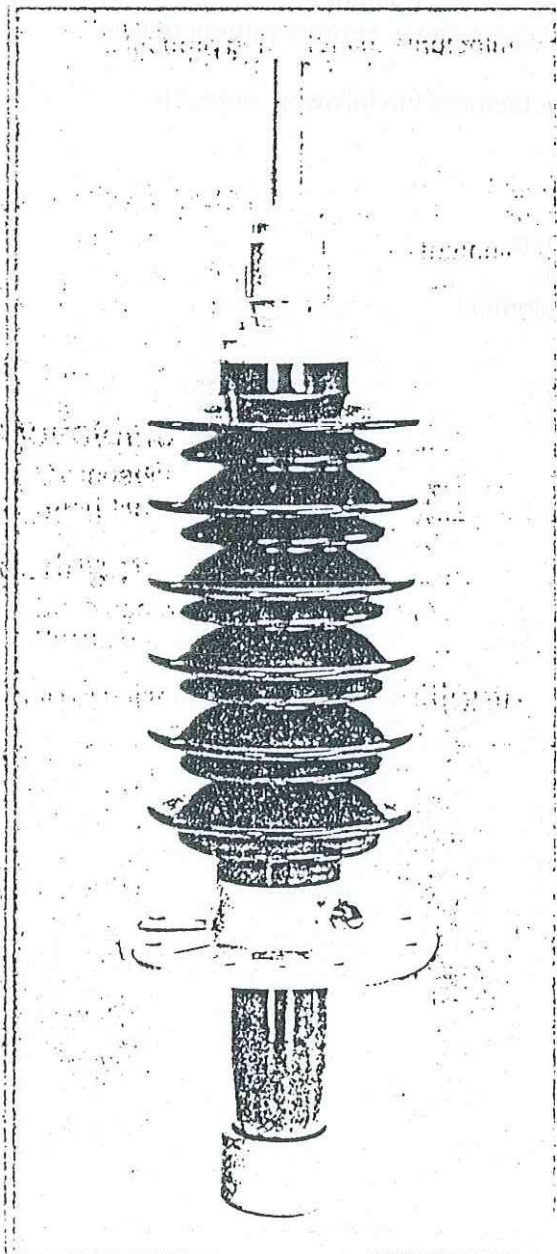


Transformer bushings

Type GOB

Technical Guide



This Technical Guide has been produced to allow transformer manufacturers, and their designers and engineers, access to all the technical information required to assist them in their selection of the appropriate Transformer Bushing. The Guide should be used in conjunction with the *Selection Guide* to allow the optimum selection to be made.

The technical information pertaining to bushings manufactured by ABB Components has been divided into separate documents, with one document for each type.

The information provided in this document is intended to be general and does not cover all possible applications. Any specific application not covered should be referred directly to ABB Components AB, or its authorized representative.

ABB Components AB makes no warranty or representation and assumes no liability for the accuracy of the information in this document or for the use of such information. All information in this document is subject to change without notice.

ABB Components also manufactures the following products:

- ☐ Wall bushings
- ☐ On-load tap-changers
- ☐ De-energized tap-changers
- ☐ Motor-drive mechanisms
- ☐ Transformer cooling equipment

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Design

The bushing is built up around a centre tube on which the condenser body is wound.

The upper porcelain, lower porcelain and fastening flange are held between the end plates by the centre tube. Sealing is accomplished by oil-resistant rubber gaskets in grooves.

The annular space between the condenser body and the porcelain is filled with transformer oil. A gas-filled expansion space is left at the top.

For GOB bushings without oil level gauge the oil level can be checked by means of a dipstick in the oil filling hole.

The lower end is shielded by an epoxy resin insulated aluminium shield.

The inner terminal is attached to the centre tube by means of a through-going resilient pin which becomes locked when the outer terminal is screwed on. The design with this special resilient pin has been patented by ABB, and the pin ensures effective electrical contact between the inner and outer terminals.

The inner terminal can be chosen for connection to leads either by brazing or crimping.

The outer terminal is available in aluminium or copper alloy and can be supplemented by terminal plates of corresponding material.

The upper porcelain is made in one piece of high quality electrical porcelain. The fixing flange is manufactured of corrosion-resistant aluminium alloy.

The flange and the other metal parts on the exterior side of the bushing are protected by painting with two-component primer and a grey-blue finishing coat of paint.

The bushings are delivered oil-filled and ready for use.

If the bushing is mounted with an inclination of more than 45° from the vertical, special measures may have to be taken to ensure sufficient filling of oil in the bushing. Further information can be obtained on request.

Shed form

The shed form for all GOB bushings is of the anti-fog type with alternating long and short sheds. For each pair of sheds the ratio between nominal creepage distance and the axial length is 3.43 and the ratio between protected and nominal creepage distance is 0.40.

According to IEC 815 the creepage factor C.F. is <3.2 and the profile factor P.F. is >1.1 .

For special customer demands regarding creepage distance, other shed forms may be used.

