

Prüfstelle für energietechnische Einrichtungen

**Investigation of suitability
 of solenoid control valves with safety function
 for usage in defined safety integrity levels according to IEC 61508**

Manufacturer/Contractor Eugen Seitz AG
 Spitalstrasse 204
 8623 Wetzikon 3, Switzerland

Type designation UV 0532 ..., see type list Annex 1 of report V 40 2004 S1

Test item solenoid control valve with safety function

Maximum working pressure 10 bar

Possible temperature range Low Demand: ambient -25°C bis +65°C
 High Demand ambient: -10°C bis +65°C
 presumptions frequency distribution see V 40 2004 S1

Work energy electric current, see type sheets

Flow medium clean and dry compressed air (instrument air) in accordance to the mounting and operation instructions

Test results:

In the opinion of the Test Centre the valves are suitable for installation in safety related systems as a single safety related system according to IEC 61511 up to SIL 2 if used in a structure hardware fault tolerance HFT=0; if used in a structure hardware fault tolerance HFT=1 the valves are suitable up to SIL 3. They are suitable for a single safety related subsystem according to IEC 61508 up to and including SIL 4.

Probability of Failure on Demand	PFD	7,00E-06	
Confidence level	1- α	90	
Safe failure fraction	SFF	99 %	
Hardware fault tolerance	HFT	0	
Diagnostic coverage	DC	0 %	
Type of sub system acc.IEC 61508-2, 7.4.3.1.2		type B	
Derived values:			
Assumed demands per year		10	
Demand/hour	F _{np}	1,14E-03	
Dangerous failure rate	λ_D	7,99E-09 1/h	7,99 FIT
MTBF dangerous failures	MTBF D	1,25E+08 h	14286 y
Safe failure rate	λ_S	7,91E-07	791,10 FIT
Total failure rate	$\lambda_S + \lambda_D$	7,99E-07	799,09 FIT
MTBF total		1251429 h	143 y
Dangerous undetected	λ_{DU}	7,99E-09	
Safe undetected	λ_{SU}	7,91E-07	

Remarks:

These figures apply for such applications with a demand rate of an average of 1 to 10/year. The suitability for high demand mode applications can be calculated according to annex 2 based on the particular demand rate. The definitions low and/or high demand mode in IEC 61508 are deployed here accordingly, as the demand rate (frequency of operation) and the number of operating hours during the period of application have, as a result of the design, a negligible influence on the probability of failure within the normal field of application.

The statement is valid for a period of operation of 5 years plus a maximum of 1.5 years storage time before being used for the first time.

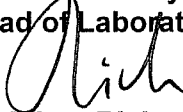
Only the valves stated above are deemed to be the subject of this investigation. As a rule in safety related systems (E/E/PE safety related systems in accordance with IEC 61508) these represent an actuator.

After expiry of the above mentioned periods of time the valves may not be used in safety related applications.

These statements are bound to the proven and verified deployment of a safety-related quality management of the manufacturer. The validity of the test report is limited to a period of 5 years until 09/2013.

Cologne, 2008-09-26

**Test Laboratory for Energy Appliances
 Head of Laboratory**


Dipl.-Ing. Rick

TÜV Rheinland Group

Anhang 1 Typenliste

Ventil

Valve

Typ Type	DN	Funktion Function	Anschluss Connection
UV 0532 UGD	5	3/2 universal	G 1/4
UV 0532 UGD / 20			G 1/4
UV 0532 UTD	5	3/2 universal	NPT 1/4
UV 0532 UTD / 20			NPT 1/4
UV 0532 UND	5	3/2 NC	NAMUR und G 1/4
UV 0532 UND / 20			NAMUR and G 1/4
UV 0532 USD	5	3/2 NC	NAMUR und NPT 1/4
UV 0532 USD / 20			NAMUR and NPT 1/4
UV 0532 UPD	5	3/2 NC	NAMUR und G 1/4 mit Druckanschluss auf NAMUR Flansch
UV 0532 UPD / 20			NAMUR and G 1/4 with pressure port on NAMUR interface
UV 0532 URD	5	3/2 NC	NAMUR und NPT 1/4 mit Druckanschluss auf NAMUR Flansch
UV 0532 URD / 20			NAMUR and NPT 1/4 with pressure port on NAMUR interface
UV 0532 UFD	5	3/2 universal	Flansch
UV 0532 UFD / 20			Flange
UV 0532 ULD	5	3/2 universal	NAMUR - Laterne
UV 0532 ULD / 20			NAMUR - lantern

Magnetspule

Solenoid

Typ Type	Zündschutzart Type of protection	Leistung Rated power	Spannung Rated Voltage
2A52	EEx em II, IP 65	3,5 W	6 V DC ... 250 V DC
2A53	EEx em II, IP 65	3,5 W	6 V DC ... 125 V DC
2A54	EEx em II, IP 65	3,5 W	6 V DC ... 250 V DC
2A55	EEx em II, IP 65	3,5 W	6 V DC ... 125 V DC
2F52	EEx em II, IP 65	3,5 W / VA	12 V AC / DC ... 250 V AC / DC
2F53	EEx em II, IP 65	3,5 W / VA	12 V AC / DC ... 125 V AC / DC
2F54	EEx em II, IP 65	3,5 W / VA	12 V AC / DC ... 250 V AC / DC
2F55	EEx em II, IP 65	3,5 W / VA	12 V AC / DC ... 125 V AC / DC
2A65	EEx d IIC, IP 65	2,5 W	6 V DC ... 400 V DC
2A66	EEx d IIC, IP 65	2,5 W	6 V DC ... 400 V DC
2A67	EEx d IIC, IP 65	2,5 W	6 V DC ... 400 V DC
2F65	EEx d IIC, IP 65	2,5 W / VA	6 V AC / DC ... 400 V AC / DC
2F66	EEx d IIC, IP 65	2,5 W / VA	6 V AC / DC ... 400 V AC / DC
2F67	EEx d IIC, IP 65	2,5 W / VA	6 V AC / DC ... 400 V AC / DC