



Inspection Requirements

Inspection Requirements

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Scope and Definitions

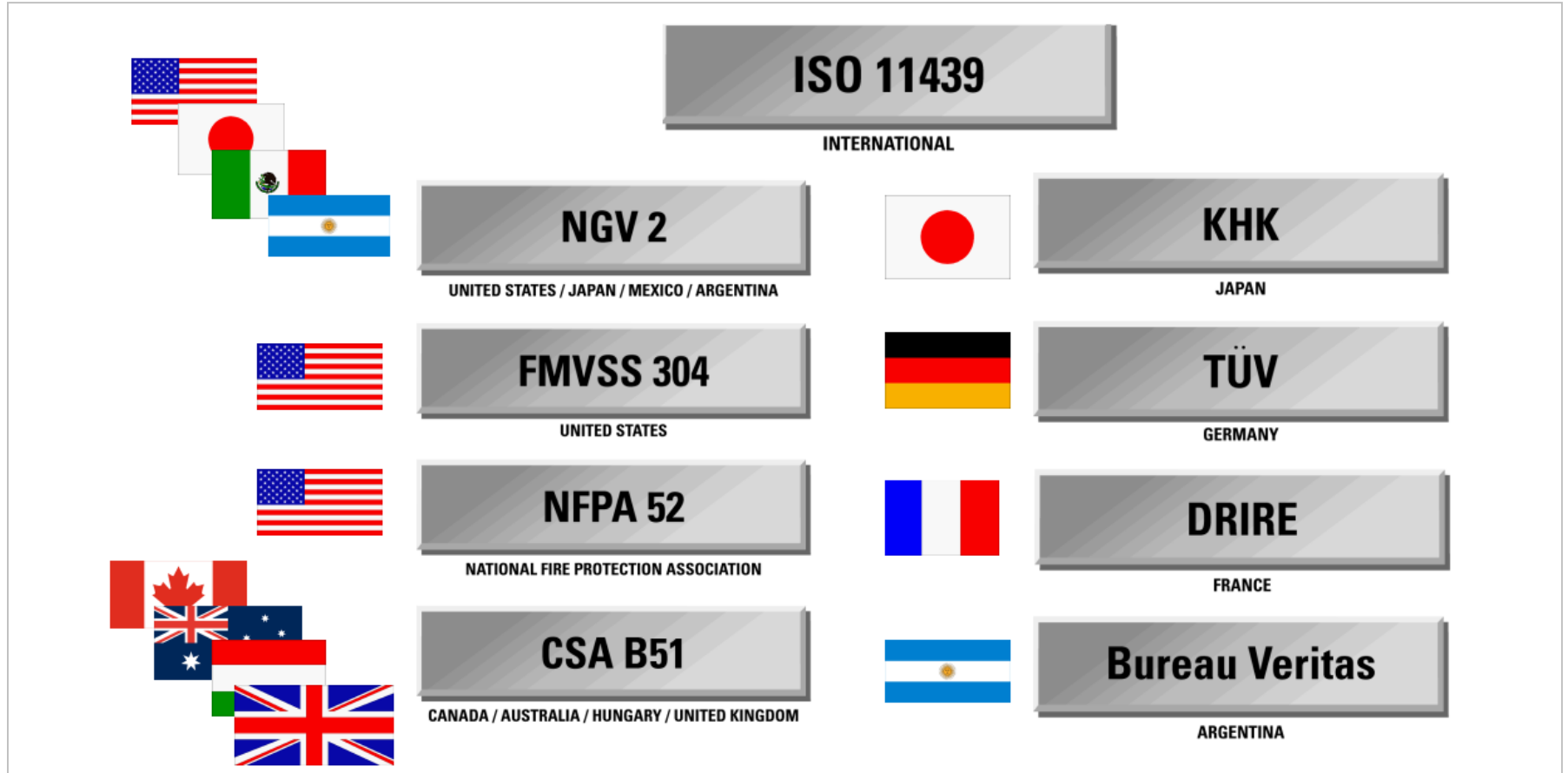
Importance of a Fundamental Knowledge



- Fuel storage systems require periodic re-qualification inspections.
- Scope of inspections entails cylinders, plumbing, prd`s, configuration etc.
- Fundamental knowledge required to interpret inspection results.
- Ensuring a safe operation of fuel storage system.
- Avoiding incidents.

Scope and Definitions

Alternative Fuels Vehicle Standards



Scope and Definitions

ISO – International Organization For Standardization



- ISO is the worlds largest developer and publisher of International Standards.
- Non governmental organization.
- Present in 162 countries.
- Headquarter in Geneva – Switzerland.
- Meets the requirement of business and the broader needs of society.

