NEAR EAST UNIVERSITY

Faculty of Engineering

Department of Electrical & Electronic Engineering

ELECTRICAL INSTALLATION

Graduation Project
EE-400

Students: İsmail Burak Demir
(20031256)

Supervisor: Asst. Professor Dr.
Özgür C. Özerdem

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ABSTRACT

This project consists of deployment of an electrical installation in a building with 4 floors, 2 large dining halls, terraces, water closets, halls and waiting rooms. Since the building is to be used as a restaurant, each deployment task is made according to this concept.

In order to draw the illumination installation design and to provide satisfactory results for the appropriate customer, taking the 75 lux values as a reference from the "Least luminance levels table", which is available in the attachment, and taking the 3.15 meter height of the ceiling and the size of the saloons into the calculation, it has been found that 150 lux value is appropriate for this project.

After choosing 150 units of lux value, the illumination calculations has been made according to the "k index" illumination formula for each of the rooms, halls, saloons, kitchens, water closets, and stairs. To be able to choose the equipment that is going to be used, several investigations have been made on the internet and other resources which provide examples to illumination solutions. In addition to that, the armature we are to use has been chosen according to the calculations and the optimum level of energy savings.

The sockets to be used in the project have not been deployed in water closets and similar places that have a possibility of being humid and wet. For the rest of the places the installations have been deployed according to the usage areas and its corresponding symbols are placed on the AutoCAD programme. Air conditioners have been appropriately chosen and placed so that they are effective along the dining halls and efficient altogether.

After these entire installations are done, a distribution panes has been placed on each floor and socket installations have been applied as a ring type and connected to the distribution panels.

These distribution panes have been connected to the main distribution pane on the ground floor. The current schema of the electric installation is deployed with speical cables and fuses to improve the ease of removal of the installation.

To make the project a professional electrical engineer work and a professional installation, certain projects and drawings of engineers have been taken as a guidance resource. These projects and the standards of KKTC installations have been thoroughly examined in order to build an electrical installation in accordance with standards and quality levels of professional installations.

CONTENTS

INTRODUCTION

Electricity is the most common and popular form of energy used in all types of buildings including residential, commercial and industrial. However, through inappropriate design of the power distribution systems and misuse of electrical equipment in buildings, it also costs us dearly in terms of losses as far as energy efficiency is concerned.

Electricity must be installing the structure for the use in the usage areas. And this installation must be done from the engineers. Engineers calculate all the installation for the best usage areas. This calculations and installations are can call electrical and illumination calculations and installations.

For illumination installation we can say illumination is the important think to make easy life and good efficiency present. Illumination is in general consisting of generation, distribution, economy and measurement of light. Physically illumination important to see object, colours and details easily the first aim to design for.

To improve technology there is important decorative illumination which consists esthetical details more than showing the object. High intensity colours and flashing lights are used which called advertisement according to source light, illumination is divided in to two categories. First one is Natural which deals with distributing the natural light evenly and used of artificial lights with natural light efficiency. Second one is called Artificial which deals with electrical light sources like incandescent light, fluorescent light and LED's.

And also there are two type areas to illuminate by the illuminating the close mediums is called interior plan or surfaces like the ceiling and walls to illuminate the medium . Second one is called exterior illumination which illuminated design uses for exterior areas by light sources as direct illumination roads, spent fields, parks etc.

There is used interior illumination method in this project. The way to design an electrical project used AutoCad to installation component of the illumination.

1. HISTORICAL REVIEW OF INSTALLATION WORK

As one might expect to find in the early beginnings of any industry, the application, and the methods of application, of electricity for lighting, heating and motive power was primitive in the extreme. Large-scale application of electrical energy was slow to develop. The first wide use of it was for lighting in houses, shops and offices. By the 1870s, electric lighting had advanced from being a curiosity to something with a definite practical future. Arc lamps were the first form of lighting, particularly for the illumination of main streets. When the incandescent –filament lamp appeared on the scene electric lighting took on such a prominence that it severely threatened the use of gas for this purpose. But it was not until cheap and reliable metal-filament lamps were produced that electric lighting found a place in every home in the land. Even then, because of the low power of these early filament lamps, shop windows continued for some time to be lighted externally by arc lamps suspended from the fronts of buildings.

The earliest application of electrical energy as an agent for motive power in industry is still electricity's greatest contribution to industrial expansion. The year 1900 has been regarded as a time when industrialists awakened to the potential of the new form of power.

Electricity was first used in mining for pumping. In the iron and steel industry, by 1917, electric furnaces of both the arc and induction type were producing over 100.000 tons of ingots and castings. The first all-welded ship was constructed in 1920; and the other ship-building processes were operated by electric motor power for punching, shearing, drilling machines and woodworking machinery.

The first electric motor drives in light industries were in the form of one motor-unit per line of shafting. Each motor was started once a day and continued to run throughout the whole working day in one direction at a constant speed. All the various machines driven from the shafting were started, stopped, reversed or changed in direction and speed by mechanical means.

The development of integral electric drives, with provisions for starting, stopping and speed changes, led to the extensive use of the motor in small kilowatt ranges to drive an associated single machine, e.g. a lathe. One of the pioneers in the use of motors was the firm of Bruce Peebles, Edinburgh. The firm supplied, in the 1890s, a number of weatherproof, totally-enclosed motors for quarries in Dumfriesshire, believed to be among the first of their type in Britain. The first electric winder ever built in Britain was supplied in 1905 to a Lanark oil concern. Railway electrification started as long ago as 1883, but it was not until long after the turn of this century that any major development took place.

Electrical installations in the early days were quite primitive and often dangerous. It is on record that in 1881, the installation in Hatfield House was carried out by an aristocratic amateur. That the installation was dangerous did not perturb visitors to the house who "...when the naked wires on the gallery ceiling broke into flame ... nonchalantly threw up cushions to put out the fire and then went on with their conversation".

Many names of the early electrical pioneers survive today. Julius Sax began to make electric bells in 1855, and later supplied the telephone with which Queen Victoria spoke between Osborne, in the Isle of Wight, and Southampton in 1878. He founded one of the earliest purely electrical manufacturing firms which exists today and still makes bells and signalling equipment.

The General Electric Company had its origins in the 1880's as a company which was able to supply every single item which went to form a complete electrical installation. In addition it was guaranteed that all the components offered for sale were technically suited to each other, were of adequate quality and were offered at an economic price.

Specialising in lighting. Falk Stadelman & Co. Ltd began by marketing improved designs of oil lamps then gas fittings, and ultimately electric lighting fittings.

