



TRANSLATION



BBG Prüf- und Zertifizier GmbH

(1) **EC-Type Examination Certificate**

(2) **- Directive 94/9/EC -**

**Equipment and protective systems intended for use
in potentially explosive atmospheres**

(3) **BVS 03 ATEX H 051 X**

(4) **Equipment and protective system: Rotary valves**

(5) **Manufacturer: DMN Machinefabriek Noordwykerhout B.V.**

(6) **Address: 16, 's-Gravendamseweg, 2211 WJ, Bedrijventerrein
Gravendam, P.O. Box 6, 2210 AA, Noordwijkerhout,
Holland, The Netherlands**

(7) The design and construction of this equipment and any acceptable variation thereto are specified in the schedule to this type examination certificate.

(8) The certification body of Deutsche Montan Technologie GmbH certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive. The examination and test results are recorded in the test and assessment report BVS PP 1100/104a/03 EG.

(9) The Essential Health and Safety Requirements are assured by compliance with:

DIN EN 1127-1:1997-10, Potentially explosive atmosphere, Explosion protection, Part 1: Basic principles and methodology,

DIN EN 13463-1:2002-04, Non-electrical equipment for use in potentially explosive areas, Part 1: Basic principles and requirements,

DIN EN 13463-1 Correction 1:2003-06, Corrections of DIN EN 13463-1:2002-04,



prEN 13463-5:2002-08, Non-electrical equipment for use in potentially explosive areas, Part 5: Protection by constructional safety, and

BGR 132: Prevention of ignition risks due to electrostatic charging, March 2003.

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to Directive 94/9/EC.
Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

 **D**
II 1D/2 GD c or  **D**
II 1D/3 GD c

Deutsche Montan Technologie GmbH

Bochum, dated 17 December 2003

Signed: Dr Jockers

Signed: Dr Wörsdörfer

DMT-Certification body

Special services unit

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(13) Appendix to

(14) **EC-Type Examination Certificate****BVS 03 ATEX H 051 X**(15) 15.1 Subject and Type

Rotary valves in accordance with table 1

15.2 Description

The rotary valves mode of operation is that, in a static casing, a rotor revolves. The rotor has permanent or exchangeable bars, positioned with a specific gap in between casing and lid. The rotor serves as a seal from the inlet of leak air in the case of varying pressure rates above and below the valve. The rotor is enclosed by adequate side covers. The valves are manufactured in two designs; as blow-out valve and as blow-through valve. They are driven either by a chain drive or by a direct drive with or without coupling.

In addition to that, the rotary valves, as autonomous protective system, in the event of an explosion, serve to prevent the explosion's propagation into subsequent parts of the plant.

15.3 Parameters

Table 1: Overview of the rotary valves

Type	Size	Dust explosion class*	Max. gap width**	Design				
				Standard	Quickly removable	MZC	Dairy	Dairy MZC
AL	150-175-200-250-300-350	St 1	≤ 0,2 mm	1 2 3N 3C 4C 4TCO 4TS	1D 2D 3ND 3CD 4CD 4TCOD 4TSD	1MZC 2MZC 3NMZC 3CMZC 4CMZC 4TCOMZC 4TSMZC		
AM L	150-200-250-300-350	St 1	≤ 0,2 mm					
BL	150-175-200-250-300-350	St 1	≤ 0,2 mm					
AL	400-450-500	St 1	≤ 0,3 mm					
AL	150	St 2	≤ 0,15 mm					
AL	150-175-200-250-300	St 1	≤ 0,2 mm					
BL	150-175-200-250-300	St 1	≤ 0,2 mm					
AM L	150-200-250-300-350	St 1	≤ 0,2 mm					
ML	150	St 1	≤ 0,2 mm	1 2				
ML D	150	St 1	≤ 0,2 mm	3N 3C 4C				

*) Flameproofness against organic dusts of the following dust explosion classes

**) Gap in between rotor and casing

Table 2: Key for use

Material	1	Cast iron
	2	Stainless steel
	3N	Cast iron completely nickel-plated
	3C	Cast iron completely chrome-plated
	4C	Cast iron – Boring completely chrome-plated
	4TCO	Cast iron – tungsten carbide-plated
	4TS	Cast iron – tungsten carbide-plated

Design	-	Standard
	D	Quickly removable
	MZC	Quickly removable with pullout appliance
	DAI	Dairy
	DMZC	Dairy with pullout appliance

Example:

	Type	Size	Material	Design
Rotary valve	AL	150	2	MZC

The rotary valves are operated in the following ambient temperatures:

- 20 °C to + 40 °C

(16) Test and Assessment Report

BVS PP 1100/104a/03 EG, as of 17 December 2003

(17) Special Conditions for Safe Use

The rotary valves' gap may not exceed the values listed in table 1, so as to guarantee the protective function. In conveying direction, the rotary valves are flameproof against explosions of organic dusts of dust explosion classes St 1 and St 2, respectively, in accordance with table 1, and they are pressure shock resistant for the respective value listed in table 1. The rotary valves must be apt to be integrated in a circuit concept, so that, in the event of an explosion, they can be brought to a standstill.

