



Updated and latest news from international standardization

ISO seminar «International standardization in the
reliability engineering & technology arena»
Universidade Petrobras, Rio de Janeiro, Brazil,
3 November 2014

Runar Østebø, Statoil, ISO/TC 67/WG4 Convenor

Scope of ISO/TC 67

- *Standardization of the materials, equipment and offshore structures used in the drilling, production, transport by pipelines and processing of liquid and gaseous hydrocarbons within the*
 - *petroleum, petrochemical and natural gas industries*
- *Excluded: Aspects of offshore structures subject to IMO regulations (ISO/TC 8 – Ships and marine technology)*

ISO Mission: To create value-added standards for the oil and gas industry

ISO Vision: Global standards used locally worldwide

Global standardization arena



WG4 responsibilities

ISO Standards for use in the oil & gas industry

- ISO 10418 Basic surface safety systems
- ISO 10423 Wellhead & christmas tree equipment
- ISO/TR 12489 Reliability modeling/safety systems (New)
- ISO 13354 Shallow gas diverter equipment (New)
- ISO 13353 Drill-through equipment (BOPs)
- ISO 13354 Hoisting equipment - care/maint
- ISO 13355 Hoisting equipment - specification
- ISO 13626 Drilling and well-servicing structures
- ISO 13702 Control & mitigation of fires & explosions (Rev)
- ISO 13700 Offshore piping systems
- ISO 14224 Reliability/maintenance data
- ISO 14692 Suez ports, Parts 1-4
- ISO 14693 Drilling equipment

- ISO 15156-1 Selection of cracking resistant materials for use in H₂S environments
- ISO 15156-2 Cracking-resistant steels and cast irons for use in H₂S environments
- ISO 15156-3 Cracking-resistant alloys for use in H₂S environments
- ISO 15138 HVAC
- ISO 15544 Emergency response
- ISO 15663 Life cycle costing, Parts 1-3
- ISO 17724 Assessment of hazardous situations
- ISO 20120 Cost-benefit analysis for environmental (New)
- ISO 20815 Production assurance and reliability management
- ISO 21163 Material selection
- ISO 23936-1 Thermoplastics
- ISO 23936-2 Elastomers (New)
- ISO 23936-2 Method of test for offshore fire dampers
- ISO 75 27469 Sector-specific quality management systems

- ISO 3977-5 Gas turbines - procurement
- ISO 10428 Sucker rods
- ISO 10431 Pumping units
- ISO 10434 Bolted bonnet steel gate valves
- ISO 10437 Special-purpose steam turbines (Rev)
- ISO 10438 Lubrication, shaft sealing and control-oil systems, Parts 1-4
- ISO 10439 Centrifugal compressors
- ISO 10440-1 Rotary-type positive-displacement process compressors (oil-free)
- ISO 10440-2 Rotary PD packaged air compressors
- ISO 10441 Flexible couplings - special
- ISO 10442 Integrally geared air compressors
- ISO 12211 Spiral plate heat exchangers
- ISO 12212 Heatpin heat exchangers
- ISO 13631 Reciprocating gas compressors
- ISO 13691 High speed enclosed gear units
- ISO 13704 Calculation of heater tube thickness
- ISO 13705 Fired heaters for general service
- ISO 13706 Air-cooled heat exchangers
- ISO 13707 Reciprocating compressors
- ISO 13709 Centrifugal pumps
- ISO 13710 Reciprocating positive displacement pumps

- ISO 14691 Flexible couplings - general
- ISO 15547-1 Plate & frame type heat exchangers
- ISO 15547-2 Brazed aluminium platefin type heat exchangers
- ISO 15649 Piping
- ISO 15761 Steel valves DN 100 and smaller
- ISO 16812 Shell & tube heat exchangers (Rev)
- ISO 75 16901 Risk assessment of offshore LNG installations
- ISO 16961 Coating of above-ground steel storage tanks (New)
- ISO 17177 Unconventional LNG transfer systems (New)
- ISO 17292 Metal ball valves
- ISO 21049 Centrifugal and rotary pumps shaft sealing
- ISO 23251 Pressure-relieving and depressuring systems
- ISO 24817 Composite repair of pipework (Rev)
- ISO 25457 Flares details
- ISO 27509 Compact flanged connections
- ISO 28300 Venting of storage tanks
- ISO 28460 LNG - Ship to shore interface

