

## Designated Entity Design Standards Task Force (DEDSTF)

### Minimum Design Requirements for FERC Order 1000 Projects

#### System Protection Subgroup

For any Competitive Substation Facility included in the scope of a Competitive Transmission Project, the following minimum system protection, metering, and control requirements apply.

#### 1. System Protection Engineering and Design Requirements for Facilities that Interconnect to Existing Incumbent Transmission Owners

For Transmission Circuits and other facilities with protective zones that are shared with existing incumbent Transmission Owners (i.e., facilities that represent ties between existing substations owned by incumbent Transmission Owners and Competitive Substation Facilities, etc.), the parties must coordinate to develop a protection system design that does not degrade the performance of the system, and meets the requirements of the NERC Reliability Standards, following the applicable technical requirements and standards of the Transmission Owner that are posted on PJM's website per Manual 14C Section 6.1.3.2., or other mutually agreed to solution for the items listed below. When interconnecting to multiple transmission owners systems, all parties must coordinate to achieve a mutually agreed upon solution.

- Line relay scheme (DCB, POTT, current diff, etc.)
- Line relay types/models
- Line protection communication media (Fiber, Power Line Carrier, etc.)
- Line protection communication scheme requirements – number of channels, channel types (POTT, DCB, DTT, etc.), and channel performance requirements
- Design must allow protection system maintenance to be performed without taking any primary element out of service (e.g., line, transformer, bus).
- Reclosing method (HBDL, sync check, etc.) and associated timing must be coordinated with the local TO
- Breaker failure timing must be coordinated per NERC Standard PRC-001.

#### Protection System Design Reliability

The PJM Relay Subcommittee (RS) is going to discuss if a "Protection System Reliability" section should be added to PJM M7. This section should address minimum Rack-rack separation requirements, possibly maintenance requirements (design with test switches to ensure that relays can be removed from service for testing without removing a BES element from service)

#### 2. System Protection Requirements for Facilities that do not directly Interconnect with Existing Substations owned by Incumbent Transmission Owners

**Comment [AMS1]:** Duquesne recommends that this manual be cleaned up and formatted prior to the next round of reviews. Small changes in formatting such as capitalization of defined terms could result in different interpretations. For example Transmission Owner is a defined term in the PJM OATT but it is not always capitalized in this document.

**Comment [AMS2]:** Is this capitalized term defined somewhere?

**Comment [AMS3]:** Is this capitalized term defined somewhere?

**Comment [AMS4]:** Is this capitalized term defined somewhere?

For facilities with protective zones that are not shared with incumbent Transmission Owners or Generation Owners (i.e., facilities entirely within a Competitive Substation Facility or ~~facilities~~[Facilities](#) that interconnect two Competitive Substation Facilities, etc.), PJM Manual 07 will apply to the following equipment as minimum design standards for system protection, metering, and control:

- Substation Buses (Manual 07, Section 9)
- Breaker Failure Protection (Manual 07, Section 12)
- Transmission Substation Transformers (Manual 07, Section 8)
- Shunt Reactors and Capacitors (Manual 07, Section 10 and 11)
- Phase Angle Regulating and Voltage Regulating Transformers (Manual 07-Section 13)
- HVDC Transmission Circuits and Converters (No Coverage in Manual 07)

Note 1: Minimum system protection requirements for HVDC Transmission Circuits and associated converter equipment shall be determined on a case-by-case basis and included in the applicable Request for Proposal. At a minimum, completely redundant protection systems will be required for these elements.

Note 2: For Phase Angle Regulators (PAR) at a Developer station that are electrically located at the terminal of a transmission line with a shared protection zone, design and relay setting coordination between the Developer and the Local T.O. is required. The required Protection schemes on a PAR are inherently complex, and can adversely affect reliability of the Local T.O. system. In these cases, agreement on scope of design and protection philosophy, relay settings and test methods may be required by the Local T.O.

### **3. Facilities not covered under [Designated Entity Agreement \(DEA\)](#) Section 4.2**

#### **Relay schemes that are not applicable to DEA 4.2**

Relay schemes that are not applicable to DEA 4.2 are those not related to the line protection schemes/systems (or schemes that are shared by the local TO and the Developer) as outlined above. For these schemes, the Developer must follow the requirements of PJM Manual 7.

#### **Relay protection review**

The overall review of the Developer design is an issue that will be brought to the PJM Planning Committee to determine how best to address.

#### **Protection System Design Reliability**

The PJM RS is going to discuss if a "Protection System Reliability" section should be added to PJM M7. This section should address minimum Rack separation requirements, possibly

maintenance requirements (design with test switches to ensure that relays can be removed from service for testing without removing a BES element from service)

### **Additional requirements**

All protection schemes in the PJM footprint are required to follow the PJM Manual 7, "PJM Protection Standards". Additionally, all Developers must follow all applicable NERC reliability standards. For protection systems in the Developer substation that do not meet the applicability of PJM Manual 7 (for example, protection systems protecting only equipment < 200kV), the PJM Relay Subcommittee has developed a [PJM M7 exceptions document](#).

Comment [AMS5]: Does this exist?

### **Individual Interconnection Requirements Document**

PJM is currently reviewing the feasibility of using the Interconnections Requirements Document to indicate any performance related technical requirements specific to ~~that the~~ Transmission Owner— that a potential Developer would need to know. Compliance with NERC FAC-001 requires all Transmission Owners to have an Interconnection Requirements Document. These documents are all currently posted on the PJM website. Developers must follow the requirements in this document when interconnecting with a specific Transmission Owner.

Specific protection requirements (that do not conflict with PJM M7 or DEDSTF final documents) for individual Transmission Owners, as it relates to the design and engineering of a proposed new interconnected facility, can be added to this document to address specific performance related requirements. This will ensure the potential Developer is aware of any additional requirements not addressed in PJM M7 or DEDSTF documents. (ie breaker failure timing requirements near a large generating facility) .

If the use of this document for that purpose is not feasible, then the DEDSTF would either add an appendix with each PJM Member relay requirements, or create a new document.