1 INTRODUCTION

The Q CELLS Q.FLAT-G5 flat roof system (also referred to as “Q.FLAT-G5”) enables solar energy to be directly converted into electrical energy in an environmentally friendly manner. In order to utilise the full performance of the Q.FLAT-G5, please read the following manual carefully and follow the instructions contained therein. Failure to do so may result in personal injury and property damage as well as loss of output.

Symbols
Throughout this installation manual, symbols are used for the purpose of quick and easy comprehension.

Intended use
The Q.FLAT-G5 flat roof system is only permitted for use on flat roofs with an inclination of 0°-5° and a maximum roof height of 38 m.
- The Q.FLAT-G5 is only suitable for use with solar modules that have been expressly approved by the manufacturer.
- If installation or operation of the Q.FLAT-G5 is not in accordance with the requirements described in this installation and operation manual, please contact Hanwha Q CELLS GmbH or one of its certified contractual partners.

DANGER!
Danger to life due to electric shock!
- Use of the Q.FLAT-G5 in a manner that is not authorised by Hanwha Q CELLS GmbH, in particular the use of solar modules that are not expressly approved, may lead to personal injury, property damage and loss of output.

Safety regulations
The operator of the Q.FLAT-G5 is responsible for compliance with all relevant regulations and guidelines. The operator is responsible for checking the load-bearing capacity and ballast on the roof.

WARNING!
Danger of falling due to unsecured roof access!
- Never enter the installation area alone or when unsecured.
- The Q.FLAT-G5 may only be commissioned, operated and maintained in accordance with the following documents, regulations and standards:
  - Installation and operation manual for solar modules from Hanwha Q CELLS GmbH and their safety regulations
  - Country-specific regulations on occupational health & safety, dangerous goods and environmental protection
  - System-specific provisions and requirements
  - Valid country-specific laws, regulations and rules for the planning, installation and operation of solar power systems and work on roofs
  - Valid international, national and regional regulations, in particular those governing the installation of electrical equipment and installations, working with direct current, and regulations governing the parallel operation of solar power systems issued by the relevant power supply company
  - Accident prevention regulations
  - Regulations issued by the German construction trade association (“Bau-Berufsgenossenschaft”)
Personnel qualifications
The installer and operator are responsible for ensuring that the installation, commissioning, operation, maintenance, dismantling and recycling of the Q.FLAT-G5 system and/or its components are performed exclusively by qualified and trained personnel with a recognised training certificate (by a national or federal organisation) for the relevant technical field. All electrical work may only be carried out by an officially certified expert in accordance with the applicable DIN standards, VDE regulations, accident prevention regulation and regulations of the local electricity supply companies (ESC).

DANGER!
Danger to life due to electric shock!

- The Q.FLAT-G5 comprises a flat roof substructure (metal frame) and solar modules. The solar modules are interconnected to form an electrical system.
- The erection of electrical installations as well as any subsequent work on electrical installations may only be carried out in accordance with the applicable regulations and standards, in particular the relevant DIN standards, VDE regulations, accident prevention regulations and the regulations issued by the local electricity supply companies (ESC), and may only be carried out by sufficiently qualified personnel.
- Before installing and commissioning the Q.FLAT-G5, information about the applicable guidelines and regulatory requirements must be obtained from the relevant authorities and the ESC.

Validy
This manual is only valid for products manufactured by the company Hanwha Q CELLS GmbH. Hanwha Q CELLS GmbH accepts no liability for damages resulting from failure to comply with the instructions it contains.
- It is also important to observe the instruction manuals for the other components that may form part of the overall solar system. If necessary, structural analyses must be created for the entire project.
- If you have any questions that are not answered within the scope of this manual, please direct them to your designated contact partner.

For further information, please visit our website at www.q-cells.com.

Information for the operator
- Register your Q.FLAT-G5 immediately (https://www.q-cells.co.uk/ under the heading “Service & Support / System Registration”). This is the only way to obtain the full range of services under our warranty regulations.
- Please report warranty claims to our Customer Service department at service@q-cells.com.
- Keep the instruction manual safe over the course the solar system’s operating life.

Applicable documents
This installation manual is only valid in conjunction with the following technical information:

<table>
<thead>
<tr>
<th>DOCUMENT TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product data sheet for solar modules</td>
</tr>
<tr>
<td>Packaging and transport information</td>
</tr>
<tr>
<td>Static friction report</td>
</tr>
<tr>
<td>Dimensional report</td>
</tr>
<tr>
<td>Project report of the Q CELLS ROOFTOP PLANNER</td>
</tr>
</tbody>
</table>

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- It is also important to observe the instruction manuals for the other components that may form part of the overall solar system. If necessary, structural analyses must be created for the entire project.
- If you have any questions that are not answered within the scope of this manual, please direct them to your designated contact partner.

