

Enclosure 4

Job Specifications for Cylinder Numbers 1 through 1000

PS-104, Specifications for Cylinders

PS-105, Specifications for Cleaning and Testing Cylinder

Bill of Material for Cylinder Numbers 3001 through 3365

Bill Number X-330-M-8 for 10-Ton Cylinders

COPY

CARBIDE AND CARBON CHEMICALS COMPANY  
UNION CARBIDE AND CARBON CORPORATION  
K-25 Operation Division

Issued March, 1951  
Revision No. 1 - Issued April 14, 1951  
Revision No. 2 - Issued June 8, 1951

JOB SPECIFICATION NO. PS-105

SPECIFICATIONS FOR CLEANING AND TESTING CYLINDER

1. SCOPE:

This specification covers the cleaning and testing of the cylinder.

2. PROCEDURE:

A. Cleaning

1. Remove plugs from the cylinder.
2. Immerse cylinder for a minimum of 15 minutes in a solution made up of 8 ounces per gallon of Metax silicate free cleaner at a temperature of 180° - 212° F.
3. Rinse for one minute in running cold water.
4. Immerse cylinder for a minimum of 30 minutes in a solution containing Troxide RES at a concentration of 4 pounds per gallon and a temperature of 140° - 180° F.
5. Rinse with cold water and blow dry.
6. Tin the threads on the valve and plugs and install them in the cylinders. Before tinning the threads of the valve, clean the threads to a bright metallic finish and then tin the thread by using Ortho Phosphoric Acid as a flux. The valve seat shall be lead tested to 1.0 micron cubic feet per hour before installation. The valve body shall be leak tested to .5 micron cubic feet per hour.
7. Optional arrangement of having buyer leak test valves for the seller may be arranged if seller so desires.

B. Air Test

1. Test with 300 PSIG using filtered dry air.
2. Soap test all welds, valve connections and plug connections.
3. Check for leaks in the valve seat of the valve. To do this, unscrew the valve port cap and replace it with a cap that has the lead gasket removed. Screw this cap on loosely and soap test around its edges to detect any leakage of air.
4. Thoroughly wash the soap from the cylinder while it is under pressure.

6. Reduce the air pressure to atmospheric and close the valve.
7. Prepare the cylinder for shipment as outlined under Job Specification No. PS-104.

P.O. WCX-A-22504 } Drawing  
D.O. WCD-628 } D-PD-233-PE

**COPY**

GARHET LTD CARBON CHEMICALS COMPANY  
UNION CARBIDE AND CARBON CORPORATION  
K-25 Operations Division

CYLS. Nos 1 THRU 1000

Issued March, 1951  
Revision No. 1 - Issued April 10, 1951  
Revision No. 2 - Issued June 8, 1951

JOB SPECIFICATION NO. PS-104

SPECIFICATIONS FOR CYLINDER

1. SCOPE:

This specification covers the fabrication, test, welding procedure, and general requirements to be followed in the production of the cylinder.

2. SERVICE CONDITIONS:

The cylinder will be subjected to the following:

- a. 15 PSI external at 70° F.
- b. 200 PSI external at 300° F.

3. DESIGN:

- a. The design of the elliptical heads, shell, stiffener rings, skirts and valve shield is shown on Drawing No. PD-233-PE-1; dimensions and tolerances shall be within those limits as set forth on this drawing.
- b. Proposals using designs or methods of fabrication other than those set forth in this specification and on Drawing No. PD-233-PE-1 will not be considered.
- c. The minimum volume of the cylinder shall be 111 Cu. Ft. as shown on Drawing No. PD-233-PE-1.

4. MATERIAL:

- a. The materials of construction for the shell and heads shall conform to the ASTM Specification A-283-47, Grade C, flange quality, and shall be made by the open hearth process. All other steel shall conform to ASTM A-283, Grade D.
- b. The valve shall be a 3/4 inch I.D. Port-Kerotest No. 7593 angle valve, aluminum-bronze body, ANPGC Grade 8; Monel stem, and the packing gland shall be equipped with Teflon packing rings.

