Expectations of the Verifier

IMechE/SPE Virtual Event : Hot and Cold – Welded and Non-Welded Connections

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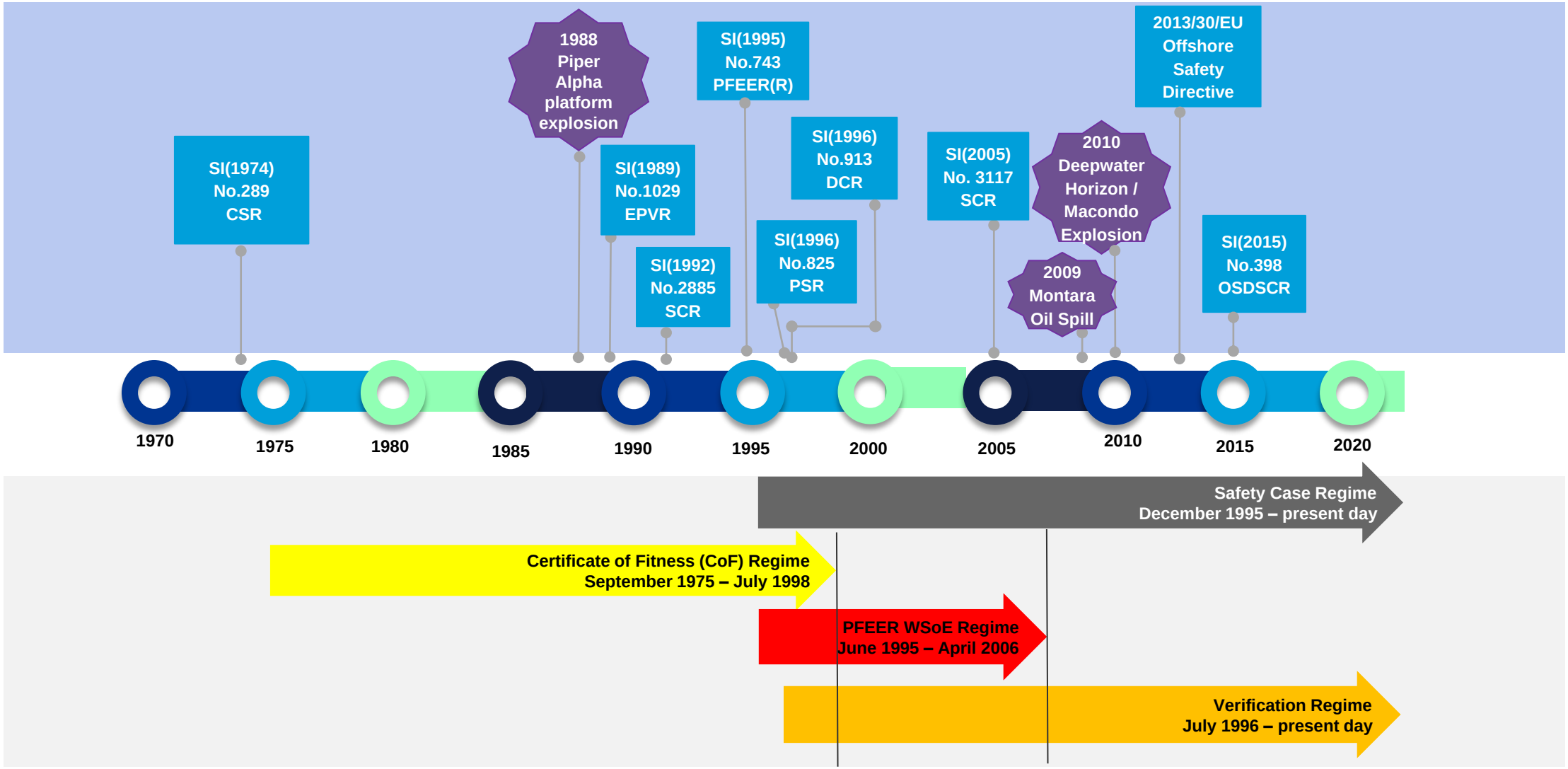
Timeline of Significant Offshore Legislation



Evolution of the “Safety Case” Regime

- 1992 - Safety Case Regulations (November 1992) ;
  (Identify MAHs / Prepare ‘Safety Case’ / Conform with the ‘Safety Case’)
  {End of transitional period = 30th November 1995}

- 1995 - PFEER Regulations (April 1995) ;
  (‘Assessment’ / ‘Performance Standards’ / ‘Written Scheme of Examination’ / ICPs)
- 1996 – Design & Construction Regulations (March 1996) ;
  (SCEs / ICPs / Verification / Well Examination
  …and revocation of CSR SI(1974) No.289)
  {End of transitional period = 30th June 1998}
- 2005 – Safety Case Regulations (Nov 2005) ;
  (Verification of PFEER ‘specified plant’)
- 2015 – OSD & Safety Case Regulations (Mar 2015) ;
  (‘Verifier’ / SECEs / ‘MAH + environment’)

What is a “Major Accident”?

