इंटरनेट मानक

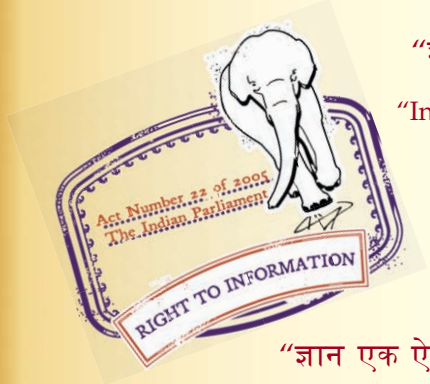
Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 8433 (1984): Code of practice for visual inspection of dissolved acetylene gas cylinders [MED 16: Gas Cylinders]



"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

BLANK PAGE

UDC 621·642·17·02 : 661·722·21 - 403·3 : 620·111·1·006·76

(Reaffirmed 2006)

Indian Standard

CODE OF PRACTICE FOR VISUAL INSPECTION OF DISSOLVED ACETYLENE GAS CYLINDERS

(First Revision)

[Ref : Doc : EDC 16 (4139)] Gas Cylinders Sectional Committee, EDC 16

1. Scope — This standard covers the measurement of various external and internal defects by visual inspection and the limiting criteria for the acceptance of dissolved acetylene gas cylinders in use, on the basis of extent of defects revealed by visual inspection.

1.1 This standard does not cover low pressure or high pressure gas cylinders which are covered by the following standards:

IS : 5845-1984 Code of practice for visual inspection of low pressure gas cylinders (*first revision*)

IS : 8451-1984 Code of practice for visual inspection of high pressure gas cylinders (*first revision*)

1.2 The limits specified in this code apply only to cylinders already in use. They do not apply to newly manufactured cylinders.

2. Preparation for Inspection

2.1 Rust, scale, caked paint, etc, shall be removed from the exterior surface so that the surface can be adequately observed. Facilities shall be provided for inverting the cylinder to facilitate inspection of the bottom. This is important because experience has shown this area to be the most susceptible to corrosion.

3. Damages

3.0 Damage usually met with may be classified under the following heads:

a) Dents;
b) Cuts, gouges or digs;
c) Dents and cuts;
d) Dents and line marks;
e) Bulges;
f) Stab marks;
g) Fusion marks and fire damage;
h) Corrosion or pitting;
j) Neck defects; and
k) General distortion.

3.1 *Dent*

3.1.1 *Definition* — This is an area of damage which has produced a deflection of the walls over a given area. Such deformations are caused on the cylinder by its coming into contact with a blunt object in such a way that the thickness of metal is not materially impaired. An indentation, which has a smooth and shallow deflection of the walls in no way affects the suitability of the cylinder for use. Indentations are of concern only where the metal deformation is sharp and confined particularly to over those areas measuring less than 50 mm × 50 mm. The appearance of the dent should provide a reasonable limiting factor apart from the limits specified.

3.1.2 *Limit*

3.1.2.1 *Dents away from weld* — When denting occurs so that no part of deformation includes a weld, the cylinder shall be condemned when the depth of a dent is greater than one-tenth of the mean diameter of the dent or the mean diameter of the dentis greater than one-quarter of the diameter of the cylinder.

3.1.2.2 *Dents at welds* — Where denting occurs so that any part of the deformation includes a weld, the permissible limits shall be reduced to half of that in **3.1.2.1**.

Adopted 4 September 1984 | | Gr 2

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

3.1.3 *Measurement* — A rigid straight edge of sufficient length is placed over the defect and a scale or depth gauge to measure the distance from the bottom of the straight edge to the bottom of the defect. Also the length and width are determined at the point where the walls return to their original contour and diameter.

3.2 *Cut, Gouge or Dig*

3.2.1 *Definition* — These are deformations caused by contact with a sharp object in such a way as to cut into or upset the metal of the cylinder, decreasing the wall thickness at that point. The metal is displaced by a gouging action.

3.2.2 *Limits*

3.2.2.1 When the original wall thickness at manufacture is not known and the actual wall thickness cannot be measured, a cylinder shall be rejected if the cut, gouge or dig decreases the wall thickness at that point in excess of 10 percent of the minimum allowable wall thickness calculated according to the specification to which the cylinder has been manufactured. On the crown, above a distance of 50 mm from the base run, the thickness of the walls generally increases and hence a larger margin may possibly be allowed in these areas, consistent with the construction of the shell.

