Code of Practice

Upstream Polyethylene Gathering Networks – CSG Industry

Companion Paper CP-08-002

Strength Test Equipment and other Considerations

October 2019

Important note on use of the *APGA Code of Practice for Upstream Polyethylene Gathering Networks in the Coal Seam Gas Industry*.

This Code of Practice has been developed for the use of organisations involved in the CSG industry, primarily in Australia and New Zealand.

Contents

Acknowledgements

This Companion Paper has been prepared by the Australian Pipelines and Gas Association (APGA) CSG Committee working group. The working group members contributed significant time and resources at the working group level in developing and reviewing this companion paper and their support is acknowledged. The support of the APGA Board and the APGA Secretariat is also acknowledged.

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Feedback process

Feedback on this Companion Paper or recommendations for the preparation of other Companion Papers is encouraged.

A form has been provided to enable the submission of feedback. The form can be found on the APGA website under Publications or by following this link https://www.apga.org.au/apga-code-practice-pe-gathering-networks-queries-and-proposed-updates-form

If there are problems with the feedback form, please contact:

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Preface

Companion Papers have been developed by the Working Group responsible for the *APGA Code of Practice for Upstream PE Gathering Networks – CSG Industry* (the Code) as a means to document technical information, procedures and guidelines for good industry practice in the coal seam gas (CSG) industry.

Since 2008, the development of the LNG export industry based in Gladstone, Queensland, with its related requirement for a large upstream CSG supply network of pipelines and related facilities presented the impetus for significant improvements in design and best practice approach.

The principal motivation since the initial development of the APGA Code of Practice was safety and standardisation in design and procedures and to provide guidance to ensure that as low as reasonably practicable (ALARP) risk-based requirements were available to the whole CSG industry. Accordingly, the Code is focused solely on this industry and the gathering networks and associated pipelines using locally manufactured PE100 pipeline. The Code is a statutory document within Queensland.

The incorporation of Companion Papers since Version 4 of the Code is intended to provide information and best practice guidelines to the Industry, allowing the Code to be limited to mandating essential safety, design, construction and operation philosophies and practices.

Companion Papers form part of the suite of documents together with the Code and are intended to:

a) be used in the design, construction and operation of upstream PE gathering networks;
b) provide an authoritative source of important principles and practical guidelines for use by responsible and competent persons or organisations; and
c) assist the gas industry to become a positive and valuable member of the community including landholders.

Companion Papers should be read in conjunction with the requirements of the Code to ensure sound principles and practices are followed. These documents do not supersede or take precedence over any of the requirements of the Code.

A key role of the Companion Papers is to provide the flexibility to incorporate endorsed industry practices and emerging technologies expeditiously, as/when necessary.

A related benefit is that the Companion Papers can be referenced by the wider resources industry which uses similar PE gathering networks for gas or water handling, including coal bed methane (CBM) in underground coal mines; mine de-watering; the emerging biogas industries (agricultural, landfill, etc.); or any development with similar characteristics (e.g. shale gas).

Other useful references to support CSG Field Development include:

- Agreed joint arrangements between the Landholder and operating company as detailed in a Conduct and Compensation Agreements;

- Queensland Government Acts and Regulations, developed in association with the industry, covering the direct and indirect issues from the beneficial use of CSG produced water to weed management, monitored by the Gasfields Commission (under its own Act); and
- Safer Together publications which address many of the industry-wide issues, specifically standardised inductions; 4WD vehicle usage and monitoring and heavy vehicle Land Transport, in particular drilling & construction water transfer and handling.

1 Scope

This Companion Paper should be read in conjunction with Section 8 of the Code of Practice.

The scope of this Companion Paper is to:

- Detail the test tools and equipment and installation of test equipment in order to undertake strength pressure testing as required by the Code of Practice.
- Provide guidance on filling the test section for hydraulic test only. Strength pressure testing can be conducted either by hydraulic or pneumatic methods. This Companion Paper only provides guidance related to filling a test section when using water for the hydraulic strength test method.
- Component testing is also covered in the Companion Paper.

