

Distributed Resources Engineering (DRE) Interconnection Updates

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2022



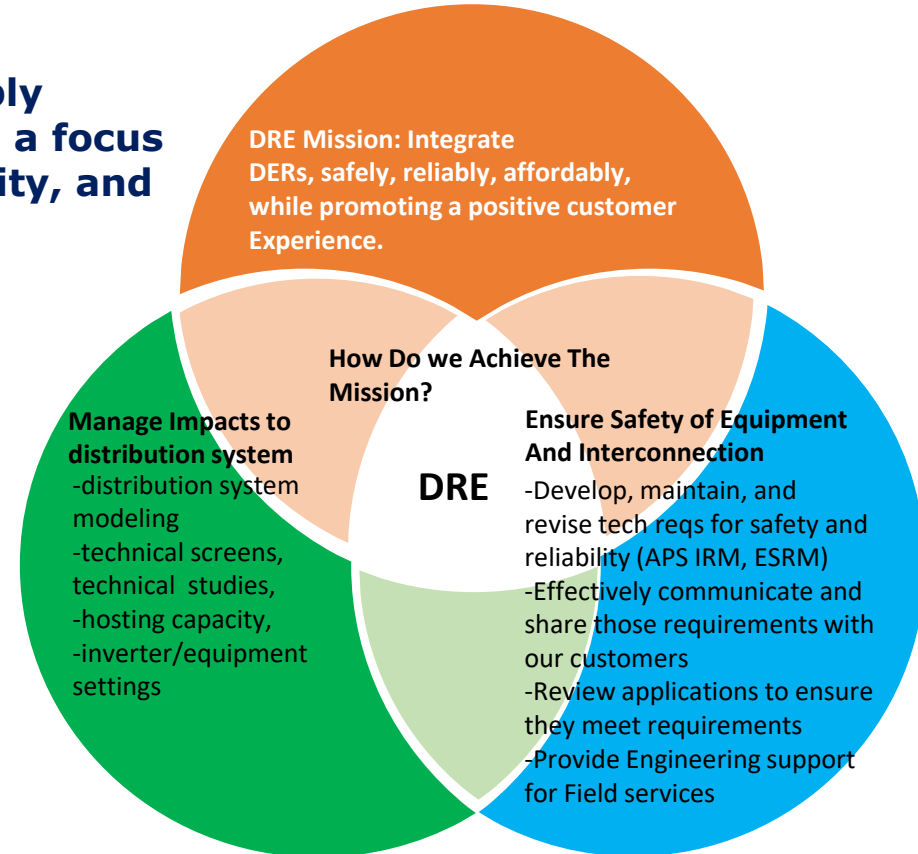
Agenda Topics

- DRE Mission
- Interconnection Requirements and Process
- Where to find Interconnection Information
 - Templates, checklists, & diagrams
- Inverter Settings
- APS Core Equipment
- Helpful Tips
 - Elevation Plan



DRE's Mission:

To partner with our customers to sustainably integrate DERs to the distribution grid with a focus on safety, reliability, flexibility, power quality, and customer affordability.



State Level Interconnection Rules & APS Interconnection Requirements Manual Updates/Alignment

- Formal Rules Adopted in February 2020
 - https://apps.azsos.gov/public_services/Title_14/14-02.pdf
- APS submitted IRM Rev. 8.5 in July 2020
- APS currently working toward a submittal of Version 9.0 which aligns with the Rules as well as ACC Staff and Stakeholder Comments

14 A.A.C. 2 Supp. 20-1
www.azsos.gov

Arizona Administrative CODE

**Office of the Secretary of State
ADMINISTRATIVE RULES DIVISION**

**TITLE 14. PUBLIC SERVICE CORPORATIONS; CORPORATIONS AND ASSOCIATIONS;
SECURITIES REGULATION**

CHAPTER 2. CORPORATION COMMISSION - FIXED UTILITIES

The table of contents on the first page contains quick links to the referenced page numbers in this Chapter. Refer to the notes at the end of a Section to learn about the history of a rule as it was published in the *Arizona Administrative Register*.

Sections, Parts, Exhibits, Tables or Appendices codified in this supplement. The list provided contains quick links to the updated rules. This Chapter contains rule Sections that were filed to be codified in the Arizona Administrative Code between the dates of January 1, 2020 through March 31, 2020.

R14-2-2601. Definitions	200	R14-2-2626. Utility Reporting Requirements	213
R14-2-2602. Applicability	201	R14-2-2627. Electric Cooperatives	213
R14-2-2603. Types of Generating Facilities	201	R14-2-2628. Interconnection Manuals	213
R14-2-2604. Customer Rights and Responsibilities	202		
R14-2-2605. Utility Rights and Responsibilities	203		
R14-2-2606. Easements and Rights-of-Way	203		
R14-2-2607. Insurance	203		
R14-2-2608. Non-Circumvention	203		
R14-2-2609. Designation of Contact Persons	204		
R14-2-2610. Minor Modifications	204		
R14-2-2611. Certification	204		
R14-2-2612. No Additional Requirements	204		
R14-2-2613. Disconnection from or Reconnection with the Distribution System	204		
R14-2-2614. Application and Generating Facility General Requirements	205		
R14-2-2615. Screens	205		
R14-2-2616. Pre-Application Report	206		
R14-2-2617. Level 1 Super Fast Track	207		
R14-2-2618. Level 2 Fast Track	207		
R14-2-2619. Level 3 Slushy Track	208		
R14-2-2620. Supplemental Review	209		
R14-2-2621. Utility Site Inspection, Approval for Parallel Operation	210		
R14-2-2622. Interconnection to a Secondary Spot Network System	211		
R14-2-2623. Expedited Interconnection Process	211		
R14-2-2624. Disconnect Switch Requirements	212		
R14-2-2625. Advanced Investor Requirements	212		

