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U.S. Army Tank Automotive Research Development and Engineering Center

Warren, Michigan 48397-5000

**ABS-Compatible Brake Fluid for Military Ground Vehicle Usage –
Market Survey Responses**

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Force Projection Technology – Ground System Performance Fluids

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1. Introduction

Since 1980, US Army brake fluid use has been governed by MIL-PRF-46176, which mandates the use of silicone brake fluid (SBF) to reduce frequent fluid changes, brake failure, and brake system deterioration over time caused by the previous polyglycol based brake fluids (PBF). Use of SBF has been a huge success for Army ground vehicles; however, it does have one major drawback, and that is that it is incompatible with Anti-lock Braking Systems (ABS). As modern vehicle platforms such as HMMWV and JLTV are beginning to transition to the use of ABS, the military needs to find a brake fluid solution without revisiting the problems that plagued the US Army's use of PBF in the past.

2. Project Background

This market survey report is in support of an ongoing research effort that began in FY18 funded by the US Army Tank Automotive Research Development and Engineering Center (TARDEC) titled "Brake Fluid Standardization for Anti-Lock Braking Systems" (BFABS). The objective of this effort is to develop and evaluate a brake fluid for use in ABS and define military-specific fluid requirements to safeguard US Army ground vehicle brake systems in all environments. Thus, TARDEC wanted to identify current commercial suppliers and a market survey was developed and conducted to capture data from the industry.

The results of the market survey will be used to identify ABS-compatible brake fluid(s) to be used in this research effort. Test candidates selected from this market research will be tested for baseline performance characteristics under SAE J1703 and MIL-PRF-46176, water absorption, simulated service in an ABS, and fleet testing with Joint Project Office Joint Light Tactical Vehicle (JPO JLTV).

3. Approach

In order to reach out to the entire market, TARDEC developed a market survey which was posted for 39 days; 01MAY18 through 08JUN18. The market survey was posted on FEDBIZOPPS (www.fdo.gov) and PROCNET (<https://contracting.tacom.army.mil>).

The posted market survey consisted of two parts. Part I consisted of questions relating to operating information on the business entity. Part II consisted of questions relating directly to the brake fluid offered by the business. TARDEC's desire was to target commercial products conforming to PBF specifications (e.g. SAE J1704, FMVSS 116), as well as any products in currently in the research and development phase. In an effort to gain additional responses to the posted market survey, TARDEC contacted the following eight different companies to encourage them to respond to the posted market survey:

- BASF SE
- Third Coast Terminals, Inc.
- DowDuPont Inc.
- CCI Manufacturing IL Corp, Inc.
- Orthene Chemicals Ltd.
- Robert Bosch LLC
- Continental Teves Inc.
- Valvoline Co.

TARDEC received four responses to the survey. The posted market survey can be found in Appendix A. The responses from the companies who responded have been removed from this document as they contain proprietary information from commercial suppliers.

In addition to the posted marked survey, TARDEC also conducted an internet search for manufacturers of ABS-compatible brake fluid. The results can be found in Section 4.

The consolidation of the companies who responded to the market survey, as well as TARDEC's internet search can be also be found in Table 1 in Appendix B.

4. Discussion & Conclusion

Market Survey Results:

The following four responses were received from three companies through the market survey:

- DowDuPont Inc.
- CCI Manufacturing IL Corp, Inc.
- Orthene Chemicals Ltd. (2 responses)

Internet Search Results:

TARDEC conducted an internal internet search to identify potential ABS-compatible brake fluids for the project. Table 1 in Appendix B provides a spreadsheet of the results as obtained from the internet search, as well as the information collected from the market survey. This search, in addition to the market survey responses, identified 9 companies as having a total of 14 suitable products. One product, identified from Greening Inc., is the SAE J1703 reference fluid (TEGME) that will be used as the control for the purpose of baselining fluid properties. The spreadsheet contains the manufacturer name, product name, acknowledgement of market survey received, and fluid specification(s) met.

Conclusion:

While the market survey did not receive the level of response expected, TARDEC was able to identify current brake fluids on the market with the internet search. Products identified span a wide range of commercial brake fluid specifications include DOT, SAE, and ISO classifications. Some

of the fluids identified are for typical passenger car use, while others are designed for high performance vehicles or specifically formulated for use in ABS. The range of products identified will provide a good cross section of products available on the market that could be ideal solutions for Army ground vehicle application.

