Field Service Bulletin	FSB.0014 Ver 1.0	October 18, 2021	HEXAGON AGILITY

CNG High-pressure Fuel Hose Inspection and Replacement Guidelines

Affected Vehicles	All vehicles equipped with Agility® and Hexagon Agility fuel systems using high-pressure, flexible CNG fuel hoses.

Introduction

High-pressure, flexible CNG fuel hoses can become compromised if exposed to corrosive chemicals such as road de-icing products, excessive heat, or if hoses are altered or moved during or following repair. Fuel hoses are also vulnerable to damage from vibration and subsequent wear and must be routed and clipped properly for maximum performance and reliability. Additionally, metal braided hoses have a finite lifespan and must be replaced at or before regular intervals.

Agility Fuel Solutions LLC, a subsidiary of Hexagon Agility Inc. (Hexagon Agility®), released new inspection criteria and intervals and reiterated replacement schedules for high-pressure, flexible CNG fuel hoses in *ENP-516 Rev. E: Truck and Tractor CNG Fuel System Operation, Maintenance & Inspection Manual*. This document is intended to widen the distribution of this information.

Warning Statements Used in this Bulletin

⚠WARNING	**WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.**
NOTICE	***NOTICE* is used to address practices not related to physical injury, such as best practices or tips to help an operation or procedure go smoothly and prevent equipment damage.**

Required Tools and Materials

- flashlight
- inspection mirror
- camera
- mild soap and water
- shop towels
- soft bristled brush

1. Vehicle Preparation

⚠WARNING **Wear approved personal protective equipment (PPE) including safety glasses.**

⚠WARNING **Only perform work on gaseous fuel vehicles in a well-ventilated area outdoors or indoors in a facility built and equipped in compliance with all federal, state, provincial, and municipal guidelines. Always follow industry standards.**

⚠WARNING **Set emergency brake and place wheel chocks in front of and behind tires.**

⚠WARNING **When performing service or repairs on any portion of the fuel system, install proper lockout/tagout (LOTO) device(s) and observe all LOTO practices.**

2. High-pressure Flex Hose Identification

Hexagon Agility® CNG fuel systems may include high-pressure hoses approved for CNG use manufactured by several suppliers including Motion Industries, Titeflex, Parker, and Swagelok®.

Motion Industries hose – stainless steel braid

Motion Industries high-pressure CNG hoses are electrically conductive and coated with a thermoplastic outer jacket. A typical high-pressure CNG hose manufactured by Motion Industries may be identified by the following characteristics:

- exposed stainless steel braid between outer jacket and collet. **FIGURE 2–1**
- indentations on collet crimp area. **FIGURE 2–1**
- metal ID tag with manufacturing and date code. **FIGURE 2–2**

