

DRAFT TANZANIA STANDARD

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**Dissolved acetylene gas – Specification**

TANZANIA BUREAU OF STANDARDS

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2<sup>nd</sup> edition

**FTZS 2069:2025**

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This standard was prepared under the supervision of Chemicals Divisional Standards Committee which consists of representatives from the following organizations;

Vice Presidents office for Union and Environment  
Tanzania Industrial Studies Consulting Organization (TISCO)  
Petro Products and Chemical Testing Services Laboratory (PCTSL)  
Ministry of Industry and Trade  
Small Industries Development Organizations (SIDO) – Dar es Salaam Region  
TOL Gases Plc \*  
Department of Chemistry, University of Dar es Salaam  
National Environmental Management Council (NEMC)  
Government Chemist Laboratory Authority (GCLA)\*  
G & B Soap Industries Limited  
Tanzania Industrial Research and Development Organization (TIRDO)  
Tanzania Medicines and Medical Devices Authority (TMDA)\*

The Organization marked with an asterisk (\*) in the above list, together with the following were directly represented on the technical committee entrusted with the preparation of this standard:

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## 0.FOREWORD

This Tanzania Standard was prepared by the Technical Committee CDC 09 – Gases Products under the supervision of Chemical Standards Division Committee, and it is in accordance with the procedures of the bureau.

**0.1.** In the preparation of this standard assistance was derived from:

IS 308:2010–*Specification for dissolved acetylene (Gas)* published by Bureau of Indian Standards.

**0.2.** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value observed or calculated expressing the result(s) of a test or analysis shall, be rounded off in accordance with TZS 4:1979 (see clause 2). The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

**0.3.**

This second edition cancels and replaces the first edition of (TZS 2069: 2017), which has been technically revised

## 1. SCOPE

This Tanzania Standard describes the requirements, sampling, and test methods for technical grade acetylene gas dissolved in acetone or any other suitable solvent.

It is intended to be used for welding, cutting and other general purposes.

## 2. Normative references

The following normative references are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the normative references (including amendments) applies

TZS 4, *Rounding off numerical values*

TZS 59, *Water – distilled quality – Specification*

TZS 97, *Specification for identification of contents of industrial gas cylinders*

## 3. Requirements

### 3.1. General requirements

**3.1.1.** Acetylene is a flammable, colorless, dissolved gas packaged in cylinders under pressure.

**3.1.2.** The material consists essentially of acetylene dissolved in acetone or any other suitable solvent which shall be contained in a homogeneous porous substance packed in a cylinder so that it is not deemed as explosive within the meaning as may be ordered by duly constituted authority.

### 3.2. Specific requirements

The dissolved acetylene gas shall comply with specific requirements specified in Table 1 when tested in accordance with the methods prescribed therein.

**Table 1 Specific requirements of Dissolved acetylene gas**

S/ No.	Characteristic	Requirement	Test method
(i)	Acetylene (C <sub>2</sub> H <sub>2</sub> ), percent by volume, Max.	98.0	Annex A
(ii)	Total impurities insoluble in acetone, percent by volume, Max.	4.0	Annex B
(iii)	Sulphur compounds (as H <sub>2</sub> S), percent by volume, Max.	0.02	Annex C
(iv)	Phosphorus compounds (as PH <sub>3</sub> ) percent by volume, Max.	0.01	Annex D
(v)	Moisture, percent by mass, Max	0.25	Annex E
(vi)	Chloro-compounds <sup>a)</sup> , per cent by volume, max.	0.001	Annex F
NOTE: a) This is the additional specific requirement only verified in case the gas is claimed to be used as navigational illuminant			

## 4. Sampling

Sampling and criteria of finding conformity of the requirements of this standard shall be done in accordance with method described in Annex G.

## 5. Packaging and marking

### 5.1. Packaging

The dissolved acetylene gas shall be packaged in compressed gas cylinder(s).

## **5.2. Marking**

The marking and labelling shall be in accordance with Tzs 97.

## **6. Quality of reagents**

Analytical grade reagents and distilled water that comply with Tzs 59 or deionized water of equivalent purity shall be used for the appropriate tests.

