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Xcel Energy

Docket No.: E002, ET2/CN-06-1115

Response To: Elizabeth Goodpaster and Mary Marrow
WOW, et al

Information Request No. 26

Date Received: April 11, 2008

Question:

Referring to our previously issued IR NO. 3 requesting various transmission line ratings for 14 combinations of conductor and voltage:

- a) Please add comparable data for quad bundled 765 KV using standard conductors.
- b) For each of the 15 combinations discussed above, please add % series X (resistance and inductive reactance) per mile all on a 100 MVA base. It is not necessary to show how these added characteristics vary with loading or temperature. Typical values are acceptable.

Response:

	Typical Impedances % on 100 MVA Base	
	<u>R</u>	<u>X</u>
(a) single circuit 115 kV, 795 ACSS	0.0949%	0.5387%
(b) double circuit 115 kV, 795 ACSS	0.0946%	0.5429%
(c) single circuit 161 kV, 795 ACSS	0.0498%	0.2829%
(d) double circuit 161 kV, 795 ACSS	0.0496%	0.2860%
(e) single circuit 230 kV, 795 ACSS	0.0227%	0.1501%
(f) double circuit 230 kV, 795 ACSS	0.0244%	0.1495%

	Typical Impedances % on 100 MVA Base	
	<u>R</u>	<u>X</u>
(g) single circuit bundled 345 kV, 954 ACSS	0.0045%	0.0493%
(h) double circuit bundled 345 kV, 954 ACSS	0.0049%	0.0506%
Single circuit tri-bundled 500 kV, 1192 ACSR (design of the Dorsey-Forbes-Chisago County 500 kV line)	0.0012%	0.0223%
(i) single circuit tri-bundled 500 kV, 954 ACSS	(1)	
(j) double circuit tri-bundled 500 kV, 954 ACSS		
(k) single circuit quad bundled 765 kV, 954 ACSS	(2)	
(l) double circuit quad bundled 765 kV, 954 ACSS		

Notes:

- (1) Only parameters for triple bundled 1,192 ACSR at 500 kV have been given as there is no experience with triple bundled 954 ACSS.
- (2) None of the CapX2020 member utilities has experience with 765 kV and since it was not considered as an option for the CapX2020 series of projects, no detailed engineering has been performed for 765 kV designs.

Response By: David K Olson
Title: Principal Substation Engineer
Department: Substation Engineering and Design
Company: Xcel Energy
Telephone: 612-330-5909
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