



TUBULAR RACK SYSTEM (TRS) OPERATING INSTRUCTIONS

DOCUMENT INFORMATION

REVISION HISTORY

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AMENDMENT RECORD

Revision	Description of Changes
1	General document review, update of template (header and footers), 6.4.3 removed, 7.2.5 removed. TRS capacity increased, notes and references updated.
2	Update branding to SES Energy
3	Update lashing assembly after calculation revalidation.

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1. INTRODUCTION

1.1 General

1.1.1 The Tubular Rack System (TRS) is intended to be installed onto the wooden deck of a vessel, to provide a system for safe and secure stowage of tubular cargoes during transit to and from offshore installations. This allows the cargoes lifting slings to be accessed from a safe location without the need for personnel to work on top of tubular stows. Furthermore, the tubular stowage space can be utilised for general cargo whenever necessary.

1.1.2 This document contains guidance on the following:

- TRS System
- Installation of the TRS (Quayside to vessel deck):
 - Manoeuvring
 - Lifting
 - Assembly
- Seafastening of the TRS.
- Loading and securing of tubulars.
- Offloading tubulars offshore.
- Loading general cargo on the TRS.

1.2 Safety Note

1.2.1 The activities detailed within this procedure should be performed with the highest regard to health and safety with no harm to people, equipment, or the environment. Risk assessments and Toolbox Talks should be carried out in advance of activities. The person in charge of the job is responsible to ensure that all personnel carrying out or involved in a specific task fully understand the requirements, the procedure to be followed, the potential hazards involved and the precautions to be taken.

1.2.2 All activities are to be carried out to be in adherence with the operators HSSE Expectations and a Control of Work process.

1.2.3 Training shall be planned and carried out for offshore operators, operating staff, and both crews of each vessel receiving the TRS on-board.

1.2.4 Vessel crew shall be competent and trained to operate the TRS.

1.2.5 It is essential, prior to any operations with the TRS, that the operation is planned in advance so that all parties are aware, e.g. items to be loaded or discharged, and the specific details of these items.

2. TUBULAR RACK SYSTEM

2.1 General

2.1.1 The Tubular Rack System (TRS) is intended to be installed onto the timber deck of a Platform Supply Vessel (PSV) with a minimum deck strength of 2.5t/m^2 and act as a safe system to aid the stowage of tubular cargoes during transit to and from offshore installations. This allows lifting slings to be accessed from a safe location without the need for personnel to work on top of tubular stows. Furthermore, the tubular stowage space can be utilised by general cargo whenever necessary.

2.1.2 The TRS has been designed, constructed, and tested to DNV 2.7-3, in support of IMO MSC/Circ. 860 of 22/05/1998.

2.2 System Configuration

2.2.1 A schematic of the TRS, in its normal operating configuration is presented in Figure 2-1 and is also included in Appendix A. The system consists of modular steelwork sections, namely:

- 2 x Tubular Rack Skids (TRS 2 & 3) (11000mm x 2165mm x 300mm) – 3.95 tonnes.
- 1 x Tubular Rack Walkway (TRS 1) (7700mm x 2120mm x 2485mm) – 5.15 tonnes.

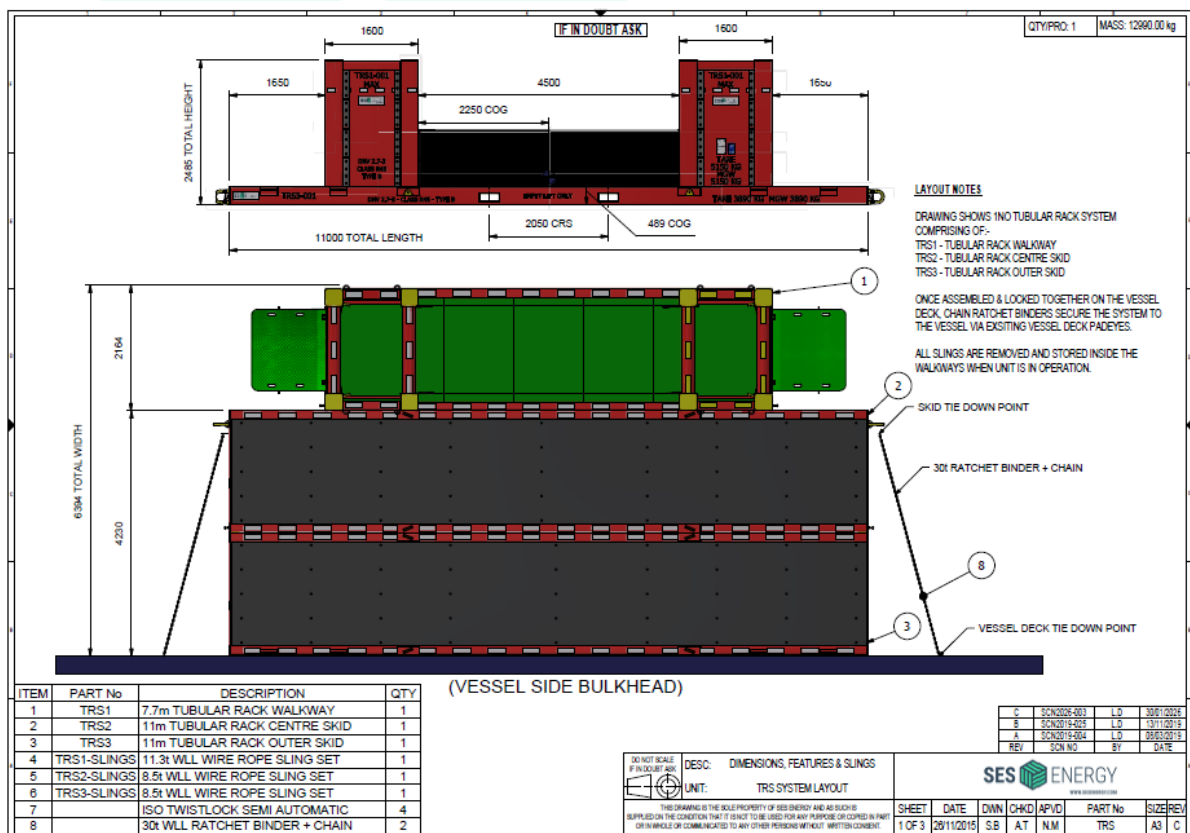


Figure 2-1 TRS Standard Operating Configuration

3. INSTALLATION OF THE TRS (QUAYSIDE TO VESSEL DECK)

3.1 General

3.1.1 A diagram presenting the TRS system in its normal configuration is presented in Figure 3-1.

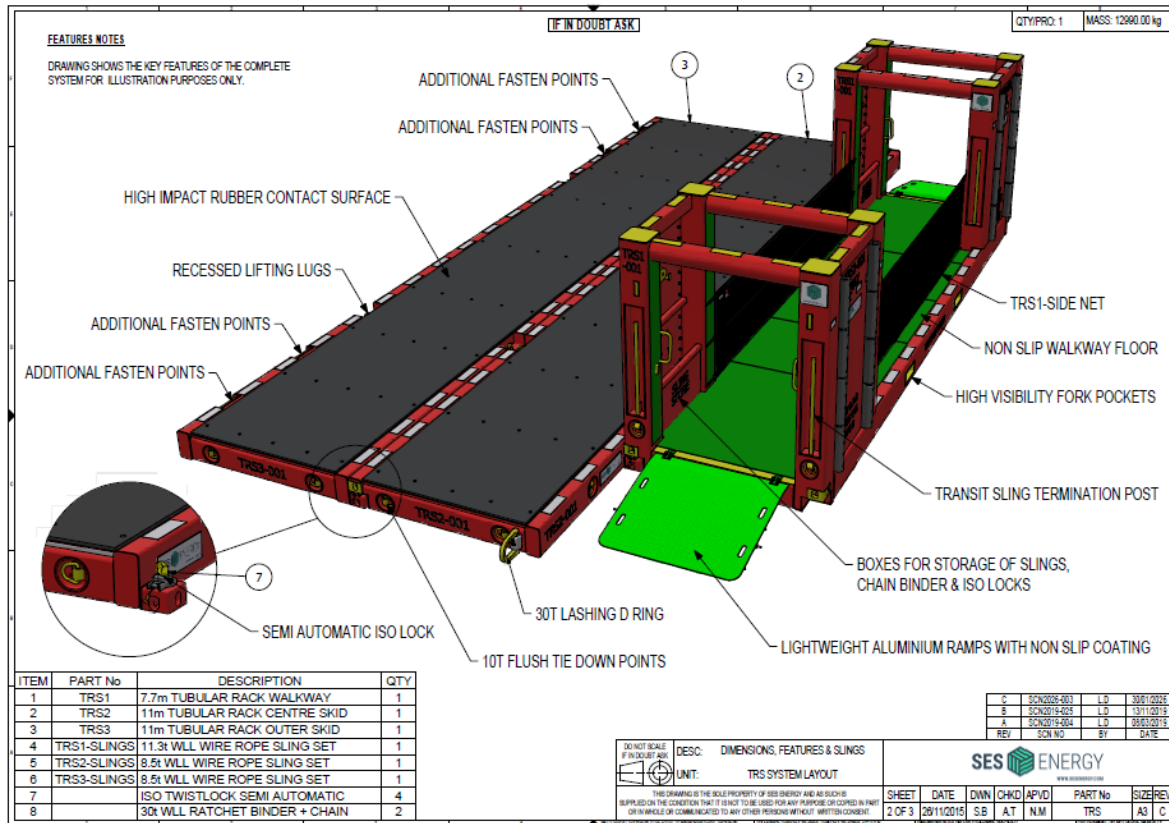


Figure 3-1 Fully Assembled TRS

3.1.2 The TRS cannot be pre-assembled onshore and should be loaded onto the vessel section by section. The order in which each section of the TRS should be loaded is as follows:

- TRS Skid (TRS 3).
- TRS Skid (TRS 2).
- TRS Walkway (TRS 1).

3.1.3 It should be noted that lifting slings should be removed from each TRS skid prior to the next section of the system being loaded on to the vessel.

3.1.4 A mobilisation/assembly checklist for the TRS is included in Appendix B.

3.2 Manoeuvring

3.2.1 Each component of the TRS can be manoeuvred either by using a suitably rated forklift truck or crane. The manoeuvring by means of the forklift truck is for shore side operations only. All manoeuvring of TRS units into position on board the vessel shall be performed by crane with the receiving vessel on an even keel.

- 3.2.2 To assist in manoeuvring, each skid is fitted with lifting points (pad-eyes) with designated rigging, forklift pockets and D-rings.

3.3 Lifting

- 3.3.1 Each section of the TRS is supplied with a DNV certified steel wire rope sling set comprising of shackles, wire slings and master link providing the approved method of lifting. Refer to Figure 3-2 and Appendix A for lifting arrangement details.
- 3.3.2 It should be noted that the TRS skids shall only be lifted/manoeuvred when empty.

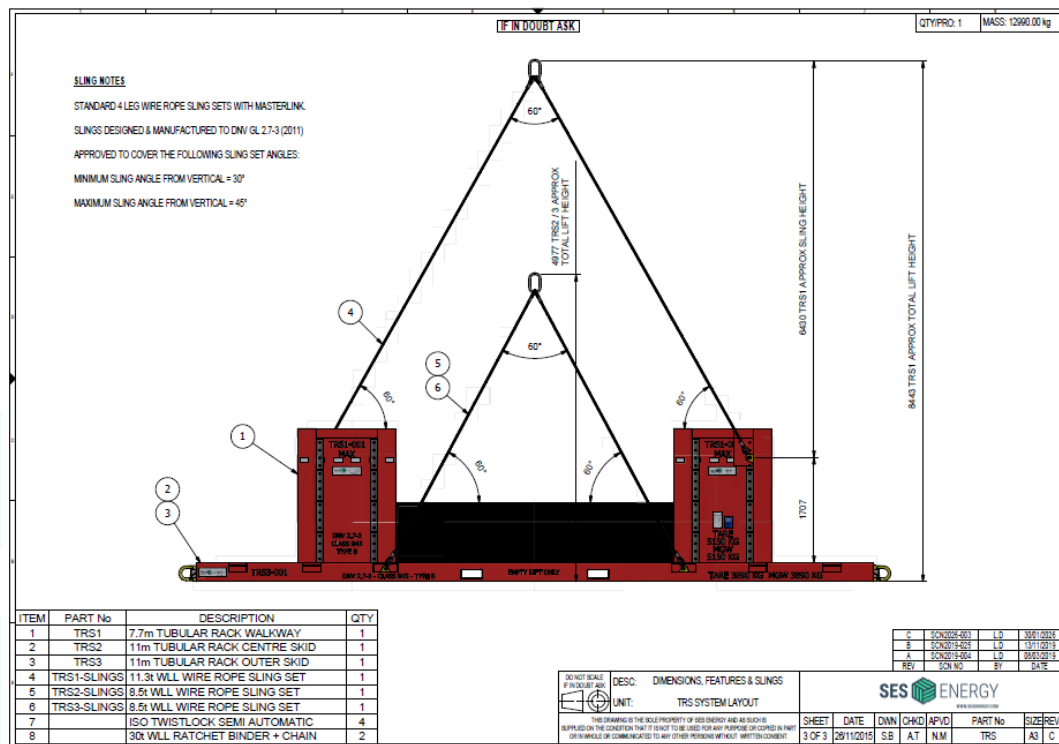


Figure 3-2 Rack Skid Lifting Points

- 3.3.3 Before commencing any lifting operations, the following should be checked as part of a lifting plan:
- Ensure that TRS units are fitted with locking blocks and their orientation (facing inboard on the vessel) has been confirmed.
 - Ensure that all lifting slings are pre-inspected, suitably colour coded if required and spare split pins are available.
 - The ramps on the TRS 1 walkway unit must be lifted into the upright position and locked in place by means of the ramp locking pins.
 - The slings for TRS 1 unit must be passed over the top of inner transverse brace before connecting to the lifting pad-eyes.
 - The storage lockers (and inside content) must be properly secured before the TRS 1 walkway unit is lifted.

- 3.3.4 The TRS is designed to be used on a range of vessels, and in a range of locations, therefore it is beyond the scope of this document to include a lifting plan to cover for all uses. However, guidance presented in Appendix C can be used to create an individual lifting plan as required. A generic lift plan can be found in Appendix D.

3.4 Assembly

3.4.1 Assembly of the TRS on board the vessel should be performed as follows:

1. TRS 3 should be lifted from the quayside and should be positioned against the vessel crash barrier. It is advised that the skid's longitudinal centre is positioned halfway between two T-bars in order to maximise the number of hardpoint locations for seafastening. TRS 3 must be orientated with the protruding ISO lock blocks facing inwards towards the centreline of the vessel. ISO Twist locks (Figure 3-3) are then inserted into the two ISO locking blocks of the TRS 3 skid as illustrated in Figure 3-4. Twist locks are supplied with the unit and stored inside TRS 1 sling stores.
2. TRS 2 is to be lifted and positioned over the twist locks of TRS 3 with its own locking blocks orientated towards the centre of the vessel. TRS 2 should then be lined up and lowered into position. The ISO Twist locks will automatically engage with the TRS 2 skid as it is landed. See Figure 3-4. ISO Twist locks are then inserted into the two locking blocks of the TRS 2 skid.
3. TRS 1 is to be lifted and positioned over the twist locks of TRS 2. This unit is symmetrical and hence its orientation is not critical. TRS 1 should then be lined up and lowered into position. The ISO Twist locks will automatically engage with the TRS 1 skid as it is landed.

3.4.2 It should be noted that lifting slings should be removed from each skid prior to the next section of the system being loaded on to the vessel.

3.4.3 In case the ISO twist locks fail to engage, the TRS is to be lifted again, lined up and lowered into position and retry to engage.

3.4.4 Once all units are on deck, all ISO twist locks are then checked as secured in the fully locked position. The lock cord must be pulled and the twist lock must be in a central position to ensure the twist locks are fully locked, see Figure 3-4.

3.4.5 Routine checks of ISO twist locks shall be performed before each use to confirm engagement.

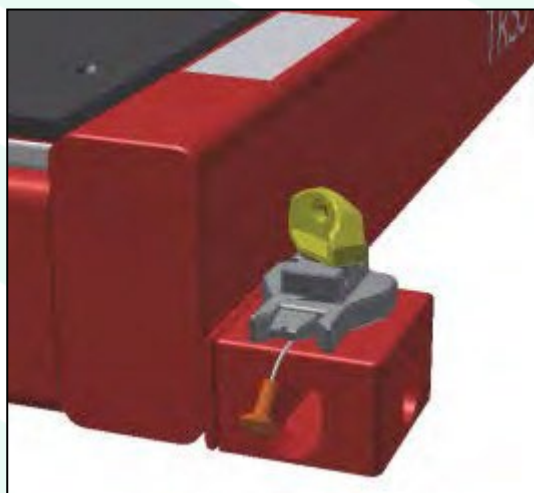


Figure 3-3 ISO Twist Lock in Locking Block (TRS3)

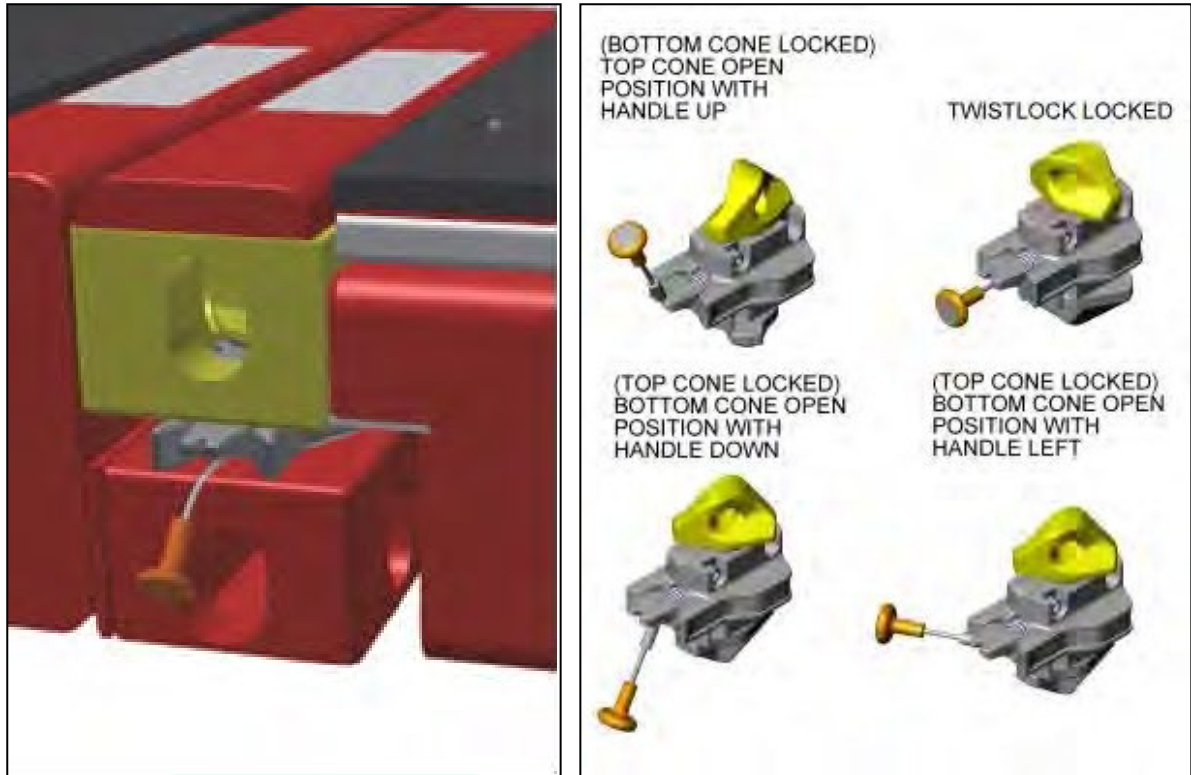


Figure 3-4 ISO Twist Lock Engaging

4. SEAFASTENING OF THE TRS

4.1 General

- 4.1.1 Once assembled, the TRS system shall be suitably seafastened to the vessel deck.
- 4.1.2 The TRS system will be seafastened for a maximum operational weight of 137.9 tonnes (total maximum weight of the unit including pipe stack (125+12.9)).
- 4.1.3 It should be noted that where T-bars are used for securing purposes, e.g. welding of stoppers to T-bars, welding of padeyes to T-bars, etc., the structural/weld makeup of the T-bars should be confirmed, and an assessment made to confirm the structural integrity under load.

