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Regulators' use of standards

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International Association of Oil & Gas Producers

OGP Publications

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Acknowledgements

This report was compiled by the OGP Standards Committee with assistance by individuals of many of the regulators discussed in this report.

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Abbreviations (origin)

ABNT	Brazilian Association of Technical Standards
ABS	American Bureau of Shipping
ACI	American Concrete Institute
ACOP	Approved Code of Practice
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
ASME	American Society of Mechanical Engineers
ANP	National Agency of Petroleum, Natural Gas and Biofuels (Brazil)
ANSI	American National Standards Institute
AODC	Association of Offshore Diving Contractors
API	American Petroleum Institute
APPEA	Australian Petroleum Production & Exploration Association
AS	Australian Standard
ASNT	American Society for Nondestructive Testing
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
BS	British Standards
CAN	Canadian Standards
CEN	European Committee for Standardization
CENELEC	European Committee for Electrotechnical Standardization
CFR	Code of Federal Regulations (US)
CNOOC	China National Offshore Oil Company
CNSOPB	Canada-Nova Scotia Offshore Petroleum Board
CNLOPB	Canada-Newfoundland and Labrador Offshore Petroleum Board
CPEC	China Petroleum Equipment Standards Committee
CPSC	China Petroleum Standards Committee
CSA	Canadian Standards Association
CSWIP	Certification Scheme for Welding and Inspection Personnel (UK)
DEA	Danish Energy Agency
DMF	Department of Mineral Fuels (Thailand)
DMAC	Diving Medical Advisory Committee (UK)
DNV	Det Norske Veritas (Norway)
DIN	German Institute for Standardization
DMAC	Diving Medical Advisory Committee (North Europe)
DOL	Department of Labour
DPVOA	Dynamically Positioned Vessel Owners Association (now IMCA)
DPVOC	Dynamic Positioning Committee of Marine Technology Society (US)
DS	Danish Standard
EC	European Commission
EFTA	European Free Trade Association
EEMUA	Engineering Equipment & Materials Users' Association
EN	European Norm
ETSI	European Telecommunications Standards Institute
HSE	Health and Safety in Employment (New Zealand)
HSE	Health and Safety Executive (UK)
IADC	International Association of Drilling Contractors
ICEL	Industry Committee for Emergency Lighting (UK)
IEC	International Electrotechnical Commission
IEE	Institution of Electrical Engineers (UK)
IEEE	Institute of Electrical and Electronics Engineers (US)
IGE	IGEM Standard (UK)
IGEM	Institution of Gas Engineers and Managers (UK)
IMCA	International Marine Contractors Association
IMO	International Maritime Organization
IP	Institute of Petroleum (Now Energy Institute – UK)
IRF	International Regulators Forum
IS	Indian Standard
ISA	International Society of Automation (US)
ISO	International Organization for Standardization
LRS	Lloyds Register (UK)
MES	Ministero dello Sviluppo Economico (Italy)
MARPOL	International Convention for the Prevention of Pollution from Ships (IMO)
MIL	Military standard (US)
MOA	Memorandum of Agreement
MODU	Mobile Offshore Drilling Units Code (IMO)MMS Minerals Management Service (US)
MPMS	Manual of Petroleum Measurement Standards (API)
MSS	Manufacturers Standardization Society (US)
NACE	National Association of Corrosion Engineers (US)
NEB	National Energy Board (Canada)
NEMA	National Electrical Manufacturers Association (US)
NEN	Netherlands Standardization Institute
NFPA	National Fire Protection Association (US)
NOGEPA	Netherlands Oil and Gas Exploration and Production Association
NOPSA	National Offshore Petroleum Safety Authority (Australia)
NOHSC	National Occupational Health and Safety Commission (Australia)
NORMAM	Maritime Authority Standards (Brazil)
NORSOK	Norwegian Competitive Position on the Continental Shelf
NPD	Norwegian Petroleum Directorate
NS	Norwegian Standard
NZS	New Zealand Standard
OCIMF	Oil Companies International Marine Forum
OCS	Outer Continental Shelf (US)
OCSLA	Outer Continental Shelf Lands Act (US)
OGP	International Association of Oil & Gas Producers
OHS	Occupational Health and Safety
OIAC	Offshore Industry Advisory Committee (formerly Oil Industry Advisory Committee)(UK)
OIML	International Organization of Legal Metrology
OISD	Oil Industry Safety Directorate (India)
OMHEC	Offshore Mechanical Handling Equipment Committee
OPITO	The Oil & Gas Academy (UK)
OSD	Offshore Safety Division (UK HSE)
PAS	Publicly Available Specification (ISO)
PSA	Petroleum Safety Authority (Norway)
SAC	Standardisation Administration of China
SDO	Standards Developing Organization
SNAME	Society of Naval Architects and Marine Engineers (US)
SODM	State Supervision of Mines (The Netherlands)
SOLAS	International Convention for the Safety of Life at Sea (IMO)
TBT	Technical Barriers to Trade (WTO)
TEMA	Tubular Exchanger Manufacturers Association (US)
UKOOA	UK Offshore Operator Association (Now UK Oil & Gas)
UL	Underwriters Laboratories (US)
USCG	US Coast Guard
WA	Workshop Agreement (ISO)
WHO	World Health Organization
WTO	World Trade Organization

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Foreword

This report reflects the current situation of selected national regulators' reference and use of national, regional, international and industry standards in their regulatory documents, with a particular focus on standards for materials, equipment, systems and structures for the offshore petroleum industry. This report attempts to analyze the documents prepared by national and provincial lawmakers and the regulators themselves.

This report analyses standards referenced by the following regulators:

- Canada, represented by:
  - Canada-Nova Scotia Offshore Petroleum Board (CNSOPB)
  - Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB)
  - National Energy Board (NEB)
- China National Offshore Oil Company (CNOOC), China
- Danish Energy Agency (DEA), Denmark
- Department of Labour (DoL), New Zealand
- Department of Mineral Fuels (DMF), Thailand
- Ministero dello Sviluppo Economico (MES), Italy
- National Agency of Petroleum, Natural Gas and Biofuels (ANP), Brazil
- National Offshore Petroleum Safety Authority (NOPSA), Australia
- Oil Industry Safety Directorate (OISD), India
- Petroleum Safety Authority (PSA), Norway
- Russia represented by:
  - The Ministry of Natural Resources of the Russian Federation (MNR)
  - The Ministry of Industry and Energy of the Russian Federation (Minpromenergo)
- State Supervision of Mines (SODM), The Netherlands
- UK Health and Safety Executive (HSE), UK
- United States represented by:
  - US Coast Guard (USCG)
  - US Minerals Management Service (US MMS).

The purpose of this report is to:

- provide for better understanding of selected offshore regulators' schemes and their use of standards in the regulatory documents
- provide a good basis for OGP interactions with the relevant regulators and in particular the International Regulators Forum (IRF), with members from: Australia, Brazil, Canada (Newfoundland & Nova Scotia), The Netherlands, New Zealand, Norway, UK and US
- provide relevant background material for the prioritization of international standards work in ISO/TC67 and other relevant oil and gas industry standards committees
- provide a better basis for the evaluation of OGP's *Position on development and use of international standards*. Ref. OGP Report № 381, April 2007
- provide a benchmark on regulators' use of standards.

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Definitions and notes

Throughout this report the word "standard" is used to represent all the documents published by any of the many standards developing organizations (SDO) around the globe. Their publications are frequently called standards, but they are also called recommended practices, specifications, bulletins, technical reports, publically available specifications etc.

This report analyses standards which are specifically referenced by standard number and/or title in the regulatory documents issued by one of the fourteen regulators covered herein.

Some of the demarcation between what is a regulatory document applicable for this report and what is not is sometimes difficult to determine as no regulatory document regime is the same. Therefore, in order to provide a reasonable basis for the evaluation of regulators use of standards, some choices have been made by the author of this report to provide a comparable situation. Regulatory documents in this report include any regulation, guideline or similar documents within the scope of this report. References in some general guidelines and general ACOPs issued by regulators have thus been disregarded, as they are not specifically established for the oil and gas industry.

The expression "long list" herein is used to reflect the amalgamated list of references by all regulators examined in this report, where same standard is counted only once per one regulator (even f it is referenced several times by same regulator), but several tiles if referenced by several regulators. China and Russia not included.

The expression "short list" herein is used to reflect the different standard titles referenced by all regulators examined in this report. This short list is derived from the long list and shows every standard title only once (disregarding revision or publication year), and represents therefore the total number of different standards titles referenced by these regulators. Standards listed in Annex C (PED), D1 (OISD) and F2 (NPD metering) are neither included in the long nor short list.

Some of the standards referenced include many parts. If the reference in a regulatory document is to e.g. five individual parts of a standards this is counted as five references. If a general reference is made to the entire series, this is counted as one reference.

Dated (e.g. different publication dates) and undated references of the same standard are counted as one reference in this report. Furthermore, national adoptions are counted either as international if basis is IEC or ISO or regional standards if basis is e.g. an EN standard.

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1 – Executive summary

1.1 Main findings

This report reflects the current situation on fourteen national regulators' use of standards in their regulatory documents, with particular focus on the offshore petroleum industry. The main findings can be summarized as follows:

1) This report shows that regulators make good use of standards. 1,348 references to standards in total have been identified, whereas 1,140 of these references are to different, individual standard titles. In these numbers Russia has not been included and China has no specific references.
2) Of these 1,140 different standards, as many as 989 or 87% are referenced by one regulator only. This shows a wide spread in regulators references. This leaves only 13% of the standards to be referenced by two or more regulators.
3) These standards emanate from more than 60 different international, regional, national and industry standards development organisations around the globe.
4) There is a dominance of references to industry standards (44%), then to national standards (35%) and finally international standards third (21%) on a global basis. Compared with an earlier European analysis performed in 1996, there is a significant increase in the reference to international standards and a sharp decrease in references to national standards. Considering the European regulators only, the new analysis compared with 1996 analysis shows an increase from 16 to 38% reference to international standards and a decrease from 39 to 14% reference to national standards..
5) The regional source of the referenced standards is 40% from SDOs in America, 24% from Europe, 21% are international standards and 15% emanates from SDOs in India, Australia and New Zealand.
6) API standards are dominating, with 225 references, including 49 API Manual of Petroleum Measurement (MPMS) standards.
7) ISO has delivered 152 of the standards referenced by the regulators covered by this report and 59 of these come from the work of ISO/TC 67.
8) There is a set of standards referenced by regulators that cover same subject and thus duplicate each other. Examples of these are in the subject areas of offshore structures and pipelines.
9) Nearly all of the regulators examined make specific references to standards in their documents, with large variations in numbers referenced, from 5 to 393 references. However, there are many general references to standards in regulatory documents so all regulators examined expect standards to be used.
10) Most of the references are to undated revisions of standards, whereas some regulators, e.g. PSA, US MMS and USCG make reference to dated revision only.
11) Referenced standards appear to be voluntary in most of the regulatory regimes, in the sense that other technical solutions can be opted for provided proof of compliance can be documented.

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1.2 Main conclusions

The main conclusions based on these findings can be summarised as follows:

1) This report shows clearly that standards play an important role in the regulators technical definition of the safety level of oil and gas installations they regulate. In fact, the oil and gas industry and regulators cannot work effectively without using these standards.
2) The diversity of references provides a challenge for international operators in understanding and applying correctly all of these different references for the actual E&P activities in different countries.
3) Duplication of standards should be looked into for harmonization, with the objective of reducing the number of standards covering the same subject.
4) The oil and gas industry is able to directly influence the content of 380 of the standards listed in this report and therefore is largely responsible for their development and maintenance.
5) Whilst the references to international standards by the regulators on a global basis have increased to 21%, there is still more international standardisation effort to be done.

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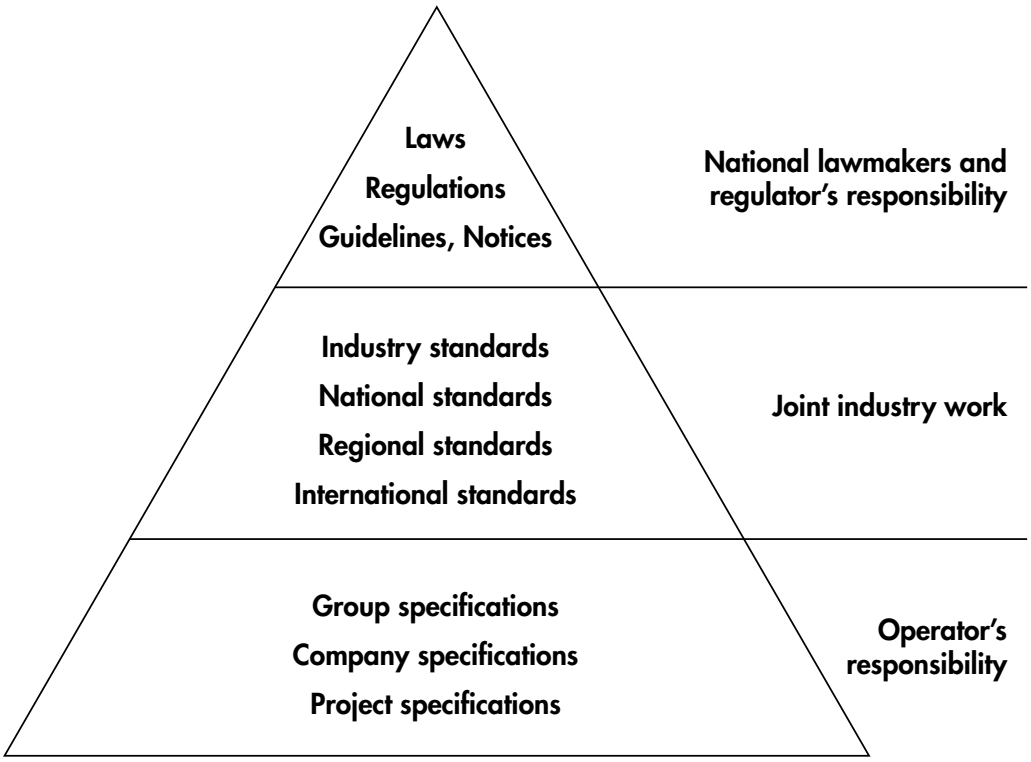
2 – Introduction

Standards are crucial for the technical definition of oil and gas installations, regardless of whether they are from national, regional, international or industry standard developing organisations (SDO). Good standards for all relevant areas make exploration, development and operation easier in an increasingly more complex and globalised industry. The global oil and gas industry makes use of several thousand standards, plus an even greater number of company and project specifications. An investigation done by CEN in 1994 assisted by OGP (E&P Forum at the time) revealed about two thousand standards in use by a number of operators in Europe only[1].

Regulations for the oil and gas industry are normally set by national regulators, with a few international exceptions such as ILO and IMO. This inadvertently leads to differences in regulations across the globe as they are written by different people of different background and culture, with potential for small or large differences in the technology to be applied. Most of the regulators use standards in defining their schemes, regulations, guidelines or other regulatory documents. The hierarchy of these documents is typically as shown in figure 1 below.

To develop and maintain these large volumes of standards requires a lot of resources to be delivered by their users and stakeholders. OGP has taken a keen interest in standards because they are important to OGP's members. To help focus and prioritising of resources, OGP has issued a position paper on the development and use of standards[2].

From an operator's point of view, an ideal situation would be to have the same technical requirements on a global basis with the necessary national adaptations to the prevailing conditions at the operating location. Hence the regulators use of standards is of interest to the members of OGP. This report seeks to investigate the current situation in this respect.



3 – Australia

Main regulator: National Offshore Petroleum Safety Authority (NOPSA)

Website: http://www.nopsa.gov.au

A NOPSA overview of the legislation is found at their website: *http://www.nopsa.gov.au/regs.asp*

3.1 Offshore OHS Legislative Framework – information paper

The legislative framework for occupational health and safety (OHS) of persons engaged in offshore petroleum operations is under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGSA 2006).

The OHS laws under this Act are:

- Offshore Petroleum (Safety) Regulations 2009

Schedule 3 to the OPGGSA 2006 imposes duties relating to OHS on a number of parties. The operator of the facility bears the principal duty in the regime. This duty is for the operator to take all reasonably practicable steps to ensure the facility and its activities are safe and without risk to health.

This is a performance-based regime typical of all modern OHS regimes, whether applying offshore or more generally at workplaces. These regimes impose general duties on parties to the regime, especially operators and employers. The principle underlying these performance-based, general duties regimes is: the primary responsibility for ensuring health and safety should lie with those who create risks and those who work with them.

Following the 1988 Piper Alpha disaster in the North Sea, the MoSOF regulations were made to introduce a safety case obligation to strengthen the implementation of the duty of care regime. In 2005 an independent national regulator, NOPSA, was established with bipartisan and tripartite support.

As noted in the Explanatory Memorandum to the Petroleum (Submerged Lands) Amendment Bill 2003: "The term 'safety case' is used to describe a sophisticated, comprehensive, integrated risk management system. This is characterised by an acceptance that the direct responsibility for the ongoing management of safety on individual facilities is the responsibility of the operators and not the regulator."

The role of the regulator in performance-based regimes is to provide independent assurance that health and safety risks are properly controlled by challenging the operator's risk management arrangements during safety case assessment and then verifying by planned inspection that the operator has implemented its risk management commitments documented in the safety case.

NOPSA commenced on 1 January 2005 with a clear set of functions set out in section 646 of the OPGGSA 2006, including:

- Promotion of OHS
- Monitoring and enforcement to secure compliance
- Investigating incidents
- Provide advice
- Cooperate with government agencies

These functions are discharged mainly through the following core activities: safety case assessment; planned inspection, and investigation of accidents & dangerous occurrences.

Safety Case Assessment:

The safety case is a regulatory requirement that forms part of the duty of care regime. The safety case documents the operator's commitments to reducing risks to a level that is as low as reasonably practicable. It is a document that describes the facility, provides details on the hazards and risks associated with the facility, the risk controls and the safety management system that will be used to minimise the risks. NOPSA assesses the operator arrangements in its decision to accept or reject

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the safety case. Once a safety case is accepted by NOPSA, the risk management commitments made by the operator must be complied with. These commitments are then verified by NOPSA during inspections of facilities.

Planned Inspections:

Planned inspections by NOPSA verify the risk management commitments of the operator as specified in its safety case. Planned inspections provide assurance that the operator is discharging its responsibility to manage risks to as low as reasonably practicable, based on the accepted safety case. NOPSA's planned inspections do not physically inspect every portion of the facility – rather they operate on a quality assurance basis. Planned inspections are a sampled evaluation of the safety management system and its implementation by the operator to manage the risks associated with the facility to a level as low as reasonably practicable. The operator is responsible for ensuring compliance with the safety management systems as laid out in its safety case.

Investigation:

Investigations are conducted when information obtained or received by NOPSA justifies seeking evidence of non-compliance with relevant OHS legislation as a basis for enforcement. All reports of accidents and dangerous occurrences are reviewed. Investigations can have either an administrative outcome, which is any outcome not involving prosecution, or a prosecution outcome. An administrative outcome includes enforcement such as a written warning or issuing an Improvement Notice.

An investigation will generally be conducted when:

- there is an accident that causes death or serious injury;
- there is an abandonment of a facility due to an emergency;
- there is an accident or dangerous occurrence which could easily have led directly to death or serious injury;
- there is an accident, dangerous occurrence or complaint which creates suspicion of a significant lack of compliance with relevant legislation;
- there is an accident, dangerous occurrence or complaint which creates suspicion of an immediate threat to health or safety; or
- the operator has a history of similar incidents or relevant enforcement.

In summary, the regime under the offshore OHS laws is a performance-based regime where the safe operation of the facility is the responsibility of the operator. It is regulated by a government inspectorate using the safety case as the basis for the operator's permission to operate.

3.2 Legislation and Regulations

NOPSA was legally established by amendments that were made to the Petroleum (Submerged Lands) Act 1967 of the Commonwealth (the PSLA 1967) by the Petroleum (Submerged Lands) Amendment Act 2003. Specifically, Part IIIC was added to the PSLA 1967 to establish NOPSA, set out its governance arrangements, and define its functions in relation to petroleum activities in Commonwealth waters. The Offshore Petroleum Act 2006 (OPA 2006) has replaced the PSLA 1967 and the OPA 2006 was subsequently replaced by the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGSA 2006).

Most States (including the Northern Territory) have made corresponding amendments to their PSLA 1982, so as to confer equivalent functions on NOPSA in relation to petroleum activities in State and NT designated coastal waters.

Schedule 3 to the OPGGSA 2006 establishes a modern occupational health and safety regime for petroleum activities at facilities (including pipelines) located in Commonwealth waters. The main features of the regime are:

Duties of care

Specific categories of persons (operators, employers, etc) who are involved in offshore petroleum activities at facilities are required to "take all reasonably practicable steps" to protect the health and safety of the facility workforce and of any other persons who may be affected

Consultation provisions

Mechanisms are set out that will enable effective consultation between each facility operator, relevant employers and the workforce regarding occupational health and safety

Powers of inspectors

NOPSA's OHS inspectors are granted powers to enter offshore facilities or other relevant premises, conduct inspections, interview people, seize evidence and otherwise take action to ensure compliance by parties with legal obligations.

A current compilation of the Offshore Petroleum and Greenhouse Gas Storage Act 2006 *(http://www.comlaw.gov.au/ComLaw/Legislation/ActCompilation1.nsf/all/search/B852B89FDB82AECACA25758D001909BD)* is available from the Commonwealth Law website.

Section 638 of the OPGGSA 2006 defines the laws that NOPSA and its OHS inspectors will administer and enforce in Commonwealth waters. These laws include Schedule 3 to the OPGGSA 2006, and the Offshore Petroleum (Safety) Regulations 2009.

3.3 New single set of safety regulations

A project undertaken by the Federal Department of Resources, Energy and Tourism (RET) to consolidate and update the safety-related regulations under the Offshore Petroleum and Greenhouse Gas Storage Act 2006 is complete. The new regulations are the Offshore Petroleum (Safety) Regulations 2009 and came into effect on 1 January 2010.

The consolidation repeals the Petroleum (Submerged lands) (Management of Safety on Offshore Facilities) Regulations 1996, the Petroleum (Submerged Lands) (Occupational Health and Safety) Regulations 1993, and the Petroleum (Submerged Lands) (Diving Safety) Regulations 2002 and amalgamates their contents into one set of regulations. In addition to the consolidation and the updating of references to the Act, there were a number of amendments including:

- Licensed pipelines are now required to have accepted safety cases. Safety-related aspects have been removed from the Petroleum (Submerged Lands) (Pipelines) Regulations 2001, including references to the Pipeline Safety Management Plan and NOPSA.
- Insertion of a list of vessels and structures that are not 'facilities' and a separate list of vessels and structures that are not 'associated offshore places'.
- New regulations for the nomination of operators of a shared facility – designed to anticipate situations where a petroleum facility may become a shared petroleum/greenhouse gas storage facility.
- An amendment to the Schedule relating to in situ asbestos. To be consistent with recent amendments to the Customs (Prohibited Imports) Regulations 1956 which remove import control that applies to ships and installations containing in situ amphibole or chrysotile asbestos under specific circumstances. The amendment complements occupational health and safety laws, and does not alter industry's obligations and responsibilities in respect of providing a safe workplace.
- An obligation on NOPSA to publish certain details of the operator register on its website.

The regulations together with an explanatory statement are available from the Federal Attorney General's Department Commonwealth Law website *(http://www.comlaw.gov.au/ComLaw/Legislation/LegislativeInstrument1.nsf/0/467E754ACD6EF9E6CA2576860006D5F6?OpenDocument)*.

NOPSA has produced a concordance table *(http://www.nopsa.gov.au/document/Register%20-%20Concordance%20Table.pdf)* that may assist in the navigation from the repealed regulations to the new regulations. This

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table was produce for NOPSA's own use and NOPSA does not guarantee the accuracy of the table for use by others.

3.4 State and Northern Territory laws

The NOPSA administered State and Northern Territory laws include:

Western Australia.

Schedule 5 of the PSLA 1982 and four sets of regulations. Each set of regulations corresponds to one set of the Commonwealth regulations listed above.

- View Act on WA Website *(http://www.slp.wa.gov.au/statutes/swans.nsf/5d62daee56e9e4b348256ebd0012c422/c7fc6f7abde7425a482565db0024261f/$FILE/Petroleum%20(Submerged%20Lands)%20Act%201982.PDF)*
- View OHS Regs on WA Website *(http://www.slp.wa.gov.au/legislation/statutes.nsf/main_mrtitle_1899_homepage.html)*
- View MoSOF Regs on WA Website *(http://www.slp.wa.gov.au/legislation/statutes.nsf/main_mrtitle_1904_homepage.html)*
- View Pipeline Regs on WA Website *(http://www.slp.wa.gov.au/legislation/statutes.nsf/main_mrtitle_1901_homepage.html)*
- View Diving Safety Regs on WA Website *(http://www.slp.wa.gov.au/legislation/statutes.nsf/main_mrtitle_1900_homepage.html)*

Victoria

Schedule 7 of the PSLA 1982 and the Petroleum (Submerged Lands) Regulations 2004. The single set of Victorian regulations corresponds to all four sets of Commonwealth regulations, and also addresses other matters.

- View Act on Vic Website *(http://www.legislation.vic.gov.au/Domino/Web_Notes/LDMS/PubLawToday.nsf/2184e627479f8392ca256da50082bf3e/c20c8c91c4afdefaca256f7a00124531/$FILE/82-9772a050.pdf)*
- View Regs on Vic Website *(http://www.legislation.vic.gov.au/Domino/Web_Notes/LDMS/PubLawToday.nsf/b12e276826f7c27fca256de50022686b/5F7871986B78879FCA25702F0021899B/$FILE/04-175sr002.pdf)*

Northern Territory.

Schedule 4 of the PSLA 1982, and the Petroleum (Submerged Lands) (Application of Commonwealth Laws) Regulations 2004. The NT regulations call up the relevant Commonwealth regulations.

- View Act and Regs on NT Website *(http://www.nt.gov.au/d/Minerals_Energy/index.cfm?header=Legislation)*

South Australia.

Schedule 7 of the PSLA 1982 and the Petroleum (Submerged Lands) Regulations 2005. The single set of South Australian regulations corresponds to all four sets of Commonwealth regulations, and also addresses other matters.

- View Act on SA Website *(http://www.legislation.sa.gov.au/LZ/C/A/PETROLEUM%20(SUBMERGED%20LANDS)%20ACT%201982.aspx)*
- View Regs on SA Website *(http://www.legislation.sa.gov.au/LZ/C/R/PETROLEUM%20(SUBMERGED%20LANDS)%20REGULATIONS%202005.aspx)*

(The mirror laws of Tasmania, Queensland and New South Wales are not yet fully in place.)

3.5 Safety levies

The Offshore Petroleum (Safety Levies) Act 2003 of the Commonwealth establishes the cost recovery regime through which NOPSA is funded. The Offshore Petroleum (Safety Levies) Regulations 2004 set out the methods of calculating the levies, and the procedures for payments. In addition to Commonwealth waters, the levies under this Commonwealth legislation relate to State and Northern Territory designated coastal waters. There is no equivalent State or NT levies legislation.

3.6 Changes to Levies Regulations

The following amendments to the Offshore Petroleum (Safety Levies) Regulations have been made effective from 1 January 2010:

- All instalments of levies become payable in arrears
- The facility rating for a large production platform with drilling/workover capability was increased from nine to 12
- The facility rating for a vessel or structure used for the erection, dismantling or decommissioning of a facility or for the provision of accommodation for persons working on another facility was decreased from five to three
- The minimum safety case levy and SMS amount payable for mobile facilities in any four consecutive quarters was reduced from two to one quarterly instalment
- The unit value was increased from $25,000 to $26,000.

For details of other relevant legislation, go to the following web sites:

- Commonwealth Law *www.comlaw.gov.au*
- Western Australian Law *www.slp.wa.gov.au/statutes/swans.nsf*
- Victoria Law *www.legislation.vic.gov.au*
- Northern Territory Law *www.nt.gov.au/dcm/legislation/current.html*
- South Australia Law *www.parliament.sa.gov.au/TheLaw/*
- Tasmanian Law *www.thelaw.tas.gov.au*
- Queensland Law *www.legislation.qld.gov.au/OQPChome.htm*
- New South Wales Law *www.legislation.nsw.gov.au*

This text is copied from *http://www.nopsa.gov.au/regs.asp* from the 12 January 2009 update. Please check the NOPSA website for the latest version.

3.7 Statement of standards in some regulations

The regulations require that the safety case and the pipeline management plan must include a statement about the Australian and international standards applied, or to be applied, to the design, construction, operation, modification and decommissioning of the facility or pipeline. It is therefore up to the responsible operator to select and specify the relevant Australian and international standards to be applied.

Petroleum (Submerged Lands) (Occupational Health and Safety) Regulations 1993 makes several references to the National Occupational Health and Safety Commission (NOHSC) standards, e.g.:

- NOHSC:1003 (1995) *National Exposure Standards for Atmospheric Contaminants in the Occupational Environment*
- NOHSC:1005 (1994) *National Model Regulations for the Control of Workplace Hazardous Substances*
- NOHSC:1008 (1999) Approved Criteria for Classifying Hazardous Substances
- NOHSC: 1007 (2000) *National Standard for Occupational Noise*

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- NOHSC: 2009 (2004) National Code of Practice for Noise Management and Protection of Hearing at Work
- NOHSC:10005 (1999) *List of Designated Hazardous Substances*

The NOHSC was a tripartite statutory body, with representation from governments, employers and employees. NOHSC was Australia's national body for occupational health and safety matters, leading and coordinating national efforts to prevent workplace death, injury and disease in Australia. NOHSC's functions were to provide a forum for the development of occupational health and safety (OHS) policies and strategies, to promote OHS awareness and to facilitate debate and discussion. NOHSC was replaced by the Australian Safety and Compensation Council (ASCC), shortly to be replaced by Safe Work Australia.

3.8 Guidance

Guidance notes are issued by NOPSA to advise industry on policy and procedure, and to assist inspectors in carrying out their duties. The current Guidance notes may be obtained from the index below.

> *DISCLAIMER: These Guidance notes are intended to provide general guidance to the industry as to the approach that NOPSA takes in carrying out its regulatory functions under powers conferred by the Commonwealth Offshore Petroleum and Greenhouse Gas Storage Act 2006, State and NT Petroleum (Submerged Lands) Acts and Regulations under those Acts. The Guidance notes should not be relied on as advice on the law, nor treated as a substitute for legal advice in any relevant situation.*

Guidance notes and advice on offshore safety issues issued by a number of regulators and industry organisations (*http://www.nopsa.gov.au/alert_resources.asp*) may also be of interest.

The Guidance may be obtained from *http://www.nopsa.gov.au/guideline* and include documents such as:

- GL0164 Pipeline Regulations
- GL0191 Noise Exposure Standard
- GL0238 Safety Case and PSMP Levies
- GL0525 Validation
- GL0225 Making Assessment Submissions to NOPSA
- GL0254 Asbestos Management
- GL0401 Noise Management – Principles of Risk Assessment and Control
- GN0106 Safety Case Content and Level of Detail.

These guidelines make general references to standards, such as the Guidelines to the Pipeline regulations, which simply states: The relevant standards used for the design, construction, operation, modification and decommissioning of the pipeline must be referenced.

GN0106, the Safety Case Content and Level of Detail makes reference to Reg 11: The safety case for a facility must specify all Australian and international standards that have been applied, or will be applied, in relation to the facility or plant used on or in connection with the facility for the relevant stage or stages in the life of the facility for which the case is submitted. Guidance is provided as follows: For some facilities, compliance with industry standards, codes or practices may play an important role in providing evidence that necessary and appropriate control measures have been identified. In principle, such standards may be Australian Standards, equivalents from overseas organisations, international industry practices such as those from the American Petroleum Institute, or company-specific standards. However, whichever standards are being used, these standards, and the control measures that they apply, should all be shown to be suitable and appropriate to the specific facility, taking account of its type, scale, activities, location, etc. It is common for an operator to adopt a suite of standards, perhaps taken from a number of different organisations. In such

cases, significant effort may be necessary to show that this overall suite of standards is suitable and appropriate, as well as the individual parts.

The Guideline on Noise Management is the only one which makes specific references to standards:

- AS/NZS 1269 Occupational Noise Management (parts 1-5)
- AS/NZS 1270 Acoustics – Hearing Protectors
- AS/NZS 1259 Acoustics – Sound Level Meters (parts 1-2)
- AS/NZS 4360 Risk Management.
- AS/NZS 4801 Occupational Health and Safety Management Systems
- ISO 15664 Noise Control Design Procedures for Open Plant
- NOHSC 2009 National Code of Practice for Noise Management and Protection of Hearing at Work
- NOHSC 1007 Noise Management – Principles of Risk Assessment and Control Revision:
- NOHSC 1991 Control Guide – Management of Noise at Work.
- OGP & IPIECA (2006). Controlling Health Risks at Work: A roadmap for the Oil & Gas industry Part 2 Health Risk Assessment (HRA): A sample template.

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4 – Brazil

Main regulator: Agência Nacional do Petróleo, Gás Natural e Biocombust'veis (ANP)

Website: http://www.anp.gov.br

4.1 Laws and regulations of the Petroleum Industry in Brazil

The National Agency of Petroleum, Natural Gas and Biofuels (ANP) was created by the Regulation of the Petroleum Industry in Brazil, Law no. 9478 of August 6, 1997, as an integral entity of the Indirect Federal Administration, under special autarchic regime, as a regulatory agency for the industry sectors concerning petroleum, natural gas and their products and biofuels, affiliated with the Ministry of Mines and Energy. One of the duties of ANP is to cause compliance with best practices in conservation of petroleum and natural gas and their products and of biofuels, rational utilisation of those items and conservation of the environment; (Wording of Law no. 11.097, 2005)

This law in Article 44 establish that the concession contract must establish that the concessionaire is obliged to adopt the best practices of the international petroleum industry and comply with the applicable norms, technical and scientific procedures, including appropriate recovery techniques, aiming at the production rationalisation, and control of reserves depletion.

By resolution No. 43 of 6th December of 2007, ANP has established a new regulation, *Sistema de Gestao de Seguranca Operacional (SGSO),* defining technical regulation of the management safety on maritime installations for drilling and production of oil and gas. Pipelines are excluded from these regulations. Seventeen management practices are defined:

1) Safety culture, commitments and managerial responsibility
2) Involvement of personnel
3) Qualification, training and personnel performance
4) Work environment and human factors
5) Selection, control and management of contractors
6) Monitoring and continued improvement of performance
7) Audits
8) Information and documentation management
9) Incidents investigation
10) Design, construction, installation and decommissioning
11) Critical operational safety elements
12) Risk identification and analysis
13) Mechanical integrity
14) Planning and management of major emergencies
15) Operational procedures
16) Management of change
17) Safe working practices and control procedures in special activities

In the management practices there are no specific, but a number of general references to codes and standards, such as:

4.2.1.1 The codes and standards related to the work environment and human factors should be identified and considered in the phases of design, construction, installation and decommissioning.

6.3 Monitoring. The operator of the installation will be responsible for:

6.3.2 Establishing means for periodic evaluation of the compliance with applicable safety legislation and standards.

10.2 Management and Organization. The operator of the installation must:

10.2.1 Observe the design criteria and consider the codes, industry standards and good engineering practices when planning the design, construction, installation and decommissioning.

10.2.2 Identify codes, standards and good engineering practices related to Operational Safety during the design, construction, installation and decommissioning phases.

10.2.3 Consider the codes, standards and good engineering practices related to Operational Safety during the installation items and equipments procurement process.

13.2 Inspection, Test, Maintenance and Procurement Planning. The Installation Operator will be responsible for:

13.2.1 Establishing plans and procedures for inspection, testing and maintenance, in order to ensure the integrity of its mechanical systems, structures, and Critical Operational Safety Equipments and Systems. This documentation must be aligned with the manufacturers' recommendations, codes, standards and good engineering practices.

14.3 Major Emergencies Response. The Installation Operator will be responsible for:

14.3.2 Establishing a training program that considers the members of the emergency response team. Other people exposed to accident scenarios must be trained at the procedures for alarm and evacuation at least. The requirements of international codes and standards for emergency response must be considered, as well as the practices adopted by other applicable regulations in Brazil.

16.2 Types of Changes. Changes in operations, procedures, standards, installations or personnel must be evaluated and managed in order to ensure that the risks remain at acceptable levels.

It is therefore up to the operator to select the codes and standards and good engineering practice that will be applied, as long as they comply with the general provisions of the regulations. The selection of codes, standards and good engineering practices will be documented by the operator, subject to ANP review and authorization before operation of the installations can commence.

The Directorate of Ports and Coasts (DCP) issues a number of documents to regulate the maritime traffic and operation of ships and offshore installations in Brazilian waters. Some of these so called Maritime Authority Standards (NORMAM) are applicable to FPSO and fixed installations. They are generally based on SOLAS and MODU Code and can be found at: *https://www.dpc.mar.mil.br/normam/tabela_normam.htm*. Here one will find requirements for design and outfitting of e.g. helidecks. Reference is also made to MARPOL 73/78 Convention.

The Brazilian Ministry of Labour and Employment (MTE) is responsible for a number of NR (Normas Regulamentadoras – Regulatory Norms) which establishes mandatory requirements to be followed in the design, construction and operation of industrial units and public or private facilities in Brazil. These norms are related to the safeguard of Brazilian workers, focusing on different health and safety aspects. Below is a list of some of these regulatory norms applicable to the offshore oil and gas industry:

NR 02 Previous inspection

NR 10 Safety in Electrical Installations and Services

NR 11 Material transportation, storage and handling

NR 12 Machinery and equipment

NR 13 Boilers and pressure vessels

NR 14 Furnaces

NR 23 Fire protection

NR 26 Safety signs

NR 30 Occupational Health and Safety at Waterways Work (draft addition in preparation)

None of the NRs make references to standards.

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Joint Ordinance, No. 1, of June 19, 2000 approves the Technical Measurement Regulation of Oil and Natural Gas that establishes the conditions and minimum requirements for the Oil and natural gas measurement systems in order to assure accurate and full results. These regulations refer specifically to standards shown in Annex I (attached hereto) and in section 1.3 in general to standards as follows:

> *"The Standards and Regulations to be met are mentioned under the corresponding items of the Regulation herein. Ordinance requirements, federal technical regulations, ABNT standards, OIML recommendations, ISO rules and other corresponding rules from other institutions shall be met, according to the following priority order."*

4.2 Brazilian committees – a brief explanation

Brazilian Government created in 1973 a system named SINMETRO – "Sistema Nacional de Metrologia, Normalização e Qualidade Industrial" or "National System for Metrology, Standardization and Industrial Quality". The activities of Metrology (Scientific and Legal), Conformity Assessment (including laboratories and inspections) and Standardization developed inside this system are recognized by the Brazilian Government that contributes with a large amount of money to help to support the system. The system activities are both in the voluntary and compulsory fields but the regulated activities for products and systems (including basic metrological units and legal metrology) must be developed inside it and follow its rules.

This system has a steering council named CONMETRO – "Conselho Nacional de Metrologia, Normalização e Qualidade Industrial" or "National Council for Metrology, Standardization and Industrial Quality". CONMETRO is fuelled by a number of advisory technical committees – CBM (Scientific Metrology), CBN (Standardization), CBAC (Conformity Assessment, including certification, inspection, test and calibration laboratories and personnel), CBL (Legal Metrology), CODEX (Codex Alimentarius) and OMC (Single Point for WTO).

