SAFETY AND INSTALLATION MANUAL
BIFACIAL SOLAR MODULES

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1. MODULES

1.1 MBF-GG60 BiSoN series – with frame

* 270-280Wp only front at STC
** 338-350Wpe (Watt peak equivalent) with Bifacial gain

1.2 MBA-GG60 BiSoN series – frameless

* 270-280Wp only front at STC
** 338-350Wpe (Watt peak equivalent) with Bifacial gain

2. INTRODUCTION

This manual contains information regarding the safe installation and handling of photovoltaic (PV) modules produced by MegaCell s.r.l. (Megacell)

IMPORTANT: Megacell modules use high efficiency BISoN BIFACIAL solar cells. These modules produce power from both the front and back of the module with significant more power than their STC rating.

To optimize electrical dimensioning and installation, make sure to read these mounting instructions carefully before installing, commissioning or servicing the PV system and keep these instructions in a well accessible location. Failure to comply with these safety instructions may result in personal injury and product damage.
We strive to be the leader in innovation and research, while continuing to improve our products. For this reason we reserve the right to make changes to this installation guide without prior notice.

2.1 Disclaimer of liability

Since the methods of system design, installation techniques, handling and use of this product are beyond company control, MegaCell does not assume responsibility and expressly disclaims liability, for loss, damage or expense resulting from improper installation, handling or use.
The information in this manual is based on MegaCell's knowledge and experience and it is believed to be reliable. Nevertheless, such information including product specification (without limitations) and suggestions do not constitute a warranty, expressed or implied. MegaCell reserves the right to change the manual, the PV module, the specifications, or product information sheets without prior notice.

2.2 IEC 61215 & 61730 certifications

This product meets or exceeds the requirements set forth by IEC 61215 and 61730 for PV Modules. These standards cover flat-plate PV modules and panels intended for installation on buildings or those intended to be freestanding. *This product is not intended for use where artificially concentrated sunlight is applied to the module.*

2.3 Limited Warranty

Please refer to MegaCell General Terms and Conditions of Sale for details of the modules' Limited Warranty. Failure to comply with this Safety and Installation Manual will invalidate MegaCell Warranty for the PV modules as stated in the General Terms and Conditions of Sale.

2.4 Module specification

Please refer to the appropriate MegaCell MBF or MBA datasheet for electrical performance data and mechanical installation information.

2.5 Product identification

Each module can be identified by means of the following embedded information:

Nameplate:

it is located on the reverse side of the module or on the frame. It gives information about the main parameters of the module referred to STC condition : Product Type, Maximum Power, Current at Maximum Power, Voltage at Maximum power, Open Circuit Voltage, Short Circuit Current, all as measured under Standard Test Conditions, weight, dimensions, Maximum System Voltage, etc.

Warning : bifacial modules increase energy and power production respect to STC nominal data through Albedo on rear surface. Refer to the specific area on data sheet for real parameters expected after installation to calculate correctly inverter, cables and connection size.

Serial number:

Each individual module is identified by a unique serial number accompanied with a barcode. They are permanently inserted inside the laminate, under the front glass of the module, visible when viewed from the front of the module.

3. SAFETY INFORMATION

3.1 Important safety precautions

The use of these modules must comply with original design purposes.

- **Installation should be performed only by qualified and authorized personnel**.
  Installers should assume the risk of all injury that might occur during installation including, without limitation, the risk of electric shock.
- Module installation must be performed in compliance with any applicable local and national standards, codes and regulations.
- Within the modules there are no user serviceable parts. Do not attempt to repair any part of the modules.
- Modules produce voltage even when not connected to an electrical circuit or load and have no on/off switch. Modules can be rendered inoperative only by removing them from sunlight, or by

fully covering their FRONT plus REAR surface with cloth, cardboard, or other completely opaque non-marking material, or by working with them face down on a smooth, flat surface.

IMPORTANT : MegaCell bifacial modules produce voltage when exposed to light also on back side

- Do not expose the modules to artificially concentrated sunlight
- Do not stand on, drop, scratch, or allow objects to fall on the modules.
- Do not lift the modules by the junction box or junction box cables.
- Do not install or handle the modules when they are wet or during periods of high winds.
- Ensure that junction box cables are provided with strain relief to avoid damage to the junction box, maintaining a minimum bending radius of 50 mm at all locations along the cable.
- Do not leave cable connectors exposed in adverse climatic conditions. Water and dust deposits inside the cable connectors can cause long term damage.
- A module with broken glass, damaged junction box, connectors or cables present electrical safety hazards and must be removed from service.

