



Type : **BVA** (Pad wear indicator for disc brake)
Manufacturer : **WABCO GmbH**

Test report
No.: TUEH - TB 2008 - 163.00

In accordance with the Directive of the European Council
Relating to
Technical unit

BVA
(Pad wear indicator for disc brake)

98/91/EG dated **14.12.1998**

ECE-R 105
including amendment 02
and
Chapter 9.2.2 ADR 2007

Approval status			
directive	type	Approval number / Test Report	Marking of type
EEC	TEBS-D	e1*72/245*95/54*1206*00 (EMC approval)	e1 02 1206
EEC	TEBS-E	e1*72/245*2006/28*4868*00 (EMC approval)	e1 03 4868

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Am Lindener Hafen 21
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Manufacturer : **WABCO** GmbH

0. General

- 0.1. Make (trade name of the manufacturer) : **WABCO**
- 0.2. Type : **BVA** (Pad wear indicator for disc brake)
- Commercial description : Pad wear indicator for disc brake
- 0.3. Marking of type, if present on the separate technical unit (b); : **612 480 036 2 and 612 480 040 2**
(see annex 1)
- 0.4. Location of that marking : non applicable
- 0.5. Name and address of the manufacturer : **WABCO** GmbH
Am Lindener Hafen 21
DE-30453 Hannover
- 0.6. Description of the system : Publication 820 020 013 3. 09/2006
(Pad wear indicator for disc brake with trailer EBS)
- 0.7. Location of EEC type approval mark, method of applying the mark : non applicable
- 0.8. Modifications : --

1. Vehicle part

1.1. Description

- 1.1.1.. **Pad wear indicator for disc brake: Variant** : **612 480 036 2 and 612 480 040 2**
(Sensors in connection with peripheral-equipment see annex 1)
- 1.1.2. **Connectors; electrical:** 2 pol. socket
- 1.1.3. **Connecting cable:** see annex 1
- 1.1.4. **Installation instructions:** **Complement to the Installation Instruction provided for ADR vehicles:**
If used in vehicles that require an ADR certificate (*International Agreement for the Transport of Dangerous Goods*) or that are subject to the GGVS (*Act Governing the Road Haulage of Hazardous Materials (Germany)*), the installation of the BVA sensors as well as the connecting cables and accessories (see annex) for the EBS have to meet the special requirements concerning the electrical equipment according to the directive 98/91/EG dated 14.12.1998 or the regulation ECE-R 105 including amendment 02 or to clause 9.2.2 of the ADR 2007.
Permanently energized circuits have to be deactivatable by the disconnecter [battery master switch] located in the towing vehicle!



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2. Testing protocol

2.1. Test results

- 2.1.1. General : Taking into account the directives stated above, the BVA (Pad wear indicator for disc brake) was tested for its suitability effecting the transport of dangerous goods. The scope of testing also included the connecting cables stated above, installed in the relevant connections. IP 54 is the minimum degree of protection demanded for plug connections in ADR vehicles (GGVS (Act Governing the Road Haulage of Hazardous Materials (Germany))).
- 2.1.2. Tests on vehicle : The applicant presented the above-mentioned BVA (Pad wear indicator for disc brake) in a system model.

2.2. Range of application

- 2.2.1. Trailer specification : All **O₃** and **O₄** trailers requiring a Registration Certificate for the transport of certain dangerous goods. (see clause 2.2.3.)
- 2.2.2. Designation of vehicle body to 9.1.1.2 directive ADR 2007 : Vehicle **EX/II** or **EX/III**
Vehicle **FL**
Vehicle **OX**
Vehicle **AT**
- 2.2.3. Definition of O₃ and O₄ trailers (for chapter 2.2.2.)
Vehicle category O : In accordance with Framework Directive 70/156/EEC, annex II, clause A, subclause 3 : Trailers (including semi-trailers).
- 2.2.3.1. Vehicle category O₃ : Trailers with a maximum mass exceeding 3,5 tonnes but not exceeding 10 tonnes.
- 2.2.3.2. Vehicle category O₄ : Trailers with a maximum mass exceeding 10 tonnes.



