

Remote Incident Summary #II-1008803-2020 (17051 #) (Final)

SUPPORTING INFORMATION	Incident Date			January 30, 2020
	Location			Delta, British Columbia
	Reg	Regulated industry sector		Electrical - Low Voltage Electrical System (30V to 750V)
		-	Qty injuries	0
		Injury	Injury description	No Injuries
	ರ		Injury rating	None
	Impa	Jamage	Damage description	Mechanical damage to the sheathing and ungrounded conductor of a kitchen non- metallic sheathed branch circuit cable. Fire damage to the building; including the soffit, siding, exterior sheathing and structure.
			Damage rating	Moderate
	Incide		t rating	Moderate
	Incident overview			A fire in a new single family dwelling under construction was most likely caused when an energized interior 40Amp kitchen branch circuit cable for the range was punctured by a nail installed to secure the wire metal meshing used for stucco applications to the exterior of the building.
INVESTIGATION CONCLUSIONS	Site, system and components		stem and nents	The BC Electrical Code requires that all non-current-carrying metal parts of an electrical system be bonded. The object of bonding is to interconnect the non-current carrying conductive parts of electrical equipment and the system grounded point to provide a low impedance path to facilitate the operation of overcurrent devices and establish equipotentiality (which is when conductive parts are at a substantially equal electric potential). A metal mesh was installed on the exterior of the wood frame dwelling as part of the supporting means for the exterior stucco product which wraps around the exterior of the building. The metal meshing was fastened to the exterior sheathing by the use of nails. The metal meshing also came in contact with other metal products such as metal flashings and structural strapping. The metal of these exterior building products are not required to be bonded as per the BC Electrical Code.
	Failure scenario(s)			When the metal stucco mesh was being installed, one of the nails struck the energized non-metallic sheathed cable for the range. The nail only pierced one of the ungrounded (hot) conductors which did not provide a low impedance path back through the electrical system and the over current device for this circuit did not trip. The nail that struck the cable energized the metal stucco mesh and other conductive parts of the building structure which were providing a high resistive path to ground. When unintended currents flow through this high resistance conductive path, arcing



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	and heating can occur. This arcing and heating can reach temperatures high enough to ignite combustible surfaces
	There is also a potential shock hazard in this scenario from the potential voltage difference between the energized building, earth and other conductive surfaces.
	-After a fire in the south east corner of the building, electrical circuits in the area of the fire were reported to have been disconnected by the electrical contractor and power was restored to the building.
	-When the restoration company began work on the fire damaged south east corner of the building, a red hot nail was observed. (See Picture 1 and 2)
	-A damaged three conductor, aluminum, non-metallic sheathed cable for the range was found on the West side of the building. The cable was reported by the fire investigator to have been close or wedged between the 2x4 vertical framing and a 2x8 horizontal blocking plate. (See Picture 3 and 4)
	-A nail used to secure the metal stucco meshing to the building exterior was found puncturing the energized branch circuit cable in the kitchen exterior wall cavity on the west side. Found by fire investigator during investigation after the red hot nail was observed by the restoration company. (See Picture 5, 6, 7 and 8)
Facts and evidence	-Electrical contractor who's services were obtained to repair the damage found a voltage differences of 50V +or- between ground and the exterior metal stucco meshing after reports of arcing on the mesh. (See Picture 9 and 10)
	-The overcurrent protection for the damaged branch circuit cable did not operate (2pole 40A circuit breaker) which allowed current to flow. Indicating the path through the conductive building materials was not a low impedance path back to ground.
	-Fire investigator believes the nail located in the south east corner of the building appears to have been energized within that location for approximately two months prior to the fire incident. It would have been a smoldering fire within the structural framing until it consumed sufficient material to ventilate and progress at the exterior of the structure.
	Remote Incident Investigation; Photos were supplied by the fire investigator.
	Diagram #1 not to scale.
Causes and contributing factors	The cause of the fire was likely due to an exterior metal nail puncturing through the exterior building sheathing and into an energized kitchen branch circuit cable that was reported to be installed to close or wedged against the exterior wall without mechanical protection. Unintended current flow through the path created by the metal nail being in contact with the metal stucco meshing and other conductive construction materials likely caused arcing or a high enough temperature to ignite a combustible surface in contact with the conductive construction materials.



Remote Incident Summary Report Completed; Technical Safety Investigator did not attend site. Requested photos were provided to Technical Safety BC investigator for review.



Photo #1 – Red hot nail observed in the area of the fire, after the fire was extinguished.





Photo #2 – Close up photo of the red hot nail.





Photo #3 – Location of the cable inside the kitchen exterior wall that was punctured by the exterior nail.





Photo #4 – Photo of the exterior nails coming through in location of where the cable was reported to have been installed / wedged.





Photo #5 – Punctured cable, after the cable was removed from the wall.





Photo #6 – Damage the nail caused to the ungrounded conductor once the cable jacket was stripped off.





Photo #7 – Close up of the damaged to the cable and ungrounded conductor.





Photo #8 - Damaged to the ungrounded conductor after the conductor insulation was removed





Photo #9-Measuring the voltage of the metal stucco mesh.





Photo #10 – Multimeter voltage reading of the metal stucco mesh.



EXTERIOR VIEW OF HOUSE (SINGLE FAMILY DWELLING)



Diagram #1 – The drawing is a representation of possible current flow; not to scale.