

Phase Angle Regulator Task Force  
 PARs as Controllable A.C. Merchant Transmission Facilities

PACKAGE/ PROPOSAL MATRIX

Instructions:

1. Copy over design component, priority, and status quo columns from options matrix
2. Complete individual packages in columns by selecting individual component options from the options matrix.

| #  | Design Components  | Priority | Status Quo | Packages  |
|----|--|----------|------------|---|
|    |  |          |            | A   |
| 1  | Number and Frequency of tap changes  |          | N/A        | Customer design concern. PJM will require controllability consistent with design component #12 and without regard to the number or frequency of tap changes this will require.  |
| 2  | Precision of flow control  |          | N/A        | Consistent with existing requirements in Manual 11 related to allowable deviations for all resources which are self scheduled. Deviations governed by existing rules for assessing Operating Reserve Charges.   |
| 3  | Capabilities of establishing flow control over a range of system conditions. |          | N/A        | Customer to design the facility such that it maintains the ability to control flows across the range of requested MWs under all required contingency conditions (e.g. All PJM RTEP planning requirements).  |
| 4  | Interface transfer capability  |          | N/A        | 1. Test to determine capability of proposed equipment<br>2. Test to determine impact on existing rights holders   |
| 5  | Rights Determination   |          | N/A        | Customer requests rights. Studies to determine system impacts based on granting rights as with other types of facilities (e.g. HVDC & VFT). Minimum of:<br>1. Load flow (Generation deliverability/Load deliverability/N-1-1)<br>2. Short circuit<br>3. Stability   |
| 6  | Loss of Rights   |          | N/A        | Customer unable to demonstrate ability to flow scheduled service  |
| 7  | PAR Controllability - Achieving zero flow                                    |          | N/A        | Customer must be able to achieve zero flow (stop flow) when directed by PJM. If unable to achieve zero flow, PJM reserves the right to disconnect the PAR to prevent unscheduled flows.   |
| 8  | Step size (MW)   |          | N/A        | Acceptable step size will be studied based on the proposed location for interconnection of each facility on a case by case basis to determine impacts; however, steps of 20 MW steps or less are expected to be acceptable in most applications.<br><br>New language required in Manual 14E.  |
| 9  | Initial flow quantity from a zero flow position (MWs)                        |          | N/A        | Initial energization to achieve a MW flow from a zero flow position shall not exceed the established step size for the facility as determined in design component #8. This may be relaxed or tightened if local system is unable to sustain events of this magnitude without impact to other parties.<br><br>New language required in Manual 14E. |
| 10 | Interim rights   |          | N/A        | Customer is able to obtain interim rights through the interim deliverability process currently outlined in PJM Manual 14A.  |
| 11 | Cost allocation for future baselines   |          | N/A        | Consistent with treatment of HVDC and VFT facilities  |
| 12 | Facility control   |          | N/A        | Automatic control required with ability to manually adjust  |