3.2 Warning: Extreme Danger due to electrical shock!

Solar modules generate electricity. When exposed to light, a voltage occurs, which can be dangerous and life-threatening. Even though the individual modules generate a relatively low voltage of 50 V DC, the voltage will accumulate as soon as several modules are connected in series. Modules connected in parallel result in accumulation of the currents. Although the fully insulated plug contacts are designed to protect against accidental contact, the following instructions must be followed when handling the solar modules in order to avoid combustion, spark formation and, above all, fatal electrical shocks:

- Never insert electrically conducting pieces into the plugs and sockets.
- Do not wear metallic jewelry during mechanical and electrical installation.
- Keep the tools and work area dry. Only install solar modules and wires with dry plugs and sockets.
- Maintain utmost caution and care. When working on the wires, always use both tools and gloves which are insulated.
- Do not disassemble the modules. Never remove parts or name plates fitted by the manufacturer. Only use flawless modules. Do not treat the back side of the modules with sharp objects, paints or adhesives.
- Do not expose modules to artificially concentrated sunlight

It is absolutely necessary that the wiring of the modules is only carried out by qualified and authorized personnel.

3.3 Warning: Danger due to high voltage

Even in disconnected condition the inverter can retain high voltages, which is a major shock hazard. Therefore:

- Be very cautious when working with the inverter and wires.
- After switching off the inverter as well as before working on the inverter, make sure to regulate the time intervals as recommended by the manufacturer so that the high voltage components can be discharged

Make sure to adhere to the assembly regulations of the inverter manufacturer.

3.4 Warning: Danger due to electric arc

The solar modules generate a direct current when exposed to light. When opening a closed circuit, e.g. disconnecting the direct current wire from the loaded inverter, a fatal electric arc may occur.

- Never disconnect the solar generator from the inverter while the inverter is connected to the grid
- Make sure to use only flawless wire connections! Connect wires seamlessly and keep them free from dirt

4. PACKAGING, HANDLING AND STORAGE

4.1 Transport, temporary storage and safe unpacking

Please refers to the instructions printed on the cartoon box of each pallet

The modules are sensitive technical components, which must be handled with utmost care. Therefore, be particularly careful during transport and temporary storage and leave the modules in the package until they are used.

- Always lift and carry the module with both hands and never carry by means of the junction box.
- Do not drop the modules or place them down clumsily on a hard floor and/or on the module corners.
- Do not place any objects on the modules.
- Do not stack the modules without protection.
- Avoid deflection of the modules.
- Do not walk on the modules.
- Do not treat with sharp objects and keep all electrical contact areas clean and dry.

For documentation purposes, the serial number should be noted. If required, the modules should be temporarily stored in a dry, ventilated room. Clean, non-slip gloves must be worn during all transport and installation work to prevent cut injuries from the panel edges. Contamination of the solar glass with fingerprints must also be avoided, as this may damage the special coating on the glass. Please pay special attention to the warnings on the package as well as on the enclosed unpacking instructions!

4.2 Installing the module

Make sure that the installation is carried out safely.

Protect yourself and other persons from falling, do not carry out the installation in heavy winds and eliminate the risk of falling objects as much as possible. Secure the work area in order to avoid the endangerment or injury of persons.

In order not to exceed the max. System voltage at -10 °C, the MBF-GG60 and MBA-GG60 modules must not be connected in series with more than 22 modules.

Additionally, the requirements of the inverters must be observed. In any case, specific checking have to be done by the designer, considering the modules working temperatures.

4.3 Observe the allowable maximum mechanical loading:

Do not exceed the maximum mechanical loading and avoid local pressure. Make sure to consider location-specific loads such as wind or snow. Remember that the module might sag when loaded under certain circumstances. In order to avoid damaging the module by pointed or uneven structures, do not place fasteners or cable ties between the rear of the module and the cross section.

4.4 Make sure that the surroundings are suitable:

Make sure that after installation the module is neither subjected to artificially concentrated sunlight, immersed in water or continuously splashed with liquids. By all means make sure that the module is not subjected to abnormal chemical exposure. Exposing the module to extreme levels of salt or sulphur may lead to corrosion.

