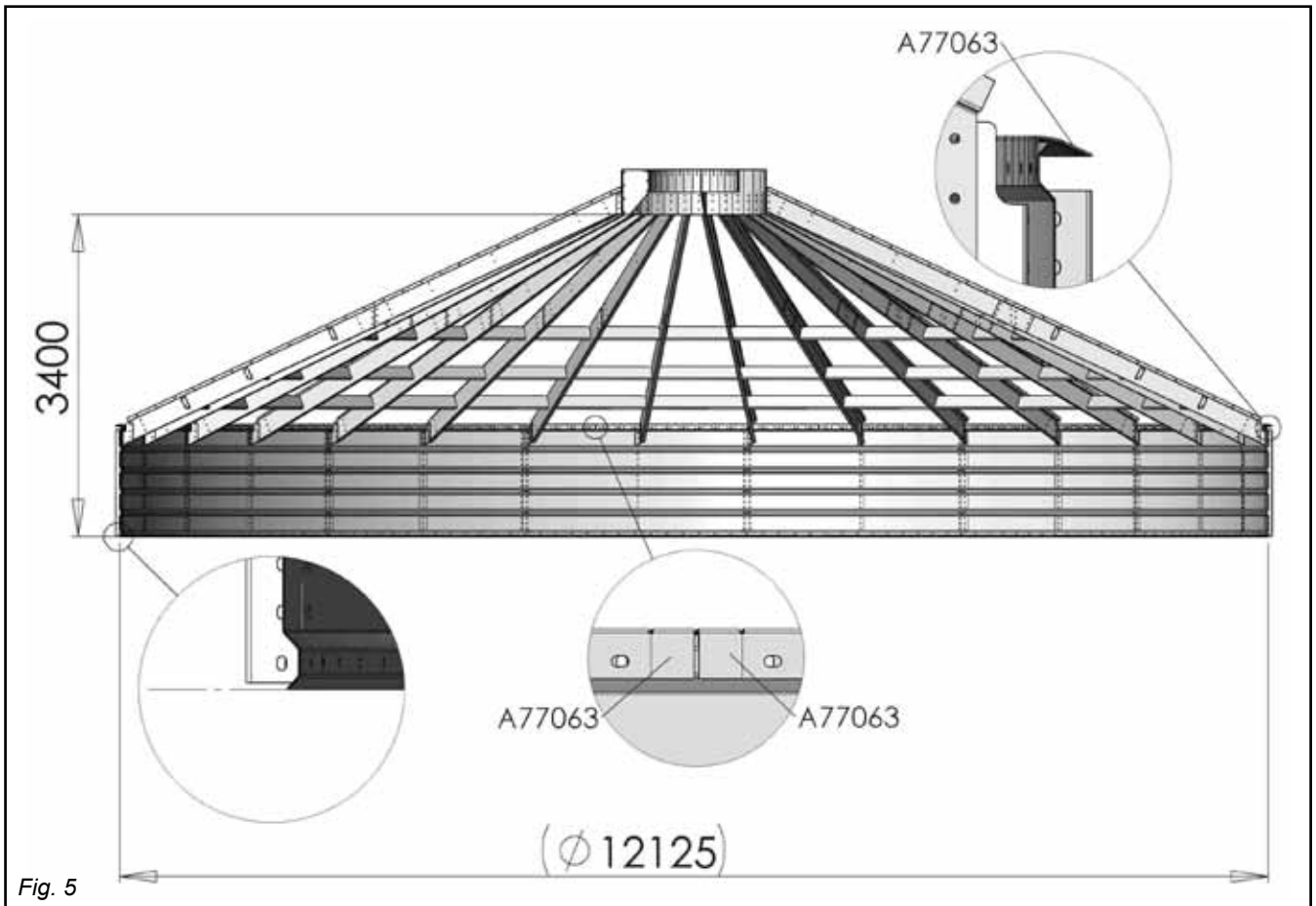


Fig.4

- The roof beams are delivered from the factory in two parts.
- Use extension A76828 to connect the roof beam as shown in the illustration.
- Mountings with M10x25 flange screws

ROOF HUB INSTALLATION HEIGHT D12,1



- The roof beams are assembled over the top floor
- The top vertical supports are always the height of one floor
- The upper rim of the grain silo A77063 is attached during the assembly of the roof beam
- The extensions of the upper rim do not overlap, but are set as a butt joint, cf. illustration
- Mountings with M10x25 flange screws
- Note: Pay attention to the roundness of the roof hub, because if the hub is not round, the installation of the roof sections will be significantly more difficult.
- The roundness of the hub must be checked before installing the roof sections by measuring the hub cross wise.
- If necessary, the roundness of the hub should be ensured by using the necessary aids (Such as load belts)

ROOF BEAM ASSEMBLY D12,1

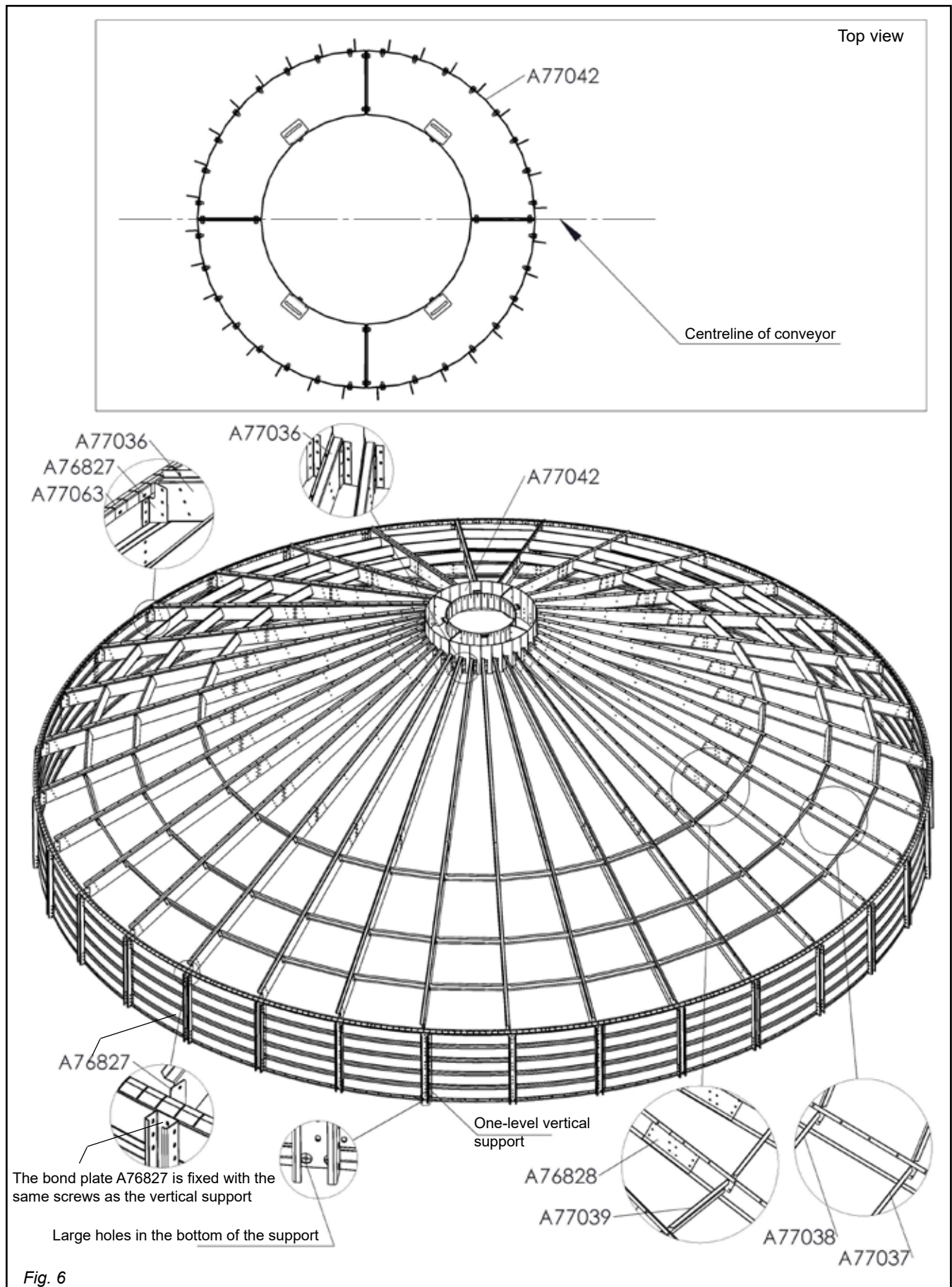


Fig. 6

Item	Denomination
A77042	ROOF CENTRE D12,1
A77036	ROOF BAR D12,1
A76828	BOND PLATE
A76827	FASTENING PLATE
A77063	TOP BAND
A77037	SUPPORT PART D12,1
A77038	SUPPORT PART D12,1
A77039	SUPPORT PART D12,1

- The roof beams are assembled over the top floor
- The top vertical supports are always one floor high
- Roof beam assembly as shown in the illustration
- Pay attention to the position of the centre in relation to the upper conveyor (see upper illustration)
- The upper rim of the grain silo A77063 is attached during the assembly of the roof beam
- Mountings with M10x25 flange screws
- Note: Pay attention to the roundness of roof hub A77042 to facilitate an easier installation of roof sections.

