




Skill India

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In collaboration with :

 <p>Liberté • Égalité • Fraternité RÉPUBLIQUE FRANÇAISE</p>	<p>MINISTÈRE DE L'ÉDUCATION NATIONALE</p>	<p>MINISTÈRE DE L'ENSEIGNEMENT SUPÉRIEUR, DE LA RECHERCHE ET DE L'INNOVATION</p>
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Schneider Electric

Test Project

National Skill Level

Skill 18 – Electrical Installation

Category: Construction and Building Technology

Module 1 – Main project

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Section - A

A. Preface

Skill Explained:

An electrician works on commercial, residential, agricultural, and industrial projects. There is a direct relationship between the nature and quality of the product required and the payment made by the customer. Therefore, the electrician has a continuing responsibility to work professionally in order to meet the requirements of the customer and thus maintain and grow the business. Electrical installation is closely associated with other parts of the construction industry and with the many products that support it, normally for commercial purposes.

The electrician works internally, including the homes of customers and on small and major projects. He or she will plan and design, select and install, commission, test, report, maintain, fault find, and repair systems to a high standard. Work organization and self-management, communication, and interpersonal skills, problem solving, flexibility and a deep body of knowledge are the universal attributes of the outstanding electrician.

Whether the electrician is working alone or in a team the individual takes on a high level of personal responsibility and autonomy. From working to provide a safe and reliable electrical installation and maintenance service, in accordance with relevant standards, through to diagnosing malfunctions, programming, and commissioning home and building automation systems, concentration, precision, accuracy, and attention to detail every step in the process matters and mistakes are largely irreversible, costly, and potentially life threatening.

With the international mobility of people, the electrician faces rapidly expanding opportunities and challenges. For the talented electrician there are many commercial and international opportunities; however, these carry with them the need to understand and work with diverse cultures and trends.

The diversity of skills associated with electrical installations is therefore likely to expand.

Eligibility Criteria (for IndiaSkills 2018 and WorldSkills 2019):

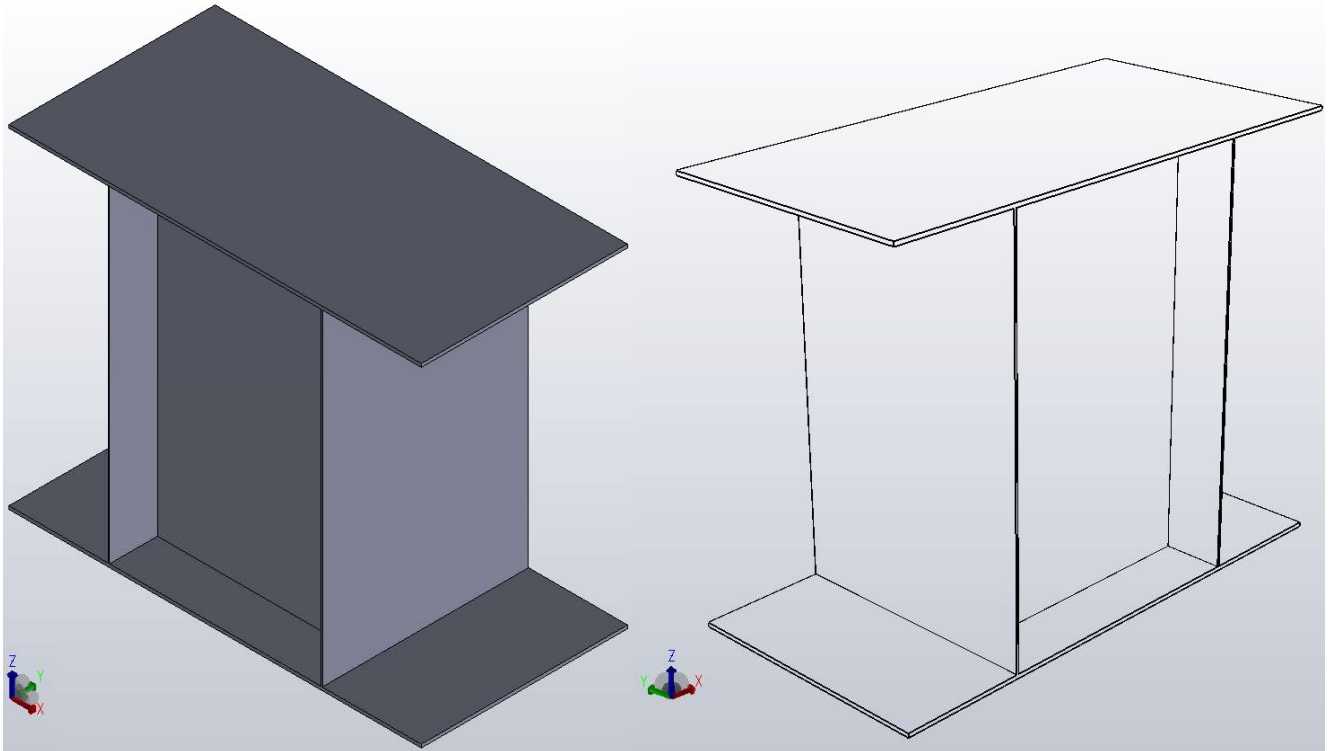
Competitors born on or after 01 Jan 1997 are only eligible to attend the Competition.

Total Duration: 3 days, 18 hours duration

Section - B

B. Test Project

Competitors are required to design, construct, install, configure, test and demonstrate the electrical installation on the guidelines of the declared test project.



Description of operation :

- The installation describes installation and operation of a hotel.
- **Technical Room :**
 - I. The technical room is the key location for all the control devices and circuit-breakers positioned inside the enclosure you will consider as **“Main DB”**;
 - II. The motor control unit for the pump for swimming pool is positioned here in the technical room
 - III. The lighting of technical room is managed by Argus presence sensor.
- **Entrance :**
 - I. The competitor needs to wire the entrance to enhance the aesthetic looks to showcase the entrance, with lights placed over the different portraits to highlight and minimum level of power sockets.
- **Bedroom :**
 - I. Wiring of bedroom includes wiring of lighting, sockets
 - II. Separate circuit for wiring the AC, maintaining the measurements specified
- **Reception Office :**
 - III. Office is the space allotted to maintain and manage the hotel bookings and for this the office needs to be wired with the utility wiring and wiring for the internet connections.

ENTRANCE

DESCRIPTION of EQUIPMENTS

S10 : SWITCH FOR LAMP L1

S1 : SWITCH FOR CEILING LAMPS L2 & L3


S2 / R1 : SWITCH and REGULATOR for speed of fan **E1**


H1 : SOCKET 3 PINS 16/6 A for the aquarium air pump (night)


H2 : SOCKET 3 PINS 16/6 A for the aquarium lighting (day)

H3 / S3 : SOCKET 3 PINS 16/6 A for the shoe shiner

SIGNIFICATION of SYMBOLS

 : casing capping W = 25 mm → free placement

 : casing capping W = 25 mm → imposed placement

 : casing capping W = 75 mm → imposed placement

POSITION of EQUIPMENTS

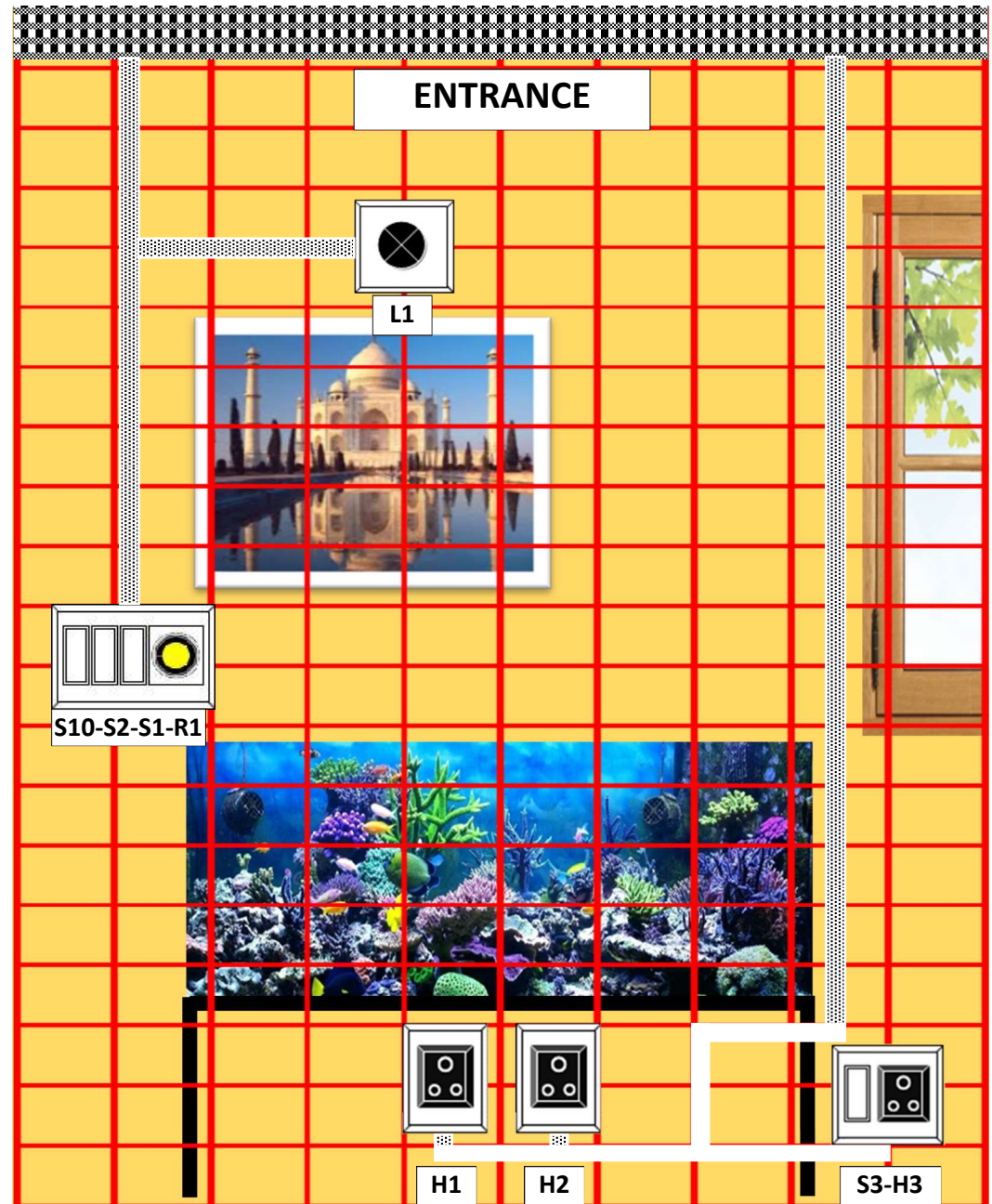
The exact position of each element as to be determined by the competitor by using the red grid on the layout.

