ACETYLENE CYLINDER VISUAL INSPECTION AND SAFE OPERATION PROCEDURE

TD 24/17/E

MIDDLE EAST GASES ASSOCIATION (MEGA)
Dubai World Trade Centre, Sheikh Rashid Tower,
Office No. ESO 20,7th Floor,
PO Box: 9204, Dubai-UAE
Tel: +971-4-3097037 E-mail: info@megases.org, www.megases.org

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This document has been developed from Guidelines for Periodic Visual Inspection and Requalification of Acetylene Cylinders.

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1. Introduction

Across the Middle East there is a lack of national regulations or clear standards for acetylene cylinders safe filling and the consequent hazards that these might pose.

MEGA realizes the consequences of potential of harm to human life and property damage that can occur due to mishandling the acetylene cylinders, not comprehending the product hazards, using the product wrongly etc. This document covers the most basic requirement of acetylene cylinder visual inspections and validating the cylinders fit for re-filling and use.

2. Background

Guidelines for periodic Visual Inspection and requalification of acetylene cylinders, Edition-4, Code of Practice Acetylene IGC Doc 123/13/E illustrate the Visual Inspection of the Cylinders and appropriate records and controls need to be maintained to avoid non-conforming cylinders getting into the production line possible to cause a serious potential incident. MEGA identifies the hazards and risks of mishandling the acetylene cylinders and necessity to develop this documentation and circulate to Member Companies as part of harmonization of acetylene pre-filling and post-filling inspection procedures.

The aim of this document is to propose that industrial gas companies across the Middle East to be compliant with the safe filling procedures of Acetylene Cylinders.

3. Scope

This document details the requirement for the safety and operational techniques that need to be adapted for acetylene cylinders for MEGA Member Companies and also Non-MEGA Companies and other suppliers/customers. The procedure outlines the measures to be taken during the prefilling inspection of acetylene cylinders including acetone addition procedure and post-filling inspections to ensure the safety of personnel and customers. This document doesn't cover other detailed periodical inspection of shell, porous mass and requalification of cylinders.

4. MEGA Recommendations

MEGA's approach has been to adopt the requirements and the guidelines of the Periodic Visual Inspection and Requalification of Acetylene Cylinders and Code of Practice Acetylene IGC Doc 123/13/E.

5. Objective

This guideline draws minimum requirements to be followed for Acetylene Cylinder Filling.

6. Requirement

This guideline requires each location to follow minimum requirements for cylinder filling as outlined below.

A. Inward cylinders Inspection
B. Inspection before and after cylinder filling
C. Cylinder handling and storage

6.1 Inward Cylinder Inspection

Inward Cylinder inspection shall be carried out as per the following steps to ensure that the cylinder confirming to the requirements is only sent to the cylinder filling area.

6.1.1 Inspect Stamp Marking: Each cylinder shall be inspected for the presence of complete readable stamp markings. Any cylinder found to have unreadable markings shall be removed from service. Check the cylinder for requalification due and follow the cylinder manufacturer's recommendation.

6.1.2 Acetoning: Acetylene cylinders may only be replenished with solvent and filled with acetylene if: they are marked with approved test stamp, the cylinders have not passed the due date of re-test, they do not show external defects in the shell, the valve guard and other fittings, the required stamp marking, label and colour coding data are present. The cylinders that are not meeting these criteria will be moved to quarantine area for further investigation.

6.1.3 Inspect Cylinder Valve: Each cylinder valve shall be inspected to ensure it is free of defects such as a damage stem, a damaged or missing hand wheel, excessive wear on outlet threads, and nicks or damage to the valve outlet regulator mating surface.

6.1.4 Inspect cylinder body for damages: like

a) Dents
b) Cuts, digs or gouges
c) Corrosion or pitting
d) Arc & Torch burns
e) Fire damage
f) Bulges

Cylinders with any of the above damages should be tagged and sent to inspection/testing facility for detailed evaluation.

6.1.5 Inspect Foot ring: Foot rings shall be examined for leakage, distortion, excessive corrosion and failure of welds.

6.1.6 Inspection of fusible metal pressure relief devices: Fusible metal pressure relief devised shall be examined for extruded metal, corrosion, bent condition and peened fusible metal.

6.1.7 Check for Valve Guard: If valve guard is loose or missing, fix the valve guard;

Note: Check cylinder documents: Ensure all the necessary documents like test certificate is available and verified for cylinders received for filling for the first time. This is applicable to new batch of cylinders exposed to first filling.

6.2 Cylinder Filling

The purpose of the procedure is to outline instructions to be followed for Acetylene cylinder filling, so that the filling is performed in a consistently controlled fashion.

