METRIC

MIL-H-24776(SH)
8 June 1992

MILITARY SPECIFICATION

HYDRAZINE TEST KIT, NAVAL SHIPBOARD (METRIC)

This specification is approved for use by the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers a water testing outfit using an organic dye for the determination of hydrazine in feedwater and boiler water.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

PPP-F-320 - Fiberboard, Corrugated and Solid, Sheer Stock (Container Grade) and Cut Shapes

MILITARY

MIL-P-116 - Preservation, Methods of.
MIL-L-19140 - Lumber and Plywood, Fire Retardant Treated

STANDARDS

FEDERAL

FED-STD-313 - Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 55Z3, Department of the Navy, Washington, DC 20362-5101 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 6810

MILITARY

MIL-STD-2073-1 - DOD Material Procedures for Development and Application of Packaging Requirements

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 4D 700 Robbins Avenue, Philadelphia, PA 19111-5094.

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D 1385 - Standard Test Method for Hydrazine in Water.
D 3951 - Standard Practice for Commercial Packaging. (DoD adopted)

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, (except for related associated detail specifications, specification sheets, or MS standards), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Definition. The hydrazine test kit measures the amount of hydrazine present in feedwater and boiler water at both the parts per billion (p/b) and the parts per million (p/m) level. The kit consists of a plastic sample with breaking device, evacuated ampoules containing test chemicals, and high and low range color comparators.

3.2 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 6.4) in accordance with 4.2.1.

3.3 Characteristics.

3.3.1 Performance. The hydrazine test kit shall measure the amount of hydrazine in feedwater and boiler water between 0 and 500 p/b using the low range comparator and between 0 and 100 p/m using the high-range comparator at a sample

temperature of 21 to 38 degrees Centigrade (°C). The value obtained shall be equal to the readable value nearest to the actual hydrazine level of the sample or to the next readable value above or below this value. Both comparators shall read 0 when no hydrazine is present. A readable value is defined as equal to the value of a color standard, the average of two adjacent color standards, or greater than the highest color standard.

3.3.2 Physical characteristics.

3.3.2.1 Component parts. The hydrazine test kit shall consist of the following:

(a) One low range colorimetric comparator.
(b) One high range colorimetric comparator.
(c) One box of 30 ampoules.
(d) One sample cup.
(e) One storage case.

3.3.2.1.1 Low range colorimetric comparator. Details and dimensions of the low range color comparator used for making the hydrazine determinations shall be as shown on figure 1. The comparator shall consist of a transparent tube in which eight liquid filled, sealed glass standard color ampoules are mounted and enclosed. There shall be a center space into which the test ampoule can be inserted for color comparison. The comparator shall have the color standards representing 0, 10, 30, 50, 70, 100, 300, and 500 p/b hydrazine. These color standards shall range in color from clear to light yellow to yellow. The standard color ampoules shall be fabricated to the same dimensions as the test ampoules, 3.3.2.1.3. The comparator shall be marked with the date of manufacture. The comparator shall yield the results as specified in table I when tested as specified in 4.5.1.

TABLE I. Hydrazine solution values for low range comparator.

Standard (p/b hydrazine)	Accepted values (p/b)
0	0
10	5, 10, 20
30	30 ± 10.0
50	50 ± 10.0
70	60, 70, 85
100	85, 100, 200
300	300 ± 100
500	400, 500, greater than 500

3.3.2.1.2 High range colorimetric comparator. Details and dimensions of the high range color comparator used for making the hydrazine determinations shall be as shown on figure 2. The high range comparator shall consist of a rack in which nine liquid filled, sealed glass standard color ampoules are mounted. The comparator shall have the color standards representing 0, 5, 10, 15, 20, 40, 60,

80, and 100 p/m hydrazine. These color standards shall range in color from clear to yellow to yellowish orange. The standard color ampoules shall be fabricated to the same dimensions as the test ampoules, 3.3.2.1.3. The comparator shall be marked with the date of the manufacture. The comparator shall yield the results as specified in table II when tested as specified in 4.5.1.

TABLE II. Hydrazine solution values for high range comparator.

Standard (p/m hydrazine)	Accepted values (p/m)
0	0
5	5 ± 2.5
10	10 ± 2.5
15	15 ± 2.5
20	22.5, 20, 30
40	40 ± 10.0
60	60 ± 10.0
80	80 ± 10.0
100	90, 100, greater than 100

3.3.2.1.3 Test ampoules. Details and dimensions of the test ampoules used in determining the hydrazine content shall be as shown on figure 3. They shall be made of glass, flat on one end and drawn to a tapered hermetically sealed closure at the other end. The tapered end shall be scored so that it breaks easily and evenly. A color-forming reagent shall be contained in each ampoule. This color-forming reagent shall be clear to pale yellow in color with no sediment present. The ampoule shall contain a vacuum so it will self fill when placed in the sample to be tested and the tip is broken. When filled, the ampoule shall contain the sample and reagent. A small inert gas bubble shall be present in the broken ampoule to facilitate mixing of the sample and reagent. The ampoules shall be packaged 30 to a box with each ampoule in an individual paper divider to hold the ampoules in an orderly manner and to provide some cushioning as shown on figure 3. The ampoules shall yield the results as specified in tables I and II when tested as specified in 4.5.2. Each box of ampoules shall be marked with the date of manufacture.