- ISO 19900 General requirements for offshore structures (Rev)
- ISO 19901-1 Metocean design and operating considerations (Rev)
- ISO 19901-2 Seismic design procedures and criteria (Rev)
- ISO 19901-3 Topside structure
- ISO 19901-4 Geotechnical and foundation design (Rev)
- ISO 19901-5 Weight control
- ISO 19901-6 Marine operations
- ISO 19901-8 Marine soil investigations (New)
- ISO 19902 And 1 Fixed steel offshore structures (Amend)
- ISO 19903 Fixed concrete offshore structures
- ISO 19905-1 Jack-ups
- ISO/TR 19905-2 Jack-ups commentary (New)
- ISO 19906 Arctic offshore structures

- ISO 13624-1 Marine drilling riser systems
- ISO/TR 13624-2 Marine drilling riser system analysis
- ISO 13625 Marine drilling riser couplings
- ISO 19901-7 Station-keeping systems for floating offshore structures (New)
- ISO 19904-1 Floating offshore structures

- ISO 3183 Steel pipe for pipeline transportation systems
- ISO 12400 Actuation, mechanical integrity and staving for pipeline valves
- ISO 12736 Wet thermal insulation coatings (New)
- ISO 75 12747 Pipeline life extension
- ISO 13623 Pipeline transportation systems
- ISO 13847 Welding of pipelines (Rev)
- ISO 14313 Pipeline valves
- ISO 14723 Subsea pipeline valves
- ISO 15589-1 Cathodic protection for on-land pipelines (Rev)
- ISO 15589-2 Cathodic protection for offshore pipelines

- ISO 15590-1 Pipeline induction bends
- ISO 15590-2 Pipeline fittings
- ISO 15590-3 Pipeline flanges
- ISO 16440 Steel-cased pipelines (New)
- ISO 16708 Pipeline reliability-based limit state design
- ISO 21329 Test procedures for pipeline mechanical connectors
- ISO 21809-1 Polyethylene coatings (3-layer PE and 3-layer PP)
- ISO 21809-2 Fusion-bonded epoxy coatings (Rev)
- ISO 21809-3 Field joint coatings
- ISO 21809-4 Polyethylene coatings (2-layer PE)
- ISO 21809-5 External concrete coatings

- ISO 13628-1 Subsea production systems (Amend)
- ISO 13628-2 Subsea flexible pipe systems
- ISO 13628-3 Subsea TFL pumpdown systems
- ISO 13628-4 Subsea wellhead and tree equipment
- ISO 13628-5 Subsea control umbilicals
- ISO 13628-6 Subsea production controls
- ISO 13628-7 Completion/workover riser system
- ISO 13628-8 ROT and interfaces

- ISO 13628-9 ROT intervention systems
- ISO 13628-10 Bonded flexible pipe
- ISO 13628-11 Flexible pipe systems for subsea and marine applications
- ISO 13628-15 Subsea structures and manifolds

- ISO 10432 Subsurface safety valves
- ISO 11960 Casing and tubing for wells (Rev)
- ISO 11961 Drill pipe
- ISO 12835 Qualification of casing connections for thermal wells (New)
- ISO 13085 Tubing aluminium alloy pipes (New)
- ISO 13590 Drilling fluids (Amend)
- ISO 13591 Drilling fluids - processing systems evaluation
- ISO 13593-1 Measurement of viscous properties of completion fluids
- ISO 13593-2 Measurement of properties of proppants
- ISO 13593-3 Testing of heavy brines
- ISO 13593-4 Measurement of stimulation & gravel-pack fluid leakage
- ISO 13593-5 Measurement of long term conductivity of proppants
- ISO 13593-6 Measuring leak-off of completion fluids under dynamic conditions (New)
- ISO 13678 Thread compounds
- ISO 13679 Casing and tubing connections testing
- ISO 13680 CRA seamless tubes for casing & tubing
- ISO 14310 Packers and bridge plugs

- ISO 14998 Accessory completion equipment (New)
- ISO 15136-1 Progressing cavity pump systems
- ISO 15136-2 Progressing cavity pump systems - drive heads
- ISO 15463 Field inspection of new casing, tubing and plain end drill pipe
- ISO 15464 Gauging and inspection of threads
- ISO 15546 Aluminium alloy drill pipe
- ISO 16070 Lock mandrels and landing nipples
- ISO 75 16530-2 Well integrity operational phase (New)
- ISO 17078-1 Side-pocket mandrels (Amend)
- ISO 17078-2 Flow control devices for side-pocket mandrels
- ISO 17078-3 Latches & seals for side-pocket mandrels & flow control devices
- ISO 17078-4 Side-pocket mandrels and related equipment
- ISO 17824 Sand control screens
- ISO 20312 Design of aluminium drill string
- ISO 27627 Aluminium alloy drill pipe thread gauging (New)
- ISO 28781 Subsurface tubing mounted formation barriers

