

17 July 2023

Sam Evans Associates Limited

Gwernypant
Llansantffraid
Powys
SY22 6TB

Lyndsey Fisher
Roger Parry & Partners LLP
21 Leg Street
Oswestry
SY11 2NN

Tel: 07970 493336

(via email)

Dear Lyndsey,

Reference: JF & AA Owen, Carreg y Ffranc, Overton, Wrexham

I am writing on behalf of the above business to provide further background regarding their planning application for an above ground slurry store.

Due to the introduction of the **The Water Resources (Control of Agricultural Pollution) (Wales) Regulations 2021**, the existing storage capacity on the holding does not meet the storage requirements of the new regulations.

The business plans to build a new above ground store to store all slurry produced on the holding for the required period to meet the new regulations.

The holding is a dairy farm stocking 240 high yielding dairy cows and associated replacement youngstock, with the majority of animals housed in cubicles whilst dry cows and youngstock are housed on straw yards.

Youngstock and dry cows are grazed as and when ground conditions allow. The business **does not** plan to change stock numbers over and above those of the current level.

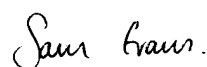
Slurry is currently stored in an above ground concrete walled store which is too small in size. The proposed store will allow all slurry to be stored in the new store whilst the existing store is then used to hold any dirty water and parlour washings.

The addition of the proposed store will result in the holding having spare capacity of 1,118 m³ for the storage period (1 October to 1 March). This spare capacity will allow the business to store slurry for longer periods to enable the targeting of slurry as a nutrient to meet crop needs throughout the growing season. Likewise, the farm will still have spare capacity if any extreme weather events (excess rainfall) occur.

Details of the calculations used for the above as well as proposed store details are attached with this letter.

I trust the above answers your queries. Please come back to me if I can be of further assistance.

Yours sincerely



Sam Evans
Sam Evans Associates Limited

Enclosures (storage requirements and stock numbers, details of store design)

Slurry Wizard

Data entry



Farm name/reference	Carreg y Ffranc
Herd size	240 cows
Milk yield/cow	10000 litres
Depreciation buildings	5 %
Depreciation plant	10 %
Interest rate	4 %
Electricity cost	32.00 p/kW hr
Water cost	1.00 £m3
Labour cost	18 £/hr
Tractor + man cost	40 £/hr

Use the buttons to move around the wizard.

User guide - click on the button to link to the guide, which can be printed once open with a right click.

EXCEL SECURITY

You may need to alter your excel security settings to enable the functions of the Housing Wizard to work.

Slurry Wizard-July2023.xlsm

Slurry Wizard ~ Data entry

Total farmable area	141.64306	hectares
Telephone STD code	01978	will be used to give typical rainfall values
Cows in herd	240	cows
Cows in milk	198	cows
Depreciation buildings	5	%
Depreciation machinery	10	%
Interest rate	4	%
Electricity cost	32	p/kW hour
Water cost	1	£/cubic metre
Slurry spreading cost	3	£/cubic metre
Water storage cost	0.5	£/cubic metre
Divert water cost	5	£/square metre
Roofing cost	80	£/square metre
Slurry storage cost	40	£/cubic metre

Slurry storage capacity for earth bank stores

Do NOT deduct freeboard from the total depth	Total Depth metres	*Slope factor (see below)	Top length metres	Bottom length metres	Top width metres	Bottom width metres	Total volume (m3)	750mm volume (m3)	Working volume (m3)
Store 1				0		0	0	0	0
Store 2				0		0	0	0	0
Store 3				0		0	0	0	0
Store 4				0		0	0	0	0
Store 5				0		0	0	0	0
Store 6				0		0	0	0	0
*Slope factor : 2 = bank slope 1:1, 3 = 1:1.5, 4 = 1 to 2, 5 = 1:2.5							Totals	0	0
							Total area	0	0

Slurry storage capacity for rectangular & circular stores

	Length m	Width m	Circumference of circular store m	Depth m (less freeboard)	Capacity m3	Area m2	Tick if Covered Store
Carreg - existing concrete store	40	22.5		2.1	1890	900	☐
Marys				1	0	0	☐
Store 3					0	0	☐
Store 4					0	0	☐
store 5 - Digester - circular			50.24	2.1	422		☒
store 6 - NEW - circular			83.3	5.76	3180	552	☐
Total existing capacity					5492	1452	

15.54 radius

Freeboard : reduce the depth to allow for freeboard (0.3 metres for a steel or concrete store and 0.75 metres for a lagoon)

