

BUdY`Uj Y]b`cdfYa UnUi hY\_c ]b`Yb]`nYa Y`g\_]`d`]b`E`DfYg\_i yUb`Y`nc`UW`g\_]`  
 cV`c[ `c]`b]` VUhYbcj`nUi hY\_c ]b`Yb]`nYa Y`g\_]`d`]b

Installations and equipment for liquefied natural gas - Testing of insulating linings for  
 liquefied natural gas impounding areas

Anlagen und Ausrüstungen für Flüssigerdgas - Prüfung von  
 Wärmedämmbeschichtungen für Flüssigerdgas-Auffangbecken

Installations et équipements relatifs au gaz naturel liquéfié - Essais des revêtements  
 isolants des cuvettes de rétention de gaz naturel liquéfié

<https://standards.iteh.ai/catalog/standards/sist/291534ee-6f53-4877-a905-6003c9d1adb0/sist-en-12066-1999>

**Ta slovenski standard je istoveten z: EN 12066:1997**

# **ICS:**

75.200

U]`{` æÁæ\|æãæ`^}b`  
 }æ^EæææQ|`[`ãç[`å[`çA`  
 :`^`^|b\^\*æ|ãæ

Petroleum products and  
 natural gas handling  
 equipment

**SIST EN 12066:1999**

**en**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 12066:1999

<https://standards.iteh.ai/catalog/standards/sist/291534ee-6f53-4877-a905-6003c9d1adb0/sist-en-12066-1999>

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

EN 12066

September 1997

ICS 75.200

Descriptors: gas installation, liquefied natural gas, vats, protective coatings, insulation, evaporation, water bath evaporation, operating requirements, tests, test equipment, measurements, coefficients, computation

English version

Installations and equipment for liquefied natural gas - Testing of  
insulating linings for liquefied natural gas impounding areas

Installations et équipements relatifs au gaz naturel liquéfié -  
Essais des revêtements isolants des cuvettes de rétention  
de gaz naturel liquéfié

Anlagen und Ausrüstung für Flüssigerdgas - Prüfung von  
Wärmedämmbeschichtungen für Flüssigerdgas-  
Auffangbecken

This European Standard was approved by CEN on 22 August 1997.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

## Contents

<b>Foreword</b> .....	<b>3</b>
<b>1 Scope</b> .....	<b>4</b>
<b>2 Normative references</b> .....	<b>4</b>
<b>3 Definitions</b> .....	<b>4</b>
<b>4 Description of the means of and the equipment required for testing</b> .....	<b>4</b>
4.1 Characteristics of test pieces.....	4
4.2 Equipment used to measure the evaporation coefficient of LNG in contact with the insulating lining.....	5
4.3 Equipment used to measure the water absorption ratio of an insulating lining.....	5
<b>5 Test method</b> .....	<b>6</b>
5.1 Measurement of the evaporation coefficient of LNG in contact with the insulating lining .....	6
5.2 Measurement of the water absorption ratio of the insulating lining.....	6
<b>6 Testing</b> .....	<b>7</b>
<b>7 Test report</b> .....	<b>7</b>
<b>Annex A (normative) Specification of the test rig</b> .....	<b>8</b>
<b>Annex B (normative) Measuring equipment used to determine the evaporation coefficient of LNG in contact with the insulating lining</b> .....	<b>10</b>
<b>Annex C (normative) Method of calculation of the evaporation coefficient of LNG in contact with the insulating lining</b> .....	<b>11</b>
<b>Annex D (normative) Method of calculation of the water absorption ratio of insulating lining</b> .....	<b>16</b>



## Foreword

This European Standard has been prepared by the 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 March 1998, and conflicting national standards shall be withdrawn at the latest by March 1998.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 12066:1999

<https://standards.iteh.ai/catalog/standards/sist/291534ee-6f53-4877-a905-6003c9d1adb0/sist-en-12066-1999>

## 1 Scope

This European Standard specifies the tests to be carried out in order to assess the suitability of insulating linings used in LNG impounding areas.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 1160	Installations and equipment for liquefied natural gas - General characteristics of liquefied natural gas
---------	---

prEN 12379	Testing concrete - Making and curing specimens for strength tests
------------	--

## 3 Definitions

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

For the purposes of this standard, the following definitions apply :

[SIST EN 12066:1999](#)

<https://standards.iteh.ai/catalog/standards/sist/291534ee-6f53-4877-a905-1033ee000000/sist-en-12066-1999>

**3.1 liquefied natural gas (LNG)** : See EN 1160.

**3.2 insulating lining** : Material or layers of materials designed to minimize evaporation of an LNG pool.

**3.3 water absorption ratio** : Ratio between the volume of water absorbed and the calculated volume of the insulating lining specimen subjected to testing.

## 4 Description of the means of and the equipment required for testing

### 4.1 Characteristics of test pieces

The dimensions of the test pieces shall be defined in accordance with the dimensions of the test rig defined in 4.2.1.

The thickness of the test piece shall be the same as that of the insulating lining of the LNG impounding area.

The manufacturing and installation technology of the test piece shall be the same as that of the impounding area insulating lining.