ROOF BLOCK ASSEMBLY D12,1

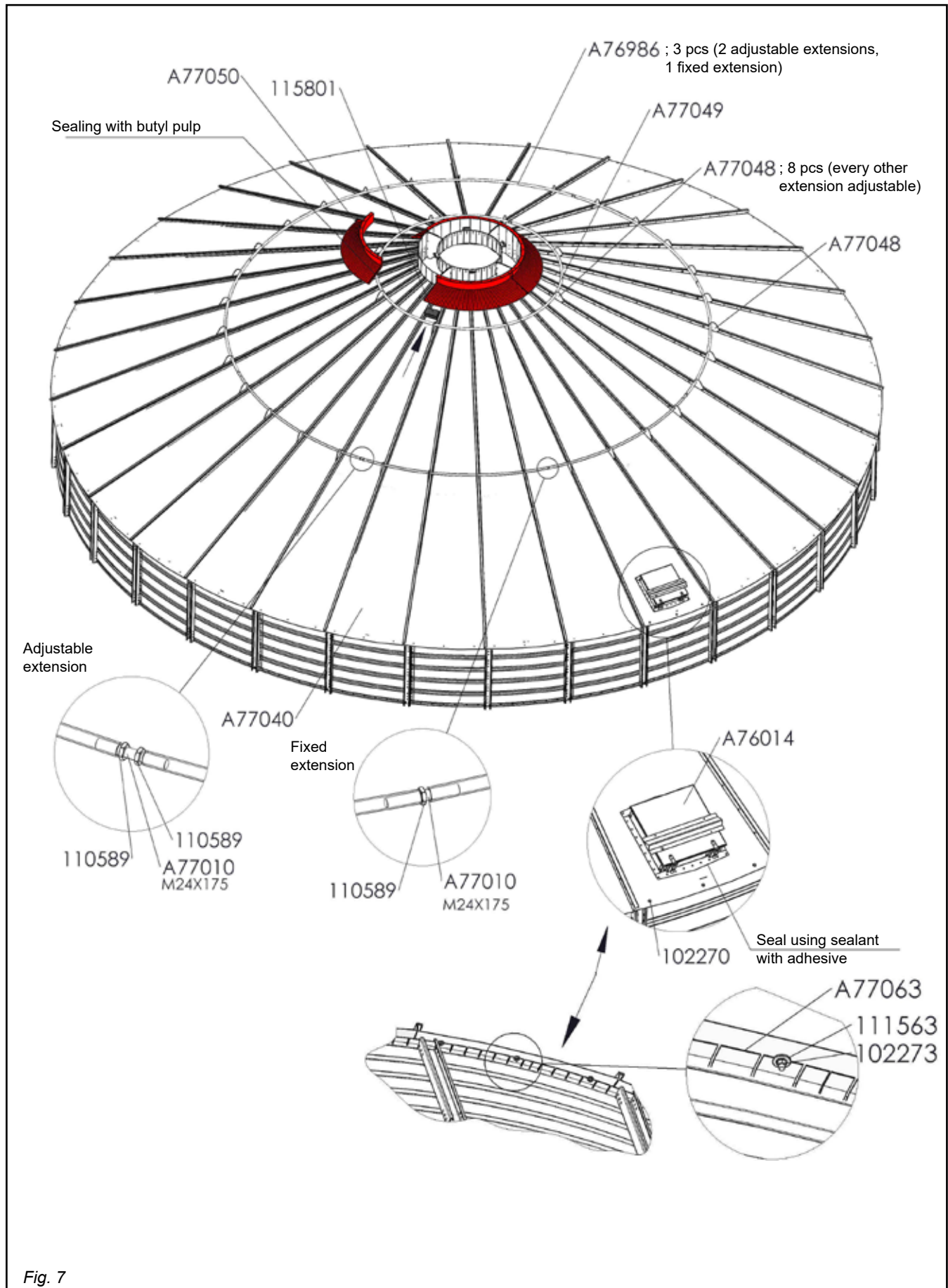


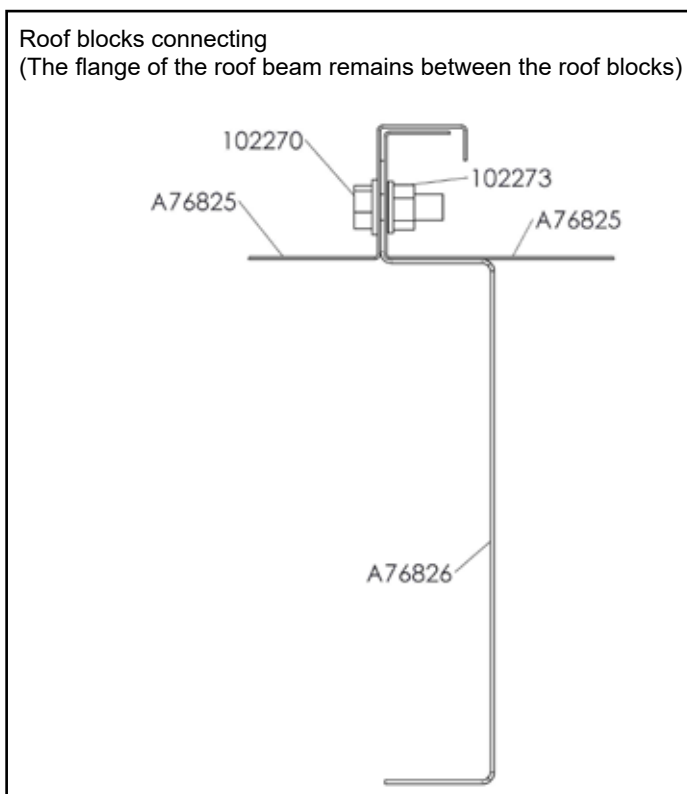
Fig. 7

Item	Denomination
A77040	ROOF PANEL D12,1
A76014	ROOF HATCH
A77048	ROOF RING BRACKET PLATE D12,1
A76986	ROOF RING R3590
A77049	ROOF RING R1375
A77050	SEALING CONE D12,1
115801	CELLULAR PLASTIC GASKET
A77063	TOP BAND
A77010	ROOF RING ADJUSTING SCREW M24x175
110589	NUT LOW M24 ZN DIN936
102270	HEXAGON FLANGE BOLTS 6K 10X25 ZN 8.8 DIN 6921
111563	WASHER M10 D34/D11X3 DIN440R ZN
102273	HEX FLANGE NUT M10 ZN 8 DIN 6923

Mounting of roof sections with M10x25 flange screws
 See the following page for fitting lugs A77048

See also:

- Wall ladders and levels
- Roof ladders
- Exhaust joints
- Roof hatch installation
- Temperature measuring cables (optional)