4.5 The correct location for installation:

Beside the module itself, the mounting system must also be suited to the expected conditions at the location of installation (snow, wind) and withstand them easily. The bottom side of the module frame (if present) features holes for draining precipitation water. Make sure during installation that these holes retain their function. For portrait mounting, the junction box may be mounted facing up or down on the underside of the module but it’s preferable to be mounted facing upwards on the underside of the module.

4.6 Yield maintenance through optimal alignment and inclination:

We advise you to familiarize yourself with the appropriate alignment and inclination of the modules prior to installation in order to ensure an optimal system yield. The ideal conditions for the generation of electricity are accomplished when the sun rays reach the generator surface perpendicularly. For modules connected in a series, make sure that all modules have the same alignment and inclination in order to avoid performance losses.

4.7 Install the module in an area free of shade:

Even a low degree of shading will have a negative effect on the system yield. Therefore, the system must be installed in a location without shading. The module should never be shaded completely during the whole year.

4.8 Maximizing Power Output through Bifaciality

Output power in increased proportionally to albedo received by rear side of modules

The available albedo light that hits the back of the module is directly related to the height (and tilt angle) of the module installed over the surface.

- Choose the highest possible Surface Reflectivity/Albedo, such as a white roof or white ground surface covering.
- Avoid shading the back side of the module by the support rack.
- Elevate the modules above the mounting surface as much as possible. For flat ground/rooftop installation it's recommended a minimum height of 50-70 cm
- With tilted rooftop installation, ensure an appropriate ventilation on back to reduce an accumulation of heat with adverse effects on the performance.

4.9 Ensure that the modules are grounded properly:

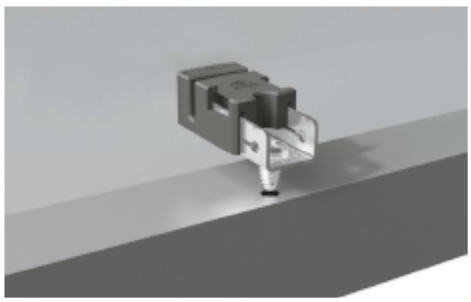
Under the terms of MegaCell, grounding of the module frame (if present) is not required for fault-free operation. To reduce the risk of electric shock (e.g. due to static charge) as far as possible, MegaCell recommends to ask an experienced installer to carry out a proper grounding. If an external lightning protection system has been already installed, the PV system has to be integrated in the existing lightning protection concept by a specialist.

Country-specific standards and regulations must be observed. The grounding connections between the modules must be checked and accepted by a qualified electrician. Furthermore, the main grounding may only be connected by a qualified electrician. In the USA and Canada, a grounding method approved by Underwriters Laboratories (UL) is obligatory. To provide proper grounding, an optimal electrical conductivity is required. For this purpose, grounding holes are provided at the rear of the module frame (if present).These grounding holes are marked by a stamped ground symbol.

For grounding we recommend the Solklip grounding terminal with integrated thread cutting screw, (UL 467 approved, UL number E69905), manufactured by Tyco Electronics.

Observe the additional instructions at www.tycoelectronics.com. These grounding terminals accommodate 4 mm² (AWG 12) and 6 mm² (AWG 10) stripped solid copper wires. The wires must not be cut, notched or scratched. No further preparation is required.

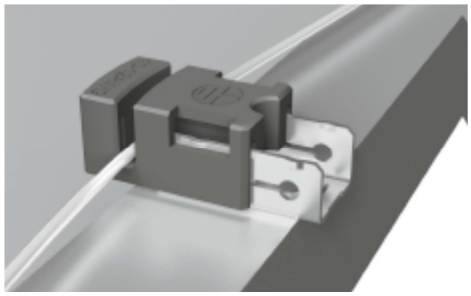
Mounting of grounding terminal on frame



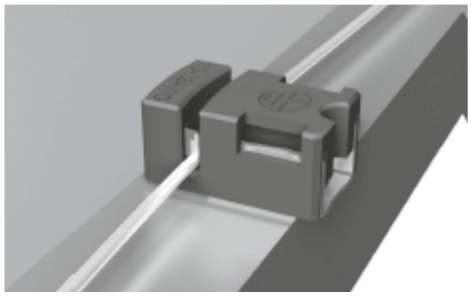
The grounding terminal must be placed on the frame in such a way that the screw touches the grounding hole. Using a screwdriver, install the screw into the grounding hole until its head is flush with the base and the base is flush with the frame.