- ISO/TR 10400 Calculations for OCTG performance properties
- ISO 10405 Care/use of casing/tubing
- ISO 10407-1 Drill stem design
- ISO 10407-2 Inspection and classification of drill stem elements
- ISO 10414-1 Field testing of water-based fluids
- ISO 10414-2 Field testing of oil-based drilling fluids
- ISO 10416 Drilling fluids - Job design
- ISO 10417 Subsurface safety valve systems
- ISO 10424-1 Rotary drill stem elements
- ISO 10424-2 Threading and gauging of connections

- ISO 10426-1 Well cementing
- ISO 10426-2 Testing of well cements
- ISO 10426-3 Testing of deepwater well cement
- ISO 10426-4 Preparation and testing of atmospheric foamed cement slurries
- ISO 10426-5 Shrinkage and expansion of well cement
- ISO 10426-6 Static gel strength of cement formulations
- ISO 10427-1 Blow spring casing centralizers
- ISO 10427-2 Centralizer placement and stop-collar testing
- ISO 10427-3 Performance testing of cement flood equipment

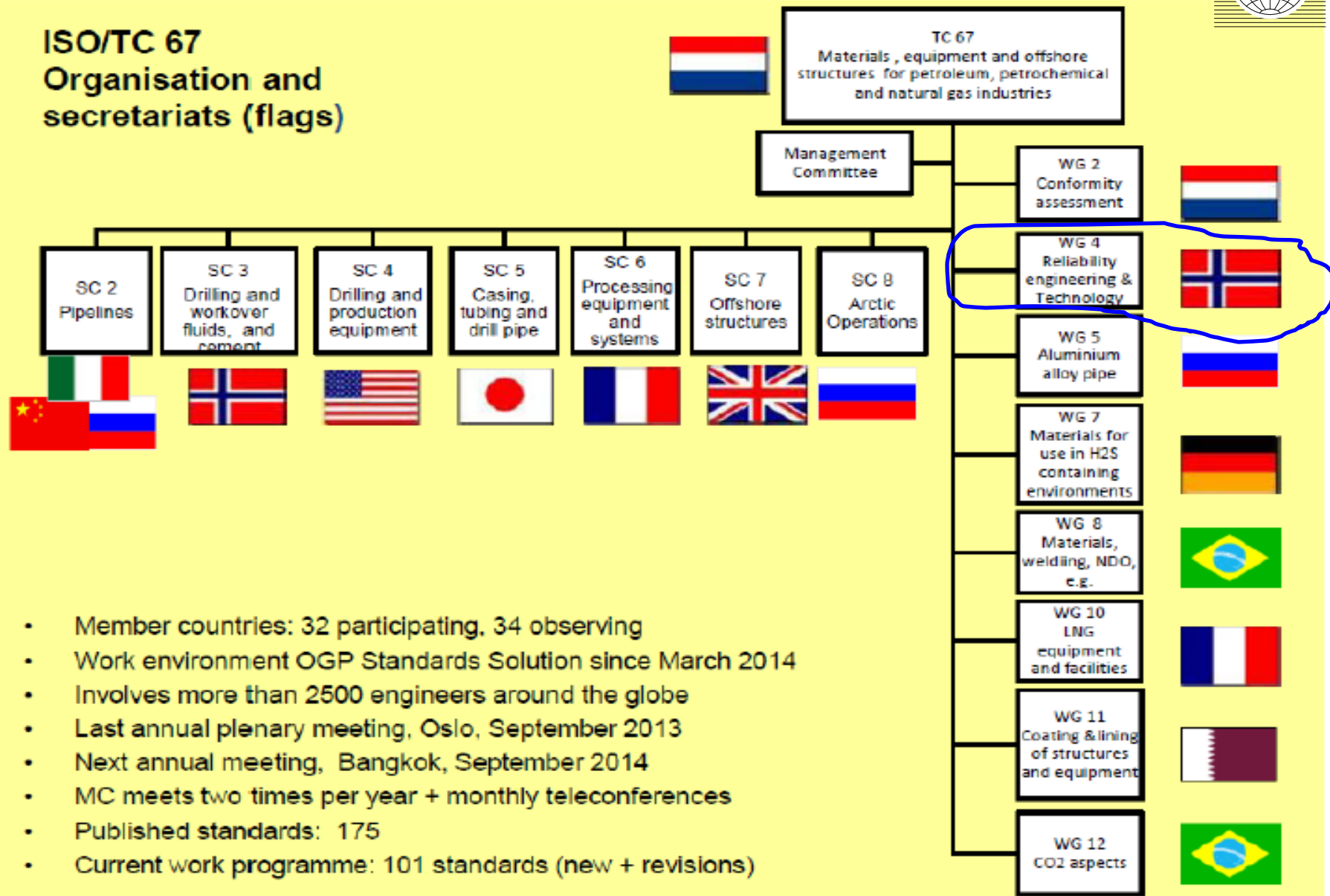


Standards in brown issued in 2013

Standards in green are a priority for 2014 issue

These ISO standards are only a core collection of several hundreds of International Standards available for the oil & gas industry

ISO/TC 67 Organisation and secretariats (flags)



- Member countries: 32 participating, 34 observing
- Work environment OGP Standards Solution since March 2014
- Involves more than 2500 engineers around the globe
- Last annual plenary meeting, Oslo, September 2013
- Next annual meeting, Bangkok, September 2014
- MC meets two times per year + monthly teleconferences
- Published standards: 175
- Current work programme: 101 standards (new + revisions)

ISO/TC 67/WG 4 - Reliability Engineering & Technology

Responsibilities and organization



- **Responsibility & mandate** in «Petroleum, petrochemical and natural gas industries»
 - *Responsible for reliability and cost related ISO/TC 67 standardization activities*
 - *Resolution 2012/19 (Rio de Janeiro) added also new cost related activity*
- **Convenor**
 - Runar Østebø, Statoil, Norway
- **Secretariat:** Standards Norway
 - Øivind Bråthen
- **Project group leaders** (active project groups):
 - PG1: Runar Østebø. Assisted by Jon Selvik, IRIS, Norway (Technical editor)