Cable makers W.T. Glover & Co. were pioneers in the wire field. Glover was originally a designer of textile machinery, but by 1868 he was also making braided steel wires for the then fashionable crinolines. From this type of wire it was a natural step to the production of insulated conductors for electrical purposes. At the Crystal Palace Exhibition in 1885 he showed a great range of cables; he was also responsible for the wiring of the exhibition.

The well-known J. & P. firm (Johnson & Philips) began with making telegraphic equipment, extended to generators and arc lamps, and then to power supply.

The coverings for the insulation of wires in the early days included textiles and gutta-percha. Progress in insulation provisions for cables was made when vulcanised rubber was introduced, and it is still used today. The first application of a lead sheath to rubber-insulated cables was made by Siemens Brothers. The manner in which we name cables was also a product of Siemens Brothers. The manner in which we name cables was also a product of Siemens, whose early system was to give a cable a certain length related to a Standard resistance of 0.1 ohm. Thus a No. 90 cable in their catalogue was a cable of which 90 yards had a resistance of 0.1 ohm. Cable sizes were also generally known by the Standard Wire Gauge.

For many years ordinary VRI cables made up about 95 per cent of all insulations. They were used first in wood casing, and then in conduit. Wood casing was a very early invention. It was introduced to separate conductors, this separation being considered a necessary safe-guard against the two wires touching and so causing fire. Choosing a cable at the turn of the century was quite a task. From one catalogue alone, one could choose from fifty-eight sizes of wire, with no less than fourteen different grades of rubber insulation. The grades were described by such terms as light, high medium or best insulation. Nowadays there are two grades of insulation: up to 600 V and 600 V /1,000 V. And the sizes of cables have been reduced to a more practicable seventeen.

During the 1890s the practice of using paper as an insulating material for cables was well established. One of the earliest makers was the company which later became a member of the present-day BICC Group. The idea of using paper as an insulation material came from America to Britain where it formed part of the first wiring system for domestic premises. This was twin lead sheathed cables. Bases for switches and other accessories associated with the system were of cast solder, to which the cable sheathing was wiped, and then all joints sealed with a compound. The compound was necessary because the paper insulation when dry tends to absorb moisture.

In 1911, the famous 'Henley Wiring System 'came on the market. It comprised flat-twin cables with a lead-alloy sheath. Special junction boxes, if properly fixed, automatically affected good electrical continuity. The insulation was rubber. It became very popular. Indeed, it proved so easy to install that a lot of unqualified people appeared on the contracting scene as 'electricians'. When it received the approval of the IEE Rules, it became an established wiring system and is still in use today.

At the time the lead-sheathed system made its first appearance, another rival wiring system also came onto the scene. This was the CTS system (cab-tyre-sheathed). It arose out of the idea that if a rubber product could be used to stand up to the wear and tear of motor-car tyres on roads, then the material would well be applied to cover cables. The CTS name eventually gave way to TRS (tough-rubber sheath), when the rubber-sheathed cable system came into general use.

The main competitor to rubber as an insulating material appeared in the late 1930s. This material was PVC (polyvinylchloride), a synthetic material which came from Germany. The material, though inferior to rubber so far as elastic properties were concerned, could withstand the effects of both oil and sunlight. During the Second World War PVC, used both as wire insulation and the protective sheath, became well established.

As experience increased with the use of TRS cables, it was made the basis of modified wiring systems. The first of these was the Callender farm-wiring system introduced in 1937. This was tough-rubber sheathed cables with a semi-embedded braiding treated with a green –coloured compound. This system combined the properties of ordinary TRS and HSOS (house-service overhead system) cables.

So far as conductor material was concerned, copper was the most widely used? But aluminium was also applied as a conductor material. Aluminium, which has excellent electrical properties, has been produced on a large commercial scale since about 1890. Overhead lines of aluminium were first installed in 1898. Rubber-insulated aluminium cables of 3/0.036 inch and 3/0.045 inch were made to the order of the British Aluminium Company and used in the early years of this century for the wiring of the staff quarters at Kinlochleven in Argyllshire. Despite the fact that lead and lead-alloy proved to be of great value in the sheathing of cables, aluminium was looked to for a sheath of, in particular, light weight. Many experiments were carried out before a reliable system of aluminium-sheathed cable could be put on the market.

Perhaps one of the most interesting systems of wiring to come into existence was the MICS (mineral-insulated copper-sheathed cable) which used compressed magnesium oxide as the insulation, and had a copper sheath and copper conductors.

The cable was first developed in 1897 and was first produced in France. It has been made in Britain since 1937, first by Pyrotenax Ltd, and later by other firms. Mineral insulation has also been used with conductors and sheathing of aluminium.

One of the first suggestions for steel used for conduit was made in 1883. It was then called 'small iron tubes '. However, the first conduits were of bitumised paper. Steel for conduits were of bitumised paper. Steel for conduits did not appear on the wiring scene until about 1895. The revolution in conduit wiring dates from 1897, and is associated with the name'Simplex'

Which is common enough today. It is said that the inventor, L. M. Waterhouse, got the idea of close-joint conduit by spending a sleepless night in a hotel bedroom staring at the bottom rail of his iron bedstead. In 1898 he began the production of light gauge close-joint conduits. A year later the screwed-conduit system was introduced.

Non-ferrous conduits were also a feature of the wiring scene. Heavy-gauge copper tubes were used for the wiring of the Rylands Library in Manchester in 1886. Aluminium conduit, though suggested during the 1920s, did not appear on the market until steel became a valuable material for munitions during the Second World War.

Insulated conduits also were used for many applications in installation work, and are still used to meet some particular installation conditions. The 'Gilflex' system, for instance, makes use of a PVC tube which can be bent cold, compared with earlier material which required the use of heat for bending.

Accessories for use with wiring systems were the subject of many experiments; many interesting designs came onto the market for the electrician to use in his work. When lighting became popular, there arose a need for the individual control of each lamp from its own control point. The 'branch switch' was used for this purpose. The term ' switch ' came over to this country from America , from railway terms which indicated a railway ' point ' , where a train could be ' switched ' from one set of tracks to another. The 'switch', so far as the electric circuit was concerned, thus came to mean a device which could switch an electric current from one circuit to another.

It was Thomas Edison who, in addition to pioneering the incandescent lamp, gave much thought to the provision of branch switches in circuit wiring. The term 'branch' meant a tee-off from a main cable to feed small current-using items. The earliest switches were of the 'turn' type, in which the contacts were wiped together in a rotary motion to make the circuit. The first switches were really crude efforts: made of wood and with no positive ON or OFF position. Indeed, it was usual practice to make an inefficient contact to produce an arc to 'dim' the lights! Needless to say, this misuse of the early switches, in conjunction with their wooden construction, led to many fires.

