Robert Bosch LLC
Initial Response to March 28, 2024 Information Request
NHTSA Investigation EA23001

This response to the Agency's March 28, 2024 Information Request (IR) is submitted on behalf of Robert Bosch LLC (Bosch LLC) in the above-referenced investigation. Although the IR was directed to Bosch LLC, the subject CP4 high pressure fuel pumps were designed and manufactured through Robert Bosch GmbH (Bosch GmbH) in Germany for global customers. Consequently, to best cooperate and assist NHTSA with this IR, Bosch LLC provides most of the information and responses by and through Bosch GmbH. Bosch LLC and Bosch GmbH are separate and distinct legal entities, but for convenience, collectively they are referred to as "Bosch" herein.

This response was prepared pursuant to a diligent search for the requested information. The scope of Bosch's search for responsive information focused on the locations where responsive information is most likely to be maintained and on review of Bosch files and information systems in which responsive information ordinarily would be expected to be found and to which Bosch ordinarily would refer.

To the extent that the Agency's definition of Bosch includes agents, contractors, consultants, attorneys and law firms and other persons or entities over which Bosch does not exercise day-to-day operational control, we note that information belonging to such persons or entities ordinarily is not in Bosch's possession, custody, or control. Also, Bosch is providing responsive information only insofar as such information is not subject to the attorney-client privilege or attorney work product doctrine.

Based on the broad nature of the Agency's request, the Office of Defects Investigation (ODI) agreed in a May 13, 2024 email to extend the deadline for the initial response to June 14, 2024. Additionally, ODI agreed to limit the scope of Bosch's initial response, which is explained in the relevant responses below.

Preliminary Statement

The IR defines the "Subject component" as "all CP4 high pressure fuel pump variants equipped on" various models of BMW, Ram, and Jeep vehicles. For the sake of clarity, Bosch manufactures a family of high-pressure diesel pumps known as CP4, which incorporates a modular design that permits Bosch's customers (vehicle manufacturers (OEMs) and a Tier 1 engine manufacturer)[1] to customize the fuel pump to meet the performance specifications of the customers' particular engine/vehicle system. These customizations include different combinations of internal components, such as the roller shoe, cam, roller (size and material), internal clearances of subcomponents, and tappets. Accordingly, the "Bosch CP4 high pressure fuel pump" supplied to one OEM (e.g., BMW) is not the same "CP4 high pressure fuel pump" supplied to different

[1] Unless otherwise stated, the document will use the term "OEM" to generally refer to both vehicle manufacturers and the Tier 1 engine manufacturer to which Bosch supplied CP4 fuel pumps.

OEMs (e.g., FCA). Indeed, a CP4 supplied to an OEM for a particular engine is not the same CP4 supplied to the same OEM for a vehicle platform using a different engine.

Following BMW's NHTSA Recall No. 21V586, in September 2021 Bosch sent a letter to NHTSA's Recall Management Division (RMD) that explained Bosch's position that the CP4 fuel pump supplied to BMW was not defective and meets all OEM and Bosch requirements and specifications. Bosch further explained that CP4 fuel pumps vary depending on the vehicle application, and that variances among the engine/vehicle systems (for example different engines or engine calibrations as well as other features in the system) have a significant impact on the field performance of the fuel pump. Finally, Bosch noted BMW's acknowledgment in its 573 report (21V586) that "the operation of the fuel pump is also affected by external factors." Although the CP4 fuel pump was not defective, in the interest in cooperating with NHTSA, Bosch voluntarily identified additional OEMs to which Bosch had supplied other fuel pumps from the CP4 family.

In December 2021, FCA initiated Recall No. 21V880, which identified a Bosch CP4 fuel pump as the component involved in the recall. Although different CP4 fuel pumps were supplied to BMW and FCA, in the interest of cooperating with the Agency, Bosch voluntarily submitted a defect information report under 49 CFR 573.3(f). As stated in Bosch's 573 report (NHTSA No. 21E101) and consistent with its letter to RMD in September 2021, the CP4 fuel pumps are not defective.

It was Bosch's position then – and remains Bosch's position today – that the CP4 fuel pumps are not defective. As discussed in further detail in Bosch's Responses to Requests No. 18 - 20 below, the performance of the CP4 fuel pumps is highly dependent upon the OEM-specific application, the engine/vehicle system, fuel quality, and other factors over which Bosch has no control once the pump is installed in a respective individual vehicle.

As discussed with the Agency, ODI identified certain geometric characteristics as being of interest (cam profiles and roller diameters) based on the respective customizations selected by BMW and FCA for vehicles included the subject recalls. Based on these discussions, Bosch's responses provide information related to CP4 variants with similar geometric characteristics.

Responses to NHTSA's Requests

Responses to the Agency's Requests are set forth below. As requested, after each numeric designation, we have set forth verbatim the request for information, followed by our response. Unless otherwise stated, information reflects data collected as of June 14, 2024.

