

**Tests on Earthquake actuated
Gas Shut-off Devices
for SLP Electronic**

TÜV-Report 184/9136929/00

November 2004

Tests on Earthquake actuated Gas Shut-off Devices for SLP Electronic

Contractor: SLP ELECTRONIC GbR
Borghagener Str. 145
44581 Castrop-Rauxel
Germany

Date of Contract: 2004-08-30

TÜV Contract No.: 9136929

Report No.: 184/9136929/00

Expert. Dr.-Ing. Burkhard Switański

Date: 2004-11-12

Pages: 41

Appendices: 8

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1 Summary

Tests were carried out on two types of earthquake actuated automatic gas shut-off devices produced by SLP ELECTRONIC connected to different valve types produced by DUNGS according to the Turkish standard TS 12884 (Nisan 2002), clauses 1.3.3.1 (Reaction to Seismic Movement) and 1.3.3.2 (Continuous Operation Test).

The Conditions of Acceptance according TS 12884 were fulfilled.

2 Documents

2.1 Standard

TS 12884 (Nisan 2002): Gaz Kezme Cihazlari – Otomatik – Sismik Hareketi Algilayan

2.2 Protocols

Protocol about product place inspection, signed on behalf of TSE Committee, SLP and RTG (2004-10-29) (Appendix 1).

Test protocol signed on behalf of TSE Committee, SLP and BAM (2004-10-28) (Appendix 2).

3 Test Specimen

- Components TAD EQm with LCD – hereafter called Type TAD -

- TAD1: Ser. No. 04.43/TAD EQm1
- TAD2: Ser. No. 04.43/TAD EQm2
- TAD3: Ser. No. 04.43/TAD EQm3

- Components TBD EMS with LCD, TB EQm, TB PS – hereafter called Type TB -

- TB1: Ser. No. 04.43/TB EQm1
- TB2: Ser. No. 04.43/TB EQm1
- TB3: Ser. No. 04.43/TB EQm1

combined with valves (DUNGS)

- SV-D 505 ½", Ser. No. 1PDK240321S00000945
- SV-D 505 ½", Ser. No. 1PDK24032100000850
- SV-DLE 505 ½", Ser. No. 1PDK240334S00000188
- SV 520 2", Ser. No. 1PDK240318S000000004
- SV-DLE 520 2", Ser. No. 1PDK24035S000000027
- SV-DLE 520 2", Ser. No. 1PDK24045S000000027
- SV-DLE 520 2", Ser. No. 1PDK24045S000000083

4 Test Setup

Test setup realized at the laboratories of Bundesanstalt für Materialforschung und –prüfung (BAM), Unter den Eichen 87, 12205 Berlin, Germany (Federal Institute of Material Sciences and Material Testing).

Specification of machinery, sensors and control devices see appendix 3

Test specimen were mounted on an inclinable table mounted to the hydraulic cylinder (appendix 4).

5 Tests

Date of testing: 2004-10-27 and 2004-10-28

Test supervision: Dr.-Ing. Burkhard Switański

Test performance: Dipl.-Ing. Kay von Oppel (BAM)

Test Series

(1) acc. TS 12884 clause 1.3.3.1

Specimen TA1 to TA3, TB1 to TB3

Temperature –18°C and + 51,5°C

Inclination 0°, 45°, 90°, 135°

Accelerations and periods acc. TS 12884, sine wave

(2) acc. TS 12884 clause 1.3.3.2

Specimen TAD3 and TB2

Temperature 18,3 ... 23,9°C

Inclination 0°

Acceleration 3,05 ... 3,25 m/s², period 0,20 s

6 Test Results

Copies of the original test protocols are included in appendix 5

A graphic evaluation of test results is shown in fig. 1 to 9.

