



**NSAI**  
Standards

Irish Standard  
I.S. EN 1473:2021

# Installation and equipment for liquefied natural gas - Design of onshore installations

**I.S. EN 1473:2021**

*Incorporating amendments/corrigenda/National Annexes issued since publication:*

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard — national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation — recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

*This document replaces/revises/consolidates the NSAI adoption of the document(s) indicated on the CEN/CENELEC cover/Foreword and the following National document(s):*

*NOTE: The date of any NSAI previous adoption may not match the date of its original CEN/CENELEC document.*

*This document is based on:*

EN 1473:2021

*Published:*

2021-05-19

*This document was published under the authority of the NSAI and comes into effect on:*

2021-06-16

ICS number:

75.200

NOTE: If blank see CEN/CENELEC cover page

NSAI  
1 Swift Square,  
Northwood, Santry  
Dublin 9

T +353 1 807 3800  
F +353 1 807 3838  
E standards@nsai.ie  
W NSAI.ie

Sales:  
T +353 1 857 6730  
F +353 1 857 6729  
W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

## National Foreword

I.S. EN 1473:2021 is the adopted Irish version of the European Document EN 1473:2021, Installation and equipment for liquefied natural gas - Design of onshore installations

This document does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

For relationships with other publications refer to the NSAI web store.

**Compliance with this document does not of itself confer immunity from legal obligations.**

*In line with international standards practice the decimal point is shown as a comma (,) throughout this document.*

This page is intentionally left blank

EUROPEAN STANDARD

EN 1473

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2021

ICS 75.200

Supersedes EN 1473:2016

English Version

## Installation and equipment for liquefied natural gas - Design of onshore installations

Installation et équipements de gaz naturel liquéfié -  
Conception des installations terrestres

Anlagen und Ausrüstung für Flüssigerdgas - Auslegung  
von landseitigen Anlagen

This European Standard was approved by CEN on 15 February 2021.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

## EN 1473:2021 (E)

<b>Contents</b>		Page
European foreword.....		4
Introduction .....		5
<b>1</b>	<b>Scope.....</b>	<b>6</b>
<b>2</b>	<b>Normative references.....</b>	<b>7</b>
<b>3</b>	<b>Terms, definitions and abbreviated terms .....</b>	<b>11</b>
<b>3.1</b>	<b>Terms and definitions .....</b>	<b>11</b>
<b>3.2</b>	<b>Abbreviations .....</b>	<b>17</b>
<b>4</b>	<b>Quality management system.....</b>	<b>18</b>
<b>5</b>	<b>Site assessment.....</b>	<b>18</b>
<b>5.1</b>	<b>General and plant description.....</b>	<b>18</b>
<b>5.2</b>	<b>Geotechnical.....</b>	<b>18</b>
<b>5.3</b>	<b>Meteorological and Oceanographic.....</b>	<b>20</b>
<b>5.4</b>	<b>Environmental.....</b>	<b>21</b>
<b>5.5</b>	<b>Surroundings .....</b>	<b>23</b>
<b>5.6</b>	<b>Seismic .....</b>	<b>23</b>
<b>5.7</b>	<b>Hydrology.....</b>	<b>24</b>
<b>5.8</b>	<b>Social.....</b>	<b>24</b>
<b>6</b>	<b>Risk management.....</b>	<b>25</b>
<b>6.1</b>	<b>General.....</b>	<b>25</b>
<b>6.2</b>	<b>Hazard and risk assessment methodologies.....</b>	<b>26</b>
<b>6.3</b>	<b>Scenario identification .....</b>	<b>31</b>
<b>6.4</b>	<b>Consequence and impact assessment.....</b>	<b>32</b>
<b>6.5</b>	<b>Estimation of frequencies and probabilities.....</b>	<b>36</b>
<b>6.6</b>	<b>Safety improvement.....</b>	<b>36</b>
<b>6.7</b>	<b>Reviews .....</b>	<b>37</b>
<b>6.8</b>	<b>Safety during operation .....</b>	<b>37</b>
<b>7</b>	<b>Design.....</b>	<b>38</b>
<b>7.1</b>	<b>General.....</b>	<b>38</b>
<b>7.2</b>	<b>Civil structures.....</b>	<b>39</b>
<b>7.3</b>	<b>Electrical.....</b>	<b>53</b>
<b>7.4</b>	<b>Mechanical and piping design/material selection.....</b>	<b>56</b>
<b>7.5</b>	<b>Process automation and controls.....</b>	<b>66</b>
<b>7.6</b>	<b>Process technical safety.....</b>	<b>72</b>
<b>7.7</b>	<b>Marine transfer systems.....</b>	<b>75</b>
<b>7.8</b>	<b>Storage unit .....</b>	<b>77</b>
<b>7.9</b>	<b>Rotating equipment.....</b>	<b>81</b>
<b>7.10</b>	<b>Regasification and send-out unit.....</b>	<b>83</b>
<b>7.11</b>	<b>Trailer loading unit .....</b>	<b>84</b>
<b>7.12</b>	<b>Liquefaction unit .....</b>	<b>84</b>
<b>7.13</b>	<b>Buildings.....</b>	<b>84</b>
<b>7.14</b>	<b>LNG and NG quality measurement.....</b>	<b>85</b>
<b>7.15</b>	<b>Custody transfer flow metering .....</b>	<b>86</b>
<b>7.16</b>	<b>Boil-Off Gas (BOG) systems.....</b>	<b>86</b>
<b>7.17</b>	<b>Flare/vent system .....</b>	<b>89</b>
<b>7.18</b>	<b>Utilities.....</b>	<b>91</b>

