



UL 1558

STANDARD FOR SAFETY

Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents

Document Sharing Hub

This document is only permissible for use by User of . 8/23/2016 1:22:17 PM

UL Standard for Safety for Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear, UL 1558

Fifth Edition, Dated February 18, 2016

SUMMARY OF TOPICS

This new Edition of ANSI/UL 1558 was issued to reflect first-time ANSI approval of the standard. None of the requirements of UL 1558 have been revised.

The requirements are substantially in accordance with Proposal(s) on this subject dated September 18, 2015.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form by any means, electronic, mechanical photocopying, recording, or otherwise without prior permission of UL.

UL provides this Standard "as is" without warranty of any kind, either expressed or implied, including but not limited to, the implied warranties of merchantability or fitness for any purpose.

In no event will UL be liable for any special, incidental, consequential, indirect or similar damages, including loss of profits, lost savings, loss of data, or any other damages arising out of the use of or the inability to use this Standard, even if UL or an authorized UL representative has been advised of the possibility of such damage. In no event shall UL's liability for any damage ever exceed the price paid for this Standard, regardless of the form of the claim.

Users of the electronic versions of UL's Standards for Safety agree to defend, indemnify, and hold UL harmless from and against any loss, expense, liability, damage, claim, or judgment (including reasonable attorney's fees) resulting from any error or deviation introduced while purchaser is storing an electronic Standard on the purchaser's computer system.

This document is only permissible for use by User of . 8/23/2016 1:22:17 PM

No Text on This Page

This document is only permissible for use by User of . 8/23/2016 1:22:17 PM

FEBRUARY 18, 2016

1



ANSI/UL 1558-2016

UL 1558

Standard for Metal-Enclosed Low-Voltage Power Circuit Breaker

Switchgear

First Edition – June, 1983
Second Edition – September, 1988
Third Edition – October, 1993
Fourth Edition – February, 1999

Fifth Edition

February 18, 2016

This ANSI/UL Standard for Safety consists of the Fifth Edition.

The most recent designation of ANSI/UL 1558 as an American National Standard (ANSI) occurred on February 18, 2016. ANSI approval for a standard does not include the Cover Page, Transmittal Pages and Title Page.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at <http://csds.ul.com>.

UL's Standards for Safety are copyrighted by UL. Neither a printed nor electronic copy of a Standard should be altered in any way. All of UL's Standards and all copyrights, ownerships, and rights regarding those Standards shall remain the sole and exclusive property of UL.

COPYRIGHT © 2016 UNDERWRITERS LABORATORIES INC.

No Text on This Page

This document is only permissible for use by User of . 8/23/2016 1:22:17 PM

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents

Document Sharing Hub

CONTENTS

INTRODUCTION

1 Scope	5
2 Glossary	5
3 References	5
4 General	5

CONSTRUCTION

5 Accelerated Aging of Gaskets	9
6 Primary or Power Carrying Circuits	9
6.1 General	9
6.2 Bus bars	9
7 Grounding	11
8 Control and Secondary Wiring	14
8.1 General	14
8.2 Wiring terminals – control circuits	15
9 Location of Operating Means	15
10 Receptacles	16
11 Impact and Pressure – Viewing Panes	16
12 Spacings	17
12.1 General	17
12.2 Details	17
12.3 Insulating barriers	22
12.4 Clamped joint	23
13 Service Equipment Use	23
13.1 General	23
13.2 Neutral disconnecting means	26
13.3 Equipment on supply side of disconnect	27
14 Multiple Source Switchgear	27
15 Corrosion Protection	27
16 Wiring Space	28
16.1 General	28
16.2 Wire bending space and gutter width	28
16.3 Clear wiring space	34
16.4 Wiring	35
17 Working Space	35

PERFORMANCE

18 General	35
------------------	----

MARKING

19 General	35
19.1 Details	35
19.2 Location	35
19.3 Service equipment	36
19.4 Ground fault protection	37
19.5 Main devices	38

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents
Document Sharing Hub

19.6 Emergency circuits	38
19.7 Transformers	38
19.8 Rainproof	38
19.9 Taps	39

INSTALLATION INSTRUCTIONS

20 Field Testing of Ground-Fault Protection of Equipment	39
--	----

This document is only permissible for use by User of . 8/23/2016 1:22:17 PM

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents

Document Sharing Hub

INTRODUCTION

1 Scope

1.1 These requirements cover metal-enclosed low-voltage power circuit breaker switchgear assemblies containing but not limited to such devices as low-voltage power circuit breakers, other interrupting devices, switches, control, instrumentation and metering, protective and regulating equipment.

