cpg.1
Fully SF6 gas insulated single and double busbar GIS switchgears up to 36 kV in accordance with IEC Standards

General Instructions
IG-137-EN, version 03; 23/06/2016
CAUTION!

When medium voltage equipment is operating, certain components are live, other parts may be in movement and some may reach high temperatures. Therefore, the use of this equipment poses electrical, mechanical and thermal risks.

In order to ensure an acceptable level of protection for people and property, and in compliance with applicable environmental recommendations, Ormazabal designs and manufactures its products according to the principle of integrated safety, based on the following criteria:

- Elimination of hazards wherever possible.
- Where elimination of hazards is neither technically nor economically feasible, appropriate protection functions are incorporated in the equipment.
- Communication about remaining risks to facilitate the design of operating procedures which prevent such risks, training for the personnel in charge of the equipment, and the use of suitable personal protective equipment.
- Use of recyclable materials and establishment of procedures for the disposal of equipment and components so that once the end of their service lives is reached, they are duly processed in accordance, as far as possible, with the environmental restrictions established by the competent authorities.

Consequently, the equipment to which the present manual refers complies with the requirements of section 11.2 of Standard IEC 62271-1. It must therefore only be operated by appropriately qualified and supervised personnel, in accordance with the requirements of standard EN 50110-1 on the safety of electrical installations and standard EN 50110-2 on activities in or near electrical installations. Personnel must be fully familiar with the instructions and warnings contained in this manual and in other recommendations of a more general nature which are applicable to the situation according to current legislation1.

The above must be carefully observed, as the correct and safe operation of this equipment depends not only on its design but also on general circumstances which are in general beyond the control and responsibility of the manufacturer. More specifically:

- The equipment must be handled and transported appropriately from the factory to the place of installation.
- All intermediate storage should occur in conditions which do not alter or damage the characteristics of the equipment or its essential components.
- Service conditions must be compatible with the equipment rating.
- The equipment must be operated strictly in accordance with the instructions given in the manual, and the applicable operating and safety principles must be clearly understood.
- Maintenance should be performed properly, taking into account the actual service and environmental conditions in the place of installation.

The manufacturer declines all liability for any significant indirect damages resulting from violation of the guarantee, under any jurisdiction, including loss of income, stoppages and costs resulting from repair or replacement of parts.

Warranty

The manufacturer guarantees this product against any defect in materials and operation during the contractual period. In the event that defects are detected, the manufacturer may opt either to repair or replace the equipment. Improper handling of this equipment and its repair by the user shall constitute a violation of the warranty.

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1 For example, in Spain the “Regulation on technical conditions and guarantees for safety in high voltage electrical installations” – Royal Decree 337/2014 is obligatory.

In view of the constant evolution in standards and design, the characteristics of the elements contained in this manual are subject to change without prior notice. These characteristics, as well as the availability of components, are subject to confirmation by Ormazabal.
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7.2.1 Commissioning from open position

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1 Description and main characteristics

The \textit{cpg.1} family is a series of GIS modular cubicles with full SF$_6$ gas insulation, for single and double busbar primary distribution applications in medium voltage networks up to 36 kV.

1.1 Models

<table>
<thead>
<tr>
<th>Function</th>
<th>Single busbar</th>
<th>Double busbar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit breaker cubicle</td>
<td>\textit{cpg.1-v1}</td>
<td>\textit{cpg.1-v2}</td>
</tr>
<tr>
<td>Disconnector cubicle</td>
<td>\textit{cpg.1-s1}</td>
<td>\textit{cpg.1-s2}</td>
</tr>
<tr>
<td>Transversal busbar coupling cubicle</td>
<td>--</td>
<td>\textit{cpg.1-ct}</td>
</tr>
<tr>
<td>Longitudinal busbar coupling cubicle</td>
<td>\textit{cpg.1-c}</td>
<td>\textit{cpg.1-cl}</td>
</tr>
<tr>
<td>Fuse protection cubicle</td>
<td>\textit{cpg.1-f1}</td>
<td>\textit{cpg.1-f2}</td>
</tr>
</tbody>
</table>

1.2 Standards applied

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC 62271-1</td>
<td>Common specifications for high voltage switchgear standards</td>
</tr>
<tr>
<td>IEC 62271-200</td>
<td>Metal-enclosed alternating current switchgear for rated voltages above 1 kV and below or equal to 52 kV</td>
</tr>
<tr>
<td>IEC 62271-100</td>
<td>Alternating current circuit breakers</td>
</tr>
<tr>
<td>IEC 62271-102</td>
<td>Alternating current disconnectors and earthing switches</td>
</tr>
<tr>
<td>IEC 62271-105</td>
<td>Alternating current circuit breaker-fuse combinations for rated voltages above 1 kV and below or equal to 52 kV</td>
</tr>
<tr>
<td>IEC 62271-206 / IEC 61243-5</td>
<td>Voltage presence indicating systems</td>
</tr>
</tbody>
</table>
1.3 Main components

Each cubicle is made up of a series of independent compartments:

![Diagram of cubicle compartments]

**Figure 1.1 Main elements of cpg.1 cubicles**

Gas tanks

These are the compartments which house the switching and breaking switchgear, where the insulating medium is SF₆ gas. There are 2 or 3 separate compartments:

- 1 for each of the feeder disconnectors
- 1 for the circuit breaker and the earthing switch

These are sealed compartments, made of stainless steel and sealed for life. They are designed and tested to withstand an internal arc of up to 31.5 kA - 1 s.

Depending on the function for which the cubicle was designed, it may contain the following components:

- Feeder disconnectors
- Earthing switch
- Internal busbar and connections
- Vacuum circuit breaker
- Switch - disconnector
- Fuse holders

![Diagram of gas tanks]

**Figure 1.2 Gas tanks of circuit breaker and disconnectors for cpg.1-v2 cubicle**

There are sets of bushings in the top and bottom of the compartments for connection of the busbar and the power cables respectively.
For testing the gas pressure in each compartment, a temperature-compensated pressure switch is installed, with a volt-free contact, for possible use as a remote alarm or blocking/trip for the functional unit.

### Top busbar

This is used for connecting cubicles. It has solid and shielded insulation, earthed by means of the compartment's specific earthing bar. As an option, the busbar is able to segregate the phases by means of a set of earthed metal plates (metal-clad).

Toroidal current transformers and/or plug-in voltage transformers can be installed in this compartment, thus avoiding the need for metering cubicles.

### Cable compartment

Located in the bottom part of the cubicle, this has a cover, interlocked with the earthing circuit, which allows front access to the medium voltage cables.

