

Appendix 10-C

Bulk Hose Management, Handling & Connection Guidance

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Revision History

Revision Number	Date	Section	Changes
1	December 2022	All	Appendix title changed to better reflect contents
			Combined and simplified version of appendices 10-C and 10-D as new revision 10-C
			Removed references to Integra and Step Change in Safety
			Revised table showing flotation collar colours and diameters
			Remove redundant Bunker Checklist
			Remove weekly checklist
			Remove references to NWEA and replace with GOMO
			Previous section on "Vessel Approaching Location" removed as this is adequately covered elsewhere in GOMO

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1 Introduction

1.1 Background

This appendix provides guidance for safely managing bulk hose systems and creates a common practice throughout the industry. Information on good working practices involving bulk hose systems has been collated and the following guidelines indicate good practices which will reduce the number of hose failure incidents in the industry and the resulting exposure to the environment.

1.2 Environmental Issues

Hose related incidents account for 21% of spills to the sea. The most common bulk hose failures are due to abrasion to the outer cover of the hoses rubbing on the installation structures, resulting in leakage from the hose string. The wear on the hose is accelerated when the hose radius exceeds the recommended minimum bend radius criteria, causing premature failure. Both examples can cause the hose to leak into the sea if not controlled by a robust hose management system. All environmentally sensitive products should have suitable hose connections or similar self-sealing connections on the hose end.

2 General Requirements

The following recommendations apply to any hose which carries products, including those that are harmful to the environment if containment is lost.

Hose manufacturers recommend that a bulk hose should be changed out approximately every two years due to internal fatigue to the hose layers. This is based on information taken from previous incidents on installations. When the hose is not in use, an end cap, commonly known as a blank, should be used on the connection that marries the hose to the vessel manifold. Where possible, protect the hose ends with a waterproof cover preventing contamination, corrosion or damage to the hose connection

Hose strings suspended from the installation should be suspended well clear of the sea and restrained to the installation, minimising movement and abrasion to the hoses' outer cover and preventing the waves from twisting the hoses. Any points where the hose may contact part of the installation structures should be covered with a form of protection. Floatation collars can be used or alternatively, sections of redundant hose can be fitted to the structures at impact abrasion points. Floatation collars should be used either side of the hose couplings to prevent the coupling damaging an adjacent hose in the hang-off points (fingers).

To prevent excessive load on a suspended hose string, the hose should be drained back to the vessel or installation once offloading is completed. Hoses should be suspended from sound structures or certified lifting/hang-off points on the installation to prevent kinking in the hose string. If required, the Lifting Operations Lifting Equipment Regulations (LOLER) competent person or equivalent, or structural engineer, should be consulted for guidance. Hoses should never be suspended or supported by wire slings as they may cut into the hose and damage the hose structure. The LOLER competent person should be consulted for selection of correctly certified and appropriate slings.

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When replacing a length of hose in a string, the string must be brought in board and barriers erected round the hose indicating no unauthorised entry during the replacement of the hose and/or floatation collars. Once a hammer lug union is installed and tightened, it should be marked across both faces with paint or similar permanent marker to monitor the fitting is continually taut and fit for purpose.

Care should be taken when using cutting tools to remove packaging from a new hose. It is imperative that no damage comes to the hose section during unpacking.

The hose string should be visually inspected for damage prior to commencing any offloading operations, using the list below as a minimum check:

- Leaks at the hose fitting or in the hose make-up
- Damaged, cut or abraded covers
- Exposure of reinforcement wires from the hose material
- Signs of kinked, cracked, crushed, flattened or twisted areas in the hose sections
- Hose ends degraded, pitted or badly corroded at the fittings
- Ensure sufficient numbers of floatation collars are on the hose string
- On completion of bunkering operations, the hose should be re-examined for any damage that may have occurred during the transfer operation

3 Installation Procedures

Documents should be in place clearly specifying how the site will control the maintenance and inspection of all bunkering hose strings and associated equipment, i.e., lifting equipment and support mountings. This document should be approved by the relevant Technical Department and entered into their pertinent system for review as per the Company Procedures. The appointed system owner is responsible for ensuring all relevant persons are aware of and understand the procedure. It is recommended that this is confirmed by frequent lifting equipment audits carried out by a competent/responsible person.