The responsible institution by the administration of SINMETRO is INMETRO – "Instituto Nacional de Metrologia, Normalização e Qualidade Industrial" or "National Intitute for Metrolology, Standardization and Industrial Quality" which is the Executive Secretariat for CONMETRO. ABNT is the National Standardization Body recognised by this system and represents Brazil in the international and regional bodies.

The general aim of the system is to promote the improvement of the Brazilian industry quality and to establish stable rules to support the international insertion of Brazilian economy in the global market – including the observation of WTO rules. Nevertheless, some regulators from the Federal Government area, mainly some agencies from agriculture, environment, labor and telecommunication, have their own regulatory systems. Those systems follow the basic WTO rules but do not utilise the best modern international practices of regulation as the utilisation of minimum basic (essential) requirements and the use of standards as the basis for regulations.

For this reason CONMETRO decided to create inside SINMETRO the CBR – "Comitê Brasileiro de Regulamentação or 'Brazilian Regulation Committee'. The main aim of this advisory committee is to change experience among the agencies and to promote the adoption of the best modern international practices of regulation including the adoption of international, regional and international standards as basis of regulations where existing and possible.

5 – Canada

Main national regulator: National Energy Board

Website: http://www.neb-one.gc.ca

5.1 National Energy Board

The National Energy Board (NEB or Board) is an independent federal agency established in 1959 by the Parliament of Canada to regulate international and interprovincial aspects of the oil, gas and electric utility industries. The purpose of the NEB is to promote safety and security, environmental protection and efficient energy infrastructure and markets in the Canadian public interest within the mandate set by Parliament in the regulation of pipelines, energy development and trade.

The NEB operates under a variety of acts, regulations, rules, guidelines, guidance notes and memoranda of guidance. Most of these are published by the Board and are generally available free of charge in both official languages.

- Acts: *http://www.neb-one.gc.ca/clf-nsi/rpblctn/ctsndrgltn/ct/ct-eng.html*
- Amendments to Acts and Regulations: *http://www.neb-one.gc.ca/clf-nsi/rcmmn/hm-eng.html*
- Regulations and Guidelines pursuant to Acts other than the National Energy Board Act: *http://www.neb-one.gc.ca/clf-nsi/rpblctn/ctsndrgltn/rgltnsndgdlnsprsntthrct/rgltnsndgdlnsprsntthrct-eng.html*
- Rules, Regulations, Guidelines, Guidance Notes and Memoranda of Guidance pursuant to the National Energy Board Act: *http://www.neb-one.gc.ca/clf-nsi/rpblctn/ctsndrgltn/rrggnmgpnb/rrggnmgpnb-eng.html*

The Canadian Offshore and Onshore Regulators rely on national and international standards, guidance document, recommended practices in support of the regulations.

As an example, the Canadian onshore pipeline regulations reference the following standards:

- CSA Z662 Oil and Gas Pipeline Systems
- CSA Z341 Storage of Hydrocarbons in Underground Formations
- CSA Z276 LNG Production Storage and Handling
- CSA W178.2 Certification of Welding Inspectors

The Guidance Notes for the Design, Construction, Operation and Abandonment of Pressure Vessels and Pressure Piping makes specific references to:

- CSA Standard B51 Boiler, Pressure Vessel, and Pressure Piping
- CAN/CGSB-48.9712 Non-destructive Testing – Qualification and Certification of Personnel
- ASNT-SNT-1A Personnel Qualification and Certification in Non-destructive Testing
- ASME Safety Code.

These CSA standards further reference a wide variety of Canadian, American and other standards.

The Canada Oil and Gas Drilling Regulations (SOR/79-82) makes references to standards for drilling equipment as follows: The minimum acceptable standards for a derrick, mast, draw-works, mud pump and for related drilling rig equipment that is installed on a drilling rig are those standards that are equal or superior to the relevant specifications of the American Petroleum Institute

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National Energy Board Processing Plant Regulations, January 30, 2003, makes no references to standards, and generally states that "A company shall develop, implement and maintain detailed designs of its processing plant."

To date very few ISO standards have been referenced in regulations in addition to ISO 9001-2000 and ISO 14000. Several years ago the Canadian offshore operators and the regulators embarked on a program to participate in the development of the offshore structures standard under ISO TC67 SC7, for the purpose of harmonising with and adopting those standards in Canada. To date Canada has adopted:

ISO 19900	Offshore Structures – General Requirement
ISO 19901-1	Met Ocean Design & Operation
ISO 19901-2	Seismic
ISO 19901-4	Foundations
ISO 19901-5	Weight Engineering
ISO 19901-7	Station Keeping
ISO 19903	Concrete structures
ISO 19904-1	Floating Offshore Structures – Monohulls, Semi-Submersibles and Spars

The Canadian offshore regulations still reference the CSA-470 series of standards for offshore structures. These will be superseded by the ISO TC67 SC7 suite of standards on adoption by Canada.

There are regional regulators of which this report looks at two:

5.2 Canada-Nova Scotia Offshore Petroleum Board

Website: *http://www.cnsopb.ns.ca*

The Canada-Nova Scotia Offshore Petroleum Board is the independent joint agency of the Governments of Canada and Nova Scotia responsible for the regulation of petroleum activities in the Nova Scotia Offshore Area. It was established in 1990 pursuant to the Canada-Nova Scotia Offshore Petroleum Accord Implementation Acts (Accord Acts). The Board reports to the federal Minister of Natural Resources Canada in Ottawa, Ontario, and the provincial Minister of Energy in Halifax, Nova Scotia.

Hereafter follows some examples of regulations, requirements and guidelines:

Regulations

- Nova Scotia Offshore Area Petroleum Production and Conservation Regulations: *http://laws.justice.gc.ca/en/C-7.8/SOR-92-676/index.html/*
- Nova Scotia Offshore Petroleum Drilling Regulations: *http://laws.justice.gc.ca/en/C-7.8/SOR-92-676/index.html/*
- Nova Scotia Offshore Petroleum Installations Regulations: *http://laws.justice.gc.ca/en/C-7.8/SOR-95-191/index.html/*

Requirements

- CNSOPB Occupational Health and Safety Requirements – December 2000: *http://www.cnsopb.ns.ca/pdfs/OHSRequirments.pdf*

Guidelines

- Guidelines Respecting Drilling Programs in the Nova Scotia Offshore Area (April, 2001): *http://www.cnsopb.ns.ca/pdfs/DrillingGuideTextnsrev1.pdf*
- Operator's Safety Plan (1995): *http://www.cnsopb.ns.ca/pdfs/plansauthoriazations.pdf*

- Plans and Authorizations Required for Development Projects (1995): *http://www.cnsopb.ns.ca/pdfs/Frontierlands.pdf*
- Offshore Physical Environmental Guidelines, September 2008: *http://www.cnsopb.ns.ca/pdfs/Frontierlands.pdf*

As many other regulators, CNSOPB relies heavily on references to standards in their regulatory documents. Similar to the Canada-Newfoundland and Labrador Offshore Petroleum Board (CNLOPB), Joint Industry Practices, such as the Canada East Coat Petroleum Industry Safe Lifting Practices, are being used. The standards considered by this report are those referred to in the Petroleum Installations Regulations and the Offshore Area Petroleum Production and Conservation Regulations (SOR/95-190) are found in Annex A.

5.3 Canada-Newfoundland and Labrador Offshore Petroleum Board

Website: *http://www.cnopb.nfnet.com*

Newfoundland Offshore Petroleum Board has a mandate to interpret and apply the provisions of the Atlantic Accord and the Atlantic Accord Implementation Acts to all activities of operators in the Newfoundland and Labrador Offshore Area; and, to oversee operator compliance with those statutory provisions.

Hereafter follows some examples of regulations, guidelines and joint industry practices:

Regulations

- Petroleum Drilling
- Petroleum Installations
- Oil and Gas Operations
- Petroleum Production and Conservation

Guidelines

- Drilling Programs
- Measurement Under Production and Conservation Regulations
- Safety Plan Guidelines
- Drilling Equipment Guidelines
- Amendment #1 – Marine Riser System

Joint Industry Practices

- Canadian East Coast Petroleum Industry Safe Lifting Practices

As many other regulators, NOPB relies heavily on references to standards in their regulatory documents. The standards considered by this report are those referred to in the Petroleum Drilling, Petroleum Installations, Oil and Gas Operations and the Petroleum Production and Conservation Regulations are found in Annex A.

The NEB, CNLOPB and CNSOPB are working with the federal and provincial governments to undertake a "Frontier and Offshore Regulatory Renewal Initiative" (FORRI). FORRI is intended to move the current suite of primarily prescriptive regulations to regulations that are goal-oriented. To that end, the vast majority of those references noted in Annex A will eventually be stripped out of the regulations and placed in associated regulatory guidance documents for which compliance would not be legally binding. This will open up operators to identify the best standards to apply, whether they are national, regional, international or industry standards, and may be those referred to in the regulatory guidance documents, or alternates so long as compliance with the goal oriented regulations can be demonstrated.

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6 – China

National offshore company: China National Offshore Oil Corporation

Website: http://www.cnooc.com.cn/index.php?styleid=2

6.1 Chinese regulatory documents

China offshore oil industry is the first one opening to the outside world on every side after reform and opening of our country. On January 30 of the year 1982, Chinese State Council promulgated Regulations of the People's Republic of China Concerning the Exploitation of Offshore Petroleum Resources in Cooperation with Overseas Partners (hereinafter referred to as Regulations in brief) and decided to establish China National Offshore Oil Corporation (CNOOC), and Qin WenCai, Deputy Minister of the Ministry of Petroleum Industry, was appointed as President. CNOOC was legislatively granted an exclusive right of conducting oil exploration, development, production and selling and completely taking charge of the business on exploiting offshore oil resources in cooperation with overseas partners in our country's sea areas opening to the overseas partners. On 15 February 1982, CNOOC was formally established in Beijing. As of its foundation, CNOOC, as China's window opening to the outside world and a national oil corporation, has shouldered the important task of cooperating with overseas partners and developing China offshore oil.

Generally, the standards and regulations on China offshore oil industry are based on governmental supervision, auditing by the third party, and responsible for safety operation by the operators.

Exploitation of offshore oil resources

1) The Regulations of The People's Republic of China on the Exploitation of Offshore Petroleum Resources in Cooperation with Foreign Enterprises
2) Provisions of the Ministry of Petroleum Industry of the People's Republic of China for the Control of Data concerning the Exploitation of Offshore Petroleum Resources in Cooperation with Foreign Enterprises

Environmental protection

1) Regulations regarding Prevention and Control of Marine Pollution and Damage from Marine Construction Projects
2) Effluent Limitations for pollutants from offshore petroleum exploration and production
3) Regulations of The People's Republic of China on The Prevention of Vessel-Induced Sea Pollution
4) Regulations for management concerning sealing of the shipboard pollutant discharging equipment in the coastal waters

Safety regulations for offshore oil

1) Law of the People's Republic of China on Work Safety
2) Law of the People's Republic of China on Prevention and Control of Occupational Diseases
3) Announcement Of China Offshore Oil Operation Safety Office
4) Safety Rules For Offshore Fixed Platforms
5) The Provisions on the Survey of Offshore Oil and Gas Production Facilities of the Ministry of Energy of the People's Republic of China
6) The Provision of Safe Operations on Offshore Petroleum Industry
7) The Regulation of Safe Operation on Offshore Petroleum Industy

Policies List

1) The Provisions on the Survey of Offshore Oil and Gas Production Facilities of the Ministry of Energy of the People's Republic of China
2) The Safety Control Provisions on Offshore Petroleum Operations of the Ministry of Petroleum Industry of the People's Republic of China

3) Announcement Of China Offshore Oil Operation Safety Office
4) The Procedure of the Offshore Petroleum Operation. Approval of Geophysical Survey Vessel
5) The Procedure of the Offshore Petroleum Operation Approval of Pipe Laying Ship
6) The Procedure of the Operation Permission of Mobile Offshore Drilling Unit of the Ministry of Petroleum Industry
7) The Procedure of the Operation Permission of Production Installation of Offshore Oil (GAS) Field of the Ministry of Petroleum Industry
8) Well Control Requirements for Offshore Petroleum Operations
9) Safety Requirements in Hydrogen Sulphide Environment for Offshore Petroleum Operations
10) General Rules on the Safety Operation of Mobile Offshore Drilling Platforms and Oil (GAS) Production Installations

6.2 References to standards

These regulatory documents make references to standards in general with expressions such as:

- According to "Law of the People's Republic of China on Work Safety", article 16 requires "Production and business units shall have the conditions for work safety as specified by the provisions in the Law and relevant laws, administrative regulations and national standards or industrial specifications."
- General Rules on the Safety Operation of Mobile Offshore Drilling Platforms and Oil (GAS) Production Installations makes the following references:
  - 11.1: Labour protection articles conforming to the state standards should be provided with to each of the staff or operating personnel on board the Drilling Unit and Production Installation.
  - 13.1: They must conform to the Safety standards and requirements issued or approved by the State or the Ministry of Energy and ex-works certificates of safety inspection certificates must be available.
  - 13.2: Protection guards or other protective devices must be installed in accordance with specified standards for the uncovered rotating parts of the equipment which endanger the personal safety.
- Labour protection articles conforming to the state standards should be provided with to each of the staff or operating personnel on board the Drilling Unit and Production Installation.
- All equipment on board the Drilling Unit or Production Installation shall be in compliance with ...the Safety standards and requirements issued or approved by the State or the Ministry of Energy...
- Protection guards or other protective devices must be installed in accordance with specified standards for the uncovered rotating parts of the equipment which endanger the personal safety.

China Petroleum Standards Committee (CPSC) and China Petroleum Equipment Standards Committee (CPEC) both work under the auspices of Standardisation Administration of China (SAC), the China National Standards Developing Organisation. There are about 1,800 standards available from CPSC and CPEC for the petroleum industry, and some of these are Chinese adoptions (identical or modified) of ISO and API standards, and others are national (compulsory or voluntary) or industry (voluntary) standards developed by the CPSC and CPEC themselves.

There are thus no specific references to standards in the Chinese regulations. Operator and his selected Certifying Survey Agency are assumed to select the standards from the above mentioned 1.800 standards.

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7 – Denmark

Main regulator: Danish Energy Authority (Energistyrelsen)

Website: http://www.energistyrelsen.dk

7.1 Introduction

The Danish Energy Agency was established in 1976, and as of 23 November 2007 is an Agency under the Ministry of Climate and Energy. The Agency carries out tasks, nationally and internationally, in relation to the production, supply and consumption of energy. This means that the Agency is responsible for the whole chain of tasks linked to the production of energy and its transportation through pipelines to the stage where oil, natural gas, heat, electricity etc. are utilised for energy services by the consumer.

By establishing the correct framework and instruments in the field of energy, it is the task of the Danish Energy Agency to ensure security of supply and the responsible development of energy in Denmark from the perspectives of the economy, the environment and security. It is the task of the Danish Energy Agency to advise the minister, to assist other authorities, to administer Danish energy legislation and to conduct analyses and assessments of the development in the field of energy, nationally and internationally.

7.2 Acts and Executive Orders

The Danish legislation on health, safety and environment consists of acts and regulations (executive orders). The acts are passed by the Danish Parliament and are mainly framework acts giving a wide range of authority to the minister – or the institution he may appoint – to issue regulations.

The main legislation and executive orders pertinent to health and safety in the offshore sector for the purpose of this report is as follows:

- The Offshore Safety Act No. 1424 (21 December 2005) with underlying regulations, amended by Act No. 107 of February 7, 2007.
- The Subsoil Act No. 889 (4 July 2007) with underlying regulations
- The Oil Pipeline Act No. 1100 (18 November 2005) with underlying regulations
- The Continental Shelf Act No. 1101 (18 November 2005) with underlying regulations

Examples of Executive Orders:

- No. 686 of June 22, 2006 on Management of Safety and Health on Offshore Installations, etc.
- No. 688 of June 22, 2006 on Emergency Response, etc. pursuant to the Offshore Safety Act.
- No. 672 of June 21, 2006 on Design of Equipment on Fixed Offshore Installations

7.3 The Offshore Safety Act No. 1424

The Offshore Installations Act and the underlying regulations, notices and guidelines deals with health, safety and certain environmental matters on offshore installations. Most of the implementation of EU directives on occupational health and safety matters are made through these regulations and supporting documents. Paragraph 42 (and others) in this act declares in general that recognized norms and standards shall be followed.

> §42 Recognised norms and standards that are important to safety and health shall be followed... Norms and standards according to subsection (1) may be deviated from in cases where it is convenient for obtaining a higher level of health and safety or to be in keeping with the technical development. It is presumed by the deviation that health and safety risks are reduced as much as reasonably practicable.

7.4 Guidelines

A number of notices and guidelines are issued by The Danish Energy Authority on health, safety and environment, and the most relevant for this report is considered to be:

- Guidelines for the Design of Fixed Offshore Installations 2008.

This guideline makes references to a number of Danish, regional, industry and international standards. See Annex B.

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8 – Europe

Main regulator: European Commission (EC)

Website: http://ec.europa.eu/enterprise/standards_policy/index_en.htm

8.1 The "New Approach" Regulations

The "New Approach", defined in a Council Resolution of May 1985, represents an innovative way of technical harmonisation in Europe. It introduces, among other things, a clear separation of responsibilities between the European legislator and the European standards bodies CEN, CENELEC and ETSI in the legal framework allowing for the free movement of goods. European directives define the "essential requirements", e.g. protection of health and safety that goods must meet when they are placed on the market.

The New Approach and European standardisation have contributed significantly to the development of the Single European Market. The success of the European standardisation system, in removing technical barriers to trade, has played a vital role in ensuring the free movement of goods between European Member States.

8.2 Harmonised standards

The European standards bodies have the task of drawing up the corresponding technical specifications meeting the essential requirements of the directives. Such specifications are referred to as "harmonised standards" and they are European standards, adopted by CEN, CENELEC or ETSI, following a mandate issued by the European Commission after consultation of Member States, developed through an open and transparent process, built on consensus between all interested parties.

The "New Approach" directives are supported by "harmonised standards" which play a significant role in ensuring their application. Such standards have first the characteristics inherent to European Standards. Standards are adopted after a public inquiry with the national votes based on corresponding weighting features. Standards remain voluntary but their transposition into national standards and the withdrawal of diverging national standards is mandatory according to the internal rules of the European Standards Organisations.

Compliance with harmonised standards, of which the reference numbers have been published in the EC Official Journal and which have been transposed into national standards, provides presumption of conformity to the corresponding essential requirements of the EC directives. Compliance with harmonised standards remains voluntary, and manufacturers are free to choose any other technical solution that provides compliance with the essential requirements. In a number of cases compliance with harmonised standards also increases the options for conformity assessment procedures.

Where the Commission or the Member States consider that harmonised standards present shortcomings with respect to the essential requirements, the publication of the reference in the Official Journal can, in conformity with the procedures laid down in the directives, will be withdrawn by the Commission. In such cases, the harmonised standard will cease to provide a presumption of conformity.

An overview of the references of harmonised standards can be found in the "List of references of harmonised standards" available on internet. Although it is updated regularly, it may not be complete and only publication in the Official Journal produces legal affect. Read more at this weblink.

8.3 Relevant new approach directives

There are a number of new approach directives relevant for the offshore petroleum industry, such as:

No. of directive and amendments, with web link	Consolidated version of directive	Subject (short title of directive). Links to lists of references of harmonised standards and general information
87/404/EEC 90/488/EEC 93/68/EEC	87/404/EEC	Simple Pressure Vessels
2004/108/EC		Electromagnetic compatibility (EMC)
98/37/EC 98/79/EC 2006/42/EC	98/37/EC	Machinery
89/686/EEC 93/68/EEC 93/95/EEC 96/58/EC	89/686/EEC	Personal protective equipment (PPE)
94/9/EC		Equipment explosive atmospheres (ATEX)
97/23/EC		Pressure equipment

This information can be found at *http://ec.europa.eu/enterprise/policies/european-standards/documents/harmonised-standards-legislation/list-references/index_en.htm*

These directives are compulsory for the national EC and EFTA member states to take into their collections of applicable regulations, hence, these will together with their harmonised standards also apply for the offshore industry.

As an example Annex C provides a list of harmonised standards available for the Pressure equipment directive, 97/23/EC.

8.4 European standards for the oil and gas industry

European standards committee CEN/TC12 "Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries" has adopted most of the standards developed by ISO/TC67 as EN ISO standards for use in Europe[4].

It is important to note that the EN ISO documents are also published as national documents in all the European countries members of CEN within six month of the publication as EN ISO.

The vast majority of these national adoptions are identical to the EN standard as the possibilities for deviation or modification is very limited and contra dictionary to the intent of developing EN standard for Europe.

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9 – India

Offshore regulator for safety: Oil Industry Safety Directorate (OISD)

Website: http://www.oisd.gov.in/

9.1 Oil Industry Safety Directorate

Oil Industry Safety Directorate (OISD) is a technical directorate under the Ministry of Petroleum and Natural Gas that formulates and coordinates the implementation of a series of self regulatory measures aimed at enhancing the safety in the oil & gas industry in India.

To ensure proper implementation of various aspects of safety in the oil industry, Government of India decided to set up a 'Safety Council' at the apex in January, 1986 under the administrative control of the Ministry of Petroleum and Natural Gas as a special self regulatory industry agency for safety matters and procedures in respect of the hydrocarbon sector. Safety Council is headed by the Secretary, Ministry of Petroleum & Natural Gas, Government of India. Members of Safety Council are from the Petroleum Ministry, other Government regulatory agencies and CEO's from Public sector and Private sector of the Oil & Gas Industry.

The safety council is assisted by OISD headed by Executive Director who also acts as the Member Secretary of Safety Council. OISD is manned by a group of technical experts in the area of design, operations, maintenance, inspection, safety, environment etc. drawn from the oil industry.

9.2 Jurisdiction – upstream and downstream activities in the hydrocarbon industry.

Activities – major activities are Standardisation, External Safety Audits, Offshore Safety Regulations, Safety Awards, Training Programme/Workshop and Dissemination of Information.

In June, 2008, Government of India promulgated the Petroleum and Natural Gas (Safety in Offshore Operations) Rules, 2008 for regulation of safety in offshore oil & gas exploration, exploitation, production and related activities. OISD has been designated as competent authority to exercise powers and functions as stipulated in the Petroleum and Natural Gas (Safety in Offshore Operations), Rules, 2008.

These rules follow goal setting approach. Functional requirements have been given in the rules which among other things, refer to safety related issues without specifying any particular solution to be adopted. The rules will be supplemented by guidance notes, wherever required. The guidance notes will indicate possible solutions for complying with the requirements arising out of the rules. The operator can choose a solution other than those mentioned in the guidelines as long as it meets the functional requirement. Solution chosen by the operator shall be based on customary practice in the industry, requirements and specifications emerging in other documents such as nationally and internationally recognised standards (e.g. standards like API, ISO, NORSK), codes and conventions (e.g. MARPOL, SOLAS, etc.). Rules require that the operator himself shall define requirements and specification for his own activities in order to comply with functional requirements of the rules. The operator's own requirements and additional requirements suggested by OISD, if any, shall be binding and will constitute the basis of the supervision carried out by the competent authority.

These rules make references to standards in general, with statements such as:

- designing, constructing, installing and maintaining the installation in accordance with recognised standards;
- ensure safe storage, transport and handling of toxic and radioactive substances in accordance with applicable standards;
- accumulator for surface and sub surface well control equipment shall have minimum usable fluid capacity as per industry standards in order to perform closing and opening sequences as applicable to secure the well.

- the blow out preventer with associated valves and other pressure control equipment on the facility shall be subjected to a complete overhaul and shall be recertified at regular intervals based on original equipment manufacturer's recommendations and international standards and recommended practises.
- diving safety management system is based on relevant international recognised standards and guidelines and inter alia includes design, inspection, maintenance and testing of diving plant and equipment, training of diving personnel, hazard analysis including collision avoidance, safe practices manual and operational procedures during various stages of diving.
- the licensee, the lessee, or as the case may be, the operator shall ensure that floating facilities are in accordance with the requirements contained in the applicable standards concerning stability, water tightness and watertight and weather tight closing means on mobile offshore units.

9.3 OISD Standards

Standardisation is one of the major activities of OISD. It is required to keep abreast of the latest design and operating practices in the areas of safety and fire fighting in the hydrocarbon processing industry in the developed countries so as to develop standards and codes that would be suitable for the conditions in India. OISD standards are reviewed periodically to incorporate the latest technological development and experience gained in their implementation so as to update them in line with the current international practices. Six and five OISD standards have been included in 'The Petroleum Rules' and 'The Gas Cylinder Rules' respectively, promulgated by the Government of India.

OISD has published number of standards and recommended practices etc. for use by the Oil and Gas Industry. These standards are intended to supplement rather than replace the prevailing statutory requirements. A list of these OISD standards is found in Annex D1. Eleven (11) OISD standards are presently part of the regulatory framework.

The OISD standards/guidelines/recommended practices which will be referred to in the guidance note to the Petroleum and Natural Gas (Safety in Offshore Operations) Rules, 2008, will come within the ambit of regulatory framework.

The OISD standards (ST), guidelines (GDN) and recommended practises (RP) make references to national Indian BIS standards, but mostly to common oil industry standards, such as API, ANSI, ASA, ASME, IADC, ISO, NACE, NFPA, NORSOK etc. these are included in Annex D2.

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10 – Italy

Main regulator: Ministry of the Economic Development (Ministero dello Sviluppo Economico),

Website: http://www.sviluppoeconomico.gov.it/

The main regulator body in Italy is the Ministry of the Economic Development (Ministero dello Sviluppo Economico – MES. The Department of the Energy and Mineral Resources (Direzione generale per l'Energia e le Risorse Minerarie – DGERM) and the Mining National Office for Hydrocarbons and Geothermal Sources (L'Ufficio Nazionale Minerario per gli Idrocarburi e la Geotermia – UNMIG) are involved in MES for regulation in petroleum and natural gas field.

The regional regulator in Sicily for petroleum industry is the Regional office for Hydrocarbons and the Geothermal Sources (Ufficio Regionale per gli Idrocarburi e la Geotermia – URIG) of the Regional Body of Mines (Corpo Regionale delle Miniere – COREMI).

References to technical standards in general and to ISO/TC67 standards in particularly are exceptions in the Italian laws. Standards are voluntary in Europe and can be part of a contract only. According to the European Procurement directive (in Italy D.Lgs 163/2006, art.68) local standards (usually harmonised with European standards) have a priority, then International standards and widely used industrial/national standards.

As an exception the Directive of Ministry (DM 29 November 2004) "Riconoscimento di idoneità di raccomandazioni tecniche o norme di altri paesi ai sensi dell'art. 30 comma 4, del D.Lgs 624/96" gives the acknowledgment of suitability of technical recommendations or norms of other countries for the law used in the petroleum sector of Italy. The Italian law recognised, as the best practice, API standards which are referenced in the DM 29 November 2004.

A list of API standards is cited in the Annex 1 of the above Directive of Ministry:

- series 4 "Derricks and Masts" (Spec 4F and RP 4G),
- series 6 "Valves and Wellhead Equipment" (Spec 6A, Spec 16A and Spec 16D),
- series 7 "Drilling Equipment" (RP 7L),
- series 8 "Hoisting Tools" and
- series 9 "Wire Rope".

Some of them are already adopted with ISO/TC67, CEN/TC12 and UNI standards:

- API Spec 6A with modified ISO, EN and UNI 10423,
- API Spec 16A with modified ISO, EN and UNI 13533,
- API Spec 8C with modified ISO, EN and UNI 13535,
- API Spec 9A with identical ISO and UNI 10425.

This Annex to the Italian law recognises best practices widely used in the petroleum sector of other countries that simplifies an approval procedure for petroleum projects in Italy. However, these recommendations are not mandatory and the Italian oil industry can now use also corresponding local standards harmonised with European and International standards.

11 – The Netherlands

Main regulator: State Supervision of Mines (SSM)

Website: www.sodm.nl

11.1 State Supervision of Mines

State Supervision of Mines (an executive agency of the Ministry of Economic Affairs) supervises on- and offshore mining activities (oil, gas, salt exploration and production and terrestrial heat and underground storage of substances i.e. CO_2) focused on safety, health, environment, optimal use of mineral resources, controlling earth movement, e.g. subsidence. It is also responsible for the supervision of the safety of the gas transportation systems in the Netherlands.

11.2 Legislation

Hybrid regulatory approach; combination of prescriptive and goal-setting legislation in combination of industry standards

As from 1 January 2003 the new mining legislation (Mijnbouwwetgeving) consisting of the Mining Act, the Mining Decree and the Mining Regulation became effective. As a result of this the health and safety related issues for E&P industry are since 1 January 2003 integrated in the Working Conditions legislation (Arbeidsomstandighedenwetgeving). This legislation is now applicable to mining activities on the Dutch territory and the Dutch continental shelf. Furthermore SSM carries out integral supervision and is therefore also responsible for the enforcement of the following laws (including Decrees and Regulations): Working Hours, Environmental, Goods , Water Supply, Metrology, Gas and Nuclear.

The mining regulations of Netherlands, effective 1st January 2003, make specific references to a few standards i.e.:

- API Spec 17J Unbonded flexible pipe
- DIN 4150 Structural vibration
- NEN 3650 Requirements for pipeline systems
- NEN 6675 Determination of mineral oil content by infrared spectroscopy

11.3 Government initiative to increase use of standards

As from 1st January 2007 the revised Working Conditions Act (Arbeidsomstandighedenwet) became effective. The most important changes are:

- More responsibility for both employers & employees for the company working conditions policy
- Less regulations.

The public domain (Government) encompasses Working Conditions Act, Decree and Regulations is goal- setting. The private domain (employers and employees) have to demonstrate which methods or means are used in order to comply with the goal-setting requirements of the Government. This is achieved by the use of good practices, practical guidelines, covenants and industry standards (NEN-EN-ISO-CEN).

The government exercises restraint regarding including standards in laws. It stimulates the industry to develop their own standards and supervises compliance on these adopted standards. An example of such initiative is development of the NTA 8120, Dutch standard for gas distribution asset management, based on UK PAS55 standard.

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11.4 NOGEPA Guidelines

NOGEPA has developed some tools to make the new mining legislation more easily accessible. These tools, the NOGEPA Procedure Guide and the NOGEPA Operational Workbook, are available for free to NOGEPA members from as@nogepa.nl. NOGEPA is currently working on the NOGEPA Guide to the Mining and Health & Safety legislation. Like the Procedure Guide and the Operational Workbook this guide will be to members available free of charge.

12 – New Zealand

Main regulator: Department of Labour

The Department of Labour (DoL) website is: http://www.dol.govt.nz/.

The Department of Labour health and safety website is: http://www.osh.dol.govt.nz/.

12.1 Legislation

The primary concern of the Department of Labour (DoL) is the safety of people. The DoL is not therefore involved in issues such as permitting or the environment.

The Crown owns the in-ground petroleum resource and any company wanting to prospect, explore or mine petroleum in New Zealand must obtain a permit from Crown Minerals under the Crown Minerals Act 1991. This includes petroleum on the New Zealand continental shelf and coal seam gas. The Crown Minerals Act 1991 is accompanied by other important pieces of legislation:

The Minerals Programme for Petroleum 2005 establishes the policies, procedures and provisions to be applied under the Crown Minerals Act 1991. This includes details of the permitting and royalty regimes.

Under the Health and Safety in Employment Act 1992 there is a general requirement to ëtake all practicable steps' to ensure safety. If there was a requirement to test whether all practicable steps had been taken, then it would generally be appropriate to check to see if best industry practice was being followed. This may involve consideration of whether appropriate codes and standards had been adopted and implemented.

12.2 Environmental management

The New Zealand system of environmental management is intended to be integrated, consistent, and effects-based. The Resource Management Act 1991 (RMA) is the core of the legislation intended to help achieve environmental sustainability. The Act's purpose is to promote the sustainable management of natural and physical resources by setting out the management of the environment, including air, water, soil, biodiversity, the coastal environment, noise, and land use planning in general. The Ministry for the Environment is responsible for administering the RMA. The Act applies onshore and offshore out to a 12 nautical mile boundary.

The Maritime Transport Act 1994 provides for the management of the marine environment beyond the 12-nautical mile boundary out to the 200-nautical mile boundary, as well as providing for health and safety matters to seafarers and obligations to international maritime agreements and conventions. The Act is administered by the Maritime Safety Authority.

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12.3 Health and safety Regulations for the extractive sector

Regulations have been made under the Health and Safety in Employment (HSE) Act that provide for safety and health in the petroleum and gas industry and in underground mining. The regulations concerned are the:

- HSE (Petroleum Exploration and Extraction) Regulations 1999
- HSE (Pipelines) Regulations 1999
- HSE (Mining – Underground) Regulations 1999
- HSE (Mining Administration) Regulations 1996
- Geothermal Energy regulations 1961, Amendment No. 6

The regulations may be found at *http://www.legislation.govt.nz*.

The Health and Safety in Employment (Pipelines) Regulations 1999, made under the Health and Safety in Employment Act 1992, replace the Petroleum Pipelines Regulations 1984. These regulations concern matters relating to health and safety in the operations of pipelines and typically apply to pipelines carrying gas or oil from production facilities to distribution points.

Onshore pipelines used for the transmission of hydrocarbons are outside the scope of the petroleum regulations and pipeline issues are dealt with by the engineering safety group (Engineering Safety, Department of Labour, Wellington).

The Health and Safety in Employment Act 1992 is the main health and safety legislation in New Zealand. Various regulations are made under the HSE Act including the Health and Safety in Employment (Petroleum Exploration and Extraction) Regulations 1999. These regulations define duties relating to petroleum operations, both onshore and offshore.

The Department of Labour administer the Health and Safety in Employment Act and Regulations.

12.4 Safety Regulations

The Health and Safety in Employment (Petroleum Exploration and Extraction) Regulations 1999 sets out the safety requirements as follows:

Part 1 – Duties relating to all petroleum operations

Part 2 – Duties relating to well-drilling operations

Part 3 – Duties relating to installations

Part 1

includes the Design, construction, operation, maintenance, suspension, and abandonment standards in §12:

1) Subject to subclause (2), an employer must take all practicable steps to ensure that the petroleum operation is designed, constructed, operated, and maintained, and suspended or abandoned (as the case may be), in accordance with the appropriate part or parts of:
   a) The Institute of Petroleum Model Code of Safe Practice in the Petroleum Industry, in particular:
      i) Part 1, Electrical Safety Code 1991; and
      ii) Part 4, Drilling and Production Safety Code for Onshore Operations 1986; and
      iii) Part 8, Drilling and Production Safety Code for Offshore Operations 1990; and
      iv) Part 15, Area Classification Code for Petroleum Installations 1990; or
   b) The International Maritime Organisation Code for the Construction and Equipment of Mobile Offshore Drilling Units 1989; or

c) The International Maritime Organisation International Convention for the Safety of Life at Sea 1974.

2) If the documents referred to in subclause (1) are not applicable to any part of the petroleum operation, the employer must take all practicable steps to ensure that that part of the petroleum operation is designed, constructed, operated, and maintained, and suspended or abandoned (as the case may be), in accordance with generally accepted and appropriate industry practice.

Note: Institute of Petroleum (now Energy Institute) Model Code of Safe Practice Part 4 and 8 are no longer in their catalogue of EI publications. Part 1 and 15 remain.

Part 2

includes the Duties relating to well-drilling operations in §13-20:

E.g. Casing of wells states that: An employer must take all practicable steps to ensure that wells are cased (a) With casing materials conforming to generally accepted and appropriate industry practice.

Part 3

includes the Safety case requirements in §22:

(1) Subject to regulation 23, an employer must take all practicable steps to ensure that a safety case containing the relevant particulars set out in Schedule 4 is prepared for:

a) The design and construction of an installation; and

b) The operation of an installation; and

c) The abandonment of an installation.

Particulars to be included in safety case for installation include a.o. particulars of the main requirements in the specification for the design of the installation and its plant and equipment, including any codes of practice to be complied with and any limits for safe operation or use (Schedule 4, Part 1.10).

There is no specific reference to standards as such in the regulations, other than what can be derived from 'good oilfield practice' and as mentioned above.

12.5 Health and Safety in Employment (Pipelines) Regulations 1999 (SR 1999/350)

PURSUANT to section 21 of the Health and Safety in Employment Act 1992, His Excellency the Governor General, acting by and with the advice and consent of the Executive Council, makes the following regulations. In clause 8 Design, construction, operation, maintenance, suspension, and abandonment standards the following codes and standards are listed:

1) Subject to subclause (2), an employer must take all practicable steps to ensure that the pipeline operation is designed, constructed, operated, and maintained, and suspended or abandoned (as the case may be), in accordance with the appropriate part or parts of:

   a) NZS/AS 2885, Pipelines Gas and Liquid Petroleum, comprising:

      i) 2885 1 Part 1: Design and Construction, 1997; and

      ii) 2885 2 Part 2: Welding, 1995; and

      iii) 2885 3 Part 3: Operation and Maintenance, 1997; or

   b) NZS 5223, Code of Practice for High Pressure Gas and Petroleum Liquids Pipelines 1987; or

   c) The provisions of ANSI B 31, American National Standards Institute Code for Pressure Piping, comprising:

      i) ASME B 31.3:1999, Chemical Plant and Petroleum Refinery Piping, 1990; and

      ii) ASME B 31.4:1998, Liquid Transportation Systems for Hydrocarbons, Liquid Petroleum Gas, Anhydrous Ammonia, and Alcohols, 1989; and

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iii) ASME B 31.8:1995, Gas Transmission and Distribution Systems, 1989; or

d) The Institute of Petroleum Pipeline Safety Code (IP Part 6), 1982.

2) If the documents referred to in subclause (1) are not applicable to any part of the pipeline operation, the employer must take all practicable steps to ensure that that part of the pipeline operation is designed, constructed, operated, and maintained, and suspended or abandoned (as the case may be), in accordance with generally accepted and appropriate industry practice.

In these two regulations there are specific and dated references to codes and standards.

12.6 Guidelines

There are guidelines, but only one have been found to be specifically related to the offshore industry, Guidelines for a Certificate of Fitness for High-Pressure Gas and Liquids Transmission Pipelines. All guidelines are available from the Department of Labour website: *http://www.osh.dol.govt.nz/order/catalogue/index.shtml*.

All the guidelines contain the best guidance available at the time of publishing. However, one should consider the effect of any changes to the law since then. Readers are encouraged to see information pages on HSE Act (*http://www.osh.dol.govt.nz/law/hse.shtml*) and HSNO Act (*http://www.osh.dol.govt.nz/law/hsno.shtml*) and also check that the Standards referred to are still current. Refer to *http://www.standards.co.nz*.

There may also be useful information in the Publications Archive (*http://www.osh.dol.govt.nz/order/catalogue/archive.shtml*). This is mostly older material that does not reflect changes in technology or industry practice. The Archive also contains earlier editions of some current publications.

Note in particular that many of the Approved Codes of Practice were issued prior to the HSE amendment and a number of the standards they refer to are now out of date. Any amendments to or revocation of an approved code of practice must be approved by the Minister.