For further information, please visit our website at www.q-cells.com.
### 2 SAFETY INFORMATION

#### 2.1 SAFETY AND TRANSPORT

**NOTE!** Damage to the modules!
- Do not drop modules.
- Modifications to the modules may only be carried out if they have been confirmed by Q CELLS in writing.
- Do not stack modules.
- Never step on modules.
- Do not apply mechanical loads to modules.
- Do not drop objects onto modules.

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### 3 PLANNING

#### 3.1 REQUIREMENTS

This document allows you to plan your Q.FLAT-G5 flat roof system in conjunction with the Q CELLS ROOFTOP PLANNER. Please contact your Q CELLS sales representative to use the Q CELLS ROOFTOP PLANNER design program.

**Installation location**

Please note the following information regarding the installation location:
- Q CELLS solar modules have been tested for safe operation in temperate climates in accordance with IEC 61215.
- Q CELLS solar modules are not explosion-proof operating equipment.
- Do not operate solar modules near flammable gases or vapours (gas containers, petrol stations).
- Do not install solar modules in enclosed spaces.
- Do not install solar modules in locations where backwater can build up (e.g. flood zones).
- Solar modules cannot be used as a substitute for standard roof covers (for example, solar modules are not impermeable to water).
- Do not install solar modules in close proximity to air conditioning systems.
- Do not install solar modules at altitudes exceeding 4000 m above sea level.
- Do not allow chemical substances (e.g. oil, solvents, etc.) to come into contact with parts of the module. Only substances approved by Q CELLS may be used during assembly, operation and maintenance.
- Do not install modules near flammable or corrosive gases/vapours.
- Do not install modules in close proximity to air conditioning systems.

**Absence of shadowing**

Optimum insolation is required for maximum energy output:
- Position each solar module so that they face the sky on the front.
- Avoid shadowing (e.g. due to buildings, chimneys, trees).
- Avoid partial shading (e.g. due to overhead lines, dirt, snow, plants).

**Application limits**

The Q.FLAT-G5 is designed for the following applications:
- Operating temperatures from -40 °C to +85 °C (-40 °F to +185 °F).
- Wind impact pressure to $q = 1.0 \text{kN/m}^2$ (according to DIN EN 1990), snow load on the roof to $s_{60} = 2.0 \text{kN/m}^2$ for Q CELLS 60-cell / 120-half-cell solar modules generation G5 / G7, or to $s_{60} = 1.77 \text{kN/m}^2$ for Q CELLS 120-half-cell solar modules generation G6 / G8 (according to DIN EN 1990).

**Module selection**

- Q.FLAT-G5 may only be installed with Q CELLS solar modules with the dimensions 1670 mm × 1000 mm × 32 mm (e.g. Q.PEAK-G4), 1685 mm × 1000 mm × 32 mm (e.g. Q.PEAK DUO-G5), or 1740 mm × 1000 mm × 32 mm (e.g. Q.PEAK DUO-G6), including frame.

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**NOTE!**

- The latest version of the product data sheet is always decisive.
- Refer to the product data sheet for detailed electrical characteristics.
- Only wire solar modules of the same type and power class together.
- The design of the fuses, cable cross-sections and other electrical operating equipment must comply with DIN VDE 0100-712 and be carried out by a suitably qualified professional electrician.

**Series connection**

Series connection of the solar modules is only permissible up to the maximum system voltage specified in the current version of the data sheet as amended.
- Ensure that the system voltage is not exceeded under any operating conditions.

**Roof suitability and protection**

Q CELLS assumes no liability for the general suitability or protection of the roof when using the Q.FLAT-G5 flat roof system.
- During the verification of slip resistance, a static friction coefficient of $\mu = 0.50$ is established for the Q.FLAT-G5.
- If this is not achieved with the existing roof, please contact Q CELLS to correct this for the planning phase.
- Use the document “Determining the static friction coefficient” to determine the static friction coefficient.
- Please note that the supplied building protection mat can be combined with the roof cover. An aluminium-clad building protection mat requires a foil roof cladding in order to prevent plasticizer migration and accelerated ageing.

**NOTE!**

Regarding bulging of the roofing foil under wind-suction loads (balking effect):
- In the absence of a sufficient bond between the roof foil and the roof structure, low pressure in roof areas exposed to the wind can cause bulges to form in the roofing foil. In extreme cases, this can lead to movement of the Q.FLAT-G5 flat roof system.
- Appropriate on-site safety measures must be taken to prevent this.
- Make sure that a sufficiently large gap is retained between the roof cladding and loaded ballast carriers if the roof surfaces are uneven.

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**NOTE!** Damage to the modules!
- Do not drop modules.
- Do not install modules near flammable or corrosive gases/vapours.
- Do not install modules in close proximity to air conditioning systems.
- Do not install modules in locations where backwater can build up (e.g. flood zones).
- Do not apply mechanical loads to modules.
- Do not allow chemical substances (e.g. oil, solvents, etc.) to come into contact with parts of the module. Only substances approved by Q CELLS may be used during assembly, operation and maintenance.

---

**NOTE!** Damage to the modules!
- Do not stack modules.
- Never step on modules.
- Do not apply mechanical loads to modules.
- Do not drop objects onto modules.