Questions about these rules? Contact:

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 Address: Arizona Corporation Commission
 Utilities Division
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 Phoenix, AZ 85007
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 1200 W. Washington St.
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 E-mail: MSScott@azcc.gov
 Web site: www.azcc.gov

The release of this Chapter in Supp. 20-1 replaces Supp. 19-2, 1-199 pages
 Please note that the Chapter you are about to replace may have rules still in effect after the publication date of this supplement. Therefore, all superseded material should be retained in a separate binder and archived for future reference.

ACC/APS Interconnection Requirements

- Apply to all systems that interconnect to the grid
- System Categories
 - Exporting Systems
 - PV, Battery, anything that regularly exports to the grid
 - Inadvertent Export Systems
 - Programmed Not to Export, (PV + Inverters/Battery)
 - Non-Exporting Systems
 - Separate Systems, Back Up Only
- Screens for each track to determine if further study is needed
 - 4 Review Tracks based on system size/category
 - Expedited (Inadvertent Export System under 20 kW)
 - Super Fast (Exporting Systems under 20 kW)
 - Fast (Systems between 20 kW and 2 MW)
 - Study Track (Systems over 2 MW)
- APS interconnection requirements
 - Align with Rules
 - Provide more detailed technical and safety requirements
 - Updates being made to address ACC Staff and Stakeholder Comments



Screens for Systems under 20 kW

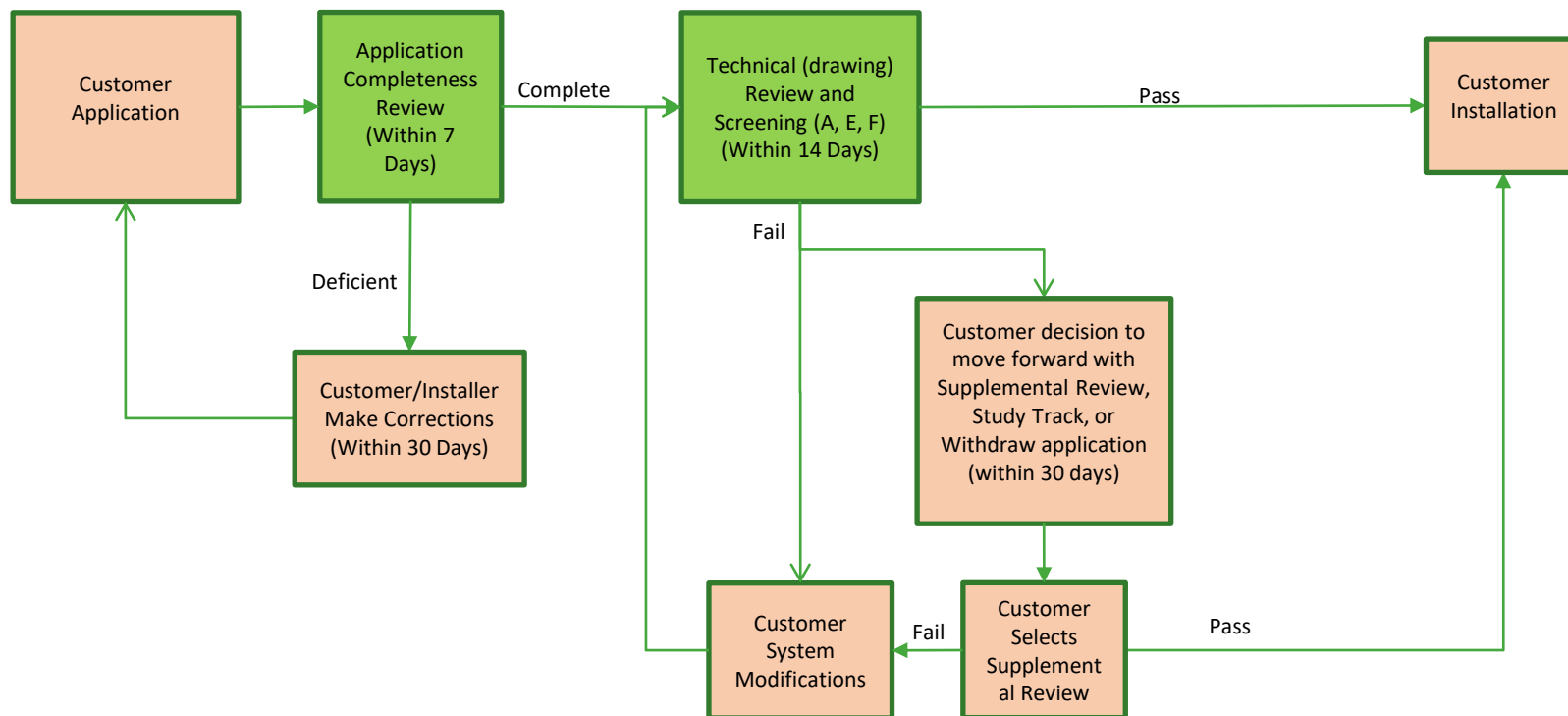
- Screen A
 - Limits the aggregate generation that can be interconnected to a distribution line without additional study.
 - Under 15% of annual peak load, or
 - Under hosting capacity calculated for that distribution line (whichever is greater)
- Screen E
 - Limits the aggregate generation capacity on a single-phase shared secondary to under 75% of the transformer rating without additional study
- Screen F
 - Limits the current imbalance of a system connected to a single phase system that is connected to a transformer providing 120/240V secondary service to under 20% of the rating of the transformer between the two sites of the 240 V service.