Scope and Definitions

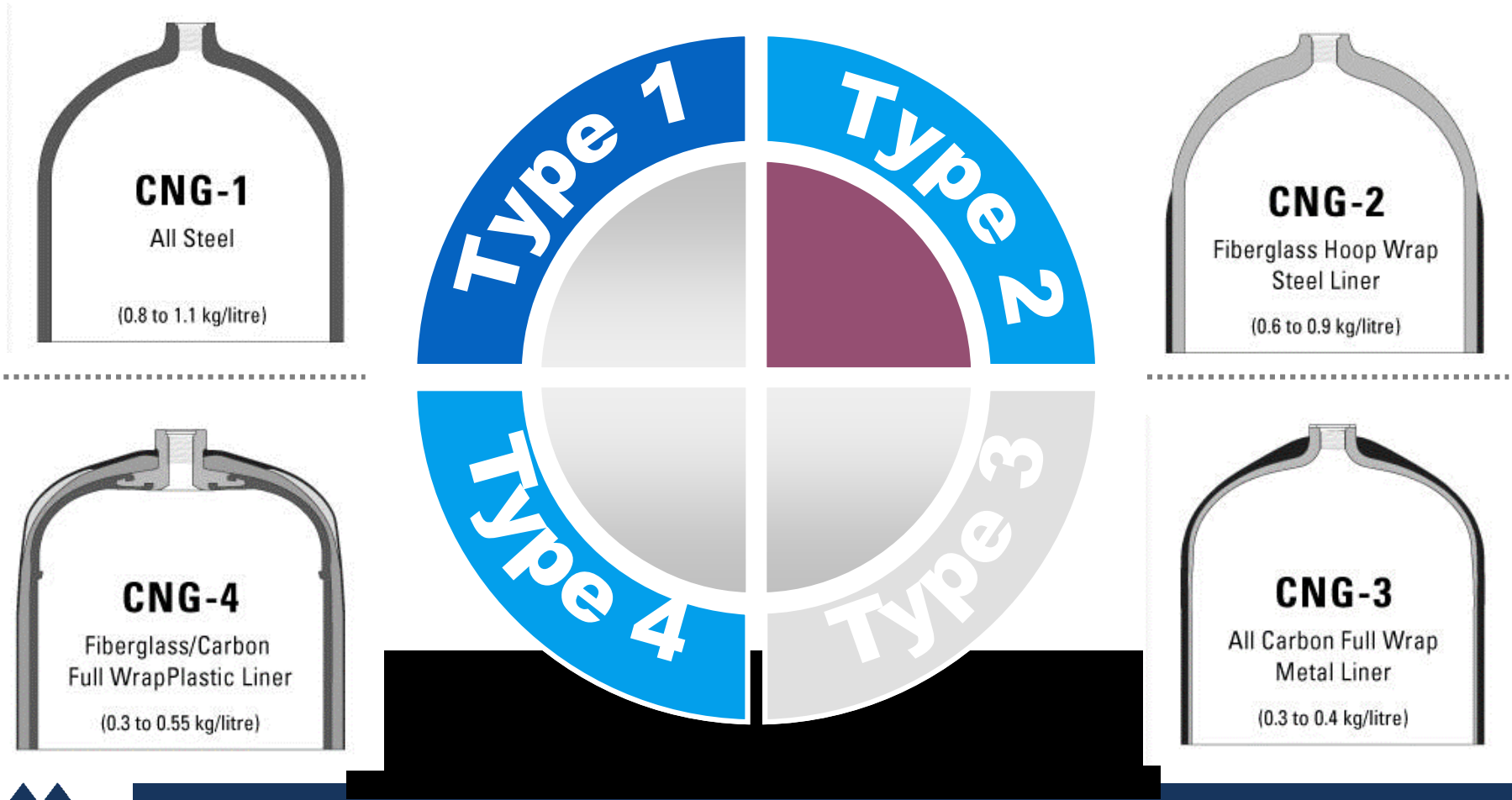
ISO/DIS 19078 – Introduction



- Requirements for inspection installation and re-qualification of high pressure cylinders.
- For ISO11439 or equivalent standards.
- Purpose is to provide guidance in:
 - Inspection.
 - Criteria for acceptance or rejection.
 - Disposition.
- In accordance with manufacturer or in the absence of man. Guidance.

Background Information

Types Of Cylinders ANSI/CSA NGV2-2000, ISO11439, CSA-B51-03 Part 2



Background Information

Type 3 - Resin Impregnated Continuous Filament With Metal Liner



Details

- Seamless aluminum liner from 6061 or 6010 material.
- Reinforced with fibers from carbon, aramid or glass.
- Fibers wound in both a helical and hoop pattern.
- Service pressure ratings up to 10150 psi.
- Load distribution: 20/80 metal/comp.


Background Information

Required Marking Information

G-Stor™ Pro
TYPE 3 CYLINDERS

CNG ONLY

G-Stor™ Pro
TYPE 3 CYLINDERS

Date of Manufacture : 09/2016
DO NOT USE AFTER : 09/2036
Luxfer Part Number : V132D-201
Cylinder Model : 3V132C200G5-ESSB
Serial Number : Y4589
Working pressure : 20.0 MPa (2900 psig) at 15°C (59°F)
Empty Weight : 50.2kg
Approvals : **ECE R 110 CNG-3**  **110 R-010064 C**

USE ONLY MANUFACTURER-APPROVED PRESSURE RELIEF DEVICE



Luxfer Canada Limited, Calgary, Canada (403) 720-0262

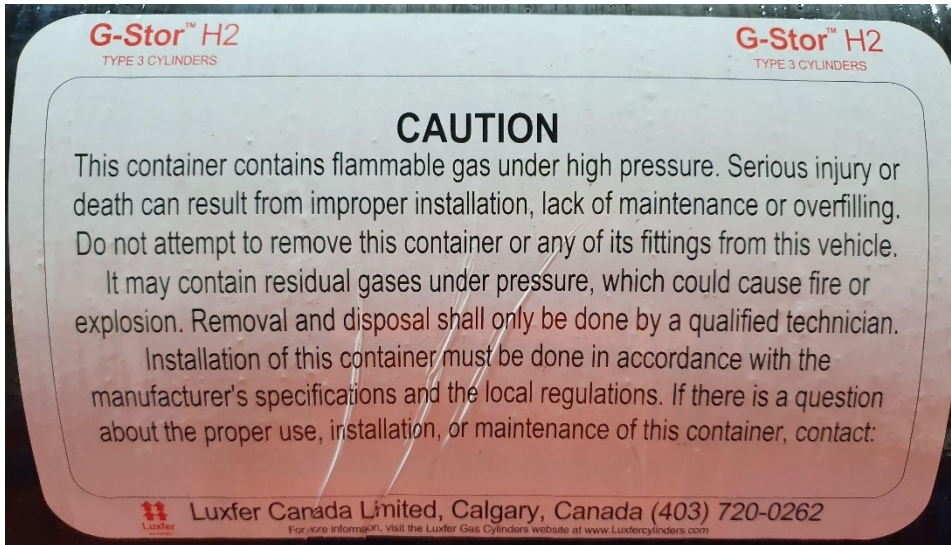
For more information, visit the Luxfer Gas Cylinders website at www.Luxfercylinders.com

Details

- Mandatory information are:
 - Fuel.
 - Date of man.- and expiration date.
 - Manufacturer ID.
 - Cylinder identification number.
 - Working pressure at spec. temperature.
 - Design standard.
- Non mandatory info are the temp. range, water cap., test date., insp. And specific PRD.

Background Information

Caution Label



Details

- Disclaimer for general information.
- Not required according to code.



