

IEEE Guide for the Design, Construction, and Operation of Safe and Reliable Substations for Environmental Acceptance

Sponsor

Substation Environmental Subcommittee of the
Substation Committee of the
IEEE Power Engineering Society

Approved December 6, 1990

IEEE Standards Board

Abstract: IEEE Std 1127-1990, *IEEE Guide for the Design, Construction, and Operation of Safe and Reliable Substations for Environmental Acceptance*, documents significant environmental items to be considered in the design, construction, and operation of safe and reliable substations for environmental and community acceptance.

Keywords: A-weighted sound level, commercial zoning, hazardous material, industrial zoning, noise, residential zoning, wetlands

ISBN 1-55937-097-1

Copyright © 1990 by

The Institute of Electrical and Electronics Engineers, Inc.
345 East 47th Street, New York, NY 10017-2394, 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 that 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 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
445 Hoes Lane
P.O. Box 1331
Piscataway, NJ 08855-1331
USA

IEEE Standards documents are adopted by the Institute of Electrical and Electronics Engineers without regard to whether their adoption may involve patents on articles, materials, or processes. Such adoption does not assume any liability to any patent owner, nor does it assume any obligation whatever to parties adopting the standards documents.
--

Foreword

(This Foreword is not a part of IEEE Std 1127-1990, IEEE Guide for the Design, Construction, and Operation of Safe and Reliable Substations for Environmental Acceptance.)

This guide was prepared by Working Group G2 — Design and Location of Substations for Community Acceptance, and is under the sponsorship of the Substation Environmental Subcommittee of the Substation Committee of the IEEE Power Engineering Society.

Working Group G2 had the following membership at the time this standard was approved:

W. B. Dietzman, *Chair*

K. M. Bevins
M. J. Bio
J. C. Burke
R. E. Carberry

R. G. Cottrell
L. N. Ferguson
H. R. Gilden

D. L. Harris
F. F. Kluge
D. F. Sabatini
D. R. Schafer

The Substation Committee that balloted and approved this document for submission to the IEEE Standards Board had the following membership:

W. J. Ackerman
B. Y. Afshar
S. J. Arnot
M. Barbeito
J. D. Betz
K. L. Black
C. J. Blattner
W. R. Block
P. C. Bolin
S. D. Brown
J. C. Burke
J. B. Cannon
R. E. Carberry
F. Y. Chu
D. M. Christie
E. F. Counsel
N. Cuk
P. Danfors
F. A. Denbrock
W. K. Dick
C. C. Diamond
L. N. Ferguson
G. G. Flaig
D. L. Garrett
H. R. Gilden

J. Grzan
A. Haban
M. A. Hick
N. G. Hingorani
J. E. Holladay
M. L. Holm
D. C. Johnson
Z. Kapelina
G. Karady
J. J. Keane
R. P. Keil
F. F. Kluge
D. F. Koenig
T. J. Kolenda
A. E. Kollar
I. H. Koponen
L. W. Kurtz
K. C. Labbe
D. N. Laird
L. M. Laskowski
A. A. Leibold
C. T. Lindeberg
H. P. Lips
W. F. Long

R. Matulic
T. S. McLenahan
S. P. Meliopoulos
P. R. Nannery
J. O'Hara
J. T. Orrell
J. Oswald
S. G. Patel
R. J. Perina
T. A. Pinkham
J. Quinata
D. G. Rishworth
B. D. Russell
J. Sabath
D. R. Schafer
F. C. Shainauskas
R. C. St. Clair
J. G. Sverak
W. K. Switzer
E. R. Taylor
L. F. Volf
R. J. Wehling
W. M. Werner
B. W. Wray
R. M. Youngs

When the IEEE Standards Board approved this standard on December 6, 1990, it had the following membership:

Marco W. Migliaro, *Chair*

Dennis Bodson
Paul L. Borrill
Fletcher J. Buckley
Allen L. Clapp
Stephen R. Dillon
Donald C. Fleckenstein
Jay Forster*
Thomas L. Hannan

Andrew G. Salem, *Secretary*

Kenneth D. Hendrix
John W. Horch
Joseph L. Koepfinger*
Irving Kolodny
Michael A. Lawler
Donald J. Loughry
John E. May, Jr.

James M. Daly, *Vice Chair*

Lawrence V. McCall
L. Bruce McClung
Donald T. Michael*
Stig Nilsson
Roy T. Oishi
Gary S. Robinson
Terrance R. Whittemore
Donald W. Zipse

*Member Emeritus

Contents

SECTION	PAGE
1. Introduction.....	6
1.1 Purpose.....	6
1.2 Scope.....	6
2. Definitions.....	6
3. References.....	7
4. Design.....	7
4.1 Noise.....	7
4.1.1 Types of Noise.....	7
4.1.2 Noise Abatement.....	7
4.2 Site Preparation.....	8
4.2.1 Grade.....	8
4.2.2 Sediment Control.....	9
4.2.3 Oil-Spill Containment and Control.....	9
4.2.4 Access Roads.....	9
4.2.5 Storm-Water Management.....	9
4.2.6 Wetlands.....	10
4.3 Aesthetics.....	10
4.3.1 Site Rendering.....	10
4.3.2 Landscaping.....	10
4.3.3 Fences and Walls.....	10
4.3.4 Color.....	11
4.3.5 Lighting.....	11
4.3.6 Structures.....	11
4.3.7 Enclosures.....	12
4.3.8 Bus Designs.....	12
4.4 Fire Protection.....	12
4.5 Potable Water and Sewage.....	12
4.6 Hazardous Material.....	13
4.7 Electric and Magnetic Fields.....	13
4.8 Safety and Security.....	14
4.8.1 Fencing.....	14
4.8.2 Lighting.....	14
4.8.3 Grounding.....	14
5. Construction.....	14
5.1 Noise.....	14
5.2 Site Preparation.....	14
5.2.1 Clearing, Grubbing, Excavation, and Grading.....	14
5.2.2 Site Access Roads.....	14
5.2.3 Water Drainage.....	14
5.2.4 Control Methods.....	14
5.3 Safety and Security.....	15
5.4 Traffic Control.....	15
5.5 Site Housekeeping.....	15
5.6 Hazardous Material.....	15
5.7 Miscellaneous.....	15
5.7.1 Oil Handling.....	15

SECTION	PAGE
5.7.2 Paint Control	15
5.7.3 Holes and Open Ditches	15
5.7.4 Falling or Windblown Objects	16
5.7.5 Open Fires	16
5.7.6 Sanitation	16
6. Operations	16
6.1 Noise	16
6.1.1 Transformers and Reactors	16
6.1.2 Radio Frequency Noise	16
6.1.3 Impulse	16
6.1.4 Maintenance Work	16
6.2 Site Housekeeping	16
6.2.1 Water and Sediment Control	16
6.2.2 Yard Surface Control	16
6.2.3 Paint	16
6.2.4 Landscaping	16
6.2.5 Storage	16
6.3 Safety and Security	16
6.4 Hazardous Material	16