2 General

The test procedure shall be fully documented and approved by the Operator. This approval may include a formal hazard assessment or other suitable risk assessment methods.

The pipeline shall be restrained against movement. Ideally the ends of the section being tested should be backfilled.

Exposed pipe should be shielded from direct sunlight during testing operations. This can be achieved by using a suitable shading material (guidance on suitable shading options can be found in PIPA document POP001 at www.pipa.com.au).

3 Tools and equipment

The following tools and equipment are required:

a) Test pressure gauges and temperature measuring devices calibrated by a recognised and certified testing agency.
NOTE: Test pressure gauges shall be sensitive enough to accurately measure pressure change required by the acceptance criteria. Digital gauges with ±1 kPa sensitivity should be used. The measuring devices shall be calibrated. Calibration shall be undertaken at least every 12 months.

b) Pressure rated hoses equipped with a suitable hose restraint.

c) Pressure test warning signs, barricading.

d) Approved test headers

e) Air compressor with oil filter/separator and cooler or suitable supply of water, meters and pump.

NOTE: The temperature of air or water being injected into the network may be significantly higher than ambient conditions. Consideration shall be given to the installation of an after-cooler on the compressor to prevent overheating when using a pneumatic strength test and air temperature measurement during pressurisation.

f) Silencer or muffler for discharging air during de-pressurisation of pneumatic tests.

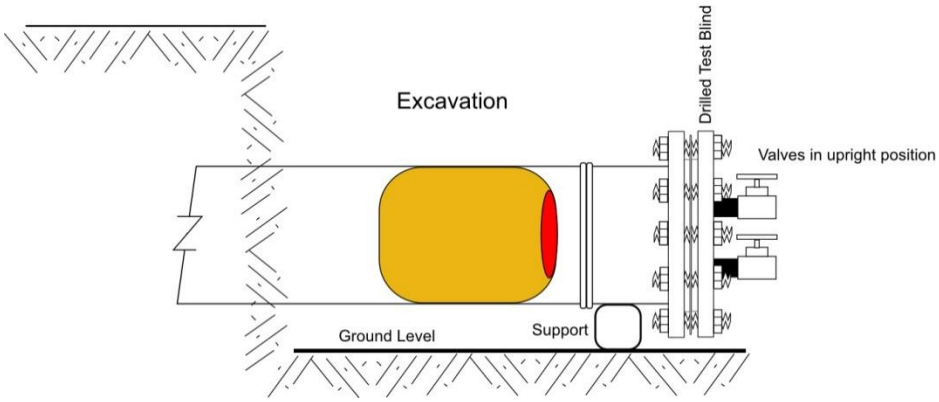


Figure 1 - Typical certified test header

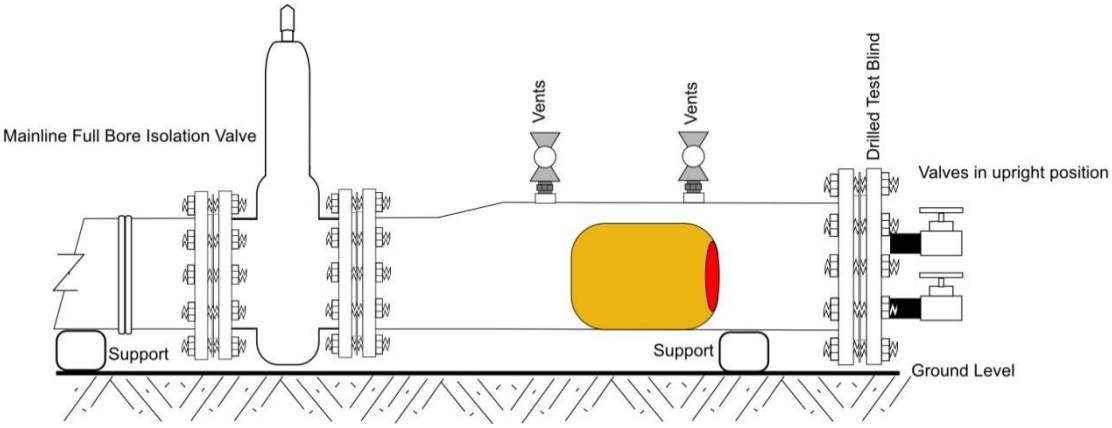


Figure 2 - Test Header/ Pig Catcher

4 Installation of test equipment

Suitable test equipment shall be connected to the network. Requirements include:

a) The location of the test equipment shall consider suitable escape routes in the event of an emergency.