4.2 Method of Seafastening the TRS System

- 4.2.1 As per Reference [7], the system will be secured for a transverse seafastening load of 47.76 tonnes (23.88*2).
- 4.2.2 The TRS can be secured via one of the following two methods:
 - **Securing Method 1** – Via 2 x lashing assemblies provided, secured between hardpoints on the TRS and suitably rated hardpoints on the vessel.
 - **Securing Method 2** – Steel stoppers welded on a minimum of two vessel deck T-bars.
- 4.2.3 Further details on these securing methods are provided in Sections 4.3 and 4.4.

4.3 Securing Method 1 – Via 2 x Lashing Assemblies

- 4.3.1 The securing method, using 2 x lashing assemblies, is presented in Figure 4-1 and is also included in Appendix E.

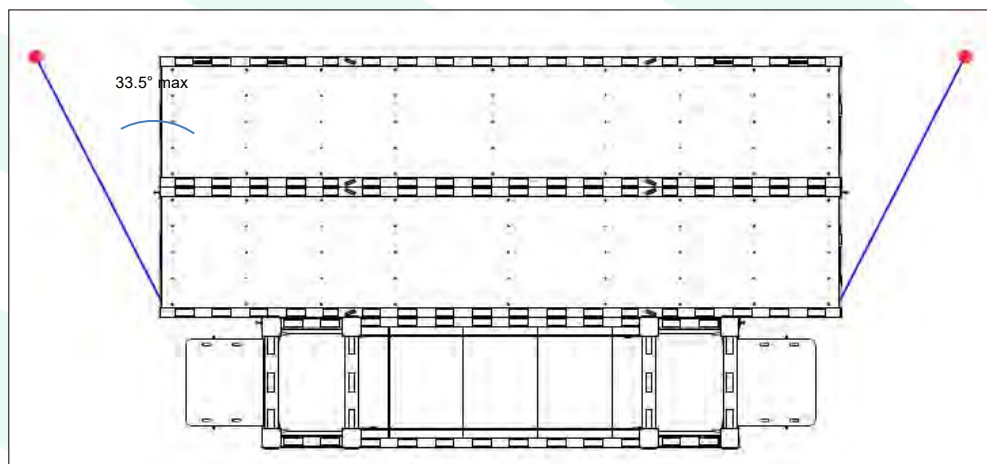


Figure 4-1 Chain Securing Arrangement

4.3.2 The TRS should be secured using the following arrangement:

- 30t MSL Vessel Hardpoint ↔ Safety Pin Bow Shackle 17t WLL ↔ Eye Sling Hook 12.5t WLL ↔ Jaw-Jaw Turnbuckle 12.7t WLL ↔ Connector 12.5t WLL ↔ Eye Grab Hook 12.5t WLL ↔ Grade 100 Chain 14t WLL ↔ Clevis Sling Hook 12.5t WLL
↔ 30t MSL TRS Hardpoint.

4.3.3 The lashing assembly securing arrangement will be a combination of clevis hooks and chain, tightened with a suitably sized turnbuckle as shown in Figure 4-2 where:

1. Safety Pin Bow Shackle (17t WLL).
2. 20mm Eye Sling Hook (12.5t WLL).
3. 1¾" x 24" Jaw-Jaw Turnbuckle (12.7t WLL).
4. 20mm Connector (12.5t WLL).
5. 20mm Eye Grab Hook (12.5t WLL).
6. 20mm Grade 100 Alloy Chain (14t WLL).
7. 20mm Clevis Sling Hook (12.5t WLL).

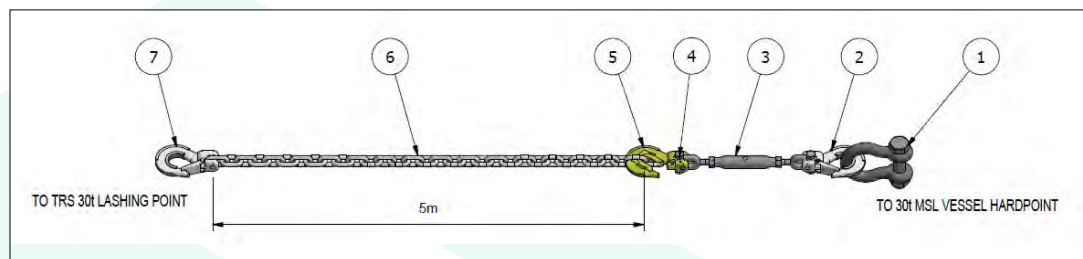


Figure 4-2 Lashing Assembly Securing Make-up

4.3.4 As shown in Figure 4-1 and Appendix E, the departure angle of the chain from the TRS should be between 0 and 33.5 degrees to ensure that adequate transverse restraint will be maintained.

4.3.5 If suitably rated existing vessel hardpoints are available (30t MSL or greater) at the base of the crash barrier, these can be utilised for seafastening purposes.

4.3.6 In instances where no suitably sized vessel hardpoints are available, The Operator will have to engineer a suitable hardpoint, e.g. a padeye, for the mobilisation of the TRS. It is emphasised that the steelwork to which any padeye is connected should be surveyed to confirm condition, and calculations performed to show the structure is suitable.

4.3.7 It should be noted that no attempts should be made to use hardpoints on the crash barrier that are above deck level.

4.4 Securing Method 2 – Steel Stoppers Welded to T-bars

- 4.4.1 The securing method, using stoppers, is presented in Figure 4-3 and is also included in Appendix F.

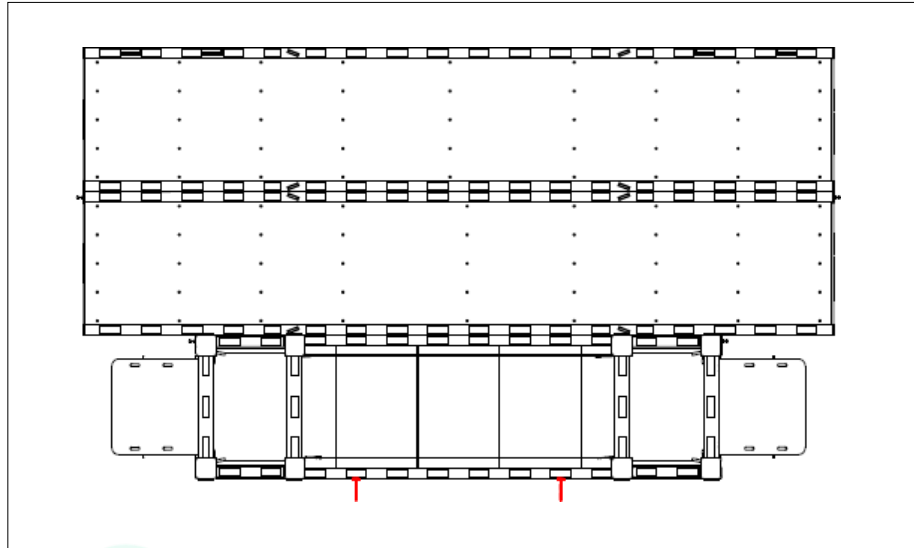


Figure 4-3 Stopper Securing Arrangement

- 4.4.2 Supporting calculations for the design of the steel stoppers is presented in Appendix G.

4.5 Seafastening Assumptions

- 4.5.1 The following assumptions have been made for the purposes of the TRS seafastening design:
- The TRS is assumed to be a single piece of cargo, i.e. all sections are rigidly connected by ISO locks.
 - The weights and overall dimensions of the empty TRS do not exceed those stated in the information supplied by SES Energy.
 - Calculations reference [9]

4.6 Seafastening Equipment List

- 4.6.1 Table 4-1 presents a seafastening equipment list for securing of the TRS using Securing Method 1 and Table 4-2 presents a seafastening equipment list for securing the TRS using Securing Method 2, respectively.

Table 4-1 Securing Method 1: Seafastening Equipment List

Item	Description	Total Quantity	WLL (t)
1	Safety Pin Bow Shackle	2	17
2	20mm Eye Sling Hook	2	12.5
3	1¾" x 24" Jaw-Jaw Turnbuckle	2	12.7
4	20mm Connector	2	12.5
5	20mm Eye Grab Hook	2	12.5
6	Grade 100 Alloy Chain (5m)	2	14
7	20mm Clevis Sling Hook	2	12.5

Table 4-2 Securing Method 2: Seafastening Equipment List

Item	Description	Total Quantity
1	Stoppers (as per Appendix G)	2

5. GENERAL NOTES ON TUBULARS

5.1 General

- 5.1.1 The following principles will apply to both individual and bundled tubulars. However, they do NOT apply where dedicated or bespoke lifting points have been provided as attachment points for the lifting slings (e.g. Container, CCU, etc.).
- 5.1.2 Prior to loading individual tubular cargo, bedding rope must be placed at appropriate positions on the TRS deck loading area. A minimum of two certified securing arrangements must be placed at equal distance approximately 25% from the ends of the intended stow. The length and/or height of securing arrangements must be sufficient to ensure that the entire tubular stow can be secured to the vessel crash barrier.
- 5.1.3 For information purposes, Table 5-1 presents typical bundle weights, required sling sizes, etc. for a range of tubular sizes. Handling information, in regards to minimum sling lengths, is presented in Figure 5-1.
- 5.1.4 It should be noted that if the sling length is shorter than the values presented in Table 5-1 then the bundle must be loaded directly onto the vessel deck and not onto the TRS.
- 5.1.5 A generic lifting arrangement that should be used for tubular lifts is presented in Appendix G.

Table 5-1 Bundle Weights

Size	lbs per foot	Av Length	Kgs Per Joint	Bundle	BDL/ TRCK	Sling Size, Ton	Total JT/Load	Size	lbs per foot	Av Length	Kgs Per Joint	Bundle	BDL/ TRCK	Sling Size, Ton	Total JT/Load
2 3/8	4.6	30	63	15	14	1	210	7 5/8	29.7	42.5	573	5	6	3	30
2 3/8	4.7	30	64	15	14	1	210	7 5/8	33.7	42.5	650	5	5	3.8	25
2 7/8	6.4	30	87	15	13	3	195	7 5/8	55.3	42.5	1067	3	5	3.8	15
2 7/8	6.5	30	88	15	13	3	195	8 5/8	40	42.5	772	3	7	3	21
3 1/2	9.2	30	125	11	11	3	121	9 5/8	47	42.5	905	3	7	3	21
3 1/2	9.2	42.5	178	11	10	3	110	9 5/8	53.5	42.5	1032	3	6	3.8	18
3 1/2	9.3	30	127	11	11	3	121	9 5/8	58.4	42.5	1127	3	5	3.8	15
3 1/2	15.8	42.5	305	11	6	3.8	66	9 7/8	58.4	42.5	1127	3	5	3.8	15
4	9.5	42.5	184	9	11	3	99	9 7/8	67.5	42.5	1302	3	4	4.7	12
4	10.9	30	148	9	11	3	99	9 7/8	70.5	42.5	1359	3	4	4.7	12
4	13.2	42.5	254	9	8	3	72	10 3/4	55.5	42.5	1070	3	5	3.8	15
4 1/2	11.6	30	158	9	11	3	99	10 3/4	73.2	42.5	1412	3	4	4.7	12
4 1/2	12.6	30	171	9	11	3	99	10 3/4	101	42.5	1947	1	9	3	9
4 1/2	13.5	42.5	261	9	8	3	72	11 3/4	71	42.5	1370	3	4	4.7	12
4 1/2	15.1	42.5	292	9	7	3	63	13 3/8	68	42.5	1311	3	4	4.7	12
4 1/2	26.5	30	361	9	5	3.8	45	13 3/8	72	42.5	1389	3	4	4.7	12
5	15	42.5	290	7	9	3	63	14	112	42.5	2160	1	8	3	8
5	18	42.5	347	7	8	3	56	16	75	42.5	1447	1	10	3	10
5	23.2	30	316	7	8	3	56	16	84	42.5	1620	1	10	3	10
5	23.2	42.5	448	7	6	3.8	42	18 5/8	87.5	42.5	1690	1	9	3	9
5 1/2	17	30	231	7	9	3	63	20	.625 WT	40	-	1	8	3	8
5 1/2	17	42.5	328	7	9	3	63	20	.750 WT	40	-	1	8	3	8
5 1/2	20	42.5	386	7	7	3	49	26	3/4" WT	40	-	1	3	6	3
5 1/2	23	42.5	444	7	6	3.8	42	26	1" WT	40	-	1	3	6	3
6 5/8	28	42.5	540	5	6	3	30	26	1.1/4 W	40	-	1	2	10	2
7	29	42.5	559	5	7	3	35	30	1" WT	40	-	1	3	8	3
7	32	42.5	618	5	6	3.8	30	30	1.75" W	40	-	1	2	12	2
7	35	42.5	675	5	5	3.8	25	30	2.0" WT	40	-	1	1	15	1
7	38	42.5	733	5	5	3.8	25								
7	41	42.5	791	5	4	4.7	20								
7	46	42.5	887	5	4	4.7	20								

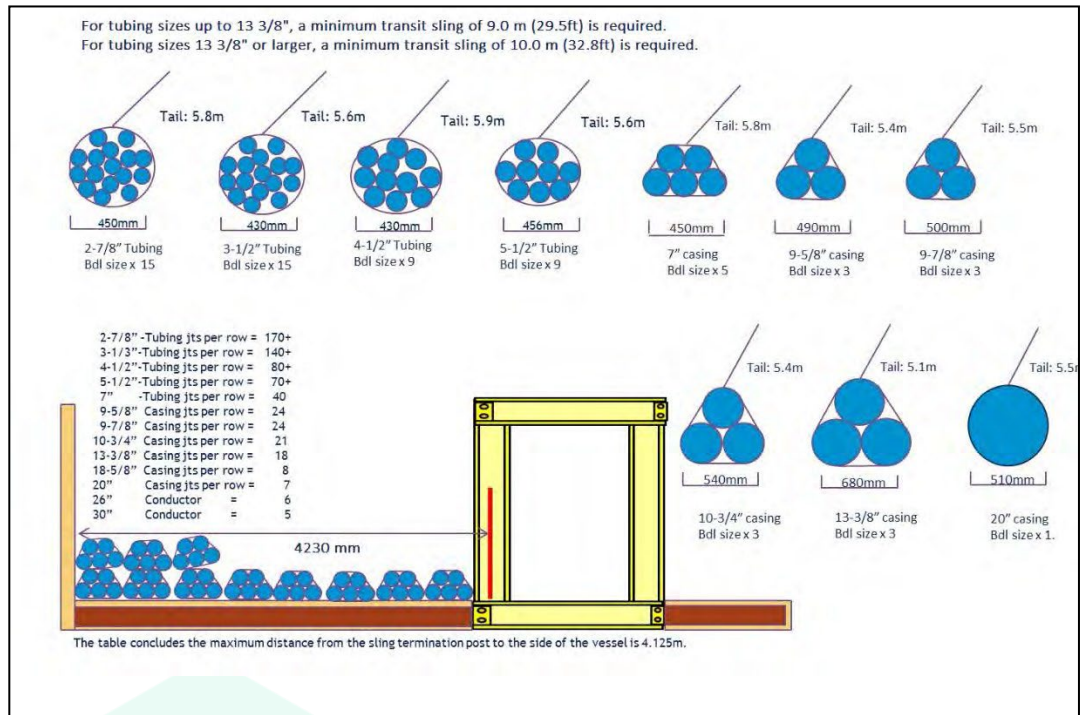


Figure 5-1 Bundle Slinging Arrangements

6. LOADING AND SECURING OF TUBULARS

6.1 Critical Safety Information

The TRS walkway must not be used as a safe area during loading / discharge operations, as tubulars may enter through the open sides. Deck crew should take refuge in the vessel's own safe areas.

The maximum tubular load, as per Reference [7], is not to exceed 125 tonnes.

- 6.1.1 The TRS pre-use inspection checklist should be used prior to loading and removal of any tubular load (Appendix H).
- 6.1.2 Access ramps to the TRS walkway should be lowered prior to operations and then returned to their stowed position while loading other general cargo to avoid potential damage to the ramps. The ramps may be left in the lowered position during vessel transit to aid crew movement around the deck.
- 6.1.3 TRS boundary nets shall be in place to prevent injury from the 300mm step off the inboard edge of the working area.
- 6.1.4 Loading crew/stevedores and ship's crew shall be clear of the TRS safe working area (in the ship's safe haven) while cargo is being moved by the crane; entering only when lifts are landed, static, and the crane operator has signalled that crew should enter to hook on or off.
- 6.1.5 Continual assessment of the safe working area should be made, and work stopped if the area becomes unsafe. If cargo is loaded and/or lashed in such a way as to obstruct safe working areas of the TRS, especially the areas around the ramps at either side, then the TRS should not be used until this cargo is cleared.
- 6.1.6 It should be noted that wires can enter the safe working area on the TRS and have the potential to wrap around crew in a dynamic environment. Deck crew should not enter the safe working platform if it is unsafe, and only enter when movement has stopped, and the crane operator has confirmed readiness.
- 6.1.7 Crew unhooking the crane hooks at either end must carefully co-ordinate the release of the hook.

6.2 Loading of Tubulars

- 6.2.1 Cargo planning offshore is vital for understanding how the TRS will be backloaded and the cargo lashed, and whether any deck area also needs to be prepared for backloading of tubulars. Offshore installations should provide accurate information on what is to be backloaded, and a clear agreement on how cargo is to be stowed made between the vessel and the installation prior to commencing operations. At this stage, positive confirmation should be made regarding what is being loaded into the TRS and that sling lengths are within the limits described in this Operating Procedure.

- 6.2.2 Tubulars should be stowed longitudinally on the TRS, as shown in Figure 6-1. Stowing of tubulars should start from the crash barrier and finish against the upright on the TRS 1 walkway skid. The bottom layer of tubulars should be loaded in single bundles to give a tight base. The stack height is limited by the maximum deck load; however, the maximum height must not exceed the height of the 2 metre markings on the side of the TRS 1 walkway unit.
- 6.2.3 It is not necessary to distribute the tubular across the entire width of the TRS 2 & 3, i.e. for a smaller load, the tubulars can be stacked and lashed back to the cargo rail, leaving the rest of the system free for general cargo. However, the stow must be secured sufficiently to ensure safety of crew when handling other cargo.
- 6.2.4 It is important to ensure bundles are stowed as close together as possible; this is to avoid the risk of cargo shifting during the voyage. When loading large dimension pipe with one tubular in each bundle, wedges should be fitted below each tubular joint; this is to avoid the risk of shifting cargo during transit.
- 6.2.5 It should be noted that large tubulars must never be loaded on top of smaller tubulars.

