Building-Unit

Warehouses

Introduction:

"BULDING-UNIT " is a professional system integrator. This looks at the client's requirements and delivers a high-valued customized suite of products and services.

"BUILDING UNIT " as an integrator not sells only, but also provides professional services and consultancy that's required to build the complete turn-key solution.

Integrated selling is a complete process, which begins by understanding the client, understanding the client's industry, the client's particular needs, and also understanding what the particular requirements are for this proposal and what the client is trying to achieve with their business initiatives.

"We don't do anything if the others can do better" is our proven philosophy. This is how we have established ourselves as company for construction and renovations .

For the client, we strive forclient satisfaction, and long term client relationship, .also offering complete value proposition for the project

OUR Customer :

Warehouse project.

After the company achieved continuous successes and significant development, it was necessary to improve the infrastructure and the backbone of any company or institution seeking to the better.

Logistics and Technical Support Department Where to this section of the prominent role from the continuation of success and the pursuit to maintaining the continuous development for which falls under this section from Large responsibilities and sensitive sections are Highly influential positive or negative.

so should be developed permanently To keep abreast of technical progress and its effective and positive solutions that contribute to raising the level of services provided and provide the expenses that can be dispensed with.

The most important logistics facilities available to commercial companies are warehouses, which are essential in any commercial or non-commercial system hence should be developed permanently.

initial study

Warehouse project

The study of your warehouses through the basic points and sensitive as follows:

1. The external structure and the required area.
2. Optimized storage system.
3. Cooling and ventilation system.
4. Energy and Alternative energy sources.
5. Barcode system.
6. Administrative system and internal mechanism of work.
7. Stock movement system.
8. The Saudi Food and Drug Authority.
9. Control system and space the administrative offices.

External structure and required area

After reviewing and checking the spaces currently used for your warehouse, it turns out that there are about 3500 m storage space distributed in two regions. This area does not exceed 40% of the required storage capacity of the branch of MidiServ Riyadh.

After checking the volume of imports and exports to company and the organizational structure of warehouses Show it two separate warehouses which contribute to raising operating costs and weakening the ability to control the workflow in an optimal manner.

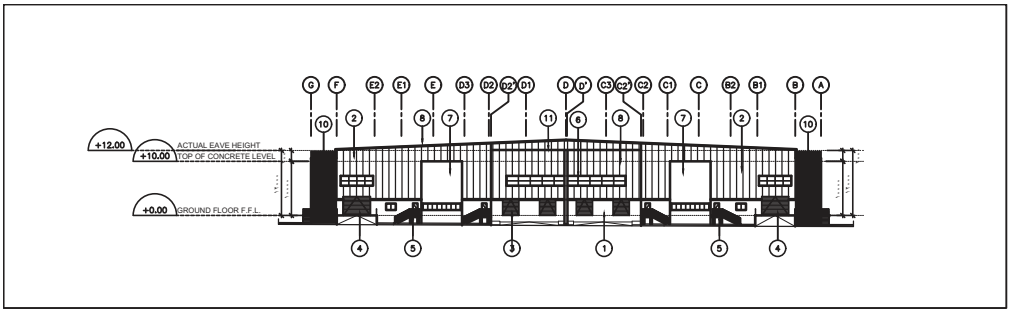
Show us that you need the following:

1. Warehouse with a total area not exceeding 8000 m.
2. It shall be a height not less than 15 m.
3. A separate storage area not less than 5000 m.
4. Administrative area not less than 400 m distributed at each entrance.
5. Separate and isolated preparation area.
6. Separate areas to loading and unloading.

An engineering team distributed these areas as shown in the following diagram:

One of the most successful choices was Logistic Park Warehouse, which provides convenient services and spaces and provides systems and technical support to facilitate the work.

External structure



1 A024 NORTH ELEVATION
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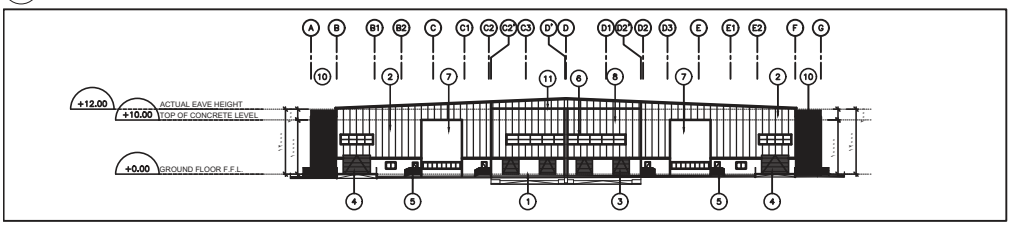
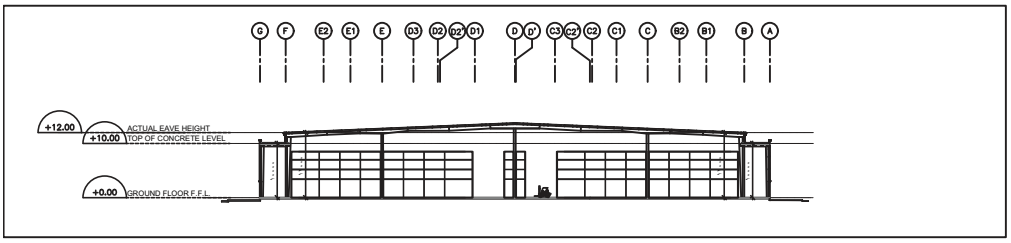


2 A024 SOUTH ELEVATION
1:500



3 A024 BUILDING SECTION
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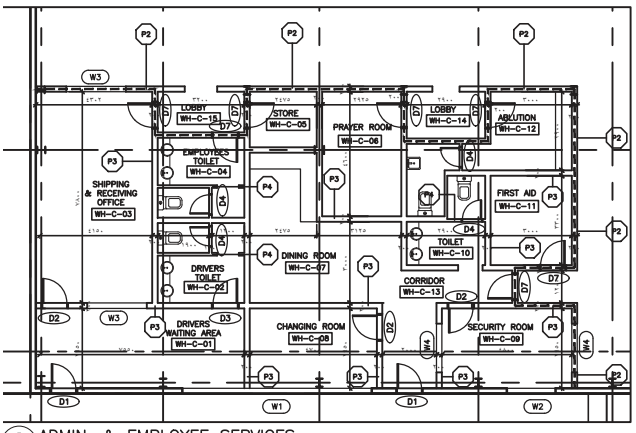
4 A024 PERSPECTIVE
NTS



5 A024 ADMIN. & EMPLOYEE SERVICES
1:100

6 A024 STORAGE AND RACKING SYSTEM
NTS

storage system

Proposed storage system

After Full study for yours requirements, we found that you need:

1. The classic storage system with volume of 3500 m2 *4.

2.The flooring storage system, which is the perfect system for the small materials and parts 3 * 3 *96 m.

3. Separate storage rooms for precious materials with an area of 3 m * 32.

4. Cooling and freezing rooms with an area of 3 * 80 meters

5. An automatic transmission and distribution system, which provides a lot of energy, time and manpower.

6. A separate area for expired materials with an area of 3 * 30.5 m

7. A separate area for returned materials with an area of 3 * 36.3 m

8. A special area to barcode system distributed at each entrance to the warehouse area of 32.8 m

9. Areas of wrapping & packing distributed on each entrance area of 36 m

10. An electric charging area for forklifts with 78.7 m parking spaces

11. Areas of large orders and storage containers similar to the orders of the Ministry of Health area 215 m

D1

D2

D3

MECALUX

FOR THE INSTALLATION OF

CONVENTIONAL PALLET RACKING

1. Safety

1.1 Steel Rack Calculations

1.1.1 Regulations

In 2009, the European standard **EN 15512: "Steel static storage systems – Adjustable pallet racking systems – Principles for structural design"** was published.

This standard specifies the structural design requirements applicable to all types of conventional pallet rack systems fabricated from steel and intended for the storage of static load units.

For Mecalux, the application of the European standard EN 15512 involved undertaking numerous tests in specialised laboratories including:

- Strength characterisation of different elements composing the racking structure.
- Determine the behaviour of the upright connection with the floor in order to obtain the bending rigidity of the connection and the maximum bending moment of the upright, for different racking loads (axial force on the upright). The values obtained were considered in the calculation of the installation. This type of testing must be performed for each upright model.
- Behaviour characterisation of connections between the upright and the beam. The relevant tests are necessary, because the beams are connected to the frame with connectors, which are fitted into the frame slots with hooks. Such tests must be carried out for all possible combinations of uprights and beams.

Floor connection test

Connect*ors bending test*

Compression test

Moreover, the application of the European EN 15512 standard implies the use of advanced software developed especially for the structural calculation of racks.

1.1.2 Calculation method

The structural calculation has been made using a programme created specifically to calculate adjustable pallet racking, based on Ansys (finite elements), and making a second-order calculation with the necessary semi-rigidities at the joints. This calculation takes into account the different tests to determine the attributes of the structural elements and the joints between them.

1.1.3 Forces considered in the calculation

The forces taken into consideration in the calculation are the following:

- Dead weight of the rack
- Stored load
- Additional loads due to stored load or assembly tolerances
- Loads transmitted by lifting devices

Seismic action was not taken into account in the rack calculation.

1.2 Tolerances, deformations and clearances

1.2.1 Standard

In October 2008, the European standard EN 15620 was published. It specifies the tolerances, deformations and clearances applicable in the production, assembly and installation of pallet racking including the interaction with the floor. This standard is limited to adjustable, single-depth pallet racking operated with forklifts or cranes, and stipulates that the supplier of the industrial trucks (forklift trucks, stacker cranes etc.) is responsible for these, while the client or user must guarantee that the tolerances, deformations and clearances are appropriate for the safe operation of the entire system.

1.2.2 Tolerances

The tolerances of the unloaded racking correspond to the European standard EN 15620.

1.2.3 Deformations

The deformations and the maximum admissible deflections correspond to the European standard EN 15620:

Y-axis:

- aximum deflection of a beam: L/200 where L is the length of the beam.
- Maximum deflection of a cantilever: L/100 where L is the length of the cantilever.

X- and Z-axes:

- Lateral deformation or admissible shift of the racking uprights: racking height / 200.

1.2.4 Clearances

The clearances of the racking system indicated in the enclosed project correspond to the European standard EN-15620.

1.3 Interaction with the floor

The safety of the structure will depend largely on the characteristics of the floor on which th system is installed.

According to the European standard EN 15629, the client is to ensure that the floor is appropriate for system assembly. The client is requested to check that the floor can carry the load of the racking, taking into account the distribution of the racks shown on the enclosed plan and the load per footplate specified in the section “Layout of the racks”.

According to the data provided by the Client, the floor has the following characteristics HORMIGON C20/25

Mecalux assumes that the concrete is not cracked.

The plane geometry of the floor must comply with the requirements of the European standard EN 15620.

The EN 15620 standard determines that in installations where class 400 forklifts (counterbalance forklifts or forklifts with extendable masts) are used, floor irregularities have to be within ±15mm range relative to a reference point.

The client confirms that requirements concerning the floor indicated in the offer are fulfilled.

1.4 Safety information

1.4.1 General information

The daily operation of the warehouse involves occupational hazards due to the continued use of the warehouse installations, for example due to collisions of forklifts with the racking, due to falling goods etc.

Several European standards refer to measures to be taken to minimise risks, especially Euronorms EN 15512, EN 15620, EN 15629 and EN 15635.

Euronorms are a standard recommendation. Therefore, Mecalux, as a leader in the field, recommends their application.

The following are the relevant aspects of these Euronorms, designed to minimise risks:

- Designation of a person responsible for the security of the storage equipment, known as PRSES.
- Prohibition of modifying the racks without them being recalculated by the company who designed these racks.
- Regular inspection of the racks by a planning based on prevention criteria.
- . Protection against falling goods in passageway tunnels.
- Dimensioning the width in the installation circulation aisles.
- Tolerances and clearances.

- Measures for signalling, maintenance, lighting and cleaning.
- Warnings and, in some countries, prohibition of re-using reconstituted racks.

In addition, in different countries there are specific rules on safety that recommend providing intermediate crossing steps for emergency exits.

Therefore, MECALUX provides various components and/or safety equipment in order to ensure the necessary safety of the installation.

However, MECALUX informs you that the application of the Euronorms by the clients is at their sole discretion, competition and responsibility, regardless of their legal obligation to implement the regulations on the prevention of occupational hazards.

Mecalux supplies its clients with user manuals (operation, handling, control and maintenance of the racking). The client is responsible for the supervision, the operation and the state of the installation and also has the duty of ensuring that the persons responsible and warehouse users are acquainted with the contents of the manual.

Moreover, the client must meet the specific norms for this type of installation as applicable in the relevant country.

1.4.2 Safety elements

MECALUX offers the following additional safety elements as optionals:

- Upright protectors

- Frame protectors

- Upright reinforcers

- Container supports

- Pallet supports

- Barrel supports

- Drum supports

- Protective mesh

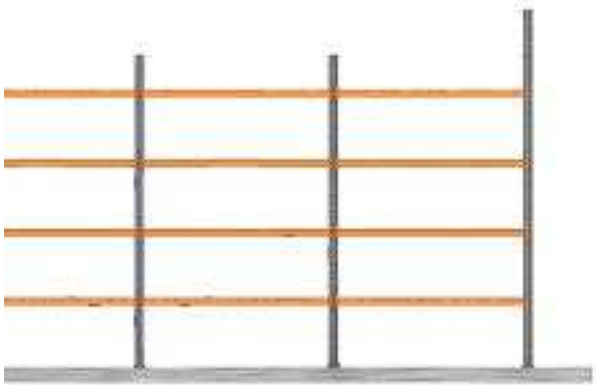
- Safety passageways

- Perimetral safety enclosures

- Safety profiles

- Positioning profiles

- Lateral frame prolongations



- Portal unions

- Guidance systems for forklift trucks

Furthermore, Arm Sets are available to place on the headers of the racks when working with trilateral / bilateral forklift trucks, as long as the client requests them.

The client, when designating the company to design the warehouse, should analyse everything he/she considers necessary, as directed by the aforementioned Euronoms, and then ask for all those components and/or accessories that the client wishes to include in the quote.

1.5 Fire safety regulation in industrial establishments

The installation reflected herein is classified as a storage system according to EN 15878 "Steel static storage Systems. Terms and Definitions" and therefore it does not require a specific treatment against fire.

However, its classification is the following:

- The steel used is classified as A1 according to EN 13501. This classification corresponds with a non-combustible material (maximum degree).
- The paints used are classified as Bs1,d0 (blue RAL 5003) and Bs2,d0 (orange RAL 2001) according to EN 13501. This classification corresponds with combustible, but not flammable materials.
- Zinc plated finish is classified as A1 according to EN 13501. This classification corresponds with a non-combustible material (maximum degree)

The fire prevention plan of the project proposed by the client should include, if their use is required, the protective measures of this installation, escape routes or other aspects to be supplied as part of the design. The client must also ensure that the rack distribution is compatible with this plan.

2. Quality

Throughout its history, MECALUX has continuously invested in human resources and technical means in order to optimise materials, products, processes and systems. We have done this so as to satisfy our clients' expectations and give them a better service, with a product that fulfils the most stringent demands of the market.

2.1 ISO 9001

The Management System employed by MECALUX in its designs, manufacturing process, organisation, commercial and technical work, assembly and after-sales service has been assessed and certified since 1994 by BUREAU VERITAS CERTIFICATIONS, which controls and supervises the correct application of the UNE-EN-ISO-9001 norm at all times.

2.2 TÜV

In October 2000, the internationally-recognised German company, TÜV Product Service GMBH, awarded this certificate to MECALUX. The certificate was given after auditing and testing the material handling instructions, and the design, production and assembly processes in accordance with the ZH 1/428 standard.
This certificate is above all, a guarantee of quality with maximum priority given to safety considerations.

2.3 ISO 14001

We are aware of the environment and the effects the work carried out at our plants has upon it. Our desire to respect the environment and to satisfy the environmental awareness of our clients has led us to implement an Environmental Management System, in accordance with the UNE –EN-ISO-14001 norm.

BUREAU VERITAS CERTIFICATIONS assesses our actions and has certified that our organisational, productive and technical work is planned, managed and controlled, and complies with the established standards at all times.

2.4 CE

European regulation No 305/2011 lays down "The harmonised conditions for the marketing of construction products". From 1st July 2014, all steel components manufactured to be permanently incorporated into construction sites within the European Union must comply with these regulations, and must be marked "CE".

To meet the requirements of this legislation, manufacturers must install a production control system within the factory and must have carried out initial product testing, which together guarantee compliance with the EN-1090 norm.

In July 2013, Mecalux was awarded this certificate by BUREAU VERITAS CERTIFICATIONS, confirming that all steel components fulfil these requirements.

3. Guarantee

Each of the above certificates ensures compliance with strict quality controls of materials, manufacturing processes and design.

All of this, together with the assurance of dealing with one of the leading European companies in the sector, acts as a guarantee to our clients that each installation is carried out following the strictest European norms and regulations.

An installation which complies with these Certificates is a full guarantee of safety.

This fact is highly valued by insurance companies and legal authorities, if a question of liability in work safety arises.

In addition to the above, MECALUX guarantees the installation for a **period of 5 years**, covering any defect in manufacturing and assembly. This guarantee does not cover neglectful usage or any exceptional circumstances not mentioned in this quote.

MECALUX has a **Post-sales** service. The service is provided at the client's request. It comprises: checking the installations where the significant flow of lifting machinery could involve damage to the structural elements, checking the correct state of the latter, and verifying that the safety usage parameters are respected.

4. Characteristics of the installation

This installation is comprised of Conventional Pallet Racking, according to the requirements and specifications provided by the client and whose distribution is detailed in the attached layout.

4.1 Load Unit

Load unit for which the project was developed, pallet.

	TYPE1	TYPE2	TYPE3	TYPE4
A-mm	800	900	1200	
B- mm	1200	1100	1200	
C- mm	1500	1500	1500	
D- mm	1200	1100	1200	
E- mm	1200	900	1200	
F-Kg(*)	1200	1200	1200	
Entry side:	A	A	A	

(*) Including pallet

4.2 Type of forklift to be used

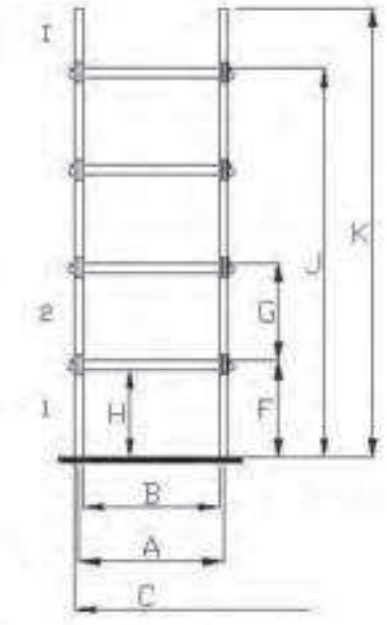
The installation is designed for Conventional electric with a minimum aisle width of 3600 mm and a maximum lifting height of 12650 mm.

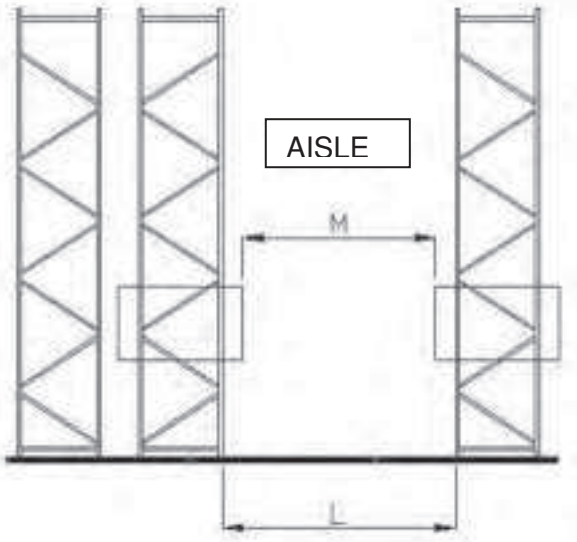
4.3 Warehouse capacity

- Number of stored loads..... 10208 Pallets.

4.4 Layout of the racks

Racks	Number	Length (mm)	Depth (mm)
Single access			
Double access	5, 12	40886.5, 41554.5	2200, 2400





A (mm)	B (mm)	C	D	E (kg)	F (mm)	G (mm)	H (mm)
Axial dimension of the module	Width between uprights	Number of modules per row	Load units per beam pair	Load per level	Height floor 1st level	Height between levels	Clear span
2820.5	2700	310	3	3600	1750	1750	1620
2820.5	2700	26	3	3600	3500	1750	1620
1945.5	1825	24	2	2400	1750	1750	1650
1070.5	950	1	1	1200	1750	1750	1650
2145.5	2025	180	2	2400	1750	1750	1630
2145.5	2025	10	2	2400	3500	1750	1630

I	J (mm)	K (mm)	L (mm)	M (mm)	N (mm x mm)	O (kg)
No. of load levels	Height to top level	Total installation height	Aisle between racks	Aisle between loads	Dim. support plate	Approximate load per footplate
8	12250	12500	3700	3600	175x110	14490
6	12250	12500	3700	3600	175x110	12420
8	12250	12500	3700	3600	175x110	9660
8	12250	12500	3700	3600	175x110	4830
8	12250	12500	3700	3600	175x110	9660
6	12250	12500	3700	3600	175x110	8280

4.5 Components description

Frames are the pillars of the rack. These structures are composed of two uprights and diagonal and beams lattice with bolted joints. Joining the beams and diagonals with the uprights is performed by bolts of a different measure.

All the uprights have two rows of cup-shaped slots in their front part, which ensure the perfect anchoring of the beams, and four or two rows of drilled holes (two or one per side, depending on the type of upright) in their laterals to fix the bracing and enable the placement of any auxiliary component that is necessary in the system. The slots in the uprights enable the measurement in height every 50 mm.

Beams are the horizontal and resistant components of the racks, over which loads are placed and remain.

The assembly of the beams to the frames is performed by means of their 2 connectors or safety pins, whose design has been deeply studied, to ensure the safety and ease setting; these safety pins are “L” shaped and are provided of 4 hooks, divided in a distance of 50mm among them.

Each hook of these connectors or safety pins, in the union system developed and registered by MECALUX, is united to the main element by both sides, thus considerably increasing the load capacity and avoiding the deformations produced when the top and lower part are not supportive with the part that corresponds with the safety pin or connector. Therefore, it prevents the beam from falling, which could occur if, because of its frequent use, it begins to open.

Each beam includes two built-in safety locking, one by each connector, mechanisms, developed in order to make the structure even safer.

This new mechanism forms part of the hook itself, locking it into place from the moment the beam is attached to the upright. Since this is not a standalone piece, its inclusion is guaranteed, making it impossible to forget to include during assembly, and protecting against improper use.

Mecalux has already successfully begun using this device in the United States, where we lead the market in pallet storage systems.

4.6 Characteristics of the steel used

The choice of one type of steel over another for the manufacturing of different components depends directly on the structural demands of each specific installation.

Given the wide variety of products and their multiple uses, different qualities of steel are used, with tensile limits ranging from 500 N/mm^2 (micro-alloyed steel S500 MC according to EN 10149), through 350-355 N/mm^2 (S 355 JO according to EN 10025), to 235 N/mm^2 (S 235 JR, EN 10025), all of which are recognised by the standards EN1993-1-1 und EN1993-1-3.

The beams are welded using an automated process in a protected atmosphere of 15% argon and 85% CO_2, with SG2 welding material according to DIN ٨٥٥٩ Section ١.

The bolts used are quality 8.8 according to DIN-267.

4.7 Finish

	Components	
	Uprights	**Beams**
Coating Process	CATAPHORESIS	ELECTROSTATIC WET COATING
Colour	Blue RAL 5003	Orange RAL 2001
Coating Material	Epoxy resin	Polyester and amino resin

Coating by cataphoresis

The paint used in the cataphoresis procedure is a cathodic electrodeposition paint consisting of a fully automated process which ensures a high quality coating with an epoxy resin basis.

The advantages of this system are the following:

- A high corrosion resistance (550 hours in salt spray chamber).
- A total coating even on the most inaccessible parts of the piece (due to the process of dipping and constant paint stirring) ensuring proper coverage in the most inaccessible corners.
- As almost no solvents are used in this process, it has only a minor effect on the environment.

The procedure consists of the following stages:

1. Physical and chemical degreasing under heat.
2. Rinsing.
3. Creation of a nano-technological conversion coating on the steel, which has the dual mission of protecting against corrosion and providing an intermediate layer between the steel and the paint, therefore improving adherence.
4. Washing with deionised and demineralised water.
5. Dip painting in cataphoresis bath. At this stage, the elements play with a cathode, and they are subjected to an electric field between 240 and 300 V in DC (direct current) for about 2 minutes.
6. Washing of the pieces with ultrafilter. Spray washing is done with recirculating ultrafilter (UFR), and later at the exit ramp, pieces are spray washed again with a new ultrafilter (UFN). The ultrafilter is a component obtained from the ultrafiltration of the same paint, and allowing the removal of any poorly bonded remnants.
7. The workpieces are then dried in a furnace at 180ºC for 30 minutes in order to obtain the polymerisation of the epoxy resin.

The average coating deposited on the flat parts of the elements is of 20 µm (microns).

Soluble electrostatic painting

Electrostatic painted with water-soluble orange paint RAL 2001 is essentially the application of liquid paint sprayed onto the parts. This is done by passing the paint through rotating discs at speeds up to 20,000 rpm, where paint droplets are sprayed and electrically polarised.

Paint is distributed with uniformly on parts through the use of double effect. First, the electrostatic effect directs the paint spray towards the workpiece. Second, the kinematic effect that releases paint at high speed onto the workpiece itself, improves penetration of paint in concave areas which, due to the Faraday effect, would not be covered by other systems using normal electrostatic paint.

The water-soluble paint is made from polyester resins and amine and is free from lead, chromate, solvents and other pigments, which minimises its environmental impact.

The procedure consists of the following stages:

1. Phospho-degreasing.
2. Phosphatisation of the surfaces.
3. Immersion bath and cycle rinsing.
4. Passivation.
5. Painting.
6. Furnace-drying at high temperatures, of about 160º.

The average coating deposited on the flat parts of the elements is 25 µm.

Pre-galvanised elements (diagonals and certain accessories)

The finish of the pre galvanised elements is obtained by dipping the steel coil in a continuous process, in a bath of molten zinc. This process is performed by the steelworks companies themselves.

The advantages of pre galvanisation are the following:

- Well controlled manufacturing process.
- Perfect cleaning and preparation of the base steel before galvanising.
- Heat treatment of the steel base as preparation before galvanising.
- Chemical passivation after the galvanisation process, through a process of chroming.

Steels of this type used by Mecalux, meet standards EN 10,346, according to the mechanical characteristics required by the structural design. The type of coating is always Z200 MA or higher, according to these same Euronorms. This finish ensures that the coating is zinc (zinc-iron alloys are not permitted).

Thickness of material	Type of coating (weight)	Thickness of zinc per side (microns)
<2mm	Z200MA (200gr/m²)	14µm
≥ 2mm	Z275MA (275gr/m²)	19µm

4.8 Technical note

The technical calculations of the installation have been carried out in accordance with the details stated in this quote. Any modification of these characteristics should previously be consulted with our Technical Department in order to check if the modifications are reasonable, and if the safety of the installation is ensured.

FOR THE INSTALLATION OF

RACKING FOR PICKING MODEL M3

1. Safety

The inspection and testing that our materials and profiles undergo, and also the quality control of production and assembly guarantee the highest safety standards for: installations, stored goods and also above all for people working in the warehouses.

1.1. Steel Rack Calculations

1.1.1. Regulations

The profiles used in this system were designed on the basis of load tables drawn up by Mecalux. The nominal values come from the tests carried out in Laboratorio de Elasticidad y Resistencia de Materiales (LERMA) in the Academy of Industrial Engineering at the Technical University of Catalonia and the tests conducted by a renowned company which issues TÜV PRODUCT SERVICE GMBH certificates.

1.1.2. Safety coefficients

Structural safety is achieved by increasing the actions by using safety coefficients.

The partial factors used are:

- variable factors (stored goods) 1,5
- self-weight 1,35

1.2. Deformations

The deflection - the maximum admissible deformation on the panel's edge is $\frac{L}{100}$, L being the length of the panel.

1.3. Stability of the installation

Longitudinal direction

Vertical cross bracing is fitted to ensure stability.

Transversal direction

Cross-aisle stability is ensured is ensured by the rigidity provided by the cross ties in the frames.

1.4. Interaction with the floor

The safety of the structure will depend to a great extent on the characteristics of the floor on which the storage system is installed.

According to the European standard EN 15629, the Client is to ensure a floor appropriate for system assembly. The Client is requested to check that the floor can carry the load of the racking, taking into account the distribution of the racks shown on the enclosed plan.

According to the data provided by the Client, the floor has the following characteristics HORMIGON C20/25

It is assumed that the concrete is not cracked.

The plane geometry of the floor must comply with the requirements of the European standard EN 15620, which establishes that all floor irregularities must be within a range of ±15 mm with respect to the horizontal reference point.

The Client confirms that requirements concerning the floor indicated in the offer are fulfilled.

1.5. Fire safety regulation in industrial establishments

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The fire prevention plan of the project proposed by the Client should include, if their use is required, the protective measures of this installation, escape routes or other aspects to be supplied as part of the design. The Client must also ensure that the distribution of racks supports this plan.

2. Quality

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2.3. ISO 14001

We are aware of the environment and the effects upon it from the work done at our plants. Our desire to respect the environment and to satisfy the environmental awareness of our Clients is has led us to implement an Environmental Management System, in accordance with the UNE –EN-ISO-14001 norm.

BUREAU VERITAS CERTIFICATIONS assesses our actions and has certified that our organizational, productive and technical work is planned, managed and controlled, and complies with the established standards at all times.

2.4. CE

European regulation No 305/2011 lays down "The harmonised conditions for the marketing of construction products". From 1st July 2014, all steel components manufactured to be permanently incorporated into construction sites within the European Union must comply with these regulations, and must be marked "CE".

To meet the requirements of this legislation, manufacturers must install a production control system within the factory and must have carried out initial product testing which together, guarantee compliance with the EN-1090 norm.

In July 2013, Mecalux was awarded this certificate by BUREAU VERITAS CERTIFICATIONS, confirming that all steel components fulfil these requirements.

Guarantee

Each of the above certificates ensures compliance with strict quality controls on materials, manufacturing processes and design.

In addition to the above, MECALUX guarantees the installation for a
defect in manufacturing and assembly. This guarantee does not cover neglectful usage or any exceptional circumstances not mentioned in this quotation.

MECALUX has a **Post-sales** service. The service is provided at the Client's request. It comprises: checking the correct state of the installation and verifying that the safety usage parameters are respected.

4. Characteristics of the installation

This installation is comprised of Racking for picking model M3, according to the requirements and specifications provided by the Client and whose distribution is detailed in the attached layout.

4.1. Description of the installation

M3 racking is basically made up of FRAMES, BEAMS and SHELVES. These components are assembled together and can be very easily modified at a later date. The slots in the frame uprights enable the height to be gauged at 25 mm intervals.

- These are the components of the installation:

- Shelf model: SHELF HM GALV. for a load of 150 kg.
- Upright model: UPRIGHT M3
- Frames formed by: CROSS TIES M3 OF.

The distribution is shown in the enclosed drawing.

4.2. Load unit

- Loose packaging of different sizes.

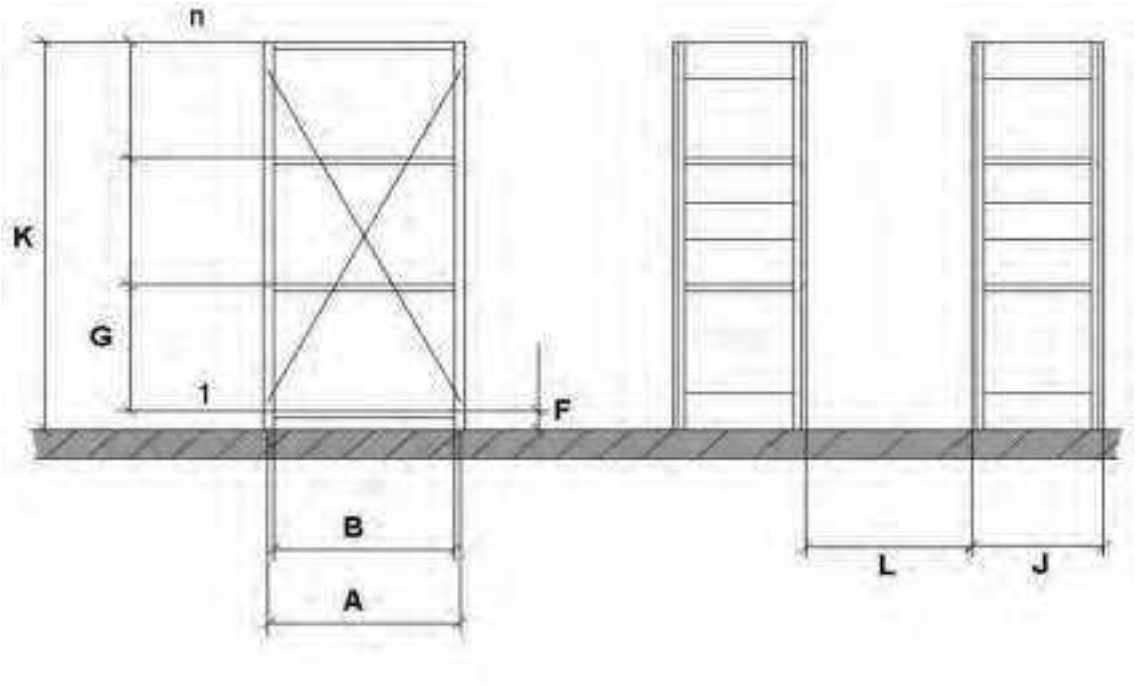
4.3. Storage capacity

- Storage spaces in ground level of 1275 x 400 x 550 mm prepared for a load of 150 kg.
- Storage spaces in first level of 1275 x 400 x 550 mm prepared for a load of 150 kg.
- Storage spaces in second level of 1275 x 400 x 550 mm prepared for a load of 150 kg.

4.4. Layout of the racks

Ground level: 0 mm high shelves

Racks	Number	Length (mm)	Depth (mm)
Single access	2	11505	400
Double access	6	11505	

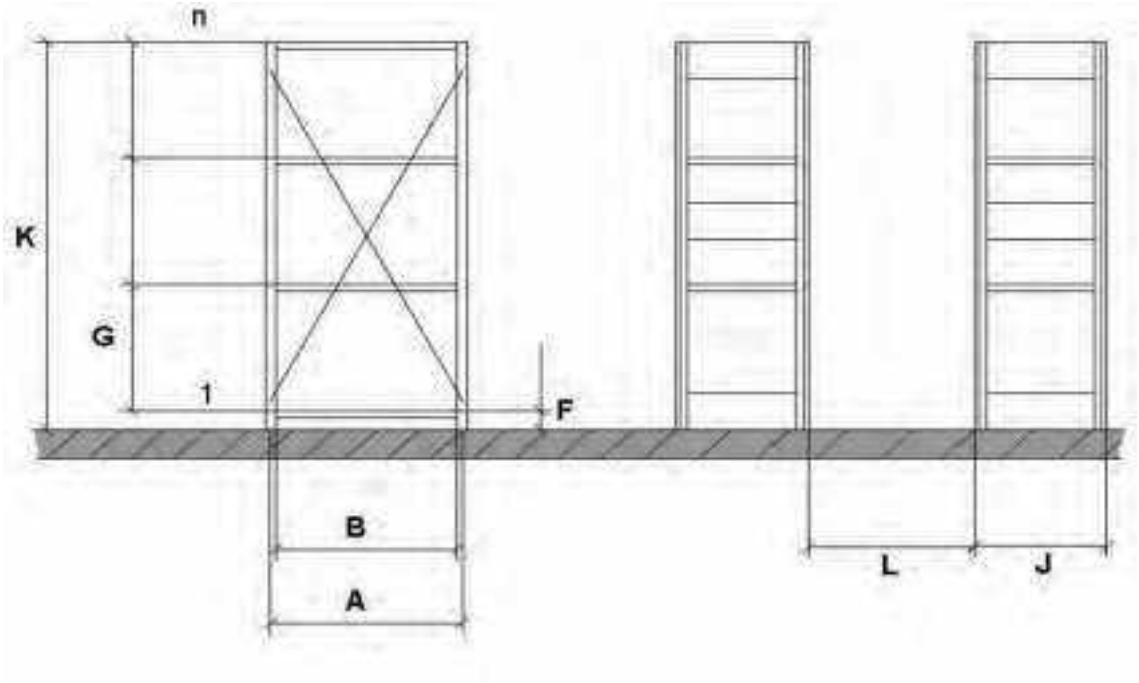


A (mm)	B (mm)	C	D	E (kg)	F (mm)	G (mm)
Bay length to axes	Length between uprights	No. bays in length	No. loads x space	Required load x space	Height floor 1st level	Height between levels
1275	1245	120		150	550	550
775	745	2		150	550	550

H (mm)	I	J (mm)	K (mm)	L (mm)	Shelf type
Clear span	No. load levels	Shelf depth	Total installation height	Aisle between shelves	
515	4	400	2250	1000	
515	4	400	2250	1000	

Frist level: 3.030 mm high shelves

Racks	Number	Length (mm)	Depth (mm)
Single access	1,1,1	3355, 11005, 6405	400
Double access	6	11005	



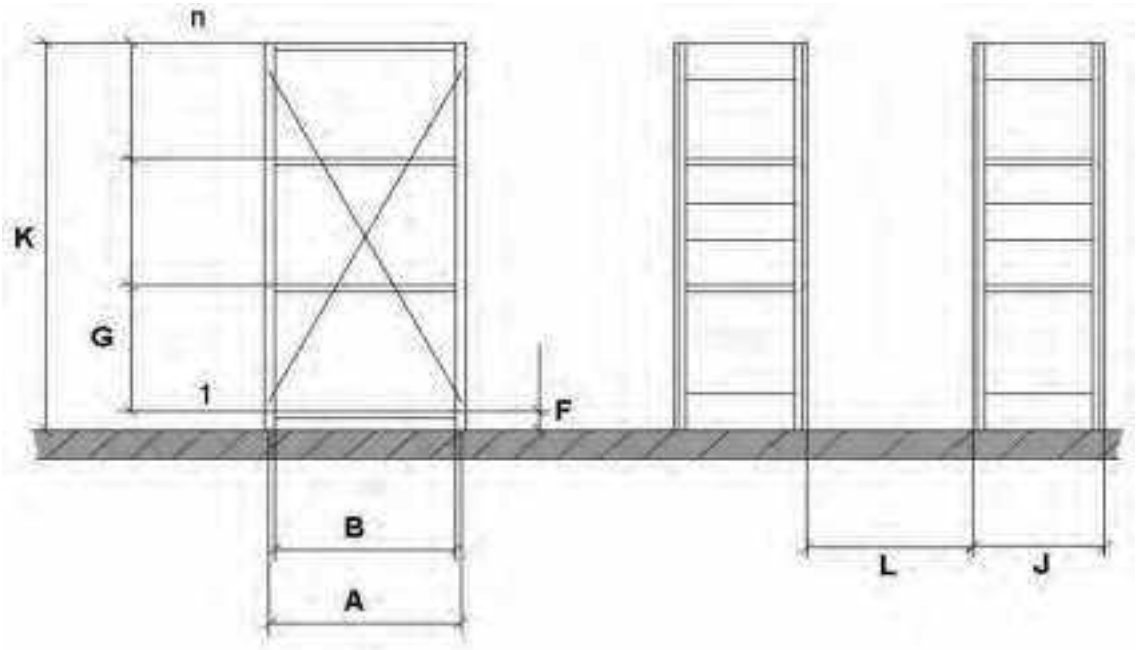
A (mm)	B (mm)	C	D	E (kg)	F (mm)	G (mm)
Bay length to axes	**Length between uprights**	**No. bays in length**	**No. loads x space**	**Required load x space**	**Height floor 1st level**	**Height between levels**
1275	1245	105		150	550	550
775	745	16		150	550	550

H (mm)	I	J (mm)	K (mm)	L (mm)	Shelf type
Clear span	**No. load levels**	**Shelf depth**	**Total installation height**	**Aisle between shelves**	
515	4	400	2250	1000	
515	4	400	2250	1000	

Aisle between shelves: Royal Decree 486/97, which establishes the minimum safety and health requirements in the workplace, indicates (in Annex I-A, 5) that the minimum corridor width must be 1m.

Second level: 3.030 mm high shelves

Racks	Number	Length (mm)	Depth (mm)
Single access	2	11005	400
Double access	6	11005	



A (mm)	B (mm)	C	D	E (kg)	F (mm)	G (mm)
Bay length to axes	Length between uprights	No. bays in length	No. loads x space	Required load x space	Height floor 1st level	Height between levels
1275	1245	112		150	550	550
775	745	14		150	550	550

H (mm)	I	J (mm)	K (mm)	L (mm)	Shelf type
Clear span	No. load levels	Shelf depth	Total installation height	Aisle between shelves	
515	4	400	2250	1000	
515	4	400	2250	1000	

Aisle between shelves: Royal Decree 486/97, which establishes the minimum safety and health requirements in the workplace, indicates (in Annex I-A, 5) that the minimum corridor width must be 1m.

4.5. Safety elements and/or accessories

- **Portal unions.** These provide rigidity to racks which require them because of height.

4.6. Characteristics of the steel used

The choice of one type of steel over another for the manufacturing of different components depends directly on the structural demands of each specific installation.

Given the wide variety of products and their multiple uses, different qualities of steel are used, with tensile limits ranging from 500 N/mm^2 (micro-alloyed steel S500 MC according to EN 10149), through 350-355 N/mm^2 (S 355 JO according to EN 10025), to 235 N/mm^2 (S 235 JR, EN 10025), all of which are recognized by the standards EN1993-1-1 und EN1993-1-3.

4.7. Finish

	Basic Elements	
	Uprights	**Panels**
Galvanising		x
Coating by cataphoresis RAL 5003	x	
Electrostatic painting with powder paint.	Blue RAL 5014	Grey RAL 7035

4.7.1. Electrostatic painting with powder paint

Finishing consists in subjecting the surface of an element to rigorous treatment beforehand, which consists of three stages:

1. **Pre-treatment of the surface:** Degreasing**,** Phosphatising of the surface and Rinsing and cleaning
2. **Electrostatic painting process.**

   Due to the painting process a coating of high abrasion and corrosion resistance as well as aesthetic appearance is obtained.

   This paint is solvent-free, which enables better environmental protection.
3. **Driying in a furnace** at a high temperature: polymerisation and drying of paint.

4.7.2. Coating by cataphoresis

The paint by the cataphoresis procedure is a cathodic electrodeposition paint consisting of a fully automated process which ensures a high quality coating with an epoxy resin basis.

The advantages of this system are the following:

- A high corrosion resistance (550 hours in salt spray chamber).
- A total coating even on the most inaccessible parts of the piece (due to the process of dipping and constant paint stirring) ensuring proper coverage in the most inaccessible corners.
- As almost no solvents are used in this process, it has only a minor effect on the environment.

The procedure consists of the following stages:

1. Physical and chemical degreasing under heat.
2. Rinsing.
3. Creation of a nanotechnological conversion coating on the steel, which has the dual mission of protecting against corrosion and providing an intermediate layer between the steel and the paint, therefore improving adherence.
4. Washing with deionized and demineralized water.
5. Dip painting in cataphoresis bath. At this stage, the elements play with a cathode, and they are subjected to an electric field between 240 and 300 V in DC (direct current) for about 2 minutes.

6. Washing of the pieces with ultrafilter. Spray washing is done with recirculating ultrafilter (UFR), and later at the exit ramp, pieces are spray washed again with a new ultrafilter (UFN). The ultrafilter is a component obtained from the ultrafiltration of the same paint, and allowing the removal of any poorly stuck remnants.
7. The work-pieces are then dried in a furnace at 180ºC for 30 minutes in order to obtain the polymeriration of the epoxy resin.

The average coating deposited on the flat parts of the elements is of 20 µm (microns).

4.7.3. Galvanised elements

The coating of galvanized components takes place by immersion of the piece in a bath of molten zinc.

The galvanized steel used by Mecalux meets the European standard EN 10.346. This finish ensures that the coating is of zinc (iron-zinc alloys are not accepted).

Thickness of material	Type of coating (weight)	Thickness of zinc per side (microns)
<2mm	Z200MA (200gr/m²)	14µm
≥2mm	Z275MA (275gr/m²)	19µm

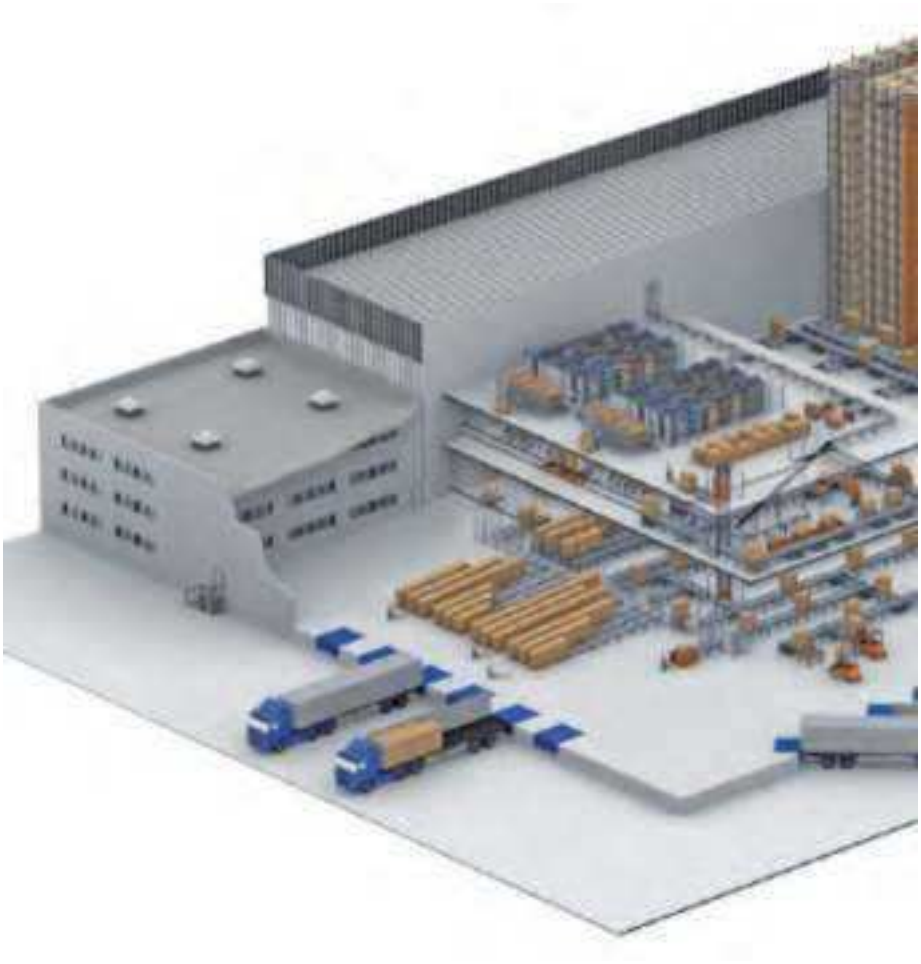
4.8. Technical note

The technical calculations of the installation have been carried out in accordance with the details stated in this quotation. Any modification of these characteristics should previously be consulted with our Technical Department in order to check, if the modifications are reasonable and if the safety of the installation is ensured.

