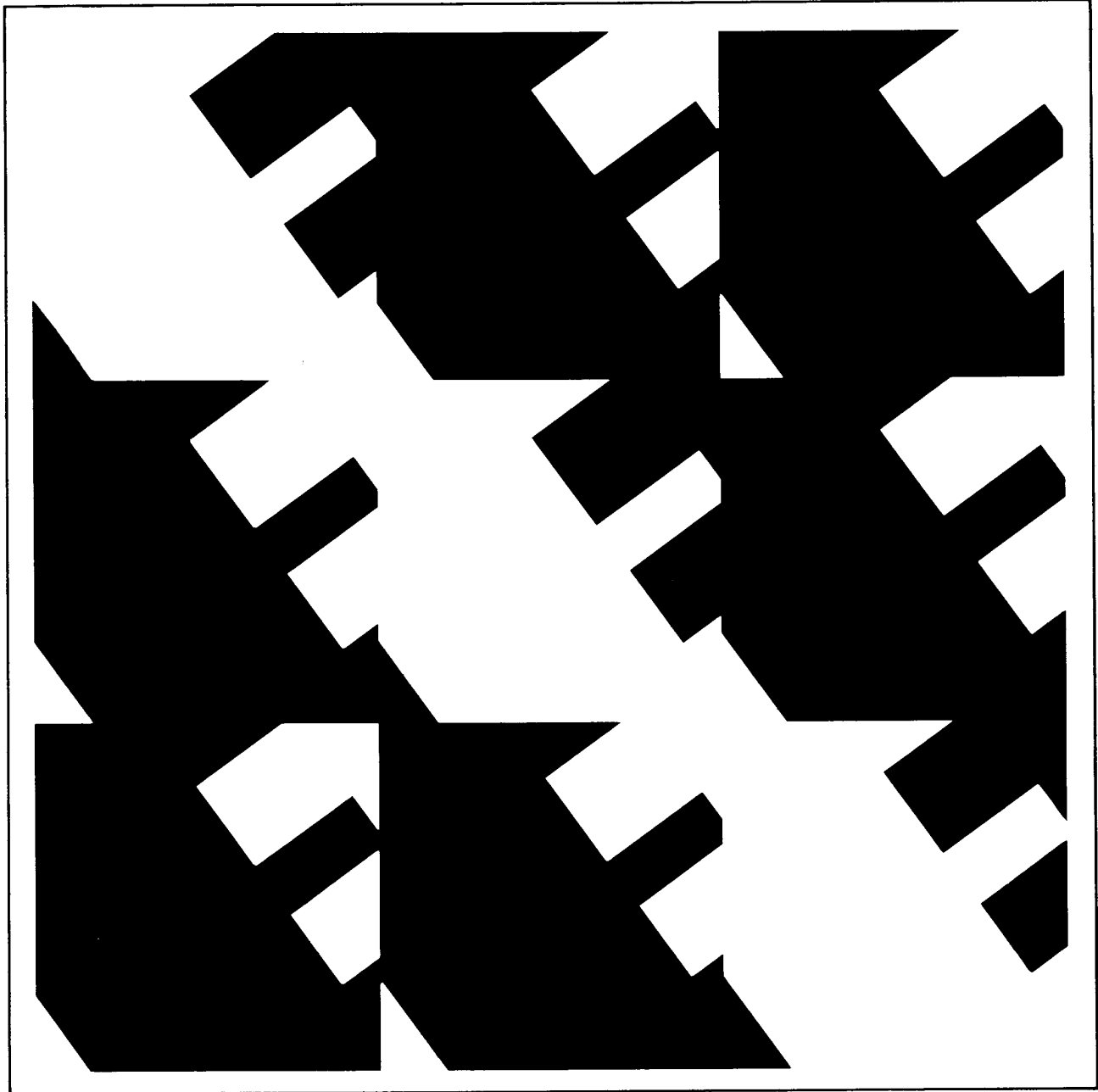


IEEE Standard Terms for Reporting and Analyzing Outage Occurrences and Outage States of Electrical Transmission Facilities



IEEE Std 859-1987



Published by The Institute of Electrical and Electronics Engineers, Inc 345 East 47th Street, New York, NY 10017, USA
February 17, 1988

SH111478

IEEE Standard Terms for Reporting and Analyzing Outage Occurrences and Outage States of Electrical Transmission Facilities

Sponsor

**Power System Engineering Committee
of the
Power Engineering Society**

Reaffirmed 27 March 2008

Approved 11 June 1987

IEEE Standards Board

© Copyright 1988 by

**The Institute of Electrical and Electronics Engineers, Inc.
345 East 47th Street, New York, NY 10017, USA**

*No part of this publication may be reproduced in any form,
in an electronic retrieval system or otherwise,
without the prior written permission of the publisher.*

IEEE Standards documents are developed within the Technical Committees of the IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Board. Members of the committees serve voluntarily and without compensation. They are not necessarily members of the Institute. The standards developed within IEEE represent a consensus of the broad expertise on the subject within the Institute as well as those activities outside of IEEE which have expressed an interest in participating in the development of the standard.