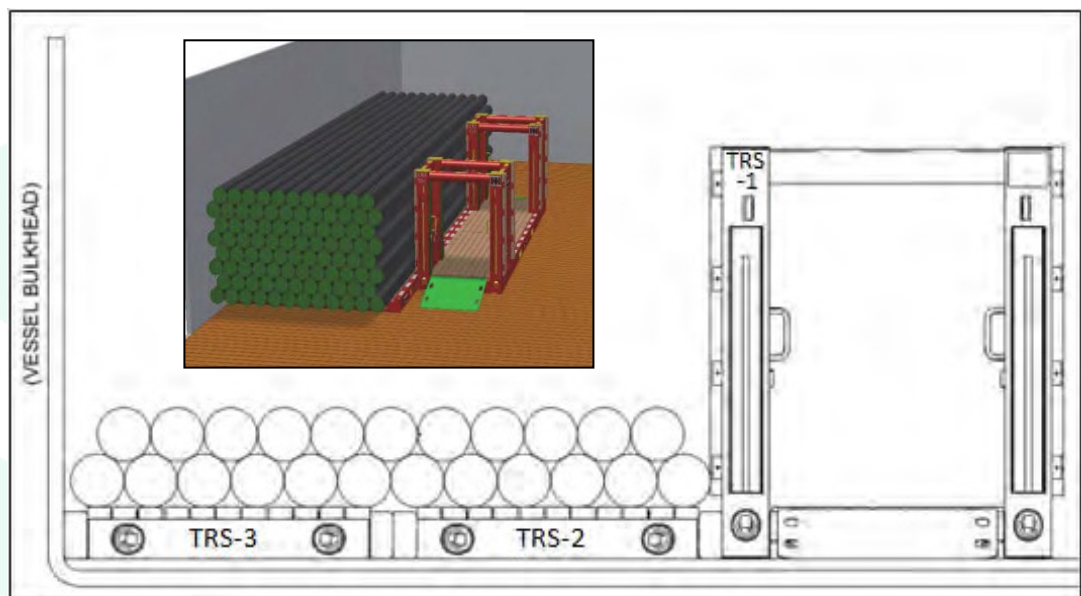


Figure 6-1 Sequence of Tubular Loading

- 6.2.6 The deck strength of the vessel should be verified for the maximum tubular load, 0.25 t/m² should be added to the deck loading to account for the weight of the storage system.
- 6.3 Sling Termination Points**
- 6.3.1 TRS 1 is fitted with sling termination points to store lifting slings safely.

- 6.3.2 As tubulars are loaded, the sling ends must be hooked over the sling termination points on the TRS 1 in the order that they are loaded. Where several bundles are lifted together the deck personnel must ensure that the sequence of placing the slings over the posts is the same at both ends of the system. As sling termination points are symmetrically fitted at each side of the walkway unit, it is important to note that only inner rods (as highlighted in Figure 6-2) must be used. This allows access to the sling ends from the doorway location, eliminating tripping hazards. Slings should be stowed in an orderly fashion, in sequential order.
- 6.3.3 During onshore loading, if sling end eyes are incorrectly or insufficiently placed over the sling termination points, the lift must be repositioned to ensure correct and sufficient placement; otherwise, the lift should be returned ashore.
- 6.3.4 Crew should be fully aware of the maximum loading capacity of the TRS as described in this procedure.

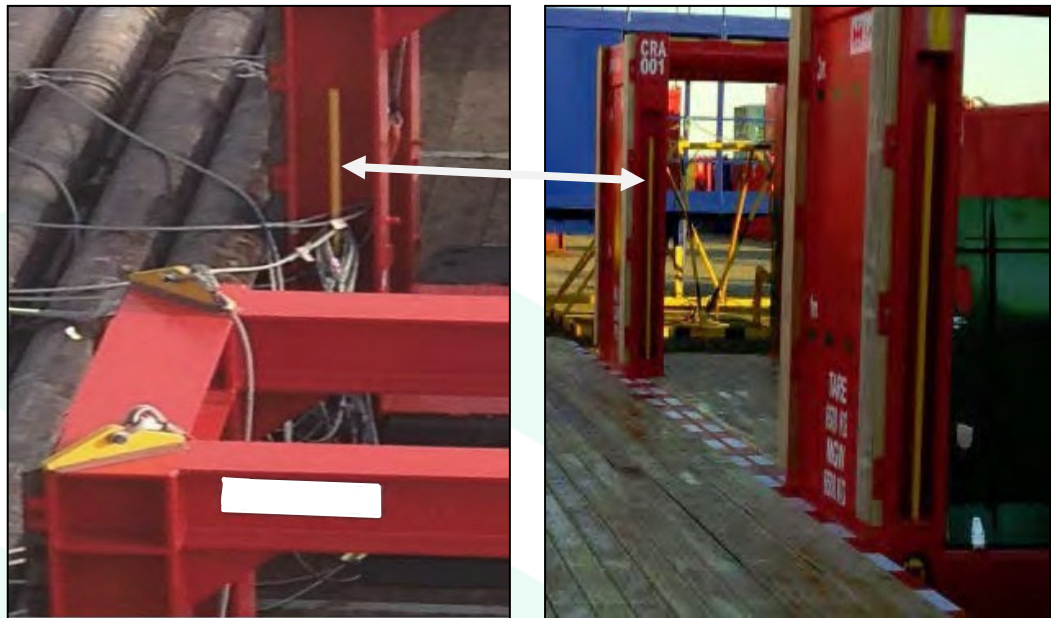


Figure 6-2 Sling termination points

6.4 Securing of the Tubulars

- 6.4.1 The TRS is designed to take a maximum tubular stack height of two metres, but actual tubular stack heights will vary.
- 6.4.2 The lashing requirements for the tubulars are dependent on whether the cargo spans the entire width of the TRS, as follows:
- In instances where tubulars span the entire width of TRS skids 2 and 3 (full load) the tubulars can remain unlashed.
 - In instances where tubulars do not span the entire width of TRS skids 2 and 3 (partial stow) the tubulars will require to be lashed to either the cargo rail or the TRS walkway skid. Lashings of the tubulars in these instances will be as per the vessel's Cargo Securing Manual.
- 6.4.3 If there is not a full spread of tubulars across the loading skid, the preferred method of lashing a partial stow is through the use of chains and binding/tightening devices.
- 6.4.4 Partial stows should be avoided if it is identified during the planning stage that the partial stow cannot be lashed safely

7. OFFLOADING TUBULARS OFFSHORE

7.1 General

- 7.1.1 Reference should be made to the vessel's Cargo Securing Manual and Guidelines for Offshore Marine Operations (G-OMO), Reference [2], and/or local regional equivalent.
- 7.1.2 Once tubular offloading is complete, the TRS may be used for general cargo backload. Cargo backload should be appropriately secured back to the vessel cargo rail and not the TRS.

7.2 Offloading Procedure

- 7.2.1 Unlash the cargo, pay particular attention as lashing chains may have sustained increased tension due to the vessel's motion during transit. The stored energy potential should be captured within the risk assessment and discussed as part of the Toolbox Talk. Remove the chains from the top of the tubulars to the safe haven or walkway (without personnel climbing on top of the tubulars). Ensure lashings are stored tidily to avoid trip hazards.
- 7.2.2 The deck crew will work from the TRS 1 walkways to hook/unhook the pre-slung tubulars. The deck crew shall not be located in the TRS 1 walkway while cargo is being lifted.
- 7.2.3 If tag lines are to be used, then fasten and secure the tag lines before hooking onto the wire slings of the tubulars.
- 7.2.4 Crew shall be trained to ensure that all sling end eyes are placed on the sling termination points in the correct sequence to ensure that tubulars are always offloaded in the correct sequence.

8. LOADING GENERAL CARGO ON TRS

8.1 General

- 8.1.1 General deck cargo may be loaded onto the TRS units, provided the vessel's deck strength is not exceeded. Cargo must be secured as per vessel's Cargo Securing Manual. Back loading of deck cargo from offshore installations onto empty TRS units is allowed as long as it is deemed suitable to do so.
- 8.1.2 The TRS 1 walkway has been designed to withstand impact loads and can be used to steady the lifted/lowered loads.

REFERENCES

- [1] TRS Operating Instructions Rev 1.
- [2] Guidelines for Offshore Marine Operations (G-OMO), Revision 0611-1401 (Nov 2013).
- [3] Vessel's Cargo Securing Manual.
- [4] DNV Standard for Certification No. 2.7-3 Portable Offshore Units (May 2011).
- [5] DNV-OS-H205 Lifting Operations, VMO Standard - Part 2-5 (Apr 2014).
- [6] DNV GL "Preliminary Design Verification Report", DVR-P5994-J-10275, Revision 2016-10.
- [7] TRS Walkway & Twist Lock Calculation Report Rev 1.
- [8] TRS Tubular Stacking Calculations Rev 1.
- [9] TRS Lashing Assembly Calculations Rev 1.



APPENDIX A

TRS GENERAL ARRANGEMENT AND RIGGING DRAWINGS

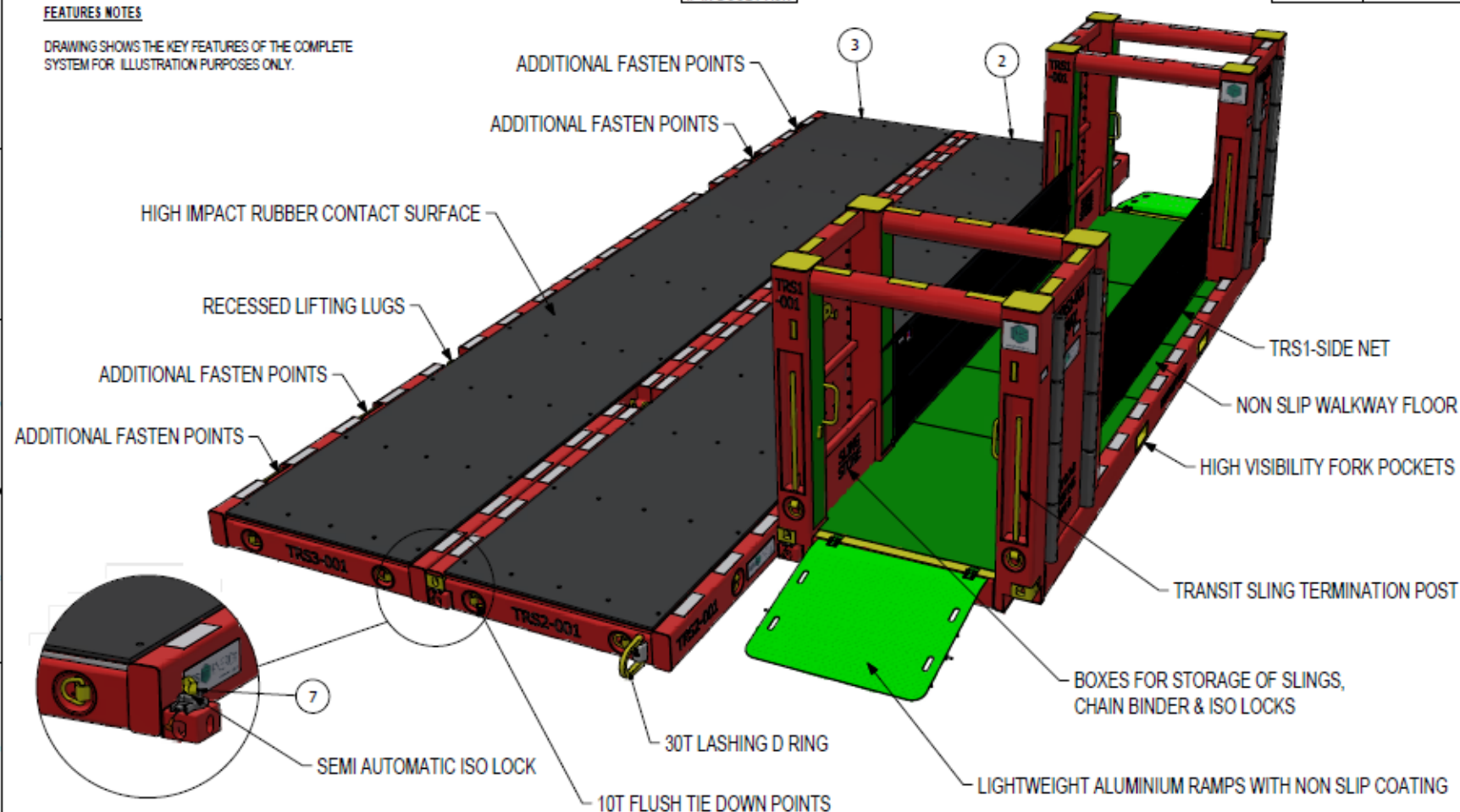
FEATURES NOTES

DRAWING SHOWS THE KEY FEATURES OF THE COMPLETE SYSTEM FOR ILLUSTRATION PURPOSES ONLY.

IF IN DOUBT ASK

QTY/PRO: 1

MASS: 12990.00 kg



ITEM	PART No	DESCRIPTION	QTY
1	TRS1	7.7m TUBULAR RACK WALKWAY	1
2	TRS2	11m TUBULAR RACK CENTRE SKID	1
3	TRS3	11m TUBULAR RACK OUTER SKID	1
4	TRS1-SLINGS	11.3t WLL WIRE ROPE SLING SET	1
5	TRS2-SLINGS	8.5t WLL WIRE ROPE SLING SET	1
6	TRS3-SLINGS	8.5t WLL WIRE ROPE SLING SET	1
7		ISO TWISTLOCK SEMI AUTOMATIC	4
8		30t WLL RATCHET BINDER + CHAIN	2

DO NOT SCALE
IF IN DOUBT ASK

DESC: DIMENSIONS, FEATURES & SLINGS

UNIT: TRS SYSTEM LAYOUT

THIS DRAWING IS THE SOLE PROPERTY OF SES ENERGY 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.

C	SCN2026-003	L.D	30/01/2026
B	SCN2019-025	L.D	13/11/2019
A	SCN2019-004	L.D	09/03/2019
REV	SCN NO	BY	DATE

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SHEET	DATE	DWN	CHKD	APVD	PART No	SIZE	REV
2 OF 3	28/11/2015	S.B	A.T	N.M	TRS	A3	C

IF IN DOUBT ASK

QTY/PRO: 1 MASS: 12990.00 kg

SLING NOTES

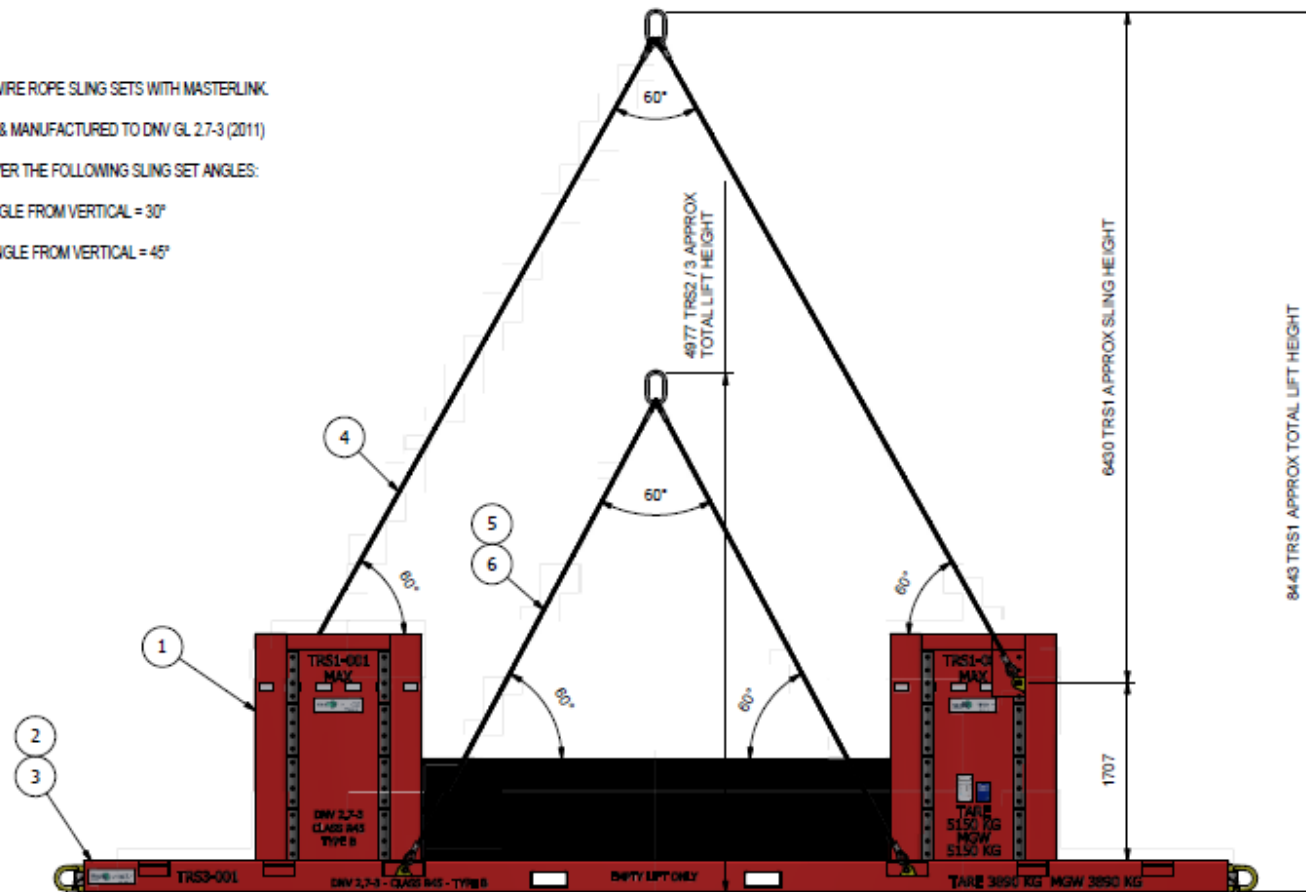
STANDARD 4 LEG WIRE ROPE SLING SETS WITH MASTERLINK.

