



**NSAI**  
Standards

Irish Standard  
I.S. EN ISO 17776:2016

Petroleum and natural gas industries -  
Offshore production installations - Major  
Accident hazard management during the  
design of new installations (ISO 17776:2016)

## I.S. EN ISO 17776:2016

*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 ISO 17776:2016

*Published:*

2016-12-21

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

2017-01-16

ICS number:

75.180.10

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 ISO 17776:2016 is the adopted Irish version of the European Document EN ISO 17776:2016, Petroleum and natural gas industries - Offshore production installations - Major Accident hazard management during the design of new installations (ISO 17776:2016)

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

**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 ISO 17776

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2016

ICS 75.180.10

Supersedes EN ISO 17776:2002

English Version

**Petroleum and natural gas industries - Offshore  
production installations - Major Accident hazard  
management during the design of new installations (ISO  
17776:2016)**

Industries du pétrole et du gaz naturel - Installations  
des plates-formes en mer - Lignes directrices relatives  
aux outils et techniques pour l'identification et  
l'évaluation des risques (ISO 17776:2016)

Erdöl- und Erdgasindustrie - Offshore-  
Produktionsanlagen - Management der Gefährdungen  
durch schwere Störfälle bei der Konstruktion neuer  
Offshore-Anlagen (ISO 17776:2016)

This European Standard was approved by CEN on 19 October 2016.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, 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: Avenue Marnix 17, B-1000 Brussels**

**EN ISO 17776:2016 (E)**

<b>Contents</b>	<b>Page</b>
<b>European foreword.....</b>	<b>3</b>

## **European foreword**

This document (EN ISO 17776:2016) has been prepared by Technical Committee ISO/TC 67 "Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries" in collaboration with Technical Committee CEN/TC 12 "Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries" the secretariat of which is held by CYS.

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 June 2017, and conflicting national standards shall be withdrawn at the latest by June 2017.

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

This document supersedes EN ISO 17776:2002.

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

### **Endorsement notice**

The text of ISO 17776:2016 has been approved by CEN as EN ISO 17776:2016 without any modification.

This page is intentionally left blank



# INTERNATIONAL STANDARD

**ISO**  
**17776**

Second edition  
2016-12-15

---

---

## **Petroleum and natural gas industries — Offshore production installations — Major accident hazard management during the design of new installations**

*Industries du pétrole et du gaz naturel — Installations des plates-  
formes en mer — Lignes directrices relatives aux outils et techniques  
pour l'identification et l'évaluation des risques*



Reference number  
ISO 17776:2016(E)

© ISO 2016

**ISO 17776:2016(E)**



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2016, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Ch. de Blandonnet 8 • CP 401  
CH-1214 Vernier, Geneva, Switzerland  
Tel. +41 22 749 01 11  
Fax +41 22 749 09 47  
copyright@iso.org  
www.iso.org

# Contents

	Page
<b>Foreword</b> .....	<b>v</b>
<b>Introduction</b> .....	<b>vi</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms, definitions and abbreviated terms</b> .....	<b>1</b>
3.1 Terms and definitions.....	1
3.2 Abbreviated terms.....	4
<b>4 Major accident hazard management overview</b> .....	<b>5</b>
4.1 General.....	5
4.2 Project management commitment.....	5
4.3 Project management accountability.....	6
4.4 Project plan to manage major accident hazards.....	6
4.5 Objectives of major accident hazard management.....	6
4.6 Selection of hazard evaluation and risk assessment methods.....	7
4.7 Good engineering practice.....	7
4.8 Documentation.....	8
4.8.1 General.....	8
4.8.2 Register of major accident hazards.....	9
4.9 Actions management.....	9
4.10 Management of change.....	9
<b>5 Management of major accident hazards in design</b> .....	<b>10</b>
5.1 Overview of MA hazard management.....	10
5.2 Key concepts.....	11
5.2.1 Understanding the MA hazards.....	11
5.2.2 Inherently safer design (ISD).....	12
5.2.3 Design strategies for managing MA hazards.....	13
5.2.4 Barriers.....	13
5.2.5 Performance standards.....	14
5.2.6 Communication with technical and operational teams.....	15
<b>6 Screening and concept selection process</b> .....	<b>15</b>
6.1 General.....	15
6.2 Objectives.....	16
6.3 Functional requirements.....	17
6.3.1 Screening.....	17
6.3.2 Hazard identification.....	17
6.3.3 Major accident hazards evaluation.....	17
6.3.4 ISD and barriers.....	18
6.3.5 Performance standards.....	18
6.3.6 Sufficiency of measures.....	18
6.3.7 Documentation.....	18
<b>7 Concept definition and optimization</b> .....	<b>19</b>
7.1 General.....	19
7.2 Objectives.....	20
7.3 Functional requirements.....	20
7.3.1 Hazard identification.....	20
7.3.2 Major accident hazard evaluation.....	20
7.3.3 Risk assessment.....	20
7.3.4 Inherently safer design (ISD).....	20
7.3.5 Barriers.....	21
7.3.6 Performance standards.....	21
7.3.7 Sufficiency of measures.....	21
7.3.8 Documentation.....	22