Request No. 1

State the number of subject components Bosch has manufactured for subject vehicles or as replacement parts. Separately, for each subject component manufactured to date by Bosch, state the following:
a. Vehicle identification number (17-character VIN) of recipient vehicle;
b. Make of recipient vehicle;

c. Model of recipient vehicle;
d. Model Year of recipient vehicle;
e. Whether it was installed as original equipment or as replacement part;
f. Part number and design version/variant;
g. Part serial number or other identifying mark;
h. Date of manufacture of subject component (MM/DD/YYYY); and
i. Date warranty coverage commenced of subject component (MM/DD/YYYY).

Provide the information in Microsoft Access 2010, or a compatible format, entitled "PRODUCTION DATA." A pre-formatted data collection file, which provides further details regarding this submission, will be provided to you.

Response to Request No. 1

As discussed with ODI, Bosch is submitting with this response an Excel document that provides information related to specific CP4 variants with certain geometric characteristics identified by ODI as being of interest (cam profiles and roller diameters) and which were used on the pumps equipped on the recalled FCA and BMW vehicles. This response includes all OEMs to which Bosch supplied CP4 fuel pumps with these variant specifications (which may vary by both customer and customer engine types), along with vehicle platform information (to the extent Bosch has such detail) and available production/supply data.

We note that subparagraphs (a) – (e) and (i) seek vehicle-level information. As a Tier 1 (or in one case a Tier 2) component supplier, however, Bosch generally does not have such vehicle-level information.[2] For the most part, CP4 high pressure fuel pumps are customer- and engine-specific components that Bosch supplies to various identified OEMs in the U.S. and globally. Bosch is not involved with individual recipient vehicles in which the OEM chooses to install CP4 fuel pumps. Accordingly, we refer ODI to the respective OEMs for this information.

Information responsive to Request No. 1 and Request No. 14 is contained in the accompanying ZIP file, "CONF BUS INFO – EA23001 Bosch (14 Jun 2024 Initial Response).ZIP," which is being submitted with a request for confidential treatment in accordance with 49 CFR Part 512. The file includes a subfolder named "CBI – Req. Nos. 1, 14" that contains an Excel spreadsheet with responsive data. *See* CONF BUS INFO - Bosch CP4 Variant Details.xlsx.

For each series part number identified in Column C of the first tab/sheet, the second tab of the spreadsheet provides its global production volumes of the fuel pump, broken down by year and, where available, by month for each part number. Production numbers represent **global**

[2] Bosch cannot trace all of its products to a particular VIN. To the extent the OEM provides vehicle-level information for a vehicle equipped with a CP4 (e.g., for products returned from the field), it is necessarily a small subset of the overall population. Comprehensive, vehicle-level data would be more properly obtained from the respective OEMs.

production, as Bosch does not have information on which (or how many) individual pumps were installed on U.S. vehicles specifically. Likewise, Bosch cannot provide individual serial numbers for units for the U.S. market. To assist NHTSA, Bosch is providing an explanation of the CP4 label used for product tracing. *See* CONF BUS INFO – Bosch CPx Label Definition.pdf in the subfolder CBI – Req. No. 1.

Request No. 2

State the number of each of the following, received by Bosch or original equipment manufacturer (OEM) of subject vehicles, or of which Bosch is otherwise aware, which relate to, or may relate to, the alleged defect in the subject vehicles:

a. Consumer or original OEM customer complaints, including those from fleet operators;
b. Field reports, including dealer field reports;
c. Reports involving a crash, injury or fatality;
d. Property damage claims;
e. Third-party arbitration proceedings, both pending and closed, where Bosch is or was a party to the arbitration; and
f. Lawsuits, both pending and closed, in which Bosch is or was a defendant or codefendant.

For subparts "a" through "f" state the total number of each item (e.g., consumer complaints, field reports, etc.) separately. Multiple incidents involving the same vehicle are to be counted separately. Multiple reports of the same incident are also to be counted separately (i.e., a consumer complaint and a field report involving the same incident in which a crash occurred are to be counted as a crash report, a field report and a consumer complaint).

In addition, for items "c" through "f" provide a summary description of the alleged problem and causal and contributing factors and Bosch's assessment of the problem, with a summary of the significant underlying facts and evidence. For items "e" and "f" identify the parties to the action, as well as the caption, court, docket number, and date on which the complaint or other document initiating the action was filed.

Response to Request No. 2

Regarding the information requested in subpart (a), as a Tier 1 (and in one case, Tier 2) supplier, Bosch generally does not directly receive consumer or original OEM customer complaints. Rather, Bosch receives such claims only to the extent they are passed through to Bosch by the respective OEMs, as discussed in the next paragraph.

