


ALAMEDA FIRE DEPARTMENT

	Subject: Solar Photovoltaic Systems Standard – Residential Only	Standard Number 07-002
	Approved By: Fire Chief David Kapler	Page 1 of 7
	Refer To: Fire Marshal Michael Fisher	Effective Date: March 25, 2010
	Policy Review Date:	Revised Date: March 25, 2010

Fire Prevention Standards

The Alameda Fire Department (AFD) has developed a standard of conditions to ensure firefighter and public safety for all solar Photovoltaic (PV) systems. The AFD appreciates the environmental friendly technologic advances these systems bring. However, traditional firefighting techniques such as roof venting, water extinguishment and fire overhaul will have to be modified to ensure human safety. Roofs that contain solar arrays will be most difficult for firefighters to vent. Delayed roof venting may increase the time factor in fire containment resulting in a greater extent of fire damage overall. Additional roof loading by PV systems may also cause the roof integrity to be compromised sooner during fire conditions. Conventional water extinguishment on roofs with solar PV systems may not be an option for firefighters if the integrity of any portion of the solar array is threatened, as the risk of accidental electrocution is greatly increased. Fire overhaul will also be a challenge for firefighters, as broken panels or compromised solar conduit will remain energized during daylight hours or when illuminated by lights.

The following conditions will apply to all roof and ground mounted solar PV systems:

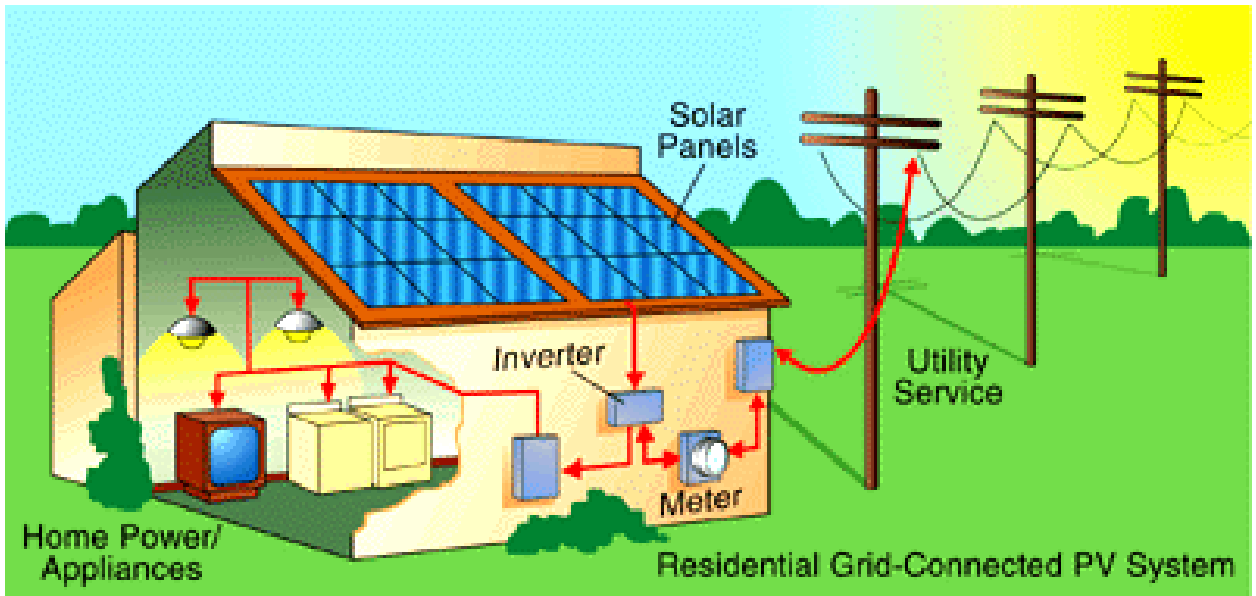
1. There will be a minimum of 36” of walking space around the perimeter of solar arrays installed on roofs.
2. Ground mounted solar arrays will be erected in areas clear of combustible vegetation. A minimum vegetation clearance or mowed perimeter of 10’ shall be maintained.
3. All solar conduits, interior or exterior, will be permanently labeled with fade resistant material as follows: “CAUTION Solar PV Wiring May Remain Energized After Disconnection During Daylight Hours.” (See attached signage requirements.)
4. Battery storage in enclosed rooms to be mounted a minimum of 24” above floor. If contained within cabinet, a permanent placard is to be posted.
5. Permanent placard installed on exterior and interior of main electrical panel stating: “CAUTION Solar PV System Installed. When Power Disconnected, Solar Panels And Wiring May Remain Energized During Daylight Hours.”
6. All disconnects shall be accessible to fire department and located together when possible.
7. The maximum length or width shall not exceed 100 feet.