MECALUX

AUTOMATED WAREHOUSE FOR BOXES

CONVEYORS SYSTEM



Contents:

1. Welcome to Mecalux

Mecalux is a world leader in storage systems, with more than 50 years' experience. Our business consists of designing, manufacturing, marketing and providing services related to metal racking, automated warehouses, warehouse management software and intralogistics solutions in general.
As part of our strong international vision, Mecalux has **4 technological centres**: Two in Spain, one in Poland and another in the United States; along with **11 production plants**: Argentina (Buenos Aires), Brazil (São Paulo), Mexico (Matamoros and Tijuana), Poland (Gliwice), Spain (Barcelona, Gijón and Palencia), and the United States (Chicago, Pontiac and Sumter).

These strategic locations allow us to offer fast and efficient service to more than 70 countries where we currently have a presence on the market. This extensive production, marketing and sales network, which continues to grow, allows us to keep close to our customers.
Our commitment to international expansion and continued improvement, along with the use of the most advance technology in the industry, and the experience obtained through successfully completing thousands of installations, positions us at the forefront of our sector.

Continuous Innovation

Mecalux dedicates significant resources to its engineering and R&D&I departments, keeping us **at the forefront of technology** in the development of new products and advanced warehouse solutions. The experience of our technicians, and the use of cutting edge calculation, design and simulation software show our commitment to innovation.
In our technological centres, the materials and profiles undergo various calculation processes, tests and checks, which in turn provide maximum levels of safety and guarantee that they perform as intended.
All of these processes are reviewed by technicians in our Continuous Improved and Quality departments in order to identify any potential improvements, both for our products, and our processes.

Barcelona (Spain)
Research and development facilities for engineering projects and automated storage systems.

Gijón (Spain)
Development centre for products and warehouse management software.

Gliwice (Poland)
Research facility for the production of automated systems.

Chicago (USA)
Research and development facilities for engineering projects.

Processes of the highest quality

For Mecalux, the quality of our products is directly linked to the safety of our installations and the people who work with them.

All of our products are designed and built in compliance with existing applicable regulations all around the world. Furthermore, as a company committed to achieving excellence across all stages of our projects, we have obtained, and continue to be certified to various international standards, such as the ISO 9001 standard.

Furthermore, Mecalux is extremely aware of the need to protect our environment and those who work with us, so we apply integrated policies for **environmental management (ISO 14001 certified) and health and safety at work (OHSAS 18001:1999)**.

We have also obtained **TÜV-GS certification** through our adherence to the **ZH 1/428 directives** for quality in design, production, assembly processes and handling instructions; and the European **CE mark**, certifying our conformity with factory production controls.

Dedication to service

Mecalux studies, plans, develops and installs all kinds of custom storage systems. Our technical team assesses the ideal operating conditions and the optimal use of space, as well as guaranteeing the safety of the devices and the profitability of each installation.

The variety of products and accessories and the flexibility of our storage systems means we can offer **the ideal solution for any flow of goods or storage requirements**.

Additionally, in Mecalux we offer our clients a technical inspection and after-sales services, thus guaranteeing the perfect working of the installation and offering guidance for future expansion or modifications to the warehouse.

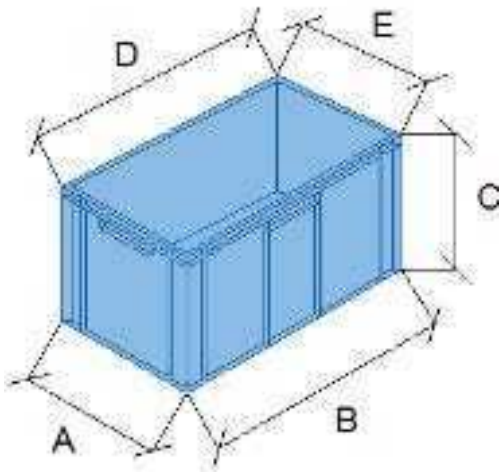
Ultimately, we provide our clients with the support they need at every stage of the project: **before**, during analysis and design; **during**, through implementation and commissioning; and **after**, ensuring the storage system remains in perfect condition, and adapting it for future needs.

2. Specifications provided by ROYAL WORLD

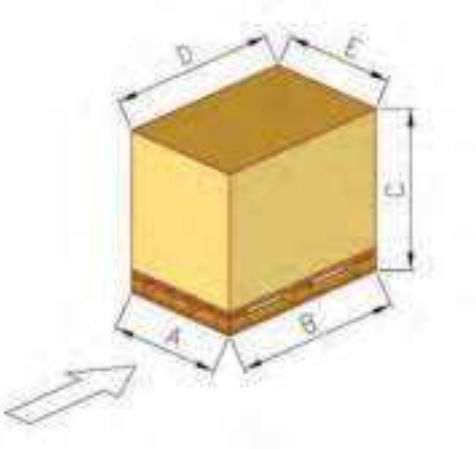
The proposed solution is based on the information you have provided. This section includes all of the information pertaining to your storage needs and the operation of the installation. This information has been taken into account to in the preparation of this offer.

2.1. Unit load

The unit load on which this project is based is a box of the following characteristics:



UNIT LOAD 1	
Type (Eurobox, tray, cardboard, other)	Eurobox
Material (plastic, carton, other)	Plastic
Colour	Not defined
Base Width (A) (mm)	400
Base Length (B) (mm)	600
Total height (Unit load + load) (C) (mm)	120 / 320
Top Length (D) (mm)	600
Top Width (E) (mm)	400
Total weight of load (Unit load + load) (Kg)	50
Side used by client for handling load	A



TYPE 1	
Type (pallet, container, other)	Pallet
Material (wood, plastic, metal, cardboard, other)	Wood
Width (A) (mm)	900
Length (B) (mm)	1100
Height load (C – pallet) (mm)	1500
Length of load (D) (mm)	1100
Width of load (E) (mm)	900
Total weight of load (Unit load + load) (F) (mm)	1200
Side used by APC for handling load	A

Other relevant information:

TYPE 2	
Type (pallet, container, other)	Pallet
Material (wood, plastic, metal, cardboard, other)	Wood
Width (A) (mm)	800/1200
Length (B) (mm)	1200
Height load (C – pallet) (mm)	1500
Length of load (D) (mm)	1200
Width of load (E) (mm)	800/1200
Total weight of load (Unit load + load) (F) (mm)	1200
Side used by APC for handling load	A

Other relevant information:

2.2. Space available

The space available for the installation in the warehouse and its location is as follows:

TOTAL SURFACE AREA AND HEIGHT OF THE WAREHOUSE	
Useful length (mm)	38-000
Useful width (mm)	7.000
Useful height (mm)	12.000 – 14.000
Warehouse temperature (°C)	Ambient
Type of warehouse building	One-space bay
City in which warehouse is located	—
Country in which warehouse is located	Saudi Arabia

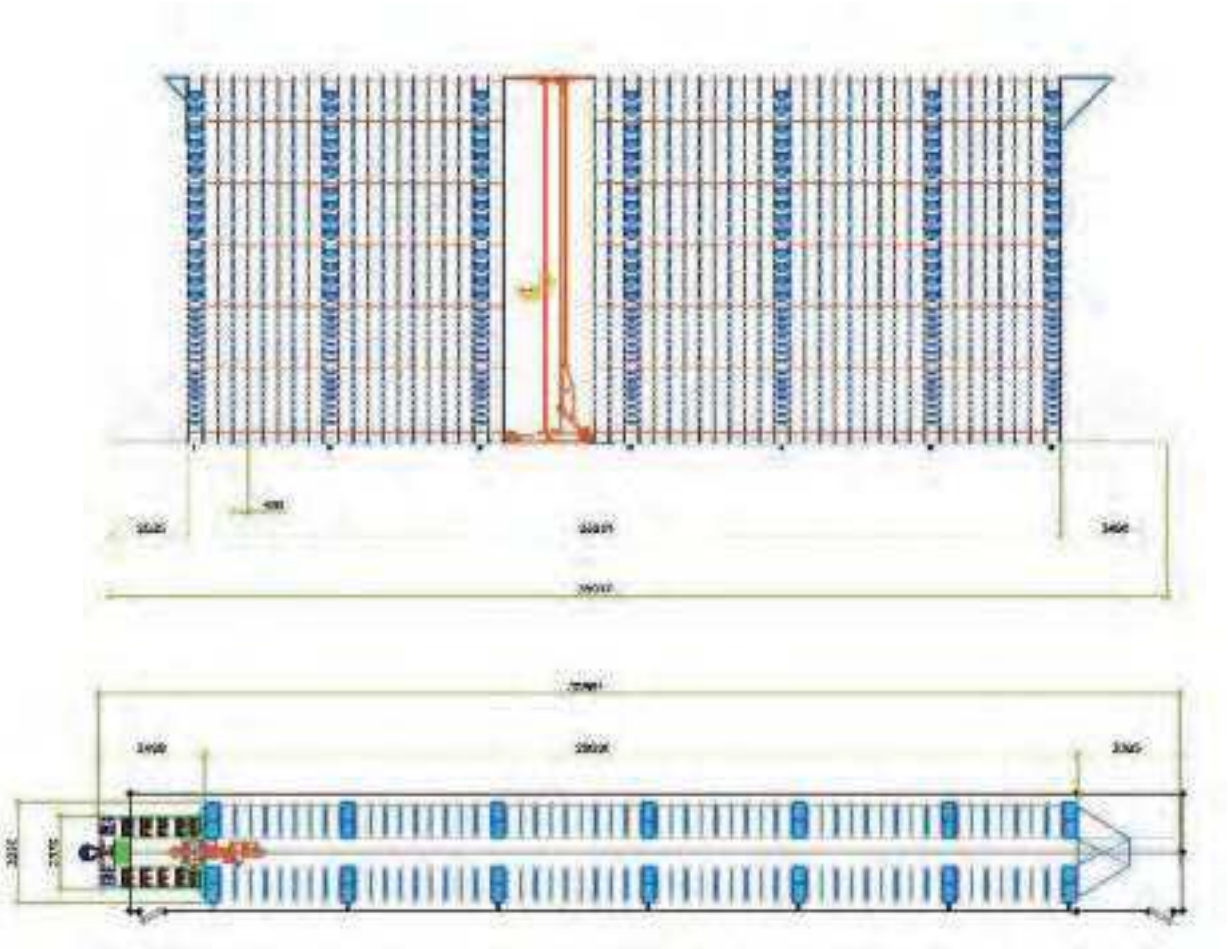
Other relevant information (pits, regulatory height limit, etc.):

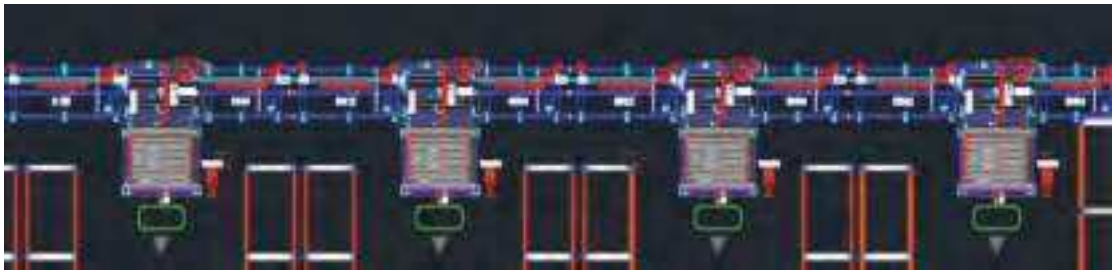
—

3. Overview of the proposed solution

Based on the specifications you have provided and a detailed prior analysis, we hereby propose an automated warehouse with stacker cranes. Technical details of the solution are given in section 3.3 below.

In this section, a variety of generic images are shown to make the proposed solution easier to understand. The actual solution is detailed in the attached layout plans.





3.1. Advantages of an automated warehouse

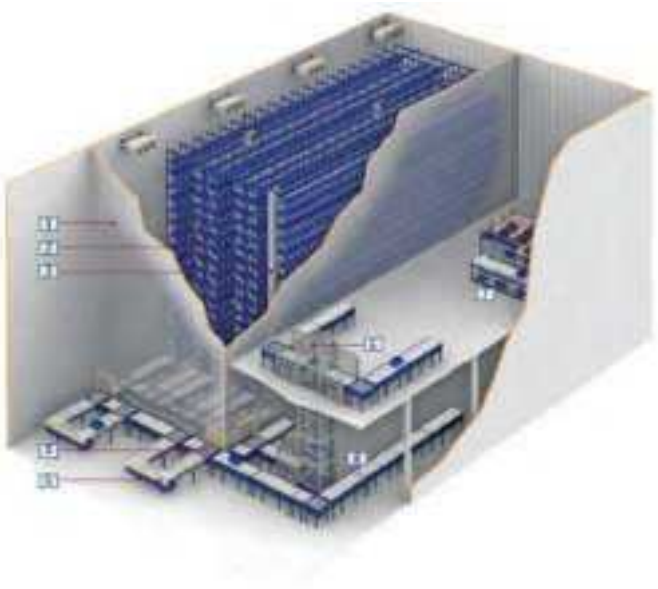
The most important advantages are:

- **PRODUCTIVITY AND HIGH AVAILABILITY.** With an automated warehouse, internal warehouse operations that are traditionally carried out by personnel with forklift trucks are no longer necessary, and work can continue 24 hours a day.
- **REDUCED OPERATING COSTS.** The number of people and resources required are minimal. Most operations are automated. The warehouse does not need to be lit constantly.
- **REAL-TIME INVENTORY** The management software allows you to identify and monitor the status of goods at all times. Tracking criteria, movement control history, rotation, etc., can all be easily maintained.
- **MAXIMUM USE OF SPACE.** With an automated system, warehouses of over 12 m in height can be built, meaning high capacity can be reached in a small space.
- **REDUCED COSTS FOR STRUCTURAL MAINTENANCE** The greatly reduced number of impacts suffered by the structure and goods as a result of improper use means considerable savings. Additionally, requirements for flooring are less exacting, and no maintenance is necessary.
- **LOADS STORED IN ABSOLUTE SAFETY.** Goods are not directly accessible, there is no risk of losses due to unknown causes, goods are stored in perfect conditions (without breakages resulting from improper handling), and the need for intermediate checks is reduced.

3.2. General overview of automated warehouses.

All automated warehouses that fall into this category, from the most simple to the most complex, include:

- Cladding or independent chamber (1).
- Racking and additional structures (2).
- Stacker cranes and aisle equipment (3).
- Conveying lines and other elements (4).
- Picking station Good to Man (5).
- Continuous lift conveyor (6).
- Picking station Man to Good (7).



In the image the different parts that make up a simple automated warehouse can be seen.

3.3. Racking and additional structures

The characteristics of the racks and the additional structures will be contingent upon:

- The number of boxes that need to be stored.
- The surface area to be covered.
- The dimensions and weight of the boxes.
- The maximum construction height permissible or required.
- The number of stacker cranes necessary.
- The constructive system (inside an industrial building or clad-rack structure).

Clad-rack warehouses will be described in more detail later.

The difference between a “single-deep” and “double-deep” structure is shown in the following two images:

	
Single-deep: From one aisle, one box per location can be accessed on each side. This solution is optimal when direct access is required to every box, and there are a high number of movements per hour.	**Double-deep:** From one aisle, two boxes per location can be accessed on each side (boxes are stored two deep).

The double-deep option offers:

- Greater capacity in the same area.
- Fewer stacker cranes and aisle equipment.
- If there are enough stacker cranes to carry out the necessary number of cycles, the investment will be lower than the “single-deep” option.

For double-deep racking, the following must be taken into account:

- The tolerance in height available must be bigger.
- In order to access the second position when there is a box in front of it, the first box needs to be repositioned somewhere else. This possibility is taken into account automatically by the management software. If repositioning is required, this should be considering during the calculation of the number of cycles.

3.4. Stacker cranes and aisle equipment

The stacker cranes are the automated machines used to move loads from the entry point of the rack's P&D station to its position on the rack, or vice versa (i.e. from its position on the rack to the exit point of the rack's P&D station).

The model and reach height of the stacker crane is contingent upon:

- The height of the installation.
- Whether it is single or double-deep.
- The weight of the load.
- The number of loads to be carried at once (up to 4 boxes).
- The number of cycles required.

Each stacker crane needs the following aisle equipment:

- Lower and upper guides.
- Power outlet.
- Infrared communication system.
- Rangefinder.
- Safety bumpers.

In the attached documents these components can be seen in detail.

In addition to the stacker cranes, the following attachments are optional:

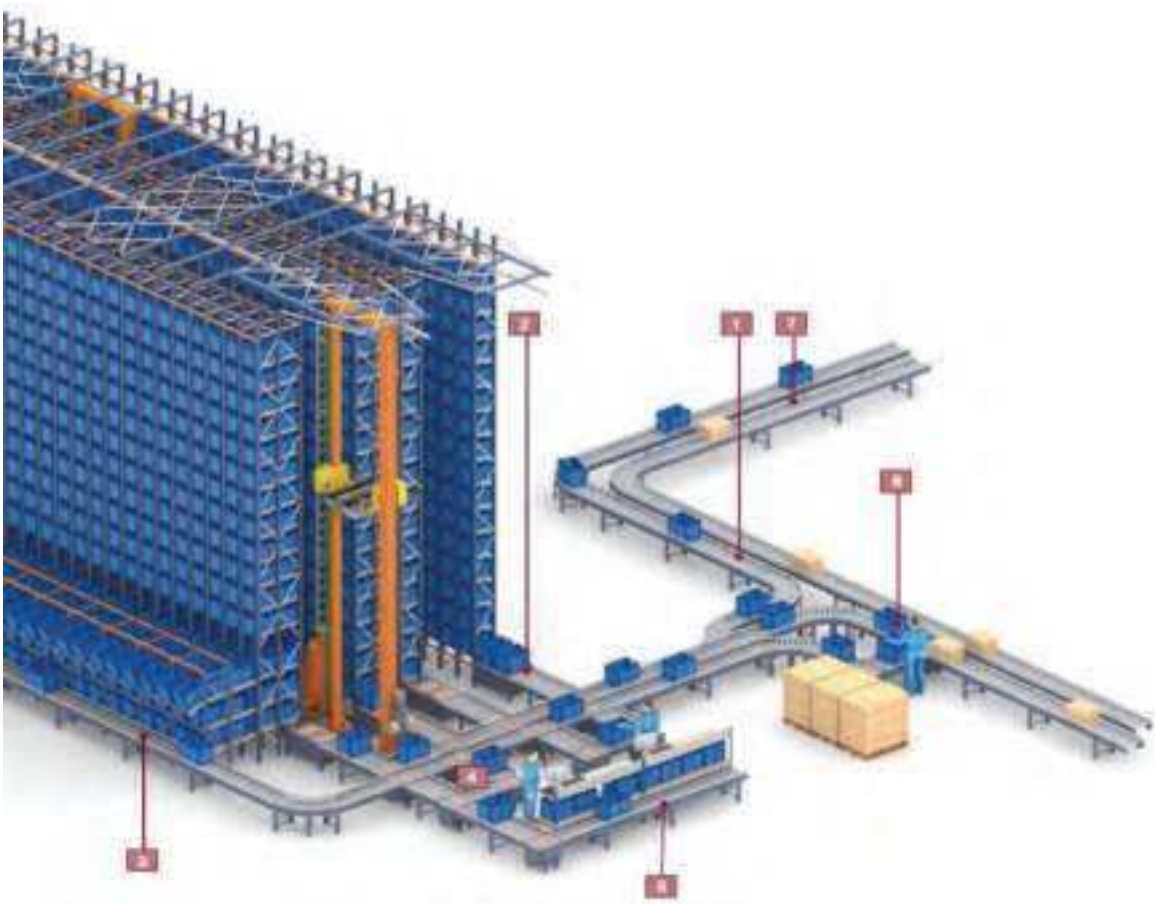
- Transfer bridge so stacker cranes can serve multiple aisles. This is a carriage that holds the stacker crane, and moves it sideways to the aisle where work is required.

3.5. Conveyors and P&D elements

These elements are responsible for carrying the boxes from the entry point of the warehouse to the collection points in each aisle, or vice versa (i.e. from the collection points in each aisle to the exit point of the warehouse).

This part of the warehouse requires more detailed analysis. Its shape, the elements of which it is made up and the number of levels will all depend on the number of boxes that must be moved along it at the same time, and the number of destination and collection points that it has.

The two following examples of P&D stations are very simple: The first is made up entirely of roller and chain conveyors. In the second, a portion of the conveyors has been replaced with a shuttle car. This option is only suitable when there are not many movements.



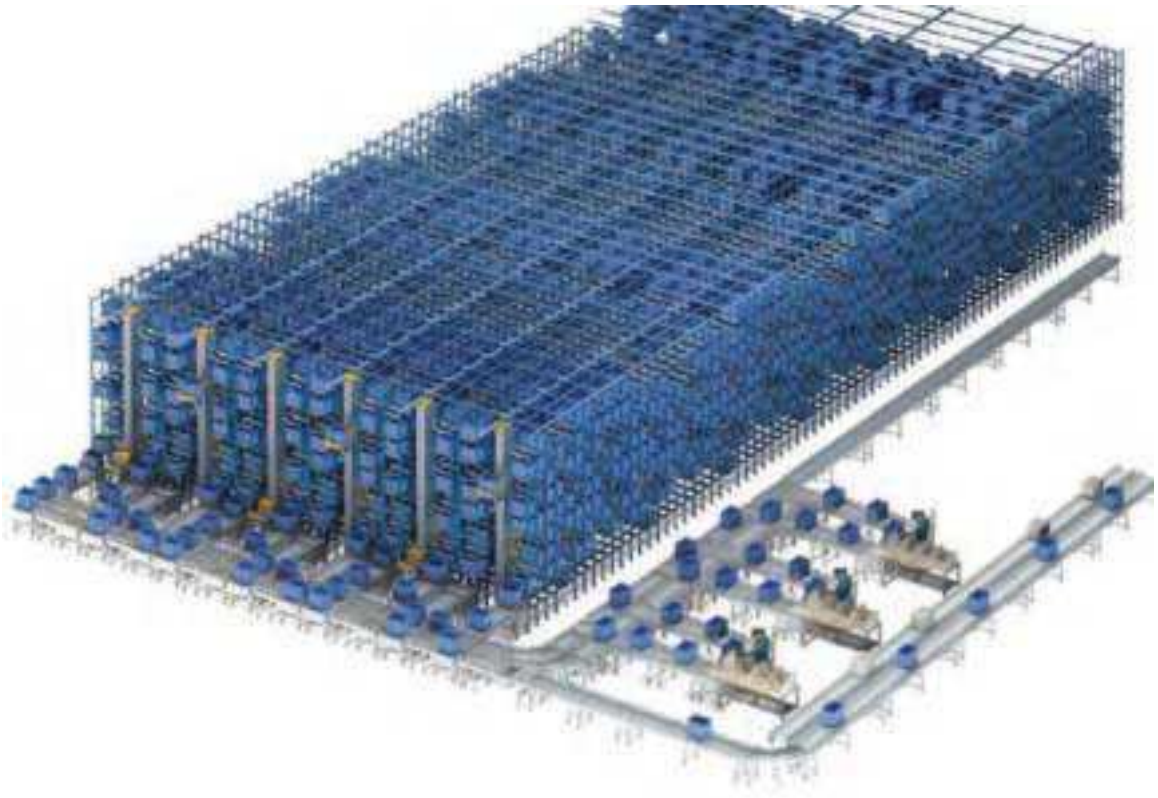
As can be seen above, a P&D station is made up of at least the following elements:

1. Inbound conveyor line.
2. In/Out miniload.
3. Man to Good Picking.
4. Good to Man Picking station.
5. Pick to light.
6. Packaging station.
7. Outbound conveyor line.

However, the P&D station can be much more complex, if so required.

- P&D stations one more than one level.
- Picking stations at the P&D station.
- Picking stations in adjoining areas.
- Pre-loading.
- Auxiliary elements fitted (baling machines, box stackers, etc.).

The following image shows a more complex installation.



Each project requires detailed analysis of the requirements and space available. The solution described in the attached layout plans reflects the current proposal.

3.6. Safety devices

Each project requires a safety study to be carried out (accident prevention), which might reveal the need for:

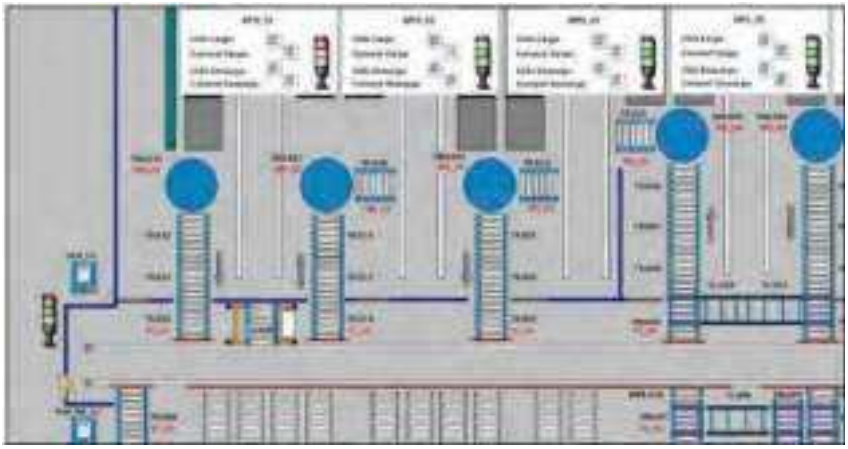
- Barriers around areas with conveyors.
- Fencing and doors with safety keys around aisles.
- Safety light curtains.
- Maintenance platforms.
- Safety rails.
- Steps and passageways between conveyors.

3.7. Management and control hardware and software

These are the brains of any automated installation. Each installation will be equipped as necessary depending on its size and the number of workstations. Operations are carried out by two programmes, working in conjunction:

- **Mecalux Easy.-** Mecalux's management software is used to decide where products should be placed, and monitor them at all times, using logical parameters as required by the products, from the moment they enter the warehouse until the moment they leave.

- **Galileo.-** Mecalux's control software is used for the logical execution of each machine's movements to move goods from one point in the warehouse to another.



In the attached documents you can see the features of both programmes in detail.

3.8. Constructive system

Automated warehouses might be built inside an industrial building or could form part of the structure itself (in the case of clad-rack warehouses). In essence, the constructive system is similar. In fact, they have a large number of elements in common. This is due to the fact that the unit load defines the racks' characteristics.

The difference between a self-supporting system and a structure that is erected inside a pre-existing building is that, in addition to the loads in storage and the impacts from the stacker cranes, the racks must also support:

- The building itself. The roof and façade structures, as well as the cladding itself, are supported by the racks.
- Stresses created by wind and snow.
- Seismic movements in the area where the warehouse is built.

In a clad-rack warehouse there are no pillars or columns to hold the building up. The racks themselves are used instead. For this reason there are a large number of uprights, to distribute the full load more evenly across the floor slab.
The warehouse location, the existing buildings and their position with regards to the warehouse have an impact on calculations and constructive processes.

4. Features of the installation

In this section each of the elements included in the proposed installation is listed along with its description. The maximum speeds indicated are those which the machines can reach in optimal conditions. Actual speeds might be lower due to warehouse operation or layout.

4.1. Warehouse

WAREHOUSE FEATURES	
Constructive system	One-space bay
Width (mm)	3.290
Length (mm)	28.991
Height (mm)	12.209
Depth of the racks	1.212
Height of support profiles at lowest point (mm)	404
Number of load levels (un.)	28
Maximum load per load level (kg)	50
Maximum load per load module (kg)	1.400
Number of modules (un.)	58
Suspended modules in front section (un.)	Not included
Total warehouse capacity (locations) (un.)	6.496
P&D conveyor support platform (un.)	Not included
Maintenance platforms (un.)	Not included
Vistor walkway (un.)	Not included
Other relevant information:	

GENERAL FEATURES OF CONVEYORS	
Height of conveyor system (mm)	600 / 650
Conveyor speed (m/min)	20
Service temperature (°C)	Ambient
Conveyor colour	Standard
Nº of rollers conveyors (TR-15)	17
Nº of transfers (TM)	17
Nº of chain conveyors (TC-3R)	43

Other relevant information

4.2. Stacker cranes

STACKER CRANES	
Stacker crane model	ML100 EP-DF
Extraction system	—
Maximum speed (m/min)	200
Number of stacker cranes (un.)	1
Stacker crane height (mm)	12.140
Control cabinet (CPC) (un.)	1
Transfer bridge (un.)	Not included
Service temperature (°C)	Ambient
Total single entry cycles per hour (un.)	110
Total single exit cycles per hour (un.)	84
Total combined cycles per hour (un.)	57

Other relevant information:

—

4.3. Proposal for U-shaped picking station

PROPOSAL FOR U-SHAPED PICKING STATION	
U-shaped picking station at P&D station (un.)	1
Number of stations (un.)	1

Other relevant information:

—

4.4. Additional safety devices

SAFETY ELEMENTS	
Safety enclosure (un.)	Included
Access doors (un.)	Included

Other relevant information:

—

5. Applied regulations and basis for calculations

For the development of the installation, several different regulations have been taken into account in order to comply with all provisions in force, as well as guaranteeing the quality and strength of the materials used, the machines and the structures. The following section details the regulations applied.

5.1. Handling equipment

Building, safety and service regulations:

- European Machinery Directive 2006/42/EC, which establishes the health and safety requirements applicable to machinery and their safety components.
- European Low Voltage Directive 2006/95/CE: Electrical equipment which is intended for use within specific voltage limits.
- European Directive 2004/108/EC relating to electromagnetic compatibility that ensures adequate protection for products against electromagnetic disturbances from telecommunications and electrical supply networks, as well as protection for the user.
- EN 619 + A1. Continuous handling equipment and systems. Safety and EMC requirements for equipment for mechanical handling of unit loads.
- EN 528. Rail dependent storage and retrieval equipment. Safety requirements.

5.2. Safety devices

Commercial safety elements are all certified to show compliance with the corresponding standards and appropriate accreditation when necessary. The following standards have also been observed:

- UNE-EN 1263-1. Safety nets. Part 1: Safety requirements, test methods
- UNE-EN 1263-2. Safety nets. Part 2: Safety requirements for the positioning limits.
- Assessment of safety level PLd for electrical and safety components.
- EN-15620. Steel static storage systems. Adjustable box racking. Tolerances, deformations and clearances.
- EN-15512. Steel static storage systems. Adjustable box racking. Principles for structural design.
- EN-15629. Flat boxes for materials handling. Quality of fasteners for assembly of new and repair of used, flat, wooden boxes.

6. Technical components

Mecalux offers a wide range of machines designed to provide customers with a variety of solutions. In this section the machines used in a warehouse served by stacker cranes are described.

6.1. Stacker cranes for boxes

Stacker cranes are machines built for the automated storage of materials through a number of automatic movements: along aisles, up and down the full height of the warehouse, and in and out of the racking, thanks to their built in load retrieval systems. Storage and retrieval of goods can be performed simultaneously, and at great speed.

The movement of our state-of-the-art stacker cranes are controlled using field-oriented control, with a positioning system that uses laser rangefinders and smart control via a computer system or PLC.

Stacker cranes typically handle goods on boxes weighing up to 100 kg. They come in different shapes and sizes depending on the type of installation, its height, the size, shape and weight of the load, the performance required, etc. All market materials used in the stacker cranes are of recognised quality.

Surfaces are treated to ensure they are as resistant as possible to adverse conditions, such as corrosion. The treatment which is applied to stacker cranes consists of several stages to guarantee it sticks completely, and the parts are entirely covered. The machine's finish is orange (RAL2001) and yellow (RAL1033).

The different component parts of the stacker crane are joined using nuts, bolts and welding. The most important welding undergoes dye penetrant inspection.

The stacker crane has various safety devices built in in order to preserve the physical integrity of the warehouse operators, the goods in storage and the installation itself.

Along with this technical offer document, you have been provided with further information about MECALUX stacker cranes.

6.2. Box conveyors

Box conveyors are used for the automated transportation of boxes from one position in the warehouse to another. Conveyors are available in a variety of types, so they can be set up in any formation, and boxes can be moved and managed in different ways. Roller, belt conveyors, cross transfers, etc., all form part of the wide range of machines designed for safe, automated load transportation. Mecalux's conveyors can move loads at speeds of 25, 45 or 60 metres per minute. We offer a varied range of machines to complete any kind of circuit, including checkpoints to allow the condition of boxes to be inspected prior to entering the warehouse. In this way, the entry of boxes in poor conditions that might cause problems in the installation can be prevented.

Conveyors are designed to move Euroboxes. However boxes of different types and dimensions can be transported too. These boxes can be automatically dispensed, and repositioning the load onto them can also be automated.
In automated circuits, picking stations are installed, for picking individual products from the boxes. This makes it possible to prepare boxes for dispatches containing multiple products. They can also be combined with conventional systems, such as gravity flow conveyors, to make exit ramps for boxes that are complete.
When a warehouse works with different lines, transfer cars or shuttles allow the movement of loads from one to another. Lifts can also be used for this, when a change of height is required.

Roller Conveyor With Contactless Accumulation (LRA):

The LRA is a straight conveyor with accumulation mode working.
It can carry more than one box in its transportation area, but keeping each box in an independent parcel, as shown in the picture.
The conveyor keeps the tracking, knowing in which position the boxes are located.
The conveyor has 1 drive roller for each accumulation zone.

Roller-Belt Conveyor Transfer (LTM):

The LTM is a conveyor used to change the direction of the boxes, without turn them.
The conveyor is equipped with rollers and belts. And if it is needed, can change the direction of the box laterally 90º or 270º, by belts that lift the boxes few millimeters.
This conveyor keeps tracking. And is commonly used in loops due to its reduced dimensions.

Roller Conveyor With Lifting Elevation (LEE):

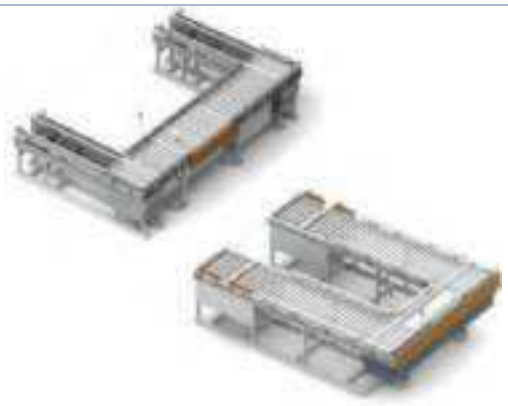
The LEE is a conveyor used to exchange the boxes between conveyors and stacker cranes.
The conveyor is equipped with a lifting profile that elevate the box 100-150 millimeters above rollers allowing the access of the handling device underneath.
This conveyor keeps tracking.
And can transfer a single load, or double one in length.

Picking Station:

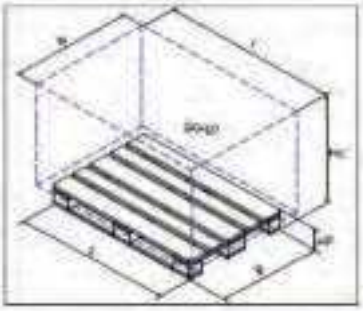
This is the item in which the operations interact with the automated system. The goods inside the automated warehouse are handled from here.

Their ergonomic design guarantees quality in load handling and safe working environment.

Safety is ensured by the different equipment in the stations, minimizing labor hazards for the operator who is working in the P&D stations.



TYPES OF ROLLER CONVEYOR



L	1000	l	1380
B	800-1000-1200	b	900-1100-1380
Hp	145	hc	var.
Q	up to 1500 kg		

(651.3)

TECHNICAL DATA		
Application	--	Horizontal transportation of pallets
Requirements	(*1)	EURO PALLET as described in UNE-EN 13698:2003
Load dimensions (mm)	--	b x l: as shown in the image above
Available lengths (mm)	(*2)	1,340 - 5,348 (in intervals of 167 mm)
Distance between rollers (mm)		167
Roller diameter (mm)		80
Pallet guide	(*3)	External or side washer (only for B=800 mm) and / or guide wheels
Brake		Optional
Mechanical stop at end		Optional
Conveyor height (mm)	(*4)	HR = 600 // HR =900 // HR = 1,100
Maximum weight per type (kg)		1500
Weight of the TR15		83 kg + 67 kg/m
Noise level (dBA)		--

Drive information		Speed 1	Speed 2
Speeds (m/min)	(*5)	10	<= 20
Neutral + three phase voltage	--	400	400
Frequency (Hz)	--	50	50
Power (kW)	--	0,37	0,37
Photocell sensor kit	(*6)	1	2
Photocell information	--	24v - Background suppression 100mm	
Ambient Storage Conditions	(*7)	0 °C to +40 °C and up to 70% humidity	
Freezer Storage Conditions	(*7)	-30 °C to 0 °C and up to 70% humidity	
Degree of protection	--	IP 54	

(*1) It is especially important for the correct operation of the installation that the pallets used are EURO PALLETS and meet the requirements set out in the UNE-EN 13698:2003 standard with regards to dimensions and tolerances.

(*2) Other measurements available on special request.
For conveyors whose length (L) is greater than 4 m., the profiles which make up the base structure are connected using brackets.

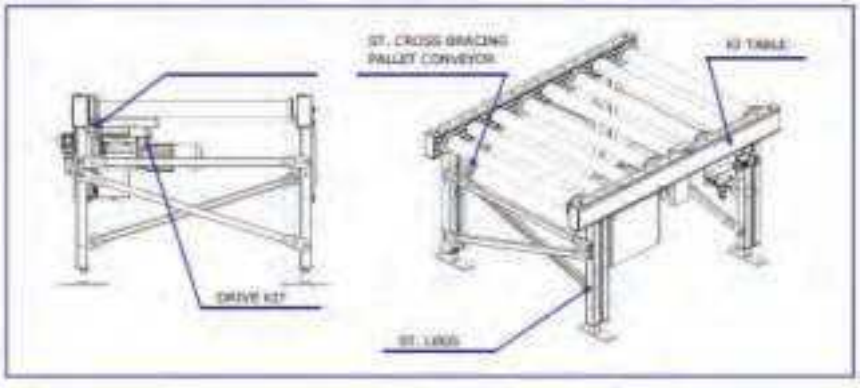
(*3) The design of the B=1,000 mm conveyor allows for the use of Euro pallets of B=800 and B=1,000 at the same time.

(*4) Allows for adjustments of +40 mm to compensate for irregularities in the floor paving.

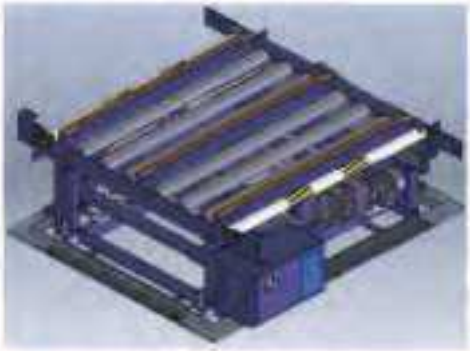
(*5) The versions with variable speeds of up to 20 m/min require a variable-frequency drive. This is also necessary when the load is unstable or is not boxed.

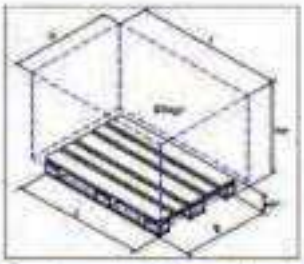
(*6) The photocell kit includes supports.

(*7) Heated photocells are included in the thermal kits (T=0N).
Other temperatures on special request.



TM-2R/3R - 1.200 mm WIDE PALLET





L	1200	l	1000
p	(600-1000-1200)	h	(600-1000-1200)
Hp	145	kg	var.
Q	up to 1500 kg		

TECHNICAL DATA		
Application		Perpendicular transfer from rollers to chains and viceversa
Requirements		EURO PALLETS as described in UNE-EN 13698-1:2003
Load dimensions (mm)		h x l, as shown in the image above
Load capacity		1 pallet
Maximum net weight (kg)		1.500
Height of conveyor 1 (mm)		(HC) Chains = 650 / (HR) Rollers = 600
Height of conveyor 2 (mm)		(HC) Chains = 950 / (HR) Rollers = 900
Height of conveyor 3 (mm)		(HC) Chains = 1150 / (HR) Rollers = 1100
Variable height of conveyor (mm)		(HC) Chains = 560 - 1100 / (HR) Rollers = 510 - 1100
Roller diameter (mm)		80
Roller bumper to prevent falls		Optional
Chain bumper to prevent falls		Optional
Hinged bumper on rollers		Optional
Weight TM8g 2R/3R A120 (kg)		411

Drive information		Features
Speed (m/min)	(*1)	variable up to 20
Elevation cycle time (s)	(*4)	5
Neutral - three phase voltage (V)		400
Input frequency (Hz)		50
Lifting power (Kw)		0,75
Roller power (Kw)		0,25
Chain power (Kw)		0,37
Strands of chains	(*2)	2 or 3 strands
Entry photocells		2
Photocell information		24v - Background suppression 300mm and reflex
Ambient Storage Conditions	(*3)	0 °C to +40 °C and up to 70% humidity
Freezer Storage Conditions	(*3)	-30 °C A 0 °C
Degree of protection		IP54

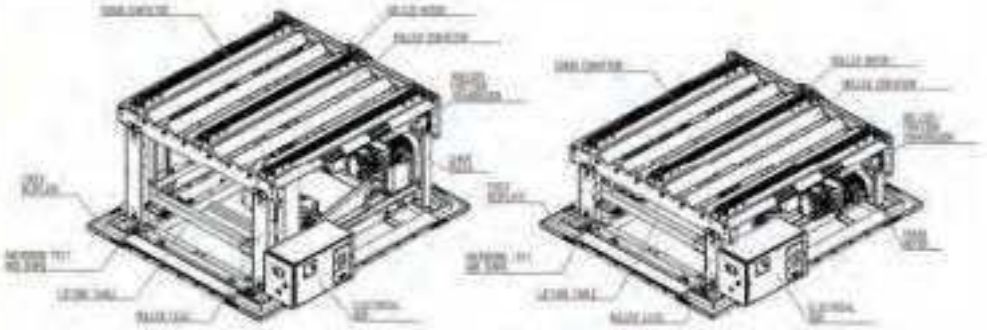
- It is especially important for the correct operation of the installation that the pallets used are EURO PALLETS and meet the requirements set out in the UNE-EN 13698-2:2003 standard with regards to dimensions and tolerance.

(*1) Versions with V0.20 m/min require a variable frequency drive to ensure correct operation. This is also necessary when the load is not fixed or is unstable.

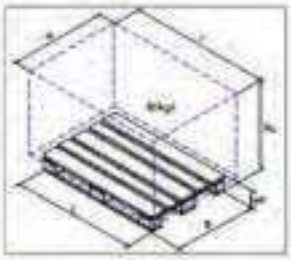
(*2) Depending on pallet quality and deflection.

(*3) Other temperatures on special request.

(*4) Time required to carry out lifting or lowering.



TYPES OF CHAIN CONVEYORS



L	1200	I	1200
B	600-1000	b	400-(100)
Hp	145	hc	var.
Q	up to 1500 kg		

TECHNICAL DATA		
Application		Transverse transportation of Euro pallets
Requirements	(*1)	EURO PALLETS as described in UNI-EN 13698:2003
Load dimensions (mm)		B x L as shown in the image above
Lengths available (mm)	(*2)	988 ÷ 2,910 (in intervals of 16 mm)
Length to be covered (mm)		Length available + 70 mm
Pallet guide	(*3)	Optional chainmesh
Mechanical stop at end		Optional
Conveyor height (mm)	(*4)	HC = 650 // HC =950 // HC=1,150
Maximum load weight (kg)		1,500
Weight TC 38		132 kg + 27 kg/m
Noise level		-

Drive information		Speed 1	Speed 2
Speed (m/min)	(*5)	10	20
Neutral + three phase voltage		400	400
Frequency (Hz)		50	50
Power (kW)		0,37	0,37
Photocell sensor		1	2
Photocell information		24v - 50Hz - Background suppression 300mm	
Ambient Storage Conditions	(*6)	0 °C to +40 °C and up to 70% humidity	
Freezer Storage Conditions	(*6)	-30 °C to 0 °C and up to 70% humidity	
Drag chains		3	
Degree of protection		IP 54	

(*1) It is especially important for the correct operation of the installation that the pallets used are EURO PALLETS and meet the requirements set out in the UNI-EN 13698:2003 standard with regards to quality, dimensions and tolerances.