HOW SOLAR POWER SYSTEM WORKS!



General Application Review Process for Systems under 20 kW-Super Fast Track



Tour of aps.com/dg

In the works

- Improvements to APS.com/dg to improve customer and installer experience
 - Content focused on:
 - Will you add PV, Battery storage, or other technology?
 - Are you a Customer or Installer?
 - Installing at a Home or Business?



Inverter Settings Submittals

- APS Required IEEE 1547-2018 Advanced Inverter Settings
- Submit inverter settings via PowerClerk as a .csv file
- Inverter Settings Agreement
- Settings and Sample Agreement on aps.com/dg
- Late Summer/early Fall 2022 implementation

APS Core Equipment

Shelly Born



Is all this equipment necessary?

- “Growth creates complexity, which requires simplicity.”
 - Mike Krzyzewski.



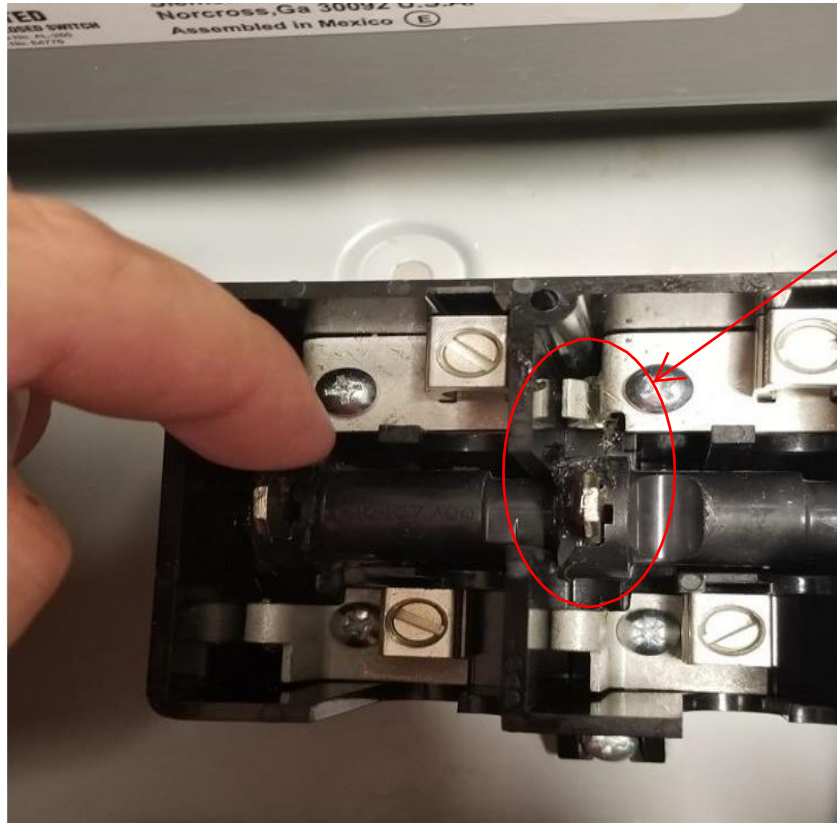
Why?

- OSHA NFPA 70E 250.2
 - Worker and public safety
 - True visible open point
- Potential backfeed
- Unfused
- Sealed/Locked
- Labeled

TRUE VISIBLE OPEN

The “Utility Disconnect Switch” shall be a true visible open disconnect. The blades, jaws and air gap between them shall be clearly visible when the switch is in the open position.

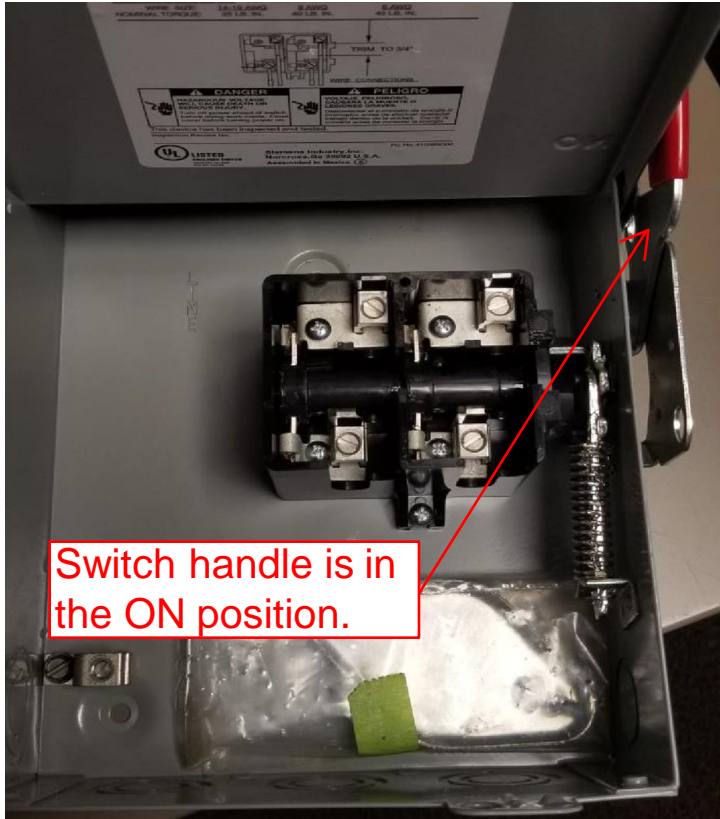
TRUE VISIBLE OPEN



"True Visible Open"

