TECHNICAL MANUAL

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL TANK,STEEL, VERTICAL, BOTED, KNOCKDOWN, SEALED OPENINGS, STANDARD BOTTOM AND ROOF, GASOLINE, OIL, OR WATER

(TYPE I - POL AND POTABLE WATER

TYPE 11 - POL AND NON-POTABLE WATER)

100 BARREL CAPACITY, TYPE I, FSN 5430-263-6076
TYPE II, FSN 5430-139-3778
250 BARREL CAPACITY, TYPE I, FSN 5430-263-6080
TYPE II, FSN 5430-138-1823
500 BARREL CAPACITY, TYPE I, FSN 5430-263-6077
TYPE II, FSN 5430-138-1822
1,000 BARREL CAPACITY, TYPE I, FSN 5430-263-6078
TYPE II, FSN 5430-138-1821
3,000 BARREL CAPACITY, TYPE I, FSN 5430-263-6075
TYPE II, FSN 5430-138-1820
10,000 BARREL CAPACITY, TYPE I, 5430-255-6073
TYPE II, FSN 5430-138-1824

HEADQUARTERS, DEPARTMENTS OF THE ARMY AND AIR FORCE
MAY, 1974

This copy is a reprint which includes current pages from Changes 1 through 4.

WARNING

SAFETY PRECAUTIONS

It is mandatory that the safety precautions prescribed in TM 10-1109 be followed whenever a bolted steel tank is being disassembled, repaired, or reassembled.

If a tank has been used for petroleum products, it must not be used for water.

If a tank is to be used for water storage, do not apply sealing compound to the tank bottom.

Scaffold boards must be tested on the ground, prior to being installed in the scaffold, to be sure they are sound and free from defects. Nail overlap of scaffold board together.

Install a guard rail on all scaffolding. Securely tie rope safety railing to each post. Individually, they are not resistant to lateral bending; but tied together, they form a strong resistance to lateral and outward bending. A diagonal line from the top of every 4th or 5th post to the bottom of the adjacent post is also recommended.

Do not install guard wire supports over stave chime lap seams or deck lap seams.

The motor starting switch of the vacuum seam tester must be in OFF position before connecting the motor to an electric power source outside the tank.

Do not use mechanical means for tank destruction if the tank is used for storage of flammable liquids.

All personnel should wear hard hats or steel helmets during erection or dismantling of tanks for protection against falling nuts, bolts, or tools.

By Order of the Secretaries of the Army and the Air Force:

FRED C. WEYAND
General, United States Army
Chief of Staff

Official:
VERNE L. BOWERS
Major General, United States Army
The Adjutant General

DAVID C. JONES, General, USAF
Chief of Staff

Official:

JACK R. BENSON, *Colonel, USAF*
Director of Administration

DISTRIBUTION:
To be distributed in accordance with DA Form 12-25A, (qty rqr block No. 273) Operator maintenance requirements for Storage Tanks.

Changes in force: C1 and C2

ARMY TECHNICAL MANUAL
AIR FORCE TECHNICAL ORDER

TM 5-5430-209-12
TO 36Y31-1-101
C2

CHANGE
No. 2

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON, D.C., *21 December 1978*

Operator and Organizational Maintenance Manual
TANK, STEEL, VERTICAL, BOLTED, KNOCKDOWN,
SEALED OPENINGS, STANDARD BOTTOM, AND ROOF,
GASOLINE, OIL OR WATER
(TYPE I-POL AND POTABLE WATER
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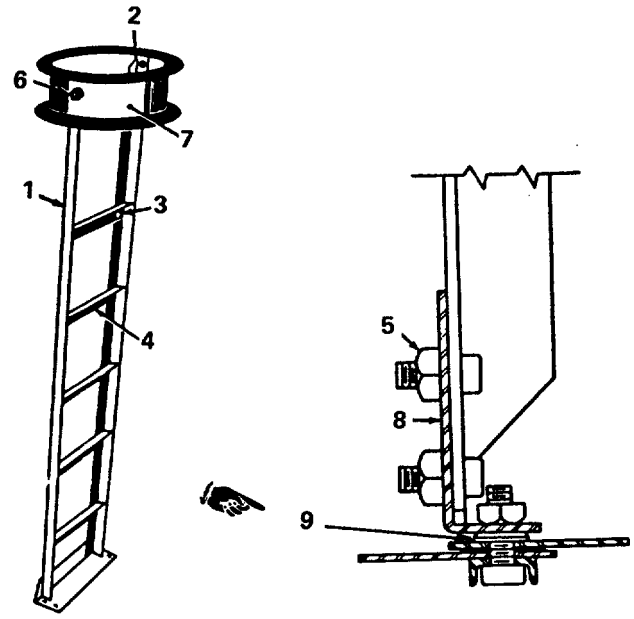
1,000 BARREL CAPACITY,	TYPE I, NSN 5430-00-263-6078 TYPE II, NSN 5430-00-138-1821
3,000 BARREL CAPACITY,	TYPE I, NSN 5430-00-263-6075 TYPE II, NSN 5430-00-138-1820
10,000 BARREL CAPACITY,	TYPE I, NSN 5430-00-255-6073 TYPE II, NSN 5430-00-138-1824

TM 5-5430-209-12/TO 36Y31-1-101, 15 May 1974, is changed as follows:

Page 3-4. Figure 3-3, Item 4 is changed from "Steel Recessed Washer" to "Sealing Washer".

Page 3-17. Figure 3-19 is superseded by new figure 3-19 as follows:



ME 5430-209-12/3-19

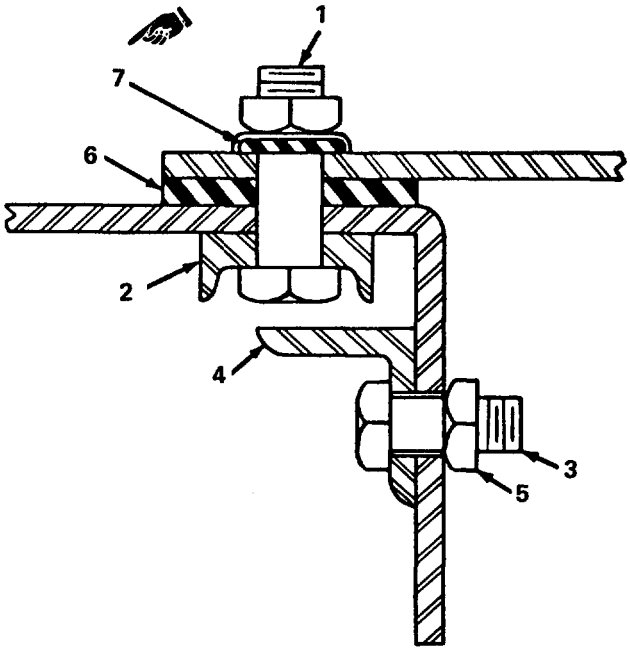
1. LEFT LADDER SUPPORT RAIL
2. RIGHT LADDER SUPPORT RAIL
3. BOLT
4. LADDER STEP
5. NUT
6. BOLT
7. MANHOLE DOME
8. LADDER BRACE
9. SEALING WASHER

Figure 3-19. Center support ladder assembled.

Page 3-18. Paragraph 3-14c is superseded as follows:

c. Place a channel (2, fig. 3-21) on the right lap seam at the flange. Insert 1/2 by 1 1/4-inch bolts (1) through all except end boltholes of plate and channel. Make sure bolt heads set square in channel. Insert sealing washers (7) over bolts (1), and install and tighten nuts (5) on bolts (1).

Page 3-18. Figure 3-21 is superseded by new figure 3-21 as follows:



ME 5430-209-12/3-21

1. BOLT
2. DECK PLATE CHANNEL
3. BOLT
4. RAFTER BOLT RETAINER ANGLE
5. NUT
6. STRIP GASKET
7. SEALING WASHER

Figure 3-21. Deck plate components.

Page 3-31. Table 3-1. Identification of Component Items, fifth line from the top add Fig. No. 3-19, and Item No. 9 to table.

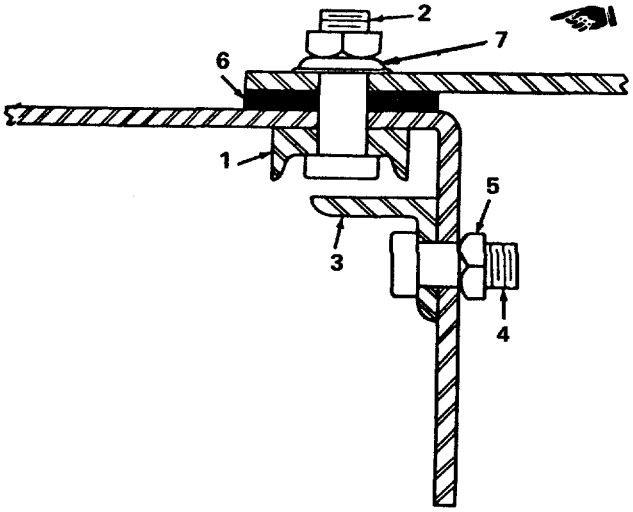
Page 3-31. Table 3-1. Identification of Component Items, sixth line from the top change fig. No. 3-19, to fig. No. 3-21 on table.

Page 3-31. Table 3-1. Identification of Component Items, third line from the bottom change Part No. from "13211E8058" to read "13217E5405".

Page 4-9. Paragraph 4-15c is superseded as follows:

c. Place channel (1, fig. 4-9) on right lap seam at the flange. Insert bolt (2) through all except the end boltholes of plate and channel. Make sure bolt heads set square in the channel. Insert sealing washers (7) over bolts (2), and install and tighten nuts (5) on bolts (2).

Page 4-9. Figure 4-9 is superseded by new figure 4-9 as follows:



ME 5430-209-12/4-9

1. DECK PLATE CHANNEL
2. BOLT
3. RAFTER BOLT RETAINING ANGLE
4. BOLT
5. NUT
6. STRIP GASKET
7. SEALING WASHER

Figure 4-9. Deck plate assembly.

Page 4-13. Table 4-1. Identification of Component Items, 14th line from top change Item No. from "4" to "5". In 15th line from top, add Qty Per Unit 1650, Fig. No. 3-3 and Item No. 4 to table.

Page 5-5. Table 5-1. Identification of Component Items, add 20 to Qty Per Unit column and add 3-19 to Fig. No. column for Part No. 13211E8059.

Page 6-18. Figure 6-16, Item 1 is changed from "Steel Recessed Washer" to "Sealing Washer".

Page 6-19. Paragraph 6-15c(6) and (7) is superseded as follows:

(6) Place other section (2) over bolts (1) and gasket (3). Place sealing washer (1, fig. 6-16), cupped side down, on each bolt. Install nut (2) loosely on each bolt.

(7) Use 1/2 by 1-inch bolts and sealing washers to seal holes in vertical portion of the manhole dome (6).

Page 7-10. Table 7-1, Identification of Component Items, Change FSN "5430-217-0144" for Kit, Re-erection to "5430-319-0114".

Page 8-4. Figure 8-6. Item 5 is changed from "Steel Recessed Washer" to "Sealing Washer".

Page 8-4. Paragraph 8-3b(5) is superseded as follows:

(5) Install sealing washer (5), cupped side down, and nut (6) on each bolt (3) protruding through outer plate (2). Tighten all bolts.

Page 8-28. Paragraph 8-17b(6) is superseded as follows:

(6) Install sealing washer (6), cupped side down, and nut (7) on each bolt (3). Tighten all bolts.

Page A-1. Under A-3. Maintenance, delete "TM 10-1109" and add "FM 10-20". Delete "TM 10-1118" and add "FM 10-18".

Page I-1. Index, second column, change page number from "4-9" to "4-10" for 250-barrel tank, listed under Gin pole. Change page number from "6-10" to "6-12" for 1000-barrel tank, listed under Gin pole.

By Order of the Secretaries of the Army, the Navy, and the Air Force:

BERNARD W. ROGERS
General, United States Army
Chief of Staff

Official:

J. C. PENNINGTON
Brigadier General, United States Army
The Adjutant General

LEW ALLEN, JR., General, USAF
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Official:

VAN L. CRAWFORD, JR., Colonel, USAF
Director of Administration

Distribution:
To be distributed in accordance with DA Form 12-25A, Operator maintenance requirements for Storage Tanks.

Changes in force: C1 Thru C3

ARMY TECHNICAL MANUAL
AIR FORCE TECHNICAL ORDER

TM 5-5430-209-12
TO 36Y31-1-101

CHANGE
No. 3

HEADQUARTERS
DEPARTMENTS OF THE ARNIY AND THE-AIR FORCE
WASHINGTON, D.C., 28 December 1982

Operator and Organizational Maintenance Manual

TANK, STEEL, VERTICAL, BOLTED, KNOCKDOWN, SEALED OPENINGS, STANDARD BOTTOM, AND ROOF, GASOLINE, OIL OR WATER (TYPE I-POL AND POTABLE WATER TYPE II-POL AND NON-POTABLE WATER)

100 BARREL CAPACITY	TYPE I, NSN 5430-00-263-6076 TYPE II, NSN 5430-00-139-3778
250 BARREL CAPACITY	TYPE I, NSN 5430-00-263-6080 TYPE II, NSN 5430-00-138-1823
500 BARRELL CAPACITY	TYPE I, NSN 5430-00-253-6077 TYPE II, NSN 5430-00-138-1822
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3,000 BARRELL CAPACITY	TYPE I, NSN 5430-00-263-6075 TYPE II, NSN 5430-00-138-1820
10,000 BARRELL CAPACITY	TYPE I, NSN 5430-00-255-6073 TYPE II, NSN 5430-00-138-1824

TM 5-5430-209-12/TO 36Y31-1-101, 15 May 1974, is changed as follows:

Page 3-31. Table 3-1. Identification of Component Items, below line 58, "Washer, Sealing," add the following:

CONSUMABLES

NSN	DESCRIPTION	PART NO	MFG CODE	QTY PER UNIT	FIG NO	ITEM NO.
8030-00-800-6382	Putty, Sealing	MIL-P-20628	81349	1 gal	(See Note)	
8030-00-598-4503	Sealing Compound	MIL-S-14321	81349	3 qt	(See Note)	
8020-00-200-3487	Brush Applicator, Sealing Compound	H-B-420	81348	4	(See Note)	

NOTE

Not required when tanks are to be used to store potable water.

Page 3-32. Table 3-1. Identification of Component Items, 3rd line from the top, add "NSN 8020-00-200-3487" for "Brush Applicator," and add "NSN 5330-01-011-5029" for the 18th line "Washer, Sealing."

Page 4-13. Table 4-1. Identification of Component Items, 15th line from top across from Gasket Strip, change "Qty Per Unit" from "90" to "500 ft."

Page 4-13. Table 4-1. Identification of Component Items, under line 18, "Washer, Sealing," add the following:

CONSUMABLES

NSN	DESCRIPTION	PART NO	MFG CODE	QTY PER UNIT	FIG NO	ITEM NO.
8030-00-800-6382	Putty, Sealing	MIL-P-20628	81349	1 gal	(See Note)	
8030-00-598-4503	Sealing Compound	MIL-S-14321	81349	6 qt	(See Note)	
8020-00-200-3487	Brush Applicator, Sealing Compound	H-B-420	81348	4	(See Note)	

NOTE
Not required when tanks are to be used to store potable water.

Page 4-13. Brush Applicator, 26th line from top, add "NSN 8020-200-3487," and on the 41st line "Washer, Sealing," add "NSN 5330-01-011-5029."

Page 5-5. Table 5-1. Identification of Component Items, 30th line, add "NSN 5330-01-011-5029" for "Washer, Sealing," and under "Item No." insert "9".

Page 5-6. Table 5-1. Identification of Component Items, 10th line, add "NSN 5330-01-011-5029" for "Washer, Sealing," and under "Washer, Sealing," add the following:

CONSUMABLES

NSN	DESCRIPTION	PART NO	MFG CODE	QTY PER UNIT	FIG NO	ITEM NO
8030-00-800-6382	Putty, Sealing	MIL-P-20628	81349	1 gal	(See Note)	
8030-00-598-4503	Sealing Compound	MIL-S-14321	81349	15 qt	(See Note)	
8020-00-200-3487	Brush Applicator, Sealing Compound	H-B-420	81348	4	(See Note)	

NOTE
Not required when tanks are to be used to store potable water.

Page 5-6. Identification of Component Items, on the 37th line "Washer, Sealing," add "NSN 5330-01-011-5029."

Page 6-27. Table 6-1. Identification of Component Items, 13th line from top, add "NSN 5330-01-011-5029" for "Washer, Sealing," and under "Washer, Sealing," add the following:

CONSUMABLES

NSN	DESCRIPTION	PART NO.	MFG CODE	QTY PER UNIT	FIG NO.	ITEM NO.
8030-00-800-6382	Putty, Sealing	MIL-P-20628	81349	2 gal	(See Note)	
8030-00-598-4503	Sealing Compound	MIL-S-14321	81349	28 qt	(See Note)	
8020-00-200-3487	Brush Applicator, Sealing Compound	H-B-420	81348	6	(See Note)	

NOTE

Not required when ranks are to be used to store potable water.

Page 6-27. Identification of Component Items, 40th line, "Washer, Sealing," add "NSN 5330-01-011-5029."

Page 7-10. Table 7-1. Identification of Component Items, line 41, "Washer, Sealing," add "NSN 5330-01- 011-5029," and under "Washer, Sealing" add the following:.

CONSUMABLES

NSN	DESCRIPTION	PART NO	MFG CODE	QTY PER UNIT	FIG NO	ITEM NO.
8030-00-800-6382	Putty, Sealing	MIL-P-20628	81349	2 gal	(See Note)	
8030-00-598-4503	Sealing Compound	MIL-S-14321	81349	28 qt	(See Note)	
8020-00-200-3487	Brush Applicator, Sealing Compound	H-B-420	81348	6	(See Note)	

NOTE

Not required when tanks are to be used to store potable water.

Page 8-40. Table 8-1. Identification of Component Items, 24th line, "Elbow: 8 in. size, 90 deg," change Part No. from "13215E9719" to "13215E9717."

Page 8-42. Table 8-1. Identification of Component Items, 12th line, add "NSN 5330-01-011-5029" for "Washer, Sealing," and under "Washer, Sealing" add the following:

CONSUMABLES

NSN	DESCRIPTION	PART NO	MFG CODE	QTY PER UNIT	FIG NO	ITEM NO.
8030-00-800-6382	Putty, Sealing	MIL-P-20628	81349	4 gal	(See Note)	
8030-00-598-4503	Sealing Compound	MIL-S-14321	81349	68 qt	(See Note)	
8020-00-200-3487	Brush Applicator, Sealing Compound	H-B-420	81348	6	(See Note)	

NOTE

Not required when tanks are to be used to store potable water.

Page 8-42. Table 8-1. Identification of Component Items, on the 24th line for "Brush Application," add "NSN 8020-00-200-3487," on the 40th line for "NUT, 1-8 thd size" edd "NSN 5310-00-891-3462," and on the 45th line for "Washer, Sealing" add "NSN 5330-01-011-5029."

By Order of the Secretaries of the Army and the Air Force:

E. C. MEYER
General, United States Army
Chief of Staff

Official:

ROBERT M. JOYCE
Major General, United States Army
The Adjutant General

CHARLES A. GABRIEL, General, USAF
Chief of Staff

Official:

JAMES E. WYATT, JR., Colonel, USAF
Director of Administration

DISTRIBUTION:
To be distributed in accordance with DA Form 12-25A, Operator maintenance requirements for Storage Tanks.

TECHNICAL MANUAL
No 5-5430-209-12
TECHNICAL ORDER
No 36Y31-1-101

HEADQUARTERS
DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON, D.C., 15 May 1974

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL

TANK, STEEL, VERTICAL, BOLTED, KNOCKDOWN,

SEALED OPENINGS, STANDARD BOTTOM, AND ROOF,

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(TYPE I-POL AND POTABLE WATER

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		TYPE	II,	FSN 5430-138-1823
500	BARREL CAPACITY,	TYPE	I,	FSN 5430-263-6077
		TYPE	II,	FSN 5430-138-1822
1,000	BARREL CAPACITY,	TYPE	I,	FSN 5430-263-6078
		TYPE	II,	FSN 5430-138-1821
3,000	BARREL CAPACITY,	TYPE	I,	FSN 5430-263-6075
		TYPE	II,	FSN 543-138-1820
10,000	BARREL CAPACITY,	TYPE	I,	FSN 5430-255-6073
		TYPE	II,	FSN 5430-138-1824

*This manual supersedes TM 5-5430-209-12/TO 36Y31-1-101, 12 November 1970.

LIST OF ILLUSTRATIONS

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope
This manual is for your use in erecting and maintaining the 100-, 250-, 500-, 1000-, 3000-, and 10,000-barrel capacity steel tanks. The manual includes information on transporting and handling tank components, preparation of tank foundations, assembly and disassembly of the tanks. A list of component items for each tank is placed at the end of the chapter on the appropriate tank. Essential tools, equipment, and supplies required for the erection of the tanks are listed in DA Supply Catalogs SC 518093-CL-EO1, Erection Outfit, High Bolted Storage Tanks (FSN 5180-566-5549); and SC 5180-97-CLEO3, Erection Outfit, Low Bolted Storage Tanks.
Kits required in the re-erection of the tanks are listed in SC 5420-30-IL.

1-2. Maintenance Forms and Records
Maintenance forms and records that you are required to use are explained in TM 38-750.

1-3. Reporting of Errors
You can improve this manual by calling attention to errors and by recommending improvements, using DA Form 2028 (Recommended Changes to Publications), or by a letter, and mail directly to Commanding General, U.S. Army Mobility Equipment Command, ATTN: AMSME-MPP, St. Louis, Missouri 63120.

1-4. Equipment Serviceability Criteria (ESC)
This equipment is not covered by an ESC.

1-5. Destruction of Army Material to Prevent Enemy Use

Refer to TM 750-244-3 for information on the destruction of Army material to prevent its capture by the enemy. See Chapter 11 for additional information.

1-6. Administrative Storage
Refer to TM 740-90-1 for information on the administrative storage of equipment.

Section II. DESCRIPTION AND DATA

1-7. Description
a. 100-, 250-, and 500-Barrel Capacity Tanks. The 100 and 250-barrel tanks (fig. 1-1) and the 500 barrel tank (fig. 1-2) are constructed of preformed and punched metal sections bolted together with 1/2 inch diameter bolts. They consist of assembled bottoms, one ring of assembled side staves, an assembled center support ladder aligned with a manhole, an assembled deck or roof, and an assembled access ladder.

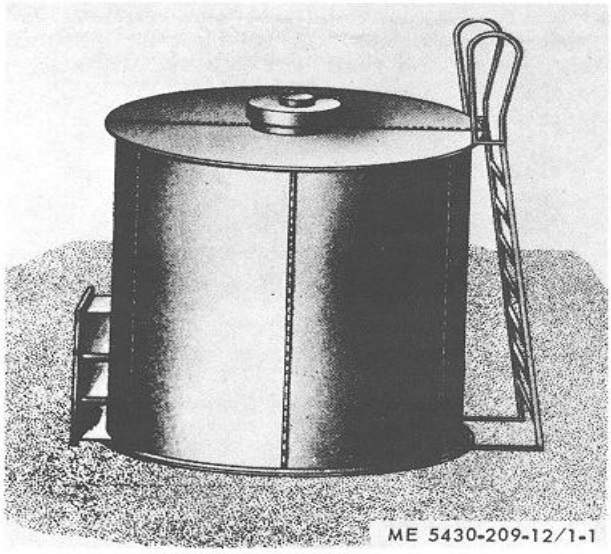


Figure 1-1. 100-barrel or 250-barrel capacity steel tank.

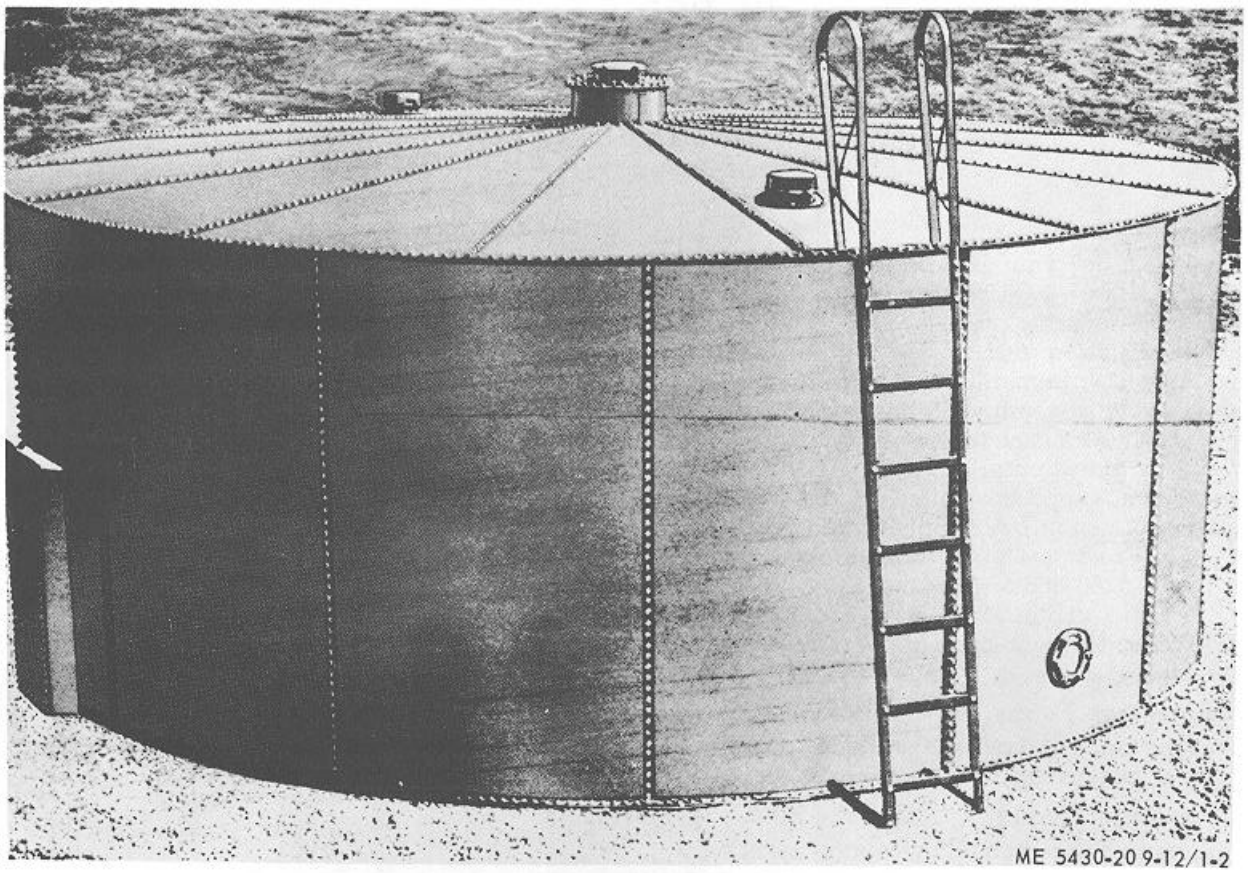
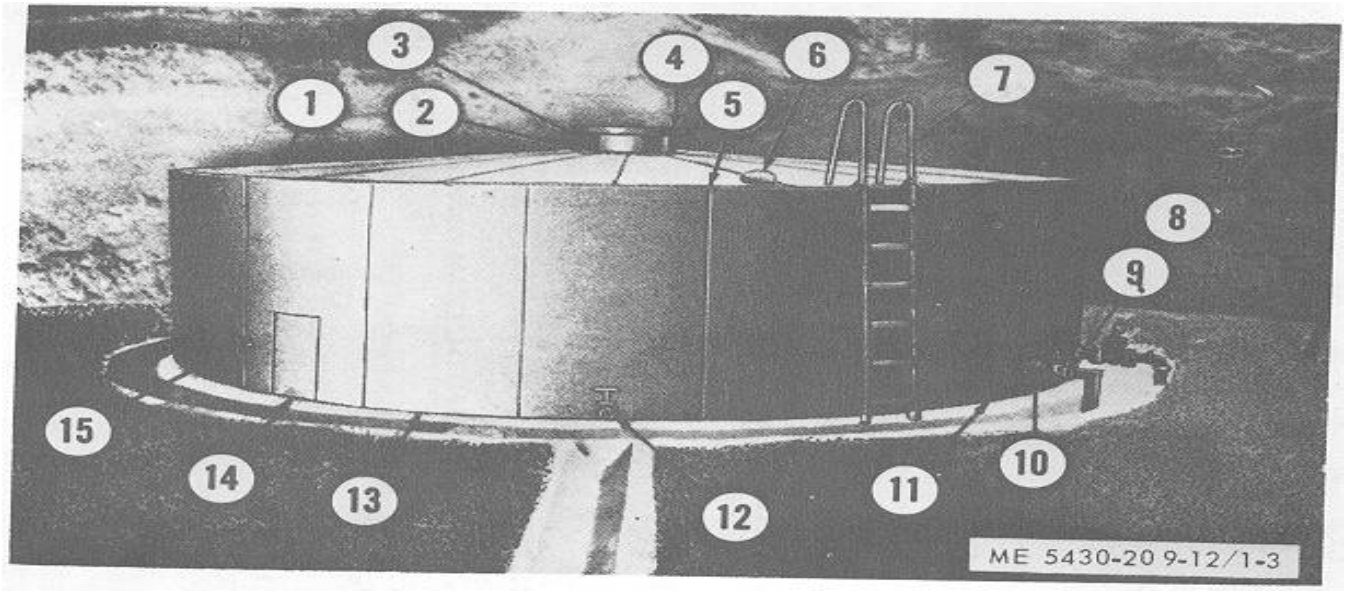


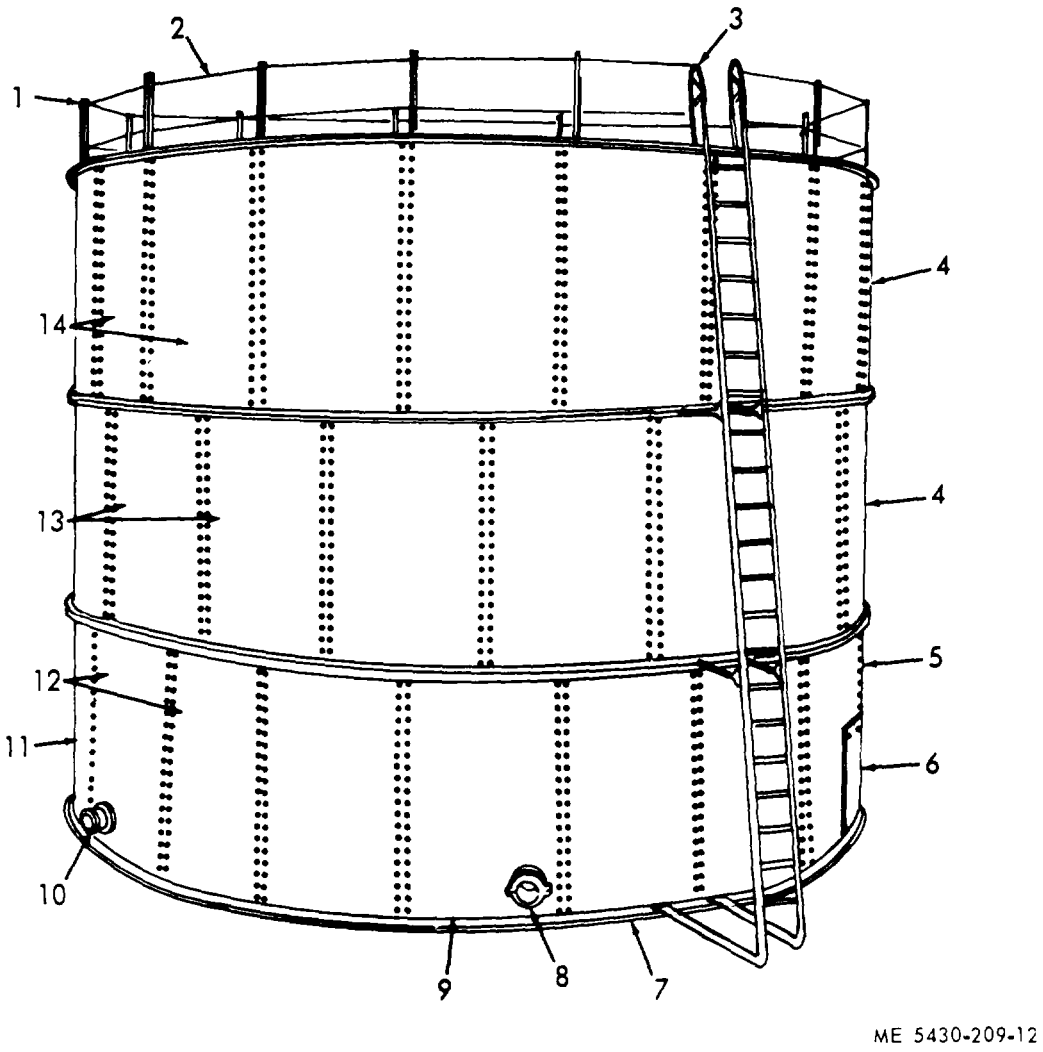
Figure 1-2. 500-barrel capacity steel tank.

b. 1000 and 3000-Barrel Capacity Tanks. The 1000 and 3000-barrel tanks are constructed of preformed and punched metal sections bolted together with %'2-inch diameter bolts. Both tanks have assembled bottoms. The 1000-barrel tank (fig. 1-3) has one ring of assembled side staves (8, 11, 13 and 15) while the 3000-barrel tank (fig. 1-4) has three rings of assembled side staves (12, 13 and 14). Both tanks have an assembled umbrella type deck support, an assembled deck or roof with a manhole (3, fig. 1-3), and an assembled access ladder (3, fig. 1-4).



1. DECK PLATE
2. CENTER DECK SECTION
3. MANHOLE DOME
4. EMERGENCY VENT
5. SPECIAL DECK PLATE
6. PRESSURE VACUUM VALVE
7. ACCESS LADDER
8. SPECIAL SIDE STAVE
9. EIGHT-INCH PIPE CONNECTION
10. SIX-INCH PIPE CONNECTION
11. SPECIAL SIDE STAVE
12. TWO-INCH PIPE CONNECTION
13. REGULAR SIDE STAVE
14. CLEAN OUT COVER
15. SPECIAL SIDE STAVE

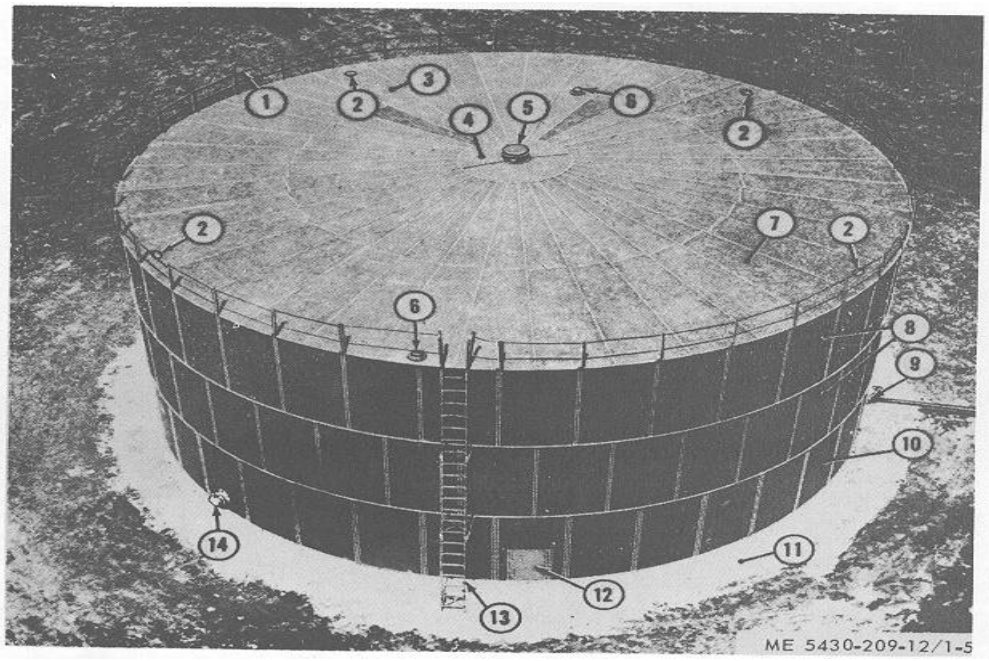
Figure 1-3. 1000-barrel capacity steel tank



1. GUARD WIRE SUPPORT
2. GUARD WIRE
3. ACCESS LADDER
4. SIDE STAVE
5. SPECIAL SIDE STAVE
6. CLEAN OUT COVER
7. REGULAR SIDE STAVE
8. EIGHT-INCH PIPE CONNECTION
9. SPECIAL SIDE STAVE
10. SIX-INCH PIPE CONNECTION
11. SPECIAL SIDE STAVE
12. FIRST RING STAVES
13. SECOND RING STAVES
14. THIRD RING STAVES

Figure 1-4. 3000-barrel capacity steel tank.

c. 10,000-Barrel Capacity Tank. The 10,000-barrel tank (fig. 1-5) is constructed of preformed and punched metal sections bolted together with 1/2-inch diameter bolts. It consists of an assembled bottom, three rings of assembled side staves, and an assembled deck or roof.



1. GUARDRAIL ASSEMBLY
2. BLIND HATCH, 8 INCH
3. SPECIAL DECK SECTION
4. CENTER DECK SECTION
5. MANHOLE DOME ASSEMBLY
6. PRESSURE VACUUM VALVE
7. PLAIN DECK SECTION
8. SECOND AND THIRD RING STAVE
9. TWO-INCH PIPE CONNECTION
10. FIRST RING STAVE
11. TANK FOUNDATION
12. CLEAN OUT COVER
13. LADDER ASSEMBLY
14. TWELVE-INCH PIPE CONNECTION

Figure 1-5. 10,000-barrel capacity steel tank

1-8. Difference in Models

a. Old Tanks. All tanks of 100-, 250-, 500-, 1000-, 5000-, and 10,000-barrel capacity supplied prior to 9 January 1950 were designed according to the standards of each individual manufacturer. These tanks were covered by Specification T-1862B, 27 October 1944. In all pre-1950 tanks, the items made by one manufacturer are not interchangeable with items of tanks made by another manufacturer.

b. New Tanks. All new tanks are covered by standard design drawings. In the new standards, the old 5000-barrel capacity tank has been replaced by the 3000-barrel capacity tank. The new 100-, 250-, 500-, 1000-, 3000-, and 10,000-barrel capacity tanks are covered by MIL-T-10086.

c. All Tanks. Erection instructions described in this manual apply to both old and new tanks except the old 5000-barrel tank.

1-9. Tabulated Data

a. Identification. Each tank has a nameplate fixed to the clean out door. The nameplate lists the following information: tank capacity, manufacturer's number. specification number, procurement office number, SNL number. and SCC number. A warning plate at the same location states:

WARNING

If this tank has been used for petroleum products, it shall not be used for water storage.

b. Tabulated Data.

(1) *100-barrel (4200 gallon) capacity tank*

Inside diameter ..... 9 it 2, in
Sidewall height ..... & ft A in
Net weight ..... 3492 lbs

(2) *250-barrel (10,500 gallon) capacity tank.*

Inside diameter ..... 15 ft 4-5/8 In
Sidewall height ..... 8 ft J in
Net weight ..... 6492 lbs

(3) *500-barrel (21,000 Gallon) Capacity Tank.*

Inside diameter ..... 21 ft 6'2 in
Sidewall height ..... A ft i2 n.
Net weight ..... 10,311 lbs.

(4) 1000-Barrel (42,000 Gallon) Capacity Tank.
Inside diameter ..... 29 ft. 8-5/8 in.
Sidewall height..... 8 ft.
Net weight..... 17,824 lbs.

(5) 3000-Barrel (126,000 Gallon) Capacity Tank.
Inside diameter ..... 29 ft. 8-5/8 in.
Sidewall height..... 24 ft. 1-7/8 in.
Net weight..... 29,635 lbs.

(6) 10,000-Barrel (420,000 Gallon) Capacity Tank.
Inside diameter ..... 54 ft. 1134 in.
Sidewall height ..... 24 ft. 2'/2 in.
Net weight ..... 78,025 lbs.

CHAPTER 2

MAINTENANCE INSTRUCTIONS

Section I. TANK SITE AND SOIL TEST

2-1. Tank Site

a. The tank site should be placed in an area that is not congested with other facilities. Do not locate the tank in drainage areas above critical installations. Do not locate the tank (if used for fuel storage) in areas containing highly flammable materials.

b. The tank should be erected on soil with a uniform bearing strength of at least 1800 pounds per square foot to prevent the tank from sinking or displacing its foundation. The site should have adequate natural drainage. Preferably, the underground water table should be more than 6 feet below the surface. Avoid marshy areas, river banks subject to flooding, and other sites with poor or undependable drainage. Prior to site preparation, refer TM 5-302, TM 5-335, and TM 5-349.

2-2. Soil Test

A positive test is made to estimate bearing capacity of the soil. Refer to TM 5-330 for the load testing procedure.

Section II. TANK FOUNDATION

2-3. Foundation Requirements

Tank foundations must be stable, with load-bearing strength of at least 1800 pounds per square foot. Lay out and grade the foundation so that there is adequate drainage away from the tank. Uneven settlement of the filled thin-wall tanks and corrosion of tank bottom results in leakage. Special foundation treatment is often necessary.

2-4. Construction of Foundation

a. Preparation. Prior to starting foundation preparation, refer to TM 5-302, TM 5-335, and TM 5-349.

b. Layout. After selecting the tank site (para 2-1), stake out the tank foundation. Drive a stake in the center of the proposed tank site. With a tape or line and a sharp tool, scribe a circle approximately 10 feet greater in diameter than the tank.

c. Grading. Where the site is level and subsoil has adequate bearing strength, proceed as follows: (1) Remove the topsoil to a depth of about 6 inches and replace it with clean sand, gravel, crushed rock, or similar granular material, except cinders (a 1-inch top layer of sand is desirable). Compact the material in layers to a grade about 8 inches above the surrounding ground surface (fig. 2-1). Use a slope ration of about 1: 1 for the outer slopes.

CAUTION

Cinders must not be used for foundation material because of the corrosive action of cinders when water or dampness is present.

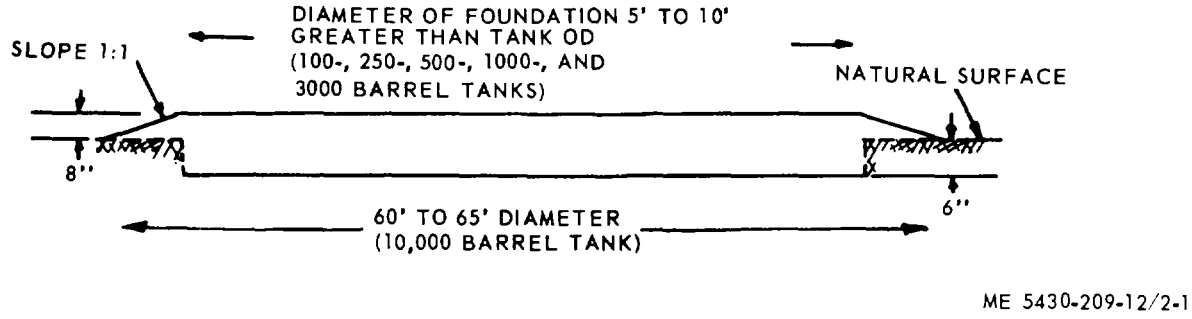
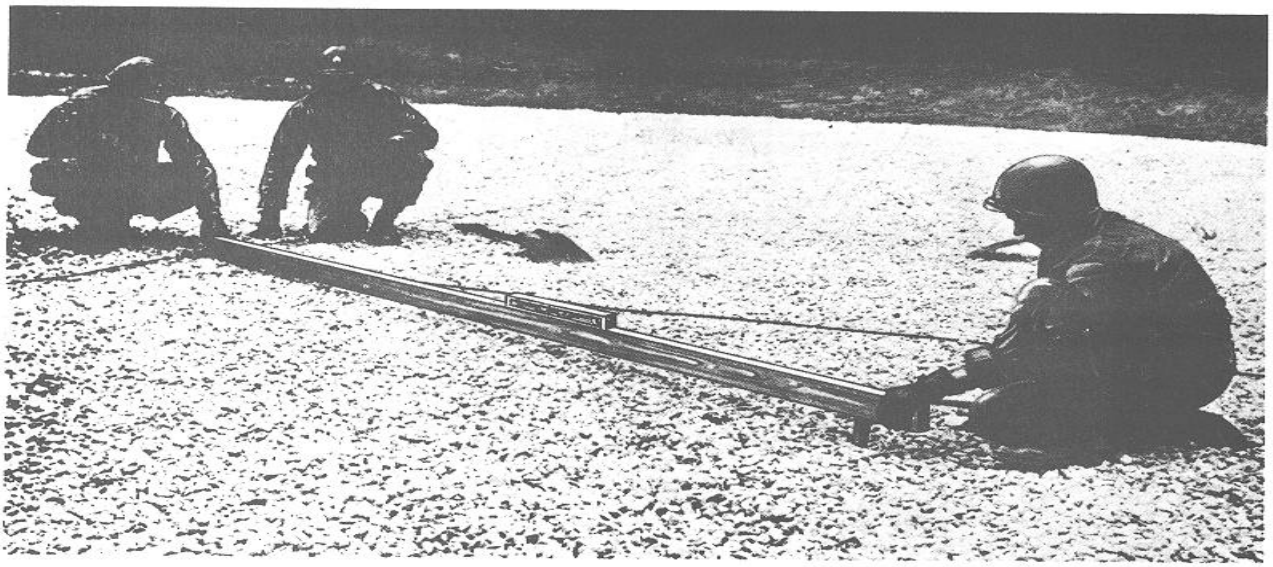


Figure 2-1. Sectional view of foundation.

(2) Carefully check the grade of the foundation with an engineer level as shown in figure 2-2. The tank foundation must be level to prevent binding of staves and deck plates as the tank is erected.



ME 5430-209-12/2-2

Figure 2-2. Checking grade of tank foundation.

(3) After the tank is erected, stabilize the outer slopes with an asphalt base material to prevent washout of the soil material.

NOTE

Purpose of the foundation is to provide drainage of water away from the tank so that moisture will not accumulate and corrode the tank bottom.

d. Surfacing. If the foundation materials or ground water contain alkali salts which will corrode the tank bottom, surfacing is required. Use a bituminous seal coat, or work bituminous material into the top layer of foundation material. Tarpaper or roofing felt may be used. It is a good practice to apply surfacing even when the foundation material is not corrosive in order to prevent seepage of water from the subsoil. Concrete slab foundations are desirable if time, labor, and material are available.

e. Special Foundations. Occasionally, tanks must be built on sites which would not be used under ideal conditions; therefore, special foundations are necessary.

(1) Concrete Foundation Ring. Where tanks must be sited on alluvial deposits, flood banks, or in low wet areas, build a concrete foundation ring (fig. 2-3) of the same diameter as the tank. Pour a continuous concrete ring 12 inches thick and 2 feet high with its base 18 inches below the ground surface. Provide drain pipes below the top of the ring but above ground level. Fill the ring with suitable foundation material. Compact the fill to provide stable support for the tank bottom. Surfacing will be required in wet areas, especially if the water is salty or brackish. The side staves of the tank bear on the concrete ring when tank is erected.

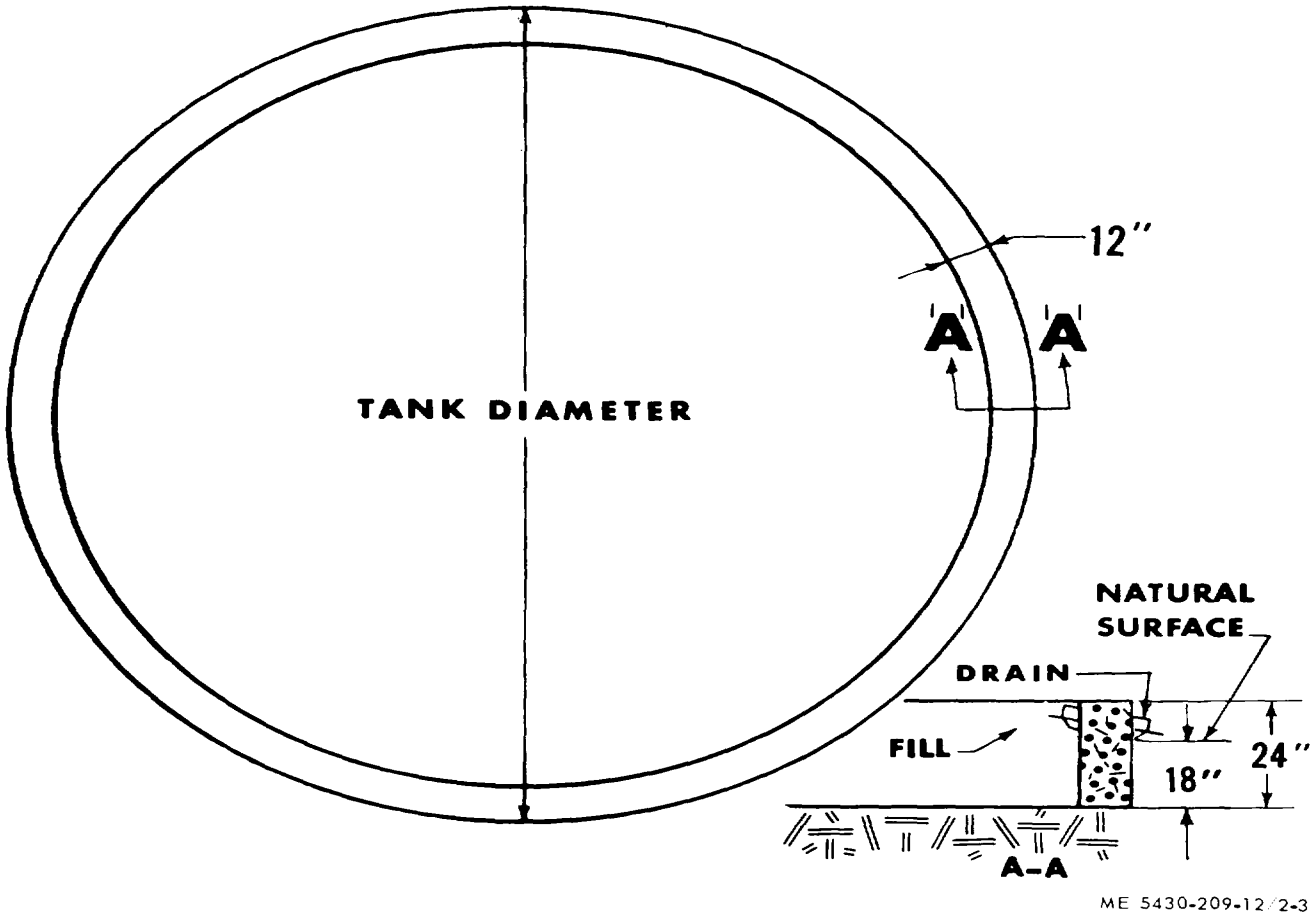
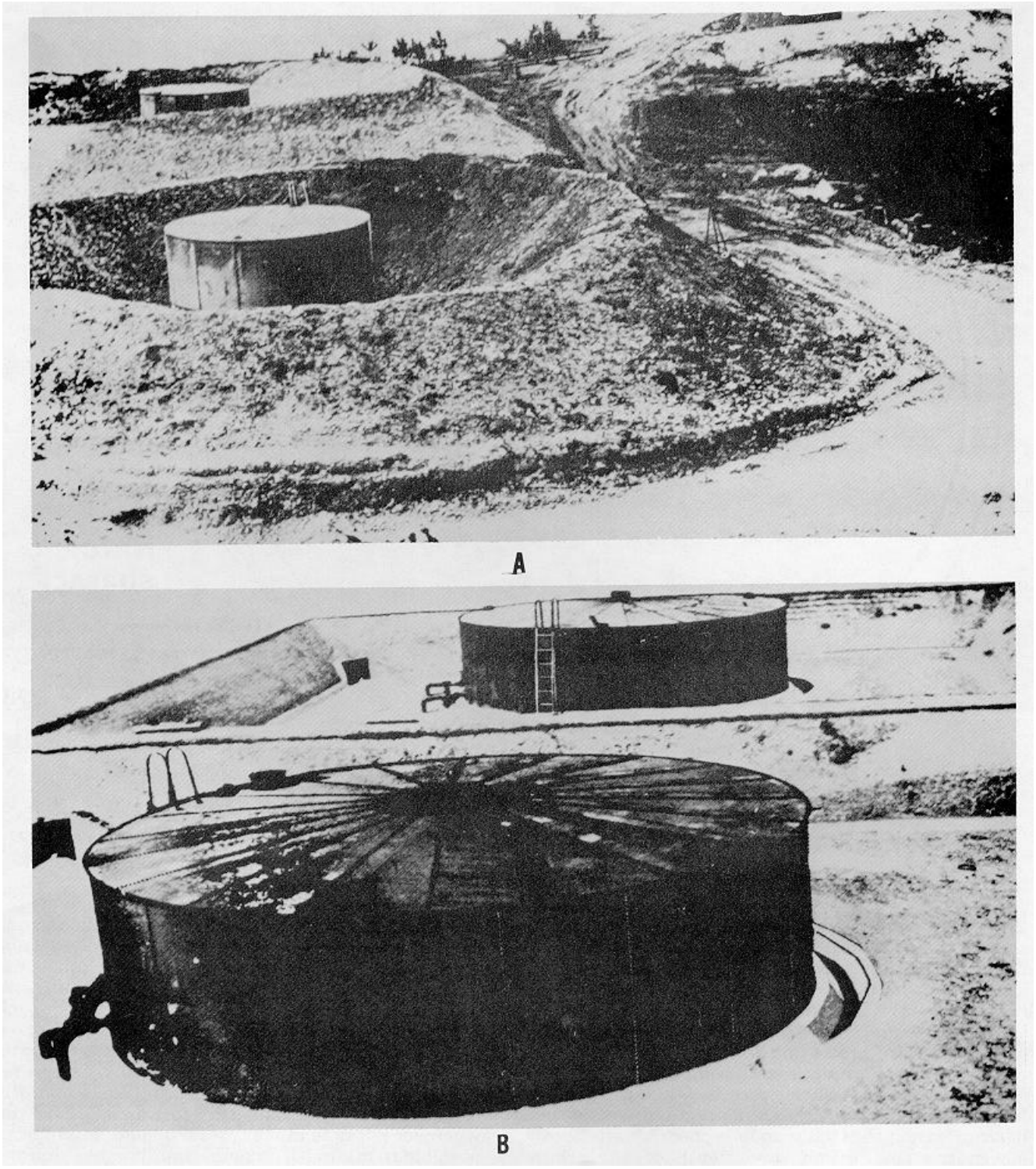


Figure 2-3. Concrete foundation ring.

(2) Tanks on Cuts and Fills. Ordinarily, tanks should not be built on mixed cut-and-fill foundations. The best practice is to erect the tank on an all-cut or an all-fill foundation compacted to a minimum of 1800 pounds per square foot.

(3) Foundation in Mixed Cut-and-Fill areas. If a mixed cut-and-fill area must be used, the tank site requires special grading and compaction, because the filled portion is likely to settle while the ground in place is not. When the fill section has proper bearing strength (1800 pounds per square foot), loosen the cut section to a depth of 24 inches. Compact it in layers of not over 9 inches to the same density as the fill at optimum soil-moisture content. When the fill section does not have proper bearing strength, put about 18 inches of backfill over the tank site, compacted in layers to the desired grade.

f. Firewalls. All fuel storage tanks must have dikes, constructed of impervious material, which serve as firewalls (fig. 2-4), with a reservoir capacity of at least 100 percent of the tank volume plus one (1) foot of freeboard. These walls are intended to contain fuel spilled from burst or leaking tanks, and to help prevent the spread of fire to nearby tanks and other installations. Firewalls in forward areas, and wherever possible in rear areas, should be as high as possible to minimize damage from bombs, shrapnel, and explosion shock. Refer to TM 5-302 and TM 5343 for detailed information on the construction of firewalls.



A. COMBAT AREA FIREWALL CONSTRUCTION
B.. REAR AREA FIREWALL CONSTRUCTION

ME 5430-209-12/2.4

Figure 2-4. Typical firewall construction for fuel storage tanks

g. Erosion Protection. After the tank is erected, place large cobbles, brick, soil cement, or pieces of broken cement on the outer slopes to prevent erosion.

CAUTION
Do not use sod or other flammable material.

Section III. INSPECTING AND SERVICING THE EQUIPMENT

2-5. Uncrating the Equipment

a. Follow instructions stenciled on the crate. Cut all straps securing the top, sides, and ends. Remove the top, sides, and ends in that order.

b. After opening the crate, remove only the necessary items for assembly of the tank bottom. Bolts, nuts, and washers are packaged separately within the crate; make sure they are not misplaced during uncrating.

c. After uncrating and assembling the bottom plates, remove the remaining tank component items from the crate. Check contents of crate with attached packing list.

2-6. Inspecting the Equipment

Inspect all items of the tank for damage due to shipping, unloading or uncrating. Inspect all plates, staves, and channels for poor alignment and damage. Examine all ladder components and manhole dome for breaks, bends, and cracks. On the 1000-, 3000-, and 10,000-barrel capacity tanks, make sure the center support base is not warped or broken. Make corrections as necessary before starting construction. Replace any items damaged beyond field repair.

Section IV. TANK ERECTION PRECAUTIONS

2-7. General

The precautions listed in this section apply to the erection of all tanks covered by this manual.

2-8. General Erection Precautions

a. Clean and dry all steel surfaces which contact gasket material.

b. Tighten all bolts uniformly and carefully; avoid crushing gaskets. A maximum of 40 to 50 foot-pounds of torque should be used. Do not force or strip bolts. Replace damaged bolts. Make sure all gaskets and bolting surfaces are smooth.

c. Always work from right to left (counterclockwise).

d. Place the round side of all nuts against steel.

e. Insert all bolts by hand. Tank component items should be aligned with a structural (spud) wrench or an aligning punch so that hammering is not necessary.

f. Splice all gaskets to cover two bolt holes.

2-9. Specific Erection Precautions

a. Foundation

(1) Try to avoid locations which are poorly drained or otherwise require special foundations.

(2) Level the foundation carefully in accordance with paragraph 2-4.

b. Bottom Section.

(1) Keep bottom plates or segments clean and dry.

(2) Loads that would cause distortion should not be placed on plates or segments.

(3) Insert bolts from underneath, and temporarily back them with boards during assembly.

(4) Do not tighten bolts until the entire bottom is laid and the first ring of staves is installed.

(5) Compress ill-fitting overlaps with a blunt chisel or peeing tool. when necessary.

NOTE
Apply sealing compound to the bottom of tanks which are to be used to store petroleum products only.

c. Staves.

(1) On all tanks except the 100-barrel tank, place the first stave sheet so that it straddles a radial seam of the tank bottom. On the 100-barrel tank, the bottom chime bolt hole in the vertical seam of the first stave installed is set over the end bolt in the bottom plate seam.

(2) On the 3000 and 10,000 barrel tanks, place the stave sheets of each higher ring so that they straddle the vertical seams of the next lower ring.

(3) Do not tighten vertical seam bolts until the last stave in the ring is in place.

d. Deck.

(1) Install first, the plate or section containing the pressure vacuum valve.

(2) Make sure that all plates straddle the vertical seams in single stave rings and in the top tank stave ring.

(3) Do not tighten bolts until the last plate is in place and all staves have been checked for tightness.

2-10. Static, Lightning, and Stray Current Precautions

a. Metallic tanks that are in contact with the ground are sufficiently grounded to provide for safe dissipation of lightning strokes.

b. Metallic tanks not resting directly on the ground but connected to grounded piping systems are usually sufficiently grounded to provide for safe dissipation of lightning strokes.

c. Metallic tanks that are insulated from the ground can be protected by adequate grounding.

CHAPTER 3

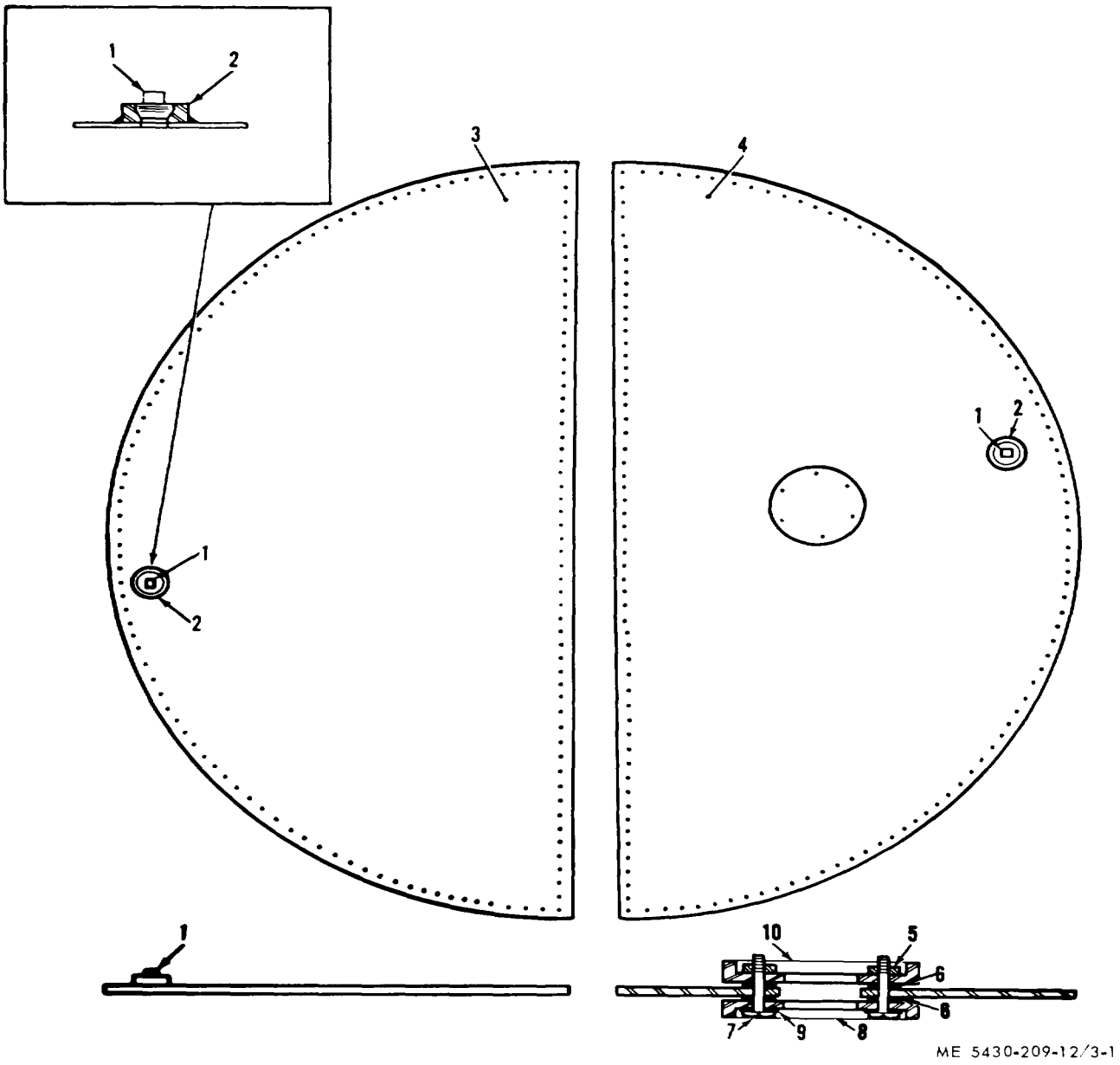
ERECTION INSTRUCTIONS FOR

THE 100-BARREL CAPACITY TANK

Section I. ASSEMBLY AND INSTALLATION OF TANK BOTTOM

3-1. General

The tank bottom consists of two semi-circular flat, steel plates (3 and 4, fig. 3-1). Both plates are fitted with a 2-inch pipe coupling. The two plates are bolted together at the lap seam.