3.1 Recommended Content of Procedures

- The system owner should indicate who is responsible for ensuring the procedure is being adhered to and act as focal point on all matters relating to bulk hoses maintenance and inspection.
- On locations where bunkering of drilling products takes place, an interface should exist with the Drilling Department and Operations Departments where responsibilities are clearly defined, documented, and agreed, i.e., who is responsible for inspection and change-out of drilling product hose assemblies. The role of Service Team Leaders, Barge Engineers or Deck Supervisors should be considered for System Owner positions.
- Hose manufacturers guidance on the life span of in-service hoses before mandatory change-out is required. Identify the time periods between physical and visual inspections

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including pre and post use checks of the equipment. This decision is addressed with relevant parties such as Suppliers and Company Technical Authorities. An Electronic Maintenance System (EMS) would be ideal to populate/generate change-out dates and inspection dates, and guidance on the required documents, e.g., Permits to Work, Control of Substances Hazardous to Health (COSHH) and Method Statements to carry out the work scope safely. On completion of any parts being changed-out, documents and identification (ID) of equipment must be updated in the hose register. In the case of replacement hose assemblies already stored offshore, a guidance note on the correct procedure of storage and shelf life should be obtained from suppliers.

- To assist in the managing, ordering and replacement of bulk hose equipment, drawings which may be electronic or hard copy, consisting of the following, would ensure the correct parts are ordered and installed at all times:
 - The correct hose lifters (hooky hooks) and their SWL
 - The type of delivery coupling, be it self-sealing or hammer lug unions
 - The correct type and quantity of floatation aids / collars and their positions in relation to the string and joining couplings
 - Describe the type and SWL of the hose lifting assembly used for transferring the hose string during operations
 - In the case of strings being made up from both hard and soft wall sections their chosen positions should be identified in the drawings
 - Identify all components by part numbers

Method Statements, Lifting Plans and Risk Assessments must be in place and available for the work party. The System Owner and work party should review these documents before use; however, if, on completion of the task, lessons were learned, the documents should be updated accordingly by identifying the changes in the procedures.

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Bad Practices

The hose should be suspended avoiding sharp bends and protrusions when in the hang-off position.



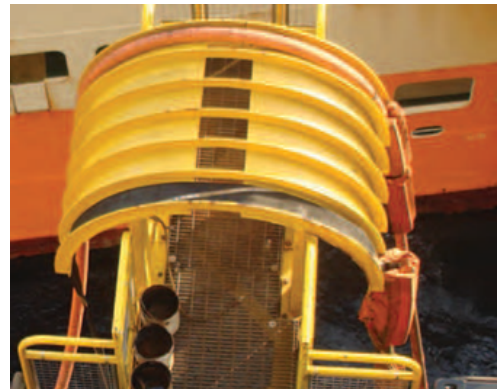
Good Practice

There are alternative systems available such as portable saddles which support the arc of a hose when in storage. The structure from which the hose is to be suspended must be surveyed by a competent person to ensure the hang-off point is of sound structure.



Portable Saddles

Permanent structure, used to support bulk hoses and forms a perfect arc, enhancing the life span of the hose.



4 Transfer Hoses

Due to the increased manual handling risks associated with hard wall hoses, it is recommended that the first and second section of the hose suspended from the installation manifold should be hard walled, and the last section which is offered to the vessel to be of soft wall type.

4.1 Hose Components and Construction

All new hose sections are hydro tested to at least 1½ times their working pressure.

A water hose is made from orange coloured, soft, reinforced rubber with the cover being made of ethylene propylene diene-terpolymer (EPDM). Hose reinforcement is provided by multiple layers of rot-proof synthetic textile yarn. The central core/tube is made from non-toxic and non-tainting rubber. The cover is abrasion and weather resistant, and care should be taken when handling and stowing. It should be noted that new floating hoses are also coloured orange and these hoses can carry a range of products.

A fuel hose is heavy and commonly soft wall type but can be of hard wall construction. The outer wall is made of black oil resistant neoprene synthetic rubber and is reinforced with synthetic textile yarn with antistatic copper wire. It has a black nitrile tube. The outer cover on this hose is susceptible to mechanical damage. The hose carries a brown lazy spiral stripe for identification.

4.2 Hose String

A hose string can be made up of 3 or 4 lengths of 15.2mtr, 16.3mtr or 18.3mtr lengths of hose joined together by quick release self-sealing couplings (hammer unions). The hose comes complete with a hose lifting assembly that consists of a hooky hook, lifting sling not less than 2 metres in length and a safety pin shackle. A “split pin” must be used to secure the nut and not an “R” clip. “R” clips can spring off the pin affecting the security of the shackle.

