Field Service Bulletin

Welding and Hot Work Precautions
Near CNG and LNG Vehicles

ENP-422

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1. Introduction

Figure 1. Welding, grinding and other "hot work" can be safely performed on or near a natural gas vehicle – but certain precautions must be followed.

This is a safety reminder for performing hot work, such as welding and grinding near a compressed- or liquefied natural gas (CNG or LNG) vehicle. This bulletin DOES NOT provide guidance on liquefied petroleum gas (LPG or propane) fueled systems.

In some cases, a CNG or LNG vehicle service area may include "hot work" such as welding or grinding. This can create additional safety issues, so be sure to follow these precautions to stay safe.

If weld slag or heat contacts a cylinder, inspection guidelines for Agility CNG cylinders are included in this revision (Section 6.)

Warning Messages Used in this Bulletin

⚠ WARNING

Personal injury or death may occur if procedures are not followed.

⚠ CAUTION

Damage to equipment, fuel system or vehicle is possible if instructions are not followed.

2. Affected Units

These precautions apply when hot work must be performed around or on any CNG or LNG fuel system vehicle.

3. Corrective Action

Not applicable.

4. Tools, Materials and Required Parts

1. Common hand tools
2. Welding personal protective equipment (PPE)
3. Leak detection solution
4. Welding blanket or sheet metal large enough to cover the cylinder or tank
5. CNG cylinder inspection tools if needed:
    a. Mirror with extending handle
    b. Measuring device, i.e. 6-in. (15.24 cm) scale
    c. Depth gauge
    d. A coin for tap testing (the larger and heavier the coin the better)
    e. Cloth rags, bucket, water and soap
    f. Flashlight/drop light

5. Procedure

⚠ WARNING **⚠ CAUTION**

A. Before performing any hot work procedure, make sure the fuel system is leak-free by performing a leak test with a suitable leak detection solution.
B. Remember, LNG is odorless so you must use a methane or flammable gas detector. Leak detection solution will confirm any leaks found by an electronic detector.
C. If a CNG cylinder or LNG tank is hit by a spark or slag, the vehicle must be taken out of service and inspected.

1. Ensure the vehicle is parked in a well-ventilated area. Natural gas is lighter than air and will rise. Do not park the vehicle in an area where natural gas may accumulate.
2. If welding or hot work is performed **more than six feet/two meters** away from the vehicle, **depressurize** the system.
3. If performing hot work **less than six feet/two meters** away from the vehicle, the system must be **de-fueled**.
    a. Defueling a system requires careful planning, since the vehicle must be towed, rather than driven to be moved. It is usually best to drive the vehicle to near-empty to minimize the amount of fuel vented to the atmosphere.

b. The best and safest way to defuel a system is to transfer fuel back to a dispensing station, if so equipped. Check with your filling station for specific procedures.

4. After the fuel system is depressurized or defueled, cover all fuel system components, including the cylinders/tanks and fuel lines, with fireproof blankets or a metal shield. Isolation must prevent sparks and slag from hitting the cylinders.

Figure 2. Cover all CNG or LNG fuel system components with fireproof welding blankets or a metal shield before performing any hot work operation.

5. A single spark or weld slag could compromise fuel system components.
6. It is now safe to perform the hot work.

When welding and hot work are completed, repressurize the system and return the vehicle to service.

If the hot work operation produced slag or other heat exposure to a CNG cylinder, the cylinder must be inspected by a qualified or certified CNG fuel cylinder inspector.

6. Notes for Agility Fuel Solutions CNG Cylinders

Maximum service temperature for Agility TUFFSHELL® containers is 180°F (82.2°C). They include a sacrificial layer that protects the container against damage. This layer also offers

protection against weld slag that may be introduced because of welding in the proximity of the container.

If the container is exposed to hot metal slag, the area of exposure must be inspected for damage.

NOTE

Remember, cylinder inspections must be performed by certified or qualified personnel. Inspection information in this bulletin is for reference only. Refer to Agility publication ENP-558, "CNG Fuel Cylinder Inspection Manual" for more details.

6.1 Cylinder Inspection After Hot Work

After the weld operation is complete, remove shield material from around the container and inspect for damage. Heat damage must be inspected before cleaning the affected area.

1. Indications of heat damage must be circled in white paint marker or some other method so inspection after clean-up can be performed. Damage may become hidden after the cylinder is cleaned as shown in Figures 3 and 4.