The red grid is made of 20 rows and 10 columns. Dimensions of wood panels are 1250 x 2500 mm.

DIMENSIONS and MEASUREMENTS

- All dimensions are in meter unless otherwise stated

General tolerance is $\pm 0,003$



BEDROOM

DESCRIPTION of EQUIPMENTS

S6 and **S7** : SWITCHES FOR LAMPS **L6** & **L7**

S8 and **S9** : TWO-WAYS SWITCHES for ceiling lamps **L4** and **L5**

H4 / S4 and **H5 / S5** : SOCKET 3 PINS 16/6 A

H6 : SOCKET 3 PINS 16/6 A for the air conditioner 2 tons

L6 and **L7** : LAMPS

SIGNIFICATION of SYMBOLS

▤ : casing capping W = 25 mm → free placement

▭ : casing capping W = 25 mm → imposed placement

▨ : casing capping W = 75 mm → imposed placement

POSITION of EQUIPMENTS

The exact position of each element as to be determined by the competitor by using the red grid on the layout.

The red grid is made of 20 rows and 10 columns. Dimensions of wood panels are 1250 x 2500 mm.

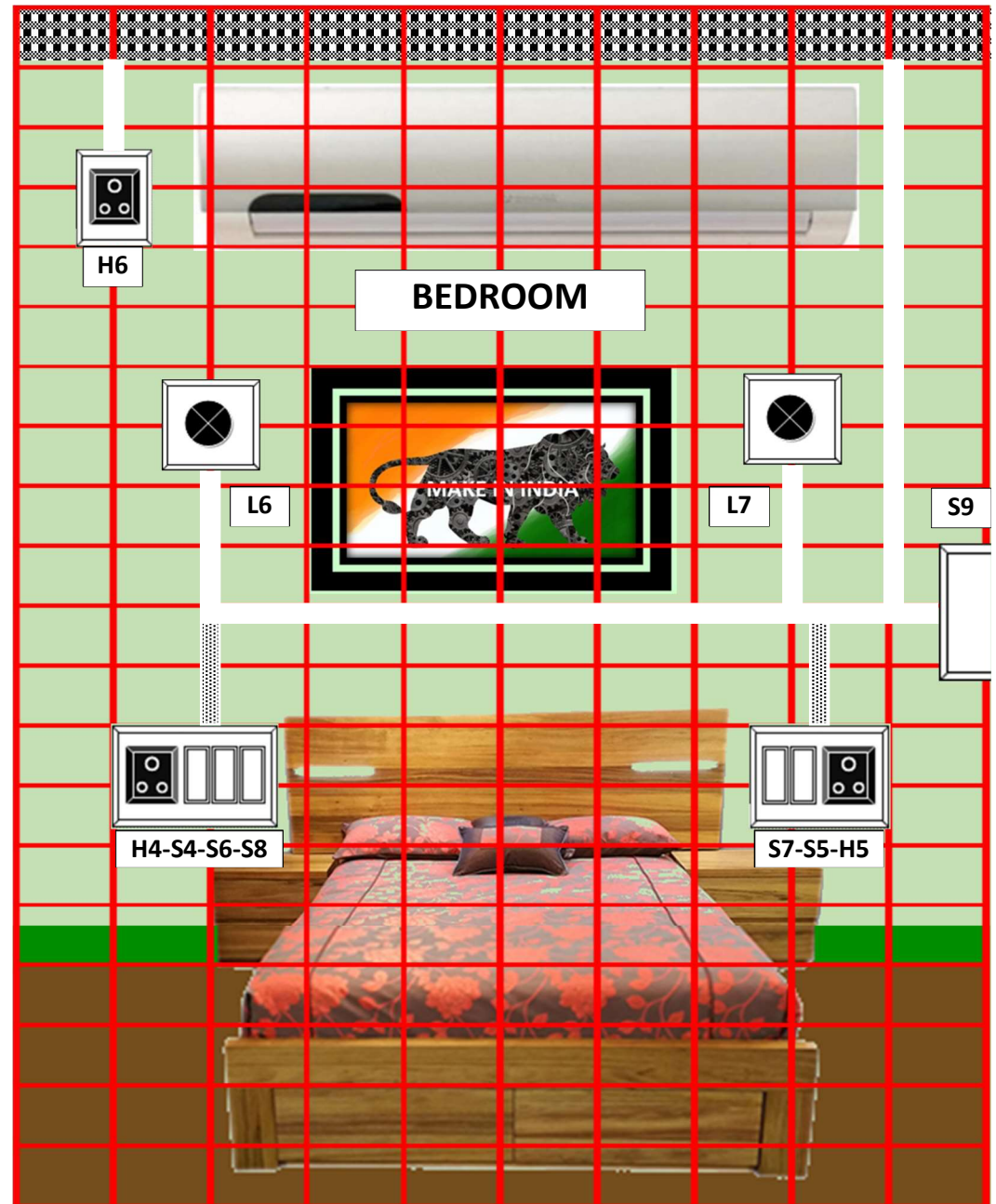
Two-ways switch **S9** is placed on the right wood panel of the bedroom.

