



## PV RACKING CRITERIA FOR EFFECTIVE ROOFTOP SOLAR INTEGRATION

*Center PV Taskforce*

*Draft Date: December 19, 2011*

The Center PV Taskforce is proud to release a draft copy of *PV Racking Criteria for Effective Rooftop Solar Integration*. The document has been prepared by taskforce members and is meant to provide criteria and recommended actions items for the installation of rooftop solar racking systems. This draft copy only contains preliminary recommendations. Members of the solar industry and other interested parties are encouraged to participate in future taskforce discussions between roofing and solar industry stakeholders. Taskforce members also will accept comments from the at-large community and consider those comments within internal stakeholder discussions.

### *Directions for submitting public comments:*

1. The Center PV Taskforce has released this document for the express purpose of engaging the solar industry, including racking manufactures, module manufactures and installers.
2. The racking criteria below are organized into seven sections. Each section lists a specific intent, criterion language, examples and recommended actions.
3. General and specific comments will be accepted.
4. All comments shall be submitted electronically to [PVTaskforce@RoofingCenter.org](mailto:PVTaskforce@RoofingCenter.org).
5. All comments shall be submitted no later than **5:00 p.m. EST on Tuesday, January 31, 2012**.
6. Any questions regarding this document or the Center PV Taskforce should be directed to the email address provided above, or by telephone to (202) 380-3371.
7. For information about becoming a part of the Center PV Taskforce, please contact Justin Koscher at [JustinK@RoofingCenter.org](mailto:JustinK@RoofingCenter.org), or by telephone to (202) 380-3371.

The Center PV Taskforce was formed to bridge the gap and increase communication between the roofing and solar industries. We hope the release of this document will catalyze enhanced collaboration between key stakeholders from the solar and roofing industries, and accelerate the deployment of high performance roofing systems.

Kind regards,

*Center PV Taskforce*

**Intent: Maintain primary purpose of roofing system—watertightness for expected lifespan**

CRITERION	EXAMPLES	RECOMMENDED ACTIONS
<p><b>A.</b> The racking system should be designed so that external forces acting on the rack do not compromise roof waterproofing integrity. All vertical and horizontal loads should be transferred to the building structure without deforming or overloading the roofing system. Loads to be considered include horizontal wind load, vertical wind uplift load, vertical dead load, vertical snow load as well as non-specific vibratory loads from external forces or building equipment.</p>	<p><b>A.1.</b> Base mounts of ballasted and self-ballasting racks may puncture, cut or abrade the roof waterproofing surface through vibration or creep.</p>	<p><b>A.1.a.</b> Include durable cushioning of compatible materials between all base mounts and the roofing surface.</p>
		<p><b>A.1.b.</b> Inclusion of expansion/contraction joints to create compatible loading between roofing and racking system.</p>
	<p><b>A.2.</b> Base mounts of mechanically attached racking systems may move laterally under load, causing distortion and failure of flashing and sealing materials.</p>	<p><b>A.2.a.</b> Reduce or eliminate lateral racking movement with mechanical anchorage to the building structure and/or inclusion of expansion/contraction joints.</p>
		<p><b>A.2.b.</b> Use flexible flashing details and materials that accommodate lateral movement.</p>
	<p><b>A.3.</b> Racking systems that are fully adhered to the roof surface may exert upward lift forces that could disbond the roof waterproofing membrane.</p>	<p><b>A.3.a.</b> Obtain UL or FM wind ratings for the combined racking/roof waterproofing system.</p>
	<p><b>A.4.</b> Base mounts of ballasted and self-ballasting racks may overload the underlying roof surface area, causing puncture or permanent compression of the roofing system.</p>	<p><b>A.3.b.</b> Include additional uplift loading when engineering roofing system.</p>
		<p><b>A.4.a.</b> Use base mounts with sufficient surface area to distribute vertical loads in accordance with roofing system without cutting or compressing the underlying roofing system.</p>

**Intent: Maintain expected longevity of roofing system**

CRITERION	EXAMPLES	RECOMMENDED ACTIONS
<p><b>B.</b> The components of the racking system should be designed to prevent or mitigate premature failure that could compromise roof waterproofing integrity.</p>	<p><b>B.1.</b> Ballasting materials such as concrete pavers may deteriorate, causing increased racking movement and puncture of the roof surface.</p>	<p><b>B.1.a.</b> Use racking trays/holders of compatible material that can contain deteriorated and cracked pavers. Use ballast pavers that have been tested for long-term durability.</p>



**Intent: Maintain warrant of roofing system through solar installation**

CRITERION		EXAMPLES	RECOMMENDED ACTIONS
<b>C.</b>	For installations over a new or existing roofing system warranted by a roof system manufacturer or other warranty issuer, flashings at all racking and mount penetrations should be reviewed and approved by the manufacturer/warranty issuer.	<b>C.1.</b> Flashing details not reviewed and approved by the roof system manufacturer/roof warranty issuer.	<b>C.1.a.</b> Use flashing details that have been reviewed and approved by the roof system manufacturer/roof warranty issuer and installed by approved applicator for PV related flashing installations.

**Intent: Follow published roofing best practices**

CRITERION		EXAMPLES	RECOMMENDED ACTIONS
<b>D.</b>	For installations over a new or existing roofing system NOT warranted by a roof system manufacturer or other warranty issuer, flashings at all racking and mount penetrations should conform to the National Roofing Contractors Association (NRCA) guidelines.	<b>D.1.</b> Flashing details not in conformance with NRCA guidelines.	<b>D.1.a.</b> Use flashing details in conformance with NRCA guidelines installed by trained applicator for PV related installations with workmanship guarantee.

**Intent: Reduce or eliminate temperature impact on roofing system**

CRITERION		EXAMPLES	RECOMMENDED ACTIONS
<b>E.</b>	The racking system should be designed so that thermal expansion/contraction of the rack does not compromise roof waterproofing integrity.	<b>E.1.</b> Base mounts of ballasted and mechanically attached racking systems may move laterally due to rack expansion/contraction, causing distortion and failure of flashing and sealing materials.	<b>E.1.a.</b> Use racking clips and attachments of compatible material that accommodate thermal expansion without transferring movement to the underlying roofing system.

**Intent: Allow roofs to retain proper drainage**

CRITERION		EXAMPLES	RECOMMENDED ACTIONS
F.	The racking system should be designed so that water drainage on the roof is not restricted.	F.1. Racking systems with horizontal elements (either structural elements or wireways) directly impinging on the roof plane and blocking roof drainage flow.	F.1.a. Maintain minimum 8" clearance between the roof surface and any horizontal element of the racking system.
			F.1.b. Orient the racking system so that horizontal elements are parallel to roof drainage flow.

**Intent: Create safe access to roofing system for maintenance and life safety personnel**

CRITERION		EXAMPLES	RECOMMENDED ACTIONS
G.	The racking system should be designed to allow safe and effective roof system inspection, leak detection, maintenance and repair.	G.1. Racking systems that obstruct effective observation and maintenance of underlying roof surfaces by roofing workers.	G.1.a. Provide designated walkway areas between and around racks.
			G.1.b. Provide clearances between the racking system and the roof surface sufficient for effective inspection and maintenance.
			G.1.c. Provide for effective removal/replacement for roof maintenance and servicing.
		G.2. Racking systems with exposed wires that compromise the safety of roofing workers.	G.2.a. Install wiring in integrated wireways elevated from roof surface.

*[End of Document]*