

FORD MOTOR COMPANY (FORD) RESPONSE TO REQUEST 14Request 14

Provide responses to each item below and all related design and/or test documents:

- a) Provide all relevant information, testing, analysis, and communications at Ford that evaluated reports of the alleged defect that occurred in vehicles manufactured after the implementation of the oil pump drive tensioner arm caulking position monitoring system at the supplier;
- b) Provide documentation that shows when Ford was first aware that the alleged defect may exist in the subject and/or peer vehicles;
- c) Provide detailed descriptions of the design and function of the oil pump and oil pump belt tensioner system, including design parameters in terms of minimum, nominal and maximum forces of the belt tensioner; and
- d) Describe any oil pump system differences between subject vehicles and peer vehicles.

Answer:

On August 1, 2023, an issue pertaining to VOQs alleging loss of motive power allegations on 1.0L Fox Classic vehicles due to failed oil pumps was brought to Ford's Critical Concern Review Group (CCRG) for review. As part of this review, Ford obtained 21 engines replaced in warranty for suspected failed oil pumps. 9 of these engines were from vehicles produced after the implementation of the oil pump drive tensioner arm caulking position monitoring at the supplier. Teardown analysis of the engines to determine more information on root cause of their failure was completed in October 2023. 6 of the 9 post-supplier containment engines showed a tensioner arm falling off the backing plate, indicating the supplier's containment was not 100% effective at preventing this failure mode. The remaining 3 engines showed oil pump drive belt degradation, with the belts missing teeth.

Ford's first record of the alleged defect was a GCQIS field report concerning a 2016 Model Year Ford Focus received on April 16, 2016.

Descriptions of the design and function of the oil pump and oil pump belt tensioner system are described below.

The engine's oil pump is driven by a belt via pulleys on the oil pump and crankshaft. The oil pump pulley is bolted to a gear that drives the balancer shaft gear assembly. The belt transfers torque that is derived by torsional vibration of the crankshaft and the driven torque/inertia of the oil pump and balancer shaft. Since the belt is driving both the oil pump and balancer shaft the increased load requires a belt tensioner to keep the system under control. The belt tensioner is a mechanical tensioner that has an arm that contacts the back of the belt along with a spring and damping element to keep the system under control. The tensioner arm motion is controlled by the spring torque and friction caused by the axial force of the cone spring contacting the damper pad. The belt tension that is generated then inputs a moment on the tensioner pivot shaft. The pivot shaft press fit and staking operation needs to withstand the peak belt tension of the system.

Ford does not consider there to be any oil pump system differences between subject and peer vehicles.

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