DIMENSIONS and MEASUREMENTS

- All dimensions are in meter unless otherwise stated

General tolerance is $\pm 0,003$

Version 1 – September 2018



RECEPTION OFFICE

DESCRIPTION of EQUIPMENTS

PC1 and **PC2** : ETHERNET PLUGS RJ45


S14 / R2 : SWITCH and REGULATOR for lamps **L8** and **L9**


H7 / S11 : SOCKET 3 PINS 16/6 A


H8 / S12 : SOCKET 3 PINS 16/6 A

H9 / S13 : SOCKET 3 PINS 16/6 A

SIGNIFICATION of SYMBOLS

 : casing capping W = 25 mm → free placement

 : casing capping W = 25 mm → imposed placement

 : casing capping W = 75 mm → imposed placement

POSITION of EQUIPMENTS

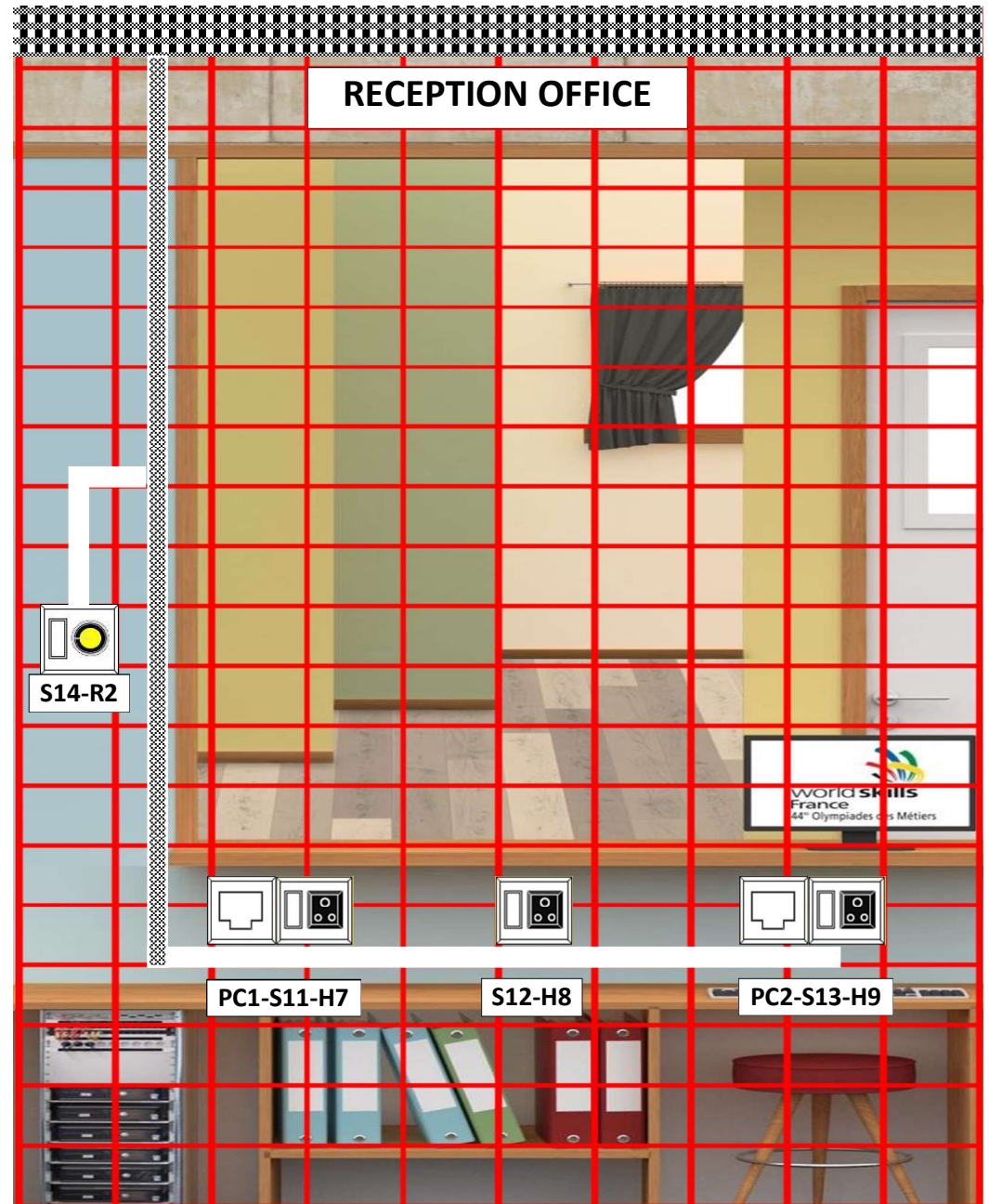
The exact position of each element as to be determined by the competitor by using the red grid on the layout.

The red grid is made of 20 rows and 10 columns. Dimensions of wood panels are 1250 x 2500 mm.

DIMENSIONS and MEASUREMENTS

- All dimensions are in meter unless otherwise stated

General tolerance is $\pm 0,003$



TECHNICAL ROOM

DESCRIPTION of EQUIPMENTS

- S14** : PUSHBUTTON FOR 6' OF FAN (MIN)
- L10 & L11** : LAMPS (on the ceiling)
- H10** : SOCKET 3 PINS 16/6 A for the boiler at night (IHP2c)
- H11** : THREE-PHASE PLUG (pump of the swimming pool)
- AP1** : ARGUS PRESENCE (on the ceiling)

SIGNIFICATION of SYMBOLS

Casing capping 75 mm

Tubular PVC pipe

Câble 3Cx1,5□

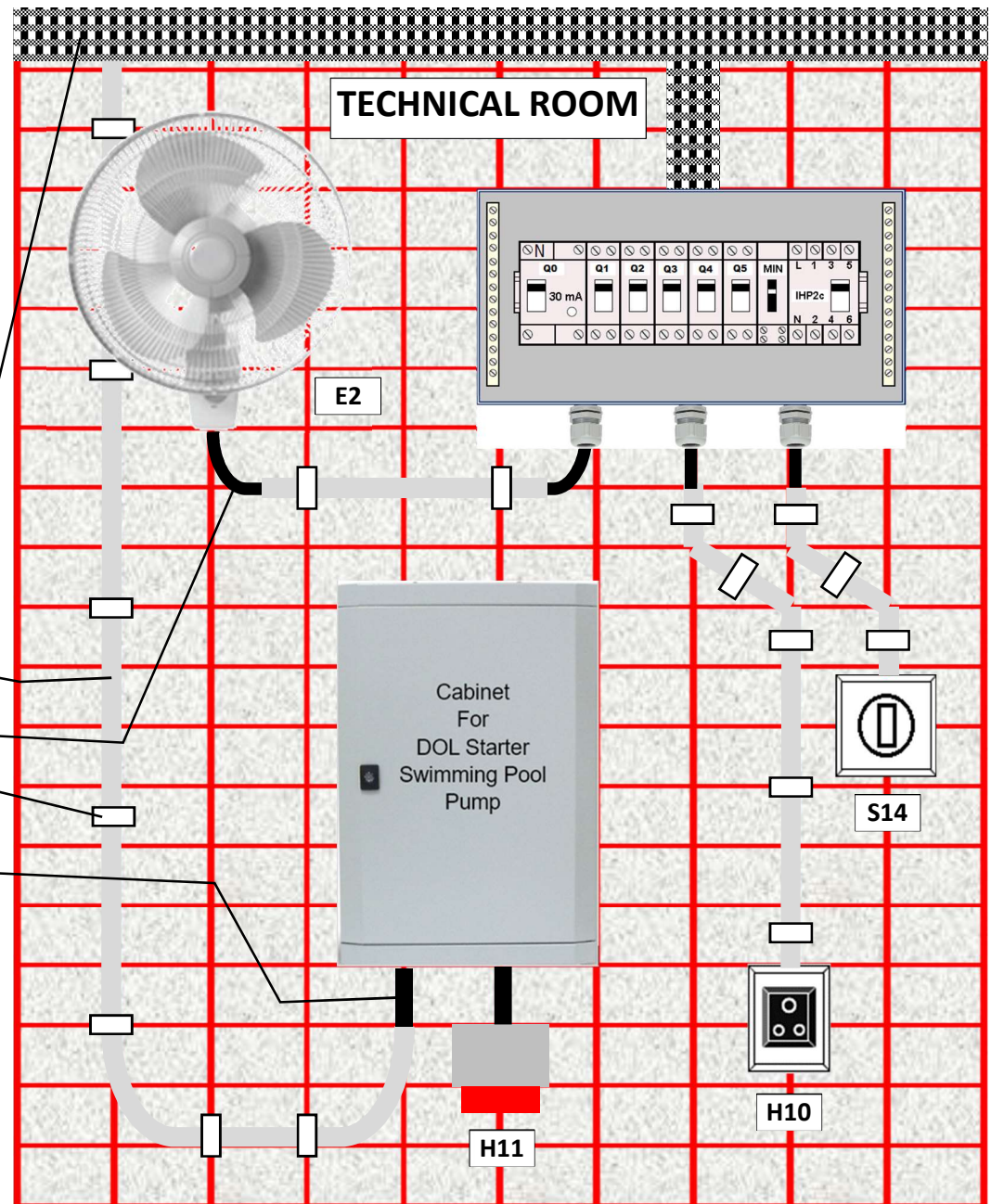
Saddle

Câble 5Cx1,5□ + gland packing

DIMENSIONS and MEASUREMENTS

- All dimensions are in millimeter unless otherwise stated

General tolerance is $\pm 0,002$



CEILINGS

DESCRIPTION and POSITION of EQUIPMENTS

Technical Room :

AP1 : ARGUS PRESENCE

L10 and L11 : LAMPS

Entrance :

E1 : CEILING FAN

L2 and L3 : LAMPS

Bedroom :

S9 : TWO-WAYS SWITCH

L5 and L6 : LAMPS

Reception Office:

L12 and L13 : LAMPS

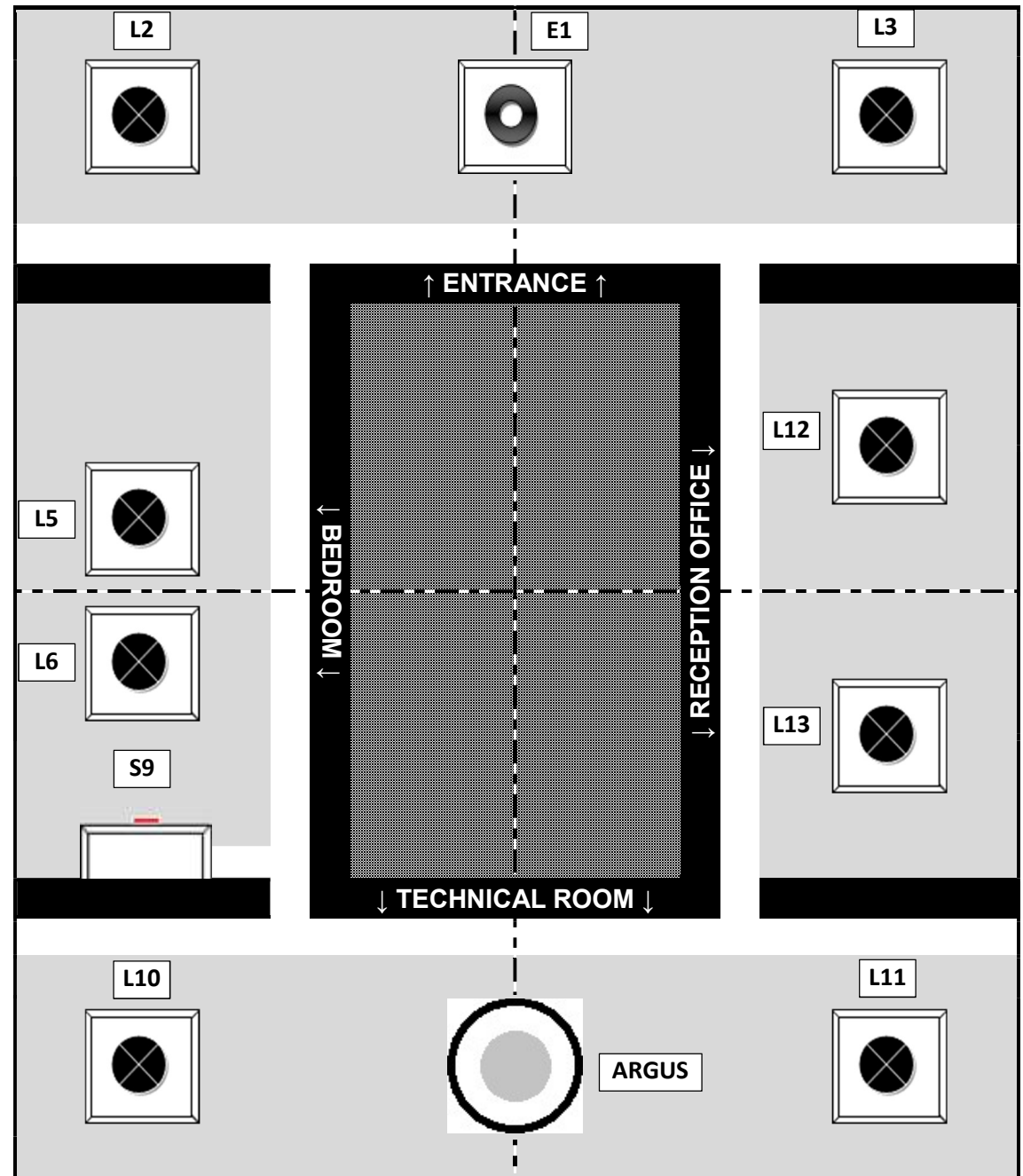
SIGNIFICATION of SYMBOLS

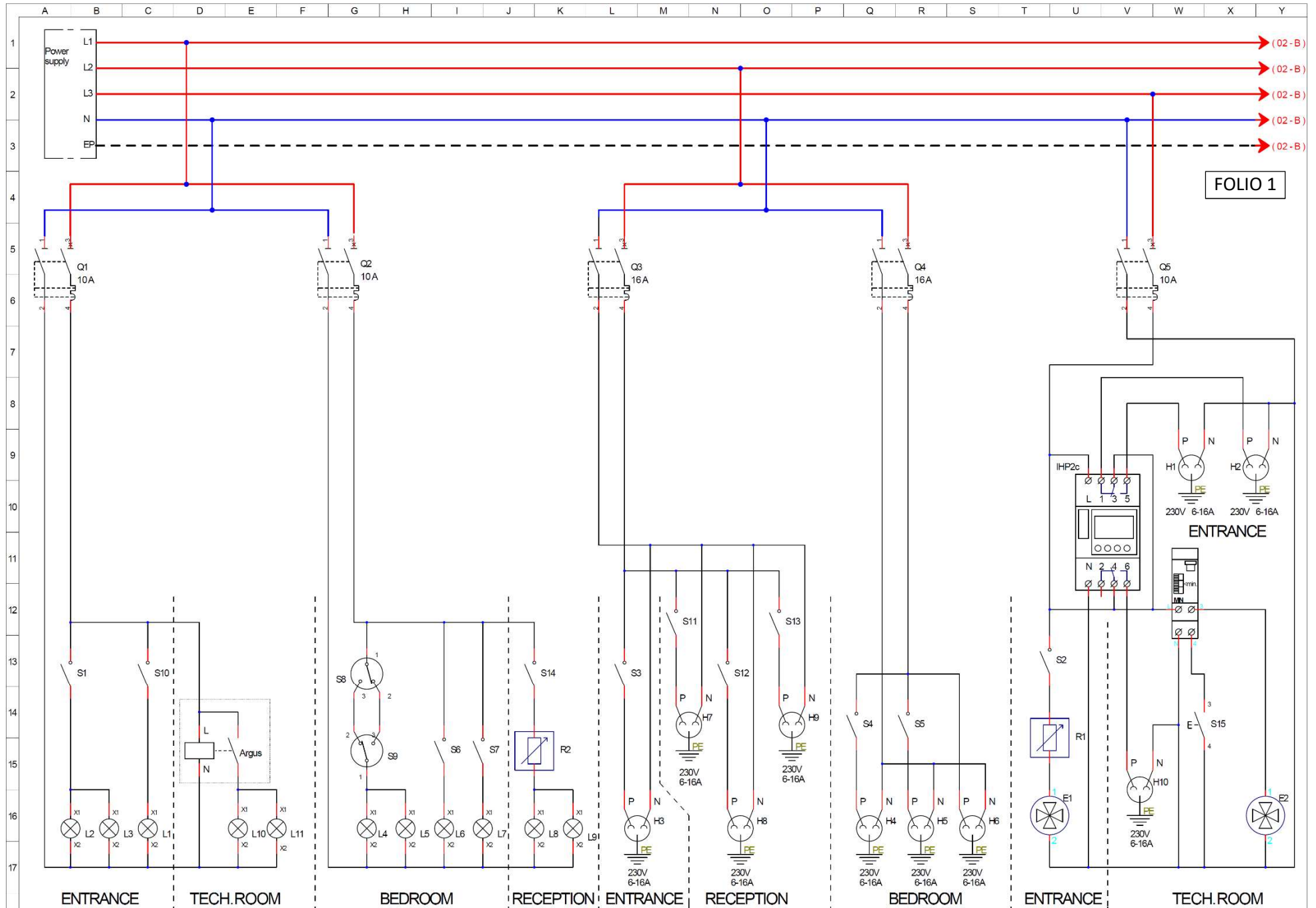
■ : wood panel 1250 x 2500 mm

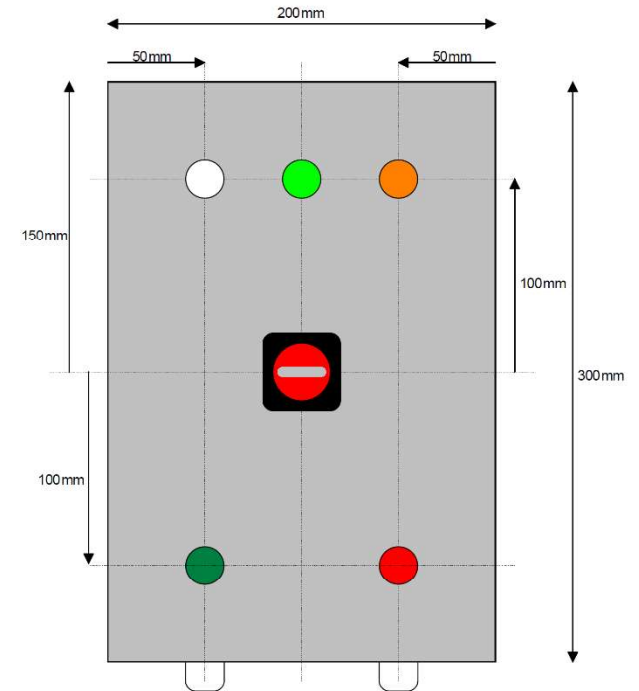
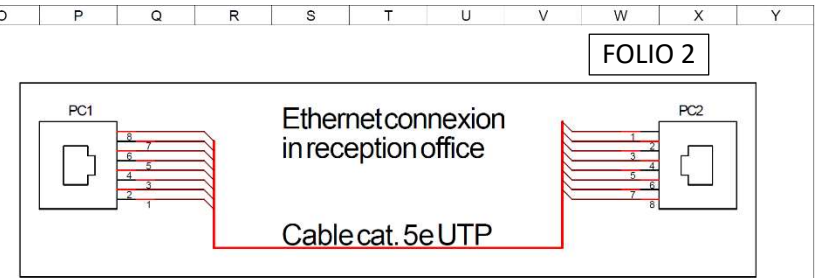
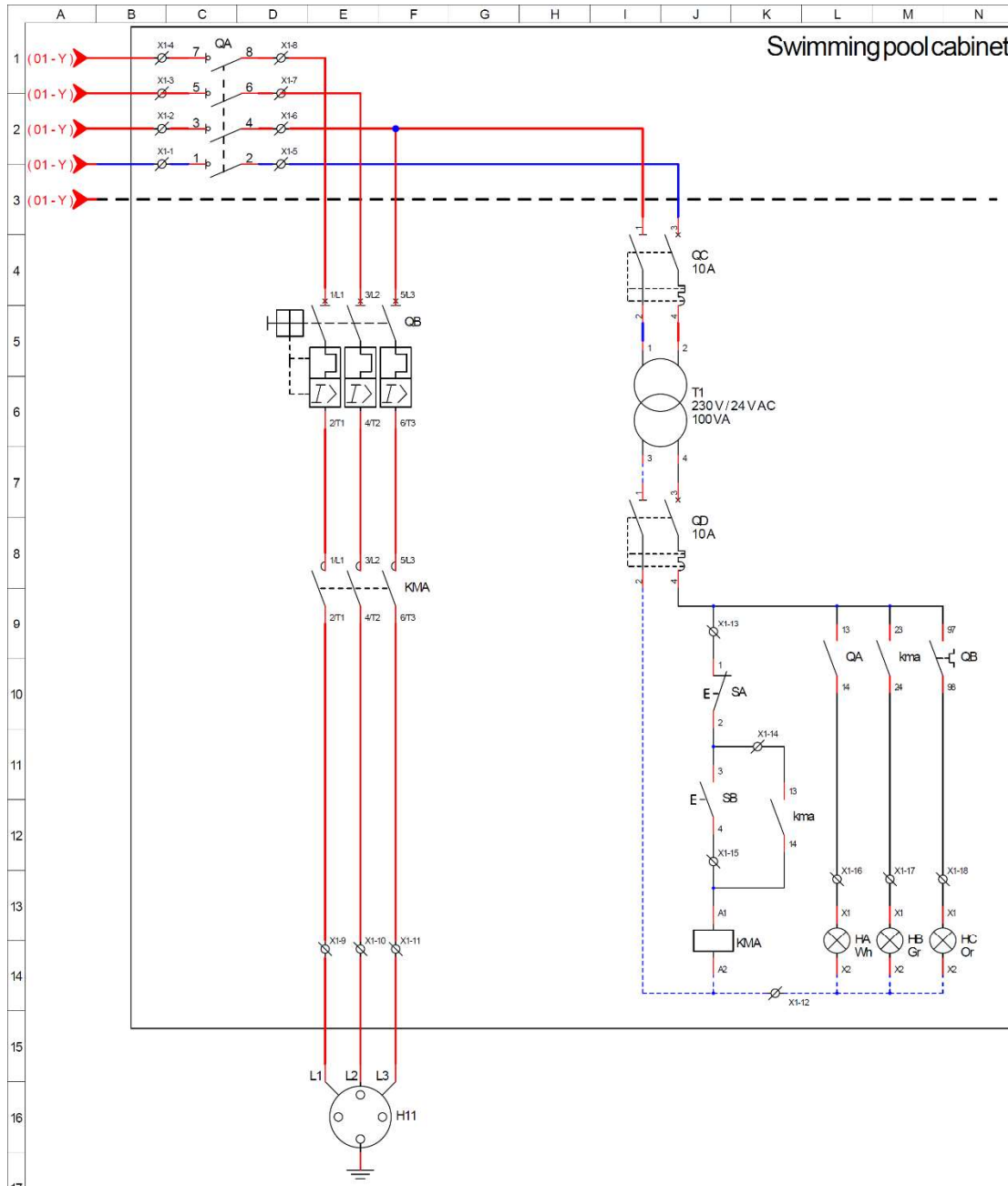
□ : casing capping W = 75 mm (except S9 → 25 mm)

