Formit Services Pty Ltd

STRUCTURAL CERTIFICATION OF 6000L EFFLUENT TANK SKID FRAME

12 March 2025

Rev No. 6

IZZAT CONSULTING ENGINEERS PTY LTD
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Revision	Issue Date	Revision Details
6	12/03/2025	Revised Drawings
5	07/10/2022	Revised Wording
4	08/02/2022	Dragging Added
3	23/08/2013	Tine Tubes Added – Lifting By Forklift
2	30/07/2010	Increased Building Load
1	11/11/2008	Lifting Added
0	27/03/2008	Original Certificate

Author:	Benjamin Landers BEng(Civil) GradMIEAust Structural / Civil Engineer	Signed:	
Reviewed By:	Nicholas Diemar BEng(Civil)(Hons) MIEAust CPEng NER RPEQ Principal Engineer & Associate	Signed:	

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1. INTRODUCTION

In accordance with Formit Service's request to provide updated certification of 6000L effluent tank frame supporting an amenities building structure, we submit the following information.

2. ENGINEER

Benjamin Landers
Bachelor of Engineering (Civil)(Hons)
University of Newcastle
Member of the Institution of Engineers Australia (Reg No. 4624777)

3. SUPERVISING ENGINEER

Nicholas Diemar
Bachelor of Engineering (Civil) (Hons)
University of Newcastle
Chartered Professional Engineer (NPER-3)
Member of the Institution of Engineers Australia (Reg No.2175285)
Registered Professional Engineer of Queensland (Registration No.10030)

4. GENERAL

This document should be read in conjunction with drawings listed below in Table 1, provided by Formit Services, located in Appendix A.

Table 1: Engineering Drawings

Drawing Number	Title
WT-1208-115	6000 Tank Frame Assembly
WT-1208-112	6000 Tank Frame Top
WT-1208-116	6000 Tank Frame Base
	100x50x4x5860RHS Skids
	50x50x2.5x5860_6000 Tank Top Frame Rails

5. DESIGN BASIS

Our office was engaged to provide a design certification for the 6000L effluent tank skid frame which can be lifted by a forklift, or a crane, and dragged on ground. The tanks are to be completely emptied before being lifted or dragged. The loads are to be evenly distributed on the 2 forklift tines which are to penetrate at least halfway into the tine tubes, or evenly distributed on the 4 lifting lugs for lifting, and 2 end-rod drag loops for dragging.

This certification covers four situations for the fully assembled frame;
1) Skid frame located on the ground and supporting the effluent tanks and amenities block
2) Skid frame and tank (empty) being lifted by forklift
3) Skid frame and tank (empty) being lifted by crane with slings evenly arranged between the 4 lifting points.
4) Skid frame and tank (empty) being dragged with slings evenly arranged between two end-rod drag loops.

All design loads are as determined by Australian Standards.
All design work was carried out in accordance with the following standards;
- AS/NZS 1170.0 General principles
- AS/NZS 1170.1 Permanent, imposed and other actions
- AS/NZS 1170.2 Wind loads
- AS 4100 Steel structures
- AS 1418.1 Cranes, hoists, and winches

For wind loading the structure is to be located in an environment equivalent to a (at worst) wind region A and terrain category 2 in accordance with AS1170.2. If the location of the structure is such that it will be subject to greater loads then an engineer must be consulted.

We have not assessed the suitability of the forklift or lifting devices. We believe this is to be the responsibility of others.

Tie downs and fixing of the of the amenities structures to the frame is considered responsibility of others.

6. DEFINED CRITERIA

Rational engineering judgment has been used to decide which components require checking with design certification calculations. A finite element analysis model was used to determine to distribution of loads and capacity of members.

7. DESIGN LOADINGS

The tank frame was certified to support an amenities structure with a uniform mass of 7000kg plus a maximum of 12 people uniformly distributed inside.

