

EA20-002 Detailed Closing Summary

Basis:

On August 31, 2020, the Office of Defects Investigations (ODI) opened Engineering Analysis (EA) EA20-002, as an upgrade of Recall Query (RQ) RQ19-003. This investigation, related to recall 14V-266, was opened to investigate instances of failure or detachment of the flexible steel seat belt anchor cable attached to the outboard side of the front seats in vehicles manufactured by General Motors (GM).

Subject Vehicles:

The subject vehicles included model year (MY) 2009-2014 GMC Acadia, Buick Enclave, and Chevrolet Traverse SUVs as well as MY 2009-2010 Saturn Outlook SUVs. These vehicles were previously repaired for this defect under subject recall 14V-266. The subject vehicle population is approximately 1.3 million vehicles.

Subject Component:

The subject components are flexible steel seat belt anchor cables that are an intertwined bundle of seven (7) individual cables. There are six (6) outer/exterior cables and one (1) interior cable within the full subject cable. Each cable is comprised of nineteen (19) steel strands: twelve (12) outer/exterior strands and seven (7) interior strands. There are 133 total strands in each subject cable.

Subject Recall:

Recall 14V-266, issued in May 2014, stated that the flexible steel cable that connects the seat belt to the vehicle at the outside of the front outboard seating positions can fatigue and separate over time as a result of occupant movement into the seat. GM stated that, in a crash, a separated cable could increase the risk of injury to the occupant. If a recalled vehicle had a protective sleeve surrounding the front cables, service technicians were instructed to inspect the sleeves and if any damage was observed, to replace the cable with a new sleeve as well as a closeout piece to relocate the cable rearward to mitigate the subject condition. If no damage was observed to the sleeve, then the original sleeve would be removed, and each cable received a new sleeve along with the closeout piece. If the cable was not covered in a protective sleeve, then the cable was replaced prior to installation of a new sleeve and closeout piece.

Special Coverage:

GM issued Special Coverage N192219480, in June 2019, to address the subject defect in vehicles that previously received the recall remedy repair for subject recall 14V-266. The Special Coverage allows for component replacement for 12 years or 180,000 miles from the initial sale date, whichever comes first. Special Coverage N192219480 instructed service technicians to inspect the driver's seat belt anchor cable for any damage to the protective sleeve and if damage was observed, the cable was replaced with a new sleeve as well as a new closeout piece that relocated the cable to mitigate the subject condition. Vehicle owners received notification of the Special Coverage via mail.

Applicable Federal Motor Vehicle Safety Standard (FMVSS):

FMVSS 209, Seat Belt Assemblies (49 CFR § 571.209), applies to the subject vehicles. The FMVSS requirement for a Type 2 seat belt assembly (combination of pelvic [lap] and upper torso [shoulder] restraints) requires the pelvic portion of the seat belt to withstand a 11.12 kilonewton (kN) tensile load without failure.

GM Testing:

GM conducted ultimate tensile strength (UTS) testing on various retrieved, field-aged parts from subject vehicles. GM stated that its testing showed the process of bending the cable causes gradual, non-critical cable damage that can, if allowed to progress, reach a tipping point and progress quickly to highly detectable total separation. GM's CT scans from the testing of field-aged parts, which did not have holes or cuts in the outer protective sleeve, demonstrated that these cables are intact and undamaged. GM stated that out of over 400 parts tested, only two had any visible interior strand damage, and the damage in both cases was minor (a cable with one broken strand and a cable with one partially damaged strand). When GM conducted strength testing on more heavily damaged cables, these cables passed GM's internal UTS requirements with significant safety margin. GM stated that wear on the protective sleeve of new cables began to appear at approximately 10,000 simulated aging cycles, prior to, or concurrent with, the first strand break. GM also tensile tested six (6) field-aged cables with an average of 209,000 miles and visible wear to the protective sleeve. These six (6) cables surpassed the FMVSS requirement of 11.12 kN and had no observable damage in CT scans.

National Highway Traffic Safety Administration (NHTSA) Testing:

The National Highway Traffic Safety Administration's (NHTSA's) Vehicle Research and Test Center (VRTC) also conducted UTS testing utilizing both retrieved field-aged cables as well as a "new" subject cable. VRTC tested three (3) field-aged cables from vehicles with an average of 120,000 miles and one (1) "new" cable from a vehicle with very low mileage. Each of the field-aged cables underwent simulated aging in a laboratory to induce various types of failures prior to being tested for UTS. These three (3) cables had visible damage to the protective sleeve surrounding the cable prior to simulated aging and UTS testing. The "new" cable had a slightly visible bend but no sleeve damage. This "new" cable did not undergo simulated aging prior to UTS testing.

One of the field cables that had been further aged through a laboratory process, as well as the "new" cable, reached GM's provided strength requirements for brand new cables. GM's strength expectation for brand new cables is greater than the FMVSS requirement for UTS, which is 11.12 kN.

The field and laboratory-aged cable that reached GM's strength expectations for new cables was tested after internal strand movement was observed in CT scans. A post-scan inspection revealed 6% of all strands within the cable had failed. The two (2) previously noted cables, as well as an additional field-retrieved cable that had been further aged through a laboratory process, exceeded the FMVSS requirement for UTS. This third cable was strength tested after CT scans revealed 2-3 strands had failed and a visual inspection revealed 27% of all strands had failed.

The fourth and final field-retrieved cable, which had undergone additional laboratory aging, was tested after a majority of the strands had failed during the laboratory aging process. This cable did not reach the FMVSS requirement of 11.12 kN, but 55% of all strands had failed prior to UTS testing. Prior to simulated, laboratory aging, this fourth cable was retrieved from a vehicle with approximately 100,000 miles and had visible damage to the protective sleeve. The visible damage to the sleeve at the time of field retrieval indicates that this vehicle would have been eligible for replacement of the cable under Special Coverage N192219480, including the protective sleeve and closeout piece to mitigate the subject condition prior to the simulated aging process.

Data:

ODI field data shows that the majority of post-recall subject cable failures were very detectable and occurred when vehicles were at rest and consumers were alerted to the condition when entering the vehicle, buckling their seat belt, or visually observing a failure upon opening the door. Furthermore, data from all sources show there is a low rate of occurrence: 0.141 incidents per thousand vehicles for subject vehicles that experienced a subject cable failure after the remedy for recall 14V-266 was performed. Additionally, ODI field data shows that the majority of these failures occurred to the driver cable, as opposed to the front passenger cable.

Closing Analysis:

To date, there have been no reported crashes, injuries, or fatalities related to this investigation. In view of the Special Coverage conducted by GM, the high detectability of the subject failure, and the low rate of occurrence, this Engineering Analysis is closed.

The closing of this investigation does not constitute a finding by NHTSA that a safety-related defect does not exist. The Agency reserves the right to take additional action if warranted by future circumstances.

To review the ODI reports cited in the Closing Resume ODI Report Identification Number document, go to NHTSA.gov.