

HIGHER TECHNICAL INSTITUTE

MECHANICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

DESIGN OF AN AIRCONDITIONING
SYSTEM FOR A BANK BUILDING

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FOR A BANK

by

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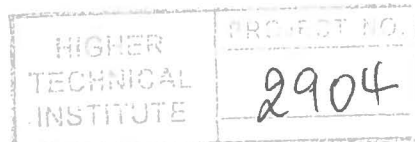
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THIS PROJECT IS DEDICATED

TO MY PARENTS
MY SISTERS
AND MY GIRLFRIEND
FOR HAVING OFFERED ME SO MUCH

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SUMMARY

The aim of this project is to design the Air Conditioning System for a bank building, which consists of a ground floor, mezzanine, first floor and second floor. These four floors consist of nine offices, two conference rooms and five open plans.

In the procedure of this project, calculations of the U-Value for the external walls, internal walls, roof, floor, ground floor, windows and doors were performed. The calculations for the cooling and heating loads were performed using the E20-II Carrier Computer program.

Also the system selection, selection of equipments, pipe sizing and cost analysis were performed.

All these are included in this project with the working drawings of the bank building.

INTRODUCTION

The science of air-conditioning may be defined as that of supplying and maintaining a desirable internal atmospheric condition irrespective of external conditions.

Full air conditioning implies the automatic control of an atmospheric environment either for the comfort of human beings or animals or for the proper performance of some industrial or scientific process. The adjective "full" demands that the purity, movement, temperature and relative humidity of the air be controlled, within the limits imposed by the design specification. Full air conditioning requires different treatments according to climate, latitude and season, but in general it involves:

- a) **In winter:** A supply of air which has been cleaned and warmed. As the warming lowers the relative humidity, some form of humidifying plant, such as spray washer with preheated and main heater whereby the humidity is under control, is generally necessary.
- b) **In summer:** A supply of air which has been cleaned and cooled. As the cooling increases the relative humidity, some form of dehumidifying plant is essential. This dehumidifying is generally accomplished by exposing the air to cold surfaces on cold spray, whereby the excess moisture is condensed and the air is left saturated at lower temperatures. The temperature of the air has then to be increased, to give a more agreeable relative humidity. This can be done by warming or by mixing it air which has not been cooled.

The essential feature of air conditioning is that it aims to produce an environment which is comfortable to the majority of the occupants. The ultimate in comfort can never be achieved but the use of individual automatic control for individual rooms helps considerably in satisfying most people.

Equipment can be classified in these groups

- 1) All-air systems
- 2) Unitary or packaged systems
- 3) Air-water systems

In order to provide suitable Air Conditioned Environments, it is essential that equipment of the proper capacity is installed and controlled throughout the year. The equipment capacity is determined by the actual instantaneous peak load requirements; type of control is determined by the conditions to be maintained during peak and partial load. Generally, it is impossible to measure either the actual peak or the partial load in any given space; these loads must be estimated.

Before the load can be estimated, it is imperative that a comprehensive survey be made to assure accurate evaluation of the load components. If the building facilities and the actual instantaneous load within a given mass of the building are carefully studied, an economical equipment selection and system design can result, and smooth, trouble free performance is then possible.

The heat gain or loss is the amount of heat instantaneously coming into or going out of the space. The actual load is defined as that amount of heat which is instantaneously added or removed by the equipment. The instantaneous heat gain and the actual load on the equipment will rarely be equal, because of the thermal inertia or storage effect of the building structures surrounding a conditioned space.

The building is a bank in Limassol consists of four floors (Ground Floor, Mezzanine, 1st Floor and 2nd Floor).

The architectural drawing were given.

For the estimation of the air-conditioning loads the following design conditions were used:

Ambient Conditions:

Summer 38°C db, 29.2°C wb

Winter 3°C db, 49% rh.

Internal Conditions:

Summer 23°C db, 49% wb

Winter 23°C db, 49% rh.