TR 56 : Part 2 : 2020
(ICS 01.140.30; 47.020; 47.040)

TECHNICAL REFERENCE

LNG bunkering

– Part 2 : Requirements for custody transfer

Singapore Standards Council

TR 56 : Part 2 : 2020
(ICS 01.140.30; 47.020; 47.040)

TECHNICAL REFERENCE

LNG bunkering

– Part 2 : Requirements for custody transfer

Published by Enterprise Singapore

ISBN 978-981-48-9486-9

The content of this Technical Reference was approved on 31 March 2020 by the Chemicals Standards Committee (CSC) under the purview of the Singapore Standards Council.

First published, 2017
First revision, 2020

CSC consists of the following members:

		Name	Representation
Chairman	:	Dr Keith Carpenter	*Individual Capacity*
Deputy Chairman	:	Er. Lucas Ng	*Individual Capacity*
Secretary	:	Ms Elane Ng	*Standards Development Organisation @ Singapore Chemical Industry Council*
		Ms Rosmalinda Tay	*Standards Development Organisation @ Singapore Chemical Industry Council*
Members	:	Mr Goh Tiak Boon	*Individual Capacity*
		Prof Alfred Huan	*Individual Capacity*
		Er. Khong Beng Wee	*Individual Capacity*
		Mr Terence Koh	*Singapore Chemical Industry Council Limited*
		Dr Leong Kwai Yin	*Individual Capacity*
		Dr Thomas Liew	*National Metrology Centre*
		Mr Lim Eng Kiat	*Individual Capacity*
		Mdm Jaime Lim	*Ministry of Manpower*
		Mr Lim Kian Chye / Mr Ng Eng Fu	*Housing & Development Board*
		Prof Loh Kian Ping	*National University of Singapore*
		Dr Loh Wah Sing	*Individual Capacity*
		Ms Pamela Phua	*Singapore Paint Industry Association*
		Mr Seah Khen Hee	*Individual Capacity*
		A/Prof Timothy Tan	*Nanyang Technological University*
		Dr Teo Tang Lin	*Chemical Metrology Division, Health Sciences Authority*
		Mr Yao Yikai	*Maritime and Port Authority of Singapore*
		Ms Suzanna Yap	*National Environment Agency*
Co-opted Members	:	Ms Christina Loh	*Individual Capacity*
		Mr Pitt Kwan Wah	*Individual Capacity*

CSC set up the Technical Committee on LNG Bunkering to oversee the preparation of this standard. The Technical Committee consists of the following members:

		Name	Representation
Chairman	:	Mr Goh Tiak Boon	*Individual Capacity*
Secretary	:	Ms Elane Ng	*Standards Development Organisation @ Singapore Chemical Industry Council*
Members	:	Dr Khorshed Alam	*Singapore Shipping Association*
		Dr Giulio Gennaro / Mr Foo Nan Cho	*Society of Naval Architects and Marine Engineers Singapore*
		Dr Lim Ee Meng	*National Metrology Centre*
		Mr Sandeep Mahawar	*Singapore LNG Corporation Pte Ltd*
		Mr Varun Iyer Mani	*Maersk Line*
		LTC Ng Geok Meng	*Singapore Civil Defence Force*
		Mr Cristian Popescu	*CMA CGM*
		Mr Saunak Rai	*FueLNG Pte Ltd*
		Capt Say Eng Sin	*Singapore Nautical Institute*
		Mr Soh Zi Quan	*Ministry of Manpower*
		Mr Richard Tan	*Pavilion Energy Singapore Pte Ltd*
		Mr Alex Tang	*The International Bunker Industry Association*
		Capt Satinder Singh Virdi	*Singapore Maritime Academy*
		Mr Yao Yikai	*Maritime and Port Authority of Singapore*
		Mr Zheng Huijian	*Energy Market Authority*

The Technical Committee set up the Working Group on LNG Bunkering Specification to prepare this standard. The Working Group consists of the following experts who contribute in their *individual capacity*:

		Name
Co-Convenors	:	Mr Chua Hock Ann
		Mr Sanjay Verma
Members	:	Mr Steve Allen
		Mr Costas Arvanitis
		Mr Naveen Hegde
		Dr Kai Fuu Ming
		Mr Gary Lim
		Dr Serena Lim
		Mr Andrew J Manton
		Mr Bhavin Mehta
		Ms Katelyn Ng
		Mr Pang Jun Jie
		Mr Andreas Salim
		Mr James Seow
		Mr Dennis Sim
		Ms Faith Tan
Members	:	Mr Tan Yew Hui

Mr Teoh Seng Eng
Mr Wu Meng Hsien
Dr Zeng Yan

The organisations in which the experts of the Working Group are involved are:

Ascenz Solutions Pte Ltd
Emerson Process Management Marine Solutions Singapore Pte Ltd
Endress+Hauser (S.E.A.) Pte Ltd
Enterprise Singapore
ExxonMobil Research and Engineering Company
FueLNG Pte Ltd
Intertek Testing Services (S) Pte Ltd
Krohne (South East Asia) Pte Ltd
Maritime and Port Authority of Singapore
Metcore International Pte Ltd
Mogas Flow Lab Pte Ltd
National Metrology Centre
Pavilion Energy Singapore Pte Ltd
SGS Testing Services Pte Ltd
Shell Eastern Trading (Pte) Ltd
Singapore LNG Corporation Pte Ltd
Wartsila Singapore Pte Ltd

Contents

Foreword

This Technical Reference was prepared by the Working Group on LNG Bunkering Specification set up by the Technical Committee on LNG Bunkering under the purview of CSC.

