Explanatory note

1. General part

Project of ventilation and air conditioning systems of the 50 beds MDR-TB Department of the Central Prison Hospital MRK-15 located at the following address: Turkmenistan, Mary Region, Turkmenbashi, has been developed pursuant to:

- Normative documentation of Turkmenistan:

1) Construction Norms of Turkmenistan (CNT) 3.05.02-94 “Heating, Ventilation and air conditioning”;

2) CNT 2.08.02-05 “Public buildings and constructions”;

3) CNT 2.08.04-09 “Health-care facilities”;

4) CNT 2.01.01-98 “Building climatology”;

5) National guidelines for TB Infectious Control of Turkmenistan, Ashkhabad, 2011.

- Architectural-building and engineering drawings;
- Recommendations World Health Organization (WHO).

2. Baseline data

Tables #1 and #2 summarize inside and outside air parameters.

Design parameters of outside air

Table #1

Season of year	Parameters B air			
	t, °C	φ,%	i, kJ/kg	d, g/kg
Cold	-12	62	-9	1
Warm	36	29	64	10,9

Design parameters of inside air

Table #2

Season of year	Optimal air parameters			
	t, °C	φ,%	i, kJ/kg	d, g/kg
Cold	20	60	42	8,7
Warm	22	60	47	9,7

3. Ventilation and air conditioning

1. Premises of the MDR-TB Department are equipped with supply-exhaust ventilation system with mechanical activation integrated with air conditioning.

Premises of the department are conditionally divided into “clean” and “dirty” zones. Division into zones, regulated air exchange rates are defined pursuant to the requirements of the documents listed in p.1 Air balance for the staff premises is calculated to provide excess heat absorption, for the patients’ rooms – based on 6 air exchanges per hour (table #3).

Air Balance

Table #3

# Room	Type of room	Area of the room S, m^2	Volume of the room V, m^3	Air exchange rate per 1 hour		Supply flow rate L supply, m^3/h	Exhaust flow rate L exhaust, m^3/h
				supply	exhaust		
1	2	3	4	5	6	7	8
"Clean" zone staff							
1	Sanitary room	9,5	27,6	-	10	280 from the corridor	280
2	Chief Nurse's office	10,2	29,6	12 (As calculated)	10	360	300
3	Head of department office	5,3	15,4	12 (As calculated)	10	190	160
18	Staffroom	16,1	46,7	12 (As calculated)	10	570	470
19	Stair case	17,2	49,9	-	-	-	-
20	Corridor of the «clean» zone	9,7	29,1	As calculated	-	-	-
Rassage from "dirty" zone into "clean" zone							
21	Tambour-sluice	3,6	10,8	As calculated	-	500	-
"Dirty" zone MDR-TB Department							
4	Storage	4,3	12,5	-	6	80 from the corridor	80

5	2-bed patient room	9,5	27,6	3	6	90	170
6	Shower	6,8	19,7	-	75 m^3/h ~1 fixture	150 from the corridor	150
7	2-bed patient room	13,1	38,0	3	6	120	230
8	4-bed patient room	16,5	47,9	3	6	150	290
9	5-bed patient room	22,8	66,1	3	6	200	400
10	Stair case	17,2	49,9	-	-	-	-
11	Sanitary room	10,5	30,5	-	10	300 from the corridor	300
12	8-bed patient room	33,6	97,4	3	6	300	600
13	8-bed patient room	33,8	98,0	3	6	300	600
14	8-bed patient room	33,9	98,3	3	6	300	600
15	8-bed patient room	33,9	98,3	3	6	300	600
16	4-bed patient room	17,3	50,2	3	6	150	300
17	Medical procedures room	15,9	46,1	12	12	560	560
18	Corridor of the «dirty» zone	52,6	152,5	As calculated	-	2000	-

"Clean" premises include: premises in doctors' block; "conditionally clean" premises include: corridor of the department, medical procedures room; "dirty" – patient rooms.

2. Design and operation of ventilation systems ensure prevention of air leaking from "dirty" zones into the "clean" zones.

Premises in the "clean" zone are supposed to be under positive pressure, those in the "dirty" zone –under negative pressure.

Remaining volume of supply air is supplied into the corridor or airlocks and flows into the rooms under negative pressure through transfer grille or seams in door panels.

Designed pressure differential between the corridor and patient room equals 30 Pa.

At the border of the "dirty" and "clean" zones there is provided a tambour-sluice with excess pressure to prevent air leaking from one zone into the other.

3. The Project provides for simultaneous operation of the following ventilation systems:

- S1, E1, E3 - “dirty” zone;

- S2, E2, E4 - “clean” zone.

4. Air is supplied and exhausted in all rooms from the upper zone.

For air supply and exhaust there are provided double-row aluminum grilles with adjustable louvers and versatile diffusers. Grilles with static pressure chambers are used in patient rooms and corridor premises, thus providing uniform transfer of air along the section of the air distributor. All air diffusers have white protecting powder coating. Air flow rate is adjusted by means of throttle-valves.

5. Supply plants are located in the ventilation heat-insulated chamber on the attic. The equipment of the exhaust systems is located on the attic. Compressor-capacitor units of S1 and S2 systems are located outside on the foundation base.

6. Outdoor air is taken into the ventilation system in the clean zone at 3.6m and 4.4m height from the surface level. Outside air, supplied by supply plants (systems S1, S2), is subject to filtration with coarse filters (class G4) in accordance with the acting normative documents. Electric air heaters with total heat power of 76.6 kW are provided for heating of the supplied air. Freon air-coolers with total refrigerating power of 66.3 kW are provided for cooling of the supplied air.

7. Air conditioning by means of located in the corridors channel air conditioners (C1 and C2) with total cooling power of 24 kW is provided in order to maintain comfortable parameters of the inside air in the MDR-TB Department.

8. Design provides for open layout of air ducts in the rooms. Systems with channel air conditioners are installed in the space of false ceiling.

9. Air removed from the “dirty” zone is decontaminated in sections of bactericidal air treatment (systems E1 and E3). Air recirculated in air conditioning systems (C1, C2) is also decontaminated by UV irradiation. The section presents a channel device equipped with Philips UV lamps. Power of the used lamps is about 75W (230V).

10. Exhaust air ducts installed in the attic and supply air ducts are insulated with heat sealing foil material with a glue layer (thickness 5 mm) in order to prevent condensate dropout.

All the pipes in the cold supply system are insulated with 20 mm thick Termoflex heat insulation tubes.

4. Used equipment

The Project provides for the use of VTS supply monoblock plants manufactured, channel equipment of Systemair, Korf, compressor-compactor units of Clint, O.ERRE domestic fans and Systemair air diffusers, channel air conditioners of GREE.

Air ducts for the ventilation systems are manufactured from zinc-galvanized steel with thickness of S=0.5-1.0 mm. Round air ducts – spiral rolled, rectangular air ducts – on a mounting rail with sealed seams.

5. Noise control activities

The Project provides for the following control measures of noise caused by ventilation plants:

- arrangement of equipment in ventilation chambers;
- installation of splitter silencers and tubular silencers;
- installation of flexible inserts upstream and downstream of fan.

6. Automation

The Project provides for automation of the ventilation systems. See Project 2011-116-02/04 – AHV.

7. Electric power supply

Current electric main of the building will be used for electric power supply of the ventilation equipment.

Electrical parameters of the equipment are listed on page 1 of the Project.

Laying of additional electric mains will be conducted in compliance with the electric safety code, and fire code.