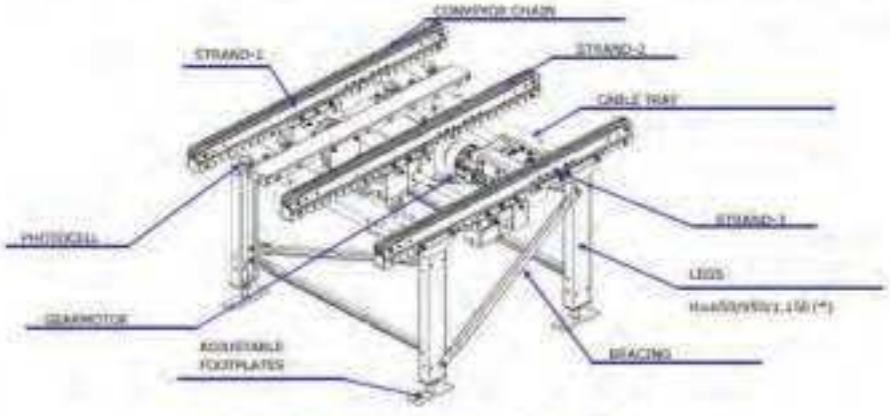
(*2) Other measurements available on special request.

(*3) Used in the conveyor immediately before. They ensure the central positioning and guide the pallet to ensure that it is always placed in the same position on the racks.

(*4) Allows for adjustments of ±40 mm to compensate for irregularities in the floor paving.

(*5) Versions with V0-20 m/min require a variable-frequency drive to ensure correct operation. This is also necessary when the load is unstable or is not pallet, even for 10 m/min versions.

(*6) Heated photocells are included in the thermal lock (T=0k). Other temperatures on special request.

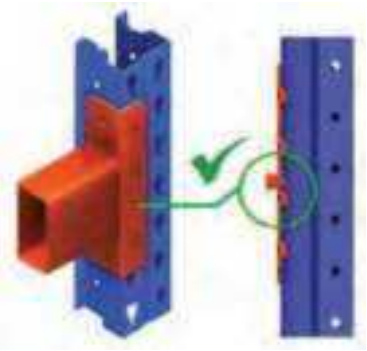


(*) OPTIONAL ELEMENTS DEPENDING ON MODEL TYPE

6.3. Racks

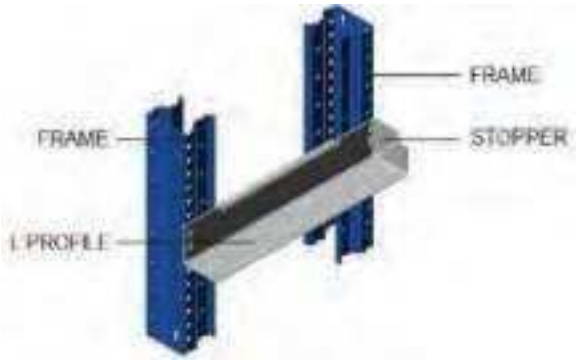
The main racking components are the beams or L profiles and frames. The frames are the upright pillars of the racks. They are latticed structures made up of two upright profiles with diagonal bracing, which are bolted together. They are pleated to increase the compressive and buckling strength of the profiles.

All of the uprights have two rows of slots, shaped like wine glasses, along the front, to which the beams or L profiles can be fixed perfectly in place. Once assembled, a safety locking mechanism ensures that the beam remains anchored in position. The frame also has several rows of boreholes down the sides, to attach the bracing and allow for the placement of any additional accessories that might be necessary in the system.
The frame is fixed to the floor using anchoring plates, held down by threaded rods and chemical plugs. A system of nuts and shims allows the height of each upright to be adjusted, to ensure that everything is perfectly level.



Frames and the anchoring plates are painted with blue epoxy resins (RAL 5003) which act as corrosion inhibitors. Coating is applied using a process of cathode electrode deposition, where pieces are totally submerged to ensure they are completely covered. This process is also called cataphoresis.

The beams are painted electrostatically after degreasing in a continuous tunnel dryer. They are orange (RAL 2001). The design of the beams allows them to be safely riveted in place, so they do not become dislodged.



The L profile finishing is pre-galvanized. The finishing of the pre-galvanized elements is obtained by dipping in the steel coil in a continuous process in a bath of molten zinc. This process is performed in the steelworks companies themselves. Mecalux buy it directly from the supplier with this finishing.

Trussed horizontal and vertical bracing ensure the structure's stability when bearing the weight of the loads and the impacts of the stacker cranes on the racking.

6.4. Control programmes and computer equipment

The automated warehouse is controlled by the programme Galileo. This programme conveys commands to the machines that either originate from the warehouse management programme or

are manually entered by the operators. As such, it works within the installation to move loads from one place to another for handling, storage or retrieval.
Communication with the warehouse management system to manage the machines under its control is one of the programme's features. This programme has been designed on three levels. The user service level is the interface that allows the user to interact with the installation via the terminals installed at the control stations for this purpose.

The interface is custom, and can be adapted to each installation. It enables the general control of the installation, or control of one of the machines found therein. This is thanks to the use of a field bus that allows all the machines to be interconnected with the system. In installation is divided into stations where different routes or other actions, such as the collection of data from goods that pass through, are carried out.

Route is used to refer to the transportation of goods from one station to another. Stations are the elements in an installation where routes start or finish.

6.5. Management programmes and computer equipment

MECALUX's experience in the field of logistics has allowed us to develop a solution for warehouse management, called Easy WMS®. This Warehouse Management Software has proved itself to be efficient and robust across various fields of logistical activity: Storage, manufacture, distributions, etc.
The main objective of Easy WMS® is to control, coordinate and manage all processes that take place in the warehouse. Its structure is based on levels of functionality. This makes Easy WMS® software that is hugely capable of adapting to the specific needs of each installation. Broadly speaking, the management software carries out the following functions:

- Exchange of information with the HOST regarding notification of goods coming into and leaving the warehouse.
- Management of outbound order lines, location management, dispatches, inventory, etc.
- Management of movement, placement in the warehouse, retrieval of goods, etc.
- Queries and lists.

Thus, Easy WMS® is an integral part of a hierarchical structure with three interconnected levels. First, we have the company's management and admin system (ERP or HOST). Next, the warehouse management programme, which receives commands from the ERP to manage the database and the creation of work commands for the warehouse. These orders are transmitted to the warehouse control system, Galileo, which manages the movement of the machines around the warehouse.

The process of implementing Easy WMS® is carried out in three stages. These cover everything from the gathering of client specifications up until the final handover of the installation's documentation. Esto sin olvidar la fase de formación a nivel operativo y técnico del personal que operará en el almacén. This training is usually carried out during the commissioning, to speed up the process of bringing the installation into production.

Given the level of complexity that can be required of Easy WMS®, depending on the customer's needs, the technical offer document for the functions of this programme are included as an appendix to this document.

7. Scope of supply and exclusions

In this section the supply volume in terms of racking, handling equipment and IT hardware and software is detailed.

7.1. Scope of supply of racking

- Anchoring plates and anchor bolts.
- Shim plates.
- Non-retraction mortar.
- Frames
- Beams.
- L profiles
- Structural frame joints
- Fixings between guide rail and beams.
- Guide rail entrance pieces.
- Top bumper for guide rail.
- Angle brackets.
- Horizontal bracing beams.
- Struts (to support the upper guide rail outside of the racks).
- Upper guide for stacker cranes.
- Conveyor maintenance platforms.
- Safety enclosures and doors (according to layout).
- Grounding of the structure. Ground lines must be in installed on the property by the CLIENT, running along each row of racks, connected to their corresponding stakes. Supply is restricted exclusively to the connection between ground lines and specific points of the structure. The frequency of the ground connections must be defined by the installation's specifier.

7.2. Scope of supply of stacker cranes and handling equipment

STACKER CRANES	
Stacker crane model	ML100
Extraction system	EPDF
Number of stacker cranes (un.)	1
Stacker crane height (mm)	12000
CPC control cabinet (un.)	1
Service temperature (°C)	Ambient

Other relevant information:

—

CONVEYORS	
Roller conveyor (LRA) (un.)	9
Cross transfer Roller-Belt conveyor (LTM) (un.)	2
Roller conveyor with lifting elevation (LEE) (un.)	2

Other relevant information:

—

7.3. Hardware and Software

HARDWARE AND SOFTWARE	
Control posts (un.)	1
Easy WMS licences (programme)	Included
Easy WMS user licences.	Included

Other relevant information:

—

7.4. Features of the Included Software

The following has been added to this delivery volume:

- The features outlined in the document appended to this report.
- Feature Analysis Document for Easy WMS® application. The Feature Analysis Document describes the full extent of the features that will be developed for the Easy WMS® warehouse management system in accordance with the specifications provided by the CLIENT for the Easy WMS® Feature Description Document, enclosed with this report as an Appendix, and with MECALUX standards.

  This document will be sent to the CLIENT for review. Once the scope of this Document is clarified, MECALUX will send out a final version to be signed by the CLIENT. The CLIENT will have thirty (30) calendar days to sign the Document.

  Once the CLIENT signs the Feature Analysis Document it will be understood that the CLIENT fully understands and accepts the Easy WMS® features that are to be implemented in its warehouse and MECALUX will therefore configure and parameterise the CLIENT's Easy WMS® warehouse management software in accordance with the Document specifications.
- Document of Organic Analysis of Communications with the Host (If there is communication with the ERP).

- Product Documentation: Easy WMS® Administration Manual (for IT staff, in English and Spanish), and Easy WMS® User Manual. The supplied manuals will provide the standards of the Easy WMS® application. No editing or customisation of the manuals is envisaged. Should the CLIENT desire a customised or specially adapted User Manual or Administration Manual, MECALUX, S.A. will perform an assessment of the editing work on the Easy WMS® Manuals and provide a quote.
- Training will be conducted using the Easy WMS® documentation delivered to the CLIENT on the operational basis described therein. A key user will be designated by the CLIENT, who will receive training in the use of the Easy WMS® application. The training of the CLIENT's key user will take a maximum duration of three (3) days. Should a training period longer than three (3) days be required, the cost of the additional hours would have to be quoted and calculated in this Offer.
- Production Support Service: 5 days a week between 8:00 am and 6:00 pm as from the time of commissioning. MECALUX will make one (1) person available to the CLIENT for this purpose. Should more hours of production support be required, the cost of the additional hours will be quoted and billed separately by MECALUX.

  During the time allocated for "production support" the MECALUX technician may resolve any questions or queries stemming from the use of the installation by the CLIENT's operators.

MECALUX offers the possibility of formalising a remote maintenance contract to allow for the resolution of any incidents that may arise after commissioning. Such maintenance would be carried out from Monday to Friday during business hours.

7.5. Not included

This offer does not include any of the following items:

- Flooring, slabs and civil works in general.
- Static, strength of the installation.
- Geotechnical surveys of any kind or stress and strength tests.
- Non-retraction mortar.
- Opening pieces of angle brackets.
- Back stop of angle brackets.
- Wall and roof cladding.
- Framework for openings.
- Parapet structure in the cross-aisle walls (it is assumed that the wall cladding will follow the slope of the roof cladding).
- Parapet structure in the down-aisle walls (it is assumed that the structure of these elements will reach approximately 200 mm over the roof joists of the respective wall).
- Wall and roof joists that do not meet the clearances detailed in previous sections.
- Additional wall and roof joists at intersections between cladding panels.
- Roof joists (it is assumed that the roof cladding is supported directly on the roof trusses).
- Lifeline.

- Fire system support.
- Drilling of the reinforcing bars of the floor slab. The CLIENT must ensure that the position of the floor slab's reinforcing bars does not interfere with the placement of the anchor bolts on the racks' base plates.
- Seismic action has not been considered in the calculation of this project. Seismic action can cause unit loads to become dislodged and fall, which can cause local and global damage to the racking. Should it be necessary, MECALUX can revisit the project to provide suitable measures to reduce the risk of unit loads falling. These measures might require changes to the project dimensional changes to the project in any direction, and involve an additional charge.
- Communication hardware for the CLIENT's HOST, HOST side communication software and HOST programming.
- The connection to the electrical supply for the power distribution cabinets described in the offer.
- Any system for the protection against, or detection and/or extinguishing of fires not described herein.
- Cables and electronic equipment for computer networks and powering terminals and computer elements.
- Isolation or electrical protection either for systems supplied by MECALUX or those already belonging to the CLIENT.
- New Easy WMS® features, the development of features or the modification of features or the operational bases applicable thereto not expressly included in the Feature Analysis Document.
- The cost of any changes requested by the CLIENT after accepting this Offer, even while the Feature Analysis Document is still being finalised, will be quoted and billed separately by MECALUX. These changes will also involve the modification of deadline for executing and implementing Easy WMS® depending on the feature specifications or modifications, of which MECALUX will inform the CLIENT.
- Maintenance services of any kind.
- Consultancy services or assistance in potential inspections of legalisation procedures completed by any competent authority.
- Logistical assessment for implementing the warehouse management system.
- Labelling of placement locations in the warehouse by MECALUX staff, unless this service has been purchased specifically.
- Any other supply, product or scope that is expressly excluded in this offer and/or that is stated as the responsibility of the CLIENT.
- Any work, supply, etc., that is not described or specified herein.
- Installation and configuration of hardware not supplied by MECALUX.

Any work or supply resulting from the exceptions listed previously will require a revision of this offer, or will be quoted separately to the CUSTOMER, at the price that is applicable at the time of quoting.

8. Planning and execution conditions

In order to complete the assembly and ensure that the plans are carried out successfully, the collaboration of the CLIENT is required.
The CLIENT will facilitate access to the premises where the material to be supplied is located to qualified MECALUX staff for assembly and commissioning of the installation.
In the event that special security passes are required, MECALUX must be informed with sufficient advance notice for the procedures to be carried out in a timely manner.
The CLIENT must provide all resources and fulfil all conditions described in this Offer on the agreed dates, as well as those outlined in the installation's Planning Document, so that the planned deadlines can be met.
Therefore, it is proposed that the CLIENT and MECALUX create a mixed work team to carry out the project. The CLIENT will assign a spokesperson with decision-making power who, along with the MECALUX Project Manager, will monitor the project to check the work progress according to the established plan. It must also ensure that the appropriate spokespeople for each work area participate in the different meetings (software area, risk prevention area, etc.) and coordinate the acquisition of the necessary information in each of the areas where the parties are required to contribute.
It must also ensure that the appropriate spokespeople for each work area participate in the different meetings (software area, risk prevention area, etc.) and coordinate the acquisition of the necessary information in each of the areas where the parties are required to contribute.
By accepting this Offer, the CLIENT declares that any spokespeople and representatives it designates in the course of the execution of the installation are authorised to represent the CLIENT and sign the respective documents, which shall enjoy full legal validity and force.
In this section, the planning conditions and other points are included, which must be adhered to in order to ensure that the project enjoys the expected level of success.

8.1. Period of Execution

The period of execution can be found detailed in the project planning document which accompanies this offer. This planning is intended to determine the approximate length of time during which work will take place. For this reason, in the aforementioned document all of the phases of this installation have been taken into account. The assembly phases and the targets to achieve during construction, both for MECALUX and the CLIENT, have been included. It is the equal responsibility of all the intervening parties to ensure that these milestones are adhered to. In the even that they are not adhered to, it will not be possible to meet the dates indicated therein, with the responsibilities that correspond to each.
If, for reasons unattributable to MECALUX, it is not possible to adhere to the timeline established for the project, this shall not constitute a reason to delay or postpone the established payment plan.
The CLIENT shall provide all the means and conditions described in this offer on the agreed dates indicated in the project planning document in order to help meet the deadlines provided.
In the event of any delay not attributable to MECALUX of more than 90 days after the agreed deadline, the prices included shall be revised and updated.
In the event that necessary materials necessary for the fulfillment of the objectives can not be delivered on site for reasons not attributable to MECALUX, they must be certified at the factory in

which they were produced and, therefore, the milestone dependent therefrom shall be billed. In the event that MECALUX does not have sufficient space to store said materials in their warehouses, the CLIENT undertakes to make a space available to store them conveniently, either within their facilities or in those of a third party hired for such a purpose. In any case, MECALUX reserves the right to bill the CLIENT for the storage of materials in the event that the CLIENT does not meet their receipt requirements.

8.2. Site handover

The site will be handed over according to the milestones indicated in the project planning document. In the event that the client is not available to receive the installation on the date indicated in the aforementioned document, MECALUX reserves the right to complete the handover on the agreed date. The CLIENT undertakes to pay any costs incurred from the completion of this milestone.
Once the assembly is finalised, commissioning of the installation will begin. This purpose of this commissioning is to confirm results from tests carried out previously are satisfactory, in accordance with the system's functionality testing plan. This test will be carried out with the involvement of mechanical, electrical and control personnel. A positive result will mean the installation is ready for operation. From this moment, the installation's warranty period begins, and risk liability passes to the CLIENT who will begin to use the installation.
Once the conditions established in each of the milestones, MECALUX reserves the right to complete the site handover unilaterally on the agreed date. In this event, the CLIENT must meet the stipulated payment milestones. If the client is unable to take charge of the installation, this shall not constitute a reason for any breach of their contractual obligations to MECALUX.

8.3. Receipt Area

In the site preparation phase, the CLIENT will assign an area for unloading and collection of materials, for pre-assembly and for installation, next to the assembly area. This shall be exclusively for use by MECALUX throughout the entire assembly period. This collection area shall be of sufficient size for the project (as an estimate, this should be equivalent to 50% of the surface area of the warehouse floor), and conditions must be suitable to allow work to take place, including sufficient lighting, for as long as work must take place. The collection area must allow access for heavy goods vehicles throughout the entire work period.
This area must have access to motor vehicles from both inside and outside the warehouse. It must also meet the requirements for the transit of vehicles used for assembly and handling of materials (forklifts, lifts, etc.). In the event that the collection area is not covered, the surface must be compacted, waterproofed and with sufficient drainage to prevent mud from forming, which could soil materials or create problems for their transportation or assembly.
Before assembly, both the installation area and its accesses must be cleared and obstacle-free (high voltage lines, scaffolding, transmitter antennae, etc.). During the assembly period, no interference with other industrial activities may occur.
Waiting hours or any assembly stoppage will be billed separately, in accordance with prices valid at the time of assembly. Similarly, if the collection area is located at a distance from the assembly floor, the additional costs of covering this distance will be billed to the CLIENT separately.

8.4. Supply and Services

The CLIENT shall ensure that there is an electricity supply of 220/380 V and water services on site. On site is understood as a distance of 25 m or less from the taps or outlets to the central area of the floor. In normaly assembly conditions, the electricity supply must be 30 kW. If it is necessary to use mobile cranes during assembly, the electricity supply must be no less than 70 kW. In the event that a tower crane is required, the required power supply shall be investigated. These installations must comply with the regulations in force. The assembly floor must be equipped with waste pipes to drain off water in the event of flooding. In such an event, clearing the any accumulated water shall be the responsibility of the CLIENT.

Night lighting shall also be provided as necessary, as well as any elements and means required for the disposal of waste materials and surplus packaging in accordance with environmental regulations in force.

This offer does not include, under any circumstances, the unloading of our materials, nor lifting devices (scaffolding, forklift trucks, platforms, scissor lifts etc.). Nor does it include structural safety elements (fencing, safety meshes, etc.).

A parking area must also be provided for the vehicles of those assigned to the project and those used during the assembly.

Regarding communication, MECALUX required a telephone line and access to the Internet en the whole of the assembly area for the configuration and initial commissioning of the installation. These shall be available during the material unloading phase.

Necessary hygiene facilities must also be made available for the fitters. These must be accessible throughout the entire working day. Modules are required, either huts or rooms, of approximately 6 x 2.5 metres, to be used as office space, tool storage and changing rooms. These must be sufficient in quantity to serve the workforce. Conditions must be suitable for these purposes and they must be fitted with heating or air conditioning systems to provide necessary comfort at all times.

The maintenance and consumption of all of the supplies described in this section shall be borne by the CLIENT.

8.5. Environment

It is the CLIENT, as the final owner, who must separate waste by material for disposal. This must be passed on to a waste picker, a recycler, a licensed valuer or a trader for reuse. The costs accrued from this shall be charged to the CLIENT.

Fitters will dispose of all waste materials and rubbish (mainly from packaging – plastic, wood, metal banding and cardboard) into the containers provided by the CLIENT.

If the CLIENT has an environmental management system, the material will be put into appropriate containers, or will be left in a suitable assigned area, separating the different products.

8.6. Prevention of Occupational Hazards

Mecalux has an established Occupational Hazard Scheme, which includes Coordination of Business Activities with clients. Therefore, we remain at your disposal for you to provide any documentation for the prevention of occupational hazards that you deem necessary for such coordination, prior to starting work.

8.7. Resistance and Surveying of the Floor

The floor should comply with the resistance and surveying specifications included in the section “Interaction with the Ground” of this offer. In the event that the resistance of the floor exceeds values calculated by MECALUX by 30%, charges will be made to cover the additional cost incurred for the use of special tools to cut the reinforced slab.

According the European standard EN 15629, it is very important to ensure that the ground on which the installation will be fitted is adequate. The CLIENT must verify that the ground is able to withstand the loads from the racks and machines, taking into account the distribution of those displayed on the attached layout, and the load per base plate included in the section “Racking Layout” in point 2.4.1 of this offer. In the event that they is necessary, geotechnical surveys to determine the strength of the floor or slab on which the warehouse is built will be charged to the CLIENT.

The surveying of the slab must meet the applicable FEM recommendations in each case. MECALUX will review the loadbearing points in the slab and will indicate the level of flatness. The CLIENT must correct any unevenness or changes in level that does not fall within the established tolerances.

The civil works contractor will set two reference points on the slab, to trace the axes of the racks, along with four additional points for reference during levelling work. These will all be delimited by an official surveyor.

If the floor exceeds values established by applicable regulations, the excess cost of levelling will be paid for by the CLIENT.

MECALUX reserves the right to refuse to perform tasks relating to the assembly until the surface is deemed adequate. MECALUX shall not be held responsible for this delay. If a tower crane is required, and this cannot be stood on the assembly floor, the CLIENT will condition a strip of at least 5 metres wide, parallel to the slab, suitable for the installation of the crane, and its rails.

8.8. Working hours and delays

Working hours shall not be restricted. In the event that it is necessary, the Client undertakes to allow that any assembly or commissioning work is completed overnight or on public holidays.

Days or fractions of days which are affected by force majeure (for example, adverse weather conditions specified in employment regulations in force) or unforeseeable events (including strikes), shall not be counted as working days in the project planning document. This document will be modified to reflect these adverse events. MECALUX will present the corresponding reports, either metereological or otherwise, by way of justification of the days in which it has not been possible to work in normal circumstances. Delays caused by third party contractors shall not be attributable to MECALUX.

If, for any reason unattributable to MECALUX during the course of the installation, services must be suspended or interrupted, the CLIENT is obliged to pay the cost of any materials that have been manufactured, assembled or are in the process of being manufactured. They must also cover any expenses derived from stopping and starting installation work. Furthermore, the information in the previous two sentences shall also be applicable in the event the rate of supply or work is affected due to the lack of input from third parties of data or items necessary for the execution of this project. In any event, resuming suspended or interrupted work will include a review of, or update to the conditions, including pricing and warranty period.

8.9. Safekeeping and protection

Safekeeping and protection of the material delivered for assembly and commissioning of the installation will be the charged to the CLIENT. They shall also be responsible for the oversight of tools and machinery left on the premises while work is being carried out. The CLIENT guarantees an adequate level of security in their installations to prevent theft or damage, as well as the corresponding coverage in their insurance policy. Delays in work resulting from security-related incidents in the installation will lead to the rescheduling of the project, with no liability for MECALUX. MECALUX will not be held responsible for any damage to the material in the event that this is left outdoors during the assembly process.

8.10. Interference with Existing Installations

The CLIENT will not hold MECALUX responsible for any damage that may be caused to existing installations, if the person designated by MECALUX to carry out the project has not previously been informed of the location of any electrical and pneumatic conduits, etc. that might interfere in the assembly of the installation.

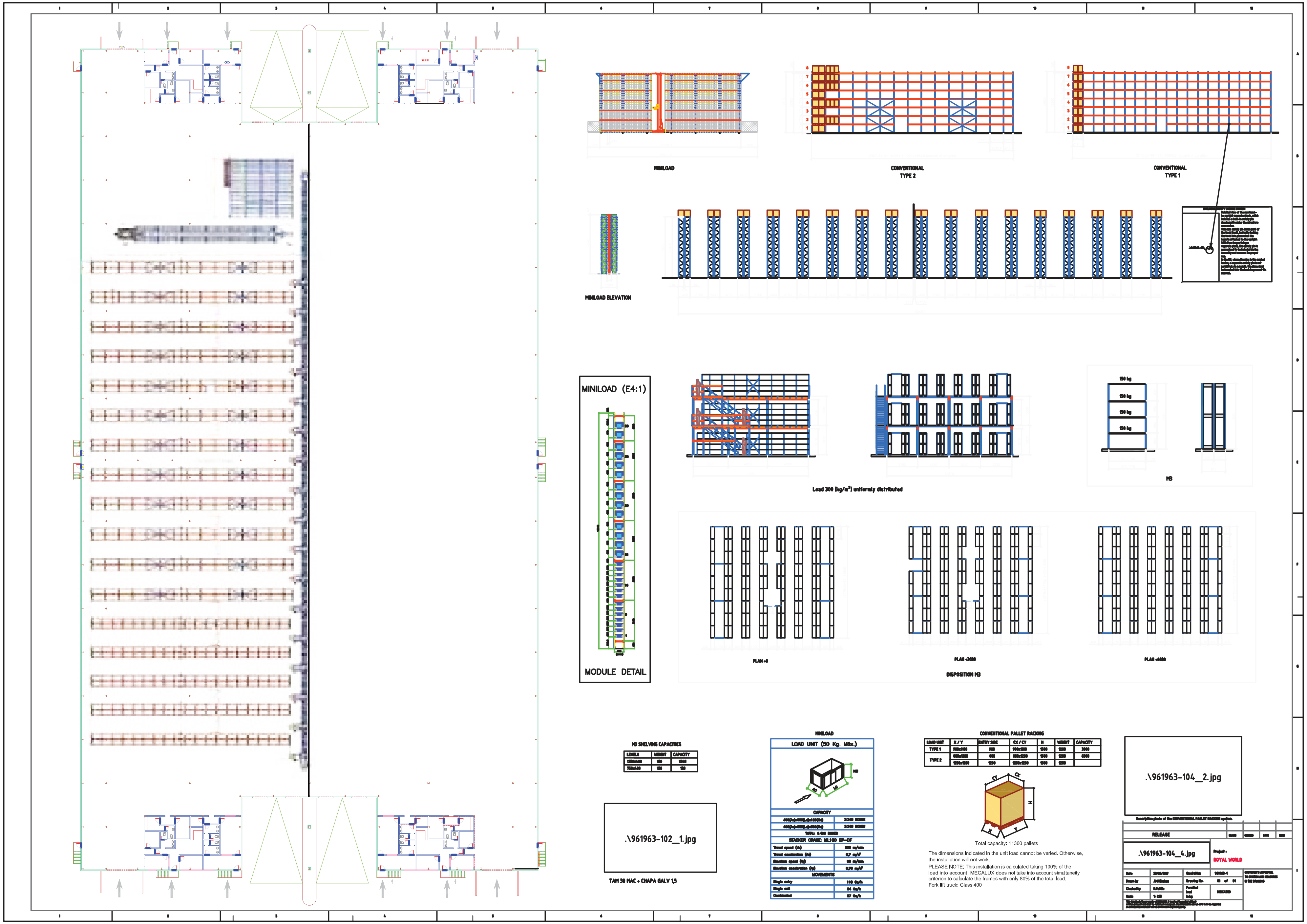
8.11. Integrity of the Installation and Offer

The structure of the warehouse that is the subject of the offer is calculated on based on the characteristics described. Therefore, no changes to the design, nor any replacement of components or repair to the installation can be made prior to finalising the assembly. Neither the CLIENT, nor any third party can make any changes with out the express consent of MECALUX.
MECALUX shall not be liable for any defects or damages caused to the installation, persons or goods resulting from modification or alteration of the installation or any of its components performed by parties other than MECALUX during or after the assembly completed by MECALUX.

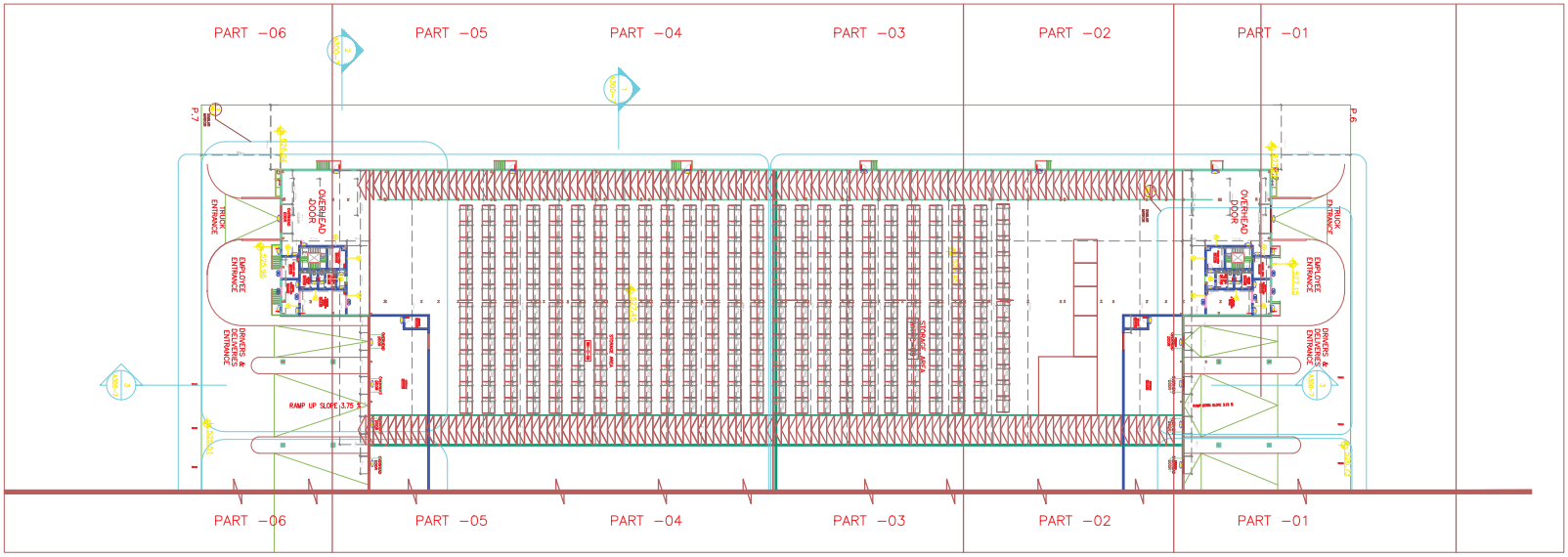
8.12. Other Conditions According to Type of Site

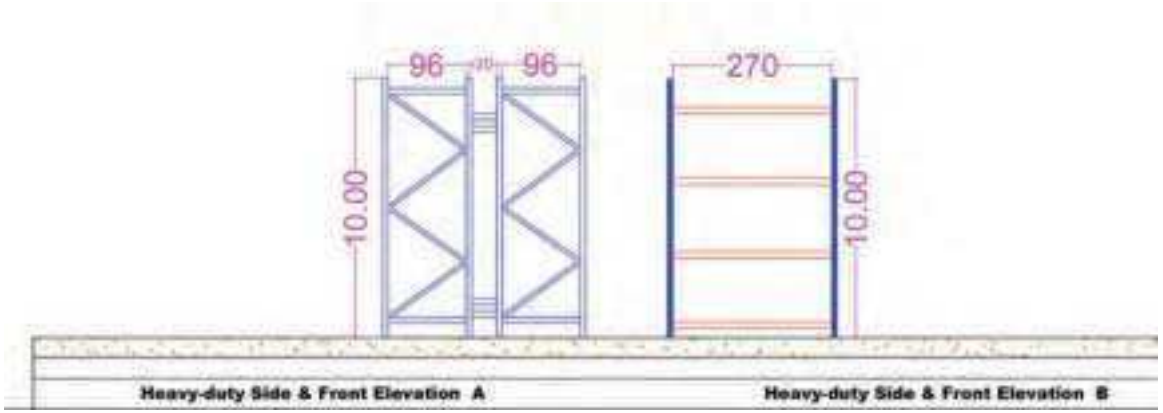
MECALUX works regularly with subcontractors specialising the in execution of installations such as the one described in this offer. As such, it is expressly stipulated that work can be subcontracted to third parties without need for the CLIENT's consent, who shall only be informed of the identifying information of the subcontracted companies, as well as the personnel involved in the work for appropriate purposes.
In any case, MECALUX shall be held liable by the CLIENT for the actions of subcontractors.
In the event that MECALUX does not carry out the installation, the CLIENT will be provided with assembly instructions under the terms established in the Machinery Directive 2006/42/CE. These instructions should enable the correct assembly of the machine or partial machine, without compromising health and safety.
Should MECALUX not be responsible for supplying the installation's WiFi infrastructure, an infrastructure meeting IEEE 802.11b/IEEE 802.11g standards will be required (to be able to guarantee proper operation of the Easy WMS® application). MECALUX recommends the IEEE 802.11g standard. It is also recommended that the Access Point devices have WPA or MAC Filtering enabled.

It will be the CLIENT's responsibility to provide the information required to implement the warehouse management system (such as layouts, current procedures, movement files and forecasts). The information provided must be accurate and ready to be used. The CLIENT must have a connection appropriate for MECALUX to be able to carry out remote technical support tasks.
The CLIENT undertakes to adopt the appropriate security measures in its information technology systems for provision of the service outlined in this Offer exclusively through MECALUX IP addresses.
The CLIENT must be duly informed of these IP addresses before Easy WMS® is implemented by MECALUX. MECALUX must also inform the CLIENT of any change in said IP addresses so that the CLIENT can update its filter.
These security measures are required in order to prevent unauthorised third-party access to the CLIENT's information technology systems.
MECALUX reserves the right to request that the CLIENT adopt any additional security measure to maintain the highest level of security for remote access. It shall be the CLIENT's sole responsibility to adopt any security measures indicated by MECALUX and to enable the connection to its information technology system solely when communicating with MECALUX for the purpose of carrying out Easy WMS® implementation and during the amount of time the connection is deemed to be necessary.
Should the CLIENT, its employees or its contractors breach any of the aforementioned requirements, it agrees to exempt MECALUX from any liability arising from the breach of its obligations in accordance with the conditions established in this Offer, and it shall be considered a substantial breach of the CLIENT's obligations.



MINILOAD
CONVENTIONAL
TYPE 2
CONVENTIONAL
TYPE 1
MINILOAD ELEVATION
MINILOAD (E4:1)
MODULE DETAIL
Load 300 (kg/m²) uniformly distributed
M3
PLAN +0
PLAN +3030
PLAN +4630
DISPOSITION M3
M3 SHELVING CAPACITIES
.\961963-102__1.jpg
TAM 30 MAC + CHAPA GALV 1,5
MINILOAD
LOAD UNIT (50 Kg. Máx.)
CAPACITY
TOTAL: 6.496 BOXES
STACKER CRANE: ML100 EP-DF
Travel speed (Vx)
Travel acceleration (Ax)
Elevation speed (Vy)
Elevation acceleration (Ay)
MOVEMENTS
Single entry
Single exit
Combinated
CONVENTIONAL PALLET RACKING
LOAD UNIT
X / Y
ENTRY SIDE
CX / CY
H
WEIGHT
CAPACITY
TYPE 1
TYPE 2
Total capacity: 11300 pallets
The dimensions indicated in the unit load cannot be varied. Otherwise, the installation will not work.
PLEASE NOTE: This installation is calculated taking 100% of the load into account. MECALUX does not take into account simultaneity criterion to calculate the frames with only 80% of the total load.
Fork lift truck: Class 400
.\961963-104__2.jpg
Descriptive photo of the CONVENTIONAL PALLET RACKING system.
RELEASE
.\961963-104__4.jpg
Project :
ROYAL WORLD
Date
Drawn by
Quotation
Drawing No.
Checked by
Scale
INDICATED
CUSTOMER'S APPROVAL





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CONTRACTOR:

CONSULTANT:

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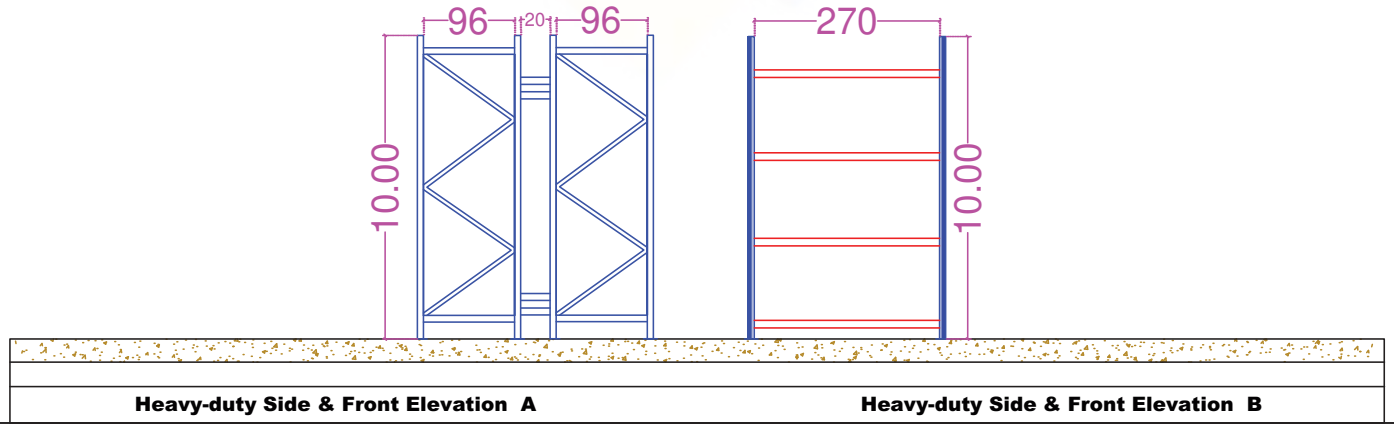
لاستشارات الهندسة المعمارية
BATIC_ARCH@YAHOO.COM

PROJECT: MEDICATION STORE

DRWG. TITLE: GROUND FLOOR LAYOUT

SCALE:	DATE: 18 / 9 /2017	PROJECT NO.
DRAWN BY:		
DESIGNED BY:	Eng.S.S.F	DRAWING NO.
CHECKED BY:	Eng.S.S.F	
PROJECT MANAGER:	Arch.Salem.S.Al fayaz	

APPROVED BY:



Heavy-duty Side & Front Elevation A

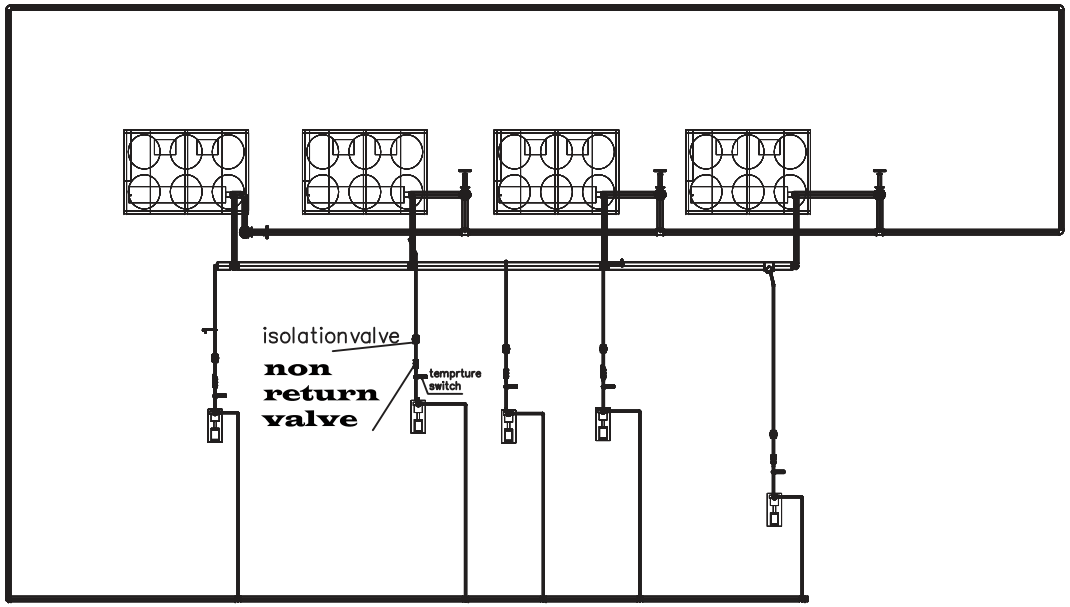
Heavy-duty Side & Front Elevation B

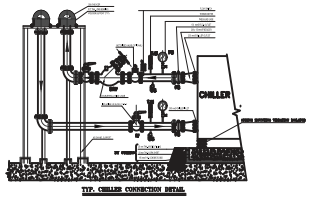
Cooling and ventilation system

It is one of the most basic and important systems in the warehouse. Therefore, the Food and Drug Authority has imposed a special system for this part.

