

**UNITED STATES DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION**

In re:

22E-061
Brake Hose Assemblies

August 19, 2022

**HITACHI CABLE AMERICA INC.'S PETITION FOR DETERMINATION OF
INCONSEQUENTIAL NONCOMPLIANCE**

Pursuant to the National Traffic and Motor Vehicle Safety Act (“Safety Act”), 49 U.S.C. §§ 30118(d) and 30120(h), and 49 C.F.R. Part 556, Hitachi Cable America Inc. (“HCA”) submits this Petition for Determination of Inconsequential Noncompliance (“Petition”) seeking an exemption from the notice and remedy requirements of 49 U.S.C. §§ 30118 and 30120 on the grounds that the potential noncompliance of certain motorcycle brake hose assemblies with Federal Motor Vehicle Safety Standard 106 (“FMVSS 106” or “106”) is inconsequential to motor vehicle safety.

On July 27, 2022, HCA submitted a Part 573 report to the National Highway Traffic Safety Administration (“NHTSA”) identifying certain nylon and PVC brake hose assemblies (“Assemblies”) sold for exclusive use in Harley-Davidson (“Harley”) motorcycles as potentially noncompliant with FMVSS 106. The Assemblies covered by the report were produced between May 2022 and mid-July 2022. While the Assemblies complied with all other aspects of FMVSS 106, certain nylon assemblies received variable High Temperature Impulse (“HTI”) and Brake Fluid Compatibility (“BFC”) test results, and PVC assemblies did not pass whip testing.

During July and August 2022, Exponent developed and supervised a series of safety-focused tests (“Safety Tests”) on both Nylon and PVC brake hose assemblies designed to

demonstrate whether the Assemblies' pressure cycle durability (Nylon) and fatigue resistance (PVC) were adequate to ensure brake hose structural integrity throughout the life of a motorcycle. The results of these Safety Tests demonstrate that the structural integrity of the Nylon and PVC Assemblies, and thus their functionality, is not compromised by the variable 106 test results.

As discussed in detail in the Exponent Technical Report on Safety Testing attached as the Appendix to this Petition, despite variable 106 test results, HCA's Nylon and PVC brake hose assemblies for Harley motorcycles meet FMVSS 106's goal of preventing "brake system failure from pressure or vacuum loss due to hose or hose assembly rupture." 49 C.F.R. § 571.106 S2. The Safety Test results therefore confirm, and Exponent concludes, that the potentially noncompliant assemblies do not increase risk to motorcycle users. Accordingly, HCA seeks an exemption from the Safety Act's notice and remedy requirements because the potential noncompliances identified in its brake hose assemblies are inconsequential to motor vehicle safety. In support of this Petition, HCA relies on the test results and technical analysis attached as the Appendix to the Petition and summarized below.

Background

I. Regulatory History of FMVSS 106

NHTSA's predecessor agency promulgated FMVSS 106 in 1967.¹ At that time, FMVSS 106 did not apply to motorcycles, but rather "to hydraulic brake hoses for use in passenger cars and multipurpose passenger vehicles." 32 Fed. Reg. 2,408, 2,411 S2 (Feb. 3, 1967); *see also id.* at 2,409 S3 (separately defining "motorcycle"). In 1973, NHTSA amended FMVSS 106 to apply

¹ Many of the requirements of FMVSS 106 originated in a 1940 standard, ASTM D571. In 1942, the Society of Automotive Engineers ("SAE") adopted J40, the specifications of which were largely based on the 1940 ASTM standard. SAE J40 later matured into SAE J1401, upon which FMVSS 106 appears to have been largely based. Appendix at 54-55.

to “all motor vehicles and hydraulic, air, and vacuum brake hose end fittings for use in those vehicles,” including motorcycles. 38 Fed. Reg. 31,302, 31,302 pt. 571 (Nov. 13, 1973). NHTSA did not explain its rationale for broadening the scope of 106 to apply to two-wheeled as well as four-wheeled vehicles. The standard was most recently substantively updated in 2004. 69 Fed. Reg. 76,298, 76,299 (Dec. 20, 2004).

FMVSS 106 requires any hydraulic brake hose to be “capable of meeting” 13 separate performance requirements. However, any individual hose “need not meet further requirements after having been subjected to and having met the constriction requirement (S5.3.1) and any one of the” 12 additional performance “requirements specified in” the regulations. 49 C.F.R. § 571.106 S5.3. The purpose of 106 testing is to demonstrate that hoses will not be at risk of a “brake system failure from pressure or vacuum loss due to hose or hose assembly rupture.” *Id.* at S2. A “rupture” is defined as “any failure that results in separation of a brake hose from its end fitting or in leakage.” *Id.* at S4. The standard does not define the amount of fluid loss or other characteristics of “leakage.”

Four FMVSS 106 tests are at issue here. Notably, manufacturers are not required to conduct these particular tests, but rather must meet the underlying performance requirements: “[m]anufacturers are not required to test their products in the manner specified in the relevant safety standard, or even to test the product at all, as their basis for certifying that the product complies with all relevant standards. A manufacturer may choose any valid means of evaluating its products to determine whether the vehicle or equipment will comply with the safety standards when tested by the agency according to the procedures specified in the standard and to provide a basis for its certification of compliance.” NHTSA Chief Counsel Letter (Aug 13, 2003);² 38 Fed.

² <https://www.nhtsa.gov/interpretations/gf005279>

Reg. 31,302, 31,303 (Nov. 13, 1973) (noting with respect to FMVSS 106 that “the safety standards should in all cases be considered as performance levels that each vehicle or item of equipment must meet, and not as instructions for manufacturer testing”).

For the nylon assemblies, at issue are (1) the “high temperature impulse test” (the “HTI” test) and (2) the “brake fluid compatibility, constriction, and burst strength test” (the “BFC” test). For the PVC Assemblies, at issue are (3) the “whip resistance” test (the “Whip” Test); and (4) the “water absorption whip resistance” test (the “Water Whip” Test). While the specifics of these tests differ, all except the Whip Test and the Water Whip Test involve a final step in which a hose is subjected to pressure and must not rupture at or below 5,000 psi. All of the hoses tested in May and June 2022 burst above 5,000 psi during this final testing step. Moreover, 5,000 psi is substantially above typical, and even emergency, braking conditions for motorcycles. Pressure during hard motorcycle braking events (0.4-0.5g) can range between 181-619 psi when applying only the front or rear brake, not both brakes at the same time. Motorcycle riders are instructed to utilize both front and rear brakes simultaneously and with two wheel braking, the pressures required to achieve a specific deceleration are lower. Nominal braking events (i.e., usual braking pattern) are lower (0.3g) and will range between 200-300 psi. An emergency braking event may reach 1,600 psi. Appendix at 10-11, 17.

The Whip Test requires running a hose on a flexing machine for 35 hours. According to ASTM D571, the predecessor voluntary standard that originally included the Whip Test, “[t]he flexing motion imparted by the test apparatus, *while different from that to which the assembly is subjected in service*, provides a highly accelerated method of measuring the resistance of a hose to dynamic fatigue.” ASTM D571-40T at 362 (1940) (emphasis added); Appendix at 55 (emphasis

added). This statement applies equally to the Water Whip Test, which involves the same flexing motion.

II. Factual Background

Hitachi Cable America Inc. (“HCA”) manufactures and sells two types of brake hose assemblies for use as original and replacement equipment exclusively in Harley motorcycles.³ The first type is made with an inner Polytetrafluoroethylene (“PTFE”) tube, 8-wire stainless steel braided cable layer, and an outer PVC layer (“PVC Assemblies”). The second type is made with an inner PTFE tube, 6-wire stainless steel braided cable layer, and an outer nylon layer (“Nylon Assemblies”). In addition, in June and July 2022, HCA produced Nylon Assemblies featuring a revised socket design (“Revised Nylon Assemblies”).

During May and June 2022, HCA and Exponent—a third-party engineering consultant—jointly tested PVC Assemblies, Nylon Assemblies, and Revised Nylon Assemblies for compliance with FMVSS 106 (“Compliance Tests”). As described in HCA’s July 27, 2022 Part 573 Report, HCA and Exponent observed variable test results on the BFC and HTI tests conducted on Nylon Assemblies, as well as failures during the Whip and Water Whip Tests conducted on PVC Assemblies.⁴ Moreover, BFC and HTI testing conducted on Revised Nylon Assemblies by HCA,

³ HCA is a corporation organized under the laws of New York, with headquarters located at 2 Manhattanville Road, Suite 301, Purchase, NY 10577. HCA’s Automotive Division is based in New Albany, Indiana.

⁴ HCA also engaged Element Materials Technology (“Element”), a NHTSA-contracted laboratory, to conduct FMVSS 106 testing in May and June 2022. Element observed mixed results in BFC tests conducted on Nylon Assemblies, passing results in HTI tests conducted on Nylon Assemblies, and failures in Whip and Water Whip tests conducted on PVC Assemblies. Moreover, due to test capacity limitations, HCA engaged an additional third-party engineering consultant—Intertek—to test Nylon Assemblies. During testing performed in June 2022, Intertek observed failing results on BFC tests conducted on Nylon Assemblies.

Exponent, and Element produced variable results. However, all of the BFC and HTI test results involved the hoses bursting above 5,000 psi during this final testing step.

The brake hose assemblies covered by HCA's Part 573 Report and this Petition fall into three categories: (1) PVC Assemblies produced from May 2 to May 14, 2022 and June 10 to July 16, 2022; (2) Nylon Assemblies produced from May 2 to May 14, 2022; and (3) Revised Nylon Assemblies produced from June 9 to July 1, 2022. All brake hose assemblies covered by HCA's Part 573 Report and this Petition were manufactured by HCA's subsidiary HC Querétaro, S.A. de C.V. ("HCQ") in Santiago de Querétaro, Mexico.

A review of production data shows that HCA shipped 26,672 potentially noncompliant Assemblies that are within the scope of the Part 573 Report:⁵ 2,790 PVC Assemblies produced between May 2 and May 14, 2022; 716 PVC Assemblies produced between June 10 and July 16, 2022; 2,696 Nylon Assemblies produced between May 2 and May 14, 2022; and 20,470 Revised Nylon Assemblies produced between June 9 and July 1, 2022.

Legal Standard

Under the Safety Act, manufacturers who file a defect or noncompliance report are generally required to comply with the notice and remedy requirements of 49 U.S.C. §§ 30118 and 30120. However, manufacturers are exempted from these requirements when the "Secretary [of Transportation] decides a defect or noncompliance is inconsequential to motor vehicle safety." 49 U.S.C. §§ 30118(d), 30120(h). NHTSA has promulgated procedural regulations for parties seeking a determination of inconsequential noncompliance, 49 C.F.R. Part 556, but neither the statute nor the regulations define when a noncompliance is "inconsequential." Instead, "the agency determines whether particular noncompliance is inconsequential to motor vehicle safety based

⁵ Harley filed a Part 573 report on August 2, 2022.

upon the specific facts before it in a particular petition.” *Toyota N. America, Inc.*, 87 Fed. Reg. 4,705, 4,707 (Jan. 28, 2022).

Under longstanding agency precedent, in evaluating a petition NHTSA focuses on “the consequence to an occupant who is exposed to the consequence of that noncompliance.” *FCA US LLC*, 87 Fed. Reg. 22,620, 22,621 (Apr. 15, 2022). The ultimate question is “whether an occupant who is affected by the noncompliance is likely to be exposed to a significantly greater risk than an occupant in a compliant vehicle.” *Sumitomo Rubber Industries, Inc.*, 83 Fed. Reg. 13,002, 13,003 (Mar. 26, 2018); *see also, e.g., Volkswagen Group of America, Inc.*, 76 Fed. Reg. 30,239, 30,240 (May 24, 2011) (same); *General Motors Corp.*, 69 Fed. Reg. 19,897, 19,900 (Apr. 14, 2004) (same).

Discussion

HCA seeks a determination of inconsequentiality on the ground that the potential non-compliances do not affect the functionality of HCA’s PVC and Nylon brake hose assemblies in any manner that would result in any increased risk to a motorcycle rider. Appendix at 72-76. HCA supports this conclusion with a summary of key findings from the report attached as an Appendix, which provides Exponent’s analysis of extensive safety testing performed on the Assemblies at issue.

I. Any Noncompliance of Nylon Brake Hose Assemblies Is Inconsequential.

A. Exponent’s Safety Testing Demonstrates That Any Noncompliance Is Inconsequential.

During its initial May and June FMVSS 106 compliance testing, Exponent observed that even the Nylon Assemblies that exhibited marginal leakage during BFC and HTI testing retained their structural integrity—and exceeded minimum burst strength requirements in subsequent FMVSS 106 burst testing. Specifically, each of the 10 assemblies subjected to BFC testing and

the 25 assemblies subjected to HTI testing had a burst pressure above 12,000 psi, which far exceeds FMVSS 106 requirements. This initial testing thus strongly indicated that use of these Assemblies would not pose any greater risk than use of fully compliant assemblies. Appendix at 14.

To further analyze the structural integrity of the Nylon Assemblies, Exponent performed an extensive series of Safety Tests during July and August 2022. Exponent's safety testing was designed to demonstrate whether the Nylon Assemblies' pressure cycle durability was adequate to assure brake hose structural integrity throughout the life of a motorcycle. In other words, the purpose of the testing was to determine whether, in actual use in motorcycles, the Nylon Assemblies would fail in a way that would compromise the integrity of the motorcycle braking system. The results of these tests demonstrate that the structural integrity of the Nylon Assemblies, and thus their functionality, is not compromised throughout the life of a motorcycle, even when marginal leakage is observed. Accordingly, any noncompliance has no impact on the safety of the Nylon Assemblies or the vehicles in which the Nylon Assemblies are incorporated.

Exponent performed four distinct sets of tests on the Nylon Assemblies: (1) Pressure and Time Sensitivity Testing; (2) Room Temperature Durability Testing; (3) Elevated Temperature Durability Testing; and (4) Accelerated Durability Suspension Stroke Testing.

1. *Pressure and Time Sensitivity Testing*

Exponent conducted a "sensitivity" analysis on the Nylon Assemblies. In this test, Exponent first preconditioned 31 Nylon Assemblies through HTI testing. Appendix at 27. In doing so, Exponent re-created the conditions in which certain Nylon Assemblies had exhibited marginal leakage during earlier BFC and HTI testing under FMVSS 106. The preconditioning enabled Exponent to evaluate the structural integrity of Nylon Assemblies—even when the assembly had already exhibited marginal leakage or wetness.

The 31 Nylon Assemblies were then subjected to incremental pressure testing. Pressure was applied to the Nylon Assemblies in 500 psi increments held for two minutes at a time, up to 5,000 psi. During each pressure hold increment, Exponent observed the Nylon Assemblies for any signs of leakage. Notably, Exponent did not observe any leakage during the pressure holds at 500, 1,000, or 1,500 psi, and only a single marginal leak at 2,000 psi, with no pressure loss, well above brake system operating pressures. While there was additional marginal leakage in certain Nylon Assemblies at and above 2,500 psi, each of these Nylon Assemblies maintained system pressure despite the presence of leaks. Appendix at 27-28. Moreover, this series of increasing two-minute pressure holds is different in kind than the two-minute hold at 4,000 psi required by FMVSS 106. *See* 49 C.F.R. § 571.106 S5.3.12, S13.

Exponent also conducted a sensitivity analysis on 31 Revised Nylon Assemblies, which followed the same steps as the sensitivity analysis for the baseline Nylon Assemblies. In these tests, none of the 31 samples leaked at 500 psi. One sample leaked at 1,000 psi, but the sample did not exhibit any pressure loss. While there was additional marginal leakage in certain brake hose assemblies at and above 1,500 psi, each of these assemblies maintained system pressure despite the presence of marginal leaks. None of the leak conditions registered in testing of Nylon hoses compromise the structural integrity of the Assemblies, or result in pressure loss or leakage sufficient to cause brake system failure. Appendix at 37-38, 73-75.

Importantly, the pressure hold testing Exponent conducted is more stringent than any real-world pressure these assemblies would experience during actual motorcycle use. According to data received from Harley, a typical hard motorcycle brake stop would produce pressures between 181-619 psi when applying only the front or rear brake, for a period of time much shorter than two minutes. Motorcycle riders are instructed to utilize both front and rear brakes simultaneously and

with two wheel braking, the pressures required to achieve a specific deceleration are lower. Nominal braking events are lower and will range between 200-300 psi. Even an emergency brake stop, such as a sudden brake event to avoid a collision, would produce pressure of no more than 1,600 psi, again for a much shorter period than two minutes. Appendix at 10-11, 17. Accordingly, Exponent's sensitivity analysis demonstrates that the Nylon Assemblies would remain fully functional in even the most extreme real-world use conditions. Appendix at 73-75.

2. *Room Temperature Durability Testing*

In this series of tests, Exponent first preconditioned a separate set of 12 Nylon Assemblies according to FMVSS 106 S5.3.12 HTI testing. Once they were exposed to high temperature and high pressure impulse cycling through HTI testing, Exponent sent the 12 preconditioned Nylon Assemblies to Element for durability testing. Element filled the assemblies with SAE compatibility brake fluid and subjected them to 300,000 pressure cycles at room temperature from 0 to 500 psi at a rate of 2,000 cycles per hour.⁶ This testing method was highly conservative, because (1) only 300,000 pressure cycles, at most, would be expected during the service life of a motorcycle, and (2) 500 psi is above the real-world braking pressure typically expected in hard-braking situations, which as noted averages 345 psi. Element reported that none of the samples exhibited signs of leakage during or after the pressure cycling test. Once the pressure cycling was completed, Element returned the 12 Nylon Assemblies to Exponent for further evaluation. Appendix at 24-26.

Exponent subsequently subjected the same 12 Nylon Assemblies to the FMVSS 106 Burst Test (S5.3.2) as well as a leak test which subjects brake hose assemblies to a five-minute hold at

⁶ As previously noted, potential emergency stops are taken into account by the 150 pressure cycles from 0 to 1600 psi that occur during the high temperature impulse testing.