Inspection Body and Inspector

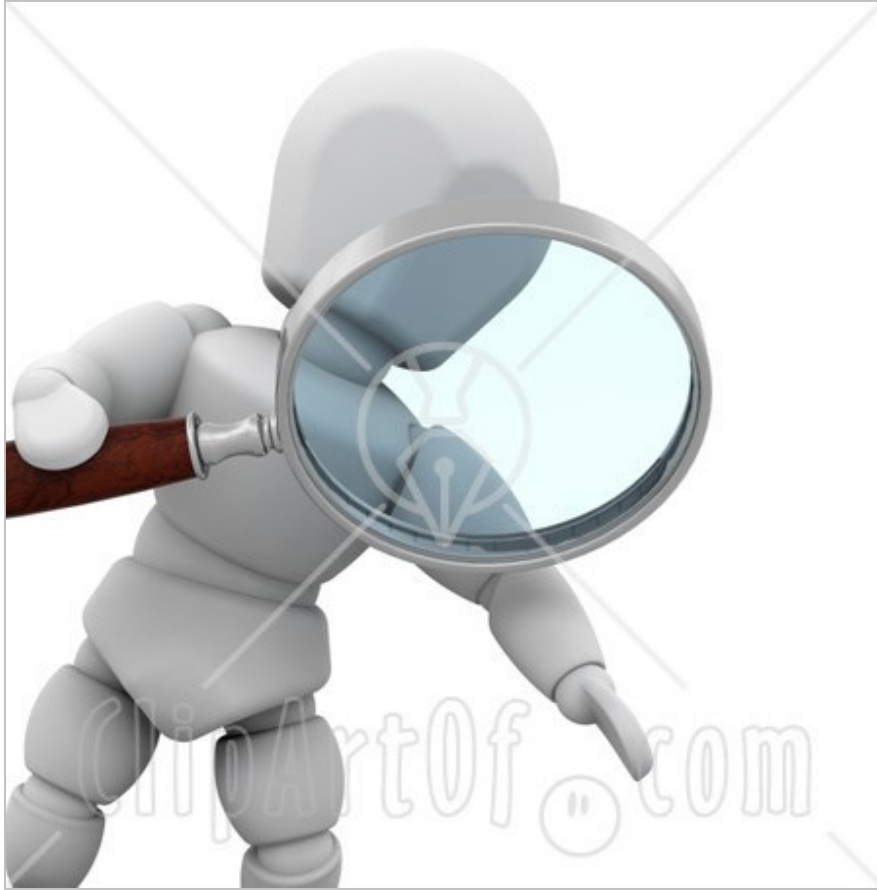
Inspection – Basics



- The inspection body shall be certified in the country of use.
- Inspections are only to be carried out by a qualified person.
- Vehicle is to be positioned to easily visually inspect the fuel system.
- Additional tests may require the removal of components from the fuel system.
- Permanent removal may be required.

Inspection Body and Inspector

Inspector Qualifications



- Two or more years experience conducting inspect. or supervised.
- Approved by the manufacturer of the cylinder being inspected.
- Certified as an inspector by the inspection body.
- Certified by a regionally or nationally recognized organization.
- Complete understanding of cylinders, systems, damage tolerances, concepts, materials and safety devices.

Inspection Equipment

Readily Available Tools



- Have the following inspection equipment on hand:
 - Adequate light.
 - Inspection mirrors.
 - Hand tools.
 - Torque wrench.
 - Depth gauge.
 - Rule and straightedge.
 - Tape measure.
 - Leak test fluid or gas detector.

Cylinder and Equipment Inspection

Inspection Interval



- General visual inspection (rec.):
 - Recom. every 3 month (DNK).
- Detailed visual or re-qualification I.:
 - Every 36 month (ISO 19078).
 - Every 36 month or 36,000 miles (FMSS304, DNK).
 - < 36 month under certain circumstances, see ISO 19078.
- Check with local authority for a more frequent inspection interval.

Cylinder and Equipment Inspection

Immediate Inspection



- If the fuel cylinder or vehicle was involved in a fire, transferred to another vehicle, over pressurized.
- Cylinder were exposed to excessive heat, fire, cargo.
- Cylinder was dropped or subjected to impact or any other damage.
- The vehicle was in a collision.

Cylinder and Equipment Inspection

Preparation For Inspection – Background Information



- Owner or vehicle operator should be questioned for any known conditions which could have caused damage:
 - Over pressurization.
 - Dropping or cylinder impact.
 - Exposure to excessive heat.
 - Vehicle accidents.
 - Exposure to harsh chemicals.
- Review all applicable standards, manuals and guidance documents.

Cylinder and Equipment Inspection

Preparation For Inspection – Cylinder Surface and Depressurization



- Cylinder surfaces shall be clean to clearly determine condition.
- Shields and covers inhibiting the inspection shall be removed.
- Cylinders shall be de-pressurized prior to inspection if:
 - Immediate inspection is required.
 - Level 2 damage is suspected.
 - Level 3 damage - cylinders to be destroyed.

Cylinder Inspection

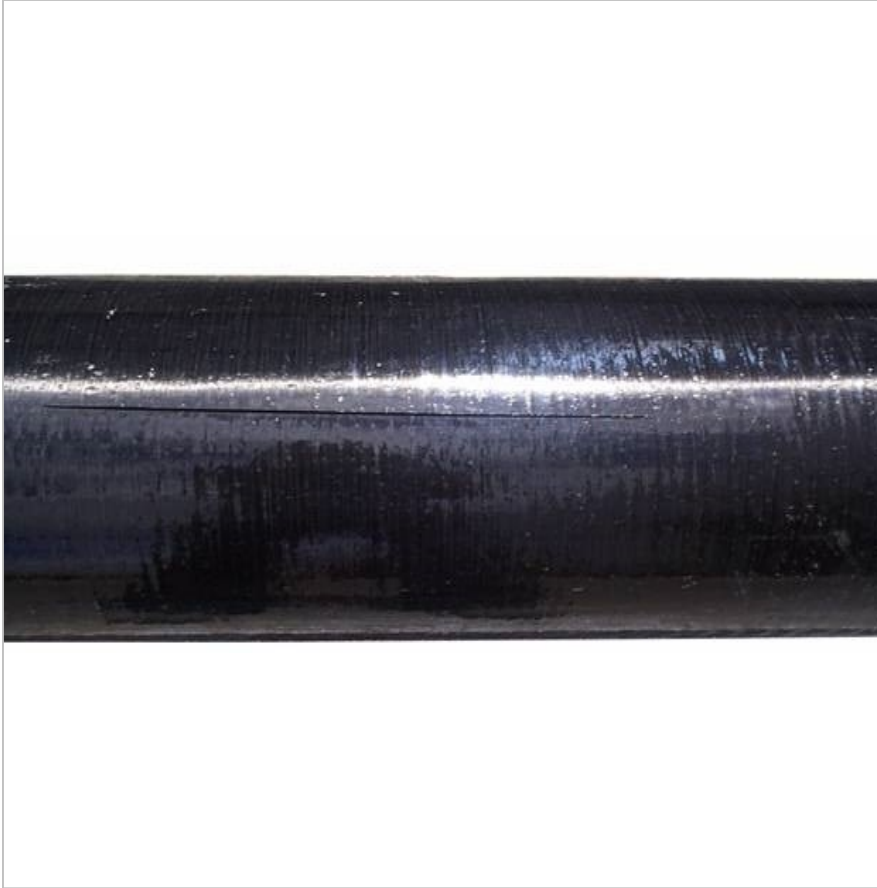
Damage Assessment - Marking and Labeling



