Analysis of Domestic and Foreign Oil and Gas Standards Final Report

Submitted to
The Bureau of Safety and Environmental Enforcement

Submitted by
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Executive Summary

On October 1, 2011, the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE), formerly the Minerals Management Service (MMS), was replaced by the Bureau of Ocean Energy Management (BOEM) and the Bureau of Safety and Environmental Enforcement (BSEE) as part of a major reorganization. BSEE is charged with the responsibility to permit, oversee and enforce the laws and regulations associated with the development of energy resources on the Outer Continental Shelf (OCS). BSEE is also responsible for safety and environmental oversight of offshore oil and gas operations, including permitting and inspections activities. Its functions include the development and enforcement of safety and environmental regulations, permitting offshore exploration, development and production, inspections, offshore regulatory programs, oil spill response and newly formed training and environmental compliance programs.

In September 2013, BSEE's Office of Offshore Regulatory Programs initiated a study on the analysis of domestic and foreign industry oil and gas standards. The purpose of this study was to conduct a comprehensive comparison and analysis of the industry oil and gas standards that the United States (U.S.) incorporates by reference into the BSEE regulations in Title 30 Code of Federal Regulations Part 250 to the international standards used by other countries around the world. BSEE currently incorporates 116 domestic oil and gas standards and 1 oil and gas international standard by reference in Title 30 Code of Federal Regulations (CFR) Part 250. The objective of this study was to identify recommendations for the incorporation of International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) standards with the purpose of achieving increased reciprocity across national and international boundaries.

This study involved an examination of domestic standards incorporated by reference in Title 30 CFR Part 250, however, there are other standards that BSEE requires industries compliance which are communicated in Notices to Lessees and Operators (NTLs) that were not examined in this study.

For the purpose of this study, BSEE identified 60 of the 117 standards incorporated by reference as priority standards. A standard comparative analysis was conducted for each of the priority standards. The analysis identified comparable and equivalent ISO or IEC standards related to the offshore oil and gas industry. The analysis presented similarities and gaps between the domestic standard and the international standard. The risks and implementation challenges of incorporating the standard were identified. Lastly, recommendations were provided for the incorporation of the international standard, as well as recommendations for the reference of the domestic standard.

Based on information gathered and the analysis conducted on foreign and domestic oil and gas industry standards, the following standards have been identified as comparable or equivalent to domestic standards incorporated in Title 30 CFR Part 250.

1. ISO 10423:2009 is identical to American National Standards Institute (ANSI)/American Petroleum Institute (API) Spec. 6A. It is noted that API & ISO will be developing their own independent documents henceforth. The ISO standard may be incorporated directly after evaluating the ISO/API relationship for future publications.

2. ISO 14313:2007 is identical to ANSI/API Spec. 6D. It is noted that API & ISO will be developing their own independent documents henceforth. The ISO standard may be incorporated directly after evaluating the ISO/API relationship for future publications.
3. ISO10423:2004 is identical to ANSI/API Spec. 14A. It is noted that API & ISO will be developing their own independent documents henceforth. The ISO standard may be incorporated directly after evaluating the ISO/API relationship for future publications.
4. ISO 10417:2004 is identical to API Recommended Practice (RP) 14B. It is noted that API & ISO will be developing their own independent documents henceforth. The ISO standard may be incorporated directly after evaluating the ISO/API relationship for future publications.
5. ISO 13703:2000 is comparable to API RP 14E. BSEE should incorporate the international standard.
6. ISO 19903:2006 is comparable to American Concrete Institute (ACI) 357R-84. BSEE should incorporate the international standard.
7. ISO 10417:2004 is comparable to API 14B. BSEE should consider incorporating the international standard.
8. ISO 19902:2007 is comparable to API RP 2A-WSD. BSEE should consider incorporating the international standard although there could be some initial industry resistance to this change.
9. ISO 10418:2003 is comparable to API RP 14C. BSEE should consider incorporating the international standard after further review.
10. IEC 61892; IEC 61892-1; IEC 61892-2; IEC 61892-3; IEC 61892-4; IEC 61892-5; IEC 61892-6; IEC 61892-7 is comparable to API RP 14F. BSEE should consider incorporating the international standard.
11. IEC 61892; IEC 61892-1; IEC 61892-2; IEC 61892-3; IEC 61892-4; IEC 61892-5; IEC 61892-6; IEC 61892-7 is comparable to API RP 14FZ. BSEE should consider incorporating the international standard.
12. ISO 13702:1999 is comparable to API RP 14G. BSEE should consider incorporating the international standard.
13. ISO 13623 is comparable to ANSI/American Society of Mechanical Engineers (ASME) B 31.8-2012. BSEE should consider incorporating the international standard.
14. ISO 7005-1;2 is comparable to ANSI/ASME B 16.5-2013. BSEE should consider incorporating the international standard.
15. ISO 14001 is comparable to ANSI/ASME SPPE-1-1994. BSEE should consider incorporating the international standard.
16. ISO 14001 is comparable to ANSI/ASME SPPE-1-1996 Addenda. BSEE should consider incorporating the international standard.

Table of Contents

List of Figures

List of Tables

List of Acronyms

AC	alternating current
ACI	American Concrete Institute
AGA	American Gas Association
ANP	National Agency of Oil, Gas and Biofuels
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATG	Automatic Tank Gauges
AWS	American Welding Society
BAST	Best Available Safest Technology
bbl	Oil Barrel
BOEM	Bureau of Ocean Energy Management
BOEMRE	Bureau of Ocean Energy Management, Regulation and Enforcement
BOP	Blowout Preventer
BSEE	Bureau of Safety and Environmental Enforcement
C	Celsius
CAB	conformity assessment bodies
CAP	Civil Aviation Publication
CD	Compact Disc
CEN	European Committee for Standardization
CFR	Code of Federal Regulations
CNH	National Hydrocarbons Commission
COS	Center for Offshore Safety
CPL	Correction for the Effect of Pressure on Liquid
CTL	Correction for the Effect of Temperature on Liquid
DC	direct current
DEA	Danish Energy Agency
DIS	Draft International Standard
DOI	Department of Interior
DOT	Department of Transportation
DP	Dynamic Positioning
EMC	Electromagnetic capability
EMS	Environmental Management System
ESD	Emergency Shutdown
ESS	Emergency Support Systems
F	Fahrenheit
FAD	Failure Analysis Diagrams
FAT	Factory Acceptance Testing
FDIS	Final Draft International Standard
FLNG	Floating Liquefied Natural Gas

FPS	Floating Production Systems
FPS	Floating Production Systems
FPSO	Floating Production Storage and Offloading
FSL	Flow Safety Low
GoM	Gulf of Mexico
GPA	Gas Processors Association
HF	Human Factors
HSE	Health, Safety, And Environment
HSG	Health and Safety Guidance
IADC	International Association of Drilling Contractors
IBOP	Internal Blowout Preventer
IBR	Incorporation by Reference
ICAO	International Civil Aviation Organization
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronic Engineers
IMO	International Maritime Organization
IRF	International Regulatory Form
ISO	International Organization for Standardization
JIP	Joint Industry Project
kPa (ga)	kilopascal gauge
Kw	kilowatts
LACT	Lease Automatic Custody Transfer
LEL	Lower Explosive Limit
LWC	Loss of Well Control
MAASP	Maximum Allowable Annular Surface Pressure
MAWOP	Maximum Allowable Wellhead Operating Pressure
MMS	Minerals Management Service
MODU	Mobile Offshore Drilling Unit
MPa	Mega Pascal
NACE	National Association for Corrosion Engineers
NCCCO	National Commission for the Certification of Crane Operators
NDE	Nondestructive examination
NEC	National Electric Code
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
NTL	Notices to Lessees and Operators
OCS	Outer Continental Shelf
OEC	Other End Connectors
OGP	Oil and Gas Producers
OMB	Office of Management and Budget
OPM	Office of Personnel Management
OSH	Occupational Safety and Health

OSHA	Occupational Safety and Health Administration
PHMSA	Pipeline and Hazardous Materials Safety Administration
PN	Nominal Pressure
POC	Point of Contact
PR	Performance Requirements
PRAC	Production Research Advisory Committee
psi	pounds per square inch
psig	pounds per square inch gage
PSL	Product Specification Levels
QMS	Quality Management System
ROT	Remotely Operated Tool
ROV	Remotely Operated Vehicle
RP	Recommended Practice
SAC	Safety Analysis Checklist
SAFE	Safety Analysis Function Evaluation
SALM	Single Anchor Leg Moorings
SC	Subcommittee
SCP	Sustained Casing Pressure
SCR	Slow Circulating Rate
SDO	Standards Development Organizations
SEMS	Safety and Environmental Management Systems
SIM	Structural Integrity Monitoring
SME	Subject Matter Expert
SOW	Statement of Work
SPPE	Safety and Pollution Prevention Equipment
SSSV	Subsurface Safety Valve
SSV	Surface Safety Valve
SWF	Shallow Water Flow
TFL	Through Flowline
TLP	Tension-Leg Platforms
TS	Technical Specification
TSH	Temperature Safety High
TSL	Temperature Safety Low
UFM	Ultrasonic Flow Meters
UPS	Uninterruptible Power Supply
U.S.	United States
USC	United States Customary
USCG	United States Coast Guard
USV	Underwater Safety Valves
UW	Underwater
V	Volt
WPS	Welding Procedure Specification

WSD	Working Stress Design

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1. Introduction

On October 1, 2011, the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE), formerly the Minerals Management Service (MMS), was replaced by the Bureau of Ocean Energy Management (BOEM) and the Bureau of Safety and Environmental Enforcement (BSEE) as part of a major reorganization. BSEE is charged with the responsibility to permit, oversee and enforce the laws and regulations associated with the development of energy resources on the Outer Continental Shelf (OCS). BSEE is also responsible for safety and environmental oversight of offshore oil and gas operations, including permitting and inspections activities. Its functions include the development and enforcement of safety and environmental regulations, permitting offshore exploration, development and production, inspections, offshore regulatory programs, oil spill response and newly formed training and environmental compliance programs.

The purpose of this study was to conduct a comprehensive comparison and analysis of the industry oil and gas standards that the United States (U.S.) incorporates by reference into the BSEE regulations in Title 30 Code of Federal Regulations (CFR) Part 250 to the international standards used by other countries around the world. This study did not include the review domestic standards that BSEE requires industries compliance which are communicated in Notices to Lessees and Operators (NTLs).

To analyze and compare the myriad number and types of domestic and international oil and gas standards, we will employ the approach summarized in **Figure 1**.

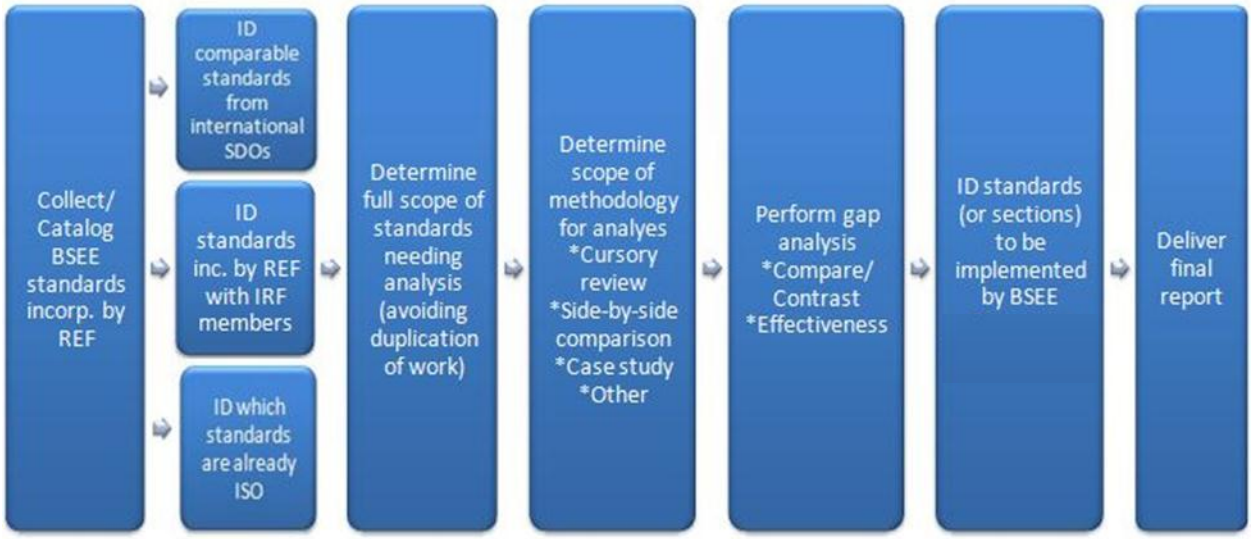


Figure 1: Approach to the Study

Research was conducted to identify the domestic and international standards that are applicable to the offshore oil and gas industry. Abstracts of these standards were then compiled to facilitate further analysis. The standards were sorted into three groups: the standards currently incorporated by

reference into the BSEE regulations; standards not currently incorporated by reference, but considered a priority to BSEE; and international standards related to the oil and gas industry.

Analysis of the standards currently incorporated by reference into 30 CFR Part 250 was conducted to identify comparable or equivalent international standards. A gap analysis was conducted on international standards to compare and contrast these with domestic standards and provide recommendations to BSEE on the effectiveness of the comparable international standards. The overarching goal of the project was to incorporate by reference an increased number of international standards into the BSEE regulations for the purpose of achieving increased reciprocity across national and international boundaries.

2. Oil and Gas Standards Applicable to the Offshore Oil and Gas Industry

The oil and gas industry operates throughout the world and across a wide variety of environments ranging from inland land-based locations to deep offshore oceans. These operations are governed by international and domestic laws and regulations, as well as industry-developed standards. These standards are designed to help the industry ensure safety, protect the environment, safeguard health and improve the efficiency and cost-effectiveness of operations, as well as comply with legislative and regulatory requirements.

A literature search of domestic and international Standards Development Organizations (SDO) was conducted to organizations that are applicable to offshore oil and gas industry. **Table 1** below displays a list of SDOs identified during this study.

Table 1: Standards Development Organizations and Acronyms

Standards Development Organizations	Acronym
International Electronic Commission	IEC
International Organization for Standardization	ISO
National Association for Corrosion Engineers	NACE
The American Concrete Institute	ACI
The American Gas Association	AGA
The American National Standards Institute	ANSI
The American Petroleum Institute	API
The American Society of Mechanical Engineers	ASME
The American Society for Testing and Materials	ASTM
The American Welding Society	AWS
The Center for Offshore Safety	COS

2.1 Domestic Standards

BSEE incorporates many of the industry-developed standards in Title 30 CFR Part 250. Incorporation by Reference (IBR) allows Federal agencies to comply with the requirement to publish rules in the Federal Register and CFR by referring to material published elsewhere.

The legal effect of IBR is that the material is treated as if it were published in the Federal Register and CFR. This material, like any other properly issued rule, has the force and effect of law. Congress authorized IBR in the Freedom of Information Act to reduce the volume of material published in the Federal Register and CFR. (5 U.S.C. 552(a) and 1 CFR part 51)

The domestic industry standards incorporated by reference into BSEE regulation are shown in **Figure 2** below.

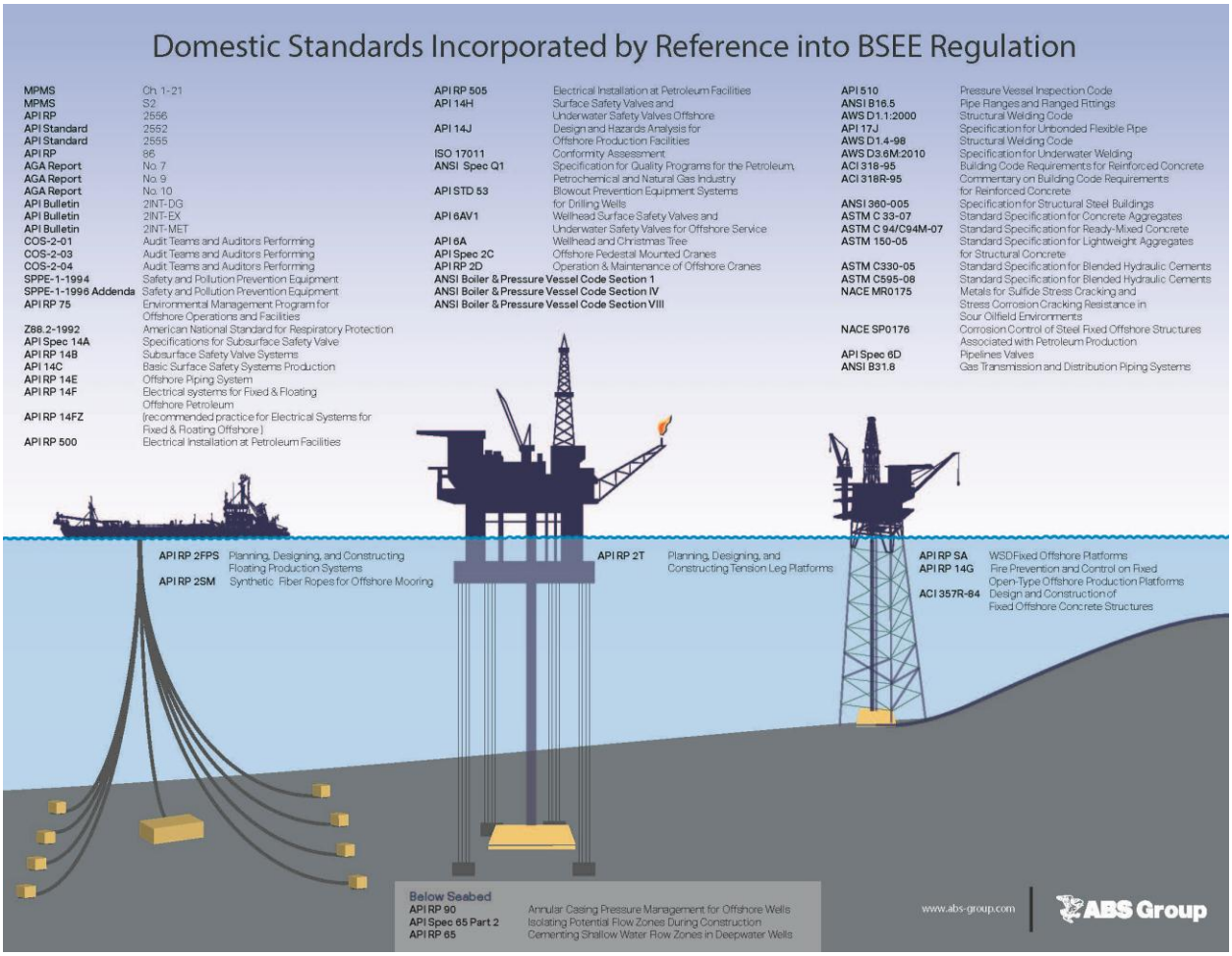


Figure 2: Domestic Standards Incorporated by Reference

2.1.1 Abstracts of Domestic Standards

Domestic standard abstracts were referenced and adopted from the respective standard development organization during the literature search. The abstracts provide a synopsis and overview of each standard. The domestic standards are organized into two categories, domestic standards currently incorporated into BSEE regulation and domestic standards not incorporated into regulation, but considered a priority by BSEE.

2.1.1.1 *Incorporated into Regulation*

BSEE incorporates 116 domestic standards in Title 30 CFR Part 250. The standard abstracts are shown in **Table 2.**

Table 2: Domestic Standards Incorporated by Reference into 30 CFR Part 250

No.	SDO	Number	Title	30 CFR Citations	Abstract
1	ACI	318-95	Building Code Requirements for Reinforced Concrete (318-95)	250.901	ACI 318-11 is the most recent edition of the standard. The standard provides minimum requirements for design and construction of structural concrete members of any structure erected under requirements of the legally adopted general building code. In areas without a legally adopted building code, it defines minimum acceptable standards for materials, design, and construction practice. It also covers the strength evaluation of existing concrete structures. (available at global.ihs.com)
2	ACI	318R-95	Commentary on Building Code Requirements for Reinforced Concrete	250.901	Superseded by above (318-11 includes commentary)
3	ACI	357R-84	Guide for the Design and Construction of Fixed Offshore Concrete Structures	250.901	357R-84 is intended to be used as a guide for the design of fixed reinforced and/or pre-stressed concrete structures for service in a marine environment. Only fixed structures which are founded on the seabed and obtain their stability from the vertical forces of gravity are covered. Such structures may be floated utilizing their own positive buoyancy during construction and installation. It is not intended to cover maritime structures such as jetties or breakwaters, or those which are constructed primarily as ships or boats. Because of the marine environment, certain recommendations override requirements of ACI 318. (available at global.ihs.com)
4	ANSI/ AISC	360-05	Specification for Structural Steel Buildings	250.901	ANSI/AISC 360-2010 is the most recent edition of the standard. The standard provides criteria for the design, fabrication, and erection of structural steel buildings and other structures, where other structures are defined as those structures designed, fabricated, and erected in a manner similar to buildings, with building-like vertical and lateral load resisting elements. (available at www.nssn.org)
5	ANSI/ ASME	Boiler and Pressure Vessel Code (BPVC), Section I	Rules for Construction of Power Boilers; including Appendices, 2004	250.803; 250.1629	BPVC, Section I provide requirements for all methods of construction of power, electric, and miniature boilers; high temperature water boilers used in stationary service; and power boilers used in locomotive, portable, and traction service. Rules pertaining to use of the V, A, M, PP, S and E Code symbol stamps are also included. The rules are applicable to boilers in which

No.	SDO	Number	Title	30 CFR Citations	Abstract
			Edition		steam or other vapor is generated at a pressure exceeding 15 pounds per square inch gage (psig), and high temperature water boilers intended for operation at pressures exceeding 160 psig and/or temperatures exceeding 250 degree Fahrenheit (F). Superheaters, economizers, and other pressure parts connected directly to the boiler without intervening valves are considered as part of the scope. (available at www.nssn.org)
6	ANSI/ ASME	BPVC, Section IV	Rules for Construction of Heating Boilers; including Appendices 1, 2, 3, 5, 6, and Non-mandatory Appendices B, C, D, E, F, H, I, K, L, and M, and the Guide to Manufacturers Data Report Forms, 2004 Edition	30 CFR 250.803; 30 CFR 250.1629	BPVC, Section IV-2013/Vol 62 provides requirements for construction of heating boilers. (available at www.nssn.org)
7	ANSI/ ASME	BPVC, Section VIII	Rules for Construction of Pressure Vessels; Divisions 1 and 2, 2004 Edition	30 CFR 250.803; 30 CFR 250.1629	BPVC, SectionVIII-1-2013/Vol 62provides requirements for construction of pressure vessels - division 1. BPVC-VIII-2-2013/Vol 62 provides requirements for construction of pressure vessels - division 2 - alternate rules.
8	ANSI/ ASME	B 16.5-2013	Pipe Flanges and Flanged Fittings	30 CFR 250.1002	B 16.5-2013 provides an overview on pipe flanges and flange fittings standard covers pressure-temperature ratings, materials, dimensions, tolerances, marking, testing, and methods of designating openings for pipe flanges and flanged fittings.
9	ANSI/ ASME	B 31.8-2012	Gas Transmission and Distribution Piping Systems	30 CFR 250.1002	B 31.8-2012 is the code for the design, operation, maintenance, and repair of natural gas distribution and transmission pipelines. This 2-½ day course explains the present-day piping Code provisions, the principal intentions of

No.	SDO	Number	Title	30 CFR Citations	Abstract
					the Code, and how the Code should be used. The emphasis is on transmission pipelines. (ASME)
10	ANSI/ ASME	SPPE-1-1994	Quality Assurance and Certification of Safety and Pollution Prevention Equipment (SPPE) Used in Offshore Oil and Gas Operations	30 CFR 250.806	SPPE-1-1994 provides requirements for: (a) Quality Assurance Programs; (b) attendant accreditation of Producers of SPPE; (c) reporting failures of equipment by Operator of offshore SPPE. (available at www.ihs.com)
11	ANSI/ ASME	SPPE-1-1996 Addenda	Quality Assurance and Certification of SPPE Used in Offshore Oil and Gas Operations	30 CFR 250.806	See ANSI/ASME SPPE-1-1994.
12	ANSI	Z88.2-1992	American National Standard for Respiratory Protection	30 CFR 250.490	Z88.2-1992 sets forth accepted practices for respirator users; provides information and guidance on the proper selection, use, and care of respirators; and contains requirements for establishing and regulating respirator programs. It covers the use of respirators to protect persons against the inhalation of harmful air contaminants and against oxygen-deficient atmospheres in the work-place.
13	API	510	Pressure Vessel Inspection Code: In-Service Inspection, Rating, Repair and Alteration, Downstream Segment, Ninth Addition, June 2006	30 CFR 250.803; 30 CFR 250.1629	API 510 covers in-service inspection, repair, alteration, and rerating activities for pressure vessels and the pressure-relieving devices protecting these vessels that have been placed in service. 9th Edition Jun 2006 (available at publications.api.org)
14	API	Bulletin 2INT-	Interim Guidance	30 CFR 250.901	Bull 2INT-DG provides guidance on the use of updated hurricane winds,

No.	SDO	Number	Title	30 CFR Citations	Abstract
		DG	for Design of Offshore Structures for Hurricane Conditions, May 2007		waves, surge, and current conditions in Bull INT-MET in the design of offshore structures in the Gulf of Mexico (GoM). It is intended to cover design of structural systems of the following types of offshore platforms: steel jacket or template platforms, towers, and compliant towers; minimum non-jacket and special structures defined in RP 2A-WSD; tension leg platforms; and moored, floating platforms. 1st Edition May 2007
15	API	Bulletin 2INT-EX	Interim Guidance for Assessment of Existing Offshore Structures for Hurricane Conditions, May 2007	30 CFR 250.901	Bull 2INT-EX provides guidance on use of updated hurricane winds, waves, surge, and current conditions in Bull 2INT-MET for the assessment of existing offshore structures in the GoM. It is intended to cover the assessment of the structural systems of the following types of offshore platforms: steel jacket or template platforms, towers, and compliant towers; minimum non-jacket and special structures defined in RP 2A-WSD; tension leg platforms; and moored, floating platforms. 1st Edition May 2007
16	API	Bulletin 2INT-MET	Interim Guidance on Hurricane Conditions in the GoM, May 2007	30 CFR 250.901	Bull 2INT-MET presents hurricane-driven metocean conditions for use with other API standards. Conditions are intended to replace those found in RP 2A-WSD. Hurricane conditions were developed using the latest hindcast storm record and incorporating industry's best understanding to date of regional dependence of storm intensity. Conditions are presented for four regions: West, West Central, Central, and East. 1st Edition May 2007, includes Errata Oct 2007
17	API	Manual of Petroleum Measurement Standards (MPMS)	Chapter 1 - Vocabulary, Second Addition, July 1994	30 CFR 250.1201	MPMS Chapter 1 provides definitions and terms used throughout the API MPMS. 2nd Edition Jul 1994 (available at publications.api.org)
18	API	MPMS	Chapter 2—Tank Calibration; Section 2A—Measurement and Calibration of Upright Cylindrical Tanks by the Manual	30 CFR 250.1202	MPMS Chapter 2.2A contains procedures for calibrating upright cylindrical tanks used primarily for storage of petroleum liquids. It addresses necessary measurement procedures to determine total and incremental tank volumes and procedures for computing volumes. Both metric and customary units are included. It also provides guidelines for recalibration and computerization of capacity tables. Ch. 2.2A combined with Ch. 2.2B supersede St 2550. 1st Edition Feb 1995, reaffirmed Feb 2012 (available at publications.api.org)

No.	SDO	Number	Title	30 CFR Citations	Abstract
			Tank Strapping Method, First Edition, February 1995		
19	API	MPMS	Chapter 2—Tank Calibration; Section 2B—Calibration of Upright Cylindrical Tanks Using the Optical Reference Line Method, First Edition, March 1989	30 CFR 250.1202	MPMS Chapter 2.2B describes measurement and calculation procedures for determining diameters of upright, welded (lap/butt) cylindrical tanks, or vertical cylindrical tanks, with a smooth outside surface and either floating or fixed roofs. It should be used in conjunction with Ch. 2.2A. 1st Edition Mar 1989, (available reaffirmed Dec 2007 at publications.api.org)
20	API	MPMS	Chapter 3—Tank Gauging; Section 1A—Standard Practice for the Manual Gauging of Petroleum and Petroleum Products, Third Edition, August 2013	30 CFR 250.1202	MPMS Chapter 3.1A describes: a) procedures for manually gauging liquid level of petroleum and petroleum products in non-pressure fixed-roof, floating-roof tanks and marine tank vessels, b) procedures for manually gauging the level of free water that may be found with the petroleum or petroleum products, c) methods to verify the length of gauge tapes under field conditions and the influence of bob weights and temperature on gauge tape length, and d) influences that may affect the position of the gauging reference point. The term petroleum is used to denote petroleum, petroleum products, or the liquids normally associated with the petroleum industry. reaffirmed Sep 2010 (available at publications.api.org)
21	API	MPMS	Chapter 3—Tank Gauging, Section 1B—Standard Practice for Level Measurement of Liquid Hydrocarbons in Stationary Tanks	30 CFR 250.1202	MPMS Chapter 3.1B covers level measurement of liquid hydrocarbons in stationary, aboveground, atmospheric storage tanks using automatic tank gauges (ATGs). It discusses automatic tank gauging in general, calibration of ATGs for custody transfer and inventory control, and requirements for data collection, transmission, and receiving. Appendices discuss operation and installation of some ATG equipment. 2nd Edition Jun 2001, reaffirmed Aug 2011 (available at publications.api.org)

No.	SDO	Number	Title	30 CFR Citations	Abstract
			by Automatic Tank Gauging, Second Edition, June 2001		
22	API	MPMS	Chapter 4—Proving Systems, Section 1—Introduction, Third Edition, February 2005	30 CFR 250.1202	MPMS Chapter 4.1 provides a general introduction to the subject of proving. Requirements are based on customary practices that evolved for crude oils and products covered by Ch. 11.1. The prover and meter uncertainties should be appropriate for the measured fluids and should be agreeable to the parties involved. 3rd Edition Feb 2005, reaffirmed Sep 2009 (available at publications.api.org)
23	API	MPMS	Chapter 4—Proving Systems, Section 2—Displacement Provers, Third Edition, September 2003	30 CFR 250.1202	MPMS Chapter 4.2 outlines the essential elements of provers that accumulate meter pulses as a displacing element within the prover travels between detector switches. It provides design and installation details for the types of displacement provers currently in use. Provers discussed are designed for proving measurement devices under dynamic operating conditions with single-phase liquid hydrocarbons. 3rd Edition Sep 2003, reaffirmed Mar 2011 (available at publication.api.org)
24	API	MPMS	Chapter 4—Proving Systems, Section 4—Tank Provers, Second Edition, May 1998	30 CFR 250.1202	MPMS Chapter 4.4 specifies the characteristics of tank provers that are in general use and the procedures for their calibration. It does not apply to weir-type, vapor-condensing, dual tank water displacement, or gas-displacement provers. 2nd Edition May 1998, reaffirmed Sep 2010 (available at publication.api.org)
25	API	MPMS	Chapter 4—Proving Systems, Section 5—Master-Meter Provers, Third Edition, November 2011	30 CFR 250.1202	MPMS Chapter 4.5 covers the use of displacement, turbine, Coriolis, and ultrasonic meters as master meters. Requirements are intended for single-phase liquid hydrocarbons. Meter proving requirements for other fluids should be appropriate for the overall custody transfer accuracy and should be agreeable to the parties involved. 3rd Edition Nov 2011 (available at publication.api.org)
26	API	MPMS	Chapter 4—Proving Systems, Section 6—Pulse Interpolation,	30 CFR 250.1202	MPMS Chapter 4.6 describes how the double-chronometry method of pulse interpolation, including system operating requirements and equipment testing, is applied to meter proving. 2nd Edition May 1999, reaffirmed May 2008, includes Errata Apr 2007 (available at publication.api.org)

No.	SDO	Number	Title	30 CFR Citations	Abstract
			Second Edition, May 1999		
27	API	MPMS	Chapter 4—Proving Systems, Section 7—Field Standard Test Measures, Third Edition, April 2009	30 CFR 250.1202	MPMS Chapter 4.7 details the essential elements of field standard test measures by providing descriptions, construction requirements, as well as inspection, handling, and calibration methods. Scope is limited to certification of "delivered volumes" of test measures. 3rd Edition Apr 2009 (available at publication.api.org)
28	API	MPMS	Chapter 5—Metering, Section 1—General Considerations for Measurement by Meters, Fourth Edition, September 2005; Reaffirmed March 2011	30 CFR 250.1202	MPMS Chapter 5.1 is intended as a guide for the proper specification, installation, and operation of meter runs designed to dynamically measure liquid hydrocarbons so that acceptable accuracy, series life, safety, reliability, and quality control can be achieved. 4th Edition Oct 2005, reaffirmed Mar 2011, latest errated Jun 2011 (available at publication.api.org)
29	API	MPMS	Chapter 5—Metering, Section 2—Measurement of Liquid Hydrocarbons by Displacement Meters, Third Edition, September 2005	30 CFR 250.1202	MPMS Chapter 5.2 describes methods for obtaining accurate quantity measurement with displacement meters in liquid hydrocarbon service. It covers the unique performance characteristics of displacement meters in liquid hydrocarbon service. It does not apply to measurement of two-phase fluids. 3rd Edition Sept 2005, reaffirmed Sep 2010 (available at publication.api.org)
30	API	MPMS	Chapter 5—Metering, Section 3—Measurement of Liquid Hydrocarbons by	30 CFR 250.1202	MPMS Chapter 5.3 defines the application criteria for turbine meters and discusses appropriate considerations regarding the liquids to be measured. It discusses installation of turbine meters in liquid hydrocarbon service. It also includes "Selecting a Meter and Accessory Equipment" and information on the recommended location for prover connections. 5th Edition Sep 2005,

No.	SDO	Number	Title	30 CFR Citations	Abstract
			Turbine Meters, Fifth Edition, September 2005		includes Addendum Jul 2009 (available at publication.api.org)
31	API	MPMS	Chapter 5—Metering, Section 4—Accessory Equipment for Liquid Meters, Fourth Edition, September 2005	30 CFR 250.1202	MPMS Chapter 5.4 describes characteristics of accessory equipment used with displacement and turbine meters in liquid hydrocarbon ercie. It includes guidance on the use of electronic flow computers. 4th Edition Sep 2005, reaffirmed Sep 2010 (available at publication.api.org)
32	API	MPMS	Chapter 5—Metering, Section 5—Fidelity and Security of Flow Measurement Pulsed-Data Transmission Systems, Second Edition, August 2005	30 CFR 250.1202	MPMS Chapter 5.5 serves as a guide for selection, operation, and maintenance of various types of pulsed-data, cabled transmission systems for fluid metering systems to provide the desired level of fidelity and security of transmitted flow pulse data. It does not endorse or advocate preferential use of any specific type of equipment or systems nor is it intended to restrict future development of such equipment. 2nd Edition July/August 2005, reaffirmed Sep 2010
33	API	MPMS	Chapter 6—Metering Assemblies, Section 1—Lease Automatic Custody Transfer (LACT) Systems, Second Edition, May 1991	30 CFR 250.1202	MPMS Chapter 6.1 provides a guide for the design, installation, calibration, and operation of a LACT system. It applies to unattended and automatic measurement by meter of hydrocarbon liquids produced in the field and transferred to a pipeline in either a scheduled or nonscheduled operation. 2nd Edition May 1991, reaffirmed May 2012
34	API	MPMS	Chapter 6—Metering Assemblies, Section 6—	30 CFR 250.1202	MPMS Chapter 6.6 provides guidelines for selection of the type and size of meters to be used to measure pipeline oil movements, as well as the relative advantages and disadvantages of the methods of proving meters by tank prover, conventional pip prover, small volume prover, and master meter. It

No.	SDO	Number	Title	30 CFR Citations	Abstract
			Pipeline Metering Systems, Second Edition, May 1991		also includes discussion on obtaining the best operating results from a pipeline-meter station. 2nd Edition May 1991, reaffirmed Jan 2012 (available at publication.api.org)
35	API	MPMS	Chapter 6—Metering Assemblies, Section 7—Metering Viscous Hydrocarbons, Second Edition, May 1991	30 CFR 250.1202	MPMS Chapter 6.7 is a guide for the design, installation, operation, and proving of meters and auxiliary equipment used in metering viscous hydrocarbons. It defines viscous hydrocarbons and describes the difficulties that arise when viscous hydrocarbons are raised to high temperature. The effects of such temperatures on meters, auxiliary equipment, and fittings are discussed, and advice and warnings to overcome or mitigate difficulties are included. 2nd Edition May 1991, reaffirmed May 2012 (available at publication.api.org)
36	API	MPMS	Chapter 7—Temperature Determination, Second Edition, Oct 2011	30 CFR 250.1202	MPMS Chapter 7 describes methods and practices that may be used to obtain accurate measurements of temperature of petroleum and petroleum products in pipelines, storage tanks, gathering tanks, ships, barges, tank cars, pip provers, tank provers, and test measures under both static and dynamic conditions using electronic temperature measuring devices or mercury-in-glass thermometers. It describes methods, equipment, and procedures for determining the temperature of petroleum and petroleum products under both static and dynamic conditions. It discusses temperature measurement requirements in general for custody transfer, inventory control, and marine measurements. 1st Edition Jun 2001, reaffirmed Feb 2012 (available at publication.api.org)
37	API	MPMS	Chapter 8—Sampling, Section 1—Standard Practice for Manual Sampling of Petroleum and Petroleum Products, Fourth Edition, Oct 2013	30 CFR 250.1202	MPMS Chapter 8.1 covers procedures for obtaining representative samples of shipments of uniform petroleum products, except electrical insulating oils and fluid power hydraulic fluids. It also covers sampling of crude petroleum and non-uniform petroleum products and shipments. It does not cover butane, propane, and gas liquids with a Reid vapor pressure above 26 pounds per square inch (psi). There is a section on extended-tube sampling. 3rd Edition Oct 1995, reaffirmed May 2011 (available at publication.api.org)
38	API	MPMS	Chapter 8—Sampling, Section	30 CFR 250.1202	MPMS Chapter 8.2 covers automatic procedures for obtaining representative samples of petroleum and non-uniform stocks or shipments, except electrical

No.	SDO	Number	Title	30 CFR Citations	Abstract
			2—Standard Practice for Automatic Sampling of Liquid Petroleum and Petroleum Products, Second Edition, October 1995		insulating oil. 2nd Edition Oct 1995, reaffirmed Mar 2010 (available at publication.api.org)
39	API	MPMS	Chapter 9—Density Determination, Section 1—Standard Test Method for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method, Third Edition, December 2012	30 CFR 250.1202	MPMS Chapter 9.1 describes the methods and practices relating to determination of density, relative density, or API gravity of crude petroleum and liquid petroleum products using the hydrometer method (laboratory determination) including glass stem and other correction factors. 3rd Edition Dec 2012 (available at publication.api.org)
40	API	MPMS	Chapter 9—Density Determination, Section 2—Standard Test Method for Density or	30 CFR 250.1202	MPMS Chapter 9.2 provides a guide for determining density or relative density (specific gravity) or API gravity of light hydrocarbons, including liquefied petroleum gases, using a pressure hydrometer. 3rd Edition Dec 2012 (available at publication.api.org)