The Guidelines for a Certificate of Fitness for High-Pressure Gas and Liquids Transmission Pipelines was published February 2002. Standards or Codes applicable to existing transmission pipelines and associated equipment in operation in New Zealand include the following:

- US Minimum Federal Safety Standards for Gas Lines – Part 192
- ASME B31.3 *Chemical Plant and Petroleum Refinery Piping*
- ASME B31.4 *Liquid Transportation Systems for Hydrocarbons, Liquid Petroleum Gas, Anhydrous Ammonia, and Alcohols*
- ASME B31.8 *Gas Transmission and Distribution Systems*
- IP Part 6 *Institute of Petroleum Pipeline Safety Code*
- NZS 5223 *Code of Practice for High Pressure Gas and Petroleum Liquids Pipelines*
- NZS/AS 2885 *Pipelines – Gas and Liquid Petroleum*.

The owner/operator of a new pipeline will specify the Standards or Codes applicable to the pipeline. Preference should be given to adopting the NZS/AS 2885 Pipeline Standard. This Standard requires a risk assessment in the design phase, and was initially adopted as a NZS/AS Standard to replace the outdated New Zealand Standard NZS 5223. The NZS 5223 Standard is still referenced in the HSE (Pipelines) Regulations 1999 as it is still applicable to existing pipelines, but should be discouraged

from use for new pipeline projects. The Code or Standard used for the design and construction phases of the pipeline may differ from the Code or Standard adopted for the operation and maintenance, however a written justification should accompany such a decision.

12.7 Approved code of practices

The HSE Act allows for the development and approval of statements of preferred work practice, known as "approved codes of practice". These are recommended means of compliance with the requirements of the Act, and have been developed after consultation with the industry or industries concerned. They are approved by the Minister of Labour after consultation with affected groups and individuals.

A code of practice applies to anyone who has a duty of care in the circumstances described in the code - which may include employers, employees, the self-employed, principals to contracts, owners of buildings or plant, and so on.

An approved code does not necessarily contain the only acceptable ways of achieving the standard required by the Act. But, in most cases, compliance will meet the requirements of the Act, in relation to the subject matter of the code.

An approved code does not have the same legal force as a regulation, and failure to comply with a code of practice is not, of itself, an offence. However, observance of a relevant code of practice may be considered as evidence of good practice in a court.

Approved Code of Practice for Pressure Equipment, as an example, refers to a number of Australian, British, International, American and other standards. Ref. Annex E.

Information on Approved Codes of Practice is given on the Department of Labour website at: *http://www.osh.govt.nz/law/hse-acop.shtml*. This site includes a link to a list of approved codes of practices.

12.8 Good oilfield practice

A key provision in the New Zealand acts and regulations is the reference to explore and develop the petroleum resource in accordance with good exploration and mining practice (also referred to as good oilfield practice) and it is pointed out that the Minister, when approving the applications for permits will have regard to international considerations in this respect.

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13 – Norway

Main regulator: Petroleum Safety Authority (Petroleumstilsynet)

Website: http://www.ptil.no

13.1 Petroleum Safety Authority Norway

The Petroleum Safety Authority Norway (PSA) is responsible for developing and enforcing regulations which govern safety and working environment in the petroleum activities on the Norwegian continental shelf and associated land facilities. The regulations assume that the activities maintain prudent health, environmental and safety standards. They are developed to be a good tool for the industry and for the authorities' supervision. Therefore, the regulations contain a large degree of functional requirements where standards and norms specify the regulations' level of prudence.

Therefore, the Norwegian offshore regulations rely heavily on national and international standards. An effort was made a few years back to revise the regulations to become functionally, with guidelines to suggest how the regulations could be fulfilled. This effort resulted in a significant reduction of regulatory text (from 1200 to 300 pages) on account of references to standards. In the same timeframe some of the text in the previous regulations was used as basis for the development of the industry NORSOK standards.

This report provides some excerpts from the five main Norwegian offshore regulations with guidelines and their way of making use of and references to industry standards and norms, including lists of these references as of October 2008.

The Framework Regulation of 31 August 2001 (revised 6 June 2008) is jointly issued by Petroleum Safety Authority Norway (PSA), Norwegian Pollution Control Authority (SFT) and Norwegian Social and Health Directorate (NSHD).

The guidelines to the respective regulations recommend solutions, inter alia in the form of industry standards, as a means of fulfilling the requirements contained in the regulations. The recommended solution becomes the recognised norm by way of this recommendation in the guidelines to the regulations. If a recommended solution is opted for, it will constitute a key basis for documenting fulfilment of official requirements. First, some general principles are included in Section 8 on Prudent petroleum activities in the guidelines in the Framework Regulations (*http://www.ptil.no/framework-hse/category408.html#_Toc249166723*), which reads as follows:

> "This is a fundamental provision for the petroleum activities, and it largely carries forward current law, cf. inter alia the Petroleum Act Section 10-1 and the Working Environment Act Section 4-1, cf. also the other sections of Chapter 4 and the previous Safety Regulations Section 9 on prudent activities which applies in both the health and safety area. As regards health-related aspects attention is drawn to Section 12 on health related matters with comments. The term "prudent" as used here entails no substantive change in relation to the term "fully satisfactory" as employed in the Working Environment Act. The term 'activity/activities' as used here means the same as in the Working Environment Act, i.e. it is approximately synonymous with "establishment" or "undertaking". The requirement of the first paragraph as to an overall assessment is based on the conception of a coherent view of health, environment and safety for the individual activity. The opportunity to undertake coherent assessments will vary from activity to activity based on what factors are to be taken into account. The first paragraph second sentence states that in addition to other relevant factors account shall be taken of the activity's distinctive characteristics, local conditions and operational premises. The outcome of an individual and overall assessment may for example be that factors such as noise and climatic conditions should not be regarded as isolated factors, and that the responsible person should as far as possible assess the overall strain that the individual factors may entail. In the sphere of the Working Environment Act the requirement addresses all factors that may have a bearing on the employees' physical and mental health and welfare. What measures the individual activity needs to initiate to fulfil the requirement as to

> prudent petroleum activities follows from the requirements of the health, environment and safety legislation. However, the requirements must be viewed in relation to the fact that levels of health, environment and safety should be further developed, inter alia in relation to technological developments, cf. the second paragraph and the authorising acts' purpose clauses.
>
> It follows from the Petroleum Act, the Pollution Control Act, the Working Environment Act and the health legislation that the level of health, environment and safety described in the second paragraph should be developed in step with technological developments, and also with the general development of society, cf. the purpose clauses and requirements as to satisfactory/prudent activities in the authorising acts.
>
> In order to lay the basis for this to happen the authorities have largely turned to the regulations' function requirements, which describe what is to be achieved rather than provide concrete solutions. At centre-stage when establishing the regulations' required level of health, environment and safety is, alongside the wording of the regulations, the authorities' interpretation of the body of rules, individual decisions made and guides provided by the authorities. Customary practice in the industry, requirements and specifications emerging in other documents such as nationally and internationally recognised industrial standards, for example standards drawn up under the auspices of CEN, CENELEC, ISO AND IEC, will also be normative. The same applies to industry standards prepared under the auspices of NORSOK and API etc. In addition, there are rules drawn up by classification institutions, and rules drawn up by other public authorities that do not apply directly to petroleum activities but which nonetheless are relevant to the area in question. The same is true of official requirements that are not directly applicable to petroleum activities but regulate corresponding or contiguous areas, for example requirements laid down by the Maritime Directorate, the Labour Inspection, etc.
>
> Other Norwegian legislation may also be relevant as a source of law for supervision of petroleum activities. Attention is drawn to the Petroleum Act Section 1-5 which gives other Norwegian law effect in petroleum activities.
>
> Attention is drawn to Section 18 on documentation as regards the use of standards in the health, work environment and safety area that the Norwegian authorities recommend in comments to the supplementary regulations."

The Framework Regulations Section 18 on documentation and the appropriate guidelines, with quotes as follows.

> "When the party responsible makes use of a standard recommended in the guidelines to a provision of the regulations, as a means of complying with the requirements of the regulations in the area of health, working environment and safety, the party responsible may as a rule take it that the regulation requirements have been met.
>
> When other solutions than those recommended in the guidelines to a provision of the regulations are used, the party responsible shall be able to document that the chosen solution fulfils the requirements of the regulations. Combinations of parts of standards shall be avoided, unless the party responsible is able to document that an equivalent level of health, working environment and safety is achieved."

The Guidelines to Section 18 Documentation reads a.o.:

> "The guidelines to the regulations provide guidance on the requirements of the regulations designed to promote understanding of and compliance with the requirements, including suggestions as to how the requirement can be complied with. This does not prevent standards or other recognised norms from being applied where relevant in order to fulfil a requirement set out in the body of rules, so long as the requirement is met."

Application of recommended standards in the area of health, working environment and safety

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The authorities' recommended solutions are stated in the comments to the individual sections of the supplementary regulations. The authorities recommend use of various industrial standards or other normative documents, in the event with supplementary items contained in the comments, as a means of fulfilling the regulations' requirements. Normative documents are referred to by date of publication and publication/revision number, for example NORSOK R-003N Lifting equipment operations, Revision 1, October 1997. The recommended solution becomes the recognised norm by way of this reference in the comments to the regulations. In areas where no industry standards have been published, or such standards have not be regarded as satisfactory, the authorities in certain cases offer in the comments to the provisions solutions that indicate ways of fulfilling the requirements. Such recommendations have the same status as the recommended industrial standards mentioned above. According to the second paragraph, the party responsible can as a rule assume that the recommended solution fulfils the requirement of the regulations in question.

Use of recognised standards is voluntary in the sense that other technical solutions, methods or procedures can be opted for provided the party responsible can provide documentary proof of compliance with the requirements of the regulations, cf. third paragraph. In the event of other solutions being used than those recommended in the comments to a provision contained in regulations, the party responsible must, under the third paragraph, be able to provide documentary proof that the solution chosen fulfils the requirements of the regulations. To obtain the best possible understanding of the level that it is desired to achieve through the regulations, the regulations and the comments need to be viewed collectively. Norms that are recommended in the comments will be central factors in interpreting the individual requirements of regulations and when establishing the level for health, working environment and safety. Combinations of parts of norms should be avoided, unless the party responsible is able to document that an equivalent level in relation to health, working environment and safety is achieved.

In the comments to the supplementary regulations the terms 'should' and 'may' are used when reference is made to recommended solutions to fulfil the requirements of the regulations. In that connection these terms mean the following:

Should means the authorities' recommended manner of fulfilling the function requirement. Alternative solutions with documented equivalent functionality and quality can be employed without being submitted to the authorities for approval.

May means an alternative, equivalent manner of fulfilling the function requirement, for example where the comments recommend using maritime norms as an alternative to a NORSOK standard.

When the industry or other parties publish standards, such standards are normally expected to be applied to new facilities and the sphere that the standard describes. Hence where the authorities recommend using such standards it is not the intention to go beyond the premises laid down for the standards, unless this is specifically stated.

In the event of major rebuilding or modifications of existing facilities, the new standards should be applied. Where the new standards are not considered appropriate, this should be justified on safety grounds. Safety grounds for not applying new standards may for example be that applying new standards to existing solutions is considered to entail a particular risk. Existing facilities are facilities where plans for development and operation (PDO) have been approved, or a specific licence for installation and operation (PIO) has been granted, cf. the Petroleum Act Section 4-2 and Section 4-3 respectively, or facilities that have been authorised to carry on petroleum activities. Where mobile facilities are concerned, it is assumed that a facility is new when new consent is sought, in the same way as under the safety rules that applied up to the point when these regulations came into force."

Annex F1 provides a list of all standards referred in the most relevant guidelines to the regulations. No references to standards are made in the regulations themselves, as that would create an administrative burden on PSA when operators or others wanted to seek deviation from details in the standards referred to. Now, with the references to the standards in the guidelines, it is up to the operators

to make his own assessment and judgement on any deviation in respect of the regulations and document his decision for later references, e.g. in the case of an audit by the regulators.

The Framework Regulation, Section 3, establishes the general rule that maritime rules can provide an alternative basis to the petroleum rules within certain areas.

As can be seen from the above excerpts and particularly Annex F1, the Norwegian regulators makes extensive use of national and international standards and thus places a large responsibility on the standards makers to set the detailed requirements for the installations in the Norwegian sector of the North Sea. This is a challenge that should to be clearly understood by the Standards Development Organizations and the industry supporting their work.

13.2 Norwegian Petroleum Directorate (NPD)

Website: http://www.npd.no

The NPD has issued two regulations relating to resource management:

- Regulations relating to resource management
- Regulations relating to measurement of petroleum.

These regulations are issued in pursuance of the Petroleum Act and the CO_2 Tax Act, and supplement the provisions in the two acts and in the Petroleum Regulations. Also, thematic guidelines have been prepared in selected areas. References to standards in the guideline relating to measurement of petroleum are shown below:

- AGA Report No 8, Natural Gas density and compressibility factor executable program and Fortran Code
- AGA Report No 9, Measurement of gas by multipath ultrasonic meters
- ASTM 1945, Standard test method for analysis of natural gas by gas chromatography (1991)
- API, MPMS, American Petroleum Institute, Manual of Petroleum Measurement Standards
- ISO/OIML The Guide to the expression of uncertainty in measurement (1995)
- OIML R 117 Measuring systems for liquids other than water, Annex A (1995)
- ISO 3171 Petroleum liquids - Automatic pipeline sampling (1988)
- ISO 5024 Petroleum liquids and liquefied petroleum gases. Measurement Standard reference conditions (1976)
- ISO 5167-1 Measurement of fluid flow by means of orifice plates, nozzles and venturi tubes inserted in circular cross section conduits running full (1998)
- ISO 6551 Petroleum Liquids and Gases - Fidelity and Security of Dynamic (1982)
- ISO 6976. Natural gas – Calculations of calorific values, density, relative density and Wobbe index from composition (1995)
- ISO 7278 Liquid hydrocarbons - Dynamic measurement - Proving system for volumetric meters.
- ISO 9002 Quality systems, Model for quality assurance in production, installation and servicing (1994)
- ISO 9951 Measurement of gas flow in closed conduits - Turbine meters (1993)
- ISO 1000 (1981), SI units and recommendations for the use of their multiples and certain other units
- ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories
- ISO/CD 10715 Natural Gas – Sampling Guidelines
- NORSOK I-104, Fiscal measurement system for hydrocarbon gas (Rev 2, 2. June 1998)
- NORSOK I-105, Fiscal measurement system for hydrocarbon liquid (Rev 2, 2. June 1998)

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- NORSOK P-100, Process system
- NS 4900 (1979)
- NS 1024 (1982)
- LNG Custody Transfer Handbook (CTH), G.I.I.G.N.L. (2001)
- ISO 13398 Refrigerated light hydrocarbon fluids – Liquefied natural gas – Procedure for custody transfer on board ship (1997)

Furthermore, NPD has issued a document on Standards relating to measurement of petroleum for fiscal purposes and for calculation of CO_2-tax (*http://www.npd.no/Global/Norsk/5%20-%20Regelverk/Standarder/Maaleforskriften.pdf*). This document is the result of a project carried out for the Norwegian Petroleum Directorate by Morten Wold, Sola Flow Measurement. Contacts in NPD have been Einar Halvorsen and Steinar Vervik. Both have contributed significantly to the layout and content of this report. This document describes the most used standards regarding fiscal measurement including multiphase measurement for allocation purposes in Norway. References to standards in the guideline relating to measurement of petroleum, including those shown above are listed in Annex F2.

14 – Russia

After the reorganisation of the Government of the Russian Federation carried out at the beginning of 2008 the main regulators are:

14.1 Main regulators

1) Ministry of industry and trade (MINPROMTORG), which is in charge of the reformation of the technical regulation system and technical regulations development.

The amendment to the Federal law "On technical regulation" FL 385 was signed on the 30th December 2009. This amendment allows technical regulations to be approved not only by federal laws but also by the decision of the Federal body on technical regulation. MINPROMTORG was assigned as such a body in January 2010.

2) Federal Agency on Technical Regulating and Metrology – Rostekhregulirovanie (www.gost.ru) – (ex-Gosstandart)

In charge of the development of the national standards, participation of Russia in international standardization. - is under jurisdiction of Minpromtorg. Rostekhregulirovanie is the federal executive body that realizes the functions on rendering state services, administration of public estate in the field of technical regulating, standardization and metrology. Rostekhregulirovanie carries out the licensing of activity with respect to manufacture and maintenance of measurement instrumentation and also implements the functions on the state metrological control and supervision until there are changes in the Russian Federation legislation. The Agency also controls and supervises the compliance of mandatory requirements of state standards and technical regulations until the Government of the Russian Federation makes the decision on delegating these functions to other federal executive authority.

In oil and gas extraction and refinery the responsible ones also are:

1) The Ministry of Natural Resources of the Russian Federation - MNR of Russia (www.mnr.gov.ru).

The MNR of Russia is a federal executive body performing the functions related to state policy formulation and normative and legal regulation in the sphere of the study, renewal, and conservation of natural resources, including management of the State subsoil stock and forestry; the use and conservation of the inventory of water resources; the use, conservation, and protection of the stock of wooded forests and reproduction; operation and safety of multipurpose reservoirs and water-resources systems, protecting and other hydraulic structures (except navigation hydraulic facilities); the use of wildlife resources and their habitat (except wildlife resources assigned to hunting resources); specially protected natural areas, as well as in the sphere of environmental conservation (except the sphere of ecological supervision).

2) The ministry of Energetics of the Russian Federation – Minenergo

The Russian's Ministry of Energetics (Minenergo of Russia - http://minenergo.com) is a federal executive authority body, who puts into effect the functions on making and implementation of state politcy and regulatory-legal settlement in the fuel energy area, includes such questions as power industry, oil and gas production, oil refining, coal, shale and peat industry, main pipelines for oil and gas and products of the refineries, renewal of energy resources, deposits of carbohydrates based on agreements of products division, and in petrochemical industry area, also function of supporting state service, governance by state property in manufacture area and in using fuel and energy resources.

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14.2 Federal law on technical regulating

The Russian Federation (RF) is now in a transition period from a mandatory standardization system to a voluntary model as also other CIS countries. A new RF federal law No. 184- ФЗ FL, "On technical regulating" was issued 27 December 2002 after adoption by the State Duma and approval by the Council of Federation, and subsequently revised with a number of Amendments, latest of December 30, 2009. Corresponding laws on technical regulation are issued in the other CIS countries. There are many interesting statements on standards in this new law, e.g.:

Article 12. Principles of Standardization

Standardization shall be carried out in accordance with the following principles:

- *elaboration of standardisation documentation with maximum account of interested persons' interests;*
- *application of an international standard, unless such application has been recognized as impossible since the requirements of international standards conflict with the special climatic and geographical features of the Russian Federation, technical and/or technological special features or on other grounds or if the Russian Federation has resolved, in accordance with established procedures, against the adoption of the international standard or of its individual provision;*
- *inadmissibility of creating obstacles to the manufacture and circulation of products, performance of works and rendering of services to a greater degree than the minimum needed for the attainment of the goals, mentioned in Article 11 of this Federal Law;*
- *inadmissibility of the establishment of standards conflicting with technical regulations;*
- *provision of conditions for unified application of standards.*

Article 16. Rules of Making a List of Standardisation Documents Whose Using Ensures Voluntary Compliance with the Requirements of the Adopted Technical Regulations

1) *Not later than thirty days prior to the effective date of the Technical Regulations, the national standardisation body shall approve a list of standardisation documents whose using ensures voluntary compliance with the requirements of the adopted Technical Regulations, and shall publish the list in a printed matter of the federal executive body for technical regulation and place its electronic digital form in the information system of general use.*
2) *The list mentioned in Clause 1 of this Article may include national standards and codes as well as international standards, regional standards, regional codes, standards of foreign states and codes of foreign states provided that the mentioned standards and codes be registered in the Federal Information Fund of Technical Regulations and Standards. International standards, regional standards, regional codes, standards of foreign states and codes of foreign states shall be registered in the Federal Information Fund of Technical Regulations and Standards in accordance with the procedure prescribed by Article 44 of this Federal Law.*
3) *National standards and codes may include Technical Regulations requirements whose voluntary compliance involves using national standards and/or codes.*
4) *Voluntary use of the documents and/or codes included in the standardisation document list mentioned in Clause 1 of this Article shall be a sufficient condition for compliance with the relevant Technical Regulations requirements. If these standards and/or codes are used for compliance with the Technical Regulations requirements, conformity to the Technical Regulations requirements shall be assessed following the confirmation of their conformity to these standards and/or codes. Failure to use these standards and/or codes may not be referred to as non-compliance with the Technical Regulations requirements. In this case other documents may be used for assessing conformity to the Technical Regulations requirements.*
5) *The standardisation documents included in the list mentioned in Clause 1 of this Article shall be subject to review and if necessary, to revision and/or updating at least once every five years.*

Technical standards before the application of a new law were mandatory therefore they were in effect regulations. All standards had to be approved by state agencies having a responsibility within

the scope of the standard. The system of technical standards was very detailed. Each product or service should have a national or industrial standard.

Under the new law all interstate (GOST for EASC country-members) and national standards (GOST R in Russia, ST RK in Kazakhstan, etc.) should be voluntary except standards referenced in new national technical regulations which have to be developed in the near future. International and European standards have a priority for adoption as interstate and national standards.

According to the new law on technical regulating, there is now a transition period (until 2010 in Russian Federation) in which national normative documents are subject to obligatory execution only regarding the part corresponding to the purposes: protection of life or health of people, property of natural or legal persons, state or municipal property; protection of the environment, life or health of animals and plants; prevention of actions misleading purchasers.

However, local authorities in CIS understand that it is difficult to move from mandatory to voluntary standards without development a new technical regulating system. Thus, national standards in the CIS countries can remain de facto "mandatory national standards" at least for a transition period of time.

Russian oil and gas industry has predominantly been onshore. Therefore, there are not yet specific regulations or standards for oil and gas installations offshore Russia. There is, however, a large national program to develop the necessary general and specific regulations as specified by the RF Law on technical regulating (within 2010). A handful of these relates to offshore activities. Some drafts for offshore regulations have been circulated for review, but it is believed none has yet been approved.

Rostekhregulirovanie established in 2007 a technical committee (No. 23) to manage the work on new standards for the oil and gas industry. The short and long term programmes of this committee include a number of the ISO/TC67 standards to be translated, adopted and issued as GOST ISO standards in the years to come.

Projects, like Sakhalin and Shtokman have been/are being developed on the basis of Project Specific Technical Specifications (PSTS) that the operator put together. For Shtokman which is in the development process right now, it is basically Total (partner in Shtokman Development AG) specifications which are used as a basis for the PSTS with suitable Russian adaptations. These specifications will be subject to Russian "expertiza" committee reviews and subsequent approval by the various regulating agencies in Russia before they can be applied to the project.

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15 – Thailand

Main regulator: Department of Mineral Fuels (DMF)

Website: www.dmf.go.th

The Department of Mineral Fuels of the Ministry of Energy is the sole governmental agency overseeing the upstream petroleum industries of Thailand. DMF was established in 1972 with the obligation to develop Thailand's energy resources in order to reduce the nation's dependency on imported energy.

The Petroleum Act B.E. 2514 (1971) and the following Acts No. 2-6 from B.E. 2516-2550 are the main legal framework for the petroleum activity in Thailand.

The Ministerial Regulations from No. 1–20 (1971–1993) have been issued under the provisions of the Petroleum Act B.E. 2514. These regulations make no specific references to standards, but include some more general references like:

No. 12 (B.E. 2524) Paragraph 14) Before constructing an integrated permanent production platform the concessionaire shall furnish the Director-General in writing not less than forty five days in advance with the following information: (2) Standard used in design of the construction, construction drawings, calculation and design of construction materials, including other details of the integrated permanent production platform.

Paragraph 17) The gas meter, the installation, method of measurement and calibration shall be in compliance with the standard of the American Gas Association (AGA).

Paragraph 33) Determination of gravity, average temperature and volume of sediments and water in natural gas liquid and crude oil shall be in compliance with the principles and methods of American Society for Testing and Materials (ASTM).

Paragraph 34) (3) In calibrating the meter, correction factors shall be ..... according to the standard of American Petroleum Institute (API) and the American Society for Testing and Materials (ASTM).

No. 17 (B.E. 2532) Clause 7 (3) Places and facilities used in the storage and transport of the concessionaire's petroleum shall, in accordance with good petroleum practice, be at such a distance from buildings, houses and communications that they shall not impose any threat to the safety of persons or of properties of other persons.

Clause 11 (1) The concessionaire shall conduct his petroleum operations...in consistence with good petroleum industry practice, and...shall undertake to observe sound technical and engineering principles in conserving the petroleum deposits and in carrying out the other operations authorised hereunder.

16 – United Kindom

Main regulator: Health and Safety Executive

Website: www.hse.gov.uk

16.1 Offshore E&P Regulatory Regime within the UK Sector

In 1992 the Offshore Installation (Safety Case) Regulations were introduced into the UK sector. These require all fixed and mobile offshore installations, operating in UK waters to have a safety case which must be accepted by the Health and Safety Executive. A safety case is a document with sufficient particulars to demonstrate that the duty holder has:

- An adequate management system to ensure –
  - That the relevant statutory provisions will, in respect of matters within his control, be complied with; and
  - The satisfactory management of arrangements with contractors and sub-contractors;
- Established adequate arrangements for audits and for making of reports thereof;
- Identified all hazards with the potential to cause a major accident; and
- Evaluated all major accident risks and measures have been, or will be, taken to control those risks to ensure that the relevant statutory provisions will be complied with.

Following consultation with the industry, the Safety Case regulations were revised in 2005 and republished in 2006. Three primary sets of regulations support the Safety Case regulations:

- *The Offshore Installation and Pipeline Works (Management and Administration) Regulations 1995* – these set out requirements for the safe management of offshore installations such as the appointment of offshore installation managers (OIMs) and the use of permit-to-work systems;
- *The Offshore Installations (Prevention of Fire and Explosion, and Emergency Response) Regulations 1995 (PFEER)* – these provide for the protection of offshore workers from fire and explosion, and for securing effective emergency response;
- *The Offshore Installations and Wells (Design and Construction, etc) Regulations 1996* – these are aimed at ensuring the integrity of installations, the safety of offshore wells, and the safety of the workplace environment offshore.

There are further offshore-specific regulations dealing with first-aid, safety representatives and safety committees, and safety zones. The offshore industry is also covered by general UK legislation addressing health and safety concerns common to all industries, and which are applicable both on and offshore. Such legislation includes:

- the Management of Health and Safety at Work Regulations 1999,
- the Provision and Use or Work Equipment Regulations, 1998,
- the Lifting Operations and Lifting Equipment Regulations 1998
- the Control of Substances Hazardous to Health Regulations updated in 2002 and
- the Noise at Work Regulations 2005.

Key elements required within safety cases include:

- a description of the management system
- the identification of all hazards with the potential to cause a major accident
- an evaluation of all major accident risks and a description of the measures to be put in place to manage the risks to ensure that the relevant statutory provisions will be complied
- a description of the independent verification scheme

The UK, safety legislation is predominantly goal-setting rather than prescriptive. The legislation sets out the objectives that must be achieved, but allows flexibility in the choice of standards, methods or equipment that may be used by companies to meet their statutory obligations.

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Within the UK regulatory regime the onus is on the Duty Holder to demonstrate that whatever provision (procedure, standard, system or hardware) is in place meets the goal defined within the regulations. Hence, if an international standard is used in the design of a safety critical element, the Duty Holder must be able to demonstrate that the resulting design meets the required performance standard.

In addition to the regulations, a series of guidance documents and approved codes of practice (ACOP) exist to support the interpretation and application of the regulatory regime. The ACOP documents are 'quasi' legal documents and it is considered that regulations are complied with if the provisions of the ACOPs are followed.

16.2 Guidance documents and approved codes of practice

Quote from the ACOP documents:

> "This Code has been approved by the Health and Safety Commission, [now the Health and Safety Board] with the consent of the Secretary of State. It gives practical advice on how to comply with the law. If you follow the advice you will be doing enough to comply with the law in respect of those specific matters on which the Code gives advice. You may use alternative methods to those set out in the Code in order to comply with the law. However, the Code has a special legal status. If you are prosecuted for breach of health and safety law, and it is proved that you did not follow the relevant provisions of the Code, you will need to show that you have complied with the law in some other way or a court will find you at fault.
>
> The Regulations and Approved Code of Practice (ACOP) are accompanied by guidance which does not form part of the ACOP. Following the guidance is not compulsory and you are free to take other action. But if you do follow the guidance you will normally be doing enough to comply with the law. Health and safety inspectors seek to secure compliance with the law and may refer to this guidance as illustrating good practice."

The Guidelines to the UK offshore regulations and the associated ACOPs makes some specific references to standards as shown in Annex H, but also many references in general terms such as in the following random examples:

1) The safety case must include sufficient details of the original design philosophy for the installation to allow a clear understanding of the safety policies and parameters to which the installation was designed and of the safety features incorporated into that design. Where the description is by reference to type design or other international standards, any individual features of the installation, or subsequent modifications, which differ from the type or standard should be identified.
2) The following approaches might contribute to ensuring the initial suitability of plant: (a) design, construction or adaptation by reference to appropriate, relevant standards. These may be international or national standards recognised by an appropriate standards-making body; appropriate industry recognised standards; or appropriate company standards.
3) The acoustic signal and colour of lights used for general platform, 'prepare to abandon' and toxic gas alarms are specified in the Regulations, which reflect the industry agreed standard.
4) The following approaches might contribute to ensuring the initial suitability of plant design, construction or adaptation by reference to appropriate, relevant standards. These may be international or national standards recognised by an appropriate standards-making body; appropriate industry recognised standards; or appropriate company standards; where relevant standards do not exist, ensuring that the scheme of examination includes scrutiny to ensure that plant and equipment chosen is fit for its purpose (e.g. through design review, testing, assessment of operational experience in similar situations); or a combination of these approaches. For example, a duty holder may wish to use an existing standard in a novel situation. In these circumstances, the use of that standard should be checked as suitable.

5) It is expected that the design of the installation will be based on current good engineering practice. It should, however, be appropriately risk-based and compliance solely with existing codes, standards and guidance may not be sufficient to meet the regulatory requirements.
6) Consideration needs to be taken of any stairways that may form traffic routes. They need to be designed in accordance with recognised standards and not be too steep.
7) Many European standards within which the noise tests are defined are currently under review and the revised versions may result in noise emission values that provide a more accurate guide to likely noise emissions during intended use.
8) For many types and classes of machine there are transposed harmonised standards produced by the European Committee for Standardization (CEN) or adopted from the International Organization for Standardization (ISO), setting out safety requirements for the machine in question.
9) So as to be readily understood, such signs will normally need to be from a nationally or internationally agreed standard set.
10) There are many HSC/HSE publications which are specific to a machine or industry. They describe the measures that can be taken to protect against risks associated with dangerous parts of machinery. Current national, European and international standards may also be used for guidance, where appropriate.
11) All guards and protection devices provided must be suitable for their purpose. In deciding what is suitable, employers should first establish the foreseeable risks from the machine and then follow guidance contained in national and international standards (see the reference section), guidance from HSC, HSE and industry associations, normal industrial practice and their own knowledge of the particular circumstances in which the machine is to be used.
12) (b) in the case of respiratory protective equipment, where no provision referred to in sub-paragraph (a) applies, be of a type approved or shall conform to a standard approved, in either case, by the Executive.
13) Employers should also consider whether the equipment is designed and installed to appropriate standards and whether it is regularly inspected and maintained.

16.3 Information documents

Finally, there are a number of information documents on subjects like: corrosion, diving, electrical, fire, occupational health, pipelines, process integrity, structural integrity etc. to support the implementation and interpretation of the regulations. The information documents may be found at *http://www.hse.gov.uk/offshore/infosheets/is_index.htm*. All of these supplementary documents make references to a number of standards recognized by HSE for use in the offshore industry.

There is one document in particular which includes a large number of references to recognised standards: The UK HSE "Guidance document for the topic assessment of the major accident hazard aspects on safety cases", issued April 2006. This is a 309 page large document available at *http://www.hse.gov.uk/offshore/gascet/gascet.pdf*. This guidance e.g. states that 'Confirmation should be obtained that installations have been designed and constructed, and/or re-assessed, maintained and repaired in accordance with the latest edition of a recognised standard, recommended practice or code of practice. Recognised standards, recommended practices and codes of practice include:' followed by long lists of standards recognised by UK HSE.

This guide further state: "The aim of the guidance is to provide the offshore industry with reasonable clarification of HSE's expectations of the technical content of safety cases. Whilst the guidance contains reference to specific standards, models, methodologies, etc to be representing good practice, alternative approaches proposed by a duty holder are likely to be acceptable if the duty holder can demonstrate that the alternative approaches are equivalent, or better, in terms of health and safety, than those cited in the guidance."

As mentioned above, the specific references to standards in the Guidance to the UK offshore regulations and the associated ACOPs, but also the references included in the information documents available at UK HSE web are all shown in Annex H.

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17 – United States

Main regulators: Minerals Management Service, US Department of the Interior

Website: www.mms.gov

Coast Guard (USCG), US Department of Homeland Security

Website: www.uscg.mil

17.1 US regulatory scheme

The Minerals Management Service (MMS) is a bureau in the United States Department of the Interior responsible for managing the nation's oil, gas, and other mineral resources on the outer continental shelf (OCS). Under the Outer Continental Shelf Lands Act (OCSLA) and other authorities, the MMS regulates activities such as exploration, drilling, completion, development, production, pipeline transportation, storage, well servicing, and workover activities under its jurisdiction. MMS ensures that these resources are explored for, developed and produced in a safe and environmentally sound manner and that development is conducted according to the principles of resource conservation. MMS also grant right-of-use and easements to construct and maintain facilities, and rights-of-way for sub-sea pipelines, umbilicals, or other equipment.

The US Coast Guard (USCG), US Department of Homeland Security is the other principal safety regulator on the US OCS. Both agencies have joint jurisdiction and responsibility to review and approve the structural design of non ship shaped floating platforms. Two MOAs have been drawn up to delineate their split of responsibilities for systems and sub-systems on mobile offshore drilling units (MODUs) and fixed and floating offshore facilities, and establish understandings related to civil penalties, accident investigations, and oil spill planning, preparedness, and response:

- MMS/USCG MOA: OCS-01 on Mobile Offshore Drilling Units, effective 30 September 2004 (*http://www.mms.gov/MOU/PDFs/MOA-MMSUSCGOCS01-30September2004.pdf*)
- MMS/USCG MOA: OCS-04 on Floating Offshore Facilities, effective 28 February 2008 (*http://www.uscg.mil/hq/cg5/cg522/cg5222/docs/mou/FLOATING_OFFSHORE_FACILITIES.pdf*)

17.2 Minerals Management Service regulatory documents

In order to achieve agency goals, MMS has developed a comprehensive regulatory programme which can best be characterized as a 'hybrid' system relying upon three distinct components: a set of unique regulations, primarily 30 CFR Part 250 Oil and Gas and Sulphur Operations in the Outer Continental Shelf, a series of performance-based goals, and reliance upon a suite of technical standards.

Other MMS regulatory documents:

Notices to Lessees and Operators (NTL's) are formal documents that provide clarification, description, or interpretation of a regulation or OCS standard; provide guidelines on the implementation of a special lease stipulation or regional requirement; provide a better understanding of the scope and meaning of a regulation by explaining MMS interpretation of a requirement; or transmit administrative information such as current telephone listings and a change in MMS personnel or office address.

Though rarely used, Letters to Lessees and Operators (LTL's) and Information to Lessees and Operators (ITL's) are also formal documents that provide additional information and clarification, or interpretation of a regulation, OCS standard, or regional requirement, or provide a better understanding of the scope and meaning of a regulation by explaining MMS interpretation of a requirement. Interim Rules (*http://www.mms.gov/federalregister/2005.htm#Interim*) – A rule that is usually issued without prior notice of proposed rulemaking. The interim rule is designed to respond to an emergency situation and is usually followed by a final rule document which confirms that the interim rule is final, addressees comments received, and includes any further amendments.

17.3 Minerals Management Service and standards

The use of standards as part of MMS's programme is not a new phenomenon. Recognition of the benefits of using industry 'best practices' as defined in technical standards and the incorporation of these documents into operating regulations has been part of the agency's regulatory philosophy since its creation in 1982. Standards first appeared in MMS codified regulations in April, 1988 after previously being referenced in the OCS Orders. Since that time, MMS has participated in standardization work by providing agency subject matter experts the ability to participate on select standards developing organizations committees and working groups.

MMS participation on the standards groups during the development process allows the agency to provide critical input while standards are being formulated, rather than after the document has been completed. The resulting dialogue enhances the chances of having agency concerns addressed in the standard. When possible, differences between agency regulations and standards requirements are resolved during the development stage, resulting in a document with an additional degree of consensus. It is important to note that agreement between a regulation and a standard is not the over-riding goal in authoring a standard, nor does it happen on every occasion. It should also be noted that the National Technology Transfer and Advancement Act (NTTAA) requires U.S. Federal Agencies to use consensus standards when they meet their agency's needs and to participate in the standards consensus process, and this act has greatly increased the reference of all consensus standards in regulation.

Presently, MMS has slightly less than one hundred separate industry standards incorporated into its programme issued by seven standards developing organizations, all American based and some also available as ISO standards. These standards can be divided into two broad subcategories based upon subject matter content. Half of these standards address equipment design and operational concerns, while the other half concern themselves with hydrocarbon measurement. All of these standards, regardless of scope, are used by the bureau to enhance safety, environmental protection, and assure the orderly development of hydrocarbon resources. A listing of standards currently incorporated into MMS regulation can be reviewed as part of the regulations at 30 CFR 250.198. This listing is updated on an annual basis. See Annex G1.

In recent years MMS has made concerted efforts to work with industry and standards developing organizations on developing technical standards in lieu of developing a unique MMS regulation. In several cases MMS articulated a safety concern to industry and allowed them the opportunity to work with the bureau on developing a technical standard to address this concern instead of MMS embarking on a lengthy formal rulemaking process. This technique has proved to be a functional and proactive approach in developing an alternative means of addressing a safety issue for select situations.

Consistent with the trend toward international commerce, today's offshore oil and gas industry has become global in scope. MMS thus finds itself regulating OCS activities of an international industry. If done correctly, one set of international standards providing for regional differences can lower business costs, provide a consistent regulatory climate on a global scale, make resources more economic to produce, and provide for safer and environmentally sound operations. Based upon this assessment, and the potential impact international standards could have on MMS domestic programme, MMS made the decision to become involved in select international standards work projects.

In August 1998, MMS began participating in the activities of ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*. MMS took this active posture because they believed to do otherwise risked abdicating their responsibility to work with the international community in this critical endeavour. MMS faces significant risks if global standards are neither technically sound nor beneficial to US interests. Since beginning MMS participation, MMS experts have participated in varying degrees on the activities of four subcommittees dealing with pipeline transportation systems; drilling and completion fluids and well cements; drilling and production equipment; and offshore structures. The standards developed by ISO/TC 67 will impact

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the offshore oil and gas industry for years to come and involvement in the organization should prove valuable for the MMS and the regulated community.

International standards are valuable in eliminating the barriers that impede safe and environmentally sound offshore operations. Out of the approximately one hundred private sector standards incorporated into MMS regulations, a handful of these standards are cobranded between API and ISO.