Three plastic effluent 2000L tanks sit along the 5.86m frame. This weight is uniformly distributed along the square hollow sections of the bottom frame. The amenities building structure, with a mass of 7000kg and considering 12 occupants, is supported as described above.

The tanks contents are mostly water. The sections used were 300 grade steel members and 350 grade galvanized steel members. The amenities structure is supported on rails 0.3m from the edge of the frame and is required to be fixed to the skid frame.

The maximum combined mass of the skid frame and empty waste tank to be lifted by either crane or forklift is 1000kg.

Ultimate limit states design factors used in the design are as follows:

- Dead load (only) factor of 1.35
- Dead load factor of 1.2
- Live load factor of 1.5
- Dynamic factor of 1.2

8. STATEMENTS & DISCLAIMERS

We confirm that the 6000L effluent tank skid frame with tine tubes as detailed in the drawings noted in Table 1 (above), is structurally satisfactory for the Load Limits noted in Section 7 above, provided the following are adhered to;

- The structure is inspected every 12 months (maximum), or as otherwise required to ensure no structural damage is evident.
- The above certificate is applicable only if the frame is not affected by heat, adverse chemicals, excessive vibrations or other external factors unknown and not noted to the certifying engineer.
- The design certification is provided on the basis that materials used meet Australian Standards, Construction practices are in accordance with industry standards.
- No modifications shall be made from the drawings attached in Appendix A, and the frame is fully assembled.
- The amenities structure is removed before moving the skid frame.
- The forklift tines penetrate at least halfway into the tine tubes.
- The effluent tanks are pumped out such that they are empty before moving the skid frame.
- The allowable bearing capacity of the ground is to be at least 100kPa
- The structure is located in no worse than wind region A and terrain category 2 as per AS1170.2

Depending on the ground type, the base frame may compress into the ground such that the 50 SHS members will be touching the ground. John Aitken at Formit Services has accepted this possibility.

The increased load, as detailed in Section 8, induces a maximum deflection of 25mm in the members of the top frame. As such it should be ensured there is adequate free space between the effluent tank and the members of the top frame to cater for this deflection.