INSTALLATION OF ROOF FRAME MOUNTING LUGS D12,1

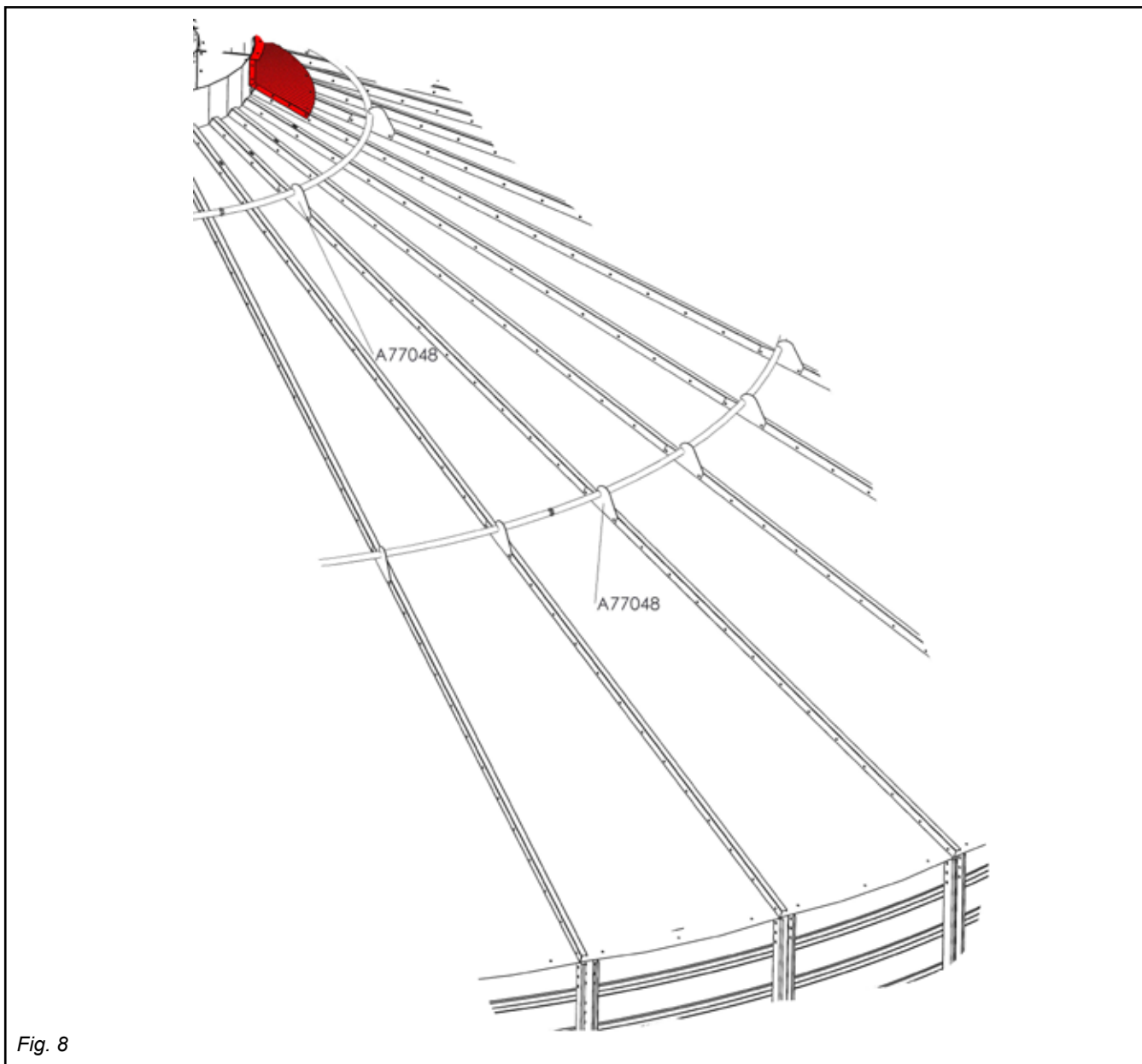


Fig. 8
The mounting lugs A77048 for the larger pipe circumference should be placed in every seam. The lug is attached to lower thirteenth and fourteenth holes of the roof section.

The mounting lugs A77048 for the smaller pipe circumference should be placed in every fourth seam. The lug is attached to the upper third and fourth holes in the roof section.

HUB COVER ASSEMBLY D12,1

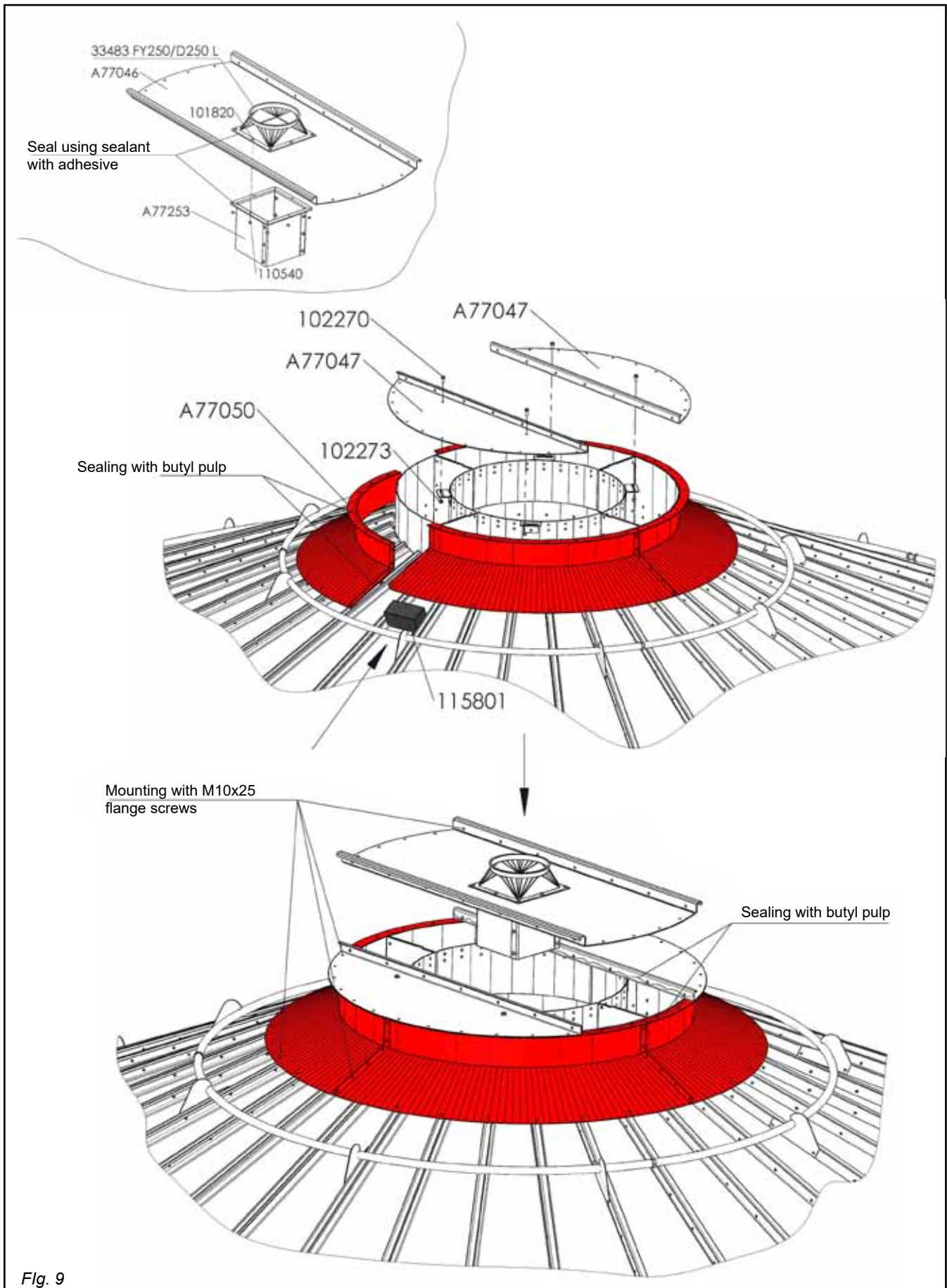


Fig. 9

Item	Denomination
A77050	SEALING CONE D12,1
115801	CELLULAR PLASTIC GASKET
A77047	GRAIN SILO CENTRE COVER D12,1
A77046	GRAIN SILO CENTRE COVER D12,1
33483	CHANGE PART STRAIGHT FY250/D250 L
A77253	PIPE FY250 L=265
101820	BOLT HEX ZN 8.8 8X20 AM DIN933
110540	MUTTERI M8 ZN 8 DIN934
102270	HEXAGON FLANGE BOLTS 6K 10X25 ZN 8.8 DIN 6921
102273	HEX FLANGE NUT M10 ZN 8 DIN 6923

