urban planning, architectural and interior design, construction, roads, plumbing and sanitation

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MECHANICAL TECHNICAL REPORT

FOR THE CONTRACT
PREPARATION OF DESIGN AND SUPERVISION FOR REPAIR AND RETROFITTING OF:

"ISMET NANUSHI JOINT HIGH SCHOOL"

LOT I
MUNICIPALITY OF DURRES

CLIENT **CONSULTANT**

This Project is Funded by the European Union

REPUBLIKA E SHQIPËRISË
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MINISTËR SHTETI PËR RINDËRTIMIN

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Air Conditioning System

1. Introduction

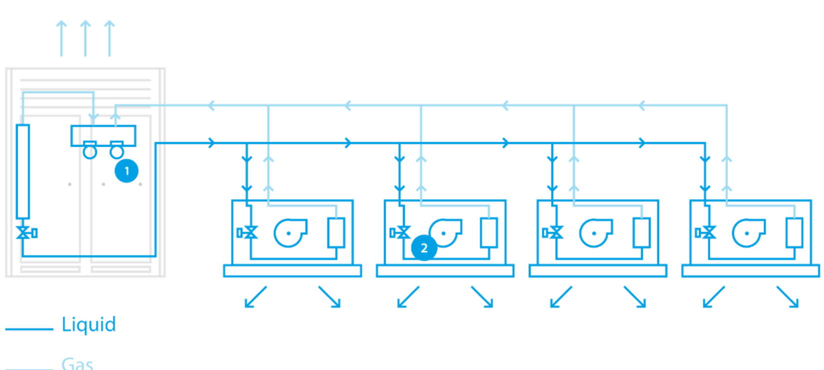
Heating, ventilation, and air conditioning (HVAC) system is designed to achieve the environmental requirements for the comfort of building occupants.

HVAC systems can be classified according to necessary processes and distribution process. The required processes include the heating process, the cooling process, and ventilation process. Other processes can be added such as humidification and dehumidification process also air quality monitoring. These processes can be achieved by using suitable HVAC equipment such as heating systems, air-conditioning systems, ventilation fans, air monitoring devices and dehumidifiers. The HVAC systems need the distribution system to deliver the required amount of air with the desired environmental condition. The distribution system mainly varies according to the refrigerant type and the delivering method such as air handling equipment, fan coils, air ducts, and pipes.

2. Selecting an energy and cost-efficient system

HVAC system selected for Ismet Nanushi school is the Variable Refrigerant Volume (VRV) system also referred to as VRF, variable refrigerant flow.

VRV is a technology that alternates the refrigerant volume in a system to match a building's precise requirements. Only a minimum amount of energy is required for a system to maintain set temperatures and ensure that it automatically shuts off when no occupants are detected in a room. This unique mechanism achieves more sustainability in the long run, as end users save on energy costs while reducing their system's carbon emissions.



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With up to 64 indoor units connected to 1 outdoor unit, the VRV system operates similar to a Multi-Split system. Each individual indoor unit determines the capacity it needs based on the current indoor temperature and requested temperature from the remote control (set point).

The total demand among all indoor units will determine how the outdoor unit adjusts the refrigerant volume and temperature accordingly. By only supplying the cooling or heating that is needed, the inverter compressor continues to save a large amount of energy during VRV operation.

3. Design Conditions

Thermo hygrometric comfort conditions (physiological wellbeing) that can be provided within the premises are subject to the use of the premises. The following data are used as references for the project.

Location	Durres
Geographic Longitude	41° 18’ 40’N 19° 26’ 21’ E
For the heating period - Winter	
Internal temperature calculation	
✓ Classrooms	20 - 22°C
✓ Corridors + service areas	18°C
Internal relative humidity	45–55%
Air speed	0.13 - 0.15 m/sek
Internal circulation	min 2 Vol/ore
Outdoor design temperature	-1 °C
External outdoor humidity	90 %
For the period of refreshment - Summer	
Internal temperature calculation	24–27°C
Internal relative humidity	50–60%
Air speed	0.16 - 0.23 m/sek
Internal circulation	min 2 Vol/ore
Temperature max. of the hot month	36 °C
External outdoor humidity	55 %

Noise level

The maximum permissible noise levels within the premises are determined by UNI 8199 and are 35 dB (A).

