

# Customer Site Installation Requirements

## 1. SUBJECT

This document sets out the general installation requirements that must be met regarding the setup of the equipment rooms and surfaces when the Customer enters into a service contract with Belgacom. This document is an appendix to the general terms and conditions for services.

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## 4. CUSTOMER SITE INSTALLATION REQUIREMENTS

### 4.1. Introduction

This document sets out the general installation requirements that must be met regarding the setup of the equipment rooms and surfaces when the Customer enters into a service contract with Belgacom. This document is an appendix to the general terms and conditions for services.

#### 4.1.1. Purpose of document.

##### 4.1.1.1. Uniformity

One of the goals of this document is to standardize insofar as possible the minimum requirements for each subject concerned. This will in turn improve the service implementation process, making it quicker, and clarify insofar as possible the responsibilities of each party for each item concerned.

The services concerned include but are not limited to leased lines, BCS, BILAN™, PRA, LAN Extension and BES.

##### 4.1.1.2. Contractual conditions

This document is an appendix that is an integral part of the service contract binding Belgacom to its customer. Except where explicitly indicated otherwise in the service contract, the requirements contained herein must be met by all parties concerned.

#### 4.1.2. Content of Document and Definitions

This document is divided into four parts:

##### 4.1.2.1. General requirements prior to installation

These requirements must be met before Belgacom begins installation.

- Room accessibility: dimensions, facilities, security
- Lighting: layout, power, precautions
- Characteristics of the rooms and surfaces: available surface, floor load, etc.
- Environmental conditions: temperature, humidity, dust, etc.
- Attachment possibilities: cable ducts, map of wall-mounted equipment, etc.
- Electrical specifications: minimum infrastructure, circuit breakers, conductors, etc.

##### 4.1.2.2. Specific environmental requirements

These requirements shall be applicable from the moment Belgacom begins installation.

- Installation of cables
- Mechanical characteristics of installed material: height, length, depth
- Internal cabling and connector: definition of connection points
- Space and volume: required per additional unit
- Electricity consumption and heat dissipation: per type of equipment
- Batteries: type, maintenance, precautions, etc.

##### 4.1.2.3. Customer guidelines for operating equipment

- Contact with Belgacom prior to service call
- Precautions concerning ESD

- Precautions concerning optical signals (eye safety)
- Precautions concerning dust for optical signals

#### 4.1.2.4. Regulatory issues

This section contains general and specific regulatory issues that apply to this document.

- Safety of persons (emergency exits, firefighting, etc.)
- Electrical power
- Pollution

## 4.2. General requirements prior to installation

### 4.2.1. Room accessibility

#### 4.2.1.1. Dimensions of passageways

Passageways of sufficient dimension must be available for the transportation of equipment from the location where it is unloaded to the equipment and battery rooms.

When calculating the space required, the materials' packaging (approximately 200 mm thick) must be taken into account.

The door to the equipment room must be at least 2.00 meters high and 0.80 meters wide. If the entrance has a doorstep, it must be possible to remove it to let the equipment pass through.

#### 4.2.1.2. Tools (load lifter, etc.)

If the available space is insufficient, a lift must be available.

#### 4.2.1.3. Security

If the room is reserved exclusively for Belgacom equipment, it must be accessible only to the building manager and Belgacom employees. Subject to Belgacom's prior agreement, the equipment room may be used for other purposes. Individual cases shall be the subject of specific agreements.

#### 4.2.1.4. 24/7 Accessibility and contact persons (keys, etc.)

On the occasion of the site survey, the means of access (keys, etc.), storage facilities and tools necessary to carry out the work will be determined.

### 4.2.2. Lighting

An adequate lighting system must be present before Belgacom begins installation work.

#### 4.2.2.1. Type

Preference shall be given to a lighting system that does not disrupt transmission systems. Because the equipment installed by Belgacom complies with CE standard 89/336 concerning electromagnetic compatibility, customers may be required to change their system if it disrupts the service.

#### 4.2.2.2. Position

If possible, the lighting system shall be located near the installation location and shall illuminate the front and back of the Belgacom cabinet. Lighting installations must be placed in such a way as to render impossible any simultaneous contact, direct or indirect via metal tubing, between the installation and Belgacom's equipment cabinet.

