# ELECTRICAL Safety Measures

**"Elimination is the first priority! Ensure a risk assessment is completed before energized work tasks are completed."**

# Impact Of Changes & Updates To CSA Z462 – 2024 Edition

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The 6th Edition of the CSA Z462 Workplace electrical safety Standard is scheduled to be published in March or the beginning of April. In a previous article it was highlighted that there are expected to be over eighty (80) changes and updates based on the public review draft. Some of the changes and updates will be minor (e.g. wording changes) while other changes are a significant technical change as well as a divergence from the NFPA 70E Standard on Electrical Safety in the Workplace, 2024 Edition which published early in May of 2023 such as the deletion of the term "arc flash PPE category."

It is important that an employer be aware of the changes and updates and how they impact your Electrical Safety Program if you have one developed and implemented. When a new edition of CSA Z462 publishes every three years it should be aligned with an audit of an Electrical Safety Program and updated accordingly. If you do not have a documented Electrical Safety Program, the changes and updates also impact your company with respect to any arc flash and shock training you may have provided in the past and the application of the training in your workplace. When the 2024 Edition pub-

lishes, the 2021 Edition will no longer be applicable.

In the 6th Edition of CSA Z462 there are significant structural changes and technical content additions and changes that the employer and the Qualified Person need to understand. One of the challenges will be ensuring that industry correctly interprets and applies the changes and that compliant training is provided. The intent of this article is to highlight the most important changes and provide guidance.

## Global & Structural Changes

The first change relates to both a content change and structure change. Completely new information will be added in Clause 6 Special requirements for special equipment, specifically Clause 6.7 Working with capacitors. Related to this content are the addition of unique terms and they will be added to Clause 3 Definitions (e.g. Boundary, hearing protection, Boundary, lung protection, Charge transfer, Dielectric absorption, Ground stick, Grounding hard (Low-Z), Grounding soft (High-Z), Hazard, arc blast, Time constant, and Time, discharge). To ensure that the user realizes that they only apply to capacitors the new definitions will be noted with the following parenthetical phrase (as applied to capacitors). Besides this change to Clause 3 Definitions, several other new definitions have been added: "laser," "protectors," "radiation, ionizing," "radiation, non-ionizing," and "temporary protective grounding equipment." It is important that the user correctly interpret and apply the new information related to capacitors and DO NOT apply it to other ac or dc electrical equipment.

## New Electrical Hazard Classification Information

Additionally with respect to capacitors a new Annex W Working with capacitors is added. Both the Clause 6.7 and Annex W content was added from NFPA 70E where it was first published in 2021. Annex W includes the findings of new research into electric shock and arc flash related to capacitors. Specific to arc flash there are new unique formulas for calculating incident energy at an assumed working distance and the arc flash boundary for capacitors. There are also two new unique boundaries related to arc blast pressure that only apply to capacitors a hearing protection boundary and lung protection boundary. If you have electrical equipment with significant capacitors the new content on electrical hazard classification applies to capacitors with the following voltage and energy thresholds: <100V and >100 J of stored energy; ≥100V and >1.0 J of stored energy; or ≥400V and >0.25J of stored energy.

## Clause 4.1 Changes

In Clause 4.1 General requirements for electrical-safety-related work practices and procedures, please be aware of a reorganization of the requirements related to an electrically safe work condition into three Clauses – 4.1.6.1, 4.1.6.2, and 4.1.6.3 as the exception to the requirements to establish an electrically safe work condition and the justification for the use of an Energized Electrical Work Permit (EEWP) has been revised to a single exception (e.g. when it is "not practicable" to do so, to align with Canadian occupational health and safety regulations). The specific items listed previously are still valid justifications "due to increased risk or hazard," or "due to equipment design or operational limitations."

## Clause 4.3 Changes

In Clause 4.3 Work involving electrical hazards, Clause 4.3.2.3 Exemptions to work permit a list of activities (defining specific energized work task descriptions) has finally been added. The justification would be "due to equipment design." The new exemptions added will be: normal operation of electrical equipment, performing work tasks that do

not involved repairs, modifications or any alterations of the electrical equipment, performing work tasks involved in establishing an electrically safe work condition, including verifying the absence of voltage and the installation of temporary protective grounding equipment, and opening hinged covers for the purposes of inspection, provided the restricted approach boundary is not crossed. An employer's Electrical Safety Program shall include an EEWP policy and document the exemptions that apply.