The final hose string length will depend on the installation needs and the elevation of the manifold. There is no requirement to have the first section of bulk hose leading from the manifold and not coming into contact with water, to be of the floating type.

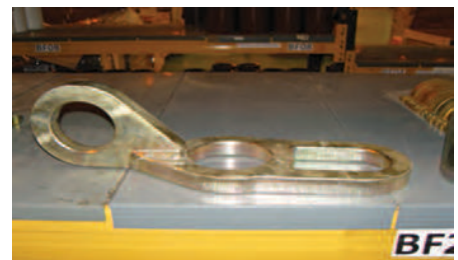
A typical hose string of 3 lengths would be:

Length 1: Hard wall

Length 2: Floating hose (preferred)

Length 3: Soft wall (outboard/vessel end)

When ordering new hose sections, stipulate the direction of the lifting eye, as the hooky hook can be installed on the hose with the lifting eye facing up or down on the hose. If the hose is stored in a support frame, then the eye in the hooky hook should be facing upwards; If using any other type of hose support, then the eye on the lifter can be either way on the hose. **Hose Lifter** (Commonly known as **hooky hook**)



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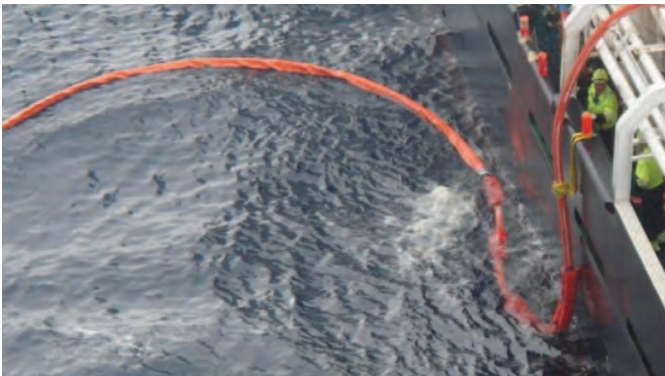
4.3 Bulk Hose Floatation

4.3.1 Floatation Collars

The hose should be fitted with the correct number of floatation collars to prevent the string sinking and being drawn into the supply vessel's thrusters. The floatation collars can also be used to help form a barrier between the hose and installation structure by simply adjusting the collar straps on the hose. Reflective floatation collars have an advantage when bulk is being transferred to an installation in the hours of darkness as the crew can see the hose is floating freely rather than being too close to the vessel side thrusters.



4.3.2 Floating Hoses



Sections of hose strings with integral buoyancy are also available and eliminate the need for floatation aids to be used.

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4.3.3 Recommended Floatation Collars for Bulk Hose Strings

Hose Application	Hose Diameter	Floats per Section
Potable Water	3"	4
	4"	4
Oil Based Mud	3"	9
	4"	10
Dry Cement	4"	7
	5"	8
Diesel Fuel	3"	4
	5"	4
Dry Barite	4"	10
	5"	13
Methanol	2"	4
	3"	4
Drill Water	4"	4

Table 1

The above information is a recommended good practice for number of floatation collars on hose sections that will be in the sea. A collar either side of any coupling that is in the water during bunkering operations is also advised.

Trials of "floating type" bulk hoses have been carried out extensively and these have proven to be very successful, with positive feedback from all concerned platform and supply vessel personnel.

4.4 New Hose Storage

Hoses delivered to the installation are normally shrink wrapped and rolled up with one end of the connection in the middle of the roll. It is preferable to store these hoses flat, out of sunlight and free from water ingress. Ultraviolet radiation and kinking during storage may shorten the life span of the hose. Manufacturers' recommendations on hose storage should be available for crews to ensure optimum methods of use to prolong hose life.

4.5 Replacing Sections of Hoses in a String

Only competent personnel should carry out the installation of hoses and connections when joining hammer lug unions. When repairing a hose string, the hose should be landed instead of left hanging from a crane hoist line. When replacing a section of hose, it should be inserted in the coupling and secured whilst free from tension.

Once the necessary controls such as permit, method statement and risk assessments are in place, remove and replace the worn parts of the string. When hammer lug unions are disturbed, the unions should be tightened up and marked across the body with paint or a similar permanent marking. This is a simple way to ensure that the coupling has not slackened off due to movement whilst in service.