But new materials were brought forward for switch construction such as slate, marble, and, later, porcelain. Movements were also made more positive with definite ON or OFF positions.

The 'turn' switch eventually gave way to the 'tumbler' switch eventually gave way to the 'tumbler' switch in popularity. It came into regular use about 1890. Where the name 'tumbler' originated is not clear; there are many sources, including the similarity of the switch action to the antics of Tumbler Pigeons. Many accessory names which are household words to the electricians of today appeared at the turn of the century: Verity's McGeoch, Tucker and Crabtree.

Further developments to produce the semi-recessed, the flush, the ac only, and the 'silent' switch proceeded apace. The switches of today are indeed of long and worthy pedigrees.

It was one thing to produce a lamp operated from electricity. It was quite another thing to device a way in which the lamp could be held securely while current was flowing in its circuit. The first lamps were fitted with the wire tails for joining to terminal screws. It was Thomas Edison who introduced, in 1880, the screw-cap which still bears his name. It is said he got the idea from the stoppers fitted to kerosene cans of the time. Like much another really good idea, it superseded all its competitive lamp holders and its use extended through America and Europe. In Britain, however, it was not popular. The bayonet-cap type of lamp holder was introduced by the
Edison & Swan Co. about 1886. The early type was soon improved to the lamp holders we know today

Ceiling roses, too, have an interesting history; some of the first types incorporated fuses. The first rose for direct attachment to conduit came out in the early 1900s, introduced by Dorman & Smith Ltd.

The first patent for a plug and socket was brought out by Lord Kelvin, a Pioneer of electric wiring systems and wiring accessories. The accessory was used mainly for lamp loads at first, and so carried very small currents.

However, domestic appliances were beginning to appear on the market, which meant that sockets had to carry heavier currents. Two popular items were irons and curling-tong heaters. Shuttered sockets were designed by Crompton in 1893. The modern shuttered type of socket appeared as a prototype in 1905, introduced by 'Diamond H'. Many sockets were individually fused, a practice which was later extended to the provision of a fuse in the plug. These fuses were, however, only a small piece of wire between two terminals and caused such a lot of trouble that in 1911 the Institution of Electrical Engineers banned their use.

One firm which came into existence which the socket-and-plug was M.K. Electric Ltd. The initials were for 'Multi-Kontakt' and associated with a type of socket-outlet which eventually became the Standard design for this accessory. It was Scholes, under the name of 'Wylex', who introduced a revolutionary design of plug-and-socket: a hallow circular earth pin and rectangular current-carrying pins. This was really the first attempt to 'polarise', or to differentiate between live, earth and neutral pins.

One of the earliest accessories to have a cartridge fuse incorporated in it was the plug produced by Dorman & Smith Ltd. The fuse actually formed one of the pins, and could be screwed in or out when replacement was necessary. It is a rather long cry from those pioneering days to the present system of standard socket-outlets and plugs.

Early fuses consisted of lead wires; lead being used because of its low melting point. Generally, devices which contained fuses were called 'cut-outs', a term still used today for the item in the sequence of supply-control equipment entering a building. Once the idea caught on of providing protection for a circuit in the form of fuses, brains went to work to design fuses and fuse gear. Control gear first appeared encased in wood. But ironclad versions made their due appearance, particularly for industrial use during the nineties. They were usually called 'motor switches', and had their blades and contacts mounted on a slate panel. Among the first companies in the switchgear field were Bill & Co., Sanders & Co. and the MEM Co., whose 'Kantark' fuses are so well known today. In 1928 this company introduced the 'splitter' which affected a useful economy in many of the smaller installations.

It was not until the 1930s that the distribution of electricity in buildings by means of busbars came into fashion, though the system had been used as far back as about 1880, particularly for street mains.

In 1935 the English Electric Co. introduced a busbar trunking system designed to meet the needs of the motor-car industry. It provided the overhead distribution of electricity into which system individual machines could be tapped wherever required; this idea caught on and designs were produced and put onto the market by Marryat & Place, GEC and Ottermill.

Trunking came into fashion mainly because the larger sizes of conduit proved to be expensive and troublesome to install. One of the first trunking types to be produced was the ‘spring conduit’ of the Manchester firm of Key Engineering. They showed it for the first time at an electrical exhibition in 1908. It was semi-circular steel troughing with edges formed in such a way that they remained quite secure by a spring action after being pressed into contact. But it was not until about 1930 that the idea took root and is now established as a standard wiring system.

2. HISTORICAL REVIEW OF WIRING REGULATIONS

The history of the development of non-legal and statutory rules and regulations for the wiring of buildings is no less interesting than that of wiring systems and accessories. When electrical energy received a utilisation impetus from the invention of the incandescent lamp, many set themselves up as electricians or electrical wiremen. Others were gas plumbers who indulged in the installation of electrics as a matter of normal course. This was all very well: the contracting industry had to get started in some way, however ragged. But with so many amateurs troubles were bound to multiply. And they did. It was not long before arc lamps, sparking commutators, and badly insulated conductors contributed to fires. It was the insurance companies which gave their attention to the fire risk inherent in the electrical installations of the 1880s.

Foremost among these was the Phoenix Assurance Co., whose engineer, Mr. Heapy, was told to investigate the situation and draw up a report on his findings.

The result was the phoneix Rules of 1882. The Rules were produced just a few months after those of the American Board of Fire Underwriters who are credited with the issue of the first wiring rules in the world.

The phoneix Rules were however, the better set and went through many editions before revision was thought necessary. That these Rules contributed to a better Standard of wiring, and introduced a high factor of safety in the electrical wiring and equipment of buildings, was indicated by a report in 1892 which showed the high incidence of electrical fires in the USA and the comparative freedom from fires of electrical origin in Britain.

Three months after the issue of the Phoneix Rules for wiring in 1882, the Society of Telegraph Engineers and Electricians (now the Institution of Electrical Engineers) issued the first edition of Rules and Regulations for the Prevention of Fire Risks arising from Electric Lighting. These rules were drawn up by a committee of eighteen men which included some of the famous names of the day: Lord Kelvin, Siemens and Crompton. The Rules, however, were subjected to some criticism. Compared with the phoenix Rules they left much to be desired. But the Society was working on the basis of laying down a set of principles rather than, as Heapy did, drawing up a guide or 'Code of Practice'. A second edition of the Society's Rules was issued in 1888. The third edition as issued in 1897 and entitled General Rules recommended for wiring for the supply of Electrical Energy.