For the information requested in subpart (b), Bosch is supplying an Excel spreadsheet generated from Bosch's "IQIS" system, which catalogues parts returned to Bosch from the OEMs

for analysis and warranty-related decision making.[3] The spreadsheet contains summaries of the IQIS data for U.S. part returns. This data is described in more detail in Response to Request No. 10.

In response to subparts (c) and (d), Bosch is not aware of any claims involving allegations of a defect in the CP4 fuel pump involving a crash, injury, fatality, or property damage. To Bosch's knowledge, all claims to date have involved only allegations of commercial/financial loss.

In response to subpart (e), Bosch is not aware of any third-party arbitration proceedings, either pending or closed, where Bosch is or was a party.

In response to subpart (f), there is one commercial-loss CP4 lawsuit in which Bosch was named as a defendant. This case was resolved in a confidential settlement. The case did not include any allegation of personal injury or property damage, apart from repairs to the vehicle at issue, and Bosch denied liability. With respect to assessment of the allegations, Bosch did not have access to the component for evaluation. In addition, to Bosch's knowledge, there have been three class action lawsuits filed in which CP4 fuel pumps were a part of the claim and in which Bosch was either originally named and dropped or was not named. Responsive documents are provided in the ZIP files entitled "PUBLIC – EA23001 Bosch (14 Jun 2024 Initial Response).ZIP" and a copy of the confidential settlement in the ZIP file "CONF BUS INFO - EA23001 Bosch (14 Jun 2024 Initial Response).ZIP."

Request No. 3

Separately, for each item (complaint, report, claim, notice, or matter) within the scope of your response to Request No. 2, state the following information:

a. Bosch's file number or other identifier used;
b. Whether the report was initially received by Bosch or OEM (if OEM, provide name);
c. The category of the item, as identified in Request No. 2 (i.e., consumer complaint, field report, etc.);
d. Vehicle owner, customer, or fleet name (and fleet contact person), email address and telephone number (please use distinct fields for each data type);
e. Vehicle owner, customer, or fleet street address, city, state (postal abbreviation), and ZIP code (please use distinct fields for each data type);
f. Vehicle's 17-character VIN;
g. Vehicle's make, model and model year (please use distinct fields for each data type);
h. Vehicle's mileage at time of incident (numeric data type);
i. Incident date (MM/DD/YYYY);
j. Report or claim date (MM/DD/YYYY);
k. Whether a loss of motive power is alleged;
l. Whether a crash is alleged;

[3] The OEMs determine the number of returned parts they will send to Bosch, which will typically be a subset of the returned components.

m. Whether property damage is alleged;
n. Number of alleged injuries, if any; and
o. Number of alleged fatalities, if any.

Provide this information in Microsoft Access 2010, or a compatible format, entitled "REQUEST NUMBER TWO DATA." A pre-formatted data collection file, which provides further details regarding this submission, will be provided to you.

Response to Request No. 3

As explained in response to Request No. 2, Bosch has information responsive to subparts (b) and (f) of Request No. 2. Information responsive to Request No. 3 is contained in the documents submitted in Response to Request No. 2.

Request No. 4

Produce copies of all documents related to each item within the scope of Request No. 2. Organize the documents separately by category (i.e., consumer complaints, field reports, etc.) and describe the method Bosch used for organizing the documents. Describe in detail the search methods and search criteria used by Bosch to identify the items in response to Request No. 2.

Response to Request No. 4

See Bosch's responses to Request Nos. 2 and 3.

Request No. 5

State, by model and model year, a total count for all of the following categories of claims, collectively, that have been paid by Bosch to date that relate to, or may relate to, the alleged defect in the subject vehicles: warranty claims; extended warranty claims; claims for good will services that were provided; field, zone, or similar adjustments and reimbursements; and warranty claims or repairs made in accordance with a procedure specified in a technical service bulletin or customer satisfaction campaign.

a. Bosch's claim number;
b. Vehicle owner, customer (OEM or otherwise), or fleet name (and fleet contact person), email address and telephone number (please use distinct fields for each data type);
c. Vehicle owner, customer (OEM or otherwise), or fleet street address, city, state (postal abbreviation), and ZIP code (please use distinct fields for each data type);
d. 17-character VIN;
e. Vehicle's make/model/model year (please use distinct fields for each data type);

f. Repair date (MM/DD/YYYY);
g. Vehicle mileage at time of repair (numeric data type);
h. Repairing dealer's or facility's name, telephone number, city and state or ZIP code (please use distinct fields for each data type);
i. Problem code(s) and/or diagnostic trouble code(s);
j. Replacement part number(s) and description(s);
k. Concern stated by customer;
l. Whether customer alleges a loss of motive power;
m. Whether subject component was evaluated/analyzed by Bosch;
n. Root cause of subject component malfunction;
o. Cause as stated on the repair order;
p. Correction as stated on the repair order; and
q. Additional comments, if any, by dealer/technician relating to claim and/or repair.
Provide this information in Microsoft Access 2010, or a compatible format, entitled "WARRANTY DATA." A pre-formatted data collection file, which provides further details regarding this submission, will be provided to you.