**Figure 1.3** Phase segregation in the cable compartment (optional)

In the most complete case, the base can house the following components:

- Phase segregation consisting of the main box and the segregating cover.
- Up to 4 screw-in shielded terminals per phase, as well as space for the corresponding incoming power cables.
- Clamp flanges for the medium voltage cables.
- Earthing plates.
- Toroidal current transformers.
- Plug-in voltage transformers.
- Surge arresters.

All the elements making up the enclosure are earthed by means of a conductor consisting of a copper bar capable of withstanding the rated short-time current. It is located in the base in such a way that it does not need to be dismantled in order to insert or remove a cable and its corresponding termination.
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**Gas pressure relief duct (optional)**

![Gas pressure relief duct (optional)](image)

This component is used to direct the gases produced by an internal arc in any of the compartments towards the top of the cubicle: Disconnector compartment and circuit breaker compartment, top busbar compartment and cable compartment.

**Control compartment**

Placed at the top of the cubicle and separate from the medium voltage area, this is ready for installation of the metering equipment and protection relays. It contains the whole terminal block with the control signals already identified.

![Control compartment](image)

**Figure 1.4** Internal arc gas pressure relief duct (optional)

**Figure 1.5** Control compartment
**Driving mechanism area**

In addition to a mimic diagram customised for each type of cubicle, this has the driving elements in its middle section: disconnector/earthing switch and circuit breaker driving mechanisms, circuit breaker opening/closing pushbuttons, status indicators, groove for access of the spring loading lever, etc.

---

1. Cable compartment cover interlocking
2. Driving shaft access interlocking
3. Circuit breaker operation and indication area
4. Voltage presence - absence detector
5. Feeder disconnector operation and indication area
6. Earthing switch operation and indication area

---

1.3.1 Levers for manual operation

---

**Figure 1.6** General manual operation panel detail

**Figure 1.7** Lever for manual loading of the circuit breaker springs in cpg.1-v cubicle

**Figure 1.8** Manual operation lever of the feeder disconnectors

**Figure 1.9** Manual driving lever of the earthing switch

**Figure 1.10** Manual operation lever of the cpg.1-f cubicle
1.3.2 Main manual operation panel

**Figure 1.11** Manual operation general panel and mimic diagram for cpg.1-v1

- a. Disconnector operation and indication area
- b. Voltage presence-absence indicator
- c. Driving shaft access handle
- d. Circuit breaker operation and indication area
- e. Earthing switch operation and indication area
- f. Cable compartment cover interlocking

**Figure 1.12** Manual operation general panel and diagram for cpg.1-v2

**Figure 1.13** Manual operation general panel and mimic diagram for cpg.1-s1

**Figure 1.14** Manual operation general panel and mimic diagram for cpg.1-s2
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cpg.1-c

Figure 1.15 Manual operation general panel and mimic diagram for cpg.1-c

- a. Disconnector operation and indication area
- b. Driving shaft access handle
- c. Circuit breaker operation and indication area
- d. Earthing switch operation and indication area

Figure 1.16 Manual operation general panel and mimic diagram for cpg.1-cl

- a. Disconnector operation and indication area
- b. Driving shaft access handle
- c. Circuit breaker operation and indication area
- d. Earthing switch operation and indication area
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Figure 1.17 Manual operation general panel and mimic diagram for cpg.1-ct

Figure 1.18 Manual operation general panel and mimic diagram for cpg.1-f1

Configuration with motorised circuit breaker-disconnector driving mechanism.
Operation of the earthing switch mechanism cannot be motorised.
1.4 Name plate

Every cubicle incorporates a name plate, indicating some of the following values:

<table>
<thead>
<tr>
<th>Name plate</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nº</td>
<td>Cubicle serial number(*)</td>
</tr>
<tr>
<td>Type</td>
<td>Ormazabal cubicle system.</td>
</tr>
<tr>
<td>Designation</td>
<td>Cubicle model.</td>
</tr>
<tr>
<td>Standard</td>
<td>Regulations applied to the equipment.</td>
</tr>
<tr>
<td>Ü</td>
<td>Equipment rated voltage.</td>
</tr>
<tr>
<td>Ü</td>
<td>Lightning impulse withstand voltage.</td>
</tr>
<tr>
<td>Ü</td>
<td>Power frequency withstand voltage.</td>
</tr>
<tr>
<td>f</td>
<td>Equipment rated frequency.</td>
</tr>
<tr>
<td>I</td>
<td>Equipment rated current.</td>
</tr>
<tr>
<td>Iₗ / Iₚ</td>
<td>Short-time withstand current/Short-time withstand peak value.</td>
</tr>
<tr>
<td>Iₖ</td>
<td>Short-circuit time.</td>
</tr>
<tr>
<td>Iₚₚ</td>
<td>Rated short-circuit breaking capacity.</td>
</tr>
<tr>
<td>Pₚₚ</td>
<td>Gas pressure inside the compartment (MPa).</td>
</tr>
<tr>
<td>Pₚₚₚ</td>
<td>Minimum operation pressure (MPa).</td>
</tr>
<tr>
<td>SFₖₚ</td>
<td>Weight (g) of insulating fluid.</td>
</tr>
<tr>
<td>Year</td>
<td>Year of manufacture.</td>
</tr>
<tr>
<td>TC</td>
<td>Minimum working temperature.</td>
</tr>
<tr>
<td>DC%</td>
<td>Percentage value of the aperiodic component.</td>
</tr>
<tr>
<td>Uₙₚₚₚ</td>
<td>Driving mechanism rated supply voltage for one closing and one opening operation.</td>
</tr>
</tbody>
</table>

(*) In the case of any incidents, note down this number and report it to Ormazabal.
2 Technical characteristics