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2.2.4. According to ADR 2007, part 9,
chapter 9.1, clause 9.1.1.2

2.2.4.1. Vehicle EX/II or EX/III : A vehicle intended for the carriage of explosives or objects including explosive material (class 1)

2.2.4.2. FL vehicle : a) a vehicle intended for the carriage of liquids having a flashpoint of not more than 60 °C (with the exception of diesel fuel complying with standard EN 590:2004, gas oil or heating oil, light – UN-number 1202 – with a flashpoint as specified in standard EN 590: 2004) in fixed tanks or demountable tanks with a capacity exceeding 1 m³ or in tank-containers or portable tanks with an individual capacity exceeding 3 m³ or
b) a vehicle intended for the carriage of flammable gases in fixed tanks or demountable tanks with a capacity exceeding 1 m³ or in tank-containers or portable tanks with an individual capacity exceeding 3 m³, or,
c) a battery-vehicle with a total capacity exceeding 1 m³ intended for the carriage of flammable gases.

2.2.4.3. OX vehicle : a vehicle intended for the carriage of hydrogen peroxide, stabilized or hydrogen peroxide, aqueous solution stabilized with more than 60 % hydrogen peroxide (class 5.1 UN number 2015) in tank-containers, portable tanks with a capacity exceeding 3 m³ or in fixed tanks or demountable tanks with a capacity exceeding 1 m³.

2.2.4.4. AT vehicle : a) a vehicle, other than EX/III, FL or OX vehicle, intended for the carriage of dangerous goods in fixed tanks or demountable tanks with a capacity exceeding 1 m³ or in tank-containers or portable tanks with an individual capacity exceeding 3 m³; or
b) a battery-vehicle with a total capacity exceeding 1 m³ other than a FL vehicle.



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- 2.2.5. Definition of the zones complements to the **vehicles FL** to 2.2.5.2. : In its subclause 9.7.8.2, the ADR gives an explanation of the classification of zones 0 and 1. Together with the application of the relevant explosion protection regulations and their instructions for implementation, these explanations are the basis for the general indications stated here.
- 2.2.5.1. Zone 0 Zone 0 comprises areas in which an explosive gas atmosphere is present continuously or for long periods. In case of tank trucks, vehicles having tanks and battery vehicles, this is, for instance,
 - the internal of the tanks, armatures and lines used for filling or delivering and for gas return
- 2.2.5.2. Zone 1 Zone 1 comprises areas in which an explosive gas atmosphere is likely to occur in normal operation. In case of tank trucks, vehicles having tanks and battery vehicles, this is, for instance,
 - the internal of closed armature boxes
 - within a radius of 0,5m around the armatures
 - within a radius of 0,5m around the venting equipment which cannot be shut off and is open under normal operating conditions. (such as tipping valve)
 - within a radius of 0,5m around the safety valves
- 2.2.5.3. Zone 2 Zone 2 comprises areas in which an explosive gas atmosphere is not likely to occur in normal operation and, if it does occur, is likely to do so only infrequently and will exist for a short period only.



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2.3. Restrictions

- 2.3.1. Emergency-off-disconnector : In case of ADR vehicles, all batteries in the trailer vehicle must be able to be disconnected from the connected consumers by means of a disconnecter (EMERGENCY OFF).
- 2.3.2. Fastening of cable : In order to prevent any vibration transfer to connectors or connector sealings, the free cable length between connector and cable clip shall not exceed 30 cm.
Fastening of cables shall be such to prevent any chafing.

2.4. Summary of assessment

: **From the technical point of view, there are no objections to the installation of the BVA (Pad wear indicator for disc brake) which according to 5205 ADR 2007 are subject to the special rules defined for the transport of dangerous goods, if the installation complies with the restrictions stated above.**

2.5. General indications

Date of testing : 08 September, 2008

3. Appendices

1. : Listing: TEBS with BVA
BVA-Sensors, Connecting cable, further accessory parts.



