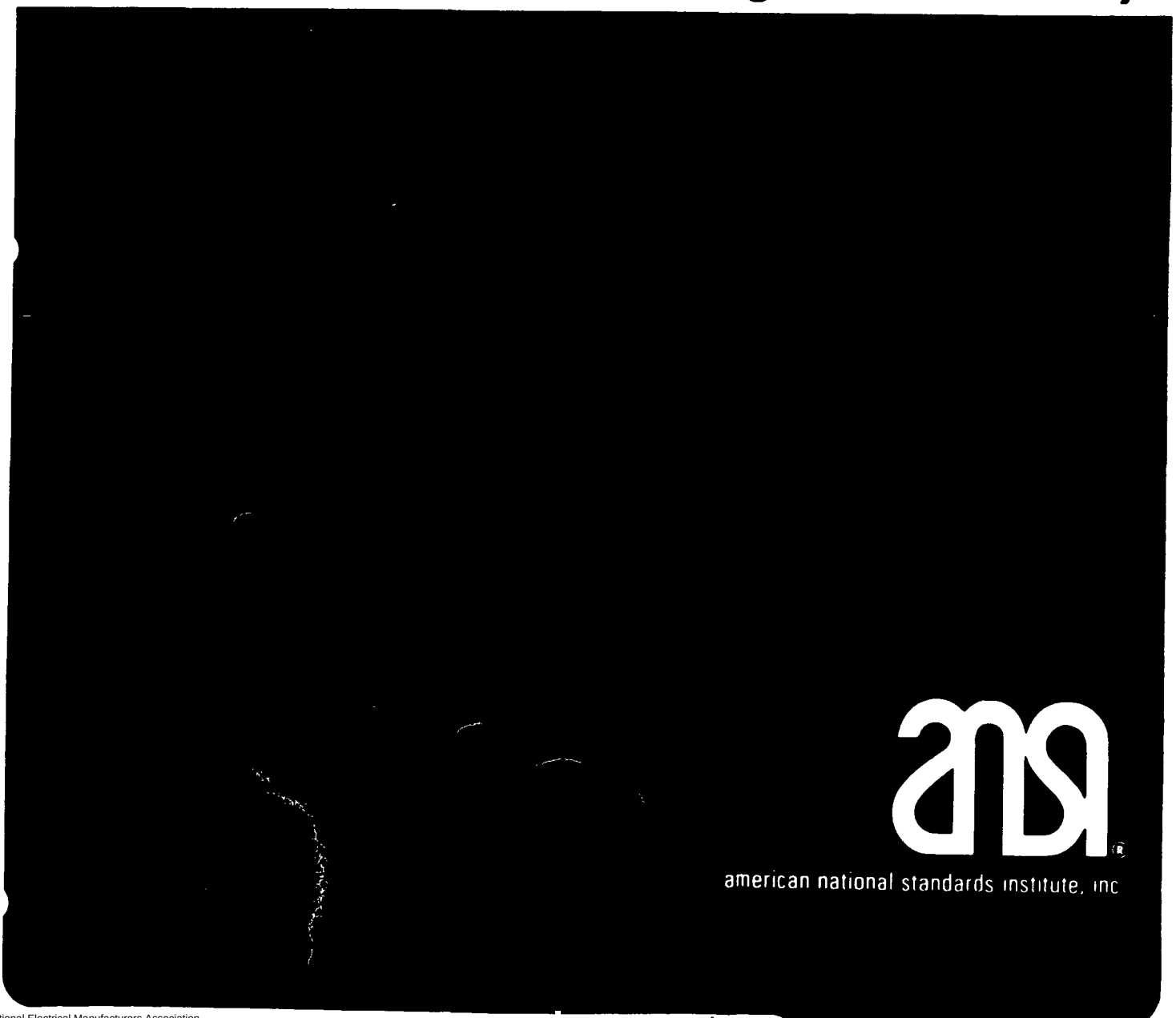
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ANSI C12.11-1987
(Revision of ANSI C12.11-1978

American National Standard

for instrument transformers for revenue metering, 10 kV BIL through 350 kV (0.6 kV NSV through 69 kV NSV)



ANSI C12.11-1987

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ANSI C12.11-1987 (R2002)

American National Standard

Instrument Transformers for Revenue Metering, 10kV BIL through 350kV BIL (0.6 kV NSV through 69 kV NSV)

Secretariat:

National Electrical Manufacturers Association

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Foreword

(This Foreword is not a part of ANSI C12.11-1987, American National Standard for Instrument Transformers for Revenue Metering, 10 kV BIL Through 350 kV BIL (0.6 kV NSV Through 69kV NSV.)

This standard was developed by the Accredited Standards Committee on Electricity Metering, C12, for full consensus approval as an American National Standard. This revised version supersedes ANSI C12.11-1978. The new edition differs from the previous one in both technical and editorial content. Besides several minor revisions, the main technical change is an extension of the scope to include metering transformers with nominal voltages beyond 15 kV up to 69 kV. Editorial changes follow the policy that contents of one standard should not be copied in another. Therefore, information that was part of ANSI/IEEE C57.13 has been deleted from this standard and replaced by the appropriate references.

This standard provides recommended minimum requirements for instruments current and voltage transformers used for electricity metering. It is to be used in conjunction with the latest revision of ANSI/IEEE C57.13.

Suggestions for improvements of this standard will be welcomed. They should be sent to the American Standards Institute, 1430 Broadway, New York, NY 10018.

Subcommittee 7 of ANSI Committee C12 that developed and revised this standard, had the following members:

R. Stetson, *Chairman* **F. Huber, Jr,** *Secretary*

D. B. Berry F. A. Fragola J. Landry

At the time this standard was processed and approved, the American National Standards Committee, C12, had the following members:

R. S. Turgel, *Chairman* **F. Huber, Jr,** *Secretary*

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Contents

SECTION			PAGE
1.	Scope		7
2.	Definitions		7
3.	General Requirements		7
	3.1	C57.13 Provisions	7
	3.2	Space for User Identification	7
	3.3	Serial Numbers	7
4.	Current Transformers		7
	4.1	Terminals	7
		4.1.1 Primary Terminals	7
		4.1.2 Secondary Terminals and Voltage Terminals	7
	4.2	Secondary Lead Markings for Current Transformers Intended for Direct Burial	7
	4.3	Test Card	7
	4.4	Indoor and Outdoor Current Transformers, 10 kV BIL (0.6 kV NSV)	8
		4.4.1 Electrical Characteristics and Dimensions	8
		4.4.2 Current Ratings	8
	4.5	Indoor Current Transformers, 60 kV BIL Through 110 kV BIL (4.8 kV NSV Through 14.4 kV NSV)	15
		4.5.1 Electrical Characteristics and Dimensions	15
		4.5.2 Current Ratings	17
	4.6	Outdoor Current Transformers, 60 kV BIL Through 110 kV BIL (4.8 kV NSV Through 14.4 kV NSV)	17
		4.6.1 Electrical Characteristics and Dimensions	17
		4.6.2 Current Ratings	17
	4.7	Small-Size Outdoor Current Transformers, 125 kV BIL Through 200 kV BIL (25 kV NSV Through 34.5 kV NSV)	17
		4.7.1 Electrical Characteristics and Dimensions	17
		4.7.2 Current Ratings	17
	4.8	Large-Size Outdoor Current Transformers, 150 kV BIL Through 350 kV BIL (25 kV NSV Through 69 kV NSV)	17
		4.8.1 Electrical Characteristics and Dimensions	17
		4.8.2 Current Ratings	17
5.	Voltage Transformers		22
	5.1	Terminals	22
		5.1.1 Primary Terminals	22
		5.1.2 Secondary Terminals	22
	5.2	Identification	22
		5.2.1 Terminal Identification	22
		5.2.2 Rated Voltage Identification	22
	5.3	Test Card	22
	5.4	Indoor or Outdoor Voltage Transformers, 10 kV and 30 kV BIL, and Indoor Voltage Transformers, 60 kV Through 110 kV BIL	22
		5.4.1 Electrical Characteristics and Dimensions	22
		5.4.2 Rated Voltages	22
	5.5	Outdoor Voltage Transformers, 60 kV BIL Through 110 kV BIL	22
		5.5.1 Electric Characteristics and Dimensions	22
		5.5.2 Rated Voltages	22
	5.6	Small-Size Outdoor Voltage Transformers, with One Bushing, 125 kV Through 200 kV BIL	25
		5.6.1 Electrical Characteristics and Dimensions	25
		5.6.2 Rated Voltages	26

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SECTION PAGE

5.7 Small-Size Outdoor Voltage Transformers, with Two Bushings, 125 kV Through 200 kV BIL 26
5.7.1 Electrical Characteristics and Dimensions—One Bushing 26
5.7.2 Rated Voltages 26
5.8 Large-Size Outdoor Voltage Transformers, with One Bushing, 150 kV BIL Through 350 kV BIL 26
5.8.1 Electrical Characteristics and Dimensions 26
5.8.2 Rated Voltages 26
5.9 Large-Size Outdoor Voltage Transformers, with Two Bushings, 150 kV BIL Through 350 kV BIL 26
5.9.1 Electrical Characteristics and Dimensions 26
5.9.2 Rated Voltages 26

FIGURES

Fig 1 Small-Size Window-Type Current Transformers, 10 kV BIL 8
Fig 2 Intermediate-Size Window-Type Current Transformers, 10 kV BIL 9
Fig 3 Large-Size Window-Type Current Transformers, 10 kV BIL 10
Fig 4 Large-Size Window-Type Current Transformers, 10 kV BIL 11
Fig 5 Small-Size Wound or Bar-Type Current Transformers, 10 kV BIL 12
Fig 6 Intermediate-Size Wound or Bar-Type Current Transformers, 10 kV BIL 13
Fig 7 Large-Size Bar-Type Current Transformers, 10 kV BIL 14
Fig 8 Window-Type Current Transformers, 10 kV BIL for Application in Secondary Compartment of Pad-Mounted Distribution Transformers 15
Fig 9 Indoor Current Transformers, 60 kV BIL Through 110 kV BIL 16
Fig 10 Outdoor Current Transformers, 60 kV BIL Through 110 kV BIL 18
Fig 11 Small-Size Outdoor Current Transformers, 125 kV BIL Through 200 kV BIL 19
Fig 12 (a) Large-Size Outdoor Current Transformers, 150 kV BIL Through 350 kV BIL 20
Fig 12 (b) Primary Terminal Dimensions for Large-Size Outdoor Current Transformers, 150 kV BIL Through 350 kV BIL 21
Fig 13 Indoor or Outdoor Voltage Transformers, 10 kV BIL Through 30 kV BIL Indoor Voltage Transformers, 60 kV BIL Through 110 kV BIL 23
Fig 14 Outdoor Voltage Transformers, 60 kV BIL Through 110 kV BIL 24
Fig 15 Small-Size Outdoor Voltage Transformers, with One Bushing, 125 kV BIL Through 200 kV BIL 25
Fig 16 Small-Size Outdoor Voltage Transformers, with Two Bushings, 125 kV BIL Through 200 kV BIL 27
Fig 17 Large-Size Outdoor Voltage Transformers, with One Bushing, 150 kV BIL Through 350 kV BIL 28
Fig 18 Large-Size Outdoor Voltage Transformers, with Two Bushings, 150 kV BIL Through 350 kV BIL 29

TABLES

Table 1 Current Ratings in Amperes for Small-Size Outdoor Current Transformers, 125 kV BIL Through 200 kV BIL (25 kV NSV Through 345 kV NSV) 17
Table 2 Current Ratings in Amperes for Large-Size, Double-Outdoor Current Transformers, 150 kV BIL Through 350 kV BIL (25 kV NSV Through 69 kV NSV) 17
Table 3 Electrical Ratings for Indoor or Outdoor Voltage Transformers, 10 kV Through 110 kV BIL 22
Table 4 Electrical Ratings for Small-Size Outdoor Voltage Transformers, with One Bushing, 125 kV Through 200 kV BIL 26
Table 5 Electrical Ratings for Small-Size Outdoor Voltage Transformers, with Two Bushings, 125 kV Through 200 kV BIL 26

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SECTION PAGE

Table 6 Electrical Ratings for Large-Size Outdoor Voltage Transformers, with One Bushing, 150 kV Through 350 kV BIL 26
Table 7 Electrical Ratings for Large-Size Outdoor Voltage Transformers, with Two Bushings, 150 kV Through 350 kV BIL 26

APPENDIX FIGURES

Fig A1 Circle Method for Determination of Voltage Transformer Accuracy 30
Fig A2 Sample of Graph Paper Specifically Scaled for Voltage Transformer Circle Diagram ... 31

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American National Standard for Instrument Transformers for Revenue Metering 10 kV BIL Through 350 kV BIL (0.6 kV NSV Through 69 kV NSV)

1. Scope

This standard covers the general requirements, metering accuracy, thermal ratings, and dimensions applicable to current and inductively coupled voltage transformers for revenue metering.