No.	SDO	Number	Title	30 CFR Citations	Abstract
			Relative Density of Light Hydrocarbons by Pressure Hydrometer, Third Edition, Dec 2012		
41	API	MPMS	Chapter 10—Sediment and Water, Section 1—Standard Test Method for Sediment in Crude Oils and Fuel Oils by the Extraction Method, Third Edition, November 2007	30 CFR 250.1202	MPMS Chapter 10.1 covers the determination of sediment in crude oils and fuel oils by extraction with toluene. The precision applies to a range of sediment levels from 0.01% to 0.40% mass, although higher levels may be determined. 3rd Edition Nov 2007, reaffirmed Oct 2012 (available at publication.api.org)
42	API	MPMS	Chapter 10—Sediment and Water, Section 2—Standard Test Method for Water in Crude Oil by Distillation, Third Edition, August 2013	30 CFR 250.1202	MPMS Chapter 10.2 specifies a method for the determination of water in crude petroleum by distillation. 2nd Edition Nov 2007, reaffirmed Oct 2012 (available at publication.api.org)
43	API	MPMS	Chapter 10—Sediment and Water, Section 3—Standard Test Method for Water	30 CFR 250.1202	MPMS Chapter 10.3 describes a method of laboratory determination of water and sediment in crude oil by centrifuge procedure. 3rd Edition May 2008 (available at publication.api.org)

No.	SDO	Number	Title	30 CFR Citations	Abstract
			and Sediment in Crude Oil by the Centrifuge Method (Laboratory Procedure), Fourth Edition, August 2013		
44	API	MPMS	Chapter 10—Sediment and Water, Section 4—Determination of Water and/or Sediment in Crude Oil by the Centrifuge Method (Field Procedure), Fourth Edition, October 2013	30 CFR 250.1202	MPMS Chapter 10.4 describes a method for determining both water and sediment or sediment only in crude oils using the field centrifuge procedure. 3rd Edition Dec 1999, reaffirmed Sep 2010 (available at publication.api.org)
45	API	MPMS	Chapter 10—Sediment and Water, Section 9—Standard Test Method for Water in Crude Oils by Coulometric Karl Fischer Titration, Third Edition, May 2013	30 CFR 250.1202	MPMS Chapter 10.9 covers determination of water in the range from 0.02% to 5.0% in crude oils. The test method presents two procedures for the direct determination of water content in crude oils: weight and volume. 2nd Edition Dec 2002, reaffirmed Jun 2010 (available at publication.api.org)
46	API	MPMS	Chapter 11.1—Volume Correction	30 CFR 250.1202	***THE 2004 EDITION OF THIS STANDARD SUPERSEDES THE 1980 EDITION*** MPMS Chapter 11.1 contains physical data that has direct application to volumetric measurements of liquid hydrocarbons. It contains equations

No.	SDO	Number	Title	30 CFR Citations	Abstract
			Factors, Volume 1, First Edition, August 1980		relating volume to temperature and pressure, and computer subroutines. Included are volume correction factors, and temperature and pressure volume correction factors for generalized crude oils, refined products, and lubricating oils. Sep 2004, reaffirmed Aug 2012 (available without the utility program at publication.api.org)
47	API	MPMS	Chapter 11.2.2—Compressibility Factors for Hydrocarbons, Second Edition, October 1986	30 CFR 250.1202	MPMS Chapter 11.2.2 provides tables to correct hydrocarbon volumes metered under pressure for the metered temperature. It contains compressibility factors related to the meter temperature and relative density of the metered material. 2nd Edition Oct 1986, reaffirmed Dec 2012 (available at publication.api.org)
48	API	MPMS	Chapter 11—Physical Properties Data, Addendum to Section 2, Part 2—Compressibility Factors for Hydrocarbons, Correlation of Vapor Pressure for Commercial Natural Gas Liquids, First Edition, December 1994	30 CFR 250.1202	MPMS Chapter 11.2.2 ADDENDUM provides correlation of vapor pressure for commercial natural gas liquids. 1st Edition, Dec 1994 (available at www.ihs.com)
49	API	MPMS	Chapter 12—Calculation of Petroleum Quantities, Section 2—Calculation of	30 CFR 250.1202	MPMS Chapter 12.2.1 provides a general introduction to the five part standard. The base volumetric determination of metered quantities is discussed along with the general terms required for solution of the equations. General rules for rounding numbers, including field data, intermediate calculations numbers, and discrimination levels are specified. 2nd Edition May 1995, reaffirmed Feb 2009, includes Addendum Aug 2007 and Errata Jul

No.	SDO	Number	Title	30 CFR Citations	Abstract
			Petroleum Quantities Using Dynamic Measurement Methods and Volumetric Correction Factors, Part 1—Introduction, Second Edition, May 1995		2009 (available at publication.api.org)
50	API	MPMS	Chapter 12—Calculation of Petroleum Quantities, Section 2—Calculation of Petroleum Quantities Using Dynamic Measurement Methods and Volumetric Correction Factors, Part 2—Measurement Tickets, Third Edition, June 2003	30 CFR 250.1202	MPMS Chapter 12.2.2 provides standardized calculation methods for quantification of liquids and determination of base prover volumes under defined conditions, regardless of the point of origin or destination or the units of measure required by governmental customs or statute. It rigorously specifies the equations for computing correction factors, rules for rounding, calculation sequence, and discrimination levels to be employed in the calculations. 3rd Edition Jun 2003, reaffirmed Sep 2010, includes Addendum Aug 2007 (available at publication.api.org)
51	API	MPMS	Chapter 14—Natural Gas Fluids Measurement, Section 3—Concentric,	30 CFR 250.1203	MPMS Chapter 14.3.1 provides a single reference for engineering equations, uncertainty estimations, construction and installation requirements, and standardized implementation recommendations for the calculation of flow rate through concentric, square-edged, flange-tapped orifice meters. Both U.S. customary units and international system are included. The mass flow

No.	SDO	Number	Title	30 CFR Citations	Abstract
			Square-Edged Orifice Meters, Part 1—General Equations and Uncertainty Guidelines, Fourth Edition, July 2013		rate and base (or standard) volumetric flow rate equation are discussed, along with the terms required for solution of the flow equation. The empirical equations for the coefficient of discharge and expansion factor are presented. 4th Edition Sep 2012
52	API	MPMS	Chapter 14—Natural Gas Fluids Measurement, Section 3—Concentric, Square-Edged Orifice Meters, Part 2—Specification and Installation Requirements, Fourth Edition, April 2000	30 CFR 250.1203	MPMS Chapter 14.3.2 outlines specification and installation requirements for measurement of single-phase, homogenous Newtonian fluids using concentric, square-edged, flange-tapped orifice meters. It provides specifications for construction and installation of orifice plates, meter tubes, and associated fittings when designing metering facilities using orifice meters. 4th Edition Apr 2000, reaffirmed May 2011 (available at publication.api.org)
53	API	MPMS	Chapter 14—Natural Gas Fluids Measurement, Section 3—Concentric, Square-Edged Orifice Meters; Part 3—Natural Gas Applications, Third Edition, August 1992	30 CFR 250.1203	MPMS Chapter 14.3.3 is a guide for the calculation of natural gas flow through a flange-tapped, concentric orifice meter, using the inch-pound system of units. It provides practical guidelines for applying Ch. 14.3.1 and Ch. 14.3.2 to the measurement of natural gas. 3rd Edition Aug 1992, reaffirmed Feb 2009 (available at publication.api.org)
54	API	MPMS	Chapter 14.5/GPA	30 CFR 250.1203	MPMS Chapter 14.5/ Gas Processors Association (GPA) 8172-9 presents

No.	SDO	Number	Title	30 CFR Citations	Abstract
			Standard 2172-09; Calculation of Gross Heating Value, Relative Density, Compressibility and Theoretical Hydrocarbon Liquid Content for Natural Gas Mixtures for Custody Transfer, Third Edition, January 2009		procedures for calculating, at base conditions from composition, the following properties of natural gas mixtures: gross heating value, relative density (real and ideal), compressibility factor, and theoretical hydrocarbon liquid content, which in the U.S. is typically expressed as GPM, the abbreviation for gallons of liquid per thousand cubic feet of gas. Annex A contains a detailed investigation of the effect of water and detailed derivations of the equations presented. 3rd Edition Jan 2009 (available at publication.api.org)
55	API	MPMS	Chapter 14—Natural Gas Fluids Measurement, Section 6—Continuous Density Measurement, Second Edition, April 1991	30 CFR 250.1203	MPMS Chapter 14.6 provides criteria and procedures for designing, installing, and operating continuous density measurement systems for Newtonian fluids in the petroleum, chemical, and natural gas industries. Application is limited to clean, homogeneous, single-phase liquids or supercritical fluids. The intent is to provide a density accuracy of 0.10% for most applications. 2nd Edition Apr 1991, reaffirmed Feb 2012, includes Errata Aug 1998 (available at publication.api.org)
56	API	MPMS	Chapter 14—Natural Gas Fluids Measurement, Section 8—Liquefied Petroleum Gas Measurement, Second Edition, July 1997	30 CFR 250.1203	MPMS Chapter 14.8 describes dynamic and static metering systems used to measure liquefied petroleum gas in the density range of 0.30 to 0.70 g/cm3. 2nd Edition Jul 1997, reaffirmed Oct 2011 (available at publication.api.org)
57	API	MPMS	Chapter 20—	30 CFR 250.1202	MPMS Chapter 20.1 provides design and operating guidelines for liquid and

No.	SDO	Number	Title	30 CFR Citations	Abstract
			Section 1—Allocation Measurement, First Edition, September 1993		gas allocation measurement systems. It includes recommendations for metering, static measurement, sampling, proving, calibrating, and calculating procedures. 1st Edition Aug 1993, reaffirmed Sep 2011 (available at publication.api.org)
58	API	MPMS	Chapter 21—Flow Measurement Using Electronic Metering Systems, Section 1—Electronic Gas Measurement, Second Edition, Feb 2013	30 CFR 250.1203	MPMS Chapter 21.1. Describes the minimum specifications for electronic gas measurement systems used in the measurement and recording of flow parameters of gaseous phase hydrocarbons. Topics included are: definitions, calculation algorithms, data availability, audit and reporting requirements, equipment installation, calibration, and verification and security. 1st Edition Aug 1993, reaffirmed Dec 2011 (available at publication.api.org)
59	API	RP 2A-WSD	Recommended Practice (RP) for Planning, Designing and Constructing Fixed Offshore Platforms—Working Stress Design, Twenty-first Edition, December 2000	30 CFR 250.901; 30 CFR 250.908; 30 CFR 250.919; 30 CFR 250.920	RP 2A-WSD contains requirements for design and construction of new platforms and relocation of existing platforms used for drilling, development, and storage of hydrocarbons in offshore areas. It provides guidelines for assessment of existing platforms in the event that it becomes necessary to make a determination of the "fitness-for-purpose" of the structure. 21st Edition Dec 2000, reaffirmed Oct 2010 (available at publication.api.org)
60	API	RP 2D	Operation and Maintenance of Offshore Cranes, Sixth Edition, May 2007	30 CFR 250.108	RP 2D is intended to serve as a guide to crane owners and operators in developing operating and maintenance practices and procedures for safe operation of pedestal-mounted revolving cranes on fixed or floating offshore platforms, jack-up drilling rigs, semi-submersible drilling rigs, and other types of mobile offshore drilling units (MODUs). Guidelines are also given for the pre-use inspection and testing of temporary cranes (also called self-erecting, leapfrog, or bootstrap cranes) that are erected offshore. 6th Edition May 2007 (available at publication.api.org)

No.	SDO	Number	Title	30 CFR Citations	Abstract
61	API	RP 2FPS	RP for Planning, Designing, and Constructing Floating Production Systems, Second Edition, August 2011	30 CFR 250.901	RP 2FPS provides requirements for the structural design of floating offshore platforms used to support production; storage/offloading; drilling & production; production, storage & offloading; or drilling, production, storage & offloading. It is applicable to all life-cycle stages and covers monohulls, semi-submersibles, and spars. It can also be used in the design of other types of floating structure, although not all aspects may apply. The standard is applicable to floating steel structures, but the general principles can be used for structures fabricated of materials other than steel. 2nd Edition, Aug 2011
62	API	RP 2I	In-Service Inspection of Mooring Hardware for Floating Structures, Third Edition, April 2008	30 CFR 250.901	RP 2I provides guidelines for inspecting mooring components of MODUs and permanent floating installations. It includes: inspection guidelines for steel permanent moorings on permanent floating installations; inspection guidelines for fiber ropes used for permanent and MODU moorings; and special guidance for MODU mooring inspection in the areas of tropical cyclone. Some of the guidelines may be applicable to moorings of other floating vessels such as pipe-laying barges and construction vessels. Some of the guidelines may be applicable to secondary or emergency moorings such as mooring for jack-up units, shuttle tanker moorings, and dynamic positioning vessel harbor mooring. 3rd Edition Apr 2008
63	API	STD 2RD	Standard Practice for Design of Risers for Floating Production Systems (FPSs) and Tension-Leg Platforms (TLPs), Second Edition, Sept 2013	30 CFR 250.800; 30 CFR 250.901; 30 CFR 250.1002	RP 2RD addresses structural analysis procedures, design guidelines, component selection criteria, and typical designs for all new riser systems used on FPSs. Guidance is given for developing load information for the equipment attached to the ends of the risers. The RP for structural design of risers, as reflected in this document, is generally based on the principles of limiting stress in the risers and related components under normal, extreme, and accidental conditions. It assumes the risers will be made of steel or titanium pipe or unbonded flexible pipe. However, other materials, such as aluminum, are not excluded if risers can be shown to be fit for purpose. 1st Edition Jun 1998, reaffirmed May 2006, includes Errata Jun 2009 (available at publication.api.org)
64	API	RP 2SK	Design and Analysis of Stationkeeping Systems for	30 CFR 250.800; 30 CFR 250.901	RP 2SK presents a national method for analyzing, designing or evaluating mooring systems used with floating units. It provides a uniform analysis tool which, combined with understanding of the environment at a particular location, the characteristics of the unit being moored, and other factors, can

No.	SDO	Number	Title	30 CFR Citations	Abstract
			Floating Structures, Third Edition, October 2005		be used to determine adequacy and safety of the mooring system. Some design guidelines for dynamic positioning systems are also included. 3rd Edition Oct 2005, includes Addendum May 2008 (available at publication.api.org)
65	API	RP 2SM	RP for Design, Manufacture, Installation, and Maintenance of Synthetic Fiber Ropes for Offshore Mooring, First Edition, March 2001	30 CFR 250.901	RP 2SM provides guidelines on the use of synthetic fiber ropes for offshore mooring applications. The secondary purpose is to highlight differences between synthetic rope and traditional steel mooring systems, and to provide practical guidance on how to handle these differences during system design and installation. 1st Edition Mar 2001, includes Addendum May 2007 (available at publication.api.org) Second edition is now available as of July 2014
66	API	RP 2T	RP for Planning, Designing, and Constructing TLPs, Third Edition, July 2010	30 CFR 250.901	RP 2T provides a guide to the designer in organizing an efficient approach to design of a TLP. Emphasis is on participation of all engineering disciplines during each stage of planning, development, design, construction, installation, and inspection. It contains guidelines developed from the latest practices in designing TLPs and adapted from successful techniques employed for related structural systems in offshore marine industries. 3rd Edition Jul 2010 (available at publication.api.org)
67	API	RP 14B	RP for Design, Installation, Repair and Operation of Subsurface Safety Valve (SSSV) Systems, Fifth Edition, October 2005	30 CFR 250.801; 30 CFR 250.804	RP 14B (identical national adoption of ISO 10417:2004) establishes requirements and provides guidelines for configuration, installation, test, operation and documentation of SSSV systems. It establishes requirements and provides guidelines for selection, handling, redress, and documentation of SSSV downhole production equipment. 5th Edition Oct 2005, reaffirmed Jul 2012 (available at publication.api.org)
68	API	RP 14C	RP for Analysis, Design, Installation, and	30 CFR 250.125; 30 CFR 250.292; 30 CFR 250.802; 30 CFR	RP 14C presents a standardized method to design, install, and test surface safety systems on offshore production platforms. It uses recognized systems analysis methods to develop requirements for a safety system and includes

No.	SDO	Number	Title	30 CFR Citations	Abstract
			Testing of Basic Surface Safety Systems for Offshore Production Platforms, Seventh Edition, March 2001	250.803; 30 CFR 250.804; 30 CFR 250.1002; 30 CFR 250.1004; 30 CFR 250.1628; 30 CFR 250.1630	procedures to document the safety system and verify conformance. 7th Edition Mar 2001, reaffirmed Mar 2007 (available at publication.api.org)
69	API	RP 14E	RP for Design and Installation of Offshore Production Platform Piping Systems, Fifth Edition, October 1991	30 CFR 250.802; 30 CFR 250.1628	RP 14E recommends minimum requirements and guidelines for design and installation of new piping systems on offshore production platforms. It includes general recommendations on design and application of pipe, valve, and fittings for typical processes; general information on installation, quality control, and items related to piping systems such as insulation; and specific recommendations for design of particular piping systems. 5th Edition Oct 1991, reaffirmed Mar 2007 (available at publication.api.org)
70	API	RP 14F	Design, Installation, and Maintenance of Electrical Systems for Fixed and Floating Offshore Petroleum Facilities for Unclassified and Class 1, Division 1 and Division 2 Locations, Fifth Edition, July 2008	30 CFR 250.114; 30 CFR 250.803; 30 CFR 250.1629	RP 14F recommends minimum requirements and guidelines for design, installation, and maintenance of electrical systems on fixed and floating petroleum facilities located offshore. Facilities include drilling, producing, and pipeline transportation facilities associated with oil and gas exploration and production. It is not applicable to MODUs without production facilities. It is intended to bring together in one place a brief description of basic desirable electrical practices for offshore electrical systems. 5th Edition Jul 2008 (available at publication.api.org)
71	API	RP 14FZ	RP for Design and Installation of Electrical Systems for Fixed and	30 CFR 250.114; 30 CFR 250.803; 30 CFR 250.1629	RP 14FZ recommends minimum requirements and guidelines for design and installation of electrical systems on fixed and floating petroleum facilities located offshore when hazardous locations are classified as Zone 0, Zone 1, or Zone 2. Facilities include drilling, producing, and pipeline transportation

No.	SDO	Number	Title	30 CFR Citations	Abstract
			Floating Offshore Petroleum Facilities for Unclassified and Class 1, Zone 0, Zone 1 and Zone 2 Locations, Second Edition, May 2013		facilities associated with oil and gas exploration and production. It describes basic desirable electrical practices for offshore electrical systems. Special considerations include inherent electrical shock possibility presented by the marine environment and steel decks; space limitations that require equipment be installed in or near classified locations; the corrosive marine environment; and motion and buoyancy concerns associated with floating facilities. It applies to both permanent and temporary electrical installations, and guidelines provide a high level of electrical safety when used in conjunction with well-defined area classifications. It emphasizes safe practices for classified locations on offshore petroleum facilities but does not include guidelines for classification of areas. 1st Edition Sep 2001, reaffirmed Mar 2007 (available at publication.api.org)
72	API	RP 14G	RP for Fire Prevention and Control on Fixed Open-type Offshore Production Platforms, Fourth Edition, April 2007	30 CFR 250.803; 30 CFR 250.1629	RP 14G presents recommendations for minimizing the likelihood of accidental fire, and for designing, inspecting, and maintaining fire control systems. It emphasizes the need to train personnel in firefighting, to conduct routine drills, and to establish methods and procedures for safe evacuation. The fire control systems discussed are intended to provide an early response to incipient fires and prevent their growth. It is applicable to fixed open-type offshore production platforms that are generally installed in moderate climates and that have sufficient natural ventilation to minimize accumulation of vapors. Enclosed areas, such as quarters, buildings, and equipment enclosures, normally installed on this type of platform, are addressed. 4th Edition Mar 2007 (available at publication.api.org)
73	API	RP 14H	RP for Installation, Maintenance and Repair of Surface Safety Valves (SSVs) and Underwater Safety Valves (USVs) Offshore, Fifth Edition,	30 CFR 250.802; 30 CFR 250.804	RP 14H provides guidance for inspecting, installing, operating, maintaining, and onsite repairing SSVs/USVs manufactured according to Spec 6A (17th Edition or later), section 10.20 or Spec 14D (withdrawn). It includes procedures for testing SSVs/USVs. It covers guidelines for inspecting, installing, maintaining, onsite repairing, and operating SSVs/USVs. Nothing is a fixed rule without regard to sound engineering judgment nor intended to override applicable federal, state, or local laws. 5th Edition Aug 2007 (available at publication.api.org)

No.	SDO	Number	Title	30 CFR Citations	Abstract
			August 2007		
74	API	RP 14J	RP for Design and Hazards Analysis for Offshore Production Facilities, Second Edition, May 2001	30 CFR 250.800; 30 CFR 250.901	RP 14J provides useful procedures and guidelines for planning, designing, and arranging offshore production facilities; and performing a hazards analysis on open-type offshore production facilities. It discusses several procedures that can be used to perform a hazards analysis, and presents minimum requirements for process safety information and hazards analysis that can be used for satisfying RP 75. 2nd Edition Apr 2001, reaffirmed Mar 2007 (available at publication.api.org)
75	API	STD 53	RPs for Blowout Prevention Equipment Systems for Drilling Wells, Fourth Edition, Nov 2012	30 CFR 250.442; 30 CFR 250.446; 30 CFR 250.517; 30 CFR 250.618; 30 CFR 250.1708	STD 53 provides requirements on the installation and testing of blowout prevention equipment systems on land and marine drilling rigs. This edition is published as a standard to bring additional consistency to the industry on how blowout preventer (BOP) systems are inspected, maintained, tested, and operated. Consideration was given to recommendations made by the Joint Industry Equipment Task Force and other organizations following the Macondo incident. International oil and gas operators, manufactures, and contractors participated in this revision and incorporated those recommendations that were pertinent to the standard. The focus is on items specific to BOP equipment systems for drilling operations and contains provision for surface BOP systems, subsea BOP systems, and those that apply to both. 4th Edition Nov 2012 (available at publication.api.org)
76	API	RP 65	RP for Cementing Shallow Water Flow Zones in Deepwater Wells, First Edition, September 2002	30 CFR 250.415	RP 65 contains a compilation of technology and practices used by many operators drilling wells in deep water. It highlights key parameters for increasing the chance of successfully drilling and cementing casings where there is a risk of shallow water flow and discusses options available. 1st Edition Sep 2002, reaffirmed Jan 2012, includes Errata Aug 2003 (available at publication.api.org)
77	API	RP 500	RP for Classification of Locations for Electrical Installations at Petroleum Facilities	30 CFR 250.114; 30 CFR 250.459; 30 CFR 250.802; 30 CFR 250.803; 30 CFR 250.1628; 30 CFR 250.1629	RP 500 provides guidelines for determining the degree and extent of Class 1, Division 1 and Class 1, Division 2 location sat petroleum facilities, for the selection and installation of electrical equipment. It is intended to be applied where there may be a risk of ignition due to presence of flammable gas or vapor, mixed with air under normal atmospheric conditions. 3rd Edition Dec 2012 (available at publication.api.org)

No.	SDO	Number	Title	30 CFR Citations	Abstract
			Classified as Class I, Division 1 and Division 2, Third Edition, Dec 2012		
78	API	RP 505	RP for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1, and Zone 2, First Edition, November 1997	30 CFR 250.114; 30 CFR 250.459; 30 CFR 250.802; 30 CFR 250.803; 30 CFR 250.1628; 30 CFR 250.1629	RP 505 provides guidelines for determining the degree and extent of Class 1, Zone 0, Zone 1, and Zone 2 locations at petroleum facilities, for the selection and installation of electrical equipment. It is intended to be applied where there may be a risk of ignition due to the presence of flammable gas or vapor, mixed with air under normal atmospheric conditions. 1st Edition Nov 1997, reaffirmed Nov 2002 (available at publication.api.org)
79	API	RP 2556	RP for Correcting Gauge Tables for Incrustation, Second Edition, August 1993	30 CFR 250.1202	RP 2556 defines incrustation as any material that adheres to the internal vertical sidewall surfaces of a tank when the tank is otherwise empty. Tables show the percent error of measurement caused by varying thicknesses of uniform incrustation in tanks of various sizes. 2nd Edition Aug 1993, reaffirmed Sep 2008 (available at publication.api.org)
80	ANSI/ API	Spec Q1	Specification for Quality Programs for the Petroleum, Petrochemical and Natural Gas Industry, Ninth Edition, June 2013	30 CFR 250.806	Spec Q1 (identical national adoption of ISO 29001:2007) defines the quality management system requirements for design, development, production, installation, and service of products for the petroleum, petrochemical, and natural gas industry. It sets forth minimum quality management system requirements, which applied in conjunction with API industry standards, are necessary to obtain a license to use the API Monogram. 8th Edition Dec 2007, includes Addendum Jun 2010 (available at publication.api.org)
81	API	Spec 2C	Specification for Offshore Pedestal Mounted Cranes, Seventh Edition,	30 CFR 250.108	Spec 2C provides requirements for design, construction, and testing of new offshore pedestal-mounted cranes. Offshore cranes are defined as pedestal-mounted elevating and rotating lift devices for transfer of materials or personnel to or from marine vessels, barges, and structures. While there are

No.	SDO	Number	Title	30 CFR Citations	Abstract
			March 2012		many configurations of pedestal-mounted cranes covered, it is not intended to be used for design, fabrication, and testing of davits or emergency escape devices. It also does not cover use of cranes for subsea lifting and lowering operation or constant-tension systems. 7th Edition Mar 2012 (available at publication.api.org)
82	ANSI/ API	Spec 6A	Specification for Wellhead and Christmas Tree Equipment, Twentieth Edition, Nov 2011	30 CFR 250.806; 30 CFR 250.1002	Spec 6A (modified national adoption of ISO 10423:2009) specifies requirements and gives recommendations for performance, dimensional and functional interchangeability, design, materials, testing, inspection, welding, marking, handling, storing, shipment, purchasing, repair, and remanufacture of wellhead and christmas tree equipment for use in the petroleum and natural gas industries. It defines service conditions, in terms of pressure, temperature, and materials class for the well-bore constituents, and operating conditions. It establishes requirements for five product specification levels (PSL), which define different levels of technical quality requirements. 20th Edition Oct 2010, includes Errata Jan 2011, latest Addendum Nov 2012 (available at publication.api.org)
83	API	Spec 6AV1	Specification for Verification Test of Wellhead SSVs and USVs for Offshore Service, Second Edition, February 1, 2013	30 CFR 250.806	Spec 6AV1 Establishes requirements to: verify basic performance requirements (PR1) standard service SSV and USV design; verify basic PR2 sandy service (SSV/USV) valve design; and demonstrate verification testing that is required to qualify specific valve bore sealing mechanism manufactured under Spec 6A for PR2 sandy service safety valves. It includes minimum acceptable standards for verification testing of SSVs/USVs for two performance requirement levels. To qualify, a SSV/USV valve must pass the verification test. 1st Edition Feb 1996, reaffirmed Apr 2008, includes Errata Dec 1996 (available at publication.api.org)
84	ANSI/ API	Spec 6D	Specification for Pipeline Valves, Twenty-third Edition, April 2008	30 CFR 250.1002	Spec 6D (identical national adoption of ISO 14313:2007) specifies requirements and provides recommendations for design, manufacturing, testing, and documentation of ball, check, gate, and plug valves for application in pipeline systems meeting ISO 13623 or similar requirements for the petroleum and natural gas industries. It is not applicable to valves for pressure ratings exceeding Nominal Pressure (PN) 420 (Class 2500). 23rd Edition Mar 2008, includes Errata Aug 2001, latest Addendum Oct 2012 (available at publication.api.org)

No.	SDO	Number	Title	30 CFR Citations	Abstract
85	ANSI/ API	Spec 14A	Specification for SSSV Equipment, Eleventh Edition, October 2005	30 CFR 250.806	Spec 14A (identical national adoption of ISO 10432:2004) provides minimum acceptable requirements for SSSVs. It covers SSSVs including all components that establish tolerances and/or clearance that may affect performance or interchangeability of the SSSVs. It includes the interface connections to the flow control or other equipment but does not cover the connections to the well conduit. 11th Edition Oct 2005, reaffirmed Jul 2012 (available at publication.api.org)
86	ANSI/ API	Spec 17J	Specification for Unbounded Flexible Pipe, Third Edition, July 2008	30 CFR 250.803; 30 CFR 250.1002; 30 CFR 250.1007	Spec 17J (identical national adoption of ISO 13628-2:2006) defines technical requirements for safe, dimensionally and functionally interchangeable flexible pipes that are designed and manufactured to uniform standards and criteria. It specifies minimum requirements for design, material selection, manufacture, testing, marking, and packaging of flexible pipes, with reference to existing codes and standards where applicable. It applies to unbounded flexible pipe assemblies, consisting of segments of flexible pipe body with end fittings attached to both ends. Applications addressed are sweet and sour service production, including export and injection applications. Production products include oil, gas, water, and injection chemicals. It applies to both static and dynamic flexible pipes used as flow lines, risers, and jumpers. 3rd Edition Jul 2008, latest Errata Aug 2010 (available at publication.api.org)
87	API	STD 2552	Use Standard Method for Measurement and Calibration of Spheres and Spheroids, First Edition, 1996	30 CFR 250.1202	STD 2552 describes procedures for calibrating spheres and spheroids, which are used as liquid containers. It outlines procedures for measurement and calibration of spherical tanks. 1st Edition Oct 1996, reaffirmed Sep 2012 (available at publication.api.org)
88	API	STD 2555	Method for Liquid Calibration of Tanks, First Edition, September 1996	30 CFR 250.1202	STD 2555 describes the procedure for calibrating tanks, or portions of tanks, larger than a barrel or drum by introducing or withdrawing measured quantities of liquid. 1st Edition Sep 1996, reaffirmed Mar 2009 (available at publication.api.org)
89	API	RP 90	Annular Casing Pressure	30 CFR 250.518	RP 90 is intended to serve as a guide for managing annular casing pressure in offshore wells. It is meant to be used for offshore wells that exhibit annular

No.	SDO	Number	Title	30 CFR Citations	Abstract
			Management for Offshore Wells, First Edition, August 2006		casing pressure, including thermal casing pressure, sustained casing pressure and operator-imposed pressure. It covers monitoring, diagnostic testing, establishment of a maximum allowable wellhead operating pressure (MAWOP), and documentation of annular casing pressure for the various types of wells that occur offshore. Include also is a discussion of risk assessment methodologies that can be used for evaluation of individual well situations where the annular casing pressure is not within the MAWOP guidelines. It provides guidelines in which a broad range of casing annuli that exhibit annular pressure can be managed in a routine fashion while maintaining an acceptable level of risk. 1st Edition Aug 2006, reaffirmed Jan 2012 (available at publication.api.org)
90	API	STD 65-Part 2	Isolating Potential Flow Zones During Construction, Second Edition, December 2010	30 CFR 250.415	STD 65-2 contains best practices for zone isolation in wells to prevent annular pressure and/or flow through or past pressure-containment barriers that are installed and verified during well construction. Well construction practices that may affect barrier sealing performance are mentioned along with methods to help ensure positive effects or to minimize any negative ones. The first objective is to help prevent and/or control flows just prior to, during, and after primary cementing operations to install or "set" casing and liner pipe strings in wells. The second objective is to help prevent sustained casing pressure. Guidance covers recommendations for pressure-containment barrier design and installation and well construction practices that affect the zone isolation process to prevent or mitigate annular fluid flow or pressure. 2nd Edition Dec 2010 (available at publication.api.org)
91	API	RP 75	RP for Development of a Safety and Environmental Management Program for Offshore Operations and Facilities, Third Edition, May 2004	30 CFR 250.1900; 30 CFR 250.1902; 30 CFR 250.1903; 30 CFR 250.1909; 30 CFR 250.1920	RP 75 provides guidance for preparing safety and environmental management programs for oil, gas, and supper operations and facilities located on the OCS. It is applicable to well drilling, servicing, and production and pipeline facilities and operations that have the potential for creating a safety or environmental hazard at OCS platform sites. Eleven major program elements are included for application to these facilities and operations. Identification and management of safety and environmental hazards are addressed in design, construction, start-up, operation, inspection, and maintenance of new, existing, and modified facilities. 3rd Edition May 2004, reaffirmed May 2008 (available at publication.api.org)

No.	SDO	Number	Title	30 CFR Citations	Abstract
92	API	MPMS	Chapter 4—Proving Systems, Section 8—Operation of Proving Systems; Second Edition, Sept 2013	30 CFR 250.1202	MPMS Chapter 4.8 covers the operation of various meter-proving systems used in the petroleum industry. Liquid petroleum meters used for custody transfer measurement require periodic proving to verify accuracy and repeatability and to establish valid meter factors. 1st Edition Nov 1995, reaffirmed Mar 2007
93	API	MPMS	Chapter 5—Metering, Section 6—Measurement of Liquid Hydrocarbons by Coriolis Meters; First Edition, reaffirmed March 2008	30 CFR 250.1202	MPMS Chapter 5.6 describes methods for achieving custody transfer levels of accuracy when a Coriolis meter is used to measure liquid hydrocarbons. Topic include: applicable API standards used in the operation of Coriolis meters; proving and verification using both mass- and volume-based methods; and installation, operation, and maintenance. Both mass and volume-based calculation procedures for proving and quantity determination are included. 1st Edition Oct 2002, reaffirmed Mar 2008
94	API	MPMS	Chapter 5—Metering, Section 8—Measurement of Liquid Hydrocarbons by Ultrasonic Flow Meters (UFMs) Using Transit Time Technology; First Edition, November 2011	30 CFR 250.1202	MPMS Chapter 5.8 defines the application criteria for UFMs and addresses appropriate considerations regarding the liquids to be measured. It addresses installation, operation, and maintenance of UFMs in liquid hydrocarbon service. The field of application is the dynamic measurement of liquid hydrocarbons. Other acceptable applications may include allocation measurement, check meter measurement, and leak detection measurement. It only pertains to spool type, multi-path UFMs with permanently affixed acoustic transducer assemblies. 2nd Edition Nov 2011
95	API	MPMS	Chapter 11—Physical Properties Data, Section 1—Temperature and Pressure Volume	30 CFR 250.1202	MPMS Chapter 11.1 provides the algorithm and implementation procedure for the correction of temperature and pressure effects on density and volume of liquid hydrocarbons that fall within the categories of crude oil, refined products, or lubricating oils; natural gas liquids and liquefied petroleum gas are excluded from consideration. A utility program on compact disc (CD) allows users to calculate corrections for temperature and pressure effects.

