

Fleurie Nursery, Lake Lane, Barnham
Drainage system - Annexe

Annexes.

- 1 Documents: ADC Drainage Officer Recommendation and Requirements 20.6.2022 and email 15.1.2021
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Annexe 1.

1a - ADC Drainage Officer Recommendation and requirements

20.6.2022

WA/75/22/DOC

Infiltration has previously been discounted and agreed with the council.

A proposed drainage strategy for the whole site and some detailed information has been provided. As has a verification report for a first phase of development (installed).

At this time, **we do not** recommend discharge of conditions until the following has been provided:

- 1) The applicant should confirm the SPR value used for the IH124 greenfield runoff rate calculations as this does not appear to be stipulated in the report.
- 2) The drainage strategy included within the FRA provides storage volumes for the site as a whole but does not detail exactly how volumes for each tank have been calculated and whether additional calculations (not submitted) have been carried out. We require:

Calculations to be carried out for each tank to confirm the following.

- The upper orifice plate will not activate when the tank is filled by rainfall events less than the 1:30 year storm (i.e. it is only activated for higher return period rainfall events). This requires calculations confirming the water level within each tank at intermediate return periods including the 1:1, 1:10, 1:30 and 1:100 year storms.
- The water level and volume expected within each tank during the 1:100 year + CC event.
- Confirmation that the pipes used between the tanks are sufficiently sized to manage the flow rates expected.

3) Applicant was previously requested to ensure that the “1 in 100 year + 40% allowances for climate change storm event must be provided in any reservoir being used for irrigation purposes”, this is also stipulated in the planning condition. The applicants’ calculations use a 20% allowance for increases in peak rainfall intensity due to climate change based on a 20-year development lifetime. The application was submitted after the Environment Agency updated the climate change allowances for Arun District, which suggest that a 45% upper end allowance should be applied to developments up to 2050. We require calculations based on the higher more contemporary estimates for climate change or a suitable argument as to why this is inappropriate. If such an argument is presented, we would still expect to have further evidence of the proposed 20-year development lifetime including confirmation from the planners that permission will be rescinded or impossible post this deadline. This is to ensure the effects of climate change are suitably considered for the period the development is located onsite irrespective of any estimated timescales.

4) Details of exactly how the sump and pump system operate are required to better understand how this is used to drain down the outfall from each tank, and why this is required. This is to ensure that the tanks cannot be full prior to the onset of an extreme rainfall event.

- Before we are able to discharge condition 7 details of the maintenance and management of the drainage system must be provided. As stated “*The scheme shall also include details of how the scheme shall be maintained and managed after completion*”.

5) Additional drawings and information should be provided to allow our engineers to better understand the drainage system (as proposed and installed). This includes but may not be limited to:

- Full construction drawings in addition to the product specific schematics provided.
- Details of the pump.

- Drawings of the outfall from the tanks must be provided, this should include a cross section / long section showing the tank in relation to the sump pump (for drain down) and the flow control devices (orifice plates), and outfall. It is currently unclear how the orifice plates relate to the sump / pump system and thus there is uncertainty whether the pumped runoff could enter the ditch during an extreme rainfall event.
- The proposed orifice diameters are (in some cases) smaller than 50mm. The applicant should provide details to demonstrate how silt and other materials, that could block the outfalls, will be prevented from entering the storage tank.
- Ground levels, invert levels, and cover levels must be provided on the drainage drawings.
- Technical drawings for the outfall(s) must be provided.

6) A flap valve on the outfall(s) must be provided (to prevent backflow of water from the ditch network(s) entering the drainage system)

7) We have previously requested information relating to exceedance events and possible failure of the tanks. Given the large volumes of storage involved we would expect details of the exceedance flow routes and safety practices to be carried out to protect on and offsite occupants from the potential failure of the tanks.

8) The FRA report makes reference to trafficked areas being, “stoned or permeable tarmac”, these areas need further consideration and details of the surfacing and sub-base material needs to be provided. As infiltration has been ruled out it is also likely that a separate outfall for these areas will be required and details of this should be available for review.

Please note, if Type 1 MOT, other impermeable, or high fines materials are proposed, these may need to be drained formally to avoid increased runoff to the streams / surrounding ditch network. If the roads are simply to be made from gravel, calculations are not required, but this must be confirmed and shown on the associated drawings.

9) Tanks H and I state a 45l/s discharge rate, please confirm this is a typo and is meant to read 4.5l/s.

10) The activation depth of the implemented tanks upper orifice plate is stated as 500mm, rather than the 750mm stated in the original FRA. The verification report should confirm that this has no detrimental impact on the proposed discharge rates for intermediate return period events (see point 3 above for further details).

11) Land Drainage Consent is required for any outfalls into the existing ditches / watercourses and should be obtained prior to conditions 7 and 4 being discharged. This is because any changes resulting from the LDC approval will need to feed back into the design which has a bearing on these conditions.

- It appears from the photographs included with the application, that an outfall has been constructed in contravention of the Land Drainage Act 1991. The applicant should be aware that Land Drainage Consent is required prior to outfalls being constructed and cannot be issued retrospectively. Drawings of the constructed outfall must be provided so that our Land Drainage Consent (LDC) team can review these and ensure there are no issues with the design. Furthermore, the LDC team may request an onsite meeting or inspection to review the unconsented outfall and any works in and around the existing ditches.

We cannot recommend discharge of conditions until the LDC team are satisfied that no further changes to the outfall are required. For any new outfalls (as part of future phases of development) the applicant should apply for consent prior to construction, in accordance with the Land Drainage Act 1991.

1b- Email from ADC Drainage Officer
15.1.21

From: Paul Cann <Paul.Cann@arun.gov.uk>
Sent: 15 January 2021 14:34
To: James Cross <James.Cross@arun.gov.uk>
Subject: RE: 1120 Fleurie - Lake Lane, Application: WA/75/20/PL

Hi James

Based upon the report enclosed, I would agree that infiltration into the ground is unlikely to be viable due to the various limiting factors, so in this case I agree it can be discounted.

The applicant should note that adequate volume to store the 1 in 100 year + 40% allowance for climate change storm event must be provided in any reservoir being used for irrigation purposes, ie. above potential standing top water levels (standing top water levels is determined by the reservoir being full due to no water recycling taking place for whatever reason). This assumes the invert of the overflow/outflow control device will be at the reservoir full level.

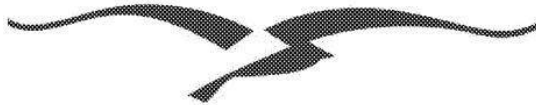
Flow rates to the watercourse must be restricted to Qbar ie. 2.3 year storm event and the 1 in 100 year + 40% storm event stored on site.

All these matters and others contained within their report can be dealt with at detailed design stage. It would probably be beneficial for us to meet their engineers on site once the drainage scheme is more progressed, so all aspects of the scheme including the existing watercourses can be discussed further.

Regards

Paul Cann
Principal Drainage Engineer
Engineering Services

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1c - Email from ADC Planning Officer
6.10.25

Subject: RE: 1120: WA/50/25/DOC - Drainage Conditions - Poly-tunnels - Phase 1
Mon, 6 Oct 2025 08:27:47 +0000
Amber Willard <Amber.Willard@arun.gov.uk>

Date:
From:
To:

Dear Mr Hughes,

Thanks for the below.

I will look through the previous applications as I wasn't the officer and am not familiar with them and get back to you on how we can move forward in getting the condition discharged. Normally the condition is always pre-commencement although in this case I acknowledge it was not. The drainage officers may not be aware of this.

Thanks

Amber Willard MRTPI
Principal Planning Officer, Planning Department

E: amber.willard@arun.gov.uk

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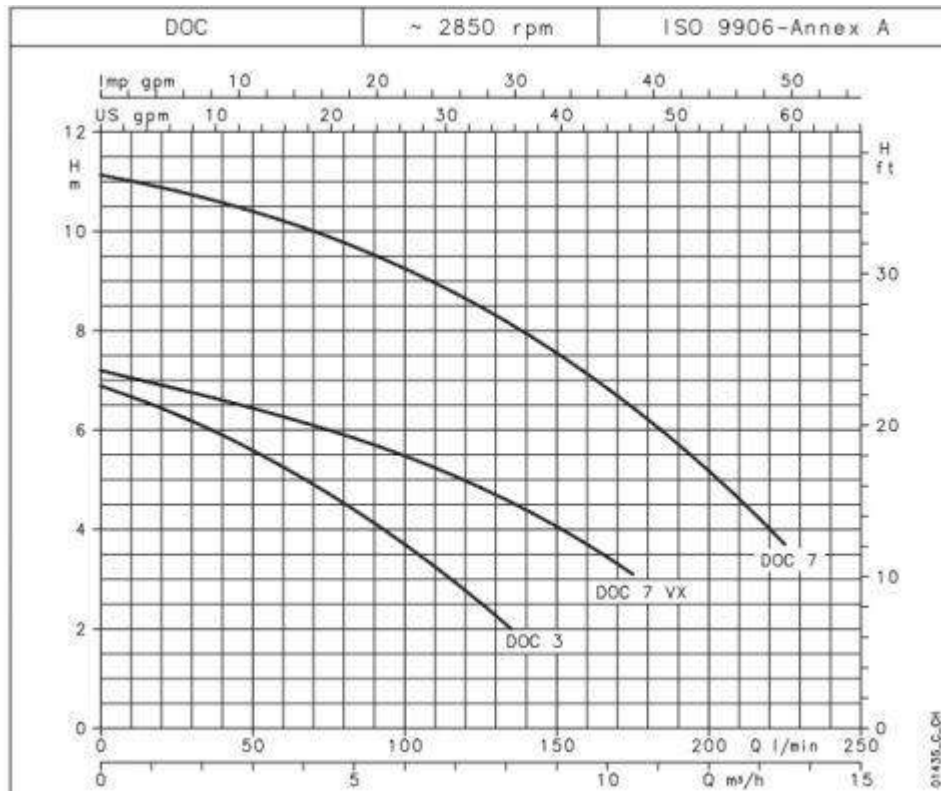
2 Drain down system details.

This system is very simply used to reduce the amount of time that the drainage system sits flooded, it is not a part of the actual means that water gets from the greenhouses to the attenuation tanks nor a means of emptying the tanks, both of which are by gravity.

It comprises a 75mm connecting pipe from the main drain run, located at the low point near the tanks, to a sealed sump with a small submersible pump. This has a 25mm pipe taking the output into the tank.

After a rainfall event a flooded pipe system will sit with water in it up to a height of the outlet into the tank, unless a drain down pump is fitted. This pump simply drains down this water in the pipe so that it is not continuously sitting flooded. The discharge from the pump is into the tank, so nil effect on system capacity or discharge. If it fails it will have no impact on the system capacity.

A drawing of the sump is enclosed - "Drain down sump".
Pump make and model: Lowara DOC3.



Sump details are shown in drawing "Drain down sump". The sump details are common to all 4 sections of the site drainage system.

Annexe 3 Attenuation tank inter-connectors.

There are 2 sets of linked twin tanks already built – south tunnels and north tunnels.

South tunnels tanks.

Existing tank interconnectors (both plastic):-
100mm ID x 6.4m long (connector A)
75mm ID x 4m long (connector B)

According to Hazen-Williams equation with 0.3m head, roughness coefficient 150:-

A – 18l/s
B – 11 l/s
Total 29 l/s

29l/s equates over the greenhouse area of 10,214 m² equates to a rainfall rate of 20mm/hr with 2 inter-connected tanks, which is the rainfall that is matched with the 4 hour 1 in 100 +40% figure, thus the interconnectors will allow for balancing from a just over 3 hour rainfall event or longer. If the event is less than 3 hours then there will be a greater difference in level but this is well within the buffering available at these shorter, more intense events (744m³ occupied of 1024m³ capacity).

North tunnel tanks.

Existing tank interconnector (plastic):-
160mm ID x 2m long

According to Hazen-Williams equation with 0.1m head, roughness coefficient 150:-
Flow 37.6 l/s

37.6l/s equates over the greenhouse area of 6,144 m² equates to a rainfall rate of 44mm/hr with 2 tanks connected, which is the rainfall that is matched with the 1½ hour 1 in 100 +40% event, thus the interconnector will allow for balancing from a 1½ hour rainfall event or longer. If the event is less than 1½ hours then there will be a greater difference in level but this is well within the buffering available at these shorter, more intense events (370m³ occupied of 648m³ capacity).

It can thus be seen that the tank interconnectors will cope with the rainfall events without causing any exceedance.

Yet to be built greenhouses and tanks are:

East glass

160mm connector, 2m long – above calculations (NT) demonstrate this is satisfactory.

Southern glass

160mm connector, 2m long – above calculations (NT) demonstrate this is satisfactory.

Annexes 4 - 7 Summary tables from design calculations

Upper Orifice Plate discharges and tank fill depths.

The tables below are for the 4 areas, calculated for the 1, 10, 25, 30 and 100 year return periods, and for the 1 minute to 35 day site specific Met Office data, with 40% CCA added.

The top of the table has a summary of the details of each area showing the greenhouse footprint in m², the outflow and height of the 2 orifice plates, the tank volume and the tank height. For volume and depth calculations the tank capacity is considered as a total for the blocks concerned, and this figure is what is shown.

The left hand part of the table proper shows the discharge from the Upper Orifice Plate (UOP) showing the events under which it becomes active.

The middle to right hand part has the height of the water in the tank.

The final right hand column has the volume of water in the tank for a 1 in 100 year return period (including +40% CCA).

As can be seen the tank volumes are sufficient, and the upper orifice plate outflow does not flow until after the 30 year return period, so the system meets requirements for attenuation under the target rainfall events.

Orifice plate discharges:	N greenhouses (final)											
	Area	6144 m2					UOP height	1.900 m				
							Tank capacity (m3) =	648 m3				
	Lower Upper	62.0 l/min 169.0 l/min					Tank height Equiv CSA	2.280 m 284.2 m2				
Return period (years)												
	1	10	25	30	100		1	10	25	30	100	1 in 100 year volume in tank (m3)
Output from UOP over UOP period (m3)						Water depth in tank (m)						
Duration (mins)												
1	0.00	0.00	0.00	0.00	0.00		0.04	0.07	0.08	0.08	0.10	29
2	0.00	0.00	0.00	0.00	0.00		0.07	0.12	0.14	0.15	0.18	51
5	0.00	0.00	0.00	0.00	0.00		0.12	0.22	0.27	0.28	0.35	100
15	0.00	0.00	0.00	0.00	0.00		0.21	0.40	0.49	0.50	0.66	187
30	0.00	0.00	0.00	0.00	0.00		0.27	0.53	0.65	0.67	0.89	253
60	0.00	0.00	0.00	0.00	0.00		0.35	0.66	0.83	0.86	1.14	325
120	0.00	0.00	0.00	0.00	0.00		0.44	0.82	1.02	1.06	1.42	403
180	0.00	0.00	0.00	0.00	0.00		0.50	0.91	1.14	1.18	1.58	448
240	0.00	0.00	0.00	0.00	0.00		0.54	0.99	1.22	1.27	1.69	480
360	0.00	0.00	0.00	0.00	0.00		0.60	1.08	1.35	1.39	1.85	525
720	0.00	0.00	0.00	0.00	55.77		0.69	1.25	1.56	1.61	2.10	596
1440	0.00	0.00	0.00	0.00	102.40		0.75	1.39	1.73	1.79	2.26	642
2160	0.00	0.00	0.00	0.00	108.14		0.74	1.43	1.80	1.86	2.28	648
2880	0.00	0.00	0.00	0.00	97.36		0.69	1.43	1.81	1.87	2.24	637
4320	0.00	0.00	0.00	0.00	52.17		0.55	1.32	1.72	1.79	2.08	592
5760	0.00	0.00	0.00	0.00	13.91		0.42	1.24	1.66	1.73	1.95	554
11520	0.00	0.00	0.00	0.00	0.00		0.00	0.94	1.42	1.50	1.90	540
50400	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0

Annexe 5. South tunnels

South tunnels												
Orifice plate discharges:	Area	10200.00 m2				UOP height	2.57 m					
						Tank volume	1024.00 m3					
	Lower	105.5 l/min				Tank height	3.00 m					
	Upper	346.0 l/min				Equiv CSA	341.3 m2					
Return period (years)												
	1	10	25	30	100		1	10	25	30	100	1 in 100 year volume in tank (m3)
Output from UOP over UOP period (m3)						Water depth in tank (m)						
Duration (mins)												
1	0.00	0.00	0.00	0.00	0.00		0.05	0.09	0.11	0.11	0.14	48
2	0.00	0.00	0.00	0.00	0.00		0.09	0.16	0.20	0.20	0.25	85
5	0.00	0.00	0.00	0.00	0.00		0.17	0.31	0.37	0.38	0.49	167
15	0.00	0.00	0.00	0.00	0.00		0.28	0.55	0.67	0.70	0.91	311
30	0.00	0.00	0.00	0.00	0.00		0.38	0.73	0.90	0.93	1.23	420
60	0.00	0.00	0.00	0.00	0.00		0.48	0.92	1.14	1.18	1.58	539
120	0.00	0.00	0.00	0.00	0.00		0.61	1.13	1.41	1.46	1.96	668
180	0.00	0.00	0.00	0.00	0.00		0.69	1.26	1.58	1.63	2.18	744
240	0.00	0.00	0.00	0.00	0.00		0.75	1.36	1.69	1.75	2.33	796
360	0.00	0.00	0.00	0.00	0.00		0.83	1.50	1.86	1.92	2.55	870
720	0.00	0.00	0.00	0.00	102.72		0.95	1.73	2.15	2.22	2.87	979
1440	0.00	0.00	0.00	0.00	163.10		1.02	1.91	2.38	2.47	3.05	1040
2160	0.00	0.00	0.00	0.00	155.66		1.00	1.96	2.47	2.55	3.02	1032
2880	0.00	0.00	0.00	0.00	122.04		0.94	1.95	2.48	2.57	2.93	999
4320	0.00	0.00	0.00	0.00	24.44		0.72	1.80	2.35	2.45	2.64	901
5760	0.00	0.00	0.00	0.00	0.00		0.53	1.67	2.25	2.35	2.57	877
11520	0.00	0.00	0.00	0.00	0.00		0.00	1.21	1.87	1.98	2.57	877
50400	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0