2. Definitions

All definitions, except as specifically covered in this standard, shall be in accord with ANSI C57.13-1978 (R1986) IEEE Standard Requirements for Instrument Transformers, or the latest edition.

accuracy class. The limits of transformer correction factor, in terms of percent error, that have been established to cover specific performance ranges for line power factors between 1.0 and 0.6 lag.

3. General Requirements

3.1 C57.13 Provisions. Instrument transformers shall meet the applicable provisions of ANSI C57.13-1978 (R1986), in addition to the provisions in this standard.

3.2 Space for User Identification. A space 2 inches to 2.75 inches long shall be provided for holding a 0.5-inch badge or for marking the user identification number.

3.3 Serial Numbers. Serial numbers shall consist of numerals only.

4. Current Transformers

4.1 Terminals

4.1.1 Primary Terminals. Primary terminals shall be electrically and mechanically suitable for use with either copper or aluminum conductors.

4.1.2 Secondary Terminals and Voltage Terminals. Secondary terminals, and voltage terminals (when provided), shall be electrically and mechanically suitable for use with either copper or aluminum stranded or solid conductors from AWG No 14 through AWG No 8.

4.2 Secondary Lead Markings for Current Transformers Intended for Direct Burial. When single-ratio current transformers, intended for direct burial, have integral leads more than 24 inches long, then:

(1) The full length of the polarity lead shall be identified.

(2) The secondary leads shall identify the rated primary current of the transformer.

(3) The identification interval shall not exceed 12 inches.

4.3 Test Card. Current transformers shall be provided with a certificate of test, approximately 3 inches $\times$ 5 inches in dimension, which shall include, as a minimum, the following information:

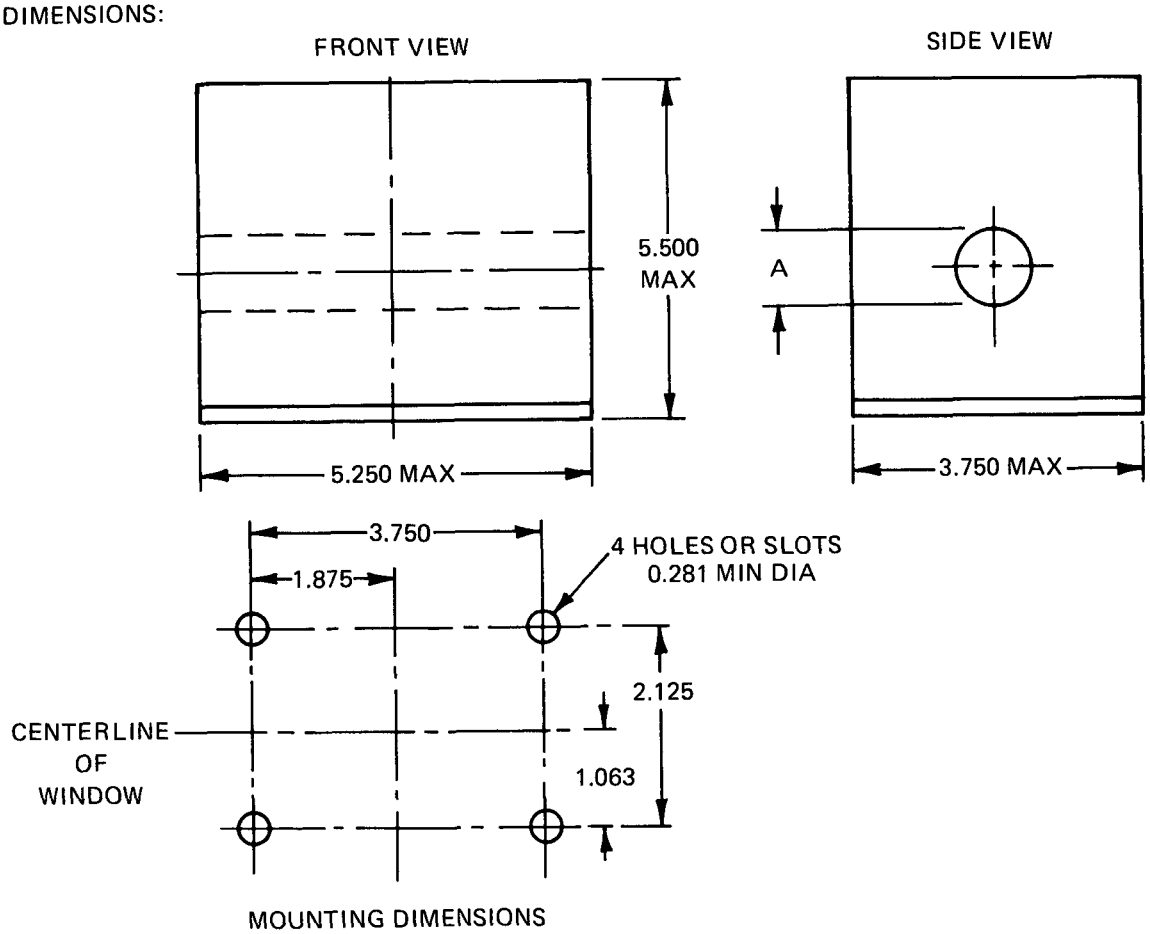
(1) Manufacturer's name or trademark
(2) Manufacturer's type
(3) Manufacturer's serial number
(4) Space for user identification number
(5) Rated primary and secondary amperes
(6) Factory accuracy test reading at 100%

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MINIMUM ELECTRICAL CHARACTERISTICS

CURRENT RATING AMPERES	CURRENT RATING FACTOR	ACCURACY CLASS AND BURDENS		MINIMUM WINDOW DIAMETER "A", INCHES
		B-0.1	B-0.2	
200:5	2.0	0.3	0.3	1.188
400:5	2.0	0.3	0.3	1.500

DIMENSIONS:



NOTES:
(1) All dimensions are in inches.
(2) Unless otherwise indicated, the tolerance is ± 0.063 inch.

Fig 1
Small-Size Window-Type Current Transformers, 10 kV BIL

and 10% of rated primary current at the maximum standard burden for 0.3 accuracy class

(7) Date of factory accuracy test

(8) Initials of factory accuracy tester (unless tested automatically)

4.4 Indoor and Outdoor Current Transformers, 10 kV BIL (0.6 kV NSV)

4.4.1 Electrical Characteristics and Dimensions. The minimum electrical characteristics, the dimensions, and the maximum envelope including the base, body, and secondary terminal covers, shall be as shown in Figs 1 through 8.

4.4.2 Current Ratings The current ratings, in amperes, shall be as follows:

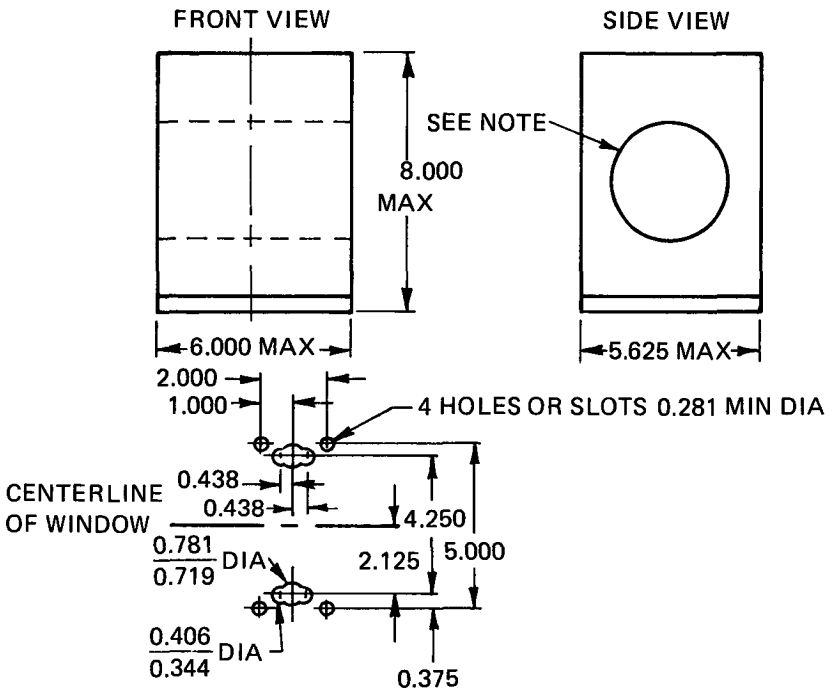
200:5	800:5	2000:5
400:5	1000:5	3000:5
500:5	1200:5	4000:5
600:5	1500:5	6000:5

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MINIMUM ELECTRICAL CHARACTERISTICS

CURRENT RATING AMPERES	CURRENT RATING FACTOR	ACCURACY CLASS AND BURDENS			CABLE DIAMETER OVER INSULATION, INCHES [SEE NOTE (3)]	
		B-0.1	B-0.2	B-0.5	ONE CABLE	TWO CABLES (EACH)
200:5	2.0	0.3	0.3	–	1.75	1.125
400:5 THROUGH 800:5	2.0	0.3	0.3	0.3	1.75	1.250

DIMENSIONS:



MOUNTING DIMENSIONS

NOTES:
(1) All dimensions are in inches.
(2) Unless otherwise indicated, the tolerance is ± 0.063 inch.
(3) Window may be of any shape but shall be of suitable dimensions to accept one-cable and two-cable installations as shown in the table.

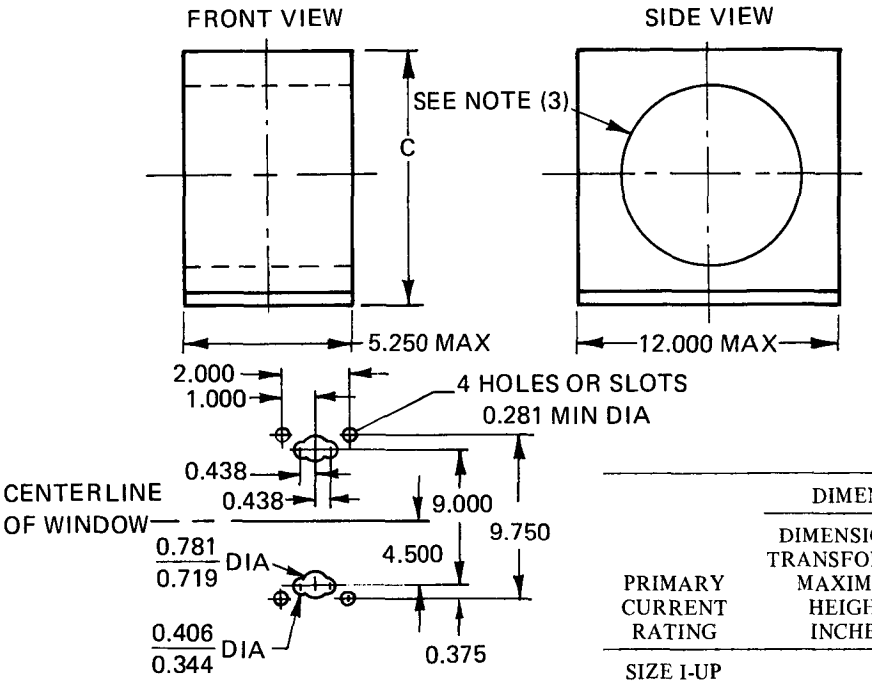
Fig 2
Intermediate-Size Window-Type
Current Transformers, 10 kV BIL

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MINIMUM ELECTRICAL CHARACTERISTICS

CURRENT RATING AMPERES	CURRENT RATING FACTOR	ACCURACY CLASS AND BURDENS		
		B-0.1	B-0.2	B-0.5
800:5	2.0	0.3	0.3	0.3
1000:5 THROUGH 2000:5	1.5	0.3	0.3	0.3
3000:5 and 400:5	1.33	0.3	0.3	0.3
6000:5	1.0	0.3	0.3	0.3

DIMENSIONS:



MOUNTING DIMENSIONS FOR SIZE I
(SIZE II IS NOT USUALLY BASE MOUNTED)

PRIMARY CURRENT RATING	DIMENSIONS-INCHES: DIMENSION C TRANSFORMER MAXIMUM HEIGHT INCHES	DIMENSIONS-INCHES: SQUARE BUS MINIMUM DIAGONAL
SIZE I-UP TO 4000	12.000	5.375
SIZE II 2000 TO 6000	13.500	8.125

NOTES:
(1) All dimensions are in inches.
(2) Unless otherwise indicated, the tolerance is ± 0.063 inch.
(3) Window may be of any shape but shall accept a bus structure as shown in the table.

