



REPORT

on Testing a Double Stage Regulator for Burn Out Safety to Gaseous Oxygen Pressure Shocks

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BAM reference	15030072 III
Copy	1 st copy of 2 copies
Customer	ESAB India Ltd. Equipment Division P-41, Taratala Road Kolkata-700 088 India
Order date	June 3, 2015
Receipt of order	June 5, 2015
Test samples	Regulator DURA OXYGEN 10 according to assembly drawing no. 901 3050 126 of October 27, 2011; BAM-Order-No.: 2.1/52 706
Receipt of samples	August 21, 2015
Test date	August 31, 2015
Test location	Working Group "Safe Handling of Oxygen"; building 41, room 120
Test procedure according to	EN ISO 2503:2009, chapter 9.7.4 "Ignition test for pressure regulators and pressure regulators with flow-metering devices for oxygen" and German Code of Practice M 034e, Oxygen", edition 6/2010

All pressures are excess pressures.

This test report consists of page 1 to 4

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The German version is legally binding, except an English version is issued exclusively.

2015-06 / 2015-09-17

1 Documents and Samples

Three samples for a test pressure of 360 bar and one set of drawings listed in the following table were delivered to BAM:

Drawing No.	Revision	Date
9 01 3050 126, 2 pages	NR	27.10.2011
E 12907 A	NR	15.10.2011
E12886	NR	12.10.2011
74629	NR	07.11.2011
E 12911	NR	08.11.2011
901 3053 003	NR	22.10.2011

2 Testing for Burn-Out Safety

2.1 Test Procedure

The samples were tested according to EN ISO 2503:2009, chapter 9.7.4 "Ignition test for pressure regulators and pressure regulators with flow-metering devices for oxygen". A connecting tube with a length of 1000 mm and an inner-diameter of 5 mm was used between the sample and the quick opening valve by means of an adapter. By opening of the hydraulically-operated quick-opening valve the samples were exposed to oxygen pressure shocks. In the open position the outlet was closed with a blind plug.

Test Pressure:	360 bar
Oxygen Temperature:	60 °C
Pressure Rise Time (from atmospheric pressure to test pressure):	20 ms
Number of Pressure Shocks:	20
Interval Between Pressure Shocks:	30 s
Pressure Hold Time:	10 s

2.2 Check of Drawings

The dimensions of the parts in the above-listed drawings were compared with these drawings.

3 Test Results

3.1 Burn-Out Safety

All samples passed the test. Neither damage to the materials nor any reaction of the materials with oxygen could be observed.

3.2 Check of Drawings

In the note of drawing no. E12886 the material "DAIKIN M 400H SHORE HARDNESS 75-80°D" was deleted in accordance with the information of ESAB (e-mail of October 8, 2015).

More differences were not found.

4 Summary and Evaluation

On basis of the test results BAM has no objections, with regard to the burn-out safety to oxygen pressure shocks, to use the Regulator DURA OXYGEN 10 according to assembly drawing no. 901 3050 126 of October 27, 2011, for 360 bar oxygen working pressure and 60 °C oxygen temperature. According to the German Code of Practice M 034 and BAM's safety philosophy aluminium shall be used only up to an oxygen pressure of 10 bar. Therefore, the requirements concerning the burn-out safety are only fulfilled, if washer seals of aluminium are not used in the oxygen-wetted areas.

The drawings listed in section 1, marked by BAM, are part of this report.

This report expires at once, if the nonmetallic materials in the oxygen wetted area are exchanged for different ones that were not used in the samples tested.

Bundesanstalt für Materialforschung und -prüfung (BAM)

12200 Berlin

October 20, 2015

Division 2.1 „Gases, Gas Plants“

By order



Dipl.-Ing. Siegfried Lehné

Distribution list:	1 st	copy:	ESAB India, Ltd.
	2 nd	copy:	BAM – Division 2.1 “Gases, Gas Plants”



REPORT

on Testing a Double Stage Regulator for Burn Out Safety to Gaseous Oxygen Pressure Shocks

12200 Berlin, Germany
P: +49 30 8104-0
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BAM reference	15030072 IV
Copy	1 st copy of 2 copies
Customer	ESAB India Ltd. Equipment Division P-41, Taratala Road Kolkata-700 088 India
Order date	June 3, 2015
Receipt of order	June 5, 2015
Test samples	Regulator IOX 63B according to assembly drawing no. 901 3210 127 of November 5, 2011; BAM-Order-No.: 2.1/52 706
Receipt of samples	August 21, 2015
Test date	August 28, 2015
Test location	Working Group "Safe Handling of Oxygen"; building 41, room 120
Test procedure according to	EN ISO 2503:2009, chapter 9.7.4 "Ignition test for pressure regulators and pressure regulators with flow-metering devices for oxygen" and German Code of Practice M 034e, Oxygen", edition 6/2010

All pressures are excess pressures.