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**NOTE!** Damage to the modules!
- Do not drop modules.
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- Do not stack modules.
- Never step on modules.
- Do not apply mechanical loads to modules.
- Do not drop objects onto modules.
3 PLANNING

3.1 REQUIREMENTS

- **Dimensions:**
  - The dimensional report is decisive for the precise planning of the Q.FLAT-G5 and is available in the Q CELLS ROOFTOP PLANNER or directly from the Q CELLS representative.
  - Measure the entire field (use measuring tape).
  - Observe distances to the parapet wall (if applicable).
  - Take note of edge distances and roof structures.
  - Fill out the dimensional report exactly with all necessary information.
  - In case of queries: Contact your Q CELLS representative. (service@q-cells.com)
  - Determine the coefficient of static friction using the static friction kit.

- **Steel + rubber**
  - Upon delivery, please check that the components are complete and intact.
  - Check all riveted joints for completeness on the pre-assembled ground profile.

- **Lightning protection and potential equalisation**
  - The Q.FLAT-G5 flat roof system is not a body of electrical operating equipment according to the definition of VDE 0100-541.3.1. Nor is it an external conductive part according to DIN VDE 0100-541.3.7, as it cannot introduce any external electrical potential (especially not external local earth potential) and does not belong to the parts of a building structure listed under DIN VDE 0100-411.3.1.2, which have to be added to the protective potential equalisation.
  - In the broadest sense, the Q.FLAT-G5 flat roof system is a metal construction that only bears operating equipment of safety class 2. A protective potential equalisation according to VDE 0100-410.3.9 can therefore be omitted.
  - However, to increase safety on the roof and make it easier to carry out the insulation measurement during the regular repeat tests on the system, we recommend realising a potential equalisation with our accessory cables and connecting the entire system to the main earthing rail at a point with minimum 6 mm² CU cables.
  - The optional potential equalisation can be realised via the rivet nuts located in the ground profiles and ballast carriers.

- **NOTE!**
  - The lightning protection system must be assessed individually for each solar system by a lightning protection specialist in accordance with DIN VDE 0185 305 3 supplement 5 (DIN EN 62305 3 supplement 5), and must also be installed or removed by a specialist company.

- **Dimensional report**
  - It is the responsibility of the client to ensure that the roof’s load bearing reserves (as specified in the structural analysis) can support the additional load from the Q.FLAT-G5 (PV system + ballast). This applies for the load transmission by the roof cladding and insulation located below.
  - Before mounting equipment on the roof, the roof structural analysis must be tested by the client and a structural engineer, and the corresponding bearing load reserves must be tested and approved for the installation of a PV system. It must also be ensured that the thermal insulation used can withstand the pressure load by the ballasted Q.FLAT-G5 (min. application type DAA ds according to DIN4108-10).
  - The wind and snow loads must be determined by a structural engineer.

- **Plastic bodies and ballast carriers**
  - The wind and snow loads must be determined by a structural engineer.

- **Roof structural analysis**
  - Fill out the dimensional report exactly with all necessary information.

- **MATERIAL**
  - The wind and snow loads must be determined by a structural engineer.
  - In case of queries: Contact your Q CELLS representative. (service@q-cells.com)

- **Lightning protection and potential equalisation**
  - The Q.FLAT-G5 flat roof system is not a body of electrical operating equipment according to the definition of VDE 0100-541.3.1. Nor is it an external conductive part according to DIN VDE 0100-541.3.7, as it cannot introduce any external electrical potential (especially not external local earth potential) and does not belong to the parts of a building structure listed under DIN VDE 0100-411.3.1.2, which have to be added to the protective potential equalisation.

3.2 COMPONENTS

- **Basic components**
  - The Q.FLAT-G5 comprises three components as a standard: the ground profile, the ballast carrier, and the end clamp. Depending on the module used, different ground profiles and ballast carriers are offered in order to optimally adapt the Q.FLAT-G5 to the module dimensions. The ground profile with pre-assembled middle support columns and end supports is available to match the roof type. Depending on the roof cover, either aluminium-laminated building protection mats (sheet roof cladding) or non-laminated building protection mats (bitumen roof cladding) are used.

- **NOTE!**
  - Upon delivery, please check that the components are complete and intact.
  - Check all riveted joints for completeness on the pre-assembled ground profile.

