

RC 80 Chronology

Ferrari was made aware of an issue involving a potential braking issue in March 2021 in connection with a MY 2018 Ferrari 488 GTB that had experienced a brake failure in the US. A vehicle technical and insurance subrogation inspection on such car took place in May 2021. The result of the inspection showed that the master cylinder failed causing the loss of brakes. It was not possible to determine the cause of the failure. Ferrari performed certain preliminary verifications on brake booster components without finding the root cause of the failure. Given that such brake components are assemblies entirely manufactured by Bosch, in June 2021, Ferrari requested Bosch to have such components inspected. Bosch inspected one of the assembly and was not able to identify the root cause of the failure. In September 2021, Ferrari was made aware about two 488s that experienced brake failure in the US. Ferrari began performing service history reviews of both of these vehicles. In September 2021, Ferrari requested again Bosch to inspect another assembly. Also for such assembly, Bosch was not able to ascertain the root cause of the relevant failure. In early October 2021, Ferrari was contacted by NHTSA concerning two Vehicle Owner Questionnaires involving 3 VINs, i.e. VIN 232813, VIN 232226 and VIN 234234. Ferrari investigated VIN 234234 and found that the vehicle was repaired under warranty at a dealer. Ferrari obtained the master cylinder/brake booster assembly from the dealer and inspections by the supplier are expected to be carried out also on this component. Additionally, Ferrari sent over to Bosch the assembly of VIN 232226 for its analysis. In October 2021, Ferrari informed Bosch about the inquiry submitted to Ferrari by NHTSA, since Bosch is the owner of all technical information, design and drawings of the brake booster components. Ferrari, in particular, requested Bosch assistance in: (i) providing any documents/information about this component, (ii) continuing to investigate the root cause of the issue as quickly as possible. In October 2021, Ferrari participated in a vehicle inspection of VIN 232226 noticed by State Farm Insurance. At the inspection, it was observed that the brake fluid had leaked into the brake booster chamber. Ferrari has been able to have a representative from Bosch to participate at the inspection. Also a representative from NHTSA was present at this inspection. In October 2021, Ferrari was contacted by an authorized Ferrari dealer regarding a used MY 2018 Ferrari 488 - owned by the dealership - which experienced a loss of braking capability. This vehicle is being shipped to Ferrari for inspection by Bosch. Although Ferrari and Bosch continue to investigate the issue, including the scope of the affected vehicle population and the root cause behind a potential brake fluid leakage, Ferrari decided to conduct a safety recall to address this issue on October 20th, 2021. Verification of the number of warranty claims is still being researched. Ferrari has been made aware of one event where a client, by communication dated July 29th, 2021, reported that he was injured as a consequence of this issue. Ferrari has had no reports of any deaths as a consequence of this issue. Ferrari and Bosch have identified the root cause of the defect. On a small number of occasions, there has been a failure of a hydraulic seal in the master cylinder, known as the isolation lip seal, an O-ring found in the master cylinder in close proximity to the brake booster. The cause of the brake fluid leakage is due to the twisting of isolation lipseal, which comes out of its groove within the use. Due to the failure of the seal on the primary circuit, the brake fluid travels into the brake booster and the brake primary circuit remains empty. When this happens, the brake capability is limited to the secondary circuit. In very rare cases, the failure has also affected the capability of the secondary braking circuit. This occurs because of the ventilation between the inside and the outside of the reservoir, that when the isolation seal twists as referenced above, might be not be sufficient to allow for the necessary venting. In case of twisting of this seal, the booster and the reservoir can become directly in contact, and this can create vacuum inside the brake fluid reservoir. In this condition, the reservoir vacuum generated by the booster through the twisted seal, can determine a brake fluid aspiration from the secondary circuit into the reservoir, which reduces the braking capability even further. In conclusion, the leakage through the isolation lipseal causes a partial reduction of the brake capability in the primary circuit. Moreover, in these circumstances, also the secondary circuit can fail, due to the reservoir under vacuum condition, in this case, the brake capability could

be almost totally compromised. Ferrari was able to reproduce the loss of braking capability of the primary circuit by causing the fluid leakage through the isolation lipseal of the master cylinder. Ferrari was also able to reproduce the total loss of braking capability, both the primary and secondary circuits, in presence of vacuum inside the reservoir. Despite numerous tests conducted, Ferrari has not yet been able to reproduce the twisting of the isolation lipseal and the movement out of its groove.

After determining the root cause of the issue, Ferrari implemented its remedy solution beginning in March, 2022 which consists of replacing the brake fluid reservoir cap, which is designed to ensure the proper ventilation of the braking system, and updating the instrument panel warning to urge the driver to get towed to the nearest Ferrari dealer if the vehicle's brake fluid level should be reduced to less than approximately 50 percent of the reservoir's capacity.

The initial analysis focused on Ferrari 458 and 488 model vehicles which have the same component code of brake booster assembly and brake fluid reservoir. Given that the replaced brake fluid reservoir cap is also fitted on other Ferrari model vehicles, Ferrari decided to extend the scope of its analysis, even though other Ferrari model vehicles are fitted with a different brake booster assembly. Subsequent analysis carried out was aimed at extending the field of investigation to all Ferrari models and focused on the claims relating to the same anomaly detected on 458/488 model vehicles and was conducted with respect to all Ferrari models having component code of brake booster and brake fluid reservoir which are different from those set for 458/488 Ferrari model vehicles, but are fitted with the same brake fluid reservoir cap. The result of this investigation found one case of brake fluid loss on a Ferrari FF in December, 2012, one case on a Ferrari FF in May, 2020, one case on a GTC4 Lusso in July, 2020, one case on a 812 Superfast in July, 2021, one case on a 488 Pista Spider in February 2022, one case on a 488 Pista in February 2022, one case on a 812 Superfast in February, 2022, one case on a 812 Superfast in March, 2022 and one case on a 812 Superfast in April, 2022. There have been no reports of any injuries and/or deaths as a consequence of any of these cases.

On July 20, 2022 Ferrari decided to extend the recall campaign initially launched in October 2021 to include all model vehicles fitted with the same brake fluid reservoir cap.