“major accident” means –

(a) *an event involving a **fire, explosion, loss of well control or the release of a dangerous substance** causing, or with a significant potential to cause, death or serious personal injury to persons on the installation or engaged in an activity on or in connection with it;*

(b) *an event involving **major damage to the structure of the installation** or plant affixed to it or **any loss in the stability of the installation** causing, or with a significant potential to cause, death or serious personal injury to persons on the installation or engaged in an activity on or in connection with it;*

(c) *the **failure of life support systems for diving operations** in connection with the installation, the detachment of a diving bell used for such operations or the trapping of a diver in a diving bell or other subsea chamber used for such operations;*

(d) *any other event arising from a work activity involving death or serious personal injury to five or more persons on the installation or engaged in an activity on or in connection with it; or*

(e) *any major environmental incident resulting from any event referred to in paragraph (a), (b) or (d)*

What is a “SECE”?

“safety and environmental-critical elements” means –

such parts of an installation and such of its plant (including computer programmes), or any part of those –

(a) the failure of which could cause or contribute substantially to a major accident; or

(b) a purpose of which is to prevent, or limit the effect of, a major accident;

SECEs normally identified at a system level; typically 20 to 40 SECEs identified per installation

<u>Examples of SECE’s where piping connections may be relevant;</u>

Hydrocarbon containment / Pressure relief systems / Blowdown systems

Drilling well control (mud/cement) / Drains / Ballast systems

Inert gas systems / Firewater systems / Deluge systems

Purpose of the “Verification Scheme”

*The “verification scheme” must ensure, by the **means** described in paragraph (2), that the safety and environmental-critical elements and the specified plant –*

- *(a) are or, where they remain to be provided, will be **suitable**; and*
- *(b) where they have been provided, **remain in good repair and condition.***

*The **means** include…….*

*(a) examination, including testing where appropriate, of the safety and environmental-critical elements and the specified plant by a **verifier**;*

*(b) examination of any design, specification, certificate, CE marking or other document, marking or standard relating to those elements or that plant by a **verifier**;*

*(c) examination by a **verifier** of work in progress;*

*(d) the creation of reports by a **verifier** on –*

(i) the examination and testing carried out;

(ii) the findings; and

(iii) any remedial action recommended;

