HORSELEY BRIDGE TANKS™

INSTALLATION MANUAL FOR PRESSED STEEL SECTIONAL TANKS

Over 120 years

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Introduction

These instructions are to be read in conjunction with any erection drawings and supplementary instructions issued for a particular contract.

Preliminaries

1 When materials are received on site, sort the components according to type marks and check them against the material/shipping lists and advice notes. Discrepancies should be reported immediately quoting the contract reference and identification marks of the items concerned.

2 Before commencing erection, ensure that grillage, dwarf walls or piers are square located at the correct centres and are level both collectively and individually within the tolerances specified on the drawings.

3 It is recommended that dwarf walls supporting tanks three or more plates deep should be capped with flat steel strips to give an improved bearing surfaces. (See fig 19)

4 Read the notes in paragraph 27 before erecting tanks with division plates.

5 Ensure that flanges are dry, clean and free from grease before applying jointing material.

Tank bottom assembly

6 Refer to the marking plan and select a row of plates located along the supports at or near the centre of the tank. Position the centre plate of this row accurately and proceed as follows.

7 Apply rubber jointing strip to the two opposite square flanges of this plate. The strip should return round each corner to the first bolt hole on adjacent flange. (See fig 20)

Position the strip centrally along the line of the bolt holes, push bolt with washer through the pre-punched hole leaving thread protruding. (See fig 21) The returns at each corner should similarly be held in place with bolts inserted.

Plate assembly

8 Position the two adjacent plates which are to be fixed to the two flanges just prepared, and ensure good alignment before entering the M12 seam bolts. Each bolt should be fitted with 30mm diameter plain washers under both head and nut and the nut must be made finger tight only at this stage – do not tighten with a spanner yet. (See fig 22)

Figure 18
Typical tank plate

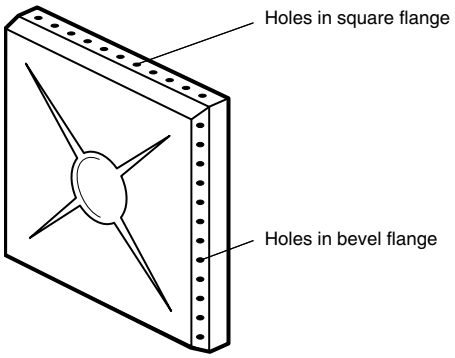


Figure 19
Dwarf walls & piers

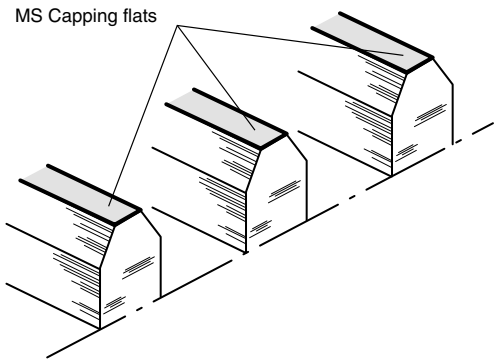


Figure 20
Rubber joining strips

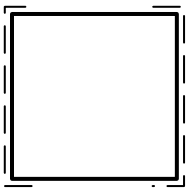
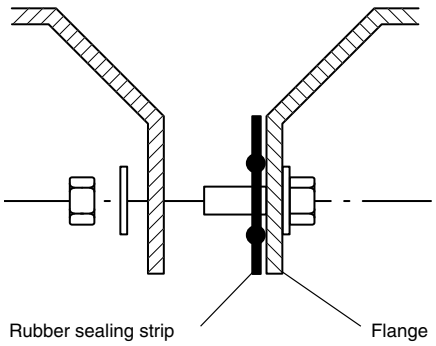


Figure 21
Rubber sealing strips



9 Apply rubber jointing strip to one flange only of the second plates as previously described in 7 (See fig 22). Repeat the procedure for the remaining plates in the row.