I have read the above safety concerns involved in the installation of a solar PV system and understand the conditions

Signed by _____

Date _____

Print Name _____



SIGNAGE REQUIREMENTS FOR SOLAR PV SYSTEMS

Two forms of signage are required for solar PV systems. Permanently affixed labels should have a white background with reflective red lettering. Printed material should resist fading. Size of lettering should be equal to the example below.

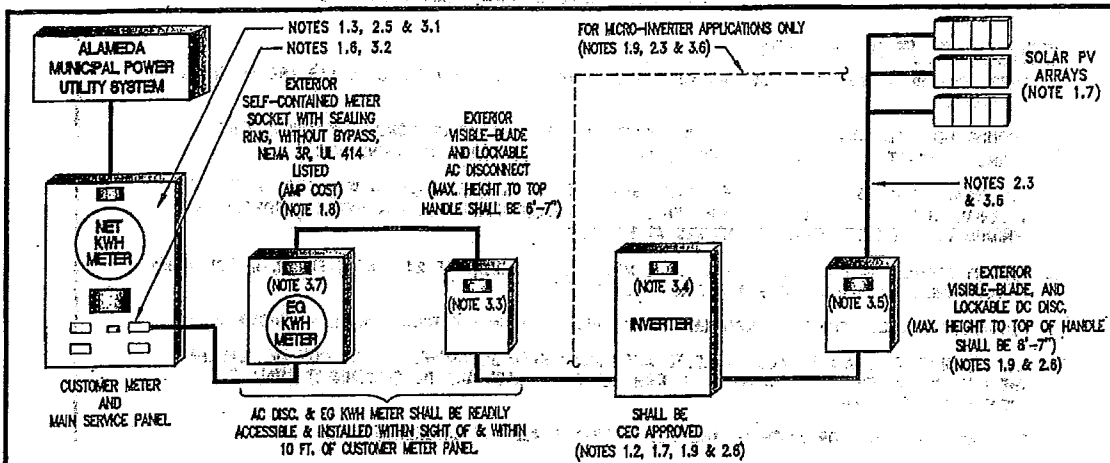
1. Exterior /Interior Conduit Signage:

To be installed every 20'. For vertical conduit, a minimum of one label to be affixed at eye level.

CAUTION
**Solar PV Wiring May Remain Energized
After Disconnection During Daylight Hours.**

2. Exterior/Interior of Electrical Panel Signage:

CAUTION
**Solar PV System Installed. When Power Disconnected,
Solar Panels And Wiring In Conduit To Inverter May
Remain Energized During Daylight Hours.**