The rules have since been revised at fairly regular intervals as new developments and the results of experience can be written in for the considered attention of all those concerned with the electrical equipment of buildings. Basically the regulations were intended to act as a guide for electricians and others to provide a degree of safety in the use of electricity by inexperienced persons such as householders. The regulations were, and still are, not legal; that is, they cannot be enforced by the law of the land. Despite this apparent loophole, the regulations are accepted as a guide to the practice of installation work which will ensure, at the very least, a minimum Standard of work. The Institution of Electrical Engineers (IEE) was not alone in the insistence of good standards in electrical installation work. In 1905, the Electrical Trades Union, through the London District Committee, in a letter to the Phoenix Assurance Co., said '.... They view with alarm the large extent to which bad work is now being carried out by electric light contractors .... As the carrying out of bad work is attended by fires and other risks, besides injuring the Trade, they respectfully ask you to ... uphold a higher Standard work '.

The legislation embodied in the factory and workshop acts of 1901 and 1907 had a considerable influence on wiring practice. In the latter Act it was recognized for the first time that the generation, distribution and use of electricity in industrial premises could be dangerous. To control electricity in factories and other premises a draft set of Regulations was later to be incorporated into statutory requirements.

While the IEE and the statutory regulations were making their positions stronger, the British Standards Institution brought out, and is still issuing, Codes of Practice to provide what are regarded as guides to good practice. The position of the Statutory Regulations in this country is that they form the primary requirements which must by law be satisfied. The IEE Regulations and codes of practice indicate supplementary requirements. However, it is accepted that if an installation is carried out in accordance with the IEE Wiring Regulations, then it generally fulfils the requirements of the Electricity Supply Regulations. This means that a supply authority can insist upon all electrical work to be carried out to the standard of the IEE Regulations, but cannot insist on a standard which is in excess of the IEE requirements.

The position of the IEE 'Regs', as they are popularly called, is that of being the installation engineer's 'bible'. Because the Regulations cover the whole field of installation work, and if they are complied with, it is certain that the resultant electrical installation will meet the requirements of all interested parties. There are, however, certain types of electrical installations which require special attention to prevent fires and accidents. These include mines, cinemas, theatres, factories and places where there are exceptional risks.

3. RULES OF THE PROJECT

At drawing the electrical installation projects the current lines have to be 0.4 mm - 0.5 mm the low current lines have to be 0.2 mm – 0.3 mm the armatures , switches , sockets , etc … and the symbols of electrical devices have to be draw with 0.2 mm

We have to use writing template or number template when writing to Project.

The power calculating and the electrical installation Project have to be suitable to the rules of "TÜRK STANDARTLARI BAYINDIRLIK BAKANLIĞI ELEKTRİK TEKNİK ŞARTNAMESİ". At the drawing electrical installation Project the high of the electrical switches and electrical sockets, wall lamps and signal buttons. From ground are important.

At the practise

Devices :	**high from ground :**
Switches	.... 150 cm
Sockets	.... 40 cm
Wall lamps	.... 190 cm
Conduit boxes	.... 220 cm
Fuse box line	.... 200 cm

Are putted higher from the ground. The devices have to put 30 cm far from door case and have to put 50 cm. far from window case.

And in modern buildings the switches have to put 100 cm – 110 cm higher from the ground in ground floor the sockets have to put as higher as like the switches just in case the water flood.

Nowadays improved cable channel and connecting devices with sockets have to put shorter then 40 cm high on the ground and wall.

In floor plans, power line plans lines and at the outlet the number of cable, crosscut and models with pipe model and its sizes are showed.

The power lines and the electric cable lines have to be numerated and this numbers are repeated a long the power lines and electric cable lines , the power lines are showed square , the electric cable lines are showed by circle.

At the electrical installation Project specially the column and the chimney etc... The architectural detailed have to state.

At the wet ground (toilets and bathroom) using the conduit box, switches, and the sockets are not permutated. The conduit box, switches and the sockets have to put to outside this place.

When we want to put a socket inside of the bathroom it is useful to use a special water leak proof socket.

The electric meter have to put a place where without damp , without dust , harmful heating changing weather like this and have to put a place that the competent can find and make control easily without asking the person who live .

In houses every subscriber can put the electric meter outside the own door, over the wall in the well hole, inside the covered parts or a ground where well weather coming dry and suitable places

The electric meter can putted to the first enter in the places like shops, bureau, Office, etc... where the manager to see fit.

By the practise in the apartments the electric meter are putted to the ground floor in the electric meter panel.

The electric meter which has to be putted the dusted places and open area must putt the electric meter panel which made from galvanized iron.

The illumination line and socket line have to separate electric cable lines have to be numbered according to the exit and secondary panel (the numbers putted in circle).

The illumination and socket cable lines are protected by the circuit breaker. The short circuit current of the circuit breakers has to be at least 3 KA. The voltage loss has to calculate for the longest and the highest line. We can not draw a line surrounding of chimneys or columns at the Project. The switches, sockets, have to be put to a different place from chimneys and columns.

We can not put on joist or columns or near the joist or columns switches or sockets.

The electrical meter have to put to an enter of well hole in a box which have to be made from galvanization sheet.

At drawing the electrical installation projects and at the practise the lamp lines and the socket lines have to be different.

It can be connecting to the lamp line at most nine (9) lamps for the socket line it can be connecting at most seven (7) sockets.

But only the washing machine, dishwasher, and oven must have a along line and the power are different from the others

Electrical device ------------------------	Power
Washing machine	2.5 kW.
Dish washer	2.5 kW.
Oven	2.0 kW.

By calculating the power we have to suitable this rule.

- As much as to eight (8) kw............60 %
- For the rest of power ....40 %

By the practise we can use Bergman pipe under the plaster and on the plaster. But the plastic pipe can use only under the plaster.

4. THE PROCESS ROW FOR THE ILLUMINATION DRAWING PROJECTS

With the helping the architectural plan and using plan 1/50 or 1/100 measure is drawn. If the using plan is not drawn , the information about the using purpose are taken from the owner of the goods oven , washing machine , dishwasher refrigerator places and where the socket , putted are important especially houses.

The places of the second table are has to be pointed. The second table has to be putted near the hole in the enter of the house and near the enter door.

In houses there have to be at least 2 illumination electrical cables lines. To take place. So the of illumination armature types and power of armatures and types of switches are shown when the illumination electric cable number are shown, nine (9) illumination putted can be connected to the area illuminated electric cable

According to the instructions 2 separate socket cable have to be putted kitchen for dishwasher and electrical oven, 1 separate socket cable line has to be putted in bathroom for the washing machine. Maximum seven (7) socket outlet can be connected to the one socket line. So the number of the illumination and socket electrical cable and outlet number and the power of the table are shown.

