



TO: Emerson Process Management, Valve Automation
19200 Northwest Freeway
Houston, TX, United States

FROM: Shell Projects & Technology
Lange Kleiweg 40
Rijswijk, the Netherlands

SUBJECT: Acceptance of Endurance Testing

DATE: August 30th 2016

SECURITY CLASS: Unrestricted

To whom it may concern,

This is to confirm that the actuator(s) described in this acceptance document has/have satisfactorily completed the Endurance Test as described in EN 15714-3 (2009) including the Shell-specific pre- and post inspections described in clause 9 of DEP 32.36.01.18 (2016).

Manufacturer name: Emerson – Bettis.

Tested model(s): G01012-SR4 with 'Xylan ESC-7' coated cylinder with a material selection suitable for -29 to +93 degC.

Manufacturing location of the tested model: Houston, TX, US.

G-series actuators based on the same specification and having Maximum Operating Torques (at Maximum Operating Pressure) between 2.55 kNm and 10.2 kNm are considered qualified.

Reference documents: Bettis data sheet GPM 1.11 Rev. C (August 2015) and Bettis G01012-SR4-Xylan Shell Endurance Test Report (June 2016).

Any change to the specification, design or material selection of the tested model(s) requires revalidation of this acceptance document.

This acceptance does not imply that the actuator is TAMAP approved.

Before seeking TAMAP approval for the tested model(s) to be used on Protective Applications an accepted design review against the latest version of the DEP is required.

The validity of this acceptance document expires 10 years after its publication date.

Signature

on his behalf: F. Marney

Name of the witness involved

Ganesh Ramani
PACO Principal Technical Expert M&I
PACO Process Automation AP

[Signature]
Xiuping Mu, Lloyds Register
North America

This document consists of 2 (two) sheets. It may only be reproduced in full.

This document may be re-issued after additional testing, expanding the qualification range.

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Description of the tested actuator

Refer to Bettis data sheet GPI 1.13 Rev B dated August 2010.

The Bettis G01012-SR4 is a guide bar series spring return actuator based on a ductile iron housing using a 1 inch nominal movement symmetric yoke and a 12 inches diameter pneumatic cylinder and a 'size 4' return spring. The actuator is equipped with '-00' materials (Generic Nitrile 70) suitable for an ambient temperature range of -29 to +93 degC (-20 to +200F).

The cylinder internals are coated with PTFE-based Xylan (a trademark of the Whitford Corporation). Maximum operating pressure of the pneumatic cylinder is 8.0 bar (116 PSI). Serial number of the complete unit is 10845510-1.

Rating and typical characteristics

Actuator Model	Metric Unit	Spring Torque Nm	Operating Pressure, barg										
			1.5	2	2.5	3	3.5	4	5	6	7	8	9
G01x12-SR4	Start	1,251			743	1,140	1,537	1,934	2,728	3,522	4,316	5,110	
	Min	623			362	570	777	984	1,398	1,811	2,225	2,639	
	End	1,060			556	951	1,345	1,740	2,529	3,319	4,108	4,898	

Source: GPM 1.11 Rev. C.

According to the table above the Maximum Operating Torque at 8.0 bar is 5.11 kNm. The Nominal Output Torque at 5.5 bar (80 PSI) is 3.12 kNm.

Materials of construction of key components:

Spring VA124824-040 ASTM A304\A29/ A29M\A689, Heat 012374

Conditions during the endurance test

The Air Start Torque at the Maximum Operating Pressure (MOP) is 3.21 kNm. Table 1 of EN 15714-3 specifies for that Nominal Torque a minimum number of loaded cycles of 100.000.

The number of cycles completed during the endurance tests is 100.000.

Minimum torque load during the test was 0.374 kNm which is larger than the minimum of 60% of the smaller of the ART@5.5 bar (1.60 kNm) and the SRT (0.623 kNm).

Details regarding the qualification range of the test results.

According to the qualification rules in EN 15714-3, all actuators having maximum operating torques (the air start torque at MOP) between 2.55 kNm (50 % of 5.11 kNm) and 10.2 kNm (200 % of 5.11 kNm) are considered qualified.

Other details

Facility where the test is performed: Bettis Houston manufacturing plant.

Date and period of the test: March to May 2016.

Independent witness involved in the test: Xiuping Mu, Lloyds Register North America

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