1. TWO-INCH PIPE PLUG
2. HALF COUPLING
3. LEFT BOTTOM PLATE
4. RIGHT BOTTOM PLATE
5. NUT
6. GASKET
7. BOLT
8. INSIDE BLIND FLANGE HALF
9. ONE-HOLE GASKET
10. OUTSIDE BLIND FLANGE HALF

Figure 3-1. Bottom plates.

3-2. Assembly of Tank Bottom

a. The left bottom plate (3, fig. 3-1) is fitted with a 2-inch pipe plug (1) made up in the 2-inch pipe coupling (2). No additional assembly work is required.

b. The right bottom plate (4) is fitted with a 2 inch pipe plug (1) made up in the 2-inch pipe coupling (2). A 6-inch blind flange set is assembled on the plate to complete the assembly.

c. Block up plate (4) 6 inches off the ground. Cut six 1-hole gaskets (9) from gasket material. Force a gasket over and against the head of each bolt (7).

d. Insert bolts through bolt holes in flange half (10) from outside face of flange with heads of bolts fitting into the cutouts provided.

e. Place bolt-retaining boards on the ground. Position flange assembly with bolt head resting on boards. Slip gasket (6) over bolts and force it down against the inside face of flange (8) using a round, smooth-mouth tool.

f. Work from the ground face of right bottom plate (4) and push bolts (7) through bolt holes of flanged opening. Place blocking under bolt and flange assembly to hold it in position.

g. Slip gasket (6) over bolts (7) and force it down against the inside face of plate (4).

h. Slip outside flange half (10) over bolts (7) with machined face of flange facing the gasket.

i. Apply nuts (5) to bolts (7). Tighten the bolts. Remove plate from blocking and lay it on tank foundation.

j. Use short pieces of 2 by 4's as blocking, and raise the lap seam end of right bottom plate (4). This will simplify the work of attaching channel (2, fig. 3-2) to the right bottom plate (4, fig. 3-1). Set blocking in about 6 inches from edge of plate to clear the channel.

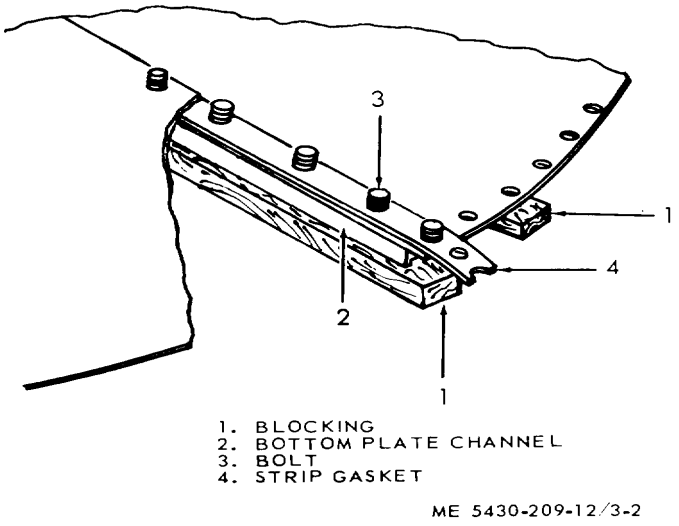


Figure 3-2. Channels, bolts, and gaskets installed on bottom plate.

k. As a ladder brace (para 3-12) is placed in the lap seam of the plates at center of tank bottom during final installation, 11 each 1/2-by 11/2-inch bolts are required in the lap seam to attach the ladder brace to the tank bottom.

NOTE

To Insure that the ladder brace bolts are properly installed mark center bolt hole in bottom plate and bottom plate channel

l. Insert a ' ,-by '2 -inch bolt through center bolt hole of bottom plate channel (2, fig. 3-2) and right bottom plate (4, fig 3-1). Apply a nut to the bolt and finger-tighten to hold channel in a temporary position while completing installation of the remaining bolts.

m. Count off 5-bolt holes on each side of the center bolt and install 10 each i/2 -by 1 "2 inch bolts. Insert by 1'4 inch bolts (3, fig. 3-2) in the remaining bolt holes. Apply a nut to each bolt and finger-tighten.

n. Remove blocking (1, fig. 3-2) placed under the plate and lay bolt backing boards under bolt heads as a blocking is removed.

o. With the plate resting on boards, remove nuts from all bolts. Apply gasket (4, fig. 3-2) to the bolts with smooth-mouth tool. Cut gasket the full length of the lap seam plus an overlap of l'2 -bolt holes at each end. As the gasket is applied, check to see that the bolt head sets square in the channel. Remove bolt backing boards

3-3. Installation of Tank Bottom

a. Place lap seam of bottom plate (1, fig. 3-3) over the bolts (2), in the lap seam of plate (3). Apply washer (4) to the bolts (2). Make sure that cup side of washers is facing down.

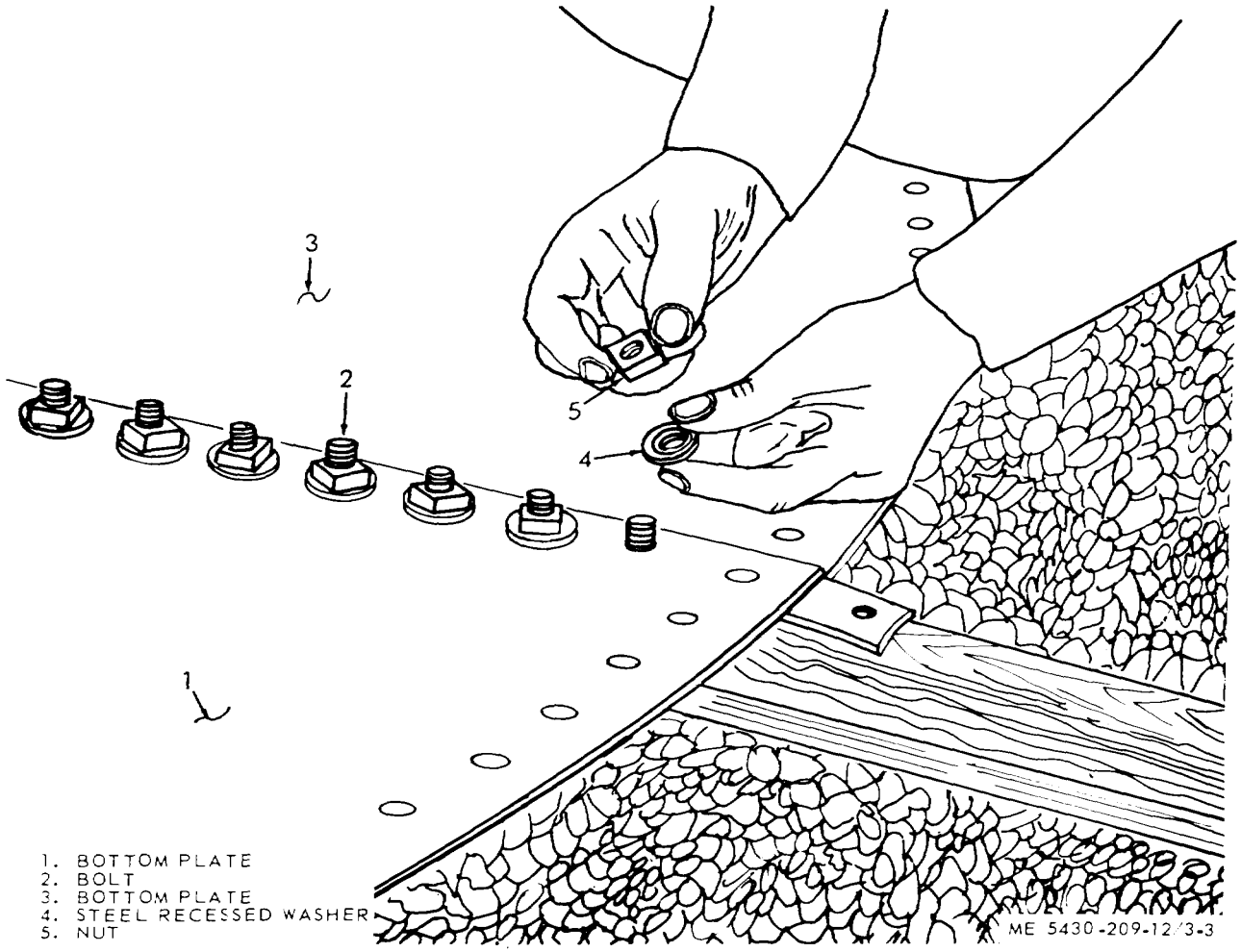


Figure 3-3. Bottom plates installed.

b. Install ladder brace (1. fig. 3-4) over the bolts at center of tank bottom. Apply nuts (5, fig. 3-3) to all bolts (2) in the lap seam of the plates. Make sure that rounded face of nut is bearing against washer; tighten all bolts.

CAUTION

Tighten bolts a maximum of 40 to 50 footpounds of torque. Over-tightening will damage the strip gasket.

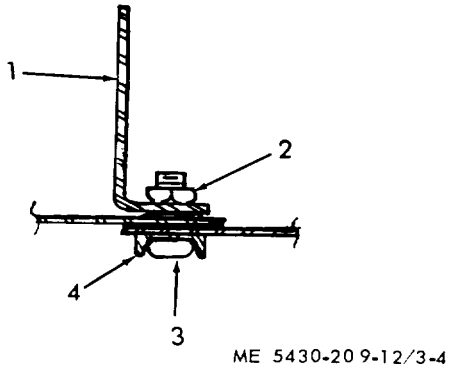


Figure 3-4. Ladder base installed.

c. Lift the assembled bottom plates and locate the center of the lap seam over the stake at center of tank foundation.

3-4. Bolt Replacement Plug

a. If the threads are stripped on one or more bolts in the tank bottom during tightening process, drive out the bolt and replace it with a replacement plug (fig. 3-5) as follows:

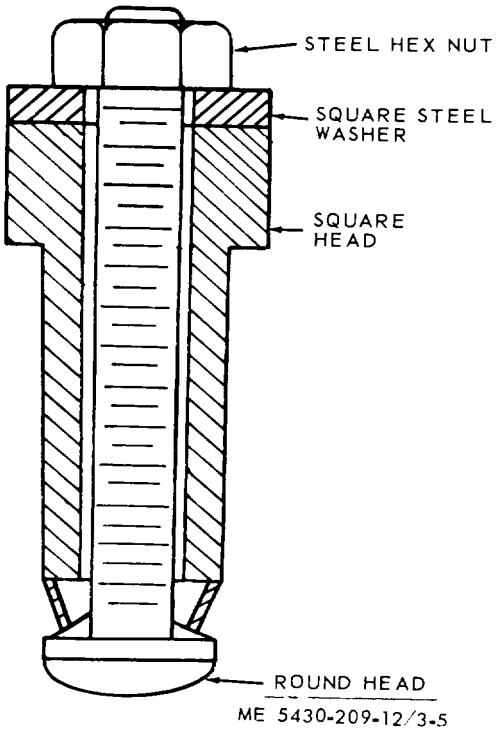


Figure 3-5. Bolt replacement plug.

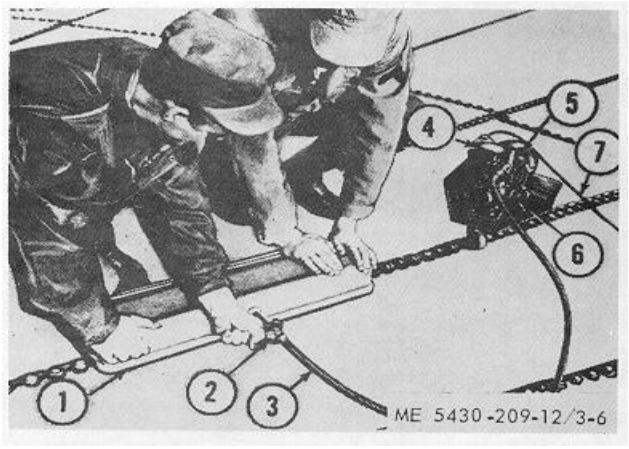
b. Push plug through bolt hole, round head down. When bottom face of square head bears against the section, plug is in expanding position.

c. Using two open-end wrenches, one to tighten hex nut to expand plug and the other to keep plug from turning, apply torque slowly to nut. At intervals. as nut is tightened, check plugs' resistance to turning. As resistance builds, increase turning force on the nut.

d. When plug no longer turns in bolt hole, apply full torque to nut until plug completely fills and seals the bolt hole through the full thickness of sections involved.

3-5. Testing Seam for Leakage

a. The tank bottom must be clean and dry during testing period. The seam and bolts are tested with a vacuum seam tester (fig. 3-6) which is incorporated in the storage tank erection outfit. Test the seam and bolts as follows:



1. VACUUM BOX
2. THREE-WAY CONTROL VALVE
3. HOSE
4. VACUUM PUMP
5. ELECTRIC MOTOR
6. DOLLY
7. EXTENSION CORD

Figure 3-6. Testing sears and bolts in tank bottom for leaks

b. Test seam and bolts in the tank working from the outer edge.

c. Mix soap solution used for testing in accordance with instructions issued with tester.

CAUTION

Motor starting switch must be in "OFF" position before connecting motor to an electric power source outside the tank.

d. Measure inside length of the box. Use blue or red engineering keel and lay out this dimension along the seam.

e. Position tester on tank bottom. Check starting switch for "OFF" position, and connect extension cord (7) to an electric power source outside the tank.

f. Use a sash brush and wipe a heavy coating of soap solution along edge of seam and bolt washers, between marks on the seam.

g. Set valve (2) to discharge air from box (1) and start motor-driven pump (4). Position box between marks on the seam coated with soap solution. A pressure gage is mounted inside the box. This gage will indicate atmospheric pressure when pump is started. When gage indicates an inside vacuum of 3 pounds per square inch, large soap bubbles will appear at all points of leakage. Make a mark with crayon on surface of the area being tested along outside edge of tester at each point of leakage. Tighten the bolts. Apply additional soap solution and follow the procedure above until leakage stops.

CAUTION

Over-tightening of bolts will result in damage to the strip gasket. Tighten bolts just enough to stop leakage.

CAUTION

Do not move off a tested area with leaks until all points of leakage have been stopped.

WARNING

If tank is to be used for water storage, do not apply sealing compound to tank bottom.

Section II. ASSEMBLY AND INSTALLATION OF SIDE STAVES

3-6. General

Instructions contained in this section, covering installation of tanks are keyed to the use of hook ladder and scaffolds issued with the storage tank erection outfit. Large boxes or fabricated saw-horses and ladders are suitable substitutes for hook ladders and scaffolds when erection outfit is not available.

NOTE

Stave assemblies for petroleum and water storage tanks are all the same except for special fittings

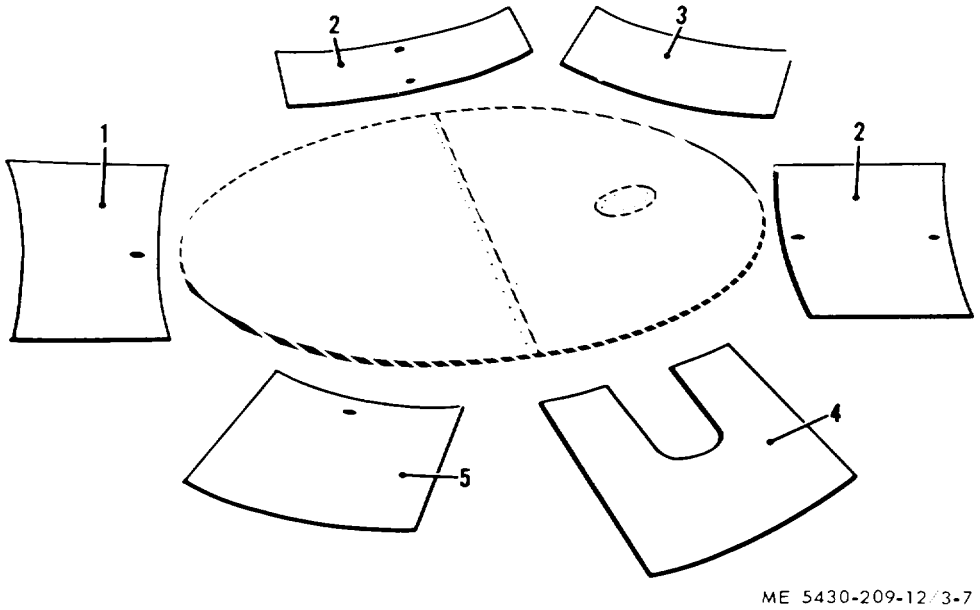
3-7. Side Staves

a. Description. This is a single ring tank with six staves in the ring. All staves have special sections for pipe connections and a clean out opening. Top and bottom flanged edges of staves are called chimes, and side edges are called vertical seams. The staves have a single row of bolt holes in each seam.

b. Assembling Side Staves. Place all center support ladder components and the manhole dome on bottom of tank prior to installation of last side

stave. This is to avoid having to lift them over the top of the staves after assembly is completed.

(1) Layout of staves. Place staves (1 through 5, fig. 3-7) with the chimed side down for convenience in preparing them for assembly. The staves are laid out so the first stave erected has vertical seam bolt holes on left edge lined up with the bottom lap seam bolts.



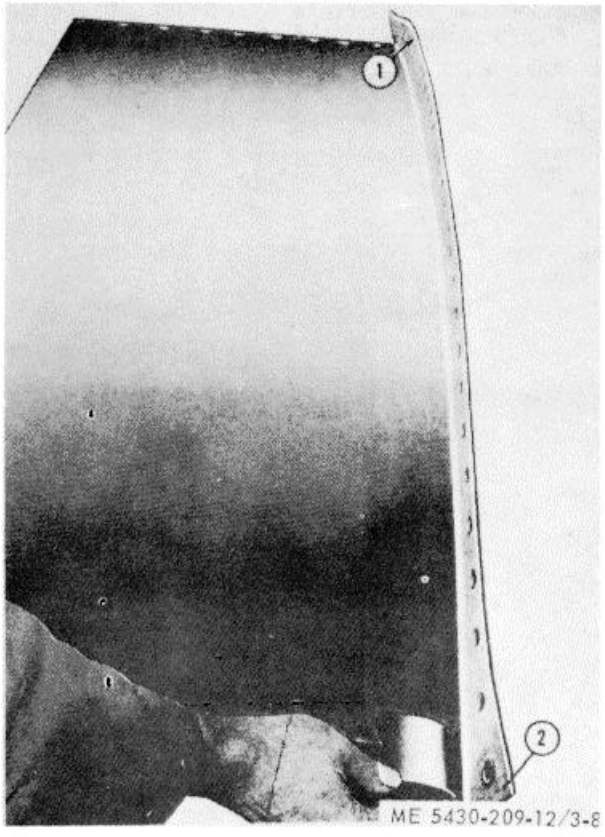
1. 6-INCH OUTLET STAVE
2. 3-INCH OUTLET STAVE
3. GLAND STAVE
4. CLEAN OUT STAVE
5. 4-INCH OUTLET STAVE

Figure 3-7. Layout of staves around tank bottom.

NOTE

Staves have an offset at top and bottom The top is determined by looking at the stave in a vertical position from the outside In proper position, offsets are at the lower left and upper left corners (2) Dressing staves.

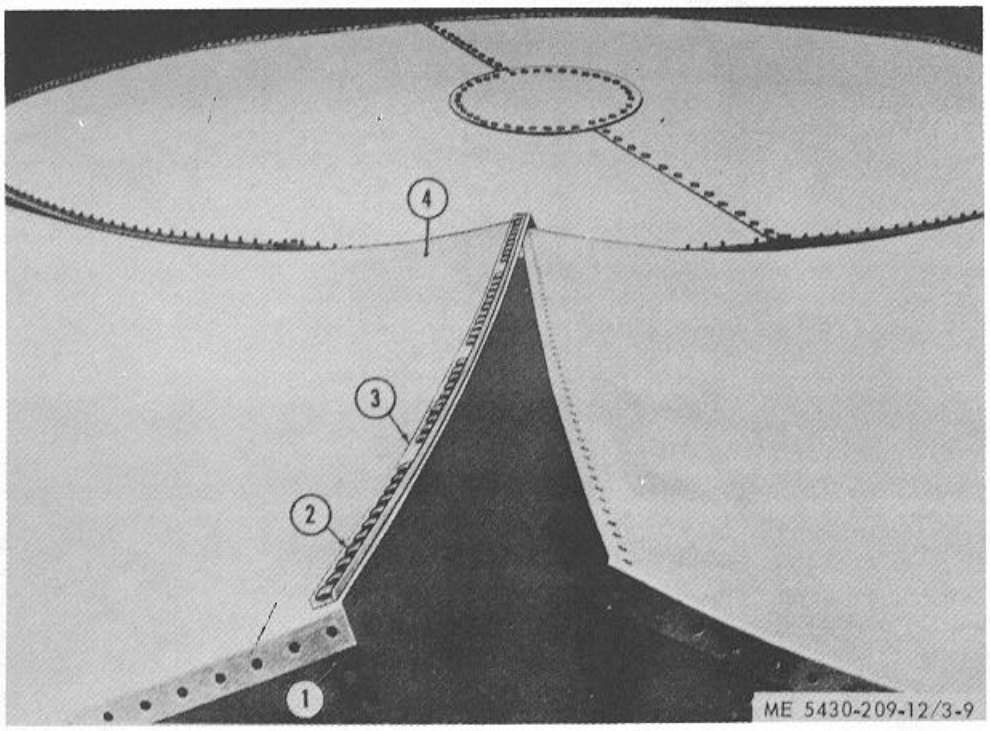
(a) The end of the chime at the offset and plain section, top and bottom, must be slightly bent for ease in installing. The ends of the chimes at the offsets must be bent inward (toward each other) (1, fig. 3-8). The ends of the plain chimes (2) are bent outward (away from each other). The bends are made with a few sharp blows from a hammer.



1. CHIMES BENT INWARD
2. CHIMES BENT OUTWARD

Figure 3-8. State chimes bent.

(b) Along the right seam of each stave, as it will be put in place with the chimes out, place strip gasket (1, fig. 3-9) on the outside at the row of bolt holes. The gasket material comes in rolls and is cut to proper length for each stave. Cut the gasket material so that it covers and projects one bolt hole past the top and bottom chimes.



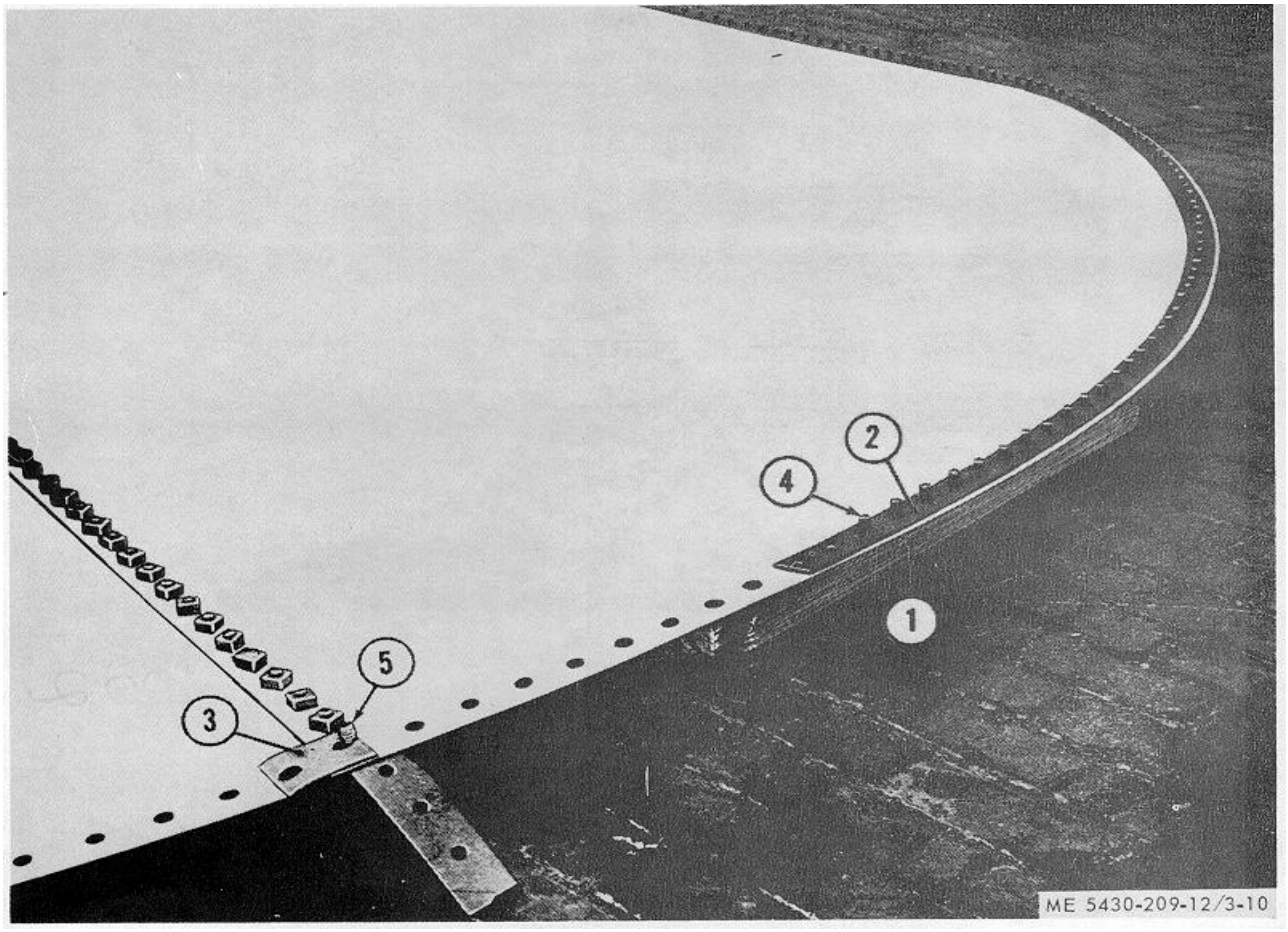
1. STRIP GASKET
2. BOLT
3. STAVE JOINT CHANNEL
4. STAVE

Figure 3-9. States with gasket, channel, and bolts assembled.

(c) Insert 1/2 -by 11/4 -inch bolts (2) through stave joint channel (3), stave (4), and gasket (1), in that order. Omit one bolt about 10 inches from the bottom and other bolts at about 2-foot intervals so that drift pins can be inserted to aline staves with one another before bolting them together.

(3) *Preparing outer edge of tank bottom*. Since channels are not used on the outer edge (chime) of tank bottom, the bottom must be raised to provide clearance for inserting and tightening bolts after installation of staves.

(a) Raise outer edge and block with short lengths of timbers (1, fig. 3-10) at equally spaced intervals around the perimeter of tank bottom. Set blocking about 6 inches from outer edge.



1. BLOCKING
2. STRIP GASKET
3. WEDGE GASKET
4. BOLT
5. BOLT

Figure 3-10. Raising and prearing outer edge of tank bottom

(b) Install strip gasket (2) to cover all bolt holes. When starting a new roll of gasket material after one roll has been used up, an overlap should be extended to cover two bolt holes. Apply sealing compound at each end of the overlap.

(c) Insert a wedge gasket (3) under the strip gasket (2) at laps formed by bottom halves (plates).

(d) Insert 1/2 by 11/2-inch bolts (5) in the lap seams and 1/2-by 1-inch bolts (4) through all remaining holes on outer edge of bottom plate.

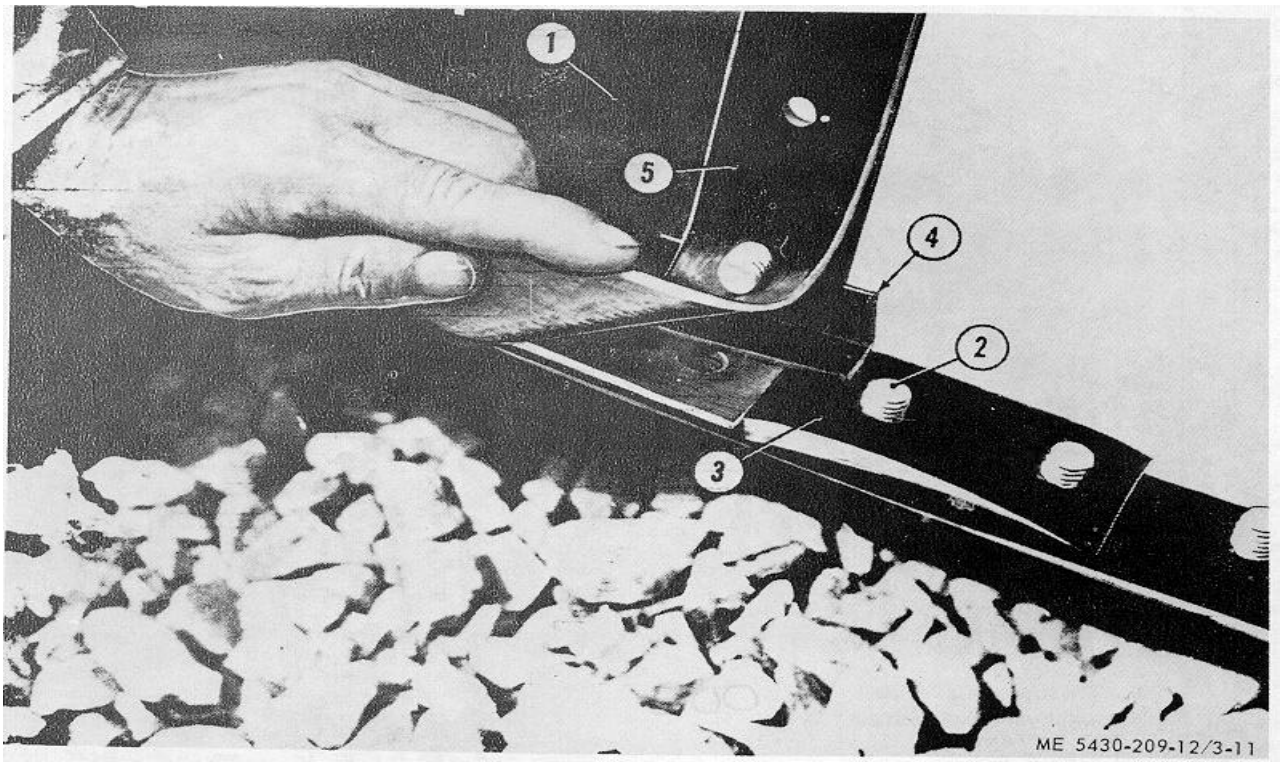
CAUTION

Omit steel recessed washers on all outer edge bolts.

c. Installing Side Statues. The first stave installed on the tank bottom must be one fitted with a pipe coupling of the same size as the tank supply pipe (1) First stave (a) Place stave (1. fig. 3-11) over proper bolt (2) so that the left vertical seam bolt holes line up with bottom lap seam. The right vertical seam of the third stave will then line up with the bottom lap seam on the opposite side of the tank.

(b) Install four equally spaced finger tightened(nuts to hold stave In position. Run nuts down by hand to fasten the stave loosely The nut are not tightened until last, stave in ring is in place

(c) Install a wedge gasket (3) in the space by the lap offset at the vertical seam, and a radii gasket (4) underneath gasket (5) of vertical seam at bottom and top chimes of stave.



1. FIRST STAVE
2. BOLT
3. WEDGE GASKET
4. RADII GASKET
5. STRIP GASKET

Figure 3-11. Installing first stave.

CAUTION

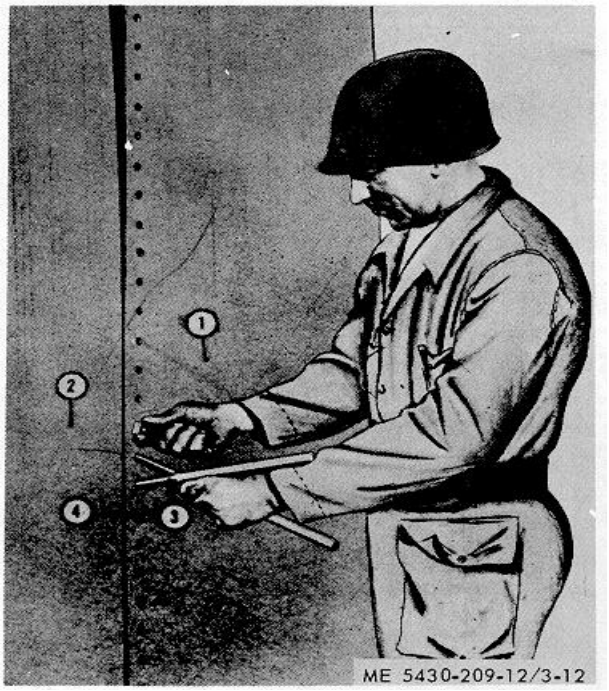
Radii gaskets must be placed between chimes, and rubber gasket material at the seams, top and bottom, of all side sheets to insure a leakproof connection.

(2) intermediate stave.

NOTE

Intermediate staves are installed in a counterclockwise direction around the bottom.

(a) Before positioning first intermediate stave (1. fig. 3-12), push two or three bolts flush with the chime gasket to the right of the first stave.



1. FIRST INTERMEDIATE STAVE
2. FIRST STAVE
3. DRIFT PIN
4. NUT

Figure 3-12. Aligning staves.

(b) Set stave (1) in position with its left seam outside the right seam of first stave (2). Use drift pins (3) in open bolt holes to aline stave. Install nuts (4) only at every sixth or tenth bolt in the row.

CAUTION

Install steel recessed washers on all vertical seam bolts.

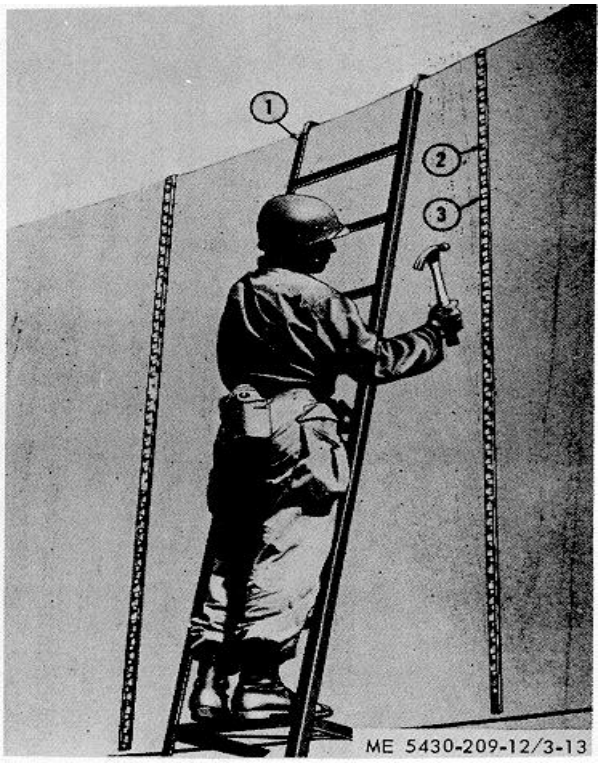
NOTE

As the remaining staves are installed, check carefully the position and tightness of all radii, wedge, and strip gaskets.

(3) *Remaining Intermediate Staves*.

(a) Face the outside of the first intermediate stave and install three staves to the right of the second stave or in a counterclockwise direction around the bottom.

(b) Assemble the hook ladder (1, fig. 3-13) and hook it over the inside of the staves.



1. HOOK LADDER
2. BOLT HEADS
3. STAVE JOINT CHANNEL

Figure 3-13. Driving bolt heads into channels.

(c) As staves are installed, stand on ladder (1) and fit all bolt heads squarely into the channels (3).

CAUTION

All bolt heads must be fitted squarely into stave joint channels to insure proper tightening of nuts.

(4) *Last stave.*

(a) To assist installation of this stave (1, fig. 3-14), push all bolts (2) flush with gasket (3) in chime at bottom to provide clearance for sliding in the last stave.

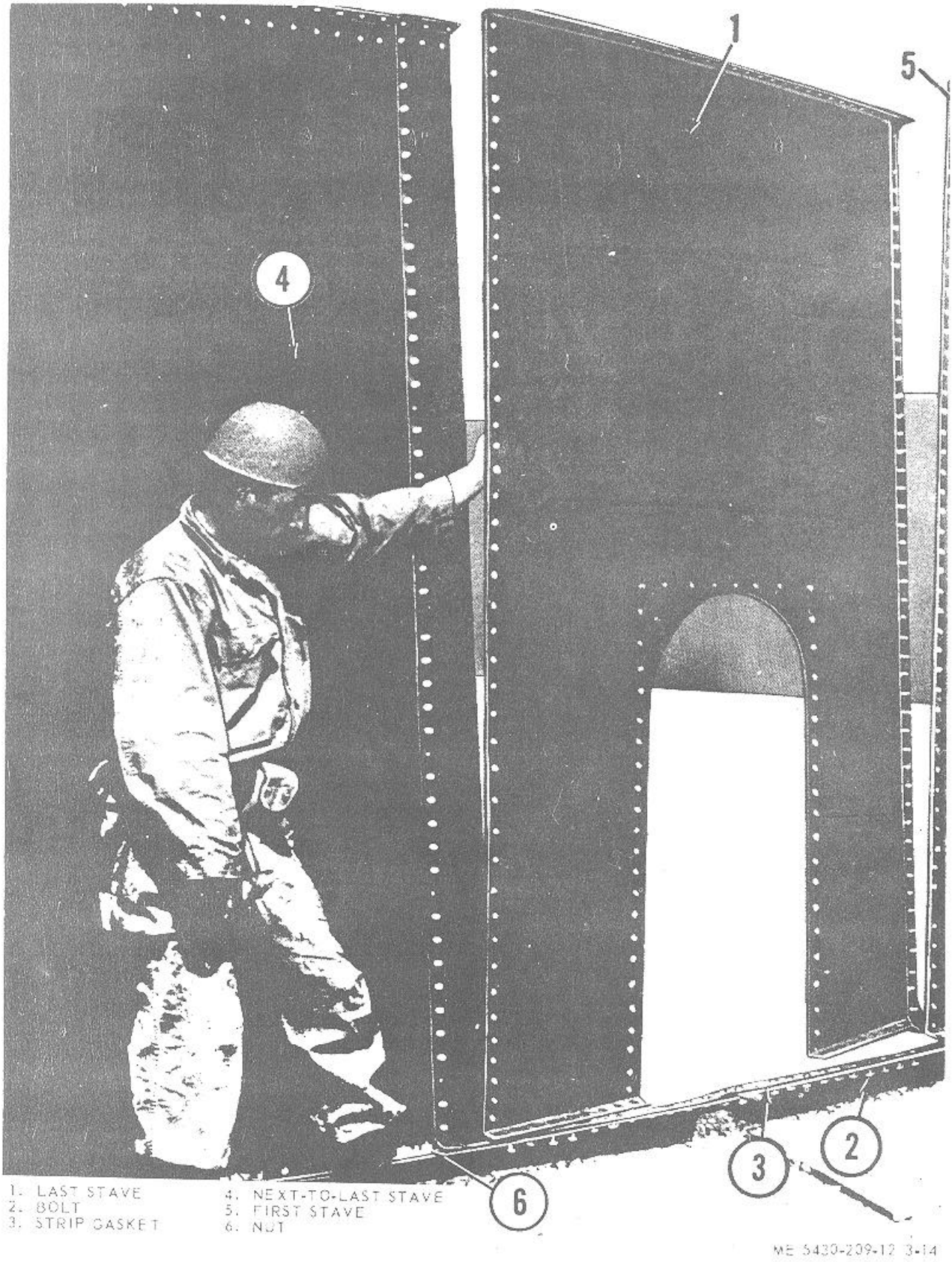


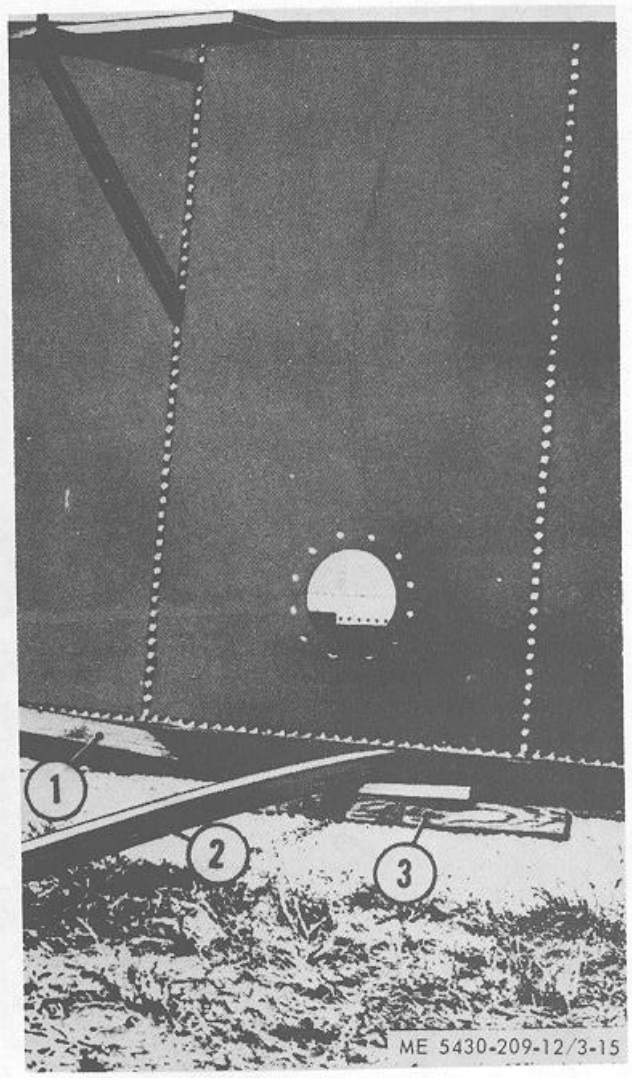
Figure 3-14. Installing last stave.

(b) Set stave (1) in position with its left seam outside the right seam of next-to-last stave (4) and its right seam inside the left seam of first stave (5). Loosen bottom chime nuts (6) of stave (5).

(c) Lift first stave (5) slightly so bottom chime of last stave (1) slips into place. Use drift pins (3, fig. 3-12) and aline bolts in staves (1, 4, and 5, fig. 3-14). Follow procedure in step (3) (c) above.

(d) Install nuts (6, fig. 3-14) on bolts (2) in bottom chime. Install 1/2-by 1 2 -inch scaffold mounting bolts in the third and twentieth bolt holes, counting down from top chime, in vertical seam of every stave. Install remaining bolts in all seams.
Install recessed washers (cup side down) and nuts (rounded face down) on all bolts. Do not tighten.

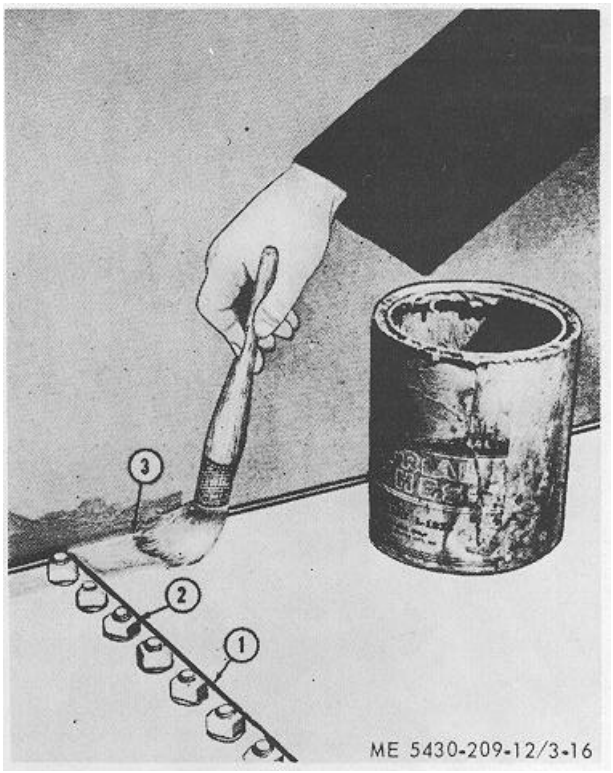
(e) Tighten all bottom chime bolts uniformly. Remove blocking (1, fig. 3-15) placed under bottom chime. Use a heavy long timber (2) as a lever and short timbers (3) as a fulcrum to lift the chime. Tighten all seam bolts; be careful not to crush the gaskets.



1. BLOCKING
2. HEAVY LONG TIMBER
3. SHORT TIMBER

Figure 3-15. Removing timber blocking

(f) Apply sealing compound (fig. 3-16) to the inside bottom chime of the staves.



1. JOINT SEAM
2. BOLT
3. BOTTOM CHIME OF STAVE

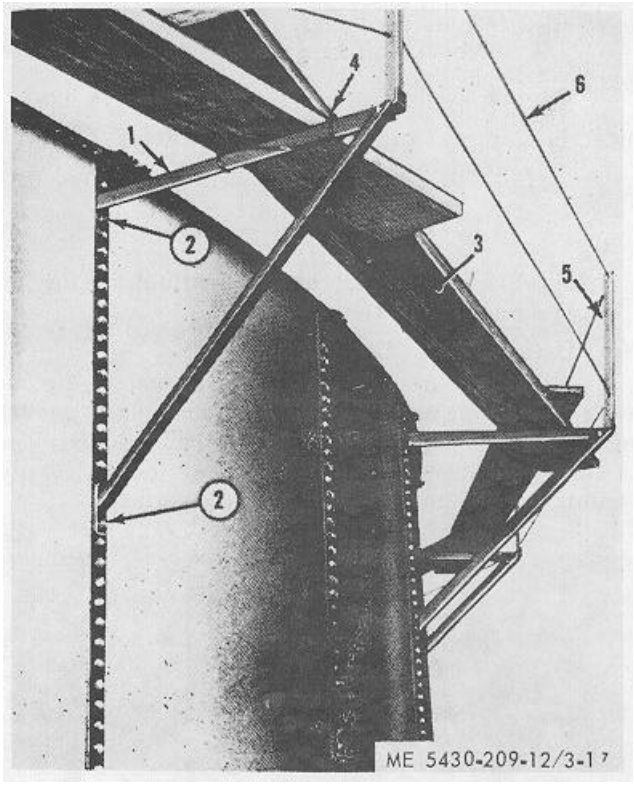
Figure 3-16. Applying sealing compound to bottom chimes of staves.

3-8. Scaffold

a. General. Prior to installation of tank deck it is necessary to install a portion of the scaffold components around the top chime of the staves. Scaffold components are provided in the storage tank erection outfit.

b. Installation.

(1) Install a scaffold bracket (1, fig. 3-17) on alternate stave lap seams, around top chime. on outside of tank.



1. SCAFFOLD BRACKET
2. BOLT
3. SCAFFOLD BOARD
4. LASHING WIRE
5. FOOTWALK POST
6. ROPE RAIL

Figure 3-17. Location of scaffold around top chime of staves

(a) Determine which bolts (2) will be used to secure the brackets. Remove nuts and washers from these bolts.

(b) Install brackets as shown in figure 3-17 and secure with nuts.

WARNING

Scaffold planks must be tested on the ground to be sure they are sound and free from defects. Before completion of tank, planks will be supporting personnel 9 feet in the air.

(2) Install 2-by 12-inch planks (3) on brackets (1). Planks must be sound and of sufficient length to overlap 2 feet at each end.

(3) Use No. 10 soft iron wire (4) or rope and lash plans (3) to brackets (1).

(4) Install a footwalk post (5) on each bracket. Post is clamped and pinned to bracket.

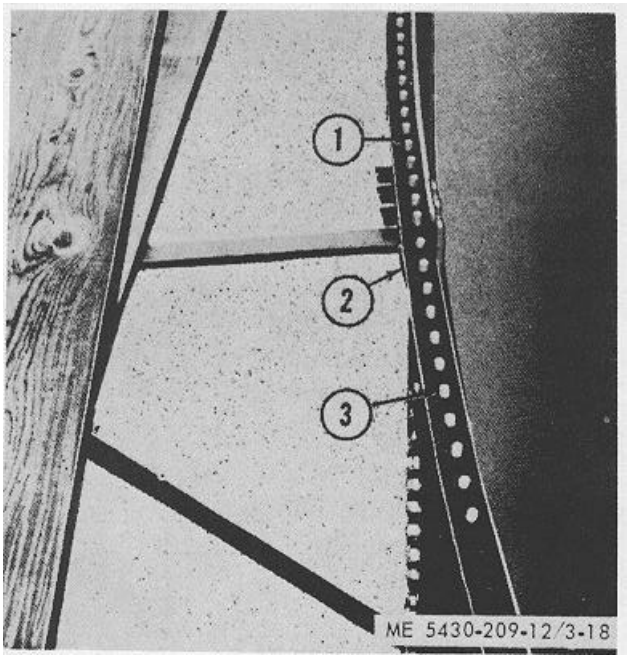
(5) Thread two 1/2 -inch manila rope rails (6) in posts.

WARNING

Install a guard rail on all scaffolding for personnel protection.

3-9. Dressing Top Chime

a. Use scaffold and install strip gasket (1, fig. 318) to cover all bolt holes. When one roll of gasket material is expended and a new roll started, the overlap should extend over two bolt holes. Apply sealing compound at each end of overlap.



1. STRIP GASKET
2. WEDGE GASKET
3. BOLT

Figure 3-18. Dressed top chime of staves.

b. Insert wedge gasket (2) underneath strip gasket (1) at each lap formed by adjoining staves.

c. Insert L/2-by 1-inch bolts (3) through chime and gasket, in that order. Gasket material will hold the bolts in place.

Section III. ASSEMBLY AND INSTALLATION OF CENTER SUPPORT LADDER

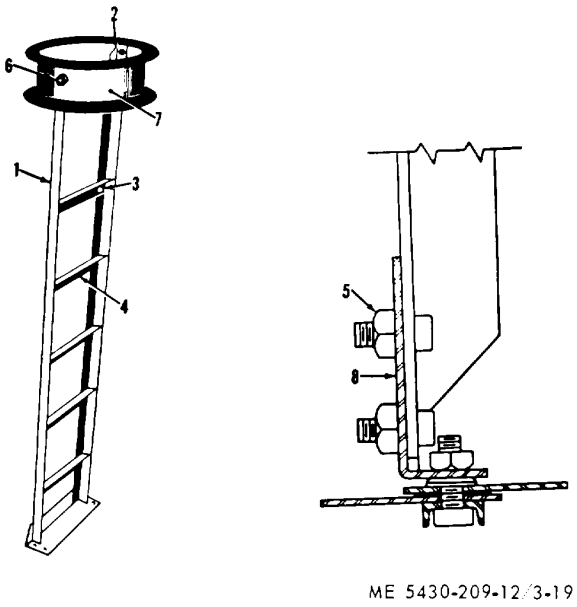
3-10. General

The ladder consists of a bolted, steel angle section. The top of the ladder is fitted with a manhole dome. Small ends of the deck plates are bolted to the bottom flange of the manhole cover.

3-11. Assembly of Ladder

a. Place left ladder support rail (1, fig. 3-19) and right ladder support rail (2), with similar bolting legs facing each other, on top of several pieces of blocking

long enough to support both rails and wide enough apart to insert ladder step (4).



1. LEFT LADDER SUPPORT RAIL
2. RIGHT LADDER SUPPORT RAIL
3. BOLT
4. LADDER STEP
5. NUT
6. BOLT
7. MANHOLE DOME
8. LADDER BRACE

Figure 3-19. Center support ladder assembled.

b. Determine which end of rails (1 and 2) will be the bottom. Install steps (4) from bottom toward top of the ladder.

c. Insert /2-by 1-inch bolts (3) through ends of step (4) and rails (1 and 2) in that order. Secure bolts with nuts (5). Tighten bolts after installing all steps.

d. Face the 28-bolthole flange of the manhole dome (7) and slide dome over top of rails. Use drift pin and aline the three boltholes at top of rails with similar holes in side of dome. Insert 1/2 -by 11/4 -inch bolts (6) through rails and dome in that order. Secure the bolts with washers and nuts; tighten the bolts.

e. Install a 30-bolthole gasket on the inside face of the bottom flange of dome. Insert ½/-by 11/4-inch bolts through flange and gasket. Gasket material will hold bolts in place.

3-12. Installation of Ladder

a. Raise ladder assembly (fig. 3-19) and set front legs of rails (1 and 2) against the inside face of the vertical leg of brace (8).

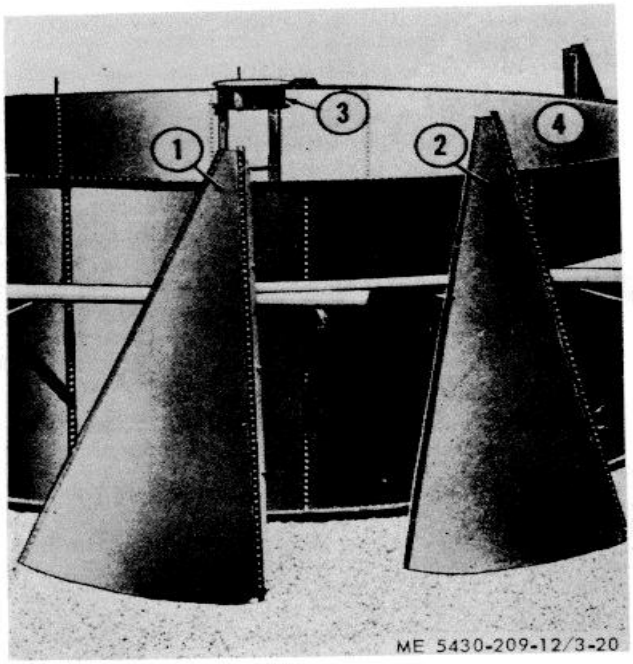
b. Insert bolts (3) through the rails and brace in that order.

c. Install nuts (5) on bolts (3). Tighten the bolts.

Section IV. ASSEMBLY AND INSTALLATION OF TANK DECK

3-13. General

The assembled deck consists of six, tapered, flat, steel plates (1, fig. 3-20). There are three special plates: one plate is fitted with a pressure vacuum valve, one is assembled with a blind flange, and the remaining plate is fitted with a liquid level indicator. All plates are interchangeable.



1. LEVEL INDICATOR DECK PLATE
2. PRESSURE VACUUM VALVE OPENING DECK PLATE
3. MANHOLE DOME
4. STAVES

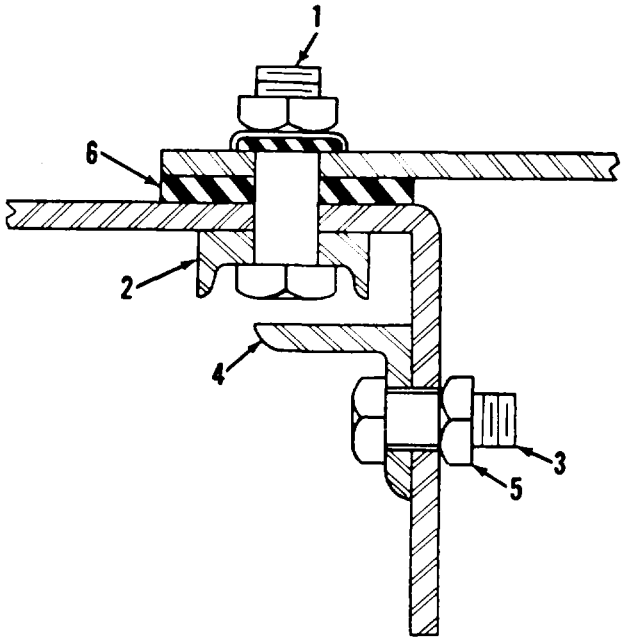
Figure 3-20. Deck plates ready for installation.

3-14. Layout and Assembly of Deck Plates

a. Lay out the plates (1, fig. 3-20) around the outer perimeter of tank foundation.

b. Place blocking on ground spaced to fit inside the confines of the plate. Lay the plate, flange up, on blocking.

C. Place a channel (2, fig. 3-21) on the right lap seam at the flange. Insert L2-by 114-inch bolts (1) through all except end boltholes of plate and channel. Make sure bolt heads set square in channel.



1. BOLT
2. DECK PLATE CHANNEL
3. BOLT
4. RAFTER BOLT RETAINER ANGLE
5. NUT
6. STRIP GASKET
7.

Figure 3-21. Deck plate components

d. Place an angle (4) against the inside of the flange. Insert four equally spaced "2 -by 1-inch bolts (3) through the angle and flange. Install nuts (5) on bolts (3). Tighten bolts.

e. Turn plate over with flange down. Install gasket (6) along the full length of right lap seam. Allow a 2bolthole overlap at each end.

3-15. Assembly of Special Plates

WARNING

If tank is to be used for water storage, omit the pressure vacuum valve. Install blind hatch flange set in place of pressure vacuum valve.

a. Pressure Vacuum Valve.

(1) Install a pressure vacuum valve (5, fig. 3-23) through two-bolthole channels. Work through the 8inch hole and insert bolts through the plate. Place blocking under bolt heads to hold them in place while installing gasket.

(2) Install a 16-hole gasket over the bolts.

(3) valve over bolts.

(4) Apply nuts to bolts and tighten.

(5) Remove blocking used in step (1) above.

b. Blind Hatch Flange Set. Install blind hatch flange set on the water inlet opening deck plate. Use the same bolts. channels, and gasket as in steps a (1) and (2) above. Follow above procedures.

c. Level Indicator. The level indicator deck plate (1, fig. 3-20) is installed, with level indicator fittings as received.

3-16. Installing Deck Plates

a. Layout of Assembled Plates. As plates are assembled, raise them up and stand them against the scaffold (fig. 3-20); move in a counterclockwise direction. Place each plate so that it straddles a vertical seam of the side staves in its approximate installation position.

b. Adjustment of Center Support Ladder.

(1) Check and adjust ladder (fig. 3-19) to the correct height before installing deck plates. Distance from top of the tank bottom to outer face of top flange of the dome (7) is 9 feet, 1/8 inch. Raise or lower ladder as required.

(2) Place a jack under one of the ladder steps (4). Adjust ladder so that in its final position, one set of holes in the bottom of rails (1 and 2) lines up with holes in brace (8). Lock the jack.

(3) Insert bolts (3) through the rails (1 and 2) and brace (8). Apply nuts (5) to bolts (3); tighten the bolts.

(4) Unlock and remove jack.

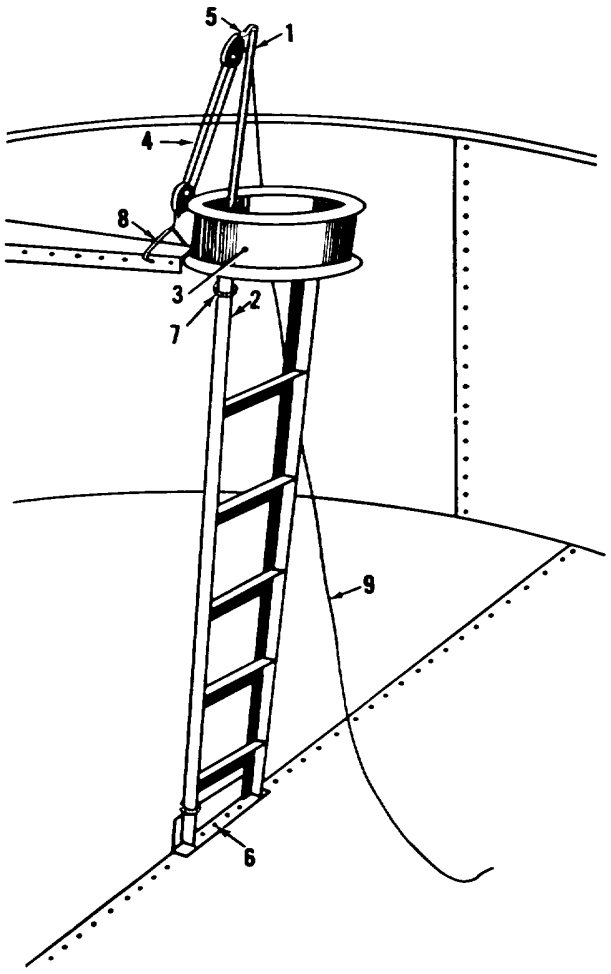
NOTE

When all deck plates have been installed on tank check height to outer face of top flange of manhole dome above the top of the tank bottom. If it is not the required height. adjust ladder until It Is the correct height. Insert bolts (3. fig. 3-19) in alined bolt holes and tighten nuts (5).

c. Gin Pole. To install deck plates (fig. 3-20), remove and assemble gin pole components, less the foot spike, that are provided in the storage tank erection outfits.

(1) Raise the pole (1, fig. 3-22) alongside one of the ladder rails (2). As the top of the pole (1) passes through the dome (3), attach block and tackle (4) to head block eye (5).

(2) Drop open bottom of gin pole (1) over a bolt (6). With the pole standing as near vertical as possible, apply lashing (7) to pole and rail. Locate lashing near the bottom and top of rail.



1. GIN POLE
2. LADDER RAIL
3. MANHOLE DOME
4. BLOCK AND TACKLE
5. HEAD BLOCK EYE
6. LAP SEAM BOLT
7. LASHING
8. ROPE DECK HOOK
9. HAUL LINE

Figure 3-22. Gin pole installed

d. Installing First Deck Plate. The first plate installed is the plate with the pressure vacuum valve (2. fig. 3-20).

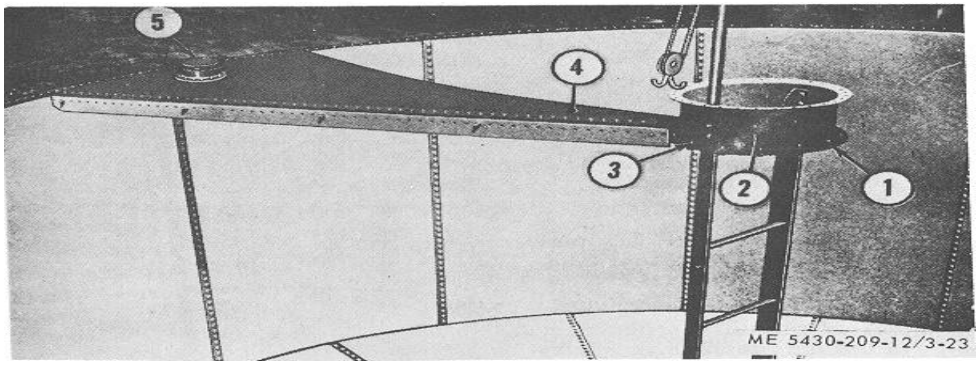
(1) Attach two rope deck hooks (8. fig. 3-22) to small end of plate (4, fig. 3-23) while it stands against the scaffold.

(2) Guide large end of plate and pull plate in place by means of haul line (9, fig. 3-22).

(3) Lower large end of plate over proper bolts in top chime of the staves so it will straddle a vertical seam.

(4) Small end of plate will drop over the proper bolts (3, fig. 3-23). Release hooks.

(5) Apply four equally spaced finger-tightened nuts to the bolts through large end of plate. One nut will be sufficient to hold the small end in place. Do not tighten bolts.



1. GASKET
2. MANHOLE DOME
3. BOLT
4. FIRST DECK PLATE
5. PRESSURE VACUUM VALVE

Figure 3-23. First deck plate installed

e. Installing Second Deck Plate.

(1) Install gasket over bolts at left lap seam of plate (4, fig. 3-23).

(2) Face small end of the plate. Install this plate and all remaining plates to left of first plate, or in a counterclockwise direction around the tank.

(3) Raise the second plate and install it in accordance with procedures outlined in d above. Place right lap seam over bolts in left lap seam of first plate (4). and large end over proper bolts in top chime of staves.

(4) Install small end of plate following procedures outlined in d above.

(5) Install nuts (5, fig. 3-21) on six equally spaced bolts in lap seam of plates. Install nuts on all bolts in the chime. Finger tighten all nuts.