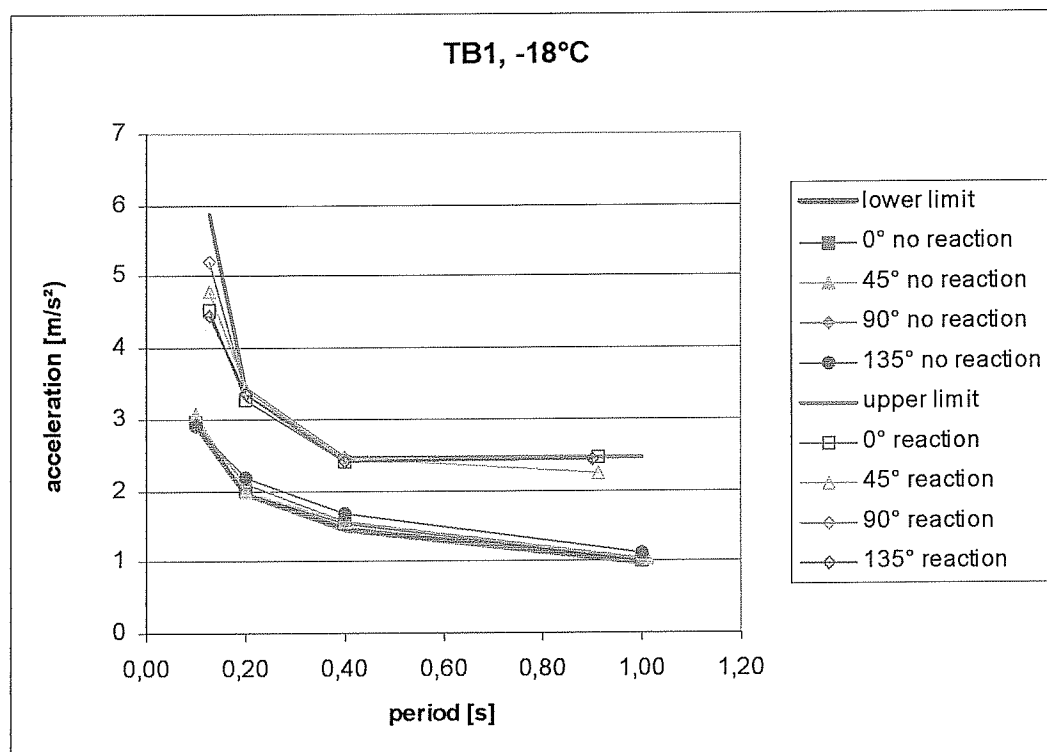


Fig. 1: Results for test specimen TB1 at -18°C

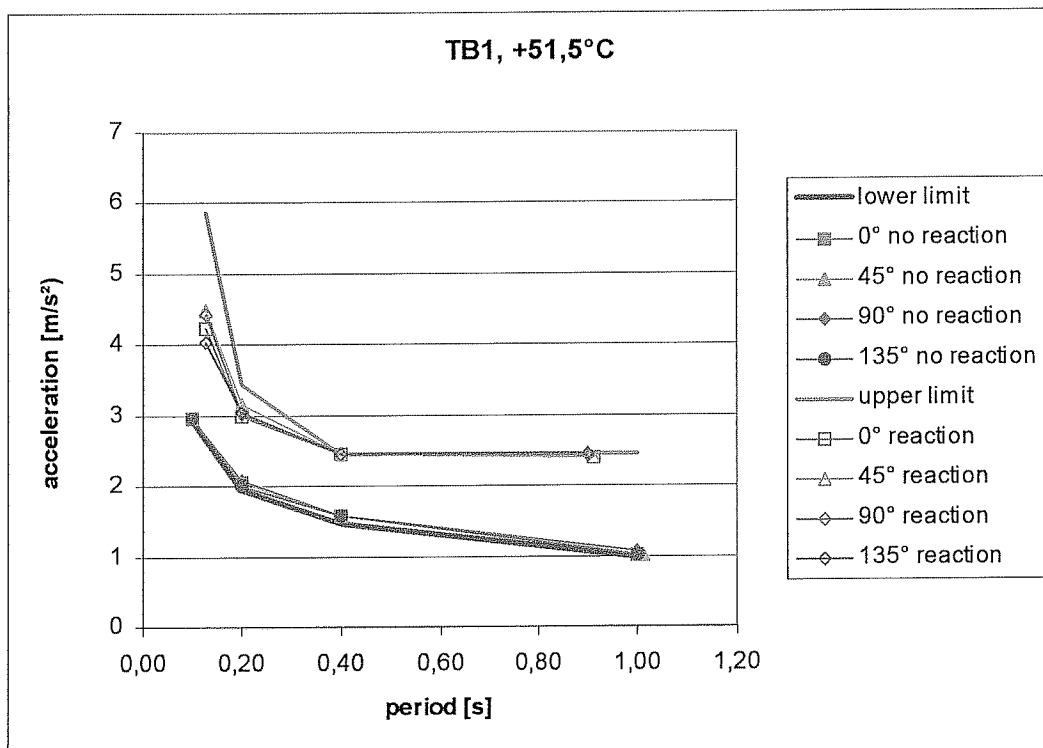


Fig. 2: Results for test specimen TB1 at +51,5°C

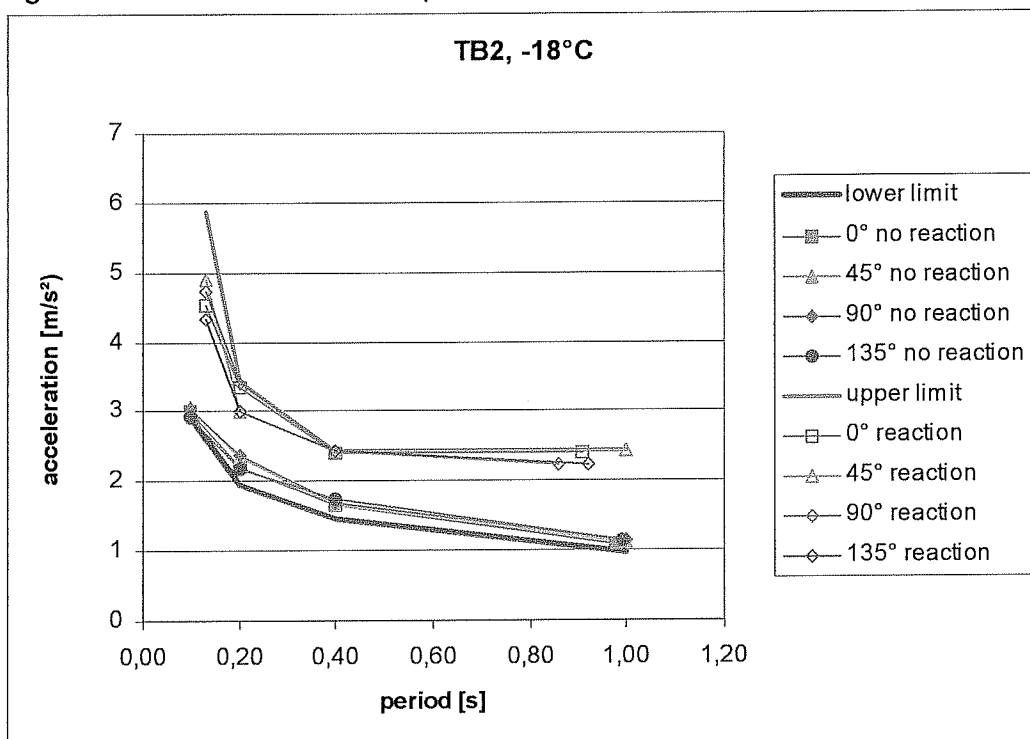


Fig. 3: Results for test specimen TB2 at -18°C