5. Appendix A – Posted Market Survey

Request for Information/Market Survey

ABS-Compatible Brake Fluid for Military Ground Vehicle Usage

DESCRIPTION OF INTENT:

THIS IS A REQUEST FOR INFORMATION (RFI), A MARKET SURVEY REQUEST IN SUPPORT OF THE FOLLOWING STUDY. No contract will be awarded from this announcement. This is not a Request for Proposal (RFP) or an announcement of a forthcoming solicitation, nor is it a request seeking Offerors to be placed on a solicitation mailing list. Response to this survey is voluntary and no reimbursement will be made for any costs associated with providing information in response to this market survey and any follow-up information requests. No solicitation document exists at this time, and calls requesting a solicitation will not be answered.

STUDY:

The U.S. Army Tank and Automotive Research, Development and Engineering Center (TARDEC) is conducting a market survey to identify commercial polyglycol-based brake fluids on the market that are compatible with Anti-lock Brake Systems (ABS) and meet strict military performance requirements. It is critical to identify the wide variety of brake fluids (BFs) available on the market in order to support the Army's fleet of ground vehicles and ground support equipment. Information on products in development that could meet these requirements would be welcome. The intent of the market survey is to identify sources of supply. These sources may be commercially available or under development.

MARKET SURVEY QUESTIONS:

Part I. Business Information:

1. Company Name:
2. Type and Size of Business:
3. Manufacturer:
4. CAGE Code:
5. Company Point of Contact:
 - a. Name:
 - b. Title:
 - c. Telephone:
 - d. Email address:
6. Business Address:
7. Web page URL:
8. Approved site certifications (e.g. ISO 14001):

Part II. BF Survey Questions:

Section a. Basic Technical Information

1. BF Product Name(s):
2. Is the product(s) polyglycol based?
3. Does your product(s) contain borate ester?
4. Are any of the components of the product(s) hazardous/toxic? If so, please provide explanation and toxicity information.
5. What color is the product(s)?
6. What are the recommended service intervals for the product(s) (e.g. checking levels, draining and refilling)?
7. How often should the service be completed in terms of time and/or mileage?
8. What types of tests would you conduct to determine if the product(s) need to be serviced or changed out?
9. What is the shelf-life?
10. Has any performance specification or standard testing been completed on the product(s) (e.g. OEM-specific, SAE, ASTM, DOT)? If so, please list the specification(s) and/or standard(s).
11. Can the product(s) be used down to -55°C?

Section b. Marketing Information

12. Who are the typical users of your product(s)?
13. Has the military ever purchased your product(s)?
14. How is the product(s) packaged (i.e. what type of containers and in what sizes)?
15. What is the unit cost of each package size?
16. Is the product(s) readily available in the commercial market? If so, where is it manufactured?
17. If the product(s) is manufactured outside of the United States, can it be shipped to the United States for testing?
18. Can the product(s) be shipped overseas?
19. Please provide Safety Data Sheets (SDS) and technical documents (e.g. test results, spec sheet) pertaining to the product(s).

RESPONSES DUE:

Responses to this market survey are DUE BY 08 June 2018. Please submit all completed questionnaires and any questions you may have via email to: Mr. Zackery Schroeder, US Army TARDEC, zackery.j.schroeder.civ@mail.mil.

Please format the subject line of the response email as follows: “[Organization Name] response to Request for Information – ABS-Compatible Brake Fluid for Military Ground Vehicle Usage” Provide the email responses in PDF format. Only electronic responses will be accepted. All interested parties and organizations are encouraged to respond to this request for information. All material submitted in response to this RFI must be unclassified and properly marked. No manufacturer/distributor shall be given a copy of another manufacture’s/distributor’s product information collected in this survey. TARDEC will use the information gathered for studying and investigating the current available BFs to potentially introduce to the Army’s fleet of vehicles and equipment.

6. Appendix B – Consolidation of Market Survey Results

Table 1: Market Survey Results			
Manufacturer	Product Name	Market Survey Received?	Spec Conformance
DowDuPont	DBF 565	Y	DOT 5.1
	DBF372LB		DOT 3 LV
	DBF700		DOT 4 LV
CCI Manufacturing IL Corp	CCI Brake Fluid B601A	Y	DOT 4 / ISO 4925 Class 6
Orthene Chemicals Inc	OSS 159	Y	DOT 5.1 LV
	OSS 13		DOT 5.1
Robert Bosch LLC	ESI6	Y	DOT 5.1
Pentosin Ltd	Pentosin Super DOT 4	N	DOT 4
	Pentosin DOT 4 LV		DOT 4 LV
BASF SE	HYDRAULAN 404	Y	ISO 4925 Class 6
	HYDRAULAN 406 ESI		ISO 4925 Class 6
Motul Ltd	Motul DOT 5.1	N	DOT 5.1
Cyclo Industries	Super Heavy Duty DOT 4	N	DOT 4
Greening Inc	RM-71 - TEGME Reference Fluid	N	SAE J1703