

Incident Summary #II-1554403-2023 (#35579) (FINAL)

SUPPORTING INFORMATION	Incident Date	May 24, 2023	
	Location	Castlegar	
	Regulated industry sector	Electrical - Low voltage electrical system (30V to 1000V)	
	Impact	Qty injuries	0
		Injury description	N/A
		Injury rating	None
	Damage	Damage description	The polymer diffuser lens of a luminaire secured to the ceiling of a school gymnasium ignited and damaged the luminaire supply cable and conductors, damaged the luminaire and civil features of the ceiling system, damaged the gymnasium wood floor and floor finishings.
		Damage rating	Moderate
	Incident rating	Moderate	
	Incident overview	<p>At the end of the school day on May 24, 2023, students were occupying the school gymnasium and participating in after school activities without supervision. Smoke was detected in the gymnasium. The school principal was notified, system fire alarm was initiated, and students evacuated the school.</p> <p>The principal immediately contacted 911 emergency services, the principal obtained a fire extinguisher and attended the incident in the gymnasium and quenched the melting debris on the gymnasium floor.</p>	
INVESTIGATION CONCLUSIONS	Site, system and components	Existing school gymnasium luminaires are supplied from two branch wiring circuits routed from a 225-ampere, 120/208-volt panel board. The luminaires are secured to the gymnasium ceiling rafter system and are fitted with wire cages to protect the luminaires from damage. The luminaires are controlled from wall mounted, low energy switching locations in the gymnasium. The luminaires originally housed four 54-watt T8 style fluorescent lamps. A recent energy efficiency upgrade was completed, and each luminaire was fitted with four 25-watt LED style lamps. Research revealed the retrofit lamps are approved and compatible with the luminaire.	
	Failure scenario(s)	The 25-watt LED lamps are constructed to physically duplicate the original fluorescent lamps: a glass tube fitted with metallic tube pins to engage and be energized from the luminaire lamp holders. A conductive strip fitted with LEDs is encased in the glass tube. Examination of the luminaire and retrofit lamps revealed that the glass tube can crack, remain energized and alight, but not drop out of the luminaire lamp holders. This cracked condition exposes the energized LED strip, and the glass tube and LED strip will contact the polymer lens. When energized and alight, the LEDs operate at high temperature. The temperatures thresholds will melt and ignite the polymer lens if the LED strip and lens are in contact.	

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<p>Facts and evidence</p>	<p>Interview statements:</p> <ul style="list-style-type: none"> • The school has recently retrofitted multiple light fluorescent light fixtures with LED replacement tubes. • Students were in the gym prior to the incident and the light fixture was struck by a ball. <p>Site observations:</p> <ul style="list-style-type: none"> • The LED bulbs have a glass outer case that when broken may not deenergize the internal light strip. • The protective cage around the light had very close tolerances to the light fixture that may not protect it from a direct hit with a gymnasium ball. • The polymer light lens had started on fire and melted onto the gym floor below.
<p>Causes and contributing factors</p>	<p>The cause of the incident was likely the high temperature LED strip in the retrofit bulb remaining energized after being physically damaged and setting fire to the polymer diffuser lens.</p> <p>Contributing factors to the incident include:</p> <ul style="list-style-type: none"> • The physical protection of the light fixture in a gymnasium did not effectively protect the fixture from damage when struck with a ball which would be expected in the gymnasium. • The retrofit LED bulbs allow the internal LED strip to remain energized when the protective outer glass is broken exposing high levels of heat to the surrounding materials. • The existing polymer lenses of the lighting fixtures are not resistant to the heat produced by a damaged LED bulb. The original fluorescent tubes would not have remained energized or produced heat if they were to break due to the electrical circuit opening.



Image 1 - Heat and fire damage to area where luminaire was secured.



Image 2 - Floor damage directly below luminaire.



Image 3 - Damaged luminaire, tubes, and cage – note that the polymer lens had completely melted away.



Image 4 - Cracked tubes.



Image 5 - Example of balls kicked up and wedged to ceiling system.