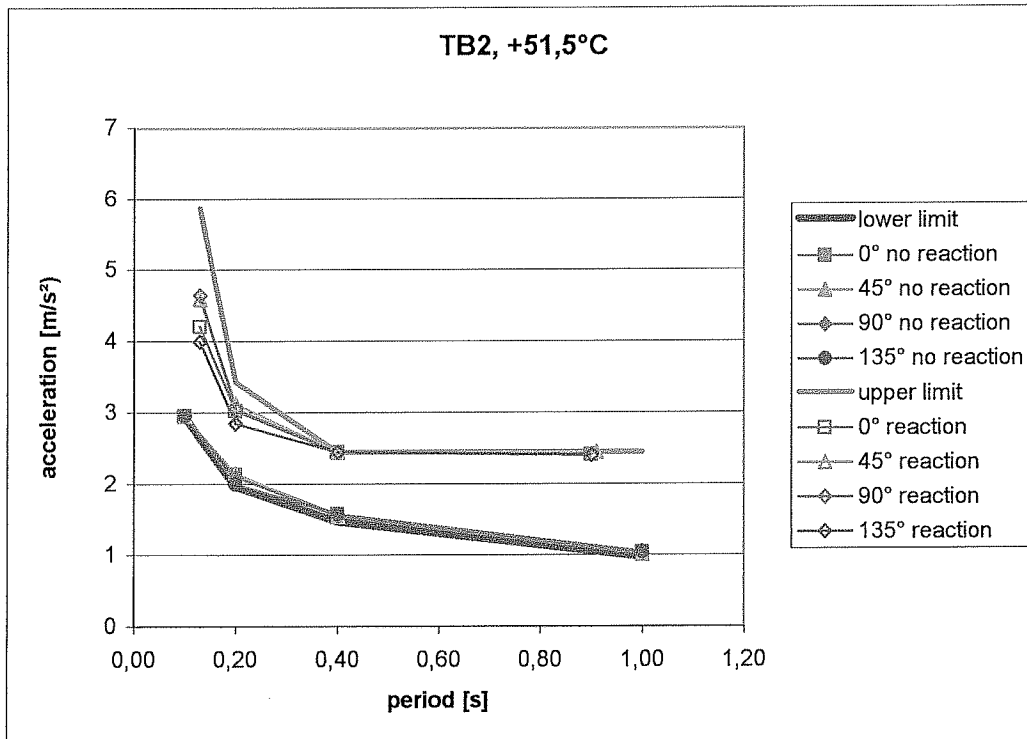


Fig. 4: Results for test specimen TB2 at +51,5°C

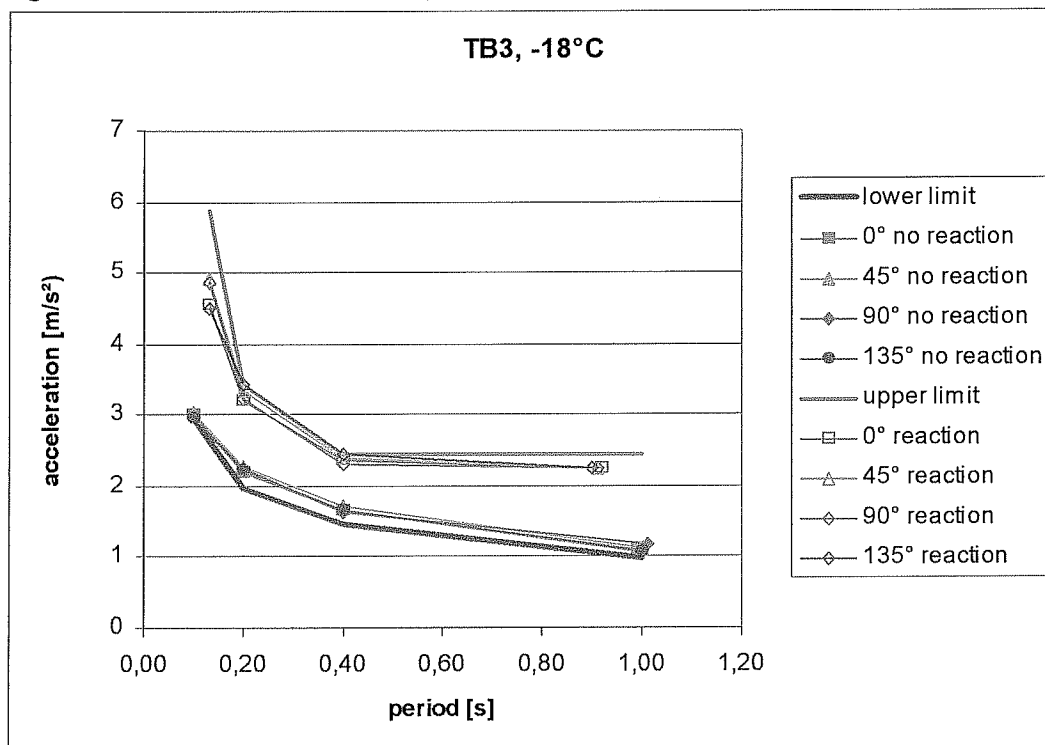


Fig. 5: Results for test specimen TB3 at -18°C

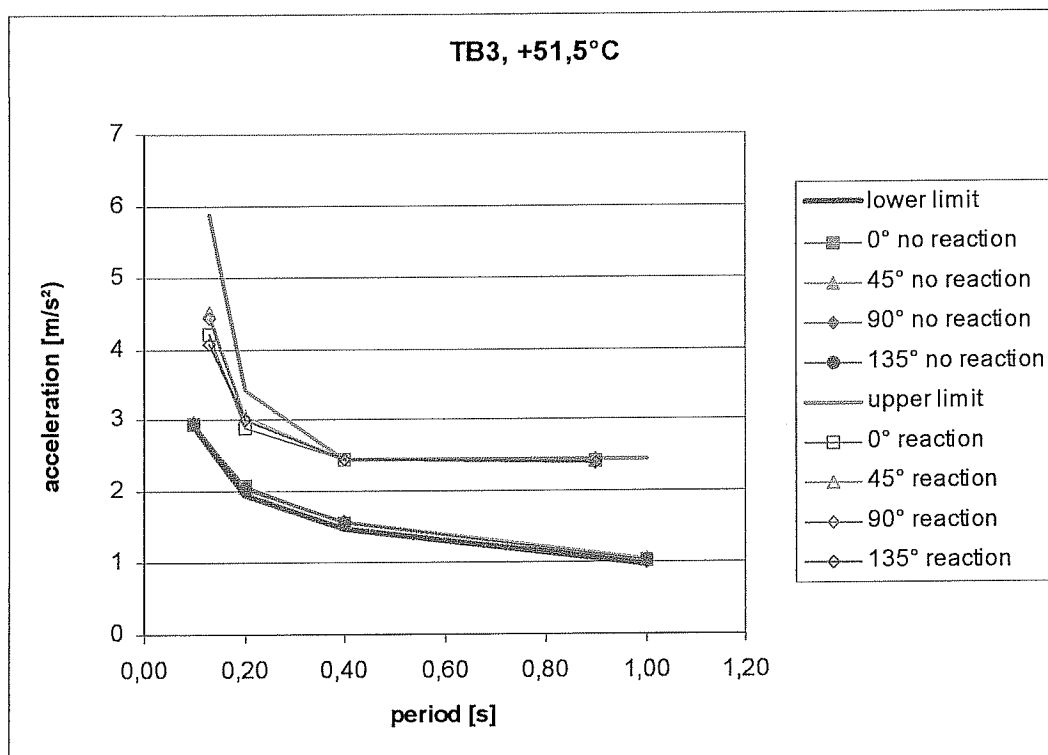


Fig. 6: Results for test specimen TB3 at +51,5°C