TR 56 consists of the following parts under the generic title “LNG bunkering”:

- Part 1 : General introduction
- Part 2 : Requirements for custody transfer
- Part 3 : Procedures and safety distances
- Part 4 : Competency requirements for personnel

In this revision, the following changes were made:

- Inclusion of new requirements and recommendations for the use of quality and quantity measurement equipment (such as custody transfer measurement systems, ultrasonic volumetric flow meter, gas chromatography and Raman analyser) for ship-to-ship mode;
- Enhanced the list of documentation for LNG bunkering;
- Amendments to the dispute resolution requirements in Clause 9;
- Amendments to LNG bunker delivery note in Annex B;
- Inclusion of new informative Annexes on disputes resolution procedures (Annex G and H).

In preparing this Part of the TR, reference was made to the documents listed under Normative references and Bibliography.

Acknowledgement is made to the following organisations for use of materials from their publications:

ASTM international
Materials reprinted in Annexes C and D of this TR, with permission, from ASTM D7940-14 *Standard Practice for Analysis of Liquefied Natural Gas (LNG) by Fiber-Coupled Raman Spectroscopy*, copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM, www.astm.org.

GIIGNL International Group of Liquefied Natural Gas Importers
Materials from the GIIGNL LNG Custody Transfer Handbook (available at: http://www.giignl.org/publications) has been adapted in Annexes C, D and E of this TR with the kind permission of GIIGNL.

International Maritime Organization
Annex E (LNG bunker delivery note) of this TR is adapted from the Annex LNG BDN of IGF Code adopted by IMO.

Material from the IMO website www.imo.org is reproduced with the permission of the International Maritime Organization (IMO), which does not accept responsibility for the correctness of the material as reproduced: in case of doubt, IMO's authentic text shall prevail. Readers should check with their national maritime Administration for any further amendments or latest advice. International Maritime Organization, 4 Albert Embankment, London, SE1 7SR, United Kingdom.

For the users of Annex E in Singapore, IMO’s authentic text shall prevail unless otherwise required by the implementing authority in Singapore in the application of this TR.

Annexes F, G and H of this TR are modified from the Annexes L, M and N of SS 600.

Acknowledgement is also made to The Society for Gas as a Marine Fuel (SGMF) for their kind assistance in the development of this Technical Reference and for their permission to reproduce/adapt the works from the following SGMF Guidelines:

- SGMF Quality and Quantity – Contractual Guidelines (definitions into TR 56 : Part 1 : 2020 and clause 5.4 into TR 56 : Part 2 : 2020)
- SGMF LNG Bunkering Safety Guidelines (clauses 4.1.1 and 4.2 into TR 56 : Part 3 : 2020)
- SGMF Training and Competency Guidelines (definitions into TR 56 : Part 1 : 2020 and clauses 4.1 to 4.8 and clause 5 into TR 56 : Part 4 : 2020)
- SGMF Recommendation of Controlled Zones during LNG Bunkering (clause 4 controlled zones definitions into TR 56 : Part 1 : 2020)

This TR is a provisional standard made available for application over a period of three years. The aim is to use the experience gained to update the TR so that it can be adopted as a Singapore Standard. Users of the TR are invited to provide feedback on its technical content, clarity and ease of use. Feedback can be submitted using the form provided in the TR. At the end of the three years, the TR will be reviewed, taking into account any feedback or other considerations, to further its development into a Singapore Standard if found suitable.

This TR is expected to be used by all stakeholders involved in the LNG bunker supply chain including LNG bunker suppliers, bunker tanker owners / operators, LNG fuel receiving vessels, ship owners / operators, training institutions, third party agencies and relevant authorities.

Attention is drawn to the possibility that some of the elements of this TR may be the subject of patent rights. Enterprise Singapore shall not be held responsible for identifying any or all of such patent rights.

NOTE

1. *Singapore Standards (SSs) and Technical References (TRs) are reviewed periodically to keep abreast of technical changes, technological developments and industry practices. The changes are documented through the issue of either amendments or revisions. Where SSs are deemed to be stable, i.e. no foreseeable changes in them, they will be classified as "Mature Standards". Mature Standards will not be subject to further review, unless there are requests to review such standards.*

2. *An SS or TR is voluntary in nature except when it is made mandatory by a regulatory authority. It can also be cited in contracts making its application a business necessity. Users are advised to assess and determine whether the SS or TR is suitable for their intended use or purpose. If required, they should refer to the relevant professionals or experts for advice on the use of the document. Enterprise Singapore and the Singapore Standards Council shall not be liable for any damages whether directly or indirectly suffered by anyone or any organisation as a result of the use of any SS or TR. Although care has been taken to draft this standard, users are also advised to ensure that they apply the information after due diligence.*

3. *Compliance with a SS or TR does not exempt users from any legal obligations.*

Technical Reference – LNG bunkering – Part 2 : Requirements for custody transfer

1 Scope

This part of the TR is intended to specify the custody transfer requirements for LNG bunkering including quality and quantity measurements.

There are various modes of transfer in LNG bunkering such as shore-to-ship, truck-to-ship, ship-to-ship, and cassette bunkering.

This TR does not alter the contractual obligations of the parties involved in the LNG bunker delivery.

2 Normative references

The following referenced documents are indispensable for the application of this TR. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

OIML R76	Non-automatic weighing Instruments
OIML R117-1	Dynamic measuring systems for liquids other than water – Part 1 : Metrological and technical requirements
ISO/IEC 17025	General requirements for the competence of testing and calibration laboratories
ISO 6578	Refrigerated hydrocarbon liquid – Static measurement – Calculation procedure
ISO 6976	Natural gas – Calculation of calorific values, density, relative density and Wobbe indices from composition
ISO 10976	Refrigerated light hydrocarbon fluids – Measurement of Cargoes on board LNG Carriers