MMS sees adoption of these international standards as an important step in the process of harmonizing the technical requirements of the offshore oil and gas industry on a global basis and ensuring that safety and environmental protection are maintained. The agency believes that many benefits can be realized from open communication and data sharing between regulators, industry, and standards developing organizations. In this way, we can support each other's efforts to identify the best and most effective operating practices for the offshore oil and gas industry.

In future years, MMS will continue to evaluate additional international standards (API/ISO) to include in their programme. As this trend towards harmonization of domestic and international standards continue MMS recognition and use of these documents should continue as well.

From a historical perspective, MMS's decision to participate in ISO/TC 67 is a significant step in the evolution of their programme. Participation in this process confirms MMS' understanding that the industry they regulate is global and that the technical challenges facing this industry have global implications that require universal solutions. When viewed individually, the examples cited above look like nothing more then the incorporation of just another standard into the suite of dozens of standards already included in our programme. Viewed collectively, these examples show an emerging pattern, acknowledging that standards addressing global concerns can have an important role in MMS regulatory programme if such standards address agency goals of safety, environmental protection, and conservation of natural resources.

The list of standards referenced in the 30 CFR Part 250 OCS regulations is reproduced in Annex G1. This list includes (at present) five adopted ISO standards which are published as equivalent (identical or modified) API standards.

17.4 US Coast Guard

The US Coast Guard, is responsible for protecting the marine environment, promoting the safety of life and property and ensuring security on the OCS. Under OSCSLA, 33 CFR Subchapter N – Outer Continental Shelf Activities, and Title 46 USC – Shipping and Title 46 CFR, as well as other authorities, the USCG regulates OCS facilities and mobile offshore drilling units (MODUs) engaged in the OSC activities.

The USCG makes use of the regulations in applicable parts of 46 CFR – Shipping (Parts 107-109) as well as 33 CFR, Subchapter N – Outer Continental Shelf Activities, Parts 140-147 for the offshore drilling platforms (MODU's) and offshore production platforms (floating offshore installations). The standards referenced in these parts of the CFR are listed in Annex G2.

The US Coast Guard also has clarifying documentation for their inspectors and customers as to the application/translation of their regulations known as Navigation and Vessel Inspection Circulars (NVIC) (*http://www.uscg.mil/hq/cg5/NVIC/nvic.asp*) and furthermore some regional guidance is available.

18 – IMO

Website: www.imo.org

18.1 Introduction to International Maritime Organization (IMO)

A specialised agency of the United Nations with 167 Member States and three Associate Members, IMO is based in the United Kingdom with around 300 international staff.

IMO's specialised committees and sub-committees are the focus for the technical work to update existing legislation or develop and adopt new regulations, with meetings attended by maritime experts from Member Governments, together with those from interested intergovernmental and non-governmental organisations.

The result is a comprehensive body of international conventions, supported by hundreds of recommendations governing every facet of shipping.

IMO plays a key role in ensuring that lives at sea are not put at risk and that the marine environment is not polluted by shipping - as summed up in IMO's mission statement: Safe, Secure and Efficient Shipping on Clean Oceans.

Its global importance cannot be underestimated, as it literally underpins world trade and the global economy. Unusually, its prime assets – the ships themselves – move between countries and between different jurisdictions; hence the need for universal standards that can be applied to and recognised by all. Typical and well known IMO documents are:

- IMO ISM International Safety Management Code
- IMO MARPOL The International Convention for the Prevention of Pollution from Ships
- IMO MODU Code for the construction and equipment of mobile offshore drilling units
- IMO SOLAS (Safety of Life at Sea)

Many ISO standards are referenced in the IMO Fire Safety Code, the High Speed Craft Code, SOLAS, MARPOL conventions as well as numerous other IMO regulations and circulars.

ISO/TC8 has an ongoing active collaboration with IMO to deliver ISO standards needed. It is claimed that 100 ISO work items in this committee are directly related to support IMO Codes & Conventions[6].

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19 – International Regulators Forum

19.1 Background

The scope of the offshore oil and gas industry is global. Both major and independent companies work around the world and are required to deal with a number of different regulatory regimes. They regularly move personnel and equipment from one country to another, and in some cases, integrated operations extend across international boundaries.

IRF members believe that both industry and government benefit from a good offshore oil and gas safety record practice, which leads to lower costs and greater public confidence. In 1994 it was recognised that government regulators working together had the potential to improve safety performance within their jurisdictions by sharing information. This led to the creation of the International Regulator's Forum (IRF), whose members are dedicated to the common cause of raising offshore health and safety standards.

19.2 Objectives

The objectives of the IRF are:

- To promote best sustainable safety performance globally and the concept that it is inseparable from and interdependent with best sustainable economic performance.
- To enable an exchange of information among regulators on:
  - Offshore health and safety trends;
  - Industry health and safety performance;
  - Lessons from incidents;
  - Industry best practice;
  - Regulatory practice; and
  - Measuring the effectiveness of regulatory activities.
- To provide a network of offshore petroleum health and safety regulators for mutual support and advise when required.

19.3 Ways of Working

The IRF achieves its objectives through:

- An annual plenary meeting.
- Communication among members between annual meetings, as the need arises;
- The formation of programme working groups, and/or the commissioning of other competent stakeholder organisations, to advance issues of importance to the IRF;
- The organisation of an International Regulators' Offshore Safety Conference from time to time, which includes presentation of awards for significant safety improvement initiatives;
- The active maintenance of an IRF web site for the purpose of disseminating outputs from programme initiatives, and for posting of information consistent with IRF objectives; and
- Individual IRF member country outreach initiatives.

Agenda items at annual meetings include country updates and technical sessions, as notified to the host agency in advance. Both cover health and safety issues likely to be of common interest, with technical sessions addressing matters such as lessons from incidents, research findings, and regulatory initiatives. Annual meetings also include a review of joint activity during the previous year, and consideration of any shared work to be carried forward in the coming year, with agreed commitment and responsibility for the topic lead.

Meetings are to be conducted in English with openness and honesty, and participants respect the confidentiality of information shared with them. To enable this, meetings must remain small, with participants sending delegations no larger than 3, except for the host agency.

Participants in the forum are authoritative decision makers, from appropriate regulatory agencies, competent to speak about key operational, technical and policy issues. They have access to sufficiently reliable data to enable meaningful discussion.

All participants are committed to making a contribution to the working of the IRF by actively participating in the annual plenary meetings and programme working groups, in hosting the annual plenary meeting on a rotational basis, in addressing IRF matters that may arise between meetings in a timely manner, in assisting the hosts in arranging the International Regulators' Offshore Safety Conferences, and in contributing to keeping the IRF website alive and current.

19.4 IRF participants are:

- National Offshore Petroleum Safety Authority, (NOPSA)
- Petroleum Safety Authority, Norway, (PSA)
- US Minerals Management Service, (MMS)
- New Zealand Department of Labour, (DOL)
- Canada-Nova Scotia, and Canada-Newfoundland and Labrador, Offshore Petroleum Boards, (CNSOPB/C-NLOPB)
- Brazilian National Petroleum Agency, (ANP)
- The Health and Safety Executive, Great Britain, (HSE)
- State Supervision of Mines, the Netherlands, (SSM)

IRF member profile available at: *http://www.irfoffshoresafety.com/country/*

The text on these two pages is copied directly from *http://www.irfoffshoresafety.com/about/*.

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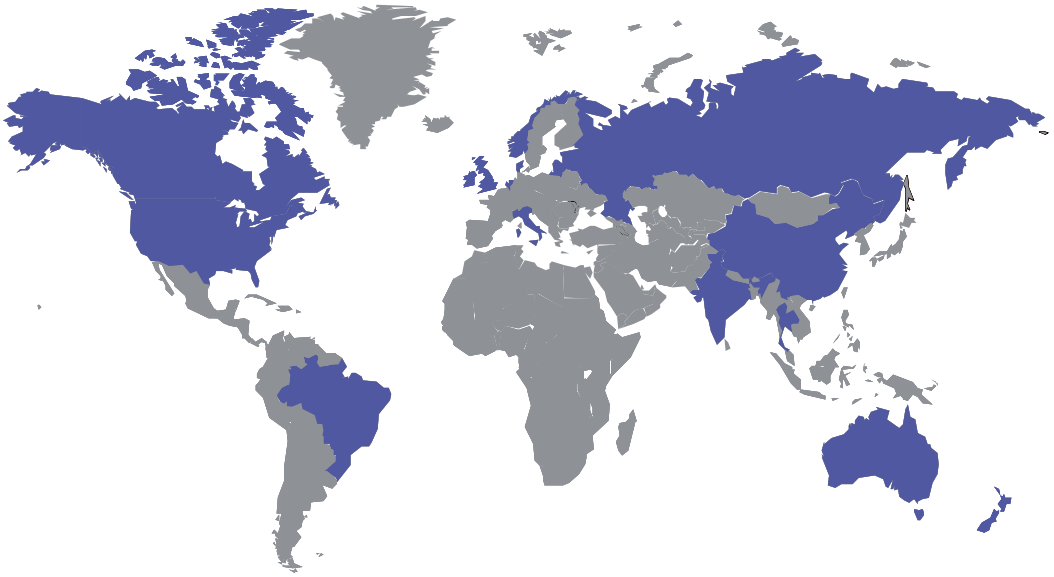
20 – Analysis and observations

20.1 Regulators covered

This report covers national regulators from fourteen countries including ANP in Brazil, NOPSA in Australia, OSHS in New Zealand, UK HSE, MES in Italy, SODM in The Netherlands, PSA (incl. NPD) in Norway, OISD in India, DEA in Denmark, DMF in Thailand, the MMS and USCG in the Unites States, Chinese and Russian regulators and finally Canada, comprised of Newfoundland Offshore Petroleum Board and Nova Scotia Offshore Petroleum Board. As illustrated by the Figure 2 below, a large part of the global offshore oil and gas activity is covered by this report.

Figure 2



20.2 Various types of regulatory documents

The regulatory schemes and their regulatory document package vary from one regulator to another, as can be seen from the preceding chapters. In the following a brief listing of the various types of regulatory documents is given:

- Acts
- Law
- Decree
- Regulations
- Executive orders
- Directives
- Amendments to Acts and Regulations
- Guidelines
- Management practices
- Standards
- Rules
- Guidance Notes
- Code of Practices
- Memoranda
- Interpretations.

References to standards are placed in various types of regulatory documents. No specific references to standards have been found or are believed to be included in the national acts or laws. Some regula-

tors make references in the regulations themselves, whereas others have selected to make references in guidelines to the regulations. Others regulators have made Code of Practices, standards or other type of documents.

PSA of Norway makes a point of not putting the reference to standards into the regulations, because if another solution than given by the referenced standards is desired for a particular project, this would necessitate the handling of a deviation request to the regulation. With the references to the standards placed in the guidelines, however, PSA has opened for the operator to handle and document the deviation himself as long as the provisions of the regulations are not impacted and the documentations of the deviation is kept for future references. This is a flexible solution, built on trust of the parties involved.

Some of the regulators examined have been in operation with regulatory documents for a long time. US MMS started its work in 1982 by taking over from its predecessor agencies. The Norwegian Petroleum Directorate was created in 1973 and PSA split out in 2004. The Indian Oil Industry Safety Directorate started its work in 1986. ANP in Brazil was established in 1997.

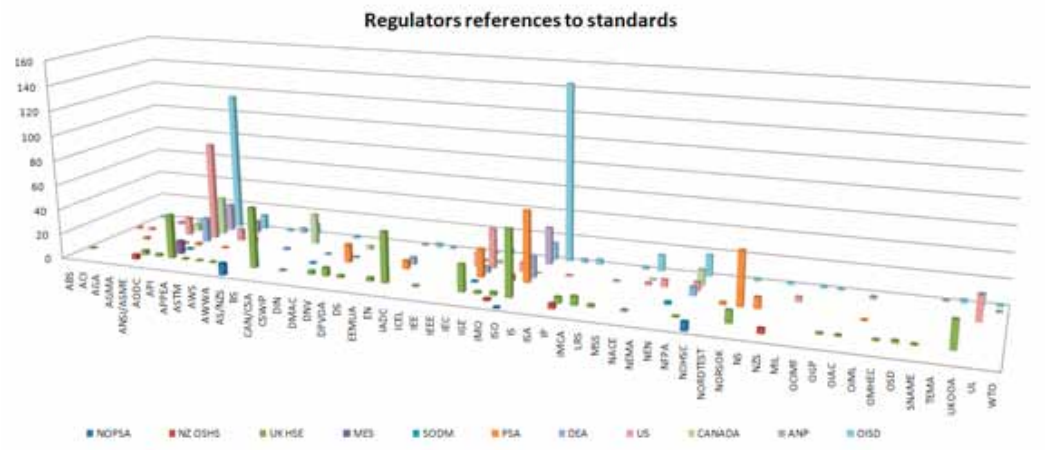
OISD is the only regulator (analysed by this report) that has created their own standards. Ref. Annex D1 for a complete listing of the OISD standards. Many of the NORSOK standards were based on previous Norwegian regulatory guidelines. The NORSOK standards are, however, consensus standards, administered by Standards Norway and owned and maintained by the Norwegian oil and gas industry organisations.

20.3 Regulators references to standards

Figure 3 below show 1,325 standards referenced in the regulatory documents from the regulators analysed that make specific references to standards. With an additional 23 less known standards characterised as 'others' a total of 1,348 standards are included in the 'long list' of references. China makes no references to specific standards in their regulations. Russian references have not been included as their regulatory documents have not been examined in detail (available only in Russian language). Figure 3 therefore includes the standards listed in the Australia, Italy, The Netherlands and New Zealand chapters, plus Annexes A, B, D2, F1, G1, G2, H and I from eleven countries in total.

This figure is rather complex and not easy to read (reprinted in larger format in Annex K), but it attempts to show the vast variety of standards used by the selected regulators and the number of references from each SDO. The figure show three countries from the Americas, five from Europe (four around the North Sea), India and two from Oceania. As can be seen, the references are from a wide selection of SDOs and widely spread out in terms of number of standards which are referenced.

Figure 3



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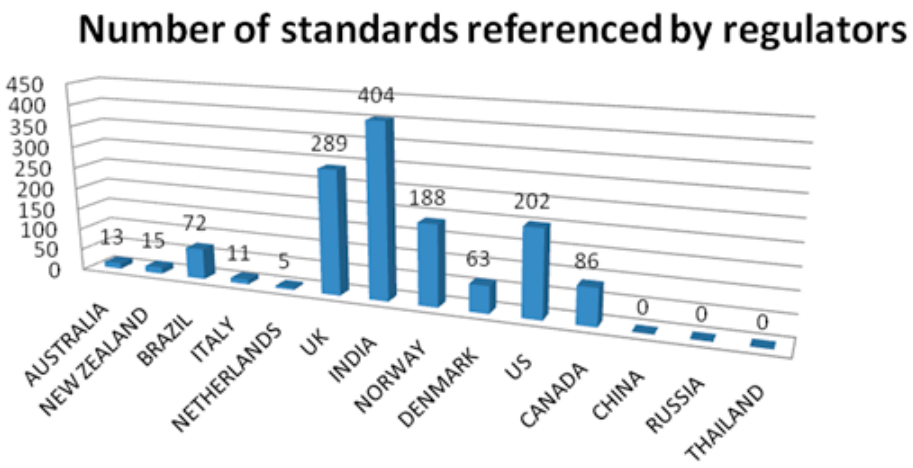
The oil and gas industry have for many years worked to harmonise standards and developed a package of international standards for global use, e.g. in ISO/TC67. There is little evidence of the same being the case in the regulatory documents and their references to standards.

20.4 Number of standards referenced by each regulator

Figure 4 show the total number of referenced standards by the national regulators in their regulatory documents directly related to the oil and gas industry. References in some general guidelines and general ACOPs have been disregarded, as they are not specifically established for the oil and gas industry.

Figure 4



This figure reveals a wide variety from zero references by some regulators (CNOOC in China and DMF in Thailand) to 404 standards references by OISD (in their 110 off OISD standards – see Annex D1 and D2) and 289 standards referenced by UK HSE (see Annex H).

From the figure and numbers quoted above, it can safely be said that many regulators make very good use of standards in their regulatory documents. However, it can also be said that for those regulators that make few or no references to standards, e.g. SODM in The Netherlands, MES in Italy, NOPSA in Australia, CNOOC of China, regulators in Thailand, Russia and MES in Italy, that they all expect national, industry and international standards to be used in the oil and gas industry in their country and area of responsibility. This is evident by the many general references to standards and good industry practices in their regulatory documents.

Standards are therefore no doubt a very important resource to rely upon by regulators in defining the technical acceptable solutions and operational requirements for all national oil and gas development activities discussed in this report, regardless of references or not.

This vast resource of standards saves the regulators a lot of time and expenses in putting together and maintaining their own regulatory documents to describe the required safety level. This also, most probably, represents a significant saving to the operating oil and gas industry which can use familiar consensus standards rather than more prescriptive and individual regulations. Use of standards creates in other words a win-win situation.

20.5 Total number of standards referenced

A single title 'short list' of standards has been compiled on the basis of the different standard titles referenced by the regulators from eleven countries represented in Figure 5 of this report. China and Russia not included. This 'short list' shows every standard title only once.

The 'short list' includes 1,140 individual standard references (different standard titles or standard parts) and Figure 5 below (larger format in Annex K) shows which SDOs provide standards preferred as references by the regulators and how many standards from each SDO are used in total. As many as 59 different SDOs from around the globe are represented in Figure 5 and with a few more less familiar ones categorised as 'others'.

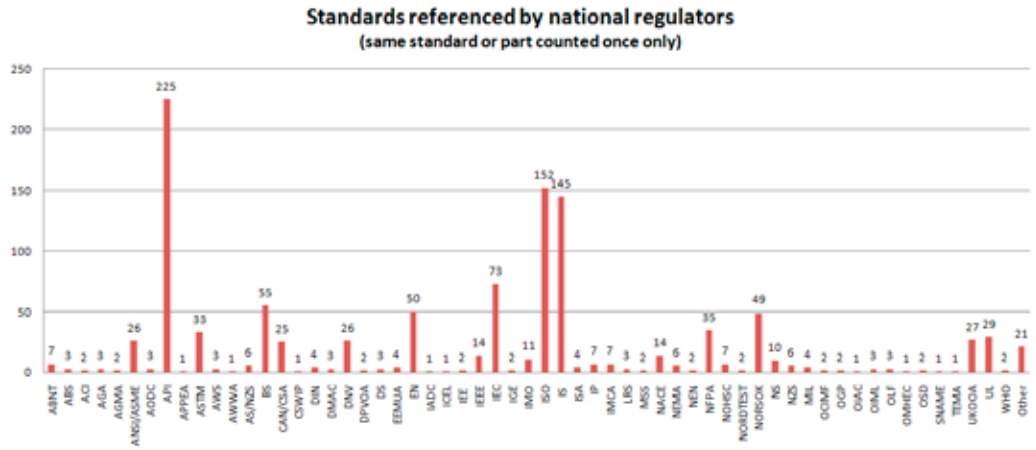
API incl. API MPMS (49 off) provides clearly the largest number of 225 standards referenced by the regulators, with ISO as number two with 152 referenced titles. Fifty-nine (59) of the ISO standards referenced come from ISO/TC 67. OISD makes all of the 145 references to local Indian standards (IS) from Bureau of Indian Standards. Next group of SDOs with a significant number of references (more than 20) are from ANSI/ASME, ASTM, BS, CAN/CSA, DNV, EN, IEC, NFPA, NORSOK, UKOOA (now UK Oil and Gas) and UL.

As many as 989 of the 1,140 different standard titles or about 87% of the standards have been referenced by one regulator only. In other words, only 13% are referenced by two or more regulators. This represents a surprisingly low degree of sharing the same references to standards within the same area of regulating. Standards referenced by three or more regulators (only 37 off) are shown in Annex J. This is clearly a challenge to the international operators which have to relate to different sets of technical standards for the same subject around the globe.

It should be recalled that the many oil and gas industry related standards from Rostechregulirovanie in Russia and CPSC and CPEC in China are not referenced by the regulators there, and thus not included in the above mentioned figures, but these should nevertheless be kept in mind when reading this figure to understand which SDOs supply standards for the oil and gas industry.

Where the same standard, e.g. API Spec 6A (also available as ISO 10423), has been referenced by several regulators only one reference is counted in this figure.

Figure 5



20.6 National, industry vs international references

Figure 6 below attempts to analyse the degree of national and industry versus international standards referenced by selected regulators from eight countries. The figure shows the number of standards referenced split into three categories. For the purpose of this analysis, three typical categories of standards have been established as follows:

- International (IEC, IMO and ISO)
- Industry (API, DNV, EEMUA, IMCA, IP, NACE, OMHEC, SNAME, etc.)
- National (ANSI/API/AWS, BS, DS, NEN, NS/NORSOK, CAN/CSA, AS/NOHSC/NZS, etc.)

For the purpose of this report the API, AWS, ASME etc. standards have been considered as 'national' standards for the US MMS and USCG as they are developed in the US by predominantly Ameri-

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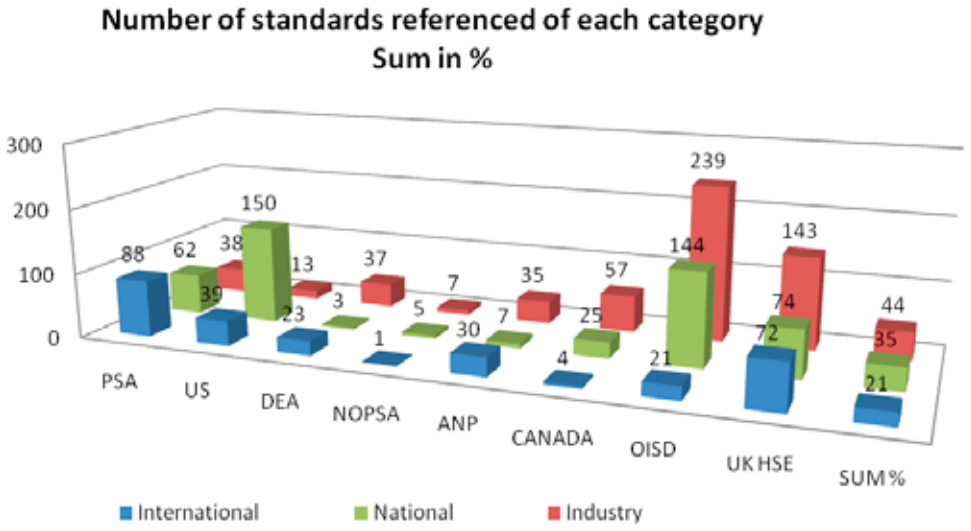
can experts, but they are considered as industry standards for Australia, Denmark, Canada and the others. A national adoption of an international (e.g. ISO) or regional (e.g. EN) standard has been counted as an international or regional standard respectively.

Figure 6



As shown in Figure 6, PSA has the highest percentage of reference to international standards. ANP, India, UK HSE, NOPSA, Canada and DEA have the highest reference to industry standards, whereas the US regulators (MMS and USCG) have the highest reference to national standards.

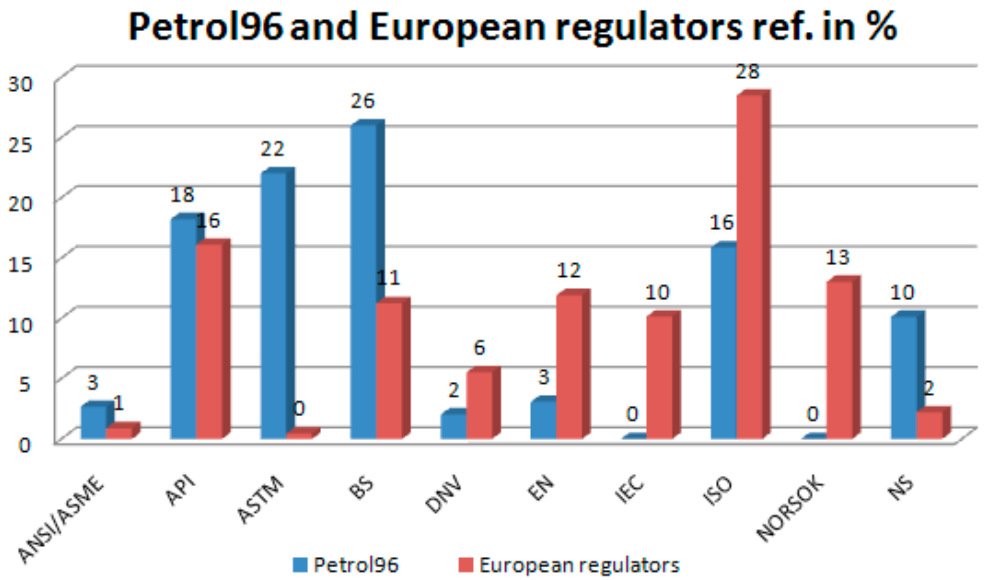
The rightmost row of columns (Sum%) represents all regulators with references included in this report and show a clear dominance of references to industry standards (44%). Thereafter to national standards by 35% (probably much more if China and Russia were included). References to international standards represent the smallest group (21%).

More than one third of the standards referenced are national standards. For the purpose of this report national adoptions of international or regional standards are counted as international and thus not included in the national figure. Some of the national standards referenced are barely known outside the country where they are developed and this makes the regulations with references to these difficult to use for companies which are not part of the national cluster. This is one of the reasons for OGP to take the position on development and use of international standards in the Report No. 381[2]. Most of the American national oil and gas related standards, however, are well known in the global oil and gas industry and does not pose the same degree of difficulties to use.

20.7 Trends in references

What is the trend in references to industry, national and international standards? If we compare with Petrol96[1], the study in 1996 of European operating companies references to standards on a selected basis of standards as shown in Figure 7, there is a significant increase in the reference to IEC and ISO standards, from 16% in Petrol96 to 38% (IEC and ISO combined) of the referenced standards by European regulators today. If we include EN standards we see an increase from 19% in Petrol96 to 59%. The same Figure 7 shows a sharp decrease in references to national standards, such as ANSI, BS and NS combined from 39% to 14%. This trend is confirmed by UK DTI Report[1], which states that in the year 1990, as much as 64% of the BSI catalogue was accounted for by purely 'national' standards whereas in 2005 this was less than 26%. At the same time there was a strong growth of international standards.

Figure 7



The trend as demonstrated above is clear. It is agreed what is the best direction for the global oil and gas industry, the goal expressed by several parties, e.g. in the OGP Position paper[2], on global standards used locally worldwide, has broad support. A solid start in development of international standards for the oil and gas industry has been made in particular by ISO/TC 67. However, with the figure of 21% references to international standards by the regulators, it is evident there is still a lot of work to be done.

The increase in references to international standards is well in line with the World Trade Organization (WTO) Technical Barriers to Trade (TBT) agreement[11], signed by all WTO member countries relevant for this report, except so far the Russian Federation. The TBT includes statements such as:

§2.4) Where technical regulations are required and relevant international standards exist or their completion is imminent, members shall use them, or the relevant parts of them, as a basis for their technical regulations except when such international standards or relevant parts would be an ineffective or inappropriate means for the fulfilment of the legitimate objectives pursued, for instance because of fundamental climatic or geographical factors or fundamental technological problems.

§2.6) With a view to harmonising technical regulations on as wide a basis as possible, members shall play a full part, within the limits of their resources, in the preparation by appropriate international standardising bodies of international standards for products for which they either have adopted, or expect to adopt, technical regulations.

§2.8) Wherever appropriate, members shall specify technical regulations based on product requirements in terms of performance rather than design or descriptive characteristics.

§2.9) Whenever a relevant international standard does not exist or the technical content of a proposed technical regulation is not in accordance with the technical content of relevant international standards, and if the technical regulation may have a significant effect on trade of other members, members shall take a number of actions as detailed in the TBT agreement.

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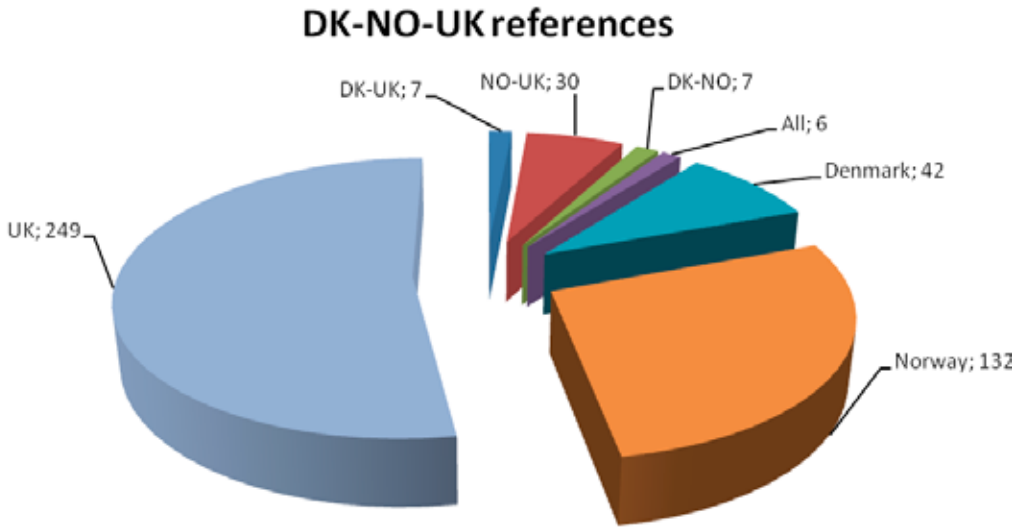
20.8 Shared references

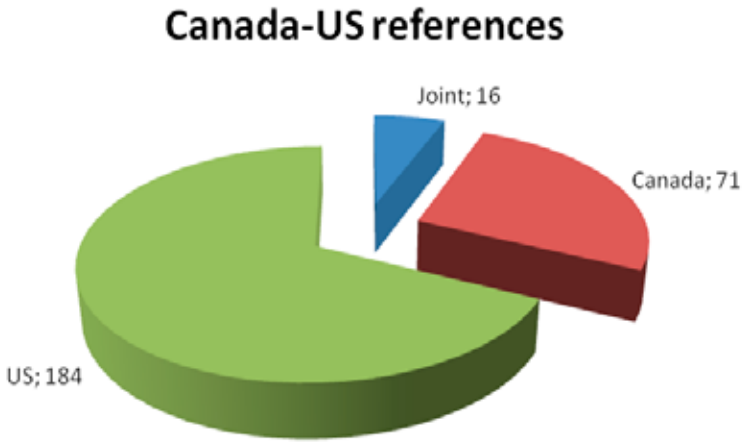
As shown in paragraph 20.5 above, only 13% of the references are shared by two or more regulators on an overall basis. One would think that the national regulators around a relatively small basin like the North Sea would have a greater joint reference selection of standards. An analysis of the references by DEA, HSE and PSA is shown in figure 8, and the result is rather the contrary. This figure shows the number of shared and individual references to standards. These three regulators make references to 473 different titles of standards, where only 6 or about 1% is shared by all three and only 44 or 9% is shared by two of the regulators.

Figure 8



The same comparison in North America of Canadian and US regulators references give only 16 standards or 6% of common references, again not as much as one could expect. Ref. Figure 9 below.

Figure 9



20.9 Standards most frequently referenced

The standards in this collection most frequently referenced by different regulators are shown in Annex J. The two most frequently referenced are API Spec 6A Wellhead and Christmas Tree Equipment (also now available as a joint publication with ISO 10423) and IMO's MODU Code which are referenced by five (5) regulators. These can safely be said to be key standards for the oil and gas industry.

It is worth noting that current version of API Spec 6A is a nearly identical adoption of ISO 10423. Work is well under way in API and ISO to remove the remaining small differences and make these two standards identical. ISO 10423 is referenced by three regulators, and combining these would then make eight references to this standard and clearly the most referenced standards of them all.

Another interesting observation is that there are two versions of nearly the same standard: API RP14C referenced by four regulators and ISO 10418 referenced by three. Whereas ISO 10418 was based on the API RP there are some significant differences in these two standards, with the same title and covering exactly the same subject. Another two standards for harmonisation and work is underway in ISO with API support to start considering this.

A further seven (7) standards have been referenced by four different regulators and 23 standards by three. These standards come from a mix of SDOs: API, ANSI/ASME, DNV, EN, IEC, IMO, ISO, NACE, NFPA, NORSOK and UL. All together 154 different standard titles have been referenced by two or more regulators. This is only 13% of the total number of referenced standards (short list).

20.10 Origin of the referenced standards

Figure 10 shows the regional origin of the referenced standards from the 'short list'. Clearly, the largest number of standards referenced comes from American SDOs (ABNT, API, ASTM, CAN/CSA etc.) with European (BS, EN, SN/NORSOK etc.) second. Standards from the international standards organisations IEC, ISO and IMO are in third place. The large majority of the standards in the category Asia & Australia are IS that come from Bureau of Indian Standards, referenced by OISD in their standards.

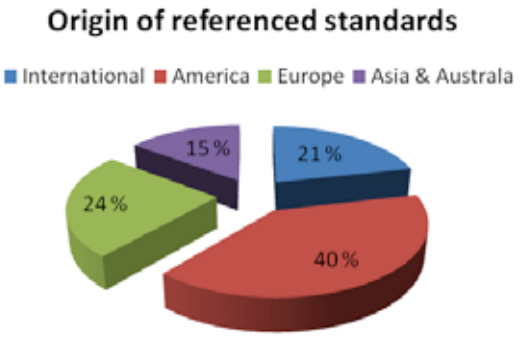


Figure 10

Figure 11 is based on the same information and show the nationality of those countries providing the most standards, where the international standards from IEC and ISO are excluded. Clearly, SDOs in the US have made most of the standards with 414 references and this offers the US operators and US industry which have participated in the development of these standards many benefits in a global market place. Europe, represented by Norway and UK together come second with 196 references. India third with 144 references. The US dominance is further amplified by the fact that many of the Indian and Norwegian standards are based on American standards.

Again, we know that there are a large number of standards from Rostechregulirovanie in Russia and CPSC and CPEC in China, specifically for the oil and gas industry which are not referenced by the regulators there. Therefore these do not show up in this graph, but they should be kept in mind when reading this figure.

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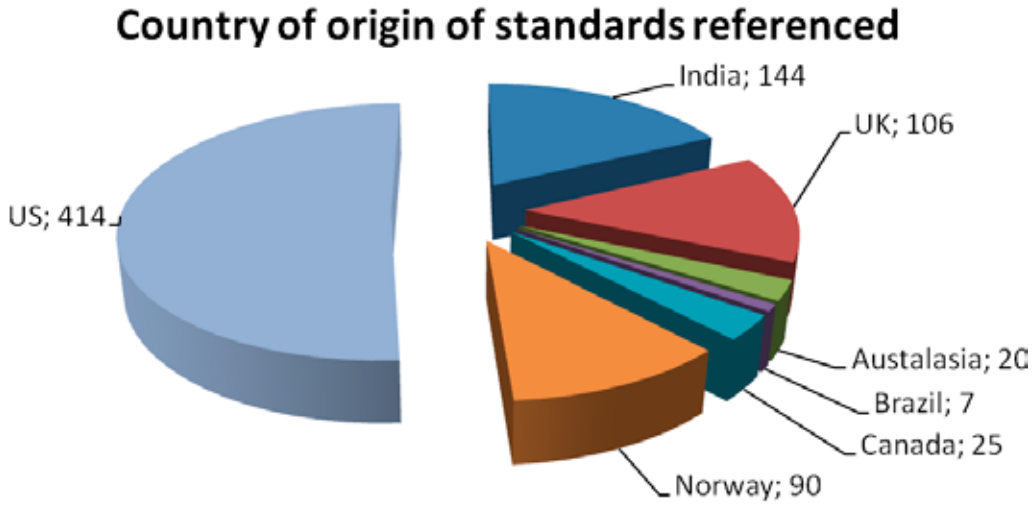
Figure 11



20.11 Duplicating standards referenced

There are a number of standards referenced in this report that duplicate each other i.e. cover largely the same subject with different wording and provisions made by different SDOs. Examples can be mentioned for offshore structures where the following references are included in this report:

- API RP2A Planning, designing and constructing fixed offshore platforms
- BS 5950 Structural design code
- CAN/CSA-S473 Steel structures, offshore structures
- DS 449 Code of practice for the design and construction of pile supported offshore steel structure (withdrawn 2008 on account of ISO 19902)
- ISO 19902 Fixed Steel structures
- NORSOK N-004 Design of steel structures

Danish Standard replaced last year its DS 449 with ISO 19902, and the ISO reference is already in place in the Danish regulatory documents recently issued by DEA. In addition the 19900 series standards mentioned in 19902 will be used in Denmark. Therefore, DS 449 can eventually be taken out of this list.

Canadian CSA has already adopted a number of the new suite of standards from ISO/TC 67/SC 7, i.e. ISO 19900, 19901-1, -2, -4, -5, -7, 19903 and 19904-1. These are believed to eventually supersede the CAN/CSA suite of offshore structures standards available at present in Canada.

API has agreed a plan for harmonisation of its API 2-series of structural standards which has served the global oil and gas industry for many years with the ISO 19900-series. Reference is made to 2008 OTC paper No. 19606[7].

Standards Norway technical committee (K114/EgN) for structures is considering how to handle the NORSOK N-series of standards in view of the emerging ISO 19900-series. The goal of Standards Norway Petroleum sector is to have access to and use international standards that cover the needs of Norwegian petroleum industry. The 19900-series of standards are adopted by CEN and thus Standards Norway as a member of CEN have to adopt the EN ISO versions as national standards within six months of their publication and withdraw competing Norwegian Standards (NS). The NORSOK standards, however, are not NS and can therefore co-exist together with the parallel NS EN ISO standards if the Norwegian oil and gas industry so desire, e.g. on the same basis as BSI PD 5500 in light of BS EN 13445 for Pressure Vessels.

ISO/TC 67/SC 7 Offshore Structures enjoys a global membership and is actively working to accommodate the global oil and gas industry needs and improve its package of ISO standards in this area. So there is hope for better harmonisation also for the oil and gas industry structural standards.

Another example of duplicating standards is for pipelines transportation systems. Here we also have a large number of more or less duplicating standards referenced by different regulators:

- ANSI/ASME B31.4 Liquid Transportation Systems for Hydrocarbons
- ANSI/ASME B31.8 Gas Transmission and Distribution Piping Systems
- API RP 1102 Liquid Petroleum Pipelines Crossing Railroads and Highways
- API RP 1111 Design, Construction, Operation and Maintenance of Offshore Hydrocarbon Pipelines
- CAN/CSA-Z184-92, Gas Pipeline Systems;
- CAN/CSA-Z187-M87 Offshore Pipelines (replaced by Z662-07)
- DNV OS-F101 Submarine Pipeline Systems
- EN 14161 Pipeline Transportation Systems (European adoption of ISO 13623 – modified scope)
- IP Part 6: Pipeline Safety Code (obsolete)
- ISO 13623 Petroleum and natural gas industries – Pipeline transportation systems
- NEN 3650 Requirements for pipeline systems
- NZS 5223 Code of Practice for High Pressure Gas and Petroleum Liquids Pipelines
- PD 8010-2 Code of practice for pipelines: Subsea pipelines

ISO/TC 67/SC 2 Pipeline systems is actively working to improve its package of ISO standards in this area, it has broad international membership, so there is hope for better harmonisation also for the oil and gas industry pipeline standards.