NOTE

Since the deck will have to be adjusted as plates are Installed, do not tighten any bolts until deck is completely Installed Raise or lower center support ladder as required to fit plates in place

f. Installing Intermediate Deck Plates. There are three intermediate plates. The special plates remaining are installed to suit field conditions. Raise and install these plates following procedures outlined in (t and e above.

g. Installing Last Deck Plate.

(1) Raise last deck plate before next-to-last plate is installed.

(2) Raise right lap seam of first plate.

(3) Left lap seam of last plate slips under right lap seam of first plate. Right lap seam of last plate is placed over bolts in left lap seam of next-to-last plate installed.

(4) Make necessary adjustments in the deck if the last plate fails to fit properly.

(5) Remove nuts temporarily installed on all bolts in plate lap seams. Install a steel washer (4, fig.

3-3), and nuts (5) on all bolts except on bolts in top chime of staves. Install any missing nuts on chime bolts. Make sure rounded head of nut is against the plate and/or washer. Tighten the bolts.

(6) Remove the scaffold. Install washers and nuts on all bolts in vertical seams. Return brackets and posts to the tank tool erection set. Remove gin pole (1. fig. 3-22) after all deck plates are installed.

h. Installing Manhole Cover.

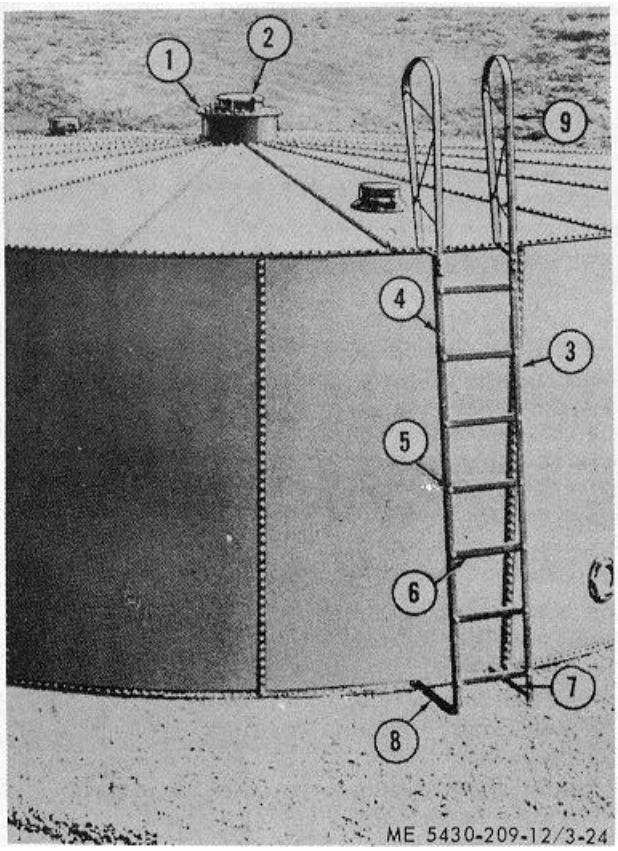
NOTE

If tank is used for water storage, omit emergency vent valve (2, fig 3-24) Install manhole cover (1) after installing manhole air intake.

(1) Install a 28-bolthole gasket on top of flange of dome (2, fig. 3-23).

(2) Insert bolts through flange and gasket, in that order. Gasket will hold the bolts down.

(3) Install manhole cover (1., fig. 3-24) over the bolts. Install washer and nut on all bolts. Install washer and nut as described in paragraph f (5) above. Tighten the bolts.



1. MANHOLE COVER
2. EMERGENCY VENT
3. ACCESS LADDER RAIL
4. ACCESS LADDER RAIL
5. BOLT
6. LADDER STEP
7. LADDER BRACE
8. LADDER BRACE
9. HAND RAIL

Figure 3-24. Access ladder installed.

Section V. ASSEMBLY AND INSTALLATION OF TANK ACCESSORIES

3-17. Emergency Vent

a. General. The emergency vent consists of a one piece, flanged, round, cast steel body fitted with lugs for a hinged vent. The vent is a one-piece, round, cast steel body fitted with a lifting handle and hinge lugs. The vent comes attached to the flanged body hinges and seals the deck opening.

b. Installation.

(1) Place manhole cover gasket over boltholes at opening in cover (1, fig. 3-24). Insert 1/2-by 11/2-inch bolts through 2-bolt-hole channels. Work through the 8-inch hole, and insert bolts through cover and gasket.

(2) Install vent (2) over the bolts.

(3) Install nuts on bolts and tighten.

3-18. Manhole Air Intake

a. General. The manhole air intake consists of a one-piece, round flanged, sheet steel dust restrictor; a one-piece, round, fabricated, steel bar inside screen ring; and a copper insect screen.

b. Installation.

(1) Wrap insect screen around inside screen ring. Join screen ends with copper wire.

(2) Install an outside screen ring at top and bottom of insect screen to hold it in place. Make sure screen is not knocked out of position. Tighten the bolts.

(3) Install screen ring on top flange of dome (2, fig. 3-23).

(4) Insert flange bolts through cover (1, fig. 324), dust restrictor, pipe sleeve spacers, and top flange of dome, in that order. Install nuts on bolts and tighten.

3-19. Access Ladder

a. General. The access ladder consists of one, bolted, steel angle section. The top of the ladder is attached to the deck by two hand rails. Two braces support the ladder at the bottom chime of a stave.

b. Assembly.

(1) Place access ladder rails (3 and 4, fig. 3-24), with similar bolting legs facing each other, on top of several pieces of blocking. The blocking should be long enough to support both rails. Rails should be spaced wide enough apart to install ladder step (6).

(2) Select the bottom of the ladder. Seven steps make up the assembled section. Insert bolts (5) through ends of step (6) and access ladder rails (3 and 4) in that order. Install a nut on each bolt, and tighten after all nuts are installed.

(3) Install braces (7 and 8) at bottom of access ladder rails.

(4) The leg with three boltholes near each end of the braces is attached at the outside face of the vertical legs of the sections.

(5) Insert a bolt through the end bolthole in rails (3 and 4) and braces (7 and 8), in that order. Install nuts on bolts and finger tighten bolts.

(6) Install hand rails (9) at top of access ladder rails (3 and 4). Insert bolts through ladder rail horizontal legs and rails, in that order. Install nuts on bolts and tighten bolts.

c. Installation

NOTE

Use a temporary ladder when Installing the access ladder

(1) Place assembled ladder where it is convenient to the pressure vacuum valve at outer perimeter of deck.

(2) Lift ladder and set end bolt holes of braces (7, and 8, fig. 3-24) over bolts in bottom chime of the staves. Mark the bolts.

(3) From top of the temporary ladder, mark bolts in outer perimeter of deck covered by the hand rail (91. Remove the access ladder. Remove nuts from the bolts.

(4) Set access ladder back over the bolts. Install nuts on bolts and tighten the bolts.

(5) Tighten bolts attaching braces to bottom of ladder.

(6) Remove and disassemble the temporary ladder.

3-20. Gland Stave Plugs

a. general. The gland stave is fitted with three gland openings. When the tank is used for gasoline storage the openings are plugged. For oil storage a steam coil is installed inside the tank, the glands being used for the coil.

b Installation.

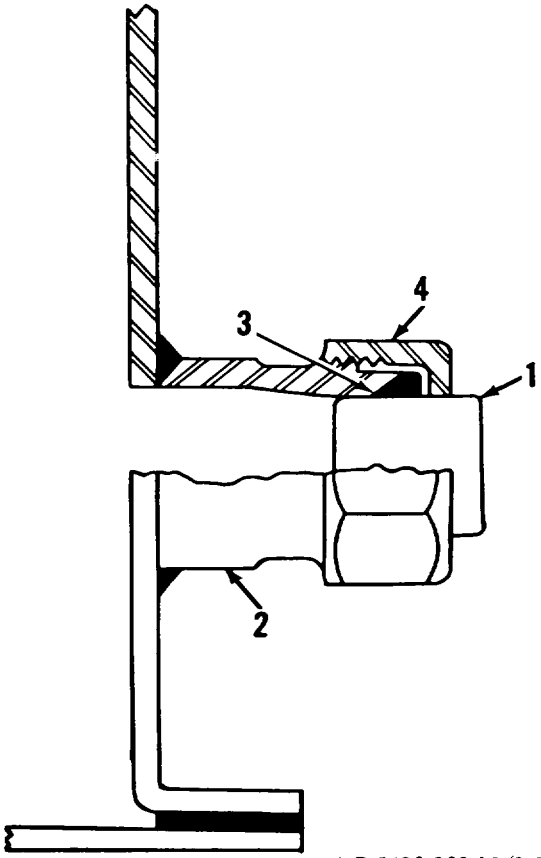
NOTE

"Work inside the tank

(1) Install solid plug (1, fig. 3-25), small end first, inside the coupling (2), Use a hammer and drift pin to drive it tight.

(2) Install retainer cup (3) over plug (1); tapered face of packing should ' ear against tapered seat in coupling (21.

(3) Install gland nut (4) over plug (1). Take up the nut carefully and tight on the coupling (2).



1. PLAIN SOLID PLUG
2. SLEEVE-TYPE COUPLING
3. RETAINER CUP
4. GLAND NUT

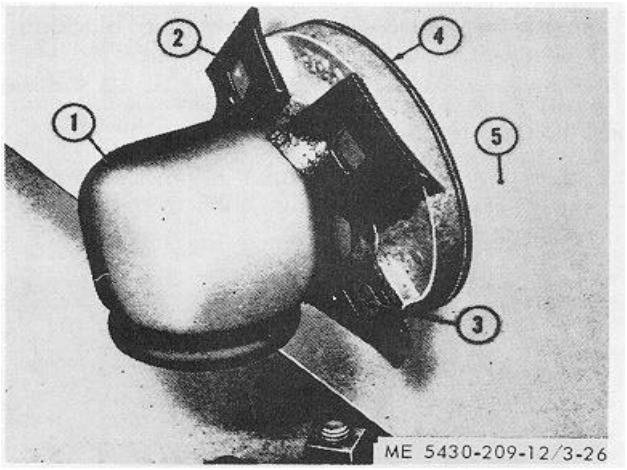
Figure 3-25. Plug installed

3-21. Water Drawoff Valve

a General. The valve assembly consists of a '2inch bronze valve made up in a steel flange and a gasket installed outside the tank. A one-piece flange elbow with gasket is installed inside the tank. The valve and elbow are bolted together through the side of the tank.

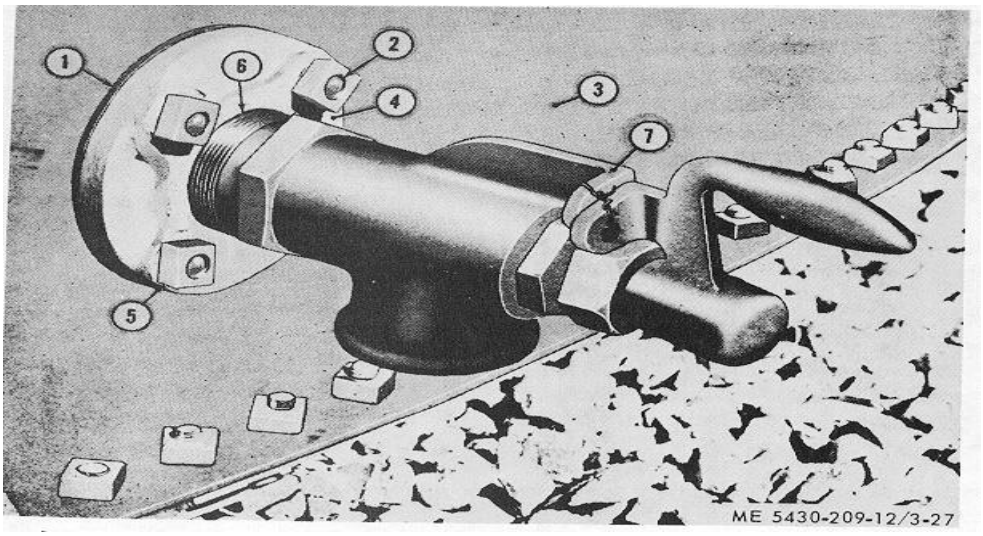
b Installation.

(1) Flanged elbow. The elbow (1, fig. 3-26) is installed inside the tank on the stave (5).



1. FLANGED ELBOW
2. ONE-HOLE GASKFT
3. BOLT
4. GASKET
5. STAVE

Figure 3-26. One-piece flanged elbow Installed on Inside of tank.



1. GASKET
2. BOLT
3. STAVE
4. OUTSIDE FLANGE
5. NUT
6. BUSHING
7. TWO-INCH WATER DRAWOFF VALVE

Figure 3-27. Water drawoff valve installed on outside of tank

(2) Drawoff valve.

(a) Hold elbow (1, fig. 3-26) in position inside the tank. Install gasket (1, fig. 3-27) over bolts (2) outside the tank on stave (3).

(b) Install outside flange (4) over bolts (2). Install nuts on bolts, and tighten.

(c) Connect bushing (6) to flange (4). Connect valve (7) to bushing (61 Tighten threads so that valve outlet faces the ground.

(3) Outlet at top of stave.

(a) Close the 3-inch outlet near top of stave with blind flange set and gaskets. Installation is

(a) Cut four 1-inch gaskets (2). Force gaskets over bolts (3).

(b) Install bolts through flange of elbow (1). Place blocking under heads of bolts. Install gasket (4) over the bolts.

(c) Turn elbow inlet toward tank bottom. Insert bolts (3) through stave (5). Install nuts (5, fig. 3-27) temporarily on two bolts (2) while assembling valve (7). Remove nuts before installing valve.

accomplished in the same manner as installation of the flanged elbow illustrated in figure 3-26.

(b) Cut four 1-hole gaskets (2, fig. 3-26).

Force gaskets over bolts (3).

(c) From outside face of flange, insert bolts through bolt holes inside the flange half with heads of bolts fitting into cutouts provided.

(d) Place gasket (4) over bolts and insert bolts through stave from inside the tank.

(e) Hold flange in place and install gasket (1, fig. 3-27) over bolts on outside of tank.

(f) Install outside blind flange half over bolts.

Install nuts on bolts, and tighten bolts.

3-22. Tank Outlet (4and 6-inch)

a. General. The outlet consists of a steel pipe fabricated elbow installed inside the tank. An adapter is installed outside the tank.

b. Installation.

(1) Elbow.

(a) Install elbow (2, fig. 3-28), made up with inside flange (3), inside the tank on the stave (1).

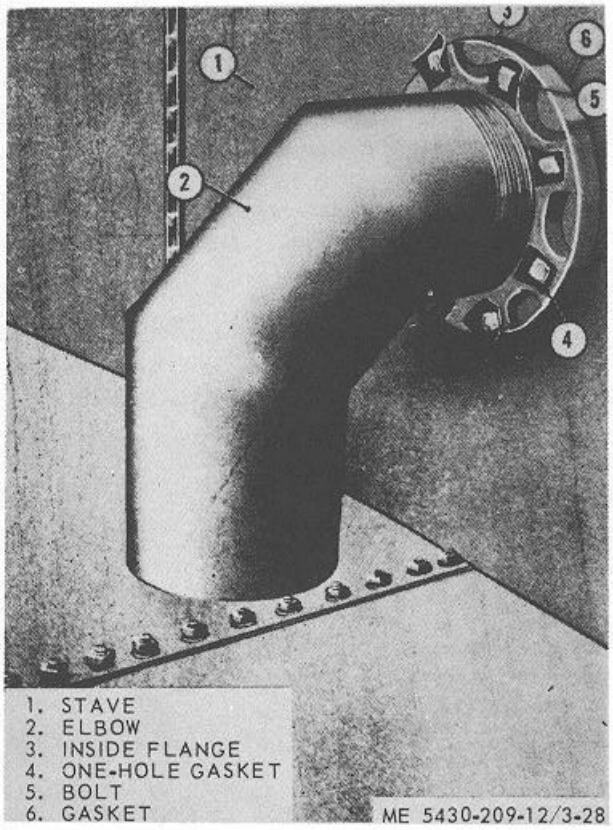


Figure 3-28. Four-inch elbow installed

(b) Cut one-hole gaskets (4) and force gaskets over bolts (5).

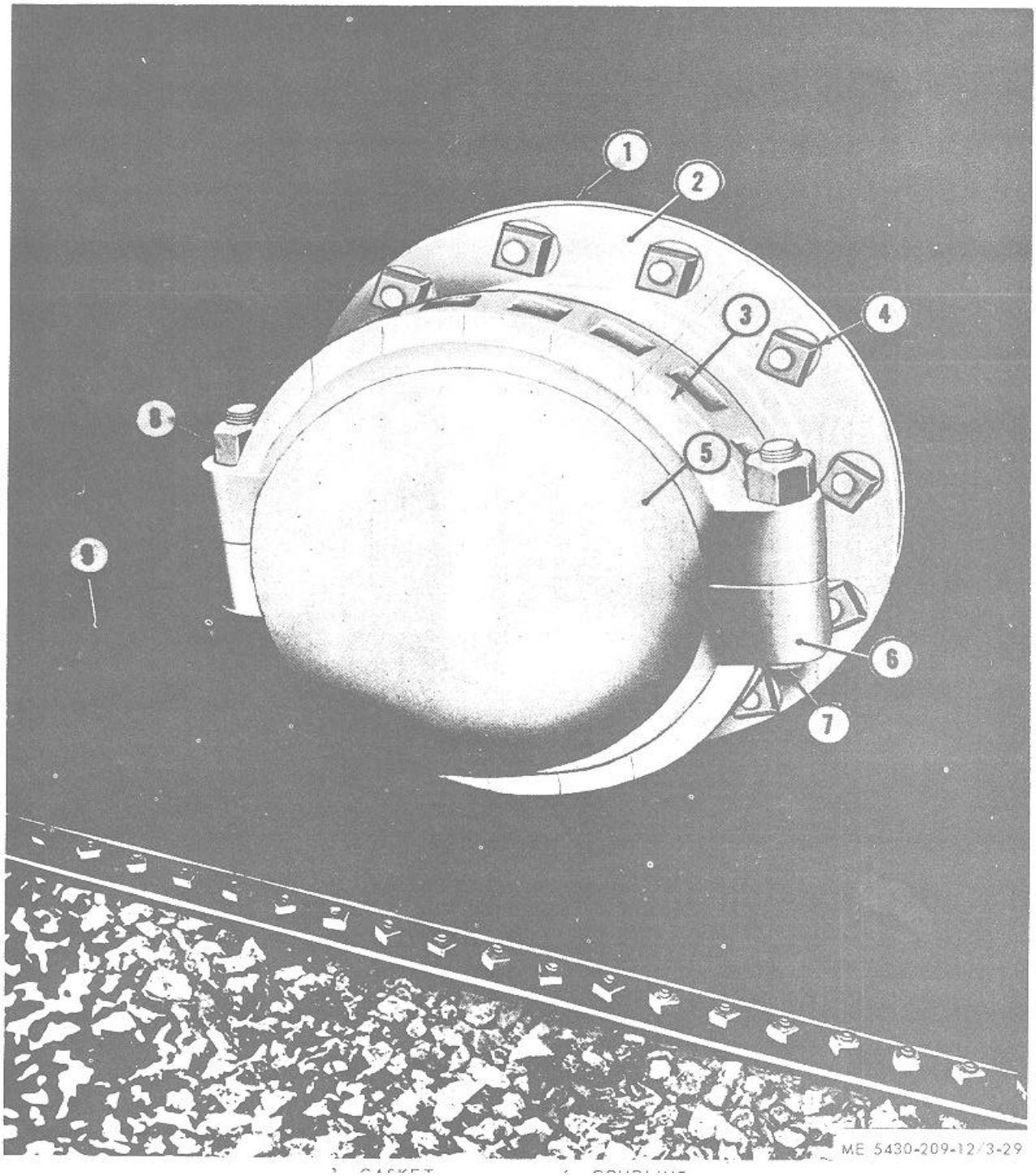
(c) Insert bolts through flange. Place blocking under heads of bolts, install a gasket (6) over the bolts.

(d) Face inlet of elbow toward tank bottom.

Insert bolts through stave from inside the tank.

(2) Adapter.

(a) Hold elbow (2, fig. 3-28) in position inside the tank. Install gasket (1, fig. 3-29) over bolts (5, fig. 3-28) outside the tank.



1. GASKET
2. OUTSIDE FLANGE
3. ADAPTER
4. NUT
5. CAP
6. COUPLING
7. BOLT
8. NUT
9. SIDE STAVE

Figure 3-29. Four-inch cap installed.

(b) Install adapter (3, fig. 3-29), made up with outside flange (2), over bolts. Install nuts (4) on bolts and tighten the bolts.

(c) Install cap (5), over outlet end of adapter. Connect coupling (6) to cap. Insert bolts (7) through bottom and top halves of coupling (6) in that order. Install nuts (8) on bolts and tighten the bolts.

(d) If a water seal is required because of bottom leakage, omit elbow (2, fig. 3-28).

Section VI. TANK TESTING AND FINAL ASSEMBLY

3-23. General

The inside of the tank must be cleaned and inspected, and tank must be tested for leakage prior to installation of cleanout cover. After installation of cover, tank site must be cleaned.

3-24. Tank Cleaning and Inspection

a. *Tank Bottom.*

(1) Sweep bottom of the tank and remove all debris and foreign matter.

(2) Check bottom seam for breaks or misses in the sealing compound. Apply compound to bare spots.

(3) Check for loose or damaged bolts. Tighten loose bolts and replace damaged bolts.

b. *Staves.*

(1) Inspect staves from inside the tank for missing bolts. Make sure all boltheads are seated in the bolt channels.

(2) Inspect staves from outside the tank for missing nuts from the lap seam. Tighten all loose nuts.

(3) Replace damaged bolts or nuts**.**

c. *Deck.*

(1) Inspect deck plates to see that all seam and chime nuts are in place and tight.

(2) Tighten all loose nuts. Replace damaged bolts and nuts.

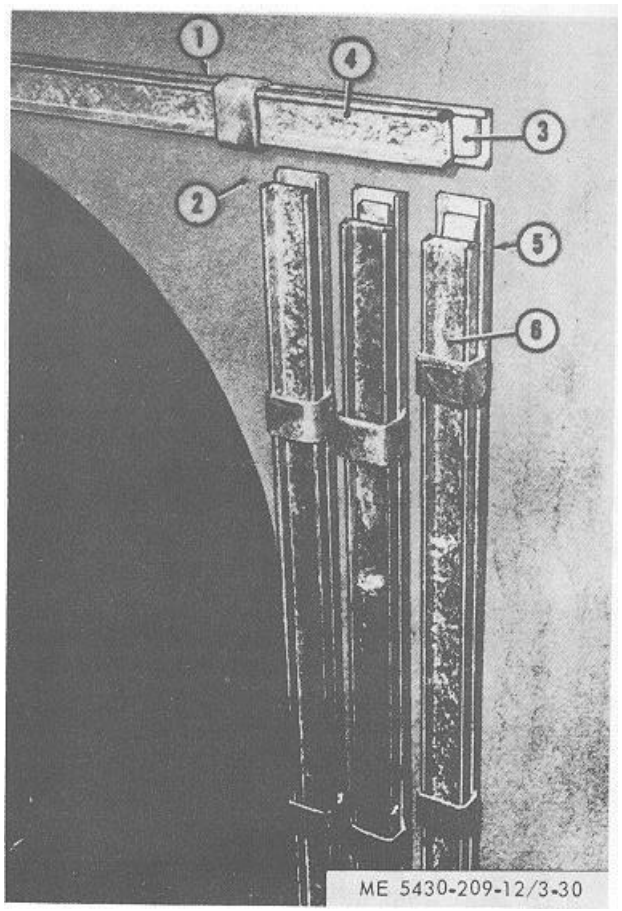
3-25. Cleanout Cover Bolt Channels and Gaskets

a. General. Special bolt channels with bolt retainers are installed on the inside top and sides of the cleanout opening.

b. *Installation.*

(1) *Top Channel.*

(a) Place a bolt channel (1, fig. 3-30) above the cleanout opening inside the staves (2). Insert %/2 by 1 1/4-inch bolts (3) through all bolt holes. Be sure bolt heads are square in the channel.

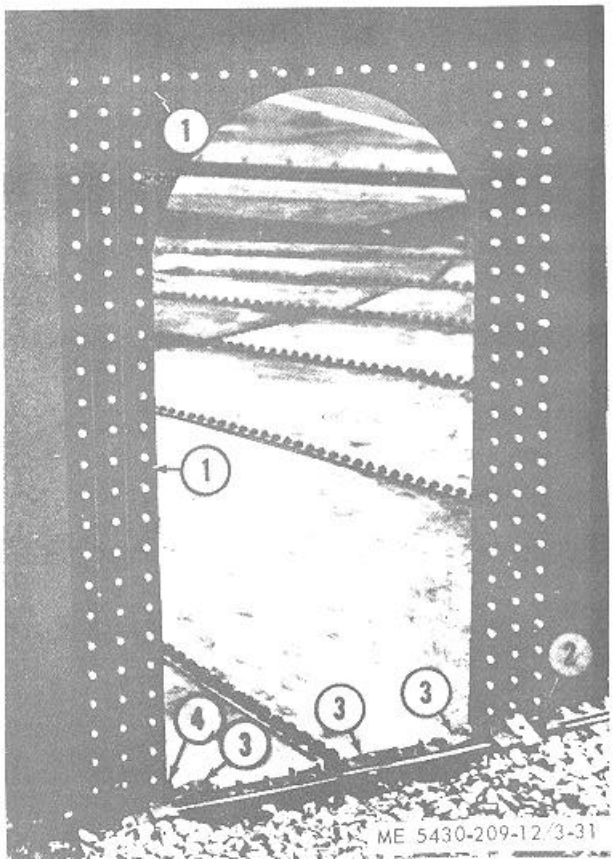


1. BOLT CHANNEL
2. STAVE
3. BOLT
4. RETAINING CHANNEL
5. BOLT CHANNEL
6. RETAINING CHANNEL

Figure 3-30.Bolt. channels for cleanout cover installed (10,000-barrel capacity tank).

(b) Insert retaining channel (4) through clips on the bolt channel (1).

(c) Install a strip gasket (1, fig. 3-31) along full length of top seam outside the stave. Allow a 1bolthole overlap at each end.



1. STRIP GASKET
2. RADII GASKET
3. WEDGE GASKET
4. RADII GASKET

Figure 3-31. Gaskets at cleanout opening installed (10.000 barrel capacity tank).

(2) *Side channels*.

NOTE

The 100-, 250-, and 500-barrel tanks contain one vertical row of channels (5 and 6, fig. 3-30) and boltholes (fig. 3-31) on each side seam, the 1000and 3000-barrel tanks contain two vertical rows of channels and boltholes on each side seam, and the 10,000-barrel tank contains three vertical rows of channels and boltholes on each side seam.

(a) Place bolt channel (5, fig. 3-30) inside the tank on each row of boltholes. Insert bolts (3) through all boltholes.

(b) Insert retaining channel (6) through clips on bolt channel (5) to retain the bolts.

(c) Install strip gasket (1, fig. 3-31) along the full length of each row of bolts. Pass gaskets under top seam gasket.

(d) Apply sealing compound at overlap of top and vertical seam gaskets.

(e) Install radii gaskets (2 and 4) under vertical seam gaskets at bottom chime of stave.

(f) Install wedge gaskets (3) at each side of opening at offset formed by the chime with the bottom sections.

(g) Recheck wedge gasket at lap formed by the adjoining bottom sections at center of cleanout opening.

3-26. Water Test

a. *Tank Bottom*. There are two methods of testing the bottom for leakage. Both methods require use of a temporary partial cover on the cleanout opening.

(1) Fabricate a temporary partial cover (fig. 332) for the cleanout opening. Cover must form a liquid-tight seal over the lower 10 inches of the cleanout opening.

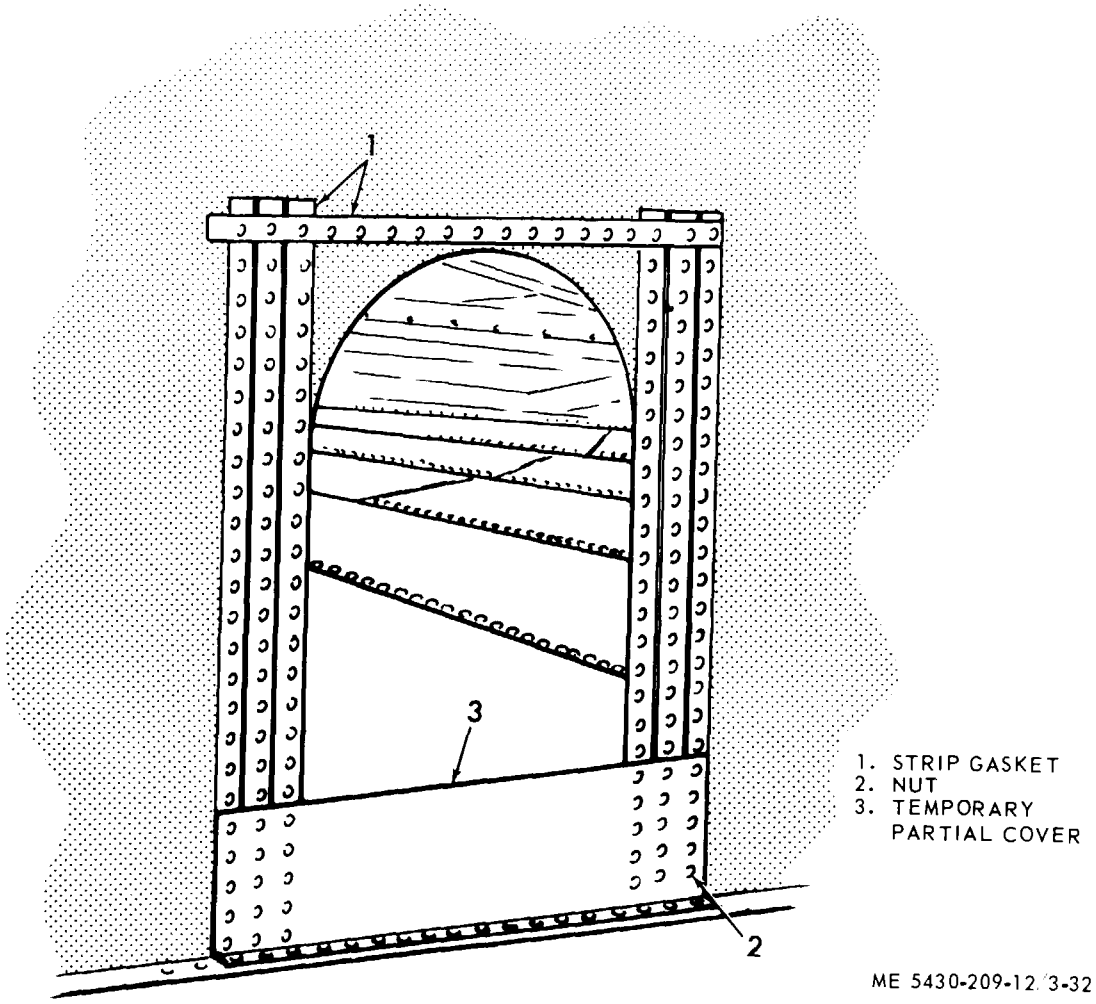


Figure 3-32. Temporary partial cover for cleanout opening (10. 000-barrel capacity tanks.

(2) If tank has a firewall, fill firewall with water to a depth of 4 or 5 inches above the tank bottom.

Enter tank and visually check the lap seams and bottom chime for leakage.

(3) If tank has no firewall, pump water over the partial door at the cleanout opening to a depth of not less than 6 inches above the bottom. At outside of tank, visually check the bottom chime for leakage.

(4) Repair leaks by tightening nuts and applying sealing compound at points of leakage.

b. *Stave Seams.*

(1) Remove partial cover and install cleanout cover (para 3-27).

(2) Fill tank to full capacity with water.

(3) Visually check all stave lap seams and chime for leakage. Tighten nuts at points of leakage until leaks have been eliminated.

(4) After the stave lap seams have been made watertight, gage the water level of the tank and make a notation of the gage reading. Gage it again 24 hours later and compare the two readings. There should be no measurable drop in water level. Any tank that leaks more than 1/8 inch in 24 hours must be emptied and inspected for bottom leaks. Repair leaks in a (4) above.

3-27. Cleanout Cover

a. *General*. The cleanout cover is a flat, rectangular, steel plate drilled and formed to provide a liquid-tight cover over the opening of the cleanout stave. The bottom edge of the plate is flanged. Two steel handles are welded to the outside face of the plate.

b. *Installation.*

(1) See paragraphs 3-23 through 3-26 prior to installation of cleanout cover.

(2) Push all bolts blush with gasket in chime at bottom to provide clearance for sliding cover in place.

(3) Install cover (1, fig. 3-33) with flange end resting on chime at bottom of tank. Work bolts (3, fig. 3-30) through cover. Temporarily install nuts (2, fig. 3-33) on a sufficient number of bolts to hold cover in place.

1. CLEANOUT COVER
2. NUT

Figure 3-33. Placing the cleanout cover (10,000-barrel capacity tank).

(4) Install washers, cup side down, over all seam bolts. Install nuts, rounded face down, on all bolts. Tighten bolts uniformly around the cover to maintain a leakproof joint.

3-28. Cleaning the Tank Site

The tank erection crew is responsible for the initial policing of the tank site. Clear out all debris, papers, cartons, and any other inflammable material. All tools and erection equipment should be returned to the tank erection tool set. The crew should leave a clean and neat installation for the pipeline crew or others.

Section VII. IDENTIFICATION OF COMPONENT ITEMS

3-29. General

This section contains a list of component items for the 100-barrel capacity tank. This list is furnished for your convenience in identifying individual components of the tank. Those items required for reassembly are listed as components of the reerection kit and grouped at the end of the listing.

3-30. Component Items

a. Refer to table 3-1 for the list of component items.

b. The following is a list of Manufacturers Codes (MFG Code) contained in Table 3-1.

Code	*Manufacturer*
79154	Victaulic Co. of America 3100 Hamilton Blvd. South Plainfield, N.J. 07080
81348	Federal Specifications Promulgated by General Services Administration
81350	Joint Army-Navy Specifications Promulgated by Standardization Division, Directorate of Logistic Services, DSA.
97403	U.S. Army Research and Development Center, Fort Belvoir, Virginia 22060

Table 3-1. IDENTIFICATION OF COMPONENT

FSN	Description	Part No.	Mfg. Code	Qty Per Unit	Fig No.	Item No.
	TANK ACCESSORIES					
	ACCESS LADDER ASSEMBLY	13211E8040	97403	1	3-24	-
5306-010-9216	BOLT, SQUARE HEAD:½ -13 thd size 1 in lg	FF-B-575	8134S	20	3-24	5
	BRACE, ACCESS LADDER	13211E8063	97403	2	3-24	8
	HAND RAIL	13211E8060	97403	2	3-24	9
5310-982-4940	NUT:1/2 -13 thd size	FF-N-836	81348	20		
	RAIL,, ACCESS LADDER	13211E8061	97403	2	:3-24	3
	STEP, ACCESS LADDER	13211E8062	97403	7	3-24	6
	ADAPTER, GROOVED AND THREADED 4 IN SIZE	40-4	79154	1	3-29	3
	ADAPTER, GROOVED AND THREADED 6 in size	40-6	79154	1	:3-29	3
5306-964-0963	BOLT, SQUARE HEAD: 5/8-11 thd size, 312 In lg	FF-B-575	81348	33	3-1	7
4730-278-3156	BUSHING, PIPE: 3 In NPT ext, NPT int	USASB16-14	81350	1	3-27	6
	CAP, GROOVED: 4 In size	60-4	79154	1	3-29	5
	CAP. GROOVED: 6 in size	60-6	79154	1	3-29	5
	COUPLING, GROOVED: 4 In size	77D-4	79154	1	3-29	6
	COUPI,ING, GROOVED: 6 In size	77D-6	79154	1	3-29	6
	ELBOWV- 90 deg, 4 in size	13211E8080	97403	1	3-28	2
	EL,BOW- 90 deg. 6 in size	13215E9716	97403	1	3-28	2
	FLAN(;E SET, BLIND- 6 in size	13216E7219	97403	2	3-1	10
	FLANGE SET, THREADED- 3 in. size	13216E7218	9740:3	1	3-27	4
	FLANGE SET, THREADED 4 in. size	13216E9718	97403	1	3-28	3
	FL.ANGE SET, THREADED- 6 in size	13215E9719	97403	1	3-28	3
	(GAGE, INDICATING: liquid level	13200E9129-1	97403	1		
	GASKET, FLANGE :3 in size	13216E7217	97403	1	3-27	1
	GASKET, FLANGE 4 in size	13215E9721	97403	1	3-28	6
	GASKET, FLANGE 6 In size	13215E9722	97403	4	3-1	6
4730-196-1511	NIPPI.E, PIPE 2 ½ in. NPT. 3 in lg	W-W-N:351	81348	1		
	PLATE, WARNING	13211E8024	97403	1		
	VALVE pressure-vacuum	13213E4596	97403	1	3-23	5
	VALVE non-freezing type	13211E8082	97403	1	3-27	7
	VENT, ENIERGENCY:8 in size	13216E7207	97403	1	3-24	2
	WATER STORAGE					
	AIR-INTAKE ASSEMBLY	13216E7223	97403	1		
5306-836-5334	BOLT: no 10-24 thd size, 1 In lg	FF-B-575	81348	2		
5306-865-9573	BOLT ½ -13 thd size. 5 in lg	FF-B-575	81348	28		
5306-042-6916	BOLT ½ -13 thd size. 1 ½ in lg	FF-B-575	81348	14		
	CHANNEL HATCH, BOLT CLIP	13215E9706	97403			
	COVER,. HATCH 8 in size	13215E9728	97403	1		
	COVER. MANHOLE 1	3216E7192	97403	1	3-24	1
	GASKET, HATCH	13215E9724	97403	1		
	GASKET manhole deck, 28 holes	13215E9726	97403	1	3-23	1
531(I-852-8593	NUT: no. 10-24 thd size	FF-N-836	81348	2		
5310-9h2-4940	NUT ½ 13 thd size	FF N-836	81348	42		
	RESTRICTOR, DUST	13216E7224	97403	1		
	RING, CLA.MPING	13211E8072	97403	2		
	RING, SCREEN inside	13211E8071	97403	1		
	SCREEN. INSECT	13211E8077	97403	1		
	SPACER	13211E8074	97403	14		
	TANK DECK					
	COLUMN, SUPPORT	13216E7191	97403	1	3-19	
5306-010-9216	BOLT. SQUARE HEAD' -13 thd size, 1 in lg	FF-B-575	81348	12	3-19	3
5306-959-7813	BOLT. SQUARE HEAD-1:3 thd size. [1] in lg	FF-H-575	81348	6	3-19	6
	BRACE, LADDER SUPPORT	13216E7194	97403	1	3-19	8
	MANHOLE DOME	13211E8048	97403	1	3-19	7

Table 3-1. IDENTIFICATION OF COMPONENT

FSN	Description	Part No.	Mfg. Code	Qty Per Unit	Fig No.	Item No.
5310-982-4940	NUT:1/2-13 thd size FF-N-836	81348	18			
	RAIL, LADDER SUPPORT: left hand	13216E7196	97403	1	3-19	1
	RAIL. LADDER SUPPORT: right hand	13216E7195	97403	1	3-19	2
	STEP. LADDER 13211E8032	97403	4	3-19	4	
	WASHER, SEALING ½%2 IN	13211E8059	97403	6		
	CHANNEL, DECK PLATE13216E7214	97403	6	3-19	2	
	COVER, MANHOLE13211E7192	97403	1	3-24	1	
	GASKET, MANHOLE: 30 holes	13215E9727	97403	1	3-23	1
	PLATE, DECK: level indicator	13216E7211	97403	1	3-20	1
	PLATE, DECK' plain13216E7208	97403	3			
	PLATE, DECK: pressure-vacuum opening	13216E7210	97403	1	3-23	4
	PLATE, DECK' water inlet opening	13216E7209	97403	1	3-20	2
	RETAINER, BOLT: rafter	3216E7221	97403	6	3-21	4
	SIDE STAVES					
	CHANNEL: cleanout, side	13215E9702	97403	2	3-30	5
	CHANNEL: Cleanout, top	13211E8079	97403	1	3-30	1
	CHANNEL: Side staves	13215E9704	97403	6	3-9	3
	COVER, CLEANOUT	13216E7203	97403	1	3-33	1
	NUT, GLAND	13216E7222	97403	4	3-25	4
	PLUG: solid, 1 in size	ASTMA575	81348	4	3-25	1
	4730-278-3411 PLUG, PIPE- 3 In size	USASB16.14	81350	4		
	RETAINER, BOLT' cleanout cover, top	13215E9701	97403	1	3-30	4
	RETAINER,BOLT- cleanout cover, vertical	13215E9703	97403	2	3-30	6
	STAVE- cleanout	13216E7201	97403	1	3-7	4
	STAVE plain	13216E7205	97403	1	3-7	3
	STAVE' 3 In outlet	13216E7204	97403	2	3-7	2
	STAVE' 4 in outlet	13216E7206	97403	1	3-7	5
	STAVE 6 in outlet 13216E7202	97403	1	3-7	1	
	TANK BOTTOM					
	CHANNEL bottom plate13216E7213	97403	1	3-2	2	
	PLATE. BOTTOM: left	13216E7198	97403	1	3-1	3
	PLATE, BOTTOM' right	13216E7197	97403	1	3-1	4
	ASPHALT CONVERSION SET					
	ASPHALT TANK	13216E8260	97403			
	BAR, SUPPORT' vertical	13216E8275	97403	3		
	CLAMP, ANGLE	13216E8274	97403	2		
	CLAMP, ANGLE: bottom coil	13216E8276	97403	3		
	CLIP: radial support	13216E8273	97403	3		
	COIL, STEAM. Bottom	13216E6265	97403	1		
	COIL, STEAM' circular	13216E8264	97403	1		
	ELBOW: 3 in size	13216E8271	97403	2		
	FLANGE SET. THREADED 3 in size	13216E7218	97403	4		
	NIPPLE	WW-N-351	81348	4		
	NUT. GLAND	13216E7222	97403	4		
	NUT, GLAND 13216E7222	97403	4			
	SUPPORT bottom coil	13216E8277	97403	2		
	SUPPORT radial	13216E8272	97403	3		
	ATTACHING COMPONENTS					
5306-010-9216	BOLT, SQUARE HEAD1/2-13 thd size. 1 in lg	FF-B-575	81348	550	3-11	2
5306-969-7813	BOLT, SQUARE HEAD1/2-13 thd size. 1 1/4 in lg	FF-B-575	81348	600	3-19	6
5306-042-6916	BOLT, SQUARE HEAD: ½ -13 thd size. 1 ½ in lg	FF-B-575	81348	200	3-2	3
	GASKET, FILLET	13211E055	97403	20	3-11	4
	GASKET, WEDGE	13211E8056	97403	50	3-10	
	GASKET, STRIP	13211E8054	97403	300 It	3-2	t)
5310-982-4940	NUT ½ -13 thd size	FF-N-836	81348	13t50	3-3	5
	WASHER, SEALING	13211E8059	97403	700	3-3	4
5430-217-2157	KIT. RE-ERECTION100 barrel capacity tank	13211E8058	97403	1		
5306-010-9216	BOLT ½ -13 thd size. 1 in lg	FF-B-575	8134,	550		
5306-959-7813	BOLT' ½ -13 thd size, 1 ¼ in lg	FF-B-575	81348	600		

Table 3-1. IDENTIFICATION OF COMPONENT

FSN	Description	Part No.	Mfg. Code	Qty Per Unit	Fig No.	Item No.
5306-042-6916	BOLT: ½ -13 thd size, 1 ½in lg	FF-B-575	81348	200		
5306-964-0963	BOLT: 5/8-11 thd size, 3 ½ in lg	FF-B-575	81348	33		
	BRUSH, APPLICATOR:sealing compound	H-B-420	81348	1		
	GASKET, FILLET 13211E8055	97403	20			
	GASKET, FLANGE: 3 in size	13216E7217	97403	4		
	GASKET, FLANGE: 4 in size	13215E9721	97403	4		
	GASKET, FLANGE: 6 in size	13215E9722	97403	4		
	GASKET, HATCH 13215E9724	97403	6			
	GASKET. MANHOLE: 28 hole	13215E9726	97403	2		
	GASKET. MANHOLE: 30 hole	13215E9727	97403	2		
	GASKET, STRIP	13211E8054	97403	300 ft		
	GASKET, WEDGE	13211E8056	97403	50		
5310-982-4940	NUT: '/2-13 thd size	FF-N-836	81348	1350		
5310-012-5550	NUT: 5/8-11 thd size	FF-N-836	81348	33		
5430-693-2968	PLUG, BOLT REPLACEMENT	13211E8058	97403	3		
8030-800-6382	PUTTY, SEALING	MIL-P-20628	81349	1 gal		
8030-598-4503	SEALING COMPOUND	MIL-S-14231	81349	3 qt		
	WASHER, SEALING	13211E8059	97403	700		

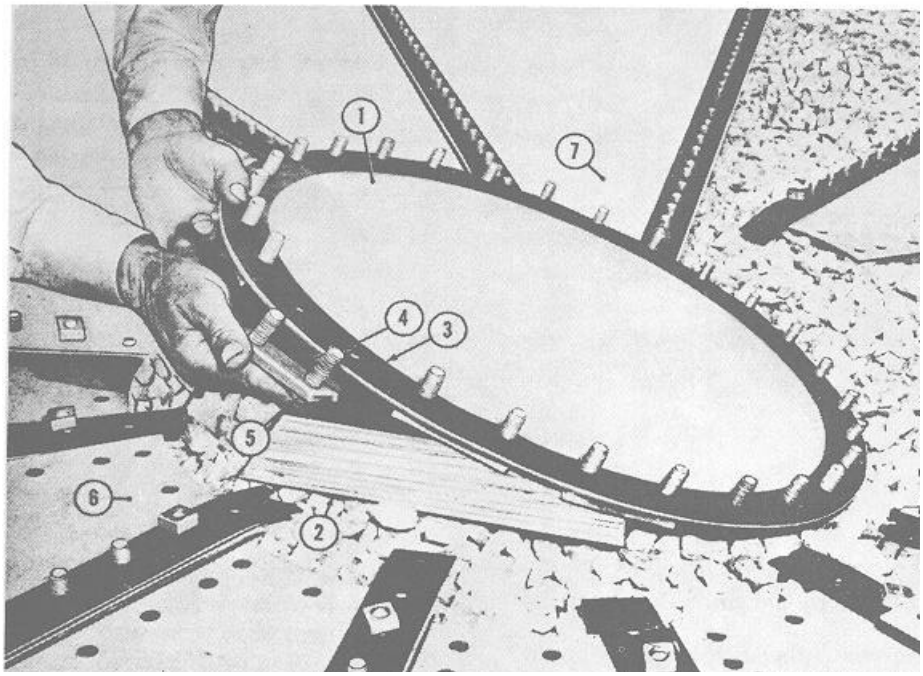
CHAPTER 4

ERECTION INSTRUCTIONS FOR THE 250-BARREL CAPACITY TANK

Section I. ASSEMBLY AND INSTALLATION OF TANK BOTTOM

4-1. Center Bottom Plate

a. General. The center bottom plate (1, fig. 41) is a circular, flat, steel plate. Tank bottom plates are attached to the outer circumference bolting circle.



1. CENTER BOTTOM PLATE
2. BOLT RETAINING BOARDS
3. CENTER PLATE GASKET
4. BOLT
5. TWO-BOLT HOLE CHANNEL
6. PLAIN BOTTOM PLATE
7. OUTLET BOTTOM PLATE

Figure 4-1. Installation of gasket, bolts, and channels on center bottom plate.

b. Installation.

(1) Drive center stake below surface of foundation and backfill the hole.

(2) Place bolt retaining boards (2) around outer circumference of center bottom plate (1).

(3) Position center bottom plate over center stake.

(4) Place gasket (3) around bolt circle of center bottom plate.

CAUTION

Do not use a sharp-edged tool or pipe to force gasket over bolts. Avoid damage to gasket by using a well-rounded, smooth-mouth tool.

(5) Insert two 1/2-by 1-1/2-inch bolts (4) in the two-bolthole channel (5).

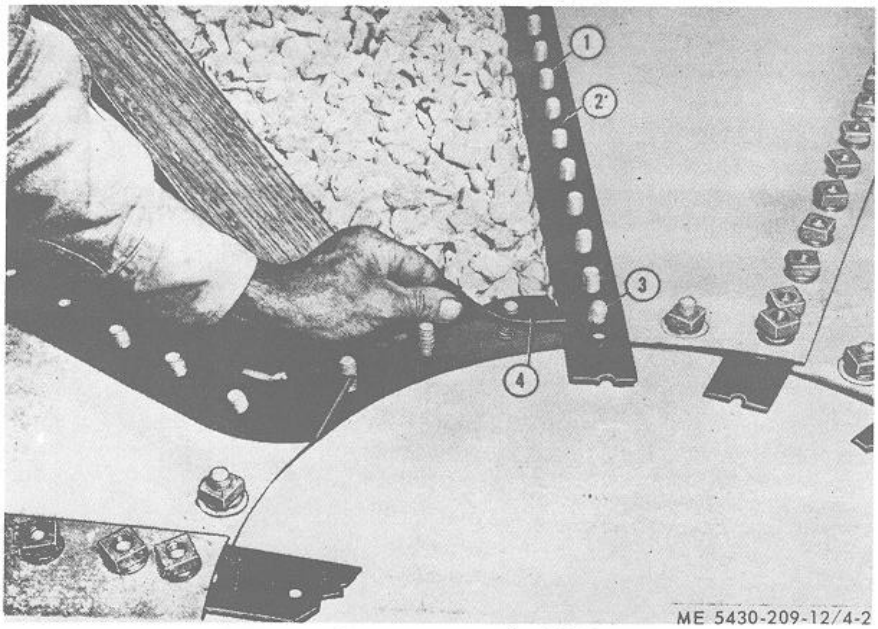
(6) Insert channel assembly through center bottom plate and gasket.

(7) Lay center bottom plate on bolt retaining boards (2). Boards will prevent movement of bolts when bottom plates are installed.

4-2. Assembly of Bottom Plates

a. General. The tank bottom consists of 10 tapered, flat, steel plates. Nine plates (6, fig. 4-1) are plain, and one plate (7) is special. Nine plates are interchangeable. They are bolted to the center bottom plate (1). When the bottom is completely installed, the plate pattern resembles a wheel.

b. Assembling First Bottom Plate. The first bottom plate has a bolt channel placed under each radial lap seam with radial bolts (1, fig. 4-2). Strip gasket (2) is placed along each seam. Seams are identified as right and left, facing the large end.



1. BOLT
2. STRIP GASKET
3. BOLT
4. WEDGE GASKET

Figure 4-2. Installation of bottom plates.

(1) Starting at large end of plate, place bolt channel under right and left lap seams of plate. Insert bolts through all except the chime boltholes in the plate and channel.

(2) As channels are placed, position bolt retaining boards against the boltheads to facilitate installation of gaskets (2, fig. 4-2).

(3) Install gasket (2) along the full length of the right and left lap seams. Allow a 1-1/2-bolthole overlap at each end.

NOTE

When there is a break in the gasket material, ends should overlap two boltholes and be cut squarely across the second hole. Sealing compound must be applied to each end of the overlap strip to ensure a leakproof joint.

(4) Upon completion of the assembly, move this plate to its approximate installation position on the tank foundation.

c. Assembling Intermediate Bottom Plates. There are ten intermediate plates, including an outlet plate (7, fig. 4-1)which are assembled with channels and strip gaskets. Except that the channels are placed under the right lap seams, follow the assembly procedure outlined in *b* above. The outlet plate (7) has, in addition, a blind flange set assembled on it. The above procedures do not apply to the last bottom plate, since no further assemblies are made on it. Keep the last bottom plate separated from all other plates until it is installed in the tank bottom.

d. Assembling Outlet Plate.

(1) Block up plate 6 inches off the ground. Cut six 1-hole gaskets from strip gasket material (2, fig. 4-2). Force a 1-hole gasket over and against the head of each flange bolt.

(2) Insert bolts through boltholes in inside flange half from the outside face of the flange with heads of bolts fitting into cutouts provided.

(3) Lay bolt retaining boards on the ground. Position flange assembly with bolt heads resting on the boards. Slip a gasket over the bolts and, using a round smooth-mouth tool, force gasket down against inside face of the flange.

(4) Work from the ground face of plate (7, fig. 4-1) and push bolts through boltholes of the flanged opening. Place blocking under bolt and flange assembly to hold it in position.

(5) Slip gasket over bolts and force it down against the inside face of the plate.

(6) Slip outside flange half over the bolts with machined face of flange facing gasket.

(7) Install steel washer and nuts on bolts and tighten the bolts. Remove plate from blocking and lay it on the tank foundation.

4-3. Installation of Bottom Plates

With first bottom plate in its approximate installation location on the tank foundation, lay remaining plates around the tank foundation as follows:

a. First Plate.

(1) Place small end of this plate over the center plate bolts (3, fig. 4-2).

(2) Install a steel recessed washer, cupped side down, over each bolt (3) and a nut loosely over the washer.

NOTE

Do not tighten nuts on the bolts until all bottom plates have been installed.

b. First Intermediate Plate.

NOTE

Wedge-shaped gaskets must be used wherever three plates are joined together.

(1) Place wedge gasket (4, fig. 4-2) over gasket at right edge of first plate.

(2) Face small end of the plate. Install plate to left of first plate, or in a counterclockwise direction, around the tank foundation.

(3) Place small end of plate over bolts (3), with right lap seam of plate laid over bolts in left lap seam of first plate.

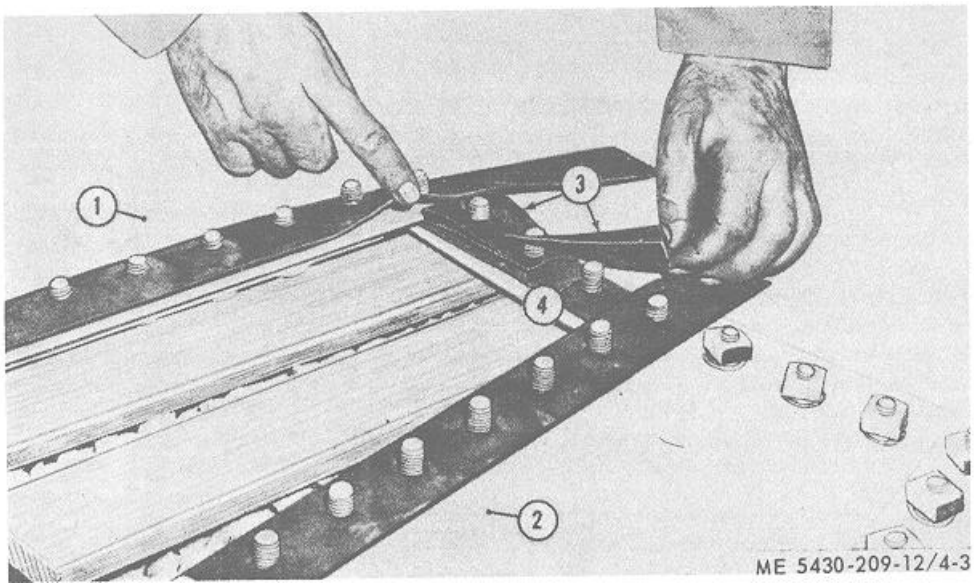
(4) Install steel washers and nuts, as in *a* (2) above, on bolts along the center bottom plate and on bolts along the lap seam of plates.

NOTE

Do not tighten nuts on the bolts until all bottom plates have been installed.

c. Remaining Intermediate Plates. Install remaining intermediate plates following the procedure described in *b* above.

d. Last Plate. Install last plate by placing its lap seams over lap seams of next-to-last plate (1, fig. 43) and first plate (2). Place small end over bolts (4). This is a vital point in the tank bottom, make sure it is secure against leakage.



1. NEXT-TO-LAST PLATE
2. FIRST PLATE
3. WEDGE GASKET
4. BOLT

Figure 4-3. Installing wedge gaskets before installation of last bottom plate.

(1) *Installing Wedge Gaskets.* Apply heavy coating of sealing compound to both faces of gaskets (3, fig. 4-3) and install them over bolts (4). Use generous amount of sealing compound at their overlap to seal opening under small end.

(2) Adjusting Bottom Plates. Adjustment of installed plates is necessary before the last plate can be correctly positioned. Adjust plates as follows:

(a) Place last plate (1, fig. 4-4) over the space remaining for its installation.

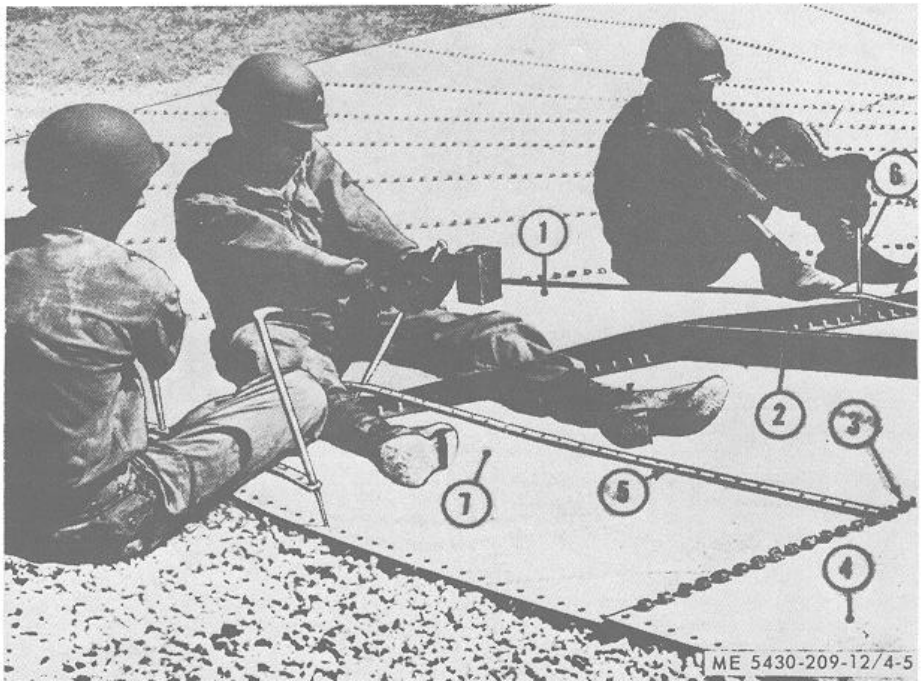
Figure 4-4. Checking bolt spacing at installation of last bottom plate.

(b) Check bolt spacing and alinement along each lap seam (2) and across the plate between lap seams.

(c) Adjust plate (3) so that right lap seam of last plate (1) will slip over bolts in left lap seam of plate (3).

(d) Install steel washers and nuts, as described in a (2) above, on bolts in lap seam.

(e) Lift free side of last plate (1, fig. 4-5) and slide boards (2) under it. Boards will keep plate clear of bolts in first bottom plate (7) and also act as slide bars when adjusting the plate.



1. LAST BOTTOM PLATE
2. BOARDS
3. BOLTS
4. FIRST INTERMEDIATE BOTTOM PLATE
5. BOLT CHANNEL
6. DRIFT PIN
7. FIRST BOTTOM PLATE

Figure 4-5. Adjusting installed bottom plates.

(f) Place several pieces of bolt channel (5) along the length of last plate (1) with their outer ends touching the right edge of first intermediate plate (4).

(g) Insert drift pins (6) through channels (5) and last plate (1), with pins bearing against the left edge of first plate (7). This will produce sufficient leverage to bring the right lap seam of last plate (1) in alinement with bolts in left lap seam of first plate (7).

(h) With last plate (1) in final position, the right lap seam will drop over bolts in left lap seam of first plate (7) upon removal of boards (2) and channels (5). Install steel washers and nuts, as described in *a* (2) above.

NOTE

All bolts, except chime bolts, must have a steel washer under the nut.

4-4. Tightening Tank Bottom

Start at small end of plates and work toward large end, tightening nuts uniformly and carefully; avoid crushing gaskets. A maximum of 40 to 50 foot-pounds of torque should be used.

4-5. Bolt Replacement Plug

If threads are stripped on one or more bolts, drive out bolt and use a bolt replacement plug as instructed in paragraph 3-4.

4-6. Testing Seams for Leakage

Refer to paragraph 3-5 and test tank bottom for leaks utilizing the vacuum seam tester incorporated in the storage tank erection outfit.

NOTE

Do not move off a tested area with leaks until all points of leakage have been stopped.

4-7. Sealing Seams

WARNING

If tank is to be used for water storage, do not apply sealing compound to tank bottom.

Sweep tank bottom clean after testing the seams. With bottom dry, apply sealing compound to all bolts and seams.

Section II. ASSEMBLY AND INSTALLATION OF SIDE STAVES

4-8. Assembly of Side Staves

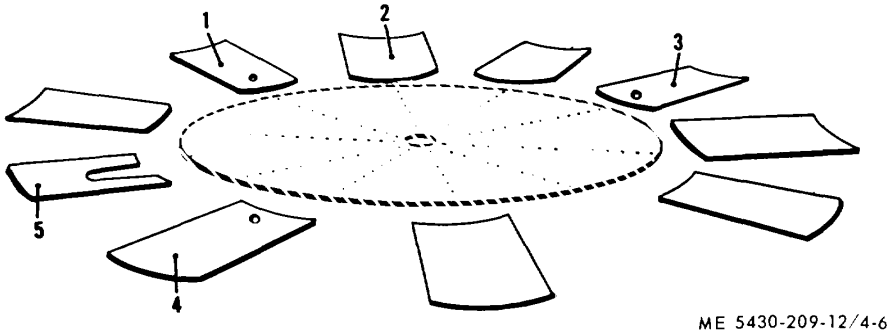
a. General. This is a single ring tank. Place all center support ladder components and manhole dome on tank bottom before laying out staves around the perimeter of tank foundation. This is to avoid having to lift them over the tops of the staves later. Top and bottom flanged edges of staves are called chimes; side edges are called vertical seams. The staves have a single row of boltholes in each seam.

NOTE

Stave assemblies for petroleum and water storage tanks are all the same except for special fittings.

b. Layout of Staves. Four special and six plain staves make up the ring.

(1) Place staves with openings and pipeline connections in proper position (fig. 4-6).



1. 6-INCH OUTLET STAVE
2. PLAIN STAVE
3. 4-INCH OUTLET STAVE
4. 2-INCH WATER DRAWOFF STAVE
5. CLEANOUT STAVE

Figure 4-6. Layout of staves around tank bottom.

(2) Lay out remaining staves around perimeter of tank bottom. Place staves with chimed side down so that each stave straddles a radial seam of the bottom.

NOTE

Staves have an offset at top and bottom The top is determined by looking at the stave in a vertical position from the outside. In proper position, offsets are at lower left and upper left corner

c. Dressing Staves. Refer to paragraph 3-7 *b* (2) and dress the staves.

d. Preparing Outer Edge of Tank Bottom. Refer to paragraph 3-7 *b* (3) and prepare the outer edge of the tank bottom.

4-9. Installation of Side Staves

Refer to paragraph 3-7 *c* and install the side staves.

NOTE

In paragraph 3-7 *c* (1), the first stave and all subsequent staves straddle a radial seam. In paragraph 3-7 *c* (3), seven intermediate staves are installed.

4-10. Scaffold

Before installation of the tank deck it is necessary to install a portion of the scaffold components, provided in the storage tank erection outfit, around the top chime of the staves. Follow the procedure outlined in paragraph 3-8.

4-11. Dressing Top Chime

Refer to paragraph 3-9 and dress the top chime.