The rotary valves have to be grounded; i.e. the bleeder must have a value of $< 10^6 \Omega$ against earth. The rotor's circumferential speed must be less than 1 m/s.

The drives (direct drive with or without coupling or chain drive, respectively) are not part of this test and assessment report. Adequate drives have to be used that bear the same as, or a high-order marking than, the rotary valves. Equipment marked II 1 D/2 GD c, if operated with a chain drive, a brass chain locker and a chain with chain adjuster (type: ARCO) has to be used.

The rotary valves' maximum surface temperature largely depends upon the temperature of the medium conveyed. The maximum surface temperatures resulting from the respective temperature of the medium conveyed as well as the temperature classes of the gases deriving from this can be drawn from table 3:

Table 3: Connection between the temperature of the medium conveyed and the maximum surface temperature or the temperature class for gases, respectively

Temperature of the medium conveyed	Maximum surface temperature	Temperature class
70 °C	120 °C	T4
80 °C	130 °C	
85 °C	135 °C	
90 °C	140 °C	T3
100 °C	150 °C	
110 °C	160 °C	
120 °C	170 °C	
130 °C	180 °C	
140 °C	190 °C	
150 °C	200 °C	

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

44809 Bochum, Germany, 23 September 2005
1100/104a/03 BVS-Hes/Sa

EXAM BBG Prüf- und Zertifizier GmbH



Certification body



Special services unit



TRANSLATION



BBG Prüf- und Zertifizier GmbH

1. Supplement

(1) (Supplement in accordance with Directive 94/9/EC Annex III Number 6)

(2) **To the EC-Type Examination Certificate**
(3) **BVS 03 ATEX H 051 X**

(4) **Equipment and protective system: Rotary valves**

(5) **Manufacturer: DMN Machinefabriek Noordwijkerhout B.V.**

(6) **Address: 16, 's-Gravendamseweg, 2211 WJ, Bedrijventerrein Gravendam,
P.O. Box 6, 2211 AA, Noordwijkerhout, Holland, The Netherlands**




(7) The design and construction of this equipment and any acceptable variation thereto are specified in the schedule to this supplement.

(8) The rotary valves are equipment according to Directive 94/9/EC. In addition to that, as autonomous protective system, in the event of an explosion, they serve to prevent the explosion's propagation into subsequent parts of the plant. The rotary valves according to table 1, in conveying direction, are flameproof against dust explosions of organic dusts of dust explosion class St 1 or St 2, respectively, and pressure shock resistant for 10 bar. The rotary valves according to table 2, both in and against conveying direction, are flameproof against explosions of organic dusts of dust explosion classes St 1 and St 2, and pressure shock resistant for 10 bar. The rotary valves according to table 3, both in and against conveying direction, are flameproof against explosions of organic dusts of dust explosion class St 2 and pressure shock resistant for 3,8 bar.

(9) The Essential Health and Safety Requirements are assured by compliance with

- DIN EN 13463-1:2002, Non-electrical equipment for use in potentially explosive areas, Part 1: Basic principles and requirements
- DIN EN 13463-1 Correction 1:2003-06, Corrections of DIN EN 13463-1:2002-04
- DIN EN 13463-5:2004, Non-electrical equipment for use in potentially explosive areas, Part 5: Protection by constructional safety
- CLC TR50404:2003, Electrostatics - Code of practice for the avoidance of hazards due to static electricity

(10) The marking of the equipment shall include the following:

 **D**
II 1D/2 GD c or  **D**
II 1D/3 GD c or  **D**
II 1D/- c

EXAM BBG Prüf- und Zertifizier GmbH

Bochum, dated 25 February 2005

Signed: Dr Jockers

Certification body

Signed: Dr Wörsdörfer

Special services unit

(11) Schedule to

(12) **1. Supplement**(13) **to the EC-Type Examination Certificate****BVS 03 ATEX H 051 X**(14) 14.1 Subject and Type

Rotary valves

Table 1: Overview of the rotary valves
Flameproof in conveying direction, pressure shock resistant for 10 bar

