

*TB 43-0002-87

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

BRAKE FLUID, SILICONE (BFS) CONVERSION PROCEDURES FOR TANK-AUTOMOTIVE EQUIPMENT

Headquarters, Department of the Army, Washington, DC

5 February 1982

REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this technical bulletin. If you find any mistakes or if you know a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), direct to: Commander, US Army Tank-Automotive Command, ATTN: DRSTA-MB, Warren, MI 48090. A reply will be sent to you.

1. Purpose. This bulletin provides instructions to Organizational, Direct Support, General Support, and Depot Maintenance personnel responsible for conversion of hydraulic brake systems from the use of the present polyglycol brake fluid to silicone brake fluid. This bulletin also contains the procedures for return of unopened containers of polyglycol brake fluids.

NOTE

Schedule for conversion is July 1981 through June 1982.

2. Scope. These procedures are for use by the US Army for the conversion of Tank-Automotive vehicle/equipment hydraulic brake systems from the use of polyglycol brake fluids (Federal Specifications W-B-680 and Military Specifications MIL-H-13910 or MIL-P-46046) to Brake Fluid, Silicone, Automotive, All Weather, Operational and Preservative (BFS) (Specification MIL-B-46176).

3. Conversion Criteria. Tank-Automotive vehicle/equipment conversion to BFS will be accomplished in the following manner:

a. New non-tactical (commercial) vehicles/equipment received with polyglycol brake fluid will be replenished with **BFS** whenever brake fluid additions are required. These vehicles/equipment are to be retrofitted with **BFS** at the time of major brake system maintenance. Vehicles/equipment in depots will be converted to **BFS** prior to shipment.

b. Fielded vehicles/equipment (Commercial, Tactical, M48/M60 Series Tanks, and Trailers) will be converted to **BFS** during scheduled maintenance or unscheduled brake system maintenance. Construction and material handling equipment brake systems utilizing polyglycol will be converted during scheduled or unscheduled maintenance as well as systems other than brakes (i.e., winch drum clutches) which utilize polyglycol brake fluid.

c. Foreign manufactured vehicles/equipment are not included in the BFS program. Support for these vehicles/equipment will be accomplished through the local economy.

4. Parts and Supplies.

a. Brake Fluid, Silicone, Automotive, MIL-B-46176: NSN 9150-01-102-9455 - Plastic container, 1 gallon.

b. Filler Bleeder, Hydraulic, NSN 4910-00-273-3658, MIL-F-19849.

c. Clear flexible tubing, 1/4 inch inside diameter, NSN 4720-00-818-3476.

NOTE

If permanent decals are not available at the time of conversion to BFS, use a suitable tag stating "Caution Use Silicone Brake Fluid Only, MIL-B-46176." Attach to master cylinder. Replace tag with a permanent decal when available.

d. Permanent decal, NSN 7690-01-111-2265, P/N 12302516, Manufacturer Code 19207.

*This bulletin supersedes TB 43-0002-87 20 April, 1981

5. Safety. Normal safety precautions must be observed when handling polyglycol and silicone brake fluids to prevent eye contact or ingestion. Do not allow brake fluid to contaminate ground water. Spills must be soaked up with absorbent material and collected for disposal.

6. Requirements.

a. The conversion procedures must be followed as they appear in this bulletin and/or with the bleeding procedures outlined in the applicable vehicle/equipmentTM. It is important to remove as much polyglycol as possible in order to obtain the benefits of BFS.

b. The chart below outlines specific requirements when converting certain vehicles to BFS.

CAUTION

Brake shoes of any vehicle contaminated with BFS must be replaced.

NOTE

Check master cylinder area for decal or tag to see if vehicle was previously converted to BFS. If not, convert to BFS.

c. Purged fluids will be drained into a suitable container and disposed of in accordance with procedures established by the local environmental control officer.

d. The hydraulic pressure filler bleeder must be

purged of polyglycol brake fluid in accordance with the following procedure:

(1) Remove gage and empty contents per paragraph 6c.

(2) Pour 1 pint minimum BFS into filler bleeder.

(3) Reinstall gage, invert filler bleeder, shake vigorously.

(4) Return filler bleeder to normal position and pressurize to 30 P.S.I., bleed at the gage and discharge as much fluid as possible from the end of the hose (Reference paragraph 6c).

