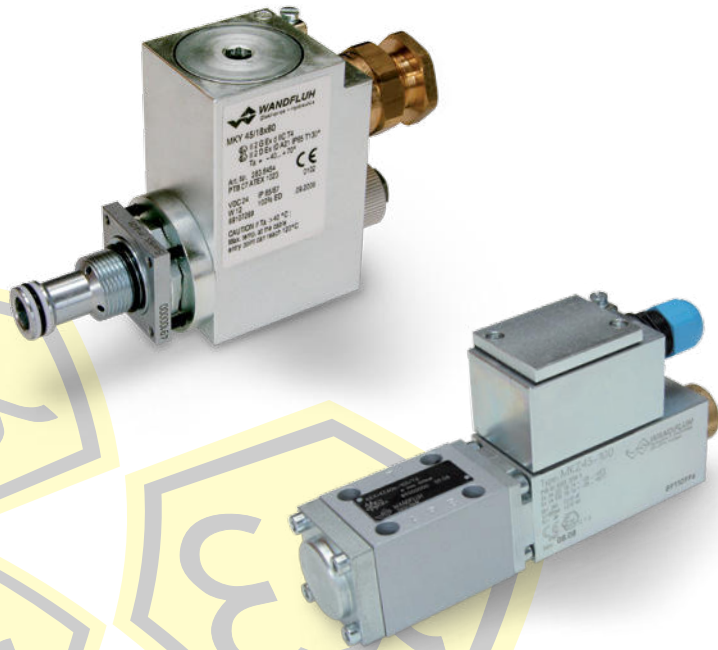


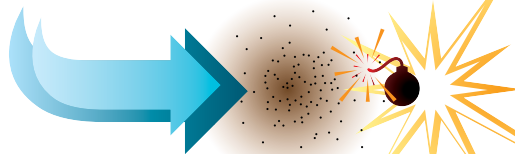
EX-PROTECTION

ADVANTAGES

- ▶ Valves for fluid technology for use in explosion hazard areas
- ▶ Explosion protection for gas, dust and mining
- ▶ Flameproof enclosures and intrinsic safety
- ▶ Solutions for all zones
- ▶ The valves comply with the requirements according to:
 - ATEX according to Directive 94/9/EC and standard EN 60079
 - IECEx according to standard IEC 60079
 - GOST Ex according to standard MEK 60079
- ▶ Wide product range
 - Solenoid operated spool valves
 - Poppet valves
 - Proportional spool valves
 - Proportional pressure valves
 - Proportional flow valves



Air + combustible gas + ignition source = explosion



Air + combustible dust + ignition source = explosion

APPLICATIONS

It is the climatic conditions which call for the use of explosion protected components, often together with high demands with respect to corrosion protection.

- ▶ As standard for $-25\text{ °C} \dots +70\text{ °C}$
- ▶ Optional for $-60\text{ °C} \dots +70\text{ °C}$
- ▶ High corrosion protection as standard
- ▶ Versions with very high corrosion protection right up to rust and acid-resistant on request
- ▶ The complete certifications can be found under:
[www.wandfluh.com/Downloads/Certifications Explosion-protection](http://www.wandfluh.com/Downloads/Certifications%20Explosion-protection)



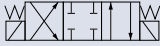
ATEX
IECEX
GOST Ex
Australia
Inmetro
NEPSI

