GIG

Good Practices in Effective Ventilation of Underground Coal Mines

Polish Practices and Regulations

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Location of major Polish coal basins

Absolute methane bearing capacity, methane drainage, amount of economically utilized methane and coal production output in Polish hard coal mines in the years 2007-2017

Specification	Year										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Absolute methane bearing capacity (mln m^3/year)	**878.9**	**880.9**	**855.7**	**834.9**	**828.8**	**828.2**	**847.8**	**891.2**	**933.0**	**933.8**	**948.5**
Methane drainage (mln m^3/year)	**268.8**	**274.2**	**259.8**	**255.9**	**250.2**	**266.7**	**276.6**	**321.1**	**339**	**342.1**	**337**
Amount of economically utilized methane (mln m^3/year)	**165.7**	**156.5**	**159.5**	**161.1**	**166.3**	**178.6**	**187.7**	**211.4**	**197.1**	**195**	**212**
Number of the hard coal mines	**31**	**31**	**31**	**32**	**31**	**31**	**30**	**30**	**31**	**23**	**23**
Hard coal output (mln tones)	**87.4**	**83.6**	**77.3**	**76.1**	**75.5**	**79.2**	**76.5**	**72.5**	**72.2**	**70.4**	**65.5**

THE POLISH MINING LAW

ACT of 9 June 2011, Geological and Mining Law

and two main executive acts of this act related to ventilation:

- Regulation of the Minister of the Environment of 29 January 2013 on natural hazards in mining plants
- Regulation of the Minister of Energy of 23 November 2016 on detailed requirements for the operation of underground mining plants

CATEGORIES OF METHANE HAZARD IN POLAND

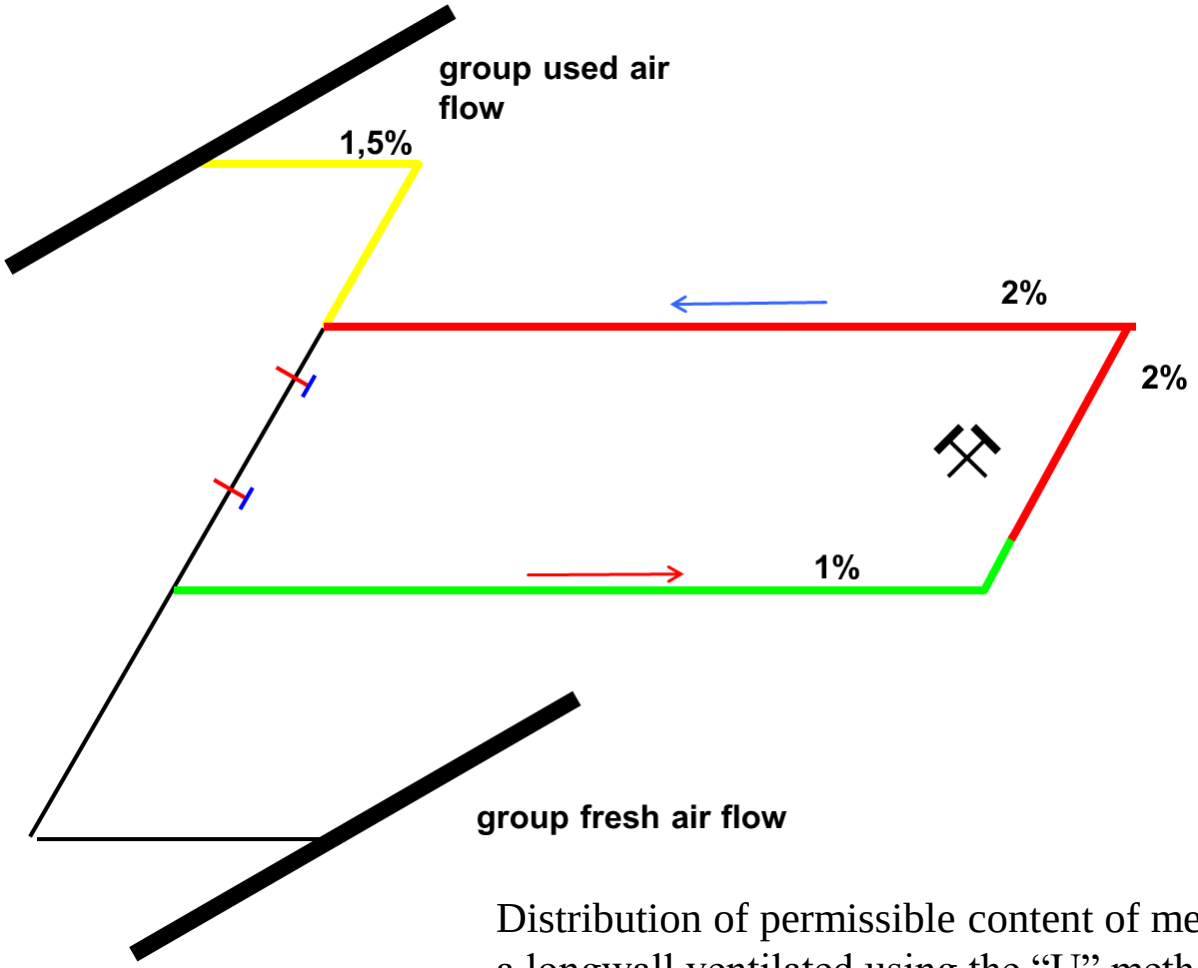
- Ist methane hazard category - *0.1 to 2.5 m^3/Mg (daf)*
- IInd methane hazard category - *2.5 to 4.5 m^3/Mg (daf)*
- IIIrd methane hazard category - *4.5 to 8.0 m^3/Mg (daf)*
- IVth methane hazard category - *>8.0 m^3/Mg (daf) or if there was sudden outflow of methane or outburst of methane and rocks*

