Appendix A - Explanation of Terms and Instructions for Data Preparation of NX-9A

ISO New England Transmission Equipment Rating, Characteristic, and Operational Data

Transmission Line

Effective Date: January 25, 2021

Review By Date: January 25, 2023

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I. EQUIPMENT REQUIREMENTS

Data for all transmission line segments designated as part of the Bulk Electric System[1] (BES) or connecting to the New England Transmission System[2] at a voltage of 69 kV or greater shall be provided by the Transmission Owners and Market Participants who own the equipment.[3]

Data for other line segments connecting at voltages that are less than 69 kV may be required when ISO determines that the data is necessary for reliable operation of the New England Transmission System. When required by ISO, the TO or MP shall submit the data within thirty (30) calendar days of ISO's notification.

NX-9A data for any line between the generator step-up (GSU) transformer and the point of change of ownership between the generator and the TO shall be supplied by the owner of the line. In cases where the line owner is not an MP or TO, the Generator Asset Lead MP of the connecting generator shall be responsible to provide ISO with the NX-9A data.

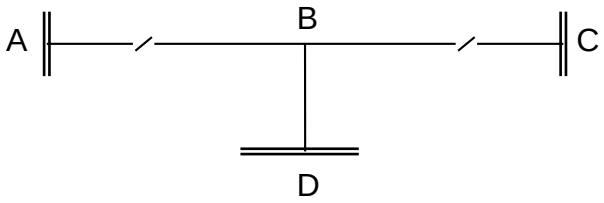
Submission of an NX-9A for a line segment internal to a substation is not required when the following conditions are met and the exemption has been approved by the ISO NX-9 Administrator:

- The total reactance (x) of the segment (all owners) is less than 0.01 (percent on a 100 MVA base)
- The segment is not part of a 3-terminal line tap
- The MW and MVAR of the segment are not metered
- All potentially limiting equipment is included in the rating calculation of the adjacent equipment

A transmission line segment is defined as follows:

> As used by the ISO nodal network model, a line segment is a transmission path between two (2) electrical nodes of the same kV level. For multi-terminal lines, a line segment is defined for each electrical node connecting to a common tap. In the example below, the four (4) terminals; A, B, C and D, are connected by three (3) line segments. These segments are: 1) A to B; 2) B to C; and 3) B to D. In this example, B is the common tap. Each of the three segments is treated as a separate segment for which ISO Identification Numbers are assigned and transmission rating and characteristic data is required.

[1] Bulk Electric System (BES) is defined in Glossary of Terms Used in NERC Reliability Standards.
[2] New England Transmission System is defined in the ISO Transmission, Markets, and Services Tariff, Section I.2.2.
[3] Generally, under Section I of Operating Procedure No. 16, data shall be provided by Transmission Owners (TOs) and Market Participants, *i.e.* Market Participants who own the equipment or Lead Market Participants for Generator Assets (collectively MPs).



A separate NX-9A form shall be provided for each transmission line segment. ISO shall provide ISO Identification Numbers for all line segments. On any jointly owned line, each MP or TO shall report the data for only that portion of the line segment that it owns or is otherwise responsible for providing as described above.

If a series reactive device cannot be switched in or out independently of the associated line, the impedance and rating information for the series reactive device may be combined with the line data and the combined total may be submitted on a single NX-9A form. On all new and revised NX-9A forms, if a series reactive device is combined with a line and reported on a single combined NX-9A form, the MP or TO shall update the Participant Equipment Notes field to indicate that the NX-9A form includes the series reactive device information.

II. GENERAL DATA INSTRUCTIONS

The NX-9A 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) if terminal additions or changes are needed.

In the Cable Type field select “Overhead,” “Underground” or “Both.” Select “Both” if the NX-9A form contains information for both overhead conductor and underground cable.

To remove equipment from service, select the Remove Equipment From Service checkbox. Equipment is removed from service either when the equipment is being retired from service or if new forms are being submitted as a replacement due to a change in configuration.

To assist in completing the NX-9A form, a completed sample NX-9A form is attached (Example 1).

III. RATING DATA INSTRUCTIONS

Facility rating data shall be provided in MVA (rounded down to the nearest whole number) and in accordance with Planning Procedure 7, “Procedures for Determining and Implementing Transmission Facility Ratings in New England”

(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.

The NX-9A form provides for entry of both summer (April 1 through October 31) and winter (November 1 through March 31) thermal ratings. The ambient temperature (reported in Fahrenheit) and wind speed (reported in feet per second) used to establish the normal ratings shall be entered for each rating set. If ratings for special conditions or configurations are added to the NX-9A form, comments that describe the associated circumstances for use of the special ratings are required. The MP or TO is also responsible for providing a statement as to the authority of ISO and the Local Control Center (LCC) for use and distribution of these special ratings.

IV. CHARACTERISTIC AND OPERATIONAL DATA INSTRUCTIONS

Provide positive sequence impedance data in percent on a 100 MVA base. Impedance on new or revised NX-9A forms shall be calculated and provided out to at least the 3rd decimal place.

R = resistance
X = reactance
B = susceptance

V. EXPLANATION OF DATA CHANGES

Any time an NX-9A form is modified or created, a brief description of the reason(s) for the entry shall be provided in the Revision Comments field. It will provide a written record of the change and clearly identify the equipment changes made in the field and/or other reasons that necessitated the update of the NX-9A form. For example: ABC line was re-conductored in January, 2011.

This data is utilized by ISO in the NX-9A form review and approval process.

VI. EQUIPMENT NOTES

The Equipment Notes field is used to provide explanations of data or other pertinent or operational information. For example: Border point is switch 123.

