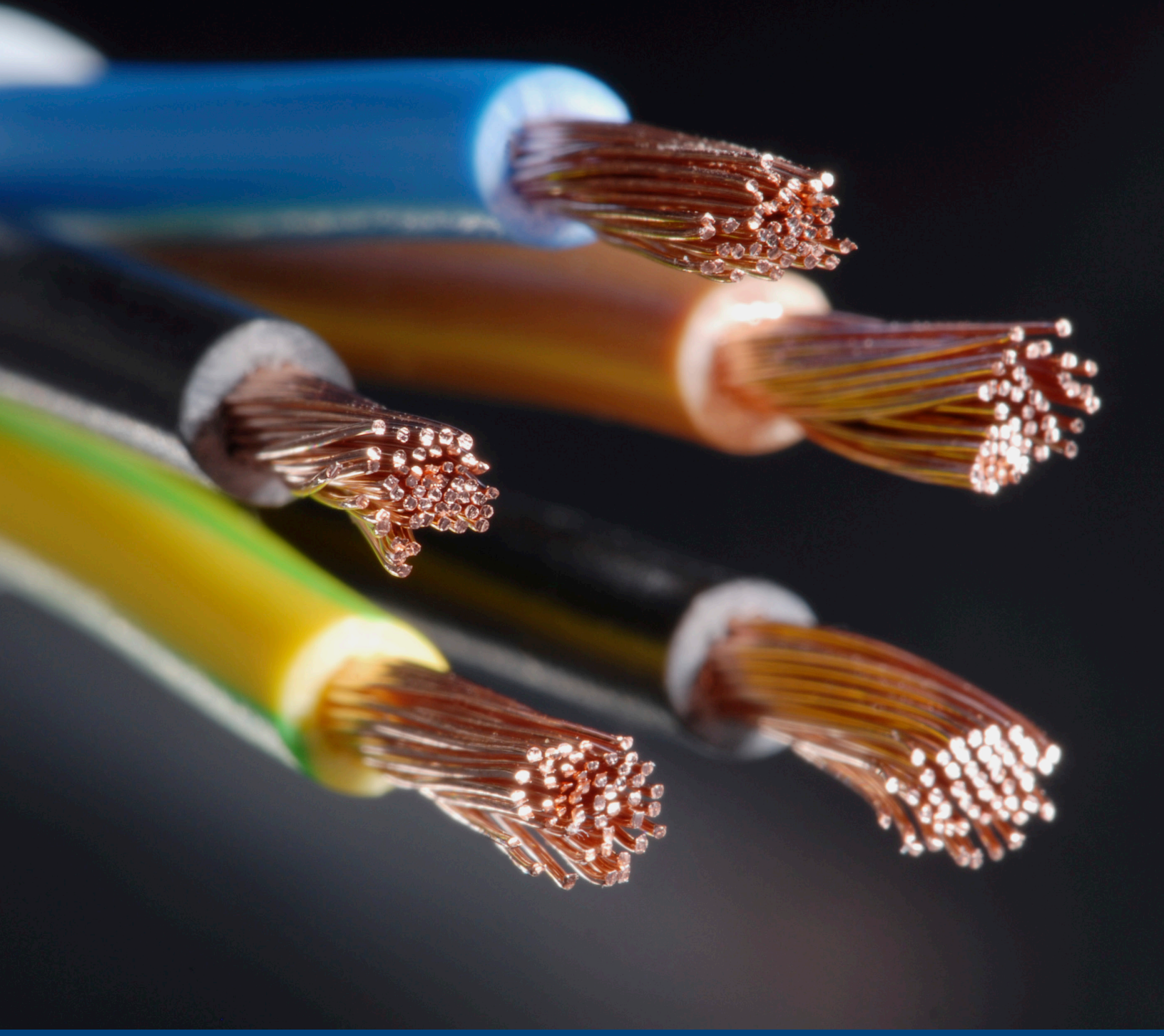


IMPROVING THE ACID GAS EMISSION TEST FOR WIRES AND CABLES

EXECUTIVE SUMMARY

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CSA GROUP™



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CSA GROUP RESEARCH

In order to encourage the use of consensus-based standards solutions to promote safety and encourage innovation, CSA Group supports and conducts research in areas that address new or emerging industries, as well as topics and issues that impact a broad base of current and potential stakeholders. The output of our research programs will support the development of future standards solutions, provide interim guidance to industries on the development and adoption of new technologies, and help to demonstrate our on-going commitment to building a better, safer, more sustainable world.

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EXECUTIVE **SUMMARY**

BACKGROUND

Acid gas emissions from burning cables are an important public health issue worldwide. The toxicity and corrosivity of acid gases that result from burning cables can lead to increased risk of injury or death, as well as extensive damage to electrical and electronic equipment.

Several industrial fires in the 1960s and 70s led to efforts by the wire and cable industry to limit the amount of acid gas emissions from burning cables. A tri-national standard for testing wires and cables (C22.2 No 2556) was published in 2005. The standard includes a testing program to which most wires and cables intended for use in commercial and private sectors in Canada must be certified for low acid gas emissions. The method was developed in cooperation with experts from Ontario Hydro in the early 1990s. The standard and the testing program aim to reduce the risk of death and permanent equipment damage in the event of a fire.

Many laboratories have since acquired the acid gas apparatus to develop and qualify various materials so they can be certified for the acid gas rating, or so-called "AG14". The number 14 represents the maximum percent total of acid gas content generated as a result of the combustion of the material.

The current method of calculating acid gas emissions from burning cable coverings is based on burning a small quantity of the nonmetallic cable component in a furnace and passing the gases through water, where these will be absorbed and form a solution (the washing). The entire quantity of the washing is then neutralized chemically by titration. The amount of chemical reagent that is used to neutralize the solution is used to determine the amount of acid gas that was generated by the specimen.

PURPOSE OF THIS PROJECT

The aim of this project was two-fold:

- Validate whether neutralizing a fraction of the final washings gave the same results as neutralizing the entire quantity of washings, thus improving efficiency and reducing the amount of reagents used and their impact on the environment; and
- Identify and better understand the different factors that may affect the test results, with the goal of reducing the variability between laboratories.

TEST RESULTS

A round robin testing involving three laboratories, including the CSA Toronto testing lab, worked independently to test samples of the same polyvinyl chloride (PVC) material and followed the same testing plan.

This project demonstrated that neutralizing only a fraction of the washing (aliquot) had a negligible effect on the final result.

One fifth of the total washing was used in this project. Based on this conclusion, a proposal will be made to amend the CSA C22.2 No 2556 standard by allowing an aliquot to be tested. This would improve the process efficiency and also reduce the amount of titration reactants needed, thus reducing cost and proportionally lowering the environmental impact. As a bonus, this would enable one to save the unused original washings for retesting in case this is needed.

This project also enabled the participating laboratories to understand the influence of various test parameters on the results, such as:

- reagents used;
- temperature gradient in the furnace;
- column height and pH of the water;
- the glassware used; and
- the air-tightness of glassware connections.

The final results showed a certain variability between different participating laboratories, such that a tolerance factor will be proposed in the next revision cycle of the CSA C22.2 No 2556 standard to compensate for this variability.

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