

G.7 Short Circuit

PJM performs short circuit analysis as part of the annual Regional Transmission Expansion Plan (RTEP) baseline assessment. This analysis includes a study of the entire PJM system based on its current configuration and equipment. In addition, PJM also performs the analysis on the planned system configuration using a 5-year out case. The generation and merchant transmission interconnection process (see Manual 14A) also includes short circuit analysis for each requested new interconnection project. The addition of new sources drives most breaker replacements. PJM Planning conducts short circuit analysis to ensure the high-voltage circuit breakers on the transmission system are sufficiently rated to safely interrupt fault currents. These short circuit studies are also referred to as breaker interrupting studies. Since new sources only become committed with relative assurance a few years before scheduled commercial operation and since breaker replacement lead times are only a few years, these analysis are only conducted within the 5-year planning horizon.

The short circuit analysis is performed in accordance with the following industry standards:

- ANSI/IEEE 551-2006 “IEEE Recommended Practice for Calculating Short-Circuit Currents in Industrial and Commercial Power Systems”
- ANSI/IEEE C37.04-1999 “IEEE Standard Rating Structure for AC High-Voltage Circuit Breakers”
- ANSI/IEEE C37.010-1999 “IEEE Application Guide for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis”
- ANSI/IEEE C37.5-1979 “IEEE Guide for Calculation of Fault Currents for Applications of AC High-Voltage Circuit Breakers Rated on a Total Current Basis”

The system condition most critical for short circuit analysis on the PJM system is all available generation in-service. This condition is modeled in short circuit reference cases that are specially configured for short circuit analysis. The PJM Transmission Planning Department maintains the following short circuit base case representations and associated data:

- 1 year planning representation consisting of the current system plus all facilities planned to be in-service within the next year.
- Current year plus 5 planning representation using the 1 year planning representation as the base model and including all system upgrades, generation projects, and merchant transmission projects planned to be in-service from years 1 through 5. This 5 year planning representation is consistent with the PJM RTEP 5 year load flow base case.
- Data file containing current circuit breaker interrupting ratings and other relevant circuit breaker nameplate data for all BES circuit breakers ~~rated 230 kV and above~~.

The short circuit base cases are maintained using Aspen One Liner and short circuit analysis is performed using the Aspen Breaker Rating Module. The PJM short circuit 1 year planning representation is developed annually with the assistance of the designated transmission owner short circuit contacts and maintained by the PJM Transmission Planning Department.