

Stupeň / Level

Dátum / Date

Kód / Code

Projekt pre realizáciu stavby  
Construction design

july 2005

1. Technická správa  
Technical report

HS HSV s.r.o. KOŠICE  
Technický úsek

792.87492

FREIGABE  
FOR CONSTRUCTION

Ra 11.08.05

Realizačný projekt spracovaný pod z. č. 3821.2.002

Construction design prepared under No. 3821.2.002



AIR LIQUIDE

PROJEKT SÚSTOČNÉHO  
VYHOTOVENIA

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0	06.07.2005	Ing. Šimkaninová		Ing. Kolivoška	<i>[Signature]</i>	Ing. Pavličko		
Rev./ Rev.	Dátum / Date	Vypracoval Originator	Sign.	Kontroloval Checked	Sign.	Schválil Approved	Sign.	Pozn. / Note

Názov zákazky / Job :

KYSLÍKOVÝ APARÁT č. 9  
AIR SEPARATION UNIT No. 9



Němcovej 30  
042 18 KOŠICE, SLOVAKIA

Objekt / Unit :

Prev. celok / Unit : SO 002 - KOMPRESOROVÁ STANICA

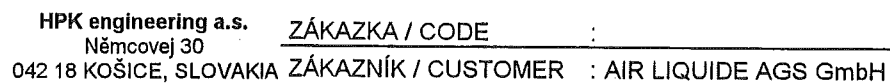
Prev. súbor / Unit :

COMPRESSOR BUILDING

Profesia / Profession :  
Prev. jednotka / P. Unit:

ELEKTROINŠTALÁCIA  
ELECTRICAL INSTALLATION

A



OBJEKT / UNIT	: SO 002 - KOMPRESOROVÁ STANICA	COMPRESSOR BUILDING
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**REVÍZIA DOKUMENTÁCIE**  
**REVISION OF DOCUMENT**

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ZÁKAZNÍK / CUSTOMER: AIR LIQUIDE AGS GmbH

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#### 1.4 Categorization of electrical equipment according to risk level

The electrical equipment designed in this project has been categorized into risk level B according to Regulation No. 718/2002 Coll.

According to § 5 par. 2 of the above regulation no written certificate or expert opinion of the Slovak Technical Inspection is necessary for this documentation.

#### 1.5 Scope of the project

##### a) Project solves

- 1.5.1 RMS002 switchboard
- 1.5.2 Lighting
- 1.5.3 Outlet installation
- 1.5.4 Building-motor installation
- 1.5.5 Main grounding terminal strip of the building
- 1.5.6 Lightning conductor and grounding

##### b) Projects does not solve

- 1.5.7 Peripheral grounding around the building – basic grounding elements in footings of supporting columns will be used
- 1.5.8 Feed to the RMS024 switchboard
- 1.5.9 Connection of the technological equipment and their grounding – this is solved in ČPS Heavy current operating distribution system

#### 2. BASIC DATA

##### 2.1 Voltage system

3PEN AC 50 Hz, 400 V/TN-C-S

Conductor splitting point PEN: - in the RMS002 switchboard

##### 2.2 Protection against injury by electric current in normal operation

Article 412 of STN 33 2000-4-41 – Protection against contact with live parts:

- by insulating live parts
- by covers

##### 2.3 Protection against injury by electric current in case of a failure

Article 413 of STN 33 2000-4-41 – Protection against contact with dead parts or protection in case of a failure:

- by automatic disconnection of power supply

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## 2.4 Environment

Basic environment in accordance with the protocol on environment and STN 33 0300 Article 3.1.1

## 2.5 Installed electrical power output

$P_i = 81 \text{ kW}$

## 2.6 Simultaneusness coefficient

$\beta = 0.8$

## 2.7 Design electrical power output

$P_p = 65 \text{ kW}$

## 2.8 Annual consumption of electric energy

$A = 95 \text{ MWh/year}$

## 2.9 Degree of electric energy supply

No. 3

## 2.10 Data on short-circuit conditions in mains

in switchboard:  $I_k = 10 \text{ kA}$ ,  $I_{km} = 18.4 \text{ kA}$

## 2.11 Power factor compensation

Central compensation using compensating capacitor switchboards with automatic regulation of the power factor is not subject of this documentation.

# 3. TECHNICAL DESIGN

## 3.1 RMS002 main switchboard

It will of wall design. The switchboard will consist of the ATLANTIC cubicle with a width of 1000 mm, depth of 300 mm and height of 1400 mm. Inlet is of the circuit breaker type (up to 100 A), outlets ore of the circuit breaker type or contactor type. Control element of the contactor outlet is located on the switchboard door. Protection is IP55/20.

## 3.2 Lighting

### 3.2.1 Light-technical project

Lighting has been designed in accordance with the valid standards STN EN 12464-1 and EN 1838. Intensity of lighting was calculated using the Calculux program in cooperation with Philips Corporation.