 - PG3: Jean Pierre Signoret, Total, France (also technical editor)
 - PG5: Rune Hellem, Statoil, Norway (also technical editor)
- **Liaison officers** (informal): R Østebø (ISO/TC67/WG4) – J P Signoret (IEC/TC56)

13 countries involved



ISO/TC 67/WG 4 - Reliability Engineering & Technology

ISO standards – Project groups



Projects (organized via OGP Interim Solution since July 2012 – from March 2014 through OGP Standards Solution)

- **PG1: ISO 14224** *“Collection and exchange of reliability and maintenance data for equipment”*
 - 2nd edition issued Dec 2006. New revision now being developed.
- **PG2: ISO 20815** *“Production assurance and reliability management”*
 - 1st edition issued June 2008. Corrected version 2009.
- **PG3: ISO TR 12489** *“Reliability modelling and calculation of safety systems”*
 - 1st edition issued Nov 2013.
- **PG4: ISO 15663-1/2/3** *“Life cycle costing”*
 - 1st editions issued 2000/2001.
- **PG5: ISO 19008** *“Standard Cost Coding System for oil and gas production and processing facilities”*
 - *New activity initiated in 2013, 1st edition planned in 2016*

ISO/TC 67/WG 4 - Reliability Engineering & Technology

PG1 – ISO Standard 14224



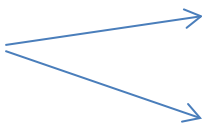
- **ISO 14224 – “Collection and exchange of reliability and maintenance data for equipment”**
- *Scope*
 - Revise the current edition 2 (based on approval by OGP in February 2013)
- *Expert members (10 countries)*
 - Brazil, Denmark, Finland, France, Italy, Netherlands, Norway, Spain, UK and USA
- *Meetings – last period and planned*
 - London, UK (Sep 2013)
 - Madrid, Spain (Dec 2013)
 - Copenhagen, Denmark (May 2014)
 - Rio de Janeiro, Brazil (Nov 2014)
- *Activities*
 - Prepared Working Drafts and current Committee Draft work will form basis for Draft International Standard (DIS)
 - Alignment and interactions across other related ISO & IEC standards (e.g. ISO/TR 12489, equipment standards)
 - Equipment attention/coverage extended to cover key industrial needs, e.g. drilling, subsea and safety equipment
 - The target milestones are:
 - November 2014: DIS (International hearing to come in Q1-2015)
 - November 2015: FDIS
 - May 2016: IS