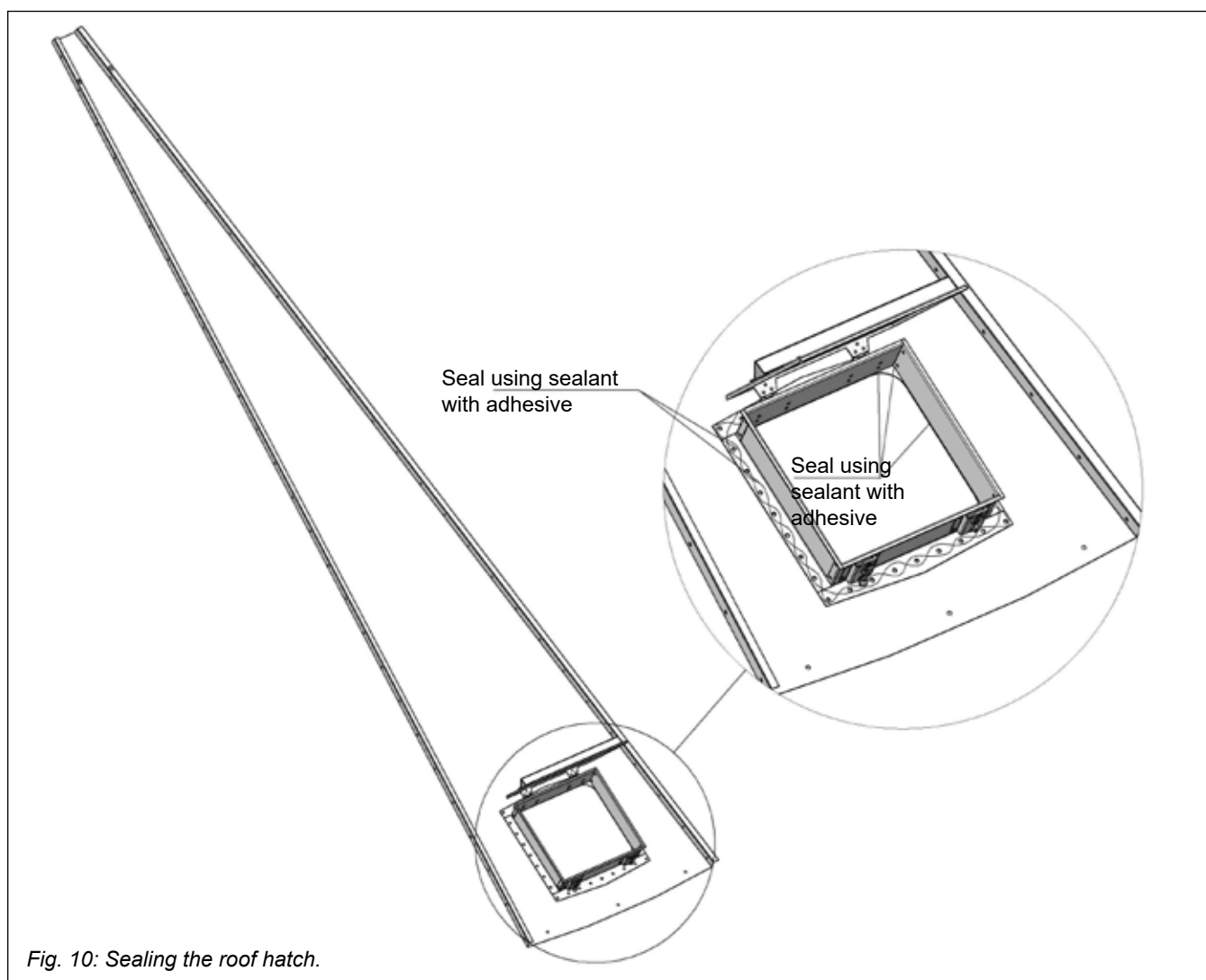
- Install protective collars A77050
- The joint between the roof sections and the protective collar is sealed with foam pieces (115801)
- Install the outermost covers A77047
Note: The outermost covers must also be attached to the lugs in the roof hub.
- On cover A77046 a hole of 250x250 is made and parts 33483 and A77253 are installed (Mounting with M8x25 screws, total of 8 screws)
- Middle cover A77046 is lowered in place
- All connecting surfaces must be sealed very carefully with sealing compound!

Installing the manhole hatch in the roof

For safety reasons, the roof hatch shall be installed under the ladder in the same roof section with the roof ladder.

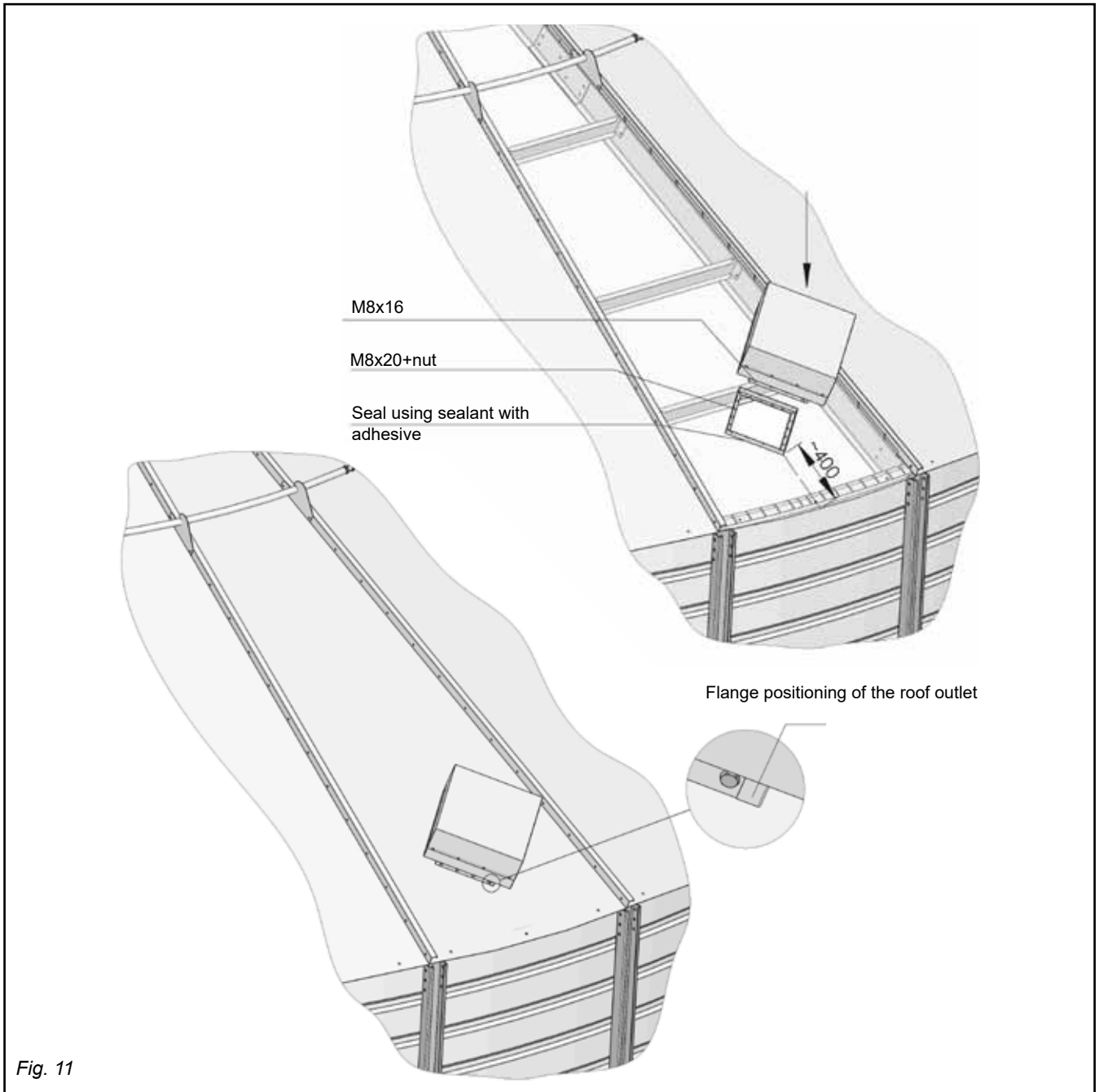
The roof section package includes one different section with ready holes for the manhole hatch.

Fix the hatch using M10x25 laipparuuveilla and apply sealing mastic that contains glue (Fig. 10).



Seal the joint between the manhole hatch frame and the roof section using sealant with adhesive. Apply a run of sealant with adhesive around each hole between the roof section and the manhole hatch frame. After wrenching the manhole hatch tight, seal the lower edge of the roof hatch frame by applying sealant with adhesive on the inside, around the whole frame.

A77382 ROOF OUTLET 270X270 INSTALLATION



The distance of the exhaust air joint from the edge is approx. 400 mm. A hole is made in the roof sector plate and D9 holes are drilled for the mounting screws. The lower flange of the exhaust air joint is used as a template. The exhaust air joint is fastened with M8 screws and sealed with adhesive.

The D12,1 diameter has 4 exhaust air joints if there is no ventilation floor in the silo.
The D12,1 diameter has 8 exhaust air joints if there is a ventilation floor in the silo.

