



Issue Date	September 6, 2011
Code/Section	IBC 1604.9, IBC 1604.1 and ASCE 7-05, Chapters 11 - 15
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Issue:

The question is whether structural supports for photovoltaic panels installed on a structure or a roof system require positive connection or can be exempt per ASCE 7-05, 13.1.4 – Exemptions.

Interpretation:

Typically photovoltaic panels are installed using structural supports on a structure or a roof system. Panels can be categorized as either mechanical or electrical components. ASCE 7-05, Chapter 11 defines supports such as: braces, frames, legs, lugs, snubbers, hangers, saddles, or struts as structural members, responsible for transmitting loads between the non-structural components and the structure.

It is the intent of the code that any support member used for non-structural component shall be bolted, welded or otherwise positively fastened without consideration of frictional resistance produced by the effects of gravity, therefore excluded from 13.4.1 – Exemptions.

For the design of the attachment capacities, appropriate seismic coefficients for mechanical and electrical components and their supports shall be selected from Table 13.6-1.

Alternate Design approach:

Ballasted mounting method for Photovoltaic Systems shall be acceptable under PBCC Section 104.10. All calculations and drawings details shall be under the seal and signature of responsible Arizona registrant. Following stipulations apply:

When evaluating the seismic resistance force, please refer to following coefficient of friction values:

Materials and Material Combinations		Static Frictional Coefficient - μ_s	
		Clean and Dry Surfaces	Lubricated and Greasy Surfaces
Aluminum	Aluminum	1.05 - 1.35	0.3
Aluminum	Mild Steel	0.61	
Cast Iron	Cast Iron	0.15	0.07
Cast Iron	Oak	0.49 ¹⁾	0.0751
Cast iron	Mild Steel	0.23	0.21, 0.133
Copper-Lead alloy	Steel	0.22	
Copper	Copper	1	0.08
Copper	Cast Iron	0.29	
Copper	Mild Steel	0.36	0.18
Hemp rope	Timber	0.5	
Polystyrene	Polystyrene	0.5	0.5
Polystyrene	Steel	0.3-0.35	0.3 - 0.35
Polythene	Steel	0.2	0.2
Polystyrene	Polystyrene	0.5	0.5
Rubber	Cardboard	0.5 - 0.8	
Rubber	Dry Asphalt	0.9 (0.5 - 0.8)	
Rubber	Wet Asphalt	0.25 - 0.75	
Rubber	Dry Concrete	0.6 - 0.85	
Tarred fiber	Cast Iron	0.15	
Tarred fiber	Aluminum	0.18	
Wood	Clean Wood	0.25 - 0.5	
Wood	Wet Wood	0.2	
Wood	Clean Metal	0.2 - 0.6	
Wood	Wet Metals	0.2	
Wood	Concrete	0.62	
Wood	Brick	0.6	
Wood - waxed	Dry snow	0.04	

Source: www.EngineeringToolBox.com

¹⁾ Kinetic or sliding frictional coefficient - holds only when there is a relative motion between the surfaces; otherwise they are somewhat higher

Required ballast load for the new system and roof live load original design criteria shall be identified on the structural plans along with any design revisions required per analysis. If the ballast and equipment loads exceed the design live load for which the roof and its members were designed, structural calculations shall be performed and submitted for review to the City per 3403.2.

Revised roof drainage plans are required to show water shed off pathway, locations of existing roof drains and any design considerations to mitigate potential ponding issues.

Rain load analysis may be required as per IBC Section 1611, ASCE 7-05 Chapter C8.