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“Writing The Book” on Standards and Codes



Arthur J. Smith, III, P.E.

The IEEE Standards Board recently acknowledged Arthur J. Smith, III, head of the electrical department in our New Orleans office, for his contributions to the development of IEEE 1458-Recommended Practice for the Selection, Field Testing, and Life Expectancy of Molded - Case Circuit Breakers for Industrial Applications, published February 2, 2018. In particular, NELSON has a long history of helping to develop industry codes and standards.

This standard has a very interesting history with NELSON. In the late 1980's one of our industrial clients asked NELSON to investigate the catastrophic failure of a molded-case circuit breaker used in a combination

motor controller within a Motor Control Center (MCC) at one of their plants. Short-circuit currents available at the breaker terminals were calculated confirming that the circuit breaker was applied within its listed and labeled short-circuit ratings. With confirmation that the circuit-breaker was applied within its short-circuit ratings, NELSON recommended the remaining breakers and MCC equipment be inspected and cycled by a qualified test company. Many of the breakers in this facility had not been operated for some time and it was later learned that the grease used during manufacturing to lubricate circuit breaker internal moving parts can retard breaker operation over time if not mechanically operated on a regular basis (i.e. cycled off and on).

With all the breakers inspected, mechanically cycled and confirmed to be in good working order per a qualified testing company, everyone felt comfortable the electrical system molded-case circuit breakers were safe for continued operation. However, after approximately six months, another molded-case circuit breaker in the same facility experienced a catastrophic failure. This time an operator was pressing a start button on the front of the motor control center when the breaker exploded. Fortunately, the starter door remained closed and the operator was not hurt.

However, two catastrophic molded-case circuit breaker failures that appeared properly applied per the manufacturer's requirements needed

further investigation. NELSON contacted the Underwriters Laboratories (UL) as part of the investigation since these breakers were listed and labeled per UL test standards. The UL contact asked an interesting question: “Did the door remain closed?”. We responded that the door remained closed, but what did that have to do with the catastrophic breaker failure? The UL contact responded that if the door remained closed, the system operated pretty much as it had been designed.

This interaction with UL launched a NELSON investigation into circuit breaker applications that had previously been considered well understood by most electrical engineers. Although we didn't know it at the time, the electrical community's understanding of proper molded-case circuit breaker applications was severely lacking.

After significant research and breaker testing at high power test labs where testing documented catastrophic breaker failures at a fraction of their nameplate ratings, NELSON sponsored an IEEE paper titled “Short-circuit Ratings, Labels, and Fault Withstandability of Molded-case and Insulated-case Circuit Breakers and Combination Motor Starters”. This paper was first presented at the IEEE-Industry Application Society (IEEE-IAS) meeting in San Diego in 1989 with approximately one-hundred engineers in the audience. As one might imagine, attendees associated with circuit breaker manufacturers did not look favorably on this

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WALDEMAR S. NELSON AND COMPANY
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Engineers and Architects

1200 St. Charles Ave., New Orleans, LA 70130
Telephone: (504) 523-5281 Fax: (504) 523-4887
www.wsnelson.com

2 Northpoint Dr. - Suite 300, Houston, TX 77060
Telephone: (281) 999-1989 Fax: (281) 999-6757

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Selection, Field Testing, and Life Expectancy of Molded Case Circuit Breakers for Industrial Applications". The introduction of this paper stated, "At the 1991 PCIC conference in Toronto, Ontario Canada, Arthur J. Smith, III presented a paper entitled *Short Circuit Ratings, Labels and Fault Withstandability of Molded-Case and Insulated-Case Circuit Breakers and Combination Motor Starters*. This paper started several very active discussions within the PCIC membership about molded case circuit breakers built to UL 489 requirements. The discussions revealed that there was a very low level of understanding about these breakers within the industry in general."

The latest Standard was introduced at the 2018 IEEE-PCIC in a paper titled "An Introduction to IEEE Std 1458-2017 "Recommended Practice for the Selection, Field Testing, and Life Expectancy of Molded-Case Circuit Breakers for Industrial Applications" where NELSON's Arthur J. Smith, III was introduced to the audience as the "father of this standard".

This is just one example where NELSON identified a problem, challenged prevailing thought, wrote and presented technical papers and participated in electrical safety conferences and standards development committees to help spread the word and "Hold paramount the safety, health, and welfare of the public".

STANDARDS RELATED AWARDS

IEEE-SA Standards Board recognition for contributing to the development of IEEE Standard 1458-2017 published February 2, 2018.

IEEE Recommended Practice for the Selection, Field Testing, and Life Expectancy of Molded-Case Circuit Breakers for Industrial Applications.

IEEE-IAS Electrical Safety Committee (ESafeC) Best Paper and Presentation-Third Place, 2017 Electrical Safety Workshop Technical Conference "Sometimes Overlooked Safety Concerns with

Large Engineered ASD".

IEEE-IAS Best Paper 2015 PCIC Technical Conference "Medium Voltage Autotransformer Failures – Explaining the Unexplained – Continuation of the Story"

IEEE-IAS Honorable Mention for Technical Paper "Staged Tests Increase Awareness of Arc-Flash Hazards in Electrical Equipment" presented at PCIC Conference in 1997 in Calgary, Canada.

