




Associated Electric Cooperative, Inc.

Your Touchstone Energy® Partner 

PRC-023-3

Assessment (Requirement R6)

Compliance Year 2016

November 2016

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Introduction

The purpose of Standard PRC-023 is to ensure that protective relay settings reliably detect all fault conditions but do not limit transmission loadability, and therefore allows system operators to take remedial action to protect system reliability during contingencies.

Requirement R6 of PRC-023 generally provides for an annual assessment by the Planning Coordinator to determine any circuits below 200kV for which requirements R1 through R5 must apply.

As a NERC registered Planning Coordinator, AECI is required to perform this assessment at least once each calendar year, with no more than 15 months between assessments, by applying the criteria in Attachment B of Standard PRC-023. This will determine the circuits (below 200kV) in its Planning Coordinator area that must comply with requirements R1 through R5 of the Standard.

This report presents the results from the 2016 assessment that was performed by applying the criteria in Attachment B.

Attachment B Criteria

Attachment B specifies which circuits must be evaluated and provides the criteria that determine if the circuit must meet loadability requirements. Attachment B is as follows:

PRC-023 — Attachment B

Circuits to Evaluate

- *Transmission lines operated at 100 kV to 200 kV and transformers with low voltage terminals connected at 100 kV to 200 kV.*
- *Transmission lines operated below 100 kV and transformers with low voltage terminals connected below 100 kV that are part of the BES.*

Criteria

If any of the following criteria apply to a circuit, the applicable entity must comply with the standard for that circuit.

B1. The circuit is a monitored Facility of a permanent flowgate in the Eastern Interconnection, a major transfer path within the Western Interconnection as defined by the Regional Entity, or a comparable monitored Facility in the Québec Interconnection, that has been included to address reliability concerns for loading of that circuit, as confirmed by the applicable Planning Coordinator.

B2. The circuit is a monitored Facility of an IROL, where the IROL was determined in the planning horizon pursuant to FAC-010.

B3. The circuit forms a path (as agreed to by the Generator Operator and the transmission entity) to supply off-site power to a nuclear plant as established in the Nuclear Plant Interface Requirements (NPIRs) pursuant to NUC-001.

B4. The circuit is identified through the following sequence of power flow analyses performed by the Planning Coordinator for the one-to-five-year planning horizon:

a. Simulate double contingency combinations selected by engineering judgment, without manual system adjustments in between the two contingencies (reflects a situation where a System Operator may not have time between the two contingencies to make appropriate system adjustments).

b. For circuits operated between 100 kV and 200 kV evaluate the post-contingency loading, in consultation with the Facility owner, against a threshold based on the Facility Rating assigned for that circuit and used in the power flow case by the Planning Coordinator.

c. When more than one Facility Rating for that circuit is available in the power flow case, the threshold for selection will be based on the Facility Rating for the loading duration nearest four hours.

d. The threshold for selection of the circuit will vary based on the loading duration assumed in the development of the Facility Rating.

i. If the Facility Rating is based on a loading duration of up to and including four hours, the circuit must comply with the standard if the loading exceeds 115% of the Facility Rating.

ii. If the Facility Rating is based on a loading duration greater than four and up to and including eight hours, the circuit must comply with the standard if the loading exceeds 120% of the Facility Rating.

iii. If the Facility Rating is based on a loading duration of greater than eight hours, the circuit must comply with the standard if the loading exceeds 130% of the Facility Rating.

e. Radially operated circuits serving only load are excluded.

B5. The circuit is selected by the Planning Coordinator based on technical studies or assessments, other than those specified in criteria B1 through B4, in consultation with the Facility owner.

B6. The circuit is mutually agreed upon for inclusion by the Planning Coordinator and the Facility owner.

Criteria B1

Criteria B1 includes any circuit that is a monitored facility of a permanent flowgate in the Eastern Interconnection.

AECI System Operations provided a listing of permanent flowgates for 2016. A flowgate consists of a “monitored facility” accompanied by a “contingent element”. The same monitored facility can be present in more than one flowgate but only needs to be considered once for loadability purposes.

Table 1 lists the applicable monitored facilities from AECI flowgates. If the evaluation criteria were not applicable to the flowgate, it is noted as such in the table. All of these flowgate monitored facilities have been identified in previous assessments.