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**Annex A**  
(normative)

**Methods of test for dissolved acetylene gas – qualitative test**

**A.1 Apparatus**

**A.1.1** Funnel as shown in **Figure 1**.

**A.1.2** *Test Paper* — *absorbent*, test paper should be kept clean and dry.

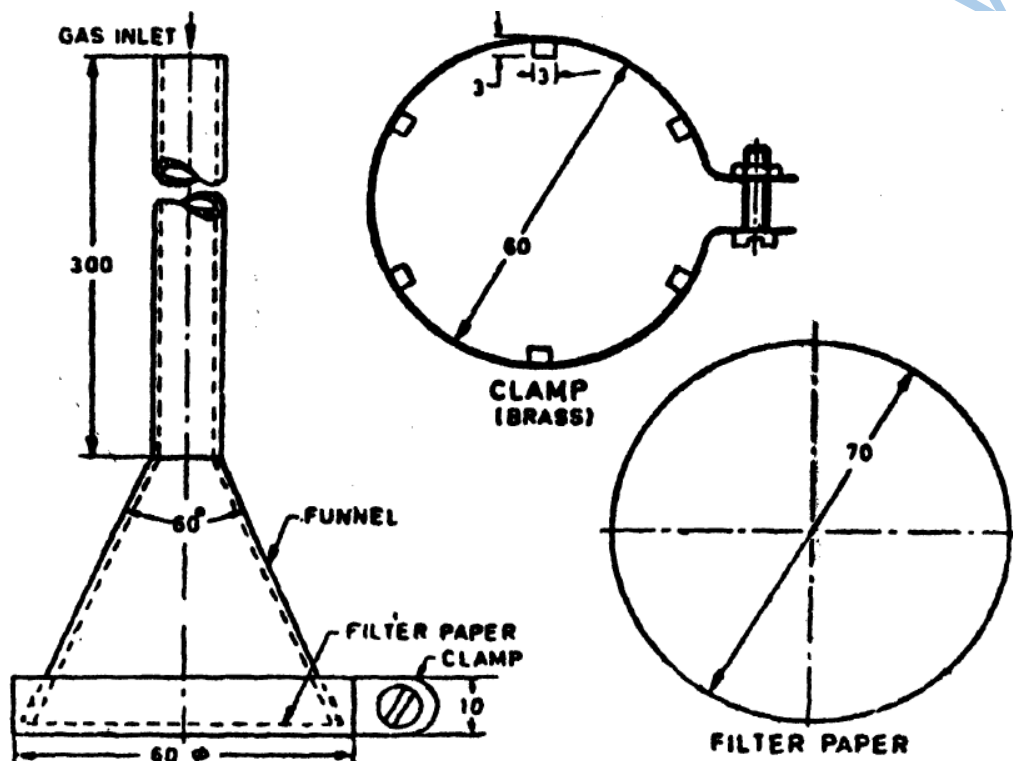


Figure 1— Funnel Assembly (All dimensions in millimeters)

**A.2 Reagents**

**A.2.1** *Silver Nitrate Solution* —0.1 percent (m/v)

NOTE: The cylinders containing dissolved acetylene gas shall be purged before testing through pressure regulator at a discharge pressure of 0.2 kg/cm<sup>2</sup> to vent out approximately one-sixth of its contents before testing.

**A.3 Procedure**

**A.3.1** Carefully wipe the bottle neck (see Note 1) with a clean cloth to remove dirt or accumulation of silver nitrate deposits.

NOTE 1 — As glass stoppers make an air tight joint with the bottle neck, the bottles are liable to burst ifexposed to sunlight or heat. So, the bottles must be kept stoppered in a cool and dark place.

**A.3.2** Place a piece of white filter paper saturated with silver nitrate solution over the mouth of the funnel and secure with clamp. Fit a regulator to the cylinder and purge it for about 2 minutes. Attach the Tygon tubing from the regulator of the acetylene tank to the funnel tip. Set the regulator gauge pressure at not more than 0.2 kgf/cm<sup>2</sup>. To avoid contamination, the moistened part of test paper should not be allowed to come into contact with anything other than gas stream under test. Release the needle valve for 30 seconds.

**A.3.3** The filter paper shall be used immediately after saturation, it shall not be allowed to dry, otherwise the test will be void.

**A.3.4** If the test paper remains white, the acetylene is pure, if the test paper is coloured light brown, the acetylene is partly purified. If the test paper is coloured dark brown or black, acetylene is unpurified. If the silver nitrate paper turns brown or black, the gas shall be considered to have failed the test.

**A.3.5** The compound formed on test paper during testing may become explosive under certain conditions, particularly if it is dry. Used test papers should be saturated with water and disposed off as waste paper.

**A.3.6** However, in the case of dispute, the dissolved acetylene gas shall be quantitatively analyzed as prescribed in *Annex C* and *Annex D* to determine the Sulphur and phosphorus compounds. If quantitatively the sample conforms to the requirements of this specification, it shall be deemed to have passed the test.

