

Incident Summary #II-1556393-2023 (#35692) (FINAL)

SUPPORTING INFORMATION	Incident Date	May 18, 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	Fire and heat damage to two wall mounted thermostats, smoke, and heat damage to wall finishings at the two wall mount thermostat locations.
		Damage rating	Minor
	Incident rating	Minor	
Incident overview	Two 30-volt heating equipment thermostats designed for use with a low energy control circuit sustained damage when accidentally connected to a 120-volt heating equipment control circuit in a residential home.		
INVESTIGATION CONCLUSIONS	Site, system and components	A single-family dwelling is heated from a gas fired boiler, supplying hot water to a hydronic radiant heating system. The heating system is regulated by a 120-volt control circuit that is governed by a hydro-thermostat fixed to the boiler, a hydronic system circulation pump and two wall mounted room thermostats are each respectively located on the main and lower level.	
	Failure scenario(s)	<p>The property owner retained the services of a contractor to service the heating equipment and to replace each existing programmable-style wall mounted room thermostats with a simplified non-programmable-style thermostat.</p> <p>The contractor serviced and maintained the hydronic equipment without issue.</p> <p>The homeowner stated the contractor sourced two thermostats from a local vendor, de-energized the boiler equipment control circuit by opening the circuit breaker supplying the heating equipment located at the dwelling panel board and completed the thermostat replacement. The new replacement thermostats were approved for use with a 30-volt low energy control circuit, and not a 120-volt line circuit which is the maximum it can operate at.</p> <p>The contractor re-energized the circuit, the ignition sequence appeared normal, and the contractor left the site.</p> <p>When the thermostat was engaged and the thermostat control contacts closed, the 120-volt supply and 2.15 ampere current flow demanded by the circulation pump welded the thermostat contacts shut. The current flow created a high heat level at each thermostat. Over the course of approximately sixteen hours the overheating effect resulted in component melting, thermal breakdown and local fire at each thermostat location.</p> <p>The property owner smelled smoke and noted burning plastic at the basement level thermostat location and immediately contacted 911 and vacated the building. Area</p>	

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	<p>fire/rescue responded immediately and suppressed the localized fires at each thermostat location.</p>
<p>Facts and evidence</p>	<p>Site Observations (Safety Officer) Image 1 - Dwelling boiler, 120-volt control circuit, hydrostats and circulation pump. Image 2 - Dwelling panel board – circuit #13 supplying boiler controls. Image 3 - Damage to thermostat. Image 4 and Image 5 – Thermostat packaging.</p> <p>Viewed the incident scene and observed melting and determined thermal breakdown and near fire and investigated conditions.</p> <p>Product Research and Review Attended plumbing supply/vendor. Product research revealed that the existing 120-volt and replacement 30-volt thermostats are:</p> <ul style="list-style-type: none"> • Manufactured by the same company. • Are packaged similarly. • Resemble each other. • Differences are discernable only when the product packaging, product information, and installation instructions are examined in detail. • Misapplication is possible. <p>Product research and review revealed that the non-programmable-style unit is not designed to operate at any voltage above 30-volt nor is it designed to control a current more than 1.0 ampere.</p> <p>Field Safety Representative (FSR) FSR viewed the incident scene and observed melting and determined thermal breakdown and near fire and investigated conditions.</p> <p>Property Owner Hired a contractor to help with servicing and tried to simplify the programable thermostat and wanted a simple on/off system.</p> <p>Qualifications and name of contractor were not disclosed.</p>
<p>Causes and contributing factors</p>	<p>Thermostats that were replaced were the incorrect style with respect to the electrical rating for the application.</p> <p>It is likely that installation confusion around the replacement thermostat ratings was contributed to by labelling on wholesale packaging not being obvious resulting in a misapplication and subsequent failure of regulated equipment.</p>

