

**General Qualitative Risk Evaluation for Compressed Air Systems**

**Existing Systems Only**

**RECORD OF REVISIONS**

<b>Rev</b>	<b>Date</b>	<b>Description</b>	<b>POC</b>	<b>RM</b>
0	9/17/2014	Initial issue. Administrative update to ES-DO-QR-2010-003.0, 5/18/2010.	Ari Ben Swartz, <i>ES-EPD</i>	Larry Goen, <i>ES-DO</i>

**Contact the Standards POC for upkeep, interpretation, and variance issues.**

<b>Chapter 17</b>	<a href="#"><u>Pressure Safety POC and Committee</u></a>
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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.
2. The system fluid service is not interconnected to a flammable (hydrogen, deuterium, and tritium).
3. The system fluid service is not interconnected with a fluid that supports combustion (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.

**Section EXIST - Legacy System Requirements**

Rev. 0, 9/17/2014

**Attachment EXIST-1c, QR Evaluation for Compressed Air Systems**

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 IV

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**

Compressed air systems, for example oil less or non-oil less air compressors used for shop air systems, calibration gas, actuation pressures, etc...

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. System shall be upgraded to ASME compliance as items age out of service by attrition.

**Qualitative Risk Assessment**

Probability: Occasional

Consequence: Insignificant

QR Factor: 5

Table 3 Qualitative Risk (QR) Determination

C o n s e q u e n c e			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	