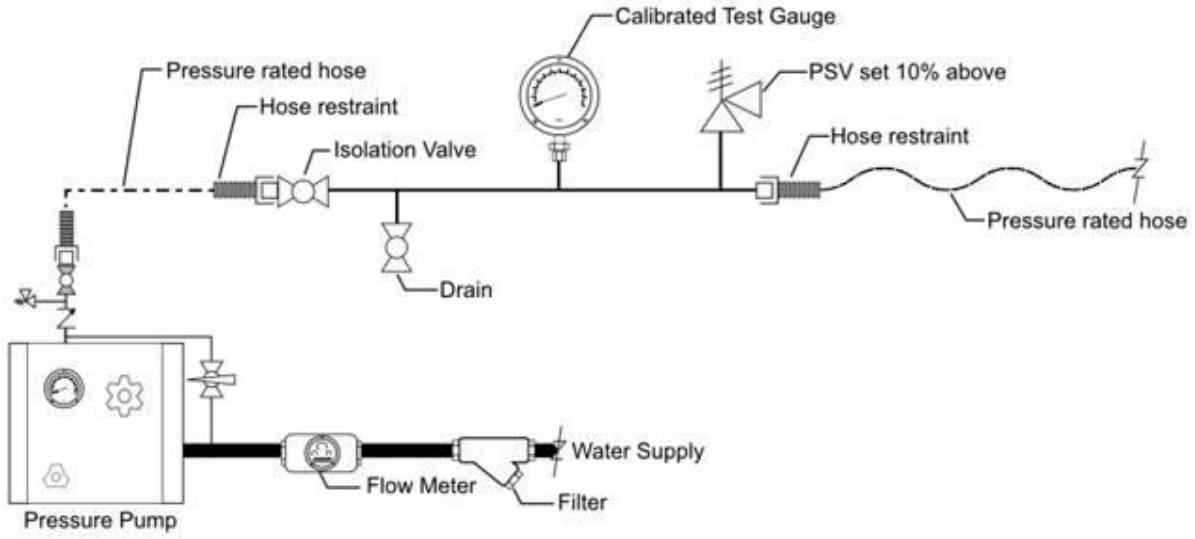
b) Test equipment shall be located in accordance with the exclusion zone detailed in this code.

c) The test equipment shall be checked by the Operator and a service test carried out on the temporary test equipment prior to the introduction of pressure.

d) Suitable warning notices shall be prominently displayed at the boundaries of the exclusion zone.

e) Consideration should be made to the test equipment having a suitable method of over pressure protection using a device set to 10 per cent above the maximum calculated test pressure.