(5) Release pressure in the filler bleeder, remove the gage, invert the unit to drain any remaining residual fluid out (Reference paragraph 6c).

(6) Brake fluid, silicone is a bluish/purple color and polyglycol brake fluid is a light amber color. Test results have shown that some procurements of BFS will change color under certain conditions (storage in hot environments (i.e., +140°F or direct sunlight) for extended periods of time). If a BFS container has been previously opened (indicated by a broken seal) and the contents are not bluish/purple in color, discard the contents. A color other than bluish/purple is acceptable for new containers of BFS with the seal intact.

7. Pressure Bleeding Flush/Fill Method (preferred method).

CAUTION

Do not use solvents of any type to flush brake system.

Models/Series of Vehicle	Item	Required Action
All 2½ Ton Tactical Trks (M44 Series)	Air/Hydraulic Unit	1. Bleed vehicle air system prior to BFS conversion. 2. After conversion, start engine and let air pressure return to normal. Pump brake pedal several times. If master cylinder reservoir level goes down and no external leaks can be found anywhere on the vehicle, replace air/hydraulic unit.
M809, M39 Series 5 Ton Tactical Trks	Vehicle Air Supply System	Bleed system before BFS conversion.
M561 1-1/4 Ton GAMA Goat	Brake Drum/Shoes	If any BFS leaks from bleeder screw into brake drum, replace brake shoes and remove all BFS from inside drum.
All Army Vehicles	Master Cylinder Boot	During flush and fill procedure, fluid leaking from master cylinder boot is acceptable providing fluid leak stops when filler bleeder is disconnected.

NOTE

One person is required for this method.

- a. Remove master cylinder cover and top-off the master cylinder reservoir with BFS.
- b. Fill the pressure filler bleeder with BFS.
- c. Install pressure bleeding adapter to the master cylinder (insure that filler bleeder hose is disconnected).
- d. Reinstall the filler bleeder gage and pressurize the unit 20 to 30 P.S.I.
- e. Bleed all air out of filler bleeder at the bleeder screw on the gage and at the end of the filler bleeder hose before connecting to pressure bleeding adapter.
- f. Connect filler bleeder hose to pressure bleeding adapter on the master cylinder.
- g. Bleed brake system.

NOTE

Bleeding should start with master cylinder (if bleed screw is provided), then to air-pack, hydrovac, or air hydraulic unit (if applicable) and then to all wheel cylinders starting with the wheel cylinder farthest from the master cylinder.

- h. Connect a clear flexible tube to the cylinder bleed valve being bled to observe when the cylinder is purged of polyglycol. Continue bleeding until all air bubbles and polyglycol brake fluid is flushed from cylinder and BFS is seen leaving the wheel cylinder.
- i. When BFS containing no air bubbles is seen leaving the wheel cylinder, close the bleeder screw.
- j. Repeat steps "h" and "i" with all remaining wheel cylinders until complete.

CAUTION

While applying pressure to the vehicle brake pedal, if pedal goes to the floor continuously or if braking performance is unacceptable, rebleeding entire vehicle system will be necessary.

8. Manual Flush/Fill Method (alternate method).

CAUTION

Do not use solvents of any type to flush brake system.

NOTE

Two people are required for this method. The Manual Method is to be used only when a pressure filler bleeder and/or bleeding adapters are not functional or available.

- a. Remove as much of the polyglycol brake fluid from the master cylinder as possible by absorbing the fluid with a clean lint-free rag.

CAUTION

After step "a" and before step "b" insure vehicle brake pedal is not applied.

- b. Fill the master cylinder with BFS.
- c. Fill a clean suitable container which will provide easy access to the master cylinder with BFS.

NOTE

Bleeding should start with master cylinder (if bleed screw is provided), then to air-pack, hydrovac, or air hydraulic unit (if applicable) and then to all wheel cylinders starting with the wheel cylinder farthest from the master cylinder.

- d. Connect a clear flexible tube to the cylinder bleed valve being bled to observe when the cylinder is purged of polyglycol. The opposite end of the bleed tube must be submerged in a clean container partially filled with BFS.

CAUTION

Once the bleeding process begins, insure that the master cylinder is topped-off as necessary. Slowly pump the brake pedal when bleeding. Never let brake pedal go all the way to the floor.

