

ISO 10976:2023-08 (E)

Refrigerated light hydrocarbon fluids - Measurement of cargoes on board LNG carriers

Contents		Page
Foreword		v
Introduction		vi
1	Scope	1
2	Normative references	1
3	Terms, definitions and abbreviated terms	1
3.1	Terms and definitions	1
3.2	Abbreviated terms	5
4	General operating safety precautions and regulations	6
4.1	General	6
4.2	Electrical equipment classification	7
4.3	Electromagnetic disturbance	7
4.4	Maintenance	7
4.5	Service conditions	7
4.6	Compatibility	7
4.7	Personnel protection	7
4.8	Procedures	8
5	Measurement systems and equipment	8
5.1	General	8
5.2	Measurement equipment performance	8
5.3	Calibration and certification of measurement equipment	9
5.4	Verification of measurement equipment between dry dockings	9
5.5	Inspection of measurement equipment during transfer operations	10
5.6	Static measurement systems and equipment	10
5.6.1	General	10
5.6.2	Tank capacity tables	10
5.6.3	Trim and list measurement	12
5.6.4	Tank gassing-up tables or means of determination	13
5.6.5	Tank cool-down tables or means of determination	13
5.6.6	Liquid level measurement equipment	14
5.6.7	Temperature measurement equipment	18
5.6.8	Pressure measurement equipment	19
5.6.9	Custody transfer measurement system	19
5.7	Dynamic measurement systems and equipment	20
6	Measurement procedures	20
6.1	General	20
6.2	Static measurement	21
6.2.1	General	21
6.2.2	Measuring liquid level	22
6.2.3	Loading	22
6.2.4	Discharge	22
6.2.5	Shipboard measurements	22
6.2.6	Liquid level	23
6.2.7	Temperature	24
6.2.8	Pressure	25

6.2.9	CTMS	25
6.2.10	Sampling	25
6.2.11	Vapour return	26
6.3	Gas-up and cool-down quantification	26
6.3.1	General	26
6.3.2	Inerting	26
6.3.3	Gas up and cool down	26
6.4	Dynamic measurement	27
7	Cargo calculations	27
7.1	General	27
7.2	LNG volume determination	27
7.2.1	General	27
7.2.2	Liquid levels below lower measurable limit	28
7.3	LNG density determination	28
Annex A (informative) LNGC design and marine operations		29
Annex B (informative) Additional considerations for measurement on board an LNGC		36
Annex C (informative) Examples of tank capacity tables for a spherical tank		40
Annex D (informative) Calculation examples		47
Annex E (informative) Sampling		57
Annex F (informative) Marine measurement witnessing checklists		61
Bibliography		64