IMPORTANT

Casing capping of each equipment listed under is not represented (except S9). You have to install each conduct as per industry and international standards.







Section - C

C. Assessment

The assessment is done by one expert. Aspects are criteria's which are judged for assessment from the following table.

	Criteria	Percentage of final result
A	Safety (electrical and personal)	12%
B	Commissioning and function	12%
C	Circuit design	19,75%
D	Measurements	6,5%
E	Installation of equipment and wire-ways	25%
F	Wiring and termination	12,75%
G	Installation testing	12%

The assessment and marking has to be done whether by measurement with a binary system (yes or no) or by judgement using a scale regarding to industry requirements as following :

Fourth level industry scale :

- performance below industry standard
- performance meets industry standard with mistakes
- performance meets industry standard
- performance wholly exceeds industry standard and is judged as excellent

Different expectations for each criteria can be evaluated. The tab on next pages give details.

- "M" means that the assessment is done according to the binary system of measurement.
- "J" means that the assessment is done regarding to industry requirements. In this case, the level reached by each competitor (one of four level) determines the percentage of maximal mark.

Section - D

D. Instructions for candidates

The Health, Safety, and Environment Policy and Regulations are given below for the skill competition on electrical installation.

During the competition, competitors :

- MUST wear ear protection and eye protection at all times.
- All marking points regarding health and safety marks will be made clear to Competitors before competition begins

If the supervising expert, who are watching the competitors, witness any breach of the Health, Safety and Environment requirements during the Competition, he will :

- On the first occasion : Warn the Competitor and make a note of the breach ;
- On the second occasion : Warn the Competitor and make a note of the breach ;
- On the third occasion : A record of the breach will be made and result in a loss of the Health and Safety marks.

Section - E

E. Health, Safety, and Environment

1. All accredited participants, and supporting volunteers will abide by rules and regulations with regards to Health, Safety, and Environment of the Competition venue.
2. All participants, technicians and supporting staff will wear the required protective personnel clothing.
3. All participants will assume liability for all risks of injury and damage to property, loss of property, which might be associated with or result from participation in the event. The organizers will not be liable for any damage, however in case of injury the competitor will immediately inform the immediate organizer for medical attention.



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Schneider Electric

Test Project

National Skill Level

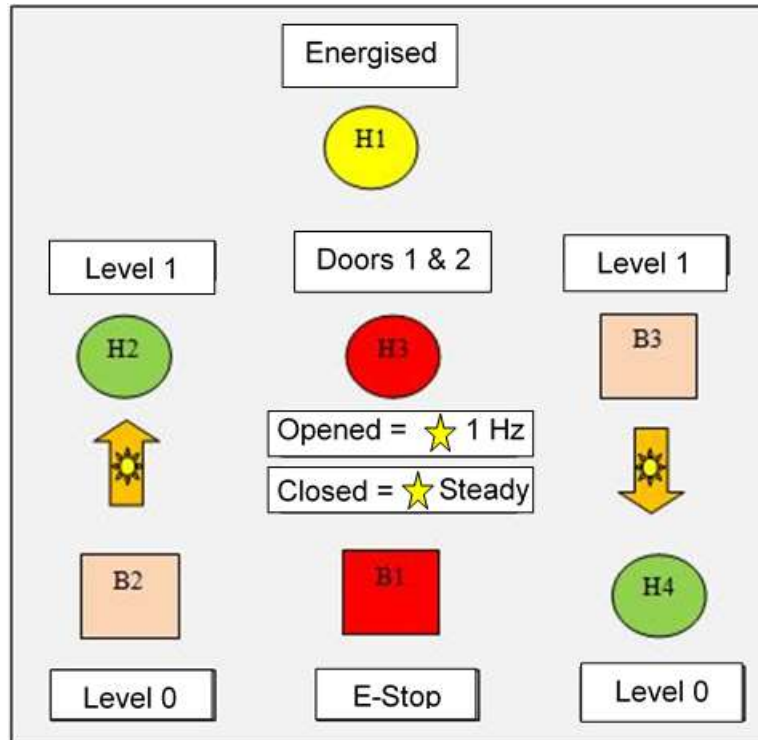
Skill 18 – Electrical Installation

Category: Construction and Building Technology

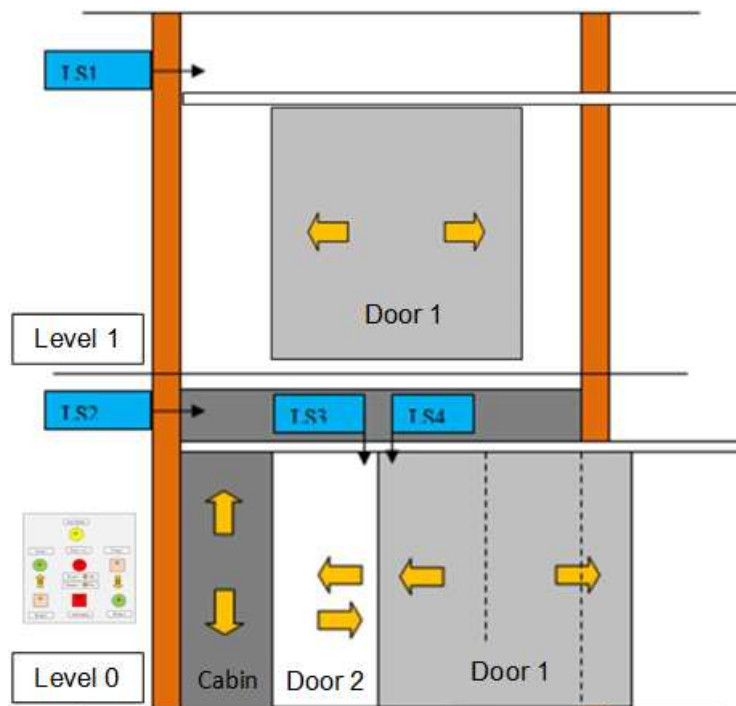
Module 2 – Programming

PRINCIPLE DIAGRAM OF THE FREIGHT ELEVATOR

Front face of control cabinet



Synoptic



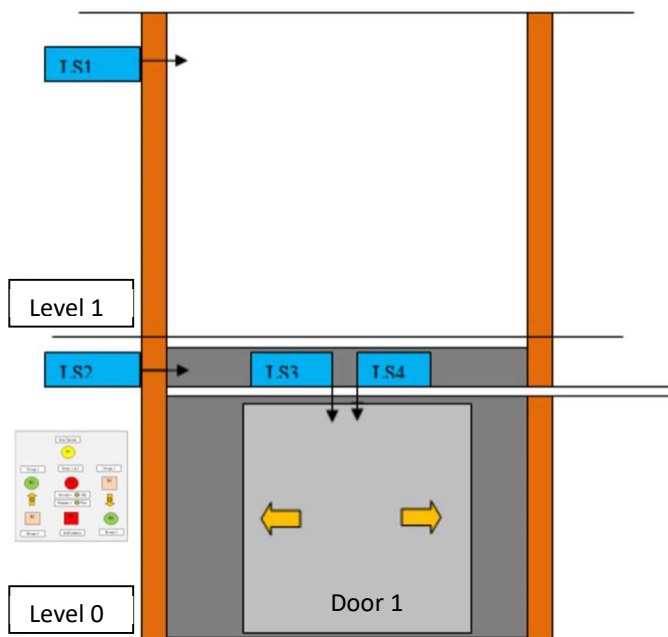
Explanations on the use of freight elevator