Use of an IEEE Standard is wholly voluntary. The existence of an IEEE Standard does not imply that there are no other ways to produce, test, measure, purchase, market, or provide other goods and services related to the scope of the IEEE Standard. Furthermore, the viewpoint expressed at the time a standard is approved and issued is subject to change brought about through developments in the state of the art and comments received from users of the standard. Every IEEE Standard is subjected to review at least once every five years for revision or reaffirmation. When a document is more than five years old, and has not been reaffirmed, it is reasonable to conclude that its contents, although still of some value, do not wholly reflect the present state of the art. Users are cautioned to check to determine that they have the latest edition of any IEEE Standard.

Comments for revision of IEEE Standards are welcome from any interested party, regardless of membership affiliation with IEEE. Suggestions for changes in documents should be in the form of a proposed change of text, together with appropriate supporting comments.

Interpretations: Occasionally questions may arise regarding the meaning of portions of standards as they relate to specific applications. When the need for interpretations is brought to the attention of IEEE, the Institute will initiate action to prepare appropriate responses. Since IEEE Standards represent a consensus of all concerned interests, it is important to ensure that any interpretation has also received the concurrence of a balance of interests. For this reason IEEE and the members of its technical committees are not able to provide an instant response to interpretation requests except in those cases where the matter has previously received formal consideration.

Comments on standards and requests for interpretations should be addressed to:

Secretary, IEEE Standards Board
345 East 47th Street
New York, NY 10017
USA

Foreword

(This Foreword is not a part of IEEE Std 859-1987, IEEE Standard Terms for Reporting and Analyzing Outage Occurrences and Outage States of Electrical Transmission Facilities.)

Data on outage occurrences of transmission facilities have been collected for many years. Initially, reporting was generally limited to reporting frequency of outage occurrence on transmission lines. Total outage frequency was classified into several general cause categories, but there were no formal definitions for the events and statistics reported beyond those contained in the data forms and instructions. Early efforts did not generally collect data on outage duration, except to classify outages as temporary or permanent according to type of restoration used.

In the 1960's, methods were first proposed for calculating reliability of transmission and distribution "systems" (networks) in terms of the reliability of their individual "components." This led to the need for more formal definitions of terms to foster uniformity and standardization of language among engineers engaged in reporting, analyzing, and predicting outages of transmission and distribution facilities and interruptions to customers. This resulted in development of IEEE Std 346-1973, IEEE Standard Definitions in Power Operations Terminology Including Terms for Reporting and Analyzing Outages of Electrical Transmission and Distribution Facilities and Interruptions to Customer Service.

More recent developments have shown the need to include definitions for a broader scope of outage events. For example, two general categories of facilities (reportable entities) must be recognized to support presently available models. In one type of model, a transmission system is partitioned functionally into "units" which represent the capability to transfer power between specified points. In the second type of model, a system is partitioned physically into "components."

Another recent development is the increasing recognition of the importance of "related outage occurrences" in which outage occurrences of two or more facilities are related in some way due to the physical construction of equipment (such as common structure), the electrical interconnection of equipment (common bus, for example), or exposure to a common environment (storms). Achieving clear and unambiguous definitions for related outage occurrences is important for reporting outage occurrences at the transmission unit level. At the component level, an important consideration is the recognition of several modes of failure, particularly for switching, protection, and automatic reclosing equipment.

No attempt is made here to standardize procedures for the collection of outage data. What is attempted is to specify certain common terms and indices to provide a basis of information exchange. The task force has attempted to keep the list of terms and indices as brief as possible.

The indices defined here are intended to serve as estimates for parameters of models which are used in transmission system reliability evaluation. The indices may also be used directly to guide system operation or in assessment of equipment performance. No attempt is made to recommend acceptable equipment reliability levels.

This is a revision of IEEE Std 346-1973. However, terms related to distribution system facilities and interruptions were eliminated from the scope of this document.

This document was prepared by the Transmission and Distribution Outage and Interruption Definitions Task Force. This task force was formed by the PROSD (Performance Records for Optimizing System Design) Working Group, which is under the guidance of the Power System Engineering Committee. The members of the task force were:

M. G. Lauby (*Chairman*)

P. F. Albrecht
R. N. Allan
M. P. Bhavaraju

R. Billinton
D. W. Forrest
G. L. Landgren

M. F. McCoy
N. D. Reppen
A. W. Schneider, Jr