Slurry separator

Do you operate a separator	No	For the slurry entering the store(s)
% reduction in slurry	35	Adjust the % to reflect the average reduction in slurry volume

Parlour washings to slurry store

Parlour washings to slurry store	Yes	to go into the old store
Litres/cow/day (e.g. 20 to 30)	25	

Uncovered dirty yard area to slurry store

	Length m	Width m	Area m2
Carreg - yard between sheds	92.4	12.12	1120
Yard 2			0
Yard 3			0
Yard 4			0
Yard 5			0
Yard 6			0
Yard 7			0
Yard 8			0
Yard 9			0
Yard 10			0
Yard 11			0
Yard 12			0
Total yard area			1120

Roof water area to slurry store

	Length m	Width m	Area m2
Roof 1			0
Roof 2			0
Roof 3			0
Roof 4			0
Roof 5			0
Roof 6			0
Roof 7			0
Roof 8			0
Roof 9			0
Roof 10			0
Total roof area			0

DairyCo

DairyCo Limited recommends seeking clarification of the specific requirements of Nitrate Vulnerable Zone (NVZ) regulations for your farm. The calculations carried out using this tool will be based on figures provided by the user and DairyCo Limited cannot take responsibility for decisions made as a result.

Livestock data entry ~ Enter all livestock below

Livestock	Age	Liveweight/milk yield	Number	% collected as slurry	Daily excreta	Total collected as slurry	Annual N output kg/year	Total N
Cattle								
Dairy Cow	After first calf	High (>9000)	240	80%	64	12,288	115	27600
Dairy Cow	After first calf	Medium (6000-9000)		100%	53	0	101	0
Dairy Cow	After first calf	Low (<6000)		100%	42	0	77	0
Dairy heifer replacement	13 mths to calving		70	0%	40	0	61	4270
Dairy heifer replacement	3<13 months		60	0%	20	0	29	1740
Beef Suckler	>25 months	Large (>500)		100%	45	0	83	0
Beef Suckler	>25 months	Small (<500)		100%	32	0	61	0
Grower	>25 months			50%	32	0	50	0
Grower	13<25 months			50%	26	0	50	0
Grower	3<13 months			100%	20	0	34	0
Bull Beef	>3 months			100%	26	0	54	0
Bulls for breeding	>25 months			100%	26	0	48	0
Bulls for breeding	3<25 months			100%	26	0	50	0
Calf	< 3 months			0%	7	0	8.4	0
Pigs								
1 sow place inc. litters	Litter up to 7kg	with syn amino acid		100%	11.0	0	16	0
1 sow place inc. litters	Litter up to 7kg	no syn amino acid		100%	11.0	0	18	0
Weaner place		7 to 13kg		100%	1.0	0	1	0
Weaner place		13 to 31kg		100%	1.7	0	4.2	0
Grower place	Dry fed	31 to 66kg		100%	3.3	0	7.7	0
Grower place	Liquid fed	31 to 66kg		100%	6.0	0	7.7	0
Finisher place	Dry fed	>66kg		100%	4.3	0	10.6	0
Finisher place		>66kg		100%	8.7	0	10.6	0
Maiden gilt place		>66kg		100%	4.3	0	11.1	0
Boar	66kg to 150kg			100%	5.0	0	12.0	0
Boar	Above 150kg			100%	8.7	0	17.5	0
Sheep								
Ewe	Lamb < 6 months	<60kg		0%	3.3	0	7.6	0
Ewe	Lamb < 6 months	>60kg		0%	5.0	0	11.9	0
Lamb	6 to 9 months			0%	1.7	0	0.5	0
Lamb	> 9 months			0%	1.7	0	0.7	0
Goats								
Goat				0%	3.7	0	15.0	0
Deer								
Breeding hinds				0%	5.0	0	15.2	0
Other deer				0%	3.7	0	12.0	0
Horses								
Horse				0%	24.7	0	21.0	0
Layers								
Replacement layer pullets	<17 weeks			0%	0.04	0	0.21	0
Laying hens - cages	>17 weeks			0%	0.12	0	0.40	0
Laying hens - free range	>17 weeks			0%	0.10	0	0.46	0
Broilers								
Broiler places				0%	0.05	0	0.33	0
Broiler breeder pullets	<25 weeks			0%	0.04	0	0.29	0
Broiler breeders	>25 weeks			0%	0.11	0	0.70	0
Turkeys								
Male				0%	0.14	0	1.23	0
Female				0%	0.11	0	0.91	0
Other								
Ducks				0%	0.08	0	0.75	0
Ostriches				0%	0.001	0	1.4	0
TOTAL						12,288		33610