2.1 Electrical characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>cpg.1-v1/v2</th>
<th>cpg.1-s1/s2</th>
<th>cpg.1-c/d/ct</th>
<th>cpg.1-f</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>kV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated current in continuous operation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Branching</td>
<td>A</td>
<td>630 / 1250 / 1600 / 2000</td>
<td></td>
<td>200</td>
</tr>
<tr>
<td>Rated frequency</td>
<td>Hz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lightning impulse voltage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between phases and phase-to-earth</td>
<td>kV</td>
<td>125 / 170</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isolating distance</td>
<td>kV</td>
<td>145 / 195</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power frequency voltage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between phases and phase-to-earth</td>
<td>kV</td>
<td>50 / 70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isolating distance</td>
<td>kV</td>
<td>60 / 80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reclosing sequence</td>
<td></td>
<td>O-0.3 s-CO-15 s-CO</td>
<td>NO</td>
<td>O-0.3 s-CO-15 s-CO</td>
</tr>
<tr>
<td>Rated short-time current main circuit</td>
<td>kA</td>
<td>25 / 31.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated short-time current earth circuit</td>
<td>kA</td>
<td>25 / 31.5</td>
<td>1 / 3</td>
<td></td>
</tr>
<tr>
<td>Rated peak current main circuit</td>
<td>kA</td>
<td>62.5 / 80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated peak current earth circuit</td>
<td>kA</td>
<td>62.5 / 80</td>
<td>2.5 / 7.5</td>
<td></td>
</tr>
<tr>
<td>Rated short-circuit time</td>
<td>s</td>
<td>1 / 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-circuit breaking rated current</td>
<td>kA</td>
<td>25 / 31.5</td>
<td>25 / 31.5</td>
<td></td>
</tr>
<tr>
<td>Breaking rated current in short-circuit</td>
<td>kA</td>
<td>62.5 / 80</td>
<td>62.5 / 80</td>
<td></td>
</tr>
<tr>
<td>DC</td>
<td>%</td>
<td>45</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Opening time</td>
<td>ms</td>
<td>&lt; 45</td>
<td>&lt; 45</td>
<td></td>
</tr>
<tr>
<td>Short-circuit breaking time</td>
<td>ms</td>
<td>&lt; 50</td>
<td>&lt; 50</td>
<td></td>
</tr>
<tr>
<td>No-load feeder rated current</td>
<td>A</td>
<td>50</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>No-load cable rated current</td>
<td>A</td>
<td>31.5 / 50</td>
<td>31.5 / 50</td>
<td></td>
</tr>
<tr>
<td>Condenser battery rated current</td>
<td>A</td>
<td>400</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>Transfer rated current</td>
<td>A</td>
<td></td>
<td></td>
<td>800</td>
</tr>
<tr>
<td>Internal fault rated current</td>
<td>kA</td>
<td></td>
<td>31.5</td>
<td></td>
</tr>
<tr>
<td>Internal fault rated time</td>
<td>s</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Electrical endurance</td>
<td></td>
<td>E2/C2</td>
<td>E2/C2</td>
<td>E3 / C2</td>
</tr>
<tr>
<td>Auxiliary voltage</td>
<td>V_{dc}</td>
<td></td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>Motorised charging time</td>
<td>ms</td>
<td></td>
<td>&lt; 15</td>
<td>&lt; 15</td>
</tr>
<tr>
<td>Mechanical endurance</td>
<td></td>
<td>M2</td>
<td>M0</td>
<td>M2</td>
</tr>
</tbody>
</table>

Technical characteristics

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2.2 Mechanical characteristics

2.2.1 Dimensions and weights

cpg.1-v circuit breaker cubicle

![Diagram of cpg.1-v circuit breaker cubicle]

<table>
<thead>
<tr>
<th>Level</th>
<th>With single busbar cpg.1-v1</th>
<th>With double busbar cpg.1-v2</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>h</td>
<td>2500*</td>
<td>2500*</td>
</tr>
<tr>
<td>f</td>
<td>1900*</td>
<td>1900*</td>
</tr>
</tbody>
</table>

Anchors [1]

<table>
<thead>
<tr>
<th>Level</th>
<th>With single busbar cpg.1-s1</th>
<th>With double busbar cpg.1-s2</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>550</td>
<td>550</td>
</tr>
<tr>
<td>c</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>d</td>
<td>590</td>
<td>590</td>
</tr>
</tbody>
</table>

Weight [kg]

<table>
<thead>
<tr>
<th>Level</th>
<th>With single busbar cpg.1-s1</th>
<th>With double busbar cpg.1-s2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1100**</td>
<td>1400**</td>
</tr>
</tbody>
</table>

* For control compartment 480 mm high and 561 mm deep. For other control compartment measurements, check with Ormazabal.
** Cubicles with IAC classification AFLR have an additional 30 kg weight.
[1] See plan of anchoring points in section 6.5.

Figure 2.1 Dimensions of cpg.1-v cubicle

cpg.1-s disconnector cubicle

![Diagram of cpg.1-s disconnector cubicle]

<table>
<thead>
<tr>
<th>Level</th>
<th>With single busbar cpg.1-s1</th>
<th>With double busbar cpg.1-s2</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>h</td>
<td>2500*</td>
<td>2500*</td>
</tr>
<tr>
<td>f</td>
<td>1900*</td>
<td>1900*</td>
</tr>
</tbody>
</table>

Anchors [1]

<table>
<thead>
<tr>
<th>Level</th>
<th>With single busbar cpg.1-s1</th>
<th>With double busbar cpg.1-s2</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>550</td>
<td>550</td>
</tr>
<tr>
<td>c</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>d</td>
<td>590</td>
<td>590</td>
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</tbody>
</table>

Weight [kg]

<table>
<thead>
<tr>
<th>Level</th>
<th>With single busbar cpg.1-s1</th>
<th>With double busbar cpg.1-s2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1000**</td>
<td>1200**</td>
</tr>
</tbody>
</table>

* For control compartment 480 mm high and 561 mm deep. For other control compartment measurements, check with Ormazabal.
** Cubicles with IAC classification AFLR have an additional 30 kg weight.
[1] See plan of anchoring points in section 6.5.
### 2.2.2 Protection grade

All power circuit elements are installed inside a stainless steel gas tank, providing IP65 degree of protection.

The maximum degree of protection for the cubicle assembly, in all designations, is IP42.
# 3 Service conditions

<table>
<thead>
<tr>
<th>Installation</th>
<th>Indoor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum ambient temperature</td>
<td>+ 40 °C</td>
</tr>
<tr>
<td>Minimum ambient temperature</td>
<td>− 5 °C</td>
</tr>
<tr>
<td>Maximum mean ambient temperature, measured over a 24-hour period</td>
<td>+ 35 °C</td>
</tr>
<tr>
<td>Maximum mean relative humidity, measured over a 24-hour period</td>
<td>&lt; 95%</td>
</tr>
<tr>
<td>Maximum mean relative humidity, measured over a 1-month period</td>
<td>&lt; 90%</td>
</tr>
<tr>
<td>Maximum height above sea level</td>
<td>1000 m</td>
</tr>
<tr>
<td>Solar radiation</td>
<td>Negligible</td>
</tr>
<tr>
<td>Ambient air pollution (dust, smoke, corrosive and/or flammable gases, vapours or salt)</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Vibrations caused by causes external to the switchgear or by seismic movements</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

The specifications refer to the section "Normal service conditions for indoor cubicles" in the IEC 62271-1 standard "Common specifications for high voltage cubicle standards". For special service conditions: ambient temperature above + 40 °C, installation and/or transport over 1000 m above sea level, significant pollution level, or others different to those described, check with Ormaezabal.
4 Handling and transport

4.1 Transport conditions

During transport, the switchgear must be perfectly seated and fixed so that it cannot move about and possibly damage the equipment. Always in upright position, directly on the ground or on a pallet, depending on the type of handling involved. Check that the switchgear is perfectly balanced at all times.

4.2 Lifting means

The cubicles must always be kept upright, directly on the ground or on a pallet depending on the type of handling involved.