No.	SDO	Number	Title	30 CFR Citations	Abstract
			Correction Factors for Generalized Crude Oils, Refined Products, and Lubricating Oils; May 2004, (incorporating Addendum 1, September 2007)		Sep 2004, reaffirmed Aug 2012, includes Addendum Sep 2007 (available without the utility program at publications.api.org)
96	API	MPMS	Chapter 12—Calculation of Petroleum Quantities, Section 2—Calculation of Petroleum Quantities Using Dynamic Measurement Methods and Volumetric Correction Factors, Part 3—Proving Reports; First Edition, reaffirmed 2009	30 CFR 250.1202	MPMS Chapter 12.2.3 consolidates and standardizes calculations for meeting petroleum liquids using turbine or displacement meters and clarifies terms and expressions by eliminating local variations among terms. It provides calculation methods for determination of meter factors under defined conditions, regardless of the point of origin or destination or units of measure required by governmental customs or statute. It specifies equations for computing correction factors, including the calculation sequence, discrimination levels, and rules for rounding. 1st Edition Oct 1998, reaffirmed Mar 2009, includes Addendum Aug 2007
97	API	MPMS	Chapter 12—Calculation of Petroleum Quantities, Section 2—Calculation of	30 CFR 250.1202	MPMS Chapter 12.2.4 provides a standardized calculation method to determine a base prover volume under defined conditions. Specifically, it discusses the calculation procedures for the waterdraw calibration method, which is one of several difference procedures used to determine base prover volume of a displacement prover. 1st Edition Dec 1997, reaffirmed Mar 2009, includes Errata Jul 2009, Addendum Aug 2007

No.	SDO	Number	Title	30 CFR Citations	Abstract
			Petroleum Quantities Using Dynamic Measurement Methods and Volumetric Correction Factors, Part 4—Calculation of Base Prover Volumes by the Waterdraw Method, First Edition, reaffirmed 2009		
98	API	MPMS	Chapter 21—Flow Measurement Using Electronic Metering Systems, Section 2—Electronic Liquid Volume Measurement Using Positive Displacement and Turbine Meters; First Edition, June 1998	30 CFR 250.1202	MPMS Chapter 21.2 provides guidance for effective use of electronic liquid measurement systems for custody transfer measurement of liquid hydrocarbons. Use of the measurement systems must fall within the scope and field of application of Ch. 12.2. Guidance applies to systems using turbine or positive displacement meters. Guidance applies to systems using on-line correction for the effect of temperature on liquid (CTL) and correction for the effect of pressure on liquid (CPL) compensation. The procedures and techniques are recommended for new measurement applications. It provides custody transfer measurement procedures for pipeline and other electronic liquid metering systems including design, selection, use, auditing, reporting, calibration, verification, and security. 1st Edition Jun 1998, reaffirmed Aug 2011
99	API	MPMS	Flow Measurement Using Electronic Metering Systems,	30 CFR 250.1202	MPMS Chapter 21.2A1 details flow measurement using electronic metering systems, for inferred mass. 1st Edition Aug 2000, reaffirmed Aug 2011

No.	SDO	Number	Title	30 CFR Citations	Abstract
			Addendum to Section 2—Flow Measurement Using Electronic Metering Systems, Inferred Mass; First Edition, reaffirmed February 2006		
100	API	RP 86	API RP for Measurement of Multiphase Flow; First Edition, September 2005; API MPMS Chapter 20.3 published Jan 2013	30 CFR 250.1202; 30 CFR 250.1203	(RP 86 is superseded by API MPMS Ch. 20.3) MPMS Chapter 20.3 addresses multiphase flow measurement in the production environment, upstream of the custody transfer (single-phase) measurement point, where allocation measurement for onshore, offshore or subsea is applied. For other multiphase flow measurement applications, it can be used as a reference guide. It addresses principles used in multiphase flow measurement, multiphase metering types and classifications, assessment of expected performance, and selecting and operating multiphase measurement systems. Operational requirements or constraints are addressed, 1st Edition Jan 2013
101	ASTM	C 33-07	Standard Specification for Concrete Aggregates	30 CFR 250.901	C33/C33M-13 (2013 edition) defines requirements for grading and quality of fine and coarse aggregate (other than lightweight or heavyweight) for use in concrete. It is for use by a contractor, concrete supplier, or other purchaser as part of the purchase document describing the material to be furnished. It is for use in project specifications to define the quality of aggregate, the nominal maximum size of the aggregate, and other specific grading requirements. (available at webstore.ansi.com)
102	ASTM	C 94/C 94M-07	Standard Specification for Ready-Mixed Concrete	30 CFR 250.901	C94/C94M-13A (2013 edition) covers ready-mixed concrete as defined in 3.2.2. It does not cover placement, consolidation, curing, or protection of the concrete after delivery to the purchaser. The standard is more concerned with the contractual aspects of delivery rather than concrete strength (covered elsewhere). (available at webstore.ansi.com)
103	ASTM	C 150-05	Standard Specification for	30 CFR 250.901	C150/C150M-12 (2012 edition) Standards for simple Portland Cement with a limited number of additives. Covers composition, chemistry, testing,

No.	SDO	Number	Title	30 CFR Citations	Abstract
			Portland cement		packaging and storage.
104	ASTM	C 330-05	Standard Specification for lightweight aggregates for structural concrete	30 CFR 250.901	C330/C330M-13 (2013 edition) Standard Specification for Lightweight Aggregates for Structural Concrete and covers similar material to that covered in ASTM C 33-13, except for lightweight aggregate
105	ASTM	C 595-08	Standard Specification for Blended Hydraulic Cements	30 CFR 250.901	C595/C595M-13(2013 edition) pertains to blended hydraulic cements for both general and special applications, using slag, pozzolan, limestone, or some combination of these, with Portland cement or Portland cement clinker or slag with lime. It prescribes ingredients and proportions, with some performance requirements. (available at webstore.ansi.com)
106	AWS	AWS D1.1:2000	Structural Welding Code—Steel, Seventeenth Edition, October 18, 1999	30 CFR 250.901	D1.1/D1.1M-2010 provides the welding requirements for any type of welded structures made from steel structural alloys. 17th Edition, October 1999 (available at webstore.ansi.com)
107	AWS	D1.4-98	Structural Welding Code—Reinforcing Steel, 1998 Edition	30 CFR 250.901	D1.4/D1.4M:2011 covers welding of reinforcing steel in most reinforced concrete applications. It covers allowable stresses, structural details, workmanship requirements, technique, procedure and performance qualification, and inspection. Figures clearly illustrate important welding considerations: unacceptable weld profiles, effective weld sizes, details of joints of anchorage, base plates, and inserts. It addresses precast concrete components, and provides clarification on prequalified details and essential variables for fillet welds. A table illustrates acceptance criteria for macro tech tests. (available at webstore.ansi.com)
108	AWS	D3.6M:2010	Specification for Underwater Welding	30 CFR 250.901	D3.6M:2010 Underwater Welding Code covers underwater welding in both dry and wet environments. It applies equally to new construction and to modification and repair of existing structures underwater. (available at webstore.ansi.com)
109	NACE	MR0175-2009	Standard Material Requirements,	30 CFR 250.901; 30 CFR 250.490	MR0175/ISO 15156 Materials for use in Hydrogren sulfide (H2S)-containing environments in oil and gas production. (A seven-year effort has resulted in

No.	SDO	Number	Title	30 CFR Citations	Abstract
			Metals for Sulfide Stress Cracking and Stress Corrosion Cracking Resistance in Sour Oilfield Environments		the technical alignment of NACE Standard MR0175, "Metals for Sulfide Stress Cracking and Stress Corrosion Cracking Resistance in Sour Oilfield Environments," and ISO 15156, "Petroleum and natural gas industries Materials for use in H2S-containing environments in oil and gas production.") It gives requirements and recommendations for the selection and qualification of carbon and low-alloy steels, corrosion-resistant alloys, and other alloys for service in equipment used in oil and natural gas production and natural gas treatment plants in H2S-containing environments, whose failure could pose a risk to the health and safety of the public and personnel or to the environment. It can be applied to help avoid costly corrosion damage to the equipment itself. (available at www.nsse.org)
110	NACE	SP0176-2007	Standard Practice, Corrosion Control of Steel Fixed Offshore Structures Associated with Petroleum Production	30 CFR 250.901	SP0176-2007 provides guidelines for materials, practices, and methods of corrosion control for fixed offshore structures associated with petroleum production located in offshore areas. It includes information on: the submerged zone, the splash zone, and the atmospheric zone. It addresses structural design, cathodic protection criteria, design and installation of cathodic protection systems, control of interference currents, dielectric shields, surface preparation, coatings and inspection, and corrosion control records. (available at webstore.ansi.com)
111	AGA	Report No. 7	Measurement of Natural Gas by Turbine Meters	30 CFR 250.1203	Report No. 7 (document number XQ0601) (2006) incorporates the most recent knowledge of research on performance of improved designs of turbine meters introduced in the market over the last decade. (available at www.nsse.org)
112	AGA	Report No. 9	Measurement of Gas by Multipath Ultrasonic Meters	30 CFR 250.1203	Report No. 9 (document number XQ0701) (2007) is a performance based specification for multipath ultrasonic meters for gas flow measurement. (available at www.nsse.org)
113	AGA	Report No. 10	Speed of Sound in Natural Gas and Other Related Hydrocarbon Gases	30 CFR 250.1203	Report No. 10 (document number XQ0310) outlines a method for the calculation of the speed of sound in natural gas and the individual components that make up natural gas. It also calculates the entropy, enthalpy and coefficient for sonic nozzles. It also provides computer codes for programming calculations of speed of sound. (available at www.nsse.org)
114	ISO/IEC	17011	Conformity assessment—	30 CFR 250.1900; 30 CFR 250.1903; 30 CFR	17011: 2004 specifies general requirements for accreditation bodies assessing and accrediting conformity assessment bodies (CABs). It is also appropriate as

No.	SDO	Number	Title	30 CFR Citations	Abstract
			General requirements for accreditation bodies accrediting conformity assessment bodies; 2004	250.1904; 30 CFR 250.1922	a requirements document for the peer evaluation process for mutual recognition arrangements between accreditation bodies. For its purposes, CABs are organizations providing the following conformity assessment services: testing, inspection, management system certification, personnel certification, product certification and calibration. (available at webstore.ansi.com)
115	COS	COS-2-01	Qualification and Competence Requirements for Audit Teams and Auditors Performing Third-party Safety and Environmental Management Systems (SEMS) Audits of Deepwater Operations, First Edition, October 2012	30 CFR 250.1900; 30 CFR 250.1903; 30 CFR 250.1904; 30 CFR 250.1921	COS-2-01 defines qualification and competence requirements for audit teams, audit team leads and audit team members performing third-party SEMS audits to API RP 75 and 30 CFR Part 250, Subpart S for deepwater operations. It is not intended for use outside U.S. GoM deepwater operations. 1st Edition Oct 2012 (available at www.centerforoffshoresafety.org)
116	COS	COS-2-03	Requirements for Third-party SEMS Auditing and Certification of Deepwater Operations, First Edition, October 2012	30 CFR 250.1900; 30 CFR 250.1903; 30 CFR 250.1904; 30 CFR 250.1920	COS-2-03 defines requirements for Center for Offshore Safety (COS)-accredited Audit Service Providers (ASPs) providing audit and certification of SEMS to the requirements of API RP 75 and 30 CFR Part 250, Subpart S. It is applicable to SEM certification of a COS member company's SEMS program(s) base on a sampling of implementation at deepwater facilities. It is not intended for use outside U.S. GoM deepwater operations. Requirements are in addition to ISO 17021 and ISO 19011. 1st Edition Oct 2012 (available at www.centerforoffshoresafety.org)
117	COS	COS-2-04	Requirements for Accreditation of Audit Service	30 CFR 250.1900; 30 CFR 250.1903; 30 CFR 250.1904; 30 CFR	COS-2-04 defines requirements for accreditation of organizations certifying and auditing a COS member company's SEMS to the requirements of API RP 75 and 30 CFR Part 250, Subpart S. It applies only to audits of deepwater oil

No.	SDO	Number	Title	30 CFR Citations	Abstract
			Providers Performing SEMS Audits and Certification of Deepwater Operations, First Edition, October 2012	250.1922	and gas facilities and operations. It is not intended for use outside U.S. GoM deepwater operations. 1st Edition Oct 2012 (available at www.centerforoffshoresafety.org)

2.1.1.2 *Not Incorporated into Regulation*

The following domestic standards abstracts shown in **Table 3** are domestic standards not incorporated by reference in Title 30 CFR Part 250. The list of standards was developed by BSEE Subject Matter Experts (SMEs) and are indicated a priority. BSEE cited these standards as extremely critical and may consider incorporation by reference in the future.

Table 3: Domestic Standards not incorporated by Reference into BSEE Regulations

No.	SDO	Number	Title	Abstract
1	API	RP 2L	RP for Planning, Designing, and Constructing Heliports for Fixed Offshore Platforms, Fourth Edition, May 1996	RP 2L provides operational consideration guidelines, design load criteria, heliport size, marking recommendations, and other heliport design recommendations. 4th Edition May 1996, reaffirmed Jan 2012
2	API	Spec 2F	Mooring Chain; June 1997	Spec 2F provides specifications for flash-welded chain and forged center connecting links used for mooring of offshore floating vessels such as drilling vessels, pipe laying barges, derrick barges, and storage tankers. 6th Edition Jun 1997, reaffirmed Oct 2010
3	API	RP 16Q	RP for Design, Selection, Operation and Maintenance of Marine Drilling Riser Systems; 1993	RP 16Q provides guidelines for design, selection, operation, and maintenance of marine riser systems for floating drilling operations. 1st Edition Nov 1993, reaffirmed Aug 2001, UNDER REVISION
4	API	Spec 16R	Specification for Marine Drilling Riser Couplings; First Edition, January 1997	Spec 16R provides specifications for design, rating, manufacturing, and testing of marine drilling riser couplings. Coupling capacity ratings are established to enable grouping of coupling models according to maximum stresses developed under specific levels of loading, regardless of manufacturer or method of make-up. 1st

No.	SDO	Number	Title	Abstract
				Edition Jan 1997, reaffirmed Aug 2010, UNDER REVISION
5	API	Spec 16F	Specification for Marine Drilling Riser Equipment; 1st edition 2004	Spec 16F specifies standards of performance and quality for design, manufacture, and fabrication of marine drilling riser equipment used in conjunction with a subsea BOP stack. It covers: riser tensioner equipment; flex/ball joints; choke, kill, and auxiliary lines; drape hoses and jumper lines for flex/ball joints; telescopic joint (slip joint) and tensioner ring; riser joints; buoyance equipment; riser running equipment; special riser system components; and lower riser adapter. 1st Edition Aug 2004, reaffirmed Aug 2010, UNDER REVISION
6	API	Spec 16A	Specification for Drill-through Equipment; 3rd Edition Dec 2004	Spec 16A (modified national adaption of ISO 13533:2001) specifies requirements for performance, design, materials, testing and inspection, welding, marking, handling, storing, and shipping of drill-through equipment. It defines service conditions in terms of pressure, temperature, and wellborn fluids for which equipment will be designed. It applies to: ram BOPs; ram blocks, packers, and top seals; annular BOPs; annular packing units; hydraulic connectors; drilling spools; adapters; loose connections; and clamps. 3rd Edition Jun 2004, reaffirmed Aug 2010, UNDER REVISION
7	API	Spec 16D	Specification for Control Systems for Drilling Well Control Equipment and Control Systems for Diverter Equipment Second Edition; July 2004	Spec 16D specifies design standards for systems used to control BOPs and associated valves that control well pressure during drilling operations. Diverter controls are included. The requirements apply to: control systems for surface mounted BOP stacks; control systems for subsea BOP stacks (common elements); discrete hydraulic/multiplex control systems for subsea BOP stacks; control systems for diverter equipment; auxiliary equipment control systems and interfaces; emergency disconnect sequenced systems; backup systems; and special deepwater/harsh environment features. 2nd Edition Jul 2004, 2-yr extension May 2010 (available at publications.api.org)
8	API	Spec 16C	Choke and Kill System; First Edition, January 1993	Spec 16C provides specifications for safe and functionally interchangeable surface and subsea choke and kill systems equipment. It specifies minimum requirements for performance, design, materials, welding, testing, inspection, storing, and shipping. 1st Edition Jan 1993, reaffirmed Jul 2001, UNDER REVISION
9	API	16J	Comparison of Marine Drilling Riser Analyses; August 1992	BULL 16J (1) shows the degree of agreement among a representative group of riser analysis computer programs, and (2) presents data which can be used to help validate other such programs. Bulletins are published to provide information for which there is a broad industry need but which does not constitute either

No.	SDO	Number	Title	Abstract
				Specifications or RPs. (available at www.ihs.com)
10	API	RP 17H	RP for Remotely Operated Vehicle (ROV) Interfaces on Subsea Production Systems, Second Edition; June 2013	RP 17H (identical national adoption of ISO 13628-8:2002) provides functional requirements and guidelines for ROV interfaces on subsea production systems. This applies to selection and use of ROV interfaces. It provides guidance on design and operational requirements for maximizing the potential of standard equipment and design principles. It also identifies issues that must be considered when designing interfaces on subsea production systems. 1st Edition Jul 2004, reaffirmed Jan 2009 (available at publications.api.org)
11	API	Spec 7F	Oil Field Chain and Sprockets, Eighth Edition, Includes Errata; November 2010	Spec 7F provides specifications for the manufacturing of components for, and assembly and packaging of, single and multiple strand, numbers 40 through 240, standard and heavy series roller chains for oil field applications. This includes: chain designation, chain length tolerance, tensile strength, pin and bushing press-out, and dynamic test requirements. Annex A provides recommendations for installation, lubrication, and maintenance of oil field chain drives. Annex B provides basic descriptions of roller chain sprockets. 8th Edition Nov 2010
12	API	Spec 8A	Drilling and Production Hoisting Equipment, Includes Addendum 1 (2001); December 1997	Spec 8A provides the specification for drilling and production hoisting equipment.
13	API	Spec 9A	Specification for Wire Rope, Includes Errata 1 (October 2012); Twenty-sixth Edition, May 2011	Spec 9A specifies minimum requirements and terms of acceptance for manufacture and testing of steel wire ropes not exceeding rope Grade 2160. It applies to: wire rope, bright- or drawn-galvanized wire rope, well-measuring wire, and well-measuring strand. Minimum breaking forces for common sizes, grades, and constructions of stranded rope are given in tables. Presented for information only are tables with minimum breaking forces for large diameter stranded and spiral ropes, and approximate nominal length masses for common stranded rope constructions and large diameter stranded and spiral ropes. 26th Edition May 2011, latest errata Oct 2012, (available at publications.api.org)
14	API	Spec 12J	Specification for Oil and Gas Separators, Eighth Edition; October 2008	Spec 12J specifies minimum requirements for design, fabrication, and plant testing of oil and gas separators and oil-gas-water separators that are used in the production of oil and gas and are located at some point on the producing flow line between the wellhead and pipeline. Separators covered may be vertical, spherical, or single or double barrel horizontal. Unless otherwise agreed upon between the purchaser and the manufacturer, the jurisdiction of this specification terminates

No.	SDO	Number	Title	Abstract
				with the pressure vessel. Separator outside the scope include centrifugal separators, filter separators, and desanding separators. 8th Edition Oct 2008
15	API	RP 64	Diverter Systems Equipment and Operations; Second Edition, November 2001	RP 64 covers surface and subsea diverter systems and components, including design, controls, operating procedures, and maintenance for land, bottom-supported offshore, floating offshore, and floating offshore installations. 2nd Edition Oct 2001, reaffirmed Jan 2012
16	API	RP 17A	Design and Operation of Subsea Production Systems—General Requirements and Recommendations, Fourth Edition, January 2006	RP 17A (identical national adoption of ISO 13628:2005) provides guidelines for design, installation, operation, repair, and decommissioning of subsea production systems. Elements included are wellheads and trees; pipelines and end connections; controls, control lines and control fluids; templates and manifolds; and production riser. Other sections cover operations, quality assurance, materials, and corrosion. Specialized equipment, such as split trees and manifolds in atmospheric chambers, are not specifically discussed, however, the information presented is applicable to those types of equipment. 4th Edition Jan 2006, reaffirmed Apr 2011
17	API	RP 17B	RP for Flexible Pipe, Fourth Edition, July 2008	RP 17B (identical national adoption of ISO 13628-11:2007) provides guidelines for the design, analysis, manufacture, testing, installation, and operation of flexible pipes and flexible pipe systems for onshore, subsea, and marine applications. It applies to flexible pipe assemblies, consisting of segments of flexible pipe body with end fittings attached to both ends. Both bonded and unbonded pipe types are covered. Applications covered are sweet- and sour-service production, including export and injection applications. It applies to both static and dynamic flexible pipe systems used as flowlines, risers, and jumpers. It does not cover flexible pipes for use in choke and kill lines or umbilical and control lines. 4th Edition, Jul 2008
18	API	RP 17C	RP on TFL (Through Flowline) Systems, Second Edition, September 2002	RP 17C (identical national adoption of ISO 1328-3:2000) presents recommendations for designing, fabricating, and operating TFL equipment. Procedures and guidelines are for hydraulic servicing of downhole equipment, subsea tree and tubing hanger, and pipelines and equipment within the pipelines. Subsea separation, boosting, metering, and downhole pumps are outside the scope. 2nd Edition Sep 2002, reaffirmed Feb 2010
19	API	Spec 17D	Specification for Subsea Wellhead and Christmas Tree Equipment, Second Edition, May 2011	Spec 17D provides specifications for subsea wellheads, mudline wellheads, drill-through mudline wellheads, and both vertical and horizontal subsea trees. It specifies associated tooling necessary to handle, test, and install equipment. It also specifies areas of design, material, welding, quality control (including factory

No.	SDO	Number	Title	Abstract
				acceptance testing), marking, storing, and shipping for individual sub-assemblies and complete subsea tree assemblies. Where applicable, this document can be used for equipment on satellite, cluster arrangements, and multiple well template applications. Included are equipment definitions, and explanation of equipment use and function, and explanation of service conditions and product specification levels, and a description of critical components. It does not apply to rework and repair of equipment. 2nd Edition May 2011, latest errata Jan 2012 (available at publications.api.org)
20	API	Spec 17E	Specification for Subsea Umbilicals, Fourth Edition, October 2010	Spec 17E specifies requirements and gives recommendations for design, material selection, manufacture, design verification, testing, installation, and operation of subsea control systems, chemical injection, gas lift, utility and service umbilicals, and associated ancillary equipment. It also applies to umbilicals containing electrical conductors, optical fibers, thermoplastic hoses, and metallic tubes, and for static or dynamic service and with routings of surface-surface, surface-subsea and subsea-subsea. 4th Edition Oct 2010
21	API	Spec 17F	Specification for Subsea Production Control Systems, Second Edition, December 2006	Spec 17F (identical national adoption of ISO 13628-6:2006) is applicable to design, fabrication, testing, installation, and operation of subsea production control systems. It covers surface control system equipment, subsea-installed control system equipment, and control fluids. It establishes design standards for systems, subsystems, components, and operating fluids to provide for safe and functional control of subsea production equipment. In contains various information including: data that provide an overview of the architecture and general functionality of control systems; basic prescriptive data that shall be adhered to by all types of control systems; selective prescriptive data; and optional data or requirements that need be adopted when considered necessary by purchaser or vendor. Rework and repair of used equipment are beyond the scope. 2nd Edition Dec 2006, reaffirmed Apr 2011
22	API	RP 17G	RP for Completion/Workover Riser Systems, Second Edition, July 2006	RP 17G (identical national adoption of ISO 13628-7:2005) provides requirements and recommendations for design, analysis, materials, fabrication, testing, and operation of subsea completion/workover riser systems run from a floating vessel. It is intended to serve as a common reference for designers, manufacturers, and operators/users, thereby reducing the need for company specifications. It is limited to risers manufactured from low alloy carbon steels. Specific equipment covered

No.	SDO	Number	Title	Abstract
				are: riser joints; connectors; workover control systems; surface flow trees; surface tree tension frames; lower workover riser packages; lubricator valves; retainer valves; subsea test trees; shear subs; tubing hanger orientation systems; swivels; annulus circulation hoses; riser spiders; umbilical clamps; handling and test tools; and tree cap running tools. 2nd Edition Jul 2006, reaffirmed Apr 2011
23	API	RP 17M	RP on Remotely Operated Tool (ROT) Intervention Systems, First Edition, April 2004	RP 17M (identical national adoption of ISO 13618-9:2000) provides functional requirements and recommendations for ROT intervention systems and interfacing equipment on subsea production systems. It does not cover manned intervention and ROV-based intervention systems, nor vertical wellbore intervention, internal flowline inspection, tree running, and tree running equipment. 1st Edition Apr 2004, reaffirmed Jan 2009
24	API	Spec 17K	Specification for Bonded Flexible Pipe, Second Edition, November 2005	Spec 17K (identical national adoption of ISO 13628-10:2005) defines technical requirements for safe, dimensionally and functionally interchangeable bonded flexible pipes that are designed and manufactured to uniform standards and criteria. It specifies minimum requirements for design, material selection, manufacture, testing, marking, and packaging of bonded flexible pipes. It applies to bonded flexible pipe assemblies, consisting of segments of flexible pipe body with end fittings attached to both ends. It can be applied to flexible pipes that include nonmetallic reinforcing layers, though no effort was made to address the specific and unique technological aspects of this product. 2nd Edition Nov 2005, reaffirmed May 2010

2.1.2 Domestic Standards Meetings

Standards development organizations are comprised of industry standards committees that hold frequent standard meetings to discuss standard development, industry trends, safety concerns, and proposed changes to standards. Each standard committee is responsible for developing standards and implementing changes to standards. Standards committees are comprised of members with active industry experience and have an interest in the development and advancement of these standards. ABS engineers active in the offshore oil and gas industry have frequent participation in industry oil and gas standards committees.

Table 4 below is a summary of the domestic standards meetings that have been attended by ABS engineers since September 2013. In support of this project and Statement of Work (SOW) 2.2.3, ABS attended additional industry meetings as requested by BSEE. At the conclusion of each meeting, ABS discussed all changes, modifications, or new additions to industry standards that may affect BSEE regulations or interpretation of regulations.

Additionally, ABS worked with BSEE to develop an industry standard meeting note template. ABS delivered industry meeting notes for the standards meetings BSEE requested ABS attend in support of this project. Domestic industry standard meeting and conference notes were delivered to BSEE electronically.

Table 4: Domestic Standard Meeting Participation

SDO	Standard	Title	Date
API	RP 2SK	Design and Analysis of Stationkeeping Systems for Floating Structures	Tuesday, November 12, 2013
API	RP 2SK	Design and Analysis of Stationkeeping Systems for Floating Structures	Wednesday, November 13, 2013
API	RP 64	Standard for Exploration & Production	Wednesday, November 20, 2013
API	Spec 2F	Mooring Chain	Monday, December 02, 2013
API	RP 2L	Planning, Designing, and Constructing Heliports for Fixed Offshore Platforms	Thursday, December 12, 2013
API	Spec 16F	Specification for Marine Drilling Riser Equipment	Thursday, December 12, 2013
API	RP 64	Planning, Designing, and Constructing Heliports for Fixed Offshore Platforms	Wednesday, December 18, 2013
API	Spec 6A	Specification for Wellhead and Christmas Tree Equipment	Wednesday, January 08, 2014
API	16D	Specification for Control Systems for Drilling Well Control Equipment and Control Systems for Diverter Equipment	Wednesday, January 08, 2014
API	6D	Specification for Pipeline Valves	Thursday, January 09, 2014
API	Spec 2F	Mooring Chain	Monday, January 13, 2014
API	17N	Subsea System	Monday, January 13, 2014
API	RP 64	Standard for Exploration & Production	Tuesday, January 14, 2014
API	SC 17	Subsea Production Systems	Wednesday, January 15, 2014
API	16Q, R, F	Drilling, Well Control Equipment	Thursday, January 16, 2014

SDO	Standard	Title	Date
API	RP 16Q	Drilling, Well Control Equipment	Thursday, January 16, 2014
API	Spec 16R	Drilling, Well Control Equipment	Thursday, January 16, 2014
API	Spec 16F	Drilling, Well Control Equipment	Thursday, January 16, 2014
API	16A	Specification for Drill-through Equipment	Monday, January 20, 2014
API	SC 5 (WI 2351)	Tubular Goods	Monday, January 20, 2014
API	Spec 16 C	Choke and Kill Systems	Monday, January 20, 2014
API	SC 5 (WI 2385)	Tubular Goods	Monday, January 20, 2014
API	SC 5	Subcommittee on Tubular Goods	Tuesday, January 21, 2014
API	SC 5 WI 4232	Tubular Goods	Tuesday, January 21, 2014
API	SC13	Drilling Completion and Fracturing Fluids	Tuesday, January 21, 2014
API	16 AR	Specification for Drill-through Equipment Remanufacturing	Tuesday, January 21, 2014
API	Spec 16D	Specification for Control Systems for Drilling Well Control Equipment	Tuesday, January 21, 2014
API	SC 5/RGSSP	Tubular Goods	Wednesday, January 22, 2014
API	SC13	Drilling Completion and Fracturing Fluids	Wednesday, January 22, 2014
API	Spec 16F	Specification for Marine Drilling Riser Equipment	Wednesday, January 22, 2014
API	SC 5	Subcommittee on Tubular Goods	Wednesday, January 22, 2014
API	RP 2L	Planning, Designing, and Constructing Heliports for Fixed Offshore Platforms	Wednesday, January 22, 2014
API	SC 16	Drilling, Well Control Equipment	Wednesday, January 22, 2014
API	SC 5	Subcommittee on Tubular Goods	Thursday, January 23, 2014
API	SC 18	Quality Standards	Thursday, January 23, 2014
API	SC 5	Subcommittee on Tubular Goods	Friday, January 24, 2014
API	RP 2SK	Design and Analysis of Stationkeeping Systems for Floating Structures	Thursday, January 30, 2014
API	17 Q	Subsea System	Thursday, January 30, 2014
API	SC 2	Subcommittee on Offshore Structures	Sunday, February 02, 2014
API	SC 6	Valves and Wellhead Equipment	Wednesday, February 05, 2014
API	Spec 6A	Specification for Wellhead and Christmas Tree Equipment	Wednesday, February 12, 2014
API	Spec 16 F	Specification for Marine Drilling Riser Equipment	Thursday, February 13, 2014
API	Spec 6A	Specification for Wellhead and Christmas Tree Equipment	Wednesday, February 19, 2014
API	14 B	RP for Design, Installation, Repair and Operation of Subsurface Safety Valve Systems	Monday, February 24, 2014
API	17 N, WG4 and 17Q	Subsea System	Thursday, February 27, 2014
API	Spec 6A	Specification for Wellhead and Christmas Tree Equipment	Wednesday, March 05, 2014
API	16 Q, R, F	Specification for Marine Drilling Riser Equipment	Thursday, March 06, 2014
API	17W	Subsea System	Thursday, March 06, 2014
API	17 V	Subsea System	Thursday, March 13, 2014

SDO	Standard	Title	Date
API	16 C	Specification for Choke and Kill Systems	Thursday, March 13, 2014
API	Spec 6A	Specification for Wellhead and Christmas Tree Equipment	Thursday, March 20, 2014
API	RP 2L	Planning, Designing, and Constructing Heliports for Fixed Offshore Platforms	Tuesday, March 25, 2014
API	17V	Subsea System	Wednesday, April 09, 2014
API	Spec 6A	Specification for Wellhead and Christmas Tree Equipment	Thursday, April 10, 2014
API	16C	Specification for Choke and Kill Systems	Tuesday, April 15, 2014
API	Spec 6A	Specification for Wellhead and Christmas Tree Equipment	Wednesday, April 16, 2014
API	6D	Specification for Pipeline Valves	Wednesday, April 23, 2014
SNAME	T&R 5-5A	Jack Up Site Assessment RPs	Thursday, May 01, 2014
API	COSEM	Various Standards	Wednesday, May 14, 2014
API	16 AR	Specification for Drill-through Equipment	Thursday, May 29, 2014
API	SC 5:	Manufacturer's Advisory Group	Monday, June 16, 2014
API	SC 5	Strain based design	Monday, June 16, 2014
API	SC 5	Fatigue equation development	Monday, June 16, 2014
API	SC 5	Collapse and compression	Monday, June 16, 2014
API	SC 5	Determination of maximum tensile strength	Monday, June 16, 2014
API	SC 16	API 16A Task Group	Monday, June 16, 2014
API	SC 16	API 16C Task Group	Monday, June 16, 2014
API	SC 5	Leak resistance test for thread compounds	Tuesday, June 17, 2014
API	SC 5	Resource group on expandable tubulars	Tuesday, June 17, 2014
API	SC 5	Elevated temperature effects	Tuesday, June 17, 2014
API	SC 5	Threaded connection evaluations	Tuesday, June 17, 2014
API	SC 5	Production Research Advisory Committee (PRAC) investigation of brittle burst Failure Analysis Diagrams (FAD)	Tuesday, June 17, 2014
API	SC 5	Casing wear	Tuesday, June 17, 2014
API	SC 5	Environmental Crack Performance	Tuesday, June 17, 2014
API	SC 13	Subcommittee (SC) on Drilling, Completion and Fracturing Fluids	Tuesday, June 17, 2014
API	SC 16	API 16D Task Group	Tuesday, June 17, 2014
API	SC 16	API 16AR Task Group	Tuesday, June 17, 2014
API	SC 6	Valve and Wellhead Roundtable	Wednesday, June 18, 2014
API	SC 6	API 6A task group	Wednesday, June 18, 2014
API	SC 13	SC on Drilling, Completion and Fracturing Fluids	Wednesday, June 18, 2014
API	SC 16	SC on Drilling, Well Control Equipment	Wednesday, June 18, 2014
API	16F TG	Drilling, Well Control Equipment	Wednesday, June 18, 2014
API	SC 17	Subsea Systems Roundtable	Wednesday, June 18, 2014
API	SC 6	Subcommittee on Valves and Wellhead Equipment	Thursday, June 19, 2014
API	16C	Specification for Choke and Kill Systems	Tuesday, August 12, 2014

SDO	Standard	Title	Date
API	16A	Specification for Drill-through Equipment	Thursday, August 14, 2014
API	53	RP for Blowout Prevention Equipment Systems for Drilling Wells	Thursday, August 21, 2014

2.1.3 Discussion of Changes to Domestic Standards

ABS engineers/SMEs have frequent participation in industry oil and gas standards meetings. Below is a summary of proposed changes to standards that have been presented or discussed during industry standard meetings since September 2013. The proposed changes to standards were discussed with the BSEE project team throughout the course of the study during monthly meetings and documented in monthly project status reports and shown in **Table 5**.

Table 5: Proposed Changes to Domestic Standards

Standard	Title	Proposed Changes
API 6A	Specification for Wellhead and Christmas Tree Equipment	• Group proposed expanding the current requirements for ring gaskets in 5.5 and 7.4.6 to cover all metallic seals. Other metal seals need to be looked at by the design and the qualification groups. • Redefining Product Specification Levels (PSL) 1 by limiting the pressure to 15K or less. Add decision block in figure A.14 for the 2 PSL1 lines that would direct the purchaser to PSL2 for tree applications. • Revise hydrostatic testing requirements and acceptance criteria for non-actuated valves manufacturer should record the torque valve as par to the Factory Acceptance Test (FAT) within manufacturer's documented requirements. Only for PSL-2 or Higher • Change Manufacture definition Clause 3.1.93. The group was not in favor for this change • Proposed vote: Annex J, Provide a process to test and inspect equipment and return to the field. Currently this would fall under RL1 which does not provide for certificate of conformance, assembly traceability and quality records. Some repair/disassembly could be allowed such as removing a blind flange, removing a tree top cap removing/installing a hand wheel removing a fitting, needle valve, gauge or cap on the grease fitting, greasing equipment. Group does not feel that a RL-0 set of requirements would help clarify the repair requirements for "field type repairs." Also Working Group did not feel that the standard should determine a maximum number of safe testing cycles for equipment; this would have to be done by the equipment repairer.
API RP 2SK	Stationkeeping	• The document is being completely restructured • Current document structure has a large number of appendices that contain both normative and informative text. The plan is to try to align the document better with the ISO document structure in which Annexes are either normative or informative, but

Standard	Title	Proposed Changes
		not both within one annex. • Certain material will also be updated during the structural changes
API 6A	Specification for Wellhead and Christmas Tree Equipment	• Complete Discussion on API 6A Overhaul: Concern about change to the standard in Section 7.4.2.1.7 - general interpretation is that should have the same design strength as based mode; no definition as to where it is required. • Need a better definition/clarification; look at AF1 and AF2 for design methodology/analysis with flange definitions and models they used • 6A using 'design criteria' or 'design manufacturers,' needs to be clearer; weld overlay and weld cladding need to be clarified regarding what each means • Section 6.5.1.1.3 and 6.5.1.4.b. shows intent here; certain instances with inlay or overlay must use it as the design criteria • Annex. Order between 20th Ed. & 21st Ed. – Some changes were suggested and would like to keep most in the same order
API 6A	Specification for Wellhead and Christmas Tree Equipment	• Section J.5.3 Repair of equipment: Presently Repair of equipment listed in the 1st Sentence & would like "Repair shall not include manufacturing or any of the parts listed in the first sentence of J.5.3. Repair may include manufacturing of parts other than those listed in J.5.3 e) 2 in accordance with quality control requirements of the repairer/remanufacturer • Section 10.19.9 & K.9– Rewriting "Shall be equipped with Bleeder plug" • NO acceptable methods for PSL2 Ferromagnetic Materials are specified • Maximum allowable stress for closing bolting • API 6A 21st Ed. – Three part list: • Part 1: General Requirements: Current Clauses: 2, 3, 4, 5, 6, 7 & 9; Current Annexes: A, D, E, G, J & M • Part 2: End Connections: Current Clauses: 8, 10.1-4, 11, 21 & 22; Current Annexes: B, C & L • Part 3: Valves & Well Head Equipment: Current Clauses: 2-9, 10.5-9, 12-20, 23-24 • Current Annexes: A, B, D, E, F, K, L, & M
API 16F	Specification for Marine Drilling Riser Equipment	• Proposed changes to the Riser Main Tube Dimensions. Some designs (Class E Riser with 21" OD 5/8" wall, X-80 pipe) may be de-rated in the future as part of the changes to the specification. • Possibility of combining 16R and 16F since couplings play a large role in riser parts
API 64	Standard for Exploration and Production	• Major rewrite of Sections 5 and 6 of the standard: Diverter Systems and Equipment • Proposed removal of NACE requirements because the diverter system is flow controlling only but not pressure controlling.

Standard	Title	Proposed Changes
API 2L	Planning, Designing, and Constructing Heliports for Fixed Offshore Platform	Proposed new standard – Bring the current API 2L up to date with other industry standards such as Civil Aviation Publication (CAP) 427 and International Civil Aviation Organization (ICAO)
API 17N	RP for Subsea Reliability	• The working group proposed to move annex on qualification of new technology along with test statistics (old Annex D) from 17N to 17Q and combine with updated old 17Q content. The current goal is issue 17N and 17Q as separate documents roughly on the same timeframe. This also needs to be supported by BSEE as a way forward in accordance with Best Available Safest Technology (BAST).

2.2 International Standards

International Standards applicable to the offshore oil and gas industry are those written and authored by a recognized international SDO. The two such SDOs that have produced standards applicable to the offshore oil and gas industry are the ISO and the IEC. To identify and assess international standards applicable to the offshore oil and gas industry and to identify best practices, the study team coordinated with the countries comprising the International Regulatory Form (IRF). These countries are shown in **Table 6** below.

Table 6: IRF Member Countries

IRF Member Countries	Regulatory Body
Australia	National Offshore Petroleum Safety and Environmental Management Authority
Brazil	National Agency of Oil, Gas and Biofuels (ANP)
Canada	Canada-Newfoundland and Labrador Offshore Petroleum Board; Canada-Nova Scotia Offshore Petroleum Board; and the National Energy Board
Denmark	Danish Energy Agency (DEA)
Mexico	National Hydrocarbons Commission (CNH)
Netherlands	State Supervision of Mines
New Zealand	Department of Labour
Norway	The Petroleum Safety Authority
United Kingdom	Health and Safety Executive
United States	Bureau of Safety and Environmental Enforcement

2.2.1 Abstracts of International Standards

International standard abstracts were referenced and adopted from the respective standard development organization during the literature search. The abstracts provide a synopsis and overview of each standard. The international standards are organized into two categories: standards currently incorporated into BSEE regulation and standards not incorporated into regulation.

2.2.1.1 *Incorporated into Regulation*

BSEE currently incorporates one international standard into Federal regulation as shown in **Table 7**.

Table 7: International Standards Incorporated into Regulation into 30 CFR 250

SDO	Number	Title	CFR Citations	Abstract
ISO/IEC	17011	Conformity assessment—General requirements for accreditation bodies accrediting conformity assessment bodies; 2004	30 CFR 250.1900; 30 CFR 250.1903; 30 CFR 250.1904; 30 CFR 250.1922	This standard specifies general requirements for accreditation bodies assessing and accrediting CABs. It is also appropriate as a requirements document for the peer evaluation process for mutual recognition arrangements between accreditation bodies. For its purposes, CABs are organizations providing the following conformity assessment services: testing, inspection, management system certification, personnel certification, product certification and calibration. (ISO/IEC 17011:2004)

2.2.1.2 *Not Incorporated into Regulation*

ABS SMEs developed a list of international standards for reference related to the offshore oil and gas industry to identify comparable or equivalent international standards to standards currently incorporated into BSEE regulations. The list was developed during the literature search phase of this project and referenced sources and publications developed by from the International Association of Oil and Gas Producers (OGP) and International Association of Drilling Contractors (IADC).

The international standards shown in **Table 8** displays relevant standards identified to be equivalent or comparable to standards identified for this study that are currently incorporated by BSEE in Title 30 CFR Part 250. Standard abstracts were developed for each of the comparable international standards to provide a brief overview and understanding of the technical components and scope of the international standard.