The test piece shall be stored in accordance with the manufacturer's recommendations. Specifically, if the material applied is concrete, the test pieces shall be built, cured and stored in compliance with prEN 12379.

## **4.2 Equipment used to measure the evaporation coefficient of LNG in contact with the insulating lining**

### **4.2.1 Test rig**

A test piece shall be hermetically sealed onto the base of a right-angled parallelepiped shaped tank whose sides and bottom are built of a rigid insulating material having a thermal conductivity less than 0,050 W/(m·K).

The quantity of LNG necessary for the test shall be discharged over the test piece in less than 0,5 s.

The discharged volume is equal to the product of the test piece surface and the desired height of LNG within a limit deviation of  $\pm 5\%$ .

After the LNG discharge, the initial height of LNG over the test piece shall be about 2,5 cm.

Annex A specifies the characteristics of the test rig.

NOTE : Given the different thermal behaviour of other cryogenic liquids, none of them can replace LNG to measure the evaporation coefficient.

<https://standards.iteh.ai/catalog/standards/sist/291534ee-6f53-4877-a905-6003c9d1adb0/sist-en-12066-1999>

### **4.2.2 Measuring equipment**

The evaporation coefficient of LNG in contact with the insulating lining shall be determined on the basis of continuous weighings of the tank placed on a scale, following LNG discharge over the test-piece.

For that purpose, an electronic scale shall be used in combination with a high-speed recorder.

Annex B specifies the characteristics of the measuring equipment.

## **4.3 Equipment used to measure the water absorption ratio of an insulating lining**

### **4.3.1 Water tank**

The water tank shall be designed in such a way that the test-piece is fully immersed and its six faces remain in permanent contact with water during immersion.

### **4.3.2 Measuring equipment**

The water absorption ratio of the test pieces shall be measured after successive weighings of test pieces on previously calibrated scales. The weighing scale shall be able to measure with an accuracy better than 1 %.

## 5 Test method

### 5.1 Measurement of the evaporation coefficient of LNG in contact with the insulating lining

#### 5.1.1 Procedure

The test for the measurement of the evaporation coefficient of LNG in contact with the insulating lining shall be performed at an initial test rig temperature of  $(20 \pm 5) ^\circ\text{C}$  and at atmospheric pressure in accordance with the following procedure :

- a) install the test piece at the base of the tank ;
- b) install the tank on the scale ;
- c) install the LNG discharge system above the tank ;
- d) fill the tip-over system ;
- e) discharge the LNG over the test-piece within a period of less than 0,5 s ;
- f) record the tank weight at high frequency for a period of at least 2 min ;
- g) visually inspect of the test rig to verify its tightness.

#### 5.1.2 The parameter derived from the measurements

The evaporation coefficient of LNG,  $K_r$ , in contact with the insulating lining shall be calculated in accordance with annex C, by quantifying the rate of evaporation of LNG in contact with the insulating lining under test.

### 5.2 Measurement of the water absorption ratio of the insulating lining

#### 5.2.1 Procedure

The test for the measurement of the water absorption ratio of the insulating lining shall be performed at a temperature of  $(20 \pm 5) ^\circ\text{C}$  in accordance with the following procedure :

- a) weigh a test-piece before testing ;
- b) immerse in water for 1 h ;
- c) weigh after draining for 1 h ;
- d) immerse in water for one day ;
- e) weigh after draining for 1 h ;
- f) immerse in water for two days ;



- g) weigh after draining for 1 h ;
- h) repeat the last two sequences (f and g) six times.

### 5.2.2 Parameters derived from the measurements

The water absorption ratio of the insulating lining shall be quantified by calculating the following parameters :

- a) the water absorption ratio of each test-piece after each weighing ;
- b) the maximum value of water absorption ratio of the insulating lining.

Annex D specifies the method of calculation of the above parameters.

## 6 Testing

The tests shall be carried out on the three test-pieces in order to determine the evaporation coefficient of LNG in contact with the insulation lining under the following conditions :

- a) the insulating lining is dry as delivered by the manufacturer ;
- b) the insulating lining is saturated with water following immersion for fifteen days ;
- c) due to the fact that the insulating material can change its characteristics under the influence of atmospheric agents such as rain, frost, ultra-violets rays etc, it is recommended to determine the evaporation coefficient of LNG after having subjected the insulating lining to an ageing procedure. In this case, the ageing procedure shall be defined by the user and agreed by the insulating manufacturer. The simulated lifetime shall be defined by the user.

## 7 Test report

The results of the tests shall be recorded in a report containing the following information :

- a) the history of the test-pieces before testing such as storage and transportation conditions (temperature, humidity, etc), time between manufacturing and testing and conditions of sampling ;
- b) the evaporation coefficient of LNG in contact with the insulating lining in the dry condition (see clause 6 a)) ;
- c) the maximum value of the water absorption ratio of the insulating lining (see 5.2.2 b)) ;
- d) the evaporation coefficient of LNG in contact with the insulating lining saturated with water following immersion for fifteen days (see clause 6 b)) ;
- e) the evaporation coefficient of LNG in contact with the insulating lining following the accelerated ageing procedure, if requested (see clause 6 c)).