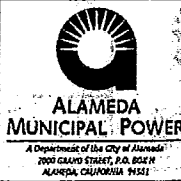
BLOCK DIAGRAM SOLAR PV INSTALLATION

1.0 GENERAL NOTES

- 1.1 ALL EQUIPMENT AND INSTALLATION SHALL MEET ALL APPLICABLE PROVISIONS OF THE FOLLOWING STANDARDS: UL STANDARD 1703, IEEE 929-2000, AND UL STANDARD 1741.
- 1.2 ALL EQUIPMENT AND INSTALLATION SHALL COMPLY WITH ALAMEDA MUNICIPAL POWER'S (AMP'S) INTERCONNECTION AND PURCHASE AGREEMENT FOR NET ENERGY METERING, AMP'S RULES AND REGULATIONS, ALAMEDA ELECTRICAL CODE, CALIFORNIA ELECTRICAL CODE, NATIONAL ELECTRICAL CODE ARTICLE 690, CALIFORNIA STATE FIRE MARSHAL REGULATIONS, AND CALIFORNIA ENERGY COMMISSION'S (CEC) NEW SOLAR HOME PARTNERSHIP (NSHP) OR CALIFORNIA PUBLIC UTILITIES COMMISSION'S (CPUC) CALIFORNIA SOLAR INITIATIVE (OSI) LISTS OF ELIGIBLE EQUIPMENT.
- 1.3 IF THE EXISTING ELECTRICAL METER IS NOT CAPABLE OF MEASURING THE FLOW OF ELECTRICITY IN TWO DIRECTIONS, THE CUSTOMER SHALL BE RESPONSIBLE FOR ALL EXPENSES INVOLVED IN PURCHASING AND INSTALLING A NET KWH METER THAT IS ABLE TO MEASURE ELECTRICITY FLOW IN TWO DIRECTIONS.
- 1.4 CUSTOMER SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH THE SOLAR PHOTOVOLTAIC SYSTEM INSTALLATION INCLUDING ALL AMP'S COSTS THAT ARE RELATED TO THE PROJECT.
- 1.5 CUSTOMER SHALL OBTAIN A CITY OF ALAMEDA ELECTRICAL PERMIT.
- 1.6 SOLAR PHOTOVOLTAIC SYSTEM SHALL TERMINATE ON ITS OWN AC BREAKER IN THE MAIN SERVICE EQUIPMENT EXCLUSIVELY.
- 1.7 CUSTOMER SHALL CONTACT AMP AT (510) 748-3996 AS SOON AS THE SOLAR PV MODULES AND INVERTER(S) ARRIVE AT THE JOB SITE TO SCHEDULE A PRE-INSTALLATION INSPECTION. THE LIST OF ELIGIBLE PV EQUIPMENT CAN BE FOUND AT WWW.GOSOLARCALIFORNIA.COM/EQUIPMENT/INDEX.HTML.
- 1.8 METER SOCKET INSTALLATION SHALL BE SUBJECT TO AMP'S APPROVAL. METER HEIGHT SHALL BE 48" MIN. AND 66" MAX. WHEN INSTALLED NEAR DRIVEWAY, METER HEIGHT SHALL BE 72" MIN. AND NOT MORE THAN 75".
- 1.9 THE DC DISCONNECT AND THE INVERTER AT GRADE LEVEL WILL NOT BE REQUIRED IF MICRO-INVERTER TECHNOLOGY IS PROPOSED ON THE SOLAR PV MODULES.
- 1.10 AMP RESERVES THE RIGHT TO WITNESS THE FUNCTIONAL TESTS OF THE SOLAR PHOTOVOLTAIC SYSTEM INSTALLATION. THE CUSTOMER SHALL NOTIFY AMP AT LEAST 5 DAYS PRIOR TO THE ESTABLISHED DATE OF INSPECTION OR TESTING.
- 1.11 APPROVAL FOR PARALLEL OPERATION WITH AMP'S DISTRIBUTION SYSTEM IS SUBJECT TO SUCCESSFULLY MEETING ALL REQUIREMENTS BY THE CITY'S BUILDING SERVICES DEPARTMENT AND AMP.
- 1.12 CUSTOMER SHALL SUBMIT DETAILED INFORMATION ON THE INVERTER TO VERIFY UL 1741 COMPLIANCE. THE CUSTOMER INVERTER SHALL HAVE THE FOLLOWING MINIMUM SPECIFICATIONS FOR PARALLEL OPERATION WITH AMP'S ELECTRIC DISTRIBUTION SYSTEM:
 - INVERTER OUTPUT SHALL AUTOMATICALLY DISCONNECT FROM AMP'S UTILITY SOURCE UPON LOSS OF UTILITY VOLTAGE AND SHALL NOT BE RECONNECTED UNTIL THE UTILITY VOLTAGE HAS BEEN RESTORED.
 - INVERTER SHALL AUTOMATICALLY DISCONNECT FROM AMP'S UTILITY SOURCE WITHIN 2 CYCLES (33ms) IF THE UTILITY VOLTAGE FLUCTUATES BEYOND $\pm 10\%$.
 - INVERTER SHALL AUTOMATICALLY DISCONNECT FROM AMP'S UTILITY SOURCE WITHIN 3 CYCLES (50ms) IF THE UTILITY FREQUENCY FLUCTUATES ± 1 CYCLE (16ms).
 - INVERTER OUTPUT DISTORTION SHALL MEET THE IEEE 519 STANDARDS.

