General Qualitative Risk Evaluation for Inert Gas Cylinders Existing Systems Only

RECORD OF REVISIONS

Rev	Date	Description	POC	RM
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Contact the Standards POC for upkeep, interpretation, and variance issues.

Chapter 17	Pressure Safety POC and Committee

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Assumptions:

Fluid Service

1. The system fluid service is not an FS1 as defined by ESM Chapter 17
   1.1. The pressure system fluid service is not high pressure as define by ASME B31.3 2008 Chapter IX.
   1.2. The pressure system fluid service is not a Category M fluid ASME B31.3 2008.
   1.3. The pressure system fluid service is not steam.
2. The system fluid service is not flammable (hydrogen, deuterium, and tritium).
3. The system fluid service will not support combustions (oxidizer for example oxygen or fluorine).

System Operation

4. The pressure system is not subject to low-cycle fatigue (where significant plastic straining occurs).
5. High-cycle fatigue (where stresses and strains are largely confined to the elastic region) is controlled to less than 100,000 cycles for the life of the pressure system.
6. The pressure system does not operate in the creep range.
7. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.
8. The pressure system is not an ASME Section I or VIII stamped item or unstamped item performing the same task (e.g. unstamped pressure vessel).

System Hardware

9. The system components have exhibited extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like material.
10. Corrosion is not a significant factor.
11. Materials of construction are compatible with the system fluid service.
12. The system is equipped with a properly sized, set, and functional pressure relief device(s).
13. Flexible elements are restrained to prevent whipping.

Failure Mode

14. A ductile failure mode is assumed (not brittle fracture).

Consequence of Failure

15. The result of the failure will not result in personnel injury

Safety Class

16. Applicable to ML4 only.

Allowance: ESM Chapter 17 Section EXIST

RL2-A. Vessel pressure rating indeterminate, or non-ASME stamped vessel without design documentation (unknown MAWP)
Risk-based engineering evaluations may be applied for FS3 deficiencies

RL2-B. Piping component pressure rating indeterminate, or unlisted piping component (unknown MAWP)
Risk-based engineering evaluations may be applied for FS2 and FS3 deficiencies

RL3-A-inside. Missing weld examination documentation (within a glove box)
Risk-based engineering evaluations should be applied for FS1 and FS2 system deficiencies to determine if further action is required

RL3-A-outside. Missing weld examination documentation (outside a glove box)
Risk-based engineering evaluations should be applied for FS1 and FS2 system deficiencies to determine if weld examination is required

RL3-B. Missing pressure test documentation
Risk-based engineering evaluations may be applied for FS2 and FS3 system deficiencies

Applicable Systems
Nitrogen, helium, argon, and other inert gases fabricated from

A system with a relief device set equal to less than 150 shall be rated as FS3.

These systems shall be exempt from the requirements of having pressure test documentation, weld documentation (inside or outside the glovebox), may continue to use unlisted components, or components with an indeterminate pressure rating, or ASME non-stamped vessels.

This equipment will be considered grandfathered and will not be replaced with like items.

Qualitative Risk Assessment

Probability: Remote

Consequence: Significant

QR Factor: 4

Table 3 Qualitative Risk (QR) Determination

Consequence			Probability				
			A	**B**	**C**	**D**	**E**
			Frequent	**Probable**	**Occasional**	**Remote**	**Improbable**
	I	**Major**	1	1	1	2	3
	II	**Serious**	1	1	2	3	4
	III	**Significant**	1	2	3	**4**	5
	IV	**Minor**	2	3	4	5	6
	V	**Insignificant**	3	4	5	6	7