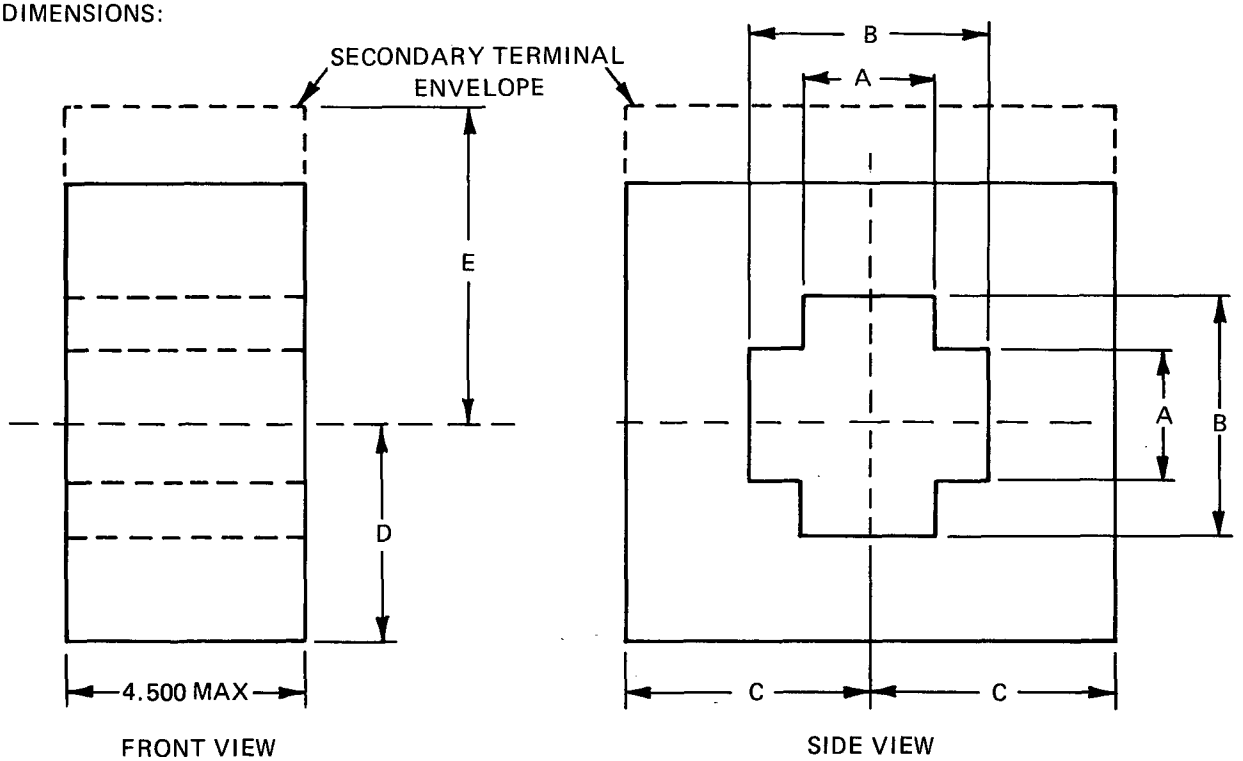
Fig 3
Large-Size Window-Type
Current Transformers, 10 kV BIL

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MINIMUM ELECTRICAL CHARACTERISTICS

CURRENT RATING AMPERES	CURRENT RATING FACTOR	ACCURACY CLASS AND BURDENS		
		B-0.1	B-0.2	B-0.5
800:5	2.0	0.3	0.3	0.3
1000:5 THROUGH 2000:5	1.5	0.3	0.3	0.3
3000:5 (SIZE I)	1.33	0.3	0.3	0.3
3000:5 (SIZE II) AND 4000:5	1.5	0.3	0.3	0.3
6000:5	1.0	0.3	0.3	0.3

DIMENSIONS:



PRIMARY CURRENT RATING	DIMENSION A		DIMENSION B		DIMENSION C	DIMENSION D	DIMENSION E
	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM	MAXIMUM	MAXIMUM	MAXIMUM
SIZE I UP TO 3000 AMPERES	2.313	2.500	4.313	4.500	4.250	4.500	6.250
SIZE II 2000 TO 6000 AMPERES	3.313	3.500	5.313	5.500	5.750	5.750	7.250

NOTES:
(1) All dimensions are in inches.
(2) Unless otherwise indicated, the tolerance is ± 0.063 inch.

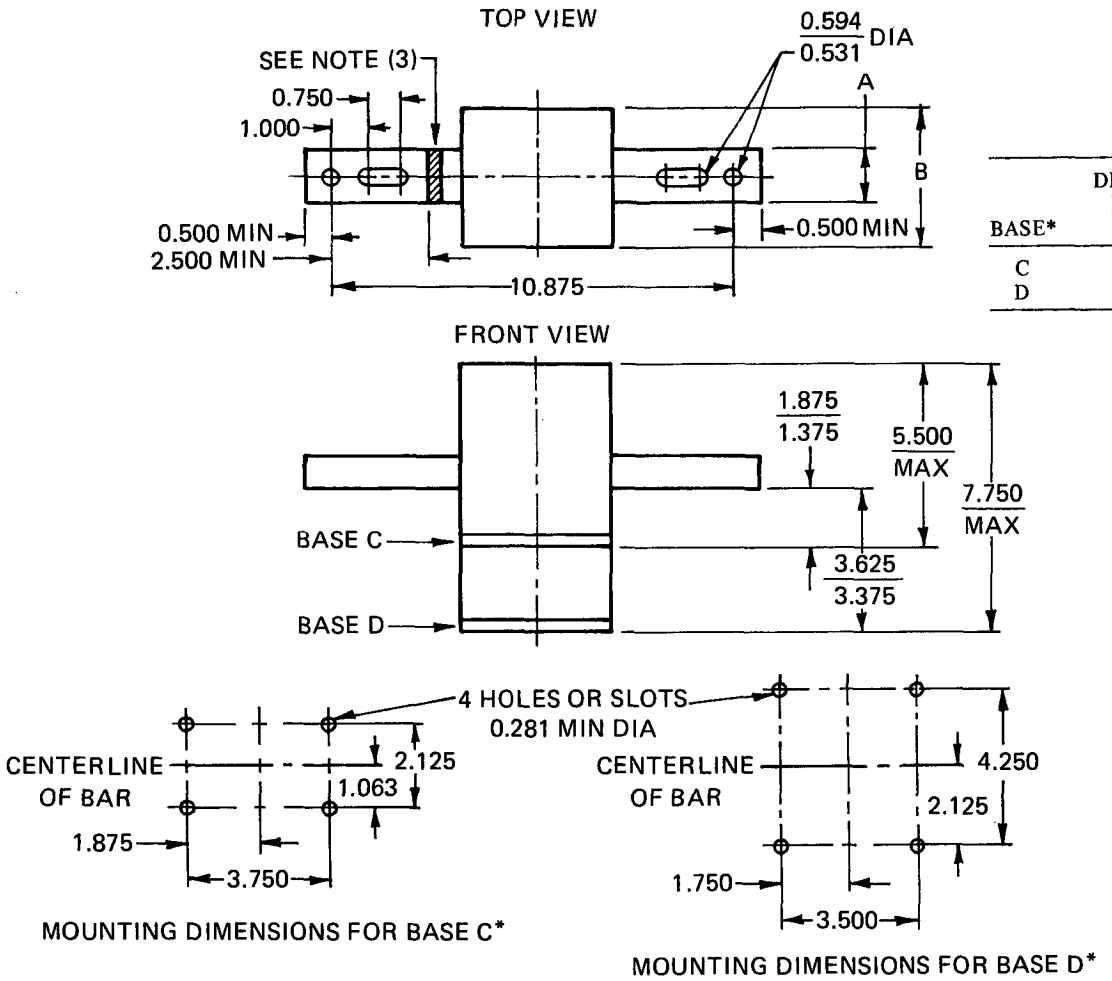
Fig 4
Large-Size Window-Type
Current Transformers, 10 kV BIL

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MINIMUM ELECTRICAL CHARACTERISTICS

CURRENT RATING, AMPERES	CURRENT FACTOR FACTOR	ACCURACY CLASS AND BURDENS		DIMENSION A, INCHES	
		B-0.1	B-0.2	MINIMUM	MAXIMUM
200:5	2.0	0.3	0.3	1.250	2.000
400:5	2.0	0.3	0.3	1.500	2.500
600:5	2.0	0.3	0.3	2.000	3.000
800:5	1.5	0.3	0.3	2.250	3.000

DIMENSIONS:



BASE*	DIMENSION B MAXIMUM INCHES
C	3.750
D	5.625

*THE TRANSFORMERS SHALL BE PROVIDED WITH EITHER BASE C OR D.

NOTES:
(1) All dimensions are in inches.
(2) Unless otherwise indicated, the tolerance is ± 0.063 inch.
(3) Voltage terminal, on primary bar on polarity side only, may be located anyware in the shaded area shown, preferably toward the secondary terminals.

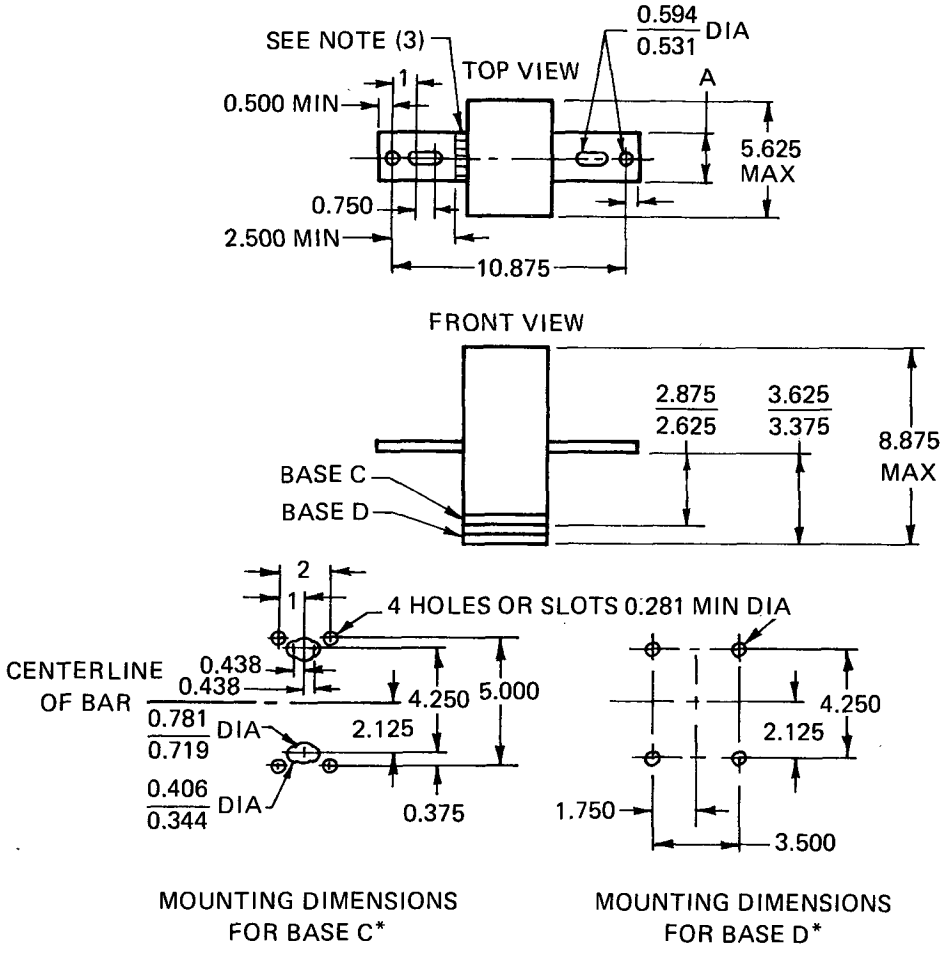
Fig 5
Small-Size Wound or Bar-Type
Current Transformers, 10 kV BIL

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CURRENT RATING AMPERES	CURRENT RATING FACTOR	ACCURACY CLASS AND BURDENS			DIMENSION A, INCHES	
		B-0.1	B-0.2	B-0.5	MINIMUM	MAXIMUM
200:5	2.0	0.3	0.3	–	1.500	2.000
400:5	2.0	0.3	0.3	0.3	1.500	2.500
500:5 AND 600:5	2.0	0.3	0.3	0.3	2.000	3.000
800:5	2.0	0.3	0.3	0.3	2.250	3.000

DIMENSIONS:



*THE TRANSFORMERS SHALL BE PROVIDED WITH EITHER BASE C OR D.