STANDARDS RELATED PUBLICATIONS AND TECHNICAL PAPERS

IEEE 1584-2018 IEEE 2018 "IEEE Guide for Performing Arc-Flash Hazard Calculations" Working Group Co-Author

IEEE 1458-2017 IEEE 2018 "Recommended Practice for the Selection, Field Testing, and Life Expectancy of Molded Case Circuit Breakers for Industrial Applications" Working Group Co-Author

"A Safety Recap for Adjustable Speed Drives" IEEE Industry Applications Magazine

"Sometimes Overlooked Safety Concerns with Large Engineered ASD Systems" IEEE ESafeC Electrical Safety Workshop (ESW), 2017 IEEE IAS

"Medium-Voltage Autotransformer Failures: Explaining the Unexplained-Continuation of the Story" IEEE Transactions on Industry Applications

"Medium-Voltage Reduced Voltage Autotransformer Starter Failures - Explaining the Unexplained" IEEE Transactions on Industry Applications by Larry Farr and Arthur Smith

IEEE 1458-2005 IEEE 2005 "Recommended Practice for the Selection, Field Testing, and Life Expectancy of Molded Case Circuit Breakers for Industrial

paper and attempted to make sure the discussion ended with this initial presentation. Fortunately, the IEEE-Petroleum and Chemical Industry Conference (IEEE-PCIC) heard of the controversy and invited NELSON to prepare and present an updated version of the 1989 paper at the 1991 IEEE-PCIC Conference General Session with approximately 1200 engineers in attendance.

These attendees were later surveyed to help capture industry understanding of what had previously been considered a simple device, and approximately 800 responses were received. Results of the survey indicated that with few exceptions, most engineers really didn't understand these seemingly simple devices. This finding initiated a number of technical papers within the industry, 13 citations of the initial paper, and finally a new IEEE Standard 1458 Recommended Practice for the Selection, Field Testing, and Life Expectancy of Molded-Case Circuit Breakers for Industrial Applications published in 2005.

This first IEEE 1458 Standard was introduced by two IEEE Fellows, Gary Donner and Clive Kimblin, at the 2006 IEEE-PCIC, in a paper titled "An Introduction to IEEE Std 1458-2005 "Recommended Practice for the

Applications” Working Group Co-Author

“Staged Tests Increase Awareness of Arc-Flash Hazards in Electrical Equipment” Co-Author presented at PCIC Conference in 1997 in Calgary, Canada Published in: IEEE Transactions on Industry Applications.

IEEE-PCIC 1997 Convention Workshop “Arc-Flash Hazards in Electrical Equipment” by Arthur Smith, and associates, Calgary, Canada

IEEE Electrical Safety Workshop Safety by Design presentation in 1998 “Reducing the Electric Arc Hazard by Design” by Arthur J. Smith, III

Short Circuit Ratings, Labels and Fault Withstandability of Molded-Case and Insulated-Case Circuit Breakers and Combination Motor Starters” PCIC-91-2 by Arthur Smith

STANDARDS RELATED MEMBERSHIPS

- Senior IEEE Member
- Member IEEE Petroleum and Chemical Industry Committee (PCIC)
- Member IEEE Industry Applications Society (IAS)
- Member IEEE Electrical Safety Committee (ESafeC)
- Member IEEE Standards Association
- Member NFPA
- IEEE Petroleum and Chemical Industry Conference (PCIC) Standards Vice-Chair (2013 through present)
- IEEE/IAS Electrical Safety Committee (ESafeC) Standards Chairman (2011 through present)
- Member of NFPA 70 National Electrical Code, Code Making Panel No. 11, since 1996 responsible for Articles 409, 430, 440, 460, 470 & Annex D Example D8 for the 1999, 2002, 2005, 2008, 2011, 2014 and 2017 NEC editions, representing the IEEE. Principal member of NEC CMP-11 since 2014
- Member IEEE Standards Coordinating Committee (SCC-18) since 1996
- Member IEEE 1458 Working Group P1458 “Recommended Practice for the Selection, Field Testing, and Life Expectancy of Molded Case Circuit Breakers for Industrial Applications” 2nd edition published February 2, 2018
- Secretary/Treasurer IEEE Standards Coordinating Committee (SCC-18) (2008 through 2015)
- Executive Committee Member (Elections Officer) of IEEE Standards Coordinating Committee (SCC-18) 2013 through present
- Member of NFPA 70E Ad-Hoc Committee investigation arc-flash hazards through laboratory testing

Service Recognition - Five/Ten/Fifteen Year Anniversaries



5 Year

I to r, back: Charles Nelson, Jon Frosch, Derek Gros, Louis Randazzo, Wil Stone, Peter Grehan. I to r, front: Frankie Glaviano, Rachel Delatte, LaTonya Coleman, Tracey Gonzales and Ken Nelson



5 Year

I to r: Randy Alsworth, Katherine Finch, Erin Douglass and Danny Call

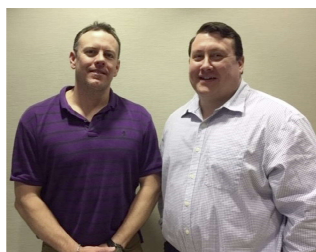


15 Year
Bob Lovinggood



10 Year

I to r: Paul Ory and Steve Schmaltz



10 Year

Slater Bass and Ken Korolyk

15 Year
Rene Boan with Jim Lane



Holiday Happenings at NELSON



Slaten Bass and Karla Webber gathered up the Houston Office employee donations for The Salvation Army. The New Orleans office employees collected for Volunteers of America.



The 2018 Houston Office Ugly Christmas Sweater Contest Participants

I to r: Karla Webber, Stephnie Breen, Erin Douglass, Katherine Finch, Andy Morrison and Gloria Schultz



The Winner
Erin Douglass

Santa Claus
(aka Wayne Talley)
also made a visit to our
Houston Office.

