SMART
Metering and Wiring Installation Guidelines

June 2020
Interconnection Process

Remaining the Same

• Requests for meters are made to the DG Interconnections team
• Eversource will install and support all Revenue and Production meters
• Eversource will provide a PTO upon successful connection

Changes for the SMART Program

• Requirement page (4) was split in two and the Interconnecting Customer/Contractor (IC) responsibility to turn on the disconnect switch when the PTO is issued was outlined and highlighted.
• DG will ask for your SMART Application ID (#SMAES_XXXXX) upfront
  • This requires the submittal of a SMART Application via the Web Portal prior to contacting the DG Interconnections team
• For Behind the Meter Installations (BTM)
  • Customer will be charged the cost for furnishing and installing the BTM solar production meter while submitting the SMART Application via the Web Portal
    Note: for larger, complex systems additional charges still apply from ES engineering, i.e., CTs, PTs, etc.
  • Will require customer-installed wiring, and installation of a socket for the solar production meter
    • Must be adequately accessible, proximate to existing utility revenue meter (see ‘Meter Location Policy for Solar Projects’)
  • For standalone AC-coupled solar plus storage systems, a Utility ISO Asset meter for the battery is only required if it is registered as a dispatchable ISO Asset.
# Meter Configurations

<table>
<thead>
<tr>
<th>Service Type</th>
<th>Project size</th>
<th>Meter Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>120/240V Single Phase</td>
<td>Under 60KW</td>
<td>Form 2S Bridge</td>
</tr>
<tr>
<td>120/208V Single Phase</td>
<td>Under 60KW</td>
<td>Form 12S Bridge</td>
</tr>
<tr>
<td>120/208V Three Phase</td>
<td>Under 60KW</td>
<td>Form 16S Bridge</td>
</tr>
<tr>
<td>277/480V Three Phase</td>
<td>Under 60KW</td>
<td>Form 16S Bridge</td>
</tr>
<tr>
<td>120/240V Single Phase</td>
<td>Over 60KW</td>
<td>Form 2S Interval</td>
</tr>
<tr>
<td>120/208V Single Phase</td>
<td>Over 60KW</td>
<td>Form 12S Interval</td>
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<tr>
<td>120/208V Three Phase</td>
<td>Over 60KW</td>
<td>Form 16S Interval</td>
</tr>
<tr>
<td>277/480V Three Phase</td>
<td>Over 60KW</td>
<td>Form 16S Interval</td>
</tr>
<tr>
<td>IT Rated Single Phase (secondary CTs)</td>
<td>Over 320A</td>
<td>Form 4S Interval</td>
</tr>
<tr>
<td>IT Rated Three Phase (secondary CTs/PTs)</td>
<td>Over 320A</td>
<td>Form 9S Interval</td>
</tr>
<tr>
<td>IT Rated Single Phase (primary CTs)</td>
<td>Over 320A</td>
<td>Form 4S Interval</td>
</tr>
<tr>
<td>IT Rated Three Phase (primary CTs/PTs)</td>
<td>Over 320A</td>
<td>Form 9S Interval</td>
</tr>
</tbody>
</table>
1. It is the responsibility of the Interconnecting Customer/Contractor (IC) to adhere to all applicable codes, standards and requirements including Eversource meter installation requirements as described in the Information and Requirements (I&R) publication, Eversource’s Interconnection Tariff, the National Electrical Code (NEC), State and Municipal building requirements.

2. It is also the responsibility of the IC to ensure all disconnecting devices are turned on upon receipt of the official final PTO approval. During Eversource’s testing, the system will be energized briefly. Eversource Metering Personnel will leave the disconnect switch for the production meter in the condition we found it (energized or not energized).

3. See the appropriate I&R publication for either EMA or WMA for the IC responsibilities for procuring and installing the appropriate meter socket and any associated instrument transformer (IT) enclosure (if required).

4. Eversource will install the meter for all services. If required, Eversource will also provide all instrument transformers for any new IT-rated installation and make all secondary wiring connections to the meter.

