



outdoor bushings

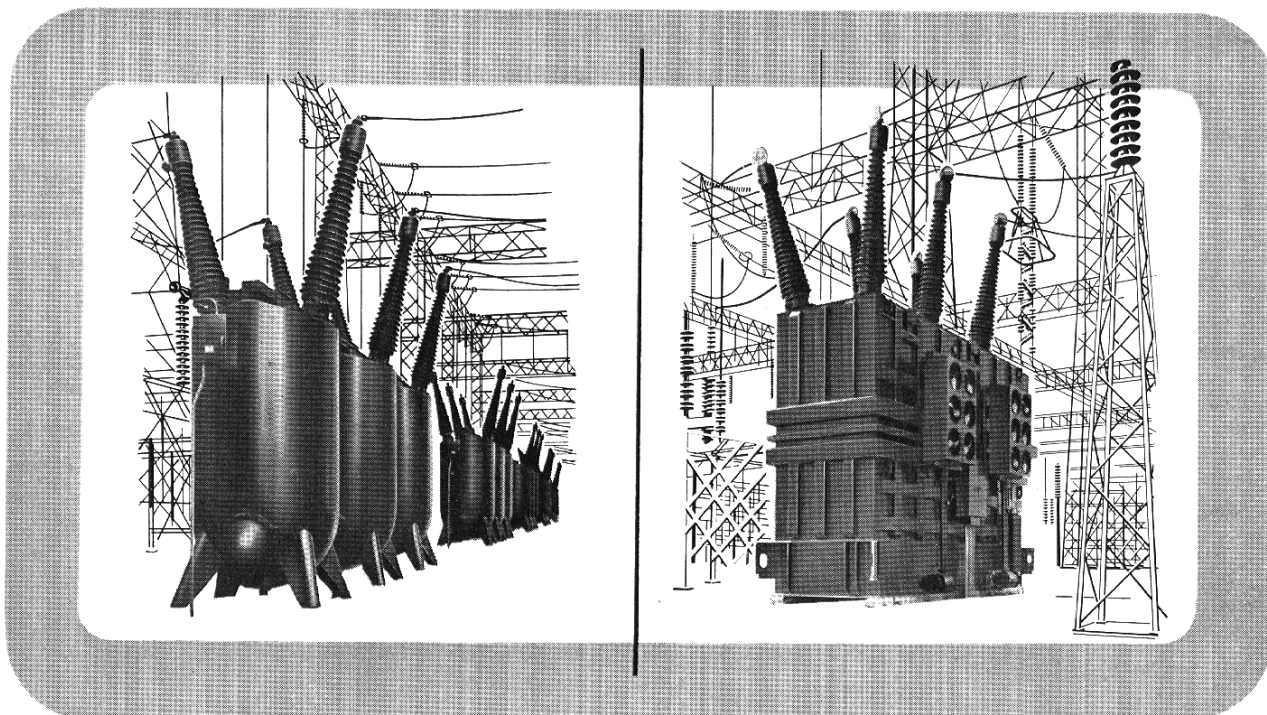
4.3 to 345 kv

for power circuit breakers
and transformers

technical
data

33-360

page 1



introduction

As an important part of this 6th edition of the Westinghouse manual of outdoor bushings, full data on the ASA (American Standards Association) development is included. The outstanding service record of Westinghouse bushings has contributed strongly to improved operating safety, greater service continuity and unmatched reliability. Industry recognition of this design has led to the ASA Standards for equipment voltages 23 kv to 196 kv. The Westinghouse bushing design required very little modification to meet the ASA Standards.

Also outlined are the basic design principles of Westinghouse bushings that are so well represented in the ASA Standards, as well as some of the outstanding design developments represented in over 50 years of Westinghouse bushing experience.

Part 1 presents a tabulation of the Westinghouse standard bushings in voltages from 15 kv to 345 kv.

Parts 2, 3, 4, and 5 present discussions and illustrations on earlier designs of Westinghouse power circuit breaker and transformer bushings, along with detailed engineering data concerning their interchangeability, tests, maintenance, repair and storage. The general index, at right, will assist in locating specifically the various phases of discussion and data.

general index

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October, 1957

supersedes technical data 33-156 dated June, 1947
mailed to: E/274,279,280/AD; C-special list



development program and basic design

over 50 years of Westinghouse condenser bushing experience

The development program for Westinghouse Outdoor Bushings has continued aggressively since 1907. Improvements in impulse and power factor testing equipment, together with many field tests, have resulted in condenser bushings which place Westinghouse in a leading position on high voltage apparatus.

The basic principle of Westinghouse condenser bushing design, as originated by Westinghouse in 1907, is now the standard for the industry. Proved through the years, this design adds substantially to the reliability of circuit breakers and transformers. Research and engineering studies are constantly being made to improve materials, details of construction and manufacturing processes.

specific phases of Westinghouse condenser bushing development and improvement since 1907

1. design established

Prior to 1907, Westinghouse used bulk type non-condenser bushings for ratings 15 kv and above. In 1907, Westinghouse adopted the principle of bushing design wherein the stress distribution through the wall and over the surface is controllable and made uniform by subdividing the insulation into many condensers in series. The first outdoor condenser bushings were made in 1909 for 44, 66, and 100 kv, and some of these bushings are still in service. Thousands of bushings of all voltage classes have been manufactured in the succeeding years. Very little service trouble has been experienced, and such difficulties as have occurred did not involve the basic condenser principle.

2. construction

In 1920 to 1922, important improvements were made in the material used in the condenser itself and in the weather casing construction.

3. filling

At the same time (1920-22), a more fluid type of filling plastic replaced the hard gum.

4. finish

A new varnish for finishing the condenser itself was introduced in 1938 with better moisture resistance and higher resistance to tracking under dielectric stress.

5. gaskets with spring compression

In 1934 a sealing and stop gasket design was developed, with spring compression, to maintain continuous pressure on the gaskets under all conditions.

6. porcelain

In 1922, the single piece porcelain was developed for 33 and 44 kv bushings . . . in 1925, for 66 kv bushings . . . and in 1928-29 for the higher voltage classes.

7. solder-sealed

In 1940, experimental type "S" solder-sealed designs for voltages up to and including 69 kv were made and tested, and a few bushings of this type placed in service. This is now standard for voltage classes 15 to 69 kv, inclusive.

In 1940, the type "N" and "ON" bushings were developed for ratings of 92 to 288 kv, inclusive, permitting a common design, except for a few parts, for plastic-encased and oil-encased bushings for circuit breakers and transformers.

8. oil-impregnated condenser

In the latter part of 1942, a new oil-encased bushing with oil-impregnated paper condenser—the type "O"—was placed in production for voltages 92 to 288 kv. This superseded the types "N" and "ON" designs.

9. Micarta® improvements

There has been continuous improvement in the Micarta used in winding condenser bushings.

Westinghouse modern bushing design

the principle: Condenser construction provides uniform voltage stress throughout insulation radially and over surface of bushing longitudinally.

the design: A series of equal capacity condensers, spaced concentrically around the conductor, consists of alternate layers of aluminum foil and impregnated paper. Extremely thin, specially-treated foil improves adhesion and electrical coordination. Continuous winding under carefully controlled conditions eliminates voids and variations in resistivity. Impregnation of supercalendered paper imparts unexcelled dielectric strength. Type "S" bushing resistance to moisture and tracking under dielectric stress is provided by baked varnish finish. Type "O" bushings are porcelain-enclosed and the condenser vacuum oil-impregnated.

the advantages: Smooth voltage gradient throughout bushing eliminates internal corona, radio and TV interference, and prevents insulation breakdown. Condenser principle design is the most efficient ever developed.

part 1

**standard
Westinghouse bushings for
circuit breakers and transformers
as of 1957**

Listing of circuit breaker and transformer
bushings now being built at East
Pittsburgh and Sharon Divisions,
including ASA Standards

section a: tabulation of
circuit breaker bushings
15 through 345 kv . . pages 4 and 5

section b: tabulation of
transformer bushings
15 through 345 kv pages 6-8

**part 1****section a: outdoor circuit breaker bushings • including ASA Standards**

assembly drawing (ref)		catalog number				fig. no.	A mounting flange			L inside length	W depth of C.T. pocket	B bottom terminal			D max dia below cover	gasket space		H overall length approx	V top metal length approx	J cap dia
																P	Q			
							drawing number	gr	kv			type	key	bolt cir		no. bolts	dia bolts				o.d.	no. thds	lgth	max i.d.	min o.d.
9A8077	6	15	S	151	1	6%	3	½	20¼	11½	1	14	1¾	2½	2⅞ ₁₆	4⅞ ₁₆	35⅞ ₁₆	4⅞ ₁₆	4¾ ₁₆	
9A8077	5	15	S	153	1	6%	3	½	20¼	11½	1¼	12	1¾	2¾	2⅞ ₁₆	4⅞ ₁₆	35⅞ ₁₆	4⅞ ₁₆	4¾ ₁₆	
①42A9626	1	23	S	288	1	7¼	4	⅝	29½	16½	1½	12	2⅞	3⅝	4	6¼	49⅝	6⅞	5⅞ ₁₆	
42A9626	3	23	S	290	1	8¾	4	¾	31½	16½	¾	12	4	5	6	7%	52¼	6¾	7⅞ ₁₆	
42A9626	4	23	S	291	1	9¾	4	¾	31½	16½	4	12	4	6	7	8⅝	52¾	7¼	7⅞ ₁₆	
①42A9626	1	23	S	288	1	7¼	4	⅝	29½	16½	1½	12	2⅞	3⅝	4	6¼	49⅝	6⅞	5⅞ ₁₆	
①42A9627	1	34.5	S	388	1	7¼	4	⅝	31½	16½	1½	12	2⅞	3½	4	6¼	55%	6⅞	5⅞ ₁₆	
42A9627	2	34.5	S	389	1	9¾	4	¾	33½	16½	2¼	12	4	4¾	7	8⅝	57¾	6¼	6⅞ ₁₆	
①42A9628	1	46	S	488	1	8¼	4	⅝	33½	16½	1½	12	2⅞	4	5	7¼	61⅝	6⅞	5⅞ ₁₆	
①42A9629	1	69	S	588	1	9¼	6	⅝	37½	16½	1½	12	2⅞	4¾	6	8¼	72⅝	6⅞	5⅞ ₁₆	
44A1262	1	69	S	558	1	11⅞	8	¾	44¾	16	2¼	12	3½	5⅞	bevel seat		88⅞	9⅞ ₁₆	6⅞ ₁₆	
①408D780	1	115	O	659	2	13¼	6	¾	43	23	figure 2-B			8¾	9⅞	11⅞	106⅜ ₁₆	16¾	10⅞ ₁₆	
①408D384	1	115	O	660	2	13¼	6	¾	43	23	figure 2-B			9¾	9⅞	11⅞	106⅜ ₁₆	17⅞	10⅞ ₁₆	
①408D781	1	138	O	719	2	14¼	6	¾	46¾	23	figure 2-B			9¾	10⅞	12⅞	115⅜ ₁₆	16¾	10⅞ ₁₆	
①408D385	1	138	O	721	2	14¼	6	¾	46¾	23	figure 2-B			10¾	10⅞	12⅞	116⅞ ₁₆	17⅞	10⅞ ₁₆	
①408D386	1	161	O	760	2	15¾	8	¾	50¼	23	figure 2-B			11½	12⅞	14⅞	128⅜ ₁₆	17⅞	10⅞ ₁₆	
①408D997	1	196	O	810	2	21	12	¾	59½	26¾	figure 2-A			14⅞ ₁₆	17⅞	19½	157⅞ ₁₆	20⅞	13⅞ ₁₆	
②41A9771	1	288	O	930	2	28	12	1	86⅞	27½	4	12	4⅞ ₁₆	20	20	26	226⅞	26⅞ ₁₆	17⅞	

① Conforms to ASA Standards.

② Suitable for application on 345 kv systems.

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4.3 to 345 kv

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page 5

K top threads	C lgth of top thds	amp	type of breaker	volt- age tap: two lay- ers	net wt lbs
1	14	2	600	144G100 144G250	no 30
1 1/4	12	2 3/4	1200	144G250	no 38
1 1/2	12	2 3/4	1200	144G1000	no 77
3/4	12	3 3/8	3000	144G1500	no 270
4	12	4 1/8	4000	144G1500	no 385
1 1/2	12	2 3/4	1200	230G500 345G1000 345G1500	no 77
2 1/4	12	3 1/8	2000	345G2500	no 200
1 1/2	12	2 3/4	1200	460G500 460G1500	no 118
1 1/2	12	2 3/4	1200	690G1000 690G1500 690G2500 GM5	no 183
2 1/4	12	3 3/4	2000	GM6 690G5000 690GM5000	no 225
1 1/2	12	2 3/8	1200	GM3 GM6	yes 450
2	12	3	1600	1150GM10000	yes 595
1 1/2	12	2 3/8	1200	GM5	yes 700
2	12	3	1600	GM7	yes 780
2	12	3	1600	GM5 GM7 1610GM15000	yes 890
2	12	3	1600	2300GW5000 2300GW10000 2300GW15000	yes 1535
2 1/4	12	3	1600	3300GW25000	yes 3700

figure 1:

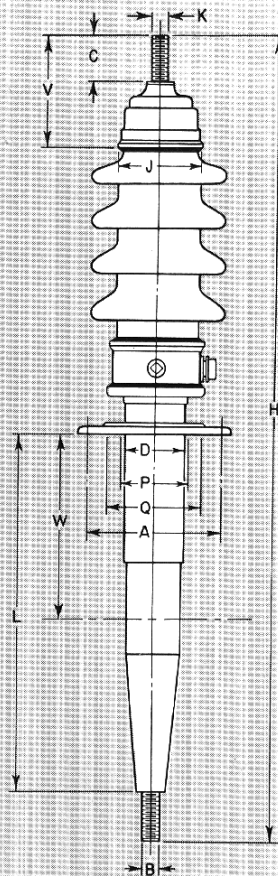
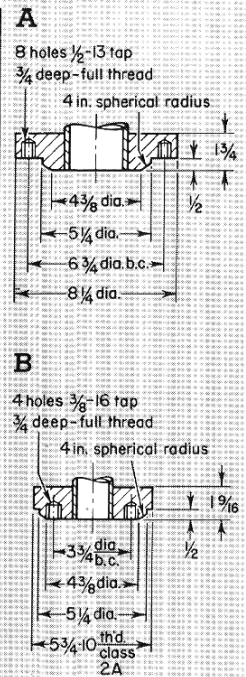
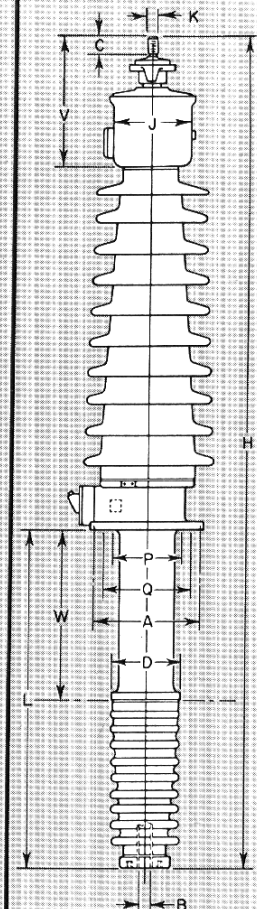


figure 2:



**part 1** section b: outdoor transformer bushings • including ASA Standards

bushing assembly				fig. no.	A mounting flange			L inner end	T or W max gas space	lead		D max dia below cover	gasket seat		H over-all length	V live metal extension in air	J cap dia	K top threads	
drawing number and gr	kv class	type letter	key no.		B.C.	no. bolt	dia bolt			i.d.	B o.d. and no. thds		P i.d.	Q o.d.				dia	thds
27B1927-1	15	RJ	...	3	4 3/4	4	3/8	14 1/16	8	...	1 1/2-13	2 1/8	2 7/16	3 7/16	26 5/8	3 3/4	2 1/2	1 1/8	12
27B1927-2	15	RJ	...	3	4 3/4	4	3/8	19 1/16	13	...	1 1/2-13	2 1/8	2 7/16	3 7/16	31 3/4	3 3/4	2 1/2	1 1/8	12
27B1927-3	15	RJ	...	3	4 3/4	4	3/8	24 1/16	18	...	1 1/2-13	2 1/8	2 7/16	3 7/16	36 3/4	3 3/4	2 1/2	1 1/8	12
27B1928-1	15	RJ	...	3	6	4	1/2	15 1/16	9	...	3/4-16	2 1/16	3 7/16	4 7/16	28 3/4	4 1/8	3 1/2	1 1/8	12
27B1928-2	15	RJ	...	3	6	4	1/2	20 1/16	14	...	3/4-16	2 1/16	3 7/16	4 7/16	33 3/4	4 1/8	3 1/2	1 1/8	12
27B1928-5	15	RJ	...	3	6	4	1/2	24 1/16	18	...	3/4-16	2 1/16	3 7/16	4 7/16	37 3/4	4 1/8	3 1/2	1 1/8	12
27B1928-6	15	RJ	...	3	6	4	1/2	12 1/16	8	...	1 -14	2 1/16	3 7/16	4 7/16	25 5/8	4 1/8	3 1/2	1 1/2	12
27B1928-7	15	RJ	...	3	6	4	1/2	14 1/16	10	...	1 -14	2 1/16	3 7/16	4 7/16	27 3/8	4 1/8	3 1/2	1 1/2	12
27B1928-3	15	RJ	...	3	6	4	1/2	23 1/16	19	...	1 -14	2 1/16	3 7/16	4 7/16	38 3/4	4 1/8	3 1/2	1 1/2	12
27B1928-4	15	RJ	...	3	6	4	1/2	13 1/16	5	...	1 1/2-12	3 1/2	4 1/2	5 1/2	26 7/8	4 1/8	4 3/4	1 1/2	12
27B1929-3	15	RJ	...	3	7	6	1/2	21 1/16	13	...	1 1/2-12	3 1/2	4 1/2	5 1/2	35	4 1/8	4 3/4	1 1/2	12
27B1929-1	15	RJ	...	3	7	6	1/2	21 1/16	13	...	1 1/2-12	3 1/2	4 1/2	5 1/2	35	4 1/8	4 3/4	1 1/2	12
27B1929-2	15	RJ	...	3	7	6	1/2	26 1/16	18	...	1 1/2-12	3 1/2	4 1/2	5 1/2	40	4 1/8	4 3/4	1 1/2	12
53B2278-1	15	RJ	...	3	7	6	1/2	20 1/16	12	...	1 1/2-12	3 1/2	4 1/2	5 1/2	34	4 1/8	4 3/4	1 1/2	12
53B2278-2	15	RJ	...	3	7	6	1/2	25 1/16	17	...	1 1/2-12	3 1/2	4 1/2	5 1/2	39	4 1/8	4 3/4	1 1/2	12
27B1930-1	15	RJ	...	3	8 1/4	6	1/2	22 1/16	15	1 3/8	2 1/4-12	4 1/8	5 1/8	6 1/8	36 7/8	4 1/8	4 3/4	2 1/4	12
27B1930-2	15	RJ	...	3	8 1/4	6	1/2	27 1/16	20	1 3/8	2 1/4-12	4 1/8	5 1/8	6 1/8	41 7/8	4 1/8	4 3/4	2 1/4	12
①53B2221	23	S	283	5	7 1/4	4	5/8	16 1/2	10	...	...	3 3/8	4	6 1/4	34 1/16	4 1/4	5 1/16	1 1/8	12
①53B2222	23	S	284	5	7 1/4	4	5/8	23	16 1/2	7/8	...	3 3/8	4	6 1/4	41 1/16	4 1/4	5 1/16	1 1/8	12
①53B2223	23	S	285	5	7 1/4	4	5/8	27 1/2	21	7/8	...	3 3/8	4	6 1/4	45 1/16	4 1/4	5 1/16	1 1/8	12
①53B2226	23	S	286	6	7 1/4	4	5/8	30 1/2	21	...	1 1/2-12	3 3/8	4	6 1/4	50 1/16	6	5 1/16	1 1/2	12
①53B2227	23	S	287	6	7 1/4	4	5/8	36 1/2	27	...	1 1/2-12	3 3/8	4	6 1/4	56 1/16	6	5 1/16	1 1/2	12
①53B2228	23	S	288	6	7 1/4	4	5/8	29 1/2	17	...	1 1/2-12	3 3/8	4	6 1/4	49 1/16	6	5 1/16	1 1/2	12
11B3446	23	S	232	4	8 1/4	3	1/2	24 1/8	16 3/8	...	2 -12	4	4	6 7/8	48 3/8	9 1/8	6 7/16	2	12
4B6024	23	S	233	4	8 1/4	3	1/2	29 3/8	21 3/8	...	2 -12	4	4	6 1/8	53 3/8	9 1/8	6 7/16	2	12
4B6025	23	S	236	4	8 1/4	3	1/2	29 3/8	21 3/8	...	2 1/2-12	4 1/2	4 1/2	6 1/8	53 3/8	9 1/8	6 7/16	2 1/2	12
11B5964	23	S	...	4	9 3/4	8	1/2	29 3/8	21 3/8	2	3 -12	5 1/4	5 1/4	8 1/2	53 1/8	9 1/8	7 7/16	3	12
24B6299	23	S	...	4	9 3/4	8	1/2	28 3/8	21 1/4	2 1/2	3 -12	5 3/4	5 3/4	8 1/2	52 1/8	9 3/8	7 7/16	3	12
24B2195	23	S	...	4	9 3/4	8	1/2	27 3/8	21 1/4	3	3 -12	6	6	8 1/2	51 7/8	9 3/8	7 7/16	3	12
①53B2231	34.5	S	383	5	7 1/4	4	5/8	18 1/2	10	7/8	...	3 1/2	4	6 1/4	40 1/16	4 1/4	5 1/16	1 1/8	12
①53B2232	34.5	S	384	5	7 1/4	4	5/8	25	16 1/2	7/8	...	3 1/2	4	6 1/4	47 1/16	4 1/4	5 1/16	1 1/8	12
①53B2233	34.5	S	385	5	7 1/4	4	5/8	29 1/2	21	7/8	...	3 1/2	4	6 1/4	51 1/16	4 1/4	5 1/16	1 1/8	12
①53B2236	34.5	S	386	6	7 1/4	4	5/8	32 1/2	21	...	1 1/2-12	3 1/2	4	6 1/4	56 1/16	6	5 1/16	1 1/2	12
①53B2237	34.5	S	387	6	7 1/4	4	5/8	30 1/2	27	...	1 1/2-12	3 1/2	4	6 1/4	62 1/16	6	5 1/16	1 1/2	12
①53B2238	34.5	S	388	6	7 1/4	4	5/8	31 1/2	17	...	1 1/2-12	3 1/2	4	6 1/4	55 1/16	6	5 1/16	1 1/2	12
4B6034	34.5	S	333	4	9 3/4	8	1/2	31 3/8	22 1/8	...	2 -12	4 1/2	4 1/2	8 5/8	58 3/8	9 3/8	6 7/16	2	12
24B8938	34.5	S	335	4	9 3/4	8	1/2	31 3/8	22 1/8	...	2 1/2-12	5	5	8 1/2	58 3/8	9 3/8	6 7/16	2 1/2	12
24B6287	34.5	S	...	4	9 3/4	8	1/2	31 3/8	22 1/8	...	3 -12	5 1/8	5 1/8	8 1/2	57 1/8	9 3/8	7 7/16	3	12
24B4485	34.5	S	340	4	11 1/8	8	1/2	31 3/8	22 1/8	...	3 1/2-12	6 3/4	7	9 3/8	59 3/8	9 3/8	8 7/16	3 1/2	12
①53B2241	46	S	483	5	8 1/4	4	3/4	20 1/2	10	7/8	...	4	5	7 1/4	46 1/16	4 1/4	5 1/16	1 1/8	12
①53B2242	46	S	484	5	8 1/4	4	3/4	27	16 1/2	7/8	...	4	5	7 1/4	53 1/16	4 1/4	5 1/16	1 1/8	12
①53B2243	46	S	485	5	8 1/4	4	3/4	31 1/2	21	7/8	...	4	5	7 1/4	57 1/16	4 1/4	5 1/16	1 1/8	12
①53B2246	46	S	486	6	8 1/4	4	3/4	34 1/2	21	...	1 1/2-12	4	5	7 1/4	62 3/16	6	5 1/16	1 1/2	12
①53B2247	46	S	487	6	8 1/4	4	3/4	40 1/2	27	...	1 1/2-12	4	5	7 1/4	68 3/16	6	5 1/16	1 1/2	12
①53B2248	46	S	488	6	8 1/4	4	3/4	33 1/2	17	...	1 1/2-12	4	5	7 1/4	61 3/16	6	5 1/16	1 1/2	12
4B6044	46	S	426	4	9 3/4	8	1/2	32 1/8	22 1/8	...	2 -12	5	5 1/4	8 5/8	64 3/8	10 3/8	6 7/16	2	12
24B2446	46	S	...	4	9 3/4	8	1/2	32 1/8	22 1/8	...	3 -12	6	6	8 1/2	64 1/8	10 3/8	7 7/16	3	12
27B1246	46	S	...	4	14	8	3/4	31 3/8	22 1/8	...	3 -12	8 3/8	8 3/8	11	60 1/4	7 3/4	8 7/16	3	12
①53B2261	69	S	583	5	9 1/4	6	3/4	30 1/2	16 1/2	7/8	...	4 3/4	6	8 1/4	63 1/16	4 1/4	5 1/16	1 1/8	12
①53B2262	69	S	584	5	9 1/4	6	3/4	35	21	7/8	...	4 3/4	6	8 1/4	68 1/16	4 1/4	5 1/16	1 1/8	12
①53B2263	69	S	585	5	9 1/4	6	3/4	41	27	7/8	...	4 3/4	6	8 1/4	74 1/16	4 1/4	5 1/16	1 1/8	12
①53B2266	69	S	586	6	9 1/4	6	3/4	38	21	...	1 1/2-12	4 3/4	6	8 1/4	73 1/16	6	5 1/16	1 1/2	12
①53B2267	69	S	587	6	9 1/4	6	3/4	44	27	...	1 1/2-12	4 3/4	6	8 1/4	79 1/16	6	5 1/16	1 1/2	12
①53B2268	69	S	588	6	9 1/4	6	3/4	37 1/2	17	...	1 1/2-12	4 3/4	6	8 1/4	72 3/16	6	5 1/16	1 1/2	12
20A2384	69	S	529	4	9 3/4	8	1/2	39 3/4	21 3/8	...	2 -12	6	6	8 1/2	81 1/16	12 7/8	7 3/4	2	12
16A9169	69	S	534	4	11 1/8	8	3/4	39 3/4	21 3/8	...	2 1/2-12	6 1/2	6 1/2	8 1/2	81 1/16	12 7/8	7 3/4	2 1/2	12
26A8256	69	S	529	4	9 3/4	8	1/2	39 3/4	21 3/8	...	2 -12	6	6	8 1/2	83 1/8	12 7/8	7 3/4	2	12
①589D192	92	O	607	8A	13 1/4	6	1 1/4	40 1/2	23	1 1/2	...	7	7	11 7/8	89	10 1/4	8 3/8	1 1/2	12
①589D193	92	O	608	8A	13 1/4	6	1 1/4	44 1/4	26 3/4	1 1/2	...	7	7	11 7/8	92 3/4	10 1/4	8 3/8	1 1/2	12
①589D114	115	O	660	8B	13 1/4	6	1 1/4	43	23	1 3/4	...	9 3/4	8 3/4	11 7/8	102 3/16	13 3/8	10 1/16	2	12
①589D116	115	O	659	8B	13 1/4	6	1 1/4	43	23	1 3/4	...	8 3/4	8 3/4	11 7/8	102 1/2	13 3/8	10 1/16	1 1/2	12
①589D115	115	O	658	8A	13 1/4	6	1 1/4	46 3/4	26 3/4	1 3/4	...	8 3/4	8 3/4	11 7/8	106 1/4	13 3/8	10 1/16	1 1/2	12
①589D137	138	O	721	8B	14 1/4	6	1 1/4	46 3/4	23	1 3/4	...	9 3/4	9 3/4	12 3/8	112 3/16	13 3/8	10 1/16	2	12
①589D139	138	O	719	8B	14 1/4	6	1 1/4	46 3/4	23	1 3/4	...	9 3/4	9 3/4	12 3/8	112 3/16	13 3/8	10 1/16	1 1/2	12
①589D138	138	O	718	8A	14 1/4	6	1 1/4	50 1/2	26 3/4	1 3/4	...	9 3/4	9 3/4	12 3/8	115 7/8	13 3/8	10 1/16	1 1/2	12
①589D162	161	O	760	8B	15 3/4	8	1 1/4	50 1/4	23	1 3/4	...	11 1/4	11 1/4	14 3/8	...	...	...	2	12

outdoor bushings

4.3 to 345 kv

for power circuit breakers
and transformers

technical
data

33-360

page 7

C length of line conn	ball dia	volt- age tap	net wt of bush- ing lbs	nom amp rat- ing
2 1/2	...	no	13.6	220
2 1/2	...	no	16.2	220
2 1/2	...	no	18.5	220
2 1/2	...	no	23	400
2 1/2	...	no	26.7	400
2 1/2	...	no	22.5	400
2 1/2	...	no	21	785
2 1/2	...	no	22.5	785
2 1/2	...	no	31.7	785
2 1/2	...	no	36.6	785
2 1/2	...	no	33	1710
2 1/2	...	no	49	1710
2 1/2	...	no	57	1710
2 1/2	...	no	52	2280
2 1/2	...	no	57	2280
2 1/2	...	no	79	3300
2 1/2	...	no	90	3300
2 1/2	...	no	58	400
2 1/2	...	no	61	400
2 1/2	...	no	64	400
2 1/2	...	no	78	1200
2 1/2	...	no	83	1200
2 1/2	...	no	77	1200
4 1/4	...	no	95	2160
4 1/4	...	no	110	2040
4 1/4	...	no	145	2590
4 1/4	...	no	115	2850
4 1/2	...	no	130	3300
4 1/2	...	no	157	3890
2 1/2	...	no	72	400
2 1/2	...	no	75	400
2 1/2	...	no	78	400
2 1/2	...	no	97	1200
2 1/2	...	no	101	1200
2 1/2	...	no	96	1200
4 1/4	...	no	119	1950
4 1/4	...	no	160	2460
4 1/4	...	no	119	2680
4 1/4	...	no	224	3420
2 1/2	...	no	94	400
2 1/2	...	no	97	400
2 1/2	...	no	102	400
2 1/2	...	no	120	1200
2 1/2	...	no	127	1200
2 1/2	...	no	118	1200
4 1/4	...	no	140	1855
4 1/4	...	no	184	2500
3 1/2	...	no	425	4100
2 1/2	...	no	157	400
2 1/2	...	no	161	400
2 1/2	...	no	167	400
2 1/2	...	no	184	1200
2 1/2	...	no	192	1200
2 1/2	...	no	183	1200
4 1/4	...	no	250	1650
4 1/4	...	no	275	2080
4 1/4	...	no	250	1620
2 1/2	6 1/2	yes	450	800
2 1/2	6 1/2	yes	465	800
3	5 3/4	yes	595	1600
2 1/2	5 3/4	yes	450	1200
2 1/2	6	yes	475	800
3	5 3/4	yes	780	1600
2 1/2	5 3/4	yes	700	1200
2 1/2	6	yes	720	800
3	5 3/4	yes	890	1600
2 1/2	6 1/2	yes	885	800
2 1/2	8 1/4	yes	...	800
3	8 1/4	yes	1675	1600
2 1/2	8 1/4	yes	1535	800
...	7	yes	2750	905
...	7	yes	2750	1035
...	7	yes	3500	1145

figure 3

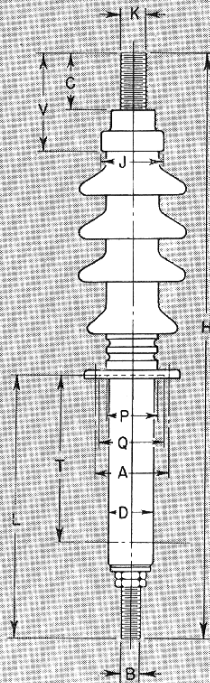


figure 4

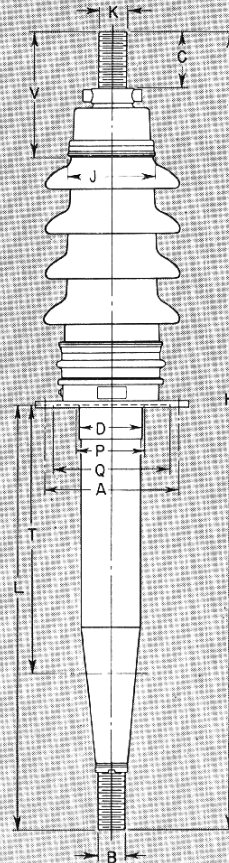
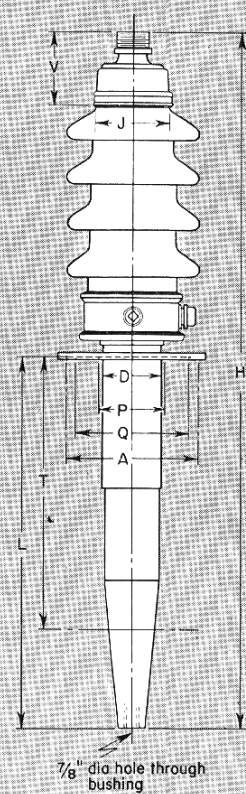


figure 5



figures 6, 7 and 8 on following page



part 1

section b: **outdoor transformer bushings** • including ASA Standards

figure 6:

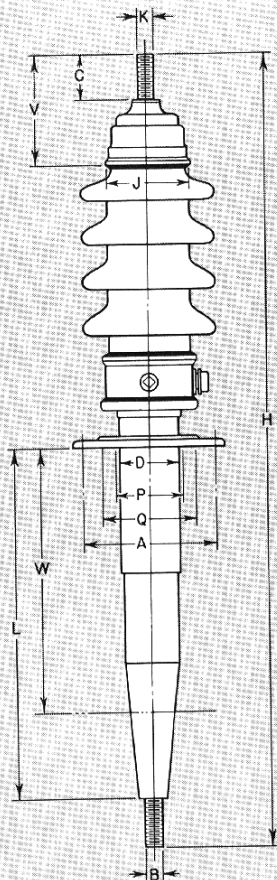


figure 7:

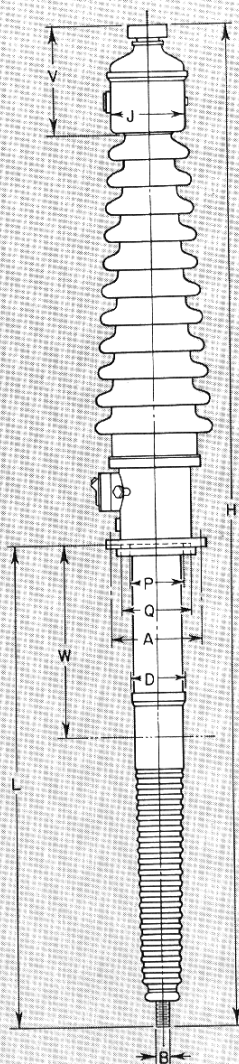
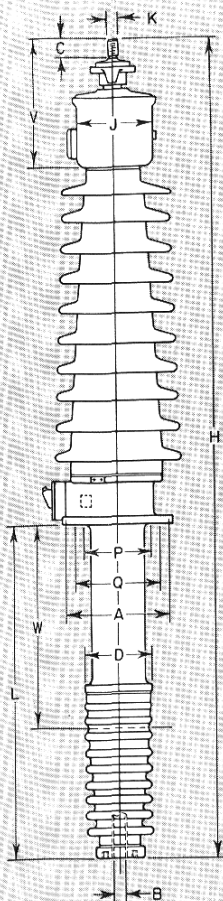
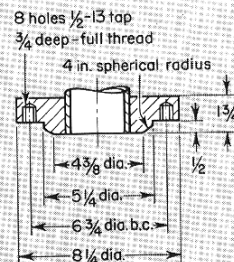


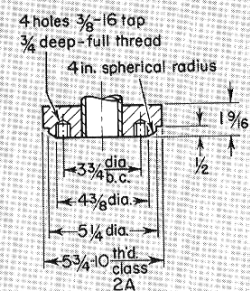
figure 8:



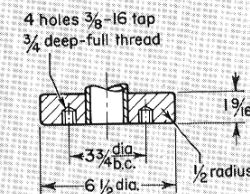
A



B



C



part 2

description and illustration of circuit breaker and transformer bushings with specific recommendations for maintenance, repair, spares and replacement

section a: modern standard bushings
types O, S, RJ, J-2 pages 10-14

section b: bushings manufactured
from 1934 to 1942
types G, K, OK, M, N . . pages 15-19

section c: bushings manufactured
from 1909 to 1933
types A, B, C, D, E, F,
H-1, H-2, J-1 pages 20-22



part 2 section a: **modern standard bushings**

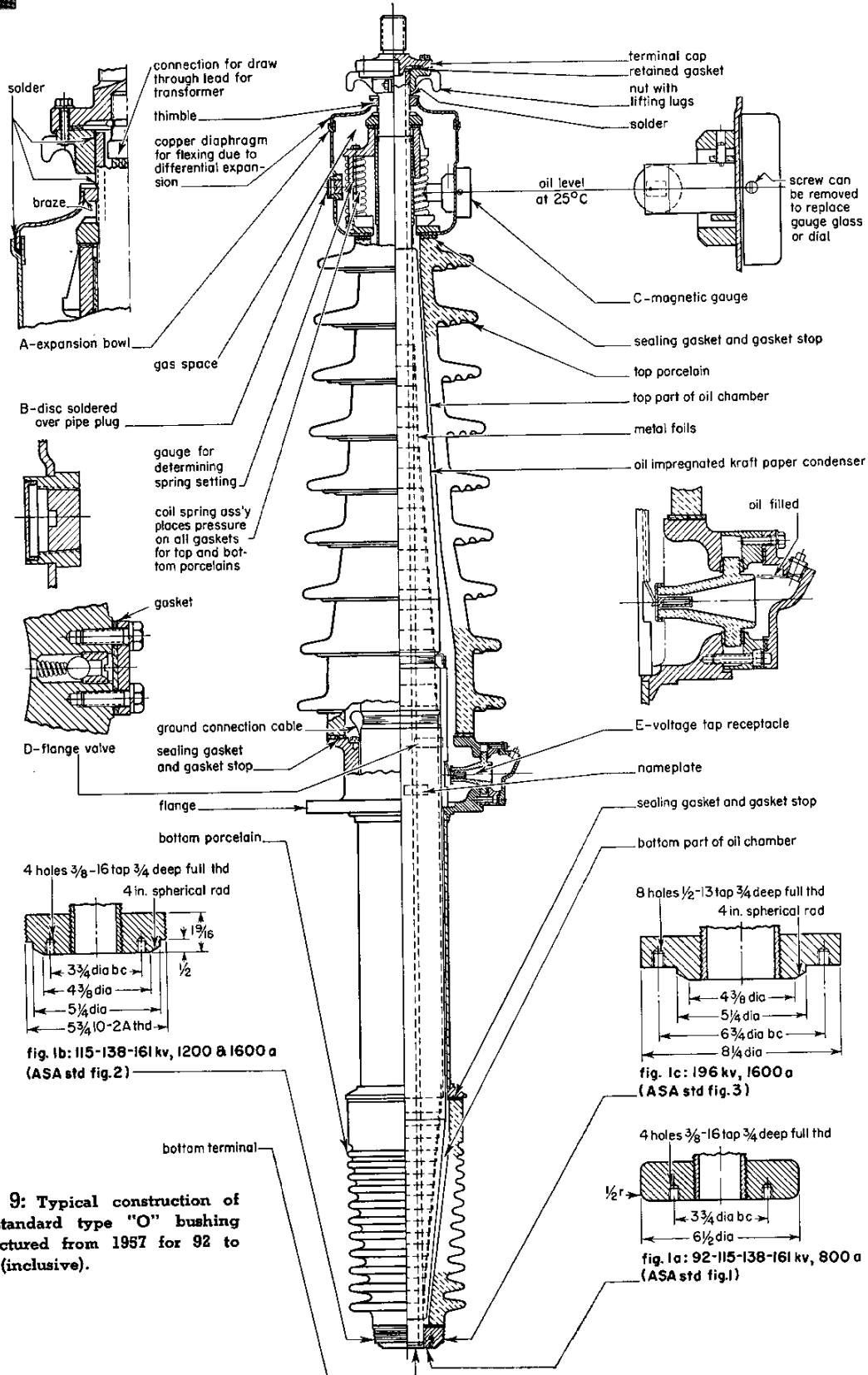


figure 9: Typical construction of ASA standard type "O" bushing manufactured from 1937 for 92 to 196 kv (inclusive).

type "O"

for transformers and circuit breakers

general description

The type "O" condenser bushings have an oil impregnated kraft paper condenser inside an oil filled chamber. The chamber consists of a cap, an upper porcelain weather casing, a metal mounting flange, a lower porcelain and a lower porcelain support. All parts are held under pressure from springs in the cap. Joints to the porcelain are sealed with cork neoprene gaskets encircled by neoprene asbestos stop gaskets. Ample expansion space is allowed in the cap to keep the pressure changes due to thermal expansion to a small amount.

recommendations for maintenance and repair: see I L 33-354-1

Make visual inspection as received and twice a year thereafter. Inspect for physical damage, leaks, and bad connections. The bushings should be cleaned at intervals to keep the insulation surfaces free from accumulation of foreign materials. Paint exposed metal to protect from the weather.

Oil level in bushing is shown by gauge on side of cap. Any bushing showing decreasing oil level should be investigated for leaks, and repaired. Small amounts of oil can be added to bushing through the flange sampling valve with a special tool.

caution: Do not break any of the oil seals or drain oil for test unless power factor or capacitance tests or some other reason indicate the need for investigation.

Where power factor testing schedules have been adopted make power factor and capacitance test the first year and recheck every second year. For limit of power factor with both ends of bushing clean and dry, see part 3, page 27.

For any major repairs, it is recommended that the damaged bushings be returned to the factory where special equipment is available for drying and oil impregnation.

Specify the voltage rating, S.O. and serial number from bushing nameplate and the S.O. of apparatus when ordering spares or replacements.

For replacements see part 5.

general note

Due to the necessarily increased diameter of lower ends on type "O" bushings as compared to other types used on transformers where no porcelain covering was used over this end, it is necessary that each application as a replacement for older transformer bushings be checked for possible interference with insulating barriers. Transformers manufactured since 1944 have a clearance suitable for the type "O" bushing.

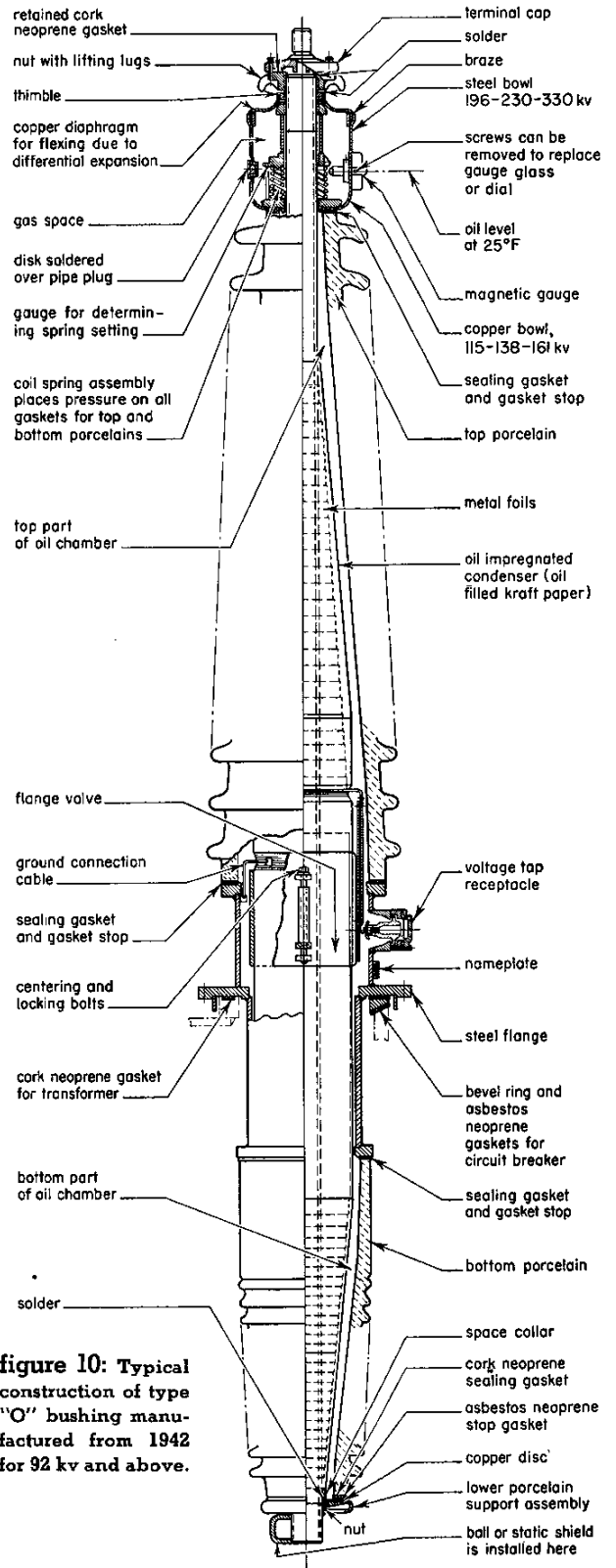


figure 10: Typical construction of type "O" bushing manufactured from 1942 for 92 kv and above.



part 2

section a: modern standard bushings

transformer bushing
400 ampere, draw-through lead

transformer and circuit breaker bushing
1200 ampere, stud type

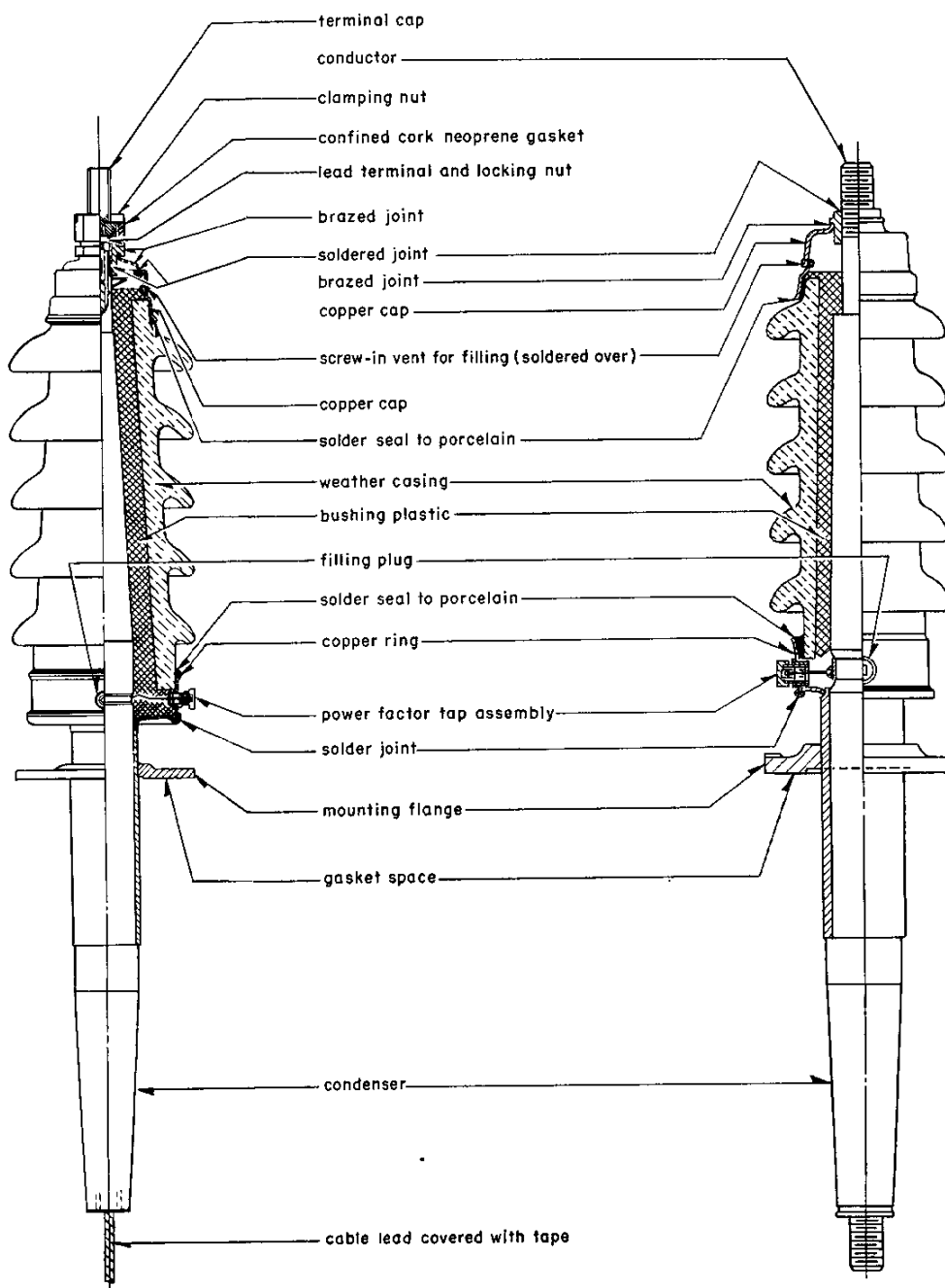


figure 11: Type "S" bushing conforming to ASA Standards as manufactured from 1956.

type "S"

for transformers and circuit breakers

general description

Bushings of this type are hermetically sealed with all joints sealed by brazing or soldering. No cement and no gaskets are used in the construction. The top cap, the ring on lower end of porcelain and the porcelain support are all of spun or drawn copper, making it impossible to have heavy strains on the porcelain. The flange with parts brazed together is of pressed-on type. A platinum film is fired into the glaze of the porcelain to which the flexible spinnings at each end are soldered. All openings for filling or for air escape during filling are also solder sealed. Ample expansion space is allowed in the cap to keep the pressure changes due to thermal expansion to a small amount.

Type "OS" has been used to designate oil encased bushings of this construction. A few designs of oil encased solder seal bushings with a modified cap construction are designated type "OS₁".

recommendations for maintenance and repair

See IL 33-354-2.

Make a visual inspection as received and twice a year thereafter.

Where power factor testing schedules have been adopted make power factor and capacitance tests the first year.

Recheck with power factor test set annually, any bushings that have noticeably higher power factor than the average power factor for the bushings of this type.

Recheck every two years with the power factor test those bushings that are consistently under the safe power factor limits as indicated by the curve on page 27 of this manual.

Damaged bushings should be rebuilt as duplicates of the original bushings, but first the condenser elements should be rechecked with the power factor test, and if the power factor is above 2% at 25°C, they should be dried out according to instructions contained on page 31. At the same time that the power factor check is made, a capacitance check should be made. A condenser element can be safely rebuilt if the capacitance of the bushing does not exceed by more than 10% the average for bushings of the same ratings. A bushing that has been rebuilt, should be given a power factor test as well as the standard 60 cycle voltage test, before being returned to service.

Spares or replacements will be ASA Standard bushings where possible.

Specify the voltage rating, stock order and serial number where available, when ordering spares or replacements.

oil circuit breaker
bushing with solid
stud

transformer bushing
with draw-through
cable

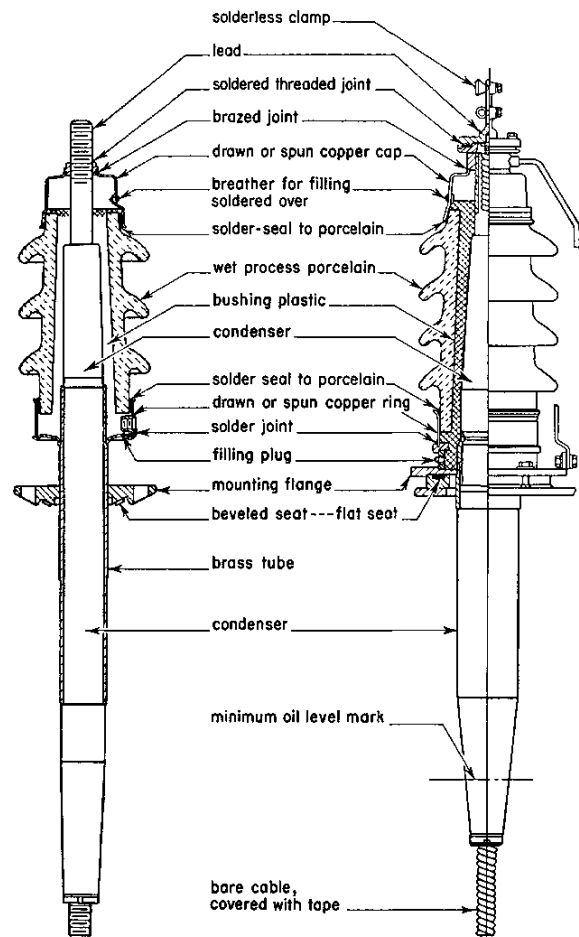


figure 12: Typical construction of type "S" bushing manufactured 1941 to date for 15 kv to 69 kv (inclusive).



part 2

section a: modern standard bushings

type "RJ"

for transformers

general description

"RJ" bulk type bushings are used only for voltages 15 kv and below. This bushing is made up of a single piece wet process porcelain with a flange sleeve rolled into grooves in the porcelain over silastic gaskets. A flange plate for clamping the bushing to the boss is made captive by this rolling and becomes an integral part of the porcelain assembly. Three types of leads are used in these bushings: a solid stud which goes through the cap, a solid stud which screws into the cap and a hollow tube with a cable conductor inside of it. For the low voltage class (5 kv) the leads are centered within the porcelains with cotton tape. For higher voltages the leads are centered within the porcelain by a Micarta tube.

Bushings like this have been used on transformers since 1955.

recommendations for maintenance and repair

Inspect periodically for broken or cracked porcelains and faulty gaskets. Power factor tests need not be made, as such tests will not show defects in the bushing. Repairs to damaged bushings may be made preferably at the factory. Porcelains and other parts are carried in stock to give prompt service.

recommendations for spares

Spares or replacements will usually be duplicates of the original design. In some cases a later style of porcelain will be furnished which will be interchangeable and will fit the original cover mounting of the apparatus.