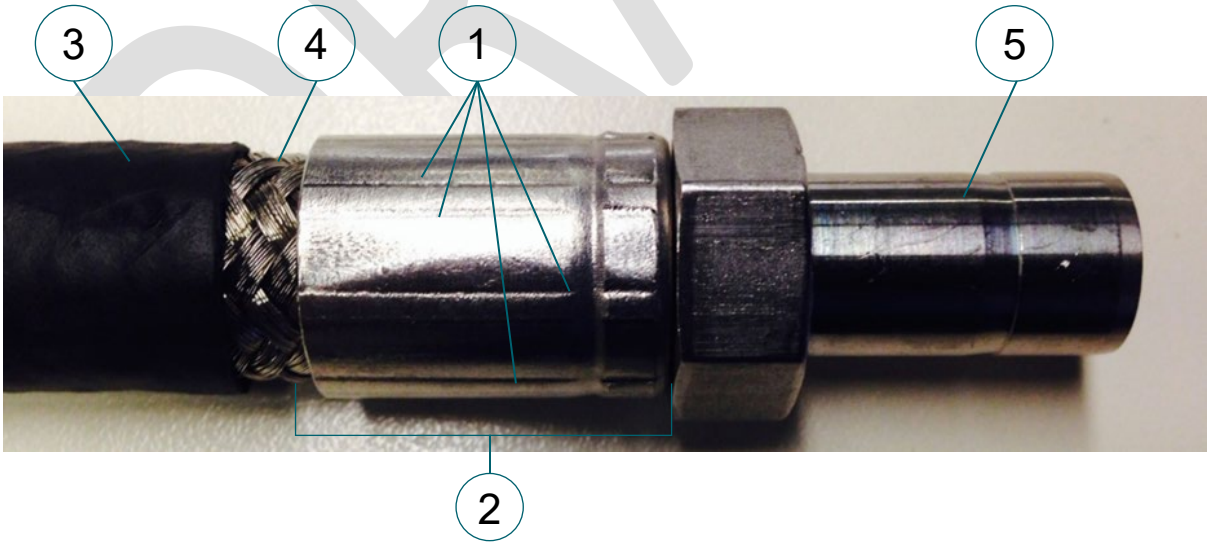

FIGURE 2–1. Motion Industries flexible CNG fuel hose. Note longitudinal crimp marks (1) on collet (2), unmarked plastic cover (jacket) (3), exposed stainless steel braid (4), tube stub (5).

FIGURE 2–2. Motion Industries CNG hose metal ID tag includes date of manufacture *(circled).*

Titeflex hose – stainless steel braid

Titeflex high-pressure CNG hoses consist of an electrically conductive PTFE inner core with a DuPont Hytrel® thermoplastic outer jacket, and are temperature rated from -40°F to 250°F (-54°C to 121°C). Titeflex hoses typically possess the following distinguishing features:

- exposed stainless steel braid between outer jacket and collet. **FIGURE 2–3**
- plastic coated paper tag (may or may not be present). **FIGURE 2–4**
- Titeflex marking and information specific to the hose properties and fuel type on the jacket **FIGURE 2–4**

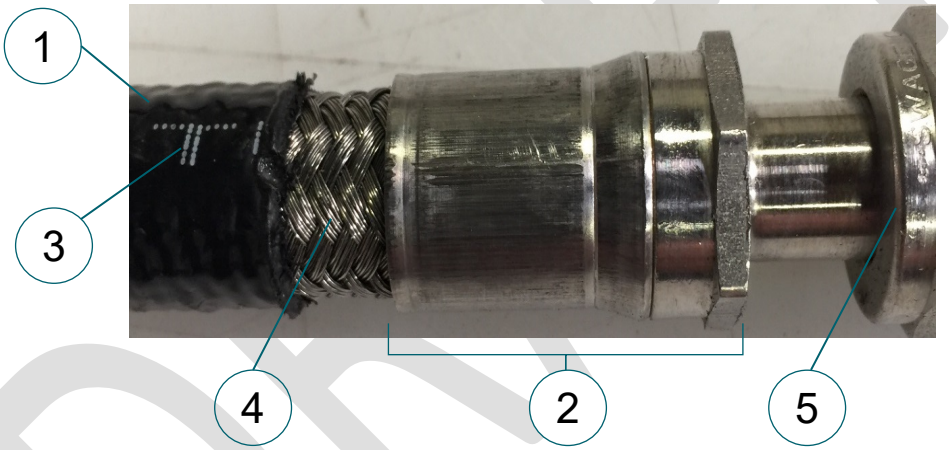

FIGURE 2–3. Titeflex flexible CNG fuel hose. Note collet style (2) and crimp marks, the plastic cover (jacket) (1) with markings (3) and exposed metal braid (4). A compression fitting (5) is attached to this example.

FIGURE 2–4. Left: Titeflex plastic coated paper tag may or may not be present.
Right: Titeflex hose outer jacket is imprinted with "TITEFLEX" branding, date of manufacture *(circled),* and maximum pressure and temperature range ratings. NOTE: Hose sample shown for illustration purposes; markings will vary with application.