5. Any primary metering, if required, will be coordinated with Eversource.

6. To ensure proper meter installation, each meter socket and its disconnect switch shall be clearly and uniquely identified and marked/placarded (e.g., “SOLAR PRODUCTION”) prior to the start of any service work. If there is more than one solar system on site, the contractor shall clearly identify and mark each meter and disconnect (e.g., with its SMAES# and/or Array Name/Location such as “Rooftop Solar” or “Canopy Solar”) to ensure that they can be distinguished from each other.
7. The wiring diagrams within this document represent standard conceptual designs for commonly used service installations. Wiring configurations outside the norms shown within this document will require additional time for Eversource review and approval.

8. The IC is responsible for obtaining all approvals from the Authority Having Jurisdiction as soon as the work is completed.

9. Where the existing PCC meter is inside, the IC will upgrade their service connection to change it to an outside location.

10. All metering maintained by Eversource will be required to be accessible to Utility personnel at all times.

11. All self-contained meter sockets will be wired such as the top (line) side is toward the Utility feed and the bottom (Load) side is toward the solar generation and/or battery storage.

12. For any IT-rated services, all transformer polarity marks will be wired pointing toward the Utility feed.

13. Eversource reserves the right to amend this document from time to time as necessary.
SMART Program

Metering Diagrams

Metering Notes:

- BTM: Behind the Meter installation option
- DER: Distributed Energy Resource
- DG: Distributed Generator/Solar Array
- ESS: Energy Storage System
- EPS: Electric Power System
- IC: Interconnecting Customer/Contractor
- PCC: Point of Common Coupling
- PoC: Point of Connection
- PTO: Permission to Operate
- SPAKey: SMART Application ID# (SMAES_XXXXX)
1a. BTM <60kW, No ESS

This diagram is representative of a standard design. Please contact Eversource for approval, if a different configuration is needed.

Note 1
* All interconnection points are required to be placed behind the utility revenue meter
* For behind the meter installations, all interconnect points are required to be located behind the utility revenue meter.
>>> No connections are to be made within the utility revenue meter socket or in utility transformer compartment. <<<

Note 2
* If the utility revenue meter is located inside customer’s facility, the interconnecting customer will be required to upgrade and have the meter relocated outside the customer’s facility near both the SMART production meter and the utility disconnect switch.

Note 3
* Utility feed for the SMART production meter, the socket is required to be wired top side utility, bottom side inverter.

Note 4
* The utility AC emergency disconnect switch is required to be located ahead of the SMART production meter where utility personnel will be able to isolate the metering circuit.
* The utility AC emergency disconnect switch is required to be located on the ground level within vicinity of the utility revenue meter where our utility personnel will have 24/7 access to it.

Special Notes:
* All meters and switches are required to be grouped unless interconnection contractor requests and is granted a written variance.
1b. BTM <60kW, with AC-coupled ESS System

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### Retail

**Residential/Commercial DG Customer**

**Behind the Meter MA SMART <60 kW**

**With AC-coupled ESS System**

**UTILITY – AREA EPS**

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**Customer**

**Main Service**

**PoC**

**PV breaker**

**Utility Revenue Meter**

**Note 1**

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**Utility AC Emergency Disconnect Switch**

**Note 2**

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**Utility SMART Meter**

**AC/DC Inverter**

**Charge and Discharge**

**ESS Battery Storage**

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**PV ARRAY**

**Main Service Switch**

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**Customer Load**

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**Special Notes:**

* All meters and switches are required to be grouped unless interconnection contractor requests and is granted a written variance.

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Note 1

* All interconnection points are required to be placed behind the utility revenue meter

* For behind the meter installations, all interconnect points are required to be located behind the utility revenue meter.

>>> No connections are to be made within the utility revenue meter socket or in utility transformer compartment. <<<

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* If the utility revenue meter is located inside customer’s facility, the interconnecting customer will be required to upgrade and have the meter relocated outside the customer’s facility near both the SMART production meter and the utility disconnect switch.