Type	Size	Dust explosion class*	Max. gap width**	Design				
				Standard	Quickly removable	MZC	Dairy	Dairy MZC
AL	150-175-200-250-300-350	St 1	≤ 0,2 mm	1 2 3N 3C 4C 4TCO 4TS	1D 2D 3ND 3CD 4CD 4TCOD 4TSD	1MZC 2MZC 3NMZC 3CMZC 4CMZC 4TCOMZC 4TSMZC		
AML	150-200-250-300-350	St 1	≤ 0,2 mm					
BL	150-175-200-250-300-350	St 1	≤ 0,2 mm					
AL	400-450-500	St 1	≤ 0,3 mm					
AL	150	St 2	≤ 0,15 mm					
AL	150-175-200-250-300	St 1	≤ 0,2 mm					
BL	150-175-200-250-300	St 1	≤ 0,2 mm					
AML	150-200-250-300-350	St 1	≤ 0,2 mm				DAI	DMZC
ML	150	St 1	≤ 0,2 mm	1 2				
MLD	150	St 1	≤ 0,2 mm	3N 3C 4C				

*) Flameproofness against organic dusts of the following dust explosion classes

**) Gap in between rotor and casing

Table 2: Overview of the rotary valves (blow-out valves)
Flameproof in and against conveying direction, pressure shock resistant for 10 bar

Type	Size	Dust explosion class*	Max. gap width**	Design				
				Standard	Quickly removable	MZC	Dairy	Dairy MZC
AL	150-175-200-250-300-350	St 2	≤ 0,2 mm	1	1D	1MZC		
				2	2D	2MZC		
				3N	3ND	3NMZC		
AML	150-200-250-300-350	St 2	≤ 0,2 mm	3C	3CD	3CMZC		
				4C	4CD	4CMZC		
				4TCO	4TCOD	4TCOMZC		
				4TS	4TSD	4TSMZC		
AL	150-175-200-250	St 2	≤ 0,2 mm				DAI	DMZC
AML	150-200-250-300	St 2	≤ 0,2 mm				DAI	DMZC

*) Flameproofness against organic dusts of the following dust explosion classes

**) Gap in between rotor and casing

Table 3: Overview of the rotary valves (blow-through valves)
Flameproof in conveying direction, pressure shock resistant for 10 bar

Type	Size	Dust explosion class*	Max. gap width**	Design				
				Standard	Quickly removable	MZC	Dairy	Dairy MZC
BL	150-175-200-250-300-350	St 2	≤ 0,2 mm	1	1D	1MZC		
				2	2D	2MZC		
				3N	3ND	3NMZC		
				3C	3CD	3CMZC		
				4C	4CD	4CMZC		
				4TCO	4TCOD	4TCOMZC		
				4TS	4TSD	4TSMZC		
BL	150-175-200-250	St 2	≤ 0,2 mm				DAI	DMZC

*) Flameproofness against organic dusts of the following dust explosion classes

**) Gap in between rotor and casing

Table 4: Overview of the rotary valves
Flameproof in and against conveying direction, pressure shock resistant for 3 bar

Type	Size	Dust explosion class*	Max. gap width**	Design
				Standard
DL	200-250	St 2	≤ 0,15 mm	1

*) Flameproofness against organic dusts of the following dust explosion classes

**) Gap in between rotor and casing

Key for use

Material	1	Cast iron
	2	Stainless steel
	3N	Cast iron completely nickel-plated
	3C	Cast iron completely chrome-plated
	4C	Cast iron – Boring completely chrome-plated
	4TCO	Cast iron – tungsten carbide-plated
	4TS	Cast iron – tungsten carbide-plated

Design	-	Standard
	D	Quickly removable
	MZC	Quickly removable with pullout appliance
	DAI	Dairy
	DMZC	Dairy with pullout appliance

Example:

	Type	Size	Material	Design
Rotary valve	AL	150	2	MZC

The rotary valves are operated in the following ambient temperatures:

- 20 °C to + 40 °C

The following materials are used:

Table 5: Materials used – Casing and lid

Designation	Key	Design	Material	Material Number / Norm
Cast iron	1, 3N, 3C, 4C, 4TCO, 4TS	Standard, D, MZC	GG 25	EN-GJL-250/EN 1561 ; 0.6025/DIN 1691
			GGG40	EN-GJS-400-15/EN 1561; 0.70740/DIN 1693
Stainless steel	2	Standard, D, MZC, DAI, DMZC	AISI 316	1.4408/ EN 10283 or DIN 17445, respectively
			AISI 316L (CF3M)	1.4404/ EN 10283 or DIN 17445, respectively
			AISI 316Ti	1.4581/ EN 10283 or DIN 17445, respectively
Carbon steel	-	Standard, D, MZC	GP240GH	1,0619/ EN 10213
Magnetic stainless steel	-	Standard, D, MZC	ASTM A890 Grade 4A	1.4470/ EN 10231-4
Hastelloy C	-	Standard, D, MZC	G-NiMo17Cr	2.4686