10 Now that the first row of bottom plates is assembled, check the following points:-

- All plates are accurately located on the supports
- One length of jointing has been inserted at every flange joint
- All bolts are finger tight only

11 Arrange the second row of plates adjacent to the first row leaving sufficient space for access between the mating flanges. Apply one continuous length of strip to the mating flanges of the first row of plates (Fig 23). Insert seam bolts as previously described.

Apply strip to second row plates as in fig 23. Return each strip round corner to first bolt hole.

12 The first plate of the second row can now be bolted in position. Locate this plate accurately before inserting the M12 seam bolts. Use the pointed ends of spanners or drifts to facilitate accurate positioning. Leave bolts finger tight as before.

13 Fit the next and subsequent second row plates.

14 When bringing plates together, ensure that jointing strip is not dislodged.

15 Repeat the above procedures for the remaining second row and all subsequent row of plates, always starting at the centre of each row and working outwards in both directions to complete the bottom. When the base is completely laid all seam bolts to be partially tightened to draw joints together. Do not fully tighten at this stage.

16 At the four plate junctions seam bolts should be arranged as shown in figure 24 to improve access for tightening at the corners.

17 Fit the stay cleats (See Appendix A) and joint covers in the tank bottom as follows:-

Apply a double thickness of 45wide x 45long mastic jointing material (P61) centrally over each bolt hole at the four plate intersection. Roll the same mastic strip into a ball approximately 70mm diameter and knead into four plate intersection. (See fig 25)

Figure 22
Position of tank plate

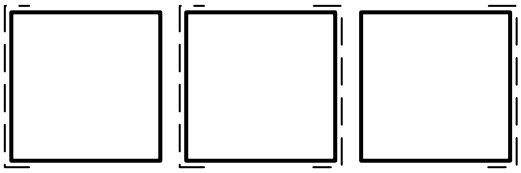


Figure 23
Position of tank plate

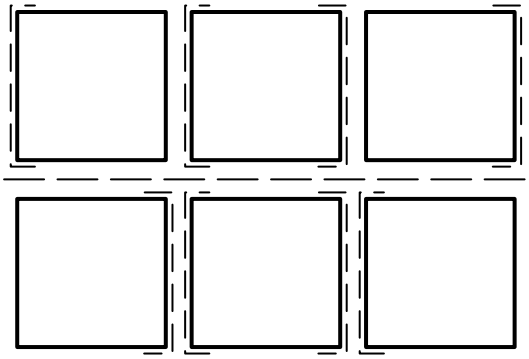
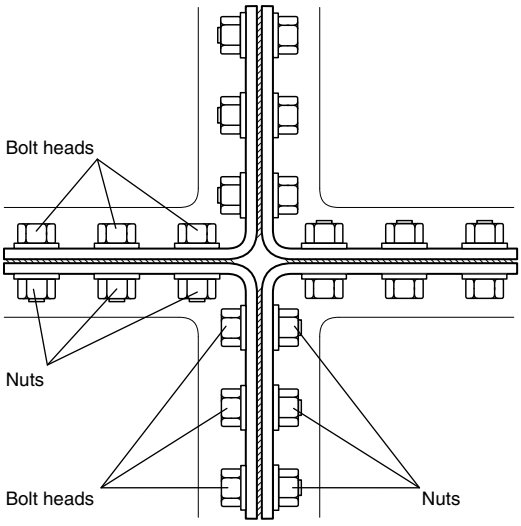


Figure 24
Arrangement of seam bolts



Place the cleats and covers over the prepared positions in the precise locations given on the marking plans. Each cleat and cover is secured with four M20 size 8.8 bolts which are fitted as follows.

To each bolt, fit a Ø45mm steel washer and a compound grummet (made by cutting narrow strips from jointing material and rolling them to form a ring around the bolt shank).

Insert the bolts from inside the tank, and on the outside, fit a further compound grommet, a steel washer and finally the hexagon nut. Fig 26.