Farm Nitrogen Loading

Kg Nitrogen per Ha	237
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This is the nitrogen loading BEFORE the import or export of manure

DairyCo

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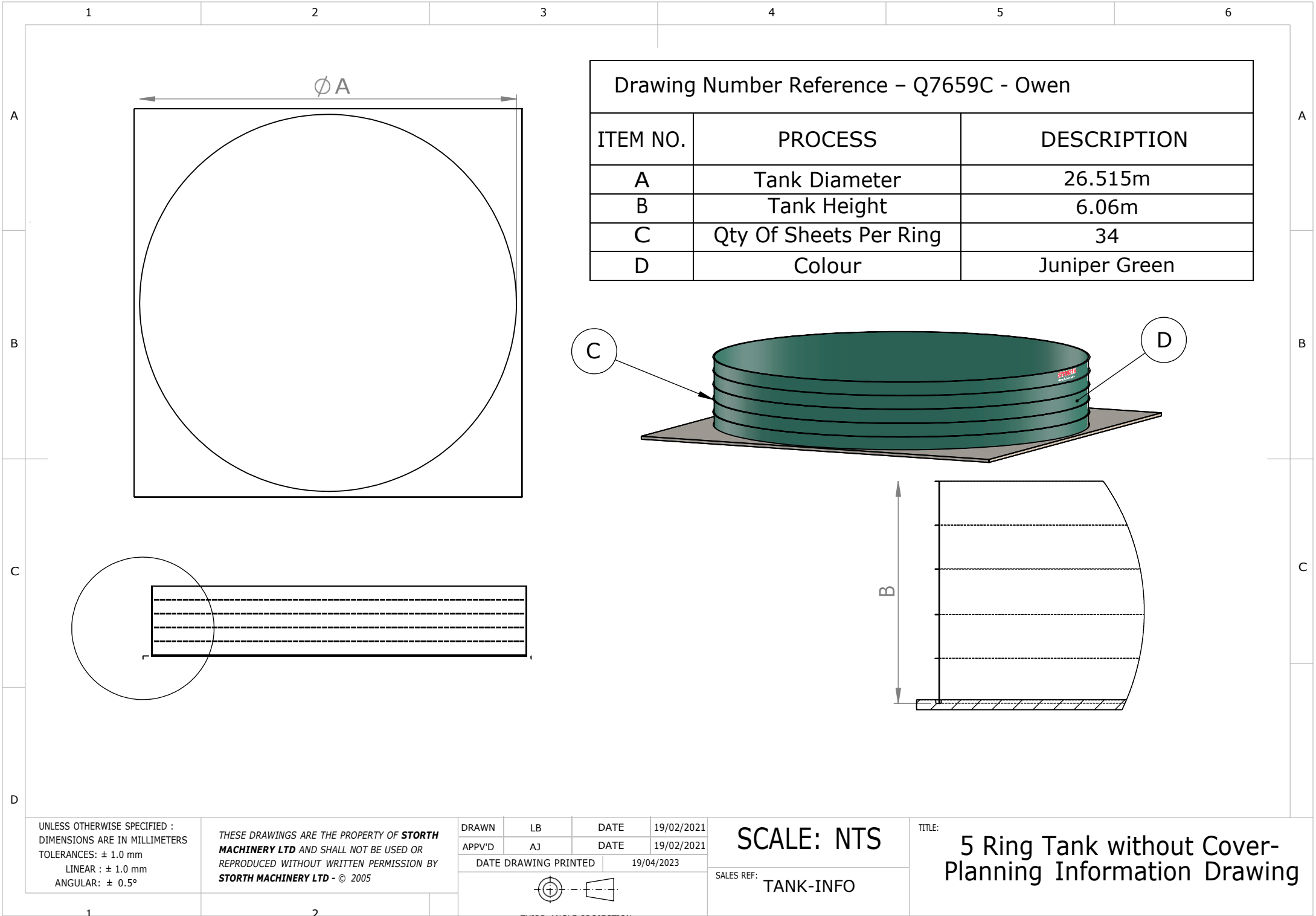
Slurry Report