If this is impossible (because of the height of the room, for example), the power supply to the lighting system must be protected by circuit breakers. These circuit breakers may not be grounded.

#### 4.2.2.3. Lighting:

Must be at least 500 lux at the point on the floor where the equipment is located.

### 4.2.3. Characteristics of the room or technical work surface

The technical work surface or room will house the internal distribution frame and, generally speaking, all Belgacom equipment. Their dimension will be determined by the size of the installation, the workspace required and the system's heat dissipation.

#### 4.2.3.1. Surface area, volume and selection of the room or technical work surface

With the exception of certain cases, the following rules shall apply:

The choice of the technical work surface and the technical room depend upon the size and use of the building and must be made in cooperation with a Belgacom representative.

The work surface or technical room must meet the following conditions:

- The work surface or technical room must be connected by cable ducts to the location(s) where the cable enters the building. These cable ducts shall be reserved exclusively for telecommunications applications. Their location and dimensions shall be defined in cooperation with a Belgacom representative.
- The room shall be in good condition, without water seepage, well-ventilated and dry.
- The floor on which the equipment is installed must be smooth and level.
- Wall construction:
  - Walls to which equipment is to be attached must be made of concrete or stone.
  - If necessary, walls should be reinforced.
- Wall sections housing Belgacom installations must be free of any other installations, even if they are integrated into the wall.
- The surface must be as far as possible from utility-related installations (water, gas, electricity).

The minimum dimensions are: 4 m x 2 m, height: 2.5 m. The dimensions will be determined on a case-by-case basis during a site survey conducted by Belgacom and the customer.

#### 4.2.3.2. Floor load

The minimum requirements are:

Distributed load: 200 kg/m<sup>2</sup>

Concentrated load: 2,5 kg/cm<sup>2</sup>

Some cabinets may require a greater floor load figure:

- LP Cabinet, rectifier + batteries: 500 kg/(0,6x0,6 m<sup>2</sup>)
- SDH Cabinet: 200 kg/(0,6x0,6 m<sup>2</sup>)

The actual floor load will be determined during the site survey.

#### 4.2.3.3. Floor covering

Belgacom recommends that the floor covering be smooth and anti-static, so that the electrical charge does not exceed 2 KV. The following standards describe this type of covering: DIN 51593, 53482 and 53486.

#### 4.2.3.4. Raised floor

Given the large number of cables to be laid and the modifications to existing cabling, for most systems Belgacom recommends a specially-designed raised floor for computer equipment.

#### 4.2.3.5. Cabinets and tables for equipment

A one-meter wide passageway must be present in front of and behind the rows of cabinets. For tabletop equipment, the customer must supply the table.

#### 4.2.3.6. Fireproofing

The Customer shall take the necessary steps to render the walls fireproof again, even if punctures were made in these walls by Belgacom at the customer's request.

### 4.2.4. General environmental requirements

#### 4.2.4.1. Temperature/humidity

The customer shall ensure that the equipment, if it is inside a room, is installed and operated in accordance with those environmental conditions, specifically concerning temperature and relative humidity, contained in Class 3.1 of ETSI standard ETS 300 019-1-3 (stationary use at weatherprotected locations).

This class applies to enclosed locations whose temperature is permanently monitored.

The conditions corresponding to this class can be encountered in offices, telecommunications centers and storage rooms for sensitive and/or valuable products.

They apply to equipment installed permanently at customer sites, during operation, installation, repair and maintenance.

In practice, the following conditions must be met:

- Where relative humidity is between 10 and 50%: the ambient temperature shall be between 10 and 40°C at all times.
- Where relative humidity is between 50 and 85%: the ambient temperature shall be between 10 and 30°C at all times.

Belgacom recommends an ideal temperature for equipment rooms and batteries of between 15 and 20°C.

A Class 3.2 environment (partially temperature-controlled) is acceptable only if the equipment is designed for continuous operation in this type of environment. For the climagram, we refer to ETSI standard ETS 300 019-1-3.

A heating unit, cooling system, forced ventilation and humidifier may be required to maintain the conditions required by the class, particularly if there is a significant difference between the room environment and the external environment. The air conditioning system must be started and stopped periodically, but extremely low (<10°C) or high (>40°C) temperatures must be avoided. It is even recommended to install a small air conditioner while waiting for a room to be completely air-conditioned.