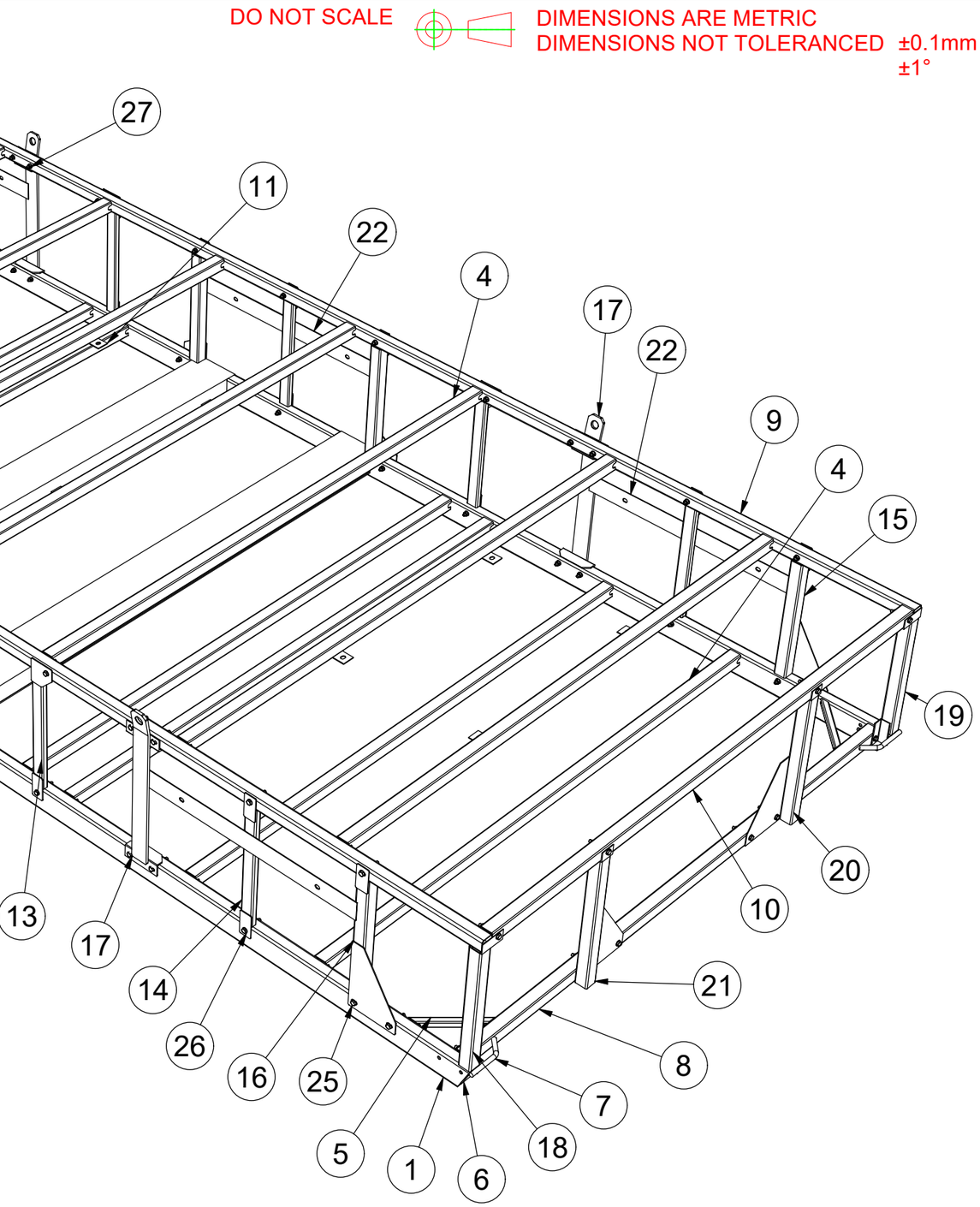
APPENDIX A DRAWINGS

17-09-2021 Fix typo in part list for bolt size. Said 70mm but is 75mm

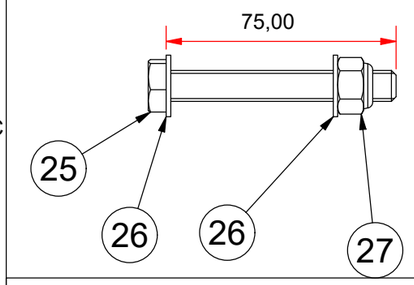
FOR MANUFACTURE

DO NOT SCALE

DIMENSIONS ARE METRIC
DIMENSIONS NOT TOLERANCED ±0.1mm
±1°



Bolts, Nuts & Washers to be hot dipped Galvanised grade



Parts List					
ITEM	QTY	REV	DESCRIPTION	Material	Weight
1	2		100x50x4x5860RHS Skids	MS/Gal	46kgs
2	2		2385x200x6 Tine Back Plate_Common Part	MS/Gal	22kgs
3	2		PFC 200 x 75 x 23_ Tine Pocket_Common Part	MS/Gal	58kgs
4	16		SHS50x50x2.6x2385_Base Cross Members_Common Part	MS/Gal	9kgs
5	4		25x25x3x280_Base Corner Brace_Common Part	MS/Gal	500g
6	4		End Plates for Skids_Common Part	MS/Gal	85g
7	4		16dia Bent Rod_Common Part	MS/Gal	310g
8	2		SHS50x50x2.6x2385_Base Cross Members Ends_Common Part	MS/Gal	7.8kgs
9	2		50x50x2.5x5860_6000 Tank Top Frame Rails	MS/Gal	20.5kgs