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On completion of hose installation, the hammer lug union should be checked to ensure the marks across the coupled joint confirm security. If possible, pressure test the hose string to 5 bar and check the assembly is free of leaks over a 5-minute period. Check the correct quantity of lace up or similar types of floatation collars are on the hoses in accordance with Table 1 in section 4.3.3.

Note: Trials of “floating type” bulk hoses have proven to be very successful, with positive feedback received from both platform and supply vessel personnel.

4.6 Weekly Inspections

- A regular inspection Planned Maintenance Routine / Work Order signifies a competent person has assessed the hose and lifting equipment and that it is in good working order. This person records the findings electronically in a controlled register. This system indicates to any 3rd party auditors that a sound maintenance strategy is in place to manage bulk hose assemblies.
- Ensure all lifting slings, shackles and hooky hooks are in good condition and display current lifting colour codes.
- Check the hose for any physical damage for chafing, cuts, blisters, splitting, perishing, lacerations or other forms of deterioration.
- Renew any damaged hoses in the string and, where minor damage is evident, record details on the check sheet.
- Check that markings across the hammer lug union line up correctly, as this indicates the fitting is tight on the coupling.
- Check hoses are protected from platform structure and stowed properly in hang-off points.
- Check that hang-off point structures shows no sign of deflection or excessive corrosion.
- Consider inspecting hoses inboard once per trip as there are blind spots on the installation structure that restrict visual inspections.
- Ensure the under-deck lighting on the installation is operational at valve manifolds.
- Check gates on the bunkering station hang-off points (fingers) are lubricated and easy to open and close.

A record of visual and routine inspections should be available for history and evidence of hose checks.

STORMS

A visual inspection should be carried out to confirm hoses show no signs of physical damage. Examples would be chafing, splitting, perishing or any other form of deterioration. It is not uncommon for hoses to become twisted around each other if they were not far enough out of the water when exposed to severe weather, making it an operationally difficult when realigning the bulk hoses.

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4.7 Visual Inspection Pre and Post use

A visual inspection must be carried out prior to and after vessel operations. The following checks should be carried out as a minimum:

- Correct colour coded hooky hooks, slings and shackles with proper split pins are attached to the hose. Hoses must show no signs of physical damage to fabric by chafing, splitting, perishing, blistering, deep lacerations or any other forms of deterioration.
- Check installation manifold couplings are tight and ready for operation.
- When using certain types of hose fittings, remove the end screw dust cap before lowering the hose to the vessel, and, on return to the installation, replace the dust cap and check it is secured to an anchor point.
- Check gates on the bunkering station hang-off points (fingers) are maintained, lubricated and easy to open and close.

The preferred way to visually check a hose is from a safe location at the hose station while directing the crane operator to slowly raise the hose, allowing the hose to be inspected for wear.

Never allow the hose to be lifted close to the crane hoist rope safety cut-out. A similar method can be used to check the hose for damage when returning the hose to its hang-off point.

Note: Avoid lifting the hose immediately over the head of the person doing the inspection.

5 General Platform Alarm (GPA)

If the installation goes to a GPA status, then bunkering operations must cease. The supply vessel's Captain and crane operator must be notified immediately of the GPA and company specific procedures are then followed before reporting to their muster station.

6 Pollution Safety

During fuelling operations, there is always the risk of pollution. This may be due to hose and/or instrument leaks, hose wear, mechanical breakdown or as a result of a hose becoming fouled in the vessel's propulsion. It is important that an individual is appointed to visually and operationally check the hose remains functional during bunkering operations.

If an oil sheen is detected on the surface of the water, bunkering operations must cease immediately. The incident must be reported to the installation control room and the cause investigated.

7 Bulk Transfer Operations at Installation

During bulk hose operations, the following should be observed:

- The vessel Master, crane operator and deck crews to confirm radio communication prior to operations.