The cpg.1 cubicles are fitted with four eyebolt-type suspension points which can be used for handling the cubicles with a crane; to do this, four slings or cloth straps are used capable of carrying at least 2500 kg.

Check that the cubicle is perfectly balanced at all times.

Once the cubicle has been sited as close as possible to its final installation position, remove all four suspension points from the cubicle.

If a forklift truck is available, this should have a fork at least 2 m long and be capable of carrying at least 2500 kg.

The cubicle should always be loaded onto the forklift truck from the front, as indicated in figure 4.2.

---

**Figure 4.1** Lifting a cpg.1 cubicle using slings

**Figure 4.2** Lifting a cpg.1 cubicle by forklift truck
To put the cubicles in their final position, elevating caster wheels can be used; please check with Ormazabal.

**Figure 4.3**  Wheel anchors in the cubicle

**Figure 4.4**  Detail of the positioned wheel
5 Storage conditions

If it needs to be stored, the equipment must be placed on dry ground or on top of damp-proof insulating material, still in its original packaging.

After prolonged storage, clean all the insulating parts carefully before commissioning the equipment. The enclosure should be cleaned with a clean, dry lint-free cloth.

Figure 5.1 Storage conditions detail

Storage must always be INDOORS, with the following conditions recommended:

1. Ambient air temperature should not exceed 40 ºC and its mean value, measured in a period of 24 hours, should not exceed 35 ºC.

2. The ambient air temperature should not drop below -5 ºC.

3. The switchgear must be protected from direct solar radiation.

4. Maximum altitude is 1000 m.

5. The environmental air must not have any significant contamination from dust, smoke, corrosive and/or inflammable gases, vapours or salt.

6. The switchgear must be protected from the rain, and the humidity conditions should be as follows:
   a) The mean relative humidity value, measured over a period of 24 hours, must not exceed 95%.
   b) The mean water steam pressure value, measured in a period of 24 hours, must not exceed 2.2 kPa.
   c) The mean relative humidity value, measured over a period of one month, must not exceed 90%.
   d) The mean water steam pressure value, measured in a period of one month, must not exceed 1.8 kPa.

7. During transport, vibrations caused by external factors or seismic movements must be insignificant.

Any other conditions must be notified beforehand, since the equipment must be factory-adjusted to the atmospheric pressure at the final destination or during transport. Otherwise, the pressure switch may indicate an incorrect value, even if the equipment’s internal gas pressure is correct.
6 Installation

6.1 Unpacking the equipment

The switchgear cpg.1 is supplied protected with a plastic cover.

On receiving the equipment, check that the goods supplied correspond to the order and associated documentation. If this is not the case, contact Ormazabal immediately.

The disassembly process for the equipment is as follows:

1. Using a blade, cutter or similar tool, cut the cellophane the cubicle is wrapped in.
2. Remove the cellophane.
3. Detach the white polystyrene corner pieces.
4. Unscrew the fixings between the base and the pallet.
5. Dispose of any waste in an environmentally-friendly manner.

It is advisable to make a visual inspection of the equipment to check whether it has suffered any damage in transit. If damaged, contact Ormazabal immediately.

6.2 List of supplied materials

Along with the switchgear cpg.1 a box is supplied with all the material necessary for installation and correct operation.

<table>
<thead>
<tr>
<th>Description</th>
<th>Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating levers</td>
<td></td>
</tr>
<tr>
<td>Connecting terminals</td>
<td></td>
</tr>
<tr>
<td>T terminal</td>
<td></td>
</tr>
<tr>
<td>X-terminal</td>
<td></td>
</tr>
<tr>
<td>Toroidal current transformer support + segregation</td>
<td></td>
</tr>
<tr>
<td>Bottom segregation</td>
<td></td>
</tr>
<tr>
<td>Earth plates</td>
<td></td>
</tr>
<tr>
<td>Bottom segregation plate</td>
<td></td>
</tr>
<tr>
<td>Right end plate</td>
<td></td>
</tr>
<tr>
<td>Top and bottom connection plate</td>
<td></td>
</tr>
<tr>
<td>Horizontal plate</td>
<td></td>
</tr>
<tr>
<td>Vertical plate</td>
<td></td>
</tr>
<tr>
<td>Decorative sides</td>
<td></td>
</tr>
<tr>
<td>Double busbar</td>
<td></td>
</tr>
<tr>
<td>High enclosure for busbar 2000 A</td>
<td></td>
</tr>
<tr>
<td>Single busbar with internal arc in busbar compartment</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Figure</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>Busbar enclosure</td>
<td></td>
</tr>
<tr>
<td>High enclosure with common voltage transformer</td>
<td></td>
</tr>
<tr>
<td>Single and double busbar without internal arc in busbar compartment</td>
<td></td>
</tr>
<tr>
<td>Busbar enclosure with voltage transformer</td>
<td></td>
</tr>
<tr>
<td>Voltage transformer support for busbar enclosure without internal arc 2000 A</td>
<td></td>
</tr>
<tr>
<td><strong>NUTS AND BOLTS</strong></td>
<td></td>
</tr>
<tr>
<td>M8x20 screw with captive washer (60 per cubicle)</td>
<td></td>
</tr>
<tr>
<td>M8x30 screw with captive washer (10 per cubicle)</td>
<td></td>
</tr>
<tr>
<td>M8 nut with captive washer (60 per cubicle)</td>
<td></td>
</tr>
<tr>
<td>M8x20 black Allen screw (30 per cubicle)</td>
<td></td>
</tr>
<tr>
<td>M10x30 screw (2 per cubicle)</td>
<td></td>
</tr>
<tr>
<td>M10 Flat washer (double) (4 per cubicle)</td>
<td></td>
</tr>
<tr>
<td>M10 Grower washer (2 per cubicle)</td>
<td></td>
</tr>
<tr>
<td>M10 nut (2 per cubicle)</td>
<td></td>
</tr>
<tr>
<td>Plugs, diameter 10 (4 per cubicle)</td>
<td></td>
</tr>
<tr>
<td>M8 lag screws (4 per cubicle)</td>
<td></td>
</tr>
<tr>
<td>Cages (30 per final cubicle)</td>
<td></td>
</tr>
<tr>
<td>Recessed head M8x20 screw (with voltage transformer in busbars)</td>
<td></td>
</tr>
<tr>
<td>Lag screw M6x30 (4 lever support)</td>
<td></td>
</tr>
<tr>
<td>M8 wall plug (4 lever support)</td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td></td>
</tr>
<tr>
<td>Paper roll</td>
<td></td>
</tr>
<tr>
<td>interconnections</td>
<td></td>
</tr>
<tr>
<td>ICO support</td>
<td></td>
</tr>
<tr>
<td>Voltage transformer in busbars</td>
<td></td>
</tr>
<tr>
<td>Homopolar transformers</td>
<td></td>
</tr>
<tr>
<td>Metal plates for voltage transformer support</td>
<td></td>
</tr>
<tr>
<td>Voltage transformer shafts</td>
<td></td>
</tr>
<tr>
<td>Earth cables</td>
<td></td>
</tr>
<tr>
<td>Cable for voltage transformer</td>
<td></td>
</tr>
<tr>
<td>Ferrules</td>
<td></td>
</tr>
<tr>
<td>Bottom segregation for transverse busbar coupling</td>
<td></td>
</tr>
<tr>
<td>Dry cable terminals</td>
<td></td>
</tr>
<tr>
<td>Fuses</td>
<td></td>
</tr>
<tr>
<td>Spares</td>
<td></td>
</tr>
<tr>
<td>List of miscellaneous material</td>
<td></td>
</tr>
<tr>
<td>Work documentation</td>
<td></td>
</tr>
<tr>
<td>Adapter for voltage transformers</td>
<td><img src="image-url" alt="Diagram" /></td>
</tr>
<tr>
<td>Description</td>
<td>Figure</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------</td>
</tr>
<tr>
<td>Bottom segregation</td>
<td></td>
</tr>
</tbody>
</table>
### General instructions