This system has been studied and the distribution of adaptation and ventilation points in accordance with the standards and regulations.

reverse commen return 6"line with pressure drop .07ft





TYP. CHILLER CONNECTION DETAIL

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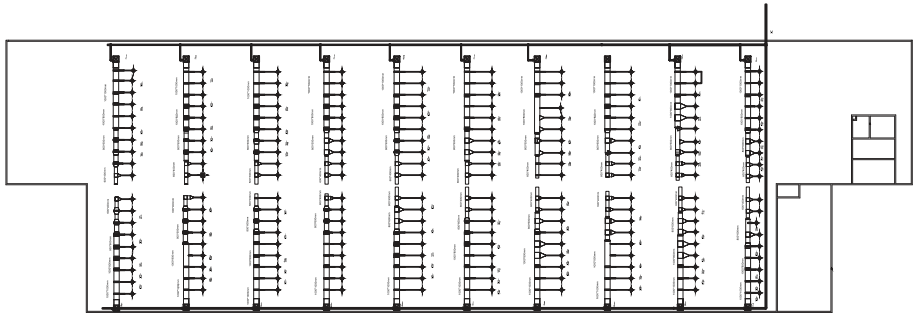
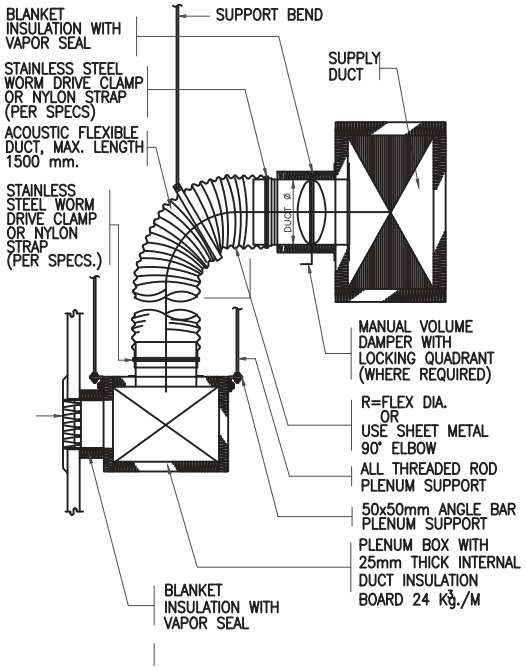
PROJECT: MEDICAI STORE

DRWG. TITLE: chiller piping

SCALE	DATE : 18 / 9 /2017	PROJECT NO.
DRAWN BY:		
DESIGNED BY:	Eng S.S.F	DRAWING NO.
CHECKED BY:	Eng S.S.F	
PROJECT MANAGER	Arch Salem S.Al fayaz	
APPROVED BY:		

REVISIONS





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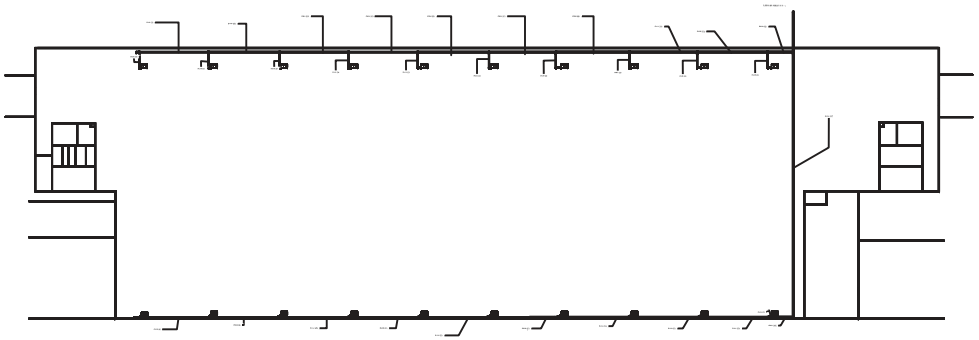
PROJECT: MEDICATION STORE

DRWG. TITLE: DUCT DRAWING

SCALE	DATE : 18 / 9 /2017	PROJECT NO.
DRAWN BY:		
DESIGNED BY:	Eng.S.S.F	DRAWING NO.
CHECKED BY:	Eng.S.S.F	
PROJECT MANAGER	Arch.Salem S.Al fayaz	
APPROVED BY:		



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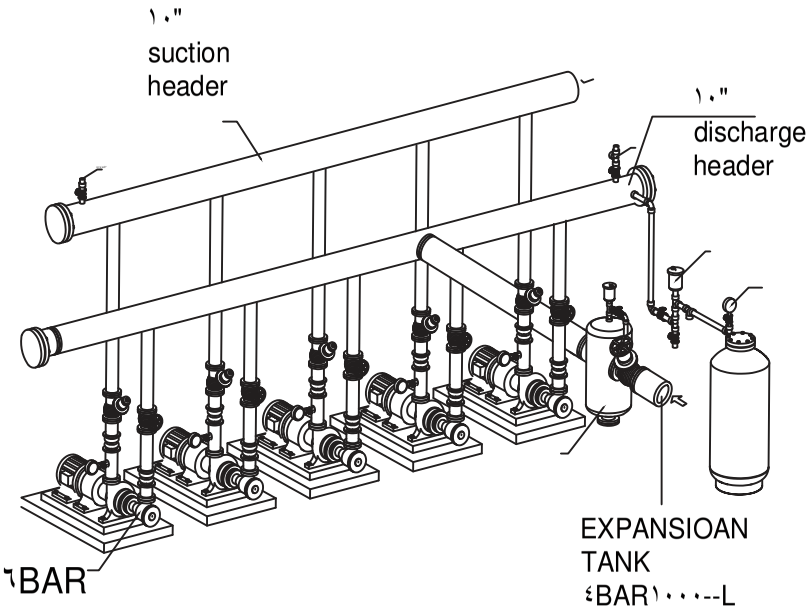
PROJECT: MEDICAI STORE

DRWG. TITLE: CHILLED WATER SUPPLY

SCALE:	DATE: 18 / 9 /2017	PROJECT NO.
DRAWN BY:		
DESIGNED BY:	Eng S.S.F	DRAWING NO.
CHECKED BY:	Eng S.S.F	
PROJECT MANAGER:	Arch Salem S.Al fayaz	
APPROVED BY:		

REVISIONS:



CHILLED WATER PUMP ASSEMBLY

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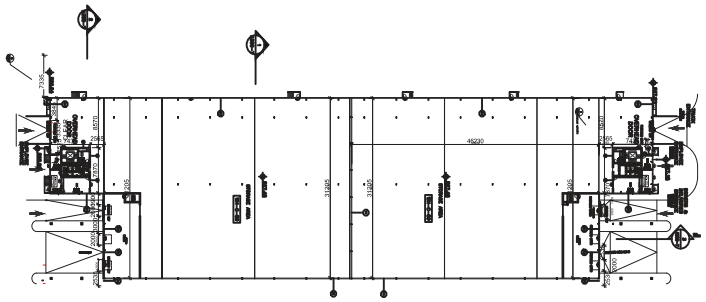
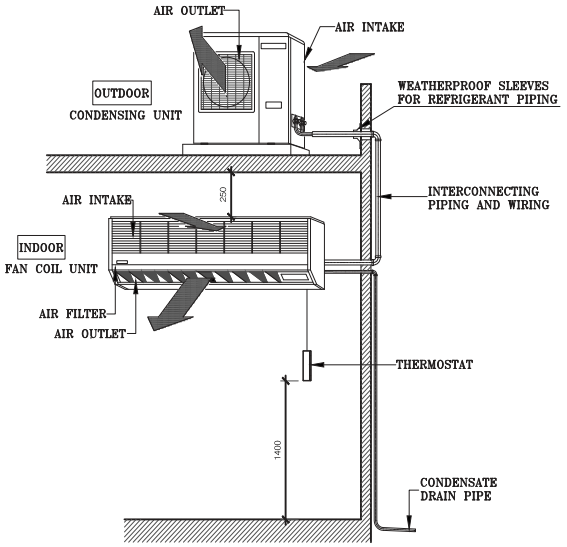
PROJECT: MEDICAL STORE

DRWG. TITLE: DUCT DRAWING

SCALE	DATE : 18 / 9 /2017	PROJECT NO.
DRAWN BY:		
DESIGNED BY:	Eng S.S.F	DRAWING NO.
CHECKED BY:	Eng S.S.F	
PROJECT MANAGER	Arch Salem S.Al fayaz	

APPROVED BY:





7 INSTALLATION DETAIL FOR MINI SPLIT UNIT
SCALE: 1/75

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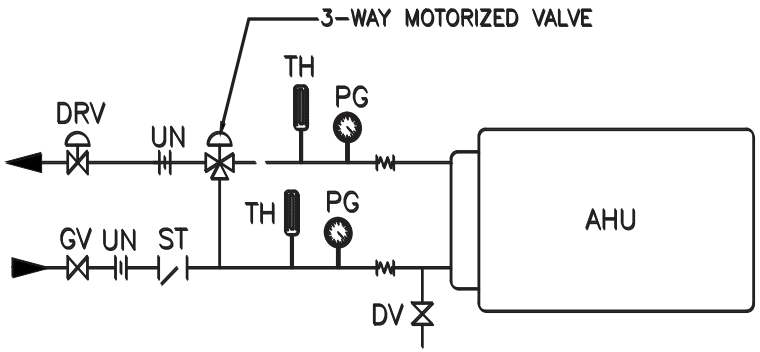
BATIC_ARCH@YAHOO.COM

PROJECT: MEDICAI STORE

DRWG. TITLE: spilit ac unites

SCALE	DATE : 18 / 9 /2017	PROJECT NO.
DRAWN BY:		
DESIGNED BY:	Eng S.S.F	DRAWING NO.
CHECKED BY:	Eng S.S.F	
PROJECT MANAGER	Arch Salem S.Al fayaz	
APPROVED BY:		



AHU TYPICAL CONNECTION DETAL

LEGEND:

DRV – DOUBLE REGULATING VALVE
GV – GATE VALVE
DV – DRAIN VALVE
TH – TEMPERATURE GUAGE
PG – PRESSURE GUAGE
ST – STRAINER
DV – DRAIN VALVE
UN – UNION
3WV – 3 WAY VALVE
– FEXIBLE CONNECTOR

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CONTRACTOR:

CONSULTANT:

BATIC
Architects & Engineers

BATIC_ARCH@YAHOO.COM

PROJECT: MEDICAI STORE

DRWG. TITLE: air handling details

SCALE	DATE : 18 / 9 /2017	PROJECT NO.
DRAWN BY:		
DESIGNED BY:	Eng.S.S.F	DRAWING NO.
CHECKED BY:	Eng.S.S.F	
PROJECT MANAGER	Arch.Salem S.Al Fayiz	
APPROVED BY:		

ABBREVIATIONS

AIR HANDLING UNIT	AHU
CONDENSING UNIT	CU
DOOR GRILL	DG
EXHAUST FAN	EF
EXHAUST GRILL	EG
FIRE DAMPER	FD
FRESH AIR	FA
FIRE DAMPER	FD
PACKAGE AIR CONDITIONER UNIT	AC
RETURN AIR GRILL	RG
RETURN AIR	RA
RETURN CEILING DIFFUSER	RCD
SPLIT UNIT	SU
SUPPLY CEILING DIFFUSER	SCD
SUPPLY AIR GRILL	SG
SUPPLY AIR FAN	SF
SUPPLY AIR	SA
TEMPERATURE CONTROL PANEL	TCP
TRANSFER GRILLE	TG
VOLUME DAMPER	VD

SYMBOLS & LEGENDS

RETURN AIR DUCT SECTION

SUPPLY AIR DUCT SECTION

SUPPLY CEILING DIFFUSER

RETURN CEILING DIFFUSER

SUPPLY LINEAR DIFFUSER

RETURN LINEAR DIFFUSER

SUPPLY GRILL

RETURN GRILL

EXHAUST FAN (ROOF MOUNTED)

EXHAUST FAN (WALL MOUNTED)

REFRIGERANT LIQUID PIPE

REFRIGERANT SUCTION PIPE

CONDENSATE DRAIN PIPE

FLEXIBLE CONNECTION

FLEXIBLE DUCT

CONDENSING UNIT

SPLIT UNIT

VOLUME DAMPER

FIRE DAMPER (CURTAIN TYPE)

SPLIT DAMPER WITH ACCESS DOOR

THERMOSTAT

TYPICAL DUCTING TAKE-OFFS

TYPICAL DUCTING TAKE-OFFS

DUCT CONNECTIONS

STANDARD DUCTED ELBOWS

GENERAL DIE GRILLE/SLOT DIFFUSER DETAIL (IF APPLICABLE)

DETAILS OF AIR SUPPLY & EXHAUST GRILLS (IF APPLICABLE)

SQUARE TEMP PER RETURN AIR DIFFUSER (IF APPLICABLE)

LINEAR SUPPLY CEILING DIFFUSER DETAIL

TYPICAL CONICAL HOOD DETAIL (IF APPLICABLE)

RETURN AIR DUCT DETAIL (IF APPLICABLE)

EXHAUST / RETURN AIR DUCTS CONNECTION (IF APPLICABLE)

DUCT HOOD SUPPORTS FROM FLOOR

DUCT THRU RETURN PARTITION

DUCT ACCESS DETAIL

DUCT HOOD SUPPORTS FROM WALL

DUCT HOOD SUPPORTS FROM FLOOR

BATIC
Architects & Engineers
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BATIC_ARCH@YAHOO.COM

MEDICATION STORE

DRAWING TITLE:

DUCT Dtails

	DATE 18 / 9 /2017	PROJECT NO.
DESIGNED BY:	Eng.S.S.F	DRAWING NO.
CHECKED BY:	Eng.S.S.F	
DRAWN BY:	Arch.Salem S.Al fayiz	
APPROVED BY:		

Energy and Alternative Energy System

The source of energy is the Main Engine to work inside the warehouse, which is the Consumable for expenses in any facility so It had to be take advantage of the technology using alternative energy sources as follows:

1. Power generators

This makes the absolute dependence on SEC power less and what may cause by fully dependence from risks such as high resistance to electrical wiring, which in turn may cause a fire, As well as raising the level of consumption segments therefore raise expenses wasted.

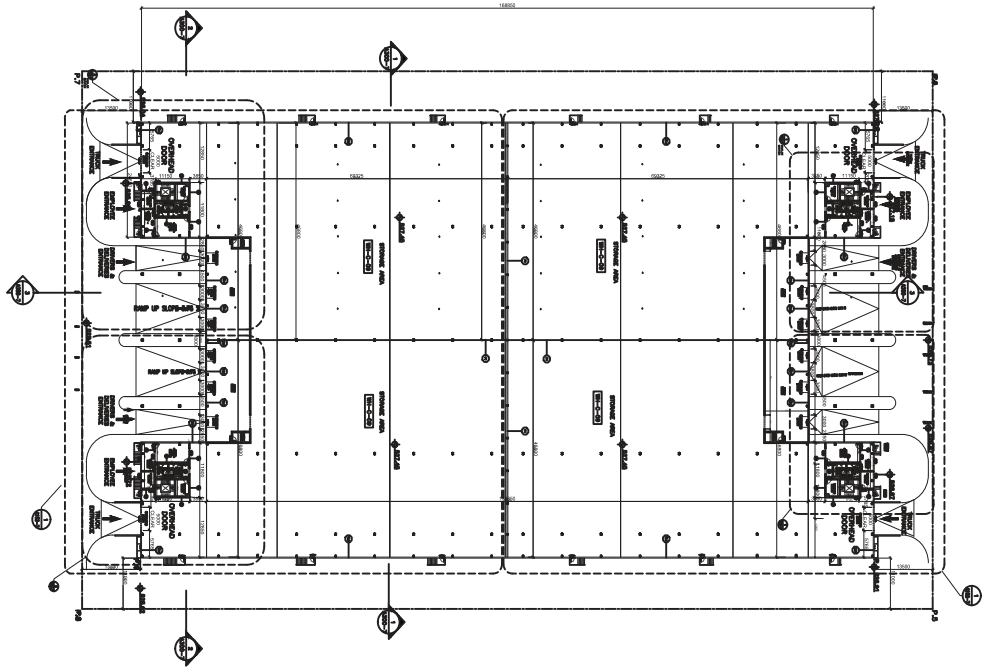
Therefore, it was necessary to provide generators that supply the warehouses with energy and work alternately with the main power source as it is characterized by its high capacity and relatively low cost with electricity costs from the main operator, and be distributed on each gate not less on 500 K V A.

2. sky lighting system.

Which save a lot of expenses due to its dependence on lighting natural sunlight.

3- Solar energy system.

It is a glass slide absorbs solar energy and converts it into electricity and is characterized by the provision of expenses significantly compared to the main electricity provider, a highly efficient system.



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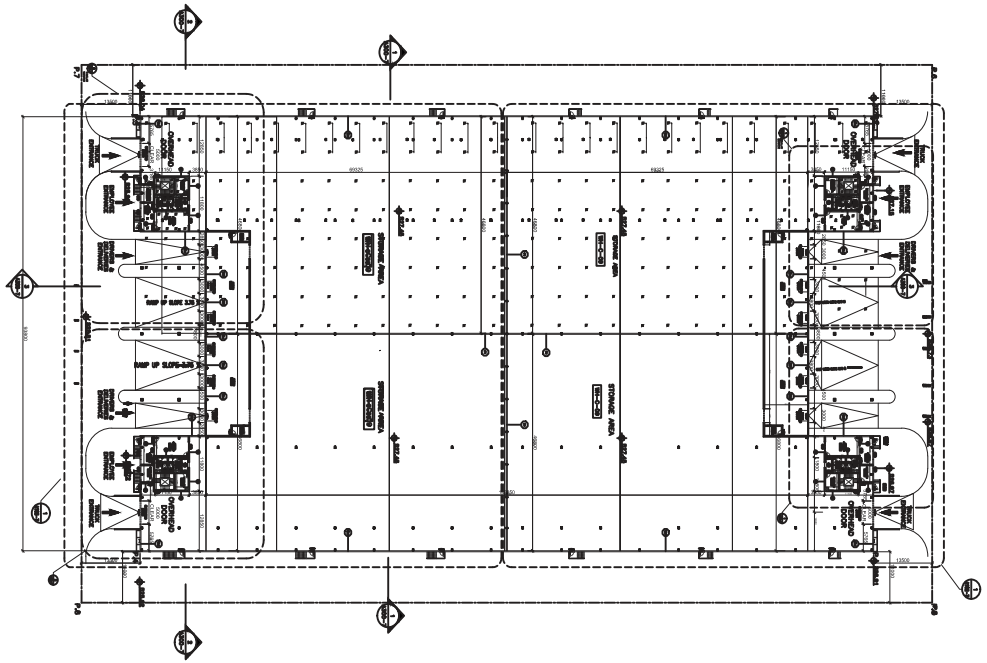
PROJECT: MEDICATION STORE

DRWG. TITLE: FIRE ALARM

SCALE	DATE 18/9/2017	PROJECT NO.
DRAWN BY:		
DESIGNED BY:	Eng.S.S.F	DRAWING NO.
CHECKED BY:	Eng.S.S.F	
PROJECT MANAGER	Arch.Salem S.Al fayiz	
APPROVED BY:		



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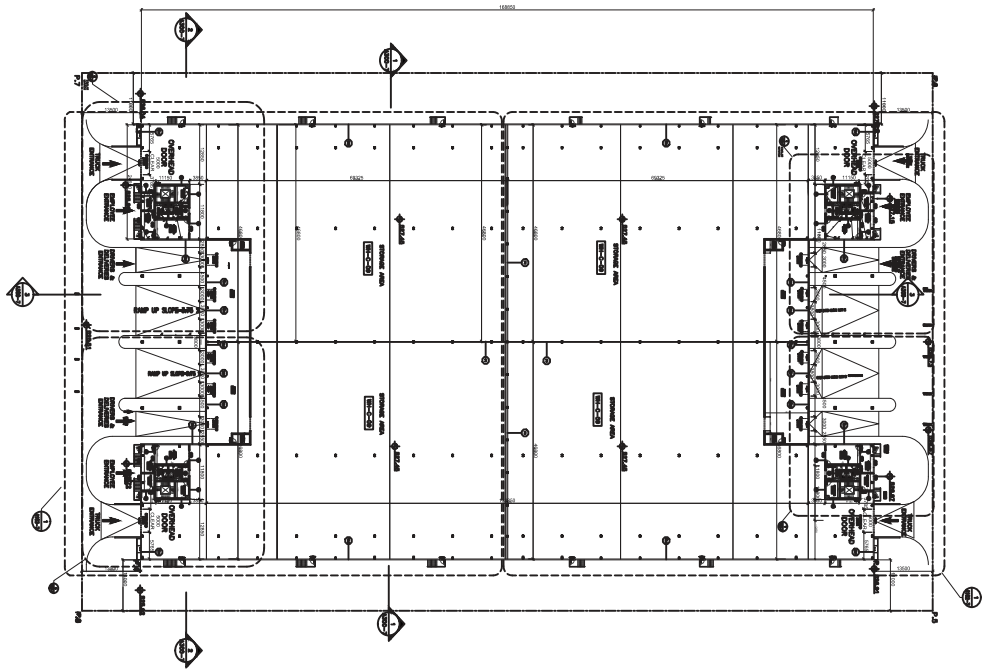
PROJECT: MEDICATION STORE

DRWG. TITLE: LIGHTING LAYOUT

SCALE:	DATE: 18/9/2017	PROJECT NO.
DRAWN BY:		
DESIGNED BY:	Eng.S.S.F	DRAWING NO.
CHECKED BY:	Eng.S.S.F	
PROJECT MANAGER:	Arch.Saleh.S.Al fayez	
APPROVED BY:		



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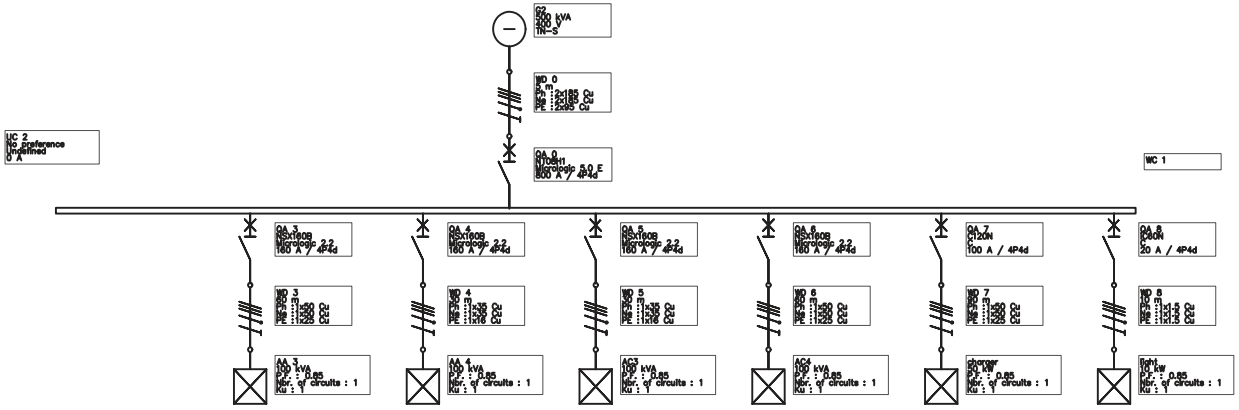
PROJECT: MEDICATION STORE

DRWG. TITLE: POWER SYS.

SCALE	DATE 18/9/2017	PROJECT NO.
DRAWN BY:		
DESIGNED BY:	Eng.S.S.F	DRAWING NO.
CHECKED BY:	Eng.S.S.F	
PROJECT MANAGER	Arch.Salem S.Al fayiz	
APPROVED BY:		



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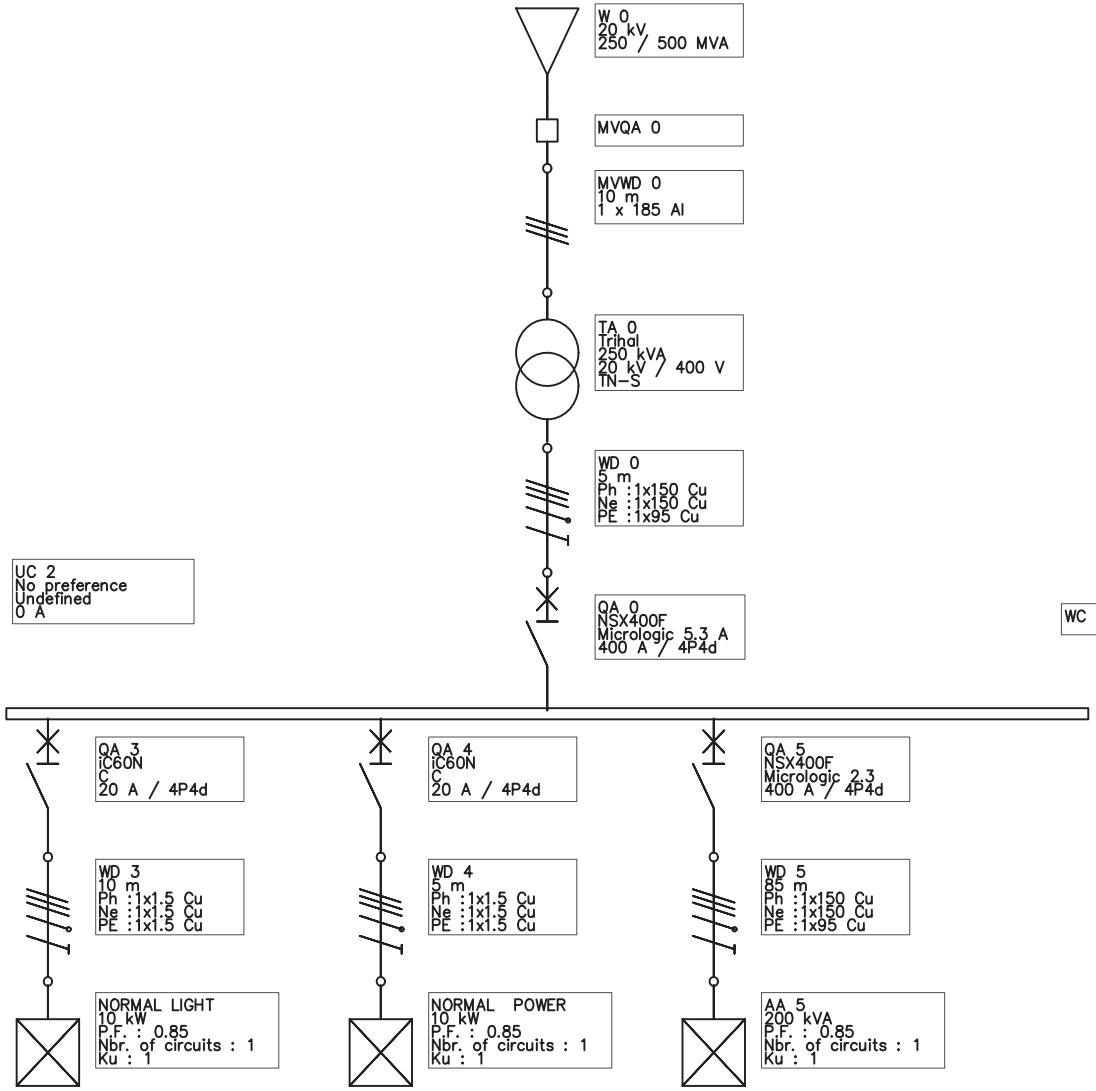
PROJECT: MEDICATION STORE

DRWG. TITLE: POWER DIAGRAM-1

SCALE	DATE 18/9/2017	PROJECT NO.
DRAWN BY:		
DESIGNED BY:	Eng.S.S.F	DRAWING NO.
CHECKED BY:	Eng.S.S.F	
PROJECT MANAGER	Arch.Salem.S.Al fayaz	
APPROVED BY:		



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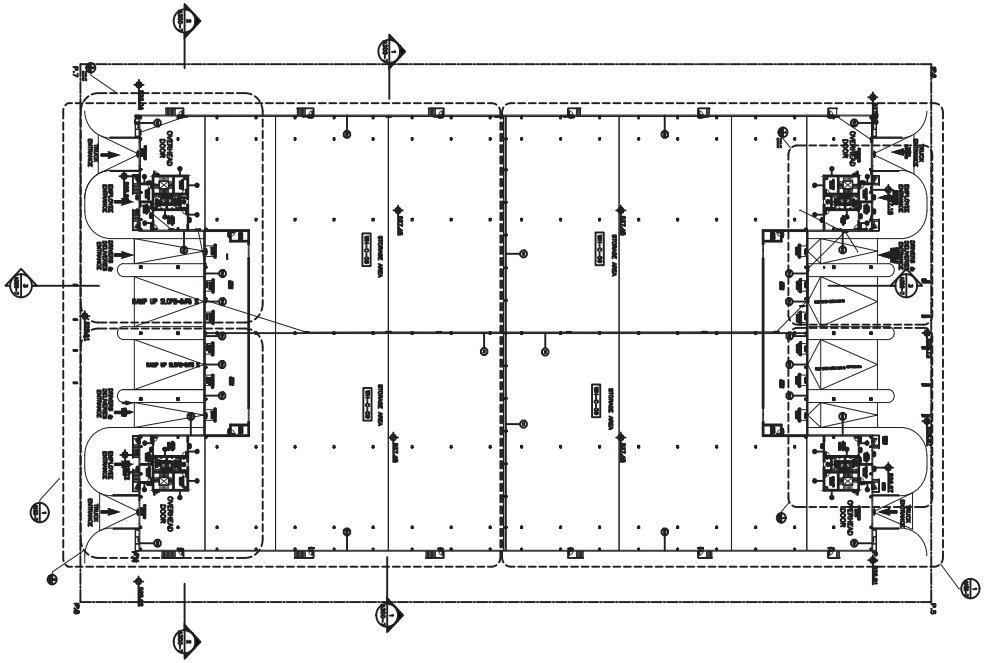
PROJECT: MEDICATION STORE

DRWG. TITLE: POWER DIAGRAM –2

SCALE:	DATE: 18/9/2017	PROJECT NO.
DRAWN BY:		
DESIGNED BY:	Eng.S.S.F	DRAWING NO.
CHECKED BY:	Eng.S.S.F	
PROJECT MANAGER:	Arch.Salem S.Al fayaz	

APPROVED BY:



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PROJECT: MEDICATION STORE

DRWG. TITLE: EMERGENCY LIGHT

SCALE	DATE 18/9/2017	PROJECT NO.
DRAWN BY:		
DESIGNED BY:	Eng.S.S.F	DRAWING NO.
CHECKED BY:	Eng.S.S.F	
PROJECT MANAGER	Arch.Salem.S.Al fayiz	
APPROVED BY:		

Installation calculation report

MEDICAL STOR NORMAL SCECOt
Full

Schneider Electric

Content

1 Project description

1.1 Project general settings

1.2 Settings for wiring device calculation

1.3 List of loads

1.3.1 Generic loads

Name	Sr (kVA)	Pr (kW)	Ir (A)	Cosφ	Nbr	Polarity	Non linear load	THDi 3 (%)
		10						

2 Installation general design

2.1 List of devices

2.1.1 MV/LV transformer

Name	Nbr	Range	Insulation	Sr (kVA)	ukrT (%)	Connection	U2 (V)	SEA	Rb (mΩ)
TA 0	1	Trihal	Dry-type	250	6	D	420	TN-S	10000

2.1.2 LV switchboards and busbar

Switchboard name	Range	Rating (A)	IP
UC 2	No preference	0.00	Undefined

Busbar name	Switchboard name	Ks	Polarity	SEA	Equipotential bounding
WC 1	UC 2	1	3Ph+N	TN-S	With

2.1.3 Circuit breaker

Name	Nbr	Range - Designation	Rating (A)	Poles	Trip unit/Curve	RCD	RCD class
QA 0	1	Compact NSX - NSX400F	400	4P4d	Micrologic 5.3 A		
QA 3	1	Acti9 iC60 - iC60N	20	4P4d	C		
QA 4	1	Acti9 iC60 - iC60N	20	4P4d	C		
QA 5	1	Compact NSX - NSX400F	400	4P4d	Micrologic 2.3		

2.1.4 Cable schedule

Name	Nbr	Incomer	Feeder	Type	Insulation	L (m)	L1/L2/L3	N	PE/PEN
WD 5	1	QA 5	AA 5	Multi-core	XLPE	85	1x150 Copper	1x150 Copper	1x95 Copper
WD 3	1	QA 3	NORMAL LIGHT	Multi-core	XLPE	10	1x1.5 Copper	1x1.5 Copper	1x1.5 Copper
WD 4	1	QA 4	NORMAL POWER	Multi-core	XLPE	5	1x1.5 Copper	1x1.5 Copper	1x1.5 Copper
WD 0	1	TA 0	QA 0	Multi-core	XLPE	5	1x150 Copper	1x150 Copper	1x95 Copper

2.1.5 MV Cable

Name	Nbr	Designation	CSA (mm²)	Icc (A)	In (A)	Un (kV)
MVWD 0	1	NA	1 x 185 Al	16.4	353	24

3 Calculation notes

3.1 Source circuits

3.1.1 Circuit Source 0

MV power supply	W 0
Max. upstream short circuit power	500 MVA
Min. upstream short circuit power	250 MVA
MV Cable	**MVWD 0**
Parameters	
Length	10 m
Type of cable	Single core
Ib	7 A
Nb of conductor per phase	1
Cross section area	1 x 185 Al mm²
Core	Aluminium
Short circuit withstand	16.4 kA
Assigned voltage	20 kV
Insulation voltage	24 kV

MV/LV transformer	TA 0
Range	Trihal
Technology	Dry-type
Rated power	250 kVA
ukrT	6 %
Type of losses	AoAk
PkrT	3.4 kW
System earthing arrangement	TN-S
MV Connection	D
LV Connection	yn
No load secondary voltage Ur0	420V
Ur LV	400V
Rb (neutral grounding)	NA
Ra (mass grounding)	NA
Sizing information	UkrT and PkrT calculated by system
Cable	**WD 0**
Parameters	
Length	5 m
Max length	NA
Installation method	31 E Multi-core cables on horizontal perforated tray
Type of cable	Multi-core
Nb of additional touching circuits	0
Insulation	XLPE
Ambient temperature	30 °C
Level of third harmonic THDI	0 %
Ib	361 A
Sizing constraint	Iz
Sizing Information	Sized with Ir
Correction factors	
Temperature factor	1
Standard table reference	B-52-14
Soil thermal resistivity factor	1
Standard table reference	B-52-16
Loaded neutral factor	1
Standard table reference	E-52-1

Touching conductor factor	1
Standard table reference	B-52-20
User correction factor	1
Overall factor	1

Selected phase	
Cross section area	1x150 mm²
Core	Copper
Iz under real conditions	399 A
Selected neutral	
Cross section area	1x150 mm²
Core	Copper
Iz under real conditions	399 A
Selected PE	
Cross section area	1x95 mm²
Core	Copper

Short circuit current							
	Ik3max	**Ik2max**	**Ik1max**	**Ik2min**	**Ik1min**	**Ief**	**Ief2min**
Operating mode Normal							
(kA)	5.88	5.09	5.81	4.35	4.95	5.03	0.00
Synthesis for all operating mode							
(kA)	5.88	5.09	5.81	4.35	4.95	5.03	0.00

Calculation results in accordance with CENELEC technical report TR50480.
All assumptions and device choices are the user's responsibility.

Circuit breaker	**QA 0**
Ib	361 A
Distance from origin	NA
Sizing Information	Sized by system
Range	Compact NSX
Designation	NSX400F
Circuit breaker rating	400 A
Breaking capacity	36 kA
TNS One pole breaking capacity	NA
IT One pole breaking capacity	NA
Reinforced breaking capacity	NA
Pole & protected pole	4P4d
Trip unit designation	Micrologic 5.3 A
Trip unit rating	400 A
Long delay settings	
Ir	361 A
Tr	16 s
Short delay settings	
Isd current	3610 A
Tsd	0.4 s
Instantaneous tripping	
Ii current	4800 A

Discrimination Results	
UpStream	**Discrimination Limit**
Operating mode Normal	
NA	Discrimination can't be determinated : no upstream Lv Breaker

Design current	IL1	IL2	IL3	IN
Operating mode Normal				
(A)	322.637	322.637	322.637	0

Synthesis for all operating mode				
(A)	322.637	322.637	322.637	0

Voltage drop	Cumulated from upstream	Circuit
Operating mode Normal		
ΔU_{3L} (%)	0.138	0.138
ΔU_{L1L2} (%)	0.159	0.159
ΔU_{L2L3} (%)	0.159	0.159
ΔU_{L3L1} (%)	0.159	0.159
ΔU_{L1N} (%)	0.138	0.138
ΔU_{L2N} (%)	0.138	0.138
ΔU_{L3N} (%)	0.138	0.138

3.2 Generic load circuits

3.2.1 Circuit Load 3

Circuit breaker	QA 3
Ib	17 A
Distance from origin	NA
Sizing Information	Sized by system
Range	Acti9 iC60
Designation	iC60N
Circuit breaker rating	20 A
Breaking capacity	10 kA
TNS One pole breaking capacity	NA
IT One pole breaking capacity	NA
Reinforced breaking capacity	NA
Pole & protected pole	4P4d
Trip unit designation	C
Trip unit rating	20 A
Long delay settings	
Ir	20 A
Tr	NA
Short delay settings	
Isd current	160 A
Tsd	NA
Instantaneous tripping	
Ii current	NA

Discrimination Results	
UpStream	Discrimination Limit

Operating mode Normal	
QA 0 NSX400F Micrologic 5.3 A 400 A / 4P4d	Full Discrimination

Cable	WD 3
Parameters	
Length	10 m
Max length	36 m
Installation method	31 E Multi-core cables on horizontal perforated tray
Type of cable	Multi-core
Nb of additional touching circuits	0
Insulation	XLPE
Ambient temperature	30 °C
Level of third harmonic THDI	0 %
Ib	17 A
Sizing constraint	Iz
Sizing Information	Sized with Ir
Correction factors	
Temperature factor	1
Standard table reference	B-52-14
Soil thermal resistivity factor	1
Standard table reference	B-52-16
Loaded neutral factor	1
Standard table reference	E-52-1
Touching conductor factor	1
Standard table reference	B-52-20
User correction factor	1
Overall factor	1

Selected phase	
Cross section area	1x1.5 mm²
Core	Copper
Iz under real conditions	23 A
Selected neutral	
Cross section area	1x1.5 mm²
Core	Copper
Iz under real conditions	23 A
Selected PE	
Cross section area	1x1.5 mm²
Core	Copper

Short circuit current	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	Ief	Ief2min
Operating mode Normal							
(kA)	1.81	1.57	0.97	1.09	0.66	0.67	0.00

Synthesis for all operating mode

(kA)	1.81	1.57	0.97	1.09	0.66	0.67	0.00

Calculation results in accordance with CENELEC technical report TR50480.
All assumptions and device choices are the user's responsibility.

Charge	NORMAL LIGHT
U	400 V
S	11.8 kVA
P	10 kW
I	17 A
cosφ	0.85
Polarity	3Ph+N
Phase connection	
Number of circuit	1
Ku (Normal)	1
Harmonic generator	No
THDI3	0
Sensitivity to over voltage	NA

Design current	IL1	IL2	IL3	IN
Operating mode Normal				
(A)	16.981	16.981	16.981	0
Synthesis for all operating mode				
(A)	16.981	16.981	16.981	0

Voltage drop	Cumulated from upstream	Circuit
Operating mode Normal		
ΔU_{3L} (%)	1.128	0.990
ΔU_{L1L2} (%)	1.303	1.143
ΔU_{L2L3} (%)	1.303	1.143
ΔU_{L3L1} (%)	1.303	1.143
ΔU_{L1N} (%)	1.128	0.990
ΔU_{L2N} (%)	1.128	0.990
ΔU_{L3N} (%)	1.128	0.990

Synthesis for all operating mode	
ΔU_{3L} (%)	1.128
ΔU_{L1L2} (%)	1.303
ΔU_{L2L3} (%)	1.303
ΔU_{L3L1} (%)	1.303
ΔU_{L1N} (%)	1.128
ΔU_{L2N} (%)	1.128
ΔU_{L3N} (%)	1.128

3.2.2 Circuit Load 4

Circuit breaker	QA 4
Ib	17 A
Distance from origin	NA
Sizing Information	Sized by system
Range	Acti9 iC60
Designation	iC60N
Circuit breaker rating	20 A
Breaking capacity	10 kA
TNS One pole breaking capacity	NA
IT One pole breaking capacity	NA
Reinforced breaking capacity	NA
Pole & protected pole	4P4d
Trip unit designation	C
Trip unit rating	20 A
Long delay settings	
Ir	20 A
Tr	NA
Short delay settings	
Isd current	160 A
Tsd	NA
Instantaneous tripping	
Ii current	NA

Discrimination Results UpStream	Discrimination Limit
Operating mode Normal	
QA 0 NSX400F Micrologic 5.3 A 400 A / 4P4d	Full Discrimination

Cable	WD 4
Parameters	
Length	5 m
Max length	36 m
Installation method	31 E Multi-core cables on horizontal perforated tray
Type of cable	Multi-core
Nb of additional touching circuits	0
Insulation	XLPE
Ambient temperature	30 °C
Level of third harmonic THDI	0 %
Ib	17 A
Sizing constraint	Iz
Sizing Information	Sized with Ir
Correction factors	
Temperature factor	1
Standard table reference	B-52-14
Soil thermal resistivity factor	1

Standard table reference	B-52-16
Loaded neutral factor	1
Standard table reference	E-52-1
Touching conductor factor	1
Standard table reference	B-52-20
User correction factor	1
Overall factor	1

Selected phase	
Cross section area	1x1.5 mm²
Core	Copper
Iz under real conditions	23 A
Selected neutral	
Cross section area	1x1.5 mm²
Core	Copper
Iz under real conditions	23 A
Selected PE	
Cross section area	1x1.5 mm²
Core	Copper

Short circuit current	**Ik3max**	**Ik2max**	**Ik1max**	**Ik2min**	**Ik1min**	**Ief**	**Ief2min**
Operating mode Normal							
(kA)	3.04	2.63	1.80	1.92	1.26	1.26	0.00
Synthesis for all operating mode							
(kA)	3.04	2.63	1.80	1.92	1.26	1.26	0.00

Calculation results in accordance with CENELEC technical report TR50480.
All assumptions and device choices are the user's responsibility.

Charge	**NORMAL POWER**
U	400 V
S	11.8 kVA
P	10 kW
I	17 A
cosφ	0.85
Polarity	3Ph+N
Phase connection	
Number of circuit	1
Ku (Normal)	1
Harmonic generator	No
THDI3	0
Sensitivity to over voltage	NA

Design current	**IL1**	**IL2**	**IL3**	**IN**
Operating mode Normal				
(A)	16.981	16.981	16.981	0
Synthesis for all operating mode				
(A)	16.981	16.981	16.981	0

Voltage drop	**Cumulated from upstream**	**Circuit**
Operating mode Normal		
ΔU_{3L} (%)	0.633	0.495

3.2.3 Circuit Load 5

Circuit breaker	QA 5
Ib	289 A
Distance from origin	NA
Sizing Information	Sized by system
Range	Compact NSX
Designation	NSX400F
Circuit breaker rating	400 A
Breaking capacity	36 kA
TNS One pole breaking capacity	NA
IT One pole breaking capacity	NA
Reinforced breaking capacity	NA
Pole & protected pole	4P4d
Trip unit designation	Micrologic 2.3
Trip unit rating	400 A
Long delay settings	
Ir	294 A
Tr	16 s
Short delay settings	
Isd current	2061 A
Tsd	0.02 s
Instantaneous tripping	
Ii current	4800 A

Discrimination Results UpStream	Discrimination Limit
Operating mode Normal	
QA 0 NSX400F Micrologic 5.3 A 400 A / 4P4d	4800 A

Cable	WD 5
Parameters	
Length	85 m
Max length	149 m
Installation method	31 E Multi-core cables on horizontal perforated tray
Type of cable	Multi-core
Nb of additional touching circuits	0
Insulation	XLPE
Ambient temperature	30 °C
Level of third harmonic THDI	0 %
Ib	289 A
Sizing constraint	Voltage drop
Sizing Information	The CSA of cable WD 5 has been increased from 95 to 150 to comply with the voltage drop in the circuit. Sized with Ir
Correction factors	

Temperature factor	1
Standard table reference	B-52-14
Soil thermal resistivity factor	1
Standard table reference	B-52-16
Loaded neutral factor	1
Standard table reference	E-52-1
Touching conductor factor	1
Standard table reference	B-52-20
User correction factor	1
Overall factor	1

Selected phase	
Cross section area	1x150 mm²
Core	Copper
Iz under real conditions	399 A
Selected neutral	
Cross section area	1x150 mm²
Core	Copper
Iz under real conditions	399 A
Selected PE	
Cross section area	1x95 mm²
Core	Copper

Short circuit current							
	Ik3max	**Ik2max**	**Ik1max**	**Ik2min**	**Ik1min**	**Ief**	**Ief2min**
Operating mode Normal							
(kA)	4.79	4.15	3.94	3.48	3.23	3.05	0.00
Synthesis for all operating mode							
(kA)	4.79	4.15	3.94	3.48	3.23	3.05	0.00

Calculation results in accordance with CENELEC technical report TR50480.
All assumptions and device choices are the user's responsibility.

Charge	**AA 5**
U	400 V
S	200 kVA
P	170 kW
I	289 A
cosφ	0.85
Polarity	3Ph+N
Phase connection	
Number of circuit	1
Ku (Normal)	1
Harmonic generator	No
THDI3	0
Sensitivity to over voltage	NA

Design current				
	IL1	**IL2**	**IL3**	**IN**
Operating mode Normal				
(A)	288.675	288.675	288.675	0
Synthesis for all operating mode				
(A)	288.675	288.675	288.675	0

Voltage drop		
	Cumulated from upstream	**Circuit**

Operating mode Normal		
ΔU_{3L} (%)	2.012	1.874
ΔU_{L1L2} (%)	2.323	2.164
ΔU_{L2L3} (%)	2.323	2.164
ΔU_{L3L1} (%)	2.323	2.164
ΔU_{L1N} (%)	2.012	1.874
ΔU_{L2N} (%)	2.012	1.874
ΔU_{L3N} (%)	2.012	1.874

Synthesis for all operating mode	
ΔU_{3L} (%)	2.012
ΔU_{L1L2} (%)	2.323
ΔU_{L2L3} (%)	2.323
ΔU_{L3L1} (%)	2.323
ΔU_{L1N} (%)	2.012
ΔU_{L2N} (%)	2.012
ΔU_{L3N} (%)	2.012

3.3 Busbar circuits

3.3.1 Circuit WC 1

Busbar	WC 1	
Parameters		
Switchboard Name	UC 2	
Switchboard Range	No preference	
Rating (A)	0	
IP	Undefined	
Feeder		
Circuit name	Protection name	Protection type
Load 3	QA 3	iC60N
Load 4	QA 4	iC60N
Load 5	QA 5	NSX400F

Short circuit current	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	Ief	Ief2min
Operating mode Normal							
(kA)	5.88	5.09	5.81	4.36	4.96	5.03	0.00
Synthesis for all operating mode							
(kA)	5.88	5.09	5.81	4.36	4.96	5.03	0.00

Calculation results in accordance with CENELEC technical report TR50480.
All assumptions and device choices are the user's responsibility.

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1 Project description

1.1 Project general settings

Installation standard	IEC60364
Calculation standard	TR50480
Circuit breaker standard	IEC 60947-2
Frequency	50 Hz

1.2 Settings for wiring device calculation

Maximal CSA	300 mm²

1.3 List of loads

1.3.1 Generic loads

Name	Sr (kVA)	Pr (kW)	Ir (A)	Cosφ	Nbr	Polarity	Non linear load	THDi 3 (%)
AA 3	100	85	144	0.85	1	3Ph+N	No	0
AA 4	100	85	144	0.85	1	3Ph+N	No	0
AC3	100	85	144	0.85	1	3Ph+N	No	0
AC4	100	85	144	0.85	1	3Ph+N	No	0
charger	58.8	50	84.9	0.85	1	3Ph+N	No	0
light	11.8	10	17	0.85	1	3Ph+N	No	0

2 Installation general design

2.1 List of devices

2.1.1 LV backup generator

Name	Nbr	Sr (kVA)	x"d (%)	x'd (%)	x0 (%)	U (V)	SEA	Rb (mΩ)
G1	1	500	20	30	6	400	TN-S	10000

2.1.2 LV switchboards and busbar

Switchboard name	Range	Rating (A)	IP
UC 2	No preference	0.00	Undefined

Busbar name	Switchboard name	Ks	Polarity	SEA	Equipotential bounding
WC 1	UC 2	1	3Ph+N	TN-S	With

2.1.3 Circuit breaker

Name	Nbr	Range - Designation	Rating (A)	Poles	Trip unit/Curve	RCD	RCD class
QA 0	1	Masterpact NT - NT08H1	800	4P4d	Micrologic 5.0 E		
QA 3	1	Compact NSX - NSX160B	160	4P4d	Micrologic 2.2		
QA 4	1	Compact NSX - NSX160B	160	4P4d	Micrologic 2.2		
QA 5	1	Compact NSX - NSX160B	160	4P4d	Micrologic 2.2		
QA 6	1	Compact NSX - NSX160B	160	4P4d	Micrologic 2.2		
QA 7	1	Acti9 C120 - C120N	100	4P4d	C		
QA 8	1	Acti9 iC60 - iC60N	20	4P4d	C		

2.1.4 Cable schedule

Name	Nbr	Incomer	Feeder	Type	Insulation	L (m)	L1/L2/L3	N	PE/PEN
WD 7	1	QA 7	charger	Multi-core	XLPE	90	1x50 Copper	1x50 Copper	1x25 Copper
WD 6	1	QA 6	AC4	Multi-core	XLPE	60	1x50 Copper	1x50 Copper	1x25 Copper
WD 3	1	QA 3	AA 3	Multi-core	XLPE	60	1x50 Copper	1x50 Copper	1x25 Copper
WD 5	1	QA 5	AC3	Multi-core	XLPE	30	1x35 Copper	1x35 Copper	1x16 Copper
WD 4	1	QA 4	AA 4	Multi-core	XLPE	30	1x35 Copper	1x35 Copper	1x16 Copper
WD 8	1	QA 8	light	Multi-core	XLPE	10	1x1.5 Copper	1x1.5 Copper	1x1.5 Copper
WD 0	1	G1	QA 0	Multi-core	XLPE	5	2x185 Copper	2x185 Copper	2x95 Copper

3 Calculation notes

3.1 Generator circuits

3.1.1 Circuit Source 0

LV generator	G1
Rated power	500 kVA
Subtransient reactance x"d	20 %
Transient reactance x'd	30 %
Zero sequence reactance x0	6 %
System earthing arrangement	TN-S
Ur	400 V
Rb (neutral grounding)	NA
Ra (mass grounding)	NA
Cable	**WD 0**
Parameters	
Length	5 m
Max length	NA
Installation method	31 E Multi-core cables on horizontal perforated tray
Type of cable	Multi-core
Nb of additional touching circuits	0
Insulation	XLPE
Ambient temperature	30 °C
Level of third harmonic THDI	0 %
Ib	722 A
Sizing constraint	Iz
Sizing Information	Sized with Ir
Correction factors	
Temperature factor	1
Standard table reference	B-52-14
Soil thermal resistivity factor	1
Standard table reference	B-52-16
Loaded neutral factor	1
Standard table reference	E-52-1
Touching conductor factor	0.88
Standard table reference	B-52-20
User correction factor	1
Overall factor	0.88

Selected phase	
Cross section area	2x185 mm²
Core	Copper
Iz under real conditions	803 A
Selected neutral	
Cross section area	2x185 mm²
Core	Copper
Iz under real conditions	803 A
Selected PE	
Cross section area	2x95 mm²
Core	Copper

Short circuit current							
	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	Ief	Ief2min

Operating mode Normal							
(kA)	3.96	3.43	3.59	1.98	3.10	3.11	0.00

Synthesis for all operating mode							
(kA)	3.96	3.43	3.59	1.98	3.10	3.11	0.00

Calculation results in accordance with CENELEC technical report TR50480.
All assumptions and device choices are the user's responsibility.

