RIOCOAL A, B, C, D

Permitted Explosive
Class I, Class II, Class III

The presence of firedamp and coal dust as encountered in coal mines requires special, permitted explosives for safe blasting operations.

The permitted explosives by MAXAM Deutschland GmbH generate short-lived detonation flames, thus, they cannot ignite explosive concentrations of methane-air or coal dust-air mixtures.

Detonating Process

To initate the methane oxidation reaction, $CH_4 + 2\ O_2 = CO_2 + 2\ H_2O$, a certain induction period is prerequisite. By confining the life span of detonation flames to values below this induction period blasting operations can be safely performed in fiery environment. Hence, the composition of permitted explosivesis such as to prevent both, continuing chemical reactions subsequent to the initial one and slow deflagration processes within the detonation front. Therefore, salt (NaCl) is added to conventional commercial explosives in order to reduce detonation temperature and life span of detonation flames. When permitted explosives are manufactured complying with the so-called salt-pair-reaction formula, in which the chemical reaction, NH_4NO_3 + (inert) NaCl = $N_2 + 2\ H_2O + ½\ O_2$ is substituted by, $NH_4Cl + NaNO_3$ (or KNO_3) = $N_2 + 2H_2O$ + NaCl (or KCl), even increased safety performance is obtained. Thereby, a very fine spray of salt is generated by the chemical reaction itself, effectively suppressing detonation flames. Salt-pair explosives are powdery and contain not more than the necessary content of nitro glycerine-nitro glycol-additaments needed to guarantee initiation of the explosion and suppress deflagration processes.

MAXAM

Civil Explosives

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Technical Data

		RIOCOAL A	RIOCOAL B	RIOCOAL C	RIOCOAL D
Density	[g/cm³]	1,18	1,17	1,16	1,15
Detonation Velocity	[m/s]	2.100-2.700	2.000-2.300	1.800-2.000	1500
Relative weight strength	[%]	50	45	38	37
Lead block test	[cm³]	190	170	125	100
Oxigen balance	[%]	2,1	1,5	3,1	4,2
Explosion heat	[kJ/kg]	2508	2384	1980	1620
Water resistance	[-]	excellent	excellent	good	good
Shelf life	[month]	12	12	12	6

Packing Data

Diameter	[mm]	32	40	32	32
Length	[mm]	135	175	135	135
Weight	[g]	125	250	125	125
No. of Cartr. per box	[-]	200	100	200	200

Storage and Shelf Life

RIOCOAL needs to be protected from heat and moisture as well as is to be stored in the original packaging. The shelf life amounts from 6 to 12 months from the date of production, at a storage temperature between +5 °C and +30 °C.

Classification

Classification	Transport	Storage
ADR/RID/ IMDG-Code/ GGVSEB	Class 1.1D,	Storage group 1.1, compatibility group D
UN-Number	0081	
Designation	Explosive, Typ A	

In Germany, three classes of permitted explosives according to detailed test procedures and stringent approval regulations are used in fiery conditions. A general outline on different applications in respect to mining environment and stratification is shown in following table.

Strata and mining conditions	Methane concentration (vol. % of mine air)	Class of explosives
hard rock, non coal bearing (except for raises)	0 - 0.5 0.5 - 1.0	usual high explosives permitted explosives class I
hard rock, coal bands with max. thickness 0,2m (except for raises)	0 - 0.5 0.5 - 1.0	permitted explosives class I permitted explosives class II
hard rock, coal bands exceeding 0,2m thickness (except for raises)	0 - 0.3 0.3 - 0.5 0.5 - 1.0	permitted explosives class I permitted explosives class II permitted explosives class III
all excavations near coal faces, seam bearing, raises	< 1.0	permitted explosives class III

Certifications	EG-Cerificate	ID-Number (BAM)
RIOCOAL A (Wetter-Westfalit C)	0589.EXP.3645/99	BAM-WI-014
RIOCOAL B (Wetter-Westfalit D)	0589.EXP.3655/99	BAM-WI-015
RIOCOAL C (Wetter-Roburit B)	0589.EXP.3656/99	BAM-WII-004
RIOCOAL D (Wetter-Securit C)	0589.EXP.3657/99	BAM-WIII-004

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