A COMPILATION OF DIFFERENT GUIDELINES AND STUDIES ON MODERN HOSPITAL LIGHTING TECHNIQUES

A thesis submitted towards partial fulfillment of the requirements of the degree of

Master of Technology in
Illumination Technology and Design

Submitted by

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All information in this document have obtained and presented in accordance with academic rules and ethical conduct.

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CHAPTER - 1: INTRODUCTION

1.1 INTRODUCTION.

Light is critical to human functioning, allowing us to see things and perform activities. However, it is also has important implications on human beings both psychologically and physiologically. Human emotions and feeling of well-being are all affected by the lighting around them. The lighting system installed in a space must be properly optimized keeping in mind the need for appropriate energy management. Lighting needs may range from simple ambient lighting to lighting catered towards specific visual tasks. Satisfaction and performance of the worker is totally dependent on Lighting in task area. The lighting system installed in an area should meet the needs for sufficient illuminance level, have the right CRI and CCT for the task, should not produce glare, should be energy efficient and cost effective, adequate for the primary purpose of facilitating the performance of the visual task. Also excess levels of illumination than the required amount leads to wastage of energy and unnecessarily increases the running cost of lighting system, apart from that, over illumination may produce irritation and discomfort but also may cause accidents if unwanted light enters the eyes of people driving cars or crossing the streets. Also for indoor lighting applications, over exposure to light for long durations especially bluish light affects the human circadian cycle which regulates the daily sleep and wake times in humans. The medical research on the effects of excessive light on human body suggests that a variety of adverse health effects may be caused by excessive light exposure. The health issues due to over illumination and improper spectral composition of light may include increase of headache, visual and physical fatigue, medically defined stress, increment of anxiety or excitement etc.

Hospital lighting must support the visual performance of hospital workers who need to examine and observe patients, dispense medications, perform medical procedures, and view displays and papers clearly. Lighting should also provide comfortable, pleasant and natural visual environments for patients in healthcare facilities and their families, and support natural rhythms of sleeping and wakefulness. All the while the maintenance costs and energy use of hospital lighting should be minimized. To fulfill these needs, international standards which specify the strict requirement for each healthcare facility have come up. Hospital lighting is in particular complex because of the sensitive nature of various patients as well as requirement of high performance from its employees. Hence this makes for a challenging task for designing a lighting scheme for a hospital. Hospital lighting standards have been well documented by IESNA and its Indian counterpart- National Lighting Code 2010. This work aims at providing proper healthcare lighting as per national and international standard in a new health care facility namely Ayursundra hospital proposed in Jorhat, Assam. The primary purpose of lighting in hospitals is to improve the quality of the patient's stay, thereby also aiding recovery.

CHAPTER - 2:

AIMS AND OBJECTIVES OF STUDIES

2.1 AIMS AND OBJECTIVES OF THE STUDY.

The concept of hospital lighting plays a pivotal role in a hospital environment. Visual performance in working spaces primarily turns on a worker. The visual performance of hospital employees & patients is needed to see visual tasks effectively, comfortably and at an appropriate speed. Hospital tasks include different operations like in X-ray room, surgeon room, ward room, and communicating remotely and face-to-face with other people and other writing works.

Visual comfort can be considered in terms of the glare created by the luminaries Glare is a very common lighting problem. Glare is the sensation produced when the levels of light are sufficiently greater than the levels to which the eyes have been adapted. Light reflected from polished, shiny objects within the visual field can cause visual discomfort. However, several ways have been devised to control glare and reflection. In hospital there is some special lighting is required for specialized application purposes like in operation theatre room. In operation theatre room there is a wide range of hydraulic O.T. table, anesthesia machine, and suction machine. In O.T. room many technical requirements like the height & length of the O.T. table, luminaries orientation according to the needs of the operation is needed to know and these types of information mainly comes from the doctors. So it is not possible during the design so in this project all lighting design has been designed as a general indoor lighting abide by the rules & the recommendations of hospital rooms.

Day to day demand for electricity is increasing. Lighting is a significant consumer of electricity. The requirements of lights in a hospital vary widely and depend upon the activity time of the day and occupancy level. Thus the lighting needs for a particular task should be provide with minimum consumption of energy with proper design, control and management of lighting system and those are the most important part of energy efficient lighting. A well-designed lighting system in hospital can lead to reductions in medical errors, pain, stress, depression, anxiety as well as aid in a good night's sleep for patients that provide a benefit of satisfaction by improving their mood. For staff, good lighting solution provides excellent working light and comfortable visual performance. By anticipating the lighting needs of the patient and the medical staff, it's possible to reach a healthy, cost-effective, and sustainable system.

The objective of the thesis is to study and design implementation of modern energy efficient lighting technology in hospital using smart lighting system depending on the situation throughout the day. Also, aim is to provide desired illuminance value and uniformity as per the standards.

CHAPTER - 3: DETAILS ABOUT THE WORKPLACE

3.1 ABOUT AYURSUNDRA HOSPITAL:

Fig 1: Frontal view of Ayursundra Hospital

Ayursundra is dedicated to promoting safe and high quality healthcare, responsive to the needs and expectations of the local people. The Ayursundra model is designed to reduce the gap between diagnosis and treatment, while easing the patient's anxiety and making treatment more cost effective for him. Ayursundra focuses on quality, affordability and technical expertise accounts for a cutting edge advantage in the field of healthcare.

The Ayursundra model operates on a unique inter-connectivity between its core healthcare institutions. The inter-connectivity facilitates optimal utilization of the available resources for patients to receive the appropriate medical attention. Ayursundra uses the latest integrated Hospital Management System in its various centres and departments: all doctors have access to patient data in real time which is furthermore updated in the shortest period of time so doctors can start early commencement of treatment. Backed by cutting-edge electronic data processing support (EDP), any individual patient reporting to an Ayursundra hub is issued with an electronic smart card embedded with a detailed digital report of medical history, pathological profile, current protocol and updates of periodic reviews. Due to the enterprise-wide architectural solution, patient flow is centrally managed: patients can move from one specialty to another without misdirection or losing important patient data. This speeds up the process of treatment and allows for higher volumes of patients. On top of this, an elaborate process of patient feedback, appraisal of services, peer reviews and periodic follow-up ensures patient compliance with long-term drug protocols and

therapy regimens. The inter-connectivity model streamlines patient management from a qualitative, quantitative and safety perspective, resulting in smoother end to end patient flow.

Once inside, the Ayursundra matrix takes charge of all administrative, logistic, investigative and curative aspects of the patients' treatment, which obviates the need for external attendance so commonplace in prevalent healthcare facilities. Ayursundra prides itself with a staff of medical specialists and other professionals which represent a cumulative experience of over 250 years, bringing expertise backed by dedication to all aspects of Ayursundra's management. In addition to that, top notch global specialists periodically add value to highly specific operations and/ or specific diagnostic analyses. Complementary to this, Ayursundra is equipped with state-of-the-art apparatus, instrumentation, machinery and technology, sourced from top-of-the-line global manufacturers. Technological upgrades put our services at par with the best in medical care worldwide. Moreover, it provides an opportunity for new treatments and technologies to be available to patients.

Fig 2: Reception of Ayursundra Hospital

Jorhat City is located at 26.75°N 94.22°E. It has an average elevation of 116 metres (381 feet).

The municipal area stretches to 9 square kilometres (3.5 sq mi) having 19 wards with a population of about 1.85 lakhs at present. The district spreads over 2,851 square kilometres (1,101 sq mi) and had a population of 870,000 according to a 1991 census. Population density at that time was 306 persons per square kilometre (793/sq mi). The sex ratio is 913 (913 females per 1000 males).

CHAPTER – 4: ASPECTS OF HOSPITAL LIGHTING

4.1 COMMON AREAS AND ROOMS IN A HOSPITAL.

Entrance Hall, Reception and Waiting Room

A harmonious lighting atmosphere in entrance hall makes people less apprehensive, inspires confidence and makes the surroundings appear friendlier. Patients and visitors are less likely to feel intimidated if they can find their way around easily. Entrance halls generally consist of four distinct zones – the entrance area, the reception desk, the waiting area and the area that leads people into the rest of the building. In entrance and waiting areas, light has an important role to play in creating a welcoming and friendly atmosphere where safety is needed. This space may also be combined with larger public spaces to serve as the lobby for an entire healthcare campus. Here visitors wait several hours for a loved one recovering from treatment or day surgery, so lighting system is installed in these areas in such a way that light effect can keep visual effect of visitors comfortable. Aesthetics, lighting, exterior views, seating, furnishings, indoor climate, positive distractions and accessibility to building amenities play into successful waiting room. Well designed waiting rooms support an important part of healing and wellness. Recess mounted and suspended luminaires with different frames and sizes may provide diffused light distribution which improves perception of space aesthetically with decorative indirect lighting component. For reception areas, recessed type diffused downlighter or pendent type luminaires are used to illuminate particularly on desk for receptionist by providing decent and sufficient lux level. Energy efficient sources and glare-free appearance are important factors to consider. Vision is at its best in reception area when there is ample light on the task and when a number of conditions are fulfilled:

- The overall surround must be neither too bright nor too dim.
- Glare sources, whether direct or indirect, are eliminated within the field of view can cause considerable discomfort to those who have to perform a task which requires visual concentration.
- Ceiling, walls and floors should have a reasonable range of brightness levels depending on its colour.
- Contrast between task and the background should not become excessive.

Lift Lobby

The lift lobby gives a comfortable and friendly feel. As lift lobbies are normally used 24/7 in a hospital, motion detection sensors may not aid energy savings to a full extent. Nevertheless, the luminaires may be set up with integrated daylight and/or motion sensors as well as emergency lights.

Corridors

The lighting in the corridor has been designed so as to not dazzle the patient being moved though stretcher or wheel chair. The components of any visual way-finding system go way beyond simple signage to encompass architecture, lighting, landscape and landmarks including a wide spectrum of architectural and design elements. For the staff and the visitors, it is important to have relatively high light levels so that they can see what is in front of them in the corridor and help to provide good visual performance in direction of their movement. A vertical light that gives a sense of space gives good light without glare, aiding vision. For corridors where patients are wheeled along on trolleys, it must be taken into consideration that sharp contrasts can be extremely uncomfortable when they are looking upwards. So, diffused type downlighter and also cove lighting is used to increase the proportion of ambient light that make better and optimum light level and uniformity with aesthetically for good visual perception. Controlling switch with time in corridor can be used that reduces the light to a low basic level during the night but should be sufficient in movement for both staffs and patients. Wheelchair users need adequate lighting during day and night. Signage needs to be clearly lit when viewed from wheelchair level. Excessive brightness in corridors cause fatigue for patients, although bright light is effective in reducing depression among patients with bipolar disorder or seasonal affective disorder (SAD).

Nurses' stations and staff bases

The nurses' station is the central hub of the in-patient floor. Nurses' stations provide a number of tasks including dispensing medicine, ad hoc meetings, greeting visitors and PC use throughout 24hours. Sufficient lighting should be needed during both the day and at night to carry out the routine tasks. Lighting at a nurses' station is multilevel, to allow for a higher illumination during the day and a lower level at night. Proper Lighting design system is important in these areas to reduce errors and lower stress and also to achieve maximum efficiency of the station for staff members and nurses making their work easier with clear view. To do so, diffused type downlighters are used to reduce discomfort glare to PC users. High level of general illumination is combined with additional task lighting at these areas to improve visual accuracy. Sometimes, suspended luminaires can be used over desk instead of desk light. Also, Cove lighting at nurses' stations can create bright ceilings or walls for aesthetic purpose. Light is the important factor in regulating the body's inner clock of circadian rhythm. An innovative light management system with colour and brightness adjustment provide a balance between circadian rhythm disruption and high alertness for night-time staff that help to create a productive and positive healing environment. In daytime, staff members with at least 3 hours of daylight exposure during their shift have higher job satisfaction than those who have less exposure to daylight. The colour and reflectance of work surface should be such that the eye does not require much colour or brightness adaptation from tasks on the workstation to long distance viewing of the ward or patient areas. Nurse workstation lighting should be balanced and not extremely contrasting with other

illuminance levels in the immediate vicinity. Extreme contrast in such areas that are demanding on vision is not good and will cause problems with dark/light adaptation.

Office and administration areas

As the demands on the equipments used by the users are more important here, so light will become an important design tool for architects, planners and lighting designers. Health care professionals and administrators face numerous critical tasks that can contribute to high stress level. So, making a proper quality of lighting design is key issue for office and administration areas. Visibility, visual appeal and visual comfort all need to be considered when selecting luminaires for this areas. Localized lighting arrangement system is used here because it not only creates pleasant atmosphere, but also it affects the well-being and performance at any type of official work with fatigue-free. Utilization of daylight is required due to presence of windows in office by using dimming system with recessed mounted 2 x 2 luminaires, located in front of the windows to reduce electrical power consumption.

Laboratories

Laboratories are dynamic and demanding areas. Multiple tasks are taking place simultaneously and multiple workplaces are being utilized. The achieved results of examination are essential requirement for the diagnosis, treatment, thereby ensuring the entire course of the patient's illness. Optimal lighting is required for laboratory work with free of shadows. The most demanding tasks require the highest mental concentration. Reading very small print and differentiating between various contrast levels require different levels of illumination based on tasking area. A parabolic or diffused type 2 x 2 recessed luminaires or 4ft recessed luminaires with diffused type desk light having proper CCT and CRI of lamps should be used to provide excellent colour production over the desk for good visual performance and outstanding contrast vision. Diffused type luminaires can create soft ambient environment and reduce eyestrain of the staffs. Research laboratories may require cleanroom lighting to control against dangerous airborne infections. In cell and tissue labs, UV-free or UV-filtered light luminaires should be used.

Patient Rest Room

For patient rooms, the environment needs to be welcoming, safety and homelike for both patient and family and also providing different illumination level required for medical, nursing and support staff to perform their tasks efficiently in the room as well patients should be made to feel comfortable and relax mood. The lighting must be provided in a way that is not distracting to other patients sharing the same place. In patient room optimum lighting condition must be provided for :

- Nursing and Patient care
- Patient observation and monitoring

- Patient activities: e.g. reading, watching TV, resting
- Sleep (night lighting)
- Medical examination
- Health check-up and emergency treatments
- Simple medical procedures
- Visitation and socializing

Good lighting design can be developed in this area depending on not only the placement, shape and type of luminaires to be used but also the brightness and reflectance value of the room surfaces and the colour of ceiling, wall , floor and furnishings. Control of brightness, combination of direct-indirect light and variation of colour appearance of light effect at different times in day and night should be required to improve visual comfort and mood of patients with glare free. Dual contribution between daylight and artificial light source delivers the desired lighting scene in the room making patients feel secure and at ease, despite being in an unfamiliar environment. The lighting installation in the patients' room is generally as follows:-

General purpose lighting

The general lighting must be adequate for the care of the patients by the nursing staff. The balance of brightness and colour of the surroundings should help to provide a visually pleasing interior and improve human efficiency. Good glare control is needed with UGR limited to Diffused type 2 x 2 recessed mounted luminaires or recessed mounted downlighters should be used. During the day, daylight through windows and artificial light create a bright and cheerful environment in patient room or ward wherever possible. But too much daylight through window can create disability glare that is not feasible for patients. So, curtains with windows give protection against glare. In daytime, proper and desired light level using automatic or manual dimming system with daylight sensor can create soft and ambient light for the patients' rest and relaxation with daylight utilization through windows. Normally, position of patients' bed is towards east-west direction and position of windows is towards north-south direction.

Reading purpose lighting

In the early morning and evening when daylight is not available, and patients may require light at the bed head for reading. Reading lighting is provided by a small bedside luminaire fixed to the wall behind the bed that should be limited brightness to avoid discomfort for patients. Light distribution of wall mounted luminaires should be direct and indirect. This allows continuous observation of a particular patient after the general lighting has been switched off, without any disturbance. The patient's reading light is required to give 30 lux directly on a 1m by 1m area based around the pillow area and can also be used by staff for nursing tasks. Hospital overhead luminaires are typically diffused type and two feet in length, providing consistent light over the center of the patient's bed for reading purpose. It is important to consider hospital overhead lights that are easy to clean and maintain.

Also table lamps can be used as a reading light and it can be readjusted easily. They are very easy to clean. These fittings can also be supplied with dimmable control gear and therefore it is possible for the staff and the patient to adjust the proper light level for their individual situation. Sometimes, in hospital reading light can be controlled to use as a night lamp. If the patients are elderly with perhaps poor sight, then a higher level of illuminance will usually be necessary that enables the patients to read than if the patients are teenagers. Reading light which is considered to be a local task lights might be a good solution, rather than a high value of uniform illuminance.

Night purpose lighting

Night light provides enough light to see to move about the room in the night or to find a call button if needed. These night lights are also very helpful to medical staff that is checking in on patients throughout the night shift as patients' care. Sufficient amount of light from night lamp help nurse to enter into the room. With low light from the nightlight installed on the wall adjacent to patients' bed providing enough light for good vision at night and therefore there is no need to turn on the overhead lights or ceiling lights that may constantly disturb the patient. As the louver is used in night lamp therefore there will be no direct view of the light source from. The brightness of the luminaires and immediate surroundings should be low enough to minimize discomfort to the patients. This type of light doesn't cover entire area of patients' bed, just as a reading light. For night lamp dimming system is required, because during nurse entering into the room from lighted corridor high light level needed and during patients' rest or sleep low light level needed. To allow patients to sleep the illuminance on the bed head should not exceed 0.1 lux, higher levels will be appropriate for watch lighting and for specific patient needs.

Examination Room or Procedure Room

For patients, entering the treatment room is often associated with emotional tension and panic, which can be relaxed by good room lighting. On the other hand, the physician and the medical staff need optimal lighting for examination and treatment, also for working on the computer creating good visual display. Room is equipped with diagnostic and anesthesia equipment. Visual examination plays a major role in deciding the right treatment. So, both horizontal and vertical illumination should be considered in this room. Sufficient levels of general illumination, long service life, energy efficiency and good colour rendering of lamp help to show the true tone of the skin and tissue of patients during treatment. High-quality lighting solutions prevent distracting reflections and glare on the surface of equipment, on monitors and on x-ray image viewing equipment. An arm based adjustable examination lamp mounted on a wall or trolley or arm based portable floor stand spotlight is the ideal supplement to the general light for examinations and treatment. These types of light provide excellent colour temperature, colour rendering and a focused beam. Depending on exact requirements either a multi-lamp unit or single lamp head can be chosen, but the important thing is arm balance, right placement and movement, so that the light can be directed exactly where required with glare free and minimizing of light trespass when the

patient is in a reclining position. For general lighting system 2 x 2 recessed type luminaires are used with appropriate optics to minimize glare.

Operation Theatre

The operation theatre is a highly challenging occupational environment. In the field of surgery comfortable lighting effect plays an important role. Examination lighting is required with general lighting system to help doctor and nurses mentally and physically concentrate on the demanding intervention during operation. When video screens and microscopes are introduced, physicians and technicians need lower light levels for a clear view of video images. Surgeons also require lower perimeter light levels to reduce eye fatigue and remain focused during long procedures. For general lighting system, cleanroom luminaires are used with HEPA (High efficiency Particulate Air filter employing unidirectional filtered air flow systems downward in a constant stream, used to trap dust particles that are 0.3 micron and larger in size, bacteria and viruses in the air. As a result they are not deposited in or onto the luminaires or distributed around the theatre. An operation theatre is considered as clean-room where provisions are made to reduce particulate contamination and control other environmental parameters such as temperature, humidity and pressure. Luminaires chosen for these spaces must be easy to clean and maintain and should have an IP rating 54. A clean-room suit is usually required for entering a clean-room. Operation theatre requires a combination satisfactory ambient lighting illuminating whole room and effective task lighting.

Classifications of clean rooms are done according to the number and size of particles permitted per volume of air. International standard organization ISO 14644-1 standard classifies a clean-room by the number of particles found in the room and that indicates how clean the air is.

Table 1: Clean-room Standards as per ISO 14644-1

Class	**Maximum particles/m^3**					
	≥ 0.1 μm	**≥ 0.2 μm**	**≥ 0.3 μm**	**≥ 0.5 μm**	**≥ 1 μm**	**≥ 5 μm**
ISO 1	10	2	-	-	-	-
ISO 2	100	24	10	4	-	-
ISO 3	1000	237	102	35	8	-
ISO 4	10,000	2,370	1,020	352	83	-
ISO 5	100,000	23700	10,200	3,520	832	29
ISO 6	1,000,000	237,000	102,000	35,200	8,320	293
ISO 7	-	-	-	352000	83,200	2,930
ISO 8	-	-	-	3,520,000	832,000	29,300
ISO 9	-	-	-	35,200,000	8,320,000	293,000

Adjustability and brightness are two factors in which decisions and priorities should be made when determining a suitable operating theatre light. Surgical light – also referred to as an operating light, must offer advance performance that eliminates shadows and provides true colour rendering, which is so vital in determining the condition of patients. Two or more arm based adjustable ceiling mounted halogen lamp or portable floor stand halogen lamp with parabolic glass reflectors based luminaires considered as surgical or operation lights are used during operation to focus on a particular spot. The surgeon may have to swing the lighting arm above their head which is awkward. Provision of dimming system of the general lighting can be arranged if their brightness is too much resulting creates eye fatigue and discomfort for doctor and nurses during long period of operation. Goggles or glasses coated with an antiglare film may decrease eye fatigue. Also, brushed steel surgical instruments can be used instead of polished steel to reduce glare. The balance ratio of task lighting to general lighting can impact on human performance, through eye fatigue, visual stress or error generation.

High light output from surgical lighting with excellent heat management and its exact positioning support personnel feeling comfortable in vision and patent safety during operation. Cleanroom luminaires and surgical lights must be low maintenance and energy efficient. The wellbeing of surgeon, anesthetist and the surgical team may be adversely affected, while the quality and safety of the working environment will be impaired due to incorrect and poor performable surgical lighting installation. During operation illumination ranges are between 10,000 to 50,000 lux.

Recovery Room

While recently operated patients wake up, it is especially important to provide them guidance and security through homogeneous and glare-free light. Lighting in recovery room not only helps patients to feel comfortable appearance but also enhance mood of patient. Adequate general lighting improves patient and staff satisfaction. Recovery rate of patients could get worse due to poor quality of lighting. Cove lighting could be used with general lighting for aesthetics purpose.

MRI Room.

MRI (Magnetic Resonance Imaging) systems utilize powerful magnets capable of propelling ferrous metal objects into the scanner envelope at dangerously high velocities. They also emit powerful radio frequency (RF) pulses that can interfere with other electronic equipments. High lighting levels are typically needed to set up procedures, but during the procedures, physicians and technicians need lower lighting levels for a clear view and accurate interpretation of the images on video screens. Machine generated images can be compromised by externally generated RF emissions. Luminaires in MRI room must be free of ferrous metals, susceptible to these powerful MRI machine RF pulses. Therefore low voltage incandescent sources in non-ferrous materials have been used for these spaces preventing possible injury to the patient and healthcare technician

due to the nature of imaging equipment, but this approach has significant limitations including short life lamp and high energy cost.

MRI room lighting fixtures must be powered using DC power instead of AC power. Because electromagnetic interference (EMI) produced by AC powered lighting affects image quality and equipment performance. Other requirements include noise free, regulated power feeding the lighting fixtures and the ability to adjust light intensity with electronic dimmer. Therefore LED based luminaires should be used. For patients' mood change during image creation of patients indirect cove lighting provide a soft-coloured ambient glow that help in relaxation of patients. Doctors see great improvement in the accuracy of their test outcomes, when working with relaxed patients. Generally, effective general white light with very low energy consumption and very low maintenance based glare-free 2 x 2 recessed type luminaires are used. Intensity and colour choice are controlled via controlling system to adjust the lighting level as needed. General lighting controlled by a dimming system in the MRI room provides low adequate illuminance value during treatments that create clear view of information and images shown on Computer screens.
Electrical noise levels should be below the recommendations for MRI system manufacturers, ensuring the highest performance of MRI equipment.

ICU Room

An ICU (intensive care unit) must not only be equipped with highly developed medical devices but also with first-class lighting systems. These must mainly enable the provision of care and observation of very ill and recently operated patients, and around the clock. Top modern medical technology, continuous monitoring and fast response times require an alert mind. Good visibility conditions are essential for the doctor and staff. In such cases, a pleasant atmosphere requires not only indirect general lighting but also direct light distribution for simple examinations as well as light for examination and treatment. Patients are under constant observation at night as well, ambient lighting is needed that does not disrupt the sleep of patients. Combination of adaptive artificial light to the natural course of daylight can help to maintain natural circadian rhythm for patients that lead to a feeling of normality, achieve a sense of trust in the medical care and also have positive effects on recovery. Cleanroom luminaires having IP 54 are used in ICU room.

Hospital Signage

Electronic hospital signage helps patients, staffs and visitors remain safe and enhance communication. Also, It indicates the direction of different rooms existing in a floor of the hospital as a way-finding. Signage solution includes:-

- Patient care sign.
- Examination sign.
- Operation theatre sign.

- Doctor's cabin sign.
- Way-finding sign.
- ADA signage.
- Electronic Poster.

4.2 SOME PARAMETERS CONSIDERED FOR HOSPITAL LIGHTING.

There are several lighting design criteria based on which all lighting designs should be made. The lighting design criteria are called Lighting Design Parameters. Those lighting design parameters are guided by Different International and Indian Lighting Standards. The recommendation gives the idea for the design parameters.
The mostly followed recommendations for indoor hospital lighting designs are given by Bureau of Indian Standards, European Standard (EN) and Illuminating Engineering Society of North America (IESNA).
The Indian Standard IS 3646(Part 1): 1992 and European Standard is EN 12464- 1:2002(E) is mostly followed for hospital lighting.

Hospital Lighting Design Parameters:
The following hospital lighting parameters are under consideration of any design.

Illuminance level:

The lighting level produced by a lighting installation is usually qualified by the illuminance produced on a specific plane. In most cases this plane is the major plane of the tasks in the interior and is commonly called the working plane. The illuminance provided by an installation affects both the performance of the tasks and the appearance of the space. The above-mentioned lighting standards recommend different illuminance levels.

Luminance Distribution:

.A well-balanced adaptation luminance is needed to increase visual acuity(sharpness of vision), contrast sensitivity(discrimination of small relative luminance differences),efficiency of the ocular function and also effects visual comfort.

Uniformity:

The term uniformity for indoor hospital lighting design generally signifies the ratio of minimum illuminance value calculated or measured under the different grid points to average value of all illuminances. According to the three standards the task shall be illuminated as uniformly as possible. The uniformity of the task area and the immediate surrounding areas shall not be less than the specified values.

Direction of incidence of light and shadow effect:

Lighting from a specific direction may reveal details within a visual task, increasing their visibility and making the task easier to perform. Veiling reflections and reflected glare should be avoided. Directional lighting may be used to highlight objects, reveal texture and improve the appearance of people within the space. Directional lighting of a visual task may also affect its visibility.

Colour Appearance and Colour Rendering:

The colour appearance of a lamp refers to the apparent colour (CCT). The choice of colour appearance is a matter of psychology, aesthetics and of what is considered to be natural. The choice will depend on illuminance level, colours of the room and furniture, surrounding climate and the application.

Colour rendering quality of light is very important for physical inspection of patients; pathological findings, physiology of patients too. To provide an objective indication of the
colour rendering properties of a light source the general colour rendering index Ra is 100. This figure decreases with decreasing colour rendering quality.

Colour appearance and Colour rendering Groups of lamps:

The colour of light emitted by a source can be indicated by its correlated colour temperature (CCT). The apparent colour of light source in a room is largely determined by the function of the room.

Each lamp has a specific correlated colour temperature, but for practical use the correlated colour temperatures have been grouped into three classes like:

Table 2: CCT type and values

Correlated Colour Temperature(CCT)	CCT type
CCT≤3300K	Warm
3300K<CCT≤5300K	Intermediate
5300K<CCT	Cold

The ability of the light source to render colours of surfaces accurately may be conveniently quantified by the general colour-rendering index. The colour rendering groups of the various lamps to be used for lighting of interior at hospital are also specified.

Table 3: Colour Rendering Groups

Colour Rendering groups	CIE General Colour Rendering Index(R_a)	Typical Application
1A	$Ra \geq 40$	Wherever accurate colour matching is required
1B	$80 \leq R_a < 90$	Wherever accurate colour judgements are necessary and good colour rendering is required for reasons of appearance
2	$60 \leq R_a < 80$	Wherever moderate colour rendering is required
3	$40 \leq R_a < 60$	Wherever colour rendering is of little significance but marked distortion of colour is unacceptable
4	$20 \leq R_a < 40$	Wherever colour rendering is of no importance at all and marked distortion of colour is acceptable

CHAPTER – 5: DIFFERENT GUIDELINES AND STANDARDS IN HOSPITAL LIGHTING

5.1 LIST OF GUIDELINES CONSULTED:

There are several guidelines for the lighting design of commercial buildings. In this study the major guidelines which have been followed are listed below:

- Bureau of Indian Standards : Code of Practice for Interior Illumination, IS :3646 (Part - 1) : 1992.
- The recommendations by European Norms :EN 12464-1:2009
- Lighting handbook of Illuminating Engineering Society of North America (IESNA) - 10th Edition (2011).
- User Guide of Bureau of Energy Efficiency -Energy Conservation Building Code (ECBC): 2018.
- Bureau of Indian Standards, IS 4347: 1967; Code of practice for Hospital Lighting.
- National Lighting Code (NLC) : 2010

5.2 BUREAU OF INDIAN STANDARDS : CODE OF PRACTICE FOR INTERIOR ILLUMINATION, IS 3646 (PART - 1): 1992

There are several guiding values of Design parameters in the standard which have been abide by in this work. The same have been listed herein after.

Lighting level:

Scale of illuminance:

In order to be able just discern features of human face, a luminance of approximately 1cd/m2 is necessary. This can be achieved under normal lighting conditions with a horizontal illuminance of approximately 20lx. The 20-lux is regarded as the minimum illuminance for all non-working interiors.

Illuminance ranges:

The circumstances may be significantly different for different interiors used for the same application or for different conditions for the same kind of activity, a range of illuminance is recommended for each type of interior or activity intended of a single value of illuminances. Each range consists of three successive steps of the recommended scale of illuminances. For working interiors, the middle value of each range represents the recommended service of illuminance that would be used unless one or more of the factors mentioned below apply. The higher value of the range should be used when: usually-low reflectance or contrasts are present in the task, errors are costly to rectify, visual work is critical, accuracy or higher productivity is of great importance and the visual capacity of the worker makes it necessary. The lower value of the range may be used when; reflectance or contrasts are unusually high.

The range of service Illuminance in of lux recommended by the standard for hospital lighting design is:

Table 4: Recommended illumination value as per IS : 3646 (Part 1) : 1992

Sl. No.	Room Name	Lux level
1	***Anesthetic Room***	
1.1	General	200 - 500
1.2	Local	750 - 1500
2	***Consulting Room***	
2.1	General	200 - 500
2.2	Examination	750 – 1500
3	***Corridor***	
3.1	General	100 – 200
4	***Ward Corridor***	
4.1`	Day , screened from bays	150 – 300
4.2	Day, open to natural light	150 – 300
4.3	Morning/evening	100 – 200
4.4	Night	5 – 10
5	***Cubicles***	
5.1	General	200 – 500
5.2	Treatment	750 – 1500
6	***Examination***	
6.1	General	200 – 500
6.2	Local Inspection	750 – 1500
7	***Intensive therapy***	
7.1	Bad head	30 – 50
7.2	Circulation between bed ends	50 – 150
7.3	Observation	200 – 500
7.4	Local observation	750 – 1500

7.5	Staff base (day)	200 – 500
7.6	Staff base (night)	30
8	***Laboratories***	
8.1	General	200 – 500
8.2	Examination	300 – 750
9	***Nurses' Station***	
9.1	Morning/day/evening	200 – 500
9.2	Night desks	30
9.3	Night, medical trolleys	50 – 150
10	***Operation theatres***	
10.1	General	300 – 750
10.2	Local	10,000 - 50,000
11	***Pathology departments***	
11.1	General	200 – 500
11.2	Examination	300 – 750
11.3	Pharmacies	200 – 500
11.4	Reception/enquiry	200 – 500
11.5	Recovery rooms	200 – 500
12	***Ward – circulation***	
12.1	Day	50 – 150
12.2	Morning/evening	50 – 150
12.3	Night	1
13	***Ward - bed head***	
13.1	Morning/evening	30 – 50
13.2	Reading	100 – 200
14	***Night***	
14.1	Adult	0.1 – 1

14.2	Pediatric	1
14.3	Psychiatric	1 – 5
14.4	Watch	5
15	***X - Ray areas***	
15.1	General	150 – 300
15.2	Diagnostic	150 – 300
15.3	Operative	200 – 500
15.4	Process dark room	50
16	***Surgeries***	
16.1	General	200 – 500
16.2	Waiting rooms	100 – 200
17	***Dental surgeries***	
17.1	Chair	Special lighting
17.2	Laboratories	300 – 750

Luminance Distribution:

The distribution of luminance should be regarded as complementary to the design on the illuminance in the interior. It should take into account the luminance of the task and its immediate surroundings: also the luminance of ceiling, walls and floor: avoidance of glare by limiting the luminance of luminaries and windows.

The luminance of the immediate surroundings of the task should, if possible be lower than the task luminance, preferably not less than 1/3 of this value i.e. the ratio of the reflectance of the immediate background of a task to that of the task itself should preferably be in the range
0.3 to 0.5

The average luminance in the peripheral field of view should be not lower than $1/10^{th}$ of the task luminance. In working interior in order to reduce the contrast between luminaries and surrounding ceiling, the ceiling reflectance should be as high as possible. The ratio of the minimum to the average illuminance should not be less than 0.8 in order to obtain a well- balanced luminance distribution. The average illuminance of the general areas of a working interior should normally

not be less than 1/3 of the average illuminance of the task areas. The average illuminance of adjacent interiors should not vary from each other by a ratio exceeding 5:1.

Restriction of Glare:

Glare may be caused by lamps, luminaires and windows (direct glare) or by the reflection of bright sources from surface with high reflectance (reflected glare). In interior lighting i.e. mainly for hospital lighting, discomfort glare from lamps and luminaries is likely to be more of a problem than disability glare.

In hospital lighting comfort of patients and Medical professional avoiding glare is important. Glare to be restricted to various operation e.g., surgery, pathological testing, eye inspection etc. Daylight and high powered beam from artificial light must be crucially handled to avoid glare.

In hospital, **unified glare rating** (UGR) value should be between 16 to 19, but in operation theatre and any examination room UGR value should not exceed 10. Also overall uniformity should be greater than0.5.

Table 5:UGR values corresponding to Discomfort Glare Criterion

UGR	**Discomfort Glare Criterion**
10	Imperceptible
13	Just perceptible
16	Perceptible
19	Just Acceptable
22	Unacceptable
25	Just Uncomfortable
28	Uncomfortable

5.3 THE RECOMMENDATIONS BY EUROPEAN NORMS,EN 12464-1:2009

There are several lighting design guidelines as discussed below:

Luminous environment:

For good lighting practice it is essential that in addition to the required illuminance, qualitative and quantitative needs are satisfied. Lighting requirements are determined by the satisfaction of basic human needs:

- Visual comfort, where the workers have a feeling of well-being; in an indirect way also contributing to a high productivity level,
- Visual performance, where the workers are able to perform their visual tasks, even under difficult circumstances and during longer periods,
- Safety. Main parameters determining the luminous environment are:
- Luminance distribution,
- Illuminance,
- Glare,
- Directionality of light,
- Colour rendering and colour appearance of the light,
- Flicker,
- Daylight.

Luminance distribution:

The luminance distribution in the field of view controls the adaptation level of the eyes which affects task visibility. A well balanced adaptation luminance is needed to increase:

- Visual acuity (sharpness of vision)
- contrast sensitivity (discrimination of small relative luminance differences),
- Efficiency of the ocular functions (such as accommodation, convergence, papillary contraction, eye movements etc.). The luminance distribution in the field of view also affects visual comfort.

The following should be avoided for the reasons given:

- Too high luminances which may give rise to glare,
- Too high luminance contrasts which will cause fatigue because of constant re-adaptation of the eyes,

- Too low luminances and too low luminance contrasts which result in a dull and non-stimulating working environment. The luminances of all surfaces are important and will be determined by the reflectance and the illuminance on the surfaces.

Recommended illuminances at the task area:

The values given in clause 5 are maintained illuminances over the task area on the reference surface which maybe horizontal, vertical or inclined. The average illuminance for each task shall not fall below the value given in Regardless of the age and condition of the installation. The values are valid for normal visual conditions and take into account the following factors:

- Psycho-physiological aspects such as visual comfort and well-being,
- Requirements for visual tasks,
- Visual ergonomics,
- Practical experience,
- Safety,
- Economy.

In normal lighting conditions approximately 20 lux is required to just discern features of the human face and is the lowest value taken for the scale of illuminances. The required maintained illuminance should be increased, when in the following causes:

- Visual work is critical,
- Errors are costly to rectify,
- Accuracy or higher productivity is of great importance,
- The visual capacity of the worker is below normal,
- Task details are of unusually small size or low contrast,
- The task is undertaken for an unusually long time. The required maintained illuminance may be decreased in the following cases:
- Task details are of an unusually large size or high contrast,
- The task is undertaken for an unusually short time. In continuously occupied areas, the maintained illuminance shall be not less than 200 lx.

Table 6: Recommended illumination value as per EN12464-1 (2002)

Sl. No.	Room Name	Lux level
1	***Rooms for general use***	
1.1	Waiting rooms	200
1.2	Corridors: during the day, cleaning	100

1.3	Corridors: during the night	50
1.4	Day rooms	200
1.5	Elevators, lifts	100
2	***Staff rooms***	
2.1	Staff office	500
2.2	Staff rooms	300
3	***Wards, maternity wards***	
3.1	General	100
3.2	Reading lighting	300
3.3	Simple examinations	300
3.4	Examination and treatment	1000
3.5	Night lighting, observation lighting	5
3.6	Bathrooms and toilets for patients	200
4	***Examination rooms (general)***	
4.1	General	500
4.2	Examination and treatment	1000
5	***Eye examination rooms***	
5.1	General	300
5.2	Examination of the outer eye	1000
5.3	Reading and colour vision tests with vision charts	500

Illuminances of immediate surroundings:

The illuminance of immediate surrounding areas shall be related to the illuminance of the task area and should provide a well-balanced luminance distribution in the field of view.
Large spatial variations in illuminances around the task area may lead to visual stress and discomfort. The illuminance of the immediate surrounding areas may be lower than the task illuminance but shall not be less than the values given in table above.

The value of illuminance may be adjusted by at least one step in the scale of illuminances (see below), if the visual conditions differ from the normal assumptions. A factor of approximately 1.5 represents the smallest significant difference in subjective effect of illuminance . In normal lighting conditions approximately 20 lux is required to just discern features of the human face and is the lowest value taken for the scale of illuminances. The recommended scale of illuminance (in lx) is:20 - 30 - 50 - 75 - 100 - 150 - 200 - 300 - 500 - 750 - 1000 - 1500 - 2000 - 3000 – 5000. The required maintained illuminance should be increased, in the following cases:

- Visual work is critical,
- Errors are costly to rectify,
- Accuracy or higher productivity is of great importance,
- The visual capacity of the worker is below normal,
- Task details are of unusually small size or low contrast,
- The task is undertaken for an unusually long time. The required maintained illuminance may be decreased in the following cases:
- Task details are of an unusually large size or high contrast,

Illuminances of immediate surroundings:

The illuminance of immediate surrounding areas shall be related to the illuminance of the task area and should provide a well-balanced luminance distribution in the field of view. Large spatial variations in illuminances around the task area may lead to visual stress and discomfort. The illuminance of the immediate surrounding areas may be lower than the task illuminance but shall not be less than the values given in table on the following page.

Table 7: Uniformities and relationship with illuminances at immediate surrounding areas to task area

Task Illuminance(lux)	**Illuminance of immediate surrounding area (lux)**
≥750	500
500	300
300	200
≤200	E_{task}
Uniformity: ≥ 0.7	Uniformity: ≥ 0.5

Daylight:

Daylight may provide all or part of the lighting for visual tasks. It varies in level and spectral composition with time and therefore provides variability within an interior. Daylight may create a specific modeling and luminance distribution due to its nearly horizontal flow of light from side windows. Windows may provide visual contact with the outside world, which is preferred by most people. In interiors with side windows the available daylight decreases rapidly with the distance from the window. Supplementary lighting is needed to ensure the required illuminance at the work place and to balance the luminance distribution within the room. Automatic or manual switching and/or dimming may be used to ensure appropriate integration between electric lighting and daylight. To reduce glare from windows, screening should be provided where appropriate.

5.4 THE RECOMMENDATIONS BY LIGHTING HANDBOOK OF ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA (IESNA) - 10TH EDITION (2011).

Recommendations for lighting levels have been referred in the 9th edition of the IESNA lighting handbook. The Illuminating Engineering society of North America is the recognized technical authority on illumination.

Lighting level

In IESNA there are different lighting levels specified depends upon the visual task, building area and task.

Table 8: Recommendation of different lux level , as per IESNA 2000

Type of visual task	Foot-candle	lux	Comments
Tasks occasionally performed	3	30	Orientation & simple visual tasks
Simple orientation/short visit	5	50	Orientation & simple visual tasks
Working space/simple task	10	100	Orientation & simple visual tasks
High contrast/large size	30	300	Common visual tasks
High contrast/smaller size or inverse	50	500	Common visual tasks
Low contrast/smaller size	100	1000	Common visual tasks
Tasks near threshold	300-1000	300-1000	Special visual tasks

Uniformity:

The uniformity of illluminance is a quality issue that addresses how evenly light spreads over a task area. Although a room's average illuminance may be appropriate, few factors may compromise uniformity:

- Improper fixture placement based on the luminaire's spacing criteria (ratio of max recommended fixture spacing distance to mounting height above task height).
- Fixtures that are retrofit with reflectors or louvers that narrow the light distribution.

Non-uniform illuminance causes several problems:

- Inadequate light levels in some areas
- Visual discomfort when tasks require frequent shifting of view from under lit to over lit areas.
- Bright spots and patches of light on floors and walls that cause distractionand generate a low-quality appearance.

Colour properties of light source

The colour properties of a light source depend on its spectral power distribution. The colour properties of a light source are described by three following quantities:

- Chromaticity
- Colour rendering index
- Efficiency

Chromaticity of colour temperature:

- All objects will emit light if they are heated to a sufficiently high temperature.
- The chromaticity or colour temp of a light source describes the colour appearance of the source.
- The CCT of a light source is the absolute temperature in Kelvin(K) of a black body radiator, having the closest possible colour match to the light source.
- Sources with low colour temps-below 3000K have a reddish or yellowish colour, described as warm colour.
- Sources with high colour temps-above 4000K have a bluish colour, described as cool colour.

5.5 RECOMMENDATIONS UNDER ENERGY CONSERVATION AND BUILDING CODE (ECBC) 2016

Building Area Method

Determination of interior lighting power specification (watts) by the building area method shall be in accordance with the following:

- Determine the allowed lighting power density from for each appropriate building area type.
- Calculate the gross lighted floor area for each building area type of ECBC.
- The interior lighting power allowance is the sum of the products of the gross lighted floor area of each building area times the allowed lighting power density for that building area types.

Table 9:ECBC Recommended LPDs (Building area method)

Building Area Type	**LPD(W/m^2)**	**Building Area Type**	**LPD(W/m^2)**
Automotive Facility	**9.5.2**	Multifamily Residential	**5.2.5**
Convention Center	**12.9**	Museum	**11.8**
Dining: Bar Lounge/Leisure	**14.0**	Office	**10.8**
Dining: Cafeteria/Fast Food	**15.1**	Parking Garage	**3.2**
Dining: Family	**15.2.2**	Performing Arts Theater	**15.2.2**
Dormitory /Hostel	**10.8**	Police/Fire Station	**10.8**
Gymnasium	**11.8**	Post Office/Town Hall/	**11.8**
Healthcare-Clinic	**10.8**	Religious Building	**14.0**
Hospital/Health Care	**12.9**	Retail/Mall	**16.1**
Hotel	**10.8**	School/University	**12.9**
Library	**14.0**	Sports Arena	**11.8**

Manufacturing Facility	**14.0**	Transportation	**10.8**
Motel	**10.8**	Warehouse	**8.6**
Motion Picture Theater	**12.9**	Workshop	**15.1**

In cases where both a general building area type and a specific building area type are listed, the specific building area type shall apply for details work and overall checking through building area method.

Space Function Method

Determination of interior lighting power allowance (watts) by the space function method shall be in accordance with the following:

Determine the appropriate building type from Table 10 and the allowed lighting power density.

For each space enclosed by partitions 80% or greater than ceiling height, determine the gross interior floor area by measuring to the center of the partition wall. Include the floor area of balconies or other projections. Retail spaces do not have to comply with the 80% partition height requirements.

The interior lighting power allowance is the sum of the lighting power allowances for all spaces. The lighting power allowance for a space is the product of the gross lighted floor area of the space times the allowed lighting power density for that space

Table 10:ECBC Recommended LPDs – Space Function Method

Space Function	**LPD (W/m^2)**	**Space Function**	**LPD (W/m^2)**
Office-enclosed	11.8	Library	12.9
Office-open plan	11.8	Card File & Cataloging	11.8
Conference/Meeting/ Multipurpose	14.0	Stacks	18.3

Classroom/Lecture/ Training	15.1	Reading Area	12.9
Lobby	14.0	Hospitals	12.9
For Hotel	11.8	Emergency	29.1
For Performing Arts Theater	35.5	Recovery	8.6
For Motion Picture Theater	11.8	Nurse Station	10.8
Audience/Seating Area	9.7	Exam Treatment	16.1
For Gymnasium	4.3	Pharmacy	12.9
Patient Room	7.5		
For Convention Center	7.5	Operating Room	23.7
For Religious Buildings	18.3	Nursery	6.5
For Sports Arena	4.3	Medic al Supply	15.1
For Performing Arts Theater	28.0	Physical Therapy	9.7
For Motion Picture	12.9	Radiology	4.3

Based on these LPD values, the designer can have an idea of the energy efficiency of his/her lighting design.

Conclusion

The different Lighting Standard have already been discussed in details in this chapter. European norms are accepted for today's hospital lighting design. The lighting level consider in India mostly follows Indian Standards. The colour aspects i.e., Colour Rendering Index, Colour Temperature values of source for indoor lighting design specified by the Indian and European norms is same.

5.6 (I) BUREAU OF INDIANSTANDARDS, IS 4347: 1967; CODE OF PRACTICE FOR HOSPITAL LIGHTING; AND (II) NATIONAL LIGHTING CODE (NLC): 2010

The IS : 4347 was introduced in the year 1967 .Since then there have been many advancements in lighting design and technology. The National Lighting Code was introduced in the year 2010 but it's hospital lighting section is based on this IS Guideline . The major areas are listed below :

LIGHTING OF THE PATIENTS' ROOMS OR WARDS:

The patients' rooms in a hospital often account for more than half of the useful floor space. The lighting of patients' rooms is of great importance and has to satisfy the needs of the patients as well as those of the medical and nursing staff. Moreover, the total lighting effect should be such as to contribute to the general decor and should be free of glare to the recumbent patient.

Lighting for the Medical and Nursing Staff-This lighting is mainly utilitarian for the staff in the sense that it should be adequate to enable them to carry out their routine tasks. They shall be able to take in the room at a glance and also carry out such tasks as reading thermometer or making charts at the bedside or elsewhere. A level of illumination as per IS 3646(Part I) would be considered normal for similar visual tasks will be too high from the patients' point of view, hence dimming provision should be present.

Lighting for the Patients- For the patients in the wards the lighting should create a cozy and pleasant atmosphere., hence illumination level as per IS 3646(Part I) should be provided. Moreover, in a ward some of the patients may like to sleep before the scheduled time of ' Lights out ' and such a level will be a nuisance to those patients, hence provision for switching and dimming should be present.