Circuit breaker	QA 0
Ib	722 A
Distance from origin	NA
Sizing Information	Sized by system
Range	Masterpact NT
Designation	NT08H1
Circuit breaker rating	800 A
Breaking capacity	42 kA
TNS One pole breaking capacity	NA
IT One pole breaking capacity	NA
Reinforced breaking capacity	NA
Pole & protected pole	4P4d
Trip unit designation	Micrologic 5.0 E
Trip unit rating	800 A
Long delay settings	
Ir	736 (Setting: 0.92) A
Tr	24 s
Short delay settings	
Isd current	2208 (Setting: 3) A
Tsd	0.4 s
Instantaneous tripping	
Ii current	3200 (Setting: 4) A

Discrimination Results UpStream	Discrimination Limit
Operating mode Normal	
NA	Discrimination can't be determinated : no upstream Lv Breaker

Design current IL1	IL2	IL3	IN
Operating mode Normal			
(A) 679.236	679.236	679.236	0

Synthesis for all operating mode				
(A)	679.236	679.236	679.236	0

Voltage drop Cumulated from upstream	Circuit
Operating mode Normal	

ΔU_{L1L2} (%)	0.136	0.136
ΔU_{L2L3} (%)	0.136	0.136
ΔU_{L3L1} (%)	0.136	0.136
ΔU_{L1N} (%)	0.118	0.118
ΔU_{L2N} (%)	0.118	0.118
ΔU_{L3N} (%)	0.118	0.118

3.2 Generic load circuits

3.2.1 Circuit Load 3

Circuit breaker	QA 3
Ib	144 A
Distance from origin	NA
Sizing Information	Sized by system
Range	Compact NSX
Designation	NSX160B
Circuit breaker rating	160 A
Breaking capacity	25 kA
TNS One pole breaking capacity	NA
IT One pole breaking capacity	NA
Reinforced breaking capacity	NA
Pole & protected pole	4P4d
Trip unit designation	Micrologic 2.2
Trip unit rating	160 A
Long delay settings	
Ir	146 A
Tr	16 s
Short delay settings	
Isd current	1164 A
Tsd	0.02 s
Instantaneous tripping	
Ii current	2400 A

Discrimination Results UpStream	Discrimination Limit
Operating mode Normal	
QA 0 NT08H1 Micrologic 5.0 E 800 A / 4P4d	Full Discrimination

Cable	WD 3
Parameters	
Length	60 m
Max length	84 m
Installation method	31 E Multi-core cables on horizontal perforated tray
Type of cable	Multi-core
Nb of additional touching circuits	0
Insulation	XLPE
Ambient temperature	30 °C
Level of third harmonic THDI	0 %
Ib	144 A
Sizing constraint	Voltage drop

Sizing Information	The CSA of cable WD 3 has been increased from 35 to 50 to comply with the voltage drop in the circuit. Sized with Ir
Correction factors	
Temperature factor	1
Standard table reference	B-52-14
Soil thermal resistivity factor	1
Standard table reference	B-52-16
Loaded neutral factor	1
Standard table reference	E-52-1
Touching conductor factor	1
Standard table reference	B-52-20
User correction factor	1
Overall factor	1

Selected phase	
Cross section area	1x50 mm²
Core	Copper
Iz under real conditions	192 A
Selected neutral	
Cross section area	1x50 mm²
Core	Copper
Iz under real conditions	192 A
Selected PE	
Cross section area	1x25 mm²
Core	Copper

Short circuit current							
	Ik3max	**Ik2max**	**Ik1max**	**Ik2min**	**Ik1min**	**Ief**	**Ief2min**
Operating mode Normal							
(kA)	3.50	3.03	2.76	1.81	2.22	1.64	0.00
Synthesis for all operating mode							
(kA)	3.50	3.03	2.76	1.81	2.22	1.64	0.00

Calculation results in accordance with CENELEC technical report TR50480.
All assumptions and device choices are the user's responsibility.

Charge	**AA 3**
U	400 V
S	100 kVA
P	85 kW
I	144 A
cosφ	0.85
Polarity	3Ph+N
Phase connection	
Number of circuit	1
Ku (Normal)	1
Harmonic generator	No
THDI3	0
Sensitivity to over voltage	NA

Design current				
	IL1	**IL2**	**IL3**	**IN**
Operating mode Normal				
(A)	144.338	144.338	144.338	0

Synthesis for all operating mode				
(A)	144.338	144.338	144.338	0

Voltage drop	Cumulated from upstream	Circuit
Operating mode Normal		
ΔU_{3L} (%)	1.786	1.668
ΔU_{L1L2} (%)	2.063	1.927
ΔU_{L2L3} (%)	2.063	1.927
ΔU_{L3L1} (%)	2.063	1.927
ΔU_{L1N} (%)	1.786	1.668
ΔU_{L2N} (%)	1.786	1.668
ΔU_{L3N} (%)	1.786	1.668

Synthesis for all operating mode	
ΔU_{3L} (%)	1.786
ΔU_{L1L2} (%)	2.063
ΔU_{L2L3} (%)	2.063
ΔU_{L3L1} (%)	2.063
ΔU_{L1N} (%)	1.786
ΔU_{L2N} (%)	1.786
ΔU_{L3N} (%)	1.786

3.2.2 Circuit Load 4

Circuit breaker	QA 4
Ib	144 A
Distance from origin	NA
Sizing Information	Sized by system
Range	Compact NSX
Designation	NSX160B
Circuit breaker rating	160 A
Breaking capacity	25 kA
TNS One pole breaking capacity	NA
IT One pole breaking capacity	NA
Reinforced breaking capacity	NA
Pole & protected pole	4P4d
Trip unit designation	Micrologic 2.2
Trip unit rating	160 A
Long delay settings	
Ir	146 A
Tr	16 s
Short delay settings	
Isd current	1455 A
Tsd	0.02 s
Instantaneous tripping	
Ii current	2400 A

Discrimination Results UpStream	Discrimination Limit
Operating mode Normal	
QA 0 NT08H1 Micrologic 5.0 E 800 A / 4P4d	Full Discrimination

Cable	WD 4
Parameters	
Length	30 m
Max length	54.2 m
Installation method	31 E Multi-core cables on horizontal perforated tray
Type of cable	Multi-core
Nb of additional touching circuits	0
Insulation	XLPE
Ambient temperature	30 °C
Level of third harmonic THDI	0 %
Ib	144 A
Sizing constraint	Iz
Sizing Information	Sized with Ir
Correction factors	
Temperature factor	1
Standard table reference	B-52-14
Soil thermal resistivity factor	1

ΔU_{L1L2} (%)	1.473	1.337
ΔU_{L2L3} (%)	1.473	1.337
ΔU_{L3L1} (%)	1.473	1.337
ΔU_{L1N} (%)	1.276	1.158
ΔU_{L2N} (%)	1.276	1.158
ΔU_{L3N} (%)	1.276	1.158

Synthesis for all operating mode	
ΔU_{3L} (%)	1.276
ΔU_{L1L2} (%)	1.473
ΔU_{L2L3} (%)	1.473
ΔU_{L3L1} (%)	1.473
ΔU_{L1N} (%)	1.276
ΔU_{L2N} (%)	1.276
ΔU_{L3N} (%)	1.276

3.2.3 Circuit Load 5

Circuit breaker	QA 5
Ib	144 A
Distance from origin	NA
Sizing Information	Sized by system
Range	Compact NSX
Designation	NSX160B
Circuit breaker rating	160 A
Breaking capacity	25 kA
TNS One pole breaking capacity	NA
IT One pole breaking capacity	NA
Reinforced breaking capacity	NA
Pole & protected pole	4P4d
Trip unit designation	Micrologic 2.2
Trip unit rating	160 A
Long delay settings	
Ir	146 A
Tr	16 s
Short delay settings	
Isd current	1455 A
Tsd	0.02 s
Instantaneous tripping	
Ii current	2400 A

Discrimination Results UpStream	Discrimination Limit
Operating mode Normal	
QA 0 NT08H1 Micrologic 5.0 E 800 A / 4P4d	Full Discrimination

Cable	WD 5
Parameters	
Length	30 m
Max length	54.2 m
Installation method	31 E Multi-core cables on horizontal perforated tray
Type of cable	Multi-core
Nb of additional touching circuits	0
Insulation	XLPE
Ambient temperature	30 °C
Level of third harmonic THDI	0 %
Ib	144 A
Sizing constraint	Iz
Sizing Information	Sized with Ir
Correction factors	
Temperature factor	1
Standard table reference	B-52-14
Soil thermal resistivity factor	1

Standard table reference	B-52-16
Loaded neutral factor	1
Standard table reference	E-52-1
Touching conductor factor	1
Standard table reference	B-52-20
User correction factor	1
Overall factor	1

Selected phase	
Cross section area	1x35 mm²
Core	Copper
Iz under real conditions	158 A
Selected neutral	
Cross section area	1x35 mm²
Core	Copper
Iz under real conditions	158 A
Selected PE	
Cross section area	1x16 mm²
Core	Copper

Short circuit current	**Ik3max**	**Ik2max**	**Ik1max**	**Ik2min**	**Ik1min**	**Ief**	**Ief2min**
Operating mode Normal							
(kA)	3.71	3.21	3.09	1.89	2.55	2.20	0.00
Synthesis for all operating mode							
(kA)	3.71	3.21	3.09	1.89	2.55	2.20	0.00

Calculation results in accordance with CENELEC technical report TR50480.
All assumptions and device choices are the user's responsibility.

Charge	**AC3**
U	400 V
S	100 kVA
P	85 kW
I	144 A
cosφ	0.85
Polarity	3Ph+N
Phase connection	
Number of circuit	1
Ku (Normal)	1
Harmonic generator	No
THDI3	0
Sensitivity to over voltage	NA

Design current	**IL1**	**IL2**	**IL3**	**IN**
Operating mode Normal				
(A)	144.338	144.338	144.338	0
Synthesis for all operating mode				
(A)	144.338	144.338	144.338	0

Voltage drop	**Cumulated from upstream**	**Circuit**
Operating mode Normal		
ΔU_{3L} (%)	1.276	1.158

ΔU_{L1L2} (%)	1.473	1.337
ΔU_{L2L3} (%)	1.473	1.337
ΔU_{L3L1} (%)	1.473	1.337
ΔU_{L1N} (%)	1.276	1.158
ΔU_{L2N} (%)	1.276	1.158
ΔU_{L3N} (%)	1.276	1.158

Synthesis for all operating mode	
ΔU_{3L} (%)	1.276
ΔU_{L1L2} (%)	1.473
ΔU_{L2L3} (%)	1.473
ΔU_{L3L1} (%)	1.473
ΔU_{L1N} (%)	1.276
ΔU_{L2N} (%)	1.276
ΔU_{L3N} (%)	1.276

3.2.4 Circuit Load 6

Circuit breaker	QA 6
Ib	144 A
Distance from origin	NA
Sizing Information	Sized by system
Range	Compact NSX
Designation	NSX160B
Circuit breaker rating	160 A
Breaking capacity	25 kA
TNS One pole breaking capacity	NA
IT One pole breaking capacity	NA
Reinforced breaking capacity	NA
Pole & protected pole	4P4d
Trip unit designation	Micrologic 2.2
Trip unit rating	160 A
Long delay settings	
Ir	146 A
Tr	16 s
Short delay settings	
Isd current	1164 A
Tsd	0.02 s
Instantaneous tripping	
Ii current	2400 A

Discrimination Results UpStream	Discrimination Limit
Operating mode Normal	
QA 0 NT08H1 Micrologic 5.0 E 800 A / 4P4d	Full Discrimination

Cable	WD 6
Parameters	
Length	60 m
Max length	84 m
Installation method	31 E Multi-core cables on horizontal perforated tray
Type of cable	Multi-core
Nb of additional touching circuits	0
Insulation	XLPE
Ambient temperature	30 °C
Level of third harmonic THDI	0 %
Ib	144 A
Sizing constraint	Voltage drop
Sizing Information	The CSA of cable WD 6 has been increased from 35 to 50 to comply with the voltage drop in the circuit. Sized with Ir
Correction factors	

Temperature factor	1
Standard table reference	B-52-14
Soil thermal resistivity factor	1
Standard table reference	B-52-16
Loaded neutral factor	1
Standard table reference	E-52-1
Touching conductor factor	1
Standard table reference	B-52-20
User correction factor	1
Overall factor	1

Selected phase	
Cross section area	1x50 mm²
Core	Copper
Iz under real conditions	192 A
Selected neutral	
Cross section area	1x50 mm²
Core	Copper
Iz under real conditions	192 A
Selected PE	
Cross section area	1x25 mm²
Core	Copper

Short circuit current							
	Ik3max	**Ik2max**	**Ik1max**	**Ik2min**	**Ik1min**	**Ief**	**Ief2min**
Operating mode Normal							
(kA)	3.50	3.03	2.76	1.81	2.22	1.64	0.00
Synthesis for all operating mode							
(kA)	3.50	3.03	2.76	1.81	2.22	1.64	0.00

Calculation results in accordance with CENELEC technical report TR50480.
All assumptions and device choices are the user's responsibility.

Charge	**AC4**
U	400 V
S	100 kVA
P	85 kW
I	144 A
cosφ	0.85
Polarity	3Ph+N
Phase connection	
Number of circuit	1
Ku (Normal)	1
Harmonic generator	No
THDI3	0
Sensitivity to over voltage	NA

Design current				
	IL1	**IL2**	**IL3**	**IN**
Operating mode Normal				
(A)	144.338	144.338	144.338	0
Synthesis for all operating mode				
(A)	144.338	144.338	144.338	0

Voltage drop		
	Cumulated from upstream	**Circuit**

3.2.5 Circuit Load 7

Circuit breaker	QA 7
Ib	84.9 A
Distance from origin	NA
Sizing Information	Sized by system
Range	Acti9 C120
Designation	C120N
Circuit breaker rating	100 A
Breaking capacity	10 kA
TNS One pole breaking capacity	NA
IT One pole breaking capacity	NA
Reinforced breaking capacity	NA
Pole & protected pole	4P4d
Trip unit designation	C
Trip unit rating	100 A
Long delay settings	
Ir	100 A
Tr	NA
Short delay settings	
Isd current	850 A
Tsd	NA
Instantaneous tripping	
Ii current	NA

Discrimination Results UpStream	Discrimination Limit
Operating mode Normal	
QA 0 NT08H1 Micrologic 5.0 E 800 A / 4P4d	Full Discrimination

Cable	WD 7
Parameters	
Length	90 m
Max length	157 m
Installation method	31 E Multi-core cables on horizontal perforated tray
Type of cable	Multi-core
Nb of additional touching circuits	0
Insulation	XLPE
Ambient temperature	30 °C
Level of third harmonic THDI	0 %
Ib	85 A
Sizing constraint	Voltage drop
Sizing Information	The CSA of cable WD 7 has been increased from 16 to 50 to comply with the voltage drop in the circuit. Sized with Ir
Correction factors	

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1 Project description

1.1 Project general settings

Installation standard	IEC60364
Calculation standard	TR50480
Circuit breaker standard	IEC 60947-2
Frequency	50 Hz

1.2 Settings for wiring device calculation

Maximal CSA	300 mm²

1.3 List of loads

1.3.1 Generic loads

Name	Sr (kVA)	Pr (kW)	Ir (A)	Cosφ	Nbr	Polarity	Non linear load	THDi 3 (%)
AA 3	100	85	144	0.85	1	3Ph+N	No	0
AA 4	100	85	144	0.85	1	3Ph+N	No	0
AC3	100	85	144	0.85	1	3Ph+N	No	0
AC4	100	85	144	0.85	1	3Ph+N	No	0
charger	58.8	50	84.9	0.85	1	3Ph+N	No	0
light	11.8	10	17	0.85	1	3Ph+N	No	0

2 Installation general design

2.1 List of devices

2.1.1 LV backup generator

Name	Nbr	Sr (kVA)	x"d (%)	x'd (%)	x0 (%)	U (V)	SEA	Rb (mΩ)
G1	1	500	20	30	6	400	TN-S	10000

2.1.2 LV switchboards and busbar

Switchboard name	Range	Rating (A)	IP
UC 2	No preference	0.00	Undefined

Busbar name	Switchboard name	Ks	Polarity	SEA	Equipotential bounding
WC 1	UC 2	1	3Ph+N	TN-S	With

2.1.3 Circuit breaker

Name	Nbr	Range - Designation	Rating (A)	Poles	Trip unit/Curve	RCD	RCD class
QA 0	1	Masterpact NT - NT08H1	800	4P4d	Micrologic 5.0 E		
QA 3	1	Compact NSX - NSX160B	160	4P4d	Micrologic 2.2		
QA 4	1	Compact NSX - NSX160B	160	4P4d	Micrologic 2.2		
QA 5	1	Compact NSX - NSX160B	160	4P4d	Micrologic 2.2		
QA 6	1	Compact NSX - NSX160B	160	4P4d	Micrologic 2.2		
QA 7	1	Acti9 C120 - C120N	100	4P4d	C		
QA 8	1	Acti9 iC60 - iC60N	20	4P4d	C		

2.1.4 Cable schedule

Name	Nbr	Incomer	Feeder	Type	Insulation	L (m)	L1/L2/L3	N	PE/PEN
WD 7	1	QA 7	charger	Multi-core	XLPE	90	1x50 Copper	1x50 Copper	1x25 Copper
WD 6	1	QA 6	AC4	Multi-core	XLPE	60	1x50 Copper	1x50 Copper	1x25 Copper
WD 3	1	QA 3	AA 3	Multi-core	XLPE	60	1x50 Copper	1x50 Copper	1x25 Copper
WD 5	1	QA 5	AC3	Multi-core	XLPE	30	1x35 Copper	1x35 Copper	1x16 Copper
WD 4	1	QA 4	AA 4	Multi-core	XLPE	30	1x35 Copper	1x35 Copper	1x16 Copper
WD 8	1	QA 8	light	Multi-core	XLPE	10	1x1.5 Copper	1x1.5 Copper	1x1.5 Copper
WD 0	1	G1	QA 0	Multi-core	XLPE	5	2x185 Copper	2x185 Copper	2x95 Copper

3 Calculation notes

3.1 Generator circuits

3.1.1 Circuit Source 0

LV generator	G1
Rated power	500 kVA
Subtransient reactance x"d	20 %
Transient reactance x'd	30 %
Zero sequence reactance x0	6 %
System earthing arrangement	TN-S
Ur	400 V
Rb (neutral grounding)	NA
Ra (mass grounding)	NA
Cable	**WD 0**
Parameters	
Length	5 m
Max length	NA
Installation method	31 E Multi-core cables on horizontal perforated tray
Type of cable	Multi-core
Nb of additional touching circuits	0
Insulation	XLPE
Ambient temperature	30 °C
Level of third harmonic THDI	0 %
Ib	722 A
Sizing constraint	Iz
Sizing Information	Sized with Ir
Correction factors	
Temperature factor	1
Standard table reference	B-52-14
Soil thermal resistivity factor	1
Standard table reference	B-52-16
Loaded neutral factor	1
Standard table reference	E-52-1
Touching conductor factor	0.88
Standard table reference	B-52-20
User correction factor	1
Overall factor	0.88

Selected phase	
Cross section area	2x185 mm²
Core	Copper
Iz under real conditions	803 A
Selected neutral	
Cross section area	2x185 mm²
Core	Copper
Iz under real conditions	803 A
Selected PE	
Cross section area	2x95 mm²
Core	Copper

Short circuit current							
	Ik3max	Ik2max	Ik1max	Ik2min	Ik1min	Ief	Ief2min

Operating mode Normal							
(kA)	3.96	3.43	3.59	1.98	3.10	3.11	0.00

Synthesis for all operating mode							
(kA)	3.96	3.43	3.59	1.98	3.10	3.11	0.00

Calculation results in accordance with CENELEC technical report TR50480.
All assumptions and device choices are the user's responsibility.

Circuit breaker	QA 0
Ib	722 A
Distance from origin	NA
Sizing Information	Sized by system
Range	Masterpact NT
Designation	NT08H1
Circuit breaker rating	800 A
Breaking capacity	42 kA
TNS One pole breaking capacity	NA
IT One pole breaking capacity	NA
Reinforced breaking capacity	NA
Pole & protected pole	4P4d
Trip unit designation	Micrologic 5.0 E
Trip unit rating	800 A
Long delay settings	
Ir	736 (Setting: 0.92) A
Tr	24 s
Short delay settings	
Isd current	2208 (Setting: 3) A
Tsd	0.4 s
Instantaneous tripping	
Ii current	3200 (Setting: 4) A

Discrimination Results UpStream	Discrimination Limit
Operating mode Normal	
NA	Discrimination can't be determinated : no upstream Lv Breaker

Design current IL1	IL2	IL3	IN
Operating mode Normal			
(A) 679.236	679.236	679.236	0

Synthesis for all operating mode				
(A)	679.236	679.236	679.236	0

Voltage drop Cumulated from upstream	Circuit
Operating mode Normal	

ΔU_{L1L2} (%)	0.136	0.136
ΔU_{L2L3} (%)	0.136	0.136
ΔU_{L3L1} (%)	0.136	0.136
ΔU_{L1N} (%)	0.118	0.118
ΔU_{L2N} (%)	0.118	0.118
ΔU_{L3N} (%)	0.118	0.118

3.2 Generic load circuits

3.2.1 Circuit Load 3

Circuit breaker	QA 3
Ib	144 A
Distance from origin	NA
Sizing Information	Sized by system
Range	Compact NSX
Designation	NSX160B
Circuit breaker rating	160 A
Breaking capacity	25 kA
TNS One pole breaking capacity	NA
IT One pole breaking capacity	NA
Reinforced breaking capacity	NA
Pole & protected pole	4P4d
Trip unit designation	Micrologic 2.2
Trip unit rating	160 A
Long delay settings	
Ir	146 A
Tr	16 s
Short delay settings	
Isd current	1164 A
Tsd	0.02 s
Instantaneous tripping	
Ii current	2400 A

Discrimination Results UpStream	Discrimination Limit
Operating mode Normal	
QA 0 NT08H1 Micrologic 5.0 E 800 A / 4P4d	Full Discrimination

Cable	WD 3
Parameters	
Length	60 m
Max length	84 m
Installation method	31 E Multi-core cables on horizontal perforated tray
Type of cable	Multi-core
Nb of additional touching circuits	0
Insulation	XLPE
Ambient temperature	30 °C
Level of third harmonic THDI	0 %
Ib	144 A
Sizing constraint	Voltage drop

Sizing Information	The CSA of cable WD 3 has been increased from 35 to 50 to comply with the voltage drop in the circuit. Sized with Ir
Correction factors	
Temperature factor	1
Standard table reference	B-52-14
Soil thermal resistivity factor	1
Standard table reference	B-52-16
Loaded neutral factor	1
Standard table reference	E-52-1
Touching conductor factor	1
Standard table reference	B-52-20
User correction factor	1
Overall factor	1

Selected phase	
Cross section area	1x50 mm²
Core	Copper
Iz under real conditions	192 A
Selected neutral	
Cross section area	1x50 mm²
Core	Copper
Iz under real conditions	192 A
Selected PE	
Cross section area	1x25 mm²
Core	Copper

Short circuit current							
	Ik3max	**Ik2max**	**Ik1max**	**Ik2min**	**Ik1min**	**Ief**	**Ief2min**
Operating mode Normal							
(kA)	3.50	3.03	2.76	1.81	2.22	1.64	0.00
Synthesis for all operating mode							
(kA)	3.50	3.03	2.76	1.81	2.22	1.64	0.00

Calculation results in accordance with CENELEC technical report TR50480.
All assumptions and device choices are the user's responsibility.

Charge	**AA 3**
U	400 V
S	100 kVA
P	85 kW
I	144 A
cosφ	0.85
Polarity	3Ph+N
Phase connection	
Number of circuit	1
Ku (Normal)	1
Harmonic generator	No
THDI3	0
Sensitivity to over voltage	NA

Design current				
	IL1	**IL2**	**IL3**	**IN**
Operating mode Normal				
(A)	144.338	144.338	144.338	0

Synthesis for all operating mode				
(A)	144.338	144.338	144.338	0

Voltage drop	Cumulated from upstream	Circuit
Operating mode Normal		
ΔU_{3L} (%)	1.786	1.668
ΔU_{L1L2} (%)	2.063	1.927
ΔU_{L2L3} (%)	2.063	1.927
ΔU_{L3L1} (%)	2.063	1.927
ΔU_{L1N} (%)	1.786	1.668
ΔU_{L2N} (%)	1.786	1.668
ΔU_{L3N} (%)	1.786	1.668

Synthesis for all operating mode	
ΔU_{3L} (%)	1.786
ΔU_{L1L2} (%)	2.063
ΔU_{L2L3} (%)	2.063
ΔU_{L3L1} (%)	2.063
ΔU_{L1N} (%)	1.786
ΔU_{L2N} (%)	1.786
ΔU_{L3N} (%)	1.786

3.2.2 Circuit Load 4

Circuit breaker	QA 4
Ib	144 A
Distance from origin	NA
Sizing Information	Sized by system
Range	Compact NSX
Designation	NSX160B
Circuit breaker rating	160 A
Breaking capacity	25 kA
TNS One pole breaking capacity	NA
IT One pole breaking capacity	NA
Reinforced breaking capacity	NA
Pole & protected pole	4P4d
Trip unit designation	Micrologic 2.2
Trip unit rating	160 A
Long delay settings	
Ir	146 A
Tr	16 s
Short delay settings	
Isd current	1455 A
Tsd	0.02 s
Instantaneous tripping	
Ii current	2400 A

Discrimination Results UpStream	Discrimination Limit
Operating mode Normal	
QA 0 NT08H1 Micrologic 5.0 E 800 A / 4P4d	Full Discrimination

Cable	WD 4
Parameters	
Length	30 m
Max length	54.2 m
Installation method	31 E Multi-core cables on horizontal perforated tray
Type of cable	Multi-core
Nb of additional touching circuits	0
Insulation	XLPE
Ambient temperature	30 °C
Level of third harmonic THDI	0 %
Ib	144 A
Sizing constraint	Iz
Sizing Information	Sized with Ir
Correction factors	
Temperature factor	1
Standard table reference	B-52-14
Soil thermal resistivity factor	1

ΔU_{L1L2} (%)	1.473	1.337
ΔU_{L2L3} (%)	1.473	1.337
ΔU_{L3L1} (%)	1.473	1.337
ΔU_{L1N} (%)	1.276	1.158
ΔU_{L2N} (%)	1.276	1.158
ΔU_{L3N} (%)	1.276	1.158

Synthesis for all operating mode	
ΔU_{3L} (%)	1.276
ΔU_{L1L2} (%)	1.473
ΔU_{L2L3} (%)	1.473
ΔU_{L3L1} (%)	1.473
ΔU_{L1N} (%)	1.276
ΔU_{L2N} (%)	1.276
ΔU_{L3N} (%)	1.276

3.2.3 Circuit Load 5

Circuit breaker	QA 5
Ib	144 A
Distance from origin	NA
Sizing Information	Sized by system
Range	Compact NSX
Designation	NSX160B
Circuit breaker rating	160 A
Breaking capacity	25 kA
TNS One pole breaking capacity	NA
IT One pole breaking capacity	NA
Reinforced breaking capacity	NA
Pole & protected pole	4P4d
Trip unit designation	Micrologic 2.2
Trip unit rating	160 A
Long delay settings	
Ir	146 A
Tr	16 s
Short delay settings	
Isd current	1455 A
Tsd	0.02 s
Instantaneous tripping	
Ii current	2400 A

Discrimination Results UpStream	Discrimination Limit
Operating mode Normal	
QA 0 NT08H1 Micrologic 5.0 E 800 A / 4P4d	Full Discrimination

Cable	WD 5
Parameters	
Length	30 m
Max length	54.2 m
Installation method	31 E Multi-core cables on horizontal perforated tray
Type of cable	Multi-core
Nb of additional touching circuits	0
Insulation	XLPE
Ambient temperature	30 °C
Level of third harmonic THDI	0 %
Ib	144 A
Sizing constraint	Iz
Sizing Information	Sized with Ir
Correction factors	
Temperature factor	1
Standard table reference	B-52-14
Soil thermal resistivity factor	1

Standard table reference	B-52-16
Loaded neutral factor	1
Standard table reference	E-52-1
Touching conductor factor	1
Standard table reference	B-52-20
User correction factor	1
Overall factor	1

Selected phase	
Cross section area	1x35 mm²
Core	Copper
Iz under real conditions	158 A
Selected neutral	
Cross section area	1x35 mm²
Core	Copper
Iz under real conditions	158 A
Selected PE	
Cross section area	1x16 mm²
Core	Copper

Short circuit current	**Ik3max**	**Ik2max**	**Ik1max**	**Ik2min**	**Ik1min**	**Ief**	**Ief2min**
Operating mode Normal							
(kA)	3.71	3.21	3.09	1.89	2.55	2.20	0.00
Synthesis for all operating mode							
(kA)	3.71	3.21	3.09	1.89	2.55	2.20	0.00

Calculation results in accordance with CENELEC technical report TR50480.
All assumptions and device choices are the user's responsibility.

Charge	**AC3**
U	400 V
S	100 kVA
P	85 kW
I	144 A
cosφ	0.85
Polarity	3Ph+N
Phase connection	
Number of circuit	1
Ku (Normal)	1
Harmonic generator	No
THDI3	0
Sensitivity to over voltage	NA

Design current	**IL1**	**IL2**	**IL3**	**IN**
Operating mode Normal				
(A)	144.338	144.338	144.338	0
Synthesis for all operating mode				
(A)	144.338	144.338	144.338	0

Voltage drop	**Cumulated from upstream**	**Circuit**
Operating mode Normal		
ΔU_{3L} (%)	1.276	1.158

ΔU_{L1L2} (%)	1.473	1.337
ΔU_{L2L3} (%)	1.473	1.337
ΔU_{L3L1} (%)	1.473	1.337
ΔU_{L1N} (%)	1.276	1.158
ΔU_{L2N} (%)	1.276	1.158
ΔU_{L3N} (%)	1.276	1.158

Synthesis for all operating mode	
ΔU_{3L} (%)	1.276
ΔU_{L1L2} (%)	1.473
ΔU_{L2L3} (%)	1.473
ΔU_{L3L1} (%)	1.473
ΔU_{L1N} (%)	1.276
ΔU_{L2N} (%)	1.276
ΔU_{L3N} (%)	1.276

3.2.4 Circuit Load 6

Circuit breaker	QA 6
Ib	144 A
Distance from origin	NA
Sizing Information	Sized by system
Range	Compact NSX
Designation	NSX160B
Circuit breaker rating	160 A
Breaking capacity	25 kA
TNS One pole breaking capacity	NA
IT One pole breaking capacity	NA
Reinforced breaking capacity	NA
Pole & protected pole	4P4d
Trip unit designation	Micrologic 2.2
Trip unit rating	160 A
Long delay settings	
Ir	146 A
Tr	16 s
Short delay settings	
Isd current	1164 A
Tsd	0.02 s
Instantaneous tripping	
Ii current	2400 A

Discrimination Results UpStream	Discrimination Limit
Operating mode Normal	
QA 0 NT08H1 Micrologic 5.0 E 800 A / 4P4d	Full Discrimination

Cable	WD 6
Parameters	
Length	60 m
Max length	84 m
Installation method	31 E Multi-core cables on horizontal perforated tray
Type of cable	Multi-core
Nb of additional touching circuits	0
Insulation	XLPE
Ambient temperature	30 °C
Level of third harmonic THDI	0 %
Ib	144 A
Sizing constraint	Voltage drop
Sizing Information	The CSA of cable WD 6 has been increased from 35 to 50 to comply with the voltage drop in the circuit. Sized with Ir
Correction factors	

Temperature factor	1
Standard table reference	B-52-14
Soil thermal resistivity factor	1
Standard table reference	B-52-16
Loaded neutral factor	1
Standard table reference	E-52-1
Touching conductor factor	1
Standard table reference	B-52-20
User correction factor	1
Overall factor	1

Selected phase	
Cross section area	1x50 mm²
Core	Copper
Iz under real conditions	192 A
Selected neutral	
Cross section area	1x50 mm²
Core	Copper
Iz under real conditions	192 A
Selected PE	
Cross section area	1x25 mm²
Core	Copper

Short circuit current							
	Ik3max	**Ik2max**	**Ik1max**	**Ik2min**	**Ik1min**	**Ief**	**Ief2min**
Operating mode Normal							
(kA)	3.50	3.03	2.76	1.81	2.22	1.64	0.00
Synthesis for all operating mode							
(kA)	3.50	3.03	2.76	1.81	2.22	1.64	0.00

Calculation results in accordance with CENELEC technical report TR50480.
All assumptions and device choices are the user's responsibility.

Charge	**AC4**
U	400 V
S	100 kVA
P	85 kW
I	144 A
cosφ	0.85
Polarity	3Ph+N
Phase connection	
Number of circuit	1
Ku (Normal)	1
Harmonic generator	No
THDI3	0
Sensitivity to over voltage	NA

Design current				
	IL1	**IL2**	**IL3**	**IN**
Operating mode Normal				
(A)	144.338	144.338	144.338	0
Synthesis for all operating mode				
(A)	144.338	144.338	144.338	0

Voltage drop		
	Cumulated from upstream	**Circuit**

3.2.5 Circuit Load 7

Circuit breaker	QA 7
Ib	84.9 A
Distance from origin	NA
Sizing Information	Sized by system
Range	Acti9 C120
Designation	C120N
Circuit breaker rating	100 A
Breaking capacity	10 kA
TNS One pole breaking capacity	NA
IT One pole breaking capacity	NA
Reinforced breaking capacity	NA
Pole & protected pole	4P4d
Trip unit designation	C
Trip unit rating	100 A
Long delay settings	
Ir	100 A
Tr	NA
Short delay settings	
Isd current	850 A
Tsd	NA
Instantaneous tripping	
Ii current	NA

Discrimination Results UpStream	Discrimination Limit
Operating mode Normal	
QA 0 NT08H1 Micrologic 5.0 E 800 A / 4P4d	Full Discrimination

Cable	WD 7
Parameters	
Length	90 m
Max length	157 m
Installation method	31 E Multi-core cables on horizontal perforated tray
Type of cable	Multi-core
Nb of additional touching circuits	0
Insulation	XLPE
Ambient temperature	30 °C
Level of third harmonic THDI	0 %
Ib	85 A
Sizing constraint	Voltage drop
Sizing Information	The CSA of cable WD 7 has been increased from 16 to 50 to comply with the voltage drop in the circuit. Sized with Ir
Correction factors	

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lighting system

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Project 1 / Luminaire parts list

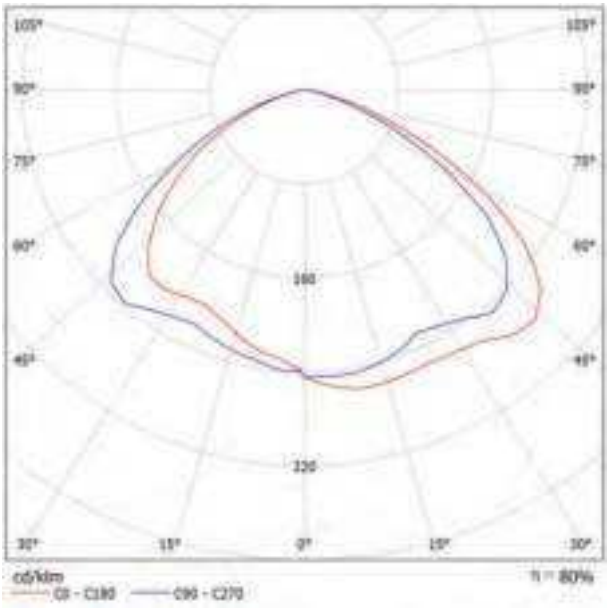
42 Pieces SAUDILIGHTING 6323S/4 -150B.GL Surface Mounted High -Bay Industrial Luminaire (Type 1)
Article No.: 6323S/4 -150B.GL
Luminous flux (Luminaire): 11626 lm
Luminous flux (Lamps): 14500 lm
Luminaire Wattage: 60.0 W
Luminaire classification according to CIE: 100
CIE flux code: 80 100 98 84 45
Fitting: 1 x User defined (Correction Factor 1.000).

SAUDILIGHTING 6323S/4 -150B.GL Surface Mounted High -Bay Industrial Luminaire / Luminaire Data Sheet

Luminaire classification according to CIE: 100
CIE flux code: 80 100 98 84 45

Surface Mounted High -Bay Industrial Luminaire installed with 150W HPS elliptical lamp for conventional control gears.

Luminous emittance 1:



Due to missing symmetry properties, no UGR table can be displayed for this luminaire.

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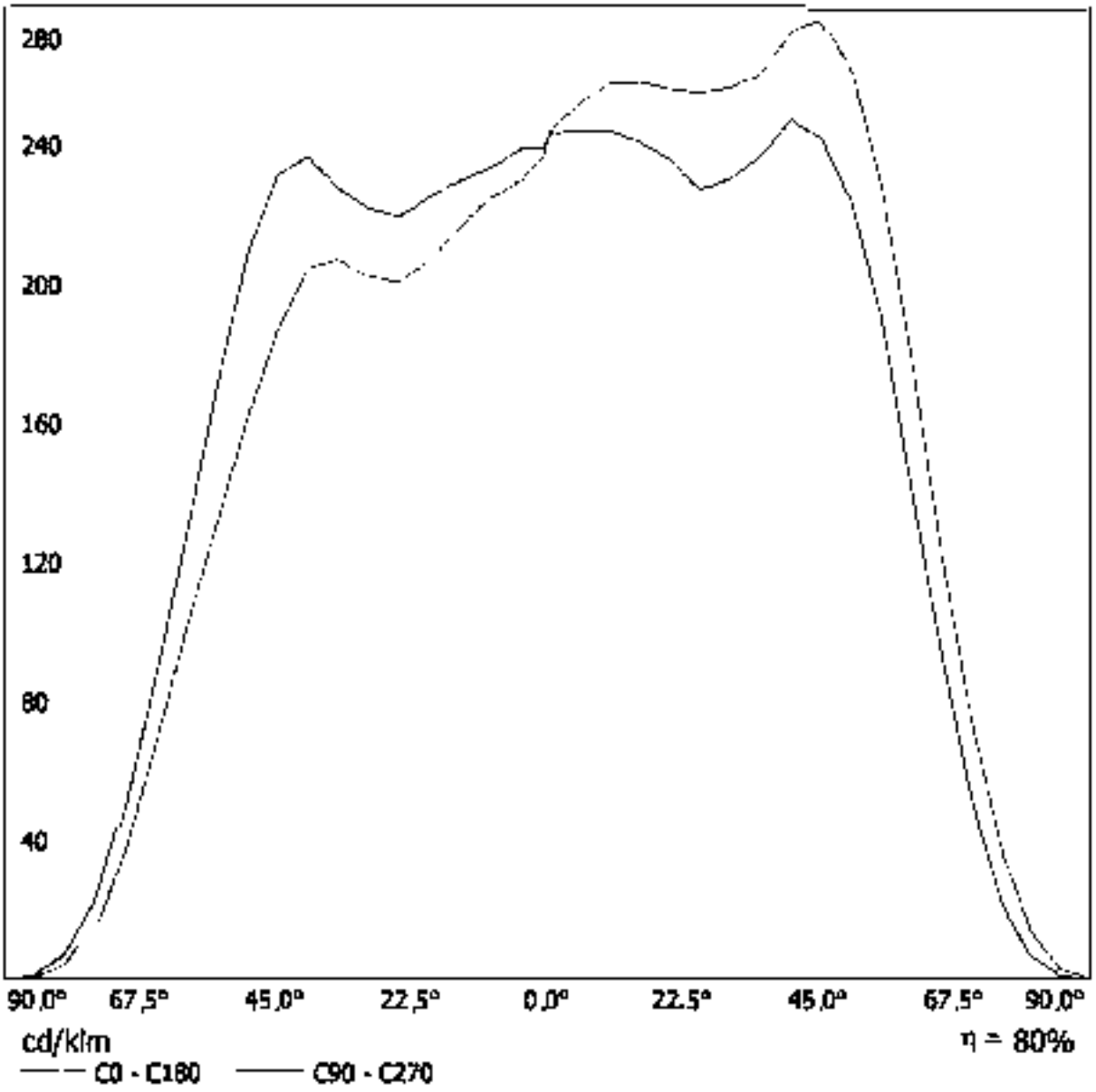
SAUDILIGHTING 6323S/4 -150B.GL Surface Mounted High -Bay Industrial Luminaire / LDC (Linear)

Luminaire: SAUDILIGHTING 6323S/4 -150B.GL Surface Mounted High -Bay Industrial Luminaire
Lamps: 1 x NAV -E 150



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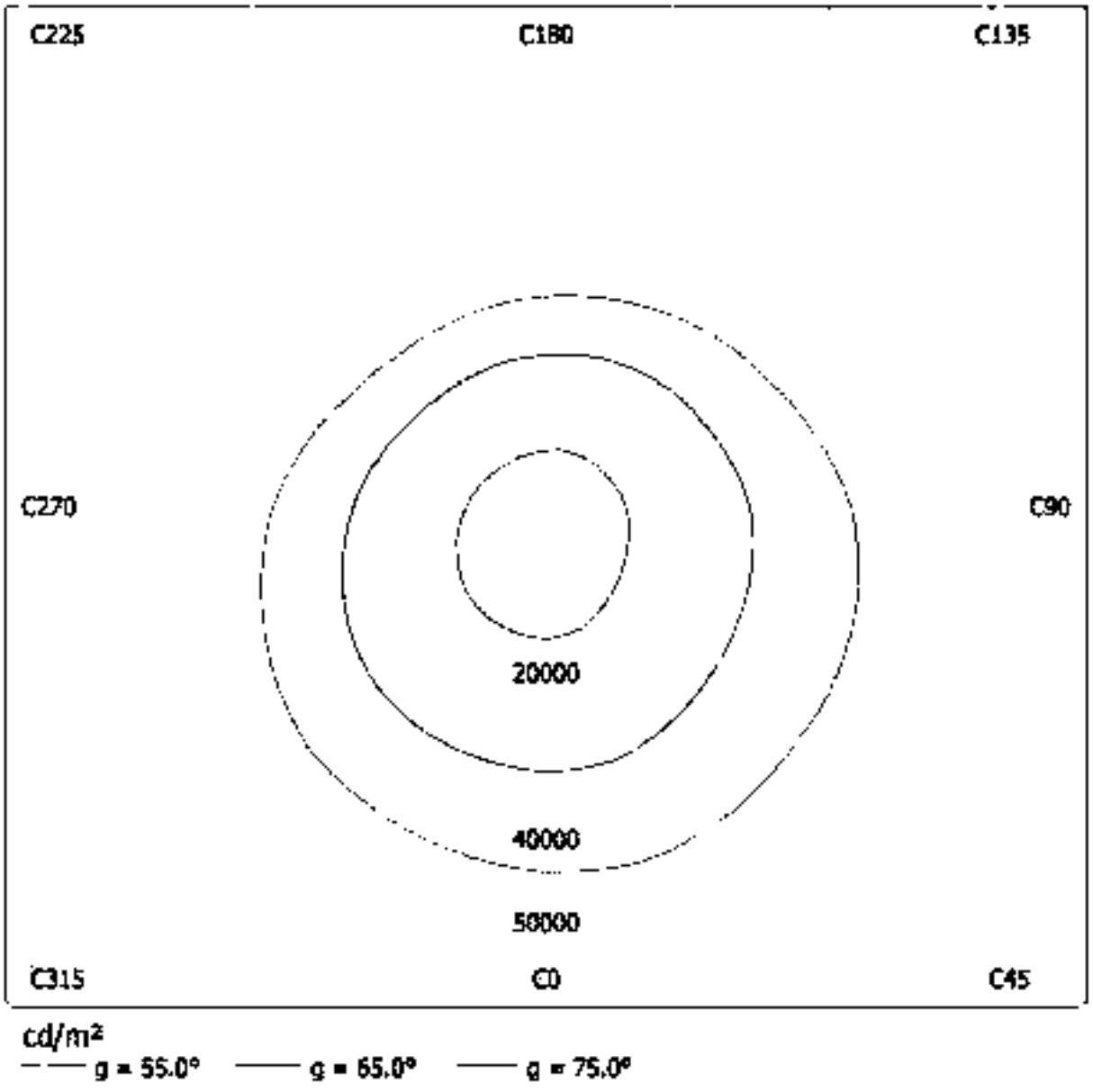
SAUDILIGHTING 6323S/4 -150B.GL Surface Mounted High -Bay Industrial Luminaire / Luminance Diagram

Luminaire: SAUDILIGHTING 6323S/4 -150B.GL Surface Mounted High -Bay Industrial Luminaire
Lamps: 1 x NAV -E 150



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SAUDILIGHTING 6323S/4 -150B.GL Surface Mounted High -Bay Industrial Luminaire / Luminous intensity table

Luminaire: SAUDILIGHTING 6323S/4 -150B.GL Surface Mounted High -Bay Industrial Luminaire
Lamps: 1 x NAV -E 150

Gamma	C 0°	C 15°	C 30°	C 45°	C 60°	C 75°	C 90°	C 105°	C 120°	C 135°
0.0°	244	244	245	245	245	243	244	242	241	241
5.0°	253	253	254	252	249	248	245	242	239	238
10.0°	258	258	258	255	253	249	245	240	236	233
15.0°	259	258	259	255	252	248	241	236	231	226
20.0°	257	259	258	254	249	243	236	230	223	217
25.0°	256	254	253	249	243	236	228	221	215	209
30.0°	257	258	255	250	244	240	231	224	216	210
35.0°	261	264	260	256	253	247	237	229	220	214
40.0°	273	275	270	266	262	257	248	235	225	216
45.0°	277	278	274	268	264	255	242	228	215	203
50.0°	262	262	259	251	246	236	224	207	193	181
55.0°	229	230	224	215	210	202	191	174	159	150
60.0°	179	177	171	162	155	150	141	131	122	116
65.0°	122	121	114	108	102	98	94	87	81	78
70.0°	74	72	67	61	57	54	52	48	45	43
75.0°	37	36	32	28	26	24	22	20	19	18
80.0°	14	13	11	9.62	8.41	7.56	6.84	6.07	5.40	4.86
85.0°	3.09	2.82	2.35	1.95	1.59	1.28	1.05	0.85	0.71	0.62
90.0°	0.26	0.22	0.16	0.14	0.12	0.09	0.10	0.10	0.10	0.11

Values in cd/klm

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SAUDILIGHTING 6323S/4 -150B.GL Surface Mounted High -Bay Industrial Luminaire / Luminous intensity table

Luminaire: SAUDILIGHTING 6323S/4 -150B.GL Surface Mounted High -Bay Industrial Luminaire
Lamps: 1 x NAV -E 150

Gamma	C 150°	C 165°	C 180°	C 195°	C 210°	C 225°	C 240°	C 255°	C 270°	C 285°
0.0°	239	239	239	237	239	237	239	239	239	239
5.0°	236	233	230	231	232	234	234	235	239	242
10.0°	229	226	225	223	224	225	226	230	234	239
15.0°	221	220	217	216	217	218	220	225	230	236
20.0°	213	209	207	205	207	209	212	218	225	230
25.0°	206	203	201	200	201	202	206	212	220	226
30.0°	207	203	203	202	203	204	207	214	222	229
35.0°	211	208	207	208	207	209	213	222	228	235
40.0°	210	206	205	205	205	206	215	226	237	245
45.0°	196	191	187	187	188	192	201	218	232	244
50.0°	171	166	163	162	163	167	177	194	210	223
55.0°	142	136	132	131	131	134	142	156	172	186
60.0°	110	106	103	101	101	103	108	119	130	142
65.0°	75	72	70	70	70	71	75	82	90	98
70.0°	42	41	39	39	39	40	43	47	52	58
75.0°	17	17	16	16	16	17	18	20	23	26
80.0°	4.50	4.31	4.10	4.12	4.30	4.63	5.26	6.10	7.14	8.41
85.0°	0.57	0.55	0.51	0.48	0.50	0.58	0.66	0.83	1.08	1.44
90.0°	0.16	0.20	0.16	0.11	0.10	0.10	0.10	0.10	0.10	0.10

Values in cd/klm

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SAUDILIGHTING 6323S/4 -150B.GL Surface Mounted High -Bay Industrial Luminaire / Luminous intensity table

Luminaire: SAUDILIGHTING 6323S/4 -150B.GL Surface Mounted High -Bay Industrial Luminaire
Lamps: 1 x NAV -E 150

Gamma	C 300°	C 315°	C 330°	C 345°	C 360°
0.0°	241	242	242	243	244
5.0°	244	246	249	252	253
10.0°	245	248	253	257	258
15.0°	243	248	252	257	259
20.0°	237	245	249	256	257
25.0°	234	240	246	252	256
30.0°	234	239	246	252	257
35.0°	240	244	251	257	261
40.0°	250	254	260	267	273
45.0°	251	257	263	271	277
50.0°	233	244	249	255	262
55.0°	200	213	218	224	229
60.0°	154	165	170	174	179
65.0°	107	114	118	120	122
70.0°	63	69	72	73	74
75.0°	29	33	35	37	37
80.0°	9.82	11	13	13	14
85.0°	1.84	2.32	2.79	3.07	3.09
90.0°	0.13	0.16	0.19	0.26	0.26

Values in cd/klm

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SAUDILIGHTING 6323S/4 -150B.GL Surface Mounted High -Bay Industrial Luminaire / Luminance Table

Luminaire: SAUDILIGHTING 6323S/4 -150B.GL Surface Mounted High -Bay Industrial Luminaire
Lamps: 1 x NAV -E 150

Gamma	C 0°	C 15°	C 30°	C 45°	C 60°	C 75°	C 90°	C 105°	C 120°	C 135°
0.0°	26851	26808	26933	26870	26860	26692	26788	26620	26495	26495
5.0°	27854	27897	27949	27833	27456	27298	26973	26638	26386	26187
10.0°	28802	28770	28718	28474	28208	27805	27275	26755	26331	25949
15.0°	29419	29386	29408	28987	28672	28165	27451	26823	26262	25700
20.0°	29995	30240	30129	29684	29107	28351	27596	26839	26095	25350
25.0°	30963	30779	30662	30179	29465	28635	27575	26814	26077	25339
30.0°	32607	32668	32281	31642	30907	30425	29291	28374	27386	26675
35.0°	34996	35341	34869	34385	33976	33159	31823	30687	29488	28699
40.0°	39140	39358	38690	38132	37571	36823	35541	33660	32241	31028
45.0°	43023	43244	42505	41590	41043	39538	37646	35372	33423	31576
50.0°	44793	44808	44176	42876	41967	40374	38293	35435	32998	30951
55.0°	43789	44080	42897	41221	40220	38692	36524	33357	30535	28785
60.0°	39246	38954	37576	35632	34025	32898	30934	28845	26840	25482
65.0°	31731	31408	29727	27999	26590	25477	24340	22586	21177	20337
70.0°	23835	23209	21500	19734	18336	17383	16636	15411	14483	13841
75.0°	15741	15071	13485	12061	10943	10132	9442	8663	8026	7582
80.0°	8600	8089	7043	6086	5317	4781	4324	3837	3416	3073
85.0°	3894	3559	2960	2456	2001	1618	1318	1066	899	779

Values in Candela/m ^{2}.

