



PO05 Vapour Recovery Plan

EPR/GB3609KQ

Document : PO05 Vapour Recovery Plan
Revision No. 4
Revision Date : 21/09/2018
Controlled :

Task	Title	Signed	Date
prepared by:	████████████████████	████████████████████	21/9/18
reviewed by:	████████████████████	████████████████████	21/9/18
approved by:	████████████████████	████████████████████	21/9/18

Contents

1.0	Introduction	3
2.0	Site background	3
3.0	Permitted activities	3
4.0	Pre-Operational Condition 05	4
5.0	Vapour recovery plan	4
5.1	Vapour recovery system specification.....	5
6.0	Preventing emissions during loading activities	7
7.0	Production phase vapour recovery	8
8.0	References.....	8
9.0	Appendix A – Additional oil storage tank specification.....	9
10.0	Appendix B – Additional oil storage tank design schematic.....	10

1.0 Introduction

The Lower Stumble Hydrocarbon Exploration Site (Commonly referred to as Balcombe) is located approximately 1.2km south of the village of Balcombe, West Sussex. The site grid reference is NGR TQ 531031 129237.

The site is permitted by the Environment Agency under the Environmental Permitting Regulations 2016. The permit reference is EPR/AB3307XD/V005.

2.0 Site background

The site features a single exploration well (Balcombe-2z), which was drilled during 2013. The well has a vertical depth of approximately 822m BGL (2,700') and a horizontal extent of approximately 522m (1,714'). The target formation is the Middle Kimmeridge Micrite, located at a depth of approximately 762m BGL (2,500'). The target formation is naturally fractured, and it is not anticipated that any well stimulation will be required beyond standard well clean up operations.

3.0 Permitted activities

The site (EPR/AB3307XD/V005) is permitted for the following activities:

A1 S1.2 A(1)(e)(i): The loading, unloading, handling or storage of, or the physical, chemical or thermal treatment of crude oil for exploration purposes only.

A2: The management of hazardous and non-hazardous extractive waste resulting from prospecting and well testing activities, not involving a waste facility. The management of extractive waste generated by well abandonment.

Angus Energy intends to undertake a short term well test of the Balcombe-2z well. The proposed test duration is seven days. The test will involve reverting the well from its current suspended state to an operational state. Following initial clean-up operations and checks, the well will be flowed for up to seven days to gain data on the presence and commerciality of any hydrocarbon resource present. During the well test, it is possible a commingled mixture of crude oil, formation water and natural gas will be brought to surface. These fluids, if encountered, will be processed onsite, with the liquids being directed to dedicated onsite storage tanks. Any natural gas present, will be directed to the onsite flare for disposal.

4.0 Pre-Operational Condition 05

A varied and consolidated site permit was issued on 22/08/2018 to adopt a 'modern condition format'. As part of this variation, a number of pre-operational conditions were included. The following pre-operational condition in relation to vapour recovery has been included within the permit:

“The operator shall submit a written plan for vapour recovery and shall obtain the Environment Agency’s written approval to it. The plan must detail the installation and utilisation of a vapour recovery system during the loading and unloading of [road and/or rail] vehicles. The plan must contain dates for the implementation of the identified improvement measures.

The plan shall be implemented in accordance with the Environment Agency’s written approval.”

This plan is provided to outline how the site operator will comply with this condition.

5.0 Vapour recovery plan

In line with the requirements of pre-operational condition 05, and the Oil & Gas Sector Guidance, Angus Energy proposes to undertake vapour recovery during the loading and unloading of any produced liquid hydrocarbons throughout the permitted activities.

In the event that significant quantities of liquid hydrocarbons are encountered, Angus Energy will employ additional measures beyond those outlined in the waste management plan and gas management plan to prevent the release of any recovered vapours during the loading/unloading of road vehicles. A description of these additional measures is included in Section 6.0 below.