Section III. ASSEMBLY AND INSTALLATION OF CENTER SUPPORT LADDER

4-12. Assembly of Center Support Ladder

a. General. The ladder consists of a bolted, steel angle section. Top of the ladder is fitted with a manhole dome. Bottom of the ladder is fitted with ladder braces (flanged, flat, steel plates). The small ends of the deck plates are bolted to the bottom flange of the manhole dome.

b. Assembling Ladder.

(1) Place ladder rails (1 and 2, fig. 4-7), with similar bolting legs facing each other, on top of several pieces of blocking. Blocking should be long enough to support both rails and wide enough apart to insert a ladder step (4).

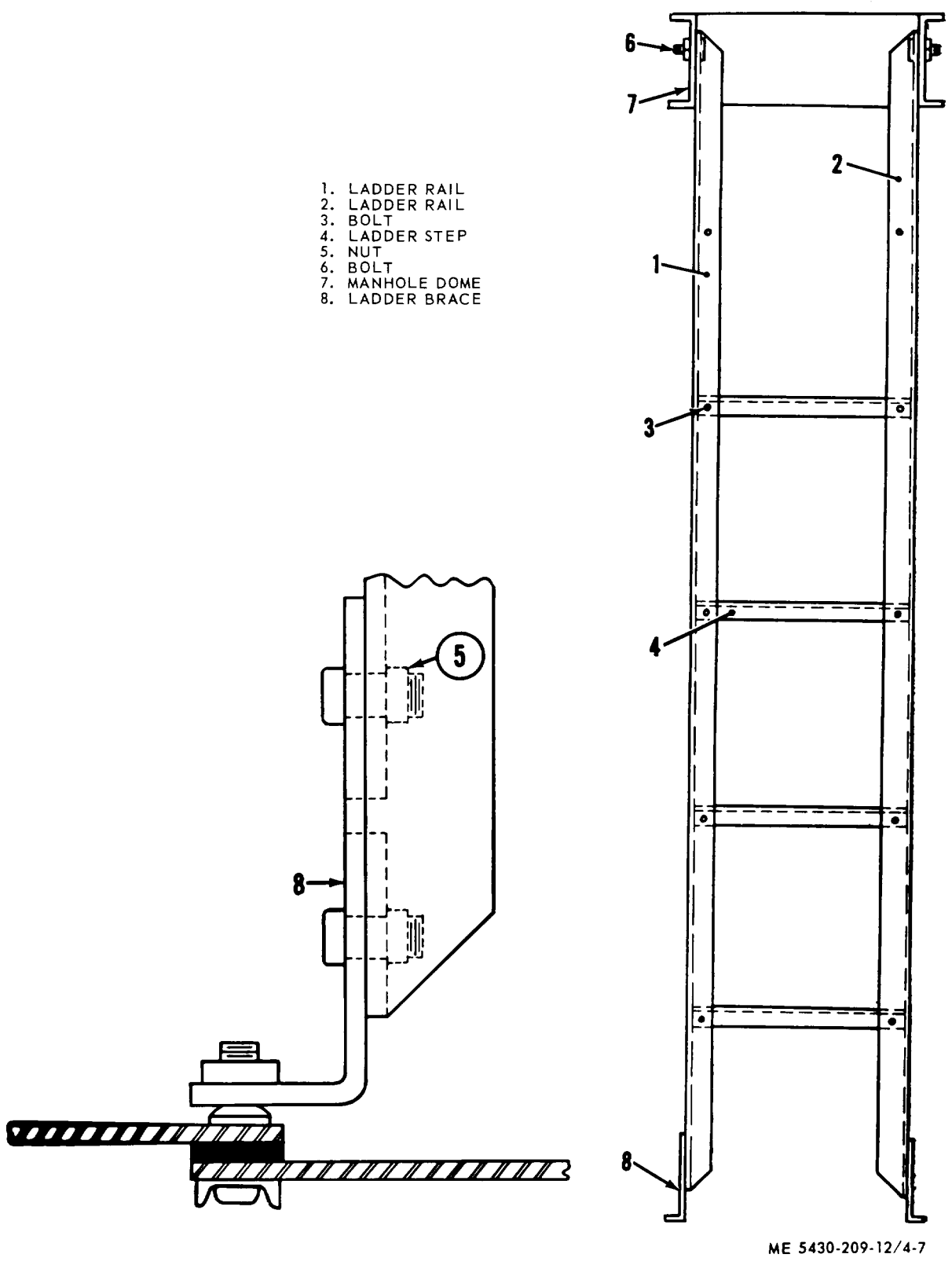


Figure 4-7. Center support ladder assembled.

(2) Determine which end of the rails (1 and 2) will be the bottom. Install steps (4) from bottom toward top of the ladder.

(3) Four steps (4) make up the assembled section. Insert bolts (3) through ends of step (4) and rails (1 and 2) in that order. Install nut (5) on each bolt (3) protruding through the rails. Tighten bolts after all steps are installed.

(4) Face the 28-bolthole flange of the manhole dome (7) and slide it over the top of the rails. Use a drift pin (3, fig. 3-12) and aline three boltholes at top of rails with similar holes in side of dome. Insert bolts (6, fig. 4-7) through rails (1 and 2) and dome (7) in that order. Apply washers to bolts (6, fig. 4-7). Make sure cup side of washer is facing down. Install nuts (5) on bolts (6). Be sure rounded face of nut bears against the washer. Tighten the bolts.

(5) Install a 30-bolthole gasket (1, fig. 3-21) on inside face of bottom flange of dome (2). Insert bolts (3) through flange and gasket. The gasket will hold the bolts in place.

(6) Install ladder braces (8, fig. 4-7) at bottom of rails (1 and 2). Place long leg of brace (8) over three boltholes in vertical leg of the rails. Short leg of the brace faces outward.

(7) Adjust outside bolting face of short leg so it measures 9 feet, 2-31/32 inches from top flange of dome (7). Insert two bolts (3) through each brace (8) and rails (1 and 2) in that order. Install nuts (5) on bolts (3) and tighten the bolts.

4-13. Installation of Ladder

a. Line up two diametrically opposite lap seams (1, fig. 4-8) in tank bottom. Remove nut from each bolt (3, fig. 4-2) in the lap seams and the first bolt to the right and left of each lap seam.

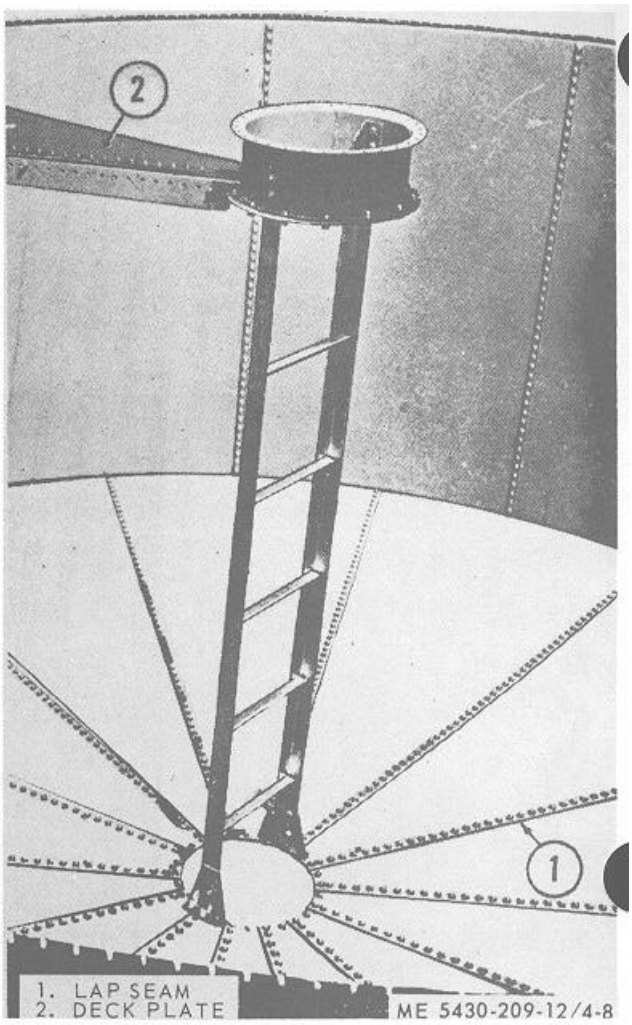


Figure 4-8. Center support ladder installed.

b. Raise ladder assembly (fig. 4-7) and set braces (8) over the bolts. Install and tighten nuts.

Section IV. ASSEMBLY AND INSTALLATION OF TANK DECK

4-14. General

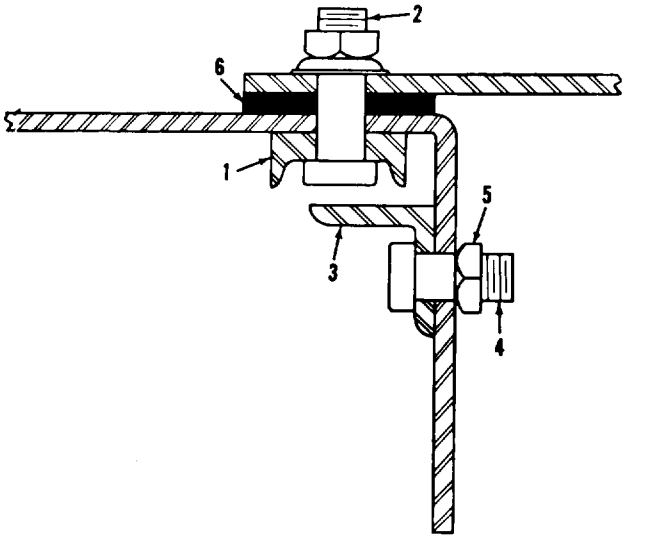
The assembled deck consists of 10 tapered, flat, steel plates (2, fig. 4-8). There are three special plates: two are fitted with a pressure vacuum valve, and the third with a liquid level indicator. All plates are interchangeable.

4-15. Layout and Assembly of Deck Plates

a. Lay plates around the outer perimeter of tank foundation.

b. Place blocking on ground spaced to fit inside the confines of the plate. Lay plate on blocking with flange up.

c. Place channel (1, fig. 4-9) on right lap seam at the flange. Insert bolt (2) through all except the end boltholes of plate and channel. Make sure bolt heads set square in the channel.



ME 5430-209-12/4-9

1. DECK PLATE CHANNEL
2. BOLT
3. RAFTER BOLT RETAINING ANGLE
4. BOLT
5. NUT
6. STRIP GASKET

Figure 4-9. Deck plate assembly.

d. Place angle (3) against inside of flange. Insert four bolts (4), equally spaced, through the angle and flange. Install and tighten nuts (5) on bolts (4).

e. Turn plate over with flange down. Install gasket (6) along full length of right lap seam. Allow 2-bolthole overlap at each end.

4-16. Assembly of Special Plates

WARNING

If this tank is to be used for water storage, omit the two pressure vacuum valves. Install blind hatch flange sets in place of pressure vacuum valves.

a. Pressure Vacuum Valve. Install a pressure vacuum valve on the pressure vacuum valve opening deck plate (2, fig. 3-20) and (2, fig. 4-8) as follows:

(1) Insert 1/2 by 1-1/2-inch bolts through eight two-bolthole channels. Work through the 8-inch hole and insert bolts through plate. Place blocking under bolt heads to hold them in place while installing the gasket.

(2) Install a 16-hole gasket over the bolts.

(3) Install valve over bolts.

(4) Install nuts on bolts and tighten bolts.

(5) Remove blocking used in step (1) above.

b. Level Indicator. The level indicator deck plate is installed with the level indicator fittings as received.

4-17. Installation of Deck Plates

a. Layout of Assembled Plates. As plates are assembled, raise them up and stand them against the scaffold (fig. 3-20). Place each plate so that it straddles a vertical seam of the side staves in its approximate installation position, counterclockwise.

b. Adjustment of Center Support Ladder.

(1) Check and adjust ladder (fig. 4-7) to the correct height before installing deck plates. The distance from top of tank bottom to outer face of top flange of the dome (7) is 9 feet, 3 13/32 inches. Raise or lower the ladder as required.

(2) Place a jack under one of the ladder steps (4). Adjust ladder so that in its final position one set of holes in bottom of the rails (1 and 2) lines up with holes in the brace (8). Lock the jack.

(3) Insert bolts (3) through the proper bolt holes in brace (8) to match the top holes in rails (1 and 2). Install nuts (5) on bolts (3); tighten the bolts.

(4) Unlock and remove the jack.

c. Gin Pole. To install deck plates (fig. 3-20) remove and assemble gin pole components, less the foot spike, provided in the tank tool erection set. Follow procedures prescribed in paragraph 3-16c.

d. Installing First Deck Plate. The first plate installed is one of two plates with a pressure vacuum valve (2, fig. 3-20). The other plate with a pressure vacuum valve (2, fig. 4-8) must be installed directly across from the first plate with the valve. Refer to paragraph *3-16 d* and install the first deck plate.

e. Installing Second D Plate. Refer to Paragraph 3-16e and install the second deck plate.

f. Installing Intermediate Deck Plates. There are seven intermediate plates. The special plates remaining are installed to suit field conditions. Refer to paragraph 3-16 *d* and *e,* and raise and install these plates.

g. Installing Last Deck Plate.

(1) Raise last deck plate before next-to-last plate is installed.

(2) Raise right lap seam of first plate (1, fig. 4-10). This is necessary to permit installation of the last plate.

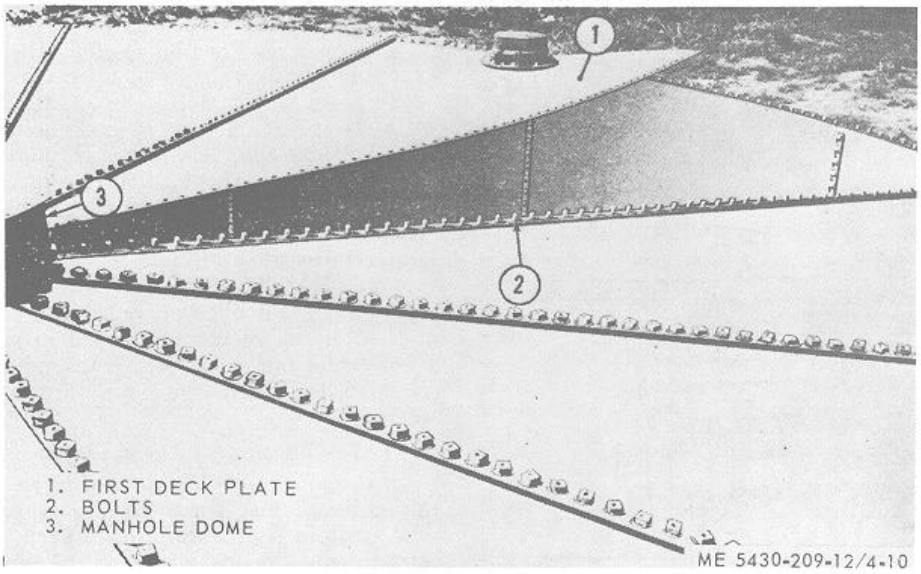


Figure 4-10. Installing last deck plate.

(3) The left lap seam of last plate slips under the right lap seam of first plate (1). The right lap seam of last plate is placed over bolts (2) in left lap seam of next-to-last plate installed.

(4) Make necessary adjustments in deck if last plate fails to fit properly.

NOTE

After all deck plates are installed, check, and if necessary adjust height of center support ladder as described In *b* above.

(5) Remove nuts temporarily installed on all bolts in the plate lap seams. Install a steel washer and nut on all bolts except on bolts in top chime of staves. Install any missing nuts on chime bolts. Make sure rounded head of nut is against the plate and/or washer. Tighten the bolts.

(6) Remove the scaffold. Install washers and nuts on all bolts in the vertical seams. Return brackets and posts to the tank tool erection set. Remove gin pole (1, fig. 3-22) after all deck plates are installed.

h. Installing Manhole Cover.

NOTE

If this tank is used for water storage, omit emergency vent (2, fig 3-24). Install manhole cover (1) after installing the manhole air intake

(1) Install a 28-bolthole gasket on the top flange of dome (3, fig. 4-10).

(2) Insert 1/2 by 1-inch bolts through the flange and gasket in that order. Gasket will hold bolts in place.

(3) Install 28-bolthole manhole cover (1, fig. 3-24) over the bolts. Install a steel washer and nut on all bolts. Install washer and nut as in *g* (5) above. Tighten the bolts.

Section V. ASSEMBLY AND INSTALLATION OF TANK ACCESSORIES

4-18. Emergency Vent

Refer to paragraph 3-17 for description and installation of the emergency vent.

4-19. Manhole Air Intake

Refer to paragraph 3-18 for description and installation of the manifold air intake.

4-20. Access Ladder
Refer to paragraph 3-19 for description, assembly, and installation of the access ladder.
4-21. Water Drawoff Valve
Refer to paragraph 3-21 for description and installation of the water drawoff valve.
4-22. Tank Outlet (4-and 6-inch)
Refer to paragraph 3-22 for description and installation of the tank outlet.

Section VI. TANK TESTING AND FINAL ASSEMBLY

4-23. General
Interior of the tank must be cleaned, inspected, and tested for leakage prior to installation of the cleanout cover. After installation of cover, tank site must be cleaned.
4-24. Tank Cleaning and Inspection
Refer to paragraph 3-24 and clean and inspect the tank.
4-25. Water Test
Refer to paragraph 3-26 and test the tank.
4-26. Cleanout Cover
Refer to paragraph 3-27 for description and installation of the cleanout cover.
4-27. Cleaning Tank Site
Refer to paragraph 3-28 for information on cleaning of the tank site.

Section VII. IDENTIFICATION OF COMPONENT ITEMS

4-28. General
This section lists component items of the 250-barrel capacity tank. The list is furnished for your convenience in identifying individual components of the tank. Those items required for reassembly are listed as components of the re-erection kit and grouped at the end of the listing.
4-29. Component Items
a. Refer to Table 4-1 for the list of component items.
b. The following is a list of Manufacturers Codes (MFG Code) contained in Table 4-1.

Code	*Manufacturer*
79154	Victaulic Co. of America 3100 Hamilton Blvd. South Plainfield, N.J. 07080
81348	Federal Specifications Promulgated by General Services Administration
81350	Joint Army-Navy Specifications Promulgated by Standardization Division, Directorate of Logistic Services, DSA
97403	U.S. Army Research and Development Center, Fort Belvolr, Virginia 22060

TABLE 4-1. IDENTIFICATION OF COMPONENT ITEMS

FSN	Description	Part No.	Mfg Code	Qty Per Unit	Fig No.	Item No.
	TANK ACCESSORIES					
	ACCESS LADDER ASSEMBLY	13211E8040	97403	1	3-24	--
5306-010-9216	BOLT, SQUARE HEAD: 1/2-13 thd size 1 in lg	FF-B-575	81348	20	3-24	5
	BRACE, ACCESS LADDER	13211E8063	97403	2	3-24	8
	HAND RAIL	13211E8060	97403	2	3-24	9
5310-982-4940	NUT: 1/2-13 thd size	FF-N-836	81348	20		
	RAIL, ACCESS LADDER	13211E8061	97403	2	3-24	3
	STEP, ACCESS LADDER	13211E8062	97403	7	3-24	6
	NIPPLE, GROOVED AND THREADED:	40-4	79154	1	3-29	3
	NIPPLE, GROOVED AND THREADED:	40-6	79154	1	3-29	3
5306-964-0963	BOLT, SQUARE HEAD: 5/8-11 thd size	FF-B-575	81348		33	5
	3-1/2 in gl	FF-B-575	81348		33	
	CAP, GROOVED: 4 in state	60-4	79154	1	3-29	5
	CAP, GROOVED: 6 in state	60-6	79154	1	3-29	6
	COUPLING GROOVED: 4 in size	77D-4	9154	1	3-29	6
	ELBOW: 90 deg 4 in size	13211E8080	97403	1	3-28	2
	ELBOW: 90 deg, 6 in size	13215E9716	97403	1	3-28	2
	FLANGE SET, BLIND: 6 in size	13216E7219	97403	2	3-1	10
	FLANGE SET, THREADED: 2 in size	13211E8081	97403	1	3-27	4
	FLANGE SET, THREADED: 4 in size	13215E9718	97403	1	3-28	3

FSN	Description	Part No.	Mfg Code	Qty Per Unit	Fig No.	Item No.
	FLANGE SET, THREADED: 6 in size	13215E9719	97403	13-283		
	GAGE, INDICATING: liquid level	13200E9129-1	97403	1		
	GASKET, FLANGE: 2 in size	13211E8057	97403	2	3-27	1
	GASKET, FLANGE: 4 in size	13215E9721	97403	2	3-28	6
	GASKET, FLANGE: 6 in size	13215E9722	97403	4	3-29	1
4730-196-1511	NIPPLE, PIPE: 2-1/2 in size	WW-N351	81348	1		
	ADAPTER, GROOVED AND THREADED 4 IN SIZE	40-4	79154	1	3-29	3
	ADAPTER, GROOVED AND THREADED: 6 in size	40-6	79154	1	3-29	3
	PLATE, WARNING	13211E8024	97403	1		
	VALVE: non-freezing	13211E8082	97403	1	3-27	7
	VALVE: pressure-vacuum	13213E4596	97403	2	3-23	5
	VENT, EMERGENCY: 8 in size	13216E7207	97403	1	3-24	2
	WATER STORAGE					
	AIR-INTAKE ASSEMBLY	13216E7223	97403	1		
5306-836-5334	BOLT: No. 10-24 thd size 1 in lg	FF-B-575	81348	2		
5306-865-9573	BOLT: 1/2-13 thd size, 5 in lg	FF-B-575	81348	28		
5306-042-6916	BOLT: 1/2-13 thd size, 1-1/2 in lg	FF-B-575	81348	14		
	CHANNEL, HATCH, BOLT CLIP	13215E9706	97403	8		
	COVER, HATCH: 8 in size	13215E9728	97403	1		
	COVER, MANHOLE	13216E7192	97403	1	3-24	1
	GASKET, HATCH	13215E9724	97403	1		
	GASKET, MANHOLE DECK: 28 holes	13215E9726	97403	1	3-23	1
5310-852-8593	NUT: no. 10-24 thd size	FF-N-836	81348	2		
5310-982-4940	NUT: 1/2-13 thd size	FF-N-836	81348	42		
	RESTRICTOR, DUST	13216E7224	97403	1		
	RING, CLAMPING	13211E8072	97403	2		
	RING, SCREEN: inside	13211E8071	97403	1		
	SCREEN, INSECT	13211E8077	97403	1		
	SPACER	13211E8074	97403	14		
	TANK DECK					
	ANGLE: rafter bolt retainer	13216E7236	97403	10	4-9	3
	COLUMN, SUPPORT	13216E7225	97403	1	4-7	--
5306-010-9216	BOLT, SQUARE HEAD: 1/2-13 thd size, 1 in lg	FF-B-575	81348	12	4-7	3
5306-959-7813	BOLT: SQUARE HEAD: 1/2-13 thd size 1-1/4 in lg	FF-B-575	81348	6	4-7	6
	BRACKET, LADDER SUPPORT	13211E8112	97403	2	4-7	8
	MANHOLE DOME	13211E8048	97403	1	4-7	7
5310-982-4940	NUT: 1/2-13 thd size	FF-N-836	81348	18	4-7	5
	RAIL, LADDER SUPPORT	13216E7240	97403	2	4-7	1
	STEP, LADDER	13211E8032	97403	4	4-7	4
	WASHER, SEALING: 1/2 in screw size	13211E8059	97403	6		
	CHANNEL: deck plate	13216E7238	97403	10	4-9	1
	CHANNEL: hatch hole clip	13215E9706	97403	16		
	GASKET, MANHOLE COVER: 30 hole	13215E9727	97403	1		
	PLATE, DECK: hatch	13216E7235	97403	1	4-10	1
	PLATE, DECK	13216E7233	97403	1	3-20	1
	PLATE, DECK: plain	13216E7234	97403	7	3-20	1
4730-221-2141	PLUG, PIPE: 1 in size	USAS B16.14	81350	1		
	SIDE STAVES					
	CHANNEL: cleanout, side	13215E9702	97403	2	3-30	5
	CHANNEL: cleanout top	13211E8079	97403	1	3-30	1
	CHANNEL: side staves	13215E9704	97403	10	3-9	3
	COVER, CLEANOUT	13216E7237	97403	1	3-33	1
	RETAINER, BOLT: cleanout cover, top	13215E9701	97403	1	3-30	4
	RETAINER, BOLT: cleanout cover, vertical	13215E9703	97403	2	3-30	6
	STAVE: cleanout	13216E7241	97403	1	4-6	5
	STAVE, plain	13216E7226	97403	6	4-6	2
	STAVE: 2 in water drawoff	13216E7227	97403	1	4-6	3
	STAVE: 4 in outlet	13216E7228	97403	1	4-6	3
	STAVE: 6 in outlet	13216E7242	97403	1	4-6	1

FSN	Description	Part No.	Mfg Code	Qty Per Unit	Fig No.	Item No.
	TANK BOTTOM					
	CHANNEL: bottom plates	13216E7238	97403	10	3-2	2
	CHANNEL: center plate	13215E9705	97403	15	4-1	5
	GASKET: center plate	13216E9726	97403	1	4-1	3
	PLATE: bottom center	13216E7229	97403	1	4-1	1
	PLATE: bottom outlet	13216E7231	97403	1	4-1	7
	PLATE: bottom plain	13216E7230	97403	9	4-1	6
	ATTACHING COMPONENTS					
5306-010-9216	BOLT, SQUARE HEAD: 1/2-13 thd size, 1 in lg	FF-B-575	81348	750	4-9	4
5306-959-7813	BOLT, SQUARE HEAD: 1/2-13 thd size 1-1/4 in lg	FF-B-575	81348	1550 200	4-2 4-1	1 4
5306-042-6916	BOLT, SQUARE HEAD: 1/2-13 thd size, 1-1/2 in lg	FF-B-57581348		30	3-11	4
	GASKET, FILLET	13211E8055	97403	500ft	4-2	2
	GASKET, STRIP	13211E8054	97403	90	4-2	4
	GASKET, WEDGE	13211E8056	97403	2500	4-9	5
5310-982-4940	NUT: 1/2-13 thd size	FF-N-836	81348	1650	3-3	4
	WASHER, SEALING: 1/2 in screw size	13211E8059	97403			
	RE-ERECTION KIT					
5430-217-2158	KIT, RE-ERECTION: 250 barrel capacity tank	13217E5406	97403	1		
5306-010-9216	BOLT: 1/2-13 thd size, 1 in lg	FF-B-575	81348	750		
5306-959-7813	BOLT: 1/2-13 thd size, 1-1/4 in lg	FF-B-575	81348	1550		
5306-042-6916	BOLT: 1/2-13 thd size, 1-1/2 in lg	FF-B-575	81348	200		
5306-851-4362	BOLT: 1/2-13 thd size, 2-1/2 in lg	FF-B-575	81348	4		
5306-964-0963	BOLT: 5/8-11 thd size, 3-1/2 in lg	FF-B-575	81348	17		
	BRUSH, APPLICATOR: sealing compound	H-B-420	81348	4		
	GASKET, FILLET	13211E8055	97403	30		
	GASKET, FLANGE: 2 in size	13211E8057	97403	4		
	GASKET, FLANGE: 4 in size	13215E9721	97403	2		
	GASKET, FLANGE: 6 in size	13215E9722	97403	4		
	GASKET, HATCH	13215E9724	97403	6		
	GASKET, MANHOLE: 28 hole	13215E9726	97403	2		
	GASKET, MANHOLE: 30 hole	13215E9727	97403	4		
	GASKET, STRIP	13211E8054	97403	500 ft		
	GASKET, WEDGE	13211E8056	97403	90		
5310-982-4940	NUT: 1/2-13 thd size	FF-N-836	81348	2504		
5310-012-5550	NUT: 5/8-11 thd size	FF-N-836	81348	17		
5430-693-2968	PLUG, BOLT REPLACEMENT	13211E8058	97403	3		
8030-800-6382	PUTTY, SEALING	MIL-P-20628	81349	1 gal		
8920-205-1711	RAGS	DDD-R-30	81348	10 lb		
8030-598-4503	SEALING COMPOUND	MIL-S-14231	81349	6 qt		
	WASHER, SEALING	13211E8059	97403	1700		

CHAPTER 5

ERECTION INSTRUCTIONS FOR THE 500-BARREL CAPACITY TANK

Section I. ASSEMBLY AND INSTALLATION OF TANK BOTTOM

5-1. Center Bottom Plate

a. General. The center bottom plate (1, fig. 4-1) is a circular, flat, steel, plate. The tank bottom plates are attached to the outer circumference bolting circle.

b. Installation. Refer to paragraph 4-1 and install the center bottom plate.

5-2. Assembly of Bottom Plates

a. The tank bottom consists of 14 tapered, flat, steel plates. Thirteen plates (6, fig. 4-1) are plain, and one plate (7) is special. Thirteen plates are interchangeable. When the bottom is completely installed, the plate pattern resembles a wheel.

b. Assembling First Bottom Plate. Refer to paragraph 4-2 and assemble the first bottom plate.

c. Assembling Intermediate Bottom Plates. Fourteen intermediate plates, including an outlet plate (7, fig. 4-1), are assembled with channels and strip gaskets. Except that the channels are placed under the right lap seams, follow the assembly procedure outlined in paragraph 4-2 *c*. The outlet plate has, in addition, a blind flange set assembled on it. The above procedures do not apply to the last bottom plate, since no further assemblies are made on it. Keep the last bottom plate separated from all other plates until it is installed in the tank bottom.

d. Assembling Outlet Plate. Refer to paragraph 4-2 and assemble the outlet plate.

5-3. Installation of Bottom Plates

Refer to paragraph 4-3 and install the bottom plates.

5-4. Tightening Tank Bottom

Refer to paragraph 4-4 and tighten the tank bottom.

5-5. Bolt Replacement Plug

If threads are stripped on one or more bolts in tank bottom during tightening process, drive out the bolt and replace it with a replacement plug as instructed in paragraph 3-4.

5-6. Testing Seams for Leakage

Refer to paragraph 3-5 and test tank bottom for leaks utilizing the vacuum seam tester furnished with the storage tank erection outfit.

NOTE

Do not move from a tested area until all leaks have been corrected.

5-7. Sealing Seams

WARNING

If tank is to be used for water storage, do not apply sealing compound to tank bottom.

a. Sweep tank bottom clean after testing the seams.

b. With tank bottom dry, apply sealing compound to all bottom seams (fig. 3-16).

Section II. ASSEMBLY AND INSTALLATION OF SIDE STAVES

5-8. Assembly of Side Staves

a. General. The 500-barrel capacity tank is a single ring tank. Place all center support ladder components and manhole dome on the bottom prior to installation of the last stave. This is to avoid having to lift them over the top of the assembled staves. Top and bottom edges of staves are called chimes; side edges are called vertical seams. The staves have a single row of boltholes in each seam.

b. Layout of Staves. Five special and nine plain staves make up the ring. Refer to figure 5-1 and lay out the staves around the tank bottom.

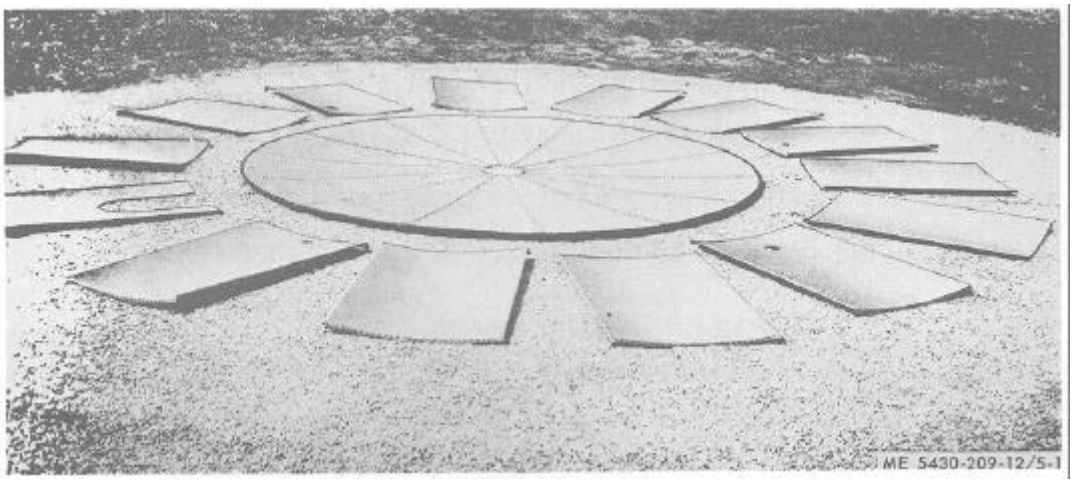


Figure 5-1. Layout of staves around tank bottom.

c. Dressing Staves. Refer to paragraph 3-7b (2) and dress the staves.

d. Preparing Outer Edge of Tank Bottom. Refer to paragraph 3-7 *b* (3) and prepare the outer edge of the tank bottom.

5-9. Installation of Side Staves.

Refer to paragraph *3-7c* and install the side staves.

NOTE

In paragraph 3-7 *c* (1), the first stave and all subsequent staves straddle a radial seam. In paragraph 3-7 *c* (3), eleven intermediate staves are installed.

5-10. Scaffold

Before installing the tank deck it is necessary to install a portion of the scaffold components, provided in the storage tank erection outfit, around the top chime of the staves. Follow the procedure outlined in paragraph 3-8.

5-11. Dressing Top Chime

Refer to paragraph 3-9 and dress the top chime.

Section III. ASSEMBLY AND INSTALLATION OF CENTER SUPPORT LADDER

5-12. Assembly of Ladder

a. General. The ladder consists of a bolted, steel angle section. Top of the ladder is fitted with a manhole dome. Bottom of the ladder is fitted with ladder braces (flanged, flat, steel plates). Small ends of the deck plates are bolted to the manhole dome bottom flange.

b. Assembling Ladder. Assembly procedures are identical to those described in paragraph 4-12. In step (3), the assembled section contains 5 steps. In step (7), the short leg measures 9 feet, 5-5/16 inches from top flange of dome.

5-13. Installation of Ladder

Refer to paragraph 4-13 and install the ladder.

Section IV. ASSEMBLY AND INSTALLATION OF TANK DECK

5-14. General

The assembled deck consists of 14 tapered, flat, steel plates (1, fig. 3-20). There are three special plates: two are fitted with a pressure vacuum valve, and the third is fitted with a liquid level indicator. All plates are interchangeable.

5-15. Layout and Assembly of Plates

Refer to paragraph 4-15, layout and assemble the plates.

5-16. Assembly of Special Plates

Refer to paragraph 4-16 and assemble the three special plates.

5-17. Installation of Deck Plates

a. Layout of Assembled Plates. Refer to paragraph 4-17 *a* and lay out the plates.

b. Adjustment of Center Support Ladder. Refer to paragraph 4-17 *b* and adjust the ladder. In step (1), distance from top of tank bottom to outer face of top flange of dome is 9 feet, 6-9/64 inches.

c. Gin Pole. To install deck plates, remove and assemble the gin pole components, less foot spike, provided in the tank tool erection set. Follow procedures prescribed in paragraph 3-16 *c*.

d. Installing First Deck Plate. The first plate installed is one of two plates with a pressure vacuum valve (2, fig. 3-20. The other plate with a

vacuum valve (2, fig. 4-8) must be installed directly across from first plate with the valve: Refer to paragraph 3-16 d and install the first deck plate.

e. Installing Second Deck Plate. Refer to paragraph 3-16e and install the second deck plate.

f. Installing Intermediate Deck Plate. There are twelve intermediate plates. The special plates remaining are installed to suit field conditions. Refer to paragraphs 3-16d and e and raise and install these plates.

g. Installing Last Deck Plate. Refer to paragraph 4-17g and install the last deck plate.

h. Installing Manhole Cover.

NOTE

If tank is used for water storage, omit the emergency vent valve (2, fig. 3-24). Install manhole cover (1) with blind flange set after installing manhole air intake.

(1) Install 30-bolthole gasket on top flange of dome (3, fig. 4-10).

(2) Insert 1/2 -by 1-inch bolts through the flange and gasket, in that order. Gasket will hold bolts in place.

(3) Install 30-bolthole manhole cover (1, fig. 3-24) over the bolts. Install a steel washer and nut on all bolts. Make sure rounded head of nut is against the washer. Tighten the bolts.

Section V. ASSEMBLY AND INSTALLATION OF TANK ACCESSORIES

5-18. Emergency Vent

a. General. Refer to paragraph 3-17 for a general description of the vent.

b. Installation.

(1) Place manhole cover gasket over bolt holes at opening in cover (1, fig. 3-24). Insert 1/2-by 1/2-inch bolts through 2-bolt hole channels. Work through the 10-inch hole, and insert bolts through cover and gasket.

(2) Install the vent (2) over the bolts.

(3) Install nuts on bolts and tighten the bolts.

5-19. Manhole Air Intake

a. General. Refer to paragraph 3-18 for a general description of the intake.

b. Installation.

(1) Wrap insect screen around outside of the inside screen ring. Join ends of the screen with copper wire weave.

(2) Install an outside screen ring at top and bottom of insect screen to hold it in place. Make sure the screen is not knocked out of position. Tighten the bolts.

(3) Install screen ring on top flange of the dome (3, fig. 4-10).

(4) Insert flange bolts through cover (1, fig. 3-24), dust restrictor, pipe sleeve spacers, and top flange of dome (3, fig. 4-10), in that order. Install nuts on the bolts and tighten.

(5) Place manhole cover gasket over bolt holes at opening in cover. Insert 1/2-by 1 /2-inch bolts through the 2-bolt hole channels. Work through the 10-inch hole and insert bolts through cover and gasket.

(6) Install 10-inch blind hatch flange over the bolts.

(7) Install nuts on the bolts and tighten.

5-20. Access Ladder

a. General. Refer to paragraph 3-19 for a general description of the access ladder.

b. Assembly. Refer to paragraph 3-19 and assemble the ladder.

c. Installation. Refer to paragraph 3-19 and install the ladder.

5-21. Water Drawoff Valve

a. General. Refer to paragraph 3-21 for a general description of the water drawoff valve.

b. Installation.

(1) Flanged elbow. Refer to paragraph 3-21 and install the flanged elbow.

(2) Drawoff valve. Refer to paragraph 3-21 and install the drawoff valve.

5-22. Tank Outlet (4-, 6-, and 8-inches)

a. General. Refer to paragraph 3-22 for a general description of the outlet.

b. Installation. Refer to paragraph 3-22 and install the 4-, 6-, and 8-inch elbows and adapters.

Section VI. TANK TESTING AND FINAL ASSEMBLY

5-23. General

Tank interior must be cleaned, inspected, and tested for leakage prior to installation of the cleanout cover. After installation of cover, the tank site must be cleaned.

5-24. Tank Cleaning and Inspection

Refer to paragraph 3-24 and clean and inspect the tank.

5-25. Water Test

Refer to paragraph 3-26 and water test the tank.

5-26. Cleanout Cover

a. General. Refer to paragraph 3-27 for a general description of the cleanout cover.

b. Installation. Installation procedures are similar to those for the 100-barrel capacity tank. Refer to paragraphs 3-25 and 3-27 and install the cleanout cover.

5-27. Cleaning Tank Site

The tank erection crew is responsible for initial policing of the tank site. Cleaning procedures are described in paragraph 3-28.

Section VII. IDENTIFICATION OF COMPONENT ITEMS

5-28. General

Contained in this section is a list of component items for the 500-barrel capacity tank. This list is furnished for your convenience in identifying individual components of the tank. Those items required for reassembly are listed as components of the re-erection kit and are grouped at the end of the listing.

5-29. Component Items

a. Refer to Table 5-1 for the list of component items.

b. The following is a list of Manufacturers Codes (MFG Code) contained in Table 5-1.

Code	*Manufacturer*
79154	Victaulic Co. of America 3100 Hamilton Blvd. Sourth Plainfield, NJ 07080
80204	United States of America Standards Institute 10 East 40th St., New York, NY 10016
81348	Federal Specifications Promulgated by General Services Administration
81349	Military Specifications
97403	U.S. Army Mobility Research and Development cent, Fort Belvoir, Virginia 22060

Table 5-1. IDENTIFICATION OF COMPONENT ITEMS

FSN	Description	Part No.	Mfg. Code	Qty Per Unit	Fig No.	Item No.
	TANK ACCESSORIES					
	ACCESS LADDER ASSEMBLY	13211E8040	97403	1	3-24	-
5306-010-9216	BOLT, SQUARE HEAD: /2-13 thd size, 1 in lg	FF-B-575	81348	20	3-24	5
	BRACE, ACCESS LADDER	13211E8063	97403	2	3-24	7
	HAND RAIL	13211E8060	97403	2	3-24	9
5310-982-4940	NUT: '/2-13 thd size	FF-N-836	81348	20		
	RAIL, ACCESS LADDER	13211E8061	97403	2	3-24	3
	STEP, ACCESS LADDER	13211E8062	97403	7	3-24	6
4730-193-0901	BUSHING, PIPE: 11/2 in NPT int, 2¼/2 in NPT ext.	USAS-B16-14	80204	1	3-27	6
	CAP, GROOVED: 4 in size	60-4	79154	1	3-29	5
	CAP, GROOVED: 6 in size	60-6	79154	1	3-29	5
	COUPLING, GROOVED: 4 in size	77D-4	79154	1	3-29	6
	COUPLING, GROOVED: 6 in size	77D-6	79154	1	3-29	6
	COUPLING, GROOVED: 8 in size	77D-8	79154	1	3-29	6
4730-249-3929	ELBOW: 21/2 IN NPT	USAS-B16.3	80204	1	3-26	1
	ELBOW: 90 deg, 4 in size	13211E8080	97403	1	3-28	2
	ELBOW: 90 deg, 6 in size	13215E9716	97403	1	3-28	2
	ELBOW: 90 deg, 8 in size	13215E9717	97403	1	3-28	2
	FLANGE SET, BLIND: 6 in size	13216E7219	97403	1	3-1	10
	FLANGE SET, THREADED: 2 in size	13211E8081	97403	1	3-27	4
	FLANGE SET, THREADED: 4 in size	13215E9718	97403	1	3-29	2
	FLANGE SET, THREADED: 6 in size	13215E9719	97403	1	3-29	2
	FLANGE SET, THREADED: 8 in size	13215E9720	97403	1	3-29	2
	GAGE, INDICATING: liquid level	13200E9129-1	97403	1		
	GASKET, FLANGE: 2 in size	13211E8057	97403	2	3-27	1
	GASKET, FLANGE: 4 in size	13215E9721	97403	2	3-28	6
	GASKET. FLANGE: 6 in size	13215E9722	97403	4	3-29	1
	GASKET, FLANGE: 8 in size	13215E9723	97403	2	3-29	1
4730-196-1511	NIPPLE, PIPE: 2% in NPT, 3 in lg	WW-N-351	81348	1		
	ADAPTER, GROOVED AND THREADED: 4 in size	40-4	79154	1		
	ADAPTER, GROOVED AND THREADED: 6 in size	40-6	79154	1		
	ADAPTER, GROOVED AND THREADED: 8 in size	40-8	79154	1		
	PLATE, WARNING	13211E8024	97403	1		
4730-221-2141	PLUG, PIPE: 1 in size	USAS-B16.14	80204	1	3-25	1
4730-278-3410	PLUG, PIPE: 2 in size	USAS-B16.14	80204	1	3-25	1
4730-278.0003	PLUG, PIPE: 4 in size	USAS-B16.14	80204	1	3-25	1
4730-044-2068	PLUG, PIPE: 6 in size	USAS-B16.14	80204	1	3-25	1
	PLUG, PIPE: 8 in size	USAS-B16.14	80204	1	3-25	1
	VALVE: non-freezing	13211E8082	97403	1	3-27	7
	VALVE: pressure-vacuum	13213E4596	97403	2	3-23	5

FSN	Description	Part No.	Mfg. Code Unit	Qty Per	Fig No	Item No
	AIR-INTAKE ASSEMBLY	13211E8070	97403	1		
5306-833-5334	BOLT: NO. 10-24 thd size, 1 in lg	FF-B-575	81348	2		
5306-042-6916	BOLT: I/2-13 thd size, 1/ in lg	FF-B-575	81348	20		
5306-865-9573	BOLT: /2-13 thd size, 5 in lg	FF-B-575	81348	30		
	CHANNEL, HATCH, BOLT CLIP	13215E9706	97403	10		
	COVER, HATCH	13215E9729	97403	1		
	COVER, MANHOLE	13211E8039	97403	1	3-24	1
	GASKET, HATCH: 8 in size	13215E9725	97403	1		
	WATER STORAGE					
	GASKET, MANHOLE COVER: 30 hole	13215E9727	97403	1		
5310-852-8593	NUT: No. 10-24 thd size	FF-N-836	81348	2		
5310-982-4940	NUT: /2-13 thd size	FF-N-836	81348	50		
	RESTRICTOR, DUST	13211E8073	97403	1		
	RING, CLAMPING	13211E8072		2		
	RING, SCREEN: inside	13211E8071	97403	1		
	SCREEN, INSECT	13211E8077	97403	1		
	SPACER	13211E8074	97403	15		
	TANK DECK					
	ANGLE: rafter bolt retainer	13211E8095	97403	14	3-21	4
	CENTER SUPPORT ASSEMBLY	13211E8026	97403	1	3-19	-
5306-010-9216	BOLT, SQUARE HEAD: '/2-13 thd size, 1 in lg	FF-B-575	81348	14	3-19	3
5306-959-7813	BOLT, SQUARE HEAD: '/2-13 thd size, 1 1/4 in lg	FF-B-575	81348	6	3-19	6
	BRACKET, LADDER SUPPORT	13211E8112	97403	2	3-19	8
	MANHOLE DOME	13211E8048	97403	1	3-19	7
5310-982-4940	NUT: l/2-13 thd size	FF-N-836	81348	20	3-19	5
	RAIL, LADDER SUPPORT	13211E8111	97403	2	3-19	1
	STEP LADDER	13211E8032	97403	5	3-19	4
	WASHER, SEALING: '/2 in screw size	13211E8059	97403	20		
	CHANNEL: deck plate	13211E8078	97403	14	4-9	1
	CHANNEL: hatch bolt clip	13215E9706	97403	16		
	COVER, HATCH: 8 in size	13215E9728	97403	2		
	GASKET: manhole and cover plate, 28 hole	13215E9726	97403	2		
	PLATE, DECK	13211E8114	97403	1	3-20	1
	PLATE, DECK: hatch	13215E9708	97403	1	4-8	2
	PLATE, DECK: hatch	13215E9709	97403	1	4-10	1
	PLATE, DECK: plain	13211E8028	97403	11	3-20	1
	SIDE STAVES					
	CHANNEL: cleanout, side	13215E9702	97403	2	3-30	5
	CHANNEL: cleanout, top	13211E8079	97403	1	330	1
	CHANNEL: side staves	13215E9704	97403	14	3-9	3
	COVER, CLEANOUT	13211E8047	97403	1	3-33	1
	RETAINER, BOLT: cleanout cover, top	13215E9701	97403	1	3-30	4
	RETAINER, BOLT: cleanout cover, vertical	13215E9704	97403	2	3-30	6
	STAVE: cleanout	13211E8046	97403	1	4-6	5
	STAVE: plain	13211E8045	97403	9	4-6	2
	STAVE: 2 in water drawoff	13215E9710	97403	1	4-6	4
	STAVE: 4 in outlet	13215E9711	97403	1	4-6	3
	STAVE: 6 in outlet	13215E9712	97403	1	4-6	1
	STAVE: 8 in outlet	13215E9713	97403	1		
	TANK BOTTOM					
	CHANNEL: bottom plates	13211E8078	97403	14	3-2	2
	CHANNEL: center plate	132115E9705	97403	14	4-1	5
	GASKET: center plate	13215E9726	97403	1	4-1	3
	PLATE: bottom. center	13215E9715	97403	1	4-1	1
	PLATE: bottom. outlet	13211E8027	97403	1	4-1	7
	PLATE: bottom. plain	13215E9707	97403	13	4-1	6
	ATTACHING COMPONENTS					
5306-010-9216	BOLT, SQUARE HEAD: 1/2-13 thd size. 1 in lg	FF-B-575	81348	1016	4-9	4

FSN	Description	Part No.	Mfg. Code	Qty Per Unit	Fig No.	Item No.
5306-959-7813	BOLT, SQUARE HEAD: 1/2-13 thd size, 1¼ in lg	FF-B-575	81348	2644	4-2	1
5306-042-6916	BOLT, SQUARE HEAD: 1/2-13 thd size, 11/2 in lg.	FF-B-575	31348	180	4-1	4
	GASKET, FILLET	13211E8055	97403	40	3-11	4
	GASKET, STRIP	13211E8054	97403	700Ft	4-2	2
	GASKET, WEDGE	13211E8056	97403	110	4-2	4
5310-982-4940	NUT: 1/2-13 thd size	FF-N-836	81348	3840	4-9	5
5430-693-2968	PLUG, BOLT REPLACEMENT	13211E8058	97403	6	3-5	-
	WASHER, SEALING: /2 in screw size	13211E8059	97403	2794	3-3	4
	RE-ERECTION KIT					
5430-217-2159	KIT, RE-ERECTION	13217E5407	97403	1		
5306-010-9216	BOLT: 1/2-13 thd size, 1 in ig	FF-B-575	81348	1050		
5306-959-7813	BOLT: 1/2-13 thd size, 1 1/4 in ig	FF-B-575	81348	2650		
5306-042-6916	BOLT: 1/2-13 thd size, 1 1/2 in ig	FF-B-575	81348	200		
5306-042-6936	BOLT: 1/2-13 thd size, 2 1/2 in ig	FF-B-575	81348	4		
5306-964-0963	BOLT: 5/8-11 thd size, 3 1/2 in Ig	FF-B-575	81348	17		
5306-019-1857	BOLT: 5/8-11 thd size, 4 in ig	FF-B-575	81348	8		
	BRUSH, APPLICATOR: sealing compound	H-B-420	81348	4		
	GASKET, FILLET	13211E8055	97403	40		
	GASKET, FLANGE: 2 in size	13211E8057	97403	4		
	GASKET, FLANGE: 4 in size	13215E9721	97403	4		
	GASKET, FLANGE: 6 in size	13215E9722	97403	4		
	GASKET, FLANGE: 8 in size	13215E9723	97403	4		
	GASKET, FLANGE: 10 in size	13215E9725	97403	1		
	GASKET, HATCH	13215E9724	97403	4		
	GASKET, MANHOLE: 28 hole	13215E9726	97403	4		
	GASKET, MANHOLE: 30 hole	13215E9727	97403	2		
	GASKET, STRIP	13211E8054	97403	700ft.		
	GASKET, WEDGE	13211E8056	97403	110		
5310872-4940	NUT: 1/2-13 thd size	FF-N-836	81348	3904		
5310-012-5550	NUT: 5/8-11 thd size	FF-N-836	81348	25		
5430-693-2968	PLUG. BOLT REPLACEMENT	13211E8058	97403	3		
8030-800-6382	PUTTY, SEALING	MIL-P-20628	81349	1 gal		
7920-205-1711	RAGS	DDD-R-30	81348	101b		
8030-598-4503	SEALING COMPOUND	MIL-S-14231	81349	15qt		
	WASHER. SEALING: 1/2 in screw size	13211E8059	97403	2800		

CHAPTER 6

ERECTION INSTRUCTIONS FOR

THE 1000-BARREL CAPACITY TANK

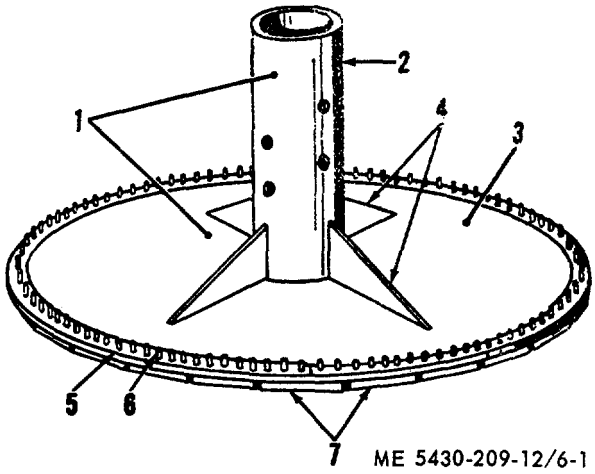
Section I. ASSEMBLY AND INSTALLATION OF TANK BOTTOM

6-1. Center Support Base

a. General. The center support base consists of a short, tubular, support column mounted on a circular, flat, steel plate. The column is held in position on the steel plate by radially mounted and welded gussets. Bottom plates of the tank are bolted to the center support base plate.

b. Installation.

(1) Position center support base (1, fig. 6-1) over the center grade stake.



1. CENTER SUPPORT BASE
2. SUPPORT COLUMN
3. BASE PLATE
4. STEEL GUSSETS
5. STRIP GASKET
6. BOLT
7. FIVE-BOLTHOLE CHANNEL

Figure 6-1. Center support base with channels, bolts, and gasket installed.

(2) Place strip gasket (5) around the bolt circle of the center support base. Where a break occurs in the gasket, overlap the joint two boltholes. Make a cut squarely across the second bolt hole in the gasket. This will insure a smooth joint where the gasket overlaps.

(3) Insert five 1/2 by 1/2 inch bolts (6) in the 5-bolt hole channel (7).

CAUTION

To prevent damage to the gasket, do not use a sharp-edged tool or pipe to force gasket over bolts. Use a rounded, smooth-mouth tool.

(4) Insert bolts (6) to channel assembly through center support plate (3) and gasket (5).

(5) Place bolt retaining boards under center support plate as the channel assemblies are installed. Remove boards as bottom plates are installed.

6-2. Assembly of Bottom Plates

a. General. The tank bottom consists of twenty tapered, flat, steel plates. All plates are plain and interchangeable. They are bolted to the center column base plate. When completely assembled, the bottom plate pattern resembles a spoke wheel.

b. Layout of Plates. For convenience in installation, each plate should be placed in its relative position around the outside of the tank foundation.

c. Assembly First Bottom Plate. The first bottom plate (1, fig. 6-2) has two bolt channels (2 and 4) placed under each radial lap seam. Strip gasket is placed along each seam. Seams are identified as right and left, facing the large end.

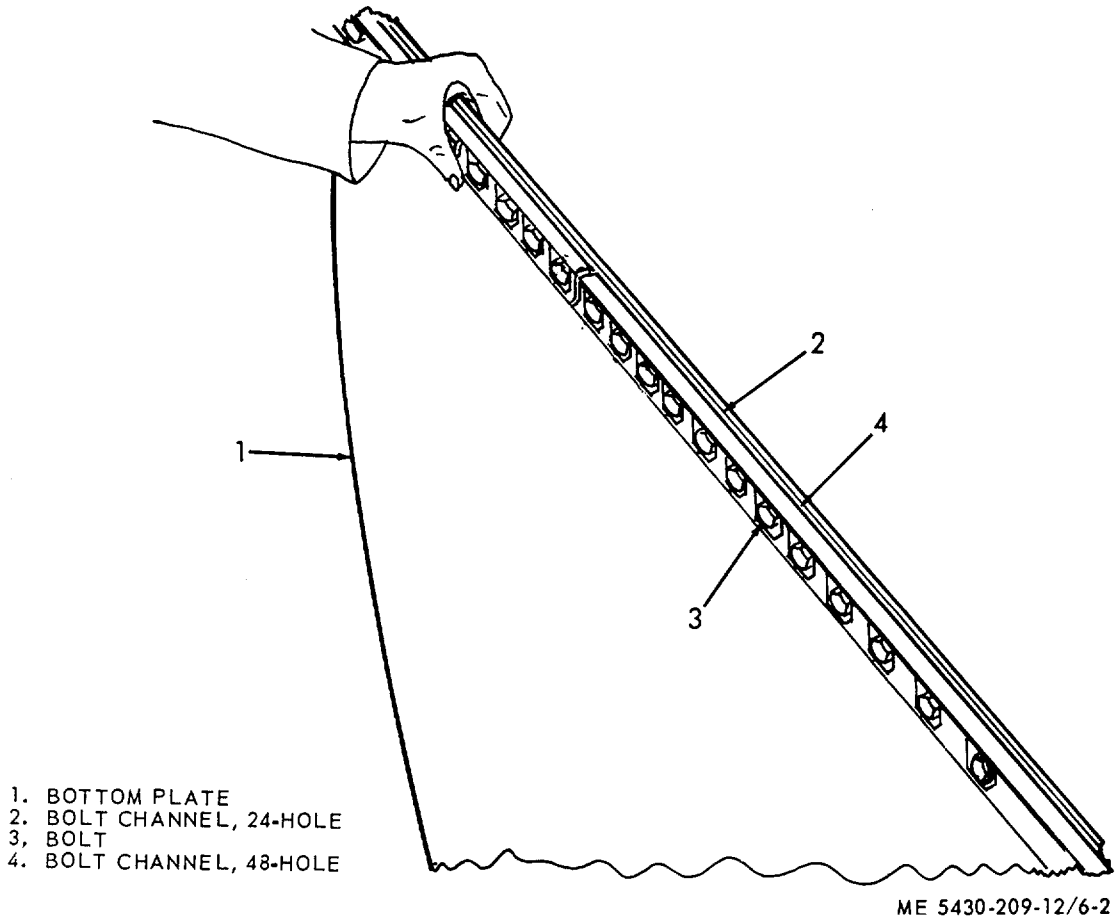
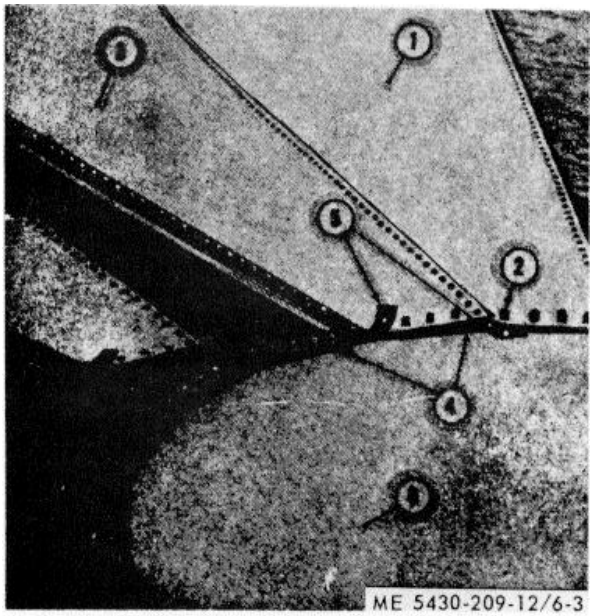


Figure 6-2. First bottom plate installed.

(1) Starting at large end of plate (1, fig. 6-2) place a bolt channel (2) under the right and left lap seams of the plate. Insert bolts (3) through all except the chime bolt holes in the plate and channels.

(2) As channels are placed, position retaining boards against boltheads to facilitate installation of strip gaskets (5, fig. 6-3).



1. FIRST BOTTOM PLATE
2. BOLT
3. FIRST INTERMEDIATE PLATE
4. WEDGE GASKET
5. STRIP GASKET
6. CENTER SUPPORT BASE

Figure 6-3. Installation of bottom plates.

(3) Place bolt channel (4, fig. 6-2) under the right and left lap seams of the plate. These channels line up with and about the inner ends, of the 24-hole channels (2). Insert bolts (3) through all bolt holes.

(4) Install gasket (5, fig. 6-3) along the full length of the right and left lap seams. Allow a 1 1/2 - bolthole overlap at each end.

NOTE

When there is a break in the gasket material, the ends should overlap 2 boltholes and be cut squarely across the second hole. Sealing compound must be applied to each end of the overlap strip to insure a leakproof joint.

(5) Upon completion of the assembly, move this plate to its approximate installation position on the tank foundation.

d. Assembling Intermediate Bottom Plates. There are eighteen intermediate plates assembled with channels and strip gaskets. Except that channels are placed under right lap seams only, follow assembly procedures outlined in c above. These procedures do not apply to the last bottom plate, since no further assemblies are made on it. Keep the last bottom plate separated from all others until it is installed.

6-3. Installation of Bottom Plates

a. General. With the first bottom plate in its approximate position, lay the remaining plates around the tank foundation. Place bolt retaining boards under each channel as bottom plates are installed on the center support base.

b. First Plate.

(1) Place small end of plate (1, fig. 6-3) over center column base bolts (2).

(2) Place a steel recessed washer, cupped side down, over each bolt and install a nut loosely on each bolt.

NOTE

Do not tighten nuts on bolts until all bottom plates have been installed.

c. First Intermediate Plate.

NOTE

Wedge gaskets must be used wherever three plates are joined together.

(1) Place wedge gasket (4, fig. 6-3) over strip gasket (5) at right edge of first plate.

NOTE

Use 1/2 by 11/2 inch bolts wherever three plates are joined together.

(2) Face small end of plate. Install this plate to left of first plate, or in a counterclockwise direction, around the tank foundation.

(3) Place small end of plate over bolts (2) with right lap seam laid over bolts (3, fig. 6-2) in the left lap seam of first plate (1, fig. 6-3).

(4) Install steel recessed washer and nut on each bolt along the lap seam and on the center base bolts as described in b (2) above.

d. Remaining Intermediate Plates. Install remaining intermediate plates as described in c above.

e. Last Plate. Refer to paragraph 4-3d and install the last plate.

6-4. Tightening Tank Bottom

Start at small end of bottom plates and work toward large end, tightening nuts evenly in each lap seam. Avoid crushing the gaskets. Tighten nuts to a maximum of 40 to 50 foot-pounds of torque.

6-5. Bolt Replacement Plug

If threads are stripped on one or more bolts, drive out bolt and use a bolt replacement plug as instructed in paragraph 3-4.

6-6. Testing Seams for Leakage

Refer to paragraph 3-5 and test tank bottom seams for leakage utilizing the vacuum seam tester provided with the storage tank erection outfit.

6-7. Sealing Seams

WARNING

If tank is to be used for water storage, do not apply sealing compound to tank bottom.

Sweep bottom of tank clean after testing seams. With bottom dry, apply sealing compound to all bolts and seams.

Section II. ASSEMBLY AND INSTALLATION OF SIDE STAVES

6-8. Assembly of Side Staves

a. General. This is a single ring tank. Place all center support ladder components and manhole dome on the bottom before laying staves around the perimeter of the tank foundation. This is to avoid having to lift them over the tops of the staves later. Top and bottom flanged edges of staves are called chimes; side edges are called vertical seams. The staves have two rows of bolt holes in each seam.

NOTE

Stave assemblies for petroleum and water storage tanks are all the same except for special fittings.

b. Layout of Staves. Five special and 15 plain staves make up the ring.

(1) Place staves with opening and pipeline connections in proper position.

(2) Lay remaining staves around the perimeter of the bottom. Place staves with chimed side down for convenience in preparing them for assembly. Staves are laid out so each straddles a radial seam of the bottom when installed.

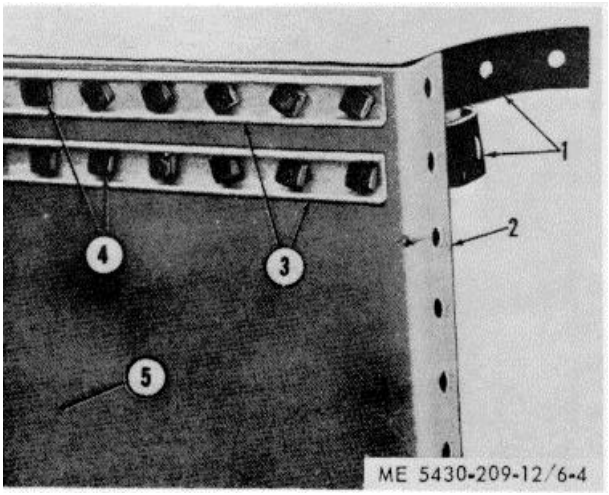
NOTE

Staves have an offset at top and bottom. The top is determined by looking at the staves in a vertical position from the outside. In proper position, offsets are at the lower left and upper left corner.

c. Dressing Staves.