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SAUDILIGHTING 6323S/4 -150B.GL Surface Mounted High -Bay Industrial Luminaire / Luminance Table

Luminaire: SAUDILIGHTING 6323S/4 -150B.GL Surface Mounted High -Bay Industrial Luminaire
Lamps: 1 x NAV -E 150

Gamma	C 150°	C 165°	C 180°	C 195°	C 210°	C 225°	C 240°	C 255°	C 270°	C 285°
0.0°	26286	26286	26296	26077	26223	26077	26265	26286	26296	26286
5.0°	25968	25737	25349	25422	25568	25757	25842	25926	26375	26627
10.0°	25525	25250	25101	24846	24931	25059	25165	25673	26076	26670
15.0°	25137	25008	24629	24564	24705	24770	25029	25635	26175	26878
20.0°	24862	24439	24205	24017	24217	24394	24773	25484	26351	26928
25.0°	24923	24648	24394	24243	24302	24463	24937	25730	26653	27437
30.0°	26192	25758	25710	25649	25758	25830	26277	27145	28206	28989
35.0°	28303	27857	27806	27896	27780	28060	28546	29743	30572	31554
40.0°	30115	29530	29432	29432	29325	29597	30756	32460	34001	35158
45.0°	30469	29612	29110	29096	29244	29818	31149	33895	36051	37823
50.0°	29262	28318	27767	27635	27767	28611	30268	33111	35857	38165
55.0°	27221	26018	25363	25072	25072	25637	27148	29915	32973	35559
60.0°	24125	23248	22620	22244	22141	22537	23707	26047	28509	31184
65.0°	19497	18805	18212	18188	18212	18558	19546	21227	23352	25403
70.0°	13401	13023	12638	12495	12565	12950	13792	15072	16669	18482
75.0°	7243	7073	6831	6771	6912	7154	7776	8635	9720	11108
80.0°	2845	2724	2592	2604	2718	2929	3326	3855	4516	5317
85.0°	719	695	647	611	635	731	827	1043	1366	1809

Values in Candela/m ^{2}.

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SAUDILIGHTING 6323S/4 -150B.GL Surface Mounted High -Bay Industrial Luminaire / Luminance Table

Luminaire: SAUDILIGHTING 6323S/4 -150B.GL Surface Mounted High -Bay Industrial Luminaire
Lamps: 1 x NAV -E 150

Gamma	C 300°	C 315°	C 330°	C 345°	C 360°
0.0°	26516	26527	26536	26703	26851
5.0°	26932	27173	27456	27749	27854
10.0°	27360	27667	28261	28621	28802
15.0°	27645	28165	28619	29225	29419
20.0°	27739	28663	29151	29863	29995
25.0°	28370	29096	29763	30478	30963
30.0°	29726	30353	31233	31980	32607
35.0°	32154	32650	33684	34485	34996
40.0°	35841	36440	37328	38254	39140
45.0°	39050	39863	40896	42107	43023
50.0°	39788	41610	42519	43607	44793
55.0°	38234	40693	41733	42843	43789
60.0°	33836	36239	37449	38244	39246
65.0°	27700	29555	30618	31211	31731
70.0°	20290	22119	23093	23569	23835
75.0°	12440	13897	14950	15494	15741
80.0°	6213	7145	8005	8474	8600
85.0°	2313	2924	3511	3870	3894

Values in Candela/m ^{2}.

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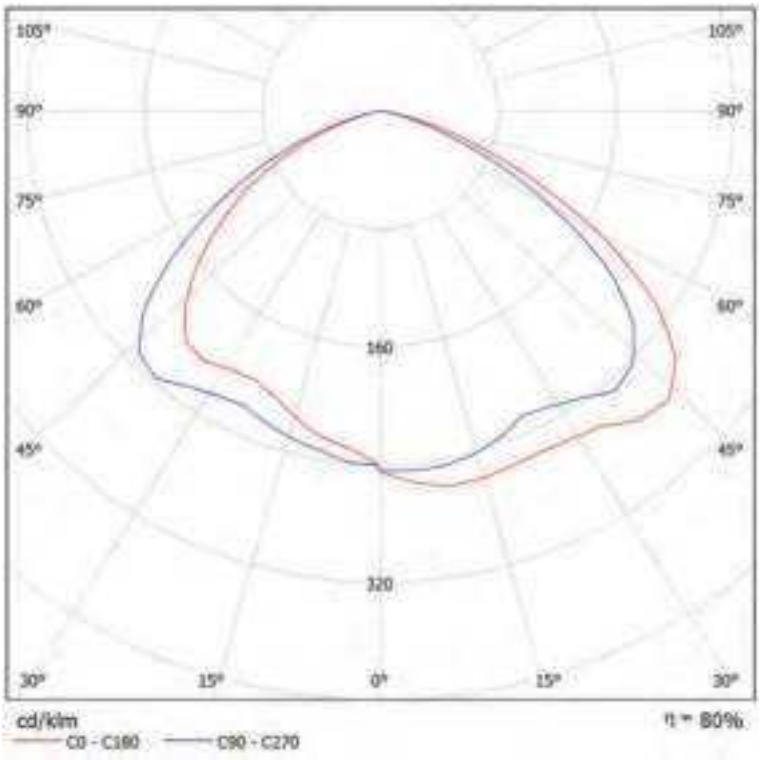
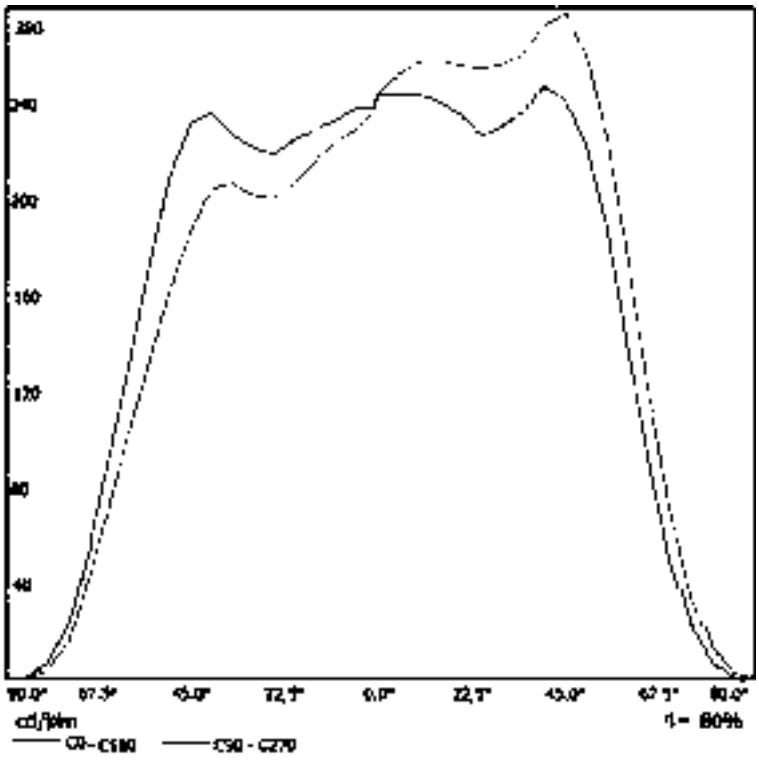
SAUDILIGHTING 6323S/4 -150B.GL Surface Mounted High -Bay Industrial Luminaire / LDC Data Sheet

Luminaire: SAUDILIGHTING 6323S/4 -150B.GL Surface Mounted High -Bay Industrial Luminaire

Lamps: 1 x NAV -E 150





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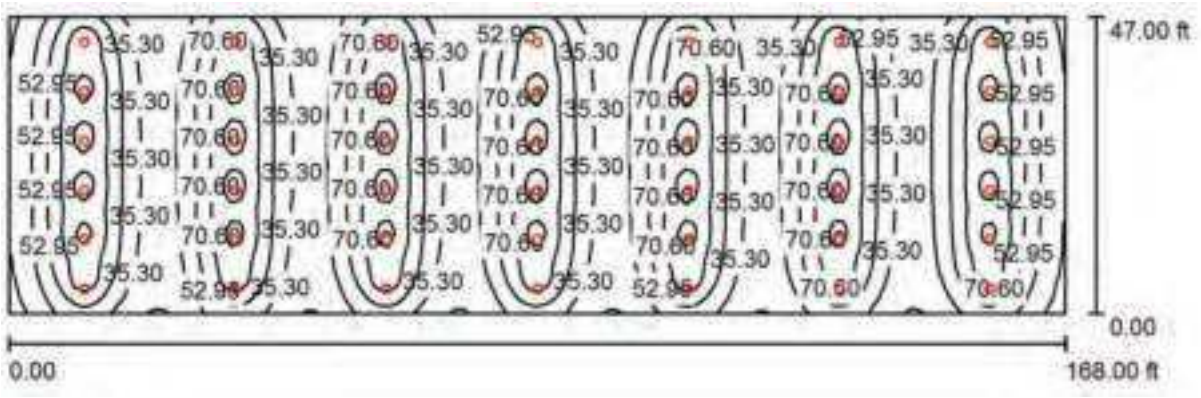
Room 2 / Summary



Height of Room: 12.000 ft, Mounting Height: 12.000 ft, Light loss factor: 0.80

Values in Footcandles, Scale 1:367

Surface	ρ [%]	E_{av} [fc]	E_{min} [fc]	E_{max} [fc]	u0
Workplane	/	52	13	97	0.245
Floor	20	50	19	75	0.388
Ceiling	80	9.62	6.79	11	0.706
Walls (4)	50	21	6.98	104	/

Workplane:
- Height: 2.493 ft
- Grid: 128 x 128 Points
- Boundary Zone: 0.000 ft

Illuminance Quotient (according to LG7): Walls / Working Plane: 0.368, Ceiling / Working Plane: 0.185.

Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	42	SAUDILIGHTING 6323S/4 -150B.GL Surface Mounted High -Bay Industrial Luminaire (Type 1)* (1.000)	11626	14500	60.0
*Modified Technical Specifications			Total: 488293	Total: 609000	2520.0

Specific connected load: 0.32 W/sq ft = 0.06 W/sq ft/10 fc (Ground area: 7896.18 sq ft)

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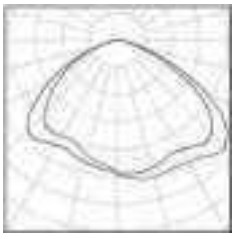
Room 2 / Luminaire parts list

42 Pieces SAUDILIGHTING 6323S/4 -150B.GL Surface Mounted High -Bay Industrial Luminaire (Type 1)
Article No.: 6323S/4 -150B.GL
Luminous flux (Luminaire): 11626 lm
Luminous flux (Lamps): 14500 lm
Luminaire Wattage: 60.0 W
Luminaire classification according to CIE: 100
CIE flux code: 45 84 98 100 80
Fitting: 1 x User defined (Correction Factor 1.000).



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Room 2 / Photometric Results

Total Luminous Flux: 488293 lm
Total Load: 2520.0 W
Light loss factor: 0.80
Boundary Zone: 0.000 ft

Surface	Average illuminances [fc]			Reflection factor [%]	Average luminance [cd/m²]
	direct	indirect	total		
Workplane	44	8.08	52	/	/
Floor	42	8.52	50	20	34
Ceiling	0.04	9.58	9.62	80	26
Wall 1	11	8.24	19	50	33
Wall 2	6.95	8.19	15	50	26
Wall 3	17	8.43	25	50	43
Wall 4	7.19	8.48	16	50	27

Uniformity on the working plane
u0: 0.245 (1:4)
E_{min} / E_{max}: 0.131 (1:8)

Illuminance Quotient (according to LG7): Walls / Working Plane: 0.368, Ceiling / Working Plane: 0.185.

Specific connected load: 0.32 W/sq ft = 0.06 W/sq ft/10 fc (Ground area: 7896.18 sq ft)

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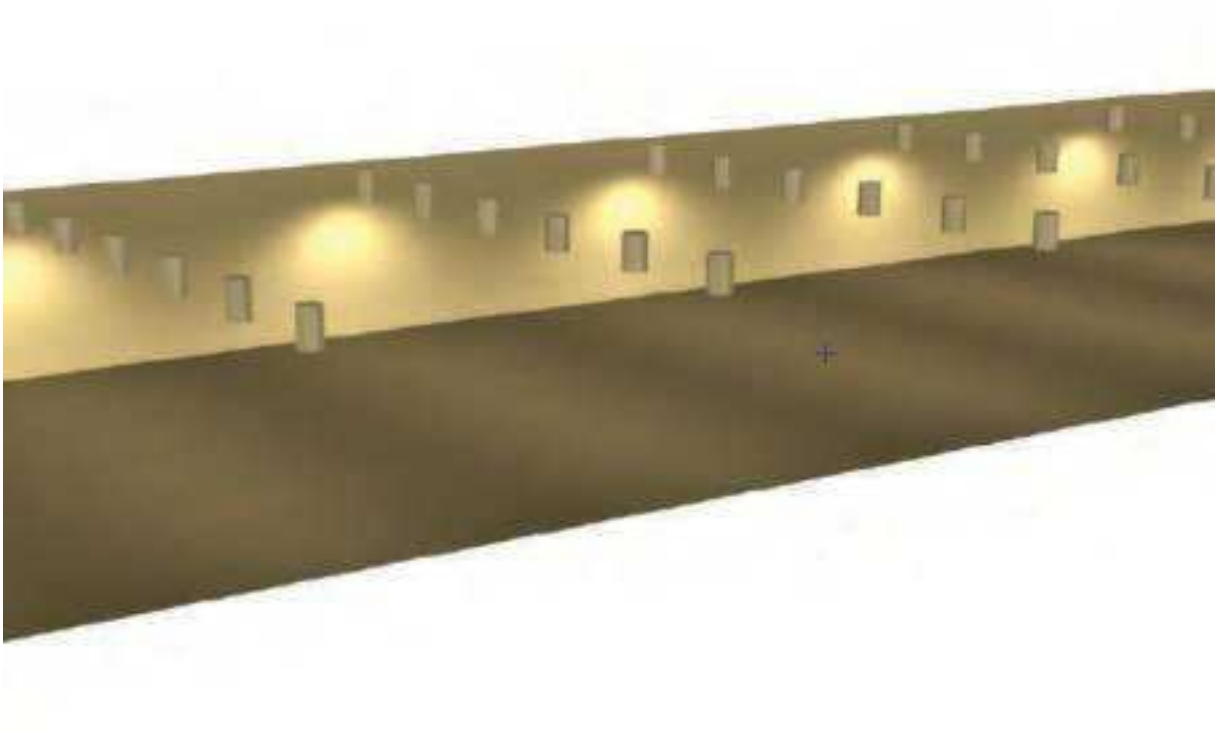
Room 2 / 3D Rendering



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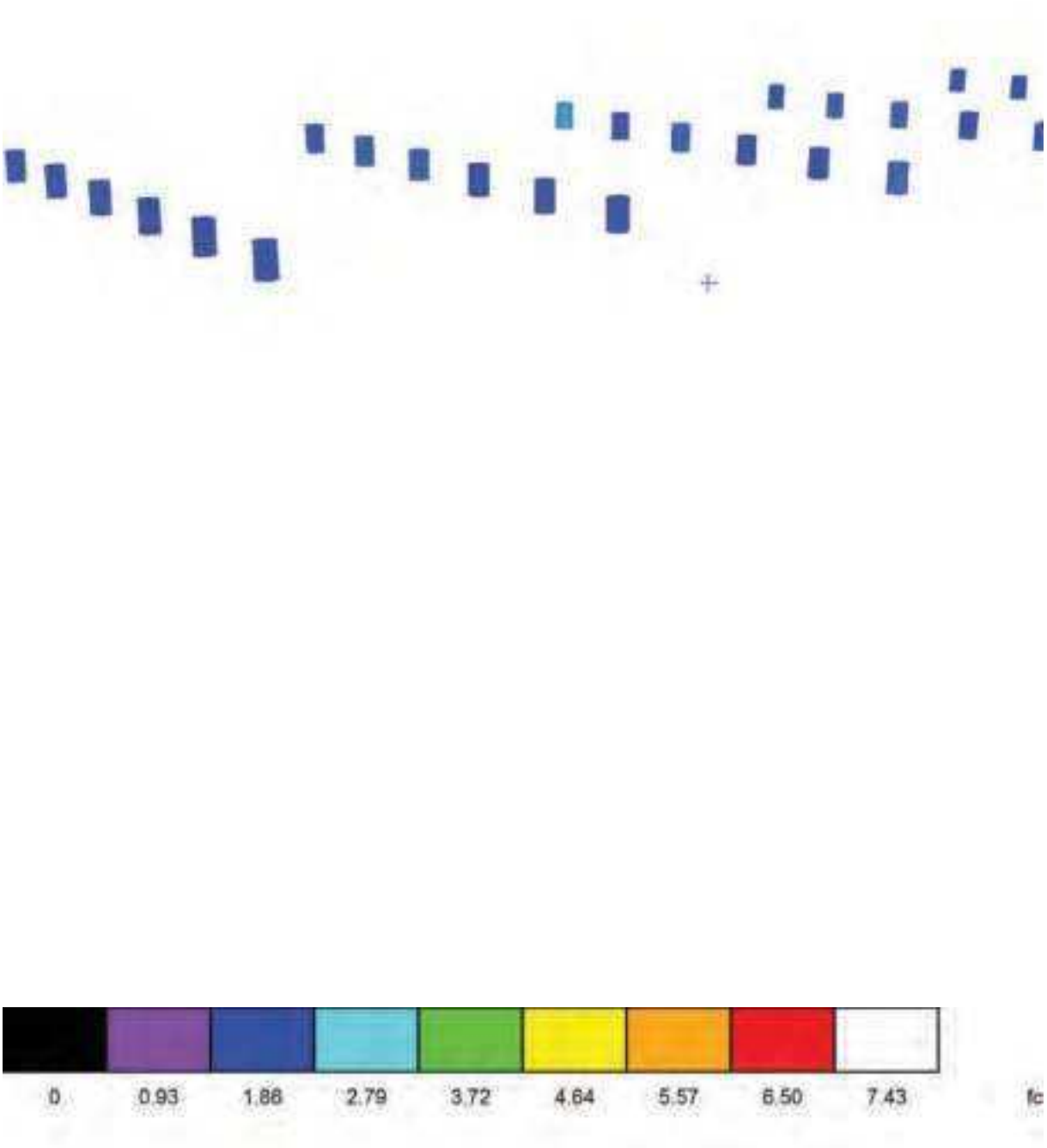
Room 2 / False Color Rendering



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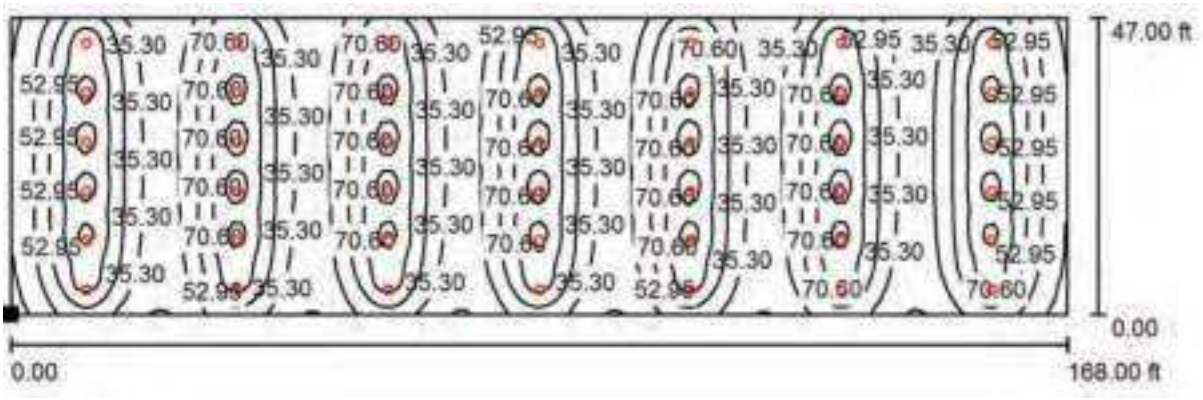
Room 2 / Workplane / Isolines (E)



Values in Footcandles, Scale 367 : 1

Position of surface in room:
Marked point:
(0.000 ft, 0.000 ft, 2.493 ft)

Grid: 128 x 128 Points

E_{av} [fc]	E_{min} [fc]	E_{max} [fc]	u0	E_{min} / E_{max}
52	13	97	0.245	0.131

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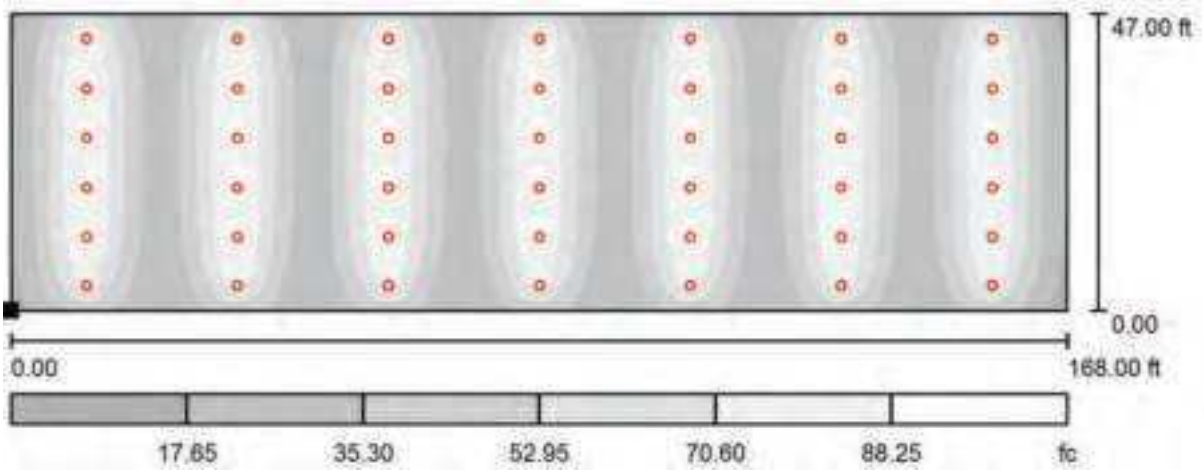
Room 2 / Workplane / Greyscale (E)



Scale 367 : 1

Position of surface in room:
Marked point:
(0.000 ft, 0.000 ft, 2.493 ft)

Grid: 128 x 128 Points

E_{av} [fc]	E_{min} [fc]	E_{max} [fc]	u0	E_{min} / E_{max}
52	13	97	0.245	0.131

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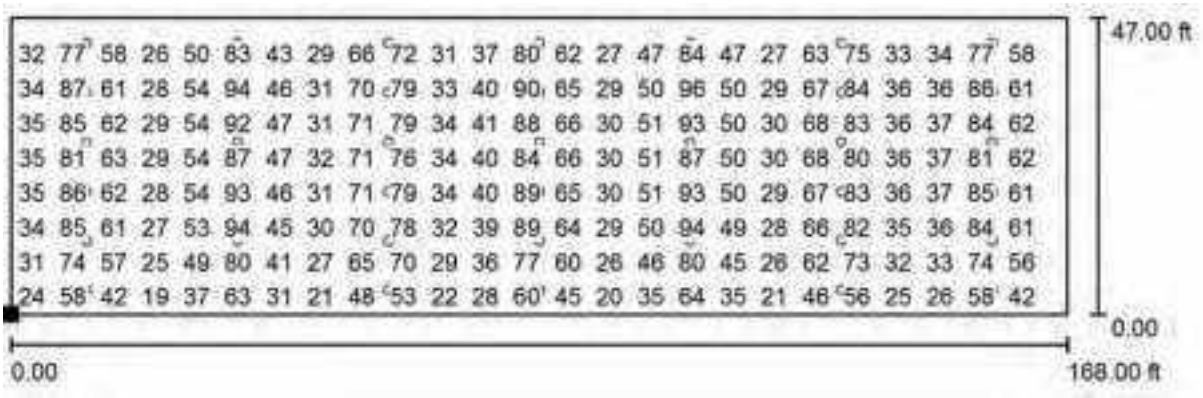
Room 2 / Workplane / Value Chart (E)



Values in Footcandles, Scale 1 : 367

Not all calculated values could be displayed.

Position of surface in room:
Marked point:
(0.000 ft, 0.000 ft, 2.493 ft)

Grid: 128 x 128 Points

E_{av} [fc]	E_{min} [fc]	E_{max} [fc]	u0	E_{min} / E_{max}
52	13	97	0.245	0.131

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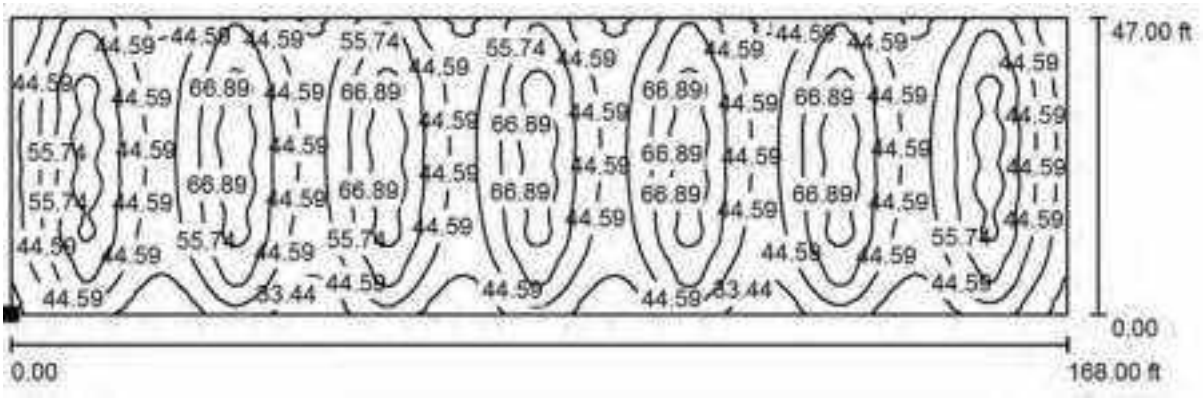
Room 2 / Floor / Isolines (E)



Values in Footcandles, Scale 1 : 367

Position of surface in room:
Marked point:
(0.000 ft, 0.000 ft, 0.000 ft)

Grid: 128 x 128 Points

E_{av} [fc]	E_{min} [fc]	E_{max} [fc]	u0	E_{min} / E_{max}
50	19	75	0.388	0.261

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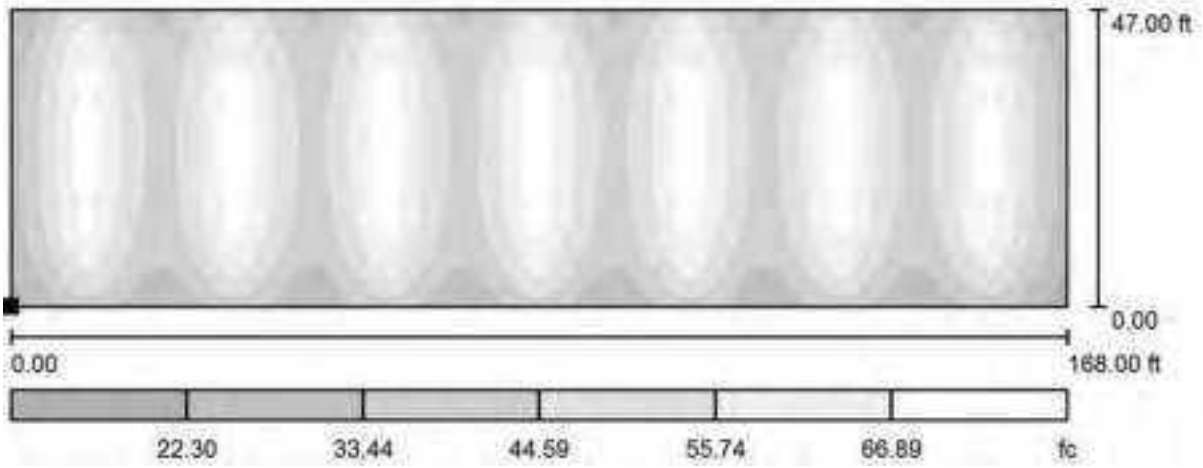
Room 2 / Floor / Greyscale (E)



Scale 1 : 367

Position of surface in room:
Marked point:
(0.000 ft, 0.000 ft, 0.000 ft)

Grid: 128 x 128 Points

E_{av} [fc]	E_{min} [fc]	E_{max} [fc]	u0	E_{min} / E_{max}
50	19	75	0.388	0.261

Barcode and raking system.

It is the most important part of the organization of inventory management so that the process begins from the receipt of goods and ends delivery to customers.

We have equipped a system that meets your needs and provides the highest level of accuracy and control, a fully automated system.

- ✓ Absolute control of warehouse management.
- ✓ Provides increased productivity, logistics and reduced operations.
- ✓ Eliminate errors in shipments and increase the efficiency of the input.
- ✓ Improve the speed of prepare orders and distributing orders. Facilitates the continuous inventory process.
- ✓ Adapt to any kind of companies and sectors.
- ✓ Reduce logistics expenses.

Materials movement

Due to the numbers of your products, it was necessary to provide a easy systematic movement one-way, work to reduce the rate of error and reduce the pressure of work as we follow in this system production lines Which operating continuously and under the highly pressure Without any error possible.

- ✓ Increase the speed of dealing with the goods in institution.
- ✓ Improve communication between different levels and regions.
- ✓ Allows for the possibility of great interconnection between simple and more complex circuits.
- ✓ Essential in any process Trustworthy.

SFDA

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We have done all the previous studies at the highest level and in line with the requirements of the Saudi Food and Drug Authority as follows:

Kingdom of Saudi Arabia
Saudi Food & Drug Authority

المملكة العربية السعودية
الهيئة العامة للغذاء والدواء

الشروط و المستندات المطلوبة للحصول على ترخيص مستودع مستحضرات صيدلانية/ تجميل	
الشروط	
١	أن يتم تقديم طلب الحصول على الترخيص قبل انتهاء المرحلة السابقة.
٢	الحصول على رخصة البلدية
٣	الحصول على رخصة الدفاع المدني
٤	تعيين مدير فني للمستودع متفرغ و متفرغ للعمل على أن يكون صيدلانيا أو في صيدلة ، وفي حال وجود أدوية مخدرة وموثرات عقلية يجب أن يكون مدير المستودع صيدلي
٥	يكون المبنى جيد الجزل حرارية ومائية وجيد التهوية و لا تقل المساحة المخصصة للتخزين عن ٦٠ متراً مربعاً و لا تقل الارتفاع عن ٣ متر و يجهز بنوافذ مضادة الحرق ، و لا يقل ارتفاع السقف عن المبنى ارتفاع التخزين عن متر.
٦	يجب أن يكون مبنى المستودع مشيد من الخرسانة المسلحة أو الحديد (هنقر)
٧	أن يكون المستودع مدعن أو أكثر مخصص للاستلام و التسليم منفصل عن منطقة التخزين
٨	توفير وحدات تكييف كافية للحفاظ على درجة الحرارة داخل المستودع من ٢٠ إلى ٢٥ درجة مئوية في جميع الأوقات.
٩	ألا تزيد نسبة الرطوبة عن ٦٠%
١٠	في حالة وجود مستحضرات تحتاج إلى تبريد يجب أن يحتوي المستودع على غرفة تبريد (ثلاجة) لتخزين المواد التي تحتاج إلى تبريد مزودة بجهاز انذار في حال انخفاض أو ارتفاع درجة الحرارة عن الدرجة المطلوبة بحيث يفضل أن يكون نطاق درجة الحرارة من ٢-٨ درجة مئوية
١١	في حال وجود مستحضرات يحتاج حفظها درجات حرارة تحت الانجماد يجب أن يتوفر مجمد (فريزر) بحيث يفضل أن يكون نطاق درجة الحرارة من (٢٠- إلى ١٠- درجة مئوية) ومزود بجهاز انذار في حال انخفاض أو ارتفاع درجة الحرارة عن الدرجة المطلوبة و مرفق مانعة الحفظ وتربط بمولد كهربائي احتياطي يعمل تلقائياً عند انقطاع التيار الكهربائي.
١٢	توفر نظام الكتروني لتسجيل قراءات درجة الحرارة و الرطوبة لكافة أرجاء المستودع والثلاجة و المجمد (الفريزر) بشكل دوري مع الاحتفاظ بالقراءات في سجلات خاصة بذلك لمدة لا تقل عن سنة مع توفير سجلات لمعايرة هذه الأجهزة لضمان دقة قياس درجة الحرارة من الجهة المختصة مع الاحتفاظ بمستندات المعايرة لمدة لا تقل عن سنة
١٣	أن يتم توزيع أجهزة قياس درجة الحرارة والرطوبة في أماكن وارتفاعات مختلفة بناء على الخريطة الحرارية للمستودع (Temperature Mapping)، أو وضع مقياس واحد لكل ٥٠ متر مربع من مساحة المستودع
١٤	يجب أن يتم تقسيم المستودع إلى: • منطقة استلام وتسليم • منطقة تخزين ذات أرفف • منطقة حجر صحة و معزلة للتالف أو المنتهي الصلاحية • منطقة مخصصة للأدوية المسترجعة (Recall) • منطقة مخصصة لتخزين العينات المجانية في حال وجودها • مكاتب للإدارة ملحقة بالمستودع أو منفصلة عنه
١٥	في حال احتواء المستودع لأكثر من نشاط فيجب أن تكون في أقسام مختلفة كأن تكون الأدوية البشرية في قسم والأدوية البيطرية في قسم آخر
١٦	يجب أن تكون الأرضيات ناعمة و يسهل تنظيفها ومن خرسانة
١٧	يجب أن تكون التهوية والإضاءة بالمستودع جيدة
١٨	يجب عدم توفر مصدر للنار والتدخين بالمستودع مع وضع لوحات إرشادية لمنع التدخين
١٩	يجب تطبيق مبدأ التخزين النوعي (كل صنف على حدا)
٢٠	يجب المحافظة على نظافة وترتيب المستودع والالتزام بالتخزين على الأرفف
٢١	يجب أن يوفر المستودع وسائل نقل مكيفة ومناسبة لنقل وتوزيع المستحضرات أو التعاقد مع شركة متخصصة
٢٢	في حال التعاقد مع شركة متخصصة للنقل فيجب الاحتفاظ بمستندات النقل لمدة لا تقل عن سنة
٢٣	يجب أن تكون وسيلة النقل مجهزة لنقل أي مستحضرات بحاجة لدرجة تبريد كتبريدة الانجماض (أقل من ٢ درجة مئوية) في حال وجودها

Version 3.1 - 09/01/2012 — 8 — النسخة ٣,١ - ١٤٣٣/٠١/١٥ هـ

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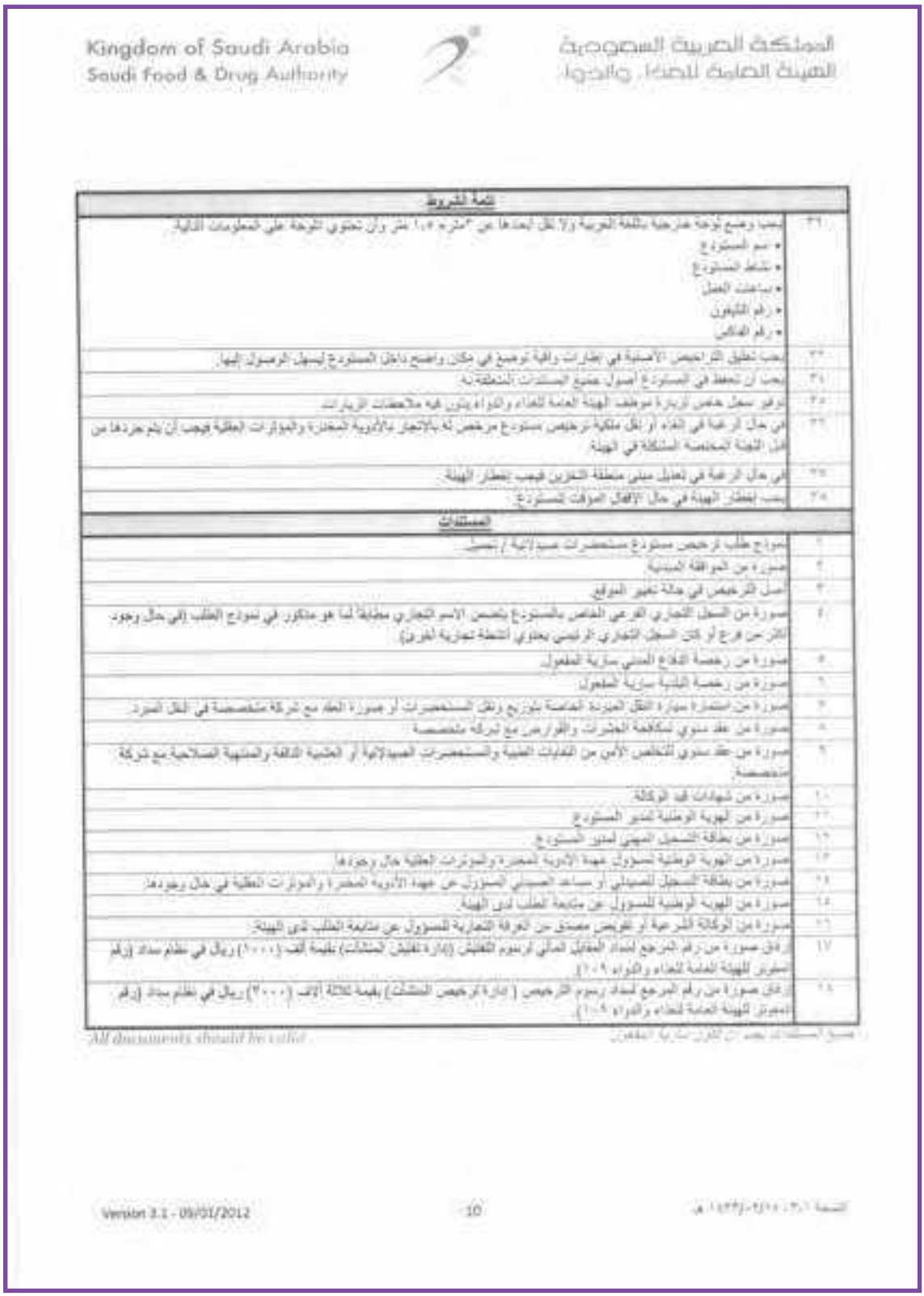
Saudi Food & Drug Authority