Parker Parflex® 5CNG – fiber reinforced hose

Parker Parflex® 5CNG reinforced nylon hoses do not have a stainless steel braid and may be identified partially by the red polyurethane cover. Parflex hoses are electrically conductive and temperature rated from -40°F to 180°F (-40°C to 82°C). **FIGURES 2–5** and **2–6**

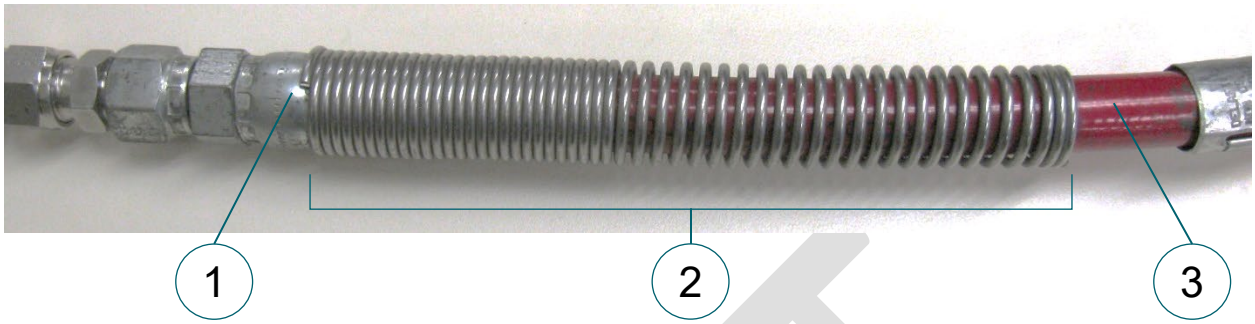

FIGURE 2–5. Parker Parflex 5CNG fiber reinforced nylon CNG hoses feature a crimped collet (1), and red plastic outer jacket (3). NOTE: Coiled spring strain relief (2) may not be present in all applications.)

FIGURE 2–6. Left: Parflex 5CNG hose metal ID tag includes a plant code, manufacturing location, and manufacturing date code *(not visible)*.
Right: Red Parflex 5CNG outer jacket is marked "ELECTRICALLY CONDUCTIVE" along with rating for CNG fuel

NOTICE

Parker recommends visual inspection of hose assemblies on at least a monthly basis.

⚠WARNING

Any of the following conditions require immediate removal of vehicle from service for inspection for additional system damage and hose replacement:

1. Fitting slippage on hose
2. Damaged, cut or abraded cover (any reinforcement exposed)
3. Hard, stiff, heat cracked or charred hose
4. Cracked, damaged or badly corroded fittings
5. Leaks at fitting or in hose
6. Kinked, crushed, flattened or twisted hose
7. Blistered, soft, degraded or loose cover

Refer to Parker Safety Guide, Parker Publication No. 4400-B.1*, for more information.*

Swagelok® NG Series – fiber reinforced hose

Swagelok NG Series hoses do not have a stainless steel braid and may be identified partially by a perforated polyurethane cover. Nylon Swagelok NG hoses feature fiber reinforcement, are electrically conductive, and are temperature rated from -40°F to 150°F (-40°C to 65°C). **FIGURES 2–7** and **2–8**

FIGURE 2–7. Swagelok NG Series hoses feature crimped collets (1), perforated polyurethane outer jacket (2), stainless steel ends (3).

FIGURE 2–8. Left: Swagelok NG Series hose outer jacket marked "SWAGELOK®" with size, rating for CNG fuel, pressure rating, and "ELECTRICALLY CONDUCTIVE".
Right: Swagelok hose decal includes date of manufacture (DOM) *(circled).*

3. Inspection Procedure for All Hose Types

Regardless of hose type or manufacturer, use the following inspection procedure:

1. Inspect CNG flexible hoses on a periodic basis
   a. Once per month
      OR
   b. Every 200 hours
2. Clean hose ends and fittings with mild soap and water; *if applicable*: use a soft bristled brush to expose hose braid.
3. If hose end is covered by protective loom or fire sleeve, the sleeve may be temporarily moved to expose the hose for inspection. **FIGURE 3–1**
4. Inspect the entire length of hose and sleeve looking for signs of rubbing or wear: if there is any damage to the sleeve, remove sleeve and inspect the hose underneath at the damaged area.