The places of the illumination switches, sockets, calling buttons are pointed the place where the door is opened or closed. The figures are downed and conduit box places are pointed.

At the drawing the electrical cables, the electrical cable lines not to be putted in chimney and around the chimney.

The illumination buttons in the well hole can be putted as possible as the near house door.

5. LIGHTING

Lighting plays a most important role in many buildings, not only for functional purposes (simply supplying light) but to enhance the environment and surroundings. Modern offices, shops, factories, shopping malls, department stores, main roads, football stadium, swimming pools – all these show not only the imagination of architects and lighting engineers but the skills of the practising electrician in the installation of luminaries.

Many sources of light are available today with continual improvements in lighting efficiency and colour of light.

<u>Lm:</u>

This is a unit of luminous flux or (amount of light) emitted from a source.

<u>Luminous efficacy:</u>

This denotes the amount of light produced by a source for the energy used; therefore the luminous efficacy is stated in 'lumens per watt' (lm / W).

A number of types of lamps are used today: filament, fluorescent, mercury vapour, sodium vapour, metal Halide, neon. All these have specific advantages and applications.

5.1 FILAMENT LAMPS:

Almost all filament lamps for general lighting service are made to last an average of at least 1000 hours. This does not imply that every individual lamp will do so, but that the short-life ones will be balanced by the long-life ones; with British lamps the precision and uniformity of manufacture now ensures that the spread of life is small, most individual lamps in service lasting more or just less than 1000 hours when used as they are intended to be used.

In general, vacuum lamps, which are mainly of the tubular and fancy shapes, can be used in any position without affecting their performance. The ordinary pear-shaped gas filled lamps are designed to be used in the cap-up position in which little or no blackening of the bulb becomes apparent in late life. The smaller sizes, up to 150 W, may be mounted horizontally or upside-down, but as the lamp ages in these positions the bulb becomes blackened immediately above the filament and absorbs some of the light. Also vibration may have a more serious effect on lamp life in these positions Over the 150 W size, burning in the wrong position leads to serious shortening of life.

5.1.1 Coiled – Coil lamps:

By double coiling of the filament in a lamp of given wattage a longer and thicker filament can be employed, and additional light output is obtained from the greater surface area of the coil, which is maintained at the same temperature thus avoiding sacrificing life. The extra light obtained varies from 20 % in the 40 W size to 10 % in the 100 W size.

5.1.2 Effect of voltage variation:

Filament lamps are very sensitive to voltage variation. A 5 % over-voltage halves lamp life due to over-running of the filament. A 5% under-voltage prolongs lamp life but leads to the lamp giving much less than its proper light output while still consuming nearly its rated wattage. The rated lamp voltage should correspond with the supply voltage. Complaints of short lamp life very often arise directly from the fact that mains voltage is on the high side of the declared value, possibly because the complainant happens to live near a substation

5.1.3 Bulb finish:

In general, the most appropriate use for clear bulbs is in wattages of 200 and above in fittings where accurate control of light is required. Clear lamps afford a view of the intensely bright filament and are very glaring, besides giving rise to hard and sharp shadows. In domestic sizes, from 150 W downwards, the pearl lamp – which gives equal light output – is greatly to be preferred on account of the softness of the light produced. Even better in this respect are silica lamps; these are pearl lamps with an interior coating of silica powder which completely diffuses the light so that the whole bulb surface appears equally bright, with a loss of 5% of light compared with pearl or clear lamps. Silica lamps are available in sizes from 40 – 200 W. Double life lamps compromise slightly in lumen output to provide a rated life of 2,000 hours.

5.1.4 Reflector lamps:

For display purposes reflector lamps are available in sizes of 25W to 150W. They have an internally mirrored bulb of parabolic section with the filament at its focus, and a lightly or strongly diffusing front glass, so that the beam of light emitted is either wide or fairly narrow according to type.

The pressed-glass (PAR) type of reflector lamp gives a good light output with longer life than a blown glass lamp. Since it is made of borosilicate glass, it can be used out-of-doors without protection.

5.1.5 Tungsten halogen lamps:

The life of an incandescent lamp depends on the rate of evaporation of the filament, which is partly a function of its temperature and partly of the pressure exerted on it by the gas filling. Increasing the pressure slows the rate of evaporation and allows the filament to be run at a higher temperature thus producing more light for the same life.

If a smaller bulb is used, the gas pressure can be increased, but blackening of the bulb by tungsten atoms carried from the filament to it by the gas rapidly reduces light output. The addition of a very small quantity of a haline, iodine or bromine, to the gas filling overcomes this difficulty, as near the bulb wall at a temperature of about 300^0C this combines with the free tungsten atoms to form a gas. The tungsten and the haline separate again when the gas is carried back to the filament by convection currents, so that the haline is freed the cycle.

Tungsten halogen lamps have a longer life, give more light and are much smaller than their conventional equivalents, and since there is no bulb blackening, maintain their colour throughout their lives. Mains-voltage lamps of the tubular type should be operated within 5 degrees of the horizontal. A 1000W tungsten halogen lamp gives 21 000 lm and has a life of 2000 hours. These lamps have all but replaced the largest sizes of g.I.s. lamps for floodlighting, etc. They are used extensively in the automotive industry. They are also making inroads into shop display and similar areas in the form of 1v. (12 V.) Single-ended dichroic lamps.

5.2 DISCHARGE LAMPS:

Under normal circumstances, an electric current cannot flow through a gas. However, if electrodes are fused into the ends of a glass tube, and the tube is slowly pumped free of air, current does pass through at a certain low pressure. A faint red luminous column can be seen in the tube, proceeding from the positive electrode; at the negative electrode a weak glow is also just visible. Very little visible radiation is obtainable. But when the tube is filled with certains gases, definite luminous effects can be obtained. One important aspect of the gas discharge is the 'negative resistance characteristic '. This means that when the temperature of the material (in this case the gas) rises, its resistance decreases – which is the opposite of what occurs with an 'ohmic' resistance material such as copper. When a current passes through the gas, the temperature increases and its resistance decreases. This decrease in resistance causes a rise in the current strength which, if not limited or controlled in some way, will eventually cause a short circuit to take place. Thus, for all gas discharge lamps there is always a resistor, choke coil (or inductor) or leak transformer for limiting the circuit current. Though the gas-discharge lamp was known in the early days of electrical engineering, it was not until the 1930s that this type of lamb came onto the market in commercial quantities. There are two main types of electric discharge lamp:

(a) Cold cathode.
(b) Hot cathode.

