



Italia

COMPLIANCE

with IEC 61508 and IEC 61511

Certificate No.: C- IS 196377 – 01

CERTIFICATE OWNER: ALPHA POMPE S.P.A.
VIA MOLINO EMILI, 16
25030 – MACLODIO (BS)

WE HEREWITH CONFIRM THAT

THE ANALYSIS DEVELOPED BY ALPHA POMPE, REPORTED IN THE
REPORT :

*“Technical Report for SIL Classification according to IEC 61508 and IEC 61511
Pneumatic Rack&Pinion Actuators Double Acting & Single Acting (Spring Return)*

SIL_2010_APR Rev.1 dated June, 30th 2010”

MEETS THE SIL REQUIREMENTS DETAILED IN THE ANNEXED TABLE
FOR THE SAFETY FUNCTION:

*“Complete switching on demand (open to closed & closed to open) with correct
torque, as for technical data sheets, in low demand mode operation”*

Examination result: The above described report was found to meet the standard defined requirements of the safety levels detailed in the following table according to IEC 61508 and 61511, under fulfillment of the conditions listed in the Report R-IS-196377-01 Rev.1 dated July, 01st 2010 in its currently valid version, on which this Certificate is based

Examination parameters: Compliance of the operational approach adopted and followed in the aforementioned report by ALPHA POMPE: “SIL_2010_APR Rev.1”.

Official Report No.: R-IS-196377-01 Rev. 1

Expiry Date June, 30th 2011

IT IS TO BE INTENDED THAT THE ABOVE OFFICIAL REPORT AND ITS ANNEXES ARE AN INTEGRAL PART OF THIS DOCUMENT

Reference Standard IEC 61508 Part 2, 4, 6, 7 - IEC 61511 Part 1, 2, 3

Sesto San Giovanni, July, 1st 2010



TÜV ITALIA S.r.l.
Industry Service Division
Director
[Signature]
Gennaro Oliva

SUMMARY TABLE T – IS – 196377 – 01

E/EE/EP safety-related system (final element)	Pneumatic rack&pinion actuators, AP, AP-A and RE Series produced by ALPHA POMPE S.P.A.		
Size (Class)	7,6 < Nm ≤ 40 at 6 BAR feeding pressure (Class A)	40 < Nm ≤ 175 at 6 BAR feeding pressure (Class B)	175 < Nm ≤ 10500 at 6 BAR feeding pressure (Class C)
Safety Function Definition	“Complete switching on demand (open to closed & closed to open) with correct torque, as for technical data sheets, in low demand mode operation”		
Max SIL	SIL 3	SIL 3	SIL 3
Additional requirements for the max SIL classification	Execution of Partial Stroke Test with time interval not higher than 6 months AND Full Functional Proof Test with time interval not higher than 12 months	Execution of Partial Stroke Test with time interval not higher than 6 months AND Full Functional Proof Test with time interval not higher than 12 months	Execution of Partial Stroke Test with time interval not higher than 6 months AND Full Functional Proof Test with time interval not higher than 12 months
λ_{TOT}	4,438E-08 h ⁻¹	9,590E-09 h ⁻¹	3,490E-08 h ⁻¹
λ_{SD}	1,364E-09 h ⁻¹	1,092E-07 h ⁻¹	5,428E-08 h ⁻¹
λ_{SU}	0,000 h ⁻¹	0,000 h ⁻¹	0,000 h ⁻¹
λ_{DD}	4,438E-08 h ⁻¹	9,950E-09 h ⁻¹	3,490E-08 h ⁻¹
$\lambda_{DD,d}^{(1)}$	0 h ⁻¹	0 h ⁻¹	0 h ⁻¹
$\lambda_{DD,PST}^{(2)}$	2,527E-09 h ⁻¹	5,462E-10 h ⁻¹	1,988E-09 h ⁻¹
$\lambda_{DD,FPT}^{(3)}$	2,338E-09 h ⁻¹	5,052E-10 h ⁻¹	1,839E-09 h ⁻¹
λ_{DU}	0 h ⁻¹	0 h ⁻¹	0 h ⁻¹
SFF ⁽⁴⁾	94,732 %	94,732 %	94,732 %
DC ⁽⁴⁾	81,427 %	81,427 %	81,427 %
PFD ⁽⁵⁾	1,577E-05	3,409E-06	1,241E-05
β and β_D factor	10%	10%	10%
MTTR	0,48 h	0,73 h	1,44 h

Remarks

- (1) Portion of the overall failure rate related to dangerous failure modes that can be considered as detectable by diagnostic tests and/or self-detectable, that it is possible to immediately detect the failure when it occurs (DD,d).
- (2) Portion of the overall failure rate related to dangerous failure modes that can be detected by means of Partial Stroke Testing (DD,PST), with characteristics of diagnostics according to the interpretation of IEC EN 61508 (see details in the report)
- (3) Portion of failure rate related to dangerous failure modes that can be detected only by means of periodical Full Proof Testing (DD,FPT).
- (4) SFF and DC calculated taking into account the correct and complete performing, with requested time intervals, of Partial Stroke Testing with characteristics of diagnostics according to the interpretation of IEC EN 61508 (see details in the report).
- (5) PFD of reference calculated on the basis of a Full Functional Proof Test with time interval equal to 12 months AND Partial Stroke Test with time interval equal to 6 months. This time intervals are considered by as reasonably consistent with the implementation of the equipment for safety related-applications, with reference to the overall range of results shown in the report, where other possible combination of time intervals adequate for a classification up to SIL 3 are reported. Note that, concerning Full Proof Tests, time intervals for higher than 36 months are considered by as not adequate and consistent for equipment for safety related applications. Concerning Partial Stroke Tests, time intervals lower than 6 months are highly recommended.