10	2		SHS50x50x2.6x2385_Top Cross Members Ends_Common Part	MS/Gal	8.5kgs
11	12		Top Frame Tank Attatchment_Common Part	MS/Gal	8g
12	2		6000 Half Post LH	MS/Gal	1.6kgs
13	2		6000 Half Post RH	MS/Gal	1.6kgs
14	6		Side Post_Common Part	MS/Gal	1.5kgs
15	2		Offset Post LH_Common Part	MS/Gal	2.8kgs
16	2		Offset Post RH_Common Part	MS/Gal	2.8kgs
17	4		Lifting Bar Assembly_Common Part	MS/Gal	4.5kg
18	2		Corner Post LH_Common Part	MS/Gal	2.2kgs
19	2		Corner Post RH_Common Part	MS/Gal	2.2kgs
20	2		End Mid Post RH_Common Part	MS/Gal	3kgs
21	2		End Mid Post LH_Common Part	MS/Gal	3kgs
22	6		930x75x3 Bridge Plate_Common Part	MS/Gal	1.6kgs
23	2		6000 Mid Side Post LH	MS/Gal	2.2kgs
24	2		6000 Mid Side Post RH	MS/Gal	2.2kgs
25	76		M10x75 Hex Bolt Hot Galvanised	Steel/Gal	55g
26	152		M10 Plain Washers Hot Galvanised	Steel/Gal	3g
27	76		M10 NYLOC Nut Hot Galvanised	Steel/Gal	10g

