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): G10040-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 131 kNm and 526 kNm are considered qualified.

Reference documents: Bettis data sheet GPM 1.11 Rev. C (August 2015) and Bettis G10040-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	Name of the witness involved
Ganesh Ramani PACO Principal Technical Expert M&I PACO Process Automation AP	on his behalf: F. Marcus ~~Xiuping Mu~~, Lloyds Register North America

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

Description of the tested actuator

Refer to Bettis data sheet GPI 1.13 Rev B dated August 2010.
The Bettis G10040-SR4 is a guide bar series spring return actuator based on a ductile iron housing using a 10 inches nominal movement symmetric yoke and a 40 inches diameter pneumatic cylinder and a 'size 4' return spring. The actuator is equipped with '-00' materials (Low Temperature Nitrile) 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 8.83 bar (128 PSI).
Serial number of the complete unit is 8614007-1.

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
			Air Torque Output, Nm										
G10x40-SR4	Start	114,627						78,194	115,309	152,428	189,548	226,671	263,797
	Min	46,607						27,034	47,133	66,743	86,212	105,630	125,023
	End	66,733						30,535	67,457	104,380	141,306	178,235	215,166

Source: GPM 1.11 Rev. C.

According to the table above the Maximum Operating Torque at 8.83 bar (128 PSI) is 264 kNm. The Nominal Output Torque at 5.5 bar (80 PSI) is 115 kNm.

Materials of construction of key components:

Spring VA 115304, Heat 81922083

Conditions during the endurance test

The Air Start Torque at the Maximum Operating Pressure (MOP) of 8.83 bar is 264 kNm.
Table 1 of EN 15714-3 specifies for that Nominal Torque a minimum number of loaded cycles of 2.500. The number of cycles completed during the endurance tests is 2.500.
Minimum torque load during the test was 28 kNm which is larger than the minimum of 60% of the lowest of ART (125 kNm) and SRT (46.6 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 131.5 kNm (50 % of 263 kNm) and 526 kNm (200 % of 263 kNm) are considered qualified.

Other details

Facility where the test is performed: Bettis Houston manufacturing plant.
Date and period of the test: March to June 2016.
Independent witness involved in the test: Xiuping Mu, Lloyds Register North America
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