A77004 GRAIN SILO DOOR INSTALLATION

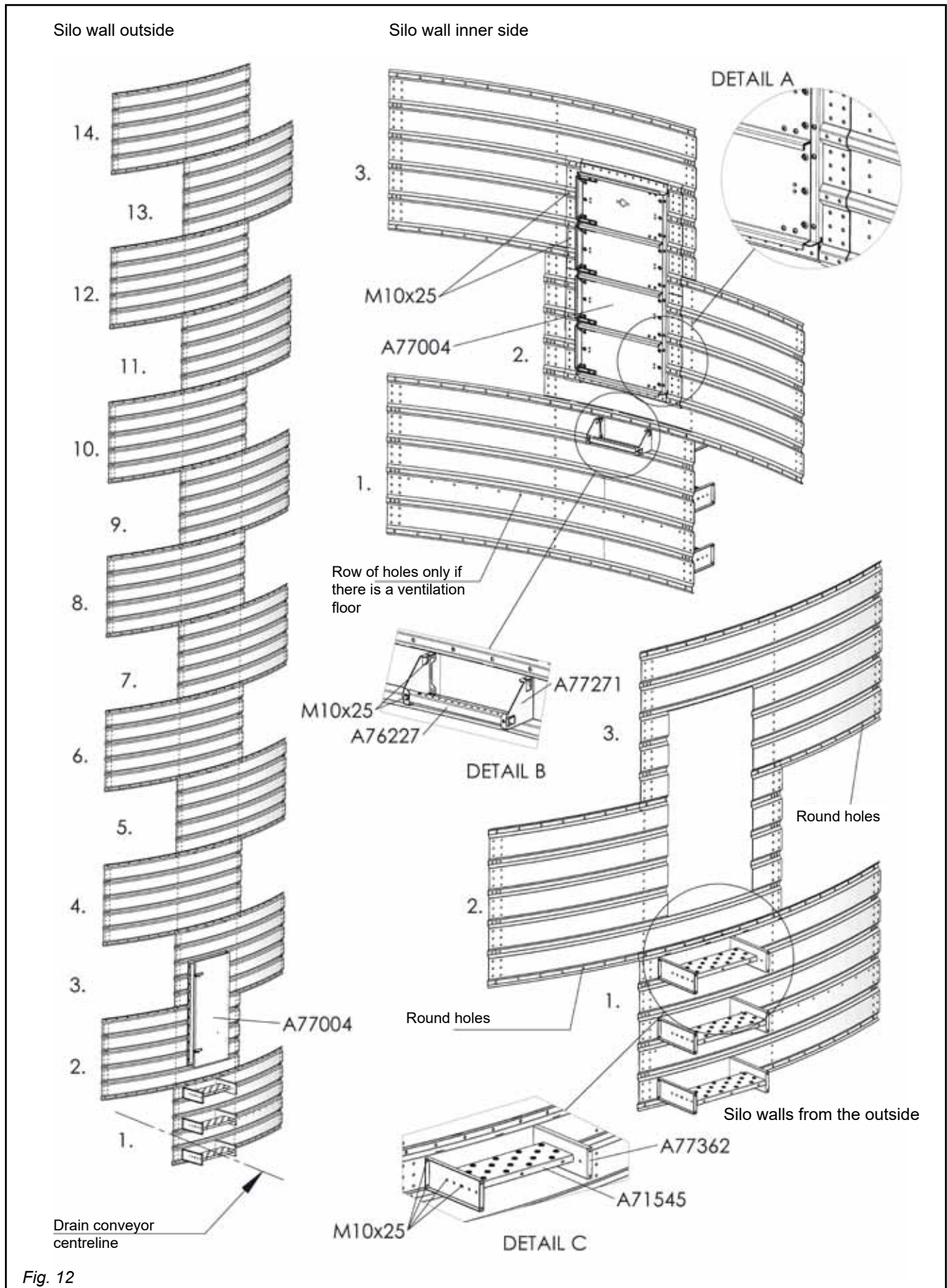


Fig. 12

Item	Denomination
A77271	STEP MOUNT
A76227	LADDER STEP
A77362	PLATFORM MOUNT
A71545	PLATFORM ELEMENT

- A door is installed on the second and third floors of the silo.
- It is strongly recommended that the door is installed in the same position as the emptying conveyor.

(Note: It is important that the wall element of the top level of the silo is correctly positioned in order for the doorway to be fitted to the desired position, cf. illustration)

- The door is installed on pre-opened elements.
- The door is mounted on the inside of the silo.
- The door is mounted with M10x25 flange screws. The joint between the silo shell and the door frame is sealed with butyl compound, which is applied to the joint between the door frame flange and the silo shell.
- The door weighs approximately 95 kg, which should be taken into account in the planning of the installation.
- Note: It is important that the door is installed correctly.(Not upside down!)
- The door is facing the right way when the edges of the inner doors are as shown in the enlarged picture "Detail A".

Installing the following wall panels

To install the following wall panels, you must lift up the silo. Lift the silo about 120 cm at a time to enable easy assembly of the wall panels.

After lifting the silo, fix the second wall row from the top to the lower edge of the topmost wall row (see directions in "Assembling the topmost wall row").

The beams must be distributed so that two element rows can be finished at a time. After that, install the respective beams in place. For the strengths of the vertical silo supports, see Figures 13a1 and 13a2 at the beginning of the main instructions. Spread sealing mastic around the holes behind the beams. Do not forget to leave the hole row at the beams without bolts to avoid unnecessary work.

Fix the beams to each other using extension pieces. All the extension pieces are similar even though the material thickness of the supports varies. Tighten the struts to their prescribed torque (50 Nm for M10 flange bolts). You cannot place the extension pieces between the vertical supports afterwards, so put them in place during assembly, before installing the next strut on the underside. The vertical seams of the wall rows fall in the middle of the plates in the upper row (Fig. 14).

Install the elements so that the middle hole row of the wall panel on the upper side always aligns with the innermost bolt hole row on the right-hand side of the wall plate to be installed, that remains visible. The installation of the elements must proceed clockwise. The supports shall be installed in every row. Observe that the thickness of the supports varies between the rows.

See the figure at the beginning of the main instruction for the strengths of the vertical supports in the silo. The strengths of the vertical supports are shown on the right side of the image.

