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NIA Project Registration and PEA Document

Date of Submission

Feb 2018

Project Reference Number

NIA_CAD0014

Project Registration

Project Title

EZ Valve performance and material testing GIS V7-1

Project Reference Number

NIA_CAD0014

Project Licensee(s)

Cadent

Project Start

February 2018

Project Duration

3 years and 11 months

Nominated Project Contact(s)

Cadent Innovation Team

Project Budget

£178,831.00

Summary

The objective of this project is to qualify the EZ valve range (1 ½", 2", 3", 4" and 6") against current PIV approval standards GIS V7-1 (excluding the double block and bleed test as the EZ valve does not have this facility) Subject to positive completion of this project and successful completion of project IL 405 and policy approval this will enable deployment of a fully approved solution for installing of PIV's into the UK Gas Network, without the need to interrupt or bypass customer's gas supplies.

Nominated Contact Email Address(es)

Innovation@cadentgas.com

Problem Being Solved

Current methods to install Pipeline isolation valves (PIV's) involve either cutting off the supply, installing the valve, and then re-commissioning downstream, or cutting in a bypass in order to be able to install a PIV. This creates disruption to the customer in terms of an interruption to their gas supply, as well as the potential for downstream failure when re-commissioning. Therefore, a costly and lengthy replacement may need to be installed.

Cadent currently have an Innovation project (IL 405) in delivery to produce a range of EZ valves (1 ½", 2", 3", 4" and 6") in diameter. Currently two EZ valves (4" & 6") have been produced and installed into Cadent's Network as part of the field trials under the auspices of G/23, the installations were monitored by Network policy and Rosen. The valves are also currently being subjected to ongoing monitoring with no reported issue. Prior to the field trails, laboratory testing was undertaken at Cadent Skills and Development Centre in Hitchin and these installations were monitored by Cadent and Rosen. Subsequent field trials for the remaining valves (1 ½", 2" & 3") are currently being planned. These valves will also be subjected to short term laboratory testing prior to field trials and will be installed under the auspices of G/23 and these will be monitored in service by Network policy and Rosen.

Upon completion of the production of the valves range and field trials within project (IL 405) it has been agreed by Network policy and Rosen that performance tests in GIS V7-1 are most applicable to confirm the performance of the valve (excluding the double block and bleed test as the EZ valve does not have this facility). This will demonstrate the performance of the valve to enable technical qualification of the EZ Valve, and subject to network policy approval will enable a fully deployable and Cadent approved solution for the UK Gas Network as a pipeline isolation valve on its low pressure network (<75mbar).

Method(s)

The full range of EZ valves will be supplied and installed onto sample pipe by AVT.

All 5 valve sizes within the EZ Valve range will be subjected to the appropriate approval/performance testing in accordance with gas industry standards (GIS V7-1).

A further two EZ Valves will be subjected to material identification and mechanical testing.

This project has been developed to enable a qualification route for the EZ Valve range as a fully deployable Cadent approved solution onto its network

Scope

AVT:

- a. Supply of two complete valve sets (1 ½", 2", 3", 4" and 6") 10 in total including shipping.
- b. Supply of 1 no old 4 inch nominal diameter grey iron pipe (pit cast grey iron or spun cast grey iron) minimum length 1.1 meters
- c. Installation of 10 Valves by AVT onto sample pipe at Rosen testing facility, unit 1 Brunswick Industrial estate, Newcastle upon Tyne, NE137BA. All tools and equipment will be provided by AVT to enable this. Installation will be observed by Rosen representatives.
- d. Supply material property specifications and equivalent BS EN standards (or nearest accepted equivalent)

ROSEN:

- a. Material Identification testing
 1. Manufacturer will provide material property specification and equivalent BS EN standards (or nearest accepted equivalent)
 2. Cast metal material identification
 - a. Valve body and any other cast component
 - b. Confirmation of mechanical properties-tensile, toughness, charpy (strain test), Micro and Macro examination of materials.
 3. Coating material identification
 4. Bolt Material
 - a. Identification of specification
 - b. Confirmation of mechanical properties – tensile, toughness, charpy (strain test), Micro and Macro examination of materials.

Material testing will be undertaken on one valve from each foundry.

- b. Full type testing as specified in GIS/V7-1 (Current UK gas industry valve standard)

1. Shell strength test
2. Obturator strength test
3. External leak test at temperature extremes
4. Internal leak test (let-by) at temperature extremes
5. Operability test
6. Bending test
7. Resistance to Liquid agents test
8. Wear test
9. Strength of stops
10. Resistance to bending movement applied via the spindle head.