(1) Each end of the chime at the offset and plain section must be slightly bent for ease in installing. End of the chimes at the offsets (1, fig. 3-8) must be bent inward (towards each other). End of the plain chimes (2) are bent outward (away from each other). Bends are made with a few sharp blows from a hammer.

(2) Along the right seam of each stave, as it will be put in place with the chimes out, place strip gasket (1, fig. 6-4) on the outside at each row of boltholes. Gasket material comes in rolls and is cut to proper length for each stave. Cut gasket material so that it covers and projects two boltholes past the top and bottom chimes (2).



1. STRIP GASKET
2. CHIME
3. STAVE JOINT CHANNEL
4. BOLT
5. STAVE

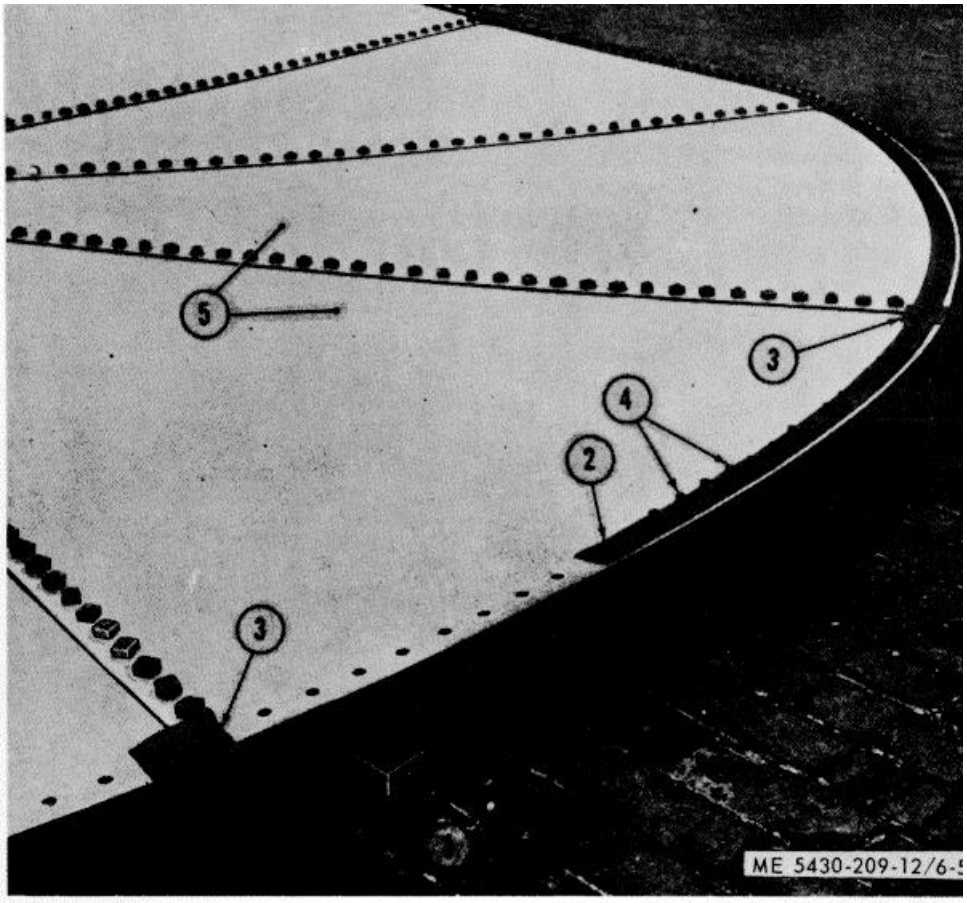
Figure 6-4. Dressed vertical seam of stave.

(3) Place channel (3) on inside of stave (5) over each row of boltholes.

(4) Insert bolts (4) through stave joint channels (3), stave (5), and gaskets (1), from the inside. Omit one bolt (4) in each row of boltholes about 10 inches from bottom of stave and other bolts at about 2-foot intervals, so that drift-pins can be inserted to aline staves with one another before bolting them together.

d. Preparing Outer Edge of Tank Bottom. As no channels are used with the bolts inserted through the chime (outer edge) of the bottom, it must be raised to provide clearance to insert and tighten the bolts for installation of the staves.

(1) Raise the chime and block it up with short lengths of 3 by 3 or 4 by 4 inch timbers (1, fig. 6-5) at equally spaced intervals around the perimeter of the bottom. Set the inner end of the blocking about 6 inches in from the outer edge of the chime.



1. BLOCKING
2. STRIP GASKET
3. WEDGE GASKET
4. BOLT
5. TANK BOTTOM

Figure 6-5. Preparing outer edge of tank bottom.

(2) Install strip gasket (2) to cover all boltholes. When one roll of gasket is used up and another started, the overlap should extend over two boltholes. Apply sealing compound at each overlap.

(3) Insert wedge gasket (3) underneath strip gasket (2) at seams formed by the bottom plates.

(4) Insert bolts (4) through all boltholes in the bottom and gasket (2).

6-9. Installation of Side Staves

a. General. The first stave installed must be one fitted with a pipe coupling of the same size as the tank supply pipe. Staves are installed in a counterclockwise direction around the tank bottom.

b. First Stave.

(1) Place first stave (1, fig. 6-6) over bolts (2) so that stave straddles a radial seam in tank bottom. As a result, each subsequent stave will straddle a radial seam.

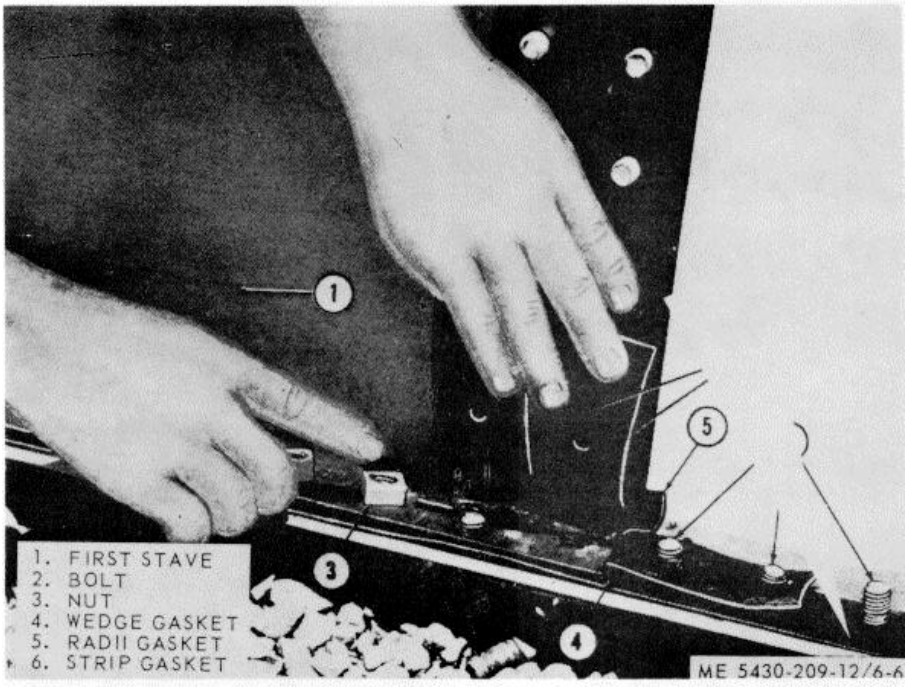


Figure 6-6. Installing first stave.

(2) Install nuts (3) on chime bolts (2) to hold stave in position. Run down nuts by hand to fasten stave loosely. Do no install nuts on two end bolts at each side of stave.

NOTE

Nuts are not tightened until the last stave in ring is in place.

CAUTION

Radii gaskets must be placed between chimes and rubber gasket material at top and bottom seams of all staves to insure a leakproof connection.

(3) Two special gaskets are required. Wedge gasket (4) fills the space by the lap offset at vertical seam. Radii gasket (5) is installed underneath strip gasket (6) at bottom and top chimes of the stave.

c. First Intermediate Stave.

(1) Set first intermediate stave (1, fig. 3-12) over chime bolts (2, fig. 6-6) so that its left seam will be outside the right seam on the first stave (2, fig. 3-12).

(2) Use drift pins (3) in open bolt holes to aline the holes in the first intermediate staves (1) with bolts in the first stave (2). Install nuts (4) loosely on every sixth or tenth bolt in each row to hold first intermediate stave (1) in place.

(3) Install wedge gasket and radii gasket at chimes on right seam of stave as instructed in b (3) above.

(4) Install nuts (3, fig. 6-6) loosely on all chime bolts (2), except two right ones, of the first intermediate stave (1, fig. 3-12).

NOTE

As remaining staves are installed, check carefully the position of all radii, wedge, and strip gaskets.

d. Remaining Intermediate Staves.

(1) Face the outside of first intermediate stave (1, fig. 3-12) and install the next 17 staves to the right of this stave (1), or in a counterclockwise direction around the bottom. Follow the procedure in c above.

(2) Assemble hook ladder (1, fig. 3-13) and hook it over the inside of the staves.

(3) As staves are installed, stand on ladder and hammer heads of all bolts (2) squarely into the channels. Install bolts in the alining holes and seat the bolts.

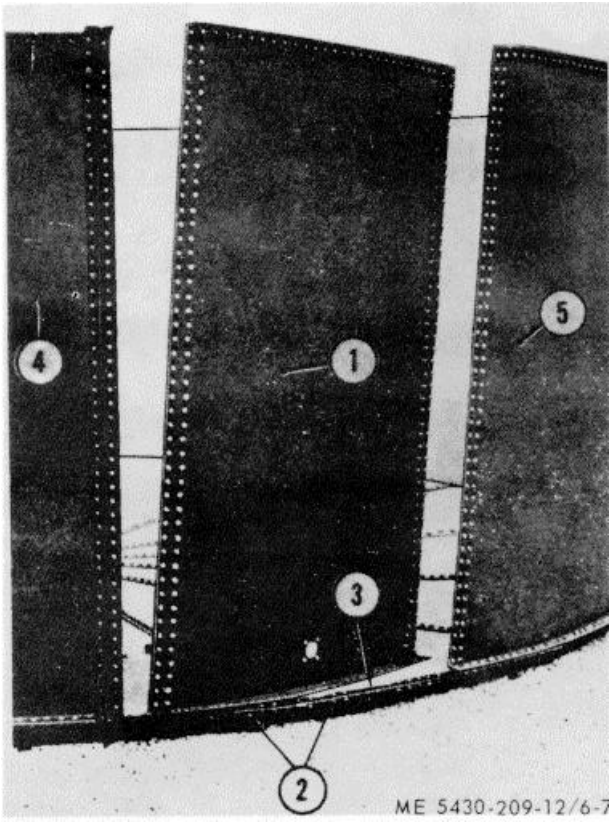
CAUTION

All bolt heads must be seated squarely in the stave joint channels to insure proper tightening of nuts.

(4) Move hook ladder to outside of tank. Remove loose nuts and place a steel recessed washer, cupped side down, over each lap seam bolt. Install a nut loosely on each bolt.

e. Last Stave.

(1) To assist in installation of last stave (1, fig. 6-7), push all chime bolts (2) of the bottom flush with gasket (3) to provide clearance for sliding in the last stave.



1. LAST STAVE
2. CHIME BOLTS
3. STRIP GASKET
4. LAST INTERMEDIATE STAVE
5. FIRST STAVE

Figure 6-7. Installing last stave.

(2) Install wedge gasket and radii gasket at chimes on right seam of last stave as instructed in b (3) above.

(3) Set stave (1) in position with its left seam outside the right seam of last intermediate stave (4), and its right seam inside the left seam of first stave (5). Loosen bottom chime nuts of staves (4 and 5).

(4) Lift first stave (5) slightly so the bottom chime of last stave (1) will slip into place. Use drift pins (3, fig. 3-12) and aline the holes and bolts in staves (1, 4, and 5. fig. 6-7). Install nuts loosely on every sixth or tenth bolts in each row to hold last stave (1) in place.

(5) Install nuts (3, fig. 6-6) loosely on all chime bolts (2).

(6) Seat all seam bolts, and install steel washers and nuts as instructed in d above.

f. Tightening Staves.

(1) Tighten all nuts (3, fig. 6-6) on chime bolts (2) uniformly.

(2) Use heavy long timber (2, fig. 3-15) as a lever and short timbers (3) as a fulcrum to raise the tank bottom, and remove all blocking (1).

(3) Start at the bottom of each stave lap seam and work toward the top, tightening the nuts evenly in each row of each seam. Replace stripped nuts or bolts.

(4) Apply sealing compound to inside perimeter of tank at seams (1, fig. 3-16) formed by the staves and bottoms (3).

6-10. Scaffold

a. General. Scaffold components are provided in the tank tool erection set. Before proceeding with further erection of the tank, it is necessary to install scaffold components around the top chime of the staves.

b. Installation. Refer to paragraph 3-8 and install the scaffold.

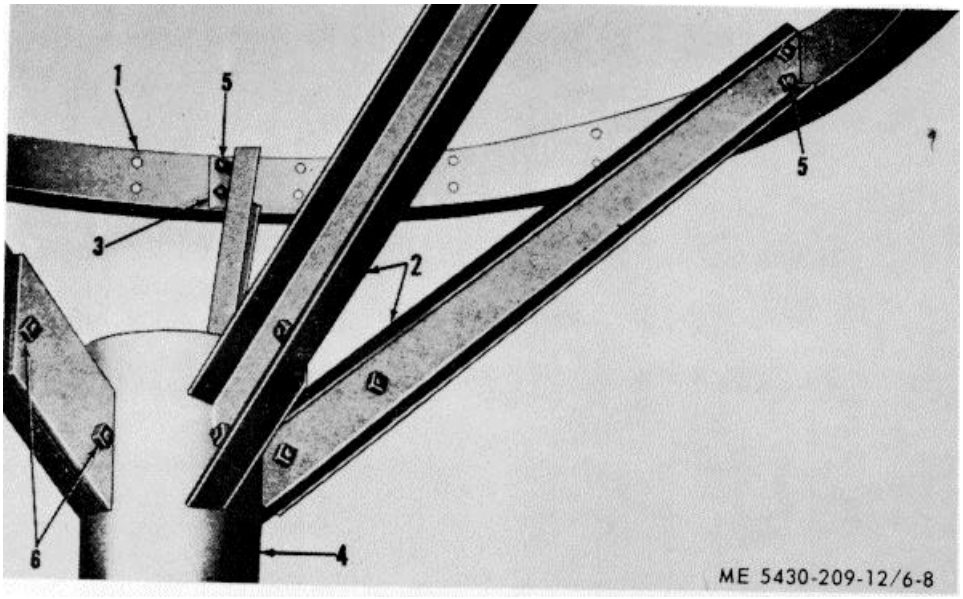
6-11. Dressing Top Chime

Refer to paragraph 3-9 and dress the top chime.

Section III. ASSEMBLY AND INSTALLATION OF TANK CENTER SUPPORT ASSEMBLY

6-12. Assembly of Umbrella-Type Deck Support

a. General. The umbrella-type deck support consists of a 1-piece, rafter landing ring (1, fig. 6-8) fitted on the inside with five equally spaced struts (2). Each strut is connected by a strut clip (3) and bolts (5) to the rafter landing ring (1). Gusset cone (4) is the center component of the support. It has five plates to which the struts are connected by bolts (6).



1. RAFTER LANDING RING
2. STRUT
3. STRUT CLIP
4. GUSSET CONE
5. BOLT
6. BOLT

Figure 6-8. Umbrella-type deck support assembled.

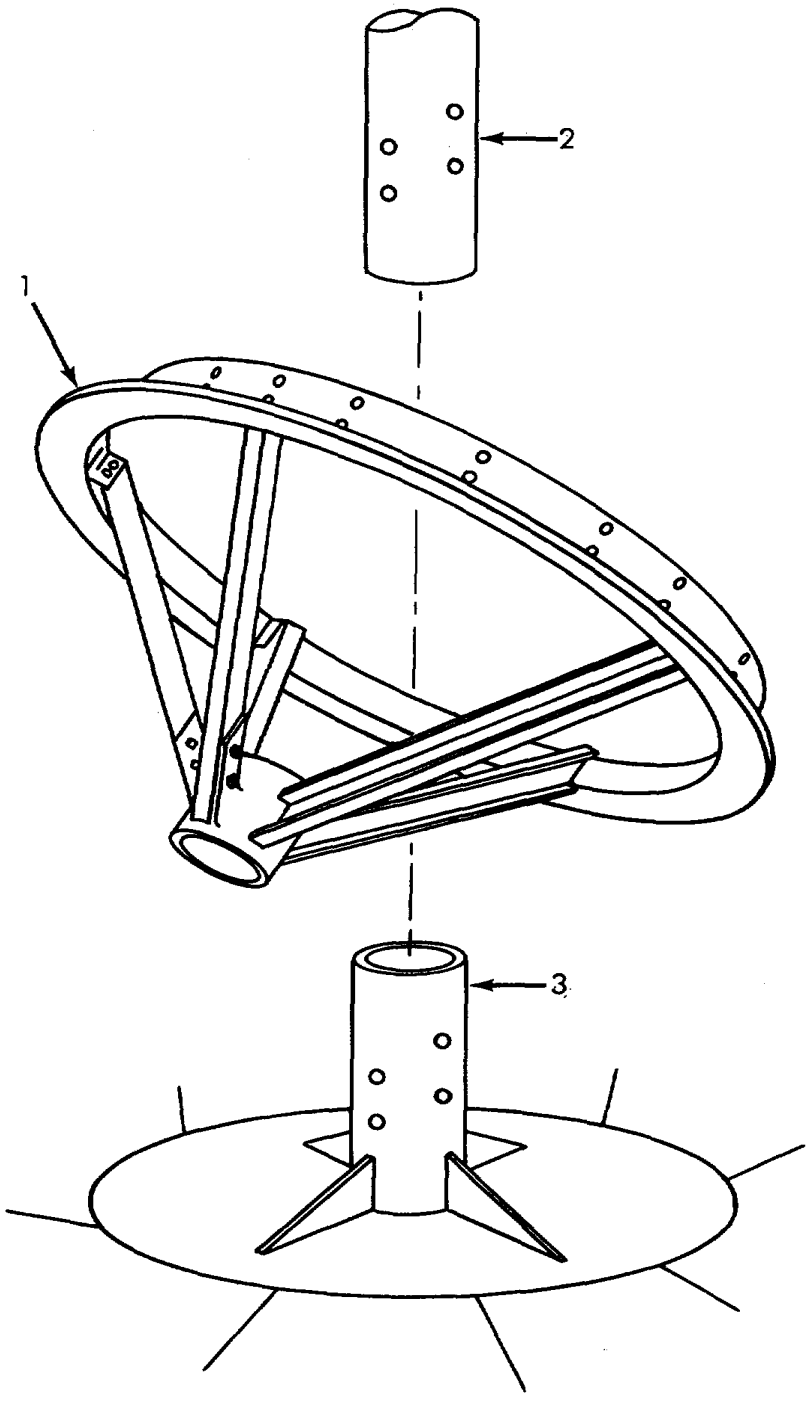
b. Assembly.

(1) Attach strut clip (3, fig. 6-8) to each strut (2) using ½ by 1-inch bolts (5) and nuts.

(2) Attach opposite end of each strut to a plate of gusset cone (4) using 1/2 by 1 /4 -inch bolts (6) and nuts.

(3) Place ring (1) over struts (2) and connect each strut clip (3) to the ring with /2 by 1-inch bolts (5) inserted from strut side. Install nuts on bolts and tighten securely.

(4) Position assembled umbrella-type support (1, fig. 6-9) in bottom of tank so that any two struts (2, fig. 6-8) straddle center support base (3, fig. 6-9) before installing center support (2).



1. UMBRELLA-TYPE DECK SUPPORT
2. CENTER SUPPORT COLUMN
3. CENTER SUPPORT BASE

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Figure 6-9. Umbrella-type deck support prior to installation.

6-13. Installation of Tank Center Support Assembly

a. General.

(1) Tank center support assembly components consist of the center support base (fig. 6-1), center support (1, fig. 6-10), step plate (8), two 1 by 8 by 9-inch center support bolts, and the assembled umbrella-type deck support (7).

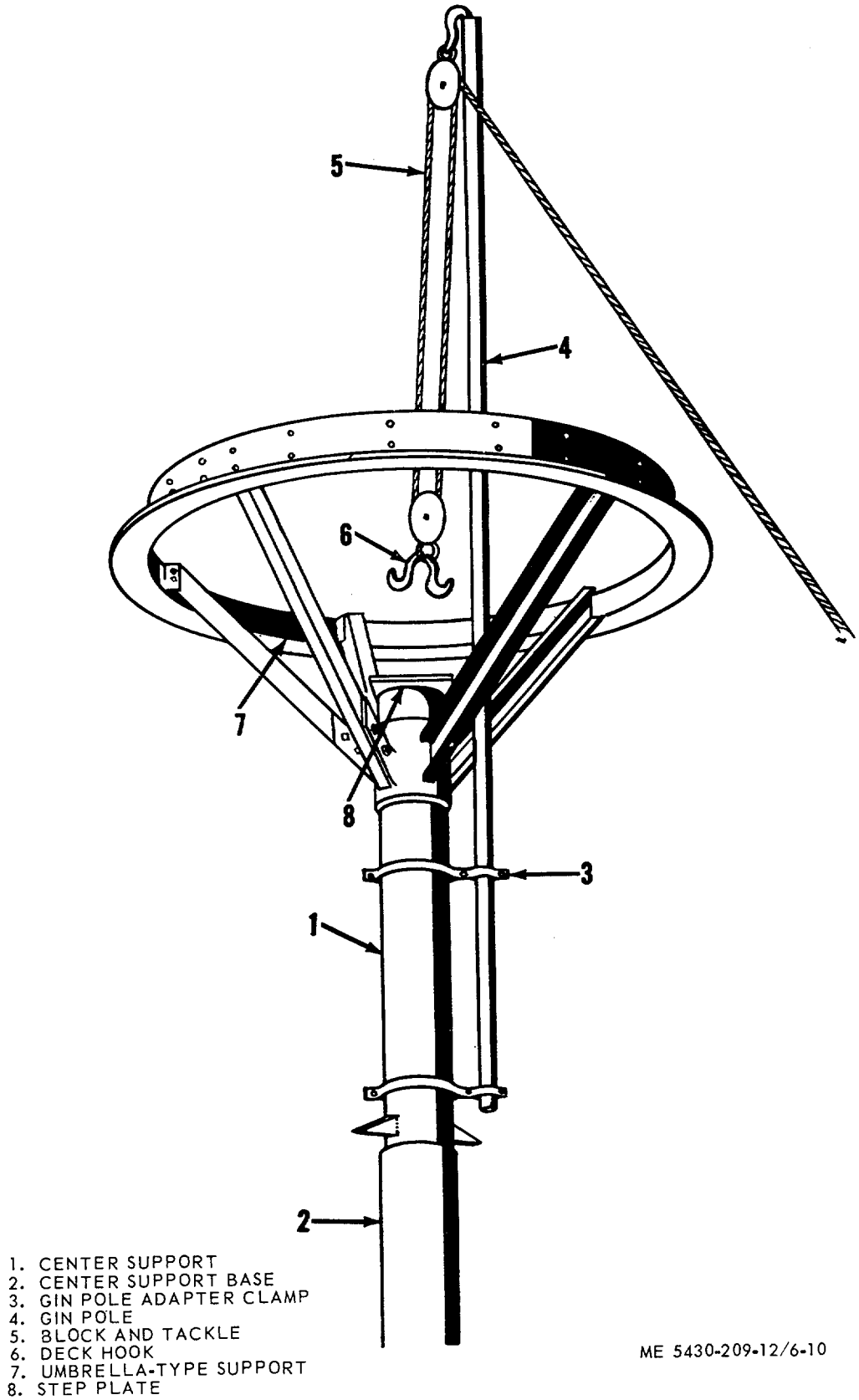


Figure 6-10. Tank center support assembly installed.

(2) Gin pole components, provided in the storage tank-erection outfit and illustrated on figure 6-10, are required to install deck support (7) and the tank top deck.

b. Installing Center Supports. The end of center support (1, fig. 6-10), which has four welded support angles, is the top. Lift support and install bottom end in center support base (2).

c. Installing Gin Pole.

(1) Install gin pole adapter on center support (1, fig. 6-10) just below the support angles near top of support.

(2) Assemble top and middle sections of gin pole, less the center rest.

(3) Slide assembled gin pole (4) through adapter clamp (3) on support (1).

(4) As gin pole (4) is raised through adapter clamps (3) attach block and tackle (5) to the head block eye.

(5) Attach two deck hooks (6) to the lower block of block and tackle (5).

(6) Place heavy wooden block on center support base (2) to support the bottom end of pole (4).

(7) With pole (4) on the wooden block, aline pole so that it is parallel to center support (1).

(8) Tighten adapter (3) and lash bottom of gin pole (4) to center support base (2).

d. Installing Umbrella-Type Support.

(1) Attach a rope sling to rafter landing ring (1, A fig. 6-8) of assembled umbrella-type support.

(2) Attach hooks (6, fig. 6-10) to the sling and lift support (7) slightly above the top of center support (1).

(3) Lower umbrella-type support so the gusset cone goes over

(4) ooks (6) and remove rope sling.

(4) Place step plate (8) over center support (1). Aline holes and install center support bolt through plate and center support. Secure bolt with nut.

e. Adjusting Tank Center Support.

(1) Measure distance from top of center support base plate (3, fig. 6-1) to top of support angles on center support (1, fig. 6-10). Distance between these points should be 6 feet, 5/16 inch.

(2) Place a jack on heavy timber under each jack lug at bottom of support (1). Using the jack, raise assembled support until correct measurement is obtained.

(3) Aline boltholes in support (1) and base (2). Install bolt through alined holes and secure with a nut.

(4) Remove jacks and blocking.

Section IV. ASSEMBLY AND INSTALLATION OF TANK DECK

6-14. Assembly of Deck Plates and Rafters

a. General.

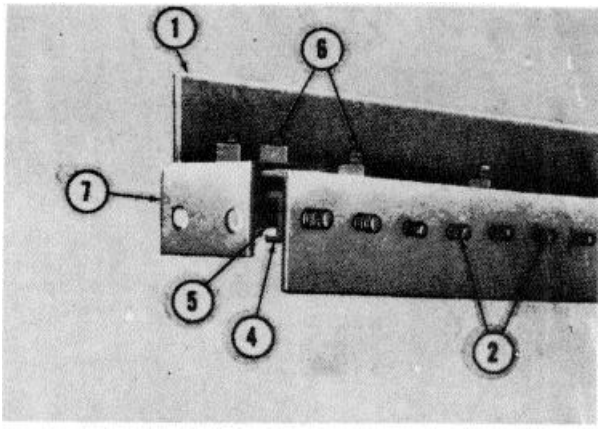
(1) The assembled deck consists of 20 tapered, flat, steel plates and 20 Z-bar rafters. Rafters are attached to the top chime of the staves and the rafter landing ring (1, fig. 6-8).

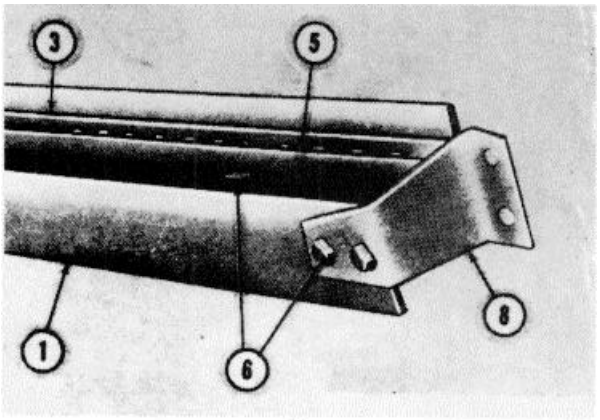
(2) All plates are interchangeable. Seventeen plates (1, fig. 1-3) are identical; three are special plates. Each of two special plates (special deck plates) has an 8-inch hole for installation of a pressure vacuum valve (6). The third special plate is the level indicator plate. This plate is equipped with a half coupling welded into the plate and a 1-inch pipe plug connected to the coupling.

(3) All rafters are interchangeable and identical. One rafter is assembled under each lap seam of the plates.

(4) The center deck section assembled with manhold dome (3) completes the tank deck.

b. Assembling Rafters. The top of the rafter (1, fig. 6-11) is the portion with 71 holes drilled on 2-inch centers. The inner end has two holes drilled on 2-inch centers in the vertical portion 1 1/8 inches from the end. The outer end has two holes drilled on 2-inch centers in the bottom of the rafter 1 inch from the end.





1. RAFTER
2. BOLT
3. LONG CHANNEL
4. SHORT CHANNEL
5. RETAINER ANGLE
6. BOLT
7. RAFTER CLIP
8. RAFTER HANGER

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Figure 6-11. Deck rafter assembled.

(1) Insert /2 by 11/4 inch bolts (2) through long channel (3) and short channel (4) for each rafter (1).

(2) Block up each rafter, top side down. Insert bolts (2) of long channel (3) in the rafters, starting at the outer end. Insert bolts (2) of short channel (4) in the rafters next to long channel (3). Be sure bolt heads are seated squarely in the channels.

(3) Place retainer angle (5) on bolthead side of each rafter so that the plain leg of the angle is toward the bolts. Secure the angle to the rafter with eight l/2 by 1 inch bolts (6) and nuts.

(4) Install a rafter clip (7) on the inner end of each rafter as shown on A, figure 6-11. Secure the clip to the rafter with two bolts (6) and nuts.

(5) Install a rafter hanger (8) on the outer end of each rafter as shown on B, figure 6-11. Secure the hanger to the rafter with two bolts (6) and nuts.

c. Assembling Deck Plates.

(1) Bottom of deck plates are the side with light colored paint. Plate lap seams are identified as right and left by facing large end of the plates. First plate installed is assembled with rafters under each lap seam. No assembly is required for the last plate. Intermediate plates are assembled with a rafter under the right lap seam.

(2) Assemble a rafter under the right lap seam of nineteen plates so that bolts (2) will pass through holes in the plates, leaving two end boltholes of each plate vacant.

CAUTION

Do not use sharp-edge tool or pipe to force gasket over bolts. Use well rounded, smooth-mouth tool.

(3) Install strip gasket (5, fig. 6-3) over bolts along full length of the right lap seam. Allow 1l/2-bolthole overlap at each end.

NOTE

When there is a break in the gasket material, ends should overlap two boltholes and be cut squarely across the second hole. Apply sealing compound to each end of overlapped gasket to insure a leakproof joint.

(4) Install a nut loosely on each end bolt and middle bolt to hold plate and rafter together during installation.

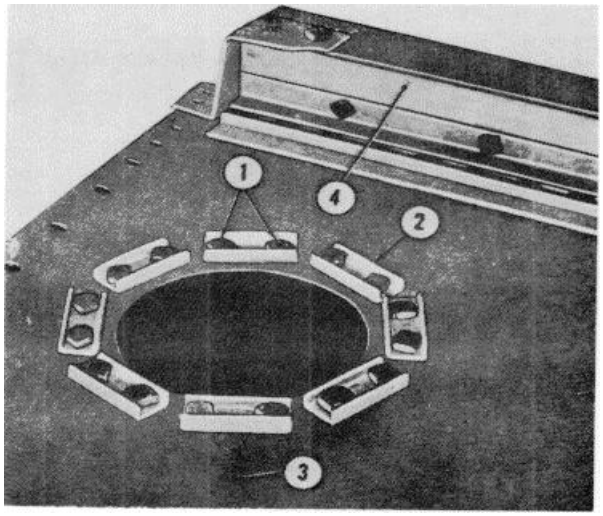
(5) On one of the nineteen previously assembled plates, assemble a rafter under the left lap seam. Follow procedures in steps (2), (3), and (4) above. This will be the first plate installed.

d. Assembling Special Plates.

NOTE

If tank is to be used for water storage, omit the two pressure vacuum valves and substitute the blind hatch flange.

(1) For each deck plate, insert '/2 by 11/2-inch bolts (1, fig. 6-12) in eight 2-hole bolt channels (2).



1. BOLT
2. CHANNEL
3. DECK PLATE
4. RAFTER

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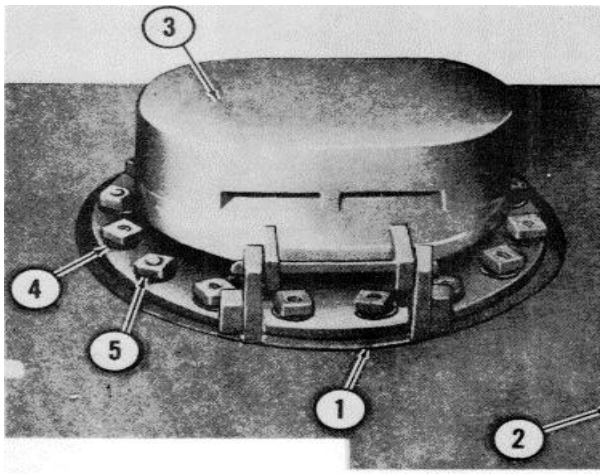
Figure 6-12. Assembling special deck plate.

(2) Install bolts and channels in each plate (3) from bottom side, as shown in figure 6-12.

(3) Place blocking against boltheads and install 16-hole gasket (1, fig. 6-13) over bolts on top side of plate (2).



1. HATCH GASKET
2. DECK PLATE
3. PRESSUQ'E VACUUM VALVE
4. STEEL RECESSED WASHER
5. NUT

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Figure 6-13. Pressure vacuum valve installed.

(4) Install pressure vacuum valve (3) over gasket (1). Locate valve so that hinged side will be toward small end of deck plate (2).

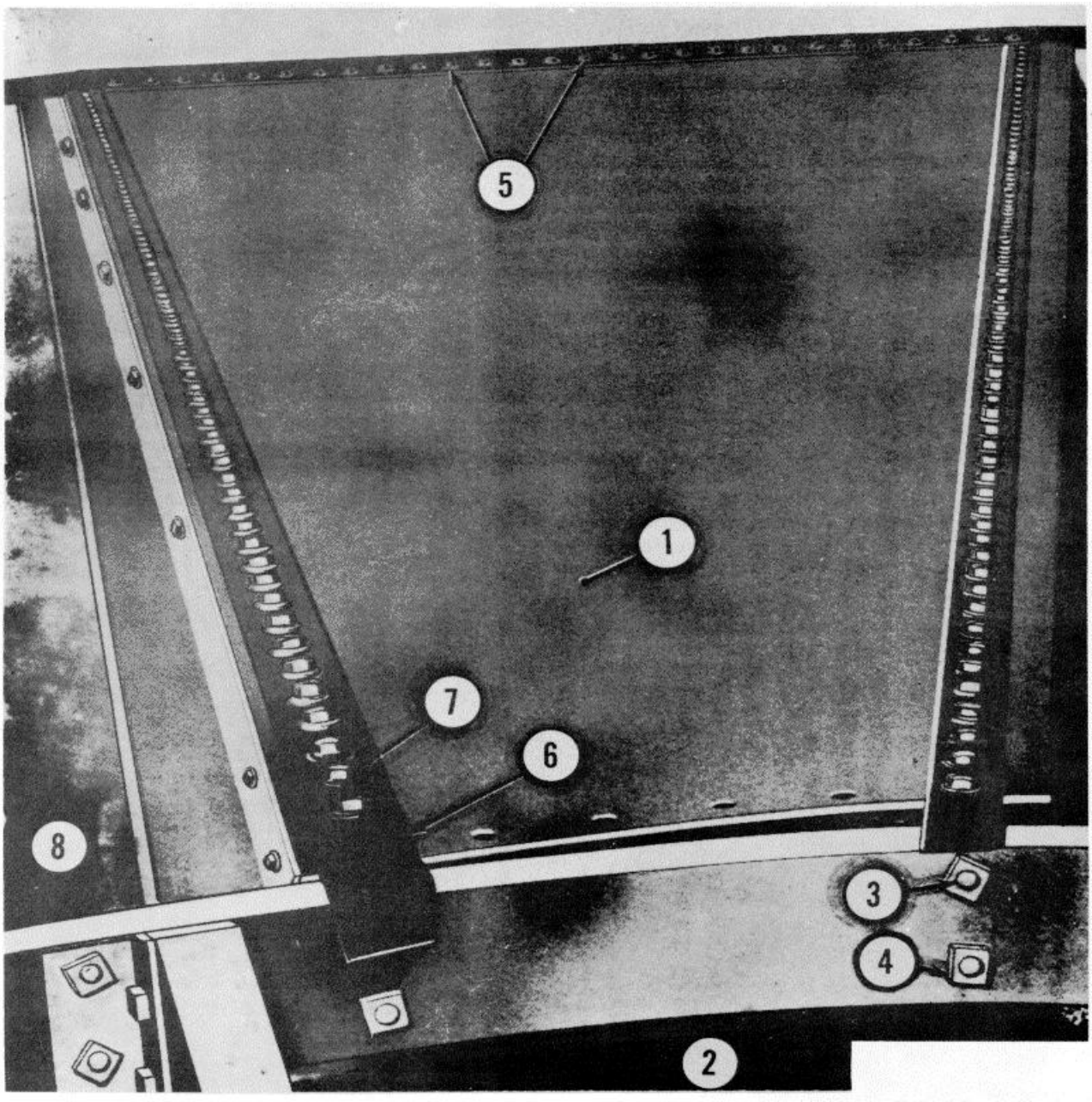
(5) Place steel recessed washer (4), cupped side down, on each bolt. Install and tighten nuts (5).

6-15. Installation of Tank Deck

a. Deck Plates. Deck plates must be installed in counterclockwise direction as viewed from the 'side stave scaffold looking toward the center support. The deck plates are lifted for installation by lowering the tackle block with deck hooks (6, fig. 6-10) between the rafter landing ring (1, fig. 6-8) and the side staves to hook the inner end of the plate. Two men, each with a rope and a deck hook, lift the outer end of the plate.

(1) First Deck Plate. The first plate installed is one assembled with a rafter under each lap seam.

(a) Connect rope hooks to plate (1, fig. 6-14) and lift it into position so that outer end is centered over a stave seam with hangers (8, fig. 6-11) resting on the stave chime and clips (7) resting on rafter landing ring (2, fig. 6-14).



1 DECK PLATE
2 RAFTER LANDING RING
3 BOLT
4 NUT
5 BOLT
6 STRIP GASKET
7 BOLT
8 RAFTER

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Figure 6-14. First deck plate installed.

(b) Secure each clip to rafter landing ring (2) with two 1/2 by 1-inch bolts (3) and nuts (4).

(c) Cut one 6-inch length of strip gasket for each rafter hanger. At each hanger (8, fig. 6-11) push chime bolts (5, fig. 6-14) clear of the hanger, and insert strip gasket between hanger and deck plate at chime bolt holes. Push chime bolts through the hanger, gasket, deck plate, and gasket (6).

(d) Install nuts on chime bolts (5) of installed plate

(1) except bolts which pass through the rafter hanger. Do not tighten the nuts.

(e) Remove loose nuts (para 6-14c (4)) installed temporarily on bolts (7) to hold plate (1) to rafter (8) during installation.

(2) Intermediate Deck Plates. The next 18 (intermediate) deck plates to be installed are assembled with a rafter under the right lap seam. They are installed to the right of the first plate. Installation procedures are identical for all intermediate deck plates.

(a) Connect rope hooks to the plate and lift it into position so that bolt holes in left side are alined with the bolts (7) in right side of the previously installed plate. Lower the plate over the bolts.

(b) Follow instructions in (1) (b) through (e) above.

NOTE

Do not use a washer on any bolt in the chime.

(c) Place a steel recessed washer, cupped side down, on each lap seam bolt. Install a nut loosely on each bolt.

(3) Last Deck Plate. The last deck plate to be installed is not assembled with a rafter.

NOTE

If last deck plate will not aline with plates already installed, it may be necessary to adjust the center support for final closure of the deck.

(a) Connect rope hooks to last plate and lift it into position above first plate and lift it into position above first plate and last intermediate plate. Aline bolt holes in last plate with bolts and lower plate over the bolts.

(b) Follow instructions in (1) (d) and (2) (c) above.

(c) Remove gin pole from tank center column.

b. Dressing Inner End of Deck Plates.

(1) Install strip gasket (1, fig. 6-15) to cover all boltholes at inner ends of the plates (2, 3, and 4). If there is a break in the gasket, overlap the gasket two bolt holes. Apply sealing compound at each end of the overlap.

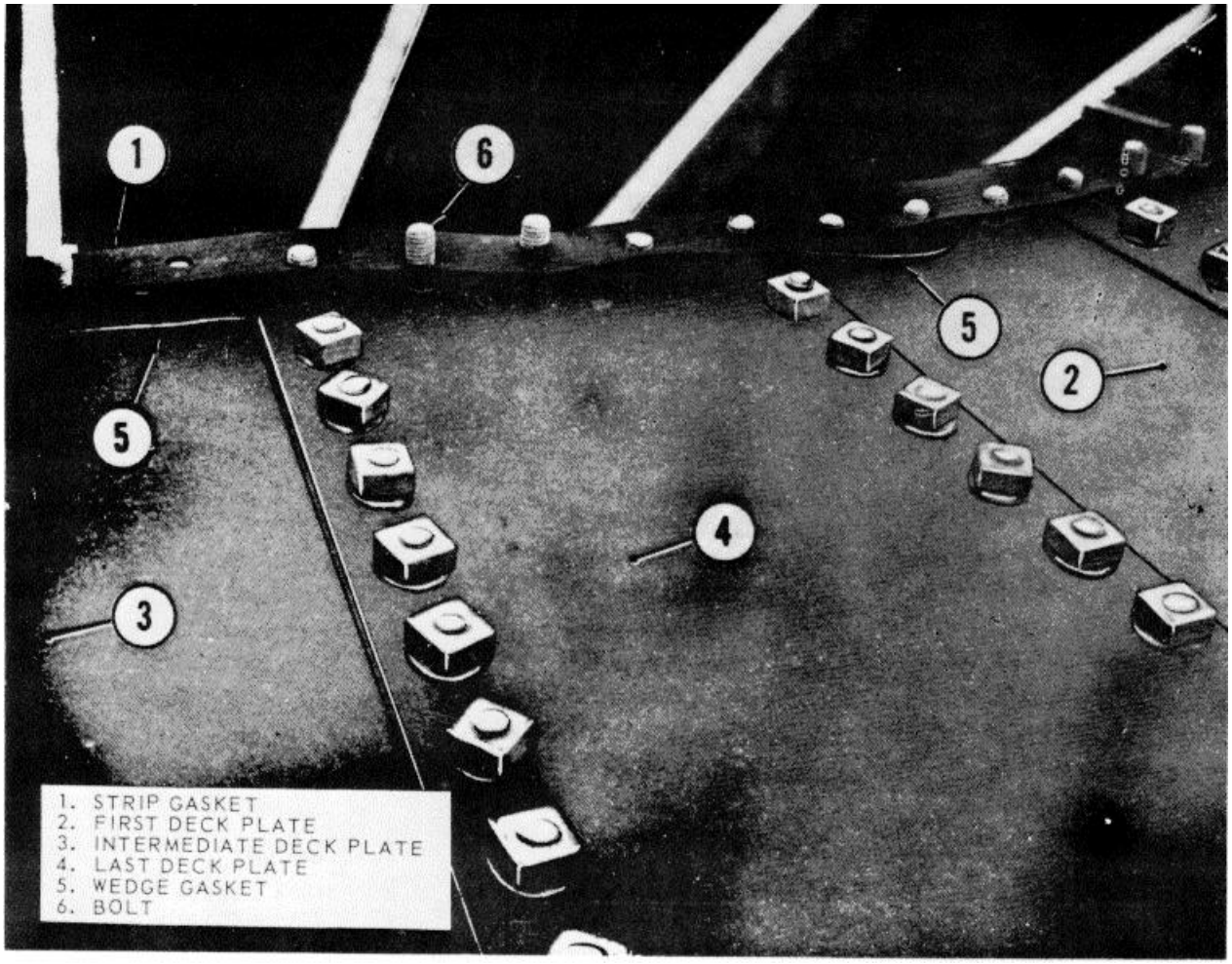


Figure 6-15. Inner end of deck plates dressed.

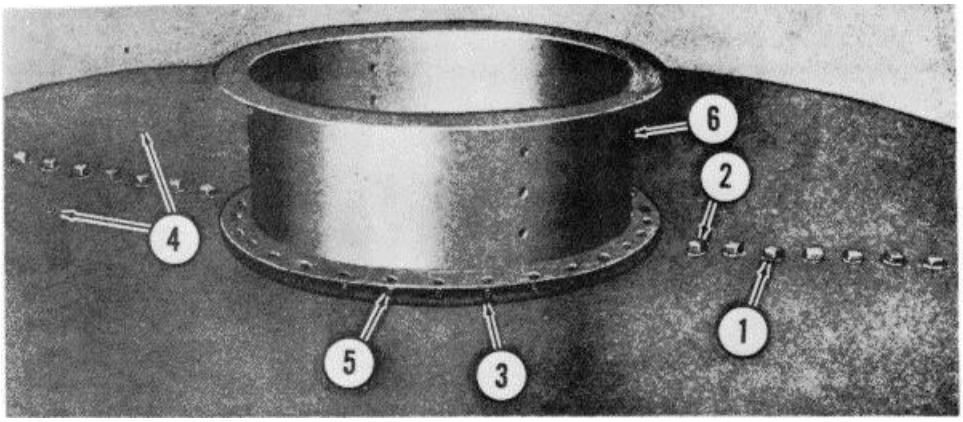
ME 5430.209-12/6-15

(2) Install a wedge gasket '(5) underneath the strip gasket (1) at the seams formed by the deck plates.

(3) Insert /2 by 1 /4-inch bolts (6) through deck plates and gaskets from the bottom side.

c. Center Deck Sections and Manhole Dome.

(1) Two center deck sections (4, fig. 6-16) and the manhole dome (6) are assembled on the ground prior to installation at inner end of the deck plates. Bolt channels are used only at seams formed by joining the two sections (4).

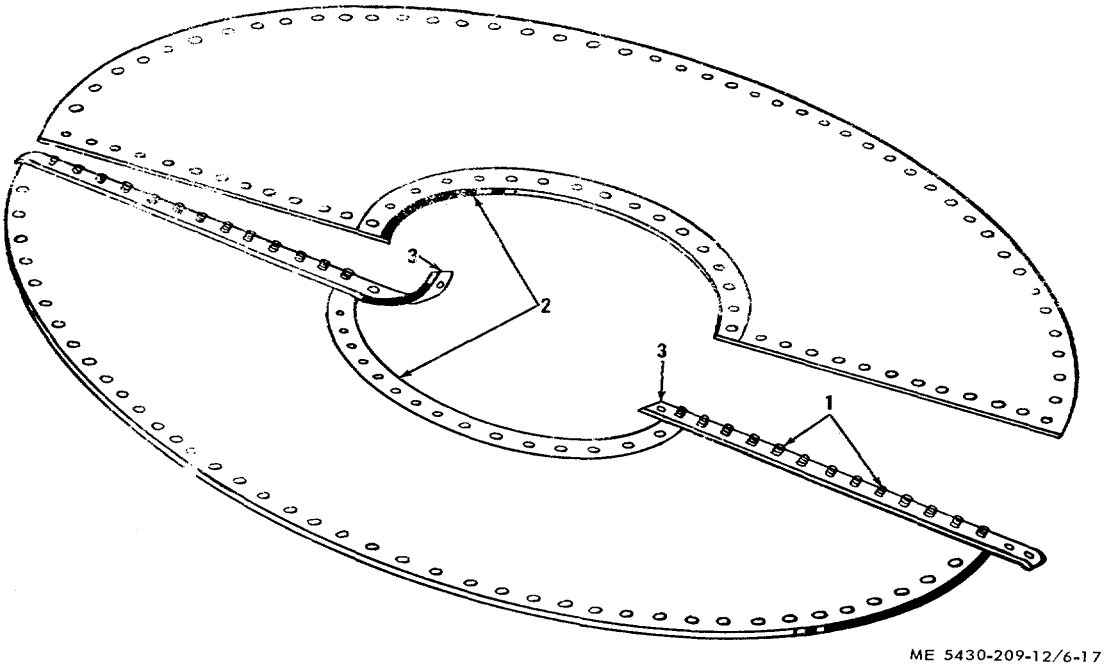


1. STEEL RECESSED WASHER
2. NUT
3. MANHOLE DECK GASKET
4. DECK CENTER SECTION
5. BOLT
6. MANHOLE DOME

ME 5430209-12/6-16

Figure 6-16. Deck center sections and manhole dome.

(2) Insert l/2 by 11/4-inch bolts (1, fig. 6-17) into two 11-hole bolt channels.



ME 5430-209-12/6-17

1. BOLT
2. DECK CENTER SECTION
3. STRIP GASKET 6-18

Figure 6-17. Dressing deck center section.

(3) From the bottom side of one section (2), install one assembled channel in each row of bolt holes, leaving the inner and outer bolt holes of the section vacant.

(4) Place a retaining board against the heads of the bolts and lay the saction on the ground, top side up.

(5) Place strip gasket (3) over each row of bolts (1), allowing a 2-hole overhang at each end.

(6) Place other section (2) over bolts (1) and gasket (3). Place steel washer (1, fig. 6-16), cupped side down, on each bolt. Install nut (2) loosely on each bolt.

(7) Use 1/2 by 1-inch bolts and steel recessed washers to seal holes in vertical portion of the manhole dome (6).

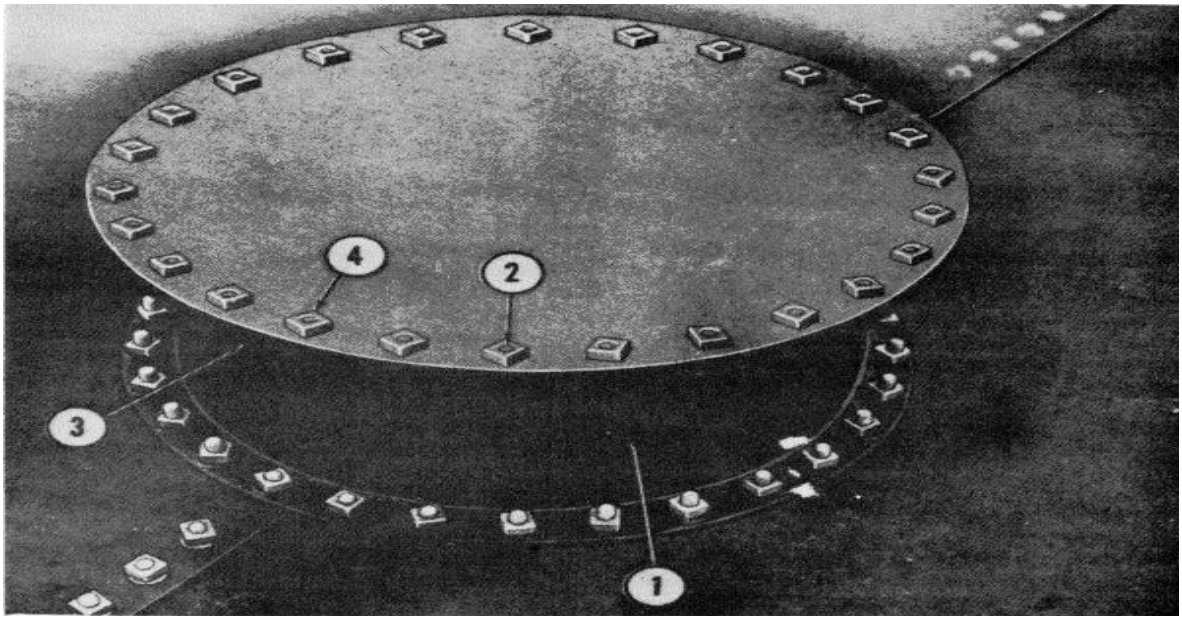
(8) Place a 30-hole manhole deck gasket (3) over bolt holes of the assembled sections (4). Install wedge gaskets under gasket (3) at the lap seams. Insert 1/2 by 1/4-inch bolts (5) through the sections and gaskets from the bottom side.

(9) Install manhole dome (6) over bolts (5) and gasket (3). Install a nut loosely on each bolt.

(10) Install assembled deck sections over bolts (6, fig. 6-15) and gasket (3, fig. 6-16) on inner end of the deck plates.

d. Manhole Cover.

(1) Place a 28-hole manhole cover gasket over bolt holes in manhole dome (1, fig. 6-18).



1. MANHOLE DOME
2. BOLT
3. MANHOLE COVER
4. NUT

ME 5430-209-12/6-18

Figure 6-18. Manhole dome and cover installed

(2) Insert 1'2 by 11/2 -inch bolts (2) through dome flange and gasket from bottom side. Gasket will hold bolts in place.

(3) Install manhole cover (3) over bolts and gasket. Install nuts (4) on bolts and tighten the nuts securely.

e. Tightening Tank Deck.

(1) Tighten all nuts on deck chime bolts (5, fig. 6-14) uniformly.

(2) Start at the outer end of each deck plate lap seam and work toward the inner end, tightening nuts evenly in each seam.

(3) Tighten nuts (2, fig. 6-16) on bolts of the deck center section (4) lap seam.

(4) Tighten nuts on bolts at the inner and outer circumference of the deck center sections.

f. Scaffold, Removal. After removal of scaffold, store components in the storage tank erection outfit.

(1) Remove rope rails (6, fig. 3-17) from posts (5), and remove posts from bracket (1).

(2) Remove wire (4) and boards (3) from the brackets.

(3) Remove nuts and brackets (1) from the lap seams.
(4) Install steel recessed washer and nuts on the bolts from which the scaffold brackets were removed. Tighten the nuts.

Section V. ASSEMBLY AND INSTALLITION ACESSORIES

6-16. Access Ladder

a. General. The access ladder consists of a bolted and prewelded steel assembly. It is attached to the tank at the stave chimes.

b. Assembly.

(1) Place right ladder section (1, fig. 6-19) and left ladder section (2) on blocking with the inside angles facing each other and the 11-hole sides up.

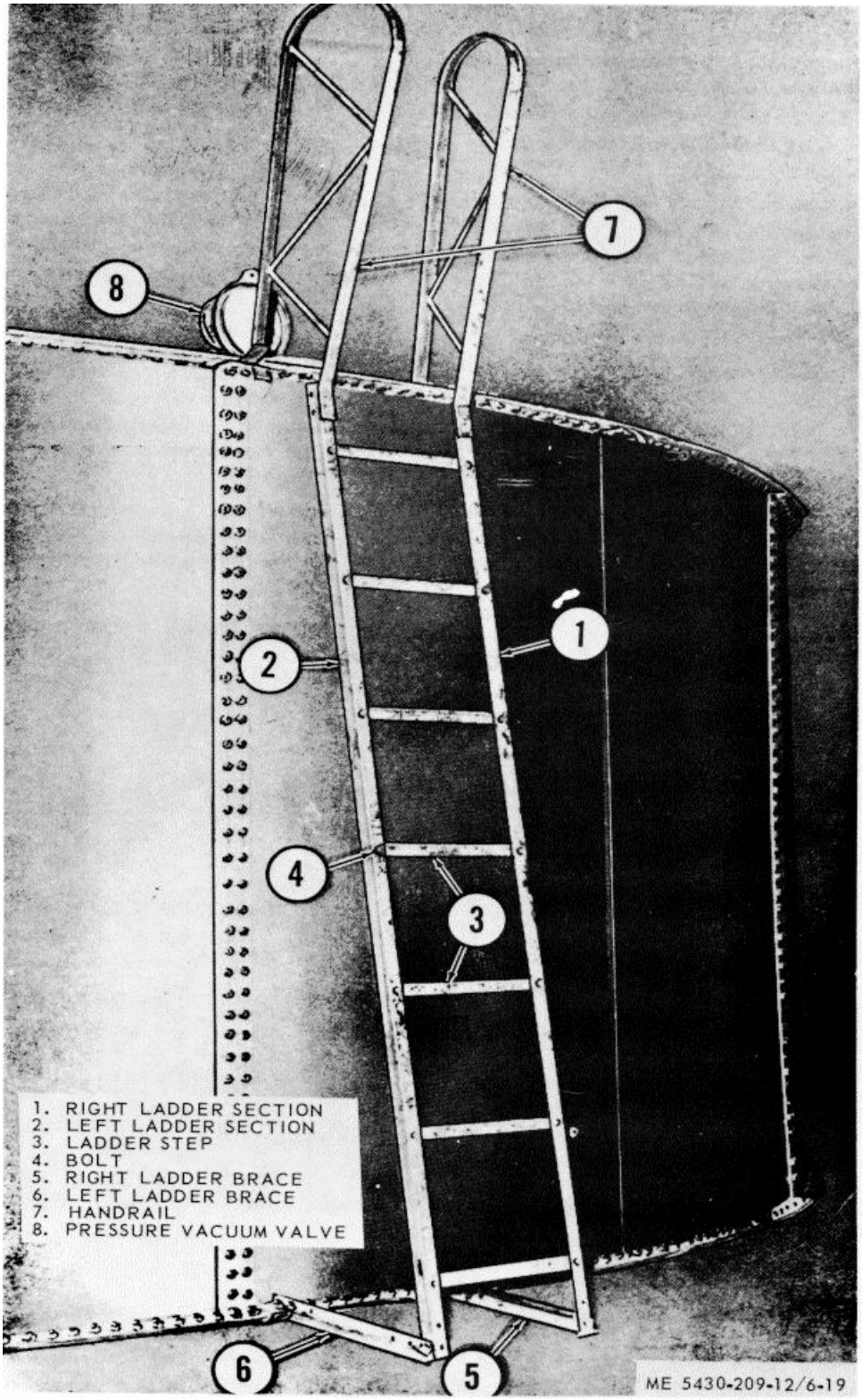


Figure 6-19. Access ladder installed.

(2) Starting at the third hole from either end of the sections, place ladder steps (3) underneath the sections with step angles all facing in the same direction. Aline the steps between sections, and install 1/2 by 1-inch bolts (4) through sections and steps from the top side. Install a nut on each bolt and tighten securely.

(3) Refer to figure 6-19 and install brace (5) on bottom of right section (1) with the 3-hole side of the brace facing the section. Use bolt (4) and nut, but do not tighten. Install brace (6) on left section in the same manner.

(4) Install handrail (7) on the top outside face of each section. Secure each handrail with two bolts (4) and nuts.

c. Installation.

NOTE

Use a temporary ladder where applicable when installing the access ladder.

(1) Place assembled ladder where it is convenient to the pressure vacuum valve (8, fig. 6-19) at the outer perimeter of the deck.

(2) Lift the ladder and set end bolt holes of braces (5 and 6) over bolts in bottom chime of the staves. Mark the bolts.

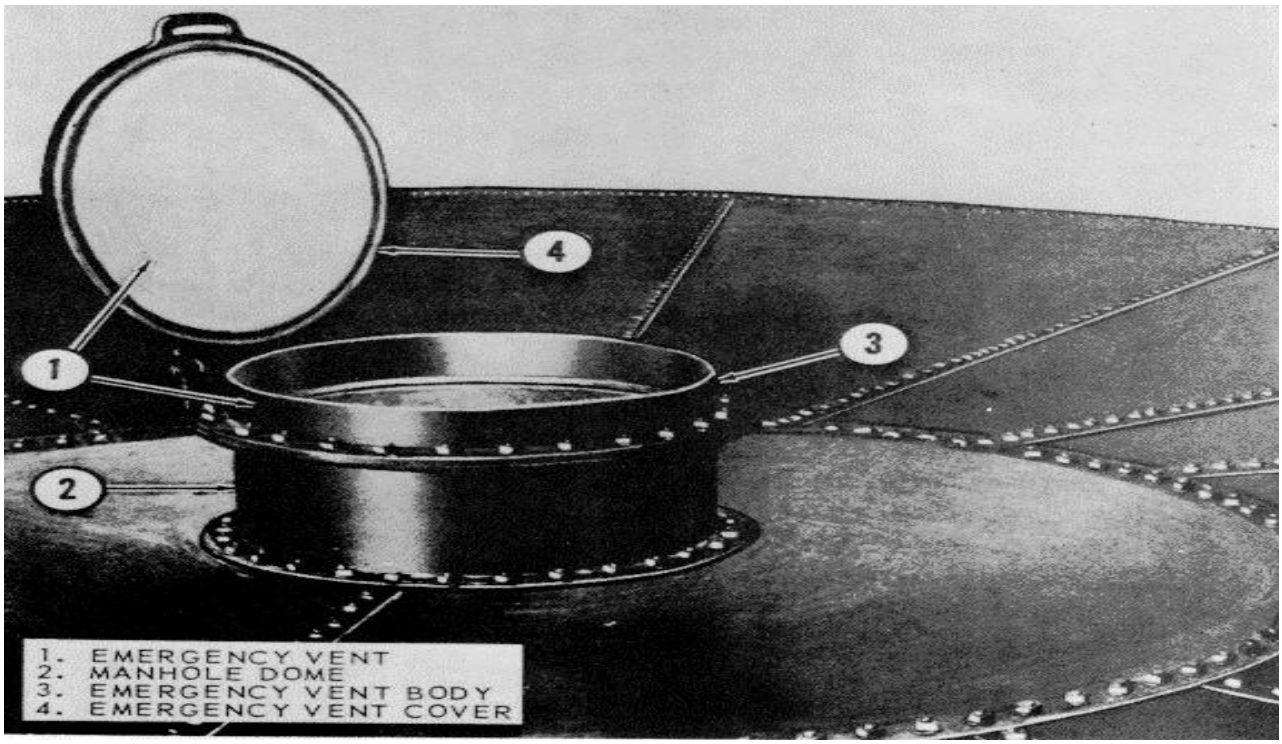
(3) Set bolt holes of handrails (7) over bolts in the top chime of the staves. Mark the bolts.

(4) Remove nuts from the marked bolts and set ladder in place over the bolts. Install nuts and tighten them securely.

(5) Tighten nuts securing braces (5 and 6) to sections (1 and 2).

6-17. Emergency Vent

a. General. The emergency vent (1, fig. 6-20) is installed on the manhole dome (2) of petroleum storage tanks to provide a means of venting the tanks, when necessary. It consists of a cast steel body (3) and a cast steel cover (4) equipped with a lifting handle. The cover is hinged to the body.



ME 5430-209-12/6-20

Figure 6-20. Emergency vent installed.

b. Installation. Emergency vent (1, fig. 6-20) 3places manhole cover (3, fig. 6-18).

(1) Remove nuts (4) and manhole cover (3).

(2) Install emergency vent (1, fig. 6-20) over the sket and bolts in manhole dome (2). Install nuts fig. 6-18) on the bolts and tighten securely.

6-18. Manhole Air Intake

a. General. The manhole air intake is used on water storage tanks and installed on the manhole dome. It consists of the following components: insect screen, inside screen ring, outside screen ring, dust restrictor, manhole cover, flange bolts, and sleeve spacer.

b. Installation.

(1) Remove nuts (4, fig. 6-18) and manhole cover (3) from dome (1). Remove the bolts (2) and gasket.

(2) Wrap the insect screen around the outside of the inside screen ring. Join the ends of the screen with copper wire weave.

(3) Install an outside screen ring around the insect screen at the top and bottom. Make sure the screen is properly positioned on the inside ring. Tighten the bolts and nuts on the outside rings.

(4) Install the assembled screen and rings on manhole dome (1) so that the inner ring tits outside the bolt circle of the dome.