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4. Statement of conformity

The system description given in section No. 0.6. and the vehicle type stated in this description -
- conform to - the directive stated above

This report includes pages 1 to 7 and the appendices.

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TEST LABORATORY
- Automotive -
TÜV Technische Überwachung Hessen GmbH
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Federal Republic of Germany
DAR registration number:
KBA-P 00005-95

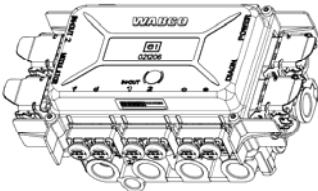
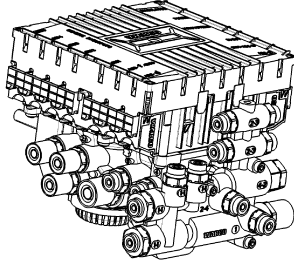
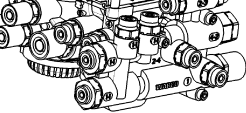
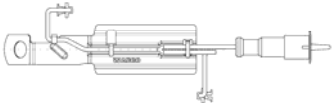
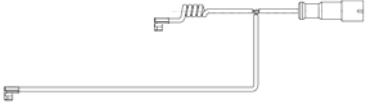
64285 Darmstadt, **2008-09-12**
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Dipl.-Ing. **Preiß**

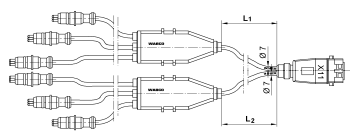
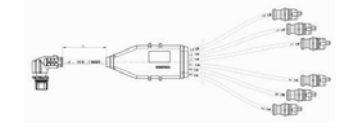
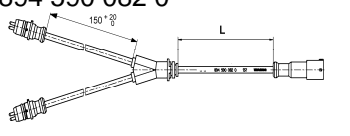
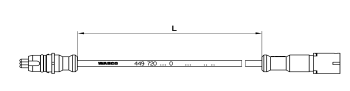
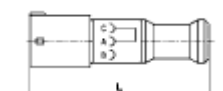
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Listing: BVA-components in connection with TEBS.

Trailer brake systems			
System-parts number	System-designation	Number system	Connecting BVA cable
480 102 0xx 0 	TEBS-D	480 102 010 0 bis 480 102 019 0	In/out
480 102 0xx 0 	TEBS-E Standard	480 102 030 0 bis 480 102 058 0	GIO 1-7
	Premium	480 102 060 0 bis 480 102 088 0	
BVA-Sensors			
Sensor	Application		
612 480 036 2 	WABCO brake		
612 480 040 2 	Knorr brake		



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Connecting cable				
Cable family	Function/ Designation	Termination device plug	Degree of protection (in connection with pendant)	requirements
449 834 000 0 	Connecting cable TEBS-D Modulator	Modulator	IP 6K9K IP IP67	-
		Sensor/ Extension cable/ Branch cable [6x]	IP 68 IP 69K	The connectors that are not used shall be closed with electrical bridge 441 902 312 2
449 816 000 0 	Connecting cable TEBS-E Modulator	Modulator	IP 6K6K IP 6K9K	-
		Sensor/ Extension cable Branch cable [6x]	IP 68 IP 69K	The connectors that are not used shall be closed with electrical bridge 441 902 312 2
894 590 082 0 	Branch cable	Connecting cable 449 834 000 0 449 816 000 0	IP 68 IP 69K	-
		Sensor Extension cable	IP 68 IP 69K	-
449 720 000 0 	Extension cable	Connecting cable 449 834 000 0 449 816 000 0 Branch cable 894 590 082 0	IP 68 IP 69K	-
		Sensor		-
Further accessory parts				
	Function/ Designation	Termination device plug	Degree of protection (in connection with pendant)	requirements
441 902 312 2 	Cable jumper	Sensor connecting device plug	IP 68 IP 69K	-