Cubic metres		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Days		31	30	31	31	28	31	30	31	30	31	31	30	365
Total excreta as slurry		381	369	381	381	356	381	369	381	369	381	381	369	4497
% excreta to slurry store		100	100	100	100	100	100	20	20	20	20	20	20	
Excreta to slurry store		381	369	381	381	356	381	74	76	74	76	76	74	2698
Slurry separated	No	0	0	0	0	0	0	0	0	0	0	0	0	0
Parlour washings	Yes	153	149	153	153	139	153	149	153	149	153	153	149	1807
Typical rainfall (metres)	1.051	0.102	0.113	0.122	0.110	0.080	0.085	0.071	0.076	0.065	0.061	0.078	0.088	1.051
Winter rainfall adjusted to M5		0.133	0.146	0.156	0.142	0.107								
Own value rainfall (metres)														0.000
Yard run off area to slurry store	1120	149	163	175	159	120	95	80	85	73	68	87	99	1353
Slurry store area	1452	193	212	227	207	155	123	103	110	94	89	113	128	1754
Roof water area to store	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total cubic metres		876	892	937	900	769	753	405	425	389	387	430	449	7612
Cumulative production		876	1768	2705	3605	4374	5127	5532	5957	6347	6733	7163	7612	
Total storage capacity	5492	5492	5492	5492	5492	5492	5492	5492	5492	5492	5492	5492	5492	
Capacity less production		4616	3724	2787	1887	1118	365	-40	-465	-855	-1241	-1671	-2120	

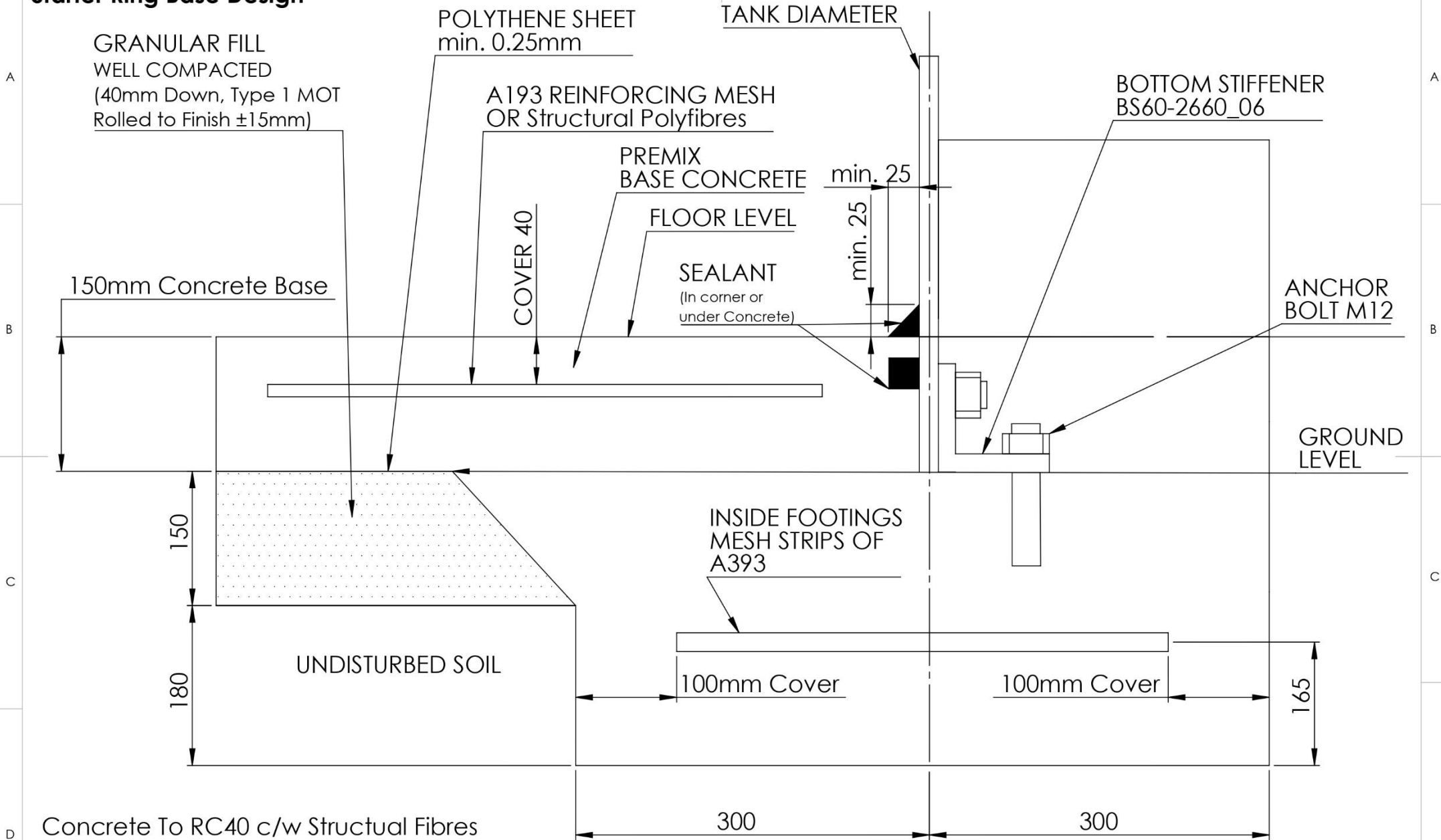
Cost/Benefits	Net Benefit £/year
Divert roof water	0
Divert roof water & harvest	0
Roof dirty yard	-1,247
Roof dirty yard & harvest water	45