#### 4.2.4.2. Dusts and Mechanically Active Substances

Installations can only take place in locations that are compliant with ETSI standard ETS 300 019-1-3 for the rate of sand, the rate of dust in suspension and sedimentation.

These conditions are not verified in rooms where heavy construction is underway or in certain basements or attics.

In practice, the following shall be ensured:

- The department carrying out the work shall limit dust creation to a minimum;
- Any equipment doors shall remain closed.

Care should be taken not to disengage dust and paint particles from the ceilings.

Dust levels may not exceed the following values:

Dust particles < 10 microns: 10-100 microgr./m<sup>3</sup>

Dust particles > 10 microns: 20-200 microgr./m<sup>3</sup>

Compliance with these requirements is of vital importance for equipment with fiberoptic connections.

#### 4.2.4.3. Water splashes

Customers must take every precaution to avoid water splashes (e.g., during room maintenance).

#### 4.2.4.4. Sunlight exposure

The equipment may not be directly exposed to sunlight. Such exposure significantly raises the ambient temperature inside the equipment cabinet and can lead normal operating conditions being exceeded in certain locations. Useable materials are anti-solar film, blinds, curtains, etc.

#### 4.2.4.5. Vibration

Ideally, the equipment cannot be installed in locations subject to vibrations oscillating between 5 and 55 Hz and with a multidirectional amplitude of more than 0.3 mm from crest to crest.

### 4.2.5. Attachment possibilities

#### 4.2.5.1. Cable ducts

With regard to Point 4.2.3., the surface area and volume described must be guaranteed and must take into account any existing cable ducts (which may be used for the installations referred to in this document). This means that while existing cable ducts may be used to assist the installation, under no circumstances may they hinder it. Nevertheless, as required under the general regulation for electrical installations (RGIE), separate cable ducts must be used for electricity and telecommunications. Where new cable ducts are necessary, they may be installed for shared use, subject to the prior agreement of the parties involved. Where new cable ducts must be installed, the maximum ceiling load must be taken into account.

#### 4.2.5.2. Attachment points

Installation of materials may include attaching them to the available surfaces (walls, ceilings, etc.). It is therefore vital to be aware of the available locations apt for such attachment. This also means that one must also be aware of the nature of the support materials and the allowable drilling depths of the surface. Any location requiring special caution (water pipes, electrical wiring, etc.) must be clearly indicated. Belgacom cannot be held liable for any consequences of drilling performed based on information provided by the customer.

### 4.2.6. Electrical specifications

#### 4.2.6.1. Minimum electrical infrastructure required before Belgacom begins installation

To supply electrical power to the measuring equipment or tools necessary for installation, the customer must provide a 230 VAC 16 amp socket with ground within 10 meters of the installation location.

If the customer wishes to use 230 V AC to power Belgacom equipment, he must provide a distribution frame (with dedicated circuit) and dedicated cable that terminates in the Belgacom installation. The customer must clearly identify the circuits concerned.

A no-break is recommended for equipment using AC current or DC current not backed up with batteries.

The distribution frame must be indicated with a warning panel (pictogram Danger Electricity + name) and must have circuit breakers on all the circuits, including any no-break circuit.

If the customer wishes to power the equipment with -48V DC, the same requirements as for the 230 V AC shall apply.

#### 4.2.6.2. Protection: Electromagnetic compatibility and grounding

There is a direct correlation between the quality of the grounding and the quality of the high-speed circuits.

Nevertheless, it is very difficult to attach a maximum value to the resistance of the ground, i.e., a value beyond which the quality would be unacceptably effected.

For electrical applications, the RGIE requires a maximum of 30 ohms resistance for the grounding. The primary reason for grounding equipment is to protect against electrocution. The customer must provide Belgacom a compliant ground connection, for which he shall be responsible. Belgacom also requests that the customer install in the telecom room a ground dividing bar connected to the building's ground network and within 5 m of the spot where the equipment is to be installed (Figure 1). Ideally, this connection will be realized via a multistrand copper cable with a minimum diameter of 16 mm<sup>2</sup>.