**TABLE**

<table>
<thead>
<tr>
<th>FIGURE</th>
<th>SAP NO.</th>
<th>MATERIAL</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>20005100</td>
<td>Steel + rubber granulate + stainless steel</td>
<td>Q.FLAT-G5 ground profile (short) pre-assembled for sheet roofs: Middle support column, end clamp, building protection mat with aluminium lamination</td>
<td></td>
</tr>
<tr>
<td>20005180</td>
<td>Steel + rubber granulate + stainless steel</td>
<td>Q.FLAT-G5 ground profile (short) pre-assembled for bitumen roofs: Middle support column, end clamp, building protection mat without aluminium lamination</td>
<td></td>
</tr>
<tr>
<td>20005890</td>
<td>Steel + rubber granulate + stainless steel</td>
<td>Q.FLAT-G5 ground profile (long) pre-assembled for sheet roofs: Middle support column, end clamp, building protection mat with aluminium lamination</td>
<td></td>
</tr>
<tr>
<td>20005891</td>
<td>Steel + rubber granulate + stainless steel</td>
<td>Q.FLAT-G5 ground profile (long) pre-assembled for bitumen roofs: Middle support column, end clamp, building protection mat without aluminium lamination</td>
<td></td>
</tr>
<tr>
<td>20005101</td>
<td>Steel + stainless steel</td>
<td>Q.FLAT-G5 ballast carrier, (short) 1623 mm: for 60-cell solar modules (e.g. Q.PEAK-G4.1), marked with notch</td>
<td></td>
</tr>
<tr>
<td>20005102</td>
<td>Steel + stainless steel</td>
<td>Q.FLAT-G5 ballast carrier, (medium) 1638 mm: for 120-half-cell solar modules (e.g. Q.PEAK DUO-G5), without marking</td>
<td></td>
</tr>
<tr>
<td>20005892</td>
<td>Steel + stainless steel</td>
<td>Q.FLAT-G5 ballast carrier, (long) 1693 mm: for 120-half-cell solar modules (e.g. Q.PEAK DUO-G6), marked with number 1</td>
<td></td>
</tr>
<tr>
<td>20005103</td>
<td>Steel + stainless steel + plastic</td>
<td>Q.FLAT-G5 end clamp with screw</td>
<td></td>
</tr>
</tbody>
</table>
### 3 PLANNING

#### 3.2 COMPONENTS

<table>
<thead>
<tr>
<th>FIGURE</th>
<th>SAP NO.</th>
<th>MATERIAL</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td>20005190</td>
<td>UV-resistant plastic</td>
<td>Q CELLS cable clips (100 pcs.)</td>
</tr>
<tr>
<td><img src="image2.png" alt="Image" /></td>
<td>10019608</td>
<td>Tin-plated copper wire, PO co-polymer</td>
<td>Q.FLAT-G5 PA cable, short with ring cable terminal (20 pcs. including 2 screws M8*20)</td>
</tr>
<tr>
<td><img src="image3.png" alt="Image" /></td>
<td>20005195</td>
<td>Tin-plated copper wire, PO co-polymer</td>
<td>Q.FLAT-G5 PA cable, long with forked cable terminal (20 pcs.)</td>
</tr>
<tr>
<td><img src="image4.png" alt="Image" /></td>
<td>10020003</td>
<td>Tin-plated copper wire, PO co-polymer</td>
<td>Q.FLAT-G5 PA cable set 6mm² (50 pcs. including 40 screws M8*20)</td>
</tr>
<tr>
<td><img src="image5.png" alt="Image" /></td>
<td>20005196</td>
<td>Steel</td>
<td>Q.FLAT-G5 ground profile connector (3 screws and 3 cap nuts are required for fastening)</td>
</tr>
<tr>
<td><img src="image6.png" alt="Image" /></td>
<td>20005289</td>
<td>Stainless steel</td>
<td>Q.FLAT-G5 screws for Ground profile connector</td>
</tr>
<tr>
<td><img src="image7.png" alt="Image" /></td>
<td>20005300</td>
<td>Stainless steel</td>
<td>Q.FLAT-G5 cap nuts for Ground profile connector</td>
</tr>
<tr>
<td><img src="image8.png" alt="Image" /></td>
<td>ON REQUEST</td>
<td></td>
<td>Q CELLS static friction kit</td>
</tr>
</tbody>
</table>

### 3 PLANNING

#### 3.3 TECHNICAL DATA

<table>
<thead>
<tr>
<th>SPECIFICATION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application range</td>
<td>Flat roofs with bitumen and sheet cladding, as well as on concrete or gravel</td>
</tr>
<tr>
<td>Maximum roof pitch</td>
<td>Up to 5°</td>
</tr>
<tr>
<td>Maximum roof height</td>
<td>38 m</td>
</tr>
<tr>
<td>Type of mounting</td>
<td>Ballasted penetration-free system</td>
</tr>
<tr>
<td>Permissible solar modules</td>
<td>Q CELLS 60-cell solar modules (dimensions 1670 × 1000 × 32 mm), Q CELLS 120-cell solar modules (dimensions 1685 × 1000 × 32 mm), Q CELLS 120-cell solar modules (dimensions 1740 × 1030 × 32 mm)</td>
</tr>
<tr>
<td>Thermal separation</td>
<td>Not necessary (horizontal or vertical)</td>
</tr>
<tr>
<td>Minimum system size</td>
<td>2 solar modules (1 unit)</td>
</tr>
</tbody>
</table>
3 PLANNING

3.3 TECHNICAL DATA

Layout grid for Q.FLAT-G5
The ground profiles are coupled at right angles to their direction of orientation via the attachment of the ballast carriers and end clamps. In the direction of orientation, the solar modules have their end faces abutted to the spacer. This results in a layout grid of 2110 × 1705.5 mm (e.g. Q.PEAK-G4.1), 2110 × 1720.5 mm (e.g. Q.PEAK DUO-G5) or 2171 × 1775.5 mm (e.g. Q.PEAK DUO-G6).