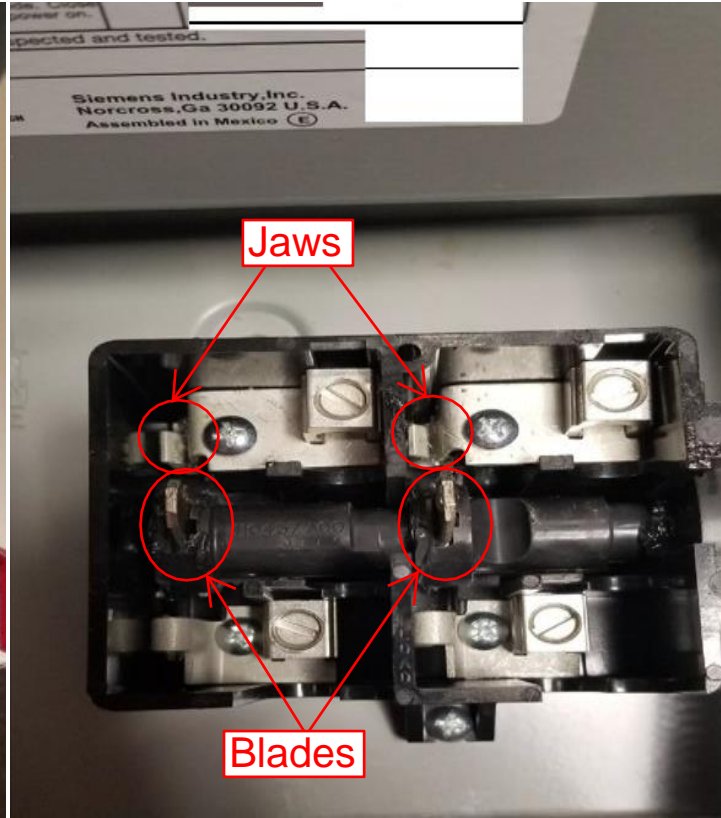
"True Visible Open" means having the ability to clearly see the blades, the jaws, and the physical separation (air gap) between them.

TRUE VISIBLE OPEN



The photographs depict the switch in the ON (closed) position. The blades and the jaws are in contact with each other and current can flow through the switch.

TRUE VISIBLE OPEN



The photographs depict the switch in the OFF (open) position. The blades and the jaws are not in contact with each other and are separated by an air gap prohibiting the flow of current through the switch.

Why?

- OSHA NFPA 70E 250.2
 - Worker and public safety
 - True visible open point
- Potential backfeed
- Unfused
- Sealed/Locked
- Labeled

What?

- Distinct purpose

Utility Disconnect



Utility Disconnect

- The Core of Interconnection Requirements
- Applies to service equipment
- Isolates customer generation from utility service equipment

Production Meters



Production Meters

- Obligation to capture all renewable production
- Data acquisition for planning the future utility infrastructure

Meter Disconnects



Meter Disconnects

- Integral to safety processes and procedures
- Applies to meter equipment
- Isolates meter from all sources of power

Moving Forward

- APS is actively engaged in working out viable solutions balancing safety and cost to reduce equipment and provide options.

Coming Soon!

- APS is in the final stages of approving and posting an alternative production meter model with test blocks that will eliminate the Meter Disconnects.



Elevation Plan

Equipment layout based on 3 line with conduits

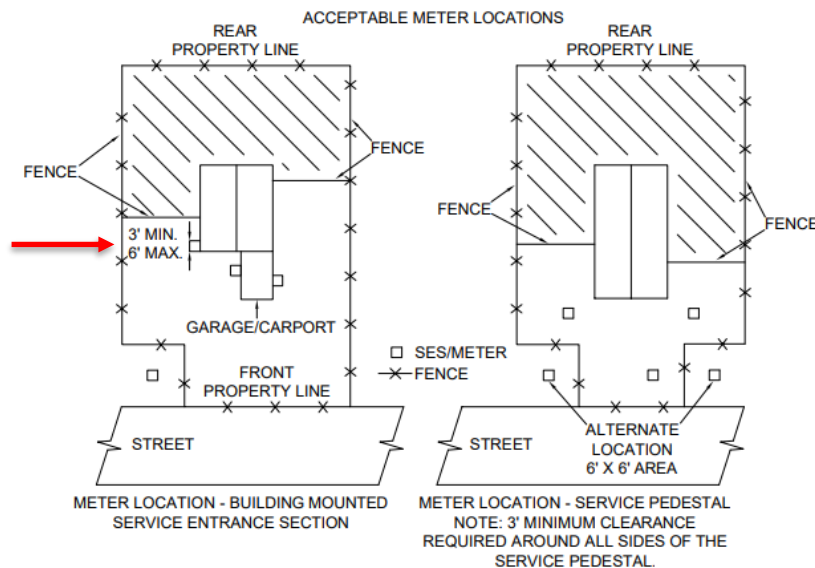
Heights to disconnects and meters from grade