MA-PwrDwg-L_Constructions&id\11578-1.DWG APRIL 30, 2009

REV	DESCRIPTION	BY	DATE
0	NEW DRAWING	AC	04/15/08
1	REQUIRED PERFORMANCE METER	AC	05/12/08
2	REVISED NOTES 1.2, 1.3, 1.7, 1.9, 2.3, 2.5 & 3.0	AC	06/17/08
3	REMOVED EMER. DC DISC. & ADDED MICRO INVERTER OPTION	AC JU	12/11/08
4	CHANGED NAME TO ALAMEDA MUNICIPAL POWER	AC	04/30/09



TITLE			
SINGLE METER SOLAR PV INSTALLATION NET METERING (UP TO 10KW)			
DRAWN BY	DATE	DWG. NO.	REV.
MA/2/09	APRIL 30, 2009	1-L-578	4
REVIEWED BY	DATE	SCALE	SHT. 1 OF 2
JWA		MTS	

2.0 INSTALLATION REQUIREMENTS:

- 2.1 THERE WILL BE A MINIMUM OF 36" WALKING SPACE AROUND THE PERIMETER OF SOLAR ARRAYS INSTALLED ON ROOFS.
- 2.2 GROUND MOUNTED SOLAR ARRAYS WILL BE ERECTED IN AREAS CLEAR OF COMBUSTIBLE VEGETATION. A MINIMUM VEGETATION CLEARANCE OR MOWED PERIMETER OF 10" SHALL BE MAINTAINED.
- 2.3 ALL SOLAR CONDUITS, INTERIOR OR EXTERIOR, SHALL BE PERMANENTLY LABELED WITH FADE RESISTANT MATERIAL AS SHOWN IN 3.6. THIS LABEL SHALL BE INSTALLED EVERY 20'. FOR VERTICAL CONDUIT, A MINIMUM OF ONE LABEL SHALL BE AFFIXED AT EYE LEVEL.
- 2.4 BATTERY STORAGE IN ENCLOSED ROOMS TO BE MOUNTED A MINIMUM OF 24" ABOVE FLOOR. IF CONTAINED WITHIN CABINET, A PERMANENT PLACARD IS TO BE POSTED.
- 2.5 PERMANENT PLACARD SHALL BE INSTALLED ON EXTERIOR OF MAIN ELECTRICAL PANEL AS SHOWN IN 3.1.
- 2.6 ALL DISCONNECTS SHALL BE ACCESSIBLE TO AUTHORIZED REPRESENTATIVES OF THE CITY OF ALAMEDA. THE NET KWH METER, AC DISCONNECT, EG KWH METER, INVERTER AND DC DISCONNECT SHALL BE LOCATED TOGETHER WHEN POSSIBLE.
- 2.7 THE MAXIMUM LENGTH OR WIDTH OF THE SOLAR ARRAY SHALL NOT EXCEED 100 FEET.

3.0 LABELING REQUIREMENTS

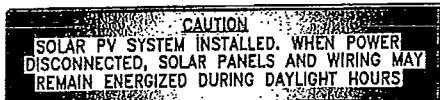
LABELS SHALL HAVE A RED BACKGROUND WITH REFLECTIVE WHITE LETTERING AND SHALL BE FADE-RESISTANT. LETTERS SHALL BE 1/4-INCH MINIMUM. ALL LABELS SHALL BE PERMANENTLY INSTALLED ON EQUIPMENT.

LABEL LOCATION AND LABELING:

3.1 ELECTRIC PANEL (NOTE 2.5)



AND



3.2 ELECTRIC PANEL PV BREAKER. LETTERS MAY BE REDUCED TO 1/8-INCH MINIMUM IN HEIGHT AND INSTALLED IN THE MAIN ELECTRICAL PANEL, ADJACENT TO THE BREAKER.



