# SHORT CIRCUIT PROTECTION

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# 800.0 SHORT CIRCUIT PROTECTION

## 800.1 GENERAL

The National Electric Code, State, County and Municipal Codes and/or Regulations require that service entrance equipment shall be suitable for the short-circuit current available at its supply terminals.

It is the responsibility of the Customer to install service entrance equipment and protective devices (fuses or circuit breakers) capable of interrupting and withstanding the available fault current.

In cases where multiple service entrance sections are served from one transformer the utility fault current contribution may exceed the values noted. Please consult your Service Representative before ordering or designing your equipment and refer to section 800.5.

The fault current values are based on a bolted phase-to-ground, phase-to-phase or three phase fault, whichever is greater.

**Arc Flash hazard calculations** should be performed by a Registered Professional Engineer. The dynamic electric utility system grid makes it impractical to provide any further information other than the fault current values noted, in Table 800.2. APS will provide only maximum fault current values at the service entrance section.

## 800.2 MAXIMUM SERVICE EQUIPMENT SHORT CIRCUIT CAPABILITIES

| SES# | 1 PH 120/240 POLE/PAD XFMR | | 3 PH 120/240- Closed Delta POLE TOP XFMR | | 3 PH 120/240- Open Delta POLE TOP XFMR | | 3 PH 120/240- Open Delta PAD XFMR | | 3 PH 120/208 POLE TOP XFMR | | 3 PH 120/208 PAD XFMR | | 3 PH 277/480 POLE TOP XFMR | | 3 PH 277/480 PAD XFMR | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AMPS | kVA | Isc | kVA | Isc | kVA | Isc | **kVA | Isc | kVA | Isc | kVA | Isc | kVA | Isc | kVA | Isc |
| 100 | 50 | 9,493 | 75 | 10,694 | 75 | 24,344 | 167 | 31,209 | 75 | 6,857 | 112.5 | 20,145 | 75 | 4,357 | 112.5 | 9,753 |
| 125 | 50 | 9,493 | 75 | 10,694 | 75 | 24,344 | 167 | 31,209 | 75 | 6,857 | 112.5 | 20,145 | 150 | 7,866 | 112.5 | 9,753 |
| 150 | 50 | 9,493 | 75 | 10,694 | 75 | 24,344 | 167 | 31,209 | 75 | 6,857 | 112.5 | 20,145 | 150 | 7,866 | 112.5 | 9,753 |
| 200 | 75 | 12,540 | 75 | 10,694 | 75 | 24,344 | 167 | 31,209 | 75 | 8,434 | 112.5 | 20,145 | 150 | 8,672 | 150 | 12,887 |
| *400 | 100 | 18,757 | 150 | 19,929 | 75 | 24,344 | 167 | 31,209 | 150 | 16,867 | 150 | 25,079 | 300 | 17,343 | 300 | 24,883 |
| 600 | 167 | 31,094 | 225 | 31,021 | 100 | 35,876 | 167 | 37,900 | 225 | 27,779 | 225 | 40,289 | 500 | 26,831 | 500 | 25,773 |
| 800 | 167 | 40,481 | 300 | 39,858 | 167 | 44,951 | 167 | 37,900 | 300 | 34,962 | 300 | 51,502 | | | 750 | 25,773 |
| 1,000 | | | 500 | 50,704 | | | | | 300 | 34,962 | 300 | 51,502 | | | 750 | 25,773 |
| 1,200 | | | 500 | 54,904 | | | | | 500 | 52,020 | 500 | 54,501 | | | 1,000 | 25,773 |
| 1,600 | | | | | | | | | 500 | 55,084 | 500 | 56,135 | | | 1,500 | 30,973 |
| 2,000 | | | | | | | | | | | 750 | 56,135 | | | 1,500 | 31,107 |
| 2,500 | | | | | | | | | | | 750 | 56,135 | | | 2,000 | 41,510 |
| 3,000 | | | | | | | | | | | 1,000 | 56,135 | | | 2,000 | 41,596 |

* 400 Amp, 120/240 V, Single Phase Panels: Second breaker is an APS requirement and needs to be minimum 22K AIC rated.

** Fault current values in this column based upon transformer size of 167/ 75kVA.

**Notes:**

1. For service equipment designed for underground feed using overhead transformers use the highest fault current between the OH and Pad XFMR values. This provides for proper bracing, if future conversions occur.
2. Please refer to the General Section 800.1 for additional information.
3. Table 800.2 indicates the minimum interrupting requirements for service entrance equipment, and is based on an infinite buss located on the transformer primary and 20 ft. of service conductor sized to serve at least 80% of the service entrance section.
4. Current values are symmetrical amperes of three-phase faults on three-phase transformers and either phase-to-phase or phase-to-neutral, whichever is larger for single-phase transformers.
5. Values do not apply to network services. Consult with APS for network services.
6. **Arc Flash hazard calculations** should be performed by a Registered Professional Engineer. The dynamic electric utility system grid makes it impractical to provide any further information other than the fault current values noted in Table 800.2. APS will provide only maximum fault current values at the service entrance section.