Orifice plate discharges:	South Glass												
	Area	13824.00 m2				UOP height	3.26 m						
						Tank volume	1536 m3						
	Lower	141.0 l/min				Tank height	3.84 m						
	Upper	340.0 l/min				Equiv CSA	400.0 m2						
Return period (years)													
	1	10	25	30	100		1	10	25	30	100	1 in 100	
	Output from UOP over UOP period (m3)						Water depth in tank (m)			UOP ht (m)		3.26	1 in 100
Duration (mins)													year volume
													in tank (m3)
1	0.00	0.00	0.00	0.00	0.00		0.06	0.11	0.13	0.13	0.16	66	
2	0.00	0.00	0.00	0.00	0.00		0.11	0.19	0.23	0.23	0.29	116	
5	0.00	0.00	0.00	0.00	0.00		0.19	0.36	0.43	0.44	0.56	226	
15	0.00	0.00	0.00	0.00	0.00		0.33	0.64	0.78	0.81	1.06	422	
30	0.00	0.00	0.00	0.00	0.00		0.44	0.84	1.04	1.08	1.42	570	
60	0.00	0.00	0.00	0.00	0.00		0.56	1.07	1.33	1.38	1.83	733	
120	0.00	0.00	0.00	0.00	0.00		0.71	1.32	1.65	1.71	2.28	911	
180	0.00	0.00	0.00	0.00	0.00		0.81	1.48	1.84	1.90	2.54	1014	
240	0.00	0.00	0.00	0.00	0.00		0.89	1.60	1.98	2.05	2.72	1088	
360	0.00	0.00	0.00	0.00	0.00		0.99	1.76	2.18	2.26	2.98	1193	
720	0.00	0.00	0.00	0.00	69.62		1.16	2.06	2.55	2.63	3.43	1374	
1440	0.00	0.00	0.00	0.00	202.89		1.31	2.34	2.89	2.99	3.77	1507	
2160	0.00	0.00	0.00	0.00	240.81		1.36	2.47	3.05	3.15	3.86	1545	
2880	0.00	0.00	0.00	0.00	238.16		1.35	2.53	3.14	3.24	3.86	1542	
4320	0.00	0.00	0.00	0.00	166.49		1.24	2.48	3.12	3.23	3.68	1470	
5760	0.00	0.00	0.00	0.00	94.29		1.16	2.47	3.14	3.25	3.50	1398	
11520	0.00	0.00	0.00	0.00	0.00		0.84	2.48	3.24	3.26	3.26	1304	
50400	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0	

Orifice plate discharges:	East glasshouse											
	Area	6912 m2				UOP height	3.70 m					
	Lower	70.0 l/min				Tank volume	800 m3					
	Upper	165.0 l/min				Tank height	3.84 m					
						Equiv CSA	208.3 m2					
Return period (years)												
	1	10	25	30	100		1	10	25	30	100	1 in 100 year volume in tank (m3)
Output from UOP over UOP period (m3)						Water depth in tank (m)						
Duration (mins)												
1	0.0	0.0	0.0	0.0	0.0		0.06	0.10	0.12	0.12	0.16	33
2	0.0	0.0	0.0	0.0	0.0		0.10	0.18	0.22	0.22	0.28	58
5	0.0	0.0	0.0	0.0	0.0		0.18	0.34	0.41	0.42	0.54	113
15	0.0	0.0	0.0	0.0	0.0		0.32	0.61	0.75	0.77	1.01	211
30	0.0	0.0	0.0	0.0	0.0		0.42	0.81	1.00	1.03	1.36	284
60	0.0	0.0	0.0	0.0	0.0		0.54	1.02	1.27	1.32	1.75	365
120	0.0	0.0	0.0	0.0	0.0		0.67	1.26	1.57	1.63	2.18	453
180	0.0	0.0	0.0	0.0	0.0		0.77	1.40	1.75	1.81	2.42	504
240	0.0	0.0	0.0	0.0	0.0		0.83	1.51	1.88	1.95	2.59	540
360	0.0	0.0	0.0	0.0	0.0		0.92	1.66	2.07	2.14	2.83	590
720	0.0	0.0	0.0	0.0	0.0		1.06	1.92	2.39	2.47	3.26	679
1440	0.0	0.0	0.0	0.0	0.0		1.14	2.13	2.66	2.75	3.63	757
2160	0.0	0.0	0.0	0.0	13.0		1.13	2.19	2.75	2.85	3.76	784
2880	0.0	0.0	0.0	0.0	19.2		1.06	2.19	2.77	2.87	3.79	790
4320	0.0	0.0	0.0	0.0	5.0		0.83	2.03	2.64	2.75	3.72	776
5760	0.0	0.0	0.0	0.0	0.0		0.63	1.90	2.54	2.65	3.68	767
11520	0.0	0.0	0.0	0.0	0.0		0.00	1.42	2.16	2.28	3.44	716
50400	0.0	0.0	0.0	0.0	0.0		0.00	0.00	0.00	0.00	0.00	0

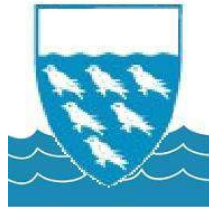
Annexe 8 Ordinary Watercourse Discharge Consent

Included -

- | | |
|-----------|---|
| Annexe 8a | OWC consent approval document LDC/ARUN/2024/015 |
| Annexe 8b | Construction notes. |
| Annexe 8c | Construction detail (drawing) |

(Other drawings referenced in this are included above).

Annexe 8a OWC consent approval document LDC/ARUN/2024/015



West Sussex County Council

Ordinary Watercourse Land Drainage Consent

Land Drainage Act 1991

Name

Fleurie Nursery Limited

Consent applying to

Connections to watercourse at Fleurie Nursery, Lake Lane, Barnham

Consent Number

LDC/ARUN/2024/015

Effective from

31st October 2024

This note does not form part of the Certificate of Authorisation.

Introduction

The West Sussex Drainage Partnership

The West Sussex Drainage Partnership is a body consisting of West Sussex County Council and the District and Borough Authorities within West Sussex acting together in partnership, to carry out specific duties under the Land Drainage Act 1991 and the Flood and Water Management Act 2010. It operates under delegated powers under section 13(4) of the Flood and Water Management Act 2010.

The Partnership aims to manage flood risk in the county through continued maintenance and regulation of ordinary watercourses, education and assistance of riparian ("river side") owners and through promotion of sustainable drainage systems (SuDS).

Legislation

Land Drainage Consents are required by virtue of the Land Drainage Act 1991. The following activities on an Ordinary (non-main) Watercourse require Local Authority Consent:

under Section 23 of the Land Drainage Act 1991;

- the erection or alteration of any mill dam, weir or other like obstruction to the flow of any watercourse
- the erection of a culvert in an ordinary watercourse
- alteration of a culvert in a manner that would be likely to affect the flow of an ordinary watercourse

under Sections 17 and 20(2) of the Land Drainage Act 1991

- any drainage works carried out by a local authority against flooding in connection with any watercourse

under Section 61F Land Drainage Act 1991 (Inserted by Schedule 22 Environment Act 1995)

- the operation of any drainage works, under the control of any Internal Drainage Board or local authority, so as to manage the level of water in a watercourse for the purposes of facilitating spray irrigation.

Note: Consent under the above legislation is required irrespective of whether the works are permanent or temporary.

Contraventions

In relation to Ordinary Watercourses, West Sussex Drainage Partnership can under Section 24 of the Land Drainage Act 1991 serve a legal notice requiring the person to abate the nuisance within a specified time. Failure to abide by such a notice can result in the West Sussex Drainage Partnership carrying out the necessary remedial work and seeking to recover costs.

Land Drainage Act 1991

Land Drainage Consent

Control of works affecting watercourses and/or flood defences

Consent number LDC/ARUN/2024/015

To: **Fleurie Nursery Limited**

West Sussex County Council, as Lead Local Flood Authority exercise of its powers under Section 23 of the Land Drainage Act 1991 and subject to the conditions attached, hereby grants its consent in relation to the works or operations described in this Consent.

Location: Land north of Lake Lane, Barnham

Map reference: SU 97699 04695

& SU 97720 04439

Description of works:

2no. 225m diameter pipe connections to the existing watercourse via new headwalls with flap valves and erosion control measures.

As detailed on plans and sections

Drg no. Outfall A (North), Outfall B (South), Construction Details V2, Pipe Routes (6.8.24)

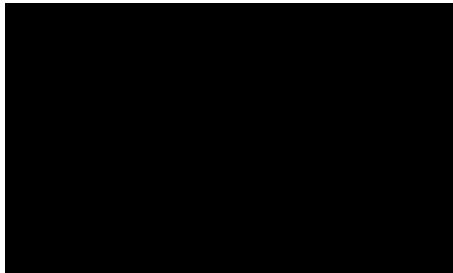
In supporting documentation

West Sussex County Council does not accept any responsibility for the design and construction of the works referred hereto and any liability for any loss or damage which may arise out of their design, construction, maintenance or use.

This Consent shall come into effect on

Date 31st October 2024

Signed on behalf of the West Sussex Lead Local Flood Authority



Michael Elkington
Head of Planning Services
West Sussex County Council

Date of signing

31st October 2024

Conditions

This consent is granted with the following conditions:

General

N/A

Site Specific

1. A construction management plan shall be submitted 7 days prior to works commencing. All Temporary structures approved by this consent shall then be removed within 2 months of the agreed start date as per the agreed construction method statement.

This statement shall include details of:

- A. Construction methods.
 - B. Programme.
 - C. Management of flood risk during construction.
 - D. Pollution protection arising from the construction of the works.
 - E. How issues associated with flora and fauna will be managed.
2. Works to be carried out as per agreed designs/method statement and in accordance with documents:
 - a. Drg no. 80000102 Rev B,
 - b. Drg no. 000-BPC-WD-ZZ-D-OWC-01 Rev A,
 - c. Drg no.000-BPC-WD-ZZ-D-OWC-02 Rev B,
 - d. Drg no. 000-BPC-WD-ZZ-D-OWC-03 Rev B
 3. Discharge rates to be agreed through the planning application process.
 4. Notice in writing must be given immediately by the applicant to the LLFA upon completion of the works.

Other Information

This Consent does not remove from the applicant the necessity to obtain other licences, consents, approvals or permissions (including planning permission) which may be required in law or in order to comply with any duties or responsibilities for conservation or protection of the environment.

It is the applicants responsibility to ensure that he obtains the consent / permission of any owners and occupiers affected by the works.

This Consent does not confer any rights of entry or rights over property.

Works should be arranged to ensure there is no increase in flood risk to third parties.

That the LLFA does not accept any responsibility for the design and construction of the works that are the subject of this Consent and any liability for any loss or damage which may arise out of their design, construction, maintenance or use.

The works must be undertaken in accordance with the approved plans, drawings, calculations, specifications and other relevant documents.

All reasonable precautions must be taken during the undertaking of the works so as not to obstruct, impede or interfere with the flow of water in, into or out of the watercourse and not to damage the banks or bed or any drainage works without the approval of the Lead Local Flood Authority.

Timescales

Works to be completed within six months of the date of this consent or else the consent will be deemed to have expired. This period can be extended upon written agreement.

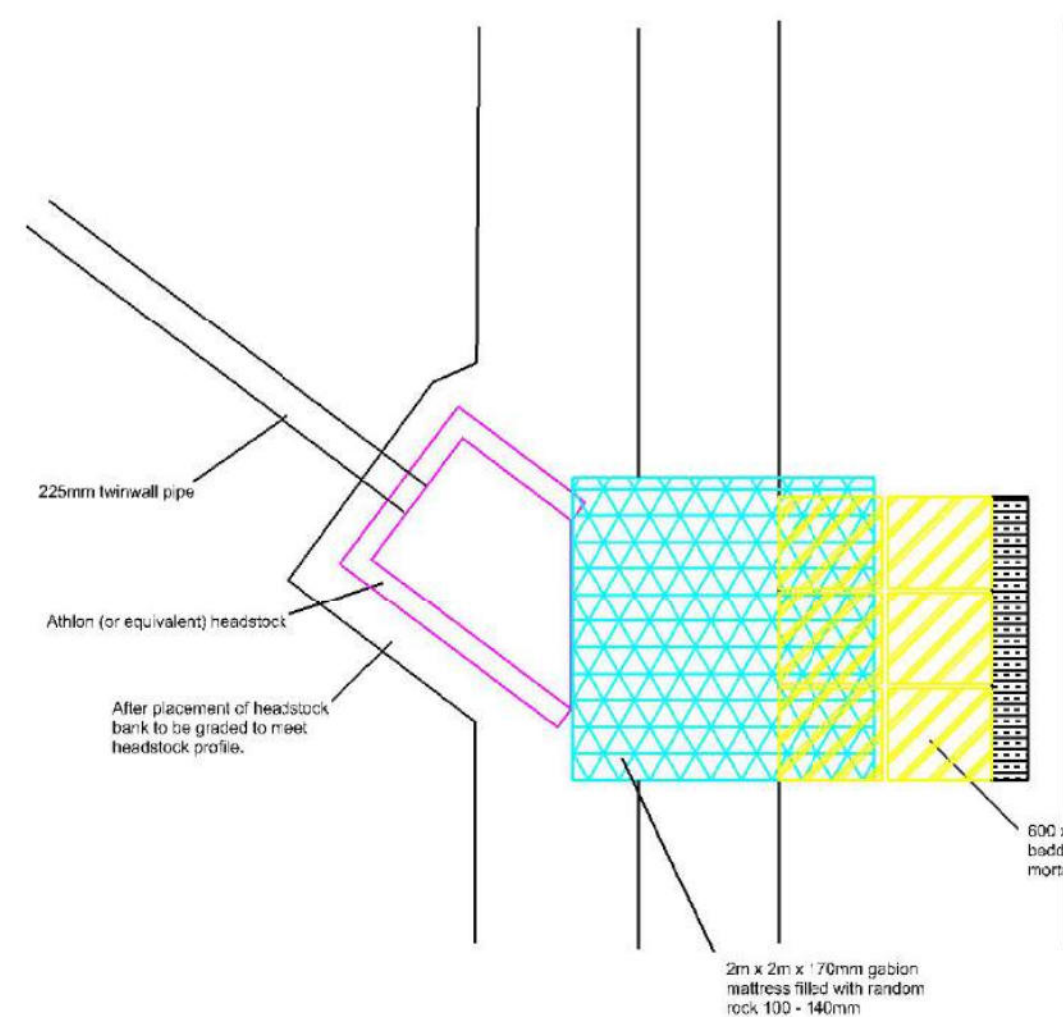
Upon completion of works please send notification within 28 days to the issuing authority or to [REDACTED]

Annexe 8b Construction notes (forming a part of the approved OWC Consent)

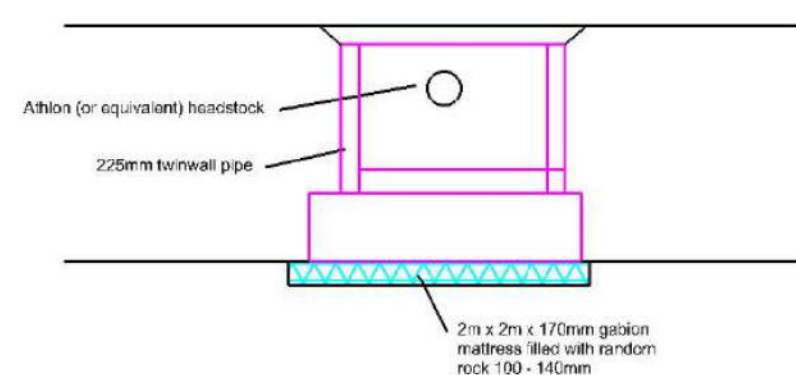
- Dig out the bank of the watercourse to take the size of the headwall making sure that the Headwall will not protrude into the path of the water flow. The angle of the excavation to the rear of the Headwall should be roughly the same as the existing bank profile.
- Dig out sufficient size trench to take the toe along the front of the foundation.
- Dig out sufficient to take gabion mattress in bed of watercourse, ensuring that top of gabion is level with existing watercourse bed level. Line with geotextile.
- Line toe foundation with Geotextile then place selected, uniformly graded granular fill in the base and compact well. Lift Toe into position using the 4 threaded inserts and lifting eyes, and level then fill around the toe with selected, uniformly graded granular fill and compact well. Insert supplied threaded rod into the sockets cast into the top of the toe.
- Install gabion and fill with selected material, close and tie down gabion lid. Backfill around edges with as dug material and compact.
- Line the base of the rest of excavation with Geotextile then place a minimum bed of 150mm Class 6A or 6K* Selected Well Graded Granular Material on the base & compact well, especially around the back of the toe, then a 50mm topping of fine material (Class 6L*) to ensure units are level and stable. Lift Headwall into position, using all 3 of the threaded inserts and lifting eyes, and place over the end of the pipe & locate over threaded rod protruding from the toe and level. Place washer over threaded rod in recess in Headwall apron and tighten nut. Fill recess with high strength non-shrink grout.
- The pipe should be protruding by 50mm from the front of the back wall to permit fitting the flap valve.
- Shim the pipe until it is central within the opening then fill void with sand cement mortar or high strength non-shrink grout.
- Gun a good quality sealant around the mating face of the flap valve, then install using stainless steel fixing bolts into cast in sockets, taking care when tightening these fixing bolts not to over tighten them or distortion may occur resulting in the valve not seating correctly.
- Backfill pipe section first then backfill all around the headwall with as dug material.
- Make good at the front with as dug material ensuring river bank is returned to its original profile.
- Excavate east bank following the existing bank profile, lay mortar bed and then lay paving slabs on top of mortar bed. Ensure that upper edge beam is cast according to minimum dimensions shown.