5.2.1 Cold Cathode Lamp:

The cold-cathode lamp uses a high voltage (about 3.5 kV) for its operation. For general lighting purposes they are familiar as fluorescent tubes about 25mm in diameter, either straight, curved or bent to take a certain form. The power consumption is generally about 8 W per 30 cm; the current taken is in milliamps. The electrodes of these lamps are not preheated. A more familiar type of cold-cathode lamp is the neon lamp used for sign and display lighting. Here the gas is neon which gives a reddish light when the electric discharge takes place in the tubes. Neon lamps are also available in very small sizes in the form of 'pygmy' lamps and as indicating lights on wiring accessories (switches and socket-outlets). This type of lamp operates on mains voltage. Neon signs operate on the high voltage produced by transformers.

5.2.2 Hot-Cathode Lamp:

The hot-cathode lamp is more common. In it, the electrodes are heated and it operates generally on a low or medium voltage. Some types of lamp have an auxiliary electrode for starting.

The most familiar type of discharge lamp is the fluorescent lamp. It consists of a glass tube filled with mercury vapour at a low pressure. The electrodes are located at the ends of the tube. When the lamp is switched on, an arc- discharge excites a barely visible radiation, the greater part of which consists of ultra-violet radiation. The interior wall of the tube is coated with a fluorescent powder which consists of ultra-violet rays into visible radiation or light. The type of light (that is the colour range) is determined by the composition of the fluorescent powder. To assist starting. The mercury vapour is mixed with a small quantity of argon gas. The light produced by the fluorescent lamp varies from 45 to 55 lm/W.

The colours available from the fluorescent lamp include a near daylight and a colour-corrected light for use where colours (of wool, paints, etc.) must be seen correctly. The practical application of this type of lamp includes the lighting of shops, domestic premises, factories, streets, ships, transport (buses), tunnels and coal-mines.

The auxiliary equipment associated with the fluorescent circuit includes:

(a) The choke, which supplies a high initial voltage on starting (caused by the interruption of the inductive circuit), and also limits the current in the lamp when the lamp is operating.

(b) The starter;

(c) The capacitor, which is fitted to correct or improve the power factor by neutralizing the inductive effect of the choke.

The so-called 'switch less' start fluorescent lamp does not require to be preheated. The lamp lights almost at once when the circuit switch is closed. An auto-transformer is used instead of a starting switch.

Mercury and Metal Halide Lamps:

The mercury spectrum has four well-defined lines in the visible area and two in the invisible ultra violet region. This u.v. radiation is used to excite fluorescence in certain phosphors, by which means some of the missing colours can be restored to the spectrum. The proportion of visible light to u.v. increases as the vapour pressure in the discharge tube so that colour correction is less effective in a high-pressure mercury lamp than in a low-pressure (fluorescent) tube.

High pressure mercury lamps are designed MBF and the outer bulb is coated with a fluorescent powder. MBF lamps are now commonly used in offices, shops and in door situations where previously they were considered unsuitable. Better colour rendering lamps have recently been introduced MBF de-luxe or MBF-DL lamps and are at presents lightly more expensive than ordinary MBF lamps.

A more fundamental solution to the problem of colour rendering is to add the halides of various metals to mercury in the discharge tube. In metal halide lamps (designed MBI) the number of spectral lines is so much increased that a virtually continuous emission of light is achieved, and colour rendering is thus much improved. The addition of fluorescent powders to the outer jacket (MBIF) still further improves the colour rendering properties of the lamp, which is similar to that of a de luxe natural fluorescent tube.

Metal halide lamps are also made in a compact linear from for floodlighting (MBIL) in which case the enclosed floodlighting projector takes the place of the outer jacket and in a very compact form (CSI) with a short arc length which is used for projectors, and encapsulated in a pressed glass reflector, for long range floodlighting of sports arenas, etc. In addition, single-ended low wattage (typically 150 W) metal halide lamps (MBI-T) have been developed offering excellent colour rendering for display lighting, floodlighting and up lighting of commercial interiors.

No attempt should ever be made to keep an MB and MBF lamp in operation if the outer bulb becomes accidentally broken, for in these types the inner discharge tube of quartz does not absorb potentially dangerous radiations which are normally blocked by the outer glass bulb.

Sodium Lamps:

Low pressure sodium lamps give light which is virtually monochromatic; that is, they emit yellow light at one wavelength only, all other colours of light being absent. Thus white and yellow objects look yellow, and other colours appear in varying shades of grey and black.

However, they have a very efficacy and are widely used for streets where the primary aim is to provide light for visibility at minimum cost; also for floodlighting where a yellow light is acceptable or preferred.

The discharge U-tube is contained within a vacuum glass jacket which conserves the heat and enables the metallic sodium in the tube to become sufficiently vaporized. The arc is initially struck in neon, giving a characteristic red glow; the sodium then becomes vaporised and takes over the discharge.

Sometimes leakage transformers are used to provide the relatively high voltage required for starting, and the lower voltage required as the lamp runs up to full brightness a process taking up to about 15 minutes. Modern practice is to use electronic ignitors to start the lamp which then continues to operate on conventional choke ballast. A power-factor correction capacitor should be used on the mains side of the transformer primary.

A linear sodium lamp (SLI/H) with an efficacy of 150 lm/W is available and in the past was used for motorway lighting. The outer tube is similar to that of a fluorescent lamp and has an internal coating of indium to conserve heat in the arc. Mainly because of its size the SLI/H lamp has been replaced with the bigger versions of SOX lamps as described above.

Metallic sodium may burn if brought into contact with moisture, therefore care is necessary when disposing of discarded sodium lamps; a sound plan is to break the lamps in a bucket in the open and pour water on them, then after a short while the residue can be disposed of in the ordinary way. The normal life of all sodium lamps has recently been increased to 4 000 hours with an objective average of 6 000 hours.

SON High-Pressure Sodium Lamps:

In this type of lamp, the vapour pressure in the discharge tube is raised resulting in a widening of the spectral distribution of the light, with consequent improvement in its colour-rendering qualities. Although still biassed towards the yellow, the light is quite acceptable for most general lighting purposes and allows colours to be readily distinguished. The luminous efficacy of these lamps is high, in the region of 1001m per watt, and they consequently find a considerable application in industrial situations, for street lighting in city centres and for floodlighting.