**cpg.1**

Fully SF6 gas insulated single and double busbar GIS switchgears up to 36 kV in accordance with IEC Standards

<table>
<thead>
<tr>
<th>Description</th>
<th>Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom segregation</td>
<td><img src="image1.png" alt="Bottom segregation" /></td>
</tr>
<tr>
<td>Left busbar enclosure</td>
<td><img src="image2.png" alt="Left busbar enclosure" /></td>
</tr>
</tbody>
</table>
**Installation**

Fully SF6 gas insulated single and double busbar GIS switchgears up to 36 kV in accordance with IEC Standards

<table>
<thead>
<tr>
<th>Description</th>
<th>Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left busbar enclosure</td>
<td>![Left busbar enclosure Image]</td>
</tr>
<tr>
<td>Right busbar enclosure</td>
<td>![Right busbar enclosure Image]</td>
</tr>
</tbody>
</table>
### General instructions

**cpg.1**

Fully SF6 gas insulated single and double busbar GIS switchgears up to 36 kV in accordance with IEC Standards

<table>
<thead>
<tr>
<th>Description</th>
<th>Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right busbar enclosure</td>
<td><img src="image1" alt="Right busbar enclosure" /></td>
</tr>
<tr>
<td>Central busbar enclosure</td>
<td><img src="image2" alt="Central busbar enclosure" /></td>
</tr>
<tr>
<td>Description</td>
<td>Figure</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>High enclosure with voltage transformer</td>
<td><img src="image" alt="High enclosure with voltage transformer" /></td>
</tr>
</tbody>
</table>
### General instructions

**cpg.1**

Fully SF6 gas insulated single and double busbar GIS switchgears up to 36 kV in accordance with IEC Standards

<table>
<thead>
<tr>
<th>Description</th>
<th>Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>High busbar enclosure</td>
<td><img src="image1" alt="Diagram of High Busbar Enclosure" /></td>
</tr>
</tbody>
</table>
6.3 Minimum installation distances

The minimum distances to the walls and ceiling, in accordance with Standard IEC-62271-200 Annex AA, are as follows:

<table>
<thead>
<tr>
<th>Minimum distances [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side wall (a)</td>
</tr>
<tr>
<td>Ceiling (b)</td>
</tr>
<tr>
<td>Front clearance (c)</td>
</tr>
<tr>
<td>Operation:</td>
</tr>
<tr>
<td>Cubicle removal:</td>
</tr>
<tr>
<td>Rear wall (d)</td>
</tr>
<tr>
<td>&gt; 100</td>
</tr>
<tr>
<td>&gt; 600</td>
</tr>
<tr>
<td>&gt; 1000</td>
</tr>
<tr>
<td>&gt; 2000</td>
</tr>
<tr>
<td>&gt; 100</td>
</tr>
</tbody>
</table>

For other types of building work, please check with Ormaebal.

6.4 Cable trench

Minimum recommended dimensions based on the trench dimensions used in the tests in accordance with IEC 62271-200. The dimensions of the trench may vary in accordance with the minimum radius of curvature of the cables used.

<table>
<thead>
<tr>
<th>Trench</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (e)</td>
</tr>
<tr>
<td>Depth (f)</td>
</tr>
<tr>
<td>&gt; 600</td>
</tr>
<tr>
<td>950</td>
</tr>
</tbody>
</table>

The surface where the cubicles are to be installed must be levelled with a tolerance of +/- 1 millimetre per metre. The general layout of the cubicles should be checked in order to verify the suitability of the medium and low voltage cable area.
6.5 Fastening to the floor

Secure the cubicles to the floor at the relevant fixing points inside the bottom supports using the M8x50 hexagonal screws provided with the material.

Figure 6.5 Fixing points inside the cable compartment
6.6 Cubicle joints

Join the cubicles through the fixing points; use the M8x20 hexagonal screws and M8 nuts provided with the different material.

Figure 6.6 Hexagonal screw and nut detail

Figure 6.7 Detail of the positioned screw

6.6.1 cpg.1-v

The fixing points for circuit breaker cubicles are defined in Figure 6.9:

Figure 6.8 Detail of the nut

Figure 6.9 Fastening points for the circuit breaker cubicle
The fixing points for disconnector cubicles are defined in Figure 6.10:

![Figure 6.10 Fastening points for the disconnector cubicle](image1)

The fixing points for busbar coupling cubicles are defined in Figure 6.11:

![Figure 6.11 Fastening points for transverse and longitudinal busbar coupling cubicles](image2)
6.6.4 cpg.1-f

The fixing points for protection with fuse cubicles are defined in Figure 6.12:

Figure 6.12  Fastening points for the protection with fuse cubicle

6.7 Equipment earthing

The cubicles earthing joint consists of three zones: top, bottom and top with bottom link.

6.7.1 Top section

The top area has copper plates when the busbar enclosure has protection for internal arc or voltage transformers in busbars.

Figure 6.13  Horizontal earthing bar
6.7.2 Bottom section

The bottom part is always connected to a copper bar.

![Horizontal earthing bar](image)

Figure 6.14  Horizontal earthing bar

![Bottom earthing bar detail](image)

Figure 6.15  Bottom earthing bar detail

- a. Earth bars between cubicles.
- b. 24 kV - 630 A cubicle joint to the other cubicles earth plates.
- c. 24 kV - 630 A cubicles joint with busbar coupling cubicle earth braid.

Figure 6.16  Earth plates for bottom section

6.7.3 Top and bottom earth side link

The link from the top to bottom sections is on the left by design.

