



## QUALITY ASSURANCE PROCESS:

### RESIDENTIAL AND SMALL COMMERCIAL PV PROJECTS

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*The Massachusetts Clean Energy Center (“MassCEC”) reserves the right to request inspection of any solar PV project that is either receiving an incentive or participating in a program administered by MassCEC. A site inspection is used to verify that a project applicant (the “Primary Installer”) is installing a solar PV system in compliance with MassCEC’s program-specific Minimum Technical Requirements, including installing in compliance with the Massachusetts Electric Code (edition based on electrical permit date), and using best workmanship practices. The third party inspection usually occurs after the municipal electrical inspection, and is meant to identify issues that might otherwise have been missed by a local inspector.*

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**The quality assurance (“QA”) inspection process supports the growth of the Massachusetts solar industry in several key ways:**

1. By ensuring high installation quality, MassCEC is helping to support installers who install projects that will be safe, efficient and long lasting.
2. By promoting high quality standards, MassCEC is helping to promote consumer confidence in the PV industry.
3. By collaborating with installers during the inspection process MassCEC makes each inspection a training opportunity for installers and, in some cases, local inspectors to expand their knowledge of solar codes, standards, and installation practices.

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### **REASONS TO REQUEST AN INSPECTION:**

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There are many reasons that MassCEC may request an inspection of a completed installation. Though MassCEC may inspect any project participating in our programs, projects selected for inspection typically fall into at least one of the following categories:



### NON EXPEDITED INSTALLER

An installer coming through an incentive program for the first time will have their first (Commonwealth Solar II) or first and second (Mass Solar Loan) installed systems inspected. See the appropriate program manual for the “Crawl Before you Walk” process for further details.

### WAIVER TO THE “CRAWL BEFORE YOU WALK” PROCESS

MassCEC may waive the “Crawl Before you Walk” requirement for installers participating in programs for the first time if they have done 10 or more residential installations, and they have received positive feedback from customer referrals. In this case, that installer does not have to go through the Design Review process, but MassCEC will inspect the first project, as well as a second project if the project initially scores in the Critical (1) or Major (2) category.

### FOR-CAUSE INSPECTION

MassCEC may elect to inspect a system based on evidence or reason to believe that an installed system may be installed in violation of the MassCEC programs’ Minimum Technical Requirements. This may be based on review of project completion documents, or other means.

### ADDITIONAL INSPECTIONS OF INSTALLER PROJECTS

Additional inspections of an installer’s work may be requested in the event that a previous system inspection received a project score in the Critical (1) or Major (2) category. See Scoring and Next Steps section below for more information.

### NON-SPECIFIC INSPECTION

MassCEC reserves the right to randomly inspect solar PV projects receiving an incentive. Installers who have not had recent inspections or with higher project volumes are more likely to receive non-specific inspections.

### SOLAR ADOPTION INITIATIVE PROGRAM INSPECTION

Under Solarize Mass or Mass Solar Connect, MassCEC will inspect a minimum of one system per program (i.e. community, group of communities, or non-profit). If there are multiple installers partnered for a program, a system for each installer will be inspected.



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## *INSPECTION PROCESS OVERVIEW*

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MassCEC utilizes a third party technical consultant to complete the inspections. Prior to any inspection taking place, the installer will be notified via email of the inspection and is encouraged to attend when possible. See the [Residential inspection overview](#) for more information. Please be sure contact information for the installer is up to date so that the third party technical consultant can schedule the inspection in an efficient manner. If you have any questions about who is currently the contact of record or you need to update that person, please reach out to MassCEC.

Following the completion of the QA field inspection, the third party technical consultant produces a QA Inspection Report and sends it to the Primary Installer for review and distribution. In general, reports are issued no later than two weeks following the inspection. In the case of a system shutdown due to unsafe conditions found during the QA inspection, the Primary Installer will be notified immediately and the report will be issued within five business days via email.

### **Scoring Criteria and Classifications**

MassCEC defines the following four deficiency categories for classifying nonconformance findings during QA Inspections in MassCEC programs. This list is not intended to be exhaustive and the third party technical consultant will fully evaluate each solar electric installation on a case-by-case basis. Issues listed as examples in one of the above categories could be more or less problematic in a particular installation, and thus fall into a different category for that installation. The inspection report is based upon the conditions found at the site on the day of the inspection. Ultimately, the field inspector will rely on his or her best judgment in determine the seriousness of a nonconforming item. In such cases, the third party technical consultant will explain in detail the basis their findings on the QA Inspection Report.