Note 3

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* The utility AC emergency disconnect switch is required to be located on the ground level within vicinity of the utility revenue meter where our utility personnel will have 24/7 access to it.

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This diagram is representative of a standard design. Please contact Eversource for approval, if a different configuration is needed.
1c. BTM <60kW, with DC-coupled ESS

**Retail**
Residential/Commercial DG Customer
Behind the Meter MA SMART <60 kW
With DC-coupled ESS System

UTILITY – AREA EPS

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**Note 1**
* All interconnection points are required to be placed behind the utility revenue meter
* For behind the meter installations, all interconnect points are required to be located behind the utility revenue meter.
* No connections are to be made within the utility revenue meter socket or in utility transformer compartment. <<<

**Note 2**
* If the utility revenue meter is located inside customer’s facility, the interconnecting customer will be required to upgrade and have the meter relocated outside the customer’s facility near both the SMART production meter and the utility disconnect switch.

**Note 3**
* Utility feed for the SMART production meter, the socket is required to be wired top side utility, bottom side inverter.

**Note 4**
* The utility AC emergency disconnect switch is required to be located ahead of the SMART production meter where utility personnel will be able to isolate the metering circuit.
* The utility AC emergency disconnect switch is required to be located on the ground level within vicinity of the utility revenue meter where our utility personnel will have 24/7 access to it.

**Note 5**
* Additional outputs of the inverter may need separate metering.

**Special Notes:**
* All meters and switches are required to be grouped unless interconnection contractor requests and is granted a written variance.

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This diagram is representative of a standard design. Please contact Eversource for approval, if a different configuration is needed.
2a. BTM >60kW to 500kW, no ESS

AC Connection to Utility EPS 60kW – 500kW
Behind the Meter MA SMART
Without ESS System
Utility Service Connection
3-Phase 4-Wire System
Secondary Metering

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**Note 1**
* Utility Revenue Meter installed will be Bi-directional/NET/Recording meter and meet the requirements of both tariff and billing rate.
* If the utility revenue meter is located inside customer’s facility, the interconnecting customer will be required to upgrade and have the meter relocated outside the customer’s facility near both the SMART production meter and the utility disconnect switch.

**Note 2**
* Must have a cellular connection at meter location.
* Meter will have bi-directional interval recording capabilities.
* Secondary metering CTs/VTs may be required.

**Note 3**
* The Emergency shut off switch shall be located within the vicinity of the utility meter and fully accessible to utility personnel.

**Note 4**
* Production meter current transformers polarity markings required to be pointed towards utility.

Special Notes:
* All meters and switches are required to be grouped unless interconnection contractor requests and is granted a written variance.

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This diagram is representative of a standard design. Please contact Eversource for approval, if a different configuration is needed.

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* Utility Meter installed will be Bi-directional/NET/Recording meter and meet the requirements of both tariff and billing rate.
* If the utility revenue meter is located inside customer’s facility, the interconnecting customer will be required to upgrade and have the meter relocated outside the customer’s facility near both the SMART production meter and the utility disconnect switch.

* Must have a cellular connection at meter location.
* Meter will have bi-directional interval recording capabilities.
* Secondary metering CTs/VTs may be required.

* The Emergency shut off switch shall be located within the vicinity of the utility meter and fully accessible to utility personnel.

* Production meter current transformers polarity markings required to be pointed towards utility.

* All meters and switches are required to be grouped unless interconnection contractor requests and is granted a written variance.
2b. BTM >60kW to 500kW, with AC-coupled ESS

AC Connection to Utility EPS 60kW – 500kW
Behind the Meter MA SMART
With AC-coupled ESS System
Utility Service Connection
3-Phase 4-Wire System
Secondary Metering

Main Service Switch

Utility Revenue Meter

Note 1
* Utility Revenue Meter installed will be Bi-directional/NET/Recording meter and meet the requirements of both tariff and billing rate.
* If the utility revenue meter is located inside customer’s facility, the interconnecting customer will be required to upgrade and have the meter relocated outside the customer’s facility near both the SMART production meter and the utility disconnect switch.