Plan the Q.FLAT-G5
The Q CELLS ROOFTOP PLANNER is an online planning tool, which can be combined with various design programs to make planning easy, reliable and efficient. All steps in a system design can be completed with just one program. Snow and wind load zones are automatically suggested and the geographical situations are taken into consideration.

Plan the Q.FLAT-G5 with less than 1.5 m distance to the roof edge. This has a positive influence on the system ballast. Comply with minimum distance of 20 cm to the parapet.

The Q CELLS ROOFTOP PLANNER provides:
- Solar module design plan
- Wiring diagram
- Inverter diagram
- Ballast plan
- Parts list
- Structural analyses according to Eurocode 5 and wind surveys taking into account the snow and wind load zones

Correct record dimensioning report, which you receive from your Q CELLS representative.

Determine the coefficient of static friction based on the test report (if applicable use static coefficient list).

Enter determined data correctly in the Q CELLS ROOFTOP PLANNER.

Plan the Q.FLAT-G5

Fig. 1: Top view Q.FLAT-G5 layout grid *(2110 × 1705.5 mm for e.g. Q.PEAK-G4.1, 2110 × 1720.5 mm for e.g. Q.PEAK DUO-G5 and 2171 × 1775.5 mm for e.g. Q.PEAK DUO-G6)
4 ASSEMBLY

4.1 PREPARATIONS FOR ASSEMBLY

DANGER! Danger to life due to electric shock!
- Restrict access to the installation site.
- Keep children and unauthorised persons away from the solar system.

WARNING! Risk of injury due to falling modules!
- Secure the modules and pre-assembled module pairs during installation.
- Only install modules in dry, calm weather.

DANGER! Danger to life due to electric shock!
- Never perform the installation alone.

DANGER! Danger to life due to electric shock!
- Use only insulated and dry tools.

DANGER! Danger to life due to electric shock!
- Ensure that the solar modules and tools are never exposed to moisture or rain during installation.

Install only undamaged modules and components.
- Do not add any holes.

Tools and aids required
Besides the project report, tools and aids that are not included in the scope of supply are required for installation of the Q.FLAT-G5. We recommend providing and using the following materials before installing the Q.FLAT-G5:

<table>
<thead>
<tr>
<th>FIGURE</th>
<th>TOOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cordless screwdriver</td>
<td>Gloves</td>
</tr>
<tr>
<td>Hexagon bit IS 6</td>
<td>Tape measure</td>
</tr>
<tr>
<td>Torque wrench</td>
<td>Chalk line</td>
</tr>
<tr>
<td>Ring spanner / Open-ended spanner SW 10</td>
<td>Ballast e.g. walkway plates, deep kerbs, paving stones or gravel</td>
</tr>
</tbody>
</table>

Selecting the ballast elements
In order to place the ballast elements under the solar module pair without causing damage, observe the maximum height of 120 mm.

NOTE!
Failure to observe these limits may result in the ballast elements not fitting underneath the solar module pairs.
- Ensure that the spacing between the ballast elements and solar module pairs is at least 10 mm.
- In order to achieve the ballast according to the ballast plan, it may be necessary to arrange the lowest ballast layer transversely to the ballast carriers. The ballast carriers must be hung into the outer notches of the ground profiles for this so that the ballast stones cannot tip over and do not come to into contact with the roof cladding.
## 4 ASSEMBLY

### 4.1 PREPARATIONS FOR ASSEMBLY

The distribution of the ballast weights specified in the ballast plan created by Q CELLS must be strictly observed. The following standard ballast elements made of concrete are recommended for the ballast:

<table>
<thead>
<tr>
<th>BALLAST ELEMENT</th>
<th>DIMENSIONS IN MM/MM/MM</th>
<th>WEIGHT IN KG</th>
<th>MAX. NUMBER</th>
<th>TYPE OF BALLAST ORIENTATION OF BALLAST ELEMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deep kerb</td>
<td>999 / 250 / ≥ 50</td>
<td>≥ 29</td>
<td>7</td>
<td>on ballast carriers</td>
</tr>
<tr>
<td>Walkway plate</td>
<td>400 / 400 / ≥ 50</td>
<td>~ 13</td>
<td>8</td>
<td>on ballast carriers</td>
</tr>
<tr>
<td>Walkway plate</td>
<td>300 / 300 / ≥ 50</td>
<td>~ 10</td>
<td>10</td>
<td>on ballast carriers</td>
</tr>
<tr>
<td>Paving stone</td>
<td>200 / 100 / ≥ 5</td>
<td>~ 4</td>
<td>8 / ground profile</td>
<td>in the ground profile</td>
</tr>
<tr>
<td>Gravel (only on gravel roofs)</td>
<td>1600 kg/m³</td>
<td>1600 kg/m³</td>
<td>15 kg / ground profile</td>
<td>in the ground profile</td>
</tr>
</tbody>
</table>

### 4.2 PERFORMING THE ASSEMBLY

1. Clean roofs and remove obstructions.
2. Measure the entire field.
3. Take note of edge distances and roof structures.
4. Compare the measurement with project documents.
5. In case of queries: Contact your Q CELLS representative.
6. Aids, tools: Project report, layout plan

- Fold up the middle support column and pull upwards.
- Press the hinge down as far as it will go in order to close off the folding mechanism.