5. WELDING:

- a. All carbon steel welding shall be performed by welders that are qualified to the applicable portion of the ASME Code for unfired pressure vessels, 1949, Paragraph U-59, welding tests and specifications or mutually agreeable equivalent.

b. The composition of the deposited weld material shall be substantially the same as that of the base material.

c. The welding process shall produce a minimum of residual flux, slag, oxide, and weld splatter, all of which shall be removed by the fabricator.

d. The welding process shall be done by the best method for producing sound, dense welds, free from porosity, inclusions, cracks and other defects, either by the manual arc, automatic arc or submerged arc welding process. The longitudinal shell seam and the head circumferential seam welds shall be done by the automatic submerged arc process as shown on Drawing No. FD-233-PE-1.

e. Care shall be taken to remove all slag from the weld before laying down the next successive bead. All traces of slag shall be removed where an interruption in welding occurs to avoid any pin holes. Any cracks, blow holes, or other defects that appear on the surface of any bead of welding shall be removed by chipping or grinding before depositing the next successive bead of welding. Stress relieving and radiographic examination of welds is not required.

f. If the stiffening rings are attached to the shell by manual arc welding, the welds shall be made as indicated on Drawing No. FD-233-PE.

6. FABRICATION:

Fabrication procedure and all practices shall be in accordance with the best methods to insure vacuum tight construction.

7. TESTING:

a. The cylinder shall be subjected to a hydrostatic test of 400 PSIG.

8. INSPECTION:

a. The buyer shall have free access to sellers facilities or to sellers contractors related to the manufacture of this cylinder covered by these specifications.

b. In judging the quality of the welding, the inspector and the buyer's representative shall be guided by the requirements of the ASME Unfired Pressure Vessel Code Paragraph U-78.

9. SHIPMENT OF CYLINDERS:

The cylinder shall be prepared for shipment by evacuating the cylinder to 0.5 PSIA.

10. GENERAL:

a. C & CCD may reject the cylinder or any parts of the cylinder which do not conform to tests and specifications as outlined in this specification.

b. The buyer reserves the right to approve all materials of construction and reject any proposals of construction which are based on materials that are not acceptable.

c. Bids shall be based on delivery F.O.B. Sellers plant with freight prepaid to Blair, Tennessee.

d. The outside of the cylinder shall be given one coat of aluminum paint, after cleaning and testing has been completed.

e. Each unit shall have a name plate permanently attached on the drain plug end of the cylinder. The name plate shall state the serial number for each unit, numbered consecutively, starting with the number one and the pressure rating.

f. The seller shall submit separate bids on (1) fabrication and (2) cleaning and testing of the cylinder.

g. Delivery of the cylinders shall be at a rate of 60 cylinders per month until completion of order. The first 60 cylinders are to be shipped by August 1, 1951.

# BILL OF MATERIAL

GIFFELS & VALLET, INC. ENGINEERS  
NATIONAL BANK BLDG. - DETROIT 26, MICHIGAN

Page 1 of 9 Pages.

Ref. No. 51-163-X

Proj. No. FX<sup>11</sup>

U.S. ATOMIC ENERGY COMM.

Bill No. X-330-M-8

Bl. X-330, Process

Material Covered 10 Ton Cylinders

Process Building X-330

PREPARED BY: <u>FJB/mab</u>	SUBMITTED FOR APPROVAL <u>March 10, 1953</u>	ISSUED FOR PURCHASE / <u>March 27, 1953</u>
APPROVED BY <u>[Signature]</u> ARCHITECT - ENGINEER	/s/ L. H. Jackson 3-23-53 ATOMIC ENERGY COMM.	R. A. Walker 3-21-53 CARBIDE & CARBON CHEMICAL CO.

## RECORD OF REVISIONS

REV. #	DATE	DESCRIPTION	APPROVED		
			G & V	CCCC	AEC

Item No.	No. Req'd	Specifications
1	365	<p>Cylinders shall be 48<math>\frac{1}{2}</math>" I.D. by 7'-6" approximately on straight side fitted with A.S.M.E. code type ellipical heads.</p> <p>The cylinder will be subjected to the following service conditions:</p> <ul style="list-style-type: none"> <li>(a) Pressure 0 p.s.i.a. to 200 p.s.i.g.</li> <li>(b) Temperature 70° F. to 300° F.</li> </ul> <p>The cylinder shall be constructed in strict accordance with the</p>

# BILL OF MATERIAL

GIFFELS & VALLET, INC. • ENGINEERS  
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Proj. No. X