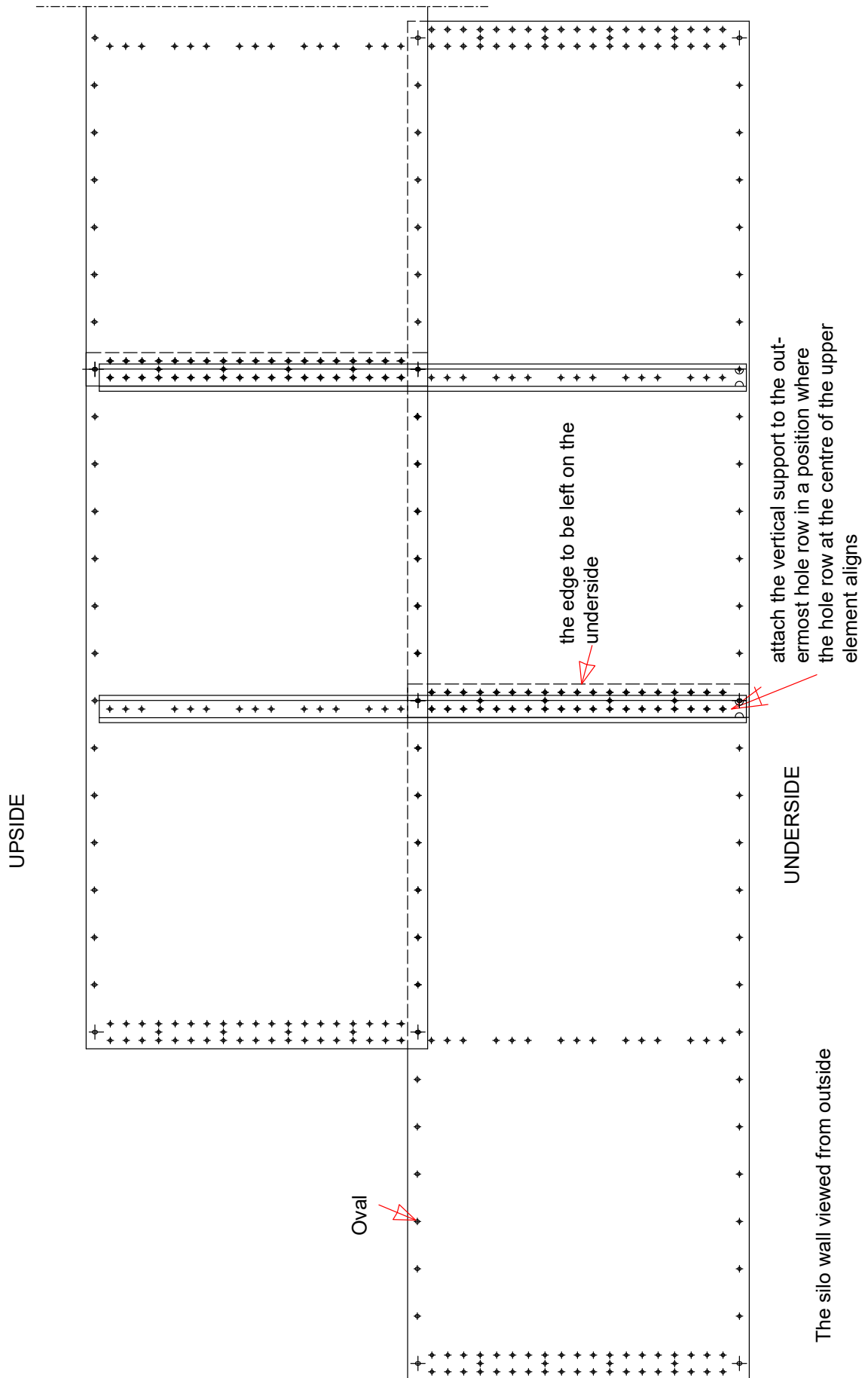


Fig. 13a1: The silo wall viewed from outside

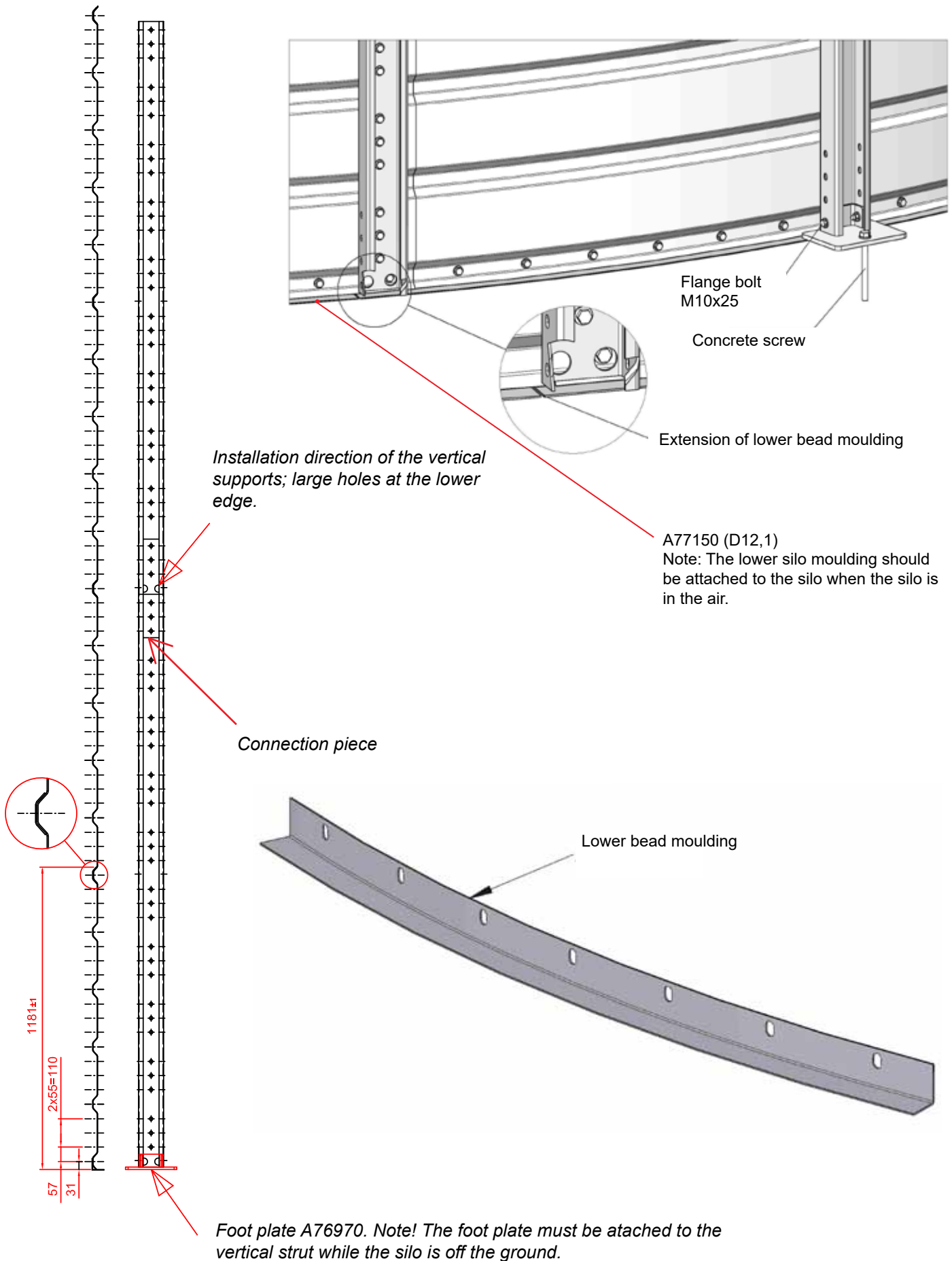
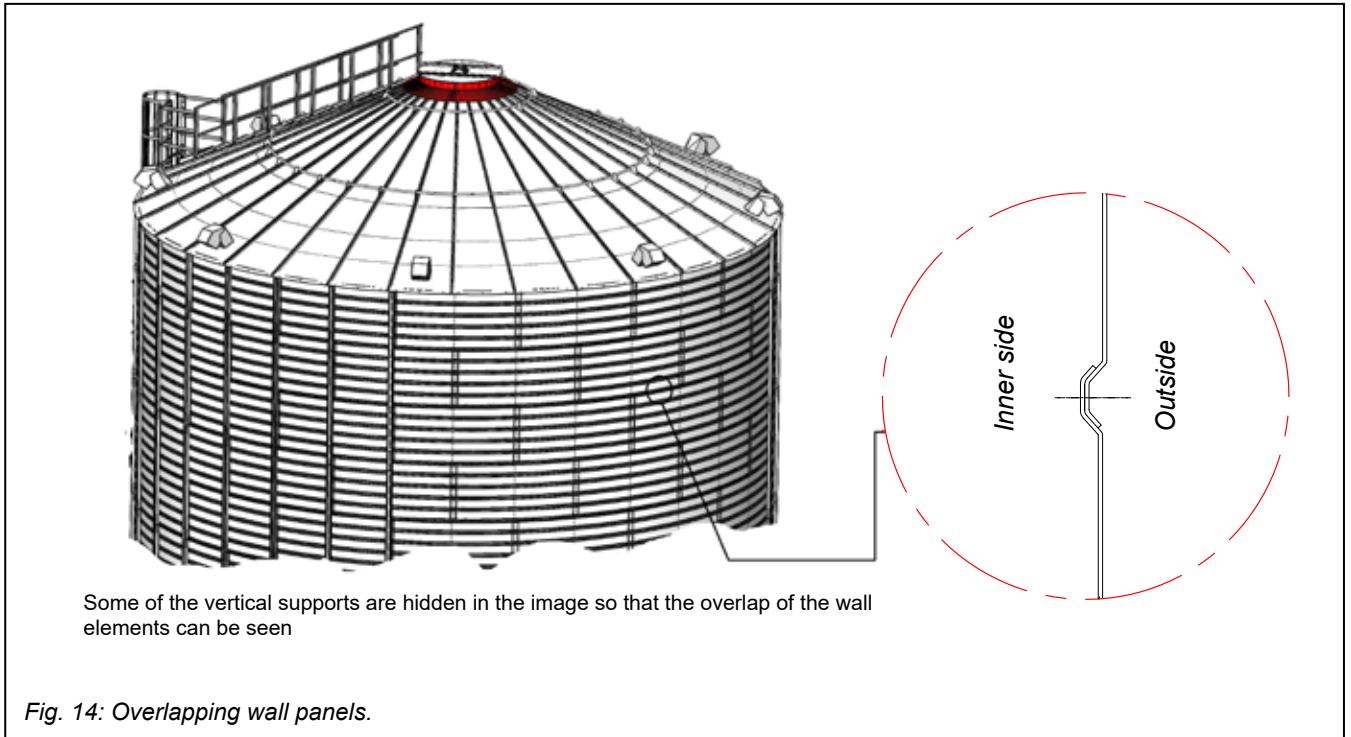


Fig. 13a2: The support viewed from the front.



Note! Be careful not to mix up supports of different material thickness. To avoid mixing up the supports, keep them in different stacks.

See the figure at the beginning of the main instructions for the strengths of the vertical supports in the silo. The strengths of the vertical supports are shown on the right side of the image.

Pay attention to material strengths of the wall elements to avoid confusing them with each other.

Refer to the figure at the beginning of the main instructions for the material strengths of the silo's wall elements.

The vertical supports should be positioned so that they extend in the same way on all sides of the silo, so that all the foot plates (A76970) are fixed as evenly as possible after the silo has been lowered against the concrete foundation.

Attaching the ready-assembled silo to the foundation.