3.2.2.2 When the original wall thickness at manufacture is known or the actual wall thickness measured, a cylinder shall be rejected if the original wall thickness minus depth of defect is less than 90 percent of the minimum allowable wall thickness.

3.2.2.3 If the length of the defect is 75 mm or more the limit of rejection set at **3.2.2.1** and **3.2.2.2** above shall be reduced to 50 percent.

3.2.3 *Measurements* — When measuring cuts by scale and depth gauge, the upset metal should be removed or compensated for, so that only actual depth of metal removed from the cylinder wall is measured.

3.3 *Dent and Cut*

3.3.1 *Definition* — As suggested by the name, this is a combination of indentation and cut. Quite frequently cylinders are damaged by an indentation contained in which is a cut.

3.3.2 *Limits* — In accordance with **3.1.2** and **3.2.2.**

3.3.3 *Measurements* — In accordance with **3.1.3** and **3.2.3.**

3.4 *Dent and Line Mark*

3.4.1 *Definition* — This form of damage results from the cylinder striking a comparatively sharp angle, such as an angle iron, which produces a line mark usually extending diametrically across the indentation.

3.4.2 *Limits* — The line marks are usually no more than 0·4 mm deep. The limit, therefore, should generally be as prescribed in **3.1.2.**

3.4.3 *Measurements* — In accordance with **3.1.3** and **3.2.3.**

3.5 *Bulges*

3.5.1 *Definition* — Swelling of the cylinder walls.

3.5.2 *Limit* — Cylinders are normally produced with a symmetrical space. Cylinders with distinct visible bulge shall be condemned.

3.5.3 *Measurement* — This is done by comparing a series of circumferential measurements, measuring the height of a bulge with a scale, comparing templates of bulged areas with similar areas not bulged.

3.6 *Stab Mark*

3.6.1 *Definition* — This type of damage is normally caused by the dropping of the cylinder or alternatively the cylinder riding during a rail or road journey on a bolt or rivet head. The damage produces a depression into the walls, sometimes without the formation of an indentation, but there are instances where there is an indentation and in the centre of this is the stab mark. In assessing such damage two factors have to be considered:

a) Depth of depression, and

b) Angle at circumference of depression and cylinder wall.

3.6.1.1 It will be appreciated that a deep and sharp punch mark produces a shearing action at the circumference, and it is with this in view that the limits are specified for such damage.

3.6.2 *Limit* — Stab marks, usually over areas of 9·5 mm × 16 mm having a depression greater than 1·6 mm will produce a comparatively sharp shearing effect at the circumference of damage. Such cylinders should be considered unfit for use. In thicker metal at base rim, etc, this limit may be proportionately increased.

3.6.3 *Measurement* — The upset metal should be removed and the depth of stab mark measured by depth gauge. The damaged area may be measured by scale.

3.7 *Fusion Mark and Fire Damage*

3.7.1 *Definition* — Damage to the cylinder as a result of a fire from a lighted blowpipe on to the walls of the cylinder, or fusion of metal due to an electric arc. Common evidence of exposure to fire are:

a) charring or burning of the paint or other protective coats,

b) burning or sintering of metal,

c) distortion of the cylinder,

d) melting or burning of the valve, and

e) melted out fusible plugs.

3.7.2 *Limit* — Cylinders which have been damaged by fire shall be condemned.

3.7.3 *Measurement* — Defect is normally determined by visual examination with particular emphasis to the condition of the protective coating. If the protective coating has been burnt off or distorted it is assumed that the cylinder has been overheated. If, however, the protective coating is only mildly blistered or dirtied from smoke or debris and is found, by examination, to be intact underneath, the cylinder shall not be considered affected.

3.8 *Corrosion or Pitting*

3.8.1 *Definition* — This involves the loss of wall thickness by corrosive media. Different kinds of corrosion to be considered are:

a) *Isolated pitting* — Isolated pits of small cross-section do not effectively weaken the cylinder wall but are indicative of possible penetration and leakage. Since the pitting is isolated the original wall is essentially intact. If the penetration is deep it should be viewed seriously and possible increase in stress at the damaged portion should be considered.

b) *Line corrosion* — When pits are not isolated but are connected or nearly connected to others in a narrow band or line, such a pattern is termed as line corrosion. This condition is more serious than isolated pitting. Line corrosion frequently occurs in the area of intersection of the footring and bottom of a cylinder.

c) *General corrosion* — General corrosion is that which covers considerable surface areas of the cylinder. It reduces the structural strength. It is often difficult to measure or estimate the depth of general corrosion because direct comparison with the original wall cannot always be made. General corrosion is often accompanied by pitting.