Progressively tighten the four M20 bolts, ensuring that the cleat/cover is drawn down level and parallel to the tank plate by tightening diagonal bolts, until the cleat/cover is firmly bedded down.

However, do not torque the M20 bolts at this stage. When fitting stay cleats ensure that the blade lies in the correct plane to engage the angle stays which will be fitted later.

18 The whole of the tank bottom is now assembled and seam bolts partially tightened. The following points however, are worth repeating.

a Ensure that parts are located as shown on the marking plans

b At all stages of assembly, check for correct positioning and alignments of plates on supports – correct any misalignment immediately

c Check that only one length of jointing strip has been placed between each pair of flanges

d Ensure that the mastic ball is fitted under each cleat and joint cover

e All surfaces in contact with jointing material must be clean, dry, free from grease, dirt, loose scale etc

Erection of tank sides

NB. If tank is fitted with a division, read paragraph 26 before proceeding further.

19 Commencing at one corner of the tank, fix rubber strip to the exact profile of both level flanges on the bottom plate ensuring match of pre-drilled holes in strip to holes in plate.

Figure 25
Stay cleats and joint covers

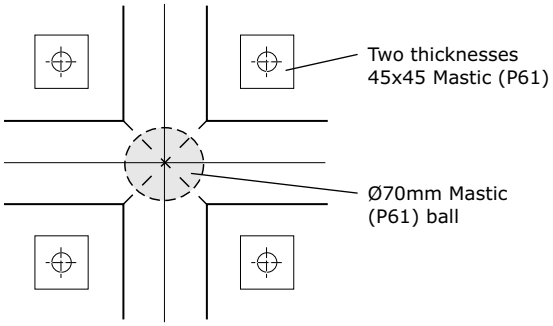
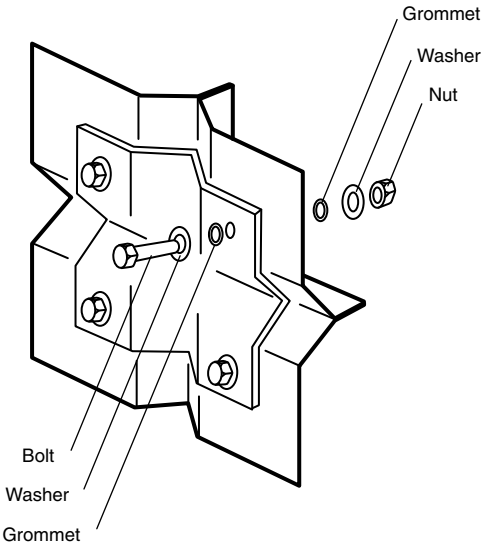


Figure 26
Bolt insertion inside tank



Rubber strip should follow this profile

Fit the M12 seam bolts, including washers, exactly as shown in fig 21.

Lift the first corner side plate into position taking care not to dislodge the jointing. Locate with drifts or spanner ends if necessary. Fit nuts and washers and leave finger tight.

20 Fit jointing strip to the vertical bevel flange of the first side plate at the tank corner, mitring each end and positioning bolt assembly as before.

21 Lift the adjacent side plate into position to form the first corner, insert the bolts but leave finger tight only.

22 Fit jointing strip to the vertical square flange of one corner plate and to the bevel flange of the adjacent bottom plate, inserting bolt assembly as before. Position the next side plate, insert the M12 seam bolts and finger tighten. (Fig 27A)

23 Repeat operation 22 around the tank (with operations 19, 20 and 21, at the second and third corners) until the fourth corner is reached. At this point go back to the first corner and work in the opposite direction to the finish of the fourth corner and complete the first tier. (Fig 27)

Partially tighten only seam bolts to draw joints together. Do not fully tighten at this stage. Corner blocks should now be fitted as in paragraph 24.

24 A corner block consists of two parts, one for the tank interior and the other for the tank exterior, as shown in fig 28. Figure 28a shows its actual installation.