Response to Request No. 5

Bosch interprets Request No. 5 as limited to claims made by individual vehicle owners or fleets and as not including commercial agreements between Bosch and its OEM or Tier 1 customers. For original equipment supplied to OEMs (which also includes service parts supplied to OEM customers), Bosch does not provide warranties to vehicle owners for the CP4 fuel pump and, consequently, Bosch has not paid any claims within the scope of this question.

With respect to the independent aftermarket, a review of records indicates that Bosch appears to have sold a small number of CP4 units in the U.S. into the aftermarket channel. As of the date of this response, Bosch is continuing to search for relevant information (variant details, sales numbers, and potential warranties Bosch offered to purchasers) and to evaluate responsiveness to this information request. To the extent Bosch locates additional responsive information related to CP4 variants in the independent aftermarket that were sold in the U.S., Bosch will supplement this response with the responsive information.

Request No. 6

Describe in detail the search methods and search criteria used by Bosch to identify the claims in response to Request No. 5, including the, [sic] problem codes and/or diagnostic trouble codes, part numbers and any other pertinent parameters used.

Response to Request No. 6

See response to Request No. 5.

Request No. 7

Provide a list of all, problem codes, and problem code descriptions, diagnostic trouble codes and diagnostic trouble code descriptions applicable to the alleged defect in the subject vehicles. State whether the diagnostic trouble codes are automatically reported to the warranty database electronically or manually entered into the warranty database by a claims administrator.

Response to Request No. 7

Bosch respectfully asserts that this information is more appropriately addressed to the U.S. OEMs selling subject vehicles in the US. For some OEMs, Bosch supplies the electronic control unit (ECU) and ECU software, which communicate with the vehicle's system that records problem codes and diagnostic trouble codes (DTC). But Bosch only supplies ECUs related to engine/vehicle systems in a subset of projects equipped with a CP4 variant. Regardless, DTCs are assigned by the OEMs and, therefore, Bosch does not have complete information related to problem codes and DTCs. In response to Request No. 10, Bosch is providing summaries from its IQIS database. To the extent the dealer provided trouble codes, they are included in that data.

To the extent Bosch has responsive information, the information would originate from the OEMs. Moreover, to the extent Bosch may have received such information from OEMs, that information is not consistent or necessarily complete. Bosch understands the DTCs relate to symptoms (e.g., system pressure too low). However, these codes may not relate directly to CP4 fuel pumps, and Bosch is not aware of a DTC related to the alleged defect as defined in the IR, i.e., "internal wear of subject component leading to wear particles entering the subject vehicle fuel flow."

Request No. 8

State, by make and model year, the terms of the new vehicle warranty coverage offered by Bosch on the subject vehicles and/or subject components (i.e., the number of months and mileage for which coverage is provided and the vehicle systems that are covered). Describe any extended warranty coverage option(s) that Bosch offered for the subject vehicles and/or subject components and state by option, model, and model year, the number of vehicles and components that are covered under each such extended warranty.

Response to Request No. 8

As explained in response to Request No. 5, Bosch does not provide new vehicle warranty coverage to owners. Rather, Bosch provides a warranty to its OEM or Tier 1 customers under the respective supply agreements for CP4 fuel pumps. These commercial warranty terms may vary by and for each OEM, and they often may not necessarily correlate or align with the OEM's warranty to the end-use customer. Accordingly, Bosch respectfully asserts that this request is more appropriately directed to the U.S. OEMs.

With respect to units in the independent aftermarket, see Bosch's response to Request No. 5.

Request No. 9

Produce copies of all service, warranty, and other documents that relate to, or may relate to, the alleged defect in the subject vehicles, that Bosch has issued to any customer OEMs, dealers, regional or zone offices, field offices, fleet purchasers, or other entities. This includes, but is not limited to, bulletins, advisories, informational documents, training documents, or other documents or communications, with the exception of standard shop manuals. Also include the latest draft copy of any communication that Bosch is planning to issue within the next 120 days.

Response to Request No. 9

With respect to units supplied to the OEMs, Bosch has not issued any such notices to OEMs, dealers, regional or zone offices, field offices, fleet purchasers, or other entities. (Bosch interprets this request as covering generalized notices and bulletins issued to customers rather than documents related to investigations, testing or analyses (such as 8Ds), which fall within the scope of other requests in this IR.)

With respect to units in the independent aftermarket, see Bosch's response to Request No. 5.