Action points

The cost/benefit is based on a slurry storage cost of £40/cubic metre



Starter Ring Base Design



UNLESS OTHERWISE SPECIFIED :
DIMENSIONS ARE IN MILLIMETERS
TOLERANCES: $\pm 1.0\text{ mm}$
LINEAR : $\pm 1.0\text{ mm}$
ANGULAR: $\pm 0.5^\circ$

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APPV'D	AJ	DATE	21/01/2021
DATE DRAWING PRINTED		26/05/2023	



DWG REF: **SDR15990**

SALES REF: -

TITLE:

Concrete Base Details
Tank Sizes up to $\varnothing 42.112\text{m}$

SCALE: NTS

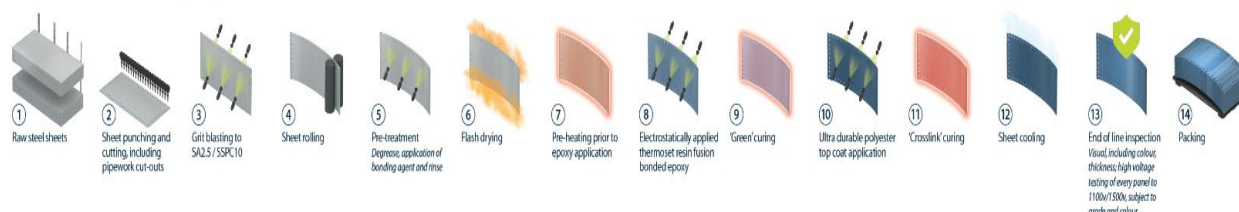
SHEET 2 OF 2

MATERIAL:

Balmoral Tanks



BITLPFS.02 Quality standard for efusion® fusion bonded epoxy coating



1. Scope

This standard specifies the quality requirements for the efusion® process for fusion bonded epoxy panels supplied by Balmoral Tanks.

assurance and management systems accredited to ISO 9001 2015.

2. Definitions

a: Fusion bonded epoxy coating

Fusion bonded epoxy coating, also known as fusion bonded epoxy powder coating and commonly referred to as FBE coating, is an epoxy-based powder coating that is widely used as a corrosion resistant protective coating in the water and wastewater industry.

FBE coatings are thermoset polymer coatings. The name fusion-bonded epoxy is due to resin cross-linking and the application method which is different from conventional paint. The resin and hardener components in the dry powder FBE stock remain unreacted at normal storage conditions. At typical coating application temperatures, usually in the range of 180-250°C, the contents of the powder melt and transform into a liquid form. The liquid FBE film wets and flows onto the steel surface on which it is applied and soon becomes a solid coating by chemical cross-linking assisted by heat. This process is known as "fusion bonding". The chemical cross-linking reaction taking place in this case is irreversible. When the curing is complete the coating cannot be returned to its original form by any means.

Application of further heating will not "melt" the coating and thus it is known as a "thermoset" coating.

b: Supplier

Any company supplying Balmoral Tanks with materials for the purpose of producing the company's market-leading efusion® product.

c: Defect

Also commonly referred to as a "holiday". Any pin hole, pit, flaw, break, thickness reduction or contamination of the fusion bonded epoxy coating.

d: Discontinuity

Any defect or holiday in the fusion bonded epoxy coating that allows an electrical current to flow through it during testing using the specified instrument in accordance with section 5.c of this standard.

3. Quality system

The inspection procedure specified within this standard and the efusion® fusion bonded epoxy application process shall be undertaken in accordance with Balmoral's quality

4. Raw materials

All raw materials used in the production of Balmoral's efusion® product are inspected upon receipt to ensure they meet the company's specification.