3.8.2 *Limit*

3.8.2.1 A cylinder shall be rejected if the remaining wall in an area having isolated pitting only is less than 90 percent of the minimum allowable wall thickness.

3.8.2.2 A cylinder shall be rejected when line corrosion on cylinder is 76 mm in length or over and the remaining wall is less than 90 percent of the minimum allowable wall thickness, or when line corrosion is less than 90 percent of the minimum allowable wall thickness.

3.8.2.3 A cylinder shall be rejected when the remaining wall thickness in an area of general corrosion is less than 90 percent of the minimum wall thickness.

3.8.3 *Measurements*

3.8.3.1 The surface which has been corroded should be thoroughly cleaned by wire brushing and by slight filing, if necessary, to ensure that any raised lip of metal is removed.

3.8.3.2 Pitted depth may be measured by placing a straight edge across high points in the pitted area and measuring the distance from the bottom of the straight edge to the bottom of the pit.

3.8.3.3 There are certain areas of the cylinder where the pit depth procedure may be difficult to apply due to the proximity of the corroded areas to footrings and other appurtenances. In this event, special curved measuring devices may be devised, or if necessary, putty casts may be made for establishing criteria for acceptance or rejection.

3.9 *Neck Defects*

3.9.1 *Definition* — Defects in the cylinder neck, such as serious cracks, folds and flaws, or damage to neck threads due to worn or corroded crests, broken threads, nicked or cut threads.

3.9.2 *Limits* — At manufacture, cylinders have a specified number of full threads of proper form as required in applicable thread standards. Cylinders shall be rejected if the required number of effective threads are materially reduced, or if a gas tight seal cannot be obtained by reasonable valving methods.

3.9.3 *Measurements* — Neck cracks are determined by testing the neck during charging operation with a soap solution. Gauges are used to measure the number of effective threads.

3.10 *General Distortion*

3.10.1 *Definition* — Appearance of the cylinder which warrants its rejection.

3.10.2 *Limits* — Noticeable tilting of the valve, loss of stability, etc.

3.10.3 *Measurements* — Judgement from visual appearance.

4. Inspection of Porous Mass

4.1 Porous mass is no longer usable when it gets contaminated with water, oil or when it develops voids, cracks that may allow concentration of acetylene in a free state. If water or oil has contaminated the porous mass, the absorption capacity of the cylinder is considerably reduced. If the absorption capacity has been reduced by over 30 percent and the cylinder mass, after blowing to atmospheric pressure, is found to be more than the tare mass, the cylinder shall be condemned.

4.2 The porous mass should be visually examined after removal of the valve for any sagging, cracks or voids. If any cracks or voids adjacent to the valve opening are found, the cylinder shall be condemned. If any sagging is noticed, a bent wire of 3·15 mm dia should be inserted in the space between the top of the porous mass and the shell. If this test shows that there is a space of 3·15 mm or more, the cylinder shall be condemned.

EXPLANATORY NOTE

The Gas Cylinders Rules, 1981 and the Indian Standard Specifications relating to compressed gas cylinders require that a cylinder be condemned when it leaks, or when internal or external corrosion, denting, bulging, or evidence of rough usage exists to the extent that the cylinder is likely to be weakened appreciably.

This standard has been prepared as a guide to cylinder users and fillers for establishing their own cylinder inspection procedures and standards. It is, of necessity, general in nature although some specific limits are recommended. It should be distinctly understood that it will not cover all circumstances for each individual cylinder type. Each cylinder user must expect to modify them to suit his own cylinder design or the conditions of use that may exist in his own service. Rejection or acceptance for continued use in accordance with these limits, does not imply that these cylinders are, or are not, dangerous, or subject to impending failure, but represents practice which has been satisfactory to a cross-section of the industry.

The personal experience of the examiner in the inspection of cylinders is as important factor in determining the acceptability of a given cylinder for continued service. Users lacking this experience and having doubtful cylinders should return them to a manufacturer of the same type of cylinders for re-inspection.

In determining the condition of the cylinder the examiner should take into consideration the minimum wall thickness required by the specification to which the cylinder was made.

In fixing limits of acceptance it is additionally recognized that cylinder design requirements have changed over the years and cylinder wall thicknesses have varied with these design requirements and the use of new materials such as alloys steels.

In the preparation of this standard, assistance has been derived from CGA - C6 - 1955 ' Visual inspection of compressed gas cylinders ' issued by Compressed Gas Association, USA.

Printed at New India Printing Press, Khurja, India