- Wrap 10mm wide strips of P61 sealing strip around corner block

  Appropriate sealer length is about 50cm per corner block. Do not allow dust to be deposited on sealer

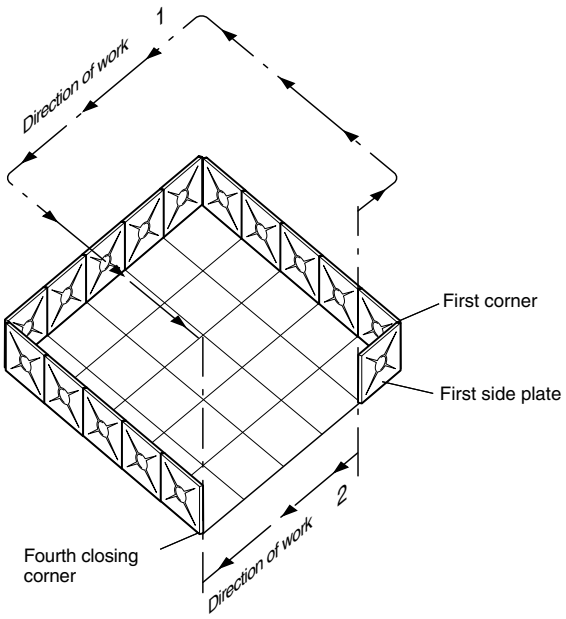
- Clean each corner block mounting are completely, removing any grease or dust

- Cut off protruding portion of the gasket, using a knife

- Insert the inner block from the interior of the tank

- Drive inner block lightly into position using wooden hammer or similar tool

Figure 27
Erection of sides



Erection of sides (First tier)	Commencing at first corner, erect all side plates up to fourth corner (Sequence 1). Return to first corner, and working in opposite direction, erect fourth side to close at fourth corner (Sequence 2)
Subsequent tiers	Follow above procedure for each tier in turn

Figure 27a
Jointing strips

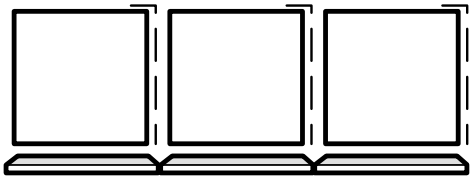
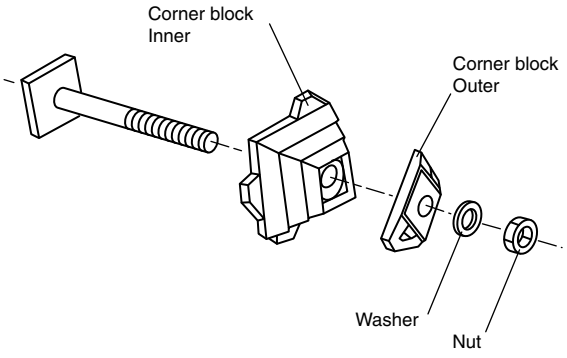


Figure 28
Corner block



- After insertion of inner block, fix outer block using the outer block nut

25 At the four bottom corners of the tank, where the side plates meet the bottom plates at right angles, corner cleats type CC have to be fitted inside the tank. Cover the contact faces of the cleats with jointing strip, fit the cleat into the corner and insert the three M20 bolts provided from inside the tank. These bolts should have steel washers, and compound grommets arranged exactly as Paragraph 18. Tighten M20 bolts as described in Paragraph 18 until cleat is bedded down and bolts are equally and fully tightened. Figure 29.

NB. Preceding paragraphs have dealt with the basic procedures which apply to all tanks up to the first tier level. At this stage all bottom and first pier plates have been assembled. The M12 seam bolts partially tightened only to pull joints together and the M20 bolts for stay cleats, joint covers. 'W' plugs and corner cleats should have been tightened sufficient for bedding cleats only.

The sections which follow, deal with specific additions to basic instructions to suit type and depth of tank being erected and must always be read in conjunction with the earlier paragraphs.