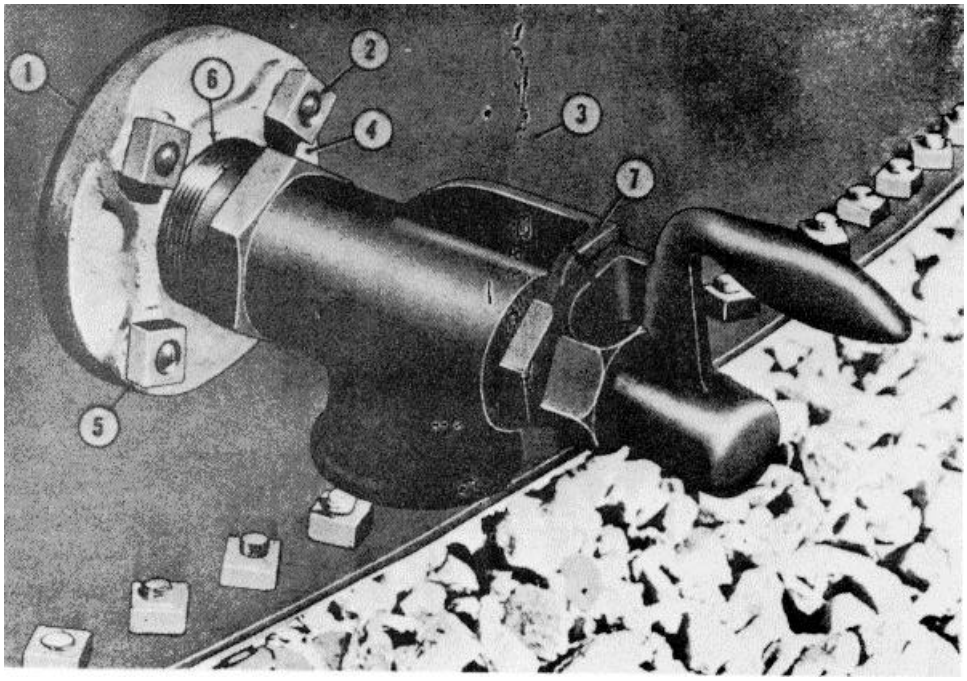
(5) Place dust restrictor over the assembled screen and rings.

(6) Working through the opening in the dust restrictor, install sleeve spacers between the restrictor and manhole dome at alternate bolt holes. Aline the holes.

(7) Install the manhole cover on the dust restrictor. Insert flange bolts through all holes from the top side. Install a nut on each bolt and tighten securely.

6-19. Water Drawoff Valve

a. General. The water drawoff valve (7, fig. 6-21), installed in special stave (3), is a 2-inch antifreeze-type valve. It is used to drain water from petroleum storage tanks. A 2-inch flange set (4) and 11/2-inch steel nipple (6) are used with the valve.



ME 5430-209-12/6-21

1. GASKET
2. BOLT
3. STAVE
4. OUTSIDE FLANGE HALF
5. NUT
6. STEEL NIPPLE
7. WATER GRAWOFF VALVE

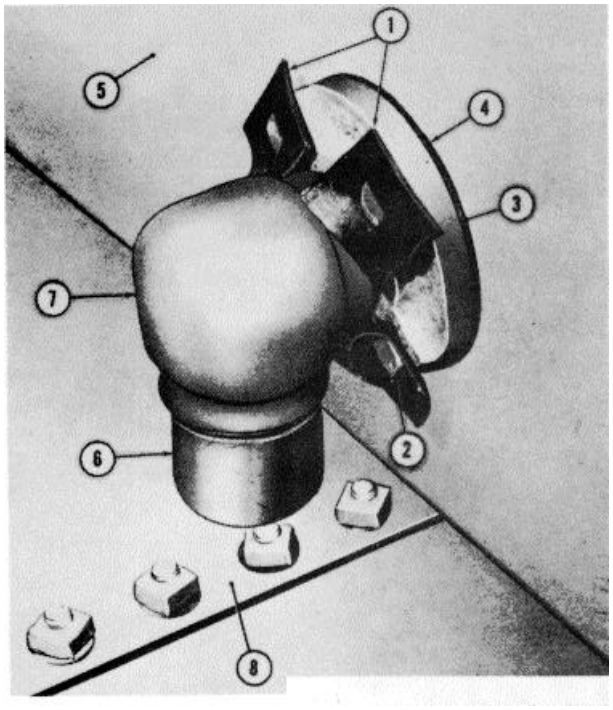
Figure 6-21. Water drawoff valve installed.

b. Installation

(1) Flange Set

(a) Dissemble flange set by removing nuts and bolts

(b) Cut fort 1-hole gaskets (1, fig. 6-22) from strip gasket. Place one gasket under the head of each bolt (2).



1. GASKET
2. FLANGE BOLT
3. INSIDE FLANGE HALF
4. GASKET
5. STAVE
6. NIPPLE
7. ELBOW
8. TANK BOTTOM

ME 5430-209.12/6-22.

Figure 6-22. Water drawoff valve elbow and nipple installed inside tank.

(c) The inside flange (3) is countersunk to receive the boltheads. Insert bolts (2) in inside flange half (3). Place 4-hole gasket (4) over the bolts and against the flange half.

(d) Install assembled flange half in stave (5) from inside the tank.

(e) On outside of tank, install gasket (1, fig. 6-21) over bolts (2) and against stave (3).

(f) Install outside flange half (4) over bolts and against gasket (1). Install nuts (5) on bolts and tighten securely.

(2) Valve and Nipple.

(a) The nipple (6, fig. 6-22) must be cut to length so that clearance between nipple and tank bottom (8) is 1-inch.

(b) Install nipple (6) in elbow (7).

(c) Install elbow in inside flange half (3). Tighten elbow until nipple is vertical and the opening faces the tank bottom.

(d) Install valve (7, fig. 6-21) in outside flange half (4). Tighten valve until the opening is vertical and faces the chime.

6-20. Tank Outlets

a. General. The tank is equipped with three special staves for installation of outlets. Two staves are made to contain 8-inch outlets, and the third a 6-inch outlet. Each outlet consists of a 90° elbow, a pipe flange set, and a grooved-type coupling.

b. Installation. Procedures for installing the 6-and 8-inch outlet components' are identical. Refer to paragraph 3-22 and install the outlet components.

Section VI. TANK TESTING AND FINAL ASSEMBLY

6-21. General

The tank interior must be cleaned, inspected, and tested for leakage prior to installation of cleanout cover (14, fig. 1-3). After installation of cover, the tank site must be cleaned.

6-22. Tanking Cleaning and Inspection

Refer to paragraph 3-24 and clean and inspect the tank.

6-23. Water Test

Refer to paragraph 3-26 and test the tank for leaks.

16-124. Cleanout Cover

Refer to paragraph 3-27 and install the cleanout cover.

NOTE

There are two vertical rows of channels (5. fig. 3-30) and boltholes (fig. 3-31) on either side of the cleanout opening on the 1000-barrel tank.

6-25. Cleaning the Tank Site

Refer to paragraph 3-28 and clean the tank site.

Section VII. IDENTIFICATION OF COMPONENT ITEMS

6-26. General

This section contains a component item list for the 1000-barrel capacity tank. The list is furnished for your convenience in identifying individual components of the tank. Those items required for reassembly are listed as components of the reerection kit and are grouped at the end of the listing.

6-27. Component Items

a. Refer to table 6-1 for the list of component items.

b. The following is a list of manufacturers Codes (MFG Code) contained in table 6-1.

Code Manufacturer

79154.....Victaulic Co of America
3100 Hamilton Blvd
South Plainfield, N.J 07080

80204.....United States of America
Standard Institute'
10 East 40th St., New York N.Y 10016

81348.....Federal Specifications Promulgated by General Services Administration

81349.....Military Specifications

81350.....Joint Army-Navy Specifications Promulgated by Standardization Division, Directorate of Logistics Services, DSA

97403.....U.S Army Mobility Research and Development Center, Fort Belvoir, Virginia 22060

Table 6-1. IDENTIFICATION OF COMPONENT ITEMS

FSN Description	Part No	Mfg	Qty Code	Fig Per Unit	Item No	No.
	TANK ACCESSORIES					
	ACCESS LADDER ASSEMBLY	13211E8040	97403	1	6-19	-
5306-010-9216	BOLT, SQUARE HEAD:1/2 -13 thd size, 1 in lg	FF-B-575	81348	20	6-19	4
	BRACE, ACCESS LADDER	13211E8063	97403	2	6-19	6
	HAND RAIL	13211E8060	97403	2	6-19	7
5310-982-4940	NUT: 1/2-13 thd size	FF.N-836	81348	20		
	RAIL, ACCESS LADDER	13211E8061	97403	2	6-19	2
	STEP, ACCESS LADDER	13211E8062	97403	7	6-19	3
	ADAPTER, GROOVED AND THREADED: 6 in size	40-6	79154	1	3-29	3
	ADAPTER, GROOVED AND THREADED: 8 in size	40-8	79154	2	3-29	3
	CAP, GROOVED: 6 in size	60-6	79154	1	3-29	5
	CAP, GROOVED: 8 in size	60-8	79154	2	3-29	5
	COUPLING, GROOVED: 6 in size	77D-6	79154	1	3-29	6
	COUPLING, GROOVED: 8 in size	77D-8	79154	2	3-29	6
	ELBOW: 6 in size, 90 deg	13215E9716	97403	1	3-28	2
	ELBOW: 8 in size, 90 deg	13215E9717	97403	2	3-28	2
	FLANGE SET, THREADED: 2 in size	13211E8081	97403	1	6-22	3
	FLANGE SET, THREADED: 6 in size	13215E9719	97403	1	3-29	2
	FLANGE SET, THREADED: 8 in size	13215E9720	97403	2	3-29	2
	GAGE, INDICATING: Liquid level	13200E9129-1	97403	1		
	GASKET, FLANGE: 2 in size	13211E8057	97403	2	6-22	4
	GASKET, FLANGE: 6 in size	13215E9722	97403	2	3-29	1
	GASKET, FLANGE: 8 in size	13215E9723	97403	4	3-29	1
	NIPPLE, PIPE: 21/2 in size	MIL-P-10388	81349	1	6-22	6
	PLATE, WARNING	13211E8024	97403	1		
4730-221-2141	PLUG, PIPE: 1 in size	USAS-B16-14	81350	1		
4730-278-3410	PLUG, PIPE: 2 in size	USAS-B16-14	81350	1		
	REDUCER, GROOVED: 6 in to 4 in size	50-6X4	79154	1		
	REDUCER, GROOVED: 8 in to 6 in size	50-8X6	79154	1		
	VALVE, NON-FREEZING: Water drawoff	13211E8082	97403	1	6-21	7
	VALVE, PRESSURE-VACUUM	13213E4596	97403	2	1-3	6
	VENT, EMERGENCY: 20 in size	13216E7392	97403	1	1-3	4
	WATER STORAGE					
	AIR-INTAKE ASSEMBLY	13216E7959	97403	1		
5306-010-9216	BOLT: /2-13 thd size, 1 in lg.	FF-B-575	81348	2		

FSN	Description	Part No	Mfg Code Unit	Qty Per	Fig No	Item No
5306-865-9573	BOLT: '/2-13 thd size, 5 in lg	FF-B-575	81348	28		
	COVER, MANHOLE	13215E9715	97403	1	6-18	3
	GASKET, MANHOLE COVER: 28 hole	13215E9726	97403	1		
	5310-982-4940 NUT: '/2-13 thd size	FF-N-836	81348	30		
	RESTRICTOR, DUST	13216E7224	97403	1		
	RING, CLAMPING	13211E8072	97403	2		
	RING, SCREEN: Inside	13211E8071	97403	1		
	SCREEN, INSECT	13211E8077	97403	1		
	SPACER	13211E8074	97403	14		
	TANK DECK					
	CHANNEL: Center deck plate, 11 hole	13216E7954	97403	2		
	CHANNEL: Deck plate, 23 hole	13216E7957	97403	20		
	CHANNEL: Hatch bolt clip, 2 hole	13215E9706	97403	16	6-12	2
	GASKET: Hatch, 16 hole	13215E9724	97403	2	6-13	1
	GASKET: Manhole deck, 30 hole	13215E9727	97403	1	6-16	3
	MANHOLE DOME	13211E8048	97403	1	6-16	6
	PLATE, DECK: Center	13216E7943	97403	2	6-17	2
	PLATE, DECK: Hatch	13216E7944	97403	1		
	PLATE, DECK: Hatch	13216E7946	97403	1		
	PLATE, DECK: Level indicator	13216E7941	97403	1		
	PLATE, DECK: Plain	13216E7945	97403	17	6-14	1
	RAFTER ASSEMBLY	13216E7964	97403	20	6-11	-
	ANGLE: Bolt retainer	13216E7956	97403	1	6-11	5
5306-010-9216	BOLT: 1/2-13 thd size, 1 in lg	FF-B-575	81348	10	6-11	6
	HANGER, RAFTER	13216E7958	97403	1	6-11	8
	5310-982-4940 NUT: '/2-13 thd size	FF-N-836	81348	10		
	RAFTER	13211E8052	97403	1	6-11	1
	SIDE STAVES					
	CHANNEL: Cleanout cover, side	13211E9702	97403	4	3-30	5
	CHANNEL: Cleanout cover, top	13216E7955	97403	1	3-30	1
	CHANNEL: Side staves, 48 hole	13215E9704	97403	80	6-4	3
	COVER, CLEANOUT	13216E7948	97403	1	3-33	1
	RETAINER, BOLT: Cleanout cover, side	13215E9703	97403	4	3-30	6
	RETAINER, BOLT: Cleanout cover, top	13215E9701	97403	1	3-30	4
	STAVE: Cleanout	13216E7949	97403	1	1-3	15
	STAVE: Plain	13216E7953	97403	15	1-3	13
	STAVE: 2 in water drawoff	13216E7952	97403	1	6-21	3
	STAVE: 6 in outlet	13216E7951	97403	1	3-29	9
	STAVE: 8 in outlet	13216E7950	97403	2	3-29	9
	TANK BOTTOM AND CENTER SUPPORT					
	CENTER SUPPORT ASSEMBLY	13211E8030	97403	1		
5306-263-8974	BASE, CENTER SUPPORT	13211E8053	97403	1	6-1	1
5306-010-9216	BOLT: 1-8 thd size, 9 in lg	FF-B-575	81348	3		
5306-959-7813	BOLT: 1/2-13 thd size, 1 in lg	FF-B-575	81348	60	6-8	5
	BOLT: 1/2-13 thd size, 1'/4 in lg	FF-B-575	81348	10	6-8	6
	CLIP, RAFTER	13216E7963	97403	20	6-11	7
	CLIP, STRUT	13216E7962	97403	5	6-8	3
	COLLAR, GUSSET	13211E8044	97403	1	6-8	4
5310-891-3462	FLANGE SET, THREADED: 8 in size	13215E9720	97403	1		
5310-982-4940	NUT: 1-8 thd size	FF-N-836	81348	3	8-51	5
	NUT:	/2-13 thd size	FF-N-836	81348	70	
	PLATE, STEP	13216E7386	97403	1	6-10	8
	PLUG, IRON: 8 in size	USAS-B16-14	80204	1		
	RING, RAFTER LANDING	13211E8075	97403	1	6-8	1
	STRUT, CENTER SUPPORT	13211E8033	97403	5	6-8	2
	SUPPORT, CENTER	13211E8051	97403	1	6-10	1
	CHANNEL: Bottom plate, 24 hole	13211E8115	97403	20	6-2	2
	CHANNEL: Bottom plate, 48 hole	13215E9704	97403	20	6-2	4
	CHANNEL: Center bottom plate, 5 hole	13216E7961	97403	20	6-1	7
	PLATE, BOTTOM	13216E7947	97403	20	6-2	1

FSN	Description	Part No	Mfg Code	Qty Per Unit	Fig No..	Item No
	ATTACHING COMPONENTS					
5306-010-9216	BOLT, SQUARE HEAD: l/2-13 thd size, 1 in lg.	FF-B-575	81348	1650	6-5	4
5306-959-7813	BOLT, SQUARE HEAD: /2-13 thd size, 1¼/4 in lg.	FF-B-575	81348	5300	6-2	3
5306-042-6916	BOLT, SQUARE HEAD: /2-13 thd size, 1¼ in lg.	FF-B-575	81348	300	6-1	6
	GASKET, FILLET	13211E8097	97403	50	6-6	5
	GASKET, STRIP	13211E8054	97403	1300 ft	6-5	2
	GASKET, WEDGE	13211E8056	97403	200	6-5	3
5310-982-4940	NUT: 1/2-13 thd size	FF-N-836	81348	7142	6-14	4
5430-693-2968	PLUG, BOLT REPLACEMENT	13211E8058	97403	6	3-5	-
	WASHER, SEALING: ¼2 in screw size	13211E8059	97403	5800	6-16	1
	RE-ERECTION KIT					
5430-217-2160	KIT, RE-ERECTION	13217E5408	97403	1		
5306-010-9216	BOLT: '/2-13 thd size, 1 in lg	FF-B-575	81348	1650		
5306-959-7813	BOLT: 1/2-13 thd size, 11/4 in lg	FF-B-575	81348	5300		
5306-042-6916	BOLT: '/2-13 thd size, 11/2 in lg	FF-B-575	81348	300		
5306-964-0966	BOLT: 1-8 thd size, 9 in lg	FF-B-575	81348	2		
5306-011-1195	BOLT: ¼/2-13 thd size, 21/2 in lg	FF-B-575	81348	4		
5306-964-0963	BOLT: 5/8-11 thd size, 31/2 in ig	FF-B-575	81348	6		
5306-019-1857	BOLT: 5/8-11 thd size, 4 in lg	FF-B-575	81348	24		
	BRUSH, APPLICATION: Sealing compound	H-B-420	81348	6		
	GASKET, FILLET	13211E8097	97403	50		
	GASKET, FLANGE: 2 in size	13211E8057	97403	4		
	GASKET, FLANGE: 6 in size	13215E9722	97403	4		
	GASKET, FLANGE: 8 in size	13215E9723	97403	8		
	GASKET, HATCH	13215E9724	97403	4		
	GASKET: Manhole cover, 28 hole	13215E9726	97403	2		
	GASKET: Manhole deck, 30 hole	13215E9727	97403	2		
	GASKET, STRIP	13211E8054	97403	1300 ft		
	GASKET, WEDGE	13211E8056	97403	165		
5310-891-3462	NUT: 1-8 thd size	FF-N-836	81348	2		
5310-982-4940	NUT: '/2-13 thd size	FF-N-836	81348	7294		
5310-012-5550	NUT: 5/8-11 thd size	FF-N-836	81348	30		
5430-693-2968	PLUG, BOLT REPLACEMENT	13211E8058	97403	6		
8030-800-6382	PUTTY, SEALING	MIL-P-07628	81349	2 gal		
7920-205-1711	RAGS	DDD-R-30	81348	101b		
8030-598-4503	SEALING COMPOUND	MIL-S-14231	81349	28 qt		
	WASHER, SEALING: 1/2 in screw size	13211E8059	97403	5800		

CHAPTER 7
ERECTION INTRUCTIONS FOR
THE 3000-BARREL CAPACITY TANK

Section I. ASSEMBLY AND STALLATION OF TANK BOTTOM

7-1. Center Support Base

a. General. The center support base for the 3000barrel tank is identical to, and interchangeable with, the center support base for the 1000-barrel tank as described in paragraph 6-la.

b. Installation. Refer to paragraph 6-1b and install the center column base.

7-2. Bottom Plates

a. General. The bottom plates for the 3000-barrel tank are identical to, and interchangeable with, the bottom plates for the 1000-barrel tank as described in paragraph 6-2.

b. Assembly and Installation. Refer to paragraph 6-2 and 6-3, and assemble and install the bottom plates.

7-3. Tightening Tank Bottom

Refer to paragraph 6-4 for tightening procedures**.**

7-4. Bolt Replacement Plug

Refer to paragraph 3-4 for bolt replacement plug procedures.

7-5. Testing Seam for Leakage

Refer to paragraph 3-5 for testing procedures.

7-6. Sealing Seams

WARNING

If tank is to be used for water storage, do not apply sealing compound to tank bottom.
Sweep bottom clean after testing seams. With bottom dry, apply sealing compound to all bolts and seams.

Section II. ASSEMBLY AND INSTALLATION OF SIDE STAVES

7-7. General

a. This is a 3-ring tank. The first-ring staves on the 3000-barrel tank are identical to, and interchangeable with, the staves on the 1000-barreltank.

b. The second and third-ring staves are identical to, and interchangeable with, the plain staves of the first ring.

c. There are 5 special staves and 55 plain staves in the 3000-barrel tank.

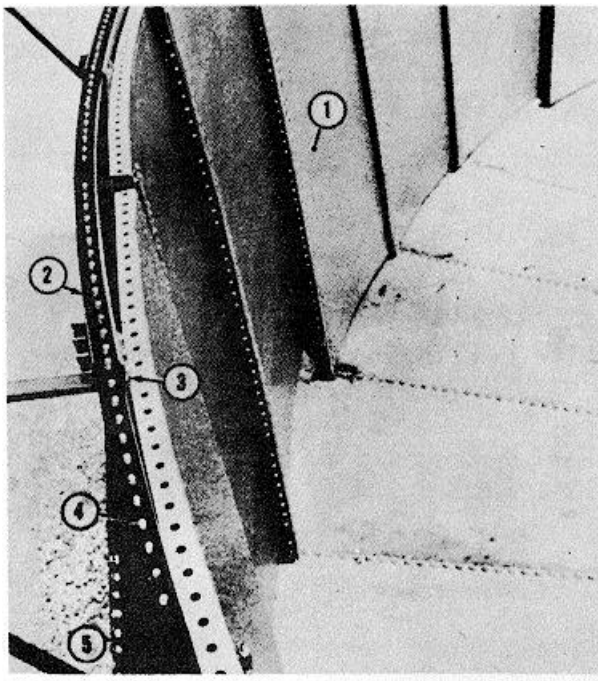
d. After completing the tank bottom and before laying out the first-ring staves around the perimeter of the tank foundation, place 40 plain staves and all remaining parts, except the cleanout cover, center plates, and manhole dome, on the tank bottom. This is to avoid having to lift them over the top of the installed staves later on.

7-8. Side Staves

a. First-Ring Staves. Assemble, install, tighten, and dress the first-ring staves as described in paragraphs 6-8 through 6-11.

b. Second-Ring Staves. Install the second-ring staves so they straddle vertical lap seams of the first-ring staves.

(1) Dress 20 staves (para 6-8c) and place them against the installed first-ring staves around the inside of the tank (fig. 7-11).



1 SECOND-RING STAVES
2 STRIP GASKET
3. WEDGE GASKET
4. BOLT
5. OPEN BOLTHOLE

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Figure 7-1. Second-ring staves dressed and ready for installation.

(2) Remove a bolt from the bottom chime near each vertical seam which has a scaffold bracket (1, fig. 3-17). These holes are for installation of the gin pole foot spike.

(3) Remove gin pole components from storage tank erection outfit. Assemble gin pole with a foot spike.

(4) Raise gin pole (1, fig. 7-2). As the pole is being raised, attach headblock (2) to the headblock eye. Push foot spike through an open bolthole in the chime. With the pole in raised position, lash it to a scaffold bracket (1, fig. 3-17).

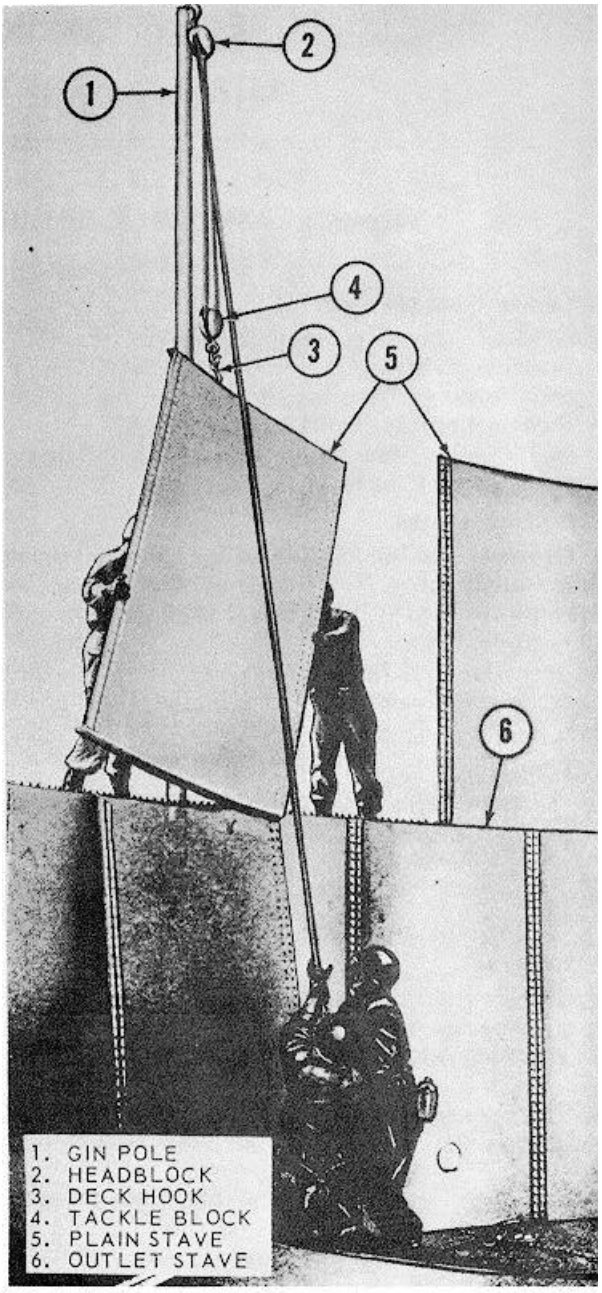


Figure 7-2. Hoisting second-ring stave.

(5) Attach deck hook (3) to tackle block (4).

(6) Lower tackle block and attach deck hook to the upper chime of a stave (5) as shown in figure 7-2.

(7) Install and tighten all staves of the ring, as described in paragraph 6-9b through f. Relocate the gin pole around the tank as necessary for hoisting the staves. After several staves are installed, gin pole should be slanted toward the staves to be installed.

NOTE

Attach guy lines from outside of tank to top chime of staves in order to stabilize the ring until it becomes self-supporting. Remove guy lines when a sufficient number of staves have been installed to give rigidity to the ring.

(8) Remove gin pole and install nuts and bolts in the vacant holes of bottom chime. Tighten the nuts.

(9) Install scaffold around top chime of secondring staves (para 6-10).

(10) Dress top chime of staves as described in paragraph 6-11.

c. Third-Ring Staves. Third ring staves are installed so that they straddle vertical lap seams of the second-ring staves. Installation procedures are identical to those for second-ring staves (para b above) .

Section III. ASSEMBLY AND INSTALLATION OF TANK CENTER SUPPORT ASSEMBLY

7-9. Assembly of Umbrella-Type Deck Support

a. General. The unmbrella-type deck support is identical to, and interchangeable with, the support used on the 1000-barrel capacity tank as described in paragraph 6-12.

b. Assembly. Refer to paragraph 6-12 and assemble the deck support.

7-10. Installation of Tank Center Support Assembly

a. General.

(1) The tank center support is an assembly consisting of the center support base (2, fig. 7-3), bottom center support (1), middle center support (7), top center support (9), step plate (11), and the assembled umbrella-type deck support (10).

1. BOTTOM CENTER SUPPORT
2. CENTER SUPPORT BASE
3. ADAPTER
4. GIN POLE
5. DECK HOOK
6. TACKLE BLOCK
7. MIDDLE CENTER SUPPORT
8, BOLT
9. TOP CENTER SUPPORT
10. UMBRELLA-TYPE DECK SUPPORT
11. STEP PLATE
12. BOLT

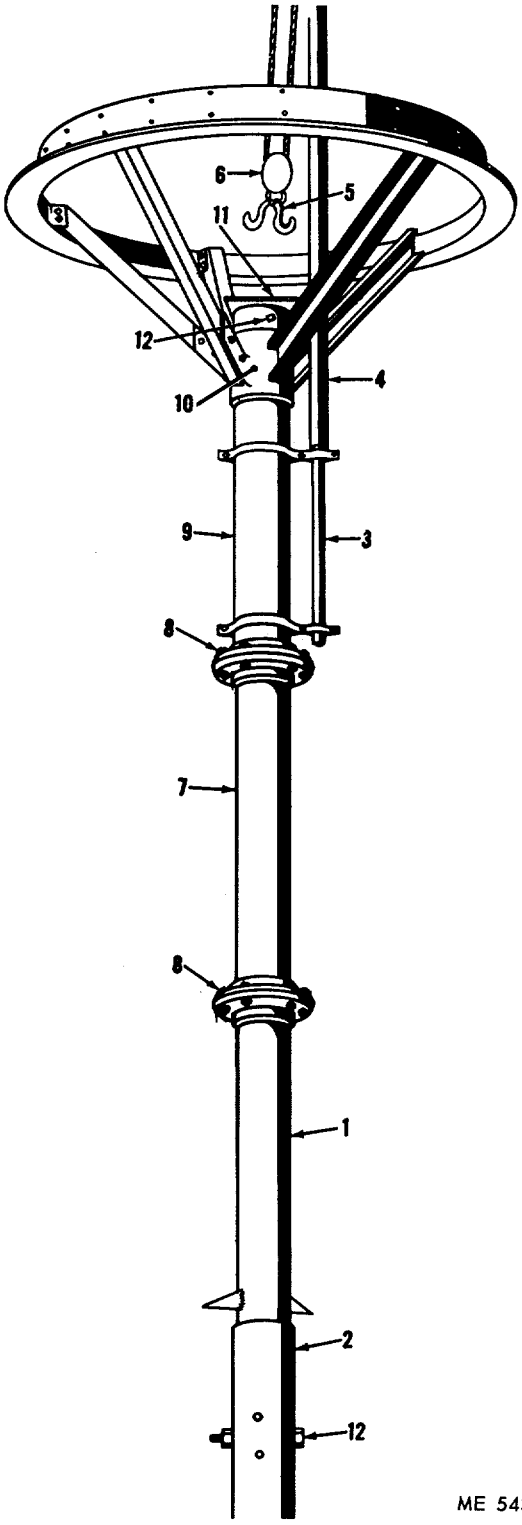


Figure 7-3. Tank center support installed.

(2) Gin pole components, provided in the storage tank erection outfit and shown on figure 7-3, are required to install middle support (7), top support (9), umbrella-type support (10), and the rafter and deck sections.

b. Installation of Bottom Center Support. Lift bottom center support (1) and insert bottom end in center support base (2).

c. Installation of Gin Pole. The gin pole is installed on the bottom support so that the middle support can be installed. It is then moved to the middle support for installation of the top support. Finally, it is installed on the top support for installation of the umbrella-type deck support and deck sections.

(1) Attach adapter (3, fig. 7-3) to the support so that top clamp of adapter will be about 6 inches below the column bolting flange.

(2) Assemble top and middle sections of the gin pole. Attach a block and tackle to the headblock eye. Raise gin pole (4) and install it in adapter (3).

(3) Attach two deck hooks (5) to tackle block (6).

d. Installation of Middle Center Support.

(1) Lower tackle block (6, fig. 7-3) and attach deck hook (5) to the bolting flange of middle support (7).

(2) Lift middle support (7) above bottom support (1). Aline flange boltholes and lower middle support into position.

(3) Install bolts (8) through flanges from the top. Install a nut on each bolt and tighten the nuts.

(4) Remove gin pole from bottom support (1) and install it on middle support (7).

e. Installation of Top Center Support.

(1) Lower tackle block (6, fig. 7-3) and attach deck hooks (5) in boltholes at top of top support (9).

(2) Lift top support (9) above middle support (7). Aline flange boltholes and lower top support into position.

(3) Install bolts (8) through flanges from the top. Install a nut on each bolt and tighten the nuts.

(4) Remove gin pole from middle support (7) and install it on top support (9).

f. Installation of Umbrella-Type Support.

(1) Lash a suitable timber to underside of support ring on the umbrella-type deck support (10, fig. 7-3).

(2) Attach deck hook (5) to the timber.

(3) Raise deck support (10) to a position above the top of the center support.

(4) Have one or two men guide the deck support as it is lowered into position on the center support.

(5) Install step plate (11) and center support bolt (12) before removing the timber and deck hook.

g. Adjustment of Tank Center Support.

(1) Measure distance from top of center support base plate to the top of the support angles on top center support (9, fig. 7-3). The correct distance between these points is 22 feet, 1-7/16 inches.

(2) Place a jack on a heavy timber under each jack lug at Lne bottom of bottom support (1). Raise the assembled support with jack until correct measurement (step (1) above) is obtained.

(3) Aline boiTholes in bottoiii support (11 and base (2). Install two bolts (12) through alined holes. Secure each bolt with a nut.

(4) Remove the jacks and blocking.

Section IV. ASSEMBLY AND INSTALLATION OF TANK DECK

7-11. General

a. 'Ihe assembled deck of the 3000-barrel tank is identical to, and interchangeable with, the deck of the 1000-barrel tank as described in paragraph 614a. The differences between the deck components of the two tanks are the part numbers and the number of hatch plates. All plates are interchangeable.

b. Fifteen of the plates are identical. Four of the plates have an 8-inch hatch hole for the installation of a pressure vacuum valve. The level indicator plate is equipped with a half-coupling welded into the plate and a 1-inch pipe plug attached to the coupling.

7-12. Assembly of Deck Plates and Rafters Refer to paragaph 6-14 and assemble the rafters and deck plates.

7-13. Installation of Tank Deck Refer to paragraph 6-15 and install and tighten the tank deck.

Section V. ASSEMBLY AND INSTALLATION OF TANK ACCESSORIES

7-14.
-14. Access Ladder

a. General. The access ladder (fig. 7-4) consists of three bolted ladder subassemblies and two welded handrail assemblies. The right (1) and left (2) ladder rails, ladder steps (3), top right (11) and top left (12) ladder braces, and handrails (13) are identical to, and interchangeable with, corresponding parts of the 1000-barrel capacity tank (fig. 6-19). Ladder subassemblies are bolted togethey.with splice gusset plates (5). Assembled ladder is attached to the stave chimes.

1. RIGHT LADDER RAIL
2. LEFT LADDER RAIL
3. LADDER STEP
4. BOLT
5. SPLICE GUSSET PLATE
6. CROSS TIE STRIP
7. LOWER RIGHT LADDER BRACE
8. LOWER LEFT LADDER BRACE
9. MIDDLE RIGHT LADDER BRACE
10. MIDDLE LEFT LADDER BRACE
11. TOP RIGHT LADDER BRACE
12. TOP LEFT LADDER BRACE
13. HANDRAIL
14. GUARD WIRE SUPPORT
15. GUARD WIRE

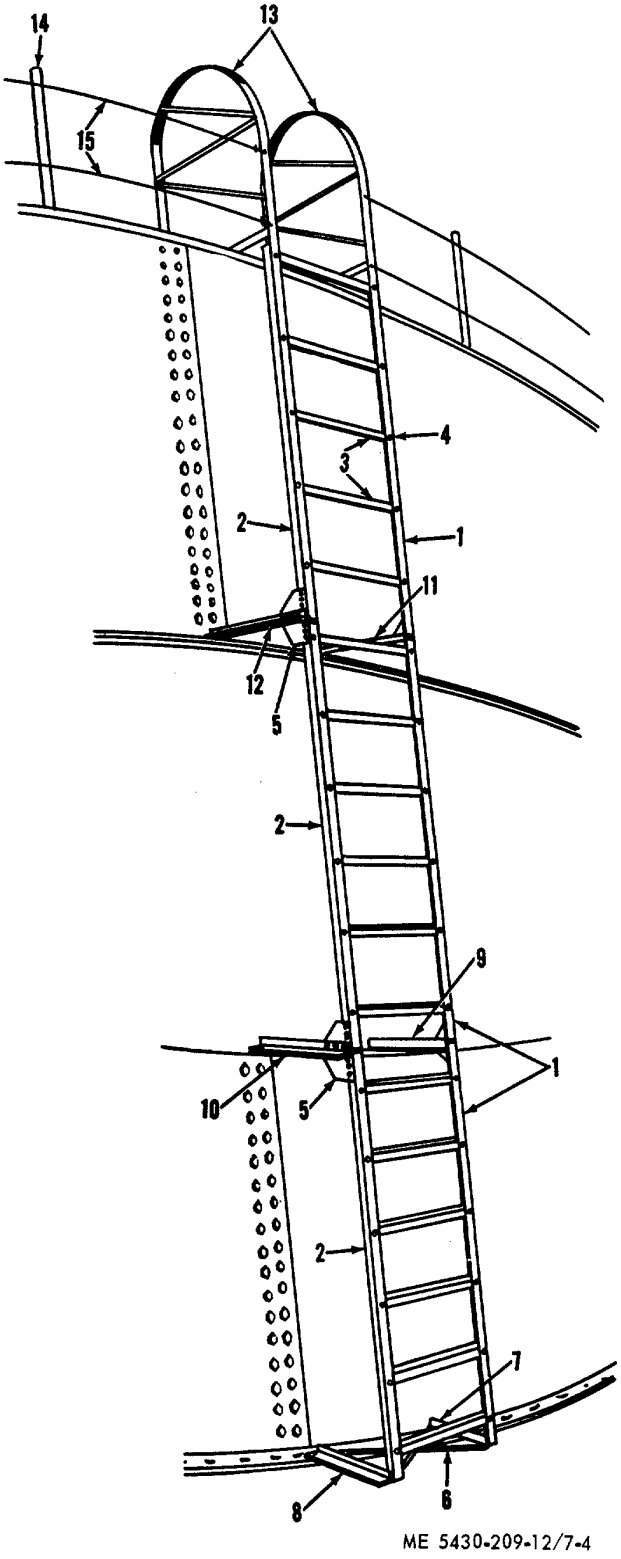


Figure 7-4. Access ladder and guard installed.

b. Assembly.

(1) Assemble right ladder rail (1, fig. 7-4), left ladder rail (2), and ladder steps (3) with bolts (4) following the procedures given in paragraph 6-16b (1) and (2).

(2) Place assembled sections end-to-end on blocking so that the inside angle of the ladder steps all face in the same direction. The end of ladder rails (1) and (2) facing the inside angle of steps (3) is the bottom.

(3) Connect assembled ladder rails together with splice gusset plates so that the short-sheared edge is toward the top of the ladder and away from the face of the ladder. From the ladder rail side, install a bolt (4) through the first, second, and fourth holes of the rail and gusset plate, counting from the bottom hole. Finger tighten a nut on each bolt.

(4) Assemble two cross tie strips (6) in the form of an "X" with a bolt (4) through the center holes. Install a nut finger tight on the bolt. Assemble the two remaining cross tie strips in the same manner.

(5) At bottom of ladder on right ladder rail (1), install brace (7) on the side face of the rail using the hole that is nearest the end of the brace. Install bolt (4) through the hole from the rail side. Finger tighten a nut on the bolt. Install brace (8) on left ladder rail (2) in the same manner.

(6) Install two crosstie strips (6) between braces (7 and 8), using holes nearest the ladder rails. Secure strips to braces with bolts (4) and nuts. Tighten nut on bolt in middle of the strips.

(7) At splice gusset plate (5) nearest bottom of ladder on right side, install brace (9) using the three vacant holes in the plate. Install bolts from the plate side. Install nuts on each bolt. Tighten all nuts and bolts at the gusset plate. Install brace (10) on left side in the same manner.

(8) Install two crosstie strips (6) between braces (9 and 10) as in step (6) above.

(9) At top splice gusset plates (5), install brace (11) on right side, and brace (12) on left side, as in step (7) above.

(10) Install handrail (13) on outside face of each ladder rail (1 and 2) at top of ladder. Secure each handrail with two bolts (4) and nuts.

c. Installation. Refer to paragraph 6-16c and install the assembled ladder.

7-15. Deck Guard

a. General. The deck guard consists of 19 guard wire supports (14) and two guard wires (15). The supports are welded steel angles which are attached to bolts in the deck chime. The guard wires are number 9 steel wire. They are threaded through holes in the supports to form guard rails around the outer perimeter of the deck.

b. Installation.

WARNING

Do not install guard wire supports over stave chime lap seams or deck lap seams.

(1) Locate supports (14, fig. 7-4) around the top chime near center of each deck plate except at the ladder.

(2) Remove two adjacent nuts from the chime bolts where each support is to be installed.

(3) Install supports over the bolt so that the undrilled side of the support is toward the outside perimeter of the deck. Secure each support with two nuts previously removed.

(4) Thread guard wires (15) through holes in supports (14). Attach ends of wires to handrails (13) leaving an opening between the two handrails.

c. Scaffold. Refer to paragraph 6-15f and remove the scaffold components.

7-16. Emergency Vent

a. General. The emergency vent for the 3000barrel tank is identical to, and interchangeable with, the vent for the 1000-barrel tank as described in paragraph 6-17a.

b. Installation. Refer to paragraph 6-17b and install the emergency vent.

7-17. Manhole Air Intake

a. General. The manhole air intake for the 3000barrel tank is identical to, and interchangeable with, the intake for the 1000-barrel tank as described in paragraph 6-18a.

b. Installation. Refer to paragraph 6-186 and install the manhole air intake.

7-18. Water Draw-off Valve

a. General. The water drawoff valve for the 3000barrel tank is identical to, and interchangeable with, the valve for the 1000-barrel tank as described in paragraph 6-19a.

b Installation. Refer to paragraph 6-19b and install the water drawoff valve.

7-19. Tank Outlets

a. General. The tank outlets for the 3000-barrel tank are identical to, and interchangeable with, the outlets for the 1000-barrel tank as described in paragraph 6-20a.

b. Installation. Refer to paragraph 6-20b and install the tank outlets.

Section VI. TANK TESTING AND FINAL ASSEMBLY

7-20. General
The inside of the tank must be cleaned and inspected, and the tank must be tested for leakage prior to installation of the cleanout cover. After installation of the cleanout cover, the tank site must be cleaned.

7-21. Tank Cleaning and Inspection
Refer to paragraph 3-24 and clean and inspect the tank.

7-22. Water Test
Refer to paragraph 3-26 and testy athe tank for leaks.

7-23. Cleanout Cover
a. General. Refer to paragraph 3-27 for a general description of the cleanout cover.

b. Installation. Refer to paragraph 3-27 and install the cleanout cover.

NOTE

There are two vertical rows of channels (5, fig. 3-30) and boltholes (fig. 3-31) on either side of the dcleanout opening on the 3000-barrel tank.

7-24. Cleaning the Tank Site
Refer to paragraph 3-28 and clean the tank site.

Section VII. IDENTIFICATION OF COMPONENT ITEMS

7-25. General
This section contains a list of component items for identifying individual components of the 3000-barrel capacity tank. Items required for reassembly of the tank are listed as components of the re-erection kit and are grouped at the end of the listing.

7-26. Component Items
a. Refer to table 7-1 for the list of component items.

b. The following is a list of Manufacturers Codes (MFG Code) contained in Table 7-1.

Code	Manufacturer
79154	Victaulic Co of America 3100 Hamilton Blvd South Plainfield, N.J 07080
80204	United States of America Standards Institute, 10 East 40th St., New York, N.Y 10016
81348	Federal Specifications Promulgated by General Services Administration
81349	Military Specifications
81350	Joint Army-Navy Specifications Promulgated by Standardization Division, Directorate of Logistic Services, DSA
97403	U.Sn Army Research and Development Center, Fort Belvoir, Virginia 22060

Table 7-1. IDENTIFICATION OF COMPONENT ITEMS

FSN	Descrlptlon	Part No	Mfg Code	Qm' Per Unit	Fig No	Item No
	TANK ACCESSORIES					
	ACCESS LADDER ASSEMBLY	13211E8041	97403	1	7-4	-
5306-010-9216	BOLT, SQUARE HEAD: ',2-13 thd size, 1 in lg.	FF-B-575	81348	62	7-4	4
	BRACE, ACCESS LADDER	13211E8063	97403	2	7-4	11
	BRACE, CROSS	13211E8068	97403	4	7-4	6
	BRACE, LOWER: Right hand	13211E8066	97403	1	7-4	7
	BRACE, LOWER: Left hand	13216E7385	97403	1	7-4	8
	BRACE, MIDDLE: Left hand	13211E8064	97403	1	7-4	10
	BRACE, MIDDLE: Right hand	13211E8065	97403	1	7-4	9
	HAND RAIL	13211E8060	97403	2	7-4	13
5310-982-4940	NUT: 2.-13 thd size	FF-N-836	81348	62		
	PLATE, GUSSET	13211E8069	97403	4	7-4	5
	RAIL, ACCESS LADDER	13211E8061	97403	6	7-4	1
	STEP	13211E8062	97403	21	7-4	3
	ADAPTER, GROOVED AND THREADED: 6 in size	40-6	79154	1	3-29	3
	ADAPTER, GROOVED AND THREADED: 8 in size	40-8	79154	2	3-29	3
	CAP, GROOVED 6 in size	60-6	79154	1	3-29	5
	CAP, GROOVED 8 in size	60-8	79154	2	3-29	5
	COUPLING, GROOVED 6 in size	77D-6	79154	1	3-29	6

Table 7-1. IDENTIFICATION OF COMPONENT ITEMS

FSN	Descrlptlon	Part No	Mfg Code	Qm' Per Unit	Fig No	Item No
	COUPLING, GROOVED 8 in size	77D-8	79154	2	3-29	6
	ELBOW: 6 in size	13215E9716	97403	1	3-28	2
	ELBOW: 8 in size	13215E9717	97403	2	3-28	2
	FLANGE SET, THREADED: 2 in size	13211E8081	97403	1	3-27	4
	FLANGE SET, THREADED: 6 in size	13215E9719	97403	1	3-28	3
	FLANGE SET, THREADED: 8 in size	13215E9720	97403	1	3-28	3
	GAGE, INDICATING: liquid level	13200E9129-2	97403	1		
	GASKET, FLANGE: 2 in size	13211E8057	97403	2	3-27	1
	GASKET FLANGE: 6 in size	13215E9722	97403	2	3-28	6
	GASKET FLANGE: 8 in size	13215E9723	97403	4	3-28	6
	NIPPLE, PIPE: 2'/2 in size	MIL-P-10388	81349	1	6-22	6
4730-221-2141	PLUG, PIPE: 1 in size	USAS-B14-16	81350	1		
4730-278-3410	PLUG, PIPE: 2 in size	USAS-B16-14	81350	1		
	REDUCER, GROOVED: 6 in	to 4 in	size	50-6X4	79154	1
	REDUCER, GROOVED: 8 in	to 6 in	size	50-8X6	79154	1
	VALVE, NON-FREEZING: Water drawoff	13211E8082	97403	1	6-21	7
	VALVE, PRESSURE-VACUUM	13213E4596	97403	4	1-3	6
	VENT, EMERGENCY: 20 in size	13216E7392	97403	1	6-20	1
	WATER STORAGE					
	AIR-INTAKE ASSEMBLY					
5306-865-9573	BOLT: l/2-13 thd size, 5 in lg	FF-B-575	81348	28		
5306-725-8522	BOLT: No 10-24 thd size, 1 in lg	FF-B-575	81348	2		
	COVER, MANHOLE	13215E9715	97403	1	6-18	3
	GASKET, MANHOLE COVER: 28 hole	13215E9726	97403	1		
5310-982-4940	NUT: '/2-13 thd size	FF-N-836	81348	28		
5310-934-9758	NUT: No	10-24 thd size	FF-N-836	81348	2	
	RESTRICTOR, DUST	13216E7224	97403	1		
	RING, CLAMPING	13211E8072	97403	2		
	RING, SCREEN: Inside	13211E8071	97403	1		
	SCREEN, INSECT	13211E8077	97403	1		
	SPACER	13211E8074	97403	14		
	TANK DECK					
	CHANNEL: Center deck plate, 11 hole	13211E7954	97403	2		
	CHANNEL: Deck plate, 23 hole	13216E7957	97403	20	6-11	4
	CHANNEL: Hatch, bolt clip, 2 hole	13215E9706	97403	16	6-12	2
	CHANNEL: Stave, 48 hole	13215E9704	97403	20	6-11	3
	GASKET: Hatch, 16 hole	13215E9724	97403	4	6-13	1
	GASKET: Manhole deck, 30 hole	13215E9727	97403	1	6-16	3
	MANHOLE DOME	13211E8048	97403	1	6-18	1
	PLATE, DECK: Hatch	13216E7946	97403	3	1-3	5
	PLATE, DECK: Hatch	13216E7944	97403	1		
	PLATE, DECK: Center	13216E7943	97403	2	6-17	2
	PLATE, DECK: Level indicator	13216E7941	97403	1		
	PLATE, DECK: Plain	13216E7945	97403	15	1-3	1
	RAFTER ASSEMBLY	13216E7964	97403	20	6-11	-
	ANGLE: Bolt retainer	13216E7956	97403	1	6-11	5
5306-010-9216	BOLT: '%2-13 thd size, 1 in lg	FF-B-575	81348	10	6-11	6
	HANGER, RAFTER	13216E7958	97403	1	6-11	8
5310-892-4940	NUT: 12-13 thd size	FF-N-836	81348	10		
	RAFTER	13211E8052	97403	1	6-11	1
	SUPPORT: Guard wire	13211E8049	97403	19	7-4	14
	WIRE, GUARD: No 9, 100 ft lg	QQ-W-461	81348	2	7-4	15
	SIDE STAVES					
	CHANNEL: Cleanout cover, side, 24 hole	13215E9702	97403	4	3-30	5
	CHANNEL: Cleanout cover top, 12 hole	13216E7955	97403	1	3-30	1
	CHANNEL: Stave, 48 hole	13215E9704	97403	120	6-2	4
	COVER CLEANOUT	13216E7948	97403	1	3-33	1
	RETAINER, BOLT: Cleanout door, top	13215E9701	97403	1	3-30	4
	RETAINER, BOLT: Cleanout door, vertical	13215E9703	97403	4	3-30	6
	STAVE: Cleanout cover	13216E7949	97403	1	3-30	2
	STAVE: Plain	13216E7953	97403	55	1-4	7

Table 7-1. IDENTIFICATION OF COMPONENT ITEMS

FSN	Descrlptlon	Part No	Mfg Code	Qm' Per Unit	Fig No	Item No
	STAVE: 2 in outlet	13216E7952	97403	1	1-3	12
	STAVE: 6 in outlet	13216E7951	97403	1	1-4	11
	STAVE: 8 in outlet	13216E7950	97403	2	1-4	9
	TANK BOTTOM AND CENTER SUPPORT					
	CENTER SUPPORT ASSEMBLY	13216E7960	97403	1	7-3	-
	BASE, CENTER SUPPORT	13211E8053	97403	1	6-1	1
5306-263-8974	BOLT: 1-8 thd size, 9 in lg	FF-B-575	81348	3	7-3	12
5306-298-8639	BOLT, 3/-10 thd size, 3 in lg	FF-B-575	81348	16	7-3	8
5306-010-9216	BOLT: /2-13 thd size, 1 in lg	FF-B-575	81348	60	6-8	5
5306fi-959-7813	BOLT: l/2-13 thd size, 11/4 in lg	FF-B-575	81348	10	6-8	6
	CLIP, RAFTER	13216E7963	97403	20	6-11	7
	CLIP, STRUT	13216E7962	97403	5	6-8	3
	COLLAR, GUSSET	13211E8044	97403	1	6-8	4
	FLANGE SET, THREADED: 8 in	size	13215E9720	97403	1	
5310-891-3462	NUT: 1-8 thd size	FF-N-836	81348	3		
5310-934-9727	NUT: 3/4-10 thd size	FF-N-836	81348	16		
5310-982-4940	NUT: 1/2-13 thd size	FF-N-836	81348	70		
	PLATE, STEP	13216E7386	97403	1	7-3	11
	PLUG, IRON	USAS-B16-14	80204	1		
	RING LANDING RAFTER	13211E8075	97403	1	6-8	1
	STRUT	13211E8033	97403	5	6-8	2
	SUPPORT, CENTER	13211E8038	97403	1	7-3	1
	SUPPORT, CENTER: Middle	13211E8037	97403	1	7-3	7
	SUPPORT, CENTER: Top	13211E8036	97403	1	7-3	9
	CHANNEL: Bottom plate, 24 hole	13211E8115	97403	20	6-2	2
	CHANNEL: Center bottom plate, 5 hole	13216E7961	97403	20	6-1	7
	CHANNEL: Stave, 48.hole	13215E9704	97403	20	6-2	4
	PLATE BOTTOM	13216E7947-2	97403	20	6-3	1
	ATTACHING COMPONENTS					
5306-010-9216	BOLT SQUARE HEAD: 1/2-13 thd size, 1 in lg	FF-B-575	81348	2700	6-5	4
5306-959-7813	BOLT, SQUARE HEAD: '/2-13 thd size, 1 '4 in lg.	FF-B-575	81348	9400	6-2	3
5306-042-6916	BOLT, SQUARE HEAD: /2-13 thd size, 11/2 in	FF-B-575	81348	400	6-3	2 lg.
	GASKET, FILLET	13211E8097	97403	140	6-6	5
	GASKET, STRIP	13211E8054	97403	2100ft	7-1	2
	GASKET, WEDGE	13211E8056	97403	280	7-1	3
5310-982-4940	NUT: '/2-13 thd size	FF-N-836	81348	12504	6-14	4
5430-693-2968	PLUG, BOLT REPLACEMENT	13211E8058	97403	6	3-5	-
	WASHER, SEALING: '/2 in screw size	13211E8059	97403	9500	6-16	1
	RE-ERECTION KIT					
5430-217-0114	KIT, RE-ERECTION	13217E5409	97403	1		
5306-010-9216	BOLT: '/4-13 thd size, 1 in lg	FF-B-575	81348	2700		
5306-959-7813	BOLT: '/2-13 thd size 11'4 in lg	FF-B-575	81348	9400		
5306-042-6916	BOLT: '/2-13 thd size, 11/2 in lg	FF-B-575	81348	400		
5306-011-1195	BOLT: '/2-13 thd size, 21/2 in lg	FF-B-575	81348	4		
5306-298-8639	BOLT: 3/4-10 thd size, 3 in lg	FF-B-575	81348	16		
5306-964-0963	BOLT: 5/8-11 thd size, 31/2 in lg	FF-B-575	81348	6		
5306-019-1857	BOLT: 5/8-11 thd size 4 in lg	FF-B-575	81348	24		
5306-426-4069	BOLT: 7/8-9 thd size, 5 in lg	FF-B-575	81348	12		
5306-964-0966	BOLT: 1-8 thd size, 9 in lg	FF-B-575	81348	3		
	BRUSH, APPLICATION: Sealing compound	H-B-420	81348	6		
	GASKET, FILLET	13211E8097	97403	140		
	GASKET, FLANGE: 2 in size	13211E8057	97403	4		
	GASKET, FLANGE: 6 in size	13215E9722	97403	4		
	GASKET, FLANGE: 8 in size	13215E9723	97403	12		
	GASKET, FLANGE: 12 in size	13216E7382	97403	4		
	GASKET, HATCH	13215E9724	97403	4		
	GASKET, MANHOLE: 28 hole	13215E9726	97403	2		

Table 7-1. IDENTIFICATION OF COMPONENT ITEMS

FSN	Descrlptlon	Part No	Mfg Code	Qm' Per Unit	Fig No	Item No
	GASKET, MANHOLE: 30 hole	13215E9727	97403	2		
	GASKET, STRIP	13211E8054	97403	2100 ft		
	GASKET, WEDGE	13211E8056	97403	255		
5310-982-4940	NUT: /2-13 thd size	FF-N-836	81348	12504		
5310-012-5550	NUT: 5/8-11 thd size	FF-N-836	81348	30		
5310-934-9727	NUT: 3/4-10 thd size	FF-N-836	81348	16		
5310-891-3425	NUT: 7/8-9 thd size	FF-N-836	81348	12		
5310-891-3462	NUT: 1-8 thd size	FF-N-836	81348	3		
5430-693-2968	PLUG, BOLT REPLACEMENT	13211E8058	97403	6		
8030-800-6382	PUTTY, SEALING	MIL-P-20628	81349	2 gal		
7920-205-1711	RAGS	DDD-R-30	81348	15 lb		
8030-598-4503	SEALING COMPOUND	MIL-S-14231	81349	28qt		
	WASHER, SEALING: 1/2 in screw size	13211E8059	97403	1000		

CHAPTER 8
ERECTION INSTRUCTIONS FOR
THE 10,000-BARREL CAPACITY TANK

Section I. ASSEMBLY AND INSTALLATION OF TANK BOTTOM

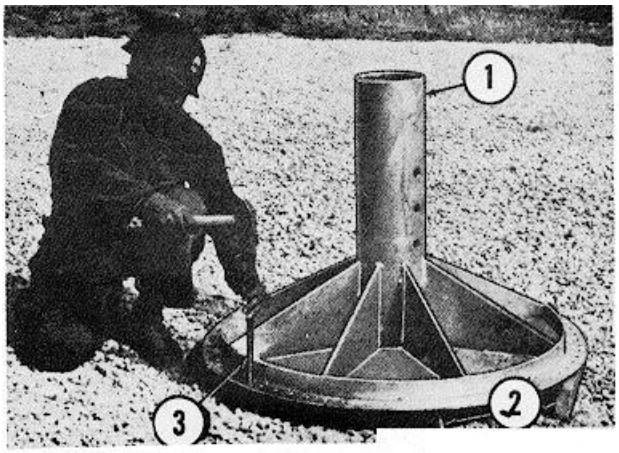
8-1. Center Support Base

a. General. The center support base consists of a short, tubular, support column mounted on a circular, flat, steel plate. The support column is held in position on the steel plate by radially extended, vertically mounted and welded, steel gussets. The two halves of the tank bottom adapter plate are bolted to the center support base.

b. Installation.

(1) Drive all grade stakes below the surface of the foundation. Backfill and tamp the resulting hole.

(2) Locate center support base blocking (2, fig. 8-1) as shown. Use 4-by 6-inch blocks, if available.



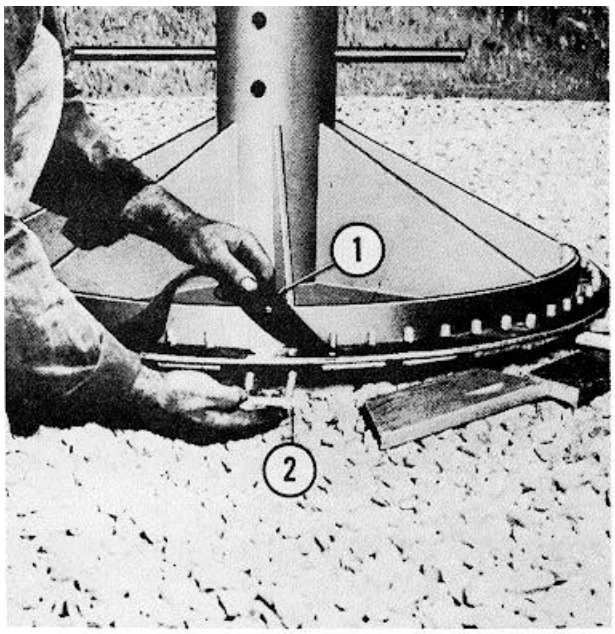
1. CENTER SUPPORT BAE
1. CENTER SUPPORT BASE
2. BLOCKING
3. DRIFT PIN

ME 5430-209-12/8-1

Figure 8-1. Center support base.

(3) Position center support base (1) over the center grade stake. Make sure blocking (2) does not block the entrance to the boltholes.

(4) Place strip gaskets (1, fig. 8-2) around bolt circle of center support base. Where there is a break in the gasket, overlap the joint two boltholes. Make a beveled cut squarely across the second bolthole in the gasket. This will insure a smooth joint where the gasket overlaps.



1. STRIP GASKET
2. TWO-BOLT HOLE CHANNEL

ME 5430-209-12/8-2

Figure 8-2. Installing channels, bolts, and gaskets on the center support base.

(5) Insert two l/2-by 112-inch bolts in the 2-bolt hole channel (2).

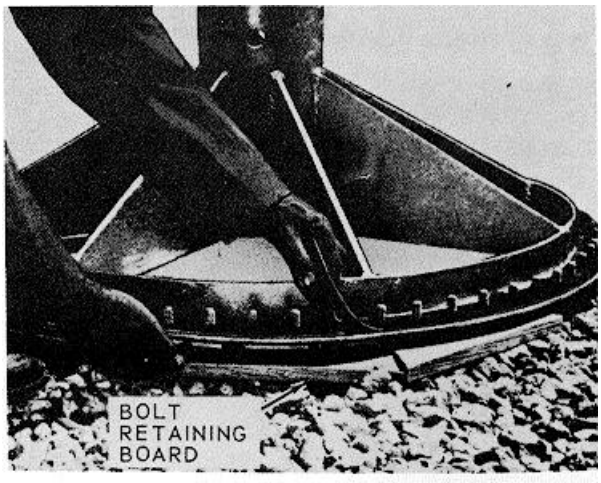
CAUTION

To prevent damage to the gasket, do not use a sharp-edged tool or pipe to force the gasket over the bolts. Use a well-rounded, smoothmouth tool.

(6) Insert the channel assembly through center support base plate and gasket as shown in figure 8-2.

(7) Remove blocking (2. fig. 8-1) and insert bolt retaining boards as shown on figure 8-3. These boards will prevent movement of bolts when center adapter plate is installed.

(8) Apply sealing compound to gasket overlap joints to insure a tight connection.



ME 5430-209-12/8-3

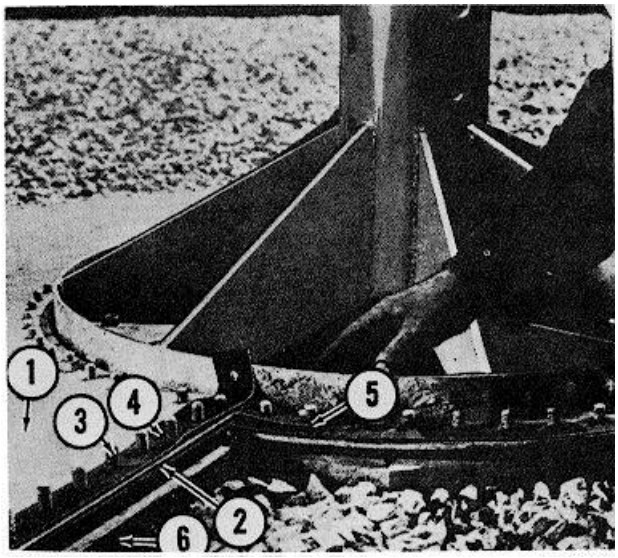
Figure 8-3. Positioning the bolt retaining boards.

8-2. Bottom Adapter Plate

a. General. The bottom adapter plate consists of two semicircular, flat, steel plates. The two plates are attached separately to the center support base and joined together by bolted lap joints. The tank bottom plates are attached to the outer circumference bolting circle.

b. Installation.

(1) Set bottom adapter plate (1, fig. 8-4) in position on the center support base bolt flange.



1. BOTTOM ADAPTER PLATE
2. BOLTING CHANNEL
3. LAP JOINT BOLT
4. STRIP GASKET
5. WEDGE GASKET
6. BOLT RETAINING BOARD

ME 5430-209-12/8-4

Figure 8-4. Installation of first half of bottom adapter plate.

(2) Place bolting channel (2) under the joining edge of adapter plate (1). Insert lap joint bolts (3) through all except the last bolthole on the outer circumference of the plate and channel.

(3) Place a bolt retaining board (6) under the bolting channel.

(4) Install strip gasket (4) along the full length of the joining seam. Allow a 11/2 -bolt overlap at each end.

CAUTION:

Wedge gaskets must be used whenever three plates or sections are jointed together.

(5) Place wedge gasket (5) on each side of the center support base at the joining edges of adapter plate (1).

(6) Set bottom adapter plate (2, fig. 8-5) in position on center support base. The joining edge of adapter plate (2) should overlap the joining edge of adapter plate (1).

1. BOTTOM ADAPTER PLATE
2. BOTTOM ADAPTER PLATE

ME 5430-209-1`2/8-5

Figure 8-5. Installation

(7) Install steel recessed washer, cup side down, and nut on each bolt protruding through bottom adapter plate. Tighten bolts on center support base flange first, then tighten lap joint bolts.