(*Manual of Contract Documents for Highway Works: Volume 1 (MCHW1), Specification for Highway Works, Series 600), Nov 09).

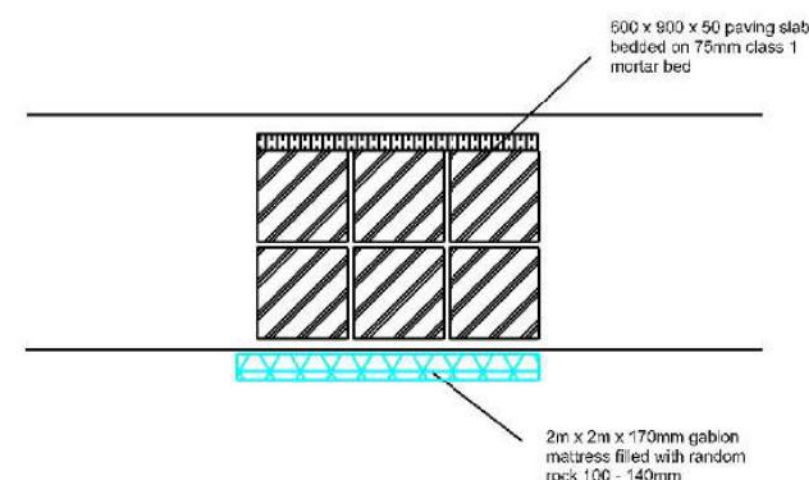
Annexe 8c Construction detail (drawing)



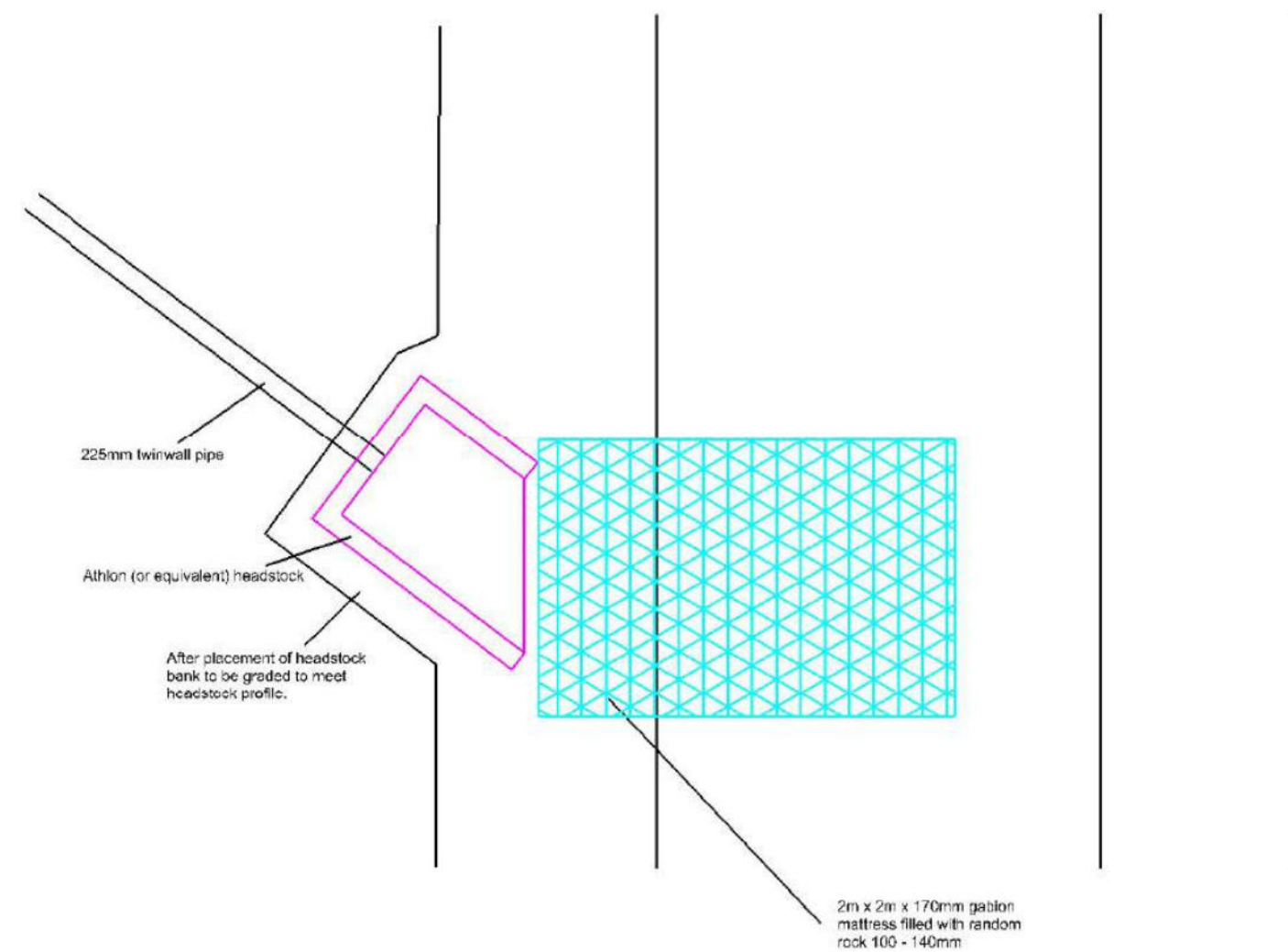
Plan view



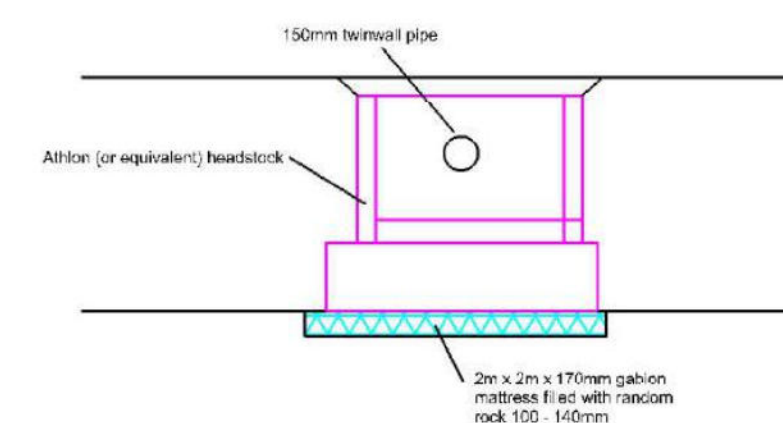
West elevation



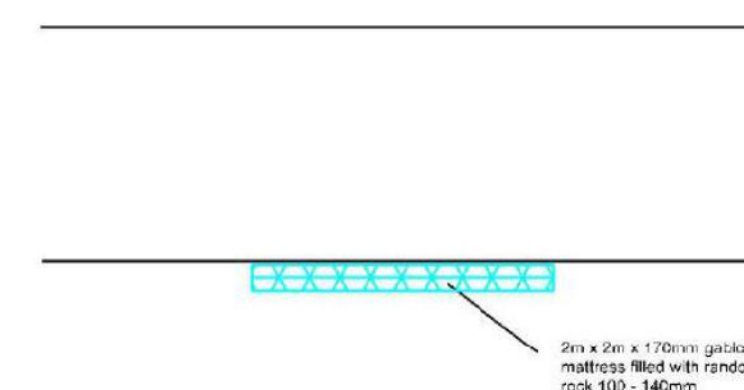
East elevation



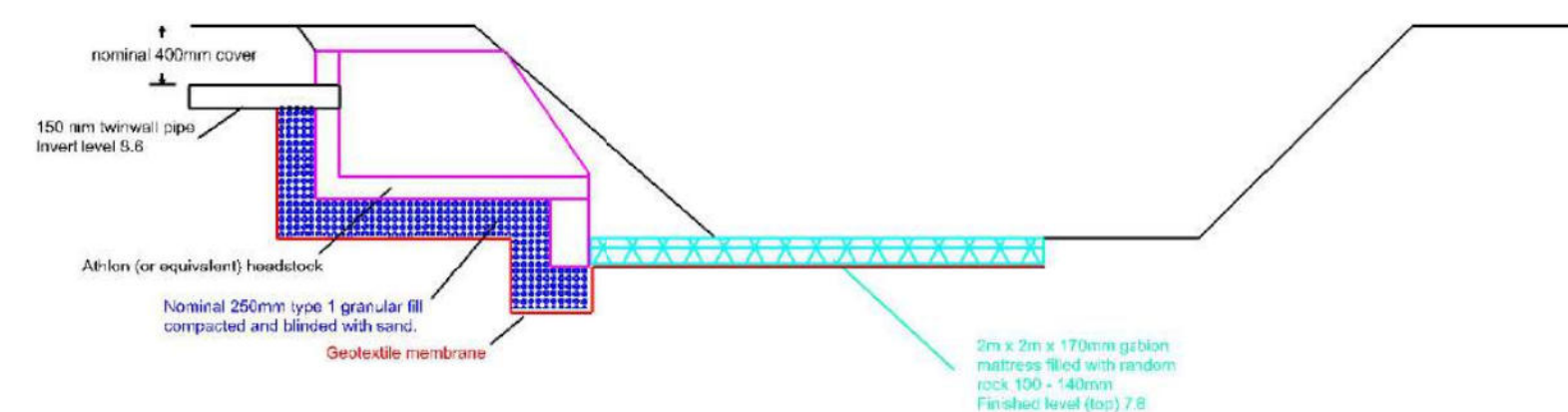
Plan view



West elevation



East elevation



Section

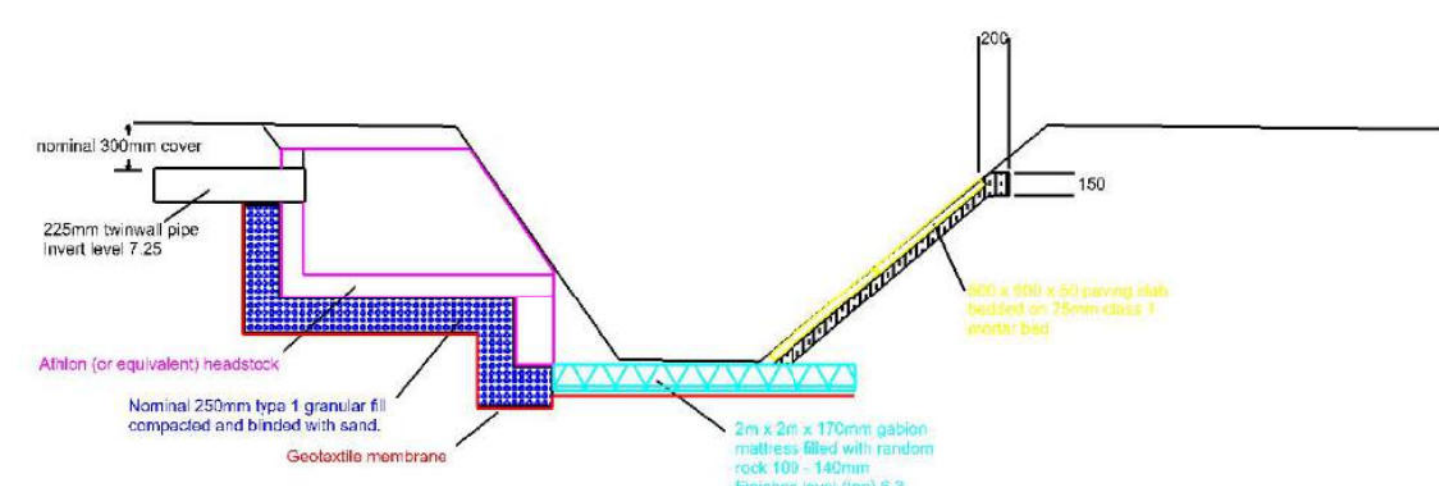
North outfall

Gabion mattresses - 2m x 2m x .17m
60 x 80mm mesh, coated wire.
BSSP or equivalent.

Top of mattress to be level with true existing
bed level.

Flap valve to be installed, but not
shown on drawing for clarity.

Headwall not to intrude into the
watercourse.



Section

South outfall

Gabion mattresses - 2m x 2m x .17m
60 x 80mm mesh, coated wire.
BSSP or equivalent.

Top of mattress to be level with true existing
bed level.

Flap valve to be installed, but not
shown on drawing for clarity.

Headwall not to intrude into the
watercourse.

Construction notes.

See separate document
of same name.

**Fleurie Nursery
Lake Lane
Barnham**

**Construction
details v2**

Date: 9.9.24
Scale 1:50 (A1)
Drawn AM

Revisions

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Annexe 9. Tank Installation Manual

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SECTION A.

PRODUCT INTRODUCTION and PRE-START INFORMATION.

1. The Tank Structure Build Strengths

Comprehensive stress calculations for our entire range of tanks have been carried out by chartered external consultants to provide builds which comply with both British BS 5950 and European BSEN 1993 structural, wind and (where an Evenproducts steel cover is fitted,) snow loading requirements.

The specified panel thicknesses, the bolt sizes, the use of double washers, the fitting of base anchor brackets and the liner support and protection within the tank are all integral to the safety calculations for our tanks.

2. The Tank Base Requirements

Tank base supplied by others (See Page 6)

In order to comply with U.K and E.C agricultural directives, it is necessary to erect the tank on a level concrete base with a minimum thickness of 100mm depending on local soil conditions. It may also be necessary to add reinforcement into the concrete.

The base slab (round / square / hexagonal, etc), should measure 600mm in excess of the diameter of the tank to ensure there is a minimum of 300mm of base beyond the outer tank wall. The base should be level over its entire surface and should be free from any sharp projections.

There should also be a further one metre minimum of clear ground, to allow unrestricted access for installing the tank. If platforms or mechanical lifting devices are used, a larger, clear, firm ground area may be required.

The base should be constructed of pre-mix concrete to a strength of not less than 35 N/mm. sq (C35 Mix). Once poured and levelled, the base should be left to cure for a minimum of 96 hours prior to installation of the tank.

3. Tank Erection Guidance and Safety Advice

(provided by Evenproducts Limited for guidance only)

Safety Information.

Evenproducts tanks have been designed to be installed using basic industry standard methods this will involve the “safe” use of ladders and step ladders. Installers should therefore take note and abide wherever possible, to the recommended installation methods. They should also familiarise themselves with the latest local and national ‘health and safety’ published advice regarding the safe use of the equipment and tooling they are using.

4. White Rust

If your tank is not being erected immediately please remove the outer polythene packaging and store in a dry environment. Ensure the tank is kept on the pallet to keep it from direct contact with the ground. Where possible do not leave an uncovered tank lying in the open, but store undercover and away from open doorways. This will reduce the risk of white rust forming on the panels of the tank.

Risks to Consider

Provide Sufficient Labour

Most tanks can be erected in the standard build method by two experienced operatives, however when erecting the taller tanks additional trained labour would be recommended.

Windy Conditions

It is advised that tank erection should not be attempted in excessively windy conditions, as handling the tank panels or attempting to install the liner could result in personal injury or damage to components or property.

Lacerations

Be aware that tank panels and galvanised cover panels may have sharp edges. Protective gloves should be used at all times.

Wet Conditions

Although tank erection can be done in wet conditions, be fully aware that steel panels become slippery when wet and that it would be extremely dangerous to be working on panel surfaces when wet.

Lifting Heavy Panels

Most panels can be lifted and handled safely by one person. However the thickest panels (1.6mm @ approx 34kg) should be a two man lift, especially if lifting above the waist.

Use of Podgers

Take care when pushing podgers through the wall of the tank, there may be people on the other side that you cannot see.

Falling from Height

When working from ladders or when cladding the steel covers, precautions should be taken such as securing ladders against the structure, supporting ladders on ground boards and using a harness if working on the cover surface. Additional care should also be taken to ensure tools or components are not dropped on to persons below.

Power Tools

Installers should be aware of the risks when using power tools on site. Power tools should be inspected and approved for safe use as required.

Packing

If the packed tank pallet is not immediately installed and you have ordered an anti-algae cover, we would recommend that the centre supporting pole is removed to protect it from very hot direct sunlight.

Suggested Safety Equipment

Good quality ladders and step ladders (various lengths), with foam protection at the base, for when working inside the tank on the installed liner.

Heavy duty plywood boards for stabilising ladders etc. on uneven ground outside the tanks (do not hang ladders from the top of tank walls, this could possibly bend the top ring of the tank).

Safety harness (for when working on galvanised steel covers).

Suitable eye protection for when using hand and power tools.

Leather safety gloves, safety boots (with soft soles for working on the liner) and hard hats.

Ear defenders for when mechanically tightening fixings or drilling outlet holes in panels.

Safety straps to secure ladders to the tank structure when working at height erecting the tank walls.



Note

For tanks with walls in excess of 3.10 metres (10ft / 4 panels high), it is recommended that platforms or mechanical lifting equipment be deployed.