## Annex B (normative)

### Determination of total impurities insoluble in acetone

#### B.1 Apparatus

B.1.1 Assemble the apparatus as shown in Figure 2.

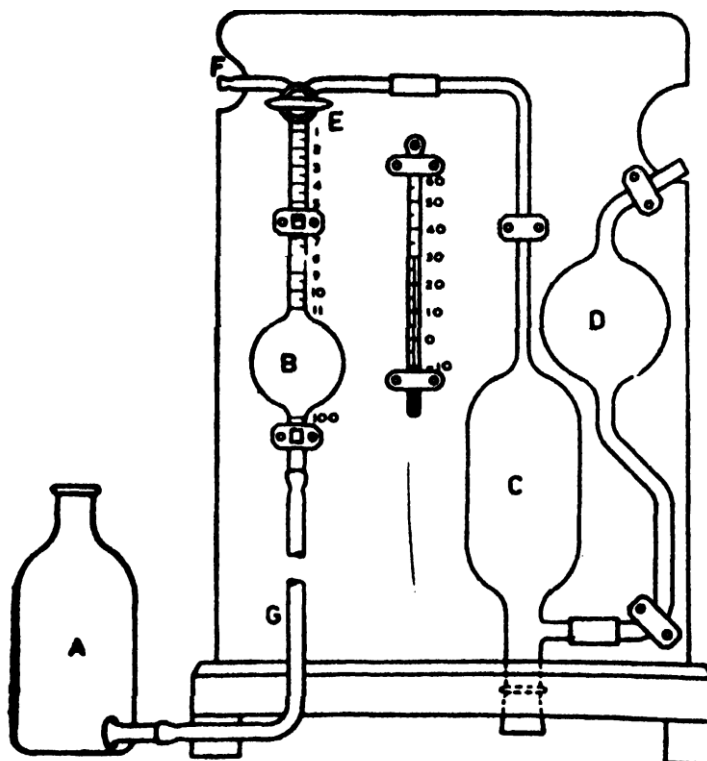


Figure 2—Assembly of apparatus for determination of total impurities insoluble in acetone

#### B.2 Reagents

B.2.1 *Acetone*

#### B.3 Procedure

**B.3.1** Turn the three-way cock *E* to connect *B* with *C* and pour acetone into *D* until *C* is completely filled and *D* is about one third filled. Turn *E* to connect *B* with *F*. Pour water into *A* and fill *B* by raising *A* until water emerges from tube *F*. Turn *E* through 90°, and then turn it to connect *B* with *C*. Lower *A* to draw up acetone to *E*. Again turn the cock through 90°, and then turn it to connect *B* with *F*. Raise *A* until water emerges from *F* and turn the cock to horizontal position. Attach a thermometer to the apparatus. Now connect the gas sample reservoir to *F*, turn the cock *E* to connect *B* with *F* and then lower *A* to draw the gas into *B*. Collect a sufficient amount of the gas in *B* and turn the cock *E* to horizontal position. Allow the water in *B* to drain for 30 seconds. Bring the water in *A* and *B* to the same level. The level of water in *B* should be at 100-ml mark if the exact amount of gas required has been taken. If the level is not at 100-ml mark, adjust the intake of the gas in *B* in such a manner as to ensure that the levels of water in *B* and *A* are brought simultaneously to the 100-ml mark. Turn *E* through 90°, and turn it again to connect *B* and *C*. Pass over water from *A* through *B* to the end of the capillary tube at the top of *C* and set the cock *E* to horizontal



position. Shake the apparatus until the absorption of the gas by acetone is complete. Lower *A*, turn *E* to connect *B* with *C* and draw the unabsorbed gas back into *B*. Turn the cock *E* to the horizontal position as soon as an acetone column from *C* reaches *E*. Allow the water in *B* to drain for 30 seconds. Bring the water in *A* and *B* to the same level and note the reading on the scale and the temperature on the attached thermometer. Record the temperature in °C from the thermometer.

**B.3.2** Fresh acetone should be taken after ten determinations. Find the percent of impurity as indicated by the unabsorbed portion of the gas in the capillary of vessel *B*. Take corrected percent of impurities from Appendix H.