3.3.2.1.4 Sample cup. The sample cup shall provide a reservoir for the sample into which the ampoule may be placed, such that when the tip of the ampoule is broken, sample will be drawn into the ampoule. The sample cup shall be fabricated from clear plastic, at least 1 mm thick, and require no more than 30 mL of sample. The breaking device shall be an integral part of the cup. The cup shall rinse easily to prevent cross contamination of the samples.

3.3.2.1.5 Storage case. The storage case shall be of corrosion resistant material (that is, plastic or coated steel) with individual compartments for each component of the test kit. Each item in the kit shall be accessible without having to remove another item. The kit shall provide protection against breakage during normal handling. Packing material shall be used inside the case to prevent breakage during shipment. The case shall close securely using a snap or latch

type closure.

3.3.3 Color standard stability. The Low Range Comparator and the High Range Comparator shall give the values specified in table I and table II, respectively, for 2 years from the date of manufacture when tested as specified in 4.5.1.

3.3.4 Ampoule stability. The ampoules shall give the values specified in tables I and II for 3 years from the date of manufacture when tested as specified in 4.5.2.

3.4 Material safety data sheet (MSDS). The contracting activity shall be provided a MSDS at the time of contract award. The MSDS shall be provided in accordance with the requirements of FED-STD-313. The MSDS shall be included with each shipment of the material covered by this specification (see 5.5 and 6.5).

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of the manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

(a) First article inspection (see 4.2.1).
(b) Quality conformance inspection (see 4.2.2).

4.2.1 First article inspection. First article inspection shall consist of the examinations and tests shown in table III (see 6.4). Unless otherwise specified (see 6.2), the Naval Ship Systems Systems Engineering Station (NAVSSES), Code 053D, Philadelphia, PA 19112-5083 is responsible for the performance of all inspection requirements.

TABLE III. First article inspection.

Inspection	Requirement	Test method
Visual and dimensional examination	3.3.2.1.1 through 3.3.2.1.5	4.4.1
Low range comparator	3.3.2.1.1	4.5.1
High range comparator	3.3.2.1.2	4.5.1
Ampoule	3.3.2.1.3	4.5.2

4.2.2 Quality conformance inspection. Quality conformance inspection shall consist of the visual and dimensional examination of table III, the comparator test of 4.5.1, and the ampoule test of 4.5.2 selected in accordance with table IV from each inspection lot (see 6.3).

4.3 Sampling.

4.3.1 Inspection lot. For purposes of sampling, a lot shall consist of all complete test kits or component parts produced in one batch, in the same facility, under the same conditions, with the same materials and being offered at one time.

4.3.2 Sampling for quality conformance inspection. A random sample of complete test kits or component parts shall be selected from each lot as specified in table IV and inspected in accordance with 4.4.1, 4.5.1 and 4.5.2. If one or more defects is found in any sample, the entire lot shall be rejected. The contractor has the option of screening 100 percent (%) of the rejected lot for the defective characteristic(s) or providing a new lot which shall be inspected in accordance with the sampling plan herein.

TABLE IV. Sampling for quality conformance inspection.

Lot size	Sample size
50 or less	5
51 to 90	7
91 to 150	11
151 to 280	13
281 to 500	16
501 to 1200	19

4.4 Examination.

4.4.1 Visual and dimensional examination. Each of the complete testing kits or component parts selected in accordance with table IV shall be visually and dimensionally examined to verify compliance with this specification. In addition, the low range and high range comparators and test ampoules shall be examined for evidence of breakage, leakage and unsatisfactory closure.

4.5 Tests.

4.5.1 Comparator test. The accuracy of the comparator shall be verified using standard hydrazine solutions prepared in accordance with ASTM D 1385. Standard solutions shall be prepared equal to zero p/m hydrazine and at least three other standards covering the range of the comparator to be tested. The standard solutions shall be treated with para-dimethylaminobenzaldehyde in accordance with the procedure in ASTM D 1385 for preparing a standard curve. After the color has fully developed, transfer 1.7 ± 0.1 mL of the standard solution into an empty ampoule meeting the dimensions of figure 3. The prepared ampoules shall then be compared to the standard colors of the comparator. If a color match is obtained, record this value. If the color lies between two standard colors, record the average of the two standards. If the color is darker than the highest standard, record as greater than the value of the highest standard.