المملكة العربية السعودية
الهيئة العامة للغذاء والدواء

	تتمة الشروط
٢١	في حالة رغبة المستورد الترخيص له بالاتجار بالأدوية المخدرة والمؤثرات العقلية يجب الالتزام بما يلي: • أن تحفظ وفقا لمواصفات وشروط التخزين التي قررتها الشركة الصانعة • أن يكون الحفظ في خزنة أو مستودع في المنشأة المرخص لها • أن تكون هذه الخزنة (أو المستودع) مخصصة لتخزين المواد المخدرة والمؤثرات العقلية فقط • أن تكون هذه الخزنة (أو المستودع) محكمة الإغلاق، وألا يترك مفتاحها أو كسرها أو نقلها، وأن تزود بنظام إنذار أمني للحماية • يجب أن يكون هناك سجل خاص في المنشأة الصيدلية لكل دواء يحتوي على مادة مخدرة أو مؤثر عقلي. • يجب أن تكون صفحات السجل مرقمة تسلسلياً • يجب أن يشتمل السجل على البيانات التالية: أ- اسم الدواء العلمي وشكله الصيدلاني وتركيزه ب- الرصيد السابق ج- الكمية الواردة منها وتاريخ الورود د- الجهة الواردة منها وتاريخ الورود هـ- المجموع الكلي و- الكمية المصروفة ورقم التشغيل وتاريخ الصرف واسم من صرفها وتوقيعه ز- اسم الجهة المستفيدة وعنوانها ح- الكمية الباقية • يجب أن تكتب السجلات بحبر غير قابل للمحو، وعند التعديل يوقع على ذلك • عند نهاية السنة يجب أن يكتب على السجل اسم مسئول عهدة المواد المخدرة أو المؤثرات العقلية وتوقيعه، واسم مدير المنشأة أو من ينيبه، وتوقيعه، وأن يختم السجل بالختم الرسمي للمنشأة • تحفظ السجلات لمدة عشر سنوات • يتم إتلاف السجلات بعد انقضاء المدة المحددة لحفظها بواسطة لجنة تشكل من ثلاثة أعضاء بقرار من مدير المنشأة أو من ينيبه، ويتم محضر بذلك • أن يكون مدير المستودع مسئولا عن الأدوية المخدرة أو نائب صيدلي أو مساعد صيدلي سعودي مكلف • يجب الالتزام بنظام مكافحة المخدرات و المؤثرات العقلية.
٢٥	في حالة رغبة المستودع الترخيص له بالاتجار بالمبيدات البيطرية يجب الالتزام بما يلي: • أن تحفظ وفقا لمواصفات وشروط التخزين المحددة من قبل الشركة الصانعة • أن يكون الحفظ في غرفة أو مستودع في المنشأة المرخص لها. • أن تكون هذه الغرفة (أو المستودع) مخصصة لتخزين المبيدات البيطرية فقط • أن تكون هذه الغرفة ذات تهوية مستقلة إلى خارج المستودع
٢٦	يجب أن يتوفر في المستودع نظام حاسب بالبيانات التالية: • الوارد ويوضح: اسم المنتج التجاري والاسم العلمي للأدوية، تركيزه، رقم الفاتورة وتاريخها، رقم التشغيلة وتاريخ انتهاء الصلاحية، اسم المصدر، الشكل الصيدلاني. • المنصرف ويوضح: اسم المنتج التجاري والاسم العلمي للأدوية الكمية، جهة الصرف، رقم الفاتورة وتاريخها، المتبقي، توقيع من قام بالصرف، رقم التشغيلة وتاريخ انتهاء الصلاحية.
٢٧	يجب الاحتفاظ بسجلات الاستلام والصرف لكل شحنة تشمل كمية البضاعة، والاسم العلمي والاسم التجاري، التركيز، الشكل الصيدلاني، رقم التشغيلة، وتاريخ الاستلام والصرف، على أن تحفظ السجلات لمدة لا تقل عن سنة لغير الأدوية المخدرة والمؤثرات العقلية
٢٨	يجب أن يتوفر جهاز حاسب بالمستودع
٢٩	يجب التعاقد مع شركة متخصصة للتخلص من النفايات الطبية، مع الاحتفاظ بسجلات الإتلاف لمدة لا تقل عن سنة
٣٠	وجود نظام لمكافحة القوارض والحشرات وذلك بالتعاقد مع شركة متخصصة للقيام بها، الرش و متابعته دورياً
٣١	يجب الالتزام ببيانات العمل الخاصة بالمستودع والمحددة في نموذج طلب الترخيص



Kingdom of Saudi Arabia
Saudi Food & Drug Authority

المملكة العربية السعودية
الهيئة العامة للغذاء والدواء

	تتمة الشروط
٢٦	يجب وضع لوحة خارجية باللغة العربية وألا تقل أبعادها عن ٣٠ سم × ١٥ سم وأن تحتوي اللوحة على المعلومات التالية • اسم المستودع • نشاط المستودع • ساعات العمل • رقم التليفون • رقم الفاكس
٢٧	يجب تعليق التراخيص الأصلية في إطارات واقية توضع في مكان واضح داخل المستودع ليسهل الوصول إليها
٢٨	يجب أن تحفظ في المستودع أصول جميع المستندات المنطقة به
٢٩	توفر سجل خاص لزيارة موظف الهيئة العامة للغذاء والدواء يدون فيه ملاحظات الزيارات
٣٠	في حال الرغبة في الغاء أو نقل ملكية ترخيص مستودع مرخص له بالاتجار بالأدوية المخدرة والمؤثرات العقلية فيجب أن يتم جردها من قبل اللجنة المختصة المشكلة في الهيئة
٣١	في حال الرغبة في تعديل مبنى منطقة التخزين فيجب إخطار الهيئة
٣٢	يجب إخطار الهيئة في حال الأقفال المؤقت للمستودع
	المستندات
١	نموذج طلب ترخيص مستودع مستحضرات صيدلانية (بشري)
٢	صورة من الموافقة المبدئية
٣	أصل الترخيص في حالة تغيير الموقع
٤	صورة من السجل التجاري الفرعي الخاص بالمستودع يتضمن الاسم التجاري مطابقاً لما هو مذكور في نموذج الطلب (في حال وجود أكثر من فرع أو كان السجل التجاري الرئيسي يحتوي أنشطة تجارية أخرى)
٥	صورة من رخصة الدفاع المدني سارية المفعول
٦	صورة من رخصة البلدية سارية المفعول
٧	صورة من استمارة سيارة النقل المبردة الخاصة بتوزيع ونقل المستحضرات أو صورة العقد مع شركة متخصصة في النقل المبرد
٨	صورة من عقد سنوي لمكافحة الحشرات والقوارض مع شركة متخصصة
٩	صورة من عقد سنوي للتخلص الآمن من النفايات الطبية والمستحضرات الصيدلانية أو العتبة الثلاثة والمنتهية الصلاحية مع شركة متخصصة
١٠	صورة من شهادات قيد الوكالة
١١	صورة من الهوية الوطنية لمدير المستودع
١٢	صورة من بطاقة التسجيل المهني لمدير المستودع
١٣	صورة من الهوية الوطنية لمسؤول عهدة الأدوية المخدرة والمؤثرات العقلية حال وجودها
١٤	صورة من بطاقة التسجيل للصيدلي أو مساعد الصيدلي المسؤول عن عهدة الأدوية المخدرة والمؤثرات العقلية في حال وجودها
١٥	صورة من الهوية الوطنية للمسؤول عن متابعة الطلب لدى الهيئة
١٦	صورة من الوكالة الشرعية أو تفويض مصدق من الغرفة التجارية للمسؤول عن متابعة الطلب لدى الهيئة
١٧	إرفاق صورة من رقم المرجع لسداد المقابل المالي لرسوم التفتيش (إدارة تفتيش المنشآت) بقيمة ألف (١٠٠٠) ريال في نظام سداد (رقم تسجيل الهيئة العامة للغذاء والدواء ١٠٩)
١٨	إرفاق صورة من رقم المرجع لسداد رسوم الترخيص (إدارة ترخيص المنشآت) بقيمة ثلاثة آلاف (٣٠٠٠) ريال في نظام سداد (رقم تسجيل الهيئة العامة للغذاء والدواء ١٠٩)

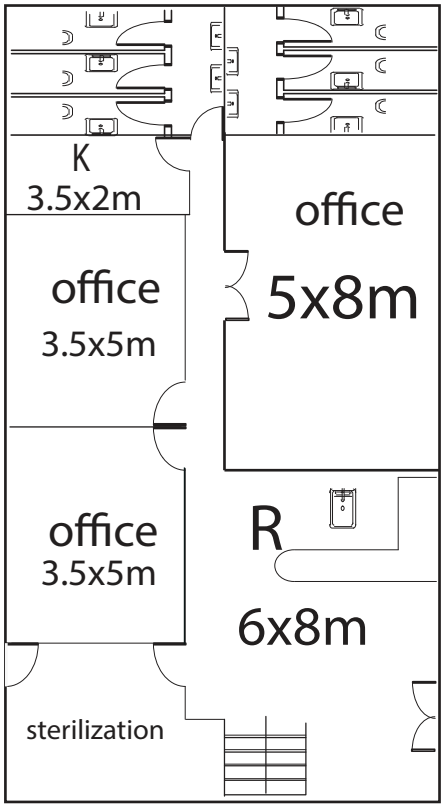
All documents should be valid

Version 3.1 - 09/01/2012

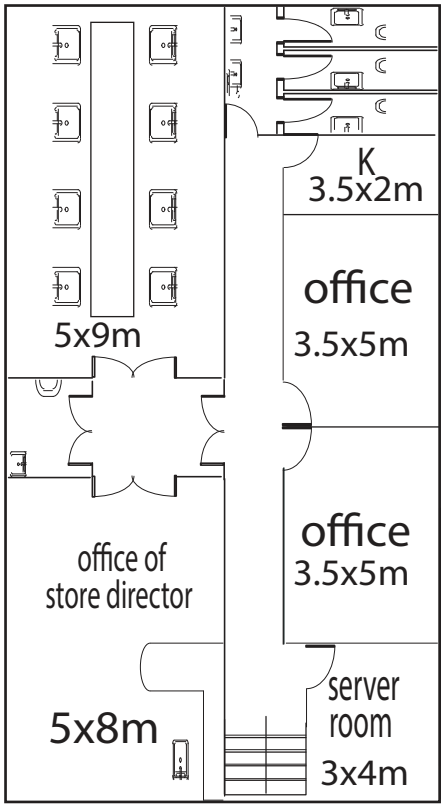
Dministrative offices

We have provided the administrative staff with the necessary facilities in the warehouse so that we provide an environment suitable for work and consistent with the continuous development of your warehouse.

After a comprehensive study of cadres appear that you need an area at least 400 m distributed on two floors.



10x20m



10x20m

Tools & Equipment

After a full review of your warehouse study, we found that you need the following equipment and tools:

No.	Product Name	Quantity
1	Forklift trucks L/R with 1.6 m space	3
2	Forklift trucks	2
3	Electric Pedestrian Pallet Trucks	2
4	Hand Pallet Trucks	2
5	Automatic doors	6
6	Loading dock	6
7	Refrigerators	8

AISLE-MASTER

Aisle-Master

The versatile articulated truck that does it all

aisle-master.com

Aisle-Master

Work stronger for longer and reduce costs

Aisle-Master – a name synonymous with quality, innovation and reliability, and one you can trust to provide forklift trucks that are engineered to deliver.

With more than 50 years' experience in providing cost-effective solutions to materials handling problems, you can be sure that you are investing in the best quality in the market when buying an Aisle-Master truck.

Our machines are built at our site in Monaghan – also home to our parent company Combilift. A state-of-the-art production line, plus extensive R&D facilities enable us to pursue our aim of continual product enhancement, thus giving our customers nothing but the best.

Aisle-Master trucks are tough, versatile and built to last. Designed to withstand heavy-duty use inside and out, each robust VNA articulated forklift truck is manufactured to the highest standards and distributed from our global headquarters in Ireland.

Our innovative products incorporate advanced technology and offer a key range of benefits, including higher reach and load capacity, driver comfort and safety, easy operation and efficient 19.5kw AC motors for low running costs – all contribute to higher productivity and better, more efficient use of available warehouse capacity.

That's not all either – each truck comes with a 5 year, 5,000 hours factory-backed warranty as standard, and free warehouse planning service – crucial reasons why our customers experience the highest levels of reliability at the lowest total cost of ownership.

For quality and design you can rely on, and materials handling solutions you can trust, speak to Aisle-Master.

Aisle-Master

Articulated VNA trucks –

LIFTS HEIGHTS UP TO 15 m

Why use an articulated truck?

Why choose an Aisle-Master vehicle? And, more crucially, why a VNA articulated truck? Designed to replace a number of other forklifts for more efficient offloading, handling and storage, the versatile VNA articulated forklift works as a counterbalance truck for offloading in the yard, taking loads directly to indoor racking.

With the ability to operate in very narrow aisles in the warehouse – as narrow as 1.6 m – the Aisle-Master articulated forklift increases and maximises storage capacity of working operations; whether it be current or new layouts.

What's more, by using the one truck, users can increase productivity and eliminate time-consuming double handling and speed up "truck to rack" operations.

Ease of use indoors and out

Operators effortlessly save time and money with the one truck transporting loads from trailer to racking position in a single operation. Thanks to the large rubber tyres, operators can make light work of loading and offloading in semi-rough yards while enjoying a smooth ride regardless of the terrain.

powerful, versatile, reliable

Increase your storage capacity by up to %50 compared with a counterbalance or reach truck

STACK TO THE RIGHT

STRAIGHT AHEAD

STACK TO THE LEFT

WORKS IN AISLES AS NARROW AS 1.6 m

AISLE-MASTER

%50 EXTRA STORAGE

When you require additional warehouse space, you have two options – extend your existing facility or move premises. With an Aisle-Master articulated forklift, you have a third option. By optimising your racking layout and reducing aisle widths down to as little as 1.6 m, you can dramatically increase your storage capacity within your existing facility. An Aisle-Master is also the ideal choice when designing your new facility or warehouse, making the most of available space and maximising storage capacity.

Invest in Aisle-Master
– gain productivity and storage

What benefits can a VNA articulated truck offer that others can't? For those users looking for a machine that offers superior ergonomics, quality design and build, easy operation and greater reach, the Aisle-Master has it all.

Need more space? Faster productivity and turnaround times? Advanced technology and easy operation? Look no further than an Aisle-Master forklift truck.

Ask any forklift operator what increases productivity and the answer will include superior ergonomics, safety, manoeuvrability and optimum stability. With an Aisle-Master truck, you get all this – and more.

Features & Benefits:

- Available in electric and LPG powered models, the articulated design offers unbeatable manoeuvrability, providing faster load cycle times and reduced driver fatigue.
- Greater reach and capacity: each truck lifts to heights up to 15m, offers VNA operation in aisle-widths of just 1.6 m and has impressive load/lift capacity of upto 2.5t, increasing warehouse storage by %50 and lowering costs.
- Easy operation gives greater efficiency and higher productivity – resulting in better use of space and lower operating costs.
- Driver comfort and safety included as standard: enhanced cabin ergonomics and superb visibility lead to fewer operator health problems and less downtime, boosting driver satisfaction and productivity.
- High quality robust construction of chassis and mast using high-grade steel and castings – gives better reliability and longer life span, reducing total cost of ownership.
- Each VNA truck can operate on any floor surface, both inside and out, eliminating the need for both reach and counterbalance machines, so minimising costs.

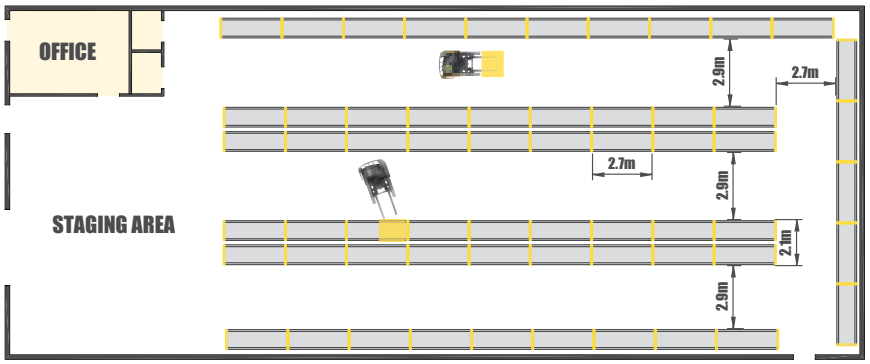
"We have seen a marked increase in productivity levels at every site where the Aisle-Masters have been introduced, which is good for our operators who appreciate the technology incorporated into the trucks. It is of course also good for us and therefore beneficial to our customers."

Graeme Undy, Operations Director, Eddie Stobart

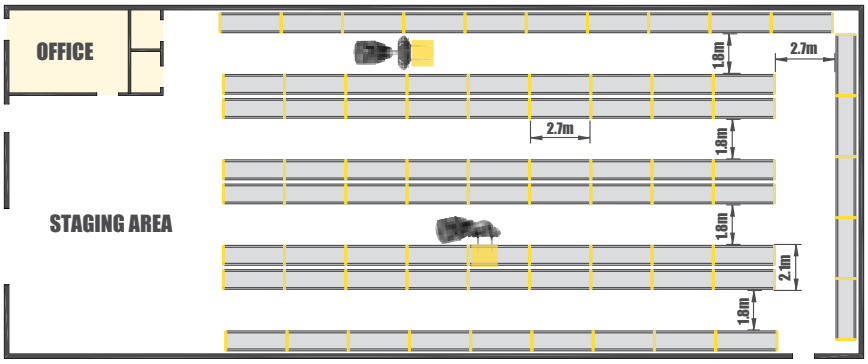
FREE warehouse planning service

Aisle-Master provides a complete warehouse planning service including racking layout proposals and storage density calculations. This free of charge service uses the latest CAD design technology to visualise the capacity potential within your facility.

BEFORE



AFTER



"The Aisle-Masters have enabled our merchandisers to make maximum use of space to get as many products in our stores, which means more sales, so payback is quickly achieved. Our first truck is still going strong which proves just how robust and reliable they are."

Tomasz Chudowolski, Group Purchasing Director, Castorama

AC ELECTRIC

Increasing storage – reducing costs

All Aisle-Master's electric powered models now benefit from AC technology as standard. This puts the company firmly at the forefront of battery powered technology in the articulated sector.

Benefits of electric

Main benefits of AC electric include enhanced performance levels, leading to increased pallet movements for greater productivity and improved acceleration and gradeability. There are also fewer wearable parts resulting in low maintenance and reduced downtime.

STANDARD SPECIFICATION	15E/20SE/20SHE/20WHE
Description	
Mast Range	4300 mm to 15000 mm
Overhead Guard*	2270 mm
Capacity	1500 kg to 2500 kg
Ground Speed*	16 kph
Lift Speed (Laden)	0.4 m/s
Lift Speed (Unladen)	0.5 m/s
Front tyre size*	412 x 174 mm
Rear tyre size*	457 x 229/178 mm
Gradeability (Laden)	%12
Gradeability (Unladen)	%15
Battery Capacity Range	620 Ah to 930 Ah
Battery Voltage	48v
Weight of truck (without battery)	5150 kg to 5510 kg
Weight of truck (with battery)	6400 kg to 7100 kg
Standard Colour*	Yellow and Grey
Standard Seat*	KAB

*Item of specification can be adjusted/modified to suit customer application and requirements. Fork length and lift height can be altered to suit customer application and requirements.

- Quick & easy battery removal
- AC Traction motor (19.5 kw)
- A choice of 930/775/620 amp-hour capacity batteries
- Ergonomically designed operator's cab
- Reduced energy consumption

LPG

Advanced technology, cleaner emissions

Aisle-Master is acknowledged as the pioneer of LPG power in the articulated forklift sector. Aisle-Masters are fitted with a closed loop fuel system as standard, to improve emissions and fuel economy whilst a specially designed engine bay cooling system ensures the effective running of the engine for maximum uptime and reliability.

Benefits of LPG

The main benefit of LPG is reduced emissions levels, ideal for indoor and outdoor operation, making it useful for trucks that are used in almost all industries, even the most emission conscientious. LPG power also offers 7/24 operation with no loss of power.

STANDARD SPECIFICATION	20S/20WH
Description	
Mast Range	4300 mm to 12400 mm
Overhead Guard*	2311 mm
Capacity	2000 kg
Ground Speed*	11kph
Lift Speed (Laden)	0.4 m/s
Lift Speed (Unladen)	0.5 m/s
Front tyre size*	406 x 178 mm
Rear tyre size*	457 x 200 mm
Gradeability (Laden)	%15
Gradeability (Unladen)	%15
Engine	3.0l GM Water Cooled
Weight of truck	6400 kg to 7000 kg
Standard Colour*	Yellow and Grey
Standard Seat*	KAB

*Item of specification can be adjusted/modified to suit customer application and requirements. Fork length and lift height can be altered to suit customer application and requirements.

- Hydrostatic drive
- Closed loop fuel system as standard
- Engine bay cooling system designed to effectively cool the engine compartment, for maximum reliability

Combi-WR Walkie Reach-Stacker

Winner of the FLTA Award for Ergonomics 2014

The Combi-WR is the first purpose built pedestrian reach-stacker with the capability to operate in a VNA working aisle – down to 2.1 m. This is achieved through a unique patented multi-position tiller arm that places the operator in the safest possible position.

Incorporating the benefits of AC technology in its traction, pump and steering motors, the Combi-WR has a lift height that can be tailored to your application with load capacities up to 1,450kg.

Electronic power steering and fingertip controls ensure effortless operation, even in the most demanding environments.

Description	Standard
Mast Range	3000 mm to 4900 mm
Overall Length	1950 mm
Fork Travel	590 mm
Ground Clearance Under Mast	80 mm
Ground Clearance to Centre of Wheelbase	50 mm
Width	1320 mm
Outside Spread of Fork Arms	815 mm
Track Front	1165 mm
Frame Opening	1008 mm
Load Centre Distance	600 mm
Overhang Front	603 mm
Wheelbase	1172 mm
Overhang Back	175 mm
Fork Side Shift	80 mm Left / 80 mm Right
Length from Face of Fork	880 mm
Fork Backward Tilt	3°
Fork Forward Tilt	3°
Minimum Outside Radius	1350 mm
Leg Height	127 mm
Leg Length	530 mm
Capacity	1450 kg @ 3200 mm Lift
Unladen Weight	2500 kg / 2600 kg / 2700 kg
Maximum Ground Speed	6 Km/h
Gradeability	%5
Battery Capacity	24V / 270 Ah
Fork Section	35 mm x 100 mm x 1070 mm
Front Tyre x (Polyurethane)	OD 127 mm / Width 75 mm
Rear Tyre (Vulkollan)	OD 250 mm / Width 75 mm
Standard Colour	Yellow and Grey
AC Electric Traction Motor	24V / 2.5 kW
AC Electric Pump Motor	24V / 5 kW

- Unique pedestrian walkie reach-stacker
- AC electric motor
- Electronic steering and fingertip controls for precise handling
- Works in a standard VNA working aisle, down to 2.1m

Aftercare and warranty

Our comprehensive Aisle-Master dealer service network ensures the very best quality support is only a phone call away.

All engineers working on Aisle-Master equipment are factory trained and on call out stand-by, to efficiently repair your truck. This ensures you receive expert support on site and that our dealers also have direct access to the factory for technical back-up. Our dealers offer a wide range of service packages – each tailored to suit your application and budget and designed to ensure your operating costs are minimised.

All Aisle-Master product is uniquely factory backed by a -5year or 5,000 hours parts warranty as standard, giving you total peace of mind across the life of your truck and ensuring lowest total cost of ownership.

Technical Support

By phone

Due to the straightforward nature of our products, difficulties can often be easily solved over the phone. Our engineers and local subsidiaries provide excellent telephone support with quick, effective solutions and offer an immediate response in urgent situations.

At your location

If you need a call out, our dedicated team of technical support engineers are certified to a high standard and are proven problem-solvers with a personal commitment to keeping downtime to a minimum.

"Due to the widely varying sizes of pallets we handle the integral hydraulic fork positioner has proved to be a great time saver. The drivers use it virtually all the time and there is no longer any need for them to keep getting on and off the trucks to manually adjust the forks, which is also better from a health and safety point of view."

Gareth Barnes, Warehouse Manager, Mibelle Group UK

"We trialled a number of brands but factors such as robust build and design quality and the Aisle-Master manufacturer's willingness to tailor aspects of the trucks to our individual requirements made it the only viable contender. We have also been able to reduce our overall forklift fleet down from seven to six which fits in well with our company's lean management strategy which aims to remove non value added equipment from the business."

Craig Wilkins, Warehouse and Value Stream Manager
Manitowoc Fluorescein

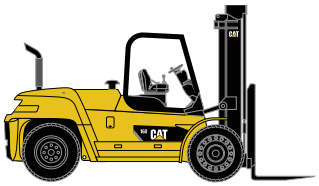
EP10CA/HCA - EP14CA/HCA - EP15CA/HCA EP18CA/HCA - EP20CA/HCA - EP25CA/HCA EP28CA - EP30CA

Specifications

Electric powered lift trucks
4 wheel 72/48 V, 3.0 - 1.0 tonnes

CAT® Lift Trucks

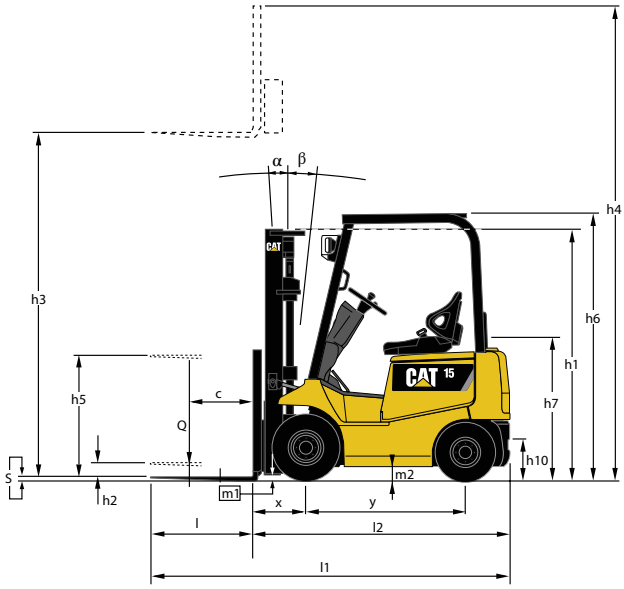
	Characteristics						
1.01	Manufacturer (abbreviation)		Cat Lift Trucks	Cat Lift Trucks	Cat Lift Trucks	Cat Lift Trucks	Cat Lift Trucks
1.02	Manufacturer's model designation		EP10CA	EP14CA	EP15CA	EP18CA	EP20CA
1.03	Power source: (battery, diesel, LP gas, petrol)		Electric	Electric	Electric	Electric	Electric
1.04	Operator type: pedestrian, (operator)-standing, -seated		Seated	Seated	Seated	Seated	Seated
1.05	Load capacity	Q (kg)	1000	1350	1500	1750	2000
1.06	Load centre distance	c (mm)	500	500	500	500	500
1.08	Load distance, axle to fork face	x (mm)	395	395	395	400	425
1.09	Wheelbase	y (mm)	1250	1250	1250	1250	1400
	Weight						
2.01	Truck weight, without load / including battery (simplex mast, lowest lift height)	kg	3325	3460	3690	3865	4500
2.02	Axle loading with maximum load, front/rear (simplex mast, lowest lift height)	kg	655 3/2980	045/590	4935/595	4285/615	3855/565
2.03	Axle loading without load, front/rear (simplex mast, lowest lift height)	kg	1370 1/1260	2075/1860	1605/1670	1260/1580	1280/250
	Wheels, Drive Train						
3.01	Tyres: V=solid, L=pneumatic, SE=solid pneumatic - front/rear		L/L	L/L	L/L	L/L	L/L
3.02	Tyre dimensions, front		6.10-9-00PR	10-9-6.00PR	21x14-9-8PR	21x14-9-8PR	23x16-10-9PR
3.03	Tyre dimensions, rear		5.8-8-00PR	8-8-5.00PR	8-8-5.00PR	8-8-5.00PR	18x14-8-7PR
3.05	Number of wheels, front/rear (x=driven)		2x/2	2x/2	2x/2	2x/2	2x/2
3.06	Track width (centre of tyres), front	b10 (mm)	890	890	900	900	955
3.07	Track width (centre of tyres), rear	b11 (mm)	900	900	900	900	945
	Dimensions						
4.01	Mast tilt, forwards/backwards	α/β °	12/6	12/12	6/12	6/12	6/6
4.02	Height with mast lowered (see tables)	h1 (mm)	1980	1980	1980	1980	1980
4.03	Free lift (see tables)	h2 (mm)	110	110	110	110	115
4.04	Lift height (see tables)	h3 (mm)	2965	2965	2965	2965	2965
4.05	Overall height with mast raised	h4 (mm)	4000	4000	4000	4000	4000
4.07	Height to top of overhead guard	h6 (mm)	2110	2110	2110	2110	2110
4.08	Seat height	h7 (mm)	1060	1060	1060	1060	1060
4.12	Tow coupling height	h10 (mm)	280	280	280	280	290
4.19	Overall length	l1 (mm)	3035	3035	3035	3080	3285
4.20	Length to fork face (includes fork thickness)	l2 (mm)	1965	1965	1965	2010	2215
4.21	Overall width b1/b2 (mm)	b1/b2 (mm)	1050	1050	1090	1090	1175
4.22	Fork dimensions (thickness, width, length)	s,e,l (mm)	35x100x1070	35x100x1070	35x100x1070	35x100x1070	35x122x1070
4.23	Fork carriage to DIN 173 15 A/B/no		2A	2A	2A	2A	2A
4.24	Fork carriage width	b3 (mm)	900	900	900	900	1000
4.31	Ground clearance under mast, with load	m1 (mm)	95	95	95	95	95
4.32	Ground clearance at centre of wheelbase, with load (forks lowered)	m2 (mm)	110	110	110	110	110
4.33	Working aisle width with 1000 x1200 mm pallets, crosswise	Ast (mm)	3305	3305	3305	3325	3575
4.34	Working aisle width with 800 x1200 mm pallets, crosswise	Ast (mm)	3105	3105	3105	3125	3375
4.35	Turning circle radius	Wa (mm)	1710	1710	1710	1725	1950
4.36	Minimum distance between centres of rotation	b13 (mm)	575	575	575	575	640
	Performance						
5.01	Travel speed, with/without load	km/h	16/15.5	14/16	13.5/16	14/16	14/14
5.02	Lifting speed, with/without load	m/s	0.0.47/0.54	0.28/0.54	0.31/0.54	0.32/0.54	0.34/37
5.03	Lowering speed, with/without load	m/s	0.0.55/0.55	0.55/0.55	0.55/0.55	0.55/0.55	0.55/55
5.05	Rated drawbar pull, with/without load	N	35210/3570	4810/3640	3230/3640	3340/3570	3380/370
5.06	Maximum drawbar pull, with/without load (5 min short duty)	N	810990/8430	10600/8630	8080/8560	8340/8260	8300/070
5.07	Gradeability, with/without load	%	9/14/12	9/12	7/13	8/14	8
5.08	Maximum gradeability, with/without load	%	225/23	19/25	17/25	19/25	20/2
5.09	Acceleration time (10 metres) with/without load	s	-	4-	.-4.3	/9	-
5.10	Service brakes (mechanical/hydraulic/electric/pneumatic)		Hydraulic	Hydraulic	Hydraulic	Hydraulic	Hydraulic
	Electric motors						
6.01	Drive motor capacity (60 min. short duty)	kW	9	9	9	9	10
6.02	Lift motor output at %15 duty factor	kW	9.5	9.5	9.5	9.5	9.5
6.03	Battery to DIN 36/35/531 43 A/B/C/no		-	-	-	-	-
6.04	Battery voltage/capacity at -5hour discharge	V /Ah	48V/330Ah	48V/330Ah	48V/400Ah	48V/400Ah	48V/450Ah
6.05	Battery weight	kg	630	630	740	740	820
6.06	Energy consumption according to VDI 60 cycle	kWh/h	-	-	-	-	-
	Miscellaneous						
8.01	Type of drive control		FET	FET	FET	FET	FET
8.02	Maximum operating pressure for attachments	bar	137	137	137	157	157
8.03	Oil flow for attachments	l/min	8.6	8.6	8.6	8.6	8.6
8.04	Noise level, value at operator's ear (EN 12053)	dB(A)	-	-	-	-	-
8.05	Towing coupling design / DIN type, ref.		-	-	-	-	-

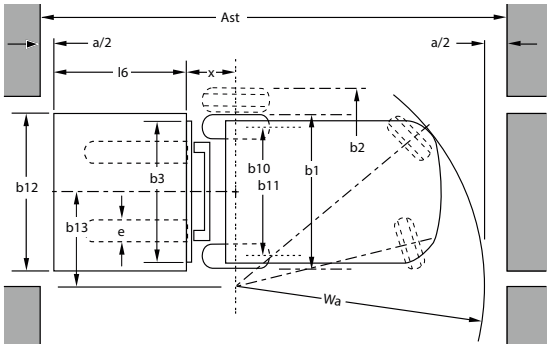




	Cat Lift Trucks	Cat Lift Trucks	Cat Lift Trucks	Cat Lift Trucks	Cat Lift Trucks	Cat Lift Trucks	Cat Lift Trucks	Cat Lift Trucks	Cat Lift Trucks
	EP25CA	EP28CA	EP30CA	EP10HCA	EP14HCA	EP15HCA	EP18HCA	EP20HCA	EP25HCA
	Electric	Electric	Electric	Electric	Electric	Electric	Electric	Electric	Electric
	Seated	Seated	Seated	Seated	Seated	Seated	Seated	Seated	Seated
	2500	2750	3000	1000	1350	1500	1750	2000	500 2
	500	500	500	500	500	500	500	500	500
	425	445	475	395	395	395	400	425	425
	1400	1400	1600	1250	1250	1250	1250	1400	1400
	5065	5280	6010	3325	3460	3690	3865	4500	5065
	945/745	5740/590	4935/595	4285/615	3855/655	3565/1035	2980/990	6735/945	6160/5740
	2075	1/1860	1605/1670	1260/1580	1280/1370	1250/2835	1265/2845	1935/2625	2675/1660
	L/L	L/L	L/L	L/L	L/L	L/L	L/L	L/L	/L
	23x16-10-9PR	23x16-10-9PR	28x12-15-9PR	10-9-6.00PR	10-9-6.00PR	21x14-9-8PR	21x14-9-8PR	23x16-10-9PR	23x16-10-9PR
	18x14-8-7PR	18x14-8-7PR	10-10-6.50PR	8-8-5.00PR	8-8-5.00PR	8-8-5.00PR	8-8-5.00PR	18x14-8-7PR	8x14-8-7PR
	2x/2	2x/2	2x/2	2x/2	2x/2	2x/2	2x/2	2x/2	x/22
	955	955	955	890	890	900	900	955	955
	945	945	980	900	900	900	900	945	945
	12	6/12	6/12	6/12	6/12	6/12	6/12	6/12	/12
	1980	1980	2215	1980	1980	1980	1980	1980	1980
	110	110	110	110	110	110	110	115	110
	2960	2955	2955	2965	2965	2965	2965	2965	2960
	4000	4000	4000	4000	4000	4000	4000	4000	4000
	2110	2110	2225	2110	2110	2110	2110	2110	2110
	1060	1060	1170	1060	1060	1060	1060	1060	1060
	290	290	350	280	280	280	280	290	290
	3345	3410	3580	3035	3035	3035	3080	3285	3345
	2275	2340	2510	1965	1965	1965	2010	2215	2275
	1175	1175	1180	1050	1050	1090	1090	1175	1175
	40x122x1070	45x120x1070	45x122x1070	35x100x1070	35x100x1070	35x100x1070	35x100x1070	35x122x1070	40x122x1070
	2A	3A	3A	2A	2A	2A	2A	2A	2A
	1000	1000	1000	900	900	900	900	1000	1000
	95	95	130	95	95	95	95	95	95
	110	110	235	110	110	110	110	110	110
	3630	3705	3915	3305	3305	3305	3325	3575	3630
	3430	3505	3715	3105	3105	3105	3125	3375	3430
	2005	2060	2240	1710	1710	1710	1725	1950	2005
	640	640	800	575	575	575	575	640	640
	17/17.5	15/17.5	15.5/18	15.5/18	16/18	16/15.5	16/15	13.5/15.5	13/13.5
	0.6	0/0.65	0.36/0.65	0.38/0.65	0.42/0.65	0.44/0.55	0.47/0.41	0.32/0.47	0.26/0.4
	0.55	0/0.55	0.55/0.55	0.55/0.55	0.55/0.55	0.55/0.45	0.55/0.55	0.45/0.55	0.55/0.55
	-2510	/5010	1920/5140	4470/4650	-	-	-	-	-
	-12720	/10390	12130/11000	9850/10510	-	-	-	-	-
	6/12	3/12	6/7	-	-	-	-	-	-
	20/25	16/23	19/25	17/25	19/25	20/20	22/18	16/20	14/16
	5.-4.4	/1	-	-	-	-	-	-	-
	Hydraulic	Hydraulic	Hydraulic	Hydraulic	Hydraulic	Hydraulic	Hydraulic	Hydraulic	Hydraulic
	10	10	10	9	9	9	9	10	10
	12	12	15	12	12	12	12	13.5	1
	-	-	-	-	-	-	-	-	-
	48V/565Ah	48V/565Ah	72V/450Ah	48V/330Ah	48V/330Ah	48V/400Ah	48V/400Ah	48V/450Ah	8V/565Ah
	880	880	1240	630	630	740	740	820	880
	-	-	-	-	-	-	-	-	-
	FET	FET	FET	FET	FET	FET	FET	FET	FET
	172	157	172	137	137	137	157	157	172
	8.6	8.6	9	8.6	8.6	8.6	8.6	8.6	8.6
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-





Ast = Wa + x + l6 + a
Ast = Working aisle width with load
a = Safety clearance (200 mm)
l6 = Pallet length (800 or 1000 mm)
b12 = Pallet width (1200 mm)

Lower Cost of Ownership

- Advanced AC motor technology provides high torque, faster acceleration, better ramp performance and smooth, quiet, controlled operation.
- AC controller provides optimum performance and energy efficiency.
- Auto power-off mode automatically shuts off forklift after truck remains unused after 15 minutes.
- 4 modes of Regenerative braking increase battery life, productivity, and performance whilst reducing brake wear.
- The easy access to control panel, traction and hydraulic motors reduces servicing time and effort.
- Self-diagnostic function display icon or message, including fault history folder, allows operator and service engineer to facilitate maintenance.

Unmatched Productivity

- Electric Power Steering System with speed compensation as standard for effortless maneuverability.
- Vacuum Fluorescent Display (VFD) instrumentation panel keeps driver informed of truck hours and state of battery, even in bright daylight.
- Compact chassis dimensions contribute to supreme maneuvrability in tight right-angled stacking aisles.

Safety and Ergonomics

- High visibility mast and overhead guard.
- Back up alarm supplied as standard.
- Presence Detection System (PDS) protects operator, pedestrians and loads by disengaging drive and hydraulic functions when the operator leaves the seated operating position.
- New generation AC controller ensures lowest noise level in its class.
- Neutral start safety function to prevent unintentional movement of the truck.
- Ergonomically designed operator's compartment features a full suspension seat, adjustable steering column and comfortably placed hydraulic control levers.
- Low footstep and well-placed grab bar makes on/off access easy. Even in repetitive situations.
- Controlled roll down and excellent ramp performance allow safe and efficient operation.

Options

- Lift height selector
- Cold storage specification
- Laser pointer
- Side shifter
- Fingertip control
- Horizontal tilt display on monitor

CAT® Lift Trucks

Cat Lift Trucks is renowned for its worldwide distribution network, but you will always find an experienced and dedicated team of professionals close to you. Individuals committed to helping you maximise profits. With Cat Lift Trucks, your investment is in safe hands.

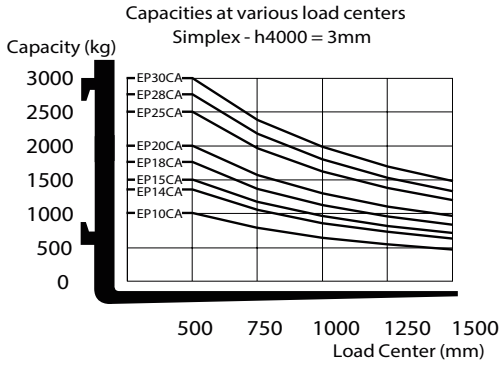
EP28CA					
Mast Type	h3 mm	h1 mm	h4 mm	h2/h5 mm	Q @ c = 500mm kg
Simplex	3000	110	2750	*2000	1480
	3300	110	2750	*2300	1630
	3500	110	2750	*2500	1730
	3700	110	2750	*2700	1830
	4000	110	2750	*3000	1980
	3300	2130	4300	110	2750
	3500	2230	4500	110	2750
	3700	2330	4700	110	2750
	4000	2480	5000	110	2750
	4300	2730	5300	110	2550
	4500	2830	5500	110	2350
	4700	2930	5700	110	2150
	5000	3080	6000	110	1850
Duplex	3000	445	2750	*2000	1480
	3300	595	2750	*2300	1630
	3500	695	2750	*2500	1730
	3700	795	2750	*2700	1830
	4000	945	2750	*3000	1980
	3300	2130	4300	1095	2750
	3500	2230	4500	1195	2750
	3700	2330	4700	1295	2750
	4000	2480	5000	1445	2750
	4300	2730	5300	1695	2550
	4500	2830	5500	1795	2350
	4700	2930	5700	1895	2150
	5000	3080	6000	2045	1850
Triplex	4500	785	2750	*3500	1830
	4700	815	2750	*3700	1880
	5000	935	2600	*4000	1980
	5300	1035	2500	*4300	2080
	4500	2130	5500	1085	2300
	4700	2230	5700	1185	2100
	5000	2330	6000	1285	1850
	5300	2430	6300	1385	1600
	5500	2480	6500	1435	1400
	5700	2680	6700	1635	1200
	6000	2730	7000	1685	1050
	6300	2830	7300	1785	850
	6500	2930	7500	1885	750
	6700	3080	7700	2035	650
	7000	3180	8000	2135	500

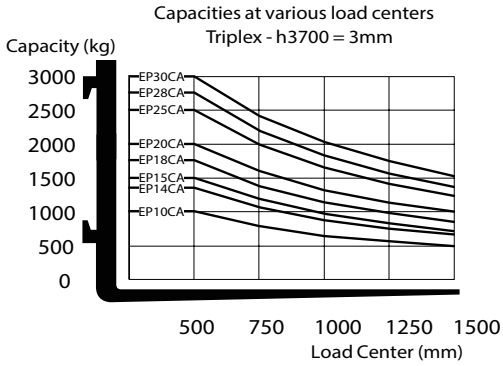
EP30CA					
Mast Type	h3 mm	h1 mm	h4 mm	h2/h5 mm	Q @ c = 500mm kg
Simplex	4000	110	3000	*3000	2215
	3300	2365	4300	110	3000
	3500	2465	4500	110	3000
	3700	2565	4700	110	3000
	4000	2715	5000	110	3000
	4300	2965	5300	110	2800
	4500	3065	5500	110	2550
	4700	3165	5700	110	2350
	5000	3315	6000	110	2100
Duplex	4000	1170	3000	*3000	2215
	3300	2365	4300	1320	3000
	3500	2465	4500	1420	3000
	3700	2565	4700	1520	3000
	4000	2715	5000	1670	3000
	4300	2965	5300	1920	2800
	4500	3065	5500	2020	2550
	4700	3165	5700	2120	2350
	5000	3315	6000	2270	2100
Triplex	4500	820	3000	*3500	1865
	4700	870	3000	*3700	1915
	5000	970	2900	*4000	2015
	5300	1070	2800	*4300	2115
	4500	2165	5500	1120	2500
	4700	2265	5700	1220	2300
	5000	2365	6000	1320	2000
	5300	2465	6300	1420	1700
	5500	2515	6500	1470	1500
	5700	2715	6700	1670	1300
	6000	2765	7000	1720	1150
	6300	2865	7300	1820	950
	6500	2965	7500	1920	850
	6700	3115	7700	2070	750
	7000	3215	8000	2170	600

* Lower than overhead guard.
** Not available for EP14-10(H)CA

Mast Performance and Capacity

h1 Height with mast lowered
h2 Standard free lift
h3 Lift height
h4 Height with mast raised
h5 Full free lift
Q Lifting capacity, rated load
c Load centre (distance)





Battery Compartment		EP10CA	EP14CA	EP15CA	EP18CA	EP20CA	EP25CA	EP28CA	EP30CA***
Length (min)	mm	605	605	605	605	670	739	739	988
Width (min)	mm	976	976	976	976	976	976	976	1100
Height (min)	mm	477	477	477	477	477	477	477	477
Minimum Weight (48V)	kg	600	600	700	700	780	840	840	1170

*** 72V

Cat® Lift Trucks.
Your partner in materials handling.

