

CERTIFICAT

CERTIFICADO

СЕРТИФИКАТ

認證證書

CERTIFICATE

ZERTIFIKAT



Italia

COMPLIANCE

with IEC EN 61508 and IEC EN 61511

Certificate No.: TUV IT 22 SIL 0158

CERTIFICATE OWNER: Alpha Pompe S.p.A.
Via Molino Emili, 16
25030 – Maclodio (BS)
Italy

WE HEREWITH CONFIRM THAT

THE ANALYSIS DEVELOPED BY ALPHA POMPE S.PA. FOR
PNEUMATIC RACK & PINION ACTUATORS, AP, AP-A AND RE SERIES
DESCRIBED IN THE REPORT:

*“Technical Report for SIL Classification according to IEC 61508:2010 and IEC 61511:2016
Pneumatic Rack & Pinion Actuators Double Acting & Single Acting (Spring Return)”*

SIL TECHNICAL REPORT 2022_apr Rev.5 dated November, 11th 2022

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 EN 61508 and IEC EN 61511, under fulfillment of the conditions listed in the Report R TUV IT 22 SIL 0134 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

Official Report No.: R TUV IT 22 SIL 0134

Expiry Date December, 12th 2025

IT IS TO BE INTENDED THAT THE ABOVE OFFICIAL REPORT AND ITS ANNEXES ARE AN
INTEGRAL PART OF THIS DOCUMENT
THE PRESENT DOCUMENT SUBSTITUTES AND REPEALS THE DOCUMENTS C-IS-722201443

Reference Standards IEC EN 61508:2010
IEC EN 61511:2016

Milan, December, 13th 2022



TUV ITALIA Srl

TUV ITALIA Srl
Industry Service Division
Managing Director



Italia

SUMMARY TABLE

| <i>E/EE/EP safety-related system (final element)</i> | Pneumatic Rack & Pinion Actuators, AP, AP-A and RE Series produced by Alpha Pompe S.p.A. | | |
|---|---|---|--|
| <i>Size (Class)</i> | 7,6 < Nm ≤ 40 at 6 bar supply pressure (Class A) | 40 < Nm ≤ 175 at 6 bar supply pressure (Class B) | 175 < Nm ≤ 10500 at 6 bar supply pressure (Class C) |
| <i>System type</i> | Type A | | |
| <i>Systematic Capability</i> | SC3 | | |
| <i>Safety Function Definition</i> | “Complete switching on demand (open to closed & closed to open) with correct torque, as for technical data sheets, in low demand mode operation” | | |
| <i>Max SIL⁽¹⁾</i> | HFT = 0, SIL 2 HFT = 1, SIL 3 | HFT = 0, SIL 2 HFT = 1, SIL 3 | HFT = 0, SIL 2 HFT = 1, SIL 3 |
| λ_{TOT} | 1,232E-09 | 7,141E-10 | 2,938E-09 |
| λ_{NE} | 1,391E-10 | 8,062E-11 | 3,317E-10 |
| λ_{SD} | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| λ_{SU} | 1,591E-10 | 9,219E-11 | 3,793E-10 |
| $\lambda_{DD,PST}^{(2)}$ | 2,306E-10 | 1,337E-10 | 5,500E-10 |
| $\lambda_{DU,FPT}$ | 8,623E-10 | 4,998E-10 | 2,056E-09 |
| <i>β and β_D factor</i> | 10% | 10% | 10% |
| <i>MRT</i> | 0,4274 h | 0,6774 h | 1,2820 h |
| <i>Hardware Safety Integrity</i> | Route 2 _H | Route 2 _H | Route 2 _H |
| <i>Systematic Safety Integrity</i> | Route 2 _S | Route 2 _S | Route 2 _S |
| Remarks | | | |
| (1) <i>The Safety Integrity Level (SIL) of the entire Safety Instrumented Function (SIF) must be verified via a calculation of PFD_{AVG} considering the redundant architectures, proof test interval, proof test effectiveness, any automatic diagnostics, average repair time and the specific failure rates of all products included in the SIF. Each subsystem must be checked to assure compliance with the minimum hardware fault tolerance (HFT) requirements.</i> | | | |
| (2) <i>Considering an automatic Partial Stroke Test.</i> | | | |

SIL classification according to Standards IEC EN 61508:2010 and IEC EN 61511:2016 for Pneumatic Rack & Pinion Actuators Double Acting & Single Acting (Spring Return) produced by Alpha Pompe S.p.A.

NOTE: The present table is integral part of the Document: TUV IT 22 SIL 0158
Date: December, 13th 2022