4.5.2 Ampoule test. The accuracy of the ampoules shall be determined using standard hydrazine solutions prepared in accordance with ASTM D 1385. Standard solutions shall be prepared equal to zero p/m hydrazine and at least three standards covering the range of the low range comparator and three standards covering the range of the high range comparator. The ampoules to be tested shall be placed in the prepared standard solutions and the tip of the ampoule broken allowing the standard solution to be drawn into the ampoule. The solution in the ampoule is then mixed by inverting the ampoule several times. The ampoule is wiped dry and color is allowed to develop for at least 10 minutes but no more than 100 minutes. The ampoules are than compared to the standard colors in the appropriate comparator. Comparators that have previously met the acceptance

criteria of 3.3.2.1.1. and 3.3.2.1.2 shall be used. If a color match is obtained, record this value. If the color lies between two standard colors, record the average of the two standards. If the color is darker than the highest standard, record as greater than the value of the highest standard.

4.6 Inspection of packaging. Sample packs, and the inspection of the preservation, packing and marking for shipment, stowage and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

5. PACKAGING

(The packaging requirements specified herein apply only for direct Government acquisition.

5.1 General.

5.1.1 Navy fire-retardant requirements.

(a) Lumber and plywood. Unless otherwise specified (see 6.2), all lumber and plywood including laminated veneer material used in shipping container and pallet construction, members, blocking, bracing, and reinforcing shall be fire-retardant treated material conforming to MIL-L-19140 as follows:

Level A and B -	Type II - weather resistant Category I - general use.
Level C -	Type I - non-weather resistant Category I - general use.

(b) Fiberboard. Fiberboard used in the construction of interior (unit and intermediate) and exterior fiberboard boxes including interior packaging forms shall conform to the class-domestic/ fire retardant or class-weather resistant/fire retardant materials requirements as specified (see 6.2), of PPP-F-320 and amendments thereto.

5.2 Preservation. Preservation shall be level A, C or commercial, as specified (see 6.2).

5.2.1 Level A. Each complete kit (see 3.3.2.1), in its storage case (see 3.3.2.1.5), shall be unit protected to meet the requirements of MIL-P-116, method III. Each storage case shall be a water resistant folding, set-up, or metal edged paperboard or fire retardant (see 5.1.1 b) fiberboard boxes meeting the unit and intermediate container requirements of MIL-STD-2073-1. Container selection shall be at the option of the contractor.

5.2.2 Level C. Each complete kit shall be unit protected as specified under level A except that the unit containers shall be as follows:

a. The paperboard containers shall be of the domestic or non-weather resistant type, class, or variety as applicable and,
b. The fiberboard containers shall be of the classs-domestic/fire-retardant material (see 5.1.1 b). The box closure shall be in accordance with method I using pressure sensitive, adhesive tape.

5.2.3 Commercial. Commercial preservation shall be in accordance with ASTM D 3951.

5.3 Packing. Packing shall be level A, B, C or commercial, as specified (see 6.2).

5.3.1 General requirements for levels A, B, and C. Containers selected shall be of minimum weight and cube consistent with the protection required, of uniform size, and contain identical quantities of identical test kits.

5.3.2 Levels A, B and C containers. Test kits preserved as specified (see 5.2), shall be packed in exterior shipping containers for the level of packing specified (see 5.2) in accordance with the exterior shipping container requirements of MIL-STD-2073-1 and herein. Unless otherwise specified (see 6.2), container selection shall be at the contractor's option.

5.3.2.1 Caseliners, closure and gross weight.

5.3.2.1.1 Caseliners. Unless otherwise specified (see 6.2), level A shipping containers containing test kits preserved level C or commercial shall be provided with waterproof caseliners in accordance with MIL-STD-2073-1.

5.3.2.1.2 Closure. Container closure, reinforcing, or banding shall be in accordance with the applicable container specification or appendix thereto except that the class weather-resistant including fire retardant fiberboard boxes shall be closed in accordance with method V and reinforced with non-metallic or tape banding and class domestic/fire retardant fiberboard boxes shall be closed in accordance with method I using pressure sensitive tape.

5.3.2.1.3 Weight. Wood, plywood, and cleated type containers exceeding 200 pounds gross weight shall be modified by the addition of skids in accordance with MIL-STD-2073-1 and the applicable container specification or appendix thereto.

5.3.3 Commercial. Commercial packing shall be in accordance with ASTM D 3951.

5.3.3.1 Container modification. Shipping containers exceeding 200 pounds gross weight shall have a minimum of two, 3-inch by 4-inch nominal wood skids laid flat, or a skid or sill type base which will support the material and facilitate handling by mechanical handling equipment during shipment, stowage and storage.

5.4 Marking.

5.4.1 Level A, B, C and commercial. In addition to any special marking required (see 6.2) and herein, each test kit container (see 3.3.2.1), interior

packs, and exterior shipping containers shall be marked in accordance with MIL-STD-2073-1 and shall include the following:

(a) National stock number.
(b) Name and class of item.
(c) Manufacturer's or contractor's name or both.
(d) Contract number.
(e) Quantity or net content.
(f) Date of manufacture: month and year.
(g) Expiration date of 24 months from date of manufacture for colorimetric comparator. Expiration date of 36 months from date of manufacture for the ampoules.
(h) NOTE: "Store ampoules in the dark. Ampoules deteriorate upon exposure to light. Mandatory shelf life material. Discard material after expiration date".
(i) Lot or batch number.