Request No. 10

Describe all assessments, analyses, tests, test results, studies, surveys, simulations, investigations, inquiries and/or evaluations (collectively, "actions") that relate to, or may relate to, the alleged defect in the subject vehicles or subject components that have been conducted, are being conducted, are planned, or are being planned by, or for, Bosch. For each such action, provide the following information:

a. Action title or identifier;
b. The actual or planned start date;
c. The actual or expected end date;
d. Brief summary of the subject and objective of the action;
e. Engineering group(s) responsible for designing and for conducting the action; and
f. A brief summary of the findings and/or conclusions resulting from the action.

For each action identified, provide copies of all documents related to the action, regardless of whether the documents are in interim, draft, or final form. Organize the documents chronologically by action. Group all documents related to returned parts analyses/actions into a separate folder. Provide a spreadsheet summarizing the actions related to the

returned parts, to include the following in separate columns; identifier, pump variant/subvariant, donor vehicle make/model/model year, mileage, location, whether a loss of motive power was alleged, description of how they were analyzed, reason for specific component analysis, and most likely cause of part malfunction.

Response to Request No. 10

As discussed with ODI, Bosch is providing with this Initial Response a general description of studies and assessments that have been conducted by or on behalf of Bosch related to CP4 fuel pumps, along with sample documents to assist the Agency in understanding the types of information Bosch has in its possession.

As a supplier to OEMs, Bosch does not have the same access to field performance data that OEMs have. It does not have a network of dealerships, nor does it have a direct relationship with vehicle owners. Rather, its direct relationship is with the OEM (or Tier 1 supplier). The field-performance data related to Bosch's components will necessarily come through the OEMs. Bosch's access to this data is within the OEM's discretion. Consequently, Bosch's knowledge of data such as customer complaints, field reports, warranty claims, and goodwill claims, is limited, inconsistent, and delayed.

Bosch does receive returned parts from OEMs for analysis and warranty-related decision-making. Similar to the limitations on field performance data, the number of returned parts shared with Bosch is within the OEMs' discretion and does not necessarily correlate to the vehicle population. Bosch's "IQIS" system catalogues data for these returned parts, which includes warranty-claim information (to the extent shared by the OEM), photographs, observations (both list-based and open-form), and analyses of the components.

As discussed with NHTSA, Bosch is providing an Excel spreadsheet generated from IQIS. The spreadsheet contains summaries of IQIS data for U.S. part returns, which are extracts of the IQIS data fields that fit the information requested in Req. Nos. 2, 5, 10.

Bosch is also providing sample documents underlying three analyses listed in the IQIS report. The number of parts returned to Bosch for analysis represents a subset of claims received by each OEM. The number of parts returned to Bosch for evaluation is within each OEM's discretion and varies.

These materials are being submitted with a request for confidential treatment in accordance with 49 CFR Part 512 in the file "CONF BUS INFO - EA23001 IR Bosch Response to Request No. 10." The enclosure includes a description of the columns in the table of IQIS data. Following this Initial Response, Bosch and ODI will discuss the scope of any additional production that ODI may deem necessary.

Request No. 11

Describe all modifications or changes made by, or on behalf of, Bosch in the design, material composition, manufacture, quality control, supply, or installation of the subject components, from the start of production to date, which relate to, or may relate to, the alleged defect. For each such modification or change, provide the following information:

a. The date or approximate date on which the modification or change was incorporated into production;
b. A detailed description of the modification or change;
c. The reason(s) for the modification or change;
d. The part number(s) (service and engineering) of the original component;
e. The part number(s) (service and engineering) of the modified component;
f. Whether the original unmodified component was withdrawn from production and/or sale, and if so, when;
g. When the modified component was made available as a service component; and
h. Whether the modified component can be interchanged with earlier production components.

Also, provide the above information for any modification or change that Bosch is aware of which may be incorporated into vehicle production within the next 120 days.

Response to Request No. 11

As discussed with ODI, due to the large volume of potentially responsive information, Bosch is providing with this Initial Response a general description of the relevant variations and changes made to CP4 fuel pumps, which are reflected in the Excel document, CONF BUS INFO - Bosch CP4 Variant Details.xlsx.

At a high level, Bosch works closely with its customers in the event a modification or change is made to the CP4 variant for the respective project. Changes to the production component that do not impact, or have non-significant impact, on the component's technical specifications would not involve a change in part number. Some examples of such changes may include changing the supplier of a subcomponent (without changing the technical specifications for the subcomponent). For changes that would materially impact the unit's technical specifications, a new part number is assigned, which, for example, would include changes to internal components like the roller shoe, plunger, tappet, etc. The spreadsheet provided in response to Request Nos. 1 and 14 includes details of changes to internal components made for particular projects, which can be identified by changes in part numbers for the CP4 variant used with the engine identified in column C (Series PN).