When ordering spares or replacements, specify the voltage rating of the bushing, or transformer, and the shop order or serial number of the apparatus along with all information given on the bushing nameplate.

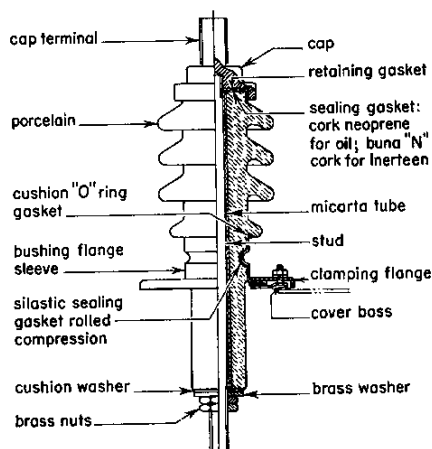


figure 13: Typical construction of type "RJ" bushing manufactured from 1955 for 15 kv and below.

type "J-2"

for transformers

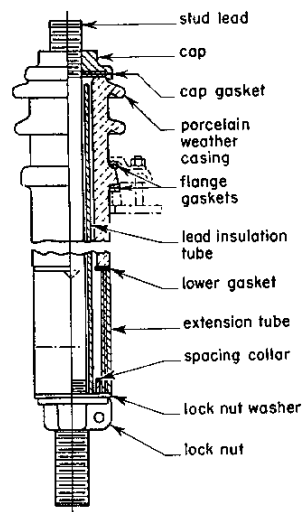


figure 14: Typical construction of type "J-2" bushing manufactured from 1922 for 4.3 to 23 kv (inclusive).

general description

This is a single piece porcelain tube, bulk type bushing, with solid stud lead through the tube. The porcelain is cast with a collar below the rain sheds; this collar fits over the gasketed mounting of the transformer cover.

From 1922 to 1955, bushings of this type have been used for circuits of 4.3 through 23 kv.

recommendations for maintenance and repair

Inspect periodically for broken or cracked porcelains, and faulty gaskets. Power factor tests need not be made, as such tests will not show defects in the bushing.

Repairs to damaged bushings may be made preferably at the factory. Porcelains and other parts are carried in stock to give prompt service.

recommendations for spares

Spares or replacements will usually be duplicates of the original design. In some cases a later style of porcelain will be furnished which will be interchangeable and will fit the original cover mounting of the apparatus.

When ordering spares or replacements, specify the voltage rating of the bushing, or transformer, and the shop order or serial number of the apparatus.

part 2 section b: bushings manufactured from 1934 to 1942

type "G"

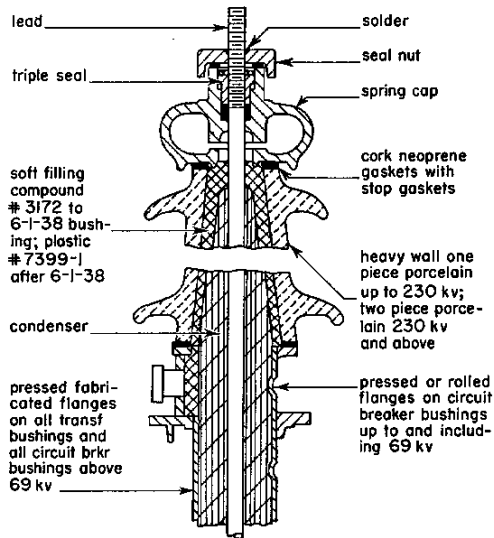


figure 15: Typical construction of type "G" bushing manufactured 1934 to 1942 for 15 to 288 kv (inclusive).

For maintenance and repairs, see part 3.

For replacements, see part 5.

general description

Bushings of this type have one-piece porcelain weather casings on all voltage ratings below 288 kv. On voltage ratings 288 kv and above, two-piece porcelain weather casings are generally used. In all voltage ratings, the porcelains are end clamped between the cap and the mounting flange. The mounting flanges are pressed on to the condenser elements for all transformer bushings and for all circuit breaker bushings above 69 kv. Circuit breaker bushings rated 69 kv and below, have the mounting flanges secured to the condenser element by pressing or by rolling the flange into grooves previously machined into the condenser element at one or more places. A globular shaped spring cap designed to maintain pressure on all gaskets is used. A triple seal stuffing box is constructed in the cap. Soft filling compound #3172 to June, 1938 and plastic #7399-1 after June, 1938, cork gaskets prior April, 1935 and cork-neoprene gaskets after April, 1935 are used in bushings of this type.

type "OG" bushings are oil encased, and have the weather casing filled with oil instead of plastic. There is a sump and sampling valve at the flange for testing or draining the oil.

type "IG" bushings have the weather casing filled with Inerteen instead of plastic, and are provided with a sump and sampling valve at the flange.

types "GI", "OGI", and "IGI" bushings are the same as described above, but are designed for use in Inerteen filled apparatus. Condenser bushings designed for Inerteen filled apparatus may be used in oil filled apparatus, but *bushings for oil filled apparatus must not be used in Inerteen*. The Micarta and varnish of standard condenser bushings will not withstand operation in Inerteen.

type "G-1"

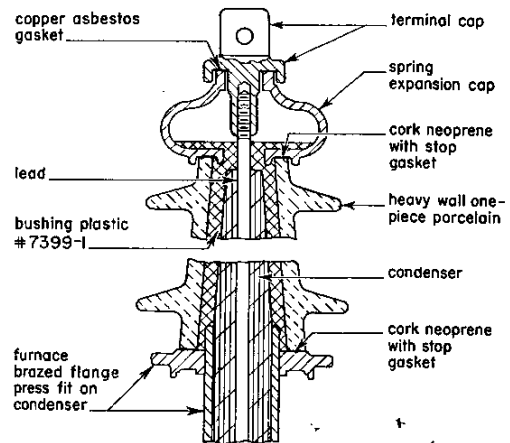


figure 16: Typical construction of type "G-1" bushing manufactured 1937 to 1942 for 15 to 23 kv (inclusive).

Type "G-1" is same as "G" except for cap construction as shown.

Maintenance and repairs same as type "G".

Spares or replacements will generally be type "S" bushing, see part 5.

**part 2**

section b: bushings manufactured from 1934 to 1942

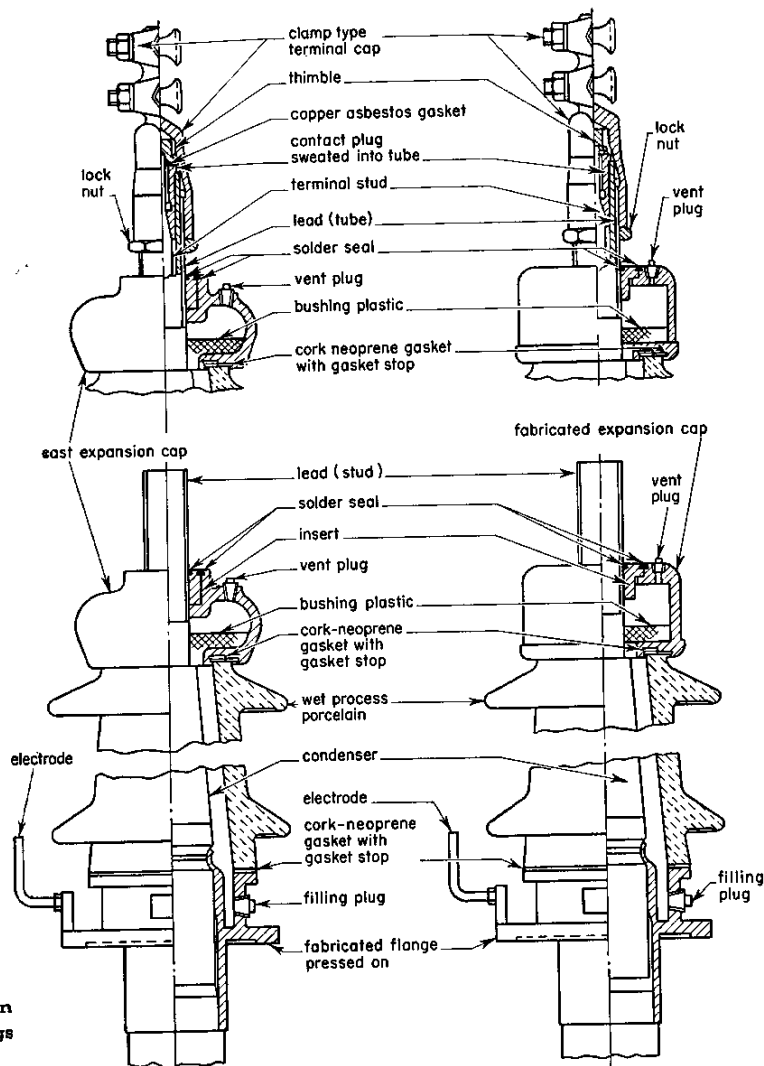
**types "G₁" and "G₂"
for transformers only**

figure 17: Typical construction of types "G₁" and "G₂" bushings for 15 to 46 kv (inclusive).

general description

Bushings of these types are modifications of type "G" bushings. They were designed when aluminum became unobtainable for spring caps, which were used on type "G" bushings. With the exception of the cap, all other parts of these bushings are identical with those of type "G" bushings. For type "G₁" the globular shaped cap is cast from bronze alloy. For type "G₂" the cap is fabricated from brass parts brazed together. In both cases the caps have special machining for extra thick cork-neoprene gasket, which takes care of difference in expansions of copper lead and porcelain weather casing. Both these constructions are limited by the lengths of the condenser leads and therefore were not used for bushings above 46 kv class.

In assembly the bushing is compressed in the press and the insert is screwed into the recess with an air motor. After pressure is

released the insert is soldered to the cap and to the lead simultaneously and forms an air-tight joint. Plastic #7399-1 is used for filling the space between condenser and porcelain.

Types "OG₁" and "OG₂" bushings are identical in construction with types "G₁" and "G₂", but have the space between condenser and porcelain filled with oil instead of plastic. Their flanges have sumps and sampling valves for testing and draining the oil.

Types "G₁-I" and "OG₁-I" bushings are identical with those described in paragraphs above but are designed for use in Iner-teen filled apparatus. Bushings of these types may also be used on oil-filled apparatus.

For maintenance and repair, see part 3.

For replacements, see part 5.

type "K"

for transformers principally

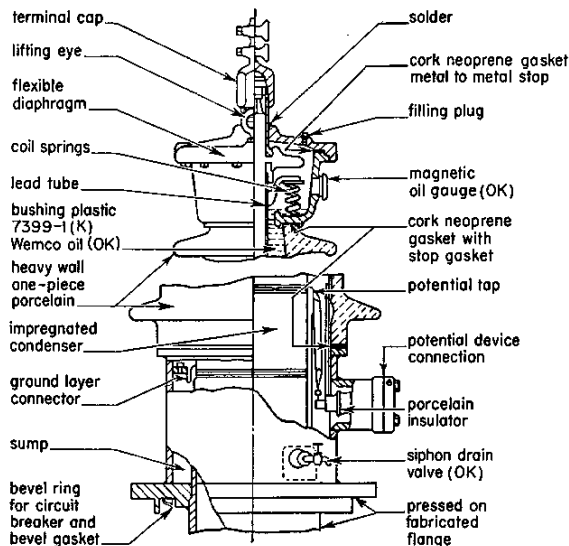


figure 18: Typical construction of type "K" bushing manufactured 1937 to 1941 for 34.5 to 230 kv (inclusive).

general description

This type of bushing is either oil or plastic encased. It is recognized by a cast cap, with bolted cover, one-piece porcelain with gaskets at the ends under constant pressure of internal steel springs inside the cap. The higher voltage ratings (69 kv and above) are the principal ones built with the type "K" construction.

type "OK" has been used to designate oil encased bushings having this construction. The oil encased design has a sampling valve and oil sump at the bushing flange. A magnetic oil gauge is mounted on the side of the cap. This oil gauge has been supplied with all type "OK" bushings for 92 kv and above, and for some of the 69 kv bushings.

In both types "K" (plastic encased) and "OK" (oil encased) the construction is identical except for the addition of a magnetic oil gauge on the cap and a sampling valve at the flange for the type "OK". Provision for expansion and contraction of the lead is obtained by a flexible diaphragm inside the cap, as shown in the sketch. When the bushing is used on heavy current circuit breakers, a central cable lead is provided, which shunts part of the current from the flexible diaphragm.

type "OKI" bushing, having this same construction, has an oil filled weather casing. The bushing is designed for use in Inerteen-filled apparatus.

recommendations for maintenance

Make a visual inspection twice a year. See page 28 of this manual. Where power factor testing schedules have been adopted make power factor and capacitance tests the first year.

Test sample of oil the first year on oil encased bushings. If the bushing does not have a magnetic oil gauge, check the liquid level by removing the test plug in the top of the cap.

Recheck the oil every year on any bushings that are noticeably higher in power factor than the average power factor for the bushings of this type.

Recheck every two years with the power factor test those bushings which are consistently well under the safe power factor limits as indicated by the curve on page 27 of this manual.

Damaged bushings should be rebuilt in duplicate of the original bushings, but first the condenser elements should be checked for power factor. If the power factor is above 2% at 25°C, they should be dried out according to instructions on page 31. A capacitance check should be made at the same time as the power factor is measured. A condenser can be safely rebuilt if the capacitance of the bushing is not more than 10% above the average for bushing of the same design. A bushing that has been rebuilt should be given a power factor and capacitance test as well as the standard 60 cycle withstand test before being returned to service.

If the magnetic oil gauge is damaged, the dial mechanism may be removed from the bushing cap for repair or replacement. It is not necessary to open the cap or break any gasket seal to remove the dial mechanism of the gauge. The motion of the float inside the cap is transmitted through the cap casting magnetically without piercing the cap. Damaged dials should be returned to the factory (Sharon) for repair or replacement.

recommendations for spares

Spares or replacements will be type "N" or "OK₁" or "O" bushings for 92 kv and above, and type "OK₁" or "S", for 69 kv and below. The replacement bushings will have the same key number and will be interchangeable without adapters.

Specify the voltage rating, stock order, and serial number of the apparatus when ordering spares or replacements.

**part 2**

section b: bushings manufactured from 1934 to 1942

types "K₁" and "OK₁"

for transformers only

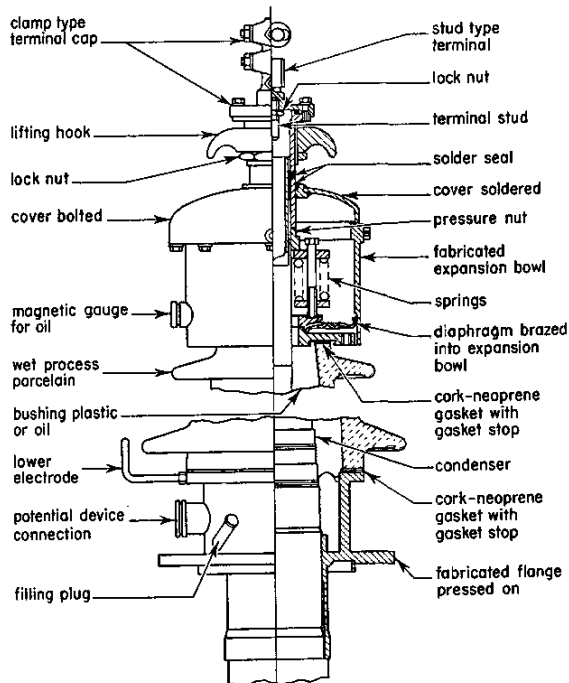


figure 19: Typical construction of type "K-1" bushing manufactured from 1939 to 1942 for 34.5 kv and above.

general description

Bushings of this type are modifications of type "K" bushings and cover the same range; that is, from 34.5 kv and up. These bushings are used in all cases when special requirements of the customer cannot be met with standard type "S", type "N" or type "O" bushings. For example, when customer requires oil-filled bushings of 69 kv or below equipped with magnetic oil gauges.

With the exception of the cap design, construction of other parts is similar or identical with bushings of other types. Thus bushings of 69 kv class and below have their condensers, flanges and weather casings identical with those of type "G" bushings. Bushings of 92 kv class and above have other parts identical with those of type "N" bushings.

Types "K₁" and "OK₁" bushings have fabricated caps and the cover is either bolted or soldered to the expansion bowl. A single disc diaphragm is brazed to the bowl inside of it and the condenser lead is brought through the cover.

The space between condenser and the weather casing is filled with plastic #7399-1 for type "K₁" and with oil, for type "OK₁". The oil-filled type "OK₁" bushings have magnetic oil gauges for indicating oil level.

For maintenance and repair, see part 3.

For replacement, see part 5.

type "M"

for circuit breakers only

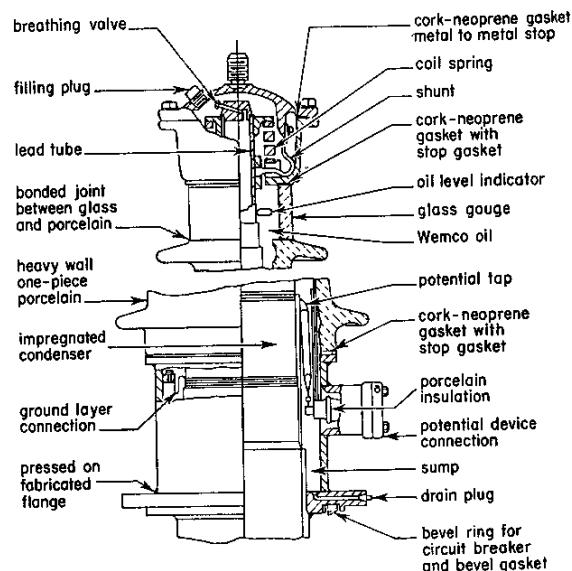


figure 20: Typical construction of type "M" bushing manufactured from 1937 to 1941 for 46 to 230 kv (inclusive).

general description

Bushings are of oil encased type with one-piece porcelain sealed by a gasket to a gauge glass which has great resistance to actinic rays. The cap is bolted over a cork-neoprene gasket with metal-to-metal stop. An internal spring maintains a definite pressure on other joints. The current is by-passed around this spring by means of shunts to prevent magnetic heating of springs. Cork-neoprene gaskets with asbestos neoprene gasket stops are used at ends of the weather casing. The cap is hermetically sealed, but when tubing conductor is used, the tubing is used to provide additional expansion space. The cap is sealed from the tube for shipment with a screw valve, which can be operated through the filling hole in the cap. The normal height of oil at 25°C is in the middle of the gauge glass. A sump and sampling connection are supplied at the flange.

For maintenance and repair, see part 3.

For replacements, see part 5.

outdoor bushings

4.3 to 345 kv

for power circuit breakers
and transformers

technical
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type "N"

for transformers and circuit breakers

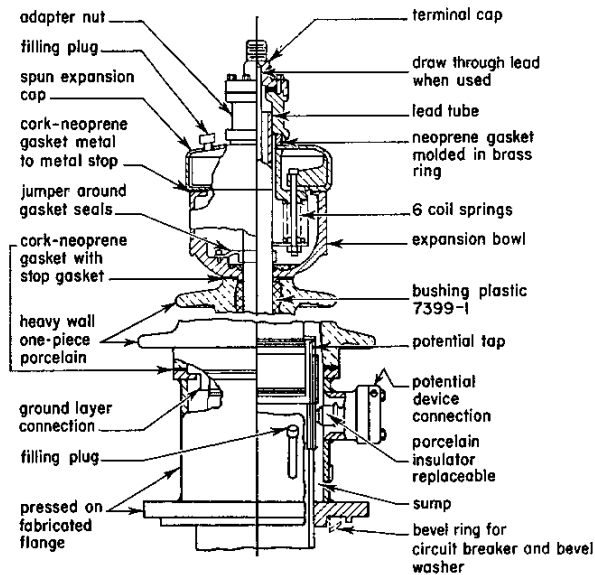


figure 21: Typical construction of type "N" bushing manufactured 1940 through 1942 for 92 to 228 kv (inclusive).

general description

Bushings of this type have a spun or drawn type cap section with multiple coil springs for placing definite pressure on all gasketed joints. The gaskets at ends of the porcelain and at ends of gauge glass in the oil encased "ON" type are of cork-neoprene with asbestos neoprene gasket stops. On the plastic encased type "N", the gasket between bowl and spun section is of cork-neoprene with a metal to metal stop. The gasket between stud, terminal adapter and spun section is a three way seal of neoprene completely enclosed by metal in a unique fashion. The oil encased "ON" has a gauge glass and gauge glass support to replace the cast metal bowl of the plastic encased "N" and also has a sampling valve at flange. Otherwise the "N" and "ON" bushings are alike. The construction except for the draw-through lead for transformers is the same for circuit breakers and for transformers. Porcelains are of one piece type except for the 288 kv where 2 pieces are used. The gauge glass for the "ON" almost entirely diverts the actinic rays. Flanges are of structural type pressed on to the condenser.

For maintenance and repair, see part 3.

For replacements, see part 5.



part 2 section c: **bushings manufactured from 1909 to 1933**

type "A"

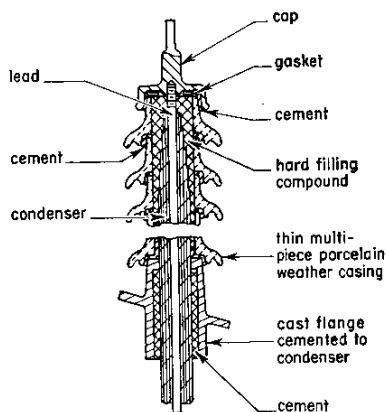


figure 22: Typical construction of type "A" bushing. Manufactured 1909 to 1922 for 23 to 154 kv (inclusive).

type "B"

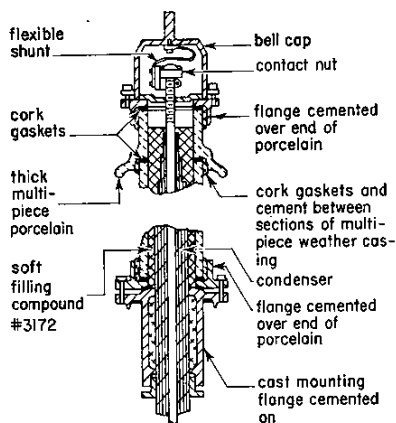


figure 23: Typical construction of type "B" bushing. Manufactured 1922 to 1929 for 46 to 187 kv (inclusive).

type "C"

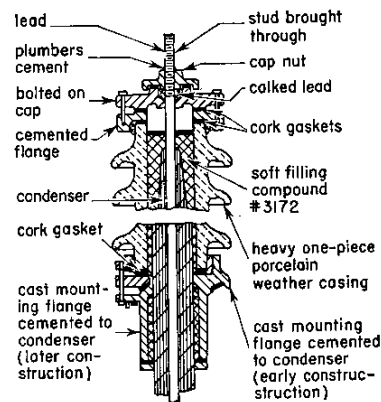


figure 24: Typical construction of type "C" bushing. Manufactured 1922 to 1929 for 22 to 66 kv (inclusive).

type "D"

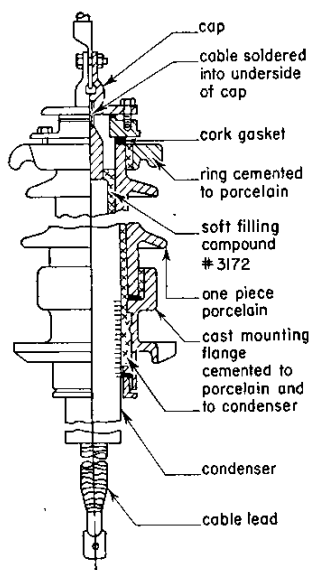


figure 25: Typical construction of type "D" bushing. Manufactured for transformers only, 1922 to 1932 for 33 and 44 kv.

type "E"

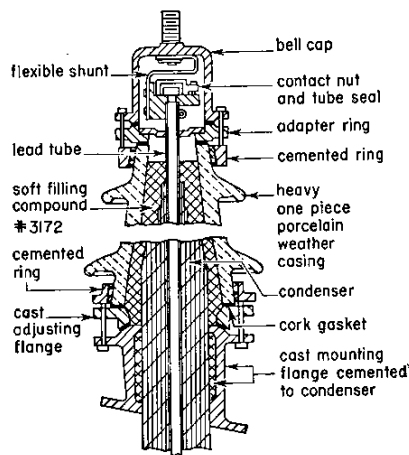


figure 26: Typical construction of type "E" bushing. Manufactured 1922 to 1929 for 33 to 187 kv (inclusive).

type "F"

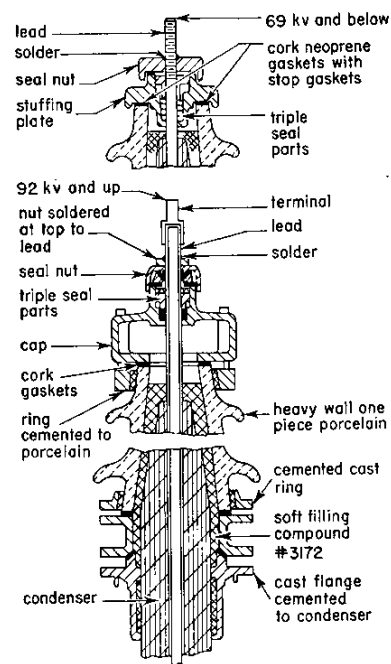


figure 27: Typical construction of type "F" bushing. Manufactured 1929 to 1934 for 13.8 to 230 kv (inclusive).

types "A", "B", "C", "D", "E" and "F" recommendations for maintenance

The insulation in the types "A", "B", "C", "D", "E", or "F" bushing condenser does not have the dielectric strength we have been able to build into bushings made more recently. The mechanical construction of the weather casing and cap is not considered good enough to exclude the possibility of water entering the bushing and contributing to an electrical breakdown of the insulation. For these reasons, we believe these bushings are incapable of maintaining the interruption free service that is expected on modern transmission and distribution circuits. It is therefore recommended that these bushings be replaced with bushings of modern design.

Until replacements can be made, the bushings should be given a visual inspection twice a year. The inspector should watch for broken porcelains, defective gaskets, and evidence of leaking compound. If any bushings are found with these defects, the bushings should be replaced with a modern bushing.

Where power factor testing schedules have been adopted, the power factor and capacitance should be checked annually and compared with previous measurements to observe if there is any evidence of water getting into the bushing. If the capacitance is more than 15% higher than the average capacitance of like bushings, or if the power factor is higher than the curve of acceptable power factor limits, fig. 32, page 27, or shows an appreciable increase over the past measurements, the suitability of the bushing for continued service is doubtful. In such a case, it should be replaced as soon as possible with the bushing recommended for this purpose in the engineering recommendations for outdoor circuit breaker and transformer bushings, pages 46 to 83, inclusive.

recommendations for spares and replacements

For spares and replacements an up-to-date bushing is recommended. Wherever the design of the apparatus permits, the replacement will be in accordance with the engineering recommendations for outdoor circuit breaker and transformer bushings on pages 46 to 83. In some cases, it may not be possible to provide a completely impulse coordinated design as it will generally be necessary to maintain lengths on the inside of the apparatus and sometimes necessary to maintain the original diameter to fit the holes in apparatus covers or to fit bushing type current transformers. Wherever possible, present standards will be used.

Where drawings for replacement bushings have not been made, we will make them, and where an adapter is required, we will provide the adapter, and its price will be included in the price of the bushing.

When ordering bushings for spares or replacements, specify the voltage rating, shop order and serial number, where available, and if possible provide also the shop order of the circuit breaker or transformer in which the bushing is to be used.

types "H-1"—"H-2" for transformers only

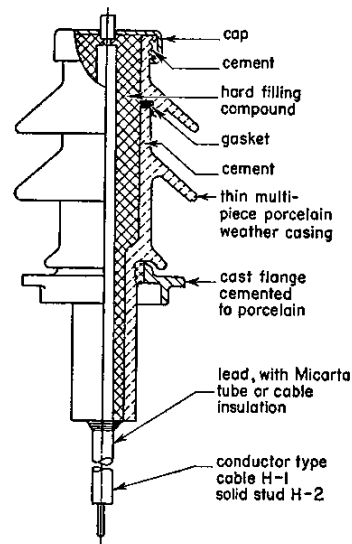


figure 28: Typical construction of types "H-1" and "H-2" bushings manufactured from 1909 to 1922 for 13.8 kv to 44 kv (inclusive).

general description

"H-1" and "H-2" bulk type porcelain tube bushings were used on voltages up to 44 kv. For 22, 33 and 44 kv multi-piece porcelains were used, cemented together with felt or cork gaskets between sections. The flange was cemented onto the lower porcelain tube.

For "H-1" the conductor through the tube consisted of a solid stud, surrounded by a Micarta tube.

For "H-2" the inside of the porcelains was filled with a hard setting gum.

recommendations for maintenance

Where power factor testing schedules are adopted make power factor tests annually, inspect visually twice a year. Replace with bushings of modern design, any bushings found defective either by the power factor test or by inspection.

recommendations for repair

We do not recommend a repair on this type of bushing, because: (a) The quality and quantity of the insulating material is much less than present standards, (b) the metal parts are not adaptable to assembly with the insulating elements of later design bushings, and (c) the cost of parts plus the cost of dismantling and rebuilding does not warrant making replacements with parts of the old design.

See page 22 for spares and replacement

**part 2****section c: bushings manufactured from 1909 to 1933****types "H-1"—"H-2" continued****recommendations for spares**

Bushings of this type were built before standards for impulse coordination were established and at a time when many of the modern testing facilities were not available. Since then, important advances have been made in design, materials, and processes, the benefits of which have been incorporated in modern bushings. It is not always possible to provide interchangeable bushings of modern design completely impulse coordinated because it is generally necessary to maintain lengths and diameters the same as the old bushing. However, the advantages of increased insulation strength through the bushing materials, together with improved weatherproofing and the reduction in future maintenance, warrants replacing these bushings with new ones of modern design. Wherever possible, present standards will be used in the design and construction of bushings intended for spares, or as replacements for bushings of this class.

In order to keep to a minimum the number of designs, and thus the number of spare bushings that the operator must carry in stock we use, wherever possible, a standard up-to-date bushing in filling an order for spares. In some cases we fit it to the apparatus by means of adapters, rather than supply new designs for each of these old bushings.

Wherever such a bushing or bushing and adapter has been designed it is indicated in the tabulation of drawings, pages 46 to 83. In each case the drawing number of the adapter is given, or if required, but not already made, it is so indicated by the ③. When such a design has not been made, we will make it with no development cost to the customer. The cost to the customer of the bushing and adapter will be the same as if the old design had been duplicated.

recommendations for replacement

These bushings are from 25 to 35 years old. On account of their age, and the improvements which have been made since they were manufactured, it is recommended that type "H-2" bushings be replaced with bushings of modern design.

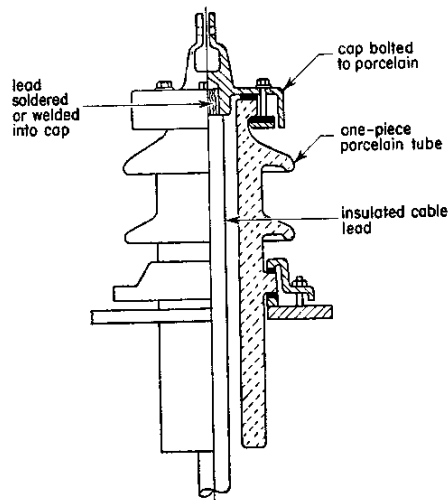
type "J-1" for transformers only

figure 29: Typical construction of type "J-1" bushing manufactured from 1922 to 1930 for 4.3 kv to 23 kv (inclusive).

general description

This is a single piece porcelain tube bulk type bushing, with heavily insulated cable lead passing through the bushing. The porcelain is cast with a collar below the rain sheds; this collar fits over the gasketed mounting ring of the transformer cover.

The bushings were used from 1922 to 1930, on circuits for 23 kv and below. A number of "J-1" bushing designs have been made since 1938 in which the lead is surrounded by a copper tube clamped to the ends of the porcelain similar to the "J-2" design. (See page 14.)

recommendations for maintenance and repair

Inspect periodically for broken or cracked porcelains and faulty gaskets. Power factor tests need not be made, as such tests will not show defects in the bushing.

Repairs to damaged porcelains or cables may be made, preferably at the factory (Sharon). Porcelains and other parts are carried in stock so that such repairs can be made promptly.

These cable type bushings must be handled carefully to prevent breaking the insulation on the cable.

recommendations for spares and replacements

Spares or replacements will usually be duplicates of the original design. In some cases a later style of porcelain will be furnished which will be interchangeable and will fit the original cover mounting of the apparatus.

When ordering spares or replacements, specify the voltage rating of the bushing or transformer winding, and the shop order or serial number of the transformer.

Spare bushings with cable leads should be stored in a dry place.

part 3

tests, maintenance, repair, and storage

section a: tests pages 24-28

- power factor tests
- power factor limits
- collar power factor tests
- moisture tests

section b: maintenance pages 28-30

- general procedure
- potential device connection
- bushing filling plastic
- prevention of oil leaks

section c: repair pages 30-32

- general procedure
- instructions for repair, test,
and re-assembly

section d: storage page 32

**part 3 section a: tests****power factor tests**

Many operators find it advisable to make annual power factor tests, and at the same time, make a visual inspection of the mechanical condition of bushings. Others do not feel that an annual check is absolutely necessary and so make their inspections at greater intervals. However, the fact that the annual check is made by many progressive customers indicates its desirability.

Some of the early bushings do not have as high puncture strength as bushings of later designs. Also in some cases, the lower ends of the older types of bushings are shorter than those of later bushings. For these reasons their condition should be checked at shorter intervals than will be required by later designs. Older bushings in very important locations where an outage might cause a serious disturbance, should receive semi-annual visual inspection as described below. Annual power factor tests are desirable.

- a. **Visual inspection:** Check for leaking compound or oil, mechanical damage, broken away cement, broken or cracked porcelains, accumulations of dirt on porcelain, or carbon on lower end, etc. If any of the above are found and cannot be removed by cleaning, the bushing should be removed from service. Leaking compound or oil even in small amounts is a potential hazard, because moisture may be drawn into the weather casing.
- b. **Power factor and capacitance tests:** The power factor will indicate the dielectric losses and show the general condition of the insulation. The capacitance measurement is valuable to show if a weakness exists in any layer of the bushing.

The Westinghouse Corporation recommends checking all bushings periodically, and the immediate reconditioning or replacing of bushings which are indicated to be below normal.

Power factor tests, while not absolutely necessary, or infallible, are the best check on the interior condition of the bushing. The information given in the following paragraphs is for customers who have adopted power factor testing, and who desire to take fullest advantage of its use.

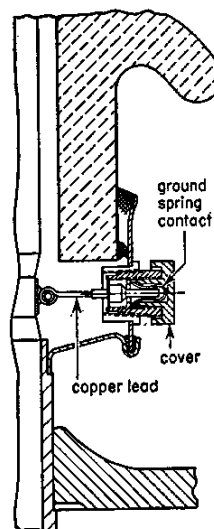
Condenser bushing construction, as related to power factor testing, falls into two general classifications; bushings with solid stud conductors, and those with tubular conductors or leads. Both types are used on circuit breakers as well as on transformers. The tubular lead permits the use of a draw-through cable conductor on transformers, which is connected to the terminal cap of the bushing. The cable is insulated to withstand a 1000 volt test between cable and tube when disconnected from the bushing cap. Tubular lead bushings for circuit breakers carry the current directly through the tube, without a cable. Solid stud bushings, for both breakers and transformers, carry the current directly through the stud.

insulating heads: Some tubular lead bushings for transformers were supplied with insulating heads mounted on top of the bushing. This feature permits making power factor tests without opening the bushing terminal cap.

When power factor testing a transformer bushing with the insulating head, withdraw the contact screw in cap, connect the testing lead to cap and the shielding lead to the top of insulating head. After test, tighten the contact screw.

ungrounded power factor methods: The so called ungrounded power factor method can be made by attaching a test lead to the voltage tap receptacle on bushings 92 kv and higher and the power factor tap provided on ASA standard bushings 23 to 69 kv, inclusive. The ungrounded power factor methods provide power factor tests on bushings mounted in apparatus without disconnecting external parts such as transformer winding, etc. Refer to fig. 30 for type "S" ungrounded power factor tests and fig. 31 for type "O" power factor tests through voltage tap.

terminal with cover in place



terminal with test plug in place

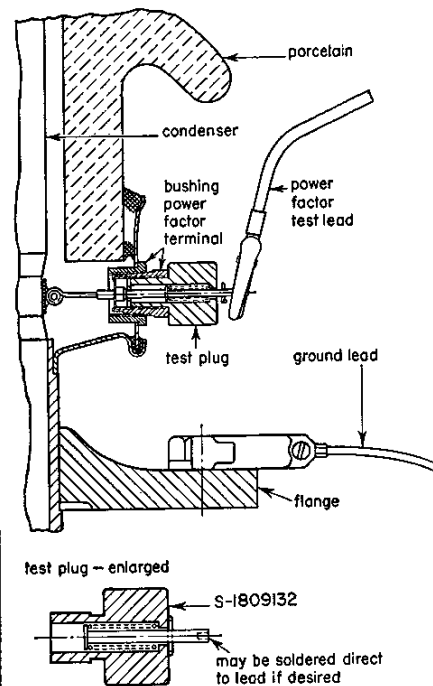


figure 30: Power factor testing terminal for making ungrounded power factor tests on type "S" bushings.

caution: Do not remove terminal cover until bushing is removed from high voltage line and grounded.

1. Remove terminal cover.
2. Proceed to make a power factor test in the conventional manner used for testing ungrounded specimen (power factor connection S-1809132 may be used).
3. Replace terminal cover.

caution: It is extremely important that the cover be re-assembled on the testing terminal before energizing the bushing.

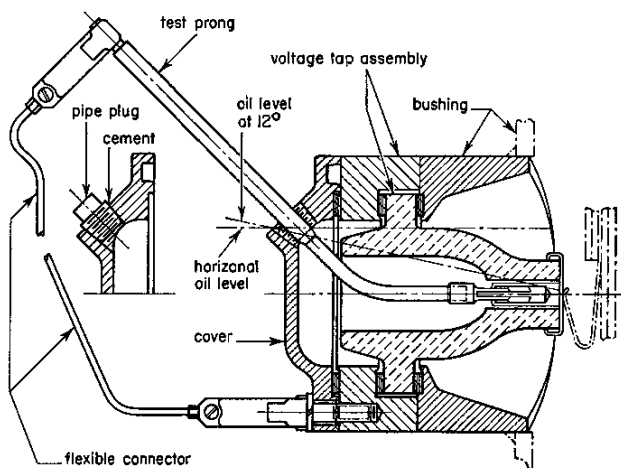


figure 31: Test prong for making ungrounded power factor tests through voltage tap on type "O" bushings.

instructions

After bushing is disconnected from the high voltage line and grounded, the procedure for using the test prong is:

1. Remove the pipe plug in the voltage tap cover.
2. Connect the terminal end of the test prong to ground with a flexible connector, so an electrostatic charge left on the bushing after it has been removed from service will be discharged to ground when the test prong is inserted in the voltage tap.
3. Insert the prong through the hole in the cover to make contact with the female contact in the rear of the voltage tap assembly.
4. Disconnect the test prong from ground and connect it to the proper power factor test lead.
5. Proceed to make a power factor test in the conventional manner used for testing ungrounded specimens.
6. After completing the power factor tests, remove the test prong.
7. Add new Wemco "C" oil to have level even with bottom of hole in cover, if necessary.
8. Replace the pipe plug in a weatherproof manner in the cover.

general procedure for power factor test:

When standard circuit breaker bushings are tested, the other parts of the breaker such as the lift rods, oil, grids, arc shields, etc., are included in the test and will influence the results. If a high power factor reading is obtained because of dirt or moisture on or in any part other than the bushing, the affected part should be cleaned and dried. In the case of arc shields, lift rods and guides, cleaning with benzine or carbon tetrachloride will usually lower the power factor to a satisfactory value. Oil which has a high power factor will cause bushings which are tested in it to read high on power factor test. Such oil should be investigated for dielectric strength, acidity, and RE test, and if any of these show the oil to be below normal, it should be replaced with oil in good condition. The gasket between the bushing flange and the circuit breaker or transformer base is an insulator, and the bushing is electrically connected to the base or tank by the mounting bolts. If paint under the heads of the bolts prevents their making good electrical contact, the bushing on test may indicate a high power factor.

The recommended way for testing circuit breaker bushings is to disconnect the bushings at the top, then test with breaker closed, and then each bushing by itself with breaker opened. The combined three readings will, after experience is obtained in interpreting them, definitely locate any defect which may be present.

With the extremely low normal power factor of the newer bushings, the influence of high power factor in the De-ion grids causes the bushing power factor measurement to be high. A high value of power factor in the grids does not affect their interrupting ability. If this condition is encountered, the losses of the De-ion grids may be eliminated by ungrounded power factor test method, shielding or removing from the bushing. They may be shielded by covering the grid with metal foil or with a screen of metal having a mesh not over 2½ inches square. The shield must make good electrical contact with the stationary contact foot.

Tests are not usually made on circuit breaker oil unless a high loss is indicated and then only after the bushings have been proven sound.

It is possible that high power factor may be caused by conducting surfaces in the proximity of the bushing. This is particularly true of spare bushings being tested in their crates. It is possible for the crate, especially if wet, or the tester himself to cause a high power factor reading. For this reason it is recommended that the bushings be removed from their crates for testing and all conducting surfaces eliminated from the immediate vicinity of the bushing.

Bushings suitable for ungrounded power factor tests may be tested in transformers without disconnecting the winding. Where ungrounded power factor methods are not available, the bushings may be tested in transformers by other methods.

For transformer bushing without the power factor test terminal or potential taps, where the draw-through lead with top cable connection is used and where it is possible to disconnect the transformer winding from ground, the bushings may be tested without removal from the apparatus providing the testing set is equipped to bring the tube and lead to the same potential and phase relationship. If there is a layer of tape on the lead such as is used in

**part 3** section a: tests**power factor tests** *continued*

present designs and has been used in most of the old designs this will be sufficient insulation to permit testing the bushing without removal. A thin wall insulating tube slipped down over the lead provides ample insulation for the top end of the lead.

If the transformer bushings have an insulating head and the testing set is equipped to bring the test circuit and the shielding circuit to the same potential and phase relationship, it will not be necessary to disconnect the internal bushing lead or the small length of outside line, but the transformer winding must be disconnected from ground.

If high losses are found it is best to determine their location before removal of the bushing; they can often be eliminated by cleaning some surfaces.

Power factors of bushings vary with changes in temperature. It is therefore desirable that the tests be made in warm weather with the apparatus not under 60°F. A record of the test should include the temperature of the bushing, as well as the ambient temperature.

The temperature of the bushing may be determined approximately by one of the following methods, if the apparatus has just been taken out of service.

- a. Use the mean of the air and top oil temperatures as measured by thermometers; the oil temperature to be measured at the top of and inside of the tank; the air temperature to be measured in the shade, at a point not less than 4 feet away from the tank.
- b. Measure with a thermometer the temperature on the outside of the tank at the level of the top of the oil and add 5°F to allow for the difference in temperature between that of the bushing and the outside of the tank.

If the apparatus has been out of service for a sufficient time to allow all parts to cool to atmospheric temperature, then the atmospheric temperature (measured in the shade) may be used.

The power factors at which apparatus should be withdrawn from service will of course depend a great deal on the seriousness of an interruption on the particular circuit.

Generally a bushing having a power factor measurement within the limits of the curves on page 27 will have a dielectric strength necessary to meet the standardized one minute acceptance test and will be satisfactory for service.

The best method for determining the condition of a bushing using power factor measurements is to compare several readings taken over a long period of time at approximately the same temperature. These readings should remain fairly constant. Any continual rise in the readings with time indicates that the bushing is deteriorating and it should be removed from service and checked to determine the cause. Where previous records are not available compare tests between similar bushings.

Bushings operated at extremely high temperatures either because of heavy loads on the apparatus, or because of the location in very hot climates will have larger losses than bushings operated

at lower temperatures. For this reason, it is recommended that curve 3 (see page 27) should be used in determining the safe power factor for bushings other than type "O" in such locations.

When field tests with the power factor testing set indicates that the condition of a bushing is questionable, the results may be referred to the Westinghouse bushing engineers for analysis and recommendations. Questions on transformer bushings should be referred to the Power Transformer Engineering Department at Sharon, Pa., and for circuit breaker bushings should be referred to the Power Circuit Breaker Department at East Pittsburgh, Pa.

There will be some difference in the safe power factors of bushings of different periods and constructions as the high power factors will arise from different sources. We would also take from service some types of bushings with known defects much quicker than others with recognized good construction. It is recommended that the factory be consulted in the case of any doubt in the interpretation of test results on any bushings.

When a bushing is used on a line having a rated circuit voltage lower than the nominal voltage class of the bushing, the power factor may be slightly higher than indicated by the curve and still be satisfactory, or if bushings are on circuits of a higher voltage, the power factor must be lower than indicated by the curve.

With normal capacitance the power factor is directly indicative of the watts loss in the insulation. The power factor shows the quality of the insulation. The watts loss is a composite indication of the quality and amount of insulation tested. The power factor can be used for direct comparison between a small bushing and a large one.

Capacitance is used in the bushing analysis only for comparison with other bushings of the same design and tested in similar apparatus. A capacitance value of more than 15 percent on all bushings of earlier make than the type "O" and 10 percent on the type "O" above the average of the other bushings of the same design raises a suspicion that some of the layers of the condenser bushing have been short circuited either through puncture or by leakage over the surface. The percentage of good layers remaining should vary inversely as the percentage of the capacitance reading to the average capacitance for the particular design of bushing.

The watts loss will not always show the condition of partial breakdown. Bushings with one or two percent power factor will be passed as satisfactory if only the watts are considered, even if thirty percent of the insulation is punctured. It would be rejected on the capacitance analysis on a comparatively small amount of short circuited insulation.

In case of a high power factor measurement, the most likely cause is that moisture has found its way inside the porcelain weather casing or that the lower end has been exposed to moisture in storage or to moisture and carbon in the oil. When it has been determined that the high power factor is in the bushing itself, the bushing must be removed from service. See recommendations applying to bushings of the type involved.

outdoor bushings

4.3 to 345 kv

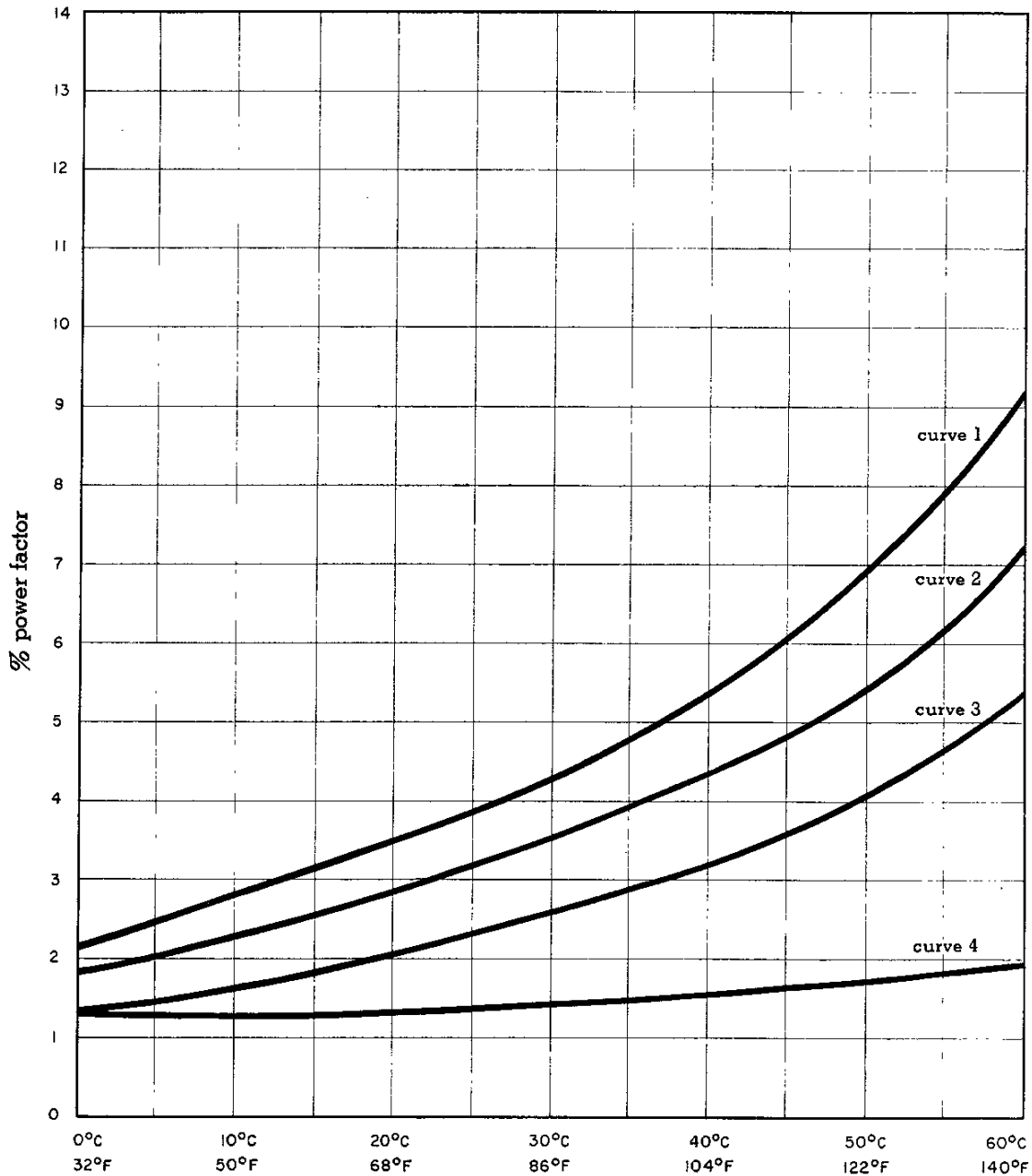
for power circuit breakers
and transformers

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page 27

power factor limits



curve 1: For type "S" and other condenser bushings of 69 kv and below used on circuit breakers and instrument transformers.

curve 2: For condenser bushings (except type "O") on circuit breakers and instrument transformers of 92 to 138 kv, incl.

curve 3: For type "S" and other condenser bushings (except type "O") all kv ratings used on power and distribution transformers. For condenser bushings (except type "O") on circuit breakers and instrument transformers on 161 to 288 kv, incl.

curve 4: For all type "O" condenser bushings 92 kv and above.

figure 32: Acceptable power factor limits for Westinghouse bushings.



part 3 section a: tests

collar power factor tests

To make power factor tests on a section of a bushing, a metal band may be placed around the bushing at some location and power factor taken between the metal band and center conductor. Example—a collar test between a metal band just beneath the top porcelain rain shed and the center conductor may show water in the top of a bushing that would not be detected on a power factor test on the complete bushing.

With power factor equipment high voltage lead connected to the metal band and the ground lead connected to the center conductor, the test is called "Hot Power Factor Collar Test". With the test leads reversed the test is called "Cold Power Factor Collar Test".

moisture tests

To test for moisture in bushings filled with compound, the following checks may be made. These checks will show 0.15% of moisture. (The tests are not applicable to bushings built before 1922 with the hard compound.) As the type "S" is hermetically sealed it should not be opened to test for moisture unless the bushing has high power factor. The type "O" should not be opened for oil examination unless power factor tests are above the acceptable limits, as shown on page 27.

To make the test, the cap is opened to expose the gum. One end of a red hot $\frac{1}{4}$ " rod is pushed into the filling compound. If moisture is present a crackling sputtering or hissing noise will be heard. If no moisture is present the gum melts very quietly.

Another very effective test is to place some of the compound on a piece of wire and melt it in the flame of a match or a blow torch. The flame of the blow torch should be turned low so that the amount of noise present will be reduced. If there is moisture in the gum, a sputtering noise will be heard and small sparks will be thrown off. If the gum is dry, it will melt without disturbance. When water is found in the compound, the bushing should be taken out of service. See recommendations for bushings of that particular type.

For types "G", "G₁", "G₂", "K" and "K₁" bushings, samples of compound for the moisture test may be obtained on a small dry stick or rod inserted through the top filling plug.

For type "S" bushings, small samples of the compound can be obtained by unsoldering the screw in the side of the cap and inserting a wire.

Check oil or Inerteen height in types "OG" and "IG" bushings at regular inspection periods and "OS" (where gauges are provided).

On all the later type bushings, except types "S" and "O", a pipe plug is provided so that a pressure test of 15 pounds with a dry air or gas can be applied to locate possible moisture leakage on high power factor bushings. A pressure gauge left for at least 15 minutes with line closed after the outside pressure is removed will show definitely if the bushing is tight. The use of oil or soapy water over suspected parts will show large leaks.

The pressure test should not be applied to the types "O" and "S" bushings. If power factor measurement indicates them to be defective, they should be taken to a repair shop where they can be thoroughly investigated.

section b: maintenance

general procedure

General maintenance of bushings should include periodic visual inspection for physical damage, leaks, bad connections, etc. The bushings should be cleaned at intervals to keep the insulation surfaces free from accumulation of foreign materials. Paint exposed metal parts to protect from the weather.

See part 2 for any specific maintenance information for various types of bushings.

If power factor testing is used, the power factor and capacitance should be measured at intervals suggested for particular type bushings or established by service conditions.

If a bushing is damaged or defective, repair or replacement should be made.

A decision between repair or replacement must often be made by the customer. To make this decision he must know the Corporation's policy on the repair or replacement of bushings and the price of the repair or replacement. It is highly desirable that the customer make this decision before he incurs any expense to send the bushing to the factory.

When the differential of price between the repair of the older types and their replacement with up-to-date bushings is balanced against the improvements of the later designs, it is desirable that all bushings except those of the later types ("G", "G₁", "G₂", "M", "K", "K₁", "CT", "N", "O" or "S") be replaced rather than repaired.

When a bushing is to be repaired, it should be returned to the factory (transformer bushings to Sharon, Pa., and circuit breaker bushings to East Pittsburgh, Pa.) Information as to the cause of the return should accompany the bushing.