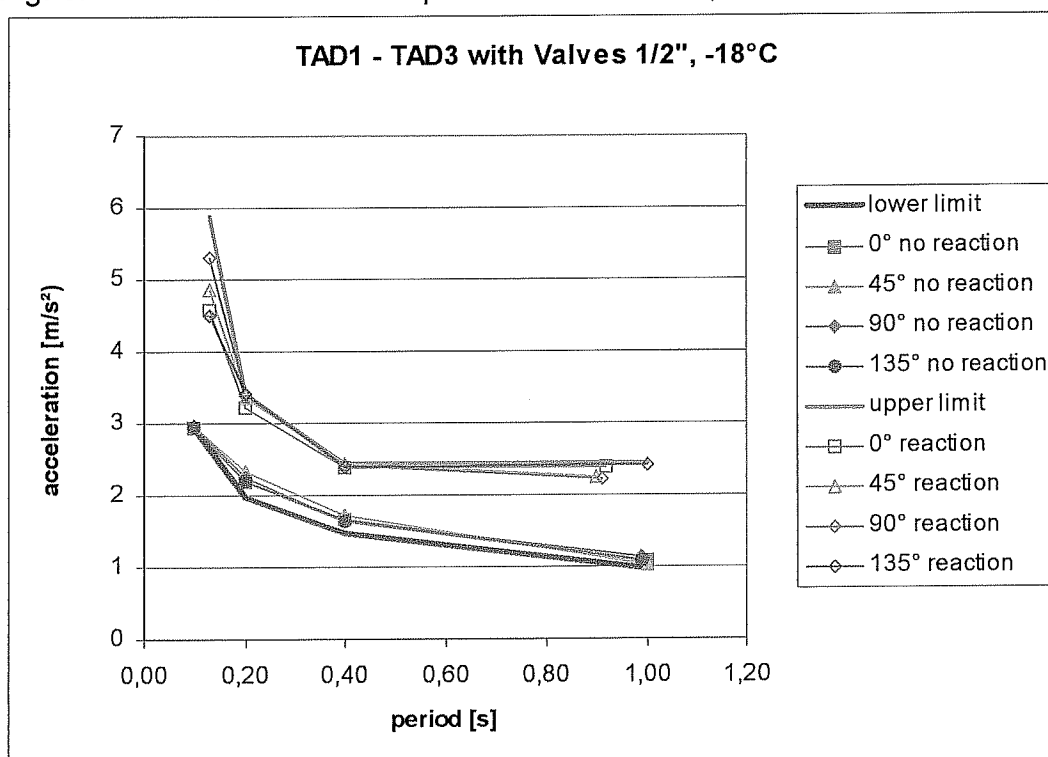


Fig. 7: Results for test specimen TAD1 – TAD3 with valves 1/2" at -18°C

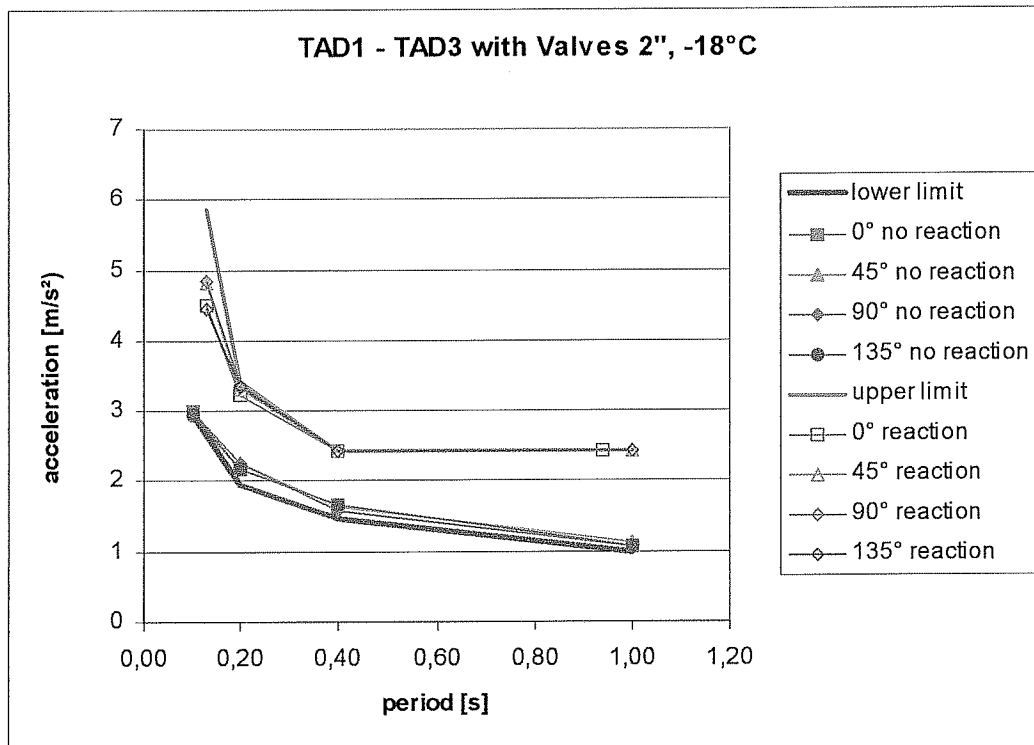


Fig. 7: Results for test specimen TAD1 – TAD3 with valves 2" at –18°C

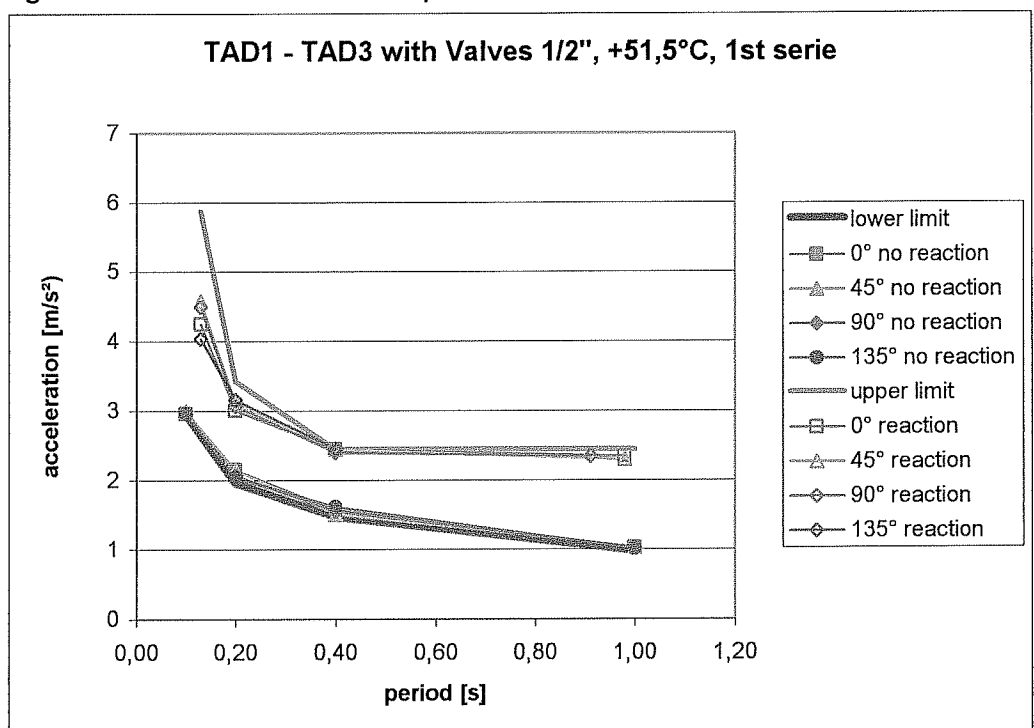