Following this Initial Response, Bosch and ODI can discuss specific part numbers that may be relevant for a more targeted and relevant search and a timeline for collecting and providing that information.

Request No. 12

Provide all documents and communications between Bosch and supplied OEMs related to the alleged defect in the subject vehicles. Organize the documents in chronological order.

Response to Request No. 12

As discussed with and agreed to by NHTSA, due to the large volume of information responsive to Request Nos. 12 and 13, Bosch is providing with this Initial Response two sample presentation as examples of the types of materials shared between Bosch and OEM customers related to CP4 fuel pumps. Following this Initial Response, Bosch and ODI can discuss the scope of any additional information that may be useful for NHTSA's evaluation and a timeline for supplemental production.

In accordance with 49 CFR Part 512, the referenced sample documents are contained in the ZIP file "CONF BUS INFO – EA23001 Bosch (14 Jun 2024 Initial Response).ZIP," in the subfolder "CBI - Req. No. 12, 13," which is being submitted with a confidential treatment request in accordance with 49 CFR Part 512.

Request No. 13

Provide all documents and communications transmitted internally within Bosch that relate to the alleged defect in the subject vehicles. Organize the documents in chronological order.

Response to Request No. 13

See Response to Request No. 12.

Request No. 14

Provide a summary of sales of the subject component, or components of substantially similar design, to OEMs and aftermarket. Organize your answer by purchaser, production month, pump variant, and make/model/model year, if applicable. For each separate purchaser provide contact information: Company name, contact person, phone number, and email address.

Response to Request No. 14

As explained in Response to Request No. 1, Bosch is providing detailed component information and production data for original equipment supplied to OEM customers (which includes service parts that were supplied to the relevant OEMs).

With respect to units in the independent aftermarket, see Bosch's response to Request No. 5.

Due to the European Union's General Data Protection Regulation (GDPR) regulations, Bosch has not provided individual contact information at this time. To the extent necessary, Bosch can identify a U.S. contact for each OEM at NHTSA's request.

Request No. 15

Provide production and assembly drawings, diagrams, schematics, or similar, (including all revisions and revision history) that describe dimensional information of subject component variants, including but not limited to the following internal subcomponents/internal structures:
a. Cams;
b. Rollers;
c. Roller shoes;
d. Filters;
e. Fluid passageways/valves;
f. Pistons;
g. Seals/gaskets; and
h. Gears.

Response to Request No. 15

As discussed with and agreed to by NHTSA, due to the large volume of information responsive to Request Nos. 15 and 16, Bosch is providing with this Initial Response sample technical documents (Technical customer document or TCDs) that relate to a Stellantis (FCA) project and to a BMW project, each involving CP4 variants subject to recall by the respective OEM.

In accordance with 49 CFR Part 512, the referenced sample documents are contained in the ZIP file "CONF BUS INFO – EA23001 Bosch (14 Jun 2024 Initial Response).ZIP," in the subfolder "CBI - Req. No. 15," which is being submitted with a confidential treatment request in accordance with 49 CFR Part 512.

Request No. 16

Provide information concerning the subject component, to include the following:
a. Design standards, specifications, or guidelines involving fuel quality characteristics;
b. Failure Mode and Effects Analysis (FMEA), or similar, related to the alleged defect; and
c. Design Verification Plan and Report (DVP&R), or similar qualification report, for the subject component.

Response to Request No. 16

See Response to Request No. 15.

Request No. 17

Provide a detailed chronology of all events relating to the alleged defect in the subject vehicles, from initial detection to the date of this Information Request letter.

Response to Request No. 17

The phrase "alleged defect" in Request No. 17 is vague. As detailed in the response to Request Nos. 18 – 20, Bosch does not agree that any variant of the CP4 fuel pump is defective. Further, the CP4 variants identified in the nine recalls listed in the second paragraph of NHTSA's information request (one BMW and eight FCA)[4] resulted from defect and safety-related determinations made by the respective OEMs. Accordingly, Bosch interprets the phrase "alleged defect" as referring to the defect determinations made by BMW and FCA involving the respective CP4 variants utilized in the vehicle populations identified by BMW and FCA.

Further, the phrase "all events" provides no logical limitation on "events" that relate to these defect determinations. As required by 49 CFR 573.5(c)(6), manufacturers submitting a defect information report must include "a chronology of *all principal events* that were the basis for the determination that the defect related to motor vehicle safety." (Emphasis added.) Accordingly, Bosch interprets the phrase "all events" in Request No. 17 to be consistent with the requirement in 573.5(c)(6) and to require "all *principal* events" that relate to the defect determinations of BMW and FCA that form the basis for alleging a defect in their recalled vehicles. Bosch respectfully refers to the chronologies provided in NHTSA Nos. 21V586, 21V880, 21E094, 22V406, 22E048, 22V767, 22E087, 23V263, and 23E032 for the material events that resulted in BMW and FCA identifying making their defect determinations. Moreover, as explained above, Bosch voluntarily submitted a defect information report (NHTSA No. 21E101) that included a chronology of events that preceded Bosch's submission.