500 psi, followed by a 30-second hold at 1,000 psi (“Leakage Test”). Exponent did not observe leaks in any of the 12 assemblies during the Leakage Test. While six of the 12 assemblies showed leakage during the 4,000 psi, two-minute hold phase of burst testing, each exceeded the FMVSS 106 burst strength requirement, with a minimum burst strength of 13,504 psi and an average burst strength of approximately 13,964 psi. These results demonstrate that the structural integrity of the Nylon Assemblies is not affected by marginal leakage or slight wetness following extensive pressure cycling. Appendix at 26-27, 73-74.

Exponent also oversaw room temperature durability testing conducted on 12 Revised Nylon Assemblies. Exponent first preconditioned the Revised Nylon Assemblies through HTI testing. The Revised Nylon Assemblies were then subjected to accelerated durability testing consisting of 300,000 cycles from 0 to 500 psi at HCA’s test laboratory in New Albany, Indiana. All 12 Revised Nylon Assemblies completed the 300,000 cycles without exhibiting any drop in pressure. Moreover, Exponent did not observe any leakage in 11 of the 12 Revised Nylon Assemblies during the 300,000 pressure cycle phase of the test. While one Revised Nylon Assembly exhibited wetness at the end fitting, this observation was made near the conclusion of the 300,000 pressure cycles, at approximately 288,000 cycles. Even then, for the remaining 12,000 cycles, the wetness observed in that Revised Nylon Assembly did not accumulate into any quantifiable fluid droplets or leakage and no pressure drop was recorded. In addition, as noted below, when this particular sample was subsequently subjected to leak testing through increased pressurization holds, it did not leak during either the 500 psi, five-minute hold or the 1,000 psi, two-minute hold periods. Appendix at 35-37.

Following room temperature durability testing, Exponent subjected the same 12 Revised Nylon Assemblies to the FMVSS 106 Burst Test and the Leakage Test. None of these hoses leaked

during the 500 psi five-minute hold. One of the 12 Nylon assemblies exhibited leakage during the 1,000 psi, 30-second pressure hold. However, this sample did not show any leakage during the 300,000 pressure cycles discussed above or during the 500 psi, five-minute hold phase of the Leakage Test. While all 12 assemblies showed leakage during the FMVSS 106 Burst Test's 4,000 psi, two-minute hold, no pressure drop was observed during this hold period, and each sample subsequently exceeded the FMVSS 106 burst strength requirement, with a minimum burst strength of 9,500 psi and an average burst strength of approximately 12,000 psi. These results demonstrate that the structural integrity of the Nylon Assemblies is not affected by marginal leakage or slight wetness following extensive pressure cycling. Appendix at 36-37, 73-75.

3. *Elevated Temperature Durability Testing*

Exponent performed elevated temperature durability testing on 24 Nylon Assemblies, with 12 assemblies tested at 100°C and 12 assemblies tested at 120°C. All 24 Nylon Assemblies completed 10,000 pressure cycles of 0 psi to 1,000 psi at the elevated temperatures noted without any drop in pressure or leakage observed. Following pressure cycling, the Nylon Assemblies were subjected to the FMVSS 106 Burst Test (S5.3.2) as well as the Leakage Test. With respect to the Burst Test, all 24 Nylon Assemblies exceeded 5,000 psi for burst strength, with an average burst strength of 12,692 for the 12 assemblies tested at 100°C and 12,573 for the 12 assemblies tested at 120°C. All 12 Nylon Assemblies tested at 100°C and seven of the 12 Nylon Assemblies tested at 120°C passed the 4,000 psi two-minute hold phase of the Burst Test. While Exponent observed leaks in five of the Nylon Assemblies tested at 120°C, the leaks were minor and did not result in pressure loss. Finally, all of the 24 assemblies passed the Leakage Test—*i.e.*, a five-minute hold at 500 psi, followed by a 30-second hold at 1,000 psi. Appendix at 32-34.

Exponent also conducted this testing on 24 Revised Nylon Assemblies. All 24 assemblies completed 10,000 pressure cycles of 0 psi to 1,000 psi at the elevated temperatures noted without

any drop in pressure or leakage observed. With respect to the Burst Test, 24 out of 24 assemblies exceeded 5,000 psi for burst strength, with an average burst strength of 12,691 for the 12 assemblies tested at 100°C and 12,323 for the assemblies tested at 120°C. Exponent observed leaks in two of the 12 assemblies tested at 100°C and 11 of the 12 assemblies tested at 120°C during the 4,000 psi, two-minute hold phase of the Burst Test. However, the leaks observed were minor and did not result in pressure loss. Finally, all of the 24 Revised Nylon Assemblies passed the Leakage Test. Appendix at 40-41.

4. *Accelerated Durability Suspension Stroke Testing*

HCA also arranged for engineers at its parent company, Hitachi Metals, Ltd.⁷ (“HML”), to conduct—with supervision from Exponent—accelerated durability suspension stroke testing on six Nylon Assemblies, and six Revised Nylon Assemblies after preconditioning through HTI testing. As described in more detail below relating to the PVC Assemblies, this test is designed to simulate real-world forces that are applied to a brake hose assembly on a motorcycle, by subjecting each assembly to 300,000 cycles of extension and compression of the suspension over full stroke, from full jounce to full rebound, pressurized at 508 psi.⁸ Appendix at 55, 57.

For the six Nylon Assemblies, no drops in pressure were observed in any of the assemblies, and five of the six completed the 300,000 cycles without an observed leak. The one remaining

⁷ HCA is a wholly-owned subsidiary of Hitachi Metals, Ltd.

⁸ Because the principal purpose of this test was to evaluate PVC Assemblies, the test relating to the Nylon Assemblies involved using a test fixture that was specifically engineered for testing PVC Assemblies, which features a manifold that connects to the bottom triple tree on the front suspension. In order to enable Nylon Assemblies to be tested on this PVC-oriented fixture, HCA fabricated custom Nylon brake hose assemblies. While these Nylon Assemblies were the same dimension (hose free length) as the PVC Assemblies and were connected to the same manifold, the hose and end fittings (*i.e.*, nipple, crimp socket, pre-crimp, and crimp) matched the Nylon Assembly design. As a result, even though the entire assemblies tested were not production parts (and thus did not correspond to a specific part number) they are representative of production Nylon Assemblies. Appendix at 34.

assembly exhibited a leak in the manifold pipe at 273,017 cycles. Exponent concluded that the leak was caused by the test setup, not the manufacture of the assembly, and that the integrity of the hose and end fittings was not compromised during the test. Specifically, Exponent determined that the initial test setup resulted in the Nylon Assemblies being pulled taut under full stroke, which is not reflective of motorcycle design. This added tension overstressed the exit tube on the manifold resulting in leaks. Appendix at 34, 68-69.

Following pressure cycling, these five Nylon Assemblies were subjected to the FMVSS 106 Burst Test and the Leakage Test (the one that leaked due to the test setup was not further tested). All five Nylon Assemblies passed the Leakage Test. While two of the Assemblies leaked during the 4,000 psi two-minute hold, leakage was minor and did not result in a pressure loss. All five samples passed the Burst Test; burst strength ranged from 13,518 to 15,137 psi, with an average of approximately 14,541 psi. Appendix at 35.

For the six Revised Nylon Assemblies, no drops in pressure were observed in any of the assemblies, and five of the six completed the 300,000 cycles without an observed leak. The one remaining hose exhibited a leak in the manifold pipe at 299,778 cycles, similar to, and for the same reasons as, the Nylon Assembly described above. Following pressure cycling, the five Nylon Assemblies (the one that leaked due to the test setup was not further tested) were subjected to the FMVSS 106 Burst Test and the Leakage Test. All five Revised Nylon Assemblies passed the Leakage Test. While two of the Assemblies leaked during the 4,000 psi two-minute hold, the leakage was minor and did not result in a pressure loss. All five samples passed the Burst Test, with an average burst strength of approximately 14,657 psi. Appendix at 42-43.

B. Agency Precedent Supports a Finding of Inconsequentiality for the Nylon Assemblies.

Third-party safety test results demonstrate the robust structural integrity of the Nylon Assemblies, even *after* being subjected to temperature and pressure conditions beyond what the assemblies would face under worst-case real-world use conditions. These results make clear that, over long periods of use beyond the life of a typical motorcycle, the performance of the Nylon Assemblies in real-world conditions is unaffected by the potential 106 non-compliance. Accordingly, Exponent's conclusion following its extensive safety testing is that any potential FMVSS 106 noncompliance in the Nylon Assemblies has no impact on the safety of the Nylon Assemblies in real-world performance conditions. Appendix at 73-75. As this testing demonstrates, "an occupant who is affected by the noncompliance is" not "exposed to a significantly greater risk than an occupant in a compliant vehicle," and so this petition should be granted. *Sumitomo Rubber Industries, Inc.*, 83 Fed. Reg. 13,002, 13,003 (Mar. 26, 2018).

Additional agency precedent supports granting this Petition for the Nylon Assemblies. In circumstances similar to those presented in this case, NHTSA has found safety testing demonstrating that a brake hose failure would not occur warrants granting an inconsequentiality petition. *See, e.g., Ford Motor Co.*, 45 Fed. Reg. 29,160, 29,161 (May 1, 1980) (corrosion test noncompliance was inconsequential because the hose did not burst until pressure reached a level much higher than that required by the standard: "No safety problem would exist unless the end fitting were corroded to the point where they could not sustain the 5000 psi pressure required by Standard No. 106; Ford's own tests showed a bursting strength approaching 11,500 PSI."), and *Philatron Int'l*, 57 Fed. Reg. 26,687, 26,687-88 (June 15, 1992) (oil immersion testing noncompliances in air brake hose assemblies were inconsequential on the basis that the tubing burst only at 1,200 and 1,050 psi, above the relevant requirement).

NHTSA more recently granted another petition on appeal involving failed tensile strength testing, on the basis that the hoses (1) passed pressure cycle testing designed to simulate heavy real-world use, and (2) demonstrated a burst strength of over 10,000 psi. *Coupled Products, Inc.*, 70 Fed. Reg. 32,397, 32,397 (June 2, 2005). The hose assemblies here underwent similarly rigorous testing, and burst near or above 10,000 psi. *See* Appendix at 27, 32, 34-35, 37-38, 41, 43.

Consistent with these precedents, and in light of the testing results described above, NHTSA should find any noncompliance inconsequential for the Nylon Assemblies.

C. Additional Considerations Regarding the Underlying Potential Non-Compliance Further Support a Finding of Inconsequentiality.

Two additional considerations further support a finding of inconsequentiality in this case.

First, the underlying potential noncompliance arose out of variable test results, not uniform test failures: 32 of the 46 HTI tests passed, and 39 of the 45 BFC tests passed. Appendix at 13-15.

Second, the underlying report of potential noncompliance was, at most, marginal. The leakage observed in the May and June testing was minimal and did not cause any observed pressure loss. Appendix at 74. Because of the minimal nature of this leakage, any noncompliance would be marginal.

For both the HTI and BFC tests, the relevant question is whether a “rupture” occurred. 49 C.F.R. § 571.106 S5.3.9, S5.3.12. A “rupture” is defined as “any failure that results in separation of a brake hose from its end fitting or in leakage.” *Id.* at S4. The term “leakage” is not defined. While NHTSA has stated that “[b]oth a small leak and a hose burst constitute ‘leakage’ under this definition,” 39 Fed. Reg. at 7,425 (Feb. 26, 1974), additional NHTSA guidance has indicated that “[t]he determining factor” in whether or not there has been a rupture is “the pressure maintained

by the system.” *See* Letter of May 27, 1987.⁹ While that guidance related to the Whip Test, the same definition of “rupture” applies throughout FMVSS 106, including for HTI and BFC testing. Moreover, the focus on pressure is consistent with the purpose of the standard, which is to prevent “brake system *failure from pressure* or vacuum *loss* due to hose or hose assembly rupture. ” 49 C.F.R. § 571.106 S2 (emphasis added). Accordingly, because there is no pressure loss here, any noncompliance would be marginal, which weighs in favor of granting the petition. *See, e.g., Fisher-Price, Inc.*, 60 Fed. Reg., 41,151, 41,152 (Aug. 11, 1995) (“[T]he margin of noncompliance is small, falling outside the standard’s maximum by less than an inch per minute. (The agency wishes to emphasize that the failure to meet a performance requirement by a minimal amount does not in itself support an inconsequentiality determination; each petition must be considered in the context of all relevant facts.)”).

II. Any PVC Assembly Noncompliance Is Inconsequential.

During July and August 2022, Exponent performed an extensive series of Safety Tests on the PVC Assemblies covered in the Part 573 report. That testing was designed to demonstrate whether the PVC Assemblies’ fatigue resistance was adequate to assure brake hose structural integrity throughout the life of a motorcycle. The results of these tests demonstrate that the structural integrity of the PVC Assemblies is not compromised throughout the life of a motorcycle, and so any noncompliance has no impact on the safety of the PVC Assemblies that are installed in braking systems incorporated into motorcycles. As Exponent concluded based on this rigorous testing, “[t]here is no risk to motor vehicle safety.” *See* Appendix at 56-71, 75-76.

⁹ Available at <https://isearch.nhtsa.gov/gm/87/nht87-1.99.html>

A. The Whip Test Does Not Reflect Real-World Conditions to Which These Motorcycle Brake Hose Assemblies Are Exposed.

Of critical significance for the agency's consideration of inconsequentiality, in developing the safety testing for PVC Assemblies, Exponent took account of the fact that according to the ASTM predecessor Whip Test requirements in 106, the conditions to which the PVC Assemblies are subjected in FMVSS 106 whip testing are different in kind from real-world conditions motorcycles experience in the most extreme conditions. As the Exponent Report demonstrates, the forces to which brake hose assemblies are subjected in a motorcycle application are principally vertical in nature, with wheel movement from full jounce (up to the upper suspension stop) to full rebound (down to the lower suspension stop). Appendix at 55, 75.

In contrast, the 106 Whip Test applies substantial *rotational* force. This type of force does not reflect the way in which these assemblies are actually mounted or utilized on a motorcycle. Appendix at 55. Indeed, the underlying ASTM test that was the predecessor to the NHTSA Whip Test recognized that “[t]he flexing motion imparted by the test apparatus, *while different from that to which the assembly is subjected to in service*, provides a highly accelerated method of measuring the resistance of a hose to dynamic fatigue.” ASTM D571-40T at 362 (1940) (emphasis added).

In short, while the Whip Test is *sufficient* to demonstrate that a brake hose assembly is resistant to dynamic fatigue, a failure to pass the Whip Test does not mean that an assembly will fail when exposed to the substantially different real-world forces that occur with use of a motorcycle.

B. Exponent's Testing Demonstrates that Under Extreme Conditions, Any Noncompliance of the PVC Assemblies Is Inconsequential.

Because of these differences between the forces incorporated in the Whip Test and real-world forces to which motorcycle brake hose assemblies are exposed, Exponent designed a

rigorous test to evaluate how the PVC Assemblies would perform in the field under real-world conditions. *See* Appendix at 56-71.

Under Exponent's supervision, HML conducted accelerated durability testing that subjected the PVC Assemblies to real-world performance conditions. In this test, the fixed ends of the PVC Assemblies were attached to motorcycle frames designed to simulate Harley's "Iron 883" and "1200V Seventy-Two" motorcycle models. The unaffixed ends of the PVC Assemblies were then attached to a simulated wheel hub that mimicked real-world suspension travel, through the full stroke suspension cycle. In this setup, the PVC Assemblies were subjected to either 300,000 or 1,000,000 full stroke suspension cycles, at a constant pressure of 508 psi. For comparison, the whip test pressure requirement is 235 psi. Importantly, a motorcycle would experience at most only 200,000 such cycles over the course of its life, and 508 psi is above the expected braking pressures experienced during nominal operation. Appendix at 56-57.

According to Harley, internal testing conducted on its "Touring" motorcycle line has demonstrated that roughly 60,000 cycles of accelerated durability suspension testing is representative of full-life motorcycle usage by a 95th percentile rider (*i.e.*, roughly 100,000 miles driven over 10 years). Based on this information, the suspension stroke cycling (and the consequent motion stresses imposed upon the brake hose) performed in HML's accelerated durability testing subjected brake hose assemblies to significantly more severe conditions than anticipated in Harley motorcycle use by even the most active riders. Appendix at 58, 68, 70, 75-76.

In June 2022, HML conducted an initial round of safety testing using 10 PVC Assemblies. Seven of the assemblies were subjected to 300,000 suspension stroke cycles and three were subjected to 1,000,000 suspension stroke cycles. All 10 assemblies completed the durability stroke

cycles without exhibiting leakage. The assemblies then underwent burst strength testing. The burst strength of all assemblies exceeded 15,000 psi, more than three times the FMVSS 106 burst strength requirement of 5,000 psi. Appendix at 63-68.

In July 2022, HML employees (overseen by Exponent) conducted an additional round of testing involving 12 PVC Assemblies. Nine of the assemblies completed 300,000 cycles without leaking. The remaining three assemblies developed leaks originating from the tube connector at the manifold on the fixed end of the assembly due to a test anomaly. After examining these three assemblies, Exponent concluded that the leaks were caused by the test setup, not the manufacture of the hose assembly, and that the integrity of the hose assemblies was not compromised during the test. Specifically, Exponent determined that initial test setup resulted in brake hose assemblies being pulled taut under full stroke, which placed tension on the hoses and manifold attachment not experienced in real-world applications. This added tension overstressed the exit tube on the manifold, resulting in fracture and leaks. Appendix at 68-69.

After Exponent identified issues in the test setup, HML (overseen by Exponent) tested an additional six PVC Assemblies, ensuring that the hoses were not pulled taut under full stroke. All six of the PVC Assemblies completed 300,000 test cycles without leaking or experiencing a drop in pressure. Appendix at 67-69.