This test report consists of page 1 to 3

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2015-06 / 2015-09-17

1 Documents and Samples

Three samples for a test pressure of 360 bar and one set of drawings listed in the following table were delivered to BAM:

Drawing No.	Revision	Date
901 3210 127, 2 pages	NR	05.11.2011
E-12392A	NR	26.10.2011
74629	NR	07.11.2011
E-12448	NR	24.10.2011
E-11889	NR	24.10.2011

2 Testing for Burn-Out Safety

2.1 Test Procedure

The samples were tested according to EN ISO 2503:2009, chapter 9.7.4 ". Ignition test for pressure regulators and pressure regulators with flow-metering devices for oxygen". A connecting tube with a length of 1000 mm and an inner-diameter of 5 mm was used between the sample and the quick opening valve by means of an adapter. By opening of the hydraulically-operated quick-opening valve the samples were exposed to oxygen pressure shocks. In the open position the outlet was closed with a blind plug.

Test Pressure:	360 bar
Oxygen Temperature:	60 °C
Pressure Rise Time (from atmospheric pressure to test pressure):	20 ms
Number of Pressure Shocks:	20
Interval Between Pressure Shocks:	30 s
Pressure Hold Time:	10 s

2.2 Check of Drawings

The dimensions of the parts in the above-listed drawings were compared with these drawings.

3 Test Results

3.1 Burn-Out Safety

All samples passed the test. Neither damage to the materials nor any reaction of the materials with oxygen could be observed.

3.2 Check of Drawings

Differences were not found.

4 Summary and Evaluation

On basis of the test results BAM has no objections, with regard to the burn-out safety to oxygen pressure shocks, to use the Regulator IOX 63B according to assembly drawing no. 901 3210 127 of November 5, 2011, for 300 bar oxygen working pressure and 60 °C oxygen temperature. The requirements concerning the burn-out safety are fulfilled.

The drawings listed in section 1, marked by BAM, are part of this report.

This report expires at once, if the nonmetallic materials in the oxygen wetted area are exchanged for different ones that were not used in the samples tested.


Bundesanstalt für Materialforschung und -prüfung (BAM)

12200 Berlin

October 20, 2015

Division 2.1 „Gases, Gas Plants“

By order



Dipl.-Ing. Siegfried Lehné

Distribution list: 1st copy: ESAB India, Ltd.
2nd copy: BAM – Division 2.1 “Gases, Gas Plants”

Gas welding equipment

Certificate N°: BAM/ZBF/007/12

Hereby it is confirmed by the BAM Certification Body that the

Safety devices and quick-action couplings

with the designations itemized in the annex

of the certificate holder

ESAB Holdings Ltd.
322 High Holborn
WC1V 7PB London
United Kingdom

meet the requirements of those paragraphs named in the annex to this certificate of the following standards:

- | | |
|------------------------|--|
| DIN EN 730:2003 | „Gas welding equipment – Safety devices“
Part 1: Incorporating a flame (flashback) arrestor |
| DIN EN 561:2002 | Gas welding equipment – Quick-action coupling with shut-off valves for welding, cutting and allied processes |
| AS 4603-1999 | Flashback arresters – Safety devices for use with fuel gases and oxygen or compressed air |

The contract No. **BAM-ZBF-0039-2011-ESAB** forms the basis for this certification. The terms and conditions for monitoring of the products are also stipulated in this contract.

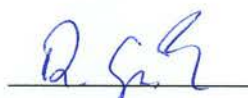
The products certified by BAM may be labelled with the BAM certification mark „BAM Geprüft und überwacht“ and/or “BAM Certified and under surveillance“ together with the certificate number.