	EP25-10(H)CA				EP10(H)CA	EP14(H)CA	EP15(H)CA	EP18(H)CA	EP20(H)CA	EP25(H)CA
Mast Type	h3 mm	h1 mm	h4 mm	h2/h5 mm	Q @ c = 500mm kg	Q @ c = 500mm kg	Q @ c = 500mm kg	Q @ c = 500mm kg	Q @ c = 500mm kg	Q @ c = 500mm kg
Simplex	23000	110	1000		1350	1500	1750	2000	2500	*000 1480
	3300	110	1000		1350	1500	1750	2000	2500	*2300 1630
	3500	110	1000		1350	1500	1750	2000	2500	*2500 1730
	3700	110	1000		1350	1500	1750	2000	2500	*2700 1830
	4000	110	1000		1350	1500	1750	2000	2500	*3000 1980
	3300	2130	4300	110	1000	1350	1500	1750	2000	2500
	3500	2230	4500	110	1000	1350	1500	1750	2000	2500
	3700	2330	4700	110	1000	1350	1500	1750	2000	2500
	4000	2480	5000	110	1000	1350	1500	1750	2000	2500
	4300	2730	5300	110	1000	1300	1450	1650	1950	2350
	4500	2830	5500	110	1000	1250	1400	1600	1900	2200
	4700	2930	5700	110	970	1200	1350	1550	1800	2050
	5000	3080	6000	110	950	1150	1300	1450	1650	1800
Duplex	3000	445	1000		1350	1500	1750	2000	2500	*2000 1480
	3300	595	1000		1350	1500	1750	2000	2500	*2300 1630
	3500	695	1000		1350	1500	1750	2000	2500	*2500 1730
	3700	795	1000		1350	1500	1750	2000	2500	*2700 1830
	4000	945	1000		1350	1500	1750	2000	2500	*3000 1980
	3300	2130	4300	1095	1000	1350	1500	1750	2000	2500
	3500	2230	4500	1195	1000	1350	1500	1750	2000	2500
	3700	2330	4700	1295	1000	1350	1500	1750	2000	2500
	4000	2480	5000	1445	1000	1350	1500	1750	2000	2500
	4300	2730	5300	1695	1000	1300	1450	1650	1950	2350
	4500	2830	5500	1795	1000	1250	1400	1600	1900	2200
	4700	2930	5700	1895	970	1200	1350	1550	1800	2050
	5000	3080	6000	2045	950	1150	1300	1450	1650	1800
Triplex	4500	695	1000		1350	1500	1750	2000	2500	*3500 1730
	4700	795	1000		1350	1500	1750	2000	2500	*3700 1830
	5000	845	950		1250	1450	1700	1950	2400	*4000 1880
	5300	945	930		1200	1400	1600	1900	2300	*4300 1980
	5500	995	900		1150	1350	1500	1800	2200	*4500 2080
	4700	2130	5700	1095	870	1100	1300	1450	1700	2000
	5000	2230	6000	1195	850	1050	1200	1300	1600	1750
	5300	2330	6300	1295	800	950	1150	1200	1350	1500
	5500	2430	6500	1395	750	850	1070	1100	1200	1300
	5700	2480	6700	1445	700	750	970	1000	1050	1150
	6000	2680	7000	1645	600	650	850	870	900	1000
	2730	7300	1695	**6300	5-	-	00	600	700	800
	4	-	-2830	7500	1795		**6500	450	600	700
	3	-	-2930	7700	1895		**6750	400	500	600
	2	-	-3080	8000	2045		**7050	300	400	450

* Lower than overhead guard.
** Not available for EP14-10(H)CA

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Printed in The Netherlands

CAT® Lift Trucks

NPP16N2 - NPP18N2 - NPP20N2
NPP20N2R - NPP20N2E

Specifications

Pedestrian Power Pallet
2.0 - 1.6 tonnes

CAT Lift Trucks

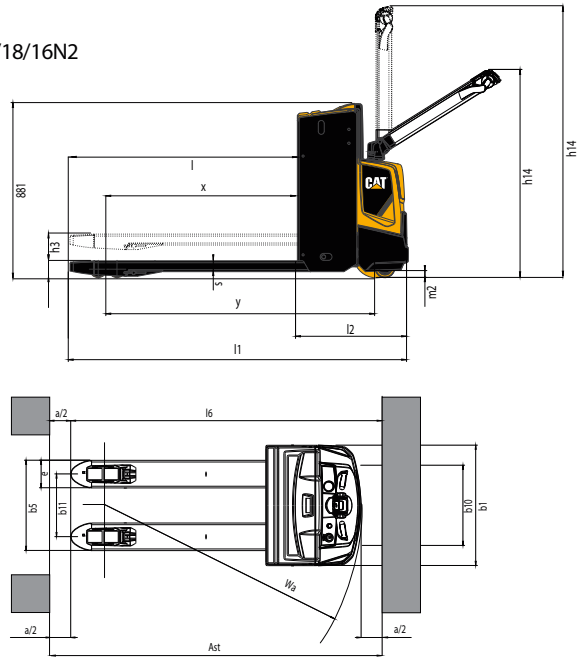
	Characteristics							
1.01	Manufacturer (abbreviation)			Cat Lift Trucks	Cat Lift Trucks	Cat Lift Trucks	Cat Lift Trucks	Cat Lift Trucks
1.02	Manufacturer's model designation			NPP16N2	NPP18N2	NPP20N2	NPP20N2R	NPP20N2E
1.03	Power source (battery, diesel, LP gas, petrol)			Battery	Battery	Battery	Battery	Battery
1.04	Operator type: pedestrian, (operator)-standing, -seated			Pedestrian	Pedestrian	Pedestrian	Pedestrian/Stand-on	Pedestrian
1.05	Load capacity	Q	(kg)	1600	1800	2000	2000	700/2000
1.06	Load centre distance	c	(mm)	600	600	600	600	600
1.08	Load wheel axle to fork face (forks lowered)	x	(mm)	960	960	960	960	852
1.09	Wheelbase	y	(mm)	1360	1424	1424	1421	1509
	Weight							
2.01	Truck weight with maximum battery weight		kg	431	502	634	595	579
2.02	Axle loadings with nominal load & maximum battery weight, drive/load side		kg	1396/635	1496/806	1770/864	1705/890	1809/770
2.03	Axle loadings without load & with maximum battery weight, drive/load side		kg	99/332	121/381	159/475	125/470	160/419
	Wheels, Drive Train							
3.01	Tyres: PT=Power Thane, Vul=Vulkollan, drive/load side			Vul/Vul	Vul/Vul	Vul/Vul	Vul/Vul	Vul/Vul
3.02	Tyre dimensions, drive side		(mm)	230x70	230x70	230x70	230x70	230x70
3.03	Tyre dimensions, load side		(mm)	85x90	85x75	85x75	85x75	85x75
3.04	Castor wheel dimensions (diameter x width)		(mm)	100x40	100x40	100x40	125x55	100x40
3.05	Number of the wheels drive/load side (x=driven)			1+2x/2	1+2x/4	1+2x/4	1+2x/4	1+2x/4
3.06	Track width (centre of tyres), drive side	b10	(mm)	480	480	480	480	480
3.07	Track width (centre of tyres), load side	b11	(mm)	495/375/355	495/375/355	495/375/355	375	375
	Dimensions							
4.04	Lift height	h3	(mm)	135	135	135	135	510
4.06	Initial lift height	h5	(mm)	-	-	-	-	135
4.08	Seat- or stand height	h7	(mm)	-	-	-	172	-
4.09	Height of tiller arm / steering console (min./max.)	h14	(mm)	1372/1050	1372/1050	1372/1050	1350/1180	1372/1050
4.15	Fork height, fully lowered	h13	(mm)	85	85	85	85	90
4.19	Overall length, platform up/down	l1	(mm)	1648	1712	1712	2346/1852	1780
4.20	Length to fork face, platform up/down	l2	(mm)	498	562	562	1195/702	653
4.21	Overall width	b1/b2	(mm)	720	720	720	720	720
4.22	Fork dimensions (thickness,width,length)	s/e/l	(mm)	1150/165/55	1150/165/55	1150/165/55	1150/165/50	1150/195/50
4.25	Outside width over forks	b5	(mm)	660/540/520	660/540/520	660/540/520	540	570/540
4.32	Ground clearance, center of wheelbase (forks lowered)	m2	(mm)	30	30	30	30	30
4.33	Working aisle width (Ast) with 1000 x1200 mm pallet, load crosswise, platform up/down	Ast	(mm)	1694	1758	1758	2400/1920	1874
4.34	Working aisle width (Ast) with 800 x1200 mm pallet,load lengthwise, platform up/down	Ast	(mm)	1894	1958	1958	2600/2120	2074
4.35	Turning circle radius	Wa	(mm)	1454	1518	1518	2160/1680	1526
	Performance							
5.01	Travel speed, with/without load		km/h	6,0/6,0	6,0/6,0	6,0/6,0	6,0/6,0	6,0/6,0
5.02	Lifting speed, with/without load		m/s	0,045/0,035	0,045/0,035	0,06/0,04	0,05/0,03	0,14/0,11
5.03	Lowering speed, with/without load		m/s	0,05/0,05	0,05/0,05	0,05/0,05	0,08/0,07	0,12/0,13
5.07	Gradeability, with/without load		%	20,0/10,0	20,0/10,0	20,0/10,0	20,0/9,0	20,0/9,0
5.10	Service brakes (mechanical/hydraulic/electric/pneumatic)			Electric	Electric	Electric	Electric	Electric
	Electric motors							
6.01	Drive motor capacity (60 min. short duty)		kW	1,0	1,0	1,0	1,0	1,0
6.02	Lift motor output at %15 duty factor		kW	0,8	0,8	1,2	1,2	1,2
6.04	Battery voltage/capacity at -5hour discharge		V/Ah	150/24	250/24	375-250/24**	375-250/24**	150/24
6.05	Battery weight		kg	151	212	294-212	294-212	151
	Miscellaneous							
8.01	Type of drive control			Stepless	Stepless	Stepless	Stepless	Stepless
8.04*	Noise level (EN 053 12)		dB (A)	0/69/62	0/69/62	0/67/65	0/78/63	0/60/59
	Whole-body vibration (EN 059 13)		m/s2	-	-	-	0,9	-
	Hand-arm vibration (EN 059 13)		m/s2	< 2,5	< 2,5	< 2.5	< 2,5	< 2,5

* Uncertainty of 4 dB(A) in section 8.4 / Noise level, mean value at operator's ear, drive/lift/idle

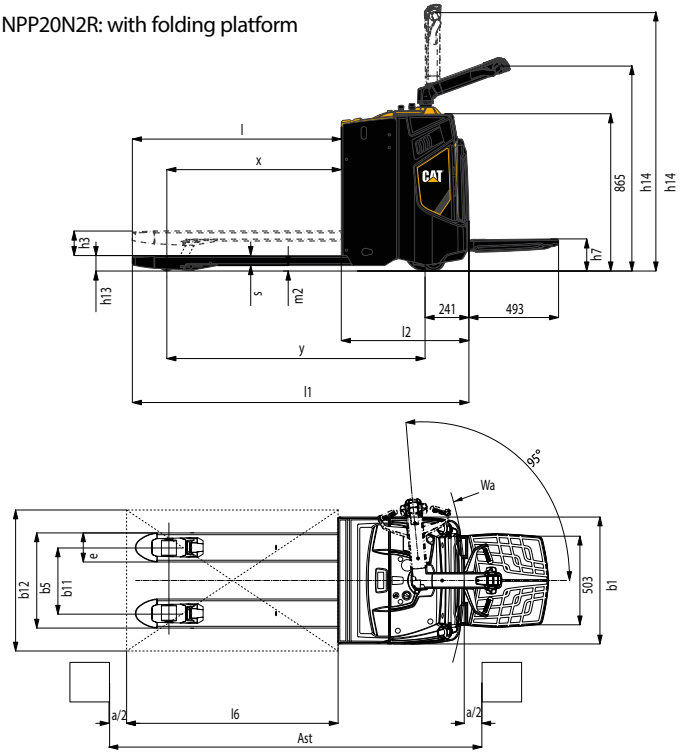
** With 375Ah battery the l2 dimension increases 72mm

Ast3 = Wa-x+l200+6
a = Safety clearance (200 mm)
l6 = Pallet length

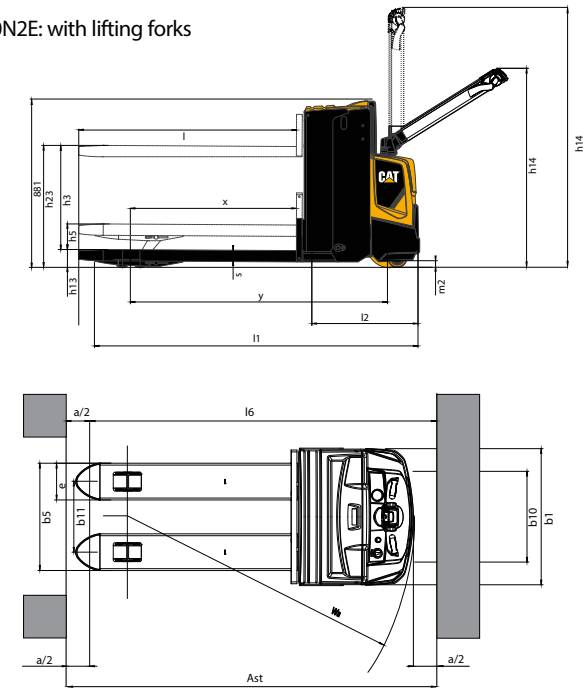
NPP20/18/16N2



NPP20N2R: with folding platform



NPP20N2E: with lifting forks



Lower Cost of Ownership

- Sturdy chassis construction and endurance-tested forks provide enhanced robustness and durability in even the toughest conditions
- Sealed chassis and waterproof electrics resist moisture, dirt and corrosion - increasing uptime, cutting maintenance costs and prolonging truck life
- Easy access to critical truck components allows faster fault diagnosis and speedier maintenance, reducing downtime still further
- Integrated drive and lift system features fewer components than previous models, reducing scope for breakdown
- Closed battery compartment with steel cover protects battery against impacts, postponing costly battery replacement
- Standard battery sizes allow interchangeability with other brands

Unmatched Productivity

- Ergonomic tiller arm helps keep operators fresh with comfortable controls
- Increased maximum lift height suits even steep ramps and loading docks, making this an ideal truck for both horizontal pallet movements and vehicle loading/unloading
- Advanced AC programmable controller lets users prioritise between faster performance and smoother handling, ensuring the most appropriate settings for the job
- Rounded fork tips make for accurate and effortless pallet entry, speeding up handling cycles and preventing pallet or load damage
- The NPP20N2R, with a maximum speed of 6 km/h, is equipped with a foldable platform for occasional use when driving over longer distances

Safety and Ergonomics

- Latest tiller arm design permits comfortable operating position with optimum hand protection
- Super-quiet oil-filled transmission helps keep noise levels low
- Optional large lift and lower levers allow easy, one-handed control, even with gloves
- Linked suspension castor wheels ensure highest possible truck stability
- The spacious platform of the NPP20N2R, with suspension for a comfortable ride, is easy to get on- and off offering also a good ground clearance.
- The NPP20N2E is equipped with lifting forks (735 mm height) that offer an ergonomic position for loading and unloading items with minimal physical strain

Options

- Pallet entry/exit rollers
- Load backrest
- Multifunctional display including hour meter
- Cold store modification class III for environments down to °35-C
- Equipment holder for: A-4size list bracket, computer rack, bottle holder and pen holder (except NPP16N2).
- Large lift/lower levers
- Single load wheels (standard on NPP16N2)
- Internal battery charger (except NPP20N2R)

For the complete list of available options please contact your nearest dealer.

CAT® Lift Trucks

Cat® Lift Trucks.
Your partner in materials handling.

info@catlifttruck.com
www.catlifttruck.com

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Printed in The Netherlands

NOTE: Performance specifications may vary depending on standard manufacturing tolerances, vehicle condition, types of tyres or surface conditions, applications, or operating environment. Trucks may be shown with non-standard options. Specific performance requirements and locally available configurations should be discussed with your Cat lift trucks Dealer. Cat Lift Trucks follows a policy of continual product improvement. For this reason, some materials, options and specifications could change without notice.

CAT® Lift Trucks

CBF25 - CBF25S - CBF25G
CBF25Q - CBF25B - CJF10

Specifications

Hand pallet truck

2.5 (1.0) tonnes

CAT Lift Trucks

Hand pallet truck

The hand pallet truck is without any doubt the most basic, yet essential, tool in materials handling. For decades, it has served as the "first assistant" for truck operators loading and unloading pallets on location.

In warehouses, shops and industry, hand pallet trucks are used in all kinds of applications. We have a model for each of them - designed to suit your needs:

- **Short distance and occasional horizontal pallet handling suit our standard model, which can be upgraded with optional quick lift for increased productivity and a brake for greater safety.**
- **For very wet, tough environmental conditions and applications in the food/chemical industry, the galvanized or stainless steel models offer the right solution.**
- **Work bench, where the high lift model offers great ergonomics preventing repetitive bending and stretching.**

Cat hand pallet trucks are durable, maneuverable, ergonomic and easy to maintain over a long service life, taking care of your business and your people.

Find out how our range of hand pallet trucks could work for you

Your Cat Lift Trucks dealer can give you more specific information about the hand pallet truck and also our full range of warehouse equipment and lift trucks, with capacities up to 16 tonnes. They'll advise you on the right equipment for your needs and how to maximize your return on investment.

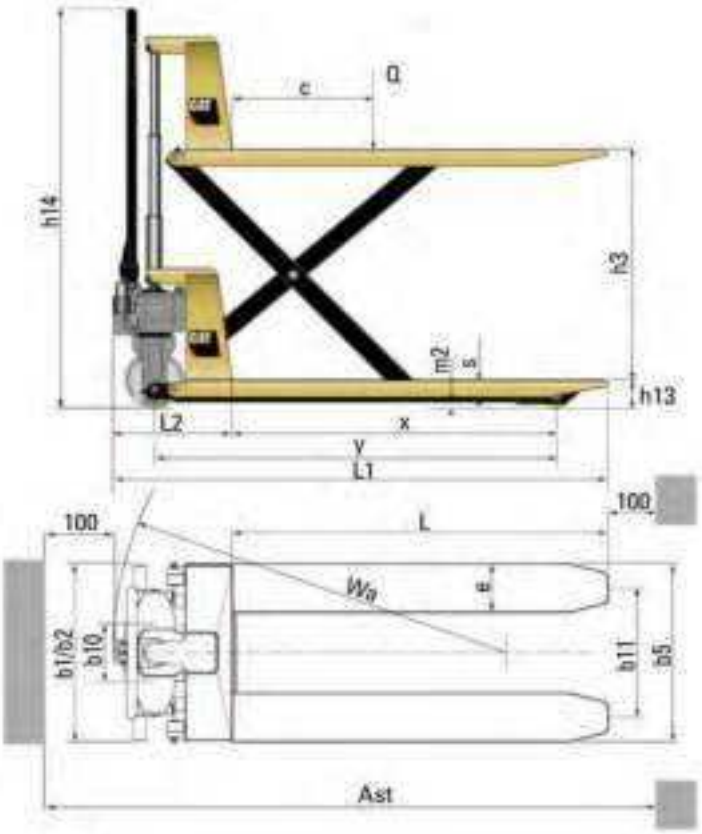
	Characteristics							
1.01	Manufacturer (abbreviation)			Cat Lift Trucks	Cat Lift Trucks	Cat Lift Trucks	Cat Lift Trucks	Cat Lift Trucks
1.02	Manufacturer's model designation			**CBF1150**	**CBF1220**	**CBFG**[1]	**CBFS**[1]	**CJF**[3]
1.04	Operator type: pedestrian, (operator)-standing, -seated			Pedestrian	Pedestrian	Pedestrian	Pedestrian	Pedestrian
1.05	Load capacity	Q	(kg)	2500	2500	2500	2500	1000
1.06	Load center distance	c	(mm)	600	600	600	600	500
1.08	Load wheels axle to fork face (forks lowered)	x	(mm)	883	953	883	883	950
1.09	Wheelbase	y	(mm)	1190	1260	1190	1190	1231
	Weight							
2.01	Truck weight without nominal load		kg	65* - 80	80	65* - 80	65* - 80	100
	Wheels, chassis							
3.01	Tyre type: P=Polyurethane, N=Nylon, R=Rubber			P, N, R	P, N, R	P, N, R	P, N, R	P, N, R
3.02	Tyre dimension, drive side	Ø	(mm)	200	200	200	200	180x50
3.03	Tyre dimension, load side	Ø	(mm)	80	80	80	80	74x50
3.05	Number of wheels, drive/load side (x=driven)			1/2x1 - 1/2x2	1/2x1 - 1/2x2	1/2x1 - 1/2x2	1/2x1 - 1/2x2	1/2x1
3.06	Track width (center of tyres), drive side	b10	(mm)	109	109	109	109	138
3.07	Track width (center of tyres), load side	b11	(mm)	370	370	370	370	430/460/595
	Dimensions							
4.04	Lift height	h3	(mm)	115	115	115	115	715
4.09	Height of Tiller Arm /Steering console (min./max.)	h14	(mm)	1224	1224	1224	1224	1225
4.15	Fork height fully lowered	h13	(mm)	85	85	85	85	85
4.19	Overall length	l1	(mm)	1533/1603	1533/1603	1533/1603	1533/1603	1515
4.20	Length to fork face	l2	(mm)	384	384	384	384	365
4.21	Overall width	b1/b2	(mm)	520/685	685	520/550/685	520/550/685	520/550/685
4.22	Fork dimensions (thickness, width and length)	s/e/l	(mm)	45/160/1150	45/160/1220	45/160/1150	45/160/1150	45/160/1150
4.25	Outside width over forks (minimum / maximum)	b5	(mm)	520/685	520/685	520/550/685	520/550/685	520/550/685
4.32	Ground clearance at centre of wheelbase (forks lowered)	m2	(mm)	40	40	40	40	17.5
4.33	Working aisle width (Ast3) with 1000 x1200 pallets, load crosswise	Ast3	(mm)	1516	1516	1516	1516	1567
4.34	Working aisle width (Ast3) with 800 x1200 pallets, load lengthwise	Ast3	(mm)	1716	1716	1716	1716	1767
4.35	Turning circle radius	Wa	(mm)	1266	1336	1266	1266	1360

* Fork length 1150mm, width over forks 520mm
1 Galvanized
2 Stainless steel
3 High Lift

Model	Fork dimensions WxL (mm)	Load wheels		Steering wheel
CBF25MNSN	520 x 1150	2	Single, Nylon	Nylon
CBF25MNTN		4	Tandem, Nylon	
CBF25MPSP		2	Single, Polyurethane	Polyurethane
CBF25MPTP		4	Tandem, Polyurethane	
CBF25JNSN	685 x 1220	2	Single, Nylon	Nylon
CBF25JNTN		4	Tandem, Nylon	
CBF25JPSP		2	Single, Polyurethane	Polyurethane
CBF25JPTP		4	Tandem, Polyurethane	
CBF25HNSN	685 x 1150	2	Single, Nylon	Nylon
CBF25HNTN		4	Tandem, Nylon	
CBF25HPSP		2	Single, Polyurethane	Polyurethane
CBF25HPTP		4	Tandem, Polyurethane	

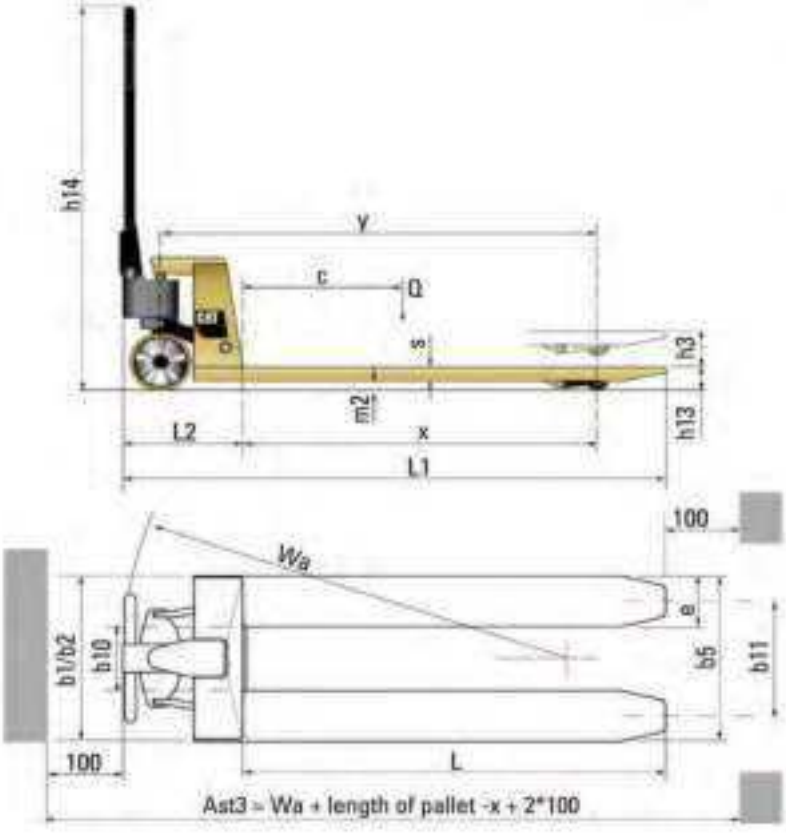
CJF10

High lifter hand pallet truck.



CBF

Standard model hand pallet truck.



Hand pallet truck

Lower Cost of Ownership
- Competitive pricing
- 12 greasing nipples on all moving parts resulting in less wear
- Bypass valve preventing over load
- Bullet connection between steering shaft and pump piston
- Convenient to replace the steering wheel

Unmatched Productivity
- Easy to maneuver with 210° steering angle
- Minimal 5 strokes with tiller arm to maximum lift height (200 mm)
- Special lowering valve to control the rate of descent
- Rollers mounted on fork tips for effortless entry/exit to/from pallet

Safety and Ergonomics
- Large rubber handle with 3 positions for control lever
- High stability when maximum lifted (High Lift model)
- Reducing physical effort at work stations by raising forks to desired height (High Lift model)
- Telescopic 3 piston rods create light pumping (High Lift Model)

Options
- Nylon- or rubber steering wheel
- Tandem load wheels
- Hand brake, for increased safety on trailer lift
- Quick lift, 5 short stroke when load <= 200 kg
- Galvanized models for operating in wet or aggressive conditions
- Stainless steel models when operating in food-processing applications apply

Cat® Lift Trucks.
Your partner in materials handling.

For over 80 years Caterpillar has built some of the world's best construction and mining equipment, designed to perform in the toughest environments.

This same philosophy and heritage is evident in our materials handling equipment, which includes a complete range of electric, diesel and LPG powered lift trucks and warehouse equipment.

Every day our dealer network delivers tailored materials handling solutions in more than 70 Countries across Europe, Africa and the Middle East.

We continually invest in the selection, development and support of our dealer network to provide you with the right equipment, service and advice. For instance, we offer the highest parts availability in the industry of over 97%, measured full line first pick, with next day delivery in most Countries.

Come and talk to us about your materials handling requirements.

Contact your dealer now or visit our website:
www.catlifttruck.com

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PERFORMANCE DURABILITY CUSTOMER SERVICE

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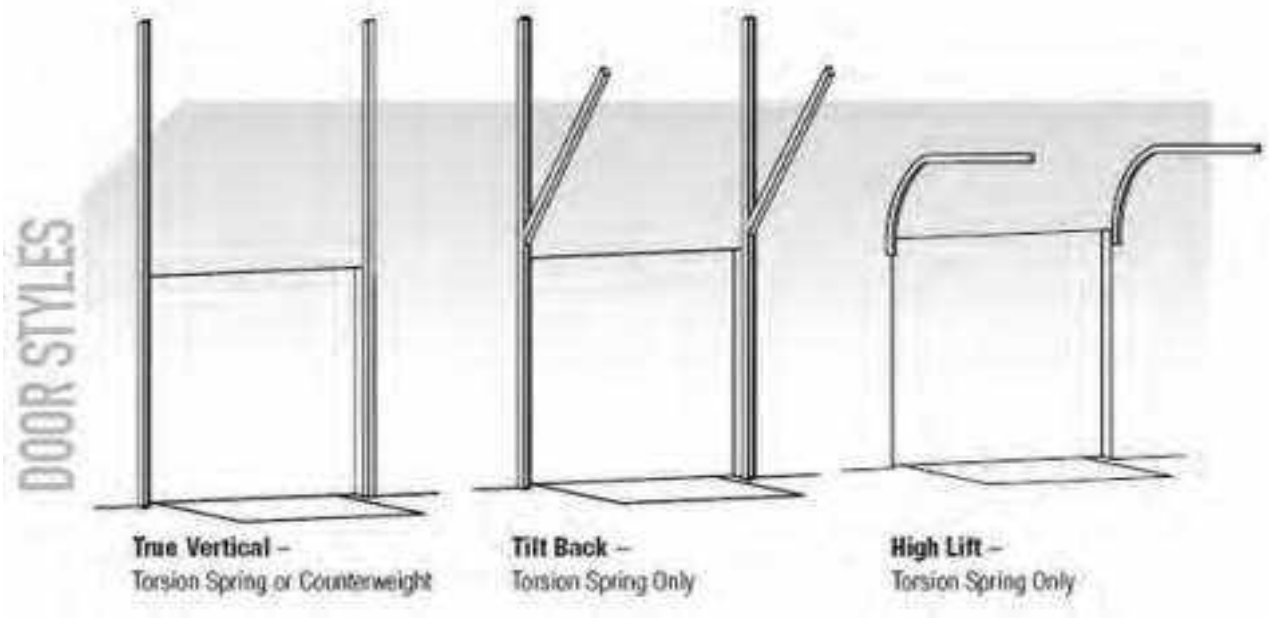
NOTE: Performance specifications may vary depending on standard manufacturing tolerances, vehicle condition, types of tyres, floor or surface conditions, applications, or operating environment. Trucks may be shown with non-standard options. Specific performance requirements and locally available configurations should be discussed with your Cat lift trucks Dealer. Cat Lift Trucks follows a policy of continual product improvement. For this reason, some materials, options and specifications could change without notice.

CAT Lift Trucks

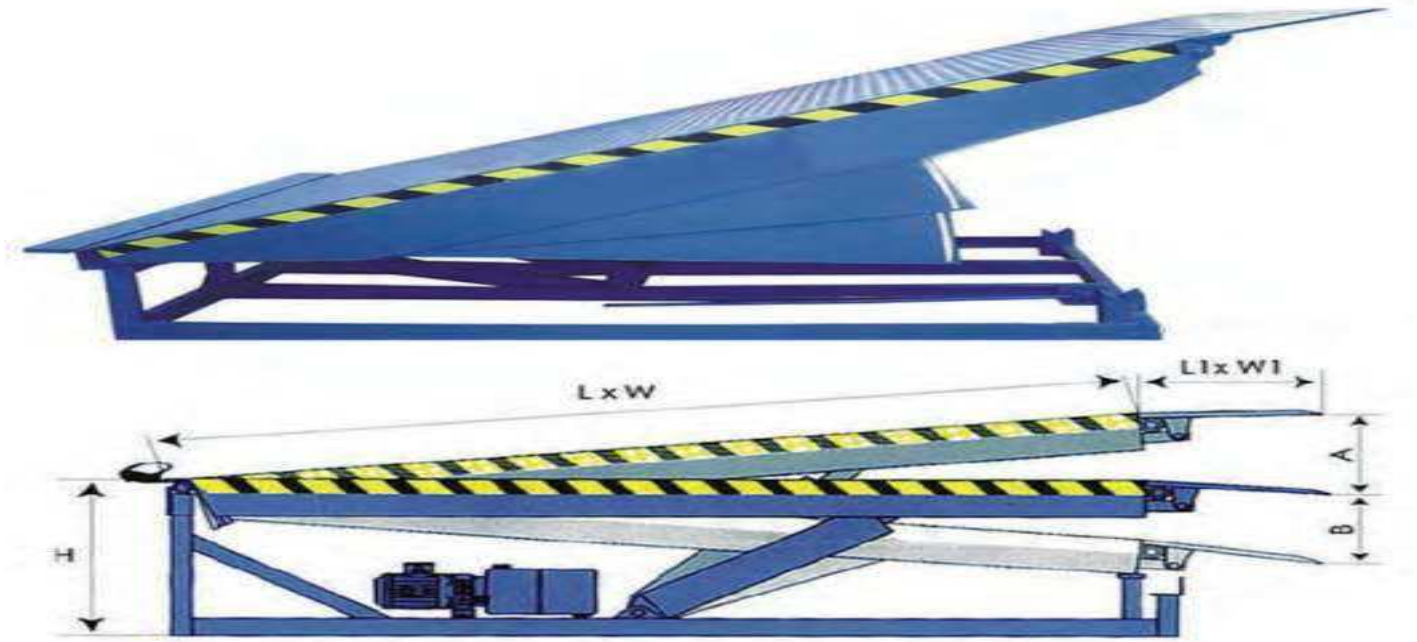
DOOR STYLES



True Vertical –
Torsion Spring or Counterweight

Tilt Back –
Torsion Spring Only

High Lift –
Torsion Spring Only


L x W
L1 x W1
A
B
H


SERCO

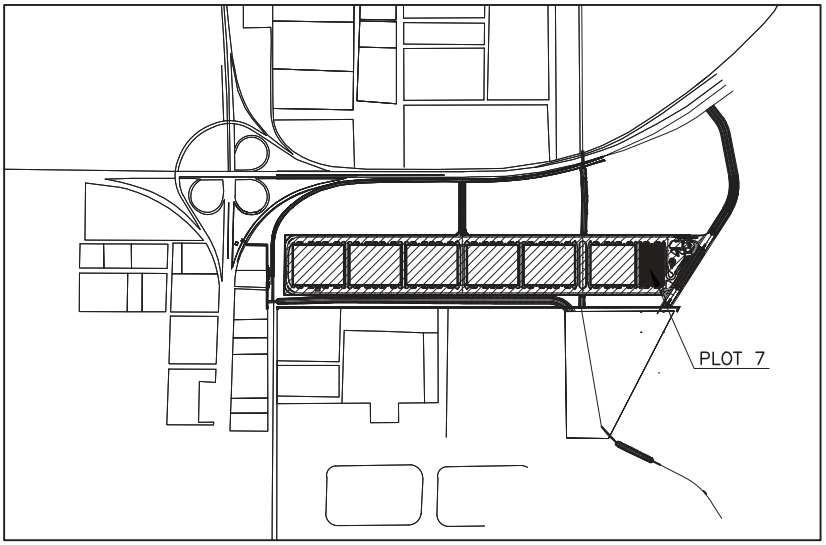
الهيئة السعودية للمدن الصناعية ومناطق التقنية
Saudi Industrial Property Authority

مدن MODON

NOTES

LEGEND

١) ٣٠٠mm HIGH MASONRY WALL PROFILE
٢) INSULATED METAL CLADDING
٣) LOADING DOCK OVER HEAD DOORS
٤) WAREHOUSE TRUCK ACCESS OVER HEAD DOORS
٥) MAN DOOR ACCESS
٦) WINDOW PRE FINISHED ANODIZED ALUMINUM
٧) WAREHOUSE SIGNAGE
٨) SLOPE METAL CLADDING
٩) PRE FINISHE METAL FLASHING
١٠) LIGHT GRAY COLOR
١١) DARK BLUE COLOR
١٢) DARK ORANGE COLOR



KEYPLAN

PARCEL CORNER COORDINATES

CORNER	EAST	NORTH
P.1	697619.235	2712384.464
P.2	697555.656	2712315.227
P.3	697680.320	2712200.752
P.4	697743.899	2712269.989
P.5	697616.731	2712401.698
P.6	697538.273	2712316.256
P.7	697682.824	2712183.519
P.8	697761.282	2712268.960

SCHEDULE OF SET BACK

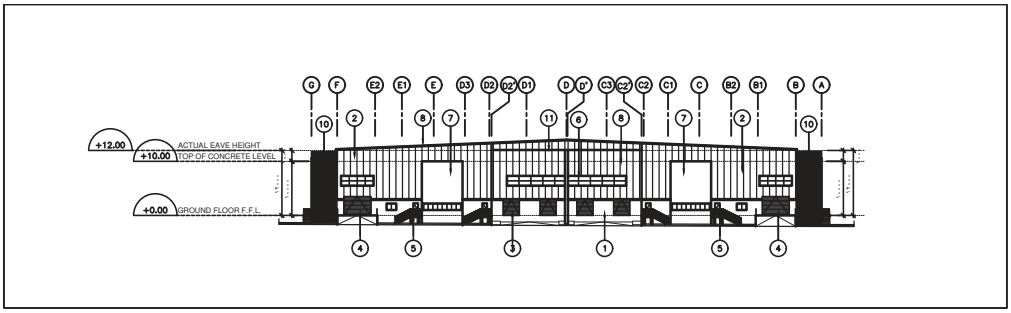
	NORTH	EAST	SOUTH	WEST
PLOT LENGTH	116m	196.25m	116m	196.25m
SET BACK	22m	27m	22m	27m
PRECENTAGE	18.80	13.75%	18.80	13.75%

LAND UTILITY SCHEDULE

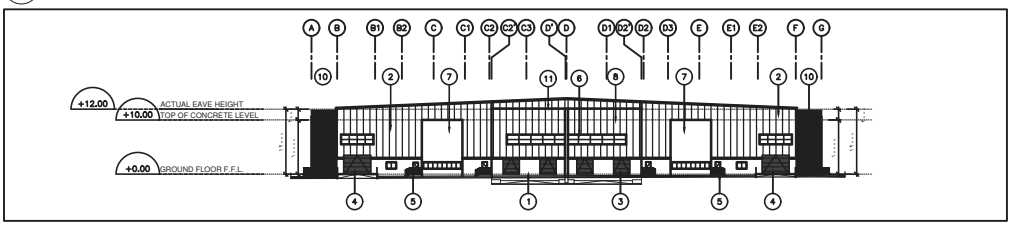
DESCRIPTION	AREA	BLDG. HEIGHT	PRECENTAGE
STORAGE AREA	14231	14.50m	62.50%
ADMIN. AREA	884	3.60m	3.88%
SETBACK AREA	6822	–	30.00%
UN/LOADING AREA	828	10.80m	3.62%
TOTAL	22765	–	100%
BUA (Built Up Area)	15943m2		
FAR (Floor Area Ratio)	70.03%		

Building-Unit

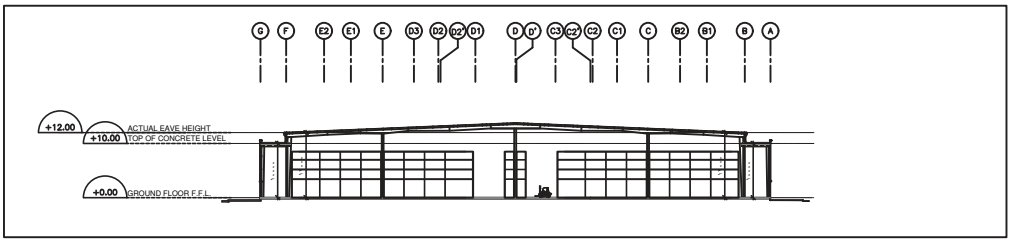
وحدة البنيان



1 A024 NORTH ELEVATION
1:500

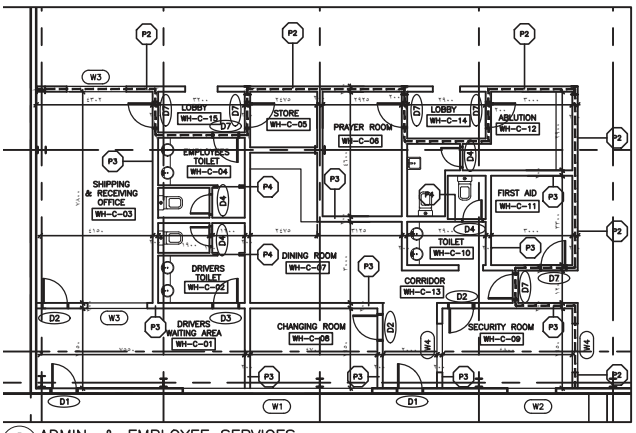


2 A024 SOUTH ELEVATION
1:500



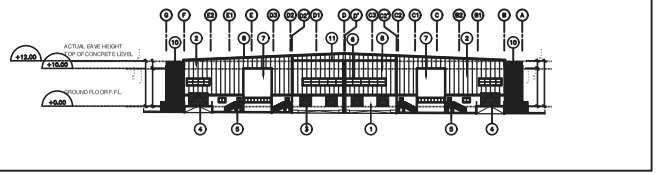
3 A024 BUILDING SECTION
1:500

4 A024 PERSPECTIVE
NTS

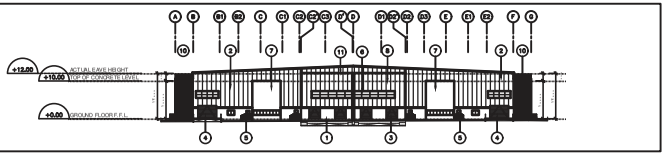


5 A024 ADMIN. & EMPLOYEE SERVICES
1:100

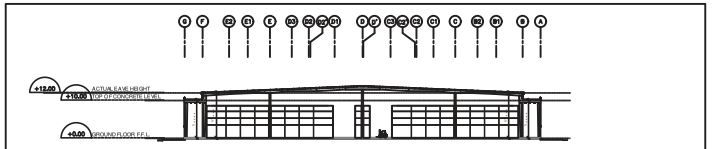
6 A024 STORAGE AND RACKING SYSTEM
NTS



1 A024 NORTH ELEVATION 1:500

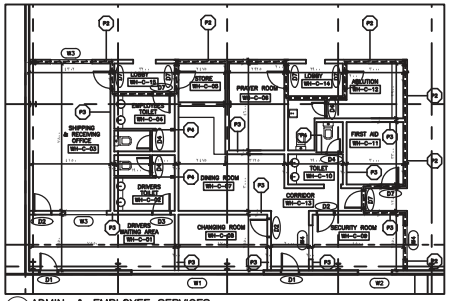


2 A024 SOUTH ELEVATION 1:500



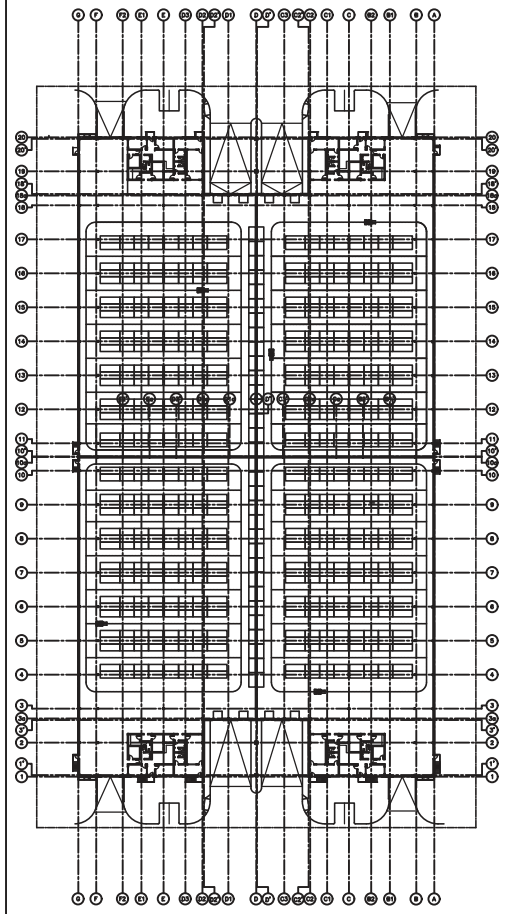
3 A024 BUILDING SECTION 1:500

4 A024 PERSPECTIVE NTS

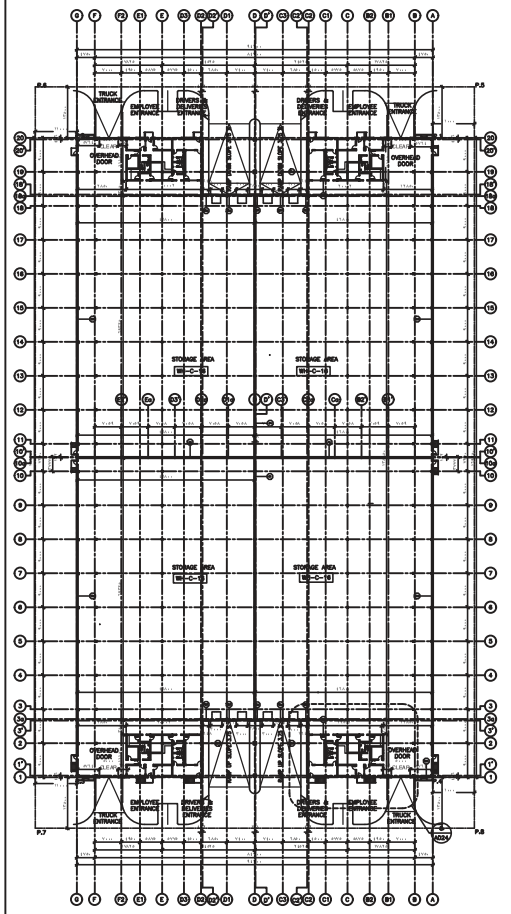


5 A024 ADMIN. & EMPLOYEE SERVICES 1:100

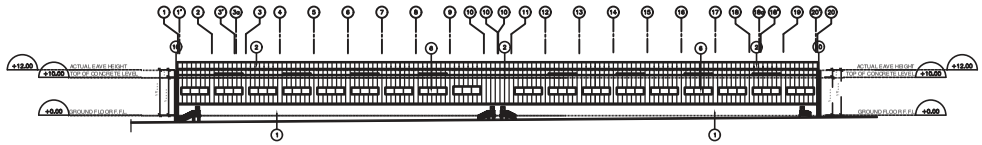
6 A024 STORAGE AND RACKING SYSTEM NTS



8 A024 STORAGE AND RACKING SYSTEM PLAN 1:500



9 A024 GROUND FLOOR PLAN 1:500

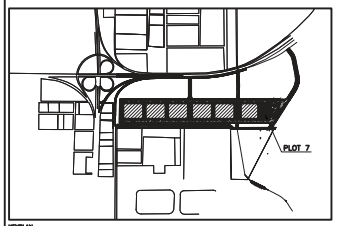


7 A024 EAST ELEVATION 1:500

NOTES

LEGEND

1) 1" mm HIGH MASONRY WALL PROFILE
2) INSULATED METAL CLADDING
3) LOADING DOOR OVER HEAD DOORS
4) WAREHOUSE TRUCK ACCESS OVERHEAD DOORS
5) MAN DOOR ACCESS
6) WINDOW PRE FINISHED ANODIZED ALUMINUM
7) WAREHOUSE SIGNAGE
8) SLOPE METAL CLADDING
9) PRE FINISHE METAL FLASHING
10) LIGHT GRAY COLOR
11) DARK BLUE COLOR
12) DARK ORANGE COLOR



KEYPLAN

PARCEL CORNER COORDINATES		
CORNER	EAST	NORTH
P.1	697618.378	3713364.464
P.2	697555.456	3713315.227
P.3	697680.320	3713200.753
P.4	697743.899	3713268.068
P.5	697616.731	3713401.698
P.6	697539.373	3713316.326
P.7	697482.824	3713183.016
P.8	697701.352	3713268.060

SCHEDULE OF SET BACK				
	NORTH	EAST	SOUTH	WEST
PLOT LENGTH	118m	196.25m	118m	196.25m
SET BACK	22m	27m	22m	27m
PRECENTAGE	18.60	13.76%	18.60	13.76%

LAND UTILITY SCHEDULE			
DESCRIPTION	AREA	BLDG. HEIGHT	PRECENTAGE
STORAGE AREA	14231	14.50m	62.50%
ADMIN. AREA	884	3.80m	3.88%
SETBACK AREA	6922	–	30.00%
UN/LOADING AREA	828	10.80m	3.62%
TOTAL	22785	–	100%
BUA (Built Up Area)	15943m2		
FAR (Floor Area Ratio)	70.03%		

Building-Unit وحدة البنيان

CLIENT:

PROJECT TITLE

DRAWING TITLE

WAREHOUSE
PLOT 7

CONSULTANT:

CONSTRUCTION & INTERIOR DESIGN

CONSTRUCTION & INTERIOR DESIGN

Building-Unit

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