

Incident Summary #II-1670853-2024 (#44157) (FINAL)

SUPPORTING INFORMATION	Incident Date	January 31, 2024	
	Location	Lake Cowichan	
	Regulated industry sector	Electrical - Low voltage electrical system (30V to 750V)	
	Impact	Qty injuries	1
		Injury description	Electric shock.
		Injury rating	Minor
	Damage	Damage description	NA
		Damage rating	None
	Incident rating	Minor	
Incident overview	Individual received an electric shock from concrete stairs at a school.		
INVESTIGATION CONCLUSIONS	Site, system and components	<ul style="list-style-type: none"> • Trace heaters commonly referred to as heat trace are used to heat surfaces and/or to prevent freezing. • Trace heaters can be concealed in walls, driveways, roofs, ceilings, and stairs, or surface mounted on piping systems, water lines, and sewer lines. They are used everywhere from industrial to residential applications. • Trace heater is defined as “a device of linear geometry designed for the purpose of producing heat on the principle of electrical resistance”. • Trace heaters are designed to self-regulate or are controlled by a thermostat commonly called a Resistive Thermal Device or RTD or a temperature probe. • Modern electrical code requires these systems to be protected by a ground fault circuit interrupter GFCI. • This installation was installed sometime in the 1990’s and appeared to be using a RTD or a probe to control the trace heater via a contactor located inside the school. • Electrical code of the day required the cold lead to be terminated in an accessible junction box with labelling to identify the system and its properties. • GFCI protection was not a requirement of the 1990s code. 	
	Failure scenario(s)	<p>On January 31st a teacher looked out the window at a gathering of students. The students were congregated at a set of concrete steps that led to the shop building. The teacher approached the students and asked them what the meeting was about. The students replied that the stairs were vibrating. The teacher bent down to feel the vibrating steps and received an electric shock.</p> <p>The school district dispatched an electrician to the site where they found a heat trace circuit was shorting out to the concrete steps. The circuit was permanently disconnected.</p>	

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Facts and evidence	<ul style="list-style-type: none">• Wiring in the junction boxes on the stairs thought to have fed the heat trace was brittle and cracking. It was likely not approved for the location.• The junction box that was examined was not bonded.• No GFCI protection was installed on the circuit.• Insulation resistance test revealed a short to ground.
Causes and contributing factors	<p>Based on the condition of the wiring in the junction box it is likely that the deteriorated insulation on the circuit conductors caused a short circuit in the concrete. GFCI protection of heat trace was not a requirement of the code at the time of this installation. Although the electrical code is not retroactive, for operators of older trace heat systems in public places or schools it is encouraged to add GFCI protection.</p>



Image 1 - Stairs where the incident occurred.



Image 2 - Deteriorated insulation on circuit conductors.



Image 3 - Junction box location on stairs.



Image 4 - Stairs and junction box.

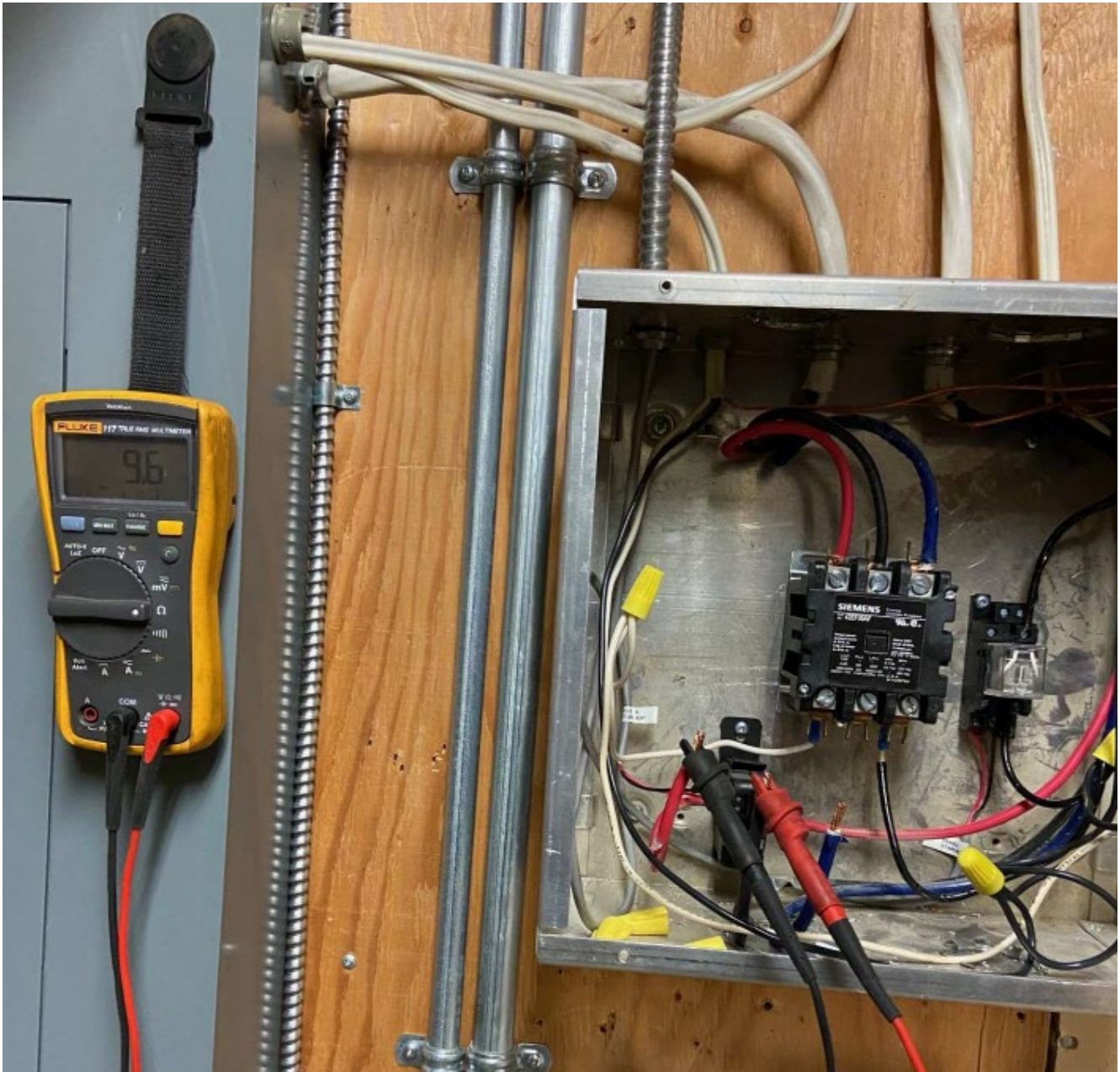


Image 5 - Insulation resistance testing of the heat trace circuit.