[4] Specifically, the recalls listed by NHTSA in which the OEM named a CP4 variant as an "involved component" are NHTSA recall numbers 21V-586, 21V-880, 21E-094, 22V-406, 22E-048, 22V-767, 22E-087, 23V-263, and 23E-032.

Other than these nine recalls, Bosch is not aware of any safety-related defect determinations involving vehicles equipped with CP4 variants. To the extent the vague phrase "initial detection" includes "events" captured by the data responsive to Request Nos. 2, 5, and 11, Bosch does not believe such events constitute "initial detection" of an alleged defect within the meaning of the Safety Act.

Request No. 18

In reference to recall 22V406 Part 573 submitted by FCA,
a. Which 'internally failed component' within the subject component introduced debris into the fuel system?
i) What physical process caused these internal components to introduce debris into the fuel system?
(1) What was the cause of this physical process?
b. Provide an assessment of factors that can cause the subject component to introduce debris into the fuel system.

Response to Request No. 18

See Response to Request No. 19.

Bosch is providing additional information responsive to this request in the enclosed presentation in the file named "CONF BUS INFO - EA23001 IR Req. Nos. 18-20 Bosch Supp (14 Jun 2024).pdf," which is being submitted with a confidential treatment request in accordance with 49 CFR Part 512. *See* Subfolder "CBI - Req. Nos. 18-20" in the ZIP file "CONF BUS INFO – EA23001 Bosch (14 Jun 2024 Initial Response).ZIP."

Request No. 19

Furnish Bosch's assessment of the alleged defect in the subject vehicles, including:
a. The causal or contributory factor(s);
b. The failure mechanism(s);
c. The failure mode(s);
d. The risk to motor vehicle safety that it poses; and
e. What warnings, if any, the operator and the other persons both inside and outside the vehicle would have that the alleged defect was occurring, or subject component was malfunctioning; and
f. The reports included with this inquiry.

Response to Request No. 19

As explained in the Preliminary Statement above, CP4 high pressure fuel pumps are not "off the shelf" components that have the same geometries, specifications, etc. across all OEM customers and applications. Rather, "CP4" refers to a *family* of fuel pumps that are highly

customized for specific OEM customers and applications, varying in overall design and specifications. The specific design depends in large part on the overall fuel system and other components that the OEM decides to include. A CP4 fuel pump variant is just one component in the overall performance and effectiveness of the OEM's entire fuel system. Further, the performance of the engine/vehicle system generally, and the CP4 fuel pump specifically, is dependent on multiple factors that are outside of Bosch's control. These include but are not limited to:

- Presence of water within the tank and fuel supply system.
- Water filtration (type, system, etc.) in the individual vehicle tank and fuel supply system, if any.
- Quality of the biodiesel used by the vehicle.
- As biodiesel ages, deposits may form near the end of this aging process. While all biodiesel ages, the aging rate within the engine/vehicle system is influenced by many factors, including the usage of catalytic materials on fuel-wetted surfaces and the rate of air / oxygen exposure to the tank system. These factors need to be considered by the system integrator, i.e., the OEM.
- Temperature range of the fuel when it enters the fuel pump.
- Air and/or external particles (such as fibers and other hard particles), often originating from the upstream components.
- Piping, including size, geometry, etc., of the fuel system.

Bosch designs particular CP4 variants based upon performance requirements that are established by each OEM, and (as required by industry practices) Bosch supplies the CP4 fuel pumps with agreed-upon technical documentation that outlines the conditions and tolerances under which the fuel pump will properly operate. These operating conditions and tolerances address the factors outside of Bosch's control that the overall engine/vehicle system must account for when integrating the CP4 fuel pump into the engine/vehicle system. Specifically, Bosch's technical specifications address conditions that include the following, amongst others:

- Sufficient fuel viscosity such that a hydrodynamic layer is built up between the rotating roller and the roller shoe.
- Avoiding deposits – particularly deposits due to aged biodiesel fuel.
- Avoiding hard particles, fibers, etc. that can impact lubrication within the fuel pump and cause the roller to stick; also including sources occurring during the value stream of the OEM.
- Avoiding water, acids, and other adulterants.
- Temperature tolerances for fuel and the fuel pump.

Engine/vehicle systems that properly address these conditions and ensure the CP4 fuel pump operates within the tolerances of the technical specifications have no significant risk of performance issues during the design life of the component. For each customer identified in Bosch's responses to Req. Nos. 1 and 14, Bosch successfully validated the CP4 fuel pump features with the technical specifications at the component level. In short, the CP4 fuel pumps themselves do not contain a defect.