Table 8: List of Relevant ISO Standards Abstracts

ISO/IEC Standard	Standard Title	ISO Standard Abstract
ISO 10423:2009	Petroleum and natural gas industries -- Drilling and production equipment -- Wellhead and christmas tree equipment	ISO 10423:2009 specifies requirements and gives recommendations for the performance, dimensional and functional interchangeability, design, materials, testing, inspection, welding, marking, handling, storing, shipment, purchasing, repair and remanufacture of wellhead and christmas tree equipment for use in the petroleum and natural gas industries. ISO 10423:2009 does not apply to field use, field testing or field repair of wellhead and christmas tree equipment. ISO 10423:2009 is applicable to specific types of wellhead equipment, connectors and fittings; casing and tubing hangers; valves and chokes; loose connectors [flanged, threaded, other end connectors (OEC), and welded]; and other equipment, such as actuators, clamp hubs, pressure boundary penetrations, ring gaskets, running and testing tools and wear bushings. The nomenclature is defined and most physical dimensions are given in United States Customary (USC) units, as well as metric units. ISO 10423:2009 defines service conditions, in terms of pressure, temperature and material class for the well-bore constituents, and operating conditions. ISO 10423:2009 establishes requirements for five PSLs (1, 2, 3, 3G and 4). These five PSL designations define different levels of technical quality requirements. Guidelines (not requirements) are provided for selecting an acceptable PSL.
ISO 16528-1:2007 and ISO 16528-2:2007	Boilers and pressure vessels -- Part 1: Performance requirements and Boilers and pressure vessels -- Part 2: Procedures for fulfilling the requirements of ISO 16528-1	ISO 16528-1:2007 defines the performance requirements for the construction of boilers and pressure vessels. It is not the intent of ISO 16528-1:2007 to address operation, maintenance and in-service inspection of boilers and pressure vessels. In relation to the geometry of the pressure-containing parts for pressure vessels, ISO 16528-1:2007 includes welding end connection for the first circumferential joint for welded connections, first threaded joint for screwed connections, face of the first flange for bolted, flanged connections, first sealing surface for proprietary connections or fittings and safety accessories, where necessary. In relation to the geometry of pressure-containing parts for boilers, ISO 16528-1:2007

ISO/IEC Standard	Standard Title	ISO Standard Abstract
		covers feedwater inlet (including the inlet valve) to steam outlet (including the outlet valve), including all inter-connecting tubing that can be exposed to a risk of overheating and cannot be isolated from the main system, associated safety accessories and connections to the boilers involved in services such as draining, venting, desuperheating, etc. ISO 16528-1:2007 does not apply for nuclear components, railway and marine boilers, gas cylinders or piping systems or mechanical equipment, e.g. turbine and machinery casings. ISO 16528-2:2007 provides a procedure and a standard format for standard-issuing bodies to demonstrate that their standards fulfil the performance requirements of ISO 16528-1.
ISO 19901-1:2005	Petroleum and natural gas industries -- Specific requirements for offshore structures -- Part 1: Metocean design and operating considerations	ISO 19901-1:2005 gives general requirements for the determination and use of meteorological and oceanographic (metocean) conditions for the design, construction and operation of offshore structures of all types used in the petroleum and natural gas industries.
ISO 19902:2007	Petroleum and natural gas industries -- Fixed steel offshore structures	ISO 19902:2007 specifies requirements and provides recommendations applicable to the following types of fixed steel offshore structures for the petroleum and natural gas industries: caissons, free-standing and braced; jackets; monotowers; towers. In addition, it is applicable to compliant bottom founded structures, steel gravity structures, other bottom founded structures and other structures related to offshore structures (such as underwater oil storage tanks, bridges and connecting structures), to the extent to which its requirements are relevant. It contains requirements for planning and engineering of the following tasks: design, fabrication, transportation and installation of new structures as well as their future removal; in-service inspection and integrity management of both new and existing structures; assessment of existing structures; and evaluation of structures for reuse at different locations.
ISO 19904-1:2006	Petroleum and natural gas industries -- Floating offshore structures -- Part 1: Monohulls, semi-submersibles and spars	ISO 19904-1:2006 provides requirements and guidance for the structural design and/or assessment of floating offshore platforms used by the petroleum and natural gas industries to support production, storage and/or offloading, drilling and production, production, storage and offloading, and drilling, production, storage and offloading.

ISO/IEC Standard	Standard Title	ISO Standard Abstract
ISO 19901-7:2013	Petroleum and natural gas industries -- Specific requirements for offshore structures -- Part 7: Stationkeeping systems for floating offshore structures and mobile offshore units	ISO 19901-7:2013 specifies methodologies for: - The design, analysis and evaluation of stationkeeping systems for floating structures used by the oil and gas industries to support production, storage, drilling, well intervention and production, production and storage, drilling, well intervention, production and storage - The assessment of stationkeeping systems for site-specific applications of mobile offshore units (e.g. mobile offshore drilling units, construction units, and pipelay units). ISO 19901-7:2013 is applicable to the following types of stationkeeping systems, which are either covered directly in ISO 19901-7:2013 or through reference to other guidelines: - Spread moorings (catenary, taut-line and semi-taut-line moorings) - Single point moorings, anchored by spread mooring arrangements - Dynamic positioning systems - Thruster-assisted moorings Descriptions of the characteristics and of typical components of these systems are given in an informative annex. The requirements of ISO 19901-7:2013 mainly address spread mooring systems and single point mooring systems with mooring lines composed of steel chain and wire rope. ISO 19901-7:2013 also provides guidance on the application of the methodology to synthetic fibre rope mooring systems, and includes additional requirements related to the unique properties of synthetic fibre ropes. ISO 19901-7:2013 is applicable to single anchor leg moorings (SALMs) and other single point mooring systems (e.g., tower soft yoke systems) only to the extent to which the requirements are relevant. ISO 19901-7:2013 is not applicable to the vertical moorings of TLPs.
ISO 18692:2007	Fibre ropes for offshore stationkeeping -- Polyester	ISO 18692:2007 specifies the main characteristics and test methods of new polyester fibre ropes used for offshore stationkeeping.
ISO 10418:2003	Petroleum and natural gas industries -- Offshore production installations -- Analysis, design, installation and testing of basic surface process safety systems	ISO 10418:2003 provides objectives, functional requirements and guidelines for techniques for the analysis, design and testing of surface process safety systems for offshore installations for the recovery of hydrocarbon resources. The basic concepts associated with the analysis and design of a process safety system for an offshore oil

ISO/IEC Standard	Standard Title	ISO Standard Abstract
		and gas production facility are described, together with examples of the application to typical (simple) process components. These examples are contained in the annexes of ISO 10418:2003. ISO 10418:2003 is applicable to fixed offshore structures, floating production, storage and off-take systems for the petroleum and natural gas industries. ISO 10418:2003 is not applicable to mobile offshore units and subsea installations, although many of the principles contained in it may be used as guidance.
ISO 13703:2000	Petroleum and natural gas industries -- Design and installation of piping systems on offshore production platforms	ISO 13703:2000 specifies minimum requirements and gives guidance for the design and installation of new piping systems on production platforms located offshore for the petroleum and natural gas industries. It covers piping systems up to 69,000 kilopascal gauge [kPa (ga)] maximum, within temperature range limits for the materials meeting the requirements of ASME B31.3.
IEC 61892-1:2010	Mobile and fixed offshore units -- Electrical installations -- Part 1: General requirements and conditions	IEC 61892-1:2010(E) contains provisions for electrical installations in mobile and fixed offshore units including pipeline, pumping or 'pigging' stations, compressor stations and exposed location single buoy moorings, used in the offshore petroleum industry for drilling, processing and storage purposes. It applies to all installations, whether permanent, temporary, transportable or hand-held, to alternating current (AC) installations up to and including 35,000 Volt (V) and direct current (DC) installations up to and including 1,500 V (AC and DC voltages are nominal values). It does not apply either to fixed equipment for medical purposes or to the electrical installations of tankers. This edition cancels and replaces the first edition published in 2001. This edition includes the following significant technical changes with respect to the previous edition: a) The DC voltages given in Clause 1, have been updated in order to ensure uniform requirements for all parts of the standard b) The requirement to electromagnetic capability (EMC) has been rewritten to comply with the requirements of IEC 61000-2:4 c) A clause regarding environmental impact has been added d) Annex A (Guidance on environmental conditions) has been deleted e) Annex B (Information regarding cold climate precautions) has been added
IEC 61892-2:2012	Mobile and fixed offshore units -- Electrical	IEC 61892-2:2012(E) contains provisions for system design of electrical installations in

ISO/IEC Standard	Standard Title	ISO Standard Abstract
	installations -- Part 2: System design	mobile and fixed units used in the offshore petroleum industry for drilling, production, processing and for storage purposes, including pipeline, pumping or 'pigging' stations, compressor stations and exposed location single buoy moorings. It applies to all installations, whether permanent, temporary, transportable or hand-held, to AC installations up to and including 35,000 V and DC installations up to and including 1,500 V (AC and DC voltages are nominal values). This standard does not apply either to fixed equipment used for medical purposes or to the electrical installations of tankers. This edition includes the following significant technical changes with respect to the previous edition: - The DC voltage given in clause 1 has been updated to 1,500 V, to ensure consistency through all parts of the IEC 61892 series - Clause 4 has been rewritten, such that all requirements to emergency power are now given in 4.3 - The tables for nominal AC voltages have been updated in accordance with the last revision of IEC 60038 - The requirement to cross sectional area for earthing conductors has been made dependent on the system earthing arrangement - The requirement for emergency stop for motor-driven fuel-oil transfer and fuel-oil pressure pumps has been added
IEC 61892-3:2012	Mobile and fixed offshore units -- Electrical installations -- Part 3: Equipment	IEC 61892-3:2012(E) contains provisions for electrical equipment in mobile and fixed offshore units including pipeline, pumping or 'pigging' stations, compressor stations and exposed location single buoy moorings, used in the offshore petroleum industry for drilling, processing and for storage purposes. This standard applies to equipment in all installations, whether permanent, temporary, transportable or hand-held, to AC installations up to and including 35,000 V and DC installations up to and including 1,500 V (AC and DC voltages are nominal values). This standard sets requirements for equipment, which are additional to the requirements given in the product standard for the relevant equipment. This standard does not apply to the electrical installations in rooms used for medical purposes or in tankers. This edition includes the following significant technical changes with respect to the previous edition: a) Table 4 in the previous edition of IEC 61892-3 regarding type testing has been

ISO/IEC Standard	Standard Title	ISO Standard Abstract
		deleted. Information regarding environmental conditions, including requirements to vibration, is now given in Clause 4 b) For liquid immersed transformers requirement for overheating alarm and shut down has been added c) Requirements for low voltage switchgear and controlgear have been rewritten, based on IEC 61439-1 and IEC 61439-2. Only additional requirements to those given in IEC 61439 are given in the standard d) Requirements to low voltage circuit breakers, switches, contactors and fuses have been added e) Requirement for subdivision of high voltage switchboard has been added f) Requirements for luminaires have been deleted and replaced with reference to IEC 60598 series and IEC 60092-306 g) Requirements for heating and cooking appliances have been deleted and replaced with reference to IEC 60335 series h) Requirement for portable equipment has been added
IEC 61892-4	Mobile and fixed offshore units -- Electrical installations -- Part 4: Cables	This part of IEC 61892-4 specifies requirements for the choice and installation of electrical cables intended for fixed electrical systems in mobile and fixed offshore units, including pumping or ""pigging"" stations, compressor stations and exposed location single buoy moorings, used in the offshore petroleum industry for drilling, production, processing and for storage purposes.
IEC 61892-5:2010	Mobile and fixed offshore units -- Electrical installations -- Part 5: Mobile units	IEC 61892-5:2010(E) specifies the characteristics for electrical installations in mobile units, for use during transfer from one location to another and for use during the exploration and exploitation of petroleum resources. It applies to all installations, whether permanent, temporary, transportable or hand-held, to AC installations up to and including 35,000 V and DC installations up to and including 1,500 V (AC and DC voltages are nominal values). This edition cancels and replaces the first edition published in 2000. This edition includes the following significant technical changes with respect to the previous edition: a) The requirement to DC generators has been deleted b) The requirement to EMC has been rewritten c) The requirement to power management system has been added

ISO/IEC Standard	Standard Title	ISO Standard Abstract
		d) An informative annex regarding testing of Dynamic Positioning (DP) systems has been added
IEC 61892-6:2013	Mobile and fixed offshore units -- Electrical installations -- Part 6 Installation	IEC 61892-6:2013 contains provisions for electrical installation in mobile and fixed offshore units including pipeline pumping or pigging stations compressor stations and exposed location single buoy moorings used in the offshore petroleum industry for drilling processing and for storage purposes. It applies to all installations whether permanent temporary transportable or hand held to AC installations up to and including 35,000 V and DC installations up to and including 1,500 V AC and DC voltages are nominal values This standard does not apply to electrical installations in rooms used for medical purposes or in tankers. This edition includes the following significant technical changes with respect to the previous edition: a) Table 1 size of earth continuity conductors has been replaced with the table in IEC 61892-4 b) The requirements for installation of batteries has been rewritten in order to distinguish better between batteries of the vented type and VRLA sealed type c) An informative annex regarding cable termination has been added d) The applicability for DC installations has been increased from 750 V to 1,500 V in accordance with Part 1 of the series
IEC 61892-7	Mobile and fixed offshore units -- Electrical installations -- Part 7: Hazardous areas	This part of IEC 61892-7 contains provisions for hazardous areas classification and choice of electrical installation in hazardous areas in mobile and fixed offshore units, including pipeline, pumping or 'pigging' stations, compressor stations and exposed location single buoy moorings, used in the offshore petroleum industry for drilling, processing and for storage purposes. This edition includes the following significant technical changes with respect to the previous edition: a) The clauses regarding area classification have been updated based on changes in IEC 60079 10 b) The clauses regarding emergency shutdown have been updated, based on current industry practice c) The clauses regarding installation have been updated based on changes in IEC 60079-14 d) A new clause regarding ventilation of battery compartment for valve regulated

ISO/IEC Standard	Standard Title	ISO Standard Abstract
		batteries has been added
ISO 13702:1999	Petroleum and natural gas industries -- Control and mitigation of fires and explosions on offshore production installations -- Requirements and guidelines	ISO 13702:1999 describes the objectives, functional requirements and guidelines for the control and mitigation of fires and explosions on offshore installations used for the development of hydrocarbon resources. ISO 13702:1999 is applicable to: fixed offshore structures and floating production, storage and off-take systems for the petroleum and natural gas industries. Mobile offshore units as defined in this international standard and subsea installations are excluded, although many of the principles contained in this international standard may be used as guidance. ISO 13702:1999 is based on an approach where the selection of control and mitigation measures for fires and explosions is determined by an evaluation of hazards on the offshore installation. The methodologies employed in this assessment and the resultant recommendations will differ depending on the complexity of the production process and facilities, type of facility (i.e., open or enclosed), manning levels, and the environmental conditions associated with the area of operation. Users of this international standard should note that while observing its requirements, they should, at the same time, ensure compliance with such statutory requirements, rules and regulations as may be applicable to the individual offshore installation concerned.
IEC 60079-10-1:2008	Explosive atmospheres -- Part 10-1: Classification of areas -- Explosive gas atmospheres	IEC 60079-10-1:2008 is concerned with the classification of areas where flammable gas or vapour or mist hazards may arise and may then be used as a basis to support the proper selection and installation of equipment for use in a hazardous area. It is intended to be applied where there may be an ignition hazard due to the presence of flammable gas or vapour, mixed with air under normal atmospheric conditions, but it does not apply to: a) Mines susceptible to firedamp b) The processing and manufacture of explosives) Areas where a hazard may arise due to the presence of combustible dusts or fibresd) Catastrophic failures which are beyond the concept of abnormality e) Rommos used for medial purposes f) Domestic premises

ISO/IEC Standard	Standard Title	ISO Standard Abstract
		This first edition of IEC 60079-10-1 cancels and replaces the fourth edition of IEC 60079-10, published in 2002, and constitutes a technical revision. The significant technical changes with respect to the previous edition are: - Introduction of Annex D which deals with explosion hazard from flammable mists generated by the release under pressure of high flash point liquids - Introduction of Clause A.3 (release rate) which gives thermodynamic equations for release rate with a number of examples for estimating release rate of fluids and gases
ISO 14313:2007	Petroleum and natural gas industries -- Pipeline transportation systems -- Pipeline valves	ISO 14313:2007 specifies requirements and provides recommendations for the design, manufacturing, testing and documentation of ball, check, gate and plug valves for application in pipeline systems meeting the requirements of ISO 13623 for the petroleum and natural gas industries. ISO 14313:2007 is not applicable to subsea pipeline valves, as they are covered by ISO 14723. ISO 14313:2007 is not applicable to valves for pressure ratings exceeding PN 420 (Class 2 500).
ISO 10423:2004	Petroleum and natural gas industries -- Drilling and production equipment -- Wellhead and Christmas tree equipment	ISO 10423:2004 specifies requirements and gives recommendations for the performance, dimensional and functional interchangeability, design, materials, testing, inspection, welding, marking, handling, storing, shipment, purchasing, repair and remanufacture of wellhead and Christmas tree equipment for use in the petroleum and natural gas industries. Defines service conditions, in terms of pressure, temperature and material class for the well-bore constituents, and operating conditions. Establishes requirements for five product specification levels. Applicable to wellhead equipment; connectors and fittings; casing and tubing hangers; valves and chokes; loose connectors (flanged, threaded, OEC, and welded); other equipment. (withdrawn and revised by ISO 10423:2009)
ISO/TS 16530-2:2013	Well integrity -- Part 2: Well integrity for the operational phase	ISO/TS 16530-2:2013 provides requirements and methods to the oil and gas industry to manage well integrity during the well operational phase. The operational phase is considered to extend from handover of the well after construction, to handover prior to abandonment. This represents only the period during the life cycle of the well when it is being operated. The scope includes: a) A description of the processes required to assess and manage risk within a defined

ISO/IEC Standard	Standard Title	ISO Standard Abstract
		framework. The risk assessment process also applies when deviating from this Technical Specification. b) The process of managing well integrity by operating wells in compliance with operating limits for all well types that are defined based on exposure or risk to people, environment, assets and reputation. The management of well integrity is supported by associated maintenance/monitoring plans, technical reviews and the management of change. c) The assessment of existing assets (wells / fields) in order to start the process of Well Integrity Management in accordance with this technical specification. d) The handover process required when changing from one activity to another during the operational phase. The scope of ISO/TS 16530-2:2013 applies to all wells that are utilized by the oil and gas industry, regardless of their age, type or location. The scope of ISO/TS 16530-2:2013 does NOT apply to: a) The periods during well intervention or work-over activities, but it does include the result of the intervention and any impact that this can have to the well envelope and the associated well barriers. b) The equipment that is required or used outside the well envelope for the well intervention, such as wire-line or coiled tubing or pumping package.
ISO 13623:2009	Petroleum and natural gas industries -- Pipeline transportation systems	ISO 13623:2009 specifies requirements and gives recommendations for the design, materials, construction, testing, operation, maintenance and abandonment of pipeline systems used for transportation in the petroleum and natural gas industries. ISO 13623:2009 applies to pipeline systems on land and offshore, connecting wells, production plants, process plants, refineries and storage facilities, including any section of a pipeline constructed within the boundaries of such facilities for the purpose of its connection. A figure shows the extent of pipeline systems covered by ISO 13623:2009. ISO 13623:2009 applies to rigid, metallic pipelines. It is not applicable for flexible pipelines or those constructed from other materials, such as glass-reinforced plastics. ISO 13623:2009 is applicable to all new pipeline systems and can be applied to modifications made to existing ones. It is not intended that it apply retroactively to existing pipeline systems.

ISO/IEC Standard	Standard Title	ISO Standard Abstract
		ISO 13623:2009 describes the functional requirements of pipeline systems and provides a basis for their safe design, construction, testing, operation, maintenance and abandonment.
ISO 17776:2002	Petroleum and natural gas industries -- Offshore production installations -- Guidelines on tools and techniques for hazard identification and risk assessment, First Edition.	ISO 17776:2002 describes some of the principal tools and techniques that are commonly used for the identification and assessment of hazards associated with offshore oil and gas exploration and production activities, including seismic and topographical surveys, drilling and well operations, field development, operations, decommissioning and disposal together with the necessary logistical support of each of these activities. It provides guidance on how these tools and techniques can be used to assist in development of strategies both to prevent hazardous events and to control and mitigate any events that may arise. ISO 17776:2002 is applicable to: fixed offshore structures and floating production, storage and off-take systems for the petroleum and natural gas industries. ISO 17776:2002 is not applicable to design and construction aspects of mobile offshore units that fall under the jurisdiction of the International Maritime Organization (IMO). ISO 17776:2002 is not intended to be used as part of certification criteria, and no defect in the management of risks should be inferred if any of the tools and techniques covered by this international standard are not applied to an installation.
ISO 13628-2: 2006	Petroleum and natural gas industries -- Design and operation of subsea production systems -- Part 2: Unbonded flexible pipe systems for subsea and marine applications	ISO 13628-2:2006 defines the technical requirements for safe, dimensionally and functionally interchangeable flexible pipes that are designed and manufactured to uniform standards and criteria. Minimum requirements are specified for the design, material selection, manufacture, testing, marking and packaging of flexible pipes, with reference to existing codes and standards where applicable. ISO 13628-2:2006 applies to unbonded flexible pipe assemblies, consisting of segments of flexible pipe body with end fittings attached to both ends. ISO 13628-2:2006 applies to both static and dynamic flexible pipes used as flowlines, risers and jumpers. The applications addressed by ISO 13628-2:2006 are sweet and sour service production, including export and injection applications for production products including oil, gas, water and injection chemicals. ISO 13628-2:2006 does not cover flexible pipes of bonded structure or flexible pipe ancillary components or to flexible pipes for use in choke-and-kill line applications.

ISO/IEC Standard	Standard Title	ISO Standard Abstract
		ISO 13628-2:2006 does not apply to flexible pipes that include non-metallic tensile armour wires.
ISO 13628-2:2006/Cor.1:2009	Petroleum and natural gas industries -- Design and operation of subsea production systems -- Part 2: Unbonded flexible pipe systems for subsea and marine applications TECHNICAL CORRIGENDUM 1	References added, deleted, and replaced as appropriate in ISO 13628-2:2006 ISO 13628-2:2006 defines the technical requirements for safe, dimensionally and functionally interchangeable flexible pipes that are designed and manufactured to uniform standards and criteria. Minimum requirements are specified for the design, material selection, manufacture, testing, marking and packaging of flexible pipes, with reference to existing codes and standards where applicable. ISO 13628-2:2006 applies to unbonded flexible pipe assemblies, consisting of segments of flexible pipe body with end fittings attached to both ends. ISO 13628-2:2006 applies to both static and dynamic flexible pipes used as flowlines, risers and jumpers. The applications addressed by this ISO 13628-2:2006 are sweet and sour service production, including export and injection applications for production products including oil, gas, water and injection chemicals. ISO 13628-2:2006 does not cover flexible pipes of bonded structure or flexible pipe ancillary components or to flexible pipes for use in choke-and-kill line applications. ISO 13628-2:2006 does not apply to flexible pipes that include non-metallic tensile armour wires.
ISO 15607:2003	Specification and qualification of welding procedures for metallic materials -- General rules	ISO 15607:2003 defines general rules for the specification and qualification of welding procedures for metallic materials. It also refers to several other standards as regards detailed rules for specific applications. ISO 15607:2003 is applicable to manual, mechanized and automatic welding.
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 specifies how a preliminary welding procedure specification is qualified by welding procedure tests. It defines the conditions for the execution of welding procedure tests and the range of qualification for welding procedures for all practical welding operations within a range of variables. Additional tests may be required by application standards. ISO 15614-1:2004 applies to the arc and gas welding of steels in all product forms and the arc welding of nickel and nickel alloys in all product forms. Arc and gas welding are covered by the following processes: a) Manual metal arc welding (metal-arc welding with covered electrode)

ISO/IEC Standard	Standard Title	ISO Standard Abstract
		b) Self-shielded tubular-cored arc welding c) Submerged arc welding d) Metal inert gas welding, MIG welding e) Metal active gas welding, MAG welding f) Tubular-cored metal arc welding with active gas shield g) Tubular-cored metal arc welding with inert gas shield h) Tungsten inert gas arc welding i) TIG welding j) Plasma arc welding k) Oxy-acetylene welding The principles of ISO 15614-1:2004 may be applied to other fusion welding processes.
ISO 17660-1:2006	Welding -- Welding of reinforcing steel -- Part 1: Load-bearing welded joints	ISO 17660-1:2006 is applicable to the welding of weldable reinforcing steel and stainless reinforcing steel of load-bearing joints, in workshops or onsite. It specifies requirements for materials, design and execution of welded joints, welding personnel, quality requirements, examination and testing. ISO 17660-1:2006 also covers welded joints between reinforcing steel bars and other steel components, such as connection devices and insert anchors, including prefabricated assemblies. Non load-bearing joints are covered by ISO 17660-2. ISO 17660-1:2006 is not applicable to factory production of welding fabric and lattice girders using multiple spot welding machines or multiple projection welding machines. The requirements of ISO 17660-1:2006 are only applicable to static loaded structures.
ISO 17660-2:2006	Welding -- Welding of reinforcing steel -- Part 2: Non load-bearing welded joints	ISO 17660-2:2006 is applicable to the welding of weldable reinforcing steel and stainless reinforcing steel of non-load-bearing welded joints, in workshops or onsite. It specifies requirements for materials, design and execution of welded joints, welding personnel, quality requirements, examination and testing. Load-bearing welded joints are covered by ISO 17660-1.
ISO 15618-2:2001	Qualification testing of welders for underwater welding -- Part 2: Diver-welders and welding operators for hyperbaric dry welding	ISO 15618-2:2001 applies to welding processes where the skill of the diver-welder or welding operator has a significant influence on weld quality. This standard specifies essential requirements, ranges of approval, test conditions, acceptance requirements and certification for the approval testing of diver-welder or welding operator performance for the welding of steels underwater in a hyperbaric dry

ISO/IEC Standard	Standard Title	ISO Standard Abstract
		environment. The recommended format for the certificate of approval testing is given in Annex A. During the approval test the diver-welder or welding operator should be required to show adequate practical experience and job knowledge (test non-mandatory) of the welding processes, materials and safety requirements for which he is to be approved, information on these aspects is given in Annex B. ISO 15618-2:2001 is applicable when the diver-welder's or welding operator's approval testing is required by the purchaser, by inspection authorities or by other organizations. The welding processes referred to in this standard include fusion welding processes which are designated as manual or partly mechanized welding for diver-welders and fully mechanized or automatic welding for operators (see 5.2). All new approvals are in accordance with this standard from the date of this issue. However, this standard does not invalidate previous diver-welder or welding operator approvals made to former national standards or specifications, providing the intent of the technical requirements is satisfied and the previous approvals are relevant to the application and production work on which they are to be employed. Also, where additional tests should be carried out to make the approval technically equivalent it is only necessary to do the additional tests on a test piece which should be made in accordance with this standard. Consideration of previous approvals to former national standards or specifications should be at the time of the enquiry/contract stage and agreed between the contracting parties. The certificate of approval testing is issued under the sole responsibility of the examiner or examining body.
ISO 7005-1:2011	Pipe flanges -- Part 1: Steel flanges for industrial and general service piping systems	ISO 7005-1:2011 establishes a base specification for pipe flanges suitable for general purpose and industrial applications including, but not limited to, chemical process industries, electric power generating industries, petroleum and natural gas industries. It places responsibility for the selection of a flange series with the purchaser. It is applicable to flanges within facilities engaged in the processing or handling of a wide variety of fluids, including steam, pressurized water and chemical, petroleum, natural gas or related products. ISO 7005-1:2011 is also applicable to packaged equipment piping, which interconnects

ISO/IEC Standard	Standard Title	ISO Standard Abstract
		individual pieces or stages of equipment within a packaged equipment assembly for use within facilities engaged in the processing or handling of a variety of fluids, including steam and chemical, petroleum, natural gas or related products.
ISO 14001:2004	Environmental management systems -- Requirements with guidance for use	ISO 14001:2004 specifies requirements for an environmental management system to enable an organization to develop and implement a policy and objectives which take into account legal requirements and other requirements to which the organization subscribes, and information about significant environmental aspects. It applies to those environmental aspects that the organization identifies as those which it can control and those which it can influence. It does not itself state specific environmental performance criteria. ISO 14001:2004 is applicable to any organization that wishes to establish, implement, maintain and improve an environmental management system, to assure itself of conformity with its stated environmental policy, and to demonstrate conformity with ISO 14001:2004 by completing one of the following: a) Making a self-determination and self-declaration b) Seeking confirmation of its conformance by parties having an interest in the organization, such as customers c) Seeking confirmation of its self-declaration by a party external to the organization d) Seeking certification/registration of its environmental management system by an external organization. All the requirements in ISO 14001:2004 are intended to be incorporated into any environmental management system. The extent of the application will depend on factors such as the environmental policy of the organization, the nature of its activities, products and services and the location where and the conditions in which it functions. ISO 14001:2004 also provides, in Annex A, informative guidance on its use.
ISO/TS 29001:2010	Petroleum, petrochemical and natural gas industries -- Sector specific requirements -- Requirements for product and service supply organizations	ISO/TS 29001:2010 defines the quality management system for product and service supply organizations for the petroleum, petrochemical and natural gas industries. Boxed text is original ISO 9001:2008 text unaltered and in its entirety. The petroleum, petrochemical, and natural gas industry sector-specific supplemental requirements are outside the boxes.

2.2.2 International Standards Meetings

Throughout the period of performance, ABS has worked to establish, coordinate, and expand outreach programs with ISOs by frequent international standards meetings and conferences participation. **Table 9** below is a summary of the international standards meetings and conferences that have been attended by ABS engineers since September 2013.

ABS delivered international standard meeting notes on the BSEE/ABS developed meeting notes template. The notes provided an overview of the meeting, trends and changes to standards. The international standards notes were delivered to BSEE electronically.

Table 9: ISO Meeting Participation

Organization	Standard	Title	Date
IRF	N/A	Offshore Safety Conference	Monday, October 21, 2013 – Wednesday, October, 23, 2013
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	Tuesday, December 10, 2013
ISO	19905-3	Petroleum and natural gas industries -- Site-specific assessment of mobile offshore units -- Part 3: Floating units	Wednesday, December 11, 2013
ISO	TC 67/SC 7	Offshore structures	Wednesday, February 26, 2014
ISO	19905-3	Petroleum and natural gas industries -- Site-specific assessment of mobile offshore units -- Part 3: Floating units	Friday, February 28, 2014
ISO	19905-1 Panel 5	Petroleum and natural gas industries -- Site-specific assessment of mobile offshore units	Monday, May 05, 2014
ISO	19905-1 Panel 10	Petroleum and natural gas industries -- Site-specific assessment of mobile offshore units	Monday, May 05, 2014
ISO	19902 WG3	Petroleum and natural gas industries -- Fixed steel offshore structures	Tuesday, May 06, 2014
ISO	19901-2 Seismic	Petroleum and natural gas industries -- Specific requirements for offshore structures -- Part 2: Seismic design procedures and criteria	Tuesday, May 06, 2014
ISO	TC 67/SC 7	Offshore structures	Wednesday, June 25, 2014 – Thursday, June 26, 2014

2.2.3 Discussion of Changes to International Standards

A summary of proposed changes to international standards presented or discussed during international standard meetings since September 2013 are shown in **Table 10** below. The proposed changes to

standards were discussed with the BSEE project team throughout the course of the study during monthly meetings and documented in monthly project status reports.

Table 10: Proposed Changes to International Standards

Standard	Title	Status & Proposed Future Changes
19900	Petroleum and natural gas industries – General requirements for offshore structures	• Revised edition, published in September 2013 • Incorporated some major changes over the previous edition • There are no current formal plans to update the document, but a number of panel members envisage changes that need to be made • Likely a scope for revision will be developed over the next year or so
19901-1	Petroleum and natural gas industries – Specific requirements for offshore structures – Part 1: Metocean design and operating considerations	• Revision is nearly ready to go out as a Draft International Standard (DIS) • There is some confusion as to whether the document will include the maps and information that is to soon be published in API RP 2MET
19901-2	Petroleum and natural gas industries – Specific requirements for offshore structures – Part 2: Seismic design procedures and criteria	• Plans to get a DIS out by around the end of 2014; there have been changes in some of the background documents that will alter some of the factors included in this standard • Plan to broaden the scope of the document so that it is not so centered on fixed structures, even if only limited guidance is offered for other structural types • The seismic maps in Annex B need to be updated so that they contain better detail along the coastline, and give variation in seismicity with distance offshore • The seismic map update work has been funded, but there are still contractual issues to be resolved • Standard may be updated without the new maps if time does not allow for a full update including maps
19901-3	Petroleum and natural gas industries – Specific requirements for offshore structures – Part 3: Topsides structure	• The first edition contained an error and there have been complications in getting it corrected • A DIS, which corrects this error only, has just been approved and it will go straight to ISO without being issued as an Final Draft International Standard (FDIS) • Plans are underway to get the next edition of the standard out and the panel is working on that • Work includes updates, revisions and improvements
19901-4	Petroleum and natural gas industries – Specific requirements for offshore	• A new revision will soon be sent out for DIS ballot • ISO should be published in 2015

Standard	Title	Status & Proposed Future Changes
	structures – Part 4: Geotechnical and foundation design considerations	
19901-5	Petroleum and natural gas industries – Specific requirements for offshore structures – Part 5: Weight control during engineering and construction	• The revision DIS was approved in March 2014, but there is slow progress in moving toward an FDIS and the publication of the revised standard
19901-6	Petroleum and natural gas industries – Specific requirements for offshore structures – Part 6: Marine operations	• The scope of work for revising and updating this standard has been approved, and work should be commencing soon; however, there has been limited nomination of experts from the member countries
19901-7	Petroleum and natural gas industries – Specific requirements for offshore structures – Part 7: Stationkeeping for floating offshore structures and mobile offshore units	• Frequently there have been hull modifications that are not properly incorporated into the analysis • Not easy to make a requirement, but need to raise a flag (possibly more suited to 19905-3).; problem is "garbage in, garbage out" • There could be merit in establishing a standard way of doing capability plots for DP vessels • A possible thought was to split 19901-7 into two documents: one for permanent and one for mobile
19901-8	Petroleum and natural gas industries – Specific requirements for offshore structures – Part 8: Marine soil investigations	• This is a new standard • The FDIS has been balloted and approved • Publication is expected before the end of the year
19901-9	Petroleum and natural gas industries – Specific requirements for offshore structures – Part 9: Structural integrity monitoring	• Standard is under development • Will cover much of the material that used to be in API RP 2A about platform reassessment • Will establish reassessment criteria where appropriate • Will be an extensive and important document containing much new material • Plan to complete the main text and submit a CD to ISO in 2014
19902	Petroleum and natural gas industries – Fixed steel offshore structures	• A large team of industry experts have undertaken the job of updating this standard • Extent of changes has been focused on more critical items • Some old/out of date methodologies have been revised or removed • Foundation text has been removed to other ISO (e.g.,

Standard	Title	Status & Proposed Future Changes
		19901-4 and 19901-8) • All technical input expected before the end of 2014 at which point ISO editing will commence
19903	Petroleum and natural gas industries – Fixed concrete offshore structures	• A new project leader has been assigned to review and revise this standard • Scope of revision has not yet been determined
19904-1	Petroleum and natural gas industries – Floating offshore structures – Part 1: Monohulls, semi-submersibles and spars	• Standard being revised currently • Expect to change the load factors for monohulls based on some work to be presented to industry at API conference in September 2014 • Other changes to correct errors and misconceptions • Expect to get DIS out for ballot in 2015
19905-1	Petroleum and natural gas industries – Site-specific assessment of mobile offshore units – Part 1: Jack-ups (under development)	• First edition published in 2012 • Work started on first revision • Corrigenda to be published soon • Certain text changes to improve clarity are under discussion • Funded studies needed to update certain areas of the standard that need improvement (e.g., cases near resonance, seismic assessment, current cancellation, etc.)
19905-2	Petroleum and natural gas industries – Site-specific assessment of mobile offshore units – Part 2: Jack-ups commentary (under development)	• Publish commentary that contains a full "Go-By" document that sets out a sample calculation following 19905-1 • Contains other background information • When updated may contain additional information on seismic loads and radiation damping
19905-3	Petroleum and natural gas industries – Site-specific assessment of mobile offshore units – Part 3: Floating units (under development)	• Short document that sets out requirements for mobile floating units that is currently under development • Expected DIS in early 2015 • Scope is planned to be broad • Largely based on the requirement for an activity specific operating guideline
19906	Petroleum and natural gas industries – Arctic offshore structures	• A new project leader has been confirmed (at SC7 in Kunming in July 2014) • Held 2 meetings to determine the scope of revisions • Hope to get better communication between some of the other panels that need to interact with work group 8.

3. Comparison and Analysis of Oil and Gas Standards

A general comparison and analysis of the oil and gas standards that BSEE incorporates by reference into regulation to the international standards used by other countries was conducted. The purpose of this comparison was to identify international standards that could be considered by BSEE for incorporation by reference into 30 CFR Part 250. Careful analysis was conducted to ensure that duplication of work already incorporated into international standards was avoided.

This section contains a summary of the comparison, along with recommendations for BSEE to incorporate an increased number of ISO documents incorporated by reference into BSEE's regulations in 30 CFR Part 250. Recommendations include sections that can be incorporated by reference without further review, sections that need further review and standards that are not appropriate for incorporation into BSEE regulations.

BSEE reviewed the list of 117 oil and gas standards currently incorporated into BSEE regulation and prioritized the standards into three categories (1) high priority, (2) medium priority and (3) low priority. The BSEE priority level determined the level of effort and projected timeline for each standards comparison.

BSEE identified 30 high priority standards, 13 medium priority standards and 17 low priority standards. Additionally, BSEE identified 57 standards that were not applicable to this study. The majority of the standards deemed not applicable were API measurement standards (MPMS).

3.1 Methodology

ABS employed the following approach in conducting the standards comparative analysis.

1. Identify domestic standards incorporated by reference into BSEE regulation
2. Identify ISO and IEC standards related to the offshore oil and gas industry
3. Conduct literature search to determine comparable or equivalent standards
4. Determine SMEs with relevant knowledge of these standards
5. Develop standard comparative analysis template that provides the following:
    - Comparable or equivalent standard, if any
    - Major finding
    - Gaps or differences
    - Impacts for incorporation
    - Recommendations for the incorporation of standard
    - Risks and implementation challenges, if any
6. Assign standard comparative analysis to SMEs in phases (high, medium, and low)
7. Submit to BSEE for review and feedback
8. Receive feedback from BSEE
9. Provide recommendations for changes to standards and incorporation of ISO standards to BSEE based upon SME findings

3.2 Comparison of domestic standards currently incorporated into BSEE regulations to similar international standards

ABS SMEs conducted standard comparative analyses of domestic standards currently incorporated by reference into BSEE regulation. **Table 11** displays the comparable or equivalent international standards identified for each domestic standard analysis. The subsequent sections display the analysis, impact, and recommendation to BSEE for incorporation of a comparable or equivalent international standard into regulation.