In this instance, it will be necessary to ensure that the surface for approximately 2 metres all around the tank base and a suitable route to the tank base, is of sufficient quality and firmness to allow safe use of such equipment.

Options for Cushioning of the Tank Liner on the Tank Base

Option A. (Not Supplied)

To provide a 50mm layer of soft “stone free” sand to be spread evenly across the entire base within the tank structure.

To provide a 5:1 sand and cement powder “dry mix” haunch shaped to approximately 45 degrees between the inner panel wall and the concrete base floor.

Note: When providing sand, ensure it is protected from the possibility of becoming saturated by rainfall prior to its required use.

Option B. (Not Supplied)

To provide 0.80 to 1.00m wide strips of HD polythene sheeting which is taped to the tank wall and allowed to fall down on to the concrete base (e.g. half on the wall half to the base).

The 50mm layer of soft “stone free” sand is then spread over the entire concrete base and polythene sheet and shaped at 45 degrees up to the tank wall at the base of the panels.

Option C. (Supplied on Request)

Supply a quality, geotextile fleece material, layers of which would be laid at 90 degrees to each other (to eliminate gaps) on top of the sand base. Then approximately 50cm up on to the tank panels, where it would be secured to the panels with adhesive (Duck) tape.

When using EPDM liners, a double layer of fleece can be used which eliminates the use of a sand base. However the smooth concrete base must be checked for any protrusions that could potentially puncture the liner.

Wall Fleece Option

Fleece can also be provided as an option if additional protection for the liner on the internal tank wall is required, or if a small amount of insulation is required.

The use of fleece to the internal tank walls is recommended for when thinner liner materials are specified (e.g. 0.50mm and 0.60mm).

The fleece is delivered in widths of 5.25m and lengths to suit the height of the ordered tank. Lay out the pieces of fleece on the top of the tank. Work around the tank, overlapping the pieces of fleece by 25cm, until the steelwork is completely covered. Make sure that the protective fleece is straight without any creases. If you have ordered the additional protective fleece to cover the ground finally cover the floor with the protective fleece.

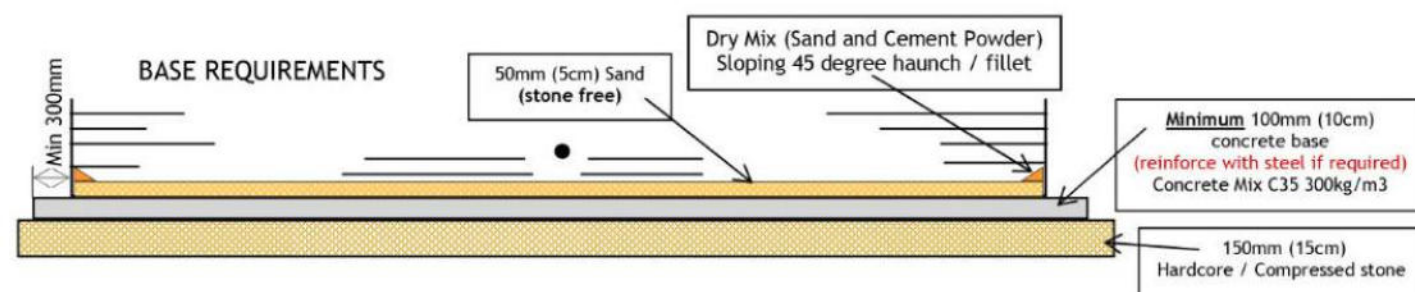
TANK BASE SPECIFICATION (UK full concrete base requirement)

Concrete Base can be square, octagonal or round.

The base must be a minimum of 600mm larger than the tank diameter.

The surface should be level over it's entire surface and be reasonably flat (smoothing not necessary).

The finished surface must be free from any sharp protrusions, crevasses or cracks, which over time could cause damage to the installed Tank liner.



The drawing above shows the traditional method for cushioning of the liner.

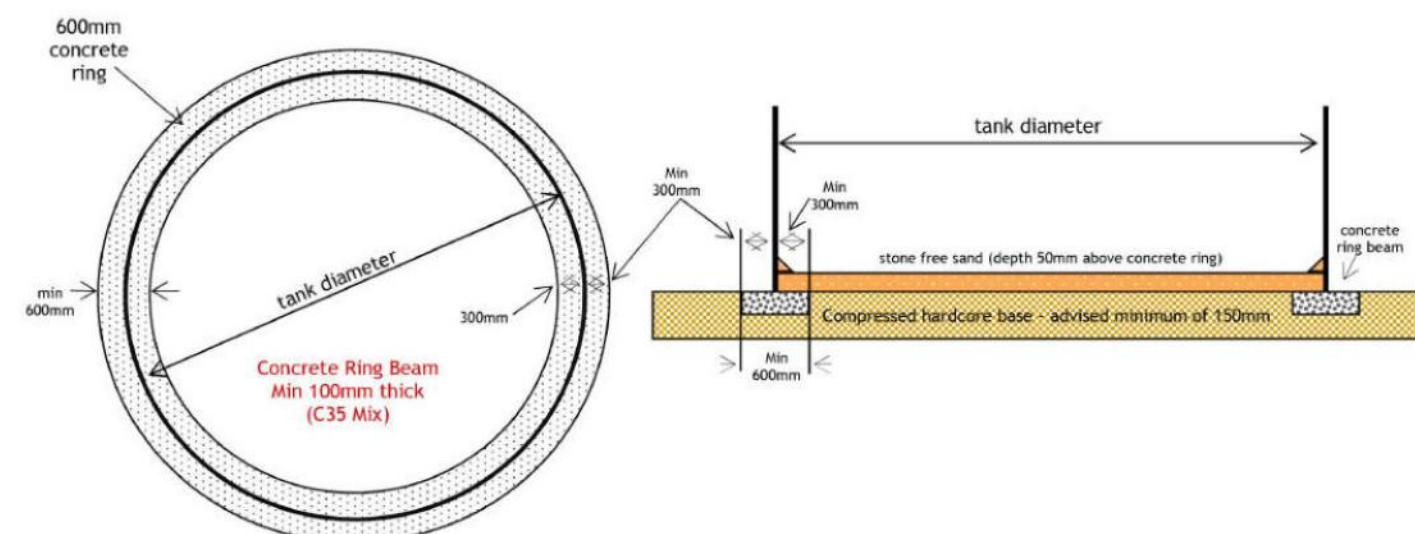
Other methods of cushioning the liner can be deployed, as advised in the storage tank installation manual.

(eg. HD polythene sheet from the tank wall on to the base, with the sand on to the polythene sheet or the fitting of an overlapping layer of geotextile fleece, down from the tank wall across the entire tank base).

TANK BASE REQUIREMENTS			
Tank	Diameter	Minimum Base Size	Stone Free Sand Required
Metres	Feet	Metres Square/ Round/ Octagonal	Cubic Metres
2.74	9'	3.34	0.30m3
3.65	12'	4.25	0.53m3
4.57	15'	5.17	0.82m3
5.48	18'	6.08	1.18m3
6.40	21'	7.00	1.61m3
7.32	24'	7.91	2.10m3
8.23	27'	8.83	2.66m3
9.14	30'	9.74	3.28m3
10.06	33'	10.66	3.97m3
10.97	36'	11.57	4.73m3
11.89	39'	12.49	5.55m3
12.80	42'	13.40	6.44m3
13.71	45'	14.31	7.39m3
14.63	48'	15.23	8.41m3

TANK BASE REQUIREMENTS			
Tank	Diameter	Minimum Base Size	Stone Free Sand Required
Metres	Feet	Metres Square/ Round/ Octagonal	Cubic Metres
15.54	51'	16.14	9.48m3
16.46	54'	17.06	10.64m3
17.37	57'	17.97	11.86m3
18.29	60'	18.89	13.15m3
19.20	63'	19.80	14.48m3
20.12	66'	20.72	15.89m3
21.03	69'	21.63	17.35m3
21.94	72'	22.54	18.90m3
22.86	75'	23.46	20.52m3
23.77	78'	24.37	22.19m3
24.69	81'	25.29	23.94m3
25.60	84'	26.20	25.74m3
26.52	87'	27.12	25.78m3
27.43	90'	28.03	29.55m3

Tank Ring Base (concrete ring beam—min 100mm thickness) (for installation on firm (stable) ground)



Note. For tanks to be installed where ground conditions are soft or unstable. The concrete ring beam should be expanded to a minimum of 1000mm in width and 150mm in depth. The hardcore infill may also require an increase in depth to 200mm.

SECTION B.

TANK KIT CONTENTS and TOOLING REQUIREMENTS

1: Tank Kit Contents

The tank kit contents are usually delivered strapped to a pallet and covered where possible. If the supplied kit is not to be installed immediately on arrival to site, the palletised kit should be stored undercover in a dry location, to prevent superficial deterioration of the materials and packaging.

If the supplied equipment is offloaded from the pallet on delivery, it is important that the tank panels are stored for future use in the same order as they were originally stacked on the delivery pallet. (i.e. pre-drilled panels on top followed by the thickest panels down to the thinnest panels at the bottom).

Product on the Pallet

Tank Panels – will be banded together (pre-drilled on the top followed by the thickest (base) panels down to the thinnest (top) panels at the bottom.

Note. Not all tanks have varying thicknesses of panels, some may have one thickness of panel only.

Carton / Buckets containing: Tank Fixings (M10 or M12 and M10) Tank Bolts x 20mm & 40mm, Hexagonal Nuts and Flat Washers).

Tank Erection Manual.

2: Optional items as ordered

Tank Capping

Straining Wire (coiled) + Wire Strainer

Base Anchor Brackets + Anchor Bolts

Tank Liner

(to the required size in the specified material).

Liner Repair Kit

(with EPDM liners)

Tank Outlet Assemblies

(for outlets, overflows etc)

Gate Valves

(or alternatives for the outlet assembly)

High Level Fill Valve

(Float fill valve, Float, Drop Arm).

Fill Valve Support Bracket

(for use when fitting Soft Covers)

Tank Outlet Filter Pipe

Soft Cover & Fittings Kit + PVC Support Post

Steel Pipe Work Enclosure

Protective Fleece

3: Tooling Requirement (not supplied)

Electric / Pneumatic Torque Wrench (or ratchet spanner)

Sockets (for M8 – M10 and M12 fixings) (for Torque Wrench)

Long Reach Socket (17mm) (for base bracket anchor bolts)

17mm Ring Spanner (for manual tightening)

Tape Measure (For measuring)

Large Flat Bladed Screw Driver (for holding bolt heads while tightening)

12mm Masonry drill bit (drilling for the anchor bolts)

Stilsons / Pipe Wrench x 2 (for tightening outlet assemblies etc)

H D Pliers (for cutting and winding straining wire)

Stanley Knife (Sharp – for cutting capping and possibly the liner)

17mm Podger Spanners x 2 (for hole alignment and holding panels in place)

Rubber Mallet (for tapping the capping into place)

Waterproof Adhesive (Duck) Tape 50mm (for holding capping in place etc)

Tin Snips or Hacksaw (for cutting pallet banding)

M10 Eyenut Fixings (for fitting to installed bolts to secure ladder safety straps. Supplied with Soft Covers, available as an option on other builds)

Access and Safety Equipment (as previously advised in section A.)

SECTION C.

INSTALLATION INSTRUCTIONS

1. Marking out the Base

Find the centre of the tank base then with chalk, mark out a precise circle to the advised diameter of the supplied tank. Use the marked out circle for the positioning of the tank panels.



Move the liner and liner cushioning materials into the centre of the tank (i.e sand, cement, polythene sheet, fleece etc) and protect from rainfall.

2: Un-banding the Panels

Any pre-drilled panels should be on top of the pallet. Panels drilled with outlets for the base ring should be placed in the location where the outlet is required. (Note. Any overflow drilled panels should be put to one side for later in the build).

The panels should then come off the pallet in the required numbers and thicknesses for each ring of panels, with the thickest panels at the top of the pallet being used for the bottom of the build to the thinnest at the bottom of the pallet being used for the top ring.

Each panel has an identification label which advises the steel thickness (eg 1.2) and the diameter (eg 21). The label (which is positioned in one corner of the inside of the panel) should be located on the same top edge of each panel when installing.

NOTE. Not all tanks have multiple thickness panels. Many smaller tanks are made with a single thickness of tank panel.

NOTE. On larger tank builds, some panels may have triple sets of vertical holes as opposed to the standard double sets of vertical holes. In this instance, the triple holed panels will always be installed below any double holed panels.

On standard build tanks, to confirm the number of panels per ring, take the tank diameter (in feet) and divide by 3 (e.g. 21ft tank divided by 3 = 7 panels to the ring).

3: Fixings

Washers. All fixing sets M12 or M10 are provided with 2 washers.

One washer directly against the bolt head and the second between the panel and the hex nut to the outside of the tank. The use of double washers is integral to the tank strength calculations. Not fitting double washers would invalidate the warranty. Please ensure all bolt heads are on the inside of the tank.

VERTICAL (Double or triple) seam joints (with the exception of the M10 x 40 Bolts in the Tank Base Bracket Holes), will be fitted with either M12 or M10 Fixings.

Any M12 Fixings provided should be fitted into the triple sets of VERTICAL HOLES from the base panel and panels immediately above, until the supplied amount has been used in full panel rings.

All vertical holes in remaining upper rings of panels will be fitted with the remaining M10 fixings

HORIZONTAL All horizontal holes on the ring seam joints are to be fitted with M10 fixings.

Note. Many tank builds will only require M10 fixings throughout.

4. Erecting the Steel Walls

The Base Ring Firstly select the panel / panels which have been pre-drilled to accept outlets and position as required. Then working in a clockwise direction and following the chalked circumference line, place each consecutive panel on the inside of the preceding one.

Once in position and using a podger / screwdriver to line up the holes and hold the panels in place, loosely bolt the bottom ring of panels together.

Use M12 or M10 fixings after referring to the information provided in the previous "supplied fixings" section.

Except for the single hole at the vertical seams, NO fixings are required in the bottom holes of the base panels, NOR in the top holes of the top ring. (If preferred, at the end of the panel build, any spare fixings can be installed into the redundant base holes).



The longer (M10 x 40) bolts should be used to fit the base anchor brackets (if supplied) at each seam between the base panels.

NOTE. DO NOT FIX THE BRACKETS TO THE CONCRETE AT THIS STAGE)

Once the base ring is complete and in position. Check for ovality and adjust accordingly to provide a true circle of the correct diameter (use a tape measure to double check).

Tighten a small but evenly placed number of bolts to hold the panels securely, but do not tighten all of the bolts until the tank is fully erected.



5: Erecting the upper rings

Proceed with installing the other rings of panels on top of the fitted base ring. (Check to ensure that the same or the next thickest panels are selected and used).

The exact centre of the panel for the ring above should be located directly over the vertical seam of the two adjoining panels on the ring below. (i.e. similar to a brickwork effect)

The panels should be bolted together using only the **M10 Fixings** with the panel above overlapping the panel below on the outside, thus enabling rainwater to run off the tank walls.

Always checking that the correct thickness of panel is selected, continue to add the remaining rings of panels but do not tighten all of the bolts until the build is completed and the tank is re-checked for ovality and re-adjusted if required.

Note. Once it becomes necessary to work from ladders and step ladders, it is important that they are made stable and fixed securely as per the H&S guidelines.



6: Final Checking and Fixing

Once all of the panel rings have been installed to the required height, double check the structure for ovality and adjust as required. (An oval tank may not accept a liner or fitted cover correctly and may result in a complete re-build of the structure)

If the circle is correct. Proceed to tighten all of the fixings on the tank and fix the Base Anchor Brackets to the concrete base.

Note. Drill and fit the bracket anchor bolt towards the front of the bracket slot and when fitting the anchor bolt, **DO NOT FULLY TIGHTEN!**

(This will allow for an amount of movement for the bracket when the water is added to the tank and any expansion has taken place).



- A. Check that there are fixings in all seam joint holes, M10 fixings on all horizontal joints and M12 or M10 on all vertical joints.
- B. Check that all bolt heads are on the inside of the tank and that any burred edges are removed
- C. Check that each ring of panels is of the correct thickness
- D. Check the fitted tank panels for any damaged or bent corners or edges. If found these must be carefully straightened back to their original profiles, to prevent puncture damage to the liner.

7: Fit the Capping

If supplied in coils, uncoil the bottom capping and straighten if possible (note. capping will be easier to fit if warmed). The capping should be fitted over the top panel edge around the entire circumference of the tank.

If supplied in lengths, capping should be fitted over the top panel edge around the entire tank.

When fitting, bend the capping back so as to open the slot. Working around the tank one person opens and applies the capping, while the other pushes or taps into place with the mallet and secures in place with adhesive (duck) tape as necessary.