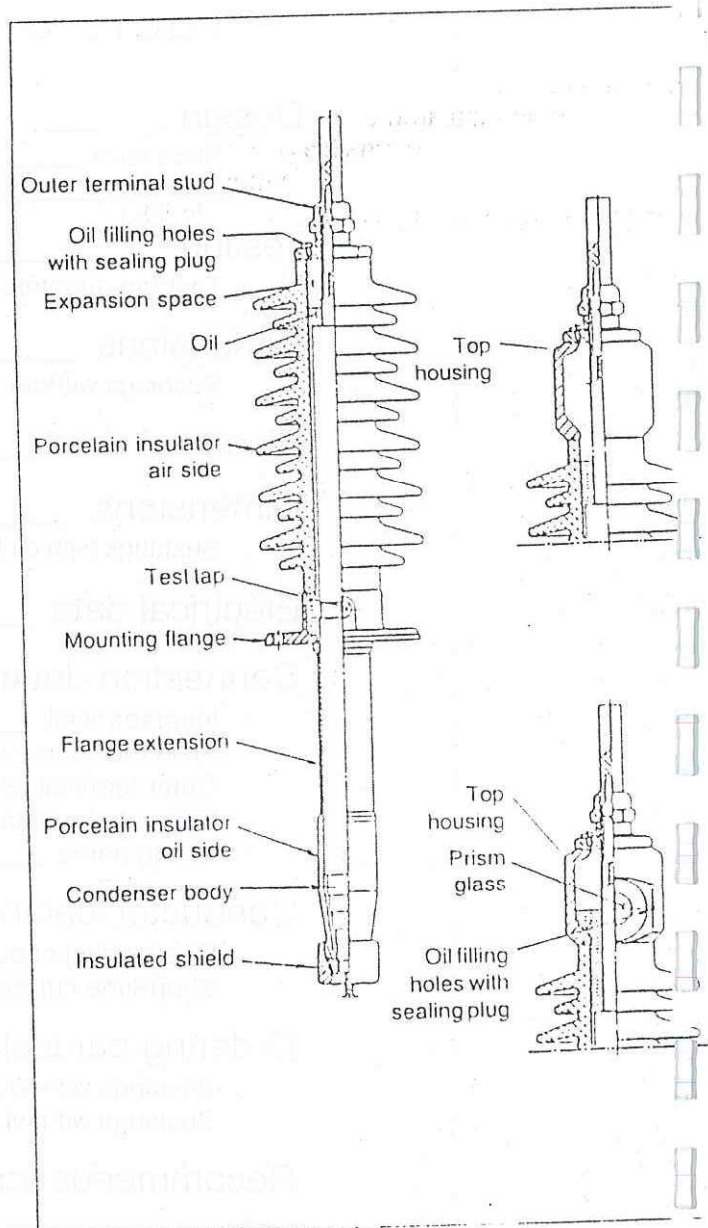


Fig. 1. Transformer bushing type GOB

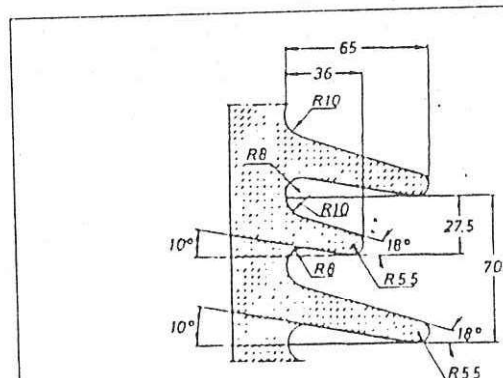


Fig. 2. Shed form

Test tap

The outer conducting layer of the condenser body is connected to an insulated test tap on the flange. During operation the test tap is automatically earthed and protected by a screw-on cap. The max. test voltage of the tap is 2 kV, 50 Hz for 1 minute. Max. service voltage is 600 V.

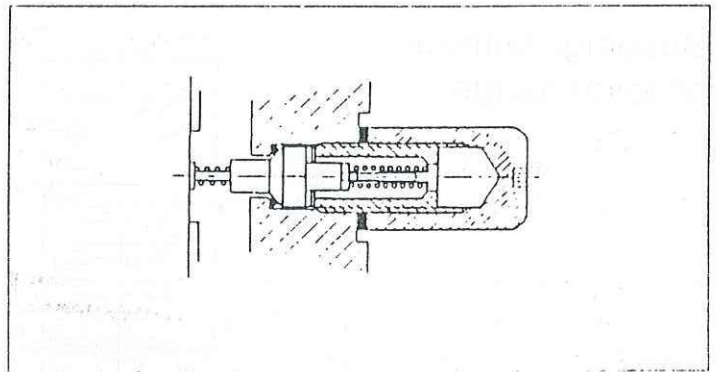


Fig. 3. Test tap

Testing

During the manufacture and on its completion the bushing is subjected to a number of routine tests. A tightness test is carried out on the assembled bushing after the final drying and impregnation. The test is made with an oil overpressure of 180 kPa (1.8 bar) for 12 hours at ambient temperature. No sign of leakage is allowed.

Each bushing is subjected to a final electrical routine test. The test is made at room temperature with the bushing submerged in oil. Capacitance and $\tan \delta$ are measured in steps up to the power frequency withstand voltage, which is maintained for one minute.

Capacitance and $\tan \delta$ are also measured at decreasing voltage at the same voltage levels as before the one minute test.

Measurements for detection of internal partial discharge (PD measurements) are also made. These measurements are carried out at the same time as the power frequency withstand test. PD measurements are made in steps up to the full test voltage and down.

It is always demonstrated that the PD value is max. 5 pC at test voltage equal to the rated system voltage.

Type tests have been carried out according to IEC 137 and IEEE. Type test reports are available on request.

Test tap adapters

For testing, special test adapters are required: one for temporary connection, and one for permanent connection of the test tap to the measuring circuits.