Apart from general lighting, individual patients should be provided with additional lighting for any occasional reading or other handiwork that they may choose to do. This should be in the form of bed head lights which can be switched 'on' or 'off' by the patients themselves. These light salso contribute to the general appearance of the wards by breaking the monotonous uniformity that will result from the general lighting.It may also become necessary under certain emergencies to examine the patient in the ward itself for which an examination light capable of providing 500 to 1 000 lux will be required. At night after 'Lights out' the wards cannot be left in complete darkness. The nursing staff should be able to take in the ward at a glance to ensure everything is alright. Those patients who can move should also be able to make their way to the lavatory, etc. A night lighting system which gives enough illumination (about 1 lux) for this purpose but which does not disturb the sleeping patients is also therefore necessary in a ward.

The lighting installation in a ward therefore calls for:
a) General lighting,
b) Reading lamps,
c) Examination lighting, and
d) Night lighting.

Consistent with the above broad requirements, recommendations as to how these could be achieved are given below:

General and Reading Lighting -The following two systems are possible:
a)General Lighting is provided by pendent fittings hanging from the middle of the ceiling and having an indirect or semi-indirect light distribution. Reading lighting is provided by small bedside fittings fixed to the wall behind the bed.
b) In the other system both the general lighting and reading lighting elements are incorporated in the same fitting fixed on the wall above the beds.

In both the systems the general lighting is controlled from a central point and the reading lights by the individual patients.

Examination Lighting - It is never satisfactory to use the reading lamp as examination lamp also. Whether a separate examination lamp is to be provided at each bed will depend on the frequency of its likely use. Where such use is only occasional a good solution will be to have a mobile examination lamp that can be wheeled along and connected to a wall socket by the bedside.

Night Lighting - A satisfactory night lighting system can be provided by a number of small fittings (with incandescent lamp of low wattage or miniature fluorescent lamp 4 watt) recessed into the wall at a height of about 30 cm above the floor level. Efforts should be made to screen the light fitting to avoid direct glare.

CORRIDORS

Corridors in a hospital serve a more important ‘function than in many other buildings because they act as transitional areas between the wards and the service rooms and between the naturally lit and artificially lit rooms. Doctors discuss their work with their colleagues and make notes. Thus the corridors act in a sense as a working area. Moreover, corridors also fall within the visual range of the patients in the wards and therefore require special attention. The artificial lighting to be provided in the corridors will depend on the architectural layout adopted for the building. Generally two types of layouts are followed. In the ‘single corridor’ layout the wards and the service rooms are on the two sides of the corridor. The corridor itself will have enough

daylighting. But in the evening the service rooms will have an illumination of about 200 lux and the lighting level in the ward will be of the order of 100 lux. The corridors should have an illumination of about 100 lux so that the staff moving between the service rooms and the wards will gradually adapt themselves to the different illumination levels. But after 'Lights out' there will be only night lighting in the wards and the corridors should also be provided with similar night lighting arrangement. The service room lighting should also be reduced to half its value in the evening.

In the 'double corridor' or 'racetrack' plan the wards are placed around the outside of the building and are normally daylighted. In the centre of the building are the service rooms which will have no access to daylight and will require artificial lighting at all times. During the day the staff will move between the wards receiving daylight of 500-l 000 lux to the internal rooms artificially lit to a level of 200 lux. The corridor should bridge these two levels and an illumination of 150 lux should be provided in the corridors during the daytime. In the evenings the ward lighting will fall to100 lux and the corridor lighting may be reduced to the same level. After' Lights out ' both the ward and the corridor will have night lighting and the service room illumination should therefore be reduced to about 100 lux, which will be just sufficient for the staff to carry on their normal work and will also reduce the excessive contrast between the brightness levels in the wards or corridors.

LIGHTING OF SURGICAL AREAS

General Lighting of Operating Theatres -The main visual problems are the detailed examination of human tissue and organs and the manipulation of surgical instruments at the site of the operation. The size of critical detail can be exceedingly small and the contrast very low. Tile required illuminance ranges between 10 000 lux and 50 000 lux.
Operation table lighting equipment can be divided into two main categories:

a) Adjustable luminaires, containing one or more tungsten filament lamps, with cantilever suspension from the ceiling, operated locally by the surgeon or an assistant. The vast majority of luminaires are within this category. They have the advantage of being simple to control and easy to maintain and replace. The main criticisms are that it is difficult to ensure that such luminaires are thoroughly hygienic and that they produce location concentration of radiant heat; and

b) A number of sealed and adjustable projectors installed in the ceiling of the theatre are located outside so as to direct their light through a transparent ceiling. They are operated by remote control and thus require skilled manipulation. Such systems are highly versatile and are very useful in teaching hospitals, as they do not obscure the views to observers.

They are more complex than (a).Portable floor standing lighting equipment is normally required for supplementary use with systems and (b).Provision should be made for the dimming of the general lighting in operation theatres. To prevent interference to sensitive medical equipment, high frequency filters and shielding bonded to earth should be considered for fluorescent lighting in operation theatres. To ensure a satisfactory gradation of brightness between the high illuminance at the site of the operation and the surrounding areas, a minimum general illuminance of 300 lux is recommended and this is normally adequate for staff operating the ancillary equipment.

The colour appearance of skin and tissue is also of great importance, and the spectral quality of the light sources used for the general lighting should be the same as that used throughout the rest of the hospital

Emergency Lighting in Theatre Suite-A failure of essential lighting during an operation may have serious consequences. It is, therefore, necessary to provide reliable and safe emergency arrangements

.

Light Sources -The choice of light source is generally a matter of economy. In hospitals an additional factor comes into play, especially in clinical areas like the operation theatres and post operative wards. This is the effect of the artificial lighting on the natural skin colour of the patients. In the past, most artificial light was produced by tungsten filament lamps and the doctors became familiar with the appearance of patients in varying conditions in this light. But in view of-the improved economy and advent of new technology, new generation energy efficient lamps are now being extensively used in important installations in hospitals so as to have better electrical, photometric and colour rendering properties.

Anesthetic Room - In view of the close association of this room with the theatre proper a general illumination of 300 lux is recommended with provision for a spotlight (which can be either fixed or portable). The general lighting should not be directly over the centre of the room but the lighting fittings should be designed to provide some illumination on the ceiling. Dimming of the installation may be required to enable the anesthetist to provide suitable environmental conditions.

Recovery Room and Intensive Care Units - The presence of large quantities of other portable apparatus renders the use of portable lighting equipment undesirable. General lighting should be installed as in a normal ward with a separate system to raise the illumination level up to 300 lux for each bed independently. This should be provided over an area of3 m x 2 m centred on the bed and the fitting designs should be such as to limit the spread on adjacent beds. Dimming of the individual bed lights should be provided for.
Some discomfort glare to a conscious patient is unavoidable under these conditions but the recommended general lighting fittings will produce a bright ceiling which will mitigate this effect.

Hazardous Areas - The zone of risk in an area where anesthetic gases are used is defined as being 1.4 m above floor and extending for a radius of l-2 m beyond any point where an anaesthetizing machine may travel.

Lighting fittings installed either in or above the zone of risk should be totally enclosed to provide adequate mechanical protection to the lamp, and to prevent hot particles falling into the zone in the event of lamp breakage(other requirements, for example, limitation of glare, provision for hosing down, demand that the lamps should be fully enclosed)

Chokes, condensers, and other control gear associated with lighting fittings should be installed outside the zone of risk. If installed above the zone of risk they should be totally enclosed in incombustible housings.

RADIOGRAPHY DEPARTMENT

In the 'screening' room due to the necessity to maintain low brightness level normally Incandescent lamps of ruby red glass bulb or a fluorescent lamp with red fluorescent powder is used. Red is chosen because this colour of light has only little effect on the state of adaptation of the eye. In the 'processing' room 15 watts dark room lamps (green or reddish brown depending on the film material used) are used.
In the 'viewing' room where the radiographs are studied and assessed artificial lighting is used in the viewing boxes.
For the general lighting required for cleaning of the rooms for setting up the apparatus, etc, an illumination of 100 lux is provided in all these rooms.

MATERNITY DEPARTMENT

Nursery Lighting - Nursery lighting should be subject to the same recommendations as for ward lighting, Lighting of special baby care suites may be done similar to nurseries.

Fitting Design-The mechanical and electrical design of fittings should take account of the high ambient temperatures and relative humidity experienced in rooms of the 'Special baby care suite.'

PHYSIOTHERAPY DEPARTMENT

Special lighting applicable to this Department should have the following average illumination levels at 0.8 m above the floor:

Gymnasium 100 lux
Hydrotherapy 100 lux

It should be borne in mind that illumination will be required to the bottom of the bath or pool.

OTHER TREATMENT AND SERVICE ROOMS

The lighting of other treatment rooms do not present any special problem. A normal general illumination of 200 lux will serve the purpose. The lighting of service rooms, such as offices, laboratories, kitchens and laundries, can be tackled in the same way as corresponding interiors in other buildings.

Table 11 : Illumination Values and Glare Index

Sl. No.	Classification	Illumination (Lux)	Limiting Glare Index
(1)	(2)	(3)	(4)
i)	Reception and waiting room	150	16
ii)	Wards		
	(a) General	100	134*
	(b) Beds	150	—
iii)	Operating theaters:		
	(a) General	300	10
	(b) Tables	special lighting	—
iv)	Laboratories	300	19
v)	Radiology departments	100	—
	*Care should be taken to screen all bright areas from view of patients in bed.		

LIGHT SOURCE

Though the choice of light source is normally a matter of economy, in hospital an additional factor comes into play, especially in clinical areas like the operation theatres and post operative wards. This is the effect of the artificial lighting on the natural skin colour of the patients. In the past most artificial light was produced by tungsten filament lamps and the doctors became familiar with the appearance of patients in varying conditions in this light. But in view of the greater economy and efficiency of the fluorescent lamp it is finding increasing use in hospitals and lamps coated with specially developed fluorescent powders offering better colour rendition are available and they can be used satisfactorily in clinical areas.

COLOUR IN HOSPITALS

Colour can play an important and useful role in creating the desired atmosphere in hospital interiors. It will be necessary not only to consider the colour scheme design in daylight but also to find out the effect on it of the light source to be used. A well chosen colour scheme can also support the effect of the lighting by increasing or decreasing the effect of contrast of suitable places. Depending on the use to which the room is to be put a correct combination of light and colour can result in the desired liveliness or a quiet atmosphere.

PERMANENT SUPPLEMENTARY ARTIFICIAL LIGHTING

Permanent supplementary artificial light of interiors as described in IS 3646 (Part I) may be useful in hospitals not only to permit wards to provide good overall lighting of the appropriate quality but also in laboratories, service and ancillary rooms where a controlled level of working illumination is desirable and in administration offices where the lighting problems are similar to office lighting elsewhere.

CHAPTER -6: SOFTWARE USED IN THE LIGHTING DESIGN

6.1 USAGE OF SOFTWARE FOR LIGHTING DESIGN

Lighting design software is one of the important thing in lighting application. We have two main difference applications in lighting which are indoor and outdoor. Outdoor applications cover road lighting, tunnel lighting, area lighting i.e. landscape lighting in parks and gardens, sports lighting and facade lighting. Indoor applications cover industrial lighting, office lighting, retail lighting, hospitality lighting, museum lighting, indoor stage lighting.

There are some advantages of using lighting design software during lighting design in indoor areas as compared to mathematical calculation regarding determination of lux level and no fixtures needed. Those are:-

- Faster time to calculate required lux level and uniformity
- Better accuracy
- View 3D and 2D of a room
- Import luminaires' photometric data sheet with their catalogue no. of the world's leading lighting manufacturers in the softwares
- Use tools, objects and surface colours
- View luminaire' layout plan in a room
- View 3D false colour rendering and Isolines of illuminance value
- Evaluate glare distribution and energy evaluation
- Utilization of daylight and daylight sensor and also create control group among the luminaires' for dimming purpose wherever needed

6.2 SELECTION CRITERIA FOR LAMPS AND LUMINAIRES BEFORE IMPORT TO LIGHTING DESIGN SOFTWARE

The most appropriate light source can then be chosen followed by the luminaire. The following attributes should be studied when choosing the proper light source and luminaire :

- Light output (lumens) of lamp and luminaire
- Output wattage of luminaire
- Efficacy (lumens per Watt)
- Lifetime of lamp
- Physical size of luminaire
- CCT and CRI characteristics of lamp
- Electrical characteristics
- Light distribution of lumianire
- Requirement for control gear and its efficiency
- Luminaire efficiency (% light output transmitted out of the fixture)
- Thermal management and power management

- IP rating and IK rating
- Surge Protection in KV
- Compatibility with existing electrical system
- Ambient temperature for operation
- Diffuser/Optical compartment material

6.3METHODOLOGY TO IMPORT LUMINAIRE OF PARTICULAR WATTAGE IN LIGHTING DESIGN SOFTWARE

After collecting photometric and electrical data (light intensity distribution along vertical angles and horizontal angles, luminaires' lumen output, luminaire efficacy, luminaire wattage, output operating current, percentage of threshold harmonic distortion and power factor), CCT and CRI of lamp and lamp life used as indoor and outdoor luminaires testing in Lab, photometric data sheet should be created in notepad format by using aforementioned data with test date, catalogue no. and manufacturer's name which is considered as IES file and it is approved by IESNA (Illuminating Engineering Society of North America). The IES file of a particular fixture wattage is imported to lighting design software.

Table 12: CCT and CRI of different lamps

Type of lamp	CCT (K)	CRI
GLS	2500 – 2700	100
Tungsten Halogen	2700 – 3200	100
FTL	3000 – 6500	60 - 90
CFL	2700 – 6500	> 80
High Pressure Mercury	3200 – 3900	40 - 50
Quartz tube Metal Halide	3000 – 5000	60 -90
Ceramic tube Metal Halide	3000 – 4400	78 - 93
SOX (Low Pressure sodium vapour lamp)	2100	19
SON (High Pressure sodium vapour lamp)	1900 – 2500	40
Induction Lamp	2500 – 4000	80
LED	2700 – 6500	> 70

6.4DIFFERENT TYPES OF LIGHTING SIMULATIONSOFTWARES

There are different types of lighting simulation softwares as described below :

Table 13: Lighting design softwares

Sl. No.	*Title*	*Description*
1	DIALux	DIALux is a free light planning software for both indoor and outdoor lighting with daylight and artificial light scenarios.
2	OptiWin 3D pro	A free lighting design program for a building or renovation project by importing large 3D models for LENI (Lighting energy numeric indicator) calculations, lux level calculation and also simple calculation of emergency lighting.
3	Vectorworks Spotlight	It is the industry-leading design software for the landscape lighting, urban lighting and entertainment business i.e. for stage lighting with 2D and 3D capabilities.
4	TracePro	A software tool for modelling the propagation of light in imaging and non- imaging opto-mechanical systems. The models are created by importing from a design or CAD program, or through directly creating the solid geometry in TracePro. The source rays propagate through the model with portions of the flux of each ray allocated for absorption, specular reflection and transmission, fluorescence, and scattering. Designers can analyze from the model: ➢ Light distributions in illumination and imaging systems ➢ Lumens exiting, absorbing, and incident at the component and system levels ➢ Candela distributions ➢ Optical efficiency, luminance ,and radiance metrics ➢ Photorealistic rendering ➢ Fluorescence effects of phosphors

5	LiteStar 4D	A software for interior and exterior lighting design
6	MA Lighting software	Lighting design software for indoor and outdoor stage lighting
7	Visual 3D	This type of lighting design is used for many outdoor lighting scenarios e.g. parking lots and exterior facade lighting. Visual design tools can be used to quickly calculate scenarios with simple geometrics where inter-reflected light will not significantly affect the resulting illuminance.
8	AGi32	A lighting design software for providing numeric and rendered solutions for almost any lighting application, interior or exterior, including roadway and day-lighting.
9	Relux	Free lighting design software for indoor, outdoor and tunnel lighting.
11	OptisWorks	This type of software is for scientific simulation of light effect- light levels, light distribution, photometric performance and light colour with respect to human visualization within a virtual reality environment. Users use this software to simulate and optimize lighting performance, product appearance, as well as the visibility of information, taking into visual angle, various ambient light conditions, glare on human product interfaces. Applications are in automotive lighting, aerospace lighting, traffic light, illuminated road signs, LED backlight and indoor lighting (for Museum and hotel). In automotive lighting system intelligent automated adaptive lighting effect can be created by using this software to enhance driver safety, good mood and visual comfort.

12	Radiance	Radiance is a free open-source suite of programs for the analysis and visualisation of lighting in design. Its input files specify the scene geometry, materials, luminaires, time, date, and sky conditions (for daylight calculations). Calculated values include illuminance values, luminance values include and glare indices. Simulation results may be displayed as colour images, numerical values, and contour plots
13	Rayfront	This type of software is used for lighting design in educational institutions and industries with daylight to compute daylight factors, work-plane illuminance and evaluate glare distribution.
14	LX Series software	Lighting design software for indoor stage lighting that helps to display beam of spotlight in particular area, lux values on stage by using DMX controlling software and glare distribution with respect to visual effect of spectators.
15	Microlux	Lighting design software for indoor stage lighting
16	Lighting Reality	Lighting software for street and outdoor area lighting
17	Capture	Capture is used for stage lighting design. Capture allows users to work with lighting, video/laser media state, motion control system and water jets. It supports a wide range of ethernet DMX protocols such as Art-Net and SACN
18	Lumicept	Lumicept is hybrid light simulation software that simulates the behaviour of light, allowing the user to know how light propagates and is distributed in space.

19	LD Assistant	Lighting design software for indoor and outdoor stage lighting as well as used entertainment industries. Users can insert lighting fixtures along camera, speaker, sound cabinets, video projectors. It supports a wide range of ethernet DMX protocols such as Art-Net and SACN
20	LightCalc	Lighting design software for indoor areas with features that include the following: It can be used to determine the overall reflectance in a room. It can find the proper footcandle level or lux level for general, task, and art lighting. It helps the user determines the proper spacing needed. It uses both inverse square law and lumen methods. A grid layout is suggested for general lighting.
21	ElumTools	Lighting design software for interior lighting design with or without daylight and exterior lighting design for light level calculation
22	Calculux	This type of software has been developed at Philips Lighting Design and Application Centre [LiDAC] and it is applied for illuminance value calculation in indoor and outdoor area
23	Light-in-Night Road	Lighting software for street lighting
24	Ulysse	Lighting design software by Schreder company, calculate the necessary lighting levels for road applications

Out of the above mentioned lighting design softwares **DIALux** software has been adopted for present study considering following aspects:-

- Simple, effective and professional light planning
- Latest luminaire data of the world's leading manufacturers
- Latest state of the art software always available free of charge
- Energy evaluation facility and lighting control system facility
- Lux level calculation in presence of integrated daylight and electrical light sources
- Coloured light scenes with LED or other colour changing luminaires

6.5PROCEDURE FOR INDOOR LIGHTING DESIGN USING LIGHT SIMULATING SOFTWARE

While designing indoor lighting system using light simulating software to achieve desired lux level and maintaining good uniformity recommended by IS : 3646 some basic steps will have to be followed. The key steps in the design process are :

- Import architectural drawing of interior building to the software.
- Room dimension (i.e. length, width and height).
- Identify type of task in each room.
- Consider proper value of reflectance of floor, ceiling and wall.
- Consider proper value of light loss factor depending on degree of pollution factor in different types of interior area.
- Identify type of ceiling (i.e. RCC type, Armstrong grid based false ceiling or gyp board false ceiling).
- Proper selection of surface mounted and recessed mounted luminaires having excellent thermal and optical management with proper CCT and CRI of lamps having energy efficient and long lifespan and insert its IES file to the software.
- Requirement of proper fixture quantity and arrange the fixtures in matrix form that create fixtures' position symmetric.
- Maintaining actual fixture-to-fixture spacing with respect to their wattage along row and column wise.
- Utilization of daylight with energy efficient electrical light source by using building management system i.e. dimming system wherever it should be required in a particular zone of a space.
- Start calculation to determine lighting parameters i.e. lux level, LPD and uniformity required to perform a particular task as per the standard.
- Calculation of monthly energy consumption by determining total luminaires' quantity with total power consumption needed in an interior building.

CHAPTER - 7:
DESIGN - DETAILS

7.1 First Floor.

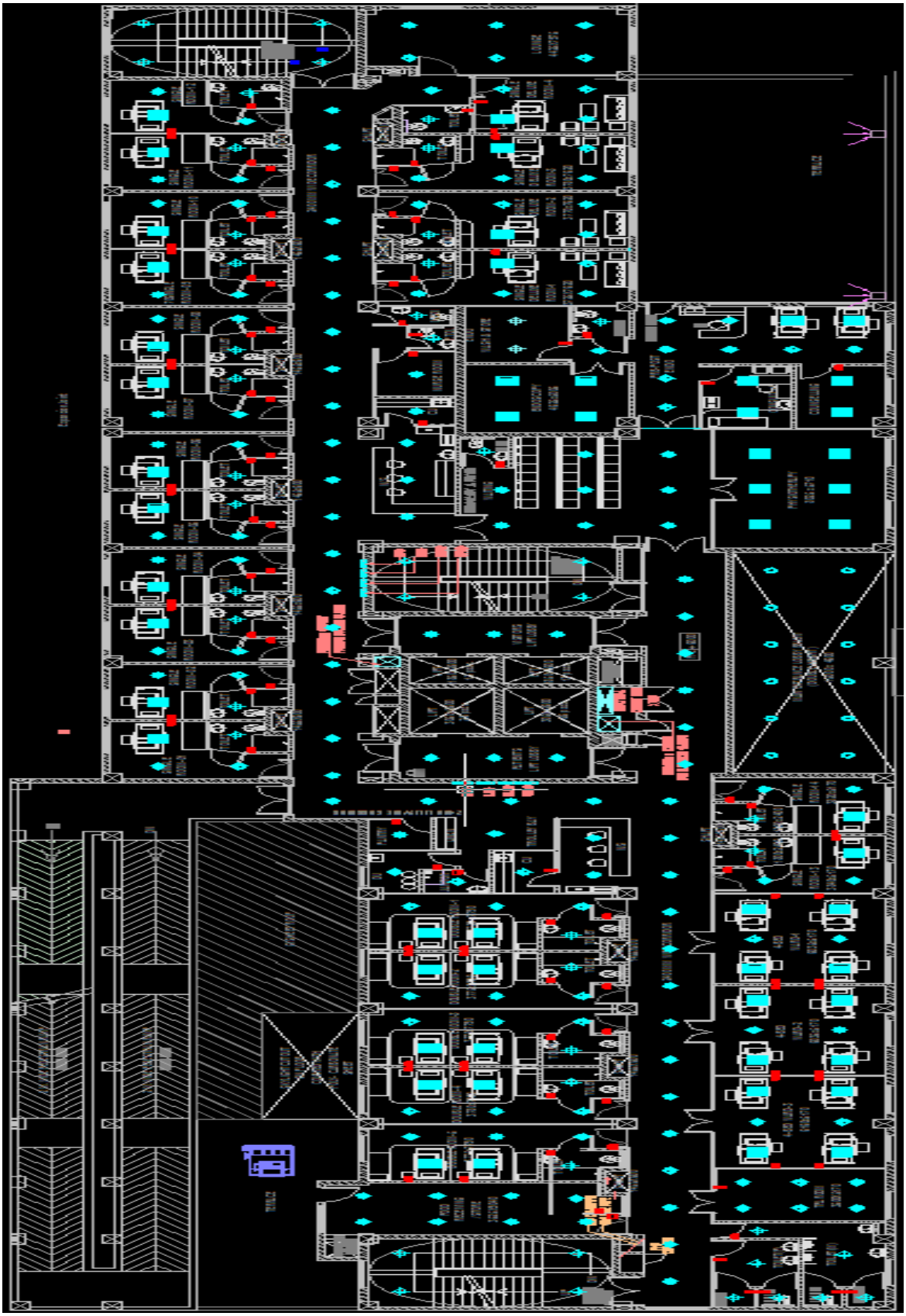


Fig 3: First Floor Plan.

Table 14: Major areasin the first floor.

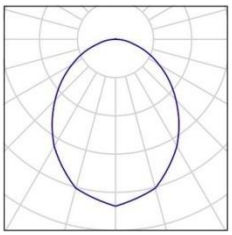
Location	Luminaire Used	Approx. Eavg achieved (lux)	Approx. Emin achieved (lux)	Approx. Emax achieved (lux)
Patient Wards (4 Bed Wards)	1. Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL 2. Crompton Greaves Ltd. 03 LCDE-15-CDL	342	213	433
Endoscopy Room	1.Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL	368	218	455
Physiotherapy Room	1.Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL	351	155	485
Lounge	1.Crompton Greaves Ltd. 03 LCDE-15-CDL	182	68	227
Nurses Stations	1.Crompton Greaves Ltd. 03 LCDE-15-CDL	100	31	149
Clean/Dirty Utility Room	1.Crompton Greaves Ltd. 03 LCDE-15-CDL	130	92	167

Operator Telephone
Fax e-Mail

Ayursundra Hospital Jorhat, Assam (First Floor) / Luminaire parts list

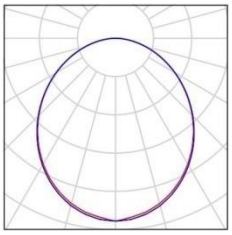
12Pieces Crompton Greaves Ltd. 01LCDN-50-TL
Article No.:01
Luminous flux (Luminaire): 2985 lm Luminous flux (Lamps): 3030 lm Luminaire Wattage: 50.9 W
Luminaire classification according to CIE: 100 CIE flux code: 53 82 96 10099
Fitting: 1 x LCDN-50-TL (Correction Factor 1.000).

See our luminaire catalog for an image of the luminaire.



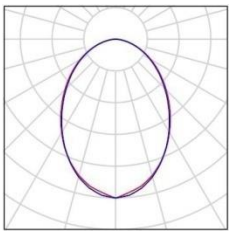
24Pieces Crompton Greaves Ltd. 01LCTLRN-36-FO-CDL
Article No.:01
Luminous flux (Luminaire): 3525 lm Luminous flux (Lamps): 3529 lm Luminaire Wattage: 34.2 W
Luminaire classification according to CIE: 100 CIE flux code: 49 80 95 100100
Fitting: 1 x LCTLRN-36-FO-CDL (Correction Factor 1.000).

See our luminaire catalog for an image of the luminaire.



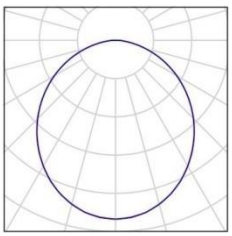
15Pieces Crompton Greaves Ltd. 02 LCDE-12-CDL
Article No.:02
Luminous flux (Luminaire): 1339 lm Luminous flux (Lamps): 1335 lm Luminaire Wattage: 12.4 W
Luminaire classification according to CIE: 100 CIE flux code: 55 84 97 100100
Fitting: 1 x LCDE-12-CDL (Correction Factor 1.000).

See our luminaire catalog for an image of the luminaire.



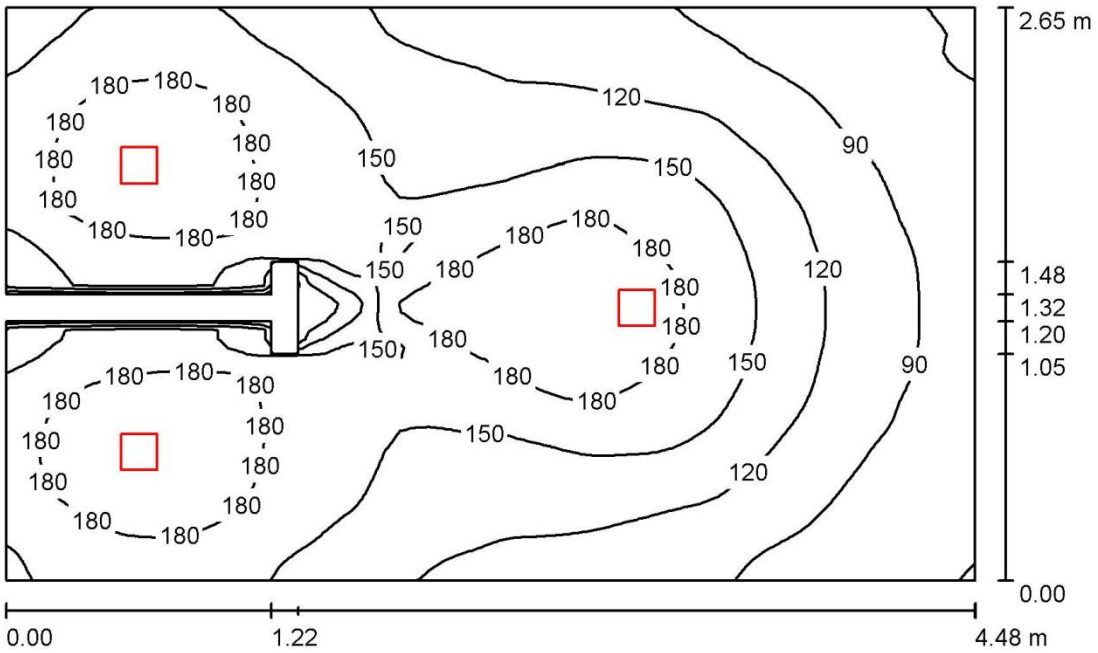
110 Pieces Crompton Greaves Ltd. 03 LCDE-15-CDL
Article No.: 03
Luminous flux (Luminaire): 1624 lm Luminous flux (Lamps): 1623 lm Luminaire Wattage: 15.9 W
Luminaire classification according to CIE: 100 CIE flux code: 48 80 96 100100
Fitting: 1 x LCDE-15-CDL (Correction Factor 1.000).

See our luminaire catalog for an image of the luminaire.



Operator Telephone
Fax e-Mail

Toilet(M) /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:35

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	141	56	202	0.399
Floor	10	106	60	153	0.566
Ceiling	70	37	17	92	0.477
Walls (12)	50	86	21	332	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.698, Ceiling / Working Plane: 0.259.

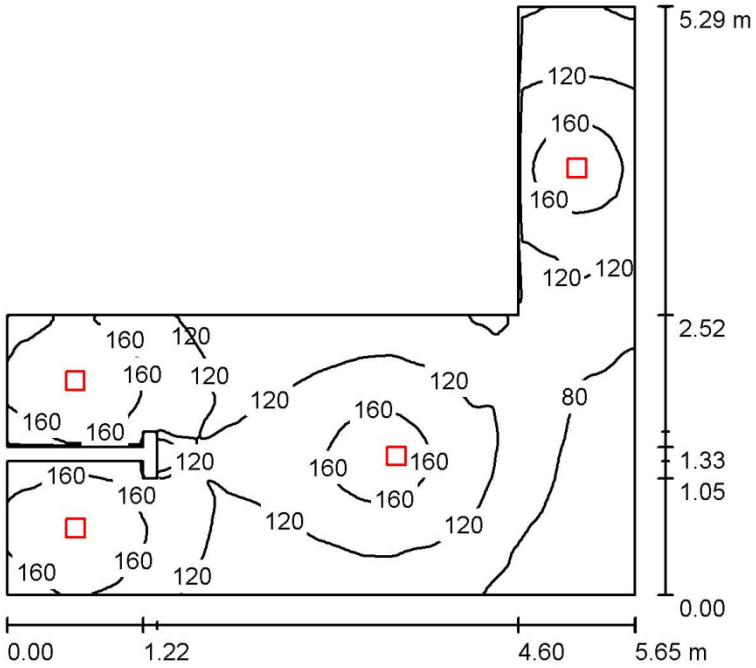
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	3	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			4018	Total: 4005	37.1

Specific connected load: 3.18 W/m² = 2.26 W/m²/100 lx (Ground area: 11.67 m²)

Operator Telephone
Fax e-Mail

Toilet(F) /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:68

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	125	44	194	0.348
Floor	10	95	51	136	0.530
Ceiling	70	35	14	84	0.415
Walls (14)	50	81	19	419	/

Workplane:
Height: 0.760 m
Grid: 128 x 128Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.752, Ceiling / Working Plane: 0.276.

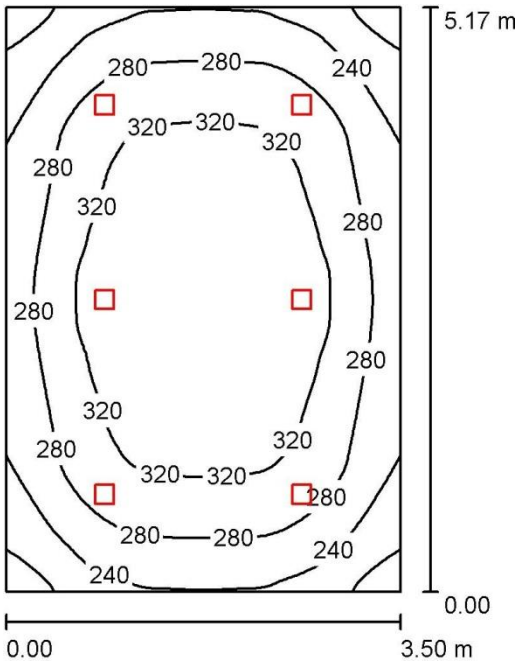
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	4	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			5358	Total: 5340	49.5

Specific connected load: 2.92 W/m² = 2.33 W/m²/100 lx (Ground area: 16.95 m²)

Operator Telephone
Fax e-Mail

TFA Room /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:67

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	292	180	357	0.617
Floor	10	235	164	287	0.697
Ceiling	70	66	48	81	0.731
Walls (4)	50	165	63	277	/

Workplane:
Height: 0.760 m
Grid: 64 x 64Points
BoundaryZone: 0.000 m

UGR

	Lengthways-	Across
LeftWall	22	22
LowerWall	23	23

(CIE, SHR = 0.25.)

Illuminance Quotient (according to LG7): Walls / Working Plane: 0.614, Ceiling / Working Plane: 0.226.

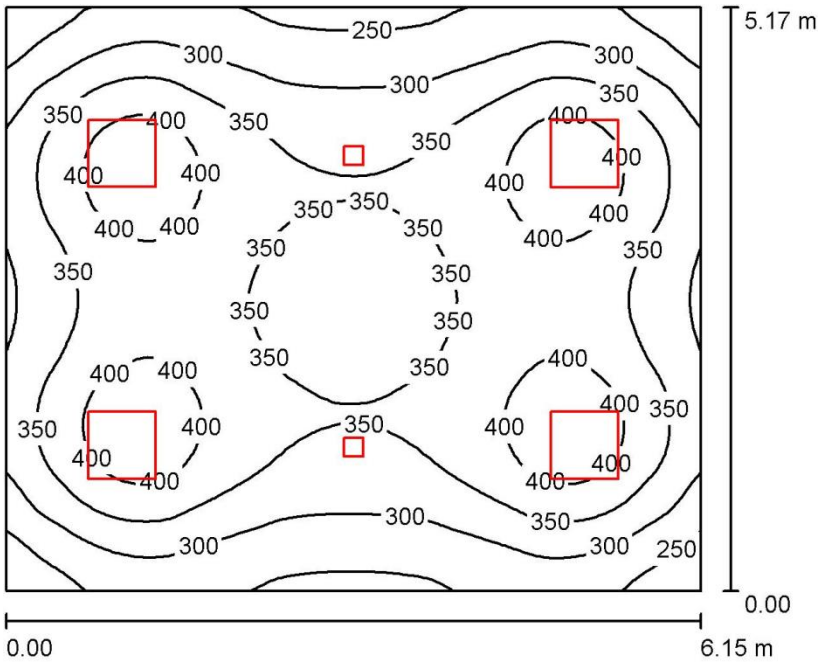
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	6	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			9747	Total: 9738	95.6

Specific connected load: 5.29 W/m² = 1.81 W/m²/100 lx (Ground area: 18.09 m²)

Operator Telephone
Fax e-Mail

4-Bed Ward /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:67

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	342	213	433	0.623
Floor	10	288	193	332	0.669
Ceiling	70	64	48	77	0.744
Walls (4)	50	181	62	355	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.551, Ceiling / Working Plane: 0.188.

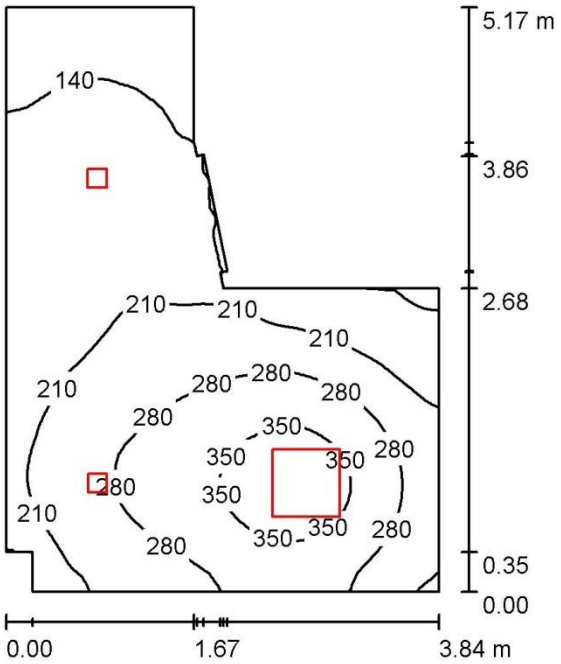
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	4	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
2	2	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			17348	Total: 17364	168.6

Specific connected load: 5.30 W/m² = 1.55 W/m²/100 lx (Ground area: 31.81 m²)

Operator Telephone
Fax e-Mail

Single Room /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:67

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	230	87	390	0.379
Floor	10	178	82	255	0.458
Ceiling	70	52	32	78	0.602
Walls (13)	50	123	38	379	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.584, Ceiling / Working Plane: 0.228.

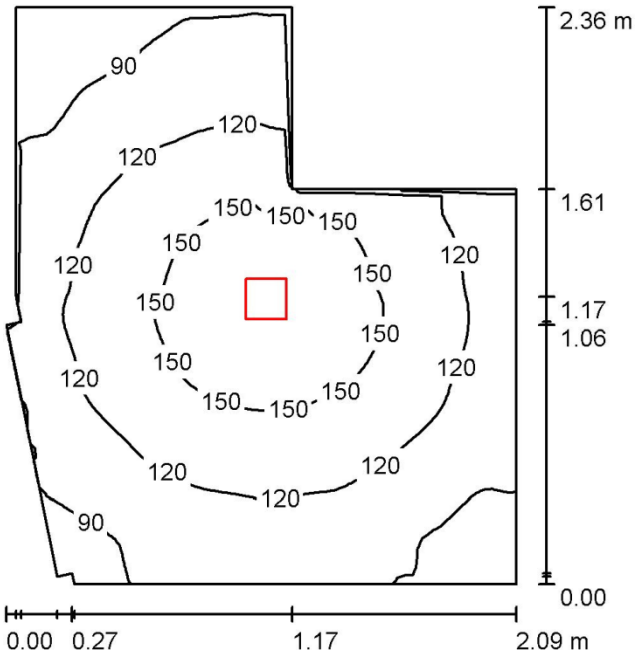
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
2	2	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			6774	Total: 6775	66.1

Specific connected load: 4.52 W/m² = 1.96 W/m²/100 lx (Ground area: 14.61 m²)

Operator Telephone
Fax e-Mail

Single Room Toilet /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:31

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	120	69	169	0.572
Floor	10	82	57	100	0.694
Ceiling	70	31	18	69	0.559
Walls (11)	50	64	19	446	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.598, Ceiling / Working Plane: 0.261.

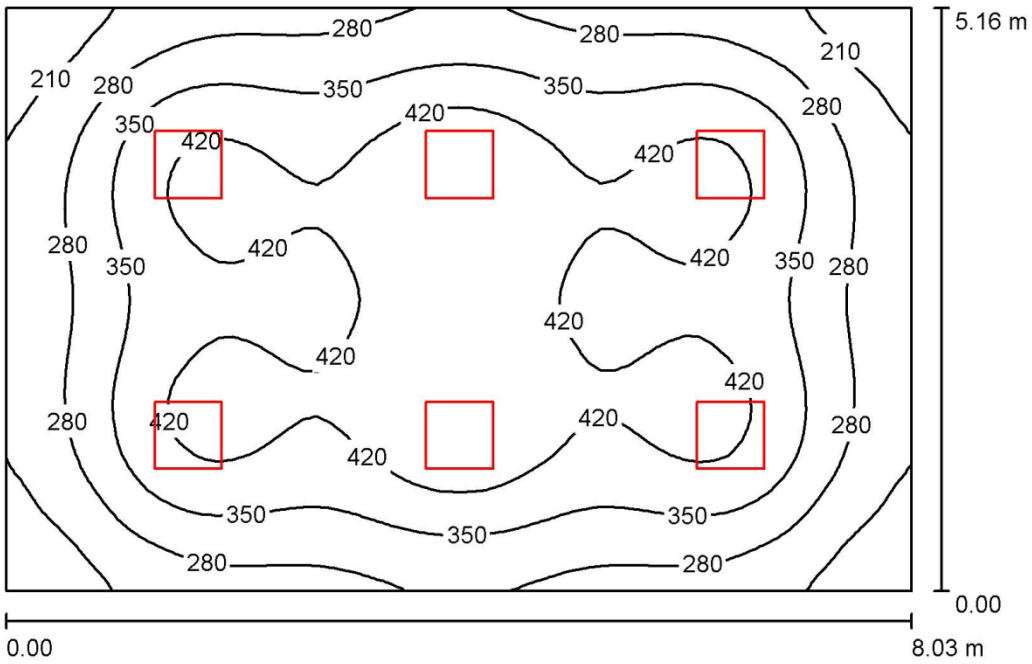
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 3.04 W/m² = 2.53 W/m²/100 lx (Ground area: 4.07 m²)

Operator Telephone
Fax e-Mail

Physiotherapy Room/Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:67

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	351	155	485	0.442
Floor	10	301	161	394	0.534
Ceiling	70	56	39	64	0.700
Walls (4)	50	159	50	254	/

Workplane:
Height: 0.760 m
Grid: 64 x 64Points
Boundary Zone: 0.000 m

UGR Lengthways- Across to luminaire axis
LeftWall 19 19
LowerWall 18 18
(CIE, SHR = 0.25.)

Illuminance Quotient (according to LG7): Walls / Working Plane: 0.448, Ceiling / Working Plane: 0.159.

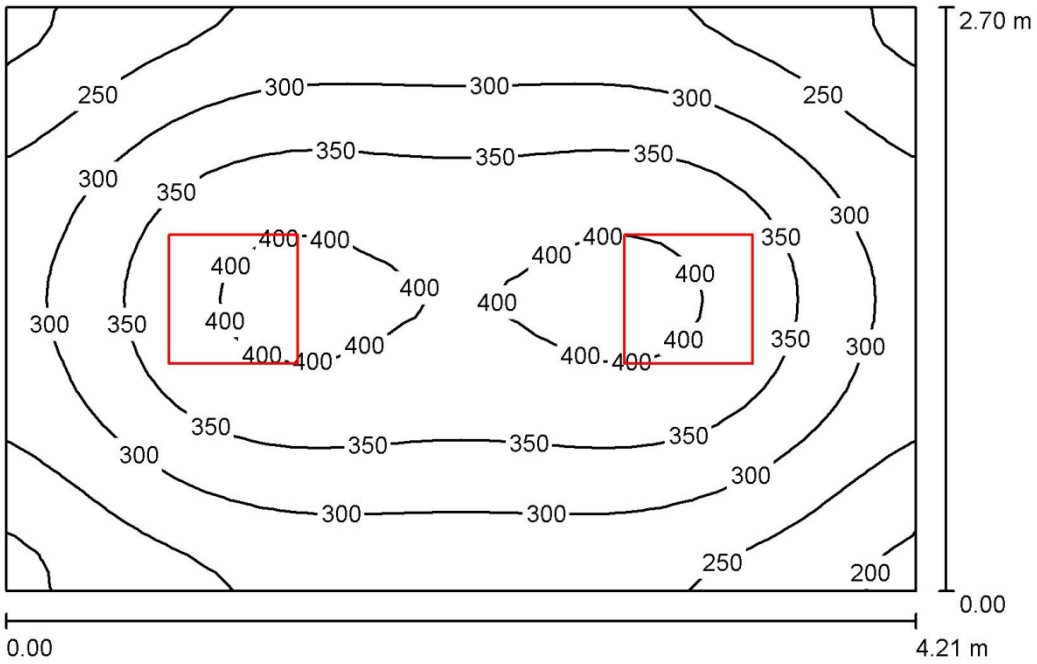
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	6	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
Total:			21149	Total: 21176	205.1

Specific connected load: 4.95 W/m² = 1.41 W/m²/100 lx (Ground area: 41.44 m²)

Operator Telephone
Fax e-Mail

Consultancy-1 /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:35

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	316	186	414	0.588
Floor	10	240	167	294	0.698
Ceiling	70	68	51	84	0.745
Walls (4)	50	167	54	340	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.563, Ceiling / Working Plane: 0.215.

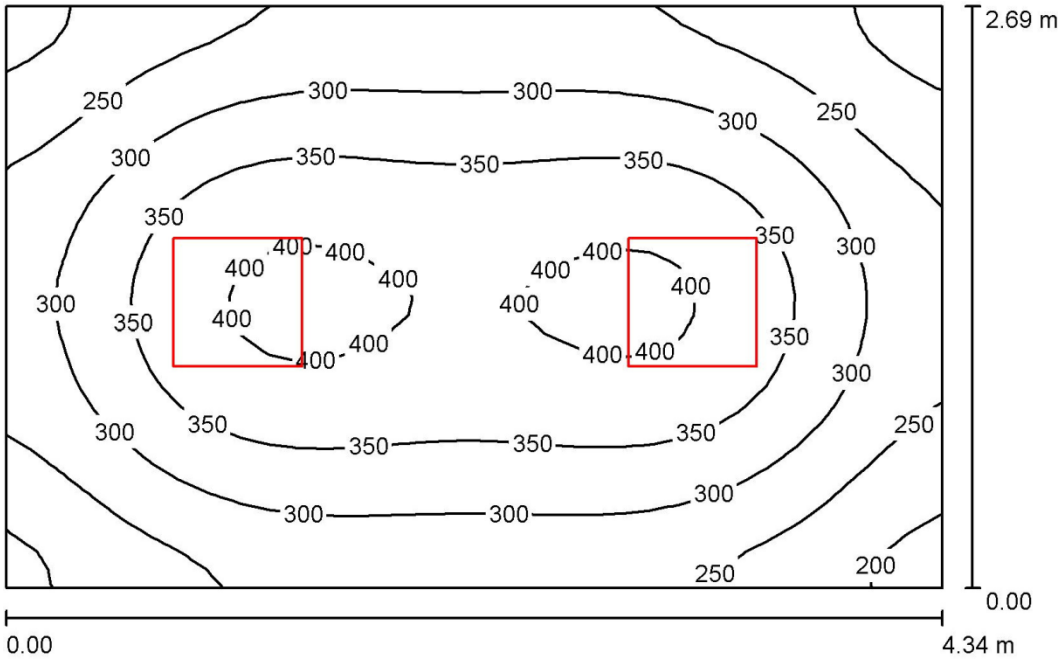
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	2	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
Total:			7050	Total: 7059	68.4

Specific connected load: 6.01 W/m² = 1.90 W/m²/100 lx (Ground area: 11.38 m²)

Operator Telephone
Fax e-Mail

Counseling /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:35

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	312	175	413	0.562
Floor	10	237	162	293	0.684
Ceiling	70	66	48	77	0.735
Walls (4)	50	162	53	329	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.555, Ceiling / Working Plane: 0.211.