5.4.2 Special marking. Shelf life, use, and warning labels as applicable for the comparator ampoules and hydrazine ampoules shall be in accordance with MIL-STD-2073-1. Bar code markings of MIL-STD-2073-1 shall apply for interior and exterior containers.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. This test kit is to be used for the determination of hydrazine in feedwater and boiler water.

6.2 Acquisition requirements. Acquisition documents must specify the following:

(a) Title, number, and date of this specification.
(b) Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
(c) When first article tests are required for inspection and approval (see 3.2 and 4.2.1).
(d) When fire-retardant treated lumber and plywood is not required (see 5.1.1 (a)).
(e) Class of fire-retardant fiberboard required (see 5.1.1 (b)).
(f) Levels of preservation and packing (see 5.2 and 5.3).
(g) Container selection if other than contractors option (see 5.2.1 and 5.3.2)
(h) Special marking required (see 5.4.2).
(i) Patent indemnity clause 52.227-3, alternate II of the FAR, Federal Acquisition Regulation (see 6.5).

6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contact. The applicable Data Item Description (DID's) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/provided and that the DID's are tailored to reflect the requirements of the specific acquisition. To insure correct contractural application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DoD FAR Supple-ment 27.475-1 exempts the requirements for a DD Form 1423.

Reference paragraph	DID Number	DID Title	Suggested Tailoring
4.2.2	DI-NDTI-80809	Test Reports	-----

The above DID's were those cleared as of the date of this specification. The current issue of DoD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DID's are cited on the DD Form 1423.

6.4 First article. When first article inspection is required, the contracting officer should provide specific guidance to offerors whether the item(s) should be a preproduction sample, a first article sample, a first production item, a sample selected from the first production items, a standard production item from the contractor's current inventory (see 3.2), and the number of items to be tested as specified in 4.2.1. The contracting officer should also include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results, and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

6.4.1 Bid data. Bidders offering individual components rather than complete kits will be subject to the following special requirements:

(a) Bidders offering items of apparatus only will not be required to perform the test of 4.5.1 and 4.5.2, but will be required to fulfill all other requirements of this specification. These bidders may request that the Government waive the requirement for first article samples, provided the bidder is offering a product which has previously been acquired or tested by the Government, and that bidders offering such products, who wish to rely on such productions or tests must furnish evidence with the bid that prior Government approval is presently appropriate for the pending acquisition.

(b) Bidders offering colorimetric comparator or ampoule items only will be required to fulfill all the requirements and tests of this specification. These bidders may request that the Government

waive the requirements for first article samples, provided the bidder is offering a product which has previously been acquired or tested by the Government, and that bidders offering such products, who wish to rely on such productions or tests must furnish evidence with the bid that prior Government approval is presently appropriate for the pending acquisition.

6.5 Material safety data sheet (MSDS). Contracting officers must identify those activities requiring copies of MSDSs. Additional required Government information is contained in FED-STD-313. In order to obtain the MSDS, FAR clause 52.223-3 must be in the contract.

6.6 Patent notice. The Government does not have a royalty-free license for US Patent 3,634,038, Device for the Quantitative Colorimetric Analysis of Fluids, patented January 11, 1972.

6.7 Subject term (key word) listing.

Ampoule
Boiler water testing
Color comparator
Color standard
Feedwater testing
Organic dye

Preparing activity:
Navy - SH
(Project 6810-N049)