1.2 These requirements cover equipment intended for use in ordinary locations in accordance with the National Electrical Code.

1.3 These requirements are intended to supplement and be used in conjunction with the Standard for Metal-Enclosed Low Voltage Power Circuit Breaker Switchgear, ANSI C37.20.1, and the Standard for Conformance Testing of Metal-Enclosed Low-Voltage AC Power Circuit Breaker Switchgear Assemblies, ANSI C37.51.

1.4 These requirements cover equipment rated 600 V ac or less nominal, 635 V ac maximum.

2 Glossary

2.1 TAP – A terminal or provision for a terminal intended for field wiring that is located on the supply side of the service disconnecting means. The tap is intended to be used in accordance with the National Electrical Code, ANSI/NFPA 70.

3 References

3.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

4 General

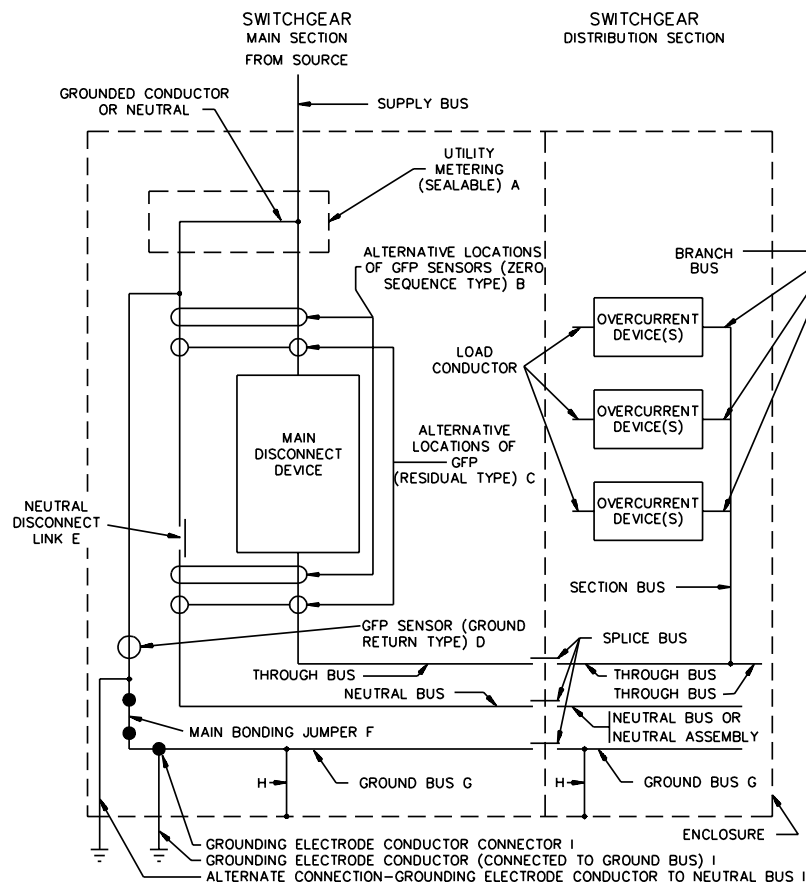
4.1 Requirements for the equipment covered by this Standard are contained in the Standard for Metal-Enclosed Low-Voltage Circuit Breaker Switchgear, ANSI C37.20.1 and the Standard for Conformance Testing of Metal-Enclosed Low-Voltage AC Power Circuit Breaker Switchgear Assemblies, ANSI C37.51. The requirements in this Standard shall be applied in addition to those contained in the above documents, or as alternatives where so specified.