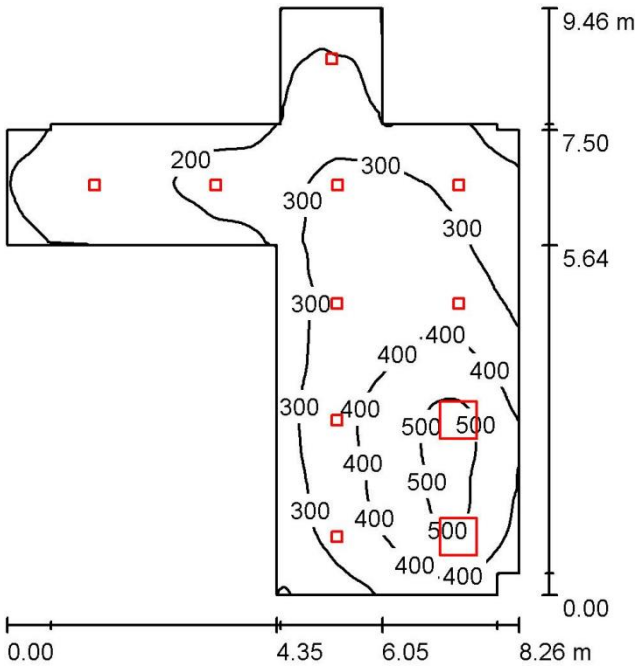
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	2	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
Total:			7050	Total: 7059	68.4

Specific connected load: 5.85 W/m² = 1.88 W/m²/100 lx (Ground area: 11.69 m²)

Operator Telephone
Fax e-Mail

Pre-Post Endoscopy /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:122

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	301	73	529	0.242
Floor	10	258	90	404	0.348
Ceiling	70	62	33	113	0.536
Walls (16)	50	158	39	433	/

Workplane:
Height: 0.760 m
Grid: 128 x 128Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.560, Ceiling / Working Plane: 0.204.

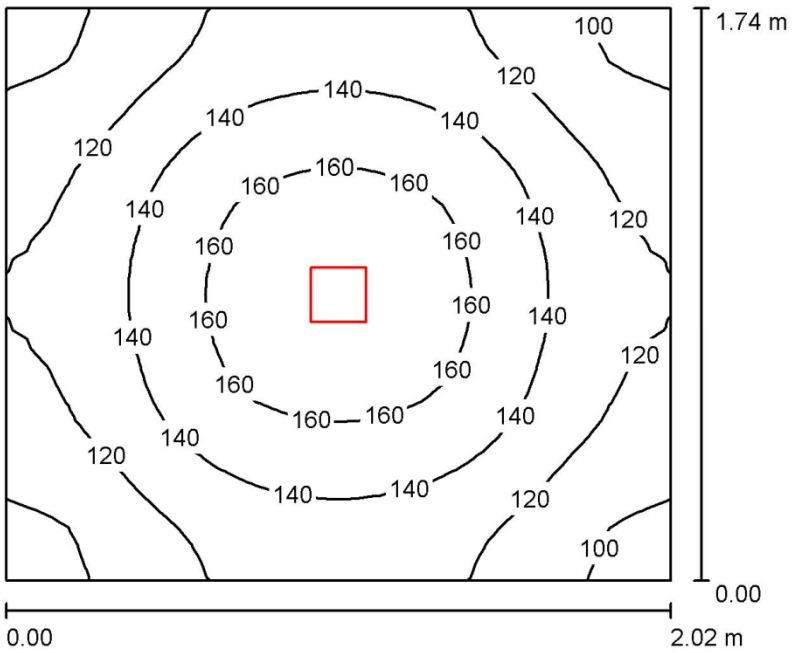
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	2	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
2	9	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			21670	Total: 21666	211.8

Specific connected load: 5.16 W/m² = 1.71 W/m²/100 lx (Ground area: 41.04 m²)

Operator Telephone
Fax e-Mail

Patients Toilet /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:23

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	133	92	174	0.693
Floor	10	88	68	104	0.773
Ceiling	70	37	26	43	0.701
Walls (4)	50	76	29	164	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.651, Ceiling / Working Plane: 0.278.

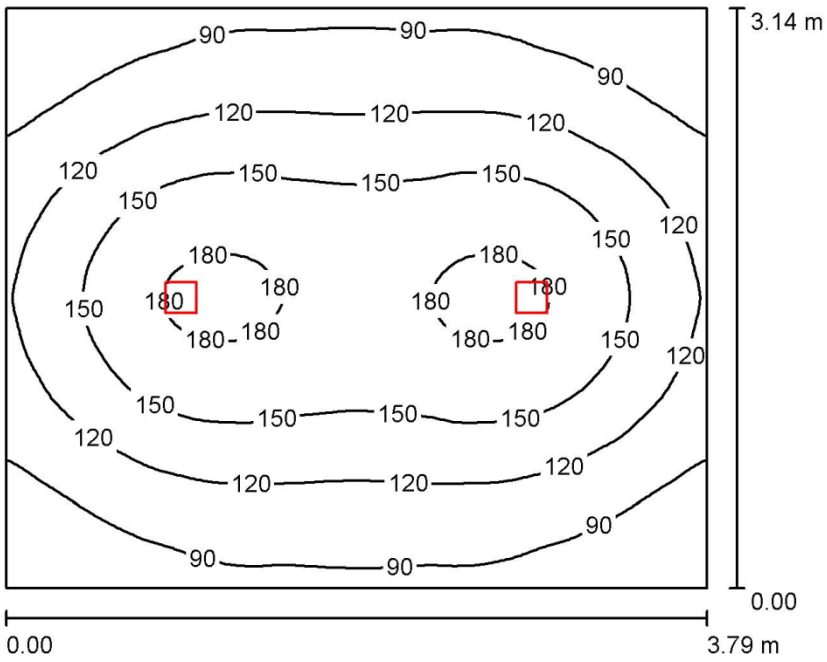
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 3.53 W/m² = 2.64 W/m²/100 lx (Ground area: 3.51 m²)

Operator Telephone
Fax e-Mail

Endoscopy Wash Store /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:41

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	126	63	186	0.500
Floor	10	99	62	129	0.628
Ceiling	70	23	17	30	0.743
Walls (4)	50	57	19	134	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.474, Ceiling / Working Plane: 0.184.

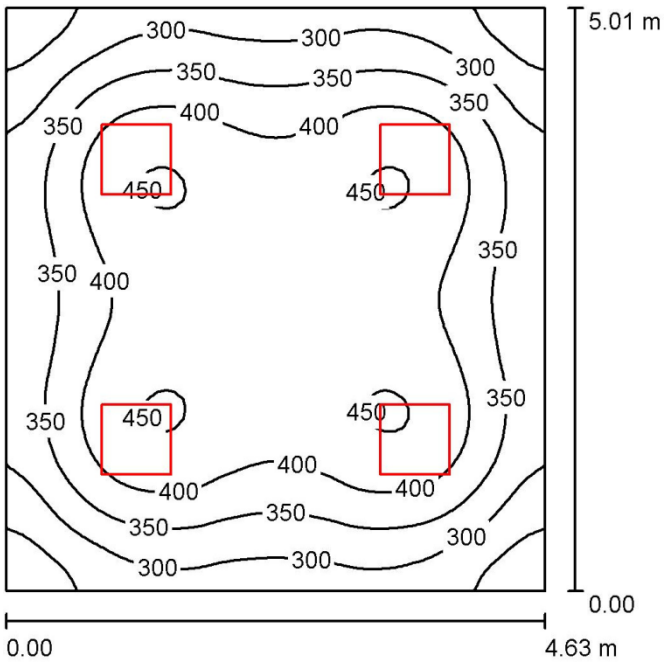
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	2	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			2679	Total: 2670	24.8

Specific connected load: 2.08 W/m² = 1.65 W/m²/100 lx (Ground area: 11.91 m²)

Operator Telephone
Fax e-Mail

Endoscopy /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:65

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	368	218	455	0.594
Floor	10	302	195	365	0.645
Ceiling	70	69	49	79	0.707
Walls (4)	50	187	60	322	/

Workplane:
Height: 0.760 m
Grid: 64 x 64Points
BoundaryZone: 0.000 m

UGR Lengthways- Across to luminaire axis
LeftWall 18 18
LowerWall 17 17
(CIE, SHR = 0.25.)

Illuminance Quotient (according to LG7): Walls / Working Plane: 0.530, Ceiling / Working Plane: 0.189.

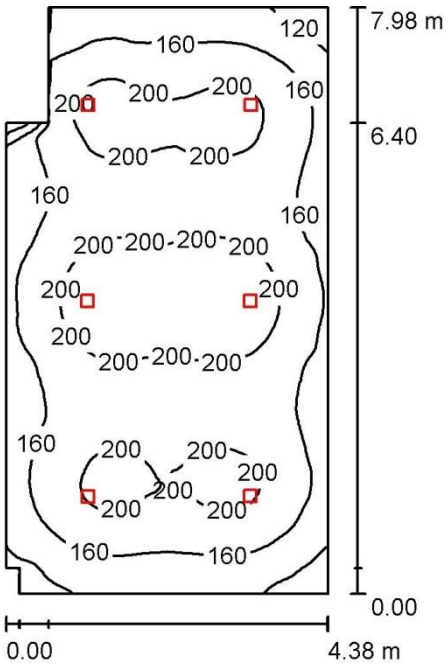
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	4	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
Total:			14099	Total: 14118	136.7

Specific connected load: 5.89 W/m² = 1.60 W/m²/100 lx (Ground area: 23.22 m²)

Operator Telephone
Fax e-Mail

Lounge /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:103

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	179	67	224	0.374
Floor	10	151	72	184	0.475
Ceiling	70	34	27	90	0.783
Walls (9)	50	94	30	510	/

Workplane:
Height: 0.760 m
Grid: 128 x 64 Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.550, Ceiling / Working Plane: 0.190.

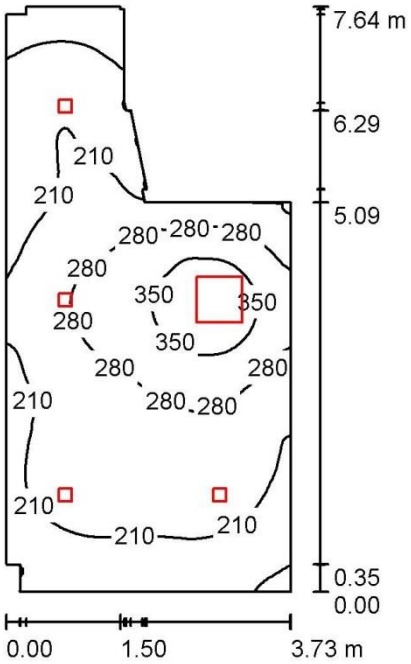
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	6	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			9747	Total: 9738	95.6

Specific connected load: 2.82 W/m² = 1.58 W/m²/100 lx (Ground area: 33.95 m²)

Operator Telephone
Fax e-Mail

Single Deluxe Room /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:99

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	239	100	403	0.421
Floor	10	194	87	281	0.448
Ceiling	70	51	36	74	0.710
Walls (17)	50	126	37	397	/

Workplane:
Height: 0.760 m
Grid: 64 x 128Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.571, Ceiling / Working Plane: 0.212.

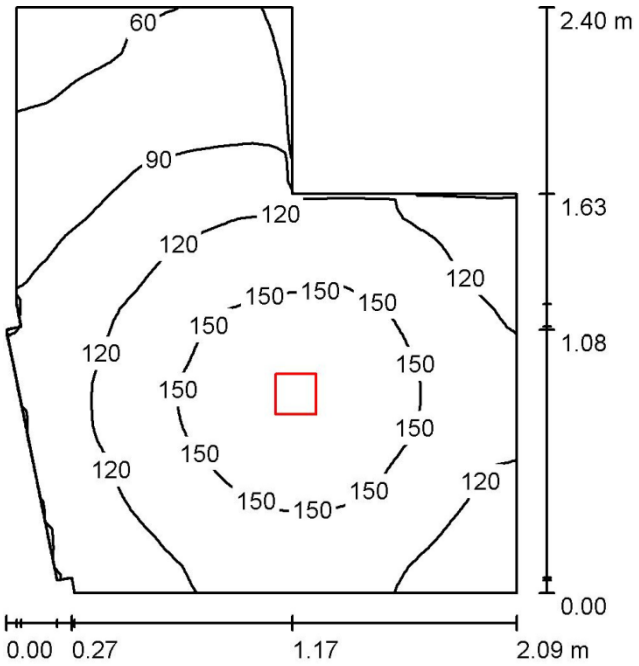
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
2	4	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			10023	Total: 10021	97.9

Specific connected load: 4.24 W/m² = 1.78 W/m²/100 lx (Ground area: 23.09 m²)

Operator Telephone
Fax e-Mail

Single Deluxe Room Toilet /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:31

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	118	43	172	0.363
Floor	10	80	37	102	0.462
Ceiling	70	31	14	43	0.463
Walls (11)	50	63	15	179	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.598, Ceiling / Working Plane: 0.262.

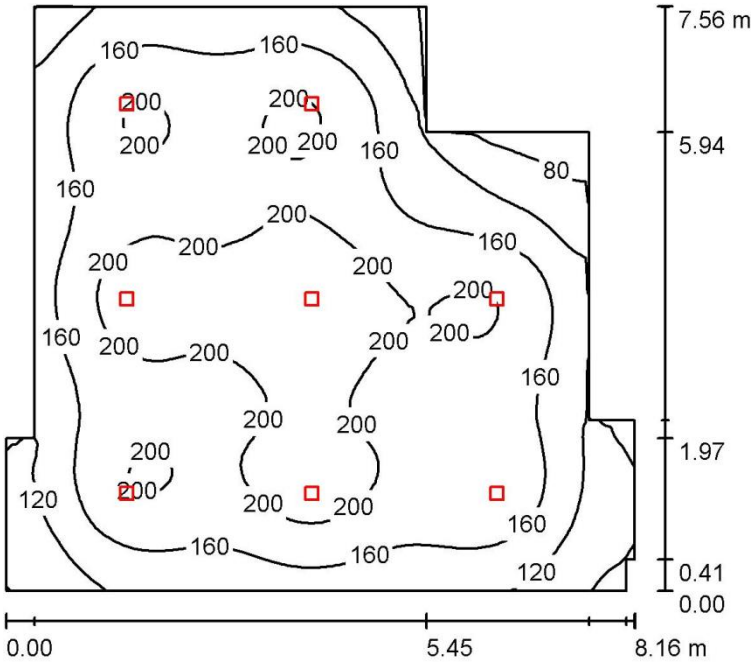
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 2.99 W/m² = 2.53 W/m²/100 lx (Ground area: 4.14 m²)

Operator Telephone
Fax e-Mail

Endoscopy and Physiotherapy Waiting /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:98

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	170	54	235	0.320
Floor	10	148	62	192	0.422
Ceiling	70	27	19	37	0.712
Walls (13)	50	78	23	139	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.463, Ceiling / Working Plane: 0.161.

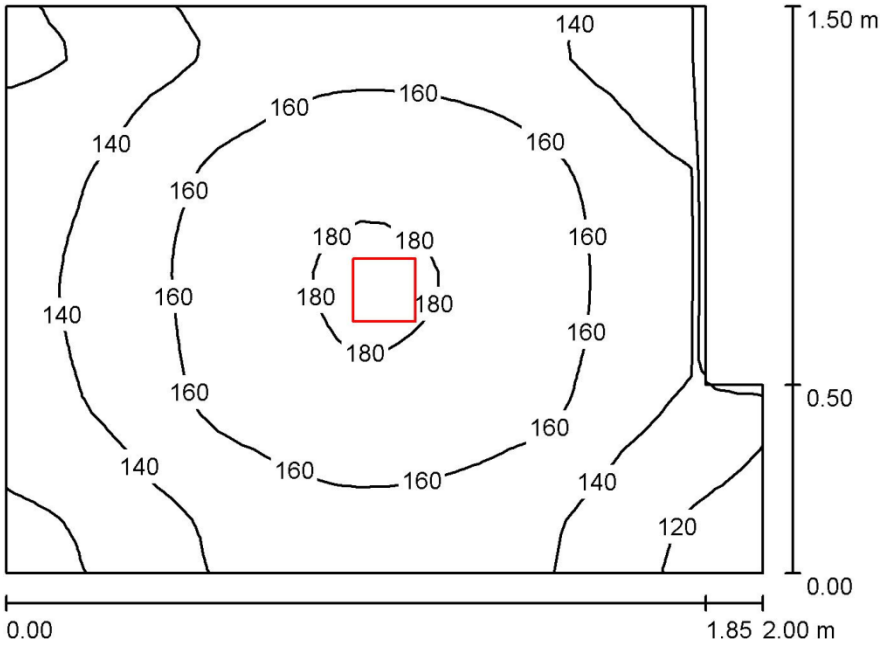
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	8	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			12996	Total: 12984	127.5

Specific connected load: 2.41 W/m² = 1.42 W/m²/100 lx (Ground area: 52.98 m²)

Operator Telephone
Fax e-Mail

Endoscopy and Physiotherapy Waiting Area Toilet/Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:20

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	151	110	183	0.725
Floor	10	95	76	108	0.802
Ceiling	70	60	39	77	0.644
Walls (6)	50	108	19	301	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.849, Ceiling / Working Plane: 0.399.

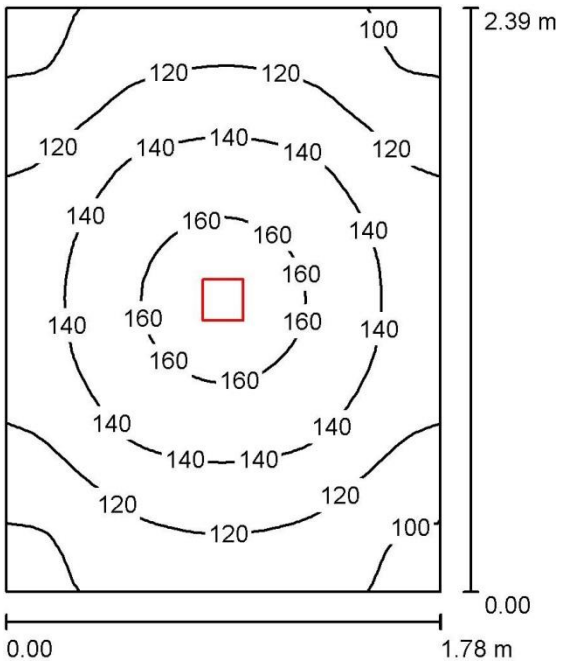
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 5.60 W/m² = 3.70 W/m²/100 lx (Ground area: 2.85 m²)

Operator Telephone
Fax e-Mail

Clean Utility /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:31

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	130	92	167	0.707
Floor	10	87	69	101	0.794
Ceiling	70	41	28	47	0.688
Walls (4)	50	83	33	209	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.731, Ceiling / Working Plane: 0.313.

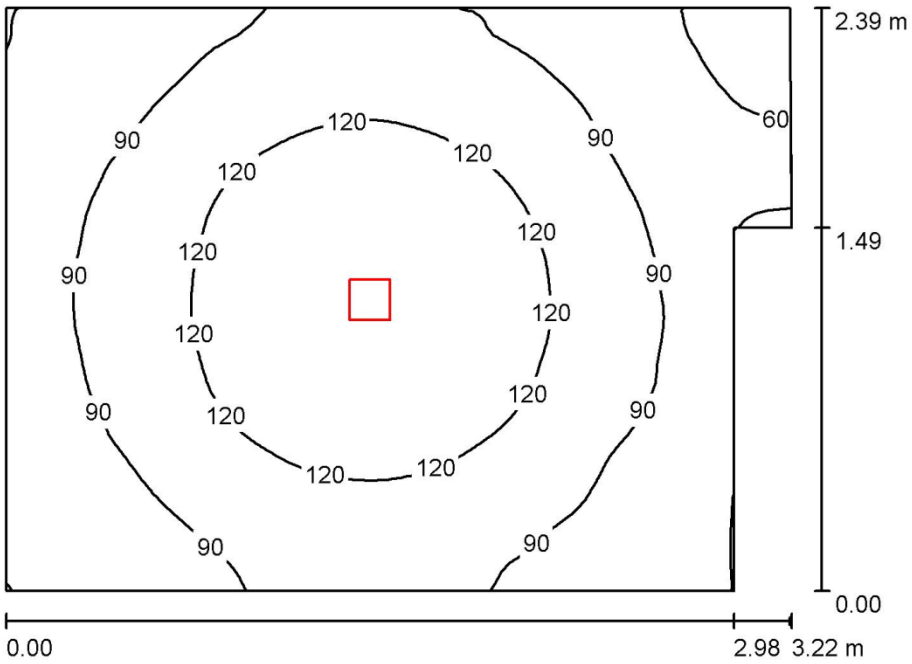
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 3.74 W/m² = 2.86 W/m²/100 lx (Ground area: 4.27 m²)

Operator Telephone
Fax e-Mail

Nurse Room /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:31

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	100	31	149	0.305
Floor	10	72	27	91	0.381
Ceiling	70	23	14	27	0.596
Walls (6)	50	53	14	117	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.578, Ceiling / Working Plane: 0.234.

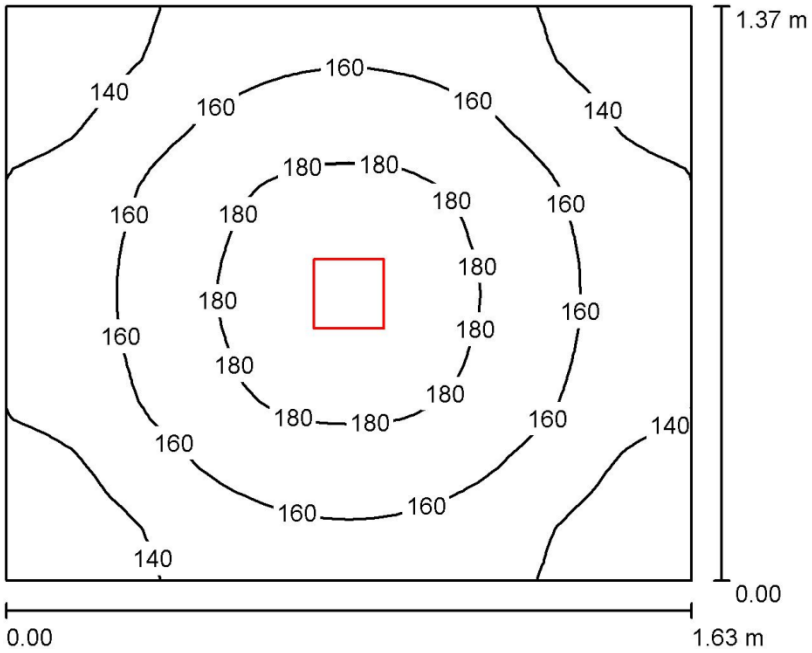
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 2.17 W/m² = 2.17 W/m²/100 lx (Ground area: 7.34 m²)

Operator Telephone
Fax e-Mail

F.Toilet /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:18

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	157	120	190	0.759
Floor	10	98	82	110	0.835
Ceiling	70	58	41	67	0.709
Walls (4)	50	105	36	263	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.790, Ceiling / Working Plane: 0.370.

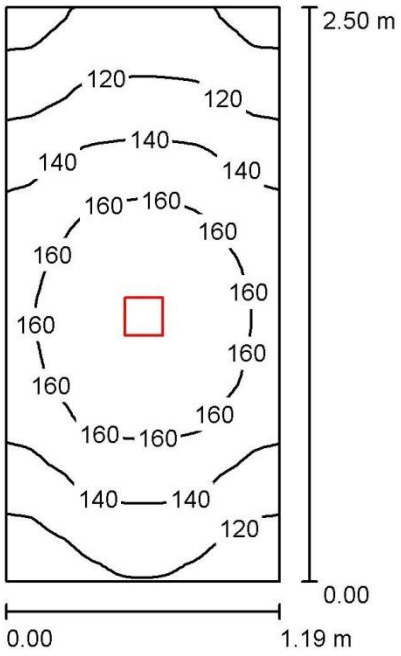
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 5.56 W/m² = 3.53 W/m²/100 lx (Ground area: 2.22 m²)

Operator Telephone
Fax e-Mail

M.Toilet /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:33

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	142	94	179	0.662
Floor	10	90	71	103	0.785
Ceiling	70	60	31	84	0.526
Walls (4)	50	103	31	454	/

Workplane:
Height: 0.760 m
Grid: 32 x 64 Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.862, Ceiling / Working Plane: 0.420.

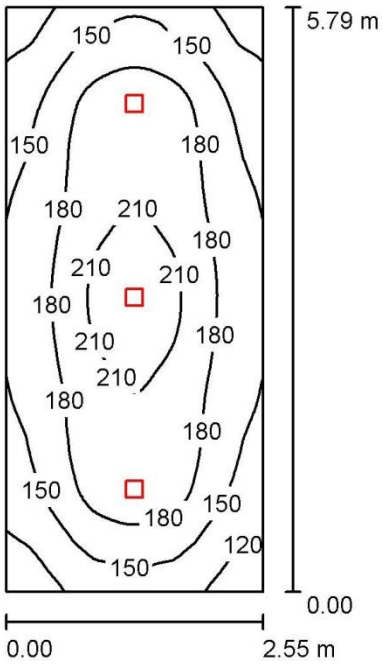
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 5.35 W/m² = 3.76 W/m²/100 lx (Ground area: 2.98 m²)

Operator Telephone
Fax e-Mail

Visitor's Lift Lobby /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:75

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	171	100	224	0.586
Floor	10	132	87	163	0.659
Ceiling	70	38	26	47	0.696
Walls (4)	50	93	33	192	/

Workplane:
Height: 0.760 m
Grid: 64 x 128Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.585, Ceiling / Working Plane: 0.220.

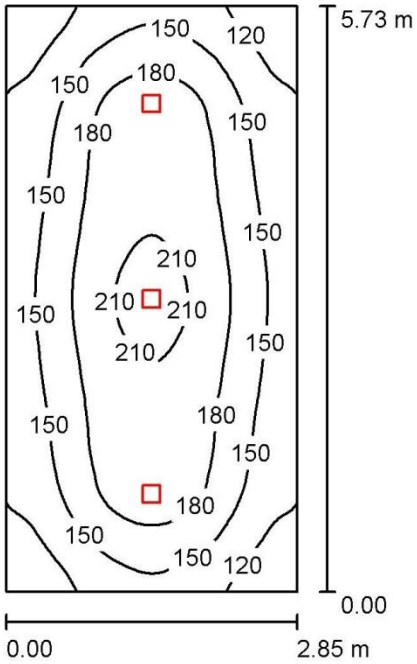
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	3	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			4873	Total: 4869	47.8

Specific connected load: 3.24 W/m² = 1.89 W/m²/100 lx (Ground area: 14.76 m²)

Operator Telephone
Fax e-Mail

Patient's Lift Lobby/Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:74

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	162	93	219	0.573
Floor	10	127	84	159	0.656
Ceiling	70	34	23	44	0.683
Walls (4)	50	86	30	188	/

Workplane:
Height: 0.760 m
Grid: 64 x 128Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.560, Ceiling / Working Plane: 0.209.

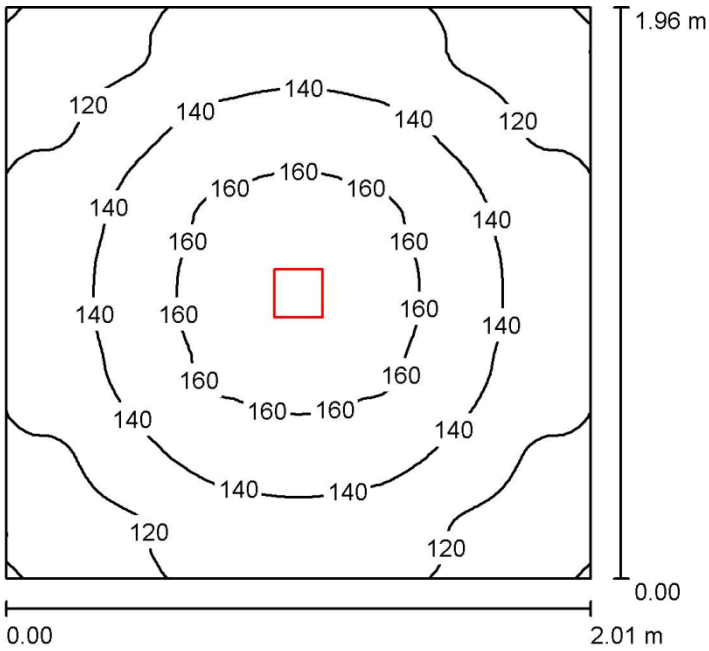
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	3	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			4873	Total: 4869	47.8

Specific connected load: 2.93 W/m² = 1.80 W/m²/100 lx (Ground area: 16.32 m²)

Operator Telephone
Fax e-Mail

Pantry /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:26

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	136	99	169	0.724
Floor	10	90	73	103	0.808
Ceiling	70	44	31	50	0.710
Walls (4)	50	89	37	183	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.753, Ceiling / Working Plane: 0.324.

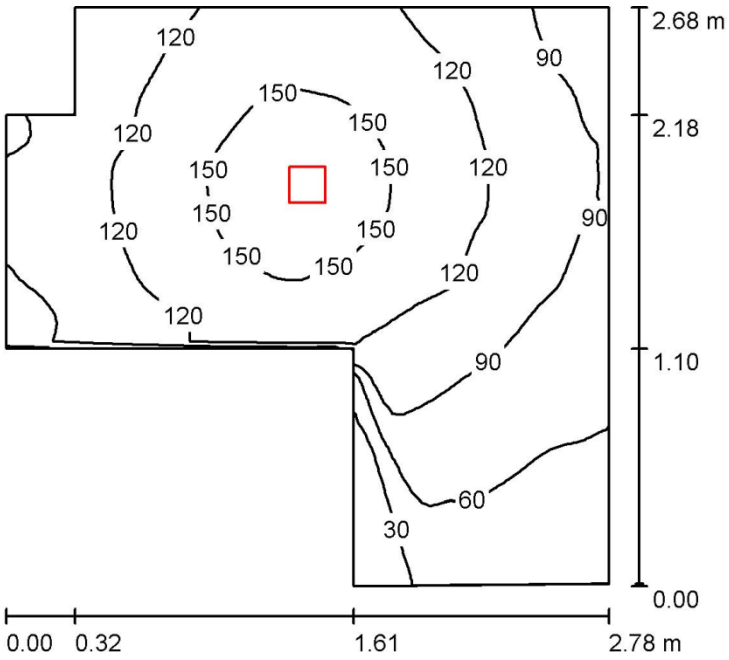
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 4.05 W/m² = 2.97 W/m²/100 lx (Ground area: 3.94 m²)

Operator Telephone
Fax e-Mail

Dirty Utility /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:35

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	107	17	162	0.154
Floor	10	74	15	96	0.209
Ceiling	70	31	13	48	0.409
Walls (8)	50	61	12	268	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.650, Ceiling / Working Plane: 0.289.

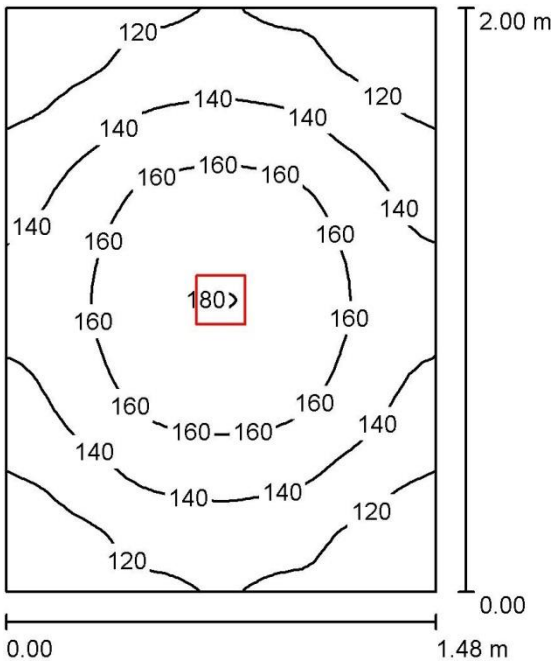
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 2.88 W/m² = 2.68 W/m²/100 lx (Ground area: 5.53 m²)

Operator Telephone
Fax e-Mail

Janitor /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:26

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	141	99	181	0.703
Floor	10	91	72	106	0.791
Ceiling	70	44	32	52	0.716
Walls (4)	50	86	33	227	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.703, Ceiling / Working Plane: 0.312.

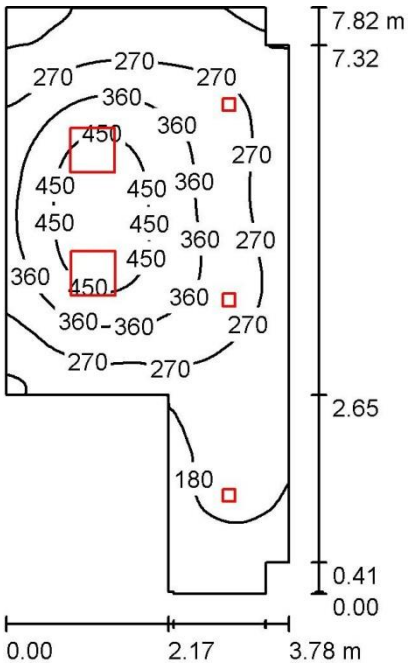
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 4.17 W/m² = 2.95 W/m²/100 lx (Ground area: 2.97 m²)

Operator Telephone
Fax e-Mail

Double Room /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:101

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	294	99	511	0.336
Floor	10	239	87	366	0.367
Ceiling	70	56	38	77	0.676
Walls (13)	50	140	36	317	/

Workplane:
Height: 0.760 m
Grid: 64 x 128Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.501, Ceiling / Working Plane: 0.192.

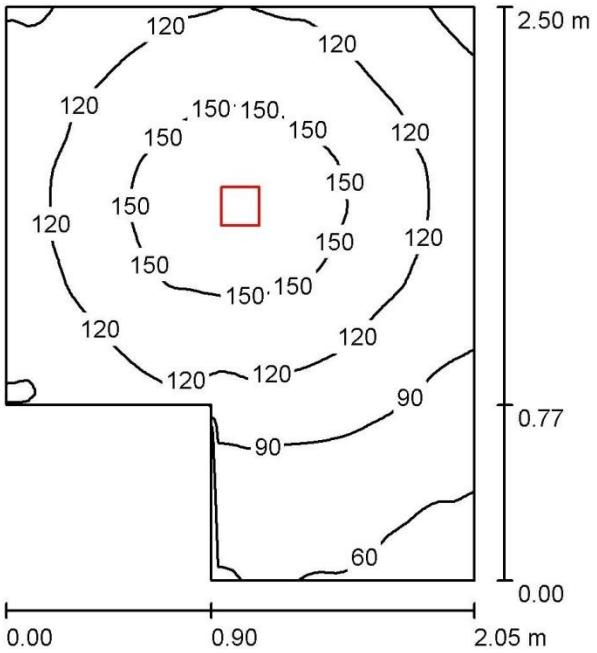
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	2	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
2	3	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			11923	Total: 11928	116.2

Specific connected load: 4.94 W/m² = 1.68 W/m²/100 lx (Ground area: 23.51 m²)

Operator Telephone
Fax e-Mail

Double Room Toilet /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:33

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	116	50	169	0.432
Floor	10	79	46	100	0.585
Ceiling	70	29	14	36	0.499
Walls (6)	50	60	17	156	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.580, Ceiling / Working Plane: 0.247.

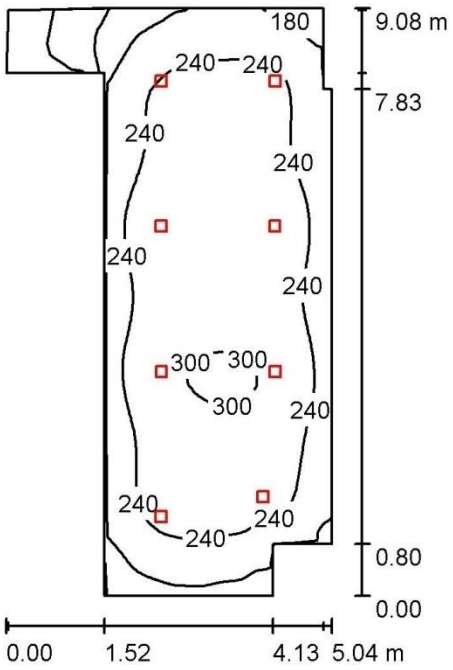
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 2.80 W/m² = 2.41 W/m²/100 lx (Ground area: 4.43 m²)

Operator Telephone
Fax e-Mail

Food Receiving/Store /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:117

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	238	25	306	0.103
Floor	10	199	28	251	0.140
Ceiling	70	47	16	71	0.346
Walls (11)	50	118	17	297	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.522, Ceiling / Working Plane: 0.197.

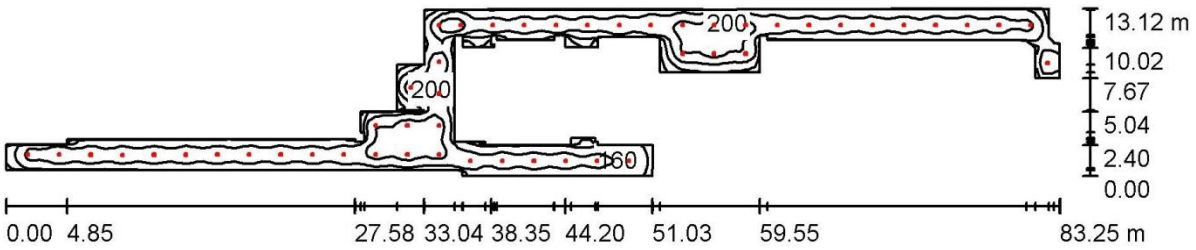
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	8	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			12996	Total: 12984	127.5

Specific connected load: 3.92 W/m² = 1.64 W/m²/100 lx (Ground area: 32.57 m²)

Operator Telephone
Fax e-Mail

Lobby and Corridors /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:596

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	160	53	230	0.333
Floor	10	135	59	195	0.437
Ceiling	70	30	17	55	0.544
Walls (66)	50	82	12	263	/

Workplane:
Height: 0.760 m
Grid: 128 x 128Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.561, Ceiling / Working Plane: 0.189.

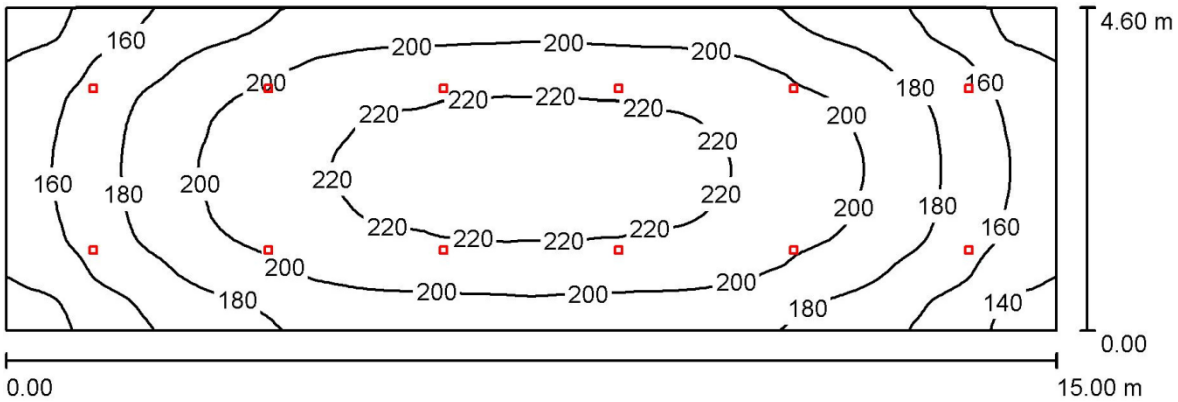
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	50	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			81225	Total: 81150	797.0

Specific connected load: 2.60 W/m² = 1.62 W/m²/100 lx (Ground area: 306.75 m²)

Operator Telephone
Fax e-Mail

Entrance /Summary



Height of Room: 7.000 m, Mounting Height: 7.000 m, Light lossfactor:0.85 Values in Lux, Scale1:108

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	191	129	227	0.673
Floor	10	173	123	204	0.710
Ceiling	70	63	54	479	0.847
Walls (4)	50	134	59	266	/

Workplane:
Height: 0.760 m
Grid: 128 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.739, Ceiling / Working Plane: 0.331.

Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	12	Crompton Greaves Ltd. 01 LCDN-50-TL (1.000)	2985	3030	50.9
Total:			35825	Total: 36364	610.6

Specific connected load: 8.85 W/m² = 4.63 W/m²/100 lx (Ground area: 69.00 m²)

7.2 Second floor:

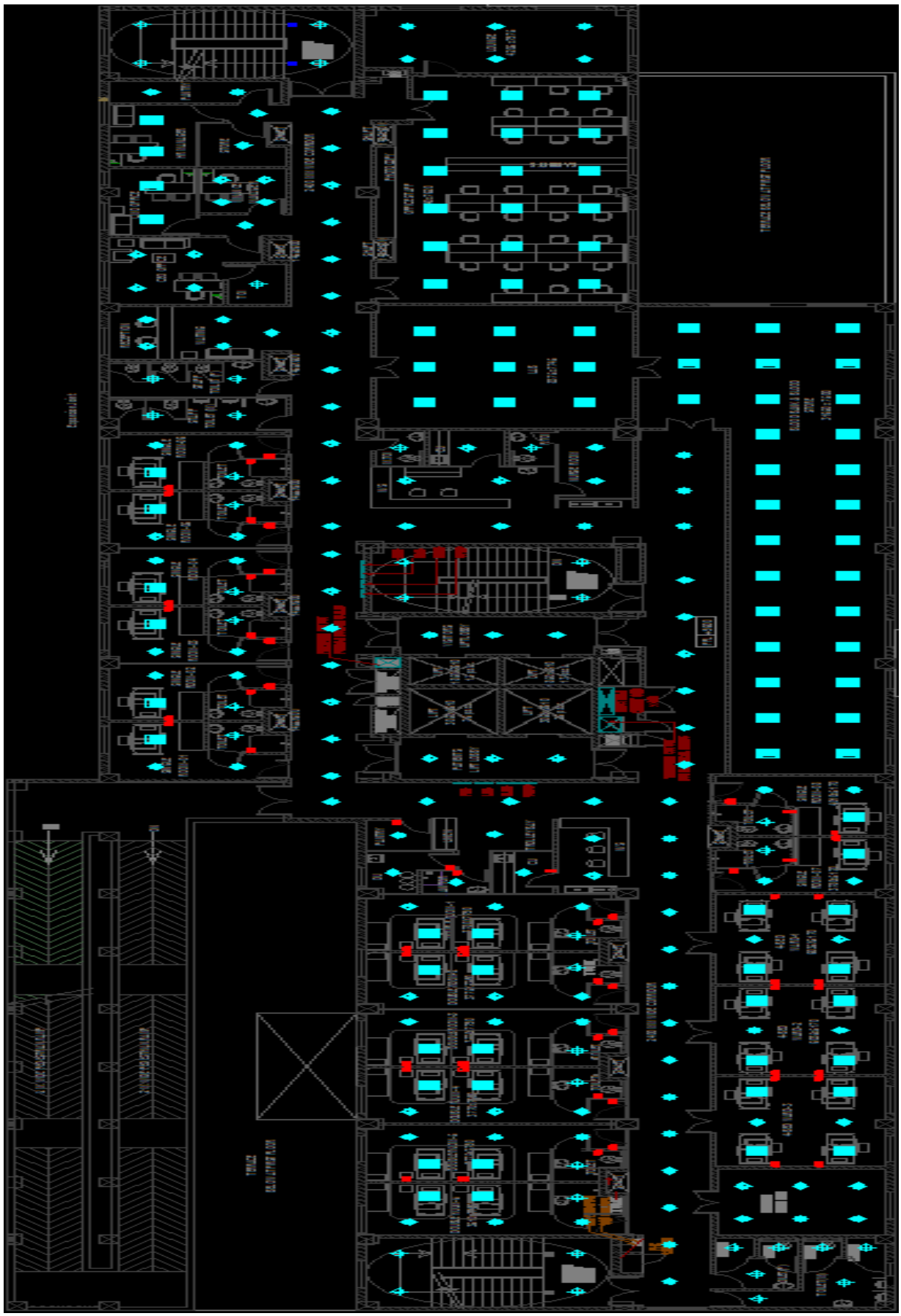


Fig 4: Second Floor Plan.

Table 15: Major area on the Second floor.

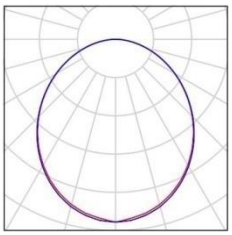
Location	Luminaire Used	Approx. Eavg achieved (lux)	Approx. Emin achieved (lux)	Approx. Emax achieved (lux)
Patient Wards (4 Bed Wards)	1. Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL 2. Crompton Greaves Ltd. 03 LCDE-15-CDL	342	213	433
Lab	1.Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL	366	143	536
Staff offices and cabins	1.Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL	424	128	552
TFA room	1.Crompton Greaves Ltd. 03 LCDE-15-CDL	252	151	307
Lounge, lobby and patient waiting areas	1. Crompton Greaves Ltd. 03 LCDE-15-CDL	182	68	227

Operator Telephone
Fax e-Mail

Second Floor / Luminaire parts list

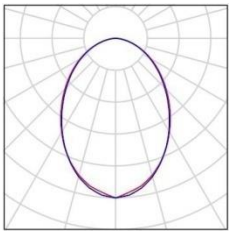
38Pieces Crompton Greaves Ltd. 01LCTLRN-36-FO-CDL
Article No.:01
Luminous flux (Luminaire): 3525 lm Luminous flux (Lamps): 3529 lm Luminaire Wattage: 34.2 W
Luminaire classification according to CIE: 100 CIE flux code: 49 80 95 100100
Fitting: 1 x LCTLRN-36-FO-CDL (Correction Factor 1.000).

See our luminaire catalog for an image of the luminaire.



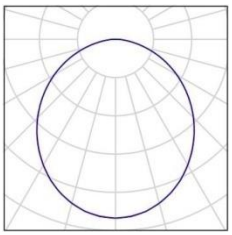
15Pieces Crompton Greaves Ltd. 02 LCDE-12-CDL
Article No.:02
Luminous flux (Luminaire): 1339 lm Luminous flux (Lamps): 1335 lm Luminaire Wattage: 12.4 W
Luminaire classification according to CIE: 100 CIE flux code: 55 84 97 100100
Fitting: 1 x LCDE-12-CDL (Correction Factor 1.000).

See our luminaire catalog for an image of the luminaire.



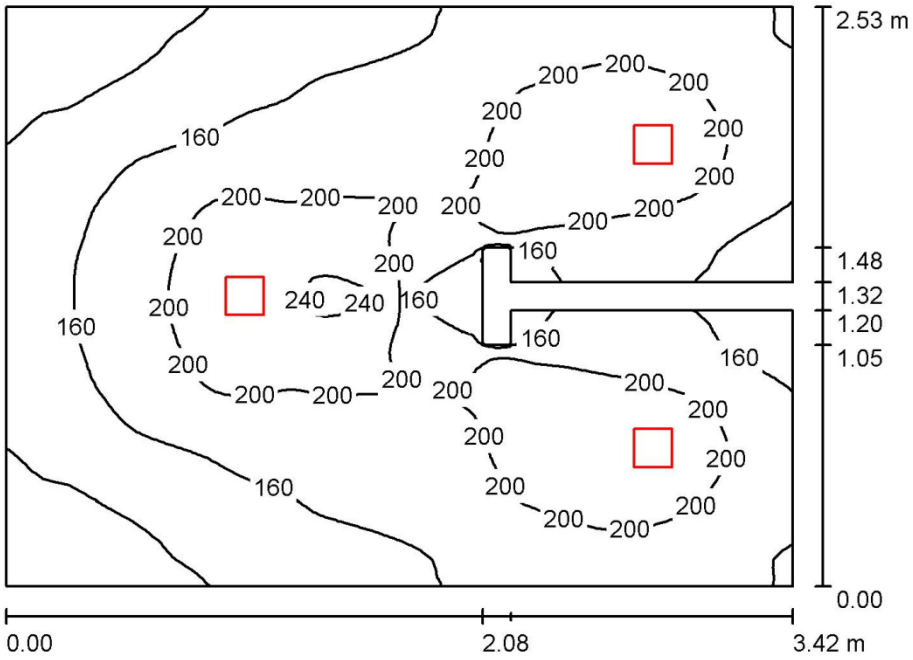
94Pieces Crompton Greaves Ltd. 03 LCDE-15-CDL
Article No.:03
Luminous flux (Luminaire): 1624 lm Luminous flux (Lamps): 1623 lm Luminaire Wattage: 15.9 W
Luminaire classification according to CIE: 100 CIE flux code: 48 80 96 100100
Fitting: 1 x LCDE-15-CDL (Correction Factor 1.000).