Arrangement matches site plan

Gas and Water outlets

Fences and Gates

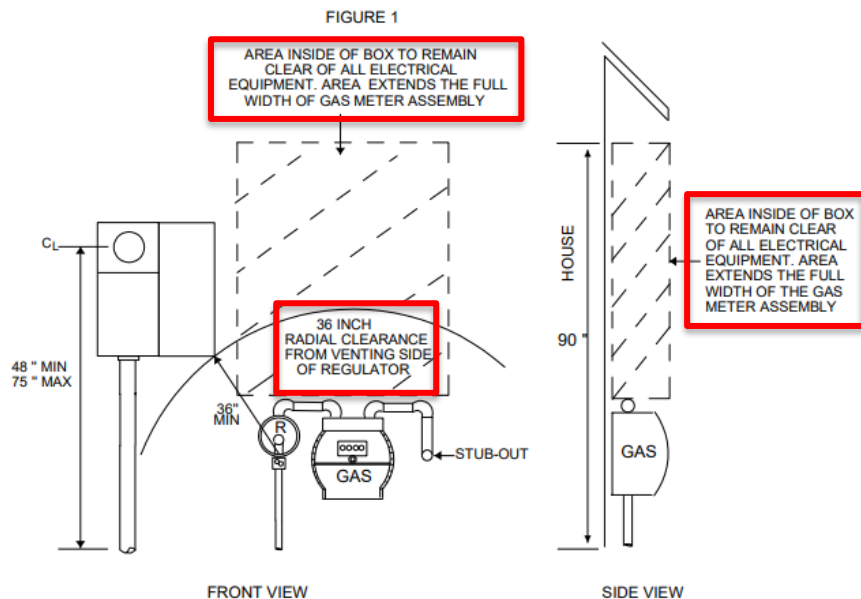
ESRM Guidelines- 301.3-2



APS RESERVES THE RIGHT TO DETERMINE ALL METER AND SERVICE LOCATIONS.

1. THE METER AND MAIN SWITCH SHALL BE ACCESSIBLE FOR READING AND MAINTENANCE WITHOUT PASSING THROUGH RESTRICTED AREAS, GATES, OR FENCES.
2. ALL METER AND MAIN SWITCHES SHALL BE LOCATED THREE FEET MINIMUM TO SIX FEET MAXIMUM ON THE FRONT CORNER OF A RESIDENCE, NEAREST TO THE POINT OF AVAILABLE SERVICE, AS DETERMINED BY APS ON AN EXTERIOR WALL OR ALTERNATE LOCATION (SUBJECT TO LOCAL INSPECTION AUTHORITY) BUT NOT UNDER A CARPORT, BREEZEWAY, PATIO, PORCH, OR OTHER AREA THAT CAN BE ENCLOSED WITH BUILDING EXPANSION OR FENCE.
3. THE ELECTRIC METER AND MAIN SWITCH "MAY BE" INSTALLED AT AN ALTERNATE LOCATION NOT ATTACHED TO A DWELLING TO ENSURE ACCESSIBILITY. (SUBJECT TO LOCAL INSPECTION AUTHORITY APPROVAL)
4. IF OVERHEAD SERVICE IS AVAILABLE IN THE REAR OF THE PROPERTY (ALLEY OR EASEMENT) THE POINT OF ATTACHMENT MAY BE ON THE REAR OF THE RESIDENCE. THE METER & MAIN DISCONNECT SHALL BE LOCATED PER ITEMS #1 & #2 ABOVE. IT IS THE CUSTOMER'S RESPONSIBILITY TO INSTALL CONDUIT AND WIRING BETWEEN THE BUILDING IN ITS ENTIRETY.
5. WHEN REMODELING EXISTING RESIDENCES, CHECK WITH LOCAL APS OFFICE.
6. SERVICE ENTRANCE EQUIPMENT SHALL BE UTILIZED FOR ITS INTENDED PURPOSE.

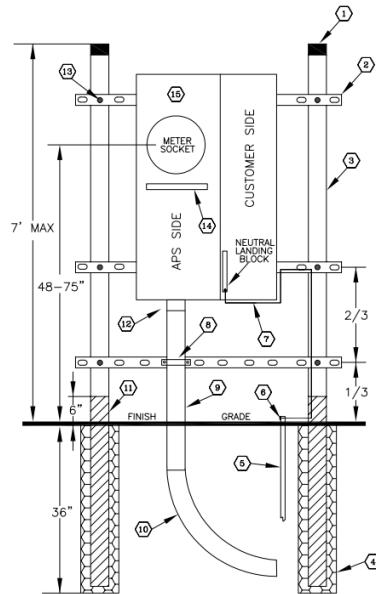
ESRM Guidelines- 301.15



301.15-1 ELECTRIC, WATER AND GAS METER SEPARATION (FIGURE 1)

1. Size and dimensions of panels will vary.
2. Working clearance shall be a minimum of 36 inches wide in front of meter panel. If electric panels extend wider than the 36 inch minimum, the working clearance shall be the width of the entire assembly. Working space shall extend out from the face of the electric meter panel a minimum of 36 inches. See paragraph 301.7 for additional workspace requirements.
3. Area directly above gas meter shall remain clear of any electrical equipment.
4. For conduit system and riser requirements, refer to Section 500.
5. For Trenching Requirements, refer to Section 600.
6. Gas piping (above grade) may be located below electric panel(s), but shall not include any couplings in that area.
7. APS prohibits water valves or hose bibs to be located within the 36 inch by 36 inch safe work area in front of the electric panels. This is to prevent any grounded surfaces in the work area and to ensure the standing surfaces remain safe and dry.
8. Drain pipes or soffits are prohibited above the meter enclosures to ensure the work area standing surfaces remain safe and dry.