Then, turn the screw another quarter or half turn.
The thread-cutting screw should be torqued by 20.4 lb in and 24,8 lb in (2.3 and 2.8 Nm).

Ground wire placement



Insert the cable into the wire slot. Then push in the wire on both ends into the slot. (The wire slot will cause the wire to be slightly curved as shown.)



The slider must be engaged (slider covers the base). Using cable clamps, move the slider over the base until it covers the base. This terminates the wire. To open the slider a slotted screwdriver can be used.

4.10 Ensure comprehensive fire protection:

The installation of on-roof systems may influence the fire safety of a building. Improperly installed systems can present even more of a danger in the case of fire. Therefore, the modules of an on-roof system must always be installed over a fire-resistant surface. As the module is not regarded as explosion-proof it must not be installed near inflammable gases and vapors e.g. close to gas containers, painting installations or gasoline stations. Furthermore, the module must not be installed next to open fire and flammable materials.

5. MECHANICAL INSTALLATION

Use always structures and materials specifically developed and certified for PV modules installation.
Avoid shading the back side of the module by the support rack

The minimum distance between two fixed modules for linear thermal expansion of the module frames should be 5 mm. Nevertheless, the recommended distance between two modules is 20 mm to allow wind circulation, in order to reduce pressure loads and improve module ventilation. The PV module should not be mounted in such a way that the drain holes of the module can become blocked.

MegaCell PV modules are suitable for mechanical mounting both in portrait and landscape orientation. In choosing the orientation, please keep in mind the internal PV module by-pass diode configuration to ensure the optimum electrical behavior from any potential shading over the modules.

Galvanic corrosion can occur between the aluminum frame of the PV module and the mounting hardware if such hardware is composed of dissimilar metals, especially in harsh environments such as high humidity. In these cases, to prevent corrosion, neoprene tape, PVC washers or stainless steel washers should be placed between the PV module frame and the support structure.

Additionally, all module support structures used to support PV modules at correct tilt angles should be wind and snow load rated by appropriate local and civil Directives prior to installation.

NOTICE: Do not disassemble the PV module and do not remove, drill or modify the frame in any way, as this will invalidate the warranty. Please contact the MegaCell Technical Service if module mounting procedure is not clear.

5.1 Modules with frame

Installation using pressure clamps may be executed along both sides of the module frame according to following instructions .

The obligatory position of the clips along the frame depends on which side of the module is used for the installation.
Note that on both sides of the module the pressure clamps always should be mounted in a symmetric position with respect to the center line for a proper load distribution.
Clamps must be installed according to the manufacturer's specific instructions. Do not apply excessive pressure on the frame such that the frame deforms. MegaCell recommends a torque of approximately 10 Newton meter [Nm], but refer to the clamp manufacturer for specific hardware and torque requirements.
For a safe and effective installation of MegaCell framed modules, the lengths for the pressure clamps are strongly recommended is not less than 50 mm for 60 - 156 x 156 mm cell modules.
The minimum recommended clamp thickness is 2,5 mm
The clamps should have contact only with the module frame and, to avoid shadowing effects and possible damage, should not overlap onto or over the module glass.
Do not install the modules with pressure clamps mounted out of the specified areas, otherwise the module mechanical resistance may be affected.
Use of unauthorized laminate clamps will render the product and performance warranty void

5.2 Frameless modules

The use of frameless MegaCell modules requires frameless mounting system that grabs the edge of the module with a pressure clamp that is lined with rubber pads (EPDM, etc).
The clamps must overlap from the edge of the module by at least 10mm but should avoid shading the cells in the module. The applied torque used to attach the clamps to the module/racking should refer to the mechanical design standard for the specific bolt in use.
For 4 point mounting, 4 mounting clamps should be located as described on paragraph 5.4

Depending on local snow and wind conditions, more than 4 clamps may be needed to ensure that the modules can withstand the expected load. For loads larger than 4000Pa (50psf), ensure that each clamp has a minimum length of 120mm. Do not use clamps with a length smaller than 80mm unless approved by MegaCell.

