Incident Summary #II-1699418-2024 (#45663) (FINAL)

SUPPORTING INFORMATION	Incident Date		April 1, 2024
	Location		Richmond
	Regulated industry sector		Electrical - Low voltage electrical system (30V to 1000V)
	Impact – Injury	Qty injuries	0
		Injury description	N/A
		Injury rating	None
	Impact – Damage	Damage description	Arcing and heat damage to a 6-50R type plug in electrical receptacle used for electric vehicle (EV) charging which was badly burnt beyond repair.
		Damage rating	Minor
	Incident rating		Minor
	Incident overview		While charging the family Tesla at a residential home, the homeowner noticed an odor in the detached garage emitting from the EV 6-50R receptacle. This odor was similar to burning rubber or electronics. The owner found a receptacle failure due to excessive heat.
INVESTIGATION CONCLUSIONS	Site, system and components		The single-family dwelling has an existing 100AMP Siemens 1phase combination panel board located in hallway of home. The homeowner hired a contractor to install an EV receptacle for a ChargePoint Home Flex EV charger to plug into. The contractor installed #6AWG 3conductor Aluminum conductor wet underground (ACWU) armoured cable, 40AMP 2pole breaker and a 6-50R receptacle in the detached garage. The Canadian electrical code requires that aluminum conductors be terminated with anti-oxide compound. Aluminum expands under a temperature increase and tends to be pushed out from under the binding screw. When the temperature decreases the result is a loose connection. Loose connections result in heat under loading, melting the wire insulation. ChargePoint Flex is one of many EV chargers that are available to be purchased and installed in commercial or residential areas. Some models are available to directly hard wire to electrical systems. Some are supplied with a cord end that plugs into a receptacle as in this case.
	Failure scenario(s)		The homeowner hired a contractor to install a Charge Point Flex EV charger. The contractor hired an unlicensed contractor to install a 40AMP 2pole breaker, 100ft #6AWG 3conductor Aluminum conductor wet underground (ACWU) armoured cable and a 6-50R receptacle. The installation of the receptacle was completed with no anti-oxide compound. The load of the electric vehicle charging caused the connection without the anti-oxide compound to loosen causing a high resistance connection and excessive heat which damaged the receptacle.

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Facts and evidence	• Electrical Safety officer conducted onsite inspection. • No record of installation permit with Technical Safety BC. • Load calculation for addition of EV charging unit not submitted. • Electrical Safety Officer observed receptacle terminations were loose. • Termination of aluminum wiring was completed without anti-oxide compound. • Manufactures specifications for installation of ChargePoint EV charger requires installer to use copper wiring. Contractor installed aluminum.
Causes and contributing factors	The installation of the EV charging receptacle was installed incorrectly by an electrical contractor without the required installation permit. The incident was highly likely caused by the incorrect installation of aluminum wiring without the required anti-oxide compound. This led to a high resistance connection and the generation of high amount of heat which damaged the internal electrical components of the receptacle during the high amperage use of the electrical vehicle charging.