SLINGS DESIGNED & MANUFACTURED TO DNV GL 2.7-3 (2011)

APPROVED TO COVER THE FOLLOWING SLING SET ANGLES:

MINIMUM SLING ANGLE FROM VERTICAL = 30°

MAXIMUM SLING ANGLE FROM VERTICAL = 45°



ITEM	PART No	DESCRIPTION	QTY
1	TRS1	7.7m TUBULAR RACK WALKWAY	1
2	TRS2	11m TUBULAR RACK CENTRE SKID	1
3	TRS3	11m TUBULAR RACK OUTER SKID	1
4	TRS1-SLINGS	11.3t WLL WIRE ROPE SLING SET	1
5	TRS2-SLINGS	8.5t WLL WIRE ROPE SLING SET	1
6	TRS3-SLINGS	8.5t WLL WIRE ROPE SLING SET	1
7		ISO TWISTLOCK SEMI AUTOMATIC	4
8		30t WLL RATCHET BINDER + CHAIN	2

C	SCN2026-003	L.D	30/01/2026
B	SCN2019-025	L.D	13/11/2019
A	SCN2019-004	L.D	08/03/2019
REV	SCN NO	BY	DATE



DESC: DIMENSIONS, FEATURES & SLINGS
UNIT: TRS SYSTEM LAYOUT

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SHEET	DATE	DWN	CHKD	APVD	PART No	SIZE	REV
3 OF 3	26/11/2015	S.B	A.T	N.M	TRS	A3	C

APPENDIX B TRS CHECKLIST

TUBULAR RACK SYSTEM (TRS) CHECKLIST

FITTING TRS AND LOADING TUBULARS

Item No	Description	Yes	No	N/A
1	Are adequate Tubular Rack Skids (TRS 2 & 3) and Tubular Rack Walkways (TRS1) available with required sea fastening chains for intended amount of tubulars? Consideration is to be given to width of deck when deciding on number of TRSs to be deployed.			
2	Are TRSs visibly in good condition?			
3	Is the lifting certification in date?			
4	Has the lift plan been discussed as per Appendix A?			
5	Has Risk Assessment and Tool Box Talk been held?			
6	Is vessel on even keel?			
7	Ensure the correct dedicated sling sets are connected to each section and that TRS walkway ramps are secured.			
8	Carry out dropped object inspection prior to lifting.			
9	Sling sets to be removed from each TRS skid after loading.			
10	Once fully assembled, the TRS skid is seafastened to the vessel.			
11	Dedicated lifting sling sets to be stored in boxes on TRS 1 prior to loading tubulars.			
12	Bedding rope to be flaked out over each end of TRS to full width.			
13	TRS 2 and 3 to be loaded with tubular from the cargo rail to the TRS 1 walkway skid side with one full row of tubulars (single tubulars or single bundles) with all lifting slings ends hooked over the sling storage rods on TRS 1 in the order that they are loaded.			
14	Tubulars/cargo are to be lashed to the cargo rail as per vessel's securing manual.			

OFFLOADING TUBULARS

Item No	Description	Yes	No	N/A
1	Has Risk Assessment and Tool Box Talk been held?			
When unlashings tubulars pay particular attention as lashings may have come under increased tension due to vessel motion during transit.				
2	Remove chains from the top of tubulars to safe haven without personnel climbing on top of tubulars.			
3	If tag lines are to be used then fasten them prior to hooking the sling ends onto the crane hook.			
4	Ensure that lifting slings are attached to same tubular bundle prior to lifting.			
5	The TRS walkways must not be used as safe havens during back loading or discharging tubulars.			

APPENDIX C GUIDANCE FOR A LIFT PLAN

GUIDANCE FOR A LIFT PLAN

Lift Plans The tubular rack system is designed to be used on a range of vessels, and in a range of locations, therefore it is beyond the scope of this document to include a lifting plan to cover for all uses. However, the guidance in this Appendix can be used to create an individual lifting plan as required. A generic lift plan can be found in Appendix D.
Hook Loads The hook loads vary depending on the tubular rack section. The maximum hook load for the Tubular Rack Skid (TRS 2&3) to be: Dynamic hook load = Mass x DAF* = 3600kg x 1 = 3600kg The maximum hook load for the Tubular Rack Walkway (TRS 1) to be: Dynamic hook load = Mass x DAF* = 5000kg x 1 = 5000kg *DAF (Dynamic Amplification Factor, see Reference [5]) = 1.0 assuming a static shore based crane is used. If a vessel crane is used then this value should be revised accordingly.
Environmental Limits Environmental limitations will depend upon the particular crane which is utilised for each lifting operation. Please use the relevant port operation's upper weather limit guidelines for loading and discharging of the tubular rack system. It is however recommended that wind speed should be less than or equal to Beaufort Force 5 (equivalent to 10m/s) for the installation of the tubular rack system.
Sling Sets As the centre of gravity (COG) of each unit varies, there is a dedicated set of pre-inspected lifting slings for each unit of this TRS. These sling-sets have been designed and manufactured to DNV 2.7-3 (2011) standards and result in a level lift of each unit. Therefore, it is important to select the correct sling-set for each assembled section. The lift rigging drawings are to be used as per Appendix A and Figure 3-2. The TRS 1 walkway unit is fitted with 4-off storage boxes within the walkways. When the TRS system is in storage or in transit, these boxes contain chain ratchet binders and ISO Twist Locks. These storage lockers (and inside content) have to be properly secured when the TRS 1 walkway unit is lifted. When the TRS is in operation aboard the vessel, these storage boxes contain the sling sets for all three (3) units. Tag lines may be used to steady the load when lifting provided that a risk assessment is performed prior to use.
Lifting Procedure: The below steps should be followed and included in all lifting plans: 1. Ensure sections are correctly assembled and walkway ramps are secured with locking pins. 2. Ensure the slings are identified and fitted correctly. Each TRS section has its own dedicated sling set identified by the sling tags. 3. Ensure that correct sling-set has been identified, and correctly fitted to the relevant section. 4. Attach tag lines to units as required. Slowly take up the slack in sling sets by using the crane. Stop, just prior to lifting any section, and confirm that slings are deployed correctly. 5. Carry out a dropped object inspection immediately prior to any lifting operations commencing. 6. Lift each TRS section onto / from the vessel.
On-Deck Setup Each unit should be craned into position on the vessel's deck (see Section 3.3 for lifting details). Once the TRS is fully assembled, the TRS is to be secured to the vessel's crash barrier. The vessel should be on an even keel prior to installation of the TRS, this to ensure that locking blocks can be aligned correctly.

APPENDIX D TRS LIFT PLANS

TRS LIFTING PLAN
TASK DESCRIPTION
FORKLIFT OPERATIONS

Lifting plan to be completed by competent person					
Installation:			Location:		
Weight of Load, Max weight: 5000Kg					
DESCRIPTION OF LIFTING OPERATION					
Category: Forklift Operations Task: Transport the TRS system by forklift (Minimum size of Forklift 10000kg) The order for lifting and installation is as follows: - 1st – TRS 3 Skid, Weight = 3600kg 2nd – TRS 2 Skid, Weight = 3600kg 3rd – TRS 1 Walkway, Weight = 5000kg TRS 1 Dimensions = 7700mm x 2120mm x 2485mm TRS 2 & 3 Dimensions = 11000mm x 2165mm x 300mm					
Personnel Involved:					
POSSIBLE CONSIDERATIONS (NOT EXHAUSTIVE)					
Weight not verified		Lifting of chemicals		Conflicting tasks in area	
High centre of gravity		Load on pallet requires securing		Dynamic factors involved	
Stability of load		Sea fastening removed		Hazards to personnel in the area	
No certified suspension points for the lifting equipment		Restricted headroom or confined work area		Communication requirements	
Awkward size / shape / sharp edges		No lifting point directly above the load		Adequate lighting and visibility	
No dedicated lifting points on the load		Appropriate and correctly installed lifting equipment and accessories		Is the use of tag lines required? Then consider personnel positioning	
ROUTE TO BE TRAVELLED AND LAYDOWN AREA					
<i>(If you can not answer either, address in the 'Step-by-Step' section)</i>					YES NO
1.	Is the route and lay down area clear of obstructions?				
2.	Is the lay down / landing area adequate in terms of size and load-bearing ability?				
3.	Is suitable packing available for protection of the load, lifting equipment, slings etc.?				
4.	Have barriers been positioned to prevent access to unauthorised personnel?				
5.	Have you confirmed that the lay down area is within the operating limits / radius of the equipment?				
6.	Have environmental conditions been considered with regards to the safety of the lifting operation?				
7.	Will the Lifting Equipment Operator be able to see the Banksman throughout the operation, or has another suitable, risk-assessed means of communication been checked and made available (e.g. radios)?				
8.	Are there hazardous process plant or materials in the area?				

STEP-BY-STEP DETAILS OF THE LIFTING OPERATIONS	
1.	Toolbox Talk - Identify Banksman / load handler and other lift team members (including the Forklift Operator)
2.	Identify lift sequence to Forklift Operator, ensuring awareness as to the required points of safe access and egress of personnel. Once identified and agreed, confirm all parties understand the measures required to maintain the safe access / egress at all times.
	MOVING OF TRS 3 SKID
3.	Erect barriers accordingly around the task areas if so required
4.	Conduct an inspection of the lifts remove all tie downs and the Forklift to be used ensuring the fork width is correct and set if needed.
5.	Check the cargo / lifts for possible loose items, i.e. potential dropped objects in particular inside of the forklift pockets.
6.	Banksman to direct the forklift to the required position and stop short (1m) to allow for any adjustment needed to the forks that can be completed at this point. The Forklift Operator must apply the parking brake prior to any manual adjustments.
7.	Once the Forklift Operator has confirmed that the forks line up to the forklift pockets he may then proceed forward until the carriage of the forklift contacts with the load.
8.	Under the instruction of the Banksman, the Forklift Operator can now adjust as needed to allow him to raise the load 0.5m clear of any obstructions.
9.	When the Forklift Operator is satisfied with the load's stability the Banksman is to position himself clear. Once the Banksman is clear, the Forklift Operator may then start to move to the laydown area via the pre-planned route. The speed of the forklift must be suitable for the site conditions to reduce the possibility of load movement under braking and turning.
10.	Upon arrival at the laydown area, the forklift Operator is to confirm with the Banksman that the load is in the correct orientation and is safe to land.
11.	The Forklift Operator can then lower the load until the forks no longer bear any weight.
12.	The Forklift Operator can now adjust as needed to allow him to reverse free from the load and clear of any obstructions.
13.	The Forklift Operator can now return for the second TRS 2 Skid.
	MOVING OF TRS 2 SKID
14.	Erect barriers accordingly around the task areas if so required.
15.	Conduct an inspection of the lifts remove all tie downs and the Forklift to be used ensuring the fork width is correct and set if needed.
16.	Check the cargo / lifts for possible loose items i.e. potential dropped objects in particular the inside of the forklift pockets.
17.	Banksman to direct the forklift to the required position and stop short (1m) to allow for any adjustment needed to the forks that can be completed at this point. The Forklift Operator must apply the parking brake prior to any manual adjustments
18.	Once the forklift operator has confirmed that the forks line up to the forklift pockets he may then proceed forward until the carriage of the forklift contacts with the load.
19.	The Forklift Operator can now adjust as needed to allow him to raise the load 0.5m clear of any obstructions.
20.	When the Forklift Operator is satisfied with the loads stability the Banksman is to position himself clear. Once the Banksman is clear the Forklift Operator may then start to move to the laydown area via the pre-planned route. The speed of the forklift must be suitable for the site conditions to reduce the possibility of load movement under braking and turning.

STEP-BY-STEP DETAILS OF THE LIFTING OPERATIONS

21.	Upon arrival at the laydown area, the Forklift Operator is to confirm with the Banksman that the load is in the correct orientation and is safe to land.
22.	The Forklift Operator can then lower the load until the forks no longer bear any weight.
23.	The Forklift Operator can now adjust as needed to allow him to reverse free from the load and clear of any obstructions.
24.	The Forklift Operator can now return for the walkway TRS 1 Walkway
	MOVING OF TRS 1 WALKWAY
25.	Erect barriers accordingly around the task areas if so required.
26.	Conduct an inspection of the lifts remove all tie downs and the Forklift to be used ensuring the fork width is correct and set if needed.
27.	Check the cargo / lifts for possible loose items, i.e. potential dropped objects in particular the inside of the forklift pockets.
28.	Banksman to direct the forklift to the required position and stop short (1m) to allow for any adjustment needed to the forks that can be completed at this point. The Forklift Operator must apply the parking brake prior to any manual adjustments.
29.	Once the Forklift Operator has confirmed that the forks line up to the forklift pockets he may then proceed forward until the carriage of the forklift contacts with the load.
30.	The Forklift Operator can now adjust as needed to allow him to raise the load 0.5m clear of any obstructions.
31.	When the Forklift Operator is satisfied with the load's stability, the Banksman is to position himself clear. Once the Banksman is clear, the Forklift Operator may then start to move to the laydown area via the pre-planned route. The speed of the forklift must be suitable for the site conditions to reduce the possibility of load movement under braking and turning.
32.	Upon arrival at the laydown area, the forklift Operator is to confirm with the Banksman that the load is in the correct orientation and is safe to land.
33.	The Forklift Operator can then lower the load until the forks no longer bear any weight.
34.	The Forklift Operator can now adjust as needed to allow him to reverse free from the load and clear of any obstructions.
35.	The Forklift Operator can now return to the designated parking area.

LIFTING EQUIPMENT AND LIFTING ACCESSORIES TO BE USED (SPECIFY TYPE AND SWL)

[illegible]

DEBRIEF AND LEARNING POINTS

(Did the lifting operation go as planned or are changes to the lift plan required?)

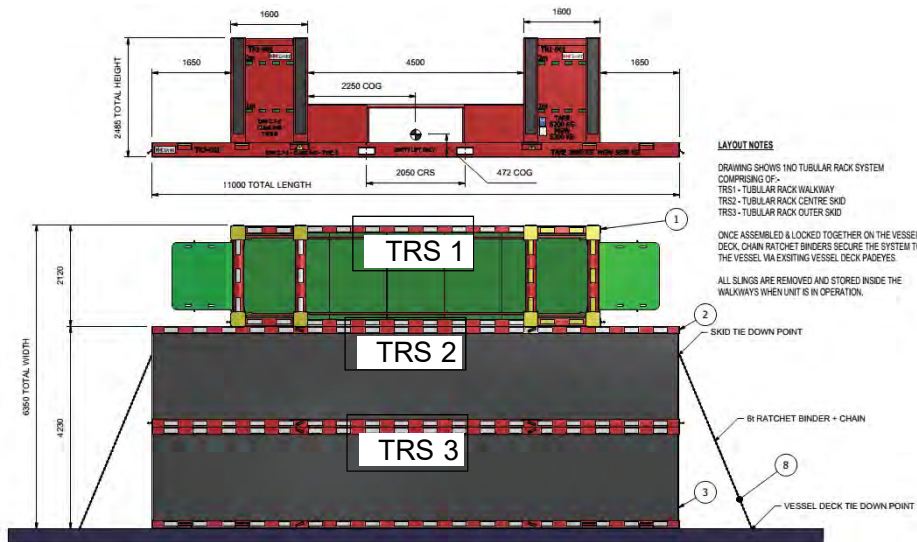
NAME	SIGNATURE

SKETCH DETAILING THE RIGGING UP AND LIFTING ACCESSORIES

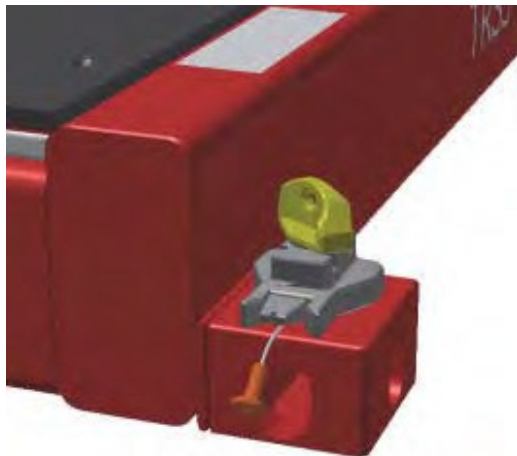
Individual Units



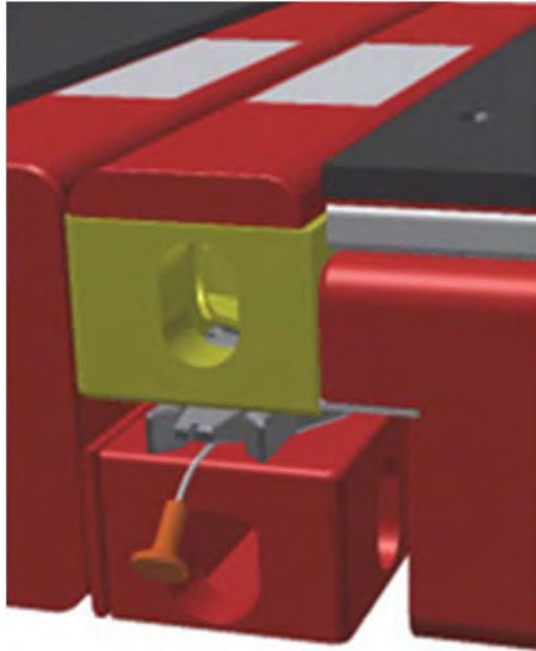
Correct orientation of the TRS system



ISO Twist Locks fitted on the locking block



SKETCH DETAILING THE RIGGING UP AND LIFTING ACCESSORIES



ISO Locks engaging

(BOTTOM CONE LOCKED)
TOP CONE OPEN
POSITION WITH
HANDLE UP



TWISTLOCK LOCKED



(TOP CONE LOCKED)
BOTTOM CONE OPEN
POSITION WITH
HANDLE DOWN



(TOP CONE LOCKED)
BOTTOM CONE OPEN
POSITION WITH
HANDLE LEFT



Twist Locks

LIFTING PLAN

TASK DESCRIPTION

Install TRS System

Approved by	Name	Signature	Date

Lifting plan to be completed by competent person					
Installation:		Location:			
Weight of Load, Max weight: 5000Kg					
DESCRIPTION OF LIFTING OPERATION					
Category: Task: Installation of the TRS system from the quayside onto the deck of the vessel in 3 separate lifts. The order for lifting and installation is as follows: - 1st – TRS 3 Skid, Weight = 3600kg 2nd – TRS 2 Skid, Weight = 3600kg 3rd – TRS 1 Walkway, Weight = 5000kg TRS 1 Dimensions = 7700mm x 2120mm x 2485mm TRS 2 & 3 Dimensions = 11000mm x 2165mm x 300mm					
Personnel Involved					
Type of Crane					
Capacity of Crane at Maximum Operating Radius					
% of crane utilisation					
POSSIBLE CONSIDERATIONS (NOT EXHAUSTIVE)					
Weight not verified		Lifting of chemicals		Conflicting tasks in area	
High centre of gravity		Load on pallet requires securing		Dynamic factors involved	
Stability of load		Sea fastening removed		Hazards to personnel in the area	
No certified suspension points for the lifting equipment		Restricted headroom or confined work area		Communication requirements	
Awkward size / shape / sharp edges		No lifting point directly above the load		Adequate lighting and visibility	
No dedicated lifting points on the load		Appropriate and correctly installed lifting equipment and accessories		Is the use of tag lines required? Then consider personnel positioning	
ROUTE TO BE TRAVELLED AND LAYDOWN AREA					
<i>(If you can not answer either, address in the 'Step-by-Step' section)</i>					
				YES	NO
1.	Is the route and lay down area clear of obstructions?				
2.	Is the lay down / landing area adequate in terms of size and load-bearing ability?				
3.	Is suitable packing available for protection of the load, lifting equipment, slings etc.?				
4.	Have barriers been positioned to prevent access to unauthorised personnel?				
5.	Have you confirmed that the lay down area is within the operating limits / radius of the equipment?				
6.	Have environmental conditions been considered with regards to the safety of the lifting operation?				
7.	Will the Lifting Equipment Operator be able to see the Banksman throughout the operation, or has another suitable, risk-assessed means of communication been checked and made available (e.g. radios)?				
8.	Are there hazardous process plant or materials in the area?				