Vapour recovery will be achieved through the use of dedicated vapour recovery systems associated with the road vehicles used for transporting all produced liquid hydrocarbons off site. All vapour recovery equipment will be associated with the road tankers rather than the onsite storage tanks.

The road transport of produced hydrocarbons will exclusively be carried out by a designated specialist road haulier. Each vehicle used for the loading and unloading of produced hydrocarbons will be fitted with a dedicated vapour recovery system (details below), independent of the system used for loading/unloading produced liquid hydrocarbons.

5.1 Vapour recovery system specification

Each vehicle used for the transport of crude oil from the site is fitted with a dedicated vapour recovery system. A brief description of the system is utilised is included below.

The vapour recovery system installed on each road tanker is fully compliant with the guidance contained in Code of Practice for Petroleum Road Tanker Vapour Collection Systems and Equipment Used in Unloading Operations, (*Energy Institute, 2008*). Each tanker is fitted with a 2" pipe that runs from the top front compartment of the tanker to the bottom rear of the tanker's final compartment. 2" pipes and hose couplings are used as standard on the road tankers which will be used for loading activities at the site. These hoses and couplings are distinct from those typically used in petrol filling station applications.

The vapour recovery line at the top of the tanker features an isolation valve which is controlled by the vehicle driver. A further isolation valve is located at the end of the vapour recovery system where the connect to the onsite infrastructure is made (pictured below).



Figure 5.1A Vehicle vapour recovery system isolated and capped for transport



Figure 5.1B Vehicle vapour recovery system isolated but ready for site connection

All pipe connections, including the vapour recovery couplings utilise 2" BSP fittings. The vapour transfer valves are in conformance with BS EN 13082, while the vapour collection adaptor complies BS EN 13081 and is fitted with a self-sealing valve. Where multiple-compartment road tankers are used, loading and vapour recovery will be undertaken on each compartment in turn. No transfer of vapours will occur between compartments during loading activities. The road vehicles used feature vapour manifold vent valves, although these will not be activated of during loading activities as the nature of the loading activity and onsite storage tanks mean any pressure build up would occur within the onsite storage tanks rather than road tank. In the event of an overpressure event occurring, this would be managed by the pressure relief system within the onsite storage tank system (described below). The road vehicles used feature liquid detection sight glasses as standard, which will be used as appropriate in line with the road tanker's standard loading and unloading procedures. Each road tanker's vapour recovery system also features a vapour hose interlock device.

These vapour recovery systems are dual-purpose in that they are necessary both to maintain site health and safety during the loading activity, and to eliminate vapour emissions and therefore environmental impact of the loading activity.

The road vehicle vapour recovery system will recover any hydrocarbon vapours or gases present within the road tanker which have broken out from the liquid hydrocarbon during loading. All recovered vapours or gases will be returned to the onsite hydrocarbon storage tanks using dedicated lines independent of the liquid transfer lines. There will be no emission of vapours or gases from either road tanker or onsite storage tanks during loading operations, unless required for safety purposes.

The above vapour recovery system will be employed during every loading movement for the duration of the well test activities.

6.0 Preventing emissions during loading activities

Where significant quantities of liquid hydrocarbons are encountered, Angus Energy will supplement their planned onsite fluid storage with an additional oil storage tank. The additional storage tank will be of an enhanced specification in order to both provide additional storage capacity, while also enabling vapour containment during loading activities.

The additional storage tank is a 19m³ pressure controlled IMDG T7 316SS tank. The tank will be provided within an ISO DNV2.7-1 transport frame. This tank provides liquid and gas containment integrity up to a maximum pressure of 4 bar (~58 psi). A pressure relief valve integrated into the tank is set to activate at 3.3 bar (~48 psi). This tank will be incorporated into the other onsite storage tanks in series, with loading taking place from this tank. The specification of this tank and a design schematic are included as Appendix A and B respectively.