Three types of lamp are available; elliptical type (SON) in which the outer bulb is coated with a fine diffusing powder, intended for general lighting; a single-ended cylindrical type with a clear glass outer bulb, used for flood-lighting, (SON.T); and a double-ended tubular lamp (SON.TD) also designed for floodlighting and dimensioned so that it can be used in linear parabolic reflectors designed for tungsten halogen lamps. This type must always be used in an enclosed fitting.

The critical feature of the SON lamp is the discharge tube. This is made of sintered aluminium oxide to withstand the chemical action of hot ionized sodium vapour, a material that is very difficult to work.

Recent research in this country has resulted in improved methods of sealing the electrodes into the tubes, leading to the production of lower lamp ratings, down to 50W, much extending the usefulness of the lamps.

Most types of lamps require some from of starting device which can take the form of an external electric pulse ignitor or an internal starter. At least one manufacturer offers a range of EPS lamps with internal starters and another range that can be used as direct replacements for MBF lamps of similar rating. They may require small changes in respect of ballast tapping, values of p.f. correction capacitor and upgrading of the wiring insulation to withstand the starting pulse voltage. Lamps with internal starters may take up to 20 minutes to restart where lamps with electronic ignition allow hot restart in about 1 minute.

Considerable research is being made into the efficacy and colour rendering properties of these lamps and improvements continue to be introduced.

Recent developments have led to the introduction of SON deluxe or DL lamps. At the expense of some efficacy and a small reduction in life far better colour rendering has been obtained. They are increasingly being used in offices and shops as well as for industrial applications

5.3 ULTRA – VIOLET LAMPS:

The invisible ultra-violet portion of the spectrum extends for an appreciable distance beyond the limit of the visible spectrum. The part of the u.v. spectrum which is near the visible spectrum is referred to as the near u.v. region. The next portion is known as the middle u.v. region and the third portion as the far u.v. region. 'Near' u.v. rays are used for exciting fluorescence on the stage, in discos, etc.

‘Middle’ u.v. rays are those which are most effective in therapeutics. ‘Far’ u.v. rays are applied chiefly in the destruction of germs, though they also have other applications in biology and medicine, and to excite the phosphors in fluorescent tubes.

Apart from their use in the lamps themselves fluorescent phosphors are used in paints and dyes to produce brighter colours than can be obtained by normal reflection of light from a coloured surface. These paints and dyes can be excited by the use of fluorescent tubes coated with phosphors that emit near ultra violet to reinforce that from the discharge. They may be made of clear glass in which case some of the visible radiation from the arc is also visible, or of black ‘Woods’ glass which absorbs almost all of it. When more powerful and concentrated sources of u.v. are required, as for example, on stage, 125W and 175W MB lamps with ‘Woods’ glass outer envelopes are used.

Since the ‘black light’ excites fluorescence in the vitreous humour of the human eye, it becomes a little difficult to see clearly, and objects are seen through a slight haze. The effect is quite harmless and disappears as soon as the observer’s eyes are no longer irradiated.

Although long wave u.v. is harmless, that which occurs at about 3000nm is not, and it can cause severe burning of the skin and ‘snow blindness’. Wavelengths in this region, which are present in all mercury discharge, are completely absorbed by the ordinary soda lime glass of which the outer bulbs of high pressure lamps and fluorescent tubes are made, but they can penetrate quartz glass. A germicidal tube is made in the 30W size and various types of high pressure mercury discharge lamps are made for scientific purposes. It cannot to be too strongly emphasised that these short-wave sources of light should not be looked at with the naked eye. Ordinary glass spectacles (although not always those with plastics lenses) afford sufficient protection.

Note that if the outer jacket of an MBF or MBI lamp is accidentally broken, the discharge tube may continue to function for a considerable time. Since short-wave u.v. as well as the other characteristic radiation will be produced these lamps can be injurious to health and should not be left in circuit.

6. SWITCHES, SOCKETS AND BUTTONS

6.1 SWITCHES:

Different type of switches can use on the electrical equipment of apartment. Switches have to be made suitable to TS – 41

Switch is equipment that it can on and off the electrical energy of an electrical circuit. The current can not be lower from 10 Ampere for using by 250 V. Electric circuit.

Switches are in three (4) groups

1 – Single key
2 – Commutator
3 _ vaevien
4 – Button

6.1.1 Single Key:

This switch can on and off a lamp or lamps only from one place. These switches are use usually in kitchen, toilets, room etc…

6.1.2 Commutator:

This switch can on and off two different lamp or lamps from one place at the same time or different time.

These switches are used usually for a wall lamp, drawing room.

6.1.3 Vaevien:

This switch can on and off a lamp or lamps of the same time from different place. These switches are used usually in the balcony which has two doors or in the kitchen which have two doors.

6.1.4 Well hole switches:

These switches can on and off the lamp or lamps more than two (2) different place at the same time.

These switches are used at the stair.

6.2 SOCKET:

Sockets are very important in our life because we need sockets in our home or in our work. To operate electrical devices sockets that we use have to be made to TS _ 40

Sockets are in two groups for a safety.

1 – Normal sockets

2 - Ground sockets

6.3 BUTTONS:

Buttons are used for a door bell. When we push to the buttons then it is operate when we stop to the push button then it stops.

At the electrical Project we have to fit to the rules of " BAYINDIRLIK BAKANLIGI ELEKTRİK TESİSATI ŞARTNAMESİ "

7. CABLE TYPES

The range of types of cables used in electrical work is very wide: from heavy lead-sheathed and armoured paper-insulated cables to the domestic flexible cable used to connect a hair-drier to the supply. Lead, tough-rubber, PVC and other types of sheathed cables used for domestic and industrial wiring are generally placed under the heading of power cables. There are, however, other insulated copper conductors (they are sometimes aluminium) which, though by definition are termed cables, are sometimes not regarded as such. Into this category fall those rubber and PVC insulated conductors drawn into some form of conduit or trunking for domestic and factory wiring, and similar conductors employed for the wiring of electrical equipment. In addition, there are the various types of insulated flexible conductors including those used for portable appliances and pendant fittings.

The main group of cables is ' flexible cables ' , so termed to indicate that they consist of one or more cores, each containing a group of wires, the diameters of the wires and the construction of the cables being such that they afford flexibility.

Single-core:

These are natural or tinned copper wires. The insulating materials include butyl-rubber (known also as 85 °C rubber insulated cables), silicone-rubber (150 °C, EP-rubber) (Ethylene propylene), and the more familiar PVC. The synthetic rubbers are provided with braiding and are self-coloured. The IEE Regulations recognize these insulating materials for twin-and multi-core flexible cables rather than for use as single conductors in conduit or trunking wiring systems.