After these samples completed stroke testing at HML, the 15 samples were sent to Exponent for FMVSS 106 Burst Testing and the Leakage Test. All 15 samples passed the 500 psi, five-minute and 1,000 psi, 30-second pressure holds of the Leakage Test without any leak or pressure drop observed. The samples were then pressurized until they burst, according to the FMVSS 106 S5.3.2 (Burst Strength) requirement. Here, all 15 samples passed the 4,000 psi, two-

minute pressure hold and subsequently exhibited burst strengths significantly in excess of 5,000 psi, the FMVSS 106 burst strength requirement, averaging 17,706 psi. Appendix at 69-70.

This testing is consistent with earlier accelerated hose motion related fatigue durability testing conducted by a brake system supplier. That supplier tested six hose assemblies from three different Harley motorcycle models on a suspension development fixture. One sample was subjected to 1,000,000 test cycles, four samples were subjected to 300,000 test cycles, and the remaining sample was subjected to 150,000 test cycles. No leaks or pressure drops were observed in five of the six samples during this testing. During testing of the sixth sample the fixture experienced a pressure drop and the test was stopped at 150,000 cycles. However, when the PVC Assembly was analyzed in detail, no leaks were observed in the hose assembly itself. Three of the six samples were then subjected to a 30-second pressure hold at 1,000 psi, followed by a 4,000 psi two-minute pressure hold, during which no leaks or pressure drops were observed, including the sample that had stopped testing at 150,000 cycles. Finally, the three samples were subjected to burst strength testing, and all three samples tested far exceeded the 5,000 psi burst strength minimum. Appendix at 61-63.

C. Agency Precedent and Additional Considerations Support a Finding of Inconsequentiality for the PVC Assemblies.

The results of the Safety Tests described above demonstrate that the PVC Assemblies, even after being subjected to extreme, real-world performance conditions that stress the brake hose in fatigue resistance, did not experience a loss of structural integrity or brake hose pressure drop. Appendix at 76. Accordingly, any FMVSS 106 noncompliance has no impact on the safety of the PVC Assemblies that are installed in braking systems incorporated into the Harley motorcycles. As Exponent concluded, “there is no risk to motor vehicle safety.” Appendix at 76. Because this testing demonstrates that “an occupant who is affected by the noncompliance is” not “exposed to

a significantly greater risk than an occupant in a compliant vehicle,” this Petition should be granted. *Sumitomo Rubber Industries, Inc.*, 83 Fed. Reg. 13,002, 13,003 (Mar. 26, 2018).

In similar circumstances, NHTSA has found noncompliance to be inconsequential. Most notably, in granting another FMVSS 106 petition involving brake hose assemblies, NHTSA found that “the configuration for the specific application of these brake hoses is such that a linear, end-to-end straight pull on the hose assembly is unlikely to occur.” *Coupled Products, Inc.*, 70 Fed. Reg. 35,774, 35,775 (June 21, 2005). NHTSA has thus recognized that where the real-world forces to which a brake hose is exposed are different in kind from those used for the noncompliance testing, noncompliance may be inconsequential. That is the situation here.

In addition, NHTSA granted a petition for hoses used only for truck tractors and trailers that failed to comply with oil resistance testing, finding that “excessive oil build-up will not occur and that there will be no saturation of the hoses with hot oil.” *Philatron Int’l*, 57 Fed. Reg. 26,687, 26,688 (June 15, 1992). Likewise, the PVC Assemblies at issue here will not be subjected to forces similar to that of the Whip Test, and the Exponent testing results demonstrate that the potentially non-compliant PVC Assemblies will remain fully functional, with a substantial margin of safety.

Finally, NHTSA granted another petition on appeal where brake hoses failed tensile strength testing, on the basis that the hoses (1) passed pressure cycle testing designed to simulate real-world use, and (2) demonstrated a burst strength of over 10,000 psi. *Coupled Products, Inc.*, 70 Fed. Reg. 32,397, 32,397 (June 2, 2005). The hose assemblies here were subjected to similarly rigorous testing, and demonstrated a burst strength of well above 10,000 psi.

Accordingly, the potentially non-compliant PVC Assemblies do not increase the risk to the motorcycle user, and NHTSA should find the noncompliance inconsequential.

Conclusion

For the foregoing reasons, any noncompliance with respect to the Nylon or PVC brake hose assemblies is inconsequential. HCA therefore respectfully requests that NHTSA grant this Petition.¹⁰

Respectfully submitted,



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¹⁰ Exponent and HCA are continuing to analyze the safety of these brake hose assemblies. HCA will amend or supplement this petition as appropriate.

**UNITED STATES DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION**

In re:

22E-061
Brake Hose Assemblies

November 10, 2022

**HITACHI CABLE AMERICA INC.'S SUPPLEMENTAL PETITION FOR
DETERMINATION OF INCONSEQUENTIAL NONCOMPLIANCE**

Pursuant to the National Traffic and Motor Vehicle Safety Act (“Safety Act”), 49 U.S.C. §§ 30118(d) and 30120(h), and 49 C.F.R. Part 556, Hitachi Cable America Inc. (“HCA”) submits this Supplemental Petition for Determination of Inconsequential Noncompliance (“Supplemental Petition”). Together with HCA’s August 19, 2022 Petition for Determination of Inconsequential Noncompliance (the “Original Petition”), which HCA incorporates by reference herein, this Supplemental Petition seeks an exemption from the notice and remedy requirements of 49 U.S.C. §§ 30118 and 30120 on the ground that the potential noncompliance of certain motorcycle brake hose assemblies with Federal Motor Vehicle Safety Standard 106 (“FMVSS 106” or “106”) is inconsequential to motor vehicle safety.

Background

HCA’s¹ Original Petition addressed certain nylon and PVC brake hose assemblies produced on or after May 2, 2022 for exclusive use in Harley-Davidson (“Harley”) motorcycles (the “Baseline Assemblies”). These Baseline Assemblies were identified in HCA’s July 27, 2022 Part 573 report (the “Initial 573 Report”) as potentially noncompliant with certain requirements of

¹ HCA is a corporation organized under the laws of New York, with headquarters located at 2 Manhattanville Road, Suite 301, Purchase, NY 10577. HCA’s Automotive Division is based in New Albany, Indiana.

FMVSS 106. Specifically, the Initial 573 Report stated that nylon Baseline Assemblies produced on or after May 2, 2022 were potentially noncompliant with the brake fluid compatibility (“BFC”) and high temperature impulse (“HTI”) requirements, and that PVC Baseline Assemblies produced on or after May 2, 2022 were potentially noncompliant with the whip resistance (“Whip”) and water absorption whip resistance (“Water Whip”) requirements.² On August 19, 2022, HCA filed its Original Petition regarding the Baseline Assemblies.

As indicated in the Initial 573 Report, Exponent, Inc. (“Exponent”) subsequently engaged in a review of historical FMVSS 106 testing data to assess whether nylon and PVC hoses produced prior to May 2, 2022 were also potentially noncompliant with the same four FMVSS 106 requirements (BFC, HTI, Whip, Water Whip). Based on Exponent’s extensive review of historical test results, HCA amended its Initial 573 Report on October 18, 2022 (the “Amended 573 Report”) to include (1) nylon brake hose assemblies manufactured from November 16, 2015 to April 30, 2022 (the “Past Production Nylon Assemblies”), which were identified as potentially noncompliant with the BFC, HTI, Whip, and Water Whip requirements;³ and (2) PVC brake hose assemblies manufactured from February 28, 2007 to April 30, 2022 and July 30, 2022 to October 13, 2022 (the “Past Production PVC Assemblies”), which were identified as potentially

² The Initial 573 Report also identified a category of Nylon brake hose assemblies with a revised socket design (the “Revised Nylon Assemblies”) as potentially noncompliant with the BFC and HTI requirements.

³ As discussed in Exponent’s Supplemental Technical Report, Exponent also identified limited instances of Whip and Water Whip test failures involving Past Production Nylon Assemblies. While the vast majority of the test records Exponent analyzed showed passing results, records from 2017 and 2020 included some failing Water Whip results (three out of 12 for 2017, and one out of 12 in 2020) and records for 2022 included some failing Whip and Water Whip results for Past Production Nylon Assemblies (six out of 12 and two out of 12, respectively). Supplemental Appendix at Section 2.6.

noncompliant with the Whip and Water Whip requirements. See Amended 573 Report, Attachment A1.

HCA is filing this Supplemental Petition to address the expanded scope of potentially noncompliant brake hose assemblies identified in its Amended 573 Report, which, for purposes of this Supplemental Petition, HCA refers to collectively as the “Past Production Assemblies.” The Amended 573 Report identified 5,972,187 potentially noncompliant Baseline Assemblies, Past Production Assemblies, and Revised Nylon Assemblies.

As described in HCA’s Original Petition, Exponent conducted and supervised extensive safety testing, which demonstrated that the Baseline Assemblies were safe and any noncompliance was inconsequential to motor vehicle safety. Exponent conducted and supervised similar testing on Past Production Assemblies (the “Supplemental Safety Tests”). The Supplemental Safety Tests likewise demonstrate that the Past Production Assemblies are safe and any noncompliance with the four 106 tests at issue (BFC, HTI, Whip, and Water Whip) is inconsequential to motor vehicle safety. Specifically, Exponent’s accelerated durability testing and analysis of motorcycles and data from the field show that the Past Production Assemblies are robust to very severe conditions that exceed motorcycle lifetime demands with no impact on brake performance. Details regarding Exponent’s supplemental safety testing are included in Exponent’s Technical Report in Support of HCA’s Amended Petition for Inconsequential Noncompliance (the “Supplemental Technical Report”), attached hereto as the Supplemental Appendix.

Accordingly, HCA seeks an exemption from the Safety Act’s notice and remedy requirements for all brake hose assemblies subject to Recall 22E-061 on the basis that the potential noncompliances identified—*i.e.*, potential noncompliances with Whip and Water Whip testing for all PVC hose assemblies and certain Nylon hose assemblies, as well as with HTI and BFC for

Nylon hose assemblies—are inconsequential to motor vehicle safety. In support of this Supplemental Petition, HCA relies on the test results and technical analysis attached to the Original Petition, as well as Supplemental Technical Report, as summarized below.

Legal Standard

Under the Safety Act, manufacturers who file a defect or noncompliance report are generally required to comply with the notice and remedy requirements of 49 U.S.C. §§ 30118 and 30120. However, manufacturers are exempted from these requirements when the “Secretary [of Transportation] decides a defect or noncompliance is inconsequential to motor vehicle safety.” 49 U.S.C. §§ 30118(d), 30120(h). NHTSA has promulgated procedural regulations for parties seeking a determination of inconsequential noncompliance, 49 C.F.R. Part 556, but neither the statute nor the regulations define when a noncompliance is “inconsequential.” Instead, “the agency determines whether particular noncompliance is inconsequential to motor vehicle safety based upon the specific facts before it in a particular petition.” *Toyota N. America, Inc.*, 87 Fed. Reg. 4,705, 4,707 (Jan. 28, 2022).

Under longstanding agency precedent, in evaluating a petition NHTSA focuses on “the consequence to an occupant who is exposed to the consequence of that noncompliance.” *FCA US LLC*, 87 Fed. Reg. 22,620, 22,621 (Apr. 15, 2022). The ultimate question is “whether an occupant who is affected by the noncompliance is likely to be exposed to a significantly greater risk than an occupant in a compliant vehicle.” *Sumitomo Rubber Industries, Inc.*, 83 Fed. Reg. 13,002, 13,003 (Mar. 26, 2018); *see also, e.g., Volkswagen Group of America, Inc.*, 76 Fed. Reg. 30,239, 30,240 (May 24, 2011) (same); *General Motors Corp.*, 69 Fed. Reg. 19,897, 19,900 (Apr. 14, 2004) (same).

Discussion

Consistent with its Original Petition, HCA seeks a determination of inconsequentiality on the ground that the potential FMVSS noncompliances (Whip, Water Whip, HTI, BFC) do not affect the functionality of HCA's PVC and nylon brake hose assemblies in any manner that would result in a significantly greater risk to a motorcycle rider. Supplemental Appendix at 52-54. The following sections summarize key aspects of the safety testing and analyses outlined in Exponent's Supplemental Technical Report.

I. Any Noncompliance of Past Production Nylon Assemblies Is Inconsequential To Motor Vehicle Safety.

A. Exponent's Supplemental Safety Testing Demonstrates That Any Noncompliance Is Inconsequential To Motor Vehicle Safety.

At HCA's request, Exponent conducted or supervised safety testing on well over 200 Past Production Nylon Assemblies. As described in its Supplemental Technical Report, Exponent tested a representative sample of assemblies selected from each month and year of production available in inventory. Supplemental Appendix at 15 (noting that Past Production Nylon Assemblies were available in inventory from 2018-2022). Based on the results of these safety tests, Exponent concluded that leaks resulting from BFC and HTI testing "do not present an incremental risk to motor vehicle safety over the useful lifetime of the motorcycles." Supplemental Appendix at 52. Key findings from each category of Exponent's safety testing are summarized below.

1. *Pressure and Time Sensitivity Testing*

Exponent subjected 93 Past Production Nylon Assemblies to the same pressure and time sensitivity testing performed in connection with the Original Petition, which consisted of preconditioning assemblies through HTI testing before exposing the assemblies to incremental pressure testing. Original Petition at 8-9; Supplemental Appendix at 18-19. Exponent found that,

similar to Baseline Nylon Assemblies tested in connection with the Original Petition, the Past Production Nylon Assemblies are robust to very severe conditions that exceed motorcycle lifetime demands, and any noncompliance has no impact on brake performance. Original Petition at 8-10; Supplemental Appendix at 21. Specifically, none of the Past Production Nylon Assemblies exhibited leaks or pressure drops during HTI pre-conditioning, and all 93 assemblies passed the post-conditioning constriction test. Moreover, while the Past Production Nylon Assemblies exhibited minor leaks during incremental pressure testing, none of the leaks generated a pressure loss and thus do not present a risk of brake system failure from pressure loss due to hose or hose assembly rupture. *Id.* (quoting 49 C.F.R. § 571.106, S2).

Following the incremental pressure testing, Exponent pressurized each of the Past Production Nylon Assemblies until burst. Exponent observed that, consistent with the performance of Baseline Nylon Assemblies tested in connection with the Original Petition, all of the assemblies far exceeded FMVSS 106's burst threshold of 5,000 psi, with each of the assemblies registering burst pressures above 11,800 psi. Supplemental Appendix at 20. Exponent further observed that burst pressures were comparable across the various years of production. *Id.*

2. *Lifetime Accelerated Durability Testing*

Exponent also performed accelerated durability testing on 103 Past Production Nylon Assemblies selected from each month and year of production available in inventory. Exponent conditioned the 103 assemblies through HTI testing before sending them to Element Materials Technology ("Element") for accelerated durability testing, consisting of 300,000 cycles of 0-500 psi pressure application at 0.56 Hz conducted at room temperature. Supplemental Appendix at 22-26.

Exponent did not observe leakage or pressure drops during HTI preconditioning in any of the 103 assemblies, and each of the assemblies passed post-conditioning constriction testing. *Id.*

at 23. Element reported that 94 of the 103 assemblies completed the full 300,000 pressure cycles without exhibiting “leaks, moisture, droplets, drips, or spray.” *Id.* The remaining nine assemblies all completed the full 300,000 cycles but showed signs of leakage (specifically wetness at the crimp) before completion—six at around 200,000 cycles and three at around 240,000 cycles. *Id.* Only one of 103 assemblies developed a quantifiable leak, which Element estimated to be one to three drops of fluid over approximately 60,000 pressure cycles. *Id.*

Following accelerated durability testing, Exponent subjected 90 of the assemblies that did not exhibit leaks during the 300,000 cycles to the FMVSS 106 Burst Test (S5.3.2) as well as a leak test which subjects brake hose assemblies to a five-minute hold at 500 psi, followed by a 30-second hold at 1,000 psi (“Leakage Test”).⁴ Exponent observed the following results: (i) 89 assemblies passed the 500 psi 5-minute and 1,000 psi 30-second holds without exhibiting leaks or pressure loss;⁵ (ii) 28 of the assemblies leaked during the 4,000 psi 2-minute hold phase of burst testing; (iii) nine of the assemblies leaked at 5,000 psi phase of burst testing; and (iv) 52 of the assemblies did not demonstrate a leak during testing. With respect to the assemblies that exhibited leaks, the leak volumes ranged from less than 0.1 ml to 10.5 ml over a five minute sustained pressure hold. Exponent concluded that these were “minor leaks that would not affect motorcycle brake performance.” Supplemental Appendix at 24. Moreover, all of the 90 assemblies exceeded the FMVSS 106 burst strength requirement, with an average burst strength of 11,203. *Id.*

⁴ Of the 94 assemblies that did not exhibit leaks during the 300,000 cycles, 90 were subjected to the FMVSS 106 Burst Test and the Leakage Test. The remaining four assemblies were lost in transit.

⁵ One of the assemblies was not subjected to leak and burst testing because it had a broken banjo fitting when received from Element. Exponent confirmed that the damage to the banjo fitting did not occur during pressure cycling conducted by Element.

The nine assemblies that exhibited leaks during accelerated durability testing were subsequently subjected to a modified pressure and time sensitivity test consisting of pressure-holds, based on analysis presented by Harley in its report.⁶ Specifically, Exponent performed pressure holds at 100 psi for 75 seconds, 1,499 psi for four seconds, and 2,220 psi for 0.5 to one second. Exponent did not observe leakage in any of the nine assemblies during these pressure holds. *Id.* at 24-25.

Exponent subsequently subjected these nine assemblies to pressure and time sensitivity testing. Exponent observed that eight of the nine assemblies passed each of the two-minute pressure holds from 500 psi to 3,000 psi without exhibiting leakage or pressure loss (with one assembly not exhibiting leakage during any stage of the pressure and time sensitivity testing). One of the nine assemblies exhibited a minor leak during the 2,000 psi two-minute pressure hold. When the eight assemblies that did exhibit leaks were subjected to five minutes of sustained pressure hold, the leaks were minor and would not affect motorcycle brake performance. Supplemental Appendix at 26.