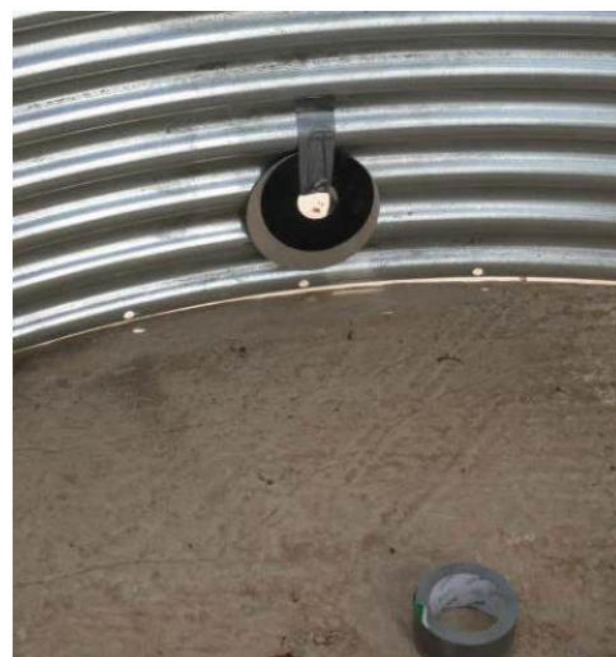


8: Preparation for fitting the Side Wall Outlet Assembly

Locate the pre-drilled outlet hole in the base panel on the inside of the tank and taking one of the aluminium discs and one of the rubber gaskets supplied with the outlet assembly, proceed as follows :

Align and hold the aluminium disc over the prepared hole and secure to the panel with a tape. Then hold the rubber gasket over the aluminium disc and hold in place with small pieces of tape

(This will enable the outlet assembly to be fitted after the liner has been installed, without the need to drop the liner to fit the disc and gasket)



9: Installation and Fitting of the Liner Cushioning

Install the chosen method for cushioning of the liner on the base using one of the three methods as described on Page 5 of this manual.

- A. 50mm layer of soft "stone free" sand with a 5.1 dry mix haunch at the outer edge.



- C. A layer of geotextile fleece, taped to the tank wall.



- B. Polythene sheet from the walls to the base, with a 50mm layer of soft "stone free" sand, shaped at the edge on to the sheet. Note. Any spare fixings can be fitted into the redundant holes at the bottom of the base panels if required.



Once installed, check for evenness and to ensure there are no protrusions which could damage the liner, then move the packed liner to the centre of the tank base.

10: Unfolding and fitting the liner

Fitting the liner will require people to work inside the tank on the fitted liner surface using ladders or step ladders. It is imperative that all equipment used within the tank has been adapted to protect against damage to the liner.

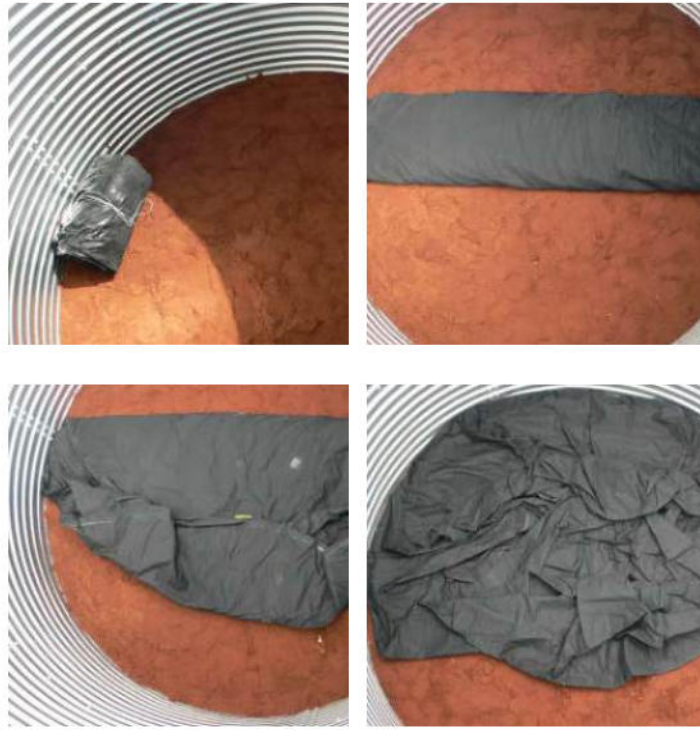
This will require that ladder or step ladder feet and tops be covered with a protective cushioning material.

In addition attention should be given to the type of footwear worn when working on the liner to ensure no damaged is caused to the liner. Also ensure that carried tooling etc, cannot fall and damage the liner.

Step 1. Place the liner package centrally on the base, double check that the liner cushioning system (sand or fleece) is free from any stones or sharp object and is evenly spread across the base, finally check that footwear is clean and appropriate.

Step 2. Unwrap and roll out the centrally located liner over the prepared base. The unfurled liner ends should reach the bases of opposite walls. Unwrap the remainder of the liner carefully pulling the circular base into place, so as the base to vertical wall seam is touching the steelwork all around. When done the vertical side will then be lying flat on the base.

Step 3. Ensure that all wall seams on the liner are lifted perfectly vertically (not twisted or at an angle). The person/s within the tank should then lift the liner offering its top edge to the person on the ladder to the outside of the tank.



Lift the liner to a height when there are no folds remaining at the base ensuring that the liner remains firmly in contact with the base floor.

An all around even length of liner of approximately 12–16 inches (30–40cm) should be lifted over the tank edge and temporarily secured in place with either short pieces of the top capping or adhesive tape.

Caution: If an even all round overlap cannot be achieved, this would indicate that the tank is oval and not round! This will need to be rectified before proceeding.

Once the liner is in place, check that the overlap is even all around the tank. Then the person/s within the tank should check and adjust as required to ensure that the liner wall seams are vertical, that the liner fits closely at the base and that any remaining creases are evened out.



Note. Liner Warranty

Excessive creasing of the liner can result in early deterioration and failure of the liner. In such proven cases liner warranties become invalid.

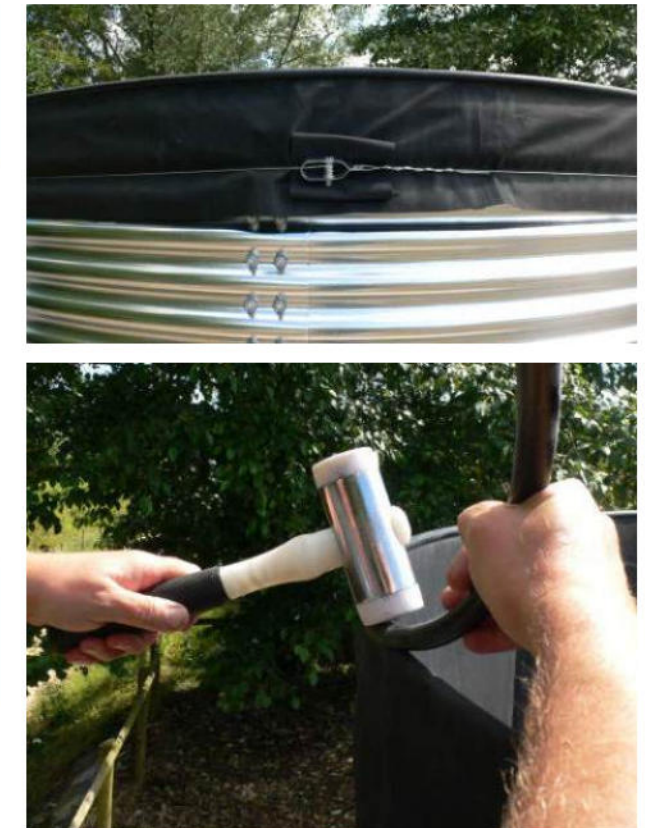
Step 4. If supplied, straining wire and strainer should be fixed within one of the panel corrugations towards the centre of the overlapping liner and tensioned, to secure the liner to the tank.

Once the straining wire has been tensioned any excess wire should be removed.

(Note. Some types of liner may have an integral ratchet strap arrangement to secure the liner to the tank, in this case the strained wire is not required).

Step 5. If supplied, the top (1.00") split capping should be fitted securely over the liner edge around the entire circumference of the top of the tank.

To do this, bend back the capping to open the slot, fit over the liner and panel edge and tap down using a rubber mallet and secure in place with adhesive tape as required.



SECTION D.

Galvanised Outlets 2-4"

Once the installation of the liner is completed and checked the outlet/s can be installed into the tank.



1. If the outlet includes the option of an isolation valve (e.g. gate valve, lever valve etc), then it is advised that the valve is fitted to the outlet assembly, before fitting to the tank (on steel outlets on to the short thread).
2. With the valve on the outlet tube, take one of the supplied back nuts and screw down to the base of the long thread. (Tip. If tight, tap the sides of the nuts when on the thread this should help free the nut and enable it to run more easily down the thread). Next slide one of the supplied aluminium discs down to the fitted back nut.
3. From the outside of the tank, offer up the long thread with fitted nut and disc, through the pre-drilled outlet hole and carefully through the pre-fitted aluminium disc and rubber gasket, which was previously taped in place between the inner tank wall and the liner.
4. Whilst the person outside the tank holds the outlet assembly upright and very firmly, (taking care not to dislodge the internal disc and gasket) the person on the inside of the tank (after ensuring that the liner is correctly positioned,) carefully uses the face of the rubber mallet to gently tap out a neat circle of liner material using the end of the outlet tube as a cutter. (Note. If knives are used to cut outlet holes, extreme care should be taken, as any damage caused may invalidate the liner warranty).
5. Once the outlet tube is cleanly through the liner wall, firmly push the second rubber gasket down on to the liner followed by the final aluminium disc and finally thread the second back nut to tighten against the aluminium disc (hand tight only).
6. Finally after checking that the liner is free from creases between the discs and gaskets, with one person holding the inside back nut firmly with stilsons, a second pair of stilsons is used to carefully tighten the outside back nut, ensuring that the outlet thread does not rotate as this may cause the liner to distort and tear.

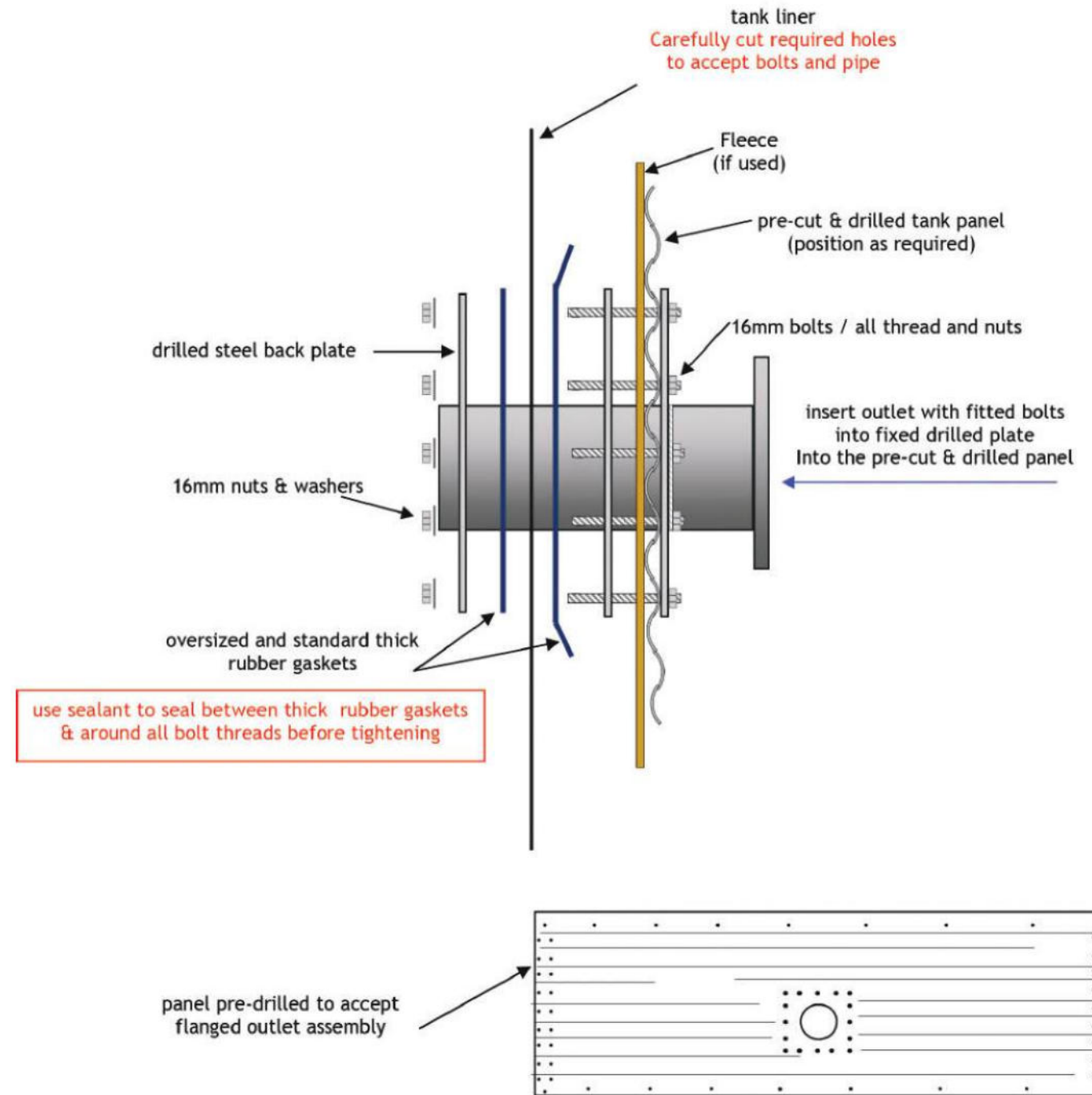
(Tip. If an outlet assembly should require tightening, this should always be done from the inside of the tank, so as to ensure that the liner does not get twisted or torn)

This should now complete the installation of the liner.

Tank Outlets & Overflows

Side Tank Outlet Assembly- Flanged for tanks 21ft / 6.40m diameter and larger

(available in galvanised or uncoated steel in sizes 5"/125mm, 6"/150mm, 8"/200mm, 10"/250mm and 12"/300mm - imperial or metric flanges)



Note. Due to the curve of the panels, the flanged outlet assembly is not available for diameter tank sizes below 21ft / 6.40mts.

Installation of Flanged Tank Outlets

TO15GFL (125mm) TO16GFL (150mm)
TO18GFL (200mm) TO20GFL (250mm)

A) Preparing the liner

1. Pre-hang the liner ensuring the seams are vertical and that the liner around the outlet hole is free of creases
2. Offer the outlet pipe through the hole in the panel up to the liner, ensuring it is held at right angles to the panels.
3. Mark the position of the tube end on the liner before carefully cutting a hole in the liner approximately 1" smaller than the tube end.
4. Fit the long threads and nuts to the first (welded) plate on the outlet, offer the pipe up to the panel locating and inserting the long threads through the small holes.
5. When held in position carefully push the liner over the tube to a point where the long threads are against the liner, carefully mark and cut out the holes for the bolts in the liner.
6. When all of the holes have been cut, the outlet is ready to install.

B) Installing the Outlet

1. Drop the liner away from the tank wall and lift the outlet into position, placing the tube and the long threads through their appropriate holes.
2. With the outlet being supported on the outside of the tank, the assembly of the outlet is now done from the inside of the tank.
3. Add the first of the steel plates (pre-threaded) over the tube and screw in the long threads, followed by the larger of the rubber gaskets.
4. Apply mastic to the rubber gasket around each of the threads and in a circle around the large hole (approximately 1" / 2.5cm)
5. Carefully fit the liner over the tube and the long threads ensuring it is free from creases.
6. Add mastic in a ring around the long tube onto the surface of the liner and also around all of the long threads.
7. Fit the smaller of the rubber gaskets and press to fit against the liner.
8. Add the final steel plate, the hexagonal nuts and tighten with a spanner. As tightening takes place, remove excess mastic with a damp cloth as it is squeezed from the seals.
9. Continue to tighten the bolts until all of the components are pressed together as tight as possible (this may require the tightening of each bolt several times)
10. Finish fitting and securing the liner in the standard way. **Please note: With these larger flanged outlets they may need supporting from the outside to avoid any damage to the tank panels because of their increased weight.**

C) Checking and Filling

Checking

Before adding water to the tank, it is essential to make the following checks:

Check that the liner is positioned correctly and that the base seam has not moved away from the wall. Re-adjust as required, to ensure "bridging" will not occur when water is added.

Check that all tooling etc has been removed from the tank.

Inspect the liner base and the walls for any possible damage caused by ladder feet or dropped tooling etc.

If damage is found, make the appropriate repairs with the provided emergency repair kits, following the manufacturers provided instructions.

Note. EPDM (rubber) or PVC materials require a glued patch repair.
FPP (polypropylene) material requires a specialist applied heated patch method. (Details on request).

Filling

Add 50 to 75mm of clean water to the tank then re-check the liner fit around the entire circumference.

Flood the tank to an approximate 150mm depth of water

(Note. This is the minimum amount of water required to ballast the liner, if the tank is not due to be filled immediately).

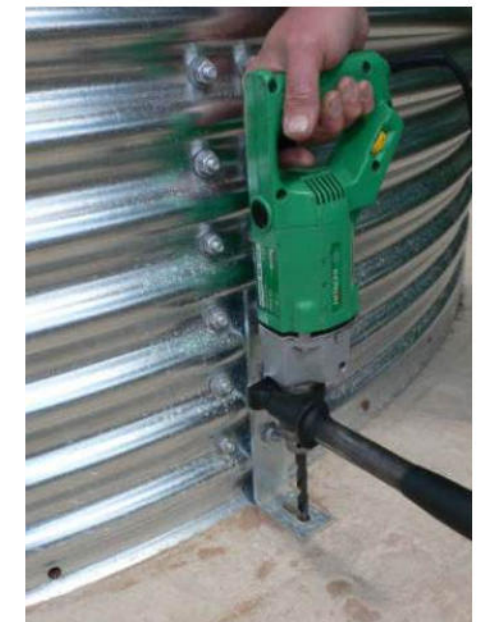
Check that the anchor brackets bolts are not fully tightened down to the concrete base, so as to allow the bracket to release so it is able to slide out if needed. (Once the tank has been filled, the anchor bracket bolt can be fully tightened if required).