4.2 It is specifically not intended that these requirements be used alone to evaluate these devices.

4.3 Figures 4.1 – 4.3 show typical switchgear layouts. It is recognized that other arrangements are possible.

This document is only permissible for use by User of . 8/23/2016 1:22:17 PM

Figure 4.1
Typical switchgear layout



SC1177-2

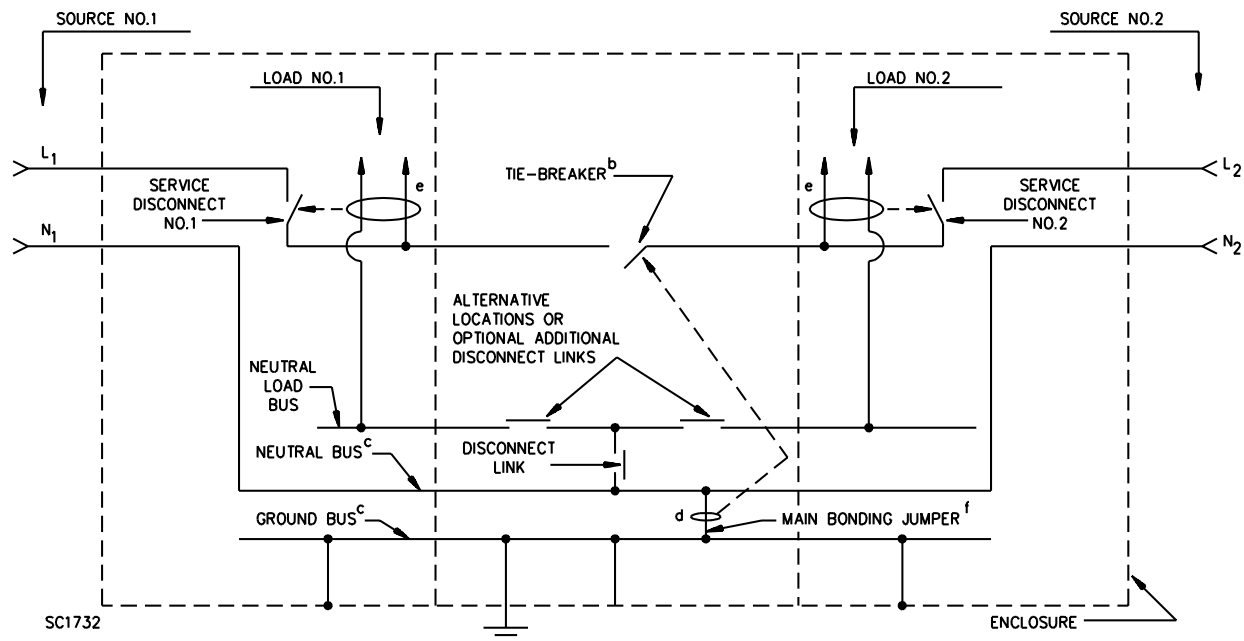
- A. Utility Metering, see 13.2.5.
- B. GFP Sensor (Zero Sequence Type), see 13.1.5 – 13.1.13.
- C. GFP Sensor (Residual Type), see 13.1.5 – 13.1.13.
- D. GFP Sensor (Ground Return Type), see 13.1.5 – 13.1.13.
- E. Neutral Disconnect Link, see 7.11, 13.1.5 – 13.1.13, and 13.2.1 – 13.2.5. (For other than ground return type GFP, the neutral disconnect link may be located on the line or load side of the GFP sensor.)
- F. Main Bonding Jumper, see 7.6.
- G. Ground Bus, see 7.1 – 7.8.
- H. Frame and Structure Grounding, see 7.2.
- I. Grounding Electrode Conductor, see 7.4 and 13.1.5 – 13.1.13.

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM



Documents
Document Sharing Hub

Figure 4.2
Typical double-ended switchgear



^a Other variations are possible.

^b Tie breaker disconnect. See 14.1 and 14.2.

^c The neutral bus and ground bus may be combined if ground return type ground fault protection is not used and the sections are marked "Suitable only for use as service equipment".

^d Ground return type ground fault protection sensor in accordance with 13.1.9.

^e Zero sequence or residual type ground fault protection sensor in accordance with 13.1.7 and 13.1.8.