NOTES:
(1) All dimensions are in inches.
(2) Unless otherwise indicated, the tolerance is ± 0.063 inch.
(3) Voltage terminal, on primary bar on polarity side only. May be located anywhere in the shaded area shown, preferably toward the secondary terminals.

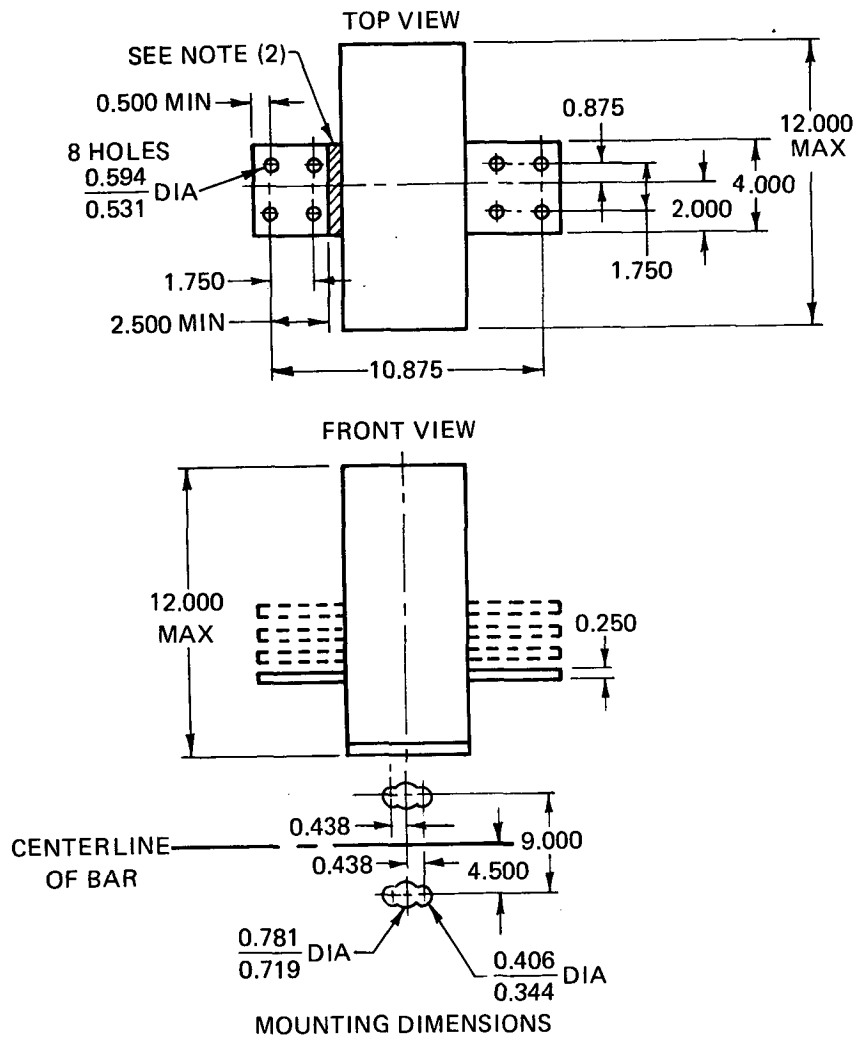
Fig 6
Intermediate-Size Wound or Bar-Type Current Transformers, 10 kV BIL

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CURRENT RATING AMPERES	CURRENT RATING FACTOR	ACCURACY CLASS AND BURDENS		
		B-0.1	B-0.2	B-05
800:5	2.0	0.3	0.3	0.3
1000:5 THROUGH 2000:5	1.5	0.3	0.3	0.3
3000:5	1.33	0.3	0.3	0.3
4000:5	1.0	0.3	0.3	0.3

DIMENSIONS:



NOTES:

(1) All dimensions are in inches. Unless otherwise indicated, the tolerance shall be ± 0.063 inch. On multi-bar assemblies bars shall be 0.250 inch thick and there shall be a 0.250 inch spacing between bars.

(2) Voltage terminals, on primary bar on polarity side only, shall be permitted to be located anywhere in the shaded area shown, preferably toward the secondary terminals.

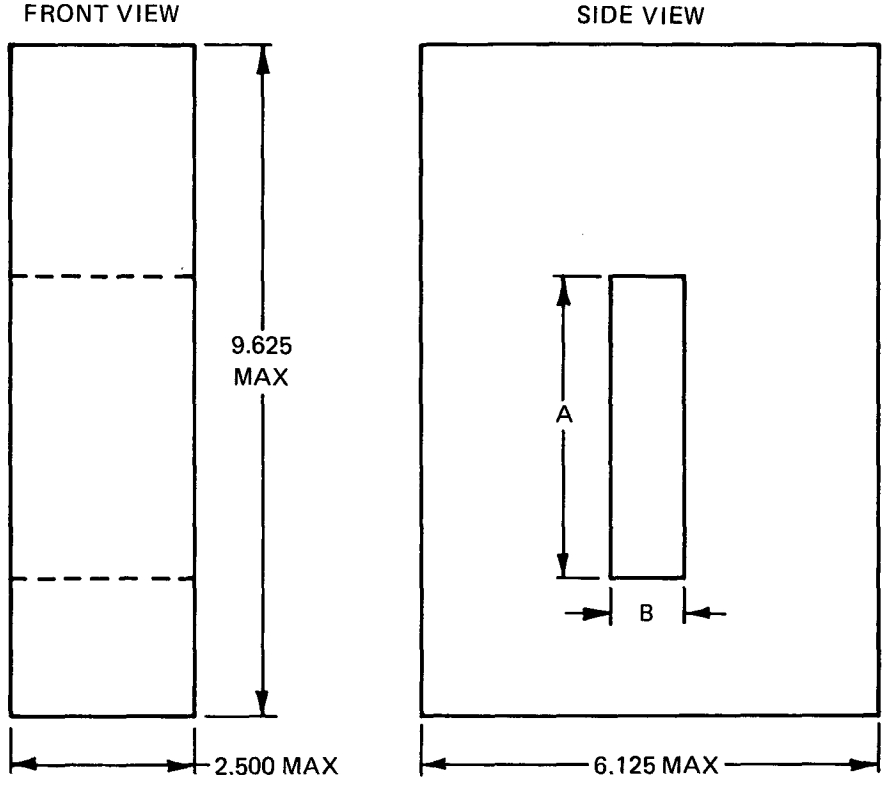
Fig 7
Large-Size Bar-Type Current Transformers,
10 kV BIL

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MINIMUM ELECTRICAL CHARACTERISTICS

CURRENT RATING AMPERES	CURRENT RATING FACTOR	ACCURACY CLASS AND BURDENS			MINIMUM WINDOW DIMENSION [SEE NOTE (2)]	
		B-0.1	B-0.2	B-0.5	A	B
400:5 THROUGH 600:5	2.0	0.3	0.3	–	3.500	0.500
800:5	2.0	0.3	0.3	0.3	3.500	0.500
1000;5	2.0	0.3	0.3	0.3	4.000	0.750
1200:5 THROUGH 2000:5	1.5	0.3	0.3	0.3	4.000	0.750
3000:5	1.0	0.3	0.3	0.3	4.000	0.750

DIMENSIONS:



NOTES:
(1) All dimensions are in inches.
(2) Window may be of any shape but shall be of suitable dimensions to accept rectangular bus with dimensions "A" and "B."

Fig 8
Window-Type Current Transformers,
10 kV BIL for Application in Secondary
Compartment of Pad-Mounted Distribution Transformers

4.5 Indoor Current Transformers, 60 kV BIL Through 110 kV BIL (4.8 kV NSV Through 14.4 kV NSV)

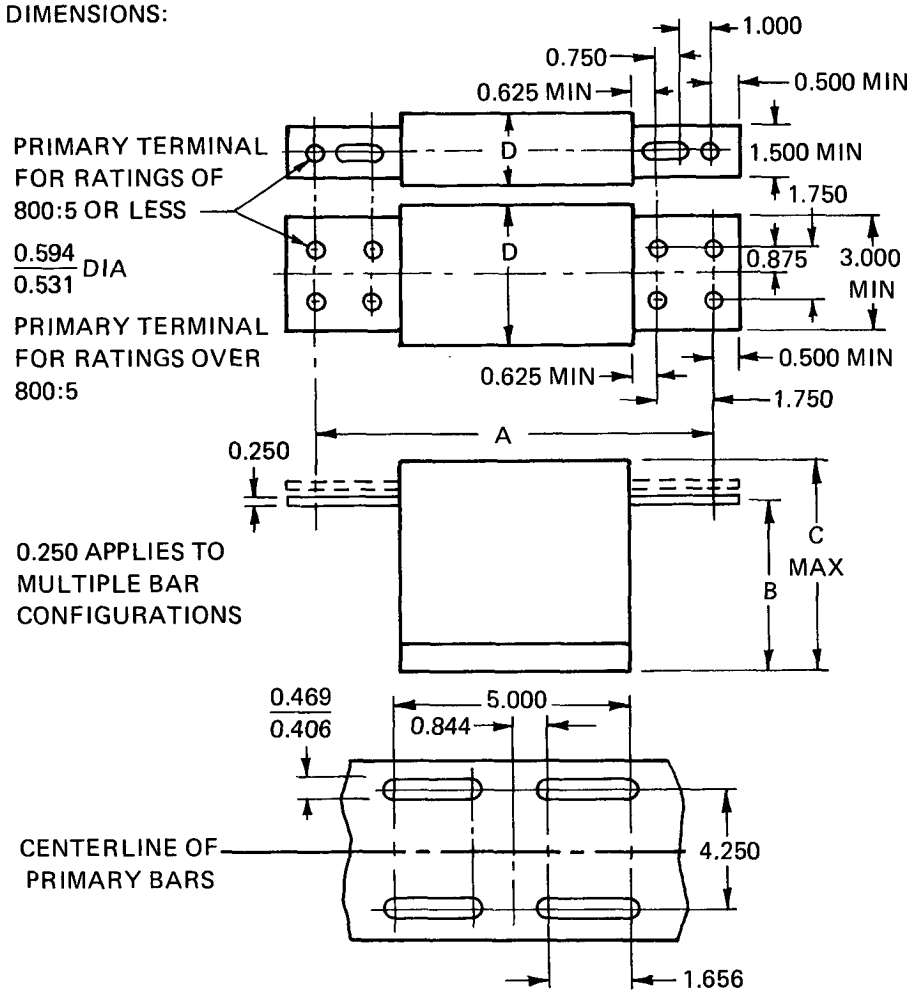
4.5.1 Electrical Characteristics and Dimensions. The minimum electrical characteristics, the dimensions, and the maximum envelope including the base, body, and secondary terminal covers, shall be as shown in Fig 9.