As mentioned before there are two versions of nearly the same standard: API RP14C and ISO 10418, both titled 'Recommended Practice for Analysis, Design, Installation, and Testing of Basic Surface Safety Systems for Offshore Production Platforms'. Whereas the ISO standard was based on the API RP there are some significant differences in these two standards, covering exactly the same subject. Work is underway in ISO with API participation to harmonise these two standards.

There are many other examples of duplicating standards and this should be analysed further in order to determine a plan for the harmonisation of more of these, in order to simplify the regulations and international operations.

20.12 Dated references

There is a mix of references to specific revisions of standards, latest available standards or standards with no references to publication date, assumed then to be the latest available at the time of applying the regulations to a specific project. There is no evident reason for this difference in practice between the regulators as both solutions are found in several regulatory documents. When a regulator makes references to specific revisions of standards he obviously knows exactly what he is making references to, he is in full control of the reference to the safety level specified by the referenced standards. This is the case with e.g. PSA and US MMS. However, this causes a significant revision effort on the hands of the regulator to keep their documents updated in view of the constant development and revisions of referenced standards. Therefore e.g. PSA provides annual updates to their regulatory documents.

Also this provides an uncertainty on how to handle editions of standards published after the one referenced in the regulatory document. The question arises if one only have to use the dated reference specifically (which may at the time of application be an old and superseded standard) or if it is possible to use a new edition of the standard referenced, if available. Normally, the industry desire is to use the latest revision of a standard and this would require a formal clarification with the regulator as this is not what he put into his references. It is assumed that in the majority of the cases, the

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regulator will accept the new revision of a standard, but obviously not in all cases, as otherwise the dated references would make no sense. This practice therefore causes an uncertainty and largely an unnecessary clarification that could be avoided with undated (latest available) references, which most of the regulators use anyway.

The choice of a regulator's references to a given edition of the standard can be driven by legal considerations, e.g. some claim the regulator cannot make references to unknown documents. This is clearly a legally relevant point. On the other hand a mix of dated and undated references is frequently seen in the same regulatory document. So there appears to be room for more undated references which would be preferred by the industry to take advantage of the constant standards development process.

Normally there is ample time for a regulator to react to avoid any undesired solutions if in a rare case a new revision of a referenced standard includes provisions not agreeable to the regulator, if he should select to go for only undated references. Lack of currency of regulations or guidelines with dated references to standards pose a problem to the industry using these. With a typical five year revision plan for standards, one can probably assume that most of the references in a regulatory document are out of date if the revision period of the regulators' document is also five years or more.

Regulators' use of international standards from ISO and IEC is also discussed in Reference 3.

20.13 Good oilfield practice and recognised norms

Regulators general references to standards often use expressions like: recognised standards or norms, applicable standards, appropriate standard, industry standards, international standards and recommended practises and international recognised standards and guidelines. Some regulators use the term 'good oilfield practice' as a general reference.

For these expressions there is no agreed international definition and hence their interpretation is up to the users at any time to select the codes and standards and good engineering practice that it is considered relevant to use for the task in question. This leaves room for different solutions under different circumstances. And one particular standard may be considered recognised in one country whereas not considered recognised in another country. Clearly, this will be interpreted differently from country or region to another. On the other hand these statements provide flexibility and leave a significant responsibility for the selection of adequate standards in the hands of the users.

Nevertheless, there is always the requirement to comply with the general provisions of the laws and regulations. The selection of codes, standards and good engineering practices will be documented by the operator and in some cases subject to the regulator review and approval before design, installation or operation of the installations can commence.

20.14 Mandatory or voluntary use of standards

Use of recognised or referenced standards appears to be voluntary with most, if not all of the regulators in the sense that other technical solutions, methods or procedures can be opted for provided the party responsible can provide documentary proof of compliance with the requirements of the regulations itself or the standards referenced, although by a different solution. This option may, however, not be used very often as this places a heavy burden of proof on the responsible party that wants to select a different solution and also some uncertainty as the alternative solution may be subject for discussion and possible rejection by the regulator.

The compliance with referenced standards in the regulatory documents will normally provide a presumption of conformity to the corresponding regulation. This appears to be a principle recognised by most, if not all of the regulators. It is clearly stated in the preamble of the UK HSE ACOP documents and PSA's guidelines to the regulations.

Another related example is found in the US Title 46 CFR 110, subpart 110.10 on Reference Specifications, Standards, and Codes (*http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr;sid=ceb56c1bff82719c96fba974f6912d0b;rgn=div6;view=text;node=46%3A4.0.1.3.13.2;idno=46;cc=ecfr*), where the word 'should', when used in mate-

rial incorporated by reference, is to be construed the same as the words 'must' or 'shall' for the purposes of this subchapter.

20.15 Different types of standards

Some SDOs puts a difference on different types of standards like: Recommended Practices, Specifications, Standards, Bulletins, Publicly Available Specifications, Workshop Agreements etc. with different standing in their catalogues. This also causes some discussion in the industry. API provides the following definitions for their various categories[9]:

a) Specifications: Documents that facilitate communications between purchasers and manufacturers
b) Recommended Practices: Documents that communicate proven industry practices
c) Standards: Documents that combine elements of both specifications and recommended practices.
d) Codes: Documents intended for adoption by regulatory agencies or authorities having jurisdiction.
e) Bulletins and Technical Reports: Documents that convey technical information on a specific subject or topic

The majority of the ISO documents references are 'standards' and ISO provides the following definition for 'standard'[5]: Document, established by consensus and approved by a recognised body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context.

> *NOTE Standards should be based on the consolidated results of science, technology and experience, and aimed at the promotion of optimum community benefits.*

When referenced by a regulator, however, the subtle differences between these different types of standards may be less important than the choice of words as 'shall' or 'should' in the referenced documents themselves. In this context the definition of 'should' provided by PSA for its own guidelines is interesting:

> *'Should' means the authorities' recommended manner of fulfilling the function requirement. Alternative solutions with documented equivalent functionality and quality can be employed without being submitted to the authorities for approval.*

In other words, a 'should' statement in one of their guidelines cannot be ignored as some may like to think about a 'should' statement in a specification or standard referenced by an operator.

20.16 Supplements to referenced standard

A regulator may supplement a referenced standard by amending the provision of a standard in the regulations or guidelines. This is not frequently done, but there are examples. E.g. PSA Facilities regulation guidelines re section 9, 10, 12, 13, 15, 19, 20, 22 and so on with additions to mainly the NORSOK standards. Therefore it is important to include the regulators in the standards work, to try to avoid these amendments.

When the industry or other SDOs publish standards, some regulators (e.g. PSA) expect such standards to be used by the industry and to be applied to new facilities and in the sphere that the standard describes.

Some of the standards referenced are national adoptions, identical (IDT) or modified (MOD) adoption of regional or international standards. An identical adoption will of course be the easiest to handle for an operator working in different countries. A modified adoption is also very useful, depending on the degree of modification and the way it is presented. Often modified adoptions are the result of differences of opinions during the original standards development process, which as a national adoption presents the views of the national delegation that did not succeed with its views in

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the international consensus process. In rare cases the modified adoption may be due to scope delineation issues; climatic; or other nationally different conditions.

An interesting observation is the duplication or supplements of standards, typically found in national standards like NORSOK and OISD. If these standards do not follow the structure of the standards they duplicate or supplement, they are difficult and time consuming to use. Hence, the suggestion to these SDOs is to follow strictly the table of content of the standard supplemented.

While national standards efforts like NORSOK and OISD will be useful to harmonise national views, their standards remain national and mostly used only in national references. These standards can, however, be an excellent stepping stone for international work if offered to the international standards communities. There are good examples of this happening already. However, if they remain national standards over time they will need to be updated and thus draw on the national resources for standards, leaving less resources for international work.

20.17 Oil & gas industry responsibility and benefits

The oil and gas industry uses standards from many sources applicable to many different industry segments. Some of the standards used are, however, only applicable to the oil and gas industry and therefore one could say the sole 'responsibility' of this industry, i.e. the oil and gas industry is able to directly influence the content of 380 of the standards listed in this report. See Figure 12 below.

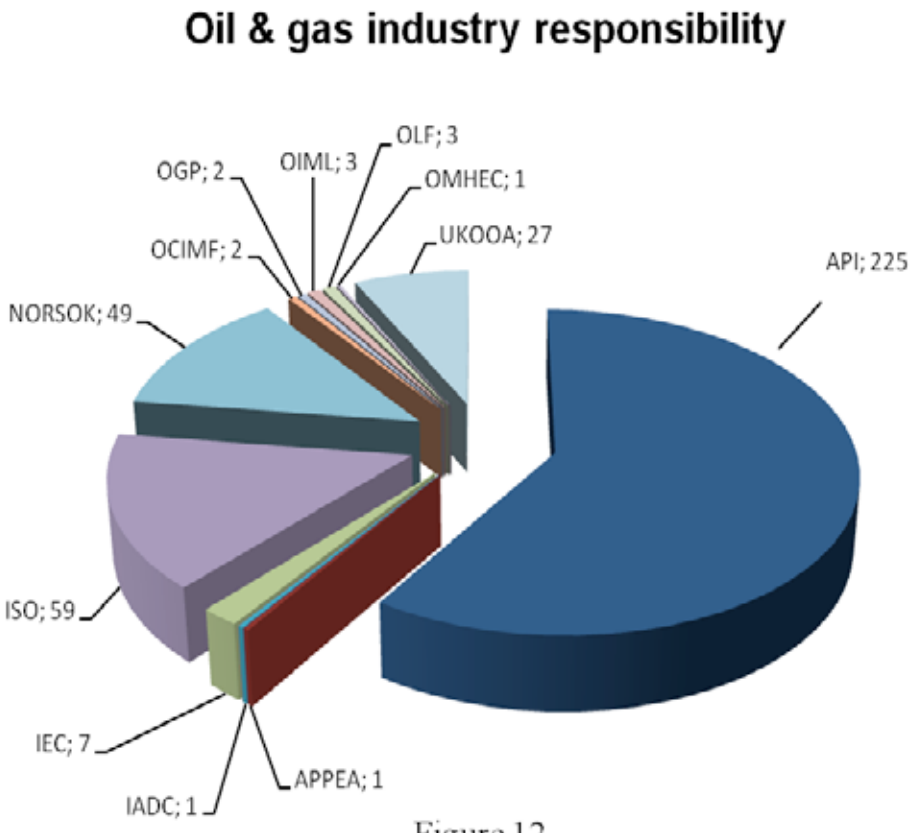

Figure 12

One third of the standards referenced in this report are thus under direct influence by the oil and gas industry. In addition to this there is also the general responsibility to share the burden of making and maintaining the other standards referenced. Standards do not make and maintain themselves – people have to be involved! Working together in a SDO to develop standards is in many cases a good investment in view of the industry overall benefit. Various reports have attempted to analyse the benefits of standards. A DIN study claims that the benefit of standardisation amounts to 1% of the

gross national product (GNP) of the countries included in the study. That is a significant number and probably applicable also to the oil and gas industry[8].

20.18 Role of standard developers

With the heavy use of standards by the regulators, the SDOs and the participants in the standards development work make a significant contribution to the actual definition of the technical solutions and details for the national oil and gas industry. This is a fact that most SDOs and their participants is well aware of. Therefore the use of words like 'shall', 'should', 'may' etc. becomes important words and is sometimes difficult to agree on in the standards development consensus process, because the fact that the standard in question may become a regulators reference document. Internationally agreed definition of these terms are included in the ISO/IEC Directives, Part 2, Rules for the structure and drafting of International Standards. Annex H[5]. Other SDOs use different definitions for these terms and this also causes some problems.

Standards are predominantly developed by oil and gas industry experts, normally coming from operators, fabricators, suppliers, research institutes or the academia. In this context it can be said these people makes a direct impact on the safety requirements of the regulatory regimes around the world.

20.19 Self regulation by standards development?

Could the oil and gas industry move towards a higher degree of self regulating by more focus on the development of standards? In view of the global nature of the oil and gas industry and the differences in national regulations around the globe, this is an interesting topic to pursue.

In this context it is interesting to note that the US National Technology Transfer and Advancement Act (NTTAA) requires US Federal Agencies to use consensus standards when they meet their agency's needs and to participate in the standards consensus process. It is reported that this act has greatly increased the reference of all consensus standards in regulations. It is the Department of Commerce's National Institute of Standards and Technology (NIST) responsibility to compare private sector standards with Federally-adopted or recognised standards and to coordinate Federal agency use of private sector standards, emphasising those private sector standards developed by consensus organisations. The rationale for using other than voluntary consensus standards must be explained.

The development of the NORSOK standards in Norway moved a lot of detailed, technical provisions and guidelines from the Norwegian regulator's documents (at the time NPD) into firstly a national industry discussion that secondly amended the words to suit a wider base of stakeholders and thirdly produced the set of new Norwegian industry standards, called NORSOK standards after the name of the 'barn raising' effort they were a part of, at the time. The NORSOK standards, still maintained by the Norwegian oil and gas industry, are the standards referenced the most by PSA and an important part of the PSA regulatory scheme.

The Indian regulators saw that various petroleum installations were designed on the basis of different technology and there was non-uniformity with regard to design & operating philosophies of facilities. With a view to standardisation of designing and operating philosophies of various plants in India, the Ministry of Petroleum and Natural Gas (MOP&NG) of India in 1986, constituted the Safety Council assisted by the Oil Industry Safety Directorate (OISD). The regulator selected to develop a suite of 110 OISD standards to overcome this problem. Ref Annex D1.

The Iranian Ministry of Petroleum has developed a large number of Iranian Petroleum Standards (IPS) available for their national oil and gas industry. These standards include references to well known and traditional oil and gas industry standards.

The wider question is if there is an opportunity and good reason for the oil and gas industry to create the foundation for a move towards a higher degree of self regulating by more focus on the development of international standards? The safety case schemes in the Australia, New Zealand and Brazil

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leaves much to the operator in respect of the definition of technical details by use of references to standards to meet the goal setting provisions of the regulations.

The work of international standards committees focusing on the oil and gas industry like, ISO/TC 28 Petroleum products and lubricants, ISO/TC67 Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries, ISO/TC 193 Natural gas and IEC/TC 18 Electrical installations of ships and of mobile and fixed offshore units, will help to move in this direction. Here a number of industry and national standards have been taken into the ISO/IEC committee work programmes, discussed and turned out as consensus built international standards for global application. There are many good examples of the success of this effort.

An example here may be the ISO/TC 8 'Ships and marine structures' which works in close liaison with the International Maritime Organization (IMO). More than hundred of their ISO/TC 8 standards are referenced by IMO regulatory documents according to a presentation by the US based chair of ISO/TC 8[6]. One of the key drivers for ISO/TC 8 is to coordinate their needs with IMO in order to be able to deliver ISO standards quickly to meet the demands of this international regulator. This can be an example for other ISO/IEC technical committees.

21 – Summary

21.1 Regulators covered

National regulators documents from regulators in fourteen countries, Australia, Brazil, Canada (Newfoundland and Nova Scotia), China, Denmark, India, Italy, The Netherlands, New Zealand, Norway, Russia, Thailand, United Kingdom and United States have been examined for references to standards. In addition IMO rules and EU directives and their associated standards have been reviewed in brief. Hence, a large part of the global oil and gas industry offshore regulators have been covered by this report.

21.2 References to standards

All of the regulators include either specific and/or general references to standards in their regulatory documents.

The preceding chapters and appendices reveal large number of specific references, but also significant variations in the manner in which standards are referenced in the national regulators documents, from no specific references at all to extensive references in the regulations themselves or in regulators standards, guidelines to the regulations or other types of documents.

A total of 1,348 references to standards have been registered from more than 60 different standards development organisations. 1,140 or 87% of these are different standard titles. Only 154 of the standards are referenced by two or more regulators. 36 of the referenced titles have been referenced by three or more regulators. This means that only 13% of the standards in question have been referenced by more than one regulator even though they all regulate the same part of the oil and gas industry. From an international operators point of view this provides a challenge in reviewing, understanding and applying correctly all of these different references for the actual exploration and development activities in different corners of the world. Amendments in company procedures and purchasing practices have to be implemented to meet these requirements in different countries around the globe. This represents also a challenge for the maintenance, because: what to prioritise when resources are scarce?

As many as 225 different API standards are referenced, with ISO in second place with 152 references (59 of these from ISO/TC67 work) and Indian Standards third with 144 references. This is not surprising as API has been providing useful standards specifically for the oil and gas industry since 1924. The next group of SDOs with more than 20 references in this report are from ANSI/ASME, ASTM, BS, CAN/CSA, DNV, EN, IEC, NFPA, NORSOK, UKOOA (now UK Oil and Gas) and UL.

The two standards most frequently referenced are API Spec 6A Wellhead and Christmas Tree Equipment (also available as ISO 10423) and IMO MODU Code which are referenced by five regulators.

This report shows a clear dominance of references to industry standards (44%). Thereafter to national standards (35%) and international standards represent the smallest group (21%). Compared to Petrol96[1], there is a significant increase in the reference to IEC and ISO standards. This comparison also shows a sharp decrease in references to national standards. This trend is confirmed by UK DTI Report[10].

However, with the figure of 21% references to international standards only by the regulators, it is evident there is still a lot of international standardisation work to be done. Most of the references included in this report are undated, i.e. latest available revision applies. Some regulators make references to dated references only. This cause an uncertainty on how to apply new editions of standards published after the one referenced in the regulatory document.

Also, there are most probably more international standards that could be considered for reference by the regulators for the purpose of internationalisation, e.g. those emanating from ISO/TC67. Making the industry and regulators aware of the relevant standards available is a constant challenge.

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21.3 Origin of referenced standards

Considering the regional origin of standards the largest number of references comes from American SDOs (ABNT, API, ASTM, CAN/CSA, etc.) with European (BS, EN, NORSOK, etc.) second. Considering the nationality of those countries providing the most standards, where the international standards from IEC and ISO are excluded, we find that the SDOs in the US have made most of the standards with 414 references. India is second with 144 references and UK and Norway come next.

This offers the US operators and US industry which have participated in the development of these standards many benefits in a global market place.

21.4 Overlapping standards

There are certainly also overlapping standards as shown in chapter 20.11. Standards for pipeline transportation systems and offshore structures are mentioned specifically. This makes room for the question of harmonization at an international level, provided the owners of the standards are prepared to cooperate. This matter should be studied further. Harmonisation presents challenges for the participants in possibly having to give up old standards for new ones, but if done correctly in a consensus building scheme, the rewards can be much greater than the perceived loss.

Duplicating standards offer many challenges to the oil and gas industry. First of all, global companies have to relate to different requirements in different parts of the world which adds cost as company global design solutions and purchasing practices may not be possible to be used. Secondly, the maintenance of different local standards for the same subject takes much more time and resources than maintenance of one global standard.

21.5 Oil & gas industry responsibility

One third of the standards referenced herein are only applicable to the oil and gas industry. Therefore, a major responsibility rests with this industry, regulators included, for their development and maintenance. Working together in a SDO to develop standards is in many cases a good investment in view of the industry overall benefit. A DIN study claims that the benefit of standardisation amounts to 1% of the gross national product (GNP)[8].

21.6 Self regulation by standards development?

The question is if there is an opportunity and good reason for the oil and gas industry to move towards a higher degree of self regulating by more focus on the development of international standards? The safety case schemes by some regulators leaves much to the operator in respect of the definition of technical details by use of references to standards to meet the goal setting provisions of the regulations.

The work of international standards committees focusing on the oil and gas industry like, ISO/TC 28 Petroleum products and lubricants, ISO/TC 67 Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries, ISO/TC 193 Natural gas and IEC/TC 18 Electrical installations of ships and of mobile and fixed offshore units, will help to move in this direction. Here a number of industry and national standards have been taken into the ISO/IEC committee work programmes, discussed and turned out as consensus built international standards for global application. There are many good examples of the success of this effort. Self regulation could be further developed by better industry coordination with the regulators.

22 – Conclusion

In conclusion, this report clearly shows that standards represent an important resource for the regulators of the offshore oil and gas industry. In fact, a modern and efficient oil and gas industry and regulatory schemes are not possible to imagine without the use of standards.

There is, however, little harmonisation by regulators in their use of standards, which presents added efforts and a challenge for the global operators. About one third of standards referenced are national standards, which provides additional work for global operators. A majority of the referenced standards are from the US. This offers benefits for the US based operators and supply industry in a global market.

There is a significant increase in the reference to international standards and a sharp decrease in references to national standards. However, with the figure of only 21% references to international standards by the regulators, it is evident there is still a lot of international standardisation work to be done.

There is more work to do in relation to harmonisation and provision of more international standards for references and regulators should be encouraged to make references to more globally relevant standards.

Standards provides for clear and known references for parts, equipment, systems and facilities of this complex industry. With this recognition comes the responsibility for the oil and gas industry, regulators included, to maintain and develop a suitable package of standards for the continued efficiency of the global oil and gas industry. Studies on benefits of standards show good return on investments in standards development[8].

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23 – References

1) *Standardisation programme for the petroleum and natural gas industries including a listing of standards used in Europe*, ISBN 92-9097-516-4, CEN Order Ref. Petrol96-1

2) *OGP Position paper on the development and use of international standards*. OGP Report No. 381. May 2007. *http://www.ogp.org.uk/pubs/381.pdf*

3) ISO publication: *Using and referencing ISO and IEC standards for technical regulations*, September 2007. Supporting presentation: *http://www.standardsinfo.net/info/livelink/fetch/2000/148478/6301438/docs/ISOandIEC_standards_for_technical_regulations_en.pdf*

4) *Global standards used locally worldwide ISO-CEN-API*. List of ISO/TC67 standards with the adoption in CEN and in API. *http://info.ogp.org.uk/standards/downloads/GSULW.pdf*

5) *ISO/IEC Directives, Part 2, Rules for the structure and drafting of International Standards*.

6) Presentation at ISO Technical Committee Chair Conference, Geneva, Switzerland, 2008-06-05/06, *Successes in support of Regulatory Bodies* by Capt. Charles H. Piersall, Chairman, ISO/TC8, Head of ISO Delegations to IMO.

7) OTC Paper 19606 API *Offshore Structures Standards: Changing Times* D.J. Wisch, Chevron ETC; A. Mangiavacchi, Experia Consulting.

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9) API S1 *Organization and Procedures for Standardization of Oilfield Equipment and Materials*.

10) UK DTI Report *The Empirical Economics of Standards*, June 2005.

11) World Trade Organization, *Technical Barriers to Trade*. *http://www.wto.org/english/docs_e/legal_e/17-tbt.doc*

Annex A

Standards referred to in Newfoundland (NFL) and Nova Scotia (NS) Regulations

NFL Offshore Petroleum Drilling, SOR/93-23 January 28, 1993

NFL Offshore Area Petroleum Production and Conservation , SOR/95-103 February 21, 1995

NFL Offshore Petroleum Installations, SOR/95-104, February 21, 1995

NS Petroleum Installations Regulations and the Offshore Area Petroleum Production and Conservation Regulations (SOR/95-190)

NS Offshore Petroleum Drilling Regulations (SOR/92-676)

Nova Scotia Offshore Petroleum Installations Regulations (SOR/95-191)

- API BUL 5C2 Performance Properties of Casing, Tubing, and Drill Pipe
- API RP 14B Design, Installation, Repair and Operation of Subsurface Safety Valve Systems
- API RP 14C Analysis, Design, Installation and Testing of Basic Surface Safety Systems for Offshore Production Platforms
- API RP 14E, Design and Installation of Offshore Production Platform Piping Systems
- API RP 14F, Design and Installation of Electrical Systems for Offshore Production Platforms
- API RP 14H Installation, Maintenance and Repair of Surface Safety Valves
- API RP 17A Design and Operation of Subsea Production Systems
- API RP 17B, Recommended Practice for Flexible Pipe.
- API RP 2D, Operation and Maintenance of Offshore Cranes
- API RP 2I, In-Service Inspection of Mooring Hardware for Floating Drilling Units
- API RP 45, Analysis of Oil-Field Waters.
- API Spec 14A Subsurface Safety Valve Equipment
- API RP 520, Design and Installation of Pressure-Relieving Systems in Refineries
- API RP 521, Guide for Pressure-Relieving and Depressuring Systems
- API RP 7C-llF, Installation, Maintenance and Operation of Internal-Combustion Engines
- API RP 8B, Hoisting Tool Inspection and Maintenance Procedures
- API RP l4F, Design and Installation of Electrical Systems for Offshore Production Platforms
- API Spec 12J, Specification for Oil and Gas Separators
- API Spec 14A Subsurface Safety Valve Equipment
- API Spec 14D Wellhead Surface Safety Valves and Underwater Safety Valves for Offshore Service
- API Spec 17D Subsea Wellhead and Christmas Tree Equipment
- API Spec 2C, Offshore Cranes
- API Spec 6A Wellhead and Christmas Tree Equipment
- API Spec 6FA Specification for Fire Test For Valves
- API Spec 6FB Fire Test for End Connections
- API Std 2000, Venting Atmospheric and Low-Pressure Storage Tanks
- API Std 526, Flanged Steel Safety-Relief Valves
- API STD 527, Seat Tightness of Pressure Relief Valves
- API Std 617, Centrifugal Compressors for General Refinery Service
- API STD 618, Reciprocating Compressors for General Refinery Services
- API Std 619, Rotary-Type Positive Displacement Compressors for General Refinery Services
- ASME Boiler & Pressure Vessel Code; section I
- ASME Boiler & Pressure Vessel Code; section II
- ASME Boiler & Pressure Vessel Code; section IV
- ASME Boiler & Pressure Vessel Code; section IX
- ASME Boiler & Pressure Vessel Code; section V
- ASME Boiler & Pressure Vessel Code; section VII

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- ASME Boiler & Pressure Vessel Code; section VIII
- CAN/CGSB-65.16-M89, Marine Abandonment Immersion Suit Systems
- CAN/CSA Preliminary Standard S474-M1989, Concrete Structures
- CAN/CSA Preliminary Standard S475-M1989, Sea Operations
- CAN/CSA Special Publication S472.1-1992, Commentary to CSA Standard CAN/CSA-S472-92, Foundations
- CAN/CSA Standard C22.2 No. 0.3-M1985, Test Methods for Electrical Wires and Cables
- CAN/CSA Z94.4-93, Selection, Use, and Care of Respirators
- CAN/CSA-B51-M1991, Boiler, Pressure Vessel, and Pressure Piping Code
- CAN/CSA-S471-92, General Requirements, Design Criteria, the Environment, and Loads;
- CAN/CSA-S472-92, Foundations, Offshore Structures
- CAN/CSA-S473-92, Steel Structures, Offshore Structures
- CAN/CSA-Z184-92, Gas Pipeline Systems;
- CAN/CSA-Z187-M87, Offshore Pipelines
- CAN/CSA-Z94.1-92, Industrial Protective Headwear
- CAN/CSA-Z94.4-93, Selection, Use, and Care of Respirators
- CAN3-Z 180.1-M85, Compressed Breathing Air and Systems, and
- CAN3-Z299.0-86, Guide for Selecting and Implementing the CAN3-Z299-85 Quality Assurance Program Standards
- CAN3-Z299.0-86, Guide for Selecting and Implementing the CSA Z299-85
- CAN3-Z299.1-85, Quality Assurance Program ó Category 1
- CAN3-Z299.2-85, Quality Control Program ó Category 2
- CAN3-Z299.3-85, Quality Verification Program ó Category 3
- CAN3-Z299.4-85, Inspection Program ó Category 4
- CAN3-Z299-85, Quality Control Program
- Canadian Coast Guard TP 7920E Standards Respecting Standby Vessels,
- Canadian Electrical Code
- DNV CN No. 31.5 ó Strength Analysis of Main Structures of Self-Elevating Units
- DNV Guideline No. 1-85, Safety and Reliability of Subsea Production Systems
- DNV Rules for Classification of Mobile Offshore Units
- IEC 60092-3, Electrical Installations in Ships, Part 3: Cables
- IEC 60332-3, Tests on electrical cables under fire conditions, Part 3: Tests on bunched wires or cables;
- IEEE 45-1983 Recommended Practice for Electric Installations on Shipboard
- IEEE 60045-1983 RP for Electric Installations on Shipboard
- IMO Mobile Offshore Drilling Units (MODU) Code
- IMO SOLAS
- NACE MR-01-75, Sulfide Stress Cracking Resistant Metallic Materials for Oil Field Equipment
- NFPA 16, Standard on Deluge Foam-Water Sprinkler and Foam-Water Spray Systems
- NFPA 321, Standard on Basic Classification of Flammable and Combustible Liquids
- NFPA 10, Standard for Portable Fire Extinguishers
- NFPA 12, Standard on Carbon Dioxide Extinguishing Systems
- NFPA 13, Standard for the Installation of Sprinkler Systems
- NFPA 13A, RP for the Inspection, Testing and Maintenance of Sprinkler Systems.
- NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection.
- NFPA 16, Standard on Deluge Foam-Water Sprinkler and Foam-Water Spray Systems
- NFPA 1961, Standard on Fire Hose
- NFPA 1971, Standard on Protective Clothing for Structural Fire Fighting
- NFPA 1973, Standard on Gloves for Structural Fire Fighting
- NFPA 1983, Standard on Fire Service Life Safety Rope, Harness and Hardware
- NFPA 321, Standard on Basic Classification of Flammable and Combustible Liquids

Annex B

- NFPA 72, Standard for the Installation, Maintenance, and Use of Protective Signalling Systems
- NFPA 72E, Standard on Automatic Fire Detectors
- Transport Canada TP 4414, Guidelines Respecting Helicopter Facilities on Ships

Standards referred in Danish guideline for design of fixed offshore installations – "Retningslinier for design af faste offshoreanlæg 2008"

- API 6A Specification for wellhead and Christmas Tree equipment
- API 6FA Fire test for valves
- API 12F Shop welded tanks for storage of production liquid
- API 14A Specification for subsurface safety valves
- API RP 14B RP for Design, Installation and operation of subsurface safety valve systems
- API RP 14C Recommended Practices for Analysis, Design, Installation and Testing of Basis Surface Safety Systems on Offshore Production Platforms
- API RP 17C Design and operation of subsea production system-Through flowline (TFL) systems
- API 17J Specification for Unbonded Flexible Pipe, with supplement of 1 June 2002
- API RP 520 RP for the Design and Installation of pressure relieving systems in refineries
- API Std 521 Guide for pressure relieving and depressure systems
- API 610 Centrifugal pumps for general refinery services
- API 616 Gas Turbines for the Petroleum, Chemical and Gas Industry Services
- API 617 Axial and centrifugal compressors and expander compressors for Petroleum, Chemical and Gas Industry Services
- API 618 Reciprocating compressors for general refinery services
- API 619 Rotary-type, positive displacement compressors for general refinery services
- API 650 Welded steel tanks for oil storage
- API 674 Positive displacement pumps – reciprocating
- API 675 Positive displacement pumps – controlled volume
- API 676 Positive displacement pumps – rotary
- API 2000 Venting atmospheric and low pressure storage tanks
- BS 2654 Vertical steel welded storage tanks
- BS 6755, part 2 Testing of valves, part 2: Spec. for Fire Type testing requirements
- DIN 4119 Tank installations of metallic materials
- DNV OS-F101 Submarine pipeline systems, 2000
- DS 1107 Stairs – Vocabulary
- DS 449, 1. ed. April 1983 Code of practice for the design and construction of pile supported offshore steel structure
- DS 700 Retningslinier for kunstig belysning i arbejdslokaler (Guidelines for artificial lighting of rooms)
- DS/EN 13852-1: 2004 Kraner. Offshore kraner. Del 1: Offshore kraner til generelle formål
- DS/EN 1838: 1999 Belysning. Nødbelysning (Emergency lighting)
- DS/EN 50014: 2000 Elektrisk materiel til eksplosionsfarlige atmosfærer – almindelige bestemmelser (Electrical equipment for potentionally explosion hazardous areas – general provisions)
- DS/EN 50272-2: 2001 Krav til sikkerhed for sekundære batterier og installasion af batterier – Del 2: Stationære Batterier (Stationary batteries)
- DS/EN ISO 14723 Subsea pipeline valves
- DS/EN ISO 19902 Fixed Steel Structures (2008-01-18) In addition will the 19900 series standards mentioned in 19902 be used
- DS/IEC 60332 Tests on electric cables under fire conditions, part 3 – 25
- DS/IEC 61511 Funktionel sikkerhed – sikkerhedssystemer til processindustri sektoren (Functional safety – safety systems for the process industry)
- EN 1591 Flanger og flangesamlinger (Flanges and flange assemblies)

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- EN ISO 3977-5 Gas Turbines for the Petroleum, Chemical and Gas Industry Services
- IEC 60092 Electrical Installation in Ships
- IEC 60331 Fire resisting characteristics of electric cables; first edition, replaced by IEC 60331-11 and –21
- IEC 61892-7 Mobile and fixed offshore units – Electrical installations – Part 7: Hazardous areas.
- ISO 1217 Displacement compressors – Acceptance Tests
- ISO 3880/1: 1977 Building construction – Stairs – Vocabulary Part 1: first edition
- ISO 10417 Recommended Practices for Design, Installation and operation of subsurface safety valve systems
- ISO 10418 Recommended Practices for Analysis, Design, Installation and Testing of Basis Surface Safety Systems on Offshore Production Platforms
- ISO 10420 PNGI – Flexible pipe systems for subsea and marine riser applications
- ISO 10423 Specification for wellhead and Christmas Tree equipment
- ISO 10432 Specification for subsurface safety valves
- ISO 13623 Petroleum and natural gas industries – Pipeline transportation systems
- ISO 13628-2, 2000 Petroleum and natural gas industries – Design operation of subsea production systems – Part 2: Flexible pipe systems for subsea and marine applications
- ISO 13628-3 Design and operation of subsea production system -Through flowline (TFL) systems
- ISO 13628-11 Flexible pipe systems for subsea and marine applications
- ISO 13709 Centrifugal pumps for general refinery services
- ISO 14313 Pipeline Valves
- ISO 15156 Petroleum and natural gas industries – Materials for use in H_2S-containing environments in oil and gas production
- ISO 15589-2 Cathodic Protection of Pipeline Transportation Systems, Offshore Pipelines
- NFPA 13 Installation of Sprinkler System
- NFPA 15 Standard for water Spray Fixed systems for Fire Protection
- NFPA 20 Standard for the Installation of Stationary Pumps for Fire Protection
- NFPA 2001 Standard for Clean Agent Fire Extinguishing System
- NFPA 72 National Fire Alarm Code
- NFPA 750 Standard on Water Mist Fire Protection System
- NFPA 96 Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations

Annex C

List of harmonised standard related to the Pressure Equipment Directive (PED)

- EN 19:2002 Industrial valves – Marking of metallic valves
- EN 287-1:2004 Qualification test of welders – Fusion welding - Part 1: Steels
- EN 334:2005 Gas pressure regulators for inlet pressures up to 100 bar
- EN 378-2:2008 Refrigerating systems and heat pumps – Safety and environmental requirements – Part 2: Design, construction, testing, marking and documentation
- EN 473:2000 Non destructive testing – Qualification and certification of NDT personnel - General principles
- EN 593:2004 Industrial valves – Metallic butterfly valves
- EN 764-5:2002 Pressure Equipment – Part 5: Compliance and Inspection Documentation of Materials
- EN 764-7:2002 Pressure equipment – Part 7: Safety systems for unfired pressure equipment
- EN 1057:2006 Copper and copper alloys – Seamless, round copper tubes for water and gas in sanitary and heating applications
- EN 1092-1:2007 Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories, PN designated – Part 1: Steel flanges
- EN 1092-3:2003 Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories, PN designated – Part 3: Copper alloy flanges
- EN 1092-4:2002 Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories, PN designated – Part 4: Aluminium alloy flanges
- EN 1171:2002 Industrial valves – Cast iron gate valves
- EN 1252-1:1998 Cryogenic vessels – Materials – Part 1: Toughness requirements for temperatures below -80°C
- EN 1252-2:2001 Cryogenic vessels – Materials – Part 2: Toughness requirements for temperatures between -80°C and -20°C
- EN 1349:2000 Industrial process control valves
- EN 1562:1997 Founding – Malleable cast irons
- EN 1563:1997 Founding – Spheroidal graphite cast irons
- EN 1564:1997 Founding – Austempered ductile cast irons
- EN 1591-1:2001 Flanges and their joints – Design rules for gasketed circular flange connections – Part 1: Calculation method
- EN 1626:1999 Cryogenic vessels – Valves for cryogenic service
- EN 1653:1997 Copper and copper alloys – Plate, sheet and circles for boilers, pressure vessels and hot water storage units
- EN 1759-3:2003 Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories, Class designated – Part 3: Copper alloy flanges
- EN 1759-4:2003 Flanges and their joint – Circular flanges for pipes, valves, fittings and accessories, class designated – Part 4: Aluminium alloy flanges
- EN 1797:2001 Cryogenic vessels – Gas/material compatibility
- EN 1866:2005 Mobile fire extinguishers
- EN 1983:2006 Industrial valves – Steel ball valves
- EN 1984:2000 Industrial valves – Steel gate valves
- EN ISO 4126-1:2004 Safety devices for protection against excessive pressure – Part 1: Safety valves (ISO 4126-1:2004)
- EN ISO 4126-3:2006 Safety devices for protection against excessive pressure – Part 3: Safety valves and bursting disc safety devices in combination (ISO 4126-3:2006)
- EN ISO 4126-4:2004 Safety devices for protection against excessive pressure – Part 4: Pilot operated safety valves (ISO 4126-4:2004)
- EN ISO 4126-5:2004 Safety devices for protection against excessive pressure – Part 5: Controlled safety pressure relief systems (CSPRS) (ISO 4126-5:2004)
- EN ISO 9606-2:2004 Qualification test of welders – Fusion welding – Part 2: Aluminium and aluminium alloys (ISO 9606-2:2004)
- EN ISO 9606-3:1999 Approval testing of welders – Fusion welding – Part 3: Copper and copper alloys (ISO 9606-3:1999)