Fields are provided for both ISO and MP/TO notes. An additional private field is available to the MP or TO for internal notes that can be edited and viewed only by the MP or TO owning the record.

Equipment notes are carried forward when an NX-9A form is updated. MPs and TOs should review and modify or delete any MP or TO note that is no longer pertinent. ISO is responsible for maintaining ISO notes.

EXAMPLE 1, NX-9A TRANSMISSION LINE

ISO New England Equipment Rating, Characteristic, and Operational Data Implementation Form Transmission Line (NX-9A)

Reference	555	**Participant ID**	12345
Participant	Test Company	**ISO ID**	12345-3
Form State	Submitted	**Ckt**	1
Conductor Type	795 MCM 36/1 ACSR and 1113 ACSS 45/7 Blue Jay	**ISO EMS ID**	12345-3
Terminal A	Station1 115kV	**Bus #** 987654	**EMS** STATION1
Terminal B	Station2 115kV	**Bus #** 654321	**EMS** STATION2
Cable Type	Overhead	**Nominal System Voltage (kV)** 115	**Conductor Length (mi.)** 12.26

Default Summer 100 F **Wind** 3 ft/s

	MVA	Limiting Device / Description	Location
Normal	208	Bus – Wire Bus	Station1
LTE	244	Breaker – 123 CB	Station2
STE	261	Conductor – 1113 ACSS	Line
DAL	328	Conductor - 1113 ACSS	Line

Default Winter 50 F **Wind** 3 ft/s

	MVA	Limiting Device / Description	Location
Normal	200	Bus – Wire Bus	Station1
LTE	200	Breaker – 123 CB	Station2
STE	200	Conductor - 1113 ACSS	Line
DAL	200	Conductor - 1113 ACSS	Line

Impedance Data (%) (100 MVA Base)

R 0.8507 **X** 5.4413 **B** 0.758

Revision Comments Reconductored section of the line with 1113 ACSS 45/7 Blue Jay from Structure X to Structure Y

Equipment Notes Open field available for Participant to supply pertinent information about the equipment or the manner in which it is operated.

Data Revision Number	2	**Date Created**	03/03/2014	**Prepared By**	Participant Username
Requested Effective Date	04/30/2014	**Date Received**	03/03/2014	**Approved By**	
Actual Effective Date	04/01/2014	**ISO EMS Implementation Date**			

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VII. OP-16 APPENDIX A 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
Rev 1	09/06/02	
Rev 2	02/01/05	Updated to conform to RTO terminology
Rev 3	08/05/05	Clarified terminology and added reference to new "Reason for Revision" field to aid NX-9 administration and conform to PP7
Rev 4	02/24/09	Clarify definition of line segment in general instructions. Update screen shots and example for addition of circuit number field and consistency of formatting.
Rev 5	05/04/12	Biennial review by procedure owner; Changed document to Arial, replace page pagination with Page X of Y format; Added Uncontrolled disclaimer to 1st page footer and added "Hard Copy is Uncontrolled" to all footers; Global language clarifications and changes to improve readability and user comprehension of requirements; Section I: clarify responsibility for reporting data; add ability to request line data for lines < 69kV, replace diagram with imbedded picture; Section II; remove list of specific ISO fields; Section III: delete Thermal Rating Definition table and replace with reference to PP7; move description of special/conditional ratings from table to text; Section IV: specify positive sequence impedance with granularity to four decimals; Section VI: add identification of comment author; Examples: remove screen shots of NX-9 Application entry forms;
Rev 6	12/09/13	Biennial review by procedure owner; General language changes to accommodate new web-based NX Application for NX-9 and NX-12D data; Globally change the term "Participant' to "Market Participant or Transmission Owner"; Define Market Participant as MP and use throughout document; Define Transmission Owner as TO as use throughout document; Sections I-II: renamed and reorganized, some instructions moved from Section I to Section II; Section I: Clarified Line segment definition; Section I: added language to provide guidance regarding when submission of NX9A data for small line segments internal to a substation is required Section III: Specify that temperature provided in the rating set should be the temp used to obtain the Normal rating; Section VI: renamed to match new application and clarified the desired information and purpose of the field; Replaced example with report from new application;
Rev 7	11/06/15	Biennial review by procedure owner; Clarify data provided by the Lead Market Participant refers to the generator asset LMP; Add instructions for use of the Remove Equipment From Service field; Add that ratings are to be provided in whole numbers; Add that facility rating is equal to the rating of the most limiting individual equipment: Update example titles; Replace example: label change from nominal line voltage to nominal system voltage;
Rev 8	08/05/16	Globally all footers, added the required corporate document identity; Update equipment requirements to include BES equipment; Update exception for line segments internal to a substation - move impedance statement to bullet list for clarity
Rev 9	11/03/17	Biennial review by procedure owner; Globally, made editorial changes to be consistent with current practices and management expectations (e.g., grammar changes from "must" to "shall"' and "which" to "that" as appropriate; and remove capitalization from non-defined terms; Clarify circumstance for ISO to require reporting of equipment connected at voltages under 69 kV is because it is needed for reliable operation of the New England Transmission System; Add language allowing data for series reactive devices which can't be operated independently to be combined with the associated line and reported on a single NX-9A form;
Rev 9.1	06/06/19	Biennial review by procedure owner requiring no changes; Made administrative changes required to publish the Minor Revision;

Rev. No.	Date	Reason
Rev 9.2	01/25/21	Biennial review by procedure owner requiring no changes; Made administrative changes required to publish the Minor Revision;