

IEEE Standard Tests for Determining Compatibility of Cable-Pulling Lubricants With Wire and Cable

Sponsor

**Insulated Conductors Committee
of the
IEEE Power Engineering Society**

Approved 21 May 1996

IEEE Standards Board

Abstract: Criteria and test methods for determining the compatibility of cable-pulling lubricants (compounds) with cable jacket or other exterior cable covering are described in this standard. Cable-pulling lubricants are used to lower the tension on cable as it is pulled into conduit, duct, or directionally bored holes. Compatibility is important because lubricants should not negatively interact with the cables they lubricate. Compatibility of lubricants with a variety of common cable coverings is considered.

Keywords: cable, cable covering, cable jacket, cable pulling, compatibility, compound, dielectric withstand, immersion testing, lubricants, physical properties, volume resistance measurement, wire

The Institute of Electrical and Electronics Engineers, Inc.
345 East 47th Street, New York, NY 10017-2394, USA

Copyright © 1996 by the Institute of Electrical and Electronics Engineers, Inc.
All rights reserved. Published 1996. Printed in the United States of America.

ISBN 1-55937-725-9

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 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 societies and Standards Coordinating 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

Note: Attention is called to the possibility that implementation of this standard may require use of subject matter covered by patent rights. By publication of this standard, no position is taken with respect to the existence or validity of any patent rights in connection therewith. The IEEE shall not be responsible for identifying all patents for which a license may be required by an IEEE standard or for conducting inquiries into the legal validity or scope of those patents that are brought to its attention.

Authorization to photocopy portions of any individual standard for internal or personal use is granted by the Institute of Electrical and Electronics Engineers, Inc., provided that the appropriate fee is paid to Copyright Clearance Center. To arrange for payment of licensing fee, please contact Copyright Clearance Center, Customer Service, 222 Rosewood Drive, Danvers, MA 01923 USA; (508) 750-8400. Permission to photocopy portions of any individual standard for educational classroom use can also be obtained through the Copyright Clearance Center.

Introduction

(This introduction is not part of IEEE Std 1210-1996, IEEE Standard Tests for Determining Compatibility of Cable-Pulling Lubricants With Wire and Cable.)

Cable-pulling lubricants (compounds) are used to lower the tension on cable as it is pulled into conduit, duct, or directionally bored holes. These friction reducers play an important part in minimizing physical damage to cable as it is installed.

It is important that lubricants do not negatively affect the cables they lubricate. Conventional oils and greases are generally not suitable pulling lubricants, since they can swell and weaken plastic jackets and insulations.

The purpose of this standard is to provide criteria and test methods for determining the compatibility of cable-pulling lubricants with cable jacket or other exterior cable covering. Until now, the evaluation of this compatibility was done on a nonstandard basis.

It should be noted that compatibility of lubricants with cable coverings is the only subject for the standard; other important performance criteria for lubricants, such as friction reduction, toxicity, combustibility, etc., are not discussed.

At the time this draft was completed, the Task Group on Cable-Pulling Compound Compatibility With Wire and Cable had the following membership:

John M. Fee, *Chair*

Thamir J. Al-Hussaini
Jim Brioty
Kent Brown
Rick Bush
Michael M. Dorn
Ken Fender
Stephen L. Fitzhugh
Bob Fulcomer
Ajit K. Gwal
Stan Harper
Rick Hartlein
Stan Howell
John Jeanmonod

W. F. Jensen
Ronnie Kirven
Mike Kopchik, Jr.
Frank LaGase
Jeffrey J. LaMarca
Don Learned
Rodney Machac
Sam Marcovi
T. M. McCauley
John Merando, Jr.
Dave Orchard
Ron Petersen

Wiley J. Pickett
George R. Pitman
Sam Rogoff
Stephen J. Sandburg
Wendell T. Starr
Joseph L. Steiner
Tom Stewart
Mike Sweat
Jack Tuzinski
T. T. A. Venkataraman
Joseph Waligorski
Olin L. Willis
Bob Washburn

Other individuals who have contributed review and comments are as follows:

Anthony Barlow
John E. Bramfitt
Gene D'Aquanno
James C. Dedman
Louis G. Delvalle
James V. Fitzgerald
Robert Fleming
D. A. Gillies
Eugene J. Hibbard
Darrell Jeter

Joseph S. Jue
Larry Kelly
Thomas J. Kendrew
James Kopcso
Ralph Lieux
Mark E. Lowell
Nicholas Lucio
Mel Maringer
Andy Melzer
Frank D. Meyers

Jim Moran
Ward C. Peterson
O. M. Rattan
George Remaley
Robert A. Resuali
Joseph H. Snow
D. J. Stonkus
William A. Thue
Robert O. Wilkenson
Walter Zenger

The following persons were on the balloting committee:

T. J. Al-Hussaini	R. W. Higginbottom	Ronald J. Ponist
R. W. Allen, Jr.	Lauri J. Hiivala	Paul F. Pugh
W. O. Andersen, Jr.	C. Katz	Peter Ralston
R. H. Arndt	L. J. Kelly	Greg P. Rampley
T. P. Arnold	F. E. Kimsey	Robert A. Resuali
T. A. Balaska	Joel Kitchens	R. B. Robertson
Anthony Barlow	H. T. Knox	Ralph W. Samm
Charles W. Blades	Frederick B. Koch	E. L. Sankey
David T. Bogden	Albert Kong	George W. Seman
Vincent J. Boliver	Donald E. Koonce	John F. Shimshock
R. R. Borowski	M. Kopchik, Jr.	Bynum E. Smith
Ken E. Bow	F. E. La Fetra	Joseph H. Snow
John E. Bramfitt	F. E. La Gase	T. F. Stabosz
M. D. Buckweitz	Jeffrey J. La Marca	Wendall T. Starr
R. R. Burghardt	Carl Landinger	Joseph L. Steiner
Paul S. Cardello	J. S. Lasky	Grover L. Stell, Jr.
John L. Carlson	Jack H. Lawson	Frank M. Stepniak
Charles White	Raoul H. Leuteritz	George A. Straniero
Paul L. Cinquemani	T. H. Ling	Mike D. Sweat
Wayne E. Cole	John V. Lipe	Keith W. Switzer
E. J. D'Aquanno	Mark E. Lowell	John Tanaka
S. J. Dale	G. Ludasi	James W. Tarpey
J. M. Daly	R. Luther	Frank A. Teti
Russ Dantzler	G. J. Luzzi	H. D. Thomas
Joseph A. Di Costanzo	Jeffrey P. Mackevich	William A. Thue
C. Doench	G. Allen MacPhail	Austin C. Tingley
J. P. Dupont	M. A. Martin	William Torok
G. S. Eager, Jr.	I. J. Marwick	Duc B. Trinh
R. M. Eichhorn	M. S. Mashikian	S. E. Turner
Hussein El Badaly	S. G. Mastoras	Jack R. Tuzinski
J. S. Engelhardt	F. M. McAvoy	Donald A. Voltz
S. L. Fitzhugh	A. R. McCulloch	C. F. Von Hermann, Jr.
A. Fitzpatrick	E. J. McGowan	Richard L. Votoupal
E. O. Forster	A. L. McKean	Michael L. Walker
Ronald F. Frank	W. J. McNulty	Steven P. Walldorf
R. D. Fulcomer	J. D. Medek	Edward M. Walton
J. B. Gardner	David J. Mintz	Daniel J. Ward
P. Gazzana-Priaroggia	J. A. Moran, Jr.	Roldan H. W. Watkins
R. B. Gear	D. J. Nichols	A. C. Westrom
A. Godoshian	Harry E. Orton	Charles A. White
A. Gwal	J. J. Pachot	William D. Wilkens
Stan V. Harper	Cutter D. Palmer	Robert O. Wilkinson
R. Hartlein	Keith A. Petty	J. A. Williams
H. C. Hervig, Jr.	James J. Pickering	William G. Wimmer
S. V. Heyer	Jan S. Pirrong	J. T. Zimnoch
	Gary A. Polhill	

When the IEEE Standards Board approved this standard on 21 March 1996, it had the following membership:

Donald C. Loughry, *Chair*

Richard J. Holleman, *Vice Chair*

Andrew G. Salem, *Secretary*

Gilles A. Baril
Clyde R. Camp
Joseph A. Cannatelli
Stephen L. Diamond
Harold E. Epstein
Donald C. Fleckenstein
Jay Forster*
Donald N. Heirman

Ben C. Johnson
E. G. "Al" Kiener
Joseph L. Koepfinger*
Lawrence V. McCall
L. Bruce McClung
Marco W. Migliaro
Mary Lou Padgett
John W. Pope
Jose R. Ramos

Arthur K. Reilly
Ronald H. Reimer
Gary S. Robinson
Ingo Rüsçh
John S. Ryan
Chee Kiow Tan
Leonard L. Tripp
Howard L. Wolfman

*Member Emeritus

Also included are the following nonvoting IEEE Standards Board liaisons:

Satish K. Aggarwal
Alan H. Cookson
Chester C. Taylor

Paula M. Kelty
IEEE Standards Project Editor

Contents

CLAUSE	PAGE
1. Overview.....	1
1.1 Scope	1
1.2 Purpose	1
2. References.....	2
3. Physical property effects.....	2
3.1 General	2
3.2 Lubricant on polyvinyl chloride (PVC) jacket	2
3.3 Lubricant on black polyethylene (PE) jacket	3
3.4 Lubricant on thermoplastic chlorinated polyethylene (CPE) jacket.....	3
3.5 Lubricant on natural rubber jacket	3
3.6 Lubricant on styrene butadiene rubber (SBR) jacket	4
3.7 Lubricant on thermoset polychloroprene jacket	4
3.8 Lubricant on acrylonitrile/butadiene and polyvinyl chloride (PVC) jacket	4
3.9 Lubricant on a thermoset chlorosulfonated polyethylene (CSPE) jacket.....	5
3.10 Lubricant on thermoset chlorinated polyethylene (CPE) jacket.....	5
4. Electrical property effects	6
4.1 General	6
4.2 Lubricant on semiconducting jackets or exposed semiconducting shields	6
4.3 Determining stability of lubricant on semiconducting materials	6
4.4 Final high-temperature volume resistivity test	7
4.5 Lubricant on exposed thermoplastic primary insulation	7
4.6 Lubricant on exposed thermoset primary insulation	8
5. Testing and test methods.....	9
5.1 General	9
5.2 Jacket test specimens for the immersion/physical property tests	9
5.3 Tensile strength and elongation test	9
5.4 Heated lubricant immersion method	10
5.5 Heated water/air immersion method	10
5.6 Environmental stress cracking test	10
5.7 Specimens for volume resistivity tests (stability and final high temperature)	11
5.8 Specimens and test for semiconducting jacket and self-supporting lubricants	11
5.9 Specimens and tests for semiconducting insulation shield with self-supporting lubricants ...	11
5.10 Volume resistivity test procedure for self-supporting lubricants on semiconducting jackets/shields.....	12
5.11 Specimens and tests for semiconducting jackets/shields when lubricants are not self-supporting—immersion test	13
5.12 Preparation of samples for the dielectric voltage withstand test in water	13
5.13 Dielectric voltage withstand test in water	13
Annex A (informative) Bibliography.....	14