CATALINA COMPOSITES®
DIVISION OF CATALINA CYLINDERS INC.

QAS INTERNATIONAL
ISO 9001:2015
REGISTERED COMPANY
Certificate No. US4415

COMPOSITE CYLINDER INSPECTION MANUAL

Guide for Use, Handling, Maintenance and Periodic Inspection of Catalina Composites Type 3 Cylinders

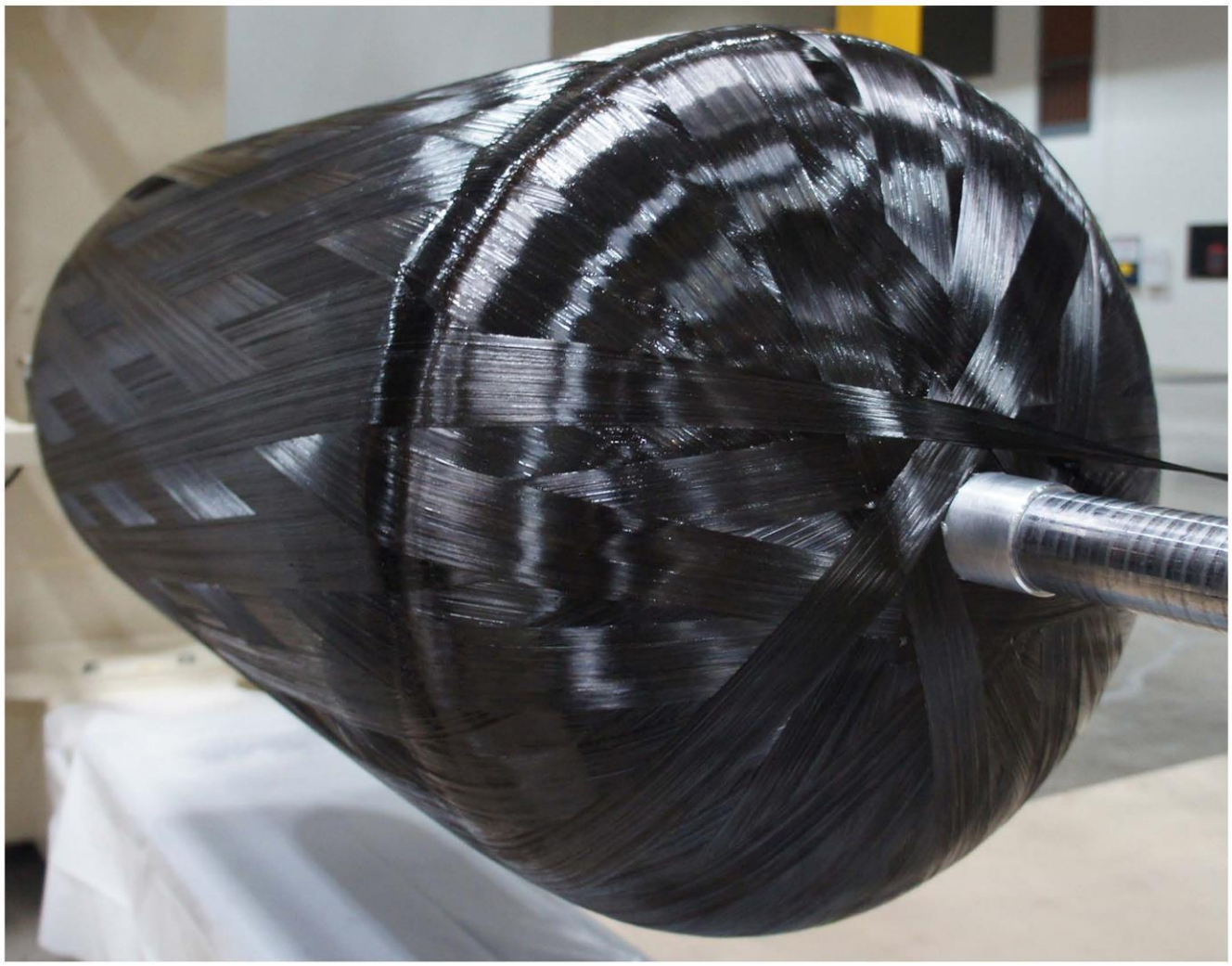

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Table of Contents

1. Introduction

1.1 Contact Info:

Catalina Composites
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1.2 Specifications

This manual provides general maintenance and inspection procedures and requirements. These additional publications must be understood for the full scope of Type 3 cylinder operation:

- CSA/ANSI NGV 2
- FMVSS-304
- ISO 11119-2 (DOT-SP 20571)
- ISO 11515
- NFPA 52

1.3 Scope

This document covers the use, inspection, and maintenance of Catalina Composites Type 3 composite cylinders, cylinder assemblies, and components only. This manual does not cover fuel system operation, inspection, or maintenance.