<b>Annex A (normative) Thermal radiation threshold values .....</b>	<b>94</b>
<b>Annex B (normative) Definitions of reference flow rates .....</b>	<b>97</b>
<b>Annex C (informative) Seismic classification .....</b>	<b>101</b>
<b>Annex D (normative) Specific requirements for LNG pumps .....</b>	<b>103</b>
<b>Annex E (normative) Specific requirements for LNG vaporizers .....</b>	<b>109</b>
<b>Annex F (normative) Criteria for the design of pipes .....</b>	<b>115</b>
<b>Annex G (informative) Description of the different types of onshore LNG installations.....</b>	<b>116</b>
<b>Annex H (informative) Trailer loading unit.....</b>	<b>118</b>
<b>Annex I (informative) Frequency ranges .....</b>	<b>120</b>
<b>Annex J (informative) Classes of consequence.....</b>	<b>121</b>
<b>Annex K (informative) Levels of risk.....</b>	<b>122</b>
<b>Annex L (informative) Typical process steps of liquefaction .....</b>	<b>124</b>
<b>Annex M (informative) Odorant systems .....</b>	<b>133</b>
<b>Bibliography .....</b>	<b>136</b>

## **EN 1473:2021 (E)**

### **European foreword**

This document (EN 1473:2021) has been prepared by Technical Committee CEN/TC 282 “Installation and equipment for LNG”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2021, and conflicting national standards shall be withdrawn at the latest by November 2021.

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

This document supersedes EN 1473:2016.

Due to the incorporation of pressurized storage the standard has been re-structured and revised. In comparison with EN 1473:2016, the following changes have been made:

- duplications detected and deleted;
- terms and definitions adjusted;
- normative references updated;
- changed subject in Annex H;
- risk assessment requirements improved;
- storage tanks classification improved.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



## **Introduction**

The objective of this document is to give functional guidelines for on-shore LNG installations. It recommends procedures and practices that will result in safe and environmentally acceptable design, construction and operation of LNG plants.

Given the wide range of facilities from small to large, with high and low risk profile, etc., the acceptability criteria could vary depending on the project and are subject to conclusions by the normative risk assessment.

Seveso, PED, and ATEX Directives are expected to be followed. Where national and/or local regulations exist in which some of the requirements are equal or more stringent than in this document, it is up to agreement with national and/or local regulators to determine which of the requirements apply.

It does not need to be applied retrospectively, but application is recommended when major modifications of existing installations are being considered.

This document is also recommended for debottlenecking, revamping and plant life extension in the limits that will be defined by the local authority. The appliance of the European Directives to the existing facilities is part of the limits to be defined together with the local authority.

In case of plant expansion, this document is applicable for the new facilities. The application of these recommendations for the tie-ins and connections to the existing facilities will be defined by the local authority. The limits of such application should consider the practicality of such appliance. In the same way, the limits of the European Directives appliance will be accurately defined with the local authority.

## EN 1473:2021 (E)

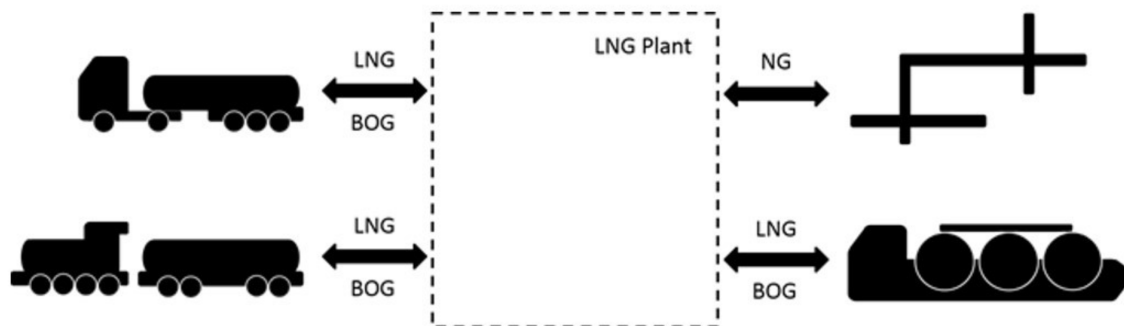
### 1 Scope

This document gives guidelines for the design, construction and operation of all onshore liquefied natural gas (LNG) installations for the liquefaction, storage, vaporization, transfer and handling of LNG and natural gas (NG).

This document is applicable for plants with an LNG storage capacity above 200 t.

The designated boundary limits are LNG inlet/outlet by the ship's manifold including vapour return connection, the truck loading/unloading connection including vapour return, the rail car loading/unloading connection including vapour return and the natural gas in and outlet boundary by piping systems.

Terminals or plant types have one or more boundary limits as described in this scope (see Figure 1).



**Figure 1 — Boundary limits of onshore liquefied natural gas (LNG) installations**

A short description of each of these installations is given in Annex G.

Feed gas for LNG liquefaction installations (plant) can be from gas field, associated gas from oil field, piped gas from transportation grid or from renewables.

Floating solutions (for example FPSO, FSRU, SRV), whether off-shore or near-shore, are not covered by this document even if some concepts, principles or recommendations could be applied. However, in case of berthed FSRU with LNG transfer across the jetty, the following recommendations apply for the jetty and topside facilities.

In case of solutions using floating storage unit (FSU) and land-based re-gasification solution, the on-shore part is covered by these standard recommendations.

Plants with a storage inventory from 5 t up to 200 t are covered by [5].

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

- 
- [Looking for additional Standards? Visit Intertek Inform Infostore](#)
  - [Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation](#)
-