See our luminaire catalog for an image of the luminaire.



Operator Telephone
Fax e-Mail

Toilet (Female) /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:33

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	175	92	247	0.524
Floor	10	127	84	181	0.665
Ceiling	70	50	25	86	0.495
Walls (12)	50	107	32	343	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.708, Ceiling / Working Plane: 0.286.

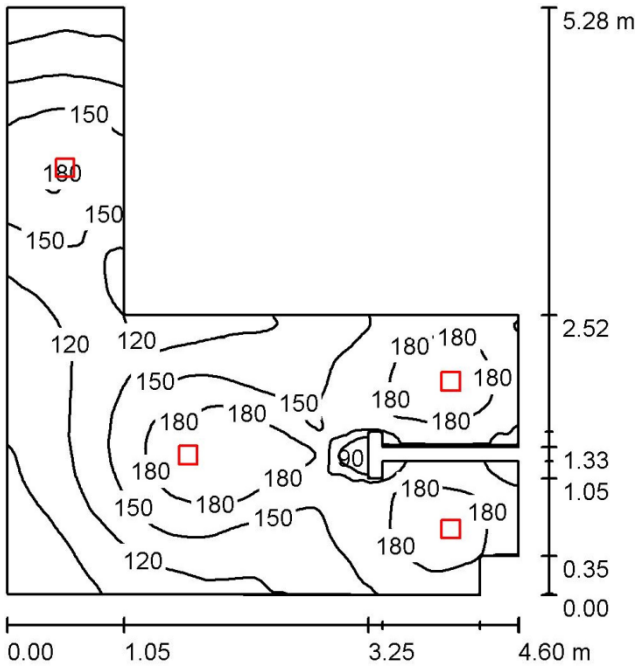
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	3	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			4018	Total: 4005	37.1

Specific connected load: 4.40 W/m² = 2.51 W/m²/100 lx (Ground area: 8.44 m²)

Operator Telephone
Fax e-Mail

Toilet (Male) /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:68

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	145	64	202	0.440
Floor	10	109	64	157	0.583
Ceiling	70	41	18	94	0.452
Walls (16)	50	91	25	558	/

Workplane:
Height: 0.760 m
Grid: 128 x 128Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.727, Ceiling / Working Plane: 0.282.

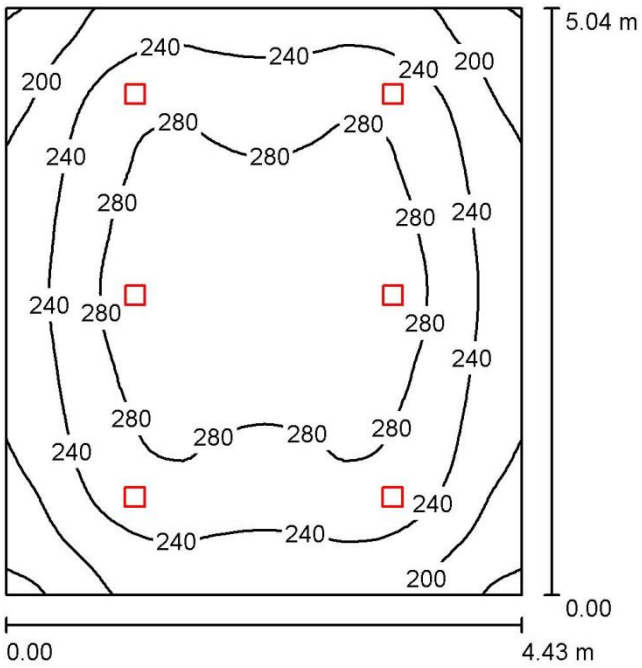
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	4	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			5358	Total: 5340	49.5

Specific connected load: 3.50 W/m² = 2.41 W/m²/100 lx (Ground area: 14.14 m²)

Operator Telephone
Fax e-Mail

Treated Fresh Air Room /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:65

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	252	151	307	0.601
Floor	10	207	140	251	0.679
Ceiling	70	53	38	66	0.729
Walls (4)	50	139	50	314	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.592, Ceiling / Working Plane: 0.210.

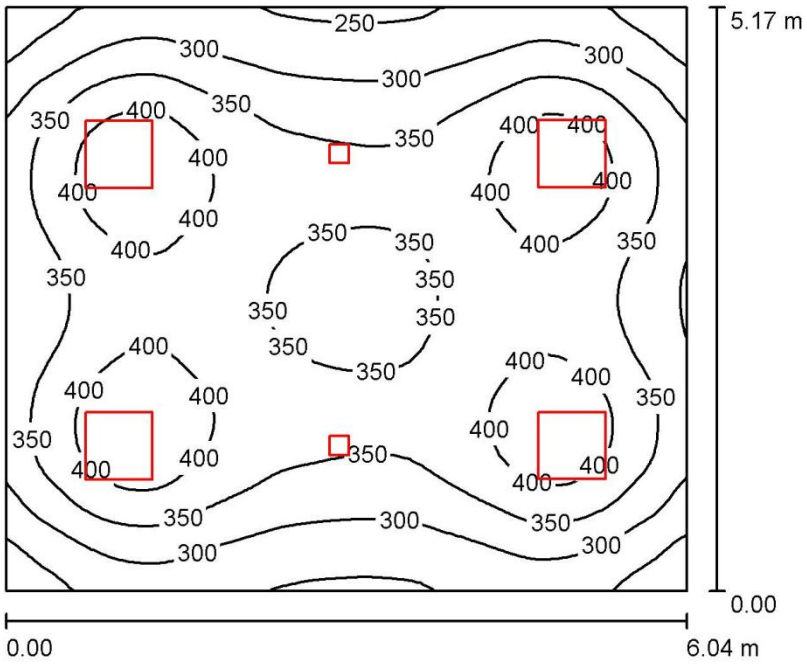
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	6	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			9747	Total: 9738	95.6

Specific connected load: 4.28 W/m² = 1.70 W/m²/100 lx (Ground area: 22.34 m²)

Operator Telephone
Fax e-Mail

4-Bed Ward /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:67

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	347	215	440	0.619
Floor	10	292	195	338	0.668
Ceiling	70	66	48	79	0.738
Walls (4)	50	184	62	371	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.554, Ceiling / Working Plane: 0.189.

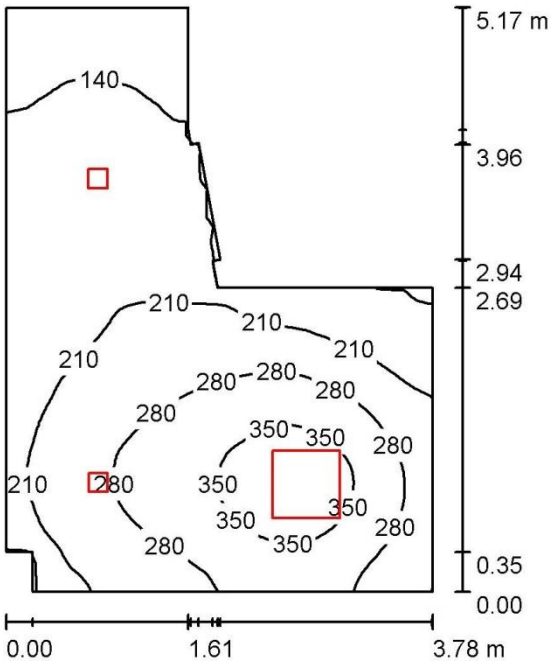
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	4	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
2	2	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			17348	Total: 17364	168.6

Specific connected load: 5.40 W/m² = 1.56 W/m²/100 lx (Ground area: 31.20 m²)

Operator Telephone
Fax e-Mail

Single Room /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:67

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	233	84	392	0.362
Floor	10	179	81	256	0.449
Ceiling	70	53	32	81	0.590
Walls (13)	50	125	38	387	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.590, Ceiling / Working Plane: 0.230.

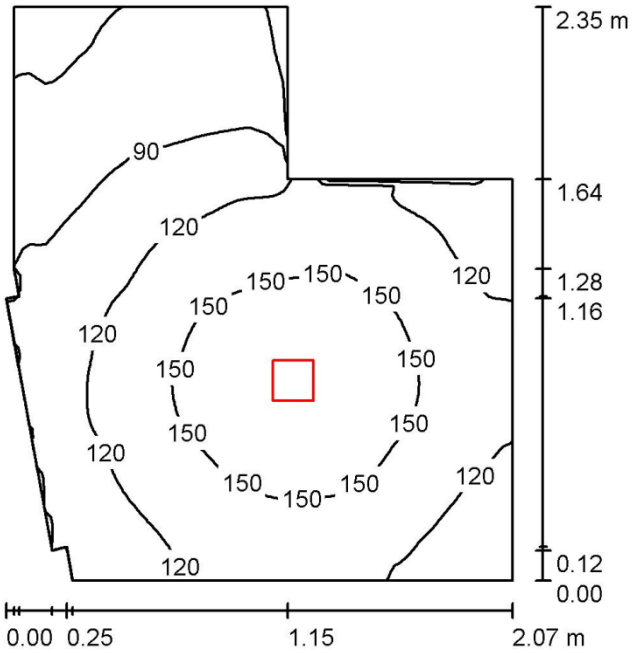
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
2	2	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			6774	Total: 6775	66.1

Specific connected load: 4.60 W/m² = 1.98 W/m²/100 lx (Ground area: 14.35 m²)

Operator Telephone
Fax e-Mail

Single Room Toilet /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:31

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	120	43	172	0.359
Floor	10	81	37	102	0.460
Ceiling	70	32	15	44	0.487
Walls (11)	50	64	15	177	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.601, Ceiling / Working Plane: 0.264.

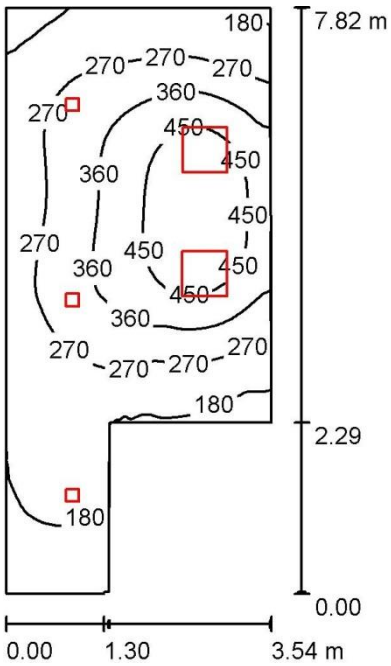
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 3.06 W/m² = 2.55 W/m²/100 lx (Ground area: 4.05 m²)

Operator Telephone
Fax e-Mail

Double Room /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:101

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	297	111	520	0.375
Floor	10	241	95	372	0.393
Ceiling	70	61	39	101	0.643
Walls (8)	50	149	43	627	/

Workplane:
Height: 0.760 m
Grid: 128 x 128Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.534, Ceiling / Working Plane: 0.205.

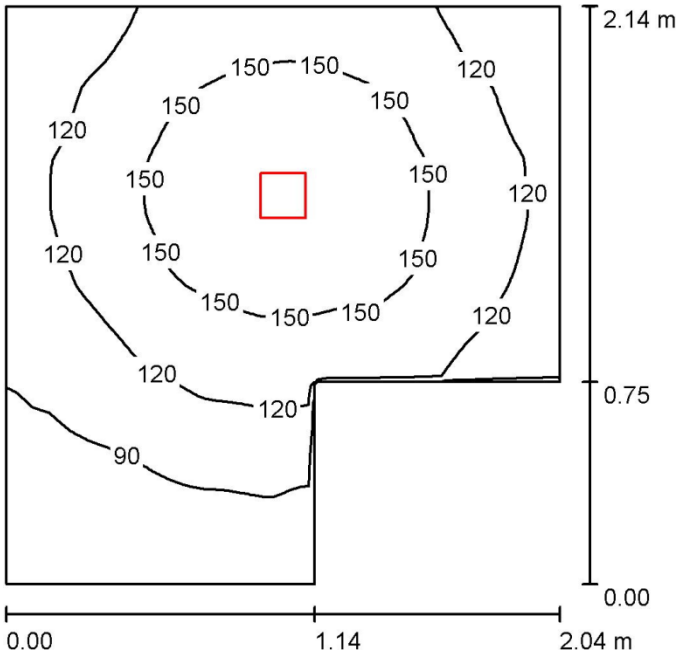
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	2	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
2	3	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			11923	Total: 11928	116.2

Specific connected load: 5.13 W/m² = 1.73 W/m²/100 lx (Ground area: 22.63 m²)

Operator Telephone
Fax e-Mail

Double Room Toilet /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:28

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	125	61	174	0.487
Floor	10	83	52	103	0.626
Ceiling	70	35	18	51	0.516
Walls (6)	50	69	19	230	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.634, Ceiling / Working Plane: 0.279.

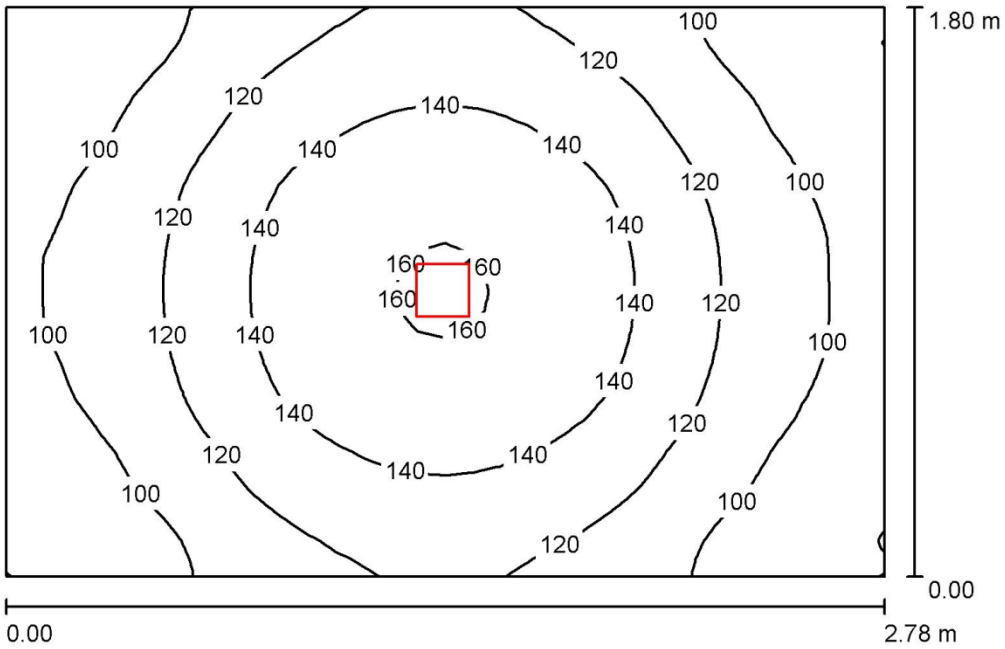
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 3.35 W/m² = 2.68 W/m²/100 lx (Ground area: 3.69 m²)

Operator Telephone
Fax e-Mail

Clean Utility /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:24

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	120	79	162	0.658
Floor	10	82	63	98	0.765
Ceiling	70	35	24	42	0.683
Walls (4)	50	73	27	201	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.688, Ceiling / Working Plane: 0.291.

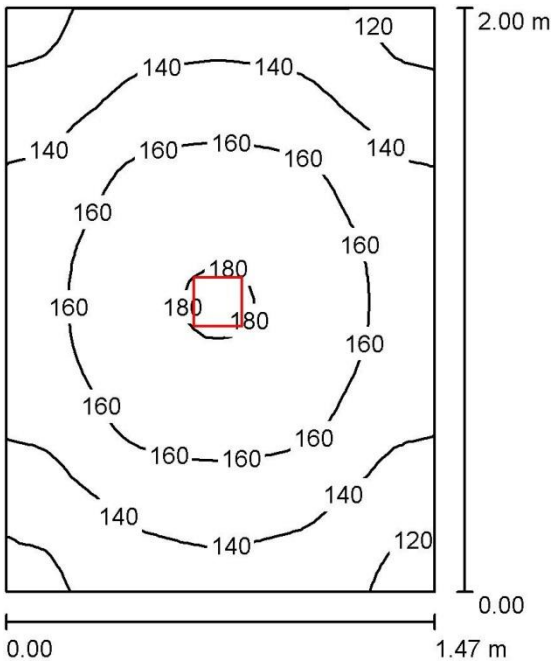
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 3.17 W/m² = 2.64 W/m²/100 lx (Ground area: 5.03 m²)

Operator Telephone
Fax e-Mail

Janitor /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:26

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	150	112	181	0.748
Floor	10	95	78	107	0.824
Ceiling	70	59	41	69	0.700
Walls (4)	50	108	37	312	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.851, Ceiling / Working Plane: 0.393.

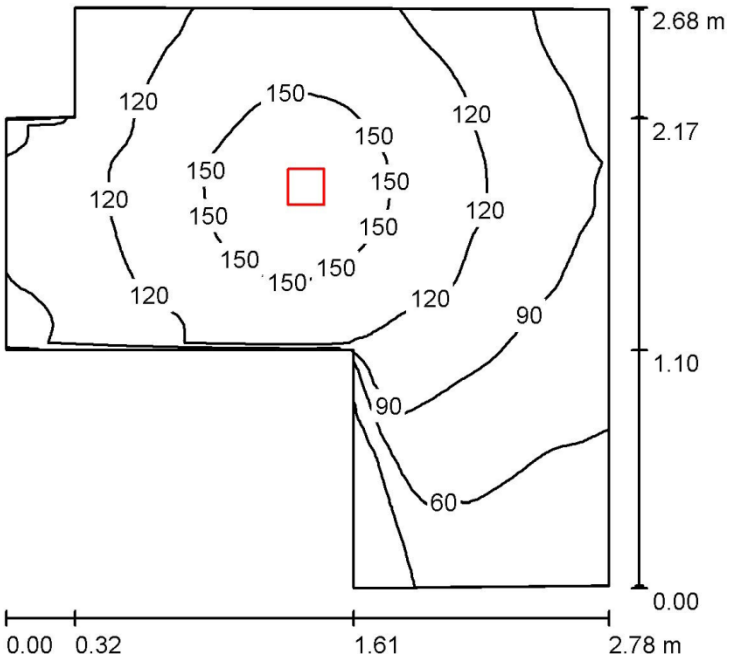
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 5.39 W/m² = 3.59 W/m²/100 lx (Ground area: 2.96 m²)

Operator Telephone
Fax e-Mail

Dirty Utility /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:35

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	107	16	162	0.153
Floor	10	74	15	96	0.209
Ceiling	70	31	13	49	0.407
Walls (8)	50	62	12	273	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.654, Ceiling / Working Plane: 0.290.

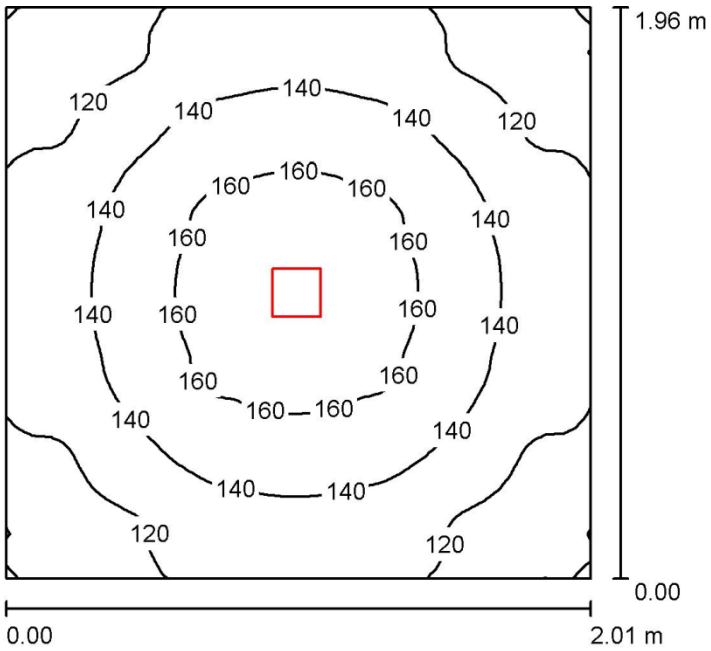
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 2.88 W/m² = 2.68 W/m²/100 lx (Ground area: 5.53 m²)

Operator Telephone
Fax e-Mail

Pantry /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:26

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	136	99	169	0.724
Floor	10	90	72	103	0.798
Ceiling	70	44	31	50	0.712
Walls (4)	50	89	37	184	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.753, Ceiling / Working Plane: 0.324.

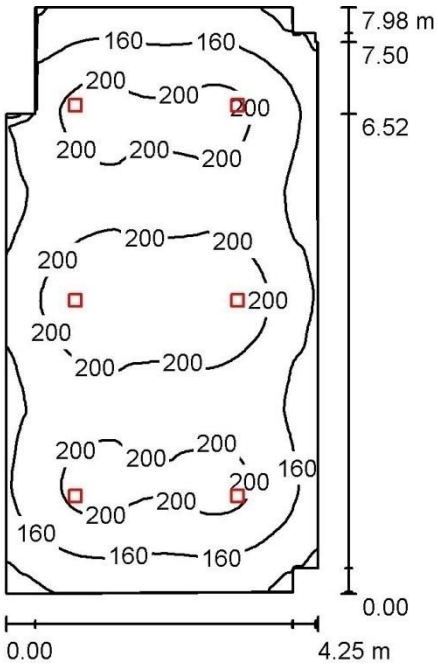
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 4.05 W/m² = 2.97 W/m²/100 lx (Ground area: 3.94 m²)

Operator Telephone
Fax e-Mail

Lounge /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:103

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	182	68	227	0.373
Floor	10	153	79	185	0.513
Ceiling	70	35	25	70	0.697
Walls (12)	50	98	32	501	/

Workplane:
Height: 0.760 m
Grid: 128 x 128Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.565, Ceiling / Working Plane: 0.195.

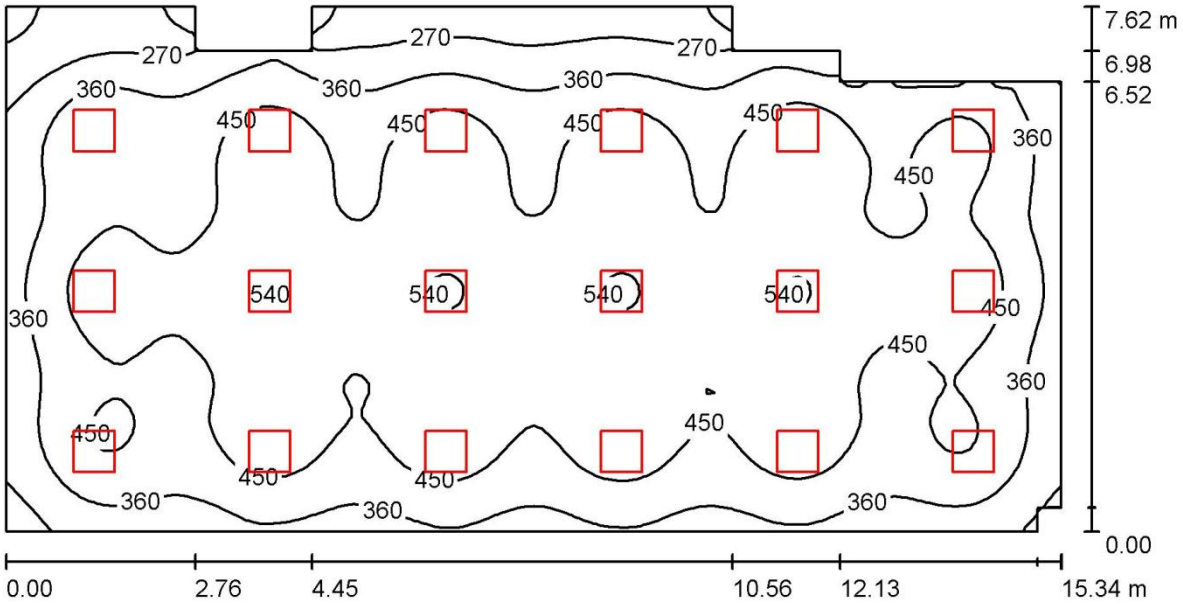
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	6	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			9747	Total: 9738	95.6

Specific connected load: 2.90 W/m² = 1.59 W/m²/100 lx (Ground area: 33.00 m²)

Operator Telephone
Fax e-Mail

Office Staff Cabinets /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:110

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	424	128	552	0.302
Floor	10	384	144	473	0.375
Ceiling	70	63	47	128	0.753
Walls (14)	50	196	51	669	/

Workplane:
Height: 0.760 m
Grid: 128 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.460, Ceiling / Working Plane: 0.148.

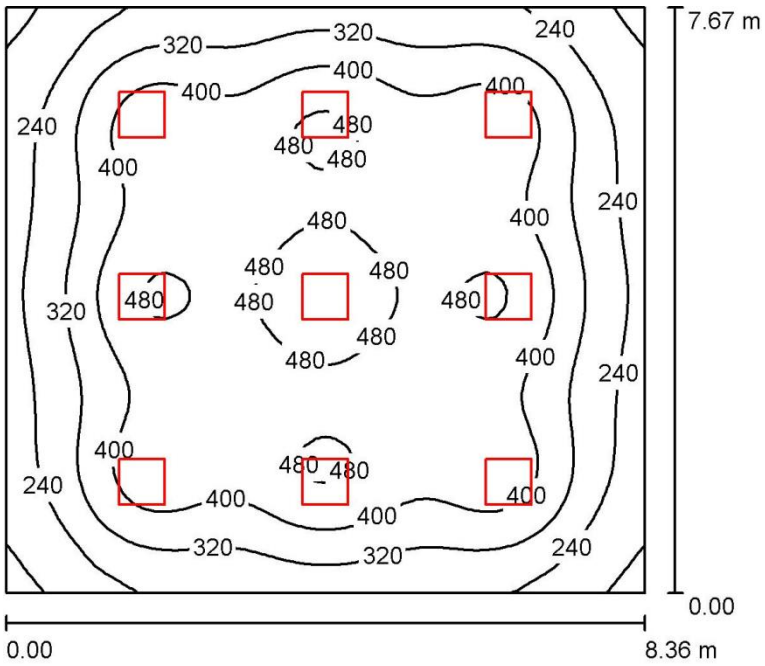
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	18	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
Total:			63446	Total: 63529	615.2

Specific connected load: 5.53 W/m² = 1.30 W/m²/100 lx (Ground area: 111.18 m²)

Operator Telephone
Fax e-Mail

Lab /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:99

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	366	143	536	0.390
Floor	10	325	157	443	0.483
Ceiling	70	53	38	64	0.714
Walls (4)	50	156	47	252	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.410, Ceiling / Working Plane: 0.145.

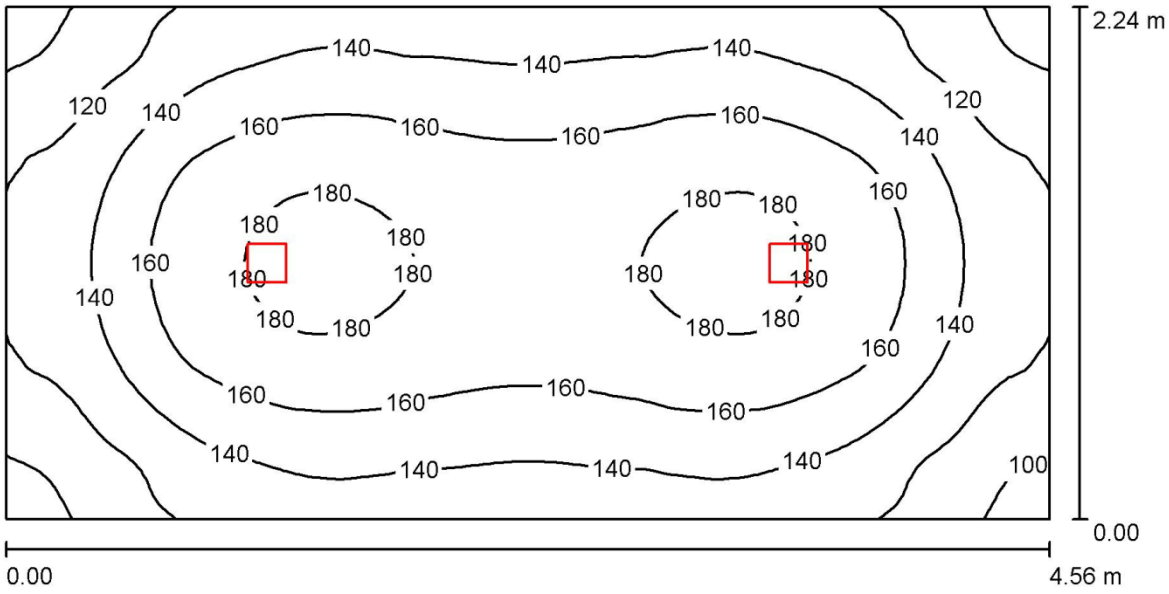
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	9	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
Total:			31723	Total: 31765	307.6

Specific connected load: 4.80 W/m² = 1.31 W/m²/100 lx (Ground area: 64.14 m²)

Operator Telephone
Fax e-Mail

Nurse Room /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:33

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	148	94	186	0.633
Floor	10	110	77	131	0.695
Ceiling	70	36	25	40	0.696
Walls (4)	50	84	32	150	/

Workplane:
Height: 0.760 m
Grid: 128 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.624, Ceiling / Working Plane: 0.243.

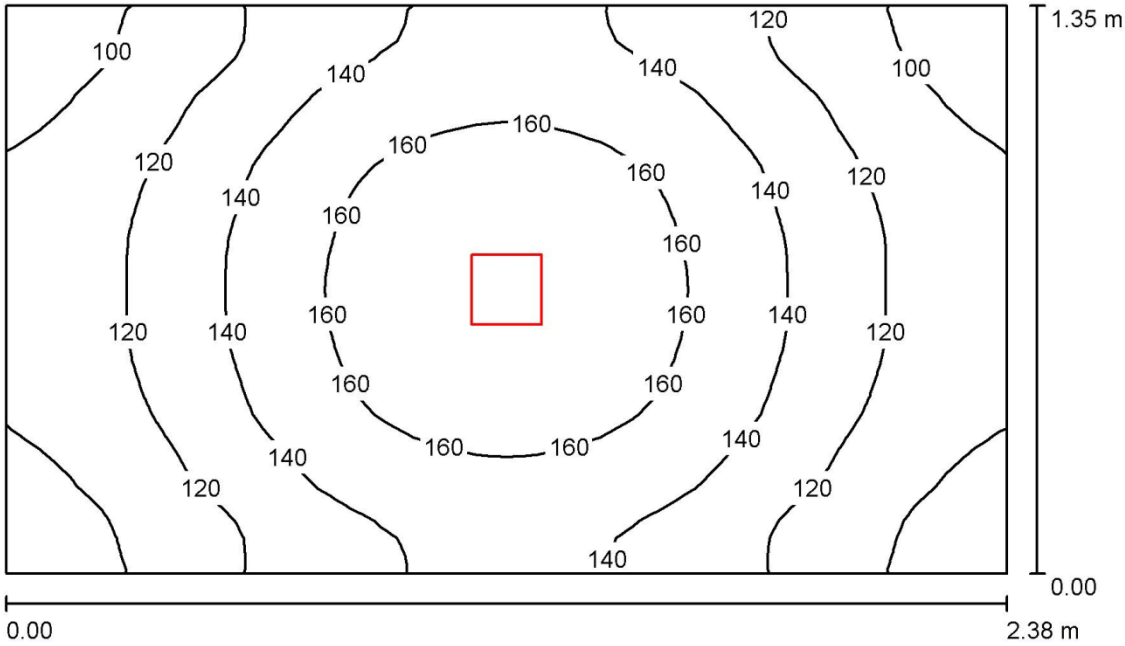
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	2	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			3249	Total: 3246	31.9

Specific connected load: 3.13 W/m² = 2.11 W/m²/100 lx (Ground area: 10.20 m²)

Operator Telephone
Fax e-Mail

Female Toilet /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:18

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	134	89	177	0.668
Floor	10	88	68	104	0.782
Ceiling	70	41	27	52	0.662
Walls (4)	50	79	30	253	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.685, Ceiling / Working Plane: 0.307.

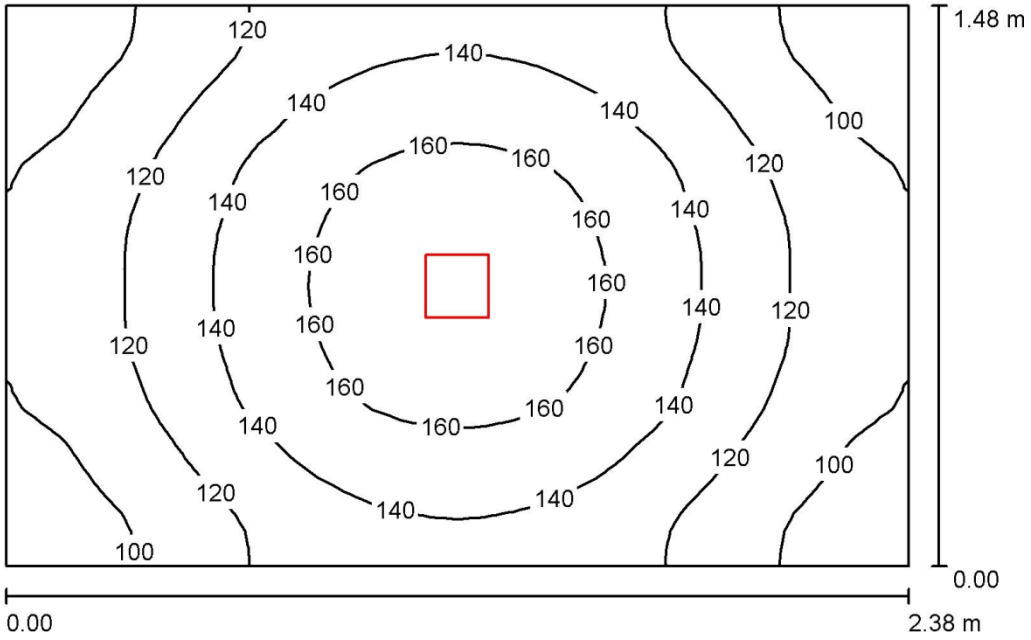
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 3.85 W/m² = 2.88 W/m²/100 lx (Ground area: 3.21 m²)

Operator Telephone
Fax e-Mail

Male Toilet /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:20

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	130	86	175	0.658
Floor	10	86	67	103	0.782
Ceiling	70	37	25	46	0.682
Walls (4)	50	74	28	212	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.654, Ceiling / Working Plane: 0.286.

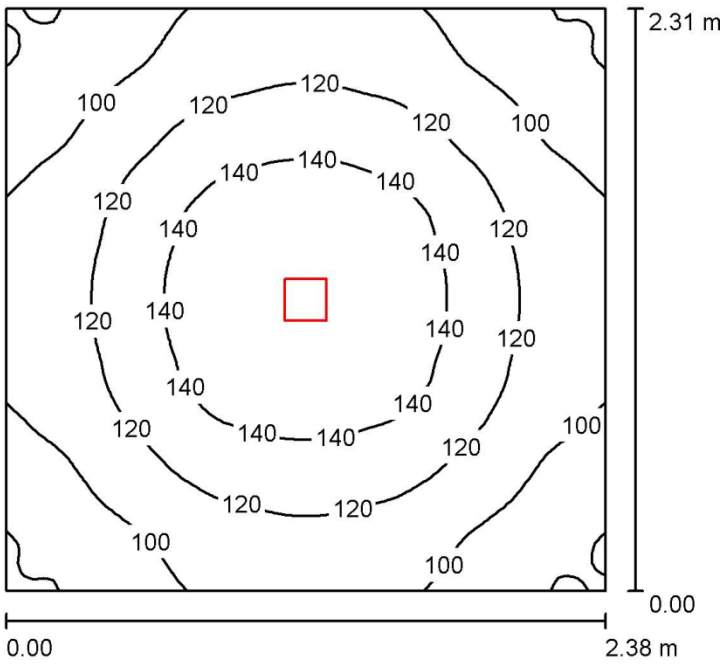
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 3.51 W/m² = 2.70 W/m²/100 lx (Ground area: 3.53 m²)

Operator Telephone
Fax e-Mail

Clean Utility /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:30

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	117	78	157	0.661
Floor	10	81	62	96	0.762
Ceiling	70	32	22	36	0.700
Walls (4)	50	69	26	132	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.658, Ceiling / Working Plane: 0.269.

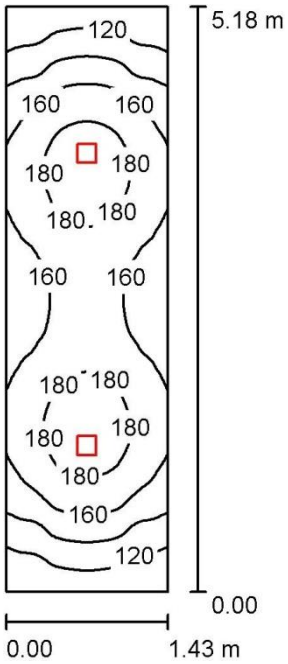
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 2.90 W/m² = 2.47 W/m²/100 lx (Ground area: 5.50 m²)

Operator Telephone
Fax e-Mail

Pantry /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:67

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	158	102	191	0.648
Floor	10	112	82	127	0.733
Ceiling	70	50	30	62	0.611
Walls (4)	50	100	38	317	/

Workplane:
Height: 0.760 m
Grid: 32 x 128Points
Boundary Zone: 0.000 m

UGR Lengthways- Across to luminaire axis
LeftWall 22 22
LowerWall 23 23
(CIE, SHR = 0.25.)

Illuminance Quotient (according to LG7): Walls / Working Plane: 0.736, Ceiling / Working Plane: 0.315.

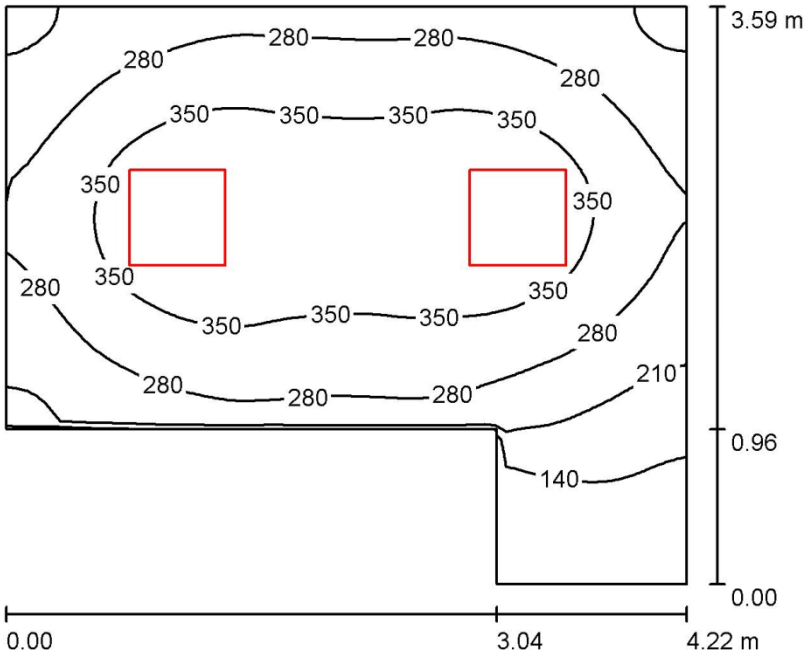
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	2	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			3249	Total: 3246	31.9

Specific connected load: 4.30 W/m² = 2.72 W/m²/100 lx (Ground area: 7.41 m²)

Operator Telephone
Fax e-Mail

HR Manager /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:47

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	297	83	416	0.279
Floor	10	226	85	292	0.377
Ceiling	70	63	30	79	0.479
Walls (6)	50	147	33	342	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.527, Ceiling / Working Plane: 0.211.

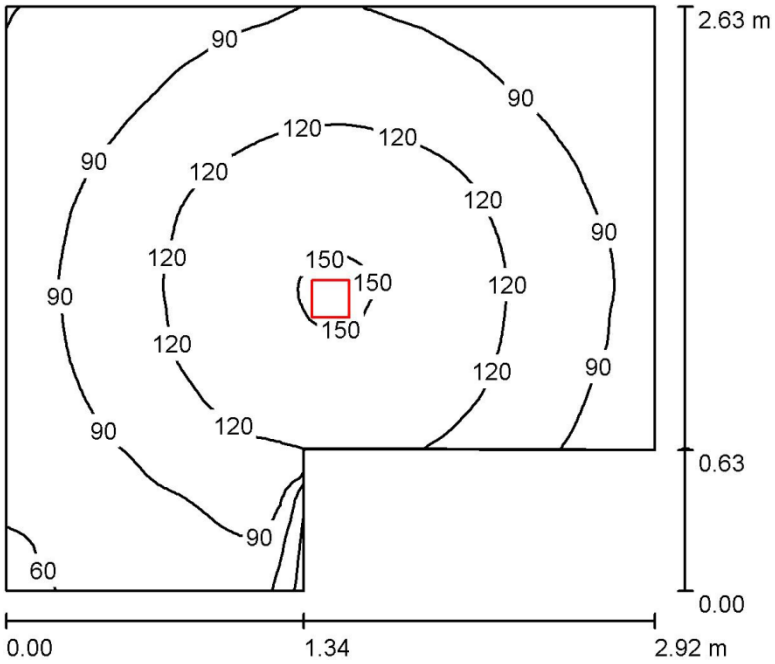
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	2	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
Total:			7050	Total: 7059	68.4

Specific connected load: 5.59 W/m² = 1.88 W/m²/100 lx (Ground area: 12.23 m²)

Operator Telephone
Fax e-Mail

Store /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:34

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	103	25	153	0.242
Floor	10	73	24	92	0.332
Ceiling	70	26	15	42	0.581
Walls (6)	50	56	15	322	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.612, Ceiling / Working Plane: 0.253.

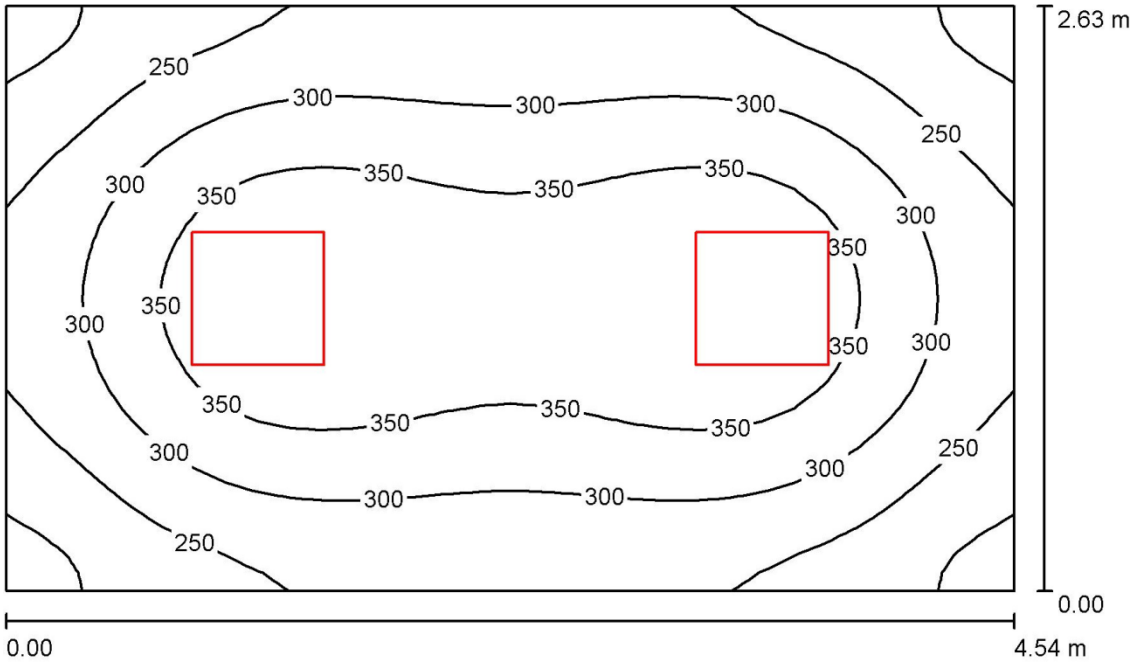
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 2.39 W/m² = 2.33 W/m²/100 lx (Ground area: 6.66 m²)

Operator Telephone
Fax e-Mail

CMO Office /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:34

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	304	179	399	0.589
Floor	10	231	162	282	0.700
Ceiling	70	65	48	78	0.745
Walls (4)	50	160	51	299	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.561, Ceiling / Working Plane: 0.213.

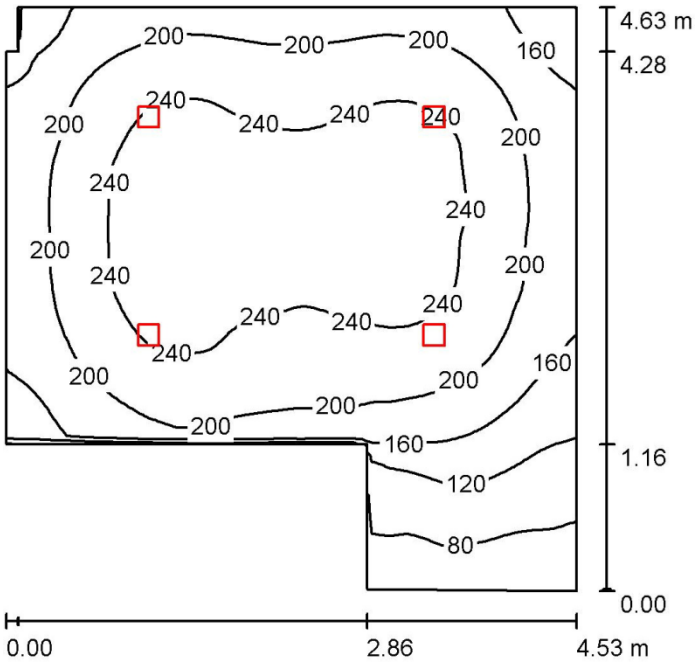
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	2	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
Total:			7050	Total: 7059	68.4

Specific connected load: 5.73 W/m² = 1.88 W/m²/100 lx (Ground area: 11.93 m²)

Operator Telephone
Fax e-Mail

CEO Office /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:60

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	201	63	262	0.311
Floor	10	160	66	206	0.412
Ceiling	70	43	21	54	0.487
Walls (8)	50	105	28	240	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.557, Ceiling / Working Plane: 0.213.