A few of the advantages obtained by returning the bushing to the factory for repair are as follows:

- The proper processes, gasket materials, filling compounds, cements, etc., are used.
- Whenever possible, the bushings are changed to latest construction and all gaskets are renewed.
- Pressure tests are made to insure tightness of the condenser and the weather casing assembly.
- Power factor tests and 60 cycle routine tests are made. A bushing which cannot be processed to have a power factor less than two percent is rejected. A repaired bushing must withstand the same 60 cycle voltage test as a new bushing of the same design.
- Experienced workmen and special facilities are available.
- A bushing repaired at the factory carries the same warranties as a new bushing of the same type.

If the above schedule for testing and maintenance is followed, and bushings renewed or replaced as per recommendations given, we believe condenser bushing failures will practically disappear.

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potential tap for use as voltage source: The primary purpose of the potential tap, fig. 33, on type "O" bushings is to provide a source of voltage for use in synchronizing, relaying, etc. Figure 34 shows potential device cable attached to a bushing. This cable may be obtained from East Pittsburgh. When using this connector, the potential tap socket cover must be removed from the bushing and the oil replaced with petrolatum. Sufficient petrolatum should be packed in the tap socket so that the cavity is almost full when the connector is in place. The one end of the connector has provisions for clamping it in place, using the same holes and bolts as for the cover of the voltage tap socket. Provisions are made for connecting the other end to the potential device cabinet.

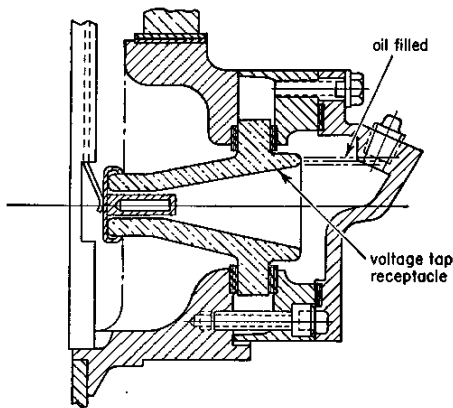


figure 33: Voltage tap receptacle for type "O" bushing

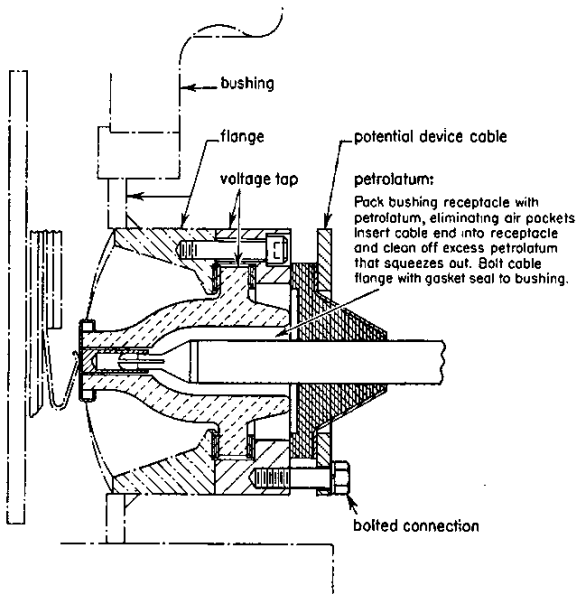


figure 34: Voltage tap, bolt connected, for type "O" bushing

potential device connection

Two layer tapped bushings have been supplied since 1934 to use the type PB-2, PBA or PBA-2 potential devices. Attachment of potential device cable to the modern bushing receptacle is made as shown in fig. 1 of I.B. 33-357-2 for adjustment.

By making several modifications as shown in fig. 35, the early types PB-1 and PB-11 single-layer tap potential devices can be attached to modern two layer tap bushings. See instruction book above for adjusting PB-1 and PB-11 to two layer taps.

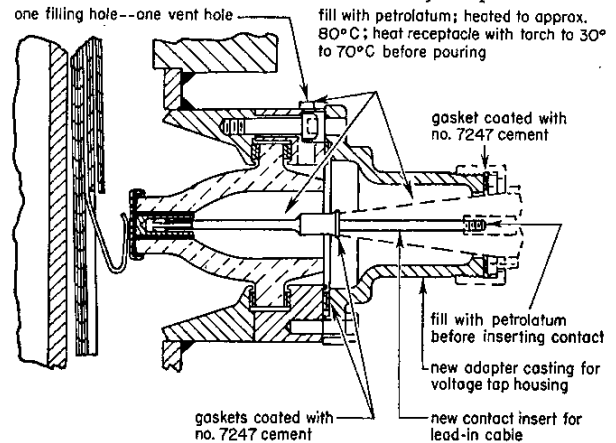


figure 35: Voltage tap connection for PB-1 and PB-11 networks.

bushing filling plastic 7399-1

The purpose of a filling material (compound or oil) in the Westinghouse Micarta condenser bushing is not to develop and maintain its electrical strength but rather to protect the surface of the condenser and to prevent flash-over inside the porcelain when impulse voltages or excessive 60 cycle voltages reach the terminals. Bushing plastic 7399-1 was developed by Westinghouse Electric Corporation for this use in 1938 and has been used since that time on both new and repair orders.

This compound is a black asphalt-oil-aeroclor plastic material, which is heavier than water at all operating temperatures. The plastic will not flow readily at room temperature but is quite fluid when heated to $125^{\circ} \pm 5^{\circ}\text{C}$ (never heat over 135°C). This material will not crack or pull away from the condenser or porcelain at temperatures as low as -50°C .

The Westinghouse standard condenser bushings 69 kv and below are all compound filled. The principal advantages of compound filling over oil filling are (1) it greatly minimizes the possibilities of fire on top of transformers and breakers in case of porcelain rupture, (2) the compound flows slowly and will remain on the bushing Micarta for a considerable time even though the porcelain is broken, and (3) the compound being heavier than water protects the upper end of the bushing even should moisture enter the weather casing.

Old bushings using compound 3172 should have the filling material changed to bushing plastic 7399-1 when bushings are being repaired or rehabilitated. The porcelain and Micarta must both be thoroughly cleaned before the bushing plastic is applied and it is preferable that this work be done at the factory.



part 3 section b: maintenance

prevention of oil leaks

types "F", "G", and "K" bushings installed on Sealedaire^① and Inertiaire[®] transformers

For bushings built up to and including year 1939. For a few years, a metal-to-metal seal was used between the end of the copper tube through the condenser, and the terminal cap. This seal depends on the end of the tube being smooth and round and on a smooth taper in the cap accurately centered. As the cap is tightened, a line contact between the tube and cap taper is depended upon to be tight.

In general, this expectation has been met. Occasional difficulty with this requirement in the field has been due to the fact that many bushings are now subjected to pressure after installation, which would not have been formerly, because of the use of Sealedaire. The Sealedaire feature now provided on power transformers, 2000 kva and below, will subject the bushings to increased pressures after installation. Therefore, special care must be taken in installing the terminal cap if leakage is to be prevented.

There are two principal causes for leakage. One is failure to tighten sufficiently. The other trouble is mechanical damage, such as nicks and other damage to the tube, and also galling and grooves in the taper inside the terminal cap.

Where leakage of oil at this spot exists in the field, it is recommended that any pressure in the tank be released. Then the cap should be inspected for mechanical damage. If such exists, it should be repaired if possible. If the tube is damaged, this can usually be repaired in the field. If the terminal cap is galled, a new one may be obtained from the factory. Tinning of the inside surface of the terminal cap will sometimes correct the trouble where the surface is only slightly damaged. An alternate method is to supply the new gasketed type of seal, as described below.

If it is reasonably certain that the cap is not tight, it may be decided not to inspect the parts but to tighten and test. Care should be taken not to tighten too much, as this will gall the tapered surface and require both repairs to the tube and a new cap. After tightening, a pressure of five pounds per square inch should be applied in the air space and the cap tested with soapy water.

For bushings built for transformers for the years 1940-41, a gasket seal is used at the top of the condenser tube.

To replace the older type of seal with the gasketed type, the old terminal cap may be used, but it is necessary to obtain the gasket and sealing thimble from the factory (Sharon). Soldering of the contact plug into the tube, in the field, is required. When such a field change is found desirable, full instructions will be given upon request to the factory.

^① trademark.

section c: repair

general procedure

Bushings manufactured prior to 1934 should be replaced with bushings of modern design whenever their condition, as indicated by visual inspection, or power factor and capacitance tests shows them to be in need of servicing. We also advocate replacement of the bushings manufactured prior to 1934 with bushings of a modern design in case the apparatus is undergoing any major rehabilitation.

When replacing old bushings we recommend using modern bushings. In some cases because of space limitations, it will not be possible to provide such bushings impulse co-ordinated even when equipped with standard gap spacings. Adapters are required in some cases to fit modern bushings to old apparatus. When necessary, they are supplied with the replacement bushings.

Condenser bushings can be rebuilt successfully by the customer, if proper facilities are available, and if the instructions for rebuilding are carefully followed by capable and experienced workmen. However, the best results are usually obtained by having the work done by East Pittsburgh or Sharon plants of the Westinghouse Corporation. Many of the Corporation's service shops are also well equipped to do the work in an excellent manner. The equipment required for rebuilding should include 60 cycle and power factor testing equipment. Ovens of a suitable size equipped with temperature control up to 110° C are necessary. A liberal change of air in the ovens is necessary. Presses for flanges and caps are essential to obtain the best results. Lathes of a size suitable for swinging the bushings are also needed. Small tools, taps and dies must be at hand. Facilities for handling the filling compound at a proper temperature must be available. For the larger bushings some crane service is also needed.

instructions for repair, test, and re-assembly

At the factory the following operations are generally followed on all except type "O" bushings. For type "O" bushing repair information, see IL 33-354-1; for type "S", see IL 33-354-2.

- a. Take power factor and capacitance readings of the bushing as received to determine its condition. (If power factor under 4%, make 60 cycle test).
- b. Remove porcelain and compound.
- c. Repeat power factor and capacitance test.
- d. If power factor of condenser alone is under curve 1 and over curve 3 of page 27, the varnish is removed and the condenser baked to a power factor under curve 3.
- e. Re-varnish and pressure test the condenser for tightness.
- f. Gaskets are replaced with new ones made of cork neoprene.

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- g. Top castings are tested for leakage.
- h. Re-assemble.
- i. Repeat 60 cycle test.
- j. Repeat power factor test.
- k. Inspection.
- l. Tape and dip lower end for moisture proofing if stored.

repair: For types "A", "B", "C", "D", "E", "F", "H-1" and "H-2": The recommendations are always that no repairs be made but bushings be replaced.

For types "G", "K", "M" and "N": Repairs are made as per original construction.

- a. Remove the cap and detachable metal parts at the top.
- b. Tape over threads.
- c. Invert the bushing in a warm place or oven and the compound will gradually flow out.
- d. Remove porcelain.
- e. Clean condenser and inside porcelain using benzine or similar material.
- f. Air test at 15 lbs per square inch the condenser and flange.

For bushing originally built with the old 3172 compound it is necessary that the porcelain be entirely cleaned of the old compound.

tests: Make power factor and capacitance tests on condenser. If the power factor meets curve 3 of page 27, the condenser is satisfactory. The gloss should then be removed from the old varnish by sandpapering and two (2) coats of varnish 7623-1 applied at both ends of the bushing. Bake each coat at 90°C for 4 hours. This varnish will give renewed moisture protection to the bushing and provide a covering entirely inert to the bushing plastic. The old varnish may be somewhat softened by the plastic at those spots where it has not been completely oxidized due to the varnish coat being too heavy.

If the power factor is over curve 3 on page 27 but not over curve 1, scrape and sandpaper off varnish, being careful not to remove any of the Micarta and then bake in an oven with free circulation and a temperature of 95°C $\pm$ 5°C for periods as given below.

For 25°C power factor 2.00 to 2.25% bake 4 days
For 25°C power factor 2.26 to 2.50% bake 6 days
For 25°C power factor 2.51 to 3.00% bake 10 days
For 25°C power factor 3.01 to 3.50% bake 12 days

After baking, cool for 24 hours before rechecking the power factor. If the condenser has not then returned to a value below curve 3, its use is not recommended.

If power factor of the condenser alone is over the curve 1 on page 27, it is questionable whether the condenser can be brought to a reasonable power factor by drying and also whether a bushing so reclaimed has entirely regained its insulating properties.

The capacitance should not be over 10% higher than the average of similar bushings or there is a suspicion of short circuited layers. The bushings should then be given 6 coats of 7623-1 varnish.

Dry each coat as specified above—sandpaper lightly each coat as necessary to maintain a smooth glossy finish.

Weather casing assemblies should be air-tested at 15 lb per sq. in.

re-assembly: Clean carefully all gaskets and gasketed surfaces. Except for screwed connections use cork neoprene gaskets 7249-1, in all cases. Gasket stops should be used on bushings where the spring follow-up on gaskets is provided. The cork neoprene gasket is applied with a thin even coat of 1887 or 6277 cement which is allowed to become tacky before placing in position. The asbestos neoprene stop gasket is coated with aluminum paint and then dried and then cement is used. Metal covered asbestos gaskets are applied with 6855 shellac which should not be allowed to become tacky.

Assemble with approximately 250 lb per sq in on the cork-neoprene gasket of largest dimension. Where gasket stops are used, this should just bring the gasket stops into close contact with porcelain and metal.

In packing the stuffing box of type "G" bushings, insert one ring at a time and tamp firmly in place before adding the next ring. Stagger the joints of the packing rings. Before screwing in the packing nut, add sufficient amount of the sealing material 6008 to fill under the nut. The packing nut should be drilled with two small holes to permit the surplus of material to be forced out. Screw packing nut tightly. Cover with 6008 sealing compound. Use 6855 cement on the metal and asbestos gasket under the top nut. Use only alcohol and rosin for soldering flux when soldering top nut.

Where oil is used as the filling for weather casing and wherever the plastic encased bushing is completely assembled before filling from the bottom, the bushing should be baked in 90°C $\pm$ 5°C oven for 3 hours to set the gasket cements and also to make them thoroughly oil proof. When filled with hot plastic compound, pour immediately after the bushing is removed from the oven. The approximate height of filling compound when at 20°C to 25°C is as per the sketches, part 2, of the various type bushings. There should be at 20°C to 25°C from $\frac{1}{6}$ to $\frac{1}{5}$ as much air space in cap and porcelain as there is plastic.

It is desirable in bushings 92 kv and above, where filling plug is provided at flange that the filling be from the bottom in order

**part 3****section c: repair****re-assembly continued**

to avoid trapping of air in the filling. The filling plug at flange is supplied on some of the type "G" and all of the type "K", "M" and "N" bushings. When filling with plastic from the bottom the vent at the top must be open and the weather casing filled until the plastic runs out of the top vent. While still hot, plastic must then be drained off from bottom vent as follows to provide the correct expansion space in cap.

92 kv	1¾ pints
115 kv	2½ pints
138 kv	3¾ pints
161 kv	4½ pints
196 kv	6 pints
230 kv	8 pints
287 kv	10 pints

When filled with oil, the oil level at 20 to 25°C should be at middle of the glass for type "M", at 25°C level for type "K", and for type "ON" 1¾" above bottom of glass for 92 to 161 kv and 1¾" above bottom of glass for 196 to 288 kv bushings.

For the type "S" bushing, the plastic is entered at the filling plug at flange until it runs out vent hole at the side of the cap. This will give the correct amount of plastic and none need be drawn off.

For type "O" bushings the pointer of magnetic oil gauge should be horizontal at 20 to 25°C.

Make air tests, power factor and capacitance tests and where possible, 60 cycle, one minute, withstand tests.

special precautions

- a. Have surfaces for gaskets clean and free from oil or grease.
- b. Do not heat bushing plastic over 135°C.
- c. Where joints are bolted, tighten evenly all around, tightening each bolt a small amount each time.
- d. Use only bushing plastic 7399-1.
- e. Do not repair bushings where oil is found in the compound unless the point of entrance is found and closed.
- f. Be sure that air space is left over plastic as specified above.
- g. Paint over edges of all exposed gaskets.

section d: storage

Outdoor condenser bushings when installed in circuit breakers or transformers, are not sensitive to weather or atmospheric conditions, because the lower end is kept immersed in oil which prevents it from coming in contact with excessive moisture and the upper end is sealed. In storage other means must be employed to protect the lower end. The exception to this is the type "O" bushing which is weather proofed all over and the following paragraphs do not apply to type "O" bushings. Type "O" bushings should be stored vertically or with cap end at least 10" higher than inside end and protected from mechanical injury.

Types "S" and "OS" bushings shipped separately from the apparatus with which they are used have the lower end covered with a polyethylene bag containing silica gel crystals. This serves as a protection against moisture and dirt. This protection should not be removed until the bushing is placed in the apparatus, or the lower end is placed under oil for storage, unless moisture is seen inside the bag. (This bag is transparent and moisture may readily be seen without removing.) For long storage periods where moisture is detected in the bag, the bag may be removed, the bushing and bag dried and the bag recharged with dry silica gel. This bag should be removed before making power factor tests. The storage place should be clean, very dry, ventilated, and several degrees warmer than the outdoor temperature to prevent condensation. Do not store in cellars, outside sheds, or similar places.

The condition of the stored bushing can best be determined by the power factor test. Periodic tests showing a high or increasing power factor indicate improper storage conditions. Such bushings should be moved to better storage. A power factor test measurement made before putting a stored bushing in a breaker or transformer will give additional assurance that the bushing is suitable for service.

part 4

identification of bushings by key numbers

section a: information on bushing
identification, replacement,
and interchange page 34

nominal current ratings . . . page 34

section b: sketches for key number
dimensions page 35

tabulation of key
numbers pages 36-44

**part 4** section a: bushing identification, replacement, and interchange**identification of bushings**

Most bushings are identified by nameplates mounted on the flanges or on the bushing caps. The bushing design is identified by drawing number (dwg no.) or style number (S#). Recent designs may have the drawing and group number (dwg _____, gr. _____.)

The shop order (S.O.) or general order (G.O.) on which the bushing was built is usually given on the nameplate.

The above numbers should be referred to when writing to headquarters about a bushing. In addition, the S.O. identification and rating of the breaker or transformer should be given.

Since 1934, when power factor testing at the factory came into general use, bushings have been identified with serial numbers, following the S.O. number. For example, three bushings, built to dwg no. 31-A-815, gr. 1, on order number S.O. 70-K-472, would be marked:

dwg 31-A-815 gr. 1; S.O. 70-K-472—1
dwg 31-A-815 gr. 1; S.O. 70-K-472—2
dwg 31-A-815 gr. 1; S.O. 70-K-472—3.

In this way, a record of location and tests on individual bushings may be kept.

Since 1940, bushings have been further identified by kv rating and type letter on the nameplate. The nameplates of bushings supplied today also specify the key number where such has been assigned. For circuit breaker bushings, the ampere rating is also given on the nameplate. The ampere rating of a transformer bushing cannot be specified as it is generally dependent on the size of the draw-through lead.

key numbers for condenser bushings A key number has been assigned to most of the outdoor bushings for the purpose of identifying the principal mounting dimensions, internal dimensions and nominal current ratings. Bushings of the same key number will fit into the same apparatus without any change internally in the apparatus or bushing except as specified in the notes of the bushing tabulations pages 84 to 87. For obsolete circuit breaker bushings having porcelain arc shields on the lower end of the bushing, the arc shield is interchangeable where the same key numbers apply except as indicated in the notes on the particular bushing.

Transformer bushings having the same key numbers but different type letters may require a new terminal stud at the top of the draw-through cable, where cables are used. In some cases a longer cable is required. New bushings which are ordered to replace older types are furnished with the necessary cables and terminals.

Bushings of the same key number may have entirely different outside structures as, for instance, the method of connecting leads may be different; the height outside apparatus may be different; the voltage tap connection may be of one or two layers or non-existent; the receptacle may be of the screwed type with Moldarta insulation or the bolted type with porcelain insulation; the porcelain may be of standard or oversize height; the type of weather casing may be different, etc.

If it is necessary to refer to the factory concerning a bushing which does not have a nameplate, or if it is not possible to obtain the nameplate reading, the nameplate reading of the transformer or circuit breaker will usually be sufficient.

Figures 36 to 44 and tables following give the major dimensions of all present key numbers and list all bushings of each key number.

how to locate dimensions, replacements, bushing number; and identification of interchangeable bushings:**1. when key number is known . . .**

- Refer to pages 36-44 for listing of dimensions and interchangeable bushings by drawings.
- All bushing drawings listed with same key number are interchangeable.

2. when drawing number is known . . .

- Refer to part 5, section a, pages 46-83, for key number and latest replacement bushings.

nominal current ratings

Current ratings of bushings as given in the table, parts 4 and 5 of this manual, are "nominal" current ratings. Actual current ratings depend upon the temperature of the surrounding media in which the bushing operates, that is, the temperature of the ambient air and oil surrounding the bushing. Nominal ratings given are for conditions as follows:

- transformer bushings**, lower end in 95°C oil and upper end in ambient air at 40°C with a maximum hot spot not exceeding 105°C. Lowering either the oil or ambient air temperature will allow the transformer bushing to be uprated above the nominal current and vice versa. For this reason operating conditions are an important consideration when applying bushings.
- circuit breaker bushings** are maximum ampere rated.

section b: sketches for key number dimensions

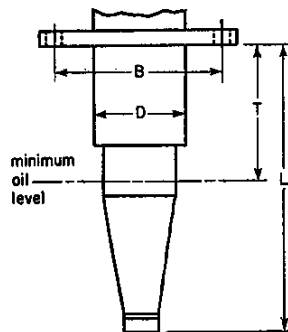


figure 36: tube-tapered, flat seat

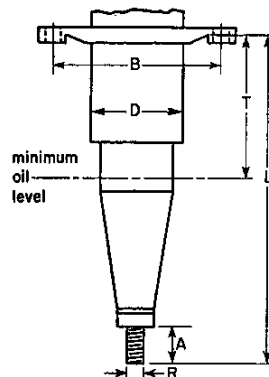


figure 37: stud-tapered, bevel seat

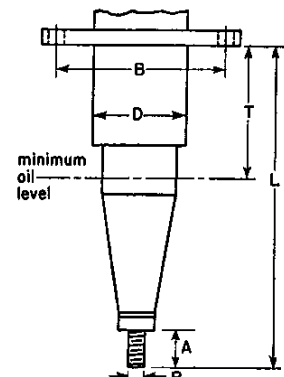


figure 38: stud-tapered, flat seat

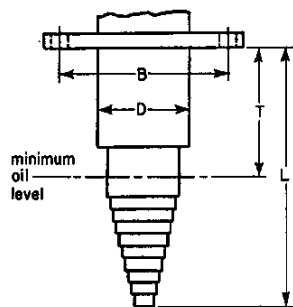


figure 39: tube-stepped, flat seat

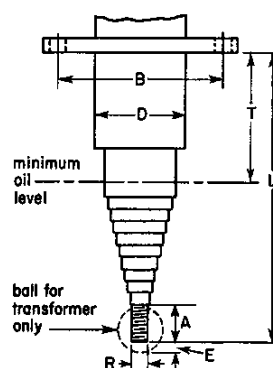


figure 40: threaded tube, flat seat

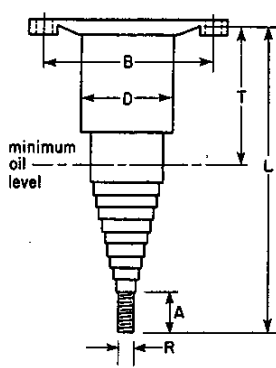


figure 41: threaded tube or stud,
bevel seat

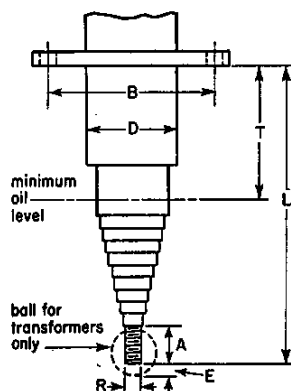


figure 42: threaded stud, flat seat

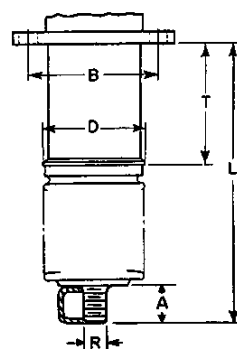


figure 43: type "O", flat or bevel seat

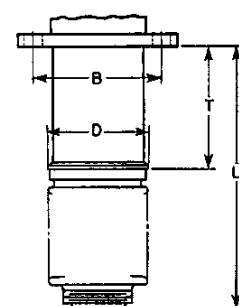


figure 44: ASA Standard

**part 4****section b: tabulation of key numbers**

key no.	fig. no.	B			L inside length	T max. gas space	D max. dia under cover	oil end lead thds			amp rating ②	T = transf CT = cur transf CB = cir breaker	drawing number
		mounting flange						R		A			
		bolt circle	no. bolts	dia bolts				O.D.	thds	lgth			
for 13.8-15 kv bushings													
112	36	6	4	½	14½	11⅞	....	....	..	0	165	T	31B452; 66B332; 1B5020; 31A515, Gr. 1, 2, 3, 8, 10; 4B6010; 4B7274; 7B2065; 7B2067; 7B2107
113	36	6	4	½	19½	16⅞	....	....	..	0	165	T	31B453; 81B342; 2B458; 24B2411; 2B4258; 8B8009; 11B1380; 2B5261; 4B4822; 5A5999; 4B8526; 4B6011; 4B7275; 7B2066; 31A515, Gr. 4, 5, 6; 7B2069; 7B2108; 7B2552
114	36	6	4	½	24¾	21¼	....	....	..	0	165	T	1B5217; 6B4380
116	38	6	4	½	17½	11⅞	....	1	14	2⅝	550	T	31B709; 1B5953; 7B2061; 31A515, Gr. 7; 6B5098
117	38	6	4	½	22½	16⅞	....	1	14	2⅝	550	T	31B454; 83B314; 2B5633; 31A515, Gr. 11, 12, 13, 14; 4B5444; 4B6012; 4B7276; 7B2109
118	38	6	4	½	27¼	21¼	....	1	14	2⅝	550	T	31B455; 82B458; 2B4069; 24B2417; 4B6017
119	36	6	4	½	29½	26⅞	....	....	..	0	165	T	7B2956
123	36	7	3	½	19¾	16¼	....	....	..	0	400	T	31B456; 65B370; 81B490; 24B2418; 4B4634; 7B1329
124	36	7	3	½	24¾	21¾	....	....	..	0	400	T	92B584; 92B984; 6B5312; 24B2419
125	38	7	3	½	22¾	16¼	....	1½	12	3⅞	1000	T	31B457; 65B713; 4B6013; 24B2413; 4B8527; 4B6489; 4B7277
126	38	7	3	½	27¾	21¾	....	1½	12	3⅞	1000	T	31B458; 93B645; 4B6014; 24B2414; 24B6544; 4B7278; 8B6128; 15B1781
127	38	7	3	½	23¾	16¼	....	2	12	4⅞	1450	T	31B459; 93B499; 7B2548; 11B2749
128	38	7	3	½	28¾	21¾	....	2	12	4⅞	1450	T	31B460; 4B6015; 4B7279; 11B4760; 6B5613; 31A515, Gr. 31; 11B7114; 24B2415
132	38	8¼	3	½	23¾	16¼	....	2½	12	4⅞	1920	T	31B461; 92B541; 11B5281
133	38	8¼	3	½	28¾	21¾	....	2½	12	4⅞	1920	T	31B462; 4B6016; 4B7280; 24B2416; 15B4081; 31A515, Gr. 37; 7B1745; 11B7115
138	38	9¾	8	½	29¾	21¾	....	3	12	3⅞	2700	T	92B648; 1B4814; 7B1327; 17B7155; 24B3148; 11B1364; 11B3848
151	37	6⅝	3	½	20¼	①	....	1	14	1⅞	600	CB	1A5041; 2A9884; 4A5902; 4A5980; 6A1440; 7A2058, Gr. 1, 2; 9A8077, Gr. 3, 4, 6; 8A2456, Gr. 1; 9A2707; 14A3430, Gr. 1
152	38	7½	4	¾	26	①	....	1	14	2⅞	600	CB	952158; 62A641; 13A4480, Gr. 1
153	37	6⅝	3	½	20¼	①	....	1¼	12	1⅞	1200	CB	1A6199; 4A5903; 4A5981; 6A1441; 7A2058, Gr. 3, 4; 9A8077, Gr. 1, 2, 5
154	38	7½	4	¾	26	①	....	1½	14	2⅞	1200	CB	952159; 62A642; 13A4480, Gr. 2
155	37	6½	3	½	15⅝	①	....	1¼	12	1⅝⅞	1200	CB	42A362; 1A5249; 13A4480, Gr. 4
157	37	8⅞	3	¾	18⅞	①	....	1½	14	2⅞	1200	CB	③340909; 18A932; 92A71
158	37	6½	3	½	14⅞	①	....	¾	16	1⅞	400	CB	640014; 4A4513; 9A8077, Gr. 8
159	37	6½	3	½	14⅞	①	....	1	14	1⅞	600	CB	640015; 4A2072; 9A8077, Gr. 7

① For circuit breakers, use oil height as per oil gauge on tank.

② See note on nominal current ratings on page 34.

③ On drawing 340909, C = 4½, kv = 7.5, amp = 1000.

outdoor bushings

4.3 to 345 kv

for power circuit breakers
and transformers

technical
data

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key no.	fig. no.	B			L inside length	T max. gas space	D max. dia under cover	oil end lead thds			amp rating ②	T=transf CT = cur transf CB = cir breaker	drawing number
		mounting flange						R		A			
		bolt circle	no. bolts	dia bolts				O.D.	thds	lgth			
for 23-25 kv bushings—continued													
229	38	7	3	½	28¾	21¾	....	1½	12	3½	950	T	31B469; 2B4715; 6B5311; 24B2426; 27B2350; 53B1988; 11B2096; 31A516, Gr. 21
232	38	8¼	3	½	24¼	16¼	....	2	12	4½	1375	T	31B470; 83B316; 31A516, Gr. 24; 11B3446; 24B1098
233	38	8¼	3	½	29¾	21¾	....	2	12	4½	1375	T	4B7285; 31B471; 4B6024; 24B2424; 440C129; 1B4588; 31A516, Gr. 27
235	38	8¼	3	½	24¼	16¼	....	2½	12	4½	1820	T	31B472; 11B4396; 31A516, Gr. 31
236	38	8¼	3	½	29¾	21¾	....	2½	12	4½	1820	T	31B473; 1B5280; 1B5497; 15B1752; 4B6025; 4B7286; 7B2118; 31A516, Gr. 34
243	36	7	3	½	11	7½	....	....	..	0	100/200	CT	69A839; 4B6026
244	36	8¼	4	½	11¾	7½	....	....	..	0	200/400	CT	69A840; 4B6027
245	36	9¾	8	½	11¾	7¾	....	....	..	0	500/1000	CT	69A841; 4B6028
246	36	11½	8	½	12¼	8¾	....	....	..	0	500/1000	CT	69A842; 4B6029
251	38	7½	4	¾	30½	①	....	1½	14	2¾	1200	CB	952127; 62A638; 2A6586; 4A1925; 5A9598; 6A8890, Gr. 2; 7A9324, Gr. 2; 7A2154, Gr. 3; 11A5185, Gr. 4; 8A2847
252	38	7½	4	¾	30½	①	....	1	14	2¾	600	CB	952126; 62A640; 4A4357
253	38	10½	4	¾	30¾	①	....	2¼	12	3	2000	CB	662741; 643987; 89A143; 8A2847, Gr. 2; 83A941; 1A4839; 96A939; 4A1980; 4A7890; 6A1732; 6A8890, Gr. 3, 4; 7A9324, Gr. 4, 5; 7A2154, Gr. 2; 15A9772, Gr. 3
254	38	10½	4	¾	29¼	①	....	3	12	4¼	3000	CB	58A966; 4A7913; 6A1733; 8A2847, Gr. 3; 6A8890, Gr. 6; 7A7002; 7A2154, Gr. 1; 7A2481; 7A9324, Gr. 6; 11A5185, Gr. 1
255	38	10½	6	¾	30	①	....	4	12	6	4000	CB	680580; 96A672; 5A6008; 8A2847, Gr. 4; 5A6275; 6A8890, Gr. 7, 8; 21A5398, Gr. 4; 7A9324, Gr. 7, 8; 11A5185, Gr. 2; ②21A5398, Gr. 2
256	38	7½	4	¾	30½	①	....	1¼	14	2¾	600	CB	3A8133; 3A8135; 6A1286; 6A8890, Gr. 1; 7A9324, Gr. 1; 11A5185, Gr. 5; ②21A5398, Gr. 1
257	38	10½	4	¾	29	①	....	2¼	12	3½	2000	CB	60A815; 6A8890, Gr. 5; 7A9324, Gr. 3; 11A5185, Gr. 3
258	37	8½	3	¾	17¾	①	....	1	14	1½	400	CB	340908; 18A931; 80A97; 11A5307, Gr. 1
259	37	7¾	4	¾	27¾	①	....	1½	14	2¾	1200	⑥CB	404314; ⑨96A427; ⑥6A8872, Gr. 1; 8A1153, Gr. 1
260	38	7¾	4	¾	29¾	①	....	1½	14	3	600	CB	647699
261	38	7¾	4	¾	25¾	①	....	1½	14	2½	1200	CB	661054; 90A739; 6A1227; 8A1153, Gr. 3
262	38	7¾	4	¾	29¾	①	....	1½	14	3	1200	CB	647699
263	38	10½	4	¾	31¼	①	....	3	12	4¼	3000	CB	662737; 3A8114; 15A9772, Gr. 1
264	38	7¾	4	¾	28¼	①	....	2¼	12	3½	2000	CB	637376; 79A497; 8A1153, Gr. 2
265	37	6½	3	½	16¾	①	....	1	14	2	600	CB	23A713; 69A462; 96A469; 21A5675, Gr. 1; 2A5317; 8A1153, Gr. 4
266	37	6¾	3	½	23¾	①	....	1	14	1¾	600	CB	1A5179; 2A6451; 4A5904; 6A1534; 9A8429, Gr. 1, 2; 15A9772, Gr. 2
267	38	7¾	4	¾	25¾	....	....	1½	14	2½	600	CB	661054
283	36	7¼	4	¾	16½	10	3½	....	..	0	400	T	53B2221
284	36	7¼	4	¾	23	16½	3½	....	..	0	400	T	53B2222
285	36	7¼	4	¾	27½	21	3½	....	..	0	400	T	53B2223
286	38	7¼	4	¾	30½	21	3½	1½	12	2½	1200	T	53B2226
287	38	7¼	4	¾	36½	27	3½	1½	12	2½	1200	T	53B2227
288	38	7¼	4	¾	29½	①17	3½	1½	12	2½	1200	CB & T	53B2228; 42A9626, Gr. 1; 44A9807, Gr. 1
289	38	8¾	4	¾	31½	①	4	2¼	12	4	2000	CB	47A6527, Gr. 1; 42A9626, Gr. 2
290	38	8¾	4	¾	31½	①	5	3¼	12	4	3000	CB	42A9626, Gr. 3
291	38	9¾	4	¾	31½	①	6	4	12	4	4000	CB	42A9626, Gr. 4

① For circuit breakers, use oil height as per oil gauge on tank.

② See note on nominal current ratings on page 34.

③ Special for Public Service Co. of N. J.

④ These drawings require flat flange ring.

⑤ Flat seat.

**part 4****section b: tabulation of key numbers**

key no.	fig. no.	B			L inside length	T max. gas space	D max. dia under cover	oil end lead thds			amp rating ②	T = transf CT = cur transf CB = cir breaker	drawing number
		mounting flange						R		A			
		bolt circle	no. bolts	dia bolts				O.D.	thds	lgth			
for 33-34.5 kv bushings													
305	36	8¼	4	½	10½	⑦	....	....	..	...	....	T	377951; 604920; 662770; 301261; 16A2830, Gr. 1
306	36	8¼	4	½	12½	⑦	....	....	..	...	....	T	604956
312	36	7	4	½	16½	11¼	....	....	..	0	165	T	⑨952160; ⑩10A982; 8A9159; 24B2430; 11B3839; 31B474; 1B4182; 1B5437; 31A517, Gr. 4, 5, 6; 2B4651; 4B6030; 4B7287; 4B6332; 6B4376; 7B2074; 7B2076; 7B2119
313	36	7	4	½	21½	16¼	....	....	..	0	165	T	31B475; 6A2673; 4B6031; 24B2431; 4B8528; 7B2120; 4B7288; 53B2599; 7B2073; 7B2077; 31A517, Gr. 1, 2, 3; 1B5592, Gr. 1
316	38	7	4	½	19¼	11¼	....	1	14	3½	500	T	11B5230; 31A517, Gr. 16; 2B4748; 46B652
321	36	8¼	4	½	16½	11¼	....	....	..	0	165	T	46B897; 1B4936; 4B8298
323	36	8¼	4	½	21½	16¾	....	....	..	0	400	T	⑤635812; ⑥662766; ⑧86A730; 11B7130; 24B4595; 4B8529; 7B2121; 6A2656; 15B1769; 6A2747; 12A7024; 5A5134; 15B2959; 31B476; 81B685; 81B755; 24B2432; 24B2437; 31A517, Gr. 7, 9; 93B708; 4B6032; 4B7289; 7B2975
324	36	8¼	4	½	26½	21¾	....	....	..	0	400	T	66B265; 7B1512; 15B1786; 24B2435
326	38	8¼	4	½	24¼	16¾	....	1½	12	3½	890	T	31B477; 6B4217; 24B2433; ④4B8530; 83B315; 2B4356; 4B6033; 4B7604, Gr. 1; 8A5240, Gr. 1; 4B7290; ⑦7B1424; 31A517, Gr. 10, 11, 13, 14
327	38	8¼	4	½	29¾	21¾	....	1½	12	½	890	T	31B478; 1B5496; 53B3136; 7B1511; 31A517, Gr. 12; 15B1782; 24B1440; 24B2436; 24B7472; 7B1511
328	38	8¼	4	½	24½	16½	....	1½-1¾	14	3½	1075	T	④661200; 6B4931; 605900
332	38	9¾	8	½	26¼	17¼	....	2	12	4½	1280	T	31B479; 92B545
333	38	9¾	8	½	31½	22½	....	2	12	4½	1280	T	31B480; 1B5936; 4B6034; 15B1788; 4B6354; 4B7291; 4B8531
335	38	9¾	8	½	31½	22½	....	2½	12	4¼	1700	T	11B4271; 20A5990; 24B2438; 24B7771; 24B8938
340	38	11½	8	¾	31½	22½	6¾	3½	12	4¼	3420	T	11B7199; 24B4485; 8A8019
343	39	8¼	4	½	14¼	8½	....	....	..	0	100/200	CT	69A843; 3A2607; 3A3672; 11B6452; 5A4910; 4B6036; 8A9162; 7B2650; 6B4377
344	39	8¼	4	½	14¼	8½	....	....	..	0	200/400	CT	69A844; 3A2598; 4B6037; 53B1934
345	39	9¾	8	½	14¾	9	....	....	..	0	500/1000	CT	69A845; 4B6038; 15B2029
346	39	11½	8	¾	15¾	9¾	....	....	..	0	500/1000	CT	69A846; 4B6039
350	38	7½	4	¾	30½	①	....	1	14	2¾	600	CB	951169; 62A639; 7A7006, Gr. 1; 19A4791, Gr. 1
351	38	7½	4	¾	30½	①	....	1¼	14	2¾	600	CB	3A8375; 3A8376; 4A5908; 6A1241; 6A8873, Gr. 1; 7A9325, Gr. 2; 13A1965, Gr. 2
352	37	7½	4	¾	30½	①	....	1½	14	2¾	1200	CB	951170; 63A310; 90A139; 13A1965, Gr. 3; 2A1759; 96A343; 1A6121; 2A6366; 3A9915; 6A1517; 6A1735; 6A1925; 6A8873, Gr. 4; 7A1450, Gr. 1; 7A7006, Gr. 4; 7A2113, Gr. 5; 7A9325, Gr. 3; 11A6599, Gr. 1
353	37	8	4	½	22½	①	....	1	14	2½	600	⑥CB	643975; 680639; 23A770; 62A606; 1A8195; 2A9954; 4A2548; 4A6089; 4A6164; 6A8873, Gr. 2; 7A2113, Gr. 1, 2; 7A9325, Gr. 1; 7A7006, Gr. 5; 7A1450, Gr. 5; 13A1965, Gr. 1; 19A4761, Gr. 1
354	38	8	4	½	22½	①	....	1	14	2½	600	⑥CB	383753; 643975; 62A606; 4A2548; 4A6089; 4A6164; 23A770; 7A9325, Gr. 6; 6A8873, Gr. 3; 19A4761, Gr. 2
355	38	10½	4	¾	30¾	①	....	2¼	12	3	2000	CB	622518; 66A36; 1A8294; 6A1226; 6A1516; 6A8873, Gr. 5; 7A1450, Gr. 2, 3; 7A7006, Gr. 6; 7A9325, Gr. 4; 7A9325, Gr. 7; 11A6599, Gr. 2; 2B5999
356	38	10½	6	¾	30¾	①	....	3	12	4	3000	CB	90A652; 6A8873, Gr. 6; 7A2113, Gr. 6; 7A9325, Gr. 5
357	37	10¼	4	¾	21½	①	....	1	14	2½	⑥600	CB	89A179; 5A9446; 10A928; 17A3905, Gr. 1
358	37	9¼	3	¾	21½	①	....	1	14	1½	300	CB	341711

- ① For circuit breakers, use oil height as per oil gauge on tank.
 ② See note on nominal current ratings on page 34.
 ③ L dimension is approximate only for these bushings.
 ④ L-T-R approximate only for these bushings.
 ⑤ 1 1/2-14 thds at ends of bushings.

- ⑥ Bevel seat.
 ⑦ Insulated cable lead.
 ⑧ Flat seat.
 ⑨ At 25 cycles.

outdoor bushings

4.3 to 345 kv

for power circuit breakers
and transformers

technical
data

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key no.	fig. no.	B			L inside length	T max. gas space	D max. dia under cover	oil end lead thds			amp rating ②	T=transf CT=cur transf CB=cir breaker	drawing number
		mounting flange						R		A			
		bolt circle	no. bolts	dia bolts				O.D.	thds	lgth			
for 33-34.5 kv bushings—continued													
359	37	7½	4	¾	27⅞	①	....	1½	14	2½	600	CB	434629
360	38	7½	4	¾	27⅞	①	....	1½	14	2½	400	CB	600714; 5A9741
361	38	8½	4	¾	31⅞	①	....	1½	14	2½	400	CB	600537; 5A9467
362	38	7½	4	¾	27⅞	①	....	1½	14	2½	1200	CB	600714; 1A8028; 5A9741
363	38	10	4	¾	30⅞	①	....	1½	14	2½	400	CB	621428; 647675; 6A1225; 7A7004, Gr. 3, 4
364	38	13	6	¾	35⅞	①	....	2¼	12	3½	2000	CB	662733; 662771; 1A8883; 7A7004, Gr. 8; 9A8474; 21A9879, Gr. 1
365	38	8½	4	¾	31⅞	①	....	1½	14	2½	1200	CB	5A9467
366	38	7½	4	¾	29⅞	①	....	1½	14	2½	400	CB	647681
367	37	7½	4	¾	29⅞	①	....	1½	14	2½	1200	CB	647681; 79A250; 1A8138; 7A7004, Gr. 1
368	38	Rect. (4½x8)	4	½	26⅞	①	....	1	14	2	600	①CB	52A109; 7A1450, Gr. 6
369	37	8½	4	¾	34⅞	①	....	1½	14	3	600	CB	690621
370	37	10	4	¾	30⅞	①	....	1½	14	2½	1200	CB	621428; 63A319; 73A772; 13A1965, Gr. 4; 1A4888; 1A7463; 3A4241; 7A7009, Gr. 9; 3A9916; 6A1225; 7A2113, Gr. 3, 4; 7A7004, Gr. 2, 3, 4; 11A4538, Gr. 1; 7A7006, Gr. 2, 3; 19A4761, Gr. 4
371	37	10½	6	¾	34¼	①	....	3	12	4¼	3000	CB	952123; 7A1450, Gr. 4
383	36	7¼	4	¾	18½	10	3½	....	..	0	400	T	53B2231
384	36	7¼	4	¾	25	16½	3½	....	..	0	400	T	53B2232; 443C332
385	36	7¼	4	¾	29½	21	3½	....	..	0	400	T	53B2233
386	38	7¼	4	¾	32½	21	3½	1½	12	2½	1200	T	53B2236; 440C436
387	38	7¼	4	¾	38½	27	3½	1½	12	2½	1200	T	53B2237
388	38	7¼	4	¾	31½	①17	3½	1½	12	2½	1200	CB & T	53B2238
389	37	9¾	4	¾	33½	①	4¾	2¼	12	4	2000	CB	42A9627, Gr. 1; 47A6203, Gr. 1; 42A9627, Gr. 2
for 44-46 kv bushings													
405	36	8¼	4	½	12¾	④	....	....	..	...	....	T	376025; 604892; 667400; 376026; 14A2122, Gr. 1
406	36	8¼	4	½	13¾	④	....	....	..	...	....	T	604955
412	36	8¼	4	½	18¾	12¾	....	....	..	0	165	T	⑤10A865; 31B481; 83B125; 1B4708; 4B6040; 4B7292; 7B2078; 7B2080; 7B2124; 31A518, Gr. 1, 3, 11, 13, 31
413	36	8¼	4	½	22¾	16¾	....	....	..	0	165	T	31B482; 93B876; 2B4213; 4B6041; 4B7293; 7B2079; 7B2081; 7B2125; 31A518, Gr. 2, 4, 5, 6, 10, 21
414	36	8¼	4	½	29¾	23¾	....	....	..	0	165	T	64B201; 7B2059; 8B6129
416	36	8¼	4	½	22¾	16¾	....	....	..	0	400	T	623810; ⑥660900; 31B483; 15B2960; 81B343; 2B5669; 4B6042; 4B7294; 7B2126; 11B5294; 31A518, Gr. 7, 8, 9, 25, 26, 27
417	36	8¼	4	½	32	26¾	....	....	..	0	400	T	81B782; 1B5465; 8B8710
418	38	8¼	4	½	25¾	16¾	....	1½	12	3½	830	T	⑦⑥61100; ⑥605102; 31B484; 11B2745, Gr. 1; 7B2908; 31A518, Gr. 12, 32, 33
419	38	8¼	4	½	30¾	21¾	....	1½	12	3½	830	T	31B485; 2B4843; 4B6043; 24B2443; 27B2351; 4B4509; 4B7295; 8B6910; 11B3063
420	38	8¼	4	½	30¾	21¾	....	1¼	14	3¼	830	T	⑧614063; 11B7495
421	36	8¼	4	½	27	21¾	....	....	..	0	400	T	7B3790; 24B2445
425	38	9¾	8	½	27⅞	17⅞	....	2	12	4½	1200	T	31B486
426	38	9¾	8	½	32⅞	22⅞	....	2	12	4½	1200	T	31B487; 4B6044; 4B7296; 7B2128
428	39	9¾	8	½	27⅞	17⅞	....	2½	12	4½	1600	T	2B6974
431	38	9¾	8	½	32⅞	22⅞	6	3	12	4¼	2500	T	24B2446

① For circuit breaker use oil height as per oil gauge on tank.
② See note on nominal current ratings on page 34.

③ Flat seat.
④ Insulated cable lead.
⑤ L = 19½.

⑥ L = 22¾.
⑦ Has 1½-14 threads both ends.
⑧ L = 25¼.
⑨ L, T, and R dimensions are approximate only.
⑩ May be tube lead.

**part 4****section b: tabulation of key numbers**

key no.	fig. no.	B			L inside length	T max. gas space	D max. dia under cover	oil end lead thds			amp rating ②	T = transf CT = cur transf CB = cir breaker	drawing number
		mounting flange						R		A			
		bolt circle	no. bolts	dia bolts				O.D.	thds	lgth			
for 44-46 kv bushings—continued													
443	39	8¼	4	½	17%	8%	....	....	..	0	100/200	CT	69A847; 4B6046
444	39	9¾	8	½	18½	9½	....	....	..	0	200/400	CT	69A848; 6A6204; 4B6047; 7B2086
445	39	11½	8	¾	18¾	9¾	....	....	..	0	500/1000	CT	69A849; 4B6048
446	39	14	8	¾	19	10	....	....	..	0	500/1000	CT	69A850; 4B6049
451	38	9¼	4	½	27½	①	....	1	14	2	600	CB	23A682; 63A312; 98A582; 4A2549; 7A1372; 6A8871, Gr. 1; 7A9326, Gr. 1
452	38	7½	4	¾	33¾	①	....	1½	14	2½	600	CB	690578; 63A316; 96A459; 29B472; 4A7315; 6A8871, Gr. 2; 7A9326, Gr. 2; 35A7403, Gr. 2
453	38	11½	8	¾	40½	①	....	1½	14	3	1200	CB	④680476; 63A317; 29B473; 4A6163; 6A8871, Gr. 3; 12A2916, Gr. 1; 7A9326, Gr. 3
454	39	10½	6	¾	32½	①	....	1½	14	3	800	CB	623476, Fig. 1; 667408; 35A7405, Gr. 1
455	38	7½	4	¾	33¾	①	....	1½	14	3	1200	CB	7A9326, Gr. 4; 32A5201, Gr. 1
456	38	7½	4	¾	27½	①	....	1½	14	2	600	CB	18A7235, Gr. 1
457	38	7½	4	¾	28¼	①	....	1½	14	2¾	1200	CB	18A7255, Gr. 2
461	41	9¼	4	½	25%	①	....	1	14	2¼	600	CB	605553, Fig. 1; 79A591; 8A4423, Gr. 2
462	42	Rect. (4½ x 7½)	4	¾	15¾	①	....	1½	14	1	300	③CB	233976; 637445; 2A8335, Gr. 1, 2, 3
463	42	10¼	4	¾	26	①	....	{ 1½ } 1	14	2¼	600	CB	293816; 61A784; 14A6576, Gr. 2
464	40	10¼	4	¾	24¾	①	....	1½	14	1	300	CB	293816; 61A784; 14A6576, Gr. 1
465	42	9¼	4	½	25½	①	....	1	14	2¼	600	CB	383526; 606553, Fig. 2; 8A4423, Gr. 1
466	41	9¼	4	¾	26¾	①	....	1½	14	2½	600	CB	605102, Fig. 2, 3; 6A1229; 18A1319, Gr. 1
467	41	9¼	4	½	32½	①	....	1	14	2¾	600	CB	660954; 5A6274
483	36	8¼	4	¾	20½	10	4	....	..	0	400	T	53B2241
484	36	8¼	4	¾	27	16½	4	....	..	0	400	T	53B2242
485	36	8¼	4	¾	31½	21	4	....	..	0	400	T	53B2243
486	38	8¼	4	¾	34½	21	4	1½	12	2½	1200	T	53B2246
487	38	8¼	4	¾	40½	27	4	1½	12	2½	1200	T	53B2247
488	38	8¼	4	¾	33½	①17	4	1½	12	2½	1200	CB & T	53B2248; 42A9528, Gr. 1

for 66-69 kv bushings

513	40	9¾	8	½	33¼	17¾	....	....	..	0	400	T	684723; ③344529; ③369100; 24B2460; ④420862; ④622730; ④628387; 24B2466; 30A403; 12A7727; 85A969; 88A369; 3A2633; 3A4581; 6A3574; 4B6060; 4B7297; 29A5164; 7B2082; 7B2084; 1A3174, Gr. 4; 62A3069; 6B5095, Gr. 1; 31A519, Gr. 1, 4, 7, 8; 12A8937; 12A8938; 16A2496, Gr. 1; 16A4430, Gr. 1; 16A4729, Gr. 1; 16A7169, Gr. 1
514	40	9¾	8	½	38¾	22½	....	1½	12	2½	400	T	31A942; 2A2269; 4B5061; 28A8255; 26A9971; 4B7298; 7B2083; 7B2085; 623429; 16A7373, Gr. 1; 16A8269, Gr. 1; 20A2329; 37A3573; 37A5076; 24B2461; 37A4369
516	40	9¾	8	½	34¾	17¾	....	1½	12	3	750	T	30A404; 88A297; 3A4799; 11B1355; 13A9220, Gr. 1
517	40	9¾	8	½	39¾	22½	....	1½	12	3	750	T	30A405; 4B6062; 4B7299; 24B2462; 11B7170; 16A9779, Gr. 1; 24B5838; 26A5873
523	43	9¾	8	....	....	....	....	1¾	12	....	....	T	16A4769, Gr. 1
524	43	9¾	8	....	....	....	....	1¾	12	....	....	T	16A5468, Gr. 1
526	40	9¾	8	....	....	....	....	1¾	12	....	....	T	....
527	43	9¾	8	....	....	....	....	....	....	....	....	T	16A5469, Gr. 1
529	40	9¾	8	½	39¾	21½	....	2	12	4¼	1650	T	20A2384; 24B2468; 20A4053; 29A8074; 26A8256
534	40	11½	8	¾	39¾	11½	....	2½	12	3½	2080	T	16A9169; 58A7473

① For circuit breakers use oil height as per oil gauge on tank.

② See note on nominal current ratings on page 34.

③ Angle flange.

④ S#587 967 is for 600 amps only.