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4. Air Quality

Air quality is especially related with the particular use of the building, its destination and activity, pollution, etc. In order to maintain indoor acceptable conditions, natural ventilation shall be scheduled by the maintenance team.

Another aspect of air quality is the allowed speed of the air flow that circulates in the ambient due to air supply grilles. The acceptable airflow parameters in school classrooms air are prescribed according to UNI 10339 and ASHRAE 62 / 89R.

It is strongly recommended to install air quality monitoring devices after HVAC commissioning handover.

5. Heat load

Heat loads have been reviewed all factors influencing such, orientation with the horizon, adjacent zones/areas, the thermophysical characteristics of the surrounding walls, windows, floors, ceilings, etc.

Heat loss is also influenced by the zone occupancy, lighting, natural ventilation, etc., which are anticipated in the terms, discussed in advance with the architect.

Thermal loads based on the nature of the factor and the influence on the thermal balance are counted as losses or as thermal additions, however, those influencing directly are:
the number of persons present in the area;
their physical activity;
the level of lighting and installed electrical appliances;
the level of solar radiation;
air infiltration by door-window (natural ventilation).
The loads in the air conditioning systems depend on the fact that not all the premises are loaded or used in a constant manner.
Thus, this fact requires the concentration chart or the operating chart of the air conditioning plant, to relate to the typology of the system and its degree of automation, control and command.

All of these factors, as understood are not always present in the same value and with the same influence, therefore considered as a variable thermal load (loss). While in the architectural, construction, etc. building result, constant thermal loss (wall, window, door, floor, ceiling, etc.)

These factors have a constant influence on thermal loads and as such are carefully selected so that the cost of plant construction does not exceed the goal of saving energy losses and on the other hand, does not over-dimension the air conditioning system.

From the point of view of thermal capacity of the equipment, we underline that the load capacity varies considerably during the day based on the variation of the occupation of the premises. In order to avoid super-dimensioning of equipment capacities, was preliminarily analyzed the occupancy profile of the area as well as the preliminary prediction of energy consumption.

6. Adaptability and flexibility of the system

The features of the selected system are provided subject to the following criteria:

Flexibility of use, which means that the system capacity ensures variable performance during the day and in different seasons.

Flexibility in the capacity of the terminals in the destinated areas.

Being able to provide the conditions in accordance with the design criteria to ensure a satisfactory physiological wellbeing; Low cost of use and maintenance.

In order to ensure a limitation of energy consumption, the system is expected to have the following characteristics:

Modulation of system operation in function of change of occupancy over time and space (hot / cold water delivery temperature) as well as outdoor climatic parameters.

Automatic terminal response to individually adjust indoor temperature in limited intervals.

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7. Outdoor Units

Outdoor units will be installed in roof area.

8. Cooling/Heating Terminals

For kindergarten classrooms floor standing units are selected

These units ensure comfort parameters for kids because of good orientation of the air flow.
For school classrooms ducted air terminal is selected.

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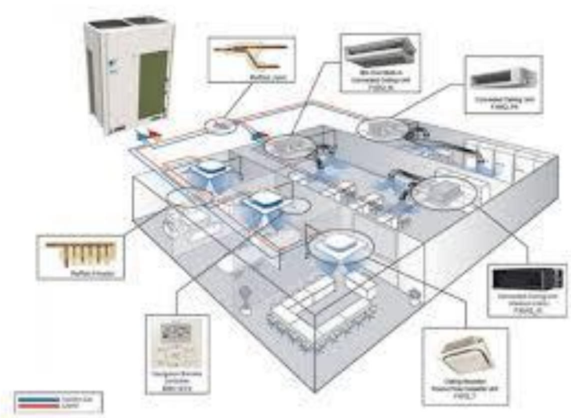
For hallways and school staff cassette units are selected.

9. Typical installation of VRV system



10. Air Supply Grilles

Grilles will be mounted in the manner shown in the drawings. These will be constructed in natural anodised aluminum. The model and the appearance of the grille must be approved by the engineer. Grilles and all its component parts should be protected from corrosion. For the installation of grills, all the necessary clamps and screws must be provided, and this deviace will be installed in the positions shown in the drawing.

11. Return Air Grilles

Return air grills will be mounted in the manner shown in the drawings. Those should have certified working chart. The grille surface will be enamelled or with epoxy powder coating. These grills should be suitable for the mounting type shown in the drawings.
Grilles and all its component parts should be protected from corrosion.

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