U. S. ATOMIC ENERGY COMM.

Bill No. X-330-M-8

Spec. X-330

Material Covered 10 Ton Cylinders

Item No.	No. Req'd	Specifications
		<p>A.S.M.E. Code for Unfired Pressure Vessels, 1950 Edition or latest revision and shall be code stamped. The design of heads, shell, skirts, valve shield, etc., shall be as shown on attached sketch. No other test, inspection or drain openings will be permitted. The minimum volume of the tank shall be 111 cu. ft. The liquid inside the tank will weigh 230 lbs./cu. ft. and will be non-crossive.</p> <p>The materials of construction for the shell and heads shall conform to the A.S.T.M. Specification A-285-50T, Grade C, flange quality. All other steel shall conform to A.S.T.M. Specification A-283, Grade D. Stress relieving welds is not required. Spot radiographing as per UW-52 shall be required.</p> <p>No internal reinforcing will be permitted. Minimum plate thickness shall be 5/8<sup>00</sup> for shell and 3/4<sup>00</sup> for heads. Backing ring is required for girth welds. The cylinder shall be of all welded construction with the maximum utilization of submerged arc welding. Fitup and welding of the heads to the shell shall be such as to minimize the amount of weld slag passing the backing rings.</p> <p><u>CLEANING AND TESTING:</u></p> <p>(a) Preliminary Cleaning.</p> <p>1. As late as practicable before assembly, sand or grit blast all interior surfaces free of slag, mill scale, weld spatter, and rust.</p>

REV. #	DATE	DESCRIPTION	APPROVED



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Proj. No. 987501

U.S. ATOMIC ENERGY COMM.

Bill No. X-330-M-8

Fig. X-330

Material Covered 10 Ton Cylinders

Item No.	No. Req'd	Specifications
		<p>2. Blow or brush free of all loose sand, grit, dust, etc.</p> <p>(b) Testing.</p> <p>Each cylinder shall be subjected to a 300 p.s.i.g. Hydrostatic test.</p> <p>(c) Final Cleaning.</p> <p>Following the hydrostatic test each cylinder shall be cleaned as outlined below:</p> <ol style="list-style-type: none"> <li>1. Immerse in an alkali cleaning solution for 10 minutes. Make sure that all air is expelled. Cleaning solution to be Wyandotte CSR or equal, 10-12 oz. per gal. and held at a temperature of 180°-200° F.</li> <li>2. Drain and rinse in 140°-150° F. water. Completely fill and drain the cylinder three times.</li> <li>3. Hammer each of the girth welds lightly to loosen any slag not dissolved.</li> <li>4. Rinse in a second tank of clean hot water at a temperature of 180°-200° F. Completely fill and drain the cylinder three times.</li> <li>5. Blow dry immediately with clean, oil-free air and install plugs.</li> <li>6. Make inspections to determine that the interior is free of all rust, scale, or other loose material.</li> </ol> <p>(d) Final Test.</p> <p>After installation of cleaning plugs, apply the following air test:</p>

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U.S. ATOMIC ENERGY COMM.

Bill No. X-330-M-8

Sk. X-330

Material Covered 10 Ton Cylinders

Item No.	No. Req'd	Specifications
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1. Pressure the cylinder with clean, dry, oil-free air at 200 p.s.i.g. While under this pressure apply a soap suds solution on all welds and plugged openings. No leaks will be permitted. Any welded repair will require a reapplication of this test.
2. Thoroughly remove all soap from the cylinder.
3. Reduce the pressure to atmosphere.
4. Evacuate the cylinder to .5 p.s.i.a., then purge with nitrogen and install plug for shipment.

**PAINTING:**

Except for a strip 2" wide on each side of each weld and at each welding connection, the tank exterior shall be painted with one coat of aluminum paint of a type where pigment and vehicle are supplied separately and mixed together just prior to application. The paint shall set to touch within one and one-half (1½) hours and dry hard in eight (8) hours after application. The paint, after applied and dry, shall withstand temperatures up to 500° F. without evidence of blistering, flaking, peeling or discoloration. The paint, after applied and dry, shall also withstand exposure to weak acids, organic solvents and fumes for a period of fifteen (15) minutes without blistering, peeling or removal.