Process for vapour containment during loading

Prior to loading activities commencing, the permanent vent (Emission point A2) on the in-situ oil storage tanks will be isolated. This will temporarily prevent the emission of any vapours arising from crude oil in storage.

During loading activities, the road tanker will connect both its liquid transfer lines and its vapour recovery system (as described above) to the additional oil storage tank. Once this connection is achieved, the combined oil storage tanks will comprise a pressure-controlled system. Liquid loading will proceed under the supervision of the vehicle driver. Any recovered vapours will be returned to the oil storage system. The pressure control valve on the additional oil storage tank will provide pressure

relief control for safety purposes during this period. As all recovered vapours will be returned to storage tanks which will be undergoing the process of being drained, any vapours present will expand upon their return to the increasingly empty storage tanks, which will have the effect of temporarily creating a very small vacuum within the storage tanks which will minimise the risk of over pressurisation during loading activities occurring.

Following the completion of the loading activity, the vehicle driver will uncouple first the liquid transfer lines, followed by the vapour recovery hoses. The road tanker will then be readied for transport, and will depart. Following the completion of the loading activity, the isolation on the permanent vent (emission point A2) will be removed. At this point, the site processes will return to their storage configuration.

7.0 Production phase vapour recovery

If at some future point, the site is further developed for the production of hydrocarbons (subject to all required regulatory permissions), a review of this vapour recovery plan will be prompted. At this point, a review of all available vapour recovery options appropriate to production phase activities will be undertaken. An updated copy of this plan, incorporating any identified improvements will be provided to the Environment Agency at that point.

8.0 References

- Site permit (EPR/AB3307XD/V005)
- Site Waste Management Plan (Doc ref: HSE-Permit-BAL0005 v3.0)
- Onshore Oil and Gas Sector Guidance (Version 1, August 17th, 2016)
- Code of Practice for Petroleum Road Tanker Vapour Collection Systems and Equipment Used in Unloading Operations (Energy Institute, 2008)



9.0 Appendix A – Additional oil storage tank specification



SURETANK

Engineering a better, safer future

www.suretank.com

Technical Specification: 19 KL 20ft ISO IMDG T7 316SS Tank, in DNV2.7-1 Frame

Customer: ATI Tank Hire UK

Contract Number: CN1727

Enquiry Number: D4069

PO Number: 28179

Country of Destination: United Kingdom

Transport: Ex-works

Container Type: 19 KL 20ft ISO IMDG T7 316SS Tank, in DNV2.7-1 Frame

Unit Type: Chemical

Approvals: ADR/RID
DNV 2.7-1 (2013)
EN 12079 (2006)
CSC
Customs/TIR
IMDG
ASME.VIII-1

Quantity: 2 Off

Owner Serial Numbers: MR562 and MR563

Suretank Serial Numbers: ST-24229 and ST-24230

Serial Number Welded to Frame: Suretank Serial Number

Sling Numbers: ST-24229/1 and ST-24230/1

Shackle Numbers: ST-24229 A-D and ST-24230 A-D

Capacity: 19000 Litres (nominal capacity +/- 2%)

External Dimensions: 6058 x 2438 x 2591mm (20' x 8'x 8'6" standard ISO dimensions)

Tare: 5400 Kg **Maximum Payload:** 19600 Kg **MGW:** 25000 Kg

External Pressure: 0.21 (Bar) **MAWP:** 2.67 (Bar) **Test Pressure:** 4.0 (Bar)