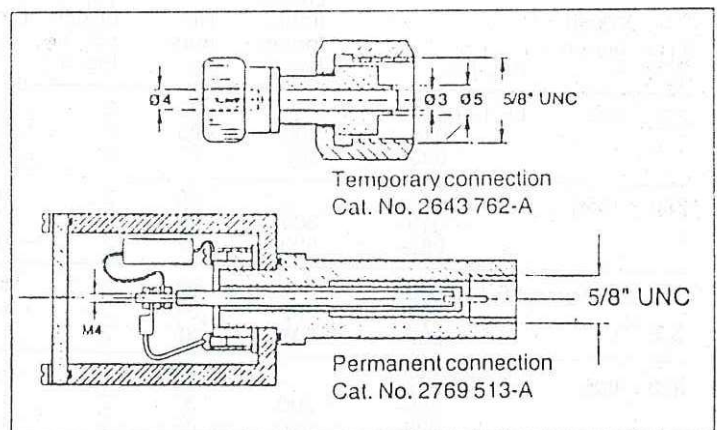


Fig. 4. Test tap adapters

Dimensions

Bushings without
oil level gauge

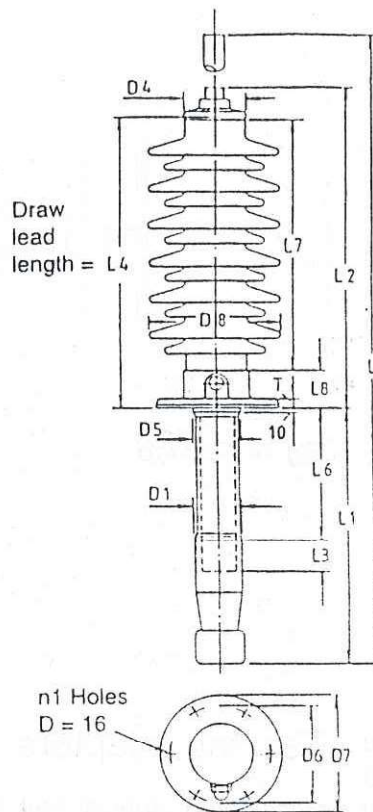


Fig. 5.1. GOB design

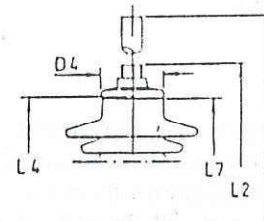


Fig. 5.2.
Top design

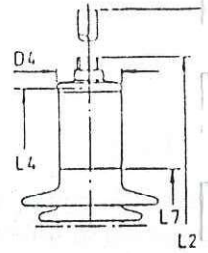


Fig. 5.3
Top design

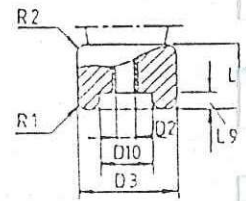


Fig. 5.4

¹⁾ The bushings can be provided with a longer shield $L9 + 50$ in which case dimensions L and $L5$ also increase by 50.

Type GOB	Rated current A	Cat. No.	Space for current trans- former mm	Net mass kg	Top design acc. to Fig. 5.	Dimensions in mm									
						L ¹⁾	L1 ¹⁾	L2	L3	L4	L5 ¹⁾	L6	L7	L8	L9
250	800	LF 123 013- 015- 083-	-	23	2	995	240	615	65	555	60	-	480	70	-
			300	25	2	1255	500	615	65	555	75	260	480	70	5
			500	27	3	1555	700	715	65	655	75	460	480	70	5
250	1250	LF 123 017- 019- 085-	-	26	2	1065	255	630	65	555	75	-	480	70	5
			300	29	2	1325	515	630	65	555	75	260	480	70	5
			500	31	3	1625	715	730	65	655	75	460	480	70	5
325	800	LF 123 025- 027- 089-	-	27	2	1195	295	760	93	700	60	-	625	70	15
			300	31	2	1455	555	760	93	700	60	260	625	70	15
			500	35	3	1755	755	860	93	800	60	460	625	70	15
380	800	LF 123 037- 039- 095-	-	33	2	1300	345	815	98	755	60	-	680	70	-
			300	37	2	1540	585	815	98	755	60	240	680	70	-
			500	39	3	1840	785	915	98	855	60	440	680	70	-
380	1250	LF 123 041- 043- 097-	-	37	2	1370	360	830	98	755	75	-	680	70	-
			300	39	2	1610	600	830	98	755	75	240	680	70	-
			500	43	3	1910	800	930	98	855	75	440	680	70	-
450	800	LF 123 049- 051- 053-	-	42	2	1470	345	985	98	925	60	-	850	70	-
			300	45	2	1710	585	985	98	925	60	240	850	70	-
			500	48	3	2010	785	1085	98	1025	60	440	850	70	-
550	800	LF 123 061- 063- 107-	100	70	2	1820	495	1185	68	1125	90	95	1050	60	25
			300	73	3	2105	680	1285	68	1225	90	280	1050	60	25
			500	77	3	2305	880	1285	68	1225	90	480	1050	60	25
550	1250	LF 123 065- 067- 109-	100	105	2	1865	495	1195	68	1145	100	95	1050	60	30
			300	109	3	2150	680	1295	68	1245	100	280	1050	60	30
			500	115	3	2350	880	1295	68	1245	100	480	1050	60	30
650	1250	LF 123 073- 075- 113-	150	116	2	2150	580	1395	60	1345	100	120	1250	60	-
			300	122	3	2410	740	1495	60	1445	100	280	1250	60	-
			500	126	3	2610	940	1495	60	1445	100	480	1250	60	-
750	1250	LF 123 077- 078- 079-	200	180	2	2465	685	1605	70	1555	100	165	1460	60	-
			300	190	3	2680	800	1705	70	1655	100	280	1460	60	-
			500	200	3	2880	1000	1705	70	1655	100	480	1460	60	-

Electrical data

Type GOB	Rating				Routine test	Design data	Nominal capacitances between conductor and test lap C1 ±10 % [pF] Space for current transformer					
	Nominal voltage U _N kV, RMS	Phase-to- earth voltage U _y kV, RMS	Dry lightning impulse kV, peak	Wet power frequency AC kV, RMS	1 min. dry 50 Hz kV, RMS	Dry switching impulse kV, peak	-	100	150	200	300	500
50/800	52	52	250	105	120	230	125				205	275
50/1250	52	52	250	105	120	230	165				270	375
125/800	72.5	72.5	350	140	150	300	135				200	260
80/800	100	72.5	380	150	162	330	145				200	245
80/1250	100	72.5	380	150	162	330	185				265	320
50/800	123	90	450	185	195	410	145				200	245
50/800	170	123	550	230	260	470		150			170	210
50/1250	170	123	550	230	260	470		175			195	240
50/1250	170	145	650	275	300	580			190		235	280
50/1250	170	170	750	325	350	670				205	235	275

Wet power frequency values apply to both IEC and ANSI requirements.