The cabinet controls a simple elevator with :

- A sliding external door at level 0 (door 1)
- A sliding external door at level 1 (door 1)
- Two sliding cabin doors (door 2)
- An on-board detection door open or closed on the doors 1
- An on-board detection door open or closed on the doors 2
- The doors must be closed to obtain the movement of the cabin
- The controls are made from the control cabinet installed at level 0
- No one should climb inside the cabin during rise or descent.
- The operator takes the staircase to reach the cabin in order to load or unload materials

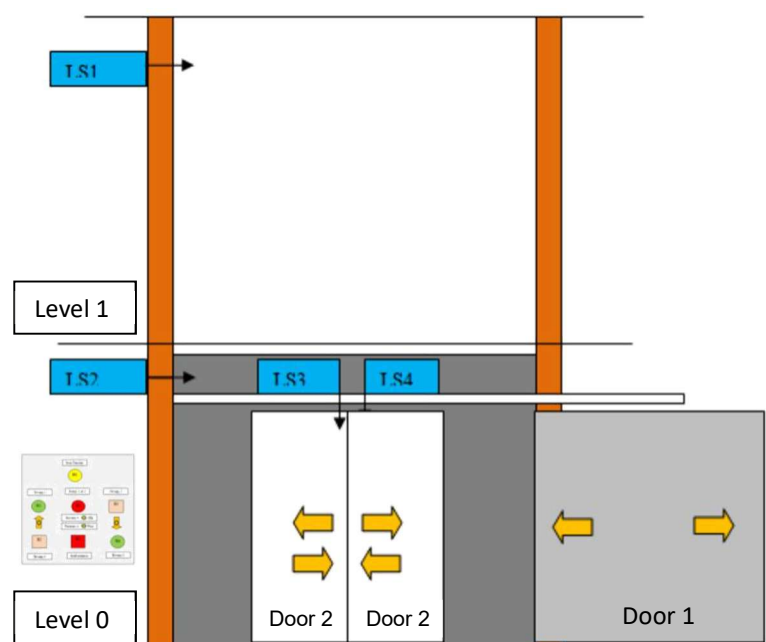
Principle of operation

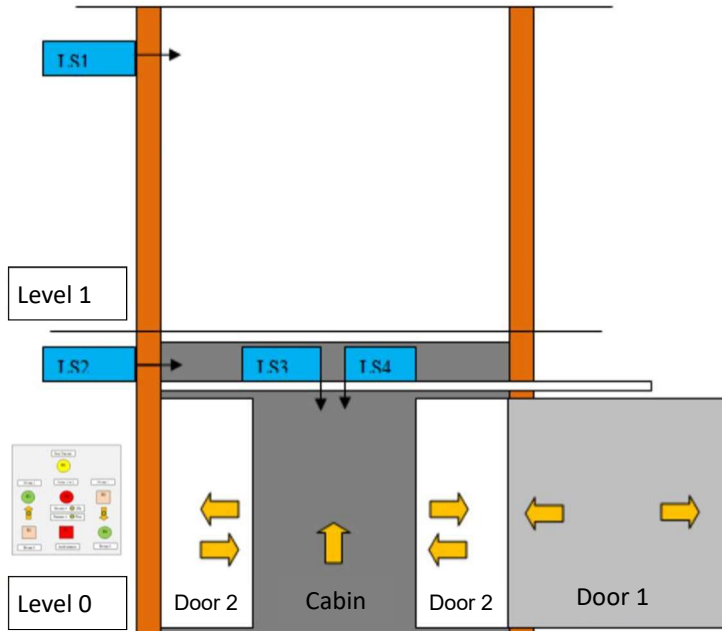
H1 is lit steady to indicate the presence of voltage in the control cabinet



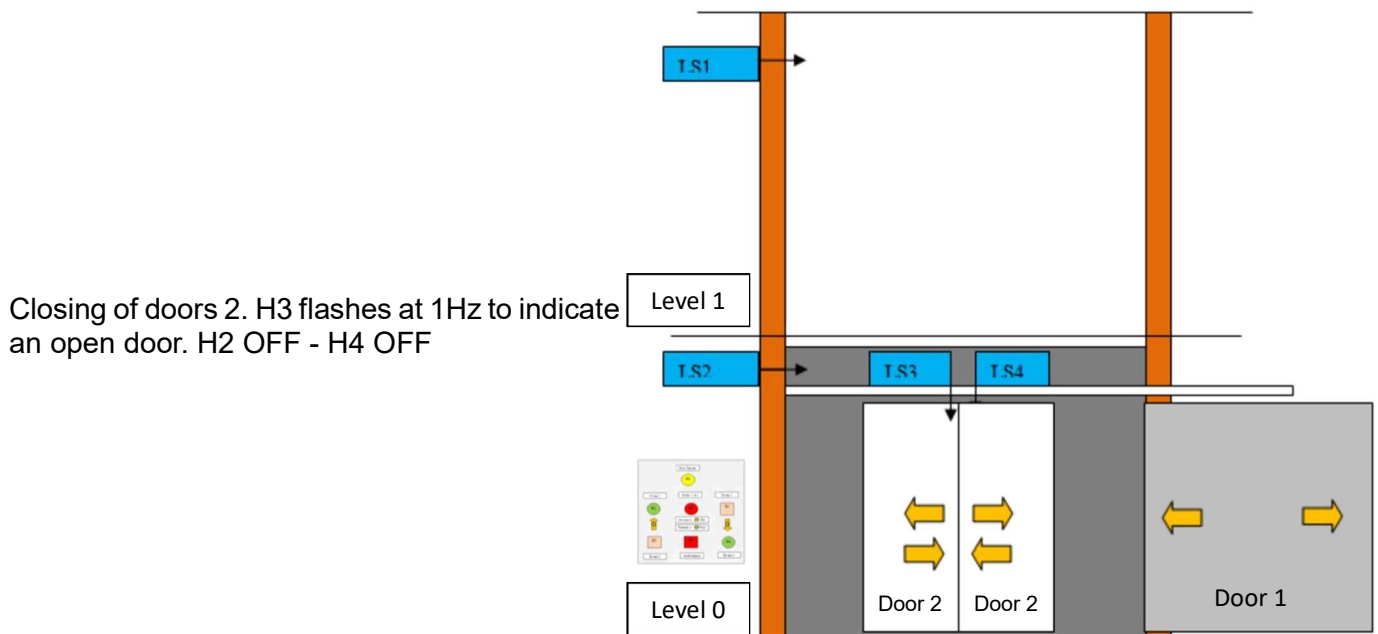
H3 is lit steady to indicate doors 1 and 2 closed.
Cabin is on level 0 - H2 is OFF - H4 is OFF

Opening of door 1. H3 flashes at 1Hz to indicate an open door. H2 OFF - H4 OFF

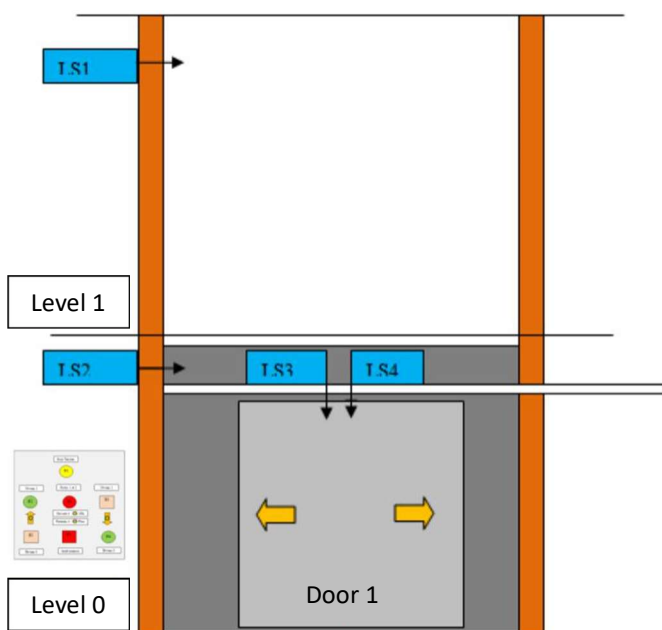




Opening of doors 2. H3 flashes at 1Hz to indicate an open door. H2 OFF - H4 OFF – Cabin loading