T Codes: T7

End Thickness: 5.2 mm minimum after forming

Shell Thickness: 4.4 mm nominal

Approval Number: LR61473 **Approved Drawing:** ST-8580

Current Drawing: ST-8580

Specification Details

<i>Category</i>	<i>Specification</i>	<i>Details (if required)</i>
1. Frame Design Temperature:	- 20 °C to + 70 ° C	
2. Frame Material:	Specify Details	EN 10219 S275 J2H on primary structure (or higher) EN10025 S355K2+N, (Impact Energy of 36 J min AVE @ -40C), Inspection Certificate EN10204:2004 Type 3.2 on padeyes EN 10219 S235 JR on secondary structure
3. Vessel Material:	Specify Details	316/316L stainless steel (EN10028-7 1.4401/1.4404 or SANS 50028-7 1.4402) Cold rolled 2B finish on shell and dish ends
4. Vessel Design Temperature:	- 40 °C to + 70 ° C	
5. Frame to Shell:	Specify Details	Vessel welded to frame via 2 x carbon steel painted cradles and 304S/S doubler plates.
6. Skirt Material:	Carbon Steel (Painted)	
7. Corner Casting:	Specify Details	ISO Corner castings on top & bottom corners (4 top type, 4 bottom type)
8. Padeyes:	Ø 40 mm hole for 13.5 tonne shackle (Designed for 45° sling angle)	
9. Fork Pockets:	Mild Steel-2way	Outer dimensions: 316mm wide x 128mm deep Internal dimensions: 300mm wide x 120mm deep Centers: 2050mm between centres Supplied with slots underneath for access for painting and welding.
10. Fork Pocket Loading:	Empty Lift Only	
11. Stacking:	Required	
12. Fittings Supplier:	No Preference	
13. Manlid:	Ø 500mm Hinged	1 x 500mm – 6-point fastening hinged manlid. Supplied with brass wing-nut swingbolts and TIR provision on neckring.
14. Bottom Outlet:	Specify Details	1 x 4" 45 degree bottom outlet assembly complete with 3/4" sample line. 4" outlet complete with 4" butterfly valve and terminating in a 4" males BSP threaded spigot and female cap. 3/4" sample line complete with 3/4" ball-valve and terminating in a 3/4" male BSP threaded spigot and female cap.
15. Safety Relief Valve:	2.5 inch Bore Pressure setting as	1 x 2 ½" pressure relief valve

	per IMDG code(no vent button)	supplied with flame gauze. Set pressure 3.3 bar.
16. Vacuum setting:	Vacuum setting as per IMDG code	-0.21 barg
17. Dipstick & Access:	Not required	No dipstick supplied.
18. Level Gauge:	Bayham	1 x float type level gauge. Supplied with internal guide-rail. Calibration 500 Litres.
19. Level Gauge Mounting:	Specify Details	Dished End (Outlet end).
20. Airline Valve:	Specify Details	1 x airline extension consisting off 1½" threaded ball-valve, pipework extending down outlet end of tank and terminating at chest height with a second 1½" ball-valve, male camlock and femael camlock cap..
21. Airline Valve Extension:	Required	
22. Valves gasket (including PRV):	PTFE/Envelope	Bottom Outlet Tank connection: PTFE Airline Valve: PTFE P/V valve: Fortyt (Fortyt is a moulded Teflon with a silicon inner core)
23. Manlid gasket:	Nitrile	
24. Walkway / Grating:	MS Grating (with hinged access to manlid)	To adequately cover all exposed fittings and thereby prevent slings or chains snagging per DNV 2.7-1. Made from mild steel galvanised grating. Fittings to be A4 316. Walkway opening size to be 50 x 30 to comply with DNV 2.7-1 (2013).
25. Ladders:	Bolted, external only	1 x aluminium bolted ladder, located on the right-hand side of bottom outlet end of frame.
26. Fittings Connection Thread:	BSP	Outlet : BSP Airline: BSP Thread sealant: PTFE tape.
27. Placard Plates:	Not required	
28. Cargo Carried:	Specify Details	Multi cargo as per IMDG T7 and ADR T7 (The operator of the vessel must ensure that the commodity carried is listed under the applicable UN Portable Tank instruction and is in no way corrosive to 316/316L Stainless Steel)
29. Earthing Point:	Spade	2 x earthing bosses 316L stainless steel M16 thread
30. Document Box:	SS	1 x 2" stainless steel tube (250mm Long), bolted to frame upright on bottom outlet end of frame. Supplied with rubber cap and 316 S/S chain. Mounted at 45° on inside of corner post. Hole in bottom for drainage.
31. Fall Arrestors:	Not required	
32. Test Requirements:	As per Code Requirements	As per DNV 2.7-1/EN 12079 & IMDG code: Hydro & Leak test: All Unit(s). 4-point lift test:1 Unit(s).