The certificate is valid until 31 August 2018.

For BAM Bundesanstalt für Materialforschung und -prüfung
Unter den Eichen 87, 12205 Berlin, **2012-04-04**



Dr. R. Schmidt
BAM Certification Body



Dr. R. Grätz
Assessor

Distribution list: 1st Certificate holder 2nd BAM Certification Body

The BAM Certification Body has been accredited according to standard DIN EN 45011:1998 by the DGA mbH (Deutsche Gesellschaft für Akkreditierung mbH). The accreditation is valid for the scope given in certificate DGA-ZE-3998.00.

This certificate may only be published in full wording and without any additions. The revocable written consent shall be obtained from BAM beforehand for changed reproduction and excerpts. The German version is legally binding, except an English version is issued exclusively. Place of jurisdiction is Berlin.

Annex: Products of Company ESAB Holdings Ltd. within the scope of Certificate N° BAM/ZBF/007/2012 according to reference no. BZS-GS/129/11

1 Safety devices according to DIN EN 730-1:2003, Article 5 and 6

The safety devices listed in the following meet the requirements of Articles 5 and 6 of standard DIN EN 730-1:2003 for the respective flammable gases and maximum operating overpressures. In addition, each safety device shall be designated according to Article 9 of standard DIN EN 730-1:2003 and an operating instruction shall be added to each safety device according to Article 8 of standard DIN EN 730-1:2003.

Furthermore the listed safety devices comply with the Australian Standard AS 4603-1999.

Connections: DIN EN 560; ISO 3253 as well as country-specific connections

Construction series "100"

Construction series "100"	BAM Test report	max. operating overpressure (Mpa)							
		acetylene	propane	methane	MAPP	H ₂	plastics filter	oxygen stainless steel filter	without filter
FR	II-699 of 18.03.99; BZS-GS/41/06 of 10.07.06	0.15	0.50	0.50	0.50	0.35	1.50	2.50	2.50
FRT	10120/94; 4-5385 of 20.07.95; II-2877/95 of 28.07.95; BZS-GS/41/06 of 10.07.06 BZS-48/07 of 12.06.07	0.15	0.50	0.50	0.50	0.35	1.50	2.50	2.50
FRTC	II-613/2001; II-4121/2001; II-699/99; II-2012/2003; BZS-GS/41/06 of 10.07.06	0.15	0.50	0.50	0.50	0.35	1.50	2.00	2.00
FRDX3	2-253/2012 of 10.02.2012	0.15	0.50	0.50	0.50	0.30	1.50	-	2.50
FR1000		0.15	0.50	0.50	0.50	0.35	1.50	-	1.50



Construction series "200"

Construction series "200"	max. operating overpressure (Mpa)									
	BAM Test report	acetylene	propane	methane	MAPP	H ₂	plastics filter	oxygen stainless steel filter	without filter	
FTH	11212/91;	0.15	0.50	0.50	0.50	0.35	1.50	-	2.00	
FT	4-4595 of 20.02.1992;	0.15	0.50	0.50	0.50	0.35	1.50	-	2.00	
FTT	4-652/92 of 05.02.1992;	0.15	0.50	0.50	0.50	0.35	1.50	-	2.00	
FCH	BZS-GS/41/06 of 10.07.06	0.15	0.50	0.50	0.50	0.35	1.50	-	2.00	
FCT										

Construction series "300"

Construction series "300"	max. operating overpressure (Mpa)									
	BAM Test report	acetylene	propane	methane	MAPP	H ₂	plastics filter	oxygen stainless steel filter	without filter	
FR91	6420/98; II-5424 of 16.11.1998;	0.15	0.50	0.50	0.50	0.40	1.50	2.50	2.50	
FT91UA	BZS-GS/41/06 of 10.07.06	0.15	0.50	0.50	0.50	0.40	1.50	2.50	2.50	
FR91T	II-5190/98 of 16.10.1998; BZS-GS/41/06 of 10.07.06 BZS/48/07 of 12.06.07	0.15	0.50	0.50	0.50	0.40	1.50	2.50	2.50	



