



Grupa **KGHM**

# THE CENTRAL AIR CONDITIONING SYSTEM AND THE MAIN DRAINAGE SYSTEM

PROJECTS EXECUTED  
BY PeBeKa S.A.



COMPREHENSIVE CHARACTER  
OF CONTRACTING SERVICES

HIGHLY QUALIFIED AND EXPERIENCED PERSONNEL

SAFETY AT EACH CONSTRUCTION PROJECT STAGE

EFFECTIVE HANDLING OF SERIOUS CHALLENGES

TECHNOLOGICALLY ADVANCED SOLUTIONS TAILORED  
TO REQUIREMENTS OF CUSTOMERS

Drawing on the tradition,  
we focus on the future

## THE OPERATING SPECTRUM OF PeBeKa S.A.

Przedsiębiorstwo Budowy Kopalń PeBeKa S.A. is one of the leading companies in the construction sector in Poland.

The company operates within the capital group of KGHM Polska Miedź S.A., one of the world's largest producers of copper and silver. Since its foundation over 55 years ago PeBeKa S.A. has drilled and equipped 30 shafts in the Copper Belt.



## THE LEGNICA-GŁOGÓW MINING DISTRICT (LGOM) CENTRAL AIR CONDITIONING SYSTEM

Both in Poland and abroad, underground mines have been reporting increased climatic hazards accompanied by high temperatures in particular headings or workings. The main reasons for this phenomenon are increasing depths of deposits as well as the use of heat and exhaust emitting diesel engines to drive machines in the process of mining and transporting the output. Reaching for deposits occurring below the depth of 1200 m requires the construction of central air conditioning systems for mine workings. PeBeKa S.A. has achieved a high level of specialisation in the comprehensive delivery of central air conditioning systems based on the state-of-the-art technologies and for over a decade has been successfully delivering such systems for Legnica-Głogów Mining District.

## THE CENTRAL AIR CONDITIONING SYSTEMS

DESIGNED AND DELIVERED BY PeBeKa S.A.  
FOR KGHM POLSKA MIEDŹ S.A.

- 1 The "Rudna" copper ore mine, R-IX shaft  
- commissioned in 2005
- 2 The "Polkowice-Sieroszowice" copper ore mine, SG shaft  
- commissioned in 2011
- 3 The "Rudna" copper ore mine - the extension of the R-IX surface air conditioning station  
- commissioned in 2012
- 4 The "Rudna" copper ore mine, R-XI shaft  
- commissioned in 2016

## THE R-IX CENTRAL AIR CONDITIONING SYSTEM IN THE "RUDNA" COPPER ORE MINE

2005 - the year of commissioning

**The R-IX central air conditioning system consists of the following facilities and equipment:**

- a surface air-conditioning station at the R-IX shaft,
- ice water shaft pipelines (Dn400),
- a three-chamber ice water feeder with an intermediate pumping station,
- ice water bottom mains (Dn300, Dn250, Dn200),
- adjustment, measurement and reduction stations,
- air conditioning points,
- water air coolers.



## THE R-IX SURFACE AIR CONDITIONING STATION

**Basic technical data:**

- cooling capacity: 16.7 MW,
- ice water temperature: +1.5°C/+22°C,
- ice water flow rate: 700 m<sup>3</sup>/h,
- a single-stage absorption ice water generator fed with hot water, functioning as the first cascade step,
- an ammonia ice water generator with a screw compressor, functioning as the second cascade step.



## THE CENTRAL AIR CONDITIONING SYSTEM IN THE "POLKOWICE - SIEROSZOWICE" COPPER ORE MINE

2011 - the year of commissioning

**The central air conditioning system consists of the following facilities and equipment:**

- a surface air-conditioning station at the SG-1 shaft,
- ice water shaft pipelines (Dn355),
- a three-chamber ice water feeder with an intermediate pumping station,
- ice water bottom mains (Dn400, Dn355, Dn315, Dn255),
- adjustment, measurement and reduction stations,
- air conditioning points,
- water air coolers.