![Side earth link detail](image)

Figure 6.17  Side earth link detail
7 Operations sequence

The order in which steps should be followed when performing any type of operation is the same for both automated operation and manual operation.

Pushbuttons are used for automated operation, whereas manual operation is performed by means of the corresponding driving levers.

7.1 cpg.1-v1 cubicle

Figure 7.1 Initial situation of the cpg.1-v1 cubicle

For safety reasons, maintenance operations performed directly on the driving mechanism must be performed WITHOUT any driving lever inserted.
7.1.1 Commissioning from open position

Initial conditions: Circuit breaker open, feeder disconnector open and earthing switch open.

1. Connect the feeder disconnector by turning the lever clockwise.

2. Then close the circuit breaker by acting on the “I” top pushbutton.

To remove from service, proceed in reverse order using the “0” pushbutton.
7.1.1 Medium voltage cable earthing

Initial conditions: Circuit breaker open, feeder disconnector open and earthing switch open.

1. Connect the earthing switch\(^{(1)}\) by turning the lever clockwise.

2. The circuit breaker closes instantaneously on removal of the driving lever.

\(^{(1)}\)If all the switchgear elements are motorised, the earthing switch and circuit breaker closing operations are performed consecutively as programmed from the automated operation panel.

To open the medium voltage cable earthing, earth connection, reverse the sequence of operation. Act on the “0” pushbutton to open the circuit breaker.

The circuit breaker opening operation is always performed manually.
7.2 cpg.1-v2 cubicle

![Figure 7.6 Initial situation of the cpg.1-v2 cubicle](image)

### Commissioning from open position

**Initial conditions:** circuit breaker open, main feeder disconnector closed, secondary feeder disconnector open and earthing switch open.

1. Connect the required feeder disconnector by turning the lever clockwise.

2. Then close the circuit breaker by acting on the "I" top pushbutton.

![Figure 7.7 Lever turn detail](image)

To remove from service, proceed in reverse order using the "0" opening pushbutton.

![Figure 7.8 "I" top pushbutton detail](image)
7.2.2 Medium voltage cable earthing

Initial conditions: Circuit breaker open, feeder disconnectors open and earthing switch open.

1. Connect the earthing switch\(^{(1)}\) by turning the lever clockwise.

2. The circuit breaker closes instantaneously on removal of the driving lever.

\(^{(1)}\)If all the switchgear elements are motorised, the earthing switch and circuit breaker closing operations are performed consecutively as programmed from the automated operation panel.

To open the medium voltage cable earthing, earth connection, reverse the sequence of operation. Act on the “0” pushbutton to open the circuit breaker.

The circuit breaker opening operation is always performed manually.

7.2.3 Replacing a busbar

Busbar change is automated.

\(\)
1. Close the feeder disconnectors, as indicated in section 7.4.1.

2. Then connect the feeder disconnector of the corresponding circuit breaker position.

3. Close the other feeder disconnector.

4. Finally, open the busbar coupling in reverse order to that shown in section 7.4.1.

The feeder input circuit breaker cubicles are interlocked with the busbar coupling cubicle so that the busbar replacement operation is only possible if the busbar coupling cubicle is in closed position.
7.3 **cpg.1-s1 cubicle**

![Diagram](image)

**Figure 7.16** Initial situation for **cpg.1-s1 cubicle**

### 7.3.1 Connection

**Initial conditions:** feeder disconnector open and earthing switch open.

To put the equipment out of commission, reverse the sequence of operation.

1. Connect the feeder disconnector by turning the lever clockwise.

![Diagram](image)

**Figure 7.17** Lever turn detail
7.3.2 Earthing

**Initial conditions:** feeder disconnector open and earthing switch open.

1. Connect the earthing switch by turning the lever clockwise.

To open the earthing switch, proceed in reverse order.

### cpg.1-s2 cubicle

![Figure 7.20 Initial situation for cpg.1-s2 cubicle](image)
7.4.1 Connection

1. Connect the right feeder disconnector by turning the lever clockwise.

2. Then connect the left feeder disconnector by turning the lever clockwise.

7.4.2 Earthing

1. Connect the right earthing switch by turning the lever clockwise.

Initial conditions: feeder disconnectors open and earthing switches open.

To put the equipment out of commission, reverse the sequence of operation.
2. Then connect the left earthing switch by turning the lever clockwise.

![Figure 7.25 Lever turn detail](image)

---

To open the earthing switches, proceed in reverse order.

7.5 **cpg.1-c cubicle**

![Figure 7.26 Initial situation for cpg.1-c cubicle](image)
7.5.1 Busbar coupling

**Initial conditions:** feeder disconnectors open, earthing switches open and circuit breaker open.

1. Connect the right feeder disconnector by turning the lever clockwise.

2. Then connect the left feeder disconnector by turning the lever clockwise.

3. Finally, close the circuit breaker by acting on the top pushbutton.

To uncouple the busbars, reverse the sequence of operation. Act on the bottom pushbutton to open the circuit breaker.
7.5.2 Busbar earthing on the right

Initial conditions: feeder disconnectors open, earthing switches open and circuit breaker open.

1. First connect the right feeder disconnector by turning the lever clockwise.

2. Next, close the left-hand earthing switch.

3. The circuit breaker closes instantaneously on removal of the driving lever once the operation is complete.

To open the earthing connection, proceed in reverse order. Act on the bottom pushbutton to open the circuit breaker.

The circuit breaker opening operation is always performed manually.
7.5.3 **Busbar earthing on the left**

**Initial conditions:** feeder disconnectors open, earthing switches open and circuit breaker open.

1. First connect the left feeder disconnecter by turning the lever clockwise.

![Figure 7.33 Lever turn detail](image1)

2. Then connect the right earthing switch by turning the lever clockwise.

![Figure 7.34 Lever turn detail](image2)

3. The circuit breaker closes instantaneously on removal of the driving lever once the operation is complete.

![Figure 7.35 Circuit breaker closed detail](image3)

To open the earthing connection, proceed in reverse order. Act on the bottom pushbutton to open the circuit breaker.

The circuit breaker opening operation is always performed manually.
7.6 **cpg.1-cl cubicle**

**7.6.1 Busbar coupling**

1. Connect the central feeder disconnectors by turning the lever clockwise in each case.

2. Then connect the side feeder disconnectors by turning the lever clockwise in each case.

*Initial conditions*: feeder disconnectors open, earthing switches open and circuit breakers open.
3. Finally, close the two circuit breakers by acting on the top pushbutton.

Figure 7.39  Top pushbutton detail

7.6.2 Busbar earthing on the right

Initial conditions: feeder disconnectors open, earthing switches open and circuit breakers open.