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MINIMUM ELECTRICAL CHARACTERISTICS

CURRENT RATING AMPERES	CURRENT RATING FACTOR	ACCURACY CLASS AND BURDENS		
		B-0.1	B-0.2	B-0.5
10:5 THROUGH 400:5	1.5	0.3	0.3	0.3
600:5	1.33	0.3	0.3	0.3
800:5 THROUGH 2000:5	1.0	0.3	0.3	0.3

DIMENSIONS:



MOUNTING DIMENSIONS

BIL kV	NSV kV	DIMENSION A		TOLERANCE ± 0.125 DIMENSION B		DIMENSION C MAXIMUM		DIMENSION D MAXIMUM	
		10-800 AMPERES	1200-2000 AMPERES	10-800 AMPERES	1200-2000 AMPERES	10-800 AMPERES	1200-2000 AMPERES	10-800 AMPERES	1200-2000 AMPERES
60	4.8	14.000	14.000	5.750	5.750	8.000	13.000	6.250	11.000
75	8.32	15.000	15.000	8.000	5.750	10.500	13.000	7.000	11.000
95 AND 110	14.4	22.000	26.000	9.000	5.750	11.250	13.000	7.000	11.000

NOTE: All dimensions are in inches. Unless otherwise indicated, the tolerance is ± 0.063 inch. On multi-bar assemblies bars shall be 0.250 inch thick and there shall be a 0.250 inch spacing between bars.

Fig 9
Indoor Current Transformers, 60 kV BIL Through 110 kV BIL

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4.5.2 Current Ratings. The current ratings, in amperes, shall be:

10:5		400:5
15:5	100:5	600:5
25:5	150:5	800:5
40:5	200:5	1200:5
50:5	300:5	1500:5
75:5		2000:5

4.6 Outdoor Current Transformers, 60 kV BIL Through 110 kV BIL (4.8 kV NSV Through 14.4 kV NSV)

4.6.1 Electrical Characteristics and Dimensions. The minimum electrical characteristics, the dimensions, and the maximum envelope including the base, body, secondary terminal covers, and secondary conduit boxes shall be as shown in Fig 10.

4.6.2 Current Ratings. The current ratings, in amperes, shall be:

	100:5
10:5	150:5
15:5	200:5
25:5	300:5
40:5	400:5
50:5	600:5
75:5	800:5

4.7 Small-Size Outdoor Current Transformers, 125 kV BIL Through 200 kV BIL (25 kV NSV Through 34.5 kV NSV)

4.7.1 Electrical Characteristics and Dimensions. The minimum electrical characteristics, the dimensions, and the maximum envelope including the base, body, secondary terminal covers, and secondary conduit boxes shall be as shown in Fig 11.

4.7.2 Current Ratings. The current ratings, in amperes, shall be as given in Table 1.

Table 1
Current Ratings in Amperes for Small-Size Outdoor Current Transformers, 125 kV BIL Through 200 kV BIL (25 kV NSV Through 345 kV NSV)

Single Ratio	Double Ratio With Taps In Secondary Winding
10:5	25/50:5
15:5	50/100:5
25:5	75/150:5
40:5	100/200:5
50:5	200/400:5
75:5	300/600:5
100:5	400/800:5
150:5	
200:5	
300:5	
400:5	
600:5	
800:5	

4.8 Large-Size Outdoor Current Transformers, 150 kV BIL Through 350 kV BIL (25 kV NSV Through 69 kV NSV)

4.8.1 Electrical Characteristics and Dimensions. The minimum electrical characteristics, the dimensions, and the maximum envelope including the base, body, secondary terminal covers, and secondary conduit boxes shall be as shown in Figs 12(a) and (b).

4.8.2 Current Ratings. The current ratings, in amperes, shall be as given in Table 2.

Table 2
Current Ratings in Amperes for Large-Size, Double-Outdoor Current Transformers, 150 kV BIL Through 350 kV BIL (25 kV NSV Through 69 kV NSV)

With Series-Parallel Primary Winding	With Taps In Secondary Winding
25 × 50:5	25/ 50:5
50 × 100:5	50/ 100:5
75 × 150:5	100/ 200:5
100 × 200:5	200/ 400:5
200 × 400:5	400/ 800:5
300 × 600:5	1000/2000:5
400 × 800:5	1500/3000:5
600 × 1200:5	

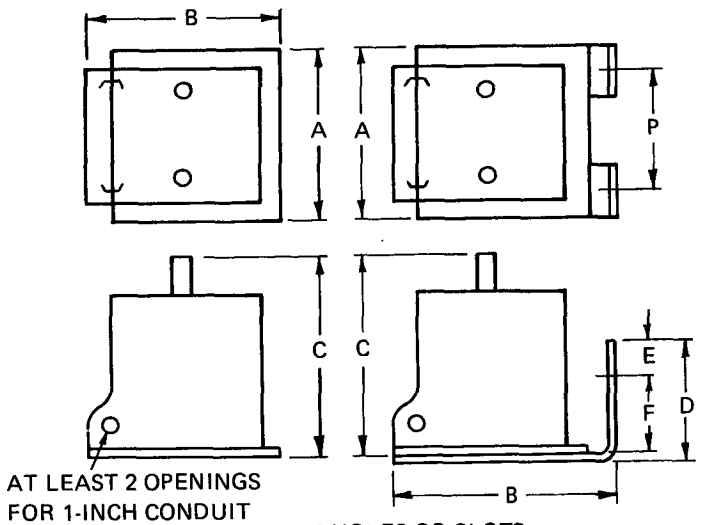
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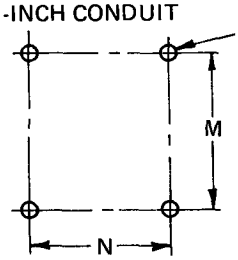
MINIMUM ELECTRICAL CHARACTERISTICS

CURRENT RATING AMPERES	CURRENT RATING FACTOR	ACCURACY CLASS AND BURDENS		
		B-0.1	B-0.2	B-0.5
10:5 THROUGH 400:5	1.5	0.3	0.3	0.3
600:5	1.33	0.3	0.3	0.3
800:5	1.0	0.3	0.3	0.3

DIMENSIONS:

WITHOUT MOUNTING BRACKETS WITH MOUNTING BRACKETS

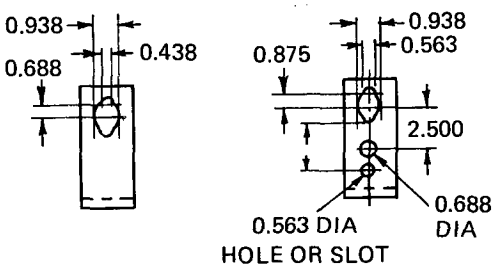




MOUNTING DIMENSIONS

MOUNTING BRACKET DIMENSIONS

60 kV BIL 75 kV BIL 110 kV BIL (SIZE B)	110 kV BIL (SIZE A)



PRIMARY TERMINALS

AMPERE RATING	MINIMUM WIDTH	MINIMUM THICKNESS
10 THROUGH 150	1.500	0.188
200, 300 AND 400	2.000	0.250
600 AND 800	2.000	0.375

BIL KV	NSV KV	WITHOUT MOUNTING BRACKETS MAXIMUM OVERALL DIMENSIONS			MOUNTING DIMENSIONS		WITH MOUNTING BRACKETS MAXIMUM OVERALL DIMENSIONS				MOUNTING DIMENSIONS		
		A	B	C	M	N	A	B	C	D	E	F	P
60	4.8	9.500	11.500	12.500	8.500	6.250	9.500	13.500	13.250	6.500	1.875	3.750	7.625
75	8.32	9.500	11.500	12.500	8.500	6.250	9.500	13.250	13.250	6.500	1.875	3.750	7.625
110 (SIZE A)	14.4	11.000	13.500	16.000	10.000	8.625	11.000	17.750	18.500	12.500	1.875	7.875	8.875
110 (SIZE B)	14.4	11.000	13.500	16.000	8.500	6.250	11.000	17.750	18.500	12.500	1.875	3.750	7.625

NOTE: All dimensions are in inches, tolerance on diameters of holes, slots and keyholes is ± 0.031 inch. Unless otherwise indicated, other tolerances are ± 0.063 inch.

Fig 10
Outdoor Current Transformers,
60 kV BIL Through 110 kV BIL

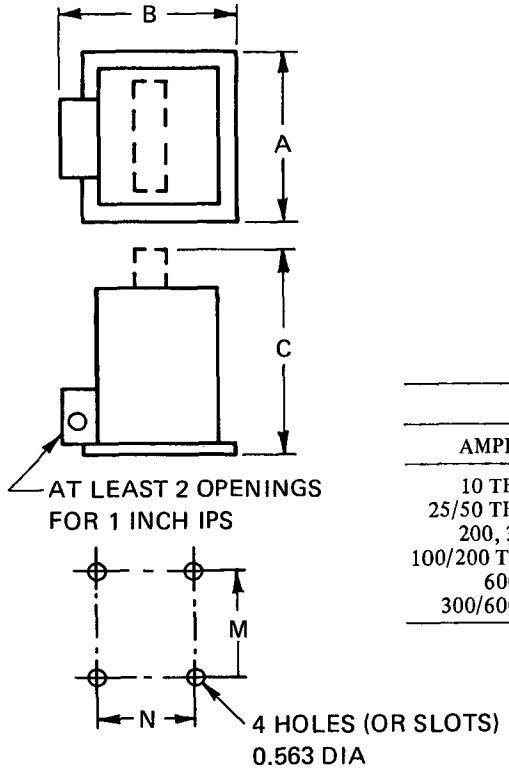
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MINIMUM ELECTRICAL CHARACTERISTICS

CURRENT RATING AMPERES	CURRENT RATING FACTOR	ACCURACY CLASS AND BURDEN		
		B-0.1	B-0.2	B-0.5
10:5 THROUGH 400:5	1.5	0.3	0.3	0.3
25/50:5 THROUGH 200/400:5	1.5	0.3	0.3	*0.3
600:5 AND 300/600:5	1.33	0.3	0.3	*0.3
800:5 AND 400/800:5	1.0	0.3	0.3	*0.3

*On tapped secondaries applies to higher ratio only.

DIMENSIONS



PRIMARY TERMINAL DIMENSIONS

PRIMARY TERMINAL DIMENSIONS		
AMPERE RATING	MIN WIDTH	MIN THICKNESS
10 THROUGH 150	1.500	0.188
25/50 THROUGH 75/150	1.500	0.188
200, 300, AND 400	2.000	0.250
100/200 THROUGH 200/400	2.000	0.250
600 AND 800	2.000	0.375
300/600 AND 400/800	2.000	0.375

BIL kV	NSV kV	MAX OVERALL DIMENSIONS			MOUNTING DIMENSIONS		
		A	B	C		M	N
125 AND 150	25	12.000	17.000	18.000	NOTE (3)	10.000	8.625
150	34.5 SEE NOTE (3)	–	–	–		–	–
200	34.5 SEE NOTE (3)	–	–	–		–	–

NOTES:
(1) All dimensions are in inches – tolerances on diameters of holes and slots are ± 0.031 inch.
(2) Unless otherwise indicated other tolerances are ± 0.063.inch.
(3) Dimensions have not been established for 34.5 kV nominal system voltage.

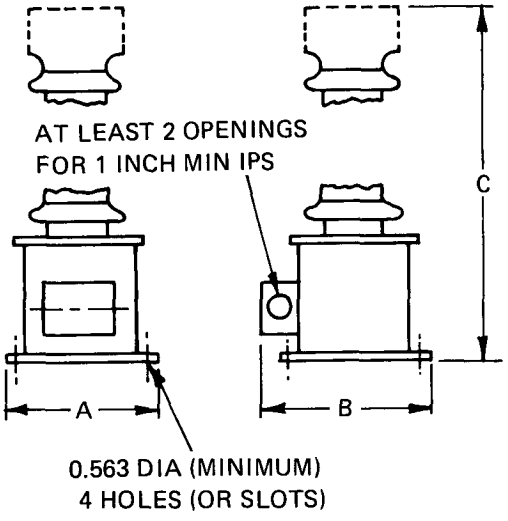
Fig 11
Small-Size Outdoor Current Transformers,
125 kV BIL Through 200 kV BIL

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MINIMUM ELECTRICAL CHARACTERISTICS

CURRENT RATING, AMPERES	CURRENT RATING FACTOR	ACCURACY CLASS AND BURDEN				
		B-0.1	B-0.2	B-0.5	B-0.9	B-1.8
25/50:5 THROUGH 1500/3000:5	1.0/1.0	0.3	0.3	0.3	*0.3	*0.3
25 x 50:5 THROUGH 600 x 1200:5	1.0 x 1.0	0.3	0.3	0.3	0.3	0.3

*Higher ratio only.



