

Recommended actions to prevent LNG leakages from DD-CC hose bunkering/transfer system connections

The following Formal Safety Notice (FSN) has been issued by the Society for Gas as a Marine Fuel (SGMF) www.sgmf.info to the industry, to address concerns regarding the safe operations of LNG-fuelled vessels and their equipment and to prevent an increase in the risk for assets, people and environment.

Applicability:	<ul style="list-style-type: none"> • LNG bunkering operations, ship to ship, shore to ship and truck/mobile to ship • Hose bunker system connection and connectors to gas-fuelled vessel bunkering manifolds • All sizes of dry-disconnect/connect couplings (DD-CCs) manufactured in accordance with and before the publication of ISO 21593-2019
Status:	<ul style="list-style-type: none"> • Active
Duration:	<ul style="list-style-type: none"> • No time limitations
References:	<ul style="list-style-type: none"> • <i>SGMF: Safety and Operational Guidelines – Bunkering – FP07-01 Ver3.0</i> • <i>SGMF: LNG bunkering with hose bunker systems: considerations and recommendations – TGN06-06</i> • <i>SGMF: Manifold Arrangements for Gas-Fuelled Vessels – TGN 06-04, Ver1.0</i> • <i>ISO 21593-2019 Ships and marine technology — Technical requirements for dry-disconnect/connect couplings for bunkering liquefied natural gas</i> • <i>ISO 20519-2021 Ships and marine technology — Specification for bunkering of liquefied natural gas fuelled vessels</i>
Distribution:	<ul style="list-style-type: none"> • Not restricted
Note:	<ul style="list-style-type: none"> • This FSN 22-02 dated 04.07.2022 supersedes FSN 19-01 and FSN 19-02 and their recommendations.

Introduction

The Society for Gas as a Marine Fuel (SGMF) has received several reports of issues and LNG leakages related to the connection and connectors used between hose bunker systems and the gas-fuelled vessel manifolds.

The main issue identified is:

- evidence that differential movement and applied forces between supply and receiving bunkering equipment are causing leakages where dry-disconnect/connect couplings (DD-CCs) are employed, highlighting the need for guidance on how they should be used.

All reported leakage cases have been detected and dealt with safely.

This Formal Safety Notice aims to address this issue and to provide recommendations for the safe connection of hose bunker systems and for preventing leakages from occurring.

Definitions

DRY-DISCONNECT/CONNECT COUPLING (DD-CC) - A manually-operated mechanical device enabling the hose bunkering system to be quickly and safely connected to, and disconnected from, the manifold of the receiving vessel without employing bolts. The coupling consists of a nozzle and a receptacle. These couplings are also known as 'dry-disconnect couplings' or 'dry-break couplings'.

QUICK CONNECT/DISCONNECT COUPLER (QC/DC) - A quick connect/disconnect coupler (QC/DC) is a generic description of couplers. It uses a manual or hydraulic mechanical device to connect the transfer system (such as a loading arm) to the bunkering manifold presentation flange without employing bolts.

NOTE: All DD-CCs are a type of Quick Connect Disconnect Coupler (QC/DC). Not all QC/DCs are DD-CCs but all DD-CCs are QC/DCs.

DD-CC connections: maximum allowable bending loads and hose support

SGMF acknowledges and approves the use of ISO 21593-2019 DD-CCs as a suitable connection option. However, it is noted that DD-CCs produced before its publication of ISO21593-2019 are still in use. The following points are deemed applicable to all types of DD-CC.

Note that a DD-CC has a limited capacity to withstand external loads/forces. This requires the hose and, in general, the connection to be supported, to minimise the lateral stress on the DD-CC and to avoid the loss of tightness in the connection between the DD-CC nozzle and receptacle.

Reference should be made to the maximum allowable bending loads for the vessel manifold as described in SGMF *TGN06-04 Manifold arrangements recommendations*, table 6, and to DD-CC in ISO 21593-2019, table 5, load case (a). These loads should be compared with the approximate weight of hoses and fittings as reported in SGMF *TGN06-06 LNG Bunkering with hose bunker systems* (see extract below).