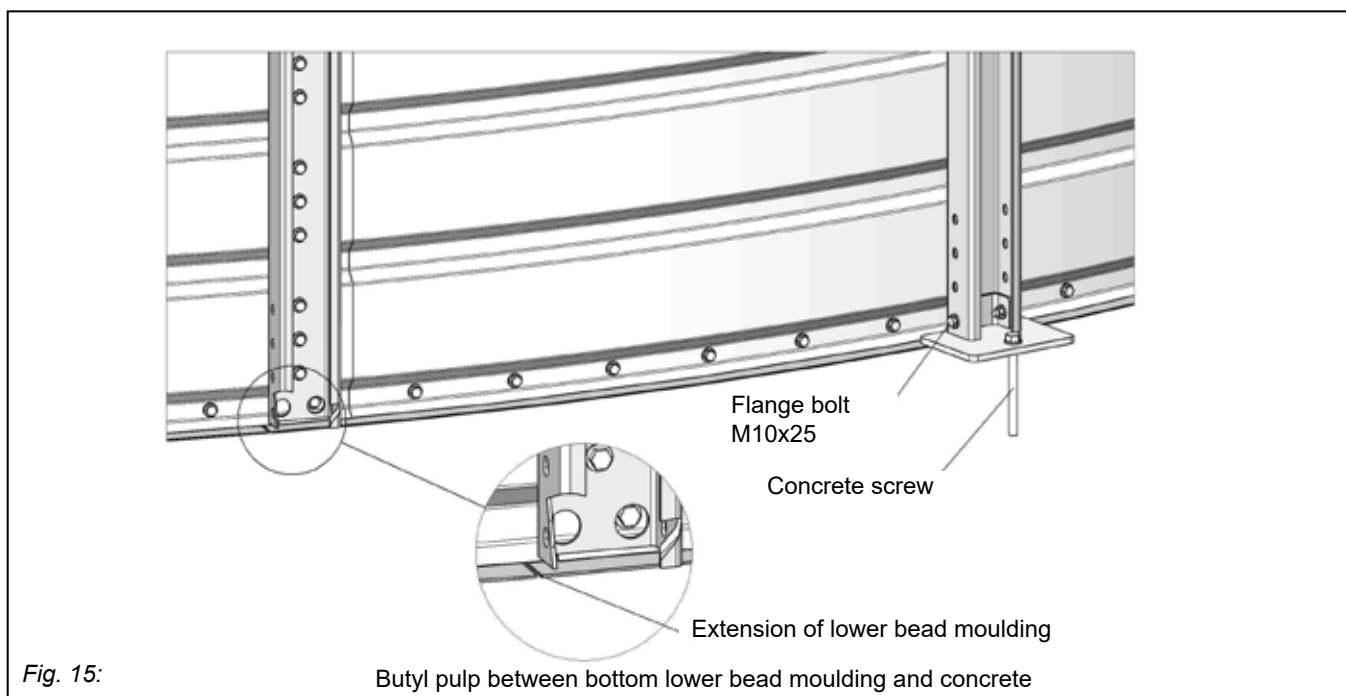
As soon as all the wall plates are in place and the assembly of the silo is completed, lower the silo onto the concrete foundation. If the height is not correct, use shims between the foot plate and the concrete. **Note! The foot plates must be attached to the vertical struts of the silo before the lowering!**

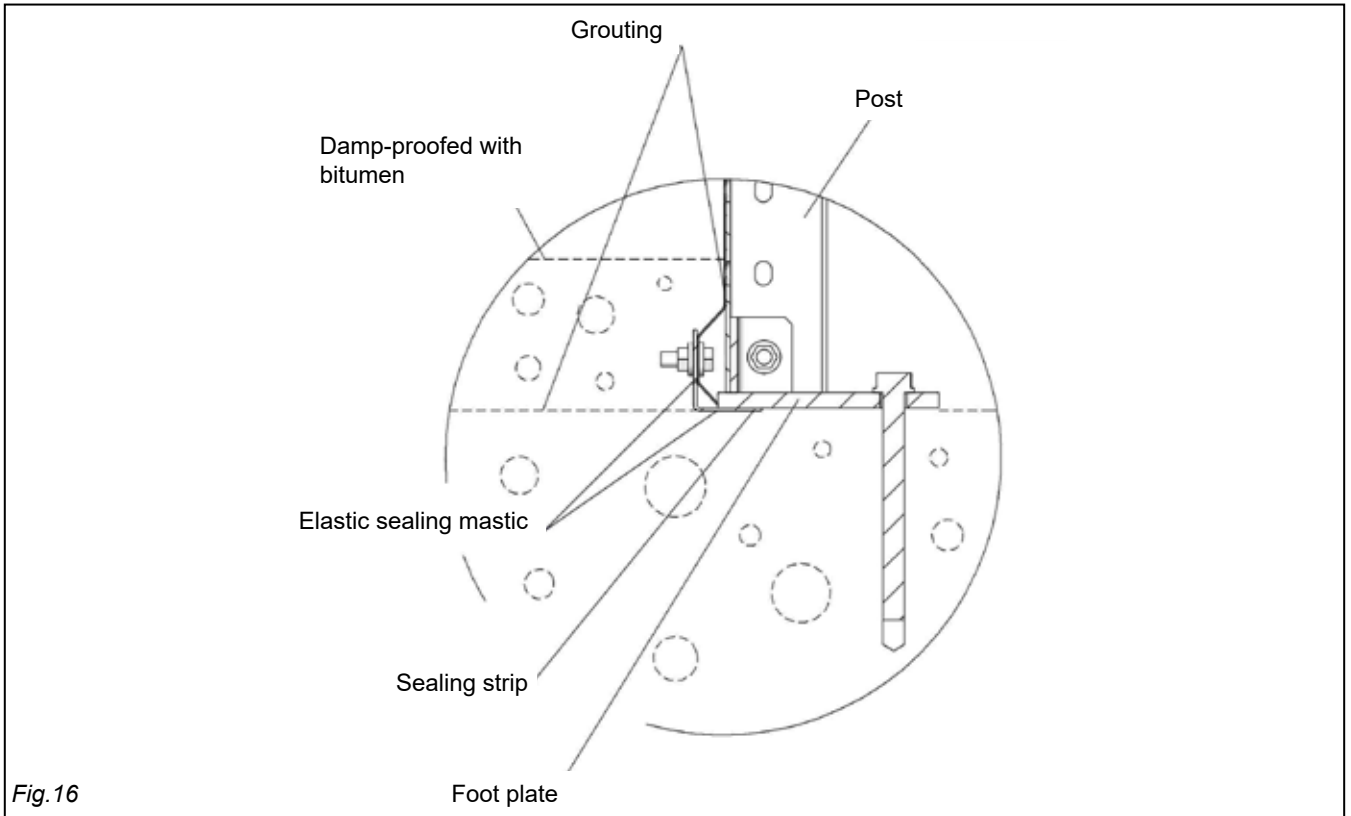
Attach the foot plates to the concrete foundation by using M14x150 concrete screws, 1 anchor/plate. Drill a D14 hole, 155mm deep for the concrete screws. Clean the drilled hole before installing the concrete screw (*Ensure that the concrete foundation has become sufficiently hard after the casting to provide firm attachment of the concrete screws*).

Concrete screws are included in the basic bolt package delivery for the silo.

Seal the lower edge of the silo jacket using lower bead moulding. Attach the lower bead moulding to the silo jacket by the hole row in the jacket using M10 bolts. Apply butyl compound between the lower bead moulding and the concrete as well as between the lower bead moulding and the silo jacket to achieve sufficient tightness.