Table 11: Comparable or Equivalent International Standards

Domestic Standard Incorporated into Regulation	Comparable or Equivalent International Standard	Priority Level
ANSI/API Spec 6A	ISO 10423:2009	High
ANSI/ASME Boiler and Pressure Vessel Code, Section VIII	ISO 16528-1:2007 and ISO 16528-2:2007	High
API Bulletin 2INT-DG	No Comparable Equivalent Found	High
API Bulletin 2INT-EX	ISO 19901-9 (Pending)	High
API Bulletin 2INT-MET	ISO 19901-1:2005	High
API RP 2A-WSD	ISO 19902:2007	High
API RP 2FPS	ISO 19904-1:2006	High
API RP 2I	No Comparable Equivalent Found	High
API STD 2RD	No Comparable Equivalent Found	High
API RP 2SK	ISO 19901-7:2013	High
API RP 2SM	ISO 18692:2007	High
API RP 2T	No Comparable Equivalent Found	High
API RP 14C	ISO 10418:2003	High
API RP 14E	ISO 13703:2000	High
API RP 14F	IEC 61892; IEC 61892-1; IEC 61892-2; IEC 61892-3; IEC 61892-4; IEC 61892-5; IEC 61892-6; IEC 61892-7	High
API RP 14FZ	IEC 61892; IEC 61892-1; IEC 61892-2; IEC 61892-3; IEC 61892-4; IEC 61892-5; IEC 61892-6; IEC 61892-7	High
API RP 14G	ISO 13702:1999	High
API STD 53	No Comparable Equivalent Found	High
API RP 65	No Comparable Equivalent Found	High
API RP 500	IEC 60079-10-1	High
API RP 505	IEC 60079-10-1	High
API Spec 2C	ISO 8686 and ISO 4302	High
ANSI/API Spec 6D	ISO 14313:2007	High
ANSI/API Spec 14A	ISO 10423:2004	High
API RP 90	ISO/TS 16530-2	High
API Standard 65, Part 2	No Comparable Equivalent Found	High
ASTM C 330-05	No Comparable Equivalent Found	High
ASTM C 595-08	No Comparable Equivalent Found	High
NACE MR0175-2009	ISO 15156	High
NACE SP0176-2007	No Comparable Equivalent Found	High

Domestic Standard Incorporated into Regulation	Comparable or Equivalent International Standard	Priority Level
ANSI/ASME B 31.8-2012	ISO 13623	Medium
API 510	No Comparable Equivalent Found	Medium
API RP 2D	No Comparable Equivalent Found	Medium
API RP 14B	ISO 10417:2004	Medium
API RP 14H	No Comparable Equivalent Found	Medium
API RP 14J	ISO 17776:2002	Medium
ANSI/API Spec 17J	ISO 13628-2:2006 and 13628-2:2006/Cor.1:2009	Medium
API RP 75	No Comparable Equivalent Found	Medium
ASTM C 3M-07	ISO 19595	Medium
ASTM C 94/C 94M-07	ISO 22965-2:2007	Medium
ASTM C 150-05	No Comparable Equivalent Found	Medium
AWS D1.1:2000	ISO 15607 and ISO 15614	Medium
AWSD1.4-98	ISO 17660	Medium
AWS D3.6M:2010	ISO 15618	Medium
ACI 318-95	No Comparable Equivalent Found	Low
ACI 318R-95	No Comparable Equivalent Found	Low
ACI 357R-84	ISO 19903:2006	Low
ANSI/AISC 360-05	No Comparable Equivalent Found	Low
ANSI/ASME Boiler and Pressure Vessel Code, Section I	ISO 16528-1:2007 and ISO 16528-2:2007	Low
ANSI/ASME Boiler and Pressure Vessel Code, Section IV	ISO 16528-1:2007 and ISO 16528-2:2007	Low
ANSI/ASME B 16.5-2013	ISO 7005:1 and ISO 7005:2	Low
ANSI/ASME SPPE-1-1994	ISO14001	Low
ANSI/ASME SPPE-1-1996 Addenda	ISO14001	Low
ANSI Z88.2-1992	ISO16976	Low
ANSI/API Spec. Q1	ISO 29001:2010	Low
API Spec. 6AV1	ISO 10423:2009	Low
ISO/IEC 17011	Not Applicable	Low
COS-2-01	ISO/TEC 17021 and ISO 19011	Low
COS-2-03	ISO/TEC 17021 and ISO 19011	Low
COS-2-04	ISO/TEC 17021 and ISO 19011	Low

ANSI/API Spec 6A ~ **ISO 10423:2009**

3.2.1 ANSI/API Specification 6A

ANSI/API 6A, Specification for Wellhead and Christmas Tree Equipment, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.1.1 *Analysis*

API 6A 20th Edition, Specification for Wellhead and Christmas Tree Equipment, is the modified national adoption of ISO 10423:2009, Petroleum and natural gas industries-Drilling and production equipment-Wellhead and Christmas Tree Equipment. This specification contains the API Monogram Annex "P" as part of the U.S. National adoption. The effective date of this specification was 1st April, 2009.

The ISO 10423, 4th Edition has been technically revised based on API 6A (19th Edition of July, 2004) and its addendums are errata, and API AVI, first edition, February 1996 and its errata with the intent that API 20th Edition will be identical to 4th Edition of ISO 10423 of December 2009. ISO 10423 3rd Edition was published in 2003 incorporating a number of minor changes as noted in the technical corrigendum. API 6A 19th Edition was published in 2004 adopting a large majority of the ISO 10423 2003 text. However some amendments were also included. The main additional subjects included are contents derived from NACE MR 0175/ISO 15156 Series, the issue of forgings versus casings for "PSL 3," the issue of the original manufactured equipment for "Repair and Remanufacturer" and various other technical changes to keep the standard up to date with emerging technology. It was proposed that the ISO 10423 4th revision should be worked together with an API 6A 20th revision with an aim of minimizing technical differences between the two standards/specifications.

API 6A 20th Edition/ISO 10423 4th Edition specifies requirements and gives recommendations for the performance, dimensional and functional interchangeability, design, material, testing, inspection, welding, marking, handling, storing, shipment, purchasing, repair and remanufacture of wellhead and Christmas tree equipment for use in the petroleum and natural gas industries.

ISO 10423:2009 is applicable to specific types of wellhead equipment, connectors and fittings, casing and tubing hangers, valves and chokes, loose connectors (flanged, threaded, and OEC, and welded), and other equipment such as actuators, clamp hubs, pressure boundary penetrations, ring gaskets, running and testing tools and wear bushings, etc.

ISO 10423:2009 standard does not apply to field use, field testing or field repair of "Wellhead and Christmas tree equipment." This International Standard uses SI units; however, nominal sizes are shown as fractions in the inch system. Fractions and their decimal equivalents are equal and interchangeable.

Metric conversions and inch dimensions in this international standard are based on the original fractional inch designs and fractional dimensions have been converted into the metric system to ensure interchangeability of products manufactured in metric or inch systems can also found in Annex "B" (The nomenclature is defined and most physical dimensions are given in USC units as well as Metric Units).

ISO 10423:2009 defines service conditions, in terms of pressure, temperature and material class for the well-bore constituents and operating conditions. This standard also establishes requirements for five PSLs, 1, 2, 3, 3G, and 4. These five PSL designations define different levels of technical quality requirements. Guidelines (NOT requirements) are provided for selecting an acceptable PSL.

3.2.1.2 *Impact and Recommendation*

As noted in the gap analysis, API 6A 20th edition (2010) and ISO10423:2009 are identical. However, the current CFR references an older edition of the standard, API Spec. 6A, 19th edition, Effective Date: February 1, 2005 / ISO 10423 3rd Edition: 2003. It is recommended that BSEE review the 20th edition and determine if the standard should be incorporated by reference. If BSEE does determine that the updated standard should be incorporated, the identical standard, ISO 10423:2009, should be reviewed for incorporation.

Note that API 6A is currently being revised from 20th Edition and will be published (tentatively 2014/2015). Hence there may be a need to compare the ISO 10423 standard 4th edition to that of 21st edition of API 6A.

ANSI/ASME Boiler and Pressure Vessel Code, Section I, IV, and VIII

ISO 16528-1;2 2007

3.2.2 ANSI/ASME Boiler and Pressure Vessel Code, Section I, IV, and VIII

The ANSI/ASME Boiler and Pressure Vessel Code, Sections I, IV, and VIII are incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.2.1 *Analysis*

The main objective of the ASME Boiler and Pressure Vessel Code is to establish the minimum requirements for safe construction and operation of pressure vessels.

ANSI/ASME Section I contains the requirements for the construction of power, electric, and miniature boilers; high temperature water boilers used in stationary service; and power boilers used in locomotive, portable, and traction service.

ANSI/ASME Section VIII contains requirements and guidance for pressure vessel materials, design, fabrication, examination, inspection, testing, certification, and pressure relief. Section VIII is divided into three divisions.

- Div. I Rules for Construction of Pressure Vessels
- Div. II Rules for Construction of Pressure Vessels (Alternative Rules)
- Div. III Rules for Construction of Pressure Vessels (Alternative Rules for Construction of High Pressure Vessels)

Division I provides requirements applicable to the design, fabrication, inspection, testing, and certification of pressure vessels operating at either internal or external pressures exceeding 15 psig. The rules of this Division have been formulated on the basis of design principles and construction practices applicable to vessels designed for pressures not exceeding 3,000 psi [20 Mega Pascal (MPa)]. The code also lists specific items for which it is not applicable. The code discusses various general requirements (UG), requirements for the fabrication of pressure vessels based on the method used (such as UW, UF, and UB for welded, forged, and brazed). It also covers specific requirements based on the class of material used in the pressure vessel construction (such as UCS, UNF, UHA, UCI, UCL, UCD, UHT, ULW, ULT, and UIG). The standard also specifies maximum allowable stress values for these classes of materials. Design rule is: Membrane – Maximum stress elastic analysis.
Division II provides the requirements on materials, design, and non-destructive examination. These requirements are more rigorous than in Division I; however, higher design stress intensify values are permitted. Design rule is maximum shear stress; material and Nondestructive examination (NDE) requirements are more stringent than Division I. The requirements of this division are contained in nine parts, which include: general requirement, responsibilities, material requirements, design by rule requirement, design by analysis requirement, fabrication requirements, pressure testing requirements, examination and inspection, and over pressure protection.

Division III provides the requirements applicable to pressure vessels operating at either internal or external pressures generally above 10,000 psi. It does not establish maximum pressure limits for Section VIII, Divisions I or II, or minimum pressure limits for this Division. Design rule is: Maximum shear stress theory, elastic plastic analysis, fracture mechanics evaluation. Material and NDE requirements are more stringent than Division I and II. The requirements of this division are contained in eight parts, which include: general requirements, material requirements, design requirements, fabrication requirements, pressure relief devices, examination requirements, testing requirements, and marking.

The most comparable ISO standard is ISO 16528-1 and 16528-2 which describes the performance requirements and procedures for fulfilling these requirements. This standard does not address operation, maintenance and in-service inspection of boilers and pressure vessels. ISO 16528-1 provides failure modes (short-term, long-term and cyclic type failure) which the designer should address. The standard specifies the properties of the material which the designer should consider for pressure, non-pressure part and welding consumables. The standard also specifies types of loads, design factors, and design methods to be considered by the designer. However, these standards do not specify detailed requirements or specific design factors, design philosophy, procedure, list of materials, etc.

3.2.2.2 *Impact and Recommendation*

ASME Boiler Pressure Code is the most comprehensive standard available for material selection, design, fabrication, examination, inspection, testing, and certification of pressure vessels. It is recommended that BSEE continue to reference this standard.

A new edition of the standard was published in 2013. BSEE should review this edition and consider incorporation.

API Bulletin 2INT-DG

3.2.3 API Bulletin 2INT-DG

The API Bulletin 2INT-DG, Interim Guidance for Design of Offshore Structures for Hurricane Conditions, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.3.1 *Analysis*

API Bulletin 2INT MET and API Bulletin 2INT DG were developed to fill an immediate need following the devastating hurricane seasons that included Ivan, Katrina, and Rita. A number of API RPs needed to be modified to reference the new metocean data included in 2INT MET. There also needed to be some modification to account for potentially higher local random wave crests (effectively either increasing air gaps or stating the local peak wave loads were to be considered in design). 2INT DG was developed to *temporarily* give the needed guidance until the base API documents could be updated.

The 2DG guidance on RP 2A WSD have not been taken into account in ISO 19902 or in API RP 2A LRFD as they already referenced a return period approach rather than a specified set of metocean parameters; in effect, 2DG is irrelevant if using either of those two standards (which are almost identical) to design a fixed steel jacket.

There is no international equivalent to API RP 2T (TLPs), but that document has since been updated and incorporates all the TLP relevant recommendations of 2DG.

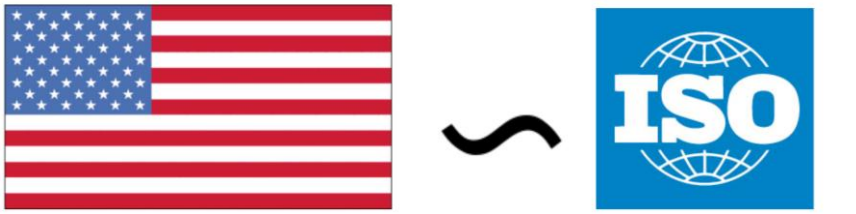
There was very little about API RP 2FPS in 2DG (only comments about the airgap); however, since publication of 2DG, 2FPS has been updated to align with ISO 19904-1, with some additional minor additions.

API RP 2SK has had an addendum published since 2DG was issued, but the main 2DG recommendation of use of 2INT MET and a robustness check have not been incorporated (except in Appendix K that deals exclusively with MODUs, and MODUs are not covered by API 2DG). It is unlikely that the current draft of

ISO 19901-7 has these recommendations, although that document is slated for updating. API RP 2TD (tiedowns) has not been updated since 2DG was published. The recommendations in 2DG do not appear to be in the ISO topsides document 19901-3.

3.2.3.2 *Impact and Recommendation*

API Bulletin 2INT DG should become obsolete as the API standards it references are either updated or replaced. The document does include some GoM specific recommendations that are not included in the relevant ISO equivalents of the referenced API documents, although this is expected to change over time. BSEE should continue to reference API Bulletin 2INT DG until either it is withdrawn or all the relevant API or ISO documents have been suitably updated.



API Bulletin 2INT-EX **ISO 19901-9 (Pending)**

3.2.4 API Bulletin 2INT-EX

The API Bulletin 2INT-EX, Interim Guidance for Assessment of Existing Offshore Structures for Hurricane Conditions, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.4.1 *Analysis*

API Bulletin 2INT EX was developed after the devastating hurricanes Ivan, Katrina and Rita. It was realized that many of the previously installed structures in the Central Zone of the GoM had been designed to too low a wave height/wind speed. The document covers all types of facilities.

High consequence jackets were to be reassessed to ensure they did not fall over in the new metocean conditions set out in 2INT MET. A1 or L1 Fixed platforms in Central Zone were to be shown to have an RSR of at least 1.2.

Floating facilities in the Central Zone were also to be reassessed. The reassessment criteria for floating units are different from fixed platforms. They should be capable of meeting sudden hurricane conditions within “normal allowable” levels, should survive the new 100 year condition, and should have a robustness check.

The document is GoM-specific and only applies to facilities installed before API 2INT MET was issued (all facilities installed after 2INT MET was created should have been designed to that document).

ISO 19902 (steel jackets) does contain a reassessment clause that approximately covers the parts of 2EX dealing with fixed platforms. Floating facilities are not covered in their equivalent ISO 19904-1 (there is

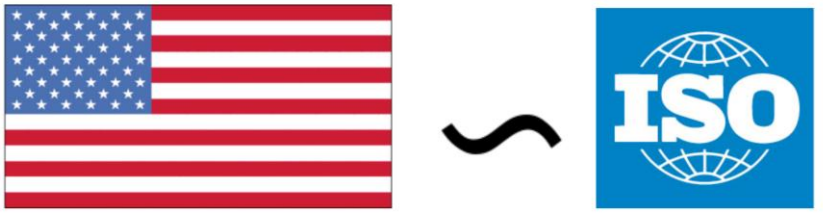
no ISO for TLPs). However, the expectation is that all the facilities in the GoM to which 2EX would apply should have been reassessed.

When published, ISO 19901-9 on Structural Integrity Monitoring (SIM) will address similar topics to 2EX. Publication is not expected before 2016.

3.2.4.2 *Impact and Recommendation*

There should be little use now of API Bulletin 2INT EX as all GoM structures that it applies to (i.e., those installed before 2INT MET in the Central Zone) should have been reassessed to its criteria. There is no International equivalent as 2INT EX is very specifically written for the GoM and consistently references API Bulletin 2INT MET.

In the longer run, it is likely that ISO 19901-9 (SIM) will cover the same type of ground as 2INT EX in a more general sense and would be a good document for BSEE to adopt. However, it will not likely be published for a couple of years.



API Bulletin 2INT-MET **ISO 19901-1:2005**

3.2.5 API Bulletin 2INT-MET

The API Bulletin 2INT-MET, Interim Guidance on Hurricane Conditions in the GoM, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.5.1 *Analysis*

API Bulletin 2INT MET was developed out of some of the results of the MODU Mooring Strength and Reliability Joint Industry Project (JIP) managed by ABS. It is an interim document that has been in revision since just after it was first published. The original expectation was that API RP 2 MET would be published in 2010 at the latest, which did not occur.

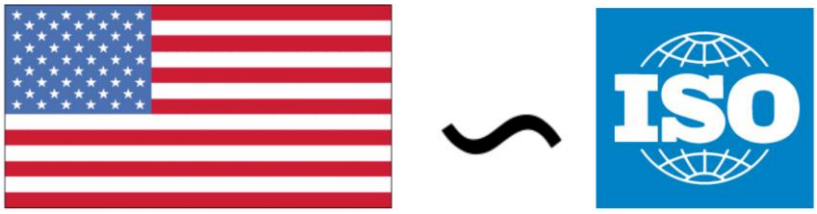
The original version of ISO 19901-1 was published in 2005, before the devastating 2005 hurricane season, but after hurricane Ivan. Since then, 19901-1 has been revised and is anticipated to be published in late 2014.

The new edition of the ISO standard will contain an Annex of GoM data. This edition is expected to include most of the revisions made to the U.S. GoM hurricane season data and will be incorporated into API RP 2MET. This is a change from what was expected in April 2014, but in an ISO TC67/SC7 Leadership Telephone conference call on May 21, 2014 the Panel Convener for 19901-1 stated that he had been told that API would be supplying the latest information for inclusion in the ISO. In effect, the ISO

standard will be fully up to date when it is published. There was further discussion on this issue in the September 4th 2014 ISO TC67/SC7 Leadership Telephone conference call. It is still unclear if the revised GoM Annex will be available for inclusion, but the issue should have been cleared up before publication of 19901-1 in 2015. It was stated that API RP 2MET has been approved by API ballot, but is subject to an additional "no-comment" ballot prior to publication expected in November 2014.

3.2.5.2 *Impact and Recommendation*

BSEE should update the CFR reference from API Bulletin 2INT MET as soon as either ISO 19901-1 revision 2 or API RP 2MET is published (it appears that API RP 2MET will be published first, as of 4th September 2014). There has been a change in thought since the JIP data was interpreted and API Bulletin 2 INT MET was published. The revised ISO standard needs to be reviewed to ensure that it does include the latest GoM data, but if it does when published, then either revised document would be a good reference (with the ISO being preferable if the intent is to move towards international standards). At present neither document is a good reference based on current thought.



API RP 2A-WSD ~ **ISO 19902:2007**

3.2.6 API RP 2A-WSD

API RP 2A-WSD, RP for Planning, Designing and Constructing Fixed Offshore Platforms — Working Stress Design, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.6.1 *Analysis*

API RP 2A WSD is a working stress design code. There is no major International equivalent standard that is Working Stress Design (WSD). The closest equivalent ISO standard (19902) is a Load and Resistance Factor Design standard.

There is an out-of-date API equivalent to ISO 19902 – and 19902 is based in large part on that standard – API RP 2A LRFD, published in approximately 1992. This API document is currently being updated and will be almost identical to ISO 19902.

When API RP 2A LRFD was first published it was intended to replace the WSD equivalent, but WSD is extensively used in the GoM, and not only was the WSD code not retired, it has been subsequently updated at least twice.

3.2.6.2 *Impact and Recommendation*

ISO 19902 is a well-founded document that has been developed over many years with considerable American and International input. While there is merit in BSEE changing its CFR reference from API RP 2A WSD to ISO 19902 (or API RP 2A LRFD), it is likely that there will be resistance from the jacket designers in the GoM who are not familiar with LRFD design methods.

API RP 2FPS ~ **ISO 19904-1:2006**

3.2.7 API RP 2FPS

API RP 2FPS RP for Planning, Designing, and Constructing Floating Production Systems, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.7.1 *Analysis*

ISO 19904-1:2006 was most likely based on the first edition of API RP 2FPS published in 2001, but would have been heavily modified and reformatted. API RP 2FPS 2nd edition was based on ISO 19904-1:2006, but contains some modifications and updates. The later API (2nd edition) includes some of the findings from the Thunder Horse incident in 2005. It also includes mention of Floating Liquified Natural Gas FLNG (not much, but it is briefly discussed). Probably the two biggest changes are the statement in section 6.2 that, "For GoM applications, all structures covered by this standard shall be considered to have an exposure level of L1." Also, because API feels that the LRFD partial factors in the ISO have not been fully calibrated for tropical revolving storm areas, current API WSD factors have been specified, and the API includes a normative Annex B in API RP 2FPS, not in 19904-1, giving references to sources of design documentation.

API RP 2FPS references API documents, while the ISO mainly references other ISO standards.

It is of note that work has just started in ISO TC67/SC7/WG5 to update ISO 19904-1. It seems likely that, while they will not be able to literally copy and paste the API changes, many of those changes will be incorporated into the revised ISO 19904-1 along with other updates.

Note, there is not an ISO equivalent of API RP 2T; ISO 19904-2 was supposed to cover TLPs, but it has not been developed, and is not on the books for development.

3.2.7.2 *Impact and Recommendation*

The current reference to API RP 2FPS is likely better suited to the current arrangement of CFRs for two reasons: 1) it contains the API references that are used within existing CFRs, and 2) it is updated from

the ISO standard and is likely better suited to use in the GoM. It is thought that after the ISO standard is updated, it will be a more current document; however, the ISO/API issues could affect future updating procedures. It is recommended that BSEE keep the current domestic reference now, but reassess in the future when ISO 19904-1 is released.

API RP 2I

3.2.8 API RP 2I

API RP 2I, In-Service Inspection of Mooring Hardware for Floating Structures, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.8.1 *Analysis*

API RP 2I is the most comprehensive mooring hardware inspection guide covering most offshore mooring hardware and jewelry. Other guides/rules may cover individual components in greater detail (e.g., Classification Society Rules for inspection of mooring chain may be more detailed) but there is not another guide, standard or RP that is as complete as API RP 2I.

3.2.8.2 *Impact and Recommendation*

BSEE should continue to incorporate the API RP 2I by reference in regulation.

API Standard 2RD

3.2.9 API STD 2RD

API Standard 2 RD, the Standard Practice for Design of Risers for FPSs and TLPs, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.9.1 *Analysis*

API Standard 2RD was originally developed as an ISO document by a joint ISO/API Work Group but later completed as an API document and published in September 2013. Hence, no ISO equivalent exists for this document.

While reviewing the standard and related CFR section it was observed that there is no direct relationship between the CFR section and API Standard 2RD since 2RD is for offshore floating risers and 250.800; 250.901 and 250.1002 is for Department of Interior (DOI) pipelines. However, for Slow Circulating Rate (SCR) the pipeline is part of it and shall have some kind consistency between them in order to make sure the same level of safety.

Sub-clause (5) of 30 CFR 250.1002 addressed this issue as the pipeline risers design needs to meet the API RP 2RD requirements.

3.2.9.2 *Impact and Recommendation*

(1) No additional requirements need to be added. CFR needs to be updated to the latest revision of API 2RD as API STD 2RD instead of API RP 2RD.

(2) Since there are differences in design requirements for pipeline when it is as part of riser in 2RD with offshore pipeline design in ANSI/ASME B31.8 (both are incorporated in 30 CFR 250), it is suggested to clearly state in CFR that the design of offshore pipeline section of pipeline riser shall meet both API STD 2RD and ANSI/ASME B31.8 requirements for gas transmission pipeline, whichever is more stringent.

(3) Because API STD 2RD covers both gas and liquid pipeline riser and ANSI/ASME B31.8 is only for gas transmission pipeline, it is suggested to incorporate the ANSI/ASME B31.4 for liquid hydrocarbons transmission pipeline into CFR, so B31.8 and B31.4 together will match the API STD 2RD.

Note: ANSI/ASME B31.4 is incorporated in 49 CFR Parts 192, 193, and 195 for onshore pipeline.

While reviewing the standard and related CFR section it was observed that there is no direct relationship between the CFR section and API Standard 2RD since 2RD. BSEE should review the standard further.

Additionally, the corresponding ISO 13628-12 is still under development and has not yet been published.

API RP 2SK ~ **ISO 19901-7:2013**

3.2.10 API RP 2SK

API RP 2SK, Design and Analysis of Stationkeeping Systems for Floating Structures, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.10.1 *Analysis*

The two documents are similar in content, except that there have been some revisions to the API document that have not been included in the ISO. In addition, the document structure is very different. API RP 2SK has a main body with a large number of Appendices that cover a range of topics. The ISO document is better structured, with the Normative covering all subjects and Annex A supplying additional information in a one-to-one mapping between Normative and Annex. There is then an Annex B that includes Regional information. The API 2SK Appendices cover a range of different topics and include both additional information, and "requirements."

API RP 2SK is currently being reviewed for updating, and it is likely that there will be major restructuring to make it similar to the ISO in layout, if not contents. In addition, the API standards that go with and support 2SK are being revised and restructured. This whole process is a major undertaking expected to be ongoing for the next few years.

The ISO panel responsible for 19901-7 was recently reformed under a new project leader and the plan is to revise the document, and incorporate all the necessary changes from the API (assuming that the IP issues do not prevent such a move).

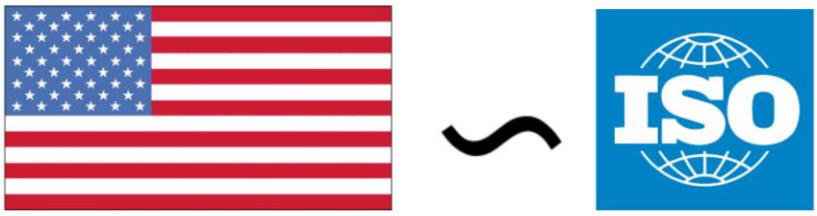
Based on what is currently known, there will be independent revisions of API RP 2SK and ISO 19901-7 being undertaken at the same time and with likely different outcomes.

RP 2SK contains an Appendix that was specifically developed for MODU operations in the GoM stating that a risk assessment be undertaken. While it is likely that this section will be subject to extensive modification and possible removal there is currently no equivalent in the ISO and it is unlikely such a section would be added to the ISO.

3.2.10.2 *Impact and Recommendation*

Logically, in the long run BSEE would be well advised to move toward the ISO 19901-7. However, currently API RP 2SK contains additional GoM specific sections that are not in the ISO and it would be

hard to replicate these within an ISO, particularly given the requirement for "ISO Speak.". In addition, the API document may be more up-to-date when the current round of edits is incorporated. Both the API and ISO revisions will take an extended period to come into effect so BSEE should keep the current API reference for a few years until the overall position is clarified.



API RP 2SM **ISO 18692:2007**

3.2.11 API RP 2SM

API RP 2SM, RP for Design, Manufacture, Installation, and Maintenance of Synthetic Fiber Ropes for Offshore Mooring, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.11.1 *Analysis*

The current version of API RP 2SM is 1st Edition (2001) with a 2007 Addendum. The addendum largely corrected errors in the methods of estimating, measuring, defining and accounting for axial stiffness and elongation. It also added an Appendix about minimizing damage during installation.

There is currently a 2nd Edition in API for editing and ballot. Most of the work on the edition was completed by February 2012. This second edition follows an ISO type of format. It references ISO 18692 as a normative reference but is not based on that document.

The scope of API 2SM is broader than the scope of ISO 18692 and 19901-7 combined in that it covers a wider range of materials and in greater detail.

3.2.11.2 *Impact and Recommendation*

API RP 2SM is the best current reference for BSEE, although the second edition will be an even better document when it is finally approved by API. The existing ISO documents have limited scope and detail. Until their scope is improved they can only be used as supplemental references (as is done in 2SM 2nd edition).

API RP 2T

3.2.12 API RP 2T

API RP 2T, RP for Planning, Designing, and Constructing TLPs, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.12.1 *Analysis*

There is no major international equivalent standard to API RP 2T. ISO 19904-2, Petroleum and natural gas industries – Floating offshore structures – Part 2: TLPs was set aside for TLPs. There are currently no plans to develop 19904-2 and this is unlikely to change in the foreseeable future.

3.2.12.2 *Impact and Recommendation*

API RP 2T 3rd Edition is now available. BSEE should review the 3rd edition for incorporation by reference and revisit ISO 19904-2 if published.

API RP 14C **ISO 10418:2003**

3.2.13 API RP 14C

API RP 14C, RP for Analysis, Design, Installation, and Testing of Basic Surface Safety Systems for Offshore Production Platforms, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.13.1 *Analysis*

API RP 14C has been proven to be effective for many years in the petroleum industry. It has an international equivalent standard, ISO 10418. The content of ISO 10418 has been derived from the methods contained in API RP 14C.

Most of the contents for both standards are equivalent, however, additional check items from Safety Analysis Checklist (SAC) tables are found in ISO 10418 as compared to API RP 14C, such as ESS for PSL,

Temperature Safety High (TSH), Temperature Safety Low (TSL), and Flow Safety Low (FSL). Also, additional ESD shutdown stations are introduced in ISO 10418.

There is a section introducing testing and reporting procedure of safety device and systems in both standards, however, the contents are somewhat different from each other. API RP 14C has specific recommended test frequency whereas ISO 10418 has a test frequency of annual or in accordance with IEC 61511-1. It is also found that Safety Analysis Function Evaluation (SAFE) Charts of ISO 10418 shows additional function performed for each process component.

3.2.13.2 *Impact and Recommendation*

ISO 10418 is a well-founded document and has been based on API RP 14C with a few additional requirements. While there is merit in BSEE changing its CFR reference from API RP 14C to ISO 10418, there could be reasons for the difference in contents for U.S. based designs. It is recommended that BSEE review ISO 10418 to determine if they want to accept the differences between the ISO and the API document.

API RP 14E **ISO 13703:2000**

3.2.14 API RP 14E

API RP 14E, RP for Design and Installation of Offshore Production Platform Piping Systems, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.14.1 *Analysis*

API RP 14E has been proven to be effective for many years in the petroleum industry. It has an international equivalent standard, ISO 13703. The content of ISO 10418 has based on API RP 14E. Most of the contents for both standards are equivalent, however, additional notes or sections are found in ISO 13703.

Another difference is that ISO 13703 uses Metric unit system whereas API RP 14C uses U.S. oilfield unit system.

3.2.14.2 *Impact and Recommendation*

ISO 13703 is a well-founded document and has been based on API RP 14E with some additional requirements. While there is merit in BSEE changing its CFR reference from API RP 14E to ISO 13703, there could be reasons for the difference in contents for U.S. based designs. In addition, unit

conversions from Metric to U.S. oilfield can be problematic. It is recommended that BSEE review ISO 13703 to determine if they want to accept the differences between the ISO and the API document.

API RP 14F and API RP 14FZ

IEC 61892; IEC 61892-1; IEC 61892-2; IEC 61892-3; IEC 61892-4; IEC 61892-5; IEC 61892-6; IEC 61892-7

3.2.15 API RP 14F and API RP 14FZ

API RP 14F and API RP 14FZ are incorporated into BSEE regulation. A literature search was conducted to determine comparable or equivalent ISO standards. A standard comparative analysis was conducted between API 14F/API 14FZ to determine relevant or comparable international standards. The analysis, impact and recommendations sections were divided into ten categories of the standard shown below. The first column in **Table 12** shows the categories of the standard and the second column shows the IEC comparable or equivalent standards identified.

Table 12: API 14F/API 14FZ Sections and Comparable ISO Standards

14F/14FZ Sections	ISO/IEC Comparable Standards
General, Reference, and Definitions	IEC 61892, Mobile and fixed offshore units – Electrical installations: IEC 61892-1, Part 1: General requirements and conditions IEC 61892-2, Part 2: System design IEC 61892-3, Part 3: Equipment IEC 61892-4, Part 4: Cables IEC 61892-5, Part 5: Mobile Units IEC 61892-6, Part 6: Installation IEC 61892-7, Part 7: Hazardous Areas
Electrical Equipment for Hazardous (Classified) Locations	
Electric Power Generating Stations	
Electrical Distribution Systems – Cables	
Electrical Distribution Systems	
Electric Motors	
Transformers	
Lighting	
Battery-powered DC Supply Systems	
Special Systems and Special Considerations	

3.2.15.1 *Analysis*

General, Reference, and Definitions

API RP 14F is a RP for electrical systems on offshore petroleum facilities. This RP identifies features of offshore electrical systems and recommends generally accepted practices for electrical design and installation in the offshore industry. It is noted that this RP is titled for "Unclassified and Class 1, Division 1 and Division 2 Locations." This terminology coincides with the classification method for hazardous areas as described in API RP 500.

API RP 14FZ is a RP for electrical systems on offshore petroleum facilities. This RP identifies features of offshore electrical systems and recommends generally accepted practices for electrical design and installation in the offshore industry. It is noted that this RP is titled for “Unclassified and Class 1, Zone 0,

Zone 1, and Zone 2 Locations." This terminology coincides with the classification method for hazardous areas as described in API RP 505.

API RP 14F and 14FZ reference and are derived from North American standards such as National Fire Protection Association (NFPA), Institute of Electrical and Electronic Engineers (IEEE), National Electrical Manufacturer's Association (NEMA), etc.

Electrical Equipment for Hazardous (Classified) Locations

API RP 14F/14FZ and IEC 61892-7 describe electrical equipment protection techniques and refer to the appropriate standards for the equipment protection. IEC 61892-7 further describes electrical system recommendations and other factors to consider for circuits and apparatus in hazardous areas, such as earth fault protection, system earthing, static electricity, lightning protection, etc.

IEC 61892-7, 5.5.1 indicates that equipment which remains live following an emergency switch-off is to be certified for hazardous area Zone 1, however, then goes on to say that some emergency equipment can be accepted without Zone 1 certification, subject to special consideration. This differs from requirements in Class Rules. Class Rules specify that equipment that remains energized following an emergency shutdown (ESD) is to be certified for installation in Class I, Division 2 (or Zone 2) locations and does not give exceptions for emergency equipment.

For hazardous area installations, API RP 14F/14FZ relies heavily on other industry standards, government codes and regulations, and Class Rules. IEC 61892-7 also refers to other standards; however, IEC 61892-7 is a more stand-alone standard for hazardous area installations.

Electric Power Generating Stations

API RP 14F/14FZ specifically specifies that floating facilities shall be furnished with an emergency power system consisting of an emergency switchboard powered from an emergency power source. IEC 61892 also gives requirements for an emergency power system, however, offers an alternative arrangement without a specific emergency power source provided the main source of power is located in two or more spaces which have their own completely independent systems, including power distribution and control systems, such that a fire or other casualty in any one space will not affect the power distribution from the other spaces.

API RP 14F/14FZ recommends sizing of the prime mover relative to the design load [kilowatts (kW)] and generator efficiency. IEC 61892 does not give this kind of prime mover sizing guidance; however, it does have guidance on the generators' performance in transient conditions.

API RP 14F/14FZ recommends that engine intakes and exhausts be located in non-hazardous locations and further recommends that air-intake shutoff valves be equipped on diesel generator installations. IEC 61892 does not cover this topic.

API RP 14F/14FZ recommends engine controls for automatic shutdowns of engines when potentially damaging conditions occur. IEC 61892 does not give this kind of guidance.

In general, API RP 14F/14FZ gives more specific guidance for natural gas turbine generators in addition to diesel generators. IEC 61892 is more general in nature where it relates to the prime mover of the generators.

Electrical Distribution Systems – Cables

API RP 14F/14FZ does not specify any particular cable construction standards or flame retardancy/fire resistant cable standards that the cables must meet. Rather, API RP 14F/14FZ describes characteristics of cables that would be suitable for installation on a floating facility. These descriptions appear to be based on IEEE. IEC 61892-4 specifically states that cables constructed in accordance with IEC 60092-350, -353, -354, and -376 are recommended for offshore units.

Both API RP 14F/14FZ and IEC 61892-4 give ampacity (current carrying capacity) ratings based on cable construction characteristics, cable installation methods, and ambient temperatures. API RP 14F/14FZ and IEC 61892-4 both provide tables for determining cable ampacity ratings.

The tables in API RP 14F/14FZ, which appear to be based on IEEE cable constructions, start with a baseline of single-banked (single-layered) installation of cables with an ambient temperature of 45 degrees Celsius (°C). The tables in IEC 61892-4 start with a baseline of cables installed in free air with an ambient temperature of 45°C. IEC 61892-4 provides tables for current carrying capacity calculation correction factors based on the number of cables installed in a single layer.

The API RP 14F/14FZ tables are then organized by size of the cable, number of conductors in the cable, and the cable insulation temperature rating. The IEC 31892-4 tables require the same information to determine a cable's ampacity; however, the information is split up into separate tables for the different conductor (insulation) temperature ratings.

The API RP 14F/14FZ tables include ampacity ratings for cables with conductor insulation temperature ratings of 75°C, 90°C, 100°C, and 110°C whereas IEC 61892-4 considers 70°C, 90°C, and 95°C.

Both API RP 14F/14FZ and IEC 61892-4 specify correction factors for different ambient temperatures, for more than three conductors in a cable, and different installation arrangements.

Both API RP 14F/14FZ and IEC 61892-4 describe cable installations in hazardous areas and specify different methods for mechanical protection of the cables (i.e., armored cables, conduit, etc.).

Electrical Distribution Systems

API RP 14F/14FZ specifies that molded-case-type circuit breakers should meet UL 489 and that thermal magnetic breakers should be used for all applications, except as otherwise described for motor circuit protections utilizing magnetic only breakers. API RP 14F/14FZ also describes power circuit breaker usage for generators and large feeders. IEC 61892-2 describes criteria to be considered for selection of circuit breakers and states that circuit breakers shall conform to the appropriate IEC standards.

API RP 14F/14FZ and IEC 61892-2 both offer and accept system grounding (or earthing) of the system neutral to be any of 1) solidly grounded [directly earthed (TN)], 2) ungrounded [isolated (IT)], or 3) impedance grounded [impedance earthed (IT)]. IEC 61892-2 recommends an isolated (IT) arrangement for the emergency power system.

API RP 14F/14FZ indicates that the structure or hull of the facility shall not act as a current carrying conductor, with some limited exceptions.

API RP 14F/14FZ and IEC 61892-2 both require ground fault/insulation monitoring and alarm for ungrounded [isolated (IT)] systems. IEC 61892-2 specifies that the flow of current to earth shall not exceed 30 mA for isolated (IT) systems.

API RP 14F/14FZ gives some specific requirements for working spaces around electrical equipment. IEC 61892-6 mentions that electrical equipment is to be accessible.

Electric Motors

API RP 14F/14FZ indicates that motors normally operate at their nameplate rating in ambient temperatures up to 40°C and that derating of the motor is required when installed where an ambient temperature is expected to be higher. IEC 61892-2 specifies an ambient air temperature of 45°C.