Table 1: Extract from SGMF TGN06-06, Maximum allowable bending loads

Connection nominal diameter	Maximum allowable bending moment		Approximate weight ^[1]		
	DD-CC bending moment load case a ^[2]	Gas-fuelled vessel manifold	Typical range of end fittings pair of ASME B16.5 class 150 RF	Typical range of Aerial Hoses	LNG product weight
	Ref ISO21593 table 5 [Nm]	Ref TGN06-04 table 6 [Nm]	Ref TGN06-06 section 4.3.3 [Kg]	Ref TGN06-06 section 4.3.3 [Kg/m]	Ref TGN06-06 section 4.3.3 [Kg/m]
2" DN 50	400	1,100	8-24	3-8	1
4" DN 100	1,700	9,300	18-54	9-23	4
6" DN 150	2,400	30,000	25-75	13-33	9
8" DN 200	2,600	42,000	40-120	20-55	16

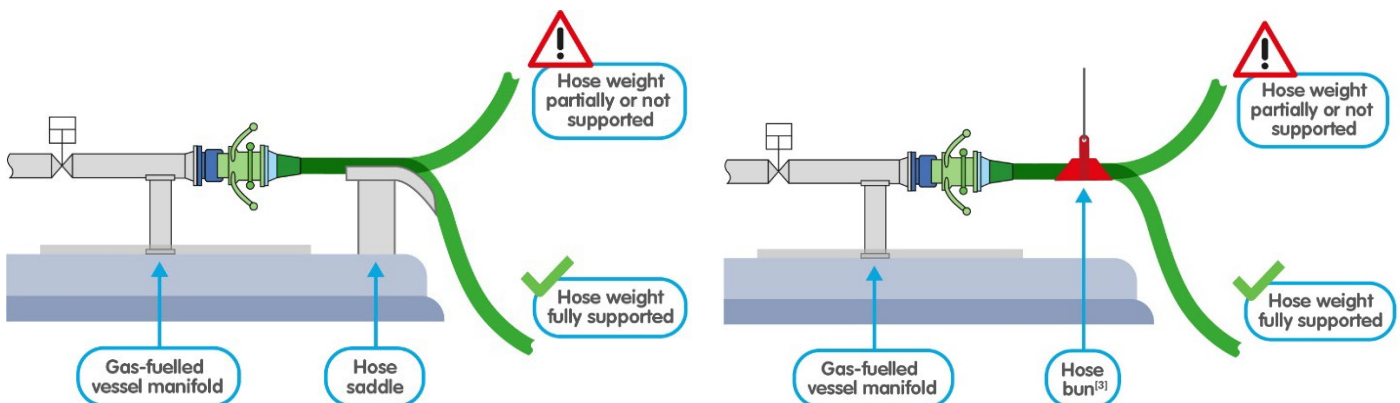
[1] the weight provided should be considered as typical and approximate and used for educational/informative purposes only – please refer to TGN 06-06 for further information.

[2] other values may apply for DD-CCs not manufactured in accordance with ISO 21593-2019.

RECOMMENDATIONS

1. The DD-CC connection of a hose bunker system to a gas-fuelled vessel manifold presentation flange should be supported (see figure 1):
 - a. Hoses should be fully seated on hose saddles or supported by hose buns so that the weight of the hose is rested on the support for the whole duration of the operation.
 - b. Hoses should have enough slack so that they do not lift away from their support if there is a change of draft or tide or if there are other relative movements between the bunkering facility and the gas-fuelled vessel.
 - c. When supporting the hose, care should be taken not to restrict its movements, to prevent damage to the hose.