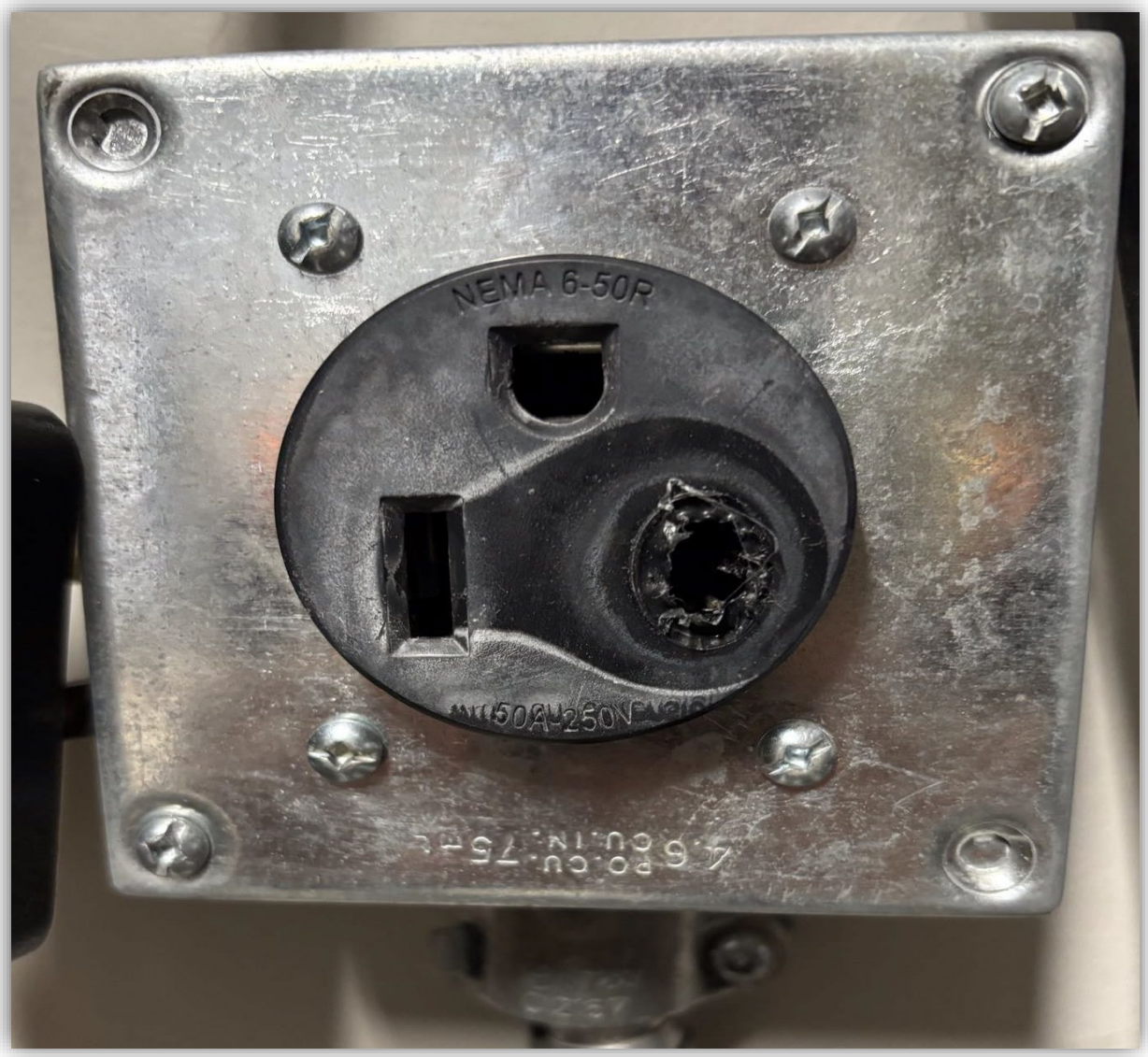

Image 1 – NEMA 6-50 receptacle showing heat damage.

Image 2 – EV ChargePoint charger and plug by receptacle box.

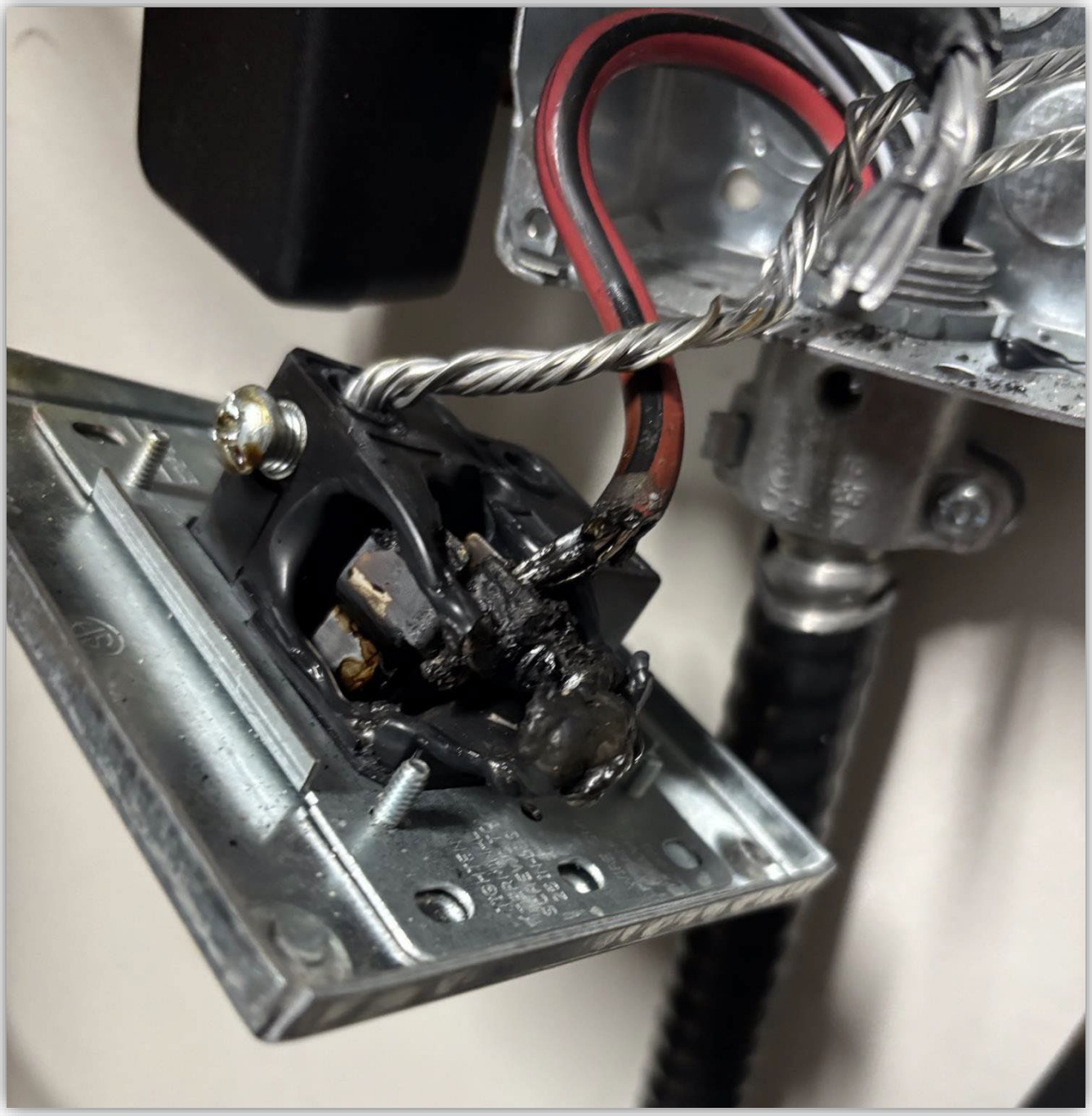

Image 3 – Closeup of overheated connection and aluminum wiring.