API RP 14F/14FZ states that in Zone 2 locations, motors having "n" type protection, or totally enclosed, open drip-proof, or NEMA weather protected Type I or II motors that have no arcing or high temperature devices may be used. This is in reference to NFPA 70 National Electric Code (NEC) which accepts non-arcing motors to be installed in Zone 2 locations without laboratory certification. There is no such provision in IEC 61892-7.

Transformers

API RP 14F/14FZ recommends that transformers should be designed and constructed in accordance with ANSI C57 standards as a minimum. Although IEC 61892-3 has references to several other IEC standards, it does not specify particular standards for transformers for offshore facilities. However, IEC 61892-3 itself includes some specific requirements, such as a requirement that transformers shall be double-wound (two separate windings) or triple-wound (three separate windings).

Both, API RP 14F/14FZ and IEC 61892-3 describe dry type transformers as well as liquid filled transformers. As a note, API recommends that liquid filled transformers be installed in outdoor locations on offshore facilities. IEC 61892-6 requires that liquid-immersed transformers shall be installed in an area with provisions for containment and drainage of liquid leakage.

Lighting

Both, API RP 14F/14FZ and IEC 61892-3 give general recommendations for lighting, such as recommended illumination levels for different areas and tasks.

For helideck lighting, API RP 14F/14FZ refers to API RP 2L. IEC 61892 has no information regarding specific requirements for lighting on helidecks.

Battery-powered DC Supply Systems

For this subject of Battery-powered DC Supply Systems, API RP 14F/14FZ is describing use of battery systems for the following reasons: a) provide continuous power, not interrupted by generator failures or shutdowns; 2) provide standby power during generator failures and shutdowns; 3) serve as buffers between electronics equipment and generating equipment; and 4) provide power to equipment

designed for DC input power. This section in API RP 14F/14FZ is guidance information, with no tangible requirements. Although organized across the series, IEC 61892 offers similar information.

API RP 14F/14FZ does offer a formula for determining the minimum charger output current rating. IEC 61892 does not have similar guidance.

Regarding battery chargers and Uninterruptible Power Supply (UPS), API RP 14F/14FZ provides features and characteristics to be considered for specifying the equipment. IEC 61892 has some of this information; however, it is not organized in a single area of the standard.

Special Systems and Special Considerations

API RP 14F/14FZ describes Platform Safety Control Systems in context with the function of an offshore facility. 14F/14FZ refers to API RP 14C and then to IEC 61511 depending on jurisdiction. IEC 61892 includes a lot of requirements for control and automation systems, however, refers wholly to IEC 61511 for process safety systems.

3.2.15.2 *Impact and Recommendation*

General, Reference, and Definitions

API RP 14F/14FZ and the IEC 61892 group of standards cover similar subjects for offshore installations. In some areas API RP 14F and 14FZ provide more detail and more relevant information. In other areas IEC 61892 provides more detail.

It is worth noting that given API RP 14F/14FZ are RP documents, they offer some descriptive guidance that does not read as requirements, rather as informative. IEC 61892 on the other hand is a Standard and generally gives requirements, with some informational reference added in.

Recommend the continued use of API 14F and 14FZ. Any changeover to IEC standards would impact costs to U.S. manufacturers.

Electrical Equipment for Hazardous (Classified) Locations

For hazardous area installations, API RP 14F/14FZ relies heavily on other industry standards, government codes and regulations, and Class Rules. IEC 61892-7 also refers to other standards; however, IEC 61892-7 is a more stand-alone standard for hazardous area installations.

Although IEC 61892-7 provides more detail regarding electrical equipment in hazardous areas, this standard introduces some restrictions which may not be preferred.

From a reader or user standpoint, the API RP 14F and 14FZ provide guidance for electrical installations which are in context with an offshore facility. IEC 61892, on the other hand, is an electrical standard, and does not put the electrical systems and equipment in context as well as API.

Electric Power Generating Stations

In this area regarding Electric Power Generating Stations, API RP 14F/14FZ provides more detail and more information which is relevant to offshore facilities. In particular, API RP 14F/14FZ provides more guidance concerning gas turbine engines.

Electrical Distribution Systems - Cables

Although the cable and cable ampacity information in these standards is presented quite differently, the result is relatively similar. The biggest difference is the allowance in API RP 14F/14FZ for cables with conductor insulation temperature ratings higher than 95°C. Given the longstanding use of IEEE type cables in North America, any change to requiring IEC type cables and methods would meet a lot of resistance in industry. Further, given the U.S. Coast Guard (USCG) preference for NFPA 70 (NEC), any change to IEC type cables and methods would present additional problems. The cost for U.S. manufacturers is not able to be calculated here.

Electrical Distribution Systems

IEC 61892-2 provides more detail on each of the system earthing options. BSEE may want to review the IEC standard for electrical distribution systems to consider if the requirements of the IEC are warranted. If so, BSEE may consider incorporating IEC 61892-2 by reference.

Electric Motors

API RP 14F/14FZ offers some flexibility in derating motors for higher ambient temperatures as well as flexibility for motor applications in hazardous area Division 2 and Zone 2 locations.

Transformers

Here again, API RP 14F/14FZ refer to a North American standard, ANSI C57. Any changeover to IEC standards would impact costs to U.S. manufacturers without any increase in safety.

Lighting

Regarding the subject of lighting, there is no substantive difference between API RP 14F/14FZ and IEC 61892.

Battery-powered DC Supply Systems

API RP 14F/14FZ appears to have a more intuitive, user friendly approach to battery systems. IEC 61892 goes into more detail in some specific areas, which may not be useful in this type of standard.

Special Systems and Special Considerations

Both, API RP 14F/14FZ and IEC 61892 refer to IEC 61511 for process safety control systems. API RP 14 F/14FZ offers additional guidance and description in API RP 14C.

Summary Recommendations

It is recommended that BSEE continue to reference API 14F and 14FZ. Any changeover to IEC standards would impact costs to U.S. manufacturers. Further, from the reader or user standpoint, the API RP 14F and 14Z provide guidance for electrical installation in context with an offshore facility. IEC 61892, on the other hand, is an electrical standard and does not put the electrical systems and equipment in context as well as API.

Although IEC 61892-7 provides more detail in some areas (e.g., electrical equipment in hazardous areas, electrical distribution systems), this standard introduces some restrictions which may not be preferred.

It is recommended that BSEE continue to reference API 14F and 14FZ and review areas of the IEC standard that provide additional detail to consider if the requirements of the IEC are warranted. If so, BSEE may consider incorporating IEC 61892-2 by reference.

API RP 14G

ISO 13702:1999

3.2.16 API RP 14G

API RP 14G, RP for Fire Prevention and Control on Fixed Open-type Offshore Production Platforms is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.16.1 *Analysis*

An analysis was conducted between API RP 14G and ISO 13702:1999. Both documents provide guidance on various fire suppression systems, and provide guidelines for both system design requirements as well as testing and inspection requirements. Both standards also provide guidance on facility layout and separation of fuel and ignition sources to prevent fire, although API RP 14G provides limited information, and instead makes reference to other API documents for more detailed guidance on this subject. Both standards also provide guidance on fire and gas detection system, including system design requirements and testing and inspection requirements.

Both API RP 14G and ISO 13702 provide guidance on emergency shutdown and systems as another means to mitigate fire risks, and are comparable in this regard, except that API RP 14G does reference other standards for further detail. Both standards also provide comparable guidance on passive fire protection systems and where it may be utilized or required, but neither of them sets any unique specific standards for design of such systems. However, ISO 13702 does provide guidance on explosion mitigation and protection, and gives guidance on blast geometry and facility layout to mitigate the effects of an explosion.

3.2.16.2 *Impact and Recommendation*

In general, API RP 14G has a greater focus on giving specific design requirements for active and passive fire protection systems, as well as fire and gas detection systems, and also gives specific guidance on testing and maintenance of these. In contrast, ISO 13702 addresses these same things but gives a greater emphasis on risk evaluation and management, and the annexes of this document contain guidance on typical sources of potential fire and what mitigation options are available to address this. Overall, ISO 13702 provides more comprehensive information on the subject of fire control and prevention.

It is recommended that BSEE review the ISO standard further and retain API 14G. If during the review BSEE determines that there is value in the specific requirements of ISO 13702 then BSEE should add it to the CFR.

API Standard 53

3.2.17 API Standard 53

API Standard 53, RP for Blowout Prevention Equipment Systems for Drilling Wells, is incorporated into BSEE regulation. A literature search was conducted to determine and identify comparable or equivalent ISO standards. The following sections provide analysis and recommendations.

3.2.17.1 *Analysis*

API STD 53 provides requirements for installation and testing of blowout prevention equipment systems both on surface and subsea rigs. The scope of the standard includes BOPs, choke and kill lines, choke manifolds, control systems and auxiliary equipment. Other subsea equipment (diverters, shut-in devices and rotating head systems) are removed from the scope of this standard and are referred to other API standards (API 64 and 16RCD), as their primary purpose is to safely divert or direct flow rather than to confine fluids to the wellbore. Procedures and techniques for well control are also not included in the standard.

The latest edition (4th) has been published as a standard as opposed to previous edition (RP) based on the recommendations made by the Joint Industry Equipment Task Force and other organizations following the Macondo incident. International oil and gas operators, manufacturers, and contractors participated in this revision and incorporated those recommendations. This standard provides guidelines on how BOP systems are inspected, maintained, tested and operated.

The standard addresses pressure sealing components of the BOP system and components that may encounter hydrogen sulfide gas zone.

The standard provides in detail Control system requirements; maintenance and testing requirements for subsea BOP System (discrete hydraulic control system & electro-hydraulic and multiplex control system) and surface BOP system.

Auxiliary well control equipment's (such as Kelly Valves, drill pipe safety valves, Internal Blowout Preventer (IBOP), drill string safety valve) are also included in the standard. The standard also covers requirements for trip tanks, degasser, mud/gas separator, flare/vent lines, top drive equipment, and hydraulic and booster lines.

There is no equivalent or identical ISO standard found which addresses requirements for installation and testing of blowout prevention systems for subsea and surface rigs.

There are ISO standards that address subsea control system, ROV interfaces on subsea system, subsea structures and manifolds design but these are for production units/systems (e.g., ISO 13628-6:2006, 13628-8:2002, 13628-15:2011). They cannot be compared against API STD 53.

3.2.17.2 *Impact and Recommendation*

API STD 53 is the most comprehensive standard available for installation and testing of blowout prevention equipment systems on land and marine drilling rigs (barge, platform, bottom-supported, and floating).

It is recommended that CFR refer to the latest edition of the standard 53.

API RP 65

3.2.18 API RP 65

API RP 65, RP for Cementing Shallow Water Flow (SWF) Zones in Deepwater Wells, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.18.1 *Analysis*

API RP 65 is the compilation of technology and best practices used by many operators drilling wells in deep water. It is meant to highlight key parameters for increasing the chance of successfully drilling and cementing casings where there is a risk of SWF and to discuss options that are available.

No equivalent or comparable ISO document was found which covers the scope of this API document.

3.2.18.2 *Impact and Recommendation*

API RP 65 provides the most comprehensive set of best practices currently available to reduce the risk from SWFs. Evaluating cementing and casing programs based on consideration/incorporation of these best practices is a critical well integrity factor.

As noted in the analysis no equivalent or comparable ISO standards were found. It is recommended that CFR should continue referencing this API standard.

API RP 500 and API RP 505

IEC 60079-10-1

3.2.19 API RP 500 and API RP 505

API RP 500 and API RP 505 are incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standards. The following sections provide analysis and recommendations.

3.2.19.1 *Analysis*

Both API RP 500/API RP 505 and IEC 60079-10 describe Classification of Hazardous areas according to the probability that a flammable gas may be present in different areas.

The most apparent difference between API RP 500/API RP 505 and IEC 60079-10 is that the API RP's cover the option of Classification into Divisions or into Zones. IEC 60079-10 uses Zones exclusively. API RP 500 incorporates the definitions of Class I, Division 1 and Division 2 from the NEC (NFPA 70) Article 500. API RP 505 incorporates the definition of Class I, Zone 0, Zone 1, and Zone 2 from IEC 60079-10.

Both API RP 500/505 and IEC 60079-10 approach the classification of hazardous areas from what may be described as a point source approach where each potential source of gas release is evaluated with consideration of the type of source of release, type of zone, extent of zone, release rate of gas, lower explosive limit (LEL), ventilation, relative density of the gas or vapor, climate or weather, and topography or arrangements. Further, both API RP 500/505 and IEC 60079-10 give schematic examples of hazardous area classifications around different types of sources of release and different arrangements.

IEC 60079-10 appears to be a more generic standard for classifying hazardous areas. This standard focus is to give the methods, with examples and calculations, for determining the hazardous areas for many arrangements in unspecified installations.

Given the different types of facilities handling hydrocarbons, API RP 500/505 presents applications that are common to several facility types as well as giving specific guidance for each type of facility (i.e., MODU, FPSO, TLP, and others). API RP 500/505 presents hazardous area classification specifications and schematic graphics associated with the most common possible sources or gas release such as vents, flanges, valves, drains, sumps, etc. on specific types of installations. For areas not addressed specifically, API RP 500/505 gives the option of classifying areas based on a point source method and calculations derived from IEC 60079-10.

3.2.19.2 *Impact and Recommendation*

It is recommended that BSEE continue to reference API RP 500 and API RP 505. These API RPs are more comprehensive and more applicable to Offshore Facilities than IEC 60079-10. API RP 500 addresses Class

I, Division 1 and Division 2 type of hazardous area classification while hazardous area divisions are not addressed in IEC 60079-10. Further, API RP 500 and RP 505 incorporate the methods and calculations found in IEC 60079-10.

API RP Spec 2C

ISO 8686 and ISO 4302

3.2.20 API Spec 2C

API Specification 2C, Specification for Offshore Pedestal Mounted Cranes, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.20.1 *Analysis*

API Specification 2C, Offshore Pedestal-mounted Cranes, provides requirements for design, construction, and testing of offshore pedestal-mounted cranes. The document addresses the three most typical contexts for such cranes, which are shipboard applications, heavy-lift applications and offshore oil and gas production.

API Spec 2C gives extended treatment of offshore crane design. An indication of its comprehensiveness is that it identifies over 20 normative references and notes them as important for application of the specification. One of these references is API RP 2D, RP for Operation and Maintenance of Offshore Cranes, a sister standard with which it parallels. This connection is key for the present analysis, because although the review makes no direct comparison between API Spec 2C and API RP 2D, recommending that one be retained – as was suggested for API RP 2D – has implications for the fate of the other as the foreword of API RP 2D strongly encourages the reader to analyze API Spec 2C concurrently. It is noted here that the usefulness of API RP 2D derives in large part from the value of API Spec 2C, an interdependency that is especially true in the areas of crane operator training, load handling, and crane rating.

The API Spec 2C standard currently is in its seventh edition. This version has improved over the decades by developing clearer definitions of which cranes the standard covers. It has also expanded its list of critical components. Such components have no redundancy; if they failed, the result would be uncontrolled descent of load and/or uncommanded rotation of upper structure. The document is designed to be used as an international standard that reflects realistic criteria. To that end, one useful feature of the standard is its requirement that manufacturers keep their test and inspection records for 20 years. The goal here is to help ensure that relevant data can be tracked and analyzed for future design, construction, and testing of offshore cranes.

Other key features of API Spec 2C include guidelines on (a) what information the manufacturer must provide the purchaser, (b) what information the purchaser must provide the manufacturer, and (c) what human factors (HF) and health, safety, and environment (HSE) issues must be addressed. There are several detailed sections that describe how to calculate dynamic components of load and structures. The load section facilitates clear calculations of safe working loads by giving three possible methods for computing dynamic forces acting on a crane at sea state. These methods are the Vessel-specific Method, the General Method, and the Legacy Dynamic Method. Each of these methods is discussed at length. The standard even provides an extensive commentary appendix in which the benefits and potential downsides of each method are discussed. The standard repeatedly notes that load estimation for offshore cranes is complex and stresses that the purchaser needs to provide the manufacturer with as much data as possible on the parameters of the context in which the crane will operate. Variables of particular interest here are wind, ice, and seismic conditions; these considerations, along with several others having to do with structural and mechanical requirements, rely on duty classification. There are four duty classes: (1) Production Duty; (2) Intermediate Duty; (3) Drilling Duty; and (4) Construction Duty. These categories are used as organizing features for requirements.

Commensurate with the sections just mentioned is an entire section devoted to gross overload conditions. Within this section, quite useful specifications for failure mode calculations are given to manufacturers. In the event an unbounded gross overload is applied to the block by a moving load, the applicable components supporting the operator control station shall not be the first to fail, the calculations shall assume the wire rope is not paid out from the hoist drums, and the crane shall fail into a safer and less critical situation with respect to the crane operator. Several other relevant requirements are listed.

The HF and HSE section is quite involved, covering several critical issues over nearly ten pages. The fact that so many issues are called out is a testament to the myriad problems that can arise when cranes are not designed with human capabilities, limitations, and safety in mind. It is excellent that the standard addresses these HF and HSE issues. However, the points are not given the weight of consideration they deserve. Given the primary goal of the section is to help manufacturers design out error-likely situations, it would be useful if examples of such situations were given. It should be noted that real-world examples from the offshore industry are provided in API 770, A Manager's Guide to Reducing Human Errors, which BSEE might consider adopting as a supplement to API Spec 2C, API RP 2D, or both.

The annexes contained in API Spec 2C are extensive and informative. They include examples of critical components, API monogram guidelines, and cylinder calculation methods. Perhaps the most useful, however, are the annexes containing involved commentaries and thorough examples of crane design loads, overturning moments, wire rope design factors, and safe working loads.

The general ISO approach to crane-related standards has been to separate the many crane-related issues into several individual standards and give them slightly more in-depth treatment. For example, there are separate ISO standards solely for the vocabularies associated with different types of cranes. There is a family of ISO standards (ISO 8686) that gives design principles of loads and load combinations for different types of cranes. But the cranes are not differentiated based on those typically found offshore. Nor are there recommendations given for how to incorporate the uniquely challenging

conditions found offshore, such as wind and seismic loads. For those, the reader would have to consult other families of ISO standards (e.g., ISO 4302). Moreover, the purported depth of each separate standard is still comparable to that found in API Spec 2C.

3.2.20.2 *Impact and Recommendation*

This analysis stresses the point that API Spec 2C is extensive and wide ranging. As such, there are no available ISO standards which are comparable. Given that the relative depths of coverage are similar, but that the API Spec 2C covers so many issues in one standard, it is recommended that BSEE retain API Spec 2C. BSEE should review API 770 and consider incorporation by reference of this standard in the CFRs.

ASNI/API Spec. 6D

ISO 14313:2007

3.2.21 ANSI/API Spec. 6D

API Specification 6D, Specification for Pipeline Valves, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.21.1 *Analysis*

API 6D 23rd edition (2008), Specification for Pipeline Valves, is identical to the ISO 14313:2007 standard. This API Specification is for the Petroleum and Natural Gas Industries and Pipeline Transportation Systems Valves. It specifies requirements of ball, check, gate and plug valves for application in pipeline systems and gives recommendations for the design, manufacturing, and testing. Annex A of this Spec 6D provides guidelines to assist the purchaser with valve type selection and specification of specific requirements when ordering valves.

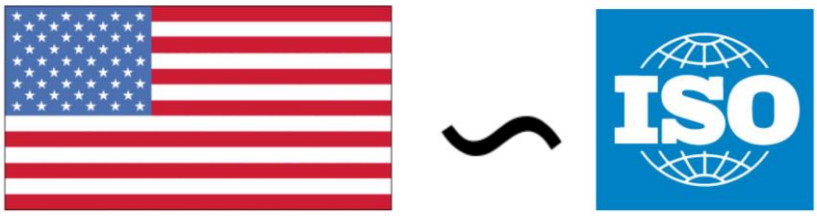
API 6D has more stringent testing requirements compared to the API 600, 602, 608 or 609 design criteria. The ISO 14313 standard specifies requirements and provides recommendations for the design, manufacturing, testing and documentation of ball, check, gate and plug valves for application in pipeline systems meeting the requirements of ISO 13623 for the petroleum and natural gas industries.

ISO 14313:2007 is not applicable to subsea pipeline valves, as they are covered by a separate International Standard (ISO 14723/ API 6DSS). In addition, ISO 14313:2007 is not applicable to valves for pressure ratings exceeding PN 420 (Class 2 500). Neither API 6D now ISO 14313 cover valves with pressure ratings exceeding PN 420 (Class 2500).

3.2.21.2 *Impact and Recommendation*

As noted above, API 6D 23rd edition (2008) and ISO 14313:2007 are identical. However, the current CFR references an older edition of the standard, API 6D 22nd edition. It is recommended that BSEE review the 23rd edition and determine if the standard should be incorporated by reference. If BSEE does determine that the updated standard should be incorporated, the identical international standard, ISO 14313:2007, should be considered for incorporation.

Note that API 6D is currently being revised from 23rd edition and will be published (tentatively 2014). Hence, there may be a need to compare the ISO standard to the 24th Edition of API 6D once it is published.



API Spec. 14A **ISO 10423:2004**

3.2.22 API Spec. 14A

The API Spec 14A, Specification for SSSV Equipment, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.22.1 *Analysis*

This edition of API Spec 14A 11th edition (2006) Specification for SSSV is the identical national adoption of ISO 10432:2004, Petroleum and natural gas industries – Downhole equipment – SSSV equipment. This specification contains the API Monogram Annex as part of the U.S. national adoption.

This specification provides the minimum acceptable requirements for SSSVs. It covers SSSVs, including all components that establish tolerances and/or clearances which may affect performance or interchangeability of SSSVs. It includes the interface connections to the flow control or other equipment, but does not cover the connections to the well conduit.

Note that this specification is not intended or designed for operational activities, such as production activities, such as production/injection reduction, production stop, or as a backflow valve

ISO 10423:2004 is intended to give requirements and information to user/purchaser and supplier/manufacturers in the section, manufacturing, testing and use of SSSVs. It also provides the minimum acceptable requirements for SSSVs. It covers SSSVs including all components that establish tolerances and/or clearances which may affect performance or interchangeability of SSSVs. It includes repair operations and the interface connections to the flow control or other equipment, but does not cover the connections to the well conduit.

The requirements for lock mandrels and landing nipples which were covered in the previous edition are now covered under ISO 16070.

3.2.22.2 *Impact and Recommendation*

As noted in the analysis, API 14A 11th edition (2006) and ISO 10423:2004 are identical. However, the current CFR references an older edition of the standard, ANSI/API Spec. 14A, 10th edition, 2000/ISO 10432:1999. It is recommended that BSEE review the 11th edition and determine if the standard should be incorporated by reference. If BSEE does determine that the updated standard should be incorporated, the identical international standard, ISO 10423:2004, should be considered for incorporation.

API RP 90

ISO/TS 16530-2

3.2.23 API RP 90

API RP 90, Annular Casing Pressure Management for Offshore Wells, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.23.1 *Analysis*

API RP 90 is intended to serve as a guide for managing annular casing pressure in offshore wells. It is meant to be used for offshore wells that exhibit annular casing pressure, including thermal casing pressure, sustained casing pressure (SCP) and operator imposed pressure. It covers monitoring, diagnostic testing, the establishment of MAWOP and documentation of annular casing pressure for various types of wells. It also includes a discussion on risk assessment methodologies that can be can be used for evaluation of individual situations where the annular casing pressure is not within MAWOP.

It is to be noted that prevention of annular casing pressure and remediation of wells in case of SCP is beyond the scope of this document.

ISO/TS 16530-2 is currently under development (in formal approval stage) by ISO/TC 67/SC 4. This is the most comparable ISO document to API RP 90. This technical specification provides the requirements and methods to manage well integrity during well operational phase (well handover after construction to well handover prior to abandonment). A risk based approach (including a barrier philosophy) is defined to assess and manage well integrity risks. Section 13 of this specification is dedicated to annular pressure management. It requires a program to be in place for monitoring and testing annulus pressure and the related frequency. Maximum allowable annular surface pressure (MAASP) is defined along with necessary parameters for its calculation and managing changes related to it.

3.2.23.2 *Impact and Recommendation*

The main purpose of the ISO/TS is to fill the gap that exists in the oil and gas industry related to API 14 A/B/D, API RP 90 and NORSOK D-010 – not addressing low complexity/exposure for onshore wells, acceptance criteria and guidance on maintaining overall well operating envelope over its lifecycle.

API RP 90 provides more detailed guidance for the specific well types – methods and frequency of monitoring, detection and evaluation of annular casing pressure.

The ISO specification covers the subject in a more high-level functional requirement and from a management systems perspective. The specification has its own merits and it is recommended to be reviewed in further detail when published for aspects that could be useful for incorporation.

API Standard 65, Part 2

3.2.24 API Standard 65 – Part 2

API Standard 65 – Part 2, Isolating Potential Flow Zones during Construction, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.24.1 *Analysis*

API 65-2 contains practices for isolating potential flow zones, an integral element in maintaining well integrity. The focus of this standard is the prevention of flow through or past barriers that are installed during well construction. These barriers that seal wellbore and formation pressures or flows may be temporary pressure-containment barriers like hydrostatic head pressure during cement curing or permanent ones such as mechanical seals, shoe formations, and cement.

Two types of barriers are discussed in the standard for system reliability:

1. Physical barriers (such as hydrostatic, mechanical or solidified chemical materials)
2. Operational barriers

The standard discusses these barriers in detail. The mechanical barriers are classified into two basic classifications:

1. Mechanical barrier elements designed for preventing loss of well control (LWC)
2. Mechanical barrier elements designed for preventing SCP

The objective of this standard is to prevent and/or control flows just prior to, during, and after primary cementing operations to install or “set” casing and liner pipe strings in wells, and help prevent SCP.

The standard contains four Annexes to address the above concerns of isolating the flow zones.

Annex A contains detailed background and technology review, historical data, perspectives, studies, statistics, lessons learned, etc. All of this information has been written to help explain how some practices work, have become proven or invalidated, or had performance limitations placed upon their application.

Annex B includes consideration in well planning and drilling plan determinations, such as evaluation for flow potential, site selection, shallow hazards, deeper hazard contingency planning, well control planning for fluid influxes, planning for lost circulation control, regulatory issues and communications plans, planning the well, pore pressure, fracture gradient, drilling fluid weight, casing plan, cementing plan, drilling plan, wellbore hydraulics, wellbore cleaning, barrier design, and contingency planning.

Annex C gives a general overview of drilling the well and some of the factors that might be considered by the drilling group (such as general practices while drilling, monitoring and maintaining wellbore stability, mitigating lost circulation and planning and operational considerations).

Annex D provides elements (such as flow potential risk assessment, critical drilling fluid parameters, critical well design parameters, critical operational parameters, critical drilling fluid removal parameters, critical cement slurry parameters, job execution, special operation considerations) to produce design, engineering and operational framework for successfully isolating a potential flow zone.

There is no equivalent or identical ISO standard found which addresses isolation of potential flow zones during well construction.

The ISO standards that address well cementing, cementing equipment and drilling fluids are ISO 10426, 10427 and 10414 which have an equivalent domestic standard (API 10B, 10D and 13B which references API STD 65-2).

3.2.24.2 *Impact and Recommendation*

API STD 65 – Part 2 is the most comprehensive standard available for isolation of potential flow zones which addresses very serious issues faced by the industry, such as how to prevent or control flows prior to, during and after cementing operations, and preventing sustained casing pressures. It is recommended that BSEE continue to reference API STD 65 – Part 2 in the CFR.

ASTM C 330 – 05

3.2.25 ASTM C 330-05

ASTM C 330-05, Standard Specification for Lightweight Aggregates for Structural Concrete, is incorporated by reference into BSEE regulation. A literature search was conducted to identify

comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.25.1 *Analysis*

The referenced standard is from 2005 while the latest is C330/C330M – 14 (published in 2014). The standard gives requirements for lightweight aggregate, required compressive strength of the concrete manufactured using lightweight aggregate and the normal type of limitations on popout, freezing, etc. The standard also limits organic matter in the aggregate and details how to prepare test samples.

There are ISO standards for aggregate, but it is unclear if there is a direct equivalent code. ASTM C 330-05 may be covered under ISO/NP 19595, Natural Aggregates for concrete, which is under development.

3.2.25.2 *Impact and Recommendation*

If concrete structures are to be used on the U.S. OCS, there is a need for specification of the component parts, although these are incorporated directly within ACI 318 by normative reference in most cases.

It is unclear what ISO equivalent standards exist, but this specification will be compatible with ACI 318, the basic concrete design code. This ASTM specification references many other ASTM specifications.

This specification, or an updated version, should be maintained within the CFRs if there is a desire to maintain a specific reference to concrete structures and the component parts of concrete, however, these specifications are incorporated by reference directly within ACI 318.

ASTM C 595 – 08

3.2.26 ASTM C 595-08

ASTM C 595-08, Standard Specification for Blended Hydraulic Cements, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.26.1 *Analysis*

The referenced standard was published in 2008 while the latest is C595/C595M – 14 (published in 2014). The standard gives the basic requirements for Portland Cement, chemical composition, labelling, testing, storage, etc.

3.2.26.2 *Impact and Recommendation*

If concrete structures are to be used on the U.S. OCS, then there is a need for specification of the component parts, although these are incorporated directly within ACI 318 by normative reference in most cases.

It is unclear what ISO equivalent standards exist, but this specification will be compatible with ACI 318, the basic concrete design code. This ASTM specification references many other ASTM specifications. This specification, or an updated version, should be maintained within the CFRs if there is a desire to maintain a specific reference to concrete structures and the component parts of concrete; however, these specifications are incorporated by reference directly within ACI 318.

This specification, or an updated version, should be incorporated by reference if there is a desire to maintain a specific reference to concrete structures and the component parts of concrete; however, these specifications are incorporated by reference directly within ACI 318. Therefore, BSEE should consider removing the ASTM standard because it is incorporated directly into ACI 318.

If BSEE intends to continue to reference the standard in the CFR, they should modify the language to cite the "latest edition" rather than a specific edition in the CFR for all concrete standards.

NACE MR0175-2009 **ISO 115156**

3.2.27 NACE MR0175-2009

NACE MR0175-2009, Standard Material Requirements, Metals for Sulfide Stress Cracking and Stress Corrosion Cracking Resistance in Sour Oilfield Environments, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.27.1 *Analysis*

NACE MR0175-2009, Standard Material Requirements, Metals for Sulfide Stress Cracking and Stress Corrosion Cracking Resistance in Sour Oilfield Environments outlines the requirements for carbon and low alloy steels. These requirements minimize the damage that is caused by corrosion to equipment.

ISO 15156, Petroleum and natural gas industries Materials for use in H2S-containing environments in oil and gas production and NACE MR0175 were developed as one document.

3.2.27.2 *Impact and Recommendation*

BSEE should continue to reference the domestic standard and consider incorporating the ISO standard, ISO 15156.

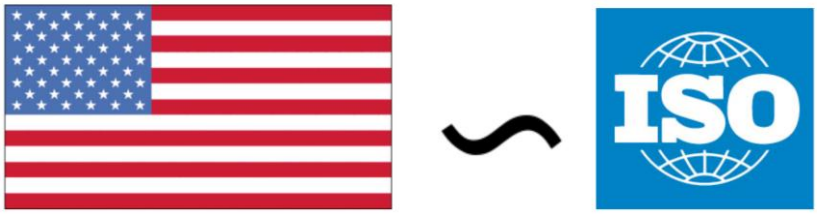
NACE SP0176 – 2007

3.2.28 NACE SP0176 – 2007

NACE SP0176-2007, Standard Practice, Corrosion Control of Steel Fixed Offshore Structures Associated with Petroleum Production, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.28.1 *Analysis*

The predominant industry standard for cathodic protection is Det Norske Veritas (DNV) RP B401 (CATHODIC PROTECTION DESIGN). The DNV standard could be compared to the NACE standard referenced by CFR. There is no equivalent ISO standard to NACE SP0176.



ANSI/ASME B 31.8 **ISO 13623**

3.2.29 ANSI/ASME B 31.8

ANSI/ASME B 31.8, Gas Transmission and Distribution Piping Systems, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.29.1 *Analysis*

ISO 13623 is the closest standard to ASME B31.8, but with a broader scope. The focus of ASME B31.8 is pipeline facilities for the transportation of gas, whereas ISO 13623 was developed to cover pipelines for the transportation of different types of fluid, which are classified with respect to potential hazard to public safety into five categories: A (non-flammable water-based fluids), B (liquid flammable and/or toxic fluids such as oil and petroleum products and methanol), C (non-flammable non-toxic gases such as nitrogen, carbon dioxide, argon and air), D (non-toxic single-phase natural gas) and E (flammable and/or toxic gases at ambient temperature and atmospheric pressure that are conveyed as gases and/or liquids).

ISO 13623 applies only to rigid, metallic pipelines, whilst ASME B31.8 covers metallic and plastic pipe and components. At this level of analysis, no other major differences were determined.

3.2.29.2 *Impact and Recommendation*

ASME B31.8 is referenced in 30 CFR 250.1002 as the criteria to determine the internal design pressure of steel pipes used in DOI pipelines. In order to consider ISO 13623 as meeting the same objective, then the design criteria in ISO 13623 is to be carefully analyzed as it differs from ASME B31.8. All other requirements in 30 CFR 250.1002 are compatible with ISO 13623.

API 510

3.2.30 API 510

API 510, Pressure Vessel (PV) Inspection Code: In-Service Inspection, Rating, Repair and Alteration, Downstream Segment, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.30.1 *Analysis*

This inspection code covers the in-service inspection, repair, alteration, and rerating activities for pressure vessels and the pressure-relieving devices protecting these vessels. This inspection code applies to all hydrocarbon and chemical process vessels that have been placed in service unless specifically excluded per 1.2.2; but it could also be applied to process vessels in other industries at owner/user discretion. This includes:

a) Vessels constructed in accordance with an applicable construction code [e.g., ASME Boiler and Pressure Vessel Code (ASME Code)]

b) Vessels constructed without a construction code (non-code vessels) — a vessel not fabricated to a recognized construction code and meeting no known recognized standard

c) Vessels constructed and approved as jurisdictional special based upon jurisdiction acceptance of particular design, fabrication, inspection, testing, and installation

d) Non-standard vessels — a vessel fabricated to a recognized construction code but has lost its nameplate or stamping

No ISO equivalent or comparable ISO standard was found which covers the scope of API 510. It appears that ISO does not address the requirements for PV in service inspection and repair.

3.2.30.2 *Impact and Recommendation*

There is no equivalent or comparable ISO standard. BSEE should continue to reference API 510 for in-service PV inspection.

API RP 2D

3.2.31 API RP 2D

API RP 2D, Operation and Maintenance of Offshore Cranes is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.31.1 *Analysis*

API RP 2D, RP for Operation and Maintenance of Offshore Cranes, is a guide for crane owners and operators on safe operation of pedestal-mounted cranes on fixed or floating offshore platforms, jack-up rigs, semi-submersibles, and other types of MODUs. The document is clear and well-written. It is fairly comprehensive, addressing a wide range of issues in operations, inspections, testing, and maintenance.

The general issue of operations is broken into four main parts. The first provides clear physical criteria by which a crane operator may become qualified in addition to minimum training requirements. Here, the standard references sister standard, API Specification 2C, to point out that any operator should have basic working knowledge of several requirements. These requirements concern design, construction, and testing of new offshore pedestal-mounted cranes. Less stringent requirements are set forth for riggers, though a detailed suggested training plan is included in one of several appendices. The operator is required to meet several best practices, as specified in the document and in a second appendix on operations. Best practices include pre-use verification of crane capabilities, appropriate communication with signal persons, securing the crane before a period of nonuse, and handling personnel transfers. Several miscellaneous issues are also treated, such as best practices for refueling, fire protection, load testing, and pull testing.

A useful feature of API RP 2D is its inclusion of well-defined crane usage categories in relation to inspection, testing, and maintenance. This inclusion reflects an expansion of API RP 2D over the years. The sixth edition is now incorporated by reference in 30 CFR. 250.198(h)(48). There are three general usage categories: infrequent, moderate, and heavy; each of these categories is then used to determine the level of inspection that must be applied: initial, pre-use, monthly, quarterly, or annually. These levels are incremental in the sense that the second includes the first, the third includes the second, and so on. The document is quite redundant here, giving a full list for each inspection level.

Another appendix, perhaps the most involved in the entire standard, lays out specific minimum guidelines for usage, inspection, testing, and maintenance. Key issues here are: (a) it is the responsibility of the crane owner to develop a preventative maintenance program in accordance with the manufactures recommendations; (b) the program should dictate a maintenance and inspection schedule based on a duty cycle versus strict time limits; and (c) the program should list specific testing methods to be carried out. The appendix offers several detailed methods.

Specific preventive maintenance guidelines are described and general procedures for repairs and replacements are outlined. The relatively brief treatment given repairs and replacements is acceptable because mechanical components have more failure modes than functionality. Thus, a full treatment of guidelines for repairs would be well outside the scope of the standard. However, specific treatment is given to the very important issues of wire rope and sling inspection. An entire detailed appendix is devoted to education and requirements concerning inspection, storage, handling, installation, and replacement of wire rope. Slings are also included. It provides clear pictures that show both the correct and incorrect methods, and other diagrams that leave very little room for ambiguity.

The API RP 2D has a few slightly undesirable traits, such as a lack of a threshold limiting the size of cranes to which its requirements apply, ill-defined miscellaneous-section issues, a fuzzy stance on the development of maintenance and operation programs, and essentially absent mention of human factors which make the bulk root cause of mishaps. These criticisms notwithstanding, there is no available ISO standard that comes close to covering such a breadth of useful issues for crane operations, testing, and maintenance. There are shorter ISO standards that individually address some of the issues contained in API RP 2D. Examples include, ISO 23814 (Competency Requirements for Crane Inspectors) and ISO 4309 (Wire Ropes, Maintenance and Installation); however, there are several important issues not individually addressed by ISO standards.

3.2.31.2 *Recommendation*

Several relevant ISO standards do not specify that they address cranes typically found offshore. For the above reasons, it is recommended that BSEE retain API RP 2D as the best currently available and most comprehensive standard for the operation and maintenance of offshore cranes.

Concerning the criticism that API RP 2D gives scant treatment of human factors, it should be noted that the standard gives little guidance on how to assess the physical qualifications of the crane operator. Addressing this issue is pivotal for ensuring that the operator has the physical capabilities required to operate crane controls for appropriate durations. Thus, it is also recommended that BSEE adopt either ASME B30-4, “Portal and Pedestal Cranes,” section 3.1.2, or the physical instructions to physicians for qualifying physical examinations, put forth by the National Commission for the Certification of Crane Operators (NCCCO) as a supplement to API RP 2D.

API RP 14B ~ ISO 10417:2004

3.2.32 API RP 14B

API RP 14B, RP for Design, Installation, Repair and Operation of SSSV Systems, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.32.1 *Analysis*

This edition of API RP 14B 5th Edition (2005) Design, Installation, Repair and Operation of SSSVs is an identical national adoption of ISO 10417:2004, Petroleum and Natural gas Industries – SSSV – Design, Installation, Operation and Redress.