The procedure consists of the following steps

1) Prefill inspection check
2) Cylinder filling
3) Post fill inspection check

6.2.1 Pre fill Inspection Check

In the Prefill inspection before filling the cylinder check the marking showing “Inward cylinder inspection – Pass”. This is to ascertain that the cylinder is safe to fill.

A visual inspection of the cylinder/ valve is necessary to counter check the quality of inward cylinder inspection.

6.2.2 Cylinder filling Procedure for Acetylene:

a. Move the cylinder close to the weighing scale. Remove the valve protective caps and place the cylinder on the weighing scale. For the fixed valve guard type cylinders, the weight of the cylinders can be noted with the fixed valve guard. Check the empty weight of the cylinder and record. Use the pressure/temperature chart to determine the amount of any residual acetylene.

b. An under-acetoned cylinder is a safety hazard because it is unstable. It should be replenished before proceed filling it.

c. After calculating the acetone shortage(if any), connect the Acetone pigtail to the Acetylene cylinder valve and open the cylinder valve slowly and top-up Acetone to the tare weight. After necessary top up of acetone record the weight of the cylinder and quantity of acetone added .The cylinder is now ready for connecting to the filling lines. .

d. Move the cylinders to the filling manifold and, connect the cylinders to the pigtails. After all cylinders are connected, slowly open the cylinder valve and manifold header valve.

e. Slowly open the manifold master valve.

f. Start the acetylene generator and the compressor as per the plant operations manual

g. Slowly open the manually activated spray nozzle system and adjust the water flow to the water spray. Use water spray to cool the cylinders, as required by the season and remove heat of solution of acetylene, if needed and during high temperature season.

h. While cylinders are getting filled, use soap and water solution to check acetylene leak from cylinder valve, top fuse plug and pig tail connections. Check for leaks at least two times during the filling i.e. at 100 psig and 200 psig. Record the leak test result in the production log. If any leakage is observed, close the appropriate valve and isolate the cylinder.

i. Once the filling is completed, close the master valve and also the cylinder valve. Disconnect the pigtails and remove the cylinder from the manifold.

6.2.3 Post Filling Checks:

a. Final Weight: Bring the cylinder to the weighing scale and record full weight of the cylinder and net weight of the gas filled.

b. Final Leak Tests: Leak test the valves inlet / out let, fuse plug and cylinder bottom using a soap solution.

7 Cylinder Storage and Handling

A. Cylinder Handling

1) Always wear proper Personal Protective Equipment.
2) Do not remove or change numbers or marks stamped on cylinders.
3) Cylinders should not be banged, dropped or permitted to strike each other or against other hard surfaces.
4) Do not use the valve cover to lift cylinders
5) Never drag or slide cylinders, even for short distances.
6) Never Drop cylinders or permit them to strike each other violently.
7) Never Subject cylinders to mechanical shocks that may cause damage to their valves.
8) Never use cylinders as rollers for moving material or other equipment.

B. Cylinder Storage:

1) Store cylinders upright and secure them with a belt or use nesting technique.
2) Acetylene cylinders should be kept at a minimum of 6 meters away from cylinders, such as Oxygen and combustible materials.
3) Acetylene gas cylinders should not be stored with oxygen, or nitrous oxide cylinders, or adjacent to oxygen charging facilities.
4) Store cylinders in a dry, well-ventilated area under temperature less than 50 Deg C, away from flames, sparks, or any source of heat or ignition.
5) Mark the cylinder storage areas with proper precautionary signs, such as “ACETYLENE-FLAMMABLE GAS – NO SMOKING - NO OPEN FLAMES.”
6) Place cylinders in a location where they will not be subject to mechanical or physical damage, heat, or electrical circuits to prevent possible explosion or fire.
7) Segregate empty cylinders from full cylinders.

Caps used for valve protection should be kept on the cylinders at all times.

C. Cylinder Bundles:

Cylinder bundles comprise a number of single cylinders, which are interconnected for simultaneous filling and discharging and are enclosed in a rigid frame for handling by crane and/or forklift.

D. Acetylene Cylinder Trailer:

Cylinder battery trailer comprise a number of acetylene cylinder bundles inter connected for simultaneous operation mounted on to a trailer chassis or a battery of single cylinders manifolded together comprising the entire trailer. The bundled cylinders after use are undergoing the standard pre-filling, safe filling and post-filling procedures as they are followed for individual cylinders.

Once the manufacture of individual cylinders is complete, they are assembled in bundles as per design. EIGA recommends dismantling bundles after every 6 refills to check acetone contents in each cylinder.

8 REFERENCES

Acetylene Plant Manufacturers' recommendation
Code of Practice Acetylene IGC Doc 123/13/E.
Design, Manufacture, Identification and Testing of cylinder Bundles EN 13769, (37)
And ISO 10961, (38)
Pre-filling Inspection EN 12754, (62)
Acetylene Cylinder Trailer EN 13807, (39)