Dimensions are subject to modification without notice.

													Creepage distance		Cantilever load	
D1	D2	D3	D4	D5	D6	D7	D8	D10	n1	R1	R2	T	total mm	protected mm	Max. permitted loading perpendicular to the terminal N	60 s Test N
16	22	86	115	88	185	225	230	46	6	8	6	16	1500 \pm 50	580	1800	2340
101	34	112	120	101	250	290	245	70	8	12	10	16	1500 \pm 50	580	3000	4000
95	22	86	115	96	185	225	230	46	6	8	6	16	1980 \pm 50	775	1500	1950
95	22	86	115	96	185	225	240	46	6	8	6	16	2210 \pm 70	870	1400	1800
112	34	112	120	112	250	290	245	70	8	12	10	16	2210 \pm 70	870	2900	3750
95	22	86	115	96	185	225	245	46	6	8	6	16	2720 \pm 80	1060	1150	1500
126	22	118	145	150	250	290	280	50	8	12	12	18	3430 \pm 100	1350	1300	1800
160	34	140	175	200	290	335	300	70	12	15	15	20	3430 \pm 100	1350	2400	3100
160	34	140	175	200	290	335	305	70	12	15	15	20	4080 \pm 110	1620	2600	3380
184	34	140	230	184	290	335	350	70	12	15	15	20	4800 \pm 150	1700	2600	3350

Dimensions

Bushings with
oil level gauge

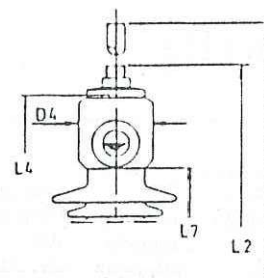
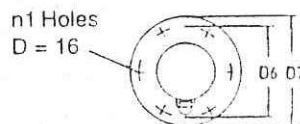
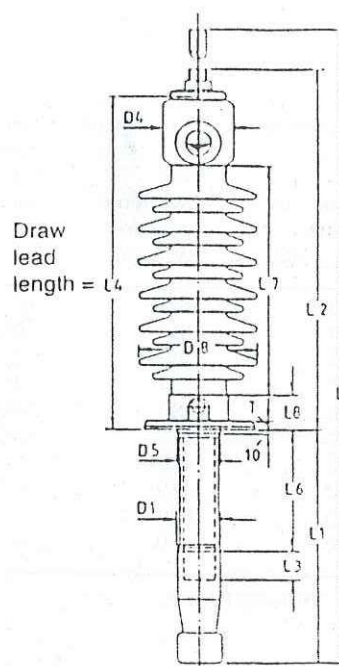


Fig. 6.2.
Top design

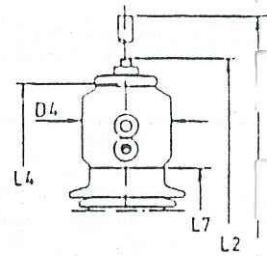


Fig. 6.3
Top design

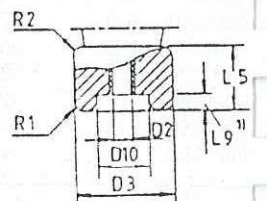


Fig. 6.4

" The bushings can be provided with a longer shield $L9 + 50$ mm in which case dimensions L , $L1$ and $L5$ also increase by 50 mm.

Type GOB	Rated current A	Cat. No.	Space for current trans- former mm	Net mass kg	Top design acc. to Fig. 6.	Dimensions in mm									
						L ¹⁾	L ¹⁾	L ²⁾	L ³⁾	L ⁴⁾	L ⁵⁾	L ⁶⁾	L ⁷⁾	L ⁸⁾	L ⁹⁾
250	800	LF 123 171-	-	24	2	1135	240	755	65	695	60	-	480	70	15
			300	26		1395	500					260			
			500	28		1595	700					460			
250	1250	LF 123 167-	-	28	2	1205	255	770	65	695	75	-	480	70	2
			300	30		1465	515					260			
			500	33		1665	715					460			
325	800	LF 123 177-	-	28	2	1335	295	900	93	840	60	-	625	70	1
			300	32		1595	555					260			
			500	36		1795	755					460			
380	800	LF 123 183-	-	34	2	1440	345	955	98	895	60	-	680	70	1
			300	38		1680	585					240			
			500	40		1880	785					440			
380	1250	LF 123 101-	-	38	2	1510	360	970	98	895	75	-	680	70	2
			300	41		1750	600					240			
			500	44		1950	800					440			
450	800	LF 123 145-	-	43	2	1610	345	1125	98	1065	60	-	850	70	1
			300	46		1850	585					240			
			500	49		2050	785					440			
550	800	LF 123 189-	100	71	2	1960	495	1325	68	1265	90	95	1050	60	2
			300	74		2145	680					280			
			500	78		2345	880					480			
550	1250	LF 123 142-	100	106	2	2005	495	1335	68	1285	100	95	1050	60	3
			300	110		2190	680					280			
			500	116		2390	880					480			
650	1250	LF 123 192-	150	118	2	2290	580	1535	60	1485	100	120	1250	60	4
			300	124		2450	740					280			
			500	128		2650	940					480			
750	1250	LF 123 104-	200	187	3	2715	685	1855	70	1805	100	165	1460	60	5
			300	197		2830	800					280			
			500	207		3030	1000					480			