- Stamped and attached information must clearly identify the cylinder.
- Luxfer cylinder have 4 markings:
 - Main cylinder label.
 - Tail stock label
 - Stamped ID on Al. liner
 - Duplicate label

Cylinder Inspection

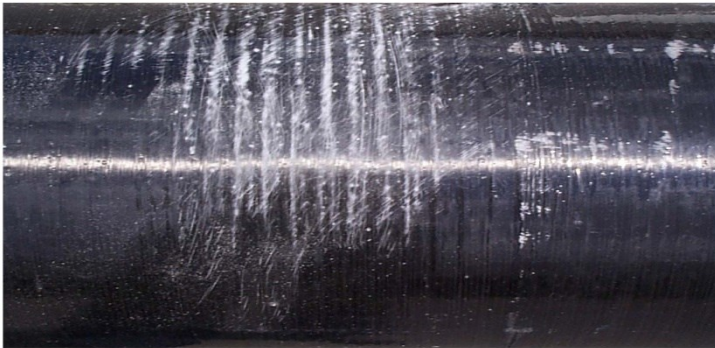
Damage Assessment – Cuts, Scratches and Gauges



- A sharp impression where material has been removed or redistributed.
- Damage caused by a sharp object coming into contact with a composite surface.
- Assessment based on depth and length of the flaw.
- Flaw length is measured perpendicular to fiber direction.
- Serious damage is considered when fiber is split.

Cylinder Inspection

Damage Assessment – Abrasion



- An area that is scuffed or worn thinner by rubbing or scraping.
- Damage to cylinder or equip. caused by wearing, grinding or rubbing.
- Level of abrasion damage depends on the depth.
- Measurement is taken on the deepest spot. And classify the damage to the worst severity.
- Scuffing abrasion damage may seriously weaken the cylinder.
- Shielding required for exposed surf..

Cylinder Inspection

Damage Assessment – Charring or Soot



- Blackening or browning of an area.
- Reject for permanent charring.

Cylinder Inspection

Damage Assessment – Gas Leakage



- Loss of content through a defect.
- Not intended to include loss by permeation.

Cylinder Inspection

Damage Assessment – Chemical Attack



- Cylinder is subjected to a chemical that dissolves or destroys the material.
- Prior to assessment wipe off any remaining chemicals or solvents.

Cylinder Inspection

Damage Assessment – Weathering



- Effects of the sun's ultraviolet radiation.
- Prior to assessment wipe the affected area to remove any dirt or foreign substances.

Cylinder Inspection

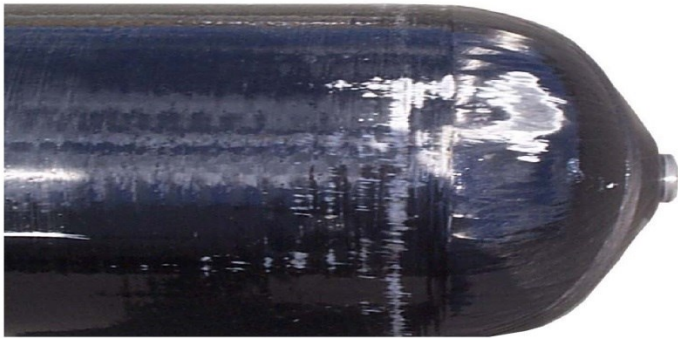
Damage Assessment – Fire or High Heat Source



- Evident by discoloration, darkening, charring or sooting of the surface.
- May result in resin removal and loose fibres.
- Melted and deformed attachments.
- Clean affected area to remove dirt or anything that is not the result of fire or heat.

Cylinder Inspection

Damage Assessment – Impact



- Forceful blow to the surface of the cylinder that may cut, gouge, indent.
- Composite material was struck or hit, a frosted or smashed look appears in resin.
- Difficult to assess as it may be beneath the surface.
- Resin cracks may be present around the impact.
- Difference in container coloration and appearance.
- Coin tap test.

Cylinder Inspection

Damage Assessment – Stress Corrosion Cracking



- Fibers may crack or split by chemical attack promoted by stresses in the material.
- Combination of stress and corrosive liquid.
- Locate batteries away from cylinders.