Only Catalina Composites approved valves and pressure relief devices (PRD) that are in compliance with any applicable standards should be used. Contact Catalina Composites for a list of approved devices if not listed on cylinder label.

2. Product Description

2.1 Cylinder Construction

A Type 3 Catalina Composites cylinder is comprised of the items shown in Figure 1.

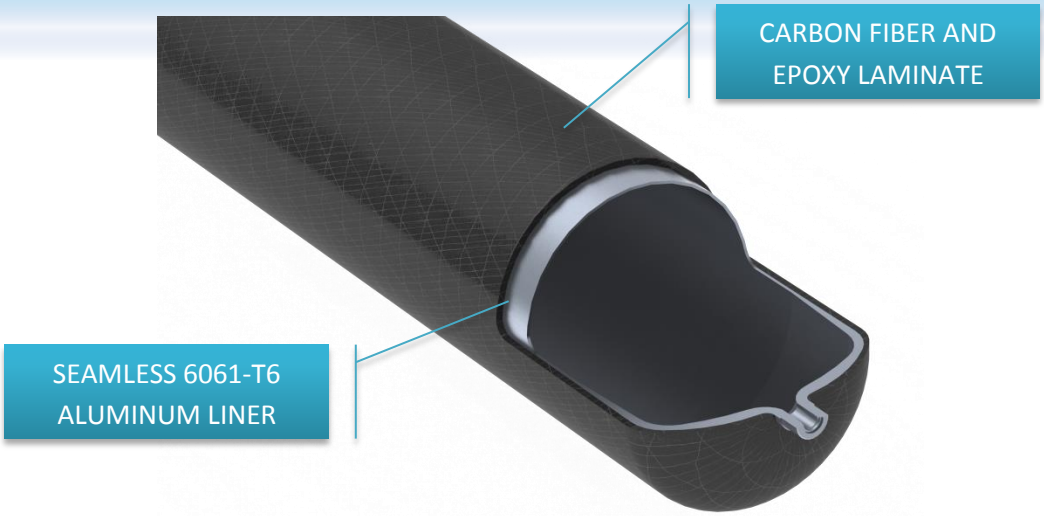

FIGURE 1

2.2 Cylinder Marking and Serialization

All cylinders are marked with the required regulatory information via a cylinder label. This permanently attached label is either an adhesive vinyl "sticker", embedded within the laminate/resin, or a combination of the two. These labels must be kept visible and shall not be removed. Contact Catalina Composites if a cylinder label becomes damaged or becomes illegible. Examples of an NGV2 and DOT-SP label shown in Figure 2 and Figure 3.