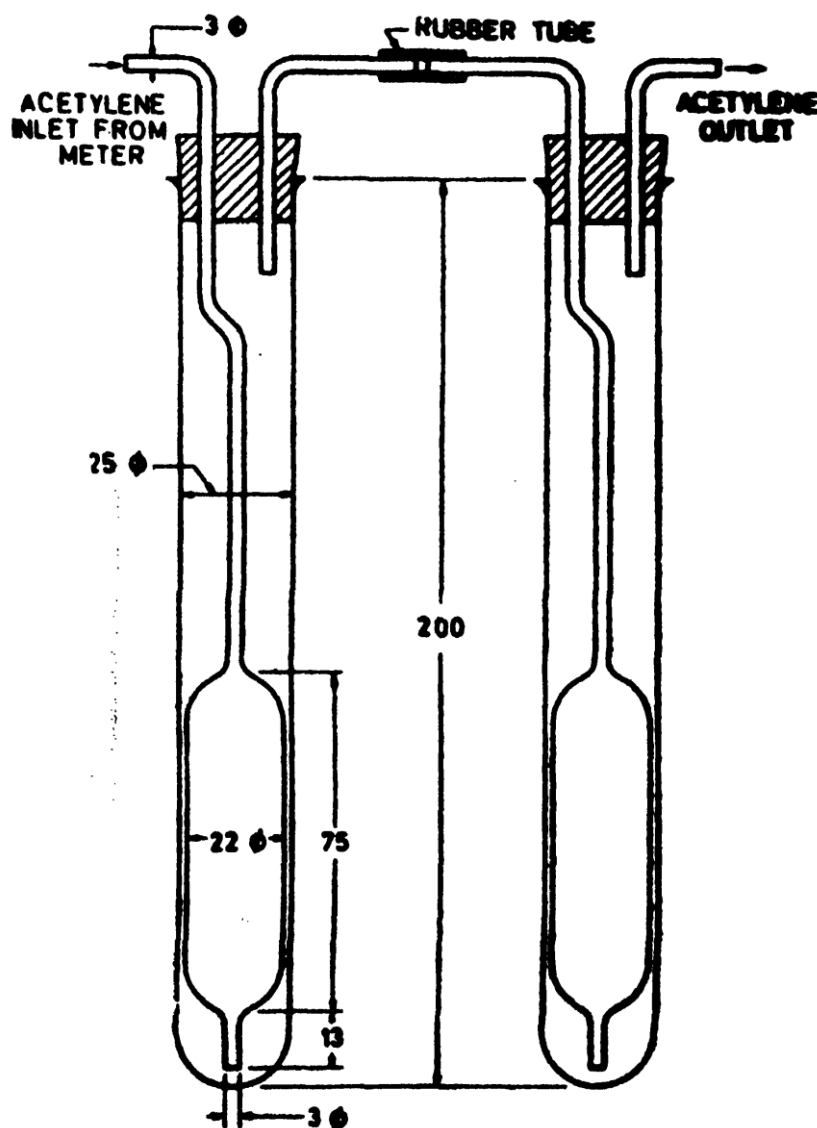
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**Annex C**  
(normative)  
**Determination of sulphur compounds**

**C.1 Apparatus**

**C.1.1** *Gas Meter* — Accurate to one percent.

**C.1.2** *Gas Scrubbers* —Two, of a suitable design, preferably as shown in Figure 3.



**Figure 3 - Details of gas scrubbers (all dimensions in millimeters)**

**C.2 Reagents**

**C.2.1** *Sodium Hypochlorite Solution* —containing 3 to 3.5 percent of available chlorine. The solution shall be saturated with sodium bicarbonate in excess.

**C.2.2** *Concentrated Hydrochloric Acid*.

**C.2.3** *Barium Chloride Solution* —Approximately 10 percent (m/v).

### C.3 Procedure

**C.3.1** Transfer 25 ml of sodium hypochlorite solution into each of the two scrubbers and pass a known volume (approximately 10 to 15 litres) of gas (see Annex C.3.1) at the rate of 2 litre/h. Note the barometric pressure and temperature. Transfer the solution in the gas scrubbers into a 100-ml beaker, wash the scrubbers with water into the beaker and boil to remove acetylene. Divide the hypochlorite solution into two equal parts and preserve one of the parts for the determination of phosphorus compounds as in Annex D. Acidify the other part with concentrated hydrochloric acid and heat to boiling. Filter the hot solution through a filter paper (Whatman No. 41 or equivalent), washing the residue with hot water till the combined volume of the filtrate is about 125 ml. Heat the solution and to the hot solution add a slight excess of hot barium chloride solution. Digest the precipitate for 15 minutes and allow the contents of the beaker to stand for 4 hours. Filter the precipitate through a tared Gooch crucible or sintered glass crucible (G No. 4) and wash the precipitate with hot water till it is free from chlorides. Dry the crucible with its contents to constant mass at 105 to 110°C. Preserve the filtrate for the determination of phosphorous compounds (Annex D.2).

