DESIGN OF AN AIR CONDITIONING SYSTEM FOR A SCHOOL

Project Report Submitted

by

6

EFTHIVOULOU ANDREAS M.

In part satisfaction of the conditions for the award of the Diploma of Technician Enginner in Mechanical Engineering of the Higher Technical Institute Nicosia - Cyprus.

Project Supervisor : Mr. T. Symeou, Lecturer in Mechanical Engineering, H.T.I.

Type of Project : Individual

M/501 May 1990

PROJECT NO HIGHER TECHN CIL INSTITUTE 1681

SUMMARY

The purpose of this project is to design an Air Conditioning system for a school in Xylophagou.

Architectural drawings of the building were provided and Cyprus environmental data were used in the Computer program.

Energy Conservation was considered to be of major importance.

This project is divided in three main parts.

The first part includes the calculation of the thermal load of the building for heating and cooling. Almost all the calculations was done with the computer program proivided by CARRIER.

The second part includes the system selection, then the equipment and pipe sizing and at the end the appropriate mahcinery selection from manufacturers catalogues. It includes also the detailed drawings of the system.

In the third and last part a preventive maintenance scheme for the equipment, was provided. There was also an estmated cost analysis of the system.

The whole project is divided into 9 chapters.

SECTIONS SUMMARY INTRODUCTION

PART A

CHAPTER	1: THE	RMAL TRANSMITTANCE "U-VALUE"		
	1-1	INTRODUCTION	1	
	1-2	CALCULATION OF U-VALUES	3	
	1-2.	1 External Wall	3	
	1-2.	2.2 Partition Wall 2.3 Floor 2.4 Roof		
	1-2.			
	1-2.			
	1-2.	5 Summary of U-Values	10	
CHAPTER	2: DES	IGN CONDITIONS		
	2-1	DESIGN CONDITIONS	11	
CHAPTER	3: COO	LING AND HEATING LOAD ESTIMATION		
	3-1	INTRODUCTION	12	
	3-2	HEAT TRANSFER	12	
CHAPTER	4: HEA	TING LOAD		
	4-1	INTRODUCTION	14	
	4.2	TRANSMISSION LOSSES	15	
	4.3	INFILTRATION LOSSES	15	

PAGE

20

SECTIONS

CHAPTER 5: COOLING LOAD

5-1 INTRODUCTION	16
5-2 CALCULATIONS OF COOLING LOAD	16
5-3 INFORMATION AND ASSUMPTIONS	17
5-3.1 Introduction	17
5-3.2 Exterior wall information	17
5-3.3 Roof Information	17
5-3.4 Glass Information	17
5-3.5 Shading Information	17
5-3.6 Internal loads	17
5-3.7 Infiltration	18

PART B

CHAPTER	6: SYS	TEM SELI	ECTION
	6-1	SYSTEM	SELECTION

CHAPTER	7: EQUI	PMENT AND PIPE SIZING - APPROPRIATE	
	MACH	INERY SELECTION	
	7-1	INTRODUCTION	24
	7-2	FAN COIL UNITS	24
	7-2.1	General Information	24
	7-2.2	Fan coil units selection	24
	7-3	SELECTION OF RADIATORS	27
	7-4	WATER CHILLER	28
	7-5	WATER PIPEWORK - PIPE SIZING	30
	7-6	PUMPS	34
	7-6.1	Pressure drop due to friction	34
	7-6.2	Pressure Drop Calculations	34
	7-6.3	Pump Selection	40

PAGE

SECTIONS

7-7	BOILER	
7-7.1	Selection of boiler	41
7-8	BURNER	42
7-9	FUEL OIL TANK	42
7-10	BOILER FLUE	44
7-11	EXPANSION TANK	45
7-11.1	System Pressurisation	45
7-11.2	Sizing the expansion tank	45

CHAPTER	8: MAI	NTENANCE	
	8-1	INTRODUCTION	47
	8-2	AIR FILTERS	47
	8-3	BOILER-CHIMNEY	48
	8-4	BURNER	48
	8-5	PUMPS	49
	8-6	CHILLER	49
	8-7	PIPES	49
			47

CHAPTER 9: ESTIMATED COST ANALYSIS

9–1	ESTIMATED	COST	ANALYSIS	5	0
-----	-----------	------	----------	---	---

CONCLUSIONS APPENDIX "A" APPENDIX "B" REFERENCES.

51