		2-point N/A Unit(s). Drop test: N/A Unit(s).
33. NDT:	Specify Details	Radiography on Vessel: Heads one piece; Shell spot (Two T Joints plus additional additional shots on Longitudinal Seams to make up 10% of weld length). MPI on frame as per DNV 2.7-1 & EN 12079 requirements
34. Approval Agency:	Lloyds	
35. External Frame Finish:	Specify Details	Paint Supplier: International Paints Frames shot blasted to Swedish standard SA 2 ½. Prime with 1 coat of zinc rich epoxy Interzinc 52 to 50 microns DFT Intermediate coat with 1 coat Intercure 200 to 100 microns DFT Finish with 1 topcoat of Interfine 691 to 50 microns DFT Overall nominal d.f.t. 200 microns Colour: ATI Green (BS221) Cross hatching to be applied to top of top rails: Colour: White
36. External Vessel Finish:	Chemically cleaned and passivated; welds as laid.	
37. Internal Vessel Finish:	Chemically cleaned and passivated; welds as laid.	No product traps. Bottom 400mm of circ seam polished smooth.
38. Markings:	Decals	MGW, Payload, Tare, Capacity, and customer serial number decals to be fitted to tank (black text on a white background). Blackboard panel, overhead warning decals, earthing decal, important notice decal and fittings label decals to be fitted. Standard ISO code markings to be applied. See decal/G.A. drawing for full details
39. Customer Logos:	Not required	
40. Nameplates:	As per Code Requirements	1 x IMDG/Offshore/ISO/CSC combined nameplate and 1 x DNV offshore sling data plate.
41. Packaging:	No Preference	
42. Shackle Grade:	6	
43. Sling Type:	4-Leg Wire rope slings - Talurit (45° rating)	
44. Additional Requirements 1:	Specify Details	4" top fill connection, to be welded top of tank supplied with blank flange. Connection to be orientated upwards with hinged access in the walkway.
45. Additional Requirements 2:	Specify Details	4" fill connection consisting of a 4" butterfly valve piped from the front through the dish then piped internally to the top head space, run to rear of vessel so the fill is at opposite end to the discharge. Terminate with a 4" Fig 207 Hammer lug fitting; including cap and chain.

46. Additional Requirements 3:

Specify Details

6" connection on dished end containing the bottom outlet. Consists of a 6" 316SS ASA raised face slip on flange (RSFO) and blank.

Release Information

Submitted by:	
Sales Review:	
Technical Review:	
Change Detail:	4" front inlet added c/w butterfly valve and Fig 207 cap, top 4" inlet blanked and butterfly valve removed, 6" blank added to front of vessel
Revision:	3
Lifecycle State:	Released
Release Date:	2015/04/30