Electrical data

Type GOB	Rating				Routine test	Design data	Nominal capacitances between conductor and test tap C1 ±10 % [pF] Space for current transformer					
	Nominal voltage U _N kV, RMS	Phase-to- earth voltage U _V kV, RMS	Dry lightning impulse kV, peak	Wet power frequency AC kV, RMS	1 min. dry 50 Hz kV, RMS	Dry switching impulse kV, peak	-	100	150	200	300	500
0/800	52	52	250	105	120	230	125				205	275
0/1250	52	52	250	105	120	230	165				270	375
325/800	72.5	72.5	350	140	150	300	135				200	260
0/800	100	72.5	380	150	162	330	145				200	245
0/1250	100	72.5	380	150	162	330	185				265	320
0/800	123	90	450	185	195	410	145				200	245
550/800	170	123	550	230	260	470		150			170	210
550/1250	170	123	550	230	260	470		175			195	240
0/1250	170	145	650	275	300	580			190		235	280
0/1250	170	170	750	325	350	670				205	235	275

Wet power frequency values apply to both IEC and ANSI requirements.

Dimensions are subject to modification without notice.

													Cantilever load			
													Creepage distance		Max. permitted loading perpendicular to the terminal N	60 s Test N
													total mm	protected mm		
D1	D2	D3	D4	D5	D6	D7	D8	D10	n1	R1	R2	T				
22	86	140	88	185	225	230	46	6	8	6	16	1500±50	580	1800	2340	
34	112	140	101	250	290	245	70	8	12	10	16	1500±50	580	3000	4000	
52	22	86	140	96	185	225	230	46	6	8	6	16	1980±50	775	1500	1950
95	22	86	140	96	185	225	240	46	6	8	6	16	2210±70	870	1400	1800
112	34	112	140	112	250	290	245	70	8	12	10	16	2210±70	870	2900	3750
15	22	86	140	96	185	225	245	46	6	8	6	16	2720±80	1060	1150	1500
26	22	118	200	150	250	290	280	50	8	12	12	18	3430±100	1350	1300	1800
60	34	140	265	200	290	335	300	70	12	15	15	20	3430±100	1350	2400	3100
60	34	140	265	200	290	335	305	70	12	15	15	20	4080±110	1620	2600	3380
184	34	140	265	184	290	335	350	70	12	15	15	20	4800±150	1700	2600	3350

Connection details

Inner terminal

Stud made of copper for connection of draw lead. The inner terminal must be provided with an outer terminal.

For crimping, hexagonal or other symmetrical dies shall be used. Pressure 200 kN.

Material and design	Conductor area mm ²	Cat. No.	Dimensions (mm)			Mass kg
			D1	D2	L	
Copper for crimping or brazing	50	LF 170 010 -M	11	14,5	35	0,3
	70	-N	13	17	35	0,3
	95	-L	15	20	35	0,3
Copper for brazing only	≤ 150	LF 170 011 -S	18	20	25	0,3
	undrilled	-U	5	20	35	0,3
	≤ 285	-T	29	32	20	0,6
	undrilled	-V	5	32	20	0,6

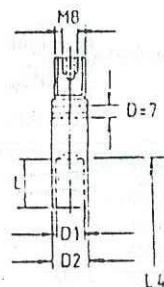


Fig. 7. Inner terminal.

Solid rod conductor

The rod is produced from electrolytic copper and is divided into two parts. For the 800 A conductor the two parts are held together by a centre bolt with a resilient locking pin. For the 1250 A conductor the two parts are connected by counter-sunk screws.

The lower part of the solid rod is designed to enable connection by brazing.

The solid rod conductor can be divided either:

- Alt. 1: 20 mm below the bushing flange, or
- Alt. 2: 20 mm below the upper end of the bottom porcelain.

The solid rod conductor must be provided with an outer terminal.

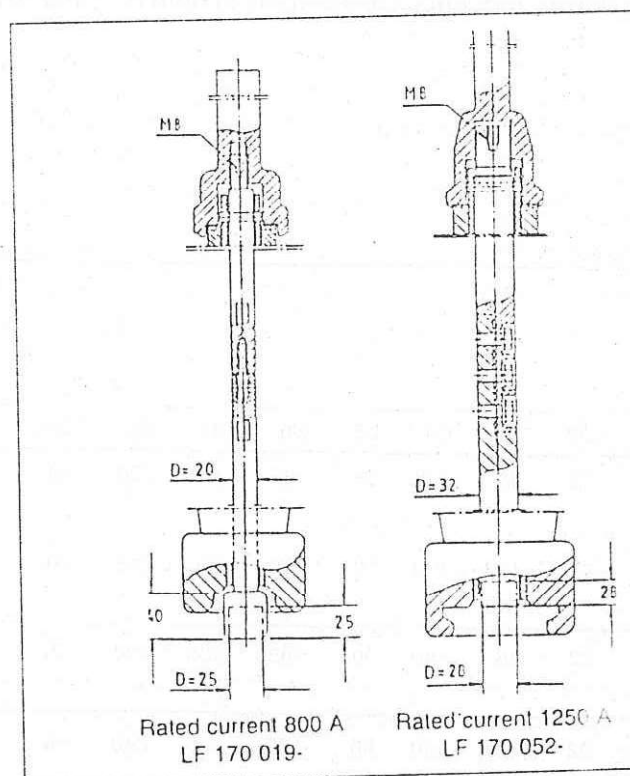


Fig. 8. Solid rod conductor.

