# 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: October 26, 2023

## Review By Date: October 26, 2025

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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 form requirements for lines associated with generator connections:

All generators participating in the Real-Time Energy Market and connecting via a line of any voltage level that is dedicated solely to the generation interconnection (i.e., via an express feeder) will be evaluated for impact to the ISO EMS Network Model. Based on this evaluation, NX-9A data forms may be required.

When NX-9A data is determined to be required,

- The TO shall provide NX-9A data for the line(s) from its connecting substation to the point of change of ownership between the generator and the TO.
- The Generator Asset Lead MP shall provide NX-9A data for the line(s) from the generator step-up (GSU) transformer to the point of change of ownership between the generator and the TO.

NX-9A data forms are not required for a line(s) between the transmission system and a generator when customer load is also served from the line.

NX-9A data forms are not required for lines connecting solely to Settlement Only Generators.

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

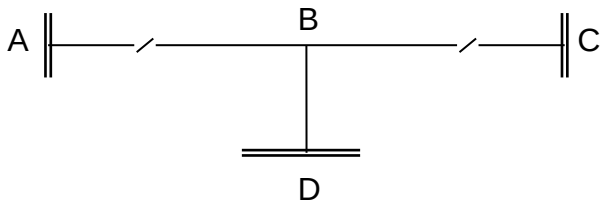
[1] Bulk Electric System (BES) is defined in Glossary of Terms Used in NERC Reliability Standards.

[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 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.




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.

Series reactive devices operated independently of the line shall be reported on the NX-9H form using the instructions in Operating Procedure 16, Appendix H.

## 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 determined 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, shall reflect relay loadability limits[4], and shall account for auxiliary support equipment such as wave traps and any other equipment that Good Utility Practice suggests is necessary. This requirement does not remove the TO’s obligation to adhere to PRC-023-4, and it successor standards, nor does it suggest a TO be allowed to change a relay setting to create a more limiting thermal rating for a facility.

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

[4] The term “relay loadability limits”, as used in this Appendix, represents the minimum flow at which the relay acts.

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 |
|---|---|---|
| - - | 10/26/23 | For previous revision history, refer to Rev 10 available through Ask ISO. |
| Rev 11 | 10/26/23 | Periodic review performed by procedure owner;<br>Add a clarifying statement that series reactive devices are reported on the NX-9H form;<br>Add footnote to define “relay loadability limits” as used in this Appendix. |
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