3.3 AC DISCONNECT



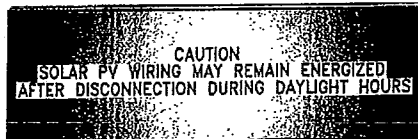
3.4 INVERTER



3.5 DC DISCONNECTS (NEAR INVERTER)



3.6 CONDUITS (NOTE 2.3)



3.7 ENERGY GENERATED (EG) METER



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REV	DESCRIPTION	BY	DATE
0	NEW DRAWING	AC	04/15/08
1	ADDED LABEL 3.8	AC	05/12/08
2	REVISED NOTES 1.2, 1.3, 1.7, 1.9, 2.3, 2.5 & 3.0	AC	06/17/08
3	REMOVED EMER. DC DISC. & CHANGED WHITE TO RED BACKGROUND LABELS	AC JU	12/11/08
4	CHANGED NAME TO ALAMEDA MUNICIPAL POWER	AC	04/30/09



TITLE :			
SINGLE METER SOLAR PV INSTALLATION NET METERING (UP TO 10KW)			
DRAWN :	rejoice/BJA	DATE: APR 30, 2009	DWG. NO. :
REVIEWED:			1-L-578
APPROVED:	JWA	SCALE : NTS	SHT 2 OF 2



**ALAMEDA
MUNICIPAL POWER**
A Department of the City of Alameda

2000 Grand Street
P.O. Box H
Alameda, CA 94501-0263

**PRELIMINARY SINGLE METER SOLAR PV INSTALLATION NET METERING
(UP TO 10 KW) PLANNING SHEET**

Project Name: _____
 Location: _____
 Electrical Consultant or Applicant Completing Form: _____
 Address: _____ Telephone No.: _____
 Tentative Date of Parallel Operation of the Solar PV installation with the Utility System: _____

BUILDING AND METERING INFORMATION

- Number of Meters in the Building: _____
- Customer Meter Number: _____

SOLAR PV EQUIPMENT INFORMATION

- PV Modules (per UL Standard 1703):
 Orientation (90°E to 270°W): _____; Tilt/Incline (0° to 60°): _____
 Model #: _____; Rating (Watt/Module): _____; No. of Modules: _____
 No. of Strings of Modules: _____; String Protection: Yes; No
- Inverter (per UL Standard 1741); Micro-Inverter: Yes; No
 CSI/NSHP Listed; Outdoor (NEMA 3R or better); Indoor (NEMA 1 or better)
 Model: _____; Size (Watts): _____; Efficiency (%): _____
 Output Rating (Watts): _____; Volts: _____; Amps: _____; %THD _____
 Includes Performance Meter: Yes; No
- PV Energy Storage Subsystem: None: _____; Battery: _____; UPS: _____
- AC Lockable Disconnect Rating: _____ Amps; Knife Blade; Fused Switch; OR Breaker
- PV Breaker Rating in Main Electrical Srvc Panel: _____ Amps
- Main Panel Busbar Rating: _____ Amps
- DC Lockable Disconnect Rating: _____ Amps; Knife Blade; Fused Switch; OR Breaker
- EG Meter Socket (for AMP Supplied Meter) with _____ Jaws
 Sealing Provisions: Yes; No
- Warning Labels and Equipment Compliance (per AP&T Standard Drawing 1-L-578): Yes; No

OTHER REQUIRED INFORMATION

Cost Breakdown for Meter Socket Installation Submitted to Alameda Municipal Power: Yes; No
 Drawing Submittals: Site Plan & System Layout; 1-Line or 3-Line Diagram;
 Equipment data and/or Cut-sheets; Other: _____
 Alameda Municipal Power Interconnection and Purchase Agreement Yes; No
 City of Alameda Electrical Application Permit Number: _____

NOTE: Alameda Municipal Power intends to use this form for preliminary job planning.
 The service equipment will also have to be inspected and approved by the City's Electrical Inspector, (510) 748-4634, and the Alameda Fire Department, (510) 337-2120, before it can be energized.