Construction series "300"	BAM Test report	max. operating overpressure (Mpa)							
		acetylene	propane	methane	MAPP	H ₂	plastics filter	oxygen stainless steel filter	without filter
FR2000	2-253/2012 of 10.02.2012	0.15	0.50	0.50	0.50	0.40	1.50	-	1.50
FRSX3	II-388/99 of 10.03.1999;	0.15	0.50	0.50	0.50	0.40	1.50	2.50	-
FRSX5	II-2012/2003 of 24.07.2003; BZS-GS/41/06	0.15	0.50	0.50	0.50	0.40	1.50	2.50	-
FRSX8	of 10.07.06	0.15	0.50	0.50	0.50	0.40	1.50	2.50	-
FRSX3N	II-388/99 of 10.03.1999;	0.15	0.50	0.50	0.50	0.40	1.50	2.50	-
FRSX5N	II-2012/2003 of 24.07.2003; BZS-GS/41/06	0.15	0.50	0.50	0.50	0.40	1.50	2.50	-
FRSX8N	of 10.07.06; BZS-GS/101/10 I,II-2107/2010 of 21.07.2010	0.15	0.50	0.50	0.50	0.40	1.50	2.50	-

Construction series "FRAX"

The devices of construction series "FRAX" are vacuum regulator valves, which, within the scope of this certificate, may only be put into circulation and applied in conjunction with one of the following safety devices, according to standard DIN EN 730-1:2003:

- 1) Safety devices of Company ESAB
 - with FRT with the designation FRAX10
 - with FR91T with the designation FRAX20

The safety devices FRT and FR91T have already been certified by BAM and form constituent parts of this certificate.

The vacuum regulator valve "FRAX" as single device has been successfully tested regarding flashback resistance based on standard DIN EN 730-2:2003, Article 5.7 up to the following maximum operating pressures:



BAM test report	max. operating overpressure (MPa)					
	acetylene	propane	methane	MAPP	O ₂	H ₂
BZS-63/05 (II-1090/05) of 12.07.05	0.15	0.5	0.5			0.35
BZS-48/07 of 12.06.07						

The maximum operating pressure of the combined devices vacuum regulator valve / safety device corresponds to the lowest maximum operating pressure of both single devices. The combination of both devices is flame transmission resistant according to standard DIN EN 730-1:2003 only up to this maximum operating pressure.

2 Quick-action couplings according to DIN EN 561:2002

The quick-action couplings meet the requirements of Articles 6 and 7 of standard DIN EN 561:2002 for the respective gases and maximum operating overpressures.

In addition, each quick-action coupling shall be designated according to Article 10 of standard DIN EN 561:2002.

Type	Design type tested	max. operating overpressure (MPa)		
		flammable gases	acetylene	oxygen
CHF	II-2271/2003	2.0	0.15	
CHO	II-2271/2003			2.0
CTF	II-2271/2003	2.0	0.15	
CTO	II-2271/2003			2.0
CRF	II-2271/2003	2.0	0.15	
CRO	II-2271/2003			2.0

Berlin, 4th April 2012

Place, Date

Signature (BAM Certification Body)





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ATTACHMENT TO LICENCE NO. CM/L- 5005742

<u>CML NO</u>	<u>NAME OF THE LICENSEE WITH ADDRESS</u>	<u>PRODUCT</u>	<u>IS NO</u>
5005742	Esab India Limited P-41, Taratalla Road, Kolkata-700088 West Bengal	Manual blow pipes for welding and cutting	IS 7653: 1975

ENDORSEMENT NO. 16

Dated : 21-03-2016

Renewed for a further period of two years from Sixteenth March Two Thousand and Sixteen to Fifteenth March Two Thousand and Eighteen.

Other terms and conditions of Licence remain the same.


(T. CHAKRABORTI)
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Web : http://www.bis.org.in

ATTACHMENT TO LICENCE NO. CM/L- 5006845

<u>CML NO</u>	<u>NAME OF THE LICENSEE WITH ADDRESS</u>	<u>PRODUCT</u>	<u>IS NO</u>
5006845	Esab India Limited P-41, Taratalla Road, Kolkata- 700088 West Bengal	Pressure regulators for gas cylinders used in welding, cutting and related processes	IS 6901: 2009

ENDORSEMENT NO. 18 Dated 01-03-2016

Renewed for a further period of two years from First March Two Thousand and Sixteen to Twenty Eighth February Two Thousand and Eighteen.

Other terms and conditions of Licence remain the same.

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