Carry out blank determination without the gas and with another 25 ml of sodium hypochlorite solution, and the same quantities of other reagents. Find the mass of the precipitate, if any.

**C.3.2** Special precaution shall be taken when treating the gas with sodium hypochlorite solution as there is a possibility of the formation of explosive nitrogen trichloride from traces of ammonia that might be present in the gas.

**C.3.3** Excess of barium chloride is necessary to reduce the solubility of barium sulphate. Precipitation in hot solution by addition of barium chloride in a slow stream with stirring minimizes mechanical occlusion of barium chloride and gives a coarse precipitate which is less soluble in acids.

### C.3 Calculation

Convert in litres the volume of gas taken for the test to that at normal temperature and pressure (NTP). From the mass of barium sulphate, calculate the volume of sulphur compounds (as H<sub>2</sub>S) on the basis that 1 g of barium sulphate is equivalent to 0.096 litre of hydrogen sulphide at NTP, and express the result as percentage by volume, as follows:

$$\text{Sulphur compounds (as H}_2\text{S), percentage by volume} = \frac{(A - B)}{V} \times 19.2$$

Where

A = mass in g of barium sulphate in the test with the gas sample,

B = mass in g of barium sulphate in the blank, and

V = volume in litres at NTP of the gas taken for the test.

## Annex D (normative)

### Determination of phosphorus compounds

#### D.1 Apparatus

D.1.1 *Laboratory glass wares.*

D.1.2 Analytical balance

Add more glass wares

#### D.2 Reagents

D.2.1 *Concentrated Nitric Acid.*

D.2.2 *Methyl Red Indicator* — Dissolve 0.1 g of methyl red in 100 ml of rectified spirit.

D.2.3 *Ammonium Hydroxide* — Relative density 0.92.

D.2.4 *Ammonium Molybdate Solution* — Dissolve 100 g of molybdic anhydride in a mixture of 150 ml of ammonium hydroxide and 250 ml of water. Pour the solution slowly and with constant stirring into a cooled mixture of 500 ml of concentrated nitric acid and 1 100 ml of water. Keep the final mixture in a warm place for several days or until a portion heated to 40°C deposits no yellow precipitate of ammonium phosphomolybdate. Decant the solution from any sediment and preserve in a glass-stoppered bottle.

D.2.5 *Ammonium Nitrate* — Powder.

D.2.6 *Ammonium Nitrate Solution* — Approximately 5 percent.

D.2.7 *Methyl Orange Indicator* — Dissolve 0.1 g of methyl orange in 100 ml of water.

D.2.8 *Standard Sodium Hydroxide Solution* — 0.1 N.

D.2.9 *Standard Hydrochloric Acid* — 0.1 N.

D.2.10 *Phenolphthalein Indicator* — Dissolve 0.1 g of phenolphthalein in 100 ml of rectified spirit

#### D.3 Procedure

D.3.1 Acidify the solution preserved in C.3 with concentrated nitric acid, evaporate it to dryness, and bake the residue for 1 hour (due caution should be exercised in adding the nitric acid). Allow to cool. Add 80 to 100 ml of hot water and 3 ml of concentrated nitric acid, and heat to boiling. Filter the hot solution through a filter paper (Whatman No. 41 or equivalent), washing the residue with hot water. Boil the filtrate for 5 minutes and make neutral to methyl red by addition of ammonium hydroxide. Add 5 g of ammonium nitrate followed by 3 ml of concentrated nitric acid. Heat the solution to  $70 \pm 1^\circ\text{C}$ . Filter through a filter funnel with an ordinary 9-cm filter paper (Whatman No. 1 or equivalent) and wash the precipitate with ammonium nitrate solution until the filtrate is not acidic to methyl orange indicator. Now transfer the precipitate together with the filter paper into the flask in which the precipitation was carried out and dissolve the precipitate by adding in excess a known volume of standard sodium hydroxide solution through the funnel in which the filtration was carried out. Rinse the funnel with water into the flask. Shake the flask until the yellow precipitate is dissolved and titrate against standard hydrochloric acid using phenolphthalein as indicator.

Carry out a blank determination without using the gas, and with another 25 ml of the sodium hypochlorite solution and the same quantities of other reagents. Find the volume of standard sodium hydroxide solution used.

