

DESIGN OF THE ELECTRICAL SERVICES

OF A FACTORY

by

Miltiadou Miltos

Project Report

Submitted to

the Department of Electrical Engineering

of the Higher Technical Institute

Nicosia Cyprus

in partial fulfillment of the requirements

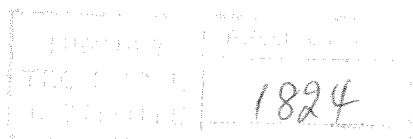
for the diploma of

TECHNICIAN ENGINEER

in

ELECTRICAL ENGINEERING

June 1991



## ACKNOWLEDGEMENTS

I would like to express my thanks to my project supervisor, Mr. G. Kourtellis, for his guidance during the whole process of this project.

Also I would like to thank all those unnamed who in anyway offered me their valuable assistance.

Finally, I would like to thank Mr. Yiannis Neophytou for his goodwill in typing this project work.

MILTIADOU MILTOS

## ABSTRACT

This project work "The design of electrical services of a factory" deals with the electrical installation of a factory. The main objectives are:

1. To design the complete electrical installation.
2. To study the illumination engineering work involved and determine the lighting load accordingly.
3. To provide all necessary diagrams, schedule of materials and costing including labour.

The terms and conditions are:

1. Architectural drawing will be provided.
2. Three phase 415V rms 50Hz and single phase 240V rms 50Hz shall be considered with the TT earthing system.
3. The IEE Wiring Regulations 15th Edition as currently amended and the local EAC conditions of supply must be complied with in the design of the installation.
4. In designing the lighting load the C.I.B.S code must be considered.

## CONTENTS

	Page
<b>ACKNOWLEDGEMENTS</b>	i
<b>CONTENTS</b>	ii
<b>ABSTRACT</b>	iv
<b>INTRODUCTION</b>	v
<b>CHAPTER 1 - ILLUMINATION</b>	
- 1.1. Introduction	1
- 1.2. Definitions and units	1
- 1.3. Flicker and Stroboscopic effect	4
- 1.4. Glare	5
- 1.5. Types of lamps	5
- 1.6. Choice of light source	6
- 1.7. Illumination design procedure	6
- 1.8. Calculations	7
<b>CHAPTER 2 - LIGHTING LOAD ANALYSIS AND CALCULATIONS</b>	
- 2.1. Introduction - General	10
- 2.2. Lighting load calculation	10
- 2.3. Conduit sizing	14
<b>CHAPTER 3 - SOCKET OUTLETS</b>	
- 3.1. Introduction - General	18
- 3.2. Calculation	18
- 3.3. Conduit sizing	23
<b>CHAPTER 4 - POWER</b>	
- 4.1. Installation of induction motors	25
- 4.2. Installation of electric motors	25
- 4.3. Y/ $\Delta$ starter	26
- 4.4. Calculations	27
- 4.5. Conduit sizing	29

---

<b>CHAPTER 5 - DISTRIBUTION BOARDS</b>	
- 5.1. Introduction	32
- 5.2. Interconnecting cables	33
- 5.3. Cable sizing	38

---

<b>CHAPTER 6 - EARTHING</b>	
- 6.1. General	40
- 6.2. What is earthing ?	40
- 6.3. Definitions	40
- 6.4. Types of earthing systems	42
- 6.5. Earth Fault Loop Impedance	43
- 6.6. Methods of earthing	45

---

<b>CHAPTER 7 - INSPECTION &amp; TESTING</b>	
- 7.1. Introduction	47
- 7.2. Visual inspection	47
- 7.3. Testing	48
- 7.4. Completion Certificate	50

---

<b>CHAPTER 8 - POWER FACTOR</b>	
- 8.1. Introduction	51
- 8.2. Consequences of low power factor	51
- 8.3. Methods of power factor correction	52

---

<b>CHAPTER 9 - FAULT LEVEL CALCULATIONS</b>	54
---------------------------------------------	----

---

<b>CHAPTER 10 - COSTING</b>	
- 10.1. Material costing	59
- 10.2. Labour costing	62

---

<b>SINGLE LINE DIAGRAMS</b>	
-----------------------------	--

---

<b>APPENDICES</b>	
-------------------	--

---