1. First connect the central - left feeder disconnector by turning the lever clockwise.

Figure 7.40  Lever turn detail

2. Then connect the right feeder disconnector by turning the lever clockwise.

Figure 7.41  Lever turn detail
3. Connect the left earthing switch by turning the lever clockwise.

4. The left-hand circuit breaker closes instantaneously on removal of the driving lever.

5. Finally, connect the central - right earthing switch by turning the lever clockwise.

6. The right-hand circuit breaker closes instantaneously on removal of the driving lever.

To open the earthing connection, reverse the sequence of operation. Act on the bottom pushbutton to open the circuit breaker.

The circuit breaker opening operation is always performed manually.
7.6.3 Busbar earthing on the left:

1. First connect the central - right feeder disconnector by turning the lever clockwise.

2. Then connect the left feeder disconnector by turning the lever clockwise.

3. Connect the central – left earthing switch by turning the lever clockwise.

4. The left-hand circuit breaker closes instantaneously on removal of the driving lever.
5. Finally, connect the right earthing switch by turning the lever clockwise.

6. The right-hand circuit breaker closes instantaneously on removal of the driving lever.

---

To open the earthing connection, reverse the sequence of operation. To open the circuit breakers, act on the corresponding bottom pushbutton.

The circuit breaker opening operation is always performed manually.

---

7.7 cpg.1-ct cubicle

---

Figure 7.50 Lever turn detail

Figure 7.51 Circuit breaker closed detail

Figure 7.52 Initial situation for cpg.1-ct cubicle
7.7.1 Busbar connection

**Initial conditions:** feeder disconnectors open, earthing switches open and circuit breaker open.

1. Connect the right feeder disconnector by turning the lever clockwise.

2. Then connect the left feeder disconnector by turning the lever clockwise.

3. Finally, close the circuit breaker by acting on the top pushbutton.

To release the busbars, reverse the sequence of operation. Act on the bottom pushbutton to open the circuit breaker.
### 7.7.2 Main busbar earthing

**Initial conditions:** feeder disconnectors open, earthing switches open and circuit breaker open.

1. First connect the left feeder disconnector by turning the lever clockwise.

   ![Figure 7.56 Lever turn detail](image)

2. Then connect the right earthing switch by turning the lever clockwise.

   ![Figure 7.57 Lever turn detail](image)

3. The circuit breaker closes instantaneously on removal of the driving lever.

   ![Figure 7.58 Circuit breaker closed detail](image)

To open the earthing connection, earth connection, reverse the sequence of operation: first, open the circuit breaker by acting on the bottom pushbutton, then the earthing switches and lastly open the feeder disconnectors.

The circuit breaker opening operation is always performed manually.
7.7.3 Secondary busbar earthing

**Initial conditions:** feeder disconnectors open, earthing switches open and circuit breaker open.

1. First, close the right-hand feeder disconnector.

2. Next, close the left-hand earthing switch.

3. The circuit breaker closes instantaneously on removal of the driving lever.

To open the earthing connection, reverse the sequence of operation: first disconnect the circuit breaker by acting on the bottom pushbutton, then the earthing switches, and finally disconnect the feeder disconnectors.

The circuit breaker opening operation is always performed manually.
7.8  cpg.1-f1 cubicle

Figure 7.62  Initial situation for cpg.1-f1 cubicle

7.8.1  Commissioning the cubicle

Initial conditions: switch-disconnector open and earthing switch open.

1. Connect the circuit breaker - disconnector by turning the lever clockwise.

2. Check the change of status of the circuit breaker - disconnector position indicator.

Figure 7.64  Switch - disconnector closed detail

To put the equipment out of commission, reverse the sequence of operation.
7.8.2 Earthing

Initial conditions: switch-disconnector closed and earthing switch open.

1. Disconnect the main switch - disconnector.
2. Connect the earthing switch by turning the lever clockwise.

To open the earthing connection, proceed in reverse order.

7.9 cpg.1-f2 cubicle

Figure 7.65 Lever turn detail

Figure 7.66 Initial situation for cpg.1-f2 cubicle
7.9.1 Commissioning the cubicle

**Initial conditions:** feeder disconnectors open, circuit breaker - disconnector open, earthing switch open.

1. Connect the required feeder disconnector by turning the lever clockwise.

2. Then connect the circuit breaker - disconnector by turning the lever clockwise.

![Figure 7.67 Lever turn detail](image)

7.9.2 Earthing

**Initial conditions:** right feeder disconnectors closed, circuit breaker - disconnector closed, earthing switch open.

1. Disconnect the circuit breaker - disconnector by turning the lever anticlockwise.

![Figure 7.69 Lever turn detail](image)

To put the equipment out of commission, reverse the sequence of operation.
Operations sequence

2. Then disconnect the corresponding feeder disconnector by turning the lever anticlockwise.

3. Finally, close the earthing switch by turning the lever clockwise.

7.10 Fuse replacement sequence in cpg.1-f

Since this is a switch-fuse combination cubicle, any of the three fuses blowing causes the switch-disconnector to open automatically.

When a fuse blows, this is indicated unequivocally by the red indicator which appears on the front of the operation panel.

1. To access the fuses, close the earthing switch and, once you have removed the medium voltage cables and fuse access cover and identified the blown fuse (the striker will be in the up position), turn the handle of the corresponding fuse holder cover upwards until the locking clip is unhooked and then pull sharply outwards.
2. Remove the fuse holder carriage.

![Figure 7.74 Removing the fuse holder in cpg.1-f](image)

3. Replace the blown fuse.

   It is advisable to change all 3 fuses, even if only one of them appears to be damaged.

   ![Figure 7.75 Replacing the medium voltage fuse](image)

4. Insert the fuse holder carriage.

   Before inserting the fuse holder carriage, it is important to ensure that both the carriage and the inside of the fuse holder are properly clean.

   ![Figure 7.76 Inserting the fuse carriage in cpg.1-f](image)

5. Before closing the cover, press downwards to reset the striker.

   ![Figure 7.77 Resetting the striker in the fuse holder cover in cpg.1-f](image)

6. To close the cover, first make sure that the clip is correctly engaged, and then turn the handle down into its vertical position.