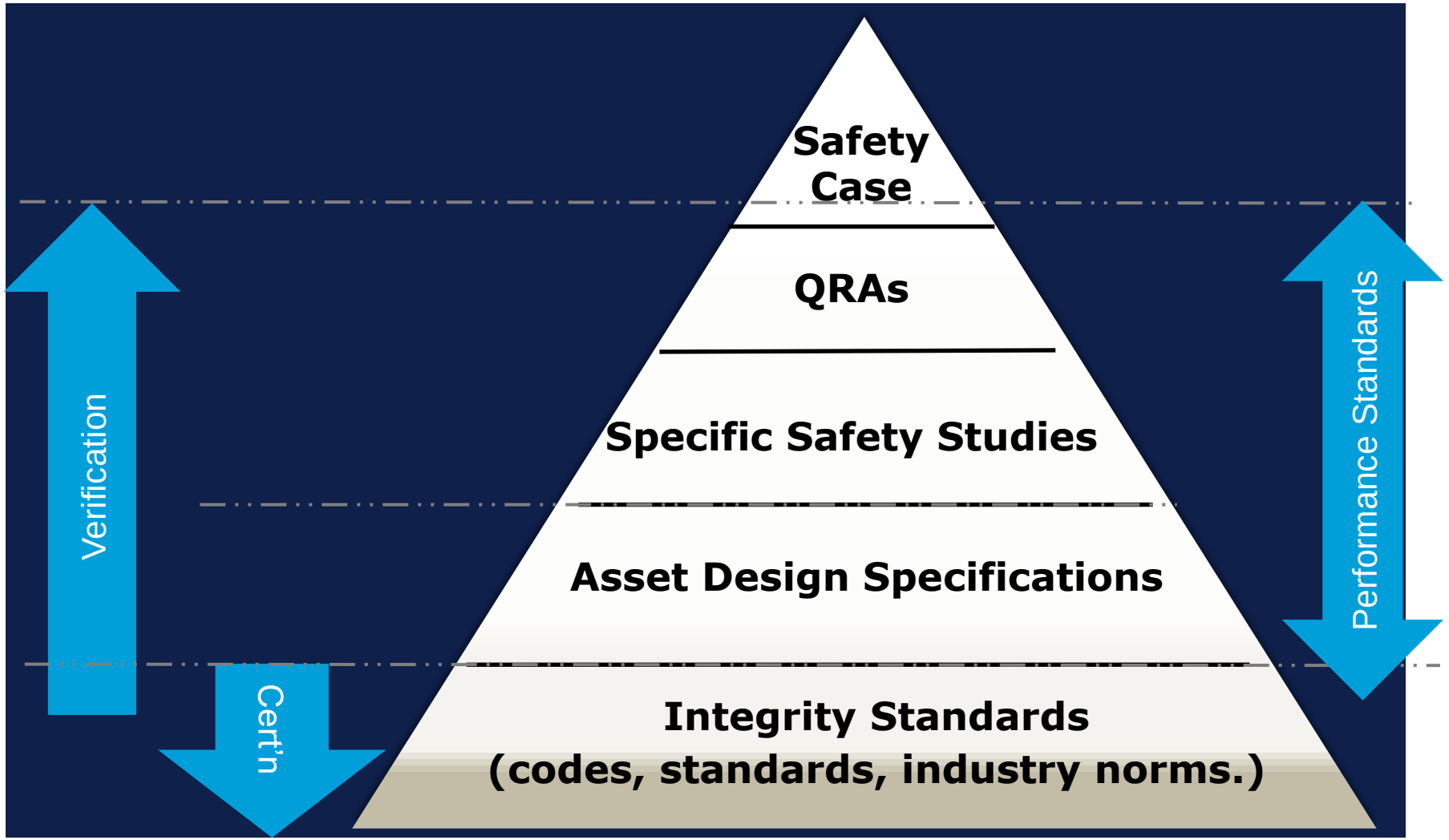
etc

“Performance Standards”

- Performance standards are normally defined in terms of **‘FARSI’**, including for;
  - **Functionality :** What is its function ?
  - **Availability :** Will it function on demand ?
  - **Reliability :** Will it continue to function for a required time ?
  - **Survivability :** Will it withstand the consequences when required to function ?
  - **Interdependencies :** What does it rely on ?

i.e. ‘Performance Standards’ provide the criteria to determine the ‘initial’ and ‘ongoing’ ‘**suitability’** of each SECE.

“Performance Standards”



Expectations (some)

The duty holder is expected to eliminate (if possible) or reduce risks from **MAH**s to '**ALARP**' ('As Low as Reasonably Practicable')

(N.B. '**Practicable**' means 'possible', 'technically feasible'; it is not the same as 'Practical'!!)

The 'verifier' is engaged by the **duty holder** (not the manufacturer) and is expected to;

- 'verify' the '**suitability'** and '**good repair/condition**' of **SECE**s,

- with regard to '**FARSI**' criteria defined within the '**performance standards**'.

Expectations (some more)

The manufacturer is expected to design, manufacture, qualify and supply products in compliance with relevant codes/standards and any applicable regulatory requirements.