### D.3 Calculation

Calculate the volume of phosphorus compounds (as  $\text{PH}_3$ ) on the basis that 1 ml of normal standard sodium hydroxide solution is equivalent to 0.000 97 litre of Phosphonic ( $\text{PH}_3$ ) at NTP, as follows:

$$\text{Phosphorus compounds (as } \text{PH}_3 \text{), percentage by volume} = \frac{0.194 (A - B) N}{V}$$

Where

A = Volume in ml of standard sodiumhydroxide solution used in the test with gas sample,

B = Volume in ml of standard sodiumhydroxide solution used in the blank,

N = Normality of standard sodium hydroxide solution, and

V = Volume in litres at NTP of the gas taken for the test in **C.3**.

## Annex E (normative)

### Determination of moisture content

#### E.1 Apparatus

**E.1.1** *Gas meter*, accurate to 1 percent.

**E.1.2** *Absorption Train*, Two tared U-tubes connected in series and containing anhydrous calcium chloride.

NOTE: Prior to initial weighing of the U-tubes; completely displace the air contained in them by the gas to be tested.

#### E.2 Procedure

Connect through a teflon tube, the gas sample reservoir (cylinder) and purge the tube at the rate of 5 to 6 litres per hour for one hour. Connect the tube with the U-tube (absorption train) and pass the gas at the rate of 4 to 5 litres per hour for about 30 minutes. Weigh the U-tube (absorption train), keeping both the ends closed. Pass the gas through the absorption train at the rate of 4 to 5 litres per hour for 5 to 6 hours. Disconnect the gas supply and again record the meter reading, barometric pressure and temperature. Remove the U-tube (absorption train) and weigh it, keeping both the ends closed with the same stoppers.

#### E.3 Calculation

Convert in litres, the volume of the gas taken for the test to that at NTP, and from this, calculate the mass of the gas on the basis that 22.4 litres of gas are equivalent to 26.04 g of acetylene. Express the increase in mass of the U-tubes (absorption train) as percentage of the mass of the gas taken for the test.

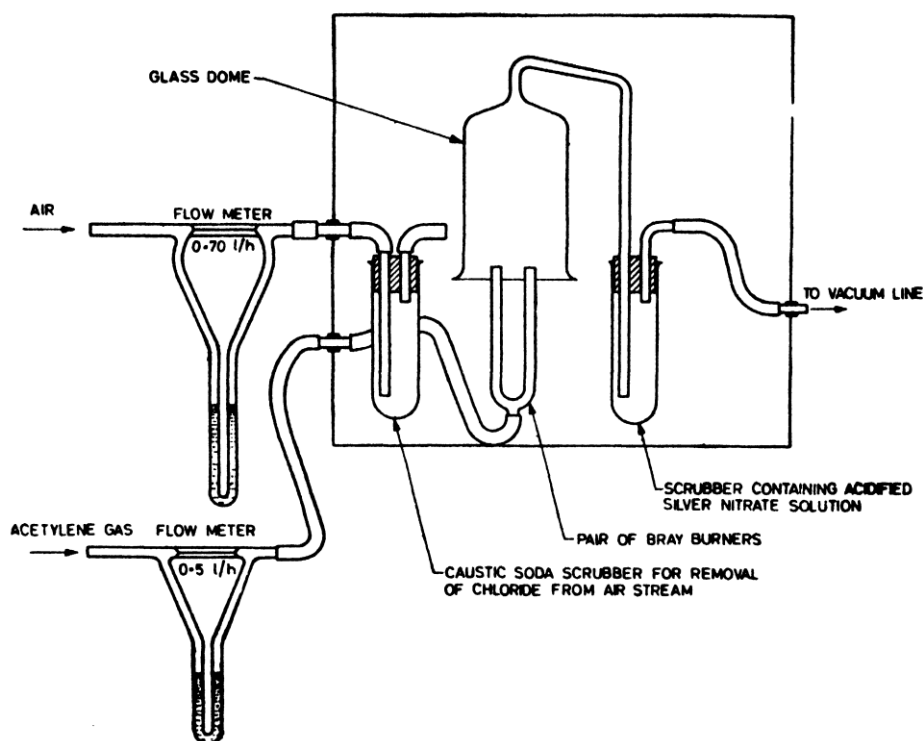
## Annex F

(normative)

### Test for chloro – compounds for navigational illuminant

#### F.1 Apparatus

**F.1.1** Assemble the apparatus as shown in Figure 4 in an airtight steel cabinet with removable glass front. Suitable inlet and outlet pipes through the cabinet side shall be provided to allow the air stream and acetylene to be fed in and the excess of air and combustion products to be withdrawn.