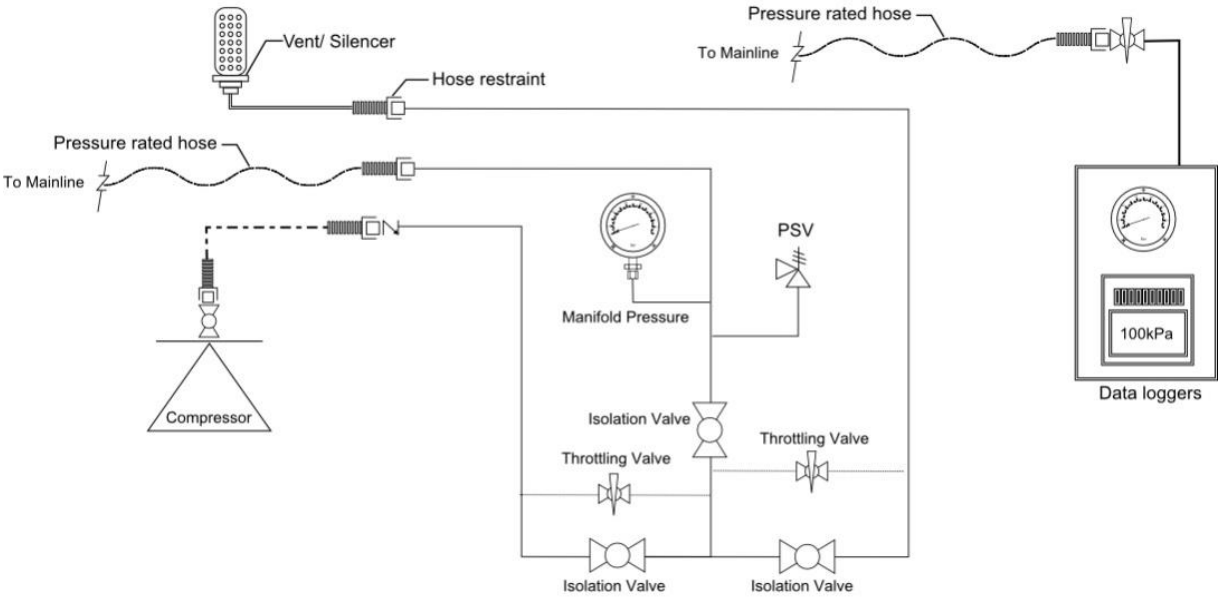
TYPICAL TEST SET UP



Note: Pump set ups may vary according to the type of pump used. It is recommended to have a Non return valve, PSV, filtration and Flow measurement device within the pump set up to control and protect the system.

Figure 3 - Hydraulic test setup

TYPICAL PNEUMATIC MANIFOLD TEST SET UP



Note: It is recommended to have a Non return valve and PSV to control and protect the system. A second instrumentation line should be used to monitor the system pressure

Figure 4 - Pneumatic test setup

5 Filling – Hydraulic test only

The objective is to fill the network section to be tested with water to ensure that residual air content in the section is minimised. This may be controlled by using a pig propelled with water to expel the air or by the release of air through air valves at high points in the network. Consideration should be given to elevations and where required a back pressure used to control the pig speed.

Where pigging is not a viable option due to short sections of pipe, dual diameter pipes or large volume networks, filling is to be conducted so that all air is expelled from all possible high point vents.

6 Component testing

6.1 General

Numerous components manufactured from PE100 pipe are used in gathering networks, including valve manifold assemblies, risers, low point drains, T-sections, high point vents and riser sections (e.g. for pressure testing). If components will be subjected to a field pressure test before commissioning, preliminary pressure testing may be undertaken in accordance with Section 6.2 of this companion paper to achieve the following outcomes:

- Sample preliminary testing of manufactured assemblies as an additional quality assurance.
- Reduce risk of component failure (e.g. electrofusion saddles at tie-in locations).
- Meet compliance requirements where preliminary testing is determined to be required or mandatory (e.g. prefabricated trenchless construction pipe strings).

Assemblies that are installed within the network post commissioning, and will not be subjected to a field pressure test, shall be tested in accordance with Section 8.4.3 of the Code.

6.2 Component preliminary testing

Component preliminary testing can be carried out using water, air or nitrogen as a test medium. A dedicated test area is to be established, with appropriate procedures. The pressure is raised to the test pressure in increments of 25 per cent, stopping at each increment to allow for settlement. On reaching the test pressure, in accordance with Section 8.4.1 of the Code, the component should be held for a 30-minute stabilisation period at the test pressure. On completion of a 60-minute strength test the test pressure should be reduced to MAOP before approaching the component to inspect for leaks. The component shall be depressurised prior to manual handling.

NOTE: Air testing is normally restricted to on-site applications or small-bore component factory testing. Exclusion zones must be maintained as per the requirements of the Code, i.e. a minimum of five (5) metres.