ISO 20815

“Production assurance and reliability management”

- *Scope*
 - Describe analysis principles
 - Provide key definitions
 - Basis for production assurance in all life-cycle phases
 - Applicable for all type of facilities and operations in petroleum, petrochemical and natural gas industries. Upstream, mid-stream and downstream coverage.
 - **Production assurance programme**



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Production assurance terms – ISO 20815

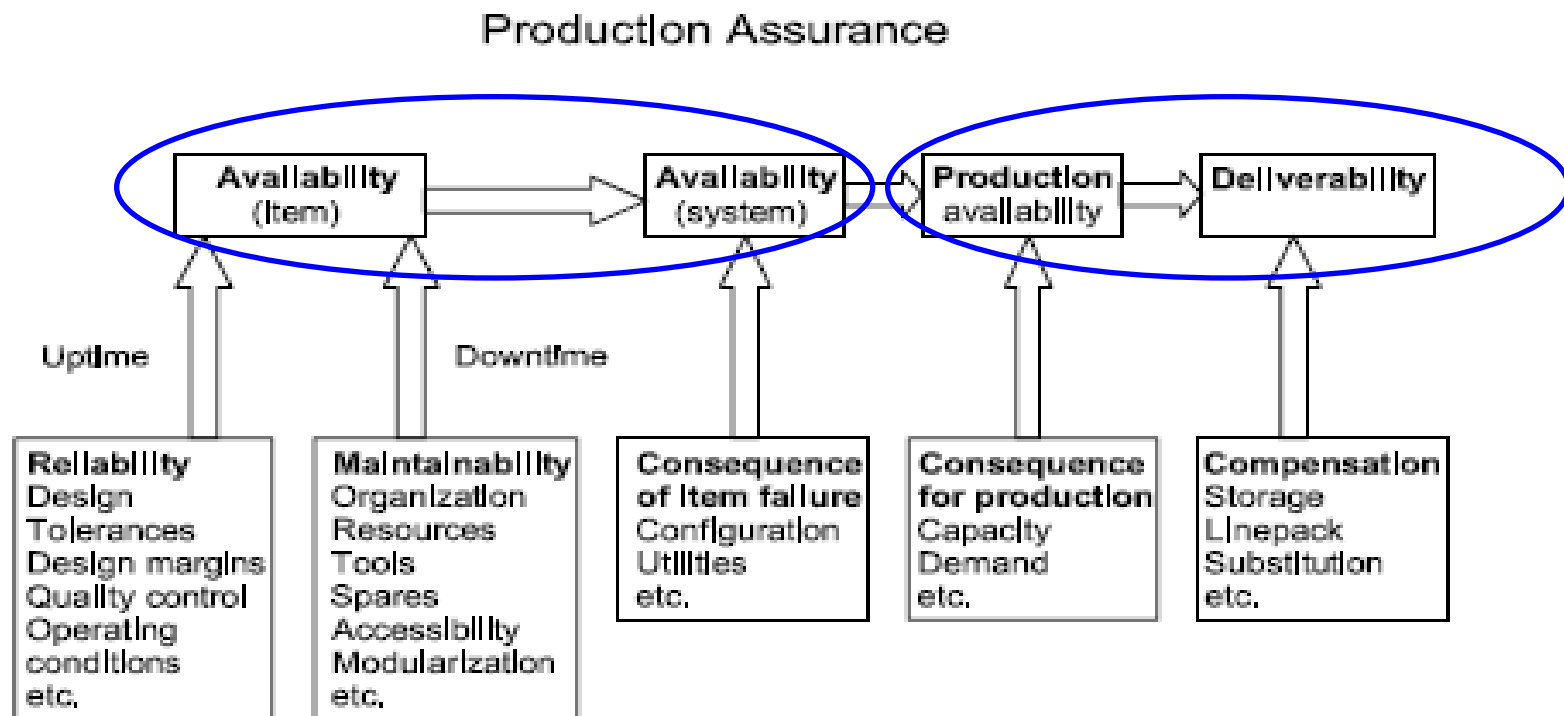


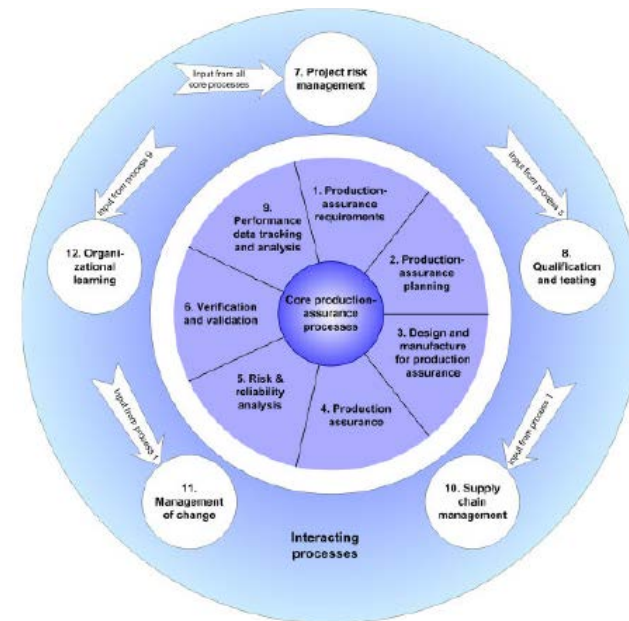
Figure G.1 — Illustration of the relationship between some production-assurance terms

Production assurance activities - ISO 20815



Table 2 – Overview of production-assurance processes versus risk levels and life-cycle phases

Production assurance processes for asset development				Life-cycle phase							
				Pre-contract award		Post-contract award					
Low-risk projects	Medium-risk projects	High-risk projects	Process name and number	Feasibility	Conceptual design	Engineering	Procurement	Fabrication/Assembly/Testing	Installation and commissioning	Operation	
-	X	X	1. Production-assurance requirements	X	X	X	X	-	-	-	
X	X	X	2. Production-assurance planning	X	X	X	X	X	X	X	
-	X	X	3. Design and manufacture for production assurance	-	X	X	-	X	X	X	
X	X	X	4. Production assurance	X	X	X	X	X	X	X	
-	X	X	5. Risk and reliability analysis	X	X	X	-	-	-	-	
X	X	X	6. Verification and validation	X	X	X	-	-	-	-	
X	X	X	7. Project risk management	X	X	X	X	X	X	X	
-	-	X	8. Qualification and testing	-	-	X	X	X	X	-	
X	X	X	9. Performance data tracking and analysis	-	-	-	-	-	X	X	
-	-	X	10. Supply chain management	-	-	-	X	-	-	-	
X	X	X	11. Management of change	-	X	X	X	X	X	X	
X	X	X	12. Organizational learning	X	X	X	X	X	X	X	



ISO/TC 67/WG 4 - Reliability Engineering & Technology

PG3 – ISO Technical Report 12489