**Figure 4—Assembly of apparatus for testing freedom from chloro-compounds**

#### F.2 Reagents

**F.2.1** *Standard Silver Nitrate Solution* — 0.05 N.

**F.2.2** *Standard Sodium Chloride Solution* — Dissolve 1.649 g of sodium chloride in water and make up the volume to 1 000 ml. Pipette out 10 ml of the solution, dilute with water and make up the solution to 1 000 ml. One millilitre of this solution contains 0.01 mg chloride (as Cl).

#### F.3 Procedure

**F.3.1** In the scrubber containing silver nitrate solution acidified with nitric acid, add 16.0 ml of standard sodium chloride solution and assemble the apparatus. Draw, through the caustic soda scrubber a stream of air at the rate of about 65 l/h for 1 hour. Disconnect the silver nitrate scrubber and use it as a comparison standard.

NOTE — 16.0 ml of standard sodium chloride solution equivalent to 0.001 percent by volume of chloride in 5 litres of acetylene.

**F.3.2** Replace in the assembly of apparatus another silver nitrate scrubber. Connect the inlet of the apparatus to the gas supply. Pass 5 litres of the gas at the rate of about 5 l/h to the pair of Bray burners mounted just within a glass dome. Also simultaneously draw, through the caustic soda scrubber, a stream of air at the rate of about 65 l/h into the glass dome, thus providing air for the combustion through the silver nitrate scrubber.

**F.3.3** The gas shall be considered to have passed the test if any opalescence or turbidity produced in silver nitrate solution with the gas is not greater than that produced in the comparison standard in

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**Annex G**  
(normative)

**Sampling of dissolved acetylene gas**

**G.1 Procedure**

**G1.1** Subject to agreement between the purchaser and the supplier, samples shall be drawn either from the filling rack during the time the cylinders are being filled or from 5 percent of the cylinders after blowing off about 15 percent of the gas contained in them.

**G.1.2** Two separate samples of the gas shall be drawn from the filling rack for tests for deciding conformity to the standard.

**G.1.3** The material shall be considered to be conforming to the standard only if both the samples satisfy all the prescribed requirements.

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**Annex H**  
(informative)

**Correction table of solubilities of water and acetylene**

CORRECTION TABLE OF SOLUBILITIES OF WATER AND ACETYLENE								
<i>Temperature</i>	<i>Impurities Percentage ( Volume )</i>	<i>Impurities Percentage Corrected ( Volume )</i>	<i>Temperature</i>	<i>Impurities Percentage ( Volume )</i>	<i>Impurities Percentage Corrected ( Volume )</i>	<i>Temperature</i>	<i>Impurities Percentage ( Volume )</i>	<i>Impurities Percentage Corrected ( Volume )</i>
(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	1000	9.0		10.00	8.0		10.00	7.0
	9.75	8.8		9.75	7.8		9.75	6.8
	9.50	8.6		9.50	7.6		9.50	6.7
	9.25	8.3		9.25	7.4		9.25	6.5
	9.00	8.1		9.00	7.2		9.00	6.3
	8.75	7.9		8.75	7.0		8.75	6.1
	8.50	7.7		8.50	6.8		8.50	6.0
	8.25	7.4		8.25	6.6		8.25	5.8
	8.00	7.2		8.00	6.4		8.00	5.6
	7.75	7.0		7.75	6.2		7.75	5.4
	7.50	6.8		7.50	6.0		7.50	5.3
	7.25	6.5		7.25	5.8		7.25	5.1
	7.00	6.3		7.00	5.6		7.00	4.9
	6.75	6.1		6.75	5.4		6.75	4.7
0°C	6.50	5.9	10°C	6.50	5.2	21°C	6.50	4.6
	6.25	5.6		6.25	5.0		6.25	4.4
to	6.00	5.4	to	6.00	4.8	to	6.00	4.2
9°C	5.75	5.2	20°C	5.75	4.6	30°C	5.75	4.0
	5.50	4.8		5.50	4.4		5.50	3.9
	5.25	4.7		5.25	4.2		5.25	3.7
	5.00	4.5		5.00	4.0		5.00	3.5
	4.75	4.3		4.75	3.8		4.75	3.3
	4.50	4.0		4.50	3.6		4.50	3.2
	4.25	3.8		4.25	3.4		4.25	3.0
	4.00	3.6		4.00	3.2		4.00	2.8
	3.75	3.4		3.75	3.0		3.75	2.6
	3.50	3.1		3.50	2.8		3.50	2.5
	3.25	2.9		3.25	2.6		3.25	2.3
	3.00	2.7		3.00	2.4		3.00	2.1
	2.75	2.5		2.75	2.2		2.75	1.9
	2.50	2.2		2.50	2.0		2.50	1.8
	2.25	2.0		2.25	1.8		2.25	1.6
	2.00	1.8		2.00	1.6		2.00	1.4
	1.75	1.6		1.75	1.4		1.75	1.2
	1.50	1.3		1.50	1.2		1.50	1.1
	1.25	1.1		1.25	1.0		1.25	0.9
	1.00	0.9		1.00	0.8		1.00	0.7
	0.75	0.6		0.75	0.6		0.75	0.5
	0.50	0.4		0.50	0.4		0.50	0.4
	0.25	0.2		0.25	0.2		0.25	0.2