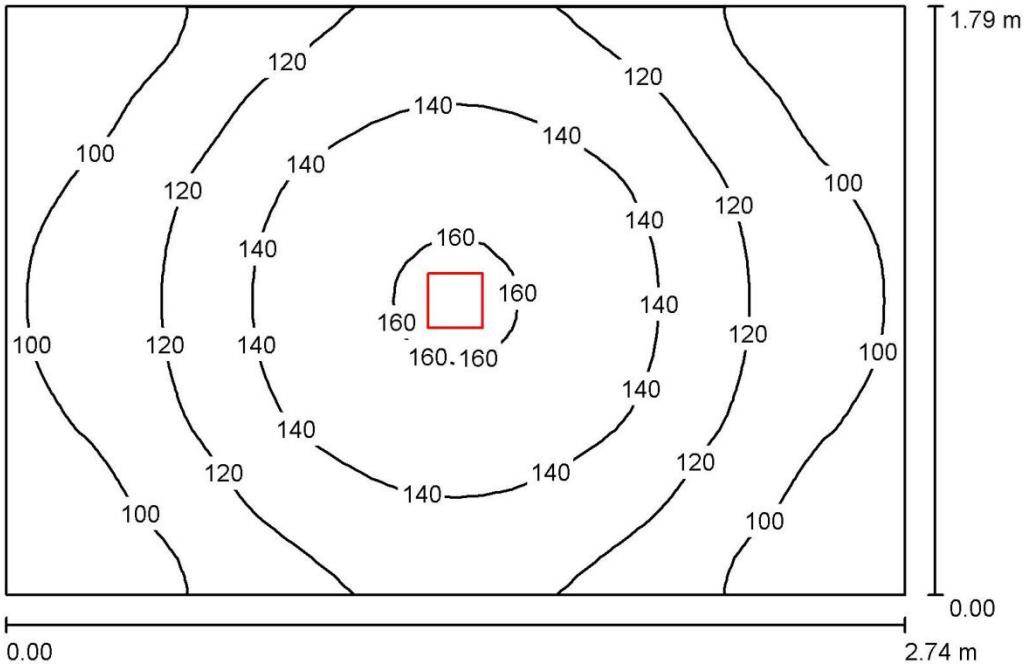
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	4	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			6498	Total: 6492	63.8

Specific connected load: 3.63 W/m² = 1.80 W/m²/100 lx (Ground area: 17.59 m²)

Operator Telephone
Fax e-Mail

Toilet /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:23

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	121	81	163	0.668
Floor	10	82	63	98	0.770
Ceiling	70	36	25	43	0.688
Walls (4)	50	74	28	203	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.696, Ceiling / Working Plane: 0.294.

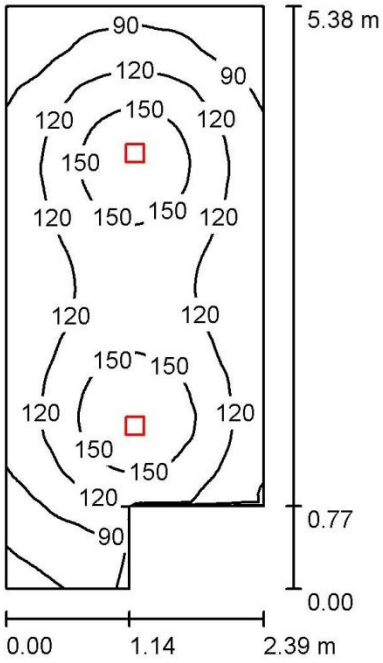
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 3.25 W/m² = 2.68 W/m²/100 lx (Ground area: 4.90 m²)

Operator Telephone
Fax e-Mail

Staff Toilet (Female) /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:70

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	119	35	175	0.295
Floor	10	91	34	114	0.373
Ceiling	70	23	12	36	0.517
Walls (6)	50	55	14	200	/

Workplane:
Height: 0.760 m
Grid: 64 x 128Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.486, Ceiling / Working Plane: 0.194.

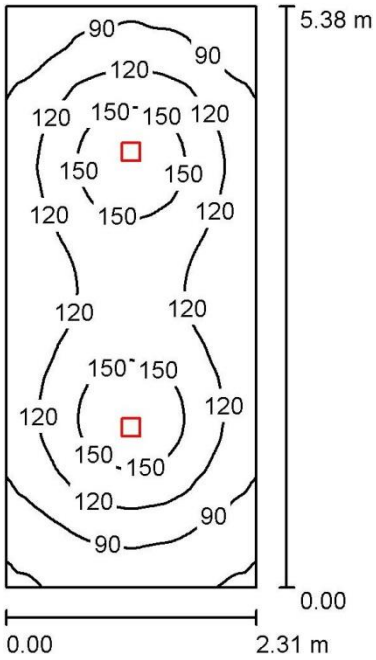
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	2	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			2679	Total: 2670	24.8

Specific connected load: 2.08 W/m² = 1.76 W/m²/100 lx (Ground area: 11.89 m²)

Operator Telephone
Fax e-Mail

Staff Toilet (Male) /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:70

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	116	56	170	0.486
Floor	10	90	52	112	0.585
Ceiling	70	22	14	25	0.619
Walls (4)	50	54	17	100	/

Workplane:
Height: 0.760 m
Grid: 64 x 128Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.489, Ceiling / Working Plane: 0.190.

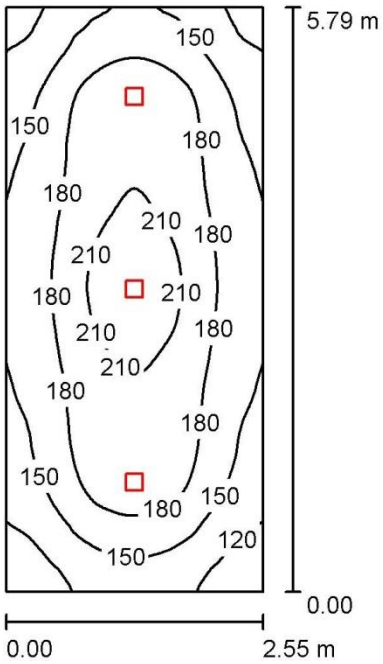
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	2	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			2679	Total: 2670	24.8

Specific connected load: 1.99 W/m² = 1.72 W/m²/100 lx (Ground area: 12.45 m²)

Operator Telephone
Fax e-Mail

Visitor's Lift Lobby /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:75

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	171	97	225	0.567
Floor	10	132	83	163	0.627
Ceiling	70	38	25	50	0.673
Walls (4)	50	93	33	216	/

Workplane:
Height: 0.760 m
Grid: 64 x 128Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.586, Ceiling / Working Plane: 0.220.

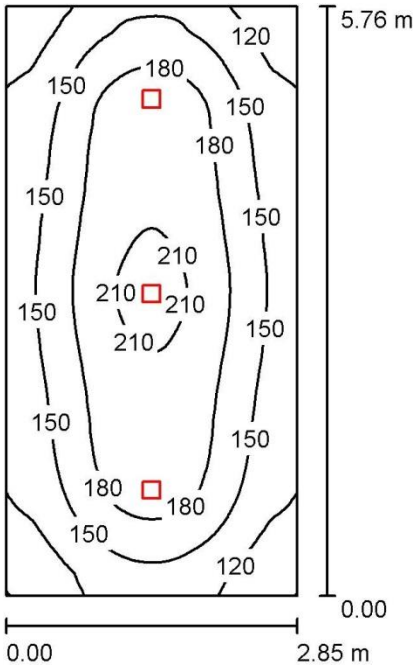
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	3	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			4873	Total: 4869	47.8

Specific connected load: 3.24 W/m² = 1.90 W/m²/100 lx (Ground area: 14.76 m²)

Operator Telephone
Fax e-Mail

Patient's Lift Lobby /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:74

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	162	90	219	0.554
Floor	10	127	81	159	0.639
Ceiling	70	34	23	43	0.676
Walls (4)	50	85	29	204	/

Workplane:
Height: 0.760 m
Grid: 64 x 128Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.559, Ceiling / Working Plane: 0.209.

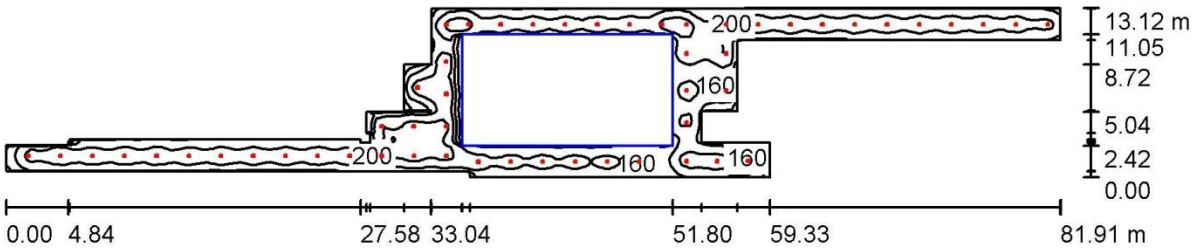
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	3	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			4873	Total: 4869	47.8

Specific connected load: 2.91 W/m² = 1.80 W/m²/100 lx (Ground area: 16.42 m²)

Operator Telephone
Fax e-Mail

Lobby and Corridors/Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:586

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	159	55	230	0.348
Floor	10	92	1.11	193	0.012
Ceiling	70	20	0.65	54	0.033
Walls (29)	50	81	21	251	/

Workplane:
Height: 0.760 m
Grid: 128 x 128Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.548, Ceiling / Working Plane: 0.125.

Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	54	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			87723	Total: 87642	860.8

Specific connected load: 1.84 W/m² = 1.16 W/m²/100 lx (Ground area: 467.69 m²)

7.3 Third floor:

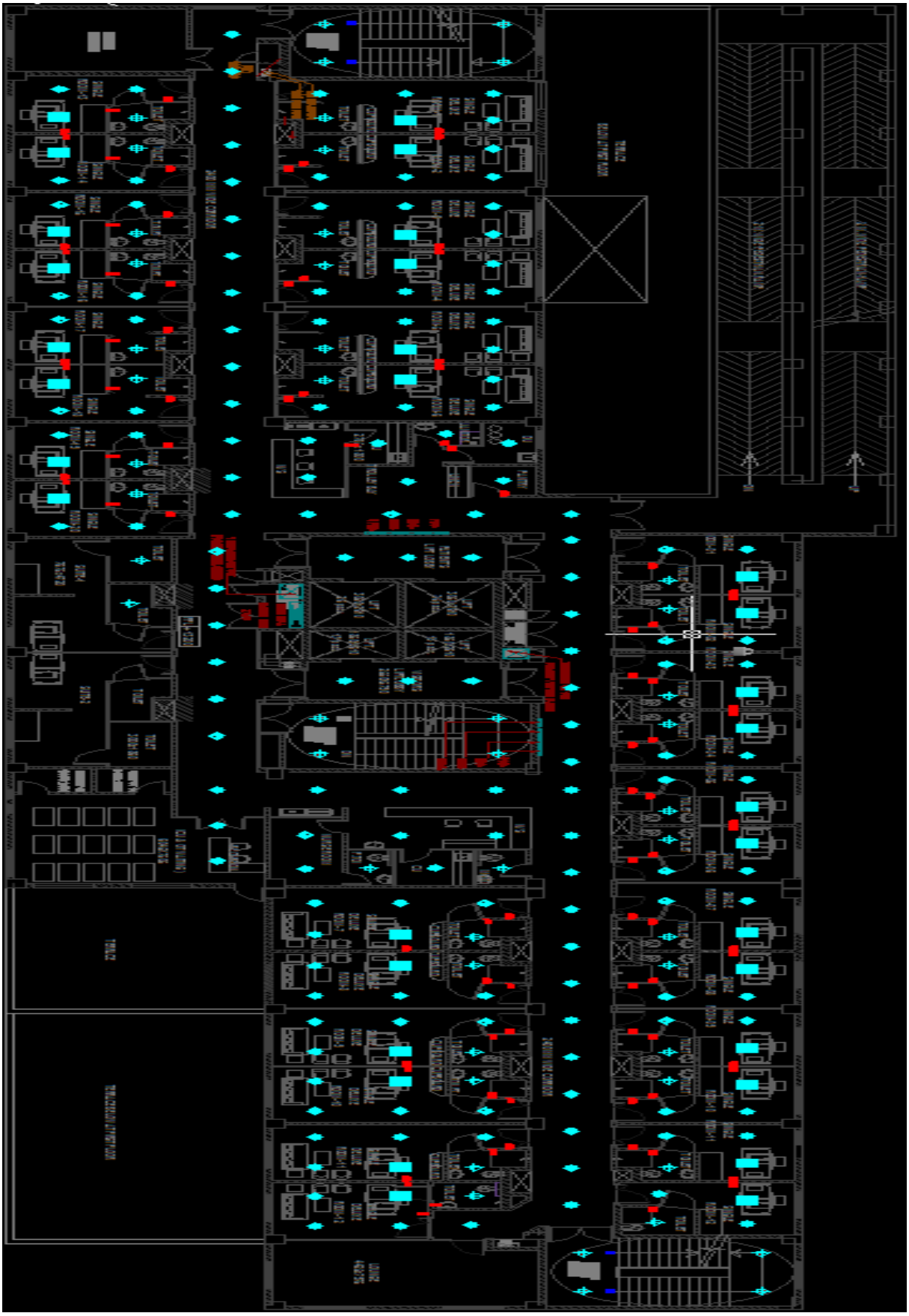


Fig 5: Third Floor Plan.

Table 16 : Major area on the Third floor.

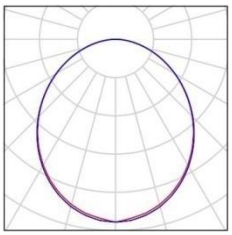
Location	Luminaire Used	Approx. Eavg achieved (lux)	Approx. Emin achieved (lux)	Approx. Emax achieved (lux)
Patient Wards (Single Room Wards)	1. Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL 2. Crompton Greaves Ltd. 03 LCDE-15-CDL	231	86	387
Nurses Stations	1.Crompton Greaves Ltd. 03 LCDE-15-CDL	100	31	149
Clean/Dirty Utility Room	1.Crompton Greaves Ltd. 03 LCDE-15-CDL	130	92	167
Lounge and lobby	1. Crompton Greaves Ltd. 03 LCDE-15-CDL	182	68	227

Operator Telephone
Fax e-Mail

3rd Floor / Luminaire parts list

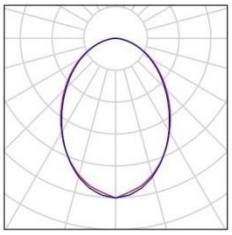
2Pieces Crompton Greaves Ltd. 01LCTLRN-36-FO-CDL
Article No.:01
Luminous flux (Luminaire): 3525 lm Luminous flux (Lamps): 3529 lm Luminaire Wattage: 34.2 W
Luminaire classification according to CIE: 100 CIE flux code: 49 80 95 100100
Fitting: 1 x LCTLRN-36-FO-CDL (Correction Factor 1.000).

See our luminaire catalog for an image of the luminaire.



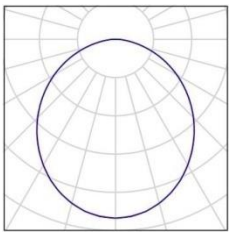
6Pieces Crompton Greaves Ltd. 02 LCDE-12-CDL
Article No.:02
Luminous flux (Luminaire): 1339 lm Luminous flux (Lamps): 1335 lm Luminaire Wattage: 12.4 W
Luminaire classification according to CIE: 100 CIE flux code: 55 84 97 100100
Fitting: 1 x LCDE-12-CDL (Correction Factor 1.000).

See our luminaire catalog for an image of the luminaire.



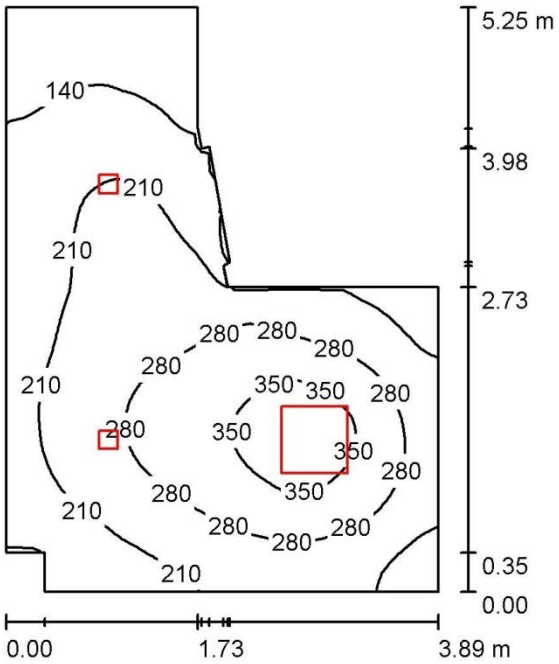
72Pieces Crompton Greaves Ltd. 03 LCDE-15-CDL
Article No.:03
Luminous flux (Luminaire): 1624 lm Luminous flux (Lamps): 1623 lm Luminaire Wattage: 15.9 W
Luminaire classification according to CIE: 100 CIE flux code: 48 80 96 100100
Fitting: 1 x LCDE-15-CDL (Correction Factor 1.000).

See our luminaire catalog for an image of the luminaire.



Operator Telephone
Fax e-Mail

Single Room /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:68

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	231	86	387	0.370
Floor	10	179	79	256	0.439
Ceiling	70	49	29	65	0.581
Walls (13)	50	118	35	292	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.548, Ceiling / Working Plane: 0.213.

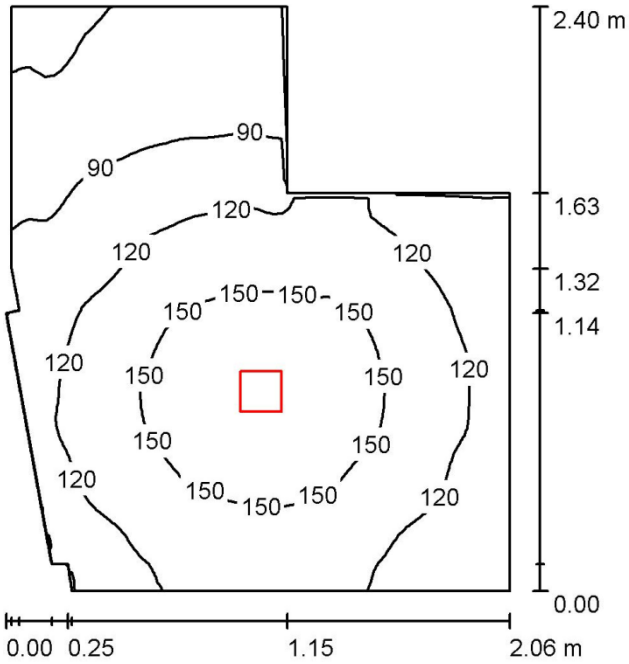
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
2	2	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			6774	Total: 6775	66.1

Specific connected load: 4.37 W/m² = 1.89 W/m²/100 lx (Ground area: 15.13 m²)

Operator Telephone
Fax e-Mail

Single Room Toilet /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:31

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	120	52	172	0.431
Floor	10	81	48	102	0.596
Ceiling	70	31	16	42	0.499
Walls (11)	50	64	17	174	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.596, Ceiling / Working Plane: 0.260.

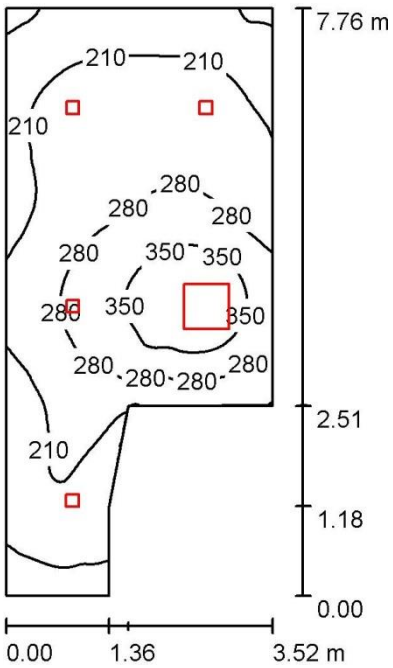
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 3.03 W/m² = 2.53 W/m²/100 lx (Ground area: 4.09 m²)

Operator Telephone
Fax e-Mail

Single Deluxe Room /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:100

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	256	111	412	0.450
Floor	10	198	90	290	0.455
Ceiling	70	53	38	95	0.718
Walls (7)	50	132	42	624	/

Workplane:
Height: 0.760 m
Grid: 64 x 128Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.578, Ceiling / Working Plane: 0.216.

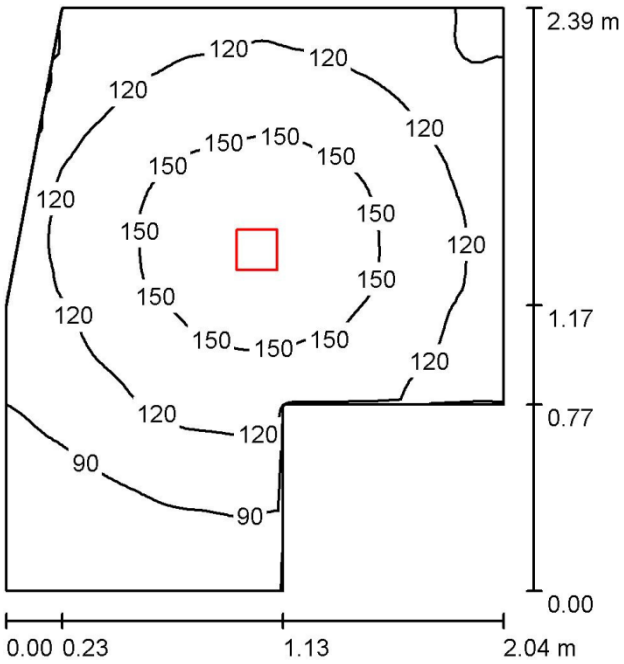
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
2	4	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			10023	Total: 10021	97.9

Specific connected load: 4.44 W/m² = 1.80 W/m²/100 lx (Ground area: 22.07 m²)

Operator Telephone
Fax e-Mail

Single Deluxe Room toilet /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:31

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	122	60	171	0.491
Floor	10	82	53	101	0.638
Ceiling	70	32	17	46	0.525
Walls (7)	50	65	19	258	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.598, Ceiling / Working Plane: 0.260.

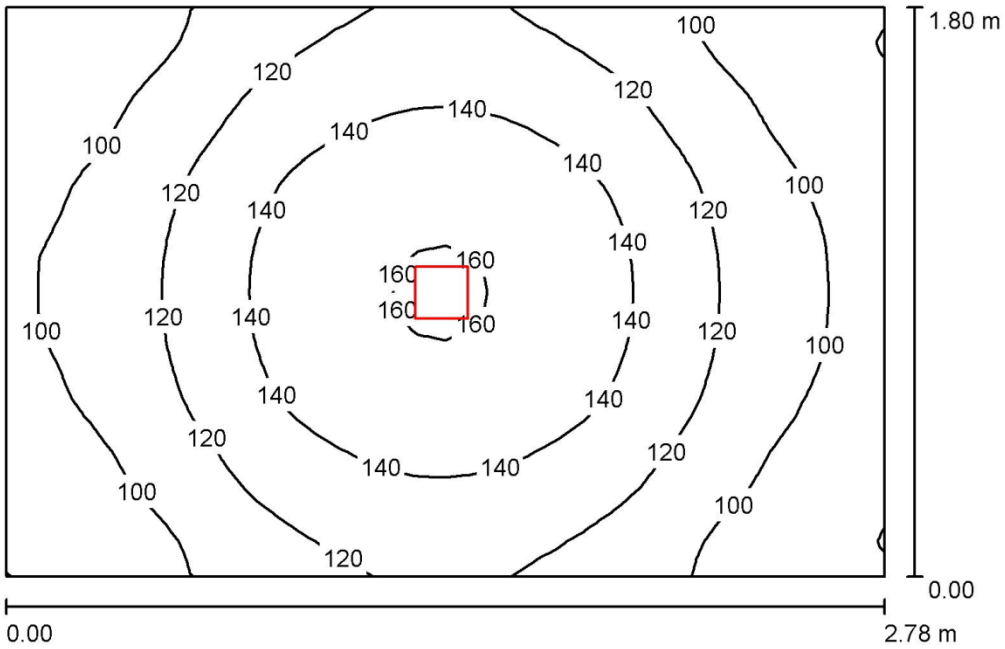
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 3.07 W/m² = 2.51 W/m²/100 lx (Ground area: 4.04 m²)

Operator Telephone
Fax e-Mail

Clean Utility /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:24

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	120	79	162	0.656
Floor	10	82	63	98	0.765
Ceiling	70	35	24	42	0.682
Walls (4)	50	73	27	200	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.688, Ceiling / Working Plane: 0.291.

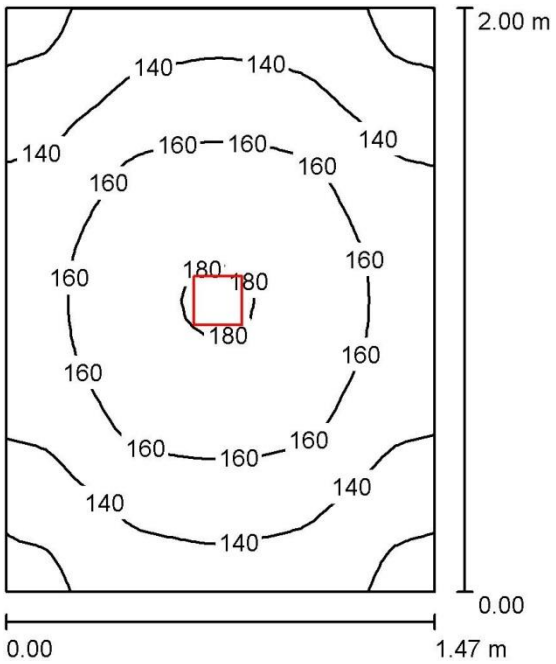
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 3.17 W/m² = 2.64 W/m²/100 lx (Ground area: 5.03 m²)

Operator Telephone
Fax e-Mail

Janitor /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:26

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	150	113	181	0.749
Floor	10	95	78	107	0.823
Ceiling	70	59	42	69	0.703
Walls (4)	50	108	37	313	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.852, Ceiling / Working Plane: 0.393.

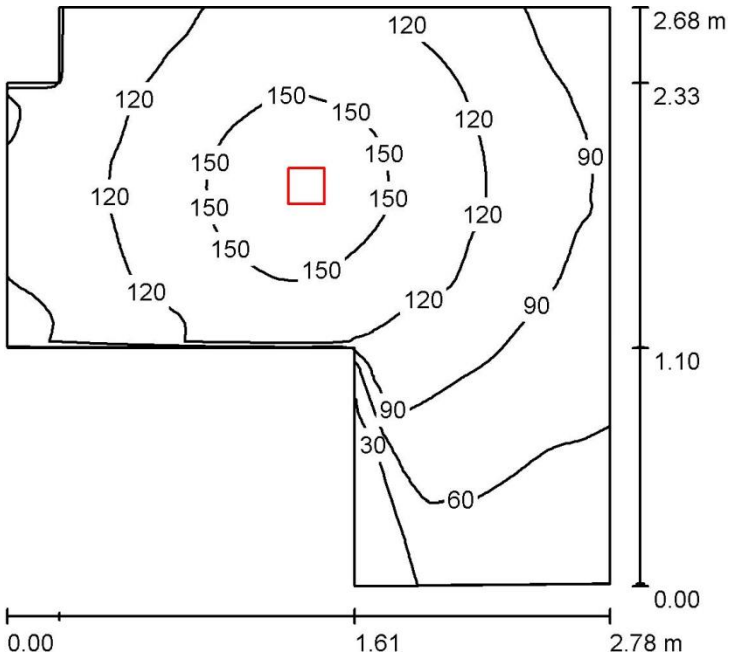
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 5.39 W/m² = 3.59 W/m²/100 lx (Ground area: 2.96 m²)

Operator Telephone
Fax e-Mail

Dirty Utility /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:35

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	107	16	161	0.152
Floor	10	73	15	96	0.206
Ceiling	70	31	12	49	0.406
Walls (8)	50	61	12	276	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.650, Ceiling / Working Plane: 0.288.

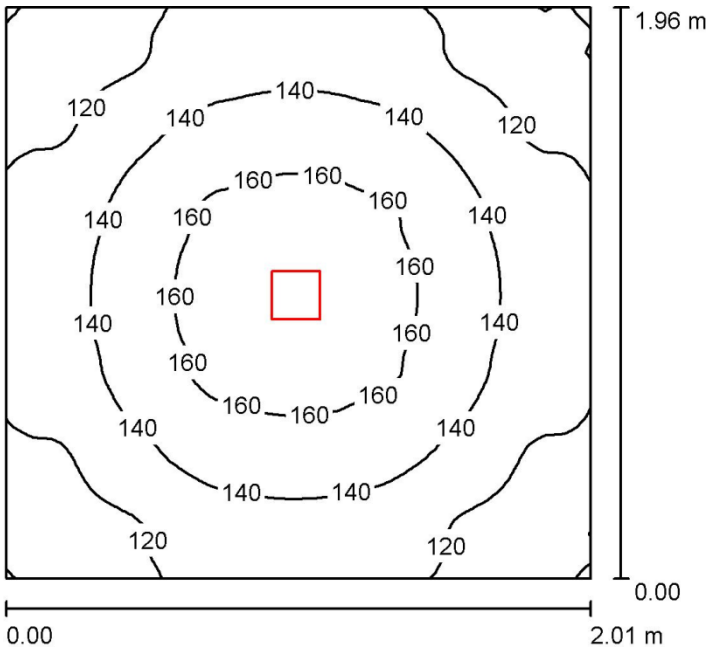
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 2.85 W/m² = 2.66 W/m²/100 lx (Ground area: 5.60 m²)

Operator Telephone
Fax e-Mail

Pantry /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:26

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	136	99	169	0.724
Floor	10	90	72	103	0.806
Ceiling	70	44	31	50	0.711
Walls (4)	50	89	37	185	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.753, Ceiling / Working Plane: 0.325.

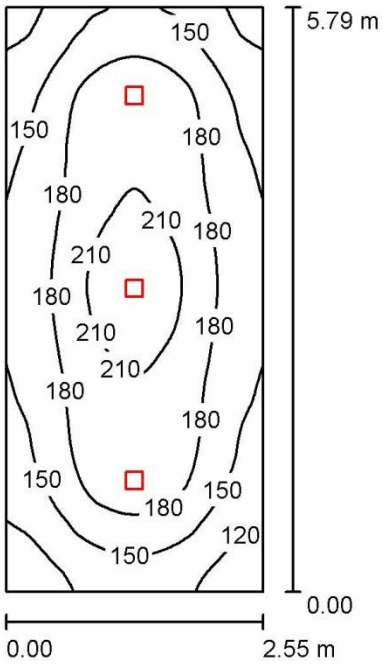
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 4.05 W/m² = 2.97 W/m²/100 lx (Ground area: 3.94 m²)

Operator Telephone
Fax e-Mail

Visitors' Lift lobby /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:75

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	171	96	225	0.563
Floor	10	132	83	163	0.624
Ceiling	70	38	25	50	0.670
Walls (4)	50	93	33	220	/

Workplane:
Height: 0.760 m
Grid: 64 x 128Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.586, Ceiling / Working Plane: 0.220.

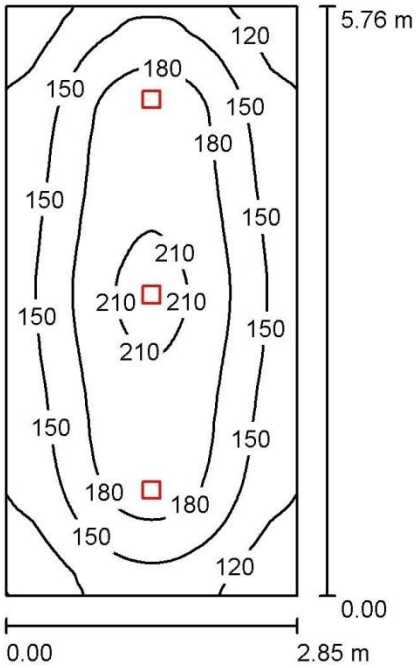
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	3	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			4873	Total: 4869	47.8

Specific connected load: 3.24 W/m² = 1.90 W/m²/100 lx (Ground area: 14.76 m²)

Operator Telephone
Fax e-Mail

Patient's Lift lobby /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:74

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	162	90	219	0.555
Floor	10	127	81	159	0.640
Ceiling	70	34	23	44	0.667
Walls (4)	50	85	29	202	/

Workplane:
Height: 0.760 m
Grid: 64 x 128Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.557, Ceiling / Working Plane: 0.209.

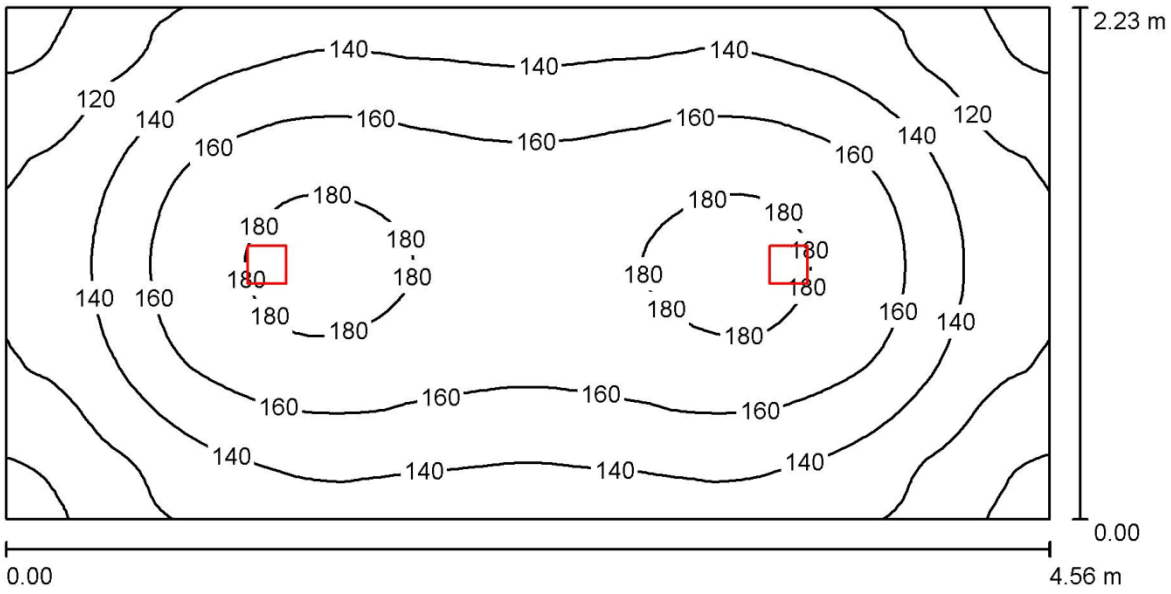
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	3	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			4873	Total: 4869	47.8

Specific connected load: 2.91 W/m² = 1.80 W/m²/100 lx (Ground area: 16.42 m²)

Operator Telephone
Fax e-Mail

Nurse room /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:33

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	148	94	186	0.632
Floor	10	110	79	131	0.712
Ceiling	70	36	25	40	0.682
Walls (4)	50	84	31	151	/

Workplane:
Height: 0.760 m
Grid: 128 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.624, Ceiling / Working Plane: 0.243.

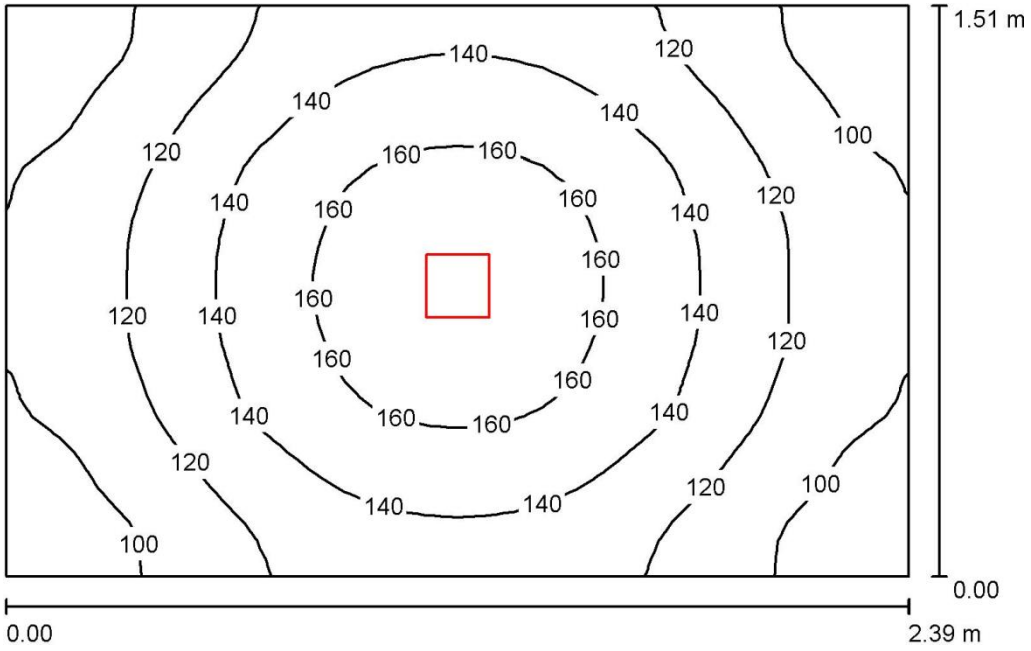
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	2	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			3249	Total: 3246	31.9

Specific connected load: 3.13 W/m² = 2.11 W/m²/100 lx (Ground area: 10.18 m²)

Operator Telephone
Fax e-Mail

Male Toilet /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:20

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	129	85	174	0.654
Floor	10	86	66	103	0.767
Ceiling	70	37	24	45	0.670
Walls (4)	50	74	28	212	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.650, Ceiling / Working Plane: 0.283.

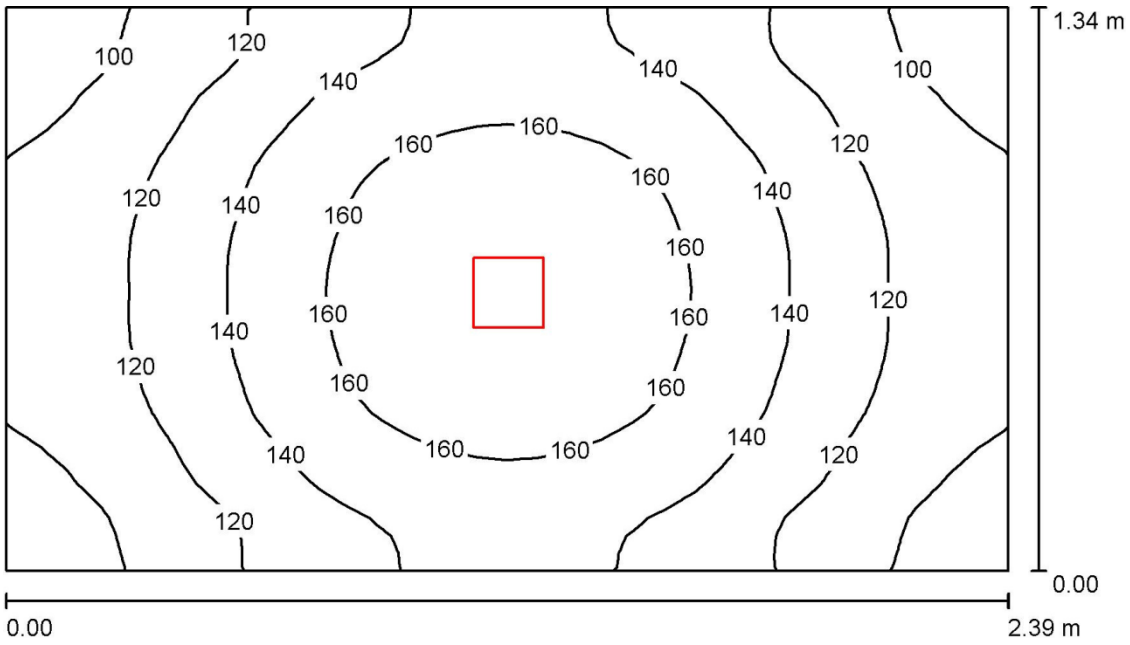
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 3.45 W/m² = 2.67 W/m²/100 lx (Ground area: 3.59 m²)

Operator Telephone
Fax e-Mail

Female Toilet /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:18

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	134	89	178	0.664
Floor	10	88	69	104	0.783
Ceiling	70	41	27	52	0.656
Walls (4)	50	79	30	261	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.687, Ceiling / Working Plane: 0.309.

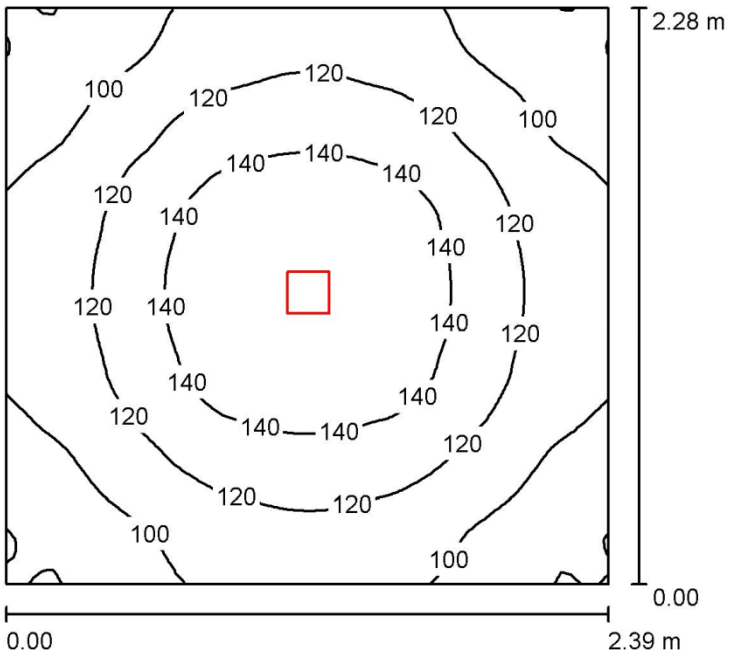
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 3.87 W/m² = 2.89 W/m²/100 lx (Ground area: 3.20 m²)

Operator Telephone
Fax e-Mail

Clean Utility/Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:30

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	118	77	157	0.657
Floor	10	81	62	96	0.765
Ceiling	70	32	22	36	0.697
Walls (4)	50	70	27	137	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.660, Ceiling / Working Plane: 0.271.

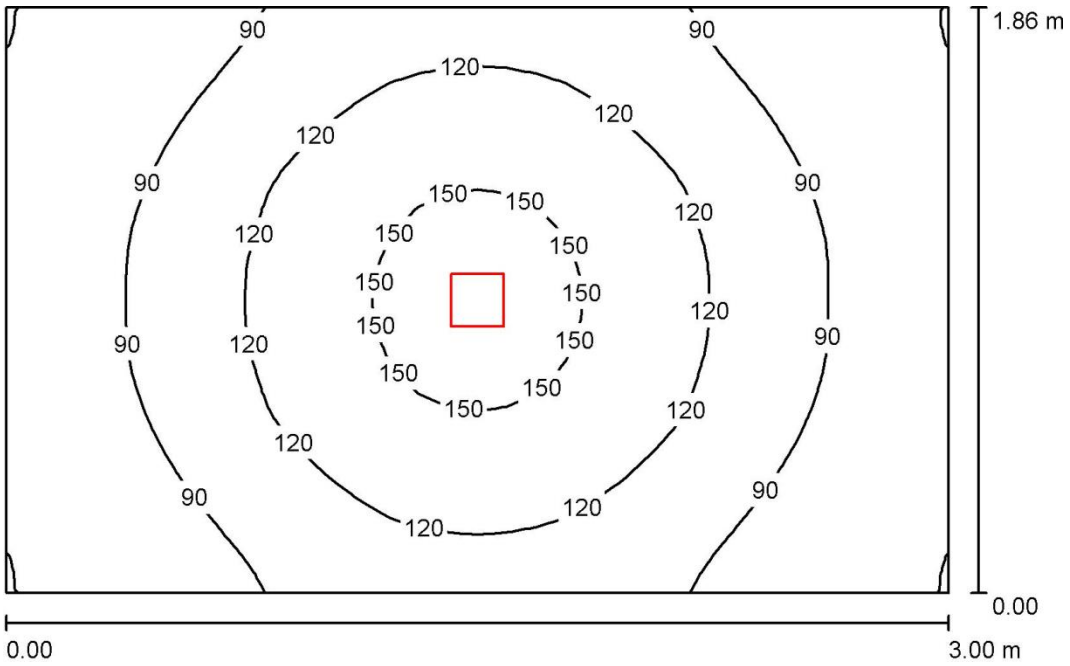
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 2.93 W/m² = 2.48 W/m²/100 lx (Ground area: 5.44 m²)

Operator Telephone
Fax e-Mail

Toilet/Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:24

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	105	59	161	0.566
Floor	10	74	51	96	0.689
Ceiling	70	24	15	29	0.646
Walls (4)	50	52	18	135	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.544, Ceiling / Working Plane: 0.225.

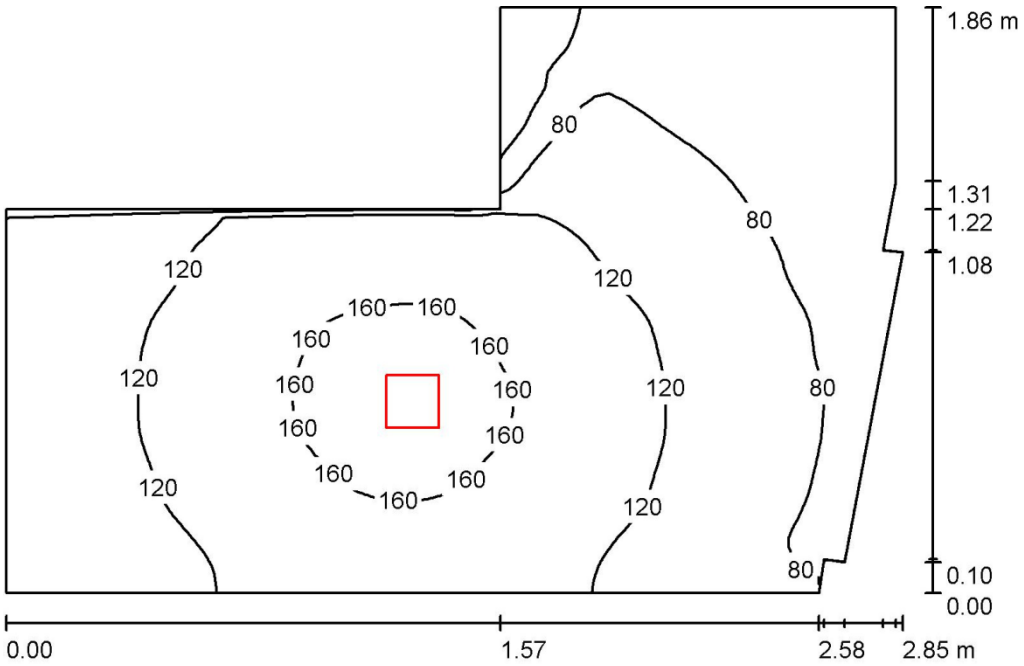
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 2.22 W/m² = 2.12 W/m²/100 lx (Ground area: 5.56 m²)

Operator Telephone
Fax e-Mail

Toilet /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:24

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	111	19	172	0.168
Floor	10	75	16	99	0.219
Ceiling	70	32	16	52	0.492
Walls (11)	50	61	12	300	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.635, Ceiling / Working Plane: 0.290.

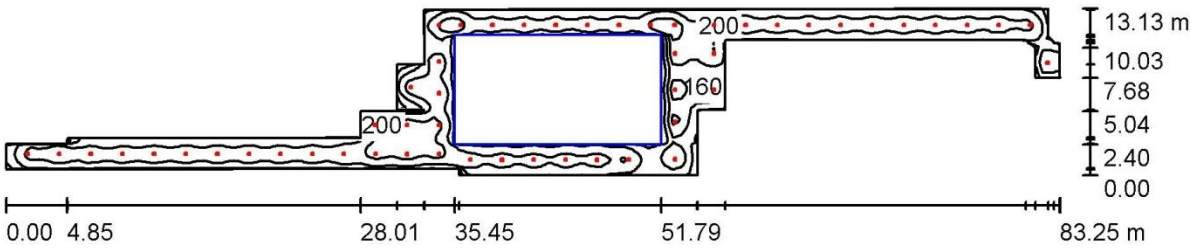
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 2.99 W/m² = 2.69 W/m²/100 lx (Ground area: 4.15 m²)

Operator Telephone
Fax e-Mail

Lobby and Corridors



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:596

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	157	55	229	0.347
Floor	10	91	0.96	193	0.011
Ceiling	70	20	0.51	55	0.026
Walls (29)	50	81	19	251	/

Workplane:
Height: 0.760 m
Grid: 128 x 128Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.561, Ceiling / Working Plane: 0.125.

Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	53	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			86098	Total: 86019	844.8

Specific connected load: 1.82 W/m² = 1.16 W/m²/100 lx (Ground area: 463.44 m²)

7.3 Fourth floor:

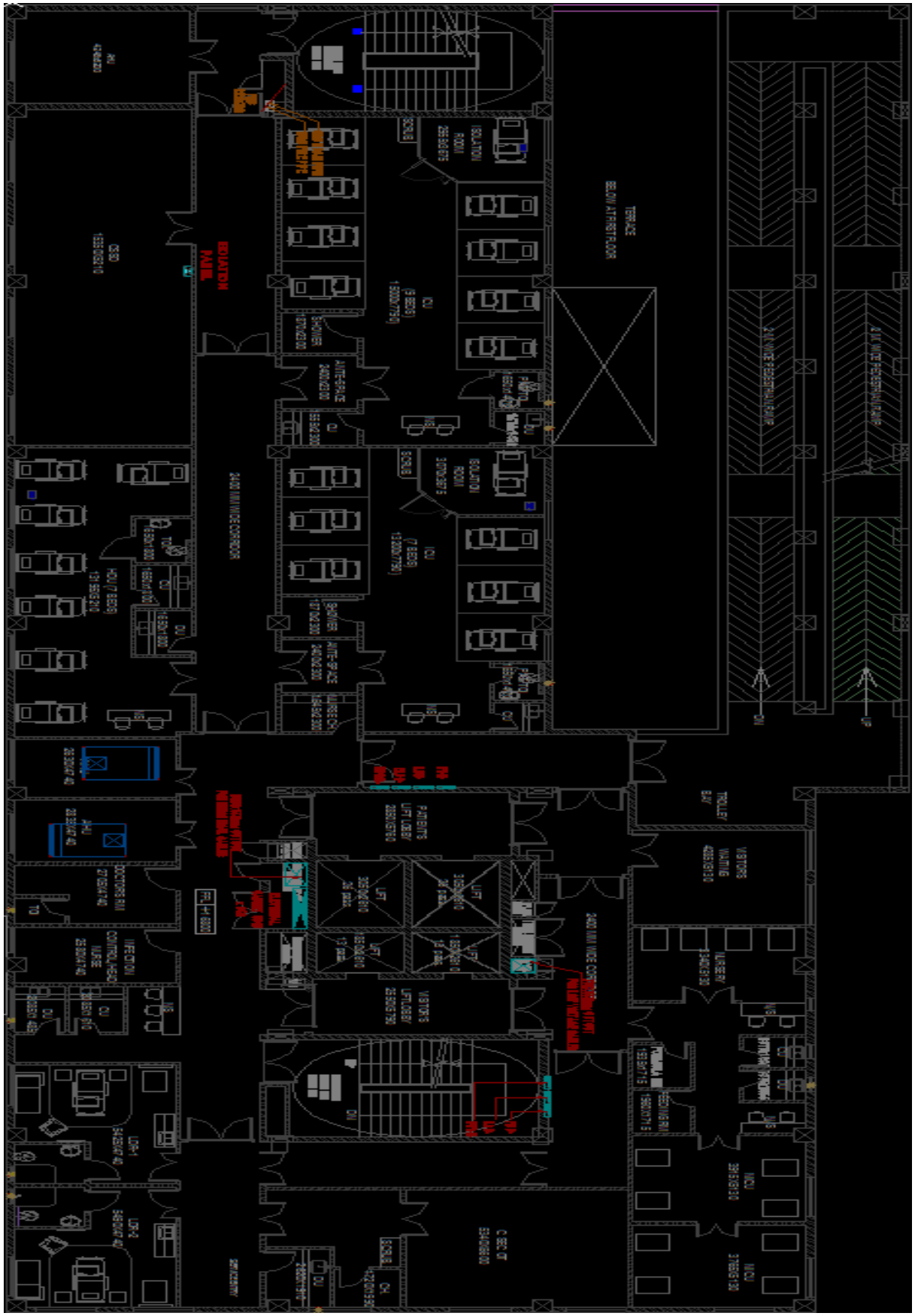


Fig 6: Fourth Floor Plan.

Table 17: Major area on the Fourth floor.

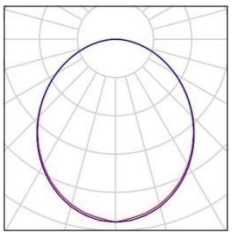
Location	Luminaire Used	Approx. Eavg achieved (lux)	Approx. Emin achieved (lux)	Approx. Emax achieved (lux)
C.S.S.D. Room	1. Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL	252	116	377
I.C.U. and H.D.U.	1.Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL 2. Crompton Greaves Ltd. 03 LCDE-15-CDL	251	45	406
LDR room	1. Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL	351	116	410
C. sec. OT	1. Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL	518	290	640
NICU and Nursery	1. Crompton Greaves Ltd. 03 LCDE-15-CDL	319	171	340
Doctor and Infection Control/Head Nurse Room	1. Crompton Greaves Ltd. 03 LCDE-15-CDL	202	92	270

Operator Telephone
Fax e-Mail

4th Floor / Luminaire parts list

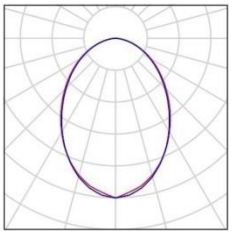
34Pieces Crompton Greaves Ltd. 01LCTLRN-36-FO-CDL
Article No.:01
Luminous flux (Luminaire): 3525 lm Luminous flux (Lamps): 3529 lm Luminaire Wattage: 34.2 W
Luminaire classification according to CIE: 100 CIE flux code: 49 80 95 100100
Fitting: 1 x LCTLRN-36-FO-CDL (Correction Factor 1.000).

See our luminairecatalog for an image of the luminaire.



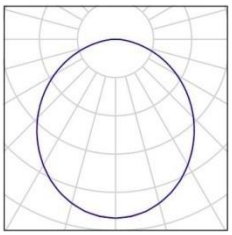
5Pieces Crompton Greaves Ltd. 02 LCDE-12-CDL
Article No.:02
Luminous flux (Luminaire): 1339 lm Luminous flux (Lamps): 1335 lm Luminaire Wattage: 12.4 W
Luminaire classification according to CIE: 100 CIE flux code: 55 84 97 100100
Fitting: 1 x LCDE-12-CDL (Correction Factor 1.000).

See our luminairecatalog for an image of the luminaire.



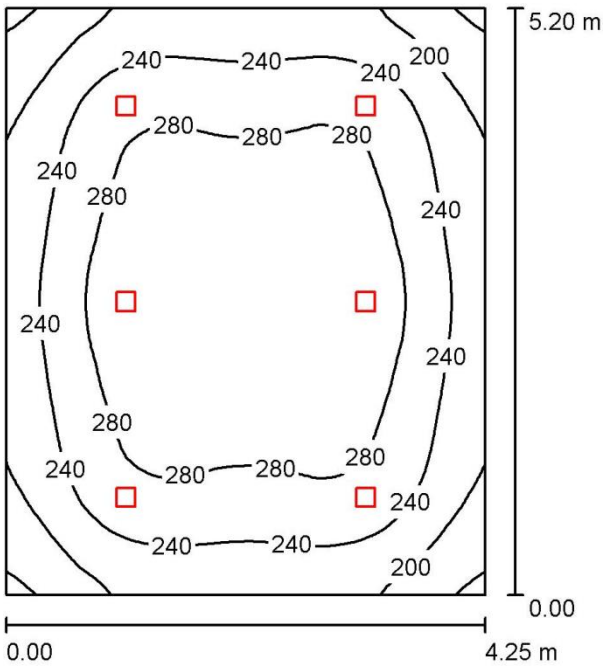
115 Pieces Crompton Greaves Ltd. 03 LCDE-15-CDL
Article No.: 03
Luminous flux (Luminaire): 1624 lm Luminous flux (Lamps): 1623 lm Luminaire Wattage: 15.9 W
Luminaire classification according to CIE: 100 CIE flux code: 48 80 96 100100
Fitting: 1 x LCDE-15-CDL (Correction Factor 1.000).

See our luminairecatalog for an image of the luminaire.



Operator Telephone
Fax e-Mail

Air Handling Unit /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:67

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	255	152	313	0.596
Floor	10	209	142	256	0.680
Ceiling	70	53	39	67	0.734
Walls (4)	50	140	52	250	/

Workplane:
Height: 0.760 m
Grid: 64 x 64Points
Boundary Zone: 0.000 m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.585, Ceiling / Working Plane: 0.209.

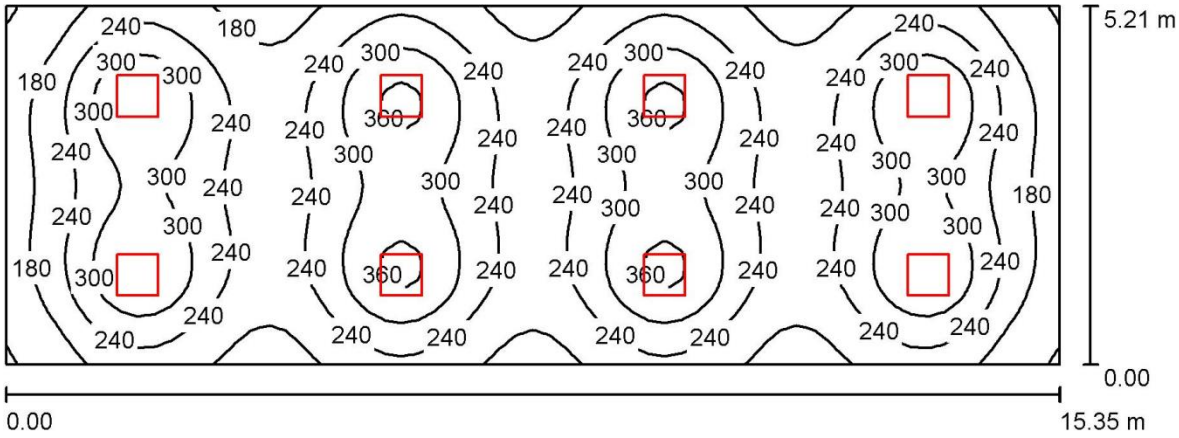
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	6	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			9747	Total: 9738	95.6

Specific connected load: 4.33 W/m² = 1.70 W/m²/100 lx (Ground area: 22.06 m²)

Operator Telephone
Fax e-Mail

Central sterile services department /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:110

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	252	116	377	0.460
Floor	10	222	125	283	0.562
Ceiling	70	39	33	51	0.842
Walls (4)	50	119	37	224	/

Workplane:
Height: 0.760 m
Grid: 64 x 32Points
BoundaryZone: 0.000 m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.466, Ceiling / Working Plane: 0.156.

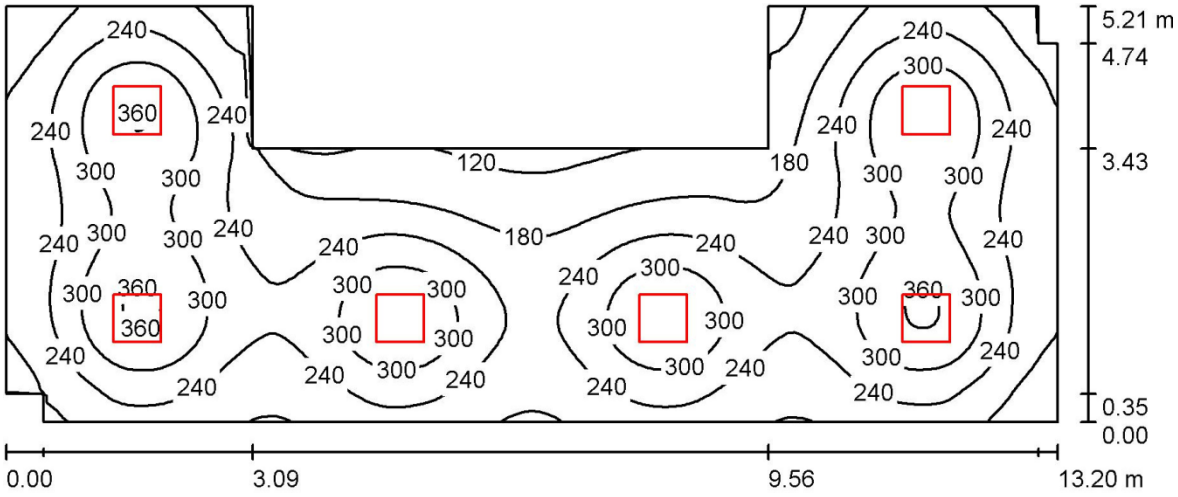
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	8	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
Total:			28198	Total: 28235	273.4

Specific connected load: 3.42 W/m² = 1.36 W/m²/100 lx (Ground area: 79.95 m²)

Operator Telephone
Fax e-Mail

High Dependency Units /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:95

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	254	98	370	0.402
Floor	10	206	111	265	0.540
Ceiling	70	41	30	57	0.744
Walls (12)	50	116	34	221	/

Workplane:
Height: 0.760 m
Grid: 64 x 128Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.478, Ceiling / Working Plane: 0.167.

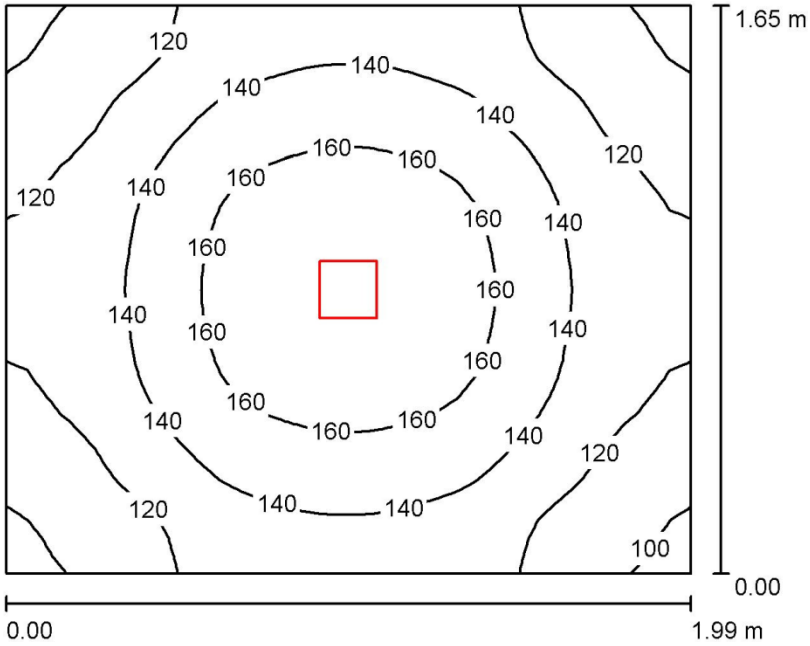
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	6	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
Total:			21149	Total: 21176	205.1

Specific connected load: 3.60 W/m² = 1.48 W/m²/100 lx (Ground area: 56.96 m²)

Operator Telephone
Fax e-Mail

HDU Toilet /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:22

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	137	96	177	0.701
Floor	10	90	70	105	0.782
Ceiling	70	40	28	46	0.714
Walls (4)	50	80	31	186	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.671, Ceiling / Working Plane: 0.291.

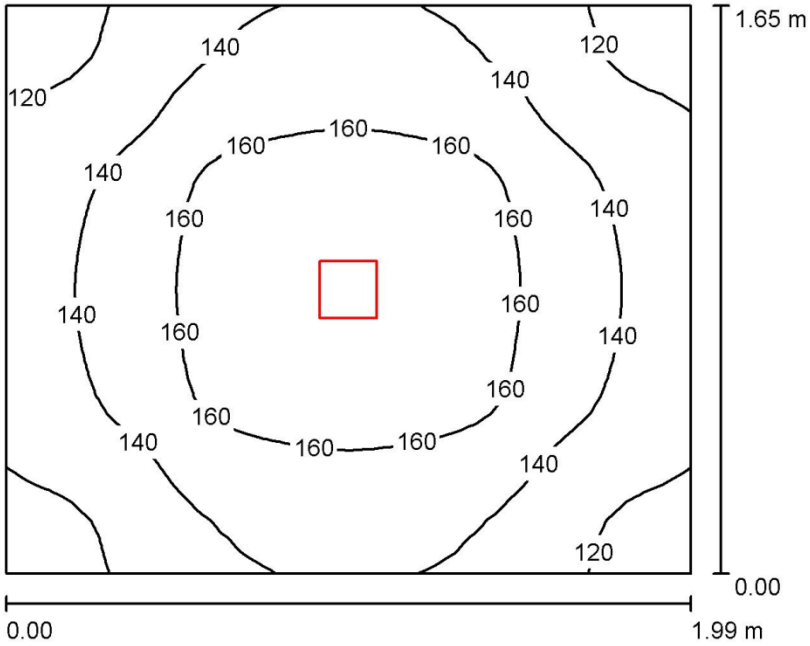
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 3.77 W/m² = 2.76 W/m²/100 lx (Ground area: 3.28 m²)

Operator Telephone
Fax e-Mail

HDU Clean Utility /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:22

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	146	111	176	0.760
Floor	10	94	76	106	0.814
Ceiling	70	53	38	61	0.724
Walls (4)	50	101	38	251	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.813, Ceiling / Working Plane: 0.365.

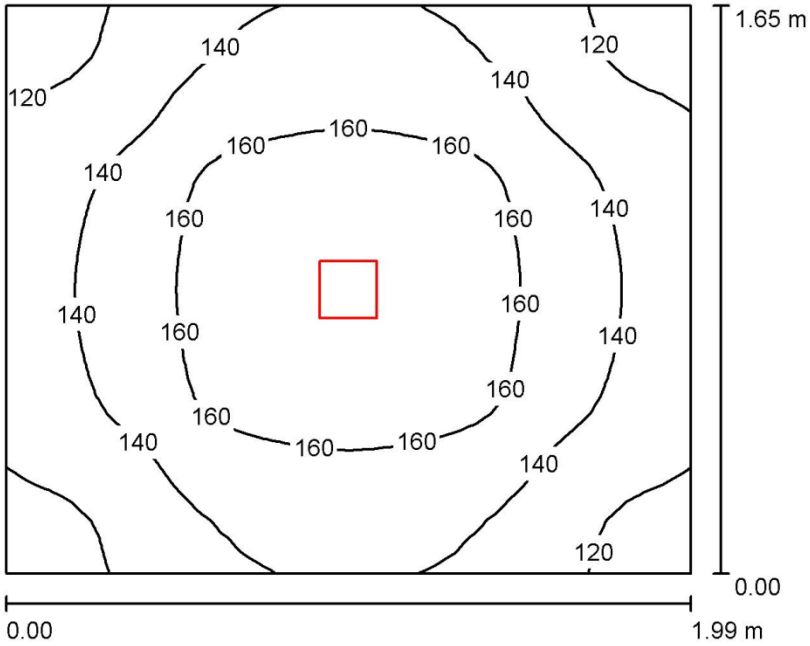
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 4.85 W/m² = 3.33 W/m²/100 lx (Ground area: 3.28 m²)

Operator Telephone
Fax e-Mail

HDU Dirty Utility /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:22

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	146	111	176	0.760
Floor	10	94	76	106	0.814
Ceiling	70	53	38	61	0.724
Walls (4)	50	101	38	251	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.813, Ceiling / Working Plane: 0.365.

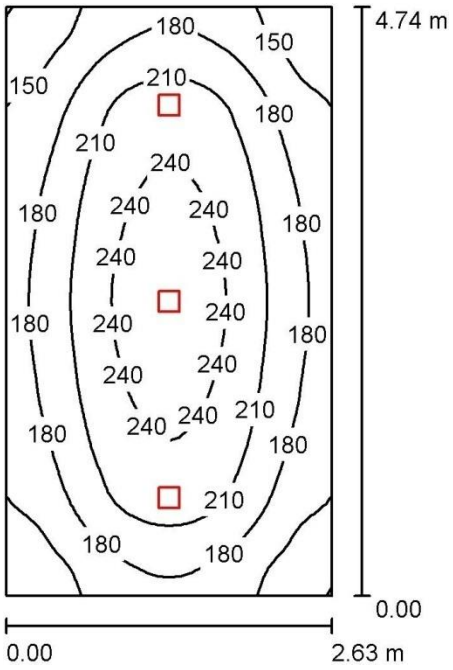
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 4.85 W/m² = 3.33 W/m²/100 lx (Ground area: 3.28 m²)

Operator Telephone
Fax e-Mail

AHU 1 /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:61

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	196	119	257	0.608
Floor	10	150	103	184	0.686
Ceiling	70	45	32	56	0.705
Walls (4)	50	108	39	269	/

Workplane:
Height: 0.760 m
Grid: 32 x 64Points
Boundary Zone: 0.000 m

UGR Lengthways- Across to luminaire axis
LeftWall 21 21
LowerWall 23 23
(CIE, SHR = 0.25.)

Illuminance Quotient (according to LG7): Walls / Working Plane: 0.601, Ceiling / Working Plane: 0.229.

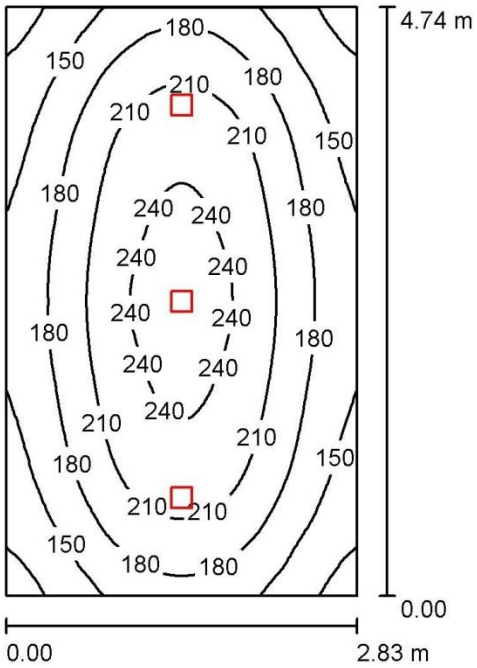
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	3	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			4873	Total: 4869	47.8

Specific connected load: 3.84 W/m² = 1.96 W/m²/100 lx (Ground area: 12.47 m²)

Operator Telephone
Fax e-Mail

AHU 2 /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:61

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	189	109	254	0.580
Floor	10	146	99	182	0.682
Ceiling	70	42	28	56	0.672
Walls (4)	50	102	36	267	/

Workplane:
Height: 0.760 m
Grid: 64 x 64Points
Boundary Zone: 0.000 m

UGR Lengthways- Across to luminaire axis
LeftWall 21 21
LowerWall 23 23
(CIE, SHR = 0.25.)

Illuminance Quotient (according to LG7): Walls / Working Plane: 0.583, Ceiling / Working Plane: 0.221.

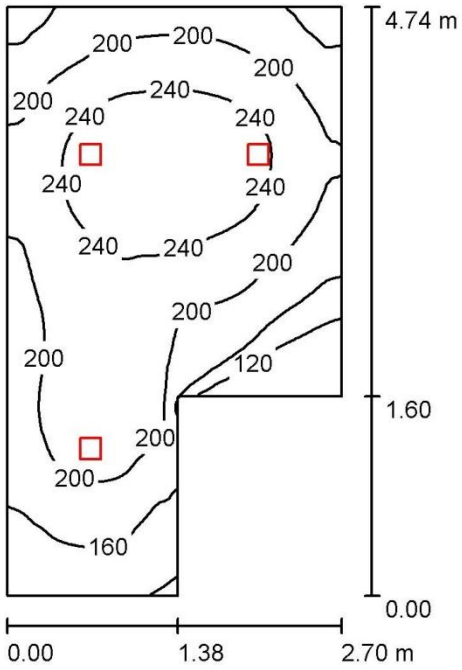
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	3	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			4873	Total: 4869	47.8

Specific connected load: 3.56 W/m² = 1.89 W/m²/100 lx (Ground area: 13.43 m²)

Operator Telephone
Fax e-Mail

Doctor's Room /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:61

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	202	92	270	0.454
Floor	10	152	84	188	0.555
Ceiling	70	54	31	84	0.579
Walls (6)	50	118	41	363	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.660, Ceiling / Working Plane: 0.266.

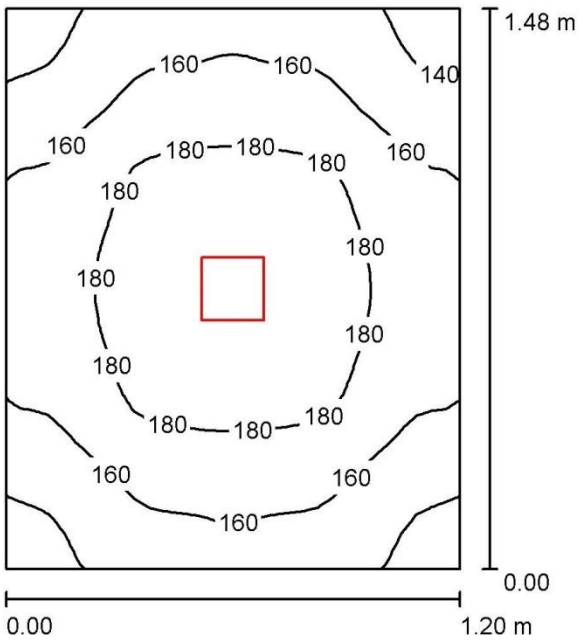
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	3	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			4873	Total: 4869	47.8

Specific connected load: 4.47 W/m² = 2.22 W/m²/100 lx (Ground area: 10.69 m²)

Operator Telephone
Fax e-Mail

Doctor's Room - Toilet /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:20

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	168	132	197	0.788
Floor	10	101	87	111	0.862
Ceiling	70	73	50	84	0.680
Walls (4)	50	122	36	352	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.884, Ceiling / Working Plane: 0.436.

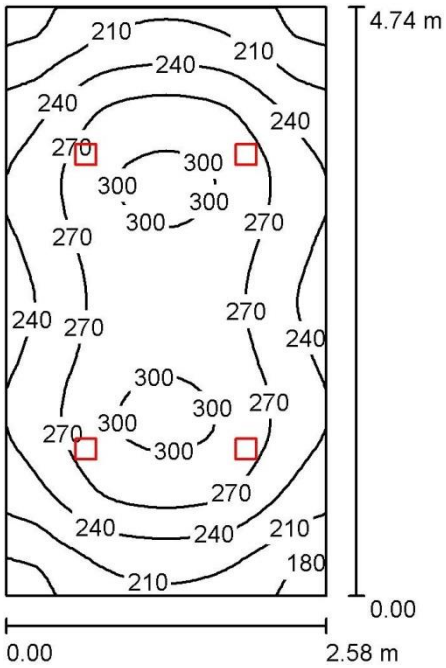
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 6.97 W/m² = 4.16 W/m²/100 lx (Ground area: 1.78 m²)

Operator Telephone
Fax e-Mail

Infection Control/Head Nurse Room /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:61

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	254	168	306	0.661
Floor	10	195	136	230	0.697
Ceiling	70	64	46	75	0.710
Walls (4)	50	150	58	404	/

Workplane:
Height: 0.760 m
Grid: 32 x 64Points
Boundary Zone: 0.000 m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.655, Ceiling / Working Plane: 0.254.

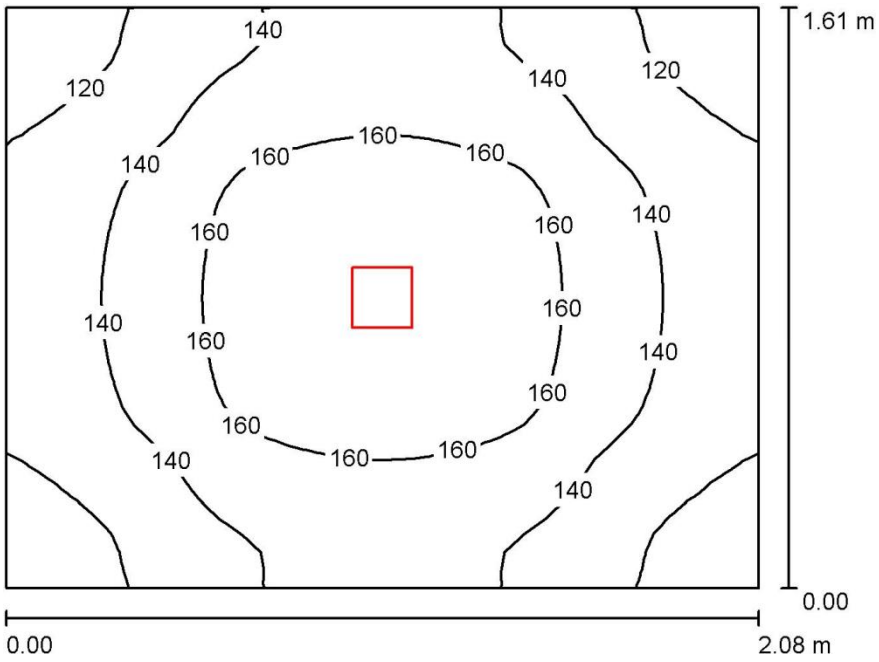
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	4	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			6498	Total: 6492	63.8

Specific connected load: 5.21 W/m² = 2.05 W/m²/100 lx (Ground area: 12.25 m²)

Operator Telephone
Fax e-Mail

Clean Utility /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:21

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	144	108	176	0.752
Floor	10	93	75	105	0.810
Ceiling	70	52	37	59	0.719
Walls (4)	50	99	37	259	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.805, Ceiling / Working Plane: 0.361.

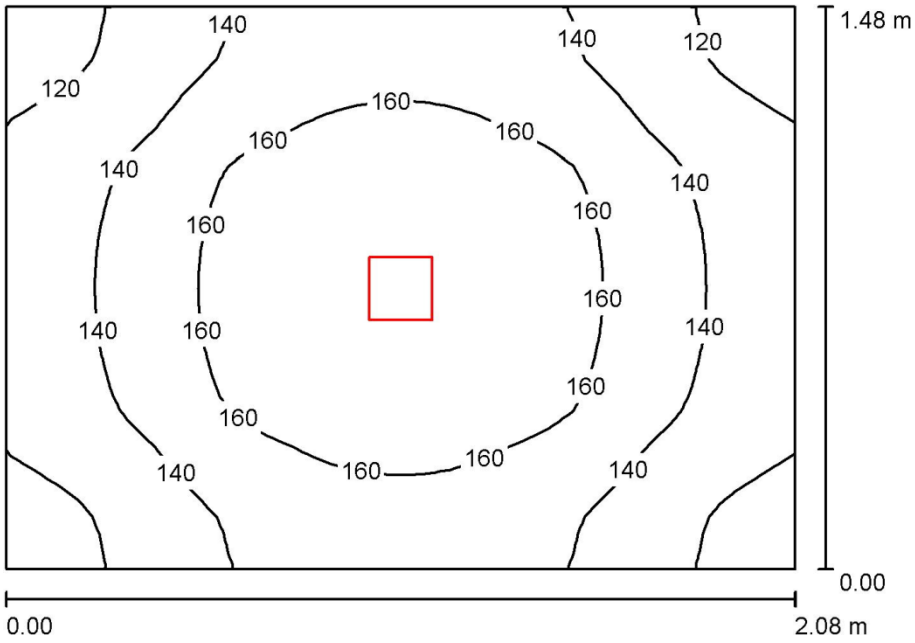
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 4.75 W/m² = 3.30 W/m²/100 lx (Ground area: 3.36 m²)

Operator Telephone
Fax e-Mail

Dirty Utility /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:20

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	147	111	179	0.751
Floor	10	94	76	106	0.813
Ceiling	70	56	40	66	0.715
Walls (4)	50	104	37	302	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.835, Ceiling / Working Plane: 0.383.

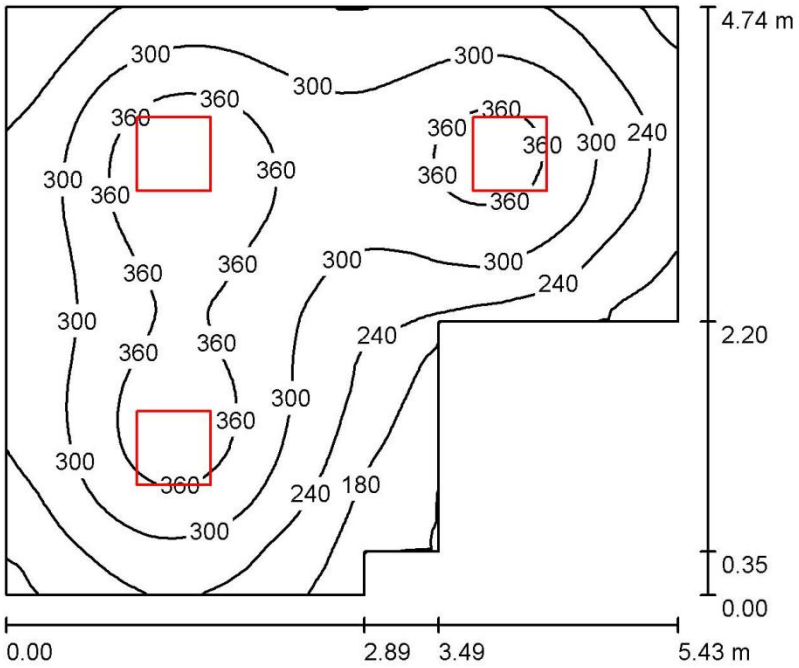
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 5.15 W/m² = 3.49 W/m²/100 lx (Ground area: 3.10 m²)

Operator Telephone
Fax e-Mail

Labor-Delivery-Recovery /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:61

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	351	116	410	0.400
Floor	10	234	119	301	0.508
Ceiling	70	55	36	64	0.664
Walls (8)	50	143	45	275	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.511, Ceiling / Working Plane: 0.188.

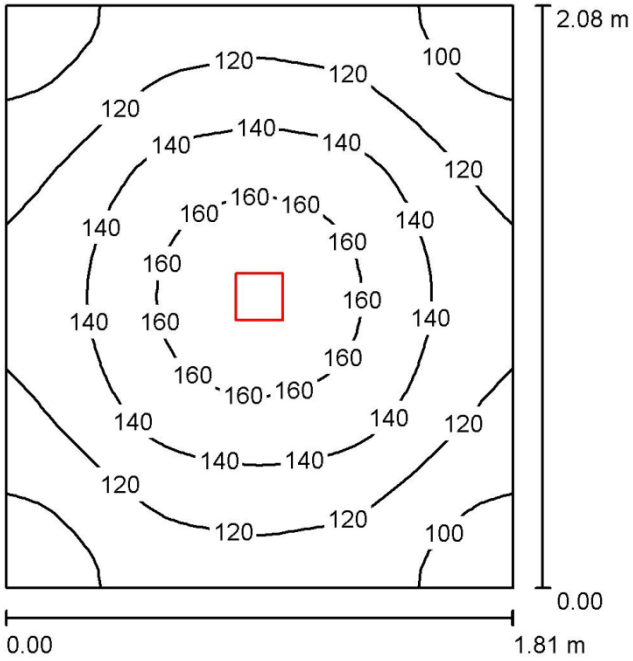
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	3	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
Total:			10574	Total: 10588	102.5

Specific connected load: 4.83 W/m² = 1.66 W/m²/100 lx (Ground area: 21.25 m²)

Operator Telephone
Fax e-Mail

LDR Toilet /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:27

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	129	88	172	0.681
Floor	10	87	67	103	0.770
Ceiling	70	35	24	40	0.692
Walls (4)	50	72	27	157	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.632, Ceiling / Working Plane: 0.268.

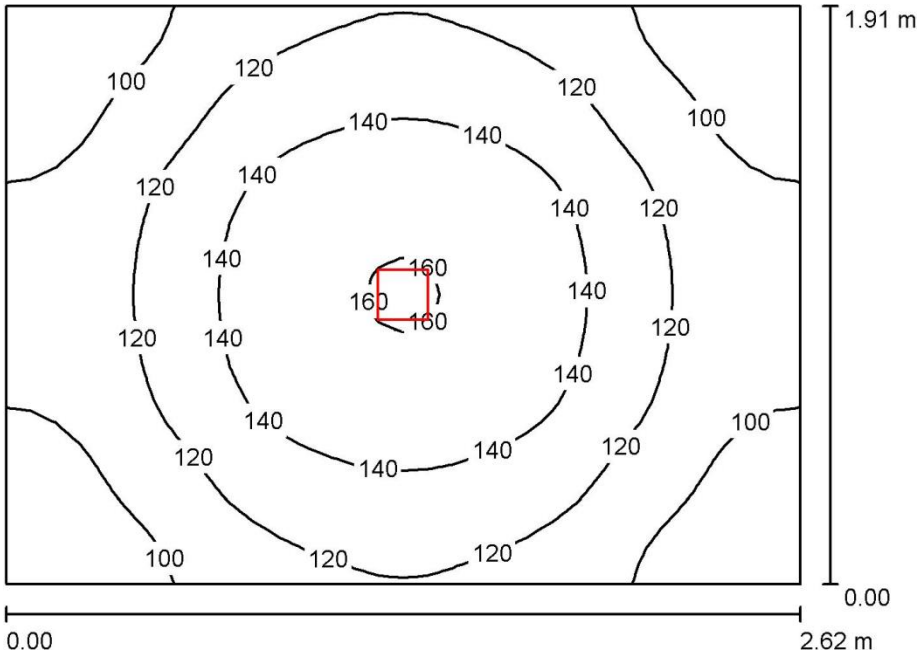
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 3.29 W/m² = 2.54 W/m²/100 lx (Ground area: 3.76 m²)

Operator Telephone
Fax e-Mail

Dirty Utility /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:25

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	121	82	161	0.676
Floor	10	83	64	98	0.773
Ceiling	70	35	24	40	0.696
Walls (4)	50	74	28	181	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.689, Ceiling / Working Plane: 0.288.

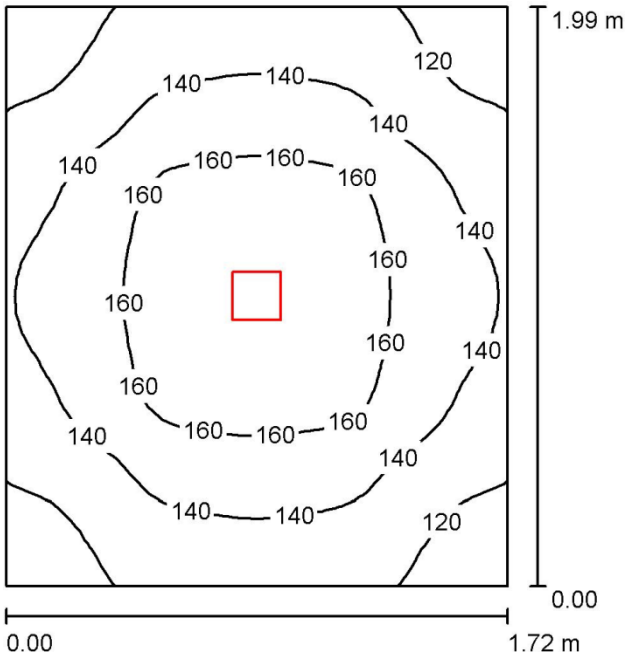
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 3.19 W/m² = 2.63 W/m²/100 lx (Ground area: 5.00 m²)

Operator Telephone
Fax e-Mail

Clean Utility /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:26

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	144	108	174	0.755
Floor	10	93	75	105	0.810
Ceiling	70	51	37	58	0.717
Walls (4)	50	98	38	233	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.799, Ceiling / Working Plane: 0.355.

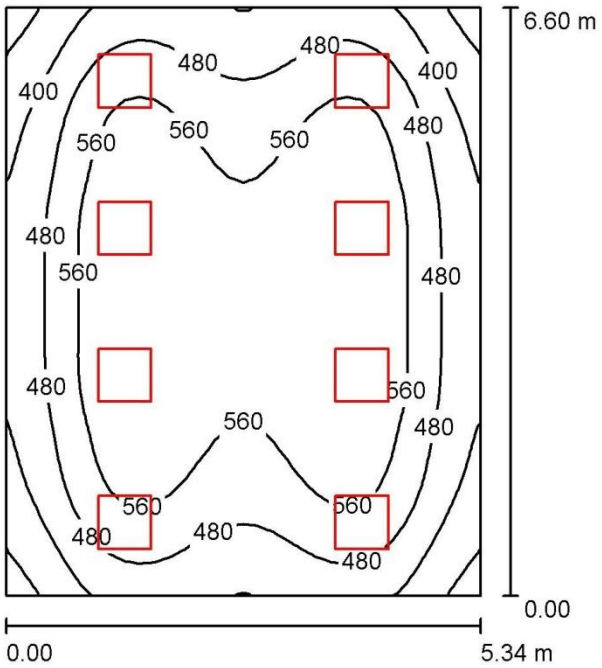
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 4.66 W/m² = 3.24 W/m²/100 lx (Ground area: 3.42 m²)

Operator Telephone
Fax e-Mail

Cesarean SEC OT. /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:85

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	518	290	640	0.559
Floor	10	441	277	540	0.627
Ceiling	70	93	68	119	0.733
Walls (4)	50	261	86	555	/

Workplane:
Height: 0.760 m
Grid: 32 x 32Points
BoundaryZone: 0.000 m

UGR Lengthways- Across to luminaire axis
LeftWall 18 18
LowerWall 18 18
(CIE, SHR = 0.25.)

Illuminance Quotient (according to LG7): Walls / Working Plane: 0.521, Ceiling / Working Plane: 0.179.

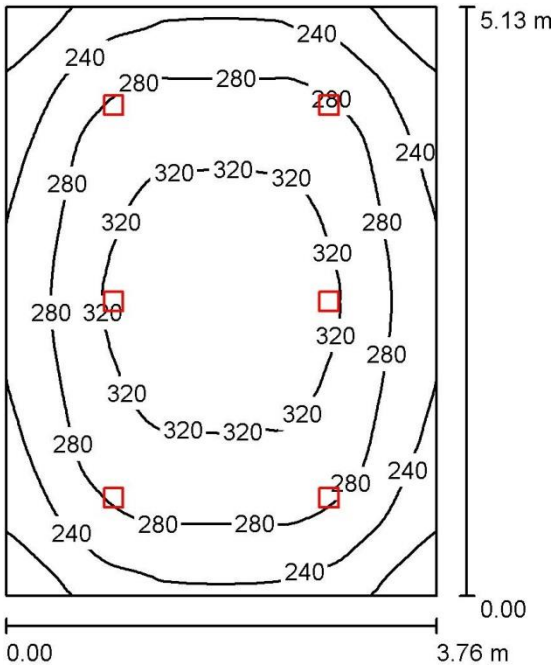
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	8	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
Total:			28198	Total: 28235	273.4

Specific connected load: 7.75 W/m² = 1.50 W/m²/100 lx (Ground area: 35.26 m²)

Operator Telephone
Fax e-Mail

Neonatal, Intensive Care Unit /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:66

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	319	171	340	0.611
Floor	10	227	157	277	0.693
Ceiling	70	61	45	76	0.732
Walls (4)	50	156	60	266	/

Workplane:
Height: 0.760 m
Grid: 64 x 64Points
Boundary Zone: 0.000 m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.604, Ceiling / Working Plane: 0.219.

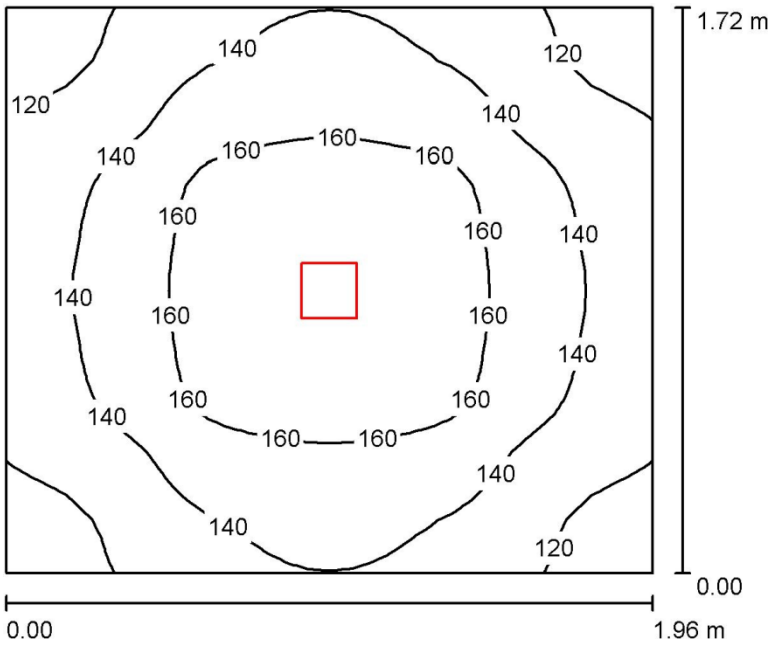
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	6	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			9747	Total: 9738	95.6

Specific connected load: 4.95 W/m² = 1.77 W/m²/100 lx (Ground area: 19.32 m²)

Operator Telephone
Fax e-Mail

Feeding Room /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:23

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	145	110	175	0.759
Floor	10	93	77	105	0.822
Ceiling	70	52	37	58	0.714
Walls (4)	50	99	38	234	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.800, Ceiling / Working Plane: 0.358.

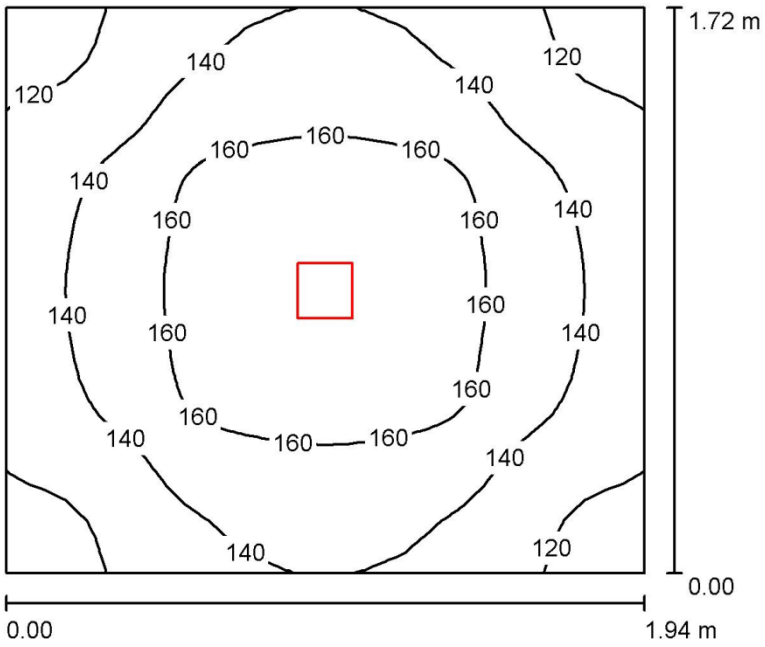
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 4.73 W/m² = 3.27 W/m²/100 lx (Ground area: 3.37 m²)

Operator Telephone
Fax e-Mail

Formula Room. /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:23

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	145	111	175	0.762
Floor	10	94	77	106	0.824
Ceiling	70	52	37	59	0.714
Walls (4)	50	100	38	235	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.809, Ceiling / Working Plane: 0.361.