⚠WARNING **If damage is present, look for other signs of fuel system damage. Remove vehicle from service and replace hose.**

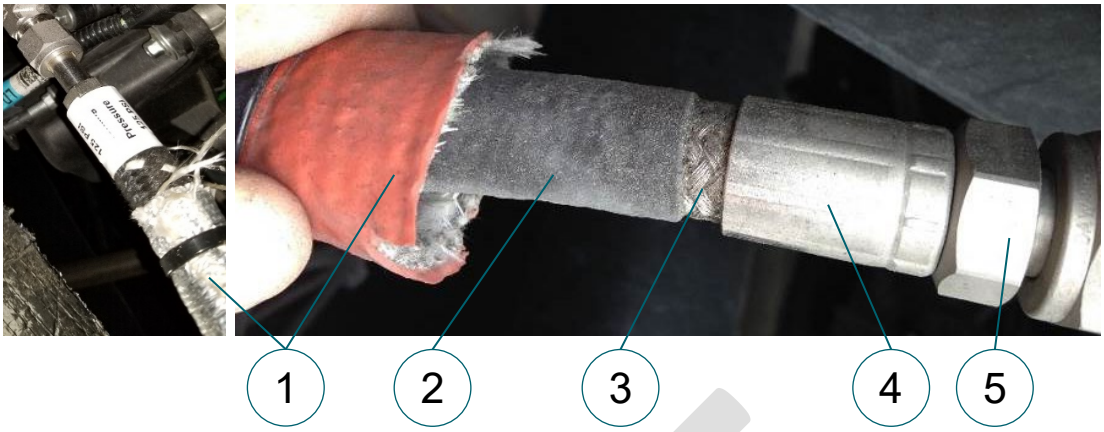

FIGURE 3–1. If hose is covered with a fire sleeve (1) or split loom, remove sleeve or loom to enable inspection of hose cover (2), braid (3), collet (4) and fitting (5).

5. Inspect hose routing by verifying none of the following conditions are present or could potentially occur:
   a. improper length or tension ranging from too long and loose to too short and strained
   b. contact with metal parts, electrical parts, battery cables, hydraulic hoses, or any other item.
6. Confirm hose is mounted a proper distance from any heat sources as follows:
   a. *If hose is protected by reflective metal heating,* a minimum of 2-in (50.8 mm) is required between the hose and the heat source.
   b. *If hose is not protected by reflective metal heating:* a minimum of 8-in (203.2 mm) is required between the hose and the heat source.
7. Confirm mounting clips are present and properly installed. *Refer to ENP-524: CNG and LNG Fuel System Routing, Clipping and Installation Guide*.

⚠WARNING **Replace clips if damaged or missing.**

8. For metal braided hose check for the following additional items:
   A. Inspect hose for date of manufacture (DOM). For hoses covered in fire sleeve or split loom, remove a section of the sleeve to verify date of manufacture. If the DOM is five years or greater, replace the hose assembly immediately.
   B. Inspect for any signs of damage, including, but not limited to the following:
      a. broken wire braid strands
      b. corrosion
      c. kinks
      d. cuts
      e. abrasion
      f. heat damage
      g. chemical attack
   C. Replace hose immediately if any damage is present, or every 5 years, whichever comes first.
   D. Use DOM on the hose to establish 5-year replacement date.

⚠WARNING **Neglecting to replace hoses at recommended intervals may lead to sudden hose failure.**

   E. Check for leaks from hose or fittings.

⚠WARNING **If any of the conditions above are present, look for other signs of fuel system damage. Remove vehicle from service and replace hose.**

9. For fiber-reinforced hose inspect for signs of damage, including, but not limited to the following additional items:
   a. cracks
   b. abrasions
   c. cuts
   d. kinks
   e. bulges
   f. blisters
   g. heat damage
   h. chemical attack

⚠WARNING **If any of the conditions above are present, look for other signs of fuel system damage. Remove vehicle from service and replace hose.**

NOTICE **There is no replacement schedule for fiber-reinforced hoses.**

Hexagon Agility® Customer Care and Technical Services

Fuel system warranty or non-warranty product support may be obtained by calling or emailing Hexagon Agility® Customer Care and Technical Services (CCTS).

Please provide **your name, phone number, email address, and complete vehicle information: VIN, year, make, model, mileage, unit number vehicle owner,** and **current vehicle location.** A service advisor will contact you to arrange vehicle repair or ship a part.

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