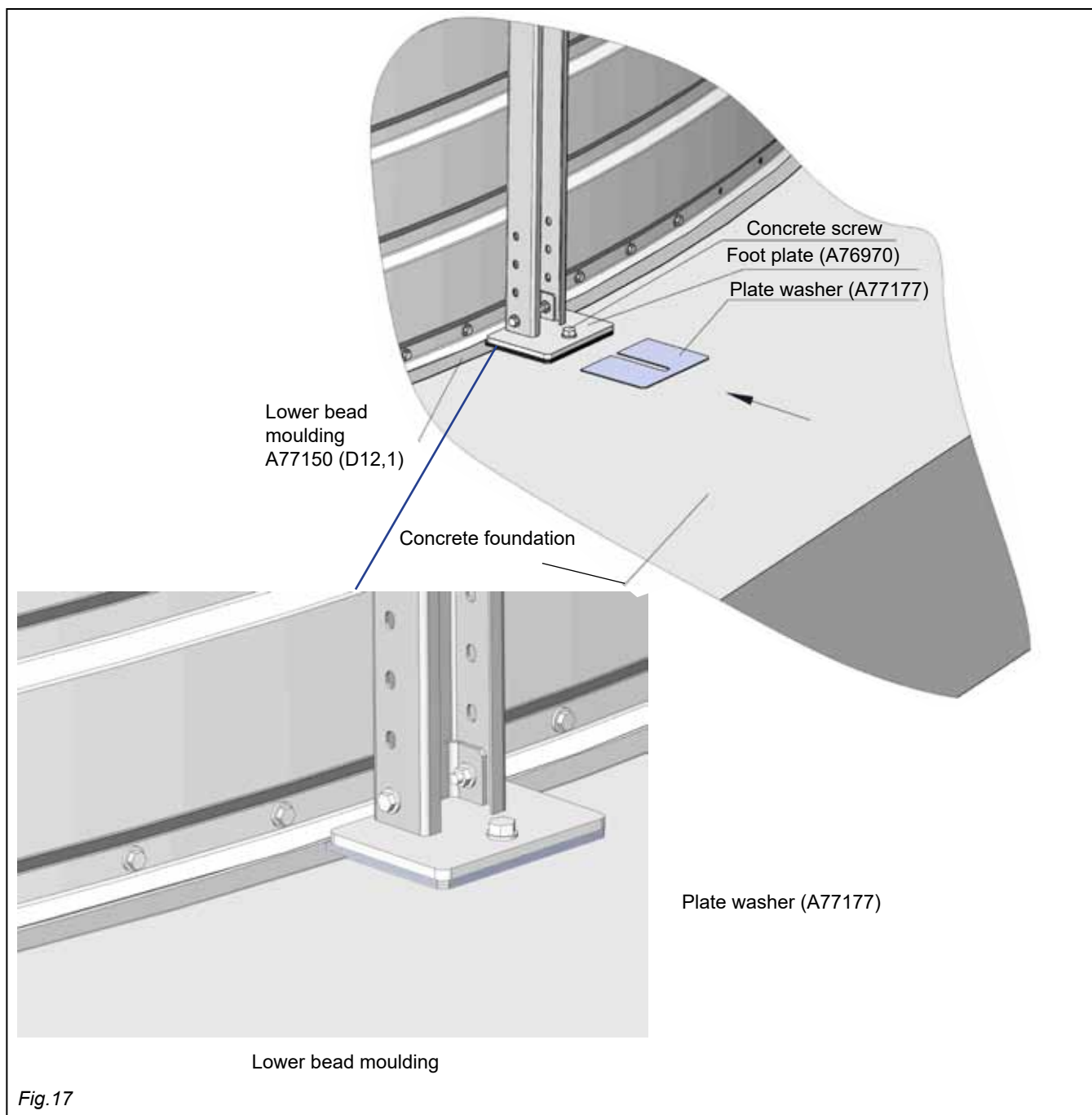
If the silo type structure requires regrouting on the bottom grout, insulate the contact surface between the base concrete and the surface concrete by applying a damp-proof course. The damp proofing with bitumen must be carried out before concreting the surface. The hot-galvanised metal parts, which remain under the surface concrete, must also be damp-proofed with bitumen. Fresh zinc, which has not been passivated yet, reacts with the ingredients of the concrete, and as a result, causes corrosion. For this reason, the parts covered by concrete must be protected. Refer to the standardised structural drawing and the details in it for more detailed information about the objects to be protected. No grout is required on a silo with a ventilation floor.





A silo with a ventilation floor does not have grout.

Elimination of gaps when fixing the silo



- There must be no clearance (gap) between the support plate and the concrete foundation
- If necessary, any clearance is removed by placing the required number of shims under the support plate A77177
- The support plate should be supported over its entire surface area (see figure 17)
- If the supplied number of shims is not sufficient, you will need to purchase an additional quantity of the same type

Attention must be paid to the silo's roundness during fixing

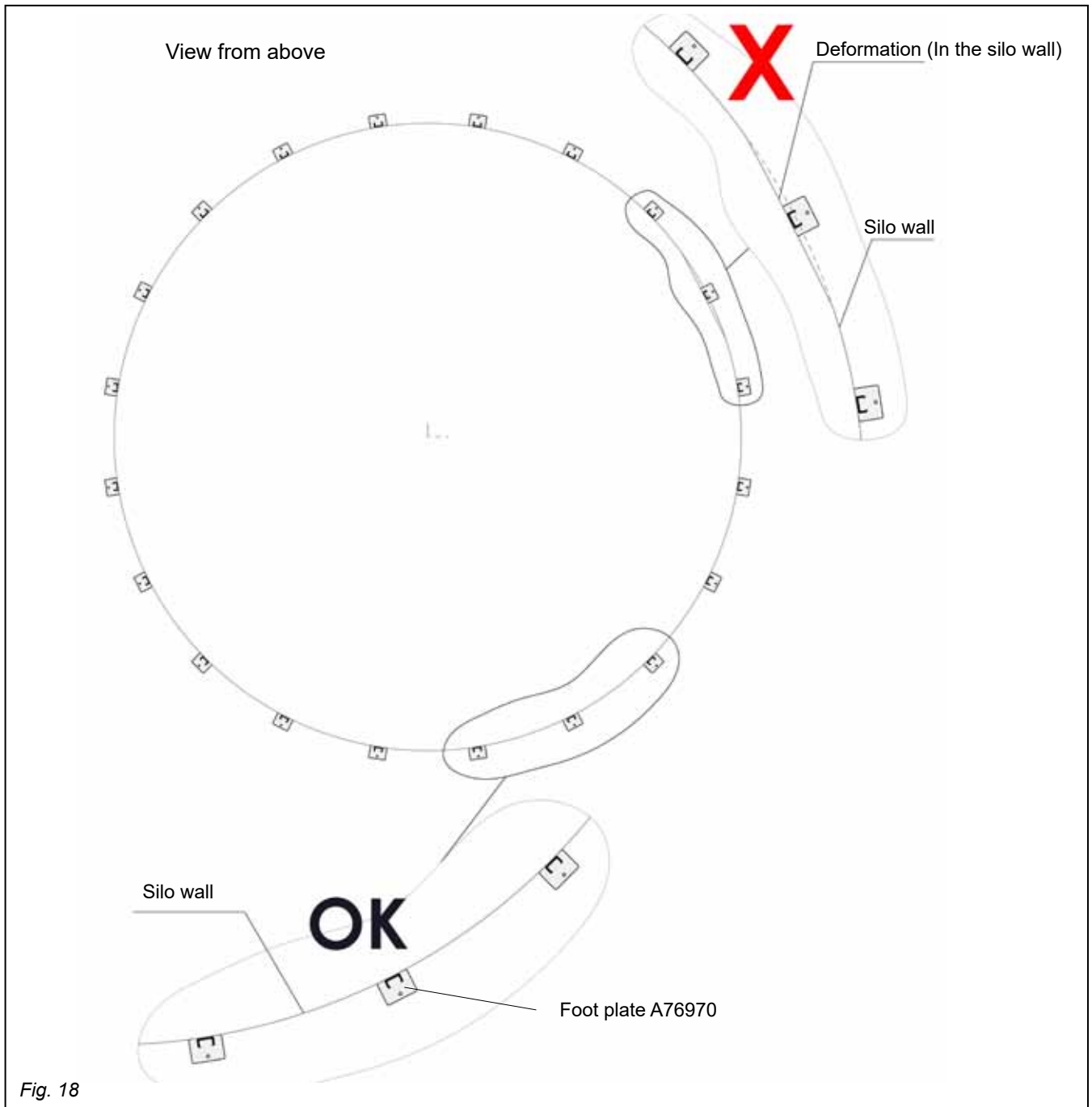


Fig. 18

- The support plates of the silo should be fixed so that they are as close as possible to the same radius of curvature.
- In particular, a situation should be avoided where the vertical support is too much inside, causing a deformation to the silo as shown in the picture.
- A deformation may cause a situation where the vertical supports bear uneven loads

FILLING AND EMPTYING THE SILO

When the silo is full, its integrity is based on even loading. It is, therefore, very important that the grain will spread evenly inside the silo during the filling and emptying phases. This helps prevent uneven loading. In the centre cover A76021 of the roof, which is the standard feature of the silos, the silo is filled through the filling opening, where the FY250 vertical pipe directs the grain to the centre of the silo.

The projecting part of the pipe is formed to take D250 quick-fastener that enables connecting of other conveyor pipes.

The central filling of the silo must be ensured. Part A77253 should always be installed, even if modification part 33483 is not used.

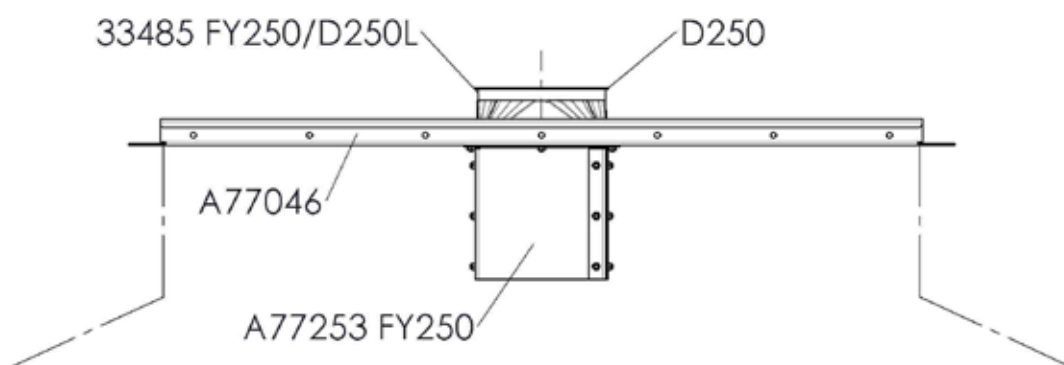


Fig. 19: Filling the silo