3. *Constriction Testing*

As described above, Exponent's pressure and time sensitivity testing and lifetime accelerated durability testing involved preconditioning assemblies through HTI testing, following FMVSS 106 constriction testing. Although constriction testing is not required as part of HTI testing, it is required following BFC testing. As a result, because Exponent used HTI preconditioning to stress hoses for both the HTI and BFC elevated temperature conditions, Exponent

⁶ The pressure-hold combinations applied as part of this test were based on an analysis by Harley-Davidson. See Technical Report in Support of Harley-Davidson Motor Company's Petition for Determination of Inconsequential Noncompliance (Sept. 2, 2022).

conducted constriction testing following HTI preconditioning on Past Production Nylon Assemblies.

During safety testing, four out of 200 Past Production Nylon Assemblies marginally failed constriction testing following HTI preconditioning.⁷ Exponent conducted computerized tomography scanning of the four assemblies and observed that the smallest measured constriction diameter was ~1.99 millimeters, which amounts to approximately 62.3% constriction—slightly below the FMVSS 106 requirement of 64%. Supplemental Appendix at 27. Exponent and HCA are continuing to investigate this potential constriction issue and will provide NHTSA further information as necessary.

4. *Testing Following Water Absorption*

As previously noted, Exponent identified historical test records reflecting a limited number of Whip and Water Whip failures involving Past Production Nylon Assemblies. Specifically, test records showed mixed Water Whip test results in 2017, 2020, and 2022 (in total 10 failures out of 36 tests) and mixed test results in 2022 (two out of 12). Notably, records from 2022 indicate that the six Water Whip and two Whip failures involved leaks at the pre-crimp, which—as Exponent explains in its Supplemental Technical Report—is not an anticipated failure mode because the rotational test motion applied during Water Whip and Whip testing stresses the hose element, not the end fitting pre-crimp area.

While the Water Whip and Whip failures involving Past Production Nylon Assemblies were limited, Exponent performed a number of additional safety tests to assess the potential effects of water absorption on the performance of Past Production Nylon Assemblies. Specifically,

⁷ Exponent identified the manufacturing dates for the four assemblies: one in March 2021, one in January 2022, and two in February 2022.

Exponent conducted three separate tests on Past Production Nylon Assemblies produced during the same timeframe as the Whip and Water Whip test failures. All of these tests were conducted after subjecting the Past Production Nylon Assemblies to water absorption conditioning in accordance with FMVSS 106 S6.5. The assemblies were then subjected to (i) pressure and sensitivity testing, (ii) motorcycle lifetime accelerated durability testing, and (iii) accelerated durability suspension stroke testing. The results of these tests are summarized below.

a) Pressure and Sensitivity Testing

Following water absorption conditioning, Exponent subjected 24 Past Production Nylon Assemblies to pressure and sensitivity testing. Exponent observed that all 24 of the assemblies completed the 2-minute incremental pressure hold testing from 500 psi to 4,500 psi without exhibiting leakage. Twenty-three of the 24 assemblies completed the 2-minute pressure hold testing at 5,000 psi without exhibiting leakage, while one assembly exhibited a minor leak. Supplemental Appendix at 29. Moreover, each of the 24 assemblies far exceeded the FMVSS 106 burst strength requirement of 5,000 psi, bursting between 12,417 and 15,333 psi, with an average burst strength of 13,899 psi.

b) Motorcycle Lifetime Accelerated Durability Testing

Exponent preconditioned 25 Past Production Nylon Assemblies with water absorption and subjected them to 300,000 pressure cycles between 0-500 psi. None of the 25 assemblies exhibited leakage during pressure cycling. Supplemental Appendix at 29-30. In addition, none of the 25 assemblies exhibited leakage during subsequent leak testing consisting of a 500 psi 5-minute hold, 1,000 psi 30-second hold, 4,000 psi 2-minute hold, and pressurization up to 5,000 psi. Moreover, all of the 25 assemblies considerably exceeded the FMVSS 106 burst strength requirement, with burst strengths ranging from 12,289 psi to 14,991 psi and an average burst strength of 13,718 psi.

c) Accelerated Durability Suspension Stroke Testing

Finally, Exponent and Hitachi Metals, Ltd. (“HML”) conducted accelerated durability suspension stroke testing on eight Past Production Nylon Assemblies and six custom nylon assemblies similar to those used in safety testing described in Exponent’s technical report in support of the Original Petition.⁸ Each of the assemblies was preconditioned with FMVSS 106 water absorption and subjected to 300,000 suspension stroke cycles at 500 psi. None of the 14 assemblies exhibited leakage or damage to the assembly during the accelerated durability suspension stroke testing.

The 14 assemblies were then subjected to FMVSS 106 Burst Testing and the Leakage Test. None of the 14 assemblies exhibited leaks and each assembly significantly exceeded the FMVSS 106 burst strength requirement, with burst strengths ranging from 12,658 psi to 14,138 psi and an average burst strength of 13,292 psi.

Exponent is currently in the process of conducting accelerated durability suspension stroke testing following water absorption on an additional 16 Past Production Nylon Assemblies. HCA intends to submit the results of these additional tests to NHTSA after they are complete.

* * *

As described above, Exponent tested well over 200 Past Production Nylon Assemblies using five different sets of rigorous test methods. At most, minor leakage was observed in a few of these assemblies, at levels that would not compromise brake system performance. Exponent found that the Past Production Nylon Assemblies are robust to very severe conditions and present no measurable risk of brake system failure due to brake system pressure loss, hose rupture, or

⁸ The eight Past Production Nylon Assemblies were tested at Exponent’s laboratory, while the six custom nylon assemblies were tested at HML’s facility in Japan.

leakage. As a result, Exponent concluded that “the noncompliance condition resulting from leaks in the subject nylon hose assemblies . . . presents no incremental risk to motor vehicle safety.” Supplemental Appendix at 54.

B. Agency Precedent Supports a Finding of Inconsequentiality for the Past Production Nylon Assemblies.

Third-party safety test results demonstrate the robust structural integrity of the Past Production Nylon Assemblies, even after being subjected to temperature and pressure conditions beyond what the assemblies would face under worst-case real-world use conditions. These results make clear that, over long periods of use beyond the service life of a typical motorcycle, the performance of the Past Production Nylon Assemblies in real-world conditions is unaffected by the potential 106 noncompliances. Accordingly, consistent with its conclusion regarding the Baseline Nylon Assemblies, Exponent’s conclusion following its extensive safety testing is that any potential FMVSS 106 noncompliance in the Past Production Nylon Assemblies has no impact on the safety of the assemblies in real-world performance conditions. Supplemental Appendix at 54. As this testing demonstrates, an occupant who is affected by the noncompliance is not exposed to any increased risk, much less a “significantly greater risk[,] than an occupant in a compliant vehicle,” and so this petition should be granted. *Sumitomo Rubber Industries, Inc.*, 83 Fed. Reg. 13,002, 13,003 (Mar. 26, 2018).

Additional agency precedent supports granting this Supplemental Petition for the Past Production Nylon Assemblies. In circumstances similar to those presented in this case, NHTSA has granted inconsequentiality petitions based on safety testing demonstrating that a brake hose failure would not occur. *See, e.g.*, *Ford Motor Co.*, 45 Fed. Reg. 29,160, 29,161 (May 1, 1980) (corrosion test noncompliance was inconsequential because the hose did not burst until pressure reached a level much higher than that required by the standard: “No safety problem would exist

unless the end fitting were corroded to the point where they could not sustain the 5000 psi pressure required by Standard No. 106; Ford's own tests showed a bursting strength approaching 11,500 PSI."), and *Philatron Int'l*, 57 Fed. Reg. 26,687, 26,687-88 (June 15, 1992) (oil immersion testing noncompliances in air brake hose assemblies were inconsequential on the basis that the tubing burst only at 1,200 and 1,050 psi, above the relevant requirement).

NHTSA more recently granted another petition on appeal involving failed tensile strength testing, on the basis that the hoses (1) passed pressure cycle testing designed to simulate heavy real-world use, and (2) demonstrated a burst strength of over 10,000 psi. *Coupled Products, Inc.*, 70 Fed. Reg. 32,397, 32,397 (June 2, 2005). The hose assemblies here remained intact and did not experience pressure loss when subjected to similarly rigorous testing and burst near or above 10,000 psi. *See* Supplemental Appendix at 21, 25-26, 29-31.

Consistent with these precedents, and in light of the testing results described above, NHTSA should find any noncompliance identified in HCA's Amended 573 Report inconsequential for the Past Production Nylon Assemblies.

C. Additional Considerations Regarding the Underlying Potential Non-Compliance Further Support a Finding of Inconsequentiality.

As noted in the Original Petition, there are two additional considerations that support a finding of inconsequentiality here.

First, as with the Baseline Nylon Assemblies, test results identifying the potential noncompliance of Past Production Nylon Assemblies do not reflect uniform test failures. Test records for the Past Production Nylon Assemblies show mixed results, as well as certain periods of passing test results. Supplemental Appendix at 4-5. This is particularly the case with respect to the Whip and Water Whip failures, which were very limited. Supplemental Appendix at 5.

Second, only minimal leakage was observed during the testing of Past Production Nylon Assemblies, as well during testing of Baseline Nylon Assemblies in May and June 2022, and no corresponding pressure loss was observed. The brake system function is fully preserved when there is no system pressure loss and thus, the minor leaks present no incremental risk to riders. Original Petition, Appendix at 74; Supplemental Appendix at 21. Because of the minimal nature of this leakage, any noncompliance would be marginal, with no impact on structural integrity and no loss of brake pressure or performance.

As explained in HCA’s Original Petition, the relevant question for BFC and HTI testing is whether a “rupture” occurred. 49 C.F.R. § 571.106 S5.3.9, S5.3.12. A “rupture” is defined as “any failure that results in separation of a brake hose from its end fitting or in leakage.” *Id.* at S4. The term “leakage” is not defined. While NHTSA has stated that “[b]oth a small leak and a hose burst constitute ‘leakage’ under this definition,” 39 Fed. Reg. at 7,425 (Feb. 26, 1974), additional NHTSA guidance has indicated that “[t]he determining factor” in whether or not there has been a rupture is “the pressure maintained by the system.” *See* NHTSA Letter of May 27, 1987.⁹ While that guidance related to the Whip Test, the same definition of “rupture” applies throughout FMVSS 106, including for HTI and BFC testing. Moreover, the focus on pressure is consistent with the purpose of the standard, which is to prevent “brake system *failure from pressure or vacuum loss* due to hose or hose assembly rupture.” 49 C.F.R. § 571.106 S2 (emphasis added). Accordingly, because there is no pressure loss here, any noncompliance would be marginal, which weighs in favor of granting the petition. *See, e.g., Fisher-Price, Inc.*, 60 Fed. Reg., 41,151, 41,152 (Aug. 11,

⁹ Available at <https://isearch.nhtsa.gov/gm/87/nht87-1.99.html>

1995) (“[T]he margin of noncompliance is small, falling outside the standard’s maximum by less than an inch per minute.”).¹⁰

II. Any Noncompliance of Past Production PVC Assemblies Is Inconsequential To Motor Vehicle Safety.

A. Exponent’s Supplemental Safety Testing Demonstrates that Under Extreme Conditions, Any Noncompliance of the Past Production PVC Assemblies Is Inconsequential To Motor Vehicle Safety.

At HCA’s request, Exponent conducted or supervised safety testing on over 200 Past Production PVC Assemblies from each month and year of production available in inventory. Supplemental Appendix at 23 (noting that Past Production PVC Assemblies were available in inventory from 2008-2011 and 2013-2022). Moreover, Exponent surveyed and inspected Past Production PVC Assemblies from Harley motorcycles in the field for signs of fatigue. A summary of Exponent’s key findings is set forth below.

1. Accelerated Durability Suspension Stroke Testing

In light of the differences between forces incorporated in the Whip test and real-world forces to which motorcycle brake hose assemblies are exposed, Exponent designed a rigorous test to evaluate how the Baseline PVC Assemblies and Past Production PVC Assemblies would perform in the field under real-world conditions. *See id*; Original Petition, Appendix at 56-71.

To enable a high volume of tests involving Past Production PVC Assemblies from a variety of assembly designs and free lengths, Exponent fabricated a custom test fixture for accelerated durability suspension stroke testing. The testing, utilizing Exponent’s custom fixture, was conducted at Exponent’s facility in California and at HML’s facility in Japan, with assistance and

¹⁰ In *Fisher Price, Inc.*, NHTSA further noted that “the failure to meet a performance requirement by a minimal amount does not in itself support an inconsequentiality determination; each petition must be considered in the context of all relevant facts.” 60 Fed. Reg., 41,151, 41,152.

oversight from Exponent. The Past Production PVC Assemblies tested were of the same, or similar, design as the baseline PVC assemblies tested in connection with the Original Petition. Supplemental Petition at 38-40.

In this test setup, the Past Production PVC Assemblies were subjected to 300,000 full stroke suspension cycles, at a constant pressure of 500 psi. For comparison, the whip test pressure requirement is 235 psi. Importantly, a motorcycle would experience at most only 200,000 such cycles over the course of its life, and 500 psi is above the expected braking pressures experienced during nominal operation. Original Petition, Appendix at 56-57; Supplemental Appendix at 9-10.

According to Harley, internal testing conducted on its “Touring” motorcycle line has demonstrated that roughly 60,000 cycles of accelerated durability suspension testing is representative of full-life motorcycle usage by a 95th percentile rider (i.e., roughly 100,000 miles driven over 10 years). Based on this information, the suspension stroke cycling (and the consequent motion stresses imposed upon the brake hose) applied during accelerated durability suspension stroke testing subjected Past Production PVC Assemblies to significantly more severe conditions than anticipated in Harley motorcycle use by even the most active riders. Supplemental Appendix at 3, 8-9.

Exponent and HML, under Exponent’s supervision, subjected 148 Past Production PVC Assemblies to accelerated durability suspension stroke testing. Exponent observed that all of the 148 assemblies completed the full 300,000 cycles without exhibiting any signs of leakage or hose damage. Supplemental Appendix at 41. The 148 assemblies were subsequently subjected to the FMVSS 106 Burst Test and the Leakage Test. No leakage was observed at any of the pressure holds (i.e., at 500, 1,000, 4,000, and 5,000 psi), and each of the assemblies exceeded the FMVSS

106 burst strength requirement, with a range of burst strengths from 13,131 psi to 18,177 psi and an average burst strength of approximately 16,683 psi. *Id.* at 41-42.

Exponent is currently in the process of conducting accelerated durability suspension stroke testing on an additional eight Past Production PVC Assemblies. HCA intends to submit the results of these additional tests to NHTSA after they are complete.

2. *Accelerated Durability Suspension Stroke Testing Following Water Absorption*

Exponent also subjected 68 Past Production PVC Assemblies to accelerated durability suspension stroke testing after preconditioning them with water absorption in accordance with FMVSS 106 S6.5. None of the 68 assemblies demonstrated leakage or hose damage. Moreover, none of the hoses exhibited leaks at the various leak test pressure holds, and each of the 68 assemblies exceeded the FMVSS 106 burst strength requirement, with a range of burst strengths from 12,431 to 18,249 and an average burst strength of approximately 16,497.

Exponent is currently in the process of conducting accelerated durability suspension stroke testing following water absorption on an additional four Past Production PVC Assemblies. HCA intends to submit the results of these additional tests to NHTSA after they are complete.

B. The FMVSS 106 Whip Test Does Not Reflect Real-World Conditions To Which The Past Production Assemblies Are Exposed, As Further Demonstrated By Exponent's Inspection of Real-World Motorcycles.

Of critical significance for the agency's consideration of inconsequentiality, in developing the safety testing for Past Production Assemblies, Exponent took account of the fact that according to the ASTM predecessor Whip Test requirements in 106, the conditions to which the Past Production Assemblies are subjected in FMVSS 106 whip testing are different in kind from real-world conditions motorcycles experience in the most extreme conditions. As Exponent's Supplemental Technical Report demonstrates, the forces to which brake hose assemblies are

subjected in a motorcycle application are principally vertical in nature, with wheel movement from full jounce (up to the upper suspension stop) to full rebound (down to the lower suspension stop). Original Petition, Appendix at 55, 75.

In contrast, the 106 Whip Test applies substantial rotational force. This type of force does not reflect the way in which these assemblies are actually mounted or utilized on a motorcycle. *Id.* at 55. Indeed, the underlying ASTM test that was the predecessor to the NHTSA FMVSS 106 Whip Test recognized that “[t]he flexing motion imparted by the test apparatus, *while different from that to which the assembly is subjected to in service*, provides a highly accelerated method of measuring the resistance of a hose to dynamic fatigue.” ASTM D571-40T at 362 (1940) (emphasis added).

In short, while the Whip Test is sufficient to demonstrate that a brake hose assembly is resistant to dynamic fatigue, a failure to pass the Whip Test does not mean that an assembly will fail when exposed to the substantially different real-world forces that occur with use of a motorcycle.

The difference between the Whip Test and real-world use, as well as the safety of the Past Production PVC Assemblies, is further confirmed by Exponent’s inspection of 156 real-world motorcycles using the Past Production PVC Assemblies. Based on its analyses of PVC assemblies that failed Whip and Water Whip testing, Exponent determined that the root cause of these test failures was “fatigue fracture of the stainless steel wire braid due to contact with the crimp socket skirt and subsequent puncture of the polytetrafluoroethylene (PTFE) inner hose by a broken wire or wires.” Supplemental Appendix at 8. This fatigue can be observed through visual inspection of assemblies. In order to obtain real-world information about whether this fatigue actually occurs in the field, between August and October 2022, Exponent surveyed and inspected 156 Past

Production PVC Assemblies from Harley motorcycles in the field, spanning model years 2008-2020. The inspected motorcycles had varying levels of mileage, with a maximum of 129,630 miles and an average of 43,446 miles. *Id.*

The parts—consisting of front and rear Past Production PVC Assemblies—were inspected for signs of brake hose fatigue, including any evidence of leakage, hose deformation, hose damage, stainless steel wire braid fractures, or hose contact with the crimp socket skirt. Exponent did not observe signs of hose fatigue in any of the Past Production PVC Assemblies inspected. Supplemental Appendix at 34. This inspection of real-world motorcycle parts in the field—including model years dating back to 2008—provides further confirmation that the Past Production PVC Assemblies do not pose any increased safety risk to motorcycles users.

