

September 6, 2024

MEMO

Delivered via email: vsi-stationinfo@mpi.mb.ca

Re: Manufacturer Inspection Procedure for Tesla Cybertruck

This memo provides guidance on the sections of the [Vehicle Equipment, Safety and Inspection Regulation](#) (*Vehicle Inspection Handbook*) that do not apply to Tesla Cybertruck.

Applicable Exemptions

- Section 4.2 (Steering Travel):
 - The requirements pertaining to steering travel do not apply to Cybertruck, as the vehicle's steering wheel cannot, by design, make two full rotations.
- Section 4.3 (Steering Components):
 - Items a) and b) under this section are not applicable to Cybertruck.
- Section 4.4, 4.5, and 4.6 (Steering Mechanisms):
 - The following components listed in these sections are not applicable to Cybertruck:
 - Idler arms
 - Bell cranks
 - Center links
 - Pitman arms
 - Dampeners
 - Cotter pins
 - U-joints
 - Slip joints
 - Flexible coupler
 - Kingpin

Context

[Transport Canada has recently granted an exemption to Tesla Motors Canada](#) “to allow Tesla Motors Canada ULC (Tesla) to use a highly variable steer-by-wire system that does not have the minimum steering angle of +270 degrees as required for testing” (as required under CMVSS 126).

Technical Background

- **What is Drive-by-Wire?**

Drive by wire is a general term that refers to operating primary vehicle controls, such as acceleration, steering, and braking, through electronic systems instead of mechanical or hydraulic connections. These electronic systems consist of:

- 1) Sensors to determine the driver input
- 2) An electronic control unit (ECU) to calculate the appropriate output
- 3) An electronic motor for actuation.

- **How is Drive-by-Wire Safe?**

Drive by wire for throttle control was first released on a production vehicle in 1988 and became commonplace on new vehicles by the start of the 2000's. Safety is assured through a system design that includes an appropriate selection of electronic components, redundancy, safety mechanisms, defined fail-safe or fail-operational states, and is proven through appropriate validation testing.

- **Is Steer-by-Wire as Safe as Traditional Steering?**

To ensure that steer by wire is as safe as traditional steering, the system is designed to be fail-operational with redundancy and fault monitoring. Any single component on the vehicle can fail, and steering functionality is maintained. For redundancy, there are two independent power sources supplying two ECUs and two independent motors on the steering rack, with power and communication harnesses routed through different areas of the vehicle. The steering wheel angle sensing is not only redundant but utilizes three sensors to be able to identify and exclude an erroneous sensor. All faults are identified by the system and the driver is notified and instructed to stop the vehicle in a safe place, while steering is maintained.