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MATERIAL Material: MS/Galvanised Colour: Weight: 552-572kgs	Drawn: HSK	Date: 12/12/2019	TITLE: 6000 Tank Frame Assembly
	REV Date:	REVISION	Stock No.: WT-1208-115
	DRAWING PRACTICE TO: AS1100	SCALE: N.T.S.	1 / 5 A3

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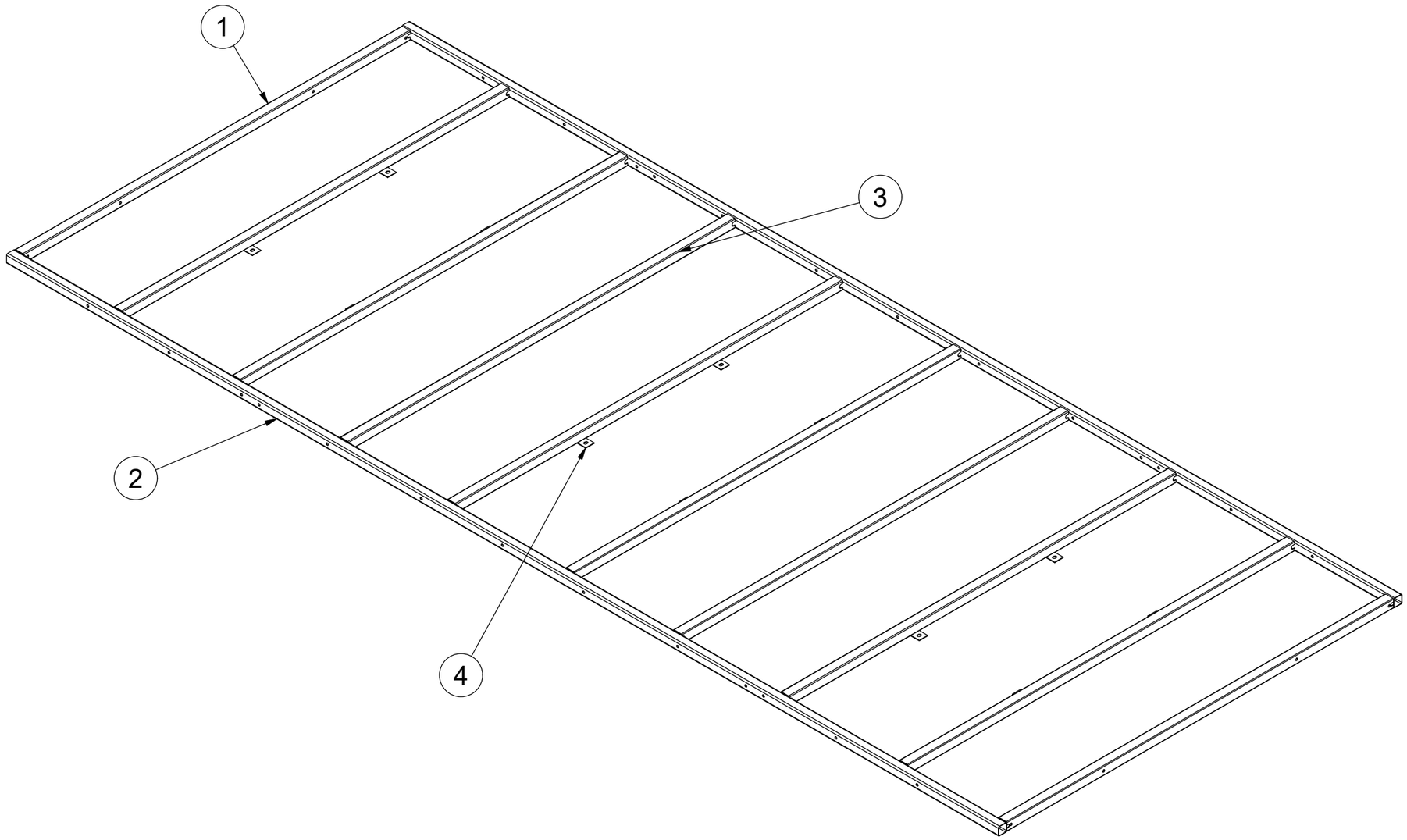