⑤ L and T dimensions are approximate only.

outdoor bushings

4.3 to 345 kv

for power circuit breakers
and transformers

technical
data

33-360

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key no.	fig. no.	B			L inside length	T max. gas space	D max. dia under cover	oil end lead thds			amp rating ②	T=transf CT=cur transf CB=cir breaker	drawing number
		mounting flange						R		A			
		bolt circle	no. bolts	dia bolts				O.D.	thds	lgth			

for 66-69 kv bushings—continued													
540	39	9	4	5/8	21 3/4	8 3/4	....	....	..	0	....	CT	⑥604964; 72A197; 3A5383; 53B6469; 4B6065; ⑨952093; 301223; 11B2755
543	39	9 3/4	8	1/2	25 1/8	11 7/16	....	....	..	0	100/200	CT	69A851; 88A733; 6A3591; 20A1873; 4B6066; 31A519, Gr. 9; 7B2969
544	39	11 1/8	8	3/4	25 7/8	12 3/16	....	....	..	0	200/400	CT	69A852; 88A734; 4B6067
545	39	14	8	3/4	26 1/8	12 7/16	....	....	..	0	400/800	CT	69A853; 88A298; 4B6068
546	39	14	8	3/4	26 1/8	12 7/16	....	....	..	0	400/800	CT	69A854; 4B6069; 15B2314
553	41	9 3/4	4	5/8	22 1/4- 23 1/2	①	....	1 1/4	14	1 1/4-2 1/4	400/600	CB	363894; 373838; 660018; 4A6090; 63A311; 2A9850; 25A9686, Gr. 1, 3; 6A4269, Gr. 1, 2, and 3; 440C463
	41	9 3/4	4	5/8	22 1/4- 23 1/2	①22 1/4- 23 1/2	....	1 1/4	14	1 1/4-2 1/4	400/600	CB & T	351905; 604736; 622014; 17A2868, Gr. 1; 70A910; 3A5382; 19A1771, Gr. 1; 6A4269, Gr. 3; 12A2919, Gr. 1, 3; 72A414, Gr. 1, 5; 440C463
554	43	9 3/4	8	5/8	38 1/4	①	5 15/16	1 1/2	12	2 3/8	600	CB	24A2503, Gr. 1
555	43	9 3/4	8	5/8	38 1/4	①	5 15/16	1 1/2	12	2 3/8	1200	CB	24A2505, Gr. 2, 6
556	37	11 1/8	8	3/4	44 3/4	①	....	1 1/2	14	3	1200	CB	⑥680494; 1A738; ①18A828; 22A6524, Gr. 1; 63A318; 73A887; 90A697; 94A156; 1A5080; ③2A2080; 5A6086; ⑥6A2934; 6A8895, Gr. 2; 7A9327, Gr. 2; 11A6598, Gr. 2; 11A8012, Gr. 2; 18A7270, Gr. 2
557	37	11 1/8	8	3/4	41 3/4	①	5 7/8	2 1/4	12	3 3/8	2000	CB	27A5522, Gr. 1
558	37	11 1/8	8	3/4	44 3/4	①	5 7/8	2 1/4	12	3 1/2	2000	CB	44A1262, Gr. 1, 2; 7A9324, Gr. 4
561	37	9 3/4	4	5/8	33 1/2	①	....	1 1/4	14	2 1/4	600	CB	26A774; 61A805; 94A86; 7A9327, Gr. 3; 11A6598, Gr. 3; 18A7270, Gr. 3
562	37	11 1/8	8	3/4	44 3/4	①28 1/16	5 7/8	1 1/2	14	3	400	CB & T	①680494; 3A8147; 3A8352; 18A828; 6A8895, Gr. 1; ⑥6A8445; ⑦7A6262, Gr. 1; 7A3702; 20A9690; 7A9327, Gr. 1; 11A6598, Gr. 1; 11A8012, Gr. 1 or 2; 13A1966, Gr. 1; 17A3906, Gr. 1; ①15A6957, Gr. 1; 18A7270, Gr. 1
563	42	Rect (5x10 7/8)	4	5/8	21	①	....	1	14	1	400	⑦CB	278840; 17A2868, Gr. 3, 6
564	37	12 1/2	6	5/8	39 1/8	①	....	1 1/2	14	2 1/2	600	CB	623200; 640387
565	42	9 1/2	4	5/8	33 3/16	①	....	2 1/4	12	3 3/4	2000	CB	622267
566	42	9 1/4	4	5/8	24 3/4	①	....	1 1/2	14	3 1/2	600	CB	614603
570	37	12 1/2	6	5/8	39 1/8	①	....	1 1/2	14	2 1/2	1200	CB	623200
583	38	9 1/4	6	5/8	30 1/2	16 1/2	4 3/4	....	..	0	400	T	53B2261; 53B9861
584	38	9 1/4	6	5/8	35	21	4 3/4	....	..	0	400	T	53B2262; 440C462; 62A4569
585	38	9 1/4	6	5/8	41	27	4 3/4	....	..	0	400	T	53B2263
586	38	9 1/4	6	5/8	38	21	4 3/4	1 1/2	12	2 1/2	1200	T	53B2266; 53B2269; 440C766
587	38	9 1/4	6	5/8	44	27	4 3/4	1 1/2	12	2 1/2	1200	T	53B2267
588	38	9 1/4	6	5/8	37 1/2	①17	5 1/4	1 1/2	12	2 1/2	1200	CB & T	42A9626, Gr. 1; 47A6658, Gr. 1; 53B2268
594	37	11 1/8	8	3/4	42 3/8	①	....	1 1/2	14	2 1/2	800	⑧CB	623734; 79A198; 80A208; 5A6273; 12A2918, Gr. 1; 18A1323, Gr. 1

① For circuit breakers use oil height as per oil gauge on tank.

② See note on nominal current ratings on page 34.

③ L and T dimensions are approximate only.

④ S# 590 448 only.

⑤ 6A8445 has larger diameter than others of Key 562.

⑥ 15A6957 has larger diameter than others of Key 562; has 2 layer voltage tap.

⑦ Angle flange.

⑧ 77 kv.

⑨ S# 590 449 only.

**part 4****section b: tabulation of key numbers**

key no.	fig. no.	B			L inside length	T max. gas space	D max. dia under cover	oil end lead thds			③E	amp rating ②	T=transf CT = cur transf CB = cir breaker	drawing number
		mounting flange						R		A				
		bolt circle	no. bolts	dia bolts				O.D.	thds	lgth				
for 88-92 kv bushings														
601	40 or 43	11½	8	¾	37½	①19%	....	2	12	3¼	1½	400	CB & T	330261; ④367220; 420877; 647694; 17A6795, Gr. 1; 16A4188, Gr. 1; 16A4773, Gr. 1; 56A781; 71A286; 80A141; 87A876; 96A486; 35B216; 6A3614; 9A5928, Gr. 1; 12A7026, Gr. 1, 4; 62A4588
602	43	11½	8	¾	37½	①	....	2	12	3¼	....	1200	CB	17A3903
603	41	11½	8	¾	47¼	③	....	1½	14	3	....	1200	CB & T	680479, Fig. 1; 680620, Fig. 1
604	41	11½	8	¾	47¼	①	....	1½	14	3	5%	600	CB & T	680479, Fig. 2; 680620, Fig. 2; 13A8850, Gr. 1; 69A259; 7A2140
605	41 or 43	11½	8	¾	39¾	①	....	2	12	5	....	1400	CB & T	662743; 4A893; 84A765; 56A782; 26A3988
606	40	11½	8	¾	39½	19¼	....	2¼	12	2¾	¼	....	T	4A885; 13A8848, Gr. 1
607	44	13¼	6	1¼	40½	23	7	...	...	...	....	800	T	589D192
608	44	13¼	6	1¼	44¼	26¾	7	...	...	...	....	800	T	589D193
614	40 or 43	11½	8	¾	43¾	22½ 3/16	....	2	12	2%	1½ 1/16	....	CB & T	20A7520; 58A2239; 31A792; 85A492; 5A4392; 13A6101, Gr. 1; 17A3904, Gr. 1; 13A9292, Gr. 1
615	43	11½	8	¾	43¾	22½ 3/16	....	2	12	2%	1½ 1/16	....	T	13A9293, Gr. 1
616	43	14	8	¾	46	22½	....	2½	12	4	3%	....	T	26A9062; 29A4700
631	40	Rect. (7¼x9¼)	4	¾	27½ 1/16	①	....	1¾	12	1½	....	400	⑤CB	233948 (S#135177); 258790; 13A9222, Gr. 1; 637464; 43A573; 2A4701; 7A1490; 16A5707, Gr. 4
632	41	11½	8	¾	42¾	①	....	1½	14	2%	....	600	CB	662761

for 110-115 kv bushings

651	41 or 43	13¼	6	¾	38½ 39½	18½ 19½	....	2	12	...	1%	400	CB & T	16A4161, Gr. 1; 20A9495; 26A8620; 363131; 419892; 660016; 662740; 56A702; 56A704; 63A313; 84A72; 18A4926, Gr. 4; 86A993; 2A4605; 7A919; 4A6001; 5A4748; 55B330; 12A7730, Gr. 1; 29A2540; 98A790, Gr. 1, 3; 29B550; 1A5247; 3A8469; 6A1504; 7A6438, Gr. 1, 10; 13A4484, Gr. 1
652	40	13¼	6	¾	47¼	①27%	....	2	12	2½	2½	400	CB & T	605263; 55A878; 56A703; 98A645; 55A875
654	41 or 43	14	8	¾	45%	21%	....	2¼	12	3¼	¾	600	CB & T	661000; 667385; 690558; ③3A3187, Gr. 4; 6A1506, Gr. 1, 8; 3A2468; 56A708; 79A166; 16A2455, Gr. 4; 81A945; 87A131; ①1A2580; 2A3135; 3A3238, Gr. 4; 4A6165; 4A7828; 5A9463; 16A3635, Gr. 1; 3A5236; 6A4657; 7A9551, Gr. 1, 2; 13A2845, Gr. 1; 12A4560, Gr. 1, 2; 21A9122, Gr. 1; 20A3028
655	41 or 43	14	8	¾	45%	21%	....	2¼	12	3¼	¾	1200	CB & T	13A2845, Gr. 2; 21A9122, Gr. 2; 20A3352
658	44	13¼	6	1¼	46¾	26¾	8¾	....	....	....	....	800	T	589D115
659	44	13¼	6	1¼	43	23	8¾	....	....	....	....	1200	CB & T	589D116; 408D780, Gr. 1
660	44	13¼	6	1¼	43	23	9¾	....	....	....	....	1600	CB & T	589D114; 408D384, Gr. 1
664	40 or 41	14	8	¾	46¾	23	....	2	12	2%	1½	....	T	31A815; 85A515; 88A315; 5A4315
665	40 or 41	14	8	¾	47½	23	....	2¼	12	3¼	....	600	CB & T	11A2115; 12A3226, Gr. 1; 41A5032, Gr. 1; 11A3865; 14A6077, Gr. 1; 26A3475; 34A1415; 13A8102; 13A9315, Gr. 1; 16A2833, Gr. 1; 16A2450, Gr. 1; 4B8155; 4B8449
666	41 or 43	14	8	¾	47½	23	....	2¼	12	3¼	....	1200	CB & T	12A3226, Gr. 2; 13A9316, Gr. 1; 14A6077, Gr. 2; 41A5032, Gr. 2; 37A3576; 587D916; 588D615; 589D113
①681	37	14	8	¾	51½	①	....	2	12	3¼	....	600	CB	76A52; 2A1758, Gr. 4; 3A8577; 6A1395, Gr. 1; 3A9429; 6A8422, Gr. 2; 8A7862; 9A4136, Gr. 1, 2; 8A4422; 5A8896, Gr. 1, 6
①682	37	14	8	¾	51½	①	....	2	12	3¼	....	1200	CB	4A7413; 5A8897, Gr. 1; 6A1398, Gr. 1
683	40	19½	4	¾	36	①	....	2	12	2½	....	500	CB	279304 (with flange 279780)
684	40	Rect. (8¼x10¾)	4	¾	38½	①	....	2	12	2½	....	400	⑤CB	279304 (with flange 279185)
685	43	16¼	8	¾	52¾	①	....	3	12	3¼	....	1600	CB	44A9806, Gr. 1

① For circuit breaker use oil height as per oil gauge on tank.

② See note on nominal current ratings on page 34.

③ Additional inside length when transformer ball is used.

④ L = 36%, R = 2¼.

⑤ Angle seat.

⑥ Not adapted for circuit breaker arc shields.

⑦ Except tubular lead.

outdoor bushings

4.3 to 345 kv

for power circuit breakers
and transformers

technical
data

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key no.	fig. no.	B			L inside length	T max. gas space	D max. dia under cover	oil end lead thds			③E	amp rating ②	T=transf CT=cur transf CB=cir breaker	drawing number
		mounting flange						R		A				
		bolt circle	no. bolts	dia bolts				O.D.	thds	lgth				
for 132-138 kv bushings														
701	41 or 43	15½	6	¾	42¾	①19¼	....	2¼	12	¾	400/ 600	CB & T	③369147; 420669; 660023; 14A1678, Gr. 5; 660013; 56A531; 98A791; 662729; 680663; 55A222; 4A6333, Gr. 1; 9A6333, Gr. 1; 56A492; 6A2496; 7A2343, Gr. 1, 2; 14A1678, Gr. 1	
702	41 or 43	15½	6	¾	46½	24½	....	2½	12	¾	600	CB & T	③350941; ③605481; 662769; 680540; 955087; 56A532; 6A1515, Gr. 1; 8A4421, Gr. 1; 9A7035; 18A1321, Gr. 1; 19A6486, Gr. 1	
703	41 or 43	15½	6	¾	42¾	22¾	....	2¼	12	¾	1000	CB	660000; 72A922; 2A9918	
704	41 or 43	16¼	8	7/8	49¾	①22½	....	2½	12	¾	600	CB & T	661060; 680541; 680621; 690551; 23A3800, Gr. 1; 5A3277, Gr. 4; 680540; 20A7083; 20A7519; 20A7788; 9A266; 3A269; 92A195; ③63A315; 92A295; 5A5692; 6A8447, Gr. 1; 11A4901, Gr. 1, 2; 13A4196, Gr. 1; 12A4560, Gr. 3 or 4; 2A1632, Gr. 4; 5A3277, Gr. 4; 16A2810, Gr. 4; 16A3619, Gr. 1; 19A7462, Gr. 1	
705	41 or 43	15½	6	¾	42¾	①	....	2¼	12	2½	1200	CB	14A1678, Gr. 8	
706	41 or 43	15½ 16¼	6 8	¾ 7/8	51¾	①23	....	2½	12	¾	800	CB & T	85A573; 2A2331; 6A2689; ③38A5992, Gr. 1; 7A1373, Gr. 9; 16A6614, Gr. 1	
707	41 or 43	16¼	8	7/8	49¾	20½	....	2½	12	¾	1200	③CB & T	③92A980; ③3A6160; ③3A6425; ③7A2142; ③18A4651, Gr. 1; ③8A6459, Gr. 1; 13A4196, Gr. 2; 19A7462, Gr. 2; 23A3800, Gr. 2; 589D638	
708	41 or 43	15½	6	1	51¾	①	....	2½	12	¾	1200	CB & T	③38A5992, Gr. 2	
714	41 or 43	16¼	8	7/8	52½	23¼	....	2½	12	5/8	11½	T	③31A838; ③56A765; 2A6314; ③85A538; 5A4338; 7A1373, Gr. 1; 12A3227, Gr. 1; 9A7828; 11A8010, Gr. 1, 2; 21A5009, Gr. 1; 22A2016, Gr. 1; 35A6368, Gr. 2; ③38A5992, Gr. 1	
715	41 or 43	16¼	8	¾ or 7/8	51¾	①23¼	....	2½	12	¾	800	CB & T	13A9338, Gr. 1; 13A9880; 16A6614; 20A2766; 34A2846; 37A5084; 9A6238; 13A6103, Gr. 1; 11C3908	
716	42	16¼	8	7/8	55½	23¼	....	2½	12	6½	1125	T	54A722; 3A3487	
717	41 or 43	16¼	8	¾ or 7/8	51¾	①23¼	....	2½	12	¾	1200	CB & T	13A9339, Gr. 1; 20A2381; 587D939; 11A8015, Gr. 1, 2; 12A3227, Gr. 2; 21A5009, Gr. 2; 20A2381, Gr. 1; 22A2016, Gr. 2; 31A3696, Gr. 1; 35A6368, Gr. 1; ③38A5992, Gr. 2	
718	44	14¼	6	1¼	50½	26¾	9¾	...	...	...	800	CB & T	589D138	
719	44	14¼	6	1¼	46¾	23	9¾	...	...	...	1200	CB & T	589D139; 408D781, Gr. 1	
720	40	15½	6	¾	53¾	28¾	....	3	12	3	400/800	CT	661029; 8A471	
721	44	14¼	6	1¼	46¾	23	10¾	...	...	...	1600	CB & T	595D137; 408D385, Gr. 1	
731	③37	14	8	7/8	56	①	....	2¼	12	¾	800	CB	73A964; 99A645; 5A9469, Gr. 1; 5A9742, Gr. 1	
732	③37 or 38	14	8	7/8	56	①	....	2¼	12	¾	1200	CB	3A8134; 3A8136; 5A9470, Gr. 1	
733	③37	14	8	7/8	56	①	....	2	12	¾	600	CB	42A365; 8A3277	
734	43	16¼	8	7/8	52½	①	....	3	12	¾	1200	CB	36A2695, Gr. 1	
735	43	16¼	8	7/8	52½	①	....	3	12	¾	1600	CB	36A2695, Gr. 5, 7	
736	43	16¼	8	7/8	52½	①	....	3	12	¾	2000	CB	36A2695, Gr. 6	
737	43	15½	6	¾	51¾	①	....	2½	12	2½	1200	CB	18A1321, Gr. 1, 5	

① For circuit breaker use oil height as per oil gauge on tank.
Key numbers 751 to 754 inclusive: In type "O" bushing the
"T" dimension is as per fig. 40 to 43.
② See note on nominal current ratings on page 34.
③ Additional inside length when transformer ball is used.
④ Not adapted for circuit breaker arc shields.

⑤ 400 amps.
⑥ Have 15½ BC, 6—1-inch bolts; also 16¼ BC 8—¾-inch bolts.
⑦ Kv = special 161 kv porcelain—increased insulation thickness.
⑧ L = 51¾, R = 2¼.
⑨ L = 43¾, A = 2¼.

**part 4** section b: tabulation of key numbers

key no.	fig. no.	B			L inside length	T max. gas space	D max. dia under cover	oil end lead thds			③E	amp rating ②	T=transf CT=cur transf CB=cir breaker	drawing number
		mounting flange						R		A				
		bolt circle	no. bolts	dia bolts				O.D.	thds	lgth				
for 154-288 kv bushings—continued														
755	41 or 43	16¼	8	⅝	54	①24-20⅜	....	3	12	3¼	....	1200	CB & T	13A9362, Gr. 1; 47A6602; 69A366; 2A7045; 11A2161; 23A658; 96A556; 47A6648, Gr. 1; 5A9515; 8A2455; 13A9362, Gr. 1; 12A3228, Gr. 1
756	41 or 43	16¼	8	⅝	54	①24-20⅜	....	3	12	3¼	....	800	CB & T	13A9361, Gr. 1; 661005; 680665; 23A658; 12A3228, Gr. 5; 26A730; 79A113, 12A4560, Gr. 5, 6
759	44	15¾	8	1¼	54	26¾	11¼	...	...	...	....	800	T	589D161
760	44	15¾	8	1¼	50¼	23	12	...	...	...	....	1600	CB & T	589D162; 408D385, Gr. 1
780	43	22	10	1	64⅞	25¼-23¼	14⅞	4	12	4	⅞	675/1130	T	29A8073; 37A4379; ④37A8280
781	43	22	10	1	64	①	....	4	12	4	....	1200	180 Kv. CB & T	32A3000, Gr. 1, 4
782	43	16¼	8	⅝	54	①	....	3	12	3⅞	....	1200	161 Kv. CB	35A3492, Gr. 1
783	43	16¼	8	⅝	54	①	....	3	12	3⅞	....	1600	161 Kv. CB	35A3492, Gr. 5
784	43	22	10	1	64	①	....	4	12	4	....	1600	180 Kv. CB	32A3000, Gr. 6
785	44	21	12	1¼	56¾	26¾	14⅞	...	...	...	....	800	T	589D180
801	41 or 43	19⅞	12	⅝	51½	①19¼	....	3	12	3½	½	600	187 Kv. CB & T	④④19781; ④438623; 660012; 13A1790, Gr. 5; 660019; 15A6855, Gr. 1; 9A9887, Gr. 1, 2; 82A409; 87A653; 93A964; 2A1930; 11A4904, Gr. 1, 2; 13A1790, Gr. 5; 20A1232
802	41 or 43	19⅞	12	⅝	52	19¾	....	3	12	4	½	1000	187 Kv. T	660019; 15A4897, Gr. 1
803	40 or 41	23½	12	1	75	①36⅞	....	4	12	4¼	....	1200	196 Kv. T	9A315; 2A9770
804	40 or 41	23½	12	1	67¾	①28⅞	....	4	12	4¼	⅝	1200	196 Kv. T	5A4396; ②31A896; 6A1812
805	41 or 43	23½	12	1	67¾	①28⅞	....	4	12	4¼	⅝	1200	196 Kv. CB & T	13A9397, Gr. 1; 29A4703; 11A2196; 3A8113; 6A1812; 13A1947, Gr. 1; 13A1947, Gr. 1, 7; 44A4823, Gr. 1; 47A6616, Gr. 1
806	43	23½	12	1	67¾	①28⅞	....	4	12	4¼	....	800	196 Kv. CB & T	13A9396, Gr. 1; 58A2996; 13A1947, Gr. 5; 13A1947, Gr. 5, 6
809	44	21	12	1¼	59½	26¾	14⅞	...	...	...	....	800	T	589D196
810	44	21	12	1¼	59½	26¾	14⅞	...	...	...	....	1600	CB & T	589D197; 408D997, Gr. 1
830	43	23½	12	1	67¾	①	....	4	12	3⅞	....	1200/1600	196 Kv. CB	36A8825, Gr. 1, 5
831	43	23½	12	1	67¾	①	....	4	12	4⅞	....	1600	196 Kv. CB	13A1947, Gr. 8
850	40 or 41	23½	12	1	69⅞	①28⅞	....	3¼	12	3¾	⅝	1200	220 Kv. CB & T	87A843; 647684
851	41 or 43	23½	12	1	83¼	①37⅞	....	4	12	4¼	0	1200	230 Kv. T	19A9002, Gr. 1; 16A6048; 684775; 1A737; 18A921; 47A6648, Gr. 1, 4; 85A724; 5A5384; 16A6048, Gr. 1
854	40 or 41	23½	12	1	76¼	①30⅞	....	4	12	4¼	⅝	505	230 Kv. CB & T	97A212; ①1A2342; 5A4330, Gr. 1; ②31A830; ③85A530
855	40 or 41	23½	12	1	87½	①37¾	....	4	12	4	0	800	250 Kv. CB & T	683800
856	41 or 43	23½	12	1	76¼	①30⅞	....	4	12	4¼	....	1200	230 Kv. T	13A9431, Gr. 1; 97A212; 7A2063; 5A4330; Gr. 6; 13A4200, Gr. 1
857	43	23½	12	1	76¼	①30⅞	....	4	12	4¼	....	800	230 Kv. T	13A9430, Gr. 1; 13A4200, Gr. 5
890	43	28	12	1	86¼	30⅞	....	4	12	4½	⅞	550	259 Kv. T	26A8257
901	43	28	12	1	89¾	①44	....	4	12	4¼	⅝	1200	288 Kv. CB & T	16A5708, Gr. 1; 18A9963; 3A3284; 5A4388; 31A888; 62A594
930	43	28	12	1	86¼	①30⅞	....	4	12	4⅞	⅞	1145, 1600/2000	288 Kv. CB & T	41A9771, Gr. 1, 2; 30B7106, Gr. 1; 30B7107, Gr. 1; 58A2249

① For circuit breaker use oil height as per oil gauge on tank.
Key numbers 755 and 756 inclusive: In type "O" bushing the "T" dimension is as per fig. 40 to 43.

② See note on nominal current ratings on page 34.

③ Additional inside length when transformer ball is used.

④ Bolt circle = 23 1/2, number of bolts = 12.

⑤ 400 amps.

⑥ L = 51 3/8, R = 2 1/4.

⑦ Not adapted for circuit breaker arc shields.

part 5

tabulation of Westinghouse bushing drawings from 1909 . . . engineering data and recommendations for spares and replacements

section a: tabulation of
drawings pages 46-83

section b: notes referring to
tabulation pages 84-87

We have listed by numerical order of their assembly drawings, all of the important designs of outdoor bushings manufactured by the Westinghouse Electric Corporation since the first of these designs were brought out in 1909. Some few sizes having a very low activity have been omitted.

Recommendations for any bushings not included may be obtained by request to the Transformer Engineering Department at Sharon, Pa., or the Power Circuit Breaker Switchgear Engineering Department at East Pittsburgh, Pa.

Where slight departures from the recommendations are necessary, detail notes, designated by footnote symbols, will be found at the bottom of the page.

For convenience in locating the recommendations for any bushing, a column headed "refer to page" has been provided from which the user may readily obtain the page numbers containing the instructions applying to any particular bushing.

Where designs for replacement or spare bushings have already been made, the drawing number is given as well as the drawing number for the adapter if one is required. Where the ③ appears it indicates that new drawings must be made. Where new designs are required and not shown, they will be prepared as required. Bushing replacements are usually made with present standard designs using adapters where necessary. When an order is entered for bushings it should state specifically a style number or shop order number of the transformer or breaker, and serial number of the transformer, as well as the identification on the bushing nameplate so that the proper bushing (with adapter if required) will be supplied.

Bushings listed as replacements should be checked in the table for later replacements.

It is possible that several bushings might be interchangeable.

When ordering a replacement from the factory, specify drawing, groups, and serial number of bushing to be replaced, shop order number (S.O. #) of breaker or transformer in which bushing will be used, and recommended replacement drawing number from the following tables. Only the newest replacement should be used.

**part 5****section a: tabulation of drawings**

bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements						② notes no.
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.		
224183 233948 233976 258790	fig. 2	400 300 400	88-A-Special 92-A-631 44-A-462 88-A-631	... ... ... ...	T CB CB CB	20, 21 20, 21 20, 21 20, 21	⑤ 7A1490 2A8335 7A1490	... 1 3 1	O O S N	2 2 ... 2	... none none none	...	
259566 275365 278840 279304		300 400 400	34-A-Special 88-A-Special 66-A-563 110-A-683	... ... ... ...	CB T CB CB	20, 21 20, 21 20, 21 20, 21	⑤ 5A9446 ① 17A2868 13A4484	 6 1	O-1 S O	2 ... 2	yes ④ 745908	44 1, 3 2, 24	
279304 293816 293816 296449		400 600 300 ...	110-A-684 44-A-463 44-A-464 66-A-Special	... ... ... ...	CB CB CB T	20, 21 20, 21 20, 21 20, 21	③ ④ 14A6576 14A6576 ③	2 1 ...	O S S	2	... none none ...	2 37 37 ...	
297323 297833 298260 299949		...	...	110-A-Special 44-A-Special 66-A-Special 25-H-1-Special		T T T T	20, 21 20, 21 20, 21 21	③ 7B2059 2B2269 ③	... 1	O S K S	2	46B376 8B6781, Gr. 5 yes ...	2 ... 62 64
300098 300565 301016 301016	...	...	16.5-H-1-Special 44-H-1-Special 22-A-Special 33-A-Special	... ... ... ...	T T T T	21 21 20, 21 20, 21	③ ③ ③ ③	... ... ... ...	S S ... S	... ... ... ...	... ... ... ...	64 64 64 64	
301016 301222 301223 301261	...	...	44-A-Special 44-A-Special 66-A-540 33-H-1-305	... ... ... ...	T CT CT T	20, 21 20, 21 20, 21 21	③ ③ 4B6065 16A2830	 1 1	S S S S	... ... ... ...	... ... none none	64 64 ... ⑦	
301261 303600 304622 304773	...	...	33-H-1-Special 44-A-Special 33-H-1-Special 2.5-H-1-Special	... ... ... ...	T T CT T	21 20, 21 21 21	③ ③ ③ ③	... ... ... ...	S S S I-2	... ... ... ...	... ... ... ...	64 64 64 64	
308499 325101 330261 340908	...	...	1-J-2-Special 44-H-2-Special 100-A-601 22-A-258	... ... ... ...	T T T CB	14 21 20, 21 20, 21	1B5701 ③ 6A3614 11A5307	1 1	I-2 S N S	 2 ...	none none none none	64 65 1	
340909 341711 344529 344608	...	1000 600 400	7.5-A-157 33-A-358 66-A-513 154-A-752	... ... ... ...	CB CB T T	20, 21 20, 21 20, 21 20, 21	③ 7A9325 4B6060 16A4484	... 1 1 ...	S S S O	 2	none 40B39 ... none	74 1, 45 1, 61, 89 99	
344608 346005 346005 347843	...	...	154-A-752 33-H-1-Special 44-H-1-Special 34.5-A-Special	... ... ... ...	CB T T CB	20, 21 21 21 20, 21	15A9770 ③ 21 ⑤ 5A9446	1	O S ... G-1	2	none 10A927	64 64 44	
350941 350941 351905 351905	...	400	132-A-702 132-A-702 66-A-553 66-A-553	... ... ... ...	T CB T CB	20, 21 20, 21 20, 21 20, 21	9A7035 18A1321 6A4269 ③ 12A2919	1 1 1 3	N O S S	2 2	none none none none	98, 99 99 1, 9 1, 9, 29	
355107 363131 363131 363894	...	450 400 400	32-H-2-Special 110-A-651 110-A-651 66-A-553	... ... ... ...	T T CB CB	21 20, 21 20, 21 20, 21	③ 16A4161 13A4484 12A2919	... 1 1 3	S O O S	2 2 2 ...	none none none none	64 20, 99 20, 23, 73 1, 9, 29	
367220 367220 367761 367762	...	400	88-A-601 88-A-601 13.8-H-1-Special 22-H-1-Special	... ... ... ...	T CB T T	20, 21 20, 21 21 21	6A3614 17A6795 ③ ③	1 1	N O	2 2	none none	20, 98, 99 20, 23, 88 64 64	
367763 369100 369147 369147	...	400	33-H-1-Special 66-A-513 132-A-701 132-A-701	... ... ... ...	T T T CB	21 20, 21 20, 21 20, 21	③ 4B6060 9A6333 14A1678	... 1 1 1	S S O O	 2 2	 none none	64 61 54, 99 20, 54	
369247 369247 373838 374335	...	400 400	154-A-751 154-A-751 66-A-553 44-H-1-Special	... ... ... ...	T CB CB T	20, 21 20, 21 20, 21 21	6A5109 17A6796 ③ 12A2919 ③	1 1 3 ...	N O S S	2 2	none none none ...	98, 99 ... 1, 9, 29 64	

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

④ Use an adapter when the old bushing has an angle flange.

⑤ Without jaw, dwg 17A3906 Gr. 1, 2.

⑥ Key 683 has flat seat; Key 684 has angled seat.

⑦ Semi-condenser replacement bushing, for use only where standard type S cannot be applied.

⑧ For breakers with current transformers less than 5½" I.D. use dwg 17A2868 Gr. 5.

outdoor bushings

4.3 to 345 kv

for power circuit breakers
and transformers

technical
data

33-360

page 47

bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	②notes no.
376025			44-H-1405	...	T	21	14A2122	...	S	...	.....	⑥64
376026			55-H-1405	...	T	21	14A2122	1	S	...	.....	⑥64
377951			33-H-1-305	...	T	21	16A2830	1	S	...	.....	⑥64
383626		600	44-A-465	...	CB	20, 21	8A4423	1	S	...	none	1, 5, 60
383753		600	33-A-354	...	CB	20, 21	7A9325	6	S	...	none	6
402237		580	⑥6.9-J-1-Special	...	T	22	730103-8	...	J-1	...	none	①
404314		1200	22-A-259	...	CB	20, 21	8A1153	1	S	...	none	7, 52
414717			13.8-J-1-Special	...	T	22	730109-10	...	J-1	...	none	.....
414718			22-J-1-Special	...	T	22	730113	...	J-1	...	none	.....
419781			187-B-801	...	T	20, 21	20A1232	...	O	2	none	99
419781		600	187-B-801	...	CB	20, 21	⑤13A1790	1	O	...	none	108
419892			110-B-651	...	T	20, 21	16A4161	1	O	2	none	99
419892		400	110-B-651	...	CB	20, 21	13A4484	1	O	2	none	73
420669			132-B-701	...	T	20, 21	9A6333	1	O	2	none	54, 99
420669		400	132-B-701	...	CB	20, 21	14A1678	1	O	2	none	54
420774			44-B-Special	...	T	20, 21	①	...	S	...	yes	.....
420862		400	65-B-513	...	T	20, 21	4B6060	1	S	...	none	61
420877			88-B-601	...	T	20, 21	6A3614	1	N	2	none	.....
420877		400	88-B-601	...	CB	20, 21	17A6796	1	O	2	none	.....
423721			154-B-751	...	T	20, 21	6A5109	...	N	2	none	98, 99
423721		400	154-B-751	...	CB	20, 21	17A6796	1	O	2	none	.....
434629		1200	33-A-359	...	CB	20, 21	42A9627	1	S	...	{ 305-C-037, Gr. 1 17B697, item 10	7, 46, 122
438623			187-B-801	...	T	20, 21	20A1232	...	O	2	none	99
438623		600	187-B-801	...	CB	20, 21	⑤13A1790	1	O	0	none	108
600537		400	33-C-361	...	CB	20, 21	③	...	S	...	none	49
600537		400	33-F-361	...	CB	20, 21	③	...	S	...	none	49
600714		400	33-C-360	...	CB	20, 21	42A9627	1	S	...	{ 305-C-037, Gr. 1 17B697, item 10	8, 47, 122
600714		400	33-F-360	...	CB	20, 21	42A9627	1	S	...	{ 305-C-037, Gr. 1 17B697, item 10	8, 47, 122
600714		1200	33-C-362	...	CB	20, 21	7A9325	3	S	...	1B3244	8, 47
600714		1200	33-F-362	...	CB	20, 21	7A9325	3	S	...	1B3244	8, 47
604736			66-B-553	...	T	20, 21	6A4269	1	S	...	none	1, 9, 29
604736		600	66-B-553	...	CB	20, 21	12A2919	3	S	...	none	1, 9, 29
604892		158	44-D-405	...	T	20, 21	14A2122	...	S	...	.....	⑥64
604920		169-330	33-D-305	...	T	20, 21	16A2830	...	S	...	.....	⑥64
604955		40	44-D-406	...	T	20, 21	③	...	S	...	.....	64
604956		40	33-D-306	...	T	20, 21	③	...	S	...	.....	64
604954		150/300	66-B-540	...	CT	20, 21	4B6065	1	S	...	none	.....
605018		169	23-J-1-Special	...	T	22	605018	...	J-1	...	none	.....
605030		300/600	33-D-Special	...	CT	20, 21	③	...	S	...	.....	64
605050		300/600	44-D-Special	...	CT	20, 21	③	...	S	...	.....	64
605079			154-B-752	...	T	20, 21	16A4484	...	O	2	none	99
605079		400	154-B-752	...	CB	20, 21	15A9770	1	O	2	none	.....
605102	fig. 1	400	44-E-418	...	T	20, 21	11B2745	1	S	...	none	.....
605102	fig. 2, 3	600	44-E-466	...	CB	20, 21	18A1319	1	S	...	none	.....
605263			110-B-652	...	T	20, 21	③	...	O	2	none	2, 99
605263		400	110-B-652	...	CB	20, 21	③	...	O	2	none	2
605481			132-B-702	...	T	20, 21	9A7035	1	N	2	none	98, 99
605481		400	132-B-702	...	CB	20, 21	18A1321	1	O	2	none	.....
605573		400	33-D-Special	...	T	20, 21	③	...	S	...	.....	64
605649		⑦	6.9-J-2-Special	...	T	14	730104-7-8	...	J-2	...	none	.....
605900		1000	33-C-328	...	T	20, 21	4B6033	1	S	...	none	.....
605900		1000	33-F-328	...	T	20, 21	4B6033	1	S	...	none	.....
606563	fig. 1	600	44-E-461	...	CB	20, 21	8A4423	2	S	...	none	.....
606563	fig. 2	600	44-E-465	...	CB	20, 21	8A4423	1	S	...	none	flat seat
614063		800	44-E-420	...	T	20, 21	4B6043	...	S	...	none	66
614257		⑧	23-J-2-Special	...	T	14	614257	...	J-2	...	none	.....
614310		⑧	13.8-J-2-Special	...	T	14	614310	...	J-2	...	none	.....
614473		480	33-D-Special	...	T	20, 21	③	...	S	...	none	64
614603		600	66-C-566	...	CB	20, 21	③	...	S	...	none	.....
614907		300/600	23-J-1-Special	...	T	22	614907	...	J-1	...	none	.....

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

④ Semi-condenser replacement bushing, for use only where standard type S cannot be applied.

⑤ For some applications this bushing was built with solid stud (type J-2).

⑥ Or dwg 15A6865 with 2-layer tap.

⑦ 490-785-1210-1710-2280 amps depending on size of stud.

⑧ 785-1210-1710 amps depending on size of stud.

**part 5****section a: tabulation of drawings**

bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	②notes no.
621428		400	33-C-363	...	CB	20, 21	42A9627	1	S	...	301-C-893, Gr. 1 52B8618, item 5 or 6	122
621428		400	33-F-363	...	CB	20, 21	42A9627	1	S	...	301-C-893, Gr. 1 52B8618, item 5 or 6	122
621428		1200	33-C-370	...	CB	20, 21	42A9627	1	S	...	301-C-893, Gr. 1 52B8618, item 5 or 6	122
621428		1200	33-F-370	...	CB	20, 21	42A9627	1	S	...	301-C-893, Gr. 1 52B8618, item 5 or 6	122
622014		600	66-E-553	...	T	20, 21	6A4269	1	S	...	none	9
622014		2000	66-E-553	...	CB	20, 21	12A2919	3	S	...	none	9, 29
622267		2000	66-C-565	...	CB	20, 21	③	...	S	...	none	10
622267		2000	66-F-565	...	CB	20, 21	③	...	S	...	none	10
622518		2000	33-C-355	...	CB	20, 21	7A9325	7	S	...	none	12
622518		2000	33-F-355	...	CB	20, 21	7A9325	7	S	...	none	12
622698		1200	33-C-Special	...	T	20, 21	③	...	S	...	none	64
622730		250	66-E-Special	...	T	20, 21	4B6060	1	S	...	none	61
623200		600	66-C-564	...	CB	20, 21	7A9327	1	S	...	36B374	12, 92
623200		600	66-F-564	...	CB	20, 21	7A9327	1	S	...	36B374	12, 92
623200		1200	66-C-570	...	CB	20, 21	7A9327	2	S	...	④	12, 92
623200		1200	66-F-570	...	CB	20, 21	7A9327	2	S	...	④	12, 92
623429	fig. 1	....	66-E-514	...	T	20, 21	4B6061	1	S	...	③	62
623476	fig. 1	800	44-E-454	...	T	20, 21	③	...	S	...	305-C-052, Gr. 1 52B8618, item 6	64
623476	fig. 1	800	44-E-454	...	CB	20, 21	42A9628	1	S	...	none	122
623476	fig. 3	800	44-E-Special	...	CB	20, 21	③	...	S	...	none	flat seat
623476	fig. 4	800	44-E-Special	...	CB	20, 21	42A9628	1	S	...	305-C-052, Gr. 1 52B8618, item 6	122
623734		800	77-B-594	...	CB	20, 21	42A9629	1	S	...	305-C-052, Gr. 1 52B8618, item 1	11, 122
623810		450	44-D-416	...	T	20, 21	4B6042	1	S	...	none	...
628387		400	66-E-513	...	T	20, 21	4B6060	1	S	...	none	61
635812		⑤250-450	33-D-323	...	T	20, 21	4B6032	1	S	...	none	...
637376		2000	23-C-264	...	CB	20, 21	8A1153	2	S	...	...	12
637376		2000	23-F-264	...	CB	20, 21	8A1153	2	S	...	...	12
637445		300	44-E-462	...	CB	20, 21	2A8335	...	S	...	none	...
637464		400	92-B-631	...	CB	20, 21	7A1490	1	N	2	none	...
640014		400	15-Special-158	...	CB	....	32A8546	1	S	...	none	...
640015		600	15-Special-159	...	CB	....	9A8077	7	S	...	none	...
640016		600	15-Special-159	...	CB	....	9A8077	7	S	...	none	...
640387		600	69-B-564	...	CB	20, 21	7A9327	1	S	...	36B374	11, 23
643975		600	33-E-353 Bevel Seat	...	CB	20, 21	7A9325	1	S	...	none	43
643975		600	33-F-354 Flat Seat	...	CB	20, 21	7A9325	6	S	...	none	43
643987		2000	23-C-253	...	CB	20, 21	7A9324	4	S	...	none	12, 75
643987		2000	23-F-253	...	CB	20, 21	7A9324	4	S	...	none	12, 75
643996		600/1200	34.5-E-Special	...	T	20, 21	③	...	S	...	none	8, 27, 80
647675		400	34.5-C-363	...	CB	20, 21	③	...	S	...	none	8, 27, 50
647675		400	34.5-F-363	...	CB	20, 21	③	...	S	...	none	8, 27, 50
647681		400	34.5-C-366	...	CB	20, 21	7A9325	3	S	...	61B654	8, 51
647681		400	34.5-F-366	...	CB	20, 21	7A9325	3	S	...	61B654	8, 51
647681		1200	34.5-C-367	...	CB	20, 21	7A9325	3	S	...	61B654	8, 51
647681		1200	34.5-F-367	...	CB	20, 21	7A9325	3	S	...	61B654	8, 51
647684		1200	220-E-850	1	CB	20, 21	③	...	O	1	none	17
647694			88-E-501	1	T	20, 21	6A3614	1	N	2	none	22
647694		600	88-E-501	1	CB	20, 21	17A6795	1	O	2	none	22
647699		600	23-C-260	...	CB	20, 21	7A9324	2	S	...	61B654	12
647699		600	23-F-260	...	CB	20, 21	7A9324	2	S	...	61B654	12
647699		1200	23-C-262	...	CB	20, 21	7A9324	2	S	...	61B654	12
647699		1200	23-F-262	...	CB	20, 21	7A9324	2	S	...	61B654	12
650808		3300	6.9-J-2 Special	...	T	14	650808	...	J-2	...	none	...
654949		500/1000	34.5-E-Special	...	CT	20, 21	③	...	S	...	...	64
656387		1500	34.5-C-Special	...	CT	20, 21	③	...	S	...	...	64
657013		1000	34.5-C-Special	...	CT	20, 21	11B5916	...	S	...	none	14, 54
660000		1000	132-F-703	...	CB	20, 21	③	...	O	2	none	...
660000			132-F-703	...	CB	20, 21	③	...	O	2	none	...
660000			132-F-703	...	T	20, 21	6A2496	1	N	2	none	14, 54, 98, 99
660012			187-B-801	...	T	20, 21	20A1232	...	O	2	none	99
660012		600	187-B-801	...	CB	20, 21	15A6865	1	O	2	none	①
660013			132-E-701	1	T	20, 21	9A6333	1	O	2	none	22, 54, 99

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

④ Non-magnetic adapter similar to dwg 36B374.

⑤ 450 amps for solid stud lead.

⑥ Type "O" bushing--dwg 15A4987, Gr. 1, with one layer tap.

outdoor bushings

4.3 to 345 kv

for power circuit breakers
and transformers

technical
data

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bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					③notes no.
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	
660013		400	132-E-701	1	CB	20, 21	14A1678	1	O	2	none	22, 54
660016		400	110-E-651	1	T	20, 21	16A4161	1	O	2	none	22, 29
660016		400	110-E-651	1	CB	20, 21	13A4484	1	O	2	none	22, 73
660018		600	66-E-553	1	CB	20, 21	③	...	...	1	none	....
660019		600	187-E-801	1	T	20, 21	③	...	O	1	none	17, 99
660019		600	187-E-802	1	CB	20, 21	15A4897	1	O	1	none	①17
660023		400	132-B-701	1	T	20, 21	9A6333	1	O	2	none	22, 54, 99
660023		400	132-B-701	1	CB	20, 21	14A1678	1	O	2	none	22, 54
660024		400	154-E-751	1	T	20, 21	6A5109	1	N	2	none	22, 98, 99
660024		400	154-E-751	1	CB	20, 21	17A6796	1	O	2	none	22
660900		400	46-E-416	...	T	20, 21	4B6042	1	S	...	none	16
660954		600	46-C-467	...	CB	20, 21	③	...	S	...	none	....
661000		600	115-B-654	1	T	20, 21	16A3635	1	O	2	none	22, 29
661000		600	115-B-654	1	CB	20, 21	13A2845	1	O	2	none	22
661005		600	161-B-756	1	T	20, 21	13A9361	1	O	2	none	22, 29
661005		600	161-B-756	1	CB	20, 21	12A3228	1	O	2	none	22
661029		400/800	132-B-720	...	CT	20, 21	③	...	O	...	none	99
661054		1200	23-C-261	...	CB	20, 21	8A1153	3	S	...	none	12, 53
661054		1200	23-F-261	...	CB	20, 21	8A1153	3	S	...	none	12, 53
661054		600	23-C-267	...	CB	20, 21	8A1153	3	S	...	none	12, 53
661054		600	23-F-267	...	CB	20, 21	8A1153	3	S	...	none	12, 53
661060		520	138-B-704	1	T	20, 21	16A3619	1	O	2	none	22, 99
661060		600	138-B-704	1	CB	20, 21	13A4196	1	O	2	none	22
661100		850	46-C-418	...	T	20, 21	11B2745	2	S	...	none	12
661100		850	46-F-418	...	T	20, 21	11B2745	2	S	...	none	12
661200		1075	34.5-C-328	...	T	20, 21	6B4931	1	S	...	none	12
661200		1075	34.5-F-328	...	T	20, 21	6B4931	1	S	...	none	12
662729		1075	132-B-701	1	T	20, 21	9A6333	1	O	2	none	22, 54, 99
662729		400	132-B-701	1	CB	20, 21	14A1678	1	O	2	none	22, 54
662733		2000	34.5-C-364	...	CB	20, 21	7A7004	3	S	...	none	12
662733		2000	34.5-F-364	...	CB	20, 21	7A7004	3	S	...	none	12
662735		300/600	34.5-E-Special	...	CT	20, 21	③	...	S	...	none	64
662737		3000	23-C-263	...	CB	20, 21	15A9772	1	S	...	none	12
662737		3000	23-F-263	...	CB	20, 21	15A9772	1	S	...	none	12
662740		400	110-B-651	1	T	20, 21	16A4161	1	O	2	none	22, 73, 99
662740		400	110-B-651	1	CB	20, 21	13A4484	1	O	2	none	22, 73
662741		2000	23-C-253	...	CB	20, 21	③	...	S	...	none	12, 27
662741		2000	23-F-253	...	CB	20, 21	③	...	S	...	none	12, 27
662743		1260	88-F-605	...	T	20, 21	③	...	O	2	none	77, 99
662743		1260	88-F-605	...	CB	20, 21	③	...	O	2	none	77
662745		600	154-B-751	1	T	20, 21	6A5109	1	N	2	none	22, 98, 99
662745		600	154-B-751	1	CB	20, 21	17A6796	1	O	2	none	22
662757		600	46-E-Special	...	CT	20, 21	53B4246	1	S	...	none	64
662760		600	50-E-Special	...	CT	20, 21	53B4246	1	S	...	none	64
662761		600	92-E-632	...	CB	20, 21	③	...	O	2	none	....
662766		250	34.5-E-323	...	T	20, 21	4B6032	1	S	...	none	16
662769		400	132-B-702	1	T	20, 21	9A7035	1	N	2	none	22, 98, 99
662769		400	132-B-702	1	CB	20, 21	18A1321	1	O	2	none	22
662770		169 & 330	34.5-D-305	...	...	20, 21	16A2830	1	S	...	none	①64
⑥662771		2000	34.5-F-364	...	CB	20, 21	7A7004	8	S	...	none	77, 91
667385		600	115-F-654	1	T	20, 21	16A3635	1	O	2	none	22, 99
667385		600	115-F-654	1	CB	20, 21	13A2845	1	O	2	none	22
667400		169 & 330	44-D-405	...	T	20, 21	14A2122	1	S	...	none	①64
667408		600	46-F-454	...	CB	20, 21	7A9326	2	S	...	90B823	36
680476		1200	46-F-453	...	CB	20, 21	7A9326	3	S	...	none	22, 76, 98, 99
680479	fig. 2	....	92-E-604	1	T	20, 21	13A8850	1	N	2	none	22, 76
680479	fig. 2	600	92-E-604	1	CB	20, 21	7A2140	1	N	2	none	22, 28, 76
680479	fig. 1	1200	92-F-603	1	T	20, 21	13A8850	1	N	2	none	22, 76, 98, 99
680494			69-F-556	...	T	20, 21	③	...	S	...	none	22, 76

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

④ Type "O" bushing—dwg 15A4897, Gr. 1 with one layer tap.

⑤ To replace 662771 on type HS breakers use dwg 21A9879, Gr. 1.

⑥ Semi-condenser replacement bushing, for use only where standard type S cannot be applied.

**part 5** section a: tabulation of drawings

bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					② notes no.
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	
680494		1200	69-F-556	...	CB	20, 21	7A9327	2	S	...	none	31, 32, 92
680494		600	69-F-562	...	CB	20, 21	7A9327	1	S	...	none	31, 32, 92
680540		400	132-B-702	1	CB	20, 21	18A1321	1	O	2	none	22
680541			138-E-704	1	T	20, 21	16A3619	1	O	2	none	22, 29
680541		600	138-E-704	1	CB	20, 21	13A4196	1	O	2	none	22
680557		2000	46-F-Special	...	CB	20, 21	①	7	S	...	none	....
680580		4000	23-F-285	1	T	20, 21	7A9324	1	N	2	none	22, 76, 98, 99
680620			92-F-604	...	...	...	13A8850	...	...	...	...	...
680620		600	92-F-604	1	CB	20, 21	7A2140	1	N	2	none	22, 76
680620		1200	92-F-603	1	CB	20, 21	②	...	N	2	none	22, 76
680621			138-F-704	1	T	20, 21	16A3619	1	O	2	none	22, 29
680621			138-F-704	1	CB	20, 21	13A4196	1	O	2	none	22
680639		600	34.5-E-353	...	CB	20, 21	7A9325	1	S	...	none	....
680663		400	132-E-701	1	CB	20, 21	14A1678	1	O	2	none	22, 54
680665			161-F-756	1	T	20, 21	13A9361	1	O	2	none	22, 99
680665		600	161-F-756	1	CB	20, 21	12A3228	1	O	2	none	22
683800			250-E-855	1	T	20, 21	③	...	O	1	none	17, 99
683800		1200	250-E-855	1	CB	20, 21	④	1	O	1	none	17
684723		400	69-F-513	...	T	20, 21	4B6060	...	S	...	none	61
684775			220-F-851	1	T	20, 21	5A5384	1	N	2	none	13, 17, 98, 99
684775		1200	220-F-851	1	CB	20, 21	19A9002	1	O	2	none	13
④ 690551		600	Special-E-704	1	CB	20, 21	18A4651	1	O	2	none	13, 22
690558		600	115-F-654	1	CB	20, 21	⑤	...	O	2	none	22, 27
690578		600	46-F-452	...	CB	20, 21	7A9326	2	S	...	none	....
690580			34.5-E-Special	...	CB	20, 21	⑥	...	S	...	none	....
690621		600	34.5-F-369	...	CB	20, 21	13A1965	4	J-2	...	none	....
728700		220-370-485	2.5-J-2-Special	...	T	14	⑦	...	J-1	...	none	....
728800		113-250	13.8-J-1-Special	...	T	22	728800	...	J-1	...	none	....
729600		95-169	23-J-1-Special	...	T	22	729600	...	J-1	...	none	....
730103		580	6.9-J-1-Special	...	T	22	730103	...	J-1	...	none	....
730104		805	6.9-J-1-Special	...	T	22	730104	...	J-1	...	none	....
730105		1710	4.6-J-1-Special	...	T	22	730105	...	J-1	...	none	....
730106		3300	4.6-J-2-Special	...	T	14	730106	...	J-2	...	none	....
730107		1710	6.9-J-2-Special	...	T	14	730107	...	J-2	...	none	....
730108		3300	6.9-J-2-Special	...	T	14	730108	...	J-2	...	none	....
730109		580	13.8-J-1-Special	...	T	22	730109	...	J-1	...	none	....
730110		805	13.8-J-1-Special	...	T	22	730110	...	J-1	...	none	....
730111		1710	13.8-J-2-Special	...	T	14	730111	...	J-2	...	none	....
730112		3300	13.8-J-2-Special	...	T	14	730112	...	J-2	...	none	....
730113		580	23-J-1-Special	...	T	22	730113	...	J-1	...	none	....
730114		805	23-J-1-Special	...	T	22	730114	...	J-1	...	none	....
730118		1210	23-J-2-Special	...	T	14	730115	...	J-2	...	none	....
730116		2900	23-J-2-Special	...	T	14	730116	...	J-2	...	none	....
730118		113	15-J-1-Special	...	T	22	730118	...	J-1	...	none	....
730450		110	15-J-1-Special	...	T	22	730450	...	J-1	...	none	....
730451		250	15-J-1-Special	...	T	22	730451	...	J-1	...	none	....
730452		95	23-J-1-Special	...	T	22	730452	...	J-1	...	none	....
730453		165	23-J-1-Special	...	T	22	730453	...	J-1	...	none	....
730460		245	6.9-J-1-Special	...	T	22	730460	...	J-1	...	none	....
775360		580	6.9-J-1-Special	...	T	22	775360	...	J-1	...	none	....
775450		3300	4.6-J-2-Special	...	T	14	775450	...	J-2	...	none	....
775451		2900	6.9-J-2-Special	...	T	14	775451	...	J-2	...	none	....
775453		785	23-J-1-Special	...	T	22	775453	...	J-1	...	none	....
775454		785-1210	13.8-J-2-Special	...	T	14	775454	...	J-2	...	none	....
775456		1710	13.8-J-2-Special	...	T	14	775456	...	J-2	...	none	....
775459		785	23-J-2-Special	...	T	14	775459	...	J-2	...	none	....
775460		1210	4.6-J-2-Special	...	T	14	775460	...	J-2	...	none	....
775462		785	23-J-2-Special	...	T	14	775462	...	J-2	...	none	....
775463		1210	15-J-2-Special	...	T	14	775463	...	J-2	...	none	....
775464		3300	15-J-2-Special	...	T	14	775464	...	J-2	...	none	....

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

④ Has special top terminal. Replacement key 707.