When installing modules in an array, please allow for a minimum lateral air gap of at least 10mm between the exposed edges of the adjacent modules to account for thermal expansion and contraction of PV system elements in the field.

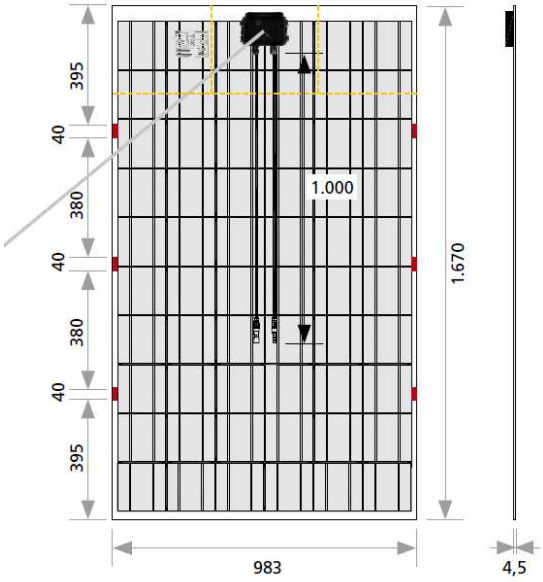
5.3 Frameless modules: continuous mounting (Carports, BIPV, etc.)

For a continuous mounting system where the entire perimeter of the module is used, the mounting surface that contacts the module should:

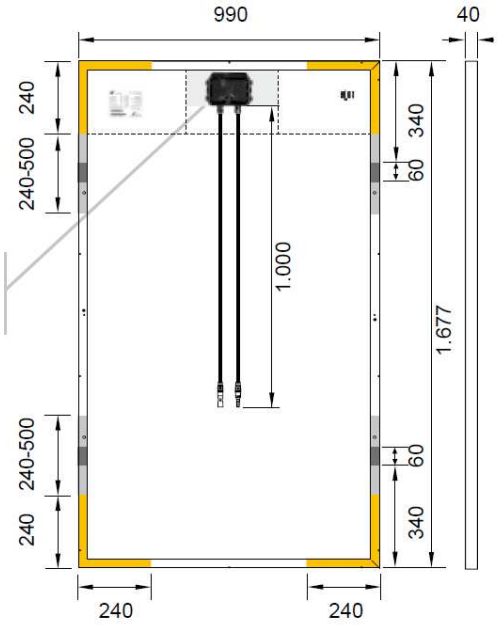
- Be a rubber material (such as EPDM, etc.) on all surfaces making contact with the module.

- Firmly clamp and hold the entire perimeter of the module, on both the front and back of the module.
- The module shall be fully supported by at least 10mm from the edge on all sides of the module.
- Any shading or covering of the cells on both sides in the module must be avoided

5.4 Clamping areas and maximum load applicable



Clamping areas: Approved up to 2,400 Pa



Clamping areas:
Approved up to 2,400 Pa
Approved up to 5,400 Pa
Approved up to 6,600 Pa

Note:

Pay attention to the maximum load-bearing capacity of the modules, with consideration of wind and snow load zones, the terrain category and the height of the building.

6. ELECTRICAL INSTALLATION

Do not connect or disconnect modules under load! Danger! Risk of serious injury or death from electric shock or electric arc flash.

The solar modules are designed for use in PV systems of application class A and are approved for operation in systems with dangerous direct current (more than 120 V DC in accordance with EN 61730) and power. PV modules of this application class are approved for operation in installations with unrestricted access.
BiSon series modules from MegaCell, which are qualified under EN 61730 and have been properly installed, meet the requirements of protection class II.

6.1 Electrical Connections

Never open the connection box! The modules are already fitted with all necessary wires and connectors.

CAUTION:
System design should consider the potential increased power output (Pmax) and current (Isc) due to the modules bifacial abilities. Additional power and currents beyond the STC rating are possible. See the Electrical Specifications on the data sheet for electrical parameters in presence of albedo. All protections, wiring, equipment ratings, and inverters should be sized accordingly o the product ratings, maximum expected output and required protection factors.