Parts List					
ITEM	QTY	REV	DESCRIPTION	Material	Weight
1	2		SHS50x50x2.6x2385_Top Cross Members Ends_Common Part	MS/Gal	8.5kgs
2	2		50x50x2.5x5860_6000 Tank Top Frame Rails	MS/Gal	20.5kgs
3	8		SHS50x50x2.6x2385_Base Cross Members_Common Part	MS/Gal	9kgs
4	12		Top Frame Tank Attatchment_Common Part	MS/Gal	8g

BLESBOK Enterprises PTY. LIMITED

MATERIAL	Drawn: HSK	Date: 12/12/2019	TITLE: WT-1208-112_6000 Tank Frame Top
Material: As Per Parts List Colour: As Per Parts List Weight: 127kgs	REV Date:	REVISION	Stock No.:
	DRAWING PRACTICE TO: AS1100	SCALE: N.T.S.	2 / 5 A3

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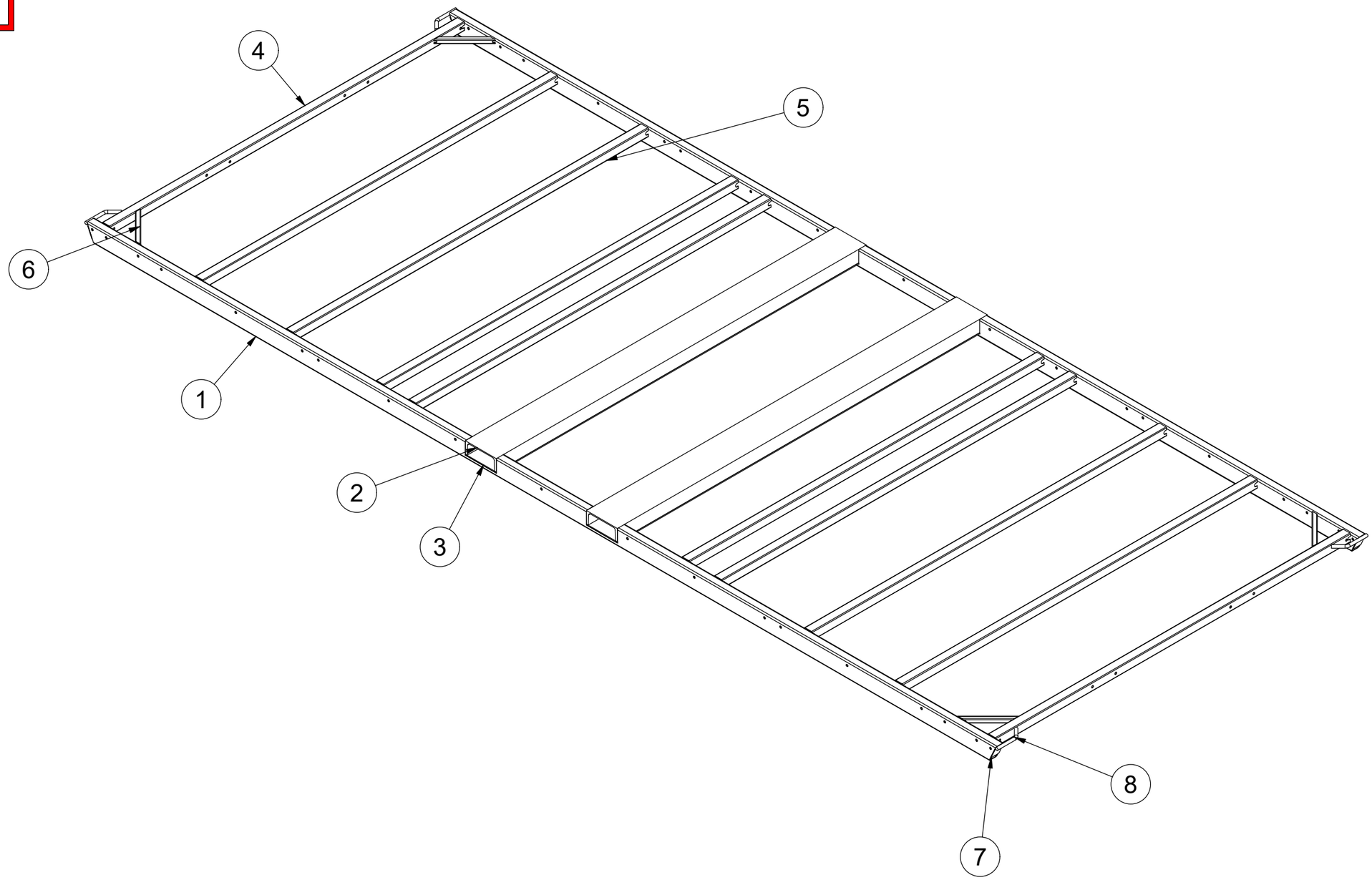

Parts List					
ITEM	QTY	REV	DESCRIPTION	Material	Weight
1	2		100x50x4x5860RHS Skids	MS/Gal	46kgs
2	2		PFC 200 x 75 x 23_ Tine Pocket_Common Part	MS/Gal	58kgs
3	2		2385x200x6 Tine Back Plate_Common Part	MS/Gal	22kgs
4	2		SHS50x50x2.6x2385_Base Cross Members Ends_Common Part	MS/Gal	7.8kgs
5	8		SHS50x50x2.6x2385_Base Cross Members_Common Part	MS/Gal	9kgs
6	4		25x25x3x280_Base Corner Brace_Common Part	MS/Gal	500g
7	4		End Plates for Skids_Common Part	MS/Gal	85g
8	4		16dia Bent Rod_Common Part	MS/Gal	310g

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MATERIAL	Drawn: HSK	Date: 12/12/2019	TITLE: WT-1208-116_6000 Tank Frame Base
Material: As Per Parts List Colour: As Per Parts List Weight: 345kgs	REV Date:	REVISION	Stock No.:
	DRAWING PRACTICE TO: AS1100	SCALE: N.T.S.	3 / 5 A3