Workings in methane fields in underground coal mines can be classified:

- to the endangered with methane explosion (degree "a"), if the concentration of methane in the ventilation air above 0.5% are excluded,
- to „b”degree of methane explosion hazard if in normal ventilation conditions the concentration of methane in air higher than 1% is excluded,
- to „c” degree of methane explosion hazard, if in normal ventilation conditions the concentration of methane in air can be higher than 1%.

PRINCIPLES OF CLASSIFYING WORKINGS IN METHANE FIELDS IN UNDERGROUND COAL-MINING TO THE DEGREES OF METHANE EXPLOSION HAZARD

Instruction No. 18 issued by the Central Mining Institute



Distribution of permissible content of methane within a longwall ventilated using the "U" method along the body of coal

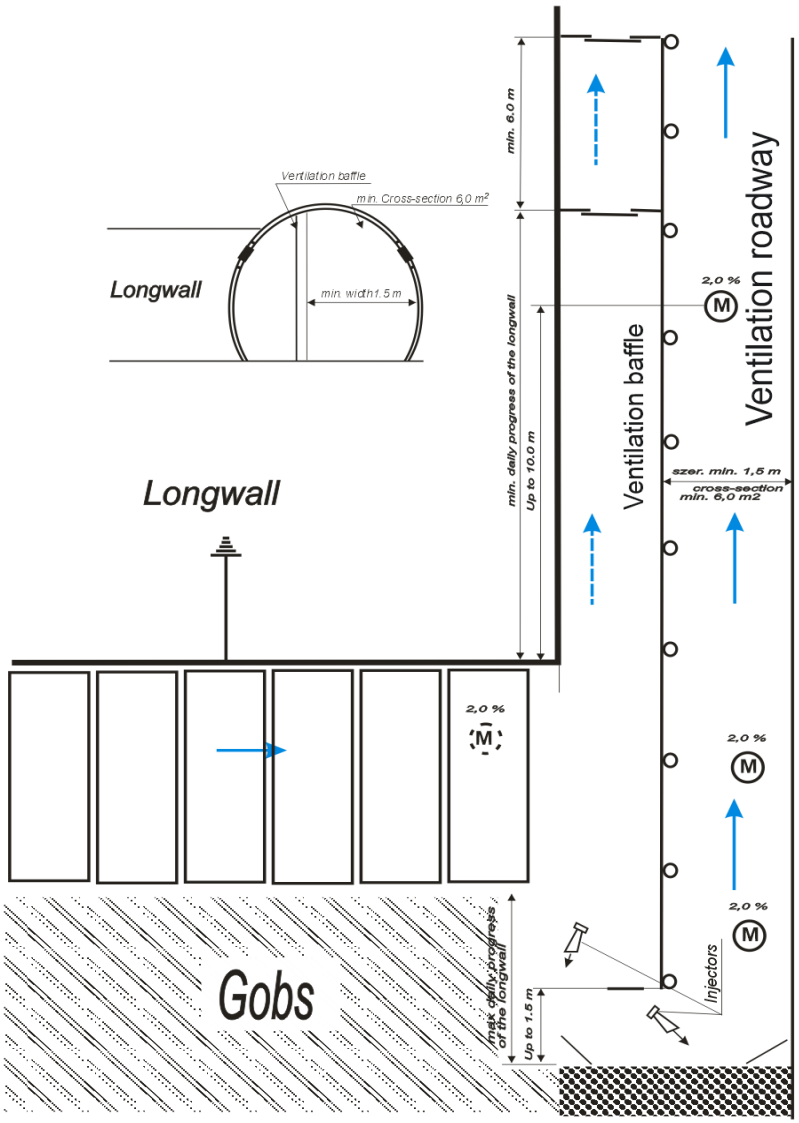


Diagram of the intersection of the longwall ventilated in the “U” system with the ventilation roadway, with the location of methane sensors and the system of auxiliary ventilation equipment for dilution of methane

Methane hazard monitoring

- Measurements of methane concentration (automatic and individual)
- Measurement of methane concentration in the methane drainage pipelines
- Measurement of air flow speed in the workings
- State of closure of ventilation dams, that affects the ventilation conditions, as well as changes in the distribution of aerodynamic potentials in the environment of longwalls

PRINCIPLES OF LONGWALL CONDUCTING IN METHANE HAZARD CONDITIONS

Instruction No. 17 issued by the Central Mining Institute