⑤ Replace with dwg 82B9 (220 amps); dwg 64B381 (370 amps); dwg 81B37 (485 amps).

outdoor bushings

4.3 to 345 kv

for power circuit breakers
and transformers

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bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					② notes no.
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	
775465		765	23-J-2-Special	...	T	14	775465	...	I-2	...	none	.....
775468		1710	15-J-2-Special	...	T	14	775468	...	I-2	...	none	.....
775470		785	4.6-J-2-Special	...	T	14	775470	...	I-2	...	none	.....
775471		805	13.8-J-1-Special	...	T	22	775471	...	I-1	...	none	.....
775474		1210	23-J-2-Special	...	T	14	775474	...	I-2	...	none	.....
775475		580	23-J-1-Special	...	T	22	775475	...	I-1	...	none	.....
777609		805	7.5-J-1-Special	...	T	22	777609	...	I-1	...	none	.....
777612		250	13.8-J-1-Special	...	T	22	777612	...	I-1	...	none	.....
777615		169	23-J-1-Special	...	T	22	777615	...	I-1	...	none	.....
777621		305	23-J-1-Special	...	T	22	777621	...	I-1	...	none	.....
796452		450	4.6-J-2-Special	...	T	14	4B7331	...	I-2	...	none	.....
796453		765	4.6-J-2-Special	...	T	14	796453	...	I-2	...	none	.....
796454		1710	4.6-J-2-Special	...	T	14	796454	...	I-2	...	none	.....
796455		3300	4.6-J-2-Special	...	T	14	764455	...	I-2	...	none	.....
796456		450	7.5-J-2-Special	...	T	14	796456	...	I-2	...	none	.....
796457		765	7.5-J-2-Special	...	T	14	796457	...	I-2	...	none	.....
796458		1710	7.5-J-2-Special	...	T	14	796458	...	I-2	...	none	.....
796459		3300	7.5-J-2-Special	...	T	14	796459	...	I-2	...	none	.....
796460		450	15-J-2-Special	...	T	14	4B7700	1	I-2	...	none	.....
796461		765	15-J-2-Special	...	T	14	796461	...	I-2	...	none	.....
796462		1710	15-J-2-Special	...	T	14	796462	...	I-2	...	none	.....
796463		3300	15-J-2-Special	...	T	14	796463	...	I-2	...	none	.....
796464		450	23-J-2-Special	...	T	14	796464	...	I-2	...	none	.....
796465		765	23-J-2-Special	...	T	14	796465	...	I-2	...	none	.....
796466		1210	23-J-2-Special	...	T	14	796466	...	I-2	...	none	.....
796467		2900	23-J-2-Special	...	T	14	796467	...	I-2	...	none	.....
951169		600	34.5-F-350	...	CB	20, 21	19A4791	1	S	...	none	91
951170		1200	34.5-F-352	...	CB	20, 21	7A9325	3	S	...	none	91
952123		3000	34.5-F-371	...	CB	20, 21	②	...	S	...	none	.....
952126		600	23-F-252	...	CB	20, 21	②	...	S	...	none	.....
952127		1200	23-F-251	...	CB	20, 21	7A9324	2	S	...	none	.....
952158		600	15-F-152	...	CB	20, 21	13A4480	1	S	...	none	.....
952159		1200	15-F-154	...	CB	20, 21	③	...	S	...	none	.....
952160		50	34.5-F-312	...	T	20, 21	4B6030	1	S	...	none	.....
955087		...	132-F-702	1	T	20, 21	9A7035	...	N	2	none	22, 98, 99
955087		400	132-F-702	1	CB	20, 21	18A1321	1	O	2	none	22
1A737		...	230-F-851	1	T	20, 21	③	...	O	1	none	17, 99
1A737		1200	230-F-851	1	CB	20, 21	③	...	O	1	none	17
1A738		1200	69-F-556	...	CB	20, 21	7A9327	2	S	...	none	13
1A835		500/1000	46-E-Special	...	CT	20, 21	③	...	S	...	yes	64
1A888		...	59-E-Special	...	CT	20, 21	③	...	S	...	.....	64
1A1443	1	3000	23-G-Special	...	CT	15	③	...	S	...	none	82, 98, 99
1A2342	...	505	230-G-854	2	T	15	5A4330	1	N	2	none	22, 29
1A2590	...	515	115-G-654	1	T	15	16A3635	1	O	2	none	.....
1A3170	1	300/600	161-K-Special	...	CT	17	11A2217	1	CT	...	none	102
1A3174	4	400	69-OK1-513	...	T	17	12A8938	4	OK1	...	none	70
1A3366	...	585	161-G-754	1	T	15	11A2161	1	N	2	none	22, 82, 98, 99
1A4839		2000	23-OG-253	...	CB	15	③	...	OS	...	none	.....
1A4888		1200	34.5-OG-370	...	CB	15	③	...	OS	...	none	.....
1A5041		600	15-G-1-151	...	CB	15	9A8077	3	S	...	none	.....
1A5080		1200	69-G-556	...	CB	15	7A9327	2	S	...	none	.....
1A5080		400	69-G-556	...	T	15	③	...	S	...	none	.....
1A5179		600	23-G-1-266	...	CB	15	9A8429	1	S	...	none	.....
1A5247		400	110-G-651	1	CB	15	13A4484	1	O	2	none	20, 22, 73
1A5249		1200	15-G-1-155	...	CB	15	13A4480	4	S	...	none	.....
1A6121		1200	34.5-G-352	...	CB	15	③	...	S	...	none	.....
1A6199		600	15-G-1-153	...	CB	15	9A8077	1	S	...	none	.....
1A7249	1	600	161-M-755	1	CB	18	12A3228	1	O	2	none	22
1A7463		1200	34.5-OG-370	...	CB	15	③	...	OS	...	none	48
1A8028		1200	34.5-OG-362	...	CB	15	③	...	OS	...	none	48

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

**part 5****section a: tabulation of drawings**

bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					② notes no.
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	
1A8138	....	1200	34.5-OG-357	...	CB	15	③	...	OS	...	none	48
1A8195	....	600	34.5-OG-353	...	CB	15	19A4761	1	OS	...	none	...
1A8294	....	2000	34.5-G-355	...	CB	15	③	...	S	...	none	...
1A8883	....	2000	34.5-G-364	...	CB	15	7A7004	8	S	...	none	...
1A9652	....	...	115-G-Special	...	CT	15	8A8020	1	N	2	none	22, 82, 99
2A1632	4	600	138-OK-704	...	T	17	16A3619	1	O	2	none	30, 96, 99
2A1758	4	515	115-OK-681	...	T	17	②	...	OK ₁	2	none	30, 96, 99
2A1758	4	600	115-OK-681	2	CB	17	12A3226	1	O	2	none	30, 96, 97, 99
2A1758	...	890	37-OG-352	...	T	15	③	...	OS	...	none	30, 96
2A1930	...	400	187-OK-801	1	T	17	③	...	S-O	1	none	17, 99
2A2080	1	400	77-K-556	...	T	17	③	...	S	...	none	64
2A2269	...	400	69-K-514	...	CT	17	4B6061	1	S	...	none	...
2A2331	....	600	138-G-706	1	T	15	16A6614	1	O	2	none	22, 78, 99
2A2331	....	600	138-G-706	1	CB	15	12A3227	1	O	2	none	22
2A3135	....	515	115-OK-654	1	T	17	16A3635	...	O	2	none	22, 99
2A4605	....	400	110-G-651	2	CB	15	13A4484	1	O	2	none	73
2A4605	....	515	110-G-651	2	T	15	16A4161	1	O	2	none	99
2A4701	....	400	92-G-631	1	CB	15	7A1490	1	N	2	none	2
2A4913	....	400	154-M-751	2	CB	18	16A6796	1	O	...	none	...
2A5317	....	600	23-OG-265	...	CB	15	③	...	OS	...	none	...
2A6314	1	600	138-G-714	2	CB	15	12A3227	1	O	2	none	78
2A6366	....	1200	34.5-OG-352	...	CB	15	③	...	OS	...	none	30
2A6431	....	600	23-OG-266	...	CB	15	③	...	OS	...	none	...
2A6586	....	1200	23-OG-251	...	CB	15	③	...	OS	...	none	48
2A7045	....	1200	161-G-755	2	T	15	12A3228	1	O	2	none	22, 99
2A7045	....	600	161-G-755	2	CB	15	13A9362	1	O	2	none	...
2A8335	3	300	44-S-462	...	CB	12, 13	2A8335	3	S	...	none	...
2A8335	1 or 2	300	44-G-462	...	CB	15	2A8335	3	S	...	none	...
2A9770	....	1200	196-G-803	1	CB	15	③	...	O	1	none	17
2A9850	....	600	66-M-553	...	CB	18	19A4761	1	OS	...	none	...
2A9884	....	600	18-G-1-151	...	CB	15	7A2053	2	G-1	...	none	...
2A9918	1	1000	132-G-703	2	CB	15	③	...	O	2	none	54
2A9954	....	600	34.5-OG-353	...	CB	15	19A4761	1	OS	...	none	30
3A2157	....	...	110-G-Special	...	CT	15	③	...	O	...	none	67, 99
3A2598	....	...	34.5-OG-344	...	CT	15	4B6037	4	OS	...	none	...
3A2602	....	...	34.5-OG-Special	...	CT	15	11B7117	...	OS	...	none	13
3A2607	....	100/200	34.5-OG-343	...	CT	15	4B6036	4	OS	...	none	...
3A2633	....	400	69-G-513	...	T	15	④4B6060	1	S	...	none	69
3A3119	....	1200	138-G-Special	2	CT	15	③	...	O	...	none	27, 99
3A3187	4	350	115-OK-654	2	T	17	34A5256	2	O	2	none	99, 101
3A3235	4	515	115-OK-654	2	T	17	16A2455	4	OK ₁	2	none	99
3A3284	....	480	288-G-901	1	T	15	③	...	O	1	none	13, 17, 99
3A3487	....	1125	138-G-716	1	T	15	③	...	SI	2	none	13, 22, 99
3A3672	....	100/200	34.5-G-1-343	...	CT	15	③	...	...	...	none	70
3A4075	....	100/200	23-G-Special	...	CT	15	③	...	S	...	none	68
③3A4241	....	890	34.5-OG-370	...	T	15	③	...	OS	...	none	96
3A4581	....	400	69-G-513	2	T	15	③16A2496	1	OS ₁	2	none	...
3A4707	....	400	34.5-G-Special	...	T	15	24B5816	1	S	...	none	64
3A4799	....	750	69-G-516	...	T	15	③	...	S	...	none	69
3A5382	1	250	66-OK-553	...	T	17	6A4269	4	OS	...	none	...
3A5383	1	300/600	69-OK-540	...	CT	17	④4B6065	4	OS	...	none	...
3A6160	2	600	Special-OK-707	2	CB	17	③18A4651	1	O	2	none	27, 55, 99
3A6191	....	400	69-G-Special	...	T	15	③	...	S	...	none	...
3A6425	1	600	Special-OK-707	2	T	17	③⑤	...	O	...	none	27, 55, 99
3A8113	....	1200	196-G-805	2	CB	15	13A1947	1	O	2	none	...
3A8114	....	3000	23-G-263	...	CB	15	15A9772	1	S	...	none	...
3A8133	....	600	23-G-256	2	CB	15	7A9324	1	S	...	none	...
3A8134	....	1200	138-G-732	2	CB	15	18A9967	2, 7	O	2	none	57, 97, 99
3A8135	....	600	23-OG-256	2	CB	15	③	...	OS	...	none	48
3A8136	....	1200	138-M-732	2	CB	18	18A9967	2, 7	O	2	none	57, 97, 99

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

④ Plus insulating head dwg 8A9554.

⑤ With magnetic oil gauge.

⑥ For bushing with oil gauge use dwg 11B2755, Gr. 1.

⑦ Has special top terminal.

outdoor bushings

4.3 to 345 kv

for power circuit breakers
and transformers

technical
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bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements						②notes no.
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.		
3A8147	....	600	69-G-562	...	CB	15	7A9327	1	S	...	none	32	
3A8362	....	600	69-M-562	...	CB	18	18A7270	1	OS	...	none	32	
3A8375	....	600	34.5-G-351	...	CB	15	7A9325	2	S	...	none	.....	
3A8376	....	600	34.5-OG-351	...	CB	15	③	...	OS	...	none	.....	
3A8469	....	600	110-M-651	1	CB	18	13A4484	2	O	2	none	22	
2A8577	....	600	115-G-681	2	CB	15	③	...	O	2	none	26, 27, 96, 97	
3A9429	....	600	115-G-681	2	CB	15	12A3226	1	O	2	none	26, 96, 97	
3A9915	....	1200	34.5-G-352	...	CB	15	7A9325	3	S	...	none	.....	
3A9916	....	1200	34.5-G-370	...	CB	15	④	...	S	...	none	27	
4A885	....	.....	92-F-606	1	T	20, 21	④	...	O	2	.....	98, 99	
4A893	....	.....	88-F-605	1	T	20, 21	④	...	O	2	.....	22, 64, 99	
4A1925	....	1200	23-G-251	...	CB	15	7A9324	2	S	...	none	.....	
4A1980	....	2000	23-G-253	...	CB	15	7A9324	4	S	...	none	.....	
4A2072	....	600	15-G-1-199	...	CB	15	9A8077	7	S	...	none	.....	
4A2548	....	600	34.5-G-353	...	CB	15	7A9325	1	S	...	none	.....	
4A2548	....	600	34.5-G-354	...	CB	15	7A9325	6	S	...	none	42	
4A2549	....	600	46-G-451	...	CB	15	7A9326	1	S	...	none	.....	
4A4513	....	400	15-G-1-158	...	CB	15	9A8077	8	S	...	none	.....	
4A5902	....	600	15-G-1-151	...	CB	15	9A8077	3	S	...	none	.....	
4A5903	....	1200	15-G-1-153	...	CB	15	9A8077	1	S	...	none	.....	
4A5904	1	600	23-G-1-266	...	CB	15	9A8429	1	S	...	none	.....	
4A5908	....	600	34.5-OG-351	...	CB	15	③	...	OS	...	none	30	
4A5980	....	600	15-G-1-151	...	CB	15	9A8077	4	S	...	none	.....	
4A5981	....	1200	15-G-1-153	...	CB	15	9A8077	2	S	...	none	.....	
4A6001	....	.....	110-G-651	1	T	15	16A4161	1	O	2	none	22, 99	
4A6001	....	400	110-G-651	1	CB	15	13A4484	1	O	2	none	22	
4A6089	....	600	34.5-OG-353	...	CB	15	19A4671	1	OS	...	none	41	
4A6089	....	600	34.5-OG-354	...	CB	15	19A4671	2	OS	...	none	41	
4A6090	....	600	69-Special-553	...	CB	.....	4A6090	...	Spcl.	...	none	.....	
4A6163	....	1200	43-G-453	...	CB	15	7A9326	3	S	...	none	.....	
4A6164	1	600	34.5-Special-353	...	CB	.....	4A6164	1	Spcl.	...	none	38, 39	
4A6164	2	600	34.5-Special-354	...	CB	.....	4A6164	2	Spcl.	...	none	38, 39	
4A6165	....	600	115-M-654	2	CB	18	13A2845	2	O	2	none	.....	
4A7315	....	600	46-G-452	...	CB	15	7A9326	2	S	...	none	.....	
4A7413	....	1200	115-K-682	2	CB	17	④	...	O	2	none	26, 30, 78	
4A7828	....	.....	115-G-654	1	T	15	16A3635	1	O	2	none	22, 29	
4A7828	....	600	115-G-654	1	CB	15	13A2845	1	O	2	none	22	
4A7890	....	2000	23-G-253	...	CB	15	7A9324	5	S	...	none	.....	
4A7913	....	3000	23-G-254	...	CB	15	7A9324	6	S	...	none	.....	
5A3277	4	600	138-OK-704	2	T	17	16A2810	4	OK ₁	2	none	98, 99	
5A3277	4	600	138-OK-704	2	CB	17	13A4196	1	O	2	none	.....	
5A4315	1	515	115-N-664	2	T	19	13A9315	1	O	2	none	99	
5A4330	1	505	230-N-854	2	T	19	③	...	O	2	none	99	
5A4330	6	1200	230-N-856	2	CB	19	5A4330	6	N	2	none	98, 99	
5A4388	1	600	138-N-714	2	T	19	9A6238	1	N	2	none	98, 99	
5A4361	1	585	161-N-754	2	T	19	11A2161	1	N	2	none	98, 99	
5A4361	1	1200	161-N-754	2	CB	19	12A3228	1	O	2	none	.....	
5A4392	1	565	92-N-614	2	T	19	13A9292	1	O	2	none	99	
5A4396	1	555	195-N-804	2	T	19	11A2196	1	N	2	none	98, 99	
5A4396	1	1200	195-N-804	2	CB	19	13A1947	1	O	2	none	.....	
5A4748	1	515	110-N-651	2	T	19	16A4161	1	O	2	none	99	
5A4748	1	600	110-N-651	2	CB	19	13A4484	1	O	2	none	.....	
5A4910	1	100/200	34.5-K-343	...	CT	17	5A4910	1	K	...	none	63	
5A5070	....	515	115-G-Special	2	T	15	③	...	O	2	none	27, 99	
5A5134	1	400	34.5-K-323	...	T	17	12A7024	1	K	...	none	63	
5A5384	1	505	230-N-851	2	T	19	16A6048	...	O	2	none	13, 99	
5A5384	1	1200	230-N-851	2	CB	19	③	...	O	2	none	13	
5A5692	1	520	138-N-704	2	T	19	16A3619	1	O	2	none	99	
5A5999	1	320	13.8-S-113	...	T	12, 13	4B8526	1	S	...	none	.....	
5A6008	....	4000	23-G-255	...	CB	15	7A9324	8	S	...	none	.....	

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

**part 5** section a: tabulation of drawings

bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					② notes no.
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	
5A6086	.....	1200	69-OG-556	...	CB	15	18A7270	2	OS	...	none	30
5A6273	.....	800	77-G-594	...	CB	15	12A2918	1	S	...	none	.....
5A6274	.....	600	46-G-467	...	CB	15	③	...	S	...	none	.....
5A6275	.....	4000	23-G-255	...	CB	15	7A9324	7	S	...	none	.....
5A8896	1	600	115-N-681	2	CB	19	12A3226	1	O	2	none	26, 96, 97
5A8896	6	600	115-N-681	2	T	19	8A7862	...	N	2	none	96, 98, 99
5A8897	1	1200	115-N-682	2	CB	19	12A3226	2	O	2	none	26, 96, 97
5A9446	.....	④600	34.5-G-1-357	...	CB	15	5A9446	...	G-1	...	none	44
5A9463	1 or 2	515	115-N-654	2	T	19	16A3635	1	O	2	none	99
5A9463	1 or 2	600	115-G-654	2	CB	15	13A2845	1	O	2	none	.....
5A9467	.....	400	34.5-G-361	...	CB	15	②	...	S	...	none	49
5A9469	1	600	138-N-731	2	CB	19	18A9967	1	O	2-7	none	57, 103
5A9470	1	1200	138-N-732	2	CB	19	18A9967	2	O	2-8	none	57, 104
5A9515	1	1200	161-N-755	2	CB	19	12A3228	1	S	...	none	.....
5A9598	.....	1200	23-S-251	...	CB	12, 13	③	...	S	...	none	.....
5A9741	.....	1200	34.5-G-362	...	CB	15	③	...	S	...	none	.....
5A9742	1	600	138-N-731	1	CB	19	18A9967	1	O	2-7	none	57, 103
6A1225	.....	1200	34.5-G-370	...	CB	15	7A7004	3	S	...	none	50
6A1226	.....	2000	34.5-G-355	...	CB	15	11A6899	2	S	...	none	.....
6A1227	.....	1200	23-G-261	...	CB	15	8A1153	3	S	...	none	.....
6A1229	1	600	46-G-466	...	CB	15	18A1319	1	S	...	none	.....
6A1241	.....	600	34.5-OG-351	...	CB	15	③	1	OS	...	none	.....
6A1286	1	600	23-G-256	...	CB	15	7A9324	...	S	...	none	.....
6A1395	1	600	115-N-681	2	CB	19	③	1	O	2	none	26, 27, 96
6A1398	1	1200	115-N-682	2	CB	19	③	1	O	2	none	26, 27, 96
6A1440	.....	600	15-G-1-151	...	CB	15	14A3430	1	S	...	none	27
6A1441	.....	1200	15-G-1-153	...	CB	15	③	1	S	...	none	27
6A1504	1	600	110-N-651	2	CB	19	13A4484	1	O	2	none	.....
6A1506	1	600	115-N-654	2	CB	19	13A2845	1	O	2	none	25, 96, 99
6A1506	8	600	115-ON-654	2	CB	19	18A1321	1	O	2	none	99
6A1515	.....	600	132-G-702	2	CB	15	11A6599	2	S	...	none	.....
6A1516	.....	2000	34.5-G-355	...	CB	15	11A6599	1	S	...	none	.....
6A1517	.....	1200	34.5-G-352	...	CB	15	③	...	S	...	none	.....
6A1534	.....	600	23-G-1-266	...	CB	12, 13	6A1732	...	S	...	none	.....
6A1732	.....	2000	23-S-253	...	CB	12, 13	6A1733	1	S	...	none	.....
6A1733	1	3000	23-S-254	...	CB	12, 13	6A1735	...	Spcl.	...	none	.....
6A1735	.....	1200	34.5-Special-352	...	CB	...	13A1947	1	O	2	none	.....
6A1812	1	1200	196-N-804	2	CB	19	7A9325	3	S	...	none	.....
6A1925	.....	1200	34.5-G-352	...	CB	15	9A6333	1	O	2	none	99
6A2496	1	480	132-N-701	2	T	19	4B8529	1	S	...	none	101
6A2656	1	610	34.5-S-323	...	T	12, 13	4B8528	1	S	...	none	101
6A2673	1	290	34.5-S-313	...	T	12, 13	16A6614	1	O	2	none	78, 99
6A2689	1	600	138-N-706	2	T	19	4B6032	1	S	...	none	69
6A2747	.....	400	34.5-G-323	...	T	15	③	...	S	...	none	.....
6A2934	.....	400	77-G-556	...	T	15	③	...	S	...	none	.....
6A3591	.....	100/200	73-G-543	...	T	19	16A4188	1	O	2	none	99
6A3614	1	565	88-N-601	2	T	15	4B7297	1	SI	...	none	70
6A3674	.....	400	69-G-1-513	...	T	15	440C463	2	S-OS	...	none	.....
6A4269	1	265/500	73-S-553	...	T	12, 13	16A3635	1	O	2	none	99
6A4657	1	515	115-N-654	2	T	19	20A3766	...	O	2	none	.....
6A5109	1	490	154-N-751	2	T	19	7B2086	4	OS	...	none	.....
6A6204	1	200/400	46-OG-444	...	CT	15	15A6957	1	Spcl.	2	none	35
6A8445	1	600	69-G-562	2	CB	15	13A4196	1	O	2	none	.....
6A8447	1	600	138-N-704	2	CB	19	7A9326	1	S	...	none	.....
6A8871	1	600	46-G-451	...	CB	15	7A9326	2	S	...	none	.....
6A8871	2	600	46-G-452	...	CB	15	7A9326	...	S	...	none	.....
6A8871	3	1200	46-G-453	...	CB	15	7A9326	3	S	...	none	.....
6A8872	1	1200	23-G-259	...	CB	15	8A1153	1	S	...	none	52
6A8873	1	600	34.5-G-351	...	CB	15	7A9325	2	S	...	none	.....
6A8873	2	600	34.5-G-353	...	CB	15	7A9325	1	S	...	none	.....

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

④ At 25 cycles.

outdoor bushings

4.3 to 345 kv

for power circuit breakers
and transformers

technical
data

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bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements						②notes no.
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.		
6A8873	3	600	34.5-S-354	...	CB	12, 13	7A9325	6	S	...	none	...	
6A8873	4	1200	34.5-S-352	...	CB	12, 13	42A9627	1	S	...	{ 52B8619, Gr. 4 52B8618, item 4	122	
6A8873	5	2000	34.5-G-355	...	CB	15	7A9325	4	S	...	none	...	
6A8873	6	3000	34.5-G-356	...	CB	15	7A9325	5	S	...	none	...	
6A8890	1	600	23-G-256	...	CB	15	42A9626	1	S	...	{ 52B8619, Gr. 5 52B8618, item 7	122	
6A8890	2	1200	23-G-251	...	CB	15	42A9626	1	S	...	{ 52B8619, Gr. 1 52B8618, item 2	122	
6A8890	3	2000	23-G-253	...	CB	15	7A9324	4	S	...	none	...	
6A8890	4	2000	23-G-253	...	CB	15	7A9324	5	S	...	none	...	
6A8890	5	2000	23-G-257	...	CB	15	7A9324	3	S	...	none	...	
6A8890	6	3000	23-G-254	...	CB	15	7A9324	6	S	...	none	...	
6A8890	7	4000	23-G-255	...	CB	15	7A9324	7	S	...	none	...	
6A8890	8	4000	23-G-255	...	CB	15	7A9324	8	S	...	none	...	
6A8895	1	600	69-G-562	...	CB	15	42A9629	1	S	...	{ 52B8647, Gr. 1 52B8618, item 1	122	
6A8895	2	1200	69-G-556	...	CB	15	42A9629	1	S	...	{ 52B8647, Gr. 2 52B8618, item 1	122	
7A1372	1	600	46-S-451	...	CB	12, 13	7A1372	1	S	...	none	...	
7A1373	1	600	138-N-715	2	CB	19	12A3227	1	O	2	none	79	
7A1373	9	600	138-N-706	2	CB	19	④12A3227	9	O	2	none	79	
7A1450	1	1200	34.5-G-352	...	CB	15	11A6599	1	S	...	none	...	
7A1450	2	2000	34.5-G-355	...	CB	15	11A6599	2	S	...	none	...	
7A1450	3	3000	34.5-G-355	...	CB	15	④	...	S	...	none	...	
7A1450	4	3000	34.5-G-371	...	CB	15	④	...	S	...	none	...	
7A1450	5	600	34.5-G-353	...	CB	15	13A1965	1	S	...	none	27	
7A1450	6	600	34.5-G-368	...	CB	15	④	...	S	...	none	...	
7A1490	1	400	88-N-631	2	CB	19	7A1490	1	N	2	none	...	
7A2058	1	600	15-G-1-151	...	CB	15	9A8077	3	S	...	none	...	
7A2058	2	600	15-G-1-151	...	CB	15	9A8077	4	S	...	none	...	
7A2058	3	1200	15-G-1-153	...	CB	15	9A8077	2	S	...	none	...	
7A2058	4	1200	15-G-1-153	...	CB	15	9A8077	1	S	...	none	...	
7A2063	1	1200	230-N-856	2	CB	19	13A4200	1	O	2	none	...	
7A2113	1	600	34.5-OG-353	...	CB	15	19A4761	1	OS	...	none	...	
7A2113	2	600	34.5-OG-353	...	CB	15	④	...	OS	...	none	...	
7A2113	3	1200	34.5-OG-370	...	CB	15	42A9627	1	S	...	{ 301-C-893, Gr. 1 52B8618, item 5	122	
7A2113	4	1200	34.5-OG-370	...	CB	15	42A9627	1	S	...	{ 301-C-893, Gr. 1 52B8618, item 5	122	
7A2113	5	1200	34.5-OG-352	...	CB	15	42A9627	1	S	...	{ 52B8619, Gr. 4 52B8618, item 5	122	
7A2113	6	3000	34.5-OG-356	2	CB	15	④	...	OS	...	none	...	
7A2140	1	600	92-N-604	2	CB	19	7A2140	1	N	2	none	...	
7A2142	1	1200	Special-N-707	2	CB	19	18A4651	1	O	2	none	25, 27	
7A2142	2	1200	Special-ON-707	2	CB	19	18A4651	1	O	2	none	25, 27	
7A2154	1	3000	23-G-254	...	CB	15	11A5185	1	S	...	none	27	
7A2154	2	2000	23-G-253	...	CB	15	④	...	S	...	none	...	
7A2154	3	1200	23-G-251	...	CB	15	42A9626	1	S	...	{ 52B8619, Gr. 1 52B8618, item 2	122	
7A2343	1	800	138-N-701	2	CB	19	14A1678	1	O	2	none	...	
7A2343	2	800	138-ON-701	2	CB	19	14A1678	2	O	2	none	...	
7A2481	1	3000	23-S-254	...	CB	12, 13	7A2481	1	S	...	none	...	
7A3702	1	600	69-M-562	...	CB	18	42A9629	1	S	...	{ 52B8647, Gr. 1 52B8618, item 1	122	
7A6262	1	600	69-G-562	...	CB	15	42A9629	1	S	...	{ 52B8647, Gr. 1 52B8618, item 1	122	
7A6438	10	600	110-N-651	2	CB	19	13A4484	1	O	2	none	20, 73	
7A6438	1	600	110-N-651	2	CB	19	14A4484	1	O	2	none	37	
7A7002	1	3000	23-OG-254	...	CB	15	④	...	OS	...	none	...	
7A7004	1	600/1200	34.5-S-367	...	CB	12, 13	7A7004	1	S	...	none	...	
7A7004	2	1200	34.5-S-370	...	CB	12, 13	42A9627	1	S	...	{ 301-C-893, Gr. 1 52B8618, item 5	122	
7A7004	3	1200	34.5-S-370	...	CB	12, 13	42A9627	1	S	...	{ 301-C-893, Gr. 1 52B8618, item 5	122	

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

④ Requires special flange drilling.

**part 5****section a: tabulation of drawings**

bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					② notes no.
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	
7A7004	4	1200	34.5-S-370	...	CB	12, 13	42A9627	1	S	...	{ 301-C-893, Gr. 1 52B8618, item 5	122
7A7004	5	600	34.5-S-Special	...	CB	12, 13	7A7004	5	S	...	none	.....
7A7004	6	1200	34.5-S-Special	...	CB	12, 13	7A7004	6	S	...	none	.....
7A7004	7	2000	34.5-S-Special	...	CB	12, 13	7A7004	7	S	...	none	.....
7A7004	8	2000	34.5-S-364	...	CB	12, 13	7A7004	8	S	...	none	.....
7A7004	9	1200	34.5-S-370	...	CB	12, 13	42A9627	1	S	...	{ 301-C-893, Gr. 1 52B8618, item 5	122
7A7006	1	600	34.5-S-350	...	CB	12, 13	7A7006	1	S	...	none	.....
7A7006	2	1200	34.5-S-370	...	CB	12, 13	42A9627	1	S	...	{ 301-C-893, Gr. 1 52B8618, item 5	122
7A7006	3	1200	34.5-S-370	...	CB	12, 13	42A9627	1	S	...	{ 301-C-893, Gr. 1 52B8618, item 5	122
7A7006	4	1200	34.5-S-352	...	CB	12, 13	42A9627	1	S	...	{ 301-C-893, Gr. 1 52B8618, item 5	122
7A7006	5	600	34.5-S-353	...	CB	12, 13	7A7006	5	S	...	none	.....
7A7006	6	2000	34.5-S-355	...	CB	12, 13	7A7006	6	S	...	none	.....
7A9324	1	600	23-S-256	...	CB	12, 13	42A9626	1	S	...	{ 52B8619, Gr. 5 52B8618, item 7	122
7A9324	2	1200	23-S-251	...	CB	12, 13	42A9626	1	S	...	{ 52B8619, Gr. 1 52B8618, item 2	122
7A9324	3	2000	23-S-257	...	CB	12, 13	7A9324	3	S	...	none	.....
7A9324	4	2000	23-S-253	...	CB	12, 13	7A9324	4	S	...	none	.....
7A9324	5	2000	23-S-253	...	CB	12, 13	7A9324	5	S	...	none	.....
7A9324	6	3000	23-S-254	...	CB	12, 13	7A9324	6	S	...	none	.....
7A9324	7	4000	23-S-255	...	CB	12, 13	7A9324	7	S	...	none	.....
7A9324	8	4000	23-S-255	...	CB	12, 13	7A9324	8	S	...	none	.....
7A9325	1	600	34.5-S-353	...	CB	12, 13	7A9325	1	S	...	none	.....
7A9325	2	600	34.5-S-351	...	CB	12, 13	42A9627	1	S	...	{ 52B8619, Gr. 3 52B8618, item 4	122
7A9325	3	1200	34.5-S-352	...	CB	12, 13	42A9627	1	S	...	{ 52B8619, Gr. 4 52B8618, item 5	122
7A9325	4	2000	34.5-S-355	...	CB	12, 13	7A9325	4	S	...	none	.....
7A9325	5	3000	34.5-S-355	...	CB	12, 13	7A9325	5	S	...	none	.....
7A9325	6	600	34.5-S-354	...	CB	12, 13	7A9325	6	S	...	none	.....
7A9325	7	2000	34.5-S-355	...	CB	12, 13	7A9325	7	S	...	none	.....
7A9326	1	600	46-S-451	...	CB	12, 13	7A9326	1	S	...	none	.....
7A9326	2	600	46-S-452	...	CB	12, 13	42A9628	1	S	...	{ 52B8644, Gr. 1 52B8618, item 6	122
7A9326	3	1200	46-S-453	...	CB	12, 13	7A9326	3	S	...	none	.....
7A9326	4	1200	46-S-455	...	CB	12, 13	42A9628	1	S	...	{ 52B8644, Gr. 2 52B8618, item 6	122
7A9327	1	600	69-S-562	...	CB	12, 13	42A9629	1	S	...	{ 52B8647, Gr. 1 52B8618, item 1	122
7A9327	2	1200	69-S-556	...	CB	12, 13	42A9629	1	S	...	{ 52B8647, Gr. 2 52B8618, item 1	122
7A9327	3	600	69-S-561	...	CB	12, 13	7A9327	3	S	...	none	.....
7A9327	4	2000	69-S-558	...	CB	12, 13	④ 44A1262	1	S	...	none	.....
7A9551	1	600	115-K-654	2	CB	17	13A2845	1	O	2	none	.....
7A9551	2	600	115-OK-654	2	CB	17	13A2845	2	O	2	none	.....
8A1153	1	1200	23-S-259	...	CB	12, 13	8A1153	1	S	...	none	.....
8A1153	2	2000	23-S-264	...	CB	12, 13	8A1153	2	S	...	none	.....
8A1153	3	1200	23-S-261	...	CB	12, 13	8A1153	3	S	...	none	.....
8A1153	4	600	23-S-265	...	CB	12, 13	8A1153	4	S	...	none	.....
8A2455	1	1200	161-G-755	2	CB	15	12A3228	1	O	2	none	.....
8A2456	1	600	15-S-151	...	CB	12, 13	8A2456	1	S	...	{ 52B8619, Gr. 1 52B8618, item 2	122
8A2847	1	1200	23-S-251	...	CB	12, 13	42A9626	1	S	...	none	.....
8A2847	2	2000	23-S-253	...	CB	12, 13	8A2847	2	S	...	none	.....
8A2847	3	3000	23-S-254	...	CB	12, 13	8A2847	3	S	...	none	.....
8A2847	4	4000	23-S-255	...	CB	12, 13	8A2847	4	S	...	none	.....
8A3277	1	600	138-N-733	2	CB	19	⑤	...	O	2	none	.....
8A4421	1	600	138-N-702	2	CB	19	18A1321	1	O	2	none	.....
8A4422	1	600	115-ON-681	2	CB	19	13A2845	1	O	2	none	30, 97
8A4423	1	600	46-S-465	...	CB	12, 13	8A4423	1	S	...	.....	.....
8A4423	2	600	46-S-461	...	CB	12, 13	8A4423	2	S	...	.....	.....

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

④ Has power factor tap.

outdoor bushings

4.3 to 345 kv

for power circuit breakers
and transformers

technical
data

33-360

page 57

bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	②notes no.
④8A5063 8A5240 8A6459 8A7862	1 1 1 1	700/1250 1550 1200 600	92-G-Special 34.5-S-326 150-N-707 115-N-681	 2 2	T T T T	15 12, 13 19 19	26A9968 53B2236 ⑤ ⑤	... ... ... ...	O S-OS O O	 2 2	585D150, Gr. 8,28 none none yes	27 122 13, 99 96, 99
④8A7890 8A8019 8A8020 8A8269	1 1 1 1	600/900 3000 400/800 2160	115-N-Special 34.5-G-340 115-N-Special 25-S-Special	2 ... 2 ...	CT T CT T	19 15 19 12, 13	11A3436 11B7199 ① 8A8269	1 1	N S O S	2 ... 2 ...	none none none none	100 ... 99 96
8A8270 8A8984 8A9159 8A9162	6 1 1	800 400 305 100/200	69-OK-Special 73-K-Special 34.5-S-312 34.5-S-343	... ... ... ...	T T T CT	17 17 12, 13 12, 13	③ 12A6332 53B2231 6B4377	 1	OS K S-OS S	... ... ... ...	none none 585D150, Gr. 4 none	... 63 122, 125 101, 100
8A9674 9A266 9A315 9A2707	1 1	2130 600 600	34.5-G-Special 138-F-704 196-F-803 15-S-151	... 1 1 ...	T CB T CB	15 20, 21 20, 21 12, 13	11B7199 ⑤ ⑤ 9A2707	1 1	S O O S	... 2 1 ...	none none none none	... 22, 27 17, 99 ...
9A5928 9A5928 9A315 9A6238	1 2	600 600 ... 600	88-N-601 88-ON-601 196-F-803 138-N-715	2 2 1 2	CB CB T T	19 19 20, 21 19	17A6795 17A6795 ③ 13A9338	1 1 ... 1	O O O O	2 2 1 2	 none none	 17, 99 99
9A6333 9A7035 9A7531 9A7532	1 1 1	⑥600 600 400 600	132-O-701 138-N-702 34.5-G-Special 154-N-752	2 2	T T ... T	10, 11 19 15 19	9A6333 ⑤ ⑤ 16A4484	1 1	O O S S	2 2	none none	... 99 71 99
9A7928 9A8077 9A8077 9A8077	 1 2 3	600 1200 1200 600	138-N-715 15-S-153 15-S-153 15-S-151	2	T CB CB CB	19 12, 13 12, 13 12, 13	13A9338 9A8077 9A8077 9A8077	1 1 2 3	O S S S	2	none	27, 99
9A8077 9A8077 9A8077 9A8077	4 5 6 7	600 1200 600 600	15-S-151 15-S-153 15-S-151 15-S-159	... ... ... ...	CB CB CB CB	12, 13 12, 13 12, 13 12, 13	9A8077 9A8077 9A8077 9A8077	4 5 6 7	S S S S	... ... ... ...	... ... ... ...	... ... ... ...
9A8077 9A8429 9A8429 9A8474	8 1 2 1	400 600 600 2000	15-S-158 23-S-266 23-S-266 34.5-Special-364	... ... ... ...	CB CB CB CB	12, 13 12, 13 12, 13 ...	9A8077 9A8429 9A8429 7A7004	8 1 2 8	S S S S	... ... ... ...	... ... ... ...	... ... ... ...
9A9867 9A9867 10A865 10A928	1 2	1200 1200 ... 600	187-N-801 187-ON-801 46-E-412 Special-A-357	... ... ... ...	CB CB T CB	19 19 20, 21 20, 21	13A1790 13A1790 4B6040 5A9446	1 1 1 ...	O O S G-1	... ... ... ...	... ... none yes	 44
10A982 11A1880 11A2115 11A2161	.... .... .... ....	50 1070 600 585	34.5-E-312 69-OK-Special 115-N-665 161-N-756	 2 2	T ... T T	20, 21 18 19 19	4B6030 ⑥ 13A9315 13A9361	1 ... 1 1	S S O O	 2 2	none ... none none	 99 99
11A2196 11A2217 11A2218 ④11A3436	.... ... ... ....	555 300/600 300/600 600/900	196-N-805 161-N-Special 115-K-Special 115-N-Special	2 2 ... 2	T CT CT T	19 19 17 19	13A9397 34A1905 ③ ③	1	O O O O	2 2 ... 2	none none none none	99 99, 102 99, 102 64
11A3565 11A3861 11A3863 11A3865	.... .... .... ....	400/800 450/900 300/600 600	69-G-Special 115-N-Special 138-CT-Special 115-N-665	... 2	CT T CT T	16 19 ... 19	③ ③ 20A4530 13A9315	 1 1	S S O O	... 2	none none none none	64 99 99, 102 99
11A4538 11A4901 11A4901 11A4904	1 1 2 1	1200 600 600 1200	34.5-OS-870 138-N-704 138-ON-704 187-N-801	... 2 2 1	CB CB CB CB	12, 13 19 19 19	42A9627 19A7462 ③ ③	1 1	S O O O	... 2 2 1	301-C-893, Gr. 1 52B8618, item 5	122 13 13 ...
11A4904 11A5185 11A5185 11A5185	2 1 2 3	1200 3000 4000 2000	187-ON-801 23-S-254 23-S-255 23-S-257	1	CB CB CB CB	19 12, 13 12, 13 12, 13	③ 11A5185 11A5185 11A5185	... 1 2 3	O S S S	1 ... ... ...	... ... ... ...	... 27 27 27

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

④ Two conductor bushing.

⑤ Drawing 11A2115 with two leads.

⑥ Limited by steel flange.

**part 5****section a: tabulation of drawings**

bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					② notes no.
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	
11A5185	4	1200	23-S-251	...	CB	12, 13	42A9626	1	S	...	{ 52B8619, Gr. 1 52B8618, item 2 52B8619, Gr. 5 52B8618, item 7	122
11A5185	5	600	23-S-256	...	CB	12, 13	42A9626	1	S	...	{ 52B8647, Gr. 1 52B8618, item 1	122
11A5307	1	600	23-S-258	...	CB	12, 13	11A5307	1	S	...	{ 52B8647, Gr. 1 52B8618, item 1	122
11A6598	1	600	69-OS-562	...	CB	12, 13	42A9629	1	S	...	{ 52B8647, Gr. 2 52B8618, item 1	112
11A6598	2	1200	69-OS-556	...	CB	12, 13	42A9629	1	S	...	{ 52B8644, Gr. 1 52B8618, item 6	122
11A6598	3	600	69-OS-561	...	CB	12, 13	18A7270	3	OS	...	{ 52B8647, Gr. 1 52B8618, item 1	122
11A6599	1	1200	34.5-S-352	...	CB	12, 13	42A9628	1	S	...	{ 52B8647, Gr. 2 52B8618, item 1	27 27
11A6599	2	2000	34.5-S-355	...	CB	12, 13	11A6599	2	S	...	{ 52B8647, Gr. 2 52B8618, item 1	122
11A8010	1	600	138-N-715	2	CB	19	22A2016	1	O	2	none	27 27
11A8010	2	600	138-ON-715	2	CB	19	22A2016	1	O	2	none	122
11A8012	1	600	69-OS-562	...	CB	12, 13	42A9629	1	S	...	{ 52B8647, Gr. 1 52B8618, item 1	122
11A8012	2	1200	69-OS-556	...	CB	12, 13	42A9629	1	S	...	{ 52B8647, Gr. 2 52B8618, item 1	122
11A8015	1	1200	138-N-717	2	CB	19	12A3227	2	O	2	none	27 27
11A8015	2	1200	138-ON-717	2	CB	19	12A3227	2	O	2	none	122
12A2916	1	1200	46-S-453	...	CB	12, 13	12A2916	1	S	...	{ 52B8647, Gr. 1 52B8618, item 1	122
12A2918	1	1200	77-S-594	...	CB	12, 13	12A2918	1	S	...	{ 52B8647, Gr. 2 52B8618, item 1	122
12A2919	1	600	66-S-593	...	CB	12, 13	12A2919	3	S	...	none	27 27
12A3226	1	800	115-O-665	2	CB	10, 11	12A3226	1	O	2	none	122
12A3226	2	1200	115-O-666	2	CB	10, 11	12A3226	2	O	2	none	122
12A3227	1	800	138-O-715	2	CB	10, 11	12A3227	1	O	2	none	22
12A3227	2	1200	138-O-717	2	CB	10, 11	12A3227	2	O	2	none	22
12A3228	1	1200	161-O-755	2	CB	10, 11	12A3228	1	O	2	none	22
12A3228	5	800	161-O-756	2	CB	10, 11	12A3228	5	O	2	none	22
12A4560	1	600	115-Special-654	1	CB	...	13A2845	1	O	2	none	22
12A4560	2	600	115-Special-654	1	CB	...	13A4196	1	O	2	none	22
12A4560	3	600	138-Special-704	1	CB	...	13A4196	1	O	2	none	22
12A4560	4	600	138-Special-704	1	CB	...	12A3228	1	O	2	none	22
12A4560	5	1200	161-Special-756	1	CB	...	12A3228	1	O	2	none	22
12A4560	6	1200	161-Special-756	1	CB	...	12A3228	1	O	2	none	22
12A6332	...	400	73-K-Special	...	T	18	37A2700	...	S	...	none	64
12A7023	...	600	69-N-Special	...	T	19	4B6032	1	S	...	none	27, 99
12A7024	...	400	34.5-K-323	...	T	17	4B6032	1	S	...	none	27, 99
12A7025	1	④400	73-S-601	...	T	12, 13	53B2263	...	S-OS	...	58SD150, Gr. 37 or 40	109, 122, 125
12A7026	4	④400	73-OS-611	...	T	12, 13	16A4773	3	OS	...	none	109
12A7727	1	400	69-K-513	2	T	18	16A2496	1	OS	2	none	109
⑩12A7730	1	400	73-K-651	...	T	18	⑩	...	S	...	none	109
12A8937	...	400	69-K-513	...	T	18	16A4430	...	OS	...	none	70
12A8938	...	400	69-K-513	...	T	18	4B7297	1	S	...	none	70
13A1790	1	800	187-O-801	...	CB	10, 11	13A1790	1	O	...	none	140
13A1790	5	800	187-O-801	...	CB	10, 11	13A1790	5	O	...	none	140
13A1947	1	1200	196-O-805	2	CB	10, 11	13A1947	1	O	2	none	99
13A1947	5	800	196-O-806	2	CB	10, 11	13A1947	5	O	2	none	99
13A1947	6	800	196-O-806	2	CB	10, 11	13A1947	6	O	2	none	138
13A1947	7	1200	196-O-805	2	CB	10, 11	13A1947	5	O	2	none	138
13A1947	8	1600	196-O-831	2	CB	10, 11	13A1947	8	O	2	none	138
13A1947	9	1600	196-O-831	2	CB	10, 11	13A1947	9	O	2	none	138
13A1965	1	600	34.5-S-353	...	CB	12, 13	13A1965	1	S	...	{ 52B8619, Gr. 3 52B8618, item 4	122
13A1965	2	600	34.5-S-351	...	CB	12, 13	42A9627	1	S	...	{ 52B8619, Gr. 4 52B8618, item 5	122
13A1965	3	1200	34.5-S-352	...	CB	12, 13	42A9627	1	S	...	{ 52B8647, Gr. 1 52B8618, item 1	122
13A1965	4	600	34.5-S-369	...	CB	12, 13	13A1965	4	S	...	{ 52B8647, Gr. 1 52B8618, item 1	122
13A1966	1	600	69-Special-562	...	CB	...	42A9629	1	S	...	{ 52B8647, Gr. 1 52B8618, item 1	122
13A2845	1	600	115-O-654	2	CB	10, 11	13A2845	1	O	2	none	99
13A2845	2	1200	115-O-655	2	CB	10, 11	13A2845	2	O	2	none	99
13A4196	1	800	138-O-704	2	CB	10, 11	13A4196	1	O	2	none	99
13A4196	2	1200	138-O-707	2	CB	10, 11	13A4196	2	O	2	none	99
13A4200	1	1200	230-O-856	2	CB	10, 11	13A4200	1	O	2	none	99

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

④ Limited by steel flange.

⑤ For replacement of bushing dwg 419892.

outdoor bushings

4.3 to 345 kv

for power circuit breakers
and transformers

technical
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bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements						② notes no.
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.		
13A4200	5	800	230-O-857	2	CB	10, 11	13A4200	5	O	2	none	99	
13A4480	1	600	15-S-152	...	CB	12, 13	13A4480	1	S	...	none	.....	
13A4480	2	1200	15-S-154	...	CB	12, 13	13A4480	2	S	...	none	.....	
13A4480	4	1200	15-S-155	...	CB	12, 13	13A4480	4	S	...	none	.....	
13A4480	5	1200	15-S-Special	...	CB	12, 13	13A4480	5	S	...	none	.....	
13A4484	1	600	110-O-651	2	CB	10, 11	13A4484	1	O	2	none*	.....	
13A6101	1	565	92-K-614	2	T	18	13A9292	1	O	2	none	99	
13A6102	1	600	115-K-665	2	T	18	13A9315	1	O	2	none	99	
13A6103	1	600	138K-715	2	T	18	13A9338	1	O	2	none	99	
13A6104	1	300/600	115-CT-Special	...	CT	....	20A6163	1	O	...	none	99, 102	
13A8848	1	565	92-N-606	2	T	19	③	...	O	2	none	99	
13A8850	1	565	92-N-604	2	T	19	⑤	...	O	2	none	22, 76, 99	
13A9220	1	750	69-K-516	...	T	18	②	...	OS	...	none	.....	
13A9222	1	600	92-N-631	2	T	19	②	...	O	2	none	99	
③13A9224	1	450/900	138-N-Special	2	T	19	③	...	O	2	none	⑤99	
③13A9224	3	450/900	138-N-Special	2	T	19	③	...	O	2	none	⑥	
13A9292	1, 2, 5	④400	92-O-614	2	T	10, 11	589D192	1	O	2	yes	122	
13A9292	3, 4, 6	650	92-O-Special	2	T	10, 11	589D192	1	O	2	yes	122	
13A9293	1	1140	92-O-615	2	T	10, 11	13A9293	3	O	2	none	.....	
13A9302	1	600	25-J-2-Special	...	T	14	13A9302	1	J-2	...	none	.....	
13A9315	1	④600	115-O-665	2	T	10, 11	589D115	1	O	2	yes	122	
13A9316	1, 2, 8	②800	115-O-666	2	T	10, 11	589D116	1	O	2	yes	122	
13A9316	3, 4, 9	650	115-O-Special	2	T	10, 11	589D116	1	O	2	yes	122	
13A9338	1	④600	138-O-715	2	T	10, 11	589D138	1	O	2	yes	122	
13A9339	1	720	138-O-717	2	T	10, 11	589D139	1	O	2	yes	122	
13A9361	1	④600	161-O-756	2	T	10, 11	589D161	1	O	2	yes	122	
13A9362	1	②800	161-O-755	2	T	10, 11	589D162	1	O	2	yes	122	
13A9396	1	640	196-O-806	2	T	10, 11	589D196	1	O	2	yes	122	
13A9397	1	④800	196-O-805	2	T	10, 11	589D197	3	O	2	yes	122	
13A9430	1	610	230-O-857	2	T	10, 11	13A9430	3	O	2	none	.....	
13A9431	1	④800	230-O-856	2	T	10, 11	13A9431	3	O	2	none	.....	
14A1678	1	800	132-O-701	2	CB	10, 11	14A1678	1	O	2	none	.....	
14A1678	5	800	132-O-701	2	CB	10, 11	14A1678	5	O	2	none	.....	
14A1678	8	1200	132-O-705	2	CB	10, 11	14A1678	8	O	2	none	.....	
③14A2122	1	158	44-S-405	...	T	12, 13	14A2122	1	S	...	none	①	
14A3430	1	800	15-S-151	...	CB	12, 13	14A3430	1	S	...	none	27	
14A6077	1	800	115-O-665	2	CB	10, 11	14A6077	1	O	2	none	27	
14A6077	2	1200	115-O-666	2	CB	10, 11	14A6077	2	O	2	none	27	
14A6576	1	400	46-S-464	...	CB	12, 13	14A6576	1	S	...	none	.....	
14A6576	2	600	46-S-463	...	CB	12, 13	14A6576	2	S	...	none	.....	
15A4897	1	1000	187-O-802	1	CB	10, 11	15A4897	1	O	1	none	.....	
15A6865	1	800	187-O-801	2	CB	10, 11	15A6865	1	O	2	none	.....	
15A6957	1	600	69-N-562	2	CB	19	42A9629	1	S	...	{ 52B8647, Gr. 1 52B8618, item 1	122	
15A9770	1	800	154-O-752	2	CB	10, 11	15A9770	1	O	2	none	.....	
15A9772	1	3000	23-S-263	...	CB	12, 13	15A9772	1	S	...	none	27	
15A9772	2	600	23-S-266	...	CB	12, 13	15A9772	2	S	...	none	27	
15A9772	3	2000	23-S-253	...	CB	12, 13	15A9772	3	S	...	none	27	
16A2450	1	600	115-N-665	2	T	19	13A9315	1	O	2	none	13, 99	
16A2455	4	600	115-OK-654	2	T	18	16A3635	...	O	2	none	99, 109	
16A2496	1	④400	69-OS-513	2	T	12, 13	53B2263	...	S-OS	...	585D150, Gr. 18	109, 122, 125	
16A2810	4	600	138-OK-704	2	T	18	16A3619	...	O	2	none	99, 109	
③16A2830	1	350	33-S-305	...	T	12, 13	53B2236	...	S-OS	...	585D150, Gr. 10-30	109, 122	
16A2833	1	600	115-N-665	2	T	19	26A3475	1	O	2	none	27, 99	
16A2858	1	1620	37-S-Special	...	T	12, 13	16A2858	1	S	...	none	②	
16A3619	1	④600	138-O-704	2	T	10, 11	16A3619	1	O	2	none	.....	
16A3635	1	④600	115-O-654	2	T	10, 11	16A3635	1	O	2	none	.....	
16A3953	1	600	69-N-Special	...	T	19	③	1	S	...	none	27	
16A4161	1	585	110-O-651	2	T	10, 11	16A4161	1	O	2	none	.....	
16A4188	1	④400	88-O-601	2	T	10, 11	16A4188	1	O	2	none	.....	
③16A4424	1	820	15-S-Special	...	T	12, 13	16A4424	1	S	...	none	①	

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

④ Limited by steel flange.

⑤ Twin conductor bushing, same mounting as dwg 5A4338.

⑥ Twin conductor bushing, same mounting as dwg 9A6238.

⑦ Limited by slotted flange.

⑧ Semi-conductor replacement bushing, for use only where standard type S cannot be applied.

⑨ Twin-conductor bushing.

⑩ Inverted pothead bushing.