In Clause 4.3.5 Arc flash risk assessment, existing Table 2 Estimate of the likelihood of occurrence of an arc flash incident for ac and dc systems will be relocated to Annex F Risk assessment and risk control and renamed Table F.3. This table is critically important to be aware of and to be referenced and utilized as a comprehensive work task list when inventorying against it for your worker roles in your workplace, identifying when a Qualified Person is exposed to an abnormal arcing fault and arc flash and completing the employer's Electrical Safety Program's work task based qualitative risk assessment to validate residual risk for both arc flash and electric shock to confirm the hierarchy or risk control methods that will be field applied.

## Renaming & Moving Tables

From the 2021 Edition Table 3 will now be renamed to Table 2 Selection of arc-rated clothing and other PPE when incident energy analysis method or an arc flash PPE selection table method is used. This change relates to the 2021 Table 2 being moved to Annex F and renamed Table F.3, but more importantly the deletion of the term "arc flash PPE category" from CSA Z462 and in the renamed "arc flash PPE selection table method" all arc flash PPE requirements will be listed with a minimum arc-rating based on Arc Thermal Performance Value (ATPV, e.g. Min. 4.0, 8.0, 25.0, 40.0 and 75.0 cal/cm$^2$). Other Table #s will be changed due to Table 6A and 6B been moved to Annex V.

## New Arc Flash PPE Selection Table Method

With the deletion of the term "arc flash PPE category" it resulted in the deletion of Table 6C as there will no longer be a requirement to convert an arc flash PPE category # to a minimum arc-rating of arc flash.

The last change that is highlighted in this article will need to be interpreted correctly or may result in misapplication and limits on the capacity of electrical equipment energized work tasks can be completed on when an engineering-based incident energy analysis has not been completed. The existing 2021 Edition, Clause 4.3.7.3.15 Arc flash PPE category method will be deleted, and relevant content relocated to MANDATORY Annex V Arc flash PPE selection table method (renamed from Annex V Arc flash PPE categories) that was included in the 2021 Edition with an alternate Table V.1 to the 2021 Edition Table 6A for ac electrical equipment. Existing Table 6A will be renamed to Table V.2 and existing Table 6B will be renamed to Table V.3 (with changes related to the minimum voltage moving from 100V dc to 150V dc and a single row, ≥150V dc to ≤600V dc. Annex V will also have additional information added related to interpreting and using Table V.1. What is important to note is Table V.1 includes 240V ac single phase electrical equipment with no substantiation of arcing fault sustainability referenced in notes and you are recommended to reference new research published in 2020 by Dr. John Wade, PE in his University of Tennessee PhD dissertation https://trace.tennessee.edu/utk_graddiss/6096/ "Arc Flash In Single-Phase Electrical Systems" that advises 240V ac single phase cannot sustain and result in an arc flash, only an arcing fault. Table V.2 for ac electrical equipment is recommended to be used. A detailed review and consideration by an employer of the interpretation and application of the CSA Z462 Workplace electrical safety Standard, 2024 Edition Annex V, Table V.1, V.2 and V.3 is required. Any training provided related to updated Annex V should be audited by the employer to ensure it is not miscommunicated to attendees of arc flash and electric shock training. The tables in Annex V CAN BE USED in lieu of the engineering-based incident energy analysis method.

The impact of changes and updates to the 6th Edition of the CSA Z462 Workplace electrical safety Standard need to be clearly understood. Any training received needs to be vetted to ensure there is not miscommunication related to electrical hazard classification related to capacitors, the deletion of the term "arc flash PPE category," the use of relocated Table 2 to Annex F Table F.3 and most importantly the deletion of Clause 4.3.7.3.15, renaming and moving of Table 6A and Table 6B to Annex V.

The information presented above was included in the public review draft of CSA Z462, 2024 Edition that was available from June 1, 2023, to July 31, 2023. This article doesn't identify all of the changes and updates to CSA Z462, 2024 Edition and you are advised to review the CSA Z462, 2024 Edition when it publishes and seek specific interpretation from the CSA Group.

If you are interested in discussing the information presented in this article or would like a specific topic presented do not hesitate to contact me at terry.becker@twbesc.ca or 587-433-3777.

**Terry Becker**, P.Eng., CESCP, IEEE Senior Member is a founding member and the First Past Vice-Chair of the CSA Z462 Workplace electrical safety Standard Technical Committee and currently a Voting Member and Clause 4.1 and Annexes Working Group Leader. Terry is also a Founding Member and a Voting Member on the CSA Z463 Maintenance of electrical systems Standard and a Voting Member of the IEEE 1584 Guide for Performing for Arc-Flash Hazard Calculations. Terry has presented at Conferences and Workshops on electrical safety in Canada, the USA, India, Australia and Italy. Terry is a Professional Engineer in the Provinces of BC, AB, ON and PEI. Terry is an Electrical Safety Specialist, Management Consultant, and can be reached at 587.433.3777 or by email **terry.becker@twbesc.ca**.