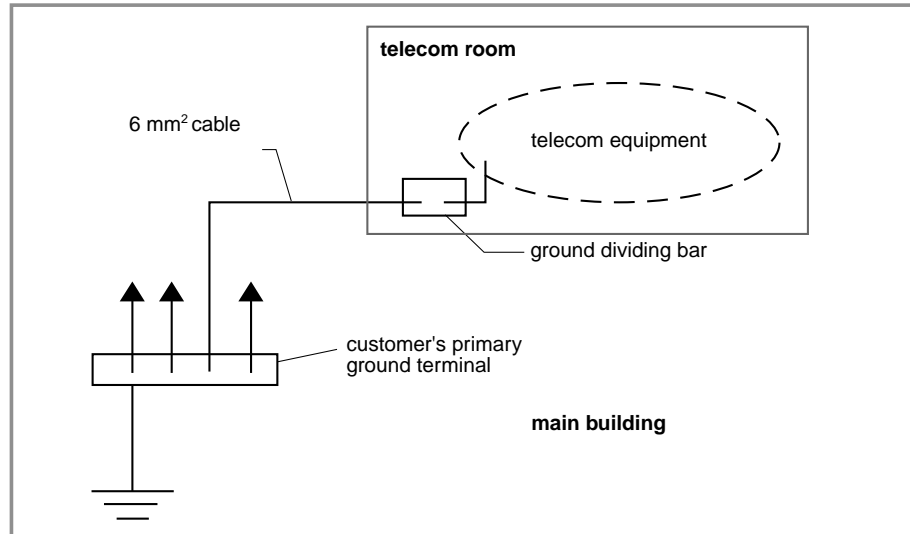


Figure 1: Grounding

If at the time of installation, no ground dividing bar is present, Belgacom shall make available to the customer a five-meter long grounding cable, terminated with a lug, in the room containing the Belgacom telecom equipment cabinet, so that the customer can then provide the necessary grounding.

If a raised floor exists, Belgacom recommends that it be connected to the ground.

#### 4.2.6.3. Energy consumption and dissipation

Power sources for equipment used at Belgacom must be compliant with ETSI standard ETS 300 132.

The direct current source shall have the following characteristics:

- Nominal voltage: - 48 V DC;
- Tolerance: variations between - 40.5 V and - 57 V;
- Current: 30 A<sup>1</sup>.

The alternating current source shall have the following characteristics:

- Nominal voltage: 230 V AC;
- Tolerance: variations between 207 and 253 V AC;
- Tolerance: variations in frequency between 48 and 52 Hz.
- Current: 12 A<sup>1</sup>.

If the customer wishes, Belgacom can provide an estimate for backing up the power supply with a battery.

<sup>1</sup> These values are for information only. Actual values will depend on the equipment installed.

## 4.3. Specific environmental requirements

### 4.3.1. Cable installation

#### 4.3.1.1. Installation of fiberoptic cables (FO)

Fiberoptic cables are installed at a depth of 60-80 cm in a high-density polyethylene (HDPE) tube with an outside diameter of 50 mm and wall thickness of 4.6 mm.

To place the HDPE tube, it is necessary to drill a hole in the outside wall.

The customer shall indicate where he wants the hole drilled for the HDPE tube.

Belgacom cannot be held liable for any consequences of drilling performed based on information provided by the customer. For carrying out jointing and repair work, Belgacom allocates extra 20-meter cable lengths at regular intervals in the manholes and buildings.

If a manhole is available at less than 100 meters from the entry point, the extra length can be placed in it.

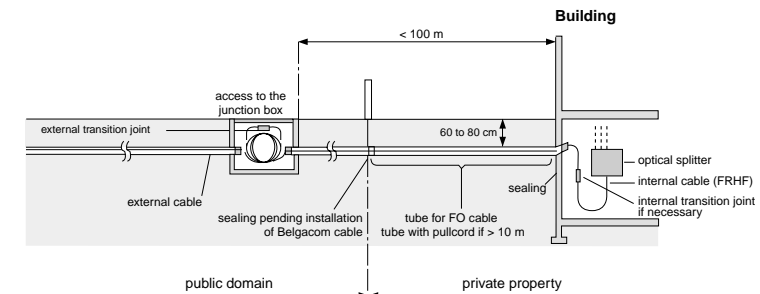


Figure 2: Installation of fiberoptic cables

If this is not the case, either an additional manhole must be installed or a protected space must be provided at the entry of the building to hang 20 meters of cable on a reel.

