CGA E-4 Ignition Test Report

Test Articles:

Industrial Regulators

Model # VSR-VSP

Report Number:

R-WHA-19227-00-A-EX1

Date:

November 11, 2019

Prepared for:

Vigour
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Project Details

WHA Project Number 19227-00

Customer Vigour

Cost Estimate Number E-WHA-19227-00-A-EX1

Purchase Order Number P.O. # P19049

Statement of Work WHA performed Ignition testing to evaluate the ignition sensitivity of the following test article(s). The following test(s) were performed as requested by the customer:

Test Article Description	Model #	WHA TA #	Testing Performed
Industrial Regulator	VSR-VSP	TA-1.1 to TA-1.3	CGA E-4 Ignition Test

Version Summary

Report Number (includes version)	Summary of Changes
R-WHA-19227-00-A-EX1	Original version

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Prepared by:	Reviewed by:	Approved by:
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Testing Summary

Test Article Details

Test Article 19227-00-TA-A01

Test Article Drawing See **Appendix A**

Test Article Type
☐Integrated Pressure Regulator
☒Industrial Regulator
☐Cylinder Valve
☐Industrial Valve
☐VIPR
☐Other:

Manufacturer/Supplier Vigour

Number of Test Articles Supplied[1] 3 + 1 spare

Test Article Part # /Drawing #	Testing Performed	WHA Test Article #'s	Max. Rated Pressure	Test Pressure
VSR-VSP	Oxygen Pressure Shock	TA-1.1 to TA-1.3	300 barg (4351 psig)	360 barg (5221 psig)

Oxygen Pressure Surge Testing[2]

Test Standard(s) **CGA E-4 (2016)**: Standard for Gas Pressure Regulators

Section 7.1: Ignition Test

Test System See **Appendix GFIS**.

Test Article Condition The test articles were tested in their "as received" condition.

Test Conditions

Condition	Specification
Test Pressure	360 barg
Test Gas	≥ 99.5% Oxygen per MIL-PRF-27210J
Test Gas Temperature	60 °C (+/- 3 °C)
Impact Tube	1000 mm long x 5 mm ID
Pressure Surge Application Point	Test Article Inlet
Pressure Surge Cycles	20 cycles in two configurations (see below)

[1] Regarding test articles received by WHA, no sampling was performed by WHA nor is WHA responsible for sampling. The sample of test articles received by WHA were selected by the customer.
[2] All test conditions, specifications, configurations listed were specified according to the test standard unless otherwise noted.

Oxygen Pressure Surge Testing[2] *(cont.)*

Test Configurations

- **Configuration #1:** The test articles were subjected to twenty (20) oxygen pressure shocks with the test article fully reduced. The outlet of the test article was open to the atmosphere. The test articles were pressurized to 360 barg through the test article inlet.
- **Configuration #2:** The test articles were subjected to twenty (20) oxygen pressure shocks with the test article fully increased. The outlet of the test article was plugged. The test articles were pressurized to 360 barg through the test article inlet.

Test Results[3]

- Oxygen pressure shock cycles were conducted on three (3) test articles (TA-1.1, 1.2, and 1.3) according to the test configurations listed previously. No evidence of ignition was observed visually or audibly during testing.
- Post-test disassembly and inspection of the test articles (TA-1.1, 1.2, and 1.3) did not reveal evidence of ignition, or scorching of the seats and seals.
- Post-test photographs of the test articles are provided in **Appendix B**.
- Based on the results observed during this testing, the test articles (TA-1.1, 1.2, and 1.3) were judged by WHA personnel to have successfully met the requirements of **CGA E-4 (2016): Section 7.1: Ignition Test.**

[3] These results represent opinions and interpretations based on qualitative measurements using visual or audible observations.

Disclaimer

The results documented in this report only relate to the test articles tested. WHA International, Inc. (WHA) does not endorse or warrant any component or item tested by WHA personnel as being suitable for any design function or service application what-so-ever. WHA has not performed any evaluation or testing beyond that stated herein, and expressly denies any responsibility for having evaluated the test article for function or safety. WHA disavows any responsibility for the function or safety of test articles.