BIL kV	NSV kV	MAX OVERALL DIMENSIONS		
		A	B	C
150	25	24	26	48
200	34.5	24	26	51
250	46	26	38	66
350	69	26	38	66

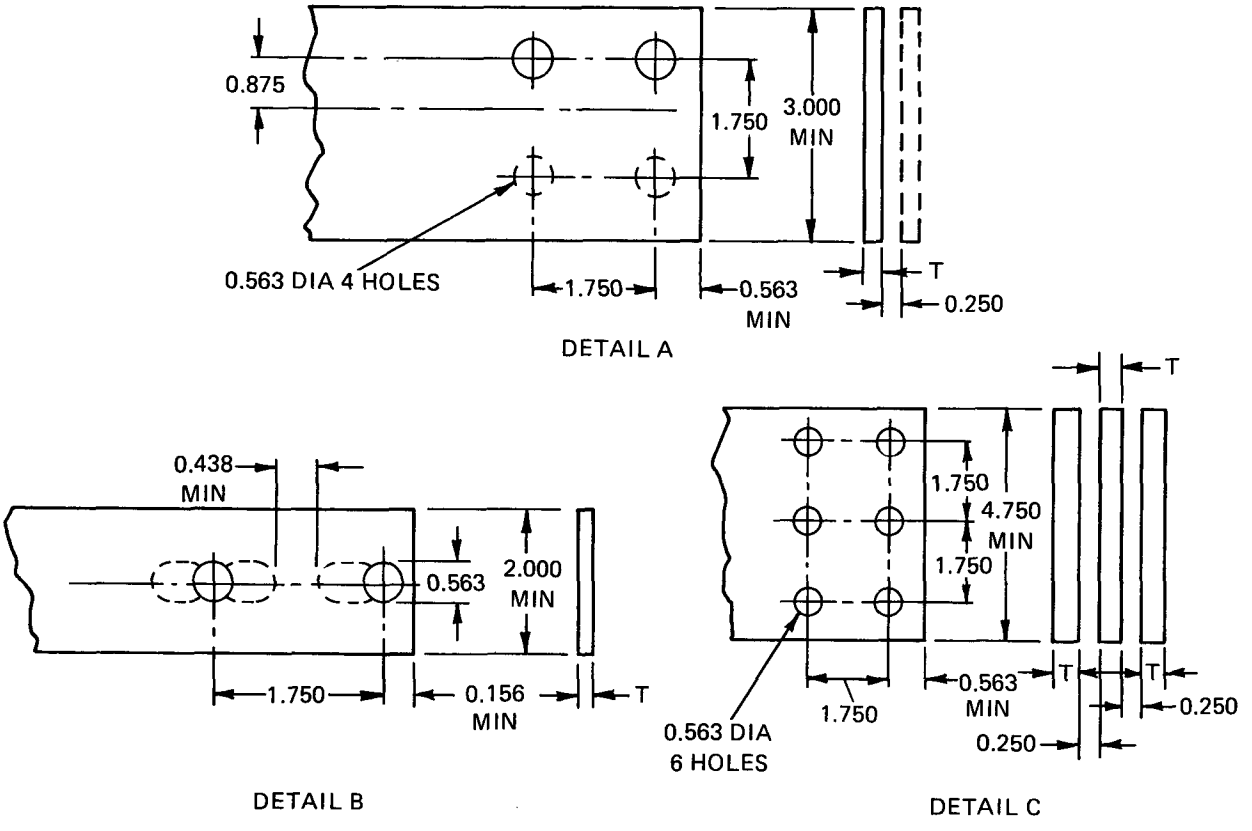
NOTES:
(1) All dimensions are in inches – tolerances on diameters of holes and slots are ± 0.031 inch.
(2) Unless otherwise indicated other tolerances are ± 0.063 inch.

(a)
Fig 12
Large-Size Outdoor Current Transformers, 150 kV BIL Through 350 kV BIL

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PRIMARY TERMINALS

CURRENT RATING, AMPERES	DETAIL	NO OF BARS	MIN T
25 X 50:5 TO 200 X 400:5 25/50:5 TO 200/400:5	B	1	0.188
25 X 50:5 TO 400 X 800:5 25/50:5 TO 400/800:5	A	1	0.188
600 X 1200:5 600/1200:5	A	1 OR 2	0.250
1000/2000:5	A	2	0.250
1500/3000:5	C	3	0.250



NOTES:
(1) All dimensions are in inches – tolerances on diameters of holes and slots are ± 0.031 inch.
(2) Unless otherwise indicated other tolerances are ± 0.063 inch.

(b)
Fig 12
Primary Terminal Dimensions for Large-Size Outdoor Current Transformers, 150 kV BIL Through 350 kV BIL

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5. Voltage Transformers

5.1 Terminals

5.1.1 Primary Terminals. Primary terminals of 10 kV BIL through 110 kV BIL voltage transformers shall be electrically and mechanically suitable for use with either copper or aluminum stranded or solid conductors from AWG No 10 through AWG No 6.

Primary terminals of 125 kV BIL through 350 kV BIL voltage transformers shall be electrically and mechanically suitable for use with either copper or aluminum conductors. When clamp-type adapters are provided, they shall be suitable for stranded or solid conductors from AWG No 6 through 250 MCM.

5.1.2 Secondary Terminals. Secondary terminals shall be electrically and mechanically suitable for use with either copper or aluminum stranded or solid conductors from AWG No 14 through AWG No 8.

5.2 Identification

5.2.1 Terminal Identification. The primary and secondary terminals of 10 kV BIL through 110 kV BIL voltage transformers shall be prominently identified in such a manner that the identification cannot easily be obliterated.

5.2.2 Rated Voltage Identification. Rated Voltage shall be prominently identified in such a manner that it cannot easily be obliterated.

5.3 Test Card. Voltage transformers shall be provided with a certificate of test, approximately 3 inches × 5 inches in dimension, which shall include, as a minimum, the following information:

(1) Manufacturer's name or trademark
(2) Manufacturer's type
(3) Manufacturer's serial number
(4) Space for user identification number
(5) Rated primary and secondary volts, rated voltage and ratio to one, or rated secondary volts and ratio to one
(6) Factory accuracy test readings at 100% rated primary voltage with zero burden and the maximum standard burden for 0.3 accuracy class
(7) Date of factory accuracy test
(8) Initials of factory accuracy tester (unless tested automatically)

5.4 Indoor or Outdoor Voltage Transformers, 10 kV and 30 kV BIL, and Indoor Voltage Transformers, 60 kV Through 110 kV BIL

5.4.1 Electrical Characteristics and Dimensions. The minimum electrical characteristics, the dimensions, and the maximum envelope including the base, body, primary and secondary terminal covers, and primary fuses, shall be as shown in Fig 13.

5.4.2 Rated Voltages. The rated voltages, marked ratios, and BIL shall be as given in Table 3.

Table 3
Electrical Ratings for Indoor or Outdoor Voltage Transformers, 10 kV Through 110 kV BIL

Rated Voltage*	Rated Voltage**	Marked Ratio	BIL kV
240/416 Y		2:1	10
288/499 Y		2.4:1	10
300/520 Y		2.5:1	10
480		4:1	10
600		5:1	10
480/832 Y		4:1	30
600/1040 Y		5:1	30
2400/4160 Y		20:1	60
4200		35:1	60
4800		40:1	60
4200/7270 Y		35:1	75
4800/8320 Y		40:1	75
7200	7200 Grd Y/7200	60:1	75
7200/12470 Y	1247 Grd Y/7200	60:1	95
8400/14400 Y	14400 Grd Y/8400	70:1	95
12000		100:1	95
14400		120:1	95
7200/12470 Y	12470 Grd Y/7200	60:1	110
8400/14400 Y	14400 Grd Y/8400	70:1	110
12000		100:1	110
14400		120:1	110

* Two fully insulated primary terminals
** Insulated-neutral or grounded-neutral terminal type

5.5 Outdoor Voltage Transformers, 60 kV BIL Through 110 kV BIL

5.5.1 Electrical Characteristics and Dimensions. The minimum electrical characteristics, the dimensions, and the maximum envelope including the base, body, secondary terminal covers, and secondary conduit boxes shall be as shown in Fig 14.

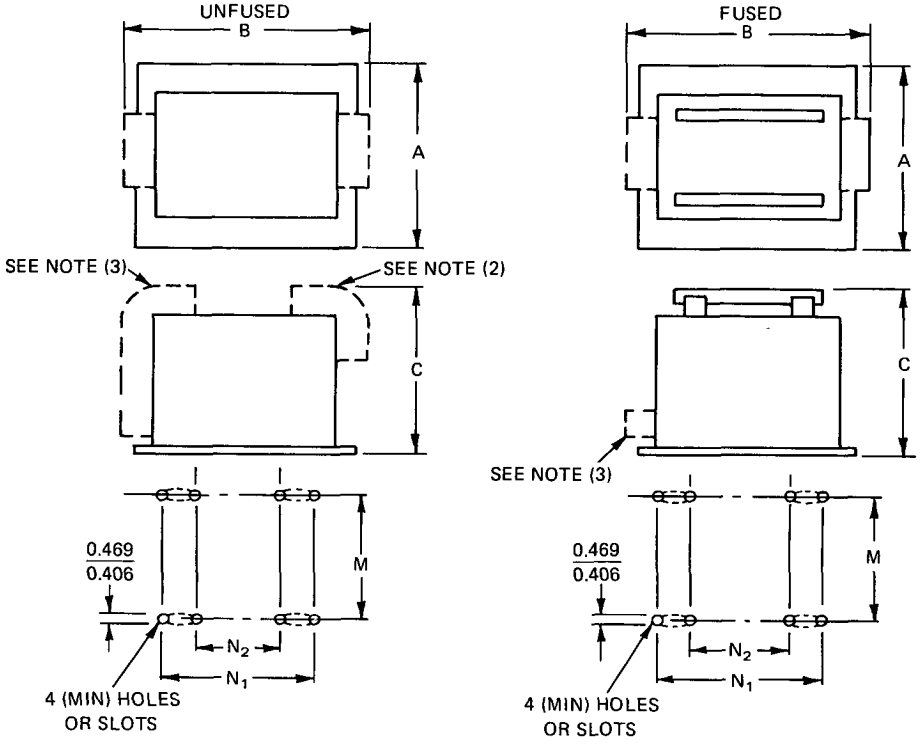
5.5.2 Rated Voltages. The rated voltages, marked ratios, and BIL shall be as in Table 3.

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MINIMUM ELECTRICAL CHARACTERISTICS

BIL kV	THERMAL BURDEN RATING AT 55° AMBIENT	ACCURACY CLASS AND BURDEN			
		W	X	M	Y
10 AND 30	75	0.3	0.3	–	–
60	200	0.3	0.3	0.3	–
75 AND 110	200	0.3	0.3	0.3	0.3

DIMENSIONS



MOUNTING DIMENSIONS

BIL kV	UNFUSED MAXIMUM OVERALL DIMENSIONS			FUSED MAXIMUM OVERALL DIMENSIONS			FUSED OR UNFUSED MOUNTING DIMENSIONS		
	A	B	C	A	B	C	M	N_1	N_2
10	6.250	8.750	8.750	6.250	9.250	8.000	5.000	4.000	
30	6.500	9.250	7.250	6.500	9.500	8.000	5.000	5.000	1.688
60	7.250	11.500	8.500	8.000	11.750	9.500	5.500	10.000	7.750
75, 95, AND 110	10.250	14.000	11.000	10.750	15.750	11.750	8.000	12.350	10.250

*12.750 FOR SINGLE FUSE DESIGN.

NOTES:
(1) All dimensions are in inches. Unless otherwise indicated, the tolerance is ± 0.063 inch.
(2) Primary terminals, and primary terminals covers if provided.
(3) Secondary terminals, and secondary terminals covers if provided.

