



Certificate / Certificat Zertifikat / 合格証

AVC 2105173 C002

exida hereby confirms that the:

**Solenoid Valves
Series R440E and R442E**

**Avcon Controls Pvt. Ltd.
Maharashtra - India**

Has been assessed per the relevant requirements of:

IEC 61508 : 2010 Parts 1-2

and meets requirements providing a level of integrity to:

Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type A, Route 2_H Device

**PFH/PFD_{avg} and Architecture Constraints
must be verified for each application**

Safety Function:

The solenoid 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.

The manufacturer may use the mark:



Revision 1.0 December 12, 2023
Surveillance Audit Due
December 15, 2026



Evaluating Assessor

Certifying Assessor

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Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability: Type A, Route 2_H Device

PFH/PFD_{avg} and Architecture Constraints must be verified for each application

Systematic 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.

Random Capability:

The SIL limit imposed by the Architectural Constraints must be met for each element. This device meets *exida* criteria for Route 2_H.

Versions:

Valve Group	Valve Type Series	Coil Type
R440E	R440E06, R440E10, R440E15, R440E20, R440E25	M36
	R440E07, R440E11, R440E16, R440E21, R440E26	M40
R442E	R442E06, R442E10, R442E15, R442E20, R442E25	M36
	R442E07, R442E11, R442E16, R442E21, R442E26	M40

IEC 61508 Failure Rates in FIT*

Series R440E					
Coil	Trip Configuration - Static Application	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}
M36	Input to Cyl 1 & Cyl 2 to Exhaust	0	285	0	419
	Input to Cyl 2 & Cyl 1 to Exhaust	0	45	0	494
M40	Input to Cyl 1 & Cyl 2 to Exhaust	0	820	0	419
	Input to Cyl 2 & Cyl 1 to Exhaust	0	45	0	534

Series R442E					
Coil	Trip Configuration - Static Application	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}
M36	All Configurations	0	285	0	530
M40	All Configurations	0	820	0	570

* FIT = 1 failure / 10⁹ hours

SIL Verification:

The Safety Integrity Level (SIL) of an entire Safety Instrumented Function (SIF) must be verified via a calculation of PFH/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 element must be checked to assure compliance with minimum hardware fault tolerance (HFT) requirements.

The following documents are a mandatory part of certification:

Assessment Report: AVC 21/05-173 R006 V1R1 (or later)

Safety Manual: SM-SVRS-DRG-001 R0

Solenoid Valves –
Series R440E and
R442E



80 N Main St
Sellersville, PA 18960