At the entrance to the building, a transition joint will be created towards the internal cable with a fire-resistant sheath. In such a case, it is necessary to provide enough space to suspend the transition joint (reel with a diameter of +/- 80 centimeters). When the external cable enters the technical room directly, without passing through other rooms, it is not necessary to create a transition joint. In this case, the external cable with the PE sheath is fed directly into the optical splitter. In the building, the fiberoptic cables (both the external cables protected by a metal sheath and the fire-resistant internal cables) will be installed in a separate, well-marked duct.

#### 4.3.1.2. Copper cable installation

The copper cables enter the building via a 125-mm PVC tube.

Here, the customer will also designate a location for the hole to be drilled for this tube. Belgacom cannot be held liable for any consequences of drilling performed based on information provided by the customer.

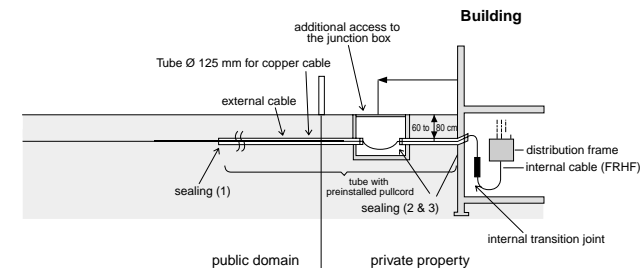


Figure 3: Installing copper cable

At the entrance to the building, a transition joint will be created towards the internal cables with a fire-resistant sheath (VVT type).  
Sufficient space must be provided. It must also be possible to properly suspend this transition joint.

#### 4.3.2. Mechanical characteristics

##### 4.3.2.1. Installation in a customer cabinet

The minimum dimensions required for installing Belgacom equipment will be given during the site survey.

##### 4.3.2.2. Installation in a new Belgacom cabinet

Cabinets installed by Belgacom may be used only by Belgacom.

Possible dimensions are:

- Length 600 x Depth 600 x Height 2200 mm (standard)
- Length 600 x Depth 600 x Height 2000 mm
- Length 600 x Depth 600 x Height 2600 mm
- Length 600 x Depth 600 x Height 1400 mm

The type of cabinet will be selected during the site survey.

##### Space and volume

The Customer shall provide the space necessary for Belgacom to install the equipment required to provide the service ordered; This will be discussed in greater detail during the site survey.

#### 4.3.3. Batteries

The electrical installation must be compliant with RGIE regulations, notably Article 109.  
When battery rooms are laid out, effective upper and lower ventilation is required.  
Information:

For a 47Ah battery, ventilation of 0.14 m<sup>3</sup>/hr. is required.

For two groups of 100 Ah batteries, ventilation of 0.6 m<sup>3</sup>/hr. is required.

The battery must be kept clean and dry to avoid superficial stray current.

#### 4.4. Customer guidelines for operating equipment

##### 4.4.1. Contact with Belgacom prior to service call

If any kind of service call becomes necessary for a piece of Belgacom equipment (except in cases of force majeure, such as fire), the customer should inform their Belgacom contact person before taking any action. To this end, a list of contact persons (at least one telephone number) shall be given to the customer. To speed any required repairs, Belgacom may request that the customer carry out basic repairs on its equipment.

##### 4.4.1.1. ESD

ESD stands for Electro-Static Discharge. This is the small shock you receive when the air is dry and you touch something metallic after walking on carpet.

When you touch electrical equipment, electrostatic discharge is produced that can cause internal damage to equipment or shorten its operating life.

One solution to avoid such problems is to use ESD bracelets when working on equipment.

Any intervention on a piece of active equipment, whatever the kind, requires the use of anti-static bracelets.

##### 4.4.1.2. Risks related to optical power

Standards for lasers have been established by the International Electrotechnical Commission (IEC) in IEC standard 825 (= IEC 60825). Lasers are classified according to the radiation they emit and the associated degree of hazard. Radiation classes are given by the manufacturer. The classes are determined by the wavelength and continuous power emitted and indicated by a sticker attached to the equipment.

Some equipment is not equipped with Automatic Laser Shutdown (ALS) or Automatic Power Reduction (APR) for when the fiber is cut. This can present a danger for users' eyes, depending on the class of laser and the use being made of it.