At the system or vehicle level, validation of CP4 fuel pumps within the overall engine/vehicle system is outside of Bosch's control. CP4 fuel pump failures that result from OEM-controlled designs of the engine/vehicle system that do not adequately ensure that the fuel pump operates within the agreed-upon technical specifications do not indicate a defect in the CP4 fuel pump itself.

The failure mechanism and modes of CP4 fuel pumps operating outside the technical specifications can result in several initial damage mechanisms. The following table outlines the main influencing factors associated with the resulting initial damage mechanisms:

Main Influencing Factor	**Corresponding Initial Damage Mechanism in the CP4 Fuel Pump**
Fuel properties entering the fuel pump (lubricity, viscosity, etc.) High fuel temperature Air in fuel or particles	Loss of hydrodynamics in the clearance between the roller and the roller shoe Damage on the roller, the roller shoe, or both
Deposits resulting from aged Biodiesel fuel	"Sticky" roller leading to braking plate on the roller
Water content in the fuel above tolerances	Corrosion or embrittlement of the cam and roller that can lead to fatigue damage

As the initial damage progresses due to the above influencing factors, metal particles may be generated from one of more of the subcomponents (the roller shoe, roller, cam, etc.). The metal particles resulting from damage to a CP4 fuel pump may then enter the fuel system and impact the performance of the fuel system and drivetrain, potentially leading to malfunctions.

Based on Bosch's analysis of parts returned from the field, pump failures in FCA and BMW vehicles indicate these OEMs installed CP4 fuel pumps into engine/vehicle systems that violate Bosch's TCDs. Indicators include a significant amount of free water in the fuel, contaminants associated with aged biodiesel, and external particles (i.e., particles that did not consist of materials in the CP4 fuel pump). Investigations of returned parts from vehicles in the recalled populations indicate that water content, deposits, and external particles exceed the agreed upon technical-boundary conditions.

Note, the information Bosch has on return rates for CP4 fuel pumps does not distinguish between replacements due to alleged fuel pump failures (or potential types of failures) and replacements for reasons other than pump failure. Bosch believes that evaluating this information is an important step in properly analyzing the performance of CP4 fuel pumps. However, this information, to the extent it exists, would be OEM data over which Bosch has no control and to which it has limited and inconsistent access. To the extent NHTSA believes this information is necessary for its evaluation, the Agency will need to request such information from the relevant OEMs to ensure more complete and consistent information.

Further, the potential impact on safety posed by the failure of the component or the vehicle's overall engine/vehicle system is more appropriately evaluated by the OEMs, which

possess the information necessary for such an evaluation. Indeed, whether a fuel pump failure is safety related within the meaning of the Safety Act depends upon the context within which such failure occurs. The context of these failures is not only outside Bosch's control, but also Bosch has minimal information to evaluate the risks to motor vehicle safety. Relevant factors include, but are not necessarily limited to, DTCs and other error codes that may trigger or provide warnings to drivers that there may be a potential issue with the fuel pump, the vehicle speeds at which failures are occurring, operational warnings (such as poor performance, significant decreases in fuel mileage, etc.) that may have been observed by owners, other performance issues prior to failure that could alert the driver to an issue, and the condition of the vehicle at the time of a failure (such as vehicle mileage, service history, region of the country in which the vehicle has primarily been operating, etc.).

Moreover, Bosch has identified many vehicle programs using CP4 fuel pumps (and multiple OEMs) in its Responses to Req. Nos. 1 and 14, and Bosch has inconsistent information for evaluating these factors. Accordingly, Bosch cannot properly evaluate the risk to motor vehicle safety in the event of a failure, nor what warning(s) may be present prior to an alleged failure.

Bosch is providing additional information responsive to this request in the enclosed presentation in the file named "CONF BUS INFO - EA23001 IR Req. Nos. 18-20 Bosch Supp (14 Jun 2024).pdf," which is being submitted with a confidential treatment request in accordance with 49 CFR Part 512. *See* Subfolder "CBI - Req. Nos. 18-20" in the ZIP file "CONF BUS INFO – EA23001 Bosch (14 Jun 2024 Initial Response).ZIP."

Request No. 20

> *Furnish a copy of all documents not specifically requested herein, which Bosch believes are relevant to, or which were used in formulating its assessment of, the alleged defect in the subject vehicles.*

Response to Request No. 20

Bosch is providing additional information responsive to this request in the enclosed presentation in the file named "CONF BUS INFO - EA23001 IR Req. Nos. 18-20 Bosch Supp (14 Jun 2024).pdf," which is being submitted with a confidential treatment request in accordance with 49 CFR Part 512. *See* Subfolder "CBI - Req. Nos. 18-20" in the ZIP file "CONF BUS INFO – EA23001 Bosch (14 Jun 2024 Initial Response).ZIP."

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