Cylinder Inspection

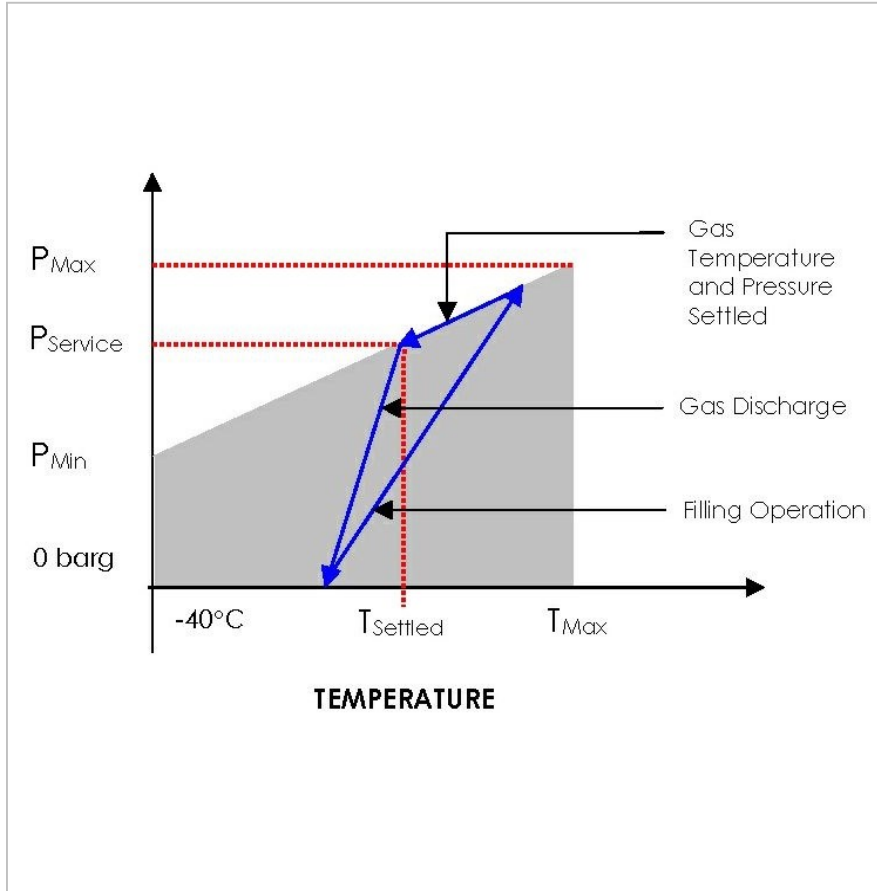
Damage Assessment – Gas Leaks



- Confirm gas leaks with a commercial leak test solution or a gas leak detector.
- Gas detectors need to be calibrated.
- Differentiate a leak from accumulated gas in the atmosphere.
- Repair leaks.

Cylinder Inspection

Damage Assessment – Over Pressurization



- Filling the cylinder to a pressure over the proper working pressure at standard temperature.
- If subjected to over pressurization, destroy cylinder.
- Difficult to determine, may show signs of bulging or cracked carbon fibers.

Cylinder Inspection

Damage Assessment – Corrosion



- All metal cylinders or exposed metal surfaces shall be inspected for:
 - Pitting corrosion.
 - Line corrosion.
 - General corrosion.
 - Corrosion of metal under comp.
 - Galvanic corrosion.

Cylinder Inspection

Cylinder Damage Assessment

Level	Damage Level Definition	Action Required
NA	Not Applicable (specialized case that cannot be categorized)	Contact Luxfer Gas Cylinders Ltd.
1	The cylinder is slightly damaged but can continue to be used	Continue to use the cylinder in its current condition, but prevent further damage from occurring
2a	The cylinder is damaged but can be repaired	Repair the cylinder
2b	The cylinder is damaged but may be repaired upon consultation with the manufacturer	Consult Luxfer Gas Cylinders Ltd. to determine whether the cylinder can be repaired.
3	The cylinder is damaged beyond repair	The cylinder is damaged beyond repair

Cylinder Inspection

Cylinder Damage Types

Cylinder Damage Type	Signs of Cylinder damage	Potential Causes of Damage
Impact	Dents, scratches, cracked or peeling laminate, crazing (hairline cracking of the laminate)	From a blunt object striking the cylinder, the cylinder being dropped
Cutting	Cut, scratch, gouge, peeling laminate	From a sharp or pointed object
Abrasion	Scuffs, dull or whitish appearance, flat spots	From friction between the laminate and an object in contact with the cylinder
Fire or Excessive Heat	Charred laminate, discoloration, soft spots, blistering, swelling	From direct flame, excessive heat source in contact with cylinder, excessive heat source near cylinder
Weathering	Cloudy appearance/ discoloration, soft spots	From UV radiation or water impregnation through a crack in the laminate
Chemical Attack	Discoloration, soft spots, blistering, swelling	From brake fluid, any corrosive fluid
Internal Damage	Contaminated output gas composition, clogged fuel filters	Contaminated input gas composition



Cylinder Inspection

Cylinder Conditions – Impact Damage

Level	Severity of Damage	Action Required
1	Cylinder shows signs of minor scratches	Continue to use, prevent further damage
2a		
2a		
2b		
3	Cylinder shows signs of dents, whitish frosted appearance, cracked or peeling laminate, large crazing	Remove cylinder from service and destroy
3		



Cylinder Inspection

Cylinder Conditions – Cut Damage

Level	Flaw Depth	Flaw Length	Number of Permissible Flaws	Action Required
1	Less than 0.25 mm (0.01")	Any length	Single or multiple flaws	Continue to use, prevent further damage
2a	> 0.25 mm (0.01") and < 0.75 mm (0.03")	Any length	Single or multiple flaws	Remove cylinder from service and repair
2a	> 0.75 mm (0.03") and < 1.25 mm (0.05")	Less than 25 mm (1")	Single Flaw	Remove cylinder from service and repair
2b	> 0.75 mm (0.03") and < 1.25 mm (0.05")	Less than 25 mm (1")	Multiple Flaw	Remove cylinder from service and contact Luxfer
3	> 0.75 mm (0.03") and < 1.25 mm (0.05")	More than 25 mm (1")	Single or multiple flaw	Remove cylinder from service and destroy
3	> 1.25 mm (0.05")	Any length	Single or multiple flaw	Remove cylinder from service and destroy



Cylinder Inspection

Cylinder Conditions – Abrasion Damage

Level	Severity of Damage	Action Required
1	Abrasion depth is less than 0.25 mm (0.01")	Continue to use, prevent further damage
2a	Abrasion depth is > 0.25 mm (0.01") and less than 0.75 mm (0.03")	Repair the cylinder
2a		
2b		
3	Abrasion depth is > 0.75 mm (0.03")	Remove cylinder from service and destroy
3		



Cylinder Inspection

Cylinder Conditions – Fire Damage

Level	Severity of Damage	Action Required
NA	Cylinder is known or suspected to have been exposed to fire or heat and does not show any signs of damage	Contact Luxfer
2a		
2a		
2b		
3	There is evidence of fire or heat exposure. This may include discoloration, charred laminate, soft spots, blistering	Remove cylinder from service and destroy, regardless of size and effected area
3		