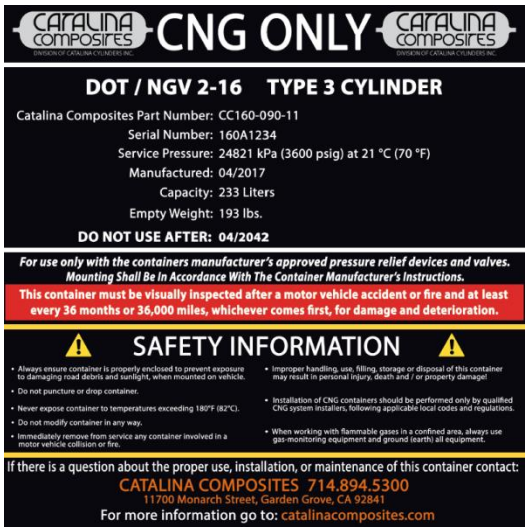

FIGURE 2

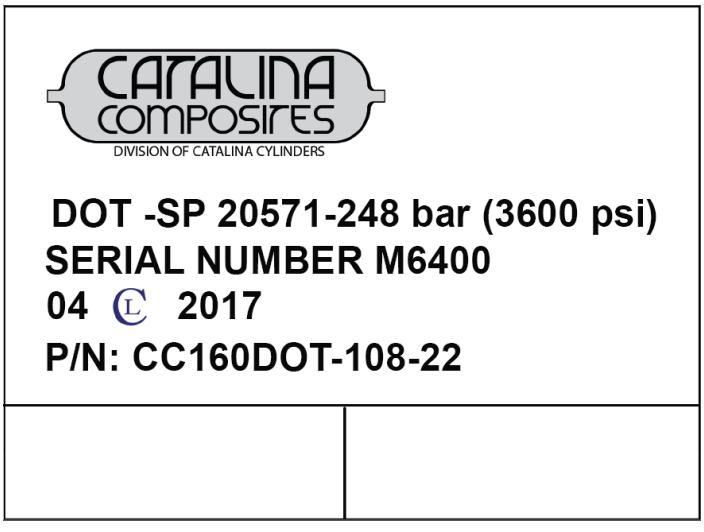

FIGURE 3

The cylinder serial number is located on the regulatory label presented above. Additionally, the cylinder serial number may be permanently marked on one of the cylinder neck faces as shown in Figure 4.

FIGURE 4

2.3 Temperature Ranges for Operation

Catalina Composites Type 3 cylinders are designed and tested to an operating temperature range of -40 °F to 180 °F (-40 °C to 82 °C).

2.4 Service Life

The cylinder service life for an NGV2 cylinder will be defined on the regulatory label as given by the "DO NOT USE AFTER" date. For a DOT-SP cylinder, the service life is 15 years from the hydrostatic test date on the regulatory label. If there is any uncertainty in the service life or expiration dates of a cylinder contact Catalina Composites. Cylinders shall not be used past their service life and must be destroyed after expiration.

3. Handling/Storage

3.1 Cylinder Handling

In order to prevent damage to the cylinder, Catalina Composites recommends the following:

- Only handle cylinders with equipment that will not damage them
- Do not handle cylinders with internal pressure above 40psi (3 bar)
- Do not lift cylinders by valves, fittings, PRDs, or piping & protect all valves and fittings from damage when transporting or lifting
- Do not drag, drop, or roughly handle cylinders
- Ensure cylinder labels are protected and free from damage
- Do not walk on cylinders as this can cause damage to the composite

3.2 Cylinder Storage

When storing Catalina Composites Type 3 cylinders, a few precautions should be followed:

- Always store cylinders in a clean, dry environment
- Store cylinders with valves and PRDs installed, if possible
- Keep a positive internal pressure of about 40 psi (3 bar) of an inert gas, if possible
- Store cylinders at temperatures between -40 °F to 180 °F (-40 °C to 82 °C)
- Secure cylinders from moving or rolling while in storage and protect them from abrasion, impacts, and any other damage
- If possible, it is recommended to store cylinders in their original packaging
- Always store cylinders in an area away from direct sunlight or UV exposure
- Store cylinders away from moisture, heat sources, and chemicals
- For long term storage of cylinders, please contact Catalina Composites for detailed instructions

4. Installation

4.1 Mounting Requirements

Depending on the cylinder model, mounting will be via the cylinder neck (neck mount) or the cylinder body (strap mount). Consult Catalina Composites for details on approved mounting methods.

5. Fueling and /Defueling

5.1 Initial fill

The procedure for an “initial fill” must be followed if the cylinder has been exposed to ambient air, such as after a valve installation, or if the system has been bled to zero pressure. The initial fill is required to remove any oxidant from the cylinder. Filling a cylinder that has been exposed to ambient air, without completing this procedure, can result in an explosion hazard when the air in the cylinder is mixed with CNG. All Catalina Composites Type 3 cylinders equipped with a valve and end plug/PRD from the factory are shipped with a small internal pressure of inert gas.

This procedure is not necessary with a new cylinder unless it has been depressurized or vented to atmosphere for any reason.

1) Move cylinder to a safe, well-ventilated area.
2) Fill the cylinder with clean, dry nitrogen gas to at least 72.5 psi (5 bar).
3) The cylinder may now be filled to service pressure with CNG.

5.2 Standard Fill

Always fill Catalina Composites Type 3 cylinders to a pressure that is consistent with the service pressure on the regulatory label. After filling, the settled pressure may not exceed that listed on the cylinder label at 70°F (21°C).

