

HIGHER TECHNICAL INSTITUTE

ELECTRICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

DESIGN OF THE ELECTRICAL INSTALLATION  
OF A FACTORY

E / 1048

BY: ANDREOU KATERINA

JUNE 1997

**DESIGN OF THE ELECTRICAL INSTALLATION  
OF A FACTORY**

**Project report submitted by:**

**ANDREOU KATERINA**

**In part satisfaction of the award of Diploma of Technical  
Engineer in Electrical Engineering of the Higher Technical  
Institute, Cyprus.**

**Project Supervisor: E. Michael  
Lecturer in Electrical Engineering  
Department, H.T. I.**

**JUNE, 1997**



## **ACKNOWLEDGEMENTS**

I would like to express my sincere appreciation and thanks, for their valuable help and guidance to prepare this project to:

- a. My project supervisor Mr E. Michael lecturer in Electrical Engineering in H.T.I.
- b. Yioula Kalorkoti who typed this project.

# CONTENTS

ACKNOWLEDGEMENTS	i
CONTENTS	ii
GENERAL INFORMATION	1
INTRODUCTION	2
<b><u>CHAPTER 1: Lighting</u></b>	
1.1. Introduction	5
1.2. Definitions and units	7
1.3. Clare	10
1.4. Flicker and Stroboscopic effect	11
1.5. The Lumen method of design	11
1.6. Illuminatin calculations	13
1.7. Lighting load - General	17
1.8. Lighting design prosedure	18
1.9. Lighting load calculations	21
<b><u>CHAPTER 2: Sockets</u></b>	
2.1 General information	26
2.2 Socket outlet calculations	27

### **CHAPTER 3: Motors**

3.1. Installation of Motors	37
3.2. Y/D starter	38
3.3. Motor load Analysis procedure	41
3.4. Motor load calculations	45

### **CHAPTER 4: Distribution boards**

4.1. General Information	49
4.2. Distribution board calculations	53
4.3. Commulative voltage drops	62
4.4. Trunking size	65

### **CHAPTER 5: Earthing**

5.1. Introduction	67
5.2. Methods of earthing	68
5.3. Earth Loop Impedance	71
5.4. Test for effectiveness of earthing	72

### **CHAPTER 6: Inspection and Testing**

6.1 Tests	73
6.2 How to do Testing	76

## **CHAPTER 7: Fire alarm system**

7.1. Purpose of installing such a System	79
7.2. Manual fire alarm systems	79
7.3. Automatic fire alarm systems	82
7.4. Detectors	83
7.5. General regulations for the installation of fire detectors	89
7.6. Control Units	90
7.7. Results	92

## **CHAPTER 8: Costing**

8.1. Methods of costing	93
8.2. General Information	94
8.3. Calculations - results	98

## **CONCLUSIONS** 108

## **REFERENCES** 109

## **APPENDICES** 110

### **APPENDIX 1: Lighting requirements**

#### 1.1. Technical tables

**APPENDIX 2:** Overload relays

2.1. Technical tables

**APPENDIX 3:** Circuit breakers

3.1. Technical tables

**APPENDIX 4:** Earthing arrangements

4.1. Systems of Earthing

**APPENDIX 5:** Fire alarm systems

5.1. System 1002

5.2. Break - Glass Callpoints

5.3. Audible Alarm devices

5.4. Smoke detectors

5.5. Design and Installation limitations of smoke detectors

5.6. Design and Installation limitation of heat detectors

## GENERAL INFORMATION

This project report is about,

The design of the Electrical Installation of a clothing factory.

### Objectives:

- (1) To design the complete electrical installation of a factory.
- (2) To study the illumination engineering work involved and determine the lighting load of the factory accordingly.
- (3) To provide all necessary diagrams schedule of materials and costing including labour.
- (4) To design a fire alarm system.

### Terms and Conditions:

- (1) Voltage 415/240V, 50HZ
- (2) Details of the plan layout of the factory together with details of load will be provided.
- (3) CIBS code will be considered in calculating levels of illumination.
- (4) The Cyprus Fire Brigade recommendations will be taken into account, for the fire alarm design work.
- (5) The Cyprus Fire Bridge recommendations will be taken into account, for the fire alarm design work.



## INTRODUCTION

The design of the electrical installation of this Clothing factory is based on the 16<sup>th</sup> Edition of the I.E.E. regulations.

The earthing system of supply is the TT system.

### **CHAPTER 1:**

It deals with the illumination work and the lighting load calculations.

The Lumen method of design is used for the calculation of the number of luminaires to be installed in the factory.

All the final results are shown in a table form.

### **CHAPTER 2:**

It deals with the socket load calculations. All the final results are shown in a table form.