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- The person appointed to supervise the bunkering process must ensure they can see the bulk hose(s) at all times, and that they are familiar with the alignment of valves and tank levels. They should not allow other distractions during the operation.
- The installation dry bulk vent line positions are identified.
- The vessel bridge, or equivalent, and OIM/Barge Master, or equivalent, should confirm quantities discharged and received at regular intervals, to ensure that there are no leaks within the respective systems.
- The vessel deck crew and installation crane operator must be readily available and close at hand throughout any transfer operation.
- Sufficient warning/instructions shall be given by each party prior to changing over the tanks.
- If, at any stage, in the operation the vessel Master or provider is in any doubt as to the integrity of the operation, then that operation shall be suspended until integrity can be reinstated.
- When pumping is finished, both the receiver and provider shall set their line to allow the hose to be drained back to the vessel's tank. In suitable conditions, the crane may also be used to lift the hose to aid draining. In the case of dry bulk, purge air should be used to empty the hose and clear the line.
- Hoses used for potable water must not be used for transferring other bulk liquids. Potable water lines should be flushed through prior to transferring water to avoid any residues within the lines contaminating the installation's supplies.
- During periods of darkness, adequate lighting must be available over the hose and support vessel throughout the operation.
- To identify hoses, they may be fitted with hi-vis bands, tape or alternative means.
- Hoses are normally colour coded for manufacturers' identification and approval, frequently by way of spiral coloured bands within the hose structure. Ensure the management system is aware of the markings on the hoses.
- The manufacturers' colour coding of the hose should not be confused; any markings on receivers or structure should adopt the universal colour coding as described in Appendix 10-E to identify bulk hose products.
- All bulk hoses used offshore are to be of sufficient length and good condition; unapproved repairs shall not be carried out, and, in the interests of safety, the hose should be disposed of immediately.
- In the event that the crane operator has to leave their cab, they shall inform the Master of the vessel. See 10.10 for further guidance
- Any bulk hose should be disconnected from the vessel as soon as possible after the bunkering has been completed and retrieved to the platform, unless otherwise agreed by the Master of the vessel.

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Vessel should ensure that:

- All pollution prevention equipment is in place as per vessel's Shipboard Oil Pollution Emergency Plans (SOPEP).
- If a connection other than a self-sealing quick release coupling is used, particular care must be exercised when disconnecting the load hose and a drip tray must be in place.
- All manifold valves have been checked and confirmed to be in good condition.
- Correct couplings have been identified for the product(s) to be transferred.
- The person in charge of the operation performs no other duties during the transfer(s).

7.1 Bulk Hose Operations in marginal conditions

In marginal weather, great care is required by the vessel Master to avoid over-running the hose especially if deck cargo is also being transferred. Consideration should be given to the connecting of bulk hoses only at this time. During hose work, deck foremen must listen to all communications on selected radio channels, which can be transmitted to the control room and platform crane operator should a hose assembly leak or significant changes in weather conditions occur.

8 Bulk Hose Handling & Securing Methods

8.1 Sling and Pin Method

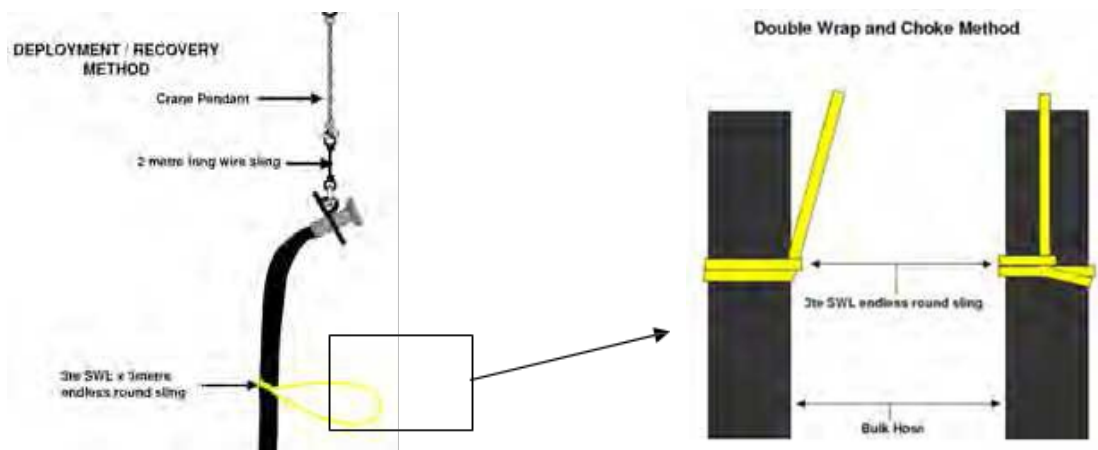
The use of an endless round web sling attached to the bulk hose and hung over a dedicated point on the supply vessel enhances the operation of passing the hose to the vessel from the installation. This process only relates to the attaching of the web sling to the bulk hose and the frequency of inspection.