C. Agency Precedent and Additional Considerations Support a Finding of Inconsequentiality for the Past Production PVC Assemblies.

The results of the Supplemental Safety Tests conducted on over 200 Past Production PVC Assemblies, as well as the inspection of 156 real-world motorcycles described above, demonstrate that the Past Production PVC Assemblies, even after being subjected to extreme, real-world performance conditions that stress the brake hose in fatigue resistance, did not experience a loss of structural integrity or brake hose pressure drop. Supplemental Appendix at 56-57. Accordingly, the FMVSS 106 noncompliances identified in Recall 22E-061 have no impact on the safety of the Past Production PVC Assemblies that are installed in braking systems incorporated into the Harley motorcycles. As Exponent concluded, “there is no incremental risk to motor vehicle safety.” *Id.* Because this testing demonstrates that an occupant who is affected by the noncompliance is not exposed to any increased risk, much less a “significantly greater risk[,] than an occupant in a compliant vehicle,” this Petition should be granted. *Sumitomo Rubber Industries, Inc.*, 83 Fed. Reg. 13,002, 13,003 (Mar. 26, 2018).

In similar circumstances, NHTSA has found noncompliance to be inconsequential. Most notably, in granting another FMVSS 106 petition involving brake hose assemblies, NHTSA found that “the configuration for the specific application of these brake hoses is such that a linear, end-to-end straight pull on the hose assembly is unlikely to occur.” *Coupled Products, Inc.*, 70 Fed. Reg. 35,774, 35,775 (June 21, 2005). NHTSA has thus recognized that where the real-world forces to which a brake hose is exposed are different in kind from those used for the noncompliance testing, noncompliance may be inconsequential. That is the situation here.

In addition, NHTSA granted a petition for hoses used only for truck tractors and trailers that failed to comply with oil resistance testing, finding that “excessive oil build-up will not occur and that there will be no saturation of the hoses with hot oil.” *Philatron Int’l*, 57 Fed. Reg. 26,687, 26,688 (June 15, 1992). Likewise, the Past Production PVC Assemblies at issue here will not be subjected to forces similar to that of the Whip Test, and the Exponent testing results demonstrate that the potentially non-compliant Past Production PVC Assemblies will remain fully functional over a motorcycle lifespan, with a substantial margin of safety.

Finally, NHTSA granted another petition on appeal where brake hoses failed tensile strength testing, on the basis that the hoses (1) passed pressure cycle testing designed to simulate real-world use, and (2) demonstrated a burst strength of over 10,000 psi. *Coupled Products, Inc.*, 70 Fed. Reg. 32,397, 32,397 (June 2, 2005). The hose assemblies here were subjected to similarly rigorous testing, and demonstrated a burst strength of well above 10,000 psi.

Accordingly, the potentially non-compliant Past Production PVC Assemblies do not increase the risk to the motorcycle user, and NHTSA should find the noncompliance inconsequential.

III. Exponent’s Analysis Of Vehicle Owner Reports And Warranty Claims Further Supports A Finding Of Inconsequentiality.

As part of its safety review, Exponent also analyzed publicly available NHTSA Vehicle Owner Questionnaire (“VOQ”) records and available warranty claims. As discussed below, Exponent’s review did not identify any VOQ or warranty claims indicating that the potential noncompliances identified in brake hose assemblies subject to Recall 22E-061 have had an impact on motorcycle users in the field. This real-world data supports HCA’s petition. NHTSA has noted that a manufacturer “has not had any complaints or reports of incidents due to this noncompliance,” in connection with other decisions to grant inconsequentiality petitions. *Toyota Motor N. Am., Inc.*, 85 Fed. Reg. 39,679, 39,681 (July 1, 2020); *see also Maserati N. Am.*, 81 Fed. Reg. 1676, 1677 (Jan. 13, 2016) (granting petition and noting “MNA also stated that they have not received or are aware of any consumer complaints, field communications, incidences or injuries related to this noncompliance. In addition to the analysis done by MNA that looked at customer complaints, field communications, incidents or injuries related to this condition, NHTSA also conducted checks of NHTSA’s Office of Defects Investigations consumer complaint database and found no related complaints.”)¹¹

A. Vehicle Owner Questionnaires

Exponent examined publicly available Vehicle Owner Questionnaires (“VOQs”)¹² for any reports of leaks, injuries, or other incidents resulting in brake system failure involving brake hoses

¹¹ A review of HCA’s records did not identify any consumer complaints or field communications suggesting the noncompliances at issue in Recall 22E-061 have impacted vehicle safety. Nor has HCA’s review identified any incidences of accidents, injuries, or fatalities related to the noncompliances.

¹² Vehicle Owner Questionnaires are complaints submitted to NHTSA regarding potential vehicle safety problems. VOQ’s are typically submitted via the internet or telephone and include

installed in Harley motorcycles. Exponent's review did not identify any relevant VOQs indicating leaks, injuries, or other incidents.¹³ Accordingly, publicly available VOQs do not indicate that the potential noncompliances in Past Production Assemblies pose any increased risk to motorcycle riders. Supplemental Appendix at 49.

B. Warranty Data

Due to its status as a tier two supplier of original equipment, HCA generally does not have access to warranty claim information from Harley. However, because HCA previously operated as a tier one supplier to Harley, its records contain some warranty claim information for Past Production PVC Assemblies sold directly to Harley for use in model year 2010 to 2014 motorcycles.

As indicated in the Supplemental Technical Report, Exponent analyzed available warranty claims from HCA's records for any signs of Whip or Water Whip failures in the field. Exponent did not identify any information in the warranty claim records indicating that the noncompliance conditions at issue in Recall 22E-061 have caused leaks or compromised the safety of Harley motorcycle riders. Supplemental Appendix at 35-37.

Conclusion

For the foregoing reasons, any noncompliance with respect to the Nylon or PVC brake hose assemblies subject to Recall 22E-061 is inconsequential to motor vehicle safety. HCA

information about the make and model of the subject vehicle, the vehicle components involved in the complaint, and a narrative description of the complaint condition or event.

¹³ As indicated in its Supplemental Technical Report, Exponent identified a 2014 VOQ containing a generalized allegation of noncompliance, rather than a description of a safety event or incident. Supplemental Appendix at 49.

therefore respectfully requests that NHTSA grant its Original Petition, as well as its Supplemental Petition.¹⁴

Respectfully submitted,



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¹⁴ HCA will amend or supplement this petition as appropriate.

Part 573 Safety Recall Report

22E-061

Manufacturer Name : Hitachi Cable America Inc.**Submission Date :** JUL 27, 2022**NHTSA Recall No. :** 22E-061**Manufacturer Recall No. :** NR**Manufacturer Information :**

Manufacturer Name : Hitachi Cable America Inc.

Address : 5300 Grant Line Road

New Albany IN 47150

Company phone : 812-941-2757

Population :

Number of potentially involved : NR

Estimated percentage with defect : NR

Equipment Information :

Brand / Trade 1 : Hitachi Cable America Inc

Model : PVC Brake Hose Assembly

Part No. : See Attachment A

Size : See Attachment A

Function : NR

Descriptive Information : Brake hose assemblies made with an inner PTFE tube, 8-wire stainless steel braided cable layer, and an outer PVC layer (the "PVC brake hose assemblies"). The assemblies were sold for use as original equipment exclusively in motorcycles manufactured by Harley-Davidson, Inc. ("Harley"). HCA has also sold assemblies for use by Harley as service parts and as Harley-branded modular brake line kits for motorcycle customization before and after sale to first purchasers.

Production Dates : MAY 02, 2022 - JUL 16, 2022

Brand / Trade 2 : Hitachi Cable America Inc

Model : Nylon Brake Hose Assembly

Part No. : See Attachment A

Size : See Attachment A

Function : NR

Descriptive Information : Brake hose assemblies made with an inner PTFE tube, 6-wire stainless steel braided cable layer, and an outer Nylon layer (the "Nylon brake hose assemblies"). The assemblies were sold for use as original equipment exclusively in motorcycles manufactured by Harley-Davidson, Inc. ("Harley"). HCA has also sold assemblies for use by Harley as service parts and as Harley-branded modular brake line kits for motorcycle customization before and after sale to first purchasers.

Production Dates : MAY 02, 2022 - MAY 14, 2022

Brand / Trade 3 : Hitachi Cable America Inc
Model : Revised Socket Nylon Brake Hose Assembly
Part No. : See Attachment A
Size : See Attachment A
Function : NR

Descriptive Information : Certain Nylon brake hose assemblies produced after June 8, 2022 and that incorporated a revised socket design (the “revised socket Nylon brake hose assemblies”). The assemblies were sold for use as original equipment exclusively in motorcycles manufactured by Harley-Davidson, Inc. (“Harley”).

Production Dates : JUN 09, 2022 - JUL 01, 2022

Description of Noncompliance :

Description of the Noncompliance : Third party lab and company FMVSS 106 testing of Nylon (original and new socket re-design) and PVC brake hose assemblies has produced variable results. Specifically, during whip and water absorption whip tests, damage to the hose in certain PVC brake hose assemblies has been observed. During the burst testing component of brake fluid compatibility and high temperature impulse tests, marginal leaking from certain Nylon brake hose assemblies has been observed during the pressure hold portion of the tests. However, despite the marginal leakage during the pressure hold, the Nylon brake hose assemblies passed the burst testing component of the test in excess of FMVSS 106’s requirements. This mixed testing record raises the possibility of noncompliance with FMVSS 106 and, accordingly, out of an abundance of caution, HCA is filing this report.

FMVSS 1 : 106 - Brake hoses

FMVSS 2 : NR

Description of the Safety Risk : Testing has not identified any safety risks associated with the noncompliance, and HCA intends to file a petition for inconsequentiality.

Description of the Cause : The cause is under investigation.

Identification of Any Warning that can Occur : NR

Involved Components :

Component Name : NR

Component Description : NR

Component Part Number : NR

Supplier Identification :**Component Manufacturer**

Name : NR

Address : NR

NR

Country : NR

Chronology :

See Attachment B.

Description of Remedy :

Description of Remedy Program : Pursuant to 49 U.S.C. 30118(d); 30120(h); and 49 C.F.R. part 556, HCA intends to seek an exemption from the notification and remedy requirements of 49 U.S.C. Chapter 301 on the basis that the potential noncompliance disclosed in this report is inconsequential as it relates to motor vehicle safety.

How Remedy Component Differs NR
from Recalled Component :

Identify How/When Recall Condition NR
was Corrected in Production :

Recall Schedule :

Description of Recall Schedule : NR

Planned Dealer Notification Date : NR - NR

Planned Owner Notification Date : NR - NR

Purchaser Information :

The following manufacturers purchased this defective/noncompliant equipment for possible use or installation in new motor vehicles or new items of motor vehicle equipment:

Name : Harley-Davidson Motor Company (sole OEM)

Address : 3700 W. Juneau Avenue
Milwaukee WI 53201-0653

Country : US

Company Phone : 4143434056

Name : Hitachi Astemo Findlay, Inc.

Address : 1901 Industrial Drive
Findlay OH 45840

Country : US

Company Phone : 4194256725

Name : Brembo North America, Inc.

Address : 47765 Halyard Drive
Plymouth MI 48170

Country : US

Company Phone : 7344682100

Name : Whitewater Manufacturing Co.

Address : 1108 Bluff Road
Whitewater WI 53190

Country : US

Company Phone : 2624733100

* NR - Not Reported

ATTACHMENT A
Part Sizes & Part Numbers
 Hitachi Cable America Inc.
 (Submitted July 27, 2022)

Part Sizes

The part numbers listed below correspond to: (1) Nylon brake hose assemblies with design-specified hose inner diameter of 3.3 - 3.58 mm and hose free lengths between 3.33” and 56.77”; and (2) PVC brake hose assemblies with design-specified hose inner diameter of 3.25 - 3.56 mm and hose free lengths between 11.65” and 15.03”.

Part Numbers

June 10, 2022 to July 16, 2022 Production of PVC Brake Hose Assemblies:

009Z751C0-2

June 9-July 1, 2022 Production of Revised Socket Nylon Brake Hose Assemblies:

06E81105	06E81106	06E81107	06E81108	06E81109
06E81110	06E81111	06E81175	06E81176	06E81181
06E81182	06E81183	06E81184	06E81185	900S220P9B
900S220Q3B	900S220Q4B	900S220Q5C	900S220Q6	900S220Q7A
900S220R5B	900S220R7A	900S220R8B		

May 2-May 14, 2022 Production of Nylon and PVC Brake Hose Assemblies:

000S220Q1B	000S220Q3B	000S220Q4B	000S220Q5C	000S220Q6
000S220R8A	000S220T4B	06C48104	06C48105	06E02580
06E02581	06E02588	06E11000	06E11002	06E11092

Production of Nylon and PVC Brake Hose Assemblies Prior to May 2, 2022:

[HCA’s review of Nylon and PVC brake hose assemblies produced prior to May 2, 2022 is ongoing.]

ATTACHMENT B
Chronology to Part 573 Noncompliance Report
Hitachi Cable America Inc.
(Submitted July 27, 2022)

In response to a regularly-scheduled audit that indicated concerns about brake hose assemblies' compliance with FMVSS 106, HCA issued a stop shipment of potentially affected Nylon and PVC brake hose assemblies and commenced an investigation focused on FMVSS 106 testing in coordination with Exponent, Inc. ("Exponent"), a third-party engineering consultant, in May 2022. Since May 2022, Exponent and HCA have jointly conducted testing at HCA's New Albany, Indiana laboratory. Separately, HCA engaged third-party testing laboratories Element Materials Technology ("Element") and Intertek to conduct 106 testing of the brake hose assemblies. Exponent provided its findings to HCA on July 20, 2022. Based on Exponent's findings, HCA decided on July 20, 2022 that the testing of Nylon, PVC, and revised socket Nylon brake hose assemblies described below indicates that certain brake hose assemblies may be noncompliant with FMVSS 106. Out of an abundance of caution, HCA is filing this report.

PVC and Nylon Brake Hose Assemblies

Between May 5 and June 10, 2022, HCA/Exponent tested Nylon brake hose assemblies with the baseline socket design to FMVSS 106. During testing, marginal leaking was observed during the pressure hold component of some but not all brake fluid compatibility and high temperature impulse tests. Additionally, between June 3 and June 17, 2022, Element and Intertek reported results from testing of the Nylon brake hose assemblies with the baseline socket design. The testing conducted by Element returned mixed results, including two tests with all passing results. The earliest production date of the Nylon brake hose assemblies that failed testing during this period was May 2, 2022. HCA has identified a possibility that Nylon brake hose assemblies produced between May 2 and May 14, 2022 do not comply with FMVSS 106's brake fluid compatibility and high temperature impulse test requirements. With respect to Nylon brake hose assemblies produced before May 2, 2022, HCA's identification of potentially affected lots remains in progress.

Between May 5 and June 8, 2022, HCA/Exponent and Element tested PVC brake hose assemblies to FMVSS 106. During testing, PVC brake hose assemblies did not pass whip and water absorption whip tests. The earliest production date of the PVC brake hose assemblies that failed testing during this period was May 2, 2022. HCA has identified a possibility that certain PVC brake hose assemblies produced between May 2 and May 14, 2022 do not comply with FMVSS 106's whip and water absorption whip test requirements. With respect to PVC brake hose assemblies produced before May 2, 2022, HCA's identification of potentially affected lots remains in progress.

HCA resumed shipment of baseline PVC brake hose assemblies that are not subject to FMVSS 106's whip test requirement on June 8, 2022. HCA correctly included in these resumed shipments baseline PVC brake hose assemblies with free lengths that fall outside of the 10-15.5" bracket for which whip testing of brake hose assemblies with a 3.25 - 3.56 mm inner diameter is required. However, HCA also erroneously included a single PVC brake hose assembly with a

free length between 10” and 15.5” in these shipments on the mistaken understanding that it was not subject to FMVSS 106’s whip test requirement because it did not experience relative motion between both ends. Accordingly, HCA has identified a possibility that certain PVC brake hose assemblies produced between June 10, 2022 and July 16, 2022 do not comply with FMVSS 106’s whip and water absorption whip test requirements.

Revised Socket Nylon Brake Hose Assemblies

Between June 1 and June 10, 2022, HCA received passing brake fluid compatibility and high temperature impulse results from design testing conducted on the revised socket Nylon brake hose assemblies at HCA’s Indiana laboratory. On June 9, 2022, HCA received passing FMVSS 106 test results, including brake fluid compatibility and high temperature impulse tests, from Element and began production of the revised socket Nylon brake hose assemblies. However, subsequent testing conducted at Element and HCA’s Indiana laboratory between June 15, 2022 and July 6, 2022 returned mixed brake fluid compatibility and high temperature impulse test results. HCA has identified a possibility that the revised socket Nylon brake hose assemblies produced between June 9, 2022 and July 1, 2022 do not comply with FMVSS 106’s brake fluid compatibility and high temperature impulse test requirements.

HCA’s investigation is ongoing. Specifically, HCA and Exponent are reviewing HCA’s historical testing data to identify any PVC and Nylon brake hose assemblies manufactured prior to May 2, 2022 affected by potential FMVSS 106 non-compliance issues. Exponent will investigate and present to NHTSA on these issues as quickly as practicable and, as a result of the ongoing review, the information in this report may be supplemented and/or revised as necessary. In the interim, HCA has ceased shipment of the products identified as potentially noncompliant above. In their place, HCA has worked with its customers to redesign (1) PVC brake hose assemblies to integrate a heat shrink layer and to modify the socket and (2) Nylon brake hose assemblies to integrate a heat shrink layer. Testing performed by HCA/Exponent and Element showed passing test results for these revised products.

Part 573 Safety Recall Report

22E-061

Manufacturer Name : Hitachi Cable America Inc.

