

## Explanatory Note

### *Initial data for design*

*Initial data for design of supply-exhaust ventilation and air conditioning system of the MDR-TB Department for 50 beds of the Central Prison Hospital MRK-15 located at: Turkmenistan, Mary Region, Turkmenbashi include:*

- Technical documentation on electro technical section of the design;*
- Task for development of automation systems in HV part.*

*System of automation and control of supply-exhaust plant is a complex device. Prior to its operation it is necessary to get acquainted with the technical documentation. Inappropriate operation of the system may result in emergency situation and breakdown of the elements of the system.*

### **Contents**

<i>1. General part</i>	<i>2</i>
<i>2. Main design solutions, accepted in the project</i>	<i>2</i>
<i>3. Preparation of ACS to operation</i>	<i>5</i>
<i>4. Labor safety and protecting safety measures</i>	<i>5</i>

					2011-161-02/04 - AHV.EN						
			Signature	Date							
Drawn by					Automation of ventilation systems. Explanatory note			Stage	Page	Pages	
Pr. manager										1	5

## **1. General part**

*Design solutions accepted in the project are subject to technology requirements (control, adjustment, operation, alarms, etc.) and should comply with labor safety requirements.*

*In order to implement design solutions there have been chosen commercially available pieces of equipment and automation aids pursuant to acting stock-lists and subject to environmental conditions of the rooms. For installation of automation aids commercial or customized cabinets can be used, automation aids are installed on-site.*

*Three-phase alternating current  $U \sim 380V$ , 50Hz and single-phase alternating current  $U \sim 220V$ , 50Hz are used for power supply of the equipment, devices and automation aids. Selection and protection of power cables is pursuant to Electrical Installation Code (EIC). Operation and protection of control cables and installation wires are pursuant to Construction Rules and Regulations (SNIIP) 3.05.07-85.*

## **2. Main design solutions, accepted in the project**

*Based on the accepted technological solutions the following elements are subject to automation in AHV part:*

- supply plants of general dilution ventilation S1, S2;*
- exhaust fans of the general dilution ventilation E1-E4;*
- channel air conditioners C1, C2.*

*During operation of the ventilation the following systems: S1 and E1 should work simultaneously, as they serve the high risk zone of the MDR-TB department.*

*The following Normative Documents were used for the project development:*

- State Standard 1.101-97 “System of design documentation for construction. Main requirements to design and working documentation”;*
- State Standard 21.408-93 “System of design documentation for construction. Rules of industrial processes automation working documentation execution”;*

- *State Standard 21.404-85 “System of design documentation for construction. Automation of technological processes. Conventional symbols for devices and automation aids on schemes”;*
- *EIC “Rules for the design and operation of electrical installation”.*

*The project provides for:*

# **1. S1, S2.**

*There will be one-piece control boxes VAC-EF-SB (ACSC #1, ACSC #2), VKT company devices and automation aids for controlling operation of supply plants. These boxes and frequency transducers are located close to plants in ventilation chamber #23.*

*Main control and operation function are implemented in boxes:*

- *Maintaining supplied air temperature downstream the plant within the range set by the controller program. (in winter time: +20°C, in summer time: +12°C);*
- *indoor temperature control (#17 and #18);*
- *fan testing;*
- *supply fan speed control;*
- *air throttle drive control;*
- *air filters loading control;*
- *electric air heater control;*
- *supply fan switch-off delay when operating with electric air heater;*
- *emergency supply system shutdown (power interruptions, fires);*
- *Manual switch to summer operation mode.*

*All the elements of the power and control parts consist of module devices and are installed on DIN-rail. All external connections are done through screw couplings.*

*For remote start/stopping of supply systems there is a button-control station with respective switches, located in tambour-sluicer #21 (S1) and staffroom #18 (S2).*

## **2. E1, E2, E3, E4**

*For the ease of operation control of these systems is separate for every electric motor. Power section elements are situated in ACSC #3, which is located in ventilation chamber #23. The latter presents a metal box with arranged there inside module power devices on the assembly panel and alarm fittings on the front panel. As per the design this is a customized box, but it can be a commercial one as well.*

*Systems E1, E2, E3 are equipped with speed controls, also located on the assembly panel of ACSC #3.*

*Main control and operation functions implemented in the box:*

- exhaust fans speed control;*
- switch on/off of UV lamps in the section of bactericidal air treatment jointly with fans of the systems (E1, E3);*
- emergency system shutdown (power interruptions, fire).*

*Start/stopping control of electric motors E2, E3 is conducted from two button control stations located in tambour-sluicer #21.*

*System E1 control is conducted from the button control station in room #18.*

*System E4 control is conducted from the button control station in room #1.*

## **3. C1, C2.**

*ACSC #4 is a plastic box with module power and signaling fittings on the front panel. As per the project this cabinet is a customized one. Channel air conditioners are operated by wired air conditioning controls supplied as a set. All the controls are located in tambour-sluicer #21.*

*When air conditioners are switched on it is necessary to additionally switch on bactericidal air treatment sections with UV lamps by means of push-button stations located near the controls (tambour-sluicer #21). In case of a fire a signal from automatic fire alarm should come to the control box ("dry" contact).*

*4. Cables, stipulated by the project, secure connection of primary automation aids located on pieces of equipment to switch boards. Metal trays are secured to walls and ceiling by means of arm supports and are taken to the plants. From the*

*trays cables are laid to the consumers in corrugated PVC pipes immediately by plants.*

### ***3. Preparation of ACS to operation***

- 1. Check accuracy of connection in accordance with the basic circuit diagram.*
- 2. Check accuracy of connection of external circuits of system control and command and ground circuits.*
- 3. Check parameters on automatic switches in order to ensure power supply of electric motors of the fans.*

### ***4. Labor safety and protective safety measures***

*To ensure labor safety for the staff and protect them from electrocution all metal parts should be connected to the protective ground common bus.*

*Parameters of devices and automation aids are pursuant to the classification of premises.*