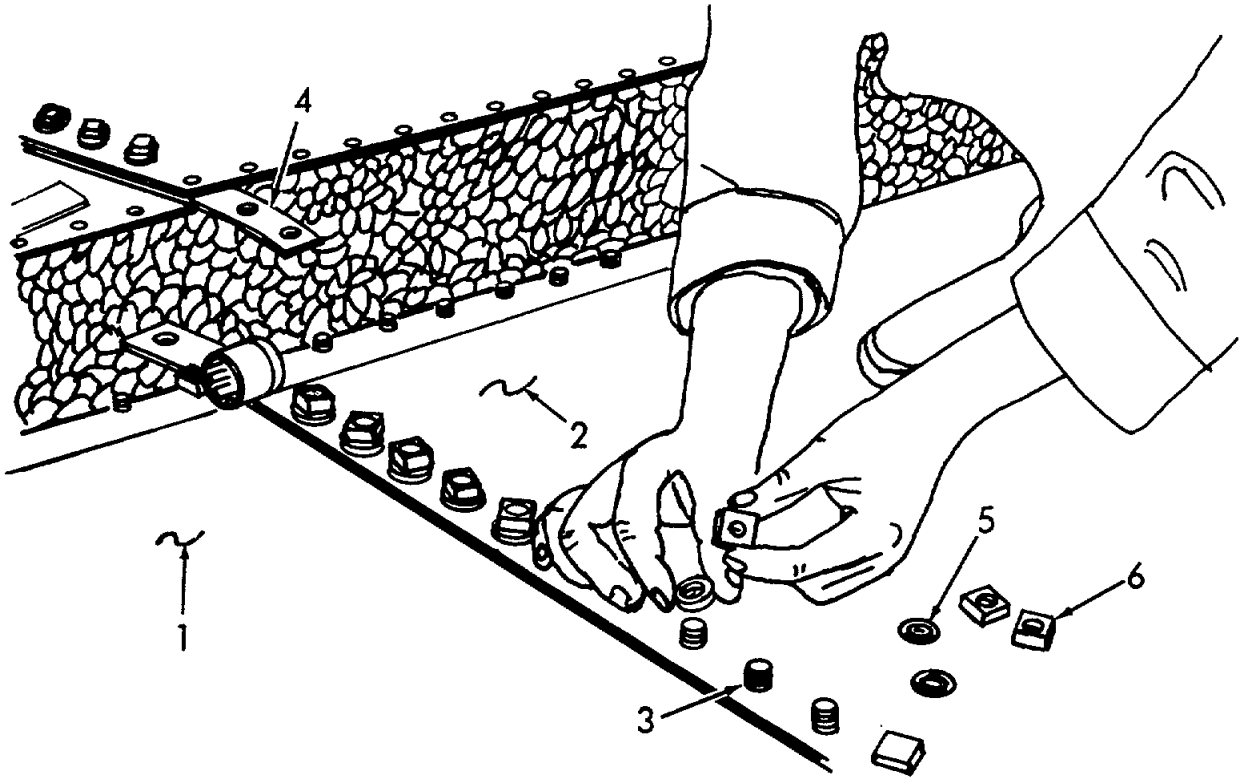
(8) Place strip gasket around the outer bolt circle of bottom adapter plates following the same procedure as in paragraph 8-lb (2), (4), (5), (6) and (7). Place wedge gasket under the gasket at lap seams of bottom adapter plates. Insert ½0-by 1½/ inch bolts in 4-bolt hole channels. Insert channel assembly through bottom adapter plates and gasket. Remove blocking.

8-3. Assembly of Bottom Sections

a. General. The assembled bottom section consists of 74 Instapered, flat, steel plates. There are 37 inner of 74 tapered, flat, steel plates. There are 37 inner plates and 37 outer plates. All inner plates are interchangeable and all outer plates are interchangeable. The plates are first assembled by bolting the small end of the large plate on top of the large end of the small plate. They are then treated as 37 one-piece sections, and are bolted to the center adapter plate assembly. When bottom is completely assembled, the section pattern reassembles a wheel.

b. Layout and Assembling Plates.

(1) Place bolting channel under outer joining seam of inner plate (1, fig. 8-6). Insert 1/2 by 1 /4 -inch lap joint bolts (3) through all except the end boltholes of the plate and channel.



1. INNER PLATE
2. OUTER PLATE
3. LAP JOINT BOLT
4. STRIP GASKET
5. STEEL RECESSED WASHER
6. NUT

Figure 8-6. Assembly of inner and outer bottom plates.

(2) Place bolt retaining board under the channel.

(3) Install strip gasket (4) along the full length of joining seam.

(4) Joining seam of outer plate (2) overlaps joining seam of inner plate (1).

(5) Install steel recessed washer (5), cup side down, and nut (6) on each bolt (3) protruding through outer plate (2). Tighten all bolts.

c. Assembling First Bottom Section. The first bottom section (para 8-4) consists of one inner plate, ter bottom plates. one outer plate, three bolt channels placed under each radial lap seam, l/2 -by 1 /4 -inch radial lap bolts, and 1/2-by 1/2-inch lap joint bolts.

NOTE

The seams are identified as right and left, facing the large end.

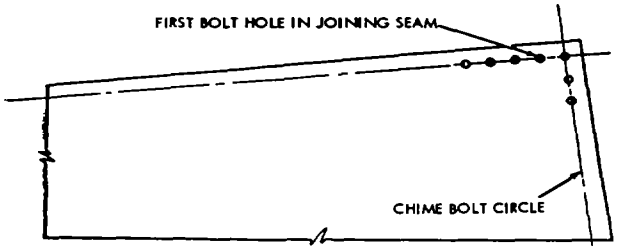
(1) Starting at large end of plate, place bolt channel (1, fig. 8-7) under right and left lap seams of the section.

1. BOLT CHANNEL
2. BOLT HOLE

ME 5430-209-12/8-7

Figure 8-7. Assembling bottom Sections

(2) Insert ½ by 1¼ inch radial lap bolts through all except the chime boltholes (fig. 8-8) in section and channels.



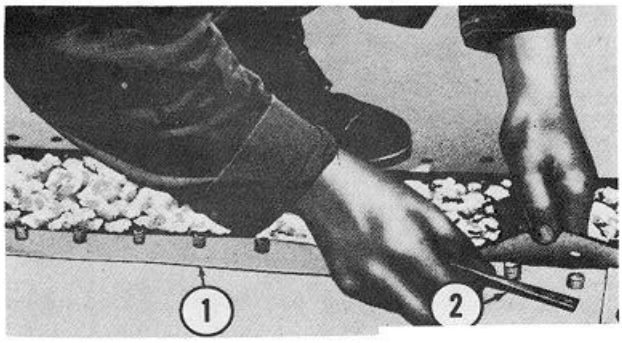
ME 5430-209-12/8-8

Figure 8-8. Locating first bolthole in joining seams

NOTE

Position bolt retaining boards under plates at seams as channels are put In place This facilitates installation of strip gaskets

(3) Place strip gasket (1, fig. 8-9) along each seam.



1. STRIP GASKET
2. WEDGE GASKET

ME 5430-209-12/8-9

Figure 8-9. Placing strip and wedge gaskets.

(4) Place wedge gasket (2) under each strip gasket at the plate overlap.

d. Assembling Intermediate Bottom Sections. There are 35 intermediate bottom sections assembled with channels, strip and wedge gaskets. Except that channels are placed under the right lap seams only, follow the assembly procedure outlined in *c* above.
Avoid damage to gasket material by stacking assembled sections as shown in figure 8-10. Above procedures do not apply to the last bottom section, since no further assemblies are made on this section. Separate the last bottom section from all other sections until it is installed in the tank bottom.

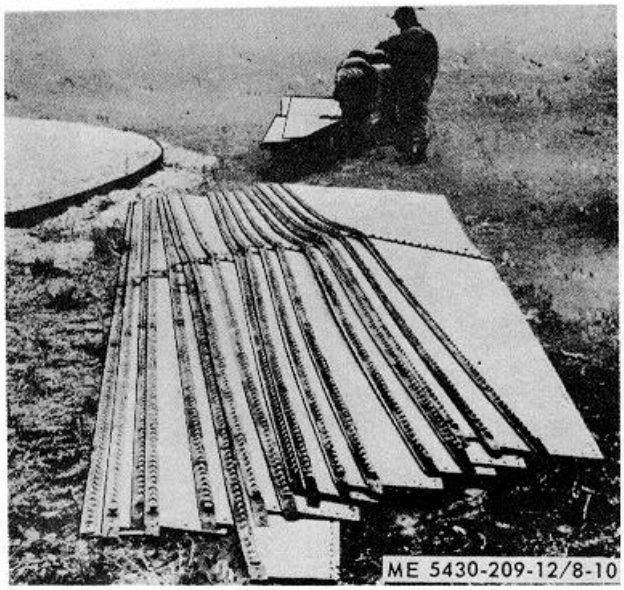


Figure 8-10. Stacking assembled bottom sections.

8-4. Installation of Bottom Sections

a. Layout of Sections. With first bottom section in its approximate installation location, lay remaining sections around the tank foundation as shown in figure 8-11.

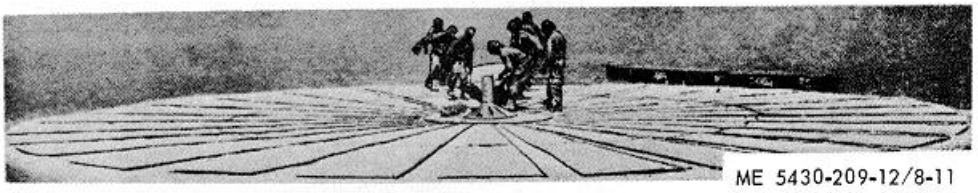


Figure 8-11. Layout of assembled bottom sections.

b. Installing First Bottom Section.

(1) Place small end of section over adapter bolts (3, fig. 8-12).

Figure 8-12. Installing first bottom section.

(2) Install finger-tightened nuts on bolts inside the lap seams. These nuts are to hold assembled section in position.

c. Installing First Intermediate Section.

NOTE

Wedge shaped gaskets must be used wherever three plates or sections are joined together.

(1) Place wedge gasket (1, fig. 8-13) over gasket (2) at right edge of first section.

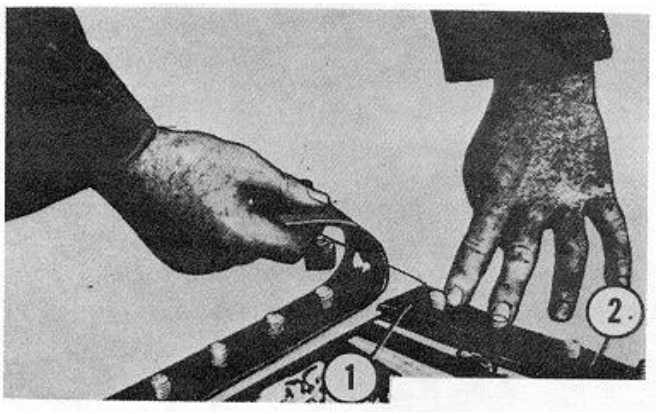
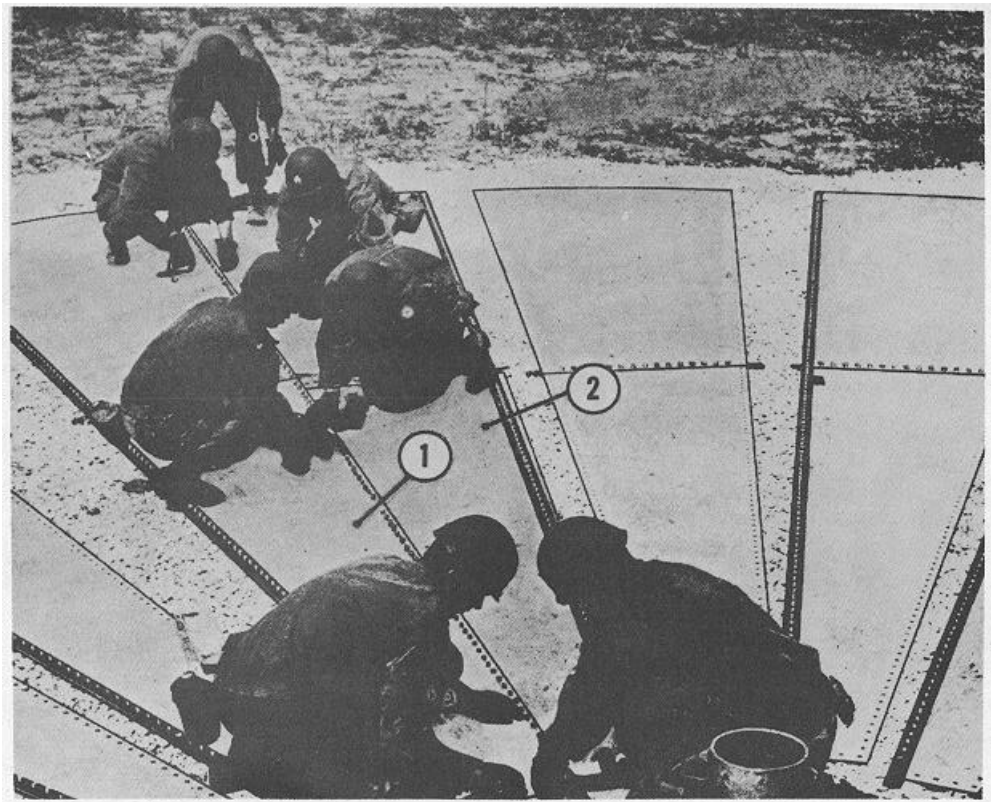


Figure 8-13. Installing wedge gasket at lap seam of first bottom section

(2) Face small end of the section. Install this section, and all remaining sections, to the left of the first section or in a counterclockwise direction around the tank foundation.

(3) Place small end of first intermediate section (1, fig. 8-14) over bolts (3, fig. 8-12) with left lap seam of the section lain over bolts (5) in the right lap seam of the first bottom section (2, fig. 8-14).



1. FIRST INTERMEDIATE BOTTOM SECTION
2. FIRST BOTTOM SECTION

ME 5430-209-12/8-14

Figure 8-14. Installing first intermediate bottom section.

(4) Install finger-tightened nuts on bolts (3, fig. 8-12) as in *b* (2) above. Install finger-tightened nuts on bolts in the lap seam at intervals of about 18 inches.

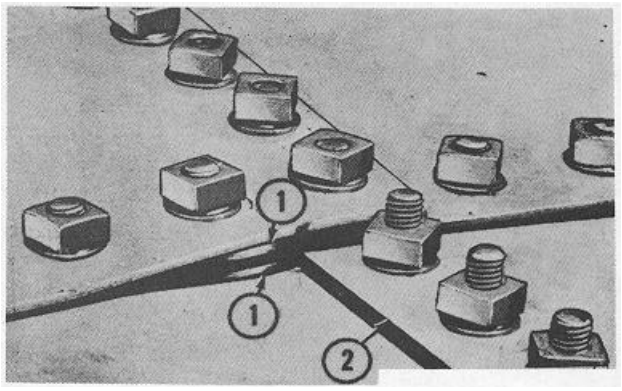
NOTE

Do not tighten nuts beyond finger tightness Each section must move when adjusting the tank bottom to obtain correct spacing for installation of the last section.

d. Installing Remaining Intermediate Bottom Sections.

(1) Refer to *c* above, and install remaining intermediate sections.

(2) At one point in the installation of bottom sections, four plates are joined where the lap seam in the sections coincides with the lap seam of the bottom adapter plates (2, fig. 8-15). At this point install two wedge gaskets (1) to fill the spaces between section and plate.



1. WEDGE GASKET
2. BOTTOM ADAPTER PLATES

ME 5430-709-12/8-15

Figure 8-15. Wedge gaskets installed at joining point of four plates

e. Installing Last Bottom Section.

(1) Place lap seams of last section (7, fig. 8-12) over lap seams of adjacent sections (8 and 4).

(2) Place small end of over bolts (3). This is a vital point in the tank bottom; make sure it is secure against leakage.

(3) Install two wedge gaskets (1, fig. 8-16) over bolts (3, fig. 8-12).

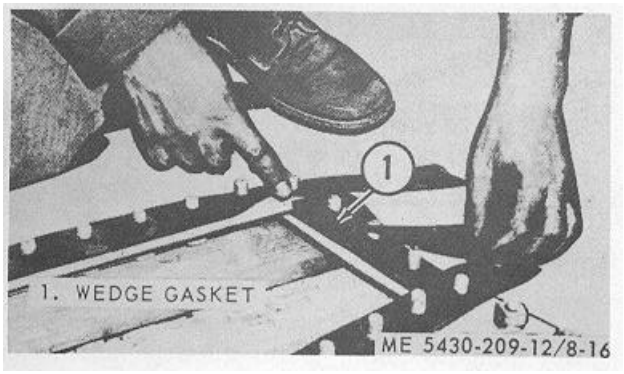


Figure 8-16. Installing wedge gaskets at installation of last bottom sections

(1) First Adjusting Method.

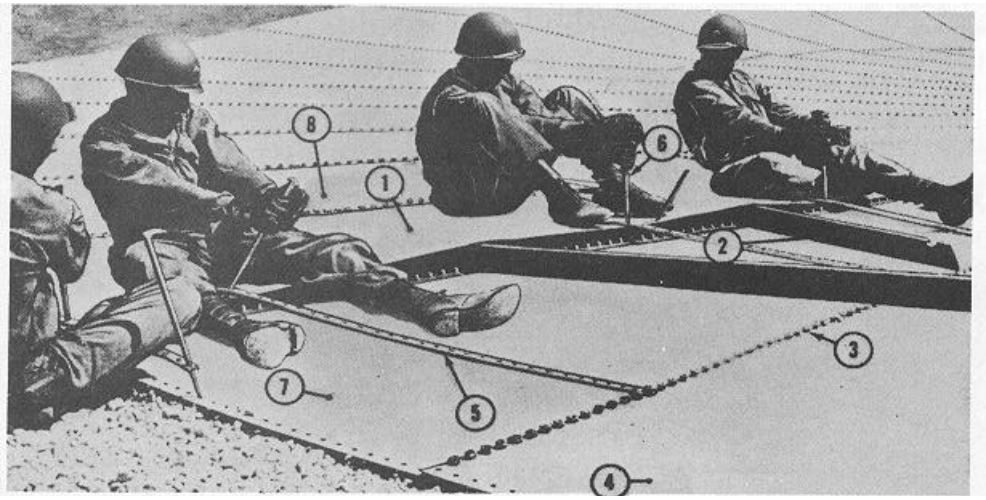
(a) Place last section over the space remaining for its installation.

(b) Check bolt spacing and alinement along each lap seam, and across the section between the lap seams (fig. 8-17).

Figure 8-17. Checking Bolt spacing at installation of last bottom section.

f. Adjustment of Bottom Sections. Some adjustment is always required in the installed sections before the last section can be correctly positioned. Either one of two procedures described below is generally used to adjust the installed sections.

(c) Adjust next-to-last section (8, fig. 8-18) so the left lap seam of last section (1) will slip over the bolts in the right lap seam of next-to-last section (8).



1. LAST BOTTOM SECTION
2. LUMBER, 2 - BY 4-INCH
3. BOLT
4. FIRST INTERMEDIATE BOTTOM SECTION
5. BOLT CHANNEL
6. DRIFT PIN
7. FIRST BOTTOM SECTION
8. NEXT-TO-LAST BOTTOM SECTION

ME 5430-209.12/8-18

Figure 8-18. Adjusting installed bottom sections.

(d) Install finger-tightened nuts on bolts in the lap seam and follow the procedure in c (4) above.

(e) Lift free side of last section (1) and slide several pieces of lumber (2) under it. The lumber supports the last section and, at the same time, acts as slide bars in adjusting the sections.

(f) Place several pieces of bolt channel (5) equally spaced on top of sections (1 and 7) along the length of the seam. Remove appropriate nuts from bolts (3) in left lap seam of first intermediate section (4). Attach one end of each bolt channel (5) to a bolt in the seam and secure with a nut.

(g) Insert drift pins (5) through channels (5) and last section (1), with the pins bearing against the left edge of first bottom section (7). This will produce enough leverage to bring the right lap seam of last section (1) in alinement with the bolts in the left lap seam of first bottom section (7).

(h) With last section (1) in final position, the right lap seam will drop over the bolts in the left lap seam of first section (7) upon removal of lumber (2) and channels (5). Install finger-tightened nuts on the bolts.

NOTE

If necessary, combine the following instructions with the adjusting procedure (1)above

(2) Alternate adjusting method.

(a) Adjust next-to-last section (8, fig. 8-18) so the left lap seam of last section (1) will slip over the bolts in the right lap seam of next-to-last section (8).

(b) Install finger-tightened nuts on the bolts and follow the procedure in c (4) above.

(c) Lift the free side of last section (1) and slide several short lengths of 2-by 4-inch lumber under it. The lumber will keep the section clear of the bolts in the left lap seam of first section (7) and act as slides during the shifting of the sections.

(d) Lift a portion of the outer edge of the installed sections and place it on boxes or other types of easily moved supports (fig. 8-19).

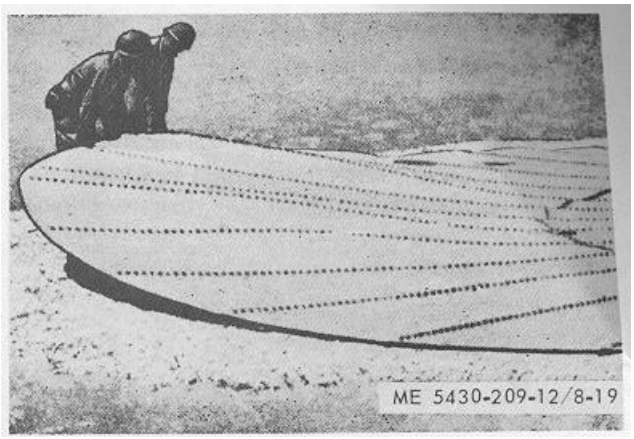


Figure 8-19. Lifting and supporting outer edge of installed bottom sections

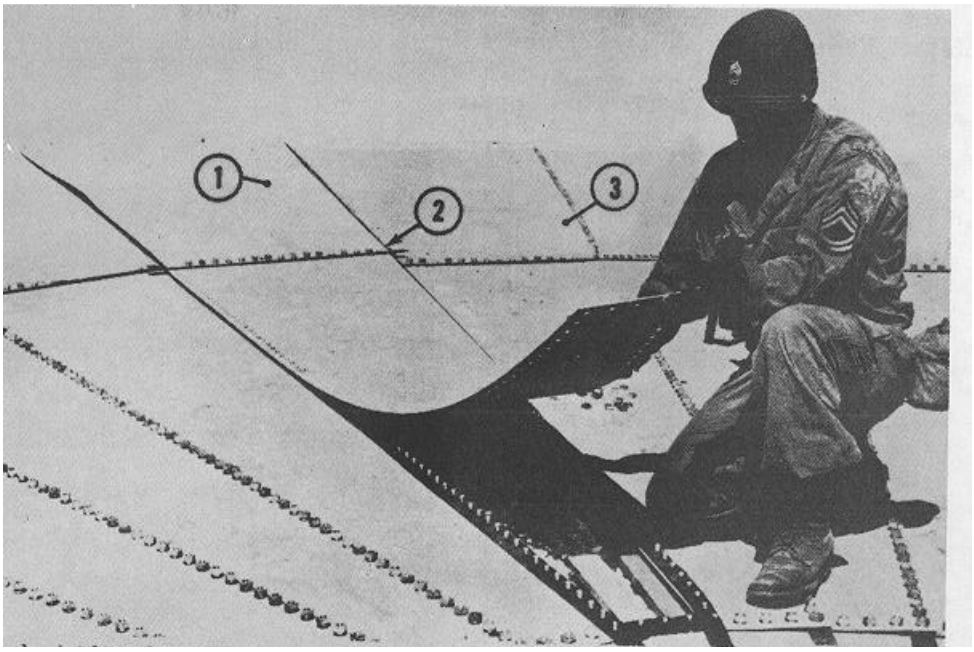
(e) Move the support progressively toward or away from the space remaining for the installation of this section as required. As the supports are shifted, the slope made in the jointed sections will cause the weight of each section to react with the angle of the slope, forcing the raised sections to slide down the slope. The direction of shift combined with the weight of the sections involved, will change relationship of the bolts in the left lap seam of first section (7) with the right lap seam boltholes in last section (1).

(f) With last section (1) in final position, the right lap seam will drop over the bolts in the left lap seam of first section (7).

(g) Install finger-tightened nuts on the bolts.

(3) Installing special gasket.

(a) When the left lap seam of last section (1, fig. 8-20) is placed over the bolts in the right lap seam of next-to-last section (3), a small gap (2) is formed under the seam. This is caused by the off-spacing of the joining seams of the sections.



1. LAST BOTTOM SECTION
2. POINT OF INSTALLATION OF SPECIAL GASKET
3. NEXT-TO-LAST BOTTOM SECTION

ME 5430-209-12/8-20

Figure 8-20. Installing special gasket.

(b) Measure the actual length of this gap and cut two pieces of strip gasket (2, fig. 8 13) to match this length.

(c) Bevel each end of the gaskets. This will make them seal tight against each other and against the seam of the section.

(d) Remove the finger-tightened nuts along the seam in the area of the gap.

(e) Block up the freed area of the seam with a short length of 2-by 4-inch lumber, clear of the gap.

(f) Force a strip gasket over the bolts. Apply a heavy coating of sealing compound along the top face and under each end of the gasket.

(g) Force the remaining strip gasket over the top of the first gasket.

(h) Remove the blocking so the section will drop back to its original position.

8-5. Tightening Tank Bottom

a. Work from small end of the sections and remove all finger-tightened nuts.

b. Install steel recessed washer, cup side down, and nut on each bolt in the tank bottom except those in the outer circumference (chime) which secure the first stave rings.

c. Tighten all nuts in the tank bottom starting at the small end of the sections. See figure 8-21.

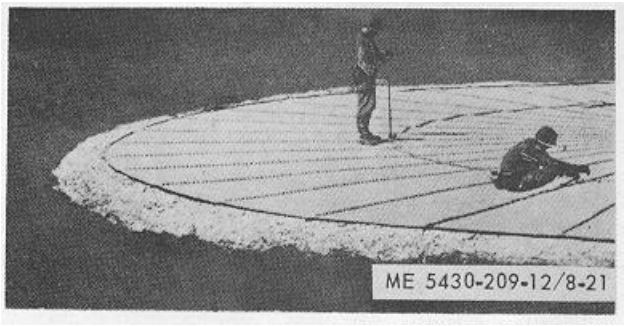


Figure 8-21. Tightening bolts in tank bottom.

8-6. Bolt Replacement Plug

If threads are stripped on one or more bolts in the tank bottom during tightening process, drive out the bolts and replace it with a replacement plug (para 3-4).

8-7. Testing Seams for Leakage

Refer to paragraph 3-5 and test tank bottom seams for leakage.

8-8. Sealing Seams

WARNING

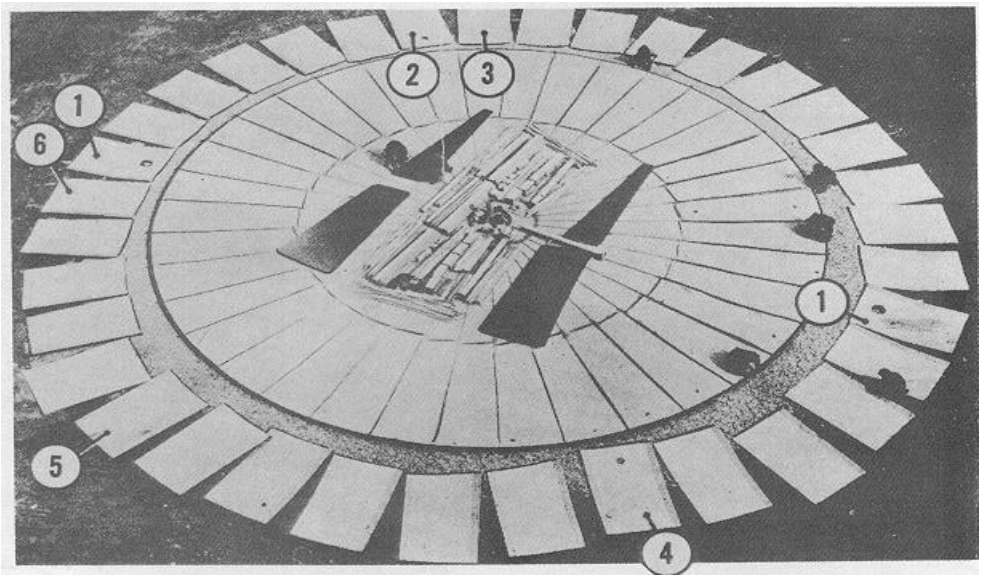
If tank is to be used for water storage, do not apply sealing compound to tank bottom.

Sweep clean the tank bottom. With bottom dry, apply sealing compound to all bolts and seams.

Section II. ASSEMBLY, AND INSTALLATION OF SIDE STAVES

8-9. Assembly of First Ring Staves

a. General. Place all remaining tank components, except the second and third ring staves, on the tank bottom and stack them as shown in figure 8-22. The second and third ring staves should not be carried in until just before the last two staves of the first ring are installed. If ground is muddy, reverse the above procedure.



1. 12-INCH OUTLET STAVE
2. 8-INCH OUTLET STAVE
3. WATER DRAWOFF STAVE
4. 6-INCH OUTLET STAVE
5. CLEANOUT STAVE
6. PLAIN STAVE

ME 5430-209-12/8-22

Figure 8-22. Layout of first ring staves.

b. Layout of Staves. The first ring consists of 6 special and 31 plain staves.

(1) Place the staves with openings aid pipeline connections in the proper position (fig. 8-22).

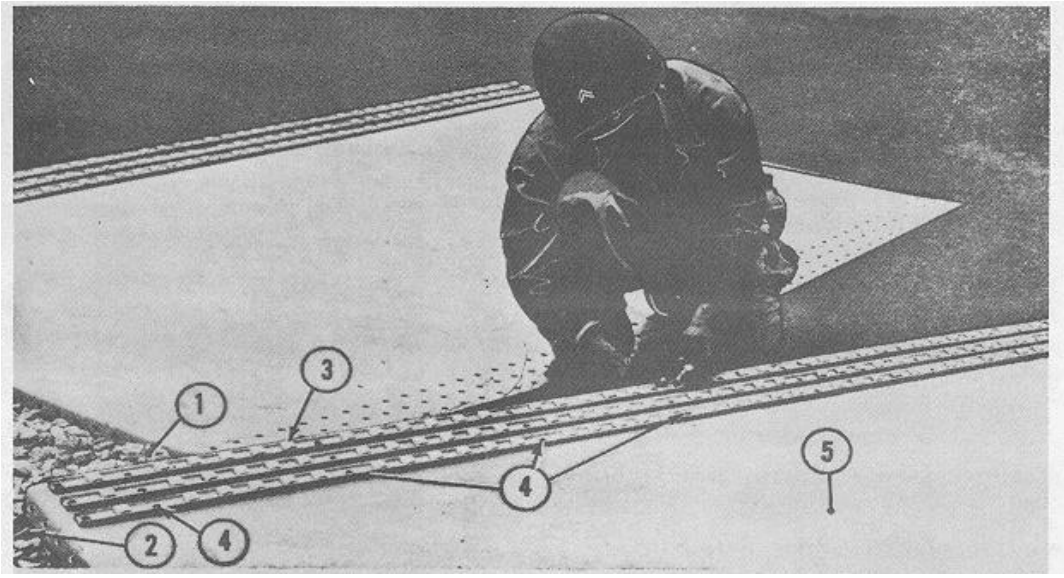
(2) Layout the remaining staves around the perimeter of the bottom. Place the staves with the chimed side up, for convenience in preparing them for assembly. The staves are laid out so each straddles a radial seam of the bottom. If the area is muddy, do not lay out the staves.

NOTE

Staves have an offset at the top and bottom. The top is determined by looking at the stave in a vertical position from the outside In proper position, offsets are at the lower left hand and upper left hand corner.

c. Dressing the Staves.

(1) Along the right seam of each stave as it will be put in place with the chimes out, place strip gasket (2, fig. 8-23) on the outside at each row of boltholes. Gasket material comes in rolls and is cut to proper length for each stave. Cut gasket material so that it projects one bolthole past the top and bottom chimes.



1. STAVE JOINT CHANNEL
2. STRIP GASKET
3. BOLT
4. OPEN BOLT HOLE
5. STAVE

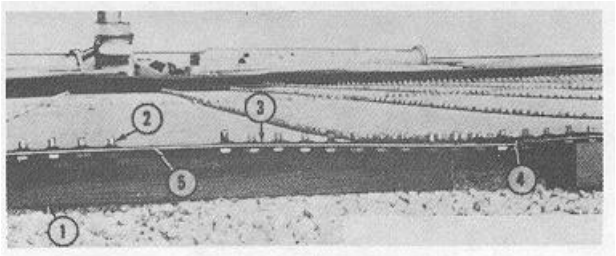
ME 5430-209-12/8-23

Figure 8-23. Assembling gaskets, channels, and bolts.

(2) Insert ½-by-1 ¼ inch bolts (3) through stave joint channels (1), stave (5) and gasket (2) in that order. Omit one bolt in each row, about 8 inches from the bottom of the stave and other bolts at about 2-foot intervals, so that drift pins can be inserted to aline staves with one another before bolting them together.

d. Preparing Outer Edge of Tank Bottom. Since channels are not used with bolts inserted through the chime (outer edge) of the bottom, it must be raised to provide clearance to insert and tighten the bolts following installation of the first ring staves.

(1) Raise the chime and block it with short lengths of 3-by 3-or-4- by 4-inch lumber (1, fig. 8-24) under each bottom section. about 6 inches in from the outer edge.



1. LUMBER
2. BOLT
3. STRIP GASKET
4. WEDGE GASKET
5. BOLT HOLE

ME 5430-209-12/8-24

Figure 8-24. Raising and preparing outer edge of tank bottom

(2) Install strip gasket (3) to cover all boltholes. When one roll of gasket is used up and a new one is started, the overlap should extend over two boltholes. Apply sealing compound at each end of overlap.

(3) Insert wedge gasket (4) underneath gasket (3) at each lap formed by adjoining bottom sections.

(4) Insert /2-by 114 inch bolts (2) through the bottom and gasket (3) in that order. Leave three boltholes (5) open at the middle of each bottom section.

(5) As staves are erected, the bottom chimes overlap at points of omission of the bolts. Insert bolts (2) through boltholes (5) as each stave is overlapped.

CAUTION

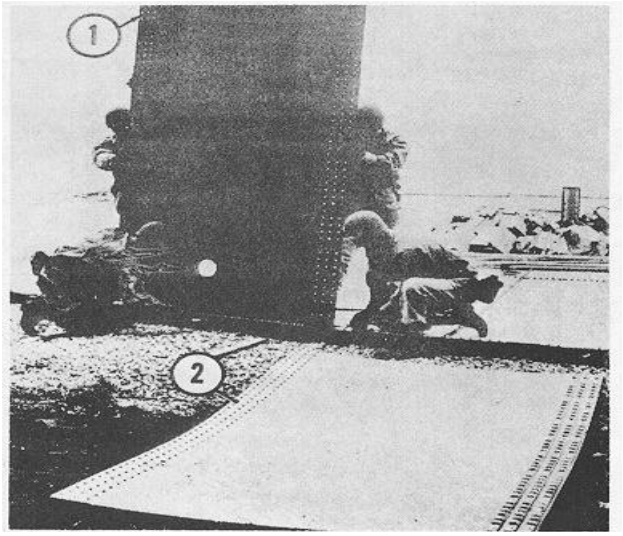
Omit steel recessed washers on all chime bolts.

8-10. Installation of First Ring Side Staves

a. General. The first stave installed must be one fitted with a pipe coupling of the same size as the tank supply pipe.

b. Installing First Stave.

(1) Place first stave (1, fig. 8-25) over the proper bolts (2, fig. 8-24) so that it straddles a radial seam in the bottom. As a result, each subsequent stave (2, fig. 8-25) will straddle a radial seam.



1. FIRST STAVE INSTALLED
2. PLAIN STAVE

ME 5430-209.12/8-25

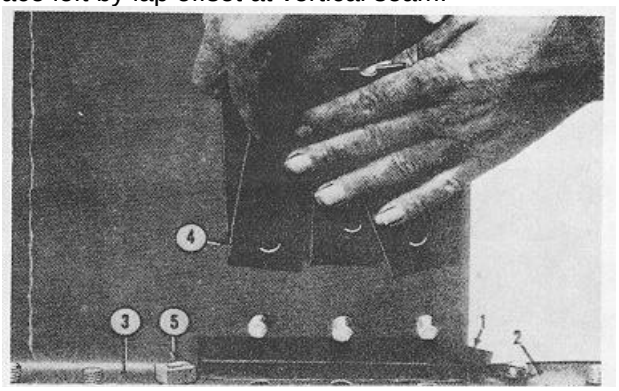
Figure 8-25. Installing first stave in first ring of tank.

(2) Install nuts (5, fig. 8-26) on all bolts (2, fig. 8-24) to fasten the stave loosely.

NOTE

The nuts are not tightened until the last stave of the ring is in place.

(3) Install wedge gasket (2, fig. 8-26) to fill the space left by lap offset at vertical seam.



1. RADII GASKET
2. WEDGE GASKET
3. BOTTOM CHIME
4. STRIP GASKET
5. NUT

ME 5430-209-12/8-26

Figure 8-26. Locating radii and wedge gaskets at bottom chime.

(4) Install radii gasket (1) underneath gaskets (4) of the vertical seam at bottom chime (3).

(5) Install radii gasket (1, fig. 8-27) underneath gaskets of the vertical seam at the top chime.

1. RADII GASKET
2. BOLT

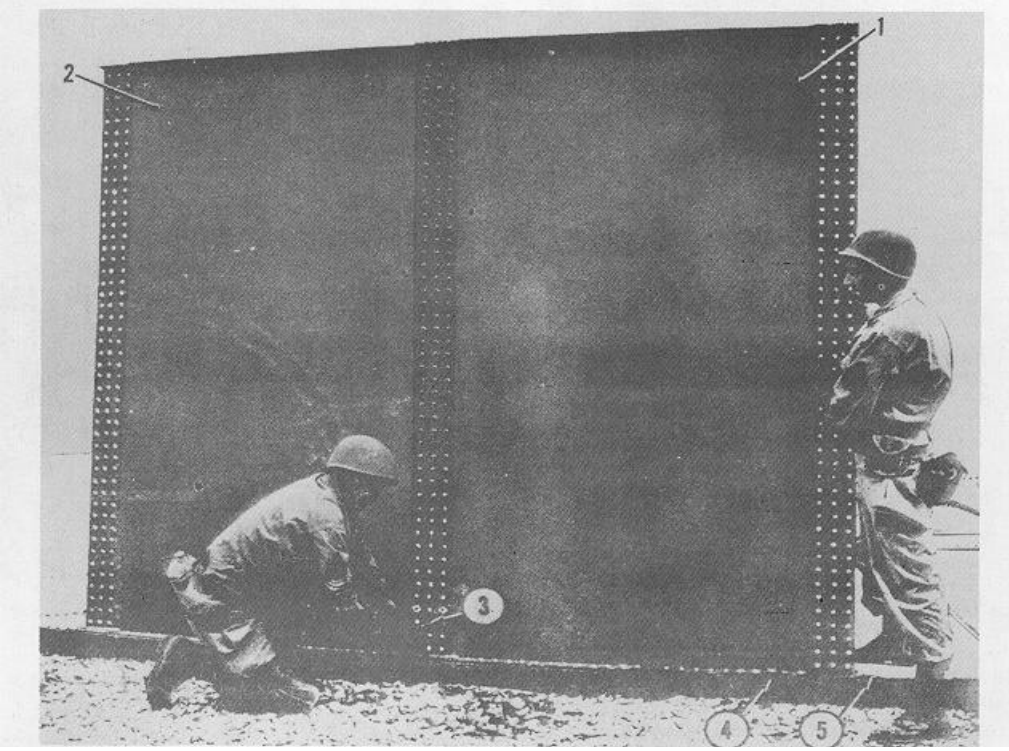
ME 5430-209-12/8-27

Figure 8-27. Locating radii gasket at top chime.

(6) Install steel recessed washers, cup side down, on all vertical seam bolts.

c. Installing First Intermediate Stave.

(1) Push 3 or 5 bolts flush with the gasket at right of first stave (2, fig. 8-28).



1. FIRST INTERMEDIATE STAV
2. FIRST STAVE
3. DRIFT PIN
4. STRIP GASKET
5. WEDGE GASKET

ME 5430-209-12/8-28

Figure 8-28. Installing first intermediate stave

(2) Set first intermediate stave (1) in position with its left seam outside the right seam of first stave (2). Use drift pins (3) in open boltholes to aline the holes with bolts (2, fig. 8-27). Install nuts on every sixth or tenth bolt in each row.

NOTE

As the remaining staves are installed, check carefully the position and tightness of all radii, wedge, and strip gaskets.

d. Installing Remaining Intermediate Staves.

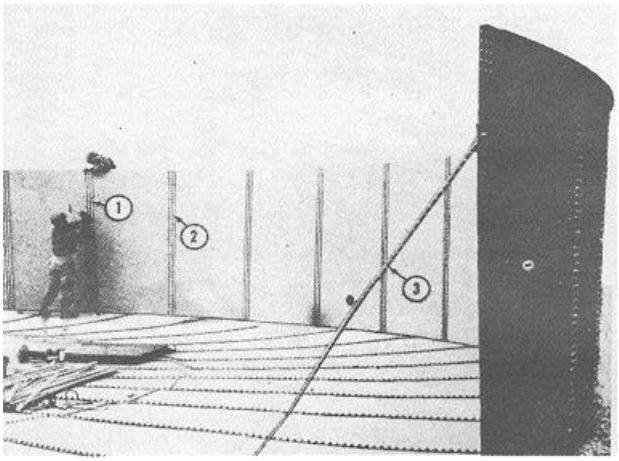
(1) Facing the outside of the second stave, install remaining 34 staves, except the last, to the right of the first intermediate stave or in a counterclockwise direction around the bottom, following the same procedure as in b and c above.

NOTE

Carry all staves for the second the third ring Into the tank before installing the last two staves.

(2) Install eight or nine staves with nuts in-stalled on bolts as in c (2) above.

(3) Install brace (3, fig. 8-29) at left seam of first stave. Use a section of channel for the brace.



1. BOLT HEAD
2. STAVE JOINT CHANNEL
3. STAVE BRACE

ME 5430-209-12/8-29

Figure 8-29. Bracing first stave and driving bolt heads into channels.

NOTE

Rope guy lines opposing each other may be used as a substitute for the channel brace.

CAUTION

Radii gaskets must be placed between chimes and strip gaskets at the vertical seams, top and bottom of all staves, to insure a leakproof joint.

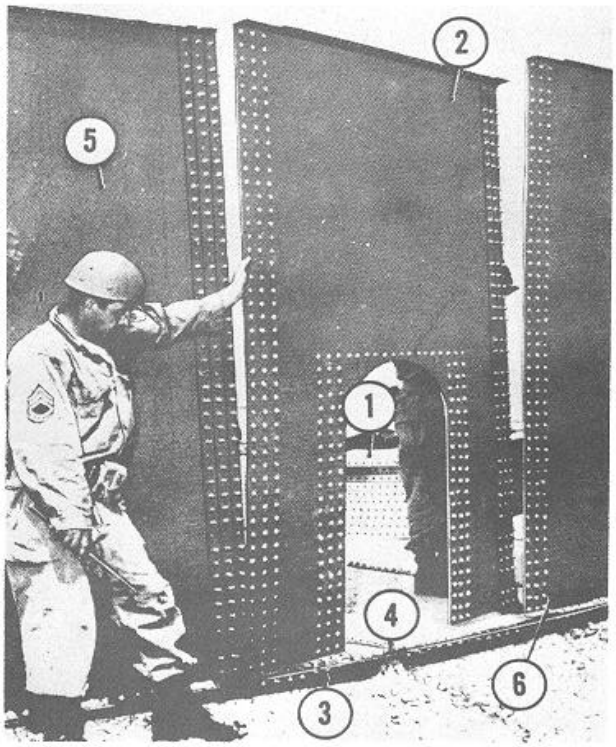
CAUTION

All boltheads must be hammered squarely into the stave joint channels to insure proper tightening of nuts.

(4) As staves are installed, hammer all bolt heads (1), except bolts with nuts, squarely into channels (2) from the inside the tank.

e. Installing Last Stave.

(1) Push all bolts (3, fig. 3-30) flush with gasket (4) in the chime of the bottom to provide clearance for sliding in the last stave.



1. SECOND AND THIRD RING STAVES
2. LAST STAVE INSTALLED
3. BOLT
4. STRIP GASKET
5. NEXT-TO-LAST STAVE
6. FIRST STAVE

ME 5430-209-12/8-30

Figure 8-30. Installing last stave.

(2) Set last stave (2) in position with the left seam outside the right seam of next-to-last stave (5) and its right seam inside the left seam of first stave (6). Loosen bottom chime nuts (5, fig. 8-26) of first stave (6, fig. 8-30).

(3) Lift first stave (6) slightly so the bottom chime of last stave (2) slips into place. Use drift pins and aline the holes and bolts in staves (2, 5, and 6,) following the same procedure as in *c* (2) above

(4) Install remaining bolts (3) in chime of the bottom and install nuts (5, fig. 8-26). In the first row of the seam bolt holes, in every other stave, install ½-by 1 ½-inch bolts in the third and twentieth boltholes counted down from the top chime. These are the scaffold mounting bolts. Install remaining bolts (2, fig. 8-27) in all seams. Install steel recessed washer, cup side down, on all seam bolts. Install nuts, rounded face down, on all bolts.

(5) Tighten all bottom chime bolts uniformly. Remove blocking (1, fig. 3-15) placed under the bottom chime. Use heavy long timber (2) as a lever and short timbers (3) as a fulcrum to lift the chime. Tighten all seam bolts.

(6) Apply sealing compound to the inside perimeter of bottom chime (3, fig. 3-16) of the staves.

8-11. Scaffold

a. General. Before installing second ring staves, it is necessary to install a portion of the scaffold components, provided in the storage tank erection outfit, around the top chime of first ring staves.

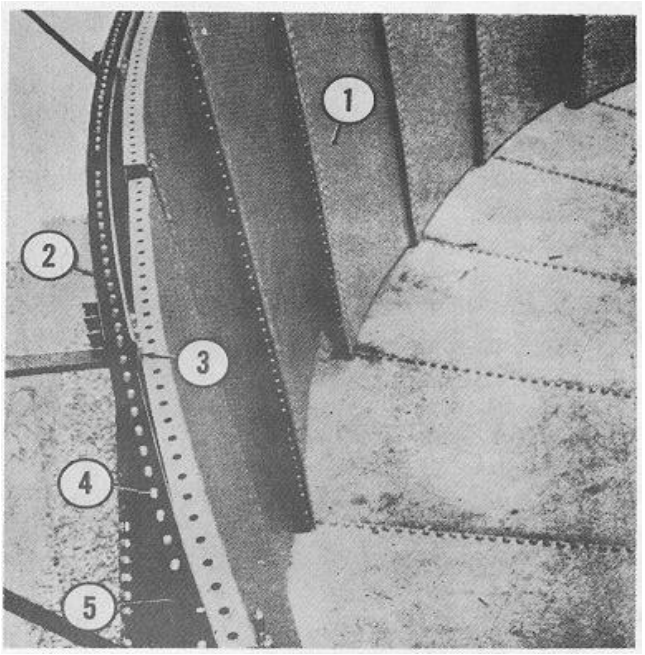
b. Installation. Refer to paragraph 3-8 and install the scaffold.

NOTE

Build as many temporary ladders as necessary to reach the various heights of the scaffold at strategic points around the tank.

8-12. Dressing the Top Chime

a. Install strip gasket (2, fig. 8-31) to cover all bolt holes. When one roll of gasket material is exhausted and a new roll is started, the overlap should extend over two bolt holes. Apply sealing compound at each end of overlap.



1. SECOND RING STAVES
2. STRIP GASKET
3. WEDGE GASKET
4. BOLT
5. OPEN BOLT HOLE

ME 5430-209-12/8-31

Figure 8-31. Dressed top chime of first ring staves

b. Insert wedge gasket (3) under strip gasket (2) at each lap formed by adjoining staves.

c. Insert ½-by 1 V4-inch bolts (4) through chime and strip gasket (2) in that order. Leave two bolt holes open at the middle of each stave.

d. As second ring staves are erected, the bottom chimes overlap at points of missing bolts. Insert bolts (4) through bolt holes as each stave is overlapped.

8-13. Gin Pole

Erection of second and third ring staves require the assembly of gin pole components, with foot spike, provided in the storage tank erection outfit.

8-14. Assembly and Installation of Second and Third Ring Staves

a. General. There are 37 plain staves (1, fig. 8-30) in both the second and third rings. These staves are slightly shorter and are made of lighter gage metal than the first ring staves. They have two rows of bolt holes in each seam.

b. Assembling Staves. Refer to paragraph 8-9 and assemble the staves.

c. Dressing of Staves.

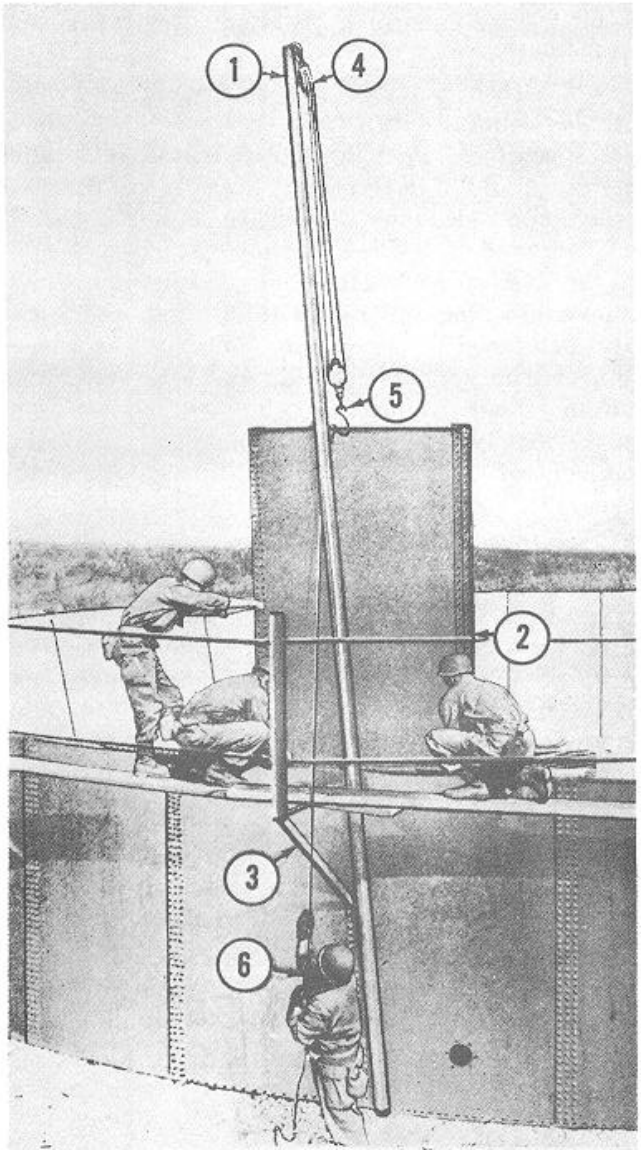
(1) Strip gasket, channels, and bolts placed along the right seam are installed as described in paragraph 8-9 d.

(2) Position second ring staves (1, fig. 8-31) against the first ring so that each stave straddles a vertical seam.

d. Installing First Stave in Second Ring.

(1) Install the staves with radii gaskets (1, fig. 8-26) and (1, fig. 8-27) in a counterclockwise direction as described in paragraph 8-10 *b*.

(2) Remove a bolt in bottom chime of first ring stave near a vertical seam fitted with scaffold bracket (3, fig. 8-32).



1. GIN POLE
2. FIRST STAVE OF SECOND RING
3. SCAFFOLD BRACKET
4. BLOCK AND TACKLE
5. ROPE DECK HOOK
6. GUY LINE

ME 5430-209-12-8-32

Figure 8-32. Hoisting first stave of second ring.

(3) Raise gin pole (1) and push the foot spike through the open bolt hole. As pole is raised, attach block and tackle (4) to the head block eye. With the pole in raised position, lash it to bracket (3).

(4) Attach rope deck hook (5) to the lower tackle block hook.

(5) With the pull line outside of the tank and as close to the pole as possible, lower hook (5) and attach it to top chime center bolt hole of second ring first stave (2).

(6) Raise first stave (2) and position it over bolts (4, fig. 8, 31) so that it straddles a vertical seam.

(7) Attach three nuts (5, fig. 8-26) to equally spaced bolts and tighten to hold stave in place.

(8) From outside the tank, attach guy line (6, fig. 8-32) near center of top chime on first stave (2). This is to stabilize the ring until it is self-supporting.

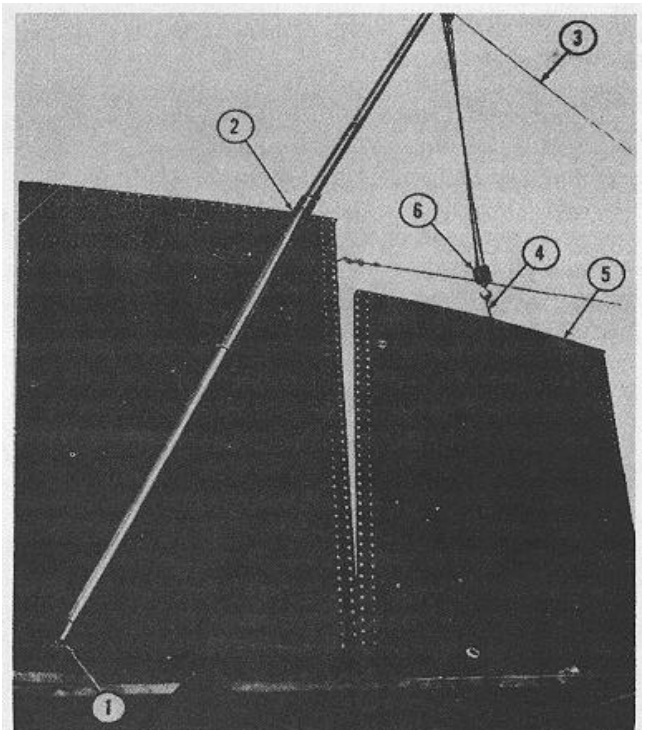
(9) From inside the tank, attach guy lines to the first two or three staves as they are installed.

e. Installing Second Stave of Second Ring.

(1) Remove gin pole (1, fig. 8-32) and reposition it. Replace the bolt in bottom chime of first ring stave.

(2) Start at left seam of first stave (2), and count off eight bolts in the bottom chime. Remove the eighth bolt.

(3) Raise the pole (1) and place foot spike (1, fig. 8-33) in the eighth bolt hole. From the right seam of first stave (2, fig. 8-32), count off four, bolt holes in the top chime and place center rest hook (2, fig. 8-33) in the bolt hole. Tighten bolt that holds the hook on the gin pole.



1. FOOT SPIKE
2. CENTER REST HOOK
3. PULL LINE
4. ROPE DECK HOOK
5. SECOND STAVE OF SECOND RING
6. LOWER TACKLE BLOCK

ME 5430-209-12/8-33

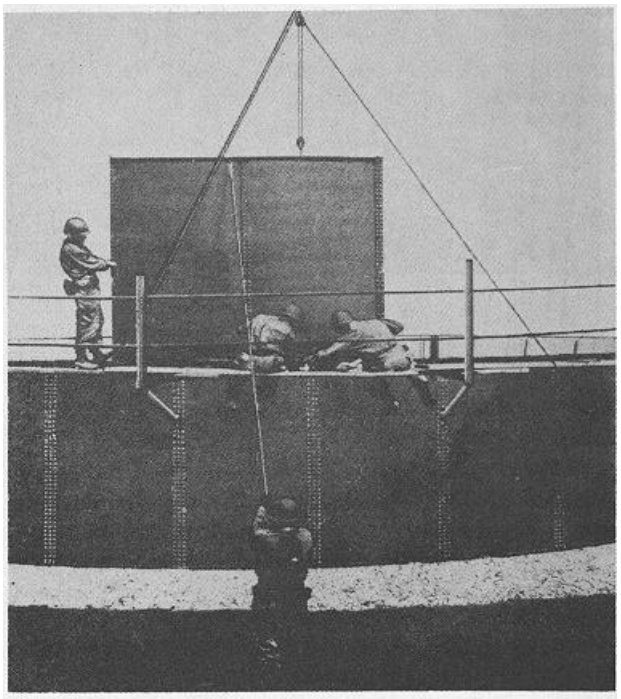
Figure 8-33. Hoisting second stave of second ring.

(4) Gin pole (1, fig. 8-32) is now directly over the center of second stave (5, fig. 8-33) position. Keep pull line (3) outside of the tank. In hoisting a stave, the pull line must form an angle with the pole equal to and adjacent to the angle formed by the load lines and pole. This will reduce bending of the gin pole and reduce danger to personnel pulling on the pull line should the stave accidentally fall.

(5) Lower hook (4) and attach it to the center bolt hole in the top chime of second stave (5).

(6) Raise stave (5) and install it following the procedures in d(6) and (7) above and in paragraph 8-10c.

(7) Shift the guy line to the new location shown in figure 8-34.



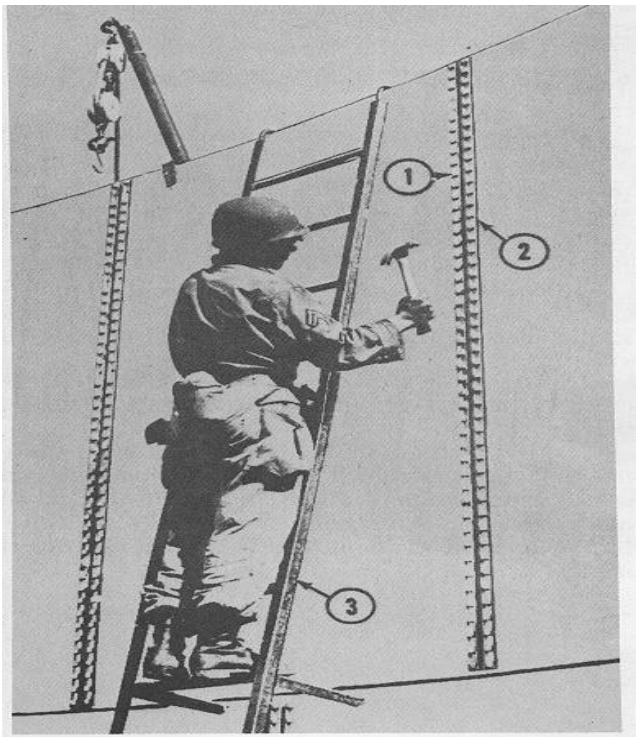
ME 5430-209-12/8-34

Figure 8-34 Attaching guy line to hold second ring staves.

f. Installing Remaining Intermediate Staves in Second Ring.

(1) Install the remaining 34 staves, except the last, following the procedure in e above.

(2) As staves are installed, assemble hook ladder (3, fig. 8-35) furnished with the storage tank erection outfit.



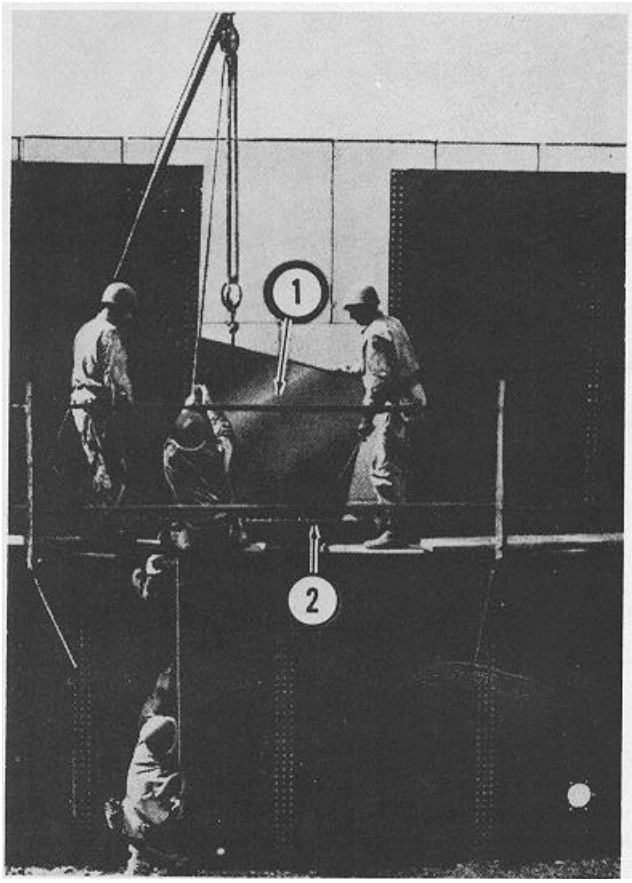
1. BOLT HEAD
2. STAVE JOINT CHANNEL
3. HOOK LADDER

ME 5430-209-12/8-35

Figure 8-35. Driving second ring stave bolts into position

(3) Working from inside the tank, hammer all bolt heads (1), except bolts with nuts, squarely into the channels (2).

g. Installing Last Stave in Second Ring. The last stave (1, fig. 8-36), with its bottom chime bolts (2), is installed following the procedure in paragraph 8-14e.



1. LAST STAVE IN SECOND RING
2. CHIME BOLTS PUSHED OUT OF POSITION

ME 5430-209-12/8-36

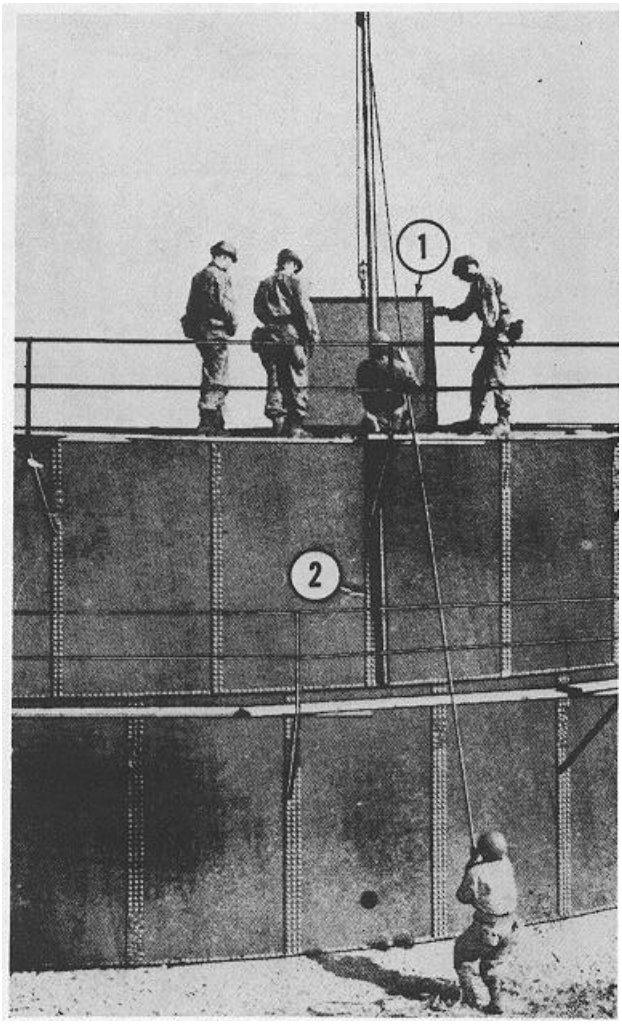
Figure 8-36. Hoisting last stave into position in second ring

h. Scaffold for Third Ring. Refer to paragraph 3-8 and install a scaffold around the top chime of the second ring staves.

i. Dressing Top Chime of Second Staves. Refer to paragraph 8-12 and install the 1/2-by 1-inch bolts and wedge and strip gaskets on the top chime.

j. Gin Pole.

(1) Remove the pole and locate it as shown in figure 8-37 following the procedures in *e* above, for installation of the first stave in the third ring.