Outer terminal assembly

Stud made of copper or aluminium with O-ring and locking pin.

Other types can be provided on request.

Material	Cat. No.	Dimensions (mm)			Mass kg	For bushings with D2 mm
		D	L	N		
Aluminium	LF 170 001 -A	30	170	55	0.5	22
	-B	30	205	66	0.8	34
Copper alloy	LF 170 002 -A	30	170	55	1.2	22
	-B	30	205	66	2.3	34

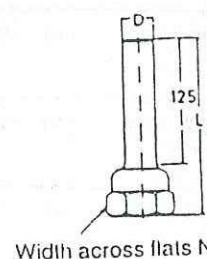


Fig. 9. Outer terminal assembly.

Separate terminal plate with bolts

A separate terminal plate is used for connecting the line to the line conductor.

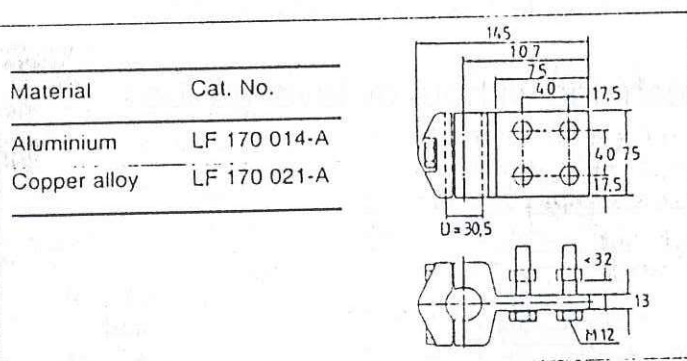


Fig. 10. Separate terminal plate with bolts.

Arcing horns

Arcing horns of galvanised steel can be mounted on the line.

The lower rod is fastened onto the flange with one of the screws and the upper rod by means of a bracket on the outer terminal.

The gap distances for standard arcing horns are shown in table. Other gap distances on request.

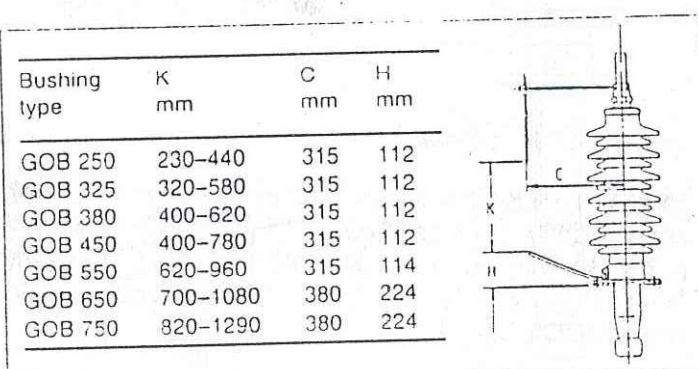


Fig. 11. Gap distances.

Conductor loading

The rated currents listed in this catalogue are the standardised values according to IEC 137 (1984) which, in the largest possible conductor, fulfil the temperature rise test.

The GOB bushings fulfil the temperature rise test requirements according to IEC 137 (1984) and ANSI C76.1 (1976) for the currents below:

Rated current bushing	Conductor	Permissible current	
		IEC A	ANSI/IEEE A
250	Solid rod LF 170 019	800	730
0, 1250	Solid rod LF 170 052	1250	1200
1, 1250	Stranded cable 50 mm ²	165	150
1, 1250	Stranded cable 70 mm ²	225	210
1, 1250	Stranded cable 95 mm ²	300	285
10, 1250	Stranded cable 150 mm ²	475	415
150	Stranded cable 185 mm ²	530	460
150	Stranded cable 285 mm ²	665	570

Overloading of bushings

If the conductor for the bushing is selected with 120 % of the rated current of the transformer, the bushing is considered to be able to withstand the overload conditions stated in IEC 354 without further clarifications or tests, according to IEC 137.

Short-time current

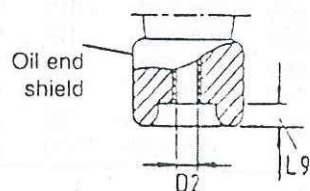
The rated thermal short-time current (I_{th}) is calculated according to IEC 137 (1984) clauses 5 and 26.

For draw-lead of stranded copper values are given for 100mm². For other areas the short-time current is directly proportional to the area.

Conductor	Rated current A	Area mm ²	Short-time current (I_{th})		Dynamic current (I_d) kA, peak
			1s kA, RMS	2s kA, RMS	
Solid rod	800	-	30	21	75
Solid rod	1250	-	70	50	175
Stranded draw-lead	365	100	9.6	6.8	24

Ordering particulars

Bushings without oil level gauge



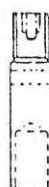
When ordering, please state:

- Type and Catalogue number for bushings.
- Catalogue number for inner and outer terminal assembly.
- Additional accessories or modifications.
- Test required, in addition to the normal routine test.
- Test tap adapter, if required.