Submission Date : OCT 18, 2022

NHTSA Recall No. : 22E-061

Manufacturer Recall No. : NR



Manufacturer Information :

Population :

Manufacturer Name : Hitachi Cable America Inc.

Number of potentially involved : 5,965,187

Address : 5300 Grant Line Road

Estimated percentage with defect : NR

New Albany IN 47150

Company phone : 812-941-2757

Equipment Information :

Brand / Trade 1 : Hitachi Cable America Inc

Model : PVC Brake Hose Assembly

Part No. : Attachments A and A1

Size : Attachments A and A1

Function : NR

Descriptive Information : Brake hose assemblies made with an inner PTFE tube, 8-wire stainless steel braided cable layer, and an outer PVC layer (the "PVC brake hose assemblies"). The assemblies were sold for use as original equipment exclusively in motorcycles manufactured by Harley-Davidson, Inc. ("Harley"). HCA has also sold assemblies for use by Harley as service parts and as Harley-branded modular brake line kits for motorcycle customization before and after sale to first purchasers.

Production Dates : FEB 28, 2007 - OCT 13, 2022

Brand / Trade 2 : Hitachi Cable America Inc

Model : Revised Socket Nylon Brake Hose Assembly

Part No. : See Attachment A

Size : See Attachment A

Function : NR

Descriptive Information : Certain Nylon brake hose assemblies produced after June 8, 2022 and that incorporated a revised socket design (the "revised socket Nylon brake hose assemblies"). The assemblies were sold for use as original equipment exclusively in motorcycles manufactured by Harley-Davidson, Inc. ("Harley").

Production Dates : JUN 09, 2022 - JUL 01, 2022

Brand / Trade 3 : Hitachi Cable America Inc
Model : Nylon Brake Hose Assembly
Part No. : Attachments A and A1
Size : Attachments A and A1
Function : NR

Descriptive Information : Brake hose assemblies made with an inner PTFE tube, 6-wire stainless steel braided cable layer, and an outer Nylon layer (the “Nylon brake hose assemblies”). The assemblies were sold for use as original equipment exclusively in motorcycles manufactured by Harley-Davidson, Inc. (“Harley”). HCA has also sold assemblies for use by Harley as service parts and as Harley-branded modular brake line kits for motorcycle customization before and after sale to first purchasers.

Production Dates : NOV 15, 2015 - MAY 14, 2022

Description of Noncompliance :

Description of the Noncompliance : Third party lab and company FMVSS 106 testing of Nylon (original and new socket re-design) and PVC brake hose assemblies has produced variable results. Specifically, during whip and water absorption whip tests, damage to the hose in certain PVC brake hose assemblies has been observed. During the burst testing component of brake fluid compatibility and high temperature impulse tests, marginal leaking from certain Nylon brake hose assemblies has been observed during the pressure hold portion of the tests. However, despite the marginal leakage during the pressure hold, the Nylon brake hose assemblies passed the burst testing component of the test in excess of FMVSS 106’s requirements.

In addition to third party lab and company testing, a review of historical FMVSS 106 test data indicates that PVC brake hose assemblies may not comply with the whip and water absorption whip test requirements and Nylon brake hose assemblies may not comply with the brake fluid compatibility, high temperature impulse, whip and water absorption whip test requirements for certain periods.

This mixed testing record raises the possibility of noncompliance with FMVSS 106 and, accordingly, out of an abundance of caution, HCA is filing this report.

FMVSS 1 : 106 - Brake hoses

FMVSS 2 : NR

Description of the Safety Risk : Testing has not identified any safety risks associated with the noncompliance. HCA filed a petition for inconsequentiality (the “Petition”) on August 19, 2022 in connection with its initial Part 573 Report. HCA intends to file a supplement to its Petition in connection with this amended report.

Description of the Cause : The cause is under investigation.

Identification of Any Warning NR
that can Occur :

Involved Components :

Component Name : NR

Component Description : NR

Component Part Number : NR

Supplier Identification :

Component Manufacturer

Name : NR

Address : NR

NR

Country : NR

Chronology :

See Attachments B and B1.

Description of Remedy :

Description of Remedy Program : Pursuant to 49 U.S.C. 30118(d); 30120(h); and 49 C.F.R. part 556, HCA is seeking an exemption from the notification and remedy requirements of 49 U.S.C. Chapter 301 on the basis that the potential noncompliance disclosed in this report is inconsequential as it relates to motor vehicle safety.

How Remedy Component Differs NR
from Recalled Component :

Identify How/When Recall Condition NR
was Corrected in Production :

Recall Schedule :

Description of Recall Schedule : NR

Planned Dealer Notification Date : NR - NR

Planned Owner Notification Date : NR - NR

Purchaser Information :

The following manufacturers purchased this defective/noncompliant equipment for possible use or installation in new motor vehicles or new items of motor vehicle equipment:

Name : Harley-Davidson Motor Company (sole OEM)

Address : 3700 W. Juneau Avenue
Milwaukee WI 53201-0653

Country : US

Company Phone : 4143434056

Name : Whitewater Manufacturing Co.

Address : 1108 Bluff Road
Whitewater WI 53190

Country : US

Company Phone : 2624733100

Name : Brembo North America, Inc.

Address : 47765 Halyard Drive
Plymouth MI 48170

Country : US

Company Phone : 7344682100

Name : Hitachi Astemo Findlay, Inc.

Address : 1901 Industrial Drive
Findlay OH 45840

Country : US

Company Phone : 4194256725

Name : Hayes Performance Systems

Address : 5800 West Donges Bay Road
Mequon WI 53092

Country : US

Company Phone : 2622424300

* NR - Not Reported

ATTACHMENT A1
Part Sizes & Part Numbers
Hitachi Cable America Inc.
(Submitted October 18, 2022)

Part Numbers and Size

The following tables present the list of part numbers that are within the scope of HCA's Part 573 Noncompliance Report (in addition to the part numbers listed in Attachment A, filed on July 27, 2022). Table 1 lists all of the part numbers for Nylon brake hose assemblies. Tables 2 and 3 list the part numbers for PVC brake hose assemblies, separated by production date. Wherever possible, this Report relies on the lot date of each lot produced for each relevant part number. Shipment dates were used as a substitute when lot dates were unavailable or inconsistent in the HCA data.

1. November 16, 2015¹ to April 30, 2022² Production of Nylon Brake Hose Assemblies

The part numbers listed below correspond to Nylon brake hose assemblies with design-specified hose inner diameter of 3.30 – 3.58mm and hose free lengths between 3.33 and 56.77 inches.

Part Number	Part Number	Part Number	Part Number
06E02569	06E02561	41800829	06C48104
41800569	06E02563	41800809	06C48100
000S221F3	06E02502	41800803	000S220R5A
06E02516	06E02504	41800810	41800742
06E02515	06E02568	41800811	41800741
000S220P9B	41800872	41800802	41800617
41800856	41800873	06C48107_CL	41800605
000S220Q5C	41800615	41800682	41800601
000S220Q4B	41800874	41800685	41800596
06E02513	41800855	41800683	41800618
000S220P8A	06E02584	41800684	41800620
06E02512	06E02585	41800688	41800594
06E02511	06C48111	41800686	41800600
06E02519	06E02581	41800800	41800597
000S220T4B	06E02583	41800799	41800595
06E02500	06E02582	41800801	41800614
06E02501	06E02509	41800798	41800606
06E02579	06E02580	41800687	000S220R9A
000S220Q3B	06C48185	06C48107	000S220U7
000S220Q1B	06C48189	000S220T4A	000S220U8
000S220R5B	06C48188	06C48105	41800604

¹ Two shipments of Nylon brake hose assemblies were shipped on this date in 2015, before mass production began in 2016.

² The last shipment of Nylon brake hose assemblies identified in Attachment A1 was produced on April 30, 2022.

06E02588	000S220N0A	06C48103	000S220Q5A
06E02587	000S220V0	06C48106	000S220R8A
06E02586	41800824	06C48101	000S220R7A
06E02560	41800828	06C48102	000S220Q3A
000S220Q7A	41800570	000S220Q1	41800623
000S220Q4A	41800571	000S220M9	41800622
000S220Q1A	41800612	000S220N0	000S220M0
000S220Q0A	41800613	000S220N1	41800631
41800705	41800627	000S220M8	41800607
41800721	41800626	000S220N4	000S220L4
41800720	41800630	41800656	000S220L7
41800723	06W11462	41800655	000S220L3
41800722	06W11458	41800654	000S220M1
41800709	06W11459	41800637	000S220M3
41800711	06W11461	41800636	000S220L5
41800707	41800677	41800652	000S220M4
000S220P9A	41800676	41800657	000S220L9
41800738	41800678	41800667	000S220L6
41800690	41800689	41800653	000S220L8
000S220T4	41800675	000S220N5	000S220M2
000S220R5	41800674	000S220N3	41800603
000S220R6	000S220Q3	06W11474	41800602
41800704	000S220Q0	06W11464	41800598
000S220R9	000S220P8	06W11475	41800599
000S220R7	000S220Q4	06W11463	41800710
000S220R8	000S220Q5	000S2290Z	000S220Q7
41800706	000S220P9	000S2290T	000S2290Q
41800708	000S220Q6	000S220N2	

2. February 28, 2007³ to October 23, 2018 Production of PVC Brake Hose Assemblies

The part numbers listed below correspond to PVC brake hose assemblies with design-specified hose inner diameter of 3.25 – 3.56mm and hose free lengths between 2.40 and 79.75 inches, including at least one hose free length between 8.54 and 23.03 inches. Until October 24, 2018, HCA’s approved drawings for PVC brake hoses required that the hose be labeled as a 1/8 inch inner diameter brake hose. FMVSS 106’s Whip and Water Whip requirements apply to hoses marked 1/8 inch with free lengths between 8 and 24 inches.

Part Number	Part Number	Part Number	Part Number
06B95932	41800577	99-33672	06C48154
000S220Y4	41800547	000S220J5	009Z751C0-2
41800762	41800546	000S220H5	41800567

³ The first shipments of the PVC brake hose assembly shipped on February 28, 2007.

41800719	41800572	000-S22-0J5	41800566
41800718	41800542	000-S22-0H5	009Z751A5
41800717	41800541	000-S22-0G6	41800537
41800519	41800543	06C48172	009Z751C0-1
41800522	41800544	06C48178	41800316
06C48194	41800545	06C48173	41800315
06C48195	41800574	06C48179	41800357
06C48196	41800576	06C48152	41800356
06C48197	41800523	06C48153	06B95999
41800671	41800520	06C48158	06B95998
41800665	41800524	06C48159	06B95912
41800575	41800521	06C48155	06B95959
41800573	41800518	06C48156	009Z751G2
009Z751F9	009Z751A3	41800208	06B95956
009Z751F8	009Z751xA4	009Z751B4	06B95973
009Z751G3	009Z751A9	41800302	06B95930
009Z751F5	009Z751A6	41800307	06B95954
99-30244	009Z751A8	41800305	06B95953
99-30243	41800340	99-28681	06B95910
06B95958	41800313	41800306	06B95952
06B95978	41800312	009Z751A1	06B95972
06B95979	41800344	009Z751C0	06B95955
41800359	41800343	009Z751B7	41800272
41800358	009Z751F7	99-28682	41800275
41800355	009Z751B0	009Z751B6	41800274
41800354	009Z751C1	06B95975	41800268
41800397	009Z751B9	06B95976	41800269
41800396	009Z751B8	99-29669	41800271
009Z751A7	41800209	99-29670	41800291
41800298	41800143	41800193	44735-06A
99-28680	41800145	28-27324	83475-09
009Z751B5	41800170	41800175	83393-09
41700158	41800144	41800009	42388-09
41700157	41800150	41800010	42391-09
41700160	41800146	28-27319	44722-08A
41700161	41800165	28-27318	42265-08A
41800205	41800151	41800174	42021-09
41800206	41800154	41800135	42022-09
41800185	41800200	41800136	42294-08A
41800184	41800199	41800134	42020-09
41800183	28-27825	48998-10	44723-08A
41800187	41800195	38994-11	40611-09
99-28505	41800194	83656-11	40612-09

99-28503	42022-09A	46674-10	42161-09
41800147	41800013	42264-08A	40610-09
40663-08	41678-08	40611-08	40612-08
87776-08	42161-08	43350-08	40610-08
40651-08	41679-08		

3. October 24, 2018 to April 30, 2022⁴ Production of PVC Brake Hose Assemblies

The part numbers listed below correspond to PVC brake hose assemblies with design-specified hose inner diameter of 3.25 – 3.56 mm and hose free lengths between 2.40 and 58.15 inches, including at least one hose free length between 10.11 and 15.01 inches. After October 24, 2018, HCA’s approved drawing for PVC brake hoses required that hose be labeled as a 3.2 mm inner diameter brake hose. FMVSS 106’s Whip and Water Whip requirements apply to hoses marked 3.2 mm with free lengths between 10 and 15.5 inches.

Part Number	Part Number	Part Number	Part Number
06E11040	41800306	40612-09	41800340
06E11037	06B95954	44723-08A	42021-09
06E11002	42020-09	44735-06A	42294-08A
06E11000	41800356	41800566	42161-08
06E11001	42391-09	41800135	42388-09
06E11035	41800154	42264-08A	41800572
06E11092	41800136	41800145	41800544
41800537	83475-09	41800573	41800576
41800307	41800567	43350-08	41800134
41800574	06C48156	41800519	41800521
46674-10	06C48172	41800150	06D56440
40610-08	41800547	41800143	06D56405
40612-08	41800762	06D56435	41800541
40610-09	06C48173	06D56404	06D56401
41800575	06B95912	41800147	41800542
42022-09A	06B95910	06D56406	009Z751B6
41800577	06C48196	06D56439	06C48153
42161-09	06C48155	06D56403	06C48152
41800545	06C48158	06D56441	000S220Y4
41800174	06C48179	06D56438	009Z751B9
41800546	41800151	06D56402	000S220J5
000S220H5	06C48194	41800522	41800543
40611-08	06C48178	41800518	009Z751B5
41800523	06C48154	06D56437	06D56492
41800520	009Z751C0-2	06D56436	06D56400
41800524	06C48159		

⁴ The last shipment of PVC brake hose assemblies identified in Attachment A1 was produced on April 30, 2022.

4. July 30, 2022 to October 13, 2022 Production of PVC Brake Hose Assemblies:

06E81193

ATTACHMENT B1
Chronology to Part 573 Noncompliance Report
 Hitachi Cable America Inc.
 (Submitted October 18, 2022)

As indicated in Attachment B to Hitachi Cable America Inc.’s (“HCA”) Part 573 Noncompliance Report filed on July 27, 2022, Exponent, Inc. (“Exponent”) conducted a review of HCA’s historical testing data to identify any PVC and Nylon brake hose assemblies manufactured prior to May 2, 2022 potentially affected by FMVSS 106 noncompliance issues. Exponent has concluded its review, and based on Exponent’s review, HCA made a determination of potential noncompliance on October 11, 2022 covering an expanded scope of potentially noncompliant brake hose assemblies sold for use in Harley-Davidson motorcycles.

Separately, on October 17, 2022, HCA determined that it erroneously shipped a PVC brake hose assembly product produced between July 30, 2022 and October 13, 2022 that may not comply with FMVSS 106’s whip and water absorption whip test requirements.

Nylon Brake Hose Assemblies

Exponent’s findings indicate that Nylon brake hose assemblies produced during certain periods between November 16, 2015 and April 30, 2022 may not comply with FMVSS 106’s brake fluid compatibility (“BFC”), high temperature impulse (“HTI”), and, for Nylon brake hose assemblies with free lengths subject to FMVSS 106’s whip resistance (“Whip”) and water absorption whip resistance (“Water Whip”) test requirements,¹ the Whip and Water Whip requirements. As demonstrated in the chart below, Exponent’s review also identified certain periods of passing test results. However, due to the variability in results, out of an abundance of caution, HCA is identifying Nylon brake hose assemblies manufactured between November 16, 2015 and May 1, 2022 in its amended Part 573 Report.

Year	HTI	BFC	Whip	Water Whip
2016	1 Pass; 0 Fail	1 Pass; 0 Fail	4 Pass; 0 Fail	4 Pass; 0 Fail
2016	3 Pass; 1 Fail	4 Pass; 0 Fail	24 Pass; 0 Fail	12 Pass; 0 Fail
2017	n/a	3 Pass; 0 Fail	n/a	n/a
2017	3 Pass; 1 Fail	2 Pass; 2 Fail	3 Pass; 0 Fail	9 Pass; 3 Fail
2018	4 Pass; 0 Fail	2 Pass; 2 Fail	n/a	n/a
2018	0 Pass; 3 Fail	1 Pass; 2 Fail	n/a	n/a

¹ Until October 2018, HCA’s approved drawings for Nylon brake hose required that the hose be labeled as a 1/8 inch inner diameter brake hose. FMVSS 106’s Whip and Water Whip requirements apply to hoses marked 1/8 inch with free lengths between 8 and 24 inches. After October 2018, HCA’s approved drawing for Nylon brake hose required that hose be labeled as a 3.2 mm inner diameter brake hose. FMVSS 106’s Whip and Water Whip requirements apply to hoses marked 3.2 mm with free lengths between 10 and 15.5 inches. During the entire period, HCA’s approved drawings for Nylon brake hose assemblies specified that the actual inner diameter of the hose fall within a range of 3.3 - 3.58 mm.

2018	4 Pass; 8 Fail	2 Pass; 7 Fail	n/a	n/a
2018	0 Pass; 3 Fail	0 Pass; 3 Fail	n/a	n/a
2019	4 Pass; 0 Fail	4 Pass; 0 Fail	4 Pass; 0 Fail	4 Pass; 0 Fail
2020	4 Pass; 0 Fail	4 Pass; 0 Fail	12 Pass; 0 Fail	11 Pass; 1 Fail
2021	n/a	3 Pass; 0 Fail	n/a	n/a
2022	4 Pass; 0 Fail	4 Pass; 0 Fail	10 Pass; 2 Fail	6 Pass; 6 Fail

PVC Brake Hose Assemblies

Exponent’s findings also indicate that PVC brake hose assemblies that were produced between February 28, 2007 and April 30, 2022 with free lengths subject to the Whip and Water Whip test requirements² may not comply with FMVSS 106’s Whip and Water Whip test requirements. Specifically, Exponent’s review identified failing Whip and Water Whip results during this period, except for passing Whip results in 2011 and 2016. Exponent’s review did not identify failing results for the FMVSS 106 BFC or HTI tests.