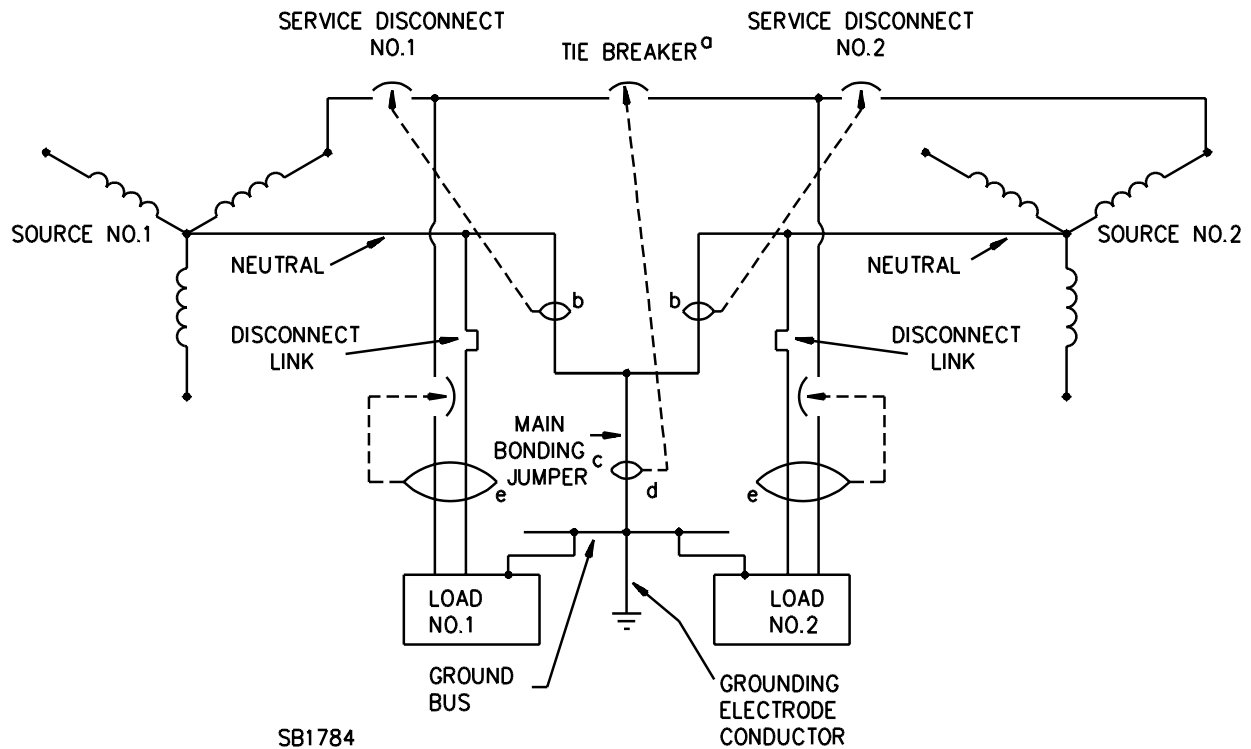
^f Size of main bonding jumper based on largest service disconnect.

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents
Document Sharing Hub

Figure 4.3
Typical double-ended switchgear



SB1784

^a Tie breaker disconnect. See 14.1 and 14.2.

^b Additional ground return type ground fault protection sensors utility interlocked with (d) so as to function only when fault current is also sensed by (d).

^c Size of main bonding jumper based on largest service disconnect.

^d Ground return type ground fault protection sensor in accordance with 13.1.9.

^e Zero sequence or residual type ground fault protection sensor in accordance with 13.1.7 and 13.1.8.

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents
Document Sharing Hub

CONSTRUCTION

5 Accelerated Aging of Gaskets

5.1 The requirements of this section are applicable to gaskets relied upon to enable an enclosure to meet the rain test specified in 6.2.10 of ANSI C37.20.1-2002.

5.2 A gasket of an elastomeric or thermoplastic material or a composition gasket utilizing an elastomeric material employed to make an enclosure rainproof shall comply with 5.3 and 5.4.

5.3 If an enclosure is provided with a rubber or rubber-like gasket, samples of the gasket shall be subjected to a temperature of $70 \pm 1^\circ\text{C}$ ($158 \pm 1.8^\circ\text{F}$) in circulating air for 168 hours. The tensile strength after the exposure shall not be less than 60 percent and the elongation shall not be less than 75 percent of the values determined with unaged samples.

5.4 A gasket of thermoplastic material, or a composition thereof, may be accepted after consideration of the effects of heat aging, distortion under conditions of use, and the means of securing the gasket to the cover or enclosure.

6 Primary or Power Carrying Circuits

6.1 General

6.1.1 The requirements of this section shall be applied in addition to those specified in 7.1.1 of ANSI C37.20.1-2002.

6.2 Bus bars

6.2.1 The bending of a bus bar shall not result in visible cracks, but roughening or slight surface crazing is acceptable.