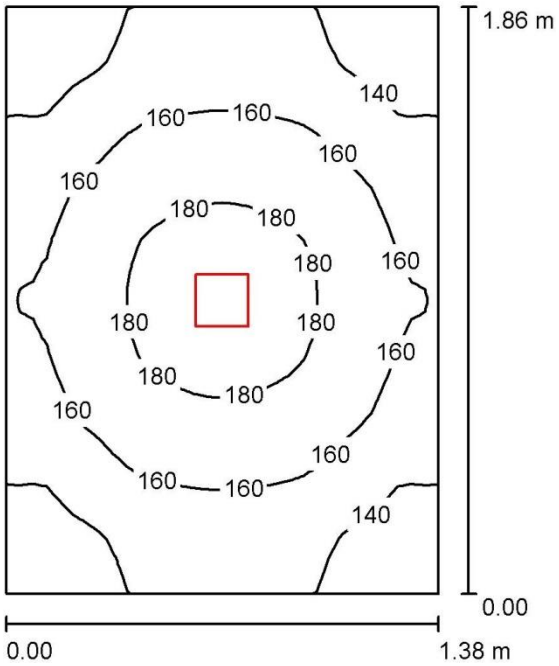
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 4.79 W/m² = 3.30 W/m²/100 lx (Ground area: 3.33 m²)

Operator Telephone
Fax e-Mail

Dirty Utility /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:24

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	158	122	186	0.771
Floor	10	98	84	109	0.863
Ceiling	70	68	50	78	0.728
Walls (4)	50	119	38	353	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.897, Ceiling / Working Plane: 0.432.

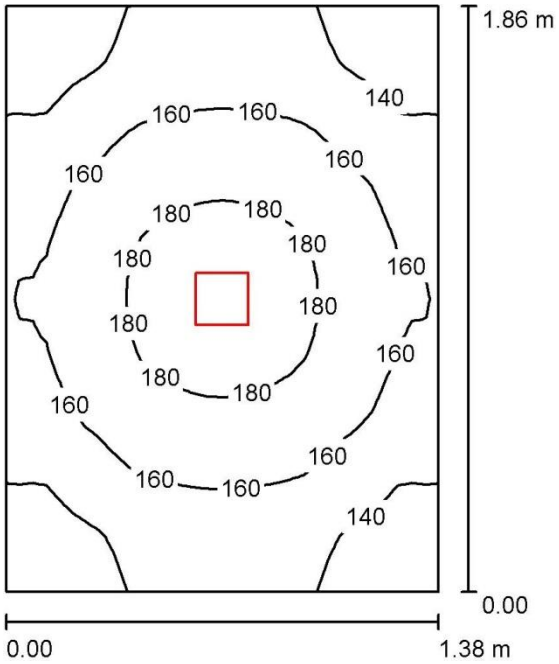
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 6.23 W/m² = 3.95 W/m²/100 lx (Ground area: 2.56 m²)

Operator Telephone
Fax e-Mail

Clean Utility /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:24

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	158	122	186	0.772
Floor	10	98	85	109	0.868
Ceiling	70	68	50	79	0.728
Walls (4)	50	119	38	354	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.897, Ceiling / Working Plane: 0.433.

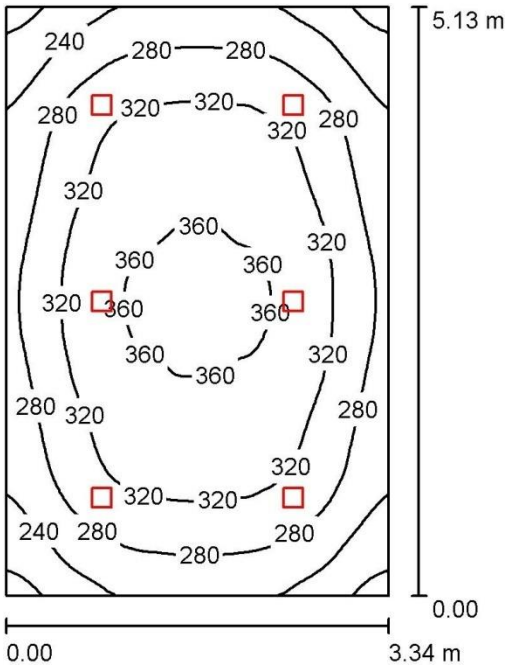
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 6.25 W/m² = 3.96 W/m²/100 lx (Ground area: 2.55 m²)

Operator Telephone
Fax e-Mail

Nursery /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:66

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	302	188	370	0.623
Floor	10	242	174	296	0.716
Ceiling	70	70	54	84	0.777
Walls (4)	50	173	68	297	/

Workplane:
Height: 0.760 m
Grid: 64 x 64Points
Boundary Zone: 0.000 m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.625, Ceiling / Working Plane: 0.231.

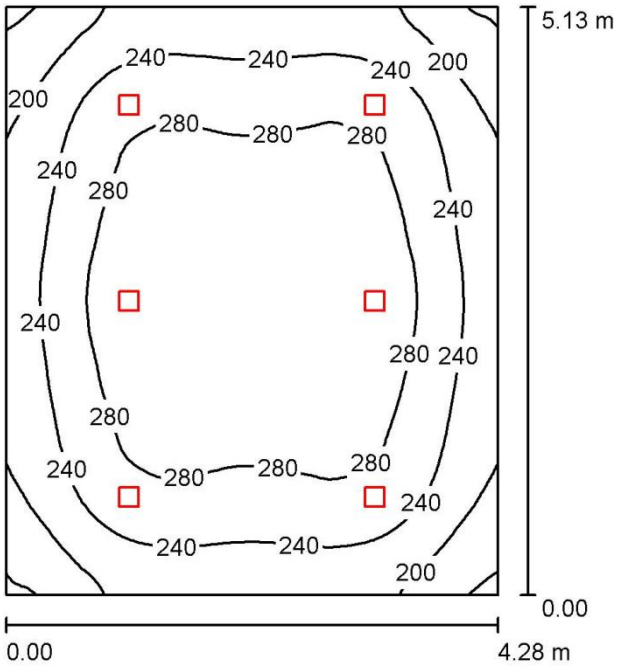
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	6	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			9747	Total: 9738	95.6

Specific connected load: 5.57 W/m² = 1.85 W/m²/100 lx (Ground area: 17.16 m²)

Operator Telephone
Fax e-Mail

Visitor's Waiting /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:66

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	256	152	314	0.595
Floor	10	210	140	256	0.669
Ceiling	70	53	39	67	0.736
Walls (4)	50	140	52	255	/

Workplane:
Height: 0.760 m
Grid: 64 x 64Points
Boundary Zone: 0.000 m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.584, Ceiling / Working Plane: 0.209.

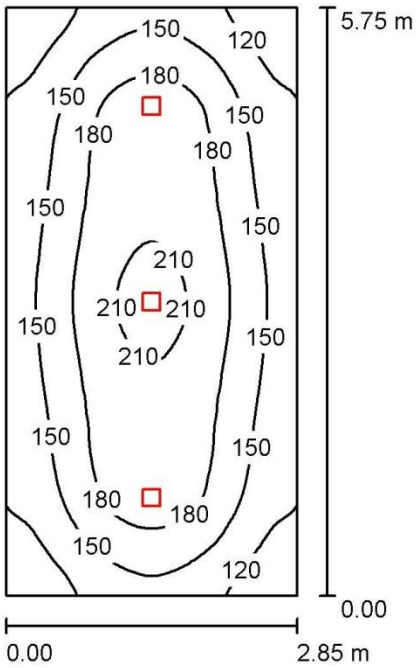
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	6	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			9747	Total: 9738	95.6

Specific connected load: 4.35 W/m² = 1.70 W/m²/100 lx (Ground area: 21.99 m²)

Operator Telephone
Fax e-Mail

Patient's Lift Lobby /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:74

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	162	93	219	0.573
Floor	10	127	82	159	0.649
Ceiling	70	34	24	44	0.695
Walls (4)	50	85	30	187	/

Workplane:
Height: 0.760 m
Grid: 64 x 128Points
Boundary Zone: 0.000 m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.561, Ceiling / Working Plane: 0.209.

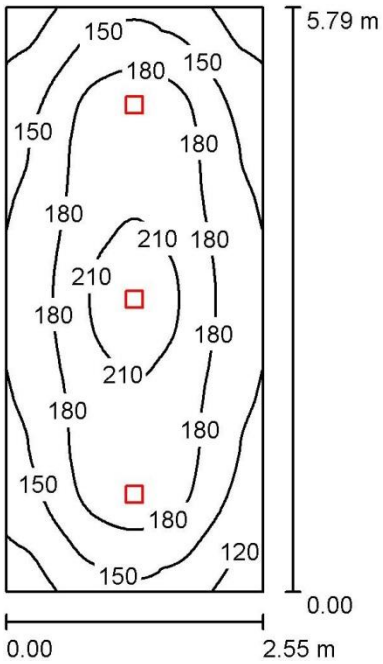
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	3	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			4873	Total: 4869	47.8

Specific connected load: 2.92 W/m² = 1.80 W/m²/100 lx (Ground area: 16.37 m²)

Operator Telephone
Fax e-Mail

Visitor's Lift Lobby /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:75

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	171	102	223	0.600
Floor	10	132	87	162	0.660
Ceiling	70	38	27	48	0.707
Walls (4)	50	93	33	189	/

Workplane:
Height: 0.760 m
Grid: 64 x 128Points
Boundary Zone: 0.000 m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.588, Ceiling / Working Plane: 0.221.

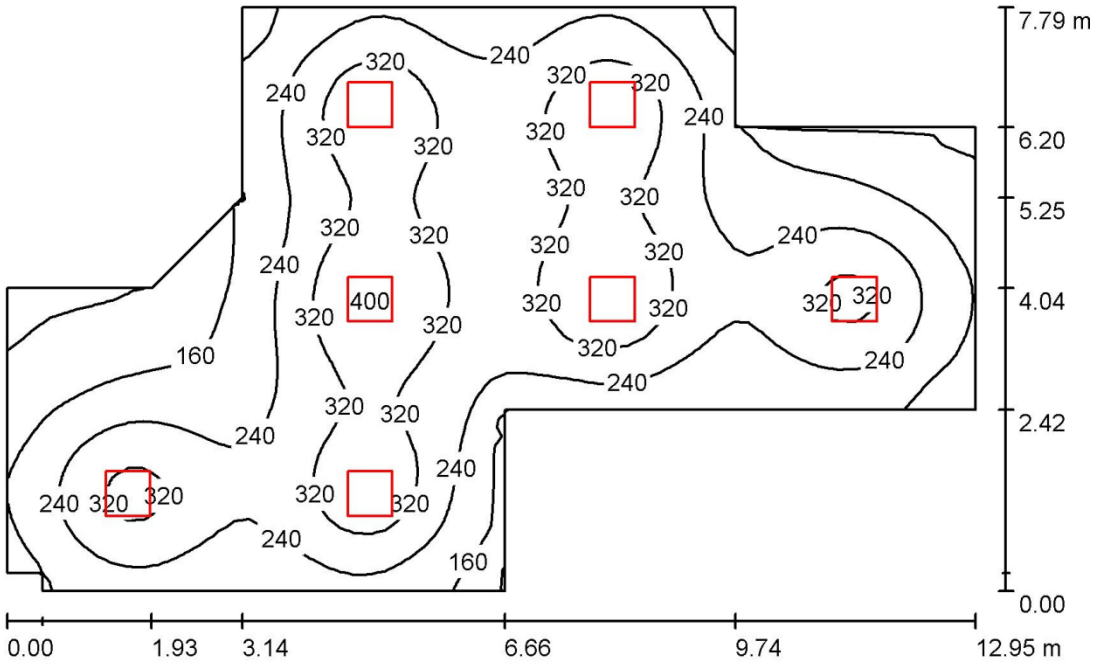
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	3	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			4873	Total: 4869	47.8

Specific connected load: 3.24 W/m² = 1.90 W/m²/100 lx (Ground area: 14.76 m²)

Operator Telephone
Fax e-Mail

ICU 7 beds. /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:101

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	251	45	406	0.179
Floor	10	219	78	307	0.354
Ceiling	70	38	22	54	0.583
Walls (13)	50	110	28	230	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.434, Ceiling / Working Plane: 0.152.

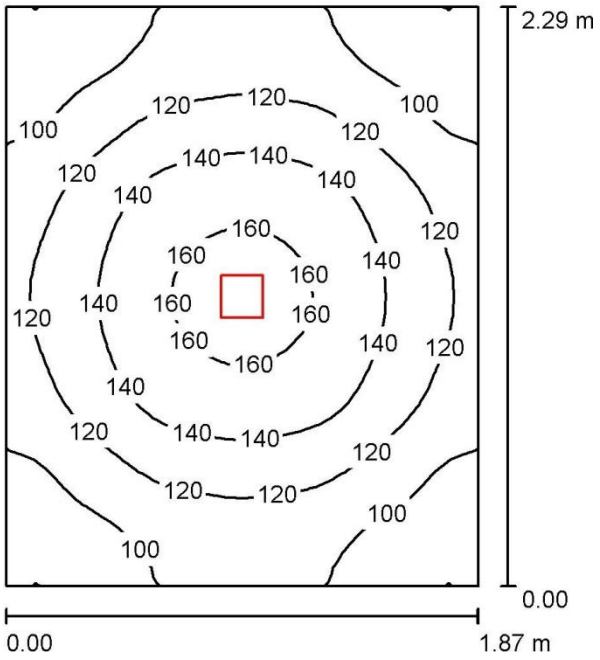
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	7	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
Total:			24673	Total: 24706	239.3

Specific connected load: 3.45 W/m² = 1.37 W/m²/100 lx (Ground area: 69.37 m²)

Operator Telephone
Fax e-Mail

Shower /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:30

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	122	79	168	0.652
Floor	10	83	63	101	0.756
Ceiling	70	30	20	35	0.659
Walls (4)	50	65	24	145	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.599, Ceiling / Working Plane: 0.250.

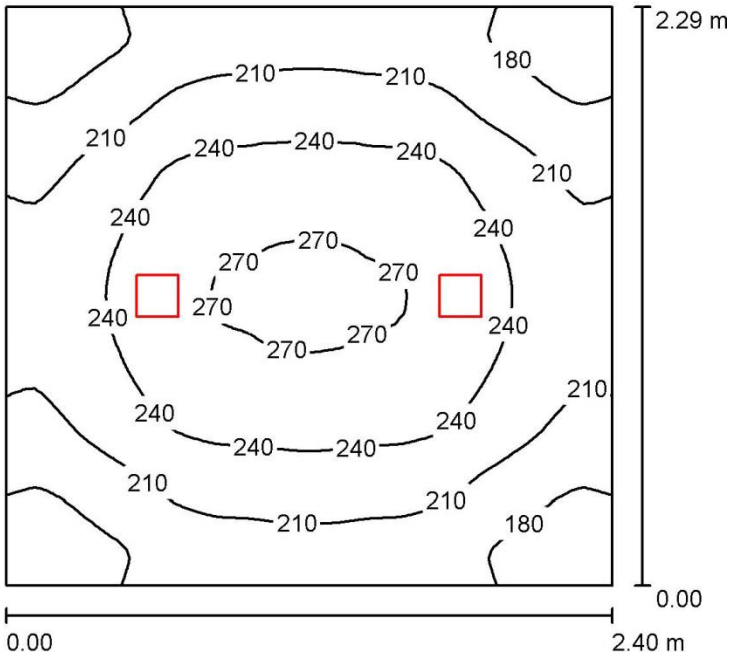
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 2.88 W/m² = 2.37 W/m²/100 lx (Ground area: 4.29 m²)

Operator Telephone
Fax e-Mail

Antechamber /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:30

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	221	158	275	0.716
Floor	10	154	121	179	0.788
Ceiling	70	68	44	90	0.651
Walls (4)	50	140	56	455	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.725, Ceiling / Working Plane: 0.309.

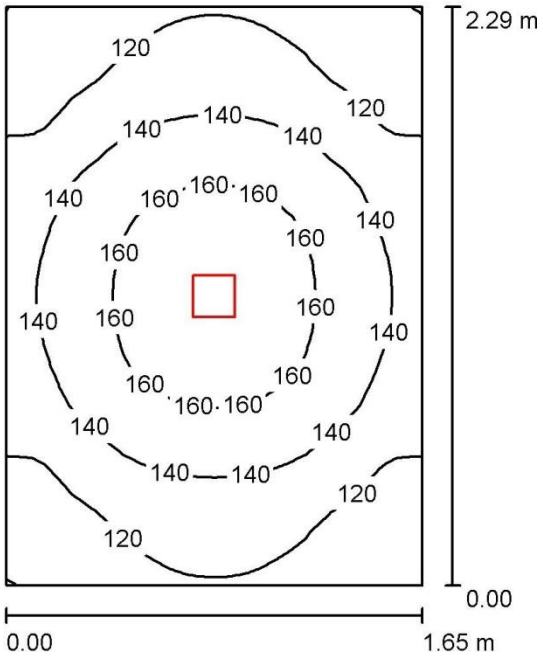
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	2	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			3249	Total: 3246	31.9

Specific connected load: 5.79 W/m² = 2.62 W/m²/100 lx (Ground area: 5.51 m²)

Operator Telephone
Fax e-Mail

Nurses Chamber /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:30

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	137	98	171	0.719
Floor	10	90	72	103	0.801
Ceiling	70	46	31	53	0.680
Walls (4)	50	91	35	244	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.768, Ceiling / Working Plane: 0.338.

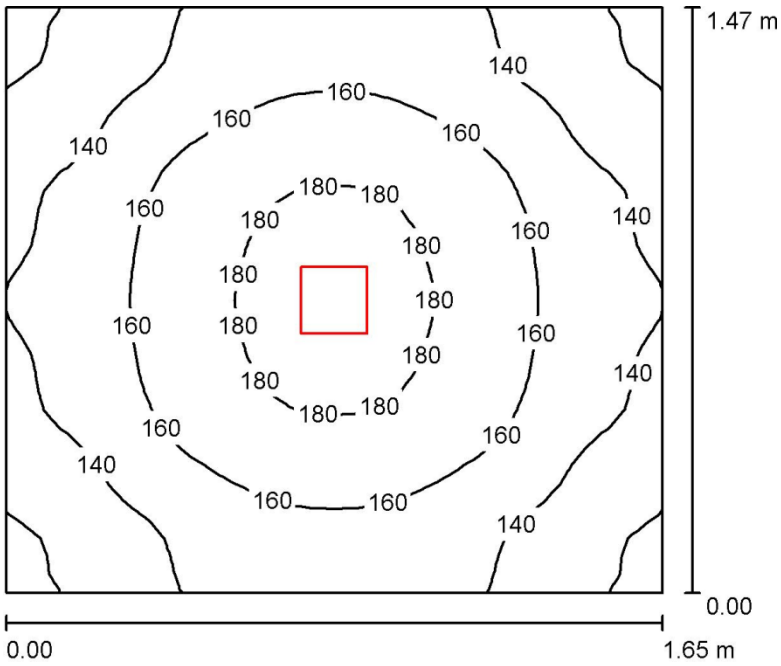
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 4.21 W/m² = 3.08 W/m²/100 lx (Ground area: 3.78 m²)

Operator Telephone
Fax e-Mail

Patient Toilet /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:19

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	153	115	187	0.750
Floor	10	96	81	109	0.837
Ceiling	70	54	40	62	0.743
Walls (4)	50	100	37	238	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.760, Ceiling / Working Plane: 0.349.

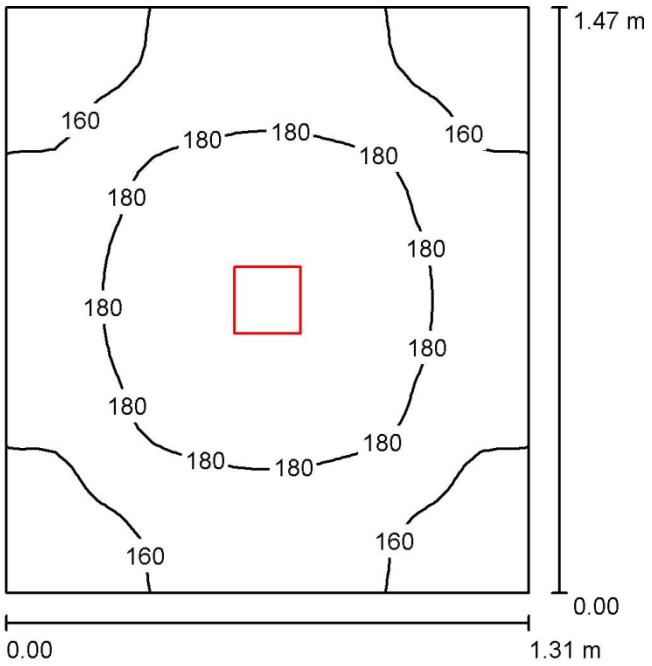
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 5.11 W/m² = 3.33 W/m²/100 lx (Ground area: 2.42 m²)

Operator Telephone
Fax e-Mail

Clean Utility /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:19

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	172	140	197	0.815
Floor	10	102	88	112	0.863
Ceiling	70	90	64	103	0.716
Walls (4)	50	144	40	403	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 1.027, Ceiling / Working Plane: 0.522.

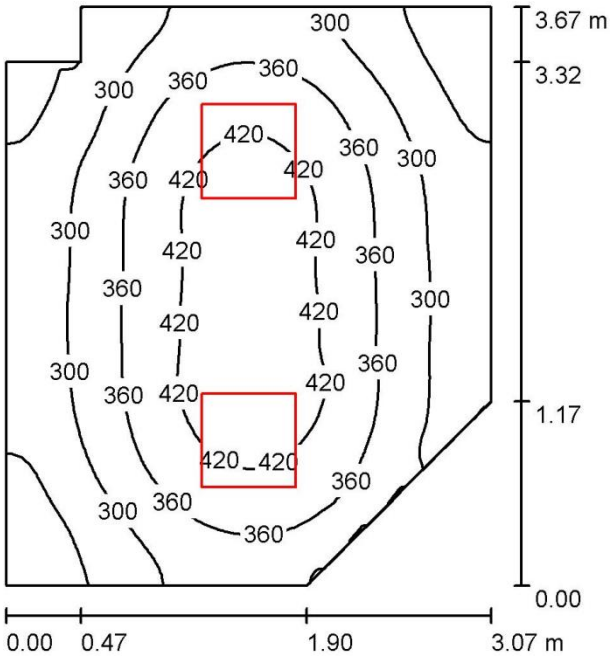
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 8.25 W/m² = 4.80 W/m²/100 lx (Ground area: 1.93 m²)

Operator Telephone
Fax e-Mail

Isolation Room /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:48

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	338	189	455	0.559
Floor	10	256	174	316	0.680
Ceiling	70	76	50	116	0.655
Walls (7)	50	182	59	444	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.578, Ceiling / Working Plane: 0.225.

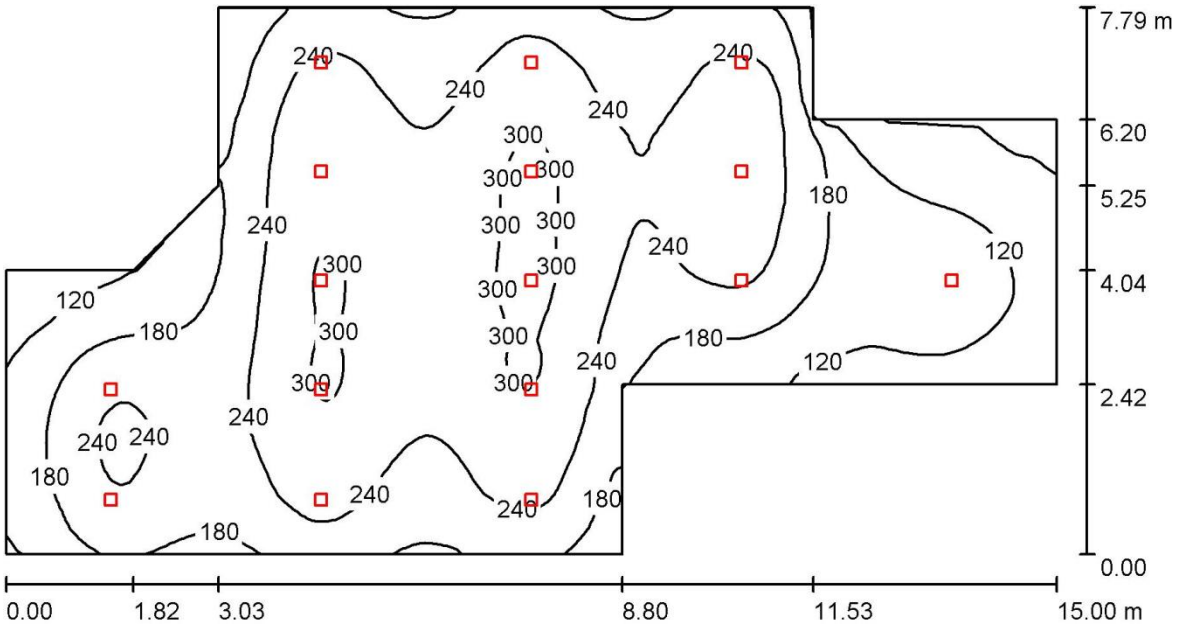
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	2	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
Total:			7050	Total: 7059	68.4

Specific connected load: 6.55 W/m² = 1.94 W/m²/100 lx (Ground area: 10.43 m²)

Operator Telephone
Fax e-Mail

ICU 9 beds /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:108

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	258	43	314	0.199
Floor	10	192	53	265	0.278
Ceiling	70	34	17	56	0.512
Walls (11)	50	100	23	281	/

Workplane:
Height: 0.760 m
Grid: 128 x 64 Points
BoundaryZone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.476, Ceiling / Working Plane: 0.159.

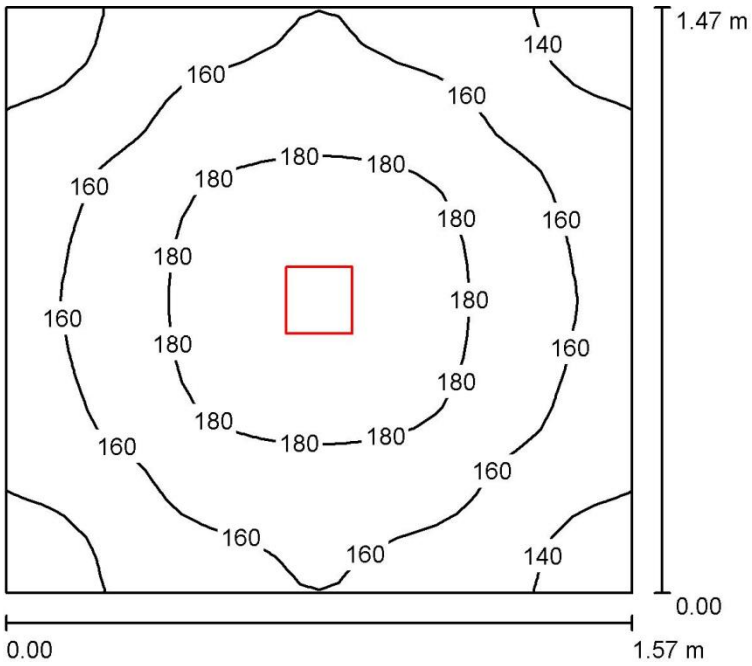
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	16	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			25992	Total: 25968	255.0

Specific connected load: 2.98 W/m² = 1.38 W/m²/100 lx (Ground area: 85.70 m²)

Operator Telephone
Fax e-Mail

Dirty Utility /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:19

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	164	131	191	0.797
Floor	10	100	86	110	0.860
Ceiling	70	75	54	87	0.719
Walls (4)	50	129	40	325	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.947, Ceiling / Working Plane: 0.457.

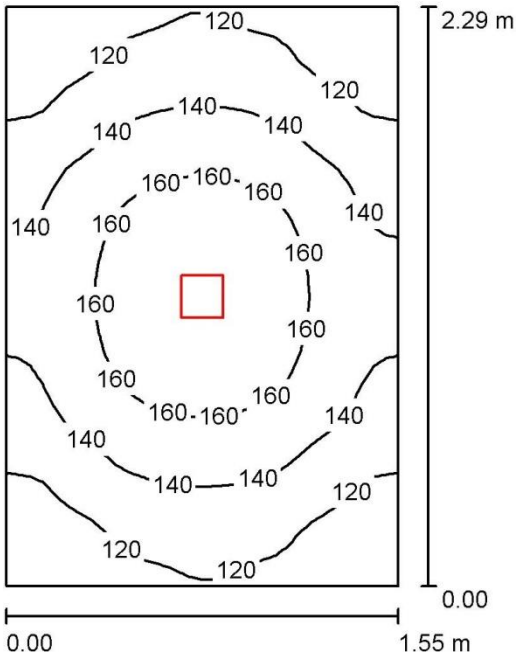
Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 6.88 W/m² = 4.20 W/m²/100 lx (Ground area: 2.32 m²)

Operator Telephone
Fax e-Mail

Clean Utility /Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:30

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	139	100	174	0.719
Floor	10	91	73	104	0.805
Ceiling	70	49	33	58	0.668
Walls (4)	50	94	35	272	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.788, Ceiling / Working Plane: 0.353.

Luminaire Parts List

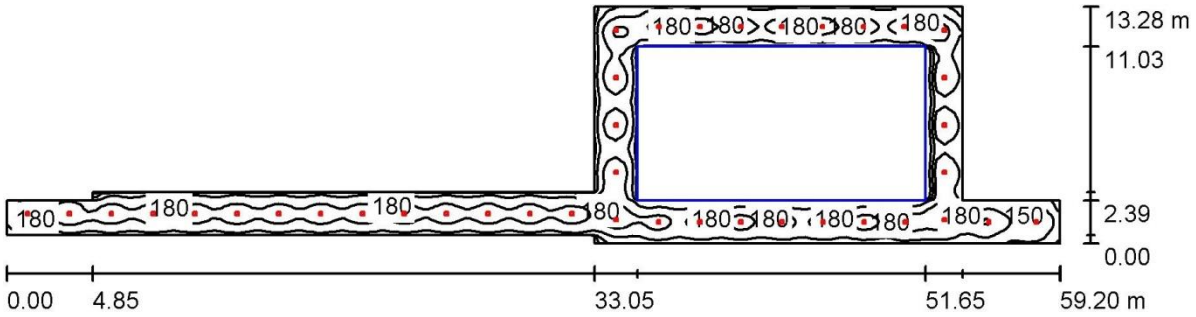
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 4.47 W/m² = 3.21 W/m²/100 lx (Ground area: 3.57 m²)

17.11.2018

Operator Telephone
Fax e-Mail

Lobby and Corridors/Summary



Height of Room: 2.850 m, Mounting Height: 2.850 m, Light lossfactor:0.85 Values in Lux, Scale1:424

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	161	71	208	0.443
Floor	10	83	0.85	163	0.010
Ceiling	70	19	0.44	53	0.024
Walls (14)	50	86	24	284	/

Workplane:
Height: 0.760 m
Grid: 128 x 128Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.578, Ceiling / Working Plane: 0.115.

Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	40	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			64980	Total: 64920	637.6

Specific connected load: 1.75 W/m² = 1.08 W/m²/100 lx (Ground area: 364.75 m²)

Fi

7.4 Fifth floor:

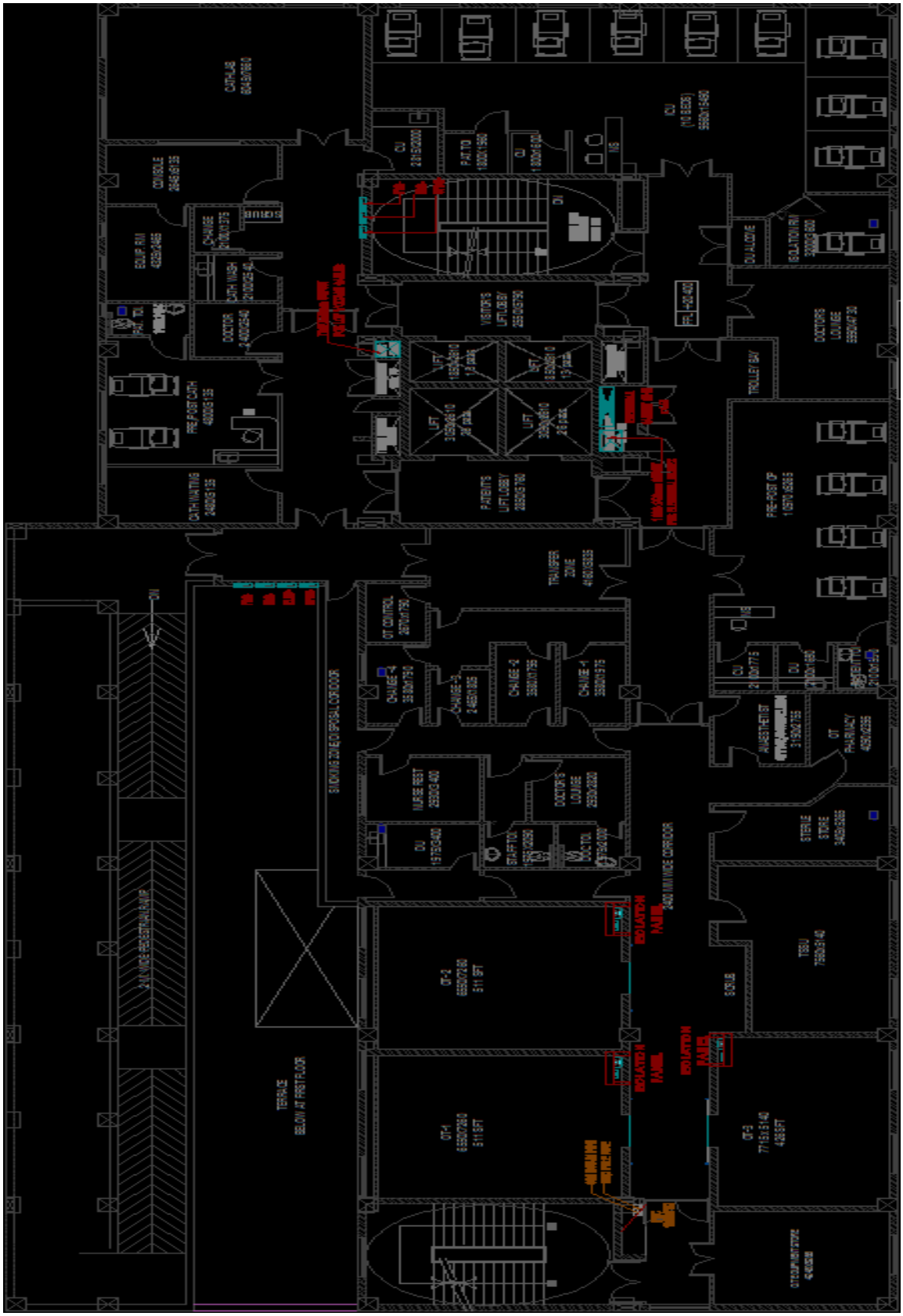


Fig 7: Fifth Floor Plan.

Fi

Table 18: Major area on the Fifth floor.

Location	Luminaire Used	Approx. Eavg achieved (lux)	Approx. Emin achieved (lux)	Approx. Emax achieved (lux)
T.S.S.U.	1. Crompton Greaves Ltd. 03 LCDE-15-CDL	254	107	326
O.T.	1. Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL	537	260	580
I.C.U.	1. Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL	250	29	293
Doctor's Lounge	1.Crompton Greaves Ltd. 03 LCDE-15-CDL	262	194	311

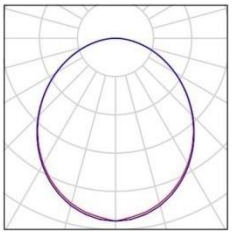
17.11.2018

Operator Telephone
Fax e-Mail

Project 1 / Luminaire parts list

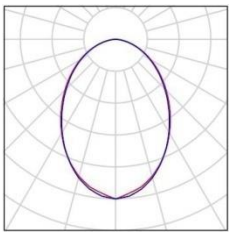
59Pieces Crompton Greaves Ltd. 01LCTLRN-36-FO-CDL
Article No.:01
Luminous flux (Luminaire): 3525 lm Luminous flux (Lamps): 3529 lm Luminaire Wattage: 34.2 W
Luminaire classification according to CIE: 100 CIE flux code: 49 80 95 100100
Fitting: 1 x LCTLRN-36-FO-CDL (Correction Factor 1.000).

See our luminaire catalog for an image of the luminaire.



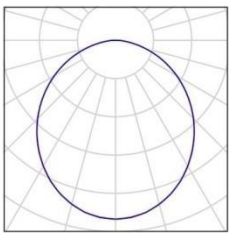
6Pieces Crompton Greaves Ltd. 02 LCDE-12-CDL Article No.:02
Luminous flux (Luminaire): 1339 lm Luminous flux (Lamps): 1335 lm Luminaire Wattage: 12.4 W
Luminaire classification according to CIE: 100 CIE flux code: 55 84 97 100100
Fitting: 1 x LCDE-12-CDL (Correction Factor 1.000).

See our luminaire catalog for an image of the luminaire.



93Pieces Crompton Greaves Ltd. 03 LCDE-15-CDL
Article No.:03
Luminous flux (Luminaire): 1624 lm Luminous flux (Lamps): 1623 lm Luminaire Wattage: 15.9 W
Luminaire classification according to CIE: 100 CIE flux code: 48 80 96 100100
Fitting: 1 x LCDE-15-CDL (Correction Factor 1.000).

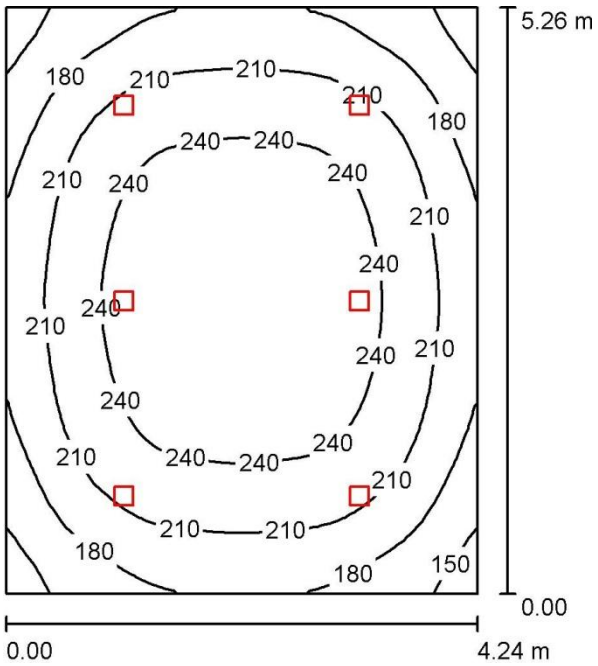
See our luminaire catalog for an image of the luminaire.



17.11.2018

Operator Telephone
Fax e-Mail

O.T. Equipment Store. /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:68

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	215	141	264	0.654
Floor	10	179	128	217	0.712
Ceiling	70	54	41	65	0.769
Walls (4)	50	131	53	247	/

Workplane:
Height: 0.760 m
Grid: 32 x 32Points
Boundary Zone: 0.000 m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.658, Ceiling / Working Plane: 0.249.

Luminaire Parts List

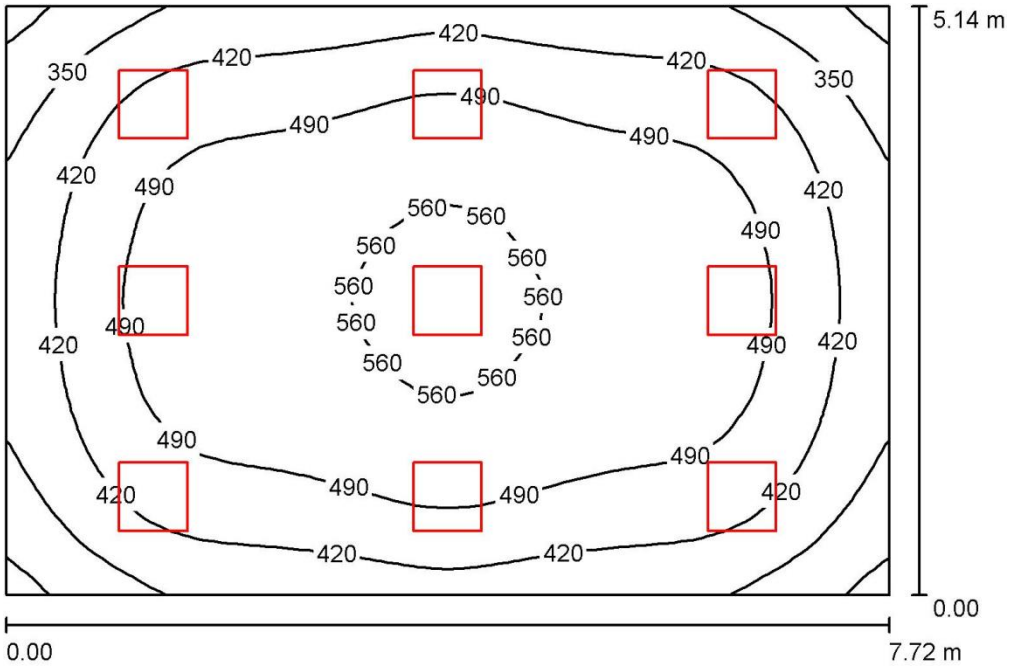
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	6	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			9747	Total: 9738	95.6

Specific connected load: 4.28 W/m² = 1.99 W/m²/100 lx (Ground area: 22.34 m²)

17.11.2018

Operator Telephone
Fax e-Mail

O.T.3 /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:66

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	500	260	580	0.564
Floor	10	401	265	495	0.660
Ceiling	70	96	74	110	0.777
Walls (4)	50	258	92	529	/

Workplane:
Height: 0.760 m
Grid: 32 x 32Points
Boundary Zone: 0.000 m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.594, Ceiling / Working Plane: 0.207.

Luminaire Parts List

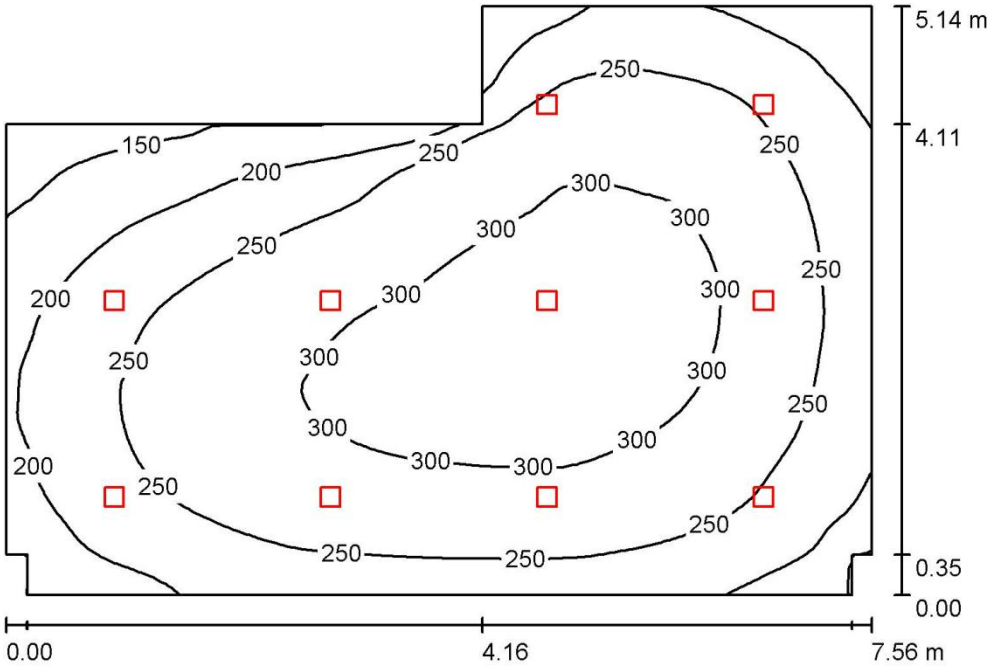
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	9	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
Total:			31723	Total: 31765	307.6

Specific connected load: 7.76 W/m² = 1.68 W/m²/100 lx (Ground area: 39.64 m²)

17.11.2018

Operator Telephone
Fax e-Mail

Theatre Sterile Services Unit /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:66

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	254	107	326	0.421
Floor	10	217	120	274	0.554
Ceiling	70	58	36	113	0.620
Walls (10)	50	147	49	499	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.618, Ceiling / Working Plane: 0.227.

Luminaire Parts List

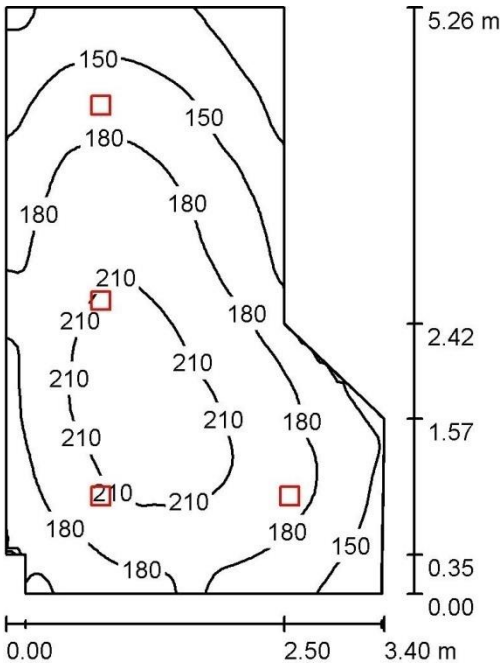
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	10	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			16245	Total: 16230	159.4

Specific connected load: 4.63 W/m² = 1.82 W/m²/100 lx (Ground area: 34.45 m²)

17.11.2018

Operator Telephone
Fax e-Mail

Sterile Store /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:68

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	177	93	225	0.523
Floor	10	142	89	173	0.624
Ceiling	70	53	33	68	0.630
Walls (8)	50	116	43	261	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.727, Ceiling / Working Plane: 0.298.

Luminaire Parts List

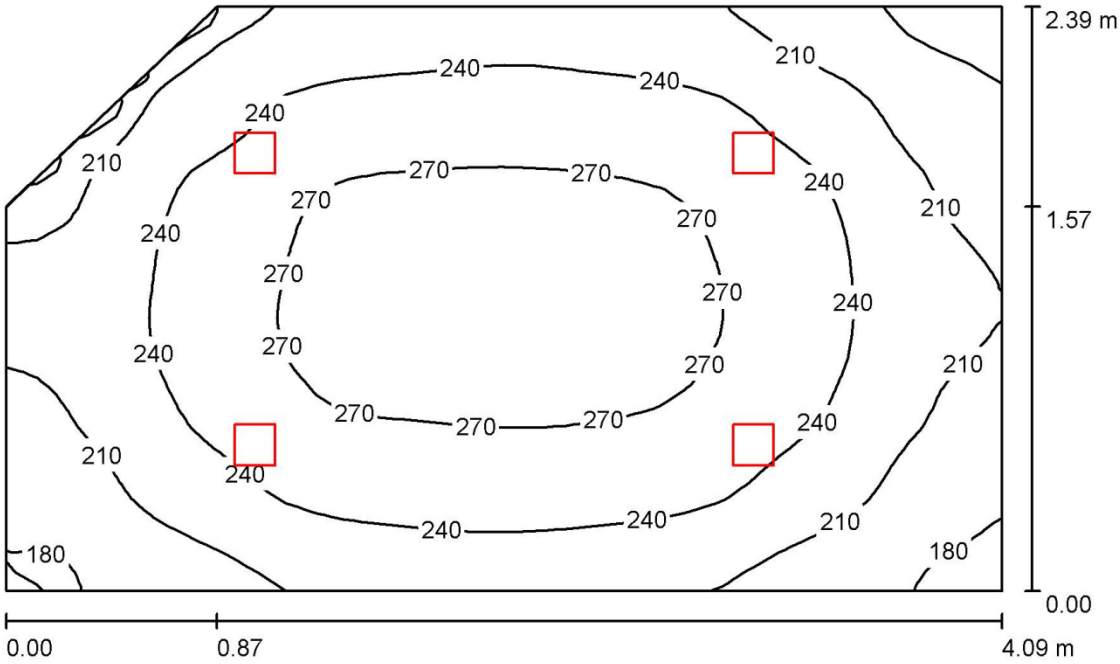
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	4	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			6498	Total: 6492	63.8

Specific connected load: 4.28 W/m² = 2.41 W/m²/100 lx (Ground area: 14.89 m²)

17.11.2018

Operator Telephone
Fax e-Mail

OT Pharmacy /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:31

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	258	165	281	0.694
Floor	10	183	143	212	0.783
Ceiling	70	87	59	147	0.677
Walls (5)	50	173	72	569	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.820, Ceiling / Working Plane: 0.366.