## THE R-IX CENTRAL AIR CONDITIONING SYSTEM IN THE "RUDNA" COPPER ORE MINE - THE EXTENSION OF THE SURFACE AIR CONDITIONING STATION

2012 - the year of commissioning

**The extension of the R-IX central air conditioning system from the cooling capacity of 16.7 MW to approximately 22.7 MW consisted in the extension of the building of the R-IX surface air conditioning station with the following:**

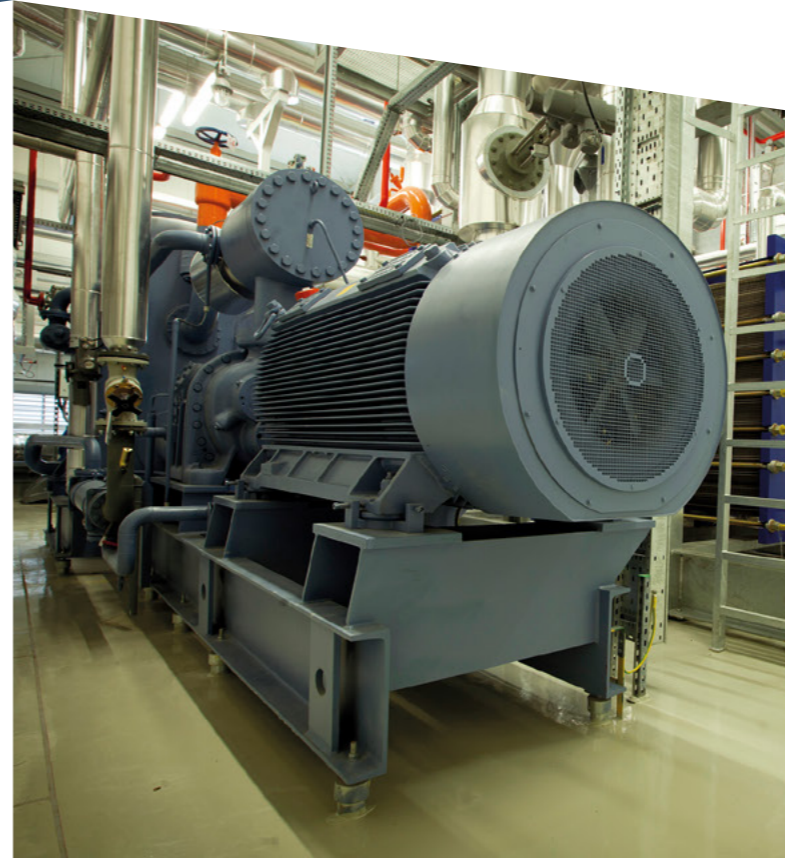
- a new engine station building,
- a water conditioning station,
- a personnel amenities building.



## THE SG SURFACE AIR CONDITIONING STATION

**Basic technical data:**

- cooling capacity: 15.0 MW,
- ice water temperature: +2°C/+22°C,
- ice water flow rate: 645 m<sup>3</sup>/h,
- an ice water compression system together with cooling towers, functioning as the first and second cascade steps.



**The technological part was extended with the following:**

- ammonia compressors,
- open evaporator towers,
- closed evaporator towers.



## THE R-XI CENTRAL AIR CONDITIONING SYSTEM IN THE "RUDNA" COPPER ORE MINE

2016 - the year of commissioning

**The R-XI central air conditioning system consists of the following facilities and equipment:**

- a surface air-conditioning station at the R-XI shaft,
- insulated surface pipelines,
- pipelines running along the service boreholes (Dn300),
- three-chamber ice water feeders with intermediate pumping stations,
- ice water bottom mains,
- loss monitoring and reduction stations,
- air conditioning points,
- water air coolers.



### Pipelines running along the service boreholes

The execution of the project included the application of an innovative technical solution consisting in the drilling of service boreholes connecting the surface with the workings at the bottom of the mine. The boreholes were subsequently piped. Their depth was 1250 m, and the bottom inclination from vertical did not exceed 1 m. The borehole curvature was monitored by means of MWD (Measurement While Drilling) apparatus. The connection between the boreholes and the surface pipeline system was made in special chambers embedded in the ground.



### Basic technical data:

- cooling capacity: 25.0 MW,
- ice water temperature: +1.5°C/+22°C,
- ice water flow rate: 1000 m<sup>3</sup>/h.



## THE PIPELINES OF THE MAIN DRAINAGE SYSTEM IN THE "RUDNA" COPPER ORE MINE

2016 - the year of commissioning

In any mine, a drainage system is one of the most important facilities. It is responsible for capturing water at the place of its outflow and delivering it to the surface.

**The main drainage system consists of the following facilities and equipment:**

- surface pipelines laid on trestles,
- a large-diameter drilled hole with the diameter of 13 3/8",
- a new working located at the circulation passway for the water reservoir,
- bottom pipelines,
- bottom water flow rate: approx. 10 m<sup>3</sup>/min,
- pipeline pressure: approx. 13 MPa.





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