Criterial absolute methane bearing capacity V_{KR}, V_{KR-O}

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Absolute methane bearing capacity (predicted or real)

$$V_{KR} = \frac{V_p c_m k}{100\,n} + \frac{V_L\left(\frac{c_m}{n} - c_p\right)}{100 - \frac{c_m}{n}} - V_{D(CH_4)} \qquad V_{KR\text{-}O} = 100 \cdot V_{KR} / (100\text{-}E)$$

where:

V_p – volume of the air flow rate flowing through the longwall, m^3/min

V_L – volume of the air flow rate supplying the outlet from the longwall – the auxiliary air duct (longwall U) or air flow rate supplying the longwall (Y type ventilation), m^3/min

c_m –acceptable content of methane in the air current of the outlet, c_m = 1.5 %

c_p – content of methane in the air supply,

k – factor determining the non-uniformity of the velocity distribution in the longwall, k = 0.85

n – factor determining the non-uniformity of methane emission, n = 1.55

$V_{D(CH4)}$ – the amount of methane flowing into the longwall from other sources, m^3/min

E - efficiency of the methane drainage of the exploited longwall, %.

Methane prevention for the longwalls:

- Selection of the proper ventilation system for the longwall
- Ensuring the required air volumes in the area of the longwall
- Methane hazard monitoring system
- Effective actions to combat the methane accumulations in the places of possible initiation of ignition or explosion
- Technology of methane drainage of the longwall environment

Thank you for your attention

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