

## **Appendix C - Explanation of Terms and Instructions for Data Preparation of NX-9C**

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## I. EQUIPMENT REQUIREMENTS

Data for all phase shifting transformers designated as part of the Bulk Electric System<sup>1</sup> (BES) or connecting to the New England Transmission System<sup>2</sup> at a voltage of 69 kV or greater shall be provided by the Transmission Owners and Market Participants who own the equipment.<sup>3</sup>

A separate NX-9C form shall be provided for each transformer. ISO shall provide ISO Identification Numbers for all transformers. All data items shall be completed for each winding unless these instructions specifically indicate otherwise.

A copy of the manufacturer's nameplate, either by document (.pdf format) or digital photograph (.tif or .jpg formats), shall be included as a file attachment to the NX-9C form for new or replaced equipment and upon revision of existing NX-9C forms.

A copy of the manufacturer's test report document (in .pdf format) shall be included as a file attachment to the NX-9C form for new or replaced equipment and upon revision of existing NX-9C forms.

## II. GENERAL DATA INSTRUCTIONS

The NX-9C form provides for entry of both ISO and MP/TO data. ISO fields cannot be modified by the MP or TO. The MP or TO is responsible for providing data for all non-ISO fields via the NX Application.

The circuit number shall initially be entered by the MP or TO for new equipment and thereafter maintained by ISO.

Select the terminals that reflect the connection points of the equipment. Terminals are created and maintained by ISO. The user should contact the ISO NX-9 Administrator ([nx9admin@iso-ne.com](mailto:nx9admin@iso-ne.com)) if terminal additions or changes are needed.

To remove equipment from service, select the Remove Equipment From Service checkbox. Equipment is removed from service either when the equipment is retiring from service or if new forms are being submitted as a replacement due to (ch)-3(se9t g0 C

To assist in completing the NX-9C form, sample manufacturer's nameplate data and a completed NX-9C form utilizing that data are attached (Example 1).

### **III. RATING DATA INSTRUCTIONS**

Facility rating data shall be provided in MVA (rounded down to the nearest whole number) and determined in accordance with

(PP7). The definition of Thermal Ratings is described in PP7 Section 2.0 Collaborative Development of Rating Procedures. A facility rating shall equal the rating of the most limiting individual equipment, shall

Non-Auto - Transformer does not have controls for complete automatic operation. May be remotely controlled by an LCC System Operator or a TO control room operator via SCADA.

Normal Operating Mode - Indicate the normal operating mode based upon the descriptions below. The normal operating mode selected should reflect the operational state that the transformer is expected to be in the majority of the time:

Auto - Transformer controls are set up for complete automatic operation. Tap changes typically occur without LCC System Operator or TO control room operator intervention.

Manual-Remote - Tap changes are typically made using the SCADA system and are remotely initiated by an LCC System Operator or a TO control room operator. Device controls are not normally operated in flow sensing mode.

Manual-Local - Switching of the device is performed locally at the substation.

Auto Mode Tap Switching Time Delay For phase shifters with the Normal Operating Mode field set to Auto, indicate the tap switching time delay before tap changes initiate (in seconds).

Normal Tap Position Number - Heavy Load/Light Load - This is required for all phase shifters whose Normal Operating Mode field is set to Manual-Remote or Manual-Local.

For the purposes of this document, heavy load shall mean the summer months of June through August and light load shall mean the remaining calendar months of January through May and September through December.

For phase shifters whose Normal Operating Mode field is set to Manual-Remote, indicate the tap position number at which the transformer is normally operated for heavy load conditions and for light load conditions.

For phase shifters whose Normal Operating Mode field is set to Manual-Local, indicate the tap position number at which the transformer is normally operated for heavy load conditions and for light load conditions.

Step Size - Indicate the change in angle (degrees) per change in tap position.

Maximum Angle - Indicate the maximum angle (degrees). This should be the angle associated with the first (top) tap indicated in the tap multiplier table

Minimum Angle - Indicate the minimum angle (degrees). This should be the angle associated with the last (bottom) tap indicated in the tap multiplier table.



EXAMPLE 1, NX-9C PHASE SHIFTING TRANSFORMER

ISO New England Equipment Rating, Configuration, and Operational Data Implementation Form  
Phase Shifter (NX-9C)

Participant: Station1PST      ISO ID: STATION1 PS01

Form State: Approved      Ckt: 1

Terminal A: Station1115kV      Bus #: 111222      EMS

Terminal B: Station1PST115kV      Bus #: 112233      EMS

Default Summer: 80 F

MVA	Limiting Device	Description	Location
Normal	150	Phase Shifter - Phase Shifting Transformer	Station1
LTE	200	Phase Shifter - Phase Shifting Transformer	Station1
S	185	Phase Shifter - Phase Shifting Transformer	Station1
DAL	265	Phase Shifter - Phase Shifting Transformer	Station1

Default Winter: 80 F

MVA	Limiting Device	Description	Location
Normal	150	Phase Shifter - Phase Shifting Transformer	Station1
LTE	200	Phase Shifter - Phase Shifting Transformer	Station1

**EXAMPLE 1 (CONTINUED),**

**VII. OP-16 APPENDIX C REVISION HISTORY**

**Document History** (This Document History documents action taken on the equivalent NEPOOL Procedure prior to the RTO Operations Date as well revisions made to the ISO New England Procedure subsequent to the RTO Operations Date.)

Rev. No.	Date	Reason
--	10/26/23	For previous revision history, refer to Rev 10 available through Ask ISO.