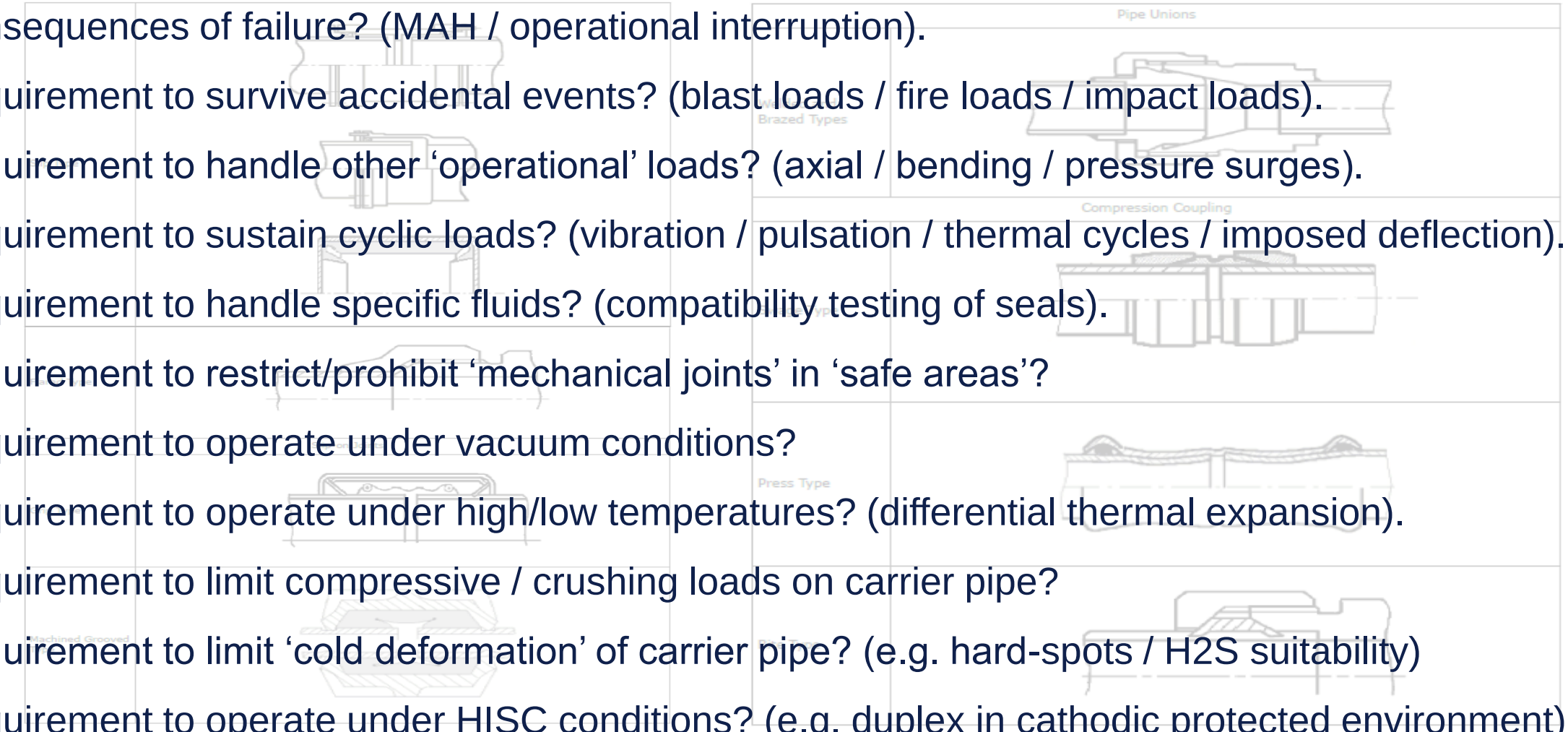
BUT….codes, standards and regulations applicable to the product are unlikely to fully address all ‘performance standard’ requirements.

N.B. the UK ‘Pressure Equipment Regulations’ (PER) relate to ‘***hazards on account of pressure***’ and do not address the subsequent consequences of failure to contain pressure e.g.

- loss of a fire-fighting system
- loss of a vent/relief system
- structural failure of a concrete leg due to flooding
- loss of stability due to flooding of a compartment

Suitability Considerations (some)

- Permanent or temporary? (design life / proven technology).
- Consequences of failure? (MAH / operational interruption).
- Requirement to survive accidental events? (blast loads / fire loads / impact loads).
- Requirement to handle other ‘operational’ loads? (axial / bending / pressure surges).
- Requirement to sustain cyclic loads? (vibration / pulsation / thermal cycles / imposed deflection).
- Requirement to handle specific fluids? (compatibility testing of seals).
- Requirement to restrict/prohibit ‘mechanical joints’ in ‘safe areas’?
- Requirement to operate under vacuum conditions?
- Requirement to operate under high/low temperatures? (differential thermal expansion).
- Requirement to limit compressive / crushing loads on carrier pipe?
- Requirement to limit ‘cold deformation’ of carrier pipe? (e.g. hard-spots / H2S suitability)
- Requirement to operate under HISC conditions? (e.g. duplex in cathodic protected environment).
- Requirement to inspect / maintain / replace parts? (repeated assembly / seal-life).



Summary Points – ‘Suitability’

- Duty holder is expected to ensure that the selection of connection method is consistent with reducing risks to a level which is ALARP.
- Duty holder is expected to define all relevant performance requirements for the connection and, as far as necessary, communicate these to the manufacturer / supplier.
- Manufacturer / supplier is expected to design, manufacture and qualify their product to comply with the performance requirements expressed by the duty holder.
- Verifier is expected to scrutinise the selected connection method (for SECEs) to establish ‘suitability’ with reference to the requirements of the performance standard(s).

Summary Points – ‘Good Repair and Condition’

- Manufacturer / supplier is expected to provide clear instructions for the installation, maintenance and inspection of their connectors (including any requirement for periodic replacement of parts).
- Duty holder is expected to maintain records documenting the competent installation, inspection & testing of connectors.
- Duty holder is expected to manage mechanical connectors and incorporate within planned maintenance / assurance programmes with due regard to manufacturer / supplier recommendations.
- Verifier is expected to scrutinise the duty holder’s management of mechanical connections (for SECEs) to ensure ongoing ‘suitability’.

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