Belgacom requests that the customer not touch the optical elements of the equipment and cannot be held liable for the results if this rule is not observed.

The level of danger represented by this type of installation is indicated using the following sticker:

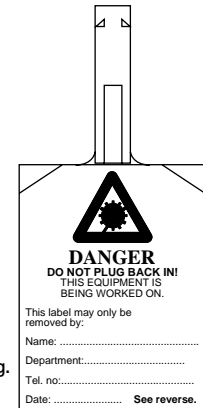


Figure 4: Sticker with "DO NOT PLUG BACK IN" warning.

##### 4.4.1.3. Risks related to dust in optical transmissions

Dust particles have a diameter of 2µm to 50 µm, compared to a diameter of 10 µm for single mode optical fiber. To give you an idea of the scales of magnitude involved, one common comparison is that one dust particle in front of the core of a single mode fiber is equivalent to an elephant standing in front of you blocking your view! For this reason, **the customer must not remove the plugs placed over the optical connectors.**

#### 4.5. Regulatory issues

##### 4.5.1. Emergency exits

The provisions of the Royal Decree of 19 December 1997 shall apply with regard to the presence, characteristics and indication of emergency exits.

##### 4.5.2. Firefighting

The installation must be designed in conformity with existing standards and have received ANPI (national fire-prevention association) certification. Those pictograms required by law must be present.

The standard warning forbidding the use of water to extinguish fires must be displayed on the equipment or in the equipment room.

The equipment may not be enclosed in walls or partitions containing flammable substances (Class A1). The equipment room may contain an automatic extinguishing system using inert gas.

A fire extinguisher must be placed in the equipment room immediately next to the entrance.

This should be a CO<sub>2</sub> (2 x 5 kg) or water + additive (9 l.) extinguisher.

To avoid mechanical damage, do not direct jets of automatic extinguishing systems towards the inside of the equipment.

**The procedure to follow in case of a fire alarm must be clearly posted in the room.**

**4.5.2.1. Preliminaries and important note**

HALON gas extinguishers will be forbidden by law effective 31 December 2002.  
Authorized inert gases are: CO<sub>2</sub>, Argonite, Inergen.

**4.5.2.2. Security equipment**

If an automatic extinguishing system is present, certain additional security equipment is required:

**4.5.2.2.1. a discontinuous alarm siren and buzzer:**

If a fire detector is triggered in the room, the **alarm siren** will emit a discontinuous signal (in the room). At the same time, a signal **buzzer** will go off in the detection center. Alarms related to these modules appear on the front panel.

**4.5.2.2.2. continuous alarm signal, flashing red light, countdown, warning panel:**

If an alarm is confirmed by a second detector of the second detection loop or by a manual switch, **the siren will become continuous, a flashing red light** will go off in the room and a programmable countdown will begin. Without human intervention and after the countdown has run out, the extinguishing gas will be released and the **warning panel** outside the door to the room will illuminate.

**4.5.2.2.3. Special switch on the extinguishing unit:**

It must be possible to stop the release of gas using a special switch on the extinguishing unit.

**4.5.3. Electrical power**

Electrical power must be fully compliant with RGIE regulations.

**4.5.4. Air pollution**

The room must be free of any air pollution that could harm the equipment.

Warning: Limits that apply to the equipment may exceed limits applicable to human beings.

For the equipment, the following maximum concentrations may not be exceeded.

Hydrogen sulfide	H <sub>2</sub> S: 1 – 3 microgr./m <sup>3</sup>
Sulfur dioxide	SO <sub>2</sub> : 30 – 100 microgr./m <sup>3</sup>
Ammonia	NH <sub>3</sub> : 30 – 100 microgr./m <sup>3</sup>
Nitrogen peroxide	NOx: 10 – 30 microgr./m <sup>3</sup>
Chloride and hydrogen chloride	CL <sub>2</sub> et HCl : 0,3 – 1 microgr./m <sup>3</sup>
Ozone	O <sub>3</sub> : 30 – 100 microgr./m <sup>3</sup>
Organic acid	Max. 0,005 ppm
Formic acid	30 – 100 microgr./m <sup>3</sup>

Materials identified by the law as harmful to human health (asbestos, etc.) are forbidden.