- c. Production testing as specified in GIS V7-1

GIS V7-1 Production tests are required once type testing has been satisfactorily achieved and consists of the following tests;

1. Shell strength test
2. Obturator strength test
3. Internal leak tightness
4. Operability test
5. External leak tightness

Objective(s)

Previously a gap analysis test was carried out by Rosen comparing the American Water Works Association specification that the valve is currently approved to (C509) against UK Specifications (GIS V7-1 and BS EN 13774). Following this analysis and project work undertaken to date, further quality assurance and acceptance testing has been proposed by Rosen and agreed with Network policy to develop a qualification route for the EZ valve.

There will be no requirement for any further external testing after the completion of this project as stated by Rosen who have recommended the proposed testing in agreement with Network policy

The project objectives are-

- Full UK Type and Production testing for all five EZ valves in the range, in accordance with current industry standard (GIS V7-1)
- Material identification and mechanical testing of two EZ valves to confirm the materials used in the valve body, bolts and coatings.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The project will be deemed as a success by providing-

- Successful completion of the appropriate testing program.
- Network Policy have appropriate information to make an informed decision as to whether the EZ valve is suitable as a deployable and fully approved solution for installing PIV's into the Gas Network.

Project Partners and External Funding

Cadent – 90% of project will be funded by NIA
Project Partner - Rosen

Potential for New Learning

The results from the project will allow Cadent and other GDN's to determine the efficacy of the EZ valve range and determine its performance against a known specification.
Should the results not qualify the product at this point Cadent will have gained valuable information to enable us to decide if further development work would be a viable alternative.

Scale of Project

This project is to undertake the associated approval/performance testing and material identification testing of the EZ valve. This work has been proposed to develop a qualification route for the EZ valve as a fully deployable and Cadent approved solution.
The scale of this project is to undertake full UK type and production testing as well as material identification and mechanical testing of the EZ valve in accordance with current industry standard GIS V7-1. This will be carried out over a 9 month period (including 3 months contingency) with an expenditure of £178,831.78 (including 10% contingency)
GIS V7-1 specifies the largest size, smallest size and one mid-range should undergo all specified tests; however AVT currently use two different foundry's for its EZ Valve range. Therefore It has been decided between Rosen and Cadent Network Policy that the full range of valves should undergo all specified tests, due to the potential differences in manufacture.

Technology Readiness at Start

TRL5 Pilot Scale

Technology Readiness at End

TRL5 Pilot Scale

Geographical Area

This project will not incorporate any field trials in the network; all testing will take place at Rosen's testing facility in Newcastle upon Tyne.

Revenue Allowed for the RIIO Settlement

No Specific RIIO deliverable output.

Indicative Total NIA Project Expenditure

Total expenditure will be £178,831.78 this comprises of External costs including 10% contingency £133,503.27 and Cadent Internal costs £45,328.51

Project Eligibility Assessment Part 1

There are slightly differing requirements for RIIO-1 and RIIO-2 NIA projects. This is noted in each case, with the requirement numbers listed for both where they differ (shown as RIIO-2 / RIIO-1).

Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations (Please complete sections 3.1.1 and 3.1.2 for RIIO-2 projects only)

Please answer **at least one** of the following:

How the Project has the potential to facilitate the energy system transition:

n/a

How the Project has potential to benefit consumer in vulnerable situations:

n/a

Requirement 2 / 2b

Has the potential to deliver net benefits to consumers

Project must have the potential to deliver a Solution that delivers a net benefit to consumers of the Gas Transporter and/or Electricity Transmission or Electricity Distribution licensee, as the context requires. This could include delivering a Solution at a lower cost than the most efficient Method currently in use on the GB Gas Transportation System, the Gas Transporter's and/or Electricity Transmission or Electricity Distribution licensee's network, or wider benefits, such as social or environmental.

Please provide an estimate of the saving if the Problem is solved (RIIO-1 projects only)

Cadent will have a cost-effective solution which will ensure that our gas riser assets are built to the current regulations; ultimately ensuring the safety of our customers. Without this system Cadent would either need to cut-off the gas supply/by-pass to insert a valve or potentially replace the whole asset.

The true benefits of the project are:

- Health and Safety
- Compliance
- Response time/speed of construction
- Live gas installation therefore no interruption
- Cost-effective
- Cadent will not need to contract flow stopping techniques from 3rd party's for <3" pipe diameter (Steve Vick)
- No need for large excavations, EZ valve requires on average 1/3 of the size of excavation compared to current PIV installation methods – therefore minimal footprint required.

The valve will in certain circumstances allow the retro-fit of the valve which in conjunction with other repairs will negate the need to replace a riser system.