Check for leaks at the outlet. If leaking, re-check the liner position to the internal rubber gaskets to ensure there is no twisting or pinching of the liner and from the inside, tighten a little more if required

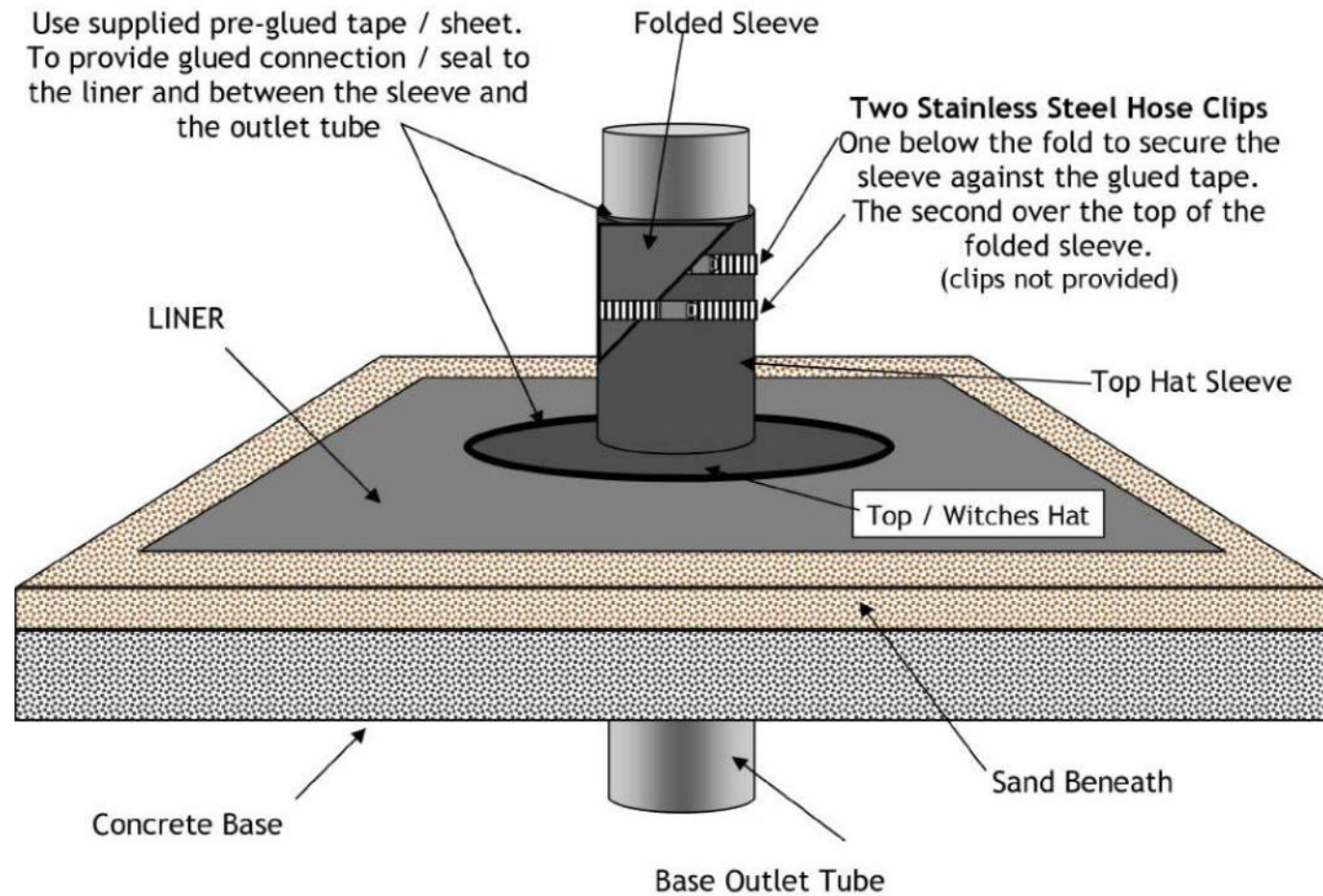
Note. Water on the base does not necessarily indicate a leaking tank!

If using sand beneath the liner, the weight of water in the filled tank will squeeze any moisture out of the sand. This will show on the outer concrete base for a week or two before the sand dries completely.

Finally, ensure that care is taken when removing ladders, equipment and personnel from the inside of the tank, to avoid causing damage to the liner or tank wall structure.



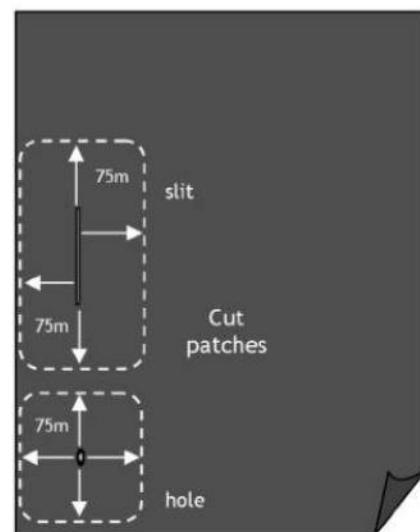
2 Top Hat / Witches Hat - Base Outlet System (sealed to the liner and outlet pipe)



Liner Repair Product

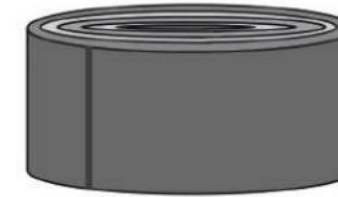


Double Sided, Glued Repair Tape or patch sheet

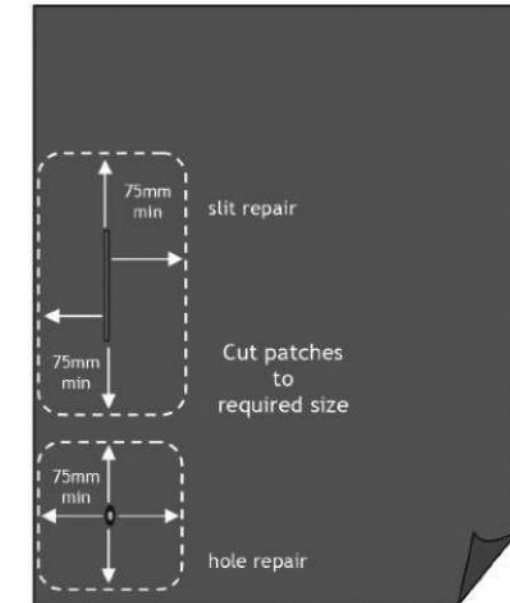


Stainless Hose Clips Not Supplied

3 EPDM (SCGT) LINER REPAIR KIT



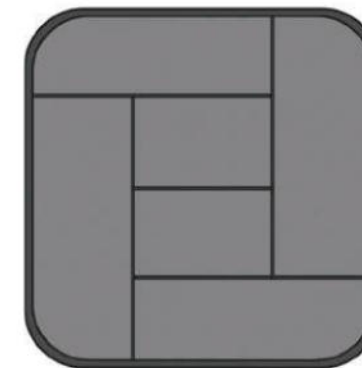
Contents:
Double Sided, Glued Repair Tape and Patch Repair Sheet



IMPORTANT !

This repair system is only suitable for the patching of small holes or splits and which are not found on the welded liner seams.

Liner Repair Method



A. After locating and marking the position of the hole or cut in the liner. Firstly ensure that the surface immediately around the damaged area of liner, is clean, dry and free from grease or slime etc.

B. Prepare the required size of repair patch from the provided sheet, then fix the repair tape over the entire surface of the patch.

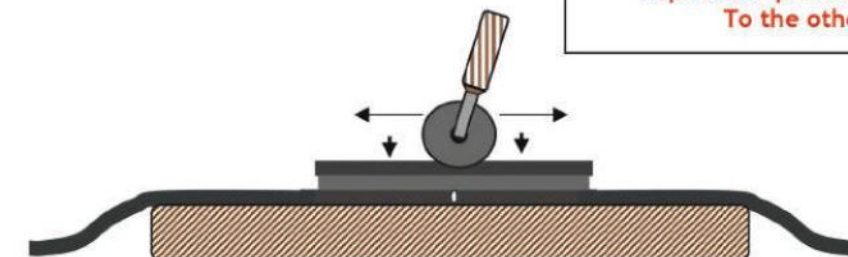
Round off the corners of the prepared patch, to help prevent the patch corners from peeling.

Tip. If making repairs to a new, unused liner, prepare two patches and fix one to each side of the damaged liner.

C. On a firm, flat surface. Apply the repair patch to the prepared area of liner, ensuring that the patch fully covers the located hole or split in the liner.

D. Using a hard surfaced roller. Rolling back and forth, apply a firm downward pressure over the taped patch, to compress the whole of the repair patch firmly on to the liner.

Repeat the process if fitting a second patch, To the other side of the liner.



TLREPD repair

4 ENPEX FPP LINER REPAIR KIT

Contents:
Heat Gun, Hand Roller, Scissors
And Repair Sheet

Liner Repair Method



A. After locating and marking the position of the hole or cut in the liner. Firstly ensure that the surface immediately around the damaged area of liner, is clean, dry and free from grease or slime etc.

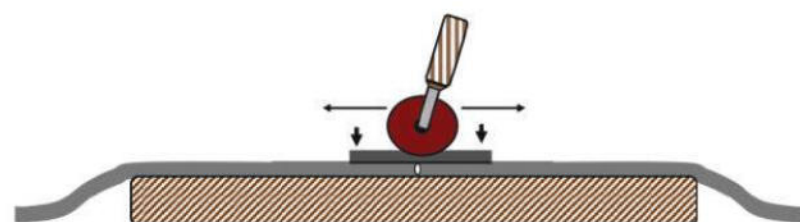
B. Prepare the required round or oval size of repair patch from the provided sheet.

With the liner supported on a firm flat surface, position the repair patch over the damaged area and hold in position with the hand roller.

When the heat gun has reached the required temperature, carefully slide the flat nozzle on the heat gun under one edge of the patch for a few seconds and remove, before firmly applying pressure with the roller to weld the two surfaces together, then repeat the same action to the other edges of the patch.

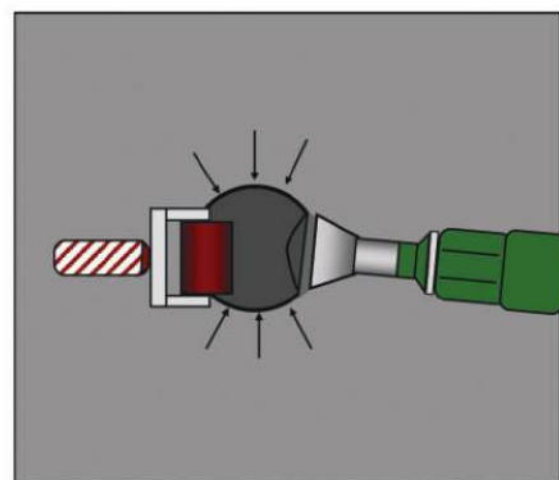
Finally, with a finger nail, check that all edges are welded down and if any lift, apply a little more heat and hand roll to complete the sealing.

Caution. Do not overheat the liner material

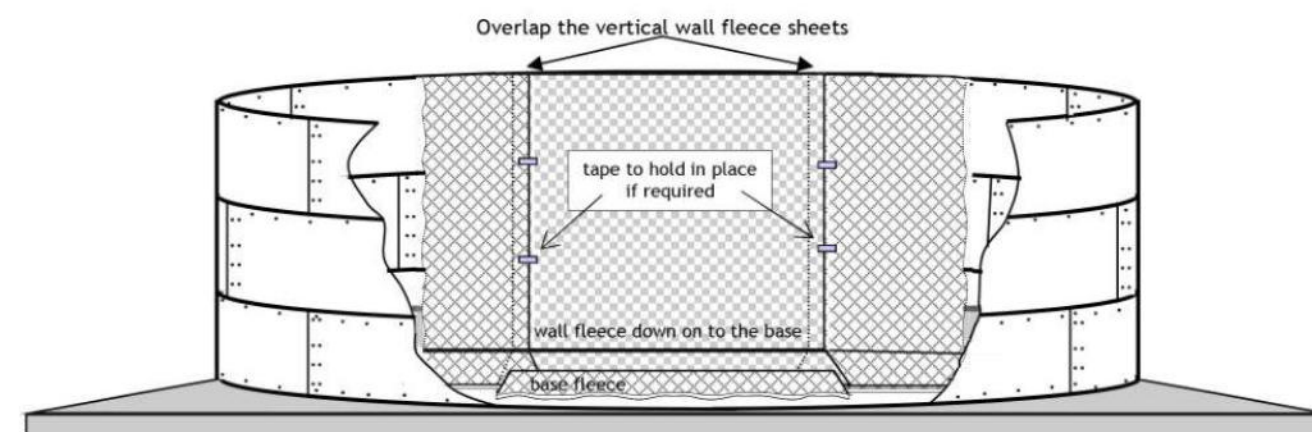


Tip. Searching for and locating leaks in liners
One person to be behind the liner (in the dark!), with a second person shining a torch at the suspect area of damaged liner.

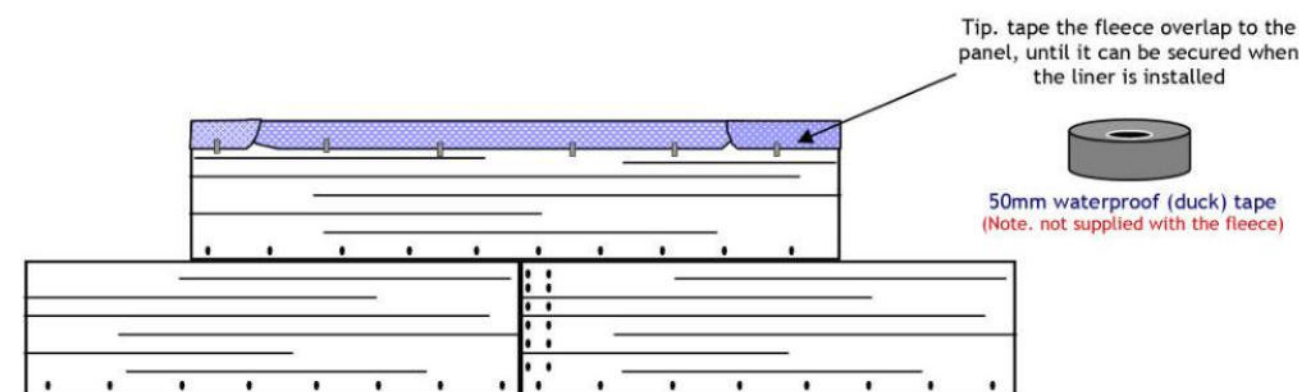
The person in the dark should be able to identify and chalk mark the exact damage location from the pinprick of torch light showing through the liner material.



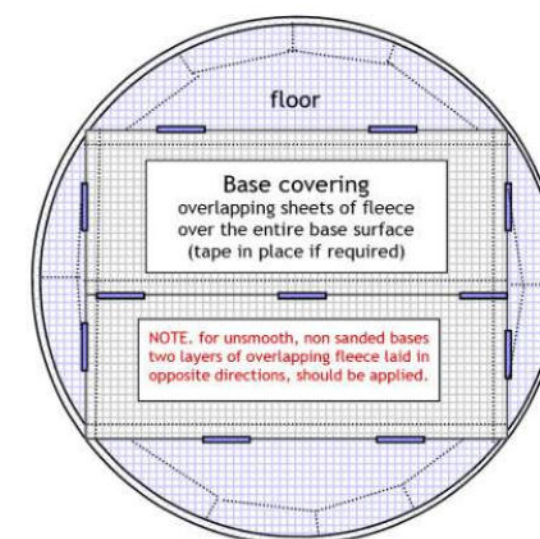
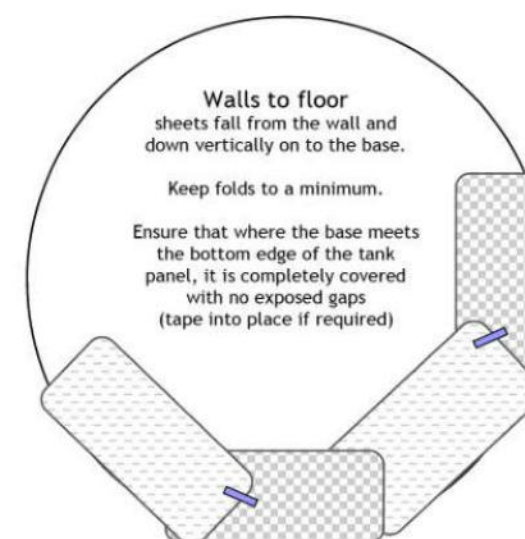
FLEECE EXAMPLE IN STORAGE TANKS 24/4 AND 24/6



Keep the number of folds in the fleece to minimum



The tank base surface should be level and flat with a reasonably smooth finish and no exposed sharp protrusions



Note. If fitting base fleece only.
Ensure that the fleece is taken from the tank wall and down on to the base, ensuring there are no exposed areas where the panels meet the base.
(tape in place as required)
(If possible, add a cushioning bank of sand all around the panel to base corner, beneath the fleece)

F: Storage Tank Maintenance

Tank Base and Surrounds

Make regular inspections to ensure that the concrete base has not been damaged or is suffering from concrete degradation, also maintain clean and clear access all around the tank to allow for any future maintenance of the structure.

Tank Steel Structure

Avoid damage to the galvanised steel structure and any attached pipe work by ensuring that vehicles or mechanical lifting equipment cannot come in direct contact with the tank (fork lift trucks and pallets etc). Regularly check the outlets and isolating valves to ensure they remain in good working order.