6.2 Ensure correct wiring:

- Only connect modules with the same rated current in series and modules with the same rated voltage in parallel.
- The modules may only be operated at the allowable system voltage; operation at a higher voltage is not recommended.
- The integrated connection cables are UV resistant. The conductor cross-section of the connection cables is 4 mm².
- For wiring, the connection cables are fitted with prefabricated connectors, which are protected against reverse polarity.
- Keep the total area of all conductor loops as low as possible in order to reduce the voltages due to indirect lightning strikes.
- Always carry out a careful final check of the wiring prior to commissioning the generator. If the measured open circuit voltage diverges from the default value, a wiring error has occurred. Check for correct polarity.
- Merge the connectors together correctly: connectors may only merged together when dry. Also make sure that a gap-free connection is possible and to respect maximum system voltage calculated at the expected lower operating temperature
- When connecting the modules in parallel, a corresponding overcurrent protection must be used. This can be achieved with direct current fuses, which prohibit return currents greater than 15 A.
- Furthermore, the connection requirements and design regulations of the inverter manufacturer must be observed.
- With multi rows structure, connect horizontal series of modules to different MPPT to reduce losses due to mismatch on reflected light on back side

6.3 Only use suitable materials:

The system may only be wired using special solar wires and suitable connectors. It is very important that all necessary materials are in a flawless electrical and mechanical condition. Only use single core wires and

chose an appropriate conductor size in order to minimize the voltage drop. For further connections of the modules only appropriate cables with a minimum conductor cross-section of 4 mm² must be used.

6.4 Protect the wires from adverse environmental effects:

- Only use UV-resistant cable ties for the attachment of the wires to the mounting system.
- Protect the exposed wire from possible damage, e.g. by routing it in plastic tubes. Avoid direct exposure to sunlight.
- IMPORTANT : the Isc and Uoc values specified on the module with reference to the STC conditions are normally exceeded during normal operation due to possible higher irradiation than standard 1000W/m^2 and also thanks to the bifacil. For this reason, refers to the data sheet of modules and to the installation system to determine the rated voltage values of conductors, fuse values and the size of control systems connected to the PV module output

7. MAINTENANCE OF MODULES

MegaCell recommends to inspect the installation on a regular basis with following minimum maintenance:

- Check the electrical and mechanical connections to verify that they are clean, secure and undamaged;
- Check that mounting hardware, terminal screws and grounding components are tightly secured with no corrosion;
- Check transition impedances of the potential equalization;
- Check that modules are not shaded by vegetation or any unwanted obstacles;

CAUTION

- Do not touch live parts of cables and connectors;
- Use appropriate safety equipment (insulated tools, insulating gloves, etc.) when handling modules;
- If any problem with the system or individual module arises, have them investigated by a competent specialist;
- Replacement modules must be the same type of those to be replaced;
- Modules generate high voltage when exposed to sunlight. Please cover both the front and rear surface of modules with an opaque non scratch material when repairing. Repairing works must be performed by specialized and properly trained personnel only;

NOTICE: Follow the maintenance instructions for all components used in the system, such as support frames, charge regulators, inverters, batteries etc.

8. CLEANING MODULES

Usually, the modules are automatically cleaned by rain. In the case of severe contamination, we recommend cleaning with plenty of water with a low lime content and without cleaning agents.

- Please do not use a nozzle attachment, and ensure that only moderate water pressure is used. Using cleaning products and scratching cleaning devices will damage the special anti-reflective coating and render the product and performance guarantees void. Under no circumstances may contaminants be scratched or rubbed off without moisture. Damage to the highly efficient anti-reflective surface may change the visual appearance of the module surface and result in decreased performance.
- Use of automatic cleaning machines for solar energy systems is at your own risk, and is not authorized by MegaCell in any way.

9. LIABILITY AND REVISION LEVEL OF THE INSTRUCTIONS

If any of the instructions given in the user information are not adhered to, MegaCell will not guarantee the availability and functionality of the modules. Since the compliance with the said safety instructions as well as the conditions and methods for installation, operation, usage and maintenance of the modules cannot be checked or monitored by MegaCell, MegaCell does not accept any liability for damage due to improper use, incorrect installation, operation, usage or maintenance. The text and the figures of this installation guide comply with the state of technology at the time of printing.

Subject to alterations.

Please retain a copy of this manual.

To download a copy of this installation manual
scan the QR-Code below
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