It is now anticipated that the EZ valve could be applied to a wider range of applications within the low pressure <75mbar network. These are: Emergency situations where a PIV cannot be located or accessed, installation of a PIV on any large diameter service especially Industrial and commercial properties (I&C) and it could also be used as a contingency valve by Gas Distribution Service Partners (GDSP's) when carrying out replacement works.

Please provide a calculation of the expected benefits the Solution

It is currently estimated that the 2" EZ valve will account for approximately 50% of all required PIV's on Cadents network. This size valve along with the 1.5" valve currently demonstrate the largest financial benefit due to the cost of valve itself (based on indicated costs from supplier AVT) and the removal of costs for 3rd party flow stopping.

The estimated base cost using current methods of connecting a 2" PIV is £5,088 this includes materials, excavation and reinstatement, 3rd party flow stop, and labour costs.

The estimated method cost of installing a 2" EZ Valve is £1,140 this includes Materials, excavation and reinstatement and labour costs. The savings are calculated assuming 1/3 excavation and 1/3 labour costs and no requirement for 3rd party flow stop.

The financial benefit is therefore £3,948 when installing a 2" EZ Valve compared to current methods.

If for example Cadent installed 300 x 2" valves per annum the total cost saving would be £1,184,400 compared to current methods.

Please provide an estimate of how replicable the Method is across GB

All Network Licensees have Multi Occupancy buildings with Gas riser systems. Therefore this technology could be rolled out across all gas networks in the UK.

Initially the scope for this technology was mainly focused on MOB gas supply pipes; however it has now been identified that this technology can be used across the low pressure Network where a PIV is required.

Please provide an outline of the costs of rolling out the Method across GB.

Costs would be clarified on completion of the projects, however there would be a requirement for a suitable training programme for field engineers and procurement of valves and tooling that will be facilitated on a commercial basis, it is envisaged costs dependent on volumes required?

Requirement 3 / 1

Involve Research, Development or Demonstration

A RIIO-1 NIA Project must have the potential to have a Direct Impact on a Network Licensee's network or the operations of the System Operator and involve the Research, Development, or Demonstration of at least one of the following (please tick which applies):

- A specific piece of new (i.e. unproven in GB, or where a method has been trialled outside GB the Network Licensee must justify repeating it as part of a project) equipment (including control and communications system software).
- A specific novel arrangement or application of existing licensee equipment (including control and/or communications systems and/or software)
- A specific novel operational practice directly related to the operation of the Network Licensees system
- A specific novel commercial arrangement

RIIO-2 Projects

- A specific piece of new equipment (including monitoring, control and communications systems and software)
- A specific piece of new technology (including analysis and modelling systems or software), in relation to which the Method is unproven
- A new methodology (including the identification of specific new procedures or techniques used to identify, select, process, and analyse information)
- A specific novel arrangement or application of existing gas transportation, electricity transmission or electricity distribution equipment, technology or methodology
- A specific novel operational practice directly related to the operation of the GB Gas Transportation System, electricity transmission or electricity distribution
- A specific novel commercial arrangement

Specific Requirements 4 / 2a

Please explain how the learning that will be generated could be used by the relevant Network Licensees

Project outputs will be shared with other GDN's which will enable them to apply on their own networks.

Or, please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the project (RIIO-1 only)

Currently there no method available for live insertion of PIV's without the need to bypass the gas supply or flow stop. This project is to develop the ability to construct a valve under live conditions and in less time. This technology could also be used in emergency situations where the PIV cannot be located.

- Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees

Is the default IPR position being applied?

- Yes

Project Eligibility Assessment Part 2

Not lead to unnecessary duplication

A Project must not lead to unnecessary duplication of any other Project, including but not limited to IFI, LCNF, NIA, NIC or SIF projects already registered, being carried out or completed.

Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

This technology is new and novel within the gas industry and there is currently no development of this type of technology in the UK. A technology search has confirmed this assertion and AVT is the sole supplier in the water industry.

If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

n/a

Additional Governance And Document Upload

Please identify why the project is innovative and has not been tried before

There is currently no other available technology that incorporates live insertion of PIV's into Gas Networks both within the UK and worldwide.

Relevant Foreground IPR

n/a

Data Access Details

n/a

Please identify why the Network Licensees will not fund the project as apart of it's business and usual activities

There are significant risks and uncertainties as to whether this technology is able to pass the required tests and as such does not form part of any BAU process

Please identify why the project can only be undertaken with the support of the NIA, including reference to the specific risks(e.g. commercial, technical, operational or regulatory) associated with the project

iii) Why the Project can only be undertaken with the support of the NIA, including reference to the specific risks (e.g. commercial, technical, operational or regulatory) associated with the Project

This project has been approved by a senior member of staff

Yes