Lighting with the following parameters has been designed in main premises (operations):

- glare  $UGR_L$ : 19
- color rendering index: 90

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➤ lighting intensity:  $E_m = 200 \text{ lx}$

Emergency lighting has been designed next to the exit door of the building with minimum light intensity of 1 to 5 lux; uniformity of lighting is approx. 40:1. The required time of lighting after failure of the mains is at least 1 hour.

### 3.2.2 Lighting of premises

Vacuum tube light has been designed using high efficient MPK 100/250 GPK 100 WB vacuum tubes HPI P BUS 250W. The lighting fittings will be hang on the ceiling trusses at a height of approx. 8 m. They will be operated from the door of the controlled RMS002 switchboard, or by switches from the entrances. Lighting fittings protection is IP54. Fluorescent lamps and incandescent lights will also be used for lighting. They will be installed on the wall.

Wall compact lighting fittings with own power source (battery + rectifier + inverter) with the appropriate pictogram and lighting capacity for 2 hours will be used for emergency lighting. The lighting fittings will be connected to a separate protected outlet with permanent power supply. In case of electricity outage in the switchboard, lighting fittings will be automatically lighted.

### 3.3 Outlet installation

It consists of installation of plastic (or cast iron) outlet cubicles of the wall type. The cubicles are intended for voltage 400/230/24 V, current 32/16/10 A, and will be uniformly distributed in the hall. Minimum protection of cubicles will be IP43. They will be equipped with relevant four-pole and two-pole circuit-breakers and protectors, as well as by an isolation transformer.

Single phase outlets 230V/16A of the wall type (for the wet environment) will be installed according to the requirements.

### 3.4 Building-motor installation

It consists of power supply of:

- air-condition system motors
- electrical heating devices

#### *Air-conditioning equipment*

- Room for main compressor and auxiliary compressor

Excessive heat will be removed by ventilation using three exhaust fans M01/2, M02/2, M03/2. In inlet and outlet of air are closing flap (3 pcs absorb- M04/1, M05/1, M06/1; 3 pcs exhaust- M04/2, M05/2, M06/2). Air will be supplied by three absorb ventilators M01/1, M02/1, M03/1. On the basis of temperature measurement in the room, when exceeding maximum temperature (approx. +35°C to +45°C), exhaust fans M01/1, M01/2 are gradually started. At the same time, with start of the first fan, flap valves with actuators M04/1, M04/2 will be opened. In

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case of temperature drop by 10°C below the set maximum temperature (+25°C to 35°C), the fans are gradually switched off. In case of a temperature drop in the room below +10°C, inlet air flap valves are automatically closed.

Within the scope of the central heating project, heating of the room is solved using electric hot-air devices of the SAHARA type to the minimum required temperature of +5°C, i.e. in case of temperature drop below +5°C, electrical hot-air heating bodies are started and keep the required room temperature. The project of central heating also includes delivery of control (regulation) box OSE and a spatial thermostat. This project also solves supply leads and connecting cable.

- Room for GAN compressors

Excessive heat will be removed by ventilation using two exhaust fans M07/2, M08/2. Air will be supplied by two inlet ventilators M07/1, M08/1, flap valves with actuators M09, M10. On the basis of temperature measurement in the room, when exceeding maximum temperature (approx. +35°C to +45°C), exhaust and absorbs fans M07/1, M07/2 are gradually started. At the same time, with start of the first fan, all flap valves with actuators M09/1, M09/2 are opened. In case of temperature drop by 10°C below the set maximum temperature (+25°C to 35°C), the fans are gradually switched off and closing flap valves of inlet air are automatically closed.

In case of temperature drop below +5°C, electric hot-air system EH13 – SAHARA is started to keep this temperature of the room by control of its heaters. The project of central heating also includes delivery of control (regulation) box OSE and a spatial thermostat. This project also solves supply leads and connecting cable.

### 3.5 Cable distribution system and equipment of cable runs

All-plastic cables with copper cores of the CYKY type with the appropriate cross-section and number of cores will be used for electrical installation. The cross-sections will be selected in such a way not to exceed the allowed current load and that the reduction of voltage would be in the allowed limits (max. 3%  $U_n$  in accordance with STN 34 1610).

Cables will be firmly seated on racks along the walls and on trusses or on the Niedax strips.

### 3.6 Main grounding terminal block of the building

A main grounding terminal block or bus bar of potential equilibrium will be installed in the building. It is proposed to use a wall terminal block with a cover, installed next to the lighting switchboard. It is recommended to use the potential equalization bus bar of the 1801 VDE OBO-Bettermann type, or equivalent. The structure and protective bus bar of main lighting switchboard, cable racks, water pipelines and pipelines of other utilities as well as large metallic objects will be connected to it. The bus bar will be connected using a FeZn 30x4 strip through the SR02 terminal block (in the testing function) to the steel structure of the nearest column of the hall by welding.

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