Fig. 8: Results for test specimen TAD1 – TAD3 with valves 1/2" at +51,5°C, 1st series

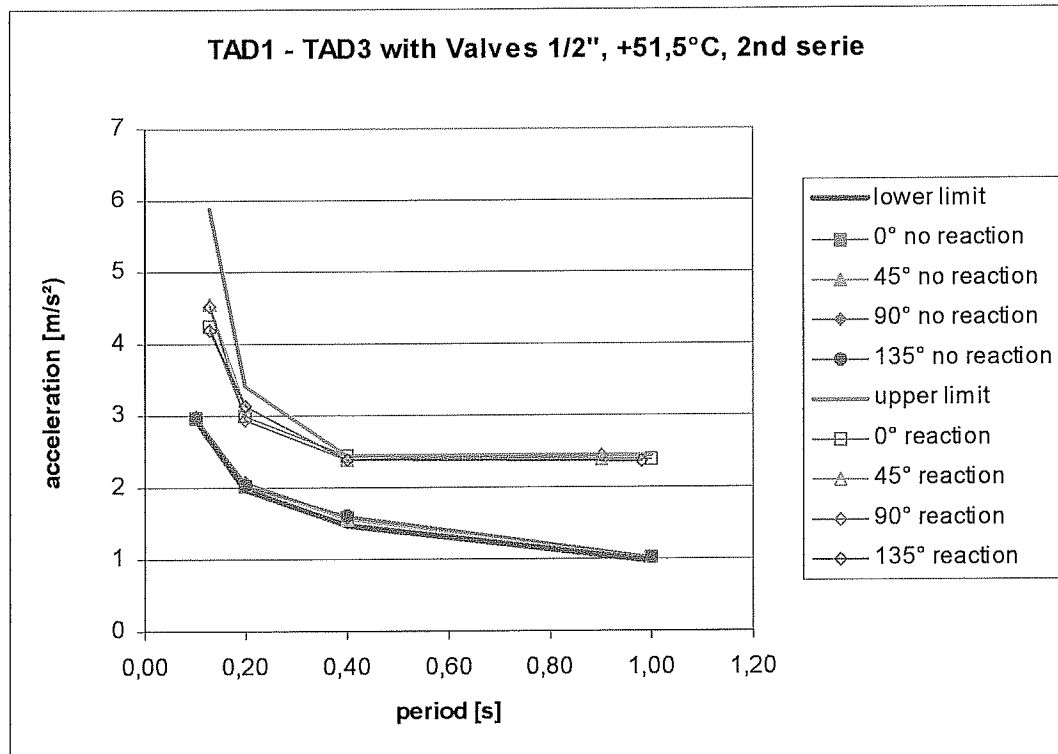


Fig. 9: Results for test specimen TAD1 – TAD3 with valves 1/2" at +51,5°C, 2nd series

The continuous operation tests showed 50 reactions for both specimen.