Tanks with standard divisions

26 Divisions consist of modified standard tank plates and are erected simultaneously with and in a similar manner to the side plates. Before the erection of any division plate, all bolts in the tank bottom seam immediately beneath and in the line of the division must be fully tightened.

The erection of the division plates can now proceed, tier by tier, with the side plates.

On the plain side of the division, fit the stay cleats as described in paragraph 18 including rubber plugs.

Where stay cleats occur on the flange side of the division, they are attached to the division flanges with slightly longer seam bolts. At these locations fit the small angles 'CD' using the longer bolts at the same time as standard bolts are being fitted. Figure 30.

On the plain side of the division at the junction of two division plates and two bottom or two side plates, fit the joint cover 'Y' as indicated on marking plans.

Figure 28a
Corner block installation

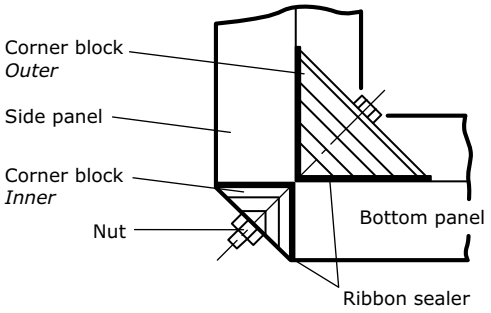


Figure 29
'CC' corner cleat

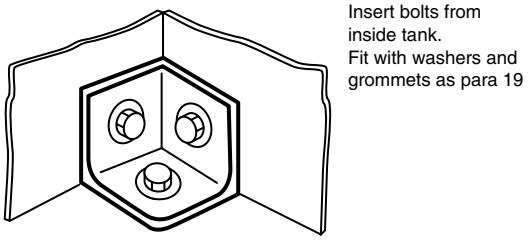


Figure 30
Typical stay cleat connection to flange side of division plates

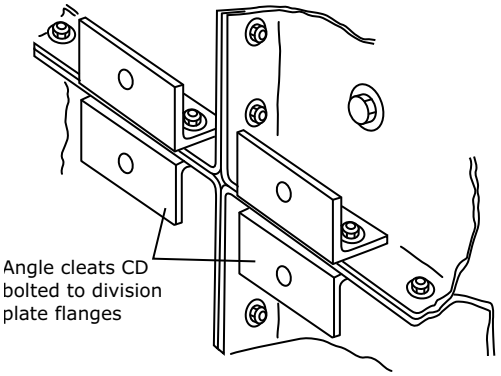
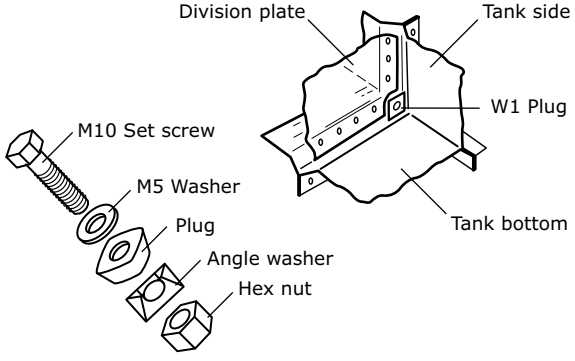


Figure 31
W1 type plug assembly



On the flange side of the division at the junction of two division plates, fit the half joint cover JCI as indicated on marking plans, in same manner as described in Paragraph 17.

Where the division forms with the sides and the bottom plates a 'W1' type plug assembly is provided. Coat the round washer and lead plug and bolt shank with joint material, fit the round washer and plug to the bolt and insert from the division flange side into the junction of the side and bottom plates. Ensure that the bolt is driven well into position and the plug is seated correctly before fitting the nut on the outside of the tank. Figure 31.

DO NOT OVER TIGHTEN

Finally, on the plain side of the division at these corners, fit the corner cleats type 'CC' exactly as previously described in paragraph 25. Figure 29.