   ![Figure 7.78 Fuse holder end in cpg.1-f](image)
7.10.1 Selection of fuses recommended for cpg.1-f

The rated current of the fuses recommended for use in the cpg.1-f cubicle are defined according to tests carried out by the manufacturers. The following table shows the recommended fuse ratings according to the \( \frac{U_r}{P_{\text{transf}}} \) ratio:

<table>
<thead>
<tr>
<th>( U_r ) (Network) (kV)</th>
<th>( U_r ) (Cubicle) (kV)</th>
<th>Transformer power (kVA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>10</td>
<td>24</td>
<td>16</td>
</tr>
<tr>
<td>13.8</td>
<td>24</td>
<td>16</td>
</tr>
<tr>
<td>15</td>
<td>24</td>
<td>16</td>
</tr>
<tr>
<td>20</td>
<td>24</td>
<td>16</td>
</tr>
<tr>
<td>25</td>
<td>36</td>
<td>16</td>
</tr>
<tr>
<td>30</td>
<td>36</td>
<td>16</td>
</tr>
</tbody>
</table>

**General operating conditions:**
Overload < 20% and Temperature < 40 °C

**Shaded areas:**
Overload < 30% and Temperature < 50 °C

**Maximum permitted power loss for a fuse:**
< 75 W (55 W for \( U_r = 10 \) kV)

**Transfer currents according to IEC 62271-105**

The transfer currents have been tested in accordance with the following parameters:

<table>
<thead>
<tr>
<th>( U_r ) Fuse (kV)</th>
<th>( U_r ) Cubicle (kV)</th>
<th>( I_r ) Fuse (A)</th>
<th>( I_{\text{transfer}} ) (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>24</td>
<td>63</td>
<td>800</td>
</tr>
<tr>
<td>36</td>
<td>36</td>
<td>40</td>
<td>800</td>
</tr>
</tbody>
</table>
8 Safety elements

8.1 Maintenance

For safety reasons, maintenance operations performed directly on the driving mechanism must be performed WITHOUT any driving levers inserted.

The active parts of the driving devices and main circuit of cpg.1 cubicles do not require inspection or maintenance, thanks to the integrated SF₆ insulation, meaning there is no influence from external environmental factors. Class E2 electrical endurance tests mean there is no restriction on maintenance of the breaking components.

The operating mechanism for the cpg.1 system cubicles driving devices does not require lubrication for correct operation throughout its estimated lifetime, according to the service conditions specified in IEC 62271-1.

These mechanisms must be inspected when used under extreme conditions (dust, salt, pollution). It is advisable to carry out at least one operation during the inspections.

Components manufactured from galvanised sheet steel have been painted to ensure their resistance to corrosion. Any scratches, dents or similar on them must be repaired to prevent corrosion.

8.2 Voltage presence detectors

The voltage presence/absence indicator installed in cpg.1 cubicles is designed and built in accordance with the recommendations laid down in standards IEC 61243-5, VDE 0682 Part 415 and IEC 62271-206, within the integrated detectors without auxiliary power supply category.

The device indication complies with the requirements laid down in standard IEC 61243-5:

<table>
<thead>
<tr>
<th>Absence of voltage</th>
<th>Uncertainty</th>
<th>Presence of voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>U &lt; 10% Uᵣ</td>
<td>10% &lt; Uᵣ &lt; 45%</td>
<td>U &gt; 45% Uᵣ</td>
</tr>
</tbody>
</table>

*Uᵣ, rated operating voltage. U, phase-to-earth voltage.

The presence of voltage is indicated by activation of the LEDs for each of the phases. If the presence of voltage is not detected, the LEDs for each of the phases remain unlit.

The unit has three light signals corresponding to phases L1, L2 and L3. On the front of the indicator, a test point is accessible for each of the phases and earth, which is used to test the balance of all phases. We recommend use of any universal phase comparator which complies with standard IEC 61243-5.

As an option, the unit has a free auxiliary contact for remote indication of voltage presence/absence.

![Figure 8.1 Voltage presence-absence indicator](image-url)
8.2.1 Locking with a padlock

The cubicles are supplied with an independent padlock for both the switch-disconnector and the earthing switch in closed or open positions. Padlocks with ring diameters of between 8 and 11 mm can be used.

8.2.1 Locking with lock

Both the switch-disconnector and the earthing switches can have an optional lock interlocking device, which allows its operation to be blocked in both open and closed positions.

8.3 Interlocks

The switch, circuit breaker and earthing switch are interlocked in accordance with section 5.11 of standard IEC 62271-200.

The disconnector driving shafts are accessed via a "driving switch", and the levers of both disconnectors can only be introduced if the circuit breaker is in open position. The circuit breaker can only be operated if all the disconnector driving levers have previously been removed. Also, all electrical operations are overridden if any of the levers has been inserted in the actuation shaft.

The circuit breaker can only be connected in the end positions (connected) of the disconnector or earthing switch. There is also an effective earth driving switch fitted with protection.

The cable compartment is only accessible with the earthing switch and the circuit breaker connected (effective earthing).

In functional units which incorporate fuses (protection by means of a switch-fuse combination and busbar voltage metering with disconnection and fuses), access to the fuse compartment is interlocked with the corresponding disconnector so that the compartment is only accessible with the earthing switch in the closed position.

Other available options are:

- Earthing switch electromagnetic interlock.
- Locking with interlocks for:
  Earthing switch in closed position.
  Earthing switch in open position.
  Disconnector in open position.
9 Spares and accessories

Although the cubicles have been designed for a service life in accordance with IEC 62271-200, certain components can be replaced and installed for various reasons.

If any of the stated auxiliary components need to be changed, the corresponding spare parts kit must be ordered, and the instructions given in the corresponding documentation must be followed.

Certain spares and accessories must be installed in the cubicle by specialised personnel. Please check with Ormazabal.

9.1 Preventive maintenance for the cpg.1 cubicle

The driving mechanisms and other elements outside the gas tank may require preventive maintenance; the frequency of this maintenance depends on the existing environmental conditions (harsh environments, dust, extreme temperatures, etc.) and must be established in line with the experience and responsibility of the installer.

Maintenance should be carried out every 5 years or 2000 operating cycles, unless, based on the conditions of use, the user, together with Ormazabal, considers otherwise.
10 Environmental information

10.1 Sulphur Hexafluoride SF₆

The cubicles of the cpg.1 system are designed as a hermetically sealed pressure system containing sulphur hexafluoride (SF₆). SF₆ is included in the Kyoto Protocol list of greenhouse gases. SF₆ has a GWP (Global Warming Potential) of 22 200 units. (TAR, IPCC 2001).

At the end of the product's life, the SF₆ contained in it must be recovered for processing and recycling, to prevent it being released into the atmosphere. Extracting and handling of SF₆ must be carried out by qualified personnel, using a sealed piercing system.

For the usage and handling of the SF₆, the indications listed in IEC 62271-303 must be followed.

10.2 Recyclability

The management and treatment of the rest of materials must be carried out in accordance with the country's current legislation.

The materials that make up the cubicle (bases and front, gas tank, switch-disconnector/earthing switch and driving mechanisms) can be recycled. For further information, please contact Ormazabal.

The bushings contain copper components which are difficult to separate from the resin. Therefore, these are treated as inert industrial waste together with the plastics. SF₆ gas is not considered as waste, however Ormazabal extracts the SF₆ from the cubicles at the end of their service life, sends it for analysis and re-uses it if it retains its defined characteristics.