**BASIS OF ACCEPTANCE:**

No pressure vessel shall be finally accepted until received and inspected at the plant of the Buyer. Upon receipt of equipment at the plant of the

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Proj. No. W-100

U. S. ATOMIC ENERGY COMM.

Bill No. X-330-M-8

Qty. X-330

Material Covered 10 Ton Cylinders

Item No.	No. Req'd	Specifications
		<p>Buyer, the right is reserved to correct any defects in material or workmanship, charging all expense in connection therewith to the account of the Seller, provided however, that the Seller has been notified of such defects and has been afforded an opportunity of making necessary repairs.</p> <p><u>GENERALs:</u></p> <p>(a) Cylinders shall be designed so they may be handled in either the horizontal or vertical position. The enclosed sketches show the lifting lugs for the horizontal position and the holes in the skirt for the vertical position.</p> <p>(b) Each unit shall have a name plate permanently attached on the drain plug end of the cylinder. The name plate shall state the serial number for each unit, numbered consecutively starting with the number one, and the pressure rating.</p> <p>(c) The fabrication of the 365 cylinders shall be complete and delivered within one (1) year at a minimum rate of seven (7) per week, starting about April 1, 1954.</p> <p>(d) Suitable blocking and straps shall be provided for protection of the cylinders during shipment.</p> <p><u>DRAWINGS, DATA, ETC.:</u></p> <p>The Manufacturer and/or Vendor shall furnish Manufacturer's data, test information, approved or certified drawings, material specifications, etc., in accordance with general Contractor's printed instructions regarding the</p>

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Proj. No. WTM

U. S. ATOMIC ENERGY COMM.

Bill No. X-330-M-8

Blk. X-330

Material Covered 10 Ton Cylinders

Item No.	No. Req'd	Specifications
		<p>furnishing and distribution of such material.</p> <p><u>WARRANTY:</u></p> <p>All equipment specified under this Bill of Material shall be covered by the provisions of Warranty No. 1, Section No. 39 of the Master Specifications.</p> <p><u>LIST OF BIDDERS:</u></p> <p>The following companies shall be included on the List of Bidders:</p> <p style="padding-left: 40px;">Alco Products Division, American Locomotive Company, Dunkirk, New York.</p> <p style="padding-left: 40px;">Chicago Bridge and Iron Company, Chicago, Illinois.</p> <p style="padding-left: 40px;">Dallas Tank Company, Inc., Dallas, Texas.</p> <p style="padding-left: 40px;">Graver Tank and Manufacturing Company, Inc., East Chicago, Indiana.</p>

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Ref. No. 51-163-X

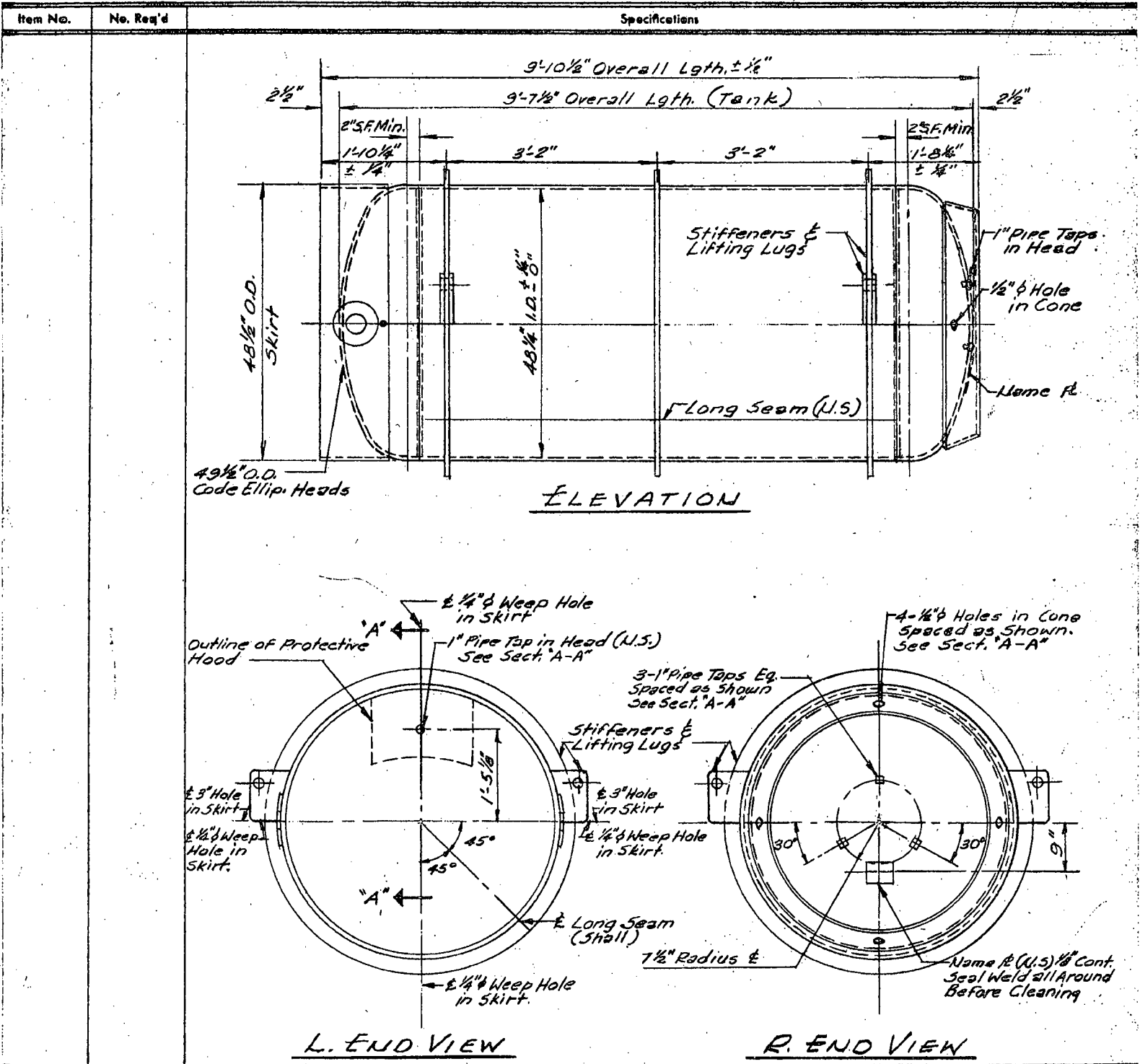
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Proj. No. NY