This RP contains the API Monogram Annex as part of the U.S. national adoption. It establishes requirements and provides guidelines for configuration, installation, test, operation and documentation of SSSV systems. In addition, this Standard establishes requirements and provides guidelines for selection, handling, redress and documentation of SSSV downhole production equipment.

3.2.32.2 *Impact and Recommendation*

As noted in the analysis, both API 14B 5th editions (2005) and ISO 10417:2004 are identical. It is noted that API and ISO will be developing their own independent documents henceforth.

BSEE should continue to reference the domestic standard and consider incorporating the ISO standard.

API RP 14H

3.2.33 API RP 14H

API RP 14H, RP for Installation, Maintenance and Repair of SSVs and USVs Offshore, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.33.1 *Analysis*

API RP 14H, 5th Edition (2007) – RP for Installation, Maintenance and Repair of SSVs and USVs Offshore has been withdrawn and superseded by API STD 6AV2, 1st Edition (2014) – Installation, Maintenance, and Repair od SSVs and USVs Offshore.

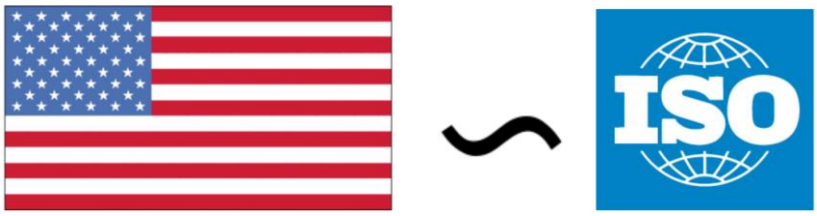
API STD 6AV2 1st Edition (2014) Installation, Maintenance, and Repair of SSVs and USVs Offshore is the revision of and supersedes API 14H, Fifth Edition and does not have any equivalent ISO standard.

This standard provides requirements for installing and maintaining SSVs and USVs. Included are requirements for receiving inspection, installation and maintenance, field and off-site repair, testing procedures with acceptance criteria, failure reporting, and documentation. Power and control systems for SSVs/USVs are not included. This document is applicable to SSVs/USVs used or intended to be used as part of a safety system, as defined by documents such as API 14C.

3.2.33.2 *Impact and Recommendation*

The current standard incorporated by reference is API 14H. Since this RP has been now revised and superseded by API STD 6AV2, the CFR reference needs to be updated.

As noted in the analysis, both API 14B 5th editions (2005) and ISO 10417:2004 are identical. It is noted that API & ISO will be developing their own independent documents henceforth. BSEE should continue to reference the domestic standard and consider incorporating the ISO standard.



API RP 14J **ISO 17776:2002**

3.2.34 API RP 14J

API 14J, RP for Design and Hazards Analysis for Offshore Production Facilities, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.34.1 *Analysis*

API RP 14J recommends the minimum requirements and guidelines for the design and layout of production facilities on open-type offshore platforms. It also discusses the different hazard analysis procedures available and presents the minimum requirements for process safety information/hazards analysis for meeting API RP 75 SEMS. It covers hazard mitigation, personnel evacuation, platform equipment arrangements and the process safety documentation requirements for SEMS hazard analysis element. API RP 14J also has valuable appendices which includes detailed checklist for hazard analysis of medium to high risk offshore production facilities and analysis questions for reviewing layouts.

The most comparable ISO standard is ISO 17776 which describes the principal tools and techniques that are commonly used for hazard identification of exploration and production (E&P) activities. The ISO standard covers both the qualitative and quantitative risk assessment methods. It also includes a hazards checklist (for job hazard analysis) along with examples of typical assessments that can be carried out during the different E&P phases.

While reviewing ISO 17776 may be useful to obtain a better understanding of the fundamentals of risk assessment and available techniques, API RP 14J provides more detailed guidance on hazard analysis for designing offshore production facilities and related considerations.

3.2.34.2 *Impact and Recommendation*

API RP 14J is the most comprehensive standard available for hazard analysis for offshore production facilities, therefore, it is recommended that CFR continues to reference this standard.

ANSI/API Spec. 17J

ISO 13628-2:2006
ISO 13628-2:2006/COR.1:2009

3.2.35 ANSI/API Spec. 17J

ANSI/API Specification 17J, Specification for Unbonded Flexible Pipe, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.35.1 *Analysis*

API 17J defines the technical requirements for safe, dimensionally and functionally interchangeable flexible pipes that are designed and manufactured to uniform standards and criteria. API 17J applies to Unbonded flexible pipe assemblies, consisting of segments of flexible pipe body with end fittings attached to both ends. API 17J is applicable to both static and dynamic flexible pipes used as flowlines, risers, and jumpers. API 17J does not cover flexible pipes of bonded structure, flexible pipe ancillary components, and flexible pipes that include nonmetallic tensile and pressure armor wires.

Functional requirements for the flexible pipe shall be specified by the purchaser. API 17J Annex B provides a format for the specification of the functional requirements.

The standard provides detailed functional requirements for Unbonded pipes (such as Overall pipe requirements, design parameters, Fluid parameters, external environmental parameters, minimum system requirements). The standard also provides detailed design requirements such as type of loads (functional, environmental, or accidental loads) and effect of loads, design methodology, design criteria, corrosion effect. In addition, API 17J covers detailed requirements for material selection and testing.

Section 7 specifies requirements for manufacturing, inspection and acceptance criteria; the manufacturing operations shall be performed in accordance with the manufacturer's written fabrication specifications and manufacturing quality plan, which shall conform to the requirements of Section 7. The detailed requirements of FATs are specified in section 9.

Up to revision 3, both API 17J and ISO 13628-2 were identical documents; however, from revision 4 (latest revision), API and ISO are different documents. ISO 13628-2:2006 and 2009 Corrigenda defines the technical requirements for safe, dimensionally and functionally interchangeable flexible pipes that are designed and manufactured to uniform standards and criteria. Even though both documents are different now, the level of requirements for designing, testing, and inspection are still the same.

3.2.35.2 *Impact and Recommendation*

Both API Spec 17J and ISO 13628-2 have the same level of requirements for design of unbounded pipes; however, API 17J is the more popular specification for unbounded pipes used industry wide. It is recommended that the CFR continue referencing this standard.

API RP 75

3.2.36 API RP 75

API RP 75, RP for Development of a Safety and Environmental Management Program for Offshore Operations and Facilities, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.36.1 *Analysis*

API RP 75 focuses on the safety and environmental protection during the performance of the offshore oil and gas and sulphur operations. The standard was introduced by API after the major accidents in the 1980s in the U.S. and U.S. affiliated companies.

The first comprehensive safety and environmental management standard of its kind in the world, RP 75 reflects the contributions of many industry offshore safety and operational experts with hundreds of years of experience in the oil and gas industry; government agencies, such as MMS and the USCG; and industry trade groups, including API, the Offshore Operators Committee, the National Ocean Industries Association, the Independent Petroleum Association of America, and the International Association of Drilling Contractors. The program was created to cover activities, procedures and operating hardware. It was designed to be flexible and responsive and to be a permanent part of a company's culture, objectives and operations. Many offshore operators and contractors, including all API oil company

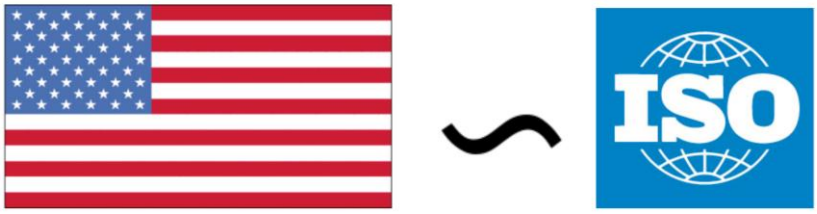
members, have created safety and environmental management programs that follow the recommendations in API RP 75.

API RP 75 starts with an assessment of operating and design requirements and a hazards analysis. It requires establishment of safe operating procedures, work practices, and management-of-change procedures, and associated training. It calls for procedures that ensure the design, fabrication, installation, testing, inspection, monitoring and maintenance of equipment meet safe (minimum) standards. In addition, it recommends periodic auditing of safety programs — and requires emergency response and incident investigation to help mitigate harm and prevent future mistakes.

API RP 75 application to OCS facilities is voluntary. In October 2010, BSEE introduced the SEMS final rule, which takes guidance from the API RP 75 and incorporates elements of API RP 75. It was made mandatory to apply SEMS for the OCS facilities.

3.2.36.2 *Impact and Recommendation*

There is no equivalent ISO standard for the API RP 75 which covers the safety and environmental management program. There are ISO standards which cover the specific elements of the API RP 75 but there is no standard which covers every aspects of the API RP 75. BSEE should continue to reference API RP 75. But it is imperative to note that API 75 applications in the offshore industry are in early stage and there will be changes required as industry learns from its application.



ASTM C 3M – 07 **ISO/NP 19595**

3.2.37 ASTM C 3M—07

ASTM C 3M-07, Standard Specification for Concrete Aggregates, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.37.1 *Analysis*

The quoted standard was published in 2007 while the latest is C33/33M – 13 (published in 2013). The standard gives the basic requirements for aggregate (except lightweight aggregate which is covered in C330-05 and its updates). Content is similar to that document giving grading and testing requirements and warnings about weathering and freezing.

There are ISO standards for aggregate, but it is unclear if there is a direct equivalent code. The standard may be covered under ISO/NP 19595, Natural Aggregates for concrete. The ISO standard is currently under development.

3.2.37.2 *Impact and Recommendation*

If concrete structures are to be used on the U.S. OCS, then there is a need for specification of the component parts, although these are incorporated directly within ACI 318 by normative reference in most cases.

This specification, or an updated version, should be incorporated by reference if there is a desire to maintain a specific reference to concrete structures and the component parts of concrete; however, these specifications are incorporated by reference directly within ACI 318. Therefore, BSEE should consider removing the ASTM standard because it is incorporated directly into ACI 318.

If BSEE intends to continue to reference the standard in the CFR they should modify the language to cite the "latest edition" rather than a specific edition in the CFR for all concrete standards.

ASTM C 94/C 94M-07

ISO 22965-2:2007

3.2.38 ASTM C 94/C 94M-07

ASTM C94/C 94M-07, Standard Specification for Ready-Mixed Concrete, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.38.1 *Analysis*

ASTM C94/C 94M-07 was published in 2007 while the latest edition of the standard was published in 2014. The standard covers most types of ready mixed and delivered concrete covering the specification from ordering, slump testing, delivered quantity definition, mixers, testing, etc. The standard is more concerned with the contractual side and quality assurance aspects of the delivery rather than the actual concrete strength which is covered in other standards.

The standard is likely covered in part by ISO 22965-2:2007, Concrete – Part 2: Specification of constituent materials, production of concrete and compliance of concrete.

3.2.38.2 *Impact and Recommendation*

If concrete structures are to be used on the U.S. OCS then there is a need for specification of the component parts, although these are incorporated directly within ACI 318 by normative reference in most cases.

BSEE should not incorporate the ISO 22965-2007 because the domestic standard is incorporated by reference in ACI 318.

This specification, or an updated version, should be incorporated by reference if there is a desire to maintain a specific reference to concrete structures and the component parts of concrete; however, these specifications are incorporated by reference directly within ACI 318. Therefore, BSEE should consider removing the ASTM standard because it is incorporated directly into ACI 318.

If BSEE intends to continue to reference the standard in the CFR they should modify the language to cite the "latest edition" rather than a specific edition in the CFR for all concrete standards.

ASTM C 150 – 05

3.2.39 ASTM C 150-05

ASTM C150-05, Standard Specification for Portland Cement, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.39.1 *Analysis*

ASTM C 150-05 was published in 2005 while the latest edition of the standard was published in 2012. The standard covers "simple" Portland cement with only a limited number of acceptable additives (the others being covered by the similar standard for Hydraulic Cement). Standard covers composition, chemistry, testing, packaging, and storage.

ISO 19903:2006 was reviewed and it was determined that there is no ISO equivalents to this standard.

3.2.39.2 *Impact and Recommendation*

If concrete structures are to be used on the U.S. OCS then there is a need for specification of the component parts, although these are incorporated directly within ACI 318 by normative reference in most cases.

This specification, or an updated version, should be incorporated by reference if there is a desire to maintain a specific reference to concrete structures and the component parts of concrete: however, these specifications are incorporated by reference directly within ACI 318. Therefore, BSEE should consider removing the ASTM standard because it is incorporated directly into ACI 318.

If BSEE intends to continue to reference the standard in the CFR they should modify the language to cite the "latest edition" rather than a specific edition in the CFR for all concrete standards.

AWS D1.1: 2000

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ISO 15607
ISO 15614

3.2.40 AWS D1.1:2000

AWS D1.1, Structural Welding Code – Steel, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.40.1 *Analysis*

There is no direct equivalent international standard to the AWS D1:1. The domestic standard is a more condensed version of the multiple related international standards, ISO 15607:2000 and ISO 15614.

It is noted that the comparable international standards are broken up into several different standards; therefore, it is possible to go into greater depth for each topic with the incorporation of the ISO standards. While the domestic standard is more condensed it does cover all areas sufficiently enough to accomplish the task at hand.

3.2.40.2 *Impact and Recommendation*

Unless there are specific issues from the field that would require the incorporation of a specific ISO standard (ISO 15607:2000 or ISO 15614) the AWS standard is more than enough. Additionally, AWS D1:1 was updated in 2010. BSEE should continue to incorporate the current edition.

AWS D1.4: 1998

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ISO 17660

3.2.41 AWS D1.4 – 1998

AWS D1.4 – 98, Structural Welding Code — Reinforcing Steel, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.41.1 *Analysis*

ISO 17660 can be considered a comparable international standard to AWS D1.4 – 98 because they both cover steel reinforcement welding in sufficient detail. However, ISO 17660 is split into two parts and

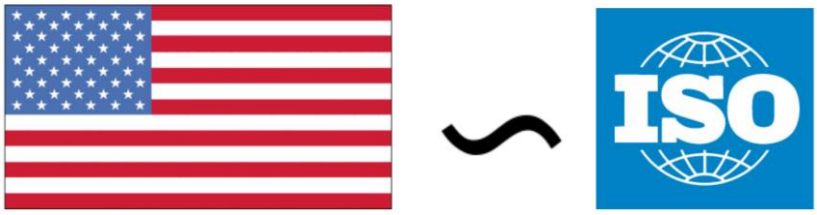
references several other standards while AWS D1.4 – 98 is less detailed, but contains all of the necessary information.

Although the ISO standard provides more detail this is accomplished with added complexity. The domestic standard is more condensed and provides adequate coverage for structural welding.

3.2.41.2 *Impact and Recommendation*

BSEE should continue to reference AWS D1.4 – 98 since ISO 17660 is broken up into several parts and references several other standards. The simplicity of the AWS standard is desirable.

A new edition of the standard has been published. BSEE should review the new edition and consider incorporation into the CFRs.



AWS D3.6M: 2010 **ISO 15618**

3.2.42 AWS D3.6M:2010

AWS D3.6M, Specification for Underwater Welding, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.42.1 *Analysis*

ISO 15618, Qualifications of Welders for Underwater Welding, could be considered a comparable standard to AWS D3.6M.

The main difference between the two standards is that the domestic standard is focused on the specific weld while the international standard focuses on the welder. Additionally, the international standard is broken up into both dry and wet hyperbaric welding. The international standards have similar requirements, but the wording is geared towards the welder being able to produce welds that will satisfy the requirements.

The domestic standard does have a section on the qualification of the welder. The domestic standard is more focused on the ability of the weld to pass the tests outlined in the standard. It is for an established welding procedure specification (WPS) to be used and is only concerned with the results and testing for the qualification of the WPS and the welds produced.

3.2.42.2 *Impact and Recommendation*

The impact of switching to the international standard will be that the focus goes from the process to the welder. The AWS standard is a code for underwater welding, while the international standard is for the qualification of welders for underwater welding.

BSEE should continue to reference AWS D3.6M and should not incorporate ISO 15618. The impact of switching to the international standard will be that the focus goes from the process to the welder.

ACI 318:95 and ACI 318R:95

3.2.43 ACI 318-1995 and ACI 318R-1995

ACI 318-95, Building Code Requirements for Reinforced Concrete and ACI 318R-95 is the commentary that explains ACI 318. Both standards are incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standards. The following sections provide analysis and recommendations.

3.2.43.1 *Analysis*

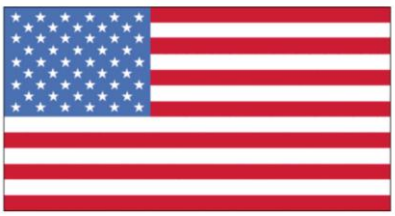
ACI 318-95 is the onshore concrete code that is referenced by the Guide ACI 357R. It can also be used in conjunction with ISO 19903:2006, Petroleum and natural gas industries - Fixed concrete offshore structures. The ACI document has been developed to be widely useable through reference and specifically states, "...this document covers the proper design and construction of buildings of structural concrete. The code has been written in such form that it may be adopted by reference in a general building code and earlier editions have been widely used in this manner."

It is understood that both ACI 318-95 and ACI 318R-95 are undergoing a complete reorganization and the new versions will be published in late 2014. The ACI website states the changes will be the first major reorganization since 1971, so the changes will likely be significant.

It is not clear what the direct ISO comparison is to this Code, but ISO TC71 covers concrete, reinforced concrete and pre-stressed concrete and is/has developed some design standards.

3.2.43.2 *Impact and Recommendation*

If a concrete design code is needed to cover the U.S. OCS (e.g., to back up either ISO 19903 or ACI 357), BSEE should incorporate ISO 19903 and ACI 318 (2014 edition).



ACI 357R:1984

ISO 19903:2006

3.2.44 ACI 357R:1984

ACI 357R-84, Guide for the Design and Construction of Fixed Offshore Concrete Structures, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.44.1 *Analysis*

ACI 357R was originally published in 1984, but was re-approved in 1997. The guide covers only bottom founded, gravity based, fixed offshore structures. It references various ASTM standards (generally for components such as aggregate, cement, additives, testing, etc.) and other ACI documents (particularly ACI 318).

The main purpose of the document is to provide additional information to the designer of concrete offshore structures that would not be contained in normal concrete codes (e.g., ACI and ASTM). The guide gives load factors (that appear to be generally in agreement with those included in ISO 19903, although a detailed review was not carried out). The guide covers the main lifecycle from construction, transportation/towage, installation, operations, and removal. It provides guidance on ice loads and seismic loads. The guide is limited by the level of detail provided (less than 25 pages in length) but helps point out critical issues that need to be considered.

ISO 19903:2006, Petroleum and natural gas industries – Fixed concrete offshore structures, is identified as a comparable standard to ACI 357R-84. The ISO standard committee plans to begin updating the standard in the near future. The introduction of ISO 19903 states that it is based on 30 years of experience, mainly with structures in the North Sea. It also states that 19903 gives "...guidance rather than detailed prescriptive rules...." ISO 19903 is based on a combination of documents, including national standards, government regulations, company specifications, etc.

ISO 19903 is in many ways very similar in scope and style to the ACI 357 Guide, although it goes into much more detail being approximately 130 pages long. The ISO establishes how to design a concrete offshore structure, but it states that the actual concrete design should be in compliance with a relevant set of national rules. It states what issues should be addressed, but does not give details of how to address them. As an example, it states that there is no ISO standard for cement, but it does list certain factors that should be considered when specifying the cement to be used. It addresses aggregates in a similar fashion. This makes the document a valuable supplemental document to the normal design standards and effectively will incorporate the ASTM standards (e.g., C33, C94/C94M, C150, etc.).

ISO 19903 covers some areas (topside, interface, and inspection/in-service monitoring) in more detail than ACI Guide.

3.2.44.2 *Impact and Recommendation*

While ACI 357R-84 was developed during or after most of the concrete activity in the North Sea, there have been some accidents since its development and other lessons learned.

In the future, it is unlikely that there will be offshore oil and gas concrete structures installed on the U.S. OCS, with the possible exception of Alaska. However, the ISO 19903 standard is still more current than

ACI 357R-84. The main problem with the ISO document is that it references some standards that have been withdrawn (Canadian and Norwegian). However, it could be successfully used with the ACI 318 standard as its core reference, incorporating the ASTM specifications by reference through ACI 318. It would then be a more up to date and complete document than the ACI Guide 357R.

It is possible that there could be concrete offshore wind turbines for which the ISO standard may be applicable.

If a reference to a concrete offshore standard is to be maintained, it is recommended that ISO 19903:2006 be referenced in place of ACI 357R-84 within the CFRs.

ANSI/AISC 360:2005

3.2.45 ANSI/AISC 360:2005

ANSI/AISC 360-05, Specification for Structural Steel Buildings, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.45.1 *Analysis*

ANSI/AISC 360-05, Specification for Structural Steel Buildings provides the specifications for the design and fabrication of structural steel buildings and other structures. The standard provides the design requirements of steel structures on the GoM.

There is no ISO equivalent to this standard.

3.2.45.2 *Impact and Recommendation*

A new edition of the standard was published in 2010. BSEE should review the new edition and should be further considered for incorporation.

ANSI/ASME B 16.5:2013

ISO 7005-1;2

3.2.46 ANSI/ASME B 16.5-2013

ANSI/ASME B 16-5, Pipe Flanges and Flanged Fittings, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.46.1 *Analysis*

ISO 7005 standard covers both Class and PN Designated flanges. When PN Series is specified, flanges (e.g., size, material) are to be in accordance with EN-1092-1. When Class series is specified, flanges shall be in accordance with ASME B16.5.

ISO 7005-1 (steel flanges), PN 20, 50, 110, 150, 260, 420, etc. are designed to be interchangeable with ASME B16.5 flanges. ISO 7005-1 flanges are not identical to ASME B 16.5 flanges but are deemed to comply with the dimensions specified in the ASME B 16.5.

In ASME B16.5 the flanges are designated by a class rating but in ISO 7005-1 and ISO 7005-2 they are designated as PN. Some Equivalent designations are follows: Class 150 (PN 20), Class 300 (PN 50), Class 600 (PN 100), and Class 900 (PN 150). There is no equivalent standard of Class 400 in ISO 7005-1 and ISO 7005-2 directly.

PN ratings do not provide a proportional relationship between different PN numbers, whereas class numbers do.

ISO 7005-1 standard does not mandate materials or corresponding Pressure/Temperature ratings, although various Informative Annexes list commonly used materials and corresponding Pressure/Temperature ratings. ISO 7005-2 standard includes as part of the standard, tables specifying materials and pressure temperature ratings. In contrast, the ASME B16.5 flange standards include, as part of the specification, ASME materials and the corresponding pressure temperature limitations and therefore materials and pressure temperature references do not have to be added after ASME standards in separate paragraphs.

ASME B 16.5 standard addresses in details the imperfections which penetrate the root and imperfections which do not penetrate the root of the flange finish. There is no similar allowable imperfection requirement in ISO 7005-1 and no such imperfection considerations are found in the flange standard ISO 7005-2 either.

3.2.46.2 *Impact and Recommendation*

ASME B16.5 is referenced in 46 CFR 250.1002(b)(2), which states that pipeline flanges and flange accessories criterion are to be in compliance with minimum design requirements as per ASME B16.5. Since ISO 7005 (international standard) refers to both Class (ASME standard) and PN (DIN standard), this standard can be considered meeting the same objective of ASME B16.5 standard; however, there are some subtle differences in detailed levels between these two standards.

Although there are some subtle differences, the standards can be considered to be meeting the same objectives and should be further considered for incorporation by reference.

ANSI/ASME SPPE-1-1994
ANSI/ASME SPPE-1-1996 Addenda

ISO 14001

3.2.47 ANSI/ASME SPPE-1-1994 and ANSI/ASME SPPE-1-1996 Addenda

ANSI/ASME SPPE-1-1994 and ANSI/ASME SPPE-1-1996 Addenda are incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.47.1 *Analysis*

The ASME officially withdrew the ANSI/ASME SPPE-1-1994 standard and all relevant addenda in 1999.

For the purpose of convenience, and because the SPPE-1-1996 Addenda merely updated version numbers of referenced standards SPPE-1-1994 (see section 4.1.2.3 below), SPPE-1 and addenda will be referenced hereafter as SPPE-1. With this information in mind, it should be useful to review the main features of SPPE-1.

SPPE-1 covers (a) SPPE QAPs; (b) accreditation of SPPE manufacturers, remanufacturers, and assemblers; and (c) SPPE failure reports. The standard was written with systems of processes and their interactions in mind – the so-called *process approach*. From this perspective, the standard put forth compliance requirements for producers and responsibilities of operators to report relevant and important information. Overall, SPPE-1 focused on QAP for SPPE producers, all of whom had to hold SPPE Certificates so as to certify compliance with SPPE-1 and several referenced standards. Those referenced standards concerned specific types of SPPE and were listed as follows:

- API Specification 14A, Specification for SSSVs Equipment, Eighth Edition, January 1994
- API Specification 14B, RP for Design, Installation, Repair, and Operation of SSSVs and USVs for Offshore Service, Ninth Edition, January 1994
- API RP 14D, Specification for Wellhead SSVs and USVs for Offshore Service, Ninth Edition, June 1994
- API RP 14H, RP for Use of SSVs and USVs Offshore, Second Edition, April 1984

The major requirement for producer accreditation, which was purportedly valuable because it helped ensure quality and reliability of SPPE, was that any certificate holder had to maintain a QAP and comply with the requirements therein. If those requirements were met, then the ASME allowed that the SPPE in question bear the official OCS symbol.

3.2.47.1.1 API Spec Q1

Because 30 CFR 250.806 currently states that the only other QAP recognized by BSEE is the API Specification Q1 standard, an analysis was also conducted of that standard. This section briefly reviews those results. It should be noted that API Specification Q1 has **not** been withdrawn by the API.

Scope of API Specification Q1 covers (a) the quality management system (QMS); (b) satisfaction of statutory and regulatory requirements; (c) continual customer satisfaction and assurance of conformity; and (d) product and service supply organizations for petroleum, petrochemical, and natural gas industries. The API Specification Q1 also adheres to the *process approach* to provide consistency and quality assurance with an emphasis on equipment defect prevention and reduction of waste in supply chain and in service providers. However, API Specification Q1 applies the process approach very generally to both products and services related to petroleum, petrochemical, and natural gas industries. In fact, the terms "products" and "services" are not specifically defined in relation to SPPE like in the withdrawn SPPE-1 standard. The API Specification Q1 standard maintains this relative generality throughout the document. It is explicitly mentioned that the standard is purposefully written to be general and that the standard is intended to be used in conjunction with other ISO-family standards, namely 9000, in any contexts more specific to the petroleum, petrochemical, and natural gas industries. To that end, it focuses on more general QMS features, as opposed to the more SPPE-specific foci of the QAPs discussed in SPPE-1. The just-mentioned generality is perhaps the greatest difference between SPPE-1 and API Specification Q1 – the latter being much more general, and potentially quite overbroad with respect to SPPE. Their clearest similarity is that both standards make provisions for licensure and accreditation so that equipment can bear the OCS (SPPE-1) or API monograms (API Specification Q1). In fact, API Specification Q1 is identical to ISO Technical Specification (TS) 29001 – this is a 9000 family standard that is slightly more specific with respect to SPPE than previous 9000 family standards – with added provisions for API monogram usage.

3.2.47.1.2 ISO 14001

The ISO 14001 standard focuses more specifically on environmental management systems (EMSs) and puts forth relevant directives and guidance for the use of those requirements. The ISO 14001 is a readable, salient, and growingly oft-referenced standard concerning environmental management and SPPE. Scope of ISO 14001 covers (a) requirements for an EMS so that it can be established, implemented, maintained, and improved; and (b) assurances and demonstrations of conformity with the international standard. The ISO 14001 also tends to be more normative than the aforementioned SPPE-1 and API Specification Q1, as ISO standards tend to be compared to API standards. One can see this phenomenon in how ISO standards often use the word "shall" instead of "should." Note, however, that more recent versions of API standards and addenda also tend to use more normative language.

Due to its specific and normative nature, and to its more administrative quality of being well-organized and well-formatted, the ISO 14001 is clearer, more readable, and more directly applicable than API Specification Q1. The specificity of ISO 14001 also means that it is more concise and, in turn, more manageable, compared to API Specification Q1. Taken together, these features directly contribute to the high quality of the ISO 14001 standard, especially given that the overarching purpose of such regulations is routine usage by those in industry being regulated.

The relative specificity of ISO 14001 does not compromise its comprehensiveness. Quite the contrary, the increased specificity of ISO 14001 actually allows it to be *more* comprehensive in specifying EMS requirements. The ISO 14001 standard mentions specifically (a) the continual improvement and prevention of pollution as two requirements of any environmental policy; (b) the environmental aspects in question; and (c) several examples of related legal requirements. By contrast, the API Specification Q1 only mentions improving the overarching QMS in relation to a relatively ill-defined "Quality Policy." Therefore, the specific-but-comprehensive feature of ISO 14001 makes it more easily and readily applied than the available alternative.

1.1.1.1 *Impact and Recommendation*

The ANSI/ASME SPPE-1 standard was usefully more specific than the potential replacement candidate and BSEE-recognized API Specification Q1. However, the SPPE-1 standard and relevant addenda have been withdrawn by the ASME.

Therefore, it is recommended here that BSEE immediately withdraw the ANSI/ASME SPPE-1 standard from regulation. However, the SPPE-1 standard did reference useful standards relating to specific types of SPPE (see section 4.1.2.3 above). These referenced standards have not been withdrawn. Therefore, they should not be withdrawn from regulation by BSEE.

The API Specification Q1 standard is the only other QAP currently recognized by BSEE for SPPE. Therefore, it is a potential replacement candidate for the withdrawn ANSI/ASME SPPE-1, but it is quite general to the point of being potentially overbroad.

Though rather vague and high-level language is common for standards, this feature of API Specification can be undesirable for regulation. Incidentally, this vagueness can make it difficult to conduct gap analyses of standards. Despite this difficulty, however, there are clear and useful differences between the API Specification Q1 standard and the relevant international standard, ISO 14001. Contrary to the API Specification Q1, the ISO 14001 is an international standard that is slightly more normative and much more focused on the environment. The ISO 14001 is more directly applicable, more concise, and more manageable than the API Specification Q1. The ISO 14001 is a recognized international standard referenced with increasing frequency. The ISO 14001 also manages to maintain comprehensiveness and appropriate flexibility in application.

Therefore, it is recommended BSEE reference ISO 140001 in place of ANSI/ASME SPPE-1-1994 and ASNSI/ASME SPPE-1-1996.

ANSI Z88.2-1992 ~ ISO 16976

3.2.48 ANSI Z88.2-1992

ANSI Z88.2-1992, American National Standard for Respiratory Protection, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.48.1 *Analysis*

The currently recognized standard for a comprehensive respiratory protection program is the ANSI Z88.2:1992. The ANSI Z88.2 standard is well established and commonly used throughout the world.

Though the ISO 16976 standard series addresses several factors related to respiratory protection equipment and the use of that equipment, it does not put forth a comprehensive respiratory protection program.

Therefore, it is concluded on the basis of the gap analysis presented below that there is no international or other national standard superior to ANSI Z88.2. It is recommended, therefore, that a comprehensive respiratory protection policy and procedure be developed in similar fashion to that detailed by the British Standard Occupational Health and Safety Assessment Series (BS OHSAS) 18001.

As noted above, ANSI Z88.2 is a standard for respiratory protection programs that is used universally.

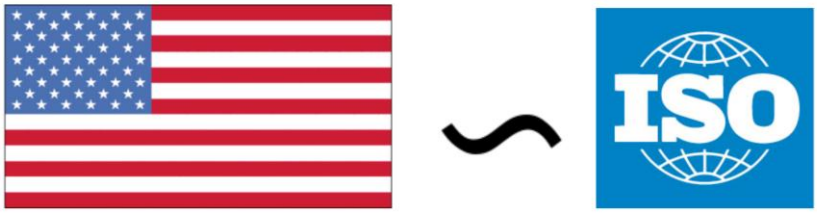
The ANSI Z88.2 standard is incorporated by reference at 29 CFR 1919(e)(72) and promulgated in part by 29 CFR 1910.134 by the Occupational Safety and Health Administration (OSHA).

The standard is incorporated or promulgated in other national regulations, sometimes without citation of the standard even though it may be copied practically verbatim. For example, Health and Safety Guidance (HSG) 53, Respiratory Equipment at Work: A Practical Guide, published by the United Kingdom Health and Safety Executive, contains substantially all of the ANSI Z88.2 requirements.

A search of the ISO standards related to respiratory protection revealed relatively narrow address of the usage, tests, and maintenance of various but specifically-noted pieces of respiratory protective equipment. For example, the ISO 16976 standard series details aspects of respiratory protective devices, especially those related to human-factors issues. The factors addressed by the ISO 16976 series include metabolic and flow rates, anthropometrics, physiological responses, thermal effects, psychophysiological effects, hearing and speech, and ergonomics. While the ISO 16976 series can inform the implementation of respiratory equipment, it serves a more limited scope than the ANSI Z88.2.

3.2.48.2 *Impact and Recommendation*

Regarding respiratory protection, there is no standard superior to ANSI Z88.2 with respect to the implementation and operation of a comprehensive respiratory protection program for worker safety. It is recommended a written respiratory protection policy and procedure be developed, implemented, and administrated similar to that required by 29 CFR 1910.134 under the Occupational Safety and Health (OSH) Act.



ANSI/API Spec. Q1 **ISO 29001:2010**

3.2.49 ANSI/API Spec. Q1

ANSI/API Specification Q1, Specification for Quality Programs for the Petroleum, Petrochemical and Natural Gas Industry, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.49.1 *Analysis*

The specification API Q1 was developed to address QMSs for organizations that manufacture products or provide manufacturing-related services under a product specification for use in the petroleum and natural gas industry. It defines fundamental QMS requirements for such organizations.

The previous revision of API Specification Q1 (8th Edition, 2007) including Addendum 1 (June 2010) was identical to ISO TS 29001 (3rd Edition, 2010) other than the inclusion of an Annex A by API before national adoption, for the provisions of the API Monogram Program.

The main difference being that in addition to the Organization operating a QMS as per ISO/TS 29001, the API Monogram Program provides evidence that the product is manufactured in accordance with an API specification or in other words, shows the Organization's capability to deliver the product to specification.

The two standards API Q1 & ISO 29001 were jointly developed by ISO until the ISO/API separation in 2012 post which a new edition of API Q1 (9th Edition) was published in June 2013. This new revision represents a significant change and a major shift in quality management as it applies to the oil and gas industry. It includes over 85 new clauses and 5 new sections.

The five new sections included are as follows:

(1) Risk Assessment and Management
(2) Contingency Planning
(3) Product Quality Plan
(4) Preventive Maintenance

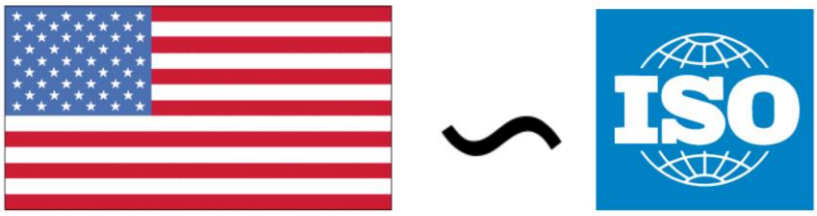
(5) Management of Change

Annexes B and C provides cross-reference tables highlighting differences between the 8th and 9th Editions. The intent of this revision has also been to closely align with API Spec Q2 in order to facilitate quality requirements for organizations that have both Q1 and Q2 operations.

3.2.49.2 *Impact and Recommendation*

The edition of API Spec Q1 that has been approved by the Director of the Federal Register for incorporation by reference is the 7th Edition; however, the latest 9th Edition needs to be considered for incorporation.

With ISO/API parting ways, the recommendation will be to consider API Q1 as it includes some new elements and requirements that have the potential to enhance existing QMSs and introduce a step change as well as closer alignment with API Spec Q2.



API Spec 6AV1 **ISO 10423:2009**

3.2.50 API Spec. 6AV1

API Specification 6AV1, Specification for Verification Test of Wellhead SSVs and USVs for Offshore Service, is incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.50.1 *Analysis*

API 6A (20th Edition, Effective April, 2001) included Annex I giving Performance Verification Procedures for SSVs and USVs; API 6AV1 is a normative reference in API 6A. Regional Annex O added definitions of test agency and requirements to test a valve at a test agency. The ISO 10423 (4th Edition), issued in December 2009 has both of the above two requirements and API 6AV1 is a normative reference in it. API 6A and API 6AV1 are both in 30CRF250.806, "All SSVs and USVs must meet the technical specifications of API Specs 6A and 6AV1." API 6AV1 is currently in the API Monogram Program.

Annex I is normative referenced in clauses 4.1, 10.20.1, and 10.20.4.3 of the current (20th Ed.) of API Specs 6A, and ISO 10423 (4th Ed.). Below are those normative references respectively:

(1) Valves operating as Safety Valves, shall be of PR2 performance level and meet the requirement of Annex I
(2) Safety Valves shall meet the performance requirements specified in Annex I and those shown in Table 94

(3) To verify a specific PR2 standard service valve for a SSV/USV design, the manufacturer shall satisfy the class I or II test in accordance with Annex I

6AV1 uses PR1 and PR2 to refer to the two classes of service. API 6A and ISO 10423 use Class I and Class II.

The monogram Annex N in 6A refers one to 6AV1 for the requirements for the test agency. The definition of "test agency" in Annex O (and in 10423) is stated as, "Independent third party that provides a test facility and administers a testing program that meets the Class II SSV/USV valve-validation testing requirements of Annex I of this International Standard and API Spec 6AV1." It's important to also note, the requirements of this definition (independent and third party) both violate the European Committee for Standardization (CEN) guidelines on standards content.

Differences between API 6AV1 (1st Edition) & API 6A (20th Ed.)/ISO 10423:2009

- 6AV1 uses PR1 and PR2 to refer to the two classes of service. API 6A and ISO 10423 use Class I and Class II.
- 6AV1 describes the Class I or PR1 test only in one place (clause 4.2) where it says the PR1 test can be run with water or similar fluids. Annex I describes the Class I test in detail in clause 1.3.
- The requirement to do a test per Annex I is stated in 10.20.4.3 c) where it says to submit a valve to a test agency but in Annex I.4.1 it says the manufacturer shall test the valve.
- The test agency requirements in Clause 4.4 of 6AV1 are not present in Annex I. However, in the definition of "test agency" in 3.119, compliance to 6AV1 is required which puts them back in. Therefore, if we want ISO 10423 or 6A to stand alone and contain all the requirements for 6AV1 testing, we would have to put these in Annex I or some other annex.
- ISO 10423 Clause I.1.4 on scaling of one valve test results to other sizes and pressure ratings only applies to Class I tests. The similar clause in 6AV1 (4.5.1) allows scaling for PR2 (Class II) test results.
- The use of the application forms and documentation of the test differs from 6AV1 to 10423.
- The flow diagram in 6AV1 Figure 1 is missing from Annex I.
- The minimum tank size of 5 oil barrel (bbl) (0.8 m^3) was changed to 1 m^3 (6.25 bbl).
- The measurements of viscosity and sand content were changed from API standards to ISO standards (ISO 10414-1).
- API 6AV1 includes licensing criteria and requirements for the test agency. There is nothing in ISO 10423 about this.