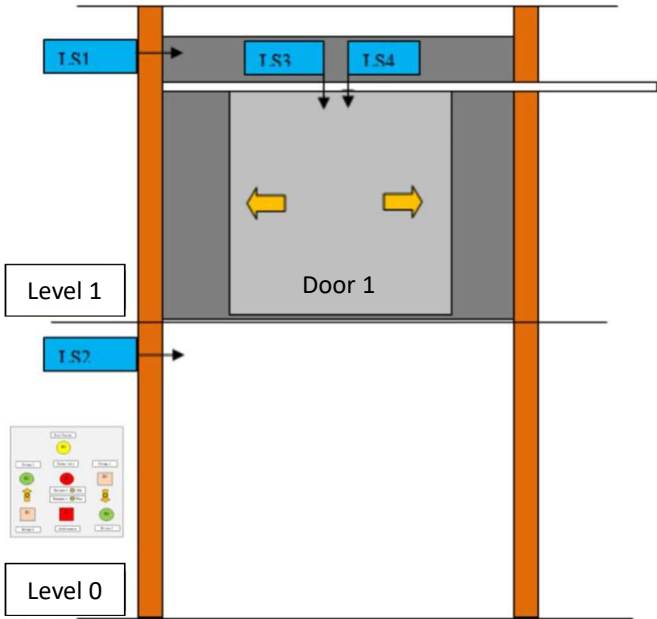
Closing of doors 2. H3 flashes at 1Hz to indicate an open door. H2 OFF - H4 OFF



Closing of door 1. H3 flashes at 1Hz to indicate an open door. H2 OFF - H4 OFF

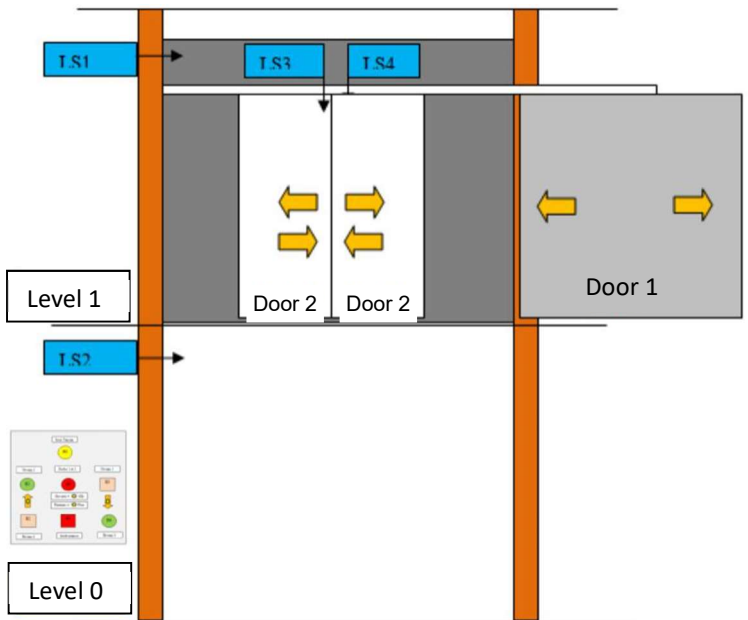
MODULE 2 - Programming

➔ Push on BP2 : Cabin rise – H4 OFF - H3 ON steady, H2 flashing at 1 Hz during rising

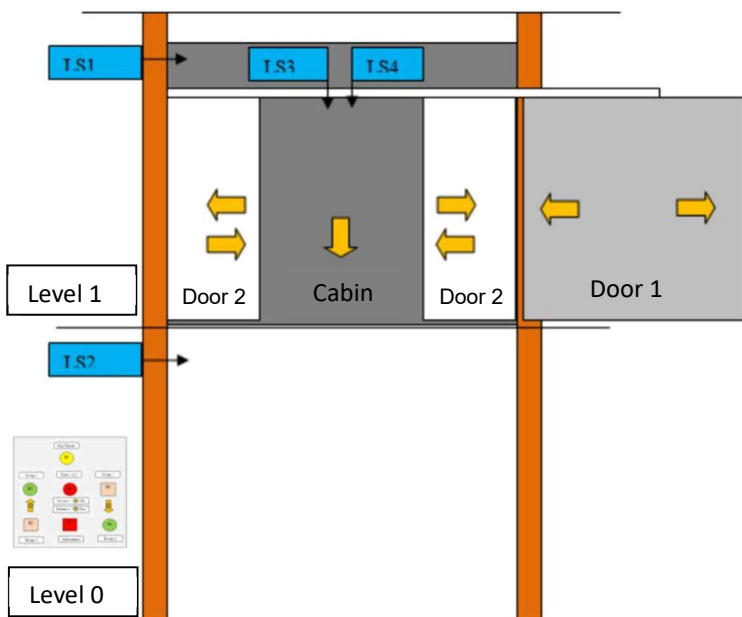


Arrival of cabin at Level 1. H3 ON steady - H2 OFF - H4 OFF

Opening of door 1. H3 flashes at 1Hz to indicate an open door. H2 OFF - H4 OFF

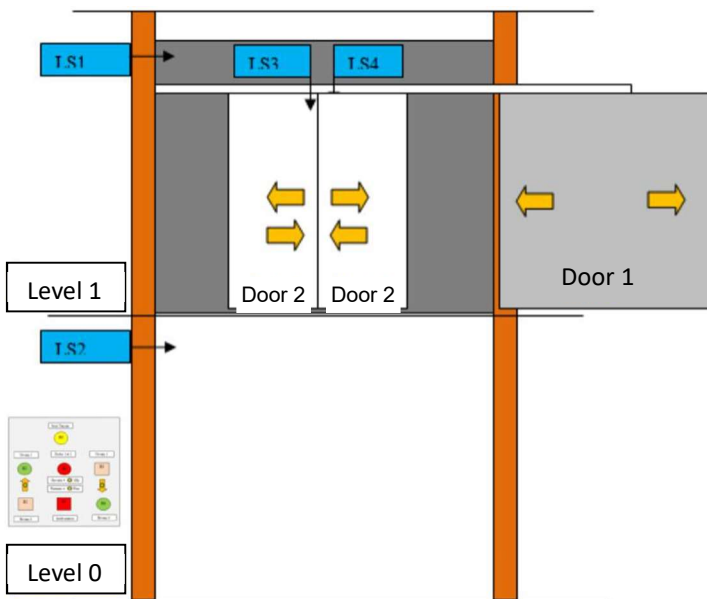


Opening of doors 2. H3 flashes at 1Hz to indicate the opening of doors 1 and 2. H2 OFF - H4 OFF

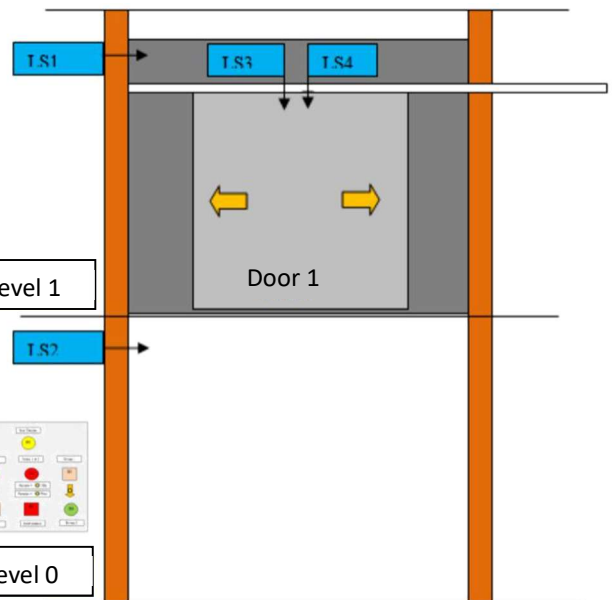


Opening of doors 2. H3 flashes at 1Hz to indicate the opening of doors 1 and 2. H2 OFF - H4 OFF