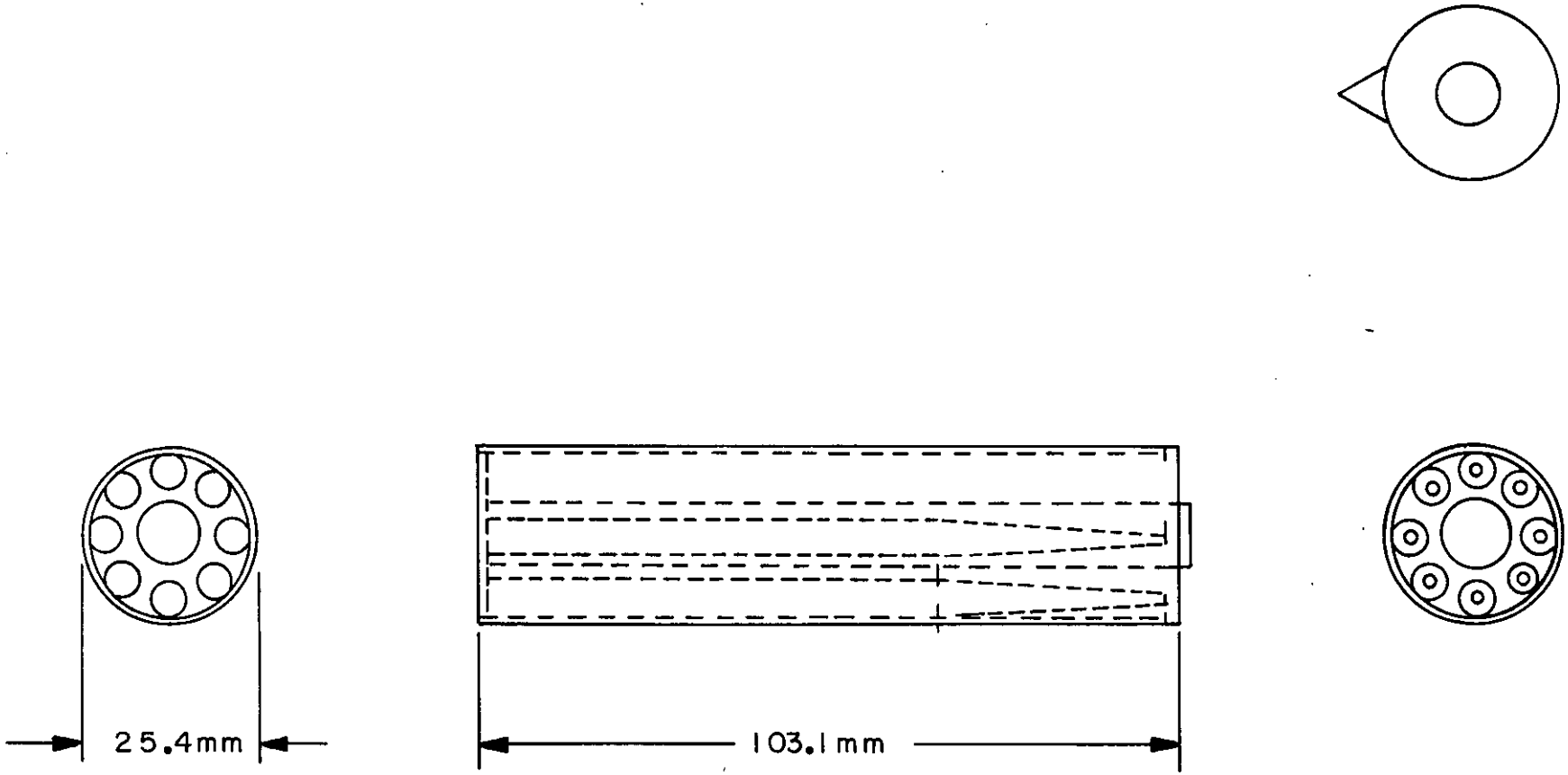

FIGURE 1. Low range comparator.