STEP-BY-STEP DETAILS OF THE LIFTING OPERATIONS	
1.	Toolbox Talk - Identify Banksman / load handler and other lift team members (including transport / shunter driver).
2.	Confirm lift sequence to crane operator, ensuring awareness as to the required points of safe access and egress of personnel. Once identified and agreed, confirm all parties understand the measures required to maintain the safe access / egress at all times.
3.	Erect barriers accordingly around the task areas if so required
4.	Position the crane in relation to pre-agreed lift points and laydown areas.
5.	Once positioned, motion the crane through the agreed lift paths from the pick-up point to the lay down areas, having the crane operator confirm the suitability of crane type and size for the proposed lifts regarding their weights and task radius.
6.	Conduct an inspection of the lifts and the lifting equipment to be used ensuring that the correct slings and the shackles are securely attached.
7.	Check all sling sets regarding position and integrity. Check all shackles are securely attached. Each TRS section has its own dedicated sling set identified by the sling tags. A pre-use inspection must be carried out to ensure that none of the lifting sets have sustained damage during transit.
8.	Check the cargo / lifts for possible loose items i.e. potential dropped objects in particular the ISO Locks.
9.	The use of Tag lines will be risk assessed before attaching to the lift (a separate risk assessment is to be completed on the use of tag lines) and are the only control / orientation method to be used during the pick-up and landing of the lifts.
10.	Banksman on the quayside to direct the crane to the required position (above the centre of gravity of the master link attached to the lifting set) in preparation for attaching the master link to the crane hook on the TRS 3 Skid.
11.	Once the master link is attached, the Banksman will then direct the crane operator to raise the lifting bridle slowly until the lifting set is tensioned equally, and position the crane hook above the centre of the lift.
12.	Banksman on the quayside to instruct the crane operator to carry out a trial lift approx. 0.5m clear of the deck.
13.	The Banksman on the quayside will check that the lift is level and stable, slings are secure and there is no potential dropped objects. At this point, check the required orientation of the load (ISO Locking blocks are facing inboard)
14.	The Banksman on the quayside will ensure that the landing area on the vessel is ready to accept the cargo before lifting and slewing the load through the lift path to the laydown area.
15.	Once the load is landed in the laydown area the Banksman on the vessel will instruct the crane operator to maintain tension until suitable positioning is confirmed against the vessel's bulkhead.
16.	Only once the cargo's position is confirmed the Banksman on the vessel can instruct the crane operator to lower the slings / master link to a position suitable for their release.
17.	Slings to be removed from TRS 3 Skid pad-eyes and stored prior to lifting TRS 2 Skid.
18.	Banksman on the vessel will instruct the crane operator to raise the hook and return to the quayside.
19.	Banksman on the quayside to direct the crane to the required position (above the centre of gravity of the master link attached to the lifting set) in preparation for attaching the master link to the crane hook on the TRS 2 Skid
20.	Before lifting, ensure that the orientation of the ISO Locks assembly has been confirmed and the slings from TRS 3 Skid have been removed.

STEP-BY-STEP DETAILS OF THE LIFTING OPERATIONS	
21.	Banksman on the quayside to instruct the crane operator to carry out a trial lift approx. 0.5m clear of the deck.
22.	The Banksman on the quayside will check that the lift is level and stable, slings are secure and there is no potential dropped objects. At this point, check the required orientation of the load (ISO locking blocks should be facing inboard).
23.	Once the Banksman on the vessel is confident of the orientation and positioning of the ISO locks he can then direct the crane operator as needed inching the TRS2 into its final position. During this operation, the Crane Operator is to monitor the Weigh Load Indicator to ensure that no additional load is taken from the adjacent unit during the operation.
24.	Then the Banksman on the vessel can signal the crane operator to release the tension on the slings and disconnect from the crane. Once the lifting set has been disconnected the Banksman will instruct the Load Handler to activate the ISO locks.
25.	Slings to be removed from TRS 2 Skid pad-eyes and stored prior to lifting TRS 2 Skid.
26.	Banksman on the vessel will instruct the crane operator to raise the hook and return to the quayside.
27.	Banksman on the quayside to direct the crane to the required position (above the centre of gravity of the master link attached to the lifting set) in preparation for attaching the master link to the crane hook on the TRS 1 Walkway
28.	Once the master link is attached, the Banksman on the quayside will then direct the crane operator to raise the lifting bridle slowly until the lifting set is tensioned equally, and position the crane hook above the centre of the lift.
29.	Banksman on the quayside to instruct the crane operator to carry out a trial lift approx. 0.5m clear of the deck.
30.	The Banksman on the quayside will check that the lift is level and stable, slings are secure and there is no potential dropped objects. At this point, check the required orientation of the load (ISO locking blocks should be facing inboard).
31.	Once the Banksman on the vessel is confident of the orientation and positioning of the ISO locks he can then direct the crane operator as needed inching the TRS1 into its final position. During this operation, the Crane Operator is to monitor the Weight Load Indicator to ensure that no additional load is taken from the adjacent unit during the operation.
32.	Then the Banksman on the vessel can signal the crane operator to release the tension on the slings and disconnect from the crane. Once the lifting set has been disconnected the Banksman on the vessel will instruct the Load Handler to activate the ISO locks.
33.	Banksman on the vessel will instruct the crane operator to raise the hook and return to the quayside.
34.	Slings to be removed from TRS 1 Walkway pad-eyes and stored.

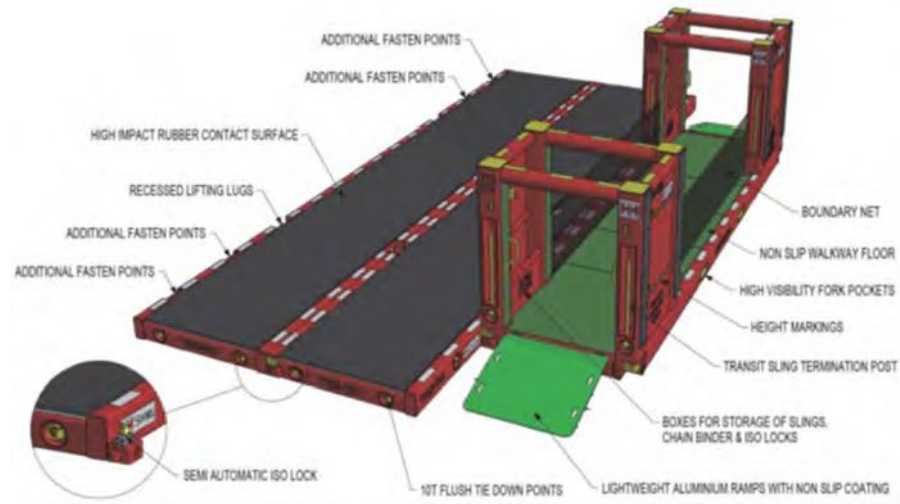
LIFTING EQUIPMENT AND LIFTING ACCESSORIES TO BE USED (SPECIFY TYPE AND SWL)			
ITEM	DETAILS	SWL	QUANTITY
Crane			
Crane Pennant			

DEBRIEF AND LEARNING POINTS

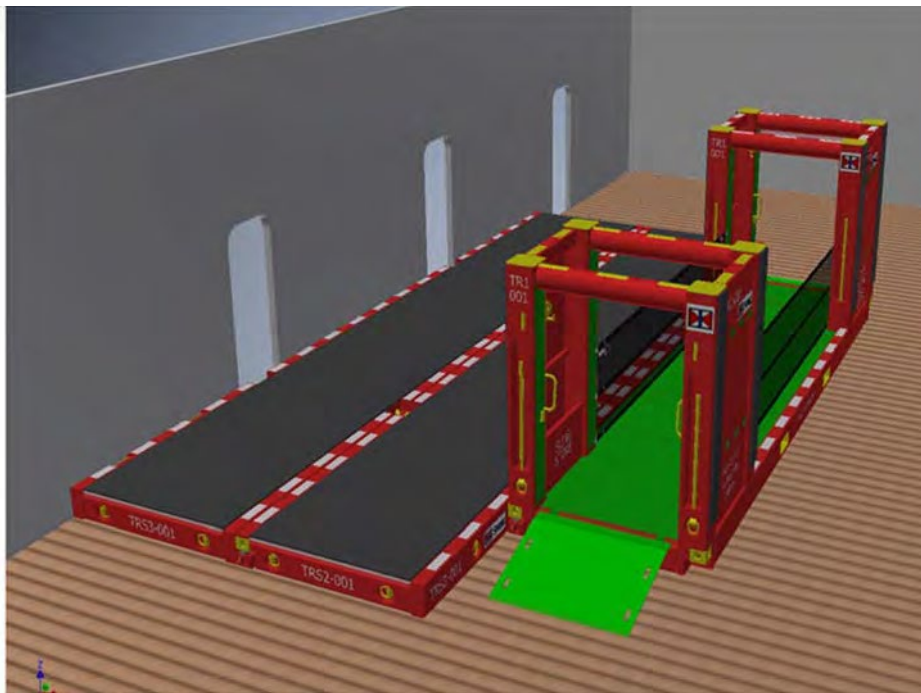
(Did the lifting operation go as planned or are changes to the lift plan required?)

NAME	SIGNATURE

SKETCH DETAILING THE RIGGING UP AND LIFTING ACCESSORIES

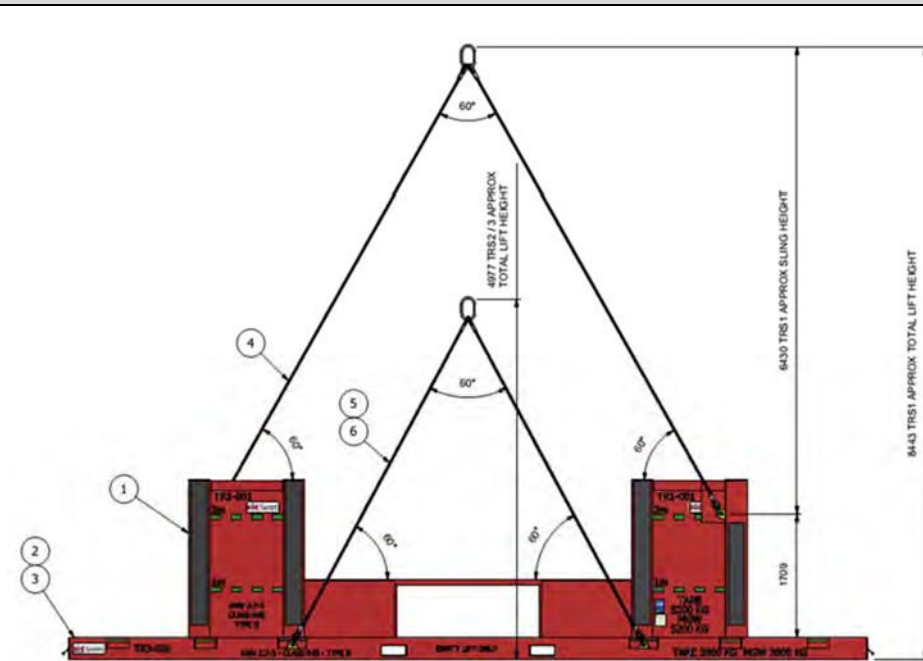


Complete rig up of the TRS

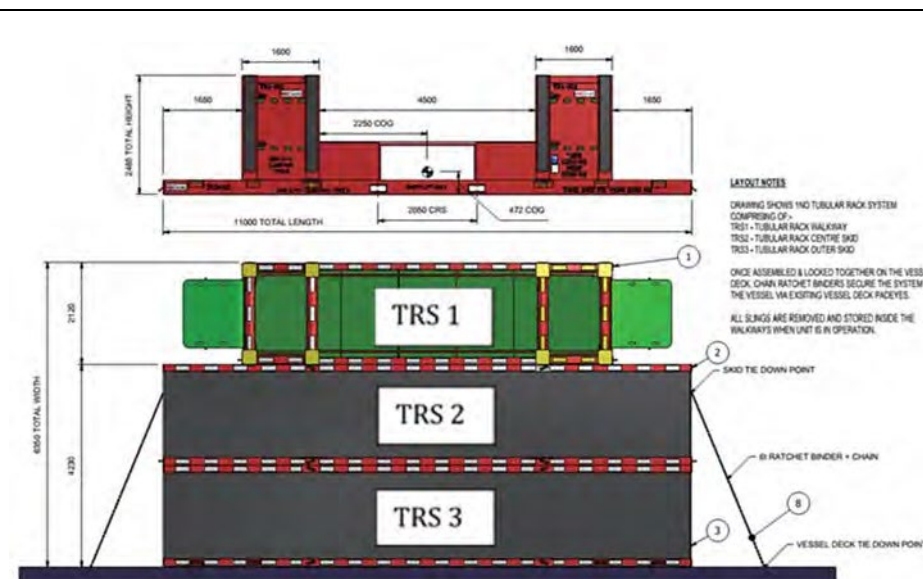


Walkway ramp and traverse braces

SKETCH DETAILING THE RIGGING UP AND LIFTING ACCESSORIES

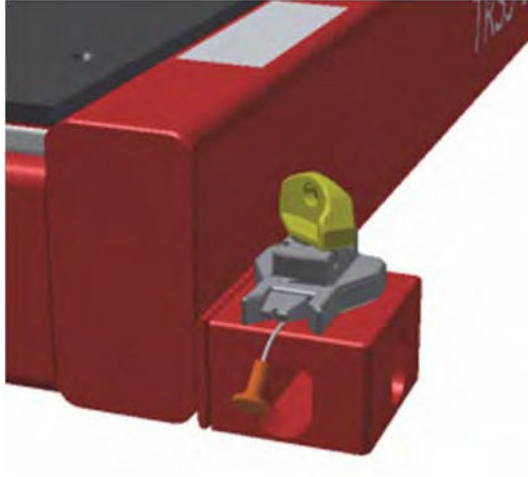


Slinging Arrangement



Correct orientation of the TRS system

SKETCH DETAILING THE RIGGING UP AND LIFTING ACCESSORIES	
	ISO Twist Locks fitted on the locking block



ISO Twist Locks fitted on the locking block

LIFTING PLAN

TASK DESCRIPTION

Removal TRS System

Approved by	Name	Signature	Date

Lifting plan to be completed by competent person					
Installation:		Location:			
Weight of Load, Max weight: 5000Kg					
DESCRIPTION OF LIFTING OPERATION					
Category: Task: Removal of the TRS system from the vessel onto the quayside in 3 separate lifts. The order for lifting and installation is as follows:- 1st – TRS 1 Walkway, Weight = 5000kg 2nd – TRS 2 Skid, Weight = 3600kg 3rd – TRS 3 Skid, Weight = 3600kg TRS 1 Dimensions = 7700mm x 2120mm x 2485mm TRS 2 & 3 Dimensions = 11000mm x 2165mm x 300mm					
Personnel Involved					
Type of Crane					
Capacity of Crane at Maximum Operating Radius					
% of crane utilisation					
POSSIBLE CONSIDERATIONS (NOT EXHAUSTIVE)					
Weight not verified		Lifting of chemicals		Conflicting tasks in area	
High centre of gravity		Load on pallet requires securing		Dynamic factors involved	
Stability of load		Sea fastening removed		Hazards to personnel in the area	
No certified suspension points for the lifting equipment		Restricted headroom or confined work area		Communication requirements	
Awkward size / shape / sharp edges		No lifting point directly above the load		Adequate lighting and visibility	
No dedicated lifting points on the load		Appropriate and correctly installed lifting equipment and accessories		Is the use of tag lines required? Then consider personnel positioning	
ROUTE TO BE TRAVELLED AND LAYDOWN AREA					
<i>(If you can not answer either, address in the 'Step-by-Step' section)</i>					
			YES	NO	
1.	Is the route and lay down area clear of obstructions?				
2.	Is the lay down / landing area adequate in terms of size and load-bearing ability?				
3.	Is suitable packing available for protection of the load, lifting equipment, slings etc.?				
4.	Have barriers been positioned to prevent access to unauthorised personnel?				
5.	Have you confirmed that the lay down area is within the operating limits / radius of the equipment?				
6.	Have environmental conditions been considered with regards to the safety of the lifting operation?				
7.	Will the Lifting Equipment Operator be able to see the Banksman throughout the operation, or has another suitable, risk-assessed means of communication been checked and made available (e.g. radios)?				
8.	Are there hazardous process plant or materials in the area?				

STEP-BY-STEP DETAILS OF THE LIFTING OPERATIONS	
1.	Toolbox Talk - Identify Banksman / load handler and other lift team members (including transport / shunter driver).
2.	Identify lift sequence to crane operator, ensuring awareness as to the required points of safe access and egress of personnel. Once identified and agreed, confirm all parties understand the measures required to maintain the safe access / egress at all times.
3.	Erect barriers accordingly around the task areas if so required
4.	Position the crane in relation to pre-agreed lift points and laydown areas.
5.	Once positioned, motion the crane through the agreed lift paths from the pick-up point to the lay down areas, having the crane operator confirm the suitability of crane type and size for the proposed lifts regarding their weights and task radius.
6.	Conduct an inspection of the lifts and the lifting equipment to be used ensuring that the correct slings and the shackles are securely attached. (Sling sets located in the storage boxes within TRS1.)
7.	Check all sling sets regarding position and integrity. Check all shackles are securely attached. Each TRS section has its own dedicated sling set identified by the sling tags. A pre-use inspection must be carried out to ensure that none of the lifting sets have possible damage sustained during transit. A pre use inspection must be carried out.
8.	Check the cargo / lifts for possible loose items i.e. potential dropped objects. The Banksman on the vessel will then instruct the Load Handler to release all ISO Locks.
9.	The use of Tag lines will be risk assessed before attaching to the lift (a separate risk assessment is to be completed on the use of tag lines) and are the only control / orientation method to be used during the pick-up and landing of the lifts.
10.	Banksman on the vessel will direct the crane to the required position (above the centre of gravity of the master link attached to the lifting set) in preparation for attaching the master link to the crane hook on the TRS 1 Walkway.
11.	Once the master link is attached, the Banksman on the vessel will then direct the crane operator to raise the lifting bridle slowly until the lifting set is tensioned equally and position the crane hook above the centre of the lift.
12.	Banksman on the vessel to instruct the crane operator to carry out a trial lift approx. 0.5m clear of the deck. During this operation the Crane Operator is to monitor the Weigh Load Indicator to ensure that no additional load is taken from the adjacent unit during the operation.
13.	The Banksman on the vessel will check that the lift is level and stable, slings are secure and there is no potential dropped objects.
14.	The Banksman on the vessel will ensure that the landing area on the quayside is ready to accept the cargo before lifting and slewing the load through the lift path to the laydown area.
15.	Only once the cargo's position is confirmed, the Banksman on the quayside can instruct the crane operator to lower the slings / master link to a position suitable for their release.
16.	Banksman on the quayside will instruct the crane operator to raise the hook and return to the vessel.
17.	Banksman on the vessel to direct the crane to the required position (above the centre of gravity of the master link attached to the lifting set) in preparation for attaching the master link to the crane hook on the TRS 2 Skid.
18.	Banksman on the vessel to instruct the crane operator to carry out a trial lift approx. 0.5m clear of the deck. During this operation, the Crane Operator is to monitor the Weigh Load Indicator to ensure that no additional load is taken from the adjacent unit during the operation.
19.	The Banksman on the vessel will check that the lift is level and stable, slings are secure and there

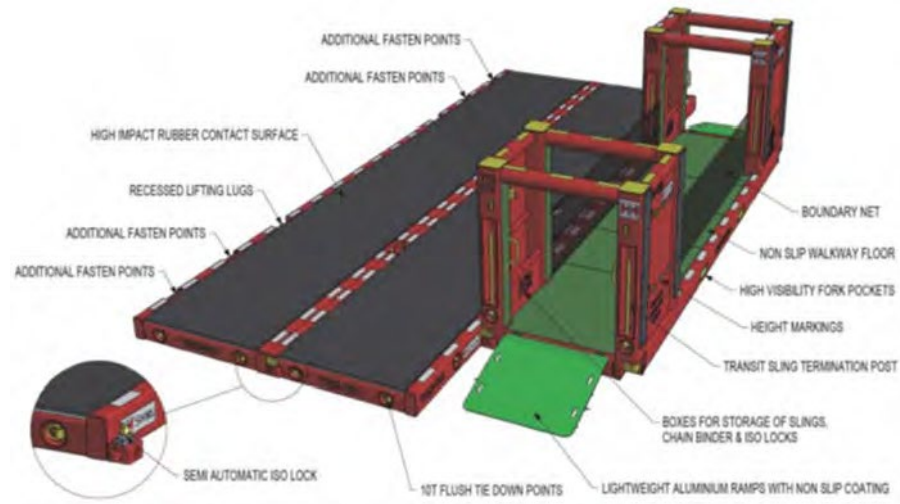
STEP-BY-STEP DETAILS OF THE LIFTING OPERATIONS	
	are no potential dropped objects.
20.	The Banksman on the vessel will ensure that the landing area on the quayside is ready to accept the cargo before lifting and slewing the load through the lift path to the laydown area.
21.	Only once the cargo's position is confirmed the Banksman on the quayside can instruct the crane operator to lower the slings / master link to a position suitable for their release.
22.	Banksman on the quayside will instruct the crane operator to raise the hook and return to the vessel.
23.	Banksman on the vessel to direct the crane to the required position (above the centre of gravity of the master link attached to the lifting set) in preparation for attaching the master link to the crane hook on the TRS 3 Skid.
24.	Once the master link is attached, the Banksman on the vessel will then direct the crane operator to raise the lifting bridle slowly until the lifting set is tensioned equally and position the crane hook above the centre of the lift.
25.	Banksman on the vessel to instruct the crane operator to carry out a trial lift approx. 0.5m clear of the deck.
26.	The Banksman on the vessel will check that the lift is level and stable, slings are secure and there is no potential dropped objects.
27.	The Banksman on the vessel will ensure that the landing area on the quayside is ready to accept the cargo before lifting and slewing the load through the lift path to the laydown area.
28.	Only once the cargo's position is confirmed the Banksman on the quayside can instruct the crane operator to lower the slings / master link to a position suitable for their release.