Temperature	Impurities Percentage ( Volume )	Impurities Percentage Corrected ( Volume )	Temperature	Impurities Percentage ( Volume )	Impurities Percentage Corrected ( Volume )	Temperature	Impurities Percentage ( Volume )	Impurities Percentage Corrected ( Volume )	Temperature	Impurities Percentage ( Volume )	Impurities Percentage Corrected ( Volume )
(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	10.00	6.00		10.00	5.00		10.00	4.00		10.00	2.50
	9.75	5.85		9.75	4.90		9.75	3.90		9.75	2.45
	9.50	5.70		9.50	4.75		9.50	3.80		9.50	2.40
	9.25	5.55		9.25	4.60		9.25	3.70		9.25	2.30
	9.00	5.40		9.00	4.50		9.00	3.60		9.00	2.25
					4.40		8.75	3.50		8.75	2.20
	8.75	5.25		8.75	4.25		8.50	3.40		8.50	2.10
	8.50	5.10		8.50	4.10		8.25	3.30		8.25	2.05
	8.25	4.95		8.25	4.00		8.00	3.20		8.00	2.00
	8.00	4.80		8.00							
					3.90		7.75	3.10		7.75	1.95
	7.75	4.65		7.75	3.75		7.50	3.00		7.50	1.85
	7.50	4.50		7.50	3.60		7.25	2.90		7.25	1.80
	7.25	4.35		7.25	3.50		7.00	2.80		7.00	1.75
	7.00	4.20		7.00							
					3.40		6.75	2.70		6.75	1.70
	6.75	4.05		6.75	3.25		6.50	2.60		6.50	1.60
	6.50	3.90		6.50	3.10		6.25	2.50		6.25	1.55
	6.25	3.75		6.25	3.00		6.00	2.40		6.00	1.50
	6.00	3.60		6.00							
					2.90		5.75	2.30		5.75	1.45
	5.75	3.45		5.75	2.75	41°	5.50	2.20	46°	5.50	1.35
	5.50	3.30		5.50	2.60	to	5.25	2.10	to	5.25	1.30
	5.25	3.15		5.25	2.50		5.00	2.00		5.00	1.25
31°	5.00	3.00	36°	5.00							
to			to								
					2.40	45°C	4.75	1.90	50°C	4.75	1.20
35°C	4.75	2.85	40°C	4.75	2.25		4.50	1.80		4.50	1.10
	4.50	2.70		4.50	2.10		4.25	1.70		4.25	1.05
	4.25	2.55		4.25	2.00		4.00	1.60		4.00	1.00
	4.00	2.40		4.00							
					1.90		3.75	1.50		3.75	0.95
	3.75	2.25		3.75	1.75		3.50	1.40		3.50	0.85
	3.50	2.10		3.50	1.60		3.25	1.30		3.25	0.80
	3.25	1.95		3.25	1.50		3.00	1.20		3.00	0.75
	3.00	1.80		3.00							
					1.40		2.75	1.10		2.75	0.70
	2.75	1.65		2.75	1.25		2.50	1.00		2.50	0.60
	2.50	1.50		2.50	1.10		2.25	0.90		2.25	0.55
	2.25	1.35		2.25	1.00		2.00	0.80		2.00	0.50
	2.00	1.20		2.00							
					0.90		1.75	0.70		1.75	0.45
	1.75	1.05		1.75	0.75		1.50	0.60		1.50	0.35
	1.50	0.90		1.50	0.60		1.25	0.50		1.25	0.30
	1.25	0.75		1.25	0.50		1.00	0.40		1.00	0.25
	1.00	0.60		1.00							
					0.40		0.75	0.30		0.75	0.20
	0.75	0.45		0.75	0.25		0.50	0.20		0.50	0.10
	0.50	0.30		0.50	0.10		0.25	0.10		0.25	0.05
	0.25	0.15		0.25							