Note:

The Cat. No. should have one of the following letters added to it, to indicate the type of insulator and oil end shield:

- K Normal oil end shield, brown porcelain
- L Normal oil end shield, light grey porcelain
- M Longer oil end shield, brown porcelain
- N Longer oil end shield, light grey porcelain

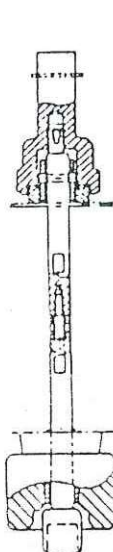
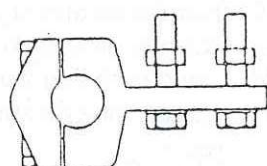
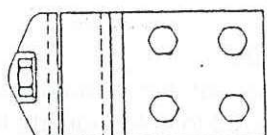
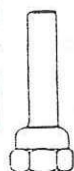


Bushings

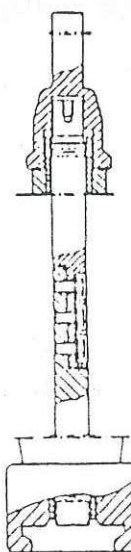
Connection details

Inner terminal stud: Cat. No. LF 170

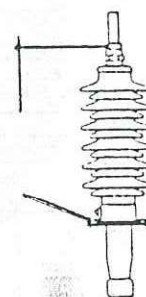
Type GOB	Rated current A	Cat. No.	Space for current transformer mm	Bushing tube (See fig.) D2, mm	For crimping or brazing Conductor area			For brazing Conductor area		Undrilled pilot hole	will
					50 mm ²	70 mm ²	95 mm ²	≤150 mm ²	≤285 mm ²		
250	800	LF 123 013- 015- 083-	- 300 500	22	010-M	010-N	010-L	011-S	-	011-U	
250	1250	LF 123 017- 019- 085-	- 300 500	34	-	-	-	-	011-T	011-V	
325	800	LF 123 025- 027- 089-	- 300 500	22	010-M	010-N	010-L	011-S	-	011-U	
380	800	LF 123 037- 039- 095-	- 300 500	22	010-M	010-N	010-L	011-S	-	011-U	
380	1250	LF 123 041- 043- 097-	- 300 500	34	-	-	-	-	011-T	011-V	
450	800	LF 123 049- 051- 053-	- 300 500	22	010-M	010-N	010-L	011-S	-	011-U	
550	800	LF 123 061- 063- 107-	100 300 500	22	010-M	010-N	010-L	011-S	-	011-U	
550	1250	LF 123 065- 067- 109-	100 300 500	34	-	-	-	-	011-T	011-V	
650	1250	LF 123 073- 075- 113-	150 300 500	34	-	-	-	-	011-T	011-V	
750	1250	LF 123 077- 078- 079-	200 300 500	34	-	-	-	-	011-T	011-V	



LF 170 019-
800 A



LF 170 052-
1250 A

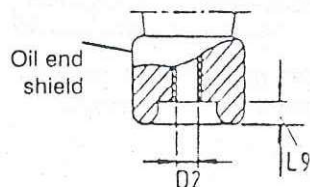
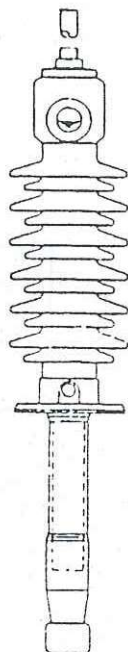


Outer terminal assembly: Cat. No. LF 170

Solid with O-ring and locking pin		Separate terminal plate with bolts		Solid rod conductor Cat. No. LF 170			Arcing horns Cat. No. LF 170
Aluminium	Copper alloy	Aluminium	Copper alloy	Alt. 1	Alt. 2	Mass kg	
01-A	002-A	014-A	021-A	019 -A -D -E	- 019 -B -C	2.6 3.3 4.2	004 -A -A -B
01-B	002-B	014-A	021-A	052 -A -D -E	- 052 -B -C	6.8 8.4 10.6	004 -A -A -B
01-A	002-A	014-A	021-A	019 -F -K -L	- 019 -G -H	3.1 3.9 4.7	004 -A -A -B
001-A	002-A	014-A	021-A	019 -M -R -S	- 019 -N -P	3.5 4.2 5.0	004 -A -A -B
001-B	002-B	014-A	021-A	052 -V -Z -AA	- 052 -X -Y	8.6 10.4 12.7	004 -B -B -B
01-A	002-A	014-A	021-A	019 -BL -BM -BP	- 019 -BN -BR	4.0 4.7 5.5	004 -B -B -C
01-A	002-A	014-A	021-A	019 -T -X -Y	- 019 -U -V	4.9 5.7 6.3	004 -B -C -C
01-B	002-B	014-A	021-A	052 -AM -AN -AR	- 052 -AP -AS	12.0 14.1 15.5	004 -B -C -C
001-B	002-B	014-A	021-A	052 -F -K -L	- 052 -G -H	14.0 15.9 17.5	005 -A -B -B
001-B	002-B	014-A	021-A	052 -M -R -S	- 052 -N -P	16.3 18.0 19.5	005 -B -E -E

Ordering particulars

Bushings with oil level gauge



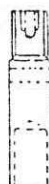
When ordering, please state:

- Type and Catalogue number for bushings.
- Catalogue number for inner and outer terminal assembly.
- Additional accessories or modifications.
- Test required, in addition to the normal routine tests.
- Test tap adapter, if required.