Cylinder Inspection

Cylinder Conditions – Weathering Damage

Level	Severity of Damage	Action Required
1	Laminate has a whitish/cloudy appearance or a yellow brown tinting of the surface resin	Continue to use, prevent further damage
2a		
2a		
2b		
3	Laminate shows signs of cracking, blistering, soft spots, or other characteristics of severely degraded laminate	Remove cylinder from service and destroy
3		



Cylinder Inspection

Cylinder Conditions – Chemical Damage

Level	Severity of Damage	Action Required
1	The affected area appears no different than the surrounding unaffected laminate. There are no signs of discoloration or soft spots	Continue to use, prevent further damage
2a		
2a		
2b		
3	Laminate may show signs of discoloration, soft spots, blistering, swelling or resin removal	Remove cylinder from service and destroy
3		

Cylinder Inspection

Cylinder Damage Types – ISO 19078

Cylinder Damage Type	Signs of Cylinder damage	Potential Causes of Damage
Marking and Labeling	Stamped and attached information	NA
Cuts, Scratches, gouges	A sharp impression where material has been removed or redistributed	NA
Abrasion	An area that is scuffed or worn thinner by rubbing or scraping	NA
Charring, Soot	Blackening or browning of an area	NA
Gas leakage	Loss of contents through a defect	NA
Chemical Attack	Cylinder is subjected to a chemical that dissolves or destroys the material	NA
Weathering	Effects of the sun`s UV radiation	NA



Cylinder Inspection

Cylinder Damage Types – ISO 19078

Cylinder Damage Type	Signs of Cylinder damage	Potential Causes of Damage
Collision, accident, fire, subjected to high heat	Vehicle accident, involved in a fire or high heat source	Only applicable for type –1 and metal portions of other designs
Impact	Composite material was struck or hit, a frosted or smashed look appears in resin	Only applicable for type –1 and metal portions of other designs
Stress Corrosion Cracking	Fibers may crack or split by a chemical attack promoted by stresses in the material	Only applicable for type –1 and metal portions of other designs
Bulge	Visible swelling of cylinder	Only applicable for type –1 and metal portions of other designs
Corrosion, pits	A hole caused by a chemical, oxidation or rusting of material	Only applicable for type –1 and metal portions of other designs
Corrosion, line	A series of corrosion pits connected in a narrow band or line	Only applicable for type –1 and metal portions of other designs
General Corrosion	An area of material loss due to chemical oxidation or rusting	Only applicable for type –1 and metal portions of other designs



Cylinder Inspection

Cylinder Damage Types – ISO 19078

Cylinder Damage Type	Signs of Cylinder damage	Potential Causes of Damage
Dents	A depression in the cylinder that has neither penetrated nor removed material and is greater than 1% of the outside diameter	Only applicable for type –1 and metal portions of other designs
Corrosion of metals under composite	Metal corrosion as evidenced on the composite surface or on the liner surface adjacent to the edge of the composite material	Only applicable for type –1 and metal portions of other designs

Cylinder Inspection

Cylinder Conditions ISO 19078

Damage	Definition	Level 1 Accept	Level 2 Poss. Rep	Level 3 Reject	Note
Marking and Labeling	Stamped and attached information	Required info is present and legible	All information is not legible, refer to man.	Required info is not legible for any trace ability, repair not possible	Man. May supply new labelling if serial number is legible.
Cuts, Scratches, gouges	A sharp impression where material has been removed or redistributed	When depth is less than 0.25 mm and no fibers were cut or broken	Greater than level 1 damage that is accepted and can be repaired according to ma. Specs.	When depth is greater than 1.25 mm	Composite cylinders may be repaired if fibers are not cut or separated
Abrasion	An area that is scuffed or worn thinner by rubbing or scraping	When the depth is less than 0.25 mm	Greater than level 1 damage that is accepted and can be repaired according to man. Specs.	When the depth in 1.25 mm or greater, if fibers are exposed	Composite cylinders may be repaired if fibers are not exposed, cut or separated



Cylinder Inspection

Cylinder Conditions ISO 19078

Damage	Definition	Level 1 Accept	Level 2 Poss. Rep	Level 3 Reject	Note
Charring, Soot	Blackening or browning of an area	None or washes off	Minor discoloration, manufacturers recommendation	Permanent charring, discoloration	Follow manufacturer's test guidelines for level 2 damage
Gas leakage	Loss of contents through a defect	None detected	Get manufacturers advise	Test confirms leak	
Chemical Attack	Cylinder is subjected to a chemical that dissolves or destroys the material	Cleans off, no residue or effect and chemical is known not to affect container materials	Chemical unknown, effects on cylinder materials unknown, moves to level 3 if these cannot be resolved	Permanent disc.; loss of material, chemical is known to affect cylinder materials, cannot determine if materials have been affected	Manufacturer shall provide guidance on exposure to chemicals



Cylinder Inspection

Cylinder Conditions ISO 19078

Damage	Definition	Level 1 Accept	Level 2 Poss. Rep	Level 3 Reject	Note
Weathering	Effects of the sun's UV radiation	Minor gloss loss or chalking	Only coating or non-structural material is affected, may be re painted	Structural materials affected	Repainting with man. Instructions, may put level 2 into a level 1
Collision, accident, fire, subjected to high heat	Vehicle accident, involved in a fire or high heat source	No visible indication on cylinder and vehicle owner knows of no accidents, fire or heat exposure	Vehicle owner knows and reports a collision, accident, fire or heat damage, Cylinder retesting	Vehicle shows signs of severe damage and or cylinder shows signs of impact or heat damage	Cylinder shall be fully insp. Immediately after an accident or exposure to fire or heat
Impact	Composite material was struck or hit, a frosted or smashed look appears in resin	Damaged area is less than 1 cm ² and no other damage is apparent	Damage is uncertain requiring manufacturers advise	Permanent deformation of cylinder or liner, or forsted/damaged area is greater tan 1 cm ²	Contact manufacturer if additional advise is needed