LIFTING EQUIPMENT AND LIFTING ACCESSORIES TO BE USED (SPECIFY TYPE AND SWL)			
ITEM	DETAILS	SWL	QUANTITY
Crane			
Crane Pennant			

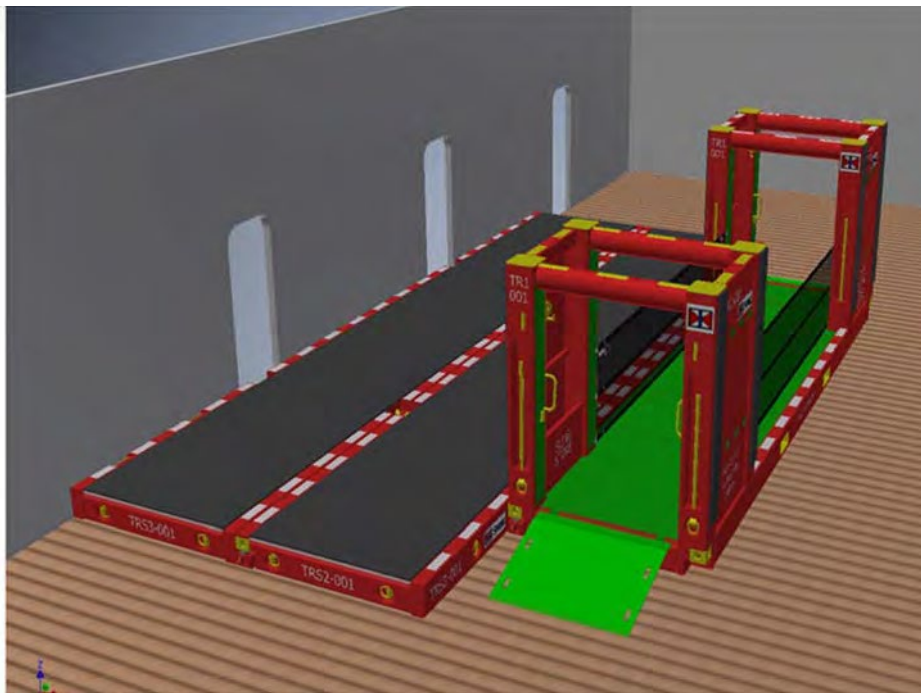
DEBRIEF AND LEARNING POINTS
<i>(Did the lifting operation go as planned or are changes to the lift plan required?)</i>

NAME	SIGNATURE

SKETCH DETAILING THE RIGGING UP AND LIFTING ACCESSORIES



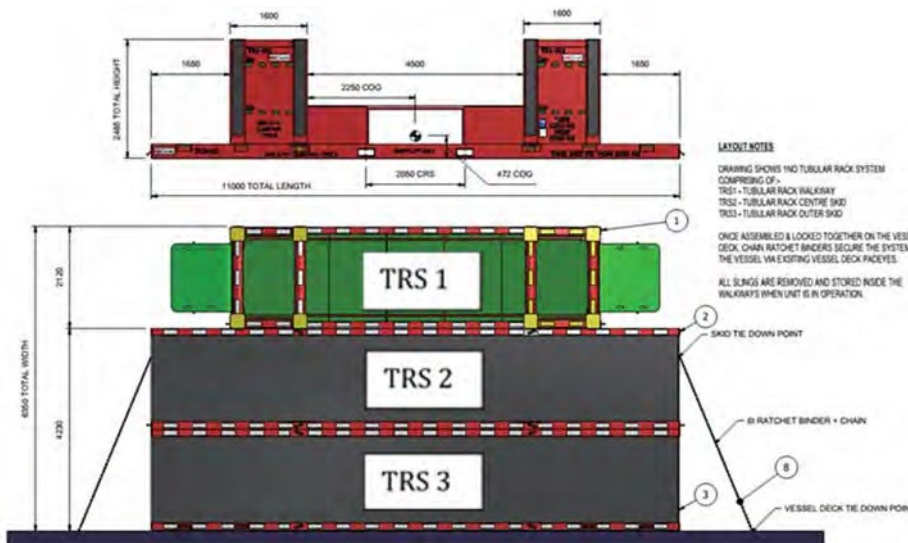
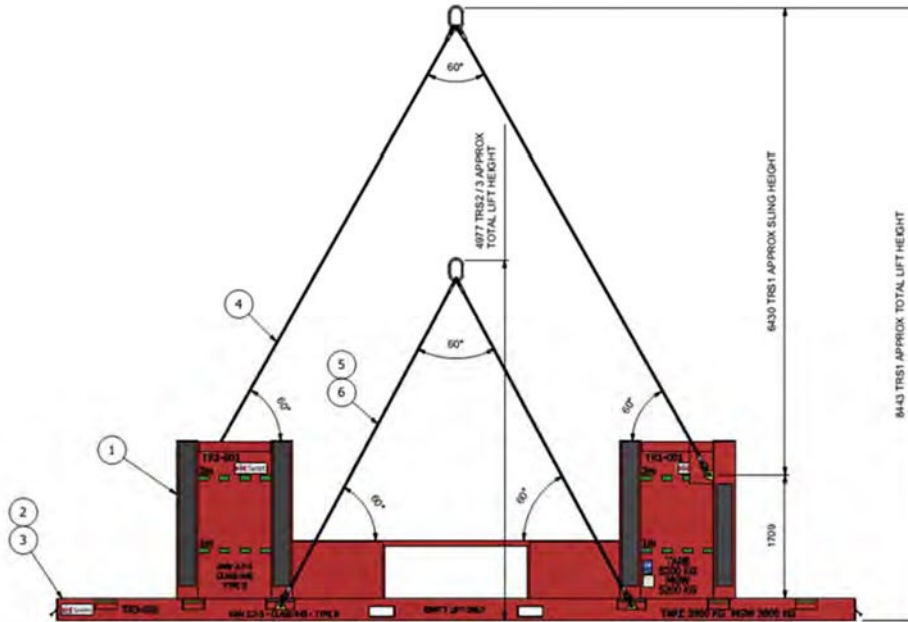
Complete rig up of the TRS



Walkway ramp and traverse braces

SKETCH DETAILING THE RIGGING UP AND LIFTING ACCESSORIES

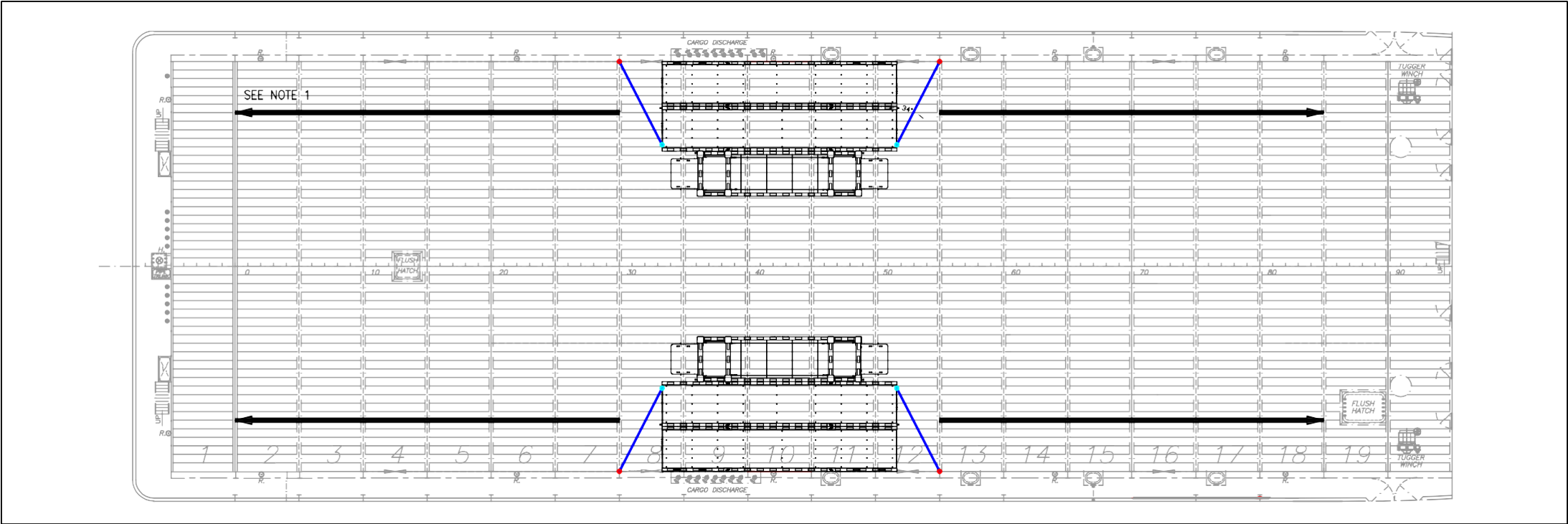
Slinging Arrangement



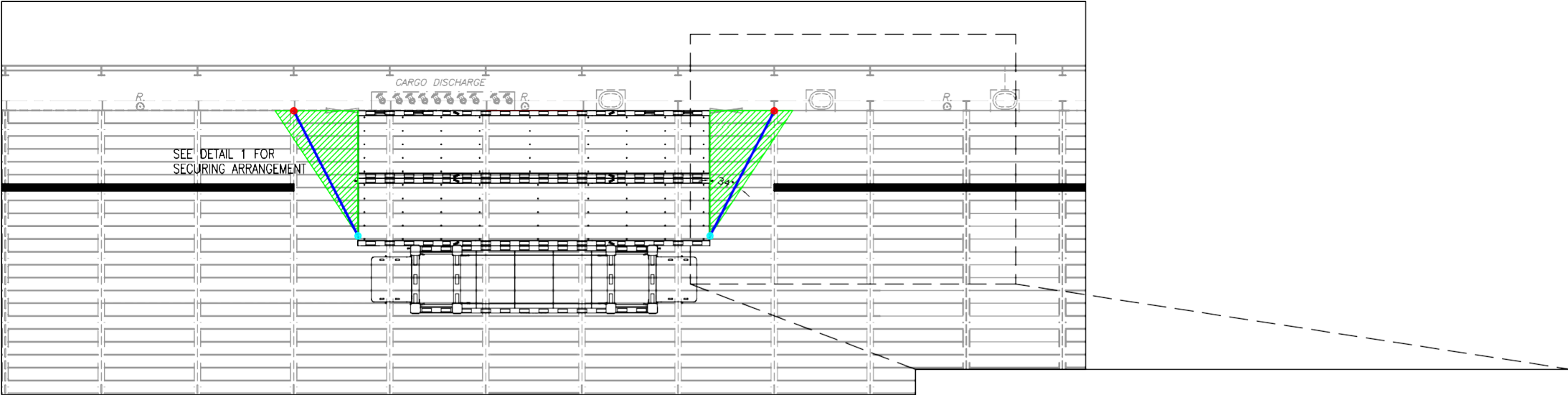
SKETCH DETAILING THE RIGGING UP AND LIFTING ACCESSORIES	

ISO Twist Locks fitted
on the locking block

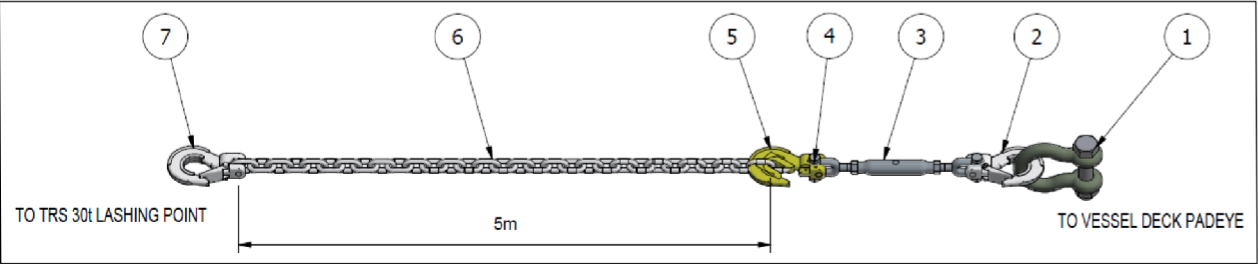
APPENDIX E SECURING METHOD 1 – SEAFASTENING ARRANGEMENT



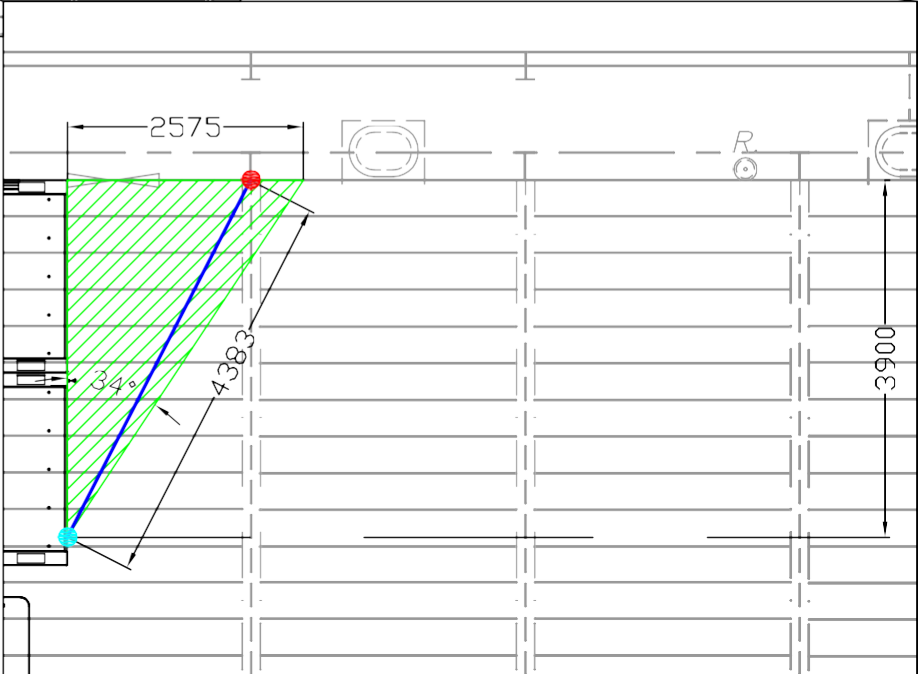
GENERAL DECK ARRANGEMENT



GENERAL SEAFASTENING ARRANGEMENT



DETAIL 1 – SECURING ARRANGEMENT



GENERAL SEAFASTENING DETAIL

Item	Description	Total Quantity	WLL (t)
1	Safety Pin Bow Shackle	2	17
2	20mm Eye Sling Hook	2	12.5
3	1¾" x 24" Jaw-Jaw Turnbuckle	2	12.7
4	20mm Connector	2	12.5
5	20mm Eye Grab Hook	2	12.5
6	Grade 100 Alloy Chain (5m)	2	14
7	20mm Clevis Sling Hook	2	12.5

- KEY
- SECURING ARRANGEMENT
 - 30t MSL VESSEL HARDPOINT
 - ALLOWABLE HARDPOINT AREA (SEE NOTE 2)
 - 30t MSL TRS HARDPOINT (MINIMUM)

- NOTES
- THE TRS SKID CAN BE POSITIONED ON THE PORT OR STARBOARD SIDE OF THE VESSEL AT ANY SUITABLE POINT ALONG CARGO RAIL.
 - THE HARDPOINT FOR SECURING CAN BE PLACED ANYWHERE IN THE GREEN HATCHED AREA AND THE TRS WILL HAVE SUFFICIENT LONGITUDINAL AND TRANSVERSE SECURING CAPACITY.
 - LENGTHS (mm) AND ANGLES (degrees) OF LASHING ARE TYPICAL.
 - THE SEAFASTENINGS SHOULD BE BALANCED FORE/AFT I.E. SYMETRICAL.
 - THE VERTICAL SECURING ANGLE SHOULD BE 0°. NO UPLIFT SHOULD BE GENERATED BY THE SEAFASTENINGS.