Figure 1: DD-CC connection support examples

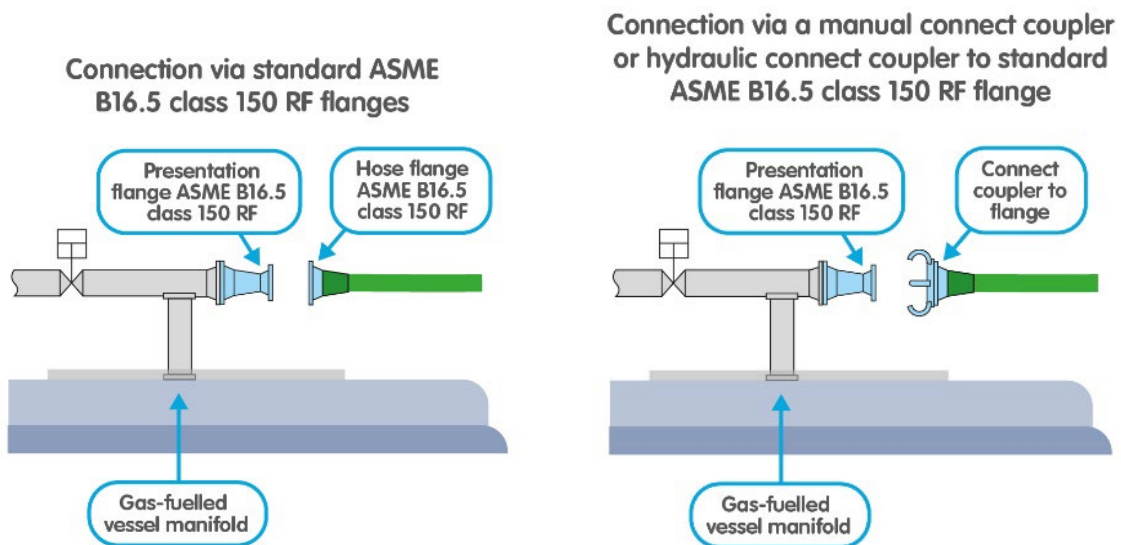


[3] Soft strop or spring-loaded wire/rope might be used to support the hose bun. Hose buns should be located on the flexible part of the hose body and away from the flange.

2. Loads and forces at the DD-CC connection are recommended to be checked by design calculation against the maximum allowable DD-CC bending moment, taking into account:
 - a. the actual application and bunkering scenario (hose size and weight, support cantilever, etc.); and
 - b. the dynamic and static loads applied at the connection.

3. Wherever a DD-CC connection is not deemed suitable because of an unacceptable risk of leakage based on a load calculation, the connection from a hose bunker system to a gas-fuelled vessel manifold presentation flange should be achieved by one of the following alternative connection means, approved under the alternative design clause of the IGF Code §2.3 (see figure 2):
 - a. via a flange bolting assembly where the two flanges are standard ASME B16.5 class 150 RF, or
 - b. via a manual or hydraulic connect coupler often referred to as a camlock or QC/DC to a standard ASME B16.5 class 150 RF manifold presentation flange.

Figure 2: SGMF recommended alternative connection means to a DD-CC connection



NOTES

The following notes apply to alternative means of connection as described in point 3 above:

1. Alternative means of connection may be allowed by the Administration under the provision of the alternative design route (ref: IGF Code §2.3).
2. See IMO submission CCC7/3/1 *Proposed amendments to the IGF Code 8.4.1* for further information on the IGF Code requirements for bunkering connections.
3. It is recommended that bunkering facilities and gas-fuelled vessels should agree on, and have in place, a connection and disconnection procedure for an alternative means of connection as a suitable back up to a DD-CC.
 - a. Connection and disconnection procedures for DD-CC and alternative connection means should be reviewed as part of the bunkering risk assessment and

approved as part of the Administration, local authority licensing or bunkering approval process.

b. Regardless of the type of connection or connector, operational procedures for bunkering line draining, purging and inerting should follow SGMF *Safety and Operational Guidelines – Bunkering – FP07-01 Ver3.0*, section 7.7.1.

Risk impact rating

<p>Yellow:</p> <p>This presents a low risk and impact to assets, people and environment and might cause some disruption to the normal operations.</p> <p>Stakeholders should be aware of the matter, evaluate the impact on their operations and plan their actions accordingly and as applicable.</p>	<p>Amber:</p> <p>This presents a medium risk and impact to assets, people and environment and can cause disruptions to the normal operation if not addressed.</p> <p>Stakeholders should evaluate the impact on their operations and plan to address the matter as part of their safety management plan.</p>	<p>Red:</p> <p>This presents potentially a high risk and impact to assets, people and environment and it should be immediately addressed.</p> <p>Stakeholders are invited to evaluate the impact on their operations and promptly take actions addressing the matter.</p>
<p>NOTE: The risk impact rating is not a substitute for a risk assessment, and is not representative of potential/consequences as determined in a risk assessment.</p>		

Note

Please report details of any such instances to the SGMF Secretariat at office@sgmf.info where it will be treated in complete confidence.