The requirement for this endless round sling will depend entirely on the facility of a suitable attachment point on the supply vessel being available.

A dialogue between the Services Supervisor and each vessel shall take place to establish the requirement for this sling and the distance from the end of the hose to attach it.

Attaching the Endless Round Sling to the Bulk Hose

- An endless round sling of 3 tonnes SWL shall be used.
- The sling shall be of 3 metres effective working length.
- The sling shall be signed out of the rigging loft and attached before each use and detached and returned to the rigging loft for correct storage after every use.
- The sling will be attached to the bulk hose using the “double wrap and choke” method.
- The attachment point for the endless sling will be approximately 7 metres from the end of the bulk hose offered to the supply vessel; this distance will be confirmed by the vessel master.
- The endless round sling must only be attached to the bulk hose by a competent Rigger or a competent slinger / load handler.
- Once in position it shall be secured by tie-wraps or light cord to prevent slippage/loosening of the sling.



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Inspection and Storage of the Endless Round Sling

The LOLER focal point or a competent person must inspect the sling before and after each use to ensure it is still “fit for purpose”.

The sling is to be inspected to cover the following points as a minimum:

1. Check SWL.
2. Check colour code is current, and ID Number is legible.
3. Check entire length for cuts, tears or chafing.
4. Check joint for burst stitching.
5. Check for chemical damage and heat damage.
6. Check there has been no ingress of foreign bodies into the fibres.

When checking the round sling, should any cuts be found in the outer protective cover then the sling should be **condemned** i.e., DO NOT USE as the inner strength core may be damaged.

When the bunkering operation is complete the round sling shall be removed and returned to the rigging loft for storage.

Requirement

This requires three pins reasonably spaced out on the upper rail or taff rail on each side of the vessel to be welded in place, adjacent to the bulk hose manifolds.

These pins are used to hook the eye of an endless webbing strop on to a 3te SWL and ca. 2-3 metres long webbing sling when attaching the hose to the vessel.

Method

The vessel Master may ask for the sling on each hose to be adjusted for his manifold and hang-off points prior to coming alongside. This may vary according to the distance from the hang-off position of the required product manifold on the vessel. Under instruction, the crane operator will transfer the hose from the installation to the vessel in the normal fashion. During the lowering of the hose, as the hang-off strop nears the vessel's side rail, the crew will retrieve the eye of the strop by hand, or if necessary, by boat hook, and fit the eye of the sling over one of the pins. The vessel crew must take care to avoid positioning themselves under the suspended hose during this operation. The crane operator, upon instruction, continues to lower the hoist rope until the sling takes the weight of the hose. The vessel deck crew then signal the crane operator to lower the hose end into the safe haven where they unhook the hose end, allowing the crew the freedom to manoeuvre the hose end onto the manifold.

On completion of transferring bulk, the vessel deck crew drain the line and remove the manifold connection. The connection is moved away from the manifold by the crew prior to signalling the crane operator to lower his pennant to the deck crew. The hose end is attached to the crane hook via the lifting sling, and, once everyone is in a safe position, the crane operator is given the signal to raise the sling until the hose and hang-off strop are clear of the vessel. This modification eliminates unnecessary risk to crews when transferring the hose back to the installation.

A final inspection should be carried out on the hose and lifting assemblies prior to and after use.

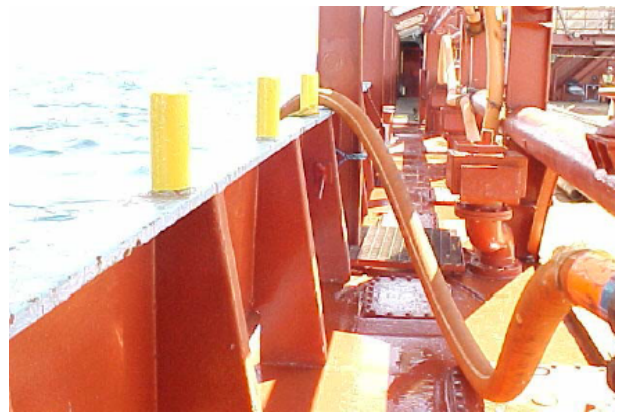
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Benefits

1. Securing the hose is simple and very effective in comparison to making the hose fast by lashing it to the ship's side rail.
2. Crew exposure to a suspended load is vastly reduced and minimal.
3. Fingers are not exposed to the same risk when lashing the hose.
4. Passing the hose back is much safer, as personnel involvement after hooking the hose end on is virtually eliminated.
5. Minimum alterations required to operate this system.