Table 6: Materials used – Rotor

Rotor shaft				
Designation	Key	Design	Material	Material Number / Norm
Steel	1, 4C, 4TCO, 4TS	Standard, D, MZC	St 52-2	S355/ EN 10025
Stainless steel	2, 3N, 3C	Standard, D, MZC, DAI, DMZC	AISI 316L	1.4404/ EN 10088 or DIN 17445, respectively
			AISI 316Ti	1.4571/ EN 10088 or DIN 17445, respectively
Rotor bars				
Designation	Key	Design	Material	Material Number / Norm
Steel	1, 4C, 4TCO, 4TS	Standard, D, MZC	St 37K	S235/ EN 10088
Stainless steel	2, 3N, 3C	Standard, D, MZC, DAI, DMZC	AISI 316L	1.4404/ EN 10088 or DIN 17445, respectively
			AISI 316Ti	1.4571/ EN 10088 or DIN 17445, respectively
Adjustable rotor bars				
Designation	Key	Design	Material	Material Number / Norm
Steel	1, 4C, 4TCO, 4TS	Standard, D, MZC	St 37K	S235/ EN 10130
Stainless steel	2, 3N, 3C	Standard, D, MZC, DAI, DMZC	AISI 316L	1.4404/ EN 10088 or DIN 17445, respectively
			AISI 316Ti	1.4571/ EN 10088 or DIN 17445, respectively
			X46Cr13	1.4034/ EN 10088-3
Brass			CuZn39Pb3	2.0401 bzw. EN-CW614N/ EN 12164
Phoenix Favoriet			90MnCRV8	1.2842/ EN ISO 4597 or DIN 17350, respectively
Hardox 400			plate, made from steel	

(15) Test and Assessment Report

BVS PP 1100/104a/03 EG, as of 10 December 2003

BVS PP 1100/104a/03 EG N1, as of 25 February 2005

(16) Special Conditions for Safe Use

The rotary valves' gap may not exceed the values listed in tables 1 to 4, so as to guarantee the protective function. In accordance with tables 1 to 4, the rotary valves are pressure shock resistant and flameproof against explosions of organic dusts. The rotary valves must be apt to be integrated in a circuit concept, so that, in the event of an explosion, they can be brought to a standstill.

The rotary valves have to be grounded; i.e. the bleeder must have a value of $< 10^6 \Omega$ against earth. The rotor's circumferential speed must be less than 1 m/s, and the revolution may not exceed 30 rev/min.

The rotary valves are suitable for an explosion-related decoupling for organic dusts of dust explosion classes St1 or St2, respectively (cf. tables 1 to 3). As far as the rotary valves according to tables 2 and 3 are concerned, a propagation of sparks and therefore, a spreading of fire beyond the rotary valve, cannot be securely excluded due to constructive reasons. Respective fire protection measures must be taken.

The drives (direct drive with or without coupling or chain drive, respectively) are not part of this test and assessment report. Adequate drives have to be used that bear the same as, or a high-order marking than, the rotary valves. Equipment marked II 1 D/2 GD c, if operated with a chain drive, a brass chain locker and a chain with chain adjuster (type: ARCO) has to be used.

Chargeable and/or non-chargeable coatings applied to the rotary valves' outside may not exceed a thickness of 0,2 mm.

The rotary valves' maximum surface temperature largely depends upon the temperature of the medium conveyed. The maximum surface temperatures resulting from the respective temperature of the medium conveyed as well as the temperature classes of the gases deriving from this can be drawn from table 7:

Table 7: Connection between the temperature of the medium conveyed and the maximum surface temperature and the temperature class for gases, respectively

Temperature of the medium conveyed	Maximum surface temperature	Temperature class
70 °C	120 °C	T4
80 °C	130 °C	
85 °C	135 °C	
90 °C	140 °C	T3
100 °C	150 °C	
110 °C	160 °C	
120 °C	170 °C	
130 °C	180 °C	
140 °C	190 °C	
150 °C	200 °C	

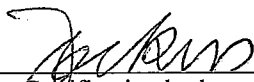
TRANSLATION



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44809 Bochum, Germany, 23 September 2005
1100/104a/03 BVS-Hes/Sa

EXAM BBG Prüf- und Zertifizier GmbH



Certification body



Special services unit