**part 5** section a: tabulation of drawings

bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	②notes no.
16A4430	1	④400	69-OS-513	2	T	12, 13	53B2263	1	S-OS	2	585D150, Gr. 18	109, 122, 125
16A4484	1	④600	154-O-752	...	T	10, 11	16A4484	1	O	...	none	...
16A4729	1	④400	73-OS-513	...	T	12, 13	53B2263	1	S-OS	...	585D150, Gr. 18	109, 122, 125
16A4769	1	④400	69-O-523	...	T	10, 11	16A4769	1	O	...	none	...
16A4773	1	④400	73-OS-601	...	T	12, 13	53B2263	...	S-OS	...	585D150, Gr. 18	109, 122, 125
16A4926	4	600	110-OK-651	2	T	18	③	...	O	2	none	99, 109
16A5468	1	④400	69-O-524	...	T	10, 11	16A5468	1	O	...	none	...
16A5469	1	1420	69-O-527	...	T	10, 11	16A5469	1	O	...	none	...
16A5700	...	④400	46-S-Special	...	T	12, 13	16A5700	...	S	...	none	99, 109
16A5707	4	600	92-OK-631	2	T	18	③	...	O	2	none	13
16A5708	1	520	289-O-901	2	T	10, 11	58A2249	1	O	2	none	...
16A6048	1	540	230-O-851	2	T	10, 11	16A6048	1	O	...	none	...
16A6301	1	400/800	69-O-Special	...	CT	10, 11	16A6301	1	O	...	none	102
16A6614	1	600	138-O-706	2	T	10, 11	16A6614	1	O	2	none	...
16A7169	1	④400	69-O-513	...	T	10, 11	16A7169	1	O	...	none	109, 122, 125
16A7373	1	④400	73-OS-514	...	T	10, 11	53B2263	...	S-OS	...	585D150, Gr. 16	...
16A8269	1	④400	69-O-514	...	T	10, 11	16A8269	1	O	...	none	...
16A8641	1	2550	25-S-Special	...	T	12, 13	16A8641	1	S	...	none	116
16A8983	1	2820	25-S-Special	...	T	12, 13	16A8983	1	S	...	none	116
16A9169	4	2060	69-OS-534	...	T	12, 13	16A9169	4	OS	...	none	...
16A9779	1	1200	73-OS-517	...	T	12, 13	53B2267	...	S-OS	...	585D150, Gr. 20, 40	122
17A2868	5	600	69-S-553	...	CB	12, 13	17A2868	5	S	...	none	...
17A2868	6	600	69-S-553	...	CB	12, 13	17A2868	6	S	...	none	...
17A3903	1	1200	88-O-602	...	CB	10, 11	17A3903	1	O	...	none	105
17A3904	1	600	92-O-614	...	CB	10, 11	17A3904	1	O	...	none	...
17A3905	1	300	33-S-357	...	CB	12, 13	17A3905	1	S	...	none	106
17A3906	1	600	69-OK-562	...	CB	17	18A7270	1	OS	...	none	...
17A6795	1	600	88-O-601	2	CB	10, 11	17A6795	1	O	2	none	...
17A6796	1	600	154-O-751	2	CB	10, 11	17A6796	1	O	2	none	...
①18A708	...	1500	34.5-F-Special	...	T	20, 21	11B5270	1	S	...	yes	89
18A777	...	50	46-F-Special	...	T	20, 21	7B2059	1	S	...	none	...
18A828	...	400	69-F-562	...	T	20, 21	20A9690	1	S	...	none	...
18A828	...	1200	69-F-556	...	CB	20, 21	42A9629	1	S	...	52B8647, Gr. 2	122
18A828	...	600	69-F-562	...	CB	20, 21	42A9629	1	S	...	52B8618, item 1	122
18A921	...	...	230-F-851	1	T	20, 21	③	...	O	1	52B8647, Gr. 1	17, 99
18A921	...	1200	230-F-851	1	CB	20, 21	③	...	O	1	52B8618, item 1	17
18A931	...	400	22-F-258	...	CB	20, 21	11A5307	1	S	...	none	...
18A932	...	1200	15-F-157	...	CB	20, 21	③	...	S	...	none	...
18A1319	1	1200	46-S-466	...	CB	12, 13	18A1319	1	S	...	none	...
18A1321	1	800	132-O-702	2	CB	10, 11	18A1321	1	O	...	none	...
18A1321	5	1200	132-O-737	2	CB	10, 11	18A1321	5	O	...	none	...
①18A1321	7	1200	132-O-737	2	CB	10, 11	18A1321	7	O	...	none	...
18A1323	1	1200	77-OK-694	...	CB	17	③	...	OS	...	none	105
18A4651	1	1200	Special-O-707	2	CB	10, 11	18A4651	1	O	...	none	...
①18A4651	6	1200	Special-O-707	2	CB	10, 11	18A4651	6	O	...	none	105
18A7265	1	600	46-S-456	...	CB	12, 13	18A7265	1	S	...	none	105
18A7265	2	1200	46-S-457	...	CB	12, 13	18A7265	2	S	...	none	105
18A7265	3	600	46-S-467	...	CB	12, 13	18A7265	3	S	...	none	105
18A7265	4	1200	46-S-Special	...	CB	12, 13	18A7265	4	S	...	none	105
①18A7270	1	600	69-OS-562	...	CB	12, 13	42A9629	1	S	...	none	122
①18A7270	2	1200	69-OS-556	...	CB	12, 13	42A9629	1	S	...	none	122
18A7270	3	600	69-OS-561	...	CB	12, 13	18A7270	3	OS	...	none	③
18A9967	1	600	138-O-Special	...	CB	10, 11	18A9967	1	O	...	none	103
18A9967	2	1200	138-O-Special	...	CB	10, 11	18A9967	2	O	...	none	104
19A1771	1	600	69-OS-353	...	CB	12, 13	19A1771	1	OS	...	none	118
①19A4761	1	600	34.5-OS-353	...	CB	12, 13	19A4761	1	OS	...	none	...
①19A4761	2	600	34.5-OS-354	...	CB	12, 13	19A4761	2	OS	...	none	...
①19A4761	3	600	34.5-OS-351	...	CB	12, 13	42A9627	1	S	...	52B8619, Gr. 3	122
①19A4761	4	1200	34.5-OS-370	...	CB	12, 13	19A4761	4	OS	...	52B8618, item 4	...
①19A4761	5	1200	34.5-OS-352	...	CB	12, 13	42A9627	1	S	...	52B8619, Gr. 4	122
											52B8618, item 5	...

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

④ Limited by steel flange.

⑤ B.C. 934-8½

⑥ Special for Detroit Edison Co. Has 1½ longer flange setting.

⑦ Special for public service of New Jersey.

⑧ Has glass oil gauge.

outdoor bushings

4.3 to 345 kv

for power circuit breakers
and transformers

technical
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bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	②notes no.
19A6486	1	800	132-O-702	2	CB	10, 11	19A6486	1	O	2	none	117
19A6487	1	600	34.5-S-Special	...	CB	12, 13	19A6487	1	S	...	none	.....
19A7462	1	800	138-O-704	2	CB	10, 11	19A7462	1	O	2	none	13
19A7462	2	1200	138-O-707	2	CB	10, 11	19A7462	2	O	2	none	13
19A9002	1	800	230-O-851	2	CB	10, 11	19A9002	1	O	2	none	13
20A1232	1	620	187-O-801	2	T	10, 11	20A1232	1	O	2	none	.....
20A1235	1	2070	115-O-Special	...	T	10, 11	20A1235	1	O	...	none	.....
20A1873	1	100-200	73-OS-543	...	CT	12, 13	20A1873	1	SO	...	none	.....
20A2165	1	3300	34.5-S-Special	...	T	12, 13	20A2165	1	S	...	none	71
20A2329	1	④400	73-O-514	...	T	10, 11	20A2329	1	S	...	none	.....
20A2338	1	1940	25-S-Special	...	T	12, 13	20A2338	1	S	...	none	71
20A2381	1	⑥800	138-O-717	2	T	10, 11	20A2381	1	O	2	none	27
20A2384	6, 4	1640	69-OS-529	...	T	12, 13	20A2384	6, 4	S-OS	...	none	.....
20A2766	1	④600	138-O-715	2	T	10, 11	20A2766	1	O	2	none	117
20A3028	1	④600	115-O-654	2	T	10, 11	20A3028	1	O	2	none	117
20A3352	1	⑥800	115-O-655	2	T	10, 11	20A3352	1	O	2	none	.....
20A3766	1	④600	154-O-751	2	T	10, 11	20A3766	1	O	2	none	.....
20A4053	1	1640	69-O-529	...	T	10, 11	20A4053	1	O	...	none	.....
20A4530	1	300/600	138-O-Special	...	CT	10, 11	20A4530	1	O	...	none	.....
20A4576	1	450	15-J-2-Special	...	T	14	20A4576	1	J-2	...	none	126
20A4809	1	785	8.7-J-2-Special	...	T	14	20A4809	1	J-2	...	none	126
20A5990	1	2300	37-OS-355	...	T	12, 13	20A5990	1	OS	...	none	109
20A6163	1	300/600	115-O-Special	...	CT	10, 11	20A6163	1	O	...	none	.....
20A6743	1	2280	8.7-J-2-Special	...	T	14	20A6743	1	J-2	...	none	126
20A7083	1	④600	138-O-704	2	T	10, 11	20A7083	1	O	2	none	13
20A7519	1	④600	138-O-704	2	T	10, 11	20A7519	1	O	2	none	27
20A7520	1	④400	92-O-614	2	T	10, 11	20A7520	1	O	2	none	.....
20A7788	1	④600	138-O-704	2	T	10, 11	20A7788	1	O	2	none	27
20A8786	1	2250	69-O-Special	...	T	10, 11	20A8786	1	O	...	none	48
20A9495	1	600	110-O-651	2	T	10, 11	20A9495	1	O	2	none	117
20A9690	1	400	73-S-562	...	T	12, 13	20A9690	1	S	...	none	.....
21A5009	1	800	138-O-715	2	CB	10, 11	21A5009	1	O	2	none	117
21A5009	2	1200	138-O-717	2	CB	10, 11	21A5009	2	O	2	none	117
21A5398	1	600	23-S-256	...	CB	12, 13	42A9626	1	S	...	(52B8619, Gr. 5	122
21A5398	3	2000	23-S-253	...	CB	12, 13	21A5398	3	S	...	52B8618, item 7	.....
①21A5398	2	4000	23-S-255	...	CB	12, 13	21A5398	2	S	...	none	.....
①21A5398	4	4000	23-S-255	...	CB	12, 13	21A5398	4	S	...	none	.....
21A5675	1	600	23-S-265	...	CB	12, 13	21A5675	1	S	...	.....	101
21A9122	1	800	115-O-654	2	CB	10, 11	21A9122	1	O	2	.....	117
21A9122	2	1200	115-O-655	2	CB	10, 11	21A9122	2	O	2	.....	117
②21A9879	1	2000	34.5-S-364	...	CB	12, 13	21A9879	1	S	...	.....	.....
②21A9899	1	2000	34.5-S-364	...	CB	12, 13	21A9899	1	S	...	.....	.....
22A2016	1	800	138-O-715	2	CB	10, 11	22A2016	1	O	2	none	27
22A2016	2	1200	138-O-717	2	CB	10, 11	22A2016	2	O	2	none	27
③22A6524	1	1200	69-S-556	...	CB	12, 13	42A9629	1	S	...	(52B8647, Gr. 2	122
23A659	.....	.....	161-F-755	1	T	20, 21	13A9362	1	O	2	52B8618, item 1	22, 99
23A658	.....	1200	161-F-755	1	CB	20, 21	12A3228	1	O	2	none	22
23A682	.....	600	46-F-451	...	CB	20, 21	7A9326	1	S	...	none	.....
23A713	.....	600	23-F-265	...	CB	20, 21	8A1153	4	S	...	none	.....
23A761	.....	.....	154-F-751	1	T	20, 21	6A5109	1	N	2	none	22, 98, 99
23A761	.....	600	154-F-751	1	CB	20, 21	⑦	...	...	2	none	22
23A770	.....	600	34.5-G-353	...	CB	15	7A9325	1	S	...	none	.....
23A770	.....	600	34.5-G-354	...	CB	15	7A9325	6	S	...	none	.....
④23A3800	1	800	138-O-704	2	CB	10, 11	13A4196	1	O	2	none	.....
④23A3800	2	1200	138-O-707	2	CB	10, 11	18A4651	1	O	2	none	.....
24A2505	1	600	69-O-554	...	CB	10, 11	24A2505	1	O	...	none	.....
24A2505	2	1200	69-O-555	...	CB	10, 11	24A2505	2	O	...	none	.....
⑤24A2505	6	1200	69-O-555	...	CB	10, 11	24A2505	6	O	...	none	.....
25A9686	1	600	69-O-553	...	CB	10, 11	25A9686	1	O	...	none	.....
25A9686	3	600	69-O-553	...	CB	10, 11	25A9686	3	O	...	none	.....
26A730	.....	.....	161-F-756	2	T	20, 21	13A9361	1	O	2	none	21, 22, 99
26A730	.....	1200	161-F-756	2	CB	20, 21	12A3228	1	O	2	none	21, 22
26A774	.....	600	69-F-561	...	CB	20, 21	7A9327	3	S	...	none	.....
26A3243	1	450	25-J-2-Special	...	T	14	26A3243	1	J-2	...	none	.....
26A3475	1	600	115-O-665	2	T	10, 11	26A3475	1	O	2	none	27

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

④ Limited by steel flange.

⑤ Limited by slotted flange.

⑥ Special for Detroit Edison Co.

⑦ Special for Public Service of New Jersey.

⑧ Special for Penn. Railroad.

⑨ Use to replace dwg 662771 on type HS breaker only.

⑩ Has 70 inch creepage.

⑪ Has shielded layer.

⑫ Special top terminal for Southern California Edison Co.

**part 5** section a: tabulation of drawings

bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements						②notes no.
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.		
26A3988 26A4409 26A5548 26A5817	1 1 1 1	800 300/600 785 450	88-O-605 92-O-Special 8-7-J-2-Special 15-J-2-Special	2	T CT T T	10, 11 10, 11 14 14	26A3988 26A4409 26A5548 26A5817	1 1 1 1	O O J-2 J-2	2	none none none none	 126 126	
26A5853 26A5869 26A5873 26A8255	1 1 2 1	2280 600/1200 750 ④400	8-7-J-2-Special 138-O-Special 69-O-517 69-OS-514	... 2 2 2	T CT T T	14 10, 11 10, 11 12, 13	26A5853 26A5869 26A5873 53B2263	1 1 2 ...	J-2 O O S-OS	2	none none none 585D150, Gr. 16	126 27 120 109, 122, 125	
26A8256 ② 26A8257 ② 26A8257 26A8620	6,4 2 3 1	1620 550 550 600	73-OS-529 288-O-890 288-O-890 110-O-651	... 2 2 2	T T T T	12, 13 10, 11 10, 11 10, 11	26A8256 58A2249 58A2249 26A8620	6,4 2 1 1	S-OS O O O	... 2 2 2	none none none none	 122	
26A9062 26A9530 26A9968 26A9971	1 1 1 1	1800 610 700/1250 ④400	92-O-616 230-O-Special 92-O-Special 69-OS-514	2	T CT CT T	10, 11 10, 11 10, 11 12, 13	26A9062 26A9530 26A9968 53B2263	1 1 1 ...	O O O S-OS	2	none none none 585D150, Gr. 16	 109, 120, 122, 125	
27A5522 28A9823 28A9823 29A875	1 1 2	2000 600 1200 400	69-S-557 69-S-Special 69-S-Special 154-B-751	 1	CB CB CB CB	12, 13 12, 13 12, 13 20, 21	27A5522 28A9823 28A9823 ②	1 1 2 ...	S S S O	 2	none none none none	..... ..... ..... .....	
29A875 29A2018 29A2539 29A2540	 1 1 1	2140 1200 400	154-B-754 69-S-Special 69-OS-Special 73-K-651	1	T T T T	20, 21 12, 13 12, 13 18	20A3766 29A2018 53B2267 ②	1 1	O OS S-OS S	2	none none 585D150, Gr. 16-26 none	99 122	
29A3459 29A4700 29A4703 29A5164	1 1 1 1	1210 ⑦830 ④800 400	15-J-2-Special 92-O-615 196-O-805 73-O-513	... 2 2 ...	T T T T	14 10, 11 10, 11 10, 11	29A3459 29A4700 29A4703 29A5164	... 1 1 1	J-2 O O O	... 2 2 ...	none none none none	126 127 127	
29A5269 29A6014 29A8048 29A8073	1 1 1 1	④400 605 675	69-OS-Special 195-O-Special Cottrell 50 kv (75 test) 179-O-780	... 2	T T T T	12, 13 10, 11 ... 10, 11	29A5269 29A6014 29A8048 589D180	1 1 1 1	OS O O O	... 2 ... 2	none none yes	117, 128 122	
29A8074 29A9024 29A9169 30A403	2 1 1	1200 2660 500/1000 400	69-O-529 69-S-Special 69-O-Special 69-G-513	... ... ... ...	T CT CT T	10, 11 12, 13 10, 11 15	29A8074 29A9024 29A9169 4B6060	2 1 1 1	O S O S	... ... ... ...	none none none none	..... ..... ..... .....	
30A404 30A405 30A686 30A739	.... .... .... ....	750 750 300/600	69-G-516 69-G-517 23-J-2-Special 34.5-E-Special	... ... ... ...	T T T T	15 15 14 20, 21	11B1355 4B6062 30A686 ②	1	S S J-2 S	... ... ... ...	none none none .....	..... ..... ..... .....	
30A7202 31A515 31A515 31A515	1 1, 2, 3, 8, 10 4, 5, 6 7	1200 165 165 550	23-S-Special 13.8-G-112 13.8-G-113 13.8-G-116	... ... ... ...	CB T T T	12, 13 15 15 15	30A7202 4B6010 4B6011 4B6061	1 2 2 2	S S S S	... ... ... ...	none one none none	 111 111 111	
31A515 31A515 31A515 31A515	11, 12, 13, 14 21, 22, 23 31 37	550 1000 1450 1920	13.8-G-117 13.8-G-125 13.8-G-128 13.8-G-133	... ... ... ...	T T T T	15 15 15 15	4B6012 4B6013 4B6015 4B6016	2 2 2 2	S S S S	... ... ... ...	none none none none	111 111 111 111	
31A515 31A516 31A516 31A516	38 2, 3 4, 5, 6 7, 8	1000 165 165 520	13.8-G-Special 23-G-212 23-G-213 23-G-217	... ... ... ...	T T T T	15 15 15 15	② 4B6020 4B6021 4B6022	... 2 2 2	S S S S	... ... ... ...	none none none none	111 111 111 111	
31A516 31A516 31A516 31A516	17 21 24 27	950 950 1375 1375	23-G-228 23-G-229 23-G-232 23-G-233	... ... ... ...	T T T T	15 15 15 15	4B6023 6B5311 11B3446 4B6024	2 2 2 2	S S S S	... ... ... ...	none none none none	111 111 111 111	
31A516 31A516 31A517 31A517	31 34 1, 2, 3 4, 5, 6	1820 1820 165 165	23-G-235 23-G-236 34.5-G-313 34.5-G-312	... ... ... ...	T T T T	15 15 15 15	② 4B6025 4B6031 4B6030	... 2 2 2	S S S S	... ... ... ...	..... none none none	111 111 111 111	
31A517 31A517 31A517 31A517	7, 9 10, 11, 13, 14 12 15	400 890 890 400	34.5-G-323 34.5-G-325 34.5-G-327 34.5-G-Special	... ... ... ...	T T T T	15 15 15 15	4B6032 4B6033 7B1511 ②	2 2 2 ...	S S S S	... ... ... ...	none none none none	111 111 111 111	
31A517 31A518 31A518 31A518	16 1, 3, 11, 13, 31 2, 4, 5, 6, 10, 21 7, 8, 9 25, 26, 27	500 165 165 400	34.5-G-316 46-G-412 46-G-413 46-G-416	... ... ... ...	T T T T	15 15 15 15	11B5230 4B6040 4B6041 4B6042	2 2 2 2	S S S S	... ... ... ...	none none none none	111 111 111 111	

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

④ Limited by steel flange.

⑤ Upper porcelain has 187" creepage.

⑥ Upper porcelain has 217" creepage.

⑦ Limited by slotted cap.

outdoor bushings

4.3 to 345 kv

for power circuit breakers
and transformers

technical
data

33-360

page 63

bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements						②notes no.
drawing no.	⑧ gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.		
31A518	12, 32, 33	830	46-G-418	...	T	15	11B2745	2	S	...	none	111	
31A519	1	400	69-O-G-513	...	T	15	4B6060	4	S	...	none	111	
31A519	4, 7, 8	400	69-G-513	...	T	15	4B6060	2	S	...	none	111	
31A519	9	100/200	69-G-543	...	CT	15	4B6066	2	S	...	none	111	
31A792	.....	555	92-G-614	2	T	15	13A9292	1	O	2	none	99	
31A815	.....	505	115-G-664	2	T	15	13A9315	1	O	2	none	22, 82, 99	
31A830	.....	600	230-G-854	2	T	15	5A4330	1	N	2	none	82, 98, 99	
31A838	.....	600	138-G-714	2	T	15	9A6238	1	N	2	none	22, 82, 98, 99	
31A861	.....	585	161-G-754	2	T	15	11A2161	1	N	2	none	22, 82, 98, 99	
31A888	.....	480	288-G-901	1	T	15	58A2249	1	O	2	none	17, 99	
31A896	1	555	196-G-804	2	T	15	13A1947	1	O	2	none	22, 99	
31A942	.....	400	69-G-514	...	T	15	4B6061	1	S	...	none	.....	
31A3694	1	4000	15-S-Special	...	CB	12, 13	31A3694	1	S	...	none	.....	
③1A3696	1	1200	138-O-717	2	CB	10, 11	31A3696	1	O	2	none	.....	
③1A8128	2	1200	69-O-Special	...	CB	10, 11	31A8128	2	O	...	none	.....	
32A3000	1	1200	180-O-781	2	CB	10, 11	32A3000	1	O	2	none	.....	
①32A3000	4	1200	180-O-784	4	CB	10, 11	32A3000	4	O	2	none	.....	
32A3000	6	1600	46-O-S-455	...	CB	12, 13	32A3000	6	O	2	none	.....	
32A5201	1	1200	46-O-S-455	...	CB	12, 13	42A9628	1	S	...	52B8644, Gr. 2 52B8618, item 6	122	
33A5448	3	600	34-S-S-Special	...	CB	12, 13	33A5445	3	S	...	none	.....	
33A8420	1	1200	46-S-Special	...	CB	12, 13	33A8420	1	S	...	none	.....	
34A268	.....	600	115-F-654	1	CB	20, 21	13A2845	1	O	2	none	.....	
34A289	.....	600	138-F-704	1	CB	20, 21	13A4196	1	O	2	none	.....	
34A1415	1	600	115-O-665	2	T	10, 11	34A1415	1	O	2	none	27	
34A1905	1	300/600	161-O-Special	2	CT	10, 11	34A1905	1	O	2	none	.....	
34A2846	1	①600	138-O-715	2	T	10, 11	34A2846	1	O	2	none	.....	
34A5104	1	600/1200	161-O-Special	...	CT	10, 11	34A5104	1	O	...	none	126	
34A5256	1	560	115-O-654	2	T	10, 11	34A5256	1	O	2	none	101, 128, 129	
34A5730	1	②800	230-O-Special	...	T	10, 11	34A5730	1	O	...	none	.....	
35A3492	5	1600	161-O-783	2	CB	10, 11	35A3492	5	O	2	none	.....	
35A3492	1	1200	161-O-782	2	CB	10, 11	35A3492	1	O	2	none	.....	
35A5945	1	1200	23-S-Special	...	CB	12, 13	35A5945	1	S	...	none	.....	
35A6368	1	1200	138-O-717	2	CB	10, 11	35A6368	1	O	2	none	.....	
35A6368	2	800	138-O-715	2	CB	10, 11	35A6368	1	O	2	none	.....	
35A7405	1	1200	46-S-455	...	CB	12, 13	42A9628	1	S	...	52B8644, Gr. 2 52B8618, item 6	122	
35A7405	2	600	46-S-452	...	CB	12, 13	42A9628	1	S	...	52B8644, Gr. 1 52B8618, item 6	122	
36A1813	1	1200	69-S-Special	...	CB	12, 13	36A1813	1	S	...	none	.....	
36A1814	2	1200	34-S-S-Special	...	CB	12, 13	36A1814	2	S	...	none	.....	
36A1814	3	600	34-S-S-Special	...	CB	12, 13	36A1814	3	S	...	none	.....	
36A2695	1	1200	138-O-734	2	CB	10, 11	36A2695	1	O	2	none	.....	
36A2695	5	1600	138-O-735	2	CB	10, 11	36A2695	5	O	2	none	.....	
36A2695	6	2000	138-O-736	2	CB	10, 11	36A2695	6	O	2	none	.....	
③6A2695	7	1600	138-O-735	2	CB	10, 11	36A2695	7	O	2	none	.....	
36A8825	5	1600	195-O-830	2	CB	10, 11	36A8825	5	O	2	none	.....	
36A8825	1	1200	196-O-830	2	CB	10, 11	36A8825	1	O	2	none	.....	
37A2700	1	600	69-O-Special	...	T	10, 11	37A2700	5	O	...	none	13	
37A3573	1	④400	73-OS-514	...	T	12, 13	53B2263	...	S-OS	...	58SD150, Gr. 16	109, 122, 125	
37A3576	1	1000	115-O-666	2	T	12, 13	37A3576	1	O	2	none	27	
37A4362	1	1400	161-O-Special	2	T	12, 13	37A4362	1	O	2	none	.....	
37A4369	1	400	69-O-514	...	T	12, 13	37A4369	1	O	...	none	13	
37A4379	1	1130	180-O-780	2	T	12, 13	37A4379	1	O	2	none	127	
37A5076	1	④400	73-OS-514	2	T	12, 13	53B2263	...	S-OS	...	58SD150, Gr. 16	109, 122, 125	
37A5084	1	⑥600	138-O-715	2	T	10, 11	37A5084	1	O	2	none	13	
37A5306	1	785	25-F-2-Special	...	T	14	37A5306	1	I-2	...	none	.....	
37A6305	1, 21	220	5-J-2	...	T	14	27B1923	5, 12	RJ	...	none	123	
37A6305	4, 24	220	5-J-2	...	T	14	27B1923	1, 8	RJ	...	none	123	
37A6305	6, 26	220	5-J-2	...	T	14	27B1923	6, 13	RJ	...	none	123	
37A6305	2, 22	400	5-J-2	...	T	14	27B1923	4, 11	RJ	...	none	123	
37A6305	5, 25	400	5-J-2	...	T	14	27B1923	7, 14	RJ	...	none	123	
37A6305	7, 27	400	5-J-2	...	T	14	27B1923	3, 10	RJ	...	none	123	

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

④ Limited by steel flange.

⑤ Special for Baltimore Electric and Gas.

⑥ Special for Southern California Edison Co.

⑦ Special top terminal—L = 1½"—12 th'ds for Bonneville Power Administration.

⑧ First group is for use in oil. Second group for use in Inerteen®.

**part 5** section a: tabulation of drawings

bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					② notes no.
drawing no.	③ gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	
37A6305	3, 23	785	5-J-2	...	T	14	27B1924	1,2	RJ	...	none	123
37A6315	1, 21	220	15-J-2	...	T	14	27B1927	1,4	RJ	...	none	123
37A6315	3, 23	220	15-J-2	...	T	14	27B1928	9	RJ	...	none	123
37A6315	6, 26	220	15-J-2	...	T	14	27B1928	10	RJ	...	none	123
37A6315	2, 22	400	15-J-2	...	T	14	⑤ 27B1928	...	RJ	...	none	123
37A6315	4, 24	400	15-J-2	...	T	14	27B1928	2	RJ	...	none	123
37A6315	7, 27	400	15-J-2	...	T	14	27B1928	5	RJ	...	none	123
37A6315	5, 25	785	15-J-2	...	T	14	27B1928	3	RJ	...	none	123
37A6315	8, 28	785	15-J-2	...	T	14	27B1928	4	RJ	...	none	123
37A6325	1, 21	220	25-J-2	...	T	14	37A6325	1,21	I-2	...	none	123
37A6325	3, 23	220	25-J-2	...	T	14	37A6325	3,23	I-2	...	none	123
37A6325	7, 27	220	25-J-2	...	T	14	37A6325	7,27	I-2	...	none	123
37A6325	2, 22	400	25-J-2	...	T	14	37A6325	2,22	I-2	...	none	123
37A6325	4, 24	400	25-J-2	...	T	14	37A6325	4,24	I-2	...	none	123
37A6325	8, 28	400	25-J-2	...	T	14	37A6325	8,28	I-2	...	none	123
37A6325	5, 25	785	25-J-2	...	T	14	37A6325	5,25	I-2	...	none	123
37A6325	9, 29	785	25-J-2	...	T	14	37A6325	9,29	I-2	...	none	123
37A6325	6, 26	1210	25-J-2	...	T	14	37A6325	6,26	I-2	...	none	123
37A6325	10, 30	1210	25-J-2	...	T	14	37A6325	10,30	I-2	...	none	123
37A6325	11	1210	25-J-2	...	T	14	37A6325	11	I-2	...	none	123
37A6387	1, 21	220	8.7-J-2	...	T	14	27B1927	1,4	RJ	...	none	75, 124
37A6387	2, 22	400	8.7-J-2	...	T	14	⑤ 27B1928	...	RJ	...	none	75, 124
37A6387	4, 24	400	8.7-J-2	...	T	14	27B1928	1	RJ	...	none	75, 124
37A6387	6, 26	400	8.7-J-2	...	T	14	27B1928	2	RJ	...	none	75, 124
37A6387	3, 23	785	8.7-J-2	...	T	14	27B1928	6	RJ	...	none	75, 124
37A6387	5, 25	785	8.7-J-2	...	T	14	27B1928	7	RJ	...	none	75, 124
37A6387	7, 27	785	8.7-J-2	...	T	14	27B1928	3	RJ	...	none	75, 124
37A6387	8, 28	785	8.7-J-2	...	T	14	53B6472	2	RJ	...	none	75, 124
37A7079	1	1130	180-O-Special	2	T	10, 11	37A7079	1	O	2	none	126
37A7418	1	450	5-J-2	...	T	14	37A7418	1	I-2	...	none	126
37A7419	1	1200	5-J-2	...	T	14	37A7419	1	I-2	...	none	126
37A7420	1	2280	5-J-2	...	T	14	37A7420	1	I-2	...	none	126
37A7421	1	450	15-J-2	...	T	14	37A7421	1	I-2	...	none	126
37A7422	1	1200	15-J-2	...	T	14	37A7422	1	I-2	...	none	126
37A7423	1	2280	15-J-2	...	T	14	37A7423	1	I-2	...	none	126
37A7424	1	450	25-J-2	...	T	14	37A7424	1	I-2	...	none	126
37A7425	1	1200	25-J-2	...	T	14	37A7425	1	I-2	...	none	126
37A7426	1	2280	25-J-2	...	T	14	37A7426	1	I-2	...	none	126
37A8273	1	1995	73-O-S-Special	2	T	12, 13	37A8273	1	OS	2	none	13
37A8280	1	640	180-O-780	...	T	10, 11	37A8280	1	O	...	none	...
③ 38A5992	1	800	138-O-706/715	2	CB	10, 11	38A5992	1	O	2	none	...
③ 38A5992	2	1200	138-O-708/717	2	CB	10, 11	38A5992	2	O	2	none	...
41A4656	1	2000	23-S-Special	...	CB	12, 13	41A4656	...	S	...	none	...
④ 41A5032	1	800	115-O-6 5	2	CB	10, 11	41A5032	1	O	2	none	...
④ 41A5032	2	1200	115-O-666	2	CB	10, 11	41A5032	2	O	2	none	...
41A9774	1	4000	18-S-Special	...	CB	12, 13	41A9774	1	S	...	none	...
41A9771	1, 2	1600/2000	330-O-930	2	CB	10, 11	41A9771	...	S	...	none	...
42A362	...	1200	15-Special-155	...	CB	...	13A4480, Gr. 4	...	S	...	none	...
42A365	...	600	138-G-733	1	CB	15	18A9967	1,9	O	2	none	22, 59
42A365	...	600	138-G-733	2	CB	15	18A9967	1,9	O	2	none	59
⑦ 42A2893	1	2000	69-S-Special	...	SW	12, 13	42A2893	1	S	...	none	...
⑦ 42A2894	1	1200	69-S-Special	...	SW	12, 13	42A2894	1	S	...	none	...
⑦ 42A2894	2	1200	69-S-Special	...	SW	12, 13	42A2894	2	S	...	none	122
42A9626	1	1200	23-S-288	...	CB-T	12, 13	42A9626	1	S	...	none	...
42A9626	2	2000	23-S-289	...	CB	12, 13	42A9626	2	S	...	none	...
42A9626	3	3000	23-S-290	...	CB	12, 13	42A9626	3	S	...	none	...
42A9626	4	4000	23-S-291	...	CB	12, 13	42A9626	4	S	...	none	122
42A9627	1	1200	34.5-S-388	...	CB-T	12, 13	42A9627	1	S	...	none	122
42A9627	2	2000	34.5-S-389	...	CB	12, 13	42A9627	2	S	...	none	122
42A9628	1	1200	46-S-488	...	CB-T	12, 13	42A9628	1	S	...	none	122
42A9629	1	1200	69-S-588	...	CB-T	12, 13	42A9629	1	S	...	none	122
43A573	...	400	92-E-631	1	CB	20, 21	7A1490	1	N	2	none	22
⑨ 44A1262	1	2000	69-S-558	...	CB	12, 13	44A1262	1	S	...	none	143
44A1262	2	2000	69-S-558	...	CB	12, 13	44A1262	2	S	...	none	143

- ① See note on nominal current ratings on page 34.
 ② Refer to pages 84 to 87.
 ③ Drawing not made.
 ④ Has two B.C.

- ⑤ Has 92½ creepage.
 ⑥ Special for telescoping disconnect switch.
 ⑦ First group is for use in oil. Second group for use in Inerteen.
 ⑧ Has pt terminal.

outdoor bushings

4.3 to 345 kv

for power circuit breakers
and transformers

technical
data

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bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	②notes no.
44A1264	1	600	15-OS-151	...	CB	12, 13	44A1264	1	OS	...	none	.....
44A4367	1	600	23-S-252	...	CB	12, 13	44A4367	1	S	...	none	.....
④44A4823	1	1200	196-O-805	...	CB	10, 11	44A4823	...	O	...	none	.....
44A9807	1	1200	23-S-288	...	CB	12, 13	44A9807	1	S	...	none	27, 122
44A9808	1	1600	115-O-685	2	CB	10, 11	44A9808	1	O	2	none	142
④47A6203	1	1200	34.5-S-388	...	CB	12, 13	47A6203	1	S	...	none	122
④47A6527	1	2000	23-S-289	...	CB	12, 13	47A6527	1	S	...	none	.....
47A6602	1	1200	161-O-735	2	CB	10, 11	47A6602	1	O	2	none	27
⑦47A6616	1	1200	196-O-805	2	CB	10, 11	47A6616	1	O	2	none	27
④47A6648	1	800	23-O-851	...	CB	10, 11	47A6648	1	O	...	none	.....
④47A6648	4	800	23-O-851	...	CB	10, 11	47A6648	4	O	...	none	27
47A6658	1	1200	69-S-588	...	CB	12, 13	47A6658	1	S	...	none	142
52A109	....	600	34.5-G-368	...	CB	15	7A1450	6	S	...	none	60
54A722	....	1125	138-G-716	1	T	15	③	...	...	...	...	.....
55A222	....	...	132-G-701	1	T	15	9A6333	1	O	2	none	22, 99
55A222	....	600	132-G-701	1	CB	15	14A1678	1	O	2	none	22, 54
③55A231	....	890	37-G-Special	...	T	15	16A2858	1	S	...	none	③
55A878	....	...	110-G-652	2	T	15	③	...	O	2	none	99
55A878	....	400	110-G-652	2	CB	15	③	...	O	2	none	.....
56A132	....	1200	161-E-754	1	CB	20, 21	12A3228	1	O	2	none	22
56A132	....	...	154-E-752	...	T	20, 21	11A2161	1	N	2	none	22, 98, 99
56A133	....	400	154-E-752	...	CB	20, 21	③	...	O	2	none	...
56A133	....	...	154-E-752	...	T	20, 21	16A4484	...	O	2	none	99
56A134	....	...	154-E-751	1	T	20, 21	6A5109	1	N	2	none	22, 98, 99
56A134	....	400	154-E-751	1	CB	20, 21	③	...	O	2	none	22
56A135	....	400	154-E-751	...	CB	20, 21	③	...	O	2	none	...
56A135	....	...	154-E-751	...	T	20, 21	6A5109	1	N	2	none	98, 99
56A398	....	...	34.5-G-Special	...	CT	15	③	...	S	...	none	.....
56A492	....	...	132-E-701	...	T	20, 21	9A6333	1	O	2	none	54, 99
56A492	....	400	132-E-701	...	CB	20, 21	14A1678	1	O	2	none	54
56A531	....	400	132-E-701	1	CB	20, 21	14A1678	1	O	2	none	22, 54
56A531	....	...	132-E-701	1	T	20, 21	9A6333	1	O	2	none	22, 54, 99
56A532	....	...	132-E-702	...	T	20, 21	9A7035	1	N	2	none	99
56A532	....	400	132-E-702	...	CB	20, 21	18A1321	1	O	2	none	99
56A536	....	200/400	69-G-Special	...	CT	15	③	...	S	...	none	64
56A702	....	...	110-E-651	...	T	20, 21	16A4161	1	O	2	none	73, 99
56A702	....	400	110-E-651	...	CB	20, 21	13A4484	1	O	2	none	73
56A703	....	400	110-E-652	...	CB	20, 21	③	...	O	2	none	...
56A703	....	...	110-E-652	...	T	20, 21	③	...	O	2	none	99
56A704	....	...	110-E-651	1	T	20, 21	16A4161	1	O	2	none	22, 73, 99
56A704	....	400	110-E-651	1	CB	20, 21	13A4484	1	O	2	none	22, 73
56A705	....	...	115-E-654	1	T	20, 21	16A3635	1	O	2	none	22, 99
56A705	....	600	115-E-654	1	CB	20, 21	13A2845	1	O	2	none	22
56A785	....	600	138-G-714	...	T	15	③	...	O	2	none	27, 99
55A781	....	...	88-E-601	...	T	20, 21	6A3614	1	N	2	none	98, 99
55A781	....	400	88-E-601	...	CB	20, 21	17A6795	1	O	2	none	...
56A782	....	1260	88-E-605	...	T	20, 21	26A3988	...	O	2	none	99
56A782	....	1260	88-E-605	...	CB	20, 21	③	...	O	2	none	.....
58A956	....	3000	23-G-254	...	CB	15	7A9324	6	S	...	none	.....
58A2239	1	600	92-O-514	2	T	10, 11	58A2239	1	O	2	none	13
58A2249	1	1145	288-O-930	2	T	10, 11	58A2249	1	O	2	none	13
58A2249	2	1145	288-O-930	2	T	10, 11	58A2249	2	O	2	none	.....
58A2996	....	635	196-O-806	2	T	10, 11	58A2996	...	O	2	none	13
58A7473	....	2040	73-S-OS-534	...	T	12, 13	58A7473	...	S-OS	...	none	.....
58A8255	....	1960	115-O-Special	2	T	10, 11	58A8255	...	O	2	none	27
60A815	....	2000	23-G-257	...	CB	15	7A9324	3	S	...	none	.....
61A784	....	300	44-G-464	...	CB	15	14A6576	1	S	...	none	37
61A784	....	600	44-G-463	...	CB	15	14A6576	2	S	...	none	37
61A805	....	600	69-G-561	...	CB	...	③	...	S	...	none	.....
61A2575	....	1500	115-O-Special	2	T	10, 11	61A2575	...	O	2	none	27

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

④ Special for Southern California Edison Co.

⑤ Special for Baltimore Gas & Electric

⑥ Special for Pacific Gas & Electric.

⑦ Inverted polehead bushing.

**part 5****section a: tabulation of drawings**

bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					② notes no.
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	
61A3099		640	92-O-Special	2	T	10, 11	61A3099	...	O	2	none	71
62A894		1200	288-G-931	2	CB	15	③	...	O	...	none	40
62A606		600	34.5-G-353	...	CB	15	7A9325	1	S	...	none	40
62A606		600	34.5-G-354	...	CB	15	7A9325	6	S	...	none	40
62A638		1200	23-G-251	...	CB	15	42A9626	1	S	...	{ 52B8619, Gr. 1 52B8618, item 2	122
62A639		600	34.5-G-350	...	CB	15	19A4791	1	S	...	none	...
62A640		600	23-G-252	...	CB	15	③	...	S	...	none	...
62A641		600	15-G-152	...	CB	15	13A4480	1	S	...	none	...
62A642		1200	15-G-154	...	CB	15	13A4480	2	S	...	none	...
62A1117		1950	115-O-Special	...	CT	10, 11	62A1117	...	O	...	none	126
62A1485		1200	180-O-Special	2	T	10, 11	62A1485	...	O	2	none	...
62A2261		③ 500	161-O-Special	2	T	10, 11	62A2261	...	O	2	none	27
62A3069		400	69-O-513	...	T	10, 11	62A3069	...	O	...	none	13
62A4569		400	69-O-584	...	T	10, 11	62A4569	...	O	...	none	120
62A4588		400	92-O-601	2	T	10, 11	62A4588	...	O	2	none	131
62A7169		1200	69-O-586	...	T	10, 11	62A7169	...	O	...	none	120
62A9425	1	450	5-RJ-Special	...	T	14	62A9428	1	RJ	...	none	126
62A9429	1	1200	5-RJ-Special	...	T	14	62A9429	1	RJ	...	none	126
62A9430	1	2280	5-RJ-Special	...	T	14	62A9430	1	RJ	...	none	126
62A9431	1	450	15-RJ-Special	...	T	14	62A9431	1	RJ	...	none	126
62A9432	1	1200	15-RJ-Special	...	T	14	62A9432	1	RJ	...	none	126
62A9433	1	2280	15-RJ-Special	...	T	14	62A9433	1	RJ	...	none	126
62A9434	1	1200	15-RJ-Special	...	T	14	62A9434	1	RJ	...	none	126
63A310		1200	34.5-G-352	...	CB	15	42A9627	1	S	...	{ 52B8619, Gr. 4 52B8618, item 5	122
63A311	fig. 1	600	66-G-553	...	CB	15	④ 12A2919	3	S	...	none	9, 29
63A311	fig. 2	600	66-G-Special	...	CB	15	17A2858	6	S	...	④	...
63A311	fig. 3	600	66-G-Special	...	CB	15	17A2858	6	S	...	none	...
63A312		600	46-G-451	...	CB	15	7A9326	1	S	...	none	...
63A313			110-G-651	1	T	15	16A4161	1	O	2	none	22, 73, 99
63A313		400	110-G-651	1	CB	15	13A4484	1	O	2	none	22, 73
63A315		600	138-F-704	...	CB	20, 21	13A4195	1	O	2	none	22
63A316		600	46-G-452	...	CB	15	42A9628	1	S	...	{ 52B8644, Gr. 1 52B8618, item 6	122
63A317		1200	46-G-453	...	CB	15	7A9326	3	S	...	none	...
63A318		1200	69-G-556	...	CB	15	42A9629	1	S	...	{ 52B8647, Gr. 2 52B8618, item 1	122
63A319		1200	34.5-G-370	...	CB	15	42A9627	1	S	...	{ 301-C-893, Gr. 1 52B8618, item 5	122
66A36		2000	34.5-G-355	...	CB	15	7A9325	...	S	...	none	...
69A259		600	92-G-604	1	CB	15	7A2140	1	N	2	none	22
69A259		600	92-G-604	2	CB	15	7A2140	1	N	2	none	22, 99
69A366			161-G-755	2	T	15	13A9362	1	O	2	none	...
69A366		1200	161-G-755	2	CB	15	12A3228	1	O	2	none	...
69A462		600	23-G-265	...	CB	15	8A1153	4	S	...	none	...
69A835		400	13.8-G-Special	...	T	15	15B1495	1	S	...	none	...
69A839		100/200	23-G-243	...	CT	15	4B6026	1	S	...	none	...
69A840		200/400	23-G-244	...	CT	15	4B6027	1	S	...	none	...
69A841		500/1000	23-G-245	...	CT	15	4B6028	1	S	...	none	...
69A842		500/1000	23-G-246	...	CT	15	4B6029	1	S	...	none	...
69A843		100/200	34.5-G-343	...	CT	15	4B6036	1	S	...	none	...
69A844		200/400	34.5-G-344	...	CT	15	4B6037	1	S	...	none	...
69A845		500/1000	34.5-G-345	...	CT	15	4B6038	1	S	...	none	...
69A846		500/1000	34.5-G-346	...	CT	15	4B6039	1	S	...	none	...
69A847		100/200	46-G-443	...	CT	15	4B6046	1	S	...	none	...
69A848		200/400	46-G-444	...	CT	15	4B6047	1	S	...	none	...
69A849		500/1000	46-G-445	...	CT	15	4B6048	1	S	...	none	...
69A850		500/1000	46-G-446	...	CT	15	4B6049	1	S	...	none	...
69A851		100/200	69-G-543	...	CT	15	4B6066	1	S	...	none	...
69A852		200/400	69-G-544	...	CT	15	4B6067	1	S	...	none	...
69A853		400/800	69-G-545	...	CT	15	4B6068	1	S	...	none	...
69A854		400/800	69-G-546	...	CT	15	4B6069	1	S	...	none	...
70A522			154-G-752	...	T	15	16A4484	1	O	2	none	80, 99
70A910		400	69-O-G-553	...	T	15	6A4269	4	OS	...	none	...

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

④ Limited by steel flange.

⑤ For breakers with current transformers less than 5½ inches I.D., use dwg 17A2868, Gr. 1.

⑥ Adapter included in dwg 17A2868 Gr. 3.

outdoor bushings

4.3 to 345 kv

for power circuit breakers
and transformers

technical
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bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	②notes no.
71A286	.....	535	88-G-601	1	T	15	6A3614	1	N	2	none	22
72A194	1	585	161-G-754	2	T	15	11A2161	1	N	2	none	22, 98, 99
72A194	3	1200	161-G-754	2	CB	15	12A3228	1	O	2	none	21
72A197	1	.....	69-G-540	...	CT	15	4B6065	1	S	...	none	.....
72A245	.....	400	194-G-751	1	CB	15	17A6796	1	O	2	none	22
72A245	.....	.....	194-G-751	1	T	15	6A9109	1	N	2	none	22, 98, 99
72A414	1	.....	66-G-553	...	T	15	6A4269	1	S	...	none	.....
72A414	5	600	66-G-553	...	CB	15	12A2919	3	S	...	none	.....
72A922	.....	1000	132-G-703	...	CB	15	③	...	O	2	none	54
73A772	.....	1200	34.5-G-370	...	CB	15	42A9627	1	S	...	{ 301-C-893, Gr. 1 52B8518, item 5 52B8847, Gr. 2 52B8518, item 1	122
73A887	.....	1200	69-G-556	...	CB	15	42A9629	1	S	...	none	122
73A964	fig. 1	600	138-G-731	1	CB	15	18A9967	1	O	2	none	22, 96
73A964	fig. 2	600	138-G-731	2	CB	15	18A9967	1	O	2	none	96
74A919	.....	400	110-G-651	1	CB	15	13A4484	1	O	2	none	20, 22, 73
76A52	.....	600	115-G-681	2	CB	15	12A3226	1	O	2	none	26, 97
79A113	.....	1200	161-G-754	1	CB	15	12A3228	1	O	2	none	22
79A113	.....	.....	161-G-754	1	T	15	11A2161	1	N	2	none	22, 98, 99
79A166	.....	.....	110-G-654	1	T	15	16A3635	1	O	2	none	22, 29
79A166	.....	600	110-G-654	1	CB	15	13A2845	1	O	2	none	22
79A198	.....	830	77-E-594	...	CB	20, 21	③	...	S	...	none	11
79A250	.....	1200	34.5-G-367	...	CB	15	7A9325	3	S	...	61B654	.....
79A497	.....	2000	23-G-264	...	CB	15	8A1153	2	S	...	none	.....
79A691	.....	600	46-G-461	...	CB	15	8A4423	2	S	...	none	.....
80A97	.....	400	22-G-258	...	CB	15	11A5307	1	S	...	none	.....
80A141	.....	400	88-G-601	1	CB	15	17A6795	1	O	2	none	22, 73
80A208	.....	800	77-E-594	...	CB	20, 21	12A2918	1	S	...	none	11
81A945	.....	600	115-Special-654	2	CB	...	13A2845	2	O	2	none	25
82A409	.....	.....	187-G-801	1	T	15	③	...	O	1	none	17, 18, 99
82A409	.....	600	187-G-801	2	CB	15	③	...	O	2	none	17, 18
83A941	.....	2000	23-G-253	...	CB	15	③	...	S	...	none	99
84A71	.....	400/800	132-G-720	...	CT	15	③	...	O	...	none	20, 22, 73
84A72	.....	400	110-G-651	1	CB	15	13A4484	1	O	2	none	20, 22, 73
84A72	.....	515	110-G-651	1	T	15	16A4161	1	O	2	none	20, 22, 73, 99
84A765	1	.....	88-G-605	...	T	15	③	...	O	2	none	99
85A492	.....	565	92-K-614	2	T	17	13A9292	1	O	2	none	99
85A515	1	515	115-OK-664	2	T	17	13A9315	1	O	2	none	22, 82, 99
85A530	.....	505	230-K-854	2	T	17	5A4330	1	N	2	none	22, 82, 98, 99
85A538	.....	600	138-K-714	2	T	17	9A6238	1	N	2	none	22, 82, 98, 99
85A542	.....	.....	23-J-2-Special	...	T	14	85A542	...	J-2	...	none	.....
85A561	.....	585	161-K-754	2	T	17	11A2161	1	N	2	none	22, 82, 98, 99
85A573	1	.....	138-G-706	2	T	15	16A6614	1	O	2	none	78, 82, 99
85A573	3	600	138-G-706	2	CB	15	12A3227	1	O	2	none	.....
85A660	.....	.....	23-J-2-Special	...	T	17	85A660	1	J-2	...	none	.....
85A724	1	505	230-E-851	1	T	20, 21	③	...	O	1	none	17, 99
85A963	.....	.....	13.8-J-2-Special	...	T	14	85A963	...	J-2	...	none	.....
86A730	.....	400	34.5-G-323	...	T	15	4B6032	1	S	...	none	.....
86A969	.....	400	69-K-513	...	T	17	16A4430	4	OS ₁	...	none	.....
86A993	.....	515	110-E-651	1	T	20, 21	16A4161	1	O	2	none	22, 99
87A126	1	2400	69-G-Special	...	T	15	③	...	...	...	none	.....
87A131	.....	.....	115-E-654	1	T	20, 21	16A3635	1	O	...	none	22, 99
87A131	.....	600	115-E-654	1	CB	20, 21	13A2845	1	O	2	none	22
87A133	1	300/600	115-K-Special	...	CT	17	11A2218	1	CT	...	none	64, 103
87A349	1	300/600	138-K-Special	...	CT	17	11A3863	1	CT	...	none	64, 103
87A653	1	.....	187-K-801	...	T	17	③	...	O	1	none	17, 64, 99
87A843	1	.....	220-K-850	...	T	17	③	...	O	2	none	64, 99
87A876	2	565	88-K-601	...	T	17	6A3614	1	N	2	none	22
88A296	.....	750	69-OK-516	...	T	17	13A9220	4	OK ₁	...	none	.....
88A298	.....	400/800	69-OK-545	...	CT	17	4B6068	1	S	...	none	.....
88A315	.....	515	115-K-664	...	T	17	13A9315	1	O	2	none	22, 82, 99
88A369	4	400	69-OK-513	...	T	17	16A4430	4	OS ₁	...	none	.....

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

**part 5****section a: tabulation of drawings**

bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					② notes no.
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	
88A733	4	100/200	69-OK-543	...	CT	17	7B2969	4	OK,	...	none	.....
88A734	4	200/400	69-OK-544	...	CT	17	4B6067	2	S	...	none	.....
89A143	...	2000	23-G-253	...	CB	15	7A9324	4	S	...	none	.....
89A179	...	600	34.5-G-1-357	...	CB	15	5A9446	...	G-1	...	none	44
90A139	...	1200	34.5-G-352	...	CB	15	42A9627	1	S	...	{ 52B8619, Gr. 4 52B8618, item 5	122
90A652	...	3000	34.5-G-356	...	CB	15	7A9325	5	S	...	none	.....
90A697	...	1200	69-M-556	...	CB	18	42A9629	1	S	...	{ 52B8647, Gr. 2 52B8618, item 1	122
90A739	...	1200	23-G-261	...	CB	15	8A1153	3	S	...	none	.....
92A71	...	1200	15-G-157	...	CB	15	③	...	S	...	none	.....
92A195	...	600	138-E-704	1	T	20, 21	13A4196	1	O	2	none	22
92A195	...	...	138-E-704	1	T	20, 21	16A3619	1	O	2	none	22, 29
92A295	...	...	138-G-704	1	T	15	16A3619	1	O	2	none	22, 29
92A295	...	600	138-G-704	1	CB	15	13A4196	1	O	2	none	22
92A580	...	1200	Special-M-707	2	CB	18	18A4651	1	O	2	none	21, 27
93A964	...	...	187-OK-801	1	T	17	③	...	O	1	none	17, 18, 63, 99
93A964	...	...	187-OK-801	2	T	17	③	...	O	2	none	17, 18, 63, 99
94A86	...	600	69-M-561	...	CB	18	18A7270	3	OS	...	none	25, 26, 97
94A135	1	600	115-M-681	2	CB	18	12A3226	2	O	2	...	22, 25, 26, 87
94A135	2	600	115-M-681	1	CB	18	12A3226	2	O	2	...	...
⑨94A156	...	1200	69-M-556	...	CB	18	42A9627	1	S	...	{ 52B8647, Gr. 2 52B8618, item 1	122
⑨96A343	...	1200	34.5-OG-352	...	CB	15	42A9627	1	S	...	{ 52B8619, Gr. 4 52B8618, item 5	122
96A427	...	1200	23-G-259	...	CB	15	8A1153	1	S	...	none	52
96A459	...	600	46-M-452	...	CB	18	42A9628	1	S	...	{ 52B8644, Gr. 1 52B8618, item 6	122
96A469	...	600	23-G-265	...	CB	15	8A1153	4	S	...	none	.....
96A486	...	400	88-G-601	1	CB	15	17A6795	1	O	2	none	22
96A486	...	400	88-G-601	2	CB	15	17A6795	1	O	2	none	.....
96A556	1	1200	161-M-755	2	CB	18	12A3228	1	O	2	none	.....
96A672	...	4000	23-G-255	...	CB	15	7A9324	7	S	...	none	.....
96A906	...	400	154-G-752	...	CB	15	15A9770	1	O	2	none	.....
96A939	...	2000	23-G-253	...	CB	15	15A9772	3	S	...	none	27
97A212	...	1200	230-M-856	2	CB	18	13A4200	1	O	2	none	.....
98A582	...	600	46-M-451	...	CB	18	③	...	OS	...	none	.....
98A643	...	400	100-G-652	2	CB	15	③	...	O	2	none	.....
98A790	1	400	110-M-651	2	CB	18	13A4484	2	O	2	none	.....
98A791	...	400	132-G-701	2	CB	15	14A1678	1	O	2	none	54
99A645	...	600	138-M-731	2	CB	18	18A9967	1,7	O	2	none	.....
1B4182	1	165	34.5-OG-312	...	T	15	4B6030	4	OS	...	none	.....
1B4588	1	1375	23-OG-233	...	T	15	4B6023	4	OS	...	none	.....
1B4708	1	165	46-OG-412	...	T	15	4B6040	4	OS	...	none	.....
1B4793	1	1710	4.3-J-2-Special	...	T	14	11B6113	1	J-2	...	none	.....
1B4814	1	...	13.8-G-138	...	T	15	11B7155	2	S	...	none	.....
1B4936	1	165	34.5-OG-321	...	T	15	4B6298	4	OS	...	none	.....
1B4977	1	520	23-OG-217	...	T	15	4B6022	4	OS	...	none	.....
1B4998	1	2280	4.3-J-2-Special	...	T	14	11B6114	1	J-2	...	none	.....
1B5020	1	165	13.8-OG-112	...	T	15	4B6010	4	OS	...	none	.....
1B5217	1	165	13.8-G-1-114	...	T	15	③	...	SI	...	none	70
1B5280	1	1820	23-G-236	...	T	15	③	...	S	...	none	27
1B5288	1	400	46-G-Special	...	T	15	③	...	S	...	none	27
1B5358	1	550	15-OG-Special	...	T	15	③	...	OS	...	none	71
1B5415	1	220	13.8-J-2-52	...	T	14	11B6125	...	I-2	...	none	.....
1B5416	1	220	13.8-J-2-52	...	T	14	11B6125	...	I-2	...	none	.....
1B5437	1	165	34.5-G-1-312	...	T	15	③	...	SI	...	none	70
1B5465	1	400	46-OG-417	...	T	15	8B8710	4	OS	...	none	.....
1B5496	1	890	34.5-OG-327	...	T	15	7B1511	4	OS	...	none	.....
1B5497	1	1820	23-OG-236	...	T	15	4B6025	4	OS	...	none	.....
1B5499	1	220	8.7-J-2-Special	...	T	14	1B5499	1	J-2	...	none	.....
1B5554	1	220	4.3-J-2-Special	...	T	14	1B5554	1	J-2	...	none	.....
1B5592	1	150	34.5-OG-313	...	T	15	4B6031	4	OS	...	none	.....
1B5701	1	2280	4.3-J-2-Special	...	T	14	1B5701	1	J-2	...	none	.....
1B5856	1	450	8.7-J-2-Special	...	T	14	1B5856	1	J-2	...	none	.....