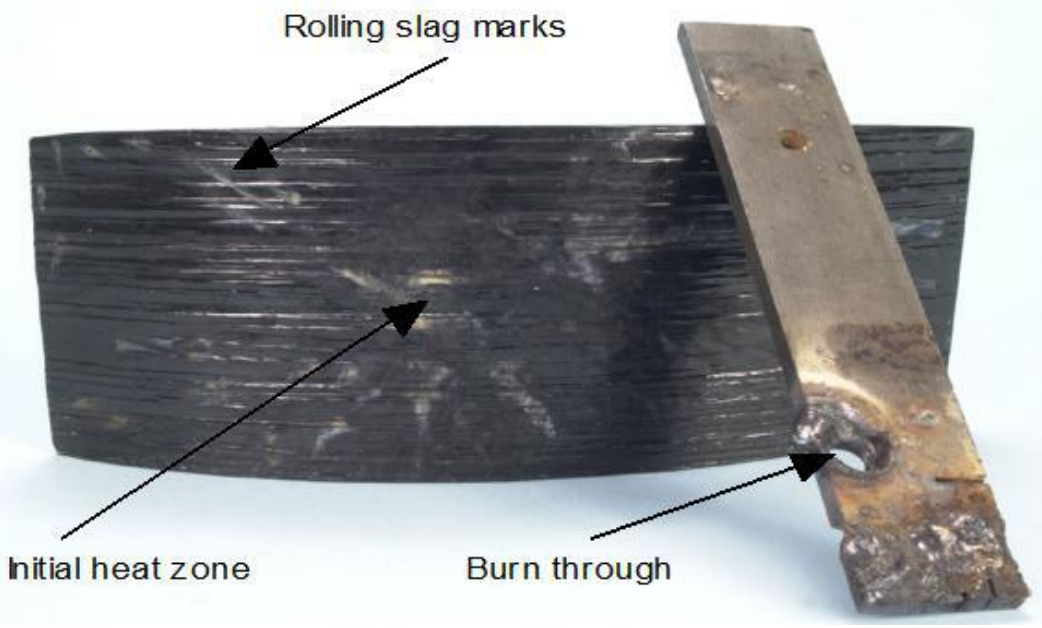

Figure 3. Composite sample that was subjected to hot weld slag. A 1/4-in. x 1-1/2-in. bar stock was burned through with a cutting torch at a height of 6-in. above the composite sample.

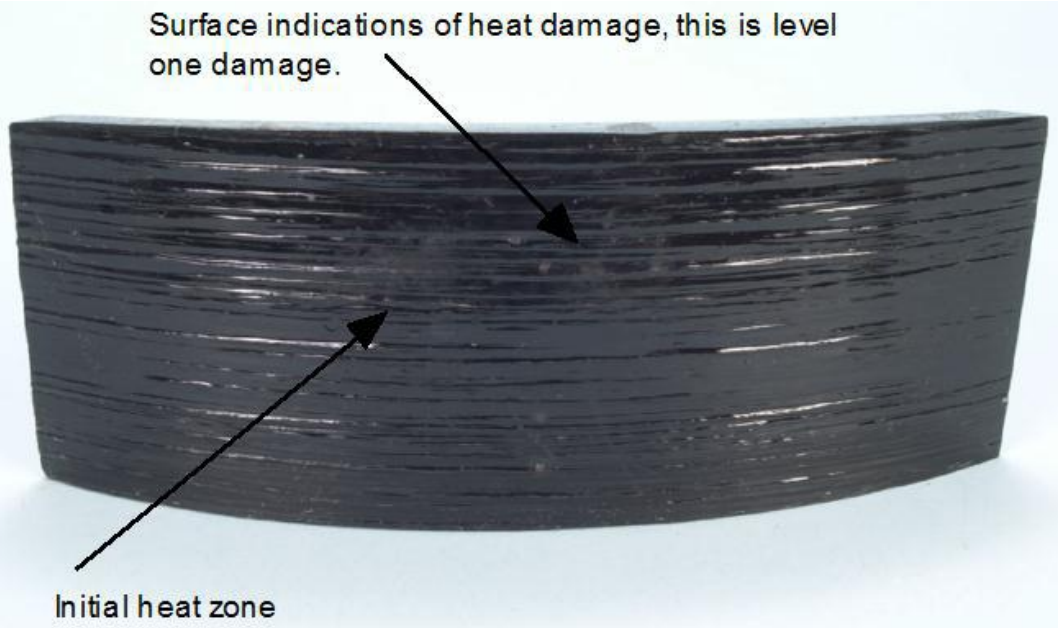

Figure 4. The same composite sample in Figure 3 but has been cleaned. Notice the areas of damage visible in Figure 3 are more difficult to identify.

2. To clean the composite surface, wash with warm soapy water.
3. Re-inspect the heat-damaged area after cleaning.
4. If the composite has sustained enough damage to create loose fibers, remove the loose fibers with a file and measure the depth of discrepancy (Figure 5). Refer to Table 1 for proper identification of the damage.

Figure 5. Inspecting damage depth.

Table 1. Damage Levels

Damage Level	Damage Type	Depth Measurement	Disposition
Level 1	Minor damage inconsequential for safe cylinder operation	0 ≤ 0.010-in. 0 ≤ 0.25mm	Paint with polyurethane paint.
Level 2a	Loose fibers, cut, scratch, abrasion	0.011 ≤ 0.035-in. 0.26 ≤ 0.89mm	Customer rework: Remove loose fibers or rough edges of a cut or gouge by hand sanding. Paint with polyurethane paint.
Level 2b	Loose fibers, cut scratch, abrasion, unraveling	0.036 ≤ 0.050-in. 0.90 ≤ 1.27mm	Remove cylinder from service and contact Customer Care for factory inspection and possible rework.
Level 3	Gouge damage	> 0.05-in. > 1.27mm	Remove from service and condemn.
Level 3	Impact damage	Not applicable	Remove from service and condemn.
Level 3	Fire damage, fire exposure	Not applicable	Remove from service and condemn.
Level 3	Chemical Damage / Chemical Attack	Not applicable	Remove from service and condemn.

7. Warranty Information

Does not apply, this is a safety reminder.

If you have any questions, contact Customer Care at +1 949 267 7745 or toll free at +1 855 500 2445 or e-mail: support@agilityfs.com

Parts can be ordered via e-mail: parts@agilityfs.com

Proprietary Statement

Trademark Notice

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