Fig 13
Indoor or Outdoor Voltage Transformers,
10 kV BIL Through 30 kV BIL
Indoor Voltage Transformers,
60 kV BIL Through 110 kV BIL

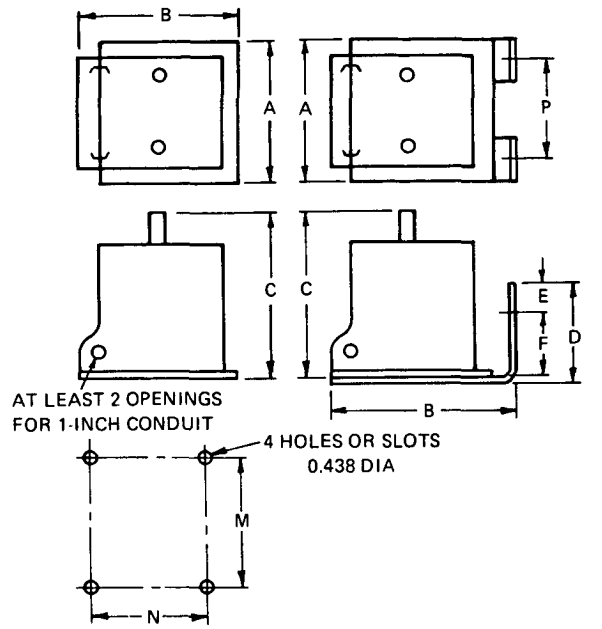
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MINIMUM ELECTRICAL CHARACTERISTICS

BIL kV	THERMAL BURDEN RATING AT 55°C AMBIENT	ACCURACY CLASS AND BURDEN			
		W	X	M	Y
60, 75, AND 110	200	0.3	0.3	0.3	0.3

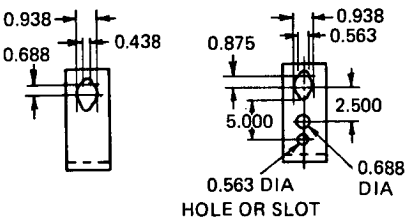
DIMENSIONS:

WITHOUT MOUNTING BRACKETS WITH MOUNTING BRACKETS



MOUNTING BRACKET DIMENSIONS

60 kV BIL AND 110 kV BIL (SIZE B)	75 kV BIL AND 110 kV BIL (SIZE A)



MOUNTING DIMENSIONS

BIL kV	WITHOUT MOUNTING BRACKETS					WITH MOUNTING BRACKETS						
	MAXIMUM OVERALL DIMENSIONS			MOUNTING DIMENSIONS		MAXIMUM OVERALL DIMENSIONS				MOUNTING DIMENSIONS		
	A	B	C	M	N	A	B	C	D	E	F	P
60	11.500	13.000	13.000	8.500	8.250	11.500	15.000	13.500	6.500	1.875	3.750	7.625
75	14.500	15.500	18.500	10.000	8.625	14.500	17.500	21.000	12.500	1.875	7.875	8.875
110 (SIZE A)	14.500	15.500	18.500	10.000	8.625	14.500	19.750	21.000	12.500	1.875	7.875	8.875
110 (SIZE B)	14.500	15.500	18.500	8.500	6.125	14.500	19.750	21.000	12.500	1.875	3.750	7.625

NOTE: All dimensions are in inches. Tolerance on diameters of holes, slots and keyholes is ± 0.031 inch. Unless otherwise indicated, other tolerances are ± 0.063 inch.

Fig 14
Outdoor Voltage Transformers,
60 kV BIL Through 110 kV BIL

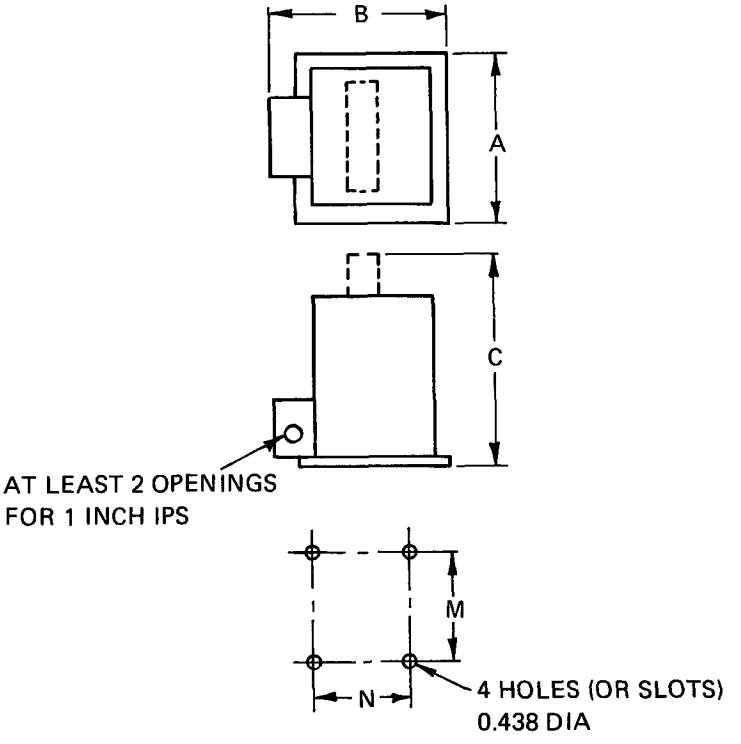
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5.6 Small-Size Outdoor Voltage Transformers, with One Bushing,[1] 125 kV Through 200 kV BIL

5.6.1 Electrical Characteristics and Dimensions. The minimum electrical characteristics, the dimensions, and the maximum envelope including the base, body, secondary terminal covers, and secondary conduit boxes shall be as shown in Fig 15.

MINIMUM ELECTRICAL CHARACTERISTICS

THERMAL BURDEN RATING AT 30°C	ACCURACY CLASS AND BURDEN			
	W	X	M	Y
500 VA	0.3	0.3	0.3	0.3



BIL kV	MARKED RATIO	MAXIMUM OVERALL DIMENSIONS			MOUNTING DIMENSIONS	
		A	B	C	M	N
125 AND 150	100:1	16	17	20	10	8.625
150 AND 200 SEE NOTE (3)	175:1	–	–	–	–	–

NOTES:
(1) All dimensions are in inches – tolerances on diameters of holes and slots are ± 0.031.
(2) Unless otherwise indicated other tolerances are ± 0.063.
(3) Dimensions have not been established for 34.5 kV nominal system voltage.

Fig 15
Small-Size Outdoor Voltage Transformers, with One Bushing, 125 kV BIL Through 200 kV BIL

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5.6.2 Rated Voltages. The rated voltages, marked ratios, and BIL shall be as given in Table 4.

Table 4
Electrical Ratings for Small-Size Outdoor Voltage Transformers, with One Bushing, 125 kV Through 200 kV BIL

Rated Voltages	Marked Ratio	BIL kV
20 780 Grd Y/12 000	100:1	125
20 780 Grd Y/12 000	100:1	150
24 940 Grd Y/14 400	120:1	125
24 940 Grd Y/14 400	120:1	150
34 500 Grd Y/20 125	175:1	150
34 500 Grd Y/10 125	175:1	200

5.7 Small-Size Outdoor Voltage Transformers, with Two Bushings,[1] 125 kV Through 200 kV BIL

5.7.1 Electrical Characteristics and Dimensions—One Bushing. The minimum electrical characteristics, the dimensions, and the maximum envelope including the base, body, secondary terminal covers, and secondary conduit boxes shall be as shown in Fig 16.

5.7.2 Rated Voltages. The rated voltages, marked ratios, and BIL shall be as given in Table 5.

Table 5
Electrical Ratings for Small-Size Outdoor Voltage Transformers, with Two Bushings, 125 kV Through 200 kV BIL

Rated Voltages	Marked Ratios	BIL kV
24 000	200:1	125
24 000	200:1	150
34 500	300:1	150
34 500	300:1	200

[1] *One bushing* and *two bushings* refer to the number of fully insulated primary terminals.

5.8 Large-Size Outdoor Voltage Transformers, with One Bushing,[1] 150 kV BIL Through 350 kV BIL

5.8.1 Electrical Characteristics and Dimensions. The minimum electrical characteristics, the dimensions, and the maximum envelope including the base, body, ground clamp (when provided), secondary terminal covers, and secondary conduit boxes shall be as shown in Fig 17.

5.8.2 Rated Voltages. The rated voltages, marked ratios, and BIL shall be as given in Table 6.

Table 6
Electrical Ratings for Large-Size Outdoor Voltage Transformers, with One Bushing, 150 kV Through 350 kV BIL

Rated Voltages	Marked Ratio	BIL kV
24 940 Grd Y/14 400	120/200 and 120/200:1	150
34 500 Grd Y/20 125	175/300 and 175/300:1	200
46 000 Grd Y/27 600	240/400 and 240/400:1	250
69 000 Grd Y/40 250	350/600 and 350/600:1	350

5.9 Large-Size Outdoor Voltage Transformers, with Two Bushings,[1] 150 kV BIL Through 350 kV BIL

5.9.1 Electrical Characteristics and Dimensions. The minimum electrical characteristics, the dimensions, and the maximum envelope including the base, body, ground clamp (when provided), secondary terminal covers, and secondary conduit boxes shall be as shown in Fig 18.

5.9.2 Rated Voltages. The rated voltages, marked ratios, and BIL shall be as given in Table 7.

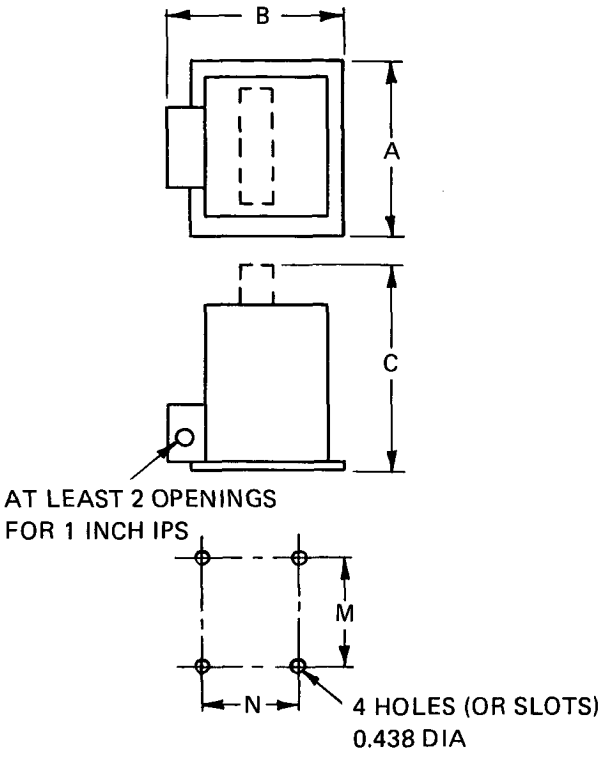
Table 7
Electrical Ratings for Large-Size Outdoor Voltage Transformers, with Two Bushings, 150 kV Through 350 kV BIL

Rated Voltages	Marked Ratio	BIL kV
24 000	200:1	150
34 500	300:1	200
46 000	400:1	250
69 000	600:1	350

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MINIMUM ELECTRICAL CHARACTERISTICS

THERMAL BURDEN RATING AT 30°C	ACCURACY CLASS AND BURDEN			
	W	X	M	Y
500 VA	0.3	0.3	0.3	0.3



BIL kV	MARKED RATIO	MAXIMUM OVERALL DIMENSIONS			MOUNTING DIMENSIONS	
		A	B	C	M	N
125 AND 150	200:1	16	17	20	10	8.625
150 AND 200 SEE NOTE (3)	300:1	—	—	—	—	—

NOTES:

(1) All dimensions are in inches – tolerances on diameters of holes and slots are ± 0.031.

(2) Unless otherwise indicated other tolerances are ± 0.063.

(3) Dimensions have not been established for 34.5 kV nominal system voltage.