Luminaire Parts List

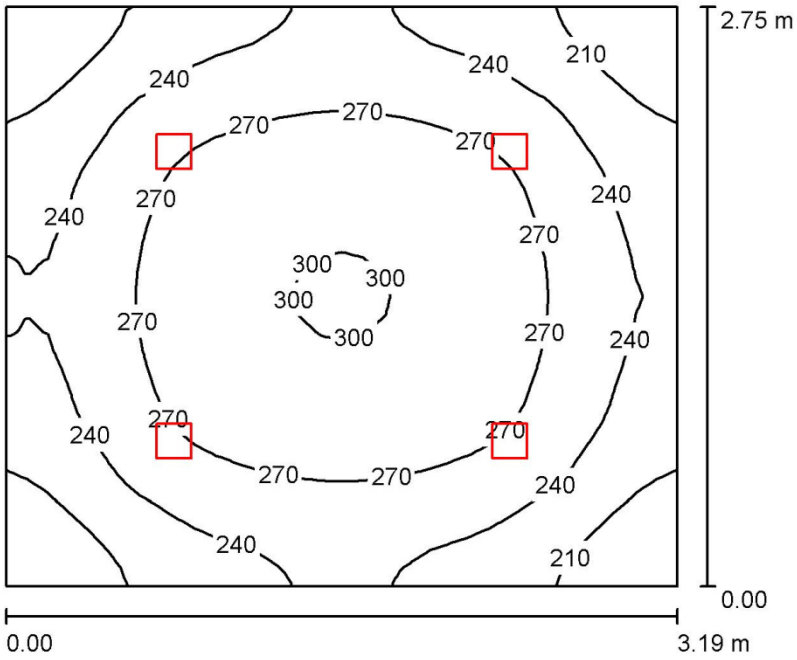
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	4	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			6498	Total: 6492	63.8

Specific connected load: 6.76 W/m² = 2.84 W/m²/100 lx (Ground area: 9.43 m²)

17.11.2018

Operator Telephone
Fax e-Mail

Anesthetist Office/counseling /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:36

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	253	186	302	0.733
Floor	10	193	153	221	0.790
Ceiling	70	91	65	104	0.718
Walls (4)	50	182	79	402	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.812, Ceiling / Working Plane: 0.359.

Luminaire Parts List

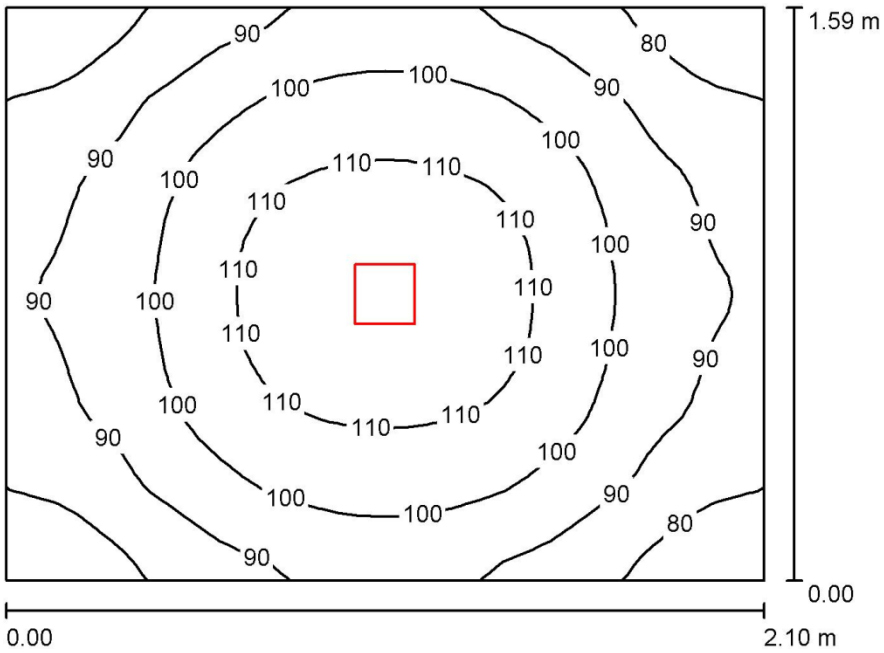
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	4	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			6498	Total: 6492	63.8

Specific connected load: 7.26 W/m² = 2.87 W/m²/100 lx (Ground area: 8.78 m²)

17.11.2018

Operator Telephone
Fax e-Mail

Patients Toilet /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:21

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	96	74	116	0.771
Floor	10	66	55	75	0.838
Ceiling	70	39	26	45	0.671
Walls (4)	50	70	24	198	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.841, Ceiling / Working Plane: 0.406.

Luminaire Parts List

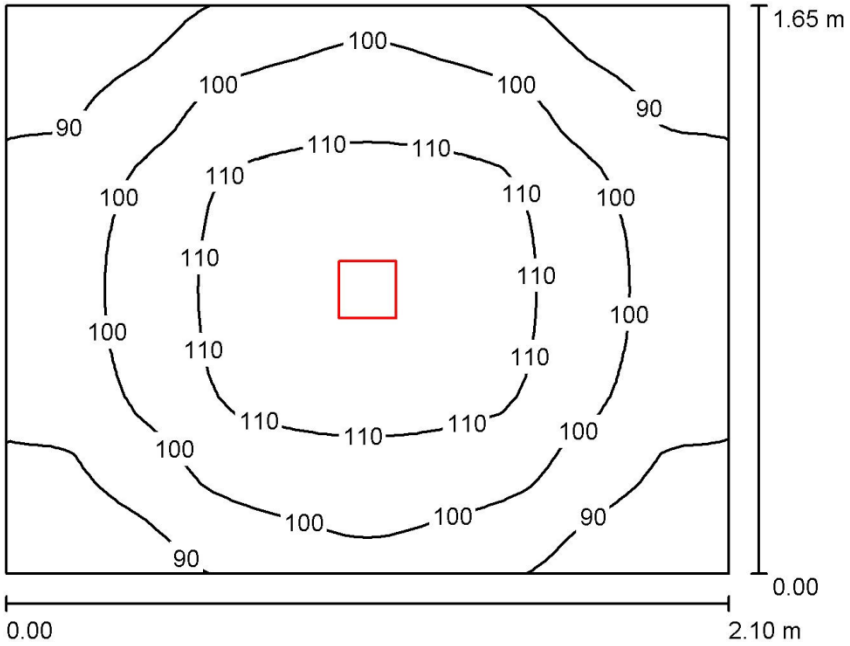
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 3.70 W/m² = 3.84 W/m²/100 lx (Ground area: 3.34 m²)

17.11.2018

Operator Telephone
Fax e-Mail

Dirty Utility /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:22

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	100	80	116	0.796
Floor	10	68	58	75	0.858
Ceiling	70	50	35	58	0.687
Walls (4)	50	86	26	249	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.996, Ceiling / Working Plane: 0.502.

Luminaire Parts List

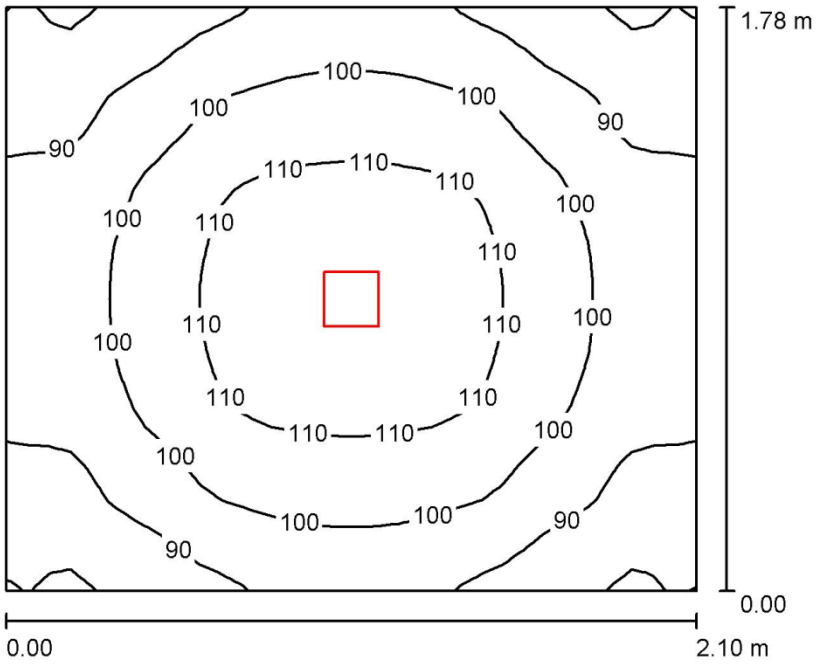
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 4.60 W/m² = 4.58 W/m²/100 lx (Ground area: 3.47 m²)

17.11.2018

Operator Telephone
Fax e-Mail

Clean Utility /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:23

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	99	78	115	0.790
Floor	10	67	57	74	0.852
Ceiling	70	47	32	54	0.692
Walls (4)	50	82	26	218	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.968, Ceiling / Working Plane: 0.474.

Luminaire Parts List

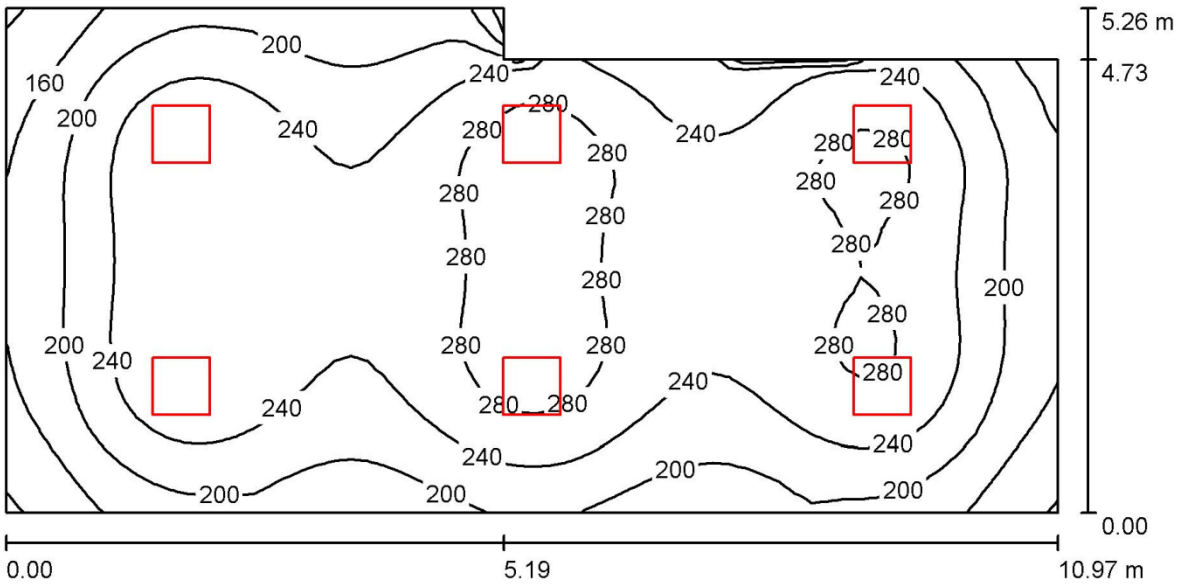
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			1624	Total: 1623	15.9

Specific connected load: 4.28 W/m² = 4.33 W/m²/100 lx (Ground area: 3.73 m²)

17.11.2018

Operator Telephone
Fax e-Mail

Pre-Post. OT /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:79

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	251	116	307	0.494
Floor	10	207	96	254	0.463
Ceiling	70	45	28	75	0.628
Walls (6)	50	125	36	533	/

Workplane:
Height: 0.760 m
Grid: 64 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.556, Ceiling / Working Plane: 0.192.

Luminaire Parts List

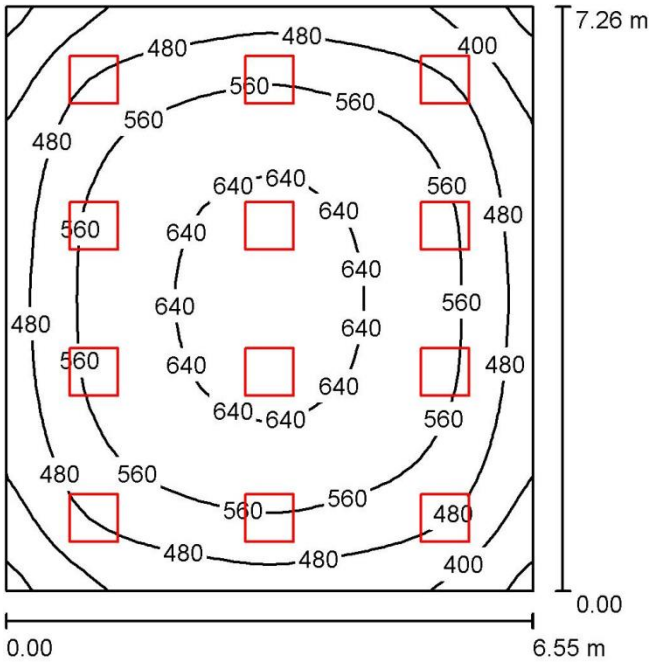
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	6	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
Total:			21149	Total: 21176	205.1

Specific connected load: 3.75 W/m² = 1.59 W/m²/100 lx (Ground area: 54.63 m²)

17.11.2018

Operator Telephone
Fax e-Mail

O.T. No. 1 /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:94

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	537	303	669	0.563
Floor	10	473	309	588	0.653
Ceiling	70	106	88	137	0.829
Walls (4)	50	295	108	515	/

Workplane:
Height: 0.760 m
Grid: 32 x 32Points
Boundary Zone: 0.000 m

UGR Lengthways- Across to luminaire axis
LeftWall 18 18
LowerWall 18 18
(CIE, SHR = 0.25.)

Illuminance Quotient (according to LG7): Walls / Working Plane: 0.579, Ceiling / Working Plane: 0.198.

Luminaire Parts List

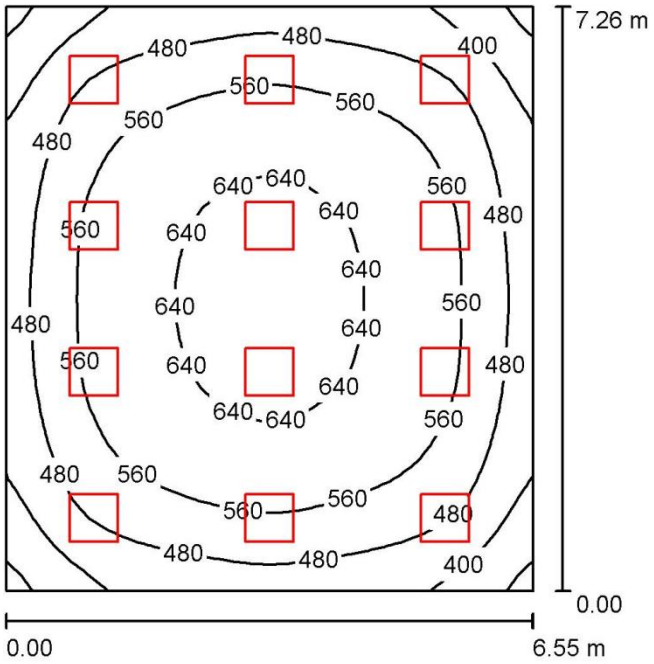
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	12	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
Total:			42297	Total: 42353	410.2

Specific connected load: 8.63 W/m² = 1.61 W/m²/100 lx (Ground area: 47.55 m²)

17.11.2018

Operator Telephone
Fax e-Mail

O.T. No. 2 /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:94

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	537	303	669	0.563
Floor	10	473	309	588	0.653
Ceiling	70	106	88	137	0.829
Walls (4)	50	295	108	515	/

Workplane:
Height: 0.760 m
Grid: 32 x 32Points
Boundary Zone: 0.000 m

UGR Lengthways- Across to luminaire axis
LeftWall 18 18
LowerWall 18 18
(CIE, SHR = 0.25.)

Illuminance Quotient (according to LG7): Walls / Working Plane: 0.579, Ceiling / Working Plane: 0.198.

Luminaire Parts List

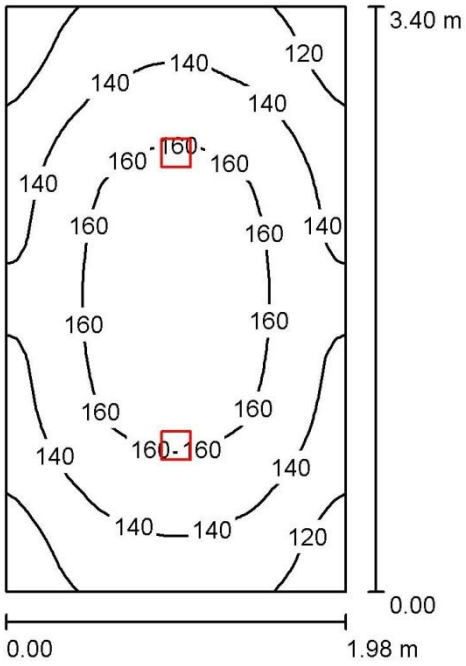
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	12	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
Total:			42297	Total: 42353	410.2

Specific connected load: 8.63 W/m² = 1.61 W/m²/100 lx (Ground area: 47.55 m²)

17.11.2018

Operator Telephone
Fax e-Mail

Dirty Utility. /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:44

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	145	108	174	0.744
Floor	10	107	85	122	0.796
Ceiling	70	55	40	67	0.729
Walls (4)	50	108	41	249	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.843, Ceiling / Working Plane: 0.381.

Luminaire Parts List

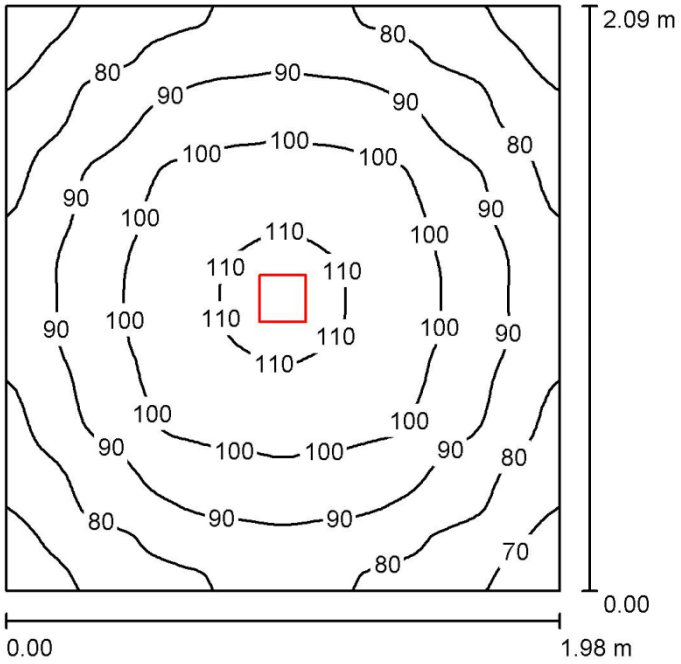
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	2	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			3249	Total: 3246	31.9

Specific connected load: 4.75 W/m² = 3.27 W/m²/100 lx (Ground area: 6.71 m²)

17.11.2018

Operator Telephone
Fax e-Mail

Staff Toilet /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:27

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	91	66	112	0.728
Floor	10	64	51	73	0.804
Ceiling	70	32	22	36	0.700
Walls (4)	50	61	25	134	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.765, Ceiling / Working Plane: 0.348.

Luminaire Parts List

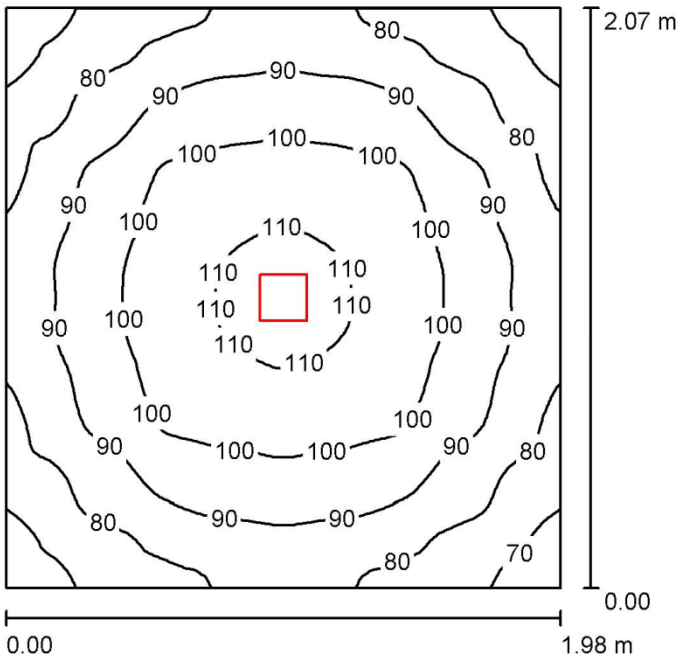
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 3.00 W/m² = 3.30 W/m²/100 lx (Ground area: 4.12 m²)

17.11.2018

Operator Telephone
Fax e-Mail

Doctors Toilet /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:27

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	91	67	113	0.730
Floor	10	64	51	73	0.803
Ceiling	70	32	22	36	0.676
Walls (4)	50	62	25	134	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.767, Ceiling / Working Plane: 0.350.

Luminaire Parts List

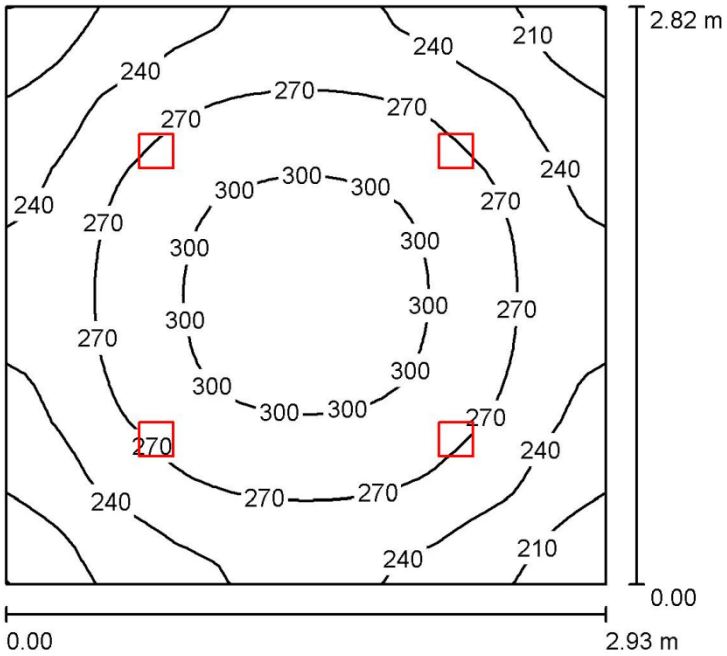
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	1	Crompton Greaves Ltd. 02 LCDE-12-CDL (1.000)	1339	1335	12.4
Total:			1339	Total: 1335	12.4

Specific connected load: 3.03 W/m² = 3.32 W/m²/100 lx (Ground area: 4.08 m²)

17.11.2018

Operator Telephone
Fax e-Mail

Doctors Lounge /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:37

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	262	194	311	0.740
Floor	10	198	157	228	0.793
Ceiling	70	97	68	110	0.706
Walls (4)	50	191	82	399	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.829, Ceiling / Working Plane: 0.369.

Luminaire Parts List

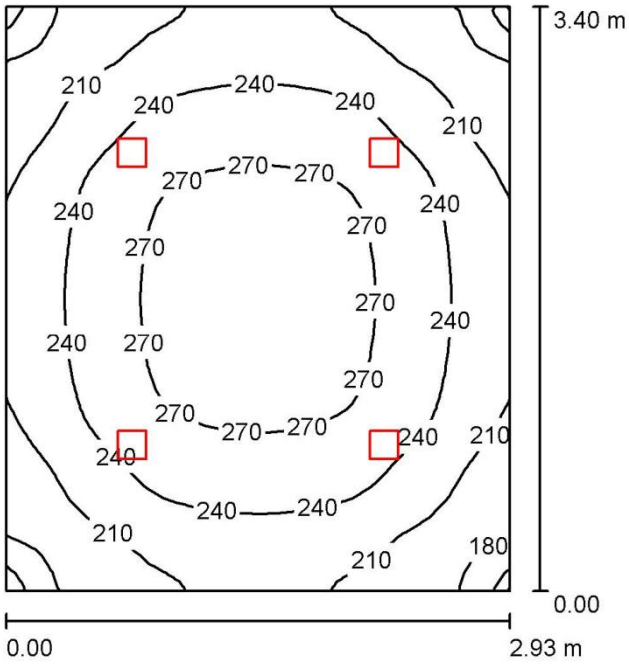
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	4	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			6498	Total: 6492	63.8

Specific connected load: 7.71 W/m² = 2.95 W/m²/100 lx (Ground area: 8.26 m²)

17.11.2018

Operator Telephone
Fax e-Mail

Nurse Rest /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:44

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	237	173	284	0.729
Floor	10	183	142	213	0.775
Ceiling	70	80	57	91	0.717
Walls (4)	50	166	75	356	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.786, Ceiling / Working Plane: 0.337.

Luminaire Parts List

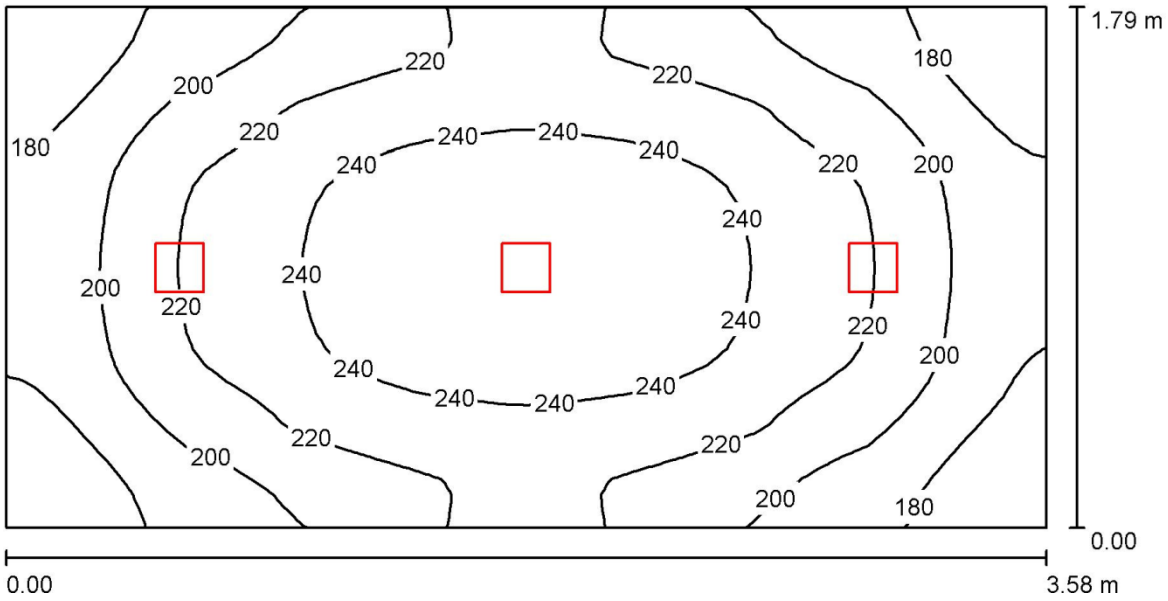
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	4	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			6498	Total: 6492	63.8

Specific connected load: 6.40 W/m² = 2.70 W/m²/100 lx (Ground area: 9.95 m²)

17.11.2018

Operator Telephone
Fax e-Mail

Changing Room No. 1 /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:26

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	215	163	254	0.757
Floor	10	157	126	178	0.805
Ceiling	70	89	63	100	0.711
Walls (4)	50	165	58	484	/

Workplane:
Height: 0.760 m
Grid: 64 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.883, Ceiling / Working Plane: 0.415.

Luminaire Parts List

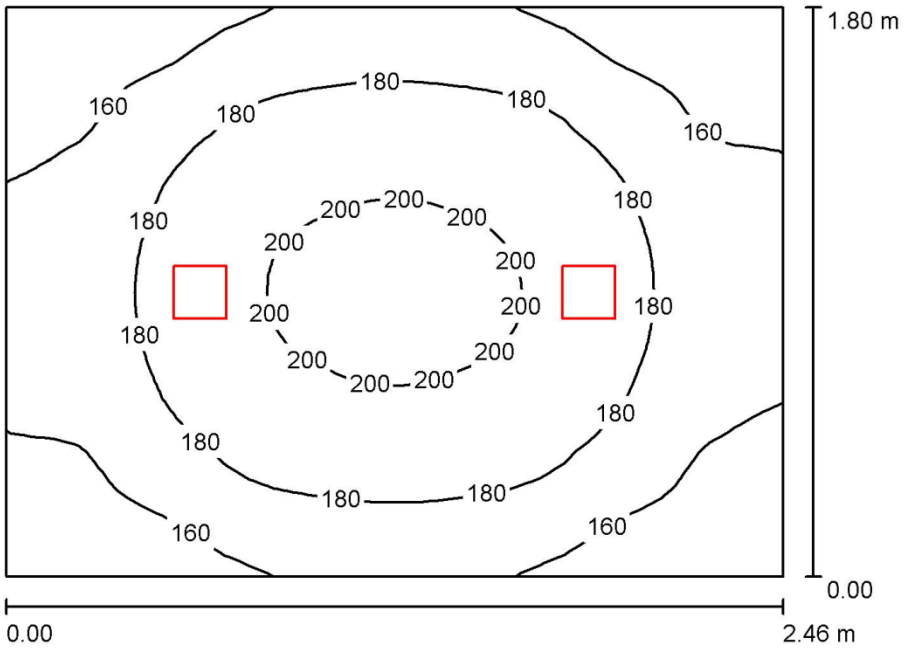
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	3	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			4873	Total: 4869	47.8

Specific connected load: 7.47 W/m² = 3.48 W/m²/100 lx (Ground area: 6.40 m²)

17.11.2018

Operator Telephone
Fax e-Mail

Changing Room No. 2 /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:24

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	176	139	203	0.792
Floor	10	123	105	137	0.852
Ceiling	70	84	59	99	0.697
Walls (4)	50	146	48	452	/

Workplane:
Height: 0.760 m
Grid: 32 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.965, Ceiling / Working Plane: 0.478.

Luminaire Parts List

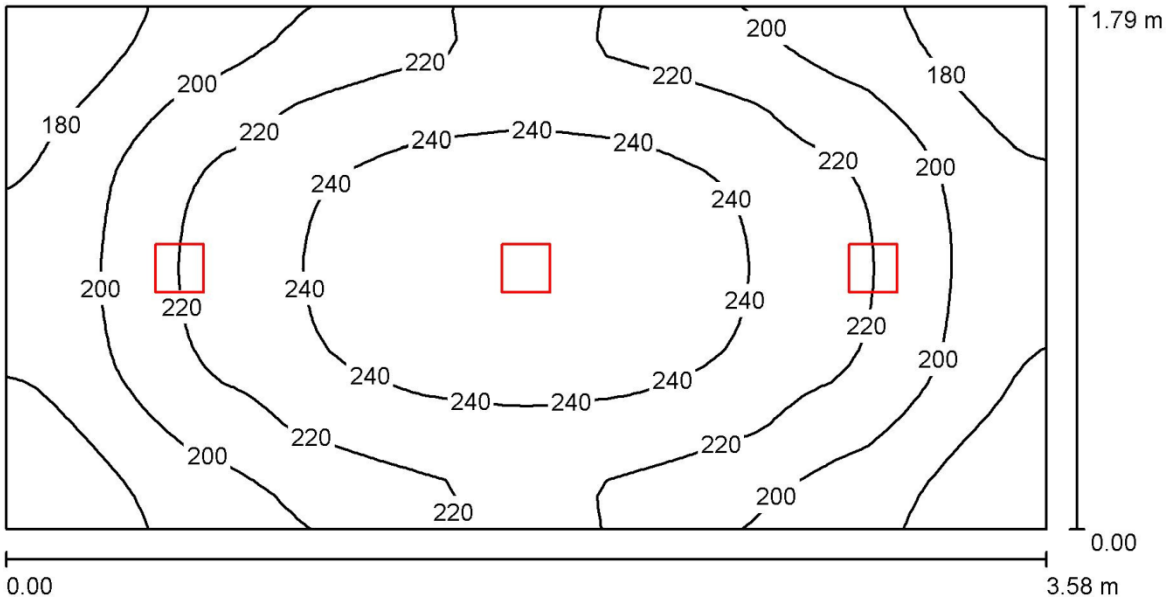
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	2	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			3249	Total: 3246	31.9

Specific connected load: 7.18 W/m² = 4.09 W/m²/100 lx (Ground area: 4.44 m²)

17.11.2018

Operator Telephone
Fax e-Mail

Changing Room No. 3 /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:26

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	214	162	254	0.757
Floor	10	157	126	179	0.802
Ceiling	70	89	63	100	0.711
Walls (4)	50	165	58	484	/

Workplane:
Height: 0.760 m
Grid: 64 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.883, Ceiling / Working Plane: 0.414.

Luminaire Parts List

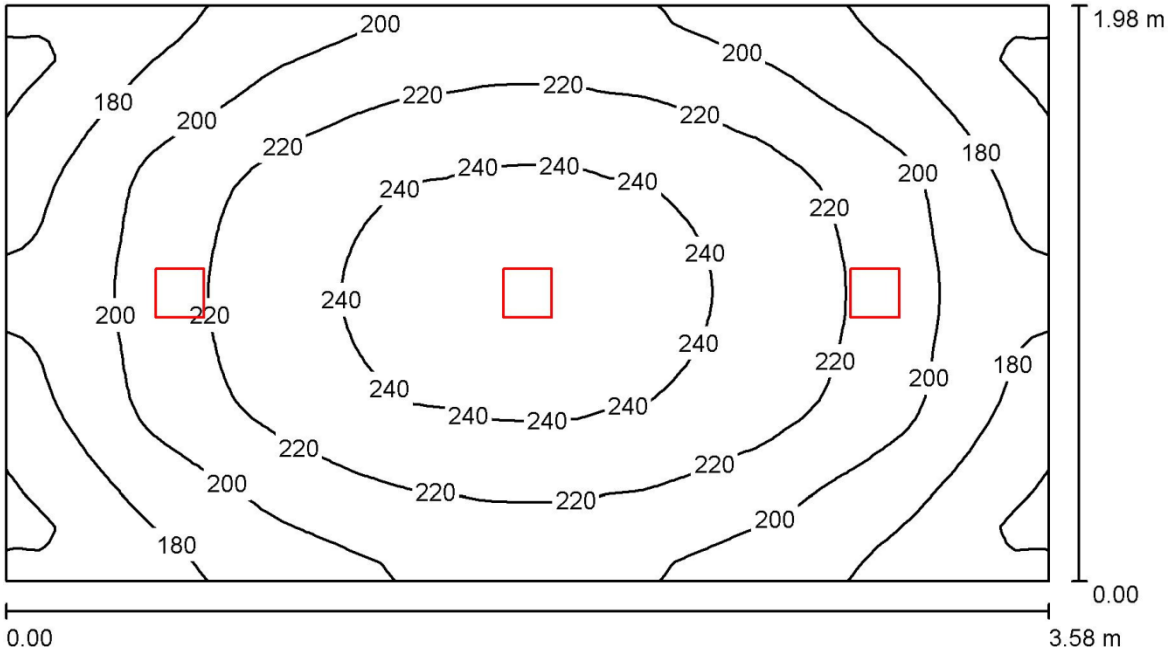
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	3	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			4873	Total: 4869	47.8

Specific connected load: 7.45 W/m² = 3.47 W/m²/100 lx (Ground area: 6.42 m²)

17.11.2018

Operator Telephone
Fax e-Mail

Changing Room No. 4 /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:26

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	209	156	249	0.746
Floor	10	154	123	177	0.798
Ceiling	70	81	55	113	0.685
Walls (4)	50	155	60	476	/

Workplane:
Height: 0.760 m
Grid: 64 x 32 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.846, Ceiling / Working Plane: 0.387.

Luminaire Parts List

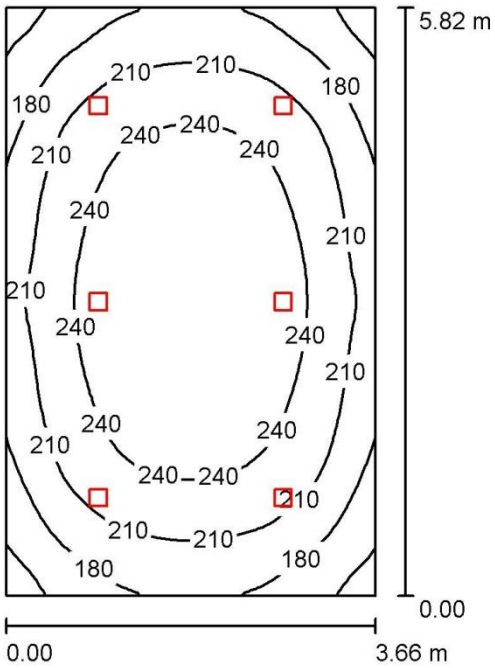
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	3	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			4873	Total: 4869	47.8

Specific connected load: 6.76 W/m² = 3.24 W/m²/100 lx (Ground area: 7.07 m²)

17.11.2018

Operator Telephone
Fax e-Mail

Transfer Zone/Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:75

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	219	133	270	0.610
Floor	10	181	128	220	0.706
Ceiling	70	56	42	66	0.756
Walls (4)	50	135	55	244	/

Workplane:
Height: 0.760 m
Grid: 32 x 32Points
Boundary Zone: 0.000 m

UGR Lengthways- Across to luminaire axis
LeftWall 21 21
LowerWall 23 23
(CIE, SHR = 0.25.)

Illuminance Quotient (according to LG7): Walls / Working Plane: 0.672, Ceiling / Working Plane: 0.257.

Luminaire Parts List

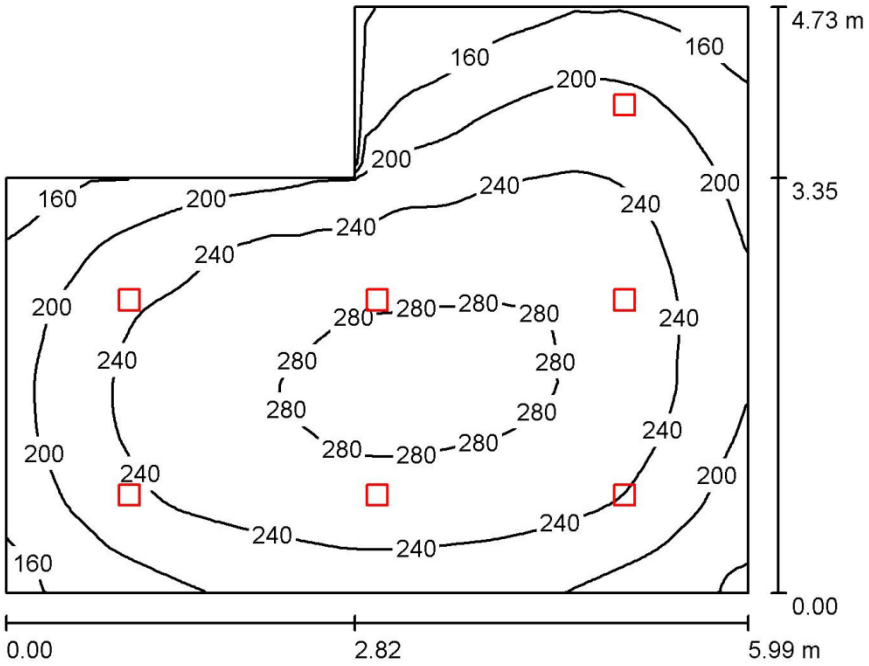
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	6	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			9747	Total: 9738	95.6

Specific connected load: 4.48 W/m² = 2.05 W/m²/100 lx (Ground area: 21.34 m²)

17.11.2018

Operator Telephone
Fax e-Mail

Doctor's lounge /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:61

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	229	118	290	0.513
Floor	10	191	117	237	0.611
Ceiling	70	57	34	80	0.606
Walls (6)	50	136	49	299	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.645, Ceiling / Working Plane: 0.247.

Luminaire Parts List

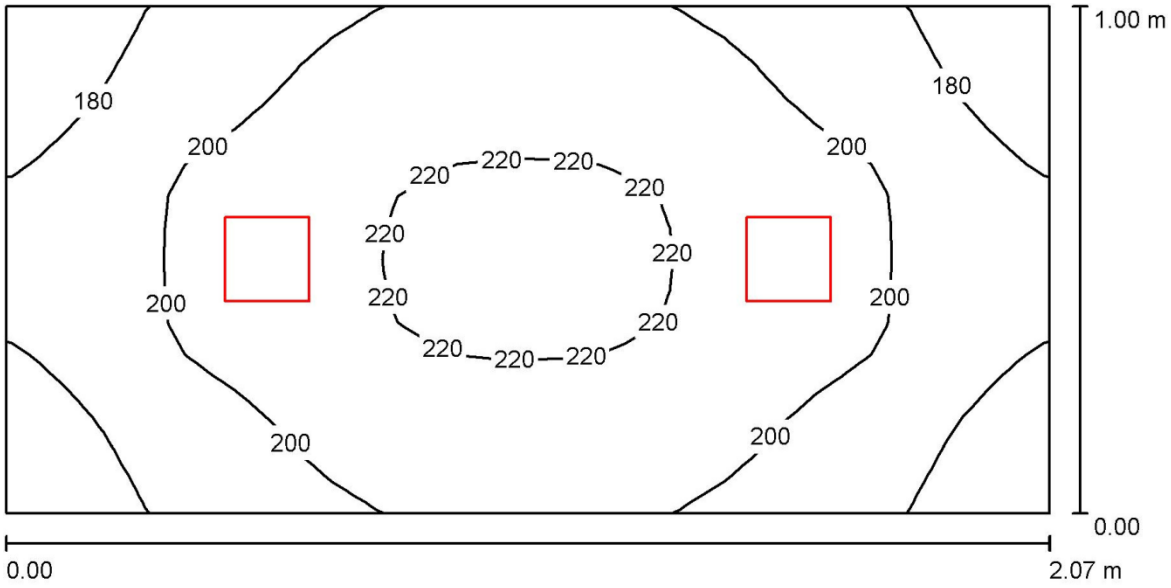
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	7	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			11371	Total: 11361	111.6

Specific connected load: 4.57 W/m² = 1.99 W/m²/100 lx (Ground area: 24.44 m²)

17.11.2018

Operator Telephone
Fax e-Mail

Dual cove /Summary



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:15

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	201	172	224	0.857
Floor	10	131	117	140	0.897
Ceiling	70	176	130	194	0.738
Walls (4)	50	226	41	736	/

Workplane:
Height: 0.760 m
Grid: 32 x 16 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 1.359, Ceiling / Working Plane: 0.875.

Luminaire Parts List

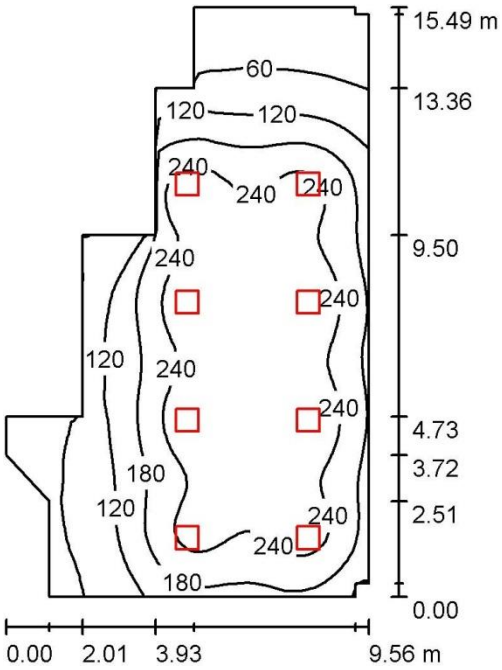
No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	2	Crompton Greaves Ltd. 03 LCDE-15-CDL (1.000)	1624	1623	15.9
Total:			3249	Total: 3246	31.9

Specific connected load: 15.37 W/m² = 7.66 W/m²/100 lx (Ground area: 2.07 m²)

17.11.2018

Operator Telephone
Fax e-Mail

ICU 10 Beds



Height of Room: 3.450 m, Mounting Height: 3.450 m, Light lossfactor:0.85 Values in Lux, Scale1:199

Surface	ρ[%]	E_{av}[lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	250	29	293	0.756
Floor	10	167	38	247	0.226
Ceiling	70	28	13	80	0.474
Walls (16)	50	76	16	443	/

Workplane:
Height: 0.760 m
Grid: 64 x 64 Points
Boundary Zone: 0.000m
Illuminance Quotient (according to LG7): Walls / Working Plane: 0.414, Ceiling / Working Plane: 0.153.

Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	8	Crompton Greaves Ltd. 01 LCTLRN-36-FO-CDL (1.000)	3525	3529	34.2
Total:			28198	Total: 28235	273.4

Specific connected load: 2.51 W/m² = 1.37 W/m²/100 lx (Ground area: 109.04 m²)

Fi

CHAPTER –8: SUMMARY AND CONCLUSION AND FUTURE SCOPE

8.1 Summary and Conclusion:

The lighting design has been made considering the requirements, comfort and energy efficiency as per the guidelines referred in the main body. Also another important thing to consider was the budget allocated for the entire project and modifications were made so as to reduce costs as and where it was required.

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The major features considered are as follows:-

- Replacement with energy efficient lamps for energy saving and operating cost saving.
- Reduce the excess light level to the required level with good uniformity and minimizing glare.
- Good lighting system is related to patients' sleep, mood and pain levels as well as work activity of hospital staff and members.
- Use of simple maintenance lamps with longer life which will improve illumination.

Saving electrical energy has become one of the most important issues these days. The most waste of energy is caused by the inefficient use of the consumer electronics. Particularly, a light accounts for a great part of the total energy consumption. Various light control systems are introduced in current markets, because the installed lighting systems are outdated and energy-inefficient. It has been found that for energy efficient lighting design and usage of energy efficient light source is very important. Thus LED in suitable luminaires are generally used in the project but problem with LED luminaires are its cost and reliability. Research is being conducted and efforts are on so that in the near future LEDs can be proposed as an able alternate for other conventional lighting solutions.

Bringing intelligence into many LED lighting applications may require moving from fixed function LED drivers to microcontroller-based or programmable architectures. For applications that need advanced functionality, using a microcontroller enables many intelligent features such as specialized color mixing, adaptive lighting control and even remote connectivity or wireless connection.

8.2 Future Scope:

Lighting system designed here is controlled by via manual buttons & switches the same can be introduced. As new technology is growing day by day people are working on that for innovation. In smart lighting, android Smartphone or PC with Bluetooth and Wi-Fi for controlling purpose are developed. Smart lighting provides Automatic Load shedding and dimming in peak & non-peak energy demand hours. Smart lighting is one of the easiest ways to save energy where every light point is connected to an intelligent system that delivers high-quality, reliable illumination and sometimes even extraordinary value beyond

illumination to the users. In future, smart lighting will be the key part of Internet of Things (IoT) that brings in the collaborative streaming of real-time data and artificial intelligence but the most striking feature is - it enables consumers to make better decisions thereby saving money. IoT is the concept of combining computers and networks to monitor and control devices to generate, exchange and consume data with minimal human intervention. General Lighting as well as some special lighting system may be controlled by visual light control system instead of radio-frequency controller. So, IoT is a boon and challenge at the same time because integrating systems, getting them to communicate using a standard protocol and providing interoperability across devices.

CHAPTER–9: REFERENCES

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