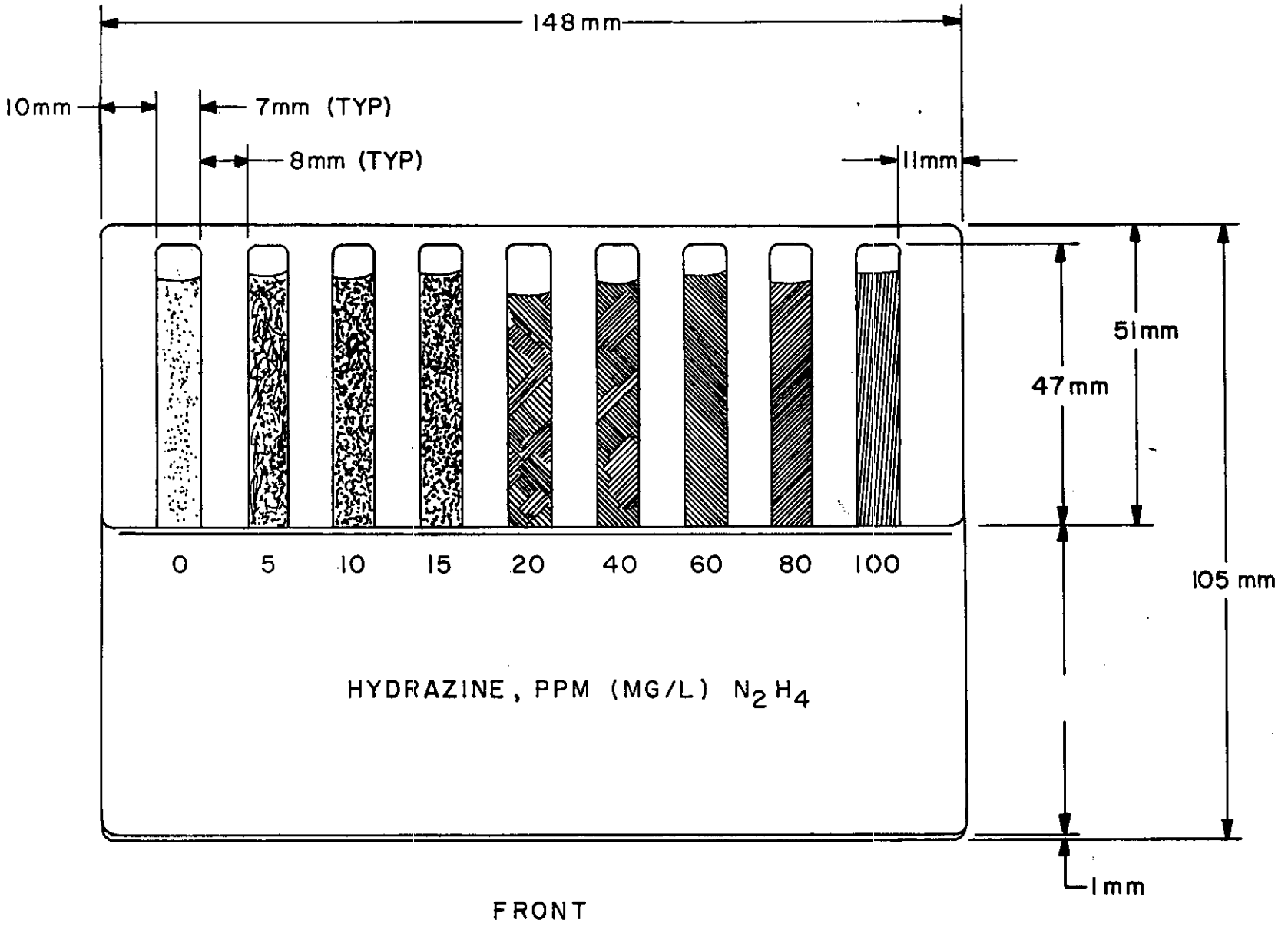

FIGURE 2. High range comparator.

