





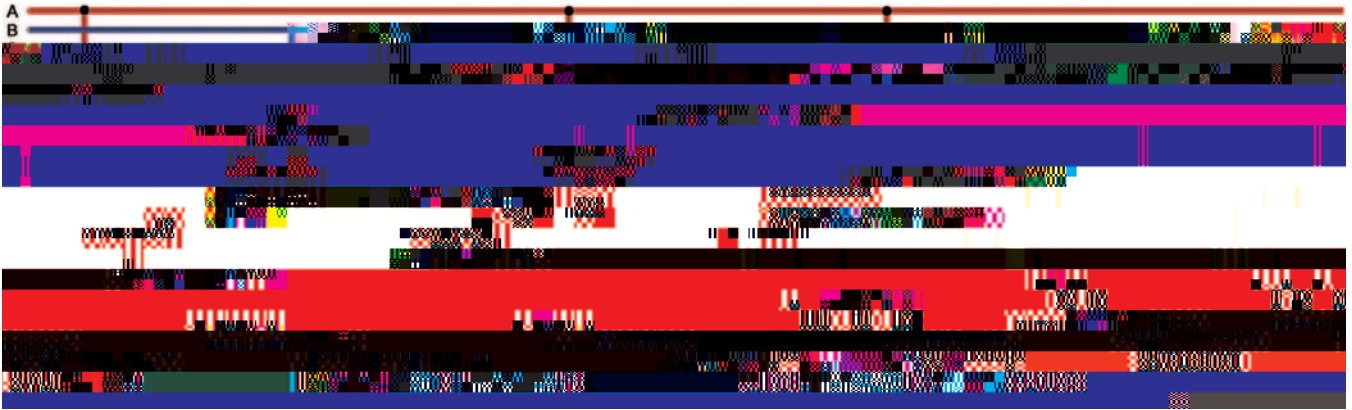
Assessing The Hazards Of High and Low Voltage Single-Phase Arc-Flash

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One common question being asked is how to determine the hazard level associated with 1-Phase (1-P) Arc Flash (AF) incidents. There is very little information about this type of circuit in the available guidelines such as CSA Z462-08, NFPA 70E 2009 & IEEE 1584 2002. If the right risk level is not properly determined, we run the risk of over-protecting or under-protecting personnel that are

working on this type of electrical system. The objective of this article is to present different methods for assessing the hazards of high and low voltage 1-P equipment, and to justify the results taking into consideration the behaviour of arc faults at different voltage levels.

1-P circuits are used mostly for low scale power distribution. Most of the 1-P circuits are located in residential and



Typical 1-P circuit connections

small commercial zones, but they are also commonly found in industrial plants being used for lighting loads and other types of circuits such as service drops for temporary equipment around the facility (loadcentres). Personnel come in contact with these types of equipment on a daily basis.

Typical 1-Phase Circuits

The most common types of 1-P circuits can be classified as Line to Neutral (i.e. AN, BN, CN), Line to Line (AB, BC, CA) and centre tap (L1 & L2). Figure 1 shows typical 1-P circuit connections which can occur at different voltage levels. Examples of LV (< 1.0 kV) 1-P applications include centre tap 240/120 Volt pole mounted distribution connections (See Figure 2) and phase to phase or line to neutral circuits (i.e. 347 Volt lighting circuits). Examples of HV 1-P circuits include traction power distribution for railway transportation systems where 1-P voltages between the pole and center tap are as high as 55 kV (V1, V2) or 110 kV (V1+V2).

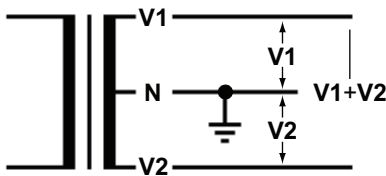


Figure 3 shows a diagram for a pole mounted 1-P 50 kVA transformer service for a 240/120 Volt small loadcentre inside an industrial facility. The size of the transformers is typically 100 kVA or less (400 Amps at 240 Volts); however in some

