

# Standards in Process Safety

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**SYNECS**  
CONSULTING

# What is a standard?

- **A standard is defined as "a technical specification approved by a recognized standardising body for repeated or continuous application, with which compliance is not compulsory, and which is one of the following: an international standard, a European standard or a national standard."**

# Why do we need standards



Standards enhance the safety of industry operations, assure quality, help keep costs down, reduce waste and minimize confusion.

They help speed acceptance and bring products to market quicker. And they avoid having to reinvent the wheel every time a product is manufactured.



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# What do Standards do?

Standards define the characteristics of a product, process or service. These characteristics usually determine the design, performance or safety requirements that are voluntarily agreed upon by interested parties.

Standards exist for a wide variety of products, e.g.:

- paper sizes,
- computer operating systems (such as DOS),
- the symbols on a motor vehicle dashboard,
- credit card sizes,
- film photo speed (such as asa 100, 200, 400), and
- weights and measures.

# Where are Standards Used?

- The physical makeup of a product (e.g., steel)
- Creating standardized dimensions, such as in finished paper or containers
- Allowing for uniformity of parts such as screws or conformity of equipment such as computers
- Product performance (i.e., the final product meets the design specifications, as in a car engine)
- Health and safety requirements for products and equipment (to prevent fires, explosions, electric shocks, chemical and radiation hazards and so forth)
- Controlling the environmental impact of products and processes
- Creating a common international communication base
- Process (i.e., how a company operates).

# Why do we need standards

- **Standards are a key component of the Single Market.**
- **Though technical and removed from the public eye, they represent one of the most important issues for business.**
- **They are critical in facilitating trade and hence have a high visibility amongst both American and European policy-makers and International Operators.**

- Flixborough
- Seveso
- Bhopal
- Pasadena
- Allentown
- Texas City
- Buncfield



# What is Process Safety

- The past 30 years have seen the development and maturity of Process Safety Management (PSM) and Risk Management Program (RMP) requirements.
- The early driving force for these concepts and the ensuing regulations were major chemical incidents at facilities throughout the world.

# ISO TC 67 and Safety

- **Enhance Technical Integrity**
  - Safety, Health and protection of the Environment
  - Maximise availability, minimise lost revenue
- **Establish a Common Technology Base**
  - Technology transfer / Sharing best practice
- **Support Legislation where linked**
  - **Safety and Environmental Regulations (e.g. Process Safety Management, US)**
  - **Procurement Legislation (e.g. European Directives)**
  - **Essential Requirements (e.g. 'New Approach' European Directives)**

# Other Standards

- Health and Safety at Work Directives 89/391 (Framework),
  - 89/654 (Workplaces),
  - 89/655 (Work Equipment),
- 89/656(Personal Protective Equipment),
- 90/269 (Manual Handling of Loads) and
- 90/270(Display Screen Equipment)

# ISO/TC 67: Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries

## ISO Standards for use in the oil & gas industry

**ISO 10218** Basic surface safety systems  
**ISO 10423** Wellhead & Christmas tree equipment  
**ISO 13533** Driftthrough equipment (DOPE)  
**ISO 13534** Hoisting equipment - core mount  
**ISO 13535** Hoisting equipment - specifications  
**ISO 13626** Drilling and well-annulus structures  
**ISO 13702** Control & mitigation of fire & explosion  
**ISO 13703** Offshore piping systems  
**ISO 14224** Reliability/maintenence data (Re)  
**ISO 14659** Drill piping, Part 1-4  
**ISO 14679** Drilling equipment

**ISO 13156-1** Selection of cracking resistant materials for use in H<sub>2</sub>S environments  
**ISO 13156-2** Cracking-resistant steels and cast irons for use in H<sub>2</sub>S environments  
**ISO 13156-3** Cracking-resistant alloys for use in H<sub>2</sub>S environments  
**ISO 13139** HAZOP studies  
**ISO 15544** Emergency response  
**ISO 15603** Life cycle costing, Part 1-3  
**ISO 17776** Assessment of hazardous situations  
**ISO 7875-2/001** Sector-specific quality management system

**ISO 3977-3** Gas turbines - procurement  
**ISO 10434** Bolted bonnet steel gate valves  
**ISO 15437** Special-purpose steam turbines  
**ISO 15438** Lubrication, shaft-sealing and alignment systems, Part 1-4  
**ISO 10439** Centrifugal compressors  
**ISO 15430-1** Rotary FC process compressors (Re)  
**ISO 10440-2** Rotary FD packaged air compressors  
**ISO 10441** Flexible couplings - special  
**ISO 15442** Integrally geared air compressors  
**ISO 12621** Reciprocating gas compressors  
**ISO 13411** High speed enclosed gear units  
**ISO 13704** Calculation heat tube thickness  
**ISO 13705** Feed heaters for general service (Re)  
**ISO 13706** Air-cooled heat exchangers (Re)  
**ISO 13707** Reciprocating compressors  
**ISO 13708** Centrifugal pumps  
**ISO 13710** Reciprocating positive displacement pumps  
**ISO 14891** Flexible couplings - general  
**ISO 15547-1** Heat & frame type heat exchangers (Re)  
**ISO 15547-2** Served aluminium plate-fin type heat exchangers (Re)  
**ISO 15649** Piping  
**ISO 15761** Steel valves DN 100 and smaller  
**ISO 16812** Shell & tube heat exchangers (Re)  
**ISO 17292** Metal ball valves  
**ISO 21049** Centrifugal and rotary pumps shaft sealing  
**ISO 21251** Process venting and monitoring systems (Re)  
**ISO/IEC 24817** Composite repair of pipelines (Re)