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- EN ISO 9606-4:1999 Approval testing of welders – Fusion welding – Part 4: Nickel and nickel alloys (ISO 9606-4:1999)
- EN ISO 9606-5:2000 Approval testing of welders – Fusion welding – Part 5: Titanium and titanium alloys, zirconium and zirconium alloys (ISO 9606-5:2000)
- EN 10028-1:2007 Flat products made of steels for pressure purposes – Part 1: General requirements
- EN 10028-2:2003 Flat products made of steels for pressure purposes – Part 2: Non-alloy and alloy steels with specified elevated temperature properties
- EN 10028-3:2003 Flat products made of steels for pressure purposes – Part 3: Weldable fine grain steels, normalized
- EN 10028-4:2003 Flat products made of steels for pressure purposes – Part 4: Nickel alloy steels with specified low temperature properties
- EN 10028-5:2003 Flat products made of steels for pressure purposes – Part 5: Weldable fine grain steels, thermomechanically rolled
- EN 10028-6:2003 Flat products made of steels for pressure purposes – Part 6: Weldable fine grain steels, quenched and tempered
- EN 10028-7:2007 Flat products made of steels for pressure purposes – Part 7: Stainless steels
- EN 10204:2004 Metallic products – Types of inspection documents
- EN 10213:2007 Steel castings for pressure purposes
- EN 10216-1:2002 Seamless steel tubes for pressure purposes – Technical delivery conditions – Part 1: Non-alloy steel tubes with specified room temperature properties
- EN 10216-2:2002+A2:2007 Seamless steel tubes for pressure purposes – Technical delivery conditions - Part 2: Non-alloy and alloy steel tubes with specified elevated temperature properties
- EN 10216-3:2002 Seamless steel tubes for pressure purposes – Technical delivery conditions – Part 3: Alloy fine grain steel tubes
- EN 10216-4:2002 Seamless steel tubes for pressure purposes – Technical delivery conditions – Part 4: Non-alloy and alloy steel tubes with specified low temperature properties
- EN 10216-5:2004 Seamless steel tubes for pressure purposes – Technical delivery conditions – Part 5: Stainless steel tubes
- EN 10217-1:2002 Welded steel tubes for pressure purposes – Technical delivery conditions – Part 1: Non-alloy steel tubes with specified room temperature properties
- EN 10217-2:2002 Welded steel tubes for pressure purposes – Technical delivery conditions – Part 2: Electric welded non-alloy and alloy steel tubes with specified elevated temperature properties
- EN 10217-3:2002 Welded steel tubes for pressure purposes – Technical delivery conditions – Part 3: Alloy fine grain steel tubes
- EN 10217-4:2002 Welded steel tubes for pressure purposes – Technical delivery conditions - Part 4: Electric welded non-alloy steel tubes with specified low temperature properties
- EN 10217-5:2002 Welded steel tubes for pressure purposes – Technical delivery conditions – Part 5: Submerged arc welded non-alloy and alloy steel tubes with specified elevated temperature properties
- EN 10217-6:2002 Welded steel tubes for pressure purposes – Technical delivery conditions – Part 6: Submerged arc welded non-alloy steel tubes with specified low temperature properties
- EN 10217-7:2005 Welded steel tubes for pressure purposes – Technical delivery conditions – Part 7: Stainless steel tubes
- EN 10222-1:1998 Steel forgings for pressure purposes – Part 1: General requirements for open die forgings
- EN 10222-2:1999 Steel forgings for pressure purposes – Part 2: Ferritic and martensitic steels with specified elevated temperature properties
- EN 10222-3:1998 Steel forgings for pressure purposes – Part 3: Nickel steels with specified low temperature properties
- EN 10222-4:1998 Steel forgings for pressure purposes – Part 4: Weldable fine grain steels with high proof strength

- EN 10222-5:1999 Steel forgings for pressure purposes – Part 5: Martensitic, austenitic and austenitic-ferritic stainless steels
- EN 10253-2:2007 Butt-welding pipe fittings – Part 2: Non alloy and ferritic alloy steels with specific inspection requirements
- EN 10253-4:2008 Butt-welding pipe fittings – Part 4: Wrought austenitic and austenitic-ferritic (duplex) stainless steels with specific inspection requirements
- EN 10269:1999 Steels and nickel alloys for fasteners with specified elevated and/or low temperature properties
- EN 10272:2007 Stainless steel bars for pressure purposes
- EN 10273:2007 Hot rolled weldable steel bars for pressure purposes with specified elevated temperature properties
- EN 10305-4:2003 Steel tubes for precision applications – Technical delivery conditions – Part 4: Seamless cold drawn tubes for hydraulic and pneumatic power systems
- EN 10305-6:2005 Steel tubes for precision applications – Technical delivery conditions – Part 6: Welded cold drawn tubes for hydraulic and pneumatic power systems
- EN ISO 10931:2005 Plastics piping systems for industrial applications – Poly(vinylidene fluoride) (PVDF) – Specifications for components and the system (ISO 10931:2005)
- EN 12178:2003 Refrigerating systems and heat pumps – Liquid level indicating devices – Requirements, testing and marking
- EN 12263:1998 Refrigerating systems and heat pumps – Safety switching devices for limiting the pressure – Requirements and tests
- EN 12266-1:2003 Industrial valves – Testing of valves – Part 1: Pressure tests, test procedures and acceptance criteria – Mandatory requirements
- EN 12284:2003 Refrigerating systems and heat pumps – Valves – Requirements, testing and marking
- EN 12288:2003 Industrial valves – Copper alloy gate valves
- EN 12334:2001 Industrial valves – Cast iron check valves
- EN 12392:2000 Aluminium and aluminium alloys – Wrought products – Special requirements for products intended for the production of pressure equipment
- EN 12420:1999 Copper and copper alloys – Forgings
- EN 12434:2000 Cryogenic vessels – Cryogenic flexible hoses
- EN 12451:1999 Copper and copper alloys – Seamless, round tubes for heat exchangers
- EN 12452:1999 Copper and copper alloys – Rolled, finned, seamless tubes for heat exchangers
- EN 12516-1:2005 Industrial valves – Shell design strength – Part 1: Tabulation method for steel valve shells
- EN 12516-2:2004 Industrial valves – Shell design strength – Part 2: Calculation method for steel valve shells
- EN 12516-3:2002 Valves - Shell design strength - Part 3: Experimental method
- EN 12516-4:2008 Industrial valves – Shell design strength – Part 4: Calculation method for valve shells manufactured in metallic materials other than steel
- EN 12542:2002 Static welded steel cylindrical tanks, serially produced for the storage of Liquefied Petroleum Gas (LPG) having a volume not greater than 13m^3 and for installation above ground – Design and manufacture
- EN 12735-1:2001 Copper and copper alloys – Seamless, round copper tubes for air conditioning and refrigeration – Part 1: Tubes for piping systems
- EN 12735-2:2001 Copper and copper alloys – Seamless, round copper tubes for air conditioning and refrigeration – Part 2: Tubes for equipment
- EN 12778:2002 Cookware – Pressure cookers for domestic use
- EN 12952-1:2001 Water-tube boilers and auxiliary installations – Part 1: General
- EN 12952-2:2001 Water-tube boilers and auxiliary installations – Part 2: Materials for pressure parts of boilers and accessories
- EN 12952-3:2001 Water-tube boilers and auxilliary installations – Part 3: Design and calculation for pressure parts

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- EN 12952-5:2001 Water-tube boilers and auxiliary installations – Part 5: Workmanship and construction of pressure parts of the boiler
- EN 12952-6:2002 Water-tube boilers and auxiliary installations – Part 6: Inspection during construction; documentation and marking of pressure parts of the boiler
- EN 12952-7:2002 Water-tube boilers and auxiliary installations – Part 7: Requirements for equipment for the boiler
- EN 12952-8:2002 Water-tube boilers and auxiliary installations – Part 8: Requirements for firing systems for liquid and gaseous fuels for the boiler
- EN 12952-9:2002 Water-tube boilers and auxiliary installations – Part 9: Requirements for firing systems for pulverized solid fuels for the boiler
- EN 12952-10:2002 Water-tube boilers and auxiliary installations – Part 10: Requirements for safeguards against excessive pressure
- EN 12952-11:2007 Water-tube boilers and auxiliary installations – Part 11: Requirements for limiting devices of the boiler and accessories
- EN 12952-14:2004 Water-tube boilers and auxiliary installations – Part 14: Requirements for flue gas DENOX-systems using liquefied pressurized ammonia and ammonia water solution
- EN 12952-16:2002 Water-tube boilers and auxiliary installations – Part 16: Requirements for grate and fluidized-bed firing systems for solid fuels for the boiler
- EN 12953-1:2002 Shell boilers – Part 1: General
- EN 12953-2:2002 Shell boilers – Part 2: Materials for pressure parts of boilers and accessories
- EN 12953-3:2002 Shell boilers – Part 3: Design and calculation for pressure parts
- EN 12953-4:2002 Shell boilers – Part 4: Workmanship and construction of pressure parts of the boiler
- EN 12953-5:2002 Shell boilers – Part 5: Inspection during construction, documentation and marking of pressure parts of the boiler
- EN 12953-6:2002 Shell boilers – Part 6: Requirements for equipment for the boiler
- EN 12953-7:2002 Shell boilers – Part 7 : Requirements for firing systems for liquid and gaseous fuels for the boilers
- EN 12953-8:2001 Shell boilers – Part 8: Requirements for safeguards against excessive pressure
- EN 12953-9:2007 Shell boilers – Part 9: Requirements for limiting devices of the boiler and accessories
- EN 12953-12:2003 Shell boilers – Part 12: Requirements for grate firing systems for solid fuels for the boiler
- EN 13121-1:2003 GRP tanks and vessels for use above ground – Part 1: Raw materials – Specification conditions and acceptance conditions
- EN 13121-2:2003 GRP tanks and vessels for use above ground – Part 2: Composite materials - Chemical resistance
- EN 13133:2000 Brazing – Brazer approval
- EN 13134:2000 Brazing – Procedure approval
- EN 13136:2001 Refrigerating systems and heat pumps – Pressure relief devices and their associated piping – Methods for calculation
- EN 13175:2003+A2:2007 LPG equipment and accessories – Specification and testing for Liquefied Petroleum Gas (LPG) tank valves and fittings
- EN 13348:2001 Copper and copper alloys – Seamless, round copper tubes for medical gases or vacuum
- EN 13371:2001 Cryogenic vessels – Couplings for cryogenic service
- EN 13397:2001 Industrial valves – Diaphragm valves made of metallic materials
- EN 13445-1:2002 Unfired pressure vessels – Part 1: General
- EN 13445-2:2002 Unfired pressure vessels – Part 2: Materials
- EN 13445-3:2002 Unfired pressure vessels – Part 3: Design
- EN 13445-4:2002 Unfired pressure vessels – Part 4: Fabrication
- EN 13445-5:2002 Unfired pressure vessels – Part 5: Inspection and testing

- EN 13445-6:2002 Unfired pressure vessels – Part 6: Requirements for the design and fabrication of pressure vessels and pressure parts constructed from spheroidal graphite cast iron
- EN 13445-8:2006 Unfired pressure vessels – Part 8: Additional requirements for pressure vessels of aluminium and aluminium alloys
- EN 13458-1:2002 Cryogenic vessels – Static vacuum insulated vessels – Part 1: Fundamental requirements
- EN 13458-2:2002 Cryogenic vessels – Static vacuum insulated vessels – Part 2: Design, fabrication, inspection and testing
- EN 13458-3:2003 Cryogenic vessels – Static vacuum insulated vessels – Part 3: Operational requirements
- EN 13480-1:2002 Metallic industrial piping – Part 1: General
- EN 13480-2:2002 Metallic industrial piping – Part 2: Materials
- EN 13480-3:2002 Metallic industrial piping – Part 3: Design and calculation
- EN 13480-4:2002 Metallic industrial piping – Part 4: Fabrication and installation
- EN 13480-5:2002 Metallic industrial piping – Part 5: Inspection and testing
- EN 13480-6:2004 Metallic industrial piping – Part 6: Additional requirements for buried piping
- EN 13480-8:2007 Metallic industrial piping – Part 8: Additional requirements for aluminium and aluminium alloy piping
- EN 13611:2007 Safety and control devices for gas burners and gas burning appliances – General requirements
- EN 13648-1:2002 Cryogenic vessels – Safety devices for protection against excessive pressure – Part 1: Safety valves for cryogenic service
- EN 13648-2:2002 Cryogenic vessels – Safety devices for protection against excessive pressure – Part 2: Bursting disc safety devices for cryogenic service
- EN 13648-3:2002 Cryogenic vessels – Safety devices for protection against excessive pressure – Part 3: Determination of required discharge – Capacity and sizing
- EN 13709:2002 Industrial valves – Steel globe and globe stop and check valves
- EN 13789:2002 Industrial valves – Cast iron globe valves
- EN 13799:2002 Contents gauges for LPG tanks
- EN 13831:2007 Closed expansion vessels with built in diaphragm for installation in water
- EN 13835:2002 Founding – Austenitic cast irons
- EN 13923:2005 Filament-wound FRP pressure vessels – Materials, design, manufacturing and testing
- EN 14071:2004 Pressure relief valves for LPG tanks – Ancillary equipment
- EN 14075:2002 Static welded steel cylindrical tanks, serially produced for the storage of Liquefied Petroleum Gas (LPG) having a volume not greater than 13 m^3 and for installation underground – Design and manufacture
- EN 14129:2004 Pressure relief valves for LPG tanks
- EN 14197-1:2003 Cryogenic vessels – Static non-vacuum insulated vessels – Part 1: Fundamental requirements
- EN 14197-2:2003 Cryogenic vessels – Static non-vacuum insulated vessels – Part 2: Design, fabrication, inspection and testing
- EN 14197-3:2004 Cryogenic vessels – Static non-vacuum insulated vessels – Part 3: Operational requirements
- EN 14222:2003 Stainless steel shell boilers
- EN 14276-1:2006 Pressure equipment for refrigerating systems and heat pumps – Part 1: Vessels – General requirements
- EN 14276-2:2007 Pressure equipment for refrigerating systems and heat pumps – Part 2: Piping – General requirements
- EN 14341:2006 Industrial valves – Steel check valves
- EN 14359:2006 Gas-loaded accumulators for fluid power applications
- EN 14382:2005 Safety devices for gas pressure regulating stations and installations – Gas safety shut-off devices for inlet pressures up to 100 bar

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- EN 14570:2005 Equipping of LPG tanks, overground and underground
- EN 14585-1:2006 Corrugated metal hose assemblies for pressure applications – Part 1: Requirements
- EN ISO 15493:2003 Plastics piping systems for industrial applications – Acrylonitrile-butadiene-styrene (ABS), unplasticized poly(vinyl chloride) (PVC-U) and chlorinated poly(vinyl chloride) (PVC-C) – Specifications for components and the system – Metric series (ISO 15493:2003)
- EN ISO 15494:2003 Plastics piping systems for industrial applications – Polybutene (PB), polyethylene (PE) and polypropylene (PP) – Specifications for components and the system – Metric series (ISO 15494:2003)
- EN ISO 15613:2004 Specification and qualification of welding procedures for metallic materials – Qualification based on pre-production welding test (ISO 15613:2004)
- EN ISO 15614-1:2004 Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys (ISO 15614-1:2004)
- EN ISO 15614-2:2005 Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 2: Arc welding of aluminium and its alloys (ISO 15614-2:2005)
- EN ISO 15614-4:2005 Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 4: Finishing welding of aluminium castings (ISO 15614-4:2005)
- EN ISO 15614-5:2004 Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 5: Arc welding of titanium, zirconium and their alloys (ISO 15614-5:2004)
- EN ISO 15614-6:2006 Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 6: Arc and gas welding of copper and its alloys (ISO 15614-6:2006)
- EN ISO 15614-7:2007 Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 7: Overlay welding (ISO 15614-7:2007)
- EN ISO 15614-8:2002 Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 8: Welding of tubes to tube-plate joints (ISO 15614-8:2002)
- EN ISO 15614-11:2002 Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 11: Electron and laser beam welding (ISO 15614-11:2002)
- EN ISO 15620:2000 Welding - Friction welding of metallic materials (ISO 15620:2000)
- EN ISO 16135:2006 Industrial valves – Ball valves of thermoplastics materials (ISO 16135:2006)
- EN ISO 16136:2006 Industrial valves – Butterfly valves of thermoplastics materials (ISO 16136:2006)
- EN ISO 16137:2006 Industrial valves – Check valves of thermoplastics materials (ISO 16137:2006)
- EN ISO 16138:2006 Industrial valves – Diaphragm valves of thermoplastics materials (ISO 16138:2006)
- EN ISO 16139:2006 Industrial valves – Gate valves of thermoplastics materials (ISO 16139:2006)
- EN ISO 21787:2006 Industrial valves – Globe valves of thermoplastics materials (ISO 21787:2006)

Annex D1

List of published OISD standards (2008)

Sl.	Standard No.	Name of the Standard
1.	OISD-STD-105	Work Permit System
2.	OISD-STD-106	Process design and operating philosophies on pressure relief and disposal system
3.	OISD-RP-108	Recommended Practices on Oil Storage and Handling
4.	OISD-STD-109	Process Design and Operating philosophies on blow down and sewer system
5.	OISD-STD-110	Recommended Practices on Static Electricity
6.	OISD-STD-111	Process design and operating philosophies on fired process furnace
7.	OISD-STD-112	Safe handling of air hydrocarbon mixtures and pyrophoric substances
8.	OISD-STD-113	Classification of Area for electrical installations at Hydrocarbon processing and handling facilities
9.	OISD-STD-114	Hazardous Chemicals and their handling
10.	OISD-GDN-115	Guidelines on Fire Fighting Equipment and Appliances in Petroleum Industry
11.	OISD-STD-116	Fire Protection facilities for Petroleum Refineries and Oil/Gas Processing Plants
12.	OISD-STD-117	Fire Protection Facilities for Petroleum Depots, Terminals, Pipeline Installations and Lube Oil Installations
13.	OISD-STD-118	Layouts for Oil and Gas Installations
14.	OISD-STD-119	Selection, Operation and Maintenance of Pumps
15.	OISD-STD-120	Selection, Operation and Maintenance of Compressors
16.	OISD-STD-121	Inspection of turbines and Diesel Engines
17.	OISD-RP-122	Selection, Operation and Maintenance of Fans, blowers, gear boxes, agitators & Mixers
18.	OISD-RP-123	Selection, Operation and Maintenance of rotary equipment components
19.	OISD-RP-124	Predictive Maintenance Practices
20.	OISD-STD-125	Inspection and Maintenance of Mechanical Seals
21.	OISD-RP-126	Specific practices for installation and maintenance of rotating equipment
22.	OISD-STD-128	Inspection of unfired pressure vessels
23.	OISD-STD-129	Inspection of storage tanks
24.	OISD-STD-130	Inspection of Piping Systems
25.	OISD-STD-131	Inspection of Boilers
26.	OISD-STD-132	Inspection of pressure relieving devices
27.	OISD-STD-133	Inspection of fired heaters
28.	OISD-STD-134	Inspection of heat exchangers
29.	OISD-STD-135	Inspection of loading and unloading hoses for petroleum products
30.	OISD-STD-137	Inspection of electrical equipment
31.	OISD-STD-138	Inspection of cross country pipelines – Onshore
32.	OISD-STD-139	Inspection of pipelines – Offshore
33.	OISD-STD-140	Inspection of jetty pipelines
34.	OISD-STD-141	Design and Construction requirements for cross country hydrocarbon pipelines
35.	OISD-STD-142	Inspection of fire fighting equipments and systems
36.	OISD-STD-144	Liquefied Petroleum Gas (LPG) Installations
37.	OISD-GDN-145	Guidelines on Internal Safety Audits (Procedures and Checklist)
38.	OISD-RP-146	Preservation of idle electrical equipment
39.	OISD-RP-147	Inspection & safe practices during electrical installations
40.	OISD-RP-148	Inspection & safe practices during overhauling electrical equipment
41.	OISD-RP-149	Design aspects for safety in electrical systems
42.	OISD-STD-150	Design and Safety Requirements For Liquefied Petroleum Gas Mounded Storage Facility

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43.	OISD-STD-151	Safety in Design, Fabrication and Fittings : Propane Tank Trucks
44.	ISD-STD-152	Safety instrumentation for process system in hydrocarbon industry
45.	OISD-STD-153	Maintenance & inspection of safety instrumentation in hydrocarbon industry
46.	OISD-STD-154	Safety aspects in functional training
47.	OISD-STD-155	Personal Protective Equipment Part I – Non-respiratory equipment Part II – Respiratory Equipment
48.	OISD-STD-156	Fire Protection Facilities for Ports Handling Hydrocarbons
49.	OISD-RP-157	Recommended Practice for Transportation of Bulk Petroleum Products
50.	OISD-RP-158	Recommended Practices on Storage and Handling of Bulk Liquefied Petroleum Gas'
51.	OISD-STD-159	LPG Tank Trucks - Requirements of Safety on Design/Fabrication and Fittings
52.	OISD-STD-160	Protection to fittings mounted on existing LPG tank trucks
53.	OISD-GDN-161	LPG Tank Truck Incidents : Rescue & Relief Operations
54.	OISD-STD-162	Safety in installation and maintenance of LPG Cylinders Manifold
55.	OISD-STD-163	Process Control Room Safety
56.	OISD-STD-164	Fire Proofing in Oil & Gas Industry
57.	OISD-GDN-165	Guidelines for Rescue & Relief Operations for POL Tank Truck Accident
58.	OISD-GDN-166	Guidelines for Occupational Health Monitoring in Oil and Gas Industry
59.	OISD-RP-167	POL Tank lorry Design & Safety
60.	OISD-GDN-168	Emergency Preparedness Plan for Marketing Locations of Oil Industry
61.	OISD-GDN-169	OISD Guidelines on Small LPG Bottling Plants (Design and Fire Protection facilities)
62.	OISD-STD-170	Inspection, Maintenance, Repairs and Rehabilitation of foundations and structures
63.	OISD-STD-171	Preservation of Idle Static & Rotary Mechanical Equipments
64.	OISD-STD-173	Fire Protection System for Electrical Installations
65.	OISD-RP-174	Well Control
66.	OISD-STD-175	Cementing Operations
67.	OISD-STD-176	Safety Health & Environment Training For Exploration & Production (Upstream) Personnel
68.	OISD-STD-177	Inspection & Maintenance of Thermal Insulation
69.	OISD-GDN-178	Guidelines on Management Of Change
70.	OISD-STD-179	Safety Requirements On Compression, Storage, Handling & Refueling Of Natural Gas For Use In Automotive Sector.
71.	OISD-GDN-180	Lightning Protection
72.	OISD-STD-181	Geophysical Operations
73.	OISD-GDN-182	Recommended Safe Procedures & Guidelines For Workover and Well Stimulation Operations
74.	OISD-STD-183	Standard on Logging Operations
75.	OISD-STD-184	Standard On Replacement Of Personal Protective Equipment And Life Saving Appliances
76.	OISD-GDN-185	Wire Line Operations
77.	OISD-GDN-186	Simultaneous Operations in Exploration & Production industry
78.	OISD-STD-187	Care And Use Of Wire Rope
79.	OISD-STD-188	Corrosion Monitoring Of Offshore & Onshore Pipelines
80.	OISD-STD-189	Standard On Fire Fighting Equipment For Drilling Rigs, Work Over Rigs And Production Installations
81.	OISD-STD-190	Derrick Floor Operations (Onshore Drilling / Workover Rigs)
82.	OISD-STD-191	Oil Field Explosive Safety
83.	OISD-GDN-192	Safety Practices During Construction
84.	OISD-GDN-193	Guidelines for Gas Lift Operations and Maintenance

85.	OISD-STD-194	Standard for Storage And Handling Of Liquefied Natural Gas (LNG)
86.	OISD-STD-195	Safety in Design, Operation, Inspection and Maintenance of Hydrocarbon Gas Compressor Stations and Terminals
87.	OISD-GDN-196	Guidelines for Seeking Environmental Clearance of Development Projects in Petroleum Industry
88.	OISD-GDN-197	Guidelines for Environmental Impact Assessment
89.	OISD-GDN-199	Guidelines For Conducting Environmental Audit In Upstream Petroleum Sector (Onland)
90.	OISD-GDN-200	Guidelines For Preparation Of Oil Spill Response Contingency Plan
91.	OISD-RP-201	Environment Management in Exploration & Production Sector
92.	OISD-GDN-202	Inspection of Drilling and Workover Rig Mast / Sub-Structure
93.	OISD-GDN-203	Operation, Maintenance & Inspection Of Hoisting Equipment
94.	OISD-GDN-204	Medical Requirements, Emergency Evacuation And Facilities (For Upstream)
95.	OISD-RP-205	Crane Operation, Maintenance and Testing (For upstream)
96.	OISD-GDN-206	Guidelines on Safety Management System in Petroleum Industry
97.	OISD-GDN-207	Contractor Safety
98.	OISD-STD-210	Storage, Handling and Refuelling of LPG for automotive use
99.	OISD-GDN-211	Safety in Petroleum Laboratories
100.	OISD-GDN-212	Guidelines on Environmental Audit in Downstream Petroleum Sector
101.	OISD-STD-214	Cross Country LPG Pipelines
102.	OISD-STD-216	Electrical Safety In Onshore Drilling And Workover Rigs
103.	OISD-GDN-218	Guidelines For Safe Rig- Up And Rig- Down Of Drilling And Work-Over Rigs
104.	OISD-GDN-219	Guidelines on Field Inspection, Handling and Testing of Casing Pipe & Tubing
105.	OISD-GDN-224	Monitoring & Control of Volatile Organic Compounds Emission
106.	OISD-STD-225	Storage, Handling & Dispensing at Petroleum Retail Outlets
107.	OISD-STD-226	Natural Gas Transmission Pipelines and City Gas Distribution Networks
108.	OISD-GDN-227	Emergency Response and Preparedness in E&P Industry
109.	OISD-GDN-228	Selection, Training & Placement of Fire Operators in Hydrocarbon & Petroleum Industry
110.	OISD-STD-230	Unlined Underground Rock Cavern Storage for Petroleum Liquefied Petroleum Gas
111.	OISD-STD-231	Sucker Rod Pumping Units

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Annex D2

List of standards referenced in OISD standards

For the purpose of this report, the OISD standards are considered also as regulatory documents and the standards referenced in these documents are included in this Annex D2 in order to enable comparable analysis of the standards situation in each country.

- ABS Guidance notes on Risk Assessment: Applications for the marine and offshore oil and gas industries (American Bureau of Shipping)
- ACGIH Threshold Limit Values for Chemical Substances and Physical Agents and Biologic Exposure Indices – ACGIH (1995-96)
- AGMA 6010 Low speed drives.
- AGMA 6011 High speed drives.
- AIChE Guidelines on Technical Management of Chemical Process Safety, 1995
- AIS 026 D1 The use of LPG Fuel in Internal Combustion Engine to Power 4-Wheeled Vehicles
- ANSI 118 Layouts
- ANSI B31.4 – Liquid Transportation System for Hydrocarbons, Liquid Petroleum Gas, Anhydrous Ammonia and Alcohols.
- ANSI B31.8 – Gas Transmission and Distribution Piping System
- ANSI Standard Electrical Power System
- ANSI/AWS D1.1 Structural welding code
- ANSI/IEEE STD-979 Guide for the sub-station fire protection
- API 10TR1 Worldwide cementing practices, 1995 edition 'Cement sheath evaluation', API technical report 10TR1, First edition, June 1996.
- API 11V1 Specification for Gas Lift Equipment
- API 11V2 Gas Lift Valve Performance Testing
- API 11V5 Operation, Maintenance, Surveillance and Troubleshooting of Gas-
- API 1102 Recommended Practice for Liquid Petroleum Pipelines Crossing Railroads and Highways.
- API 1104 Welding Pipelines and Related Facilities.
- API 1105 Practices for Oil and Product Pipelines.
- API 1107 Recommended Pipeline Maintenance Welding Practices.
- API 1109 Recommended Practice for Marking Liquid Petroleum Pipeline Facilities.
- API 1110 Recommended Practice for Pressure Testing of Liquid Petroleum Pipelines.
- API 1111 Recommended Practice for Design, Construction, Operation and Maintenance of Offshore Hydrocarbon Pipelines.
- API 11E Specification for Pumping Units
- API 11ER Recommended Practices for Guarding of Pumping Units
- API 11G Recommended Practices for Installation and Lubrication of Pumping Units
- API 11P Other small gas compressors
- API 14B Fourth Edition, July 1, 1994
- API 14J Recommended Practice for Design and Hazards Analysis for Offshore Production Facilities.
- API 1B V-Belts
- API 2000 Venting Atmospheric and Low-Pressure Storage tanks.
- API 2001 Fire Protection In Refineries
- API 2003 Protection against ignitions arising out of Static, Lighting and Stray Currents
- API 2015 Std Requirements for safe entry and cleaning of petroleum storage tanks.
- API 2016 Guidelines and Procedures for entering and cleaning petroleum storage tanks.
- API 2200 Repairs to Crude Oil, Liquefied Petroleum Gas and Products Pipelines.
- API 2201 Procedures for Welding or Hot tapping on equipment containing Flammables.
- API 2209 Pipeline Plugging practices.
- API 2218 Fireproofing Practices in Petroleum and Petrochemical Processing plants
- API 25, 4th Edition, December 1978 – Design and Construction of LP Gas Installations.
- API 2510 Design and construction of LPG installations

- API 2510A : Fire-Protection consideration for the design and operation of LPG storage facilities
- API 2521 Use of PV Vent Valves for Atmospheric Pressure Tanks to reduce Evaporation Loss.
- API 2550 Std
- API 2610 Std-Design, construction, operation, maintenance and
- API 2X RP 'Ultrasonic examination of offshore structural fabrication and guidelines for qualification of ultrasonic technicians'.
- API 38 Recommended practice for biological analysis of subsurface injection waters
- API 4612 on Refinery Fugitive Emissions from Equipment Leaks).
- API 49: Recommended Practice for Drilling and Well Servicing Operations involving Hydrogen Sulfide.
- API 4A Std Steel Derricks (Including Standard Rigs) Withdrawn
- API 4D Std Guyed Portable Masts, Withdrawn
- API 4E Drilling and Well Servicing Structures Withdrawn
- API 4F Specifications for Drilling and Well Servicing Structures
- API 500 Classification of locations for Electrical Installations in Petroleum Refineries
- API 500C Classification of Locations for Electrical Installations at Pipeline Transportation Facilities.
- API 51: Onshore Oil and Gas Production Practices for Protection of the Environment.
- API 510 January 1979 – Maintenance Inspection, Rating and Repair of Pressure Vessel.
- API 52: Land Drilling Practices for Protection of the Environment.
- API 520 Part I Design and installation of pressure relieving system in Refineries.
- API 520 Part II Design and installation of pressure relieving system in Refineries.
- API 521, 1982 Guide for Pressure Relieving and Depressurising Systems.
- API 526 Flanged Steel Safety Relief Valves.
- API 527 Seat tightness of Safety Relief Valves.
- API 530 Recommended Practices for Calculation of Heater Tube Thickness in Petroleum Refineries'.
- API 54 Occupational safety For Oil and Gas Well Drilling And Servicing operation
- API 570 Piping Inspection Code (Inspection repair, alteration, and re-rating of in-service piping systems)
- API 573 Inspection Of Fired Heaters And Stacks
- API 574 Inspection of Piping System Components
- API 575 Guidelines and methods for inspection of existing Atmospheric and low pressure storage tanks
- API 579 Recommended Practice for Fitness-For-Service and Continued Operation of Equipment
- API 5C1 Recommended Practice for Care and Use of Casing and Tubing.
- API 5C6 Welding Connections to Pipe
- API 5CT Specification of Casing and Tubing
- API 5L Specification for Line pipes
- API 610 Centrifugal Pumps for Petroleum, Petrochemical & Natural
- API 611 General purpose steam turbine for Refinery Services.
- API 612 Special purpose steam turbine for Refinery Services.
- API 613 Special purpose Gear Units for Refinery Services.
- API 614 Lubrication, Shaft–sealing and control oil system for special purpose applications.
- API 615 Sound Control of mechanical equipment
- API 616 Combustion Gas Turbine for General Refinery Services
- API 617 Centrifugal compressors for general refinery services
- API 618 Reciprocating compressors for general refinery services
- API 619 Rotary-Type Positive-Displacement Compressors for Petroleum, Petrochemical, and Natural Gas Industries

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- API 620 Design and construction of large welded low-pressure storage tanks.
- API 65 Cementing shallow water flow zones in Deep water wells, API Recommended practice 65, First edition, September 2002.
- API 650 Welded Steel tanks for oil storage.
- API 653-1992: Tank Inspection, Repair, Alteration and Reconstruction.
- API 661 Air Cooled Exchangers for general refinery service.
- API 67 Recommended Practices of Oil Field Explosives Safety March 1994
- API 670 Non contacting vibration and axial position monitoring system.
- API 671 Special Purpose Couplings for Refinery Service.
- API 673 Standard for centrifugal fans
- API 674 Positive Displacement Pumps – Reciprocating
- API 675 Positive Displacement Pumps – Controlled volume
- API 676 Positive Displacement Pumps – Rotary
- API 677 For General purpose gear transmission system
- API 678 Accelerometer based vibration monitoring system.
- API 681 Liquid Ring Vacuum Pumps & Compressors for Petroleum,
- API 682 Shaft Sealing Systems for Centrifugal and Rotary Pumps.
- API 684 Tutorial on the API Standard Paragraphs Covering Rotor Dynamics and Balance (An Introduction to Lateral critical and Train Torsional Analysis and Rotor Balancing
- API 685 Seal-less Centrifugal Pumps for Petroleum, Heavy Duty Chemical & Gas Industry Services.
- API 686 Recommended Practices for Machinery Installation and design
- API 6D Pipeline Valves
- API 7 Specification for Rotary Drill Stem Elements
- API 7K Specification for Drilling and Well Servicing Equipment
- API 75 1998 Recommended Practice for Development of a Safety and Environmental Management Program for Outer Continental Shelf (OCS) Operations and Facilities.
- API 750 RP Management of process hazards.
- API 752 Management of Hazards Associated with Location of Process Plant Building
- API 8A Specifications for drilling and production hoisting equipment.
- API 8B Recommended practice for procedures for inspections, maintenance repair and remanufacture of hoisting equipment.
- API 8C Specifications for drilling and production hoisting equipment.
- API 9B Recommended Practice on Application, Care & Use of Wire Rope For Oil Field Service
- API Guide for inspection of Refinery Equipment – Chapter II – Conditions causing deterioration and failures.
- API Guide for inspection of Refinery Equipment – Chapter IX – Fired Heaters & Stacks
- API Guide for Inspection of Refinery Equipment – Chapter V – Preparation of Equipment for Safe Entry and Work.
- API Guide for Inspection of Refinery Equipment – Chapter VI – Unfired Pressure Vessels.
- API Guide for Inspection of Refinery Equipment – Chapter VII – Heat Exchangers, Condensers and Cooler Boxes.
- API Guide for Inspection of Refinery Equipment – Chapter VIII – Direct Fire Boilers and Auxiliary Equipment.
- API Guide for Inspection of Refinery Equipment – Chapter XII – Foundations, Structures and buildings.
- API Guide for Inspection of Refinery Equipment – Chapter XIV – Electrical System 1976
- API Guide for Inspection of Refinery Equipment – Chapter XVI – Pressure Relieving Devices.
- API Guide for Inspection of Refinery Equipment – Chapter XVIII – Protection of Idle Equipment.
- API Publ 2009 Safe Welding, Cutting, and other Hot Work Practices in Refineries, Gas Plants, and Petrochemical Plants.

- API Publ 2026 Safe access/Egress involving floating roof of storage tanks in petroleum service
- API Wire Line Operations and Procedures Third Edition, Books of Vocational Training Series. API
- AS/NZS 1596:1997 Storage of Handling of LP Gas
- ASA B 36.10/19 Welded Seamless Wrought Steel Pipe.
- ASME 31 G Manual for Determining the Remaining Strength of Corroded Pipelines
- ASME B 31.3 Process Piping
- ASME B.31.4 Liquid Transportation Systems for Hydrocarbons, Liquid Petroleum Gas, Anhydrous Ammonia and Alcohols
- ASME B.31.8 Gas Transmission and Distribution Piping Systems.
- ASME B.31Q-2006 Standard on Pipeline Personnel Qualification
- ASME Boiler and Pressure Vessel Code Section I Rules for construction of power Boilers
- ASME Boiler and Pressure Vessel Code Section IV Rules for care and operation of Heating Boiler
- ASME Boiler and Pressure Vessel Code Section IX Welding Qualifications.
- ASME Boiler and Pressure Vessel Code Section V
- ASME Boiler and Pressure Vessel Code Section VII Recommended Rules for care of Power Boilers.
- ASME Boiler and Pressure Vessel Code Section VIII Division 1 Pressure Vessels,
- ASME Boiler and Pressure Vessel code Section VIII Division 2 Alternate Rules for Pressure Vessels
- ASTM A388 Recommended practice for ultrasonic examination of heavy steel forging
- ASTM A609 Specification for Ultrasonic Examination for carbon and low alloy steel castings
- ASTM E119 Method for fire test of building construction and Material
- ASTM E1529 Standard test methods for determining effects of large Hydrocarbon pool fires on Structural members and assemblies.
- ASTM E165 Standard practice for Liquid Penetrant Inspection
- ASTM E186 Standard reference radiographs for heavy walled (2 to 4½in./51 to 114 mm) steel casting
- ASTM E280 Standard reference radiographs for (4½ in. to 12 in./114 to 305 mm) steel castings. Acceptance criteria: ASME boiler and pressure vessel code, Section VIII, Appendix 4, Rounded indication charts acceptance standard for radiographically determined rounded indications in welds
- ASTM E428 Standard recommended practice for fabrication and control of steel reference blocks used in Ultrasonic Inspection
- ASTM E446 Standard reference radiographs for steel castings up to 2 in. in thickness
- ASTM E709 Standard recommended practice for magnetic particle examination'. Acceptance criteria: Section VIII, Appendix 4, ASME Boiler and Pressure Vessel Code.
- ASTM E797 Standard Practice for Measuring Thickness by Manual Ultrasonic Pulse-Echo Contact Method
- ASTM E94 Standard practice for radiographic testing
- AWWA C203-86 Standard for Coal-Tar Protective Coatings and Linings for Steel Water Pipelines-Enamel and Tap-Hot Applied.
- BIS National Electrical Code NEC-1985 of BIS.
- BIS National Electrical Code of Bureau of Indian Standards. (SP-30:1984)
- BS 1987 Applied Coating Materials for protecting iron and Steel, including suitable Primers where required.
- BS 3958 Thermal Insulation Material
- BS 4146 Specifications for Coal-Tar Based Hot
- BS 5500 Specification for Unfired Fusion Welded Pressure Vessels
- BS 6651 Protection of structures against lightning
- BS 7777 Part – 1: 1993 Guide to the general provisions applying for design, construction, installation and operation.