3.2.50.1 *Impact and Recommendation*

As noted in the gap analysis, most of the requirements of API Spec 6AV1 (1st Edition) have been incorporated into API 6A (20th Edition)/ISO 10423:2009.

We recommend BSEE to review the differences and consider the need to incorporate ISO 10423:2009. API 6A standard comparison as in section 3.2.1 can also be taken into account.

Since API 6AV1 has been updated to 2nd Edition there is a need to review the differences between API 6AV1 1st Edition and 2nd Edition to consider the same for incorporation.

ISO/IEC 17011:2004

3.2.51 ISO/IEC 17011

ISO/IEC 17001, Conformity assessment — General requirements for accreditation bodies accrediting conformity assessment bodies (2004), is incorporated by reference into BSEE regulation. It is noted that ISO/IEC 17011 is the only international standard incorporated by reference into BSEE regulation. Therefore, a literature search was not required to determine international equivalents to the standard.

It is recommended that BSEE continue to incorporate the standard by reference.

COS-2-01
COS-2-03
COS-2-04

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ISO 17021
ISO 19011

3.2.52 COS-2-01, C0S-2-03, and COS-2-04

COS-2-01, COS-2-03, and COS-2-04 are incorporated by reference into BSEE regulation. A literature search was conducted to identify comparable or equivalent international standards to the domestic standard. The following sections provide analysis and recommendations.

3.2.52.1 *Analysis*

According to COS, COS-2-01 defines qualification and competence requirements for audit teams, audit team leads and audit team members performing third-party SEMS audits to API RP 75 and 30 CFR Part 250, Subpart S for deepwater operations. It is not intended for use outside U.S. GoM deepwater operations.

COS-2-03 defines the requirements for COS-accredited ASPs providing audit and certification of SEMS to the requirements of API RP 75 and 30 CFR Part 250, Subpart S. It is applicable to SEMS certification of a COS member company's SEMS program(s) based on a sampling of implementation at deepwater facilities. It is not intended for use outside U.S. GoM deepwater operations. Requirements are in addition to ISO 17021 and ISO 19011.

COS-2-04 defines the requirements for accreditation of organizations certifying and auditing a COS member company's SEMS to the requirements of API RP 75 and 30 CFR Part 250, Subpart S. It applies only to audits of deepwater oil and gas facilities and operations. It is not intended for use outside U.S. GoM deepwater operations.

There are international standards for the conformity assessment which are generic and can be applied to any industry and organizations, for example ISO 17021 and ISO 19011. However, the COS standards are developed to provide specific guidance for the COS audit program on the U.S. OCS in GoM region.

COS 2-01/03/04 includes the requirement for audit/auditing body in addition to those required by the ISO 17021 and ISO 19011.

3.2.52.2 *Impact and Recommendation*

ISO 17021 and ISO 19011 are recognized international standards for the auditing practice and their specific requirements which can be applied to COS are already incorporated by reference in the COS domestic standard for audit/auditing body and we recommend not changing existing COS standards.

BSEE should continue to incorporate the COS standards by reference in regulation.

3.3 Edits to the In-house Whitepaper

ABS provided assistance in conducting a comprehensive review and analysis of the BSEE In-house white paper.

3.4 Analysis of API RP 2N 3rd Edition

BSEE required a need for the review of API's RP 2N 3rd Edition that could be applied to the design and use of MODU and other equipment for Arctic OCS operations. The scope of this RP specifically states that the procedures relating to ice actions and ice management in the document are applicable to MODUs. ABS engineers completed a full review of the standard as related to MODUs and arctic drilling.

3.5 Analysis of API 17G

BSEE required a need for the analysis of API 17G, RP for Completion/Workover Risers. ABS engineers completed a review of the standard.

3.6 National and International Outreach Activities

Below is a summary of the activities that the ABS Team has undertaken since September 2013 to establish, coordinate and expand outreach programs to national and international standards organizations. Also included in this document are recommendations for BSEE to establish and expand similar outreach efforts.

The mission of BSEE is to ensure safe and clean operations of energy exploration and production activities on the OCS.

Outreach is an important activity that aims to:

- Learn about stakeholder needs/requirements
- Communicate mission, strategies and goals
- Engage with stakeholders during daily activities
- Communicate mission results

Outreach efforts can take place at all levels in an organization, including:

- Executive level
- Program, department level
- Regional level
- Local level

There are many different avenues that can be used to conduct outreach activities, including:

- Meetings
- Conferences
- Newsletters
- Websites
- Articles in professional journals
- Media interviews/press releases
- Congressional hearings
- One-on-one contacts with customers and stakeholders
- Interagency coordinating activities

During this period the ABS Team has engaged in the following outreach efforts with national and international standards organizations:

3.6.1 Outreach to National Standards Organizations

- Attended the following domestic standards conferences
    - API Winter Standards Conference, Jan 2014, Addison, TX; ABS Engineers participated in workgroup meetings of various API committees.
    - U.S. Department of Transportation (DOT) Pipeline and Hazardous Materials Safety Administration's (PHMSA) Safety Management System workshop, February 27, 2014. James Watson, President, ABS Americas provided key note address. The focus

of the workshop discussion was how PHMSA is developing standards for safety management systems for use by pipeline operators.
    - API Summer Standards Conference, June 2014, Chicago, IL; ABS Engineers participated in workgroup meetings of various API committees.
- Joined standards organizations to participate in development of standards, including:
    - ABS participated in many API committees meetings to provide technical assistance to the development of standards and RPs.
    - Coordination with API to get introduced to the committee leads for the various API committees involved with developing oil and gas standards
- Facilitated relationships with standard committee chairman and SDO personnel.

3.6.2 Outreach to International Standards Organization

- Attended the IRF's Offshore Safety Conference, Perth, Australia, 21-23 October 2013. Met representatives from IRF member countries to discuss oil and gas issues around the world.
- Attended ISO meetings, (e.g. Paris France, 10-11 December 2013)
- Attended Offshore Technology Conference, Houston, TX, 5 – 8 May 2014
    - ABS SMEs participated in various ISO meetings
- Joined standards organizations to participate in development of standards
    - ABS Country managers engaged with various ISO committees (See Table 1**Table 13**)
    - Planned to attend future ISO conferences and meetings in these countries
- Coordinated with ABS International Country Managers to publicize the BSEE Standards Conference in New Orleans, LA; Jan 2014.
- Coordinated with ABS International Country Mangers to improve BSEE's international outreach strategy and the international industries understanding of BSEE.

Table 13: ABS Outreach Strategy Contact

Country	ABS Country Manager
Norway	Knut Oscar Gilje
United Kingdom	Garry Kelly
Canada	Multiple offices
Mexico	Miguel Cinta
Australia	Suresh Sethuram Bheema
New Zealand	Craig Hughes
Netherlands	Tony Vaclavicek
Brazil	Joao Pacheco
Russian Federation	Alexandre Artemiev
Venezuela	Victor Martinez

4. Recommendations

Based on the information gathered and analyses conducted throughout this study, the following recommendations are presented for BSEE's consideration.

4.1 Recommendations for Priority Standards

The following recommendations table is presented for BSEE's consideration. The table provides a summary of the comprehensive analyses presented in the report. It is organized by the BSEE's indicated priority level for each of the 60 standards identified for comparative analysis in this study.

The recommendations table presents the following information:

1. Identifies the domestic standard incorporated by reference in the CFRs.
2. Identifies comparable or equivalent international standards to the domestic standard.
3. Provides recommendation for the incorporation of the international standard by reference.
4. Provides recommendation for the reference of the domestic standard.
5. Provides description of the overall recommendation.

Table 14: Recommendations for Priority Standards

Domestic Standard	Comparable International Standard	International Recommendation	Domestic Recommendation	Description of Recommendation
ANSI/API Spec 6A	ISO 10423:2009	Intl Standard is Identical – Consider and review further	Updated standard available – Review new edition for incorporation	API 6A 20th edition (2010) and ISO10423:2009 are identical. However, the current CFR references an older edition of the standard, API Spec. 6A, 19th edition, Effective Date: February 1, 2005/ISO 10423 3rd Edition: 2003. It is recommended that BSEE review the 20th edition and determine if the standard should be incorporated by reference. If BSEE does determine the updated standard should be incorporated, the identical standard, ISO 10423:2009, should be reviewed for incorporation.
ANSI/ASME Boiler and Pressure Vessel Code, Section VIII	ISO 16528-1:2007 and ISO 16528-2:2007	Do not Incorporate Intl Standard	Keep current reference	ASME Section VIII is the most comprehensive standard available for material selection, design, fabrication, examination, inspection, testing, and certification of pressure vessels. It is recommended that BSEE continue to reference this standard.
API Bulletin 2INT-DG	No Comparable Equivalent Found	No comparable Intl Standard	Keep current reference – Revisit in future	BSEE should continue to reference API Bulletin 2INT-DG until either it is withdrawn or all the relevant API or ISO documents have been suitably updated.
API Bulletin 2INT-EX	ISO 19901-9 (Pending)	Revisit (Comparable Intl Standard Pending)	Keep current reference – Revisit in future	There is no current international equivalent as 2INT EX is very specifically written for the GoM and consistently references API Bulletin 2INT-MET. In the longer run, it is likely that ISO 19901-9 (SIM) will cover the same type of ground as 2INT-EX in a more general sense and would be a good document for BSEE to adopt.
API Bulletin 2INT-MET	ISO 19901-1	Revisit (Comparable Intl Standard Pending)	Keep current reference – Revisit in future	BSEE should update the CFR reference from API Bulletin 2INT-MET as soon as either ISO 19901-1 revision 2 or API RP 2MET is published. The revised ISO standard should be reviewed to ensure that it does include the latest GoM data, but if it does when published, then either revised document would be a good reference (with the ISO being preferable if

Domestic Standard	Comparable International Standard	International Recommendation	Domestic Recommendation	Description of Recommendation
				the intent is to move towards international standards). It currently appears likely that API RP 2MET will be published first, possibly as soon as November 2014, and the CFR should be updated accordingly.
API RP 2A-WSD	ISO 19902:2007	Intl Standard is Comparable – Consider and review further	Keep current reference – Revisit in future	ISO 19902 is a well-founded document that has been developed over many years with considerable American and International input. While there is merit in BSEE changing its CFR reference from API RP 2A-WSD to ISO 19902 (or API RP 2A-LRFD), it is likely that there will be resistance from the jacket designers in the GoM who are not familiar with LRFD design methods.
API RP 2FPS	ISO 19904-1	Revisit (Comparable Intl Standard Pending)	Keep current reference – Revisit in future	The current reference to API RP 2FPS is likely better suited to the current arrangement of CFRs. It is thought that after the ISO standard is updated, it will be a more current document; however, the ISO/API issues could affect future updating procedures. It is recommended that BSEE keep the current domestic reference now, but reassess in the future when ISO 19904-1 is released.
API RP 2I	No Comparable Equivalent Found	No comparable Intl Standard	Keep current reference	API RP 2I is the most comprehensive mooring hardware inspection guide covering most offshore mooring hardware and jewelry. BSEE should continue to incorporate the API RP 2I by reference in regulation.
API STD 2RD	No Comparable Equivalent Found	No comparable Intl Standard	Keep current reference – Revisit in future	While reviewing the standard and related CFR section it was observed that there is no direct relationship between the CFR section and API Standard 2RD since 2RD. BSEE should review further.
API RP 2SK	ISO 19901-7:2013	Revisit (Comparable Intl Standard Pending)	Keep current reference – Revisit in future	Logically, in the long run, BSEE would be well advised to move towards the ISO 19901-7. However, currently API RP 2SK contains additional GoM specific sections that are not in the ISO, and it would be hard to replicate these within an

Domestic Standard	Comparable International Standard	International Recommendation	Domestic Recommendation	Description of Recommendation
				ISO, particularly given the requirement for "ISO Speak." In addition, the API document may be more up-to-date when the current round of edits is incorporated. Both the API and ISO revisions will take an extended period of time to come into effect, so BSEE should keep the current API reference for a few years until the overall position is clarified.
API RP 2SM	ISO 18692:2007	Do not Incorporate Intl Standard	Keep current reference – Revisit in future	API RP 2SM is the best current reference for BSEE, although the second edition will be an even better document when it is finally approved by API. The existing ISO documents have limited scope and detail. Until their scope is improved they can only be used as supplemental references (as is done in 2SM 2nd edition).
API RP 2T	No Comparable Equivalent Found	Revisit (Comparable Intl Standard Pending)	Updated standard available – Review new edition for incorporation	API RP 2T 3rd Edition is now available. BSEE should review the 3rd edition for incorporation by reference and revisit ISO 19904-2 when published.
API RP 14C	ISO 10418:2003	Intl Standard is Comparable – Consider and review further		ISO 10418 is a well-founded document and has been based on API RP 14C with a few additional requirements. While there is merit in BSEE changing its CFR reference from API RP 14C to ISO 10418, there could be reasons for the difference in contents for U.S. based designs. It is recommended that BSEE review ISO 10418 to determine if they want to accept the differences between the ISO and the API document.
API RP 14E	ISO 13703:2000	Intl Standard is Comparable – Incorporate		ISO 13703 is a well-founded document and has been based on API RP 14E with some additional requirements. While there is merit in BSEE changing its CFR reference from API RP 14E to ISO 13703, there could be reasons for the difference in contents for U.S. based designs. In addition, unit conversions from Metric to U.S. oilfield can be problematic. In addition, unit conversions from Metric to U.S. oilfield can

Domestic Standard	Comparable International Standard	International Recommendation	Domestic Recommendation	Description of Recommendation
				be problematic. It is recommended that BSEE review ISO 13703 to determine if they want to accept the differences between the ISO and the API document.
API RP 14F	IEC 61892; 61892-1; 61892-2; 61892-3; 61892-4; 61892-5; 61892-6; 61892-7	Intl Standard is Comparable – Consider and review further	Keep current reference	It is recommended that BSEE continue to reference API 14F and 14FZ. Any changeover to IEC standards would impact costs to U.S. manufacturers. Further, from the reader or user standpoint, the API RP 14F and 14Z provide guidance for electrical installation in context with an offshore facility. It is also recommended that BSEE review areas of the IEC standard that provide additional detail (e.g., electrical equipment in hazardous areas, electrical distribution systems) to consider if the requirements of the IEC are warranted. If so, BSEE may consider incorporating IEC 61892-2 by reference.
API RP 14FZ	IEC 61892; 61892-1; 61892-2; 61892-3; 61892-4; 61892-5; 61892-6; 61892-7	Intl Standard is Comparable – Consider and review further	Keep current reference	See above. Combined with API 14F analysis.
API RP 14G	ISO 13702:1999	Intl Standard is Comparable – Consider and review further	Keep current reference	It is recommended that BSEE review the ISO standard further and retain API 14G. If during the review BSEE determines there is value in the specific requirements of ISO 13702 then BSEE should add it to the CFR.
API STD 53	No Comparable Equivalent Found	No comparable Intl Standard	Updated standard available – Review new edition for incorporation	API STD 53 is the most comprehensive standard available for installation and testing of blowout prevention equipment systems on land and marine drilling rigs (barge, platform, bottom-supported, and floating). It is recommended that CFR refer to the latest edition of the standard 53.
API RP 65	No Comparable Equivalent Found	No comparable Intl Standard	Keep current reference	API RP 65 provides the most comprehensive set of best practices currently available to reduce the risk from SWFs.

Domestic Standard	Comparable International Standard	International Recommendation	Domestic Recommendation	Description of Recommendation
API RP 500	IEC 60079-10-1	Do not Incorporate Intl Standard	Keep current reference	It is recommended that BSEE continue to reference API RP 500 and API RP 505. These API RPs are more comprehensive and more applicable to Offshore Facilities than IEC 60079-10. API RP 500 addresses Class I, Division 1 and Division 2 types of hazardous area classifications while hazardous area divisions are not addressed in IEC 60079-10. Further, API RP 500 and RP 505 incorporate the methods and calculations found in IEC 60079-10.
API RP 505	IEC 60079-10-1	Do not Incorporate Intl Standard	Keep current reference	See above. Combined with RP 500 analysis.
API Spec 2C	ISO 8686 and ISO 4302	No comparable Intl Standard	Keep current reference	Given that the relative depths of coverage are similar, but that the API Spec 2C covers so many issues in one standard, it is recommended BSEE retain API Spec 2C.
ANSI/API Spec 6D	ISO 14313:2007	Intl Standard is Identical – Consider and review further	Updated standard available – Review new edition for incorporation	As noted above, API 6D 23rd edition (2008) and ISO 14313:2007 are identical. However, the current CFR references an older edit of the standard, API 6D 22nd edition. It is recommended that BSEE review the 23rd edition and determine if the standard should be incorporated by reference. If BSEE does determine the updated standard should be incorporated, the identical international standard, ISO 14313:2007, should be reviewed for incorporation.
ANSI/API Spec 14A	ISO 10423:2004	Intl Standard is Identical – Consider and review further	Updated standard available – Review new edition for incorporation	As noted in the analysis, API 14 11th edition (2006) and ISO 10423:2004 are identical. However, the current CFR references an older edition of the standard, ANSI/API Spec 14A, 10th edition, 2000/ISO 10432:1999. It is recommended BSEE review the 11th edition and determine if the standard should be incorporated by reference. If BSEE does determine the updated standard should be incorporated, the identical international standard, ISO 10423:2004, should be considered for incorporation.

Domestic Standard	Comparable International Standard	International Recommendation	Domestic Recommendation	Description of Recommendation
API RP 90	ISO 16530-2:2013	Revisit (Comparable Intl Standard Pending)	Keep current reference	API RP 90 provides more detailed guidance for the specific well types – methods and frequency of monitoring, detection and evaluation of annular casing pressure. The ISO specification covers the subject in a more high-level functional requirement and from a management systems perspective. The specification has its own merits and it is recommended to be reviewed in further detail when published for aspects that could be useful for incorporation.
API Standard 65 – Part 2	No Comparable Equivalent Found	No comparable Intl Standard	Keep current reference	API STD 65 – Part 2 is the most comprehensive standard available for isolation of potential flow zones which addresses very serious issues faced by the industry, such as how to prevent or control flows prior to, during and after cementing operations, and preventing sustained casing pressures. It is recommended that BSEE continue to reference API STD 65 – Part 2 in the CFR.
ASTM C 330-05	No Comparable Equivalent Found	Revisit (Comparable Intl Standard Pending)	Consider withdrawing the standard or state "latest edition" in CFRs	BSEE should consider removing the ASTM standard because it is incorporated directly into ACI 318. If BSEE intends to continue to reference the standard in the CFR, they should modify the language to cite the “latest edition” rather than a specific edition in the CFR for all concrete standards.
ASTM C 595-08	No Comparable Equivalent Found	No comparable Intl Standard	Consider withdrawing the standard or state "latest edition" in CFRs	BSEE should consider removing the ASTM standard because it is incorporated directly into ACI 318. If BSEE intends to continue to reference the standard in the CFR, they should modify the language to cite the “latest edition” rather than a specific edition in the CFR for all concrete standards.
NACE MR0175-2009	ISO 15156	Intl Standard is Comparable – Consider and review further	Keep current reference	BSEE should continue to reference the domestic standard and consider incorporating the ISO standard, ISO 15156.

Domestic Standard	Comparable International Standard	International Recommendation	Domestic Recommendation	Description of Recommendation
NACE SP0176-2007	No Comparable Equivalent Found	No comparable Intl Standard	Keep current reference	The predominant industry standard for cathodic protection is DNV RP B401 (Cathodic Protection Design). The DNV standard could be compared to the NACE standard or the CFR (which simply references the NACE standard). There is no equivalent ISO standard to NACE SP0176.
ANSI/ASME B 31.8-2012	No Comparable Equivalent Found	Intl Standard is Comparable – Consider and review further		ASME B31.8 is referenced in 30 CFR 250.1002 as the criteria to determine the internal design pressure of steel pipes used in DOI pipelines. In order to consider ISO 13623 as meeting the same objective, then the design criteria in ISO 13623 is to be carefully analyzed as it differs from ASME B31.8. All other requirements in 30 CFR 250.1002 are compatible with ISO 13623.
API 510	No Comparable Equivalent Found	No comparable Intl Standard	Keep current reference	BSEE should continue to reference API 510 for in-service pressure vessel inspection.
API RP 2D	No Comparable Equivalent Found	No comparable Intl Standard	Keep current reference	Several relevant ISO standards do not specify that they address cranes typically found offshore. For the above reasons, it is recommended that BSEE retain API RP 2D as the best currently available and most comprehensive standard for the operation and maintenance of offshore cranes. Thus, it is also recommended that BSEE adopt either ASME B30-4, "Portal and Pedestal Cranes," section 3.1.2, or the physical instructions to physicians for qualifying physical examinations, put forth by the NCCCO as a supplement to API RP 2D.
API RP 14B	ISO 10417:2004	Intl Standard is Identical – Consider and review further		As noted in the analysis, both API 14B 5th editions (2005) and ISO 10417:2004 are identical. It is noted that API and ISO will be developing their own independent documents henceforth. The ISO standard may be incorporated directly after evaluating the ISO/API relationship for future publications.

Domestic Standard	Comparable International Standard	International Recommendation	Domestic Recommendation	Description of Recommendation
API RP 14H	No comparable equivalent found	No comparable Intl Standard	Keep current reference – Revisit in future	The current standard incorporated by reference is API 14H. Since this RP has been now revised and superseded by API STD 6AV2, the CFR reference needs to be updated.
API RP 14J	ISO 17776:2002	Do not Incorporate Intl Standard	Keep current reference	API RP 14J is the most comprehensive standard available for hazard analysis for offshore production facilities and it is recommended that CFR continues to reference this standard.
ANSI/API Spec 17J	ISO 13628-2:2006 and 13628-2:2006/Cor.1:2009	Do not Incorporate Intl Standard	Keep current reference	Both API Spec 17J and ISO 13628-2 have the same level of requirements for design of unbounded pipes; however, API 17J is the more popular spec for unbounded pipes used industry wide. It is recommended that the CFR continue referencing this standard.
API RP 75	No Comparable Equivalent Found	No comparable Intl Standard	Keep current reference	There are ISO standards which cover the specific elements of the API RP 75 but there is no standard which covers every aspects of the API RP 75. BSEE should continue to reference API RP 75.
ASTM C 3M-07	ISO 19595	Revisit (Comparable Intl Standard Pending)	Consider withdrawing the standard or state "latest edition" in CFRs	This specification, or an updated version, should be incorporated by reference if there is a desire to maintain a specific reference to concrete structures and the component parts of concrete; however, these specifications are incorporated by reference directly within ACI 318. Therefore, BSEE should consider removing the ASTM standard because it is incorporated directly into ACI 318. If BSEE intends to continue to reference the standard in the CFR, they should modify the language to cite the “latest edition” rather than a specific edition in the CFR for all concrete standards.
ASTM C 94/C 94M-07	ISO 22965-2:2007	Do not Incorporate Intl Standard	Consider withdrawing the standard or state "latest edition" in	BSEE should not incorporate the ISO 22965-2007 because the domestic standard is incorporated by reference in ACI 318. This specification, or an updated version, should be incorporated by reference if there is a desire to maintain a

Domestic Standard	Comparable International Standard	International Recommendation	Domestic Recommendation	Description of Recommendation
			CFRs	specific reference to concrete structures and the component parts of concrete; however, these specifications are incorporated by reference directly within ACI 318. Therefore, BSEE should consider removing the ASTM standard because it is incorporated directly into ACI 318. If BSEE intends to continue to reference the standard in the CFR, they should modify the language to cite the "latest edition" rather than a specific edition in the CFR for all concrete standards.
ASTM C 150-05	No Comparable Equivalent Found	No comparable Intl Standard	Consider withdrawing the standard or state "latest edition" in CFRs	This specification, or an updated version, should be incorporated by reference if there is a desire to maintain a specific reference to concrete structures and the component parts of concrete; however, these specifications are incorporated by reference directly within ACI 318. Therefore, BSEE should consider removing the ASTM standard because it is incorporated directly into ACI 318. If BSEE intends to continue to reference the standard in the CFR, they should modify the language to cite the "latest edition" rather than a specific edition in the CFR for all concrete standards.
AWS D1.1:2000	ISO 15607 and ISO 15614	Do not Incorporate Intl Standard	Keep current reference	Unless there are specific issues from the field that would require the incorporation of a specific ISO standard (ISO 15607:2000 or ISO 15614) the AWS standard is sufficient.
AWSD1.4-98	ISO 17660	Do not Incorporate Intl Standard	Updated standard available – Review new edition for incorporation	BSEE should continue to reference AWS D1.4-98 since ISO 17660 is broken up into several parts and references several other standards, the simplicity of the AWS standard is desirable. A new edition of the standard has been published. BSEE should review the new edition and consider incorporation into the CFRs.

Domestic Standard	Comparable International Standard	International Recommendation	Domestic Recommendation	Description of Recommendation
AWS D3.6M:2010	ISO 15618	Do not Incorporate Intl Standard	Keep current reference	BSEE should continue to reference AWS D3.6M and should not incorporate ISO 15618. The impact of switching to the international standard will be that the focus goes from the process to the welder.
ACI 318-95	No Comparable Equivalent Found	No comparable Intl Standard	New edition will be published this year – Revisit in the future	If a concrete design code is needed to cover U.S. OCS (e.g., to back up ISO 19903 or ACI 357), then this is a good standard and should be retained within the CFR, although it is out of date and it is likely the new 2014 version will be completely reorganized.
ACI 318R-95	No Comparable Equivalent Found	No comparable Intl Standard	New edition will be published this year – Revisit in the future	This commentary is now part of ACI 318 and, as recommended above, the latest 2014 version, ACI 318-14 should be referenced.
ACI 357R-84	ISO 19903:2006	Intl Standard is Comparable – Incorporate	Remove Domestic Standard (N/A)	If a reference to a concrete offshore standard is to be maintained, it is recommended that ISO 19903 be referenced in place of ACI 357R-84 within the CFRs.
ANSI/AISC 360-05	No comparable Intl Standard	No comparable Intl Standard	Updated standard available – Review new edition for incorporation	A new edition of the standard was published in 2010. BSEE should review the new edition and should be further considered for incorporation.
ANSI/ASME Boiler and Pressure Vessel Code, Section I	ISO 16528-1:2007 and ISO 16528-2:2007	Do not Incorporate Intl Standard	Updated standard available – Review new edition for incorporation	ASME Section I is the most comprehensive standard available. It is recommended that BSEE continue to reference this standard.
ANSI/ASME Boiler and Pressure Vessel Code, Section IV	ISO 16528-1:2007 and ISO 16528-2:2007	Do not Incorporate Intl Standard	Updated standard available – Review new edition for incorporation	ASME Section IV is the most comprehensive standard available. It is recommended that BSEE continue to reference this standard.

Domestic Standard	Comparable International Standard	International Recommendation	Domestic Recommendation	Description of Recommendation
ANSI/ASME B 16.5-2013	ISO 7005	Intl Standard is Comparable – Consider and review further		Although there are some subtle differences in detailed levels between ISO 7005 and ASME B 16.5, the standards can be considered to be meeting the same objectives and should be further considered for incorporation by reference.
ANSI/ASME SPPE-1-1994	ISO14001	Intl Standard is Comparable – Consider and review further	Remove Domestic Standard (Withdrawn/ Replaced)	It is recommended that BSEE immediately withdraw ASNI/ASME SPPE-1-1994 and ASNI/ASME SPPE-1-1996 Addenda. API Spec Q1 is the only other QAP currently recognized by BSEE. ISO 14001 is more directly applicable to SPPE than API Q1 and should be further reviewed for consideration of incorporation by reference.
ANSI/ASME SPPE-1-1996 Addenda	ISO 14001	Intl Standard is Comparable – Consider and review further	Remove Domestic Standard (Withdrawn/ Replaced)	It is recommended that BSEE immediately withdraw ASNI/ASME SPPE-1-1994 and ASNI/ASME SPPE-1-1996 Addenda. API Spec Q1 is the only other QAP currently recognized by BSEE. ISO 14001 is more directly applicable to SPPE than API Q1 and should be further reviewed for consideration of incorporation by reference.
ANSI Z88.2-1992	ISO 14001	Do not Incorporate Intl Standard	Keep current reference	Regarding respiratory protection, there is no standard superior to ANSI Z88.2 with respect to the implementation and operation of a comprehensive respiratory protection program for worker safety. It is recommended a written respiratory protection policy and procedure be developed, implemented, and administrated similar to that required by 29 CFR 1910.134 under the OSH Act.
ANSI/API Spec Q1	ISO TS 29001:2010	Do not Incorporate Intl Standard	Updated standard available – Review new edition for incorporation	BSEE should consider incorporating the API Spec Q1, 9th Edition. Additionally, BSEE should not consider incorporating the ISO standard because API and ISO are parting ways.
API Spec 6AV1	ISO 10423:2009	Intl Standard is Comparable – Consider and review further	New Edition Available Review Further	BSEE should review the differences and consider the need to incorporate ISO 10423:2009. API 6A standard comparison as in section 3.2.1 can also be taken into account. Since API

Domestic Standard	Comparable International Standard	International Recommendation	Domestic Recommendation	Description of Recommendation
				6AV1 has been updated to 2nd Edition there is a need to review the differences between API 6AV1 1st Edition and 2nd Edition to consider the same for incorporation.
ISO/IEC 17011	Not Applicable	Not Applicable	Keep current reference	It is recommended that BSEE continue to incorporate ISO/IEC 17011 by reference.
COS-2-01	ISO/TEC 17021 and ISO 19011	Do not Incorporate Intl Standard	Keep current reference	ISO 17021 and ISO 19011 are recognized standard for the auditing practice and their specific requirement which can be applied to COS are already incorporated by reference in the COS domestic standard for audit/auditing body and we recommend not changing existing COS standards.
COS-2-03	ISO/TEC 17021 and ISO 19011	Do not Incorporate Intl Standard	Keep current reference	ISO 17021 and ISO 19011 are recognized standard for the auditing practice and their specific requirement which can be applied to COS are already incorporated by reference in the COS domestic standard for audit/auditing body and we recommend not changing existing COS standards.
COS-2-04	ISO/TEC 17021 and ISO 19011	Do not Incorporate Intl Standard	Keep current reference	ISO 17021 and ISO 19011 are recognized standard for the auditing practice and their specific requirement which can be applied to COS are already incorporated by reference in the COS domestic standard for audit/auditing body and we recommend not changing existing COS standards.

4.2 Recommendations for International Standards to be Incorporated into Regulation

Based on the analyses conducted throughout this study, the following sections identify equivalent or comparable international standards to domestic standards incorporated by reference. BSEE should consider these standards for incorporation by reference for the purpose of achieving increased reciprocity across national and international boundaries.

4.2.1 Equivalent International Standards

The following international standards were identified to be equivalent to a domestic standard incorporated by reference (**Table 15**). The international standards shown below are identified as well-founded documents that have been developed over many years. BSEE should incorporate these equivalent standards by reference in the CFRs.

Table 15: Equivalent International Standards

Domestic Standard Incorporated by Reference	Equivalent International Standard
ANSI/API Spec 6A	ISO 10423:2009
ANSI/API Spec 6D	ISO 14313:2007
ANSI/API Spec 14A	ISO 10423:2004
API RP 14B	ISO 10417:2004
API RP 14E	ISO 13703:2000
ACI 357R-84	ISO 19903:2006

It is noted that API and ISO will be developing their own independent documents henceforth. The ISO standard may be incorporated directly after evaluating the ISO/API relationship for future publications.

4.2.2 Comparable International Standards

The following international standards were identified to be similar or comparable to a domestic standard incorporated by reference (**Table 16**). BSEE should consider further review of these standards for incorporation by reference in the CFRs.

Table 16: Comparable International Standards

Domestic Standard Incorporated by Reference	Comparable International Standard
API RP 2A-WSD	ISO 19902:2007
API RP 14C	ISO 10418:2003
API RP 14F and API RP 14FZ	IEC 61892; IEC 61892-1; IEC 61892-2; IEC 61892-3; IEC 61892-4; IEC 61892-5; IEC 61892-6; IEC 61892-7
API RP 14G	ISO 13702:1999
ANSI/ASME B 31.8-2012	ISO 13623
ANSI/ASME B 16.5-2013	ISO 7005-1;2
ANSI/ASME SPPE-1-1994	ISO 14001
NACE MR0175-2009	ISO 15156

4.3 Program Related

Based on the information gathered throughout this study, the following program recommendations are presented for BSEE's consideration.

4.3.1 Standard Development Organization Outreach

BSEE is charged with the responsibility to permit, oversee, and enforce the laws and regulations associated with the development of energy resources on the Outer Continental Shelf (OCS). BSEE is also responsible for safety and environmental oversight of offshore oil and gas operations, including permitting and inspections activities. Standards Development Organizations (SDOs) directly influence the development of standards incorporated by reference in BSEE regulation. Therefore, it is necessary that BSEE have active participation in SDOs.

BSEE is actively involved with many SDOs through committee meetings, conferences, ongoing communication with SDO personnel, and established relationships with committee members. However, BSEE requires additional support staff in order to maintain and expand the current SDO outreach program.

BSEE can expand the current SDO outreach program by assigning a Point of Contact (POC) to coordinate with SDOs. The POC would be responsible for creating a master meeting calendar that would be used to track communication with standard committee members and other committee involvement.

The POC would be responsible for coordinating with BSEE personnel, contractors, and other support staff to provide standard meeting coverage. The SDO POC would assign primary and alternate responsibilities for attending domestic and international meetings to staff. They would be responsible for establishing procedures for meeting attendance and reporting meeting minutes.

BSEE should identify additional support staff (Standards Database Coordinator) to develop a standards database. The database would be an asset to BSEE's Office of Offshore Regulatory Programs in the development and update of standards incorporated by reference in BSEE regulation. The database would track the following information on standards incorporated by reference in BSEE regulation and standards not incorporated by reference but indicated a priority to BSEE.

- Standard Committee Updates
- Proposed Changes to Standards
- Proposed Changes to Standards that impact Regulation
- Revisions and Changes to Standards
- Committee Votes and Ballots
- Standard Meeting Calendar
- Impacts/discussion related to BSEE
- Follow-up Actions for Committees
- Actions for BSEE personnel

4.3.2 National and International Outreach Recommendations

In order to establish, coordinate and expand national and international outreach programs, BSEE should develop a communications plan. The components of the outreach plan are outlined below.

4.3.2.1 *Determine Outreach Goals*

BSEE should increase awareness of its mission, goals, and strategies among key stakeholders at the international, national, regional, and local level.

BSEE should become aware of key stakeholder expectations and requirements related to the services provided to these stakeholders by BSEE.

BSEE should engage with stakeholders during daily activities to communicate information about the services being provided (e.g., Permitting and Inspection activities).

BSEE should communicate key performance information to stakeholders. Example performance measures include:

- Mission outcomes – deaths, injuries, oils spills, etc.
- Leadership outcomes – progress on goals and strategies in BSEE's Strategic Plan
- Stakeholder outcomes – stakeholder satisfaction
- Process outcomes – processing time for permits, risk reduction among platforms/rigs
- Human Resource outcomes – workplace engagement, progress towards hiring goals
- Financial outcomes – percentage of operating costs covered by fees, reduction in operating expenses

4.3.2.2 *Identify the Audience*

BSEE should identify the internal audience. The internal audience includes the employees throughout BSEE – headquarters (Main Interior Building, Herndon), Regional offices, and District Offices. Employees should be grouped by position type – Executive level, program, department level, Regional level, District level

BSEE should identify the external audience: This includes stakeholders impacted by BSEE's operations. Government stakeholders include US agencies. Government stakeholders could include the following:

- DOI
- Office of Management and Budget (OMB)/Office of Personnel Management (OPM)
- Congressional oversight committees
- Government Accountability Office (GAO)
- Other agencies [USCG, Environmental Protection Agency (EPA), OSHA)
- International Countries that comprise the IRF.
    - Australia
    - Brazil
    - Canada
    - Denmark
    - Mexico

- Netherlands
- New Zealand
- Norway
- United Kingdom
- United States (not applicable to be an external stakeholder)

BSEE should identify external audience that includes domestic and international standards organizations as well as oil and gas industry trade associations. These audiences may include the following.

- API
- IADC
- OGP
- Oil and Gas Producers
- Oil and Gas Contractors
- Oil Spill Response Organizations

4.3.2.3 *Develop Key Messages*

BSEE should develop key messages for internal stakeholders. The messages for internal audiences should be developed and tailored to the unique needs of BSEE employees. Executives need specific messages on their involvement with implementing key initiatives, Regional and District personnel need information on program administration and priorities in order to implement consistent approaches. All employees need information on what's expected of them, how they are personally involved in achieving BSEE's goals and how they can work together as a team.

Key messages could include the following:

- BSEE's enduring mission and its importance to the nation
- BSEE's vision for change: How BSEE will look in the future when this vision is achieved
- Goals contained it the various Strategic Plan(s): Human Capital, Information Technology, etc.
- Areas of Focus: Key priorities for the immediate future in order to achieve established goals and vision
- Strategies: How BSEE will accomplish the goals in the strategic plan; key initiatives and projects that will be implemented; each employee's involvement in these initiatives; and the resources that will be needed
- Performance measures that will be used to manage progress and how information about progress will be made available to all employees

BSEE should develop key messages for external stakeholders and audiences. The message for external audience should also be developed and tailored to the unique needs of government stakeholders, SDOs, and the oil and gas industry.

Key messages could include the following:

- BSEE's enduring mission and its importance to the nation
- BSEE's vision for change: How BSEE will look in the future when this vision is achieved

- Goals contained in the various Strategic Plan(s), especially those related to managing and mitigating risks associated with operations on the OCS.
- Areas of Focus: Key priorities for the immediate future in order to achieve established goals and vision
- Strategies: How BSEE will accomplish the goals in the strategic plan; key initiatives and projects that will be implemented
- Key services: Information on the services provided to stakeholders, including delivery standards (e.g., permit processing time)
- Stakeholder relationships: POCs for questions about how to apply for permits, interpretations of BSEE regulations, etc.
- Performance measures that will be used to manage progress and how information about progress will be made available to all employees

4.3.2.4 *Select the Communication Channel(s)*

There are many different avenues that can be used to conduct outreach activities including meetings, conferences, newsletters, websites, articles in professional journals, media interviews, press releases, congressional hearings as well as one-on-one contacts with stakeholders during daily activity.

4.3.2.5 *Implement the Plan*

To implement the plan, leaders should communicate outreach expectations, responsibilities and tasks to each employee involved.

A project plan should be established to outline the tasks, duration, sequence and resources needed to conduct each task. A project manager should be assigned to ensure implementation proceeds as planned. The project manager should also be responsible for modifying the plan to adjust tasks, duration, and sequencing and the resource assignments as the project progresses.

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