## ISO 17776:2016(E)

<b>8</b>	<b>Detailed design and construction phase</b> .....	<b>22</b>
8.1	General .....	22
8.2	Objectives .....	23
8.3	Functional requirements .....	23
8.3.1	Overview .....	23
8.3.2	Hazard identification .....	24
8.3.3	Major accident hazards evaluation .....	24
8.3.4	Risk assessment .....	24
8.3.5	Inherently safer design (ISD) .....	24
8.3.6	Barriers .....	24
8.3.7	Performance standards .....	25
8.3.8	Sufficiency of measures .....	25
8.3.9	Register of major accident hazards .....	25
8.3.10	Documentation .....	25
8.3.11	Procurement of equipment .....	26
8.3.12	Construction, completion and commissioning .....	26
8.3.13	Transfer to operation .....	26
8.3.14	Actions management .....	26
<b>9</b>	<b>Major accident hazard management in operation</b> .....	<b>27</b>
9.1	General .....	27
9.2	Objectives .....	27
9.3	Functional requirements .....	28
9.3.1	Barrier management .....	28
9.3.2	Revalidation .....	28
9.3.3	Safety-critical tasks .....	28
9.3.4	Temporary changes .....	29
9.3.5	Non-availability of barrier performance .....	29
9.3.6	Management of change (MOC) .....	29
	<b>Annex A (informative) Example of a framework for risk-related decision support</b> .....	<b>31</b>
	<b>Annex B (informative) Plan to manage major accident hazards</b> .....	<b>32</b>
	<b>Annex C (informative) Major accident hazard management identification and evaluation tools</b> .....	<b>41</b>
	<b>Annex D (informative) Strategy for managing major accident hazards</b> .....	<b>71</b>
	<b>Annex E (informative) Barrier system performance standards</b> .....	<b>77</b>
	<b>Annex F (informative) HAZID guidewords</b> .....	<b>80</b>
	<b>Bibliography</b> .....	<b>94</b>

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

The committee responsible for this document is ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 6, *Processing equipment and systems*.

This second edition cancels and replaces the first edition (ISO 17776:2000), which has been technically revised and the title changed from *Petroleum and natural gas industries — Offshore production installations — Guidelines on tools and techniques for hazard identification and risk assessment* to the present title.

## ISO 17776:2016(E)

### Introduction

The purpose of this document is to establish requirements and provide guidance for the effective management of major accident (MA) hazards during the design of new offshore installations for the petroleum and natural gas industries.

The management of MA hazards involves the application of engineering expertise and knowledge to provide the measures needed to meet the objectives set by the organizations involved in the project development. A range of tools for evaluating and assessing the likelihood and consequences of MAs is needed to help select the measures to be implemented, and to judge when sufficient measures have been provided.

This process is built on the underlying integrity provided by the application of internationally recognized codes and standards.

This document covers the following main elements:

- establishing general requirements for identifying MA hazards and their causes;
- assessing MA hazards to understand their likelihood and possible consequences;
- developing suitable strategies for managing MA hazards;
- progressively improving the understanding of MA hazards and their consequences to guide design decisions during the development phases of the installation;
- providing the measures needed to manage all credible MAs;
- maintaining the measures throughout the life of the installation.

The technical content of this document is arranged as follows:

- a) objectives: the goals to be achieved;
- b) functional requirements: specifying requirements considered necessary to meet the stated objectives;
- c) annexes: guidelines in support of the functional requirements.

This document should be read in conjunction with ISO 13702 and ISO 15544.

# Petroleum and natural gas industries — Offshore production installations — Major accident hazard management during the design of new installations

## 1 Scope

This document describes processes for managing major accident (MA) hazards during the design of offshore oil and gas production installations. It provides requirements and guidance on the development of strategies both to prevent the occurrence of MAs and to limit the possible consequences. It also contains some requirements and guidance on managing MA hazards in operation.

This document is applicable to the design of

- fixed offshore structures, and
- floating systems for production, storage and offloading

for the petroleum and natural gas industries.

The scope includes all credible MA hazards with the potential to have a material effect on people, the environment and assets.

This document is intended for the larger projects undertaken to develop new offshore installations. However, the principles are also applicable to small or simple projects or design changes to existing facilities and can also be relevant to onshore production facilities.

Mobile offshore units as defined in this document are excluded, although many of the principles can be used as guidance. The design of subsea facilities are also excluded, though the effects of mobile and subsea facilities are considered if they can lead to major accidents that affect an offshore installation. This document does not cover the construction, commissioning, abandonment or security risks associated with offshore installations.

The decision to apply the requirements and guidance of this document, in full or in part, is intended to be based on an assessment of the likelihood and possible consequences of MA hazards.

## 2 Normative references

The following documents are referred to in text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 31000, *Risk management — Principles and guidelines*

## 3 Terms, definitions and abbreviated terms

### 3.1 Terms and definitions

For the purposes of this document, the following terms, definitions and abbreviated terms apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

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](#)
-