① See note on nominal current ratings on page 34.
 ② Refer to pages 84 to 87.

③ Drawing not made.
 ④ When bushings with special gaps are used refer to groups 2 and 3 of these drawings.

outdoor bushings

4.3 to 345 kv

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bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements						②notes no.
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.		
1B5936	1	1280	34.5-OG-333	...	T	15	4B6034	4	OS	...	none	.....	
1B5953	1	550	13.8-OG-116	...	T	15	7B2061	4	OS	...	none	.....	
1B5978	1	765	4.3-J-2-Special	...	T	14	1B5978	1	J-2	...	none	.....	
2B955	....	450	7.5-J-2-Special	...	T	14	2B955	...	J-2	...	none	.....	
2B956	....	765	7.5-J-2-Special	...	T	14	2B956	...	J-2	...	none	.....	
2B957	....	450	15-J-2-Special	...	T	14	2B957	...	J-2	...	none	.....	
2B958	....	750	15-J-2-Special	...	T	14	2B958	...	J-2	...	none	.....	
2B959	....	450	23-J-2-Special	...	T	14	2B959	...	J-2	...	none	.....	
2B960	....	765	23-J-2-Special	...	T	14	2B960	...	J-2	...	none	.....	
2B967	....	1710	15-J-2-Special	...	T	14	27B1929	2	RJ	...	none	.....	
2B969	....	765	15-J-2-Special	...	T	14	2B969	...	J-2	...	none	.....	
2B2269	....	....	69-K-Special	...	T	17	4B6061	1	S	...	none	.....	
2B4069	1	550	13.8-OG-118	...	T	15	4B6017	4	OS	...	none	.....	
2B4213	1	165	46-OG-413	...	T	15	4B6041	4	OS	...	none	.....	
2B4228	1	450	13.8-J-2-Special	...	T	14	2B4228	1	J-2	...	none	.....	
2B4258	1	165	13.8-G-1-113	...	T	15	4B7275	1	SI	...	none	70	
2B4356	1	890	34.5-G-326	...	T	15	4B8530	1	S ₁	...	none	.....	
2B4380	1	450	13.8-J-2-Special	...	T	14	2B4380	1	J-2	...	none	.....	
2B4651	1	165	34.5-GI-312	...	T	15	4B7287	1	ISI	...	none	70, 81	
2B4657	1	765	4.3-J-2-Special	...	T	14	11B6112	...	J-2	...	none	70	
2B4715	1	950	23-OG-229	...	T	15	6B5311	4	OS	...	none	.....	
2B4734	1	400	23-OG-223	...	T	15	7B1507	4	OS	...	none	.....	
2B4748	1	900	34.5-GI-316	...	T	15	③	...	OS	...	none	.....	
2B4843	1	830	46-OG-419	...	T	15	4B6043	4	OS	...	none	.....	
2B4957	1	5400	4.3-J-2-Special	...	T	14	2B4957	1	J-2	...	none	71	
2B4993	1	3300	4.3-J-2-Special	...	T	14	2B4993	1	J-2	...	none	.....	
2B5023	1	220	4.3-J-2-Special	...	T	14	27B1923	12	RJ	...	none	70, 123	
2B5154	1	220	8.7-J-2-Special	...	T	14	2B5154	1	J-2	...	none	70	
2B5155	1	220	8.7-J-2-32	...	T	14	2B5155	1	J-2	...	none	.....	
2B5248	1	5400	4.3-J-2-Special	...	T	14	2B5248	1	J-2	...	none	.....	
2B5633	1	550	13.8-OG-117	...	T	15	4B6012	4	OS	...	none	70	
2B5669	1	400	50-G-416	...	T	15	11B5294	1	S	...	none	.....	
2B5999	1	...	37-OG-355	...	T	15	20A5990	...	OS	...	none	13, 96, 109	
2B6043	1	765	4.3-J-2-Special	...	T	14	2B6043	1	J-2	...	none	71	
2B6044	1	765	8.7-J-2-Special	...	T	14	11B6104	...	J-2	...	none	71	
2B6045	1	450	13.8-J-2-Special	...	T	14	11B6106	1	RJ	...	none	71	
2B6174	1	220	13.8-J-2-Special	...	T	14	2B6174	1	J-2	...	none	70	
2B6261	1	165	13.8-OG-113	...	T	15	4B6011	4	OS	...	none	31	
2B6283	1	1710	4.3-J-2-Special	...	T	14	2B6283	1	J-2	...	none	27	
2B6592	1	169	25-J-1-Special	...	T	22	2B6592	1	J-1	...	none	.....	
2B6597	1	765	8.7-J-2-Special	...	T	14	2B6597	1	J-2	...	none	.....	
2B6600	1	450	13.8-J-2-Special	...	T	14	11B6106	1	J-2	...	none	70, 71	
2B6629	1	765	4.3-J-2-Special	...	T	14	2B6629	1	J-2	...	none	70	
2B6630	1	765	8.7-J-2-Special	...	T	14	11B6104	...	J-2	...	none	70, 71	
2B6631	1	450	13.8-J-2-Special	...	T	14	4B7701	...	RJ	...	none	70	
2B6720	1	...	8.7-J-2-Special	...	T	14	2B6720	...	J-2	...	none	.....	
2B6728	1	520	23-G-216	...	T	15	③	...	S	...	none	.....	
2B6974	1	...	46-OG-428	...	T	15	③	...	OS	...	none	.....	
4B4200	1	450	4.3-J-2-Special	...	T	14	11B6111	2	J-2	...	none	.....	
4B4312	1	1710	8.7-J-2-Special	...	T	14	4B4312	1	J-2	...	none	.....	
4B4393	1	1000	23-J-2-Special	...	T	14	6B5787	1	J-2	...	none	.....	
4B4459	1	450	8.7-J-2-Special	...	T	14	4B4459	1	J-2	...	none	71	
4B4460	1	...	8.7-J-2-Special	...	T	14	4B4460	1	J-2	...	none	70, 71	
4B4509	1	830	46-G-419	...	T	15	11B3063	1	S	...	none	115	
4B4611	1	450	4.3-J-2-Special	...	T	14	4B4611	1	J-2	...	none	.....	
4B4634	1	400	13.8-OG-123	...	T	15	7B1329	4	OS	...	none	30	
4B4698	1	160	25-G-213	...	T	15	4B6021	1	S	...	none	.....	
4B4822	1	165	13.8-G-113	...	T	15	③	...	S	...	none	27	
4B4930	1	785	4.3-J-2-Special	...	T	14	4B4930	1	J-2	...	none	.....	
4B5073	1	5400	4.3-J-2-Special	...	T	14	4B5073	1	J-2	...	none	70-71	
4B5318	1	1700	34.5-G-Special	...	CT	15	11B5916	1	S	...	none	.....	
④ 4B5375	1	...	8.7-J-2-Special	...	T	14	4B5375	1	J-2	...	none	.....	
4B5444	1	550	13.8-G-1-117	...	T	15	4B7276	1	SI	...	none	70	
4B5753	1	220	4.3-J-2-Special	...	T	14	4B5753	1	J-2	...	none	101, 113	

① See note on nominal current ratings on page 34.
② Refer to pages 84 to 87.

③ Drawing not made.
④ Twin conductor bushing.

**part 5****section a: tabulation of drawings**

bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					② notes no.
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	
4B5754	1	450	4.3-J-2-Special	...	T	14	4B5754	...	J-2	...	none	101, 113
4B5755	1	785	4.3-J-2-Special	...	T	14	4B5755	1	J-2	...	none	101, 113
4B5756	1	1710	4.3-J-2-Special	...	T	14	4B5756	1	J-2	...	none	101, 113
4B5757	1	3300	4.3-J-2-Special	...	T	14	4B5757	1	J-2	...	none	101, 113
4B5758	1	450	8.7-J-2-Special	...	T	14	4B5758	1	J-2	...	none	101, 113
4B5759	1	785	8.7-J-2-Special	...	T	14	53B6472	1	RJ	...	none	75, 123, 124
4B5760	1	1710	8.7-J-2-Special	...	T	14	4B5760	1	J-2	...	none	101, 113
4B5761	1	1710	8.7-J-2-Special	...	T	14	27B1929	2	RJ	...	none	75, 123, 124
4B5762	1	3300	8.7-J-2-Special	...	T	14	4B5762	1	J-2	...	none	75, 123, 124
4B5763	1	3300	8.7-J-2-Special	...	T	14	4B5763	1	J-2	...	none	75, 123, 124
4B5764	1	220	4.3-J-2-Special	...	T	14	27B1923	2	RJ	...	none	123
4B5849	1	5400	4.3-J-2-Special	...	T	14	4B5849	1	J-2	...	none	70
4B5992	1	400	15-OG-Special	...	T	15	③	...	S	...	none	30
4B5993	1	5400	4.3-J-2-Special	...	T	14	4B5993	1	J-2	...	none	70
4B6010	...	350	13.8-S-112	...	T	12, 13	4B6010	...	S	...	none	...
4B6011	...	320	13.8-S-113	...	T	12, 13	4B6011	...	S	...	none	...
4B6012	1	④400	13.8-S-117	...	T	12, 13	4B6012	1	S	...	none	...
4B6013	...	1700	13.8-S-125	...	T	12, 13	4B6013	...	S	...	none	...
4B6014	...	1600	13.8-S-126	...	T	12, 13	4B6014	...	S	...	none	...
4B6015	...	2120	13.8-S-128	...	T	12, 13	4B6015	...	S	...	none	...
4B6016	...	2600	13.8-S-133	...	T	12, 13	4B6016	...	S	...	none	...
4B6017	1	④400	13.8-S-118	...	T	12, 13	4B6017	1	S	...	none	...
4B6020	1	330	23-S-212	...	T	12, 13	441C620	...	S-OS	...	none	...
4B6021	1	305	23-S-213	...	T	12, 13	441C621	...	S-OS	...	none	...
4B6022	1	④400	23-S-217	...	T	12, 13	441C621	...	S-OS	...	none	...
4B6023	1	1630	23-S-228	...	T	12, 13	53B2226	...	S-OS	...	585D150, Gr. 3 or 23	122
4B6024	...	2050	23-S-233	...	T	12, 13	4B6024	...	S	...	none	...
4B6025	...	2600	23-S-236	...	T	12, 13	4B6025	...	S	...	none	...
4B6026	...	④400	23-S-243	...	CT	12, 13	4B6026	...	S	...	none	...
4B6027	...	④200/400	23-S-244	...	CT	12, 13	4B6027	...	S	...	none	...
4B6028	...	500/1000	23-S-245	...	CT	12, 13	4B6028	...	S	...	none	...
4B6029	...	500/1000	23-S-246	...	CT	12, 13	4B6029	...	S	...	none	...
4B6030	1	310	34.5-S-312	...	T	12, 13	53B2231	...	S-OS	...	585D150, Gr. 4	122, 125
4B6031	1	290	34.5-S-313	...	T	12, 13	53B2232	...	S-OS	...	585D150, Gr. 5	122, 125
4B6032	1	④1400	34.5-S-323	...	T	12, 13	53B2232	...	S-OS	...	585D150, Gr. 7	122, 125
4B6033	1	1550	34.5-S-326	...	T	12, 13	24B2432	...	S	...	none	...
4B6034	...	1950	34.5-S-333	...	T	12, 13	4B6034	...	S	...	none	...
4B6036	...	100/200	34.5-S-343	...	CT	12, 13	4B6036	...	S	...	none	...
4B6037	...	200/400	34.5-S-344	...	CT	12, 13	4B6037	...	S	...	none	...
4B6038	...	500/1000	34.5-S-345	...	CT	12, 13	4B6038	...	S	...	none	...
4B6039	...	500/1000	34.5-S-346	...	CT	12, 13	4B6039	...	S	...	none	...
4B6040	1	290	46-S-412	...	T	12, 13	53B2241	...	S-OS	...	585D150, Gr. 11	122, 125
4B6041	1	270	46-S-413	...	T	12, 13	53B2242	...	S-OS	...	585D150, Gr. 14	122, 125
4B6042	1	④400	46-S-416	...	T	12, 13	53B2242	...	S-OS	...	585D150, Gr. 14	122
4B6043	1	1400	46-S-419	...	T	12, 13	53B2246	...	S-OS	...	585D150, Gr. 14	64, 66
4B6044	1	1850	46-S-426	...	T	12, 13	11B7495	...	S	...	none	...
4B6046	...	100/200	46-S-443	...	CT	12, 13	4B6044	...	S	...	none	...
4B6047	...	200/400	46-S-444	...	CT	12, 13	4B6046	...	S	...	none	...
4B6048	...	500/1000	46-S-445	...	CT	12, 13	4B6048	...	S	...	none	...
4B6049	...	600/1200	46-S-446	...	CT	12, 13	4B6049	...	S	...	none	...
4B6060	1	④400	69-S-513	...	T	12, 13	53B2263	...	S-OS	...	585D150, Gr. 18	122, 125
4B6061	1	④400	69-S-514	...	T	12, 13	53B2263	...	S-OS	...	585D150, Gr. 16	122, 125
4B6062	1	1220	69-S-517	...	T	12, 13	53B2267	...	S-OS	...	585D150, Gr. 40	122
4B6065	...	150/300	69-S-540	...	CT	12, 13	4B6065	...	S	...	none	...
4B6066	...	100/200	69-S-543	...	CT	12, 13	4B6066	...	S	...	none	...
4B6067	...	200/400	69-S-544	...	CT	12, 13	4B6067	...	S	...	none	...
4B6068	...	400/800	69-S-545	...	CT	12, 13	4B6068	...	S	...	none	...
4B6069	...	400/800	69-S-546	...	CT	12, 13	4B6069	...	S	...	none	...
4B6106	1	165	23-G-1-216	...	T	15	③	...	SI	...	none	73
4B6146	1	400	25-G-Special	...	T	15	③	...	S	...	none	...

① See note on nominal current ratings on page 34.
 ② Refer to pages 84 to 87.

③ Drawing not made.
 ④ Limited by steel flange.

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bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	②notes no.
4B6332	1	150	34.5-OG-312	...	T	15	4B6030	4	OS	...	none	30
4B6354	1	1950	34.5-S-333	...	T	12, 13	4B8531	1	S	...	none	101
4B6479	1	600	15-G-Special	...	T	15	③	...	S	...	none	.....
4B6481	1	1200	8.7-J-2-Special	...	T	14	11B6105	...	I-2	...	none	.....
4B6489	1	1750	15-S-125	...	T	12, 13	4B8527	1	S	...	none	101
4B6822	1	890	15-G-5	...	T	15	③	...	S	...	none	.....
4B6974	1	220	4.3-J-2-Special	...	T	14	4B6974	...	I-2	...	none	.....
4B7274	....	350	15-SI-112	...	T	12, 13	4B7274	...	SI	...	none	70
4B7275	....	320	15-SI-113	...	T	12, 13	4B7275	...	SI	...	none	70
4B7276	1	④400	15-SI-117	...	T	12, 13	4B7276	...	SI	...	none	70
4B7277	1	1700	15-SI-125	...	T	12, 13	4B7277	...	SI	...	none	70
4B7278	1	1620	15-SI-126	...	T	12, 13	4B7278	...	SI	...	none	70
4B7279	....	2120	15-SI-128	...	T	12, 13	4B7279	...	SI	...	none	70
4B7280	....	2700	15-SI-133	...	T	12, 13	4B7280	...	SI	...	none	70
4B7281	1	160	25-SI-212	...	T	12, 13	4B7281	...	SI	...	none	70
4B7282	1	160	25-SI-213	...	T	12, 13	4B7282	...	SI	...	none	70
4B7283	1	520	25-SI-217	...	T	12, 13	4B7283	1	SI	...	none	70
4B7284	1	950	25-SI-228	...	T	12, 13	4B7284	1	SI	...	none	70
4B7285	1	1375	25-SI-233	...	T	12, 13	4B7285	1	SI	...	none	70
4B7286	1	1820	25-SI-236	...	T	12, 13	4B7286	1	SI	...	none	70
4B7287	1	150	34.5-SI-312	...	T	12, 13	4B7287	1	SI	...	none	70
4B7288	1	150	34.5-SI-313	...	T	12, 13	4B7288	1	SI	...	none	70
4B7289	1	400	34.5-SI-323	...	T	12, 13	4B7289	1	SI	...	none	70
4B7290	1	890	34.5-SI-326	...	T	12, 13	4B7290	1	SI	...	none	70
4B7291	....	1280	34.5-SI-333	...	T	12, 13	4B7291	...	SI	...	none	70
4B7292	1	140	46-SI-412	...	T	12, 13	4B7292	1	SI	...	none	70
4B7293	1	140	46-SI-413	...	T	12, 13	4B7293	1	SI	...	none	70
4B7294	1	400	46-SI-416	...	T	12, 13	4B7294	1	SI	...	none	70
4B7295	1	830	46-SI-419	...	T	12, 13	4B7295	1	SI	...	none	70
4B7296	1	1200	46-SI-426	...	T	12, 13	4B7296	...	SI	...	none	70
4B7297	1	400	69-SI-513	...	T	12, 13	4B7297	1	SI	...	none	70
4B7298	1	400	69-SI-514	...	T	12, 13	4B7298	1	SI	...	none	70
4B7299	1	1220	69-SI-517	...	T	12, 13	4B7299	...	SI	...	none	70
4B7328	1	1710	8.7-J-2-Special	...	T	14	4B7328	1	I-2	...	none	112
4B7329	1	785	8.7-J-2-Special	...	T	14	4B7329	1	I-2	...	none	112
4B7330	1	1710	8.7-J-2-Special	...	T	14	4B7330	1	I-2	...	none	112
4B7331	1	450	8.7-J-2-Special	...	T	14	4B7331	1	I-2	...	none	.....
4B7602	1	390	15-S-Special	...	T	12, 13	4B7602	1	S	...	none	101
4B7603	1	④400	15-S-Special	...	CT	12, 13	4B7603	1	S	...	none	100, 101
4B7604	1	890	34.5-OG-326	...	T	15	③	...	S	...	none	30
4B7696	1	785	8.7-J-2-Special	...	T	14	4B7696	1	I-2	...	none	.....
4B7697	1	1710	8.7-J-2-Special	...	T	14	4B7697	1	I-2	...	none	70
4B7698	1	1710	8.7-J-2-Special	...	T	14	4B7698	1	I-2	...	none	70, 112
4B7699	1	220	4.3-J-2-Special	...	T	14	4B7699	1	I-2	...	none	70
4B7700	1	450	15-J-2-Special	...	T	14	4B7700	1	I-2	...	none	.....
4B7701	1	450	15-J-2-Special	...	T	14	4B7701	1	I-2	...	none	70, 116
4B7702	1	450	15-J-2-Special	...	T	14	4B7702	1	I-2	...	none	116
4B8144	1	5400	4.3-J-2-Special	...	T	14	4B8144	1	I-2	...	none	.....
4B8155	1	515	115-N-665	2	T	19	13A9315	1	O	2	none	99
4B8298	1	310	34.5-S-321	...	T	12, 13	53B2231	...	S-OS	...	585D150, Gr. 7	122, 125
④4B8449	1	590	115-N-665	2	T	19	13A9315	1	O	2	none	99, 100
4B8526	1	330	15-S-113	...	T	12, 13	4B8526	1	S	...	none	101
4B8527	1	1730	15-S-125	...	T	12, 13	4B8527	1	S	...	none	101
4B8528	1	290	34.5-S-313	...	T	12, 13	53B2232	...	S-OS	...	585D150, Gr. 5	122, 125
4B8529	1	④400	34.5-S-323	...	T	12, 13	53B2232	...	S-OS	...	585D150, Gr. 7	122, 125
4B8530	1	1540	34.5-S-326	...	T	12, 13	53B2236	...	S	...	none	122
4B8531	1	1950	34.5-S-333	...	T	12, 13	4B8531	1	S	...	none	101
4B8668	1	350	25-S-Special	...	T	12, 13	4B8668	1	S	...	none	101
4B8669	1	840	25-S-Special	...	CT	12, 13	4B8669	1	S	...	none	100, 101
6B4029	1	5400	4.3-J-2-Special	...	T	14	4B4029	1	I-2	...	none	71
6B4030	1	5400	4.3-J-2-Special	...	T	14	4B4030	1	I-2	...	none	71
6B4031	1	5400	4.3-J-2-Special	...	T	14	6B4031	1	I-2	...	none	71
6B4032	1	5400	4.3-J-2-Special	...	T	14	6B4032	1	I-2	...	none	70, 71
6B4033	1	5400	4.3-J-2-Special	...	T	14	6B4033	1	I-2	...	none	70, 71

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

④ Limited by steel flange.

⑤ Drawing 11A2115 with draw through stud.

**part 5****section a: tabulation of drawings**

bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements						②notes no.
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.		
6B4217	1	890	34.5-G-326	...	T	15	4B6033	1	S	...	none	...	
6B4376	1	310	34.5-S-312	...	T	12, 13	53B2231	...	S-OS	...	585D150, Gr. 4	122, 125	
6B4377	1	100/200	34.5-S-343	...	CT	12, 13	6B4377	1	S	...	none	101	
6B4379	1	950	25-G-Special	...	T	15	③	...	S	...	...	71	
6B4380	1	165	15-G-114	...	T	15	③	...	S	...	...	112	
6B4471	1	220	8.7-J-2-Special	...	T	14	6B4471	1	I-2	...	none	112	
6B4624	1	1710	8.7-J-2-Special	...	T	14	6B4624	1	I-2	...	none	30	
6B4672	1	400	23-OG-Special	...	T	15	③	...	S	...	...	...	
6B4674	1	1820	25-G-Special	...	T	15	16A8641	1	S	...	...	71	
6B4838	1	450	15-J-2-Special	...	T	14	6B4838	1	I-2	...	none	112, 116	
6B4861	1	785	8.7-J-2-Special	...	T	14	6B4861	1	I-2	...	none	70	
6B4862	1	1700	37-OG-Special	...	T	15	③	...	S	...	...	109	
6B4863	3	1210	15-J-2-Special	...	T	14	6B4863	1	I-2	...	none	112, 116	
6B4864	1	220	8.7-J-2-Special	...	T	14	6B4864	1	I-2	...	none	112, 116	
③6B4931	1	1800	34.5-S-328	...	T	12, 13	6B4931	1	S	...	...	101	
6B4983	1	550	15-J-2-Special	...	T	14	6B4983	1	I-2	...	none	...	
6B4984	1	550	15-J-2-Special	...	T	14	6B4984	1	I-2	...	none	70	
6B4985	1	220	25-J-2-Special	...	T	14	6B4985	1	I-2	...	none	...	
6B5095	1	400	69-OG-513	...	T	15	4B6060	1	S	...	none	30	
6B5098	1	550	15-OG-116	...	T	15	7B2061	4	S	...	none	30	
6B5099	...	2320	46-S-Special	...	T	12, 13	6B5099	1	S	...	none	70	
6B5286	1	785	15-J-2-Special	...	T	14	6B5286	1	I-2	...	none	...	
6B5310	1	400	15-G-Special	...	T	15	①15B9110	1	S	...	none	...	
6B5311	1	1550	25-S-229	...	T	12, 13	53B2226	...	S-OS	...	585D150, Gr. 2,22	122	
6B5312	1	④400	15-S-124	...	T	12, 13	6B5312	...	S	...	none	...	
6B5313	1	400	25-G-Special	...	T	16	③	...	S	...	none	...	
6B5580	1	450	15-J-2-Special	...	T	14	6B5580	1	I-2	...	none	70, 116	
6B5581	1	1210	15-J-2-Special	...	T	14	6B5581	1	I-2	...	none	70, 116	
6B5582	1	450	15-J-2-Special	...	T	14	6B5582	1	I-2	...	none	116	
6B5609	1	220	25-J-2-Special	...	T	14	6B5609	1	I-2	...	none	70	
6B5610	1	520	25-J-2-Special	...	T	14	6B5610	1	I-2	...	none	...	
6B5611	1	520	25-J-2-Special	...	T	14	6B5611	1	I-2	...	none	70	
6B5613	1	1450	15-G-128	...	T	16	4B6015	1	S	...	none	...	
6B5614	1	1490	34.5-G-Special	...	T	15	③	...	S	...	...	70	
6B5723	1	220	8.7-J-2-Special	...	T	14	6B5723	1	I-2	...	none	70	
6B5724	1	3300	8.7-J-2-Special	...	T	14	6B7214	1	I-2	...	none	...	
6B5725	1	450	8.7-J-2-Special	...	T	14	6B5725	1	I-2	...	none	70	
6B5784	1	3300	8.7-J-2-Special	...	T	14	6B5784	1	I-2	...	none	70	
6B5787	1	1000	25-J-2-Special	...	T	14	6B5787	1	I-2	...	none	...	
6B5788	1	3300	4.3-J-2-Special	...	T	14	6B5788	1	I-2	...	none	113	
7B1140	1	1810	15-S-Special	...	T	12, 13	7B1140	1	S	...	none	71	
7B1145	1	2130	34.5-G-Special	...	T	16	③	...	S	...	...	...	
7B1173	1	450	8.7-J-2-Special	...	T	14	7B1173	1	I-2	...	none	70	
7B1174	1	1710	8.7-J-2-Special	...	T	14	7B1174	1	I-2	...	none	70	
7B1175	1	1710	8.7-J-2-Special	...	T	14	7B1175	1	I-2	...	none	70	
7B1327	1	2700	15-G-138	...	T	16	11B7155	2	S	...	none	...	
7B1329	...	400	15-S-123	...	T	12, 13	7B1329	...	S	...	none	...	
7B1376	1	3300	4.3-J-2-Special	...	T	14	7B1376	1	I-2	...	none	113	
7B1424	1	1540	34.5-S-326	...	T	12, 13	53B2236	...	S-OS	...	585D150, Gr. 8,28	122	
7B1507	1	④400	25-S-223	...	T	12, 13	53B2222	...	S-OS	...	585D150, Gr. 2	122, 125	
7B1511	1	1460	34.5-S-327	...	T	12, 13	53B2236	...	S-OS	...	585D150, Gr. 7,27	122	
7B1512	1	④400	34.5-S-324	...	T	12, 13	53B2233	...	S-OS	...	585D150, Gr. 6	122, 125	
7B1513	1	220	15-J-2-Special	...	T	14	7B1513	1	I-2	...	none	70	
7B1514	1	220	15-J-2-Special	...	T	14	7B1514	1	I-2	...	none	...	
7B1559	1	2450	25-G-Special	...	T	16	③	...	S	...	...	...	
7B1662	1	3000	34.3-G-Special	...	T	16	③	...	S	...	none	...	
7B1743	1	950	25-S-228	...	T	12, 13	7B1743	1	S	...	none	...	
7B1744	1	400	25-G-Special	...	T	16	③	...	S	...	none	30	
7B1745	1	2700	15-S-133	...	T	12, 13	7B1745	1	S	...	...	...	
7B2059	1	250	46-S-414	...	T	12, 13	53B2243	...	S-OS	...	585D150, Gr. 11	122	
7B2061	1	④400	15-S-116	...	T	12, 13	7B2061	1	S	...	none	...	
7B2062	1	3300	8.7-J-2-Special	...	T	14	7B2062	1	I-2	...	none	...	
⑦7B2065	1	165	15-S-112	...	CSP T	12, 13	7B2065	1	S	...	none	...	
⑦7B2066	1	310	15-S-113	...	CSP T	12, 13	7B2066	1	S	...	none	...	

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

④ Limited by steel flange.

⑤ 1 3/4" dia. stud machined to 1 1/2" dia. both ends.

⑥ Bushing has fusible link inside bushing tube.

outdoor bushings

4.3 to 345 kv

for power circuit breakers
and transformers

technical
data

33-360

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bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	②notes no.
⑦7B2067	1	330	15-SI-112	...	CSP T	12, 13	7B2067	1	SI	...	none	70
⑦7B2069	1	310	15-SI-113	...	CSP T	12, 13	7B2069	1	SI	...	none	70
⑦7B2070	1	160	25-S-212	...	CSP T	12, 13	7B2070	1	S	...	none	70
⑦7B2071	1	160	25-S-213	...	CSP T	12, 13	7B2071	1	S	...	none	.....
⑦7B2072	1	160	25-SI-212	...	CSP T	12, 13	7B2072	1	SI	...	none	70
⑦7B2073	1	160	25-SI-213	...	CSP T	12, 13	7B2073	1	SI	...	none	70
⑦7B2074	1	150	34.5-S-312	...	CSP T	12, 13	7B2074	1	S	...	none	.....
⑦7B2075	1	280	34.5-S-313	...	CSP T	12, 13	7B2075	1	S	...	none	.....
⑦7B2076	1	150	34.5-SI-312	...	CSP T	12, 13	7B2081	1	SI	...	none	70
⑦7B2077	1	150	34.5-SI-313	...	CSP T	12, 13	7B2082	1	S	...	none	.....
⑦7B2078	1	140	46-S-412	...	CSP T	12, 13	7B2083	1	S	...	none	.....
⑦7B2079	1	265	46-S-413	...	CSP T	12, 13	7B2084	1	SI	...	none	70
⑦7B2080	1	140	46-SI-412	...	CSP T	12, 13	7B2085	1	SI	...	none	70
⑦7B2081	1	140	46-SI-413	...	CSP T	12, 13	7B2076	1	SI	...	none	70
⑦7B2082	1	400	69-S-513	...	CSP T	12, 13	7B2077	1	SI	...	none	70
⑦7B2083	1	400	69-S-514	...	CSP T	12, 13	7B2078	1	S	...	none	.....
⑦7B2084	1	400	69-SI-513	...	CSP T	12, 13	7B2079	1	S	...	none	.....
⑦7B2085	1	400	69-SI-514	...	CSP T	12, 13	7B2080	1	SI	...	none	70
7B2086	1	200/400	46-S-444	...	CT	12, 13	7B2086	1	S	...	none	.....
7B2107	1	165	15-G-112	...	CT	16	4B6010	1	S	...	none	.....
7B2108	1	165	15-G-113	...	T	16	4B6011	1	S	...	none	.....
7B2109	1	550	15-G-117	...	T	16	4B6012	1	S	...	none	.....
7B2112	1	1920	15-G-133	...	T	16	4B6016	1	S	...	none	.....
7B2113	1	160	25-G-212	...	T	16	4B6020	1	S	...	none	.....
7B2114	1	160	25-G-213	...	T	16	4B6021	1	S	...	none	.....
7B2116	1	520	25-G-228	...	T	16	4B6023	1	S	...	none	.....
7B2118	1	1820	25-G-236	...	T	16	4B6025	1	S	...	none	.....
7B2119	1	150	34.5-G-312	...	T	16	4B6030	1	S	...	none	.....
7B2120	1	150	34.5-G-313	...	T	16	4B6031	1	S	...	none	.....
7B2121	1	400	34.5-G-323	...	T	16	4B6032	1	S	...	none	.....
7B2124	1	140	46-G-412	...	T	16	4B6040	1	S	...	none	.....
7B2125	1	140	46-G-413	...	T	16	4B6041	1	S	...	none	.....
7B2126	1	400	46-G-416	...	T	16	4B6042	1	S	...	none	.....
7B2128	1	1200	46-G-426	...	T	16	4B6044	1	S	...	none	.....
7B2307	1	520	25-G-Special	...	T	16	③	...	S	...	none	70, 71
7B2311	1	1210	8.7-J-2-Special	...	T	14	7B2311	1	J-2	...	none	70, 116
7B2313	1	370	25-SI-Special	...	T	12, 13	7B2313	1	SI	...	none	70
7B2552	1	165	15-GI-113	...	T	16	7B2775	1	SI	...	none	70
7B2554	1	3000	34.5-G-Special	...	T	16	③	...	SI	...	none	.....
7B2631	1	④400	25-S-218	...	T	12, 13	7B2631	1	S	...	none	.....
7B2648	1	1450	15-G-127	...	T	16	11B2749	1	S	...	none	.....
7B2649	1	290	25-S-213	...	T	12, 13	441C621	...	S-OS	...	none	27
7B2650	1	100/200	34.5-G-343	...	CT	16	4B6036	1	S	...	none	.....
7B2875	1	4160	4.3-J-2-Special	...	T	14	7B2875	1	J-2	...	none	113
7B2908	1	830	46-G-418	...	T	16	11B2745	1	S	...	none	.....
7B2909	1	450	15-J-2-Special	...	T	14	7B2909	1	J-2	...	none	.....
7B2910	1	450	15-J-2-Special	...	T	14	7B2910	1	J-2	...	none	.....
7B2912	1	2280	8.7-J-2-Special	...	T	14	7B2912	1	J-2	...	none	.....
7B2913	1	2280	8.7-J-2-Special	...	T	14	7B2913	1	J-2	...	none	70
7B2914	1	1710	8.7-J-2-Special	...	T	14	7B2914	1	J-2	...	none	.....
7B2956	1	300	15-S-119	...	T	12, 13	7B2956	1	S	...	none	.....
7B2959	1	④400	25-S-Special	...	T	12, 13	7B2959	1	S	...	none	69
7B2960	1	④400	15-S-Special	...	T	12, 13	7B2960	1	S	...	none	69
7B2969	1	100/200	69-K-543	...	CT	18	4B6066	2	S	...	none	.....
7B2975	1	860	34.5-S-323	...	T	12, 13	53B2232	...	S-OS	...	58SD150, Gr. 7, 27	122
7B3383	1	1210	8.7-J-2-Special	...	T	14	7B3383	1	J-2	...	none	112, 113, 116
7B3384	1	④400	46-S-Special	...	T	12, 13	53B2243	...	S-OS	...	yes	122
7B3790	1	④400	46-S-421	...	T	12, 13	53B2243	...	S-OS	...	58SD150, Gr. 13	122, 125
7B3809	1	830	46-S-Special	...	T	12, 13	7B3809	1	S	...	none	27
7B3816	1	4160	4.3-J-2-Special	...	T	14	7B3816	1	J-2	...	none	113
7B3850	1	5400	4.3-J-2-Special	...	T	14	7B3850	1	J-2	...	none	70, 71
7B3854	1	785	4.3-J-1-Special	...	T	22	7B3854	1	J-1	...	none	70, 71
7B3855	1	5400	4.3-J-2-Special	...	T	14	7B3855	1	J-2	...	none	70, 71
7B3892	1	4000	4.3-J-2-Special	...	T	14	7B3892	1	J-2	...	none	113

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Drawing not made.

④ Limited by steel flange.

⑤ Bushing has fusible link inside bushing tube.

**part 5** section a: tabulation of drawings

bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	②notes no.
7B3905	1	2700	15-Gr-Special	...	T	16	11B7112	...	S	...	none	.....
8B6117	1	4000	4.3-J-2-Special	...	T	14	8B6117	1	J-2	...	none	27
8B6126	1	4000	4.3-J-2-Special	...	T	14	8B6126	1	J-2	...	none	113
8B6128	1	1000	15-Gr-126	...	T	16	4B6014	1	S	...	none	.....
8B6129	1	140	46-G-414	...	T	16	7B2059	1	S	...	none	.....
8B6907	1	285	25-S-214	...	T	12, 13	8B6907	1	S	...	none	.....
8B6910	1	1320	46-S-419	...	T	12, 13	53B2246	...	S-OS	...	585D150, Gr. 14	122
8B6949	1	4160	4.3-J-2-Special	...	T	14	8B6949	1	J-2	...	none	70, 113
8B7190	1	150/300	25-J-2-Special	...	CT	14	8B7190	1	J-2	...	none	.....
8B7423	1	1210	15-J-2-Special	...	T	14	8B7423	1	J-2	...	none	112
8B7424	1	830	25-G-Special	...	T	16	⑨	...	S	...	none	71
8B7442	1	4000	4.3-J-2-Special	...	T	14	8B7442	1	J-2	...	none	27
8B7446	1	4160	4.3-J-2-Special	...	T	14	8B7446	1	J-2	...	none	70, 113
8B7462	1	785	15-J-2-Special	...	T	14	8B7462	1	J-2	...	none	.....
8B7895	1	220	15-J-2-Special	...	T	14	8B7895	1	J-2	...	none	.....
8B7896	1	220	5-J-2-Special	...	T	14	8B7896	1	J-2	...	none	.....
8B8009	1	325	15-S-113	...	T	12, 13	4B8526	1	S	...	none	101
8B8032	1	1820	25-G-Special	...	T	16	⑩	...	S	...	none	71
8B8077	1	785	8.7-J-2-Special	...	T	14	8B8077	1	J-2	...	none	70, 112
8B8710	1	④400	46-S-417	...	T	12, 13	53B2243	...	S-OS	...	none	122
8B8717	1	3300	8.7-J-2-Special	...	T	14	8B8717	1	J-2	...	none	116
8B8718	1	450	4.3-J-2-Special	...	T	14	8B8718	1	J-2	...	none	.....
8B8767	1	450	15-J-2-Special	...	T	14	8B8767	1	J-2	...	none	.....
8B8803	1	820	15-S-Special	...	CT	12, 13	8B8803	1	S	...	none	.....
11B1355	1	1280	69-S-516	...	CT	12, 13	11B1355	1	S	...	none	.....
11B1364	1	2700	15-G-138	...	T	16	11B7155	1	S	...	none	.....
11B1380	1	330	⑪15-S-113	...	T	12, 13	11B1380	1	S	...	none	101, 114
11B1740	1	220	15-J-2-Special	...	T	14	11B1740	1	J-2	...	none	.....
11B1741	1	220	15-J-2-Special	...	T	14	11B1741	1	J-2	...	none	70
11B1742	1	220	25-J-2-Special	...	T	14	11B1742	1	J-2	...	none	.....
11B1743	1	220	25-J-2-Special	...	T	14	11B1743	1	J-2	...	none	70
11B1744	1	220	25-J-2-Special	...	T	14	11B1744	1	J-2	...	none	.....
11B1745	1	220	25-J-2-Special	...	T	14	11B1745	1	J-2	...	none	70
11B1746	1	160	25-J-1-Special	...	T	22	11B1746	1	J-1	...	none	.....
11B1747	1	160	25-J-1-Special	...	T	22	11B1747	1	J-1	...	none	70
11B1748	1	165	15-J-1-Special	...	T	22	27B1971	1	RJ	...	none	75, 123
11B1749	1	165	15-J-1-Special	...	T	22	11B1749	1	J-1	...	none	70
11B1772	1	265	46-S-Special	...	T	12, 13	11B1772	1	S	...	none	.....
11B1776	1	2280	4.3-J-2-Special	...	T	14	11B1776	1	J-2	...	none	70
11B2095	1	520	25-G-218	...	T	16	7B2631	...	S	...	none	.....
11B2096	1	950	25-G-229	...	T	16	6B5311	1	S	...	none	13
11B2305	1	⑫400	25-S-223	...	T	12, 13	53B2222	...	S-OS	...	585D150, Gr. 2	27, 122, 125
11B2308	1	450	15-J-2-Special	...	T	14	11B2308	1	J-2	...	none	.....
11B2313	1	4000	15-S-Special	...	T	12, 13	11B2313	1	S	...	none	.....
11B2745	1	⑬400	46-S-418	...	T	12, 13	53B2246	...	S-OS	...	585D150, Gr. 15, 35	122
11B2749	...	2230	15-S-127	...	T	12, 13	11B2749	...	S	...	none	.....
11B2754	1	2700	15-Gr-Special	...	T	16	⑬	...	S	...	none	.....
11B2755	1	150/300	69-OS-540	...	CT	12, 13	11B2755	1	OS ₁	...	none	109
11B2757	1	785	15-J-2-Special	...	T	14	11B2757	1	J-2	...	none	112, 116
11B3026	1	165	15-J-1-Special	...	T	22	11B3026	1	J-1	...	none	.....
11B3061	1	450	8.7-J-2-Special	...	T	14	11B3061	1	J-2	...	none	113
11B3063	1	1400	46-S-419	...	T	12, 13	53B2246	...	S-OS	...	585D150, Gr. 14, 34	122
11B3446	...	2120	25-S-232	...	T	12, 13	11B3446	...	S	...	none	.....
11B3461	1	785	4.3-J-2-Special	...	T	14	11B3461	1	J-2	...	none	70
11B3516	...	...	5-J-2-Special	...	T	14	11B3516	...	J-2	...	none	130
11B3839	1	305	34-S-312	...	T	12, 13	53B2231	...	S-OS	...	585D150, Gr. 4, 24	101, 122
11B3842	1	1710	8.7-J-2-Special	...	T	14	11B3842	1	J-2	...	none	112, 113, 116
11B3844	1	450	4.3-J-2-Special	...	T	14	11B3844	1	J-2	...	none	.....
11B3848	1	2750	15-S-138	...	T	12, 13	11B3848	1	S	...	none	27
11B3882	1	300	8.7-J-2-Special	...	T	14	11B3882	1	J-2	...	none	70, 116
11B4236	1	220	15-J-2-Special	...	T	14	11B4236	1	J-2	...	none	113
11B4237	1	450	8.7-J-2-Special	...	T	14	11B4237	1	J-2	...	none	112, 113, 116
11B4271	1	2450	34-S-S-335	...	T	12, 13	11B4271	1	S	...	none	.....
11B4272	1	⑭400	25-S-224	...	T	12, 13	53B2223	...	S-OS	...	585D150, Gr. 1	122

① See note on nominal current ratings on page 34.
 ② Refer to pages 84 to 87.

③ Drawing not made.
 ④ Limited by steel flange.

outdoor bushings

4.3 to 345 kv

for power circuit breakers
and transformers

technical
data

33-360

page 75

bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements						② notes no.
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.		
11B4284	1	220	15-J-2-Special	...	T	14	11B4284	1	J-2	...	none	112, 113, 116	
11B4338	1	450	8.7-J-2-Special	...	T	14	11B4338	1	J-2	...	none		
11B4396	1	1820	25-G-1-235	...	T	15	③	...	S	...	none		
11B4397	1	220	25-J-2-Special	...	T	14	11B4397	1	J-2	...	none		
④11B4760	1	2130	15-S-128	...	T	12, 13	11B4760	1	S	...	none	112, 116	
11B4765	1	220	25-J-2-Special	...	T	14	11B4765	1	J-2	...	none		
11B5212	1	450	8.7-J-2-Special	...	T	14	11B5212	1	J-2	...	none		
11B5230	1	④400	34.5-S-316	...	T	12, 13	53B2236	...	S-OS	...	585D150, Gr. 19, 39		
11B5270	1	2250	34.5-S-Special	...	T	12, 13	11B5270	1	S	...	none	122	
11B5281	1	2830	15-S-132	...	T	12, 13	11B5281	1	S	...	none		
11B5294	1	④400	50-S-416	...	T	12, 13	53B2242	...	S-OS	...	585D150, Gr. 14		
11B5298	1	④400	69-S-Special	...	T	12, 13	11B5298	1	S	...	none		
11B5335	1	450	8.7-J-2-Special	...	T	14	11B5335	1	J-2	...	none	113	
11B5336	1	450	15-J-2-Special	...	T	14	11B5336	1	J-2	...	none		
11B5916	1	2560	34.5-S-Special	...	T	12, 13	11B5916	1	S	...	none		
11B5928	1	4000	5-J-2-Special	...	T	14	11B5928	1	J-2	...	none		
11B5945	1	450	8.7-J-2-Special	...	T	14	11B5945	1	J-2	...	none	123	
11B5964	...	3100	25-S-Special	...	T	12, 13	11B5964	...	S	...	none		
11B5968	...	450	5-J-2-Special	...	T	14	37A6305	7, 27	J-2	...	none		
11B6047	1	1210	25-J-2-Special	...	T	14	11B6047	1	J-2	...	none		
11B6086	1	2280	8.7-J-2-Special	...	T	14	11B6086	1	J-2	...	none	123	
11B6102	1	785	5-J-2-Special	...	T	14	11B6102	1	J-2	...	none		
11B6103	1	785	5-J-2-Special	...	T	14	11B6103	1	J-2	...	none		
11B6104	1	785	8.7-J-2-Special	...	T	14	11B6104	1	J-2	...	none		
11B6105	1	1210	8.7-J-2-Special	...	T	14	11B6105	1	J-2	...	none	75, 123, 124	
11B6106	1	450	15-J-2-Special	...	T	14	11B6106	1	J-2	...	none		
11B6107	1	785	15-J-2-Special	...	T	14	11B6107	1	J-2	...	none		
11B6108	1	1210	15-J-2-Special	...	T	14	11B6108	1	J-2	...	none		
11B6109	1	220	5-J-2-Special	...	T	14	37A6305	4, 24	J-2	...	none	75, 123	
11B6110	1	220	5-J-2-Special	...	T	14	27B1923	2, 9	RJ	...	none		
11B6111	1	450	5-J-2-Special	...	T	14	37A6305	2, 22	J-2	...	none		
11B6112	1	785	5-J-2-Special	...	T	14	37A6305	3, 23	J-2	...	none		
11B6113	1	1710	5-J-2-Special	...	T	14	27B1925	1, 7	RJ	...	none	75, 123, 124	
11B6114	1	2280	5-J-2-Special	...	T	14	27B1925	2, 8	RJ	...	none		
11B6115	1	3300	5-J-2-Special	...	T	14	27B1926	1	RJ	...	none		
11B6116	1	220	8.7-J-2-Special	...	T	14	37A6387	1, 21	J-2	...	none		
11B6117	1	220	8.7-J-2-Special	...	T	14	27B1928	8	RJ	...	none	75, 123, 124	
11B6118	1	450	8.7-J-2-Special	...	T	14	37A6387	4, 24	J-2	...	none		
11B6119	1	450	8.7-J-2-Special	...	T	14	37A6387	6, 26	J-2	...	none		
11B6120	1	785	8.7-J-2-Special	...	T	14	53B6472	1	RJ	...	none		
11B6121	1	1710	8.7-J-2-Special	...	T	14	27B1929	1	RJ	...	none	75, 124	
11B6122	1	1710	8.7-J-2-Special	...	T	14	27B1929	2	RJ	...	none		
11B6123	1	3300	8.7-J-2-Special	...	T	14	27B1930	1	RJ	...	none		
11B6124	1	3300	8.7-J-2-Special	...	T	14	27B1930	2	RJ	...	none		
11B6125	1	220	15-J-2-Special	...	T	14	37A6315	1, 21	J-2	...	none	123	
11B6135	1	...	34.5-G-Special	...	CT	16	③	...	S	...	none		
11B6253	1	450	5-J-2-Special	...	T	14	11B6253	1	J-2	...	none		
11B6283	1	785	15-J-2-Special	...	T	14	11B6283	1	J-2	...	none		
11B6452	1	100/200	34.5-S-343	...	CT	12, 13	11B6452	1	SI	...	none	70, 119, 117	
11B6462	1	1210	15-J-2-Special	...	T	14	11B6462	1	J-2	...	none		
11B6463	1	1210	7.5-J-2-Special	...	T	14	11B6463	1	J-2	...	none		
11B6482	1	④400	34.5-S-Special	...	T	12, 13	11B6482	1	S	...	none		
11B6492	1	795	15-J-2-Special	...	T	14	11B6492	1	J-2	...	none	75, 123, 123	
11B6493	1	785	7.5-J-2-Special	...	T	14	11B6493	1	J-2	...	none		
11B7102	1	220	15-J-2-Special	...	T	14	27B1928	9	RJ	...	none		
11B7103	1	785	15-J-2-Special	...	T	14	37A6315	5, 25	J-2	...	none		
11B7104	1	220	25-J-2-Special	...	T	14	37A6325	1, 21	J-2	...	none	123	
11B7105	1	450	25-J-2-Special	...	T	14	37A6325	2, 22	J-2	...	none		
11B7106	1	220	25-J-2-Special	...	T	14	37A6325	3, 23	J-2	...	none		
11B7107	1	785	25-J-2-Special	...	T	14	37A6325	5, 25	J-2	...	none		
11B7112	1	2700	15-S-Special	...	T	12, 13	11B7112	1	S	...	none	101, 117	
11B7114	1	2130	15-S-128	...	T	12, 13	11B7114	1	S	...	none		
11B7115	1	2570	15-S-133	...	T	12, 13	11B7115	1	S	...	none		
11B7117	...	750/1500	34.5-S-Special	...	CT	12, 13	11B7117	...	S	...	none		

① See note on nominal current ratings on page 34.

② Refer to pages 64 to 87.

③ Drawing not made.

④ Limited by steel flange.

⑤ Stud size outer end differs from key 128.

**part 5** section a: tabulation of drawings

bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					② notes no.
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	
11B7130	1	④400	34.5-S-323	...	T	12, 13	53B2232	...	S-OS	...	585D150, Gr. 7	109, 122
11B7138	1	3040	25-S-Special	...	T	12, 13	11B7138	1	S	...	none	...
11B7153	...	3260	15-S-138	...	T	12, 13	11B7155	...	S-OS	...	none	...
11B7157	1	785	15-J-2-Special	...	T	14	37A6315	8,28	J-2	...	none	123
11B7159	1	1710	15-J-2-Special	...	T	14	27B1929	2	RJ	...	none	75, 123
11B7170	1	1200	73-S-517	...	T	12, 13	53B2267	...	S-OS	...	585D150, Gr. 16	122
11B7194	1	500	34.5-G-316	...	T	16	③	1	S	...	none	...
11B7199	1	4000	34.5-S-340	...	T	12, 13	11B7199	1	S	...	none	132
11B7495	1	1360	46-S-420	...	T	12, 13	53B2246	...	S-OS	...	585D150, Gr. 14,34	122, 133
11B7844	1	1210	15-J-2-Special	...	T	14	11B7844	1	J-2	...	none	...
11B7899	1	3420	25-S-Special	...	T	12, 13	11B7899	1	S	...	none	...
11B7987	1	450	8.7-J-2-Special	...	T	14	11B7987	1	J-2	...	none	...
11B8557	1	2280	15-J-2-Special	...	T	14	53B2278	1	RJ	...	none	75, 123
11B8726	1	1210	15-J-2-Special	...	T	14	11B8726	1	J-2	...	none	...
11B8727	1	450	15-J-2-Special	...	T	14	27B1928	10	RJ	...	none	75, 123
11B8728	1	785	8.7-J-2-Special	...	T	14	37A6387	8,28	J-2	...	none	123
11B8729	1	785	5-J-2-Special	...	T	14	11B8729	1	J-2	...	none	71
11B8734	1	3520	15-S-Special	...	T	12, 13	11B8734	1	S	...	none	...
11B8791	1	④400	34.5-S-Special	...	T	12, 13	11B8791	1	S	...	none	71
11B9007	1	785	8.7-J-2-Special	...	T	14	11B9007	1	J-2	...	none	...
11B9008	1	220	15-J-2-Special	...	T	14	11B9008	1	J-2	...	none	...
11B9025	1	160	25-J-1-Special	...	T	22	11B9025	1	J-1	...	none	...
11B9048	1	165	15-J-1-Special	...	T	22	11B9048	1	J-1	...	none	...
11B9078	1	450	15-J-2-Special	...	T	14	11B9078	1	J-2	...	none	...
11B9096	1	2160	34.5-S-Special	...	T	12, 13	11B9096	1	S	...	none	...
11B9098	1	1710	15-J-2-Special	...	T	14	27B1929	3	RJ	...	none	...
11B9321	1	4160	5-J-2-Special	...	T	14	11B9321	1	J-2	...	none	...
11B9336	1	1710	8.7-J-2-Special	...	T	14	11B9336	1	J-2	...	none	134
11B9342	1	2900	15-J-2-Special	...	T	14	11B9342	1	J-2	...	none	...
11B9350	1	1260	15-S-Special	...	T	12, 13	11B9350	1	S	...	none	71
11B9756	1	1710	15-J-2-Special	...	T	14	27B1929	1	RJ	...	none	...
11B9900	1	④400	34.5-S-Special	...	T	12, 13	15B5215	1	S	...	none	...
14B553	1	5400	4.3-J-2-Special	...	T	14	14B553	1	J-2	...	none	71
15B693	1	765	25-J-2-Special	...	T	14	15B693	1	J-2	...	none	...
15B1489	1	400	25-S-223	...	T	12, 13	53B2222	...	S-OS	...	584D150, Gr. 1	27, 122, 125
15B1495	1	④400	15-S-Special	...	T	12, 13	15B1495	...	S	...	none	...
15B1700	1	3300	5-J-2-Special	...	T	14	15B1700	1	J-2	...	none	135
15B1739	1	450	25-J-2-Special	...	T	14	15B1739	1	J-2	...	none	...
15B1749	1	400	8.7-J-1-Special	...	T	22	15B1749	1	J-1	...	none	134
15B1752	1	2550	25-S-236	...	T	12, 13	15B1752	1	S	...	none	135
15B1768	1	1210	25-J-2-Special	...	T	14	15B1768	1	J-2	...	none	134
15B1769	1	④400	34.5-S-323	...	T	12, 13	53B2230	...	S-OS	...	585D150, Gr. 7,27	122
15B1779	1	100	15-J-1-Special	...	T	22	15B1779	...	J-1	...	none	134
15B1781	1	1550	15-S-126	...	T	12, 13	15B1781	1	S	...	none	128
15B1782	1	1420	34.5-S-327	...	T	12, 13	53B2236	...	S-OS	...	585D150, Gr. 6,26	122
15B1786	1	④400	34.5-S-324	...	T	12, 13	53B2233	...	S-OS	...	585D150, Gr. 6	122, 125
15B1788	1	1900	34.5-S-333	...	T	12, 13	15B1788	1	S	...	none	128
15B1789	1	2800	25-S-Special	...	T	12, 13	15B1789	1	S	...	none	128
15B1793	1	3420	25-S-Special	...	T	12, 13	15B1793	1	S	...	none	136
15B2014	1	785	15-J-2-Special	...	T	14	15B2014	1	J-2	...	none	134
15B2016	1	2280	5-J-2-Special	...	T	12, 13	15B2016	1	J-2	...	none	134
15B2029	1	500/1000	34.5-SI-345	...	CT	14	15B2029	1	SI	...	none	...
15B2314	1	600/1200	69-S-546	...	CT	12, 13	15B2314	1	S	...	none	...
15B2318	1	450	15-J-2-Special	...	T	14	15B2318	1	J-2	...	none	...
15B2336	1	1710	15-J-2-Special	...	T	14	15B2336	1	J-2	...	none	...
15B2621	1	1710	5-J-2-Special	...	T	14	15B2621	1	J-2	...	none	...
15B2959	1	④400	34.5-S-323	...	T	12, 13	53B2230	...	S-OS	...	585D150, Gr. 7,27	137
15B2960	1	④400	46-S-416	...	T	12, 13	53B2240	...	S-OS	...	585D150, Gr. 14	137
15B3059	1	2900	25-J-2-Special	...	T	14	15B3059	1	J-2	...	none	...
15B3435	1	1210	25-J-2-Special	...	T	14	15B3435	1	J-2	...	none	...
15B3823	1	1710	5-J-2-Special	...	T	14	15B3823	1	J-2	...	none	...
15B3888	1	1710	8.7-J-2-Special	...	T	14	15B3888	1	J-2	...	none	128
15B3890	1	400	15-J-1-Special	...	T	22	15B3890	1	J-1	...	none	134
15B3896	1	2900	15-J-2-Special	...	T	14	15B3896	1	J-2	...	none	...