7 Conclusion

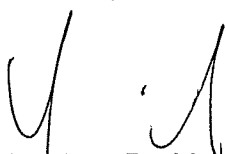
The requirements of TS 12884, clauses 1.3.3.1 and 1.3.3.2 were fulfilled.

Tests as defined by TS 12884, clauses 1.3.2.1.1 to 1.3.2.1.8 refer to the valves. The producer DUNGS has an EC type examination certificates (product identification no. CE-0085BM0332 issued by DVGW, appendix 6, and certificate no. BAF.MUC 01 09 112765 001 issued by TÜV CERT, appendix 7) which certify that the valves used for the tests as described above fulfill the requirements of DIN EN 161.

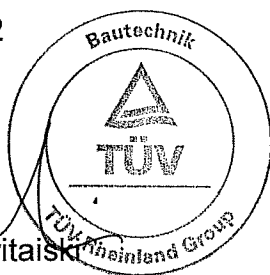
The DUNGS safety solenoid valves (type SV...) fulfil in consequence all the requirements of TS 12884, clauses 1.2.2.1.1 to 1.3.2.1.8. The representatives of TSE Committee declared on 2004-10-25 during their visit to TÜV Rheinland Group in Cologne, that a renewed check of the valves will not be necessary if TÜV declares that earlier certified tests fulfil the requirements of TS 12884.

Clauses 1.3.2.1.1 to 1.3.2.1.3 and 1.3.1.5 to 1.3.2.1.8 are covered by DIN EN 161. The tests according clause 1.3.2.1.4 (impact test) were carried out at Underwriters Laboratories in March 2003 (appendix 8) at severe temperature conditions (-40°C) showing that three test specimen had no damage after the test, two specimen showed damages but no opening of the enclosure. The representatives of TSE Committee declared on 2004-10-27 during the tests at BAM in Berlin that the requirements of clause 1.3.2.1.4 would be covered by these tests.

Cologne, 2004-11-12
The Expert



Dr. Ing. Burkhard Switański



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**Addendum to
TÜV-Report 184/9136929/00**

January 2005

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Date: 2005-01-20

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App. 1	CE Certificate BAF.MUC 01 09 112765 001
App. 2	CE Certificate CE-0085BM0332
App. 3	Protocol of Impact Test
App. 4	Protocol of Internal/External Leakage

1 Scope

As stated in the protocol dated 2004-29-10 by the TSE Committee further tests on the earthquake actuated automatic gas shut-off devices produced by SLP ELECTRONIC connected to different valve types produced by DUNGS must be performed according to the Turkish standard TS 12884 (Nisan 2002). For clauses in TS12884, which are fulfilled by tests based on the European standard EN 161 the requirements of both standards have to be compared.

2 Documents

2.1 Standards

TS 12884 (Nisan 2002): Gaz Kezme Cihazlari – Otomatik – Sismik Hareketi Algilayan

EN 161:2001: Automatic shut-off valves for gas burners and gas appliances.

2.2 Protocols

Protocol about product place inspection, signed on behalf of TSE Committee, SLP and RTG (2004-10-29) (Appendix 1).

3 Tests to be performed

The tests acc. TS 12884 whose realization has to proven are

Static pressure test (clause 1.3.2.1.1)

Moment test (clause 1.3.2.1.2)

Bending test (clause 1.3.2.1.3)

Impact test (clause 1.3.2.1.4)

External leakage test (clause 1.3.2.1.5)

Internal leakage test (clause 1.3.2.1.6)

Capacity test (clause 1.3.2.1.7)

Shut-off test at full capacity (1.3.2.1.8)

The tests acc. to clauses 1.3.3.1 and 1.3.3.2 are already done, reported and accepted by TSE committee.

3.1 Static Pressure Test

Acc. to TS 12884 clause 1.3.2.1.1) this test must be performed at a temperature of 25°C +/- 5,5°C. The pressure must be increased slowly to 5 times the maximum operating pressure and be held for 1 minute. The test specimen must not show any cracks and mechanical deformations.

EN 161 states in clauses 6.1 and 6.2 that valves must be save with regard to construction and operation. This condition fulfils the requirements of the document 90/396/EEC which is a legal document in the European Free Trade Zone (includes Turkey).

The supplier of the valves proves the fulfilment of EN 161 by the certificate of TÜV Süddeutschland (2003-06-23) (appendix 1).

3.2 Moment Test

Acc. to TS 12884 clause 1.3.2.1.2 this test must be performed at a temperature of 25°C +/- 5,5°C. Minimum torque moments are 42,4 Nm (1/2") and 134,5 Nm (2"). Inner and outer leakage are limited to 200 cm³/h.

EN 161 clause 7.9 gives minimal torque moments of 50 Nm (15 mm) and 250 Nm (50 mm) and an inner and outer leakage limit of 40 cm³/h (15 mm) and 60 cm³/h (50 mm). The test temperature is defined as 20°C +/- 5°C.

The demands of EN 161 are sharper than those of TS 12884.

The supplier of the valves proves the fulfilment of EN 161 by the certificate of TÜV Süddeutschland (2003-06-23) (appendix 1).

3.3 Bending Test

Acc. to TS 12884 clause 1.3.2.1.3 this test must be performed at a temperature of 25°C +/- 5,5°C. Minimum bending moments are 89 Nm (1/2") and 200 Nm (2"). Inner and outer leakage are limited to 200 cm³/h.

EN 161 clause 7.9 gives minimal bending moments of 105 Nm (15 mm) and 1100 Nm (50 mm) and an inner and outer leakage limit of 40 cm³/h (15 mm) and 60 cm³/h (50 mm) for class 2 valves. The test temperature is defined as 20°C +/- 5°C.

The demands of EN 161 are sharper than those of TS 12884.