REV	DATE	DESCRIPTION	DRAWN	CHK'D	APPR'D

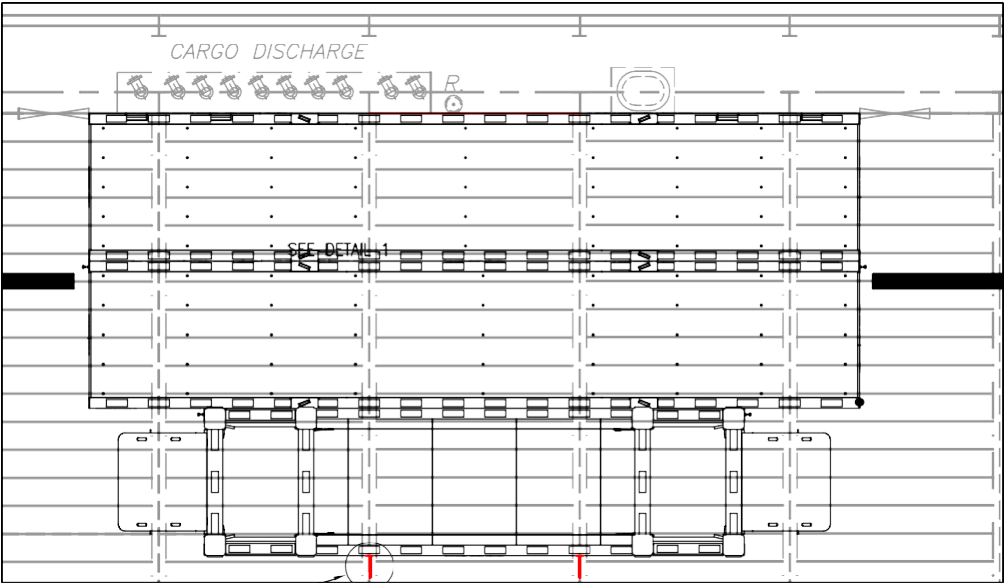


PROJECT: TRS OPERATING PROCEDURE					
DRAWING TITLE: TRS GENRAL SEAFASTENING – METHOD 1					
DRAWN: LC	CHECKED: AT	APPROVED: AT	ORIGINAL SIZE: A3	DATE: 27/02/26	SCALE: NTS
DRAWING NUMBER: TRS Lashing Layout				1 OF 1	REVISION: 1

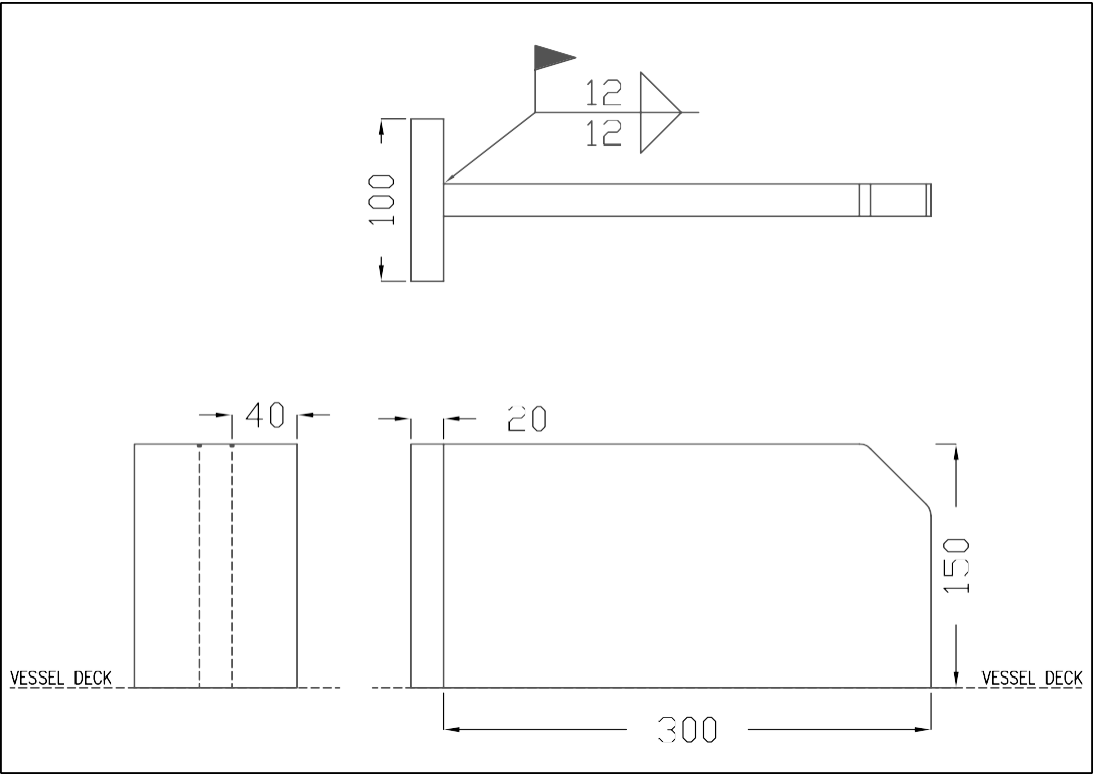
APPENDIX F SECURING METHOD 2 – SEAFASTENING ARRANGEMENT



GENERAL DECK ARRANGEMENT



GENERAL SEAFASTENING ARRANGEMENT



DETAIL 1: STOPPER GEOMETRY

SEAFASTENING ARRANGEMENT
TRS FRAME ◀ ▶ STOPPER WITH FACEPLATE (WELDED TO VESSEL TT-BAR)

SEAFASNTING EQUIPMENT LIST	
ITEM	QUANTITY
STOPPER (300mm x 150mm x 20mm)	2

KEY
STOPPER WITH FACEPLATE

- NOTES
1. THE TRS SKID CAN BE POSITIONED ON THE PORT OR STARBOARD SIDE OF THE VESSEL AT ANY SUITABLE POINT ALONG CARGO RAIL.
 2. LENGTHS (mm) AND ANGLES (degrees) OF LASHING ARE TYPICAL.
 3. THE SEAFASTENINGS SHOULD BE BALANCED FORE/AFT I.E. SYMETRICAL.
 4. THE VERTICAL SECURING ANGLE SHOULD BE 0°. NO UPLIFT SHOULD BE GENERATED BY THE SEAFASTENINGS.

REV	DATE	DESCRIPTION	DRAWN	CHK'D	APPR'D
THIS					

PROJECT: TRS OPERATING PROCEDURE

DRAWING TITLE: TRS GENRAL SEAFASTENING – METHOD 2

DRAWN: KR	CHECKED: LB	APPROVED: KR	ORIGINAL SIZE: A3	DATE: 12/09/17	SCALE: NTS
DRAWING NUMBER: MAC11279–DWG004				SHEET: 1 OF 1	REVISION: B

APPENDIX G SECURING METHOD 2 – STOPPER DESIGN

Stopper Seafastening System - 50T Load

This MathCAD sheet details the design of a stopper system to secure transverse seafastening loads.



- Input for calculations



- Output for calculation checks

Transverse Force
(maximum SF transport load)

$$F_T := 50\text{-tonne} \cdot g = 490.332\text{-kN}$$

Stopper Thickness

$$t_s := 20\text{-mm}$$

Stopper Length

$$L_s := 300\text{-mm}$$

Stopper Height

$$H_s := 150\text{-mm}$$

Number of Stoppers

$$No_s := 2$$

Force on Single Stopper
(including 20% additional
force for unsymetric loading)

$$F_s := \frac{1.20 \cdot F_T}{No_s} = 294.2\text{-kN}$$

Weld Leg

$$Leg_w := 12\text{-mm}$$

Weld Throat

$$t_w := \frac{Leg_w}{\sqrt{2}} = 8.485\text{-mm}$$

Number of Welds (per plate)

$$No_w := 2$$

Yield Stress of Steel

$$F_y := 235 \cdot \frac{N}{mm^2}$$

Impact Height of Force

$$H_{\text{impact}} := 100\text{-mm}$$

Allowable Stresses

Allowable Shear Stress:

$$\tau_{\text{allow}} := 0.4 \cdot F_y = 94 \cdot \frac{N}{mm^2}$$

Allowable Bending Stress:

$$\sigma_{b,\text{allow}} := 0.6 \cdot F_y = 141 \cdot \frac{N}{mm^2}$$

Allowable Combined Stress:

$$\tau\sigma_{\text{allow}} := 0.9 \cdot F_y = 211.5 \cdot \frac{N}{mm^2}$$

Calculation - Weld from Stopper to Deck for Single Plate

Area of Weld to Deck

$$A_w := t_w \cdot L_s \cdot N_o_w = 5091 \cdot \text{mm}^2$$

Modulus of Weld to Deck

$$Z_w := \frac{N_o_w \cdot t_w \cdot L_s^2}{6} = 254558 \cdot \text{mm}^3$$

Moment at Weld to Deck

$$M_w := F_s \cdot H_{\text{impact}} = 29419.95 \cdot \text{kN} \cdot \text{mm}$$

Shear Stress at Weld to Deck

$$\tau_w := \frac{F_s}{A_w} = 57.786 \cdot \frac{\text{N}}{\text{mm}^2}$$

Shear Utilisation at Weld to Deck

$$UR_{\tau_w} := \frac{\tau_w}{\tau_{\text{allow}}} = 0.61$$

Bending Stress at Weld to Deck

$$\sigma_w := \frac{M_w}{Z_w} = 115.572 \cdot \frac{\text{N}}{\text{mm}^2}$$

Bending Utilisation at Weld to Deck

$$UR_{\sigma_w} := \frac{\sigma_w}{\sigma_{b,\text{allow}}} = 0.82$$

Combined Stress at Weld to Deck

$$\tau_{\sigma_w} := \sqrt{3\tau_w^2 + \sigma_w^2} = 152.888 \cdot \frac{\text{N}}{\text{mm}^2}$$

Combined Utilisation at Weld to Deck

$$UR_w := \frac{\tau_{\sigma_w}}{\tau_{\sigma,\text{allow}}} = 0.723$$

Calculation - Stopper Plate to T-bar for Single Plate

Area of Stopper Plate at Deck

$$A_s := t_s \cdot L_s = 6000 \cdot \text{mm}^2$$

Modulus of Stopper Plate at Deck

$$Z_s := \frac{t_s \cdot L_s^2}{6} = 300000 \cdot \text{mm}^3$$

Moment at Stopper Plate at Deck

$$M_s := M_w = 29419.95 \cdot \text{kN} \cdot \text{mm}$$

Shear Stress of Stopper Plate at Deck

$$\tau_s := \frac{F_s}{A_s} = 49.033 \cdot \frac{\text{N}}{\text{mm}^2}$$

Shear Utilisation of Stopper Plate at Deck

$$UR_{\tau_s} := \frac{\tau_s}{\tau_{\text{allow}}} = 0.52$$

Bending Stress of Stopper Plate at Deck

$$\sigma_s := \frac{M_s}{Z_s} = 98.067 \cdot \frac{\text{N}}{\text{mm}^2}$$

Bending Utilisation of Stopper Plate at Deck

$$UR_{\sigma_s} := \frac{\sigma_s}{\sigma_{b,\text{allow}}} = 0.696$$

Combined Stress Stopper Plate at Deck

$$\tau\sigma_s := \sqrt{3\tau_s^2 + \sigma_s^2} = 129.73 \cdot \frac{\text{N}}{\text{mm}^2}$$

Combined Utilisation of Stopper Plate at Deck

$$UR_{\tau\sigma_{\text{wm.d}}} := \frac{\tau\sigma_s}{\tau\sigma_{\text{allow}}} = 0.61$$

APPENDIX H TRS PRE-USE INSPECTION CHECKLIST

TUBULAR RACK SYSTEM (TRS) PRE-USE

INSPECTION CHECKLIST PRE-LOADING CHECKS

	Checks	Yes	No	N/A
1	TRS units annual inspection is up to date. See Data Plate			
2	TRS lifting sling sets are free from damage or excessive corrosion.			
3	3No TRS lifting sling sets are safely stored inside TRS walkway.			
4	4No Loose supplied ISO twist lock connectors are in working condition and free from excessive corrosion.			
5	4No ISO twist lock connectors are secured in the locked (centre) position prior to loading tubulars.			
6	Seafastening equipment is installed in line with operating procedures and is free from damage or excessive corrosion.			
7	2No Nets are fitted and secured			
8	Sling poles (yellow bars) are straight and undamaged.			
9	Access ramps are down and free from damage or excessive corrosion.			

PRE REMOVAL CHECKS

	Checks	Yes	No	N/A
1	TRS units annual inspection is up to date. See Data Plate			
2	TRS lifting sling sets are free from damage or excessive corrosion.			
3	3No TRS lifting sling sets are correctly fitted including split pins.			
4	4No Loose supplied ISO twist lock connectors are stored in the TRS walkway			
5	Seafastening equipment is stored inside the TRS walkway			
6	Nets are fitted or stored inside the TRS walkway			
7	Access ramps are safely secured in the up position			
8	Units are free from any potential dropped objects.			

APPENDIX I GENERIC LIFT PLAN FOR TUBULARS

Lift Plan

Lift Plan No: Generic lift plan for routine and simple lifting operations

PART 1 of 2. LIFT PLAN TECHNICAL DETAIL

This is a controlled document; please ensure you complete the information requested. Do **not** attempt to alter formatting, amend text or headings in any section of the document. All text boxes will expand as necessary.

Guidance on Completing the Lift Plan:

1. Complete all boxes in every section of the lift plan. Where information requested does not apply to the lift being planned, state N/A (Not Applicable).
2. Where guidance notes have been provided, please ensure you read and understand these prior to completing that section of the plan.
3. When completing the plan, if in doubt, seek further guidance from the Lifting Focal Point and / or Lifting Technical Authority.

Note: Incorrect or incomplete information will result in the plan being rejected and delays in the authorisation and endorsement process.

1.1 LIFT PLAN DETAILS

Lift Plan Title:	Generic-Routine/ Simple lifting operations.		
Description of the Lifting Operation:	Operator managed quayside loading or discharge operations of cargo to from an offshore supply vessel. Cargo has previously been identified as being suitable for the shipment to or from an offshore installation in accordance with The UK Oil & Gas Cargo Handling Best Practice Requirement.		
Site Name:	Albert Quay (AQ)	Lift Location:	Various Berths
Lift Plan No:	Generic	Site Visit Conducted by:	Gary Bain
Risk Assessment No:	AOAQ012	Date Site Visit Conducted:	N/A
RA Attached for Review: Yes / No	Reviewed during Toolbox Talk	Photos / Drawing / Sketch attached: Yes / No	YES
Name of Plan Author:	G.Bain	Date Plan Created:	19/08/2016
Plan Author's Job Title:	LTA	Plan Revision No:	REV 0
Category of Lift:	Routine/Simple	Categorised by:	G.Bain

1.2 APPROVAL, AUTHORISATION AND REVIEW & ENDORSEMENT

Lift Category	Originator Lift Plan Author:		Authorisation Lifting Focal Point:		Review & Endorsement Lifting Technical Authority:	
Routine & Simple	Name:	Gary Bain	Name:	G.Bain	LTA Review / Audit	
	Signature:	<i>Gary Bain</i>	Signature:	<i>Gary Bain</i>		
	Date:	19/08/2016	Date:	19/08/2016		
Complicated Non-Routine	Name:		Name:		Name:	
	Signature:		Signature:		Signature:	
	Date:		Date:		Date:	
Complex Non-Routine	Name:		Name:		Name:	
	Signature:		Signature:		Signature:	
	Date:		Date:		Date:	

Lift Plan

Lift Plan No: Generic lift plan for routine and simple lifting operations

1.3 LIFT CATEGORISATION PROCESS					
Start at the top of the chart, Answer ALL THE QUESTIONS the first question that is answered "YES" will identify the category of the lift.		YES	NO	Category	
1	Will additional technical input be required (e.g. engineering input (uncertified steel etc.), engineering work pack, ground surveys, ground preparation etc.) during the planning stage for the lift?		N	Complex (Non-Routine)	
2	Are the load / lift characteristics unusual (e.g. non-returnable i.e. classed as demolition or decommissioning, heavier, more complex) than normally performed at this site or base?		N		
3	Does the lift involve overloading a structure and / or equipment (e.g. load testing) in order to clarify integrity?		N		
4	Does the lift involve lifting, lowering or the suspension of personnel (e.g. man riding, personnel transfer, personnel basket etc.)?		N		
5	Does the lifting appliance (e.g. mobile / crawler crane, telehandler / forklift with attachment, excavator etc.) have to travel or track with the load suspended?		N		
6	Is the load heavy (e.g. exceeding 25 tonne) and / or required to be conducted in a predefined area or on heavy lift pads with a known high ground bearing capacity?		N		
7	Has the load been identified as extremely valuable or irreplaceable and / or will the consequences of failure of equipment or procedure be significant to the site / company?		N		
8	Does the load require rotating, upending, overturned or tailing using two or more appliances (e.g. tandem lifting using two cranes or tandem lifting using portable hand operated appliances e.g. chain blocks etc.)?		N		
9	Will the load be lifted over or in close proximity to unprotected live plant, pipework or machinery?		N		
10	Will the crane (e.g. mobile, crawler, portal etc.) be used at or above 80% utilisation?		N		
11	Does the load have a large surface area that may be affected by wind and/or gusts?		N	Complicated (Non-Routine)	
12	Is the lift blind, conducted within a confined space, trench, excavation, or over an open quayside?		N		
13	Is the load fragile or the integrity of the load and / or any structure to which it is attached, for the purposes of lifting uncertain?		N		
14	Is the load unbalanced (e.g. centre of gravity unknown or not central to the load) and requires to be slung to compensate an offset centre of gravity? (e.g. may require several "trial lift's" with adjustment of the selected rigging to compensate)		N		
15	Does the load have a high centre of gravity, (e.g. CoG above the lifting/attachment points) or the potential to become unstable , due to its size and/or shape, during the lift?		N		
16	Will the load be lifted, cross hauled and / or restrained using two or more lifting appliances?		N		
17	Do you know the weight of the load to be lifted (vendor information, data plate, calculated etc.)?	Y		Routine & Simple	
18	Does the lifting operation appear to be straightforward (e.g. the load is pre-slung or very easy to sling)?	Y			
19	Have you performed the lift, or a lift of similar size, shape and weight before?	Y			
20	Is there a documented procedure (e.g. generic lift plan, work instruction etc.)?	Y			
21	Are you experienced with the plan / procedure and all the lifting equipment and / or gear to be used?	Y			
22	Is there a crane or certified steelwork (e.g. runway beam, pad eye etc.) directly above the load?	Y			
23	Is there ample headroom for the lifting appliances and slings?	Y			
24	Does the load have certified lifting points fitted (pad eyes, integrated lift points, eyebolts etc.) and if not, can slings be wrapped around easily (e.g. no sharp edges, the load is not fragile, etc.)?	Y			
25	Is the load balanced (e.g. centre of gravity known and central to the load) or fitted with special slings to compensate?	Y			
26	Is the lift stable (e.g. centre of gravity below the lift / attachment points)?	Y			
Category of Lifting Operation: (Please Mark with a capital X)					
Complex:			Complicated:		
			Routine / Simple:		X

Lift Plan

Lift Plan No: Generic lift plan for routine and simple lifting operations

1.4 DESCRIPTION OF LOAD				
Load Weight: [e.g. Kg]	Up to 25000kg		Load Dimensions: L x W x H	Various
Rigging Weight: [e.g. Kg]	HB =	1700Kg	Number of Rigging / Lift Points on the load:	Various
	RS =	NA		
	FJ =	NA		
	RW =	Included		
Total Weight to be Lifted: [e.g. Kg]	N/A		Offset Centre of Gravity: Yes / No	NO