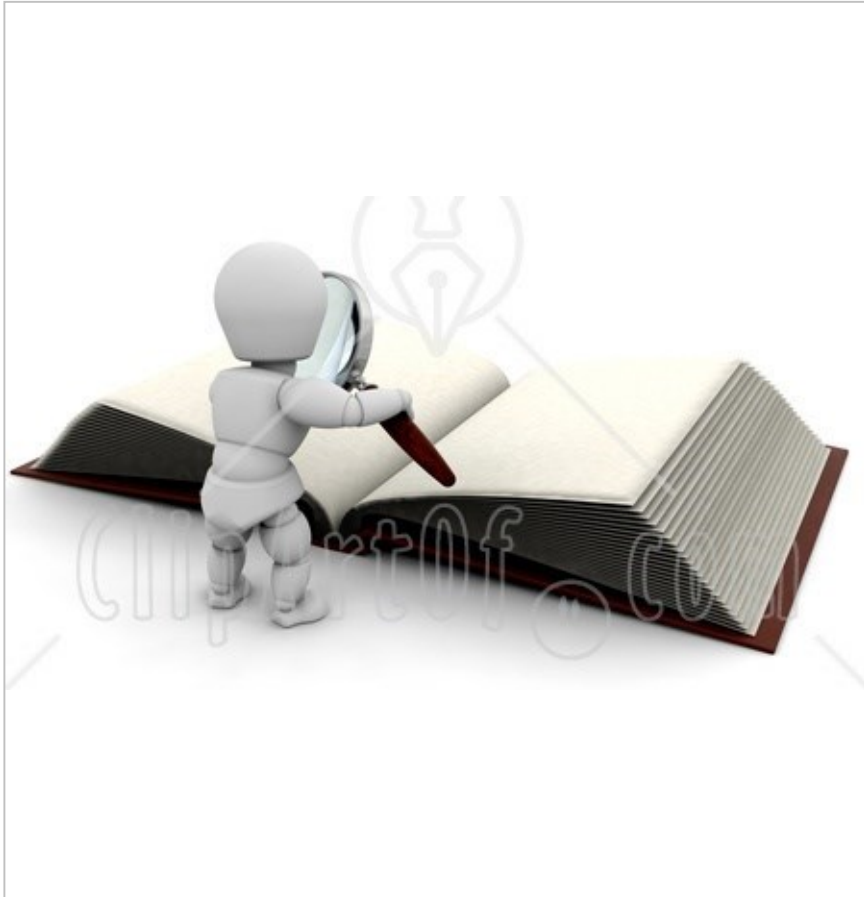
Cylinder Inspection

Cylinder Conditions ISO 19078

Damage	Definition	Level 1 Accept	Level 2 Poss. Rep	Level 3 Reject	Note
Stress Corrosion Cracking	Fibers may crack or split by a chemical attack promoted by stresses in the material	Materials in contact with chemical's but nothing visible is detected	Possible cracking or splitting has occurred as cylinder was known to have had chemical contact	Identified stress corrosion cracking	Contact manufacture if questionable conditions exist

Cylinder Inspection

Service History



- Inspector shall review previous service and inspection records.
- Aid for the inspection process.

Cylinder Inspection

Damage Evidence



- Visual inspection is the primary means of detecting cylinder damage:
 - Corrosion.
 - Cuts, scratches, exposed fibers.
 - Dents, bulges, gauges, fractures.
 - Surface deterioration, discoloration
 - Impact or accidents.
- Do not dismantle system for re qualification inspection.

Cylinder Inspection

Cylinder Damage Assessment – ISO/DIS 19078



- Level 1: Acceptable, minor or no visual damage.
- Level 2: Rejectable damage requiring work.
- Level 3: Sufficiently severe damage to reject and condemn cylinder.
- ISO damage level id is a recommend
- Follow manufactures damage levels.
- Investigate cause of damage, advise of corrective actions.

Cylinder Inspection

Cylinder Damage Assessment - 19078

Level	Damage Level Definition	Action Required
NA	NA	NA
1	No visual or minor damage	Acceptable, repair not required
2	NA	Reject able and requires rework
2a,b	NA	NA
3	Major Damage	Remove and destroy

Equipment Inspection

Final Disposition – Cylinders



Details

- Three levels of disposition:
 - Level 1: No rework.
 - Level 2: Rework.
 - Level 3: Destroy.
- Inspector shall place an inspection label on each tank.
- Min. info required:
 - Inspection date.
 - Name of inspection body.

Equipment Inspection

Labelling

G-Stor™ Pro
TYPE 3 CYLINDERS

CNG ONLY

G-Stor™ Pro
TYPE 3 CYLINDERS

Date of Manufacture : 09/2016
DO NOT USE AFTER : 09/2036
Luxfer Part Number : V132D-201
Cylinder Model : 3V132C200G5-ESSB
Serial Number : Y4589
Working pressure : 20.0 MPa (2900 psig) at 15°C (59°F)
Empty Weight : 50.2kg
Approvals : **ECE R 110 CNG-3** (E₂₄) **110 R-010064 C**

USE ONLY MANUFACTURER-APPROVED PRESSURE RELIEF DEVICE



Luxfer Canada Limited, Calgary, Canada (403) 720-0262

For more information, visit the Luxfer Gas Cylinders website at www.Luxfercylinders.com

Details

- Mandatory information are:
 - Fuel.
 - Date of man.- and expiration date.
 - Manufacturer ID.
 - Cylinder identification number.
 - Working pressure at spec. temperature.
 - Design standard.
- Non mandatory info are the temp. range, water cap., test date., insp. And specific PRD.

Information on label must be legible

Equipment Inspection

Inspection Record and Checklist



Details

- Develop or make use of check lists:
 - ISO/DIS 19078.
 - Luxfer operations manual.
 - CGA 6.4
- File inspection check lists for records and later review.

Equipment Inspection

Final Disposition – Equipment



Details

- Three levels of disposition:
 - Level 1: No rework.
 - Level 2: Rework or advice.
 - Level 3: Destroy.