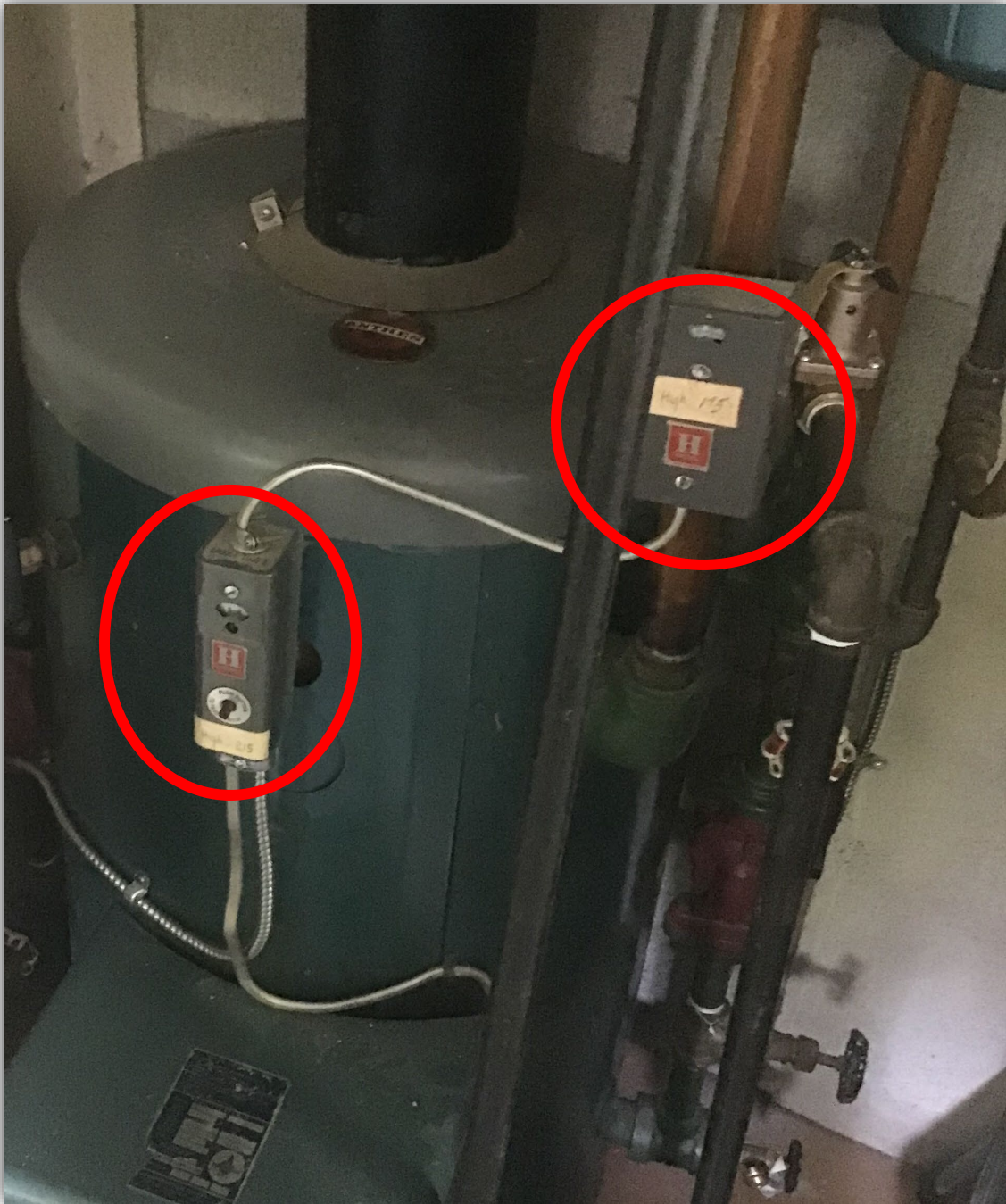


Image 1 - Dwelling boiler, 120-volt control circuit, hydrostats and circulation pump.