1.5 CRANE – MOBILE, PORTAL, CRAWLER, TRUCK-MOUNTED, HIAB, ETC.		
Crane Manufacturer: (e.g. Model, Capacity. etc.)	Liebherr LHM 100	
Identification Number: (Certificate, Registration etc.)	140388	
Maximum Required Operating Radius:	10m-30m	
Crane(s) Capacity @ Maximum Operating Radius:	38000kg @ 10m 9200kg @ 30m	
Hook Block Weight:	1700Kg	
Stowed Fly-Jib weight @ maximum required radius:	NA	
Boom tip sheave (rooster sheave) weight:	NA	
Capacity / Radius charts attached (if applicable): YES / NO / N/A	NO	
Crane percentage utilization: (TW ÷ Crane capacity at maximum radius) x 100	Maximum of 80%	

1.6 GROUND CONDITION:				
Gross Weight Being Applied?	Crane weight plus load weight			Underground Services / Voids Identified: Yes / N/A
				YES
Load Spreading:	No of Mats	Mats Area	Total Area	Any Environmental Effect, e.g. waterlog (High Water Table):
Actual Size of Load Mats to be used: (e.g. 2.5m x 2.5m etc.)	4	5.5 x 1.0 =5.5m ²	22m ²	
Applied Bearing Pressure:	Not exceeding 50000Kg/m ² Total weight x 0.75 Divided by the area of 1 x mat			Allowable Ground Bearing Pressure:
				50000Kg/m ²

Lift Plan

Lift Plan No: Generic lift plan for routine and simple lifting operations

1.7 PICKUP, ROUTE TO BE TRAVELLED, LAYDOWN:				
Load Pickup location?	Quayside/Vessel deck		Load Laydown location?	Quayside/Vessel deck
Load path identified as clear of obstructions? Yes / No	Yes	If No, list all obstructions in the load path:		
Will the load be travelled over or in close proximity live plant, pipework or machinery? Yes / No	No	If "Yes" Has this been addressed in the Risk Assessment? Yes / N/A		
		Has a "contingency plan" been generated and / or communicated? Yes / N/A		
Has laydown location been clarified as suitable to accept a load of this size and shape? Yes / No	Yes	Are Site Plans, Deck plans, Drawing's etc. Attached?	N/A	
Has the capacity of the laydown location been assessed as suitable to accept a load of this weight? Yes / No	Yes	Are Ground bearing pressure, Deck capacity plan etc.?	N/A	

1.8 SIMULTANEOUS OPERATIONS:	
Have simultaneous operations been identified adjacent to lift area? Yes / No / NA	YES
How have these been communicated / controlled?	TOOLBOX TALK
Have simultaneous operations been identified within lift area? Yes / No / NA	YES
How have these been communicated / controlled?	TOOLBOX TALK

1.9 COMMUNICATION METHOD:							
Hand Signals:		Radio:		Verbal:		Combination:	X
Notes: Primary means of communicating with the crane operator is hand signals							
Secondary means of communicating with the crane operator is radio							
The method being used MUST be confirmed / discussed during the toolbox talk							

Lift Plan

Lift Plan No: Generic lift plan for routine and simple lifting operations

PART 2 of 2. WORKFORCE SITE SECTION

Lift Plan Title:	Generic-Routine/ Simple lifting operations.	Lift Plan No:	Generic
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2.1 MANPOWER REQUIREMENTS: (Number of personnel required to conduct the lifting operation)

Supervisor / PA etc.:	1	Crane Operator(s):	1	Banksman / Signalman:	2	Rigger(s) / Slinger(s):	3
Additional Personnel Required? (Vendors, Labourer / Helper etc.) YES / NO					As required	Total Numbers:	7

2.2 RIGGING EQUIPMENT AND MATERIALS LISTS

	Item Quantity	SWL / WLL [kg]	Item Weight [kg]	Total Weight [kg]
Brief description of the component / load to be rigged (drawing number reference):				
All loads are pre slung, with rigging weights included				Included
(To be included in Section 1.4) Rigging Weight: [kg]				
Brief description of the component / load to be rigged (drawing number reference):				
(To be included in Section 1.4) Rigging Weight: [kg]				

Lift Plan

Lift Plan No: Generic lift plan for routine and simple lifting operations

2.3 METHOD STATEMENT: (Step by Step Procedure)

1. Develop, review, and accept Permit-to-Work (if required) for lifting operation.
2. Barrier off or police area where lifting operation shall occur as required.
3. Conduct toolbox / live safe conversation.
4. Conduct pre-use inspection on all rigging equipment to be used in operation.
5. The lift types and weights must be identified to the crane operator prior to lifting, ensuring his agreement on the suitability of the crane and its position in relation to the lift weight, lift radius, and pick up and lay down areas.
6. Banksman to check that all fastenings between the loads and transport trailers have been removed and that the driver is in his appointed safe area i.e. Safe Haven, before performing the lift.
7. Tag lines to be attached where required but should not be attached directly to the lifting slings if possible.
8. Banksman to direct the crane hook to nearby the load lifting slings.
9. Banksman to instruct cargo handlers to connect the load lifting slings to the crane hook.
10. Banksman to direct the crane hook to its position directly above load centre.
11. Banksman to instruct the crane operator to raise the hook slowly and take up the tension.
12. Banksman to check slings and shackles for any possible kinks or twists adjust as required.
13. Banksman to instruct the crane operator to raise the load slowly until approximately 200mm clear of the trailer or ground and stop.
14. Banksman will check that the lift is level i.e. <6" over 20ft, and check that the load is stable and will not snag on any adjacent containers or obstacles.
15. The Banksman will then instruct the crane operator to lift the load fully and through the agreed lift path to the lay down area.

AT THIS POINT, THE BANKSMAN MAY INSTRUCT THE CRANE OPERATOR TO TAKE DIRECTIONS FROM A SECOND PREVIOUSLY AGREED AND APPOINTED BANKSMAN IN CONTROL OF THE LAY DOWN.

16. Banksman to direct load to the lay down area.
17. Load is to be lowered slowly to its lay down area, and handling position of below the waist height of the handler.
18. Slinger / load handler to assist with the positioning of the load where required, using tag lines if attached or handling poles. They must not approach or handle the load until it is stable and below his waist height.
19. Load to be lowered slowly into position, once landed the slinger / load handler should retreated slightly from the lifts until the crane hook can be lowered to a safe handling position for the release of the lifting slings.

Lift Plan

Lift Plan No: Generic lift plan for routine and simple lifting operations

20. The Banksman will monitor the release of the hook from the slings, and on completion will instruct and monitor the lifting of the crane hook clear of the load, once the hook is free from possible snags and in full view of the crane operator are his duties complete for that operation.
21. Perform post-use inspection of all rigging equipment used, if no defects detected return to storage / loft area
22. Perform housekeeping where lifting operation has occurred.
23. Remove barriers.
24. Ensure completion of debrief, comments and lessons learned section at end of plan/live safe conversation.

Load handling guidance

OFFSHORE CONTAINERS, PORTABLE TANKS, FABRICATED STRUCTURES & PRE-SLUNG DRILLING TUBULAR

1. The lift is of a standard design and built and certified to: BS7072. EN12079. DNV 2.7-1, DNV 2.7-3 and supplied with their own dedicated wire rope sling assemblies attached.
2. The lift has been pre-checked and certified as fit for use by a competent person and has a minimum of 30 days certification prior to expiry.
3. The lift weight is known or can be simply established prior to the lift being conducted, i.e. where the lift is a CCU it is clearly marked with its "maximum gross weight" allowable.
4. The lift is fitted with welded fabricated pad eyes, suitable for the attachment of purpose built sling set connected by safety type shackle, such slings being permanently attached to the container and considered to be part of the container / lift.
5. The slinging arrangement terminates in a single point master link, suitable in size (270mm) for the direct attachment to a crane hook or pennant.
6. The unit is fitted with the appropriate offshore data plate.

TUBULAR STEEL CASING AND DRILL PIPE

1. The lift weight is known, or can be simply established.
2. Pre-use examination of the lifting slings is conducted to include (SWL, test date, correct fitment, and possible damage)
3. Item is slung using two slings of the same length and SWL
4. The manufacturers SWL stamped on each sling fitted, is equal to or greater than the total gross weight of the load.
5. Tubulars >5.5" diameter must be bundled in odd numbers to prevent roll over.
6. The slings are fitted double wrapped, choked, with bulldog and ty-wrapped applied.
7. The sling position should be approximately 25% in from each end.
8. The sling wire diameter used should be greater than 13mm, (i.e. 2te) and when lifted the angles must not to exceed 90°

LIFTING APPLIANCE & ACCESSORIES

1. The crane and the lifting accessories selected are certified, and a visually pre-examined is conducted before their use.

Lift Plan

Lift Plan No: Generic lift plan for routine and simple lifting operations

2. The selection of the crane has been agreed with the crane operator as being suitable for the weight of the load to be lifted, the lift height, and the maximum radius required for the task.
3. The lift path has been agreed and conveyed to all involved in the lifting operation.
4. The lift path is free from obstruction and will remain free from obstruction, personnel, and vehicles during a lifting operation.
5. The landing area is suitable for the lift dimensions and weight and is within the crane working radius for that weight.
6. The environmental conditions are suitable for the task and will not impact on the safe operation of the task.

**“IN AN EMERGENCY”
A COMMONLY RECOGNISED STOP SIGNAL MAY BE GIVEN BY ANY PERSON
OBSERVING A SITUATION LEADING TO DANGER, AND THE CRANE OPERATOR
SHOULD RESPOND TO THAT SIGNAL.**

LIFTING OPERATIONS PERSONNEL DUTIES

Charge Hand / Boat Foreman

- The competent person in charge of the lifting operation must be familiar with all the relevant parts and content of this lift plan and any associated risk assessments conducted and their suitability and validity within the location where the lifting operation is being performed.
- The competent person in charge must with the assistance of the contents of this plan and any associated assessments of risk or hazard, assess the lifting operation to be conducted, and agree that the crane, the lifting accessories, and personnel selected, are all suitable for the task to be performed.
- Ensure an adequate inspection/examination of the cargo and the lifting equipment to be used has been performed by a competent person prior to each lift.
- Ensure defects and or incidents are reported immediately, and any necessary corrective action is implemented.
- The person in charge must ensure that all members of the lifting team have safe access and egress during the lifting operation, and that that access is maintained throughout.
- Take responsibility for the organisation and control of the lifting operation and the safe use of the equipment.
- Ensure all members of the lifting operation, are fully briefed on the contents of this lifting operation method.
- The Person in Charge must have the necessary authority for the performance of all these duties and in-particular the authority to stop the operation whenever they consider that danger is likely to arise if the lifting operation was to continue.

Crane Operator

Lift Plan

Lift Plan No: Generic lift plan for routine and simple lifting operations

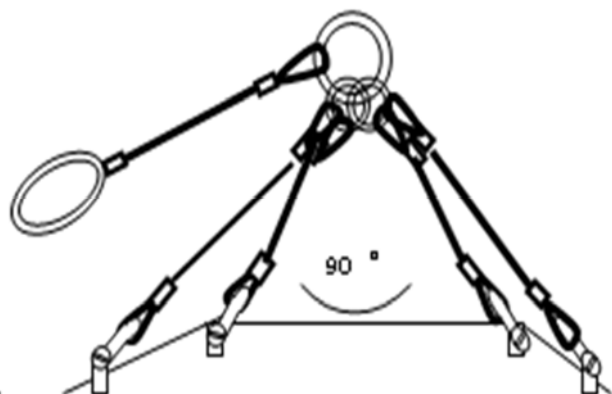
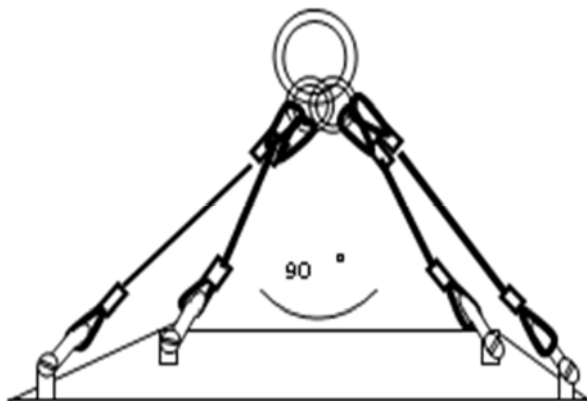
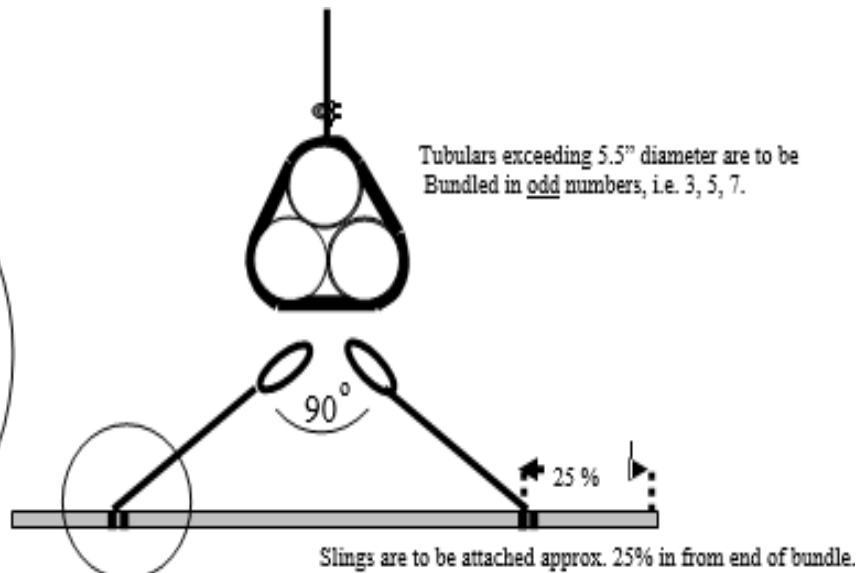
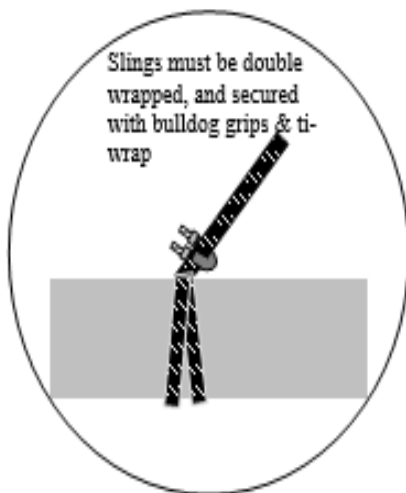
The crane operator is responsible for the correct and safe positioning and operation of the crane in accordance with the manufacturer's instructions and the pre-agreed safe system of work.
The crane operator will only respond to the signals given from the pre- identified banks man / signaller controlling the load. Unless in the case of an emergency.
<u>Banksman / Signaller</u>
The banks man / signaller are responsible for relaying signals to the crane Operator, and must be easily identifiable "visually" to the crane operator and others i.e. by way of a pre-agreed high visibility orange hard hat or an agreed equivalent.
During a lifting operation where the responsibility for directing the crane and load is transferred from one banksman to another the signaller must clearly indicate to the crane operator when the responsibility is being transferred and to whom.
<u>Cargo Handler / Slingers</u>
The slingers / load handler, are under the direction of the banksman responsible for attaching and detaching the load from the crane, ensuring the correct and safe body positioning and manual handling methods are performed and maintained at all times.

**HAVE YOU COMPLETED SECTION 2.5?
FINAL CHECKS BEFORE LIFTING**

Lift Plan

Lift Plan No: Generic lift plan for routine and simple lifting operations

2.4 DRAWINGS, SKETCHES, TECHNICAL DRAWING:



Lift Plan

Lift Plan No: Generic lift plan for routine and simple lifting operations

OFFSHORE CONTAINER

Name of manufacturer:

XXXXXXXXXXXXXXXXXX

Month/year of manufacture:

XXXX

Identification No:

XXXXXXXXXX

Maximum gross mass:

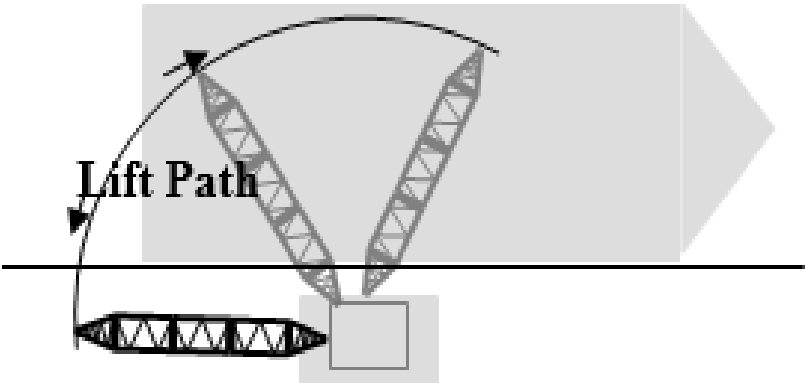
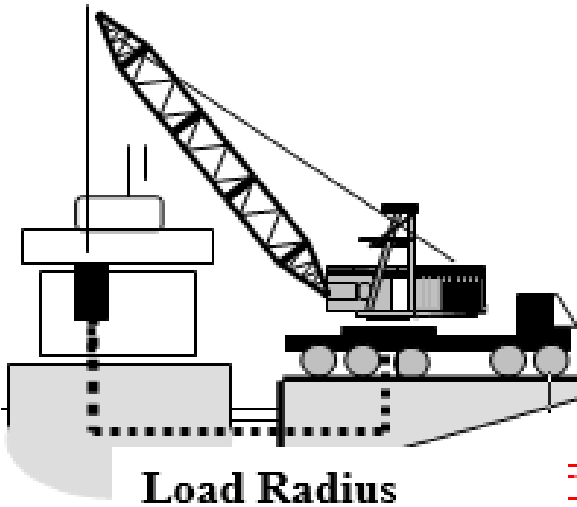
XXXXXXXXXX Kg

Tare-mass:

XXXXXXXXXX Kg

Payload:

XXXXXXXXXX Kg



Lift Plan

Lift Plan No: Generic lift plan for routine and simple lifting operations

2.5 FINAL CHECKS BEFORE LIFTING: To be completed by competent person (See Note 1 of section 2.6 Guidance Notes)

2.5.1: Have all personnel received training (awareness etc. been checked and validated? YES / NO (See note 2 below)

2.5.2: Have all required toolbox conversation(s) been completed for this task: YES / NO

2.5.3: Have the crane daily checklist been completed? (if applicable): YES / NO / N/A

2.5.4: Have pre-use inspections of all lifting equipment been conducted? YES / NO (See note 3 below)

2.5.5: Have you rigged the task as per this plan's sketch and materials list? (See note 4 below)

2.5.6: Has the load been checked for loose or dropped objects and is free to be lifted (e.g. sea fastening released, hold down bolts / lashings removed, not jammed etc.): YES / NO

2.5.7: Is the wind speed at or below the site and / or equipment requirement?: YES / NO (See note 5 below)

2.5.8: Will the task you are about to conduct be affected by simultaneous operations? (See note 6 below)

2.5.9: Working at height, PPE, Rescue plan in place: YES / NO (See note 7 below)

2.5.10: If tag lines are required, are all team members aware of their correct use? (See note 8 below)

2.6 ADDITIONAL TECHNICAL INFORMATION: (e.g. Drawings, Sketches, Manuals, Load Charts etc.)

2.7 DEBRIEF / LESSONS LEARNED

Note: Once the lift has been safely completed, please note any problems encountered and how they were overcome, also any suggestions for doing the lift more efficiently and/or safely in the future. **(Routine, Simple Lifts Only)**