-60 °C

VALVES EX D

Equipment according to ignition protection type flameproof / encapsulated housing					
		Explosion protection designation	acc. to	Zones	
		I M2 Ex d I Ex d I Mb II 2G Ex d IIC T4/T6 Ex d IIC T4/T6 Gb II 2D Ex tD A21 IP65 T80°C/T130°C Ex tb IIIC IP65 T80°C/T130°C Db	ATEX IEC ATEX IEC ATEX IEC	mines mines zones 1 and 2 zones 1 and 2 zones 21 and 22 zones 21 and 22	
Type	Type designation	Data sheet no.	Size	Characteristic hydraulic values	
Solenoid	MKY45	1.1-183	Square 45 mm	Q_{max} [l/min]	P_{max} [bar]
Solenoid operated spool valve direct operated	BEXd4x4 AEXd4x4 WDYFA06	1.3-23 1.3-33 1.3-34	NG4-Mini NG6 NG6	20 50 80	350 350 350
Solenoid operated spool valve pilot operated	AEXdVP4x10	1.9-37	NG10	100	315
Proportional spool valve	WDBFA06	1.10-88	NG6	25	350
Solenoid poppet valve cartridge direct operated	SDYPM22	1.11-2064	M22x1,5	40	350
Solenoid poppet valve cartridge pilot operated	SVYPM22 SVYPM33	1.11-2084 1.11-2085	M22x1,5 M33x2	80 150	350 350
Solenoid poppet valve direct operated	BEXd2204 AEXd2206	1.11-3132 1.11-3143	NG4-Mini NG6	15 40	350 350
Pressure relief cartridge direct operated	BDBPM22	2.3-547	M22x1,5	25	350
Pressure relief cartridge pilot operated	BVBPM22	2.3-536	M22x1,5	100	350
Pressure reducing cartridge direct operated	MDBPM16 MGBPM16	2.3-602 2.3-608	M16x1,5 M16x1,5	6 6	40 100
Pressure reducing cartridge pilot operated	MVBPM22	2.3-635	M22x1,5	60	350
Throttle cartridge	D.BPM22	2.6-535	M22x1,5	25	350
2-way flow control cartridge	QNBPM22	2.6-634	M22x1,5	25	350
3-way flow control cartridge	QDBPM22	2.6-648	M22x1,5	25	350

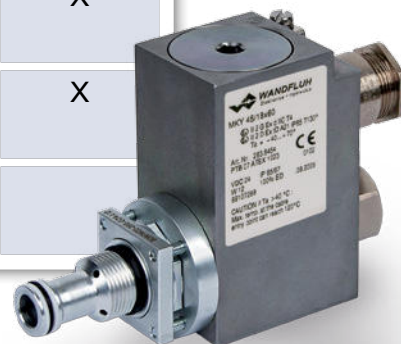
VALVES EX IA

Equipment according to ignition protection type intrinsic safety				
		Explosion protection designation	acc. to	Zones
		I M1 Ex ia I Ex ia I Ma II 1G Ex ia IIC T5/T6 Ex ia IIC T5/T6 Ga	ATEX IEC ATEX IEC	mines mines zones 0, 1 and 2 zones 0, 1 and 2
Type	Type code	Data sheet no.	Size	Characteristic hydraulic values
Solenoid	MKZ45	1.1-185	Quadrat 45 mm	Q_{max} [l/min] p_{max} [bar]
Solenoid operated spool valve direct operated 	AEXi4x6 WDZFA06-Z546	1.3-40 1.3-42	NG6 NG6	

CERTIFICATIONS EX D

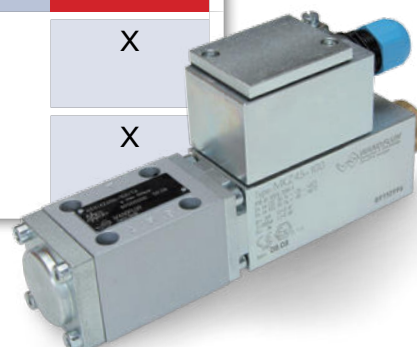
Protection type: flameproof enclosure		
Ex d 1.1-183	Surface Gas + Dust	Mining
ATEX	X *	X
IECEX	X *	X
GOST Ex	X	
Australia	X	X
Inmetro	X	X
NEPSI	X	

- * Optional for
-60 °C ... +70 °C
for spool and poppet valves
- ▶ As standard for spool
and poppet valves
- ▶ Other functions on request



CERTIFICATIONS EX IA

Protection type: intrinsic safety		
Ex ia 1.1-185	Surface	Mining
ATEX	X	X
IECEX	X	X



Designation of electrical equipment

ATEX	Ⓔ	I	M1	Ex	ia	I			
IEC				Ex	ia	I	Ma		
ATEX	Ⓔ	II	1G	Ex	ia	IIC	T5/T6		
IEC				Ex	ia	IIC	T5/T6	Ga	
ATEX	Ⓔ	I	M2	Ex	d	I			
IEC				Ex	d	I	Mb		
ATEX	Ⓔ	II	2G	Ex	d	IIC	T4/T6		
IEC				Ex	d	IIC	T4/T6	Gb	
ATEX	Ⓔ	II	2D	Ex	tD	A21	IP65	T80 °C/T130 °C	
IEC				Ex	tb	IIIC	IP65	T80 °C/T130 °C	Db