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8.2 Over Rail Method

An alternative method of handling bulk hoses is summarised below. This method also requires minimal modifications to the vessel and has been used satisfactorily in various areas.

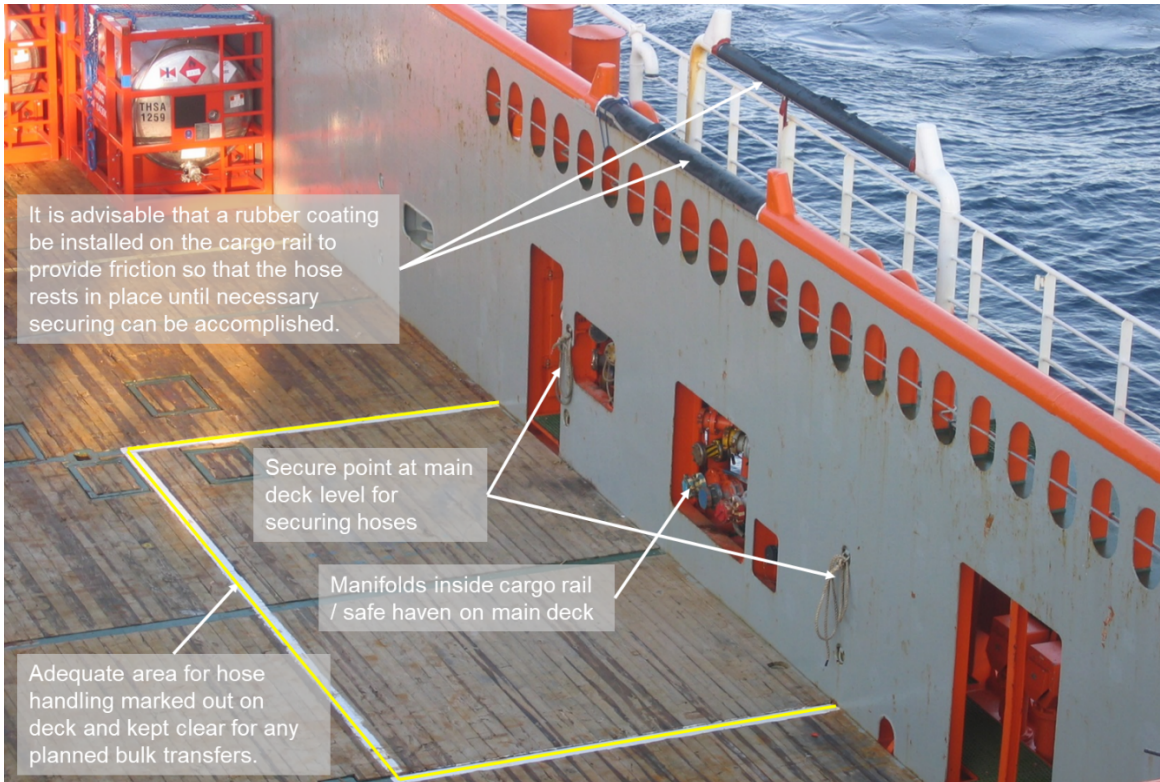
Modifications / Preparations on the vessel include the following:

- A rubber coating or similar arrangements should be installed on the cargo rails to provide friction so that movement in the hose(s) is prevented until secured to the manifold.
- A sufficiently large area must be allocated and marked on the deck of the vessel so that the hose can be positioned by the crane without assistance from the vessel's deck crew.
- Similar arrangements are required at all bulk handling stations where this method will be used.
- The hose must have sufficient buoyancy elements, which must be clearly visible to vessel personnel

In order to reduce the risks associated with bulk hose handling when using this method, the following precautions should be observed:

- A pre-job talk should be held between crane driver and vessel personnel.
- The hose should be delivered with the crane hook connected to the end of the hose. Where this is not possible, i.e., where the hook is connected to the hose at some distance from the end, the free end must be secured to prevent uncontrolled movement.
- Personnel on the deck of the vessel **must not be** in the allocated landing zone whilst the crane is handling the hose. After the hose is landed within the zone, the crane hook is disconnected.
- After the hook has been disconnected, the hose is connected to the appropriate manifold prior to the commencement of the bulk transfer operation.

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Securing after the hose has been landed avoiding the need to walk under a suspended load.

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