**ISO 13621** Marine drilling riser couplings  
**ISO 19901-7** Subsea engineering systems (Re)

**ISO 13628-1** Subsea production systems (Re)  
**ISO 13628-2** Subsea production systems (Re)  
**ISO 13628-3** Subsea production systems (Re)  
**ISO 13628-4** Subsea production systems (Re)  
**ISO 13628-5** Subsea production systems (Re)  
**ISO 13628-6** Subsea production systems (Re)  
**ISO 13628-7** Subsea production systems (Re)  
**ISO 13628-8** Subsea production systems (Re)  
**ISO 13628-9** Subsea production systems (Re)  
**ISO 13628-10** Subsea production systems (Re)  
**ISO 13628-11** Subsea production systems (Re)

**ISO 13628-6** Subsea production control (Re)  
**ISO 13628-7** Completion/workover riser system (Re)  
**ISO 13628-8** ROV interfaces  
**ISO 13628-9** ROV intervention systems  
**ISO 13628-10** Remotely operated pipe (Re)  
**ISO 13628-11** Flexible joint systems for subsea and marine applications (Re)

**ISO 19423** Care/use of casing/tubing  
**ISO 10427-1** Drill stem design  
**ISO 10414** Field testing of drilling fluids, Part 1-2  
**ISO 10418** Drilling fluids - lab testing  
**ISO 10419** Subsurface safety valve systems  
**ISO 10424-1** Rotary drill stem elements  
**ISO 10424-2** Threading, gauging and testing of rotary connection (Re)  
**ISO 10426-1** Well cementing (Re)  
**ISO 10426-2** Sealing of well cement (Amendment)  
**ISO 10426-3** Sealing of deepwater well cement  
**ISO 10426-4** Preparation and testing of cementitious bonded cement slurries  
**ISO 10426-5** Storage and expansion of well cement

**ISO 10427-1** Flow spring casing operations  
**ISO 10427-2** Cementation placement and displacement testing  
**ISO 10427-3** Performance testing of cement float equipment  
**ISO 10432** Subsurface safety valves  
**ISO 11960** Casing and tubing  
**ISO 11961** Drilling  
**ISO 12201** Drilling fluids (Re)  
**ISO 12301** Drilling fluids - processing systems evolution (Re)

**ISO 13203-1** Measurement of viscosity properties of completion fluids  
**ISO 13203-2** Measurement of properties of proppants (Re)  
**ISO 13203-3** Sealing of heavy brines (Re)  
**ISO 13203-4** Measurement of attrition & proppant bed loss (Re)  
**ISO 13203-5** Measurement of long term conductivity of proppants (Re)  
**ISO 13678** Thermal compounds  
**ISO 13679** Connection testing  
**ISO 13680** CEA assemblies tubes for casing and tubing  
**ISO 14310** Packers and bridge plugs  
**ISO 13136-1** Pressurizing cavity pumps systems  
**ISO 13136-2** Pressurizing cavity pumps systems - drive heads (Re)  
**ISO 15463** Field installation of new casing, tubing and drill pipe  
**ISO 15468** Aluminium drill pipe  
**ISO 16070** Lock mandrels and landing nipples (Re)  
**ISO 17078-1** Sidepack mandrels

**ISO 21189** Linings, Part 1-2  
**ISO 13823** Pipeline transportation systems  
**ISO 13847** Pipeline welding  
**ISO 14213** Pipeline valves  
**ISO 15590-1** Subsea pipeline valves  
**ISO 15590-2** Cathodic protection for onshore pipelines  
**ISO 15590-3** Cathodic protection for offshore pipelines  
**ISO 15903-1** Pipeline induction bends  
**ISO 15903-2** Pipeline fittings  
**ISO 15903-3** Pipeline flanges  
**ISO 15903-4** Pipeline hangers  
**ISO 15903-5** Pipeline supports  
**ISO 15903-6** Pipeline valves  
**ISO 15903-7** Pipeline wellhead design (Re)  
**ISO 21129** Test procedures for pipeline mechanical connectors

**OGP** **ISO**

Standards in brown issued in 2005  
 Standards in green are a priority for 2006 issue  
 Many of these standards are adopted by API, CEN and other recognised standards bodies

- ISO TC67 has published 120 standards.
- API has adopted 46 of these as joint API / ISO standards.
- CEN has adopted 89 of these as joint European EN ISO standards.
- China has adopted 18 of these as Chinese national standards.



# Some Examples

ISO TC/145 has developed ISO 9186, Graphical symbols – Test methods for comprehensibility and for comprehension,



and ISO, 7010:2003, Graphical symbols – safety colours and safety signs – Safety signs used in workplaces and public areas

# Some Examples



There are 193 ISO standards and other documents applying to fasteners

# Now What?

- Do we need an individual standard for process safety?
- Should “safety” be left in the hands of other standards?
- Should Industry “self regulate”?