

The manufacturer
may use the mark:



Reports:

ROT 11/01-097 R002 V1 R1
Assessment Report

ROT 11/01-097 R003 V1 R2
FMEDA Report

Validity:

This assessment is valid for
Rotex Type 52S Solenoid &
Air Operated Valve models
listed on page 2.

This assessment is valid
until March 1, 2015.

Revision 1.1 March 9, 2012



Certificate / Certificat Zertifikat / 合格証

ROT 1101097 C002

exida hereby confirms that the:

Rotex Solenoid & Air Operated Valves Type 52S

**Rotex Automation Limited
Vadodara, Gujarat - INDIA**

Has been assessed per the relevant requirements of:

IEC 61508 : 2010 Parts 1-7

and meets requirements providing a level of integrity to:

Systematic Integrity: SIL 3 Capable

Random Integrity: Type A Element

**PFD_{AVG} and Architecture Constraints
must be verified for each application**

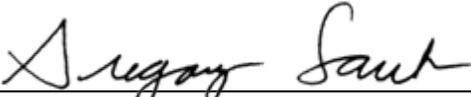
Safety Function:

The Solenoid / Air Operated Valve will move to the designed
safe position when De-energized / Energized within the
specified safety time.

Application Restrictions:

The unit must be properly designed into a Safety Instrumented
Function per the Safety Manual requirements.




Evaluating Assessor


Certifying Assessor

ROT 1101097 C002

Systematic Integrity: SIL 3 Capable

Random Integrity: Type A Element

**PFD_{AVG} and Architecture Constraints
must be verified for each application**

SIL 3 Capability:

The product has met manufacturer design process requirements of Safety Integrity Level (SIL) 3. These are intended to achieve sufficient integrity against systematic errors of design by the manufacturer.

A Safety Instrumented Function (SIF) designed with this product must not be used at a SIL level higher than stated without “prior use” justification by end user or diverse technology redundancy in the design.

52S Solenoid Valve Series Assessed¹

| Valve Group | Valve Type Series | Description and Application |
|-------------|--|---|
| Type 52S-A | 51440, 51441, 51442, 51445, 51450, I5005, M5003, M5004, P5003, & P5011 | 5/2 Single Solenoid Internal Pilot, De-energize To Trip (DTT) or Energize To Trip (ETT), ≤8 W Coils |
| Type 52S-B | 57440, 57441, 57445, 57450, I5006, P5006, & P5012 | 5/2 Double Solenoid Internal Pilot, Energize To Trip (ETT) only, ≤8 W Coils |
| Type 52S-C | 53440 | 5/2 Single Air Operated, De-energize To Trip (DTT) or Energize To Trip (ETT) |
| Type 52S-D | 58440 | 5/2 Double Air Operated, Energize To Trip (ETT) only |

IEC 61508 Failure Rates in FIT*

| Valve Group and Application | λ_{SD} | λ_{SU} | λ_{DD} | λ_{DU} |
|---|----------------|----------------|----------------|----------------|
| 52S-A Valve Types; DTT | 0 | 276 | 0 | 416 |
| 52S-A Valve Types; DTT w/ PVST [†] | 276 | 0 | 387 | 29 |
| 52S-A Valve Types; ETT | 0 | 107 | 0 | 529 |
| 52S-A Valve Types; ETT w/ PVST [†] | 107 | 0 | 500 | 29 |
| 52S-B Valve Types; ETT | 0 | 82 | 0 | 599 |
| 52S-B Valve Types; ETT w/ PVST [†] | 82 | 0 | 563 | 36 |
| 52S-C Valve Types; DTT | 0 | 160 | 0 | 319 |
| 52S-C Valve Types; DTT w/ PVST [†] | 160 | 0 | 295 | 24 |
| 52S-C Valve Types; ETT | 0 | 80 | 0 | 389 |
| 52S-C Valve Types; ETT w/ PVST [†] | 80 | 0 | 364 | 25 |
| 52S-D Valve Types; ETT | 0 | 40 | 0 | 414 |
| 52S-D Valve Types; ETT w/ PVST [†] | 40 | 0 | 387 | 27 |

SIL Verification:

The Safety Integrity Level (SIL) of an entire Safety Instrumented Function (SIF) must be verified via a calculation of PFD_{AVG} considering 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 minimum hardware fault tolerance (HFT) requirements.

¹ Excludes Latching Coil options LC, and ETT Manual Reset Mxxxx

* FIT = 1 failure / 10⁹ hours

[†] PVST = automated Partial Valve Stroke Test

Rotex Solenoid & Air Operated Valves – Type 52S

Rotex Automation Limited
Vadodara, Gujarat - India



| Form | Version | Date |
|--------|---------|----------|
| C61508 | 2.7-3 | Mar 2011 |