→ Unloading of the cabin

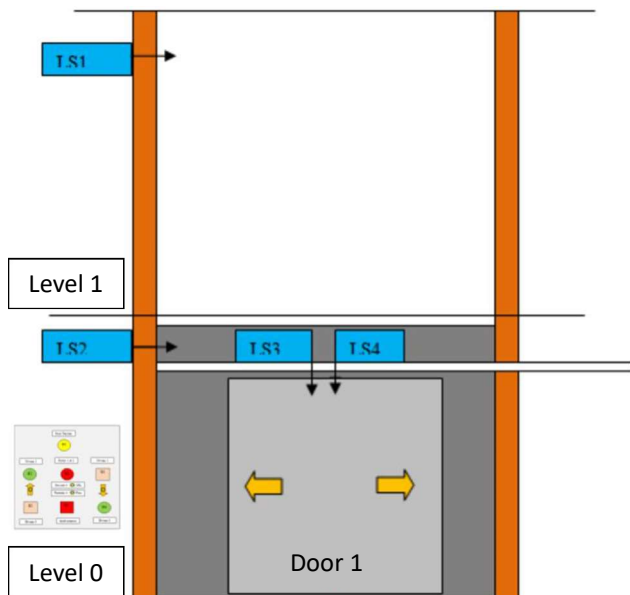


Closing of doors 2. H3 flashes at 1Hz to indicate door 1 open. H2 OFF – H4 OFF



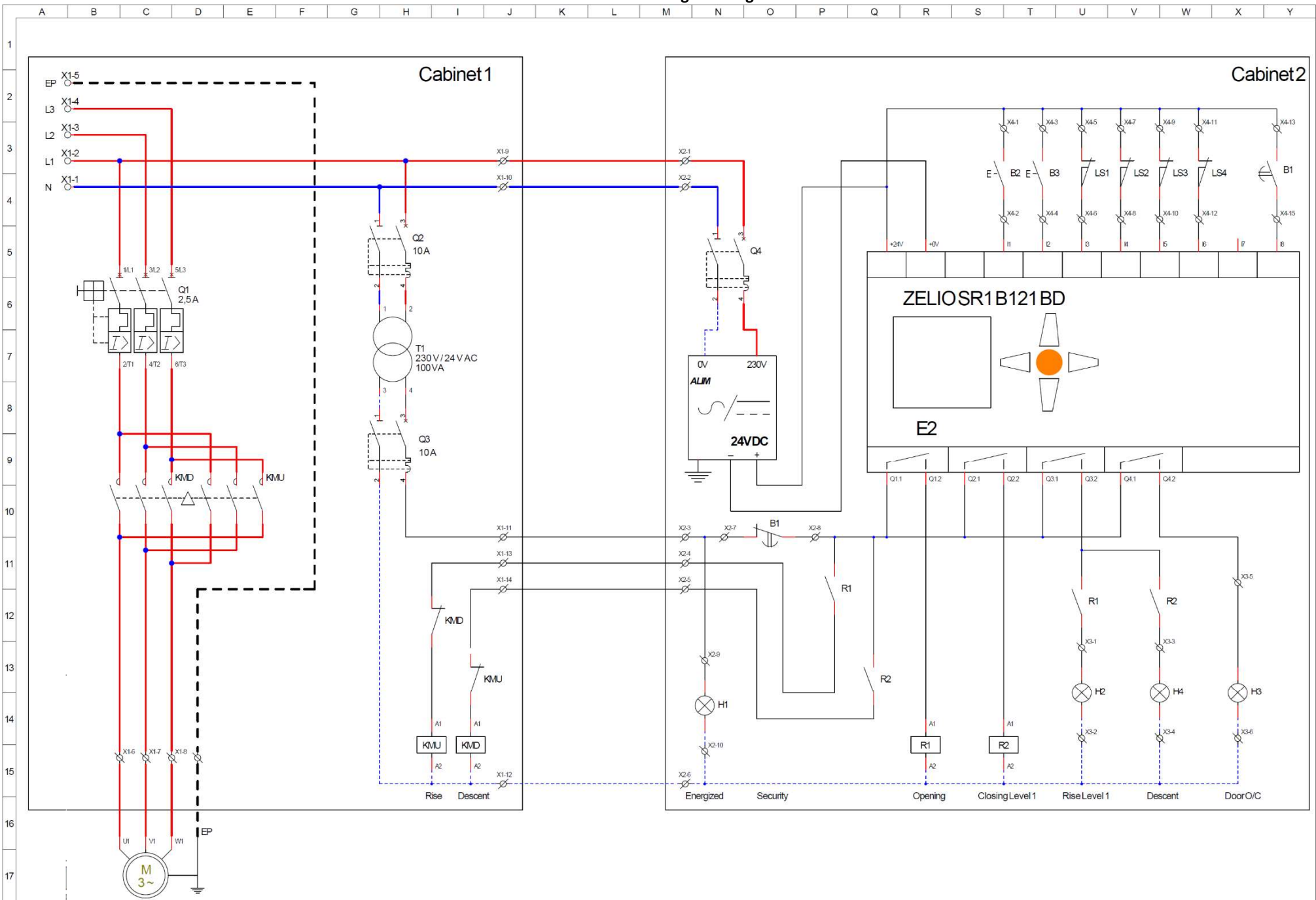
Closing of the door 1. H3 is lit steady to indicate closing doors 1 and 2. H2 OFF– H4 OFF

→ Push on BP3 : descent of the cab - H2 OFF. H4 flashes at 1 Hz during the descent



H3 is ON steady to indicate doors 1 and 2 closed
Cabin is on level 0 - H4 OFF - H2 OFF, restart of the cycle
Note = The emergency stop acts directly on the power supply of the control circuit

MODULE 2 - Programming





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Schneider



Electric

Test Project

National Skill Level

Skill 18 – Electrical Installation

Category: Construction and Building Technology

Organisation and jury's papers

Test project timing and schedule

The test project is to be accomplished during 3 days and 18 hours in three different parts :

1. Module A – Main Test Project
2. Module B – PLC Programming
3. Module C – Installation testing

Days	Duration
Day 1	7 hours
Day 2	7 hours
Day 3	4 hours

Module A

Module A is schedule for 15.5 hours distributed over three days :

Module B

Module B is schedule for 1.30 hour and this duration is excluded from the time allocated for the main project, and each competitor will reach the programming station one by one as per the following schedule :

Day	Schedules Time	Booth No.
Day 1	10.45 am – 12.15 pm	6
Day 1	2.00 pm – 3.30 pm	9
Day 1	3.45 pm - 5.15 pm	3
Day 2	9.00 am – 10.30 am	4
Day 2	10.45 am – 12.15 pm	1
Day 2	2.00 pm – 3.30 pm	7
Day 2	3.45 pm - 5.15 pm	8
Day 3	9.00 am – 10.30 am	5
Day 3	10.45 am – 12.15 pm	2

If time is saved by the competitor, it will be reallocated to the main project module.

Organisation and jury's papers

Module C

Module C is scheduled for 1.00 hour and this duration is excluded from the time allocated for the main project, and each competitor will reach the Installation testing station one by one as per the following schedule :

Day	Schedules Time	Booth No.
Day 1	11.00 am – 12.00 pm	7
Day 1	2.00 pm – 3.00 pm	1
Day 1	3.15 pm - 4.15 pm	4
Day 2	9.00 am – 10.00 am	5
Day 2	10.15 am – 11.15 am	2
Day 2	11.30 am – 12.30 pm	8
Day 2	2.00 pm - 3.00 pm	9
Day 3	3.15 pm – 4.15 pm	6
Day 3	9.00 am – 10.15 am	3

If time is saved by the competitor, it will be reallocated to the main project module.

Infrastructure List

Workshop Installation – Tools & Equipment provided by Organizers of Test Project

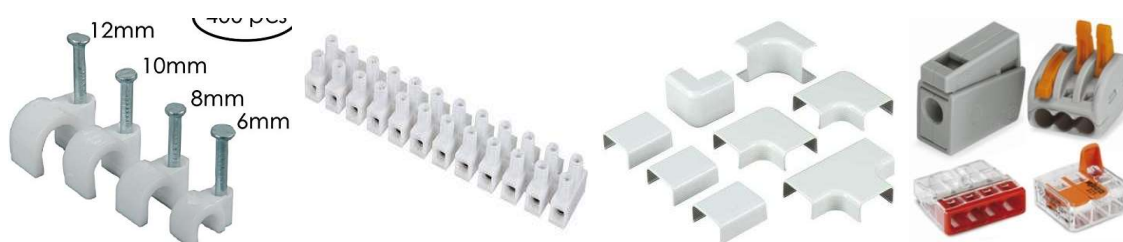
Mechanical equipment (per competitor)

1. Consumables, cleaning materials, paper, pens
2. 1 table and 1 chair ; 1 ladder or height workstation
3. 1 wood structure per competitor (with simulation of walls and roof). Panels are 1,2 m x 2,4 m
4. Measuring tape, poker, centre punch, spirit level, miter box with saw, sandpaper (at least file)



Instruments, electrical items, cables and accessories (per competitor)

1. 1 Residual Current Device 16A - 30 mA, 2 DP MCB 16A, 3 DP MCB 10A
2. 1 pushbuttons with NO contact, 11 one-way flush switches with NO contact, 1 two-way flush switch with NO contact, 1 Argus presence sensor ; 1 10-modules cabinet
3. 10 single-phase electric plugs 230V – 6-16A ; 1 three-phase plug 400V – 32 A
4. Power supply 4000V 3P+N+E ; 11 light bulbs 230 V
5. Wires (different sections and colors) and cable 3Cx1.5², wire ends, PVC glands, labels Plastic cable clips, PVC **square** cable channels (casing capping) in **different sizes** (2 at least) with cord covers, screws, clips, terminal block strips (dominos and wagos), junction boxes
6. Digital multimeter and Megaohmmeter
7. 1 electronic timer Schneider CCT15363, 1 programmable switch Schneider CCT15452 ; 2 fans
8. Cabinet 200 x 300 ; Isolator + MCB + Contactor + PB NO + PB NC + transformer + 2 MCBs +



Tools, Kit-Tool & Equipment allowed to be brought by competitors for competitions

1. Set of screwdrivers insulated and not, wire stripper, round and flat nose plier, combination plier, side cutting plier, wire puller, test instruments, clamps.
2. Jokari cable knife, drill machine with bits and hole saw, mallet, poker, centre punch



Common equipments



Forbidden tools and equipments



Jury's tools and equipments



- All other tools not mentioned in the list above to be provided by the organizers
- During practical session change in the provided diagram is not allowed without any authorisation given by member(s) of jury
- Time will be allocated to check the working condition of the component, declaration on not working condition should be done that time
- The working methodologies are considered for marking
- Any damage in the component will not be replaced if declared after starting of the competition
- Competitors can check for the working of the circuit any number of time before declaration