① See note on nominal current ratings on page 34.
 ② Refer to pages 84 to 87.

③ Drawing not made.
 ④ Limited by steel flange.

outdoor bushings

4.3 to 345 kv

for power circuit breakers
and transformers

technical
data

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bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	②notes no.
15B3897	1	785	2.4-J-2-Special	...	T	14	15B3897	1	J-2	...	none	.....
15B3899	1	400	25-J-1-Special	...	T	22	15B3899	1	J-1	...	none	126
15B4009	1	450	25-J-2-Special	...	T	14	15B4009	1	J-2	...	none	134
15B4046	1	100	25-J-1-Special	...	T	22	15B4046	1	J-1	...	none	134
15B4081	1	2650	15-S-133	...	T	12, 13	15B4081	1	S	...	none	114
15B4089	1	2280	8.7-J-2-Special	...	T	14	53B2278	1	RJ	...	none	75, 123, 124
15B4306	1	785	8.7-J-2-Special	...	T	14	15B4306	1	J-2	...	none	101
15B4367	1	450	5-J-2-Special	...	T	14	15B4367	1	J-2	...	none	101
15B4615	1	512	46-S-Special	...	T	12, 13	53B2243	...	S-OS	...	585D150, Gr. 13	122, 126
15B4868	1	2280	8.7-J-2-Special	...	T	14	15B4868	1	J-2	...	none	.....
15B5213	1	2280	25-J-2-Special	...	T	14	15B5213	1	J-2	...	none	134
15B5215	1	④400	34.5-S-Special	...	T	12, 13	15B5215	1	S	...	none	.....
15B5575	1	2120	34.5-S-Special	...	T	12, 13	15B5575	1	S	...	none	71
15B5576	1	2360	15-S-Special	...	T	12, 13	15B5576	1	S	...	none	71
15B5577	1	3000	15-S-Special	...	T	12, 13	15B5577	1	S	...	none	71
15B5578	1	2650	34.5-S-Special	...	T	12, 13	15B5578	1	S	...	none	71
15B6049	1	450	25-J-2-Special	...	T	14	15B6049	1	J-2	...	none	134
15B6464	1	2150	34.5-S-Special	...	T	12, 13	15B6464	1	S	...	none	117
15B6495	1	1710	8.7-J-2-Special	...	T	14	15B6495	1	J-2	...	none	101
15B6760	1	3400	34.5-S-Special	...	T	12, 13	15B6760	1	S	...	none	.....
15B6797	1	3420	15-S-138	...	T	12, 13	15B6797	1	S	...	none	.....
15B6799	1	④400	15-S-Special	...	T	12, 13	15B6799	1	S	...	none	71
15B7892	...	400	25-SI-224	...	T	12, 13	11B4272	...	SI	...	none	70
15B8387	1	4200	15-S-Special	...	T	12, 13	15B8387	1	S	...	none	128
15B8392	1	3800	15-S-Special	...	T	12, 13	15B8392	1	S	...	none	.....
15B8713	...	1800	25-S-Special	...	T	12, 13	15B8713	...	S	...	none	71
15B9110	1	④400	15-S-Special	...	T	12, 13	15B9110	1	S	...	none	.....
15B9111	1	1480	25-S-Special	...	T	12, 13	24B2426	1	S	...	none	.....
24B1098	1	2240	25-S-232	...	T	12, 13	24B1098	1	S	...	none	.....
24B1440	1	1460	34.5-S-327	...	T	12, 13	53B2236	1	S-OS	...	285D150, Gr. 7, 27	122
24B1483	1	450	15-J-2-Special	...	T	14	24B1483	1	J-2	...	none	128
24B1926	1	785	5-J-2-Special	...	T	14	24B1926	1	J-2	...	none	.....
24B2192	1	1710	25-J-2-Special	...	T	14	24B2192	1	J-2	...	none	.....
24B2195	...	3900	25-S-Special	...	T	12, 13	24B2195	...	S	...	none	.....
24B2196	1	1630	25-S-228	...	T	12, 13	53B2226	...	S-OS	...	585D150, Gr. 3, 23	122
24B2411	...	325	15-S-113	...	T	12, 13	24B2411	...	S	...	none	.....
24B2413	...	1700	15-S-125	...	T	12, 13	24B2413	...	S	...	none	.....
24B2414	...	1600	15-S-126	...	T	12, 13	24B2414	...	S	...	none	.....
24B2415	...	2100	15-S-128	...	T	12, 13	24B2415	...	S	...	none	.....
24B2416	...	2650	15-S-133	...	T	12, 13	24B2416	...	S	...	none	.....
24B2417	...	1060	15-S-118	...	T	12, 13	24B2417	...	S	...	none	.....
24B2418	...	④400	15-S-123	...	T	12, 13	24B2418	...	S	...	none	.....
24B2419	...	④400	15-S-124	...	T	12, 13	24B2419	...	S	...	none	.....
24B2421	...	305	25-S-213	...	T	12, 13	441C621	...	S-OS	...	none	.....
24B2422	...	④400	25-S-217	...	T	12, 13	441C621	...	S-OS	...	585D150, Gr. 3, 23	122
24B2423	...	1630	25-S-228	...	T	12, 13	53B2226	...	S-OS	...	none	.....
24B2424	...	2050	23-S-233	...	T	12, 13	24B2424	...	S	...	585D150, Gr. 2, 22	122
24B2426	1	1550	25-S-229	...	T	12, 13	53B2226	...	S-OS	...	585D150, Gr. 1	122, 125
24B2428	1	④400	25-S-224	...	T	12, 13	53B2223	...	S-OS	...	585D150, Gr. 4, 24	122
24B2430	1	310	34.5-S-312	...	T	12, 13	53B2231	...	S-OS	...	585D150, Gr. 4	122, 125
24B2431	1	290	34.5-S-313	...	T	12, 13	53B2231	...	S-OS	...	585D150, Gr. 7	122, 125
24B2432	1	④400	34.5-S-OS-323	...	T	12, 13	53B2232	...	S-OS	...	585D150, Gr. 8, 28	122
24B2433	...	1550	34.5-S-OS-326	...	T	12, 13	53B2236	...	S-OS	...	585D150, Gr. 6, 26	122
24B2435	1	④400	34.5-S-324	...	T	12, 13	53B2233	...	S-OS	...	585D150, Gr. 7, 27	122
24B2436	1	1460	34.5-S-327	...	T	12, 13	53B2236	...	S-OS	...	585D150, Gr. 7, 27	122
24B2437	1	④400	34.5-S-OS-323	...	T	12, 13	53B2232	...	S-OS	...	585D150, Gr. 7, 27	122
24B2438	...	2450	34.5-S-OS-335	...	T	12, 13	24B2438	...	S-OS	...	none	.....
24B2443	1	1400	46-S-419	...	T	12, 13	53B2246	...	S-OS	...	585D150, Gr. 14	122
24B2445	1	④400	46-S-421	...	T	12, 13	53B2243	...	S-OS	...	585D150, Gr. 13	122, 125
24B2446	...	2800	46-S-OS-431	...	T	12, 13	24B2446	...	S-OS	...	none	.....
24B2460	1	④400	69-S-513	...	T	12, 13	53B2263	...	S-OS	...	585D150, Gr. 18	122, 125
24B2461	1	④400	69-S-514	...	T	12, 13	53B2263	...	S-OS	...	585D150, Gr. 16	122
24B2462	1	1240	69-S-517	...	T	12, 13	53B2267	...	S-OS	...	585D150, Gr. 40	122
24B2466	1	④400	73-S-OS-513	...	T	12, 13	53B2263	...	S-OS	...	585D150, Gr. 18	122, 125

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

④ Limited by steel flange.



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part 5

section a: tabu

bushings

bushings

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technical data

bushing assembly

drawing no.	gr no.	ampere rating adapter wiring	② notes
11B7130	1		
11B7138	1		
11B7155			
11B7157			
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11B7170			
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11B7625			
11B7626			
11B7627			

outdoor bushings

4.3 to 345 kv

for power circuit breakers
and transformers

technical
data

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bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	②notes no.
27B1924	6	785	5-RJ	...	T	14	27B1924	6	RJ	...	none	70, 123
27B1925	1	1710	5-RJ	...	T	14	27B1925	1	RJ	...	none	123
27B1925	2	2280	5-RJ	...	T	14	27B1925	2	RJ	...	none	123
27B1925	3	1710	5-RJ	...	T	14	27B1925	3	RJ	...	none	123
27B1925	4	1710	5-RJ	...	T	14	27B1925	4	RJ	...	none	70, 123
27B1925	5	2280	5-RJ	...	T	14	27B1925	5	RJ	...	none	123
27B1925	6	2280	5-RJ	...	T	14	27B1925	6	RJ	...	none	70, 123
27B1925	7	1710	5-RJ	...	T	14	27B1925	7	RJ	...	none	70, 123
27B1925	8	2280	5-RJ	...	T	14	27B1925	8	RJ	...	none	70, 123
27B1926	1	3300	5-RJ	...	T	14	27B1926	1	RJ	...	none	123
27B1926	2	3300	5-RJ	...	T	14	27B1926	2	RJ	...	none	123
27B1926	3	3300	5-RJ	...	T	14	27B1926	3	RJ	...	none	70, 123
27B1927	1	220	15-RJ	...	T	14	27B1927	1	RJ	...	none	123
27B1927	2	220	15-RJ	...	T	14	27B1927	2	RJ	...	none	123
27B1927	3	220	15-RJ	...	T	14	27B1927	3	RJ	...	none	123
27B1927	4	220	15-RJ	...	T	14	27B1927	4	RJ	...	none	70, 123
27B1927	5	220	15-RJ	...	T	14	27B1927	5	RJ	...	none	70, 123
27B1927	6	220	15-RJ	...	T	14	27B1927	6	RJ	...	none	70, 123
27B1927	7	220	15-RJ	...	T	14	27B1927	7	RJ	...	none	123
27B1927	8	220	15-RJ	...	T	14	27B1927	8	RJ	...	none	70, 123
27B1928	1	400	15-RJ	...	T	14	27B1928	1	RJ	...	none	123
27B1928	2	400	15-RJ	...	T	14	27B1928	2	RJ	...	none	123
27B1928	3	785	15-RJ	...	T	14	27B1928	3	RJ	...	none	123
27B1928	4	785	15-RJ	...	T	14	27B1928	4	RJ	...	none	123
27B1928	5	400	15-RJ	...	T	14	27B1928	5	RJ	...	none	123
27B1928	6	785	15-RJ	...	T	14	27B1928	6	RJ	...	none	123
27B1928	7	785	15-RJ	...	T	14	27B1928	7	RJ	...	none	123
27B1928	8	220	15-RJ	...	T	14	27B1928	8	RJ	...	none	123
27B1928	9	220	15-RJ	...	T	14	27B1928	9	RJ	...	none	123
27B1928	10	220	15-RJ	...	T	14	27B1928	10	RJ	...	none	123
27B1928	11	785	15-RJ	...	T	14	27B1928	11	RJ	...	none	70, 123
27B1928	12	785	15-RJ	...	T	14	27B1928	12	RJ	...	none	70, 123
27B1929	1	1710	15-RJ	...	T	14	27B1929	1	RJ	...	none	123
27B1929	2	1710	15-RJ	...	T	14	27B1929	2	RJ	...	none	123
27B1929	3	1710	15-RJ	...	T	14	27B1929	3	RJ	...	none	123
27B1929	4	1710	15-RJ	...	T	14	27B1929	4	RJ	...	none	123
27B1930	1	3300	15-RJ	...	T	14	27B1930	1	RJ	...	none	123
27B1930	2	3300	15-RJ	...	T	14	27B1930	2	RJ	...	none	123
27B1930	3	4160	15-RJ	...	T	14	27B1930	3	RJ	...	none	123
27B1930	5	3300	15-RJ	...	T	14	27B1930	5	RJ	...	none	123
27B1930	6	4100	15-RJ	...	T	14	27B1930	6	RJ	...	none	123
27B1971	1	165	15-RJ	...	T	14	27B1971	1	RJ	...	none	123
27B2306	1, 2	4160	5-J-2	...	T	14	439C909	1	RJ	...	none	123
27B2325	....	3900	25-S-Special	...	T	12, 13	27B2325	...	S	...	none	.....
27B2347	1, 6	400/785/1200	15-J-2-Special	...	T	14	27B2347	1, 6	I-2	...	none	.....
27B2350	....	1520	25-S-229	...	T	12, 13	53B2226	...	S-O/S	...	585D150, Gr. 2, 22	122
27B2351	....	1400	46-S-419	...	T	12, 13	53B2246	...	S-O/S	...	585D150, Gr. 14, 34	122
27B2352	....	④400	25-S-Special	...	T	12, 13	27B2352	...	S	...	none	71
27B2377	....	2280	8.7-J-2-Special	...	T	14	27B2377	...	I-2	...	none	.....
29B472	....	600	46-F-452	...	CB	20, 21	7A9326	2	S	...	none	.....
29B473	....	1200	46-F-453	...	CB	20, 21	7A9326	3	S	...	none	.....
29B550	....	400	110-F-651	1	CB	20, 21	7A6438	1	N	2	none	22, 73
30B525	....	765	15-J-2-Special	...	T	14	③	...	RJ	...	none	123
30B526	....	3300	8.7-J-2-Special	...	T	14	③	...	RJ	...	none	123
30B7106	1	1600/2000	330-O-930	2	CB	10, 11	30B7106	1	O	2	none	.....
30B7107	1	1600/2000	330-O-930	2	CB	10, 11	30B7107	1	O	2	none	.....
31B388	....	765	4.3-J-2-30	...	T	14	11B6112	...	I-2	...	none	.....
31B389	....	1710	4.3-J-2-33	...	T	14	11B6113	...	I-2	...	none	.....
31B390	....	3300	4.3-J-2-36	...	T	14	57B1119	1	RJ	...	none	.....
31B391	....	450	8.7-J-2-37	...	T	14	11B6118	1	I-2	...	none	.....
31B392	....	450	8.7-J-2-38	...	T	14	11B6119	1	I-2	...	none	.....
31B393	....	765	8.7-J-2-41	...	T	14	11B6120	1	I-2	...	none	.....
31B394	....	1710	8.7-J-2-44	...	T	14	11B6121	1	I-2	...	none	.....
31B395	....	1710	8.7-J-2-45	...	T	14	31B395	1	I-2	...	none	.....

① See note on nominal current ratings on page 34.
② Refer to pages 84 to 87.

③ Drawing not made.
④ Limited by steel flange.

**part 5****section a: tabulation of drawings**

bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	②notes no.
31B396	....	3300	8.7-I-2-47	...	T	14	11B6123	1	J-2	...	none	.....
31B397	....	3300	8.7-I-2-48	...	T	14	11B6124	1	J-2	...	none	.....
31B452	1	165	13.8-G-112	...	T	15	4B6010	1	S	...	none	.....
31B453	1	165	13.8-G-113	...	T	15	4B6011	1	S	...	none	.....
31B454	1	550	13.8-G-117	...	T	15	4B6012	1	S	...	none	.....
31B455	1	550	13.8-G-118	...	T	15	4B6017	1	S	...	none	.....
31B456	1	400	13.8-G-123	...	T	15	7B1329	1	S	...	none	.....
31B457	1	1000	13.8-G-125	...	T	15	4B6013	1	S	...	none	.....
31B458	1	1000	13.8-G-126	...	T	15	4B6014	1	S	...	none	.....
31B459	1	1450	13.8-G-127	...	T	15	11B2749	1	S	...	none	.....
31B460	1	1450	13.8-G-128	...	T	15	4B6015	1	S	...	none	.....
31B461	1	1920	13.8-G-132	...	T	15	③	...	S	...	none	.....
31B462	1	1920	13.8-G-133	...	T	15	4B6016	1	S	...	none	.....
31B463	1	165	23-G-212	...	T	15	4B6020	1	S	...	none	.....
31B464	1	165	23-G-213	...	T	15	4B6021	1	S	...	none	.....
31B465	1	520	23-G-217	...	T	15	4B6022	1	S	...	none	.....
31B466	1	520	23-G-218	...	T	15	7B2631	1	S	...	none	.....
31B467	1	400	23-G-223	...	T	15	7B1507	1	S	...	none	.....
31B468	1	950	23-G-228	...	T	15	4B6023	1	S	...	none	.....
31B469	1	950	23-G-229	...	T	15	6B5311	1	S	...	none	.....
31B470	1	1375	23-G-232	...	T	15	11B3446	1	S	...	none	.....
31B471	1	1375	23-G-233	...	T	15	4B6024	1	S	...	none	.....
31B472	1	1820	23-G-235	...	T	15	③	...	S	...	none	.....
31B473	1	1820	23-G-236	...	T	15	③	...	S	...	none	.....
31B474	1	165	34.5-G-312	...	T	15	4B6030	1	S	...	none	.....
31B475	1	165	34.5-G-313	...	T	15	4B6031	1	S	...	none	.....
31B476	1	400	34.5-G-323	...	T	15	4B6032	1	S	...	none	.....
31B477	1	890	34.5-G-326	...	T	15	4B6033	1	S	...	none	.....
31B478	1	890	34.5-G-327	...	T	15	7B1511	1	S	...	none	.....
31B479	1	1280	34.5-G-332	...	T	15	③	...	S	...	none	.....
31B480	1	1280	34.5-G-333	...	T	15	4B6033	1	S	...	none	.....
31B481	1	165	46-G-412	...	T	15	4B6040	1	S	...	none	.....
31B482	1	165	46-G-413	...	T	15	4B6041	1	S	...	none	.....
31B483	1	400	46-G-416	...	T	15	4B6042	1	S	...	none	.....
31B484	1	830	46-G-418	...	T	15	③	...	S	...	none	.....
31B485	1	830	46-G-419	...	T	15	4B6043	1	S	...	none	.....
31B486	1	1200	46-G-425	...	T	15	③	...	S	...	none	.....
31B487	1	1200	46-G-426	...	T	15	4B6044	1	S	...	none	.....
31B642	1	220	4.3-I-Special	...	T	14	31B642	1	J-2	...	none	70
31B709	1	550	13.8-G-116	...	T	15	7B2061	1	S	...	none	.....
35B216	....	565	88-E-601	1	T	20, 21	6A3614	...	N	2	none	.....
35B216	....	400	88-E-601	1	CB	20, 21	17A6795	1	O	2	none	22
45B182	1	200/400	25-G-Special	...	CT	15	③	...	S	...	none	.....
46B154	1	220	8.7-I-2-49	...	T	14	46B154	1	J-2	...	none	.....
46B354	1	400	23-G-224	...	T	15	11B4272	1	S	...	none	.....
46B652	1	500	34.5-G-316	...	T	15	③	...	S	...	none	.....
46B897	1	150	34.5-G-321	...	T	15	4B6298	1	S	...	none	.....
53B1918	....	3800	15-S-Special	...	T	12, 13	53B1918	...	S	...	none	.....
53B1934	....	200/400	34.5-S-344	...	CT	12, 13	53B1934	...	S	...	none	.....
53B1946	....	④400	46-S-Special	...	T	12, 13	53B2243	...	S-OS	...	none	122, 125
53B1988	....	1600	25-S-229	...	T	12, 13	53B2226	...	S-OS	...	585D150, Gr. 2, 22	123
53B2215	1, 2	2280	15-I-2	...	T	14	53B2278	2	RJ	...	none	.....
53B2221	1, 2	400	23-S-OS-283	...	T	12, 13	53B2221	1, 2	S-OS	...	none	122
53B2222	1, 2	400	23-S-OS-284	...	T	12, 13	53B2222	1, 2	S-OS	...	none	122
53B2223	1, 2	400	23-S-OS-285	...	T	12, 13	53B2223	1, 2	S-OS	...	none	122
53B2226	1, 2	1200	23-S-OS-286	...	T	12, 13	53B2226	1, 2	S-OS	...	none	122
53B2227	1, 2	1200	23-S-OS-287	...	T	12, 13	53B2227	1, 2	S-OS	...	none	122
53B2228	1, 2	1200	23-S-OS-288	...	T	12, 13	53B2228	1, 2	S-OS	...	none	122
53B2229	....	1850	23-S-Special	...	T	12, 13	53B2229	...	S	...	none	.....
53B2230	1	400	34.5-S-Special	...	T	12, 13	53B2230	1	S	...	none	97
53B2231	1, 2	400	34.5-S-OS-383	...	T	12, 13	53B2231	1, 2	S-OS	...	none	122
53B2232	1, 2	400	34.5-S-OS-384	...	T	12, 13	53B2232	1, 2	S-OS	...	none	122
53B2233	1, 2	400	34.5-S-OS-385	...	T	12, 13	53B2233	1, 2	S-OS	...	none	122
53B2236	1, 2	1200	34.5-S-OS-386	...	T	12, 13	53B2236	1, 2	S-OS	...	none	122

① See note on nominal current ratings on page 34.
 ② Refer to pages 84 to 87.

③ Drawing not made.
 ④ Limited by steel flange.

outdoor bushings

4.3 to 345 kv

for power circuit breakers
and transformers

technical
data

33-360

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bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	②notes no.
53B2237	1, 2	1200	34.5-S-OS-387	...	T	12, 13	53B2237	1, 2	S-OS	...	none	122
53B2238	1, 2	1200	34.5-S-OS-388	...	T	12, 13	53B2238	1, 2	S-OS	...	none	122
53B2240	1	400	46-S-Special	...	T	12, 13	53B2240	1	S	...	none	97
53B2241	1, 2	400	46-S-OS-483	...	T	12, 13	53B2241	1, 2	S-OS	...	none	122
53B2242	1, 2	400	46-S-OS-484	...	T	12, 13	53B2242	1, 2	S-OS	...	none	122
53B2243	1, 2	400	46-S-OS-485	...	T	12, 13	53B2243	1, 2	S-OS	...	none	122
53B2246	1, 2	1200	46-S-OS-486	...	T	12, 13	53B2246	1, 2	S-OS	...	none	122
53B2247	1, 2	1200	46-S-OS-487	...	T	12, 13	53B2247	1, 2	S-OS	...	none	122
53B2248	1, 2	1200	46-S-OS-488	...	T	12, 13	53B2248	1, 2	S-OS	...	none	122
53B2249	1	400	46-S-OS-Special	...	T	12, 13	53B2249	1	S-OS	...	none	97
53B2260	1	400	60-S-Special	...	T	12, 13	53B2260	1	S	...	none	97
53B2261	1, 2	400	69-S-OS-583	...	T	12, 13	53B2261	1, 2	S-OS	...	none	122
53B2262	1, 2	400	69-S-OS-584	...	T	12, 13	53B2262	1, 2	S-OS	...	none	122
53B2263	1, 2	400	69-S-OS-585	...	T	12, 13	53B2263	1, 2	S-OS	...	none	122
53B2266	1, 2	1200	69-S-OS-586	...	T	12, 13	53B2266	1, 2	S-OS	...	none	122
53B2267	1, 2	1200	69-S-OS-587	...	T	12, 13	53B2267	1, 2	S-OS	...	none	122
53B2268	1, 2	1200	69-S-OS-588	...	T	12, 13	53B2268	1, 2	S-OS	...	none	122
53B2269	1	1200	69-S-586	...	T	12, 13	53B2269	1, 2	S-OS	...	none	27
53B2278	1	2280	15-RJ	...	T	14	53B2278	1	RJ	...	none	123
53B2278	2	2280	15-RJ	...	T	14	53B2278	2	RJ	...	none	123
53B2278	3	2280	15-RJ	...	T	14	53B2278	3	RJ	...	none	123
53B2278	4	2280	15-RJ	...	T	14	53B2278	4	RJ	...	none	123
53B2278	5	2280	15-RJ	...	T	14	53B2278	5	RJ	...	none	123
53B2278	6	2280	15-RJ	...	T	14	53B2278	6	RJ	...	none	70, 123
53B2599	1	275	34.5-S-313	...	T	12, 13	53B2232	...	S-OS	...	585D150, Gr. 5	122, 125
53B3128	1	280	25-S-212	...	T	12, 13	44C1620	...	S	...	none	27
53B3136	1	1450	34.5-S-327	...	T	12, 13	53B2236	...	S-OS	...	585D150, Gr. 7, 27	122
53B3199	....	4000	34.5-S-Special	...	T	12, 13	53B3199	...	S	...	none	.....
53B3361	....	3300	8.7-J-2	...	T	14	53B3361	...	J	...	none	.....
53B4234	....	100/200	15-S-Special	...	CT	12, 13	53B4234	...	S	...	none	101
53B4246	....	300/600	46-S	...	CT	12, 13	53B4246	...	S	...	none	.....
53B4623	....	6000	23-S-Special	...	T	12, 13	53B4623	...	S	...	none	.....
53B4698	....	2610	34.5-S-Special	...	T	12, 13	53B4698	...	S	...	none	.....
53B5823	....	6000	23-S-Special	...	T	12, 13	53B5823	...	S	...	none	.....
53B6469	....	150/300	69-S-540	...	CT	12, 13	53B6469	...	OS	...	none	.....
53B6472	1	785	15-RJ-Special	...	T	14	53B6472	1	RJ	...	none	123
53B6472	2	785	15-RJ	...	T	14	53B6472	2	RJ	...	none	123
53B6490	....	7500	15-J-2-Special	...	T	14	53B6490	...	J-2	...	none	.....
53B8425	....	5000	25-S-Special	...	T	12, 13	53B8425	...	S	...	none	.....
53B8437	....	4320	34.5-S-Special	...	T	12, 13	53B8437	...	S	...	none	.....
⑤53B8478	1	400	15-RJ-Special	...	T	14	53B8478	1	RJ	...	none	123, 128
⑤53B8478	2	400	15-RJ-Special	...	T	14	53B8478	2	RJ	...	none	123, 128
53B8479	1	785	15-RJ-Special	...	T	14	53B8479	1	RJ	...	none	123, 128
53B8479	2	785	15-RJ-Special	...	T	14	53B8479	2	RJ	...	none	123, 128
53B8907	1	785	5-RJ-Special	...	T	14	53B8907	1	RJ	...	none	123
53B8909	1	785	5-RJ-Special	...	T	14	53B8909	1	RJ	...	none	123
53B9861	....	400	69-S-583	...	T	12, 13	53B9861	...	S-OS	...	none	13
53B9873	1	1710	2.5-RJ	...	T	14	53B9873	1	RJ	...	none	70, 123
53B9899	1	4000	15-S-Special	...	T	12, 13	53B9899	1	S	...	none	71
55B330	....	400	110-F-651	...	CB	20, 21	13A4484	1	O	2	none	20, 22, 73
57B1119	1	3300	5-RJ	...	T	14	57B1119	1	RJ	...	none	123
57B1127	1	4540DC 4160AC	2.5-RJ	...	T	14	57B1127	1	RJ	...	none	123
57B1127	2	4160	2.5-RJ	...	T	14	57B1127	2	RJ	...	none	70, 123
57B1141	1	4160	2.5-RJ	...	T	14	57B1141	1	RJ	...	none	123
57B1141	2	4160	2.5-RJ	...	T	14	57B1141	2	RJ	...	none	70, 123
57B1152	1	785	5-RJ	...	T	14	53B1152	1	RJ	...	none	123
57B1551	1	220	5-RJ	...	T	14	57B1551	1	RJ	...	none	123
57B1551	2	220	5-RJ	...	T	14	57B1551	2	RJ	...	none	70, 123
57B1551	3	220	5-RJ	...	T	14	57B1551	3	RJ	...	none	123
57B1551	4	220	5-RJ	...	T	14	57B1551	4	RJ	...	none	70, 123
57B1551	5	400	5-RJ	...	T	14	57B1551	5	RJ	...	none	123
57B1551	6	400	5-RJ	...	T	14	57B1551	6	RJ	...	none	70, 123
57B1551	7	400	5-RJ	...	T	14	57B1551	7	RJ	...	none	123
57B1551	8	400	5-RJ	...	T	14	57B1551	8	RJ	...	none	70, 123

① See note on nominal current ratings on page 34.

② Refer to pages 84 to 87.

③ Bushing is equipped with insulated head for power factor testing.

**part 5** section a: tabulation of drawings

bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	②notes no.
63B355	1	100/200	34.5-G-Special	...	CT	15	③	...	S	...	none	.....
63B393	1	500/1000	34.5-G-Special	...	CT	15	③	...	S	...	none	.....
64B201	1	140	46-G-414	...	T	15	7B2059	1	S	...	none	.....
64B233	1	785	8.7-J-2-Special	...	T	14	64B233	1	J-2	...	none	112
64B381	1	300	4.3-J-2-Special	...	T	14	64B381	1	J-2	...	none	.....
64B562	1	400	23-G-225	...	T	15	③	...	S	...	none	.....
65B370	1	400	13.8-G-1-123	...	T	15	7B1329	1	SI	...	none	70
65B713	1	1000	13.8-OG-125	...	T	15	4B6013	4	OS	...	none	.....
65B769	1	165	23-OG-213	...	T	15	4B6021	4	OS	...	none	.....
65B977	1	300	4.3-J-2-Special	...	T	14	65B977	1	J-2	...	none	70
66B265	1	400	34.5-G-324	...	T	15	7B1512	1	S	...	none	.....
66B332	1	165	13.8-G-1-112	...	T	15	4B7274	1	SI	...	none	70
81B37	1	450	4.3-J-2-27	...	T	14	81B37	1	J-2	...	none	.....
81B342	1	165	13.8-OG-113	...	T	15	4B6011	4	OS	...	none	.....
81B343	1	400	46-OG-416	...	T	15	4B6042	4	OS	...	none	.....
81B369	1	3300	4.3-J-2-Special	...	T	14	27B1926	1	RJ	...	none	13, 123
81B490	1	400	13.8-OG-123	...	T	15	7B1329	4	OS	...	none	.....
81B685	1	400	34.5-OG-323	...	T	15	24B2432	8	OS	...	none	.....
81B755	1	400	34.5-OG-323	...	T	15	4B6032	6	OS	...	none	.....
81B782	1	400	46-G-417	...	T	15	8B8700	1	S	...	none	.....
82B9	1	220	4.3-J-2-22	...	T	14	11B6109	1	J-2	...	none	.....
82B26	1	450	8.7-J-2-Special	...	T	14	82B26	1	J-2	...	none	112
82B27	1	220	8.7-J-2-Special	...	T	14	82B27	1	J-2	...	none	112
82B98	1	1710	8.7-J-2-Special	...	T	14	82B98	1	J-2	...	none	.....
82B458	1	550	13.8-G-1-118	...	T	15	③	...	SI	...	none	70
82B68	1	1000	13.8-G-Special	...	T	15	③	...	S	...	none	.....
82B970	1	220	4.3-J-2-Special	...	T	14	37A6305	4	J-2	...	none	123
82B973	1	785	8.7-J-2-Special	...	T	14	82B973	1	J-2	...	none	70, 112
83B2	1	3300	4.3-J-2-Special	...	T	14	11B6115	3	J-2	...	none	.....
③83B117	1	165	23-G-212	...	T	15	4B6020	1	S	...	none	.....
83B125	1	165	46-G-412	...	T	15	4B6040	1	S	...	none	.....
83B314	1	550	13.8-OG-117	...	T	15	4B6012	4	OS	...	none	.....
83B315	1	890	34.5-OG-326	...	T	15	4B6033	4	OS	...	none	.....
83B316	1	1375	23-OG-232	...	T	15	11B3446	4	OS	...	none	.....
83B365	1	1000	13-G-Special	...	T	15	③	...	S	...	none	.....
83B370	1	1710	8.7-J-2-Special	...	T	14	83B370	...	J-2	...	none	.....
83B765	1	400	34.5-G-Special	...	T	15	③	...	S	...	none	.....
83B824	1	220	8.7-J-2-Special	...	T	14	83B824	...	J-2	...	none	.....
83B873	1	165	23-G-214	...	T	15	8B6907	1	S	...	none	.....
92B429	1	220	4.3-J-2-Special	...	T	14	37A6305	1	J-2	...	none	123
92B541	1	1920	13.8-OG-132	...	T	15	11B5281	...	OS	...	none	.....
92B545	1	1280	34.5-OG-332	...	T	15	③	...	OS	...	none	.....
92B557	1	450	8.7-J-2-Special	...	T	14	92B557	...	J-2	...	none	.....
92B584	1	400	13.8-OG-124	...	T	15	6B5312	4	OS	...	none	.....
92B648	1	2700	13.8-OG-138	...	T	15	11B7155	1	OS	...	none	.....
92B682	1	3300	4.3-J-2-Special	...	T	14	97B1119	1	RJ	...	none	13
92B984	1	400	13.8-G-124	...	T	15	6B5312	1	S	...	none	.....
93B194	1	785	8.7-J-2-Special	...	T	14	37A6387	5	J-2	...	none	123
93B258	1	580	13.8-J-1-Special	...	T	22	93B258	1	J-1	...	none	.....
93B364	1	450	8.7-J-2-Special	...	T	14	93B364	1	J-2	...	none	112
93B409	1	550	13.8-G-Special	...	T	15	③	...	S	...	none	71
93B412	1	3300	8.7-J-2-Special	...	T	14	93B412	1	J-2	...	none	.....
93B499	1	1450	13.8-OG-127	...	T	15	11B2749	4	OS	...	none	.....
93B708	1	400	34.5-OG-323	...	T	15	4B6032	4	OS	...	none	.....
93B769	1	950	23-OG-228	...	T	15	4B6023	4	OS	...	none	.....
93B809	1	220	4.3-J-2-Special	...	T	14	93B809	1	J-2	...	none	.....
93B825	1	165	23-OG-212	...	T	15	4B5020	4	OS	...	none	.....
93B845	1	1000	13.8-OG-126	...	T	15	4B6014	4	OS	...	none	70
93B876	1	165	46-G-1-413	...	T	15	4B7293	1	SI	...	none	122
408D384	1	1600	115-O-660	2	CB & T	10, 11	408D780	1	O	2	none	70
408D385	1	1600	138-O-721	2	CB & T	10, 11	408D385	1	O	2	none	122
408D386	1	1600	161-O-760	2	CB & T	10, 11	408D386	1	O	2	none	122
408D780	1	1200	115-O-659	2	CB & T	10, 11	408D780	1	O	2	none	122
408D781	1	1200	138-O-719	2	CB & T	10, 11	408D781	1	O	2	none	122
408D997	1	1600	196-O-810	2	CB & T	10, 11	408D997	1	O	2	none	122

① See note on nominal current ratings on page 34.
 ② Refer to pages 84 to 87.

③ Drawing not made.
 ④ Special flange, with overhang.

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bushing assembly		① ampere rating	kv-type-key no.	tap	circuit breaker or trans- former	refer to page	recommendations for spares and replacements					
drawing no.	gr no.						bushing assembly drawing no.	gr no.	type	tap	adapter drawing no.	②notes no.
439C909	1	4540	5-RJ	...	T	14	439C909	1	RJ	...	none	123
440C129	1	2050	23-S-233	...	T	12, 13	440C129	1	S	...	none	126
440C219	1	450	15-RJ-Special	...	T	14	440C219	1	RJ	...	none	70
440C436	1	1200	34.5-SI-386	...	T	12, 13	440C436	1	SI	...	none	70
440C437	1	3300	25-I-2-Special	...	T	14	440C437	1	I-2	...	none	13
440C462	1	400	69-S-584	...	T	12, 13	440C462	1	S	...	none	71
440C463	1	400	69-S-Special	...	T	12, 13	440C463	1	S	...	none	71
440C723	1	6000	23-S-Special	...	T	12, 13	440C723	1	S	...	none	70
440C766	1	1200	69-S-586	...	T	12, 13	440C766	1	S	...	none	126
441C620	1	400	23-S-212	...	T	12, 13	441C620	1	S	...	none	126
441C621	1	400	23-S-213	...	T	12, 13	441C621	1	S	...	none	126
584D961	1	450	5-RJ-Special	...	T	14	584D961	1	RJ	...	none	27
585D420	1	1500	115-O-Special	2	T	10, 11	585D420	1	O	2	none	126
587D678	1, 2	400/800	15-I-2-Special	...	T	14	587D678	1, 2	I	...	none	27
587D693	1	1140	92-O-Special	2	T	10, 11	587D693	1	O	2	none	27
587D832	1	1500	138-O-Special	2	T	10, 11	587D832	1	O	2	none	27
587D916	1	800	115-O-666	2	T	10, 11	587D916	1	O	2	none	27
587D939	1	800	138-O-717	2	T	10, 11	587D939	1	O	2	none	27
588D015	1	2000	115-O-Special	2	T	10, 11	588D015	1	O	2	none	27
588D615	1	1030	115-O-666	2	CB & T	10, 11	588D615	1	O	2	none	27
588D638	1	④800	138-O-707	2	CB & T	10, 11	588D638	1	O	2	none	27
589D113	1	800	115-O-666	2	T	10, 11	589D113	1	O	2	none	122
589D114	1	1600	115-O-660	2	CB & T	10, 11	589D114	1	O	2	none	122
589D115	1	800	115-O-658	2	T	10, 11	589D115	1	O	2	none	122
589D116	1	1200	115-O-659	2	CB & T	10, 11	589D116	1	O	2	none	122
589D138	1	800	138-O-718	2	T	10, 11	589D138	1	O	2	none	122
589D139	1	1200	138-O-719	2	CB & T	10, 11	589D139	1	O	2	none	122
589D161	1	800	161-O-759	2	T	10, 11	589D161	1	O	2	none	122
589D162	1	1600	161-O-760	2	CB & T	10, 11	589D162	1	O	2	none	122
589D180	1	800	180-O-785	2	T	10, 11	589D180	1	O	2	none	122
589D192	1	800	92-O-607	2	T	10, 11	589D192	1	O	2	none	122
589D193	1	800	92-O-608	2	T	10, 11	589D193	1	O	2	none	122
589D196	1	800	196-O-809	2	T	10, 11	589D196	1	O	2	none	122
589D197	1	1600	196-O-810	2	CB & T	10, 11	589D197	1	O	2	none	123
590D765	1	2280	15-RJ-Special	...	T	14	590D765	1	RJ	...	none	122
595D137	1	1600	138-O-721	2	CB & T	10, 11	595D137	1	O	2	none	122

① See note on nominal current ratings on page 34.
② Refer to pages 84 to 87.

④ Limited by slotted flange.



part 5

section b: notes referring to tabulation

1. This bushing has considerably less insulation thickness than is used on present designs.
2. Bushing key #652 with proper adapters can be used to replace bushing dwg 279304, 279323, 363131 and 419892.
3. Requires also new arc shield assembly.
4. Replacements recommended have 600 amp rating.
5. A new drawing with a 34.5 kv rating may be used as replacement if service voltage and line protection are not over 34.5 kv class. If a bushing with 46 kv insulation is used, the current transformers and perhaps their mountings will need to be changed to ones of larger diameter.
6. Replacement must have flat flange seat.
7. This bushing has the single seal stuffing box and construction does not permit modification. Replacement is recommended.
8. The bushings with triple seal of type "F" can be distinguished if they have any or all the following features:
 - (a) A plugged pipe tap for air tests.
 - (b) A plain ring (not an angle ring) cemented to the top of the porcelain.
 - (c) The top of the upper nut is $1\frac{3}{8}$ " or more above the upper surface of the stuffing plates.
 - (d) Soldering of top nut to stud.
9. The suggested replacement bushing is provided with a detachable bevel ring which makes it suitable for either a beveled or flat seat on the cover boss. In some cases it may also be necessary to shorten lower thread end.
10. The bushings of triple seal of type "F" can be distinguished if they have any of the following features:
 - (a) A plugged pipe tap for air tests.
 - (b) A plain ring (not an angle ring) cemented to the top of the porcelain.
 - (c) The top of the upper nut is $1\frac{1}{2}$ " or over above the upper surface of the stuffing plate.
 - (d) The top nut is soldered to the stud.
11. The replacement bushing has 265 kv average dry F.O.
12. The bushing of triple seal of type "F" can be distinguished if they have any or all of the following features. Otherwise, it will be necessary to check factory for the particular S.O.
 - (a) A plugged pipe tap for air tests.
 - (b) A plain ring (not an angle ring) cemented to the top of the porcelain.
 - (c) The top nut is soldered to the stud.
13. This design has oversize porcelains.
14. This design has single seal stuffing box. Bushings should be rehabilitated.
15. Any rebuilding should be done at the factory.
16. Addition of tube seal as per dwg 45-B-129 is recommended for bushing dwg 660900 and 662766.
17. Part 5, section a, specifies a one layer tap for the replacement bushing. If a two layer tap is required for possible future use with a PB-2 or PBA potential network, but for present use on PB-1 or PB-11 network, the factory should be consulted for necessary modifications and adjustments, see page 29. If the two layer tap is required for use only with the PB-2 or PBA potential network, merely specify this in the order.
18. S#1019225, dwg 82-A-409 and S#1040675, dwg 93-A-964 have one layer tap. S#1019226, dwg 82-A-409 and S#1040676, dwg 93-A-964 have two layer tap.
19. S#1019225 has one layer tap. S#1019226 has two layer tap.
20. Original bushing has lower threads $2\frac{1}{4}$ " long while replacement bushing has lower threads $3\frac{1}{4}$ " long.
21. Original dwg has voltage tap receptacle which requires special potential network cable. The special network cable will not fit specified replacement.
22. Replacement bushing can be adjusted for use with PB-1 or PB-11 network by proper adapters on voltage tap receptacle and change of contact plunger in cable.
23. If clamp type arc shield hood, grounding of flange hood is necessary.
24. Bushing key #652 with adapter dwg 623080 can replace bushing key #683.
25. Requires special tapping of voltage tap receptacle, to fit same potential network cables as for original bushing.
26. Bushing key #682 (1200 amp CB rating) can replace bushing key #681 (600 amp CB rating).
27. This bushing has porcelain of higher voltage class.
28. Proposed replacement has stud; original had tubing.
29. The arc shield hood of replacement bushing must be used.
30. The original bushing has external oil reservoir.

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31. S#590449 is 1200 amp—uses key #556. S#590448 is 600 amp—uses key #562.
32. Bushings of 1200 amp rating, key #556, can be used to replace 600 amp rating, key #562.
33. S#487109 is 1200 amp and uses key #570. S#511820 is 600 amp and uses key #564.
34. Bushings of 1200 amp rating, key #570, can be used to replace 600 amp rating, key #564.
35. This bushing is larger diameter on inside of apparatus than others with this key #562 and cannot replace the others but the others may replace this.
36. S#587967 is 600 amp rating. Others of this key number have 1200 amp.
37. S#918721, 415833 and 280679 are 300 amp key #464 and S#918722 is 600 amp key #463.
38. Is oil encased type with "M" cap but no glass gauge.
39. S#1124178, key #353, has bevel seat on flange. S#1173218, key #354, has flat seat on flange. S#1114918, key #354, has flat seat on flange.
40. S#940083, key #353, has bevel seat on flange. S#940084, key #354, has flat seat on flange.
41. S#1124174, key #353, has bevel seat on flange. S#1124175, key #354, has flat seat on flange.
42. S#1114917, key #353, has bevel seat on flange. S#1114918, key #354, has flat seat on flange.
43. S#486824 and 486825, key #353, have bevel seat on flange. S#486822 and 486823, key #354, have flat seat on flange.
44. For 1912 type with obtuse angle flange use adapter dwg 10-A-923. For 1913 type with right angle flange use adapter dwg 10-A-927.
45. Requires modification of flange and arc shield fittings to go through current transformers.
46. Same as key #360 except has flat flange seat. Use adapter 70-B-748 for 600 amp—non-magnetic adapter required for 1000 or 1200 amp.
47. Bushing key #362, 1200 amp may replace bushings key #360, 600 amp.
48. Has gauge glass.
49. Bushing key #365, 1200 amp, may replace bushing key #361, 600 amp.
50. Bushing key #370, 1200 amp, may replace bushing key #363, 400 amp.
51. Bushing key #367, 1200 amp, may replace bushing key #366, 400 amp.
52. Replacement bushing requires ring dwg 6-A-8872, item 16, for flat seat.
53. S#596933 has 600 amp rating. S#571262 has 1200 amp rating.
54. Bushing key #703 (1000 amp) may replace bushing key #701 (400 amp).
55. Normal CB rating—600 amp with cable reinforcements through tube, 1200 amp. Emergency replacement by bushings key #704 with their own arc shields and currents up to 600 amp can be made.
56. S#596934, key #260, has 600 amp rating; S#520109, key #262, has 1200 amp rating.
57. Bushing key #732, 1200 amp, can replace bushings key #731, 600 amp.
58. S#949163 has 1 layer tap; S#949164 and 1151962 have 2 layer tap.
59. S#841623 has 1 layer tap; S#841624 has 2 layer tap.
60. A new drawing replaces dwg 383626 for 34.5 kv service.
61. This bushing may be replaced by dwg 4-B-6060 where the current does not exceed 400 amps. It may be necessary to raise the oil level 2". An adapter may be required to raise the bushing if clearance at bottom end is close.
62. An adapter may be required when dwg 298260 or 623429 is replaced by dwg 2-B-2269 or 4-B-6061 because the latter is 2 3/8" longer. Also, the old bushing may have an angle flange; dwg 2-B-2269 or 4-B-6061 has a 90° flange.
63. These bushings have a special cap construction, similar to, but not identical with that described for type "K" bushings on page 17.
64. Replacement bushing drawing number will depend on design of transformer and clearances available. Refer to the factory, giving S.O., S#, or serial number of transformer.
65. Increase in oil level from 1" to 4" may be necessary with replacement bushing.



part 5

section b: notes referring to tabulation

66. Bushing dwg 614063 has been made both with a solid stud lead and a hollow lead for draw-through cable.
67. This is a 300/600 amp C.T. bushing which may be used as key #651 in transformers only. Central tube is larger than standard for key #651.
68. Same as key #243, except flange has slots for 4 bolts instead of three.
69. Special construction, with Micarta tube over lower part of flange.
70. This bushing for use in Inerteen transformers. Bushings for Inerteen transformers may be used on oil insulated transformers, but bushings for oil insulated transformers must not be used on Inerteen transformers.
71. This bushing is made for horizontal mounting.
72. This bushing has a detachable flange, with $3\frac{7}{8}$ " dia bolt circle for four $\frac{5}{16}$ " dia bolts. It may also be used with a flange and cover mounting for $4\frac{3}{4}$ " dia B.C., four $\frac{3}{8}$ " dia bolts.
73. Some breakers which have arc shield fittings which are clamped over condenser have current transformers of too small an I.D. to take the screwed type fittings and all bushings of this key no. may not fit.
74. Dwg 340909 has 7.5 kv, 1000 amp rating.
75. The replacement bushing differs in length outside apparatus from the original bushing.
76. Key #603, 1200 amp, can be used to replace key #604, 600 amp, S#595750, dwg 680620, S#588928, dwg 680479, are key #603, and S#595751, dwg 680620 and S#588928, dwg 680479 are key #604.
77. Has earliest type seal where packing nut of stuffing box was screwed to stud. Recommendations same as for type "C".
78. Normal CB current rating=600 amp. With cable reinforcement—1200 amp.
79. Bushing key #714 can replace bushing key #706 for $16\frac{1}{4}$ " B.C. only.
80. Dwg 70-A-522 cannot be used on circuit breakers.
81. Has external Inerteen reservoir.
82. Not adapted for use with circuit breaker arc shields.
83. Key #666, 1200 amp or key #665, 600 amp, can be used to replace key #664. Key #664 cannot be used on circuit breakers as not adapted for arc shields.
84. Key #717, 1200 amp or key #715, 800 amp can be used to replace key #714. Key #714 cannot be used in circuit breakers as not adapted for arc shields.
85. Key #755, 1200 amp or key #756, 1200 amp can be used to replace key #754. Key #754 cannot be used for circuit breakers as not adapted for arc shields.
86. Key #805, 1200 amp or key #806, 800 amp can be used to replace key #804. Key #804 cannot be used on circuit breakers as not adapted for arc shields.
87. Key #856, 1200 amp or key #857, 800 amp can be used to replace key #854. Key #854 cannot be used on circuit breakers as not adapted for arc shields.
88. The original breaker current transformer and transformer case should be checked for fit with the replacement bushing.
89. Use an adapter when the old bushing has an angle flange.
90. See dwg 12-A-3636 for revamping with spun cap.
91. See dwg 12-A-3637 for revamping with spun cap.
92. See dwg 12-A-3345 for revamping with spun cap.
93. See dwg 12-A-4560 for revamping with spun cap.
94. See dwg 14-A-1675 for revamping with spun cap.
95. See dwg 15-A-1193 for revamping with spun cap.
96. The bushing has a beveled flange seat and tapered lower end.
97. The replacement bushing requires a lead extension and static shield.
98. Spares or replacements may be type "O".
99. When the type "O" is used as a replacement on transformers bought before 1944 it is necessary to check against mechanical interference between barriers and lower end of the bushing.
100. Has draw-through lead.
101. Special for Consolidated Gas Electric Light & Power Company.
102. This bushing has cap and bell connector combined.
103. With lead extension, this bushing can be used to replace bushings key #731.

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104. With lead extension, this bushing can be used to replace bushings key #732.
105. Special design.
106. Has lead straight through cap, without switch jaw.
107. Replacement bushing requires lead extension and additional static shield.
108. For circuit breakers only.
109. Bushing has magnetic oil gauge.
110. Dwg 7-A-7004Gr3 for breakers without "De-ion" Grids. Dwg 7-A-7004Gr4 for breakers with "De-ion" Grids.
111. Group number, as well as drawing number must be specified to identify original bushing. Special gaps were supplied with original bushing; these gaps will not fit the replacement bushing. Special gaps for the replacement bushing should be ordered separately, if desired.
112. Inner end of this bushing must be entirely under oil (or Inerteen).
113. This bushing is supplied with a special flange designed to obtain uniform, limited gasket compression. Construction is described in instruction leaflet 3172.
114. Special flange construction. Bushing flange is welded to transformer cover.
115. Dwg 4-B-4509 has central lead threaded for 1/4-14 threads at top and bottom; otherwise it is the same as key #419.
116. This bushing may be mounted horizontally or vertically.
117. Has shield layer for power factor test.
118. Has sight oil level indicator.
119. Used only as a roof bushing on transformer-switchgear housing.
120. Bushing has greater internal diameter than A.S.A. standard bushing of same key number. Check clearance to metal porcelain support at the bottom end of bushing.
121. For indoor use only.
122. Replacement bushing meets all A.S.A. standard dimensions and characteristics.
123. Replacement bushing has A.S.A. standard threading on terminals.
124. Replacement bushing is a 15 kv bushing.
125. A cable adapter is required with the replacement bushing.
126. These bushings are concentric lead bushings.
127. These bushings for 45° mounting and require a special boss.
128. These bushings have insulated stud for power factor testing.
129. These bushings have pressure gauges on flange.
130. These bushings for metering outfits.
131. These bushings for 35° mounting.
132. Replacement bushing has special gaps.
133. Replacement bushing requires new top and bottom terminals.
134. These bushings are special for Detroit Edison with rolled on flange.
135. These bushings have smooth studs both ends.
136. These bushings are special for Detroit Edison with grooved studs.
137. These bushings have provisions for protective link.
138. Bushing has 1/2-12 thread at top.
139. Extra mechanical strength bushing for high kva interruption.
140. Bushing has extra creepage.

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