But they are available from cable manufacturers for specific installation requirements. Sizes vary from 1.00 to 36 mm^2 (PVC) and 50 mm^2 (synthetic rubbers).

Two-core:

Two –core or 'twin' cables are flat or circular. The insulation and sheathing materials are those used for single-core cables. The circular cables require cotton filler threads to gain the circular shape. Flat cables have their two cores laid side by side.

Three-core:

These cables are the same in all respects to single and two-core cables except, of course, they carry three cores.

Composite Cables:

Composite cables are those which, in addition to carrying the current-carrying circuit conductors, also contain a circuit-protective conductor.

To summarize, the following groups of cable types and applications are to be found in electrical work, and the electrician, at one time or another during his career, may be asked top install them.

Wiring Cables:

Switchboard wiring; domestic and workshop flexible cables and cords. Mainly copper conductors.

Power Cables:

Heavy cables, generally lead-sheathed and armoured; control cables for electrical equipment. Both copper and aluminium conductors.

Mining Cables:

in this field cables are used for trailing cables to supply equipment; shot-firing cables; roadway lighting; lift-shaft wiring; signalling, telephone and control cables. Adequate protection and fireproofing are features of cables for this application field.

Ship-wiring Cables:

These cables are generally lead-sheathed and armoured, and mineral-insulated, metal-sheathed. Cable must comply with Lloyd's Rules and Regulations, and with Admiralty requirements.

Overhead Cables:

Bare, lightly-insulated and insulated conductors of copper, copper-cadmium and aluminium generally, sometimes with steel core for added strength. For overhead distribution cables are PVC and in most cases comply with British Telecom requirements

Communications Cables:

This group includes television down-leads and radio-relay cables; radio frequency cables; telephone cables.

Welding Cables:

These are flexible cables and heavy cords with either copper or aluminium conductors.

Electric-sign Cables:

PVC and rubber insulated cables for high-voltage discharge lamps (neon, etc.).

Equipment Wires:

Special wires for use with instruments often insulated with special materials such as silicone, rubber and irradiated polythene.

Appliance-wiring Cables:

This group includes high-temperature cables for electric radiators, cookers and so on. Insulation used includes nylon, asbestos and varnished cambric.

Heating Cables:

Cables for floor-warming, road-heating, soil-warming, ceiling-heating and similar applications.

Flexible Cords:

A flexible cord is defined as a flexible cable in which the csa of each conductor does not exceed 4 mm^2. The most common types of flexible cords are used in domestic and light industrial work.

The diameter of each strand or wire varies from 0.21 to 0.31 mm. Flexible cords come in many sizes and types; for convenience they are grouped as follows:

Twin-twisted:

These consist of two single insulated stranded conductors twisted together to form a two-core cable. Insulation used is vulcanised rubber and PVC. Colour identification in red and black is often provided. The rubber is protected by a braiding of cotton, glazed-cotton, rayon-braiding and artificial silk. The PVC insulated conductors are not provided with additional protection.

Three-core (twisted):

Generally as twin-twisted cords but with a third conductor coloured green, for earthing lighting fittings.

Twin-circular:

This flexible cord consist of two conductors twisted together with cotton filler threads, coloured brown and blue, and enclosed within a protective braiding of cotton or nylon. For industrial applications, the protection is though rubber or PVC.

Three-core (circular):

Generally as twin-core circular expect that the third conductor is coloured green and yellow for earthing purposes.

Four-core (circular):

Generally as twin-core circular. Colours are brown and blue.

Parallel-twin:

These are two stranded conductors laid together in parallel and insulated to form a uniform cable with rubber or PVC

Twin-core (flat):

This consists of two stranded conductors insulated with rubber, coloured red and black, laid side and braided with artificial silk.

Flexible Cables:

These cables are made with stranded conductors, the diameters being 0.3, 0.4, 0.5 and 0.6 mm. They are generally used for trailing cables and similar applications where heavy currents up to 630 an are to be carried, for instance, to welding plant.

CONCLUSION

The chosen projects architectural drawings have been removed from the AutoCad programs Layer Properties Manage in order to fit it in the Electrical Installation project.

This project, a 4 floored restaurant's electrical installation has been made so:

First of all, the symbol table that the "K.K.T.C Elektrik Mühendisleri Odası" has published has been taken from their official site.

After, the electrical sockets circuits, illumination systems, and the needed cable types for the hand dryers, blow dryers, air conditioners, refrigerators, aspirators, cookers, micro waves, disposal units and other equipments were added to Layer Properties Manager.

Then, in order to draw the illumination systems and to appease the customer coming to the restaurant, the 75 lux rate that was given in the 'Less Illumination Levels For The Areas" table has been chosen as base. After, because the roofs 3.15m lenght and because of the saloons being too large, a 150 lux rate has been chosen instead.

After, by using the "k index illumination formule" every rooms, WC, depots, holes, kitchen, service rooms and upstairs illumination calculations have been made.

The materials needed to for this project has been choosen according to the universal standarts (which has been searched from internet) and cautiousness to energy saving.

Then, the armatures that has been chosen from "K.K.T.C Elektrik Mühendisleri Odası" 's symbol table has been applied to every single saloons, depots, terraces, holes, service rooms, WCs and upstairs according to the best calculation places.

Every switch that has been used for the illumination installation has been suited according to the doors position and usage of the areas.

The sockets that have been choosen for this project haven't been placed in WC's and wet areas, and again have been placed according to the most useful areas. Their symbols have once again been taken from the symbol table and applied to the AutoCad program.

The air conditioners have been placed in a manner that would be enough to cool the floors. Hand dryers has been placed to the WC's and personal rooms. And other than this blow dryers and water heaters have been placed to the personel rooms.

And in kitchen aspirator has been put to the main oven part , a micro wave and a disposal units has been put to the other parts of the kitchen.

Only one cool depot is avaliable on the project. And freezers has been put to the cool depot.

After all of these installations, Distributing Panels have been placed for the every floor. Main distributing Panel has been placed at the first floor. All sockets has been connected the ring type and all socket rings has been started from the Distributing Panel and has been finished on the Distributing Panel. All Distributing Panels has been connected to the Main Distributing Panel which has been placed on the first floor.

Than cable types have been calculated for the every illumination, sockets and all other equipments.

For the choosen project finally Current Distributing Diagram have been drawen with choosen cable types for illumination and electrical installation and their fuses for the distributing panel.

While this project has been made, in order to make it is a Professional installation and in order to get information, some projects that have been drawn by other engineers have been as examples.

These project have been analyzed, the standarts used in Northern Cyprus have also been analyzed and an electrical installation has been made according to these values refference.

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