Note 2
* Must have a cellular connection at meter location.
* Meter will have bi-directional interval recording capabilities.
* Secondary metering CTs/VTs may be required.

Note 3
* The Emergency shut off switch shall be located within the vicinity of the utility meter and fully accessible to utility personnel.

Special Notes:
* All meters and switches are required to be grouped unless interconnection contractor requests and is granted a written variance.

This diagram is representative of a standard design. Please contact Eversource for approval, if a different configuration is needed.
2c. BTM >60kW to 500kW, with DC-coupled ESS

This diagram is representative of a standard design. Please contact Eversource for approval, if a different configuration is needed.

Note 1
* Utility Revenue Meter installed will be Bi-directional/NET/Recording meter and meet the requirements of both tariff and billing rate.
* If the utility revenue meter is located inside customer’s facility, the interconnecting customer will be required to upgrade and have the meter relocated outside the customer’s facility near both the SMART production meter and the utility disconnect switch.

Note 2
* Must have a cellular connection at meter location.
* Meter will have bi-directional interval recording capabilities.
* Secondary metering CTs/VTs may be required.

Note 3
* The Emergency shut off switch shall be located within the vicinity of the utility meter and fully accessible to utility personnel.

Note 4
* Additional outputs of the inverter may need separate metering.

Special Notes:
* All meters and switches are required to be grouped unless interconnection contractor requests and is granted a written variance.
3a. BTM >500kW, no ESS

AC Connection to Utility EPS 500kW and Greater
Behind the Meter MA SMART
Without ESS System
Utility Service Connection
3-Phase 4-Wire System
Primary Metering

Note 1
Utility Revenue & SMART Meters installed will be Bi-directional recording cellular meters. Must be utility accessible.

Note 2
Polarity Mark of metering transformers is to be toward the Utility feed. 3-phase 4-wire WYE metering connection.

Note 3
Must have a cellular connection at the meter location.

This diagram is representative of a standard design. Please contact Eversource for approval, if a different configuration is needed.
3b. BTM >500kW, with AC-coupled ESS

AC Connection to Utility EPS 500kW and Greater
Behind the Meter MA SMART
With AC-coupled ESS System
UTILITY SERVICE Connection
3-Phase 4-Wire System
Primary Metering

Note 1
Utility Revenue and SMART meters installed will be Bi-directional recording cellular meters. Must be utility accessible.

Note 2
Polarity Mark of metering transformers is to be toward the Utility feed. 3-phase 4-wire WYE metering connection.

Note 3
Must have a cellular connection at the meter location.

This diagram is representative of a standard design. Please contact Eversource for approval, if a different configuration is needed.
3c. BTM >500kW, with DC-coupled ESS

AC Connection to Utility EPS 500kW and Greater
Behind the Meter MA SMART
With DC-coupled ESS System
UTILITY SERVICE Connection
3-Phase 4-Wire System
Primary Metering

Utility
Revenue
Meter
Notes 1 & 3
To Utility
Metering
Transformer
Main Disconnect
Main Bus
PV / ESS breaker
Premise
Loads
DG

This diagram is representative of a standard design. Please contact Eversource for approval, if a different configuration is needed.

Note 1
Utility Revenue & SMART Meters installed will be Bi-directional recording cellular meters. Must be utility accessible.

Note 2
Polarity Mark of metering transformers is to be toward the Utility feed. 3-phase 4-wire WYE metering connection.

Note 3
Must have a cellular connection at the meter location.

Note 4
* Additional outputs of the inverter may need separate metering.
Stand-Alone Wiring Diagrams
4a. Stand Alone <60kW, no ESS

Retail
Residential/Commercial DG Customer
Stand Alone MA SMART <60 kW
Without ESS System

This diagram is representative of a standard design. Please contact Eversource for approval, if a different configuration is needed.