Tank Cover and Internal Fill valves etc. (if supplied)

Check annually, the tension of the steel tie down straps and tighten if required.

Remove the appropriate access hatch cover and make regular checks of any installed water feed valves to ensure that the valve is opening and closing correctly at the right water fill levels.

Any debris or pooled water should be removed from the tank cover as soon as possible, failure to do so could put substantial pressure on the cover support structure and cause damage to the top ring of the tank. Check the centre support pole on a regular basis to ensure this has not moved. During periods of high wind activity we strongly advise that Anti Algae and PVC covers are removed and the tank is kept full to its maximum volume. This will avoid any damage to the top ring of the tank

When using a Floating Cover, especially in windy conditions, the liner should be inspected at regular intervals for wear and tear. Dropping the water level may be a good precaution in certain conditions.

Important! Ensure that when working at high level, hatch covers and tools etc, are secured so as to prevent possible damage and injuries from falling objects.

Working Within the Storage Tank

For safety reasons, if it is necessary to enter the tank, always ensure that a responsible person supervises from outside the tank until such times as the tank has been vacated. Note: the tank will constitute a Confined Space and appropriate precautions should be taken.

Warning! Do not enter the tank until the water has been emptied to a safe working level.

Drain the tank via the installed tank outlet (utilise the pump system if possible). Then if required, remove the remaining water with a submersible (sump) pump and attached hose, either out through an open outlet or over the rim of the tank.

Important! If working inside the tank. To prevent damage to the lining material, ensure that ladder/step ladder feet are cushioned, that only soft soled shoes are worn and that components or tools etc, are held securely and cannot fall and pierce the liner.

The covered tank, if filled with mains water or filtered re-cycled water, should not accumulate debris or silt on the liner base. Should the tank be filled from other sources (bore-hole, well, stream etc), it is possible that silt etc, may eventually settle and build up on the liner.

Important! Do NOT attempt to remove any accumulated silt or debris the bottom of the tank with manual tools (rakes, shovels etc), as this will almost certainly pierce the lining, resulting in an expensive re-fit and possible damage to the surrounding areas from water spillage.

Remove silt etc, by suction or with a submersible pump.

Winterisation

Generally, water within a covered storage tank with an automated fill arrangement, and which is in regular use, will not freeze sufficiently to cause damage to the structure.

For tanks with no winter usage, the tank can be drained to a low level.

For tanks with no winter usage, likely to experience temperatures below -10 Celsius, the tank can be completely drained and the liner weighted with sandbags every 1.5m2.

Important! An empty tank structure is considerably less stable, especially if exposed to strong winds.

For special tanks which have to remain full for emergency use (fire tanks etc), it is advised that internal immersion heating is installed in the location of the fill valve. This is to ensure icing does not occur under the fill inlet.

Where temperatures may fall below -10 Celsius, electronic or mechanical accessories (e.g. depth gauge, immersion heater) should be removed and stored.

Feed pipe work, external valves and delivery hoses to pump rooms etc, should be lagged to protect from possible freezing wherever possible.

As a minimum, an annual inspection of all tank components should be undertaken to validate the warranty.

Annexe 10. Flood Risk Assessment

Copy of the original FRA that formed a part of the approval WA/75/20/PL.

**Flood risk assessment for proposed greenhouse structures at
Fleurie, Lakes Lane, Barnham.**

Summary

The site is classified as EA Zone 1.

The total site area is 8.9ha, of which 7.8ha is pertinent to the application (the remaining area with eucalyptus trees is on the east side and has no material change to it).

All of the site is unclassified in terms of risk of flooding from sea or river.

Virtually all of the site is unclassified for surface water, with just a few small depressions at risk. None of the proposed development is impacted by the small pockets that are classified as likely to have shallow ponding in surface topographical features.

All of the site is unclassified in terms of risk of flooding from reservoirs.

There are existing greenhouses on the site.

The redevelopment adds a further 2.9ha of greenhouses (plastic clad and glass).

A roof water drainage and attenuation system is proposed, designed according to EA guidelines i see separate document "Drainage and attenuation system"

The site was not in the 2012 flood event zone.

1. Background

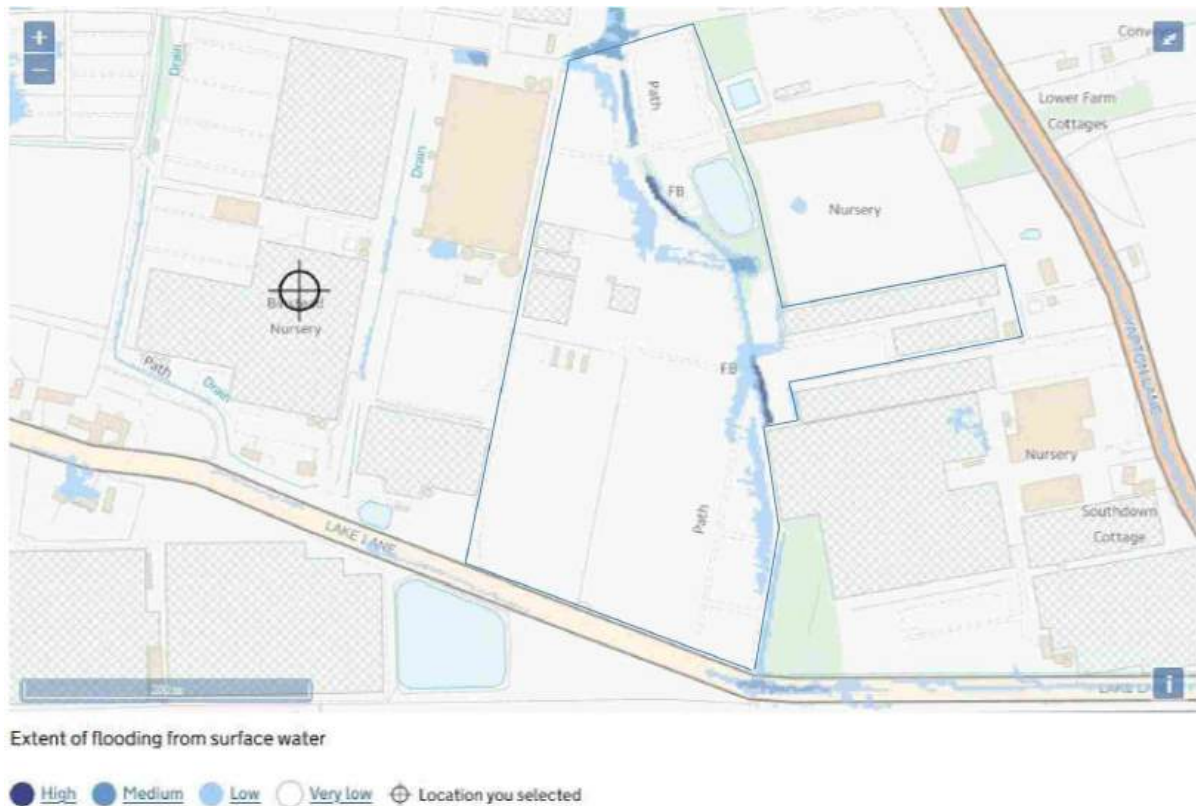
The proposal is for a redevelopment of an existing site currently in horticultural production with various greenhouse structures already on it.

The site is broadly level, with a very slight fall (~0.6m) north to south on the west boundary, and larger fall (~1.8m) on the eastern one. There is also a slight dip in the centre at the north end. This will be levelled as part of the development, and therefore will alter the flood risk assessments from the EA system as below.

Due to the nature of the structure and use there is no concern of flood risk consequences to the structure or cropping, thus the only issue is avoiding increased discharge to the drainage system.

There is no risk to human life as there is no permanent occupancy and none of the risk scenarios in the EA data show more than a small fraction of the site covered, and to shallow depths only.

The majority of the site is un-classified, with only the immediate surrounding areas to the stream having any risk, see map below. All of the high risk area is within the confines of the stream and immediate environs, and is not included in any of the proposals.



Risk of flooding from reservoirs is also un-classified.

2.4 Conclusion

This is a low risk development, as it retains the site in agricultural production and is not for habitation, with only short term and intermittent occupancy by workers.

There is a low risk of flooding from surface water,

The design as laid out in the associated document 'Drainage' can contain all the predicted rainfall including the Climate Change Allowance.

According to the EA assessments there is low risk of flooding within the proposed area, which is only shallow surface water ponding. This is not a significant issue for the development proposed.

Annexe 11. Maintenance and operation

a) Drainage system

Annual - visual inspection of above ground pipe, checking especially for any unsound connections or damage.

Annually during a high rainfall event - visual check of operation for any issues affecting proper operation.

Exceedance bunded areas - annual check on condition of bunds and drainage outlet, especially looking for blockage and invasion of vegetation.

b) Sumps and drain down pumps

6 monthly - check operation of float switch and pump.

Annual - Assess debris build up in base of tank, clean as required.

'Exercise' valves.

c) Tanks.

Annual -

Visual inspection of steel panels and bolts.

Visual inspection of liner, especially welded outlet connections and fold around top of tank.

Check liner tie downs (external), replace as necessary.

Assess debris build up in base of tank, clean as required.

d) Orifice plates / outlets

Monthly – remove and clean pre-LOP filters (see Annexe 12b).

(above frequency to be – reassessed after initial cleaning to see if it should be more or less frequent).

Annual - visual inspection of pipework and plates.

'Exercise' valves.

e) Outfalls

Annual - visual inspection of outfall, checking for accumulation of debris, erosion adjacent to abutments, intrusion of vegetation. Check operation of flap valve (Athlon flaps are maintenance free units).

Annexe 12. Steel tank installation and strainer / filter details

Included -

- | | |
|------------|---|
| Annexe 12a | Tank Erection Manual |
| Annexe 12b | Strainer Filter Installation and Maintenance Instructions |



12a Tank Erection Manual

SURFACE MOUNTED WATER TANK AND LINER ERECTION INSTRUCTIONS

Tools Required

Speed bit to tighten the bolts and nuts
17mm socket for tank bolts
17mm long reach socket for tank brackets or 17mm ring spanner
Stilsons to tighten outlet (where appropriate)
Strong pliers to wind up wire strainer
Rubber hammer for top capping
Sharp knife to cut liner
Strong screwdriver or 'Podger'

Check List

1. The steel sheets for the tank wall are banded together. These should be kept under cover until separated for building. Each sheet is letter coded for thickness and one will have a hole drilled in it for a take-off unit (if specified at time of ordering).



2. Box containing nuts, bolts, washer, anchor brackets and 10mm x 75mm Parabolts.



3. Coil of wire for liner collar and wire strainer.
4. Two lengths of split capping (25mm and 12mm diameter).



5. Butyl rubber waterproof liner.
6. Emergency repair kit for the liner.
7. Ballcock bracket (if ordered).
8. Tank outlet (if ordered).

NOTE: Comprehensive stress calculations for our range of tanks have been professionally carried out for us by external consultants for wind loadings of up to 90mph.

The steel thickness shown below and the cement flaunching around the inner circumference of the base are integral of these calculations. A thin gauge top sheet placed in the base ring can be a potential time bomb!

CONCRETE BASE

In order to comply with the UK Ministry of Agriculture or EC requirements, it is necessary to erect the tank on a concrete base with a minimum thickness of 100mm. Dependent on local soil conditions and size of tank it may be necessary to insert reinforcements into the concrete. The base slab must have a relatively smooth surface and measure 600mm in excess of the diameter of the tank. All sharp projections must be removed and the slab swept clear of all loose rubble, stones etc.

The concrete base should be constructed of pre-mix concrete to a strength of 30 Newton, 300kg/m³.

The approximate quantities to provide a minimum depth of 100mm are shown at the rear of this document headed 'Dimensional Technical Data' in the Appendix 5.

Leave pre-mix concrete a minimum of 72 hours to harden off before any further work is carried out.

ERECTING THE STEEL WALLS

1. Find the centre of the concrete base and mark out a precise circle with the chalk to the diameter of the tank. Tip sufficient sand on the base area to provide a 50mm layer. Provide enough cement powder for the 75mm flaunching mix later on (step 8). Place the liner, still packed, on the centre of the base.



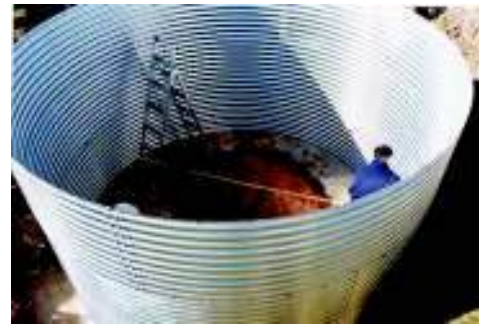
2. Sort out the galvanised sheets to determine the different thicknesses. Each sheet is marked with a labelled code number to denote its gauge, strength and the diameter of the completed tank. eg 16 25 36 = 1.6mm thick, Z25 strength steel, 36' diameter. The relevant thicknesses are 1.6mm, 1.2mm, 1.0mm and 0.8mm.
3. The thickest panel is used at the base of the tank and the thinnest is used at the top. The steels will be supplied on the pallet in the order they should be assembled in, i.e the bottom ring of the tank will be on the top of the pallet.
4. **The base ring:** Working in a clockwise direction and following the chalk line, place each consecutive panel on the inside of the preceding one. Loosely bolt the bottom layer of sheets together using a screwdriver to line up the bolt holes, where necessary. Bolt heads must be inside the tank. Nuts and bolts are not fitted to the bottom horizontal row of holes.



5. Fix the anchor brackets provided on the outside of the tank at each vertical end joint in the base ring, using the long bolts (M10 x 40mm) and additional spacer nuts. Do not fix the brackets to the concrete.



6. Check for ovality and adjust accordingly to provide a circle of the correct diameter. Tighten some of the bolts to hold the panels securely. Do not tighten all the nuts and bolts until the tank is fully erected.



7. **Second, third and fourth steel rings:** Each additional ring of panels is fitted outside the ring below, thus creating an external overlap, enabling rain to be shed.



It is essential that each alternate ring is staggered i.e. the end of each panel should rest towards the middle of the panels below, similar to a brickwork effect.

Proceed as for the base ring ensuring the correct thickness of galvanised sheet is used at each level.



Check again for ovality; when all panels are in place tighten all the nuts and bolts. Fix the anchor brackets to the concrete base.

8. **Cement flaunching and sand bed:** Make a 5:1 cement dry mix and place the 75mm flaunching around the inside circumference of the tank wall. Spread the FINE SOFT BUILDERS SAND and cover the base with 50mm of sand.



9. If an outlet is to be fitted, place a gasket washer and alloy disc adjacent to the pre-drilled hole in the appropriate panel. The take-off is fitted last and one of the washers is located between the steel wall and rubber liner.



10. Quantities of sand & cement required for flaunching

Tank Diameter	Sand Required	Cement Required
2.74m (09')	0.26m ³	25kg
3.66m (12')	0.46m ³	25kg
4.57m (15')	0.72m ³	25kg
5.49m (18')	1.04m ³	50kg
6.40m (21')	1.42m ³	50kg
7.32m (24')	1.85m ³	50kg
8.23m (27')	2.34m ³	75kg
9.14m (30')	2.89m ³	75kg
10.06m (33')	3.50m ³	75kg
10.97m (36')	4.16m ³	75kg
11.89m (39')	4.88m ³	75kg
12.80m (42')	5.66m ³	100kg
13.72m (45')	6.50m ³	100kg
14.63m (48')	7.40m ³	100kg
15.54m (51')	8.35m ³	100kg
16.46m (54')	9.36m ³	100kg
17.37m (57')	10.43m ³	125kg
18.29m (60')	11.56m ³	125kg
19.20m (63')	12.74m ³	125kg

20.12m (66')	13.99m ³	125kg
21.03m (69')	15.29m ³	150kg
21.95m (72')	16.65m ³	150kg
22.86m (75')	18.06m ³	150kg

NOTES: Distribute the sand evenly across the base ensuring it is to a minimum 50mm layer.

A 75mm high flaunching of cement must be provided around the inside circumference of the tank base to ensure retention of the sand and the rubber liner; see drawing below. It is essential to place a 50mm layer of sand over the concrete base. Failure to provide the cement flaunching and the 50mm sand layer will invalidate the warranty.

~ THE FLEECE – OPTIONAL ITEM

BEFORE FITTING THE FLEECE...

1. **CHECK** that each steel ring has the correct gauge number code.
2. **CHECK** that there are bolts in every punched hole except the top and bottom single line of traverse holes.
3. **CHECK** that all screw heads are inside the tank. All burrs must be removed and smooth surfaces restored.
4. **CHECK** for damaged corners and/or distorted edges of the corrugated sheets. These must be carefully straightened back to their original profiles to prevent puncture damage to the liner.

FITTING THE FLEECE

This is a two-man job, requiring one person inside the tank and one outside on a ladder. If a tank outlet has been ordered please refer to the Tank Outlet details below.

1. Fit the smaller capping (12mm) around the top of the steelwork. Tape the capping into place to ensure that it remains in place when pulling the liner over it.



2. The fleece comes in widths of 5.25 metres and lengths to suit the height of the tank ordered. Lay out the pieces of fleece onto the base of the tank.
3. The person inside the tank passes up the edge of the liner to the outside man on the ladder who pulls the liner up until he has approximately 300mm of liner hanging down the outside of the tank, which he should secure with clamps.



4. Work around the tank overlapping on the vertical seam by 25cm until the steelwork is completely covered by the fleece.





5. It is now a simple matter to go around and adjust the fleece so there are no creases in the sides.

Now proceed to point 2 of **FITTING THE LINER**.