- e. Begin bleeding by:
 - (1) One person will pump brake pedal until it feels firm and hold pressure on pedal.
 - (2) The second person will open the cylinder bleeder screw.
 - (3) As the fluid is bled, the brake pedal will slowly go to the floor and the person operating the brake pedal will notify the person bleeding the fluid just before the pedal reaches the floor so the second person can close the bleeder screw. This will prevent any air or other fluid from entering the cylinder being bled when the brake pedal is released.
 - (4) The cylinder will be bled until BFS having no air bubbles is seen leaving the cylinder.
- f. Repeat step "e" until all remaining cylinders are complete.

CAUTION

While applying pressure to vehicle brake pedal, if pedal goes to the floor continuously or if braking performance is unacceptable, rebleeding the entire system will be necessary.

9. Identification. Vehicles/equipment systems that have been converted to Silicone Brake Fluid must be identified by a permanent decal, P/N 12302516, located as close to but not on, the master cylinder reservoir as possible. The decal will state "Caution Use Silicone Brake Fluid Only, MIL-B-46176."

NOTE

If permanent decals are not available at the time of conversion to BFS, use a suitable tag stating "Caution Use Silicone Brake Fluid Only, MIL-B-46176." Attach to master cylinder. Replace tag with permanent decal when available.

10. Guidance for Return of Polyglycol Brake Fluid.

a. Due to costs involved for testing, packaging, and shipment of excess stocks to a storage facility, it is recommended that a \$500 CONUS and \$1500 overseas minimum per Report of Excess (FTE) be utilized. Consolidation of stocks by batch/lot at Direct Support and General Support, DIOs, etc, for satellited units may be desirable prior to return.

b. This product has a 24 month shelf-life (extendable). Testing is normally initiated 9 months prior to expiration date to insure timely upgrading and extension of shelf-life.

c. DGSC has a partial list of batches passing tests as sent from various labs.

d. For batches not on this list which are not from production runs within 12 months of turn-in date:

(1) Check with local labs or contact the US Army General Materiel and Petroleum Activity, New Cumberland Army Depot, AV 977-6445, AV 977-6955. Furnish the following information:

- (a) Specification
- (b) NSN
- (c) Contract number
- (d) Batch number
- (e) Date of pack

NOTE

To determine if tests have been run, testing must be done IAW Military Handbook 200-F, Quality Surveillance Handbook for Fuels, Lubricants, and Related Petroleum Products.

(2) If tests have been performed and batch "passes", send Report of Excess (FTE) and copy of lab report to DGSC IAW paragraph 11 below.

(3) If tests have not been performed, recommend \$500 minimum for retest of a batch. Follow local procedures for testing.

(4) If tests are in progress, place stock in hold status and follow instructions in "11b" or "11e" when tests are completed.

(5) For batches that fail, dispose locally.

11. For Credit Returns:

a. Guidelines in this section are designed to minimize waste of transportation funds, packing, crating, handling, and manpower at each station and denial of credit by ICP/Depot .

b. Returns are screened at depots for condition code of containers and shelf-life. Returns programs will deny credit for stock not received in "A" condition for both containers and shelf-life. (FTZ return code TM) for instance; less than 6 months shelf-life is CC "B".

c. Therefore, only report stock with a minimum of 12 months valid shelf-life from either date of pack or date of last test. This will allow for transit and receipt time.

d. Only report stock which is in new or like-new containers – CC "A". Damaged, leaky, bent, or rusted containers will cause denial of credit.

e. Submit FTE cards, one for each batch, and for each batch by mail send the following information:

- (1) FTE document number, including DODAAC
- (2) NSN
- (3) Quantity this batch
- (4) Batch number
- (5) Contract number
- (6) Date of Pack/Last Test
- (7) Condition of Containers
- (8) Copy of Test Report (if applicable)
- (9) Name and Autovon number of POC

f. Failure to supply information in paragraph 11 will result in delayed processing of FTE documents.

g. Point of Contact:

Defense General Supply Center
DCSC-OB3, AV 6954173
Richmond, VA 23297

By Order of the Secretary of the Army:

E. C. MEYER
General, United States Army
Chief of

official:

ROBERT M. JOYCE
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:

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