5.3 Defueling

If for any reason the cylinder needs to be depressurized for fuel system or cylinder maintenance, the fuel system manufacturer's procedure should be followed to ensure a safe depressurization procedure. Always ensure you are in compliance with all federal, state, and local codes when defueling a system or releasing CNG into the atmosphere.

In general, the preferred method for de-fueling a cylinder is to run the vehicle, if possible. Any remaining pressure in the cylinder will need to be properly vented through a vent stack to reduce the risk of hazardous gas accumulation. All fuel system components, vent lines, and cylinder must be properly grounded during defueling.

6. Inspection

6.1 General System Inspection

A general inspection of the cylinder and fuel system should be completed by a qualified CNG fuel system inspector every 3 years or 36,000 miles for NGV2 compliant cylinders. This inspection is a simple visual check to see all system components are in good operating condition. This includes cylinder mounts, cylinder, safety devices, and any fuel system plumbing. Things such as any visual damage to the cylinder, worn mounts, or fuel system damage and leaks should be checked for.

DOT Special Permit cylinders shall be inspected per the requirements of the special permit and any other system-level requirement from the system manufacturer.

6.2 Mounting Inspection

Always follow the fuel system manufacturer's guidelines for repairing or replacing any necessary or worn mounting components. Make sure that all brackets, straps, mounting blocks, and hardware are properly secured. Tighten any loose mounting components with regards to the fuel system manufacturer's specifications. Contact the fuel system manufacturer for any mounting components that are missing or need replacement.

6.3 Cylinder Inspection

All Catalina Composites Type 3 cylinders have a maximum service life, which is given on the cylinder label. Before the cylinder is inspected, always make sure the cylinder has not exceeded its service life.

Please refer to listed cylinder specifications for required inspection intervals. It is mandatory to maintain a detailed inspection log of Catalina Composites Type 3 cylinders.

In addition to regular inspection intervals, cylinders should also be inspected if they or the vehicle they are installed in has been involved in a fire or collision. During inspection the following conditions should be checked for:

- Abrasive damage (gouges, cuts, scratches, etc.)
- Fire or excessive heat damage
- Damage from impacts on the cylinder
- Debonding and delamination
- Chemical damage

6.4 Inspection Tools

Common cylinder inspection tools include those shown in Figure 5.

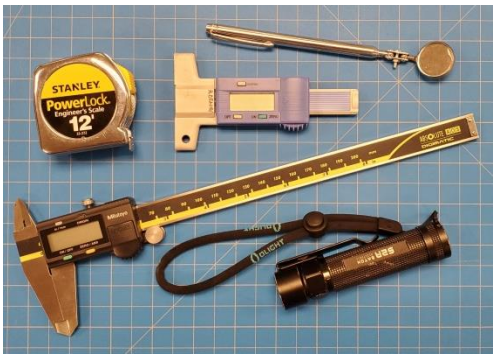

FIGURE 5

6.5 Damage Levels

Catalina Composites Type 3 cylinders are subject to the following damage levels:

Level 1: Minor "cosmetic" and/or "wear and tear" damage.
This damage will have no impact on the cylinder safety or performance.
Examples: Light abrasion, rub marks, light scratches, etc. with a depth less than .005".

Level 2: Damage between .005" and .045" in depth and a length up to 20% of the sidewall straight length.
This damage is often repairable but may compromise the cylinder integrity if ignored. Rework must be performed prior to returning to service.
Examples: Abrasion, scratches, severed fiber, cuts, gouges, etc.

Level 3: Damage that exceeds .045" in depth or other damage cannot be reworked.
A cylinder with Level 3 damage is not suitable for use and must be condemned and destroyed.
Examples: Deep abrasion, deep scratches, multiple severed fibers, fire damage, etc.

7. Repair

Some Level 2 damage can be repaired. Consult Catalina Composites for limits on repairable damage and repair instructions.

8. Destruction

Any cylinder that has been condemned or expired must be rendered permanently unusable and destroyed. Before the cylinder is destroyed, completely follow the depressurization and defueling procedure outlined in Section 5.3.

To destroy the cylinder, and render it unable to hold gas under pressure, drill two holes with a minimum of 1/2” diameter each through the cylinder sidewall.

Contact Catalina Composites for any questions on destruction of an expired cylinder.

9. Warranty

For warranty information please visit https://www.catalinacylinders.com