Equipment Inspection

Equipment Conditions ISO 19078

Damage	Definition	Level 1 Accept	Level 2 Poss. Rep	Level 3 Reject	Note
All equipment		Clean, no damage, working, good condition	Evidence or minor chemical attack, oxidation, rust or corrosion, unclear Level 1, need advice, repairable	Damaged, cracked, leaking, cannot make proper connection, Level 2 condition is not minor	
Mounting system		Cylinder manufacturer has approved the mounting and it is in good condition	Loose, wear showing or in questionable condition, inspect for other fuel system damage, follow man. Advise	Broken, excessive wear, damaged, cracked, corroded, abrasion noted or not cylinder manufacturer approved	
Fuel system		Fuel and vent lines are secure and dry	Water is gathering at points, lines are loose but can be properly tightened, eliminate accumulation of water	Broken, excessive wear, damaged, cracked, corroded, or abrasion noted	

Equipment Inspection

Equipment Conditions ISO 19078

Damage	Definition	Level 1 Accept	Level 2 Poss. Rep	Level 3 Reject	Note
PRD vent lines and assemblies		Clean, no damage, no leaks and cylinder manufacturer approved	Possible seal damage, leaking, vent lines dirty or partially plugged, cylinder manufacture did not approve	Damaged, cracked, deformed, leaking, plugged, or non working parts	Equipment manufacturers advise needed for any repair or to clarify Level 2 conditions
PRD		Clean, no damage, cylinder manufacturer approved and appropriate for container type	Evidence of minor wear, or corrosion, leakage evident, equipment manufacturers advice needed on repairs or acceptance criteria	Corroded, plugged, rusted, bulged, deformed, defective, leaking or fusible metal has extruded or partially extruded	
PRD dents, gouges and or scratches		None evident	Less than 0.5 mm deep, contact equipment manufacturer for advice	0.5 mm deep or greater, or unclear Level 2 condition	



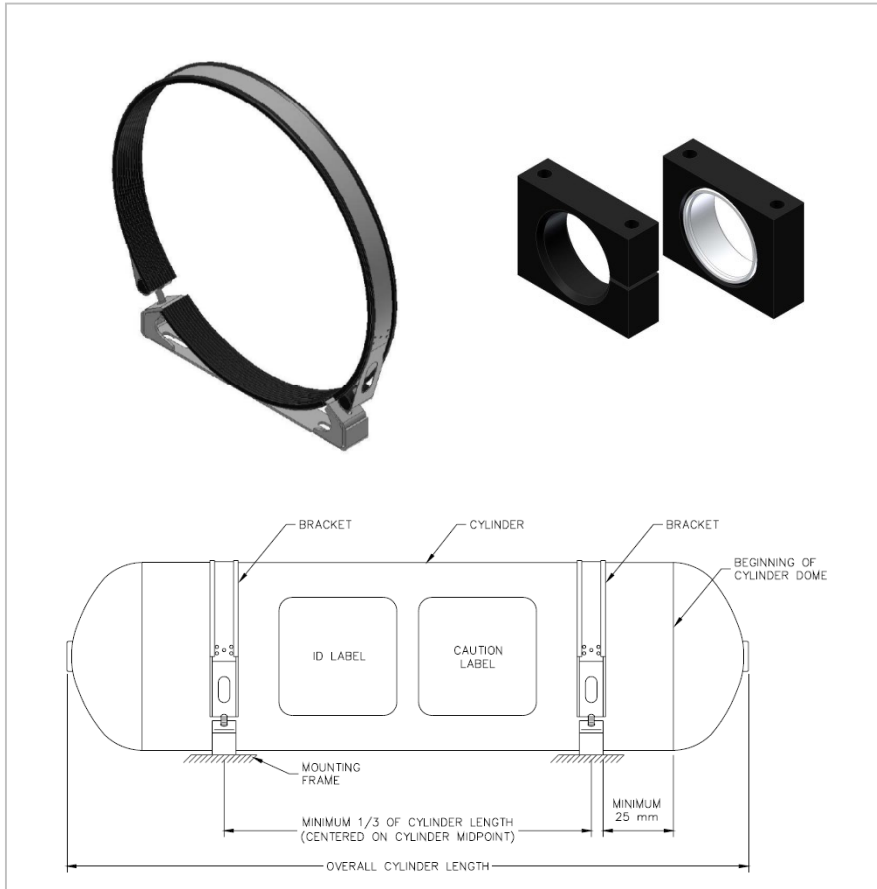
Equipment Inspection

Equipment Conditions ISO 19078

Damage	Definition	Level 1 Accept	Level 2 Poss. Rep	Level 3 Reject	Note
PRD hexagonal torque nut		No damage and clean	Some minor wear noted, obtain advice of equipment manufacturer	Rounded edges, distorted, non functional or leaking	
Valving		Clean, no damage, no leaks, no connection leaks and cylinder manufacturer approved	Dirty, gaps pr loose cylinder port connections, needs valve cylinder ports further inspection	Damaged, deformed, leaking	



Installation and Mounting Inspection



- Use manufacturer recommended straps/brackets only.
- Cylinder expands and contracts as pressure changes.
- Cylinder diameter and length changes.
- Mounting shall accommodate expansion.
- Inspect for signs of corrosion or other damage.

Installation and Mounting Inspection

General Inspection Criteria



- Examination of the installation by the inspector shall:
 - Determine compliance.
 - Usage for designated fuel only.
 - Determine potential for damage.
 - Verify clearance around the tank, recommended is 12.5 mm.
 - Vent line securely fixed, protected and capped.
 - Shields have a rec. clearance of 9.5 mm.

Installation and Mounting Inspection

Fuel System General Inspection



- Check for signs of looseness.
- Look for signs of abrasion.
- Check for loose fittings.
- Examine for accumulation of water.
- Record findings in inspection form.

Installation and Mounting Inspection

Mounting Brackets and Strap Inspection



- Verify mounting system is approved.
- Verify that cylinder is firmly held.
- Verify all bolts are fully tightened, not for belly mounts.
- Verify rubber brackets and straps and all other components are in tact.
- Carefully examine the brackets and insulator straps for wear.
- Check for any looseness.
- Inspect shielding for wear.
- Document any findings.

Disposition of Condemned Cylinders

General



- Cylinders may be condemned for:
 - Reached or exceeded service life.
 - Missing identification.
 - Exhibits level 3 damage.
- Procedure:
 - Depressurize and purge.
 - Remove attachments.
 - Obliterate markings.
 - Destroy cylinder and dispose of.
 - Drill 2 x 1/2" holes compl. Through.

Disclaimer

Liability



- Information contained is from reliable sources.
- Always reference to local standards and their requirements.
- Manuals are subject to periodic review.
- Obtain the latest version of applicable manuals and standards.
- If in any doubt contact the manufacturer for further information.