- **ISO/TR 12489 – “Reliability modelling and calculation of safety systems”**
- *Scope*
 - Creation of a technical report to provide guidelines on the reliability assessment of safety systems in the petroleum, petrochemical and natural gas industries
 - ISO/TR 12489 is an important supplement of IEC 61508-part 6 (functional safety), but with a wider scope for all safety systems (31 systems covered by the ISO/TR 12489)
 - As a Priority 2 issue on ISO/TC 67 “Action plan industry events” it requires high attention and proper use
- *Expert members (9 countries)*
 - Belgium, Brazil, France, Italy, Netherlands, Norway, Spain, UK and USA.
 - In addition: China and Nigeria were previous members.
- *Activities*
 - Issued by ISO in November 2013
 - Conference presentations:
 - Stavanger/Norway (Jan 2014)
 - Cologne/Germany (May 2014)
 - Dijon/France (Oct 2014)
 - Rio/Brazil (Nov 2014)



ISO/TC 67/WG 4 - Reliability Engineering & Technology

PG5 – ISO Standard 19008

- **ISO 19008 – “Standard Cost Coding System for oil and gas production and processing facilities”**
- *Scope*
 - Based on NORSOK Standard Z-014 “Standard cost coding system (SCCS)”, develop an ISO standard for the same purpose. Covering petroleum, natural gas and petrochemical industries.
 - Initiated work in 2013 based on approval by OGP in March 2013
- *Expert members (7 countries)*
 - Denmark, Germany, Italy, Kazakhstan, Netherlands, Norway and UK.
- *Current status*
 - The current Committee Draft (WD) will form basis for for the DIS version.
 - The target milestones are now:
 - December 2014: DIS (International hearing to come in Q1-2015)
 - September 2015: FDIS
 - March 2016: IS



Thank you for your attention!

ISO Mission: To create value-added standards for the oil and gas industry

ISO Vision: Global standards used locally worldwide

WG4 Objective : Develop and maintain relevant
reliability and cost standards