CAUTION! Personal injury due to sharp-edged and heavy supports!
- Wear protective gloves during the entire assembly.

NOTE! Damage to the roof cladding!
- Use ground profiles with pre-assembled building protective mats that are suitable for the nature of the roof cladding.
- To compensate for height differences, the building protection mat may be removed and replaced with a higher building protection mat of the same type.

NOTE! Damage to the roof cladding!
- Use ground profiles with pre-assembled building protective mats that are suitable for the nature of the roof cladding.
- To compensate for height differences, the building protection mat may be removed and replaced with a higher building protection mat of the same type.

NOTE! The exact distance to the next ground profile is stipulated by the ballast carriers.

NOTE! The exact distance to the next ground profile is stipulated by the ballast carriers.
4 ASSEMBLY

4.2 PERFORMING THE ASSEMBLY

5 ➔ Determine the position of the ballast carriers:
   • If ballast is not necessary, select standard position A.
   • In case of ballast with walkway plates and bricks, select standard position A.
   • In case of high ballast with transverse ballast stones, select position B.

NOTE! Damage to the ballast carriers!

➔ Use 4 ballast carriers from a ballast of more than 125 kg, with the ballast stones being placed evenly on the inner and outer ballast carriers.

6 ➔ Hang the ballast carriers to the left and right of the middle support columns into the ground profiles at the corresponding position.

➔ Start hanging the ballast carrier in the narrow groove.

➔ Make sure that the ballast carriers latch fully into the notches of the ground profile.

7 ➔ Arrange the next ground profile parallel and aligned to the first two ground profiles.

➔ Fit ballast carriers into the ground profiles corresponding to steps 5 and 6.

➔ The ground profile holds the ballast carrier on both sides.

NOTE! For better differentiation, ballast carriers for 60 cell modules are marked with a notch and ballast carriers as well as base profiles for 120 half-cell solar modules G6 / G8 are marked with the number 1.

➔ Check whether the correct ballast carriers have been supplied.

8 ➔ Repeat step 7 until the row length corresponding to project report is achieved.

➔ Align the ground profile rows on the roof based on the project report.

➔ Comply with the minimum distances to the roof edge.

Aids, tools: Project report, layout plan

9 ➔ Mount remaining ground profiles and ballast carriers in the same way and align until the planned field size is attained.

Aids, tools: Project report, layout plan

NOTE!

➔ The distances between the ground profile rows are defined in the project report, but are a minimum of 5 mm.

➔ When using ground profile connectors, the distance between the ground profile rows is exactly 242 mm.

10 Assembly with ground profile connectors:

➔ Align ground profile rows with a vertical distance of 242 mm to one another.

➔ Place ground profile connectors flush on both ground profiles.

➔ Make sure that the holes of the ground profile connector correspond to those of the ground profile.

11 ➔ Push screws through the holes and secure with cap nuts (tightening torque: 6 Nm).

➔ Connect the remaining ground profiles in the same way.

Optional potential equalisation:

➔ Rivet nuts are integrated in the ground profiles and ballast carriers of the Q.FLAT-G5, which help with potential equalisation.

➔ The screws compensate for the thermal expansion and therefore remain mobile.
4 ASSEMBLY

4.2 PERFORMING THE ASSEMBLY

12 Ground profile with 2 ballast carriers:
- Tightly screw 1 potential equalisation cable using one screw to the middle support column and ballast carrier (tightening torque: 7 Nm).
- Only one middle support column of the ground profile has to be connected to a ballast carrier respectively.

13 Ground profile with 4 ballast carriers:
- Tightly screw 2 potential equalisation cable using one screw to the middle support column and ballast carrier (tightening torque: 7 Nm).
- Only one middle support column of the ground profile has to be connected to 2 ballast carriers respectively.

NOTE!
- Use long potential equalisation cables for ballast carrier position B.