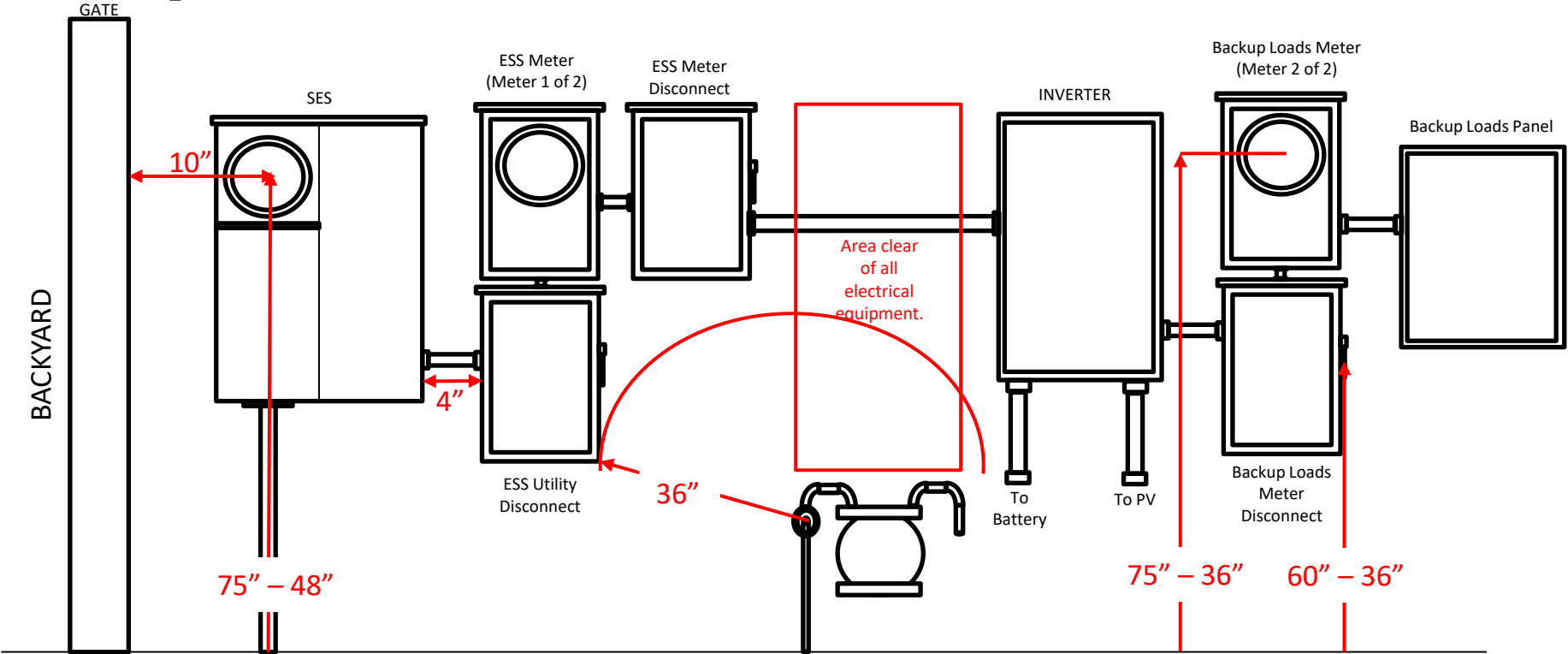
ESRM Guidelines- 306



ALL DIMENSIONS ARE MANDATORY.

- Location does not provide 24/7 access
- Non-permanent wall

Sample Elevation Plan



Appendix

Navigating the Interconnection Process

DRE Preliminary Project Support

- Recommended for systems over 100 kW
- Pre-Application Report
 - Review of existing information regarding available feeder capacity
- Pre-Application Meeting
 - Discussion of technology/location, project scope, project development support
- Preliminary Engineering Support
- Reach out to your local APS Customer Project Rep or Commercial-Renewables to initiate