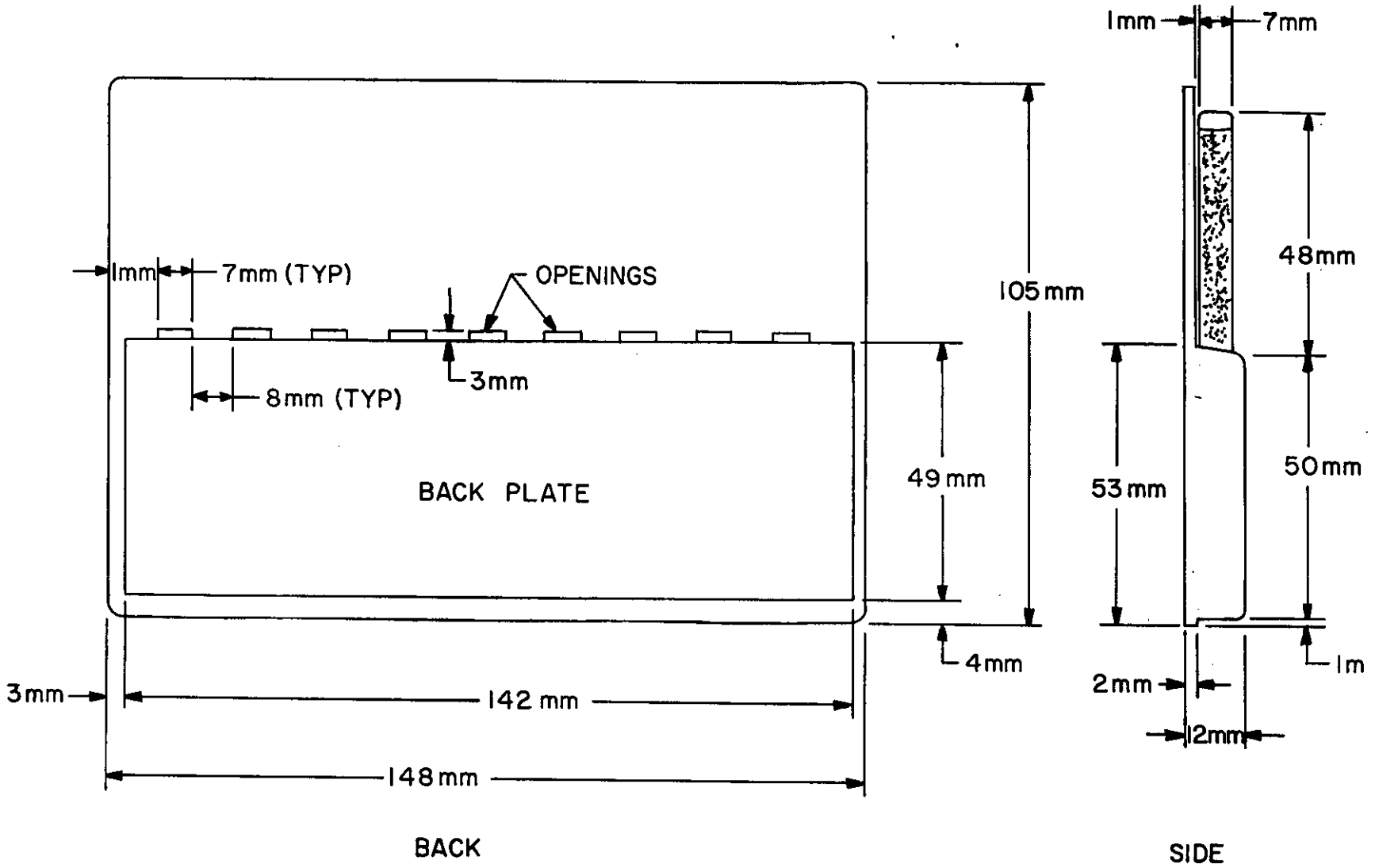

FIGURE 2. High range comparator - Continued.

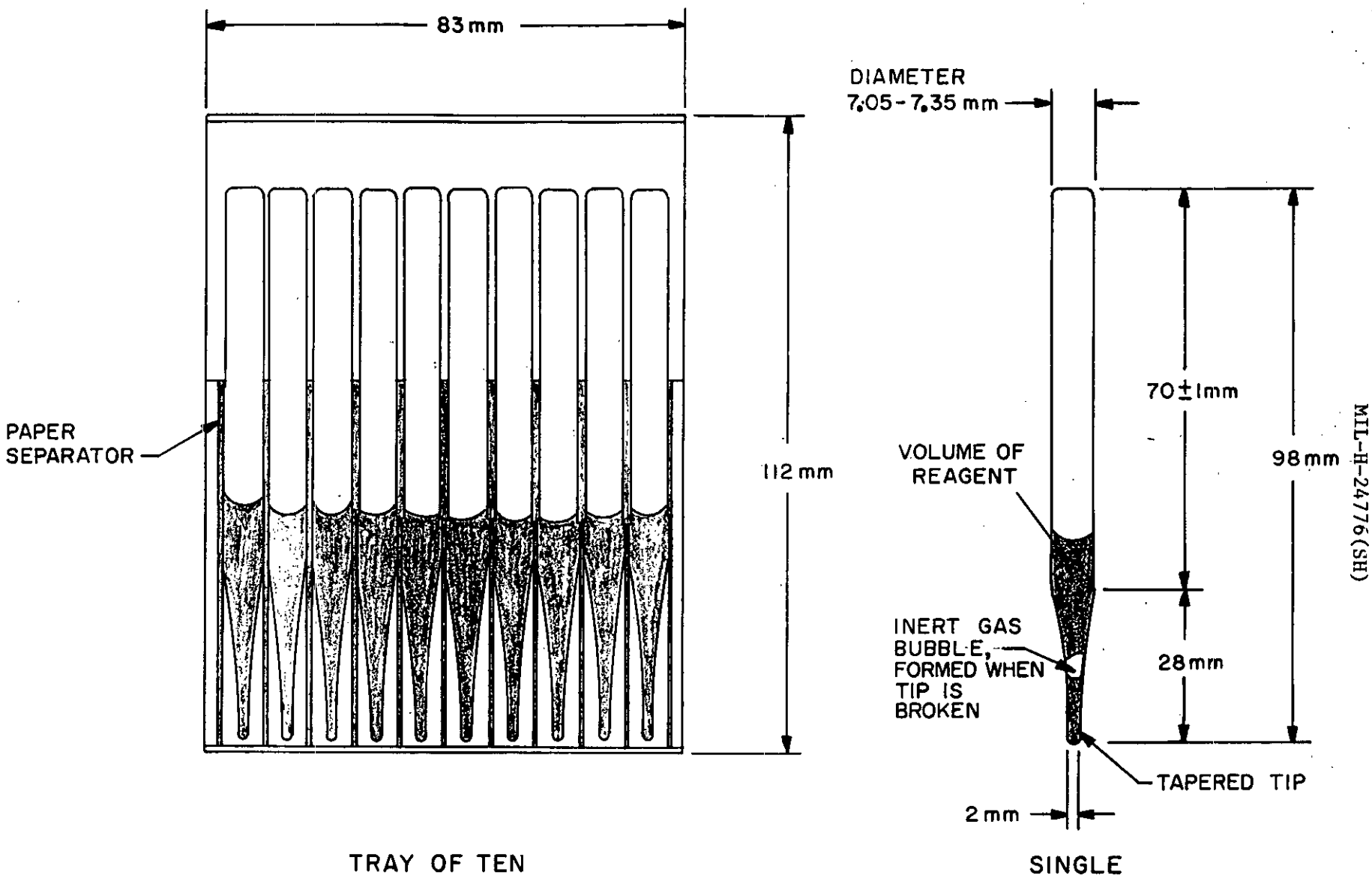

FIGURE 3. Glass ampoules.