Bill No. X-330-M-8

Bldg. X-330

Material Covered 10 Ton Cylinders



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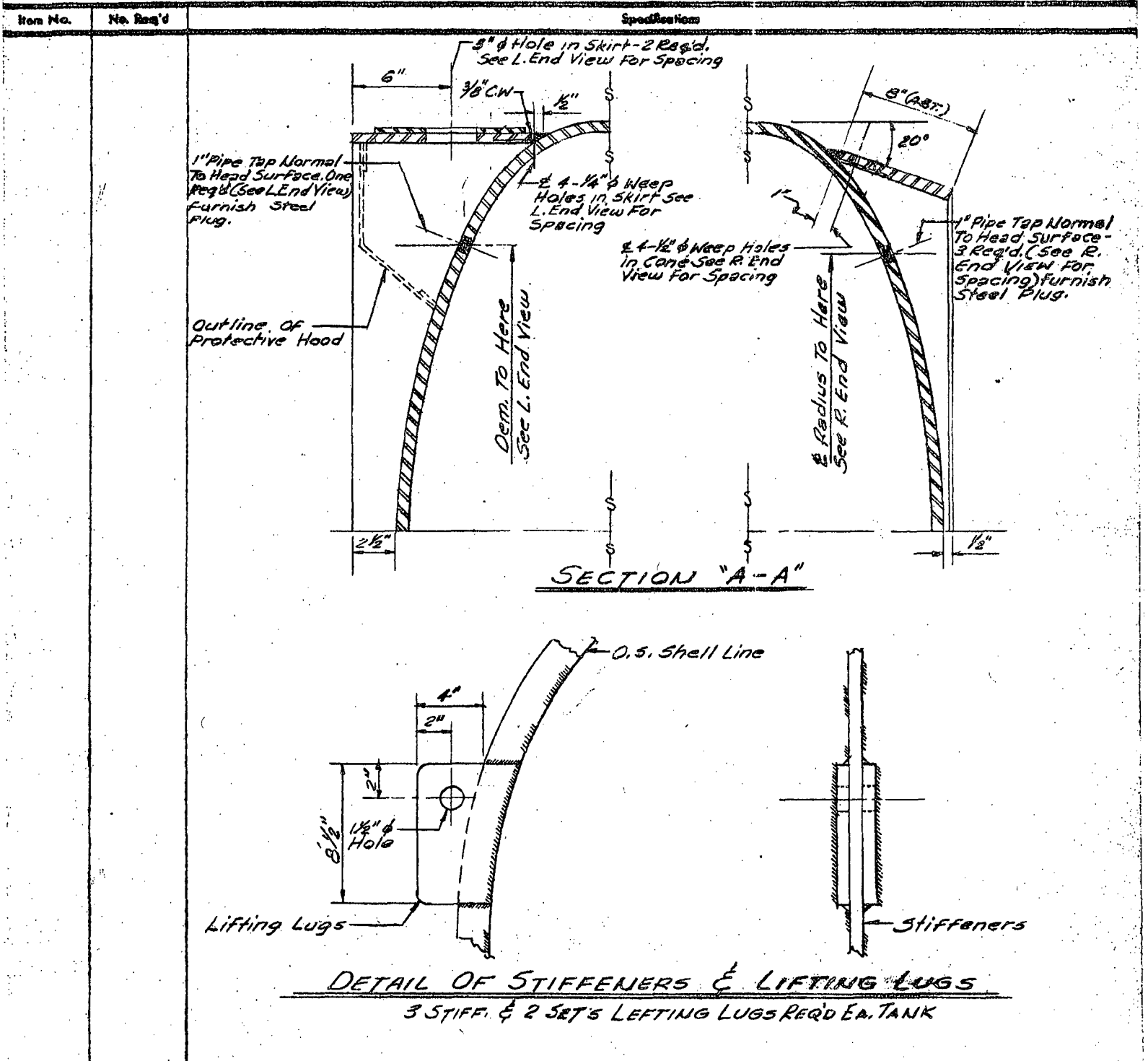
Bill No. X-330-N-8