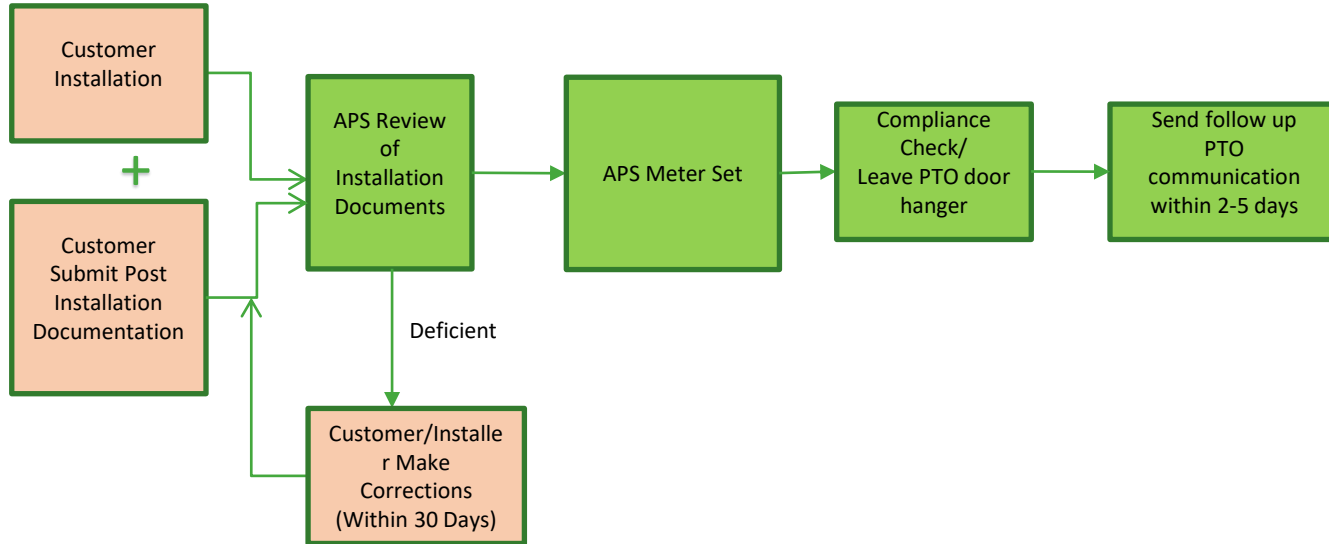
Customer Submit Complete Application

- Load Meter or Temp Meter Installed
- Drawings
 - City or AHJ approved drawings

DRE Formal Application Review and Studies

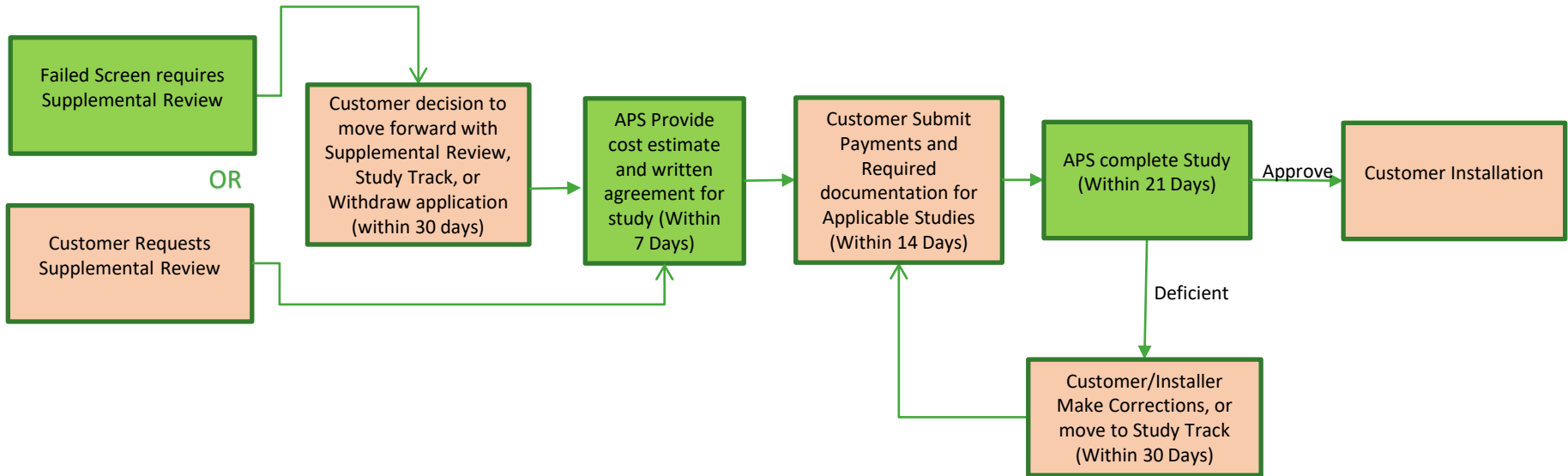
- Application Review
- Drawing Review
- Technical Studies