Note 1
* Following utility I & R book
* All 277v/480 or instrument rated services required to be cold sequenced as shown in diagram.
* The Emergency shut off switch shall be located within the vicinity of the utility meter and fully accessible to utility personnel.

Note 2
* SMART meter to be used for Utility Revenue, SMART compensation, and REC determination purposes.
* Utility meter must be fully accessible to utility personnel.
4b. Stand Alone <60kW, with AC-coupled ESS

Retail
Residential/Commercial DG Customer
Stand Alone MA SMART <60 kW
With AC-coupled ESS System

UTILITY – AREA EPS

Main breaker

Utility Revenue Meter

Note 1, 2

This diagram is representative of a standard design. Please contact Eversource for approval, if a different configuration is needed.

Note 1
* Utility Revenue Meter installed will be Bi-directional Interval Recording Cellular Meter
* Secondary metering CTs/VTs may be required.
* Cellular connection at the meter location is required.
* Utility Revenue Meter must be fully accessible.

Note 2
* All 277v/480 services must be cold sequenced.
* The Emergency shut off switch shall be located within the vicinity of the utility meter and fully accessible to utility personnel.

Note 3
* SMART meter to be used for Utility Revenue, SMART compensation, and REC determination purposes.
* Utility meter must be fully accessible to utility personnel.

Note 4
* Utility ISO Asset meter is only required if the ESS storage is registered as a dispatchable ISO Asset

Utility Disconnect Switch

Utility Revenue / Production Meter

Inverter

PV Array

DG

Utility / ISO Asset Meter

Charge and Discharge

ESS Battery Storage

Note 4
* Utility ISO Asset meter is only required if the ESS storage is registered as a dispatchable ISO Asset.
4c. Stand Alone <60kW, with DC-coupled ESS

**Retail** Residential/Commercial DG Customer
Stand Alone MA SMART <60 kW
With DC-coupled ESS System

This diagram is representative of a standard design. Please contact Eversource for approval, if a different configuration is needed.

**Note 1**
* Following utility I & R book
  * All 277v/480 or instrument rated services required to be cold sequenced as shown in diagram.
  * The Emergency shut off switch shall be located within the vicinity of the utility meter and fully accessible to utility personnel.

**Note 2**
* SMART meter to be used for Utility Revenue, SMART compensation, and REC determination purposes.
  * Utility meter must be fully accessible to utility personnel.

**Diagram Elements**
- DG PV Array
- ESS Battery Storage
- Inverter
- Utility Disconnect Switch
- Utility / Production Revenue Meter
- Charge & Discharge
5a. Stand Alone >60kW to 500kW, no ESS

AC Connection to Utility EPS 60kW – 500kW
Stand Alone MA SMART
Without ESS System
Utility Service Connection
3-Phase 4-Wire System
Secondary Metering

Main Service Disconnect.

Utility Revenue Meter

Note 1, 2

Main Bus

Utility Disconnect Switch

Inverter

PV breaker

PV Array

DG

This diagram is representative of a standard design. Please contact Eversource for approval, if a different configuration is needed.

Note 1
* Utility Meter will be Bidirectional Interval Recording cellular meter to be used for Utility Revenue, SMART compensation, and REC determination purposes.
  * Secondary metering CTs/VTs may be required.
  * Cellular connection at the meter location is required.
  * Utility Revenue Meter must be fully accessible.

Note 2
* All 277v/480 services must be cold sequenced.
  * The Emergency shut off switch shall be located within the vicinity of the utility meter and fully accessible to utility personnel.
5b. Stand Alone >60kW to 500kW, with AC-coupled ESS

AC Connection to Utility EPS 60kW – 500kW
Stand Alone MA SMART
With AC-coupled ESS System
Utility Service Connection
3-Phase 4-Wire System
Secondary Metering

Note 1
* Utility Revenue Meter installed will be Bi-directional Interval Recording Cellular Meter
* Secondary metering CTs/VTs may be required.
* Cellular connection at the meter location is required.
* Utility Revenue Meter must be accessible.