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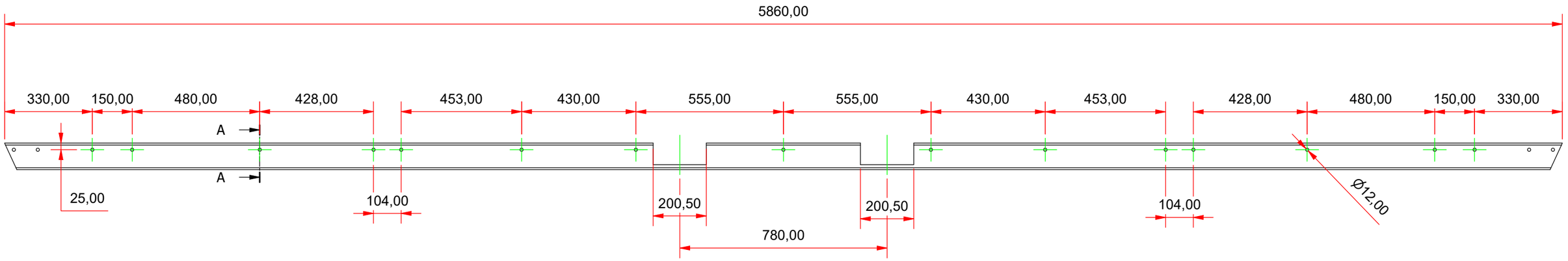

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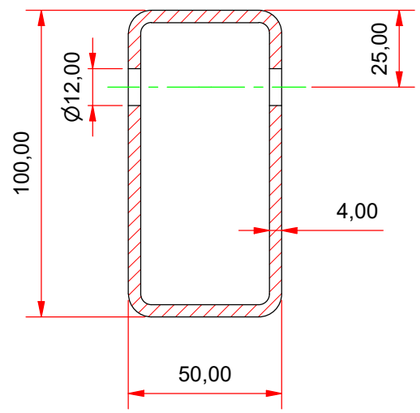

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MATERIAL	Drawn: HSK	Date: 12/12/2019	TITLE: 100x50x4x5860RHS Skids
Material: MS/Gal Colour: Weight: 46kgs	REV Date:	REVISION	PART No.:
	DRAWING PRACTICE TO: AS1100	SCALE: N.T.S.	4 / 5 A3

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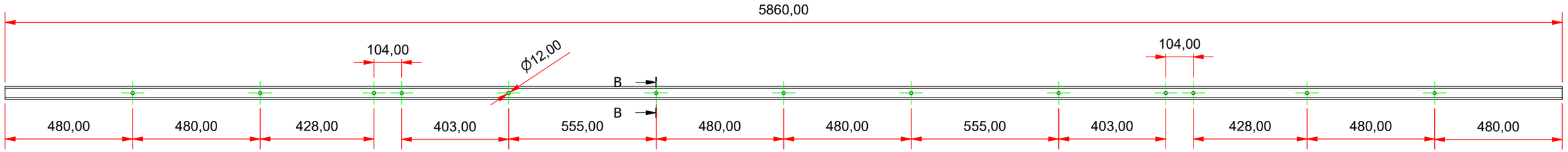

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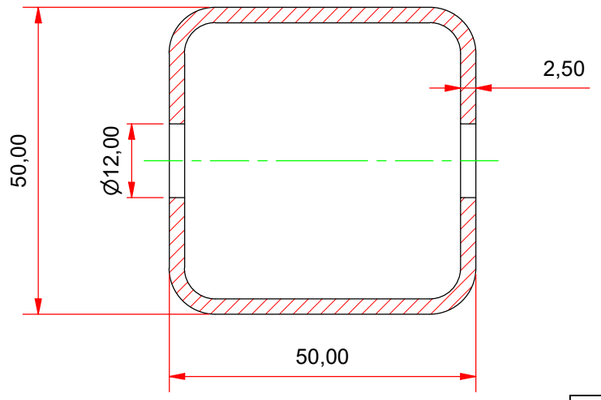

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MATERIAL	Drawn: HSK	Date: 12/12/2019	TITLE: 50x50x2.5x5860_6000 Tank Top Frame Rails
Material: MS/Gal Colour: Weight: 20.5kgs	REV Date:	REVISION	PART No.:
	DRAWING PRACTICE TO: AS1100	SCALE: N.T.S.	5 / 5 A3

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