Tanks of two or more plates deep

27 Complete the assembly of the tank bottom, the first tier of the side and where applicable the first tier of the division.

The second and subsequent tiers of side plates (and division plates) can now be erected by following the sequence previously described for the first tier. Each tier in turn. Position the rubber jointing strip as fig. 27B.

Stay cleats, joint covers JC, 'W' plugs should be fitted as described with bottom and first pier.

When all the sides are complete, continue fixing the top cleats and their associated stays in position (Figure 33). Jointing material is not normally required on top edge cleats as they are located above top water level. Seal any holes left in the tank or division plates after the cleats and joint covers have been fitted with plug bolts. (Where noted on marking plans) Plug bolts are standard hexagon headed bolts and are fitted with washers, and compound grommets exactly as described in paragraph 17.

Final tightening of the tank bolts

28 The final tightening of bolts previously partially tightened can now be carried out.
At all stages of this operation, check that individual bolts do not become loose during tightening of adjacent seams. Check for correct alignment of plates during the tightening procedure. Minor adjustments can be made by tightening a few bolts out of sequence if necessary.

Figure 32
Typical staying arrangement

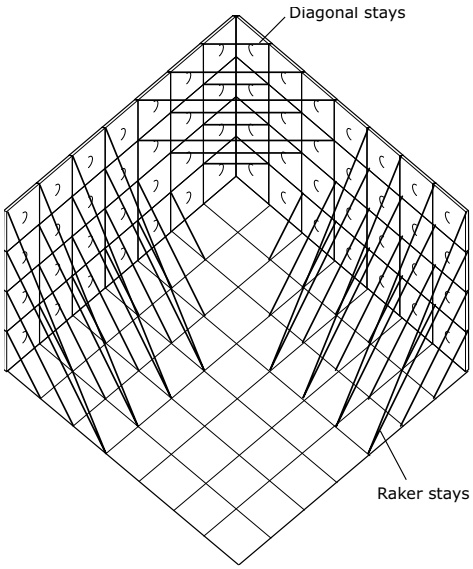


Figure 27b
Side plate erection

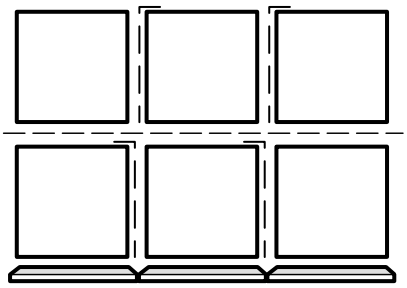
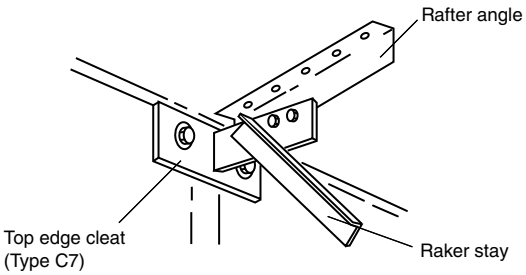


Figure 33
Typical top edge cleat with rafter and stay



Commencing at or near the centre of the tank and at the centre of the span, tighten all seams in the tank bottom in turn, working outwards towards the tank edge. Each individual seam between intersections should be tightened starting at the centre of the plate and working outwards each way to the adjacent intersection.

First tighten the rows running across the tank width (Items 1, 2 and 3 in figure 34) and then those along the length (Items 4 and 5). Tighten all stages, proceeding always along each flange line before starting the next. Do not tighten the bolts connecting the tank sides to the bottom (Item 7, figure 34) at this stage.

After tightening the tank bottom seams, continue by tightening the side plate seams as follows:-

Starting at the centre of the tank, vertical seams (Item 6, figure 34) should be tightened as previously described for bottom, working outwards to sides.

Now tighten the horizontal tank bottom side plate seam (Item 7).