General Installation Process for Systems under 20 kW



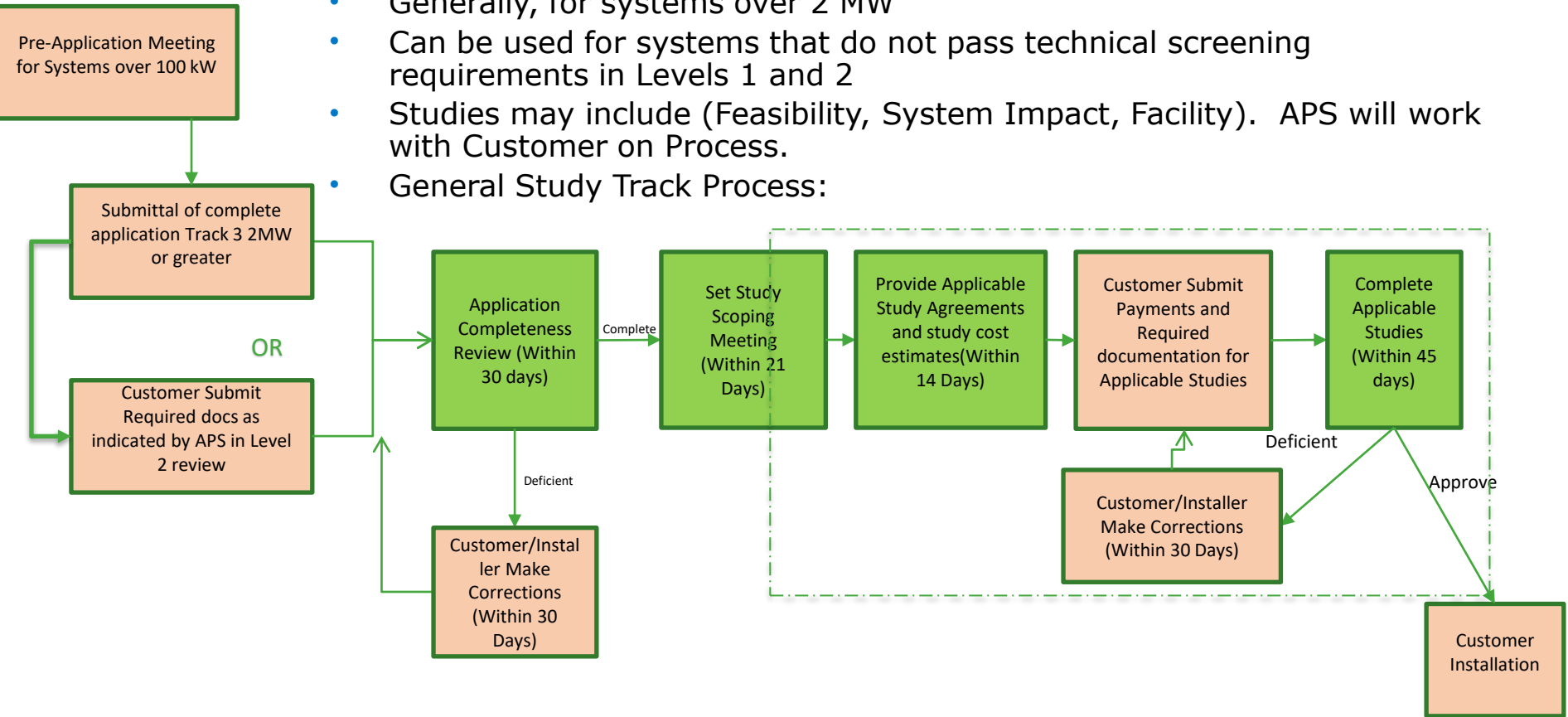
Supplemental Review

- Generally, for systems that fail 1 or more of the technical screens
- General Supplemental Review Process:



Study Track

- Generally, for systems over 2 MW
- Can be used for systems that do not pass technical screening requirements in Levels 1 and 2
- Studies may include (Feasibility, System Impact, Facility). APS will work with Customer on Process.
- General Study Track Process:



aps.com/dg <https://www.aps.com/dg> or <https://www.aps.com/dg#Interconnection>

Residential Business Contact us Help Español



COVID-19 resources Account Billing and payment Service plans Save money and energy Outages



Log in

How to navigate the dg site...

1. Go to [aps.com/dg](https://www.aps.com/dg).
2. Ignore top menus. They take you away from dg.
3. Click on Interconnection.

Understanding Solar



[Renewables](#)

[FAQs](#)

[Interconnection](#)

Interconnection Documents and Requirements

APS provides support to customers installing equipment that connects with our grid, such as a solar system, a home battery or other type of generator. We want everything to go smoothly for you and your installer throughout the permitting and installation process. Please review our interconnection standards below — they protect your equipment and our electrical system, and keep everyone safe.

Residential resources (4)

Common requirements (4)

Getting started (8)

Business resources (5)

Business sample design diagrams (4)

Business wholesale non-FERC (3)

Common documents and resources (10)

Residential sample design requirements (5)

Applicant User Guide

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Authorization Form

[Download](#)

Commercial Interconnection Process Overview
(1 MWAC or more)

[Download](#)

Commercial Interconnection Process Overview (less
than 1 MWAC)

[Download](#)

Distributed Energy Administration Plan (DEAP)

[Download](#)

Interconnection Agreement

[Download](#)

Interconnection Process Guide

[Download](#)

How to navigate the dg site...

5. Scroll down to list at lower left.
6. Select topic(# documents).
7. Scroll through list of documents on right. (Hint: may be more pages of documents. Default only shows 5.)
8. Click on Download below each file you want.

Interconnection Documents and Requirements

APS provides support to customers installing equipment that connects with our grid, such as a solar system, a home battery or other type of generator. We want everything to go smoothly for you and your installer throughout the permitting and installation process. Please review our interconnection standards below — they protect your equipment and our electrical system, and keep everyone safe.

Residential resources (4)

Common requirements (1)

Getting started (8)

Business resources (5)

Business sample design diagrams (4)

Business wholesale non-FERC (3)

Common documents and resources (10)

Residential sample design requirements (5)



APS Interconnection Requirements

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Load Side Connection Requirements

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Supply Side Connection Requirements

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Residential resources (4)

Common requirements (4)

Getting started (8)

Business resources (5)

Business sample design diagrams (4)

Business wholesale non-FERC (3)

Common documents and resources (10)

Residential sample design requirements (5)

Plan Review & Installer Guidelines Checklist

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Single Phase 120-240V Fault Current AC Disco Guide

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Typical Wind Diagram

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Utility Disconnect Checklist

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[Residential resources \(4\)](#)

[Common requirements \(4\)](#)

[Getting started \(8\)](#)

[Business resources \(5\)](#)

[Business sample design diagrams \(4\)](#)

[Business wholesale non-FERC \(3\)](#)

[Common documents and resources \(10\)](#)

[Residential sample design requirements \(5\)](#)



[APS ESS Metering and Isolation Concept Drawings](#)

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[APS PV Solar Metering and Isolation Concept Drawings](#)

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[Consumer Acknowledgement](#)

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[Diagram Checklist](#)

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Residential resources (4)

Common requirements (4)

Getting started (8)

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Business wholesale non-FERC (3)

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Residential sample design requirements (5)

200A Typical Residential Diagram for Load Side Connection

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400A Typical Residential Diagram for Load Side Connection

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240V Battery System Diagram

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400A Typical Residential Diagram for Load Side Tap

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Typical Residential Diagram for Supply Side Tap