HCA intends to supplement its August 19, 2022 Petition for Determination of Inconsequential Noncompliance to include the expanded scope of Nylon and PVC brake hose assemblies identified in its amended Part 573 Report.

² Until October 2018, HCA’s approved drawings for PVC brake hose required that the hose be labeled as a 1/8 inch inner diameter brake hose. FMVSS 106’s Whip and Water Whip requirements apply to hoses marked 1/8 inch with free lengths between 8 and 24 inches. After October 2018, HCA’s approved drawing for PVC brake hose required that hose be labeled as a 3.2 mm inner diameter brake hose. FMVSS 106’s Whip and Water Whip requirements apply to hoses marked 3.2 mm with free lengths between 10 and 15.5 inches. During the entire period, HCA’s approved drawings for PVC brake hose assemblies specified that the actual inner diameter of the hose fall within a range of 3.25 - 3.56 mm.

Part 573 Safety Recall Report

22E-061

Manufacturer Name : Hitachi Cable America Inc.

Submission Date : OCT 26, 2022

NHTSA Recall No. : 22E-061

Manufacturer Recall No. : NR



Manufacturer Information :

Population :

Manufacturer Name : Hitachi Cable America Inc.

Number of potentially involved : 5,972,187

Address : 5300 Grant Line Road

Estimated percentage with defect : NR

New Albany IN 47150

Company phone : 812-941-2757

Equipment Information :

Brand / Trade 1 : Hitachi Cable America Inc

Model : PVC Brake Hose Assembly

Part No. : Attachments A and A1

Size : Attachments A and A1

Function : NR

Descriptive Information : Brake hose assemblies made with an inner PTFE tube, 8-wire stainless steel braided cable layer, and an outer PVC layer (the "PVC brake hose assemblies"). The assemblies were sold for use as original equipment exclusively in motorcycles manufactured by Harley-Davidson, Inc. ("Harley"). HCA has also sold assemblies for use by Harley as service parts and as Harley-branded modular brake line kits for motorcycle customization before and after sale to first purchasers.

Production Dates : FEB 28, 2007 - OCT 13, 2022

Brand / Trade 2 : Hitachi Cable America Inc

Model : Nylon Brake Hose Assembly

Part No. : Attachments A and A1

Size : Attachments A and A1

Function : NR

Descriptive Information : Brake hose assemblies made with an inner PTFE tube, 6-wire stainless steel braided cable layer, and an outer Nylon layer (the "Nylon brake hose assemblies"). The assemblies were sold for use as original equipment exclusively in motorcycles manufactured by Harley-Davidson, Inc. ("Harley"). HCA has also sold assemblies for use by Harley as service parts and as Harley-branded modular brake line kits for motorcycle customization before and after sale to first purchasers.

Production Dates : NOV 15, 2015 - MAY 14, 2022

Brand / Trade 3 : Hitachi Cable America Inc
Model : Revised Socket Nylon Brake Hose Assembly
Part No. : See Attachment A
Size : See Attachment A
Function : NR

Descriptive Information : Certain Nylon brake hose assemblies produced after June 8, 2022 and that incorporated a revised socket design (the “revised socket Nylon brake hose assemblies”). The assemblies were sold for use as original equipment exclusively in motorcycles manufactured by Harley-Davidson, Inc. (“Harley”).

Production Dates : JUN 09, 2022 - JUL 01, 2022

Description of Noncompliance :

Description of the Noncompliance : Third party lab and company FMVSS 106 testing of Nylon (original and new socket re-design) and PVC brake hose assemblies has produced variable results. Specifically, during whip and water absorption whip tests, damage to the hose in certain PVC brake hose assemblies has been observed. During the burst testing component of brake fluid compatibility and high temperature impulse tests, marginal leaking from certain Nylon brake hose assemblies has been observed during the pressure hold portion of the tests. However, despite the marginal leakage during the pressure hold, the Nylon brake hose assemblies passed the burst testing component of the test in excess of FMVSS 106’s requirements.

In addition to third party lab and company testing, a review of historical FMVSS 106 test data indicates that PVC brake hose assemblies may not comply with the whip and water absorption whip test requirements and Nylon brake hose assemblies may not comply with the brake fluid compatibility, high temperature impulse, whip and water absorption whip test requirements for certain periods.

This mixed testing record raises the possibility of noncompliance with FMVSS 106 and, accordingly, out of an abundance of caution, HCA is filing this report.

FMVSS 1 : 106 - Brake hoses

FMVSS 2 : NR

Description of the Safety Risk : Testing has not identified any safety risks associated with the noncompliance. HCA filed a petition for inconsequentiality (the “Petition”) on August 19, 2022 in connection with its initial Part 573 Report. HCA intends to file a supplement to its Petition in connection with this amended report.

Description of the Cause : The cause is under investigation.

Identification of Any Warning that can Occur : NR

Involved Components :

Component Name : NR

Component Description : NR

Component Part Number : NR

Supplier Identification :

Component Manufacturer

Name : NR

Address : NR

NR

Country : NR

Chronology :

See Attachments B and B1.

Description of Remedy :

Description of Remedy Program : Pursuant to 49 U.S.C. 30118(d); 30120(h); and 49 C.F.R. part 556, HCA is seeking an exemption from the notification and remedy requirements of 49 U.S.C. Chapter 301 on the basis that the potential noncompliance disclosed in this report is inconsequential as it relates to motor vehicle safety.

How Remedy Component Differs from Recalled Component : NR

Identify How/When Recall Condition was Corrected in Production : NR

Recall Schedule :

Description of Recall Schedule : NR

Planned Dealer Notification Date : NR - NR

Planned Owner Notification Date : NR - NR

Purchaser Information :

The following manufacturers purchased this defective/noncompliant equipment for possible use or installation in new motor vehicles or new items of motor vehicle equipment:

Name : Harley-Davidson Motor Company (sole OEM)

Address : 3700 W. Juneau Avenue
Milwaukee WI 53201-0653

Country : US

Company Phone : 4143434056

Name : Whitewater Manufacturing Co.

Address : 1108 Bluff Road
Whitewater WI 53190

Country : US

Company Phone : 2624733100

Name : Brembo North America, Inc.

Address : 47765 Halyard Drive
Plymouth MI 48170

Country : US

Company Phone : 7344682100

Name : Hitachi Astemo Findlay, Inc.

Address : 1901 Industrial Drive
Findlay OH 45840

Country : US

Company Phone : 4194256725

Name : Hayes Performance Systems

Address : 5800 West Donges Bay Road
Mequon WI 53092

Country : US

Company Phone : 2622424300

* NR - Not Reported

Part 573 Safety Recall Report

22E-061

Manufacturer Name : Hitachi Cable America Inc.

Submission Date : NOV 16, 2022

NHTSA Recall No. : 22E-061

Manufacturer Recall No. : NR



Manufacturer Information :

Population :

Manufacturer Name : Hitachi Cable America Inc.

Number of potentially involved : 5,972,187

Address : 5300 Grant Line Road

Estimated percentage with defect : NR

New Albany IN 47150

Company phone : 812-941-2757

Equipment Information :

Brand / Trade 1 : Hitachi Cable America Inc

Model : PVC Brake Hose Assembly

Part No. : Attachments A and A1

Size : Attachments A and A1

Function : NR

Descriptive Information : Brake hose assemblies made with an inner PTFE tube, 8-wire stainless steel braided cable layer, and an outer PVC layer (the "PVC brake hose assemblies"). The assemblies were sold for use as original equipment exclusively in motorcycles manufactured by Harley-Davidson, Inc. ("Harley"). HCA has also sold assemblies for use by Harley as service parts and as Harley-branded modular brake line kits for motorcycle customization before and after sale to first purchasers.

Production Dates : FEB 28, 2007 - OCT 13, 2022

Brand / Trade 2 : Hitachi Cable America Inc

Model : Revised Socket Nylon Brake Hose Assembly

Part No. : See Attachment A

Size : See Attachment A

Function : NR

Descriptive Information : Certain Nylon brake hose assemblies produced after June 8, 2022 and that incorporated a revised socket design (the "revised socket Nylon brake hose assemblies"). The assemblies were sold for use as original equipment exclusively in motorcycles manufactured by Harley-Davidson, Inc. ("Harley").

Production Dates : JUN 09, 2022 - JUL 01, 2022

Brand / Trade 3 : Hitachi Cable America Inc

Model : Nylon Brake Hose Assembly

Part No. : Attachments A and A1

Size : Attachments A and A1

Function : NR

Descriptive Information : Brake hose assemblies made with an inner PTFE tube, 6-wire stainless steel braided cable layer, and an outer Nylon layer (the "Nylon brake hose assemblies"). The assemblies were sold for use as original equipment exclusively in motorcycles manufactured by Harley-Davidson, Inc. ("Harley"). HCA has also sold assemblies for use by Harley as service parts and as Harley-branded modular brake line kits for motorcycle customization before and after sale to first purchasers.

Production Dates : NOV 15, 2015 - MAY 14, 2022

Description of Noncompliance :

Description of the Noncompliance : Third party lab and company FMVSS 106 testing of Nylon (original and new socket re-design) and PVC brake hose assemblies has produced variable results. Specifically, during whip and water absorption whip tests, damage to the hose in certain PVC brake hose assemblies has been observed. During the burst testing component of brake fluid compatibility and high temperature impulse tests, marginal leaking from certain Nylon brake hose assemblies has been observed during the pressure hold portion of the tests. However, despite the marginal leakage during the pressure hold, the Nylon brake hose assemblies passed the burst testing component of the test in excess of FMVSS 106's requirements.

In addition to third party lab and company testing, a review of historical FMVSS 106 test data indicates that PVC brake hose assemblies may not comply with the whip and water absorption whip test requirements and Nylon brake hose assemblies may not comply with the brake fluid compatibility, high temperature impulse, whip and water absorption whip test requirements for certain periods.

This mixed testing record raises the possibility of noncompliance with FMVSS 106 and, accordingly, out of an abundance of caution, HCA is filing this report.

FMVSS 1 : 106 - Brake hoses

FMVSS 2 : NR

Description of the Safety Risk : Testing has not identified any safety risks associated with the noncompliance. HCA filed a petition for inconsequentiality (the "Petition") on August 19, 2022 in connection with its initial Part 573 Report. HCA intends to file a supplement to its Petition in connection with this amended report.

Description of the Cause : The cause is under investigation.

Identification of Any Warning NR
that can Occur :

Involved Components :

Component Name : NR

Component Description : NR

Component Part Number : NR

Supplier Identification :

Component Manufacturer

Name : NR

Address : NR

NR

Country : NR

Chronology :

See Attachments B and B1.

Description of Remedy :

Description of Remedy Program : Pursuant to 49 U.S.C. 30118(d); 30120(h); and 49 C.F.R. part 556, HCA is seeking an exemption from the notification and remedy requirements of 49 U.S.C. Chapter 301 on the basis that the potential noncompliance disclosed in this report is inconsequential as it relates to motor vehicle safety.

How Remedy Component Differs NR
from Recalled Component :

Identify How/When Recall Condition NR
was Corrected in Production :

Recall Schedule :

Description of Recall Schedule : NR

Planned Dealer Notification Date : NR - NR

Planned Owner Notification Date : NR - NR

Purchaser Information :

The following manufacturers purchased this defective/noncompliant equipment for possible use or installation in new motor vehicles or new items of motor vehicle equipment:

Name : Harley-Davidson Motor Company (sole OEM)

Address : 3700 W. Juneau Avenue
Milwaukee WI 53201-0653

Country : US

Company Phone : 4143434056

Name : Whitewater Manufacturing Co.

Address : 1108 Bluff Road
Whitewater WI 53190

Country : US

Company Phone : 2624733100

Name : Hayes Performance Systems

Address : 5800 West Donges Bay Road
Mequon WI 53092

Country : US

Company Phone : 2622424300

Name : Hitachi Astemo Findlay, Inc.

Address : 1901 Industrial Drive
Findlay OH 45840

Country : US

Company Phone : 4194256725

Name : Brembo North America, Inc.

Address : 47765 Halyard Drive
Plymouth MI 48170

Country : US

Company Phone : 7344682100

Name : Anderson Packaging, LLC

Address : PO Box 407

Butler WI 53007-0407

Country : US

Company Phone : NR

* NR - Not Reported

Part 573 Safety Recall Report

22E-061

Manufacturer Name : Hitachi Cable America Inc.

Submission Date : MAR 30, 2023

NHTSA Recall No. : 22E-061

Manufacturer Recall No. : NR



Manufacturer Information :

Manufacturer Name : Hitachi Cable America Inc.

Address : 5300 Grant Line Road

New Albany IN 47150

Company phone : 812-941-2757

Population :

Number of potentially involved : 6,174,355

Estimated percentage with defect : NR

Equipment Information :

Brand / Trade 1 : Hitachi Cable America Inc

Model : PVC Brake Hose Assembly

Part No. : Attach. A, A1, & A2

Size : Attach. A, A1, & A2

Function : NR

Descriptive Information : Certain brake hose assemblies made with an inner PTFE tube, 8-wire stainless steel braided cable layer, and an outer PVC layer (the "PVC brake hose assemblies"). The assemblies were sold for use as original equipment exclusively in motorcycles manufactured by Harley-Davidson, Inc. ("Harley"). HCA has also sold assemblies for use by Harley as service parts and as Harley-branded modular brake line kits for motorcycle customization before and after sale to first purchasers.

Production Dates : FEB 28, 2007 - OCT 13, 2022

Brand / Trade 2 : Hitachi Cable America Inc

Model : Nylon Brake Hose Assembly

Part No. : Attach. A, A1 & A2

Size : Attach. A, A1 & A2

Function : NR

Descriptive Information : Certain brake hose assemblies made with an inner PTFE tube, 6-wire stainless steel braided cable layer, and an outer Nylon layer (the "Nylon brake hose assemblies"). The assemblies were sold for use as original equipment exclusively in motorcycles manufactured by Harley. HCA has also sold assemblies for use by Harley as service parts and as Harley-branded modular brake line kits for motorcycle customization before and after sale to first purchasers.

Production Dates : NOV 15, 2015 - MAY 14, 2022

Brand / Trade 3 : Hitachi Cable America Inc
Model : Revised Socket Nylon Brake Hose Assembly
Part No. : See Attachment A
Size : See Attachment A
Function : NR

Descriptive Information : Certain Nylon brake hose assemblies produced after June 8, 2022 and that incorporated a revised socket design (the “revised socket Nylon brake hose assemblies”). The assemblies were sold for use as original equipment exclusively in motorcycles manufactured by Harley, Inc.

Production Dates : JUN 09, 2022 - JUL 01, 2022

Description of Noncompliance :

Description of the Noncompliance : Third party lab and company FMVSS 106 testing of Nylon (original and new socket re-design) and PVC brake hose assemblies has produced variable results. Specifically, during whip and water absorption whip tests, damage to the hose in certain PVC brake hose assemblies has been observed. During the burst testing component of brake fluid compatibility and high temperature impulse tests, leakage from certain Nylon brake hose assemblies has been observed during the pressure hold portion of the tests. (See Technical Report in Support of Hitachi Cable America, Inc. Petition for Inconsequential Noncompliance—FMVSS 106, Brake Hoses, p. 15). Third party testing also produced variable constriction test results involving PVC and Nylon brake hose assemblies manufactured during certain periods.

In addition to third party lab and company testing, a review of historical FMVSS 106 test data indicates that certain PVC brake hose assemblies do not comply with the whip and water absorption whip test requirements and certain Nylon brake hose assemblies do not comply with the brake fluid compatibility, high temperature impulse, whip and water absorption whip test requirements for certain periods. Moreover, a review of historical FMVSS 106 and production test data indicates that certain PVC brake hose assemblies manufactured during certain periods do not comply with the tensile, burst, and high temperature impulse test requirements.

FMVSS 1 : 106 - Brake hoses

FMVSS 2 : NR

Description of the Safety Risk : HCA filed a petition for inconsequentiality (the “Petition”) on August 19, 2022 in connection with its initial Part 573 Report, and supplemented the Petition on November 10, 2022. HCA intends to file an additional supplement to its Petition in connection with this amended report.

Description of the Cause : The cause is under third party technical investigation.

Identification of Any Warning NR
that can Occur :

Involved Components :

Component Name : NR

Component Description : NR

Component Part Number : NR

Supplier Identification :

Component Manufacturer

Name : NR

Address : NR

NR

Country : NR

Chronology :

See Attachments B, B1, and B2.

Description of Remedy :

Description of Remedy Program : Pursuant to 49 U.S.C. 30118(d); 30120(h); and 49 C.F.R. part 556, HCA is seeking an exemption from the notification and remedy requirements of 49 U.S.C. Chapter 301 on the basis that the noncompliance disclosed in this report is inconsequential as it relates to motor vehicle safety.

How Remedy Component Differs NR
from Recalled Component :

Identify How/When Recall Condition NR
was Corrected in Production :

Recall Schedule :

Description of Recall Schedule : NR

Planned Dealer Notification Date : NR - NR

Planned Owner Notification Date : NR - NR

Purchaser Information :

The following manufacturers purchased this defective/noncompliant equipment for possible use or installation in new motor vehicles or new items of motor vehicle equipment:

Name : Harley-Davidson Motor Company (sole OEM)

Address : 3700 W. Juneau Avenue
Milwaukee WI 53201-0653

Country : US

Company Phone : 4143434056

Name : Whitewater Manufacturing Co.

