

Incident Summary #II-1656307-2024 (#42977) (FINAL)

SUPPORTING INFORMATION	Incident Date	December 28, 2023	
	Location	Chilliwack	
	Regulated industry sector	Electrical - Low voltage electrical system (30V to 750V)	
	Impact	Qty injuries	0
		Injury description	N/A
	Damage	Injury rating	None
		Damage description	A four-inch wood screw penetrated the armoured jacket of a four-conductor Armoured Conductor Wet Underground (ACWU) unfused service cable installed in the exterior wall. The screw drilled through an aluminum ungrounded conductor and the neutral conductor creating a short circuit condition.
		Damage rating	Moderate
Incident rating	Moderate		
Incident overview	Unaware of the location of the unfused ACWU service cable in the exterior wall where it rose up from the concrete slab and into the electrical combination panel, the homeowner installed shelving in the attached car garage using four-inch wood screws to secure wood wall brackets at the bottom of the wall where baseboard trim was installed. One of the screws penetrated the armoured jacket of the unfused service cable causing the described damage. The armoured cable was not protected from mechanical damage immediately behind the baseboard with a supplemental means of protection.		
INVESTIGATION CONCLUSIONS	Site, system and components	<p>A portion of the installation consisted of the unfused service raceway from an exterior utility meter enclosure that was installed in a concealed wall space.</p> <p>There is a specific 2021 Canadian Electrical Code rule requiring that when an armoured cable is installed immediately behind baseboards, that it shall be protected from mechanical damage from driven nails and screws.</p>	
	Failure scenario(s)	<p>The duplex townhome was built new in 2023 and when the armored ACWU service cable was installed for the unit it was not installed with the required mechanical protection behind the baseboard.</p> <p>The homeowner was unaware of the location of the unfused ACWU service cable in the concealed wall space and penetrated the cable with a four-inch wood screw at a location where supplemental mechanical protection is required to be installed by the installer of the electrical equipment. Due to heat, this caused sections of the armoured jacket and neutral conductor to melt without tripping the utility overcurrent protection at the utility transformer.</p>	
	Facts and evidence	A 300mm portion of the damaged ACWU service cable where the screw pierced the armoured jacket was provided by the homeowner for examination confirming the path of the screw as it entered the cable and the subsequent damage caused. Provided images around the time of the incident verify that supplemental mechanical protection was not installed at the required location immediately behind the baseboard where the cable was installed.	

**Causes and
contributing factors**

It is certain that the location where the wood screw penetrated the ACWU cable would have been prevented had supplemental mechanical protection been installed as per 2021 Canadian Electrical Code rules.



Image 1 - Location where wood screw penetrated the ACWU cable.



Image 2- Rubber outer jacket of cable removed showing entry point of wood screw and area where armoured jacket melted due to the generated heat from the short circuit.



Image 3 - All components of the 300mm section of damaged ACWU cable.



Image 4 - Close up of the ungrounded service conductor on the left showing where the wood screw penetrated through the internal aluminum conductors and the neutral conductor on the right which the tip of the wood screw penetrated and where most of the internal aluminum conductors melted due to the generated heat while not entirely severing the neutral conductor.