6.2.2 A bolted joint involving aluminum bus bars shall comply with the requirements of 6.2.3 and 6.2.4, unless:

- a) A spring washer as described in 6.2.6 is used at one end of each bolt securing current-carrying parts together is used, or
- b) A locknut or a split-ring lock washer and a flat washer as described in 6.2.5 is used and each aluminum bus in the joint has a tensile yield strength of at least 20,000 psi (138 MPa).
- c) A flat washer, as described in 6.2.5, and aluminum bolts are used with aluminum bus bars.

6.2.3 A switchgear bus, as mentioned in 6.2.2, that employs a bolted joint construction with aluminum bus bars shall be subjected to the test described in 6.2.4. The temperature rise at the joint during the 500th cycle shall not be more than 15°C (27°F) higher than the temperature rise at the 25th cycle.

Exception: Constructions described in 6.2.2 (a), (b), or (c), need not comply with this requirement.

6.2.4 The test sample is to consist of an assembly of bus bars connected together to form a series circuit. The bus bars are to be clamped together with the joint construction used in actual production. The number and size of the bus bars are to represent the maximum ampere rating and the maximum current density in which the joint construction is to be employed. This may necessitate more than one test. The length of each bus bar is to be not less than 2 ft (610 mm). The bus bar is to be connected to a power supply by any convenient means that will not affect the joint temperature. The power supply is to be adjusted to deliver a value of current that will result in a temperature of 75°C (135°F) above room temperature at the joint. The assembly is then to be subjected to a 500 cycle test. At the end of the 24th cycle, the current is to be readjusted to bring the temperature of the joint to 75°C (135°F) above room temperature. At the end of the 25th and 500th cycles, the temperatures are to be recorded. The temperatures are to be measured on both sides of the joint as close as possible to the bolt. The cycling rate is to be 3 hours on and 1 hour off. The on period during which temperatures are recorded may be extended to more than 3 hours if necessary for the joint to attain thermal equilibrium.

6.2.5 The flat washer mentioned in 6.2.2 (b) and (c) shall have a nominal thickness of at least 1/6 that of the diameter of the bolt and shall have an outer diameter at least 150 percent of bolt and not less than the outer diameter of any spring washer employed.

6.2.6 A typical spring washer as mentioned in 6.2.2 is a dished washer of stainless, or hardened and tempered steel, having an outer diameter not less than 150 percent of the bolt diameter, a thickness not less than 1/8 of the bolt diameter, and nominally dished not less than 3-1/2 percent of the bolt diameter. Other configurations are acceptable if they provide equivalent spring action.

6.2.7 A construction other than described in 6.2.2 may be accepted if it is investigated and found acceptable for the particular application.

6.2.8 Unless investigated for such use, a bolted connection between two bus bars or between a bus bar and another current carrying part shall not depend on any polymeric insulation to maintain the clamping force and shall not depend on thermoplastic material in any case.

6.2.9 When bolts, nuts, and washers are provided for connecting through bus to other sections, the length of the bolts shall be such that spacings in accordance with Table 12.1 are maintained.

6.2.10 A bus bar or uninsulated live part, other than a pressure wire connector as mentioned in the Exception of 12.2.7, shall be secured so that ordinary vibration will not loosen the securing means, and shall be prevented from turning or shifting in position if any spacings less than half those indicated in Table 12.1 would result from such turning or shifting. A bus bar provided with one or more insulators that must be removed when a unit is installed shall be prevented from any turning that would result in spacings less than half those specified in Table 12.1 with all insulators in place, or that would result in spacings less than 1/8 inch (3.2 mm) for any voltage up to 250 V, or 1/4 inch (6.4 mm) for any voltage of 251 to 600 V, with any insulators omitted.

6.2.11 Friction between surfaces is not acceptable as a means to prevent turning or shifting of an uninsulated live part. Turning or shifting may be prevented by the use of two screws or rivets, by noncircular shoulders or mortises, by a dowel pin, lug, or offset, by a connecting strap or clip fitted into an adjacent part, or by an equivalent method. No reliance is to be placed on a single branch circuit fuseholder, circuit breaker, or switch unit for preventing turning of the branch bus feeding such unit, if such turning would reduce spacings to less than those specified in Table 12.1 or 6.2.10.

This document is only permissible for use by User of . 8/23/2016 1:22:17 PM