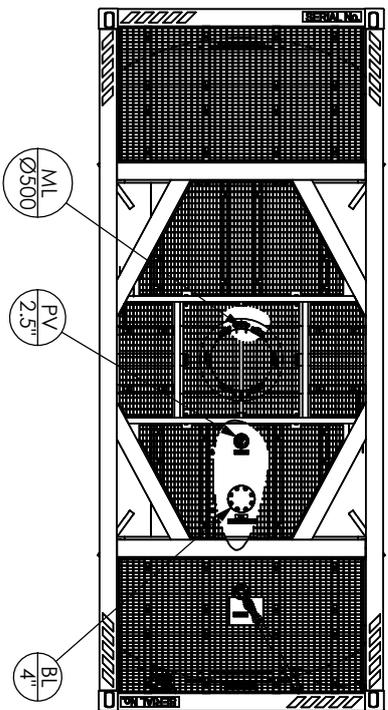
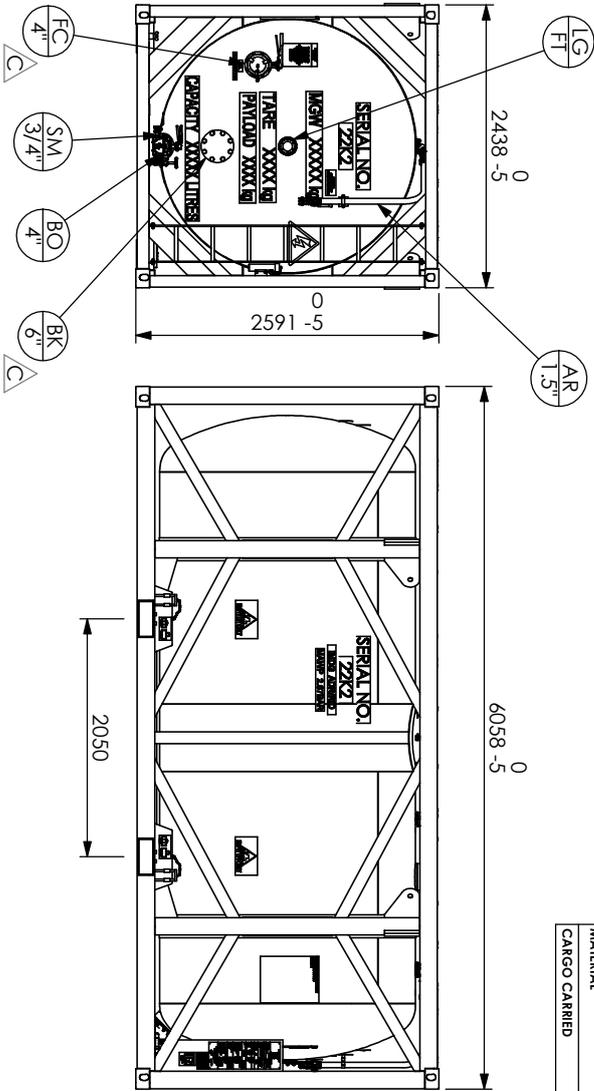
10.0 Appendix B – Additional oil storage tank design schematic

IF IN DOUBT ASK

ITEM	QTY	SIZE	DESCRIPTION
ML	1	Ø300	MANHOLE
AR	1	1.5"	RELIEF VALVE
PV	1	2.5"	RELIEF VALVE
LG	1	4"	BSP BOTTOM OUTLET
BO	1	4"	BSP SAMPLE VALVE
SM	1	3/4"	BLANK CONNECTION
BC	1	4"	BLANK CONNECTION
BK	1	6"	BREAK CONNECTION

FITTINGS DATA		WELDING DATA	
ALL FRAME PRIMARY STRUCTURE WELDS			
ALL ARE FULL PENETRATION WELDS ON VESSEL CASE HEAD PENETRATION WELDS	ALL ARE FULL PENETRATION WELDS ON VESSEL CASE HEAD PENETRATION WELDS	ALL ARE FULL PENETRATION WELDS ON VESSEL CASE HEAD PENETRATION WELDS	ALL ARE FULL PENETRATION WELDS ON VESSEL CASE HEAD PENETRATION WELDS
LIFTING LUGS		FRAME - 3:2 CERTIFIED	

TANK DATA DETAILS	
CAPACITY	19,000 LITRS
MGW	25,000 KG
TARE	5,400 KG
MAX PAYLOAD	19,600 KG
DESIGN TEMPERATURE RANGE	-20°C - +70°C
DESIGN PRESSURE	4 Bar
TEST PRESSURE	2.67 Bar
WORKING PRESSURE	0.21 Bar
EXTERNAL PRESSURE	EN 10028-7:1.4401/1.4404 EN 10219 S235 JR ON SECONDARY STRUCTURE
MATERIAL	EN 10219 S235 JR ON SECONDARY STRUCTURE
CARGO CARRIED	MULTI CARGO AS PER IMDG 17