Note 2
* All 277v/480 services must be cold sequenced.
* The Emergency shut off switch shall be located within the vicinity of the utility meter and fully accessible to utility personnel.

Note 3
* Utility ISO Asset meter is only required if the ESS storage is registered as a dispatchable ISO Asset

This diagram is representative of a standard design. Please contact Eversource for approval, if a different configuration is needed.
5c. Stand Alone >60kW to 500kW, with DC-coupled ESS

Note 1
- Utility Revenue Meter installed will be Bi-directional Interval Recording Cellular Meter
- Secondary metering CTs/VTs may be required.
- Cellular connection at the meter location is required.
- Utility Revenue Meter must be fully accessible.

Note 2
- All 277v/480 services must be cold sequenced.
- The Emergency shut off switch shall be located within the vicinity of the utility meter and fully accessible to utility personnel.
6a. Stand Alone >500kW, no ESS

AC Connection to Utility EPS 500kW and Greater
Stand Alone MA SMART
Without ESS System
Utility Service Connection
3-Phase 4-Wire System
Primary Metering

To Utility Metering

Utility Revenue Meter

Transformer

Main Disconnect

Main Bus

DG

PV breaker

Inverter

Utility Disconnect Switch

Note 1
* Utility Revenue Meter installed will be Bi-directional Interval Recording cellular meter.
* Cellular connection at the meter location is required.
* Utility Revenue Meter must be fully accessible.
* Follow I&R metering requirements for Cold/Hot sequence metering

Note 2
Polarity Mark of metering transformers is to be toward the Utility Feed

This diagram is representative of a standard design. Please contact Eversource for approval, if a different configuration is needed.
6b. Stand Alone >500kW, with AC-coupled ESS

AC Connection to Utility EPS 500kW and Greater
Stand Alone MA SMART
With AC-coupled ESS System
Utility Service Connection
3-Phase 4-Wire System
Primary Metering

This diagram is representative of a standard design. Please contact Eversource for approval, if a different configuration is needed.

Note 1
* Utility Revenue, SMART and ESS Meters will be Bi-directional Interval Recording Cellular meter. Cellular connection at the meter location is required. Utility Revenue Meter must be fully accessible.
* Follow I&R metering requirements for Cold/Hot sequence metering.

Note 2 - Polarity Mark of metering transformers is to be toward the Utility Feed

Note 3 - Each pair of PV Array and AC coupled ESS System will be individually metered.

Note 4
* Utility ISO Asset meter is only required if the ESS storage is registered as a dispatchable ISO Asset
6c. Stand Alone >500kW, with DC-coupled ESS

AC Connection to Utility EPS 500kW and Greater
Stand Alone Ma SMART
With DC-coupled ESS System
Utility Service Connection
3-Phase 4-Wire System
Primary Metering

---

Note 1
* Utility Revenue Meter installed will be Bi-directional Interval Recording Cellular meter.
* Cellular connection at the meter location is required.
* Utility Revenue Meter must be fully accessible.
* Follow I&R metering requirements for Cold/Hot sequence metering

Note 2
Polarity Mark of metering transformers is to be toward the Utility Feed

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This diagram is representative of a standard design. Please contact Eversource for approval, if a different configuration is needed.
## Summary of changes from previous edition

<table>
<thead>
<tr>
<th>Change</th>
<th>Slide</th>
<th>Description</th>
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<tbody>
<tr>
<td>1.</td>
<td>General Guidelines - Slide broken into slides 4 and 5.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>4B</td>
<td>Additional metering required under the Stand Alone AC-coupled ESS conditions where the ESS Storage is registered as a dispatchable ISO asset.</td>
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<td>3.</td>
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<td>Same as Change 1</td>
</tr>
<tr>
<td>4.</td>
<td>6B</td>
<td>Same as Change 1</td>
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