Ref. No. 51-163-X

Proj. No. XI

Fig. X-330

Material Covered 10 Ton Cylinders



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Proj. No. X

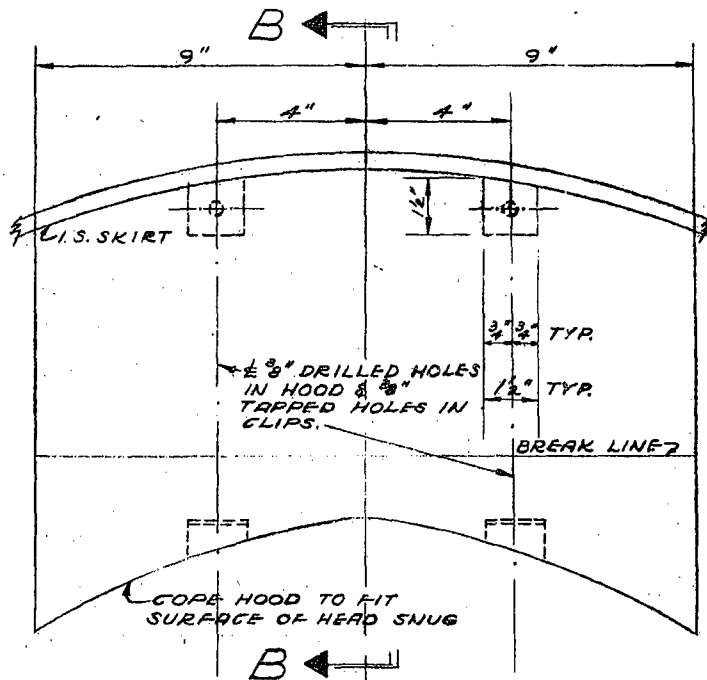
U.S. ATOMIC ENERGY COMM.

Bill No. X-330-N-8

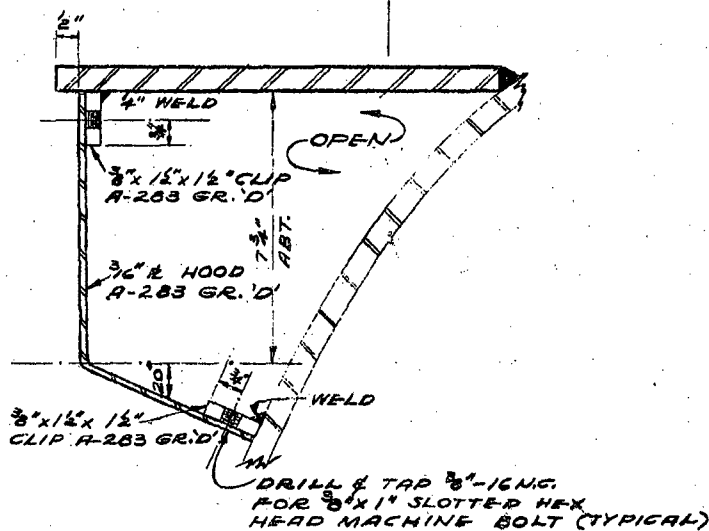
Buy X-330

Material Covered 10 Ton Cylinders

Item No.	No. Req'd	Specifications
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PROTECTIVE HOOD DETAIL  
END VIEW



SECTION B. B.

REV. #	DATE	DESCRIPTION	APPROVED
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