Note:

The Cat. No. should have one of the following letters added to it, to indicate the type of insulator and oil end shield:

- K Normal oil end shield, brown porcelain
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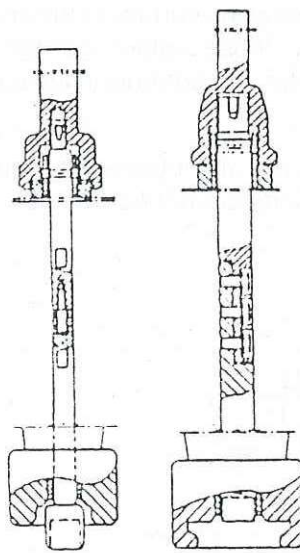
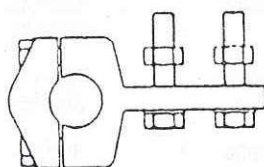
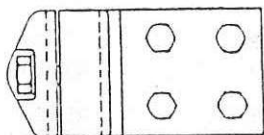


Bushings

Connection details

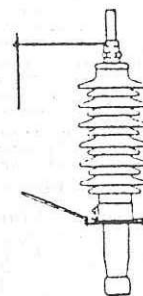
Inner terminal stud: Cat. No. LF 170

Type GOB	Rated current A	Cat. No.	Space for current transformer mm	Bushing tube (See fig.) D2, mm	For crimping or brazing Conductor area			For brazing Conductor area		Undrilled pilot hole
					50 mm ²	70 mm ²	95 mm ²	≤150 mm ²	≤285 mm ²	
250	800	LF 123 171- 173- 175-	- 300 500	22	010-M	010-N	010-L	011-S	-	011-U
250	1250	LF 123 167- 168- 169-	- 300 500	34	-	-	-	-	011-T	011-V
325	800	LF 123 177- 179- 181-	- 300 500	22	010-M	010-N	010-L	011-S	-	011-U
380	800	LF 123 183- 185- 187-	- 300 500	22	010-M	010-N	010-L	011-S	-	011-U
380	1250	LF 123 101- 102- 103-	- 300 500	34	-	-	-	-	011-T	011-V
450	800	LF 123 145- 147- 149-	- 300 500	22	010-M	010-N	010-L	011-S	-	011-U
550	800	LF 123 189- 190- 191-	100 300 500	22	010-M	010-N	010-L	011-S	-	011-U
550	1250	LF 123 142- 143- 144-	100 300 500	34	-	-	-	-	011-T	011-V
650	1250	LF 123 192- 193- 194-	150 300 500	34	-	-	-	-	011-T	011-V
750	1250	LF 123 104- 105- 106-	200 300 500	34	-	-	-	-	011-T	011-V



LF 170 019-
800 A

LF 170 052-
1250 A



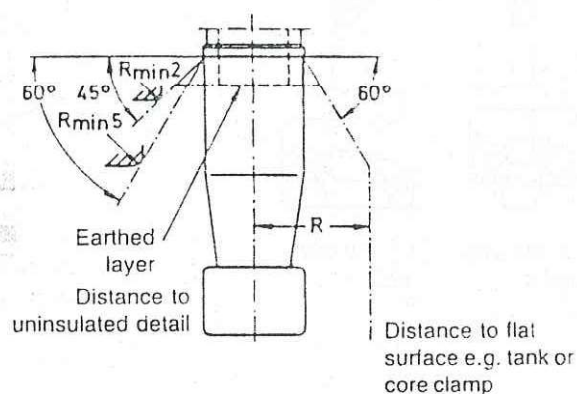
Outer terminal assembly: Cat. No. LF 170

Solid rod conductor Cat. No. LF 170		Separate terminal plate with bolts		Solid rod conductor Cat. No. LF 170		Mass kg	Arcing horns Cat. No. LF 170
Aluminium	Copper alloy	Aluminium	Copper alloy	All. 1	All. 2		
-A	002-A	014-A	021-A	019 -AM -AS -BB	- 019 -AT -BC	3.0 3.7 4.3	004-B -B -B
01-B	002-B	014-A	021-A	052 -BC -BF -BG	- 052 -BD -BE	7.7 9.3 10.8	004-B -B -B
001-A	002-A	014-A	021-A	019 -AN -AU -BD	- 019 -AV -BE	3.5 4.3 4.8	004-B -B -B
001-A	002-A	014-A	021-A	019 -AP -AX -BF	- 019 -AY -BG	3.9 4.6 5.1	004-B -B -B
01-B	002-B	014-A	021-A	052 -BK -BN -BP	- 052 -BL -BM	9.6 11.4 12.6	004-B -B -B
-A	002-A	014-A	021-A	019 -BS -BT -BV	- 019 -BU -BX	4.4 5.1 5.6	004-C -C -C
-A	002-A	014-A	021-A	019 -AR -AZ -BH	- 019 -BA -BK	5.3 5.8 6.4	004-C -C -C
01-B	002-B	014-A	021-A	052 -AT -AU -AV	- 052 -AX -AY	13.0 14.4 15.8	004-C -C -C
001-B	002-B	014-A	021-A	052 -AD -AE -AG	- 052 -AF -AH	14.9 16.1 17.7	005-B -B -B
001-B	002-B	014-A	021-A	052 -AZ -BA -AK	- 052 -BB -AL	18.0 19.0 20.5	005-F -F -F

Recommendations for positioning

The maximum stresses in the oil at the surface of the shield insulation must be limited to those values normal for insulated conductors and similar components in the same transformer.

The adjacent recommendations are intended as guide lines when complete calculations are not carried out.



Type GOB	Internal insulation level of transformer (kV)	R (mm)
250/800	170-70	65
	250-95	75
250/1250	170-70	75
	250-95	85
325/800	250-95	75
	325-140	100
380/800	325-140	100
	380-150	105
380/1250	325-140	105
	380-150	110
450/800	380-150	105
	450-185	125
550/800	450-185	130
	550-230	155
550/1250	450-185	140
	550-230	160
650/1250	550-230	160
	650-275	185
750/1250	650-275	185
	750-325	210

ABB Components	Made in Sweden
GOB 250	
LF 123 013-K	
No. 155678 Yr 1986	
52 kV	800 A

Nameplate with
marking example.