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- BS 7777 Part – 2: 1993 Specification for the design and construction of single, double and full containment metal tanks for the storage of liquefied gas at temperatures down to -165°C
- BS 7777 Part – 3: 1993 Recommendations for the design and construction of prestressed and reinforced concrete tanks and tank foundations and the design and installation of tank insulation, tank liners and tank coatings
- BS PD 5500 Specification for unfired fusion welded pressure vessels
- DIN 30670 Polyethylene Sheathing of Steel Tubes and of Steel Shapes and Fittings.
- DIN 30672 Corrosion Protection Tapes and Heat Shrinkable Sleeves – Coatings made from Corrosion Protection Tapes and Heat
- OGP Report No. 6.36/210: Guidelines for the Development and Application of Health, Safety and Environmental Management Systems.
- EEMUA 147 Recommendations for the Design and Construction of Refrigerated Liquefied Gas Storage Tanks
- EIL Spec. 6-48-0002: Standard spec. for EOT crane
- EN 14015:2004 Specification for the design and manufacture of site built, vertical, cylindrical, flat bottomed, above ground, welded, steel tanks for the storage of liquids at ambient temperature and above.
- EN 14125:2004 : Thermoplastic and Flexible Metal Pipe Work for Underground Installation at Petrol Filling Station
- EN 1473 Installation and equipment for liquefied natural gas – IADC Suggested Procedures for Development of Spill Prevention Control and Countermeasure Plans.
- IEC 183 Guide to the selection of high voltage cables
- IEC 34-9 Rotating Electrical Machine – Part 9 (Noise Limit)
- IEC 529 Degree of protection Provided by Enclosures.
- IEC 60331 Fire resisting characteristics of electrical cables.
- IEC 79 Electrical Apparatus for Explosive Gas Atmosphere
- IEE Regulations for the electrical equipment of buildings. Fifteenth edition 1976 (Institution of Electrical Engineers)
- IEEE C37.2 Device Standard Function Numbers
- IP 12 Pressure Vessel Inspection Safety Code-Part 12)Institute of Petroleum)
- IP Model code of safe practice Electrical-Part 1, 1974 (Institute of Petroleum)
- IP Model Code of Safe Practices The Institute of Petroleum (U.K.)
- IP Model code of safe practices - Shrinkable Sleeves for Underground Pipelines.
- IS 10028 Part 1 Code of practice for selection, installation and maintenance of Transformer.
- IS 10028 Part 2 Code of practice for selection, installation and maintenance of Transformer.
- IS 10028 Part 3 Code of practice for selection, installation and maintenance of Transformer.
- IS 10029 Methods for sensory evaluation of sweetened condensed milk
- IS 10118 Code of Practice for Selection, Installation and Maintenance of Switchgear and Controlgear
- IS 10204 Portable fire extinguishers – mechanical foam type
- IS 1022:1982 Code of practice for coating and wrapping of underground mild steel pipelines
- IS 10245:1982 Specification for Breathing Apparatus (Parts-I, II, III & IV)
- IS 10667:1989 Selection of Industrial Safety Equipment for Protection of Foot & Leg
- IS 10810 Methods of tests for Cables.
- IS 10987:1992 Code of Practice for Design, Fabrication, Testing and Installation of Underground/Above ground Horizontal Cylindrical Storage Tanks for Petroleum Products.
- IS 10993 Functional requirements for 2000kg dry powder tender for fire brigade use
- IS 11333 Specification for Flameproof Dry Type Transformers For Use in Mines
- IS 1206 Determination of viscosity
- IS 1239-Part 1 Steel Tubes, Tubulars and Other Wrought Steel Fittings – Specification – Part 1:Steel Tubes
- IS 1239-Part 2: 1992, Steel Tubes and Other Wrought Steel Fittings.
- IS 12458 BIS Standard for testing of Fire Rating

- IS 12459 Code of practice for fire safety in cable runs
- IS 1255 Code of practice for installation and maintenance of power cables up to and including 33kV rating
- IS 13205:1991 Code of Practice for the application of Polyurethane insulation by In-situ Pouring Method
- IS 13346 General Requirements for Electrical Apparatus for Explosive Gas Atmospheres
- IS 13408 Code of Practice for the Selection, Installation and Maintenance of Electrical Apparatus for Use in Potentially Explosive Atmospheres
- IS 1448 Method of Test of Petroleum and its Products
- IS 14609 Standard on Dry Chemical Powder for Fighting A,B,C Class Fires – Specifications.
- IS 14861 BIS Specification of LPG for automotive purposes
- IS 14899 Liquefied Petroleum Gas containers for automotive use – Specification
- IS 1554 Specification for PVC Insulated (Heavy Duty) Electric Cables
- IS 15683: Portable Fire Extinguishers – Performance and Construction - Specification
- IS 1646 Code of practice for fire safety of buildings (General) Electrical Installations
- IS 1866 Code of Practice for Electrical Maintenance and Supervision of Mineral Insulating Oil in Equipment
- IS 1893:1975 Criteria for earthquake resistant design of structures.
- IS 1944 Code of practice for lighting of public thoroughfares
- IS 1978 Indian Standard Specification for Line Pipe (Second Revision)
- IS 2062:1999: Steel for General Structural Purpose
- IS 2097 Specification for foam making branches
- IS 2147 Degrees of protection provided by enclosures for low voltage switchgear and control gear
- IS 2148 Flameproof enclosures for electrical apparatus
- IS 2165 Part (1 & 2) Insulation Coordination.
- IS 2165 Part (1 & 2) Insulation Coordination.
- IS 2171 Dry Chemical Fire Extinguishers
- IS 2189 Code of practice for selection, installation and maintenance of Automatic Fire Detection and Alarm System
- IS 2190 Code of Practice for Selection, Installation & Maintenance of Portable First Aid Fire appliances.
- IS 2206 Flameproof electric lighting fittings
- IS 2274 Code of practice for electrical wiring installations (system voltage exceeding 650 volts)
- IS 2309:1989 Code of Practice for the Protection of Building and Allied Structures Against Lighting
- IS 2309 Protection of buildings and allied structures against lightning
- IS 2379 Specification for Colour Code for Identification of Pipelines
- IS 2516 Circuit breakers
- IS 266 Sulphuric acid
- IS 2705 Current transformers
- IS 2706 Batch pasteurizer (aluminium) Withdrawn
- IS 2745:1969 Specification for Fireman's helmet
- IS 2825:1969 Indian Standard Code for Unfired Pressure Vessels.
- IS 2834 Specifications of shunt capacitor for power system
- IS 2911 Code of Practice for Design and Construction of Pile Foundation
- IS 2925:1984 Specification for Industrial Safety Equipments
- IS 2974 Code of practice for design and construction of machine foundations.
- IS 3034 Code practice for fire safety of industrial buildings, electrical generating and distributing stations
- IS 3043:1987 Code of Practice for Earthing
- IS 3072 Code of practice for installation and maintenance of switchgear. Withdrawn

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- IS 3106 Code of practice for selection, installation, maintenance of fuses (voltage not exceeding 650 volts) Withdrawn
- IS 3156 Voltage transformers
- IS 3177 Code of practice for EOT cranes and Gantry Cranes
- IS 335 New insulating oils
- IS 3521:1983 Specification for Industrial Safety Belts
- IS 3646 Interior illumination: Part 1, Part 2 & Part 3.
- IS 3646 Interior illumination: Part 1, Part 2 & Part 3.
- IS 3646 Interior illumination: Part 1, Part 2 & Part 3.
- IS 3646 Code of practice for interior illumination
- IS 3682 Flameproof ac motors for use in mines
- IS 3710:1978 Filling ratios for Low Pressure Liquefied Gases.
- IS 3716 Insulation coordination application guide.
- IS 3809 BIS Standard for testing of Fire Rating for Barrier Wall
- IS 383 Coarse and fine aggregates from natural sources for concrete.
- IS 3844 Code of Practice on Installation of Internal Hydrants in Multistory Building.
- IS 3946:1960 Specification for Leather Leg Guard
- IS 4051 Code of practice for installation and maintenance of electrical equipment in mines
- IS 4209 Code of Safety in Chemical laboratories
- IS 4308 Standard on Dry Chemical Powder for Fighting B & C Class Fires – Specifications
- IS 4501:1985 Specification for Aprons, rubberised and alkali resistant
- IS 456:1978 Code of Practices for Plain and Reinforced Concrete Construction
- IS 4571 Specification for Aluminium Extension Ladders for Fire Brigade use
- IS 4576:1978 Specifications for Liquefied Petroleum Gases.
- IS 4682 Code of practice for Lining of Vessels and Equipment for Chemical Processes. Part – 1 Rubber lining
- IS 4691 Degrees of protection provided by enclosure for rotating electrical machinery
- IS 4770 Specification for Rubber Gloves for Electrical Purposes
- IS 4947 Specification for gas cartridges for use in fire extinguishers
- IS 4989 Standard on Foam Concentrate for Producing Mechanical
- IS 4989 Part 1 Specifications for foam concentrate for producing mechanical foam for fire fighting
- IS 4989 Part 2 Specifications for foam concentrate for producing mechanical foam for fire fighting
- IS 4989 Part 3 Specifications for foam concentrate for producing mechanical foam for fire fighting
- IS 5124 Code of practice for installation and maintenance of ac induction motor starters (voltage not exceeding 1000V) Withdrawn
- IS 5131 Dividing Breeching with Control for Fire Brigade Use – Specification
- IS 5214 Specification for Jumping and Vaulting Standards
- IS 5216 Recommendations on Safety Procedures and Practices in Electrical Work
- IS 5424 Specification for Rubber Mats for Electrical Purposes
- IS 5490 Refills for portable fire extinguishers & chemical fire engines
- IS 5505 Specification for multi-edged rescue axe (non-wedging)
- IS 5507 Chemical fire engine, 50 litre capacity, foam type
- IS 5571 Guide for Selection of Electrical Equipment for Hazardous Area
- IS 5572 Classification of Hazardous Area (Other than Mines) for Electrical Installation
- IS 5780 Electrical Apparatus for Explosive Gas Atmospheres – Intrinsic Safety "i" – Specification
- IS 6044 (Part II) Code of Practice for LPG Storage Installations (Part II) – 1972.
- IS 6153:1971 Specification for Protective Leather Clothing

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- IS 6381 Specification for construction and testing of Electrical apparatus with type of protection ëe'
- IS 6665 Code of practice for industrial lighting
- IS 6994 (Part-I) Specification for Industrial Safety Gloves
- IS 732 Code of practice for electrical wiring installations
- IS 7389 Pressurised enclosures of electrical equipment for use in hazardous areas
- IS 7612:1974 Specification for Respirators, Chemical Cartridge (Reaffirmed in 1983)
- IS 7689 Guide for control of undesirable static electricity
- IS 7693 Oil immersed electrical apparatus for use in explosive gas atmosphere
- IS 7724 Sand filled protection of electrical equipment for use in explosive atmospheres
- IS 7959 Specification for Polyethylene Containers for Foam Compounds
- IS 800:1962 Code of Practice for use of Structural Steel in General Building Construction
- IS 803 Code of practice for Design, Fabrication and Erection of Vertical M.S. Cylinder Oil storage tanks
- IS 814 Covered Electrodes For Manual Metal Arc Welding Of Carbon Steel And Carbon Manganese Steel
- IS 8150 Chemical foam engine, 4 litre capacity – for marine use
- IS 8224 Electric lighting fittings for division 2 areas
- IS 8239 Classification of maximum surface temperature of electrical equipment for use in explosive atmospheres
- IS 8280 Methods of calibration of ionization vacuum gauges
- IS 8289 Electrical equipment for type of protection 'n'
- IS 8318:1977 Colour Identification Markings for Air Purifying Canister & Cartridges
- IS 8347:1977 Glossary of terms relating to Respiratory Protective Devices (Reaffirmed in1983)
- IS 8442 Functional requirements for stand post type water monitor for fire fighting
- IS 8519:1977 Specification for Selection of Industrial Safety Equipment for Body Protection
- IS 8520:1977 Guide for Selection of Industrial Safety Equipment for Eye, Face and Ear Protection
- IS 875:1964 Code of Practice for Structural Safety of Buildings: Loading Standards.
- IS 8807:1978 Guide for Selection of Industrial Safety Equipment for protection of Arms and Hands
- IS 8985 Single walled baking ovens
- IS 8990:1978 Specification for Code of Practice for Maintenance and Care of Industrial Safety Clothing
- IS 900 Code of practice for installation and maintenance of induction motors
- IS 903 Specification for fire hose delivery couplings, branch pipe, nozzles and nozzle spanner
- IS 9048 Specification for re-refined automotive internal combustion engine lubricating oils
- IS 905 Specification for delivery breechings, dividing and collecting instantaneous pattern for fire fighting purposes
- IS 933 Portable chemical fire extinguisher – foam type.
- IS 934 Portable chemical fire extinguisher soda acid type
- IS 951 Crash tender combined foam and carbon dioxide, functional requirements
- IS 9570 Classification of Flammable Gases or Vapours with Air according to their Maximum Experiment Safe Gaps and Minimum Igniting Current
- IS 9623:1980 Recommendations for Selection and Maintenance of Respiratory Protective Devices
- IS 9628 Three-phase induction motors with type of protection 'n'
- IS 9885 (Parts I & II) Specification for Protective Boots for Oil Field Workmen
- IS 9964 Recommendations for Maintenance and Operation of Petroleum Storage Part I – Preparation of tanks for safe entry & Work.
- IS 9964 Recommendations for Maintenance and Operation of Petroleum Storage Part II – Inspection

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- IS0 10426-2/API 10B-2, Recommended Practice for Testing Well Cements, First Edition, July 2005
- ISA RP 60.1 on Control Centre Facilities.
- ISA S-75.01 Flow evaluation for sizing control valve
- ISA S-75.02 Control valve test procedure
- ISO - VDI / ISO for balance quality
- ISO 10426-1/API 10A Specification for Cements and Materials for Well Cementing, Twenty-third Edition, April 2002
- ISO 10426-3/API 10B-3 Recommended Practice on Testing of Deepwater Well Cement Formulations, First Edition, July 2004
- ISO 10427-2/API 10D-2: 2004, Recommended Practice for Centralizer Placement and Stop Collar Testing, First Edition, August 2004
- ISO 13702:1999 Petroleum gas industries – Control and mitigation of fires and explosions on offshore production installations – Requirements and guidelines
- ISO 14001:2004 Environmental Management Systems.
- ISO 15544:2000 Petroleum and natural gas industries – Offshore production installations – Requirements and guidelines for emergency response.
- ISO 17776:2000 Petroleum and natural gas industries – Offshore production installations – Guidelines on tools and techniques for hazard identification and risk assessment.
- ISO 1940:1986 Mechanical vibration – Balance quality requirements for rotors in a constant (rigid) state
- ISO 2372 Mechanical vibration of machines with operating speeds from 10 to 200 rev/s
- ISO 281:1990 Rolling bearings – Dynamic load ratings and rating life
- ISO 286-2:1988 Tolerances for holes
- ISO 3977 Gas Turbine Procurement
- ISO 76:1987 Rolling bearings – Static load ratings
- MSS-SP-50 Pipe Hangers and Supports Materials, Design and Manufacture.
- MSS-SP-69 Pipe Hangers and Supports – Selection and Application.
- NACE 286-97 Electrical isolation of cathodicaly protected pipeline
- NACE MR-01-75 Sulphide Stress Corrosion Cracking (SSCC) Resistant Metallic Material for Oil Field Equipment
- NACE RP 01-69 Recommended Practice. Control of External Corrosion of Underground or Submerged Metallic Piping Systems.
- NACE RP-01-70 Protection of Austenitic Stainless Steel in Refineries against Stress Corrosion, Cracking by use of Naturalizing Solutions during shutdown
- NACE RP-01-75 Control of Internal Corrosion in Steel Pipelines and Piping Systems
- NACE RP-0192-92 Monitoring Corrosion in oil & gas production with iron counts
- NACE RP-0194-94 Field monitoring of bacterial growth in oil field system
- NACE RP-06 75-88 Control of external corrosion on offshore steel pipelines
- NACE RP-07-75-91 Preparation and installation of corrosion coupons and interpretation of test data in oil field operation
- NACE TM-01-69-96 Control of external corrosion on underground or sub merged metallic piping systems
- NACE TM-01-77 Testing of Metals for Resistance to Sulphide Stress Cracking at Ambient Temperatures.
- NACE TM-02-84 Testing of Metals for Resistance to Stepwise Cracking.
- NACE TM-0497-97 Measurement technique related to criteria for cathodic protection on underground or submerged piping system
- NEC 1985 Indian Electricity Act & Rules, 1956 as per latest amendments.
- NEPA 59 LP Gases at Utility Gas Plants
- NFPA 11 Standard For Low, Medium and High Expansion Foam Systems
- NFPA 11C - Mobile foam apparatus
- NFPA 13 Standard for the installation of sprinkler systems.

- NFPA 15 Standard on Installation of Water Spray System.
- NFPA 1582 Standard on Medical Requirements For Fire Fighters
- NFPA 16 Installation of deluge foam water sprinkler systems and foam water spray systems
- NFPA 17 DCP System
- NFPA 20 Standard for Installation of Centrifugal fire pumps.
- NFPA 2001:2004 Standard on Clean Agent Fire Extinguishing System.
- NFPA 30 Flammable and Combustible Liquids Code
- NFPA 385 Standard for Tank Vehicles for Flammable and Combustible Liquids – 1985
- NFPA 45 Standard on Fire Protection for Laboratories Using Chemicals
- NFPA 497A Recommended Practice for Classification of Class I Hazardous (Classified) Location for Electrical Installations in Chemical Process AreaS
- NFPA 52 Compressed Natural Gas (CNG) Vehicular Fuel Systems, 1992
- NFPA 58 Standard for the Storage and Handling of Liquified Petroleum Gases – 1983.
- NFPA 59 (A) 1996 Standard for production, storage and handling of LNG.
- NFPA 850 Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Station
- NORSOK S-003 Environmental Care.
- NORSOK Z–013 Risk and emergency preparedness analysis.
- NZS 5425: Part 1:1980 i.e. Code of Practice for CNG Compressor and Refuelling Stations Part 1 On Site Storage and Location of Equipment.
- NZS 5425: Part 2:1982 i.e. Code of Practice for CNG Compressor and Refuelling Stations Part 2 Compressor Equipment.
- OCIMF Guide on Marine Terminal Fire Protection and emergency valuation Oil Companies International Marine Forum (OCIMF) Guidelines.
- OCIMF Guide to Purchasing, Manufacturing and Testing of loading and discharge hoses for offshore moorings (Fourth Edition – 1991).
- OECD 2003 Guiding Principles for Chemical Accident, Prevention, Preparedness and Response.
- OSHA Occupational Safety Health Administration (OSHA) Standards
- Shell DEP 70.10.70.11 GEN The Preservation of Equipment and Piping Standing Idle
- SIGTTO Site Selection and design for LNG ports and jetties, Information paper No.14, 1st edition
- SOLAS regulation 1974 amended up to date.
- TEMA Standards of Tubular Exchanger Manufacturers Association.
- UKOOA Industry Guidelines for the Management of Emergency Response for Offshore Installations
- UKOOA Guidelines for the Management of Competence and Training in Emergency
- UKOOA Guidelines on Safety Related Telecommunications Systems on Normally – manned Fixed Offshore Installations
- UL 1316 Glass-Fiber-Reinforced Plastic Underground Storage Tanks for Petroleum Products, Alcohols, and Alcohol-Gasoline Mixtures.
- UL 154 Carbon-Dioxide Fire Extinguishers
- UL 1709 Structural steel Protected for Resistance to Rapid Temperature rise fires
- UL 263 Fire tests of Building Construction and materials
- UL 299 Dry Chemical Fire Extinguishers
- UL 711 Rating & Fire Testing of Fire Extinguishers
- UL 79 Power Operated Pumps for Petroleum Dispensing Products or Relevant Standard
- UL 87 Power Operated Dispensing Device for Petroleum Product or Relevant Standards
- UL 971 Non metallic Underground Piping for Flammable Liquids
- WHO Early detection of occupational diseases – publication of WHO, Geneva, 1986
- WHO Technical Report Series No.862 on “Hypertension Control”, 1996

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Annex E

List of standards in New Zealand Approved Code of Practice for Pressure Equipment

General

- ANSI/NB – 23 National Board Inspection Code
- AS 1548 Steel plates for pressure equipment
- AS 3873 Pressure equipment – Operation and maintenance
- AS 3892 Pressure equipment – Installation
- AS 4343 Pressure equipment – Hazard levels
- AS 4458 Pressure equipment – Manufacture
- AS/NZS 1200 Pressure equipment
- AS/NZS 3788 Pressure equipment – In-service inspection
- AS/NZS 4360 Risk management
- BS 1501 Steels for pressure purposes
- BS EN 10028 Specification for flat products made of steels for pressure purposes
- NZS 4203 Code of practice for general structural design and design loading for buildings
- NZS 5807 Code of practice for industrial identification by colour, wording or other coding

Hyperbaric Chambers

- ASME PVHO-1 1990 Pressure vessels for human occupancy
- CSA Z275-1-93 Hyperbaric facilities

Management Systems

- AS/NZS ISO 9001 Quality Systems – Model for quality assurance in design/development, production, installation and servicing
- AS/NZS ISO 9002 Quality Systems – Model for quality assurance in production and installation
- AS/NZS ISO 8402 Quality management and quality assurance – Vocabulary
- ISO-IEC Guide 25 General requirements for the competence of calibration and testing laboratories
- ISO Guide 39 General requirements for the acceptance of inspection bodies
- ISO 17020 General criteria for the operation of various types of bodies performing inspection

Pressure Vessels

- ANSI/UL 1450 Motor-operated air compressors, vacuum pumps, and painting equipment
- AS 1210 Pressure vessels
- AS 1210, Supplement No.1 Unfired pressure vessels – Advanced design and construction
- AS 1210, Supplement No.2 Pressure vessels – Cold-stretched austenitic stainless steel vessels
- AS 2971 Serially produced pressure vessels
- AS 3577 Steel cylinders for compressed gases – Welded – 150kg to 500kg
- ASME Boiler and Pressure Vessel Code, Section VIII Rules for Construction of Pressure Vessels Division 1
- ASME Boiler and Pressure Vessel Code, Section VIII Rules for Construction of Pressure Vessels Division 2 Alternative Rules
- ASME Boiler and Pressure Vessel Code, Section X Fiber-Reinforced Plastic Pressure Vessels
- AS/NZS 1596 Storage and handling of Liquified Petroleum Gas
- AS/NZS 1677, Parts 1-2 Refrigerating systems
- AS/NZS 3711.6 Tank containers
- BS 470 Specification for inspection, access and entry openings for pressure vessels
- BS 1101 Specification for pressure containers for paint and other similar substances
- BS 2646, Parts 1-5 Autoclaves for sterilisation in laboratories
- BS 3274 Tubular heat exchangers for general purposes

- BS 3970, Parts 1-5 Sterilising and disinfecting equipment for medical products
- BS 4814 Specification for expansion vessels using an internal diaphragm for sealed hot water heating systems
- BS 4994 Vessels and tanks in reinforced plastics
- BS 5169 Specification for fusion welded steel air receivers
- BS 7201 Hydro-pneumatic accumulators for fluid power purposes
- BS EN 286, Part 1 Simple unfired pressure vessels designed to contain air or nitrogen
- NZS/BS 853 Specification for calorifiers and storage vessels for central heating and hot water supply
- NZS/BS 5045, Parts 1-3 Transportable gas containers
- NZS PD 5500 Specification for unfired fusion welded pressure vessels
- TEMA Standards of Tubular Exchanger Manufacturers Association
- UL 1450 Motor-operated air compressors, vacuum pumps and painting equipment
- Note: NZ BS 5500 (BS 5500) has been replaced by NZS PD 5500.

Pipework

- ASME B31.1 Power Piping
- ASME B31.3 Process Piping
- ASME B31.4 Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids
- ASME B31.5 Refrigeration Piping
- AS 4041 Pressure Piping
- NZS/BS 806 Specification for design and construction of ferrous piping installations for

Refrigeration Systems

- AS/NZS 1677 Refrigerating systems
- ROTATING EQUIPMENT
- BS EN 60045-1 Steam turbine procurement
- BS EN 60953-2 Rules for steam turbines thermal acceptance tests
- BS 5968 Methods of acceptance testing of industrial steam turbines
- API Standard 611 General purpose steam turbines for refinery services
- ANSI/ASME PTC6 Steam turbines performance test code
- ANSI/ASME PTC 6-1 Interim test code for an alter native procedure for testing steam turbines

Transportable Equipment

- AS/NZS 3711.6 Tank containers
- IMDG Code International Maritime Dangerous Goods Code
- ISO 1496.3 Series 1 freight containers – Specification and testing – Part 3: Tank containers for liquids, gases and pressurised dry bulk
- NZS 5418 Transportation containers for hazardous substances

Welding

- BS EN 287 Approval testing of welders for fusion welding
- BS EN 288 Specification and approval of welding procedures for metallic materials
- ASME Boiler and Pressure Vessel Code, Section IX Welding and Brazing Qualifications
- AS/NZS 3992 Pressure equipment

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Annex F1

List of standards in the Norwegian PSA offshore regulation guidelines

- AODC-035 Code of practice for the safe use of electricity under water, The Association of Offshore Diving Contractors: 1985.
- API 17J, Specification for Unbonded Flexible Pipe, 2nd Edition November 1999, Errata May 25, 2001, Addendum 1, June 2002, Effective date: December 2002.
- API RP 17B Recommended Practice for Flexible Pipe, 1 July 1998,
- API RP 13B2 Recommended Practice Standard Procedure for Field Testing Oil-Based Drilling Fluids, 1 February 1998,
- API RP 14B Recommended Practice for Design, Installation, Repair and Operation of Subsurface Safety Valve Systems, 1 July 1994.
- Danish Guidelines for design of unmanned production platforms, Energistyrelsen, October 1989.
- DNV Guidelines no.14 "Free spanning Pipelines", 1998
- DNV OS-A101, Safety Principles and Arrangement, 2001
- DNV OS-B101, Metallic Materials, 2001
- DNV OS-C101, Design of Offshore Steel Structures, General (LRFD-method), 2004
- DNV OS-C102, Structural Design of Offshore Ships, 2004
- DNV OS-C103, Structural Design of Column Stabilised Units (LRFD-method), 2004.
- DNV OS-C104, Structural Design of Self Elevating Units, 2004
- DNV OS-C105, Structural Design of TLPs (LRFD-method), 2005.
- DNV OS-D101, Marine & Machinery Systems & Equipment, 2001
- DNV OS-D201, Electrical System and Equipment, 2001
- DNV OS-D202, Instrumentation, Control & Safety Systems, 2000
- DNV OS-D301, Fire Protection, 2001
- DNV OS-E101, Drilling Plant, 2000
- DNV OS-F101, Submarine Pipeline System, 2000
- DNV OS-F201, Dynamic Risers, 2001
- DNV RP G-101Recommended Practice for Risk Based Inspection of Topside Static Mechanical Equipment, 2000,
- DNV RP F-101 Corroded Pipelines, 1999.
- EN 13852-1, Cranes – Offshore cranes – Part 1: General – purpose offshore cranes, 2004
- EN 1838, Lighting applications – Emergency lighting, April 1999
- EN 614-1, Safety of machinery – Ergonomic design principles Part 1: Terminology and general principles, 1995
- EN 894-1, Safety of machinery – Ergonomics requirements to the design of displays and control actuators – Part 1: General principles for human interactions with displays and control actuators, 1997
- EN 894-2, Safety of machinery – Ergonomics requirements to the design of displays and control actuators – Part 2: Displays, 1997
- EN 894-3, Safety of machinery – Ergonomics requirements to the design of displays and control actuators – Part 3: Control actuators, 2000
- IEC 60092 Electrical installations in ships (relevant parts)
- IEC 60300-3-11 Application guide – Reliability centred maintenance. First edition, 1999-03.
- IEC 60331 Tests for electric cables under fire conditions – Circuit integrity, Part 11, 21, 23 and 25, 1999
- IEC 60332 Tests on electric cables under fire conditions - Part 1 (1993), 2 (1989), 3-10 and 3-21 through 3-25 (2000)
- IEC 61508 Functional safety of electrical/electronic/programmable electronic safety-related systems, Part 1-7, 1998
- IEC 61892 Fixed and mobile offshore units - Electrical Installations, Part 1,2,3, 5, 6 and 7, 1997-2005
- IMO MODU Code for the construction and equipment of mobile offshore drilling units, 1989 with amendments in 1991.

- IMO Resolution A.471 (XII) Recommendation on test method for determining the resistance to flame of vertically supported textiles and films, 1984
- IMO/MSC circular 645, Guidelines for vessels with dynamic positioning systems, 6 June 1994.
- IMO Resolution A.653 (16) Flame spread, surface materials and floorings
- IMO Resolution A.754 (18) Recommendation on fire resistance tests for 'A', 'B' and 'F' class divisions, 4th November 1993
- ISO 10417 Petroleum and natural gas industries – Subsurface safety valve systems - Design, installation, operation and repair, 2004,
- ISO 10418 Petroleum and natural gas industries – Offshore production platforms - Basic surface safety systems, 2003
- ISO 10423 Petroleum and natural gas industries – Drilling and production equipment - Wellhead and christmas tree equipment, 2003
- ISO 11064:1999 Ergonomic design of control centers
- ISO 1182 Fire Tests – Building Materials – Non-Combustibility Test, third edition, 1990.
- ISO 12639 Graphic technology – Prepress digital data exchange – Tag image file format for image technology (TIFF/IT), 1998
- ISO 13535 Petroleum and natural gas industries – Drilling and production equipment - Hoisting equipment, 2000
- ISO 13623 Petroleum and natural gas industries – Pipeline transportation systems, 2000
- ISO 13628 Petroleum and natural gas industries – Design and operation of subsea production systems, part 1-9, 1999-2002
- ISO 13702 Petroleum and natural gas industries – Control and mitigation of fires and explosions on offshore production installations – Requirements and guidelines", 1999
- ISO 14224:1999 Petroleum and natural gas industries Collection and exchange of reliability and maintenance data for equipment
- ISO 15544:2000 Petroleum and natural gas industries – Offshore production installations – Requirements and guidelines for emergency preparedness
- ISO 1716 Building Materials – Determination of Calorific Potential, first edition, 1973.
- ISO 17776:2000 Petroleum and natural gas industries – Offshore production installations – Guidelines on tools and techniques for hazard identification and risk assessment
- ISO 19901-7 Petroleum and natural gas industries - Specific requirements for offshore structures - Part 7: Stationkeeping systems for floating offshore structures and mobile offshore units, 2005,
- ISO 3008 Fire-Resistance Tests on Door and Shutter Assemblies, first edition, 1976 with additions and corrections from 1976, 1977, 1982 and 1984.
- ISO 3009 Fire-Resistance Tests – Glazed Elements, first edition, 1976 with additions from 1977 and 1984.
- ISO 5657 Reaction to fire tests – Ignitability of building products using a radiant heat source, 1997.
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- ISO 6385: Ergonomic principles in the design of work systems, first edition 1981.
- ISO 834 Fire-resistance tests – Elements of building construction, Part 1 (1999), 3 (1994) and 4 through 7 (2000).
- ISO 8383 Lifts on ships – specific requirements, 1985.
- ISO 8879:1986, Information processing - Text and office systems - Standard Generalized Markup Language (SGML), 1986,
- ISO 9705 Fire Tests – Full-Scale Room Test for Surface Products, first edition, 1993 with corrections in 1996.
- ISO/IEC 8859-1 Information technology - 8-bit single-byte coded graphic character sets - Part 1: Latin alphabet No. 1, 1998,
- ISO/IEC guide 51:1999 Safety aspects – Guidelines for their inclusion in standards
- MSC/Circ. 645, Guidelines for vessels with dynamic positioning systems, 6th June 1994.
- Nordtest (NT) Fire 021 Insulation of Steel Structures: Fire protection, February 1985.

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- Nordtest (NT) Fire 036 Pipe insulation: Fire spread and smoke production – Full scale test, February 1998.
- NORSOK C-001 Living quarters area, revision 3, May 2006,
- NORSOK C-002 Architectural components and equipment, revision 3, June 2006.
- NORSOK C-004 Helicopter deck on offshore installations, revision 1, September 2004,
- NORSOK D-001 Drilling facilities, revision 2, July 1998
- NORSOK D-002 System requirements well intervention equipment, revision 1, October 2000
- NORSOK D-010 Well integrity in drilling and well operations, revision 3, August 2004
- NORSOK D-SR-007 Well testing system, revision 1, January 1996
- NORSOK G-CR-001 Marine soil investigations, revisjon 1, mai 1996
- NORSOK H-001 HVAC – Heating, Ventilation and Air Conditioning, revision 4, November 2001
- NORSOK I-002 Safety and automation systems (SAS), revision 2, May 2001
- NORSOK L-001 Piping and Valves, revision 3, September 1999
- NORSOK L-002 Piping Design, Layout and Stress Analysis, revision 2, September 1997
- NORSOK M-001 Material selection, revision 4, August 2004
- NORSOK M-101 Structural steel fabrication, revision 4, Dec. 2000
- NORSOK M-102 Structural aluminium fabrication, revision 1, Sept 1997
- NORSOK M-501 Surface preparation and protective coating, revision 5, June 2004
- NORSOK M-503 Cathodic protection, revision 2. September 1997
- NORSOK M-601 Welding and inspection of piping, revision 4, July 2004
- NORSOK N-001 Structural design, revision 4, January 2004
- NORSOK N-002 Collection of metocean data, revision 1, September 1997
- NORSOK N-003 Actions and action effects, revision 2, September 2007
- NORSOK N-004 Design of steel structures, revision 2, October 2004
- NORSOK N-005 Condition monitoring of loadbearing structures, revisjon 1, desember 1997,
- NORSOK P-001 Process Design, revision 5, September 2006
- NORSOK P-100 Process Systems, revision 2, October 2001
- NORSOK R-001 Mechanical Equipment, revision 3, November 1997
- NORSOK R-003N Sikker bruk av løfteutstyr, revisjon 2, juli 2004
- NORSOK R-004 Piping and equipment insulation, revision 2, June 1999
- NORSOK R-100 Mechanical Equipment Selection, revision 2, November 1997.
- NORSOK S-001 Technical Safety, revision 3, January 2000.
- NORSOK S-002N Arbeidsmiljø, revisjon 4, August 2007 (Working environment)
- NORSOK S-005 Machinery-working environment analyses and documentation, revision 1, March 1999.
- NORSOK T-001Telecommunication systems, revision 3, December 2003
- NORSOK T-100 Telecom subsystems, revision 3, January 2004
- NORSOK U-001 Subsea production systems, revision 3, October 2002
- NORSOK U-100N Bemannede undervannsoperasjoner, revisjon 1, august 1999
- NORSOK U-101 Diving respiratory equipment, revision 1, August 1999
- NORSOK Z-001 Documentation for operation, revision 4, March 1998
- NORSOK Z-003 Technical information flow, revision 2, May 1998
- NORSOK Z-006 Preservation, revisjon 2, november 2001,
- NORSOK Z-007 Mechanical Completion and Commissioning, revisjon 2, desember 1999,
- NORSOK Z-008 Criticality analysis for maintenance purposes, revisjon 2,
- NORSOK Z-013 Risk and emergency preparedness analysis, revision 2, September 2001
- NORSOK Z-015N Midlertidig utstyr, revisjon 3, juni 2004
- NORSOK Z-016 Regularity management & reliability technology, revision 1, December 1998
- NORSOK Z-DP-002 Coding System, revision 3, October 1996
- NS 3420 Descriptive texts for buildings and construction, 2004
- NS 3473 Engineering of concrete structures, calculation and structural rules, 2003

- NS 3907 Technical fire testing of doors, ports and hatches – fire resistance, 1977
- NS 3908 Technical fire testing of glass sections – fire resistance, 1977
- NS 4138 Krav og retningslinjer for dokumentadministrasjon – arkivnøkkel, 1997. (Requirements and guidelines for document administration – file key, 1997)
- NS 4931 Guidelines for assessing human reactions to low-frequency horizontal movements (0.063 to 1Hz) in permanent structures, particularly buildings and offshore installations, 1985
- NS 6033 Sea engineering – Signs – with fixed text, 1977 with addition 1981
- NS-EN-ISO 9000:2000 Systemer for kvalitetsstyring. Prinsipper og terminologi (Quality management systems. Principles and terminology)
- NS-EN-ISO 9004:2000 Systemer for kvalitetsstyring. Retningslinjer for prestasjonsforbedringer (Quality management systems. Guidelines for improving performance)
- NS-INSTA 800:2000 Rengjøringskvalitet
- NS-ISO 11064 Ergonomic design of control centres, Part 1-4, 1999-2004
- prEN 614-2, Safety of machinery – Ergonomic design principles Part 2: Interactions between the design of machinery and work tasks
- OLF Retningslinjer for sikkerhets- og beredskapsopplæring, revisjon 8, 15.12.1998,
- OLF 070 Recommended guidelines for the application of IEC 61508 and IEC 61511 in the petroleum activities on the Norwegian continental shelf, revision no. 01, 1.2.2001,
- OLF 081 Anbefalte retningslinjer for å oppfylle Ptils krav til fjernoperert rørhåndtering, fastsatt i Innretningsforskriften § 55 og Aktivitetsforskriften § 80, revisjon 1, 1.2.2006

Norwegian Petroleum Directorate (NPD)

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- AGA Report No 9, Measurement of gas by multipath ultrasonic meters
- ASTM 1945, Standard test method for analysis of natural gas by gas chromatography (1991)
- API, MPMS, American Petroleum Institute, Manual of Petroleum Measurement Standards
- ISO/OIML The Guide to the expression of uncertainty in measurement (1995)
- OIML R 117 Measuring systems for liquids other than water, Annex A (1995)
- ISO 3171 Petroleum liquids – Automatic pipeline sampling (1988)
- ISO 5024 Petroleum liquids and liquefied petroleum gases. Measurement Standard reference conditions (1976)
- ISO 5167-1 Measurement of fluid flow by means of orifice plates, nozzles and venturi tubes inserted in circular cross section conduits running full (1998)
- ISO 6551 Petroleum Liquids and Gases – Fidelity and Security of Dynamic (1982)
- ISO 6976. Natural gas – Calculations of calorific values, density, relative density and Wobbe index from composition (1995)
- ISO 7278 Liquid hydrocarbons – Dynamic measurement – Proving system for volumetric meters.
- ISO 9002 Quality systems, Model for quality assurance in production, installation and servicing (1994)
- ISO 9951 Measurement of gas flow in closed conduits – Turbine meters (1993)
- ISO 1000 (1981), SI units and recommendations for the use of their multiples and certain other units
- ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories
- ISO/CD 10715 Natural Gas – Sampling Guidelines
- NORSOK I-104, Fiscal measurement system for hydrocarbon gas (Rev 2, 2. June 1998)
- NORSOK I-105, Fiscal measurement system for hydrocarbon liquid (Rev 2, 2. June 1998)
- NORSOK P-100, Process system
- NS 4900 Petroleum liquids and gases – Measurement – Standard reference conditions (1979)
- NS 1024 (1982)
- LNG Custody Transfer Handbook (CTH), G.I.I.G.N.L. (2001)
- ISO 13398 Refrigerated light hydrocarbon fluids – Liquefied natural gas – Procedure for custody transfer on board ship (1997)

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Annex F2

NPD's list of Standards relating to measurement of petroleum

- AGA Report No 10 Speed of sound in Natural Gas and Other Related Hydrocarbon Gases
- AGA Report No 11 Measurement of Natural Gas by Coriolis Meter
- AGA Report No 3 Orifice Metering of Natural Gas
- AGA report No 7 Measurement of gas by turbine meters
- AGA Report No 8 Compressibility factor of natural gas and related hydrocarbon gasses (1994)
- AGA Report No 9 Measurement of Gas by Multipath Ultrasonic Meters
- API/MPMS Ch. 10.1 Standard Test Method for Sediment in Crude Oils and Fuel Oils by the Extraction Method (ANSI/ASTM D 473)
- API/MPMS Ch. 10.2 Determination of Water in Crude Oil by Distillation (ANSI/ASTM D 4006)
- API/MPMS Ch. 10.3 Standard Test Method for Water and Sediment in Crude Oil by the Centrifuge Method (ANSI/ASTM D 4007)
- API/MPMS Ch. 10.4 Determination of Sediment and Water in Crude Oil by the Centrifuge. Method (Field procedure)
- API/MPMS Ch. 10.5 Standard Test Method for Water in Petroleum Products and Bituminous Materials by Distillation (ANSI/ASTM D 95).
- API/MPMS Ch. 10.6 Standard Test Method for Water and Sediment in Fuel Oils by the Centrifuge Method the water and sediment in fuel oils by using the centrifuge method in the range from 0 to 3 percent volume. (ANSI/ASTM D1796)
- API/MPMS Ch. 10.7 Standard Test Method for Water in Crude Oils by Potentiometric Karl Fischer Titration
- API/MPMS Ch. 10.8 Standard Test Method for Sediment in Crude Oil by Membrane Filtration (ANSI/ASTM D 4807).
- API/MPMS Ch. 10.9 Standard Test Methods for Water in Crude Oils by Coulometric Karl Fischer Titration (ANSI/ASTM D 4928)
- API/MPMS Ch. 11 Physical Properties Data (Volume Correction Factors)
- API/MPMS Ch. 12.2 Calculation of Liquid Petroleum Quantities Measured by Turbine or Displacement Meters (ANSI/API MPMS 12.2-1981)
- API/MPMS Ch. 13 Statistical Aspects of Measuring and Sampling
- API/MPMS Ch. 13.1 Statistical Concepts and Procedures in Measurement.
- API/MPMS Ch. 13.2 Statistical Methods of Evaluating Meter Proving
- API/MPMS Ch. 4 Proving Systems
- API/MPMS Ch. 4.1 Introduction
- API/MPMS Ch. 4.4 Tank Provers.
- API/MPMS Ch. 4.5 Master-meter Provers
- API/MPMS Ch. 4.6 Pulse Interpolation
- API/MPMS Ch. 4.7 Field-Standard Test Measures
- API/MPMS Ch. 4.8 Operation of Proving Systems
- API/MPMS Ch. 5 ERTA Manual of Petroleum Measurement Standards Chapter 5 – Metering
- API/MPMS Ch. 5.1 General Consideration for Measurement by Meters
- API/MPMS Ch. 5.2 Measurement of Liquid Hydrocarbons by Displacement Meters
- API/MPMS Ch. 5.3 Measurement of Liquid Hydrocarbons by Turbine Meters
- API/MPMS Ch. 5.4 Accessory Equipment for Liquid Meters
- API/MPMS Ch. 5.5 Fidelity and Security of Flow Measurement Pulsed-data Transmission. Systems
- API/MPMS Ch. 5.6 Measurement of Liquid Hydrocarbons by Coriolis Meters (2002)
- API/MPMS Ch. 7. Temperature Determination
- API/MPMS Ch. 8 Sampling.
- API/MPMS Ch. 8.1 Manual Sampling of Petroleum and Petroleum Products (ANSI/ASTM D 4057)

- API/MPMS Ch. 8.2 Automatic Sampling of Petroleum and Petroleum Products (ANSI/ASTM D 4177)
- API/MPMS Ch. 8.3 Mixing and Handling of Liquid Samples of Petroleum and Petroleum Products (ANSI/ASTM D 5854)
- API/MPMS Ch. 8.4 Manual Sampling and Handling of Fuels for Volatility Measurement (ANSI/ASTM D 5842)
- API/MPMS Ch. 9 Density Determination
- API/MPMS Ch. 9.1 Describes the hydrometer method
- API/MPMS Ch. 9.2 Standard test method for Density or Relative Density of light Hydrocarbons by pressure hydrometer.
- API/MPMS Ch. 9.3 Standard test method for density, relative density and API gravity of crude petroleum products by thermo hydrometer method.
- API/MPMS Ch. Draft. Standard Measurement of Liquid Hydrocarbons by Ultrasonic Flow meters Using Transit Time Technology.
- ASTMD 1945 Analysis of natural gas by gas chromatography
- BS 1042 Measurement of fluid flow in closed conduits; pressure differential devices
- BS 7965 The selection, installation, operation and calibration of diagonal path transit time ultrasonic flow meters for industrial gas measurement
- EN 45000 Conformity assessment
- EN 60751 Industrial Platinum Resistance Thermometer sensors
- EN 60751 Industrial Platinum Resistance Thermometer sensors
- HM 8; 1997 Density, sediment and water. Section 2: Continuous density measurement (Formerly PMM Part VII, S2)
- IP 386/90 Determination of water content of crude oil – Coulometric Karl Fischer method
- IP PMM Part X Meter proving
- IP PMP No. 2 Guidelines for users of Petroleum Measurement Tables
- ISO 1000 SI units and recommendations for the use of their multiples and of certain other units
- ISO 1000: 1992 SI units and recommendations for the use of their multiples and of certain other units
- ISO 10005: 1995 Quality management Guidelines for quality plans.
- ISO 10336 Crude petroleum – Determination of water – Potentiometric Karl Fischer titration method
- ISO 10337 Crude petroleum – Determination of water – Coulometric Karl Fischer titration method
- ISO 10337 Crude petroleum – Determination of water – Coulometric Karl Fischer titration method
- ISO 10715 Natural Gas – Sampling Guidelines
- ISO 10790:1999 Measurement of fluid flow in closed conduits – Guidance to the selection, installation and use of Coriolis meters (mass flow, density and volume flow measurements)
- ISO 12185: 1996 Crude petroleum and petroleum products – Determination of density – Oscillating U-tube method
- ISO 12213-1:1997 Natural gas – Calculation of compression factor – Part 1: Introduction and guidelines
- ISO 12213-2:1997 Natural gas – Calculation of compression factor – Part 2: Calculation using molar-composition analysis
- ISO 12213-3:1997 Natural gas – Calculation of compression factor – Part 3: Calculation using physical properties
- ISO 12937:2000 Petroleum products – Determination of water – Coulometric Karl Fischer titration method
- ISO 13398 Refrigerated light hydrocarbon fluids – Liquefied natural gas – Procedure for custody transfer on board ship (1997).