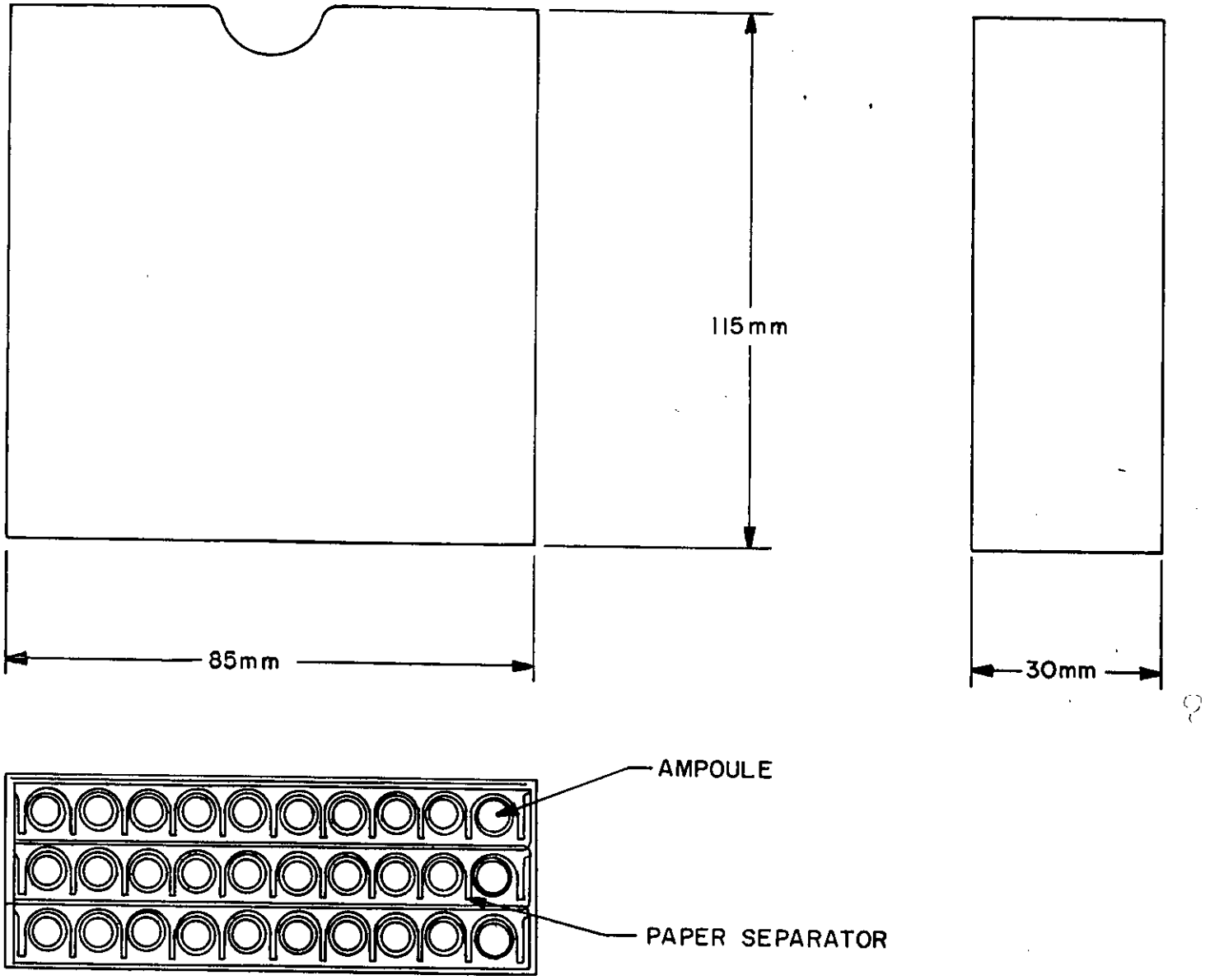

FIGURE 3. Glass ampoules - Continued.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-H-24776(SH)	2. DOCUMENT DATE (YYMMDD) 8 JUNE 1992

3. DOCUMENT TITLE
HYDRAZINE TEST KIT, NAVAL SHIPBOARD (METRIC)

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME *(Last, First, Middle Initial)*	b. ORGANIZATION	
c. ADDRESS *(Include Zip Code)*	d. TELEPHONE *(Include Area Code)* (1) Commercial (2) AUTOVON *(If applicable)*	7. DATE SUBMITTED *(YYMMDD)*

8. PREPARING ACTIVITY

a. NAME TECHNICAL POINT OF CONTACT (TPOC): A. BELFIELD, SEA 56P2 NAVAL SEA SYSTEMS COMMAND	b. TELEPHONE *(Include Area Code)* (1) Commercial (2) AUTOVON TPOC: 703-602-2095 8-332-2095
c. ADDRESS *(Include Zip Code)* SEA 55Z3, DEPARTMENT OF THE NAVY WASHINGTON, DC 20362-5101	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340