## 800.3 FAULT CURRENT FOR MULTI-FAMILY RESIDENTIAL PROJECTS

APS uses the following minimum design criteria as a method to limit fault current in multi-family residential projects to 22,000 amps or less:

1. Transformer size does not exceed 100 KVA.
2. Service wire runs will not be less than the following distances:

| | | |
|---|---|---|
| UA 1/0 | - | 10 Ft. |
| UA 4/0 | - | 15 Ft. |
| UA 4/0-2 | - | 30 Ft. |
| UA 500 | - | 25 Ft. |

**If the transformer size is larger or service length is shorter than shown, refer to Table 800.2 for available fault current.**

## 800.4 MINIMUM CONDUCTOR LENGTH REQUIRED TO LIMIT FAULT CURRENT

**MINIMUM CONDUCTOR LENGTH REQUIRED TO LIMIT FAULT CURRENT TO 22,000AMPS**

| **CONDUCTOR SIZE** | TRANSFORMER SIZE - SINGLE PHASE, 120/240v | | | | |
|---|---|---|---|---|---|
| | **25kVA** | **50kVA** | **75kVA** | **100kVA** | **167kVA** |
| Underground Conductor | Minimum Wire Length in Feet | | | | |
| 1/0 AL | 0 | 0 | 0 | 10 | 15 |
| 4/0 AL | 0 | 0 | 0 | 15 | 30 |
| 2 sets of 4/0 AL | 0 | 0 | 0 | 30 | 55 |

**MINIMUM CONDUCTOR LENGTH REQUIRED TO LIMIT FAULT CURRENT TO 10,000AMPS**

| **CONDUCTOR SIZE** | TRANSFORMER SIZE - SINGLE PHASE, 120/240v | | | | |
|---|---|---|---|---|---|
| | **25kVA** | **50kVA** | **75kVA** | **100kVA** | **167kVA** |
| Underground Conductor | Minimum Length in Feet | | | | |
| 1/0 AL | 0 | 20 | 35 | 45 | 55 |
| 4/0 AL | 0 | 35 | 70 | 85 | 100 |
| 2 sets of 4/0 AL | 0 | 65 | 135 | 170 | 200 |

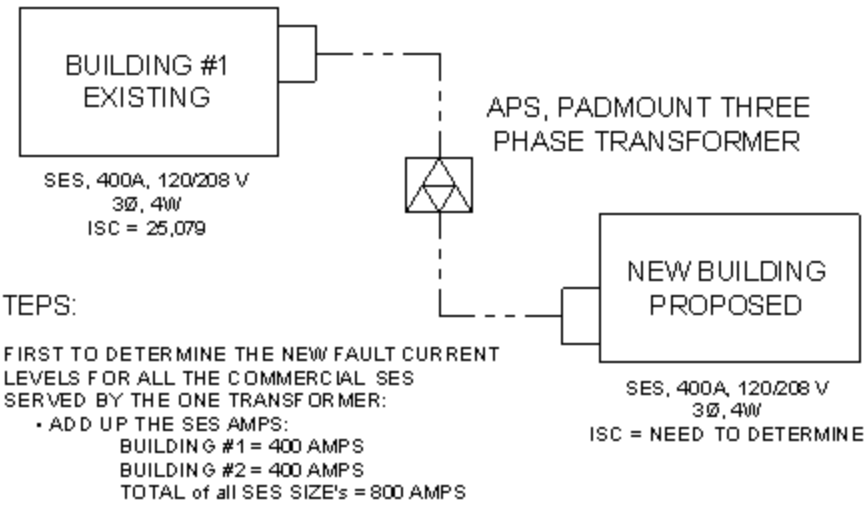
**Note: The above charts are to be used for assistance with existing field situations.**

## 800.5 MULTIPLE SERVICES FOR COMMERCIAL APPLICATIONS

Use the following to determine the fault current for multiple services from one three phase transformer:

Add all of the existing and proposed service entrance (SES) ampere ratings. Then use this total SES amp figure to find the appropriate fault current using, Table 800.2. Each SES being served from this transformer needs to be braced for this fault current level. Also, ensure the new building plans indicate on the one-line the proper bracing or AIC rating for the equipment.

FAULT CURRENT FOR MULTIPLE COMMERCIAL SERVICES FROM ONE TRANSFORMER




STEPS:

1. FIRST TO DETERMINE THE NEW FAULT CURRENT LEVELS FOR ALL THE COMMERCIAL SES SERVED BY THE ONE TRANSFORMER:
   - ADD UP THE SES AMPS:
     BUILDING #1 = 400 AMPS
     BUILDING #2 = 400 AMPS
     TOTAL of all SES SIZE's = 800 AMPS
2. FIND FROM THE FAULT CURRENT TABLE 800.2 ISC FOR 800 AMPS = 51,502 AMPS
3. EACH SES SERVED BY THE ONE TRANSFORMER WILL NEED TO BE BRACED FOR 51,502 AMPS OF FAULT CURRENT.
4. VERIFY THE EXISTING SES BRACING.
5. IF THE EXISTING SES IS NOT ADEQUATELY BRACED FOR THE NEW AVAILABLE FAULT CURRENT LEVEL, APS WILL CONSIDER INSTALLING A SEPARATE TRANSFORMER FOR THE NEW BUILDING.