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- ISO 15169:2003 Petroleum and liquid petroleum products – Determination of volume, density and mass of the hydrocarbon content of vertical cylindrical tanks by hybrid tank measurement systems
- ISO 17025 General requirements for the competence of testing and calibration laboratories,
- ISO 19011:2002 Guidelines for quality and/or environmental systems auditing
- ISO 19739:2004 Natural gas – Determination of sulfur compounds using gas chromatography
- ISO 2715:1981 Liquid hydrocarbons – Volumetric measurement by turbine meter systems
- ISO 2909:2002 Petroleum products – Calculation of viscosity index from kinematic viscosity
- ISO 3170:2004 Petroleum Liquids – Manual sampling
- ISO 3171 Petroleum liquids – Automatic pipeline sampling
- ISO 3171:1988 Petroleum liquids – Automatic pipeline sampling
- ISO 3675:1993 Crude petroleum and liquid petroleum products – Laboratory determination of density or relative density – Hydrometer method
- ISO 3733:1999 Petroleum products and bituminous materials – Determination of water – Distillation method
- ISO 3734:1997 Petroleum products – Determination of water and sediment in residual fuel oils – Centrifuge method
- ISO 3735:1999 Crude petroleum and fuel oils – Determination of sediment – Extraction method
- ISO 3838:2004 Crude petroleum and liquid or solid petroleum products – Determination of density or relative density – Capillary-stoppered pyknometer and graduated bicapillary pyknometer methods
- ISO 3993:1984 Liquefied petroleum gas and light hydrocarbons – Determination of density or relative density – Pressure hydrometer method
- ISO 4268:2000 Petroleum and liquid petroleum products – Temperature measurements – Manual methods
- ISO 5024 Petroleum liquids and liquefied petroleum gases – Measurement – Standard reference conditions
- ISO 5024: 1999 Petroleum liquids and liquefied petroleum gases – Measurement – Standard reference conditions
- ISO 5167-1 Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full – Part 1: General principles and requirements
- ISO 5167-1:2003 Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full – Part 1: General principles and requirements
- ISO 5167-2:2003 Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full – Part 2: Orifice plates
- ISO 5167-3:2003 Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full – Part 3: Nozzles and Venturi nozzles
- ISO 5167-4:2003 Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full – Part 4: Venturi tubes
- ISO 6296:2000 Petroleum products – Determination of water – Potentiometric Karl Fischer titration method
- ISO 649-1:1981 Laboratory glassware – Density hydrometers for general purposes – Part 1: Specification
- ISO 649-2:1981 Laboratory glassware – Density hydrometers for general purposes – Part 2: Test methods and use
- ISO 6551 Petroleum liquids and gases – Fidelity and security of dynamic measurement
- ISO 6551:1982 Petroleum Liquids and gasses – Fidelity and security of dynamic measurement cabled transmission of electric and/or electronic pulsed data.
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Annex G1

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- UL 1203, Standard for Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations, Third Edition, Sep. 7, 2000 (Revisions through and including Apr. 30, 2004)
- UL 1309, Marine Shipboard Cables, First Edition (July 14, 1995)
- UL 1581 (May 6, 2003)
- UL 1598, Luminaires, First Edition (Jan. 31, 2000)

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- UL 1598A, Standard for Supplemental Requirements for Luminaires for Installation on Marine Vessels, First Edition (Dec. 4, 2000)
- UL 19 Lined commercial fire hose
- UL 44, Standard for Thermoset-Insulated Wire and Cable, Fifteenth Edition, Mar. 22, 1999 (Revisions through and including May 13, 2002)
- UL 484, Standard for Room Air Conditioners, Seventh Edition, Apr. 27, 1993 (Revisions through and including Sep. 3, 2002)
- UL 489, Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures, Ninth Edition, Oct. 31, 1996 (Revisions through and including Mar. 22, 2000)
- UL 50, Standard for Safety Enclosures for Electrical Equipment, Eleventh Edition (Oct. 19, 1995)
- UL 514A, Metallic Outlet Boxes, Ninth Edition (Dec. 27, 1996)
- UL 514B, Conduit, Tubing, and Cable Fittings, Fourth Edition (Nov. 3, 1997)
- UL 514C, Standard for Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers, Second Edition (Oct. 31, 1988)
- UL 62, Standard for Flexible Cord and Fixture Wire, Sixteenth Edition (Oct. 15, 1997)
- UL 83, Standard for Thermoplastic-Insulated Wires and Cables, Twelfth Edition (Sep. 29, 1998)
- UL 913, Standard for Intrinsically Safe Apparatus and Associated Apparatus for Use in Class i, ii, and iii, Division 1, Hazardous (Classified) Locations, Sixth Edition, Aug. 8, 2002 (Revisions through and including Dec. 15, 2003)

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Annex H

Standards referenced in the following UK Guidance and Approved Code of Practices:

L21 Management of Health and Safety at Work ACoP

L22 Safe Use of Work Equipment ACoP and Guidance

L30 A guide to the Offshore Installations (Safety Case) Regulations 2005

L5 COSHH ACoP

L64 Safety signs and signals

L65 Offshore Installations (Prevention of Fire and Explosion, and Emergency Response) Regulations 1995 Approved Code of Practice and guidance

L70 A guide to the Offshore Installations and Pipeline Works (Management and Administration) Regulations 1995

L72 A guide to the Borehole Sites and Operations Regulations 1995

L82 A guide to the Pipelines Safety Regulations 1996

L84 A guide to the well aspects of the Offshore Installations and Wells (Design and Construction etc) Regulations 1996

L85 A guide to the integrity, workplace environment and miscellaneous aspects of the Offshore Installations and Wells (Design and Construction etc) Regulations 1996

L108 Guidance on the Noise at Work Regulations 1989

L113 Safe use of lifting equipment

L138 Dangerous Substances and Explosive Atmosphere Regulations 2002 Approved Code of Practice and Guidance

- ANSI S3.36:1985 Specification for manikin for simulated in situ airborne acoustic measurements
- API RP 500B Classification of areas for electrical installation at drilling rigs and production facilities on land and marine fixed and mobile platforms
- BS 1088-1:2003 Marine plywood. Requirements
- BS 1710:1984 Specification for identification of pipelines and services
- BS 3641 Symbols for machine tools
- BS 4275:1997 Guide to implementing an effective respiratory protective device programme
- BS 4444:1989 Guide to electrical earth monitoring and protective conductor proving
- BS 5345 Code of practice for selection, installation and maintenance of electrical apparatus for use in potentially explosive atmospheres
- BS 5378:1980 Safety signs and colours Parts 1 and 2:1980 and Part 3:1982
- BS 5499:1990 Fire safety signs, notices and graphic symbols Parts 1 and 3
- BS 5501 Electrical apparatus for potentially explosive atmospheres
- BS 5501-8:1988 Electrical apparatus for potentially explosive atmospheres encapsulation 'm'
- BS 5839:1980 Fire detection and alarm systems in buildings
- BS 5958-1:1991 Code of practice for control of undesirable static electricity
- BS 6651:1992 Code of practice for protection of structures against lightning
- BS 6698:1986 Methods for determination of airborne acoustical noise emitted by household and similar electrical appliances
- BS 6713 Explosion protection systems
- BS 6713-1:1996 Determination of the explosion characteristics of dust clouds Part1: Determination of the maximum explosion pressure
- BS 6736:1986 Code of practice for hand signalling for use in agricultural operations

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- BS 7028:1999 Eye protection for industrial and other uses. Guidance on selection, use and maintenance
- BS 7121:1989 Code of practice for safe use of cranes
- BS 7184:2001 Selection, use and maintenance of chemical protective clothing - Guidance
- BS 7244:1990 Specification for flame arresters for general use
- BS 7580:1997 Specification for the verification of sound level meters
- BS 8800: 1996 Guide to occupational health and safety management systems
- BS EN 1265:1999 Noise test code for foundry machines and equipment.
- BS EN 13463-1 Non-Electrical Equipment for Potentially Explosive Atmospheres – Part 1: Basic Method and Requirements
- BS EN 1746:1999 Safety of machinery.
- BS EN 294:1992 Safety of machinery – Safety distances to prevent danger zones being reached by the upper limbs
- BS EN 3 Portable fire extinguishers
- BS EN 481:1993 Workplace atmospheres
- BS EN 50016 Electrical apparatus for potentially explosive atmospheres – Pressurised apparatus
- BS EN 50281:2002 Electrical apparatus for use in the presence of combustible dust – Electrical apparatus protected by enclosures. Construction and testing
- BS EN 60079-10:1996 Electrical apparatus for explosive gas atmospheres: Part 10 – Classification of hazardous areas
- BS EN 60079-14:1997 Code of practice for selection, installation and maintenance of electrical apparatus for use in potentially explosive atmospheres (other than mining applications or explosive processing and manufacture)
- BS EN 60204-1 Safety of machinery – Electrical equipment of machines – General requirements
- BS EN 60645-1:2001 Audiometers. Pure-tone audiometers
- BS EN 60804:2001 Integrating-averaging sound level meters (superseded, withdrawn)
- BS EN 60942:2003 Electroacoustics. Sound calibrators
- BS EN 61252:1997 Electroacoustics. Specifications for personal sound exposure meters
- BS EN 61672-1:2003 Electroacoustics. Sound level meters. Specifications
- BS EN 62303 Parts 1-4:2006, Code of Practice for protection of structures against lightning.
- BS EN 953:1998 Safety of machinery. Guards. General requirements for the design and construction of fixed and movable guards
- BS EN 999:1999 Safety of machinery. The positioning of protective equipment in respect of approach speeds of parts of the human body
- BS EN ISO 11904-1:2002 Acoustics. Determination of sound immission from sound sources placed close to the ear. Technique using a microphone in a real ear (MIRE technique)
- BS EN ISO 11904-2:2004 Acoustics. Determination of sound immission from sound sources placed close to the ear. Technique using a manikin
- BS EN ISO 12001:1997 Acoustics. Noise emitted by machinery and equipment. Rules for the drafting and presentation of a noise test code
- BS EN ISO 13849-1:2006 Safety of machinery. Safety-related parts of control systems. General principles for design
- BS EN ISO 14738: 2002 Safety of machinery. Anthropometric requirements for the design of workstations at machinery
- BS EN ISO 4871:1997 Acoustics. Declaration and verification of noise emission values of machinery and equipment
- BS EN ISO 61672-1:2003 Electroacoustics. Sound level meters. Specifications
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- BS IEC 61511 Functional safety - Safety instrumented systems for the process industry sector.
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- IEC 804:1985 Integrating-Averaging Sound Level Meters
- IEC/TR 60959:1990 Provisional head and torso simulator for acoustic measurements on air conduction hearing aids
- IGE/TD 3:1992 Distribution mains
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- IP 15: Area classification code for installations handling flammable fluids 2002
- IP 4: Drilling and production safety code for onshore operations
- ISO 7960:1995 Airborne noise emitted by machine tools. Operating conditions for wood-working machines
- ISO TR 18690 Guidelines for the selection, use and maintenance of protective occupational footwear
- PD 5304:2000 Safe use of machinery
- PD CEN/TR 14560:2003 Guidelines for selection, use, care and maintenance of protective clothing against heat and flame

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- AODC Guidance Note 029: Oxygen Cleaning, published by IMCA
- API BULL 16J Comparison of Marine Drilling Riser Analysis
- API BULL 6AR Recommended Practice for Repair and Remanufacture of Wellhead and Xmas Tree Equipment, First Edition
- API BULL 6FA Specification Fire Test for Valves
- API BULL 6FC Fire Test for Valve with Automatic Backseats
- API RP 14 C – Recommended practice for analysis, design, installation, and testing of basic surface safety systems for offshore production platforms.
- API RP 14E Recommended Practice for Design and Installation Products Platform
- API RP 16Q Design, Selection, Operation and Maintenance of Marine Drilling Riser Systems
- API RP 17B Recommended Practice for Flexible Pipe
- API RP 2A Recommended practice for planning, designing and constructing fixed offshore platforms.
- API RP 2A-LRFD: Recommended practice of planning, designing and constructing fixed off-shore platforms – Load and Resistance Factor Design, Washington
- API RP 2A-WSD: Recommended practice of planning, designing and constructing fixed off-shore platforms – Working Stress Design
- API RP 2D Recommended Practice for the Operation and Maintenance of Offshore
- API RP 2FPS Recommended Practice for Planning, Designing and Constructing Floating Production Systems
- API RP 2I Inservice Inspection of Mooring Hardware for Floating Drilling Units.

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- API RP 2L – Recommended Practice for Planning, Designing and Constructing Heliports for Fixed Platforms.
- API RP 2R Design, Rating, and Testing of Marine Drilling Riser
- API RP 2SK Design and Analysis of Station keeping Systems for Floating Structures
- API RP 2SM Recommended Practice for Design, Manufacture, Installation and Maintenance of Synthetic Fiber Ropes for Offshore Mooring
- API RP 2T Planning, Designing, and Constructing Tension Leg Platforms
- API RP 500B Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class 1, Division 1 and Division 2
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- API RP 53 Characterisation of Exploration and Production Associated Wastes
- API RP 55 – Conducting Oil and Gas Producing and Gas Processing Plant Operations Involving Hydrogen Sulphide
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- API SPEC 13A Drilling Fluid Materials
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- DMAC 21 The Duration of Saturation Exposures and Surface Intervals Following Saturation
- DMAC 22 Proximity to a Recompression Chamber after Surfacing
- DMAC 28 Provision of Emergency Medical Care for Divers in Saturation
- DNV Design of Offshore Structures
- DNV Classification Rules: Mobile Offshore Units
- DnV Guidelines for Offshore Structural Reliability Analysis
- DNV OS-C301 DnV Offshore Standard Stability & Watertight Integrity
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- IP 6 Model Code of Safe Practice Part 6 Pipelines
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- IP/UKOOA Guidance for safer design of offshore installations: an overview
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- ISO 10407 Petroleum and natural gas industries; drilling and production equipment; drill stem design and operating limits
- ISO 10414 Petroleum and natural gas industries – Field testing of drilling fluids - Part 1: Water based fluids
- ISO 10416 Petroleum and natural gas industries – Drilling fluids - Laboratory testing
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- ISO 10423 Petroleum and natural gas industries – Drilling and production equipment – Wellhead and Xmas tree equipment
- ISO 10424 Draft Document – Petroleum and natural gas industries – Rotary drilling equipment - Part 1: Specification for rotary drilling equipment
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- ISO 10427 Petroleum and natural gas industries – Casing centralisers – Part 1: Bow-spring casing centralisers
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- ISO 13500 Petroleum and natural gas industries – Drilling fluid materials – Specifications and tests
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- ISO 14310 Downhole equipment – Packers and bridge plugs
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- ISO 15544 Offshore production installations – Requirements and guidelines for emergency response
- ISO 16070 Downhole equipment – Lock mandrels and landing nipples.
- ISO 16708 Reliability Based Limit State Methods
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- ISO 19901-2 Petroleum and natural gas industries – Offshore Structures: Seismic Criteria
- ISO 19901-3 Petroleum and Natural Gas Industries – Specific Requirements for Offshore Structures Part 3: Topsides Structure
- ISO 19901-4 Petroleum and Natural Gas Industries – Specific Requirements for Offshore Structures Part 4: Geotechnical and Foundations Design Considerations
- ISO 19901-5 Petroleum and Natural Gas Industries – Specific Requirements for Offshore Structures Part 5: Weight Control During Engineering and Construction
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- NORSOK Z-001 Documentation for Operation
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Annex I

List of standards in Brazilian Technical Measurement Regulation of Oil and Natural Gas

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- ABNT 05800 NB00418 75 – Oil and Liquid By-Products Sampling for Quantitative Purposes
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- ABNT 14065 Petroleum Distillates and Viscous Oils – Determination of Specific Mass and of Relative Specific Mass by Digital Densimeter
- ABNT 14236-98 Petroleum Products and Bituminous Materials – Determination of Water Content by Distillation
- ABNT MB00038-72 Determination of Water and Sediments in Crude Petroleum and Fuel Oils (Centrifugation Methods)
- ABNT MBO0294-66 Test Method for determination of Sediments in Petroleum and Fuel Oils – Extraction Method
- AGA Report No. 7 Measurement of Gas by Turbine Meters
- AGA Report No. 9 Measurement of Gas by Multipath Ultrasonic Meters
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- API MPMS Chapter 4.1, Introduction, Second Edition.
- API MPMS Chapter 4.3, Small Volume Tester
- API MPMS Chapter 4.4, Tank Tester
- API MPMS Chapter 4.5, Master-Meter Tester.
- API MPMS Chapter 4.7, Field-Standard Test Measures
- API MPMS Chapter 5.1, General Consideration for Measurement by Meters.
- API MPMS Chapter 5.4, Accessory Equipment for Liquid Meters.
- API MPMS Chapter 5.5, Fidelity and Security of Flow Measurement Pulsed – Data Transmission Systems.
- API MPMS Chapter 7.2, Temperature-Dynamic Temperature Determination.
- API MPMS Chapter 8.2, Automatic Sampling of Petroleum and Petroleum Products (ANSI/ASTM D4177)
- API MPMS Chapter 8.3, Mixing and Handling of Liquid Samples of Petroleum and Petroleum Products (ASTM D5854
- API MPMS Chapter 9.1, Hydrometer Test Method for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products (ANSI/ASTM D 1298) (IP 160) Chapter 9.3, Thermo hydrometer Test Method for Density and API Gravity of Crude Petroleum and Liquid Petroleum Products
- API MPMS Chapter 141, Collecting and Handling of Natural Gas Samples for Custody Transfer.
- API MPMS Chapter 201, Allocation Measurement
- ASTM D 1945 Standard Test Method for Analysis of Natural Gas by Gas Chromatography

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- ASTM D 3588 Calculating Heat Value, Compressibility Factor, and Relative Density (Specific Gravity) of Gaseous Fuels
- ASTM D 5454 Standard Test Method Water Vapor Content of Gaseous Fuels Using Electronic Moisture Analyzers
- ASTM D 5504 Standard Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Chemiluminescence
- ASTM D1266-98 Standard Test Method for Sulfur in Petroleum Products (Lamp Method)
- ASTM D129-95 Standard Test Method for Sulfur in Petroleum Products (General Bomb Method)
- ASTM D2892-98b Standard Test Method for Distillation of Crude Petroleum (15 – Theoretical Plate Column)
- ASTM D5236-95 Standard Test Method for Distillation of Heavy Hydrocarbon Mixtures (Vacuum Potstill Method)
- ASTM D5708-95a Standard Test Methods for Determination of Nickel, Vanadium, and Iron in Crude Oils and Residual Fuels by Inductively Coupled Plasma (ICP) Atomic Emission Spectrometry
- ASTM D5863-95 Standard Test Methods for Determination of Nickel, Vanadium, Iron, and Sodium in Crude Oils and Residual Fuels by Flame Atomic Absorption Spectrometry
- ISO 2714 Liquid hydrocarbons – Volumetric Measurement by Displacement Meter Systems Other Than Dispensing Pumps
- ISO 2715 Liquid Hydrocarbons – Volumetric Measurement by Turbine meter Systems
- ISO 4266 Petroleum and Liquid Petroleum Products – Measurement of Temperature and Level in Storage
- ISO 4266 Petroleum and Liquid Petroleum Products – Measurement of Temperature and Level in Storage Tanks – Automatic Methods
- ISO 4267-2 Petroleum and Liquid Petroleum Products – Calculation of Oil Quantities – Part 2: Dynamic Measurement
- ISO 6326 Natural Gas – Determination of Sulfur Compounds, Parts 1 to 5
- ISO 6974 Natural Gas – Determination of Hydrogen, Inert Gases and Hydrocarbons up to C8 - Gas Chromatography Method
- ISO 7278-1 Liquid Hydrocarbons – Dynamic Measurement – Proving Systems for Volumetric Meters – Part 1: General Principles
- ISO 7278-2 Liquid Hydrocarbons – Dynamic Measurement – Proving Systems for Volumetric Meters – Part 2: Pipe Tester
- ISO 7278-3 Liquid Hydrocarbons – Dynamic Measurement – Proving Systems for Volumetric Meters – Part 3: Pulse Interpolation Techniques
- ISO 7507-1 Petroleum and Liquid Petroleum Products – Calibration of Vertical Cylindrical Tanks – Part 1: Strapping Method
- ISO 7507-2 Petroleum and Liquid Petroleum Products – Calibration of Vertical Cylindrical Tanks – Part 2: Optical-Referent-Line Method
- ISO 7507-3 Petroleum and Liquid Petroleum Products – Calibration of Vertical Cylindrical Tanks – Part 3: Optical-Triangulation Method
- ISO 7507-4 Petroleum and Liquid Petroleum Products – Calibration of Vertical Cylindrical Tanks – Part 4: Internal) Electro-Optical Distant-Ranging Method
- ISO/DIS 4266-1 Petroleum and Liquid Petroleum Products - Measurement of Level and Temperature in Storage Tanks by Automatic Methods – Part 1: Measurement of Level in Atmospheric Tanks
- ISO/DIS 4266-4 Petroleum and Liquid Petroleum Products - Measurement of Level and Temperature in Storage Tanks by Automatic Methods - Part 4: Measurement of Temperature in Atmospheric Tanks
- ISO/DIS 4268 Petroleum and Liquid Petroleum Products Temperature Measurements – Manual Methods
- ISO/DIS 4269-1 Petroleum and Liquid Petroleum Products – Tank Calibration by Liquid Measurement – Part 1: Incremental Method Using Volumetric Meters
- ISO/DIS 4512 Petroleum and Liquid Petroleum Products – Equipment for Measurement of Liquid Levels in Storage Tanks – Manual Methods

- ISO/DIS 7278-4 Liquid Hydrocarbons – Dynamic Measurement – Proving Systems for Volumetric Meters – Part 4: Guide for Operators of Pipe Tester
- ISO/DIS 7507-5 Petroleum and Liquid Petroleum Products Calibration of Vertical Cylindrical Tanks – Part 5: External) Electro-Optical Distant-Ranging Methods
- ISO/TR 5168 Measurement of Fluid Flow – Evaluation of Uncertainties
- ISO/TR 7507-6 Petroleum and Liquid Petroleum Products – Calibration of Vertical Cylindrical Tanks – Part 6: Recommendations for Monitoring, Checking and Verification of Tank Calibration and Capacity Table OIML R 71 – Fixed Storage Tanks. General Requirements
- ISO/TR 9464 Guidelines for The Use of ISO 5167-1:1991
- NBR ISO 10012-1 Quality assurance requirements for measuring equipment – Part 1: Metrological confirmation system for measuring equipment
- NBR ISO 5167-1 Measurement of Fluid Flow by means of Pressure Instruments – Part 1: Orifice Plates, Nozzles and Venturi Tubes Installed in Circular Transverse Section of Flues.
- OIML R71 Fixed Storage Tanks. General Requirements.
- OIML R85 Automatic Level Gauges for Measuring the Level of Liquid in Fixed Storage Tanks

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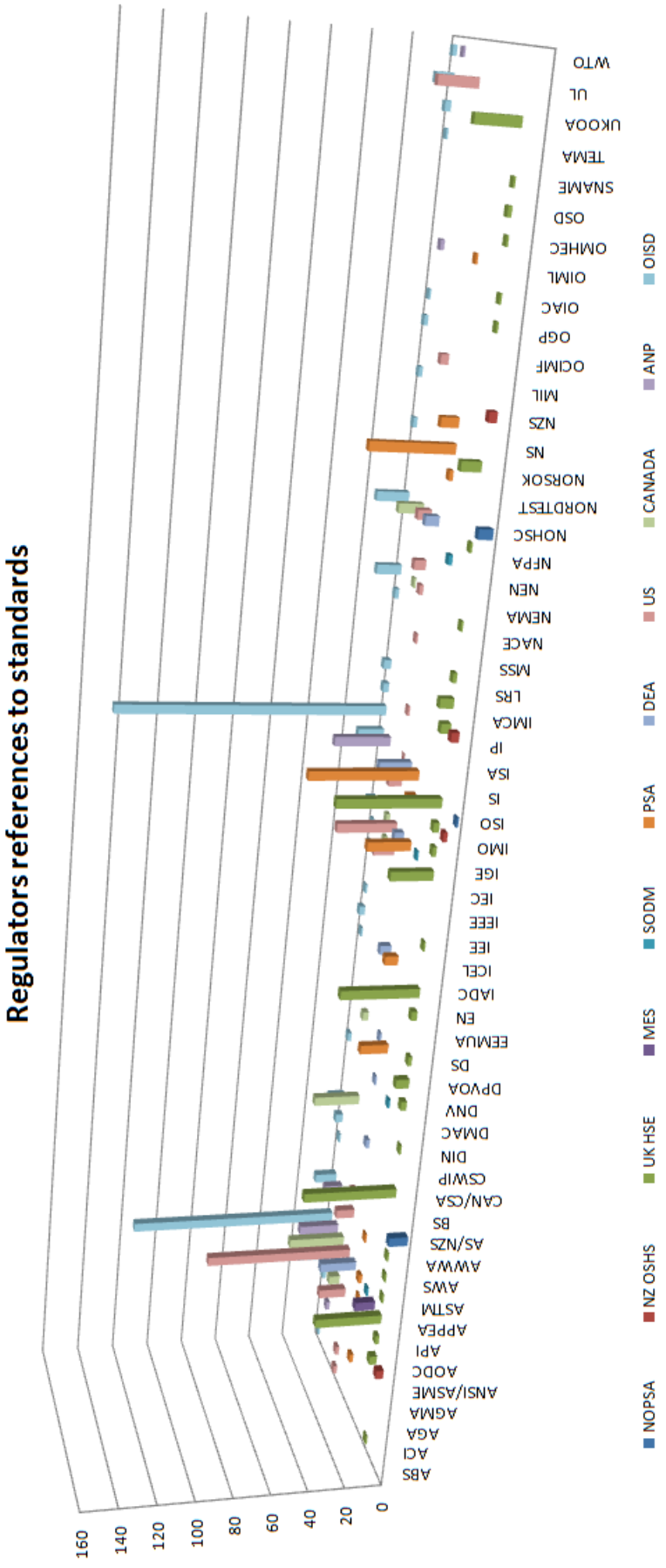
Annex J

Standards referenced by three or more (#) regulators

#	Title of standard
5	API Spec 6A Wellhead and Christmas Tree Equipment,
5	IMO Mobile Offshore Drilling Units (MODU) Code
4	API RP 14B Design, Installation, Repair and Operation of Subsurface Safety Valve Systems
4	API Spec 17J Unbonded Flexible Pipe
4	IEC 60331-11 Fire resisting characteristics of electric cables
4	API RP 14C Analysis, Design, Installation, and Testing of Basic Surface Safety Systems for Offshore Production Platforms
4	API RP 521 Guide for Pressure-Relieving and Depressuring Systems
4	API Spec 14A Subsurface safety valves
4	NFPA 13 Installation of sprinkler systems.
4	ANSI/ASME VIII-1 Pressure Vessels
4	NACE MR 01-75 Standard Material Requirements, Metals for Sulfide Stress Cracking and Stress Corrosion Cracking Resistance in Sour Oilfield Environments
3	DNV OS-F101 Submarine Pipeline Systems
3	EN 1838 Emergency lightening
3	IEC 61892-7 Fixed and mobile offshore units - Electrical Installations
3	ISO 10418 Analysis, Design, Installation and Testing of Basis Surface Safety Systems on Offshore Production Platforms
3	ISO 10423 Wellhead and christmas tree equipment
3	ISO 13623 Pipeline transportation systems
3	IEC 60332 Tests on electric cables under fire conditions 3-10
3	API Std 2000 Venting Atmospheric and Low-Pressure Storage tanks.
3	API Std 617 Axial and centrifugal compressors and expander compressors for Petroleum, Chemical and Gas Industry Services
3	API Std 618 Reciprocating compressors for general refinery services
3	API Std 619 Rotary-type, positive displacement compressors for general refinery services
3	NFPA 15 Standard on Installation of Water Spray System.
3	API RP 17B Flexible Pipe.
3	IEC 60332 Tests on electric cables under fire conditions - Part 1
3	ISO 13702 Control and mitigation of fires and explosions on offshore production installations – Requirements and guidelines
3	ISO 15544 Requirements and guidelines for emergency response
3	NORSOK Z-013 Risk and emergency preparedness analysis
3	ANSI/ASME B 31.3 Process Piping
3	API RP 14E Design and Installation of Offshore Production Platform Piping Systems
3	API RP 2D Operation and Maintenance of Offshore Pedestal Cranes
3	ANSI/ASME B 31.8 Gas Transmission and Distribution Piping Systems
3	ANSI/ASME I Rules for construction of power Boilers
3	ANSI/ASME IV Rules for care and operation of Heating Boiler
3	API RP 8B Procedures for inspections, maintenance repair and re-manufacture of hoisting equipment.
3	UKOOA Guidelines for The Management of Competence and Training in Emergency Response

Annex K – figures



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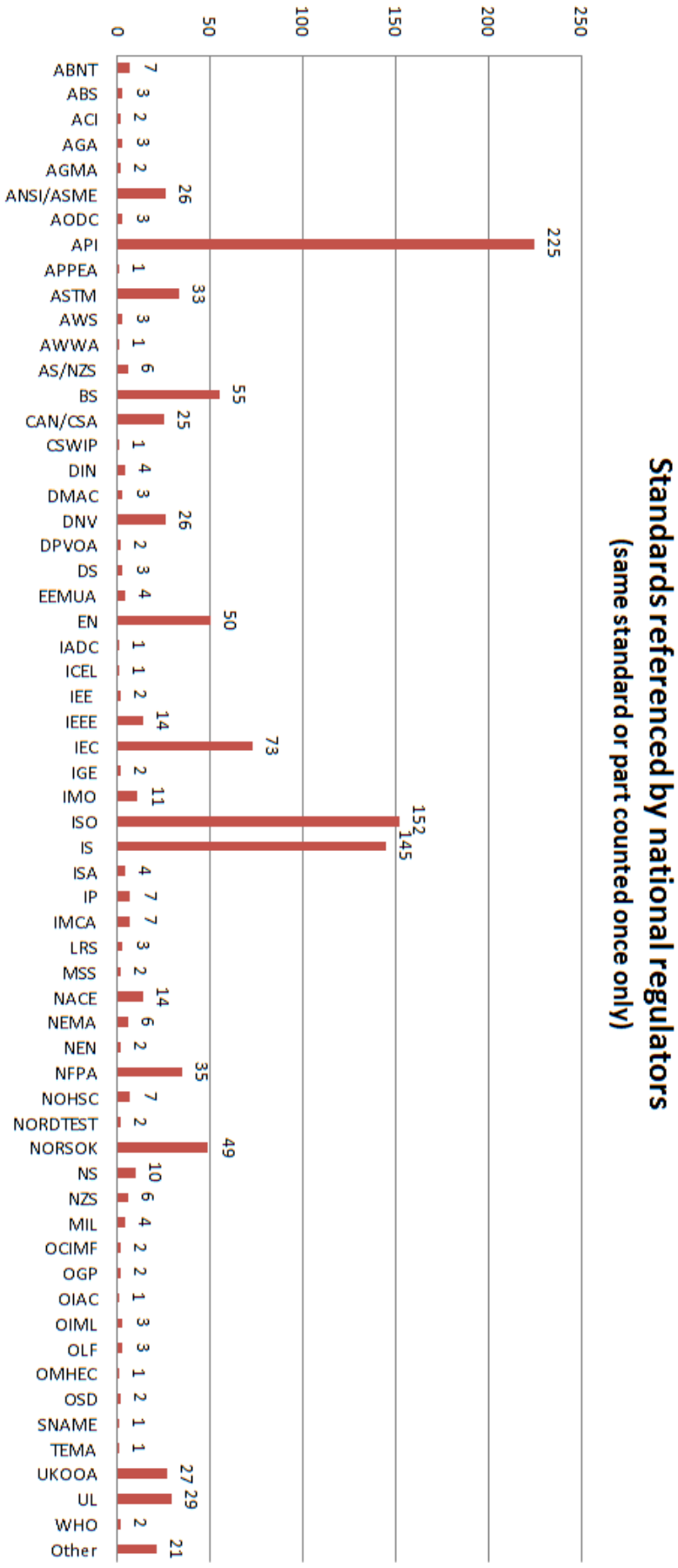
Standards referenced by national regulators
(same standard or part counted once only)
0
50
100
150
200
250
ABNT 7
ABS 3
ACI 2
AGA 3
AGMA 2
ANSI/ASME 26
AODC 3
API 225
APPEA 1
ASTM 33
AWS 3
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AS/NZS 6
BS 55
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DIN 4
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DNV 26
DPVOA 2
DS 3
EEMUA 4
EN 50
IADC 1
ICEL 1
IEE 2
IEEE 14
IEC 73
IGE 2
IMO 11
ISO 152
IS 145
ISA 4
IP 7
IMCA 7
LRS 3
MSS 2
NACE 14
NEMA 6
NEN 2
NFPA 35
NOHSC 7
NORDTEST 2
NORSOK 49
NS 10
NZS 6
MIL 4
OCIMF 2
OGP 2
OIAC 1
OIML 3
OLF 3
OMHEC 1
OSD 2
SNAME 1
TEMA 1
UKOOA 27
UL 29
WHO 2
Other 21

What is OGP?

The International Association of Oil & Gas Producers encompasses the world's leading private and state-owned oil & gas companies, their national and regional associations, and major upstream contractors and suppliers.

Vision

- To work on behalf of the world's oil and gas producing companies to promote responsible and profitable operations

Mission

- To represent the interests of oil and gas producing companies to international regulators and legislative bodies
- To liaise with other industry associations globally and provide a forum for sharing experiences, debating emerging issues and establishing common ground to promote cooperation, consistency and effectiveness
- To facilitate continuous improvement in HSE, CSR, engineering and operations

Objectives

- To improve understanding of our industry by being visible, accessible and a reliable source of information
- To represent and advocate industry views by developing effective proposals
- To improve the collection, analysis and dissemination of data on HSE performance
- To develop and disseminate best practice in HSE, engineering and operations
- To promote CSR awareness and best practice

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