4 ASSEMBLY

4.3 BALLAST

1 Ballast with walkway plates:
- Place ballast stones flush on the ballast carriers in accordance with the ballast plan.
Aids, tools: Layout plan, ballast plan

2 Ballast with deep kerbs:
- Place ballast stones diagonal and flush on the ballast carriers in accordance with the ballast plan.
- Use ballast carrier position B.
Aids, tools: Layout plan, ballast plan

3 Ballast with bricks:
- Install ballast stones flat in the ground profile according to the ballast plan.
- Make sure that the ballast does not come into contact with the module frames.
Aids, tools: Layout plan, ballast plan

4 Ballast with gravel on gravel roofs:
- Install ballast stones flat in the ground profile according to the ballast plan.
- Make sure that the ballast does not come into contact with the module frames.
Aids, tools: Layout plan, ballast plan

NOTE! Damage to the roof!
- Do not drop ballast elements onto the roof cover.
- Make sure that the ballast does not come into contact with the roof cover.
- Comply with the maximum ballast height of 120 mm.

• Damage to the roof!
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- Make sure that the ballast does not come into contact with the roof cover.
- Comply with the maximum ballast height of 120 mm.
**5 ELECTRICAL CONNECTIONS**

### 5.1 SAFETY

**DANGER! Danger to life due to electric shock!**

- Disconnecting a direct current circuit can cause arcs that may result in life-threatening injuries.
- Never disconnect live cables.
- Do not touch the poles.
- Electrical work may only be carried out by a certified expert.

A solar module generates electrical current and voltage even with low levels of solar radiation. The disconnection of a closed circuit can lead to flying sparks and arcs. These can cause life-threatening injuries. This danger increases when multiple solar modules are connected in series.

- Be aware that the entire open circuit voltage is present even with low insulation.
- Observe the relevant regulations and safety instructions for the installation of electrical equipment and systems.
- Take appropriate protective and precautionary measures.
- Use insulated and dry tools for electrical work.

**DANGER! Danger to life due to electric shock!**

- Never open the junction box.
- Do not remove the bypass diodes.

**DANGER! Danger to life due to electric shock!**

- Never disconnect live cables.
- Do not touch live contacts with your bare hands.
- Insulate bare cable ends.

**DANGER! Danger to life due to electric shock!**

- Electrical work may only be carried out by a certified expert.
- Observe the correct polarity.

**DANGER! Danger to life due to electric shock!**

- After switching off the inverter, observe the time intervals prescribed by the inverter manufacturer before starting further work.

**DANGER! Danger to life due to electric shock!**

- Use the solar cable for connection to the output on the junction box.
- Use identical connector systems and ensure they are compatible with the inverter.
- Use at least 4 mm² copper cables for the connections, which are suitable for a minimum of 90 °C.

**DANGER! Danger to life due to electric shock!**

- Use only insulated and dry tools for electrical work.

- Insulate bare cable ends.
- Only connect cables with plugs.

**DANGER! Danger to life due to electric shock!**

- Switch off the inverter.

**DANGER! Danger to life due to electric shock!**

- Ensure that all electrical components are dry and in proper, safe condition.

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**5 ELECTRICAL CONNECTIONS**

### 5.1 SAFETY

1. Switch off the inverter.
2. Interrupt the DC electric circuit.
3. Measure the switch-off at the DC string (no direct current flow).
4. Only disconnect the plug with the corresponding tool from the relevant manufacturer.
5. Proceed in the reverse order when connecting the modules.
5 ELECTRICAL CONNECTIONS

5.1 SAFETY

- Ensure the plugs are firmly connected. The plugs should audibly snap into place.

NOTE! Material damage due to short circuit!
- Make sure that the cable and plug are not lying on a water-bearing layer, are not touching the roof cladding and are not rubbing against edges and components.

NOTE! Damage to the solar modules!
- Do not damage the back sheet of the module.
- Remove adhesive tape on the rear.
- Cut through cable clips.

- Ensure voltage-free wiring (comply with bending radius of ≥ 60 mm).
- Store cable hanging freely. Cables must not lie between the module and substructure (risk of crushing).

NOTE! Material damage due to short circuit!
- Only interconnect cables of the same string.
- Take care not to short-circuit the string.

NOTE! Material damage due to short circuit!
- Ensure the correct module types are used (see "Module selection" on page 7).

- Check the installation dimensions against the project documents.
- Take corrective action if necessary.
- Connect the system as shown in the project documents.

Aids, tools: Project documents, layout plan

- Ensure the correct module types are used (see "Module selection" on page 7).

5.2 BEFORE INSTALLATION

1 NOTE! Damage to the solar modules!
- Do not damage the back sheet of the module.
- Remove adhesive tape on the rear.
- Cut through cable clips.

NOTE!
- The orientation of the modules in the neighbouring rows must be observed.
- Plan the wiring of the rows before installation so as to ensure optimal wiring during the installation.

2 Alignment of 60 cell modules:
- Align the solar modules so that all junction boxes in each string point in the same direction.
- Depending on the string length, observe a 180° string rotation from row to row.

3 Alignment of 120 cell modules:
- Align the solar modules so that all junction boxes in each row point in the same direction.
- Depending on the polarity, fasten cables with 2 cable clips each on the long module side.
- Do not fasten cables while live or crosswise.
- The cables later run to the roof ridge of the Q.FLAT-G5.