Zones

dangerous explosive atmosphere		continuously, frequently or long-term	occasionally	not likely to occur and for short periods only
Gas	ATEX / IEC / NEC 505	Zone 0	Zone 1	Zone 2
	NEC 500 (Class I)	Division 1		Division 2
Dust	ATEX / IEC / NEC 505	Zone 20	Zone 21	Zone 22
	NEC 500 (Class II, III)	Division 1		Division 2

Zone 0 (20) includes zones 1 and 2 (21 and 22)

Equipment category and Equipment protection level (EPL)

acc. to ATEX		acc. to IEC		
Equipment group	Equipment category	EPL		sufficient security
mines susceptible to firedamp				
I	M1	Ma		during rare malfunctions
I	M2	Mb		until de-energizing of the equipment
gas explosion hazard areas				
II	1G	Ga	Zone 0	during rare malfunctions
II	2G	Gb	Zone 1	during expected malfunctions
II	3G	Gc	Zone 2	in normal operation
Dust explosion hazard areas				
II	1D	Da	Zone 20	during rare malfunctions
II	2D	Db	Zone 21	during expected malfunctions
II	3D	Dc	Zone 22	in normal operation

Type of protection

IP Type of protection acc. to IEC / EN 60529





ZONE 2




ZONE 1

ZONE 0

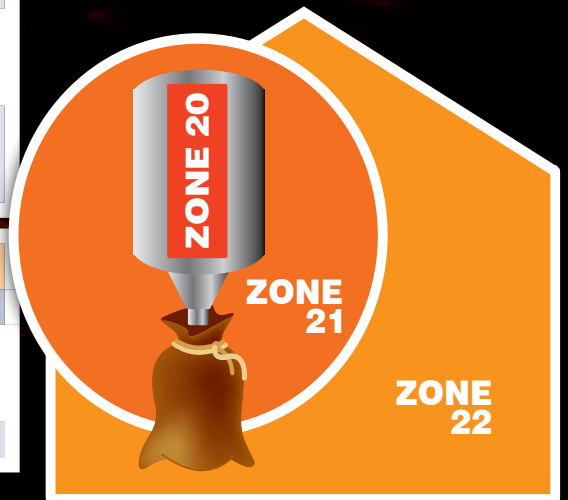
Types of protection for electrical equipment in gas explosion hazard areas

Type of protection	Symbol	Zone	Diagram	Standard
increased safety	e	1		IEC 60079-7 EN 60079-7 (ATEX)
flameproof enclosure	d	1		IEC 60079-1 EN 60079-1 (ATEX)
intrinsic safety	ia	0		IEC 60079-11 EN 60079-11 (ATEX)
encapsulation	m	1		IEC 60079-18 EN 60079-18 (ATEX)

Types of protection for electrical equipment in areas with combustible dust

Type of protection	Symbol	Zone	Diagram	Standard
protection by enclosures	tb	21		IEC 60079-31 EN 60079-31 (ATEX)

old identification: tD A21 = under procedure A for zone 21 (EN 61241-1)



Groups

ATEX / IEC / NEC 505		NEC 500	
Group I	mines susceptible to firedamp	—	
	Methane		
Group II	gas explosion hazard areas	Class I	
subdivisions	typical gas	subdivisions	
IIA	Propane	Propane	Class I Group D
IIB	Ethylene	Ethylene	Class I Group C
IIC	Hydrogen	Hydrogen	Class I Group B
	Acetylene	Acetylene	Class I Group A
Group III	dust explosion hazard areas	Class II/III	
subdivisions	typical dust	subdivisions	
IIIA	combustible flyings	fibres and fluff	Class III
IIIB	non-conductive dust	non-conductive dust	Class II Group G
IIIC	conductive dust	carbonaceous dust	Class II Group F
		combustible metal dust	Class II Group E

Subdivisions IIC (IIIC) include subdivisions IIA and IIB (IIIA and IIIB)

Temperature classification

Maximum surface temperature	Temperature classes for gases	
	ATEX / IEC / NEC 500/505	ATEX / IEC / NEC 500/505
450 °C	T1	T3
300 °C	T2	T4
For dusts: indication of the maximum surface temperature in °C	100 °C	T5
	85 °C	T6



Wandfluh AG
Hydraulik + Elektronik
Helkenstrasse 13
Postfach
CH-3714 Frutigen

Telefon +41 33 672 72 72
Telefax +41 33 672 72 82

sales@wandfluh.com
www.wandfluh.com

wandfluh.com