Table 1 – 2016 Monitored Facilities of Flowgates

FG ID	Flowgate Monitored Facility	PRC-023 attachment B applicability (Criteria B1)?
1671, 1089	Adair - Novelty 161 kV	Yes
1092, 1674	Apache Tap - Barnett 161 kV	Yes
1093, 1094, 1096	Barnett - Eldon 161 kV	Yes
1099	Barnett 161/69 XFMR	N/A. LV terminals below 100 kV
1063	Blackberry - Jasper 345 kV	N/A. Previously identified since 200 kV+
1653	BOONE 161/69 XFMR	N/A. LV terminals below 100 kV

FG ID	Flowgate Monitored Facility	PRC-023 attachment B applicability (Criteria B1)?
1070	California 161/69 XFMR	N/A. LV terminals below 100 kV
1029	Collins (OSCEOLA) - Stockton 161 kV	Yes
1044, 1666	Cooper - Fairport 345 kV	N/A. Previously identified since 200 kV+
1668, 1669, 1687, 1696	Cottleville - Kisker 161 kV	Yes
1688, 1698, 1699, 2653	Cox Creek - Thayer South 161 kV	Yes
1073, 1078, 1691	Dardenne - Troy 161 kV	Yes
1071, 1076, 1087	Enon - Ethlyn 161 kV	Yes
1077, 1670	Enon 345/161 XFMR	Yes
1041, 1042, 1690	Essex - Lutesville 345kV	N/A. Previously identified since 200 kV+
1040	Essex - Stoddard 161kV	Yes
1064	Essex - West New Madrid 345 kV	N/A. Previously identified since 200 kV+
1682	Essex 345/161 XFMR	Yes
1043, 1648, 2652	Essex-Idalia 161 kV	Yes
1075	Fairport - Darlington 69 kV	N/A. Below 100 kV.
1061, 1667, 1676	Fairport - Gentry 161 kV	Yes
1058, 1059, 1060	Fairport - Hickory 161 kV	Yes
1015, 1046	Fairport - Osborn 161 kV	Yes
1045, 1074	Fairport - St. Joe 345 kV	N/A. Previously identified since 200 kV+
1098, 1684, 1697	Fairport 345/161 XFMR	Yes
1065, 1066, 1067	Franks - Huben 345 kV	N/A. Previously identified since 200 kV+
2657	Franks - South Crocker 161 kV	Yes
1685	Fredericktown - Fredericktown Tap 161 kV	Yes
2655	Gobbler Knob - Fletcher 345 kV	N/A. Previously identified since 200 kV+
1686	Hannibal - Spalding 161 kV	Yes
1689	Huben 345/161 XFMR	Yes
6522	Jim Hill - St. Francis 161 kV	Yes
1693	Kingdom City 345/161 XFMR	Yes
2663	Lebanon - Orla 161kV	Yes
1007, 1090, 1665	Maries - Old Maries 138/161 XFMR	Yes

FG ID	Flowgate Monitored Facility	PRC-023 attachment B applicability (Criteria B1)?
1072, 1664	Marion Tap - Spalding 161 kV	Yes
1035	Maryville-Nodaway 161 kV	Yes
1694	Missouri City - Excelsior Springs (aka Maurer Lake) 161 kV	Yes
1675, 3085, 6530	Moberly Tap - Moberly 161 kV	Yes
1068	Montgomery City - Williamsburg 161 kV	Yes
1047, 2660, 2661	Montrose - Clinton 161kV	Yes
2654, 2656	New Madrid - Sikeston 161 kV	Yes
1048	New Madrid - Tiptonville 161 kV	Yes
1051, 1069	New Madrid 345/161kV XFMR1	Yes
1052	New Madrid 345/161kV XFMR2	Yes
1020, 1050	New Madrid 500/345kV XFMR1	N/A. Previously identified since 200 kV+
1021, 1049	New Madrid 500/345kV XFMR2	N/A. Previously identified since 200 kV+
1672	Nodaway - Gentry 161 kV	Yes
1683	North Warsaw - Edmonson 161 kV	Yes
1663	Oran - Morley 161 kV	Yes
1030, 1031, 3175	Palmyra 345/161 kV XFMR	Yes
1681	Pike - Cyrene 161 kV	Yes
1091	South River - Muldrow 69 kV	N/A. Below 100 kV.
1673	Spalding 161/69 XFMR	N/A. LV terminals below 100 kV
1678, 1680, 1695, 2651	St Francis - Gobbler Knob 345 kV	N/A. Previously identified since 200 kV+
1062, 1088, 2658	Thomas Hill - Adair 161 kV	Yes
1057	Thomas Hill - Salisbury 161 kV	Yes
1053, 1054, 1055, 1056	Thomas Hill 345/161 XFMR	Yes
1692	Truman - Clinton 161 kV	Yes
1079	Warrenton - Big Creek 161 kV	Yes
1097, 1677, 1679	Wedeken Tap - Fredericktown 161 kV	Yes
1017, 1018, 1019, 1366, 1367	West New Madrid - Dell 500 kV	N/A. Previously identified since 200 kV+
2648, 2649, 2650	West New Madrid 500/345 kV XFMR	N/A. Previously identified since 200 kV+