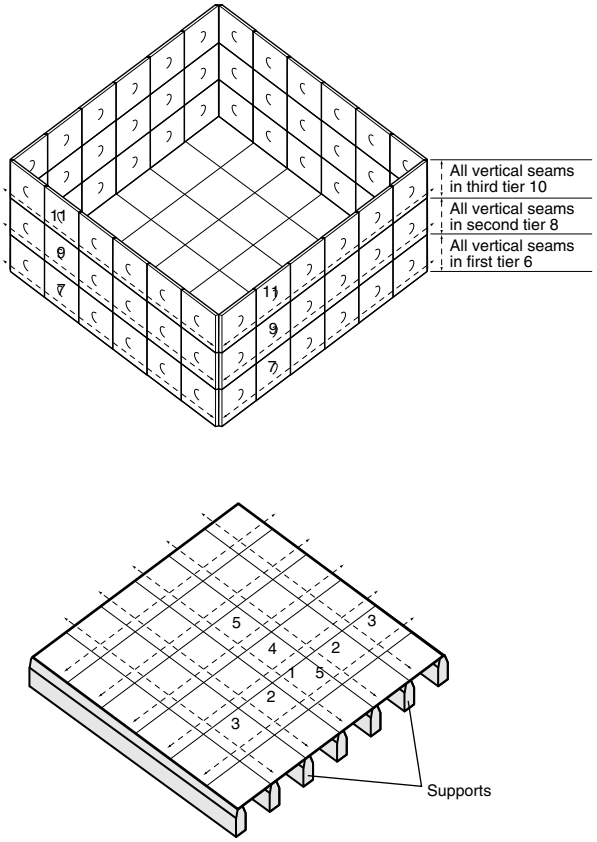
If the tank is more than one plate deep, continue by tightening the seams in the sequence shown in figure 34 Sides (Item 8, 9, 10, 11 etc.). Always start at the centre of individual joint working towards intersections. All seams should now have been finally tightened.

Stay cleat and joint cover M20 fixing bolts previously tightened should now be finally tightened to a torque of 450 Nm (330 lbs/ft).

Finally tighten al top edge cleats, stay to cleat connections. It is strongly recommended that all bolts are checked again to ensure that individual bolts have neither been missed nor loosened during tightening adjacent seams.

Figure 34

Tightening sequence for tank seam bolts



Finishing off

29 When all bolts are tight, surplus sealant on the outside should be trimmed back to the flange.

Covers general

30 On the tanks with flat covers the supporting steelwork replaces the normal top edge stays, and these tanks must not be used as open top tanks without additional staying.

Pitched covers slope at 1 in 12 and are provided with gable end filters. The cover plates supplied

for both types of roof are interchangeable and have bolted lap joints sealed by means of 45mm wide jointing strip. Manholes are supplied if specified – standard manholes being integral with cover plates.

Erection of a flat cover

31 Complete the tank erection as for the open top tank, but fit the cover supporting steelwork instead of the top level staying. Lay the cover plates in accordance with the erection drawings and marking plans, inserting a length of the 45mm wide jointing strip at each lap joint between plates and between the cover and tank top.

Perforate the strip at the bolt holes. Insert the M10 bolts downwards, fitting one of the large diameter washers (Ø24mm) under both head and nut. Do not tighten these bolts until the complete cover is assembled. Minor adjustments can be made if necessary, prior to finally tightening the bolts.

The hole in the top corner by the side plates and cover should be filled using a piece of P61 Mastic Strip rolled into a Ø20mm sausage and pushed hard into position to seal aperture.

Additional fittings

32 Additional items such as ladders, balconies, hand railing, level gauge and pipework can now be fitted. If supplied with the tank, full details of these will be given on the erection drawings. Standard ladders are bolted to brackets at the tank top and when fitted internally the bases engaged on pegs welded to the tank bottom. External ladders are usually secured to the tank side wall.

Painting and testing

33 Where required, site painting should be carried out promptly after the completion of erection and the tank should be tested as soon as possible afterwards. Test by filling to capacity with water and allow it to stand for at least seven days before making any remedial adjustments which may be necessary.