The supplier of the valves proves the fulfilment of EN 161 by the certificate of TÜV Süddeutschland (2003-06-23) (appendix 1) and EC type examination certificate CE 0085 (appendix 2).

3.4 Impact Test

The impact test according TS 12884 clause 1.3.2.1.4 was performed by the manufacturer and is certified by this document. 8 valves were tested, no cracks were detected (appendix 3)

3.5 External Leakage Test

The external leakage test according TS 12884 clause 1.3.2.1.5 was performed by the manufacturer and is certified by this document. 8 valves were tested (valves used in seismic tests and new valves). The requirements of TS 12884 were fulfilled (appendix 4).

3.6 Internal Leakage Test

The internal leakage test according TS 12884 clause 1.3.2.1.6 was performed by the manufacturer and is certified by this document. 8 valves were tested (valves used in seismic tests and new valves). The requirements of TS 12884 were fulfilled (appendix 4).

3.7 Capacity Test

Acc. to TS 12884 clause 1.3.2.1.7 this test must be performed at a temperature of 25°C +/- 5,5°C. The pressure loss is defined as 10 % for an input pressure of 25 % of the maximum operating pressure (249 resp. 747 Pa for 3,5 kPa maximum operating pressure).

EN 161 clause 7.10 states that the throughput must be at a minimum of 95 % of the nominal throughput. Throughput must be limited by constructive measures to a maximum of 110 % nominal throughput. Characteristics must be tested using a device which is equivalent to TS 12884 fig. 2. The test temperature is defined as 20°C +/- 5°C.

The demands of EN 161 are sharper than those of TS 12884.

The supplier of the valves proves the fulfilment of EN 161 by the certificate of TÜV Süddeutschland (2003-06-23) (appendix 1).

3.8 Shut-off Test at Full Capacity

TS 12884 states that the device must totally close at seismic impacts.

This demand was proven by the tests performed at BAM and are already reported.

Further EN 161 clause 8.3 demands for a total closure when current is 15 % of the nominal current. This sharpens the demands of TS 12884.

The supplier of the valves proves the fulfilment of TS 12884 by the report 184/9136929 of TÜV Industrie Service and of EN 161 by the certificate of TÜV Süddeutschland (2003-06-23) (appendix 1).

4 Remark

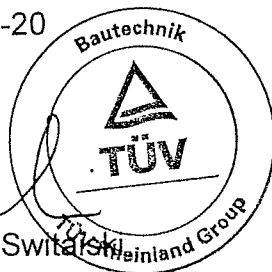
Since certificates on EC Type examination do not include specific test results these documents are not available to the manufacturer. The testing institute however guarantees by the certificate that all demands of the standards werde fulfilled.

Cologne, 2005-01-20

The expert

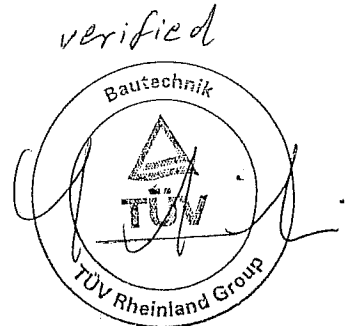


Dr.-Ing. Burkhard Switala





ZERTIFIKAT Certificate



EG-Baumusterprüfung (Modul B) nach Richtlinie 97/23/EG
EC Type-examination (Module B) according to Directive 97/23/EC

Dr. Switalski

20. Jan. 05

Zertifikat-Nr.: BAF-MUC 01 09 112765 001
Certificate No.: Revision 02

**Name und Anschrift
des Herstellers:**

Name and Postal Address of Manufacturer:

Karl Dungs GmbH & Co.KG
Siemensstraße 6 - 10
D - 73660 Urbach

Hiermit wird bescheinigt, daß das unten genannte EG-Baumuster die Anforderungen der Richtlinie 97/23/EG erfüllt.

We herewith certify that the type mentioned below meets the requirements of the Directive 97/23/EC.

Produktart
product category

Automatisches Absperrventil für Gasbrenner
und Gasgeräte

Typ, Ausführung
type, model

SV,
Ausführungen siehe Seite 2

Prüfgrundlage
basis of examination

DIN EN 161 : 2002-06, DIN EN 13611 : 2000-12,
Grundlegende Sicherheitsanforderungen gemäß Anhang I

Prüfbericht Nr.
test report No

STE 2561 vom 2001-09-17, V-A 1025-00/02 vom 2002-06-18,
V-A 1025-01/03 vom 2003-04-08 und V-A 1025-02/03 vom 2003-06-23,
TÜV Süddeutschland Bau und Betrieb

Fertigungsstätte
manufacturing plant

- 1) Karl Dungs GmbH & Co., D - 73660 Urbach
- 2) Karl Dungs A/S, DK - 8722 Hedensted

(Ort, Datum)

München, 2003-06-23

Ersatz für Ausgabe [2002-06-18]

TÜV Süddeutschland
Bau und Betrieb GmbH
TÜV-CERT-Zertifizierungsstelle
für Druckgeräte

Benannte Stelle, Kennnummer 0036

Bitte beachten Sie die umseitigen Hinweise.

TÜV Süddeutschland
Bau und Betrieb GmbH
Westendstraße 199
80686 München

Tel.: (089) 51 90 - 10 27
Fax: (089) 51 90 - 33 07
E-Mail: feuerung@tuev-sued.de

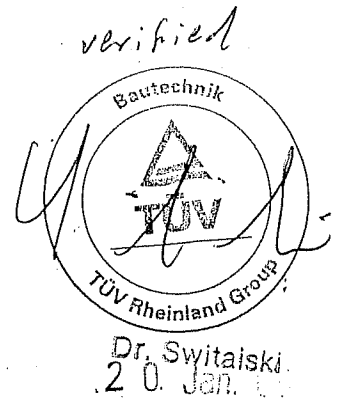
Mitglied der
CONFÉDÉRATION EUROPÉENNE



D'ORGANISMES DE CONTROLE

Das Zertifikat gilt für folgende Ausführungen:

Ausführungen	Funktion	Anschluß (Standard)
SV 505, SV 507, SV 510, SV 512, SV 515, SV 515 BG3, SV 520	schnell öffnend, schnell schließend	Rp ½, Rp ¾, Rp 1, Rp1 ¼, Rp 1 ½, Rp 1 ½, Rp 2
SV-D 505, SV-D 507, SV-D 510, SV-D 512, SV-D 515, SV-D 515 BG3, SV-D 520	schnell öffnend, schnell schließend, mit manueller Begrenzung der durchfließenden Gasmenge durch Mengeneinstellung	Rp ½, Rp ¾, Rp 1, Rp1 ¼, Rp 1 ½, Rp 1 ½, Rp 2
SV-DLE 505, SV-DLE 507, SV-DLE 510, SV-DLE 512, SV-DLE 515, SV-DLE 515 BG3, SV-DLE 520	langsam öffnend (Herstellerangabe: ca. 20 s), schnell schließend, mit einstellbarem Schnellhub und manueller Begrenzung der durch- fließenden Gasmenge durch Men- geneinstellung	Rp ½, Rp ¾, Rp 1, Rp1 ¼, Rp 1 ½, Rp 1 ½, Rp 2



C € 0085



EG-Baumusterprüfbescheinigung

EC type examination certificate

CE-0085BM0332

 Produkt-Identnummer
 product identification no.

Anwendungsbereich
field of application

 EG-Gasgeräte-richtlinie (90/396/EWG)
 EC Gas Appliance Directive (90/396/EEC)

Zertifikatinhaber
owner of certificate

 Karl Dungs GmbH & Co.
 Siemensstr. 6-10, D-73660 Urbach

Vertreiber
distributor

 Karl Dungs GmbH & Co.
 Siemensstr. 6-10, D-73660 Urbach

Produktart
product category

 Ausrüstungsteile für Gasgeräte: Absperrventil, automatisch ohne
 Regelfunktion (4128)

Produktbezeichnung
product description

Automatisches Absperrventil, spannungslos geschlossen

Modell
model

SV ...

Bestimmungsländer
countries of destination

AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IS, IT, LU, NL, NO, PT, SE

Prüfberichte
test reports

BMP: STE 2560 vom 06.09.2001 (TSG)

Prüfgrundlagen
basis of type examination

 DIN EN 161 (01.08.1996)
 DIN EN 161/A2 (01.01.1998)
 DIN EN 13611 (01.12.2000)
 DIN EN 161 (Entwurf 01.11.1998)

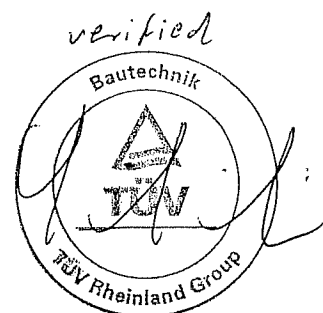
Aktenzeichen
file number

01-0992-GEE

30.10.2001 File A-1/2

 Datum, Bearbeiter, Blatt, Leiter der Zertifizierungsstelle
 date, issued by, sheet, head of certification body

 DVGW-Zertifizierungsstelle - von der Deutschen Bundesregierung benannte und
 von der Europäischen Kommission offiziell registrierte Stelle für die
 Konformitätsbewertung von Gasgeräten

 DVGW Certification Body - notified by the government of the Federal Republic of
 Germany and officially registered by the European Commission for conformity
 assessment of gas appliances


Dr. Switalski

20. Jan. 05


 DVGW Deutsche Vereinigung
 des Gas- und Wasserfaches e.V.
 Technisch-wissenschaftlicher
 Verein

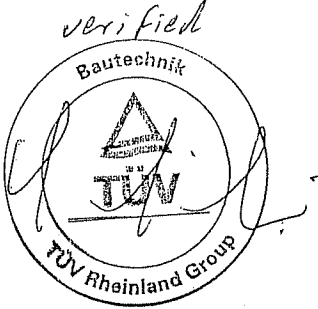
Zertifizierungsstelle

 Josef-Wirmer-Straße 1-3
 D-53123 Bonn

 Telefon +49 (228) 91 88 807
 Telefax +49 (228) 91 88 993

Elektrische Daten: 230 V AC, 50-60 Hz, P = 25 VA, IP65
electrical data

Gasart <i>gas category</i>	Bemerkung <i>remarks</i>
Brenngase der 1., 2. und 3. Gasfamilie	

Typ <i>type</i>	Technische Daten <i>technical data</i>	Bemerkungen <i>remarks</i>
SV...505	Nennweite: DN 15 Ventilgruppe: 2 Ventilklasse: A max. Betriebsdruck: 500 mbar	 Dr. Switalski 20. Jan. 05
SV...507	Nennweite: DN 20 Ventilgruppe: 2 Ventilklasse: A max. Betriebsdruck: 500 mbar	
SV...510	Nennweite: DN 25 Ventilgruppe: 2 Ventilklasse: A max. Betriebsdruck: 500 mbar	
SV...512	Nennweite: DN 32 Ventilgruppe: 2 Ventilklasse: A max. Betriebsdruck: 500 mbar	

Ausführungsvariante <i>type variation</i>	Erläuterungen <i>explanations</i>
SV...	schnell öffnend und schnell schließend
SV-D...	schnell öffnend und schnell schließend, mit manueller Begrenzung der durchfließenden Gasmenge durch Mengeneinstellung
SV-DLE...	langsam öffnend und schnell schließend, mit einstellbarem Schnellhub und manueller Begrenzung der durchfließenden Gasmenge durch Mengeneinstellung

Verwendungshinweise / Bemerkungen

hints of utilization / remarks

Zul. Umgebungstemperaturbereich: -15...+60 °C
 Antrieb: elektromagnetisch
 Einbaulage: Magnet senkrecht nach oben bis waagrecht
 Anschlussart: beiderseitig Innengewinde Rp 1/2 bis Rp 1 1/4 nach DIN 2999-1