Fig 16
Small-Size Outdoor Voltage Transformers,
with Two Bushings,
125 kV BIL Through 200 kV BIL

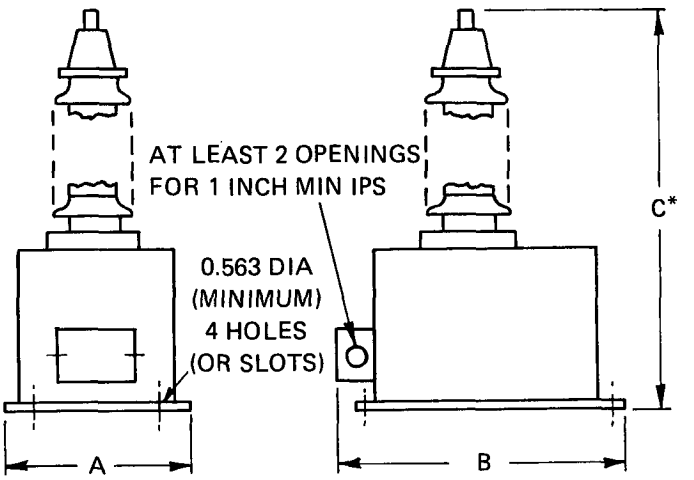
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MINIMUM ELECTRICAL CHARACTERISTICS

THERMAL BURDEN RATING AT 30°C	ACCURACY CLASS AND BURDEN				
	W	X	M	Y	Z
1500 VA	0.3	0.3	0.3	0.3	0.3

DIMENSIONS



*Does not include primary terminal adapter.

BIL kV	MARKED RATIO	MAXIMUM OVERALL DIMENSIONS		
		A	B	C
150	120/200 AND 120/200:1	19	20	46
200	175/300 AND 175/300:1	21	23	54
250	240/400 AND 240/400:1	21	24	60
350	350/600 AND 350/600:1	26	34	74

NOTES:
(1) All dimensions are in inches – tolerances on diameters of holes are ± 0.031.
(2) Unless otherwise indicated other tolerances are ± 0.063.

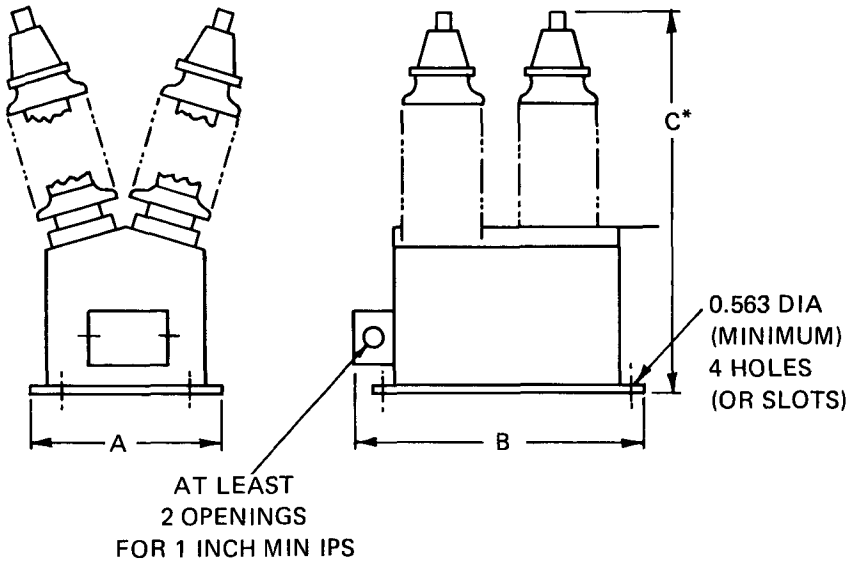
Fig 17
Large-Size Outdoor Voltage Transformers, with One Bushing, 150 kV BIL Through 350 kV BIL

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MINIMUM ELECTRICAL CHARACTERISTICS

THERMAL BURDEN RATING AT 30°C	ACCURACY CLASS AND BURDEN				
	W	X	M	Y	Z
1500 VA	0.3	0.3	0.3	0.3	0.3

DIMENSIONS



*Does not include primary terminal adapter.

BIL kV	MARKED RATIO	MAXIMUM OVERALL DIMENSIONS		
		A	B	C
150	100:1	42	28	50
200	300:1	46	32	54
250	400:1	58	34	58
350	600:1	69	38	70

NOTES:
(1) All dimensions are in inches – tolerances on diameters of holes are ± 0.031 inch.
(2) Unless otherwise indicated other tolerances are ± 0.063 inch.

Fig 18
Large-Size Outdoor Voltage Transformers, with Two Bushings, 150 kV BIL Through 350 kV BIL

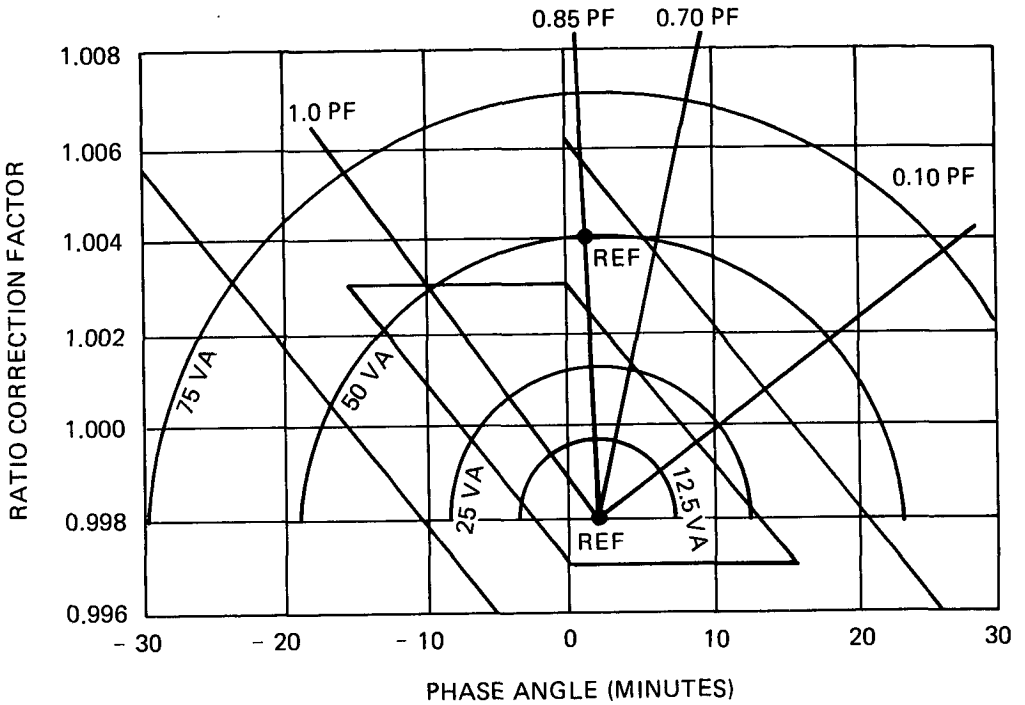
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Appendix

(This Appendix is not a part of ANSI C12.11-1987, American National Standard for Instrument Transformers for Revenue Metering, 10 kV BIL Through 350 kV (0.6 kV NSV Through 69 kV NSV), but is included for information only.)

Appendix A

Circle Method for Determination of Voltage Transformer Accuracy



NOTE: Reference points representing two sets of given performance data are plotted on the grid. Points on the line connecting the two given burdens represent performance at various burdens with the same power factor.

Fig A1
Circle Method for Determination of Voltage Transformer Accuracy

The accuracy of a voltage transformer is directly affected by the burden connected to the secondary of the transformer. This burden is usually expressed in terms of voltamperes and percent power factor.

The circle method provides an easy means of determining the accuracy of a voltage transformer at any desired burden by using only the phase angle and ratio correction factor (RCF) at 0 voltampere burden and one other known burden. Normally the manufacturer furnishes this information with the transformer.

Graph paper that is scaled so that a given distance represents 0.0010 units on the RCF axis and 3.438 minutes on the phase angle axis is necessary. A sample is shown in Fig A2.

EXAMPLE: The following data are test results at 120 secondary volts for a 2400:120 volt voltage transformer. At 0 voltampere burden, RCF = 0.9979 and phase angle = +2.0 minutes. At 50 voltamperes, 85 percent power-factor burden. RCF = 1.0040 and phase angle = +1.0 minute. Performance at other voltampere and power-factor burdens can now be plotted by making radii proportional to voltamperes, and angles equal to burden power-factor angles.

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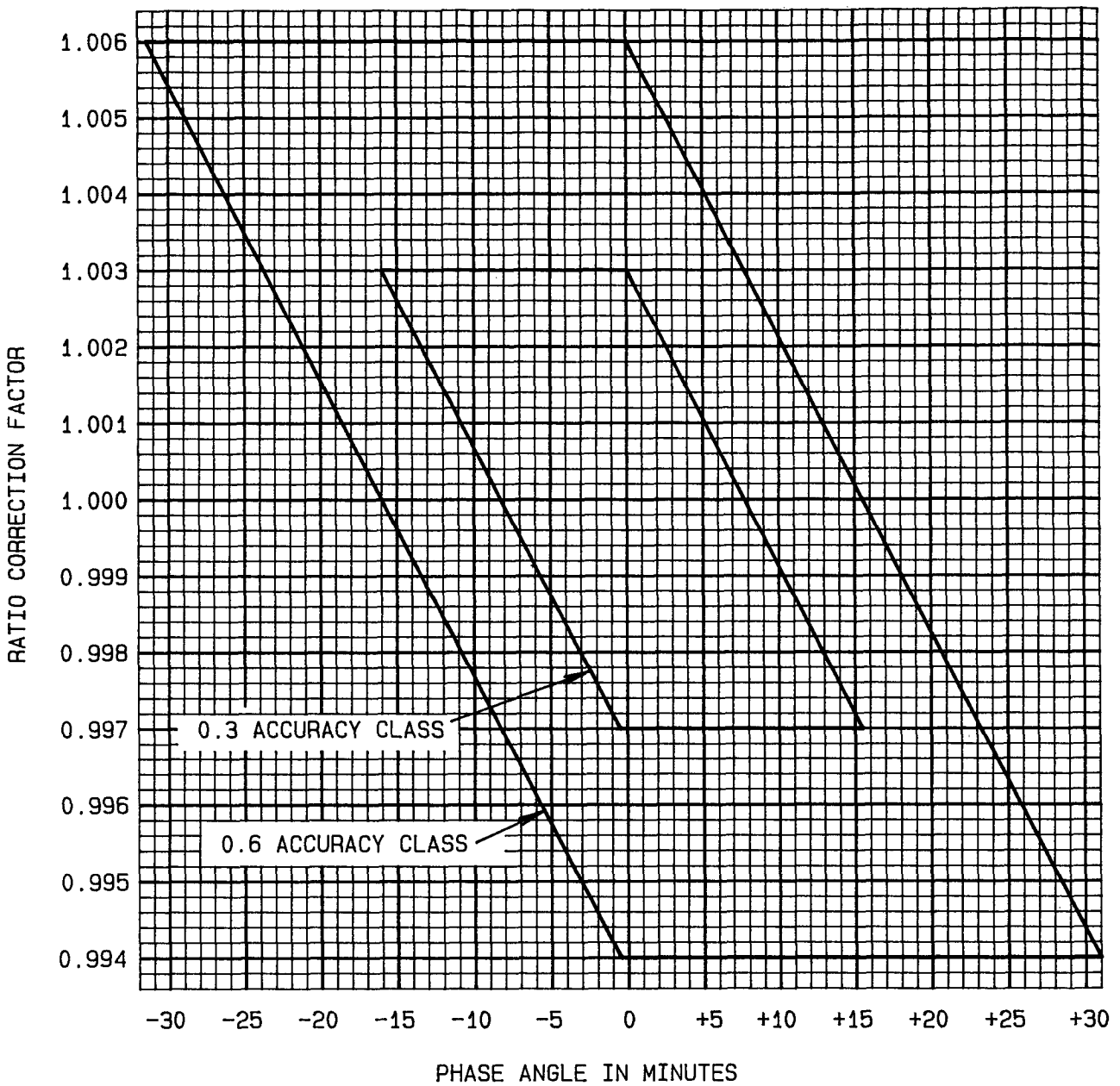


Fig A2
Sample of Graph Paper Specifically Scaled for Voltage Transformer Circle Diagram

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