THE LINER

BEFORE FITTING THE LINER...

1. **CHECK** that each steel ring has the correct gauge number code.
2. **CHECK** that there are bolts in every punched hole except the top and bottom single line of traverse holes.
3. **CHECK** that all screw heads are inside the tank. All burrs must be removed and smooth surfaces restored.
4. **CHECK** for damaged corners and/or distorted edges of the corrugated sheets. These must be carefully straightened back to their original profiles to prevent puncture damage to the liner.

FITTING THE LINER

This is a two-man job, requiring one person inside the tank and one outside on a ladder. If a tank outlet has been ordered please refer to the Tank Outlet details below.

1. Fit the smaller capping (12mm) around the top of the steelwork. Tape the capping into place to ensure that it remains in place when pulling the liner over it.



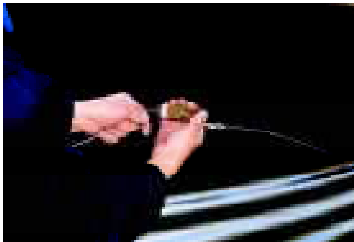
2. Roll out the liner over the 50mm sand base, laying it out so that the base to wall circumference seam is touching the steelwork all around. The vertical side will then be laying flat on the base. **BEFORE working with the liner check the sand for stones or sharp objects. Also check your SHOES.**



3. The person inside the tank passes up the edge of the liner to the outside man on the ladder who pulls the liner up until he has approximately 300mm of liner hanging down the outside of the tank, which he should secure with 75mm pieces of outer capping.



4. The inside man should check that the side of the base seam exactly fits into the corner of the cement fillets. He then moves around to the next vertical steel joint and repeats until the liner is hung. This operation will have stretched the liner wall and you will probably have vertical or diagonal creases in the wall. It is now a simple matter to go around and adjust the liner so there are no creases anywhere in the sides or the base by removing the 15cm clips and readjusting.
5. Included in the kit is a length of wire and a wire strainer to act as a collar. This secures the 300mm overhang around the outside circumference of the tank to prevent the liner creeping back under the capping in time. This wire collar should be tightly strained just below the split capping and above the first horizontal row of bolts. **Slip a spare piece of butyl sheet behind the strainer to prevent it cutting into the liner while it is being tightened.**



6. When the liner is free of creases, fit the outer split capping, removing the temporary clips as you go. The outside flap should be even all round; if it is not the tank is oval.



Creases in the liner always show. They can be detected even when the liner has been removed from the tank. ANY SIGN OF CREASES INVALIDATES THE WARRANTY.

TANK OUTLET UNIT

When the liner is properly hung, the take-off unit can be fitted.

Tap out a neat circle of rubber on the end of the threaded outlet once it has been pushed through the steelwork. Use PTFE tape around the threads of the outlet to prevent water seeping down the threads. The rubber gaskets should be positioned either side of the liner between the metal washers. Tighten the inside nut by hand as far as necessary and with the inside nut held stationary by a spanner, complete the tightening on the OUTSIDE nut. Take care not to rotate the threaded pipe as this will distort and tear the liner.

The process is shown here, please note that we prepared this in our workshop to demonstrate the procedure.





NOTE: It is advisable to fit the brass gate valve to the short thread of the outlet assembly prior to making the connection through the tank wall.

OUTLET ASSEMBLIES



Screwed Outlet Assemblies These are available in 2", 3" and 4" and screwed Male BSP, providing a thread to take a filter assembly on the inside of the tank and a screwed gatevalve on the outside of the tank. The panels are provided with predrilled holes to customer specification and the outlet assemblies are installed so that the liner and tank panels are trapped between backing flanges.

Flanged Outlet Assemblies These are available in 110mm up to 200mm diameter to allow for overflow or larger outlets. Panels are supplied drilled for bolts as required, although due to the weight of some of the larger assemblies it is important that pipework has additional support.

It is essential to check the correct positioning of the liner to ensure that the wall to base seam has not moved away from the tank side. This will not show from a cursory inspection and it is essential that the erector is inside the tank to check correct positioning whilst the first 50 to 75mm of water is run in.

Failure to position the liner correctly will cause dangerous bridging. See Appendix 6.

Flood the tank floor with 150mm of water. Fix the anchor brackets to the concrete base with parabolts.

TOOLS REQUIRED

Speed bit to tighten the nuts



'PODGER' or strong screwdriver to align and hold the steel panels



17mm socket for tank bolts



19mm socket for parabolts



12mm drill bit & drill to drill holes for Parabolts



17mm long reach socket for tank brackets or 17mm ring spanner



Stilsons to tighten tank outlet (where appropriate)



Strong pliers to wind up wire strainer



Rubber hammer for top capping



Standard hammer for marking liner with outlet



Sharp knife to cut liner



12b Strainer Filter Installation and Maintenance Instructions

INSTALLATION AND MAINTENANCE INSTRUCTIONS

3/4", 1" and 1½" Filters
2", 2"S, 3" Filters

INSTALLATION

1. Amiad recommends using plastic connectors when installing the filter onto metal pipes.
2. Use only Teflon or silicon sealing material on the inlet/outlet connections. Do not use any sealing material on the plastic ball valve connection to the filter drain port. This is a compression type fitting and does not require any sealing material.
3. Install a shut-off valve before the filter to facilitate cleaning.
4. Install the filter with the housing oriented downward. Make sure to install according to the direction of water flow as shown. This filter is available with either a Screen cylinder or Disc element. Be sure the direction of flow is inside/out for the Screen cylinder and outside/in for the Disc element. See drawing.

WARNING: Improper flow direction or backflow through a screen may damage the filter element.

CLEANING

The filter requires cleaning when pressure drop between the inlet and outlet reaches 0.5-0.6 bar (7-8 psi).

WARNING: NEVER OPEN THE FILTER WHILE UNDER PRESSURE!

Cleaning the Screen element:

Rinse the screen with water. Use a soft brush for hard-to-remove particles. Do not use a metal brush which may damage the screen.

Cleaning the Disc element:

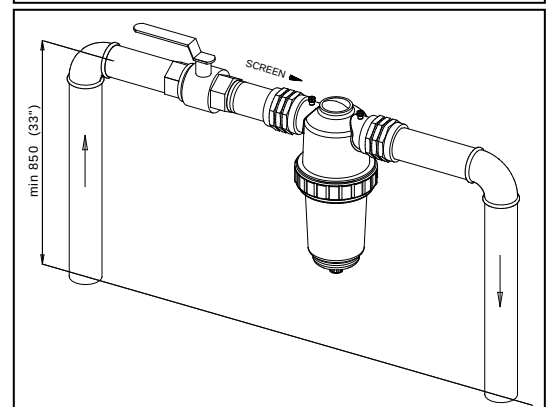
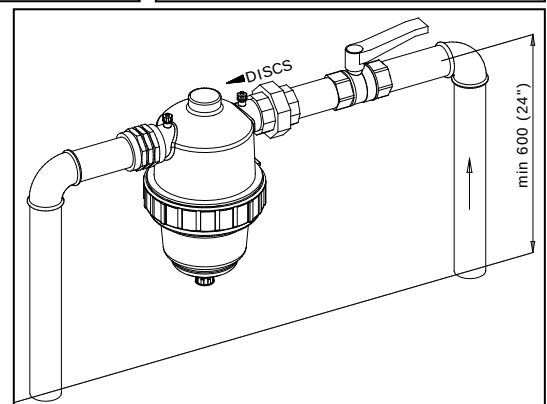
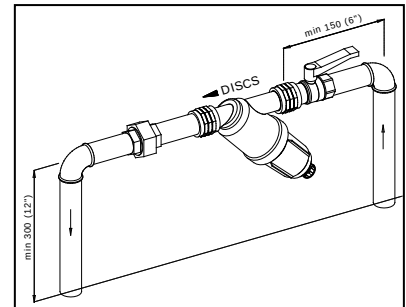
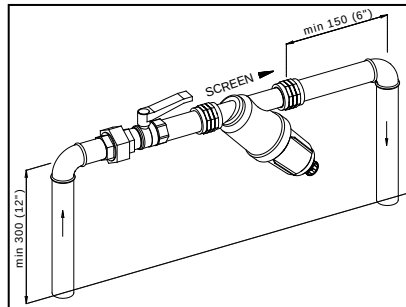
Twist the disc element core at each end and unscrew in a counter-clockwise direction. This loosens the disc core. Direct a stream of water along the disc edges to rinse with a spinning action. Hand-tighten the disc element core after cleaning.

Maximum pressure drop across the filter element, for a short time should not exceed 1 bar (14 psi).

MAINTENANCE

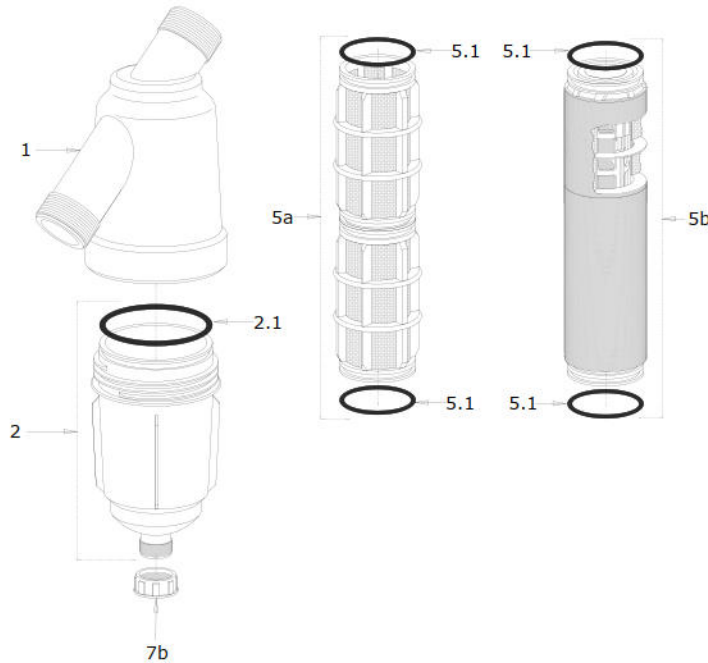
The following actions are recommended in order to keep the filter in best working order:

1. Once a week perform a complete visual check on the filter housing, filter element and seals. If needed, replace as necessary.
2. Before and after the irrigation season verify that the current installation meets the requirements as stated above.
Perform the following treatment to the screen:
 - a) Removal of Organic Material: Soak the screen in a 0.5% hypochlorite solution for 30 minutes. Rinse with clean water and return to filter according to procedures above.
 - b) Removal of Calcium Build-up: Soak the screen in a 2% HCL (Hydrochloric Acid) solution for 30 minutes. Rinse with clean water and return to filter according to procedures above.



AMIAD TAGLINE - PARTS SCHEDULE

3/4"; 1" and 1½" Filters

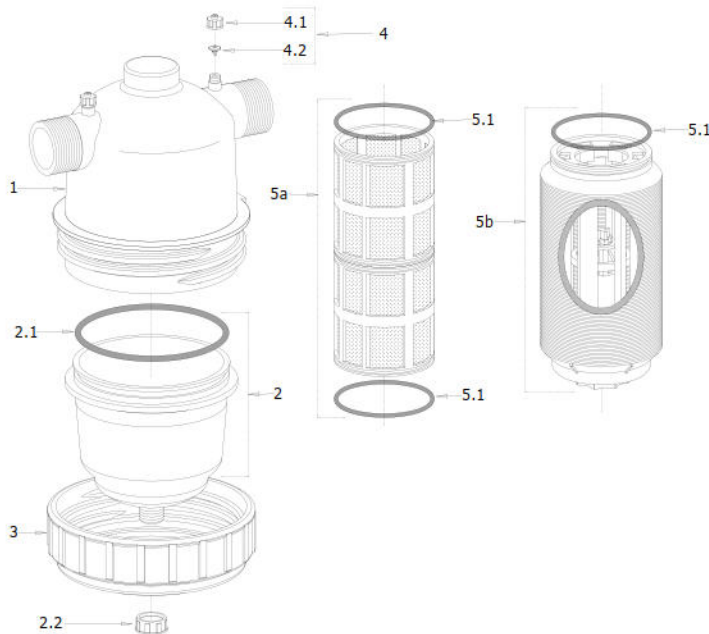


#	Description	Cat. number
1	Housing [3/4"]	700190-001164
	Housing [1"]	710101-000478
	Housing [1½"]	700190-001205
2	Bowl [3/4"; 1"]	710101-000452
	Bowl [1½"]	700190-001207
2.1	Bowl seal [3/4"; 1"]	770102-000099
	Bowl seal [1½"]	770102-000125
5a	Screen element [3/4"; 1"]	700101-000314
	Screen element [1½"]	700101-000365
5b	Disc element [1½" only]	700101-000351
5.1	Cylinder seal [3/4"; 1"]	770101-000039
	Cylinder seal [1½"]	770102-000117
7b	Cap [3/4" only]	710101-000960

Please note:

- 3/4" and 1" filters are available with screen elements only (5a).
- 3/4" and 1" filters are available with closed Bowl (2) and do not have the Cap at the bottom (7b).

2"; 2"-Super and 3" Filters



#	Description	Cat. number
1	Housing [2"/2"S]	710103-004375
	Housing [3"]	710103-004380
2	Lid [2"]	710103-000551
	Lid [2"S/3"]	710103-000571
2.1	Lid seal	770102-000169
2.2	Cap 3/4"	710101-000960
3	Tightening nut	710103-000544
4	Pressure check point	700190-001307
4.2	Rubber grommet	770104-000067
4.1	Plastic cap	710101-000554
5a	Screen element [2"]	700101-000388
	Screen element [2"S/3"]	700101-000415
5b	Disc element [2"]	700101-001513
	Disc element [2"S/3"]	700101-001512
5.1	Cylinder seal	770102-000130

AMIAD LIMITED WARRANTY

This certificate applies to Amiad Products purchased by You from Amiad or an Amiad authorized Distributor ("Distributor"). This limited warranty extends only to the original purchaser, and is not transferable to anyone who subsequently purchases, leases, or otherwise obtains the Product from the original purchaser.

1. Amiad hereby warrants that the Products are and will be free from defects in material and workmanship under normal use and service. Amiad warrants that it will correct manufacturing defects in the Products, in accordance with the conditions set out in this warranty.
2. This warranty is enforceable for a period of 12 months after the date Bill of Lading or equivalent (the "Warranty Period").
3. In the event that during the Warranty Period the Distributor discovers a defect in material and/or workmanship in any Product or part (the "Defective Product"), it shall submit a written complaint to Amiad using Amiad's standard customer complaint form. For the receipt of the customer complaint form, the submission of the complaint or any questions please contact your customer service representative.
4. Upon written demand by Amiad the Distributor shall return the Defective Products – or a sample thereof – to Amiad, at Amiad's cost. If the customer ships any such Product, Amiad suggests the customer package it securely and insure it for value, as Amiad assumes no liability for any loss or damage occurring during shipment. Provided however that in the event Amiad determines that the warranty does not apply to such Product, Distributor shall promptly reimburse Amiad for such cost (including freight and customs). Any returned Product or part must be accompanied by the warranty certificate and the purchase invoice. It is clarified that the Distributor may not return the Defective Product unless such return was coordinate and approved by Amiad in advance.
5. Amiad's obligation under this warranty shall be limited to, at its option, the repair or exchange, free of charge, of the Product or any part which may prove defective under normal use and service during the Warranty Period. The provision of a repaired or replacement Product during the Warranty Period will result in an extension of the Warranty Period by an additional period of 12 months, provided that the total accumulated Warranty Period shall in any event be no more than 18 months from the original Bill of Lading.
6. This warranty is valid on the condition that the Products are installed according to Amiad's instructions as expressed in Amiad's instruction manuals and according to the technical limitations as stipulated in Amiad's literature or as stated by a representative of Amiad.
7. This warranty will not apply to damaged or defective Products resulting from or related to:
 - (i) Fire, flood, power surges or failures or any other catastrophe/and or unforeseen occurrence, such as but not limited to those for which the customers are customarily insured;
 - (ii) Fault, abuse or negligence of the customer;
 - (iii) Customer's responsibilities, including the failure of the intake water to meet the agreed standards, as set forth in a written document, approved by Amiad or improper storage.
 - (iv) Improper or unauthorized use of the Product or related parts by the customer, including the customer's failure to operate the Product in conformity with the recommendations and instructions of Amiad, as set forth in Amiad's manuals and other written materials, the operation of the Product other than by a trained and qualified operator, or improper installation of the Product by a third party not authorized by Amiad;
 - (v) Performance by the customer of maintenance and other services other than by a trained and qualified advanced operator, or other than in conformity with the recommendations and instructions of Amiad, or other than in accordance with procedures defined in the literature supplied for Products;
 - (vi) Any alteration, modification foreign attachment to or repair of the Products, other than by Amiad or its authorized technical representatives.
8. In no event shall Amiad be liable to the customer or any third party for any damages, including indirect, special, exemplary, punitive or consequential damages, or lost profits arising out of or in connection with this warranty, or arising out of or in connection with the Product's performance or failure to perform, even if it has been advised of the possibility of such damages.
9. Amiad will be excused for failure to perform or for delay in performance hereunder if such failure or delay is due to causes beyond its reasonable control or force majeure preventing or hindering performance.
10. The limited warranty set forth herein is the only warranty given by Amiad and is provided in lieu of any other warranties created by any documentation, packaging or otherwise.
11. Amiad makes no warranty whatsoever in respect of accessories or parts not supplied by Amiad. In the event that Amiad is required to correct a defective Product or product not covered by this warranty, it will do so solely in consideration for additional fees.