CONTINGENCY/FACILITY	16SP	16SP T&D	16WP	16WP T&D	21SP	21SP T&D	21WP	21WP T&D	26SP	26WP
Franks-South Crocker 161kV Line Loading	-	-	-	-	-	103%	-	-	-	-
Franks-Loose Creek & Franks-Bland 345kV Xmsn Ckts Out										
Old Maries 161/138kV Xfmr Loading	-	-	-	-	-	104%	-	-	-	-
Troy-Dardenne(UE) 161kV Xmsn Ckt Out & Palmyra 345/161kV Xfmr Out										
Enon-Ethlyn 161kV Line Loading	-	-	-	102%	-	-	-	101%	-	-
Troy-Dardenne(UE) 161kV Xmsn Ckt Out & Palmyra-Maywood 345kV Xmsn Ckt Out										
Enon-Ethlyn 161kV Line Loading	-	-	-	102%	-	-	-	101%	-	-
Troy-Dardenne(UE) & Palmyra-Hannibal 161kV Xmsn Ckts Out										
Enon-Ethlyn 161kV Line Loading	-	-	-	102%	-	-	-	104%	-	-
Thomas Hill Unit 1 Out & Thomas Hill 345/161kV Xfmr #1 Out										
Thomas Hill 345/161kV Xfmr #2 Loading	103%	104%	-	-	-	-	-	-	-	-
Thomas Hill Unit 2 Out & Thomas Hill 345/161kV Xfmr #1 Out										
Thomas Hill 345/161kV Xfmr #2 Loading	111%	112%	-	-	106%	106%	-	-	106%	-
Thomas Hill-McCredie-Kingdom City 345kV Xmsn Ckt & Thomas Hill-Moberly-Higbee 161kV Xmsn Ckt										
Thomas Hill-Salisbury 161kV Line Loading	104%	102%	-	-	-	-	-	-	-	-
Thomas Hill-Salisbury & Thomas Hill-Meadville-Chillicothe 161kV Xmsn Ckts Out										
Moberly Tap-Moberly 161kV Line Loading	103%	102%	-	-	-	-	-	-	-	-
Thomas Hill-McCredie-Kingdom City 345kV Xmsn Ckt Out & Thomas Hill-Salisbury 161kV Xmsn Ckt Out										
Thomas Hill-Moberly Tap 161kV Line Loading	105%	104%	106%	105%	102%	102%	102%	101%	103%	103%
Moberly Tap-Moberly 161kV Line Loading	125%	122%	124%	123%	120%	118%	120%	117%	121%	121%
Thomas Hill-Salisbury & Higbee-Bolstad 161kV Xmsn Ckts Out										
Moberly Tap-Moberly 161kV Line Loading	105%	104%	102%	102%	102%	-	101%	-	102%	101%
Thomas Hill-Salisbury & Missouri City-Excelsior Springs 161kV Xmsn Ckts Out										
Moberly Tap-Moberly 161kV Line Loading	105%	104%	-	-	102%	-	-	-	104%	101%
Thomas Hill-Salisbury & Thomas Hill-Adair 161kV Xmsn Ckts Out										
Moberly Tap-Moberly 161kV Line Loading	105%	103%	101%	-	-	-	-	-	101%	-

CONTINGENCY/FACILITY	16SP	16SP T&D	16WP	16WP T&D	21SP	21SP T&D	21WP	21WP T&D	26SP	26WP
Montgomery City-McCredie-Overton 345kV Xmsn Ckt Out & Thomas Hill- Salisbury 161kV Xmsn Ckt Out										
Moberly Tap-Moberly 161kV Line Loading	111%	109%	107%	106%	105%	102%	103%	-	104%	103%
Barnett-Gravois & Huben-Whispering Oaks-Camdenton 161kV Xmsn Ckts Out										
Lost Valley-Truman 161kV Line Loading	-	-	-	-	-	-	-	104%	-	-
<p>Indicates facility loading above 130%.</p> <p>Indicates a facility that was identified by Criteria B4 screening in previous years' assessments.</p> <p>Indicates a facility identified by this year's Criteria B4 screening that has not been identified in previous years' assessments.</p> <p>Since AEI Facility Ratings are based on continuous load durations, criteria B4.d.iii applies and circuits that are loaded above 130% must comply with the standard.</p>										

Criteria B5, B6

AEI does not have any additional circuits that must comply with the standard based on criteria B5 or B6.