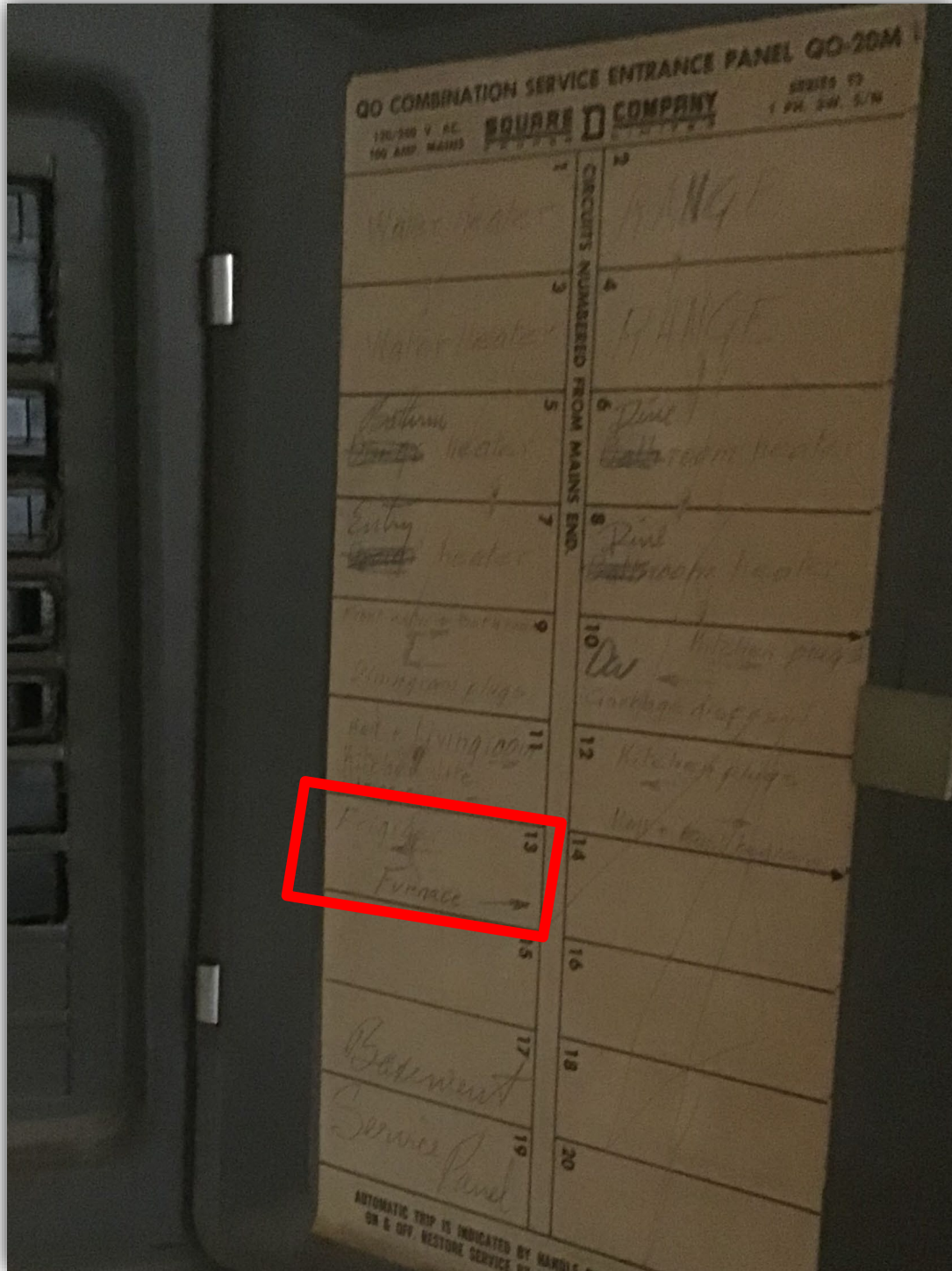


Image 2 - Dwelling panel board – circuit #13 supplying boiler controls.



Image 3 - Damage to thermostat.



Image 4 - Replacement non-programmable thermostat packaging.

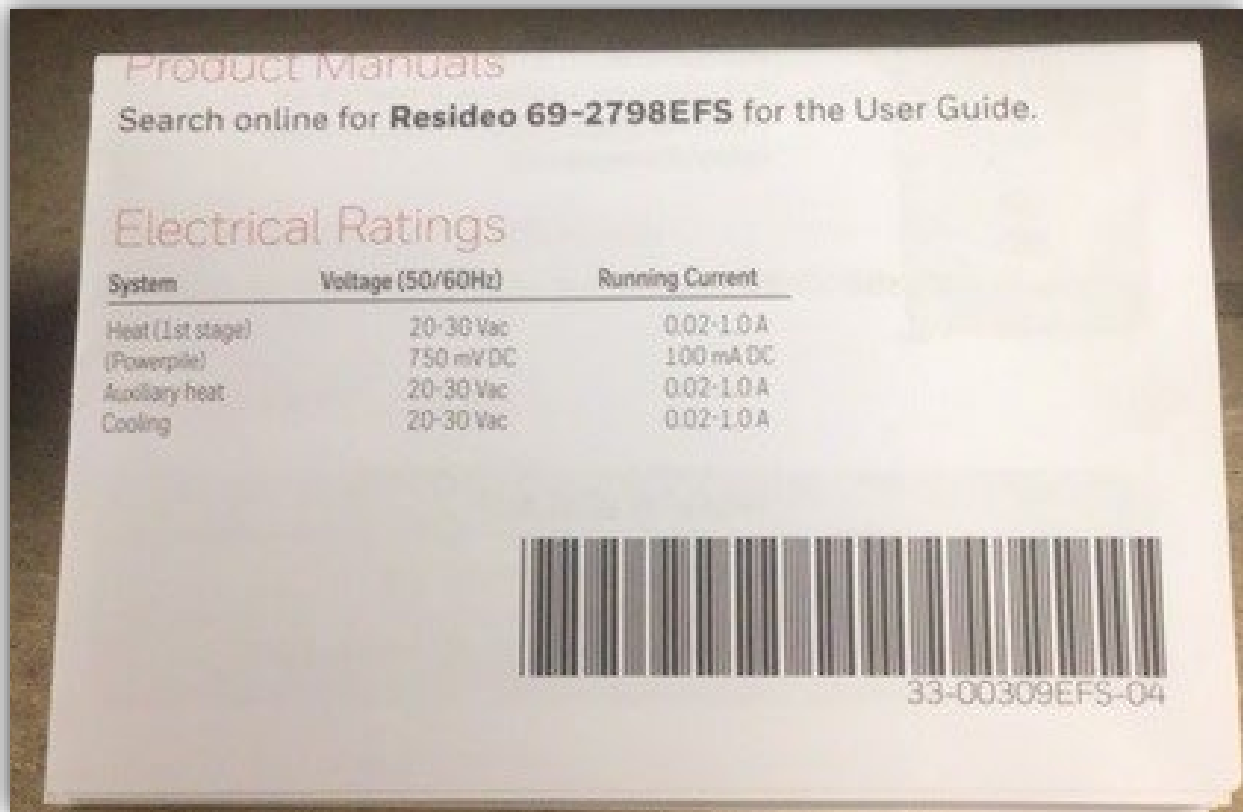


Image 5 - Replacement non-programmable thermostat electrical characteristics.