Each inspection is scored from 1 (poor) to 5 (excellent) based on how numerous and severe the issues are.

#### **5 – No Issues**

#### **4 - Incidental Non Conformance**

Incidental issues are not expected to impact system operation or safety under normal operating conditions but still represent non-compliance with relevant codes/standards. Examples include:

- Missing screws on indoor enclosure covers (but cover is still secure and renders interior of enclosure inaccessible)
- Installation debris (e.g., bits of wire, packing materials) left onsite
- Poor wire management that is not expected to cause a fault condition
- Equipment installed does not match Program records but is considered equivalent

#### 4 - Incidental Non Conformance cont'd

- Missing/incomplete labels
- Incorrect color code on wires
- Missing air sealing measures inside conduit that penetrates the wall or roof

#### 3 - Minor Non Conformance

Minor issues pose a mid to long-term risk of system failure or safety hazard

- Bonding neutral to ground in a meter enclosure
- Insufficient clearance around boxes
- Undersized circuit protection (nuisance tripping)
- Improperly supported conductors or conduit

#### 2 - Major Non Conformance

Major issues are deemed likely to impact system performance or safety in the short-term, though they do not pose an immediate hazard

- Missing equipment grounding
- Missing or undersized grounding electrode conductor
- Improperly secured PV modules
- Ungrounded equipment (module frames, racking, enclosures, etc.)
- Missing/inadequate thermal expansion joints in long conduit runs

#### 1 - Critical Non Conformance

Critical issues pose an immediate risk of system failure and/or safety hazard. Often, the technical consultant will shut down systems with this level of defect for safety reasons.

- Exceeding current limits on busbars and/or conductors
- System not operational (ground fault, disconnected conductors, etc.)
- Use of non-DC rated equipment in DC circuits
- *Multiple major-classified issues may also result in a final score of 1*



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## SCORING AND NEXT STEPS

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The score given is an indicator of the overall quality and compliance with MassCEC Program requirements of the system, based on the number and type of non-conformances observed.

When assigning a QA score, the inspector will consider the highest level of nonconformance observed during the field inspection as well as the volume of issues. For example, systems with any critical nonconformance will automatically receive a score of 1. A system with 2 “major” nonconformances would receive a score of 1, even if it had no critical nonconformances. A system with 4 minor nonconformances and no others would receive a score of 3, while a system with only 1 minor nonconformance would receive a score of 4 because it does not quite meet the requirements to get a 5, but exceeds the thresholds to get a score of 3. The final score, however, will be informed by the field inspector, who will have the latitude to recommend a higher or lower score based on a holistic view of the installation.

The QA Inspection Report is based upon the conditions found at the site on the day of the inspection. Nonconformances that are corrected during the inspection will still be recorded in the report. All nonconformance defect categories are also identified on the inspection report.

The QA Inspection Report is based upon the conditions found at the site on the day of the inspection. Nonconformances that are corrected during the inspection will still be recorded in the report and reflected in the QA score. All nonconformance defect categories are also identified on the inspection reports.

***If the QA Inspection Report received a score of 4 or below***, the Primary Installer will receive a template Corrective Action Response (CAR). The contractor must make corrections and submit photo evidence that they have all been completed within 30 days of issuance.

***If the QA Inspection report received a score of 3***, the installer will be required to work with MassCEC to demonstrate the installers’ commitment to improving internal QA processes.

***If the QA Inspection report received a score of 2***, the installer can expect at least one additional inspection request and will be required to work with MassCEC to demonstrate the installers’ commitment to improving internal QA processes.

***If the QA Inspection report received a score of 1***, the installer can expect two additional inspection requests and will be required to work with MassCEC to demonstrate the installers’ commitment to improving internal QA processes.

***MassCEC has the authority to elect to modify the QA process on a case by case basis.***



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## *CODE OF CONDUCT*

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Failure to maintain passing QA scores, work with MassCEC and its contractors on scheduling inspections, or failing to respond to low scoring QA Inspection reports in a timely manner, may be grounds for disciplinary action. Disciplinary actions may include increased inspection rates, limited access to MassCEC programs and resources for future projects, or removal from MassCEC programs. For more information, see the MassCEC contractor [Code of Conduct](#).

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## *QUESTIONS*

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MassCEC encourages installers to consider the QA process as an additional value of participation and as a learning opportunity. Please submit all questions about this process to [solarloan@masscec.com](mailto:solarloan@masscec.com).