Address : 1108 Bluff Road
Whitewater WI 53190

Country : US

Company Phone : 2624733100

Name : Hayes Performance Systems

Address : 5800 West Donges Bay Road
Mequon WI 53092

Country : US

Company Phone : 2622424300

Name : Hitachi Astemo Findlay, Inc.

Address : 1901 Industrial Drive
Findlay OH 45840

Country : US

Company Phone : 4194256725

Name : Brembo North America, Inc.

Address : 47765 Halyard Drive
Plymouth MI 48170

Country : US

Company Phone : 7344682100

Name : Anderson Packaging, LLC

Address : PO Box 407
Butler WI 53007-0407

Country : US

Company Phone : NR

* NR - Not Reported

ATTACHMENT A2
Part Sizes & Part Numbers
Proterial Cable America, Inc.
(Submitted March 30, 2023)

Part Sizes and Numbers

The following tables present the list of part numbers that are within the scope of the noncompliances described in Attachment B2 to PCA’s Part 573 Noncompliance Report.

1. Production of Certain PVC Brake Hose Assemblies

a. Tensile

The following table lists part numbers of PVC brake hose assemblies manufactured¹ within the time periods listed in Attachment B2 that are noncompliant with FMVSS 106’s tensile requirement. The part numbers listed below correspond to PVC brake hose assemblies with design-specified hose inner diameter of 3.25 – 3.56 mm and hose free lengths between 2.40 and 67.40 inches.

Part Number	Part Number	Part Number	Part Number
06D56400	06D56402	06D56405	06D56436
06D56440	06D56441	06D56473	06D56492
009Z751B5	009Z751C2	009Z751C3	41800305
41800319	41800353	41800354	41800355
40610-09	40611-09	40612-09	41679-09
41700157	41700158	41700159	41800268
41800269	41800270	41800274	41800299
41800302	41800307	41800524	06B95910
06B95930	06B95950	06B95952	06B95953
06B95954	06B95955	06B95956	06B95970
06B95972	06B95973	06B95912	06B95957
06B95958	06B95959	06B95978	06B95979
06B95990	06B95994	06B95997	06B95998
06B95999	06C48152	06C48153	06C48154
06C48155	06C48156	06C48158	06C48159
06C48172	06C48173	06C48178	06C48179
06D56435	06D56437	41800010	41800011
41800009	41800134	41800135	41800136
41800174	41800175	42022-09A	83656-11
38937-09	42161-09	42388-09	43350-08

¹ Wherever possible, this Report relies on the lot date of each lot produced for each relevant part number. Shipment dates were used as a substitute when lot dates were unavailable or inconsistent in the PCA data.

83393-09	83475-09	40610-08	40611-08
40612-08	40651-08	40663-08	41678-08
41679-08	42161-08	42391-09	42392-09
46673-10	46674-10	38162-11	42020-09
42021-09	42022-09	42264-08A	42265-08A
42294-08A	44722-08A	44723-08A	44735-06A
87776-08	41700160	41700161	41700162
41800145	41800147	41800150	41800160
41800161	41800162	41800168	41800171
41800195	41800199	41800200	41800300
41800303	41800306	41800314	41800315
41800316	41800317	41800318	41800321
41800323	41800323A	41800340	41800343
41800396	41800397	41800671	38994-11
28-27318	28-27319	28-27324	28-27825
28-28025	99-28344	99-28503	99-28505
99-28680	99-28681	99-28682	99-29318
99-30243	99-30244	41800190	41800193
000-S22-0G6	000-S22-0G7	000S220H5	000S220J5
000S220Y0	009Z75195	009Z75196	009Z75198
009Z75199	009Z75199-1	009Z751A0	009Z751A1
009Z751B4	009Z751B6	009Z751B7	009Z751B8
009Z751B9	009Z751C0	009Z751C0-1	009Z751C0-2
009Z751C1	009Z751F2	009Z751F3	009Z751F5
009Z751F6-1	009Z751F7	009Z751F9	009Z751G0-2
009Z751G1	41800146	41800166	41800167
41800185	009Z75197	009Z751B0	

b. Burst

The following table lists part numbers of PVC brake hose assemblies manufactured within the time periods listed in Attachment B2 that are noncompliant with FMVSS 106's burst requirement. The part numbers listed below correspond to PVC brake hose assemblies with design-specified hose inner diameter of 3.25 – 3.56 mm and hose free lengths between 2.40 and 67.40 inches.

Part Number	Part Number	Part Number	Part Number
41800135	41800136	41800143	41800145
41800146	41800147	41800150	41800151
41800190	41800200	41800269	41800270
41800274	41800299	41800318	41800340
41800358	41800359	009Z75195	009Z75199
009Z751A0	009Z751A1	009Z751A3	009Z751A4
009Z751A6	009Z751A7	009Z751A8	009Z751B2
009Z751B4	009Z751B5	009Z751B6	009Z751B7

009Z751B8	009Z751B9	009Z751C0	009Z751C0-1
009Z751C1	009Z751C2	009Z751C3	009Z751F3
009Z751F5	009Z751F7	06B95910	06B95912
06B95930	06B95950	06B95952	06B95953
06B95954	06B95955	06B95956	06B95957
06B95958	06B95959	06B95970	06B95972
06B95973	06B95975	06B95976	06B95978
06B95980	28-28025	38937-09	40612-08
40612-09	42021-09	42022-09A	42264-08A
46674-10	87776-08	99-28344	99-28503
99-28505	99-28680	99-28681	99-28682
99-29318	99-29669	99-29670	99-30244
40611-08	009Z751F9		

c. Hot Impulse

The following table lists part numbers of PVC brake hose assemblies manufactured within the time period listed in Attachment B2 that are noncompliant with FMVSS 106’s hot impulse requirement. The part numbers listed below correspond to PVC brake hose assemblies with design-specified hose inner diameter of 3.25 – 3.56 mm and hose free lengths between 5.08 and 20.55 inches.

Part Number	Part Number	Part Number	Part Number
40610-08	40611-08	40612-08	40651-08
40663-08	41678-08	41679-08	42161-08
43350-08	87776-08		

2. Production of Certain PVC and Nylon Brake Hose Assemblies

The following table lists part numbers of PVC and Nylon brake hose assemblies that are noncompliant with FMVSS 106’s constriction requirement for the corresponding time period listed in Attachment B2. The part numbers listed below correspond to PVC brake hose assemblies with design-specified hose inner diameter of 3.25 – 3.56 mm and Nylon brake hose assemblies with design-specified hose inner diameter of 3.3 – 3.58 mm. The PVC and Nylon brake hose assemblies have hose free lengths between 3.33 and 54.53 inches.

Part Number	Part Number	Part Number	Part Number
000S220P8A	000S220P9B	000S220Q5C	000S220Q1B
000S220Q3B	000S220Q4B	000S220R8A	000S220Q6
000S220Q7A	000S220R5B	06C48105	000S220T4B
06C48101	06C48102	06E02580	06C48107 CL
06C48185	06E02568	000S220Y4	06E02585
06E02586	06E02588	06E11035	009Z751B5
009Z751C0-2	06D56441	06E11092	41800816 (41800810)

41800731 (41800723)	41800595 (000S220P8, 000S220Q3A, 000S220Q4A, 000S220P9A, 000S220T4A, 000S220Q5A, 000S220Q1A)
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ATTACHMENT B2
Chronology to Part 573 Noncompliance Report
Proterial Cable America, Inc.
(Submitted March 30, 2023)

As indicated in Attachment B to Proterial Cable America, Inc.'s ("PCA")¹ Part 573 Noncompliance Report filed on July 27, 2022 and Attachment B1 to PCA's Part 573 Noncompliance Report filed on October 18, 2022, PCA and Exponent, Inc. ("Exponent") conducted a review of PCA's historical FMVSS 106 testing data to identify any PVC and Nylon brake hose assemblies affected by FMVSS 106 noncompliance issues. As reflected in the Part 573 submitted on July 27, 2022 and the amendment filed on October 18, 2022, the review was initially focused on the brake hose assemblies' whip, water absorption whip, brake fluid compatibility ("BFC"), and high temperature impulse ("hot impulse") test performance. Exponent's review later expanded to PCA's records of other FMVSS 106 tests conducted on PVC and Nylon brake hose assemblies produced before May 2022, including engineering testing conducted on a periodic basis (the "Engineering Tests") and tensile, BFC, and burst testing conducted on a regular basis as part of production control (the "Production Tests").² Exponent has now concluded its review of the available Engineering Tests and Production Tests.

Based on Exponent's review, PCA made a determination on March 23, 2023 that (1) certain PVC brake hose assemblies are noncompliant with FMVSS 106's tensile, burst, and hot impulse requirements and (2) certain PVC and Nylon brake hose assemblies are noncompliant with FMVSS 106's constriction requirement. Based on a review of historical production and quality records, PCA was largely unable to confirm whether noncompliant assemblies were contained, and is filing this amended noncompliance report.

PVC brake hose assemblies

Exponent's review identified 54 relevant tensile Engineering Tests conducted between 2007 and 2020. Of these tests, three tests conducted in 2007 returned at least one failing tensile test result, and one test conducted in 2007 returned a single failing water absorption tensile test result. Exponent's review also identified tensile Production Tests conducted between 2007 and 2022, which included approximately 19,442 test results, of which 584 results did not meet FMVSS 106's tensile test requirement. These results were dated between September 13, 2007 and June 11, 2021, with approximately 91% of the failing results dating from between September 13, 2007 and June 18, 2009. Accordingly, PCA is identifying certain PVC brake hose assemblies

¹ Hitachi Cable America Inc. changed its name to Proterial Cable America, Inc. on January 4, 2023.

² Exponent reviewed Production Tests conducted on PVC, Nylon, and possibly other brake hose assembly samples. Based on PCA's review, with two possible exceptions, the failing test results pertain to PVC brake hose assembly samples produced on the crimpers identified in the chart below. With respect to these two test results, PCA is still determining whether these correspond to PVC brake hose assemblies within the scope of this Part 573.

manufactured from the beginning of production on February 28, 2007 until June 18, 2009,³ as well as certain PVC brake hose assemblies manufactured during the specified subsequent date ranges identified below as noncompliant with FMVSS 106’s tensile and water absorption tensile requirements.

Test Failure Dates⁴	Passing Test Dates⁵	Crimper
August 24, 2009	August 31, 2009	102.055
September 21, 2009	September 28, 2009	102.051
November 10, 2010	November 16, 2010	102.050
November 23, 2010	December 1, 2010	102.050
December 7, 2010	December 16, 2010	102.050
December 7, 2010	December 16, 2010	102.055
December 16, 2010	December 21, 2010	102.054
February 2, 2011	February 9, 2011	102.050
February 2, 2011	February 9, 2011	102.051
July 13, 2011	August 18, 2011	102.055
July 20, 2011	July 27, 2011	102.051
September 8, 2011	September 29, 2011	102.055
October 5, 2011	October 14, 2011	102.055
October 24, 2011	November 7, 2011	102.055
November 8, 2011	November 27, 2011	102.055
July 19, 2012	July 29, 2012	102.045
November 16, 2012	November 26, 2012	102.048
March 28, 2013	April 25, 2013	102.054
July 10, 2014	July 16, 2014	102.048
July 10, 2014	July 21, 2014	102.099
July 29, 2014	August 5, 2014	102.099
August 12, 2014	August 19, 2014	102.101
August 19, 2014	August 28, 2014	102.109
September 2, 2014	September 8, 2014	102.050
September 22, 2014	September 29, 2014	102.107
September 29, 2014	October 14, 2014	102.011
September 29, 2014	October 14, 2014	102.109
June 22, 2015	June 29, 2015	102.047
March 15, 2016	March 21, 2016	102.101
April 17, 2017	April 24, 2017	102.101
August 19, 2020	August 25, 2020	102.051

³ June 18, 2009 marks the end of the 2007 to 2009 time period in which approximately 91% of the failures occurred.

⁴ The “test failure dates” are the production dates of the brake hose assemblies that failed tensile testing.

⁵ The “passing test dates” are the production dates of the brake hose assemblies produced on the same crimper that subsequently passed tensile testing.

March 22, 2021	N/A	102.049
June 11, 2021	N/A	HHA-217A (subassembly part number)

Exponent’s review identified burst Production Tests conducted between 2009 and 2022, which included approximately 8,551 test results. 3 results did not meet FMVSS 106’s burst test requirement. These results were dated between October 12, 2013 and September 29, 2014. Accordingly, PCA is identifying certain PVC brake hose assemblies manufactured during the date ranges below as noncompliant with FMVSS 106’s burst requirement.

Test Failure Dates ⁶	Passing Test Dates ⁷	Crimper
October 12, 2013	October 20, 2013	102.047
October 20, 2013	November 8, 2013	102.046
September 29, 2014	October 7, 2014	102.109

Exponent’s review identified 14 hot impulse Engineering Tests conducted between 2007 and 2020. Of these, one Engineering Test from 2007 included three failing results. Accordingly, PCA is identifying certain PVC brake hose assemblies manufactured between August 30, 2007 and October 1, 2007⁸ as noncompliant with FMVSS 106’s hot impulse requirement.

Nylon and PVC brake hose assemblies

Separately, during safety testing conducted by Exponent in support of PCA’s November 10, 2022 supplemental petition for inconsequentiality, certain Nylon brake hose assemblies produced between March 2021 and March 2022 failed constriction testing.⁹ Exponent further analyzed the constriction performance of PVC and Nylon brake hose assemblies by, among other things, conducting constriction testing on a sample of 7,683 brake hose assemblies produced between December 29, 2020 and July 16, 2022, resulting in constriction testing of more than 34,000 end fittings (crimps). Exponent’s analysis indicates that certain brake hose assemblies produced on certain dates failed to meet FMVSS 106’s constriction requirements.

Based on the results of Exponent’s analysis, PCA is identifying certain PVC and Nylon brake hose assemblies manufactured on the following dates as noncompliant with FMVSS 106’s constriction test requirement:

⁶ The “test failure dates” are the production dates of the brake hose assemblies that failed tensile testing.

⁷ The “passing test dates” are the production dates of the brake hose assemblies produced on the same crimper that subsequently passed burst testing.

⁸ October 1, 2007 is the date of the subsequent passing hot impulse Engineering Test.

⁹ See Exponent’s November 10, 2022 Technical Report in Support of Hitachi Cable America Inc.’s Amended Petition for Inconsequential Noncompliance, at page 27.

Date ¹⁰	Part Number(s) Affected	Type
March 8, 2021	41800595 (000S220P8, 000S220Q3A, 000S220Q4A, 000S220P9A, 000S220T4A, 000S220Q5A, 000S220Q1A) ¹¹	Nylon
June 16, 2021	000S220Y4	PVC
June 17, 2021	000S220Y4	PVC
August 3, 2021	009Z751C0-2	PVC
August 16, 2021	009Z751B5	PVC
September 3, 2021	000S220P8A	Nylon
October 1, 2021	41800731 (41800723)	Nylon
November 9, 2021	000S220T4B	Nylon
November 12, 2021	000S220Q1B	Nylon
November 17, 2021	000S220T4B	Nylon
November 19, 2021	000S220T4B	Nylon
November 20, 2021	000S220T4B	Nylon
December 1, 2021	06E02568	Nylon
December 6, 2021	000S220Q4B	Nylon
December 7, 2021	06C48185	Nylon
December 20, 2021	000S220T4B	Nylon
December 30, 2021	009Z751C0-2	PVC
January 4, 2022	000S220T4B	Nylon
January 5, 2022	000S220Q1B	Nylon
January 11, 2022	000S220T4B; 41800731 (41800723)	Nylon
January 12, 2022	000S220T4B	Nylon
January 13, 2022	06D56441	PVC
February 4, 2022	000S220Q1B	Nylon
	009Z751C0-2	PVC
February 10, 2022	41800816 (41800810)	Nylon
February 17, 2022	06E02586	Nylon
February 21, 2022	000S220Q7A	Nylon
February 22, 2022	000S220Q7A	Nylon
February 23, 2022	000S220R5B	Nylon
February 24, 2022	06C48105	Nylon
February 26, 2022	000S220Q6	Nylon

¹⁰ The calculated quantity of brake hose assemblies that are noncompliant with FMVSS 106's constriction requirement consists of shipments corresponding to the production date and the date appearing on the box containing the brake hose assembly, if different.

¹¹ For certain part numbers, the part number of the brake hose assembly that failed testing as well as the part numbers shipped to customers that incorporated the failing brake hose assembly are listed.

March 3, 2022	06C48107_CL; 06E02588	Nylon
March 4, 2022	06D56441	PVC
March 14, 2022	06C48102	Nylon
March 15, 2022	06E02588	Nylon
March 16, 2022	009Z751C0-2	PVC
March 17, 2022	009Z751C0-2	PVC
March 22, 2022	000S220Q1B	Nylon
March 23, 2022	000S220Q1B	Nylon
March 25, 2022	000S220Q1B; 000S220Q4B; 06E02585; 06E02586	Nylon
March 26, 2022	000S220Q1B	Nylon
March 28, 2022	000S220Q1B; 06E02586	Nylon
March 29, 2022	000S220P9B; 000S220Q3B; 000S220Q4B; 06E02580	Nylon
March 30, 2022	000S220P9B; 06E02588	Nylon
	06E11092	PVC
March 31, 2022	000S220Q4B	Nylon
April 1, 2022	000S220R5B; 000S220T4B	Nylon
April 6, 2022	000S220P9B; 000S220Q6; 06C48101	Nylon
April 7, 2022	06E11092	PVC
April 8, 2022	000S220R5B	Nylon
April 12, 2022	06E11092	PVC
April 14, 2022	06E11092	PVC
April 18, 2022	000S220Q4B	Nylon
April 19, 2022	06E02580	Nylon
	06E11092	PVC
April 21, 2022	06E11035	PVC
April 27, 2022	000S220Q5C; 000S220R8A; 06E02580	Nylon
April 28, 2022	009Z751C0-2; 06E11092	PVC
April 29, 2022	06E11092	PVC
July 6, 2022	009Z751C0-2	PVC
July 7, 2022	009Z751C0-2	PVC
July 15, 2022	009Z751C0-2	PVC