All sheet material will be supplied in accordance with BS EN 10025 or BS EN 10149-2. Mill certificates can be provided upon request and prior agreement.

5. Preparation of raw materials

a: Punching/cutting

Sheets shall be punched individually on an automated and computer-controlled CNC punching machine or laser machine.

b: Shot blasting

Sheets shall be steel grit-blasted to a near white finish on both sides to remove mill scale and surface oxidation and shall be performed to the equivalent of SA2½ or SSPC-SP10. The surface anchor pattern shall be in the range of 20µm to 100µm with a target value of 60µm.

c: Pre-treatment

Immediately after fabrication and grit blasting and prior to application of the coating, all sheets shall pass through a 3-stage pre-treatment process, comprising of a phosphate combined degreaser and pre-treatment spray, a cold water rinse using permeate water and the application of a propriety bonding agent to assist on the adhesion of the epoxy coating to the steel substrate. Sheets will be immediately dried to ensure that there is no risk of inter stage surface oxidation prior to coating.

6. Coating performance

a: Finished coated product

All finished coated efusion® product shall be inspected following the coating process prior to packing and despatch from Balmoral's facility. Balmoral shall conduct inspections on the coating on both the inside and outside surfaces as well as the sheet edges, bolt holes and any cut-outs.

b: Inspection of the outside surface

The outside surface of all sheets will be visually inspected under good lighting (natural or artificial) for defects to the polyester. For tanks that are intended in a non-drinking

water application a small amount of polyester overspray shall be permitted.

c: Inspection of the inside surface

The inside surface of all sheets shall be first inspected visually under good lighting (natural or artificial) for defects to the fusion bonded epoxy. The inside of every panel will be subjected to a high voltage test using an industry standard device to 1100 volts. The tester shall be passed over the surface area of the inside of the tank sheet. Only 100% defect-free sheets to the specified test voltage will be released. All panels found to have any discontinuities will be rejected.

d: Inspection of fusion bonded epoxy thickness

The thickness of fusion bonded epoxy and polyester will be measured using an industry standard device. A minimum of five thickness readings shall be taken on the internal surface and a minimum of five thickness readings on external surface. A reading shall be taken from 150mm from each corner and one from the centre of the sheet. All readings shall be recorded. The internal surface shall have a target dry film thickness range of 150µm (6 mils) - 250µm (10 mils). The external surface shall have a target dry film thickness range of 150µm (6 mils) -230µm (9 mils).

7. efusion® coating performance and quality standards

The below results are based on a 3mm steel plate, prepared in accordance with this standard.

Internal coating: Thermoset resin fusion bonded epoxy

Application	Test	Result
Dry film thickness	Industry standard device	150µm – 250µm (6-10mils)
PH range		PH 2-11
Corrosion resistance (Salt spray test)	EN ISO 9227	Pass - 0mm creep from scribe at 1440hrs
Hot water immersion 90 days, 75°C	EN ISO 21809-2	Pass rating 1
Humidity	EN ISO 6270-2	Pass – 1000 Hrs
Adhesion	EN ISO 21809-2	Pass - 0mm
Hardness	EN ISO 2815 - Bucholtz Hardness Test	Pass - Indentation resistance = 91
Impact resistance	EN ISO 6272-2	Pass >15J
Abrasion resistance	Abrasion wheel ASTM 4060	CS17,1000g,1000 cycles < 27mg
Chemical immersion	50% NaOH, 50% H ₂ SO ₄	Meets / Exceeds industry standard
Holiday test	1100v	100% defect free at test voltage

External coating: Durable polyester

Application	Test	Result
Dry film thickness	Industry standard device	150µm – 230µm (6-9mils)
Corrosion resistance (Salt Spray Test)	EN ISO 9227	16mm creep from scribe at 1000 Hrs
Humidity	EN ISO 6270-2	Pass - 1000Hrs
Adhesion	EN ISO 21809-2	Pass - 0mm
Hardness	EN ISO 2815 - Bucholtz Hardness Test	Pass - Indentation Resistance = 80
Impact resistance	EN ISO 6270-2	2.5Nm/22 inch-pound (no sign of detachment)
Weathering	EN ISO 16474-2	Pass -1000Hrs, residual gloss ≥50%, Colour change ΔE according to Qualicoat requirements (appendix A7)
Weathering	EN ISO 16474-3	Pass - 300Hrs, Residual gloss ≥ 50%



Formulated specifically for Balmoral's range of fusion bonded epoxy tanks by Axalta, a leading global supplier of liquid and powder coatings