APPROVAL & DESIGN CODE	
IMDG 17, ADR/RID, DNV2.1 (2013), EN12079 (2006), CSC	ASME VIII DIV. 1 (NCS)
HAZARD AREA CLASSIFICATION	N/A
VESSEL	ASME SA 240 3/16/3/16L, EN 10028-7 1.4401/1.4404 (3/16/3/16L) SAWS SHELL THK - 4.4mm NOMINAL DISH ENDS - 5.4mm MIN A/E
GRADE	S275 D23, EN10025, 318 CERTIFIED
FRAME	EN 10219 S235 JR ON SECONDARY STRUCTURE EN 10025 S355 N2 ON PRCT ENERGO OF 36 L/IN INSPECTION CERTIFICATE EN10204/2004 TYPE 3.2 EN 10219 S235 JR ON SECONDARY STRUCTURE
BOIS - STUDS	A4 SS
NUTS	A4 SS
GASKET (MANNID)	NITRILE
GASKET (OTHER)	PIFE
PROCEDURE DOCS.	SEE CONTRACT SPECIFICATION DOCUMENT
TANK SURFACE FINISH	INTERNAL/EXTERNAL ALL WELDS AS LAD, CHEMICALLY CLEANED AND PASSWATED
DRAWING NUMBER	ST-8580
GENERAL ASSEMBLY	ST-8580
VESSEL ASSEMBLY	ST-8582
VESSEL TO FRAME ASSEMBLY	ST-8583
FRAME ASSEMBLY	ST-8584
WALKWAY ASSEMBLY	ST-8585
FITTING ASSEMBLY	ST-8586
DECAL ASSEMBLY	ST-8586
RADIOGRAPHY & NDT	SEE TECHNICAL SPECIFICATION FOR DETAILS
CUSTOMER PREFERENCES	SEE TECHNICAL SPECIFICATION FOR DETAILS
SLINGS	SEE TECHNICAL SPECIFICATION FOR DETAILS
NOTES	

REMOVE ALL SHARP EDGES	
PROJECTION	0-30mm +/-1
LINEAR TOLERANCES:	0-30mm +/-1
30-400mm +/-2	
400-1000mm +/-4	
1000-4000mm +/-6	
4000-12000mm +/-10	
ANGULAR TOL.	+/- 1 DEG
WEILD LEG TOL.	+5/-20mm
DIMENSIONS	mm
SCALE	NIS
APPROVAL NO.	LR61473
APPROVAL DWG	ST-8580
DATE OF ISSUE	23/01/2015
DRAWN BY	SK
CHECKED BY	SK
APPROVED BY	GM

SURETANK

SHARROCK HILL, DUNLEER,
CO. LOUTH, IRELAND.
TEL. +353 41 6862022
WEB: www.suretank.com

19,000L HORIZONTAL TANK GENERAL ASSEMBLY

DRAWING NO. ST-8580

DESIGN MASS (G): 10K BOL

REVISION C 1 OF 1

REV	DESCRIPTION	BY	DATE	APPROVED BY	DATE
C	FITTINGS ADDED AS PER CUST REQUEST	NC	05/05/2015	GM	05/05/2015
B	DISH A/E THK REVISED	KE	19/02/2015	GM	19/02/2015
A	INITIAL RELEASE	NC	23/01/2015	GM	23/01/2015

THIS DRAWING IS THE SOLE PROPERTY OF SURETANK LTD AND AS SUCH IS SUPPLIED ON THE CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED IN PART OR IN WHOLE OR COMMUNICATED TO ANY OTHER PERSONS WITHOUT WRITTEN CONSENT