4 Depending on the polarity, fasten cables with 2 cable clips each on the long module side.
- Do not fasten cables while live or crosswise.
- The cables later run to the roof ridge of the Q.FLAT-G5.
5  ELECTRICAL CONNECTIONS

5.3 CONNECT MODULE PAIRS

1  Guide module horizontal with the cable frame side ahead, into the opening of the middle support columns.
   Ensure that the string cable is freely accessible for subsequent wiring.

2  Place module on the end supports.
   Place module flush between the spacers on the ground profile.
   Press module against the middle support columns if it does not latch directly into the ground profile.

3  Place neighbouring module upright on module longitudinal side (cable frame side).
   Wire the modules (a click signals correct wiring).
   Insert cabled module into the ground profile without pulling the cables (see p. 26, work steps 1 and 2).

4  Insert modules on the opposite side in the same way and wire.
   Insert module and arrange without pulling the cables.

5  The modules are fastened on the ground profiles with the end clamp.
   Screw end clamps with pre-assembled screw to each ground profile (tightening torque: 7 Nm).
   The terminals clamps function as edge and centre terminals.

Optional potential equalisation:
   - Raise screw and push fork of the long potential equalisation cable under the screw head.
   - Tighten screw together with potential equalisation cable and thus connect the ground profiles electrically (tightening torque: 7 Nm).

Optional step:
   - Integrate the system into the existing lightning protection system in accordance with the local regulations.

5.4 AFTER INSTALLATION

- Carry out safety and functional tests, ensuring that they are state of the art.

- Make sure that the plug connections are not located in a water-bearing level.

- Make sure that the wiring is not exposed.
- Protect the wiring from dirt, moisture and UV irradiation.
- Do not use chemical cleaning or rotating brushes.
- Only clean the modules manually with sufficient water.

NOTE! Damage to the modules!

WARNING! Risk of fire!
- Under no circumstances use light concentration devices (e.g. mirrors or lenses).
### 6 REGISTRATION

**NOTE!**
- Register Q.FLAT-G5 promptly on the homepage https://www.q-cells.co.uk/ under the heading “Service & Support / System Registration”.
- Perform external registration (local energy provider, market master data register).
- The full guarantee scope will only become valid after successful registration.

### 7 FAULTS

**DANGER! Danger to life due to electric shock!**
- Do not attempt to remedy the malfunction by yourself (e.g. glass breakage, damaged cable).
- Contact the installer or Q CELLS Technical Customer Service.

### 8 MAINTENANCE AND CLEANING

**Q CELLS** solar modules are characterised by a long service life and minimal maintenance. In most cases, dirt is washed off by rain. Cleaning is necessary if the modules are partially shadowed by coarse dirt (e.g. plants, bird excrement), as this may reduce their power.

#### Maintenance
- Have the system checked by an installer once annually or after storms.
- Observe the statutory test intervals for stationary systems (DIN EN 62446-1 / VDE 0126-23-1):
  - Ensure that all system components are securely mounted and corrosion-free.
  - Check the safe connection, cleanliness and integrity of all electrical components and the positional stability of all systems.
  - Check for correct assembly of all mechanical components (rivets and screws present) and secure mounting of the ballast (ballast location correct).

#### Cleaning
- **WARNING! Risk of injury from hot and live solar modules!**
  - Only clean cool solar modules.
  - Do not wear any electrically conductive materials on your body or as part of your clothing.

- **WARNING! Danger of falling due to unsecured roof access!**
  - Never enter the installation area alone or when unsecured.
  - Commission the services of a specialist company.

- **NOTE! Modular surface can become damaged!**
  - Clean the modules as follows:
    - Remove snow and ice carefully and without using force (e.g. with a soft broom).
    - Do not scrape off dirt.
    - Rinse off dirt with lukewarm water (dust, foliage, etc.) or use an alcohol-based glass cleaner. Do not use abrasive detergents or surfactants.
    - Moisten stubborn dirt with a cellulose cloth (kitchen roll) or soft sponge and carefully wipe off. Please do not use cloths made from microfibre or (cotton) wool.
    - Stubborn dirt can be removed rapidly within an hour after origination using isopropanol (IPA):
      - Observe the safety instructions on the IPA packaging.
      - Do not allow isopropanol to run between the module and frame or into the module’s edges.

- **NOTE! Damage to the solar modules!**
  - Do not clean the module with water if there is a risk of frost.

- **NOTE!**
  - Remove dirt with lukewarm water, alcohol-based glass cleaner, a broom or soft cloth.
  - Do not use surfactants, scrapers, rotating brushes or equipment with elevated water pressure.

- **NO!**
  - Remove dirt from the substructure (foliage, bird nests, etc.).
Please ask your installer about disposal of your solar modules. In all cases, ensure that your solar modules are disposed of in compliance with local disposal regulations.

- Do not attempt to decommission the modules by yourself.
- Commission the services of a specialist company.

Sources

[2] Ing. Büro Dr. Siebert: Systematic Calculations Q.Flat G5 Retaining System PV