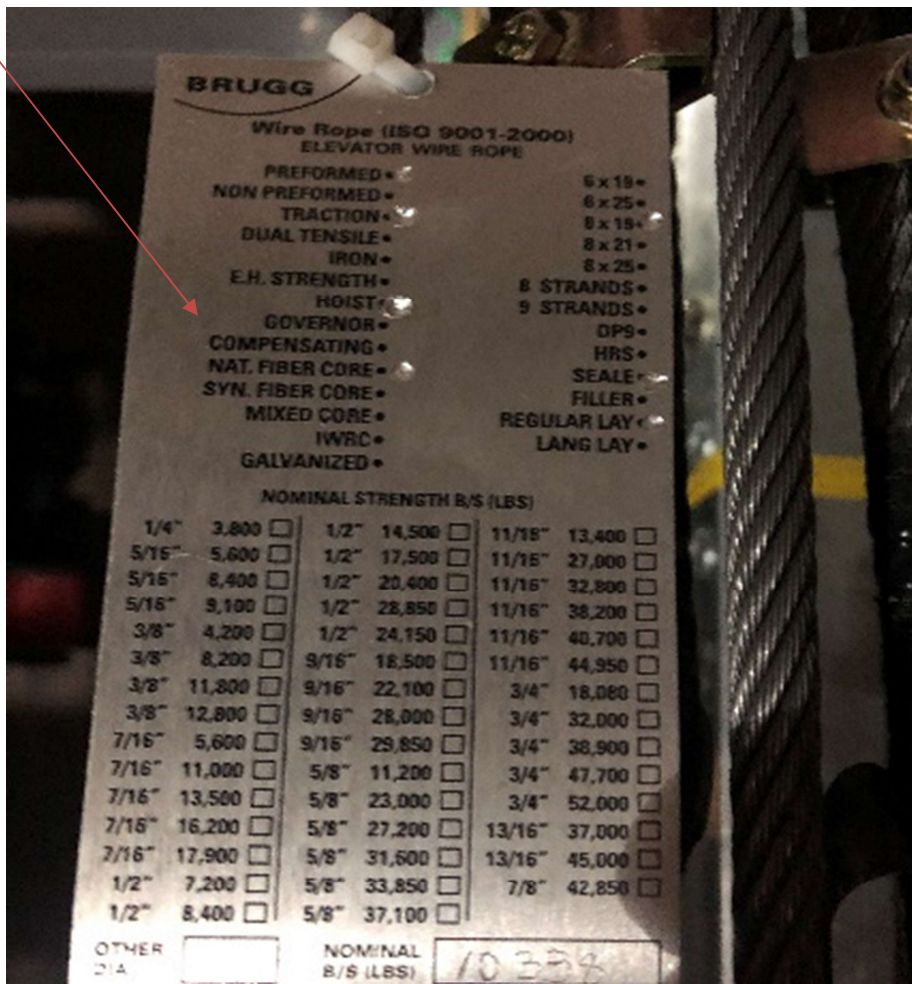


Incident Summary #II-873064-2019 (#13812) (FINAL)

SUPPORTING INFORMATION	Incident Date	June 17, 2019	
	Location	Vancouver Lower Mainland	
	Regulated industry sector	Elevating devices - Elevator	
	Impact	Qty injuries	0
		Injury description	None
		Injury rating	None
	Damage	Damage description	Elevator wire ropes were damaged, frayed and a worn groove on the traction wheel.
		Damage rating	Moderate
	Incident rating	Moderate	
	Incident overview	Wire ropes were not tensioned to manufacturer's specifications, incorrect ropes were supplied and installed.	
INVESTIGATION CONCLUSIONS	Site, system and components	<p>An elevator's suspension system members or wire ropes must be equally tensioned among each of the suspension members. If the range of tension exceeds 10%, the tension needs to be adjusted. An elevator loaded to its official capacity rating is very heavy. There are many different components in the construction of wire rope to provide strength and flexibility against fatigue, corrosion, crushing, and rotation.</p> <p>Nylon/fibre core ropes are made of natural or synthetic polypropylene fibres. Ropes with synthetic core are subject to stretch and wear less time than a steel core wire rope when used in high-speed applications.</p> <p>Steel core and steel strands make up a wire rope. Each wire for the rope is made of independent wire strands. Steel core ropes provide a much larger foundation to support the wire rope strands, which allows less chance of fatigue, stretching and rotation. Steel core ropes are the most commonly used ropes in the elevating industry.</p> <p>The ropes are attached to the elevator car, and loop around a traction wheel. A traction wheel is a pulley with deep grooves around the circumference, commonly called a sheave.</p> <p>The sheave grips the hoist ropes, so when the machine rotates the traction wheel, this then drives the ropes to move. The size, lay and construction of the wire ropes are very crucial to the type of cut and lining on the traction wheel. The machined grooves provide surface contact for the wire rope traction. This traction is required to smoothly and efficiently lift and lower passengers to different elevations at different rates of speed.</p>	
	Failure scenario(s)	Incorrect wire ropes supplied and installed. An inadequate amount of wire rope tension led to premature wire rope wear and damage to the sheave grooves.	

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Facts and evidence	<p>Via phone and email communications, the elevating contractor stated wrong types of wire ropes were supplied by the manufacturer.</p> <p>Contractor confirmed that no procedure for wire rope tensioning was provided to field installers.</p> <p>Contractor confirmed that they did not have wire rope tension gauge tool.</p> <p>Photos show rope wear and incorrect rope material used at installation.</p>
Causes and contributing factors	<p>It is highly probably that the premature failure of the wire ropes and damage to the traction wheel were caused by an incorrect type of wire rope used during initial installation (nylon/fibre vs. steel core) along with inadequate rope tension.</p>



Rope data tag showing Nylon core rope installed



Premature worn rope



Premature worn rope with broken strands