Summary

Table 3 is a comprehensive listing of facilities that were identified through this 2016 assessment required by PRC-023 requirement R6.

Table 3 - Comprehensive Listing of Identified Facilities

FACILITY TYPE	FACILITY	ATTACHMENT B CRITERIA	FIRST CALENDAR YEAR THAT CRITERIA APPLIES	NOTES
Line	Adair3-Novelty 161kV ckt. 1	B1	2013	
Line	Apache Tap-Barnett 161kV ckt. 1	B1	2013	
Line	Barnett-Eldon 161kV ckt. 1	B1	2013	
Line	Clinton-Montrose 161kV ckt. 1	B1	2013	In SPP's 2014 assessment
Line	Clinton-Truman 161kV ckt. 1	B1	2013	In SPP's 2014 assessment
Line	Collins-Stockton 161kV ckt. 1	B1	2013	In SPP's 2014 assessment
Line	Cottleville-Kisker 161kV ckt. 1	B1	2013	
Line	Cox Creek-Thayer 161kV ckt. 1	B1	2013	
Line	Dardenne-Lake St. Louis 161 kV ckt. 1	B4	2014	
Line	Dardenne-Troy 161kV ckt. 1	B1	2013	
Transformer	Enon 345/161kV xfmr. 1	B1	2013	
Line	Enon-Ethyln 161kV ckt. 1	B1	2013	
Line	Enon-Lake St. Louis 161 kV ckt. 1	B4	2015	
Transformer	Essex 345/161kV xfmr. 1	B1	2013	
Line	Essex-Idalia 161kV ckt. 1	B1	2013	In SPP's 2014 assessment
Line	Essex-Stoddard 161kV ckt 1	B1	2013	

FACILITY TYPE	FACILITY	ATTACHMENT B CRITERIA	FIRST CALENDAR YEAR THAT CRITERIA APPLIES	NOTES
Transformer	Fairport 345/161kV xfmr. 1	B1	2013	
Line	Fairport-Gentry 161kV ckt. 1	B1	2013	
Line	Fairport-Hickory Creek 161kV ckt. 1	B1	2013	
Line	Fairport-Osborn 161kV ckt. 1	B1	2013	
Line	Franks-South Crocker 161 kV ckt. 1	B1	2014	
Line	Fredericktown-Fredericktown(UE) 161kV ckt. 1	B1	2013	
Line	Fredericktown-Wedeken Tap 161kV ckt. 1	B1	2013	
Line	Hannibal West-Spalding 161kV ckt. 1	B1	2013	
Transformer	Huben 345/161kV xfmr. 1	B1	2013	
Line	Jim Hill-St. Francis 161 kV ckt. 1	B1	2014	
Transformer	Kingdom City 345/161kV xfmr. 1	B1	2013	
Line	Lebanon-Orla 161 kV ckt. 1	B1	2014	
Transformer	Maries-Old Maries 161/138 kV xfmr. 1	B1	2014	
Line	Marion Tap-Spalding 161kV ckt. 1	B1	2013	
Line	Maryville-Nodaway 161kV ckt. 1	B1	2013	In SPP's 2014 assessment
Line	Missouri City-Maurer Lake 161kV ckt. 1	B1	2013	
Line	Moberly Tap-Moberly 161kV ckt. 1	B1	2013	
Transformer	New Madrid 345/161kV xfmr. 1	B1	2013	
Transformer	New Madrid 345/161kV xfmr. 2	B1	2013	
Line	New Madrid-Sikeston 161kV ckt. 1	B1	2013	In SPP's 2014 assessment
Line	New Madrid-Tiptonville 161kV ckt. 1	B1	2013	
Line	Nodaway-Gentry 161kV ckt. 1	B1	2013	
Line	North Warsaw-Edmonson 161kV ckt. 1	B1	2013	In SPP's 2014 assessment
Line	Oran-Morley 161kV ckt. 1	B1	2013	
Transformer	Palmyra 345/161kV xfmr. 1	B1	2013	
Line	Pike-Cyrene 161kV ckt. 1	B1	2013	
Transformer	Sportsman 345/161kV xfmr. 1	B4	2013	
Transformer	Sportsman 345/161kV xfmr. 2	B4	2013	
Transformer	Thomas Hill 345/161kV xfmr. 1	B1	2013	
Line	Thomas Hill-Adair1 161kV ckt. 1	B1	2013	
Line	Thomas Hill-Salisbury 161kV ckt. 1	B1	2013	In SPP's 2014 assessment
Line	Warrenton-Big Creek 161kV ckt.1	B1	2013	
Line	Williamsburg-Montgomery City 161kV ckt. 1	B1	2013	