NB. Tanks should be filled and tested within 28 days of completion.

Appendix A Figures 1-15

Figure 1
Joint cover JC

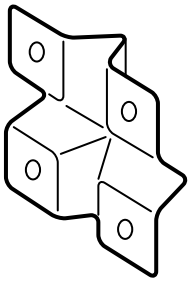


Figure 2
Cleat C1
Cleat C2 & C3 similar but 3 hole blades

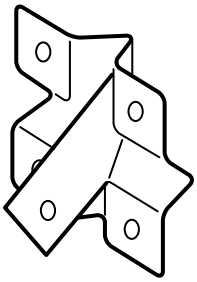


Figure 3
Cleat C4
Cleat C5 & C11 similar but 3 hole blades

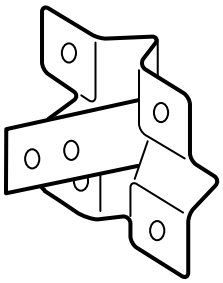


Figure 4
Cleat C6

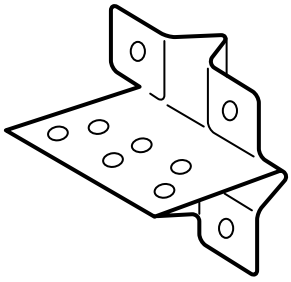


Figure 5
Cleat C7
Cleat C7X opposite hand

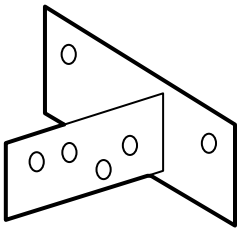


Figure 6
Cleat C8

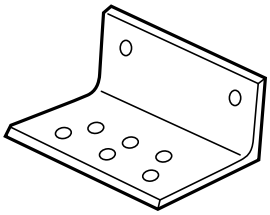


Figure 7
Cleat C9
Cleat C9X opposite hand

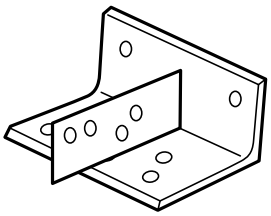


Figure 8
Cleat C1D
Cleat C2D opposite hand

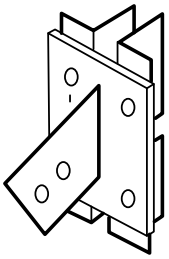


Figure 9
Cleat C1D
Cleat C2D similar but 3 hole blades

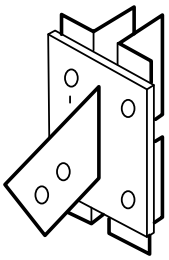


Figure 10
Cleat 6D

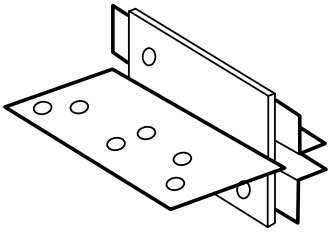


Figure 11
Cleat C7D

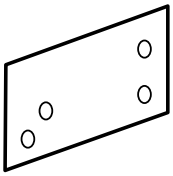


Figure 12
Cleat 8D

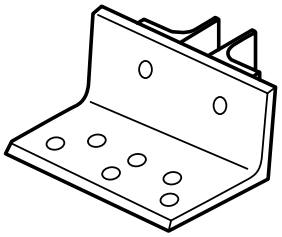


Figure 13
Corner cleat CC

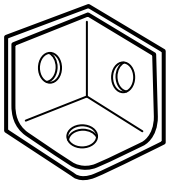
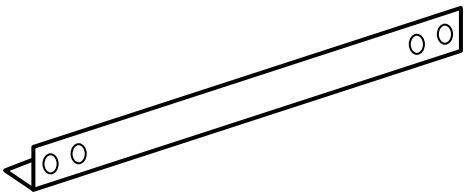


Figure 14
Raker stay



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