1. FIRST STAVE OF THIRD RING
2. BOLT

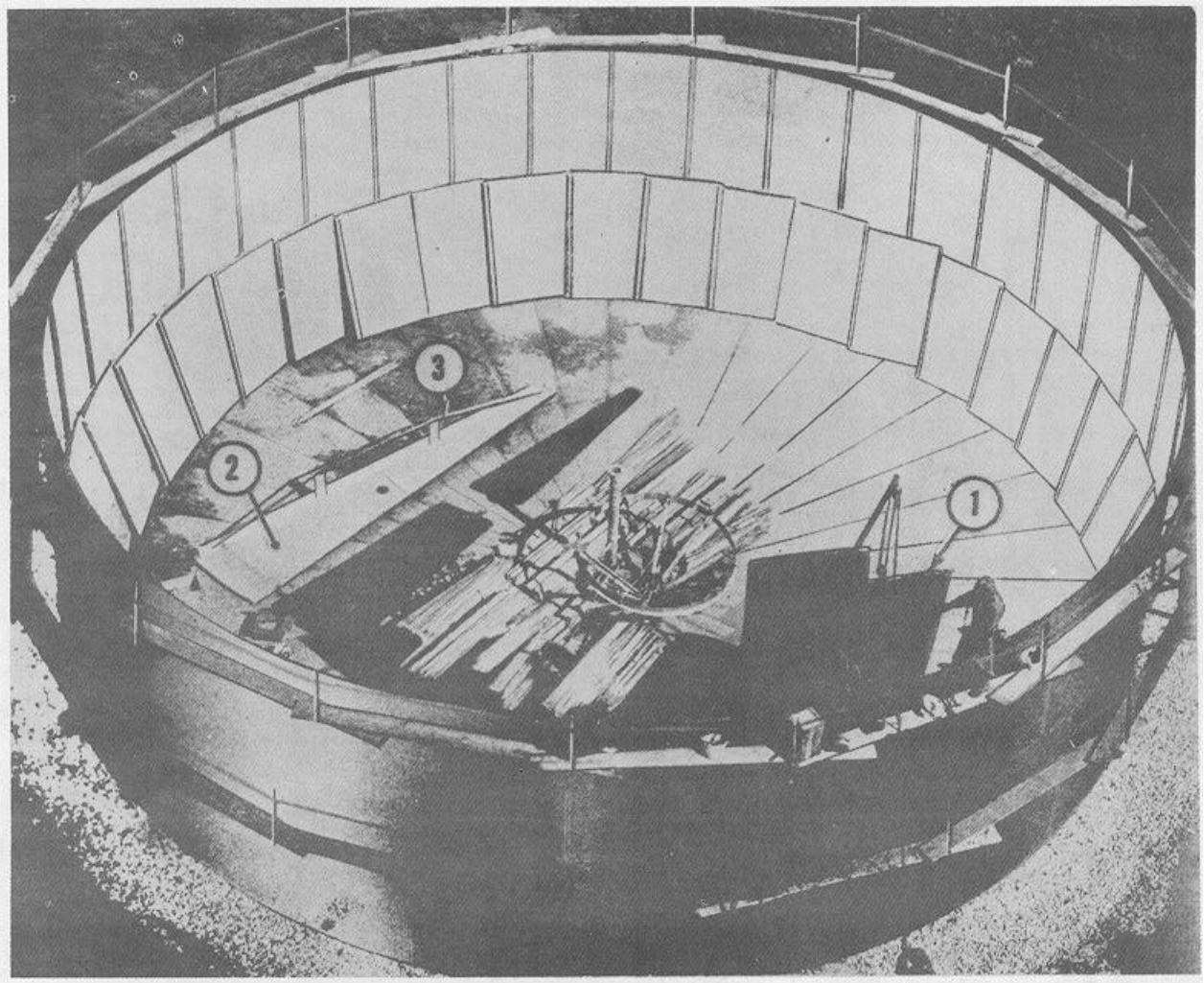
ME 5430-209-12/8-37

Figure 8-37. Hoisting first stave of third ring.

(2) Move the pole (1, fig. 8-32) and position it as shown in figure 8-33 following the procedures in *f* above, for installation of remaining third ring staves.

k. Installing First Stave in Third Ring. The first stave of the third ring (1. fig. 8-37) is raised and placed according to the procedures in *e* above.

l. Installing Remaining Third Ring Staves. The second (1, fig. 8-38) intermediate, and last staves are installed following the procedures in *f, g, h,* and *j* above.



1. SECOND STAVE IN THIRD RING
2. FIRST DECK SECTION
3. TRUSSED RAFTER

ME 5430-209-12/8-38

Figure 8-38. Installing third ring staves

Section III. ASSEMBLY AND INSTALLATION OF TANK CENTER SUPPORT ASSEMBLY

8-15. Assembly of Umbrella-Type Deck Support

a. General. The umbrella-type deck support consists of two semi-circular rings. Each half ring is fitted on the inside with five gusset plates, two splice plates, ten channel braces, and a gusset collar.

b. Assembly.

(1) Set the ring halves on tank bottom, flanged end down, with splice ends butted together.

(2) Insert splice bolts through ring halves and splice plates in that order. Install and tighten nuts.

(3) Reverse position of assembled ring so that flanged end is up.

(4) Attach eight pieces of channel brace 12. fig. 8-39) to the ring (1).

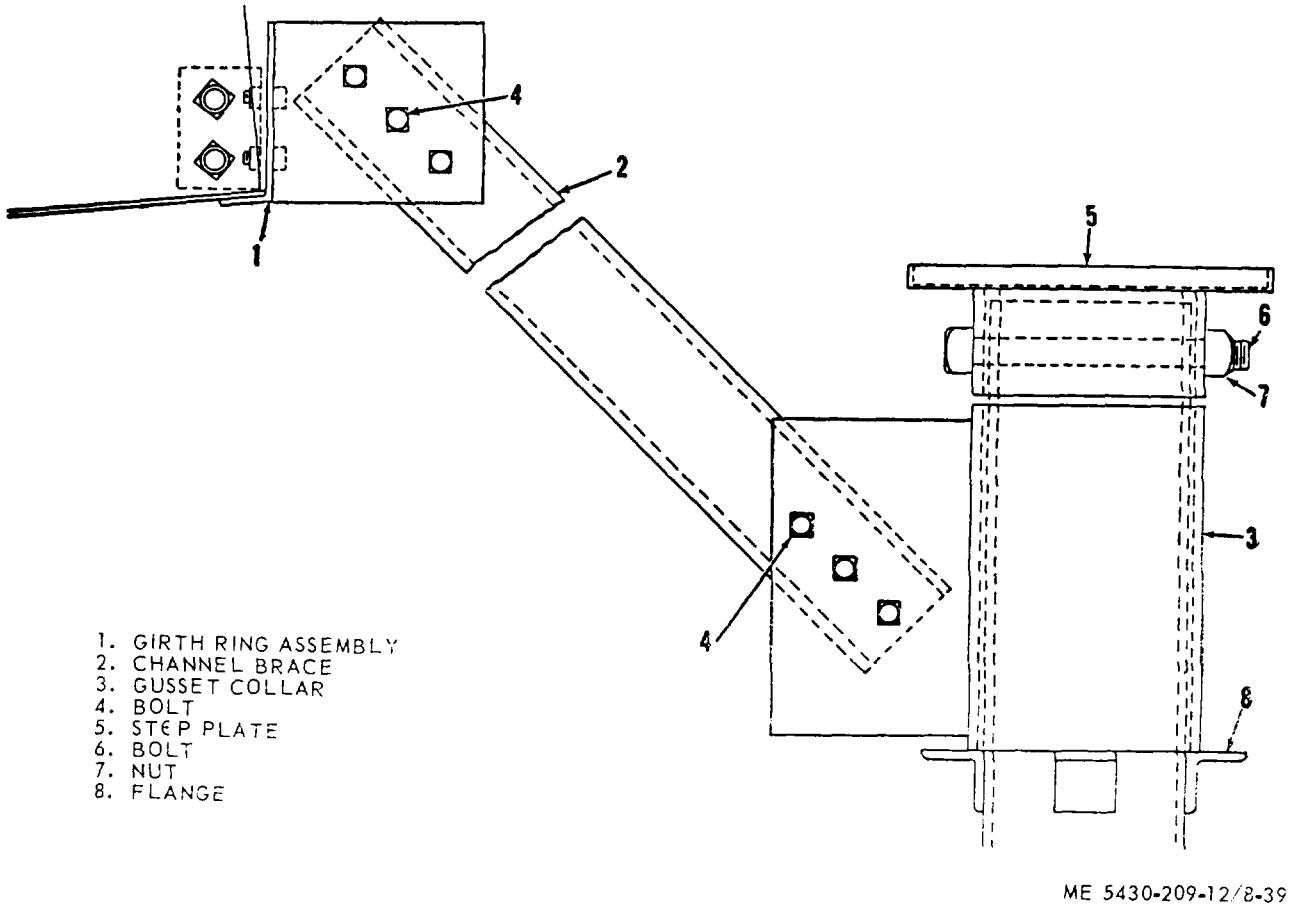


Figure 8-39. Assembly of umbrella-type deck support.

(5) Insert 1/2-by 11/4-inch bolts (4) through the ring gusset plate and channel (2) in that order. Install and tighten nuts.

(6) Position collar (3) at opposite end of brace (2).

(7) Insert bolts (4) through gusset plates of collar (3) and braces (2) in that order. Install and tighten nuts.

NOTE

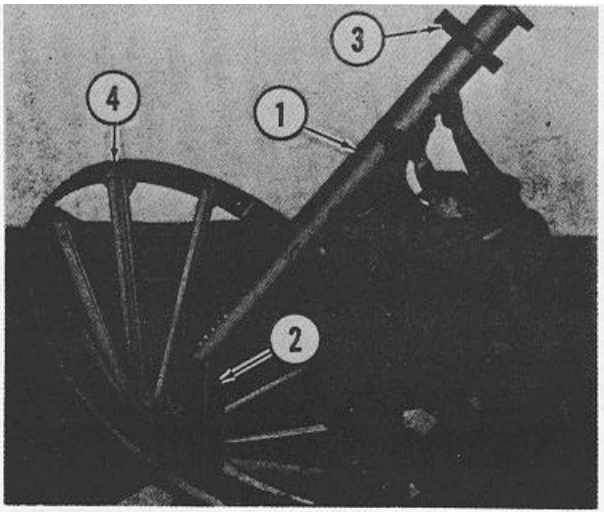
Remaining braces (2) are attached after umbrella support is raised to its final position.

8-16. Installation of Tank Center Support Assembly

a. General. The tank center support assembly consists of the bottom, middle, and top center supports, step plate, and umbrella-type deck supports.

b. Installing Bottom Center Support.

(1) Place assembled umbrella-type support (4, fig. 8-40) over center support base (2) before starting installation of center support sections.



1. BOTTOM CENTER SUPPORT
2. CENTER SUPPORT BASE
3. GIN POLE ADAPTER
4. UMBRELLA-TYPE DECK SUPPORT

ME 5430-209-12/8-40

Figure 8-40. Erecting bottom center support.

(2) Flanged end of bottom center support (1) is the top of the section. Obtain gin pole adapter (3) provided in the storage tank erection outfit. Measure 6 inches from face of the flange and attach adapter (3) to support (1) directly below one of the flange bolt holes.

(3) Raise support (1) and lower it into center support base (2).

c. Gin Pole. Erection of the gin pole (fig. 8-41) is required for installation of the middle center support, top center support, and umbrella-type deck support.

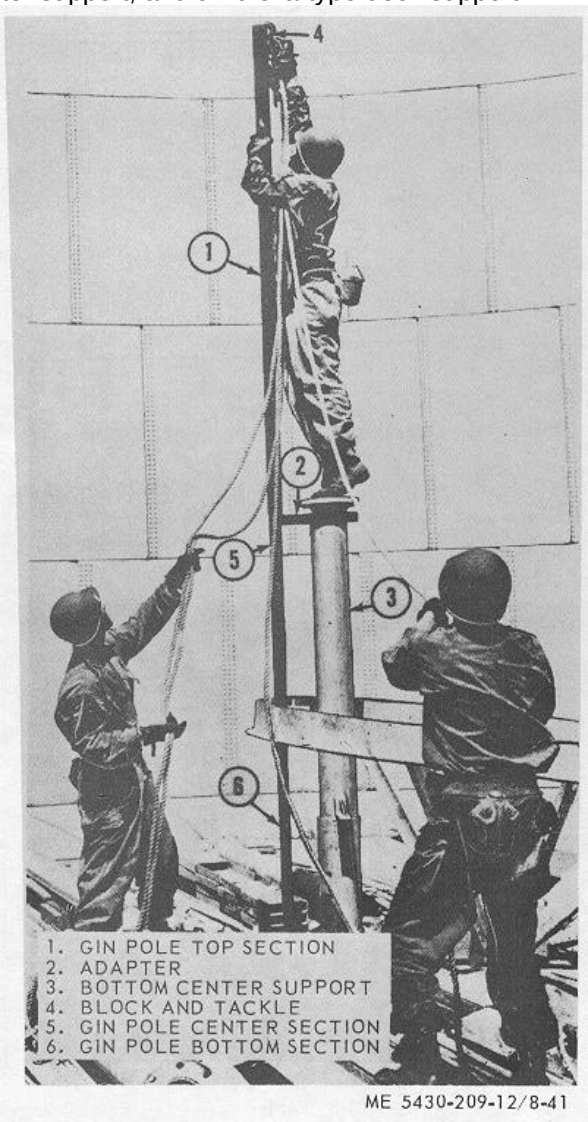


Figure 8-41. Erecting gin pole for Installation of middle center support

d. Installing Middle Center Support.

(1) Slide gin pole top section (1, fig. 8-41) through adapter (2) attached to bottom center support (3).

(2) As top section (1) is raised, attach a block and tackle to the top of the gin pole.

(3) Fit gin pole center section *(5),* less center rest, to top section (1). Push fitted. sections (1 and 5) through adapter (2). Remove the spur from the bottom of gin pole bottom section (6) and fit this section to center section (5).

(4) Set the bottom of gin pole bottom section (6) on a piece of board and tighten the clamp of adapter (2). Place blocking between the gin pole and bottom center support (3) so that the gin pole is parallel to the support. Lash the bottom of the gin pole in place.

(5) The middle center support (1, fig. 8-42) is flanged at both ends. Attach adapter (2) near the end selected as the top.

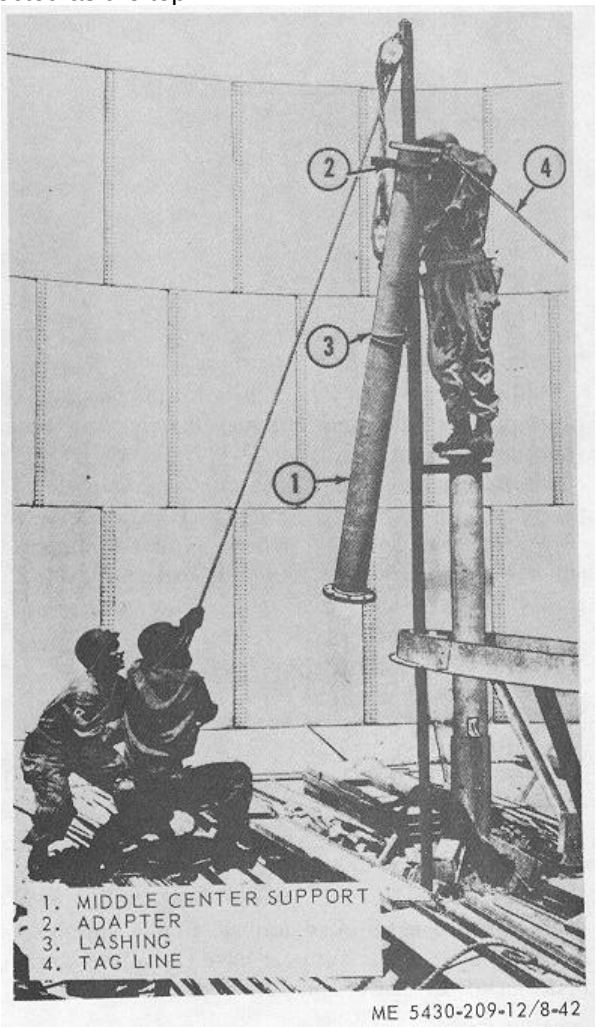


Figure 8-42. Hoisting middle center support into position.

(6) Attach tag line (4) to the top flange of middle center support (1) to assist in placing and bolting the support.

(7) Place lashing (3) around support (1) about one foot above the center of the support to raise it into position.

(8) Attach the lower tackle block hook to lashing (3) and raise support (1) to its final position as shown in figure 8-43.

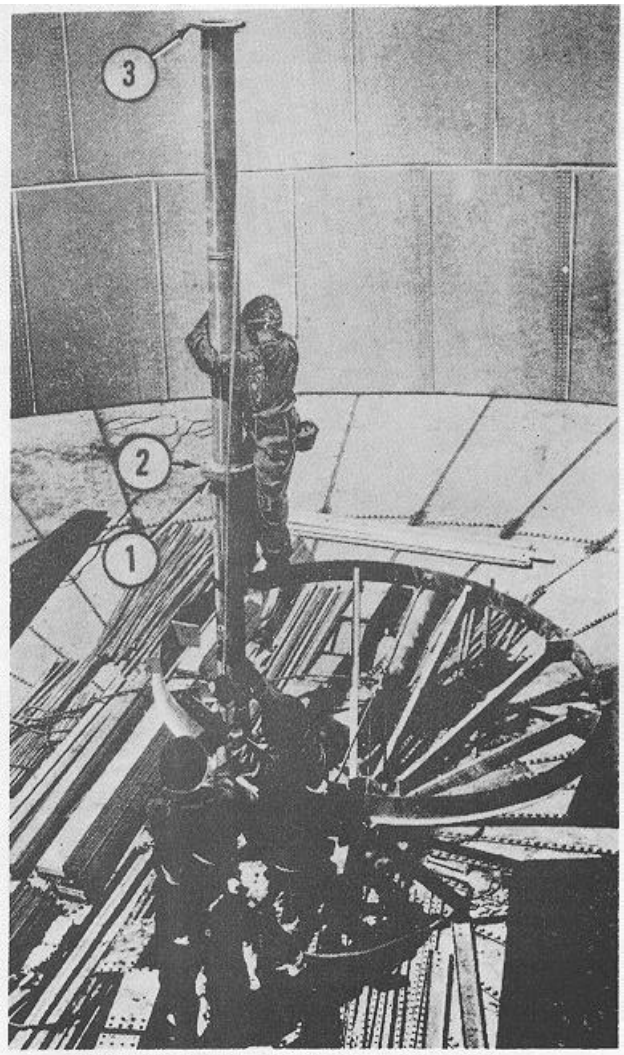


Figure 8-43. Middle center support in final position.

(9) Insert seven 3/4-by 3-inch bolts (8, fig. 8-44) through flanges (1 and 2, fig. 8-43) in that order. Install nuts and tighten.

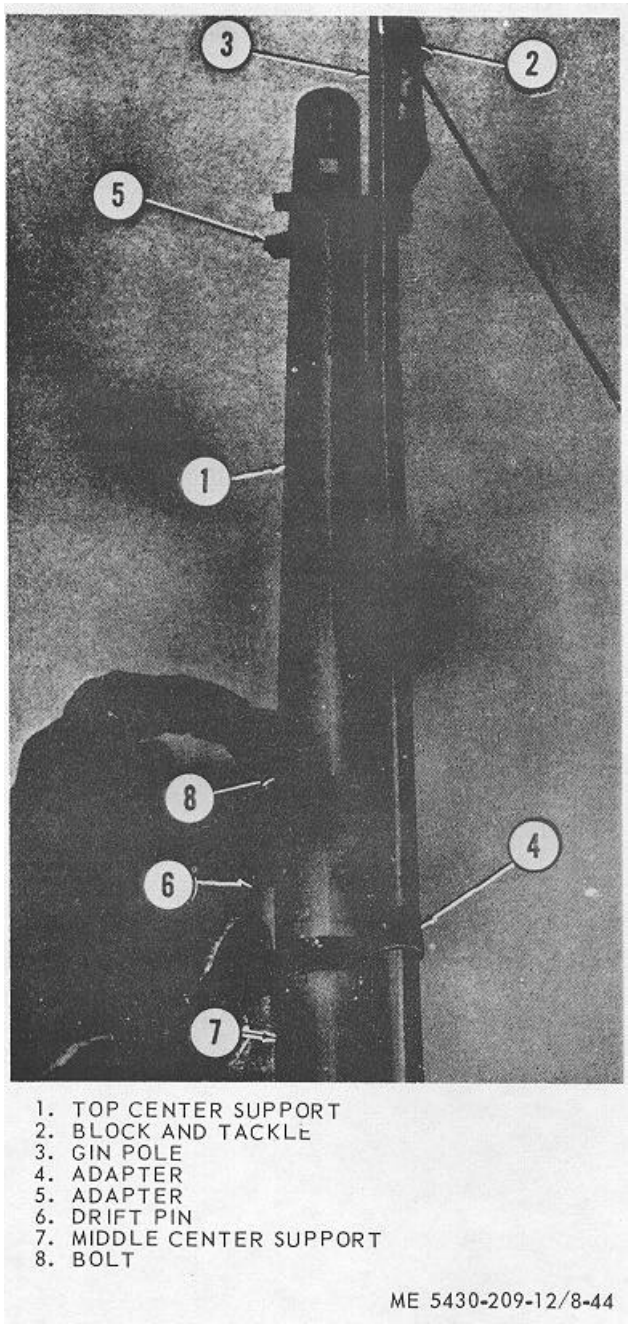


Figure 8-44. Bolting top center to middle center support.

e. Installing Top Center Support.

(1) Unclamp and remove the assembled gin pole sections (1, 5, and 6, fig. 8-41). Detach block and tackle (4).

(2) Remove adapter (2) attached to bottom center support (3).

(3) Attach adapter (5, fig. 8-44) to top center support (1) just below the support angles near the top of the section.

(4) Attach foot spike (1, fig. 8-33) to gin pole (3, fig. 8-44).

(5) Slide the pole, top first, through the adapter (4).

(6) As the pole is raised, attach block and tackle (2) to the head block eye.

(7) Push the bottom of the pole clear of the inside face of flange (2, fig. 8-43). Drop the foot spike (1, fig. 8-33) through the open bolthole.

(8) Adjust adapter (4, fig. 8-44) so that gin pole (3) stands as nearly vertical as possible.

(9) Attach the lower tackle hook to adapter (5) and raise top center support (1) to final position as shown in figure 8-44.

(10) Insert seven bolts (8) through the top flange of middle center support (7) and the bottom flange of top center support (1). Install nuts and tighten. Make sure the open bolthole is directly below the adapter.

f. Installing the umbrella-type Support.

(1) Remove tackle from the top of the gin pole and hang the tackle on top center support (1, fig. 8-44).

(2) Slide pole (4, fig. 8-45), top first, through adapter (5, fig. 8-44).

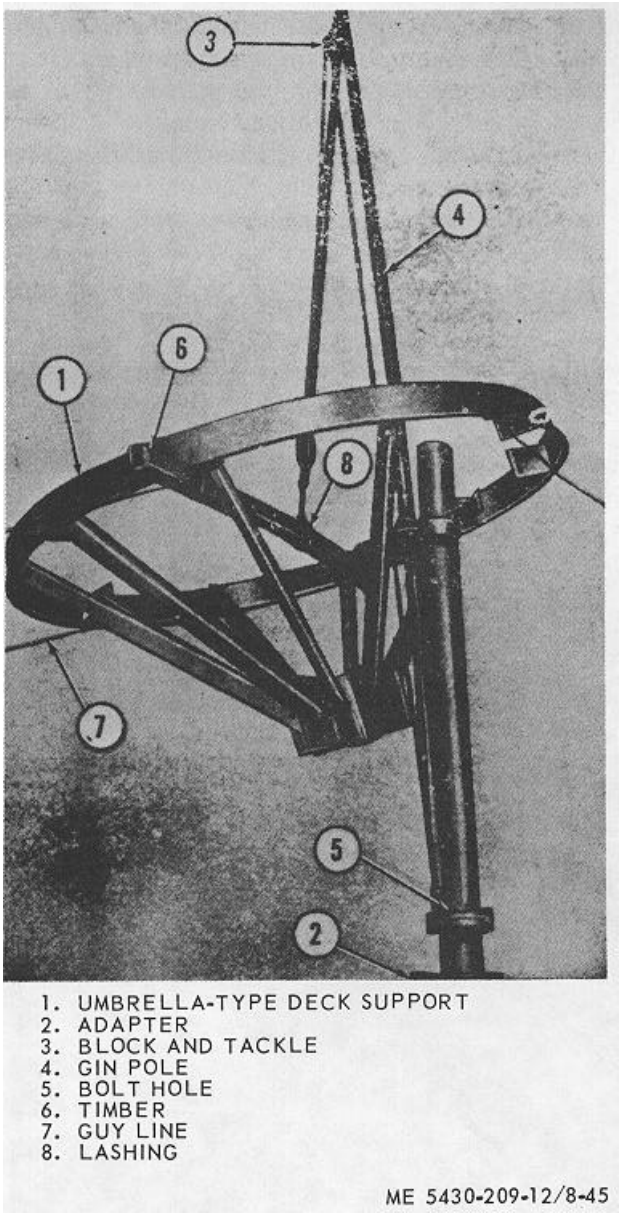


Figure 8-45. Raising umbrella-type deck support.

(3) As the pole is raised, attach block and tackle to the head block eye.

(4) Push the bottom of the pole clear of the inside face of the bottom flange of top center support (1). Drop the foot spike through bolthole (5, fig. 8-45).

(5) Adjust the adapter so that the pole stands as nearly vertical as possible.

(6) Place a 4-by 6 inch by 10-foot long timber (6) under the girth ring of deck support (1). Lash both ends of the timber to the ring.

(7) Apply lashing (8) around timber (6) at the midpoint of the timber and support (1).

(8) Attach guy lines (7) to deck support (1) and position as shown in figure 8-45. Use the lines to aline support (1) over the top of top center support (1, fig. 8-44).

(9) Attach a lower tackle block hook to lashing (8, fig. 8-45). Raise support (1) until it clears the top of the top center support. Line deck support (1) over the top of the top center support with guy lines (7), and lower the deck support to final position on the support angles as shown in figure 8-46.

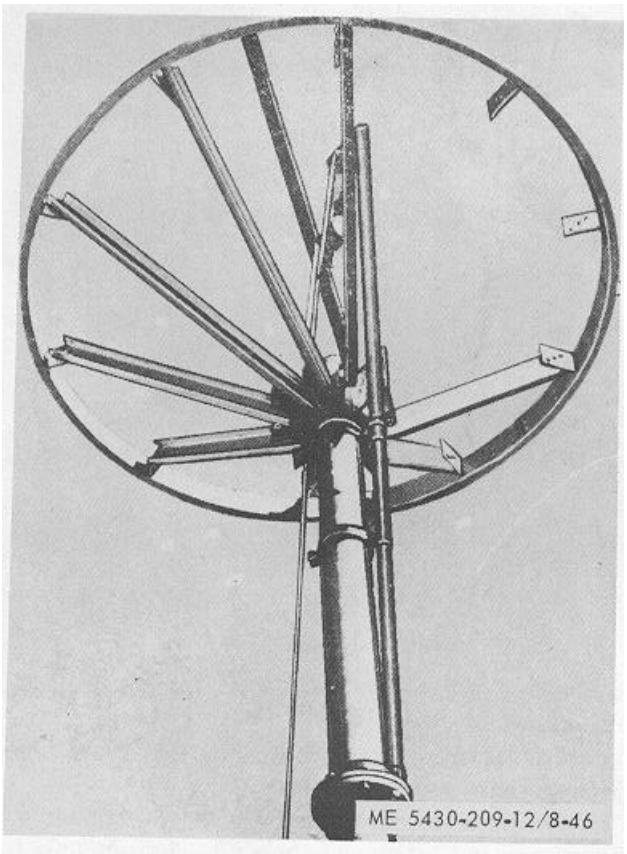


Figure 8-46. Umbrella-type deck support in place.

(10) Raise and install a 2-by 12-inch by 12-foot long plank on top of the deck support. Lash both ends of the plank to the support. The plank is a temporary platform for personnel during the installation of the first five or six deck sections.

(11) Remove timber (6, fig. 8-45) and lower it to the tank bottom.

(12) Attach remaining braces (2, fig. 8-39) to the ring (1).

(13) Assemble sufficient lengths of bolt channel (1, fig. 8-49) to span the radius of the tank. Install about seven braces (6, fig. 8-53) around the tank. Adjust the braces so that the distance between the tank wall and the ring is the same where the braces are attached.

g. Installing the Center Pole Boom.

(1) To install the deck sections, assemble the center pole boom components provided in the storage tank erection outfit.

(2) Use gin pole (4, fig. 8-45) and install the boom (3, fig. 8-52) in the top center support. Remove the gin pole and adapters and install the remaining bolts in the flanges.

Section IV. ASSEMBLY AND INSTALLATION OF TANK DECK

8-17. Assembly of Deck Sections

a. General.

(1) The assembled deck section consists of 74 tapered, flat, steel plates. There are 37 inner plates, all interchangeable, and 37 outer plates, also interchangeable. The two plates are bolted together and are then treated as 37 one-piece sections.

(2) Six of the 37 outer plates are special plates. Three plates are assembled with blind flanges, two plates are assembled with a pressure vacuum valve, and one plate is fitted with a liquid level indicator.

(3) One deck truss is assembled on 36 sections. Two deck trusses are assembled on the remaining section. This section is identified as the first deck section. The center deck section, assembled with the manhole dome assembly, completes the assembly.

b. Layout and Assembly of Plates.

(1) Lay one inner plate (1, fig. 8-47) and one outer plate (2) on the tank bottom.

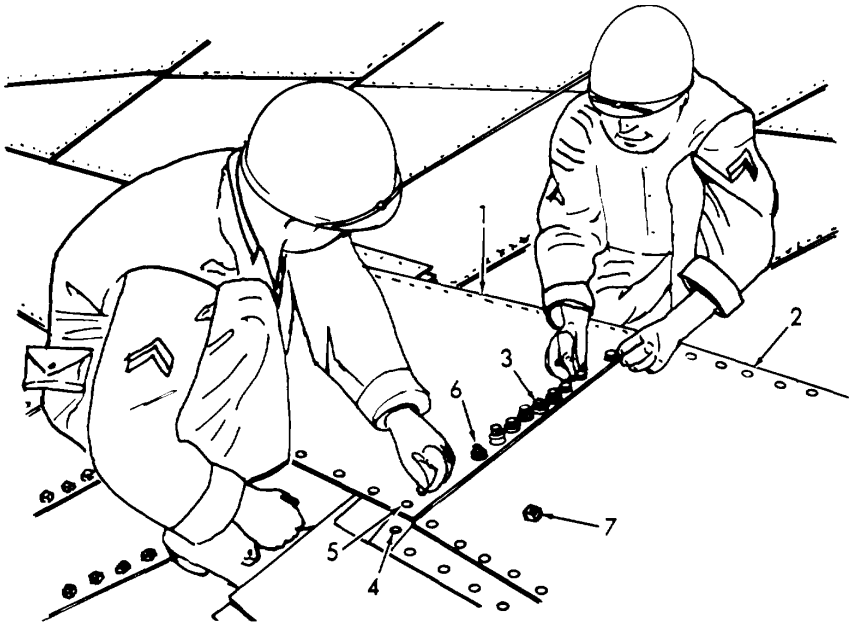


Figure 8-47. Assembling inner and outer deck plates

(2) Place bolting channel under inner joining seam of outer plate (2). Insert 1/2 -by 1/4-inch bolts

(3) through all except the end boltholes (5) of plate and channel. Make sure bolt heads set square in channel.

(3) Place a bolt retaining board under the channel.

(4) Install strip gasket (4) along the full length of joining seam. Allow a 2-bolthole overlap at each end.

(5) Joining seam of inner plate (1) overlaps joining seam of outer plate (2).

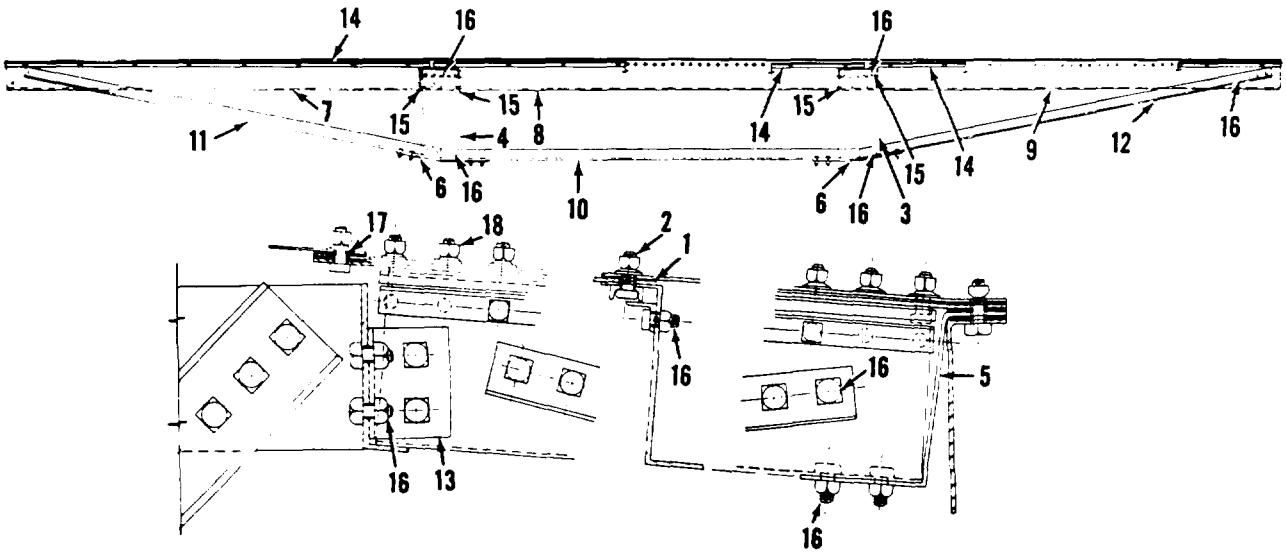
(6) Install steel recessed washer 16), cupped side down, and nut (7) on each bolt (3). Tighten all bolts.

c. Assembling First Deck Section.

(1) Place blocking on tank bottom to support the deck section. Locate blocking lengthwise to section so that it will not obstruct the boltholes in the lap seams.

(2) Lay deck section, numbered face down, on top of block. Numbered face is the top or outside of the section.

(3) Starting at large end of deck section, place outer rafter section (9, fig. 8-48) on each lap seam of the deck section. Correct position of rafter section is shown on figure 8-48. Install 1/2 -by 1/4 inch bolts (2) through all boltholes in bolt channel (1, fig. 8-49), rafter section, and deck section, leaving the chime boltholes vacant. Secure not less than eight bolts with finger-tightened nuts to hold rafter section in place.



1. STRIP GASKET
2. BOLT
3. RAFTER POST (OUTER)
4. RAFTER POST (INNER)
5. RAFTER HANGER
6. TRUSS SUPPORT PLATE
7. RAFTER SECTION (INNER)
8. RAFTER SECTION (MIDDLE)
9. RAFTER SECTION (OUTER)
10. TENSION MEMBER (CENTER)
11. TENSION MEMBER (INNER)
12. TENSION MEMBER (OUTER)
13. RAFTER SUPPORT CLIP
14. RAFTER BOLT RETAINER
15. RAFTER STIFFENER
16. BOLT
17. BOLT HOLE
18. NUT

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Figure 8-48. Trussed rafter.

(4) Place middle rafter section (8, fig. 8-48) on each lap seam so that the middle sections are alined with and abutted against the inner ends of the outer sections. Insert bolts (2) through boltholes in bolt channel (2, fig. 8-49), rafter section, and deck section. Secure 8 or 10 bolts with finger-tightened nuts.

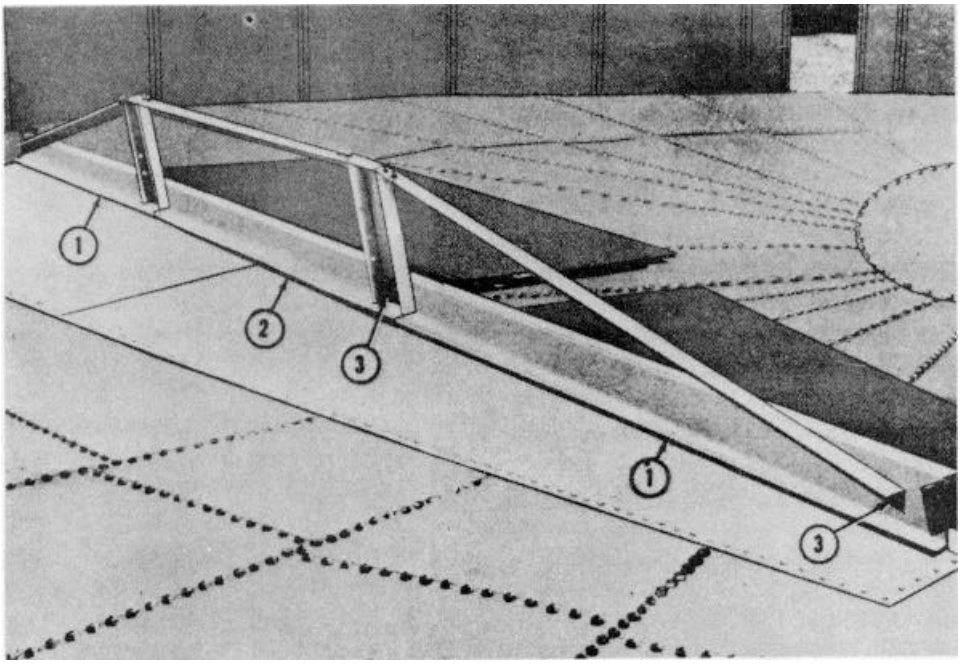


Figure 8-49. Assembled trussed rafter.

(5) Install inner rafter section (7, fig. 8-48) on each lap seam as in step (4) above.

(6) Install rafter bolt retainer (14) over the bolts in rafter sections (7, 8, and 9). Insert 1/2-by 1-inch bolts (16) through retainers (14) and rafter sections.

(7) Install nuts (18) on bolts (16). Make sure the flat face of the nut is against the web of the sections. Tighten all bolts.

(8) Install inner rafter posts (4) on inside face of webs at butt joints of rafter sections (7 and 8). Position them as shown on figure 8-48. Insert bolts (16) through stiffener (15), rafter sections and posts. Secure bolts with finger-tightened nuts.

(9) Install outer rafter posts (3) on inside face of webs at butt joints of rafter sections (8 and 9). Position them as shown on figure 8-48. Insert bolts (16) through stiffeners (15), rafter sections, and posts (3). Install nuts finger-tightened on the bolts.

(10) Install inner tension members (11). Attach the 2-bolt hole end to inner posts (4), and the 4-bolt hole end to the inside face of the web of rafter inner sections (7). Insert bolts (16) through the rafter sections, posts, and tension members. Install nuts finger tight on the bolts.

(11) Install center tension members (10) on rafter posts (3 and 4). Insert bolts (16) through the members and posts. Install nuts finger tight on the bolts.

(12) Install outer tension members (12). Attach the 4-bolt hole end to the inside face of the web of rafter sections (9), and the 2-bolt hole end to the outer rafter posts (3). Insert bolts (16) through rafter sections, posts, and tension members. Install nuts finger tight on the bolts.

(13) Install truss support plates (6) at posts (3 and 4). The plates tie tension members (10, 11, and 12) together. Insert bolts through tensions members and plates (6). Install nuts finger-tight on the bolts.

(14) Tighten all remaining bolts in the trussed rafters.

(15) Install rafter support clips (13) at inner edges of inner rafter sections (7). Position them as shown on figure 8-48. Insert bolts (16) through the wide leg of the angle and section. Install nuts on the bolts and tighten.

(16) Install rafter hangers (1, fig. 8-50) at the outer edge of outer rafter section (9, fig. 8-48). Insert bolts (2, fig.8-50) through the bottom flange of the sections and hangers. Install nuts (3) on bolts (2) and tighten.

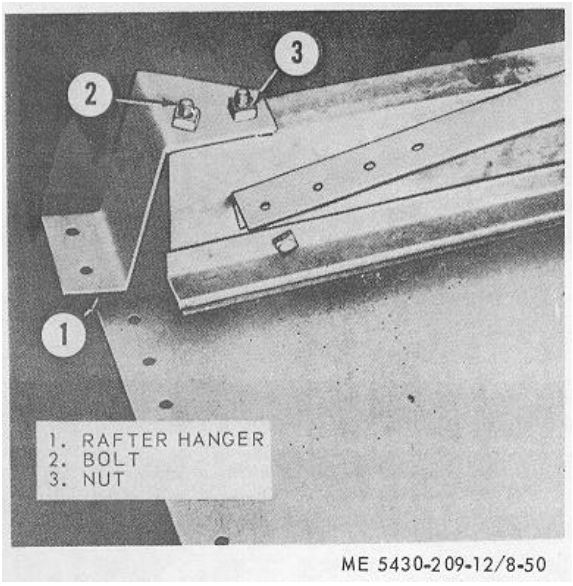


Figure 8-50. Rafter hanger installed.

(17) Turn the deck section over with trussed rafters resting on the tank bottom. Remove all finger tightened nuts installed on the bolts.

(18) Install strip gasket (1, fig. 8-48) along the full length of the right and left seams. Allow a 1-bolt hole overlap at each end of the seam.

d. Assembling Special Deck Sections.

(1) Install pressure vacuum valve (2, fig. 8-54) on the plate of the first deck section to be installed.

(2) Insert /2 by 1/2 inch bolts through 2-bolt hole channels. Work through the 8-inch hole and insert the bolts through the section. Place blocking under the bolt heads to hold them in place during installation of the gasket.

(3) Install a 16-hole gasket over the bolts.

(4) Install a pressure vacuum valve over the bolts.

(5) Install nuts on the bolts and tighten.

(6) Remove the blocking used in step (2) above.

(7) Install pressure vacuum valve (2) on a hatch deck plate (4). Follow the procedures in steps (1) through (6) above.

(8) Install blind hatch flange (3) on three hatch deck plates (4). Use the same bolts, channels, and gasket as in steps (2) and (3) above. Follow the above procedures.

(9) The level indicator plate (6) is installed with level indicator fitting (7) as received.

e. Assembling Remaining Intermediate Sections. There are 35 intermediate deck sections assembled with trussed rafters and strip gaskets. The trussed rafters are placed under the right lap seams only. The above procedures do not apply to the last deck section, since no further assemblies are made on it. Keep the last deck section separated from all other sections until it is installed in the deck.

f. Assembling Center Deck Plate. The center deck plate consists of two semicircular, flat, steel plates. The two plates are joined together by bolted lap joints. The plate covers the umbrella support. The outer circumference bolting circle laps over the inner edge of the deck sections.

(1) Lay plate (1, fig. 8-56), numbered side up, on tank bottom. Place blocking under lap seam of the plate.

NOTE

Make sure blocking does not block entrance to the bolt holes.

(2) Place a bolt channel under the lap seam of the plate. Insert 1/2-by-11/4 -inch bolts (2) through all except the last bolt hole on the inner and outer circumference of the plate and channel.

(3) Remove the blocking and place a bolt retaining board under the bolt channel.

(4) Install strip gasket (3) along the full length of the lap seam. Allow a 1/2 -bolt hole overlap at each end.

(5) Install steel recessed washer, cup side down, and nut on each of the bolts (2, fig. 8-56) protruding through the plate. Be sure the rounded head of the nut is against the washer. Tighten the bolts.

(6) Raise center deck plate assembly (5, fig. 8-54) to the deck before the deck sections are completely installed.

8-18. Installation of Deck Sections

a. Scaffold for Deck. Install a scaffold around the tank about 3 feet below the top chime of the third ring staves. Refer to paragraph 3-8 and install the scaffold.

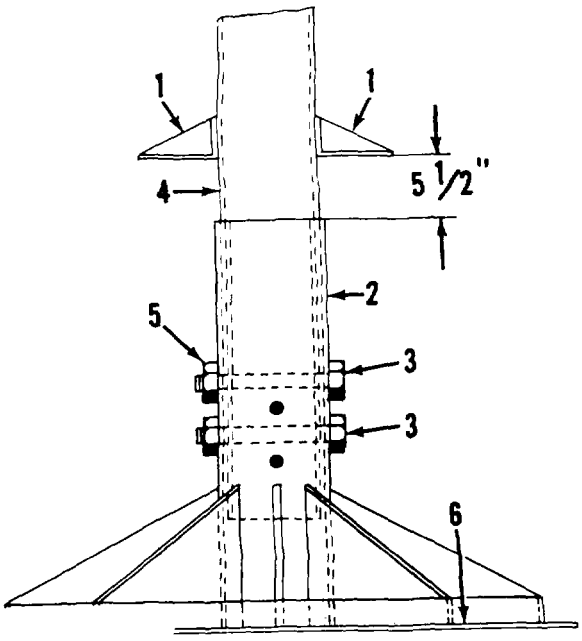
b. Gin Pole.

(1) To install the deck section (3, fig. 8-53), position the pole (1, fig. 8-32) with the foot spike (1, fig. 8-33) placed in a bolthole in the bottom chime of the third ring staves. Follow the procedures in paragraph 8-14e.

(2) Erect the pole at every vertical seam in the third ring. Install a temporary bracket (3, fig. 8-32) at every seam not occupied by a scaffold bracket.

(3) Install the pole on the vertical seam at the point selected for the installation of the first deck section. Replace the bolt in the bottom chime each time the pole is moved.

c. Adjusting Center Support. Check and adjust the center support before installing the deck sections. The distance from the top of the center support base plate (6, fig. 8-51) to the top of the rafter support clips should be 22 feet 1-7/16 inches. Raise or lower the support as required.



1. JACKING PAD
2. CENTER SUPPORT BASE TUBE
3. BOLT
4. BOTTOM CENTER SUPPORT
5. NUT
6. CENTER SUPPORT BASE PLATE

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Figure 8-51. Adjusting height of center support.

(1) Place a jack under each pad (1, fig. 8-51). Use 2 by 2 dunnage and cut two gaging sticks 5 1/2 inches long.

(2) As jacks are adjusted, use gaging sticks and check the distance between the top of the center support base tube and the face of the pads (1). When the gaging sticks fit in this space, lock the jacks.

(3) Insert 1-by 9-inch bolts (3) through the alined boltholes in the center support base tube and bottom center support (4).

(4) Install nuts (5) on the bolts (3) and tighten the bolts.

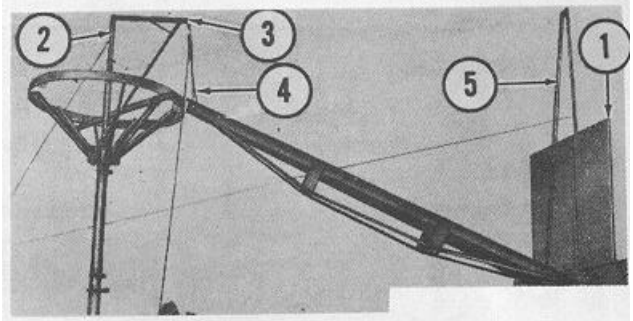
(5) Unlock and remove the jacks.

NOTE

After all deck sections have been Installed, the height measured from top of the top center support to top of the center base plate may required further adjustment to make deck sections fit properly

d. Installing First Deck Section.

(1) Across the top of first deck section (1., fig. 8-52), place a 4-by 4-inch by 6-foot long timber about 8 inches from large end. Run a 5/8-inch two line rolling hitch sling (5) under the section, lashed to each end of timber.



1. FIRST ASSEMBLED DECK SECTION
2. GIN POLE
3. CENTER POLE BOOM
4. LIFT SLING
5. DECK SLING

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Figure 8-52. Raising first deck section.

(2) At midpoint of timber, apply lift sling (4). Make a single line short sling with a clove hitch at each end.

(3) Lower haul line of gin pole (2) to bottom of tank and attach sling (4) to the hook of the lower tackle.

(4) Lower haul line of boom (3) to bottom of tank and attach a pair of hooks to the lower tackle. Attach hooks to equally spaced holes in small end of deck section.

(5) Raise deck section, small end first. Keep small end at least 3-feet higher than large end while section is raised.

(6) Lower large end of section over proper bolts in top chime of third ring staves. Install finger tightened nuts on all except the end bolts in the section.

(7) Lower small end of section and aline bolt holes in rafter support clip 113, fig. 8-48) with proper bolt holes in umbrella-type deck support (1, fig. 8-45).

(8) Insert bolts through the support and clip. Secure bolts with finger tightened nuts.

(9) Release one end of deck sling (5, fig. 8-52) and lower the timber to the tank bottom.

(10) Remoe rope deck hooks at small end of section. Face small end of section and swing center pole boom (3) counterclockwise.

NOTE

Above procedures can be accomplished with a rope and hooks attached to the opposite sides of the section. 3 or 4 bolt holes from the end. If rope hooks are not used. a sling can be wrapped around the end of the section Keep knot on top of deck for easy removal.

e. Installing Second Deck Section.

(1) Face small end of the section. Install second section and all remaining sections to the. left of first section, or in a counterclockwise direction around the tank.

(2) Face large end of section and move gin pole (2, fig. 8-52) to the right, to the next vertical beam. Install per instructions in b above

(3) Raise second section in accordance with d. above. Place left lap seam over the bolts in right lap seam of first section (3, fig. 8-53). Position large end of section over proper bolts in top chime of third ring staves.

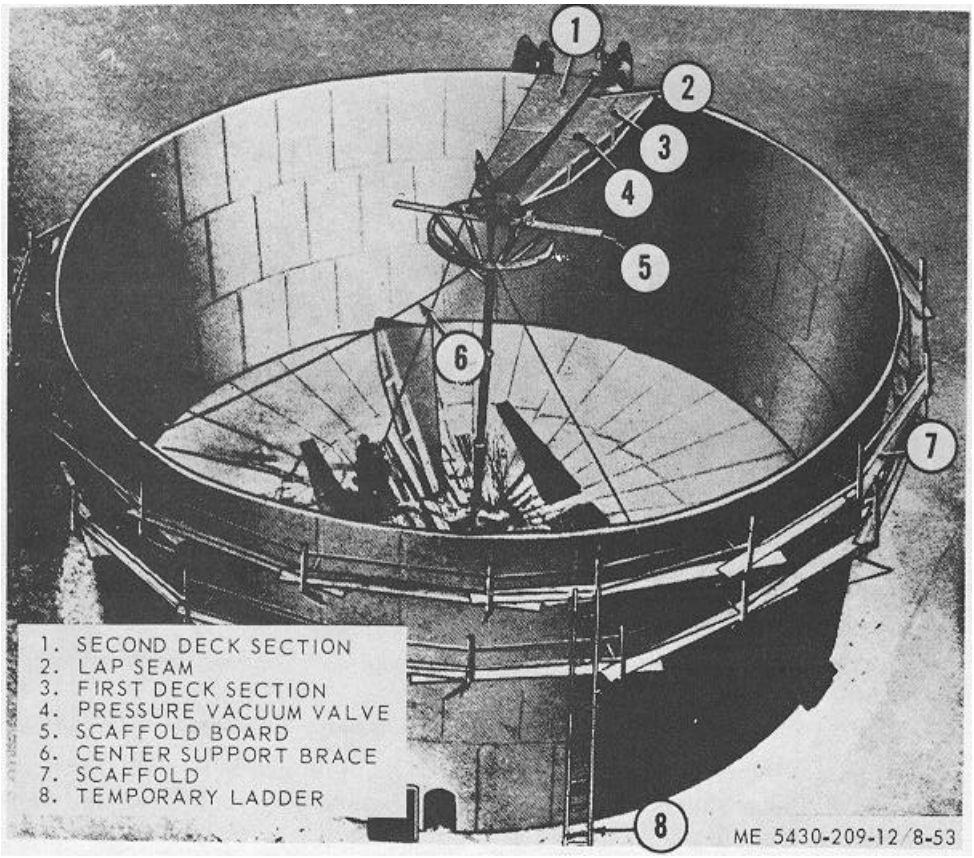

Figure 8-53. Installing deck sections.

(4) Install small end of second section (1) following procedures in d (7) and (8) above.

(5) Install nuts on 10 equally spaced bolts (2.fig. 8-481 in lap seam (2, fig. 8-53). Install finger tightened nuts on all chime bolts except the bolt in the right lap seam of second section.

f. Installing Intermediate Deck Sections. There are 34 intermediate deck sections. Those made up with special plates (fig. 8-54) are installed to meet field conditions.

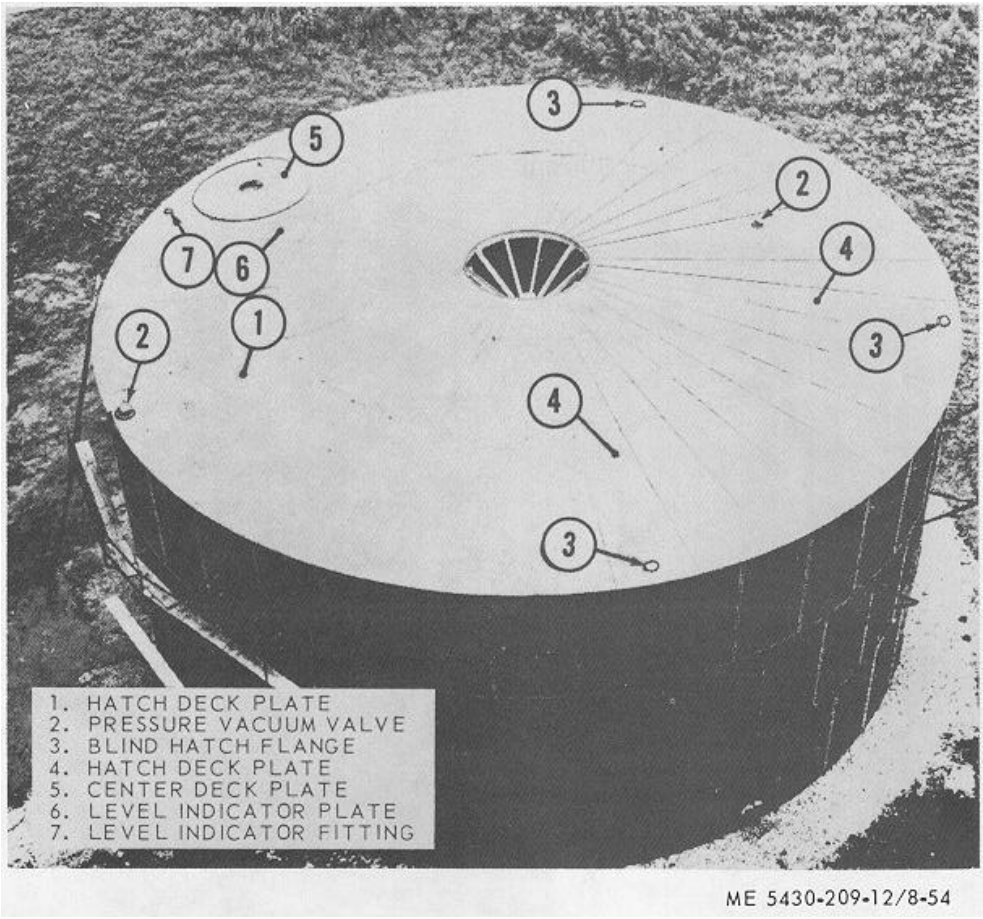

Figure 8-54. Installing deck plates and fittings.

(1) Raise and install intermediate sections following procedures in d and e above.

(2) Before completing the installation of the deck sections, raise the following items to the deck: center deck plate (5. fig. 8-54). step plate (1. fig. 8-55), 1-by 9-inch bolt, nut, manhole dome (6, fig. 8-56), emergency vent valve (9), manhole deck gasket (5), manhole cover gasket (7), wedge gaskets (4), and the necessary 1/2 - by 1 1/4-inch bolts (2) and (8), nuts and washers.

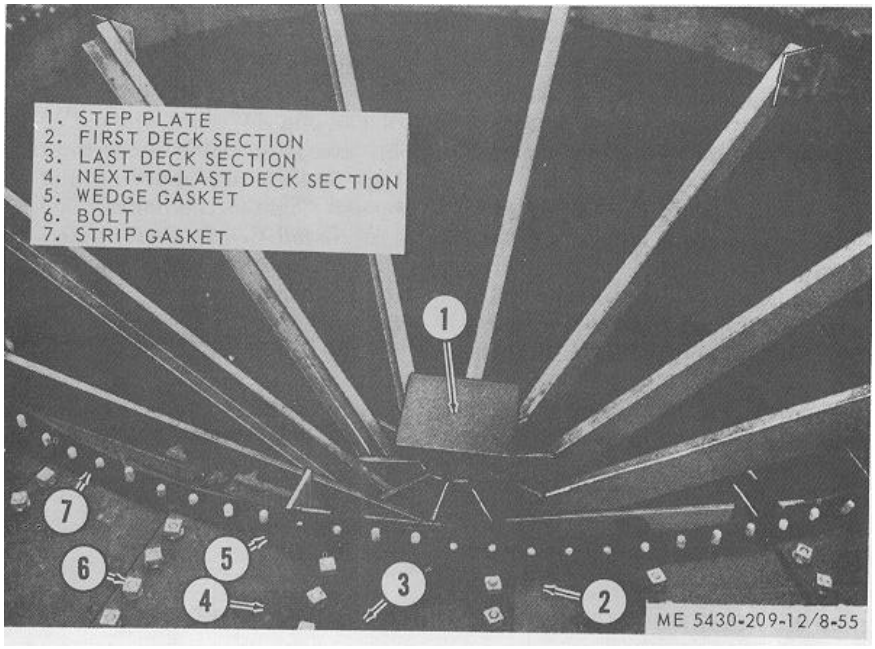

Figure 8-55. Completed assembly of deck sections.

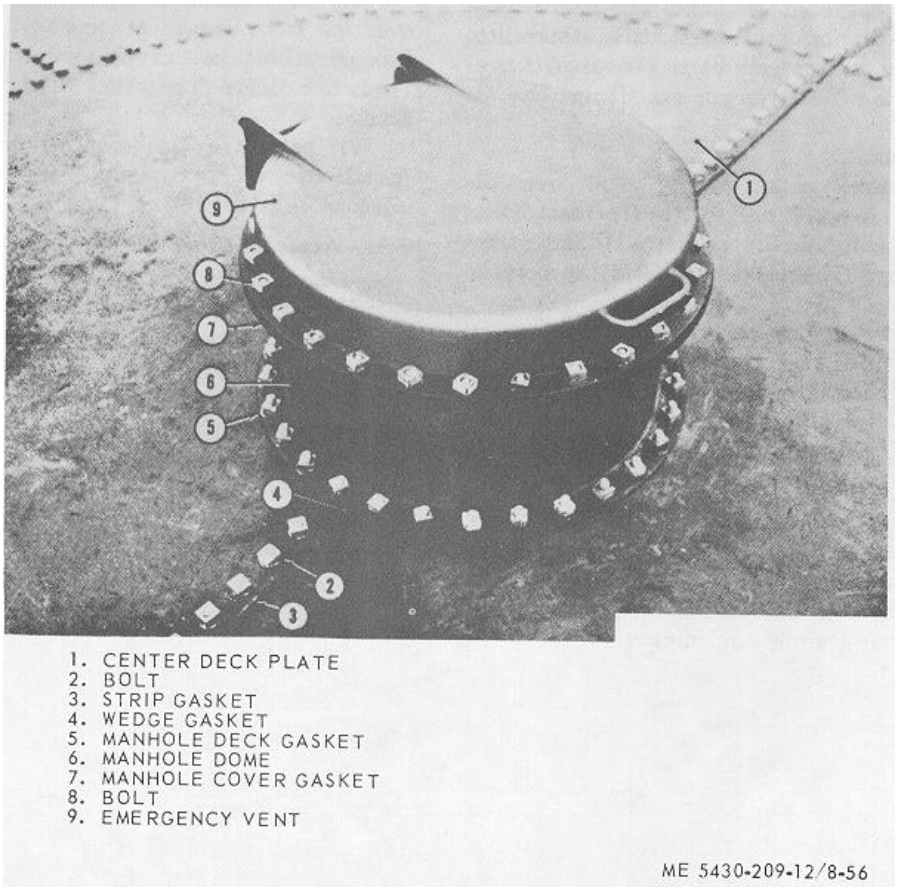

Figure 8-56. Center deck plate and manhole dome installed.

g. Installing Last Deck Section.

(1) Raise last deck section (3, fig. 8-55) before the next-to-last section (4) is installed.

(2) Install two wedge gaskets (5) in the deck opening on top chime of third ring. Follow procedure described in paragraph 8-4d (1) and shown in figure 8-16.

(3) Install last section (3, fig. 8-55) by placing its lap seams over the lap seams of adjacent sections (2 and 4). The large end fits over the bolts in the top chime of the third ring. If the last section does not fit the adjacent sections and the inner support properly, raise or lower the center support, c above, until the proper fit is obtained.

(4) Remove boom (3, fig. 8-52) and lower to ground. Disassemble the boom and return the items to the storage tank erection outfit.

(5) Install step plate (1, fig. 8-55) at top of top center support (1, fig. 8-44). Aline bolt holes and insert a 1-by 9-inch bolt through the support (1) and plate (1, fig. 8-55) in that order. Install nut on bolt and tighten.

(6) Remove nuts temporarily installed on all bolts in the deck lap seams. Install steel recessed washer, cup side down, and nut on all bolts (5, fig. 8-55), except on bolts in the top chime of the third ring. Make sure rounded head of nut is against the washer. Tighten the bolts.

h. Install Center Deck Plate.

(1) Insert 1/2-by 1 1/4-inch bolts (6, fig. 8-55) through small end of sections forming the outer bolt circle of center deck plates.

(2) Apply strip gasket (7) to bolts (6). Install wedge gasket (5) under strip gasket (7) at lap seam of every deck section.

(3) Place center deck plate (1, fig. 8-56), over bolts (6, fig. 8-55). Install steel recessed washer, cup side down, and nut on each bolt protruding through the plate. Make sure rounded head of nut is against washer. Tighten all bolts.

Section V. ASSEMBLY AND INSTALLATION OF TANK ACCESSORIES

8-19. Manhole Dome

a. General. The manhole dome consists of one-piece, flanged, tubular, steel sheet. It is attached to the hatch in the center deck plate. The deck flange has 30 bolt holes. The cover, or vent flange, has 28 bolt holes.

b. Installation.

(1) Place deck gasket (5, fig. 8-56) over the hatch boltholes in center deck plates (1). Insert bolts (2) through all bolt holes in the plates (1) and gasket (5) in that order. The gasket will hold the bolts in place.

(2) Install wedge gasket (4) under the gasket (5) at the lap seam of the plates (1).

(3) Install the 30-bolt hole flange of dome (61 over bolts (2). Install a steel recessed washer, cup side down, and a nut, rounded head down, on each bolt (2) protruding through the flange of dome (6).

8-20. Emergency Vent

a. General. The vent is a one-piece, round, cast steel body fitted with a lifting handle and hinge lugs. The vent comes attached to the flanged body by hinges, and seals the deck opening.

b. Installation.

(1) Place manhole cover gasket (7, fig. 8-56) over the cover flange of dome (6). Insert bolt (8) through all bolt holes in the dome flange and gasket (7) in that order. The gasket will hold the bolts in place.

(2) Install the flange of vent (9) over bolts (8). Install steel recessed washers, cup side down, and nuts on each bolt (2).

8-21. Access Ladder

a. General. The access ladder consists of three bolted, steel angle rails. The top section of the ladder is attached to the deck by two fabricated, steel handrails. Bolted, steel angle braces support the ladder at the remaining stave chimes.

b. Assembling Bottom Section.

(1) Place two ladder rails (1 and 2, fig. 8-57) with similar bolting legs facing each other, on top of several pieces of blocking sufficiently long to support both rails spaced wide enough apart to install a ladder step (3).

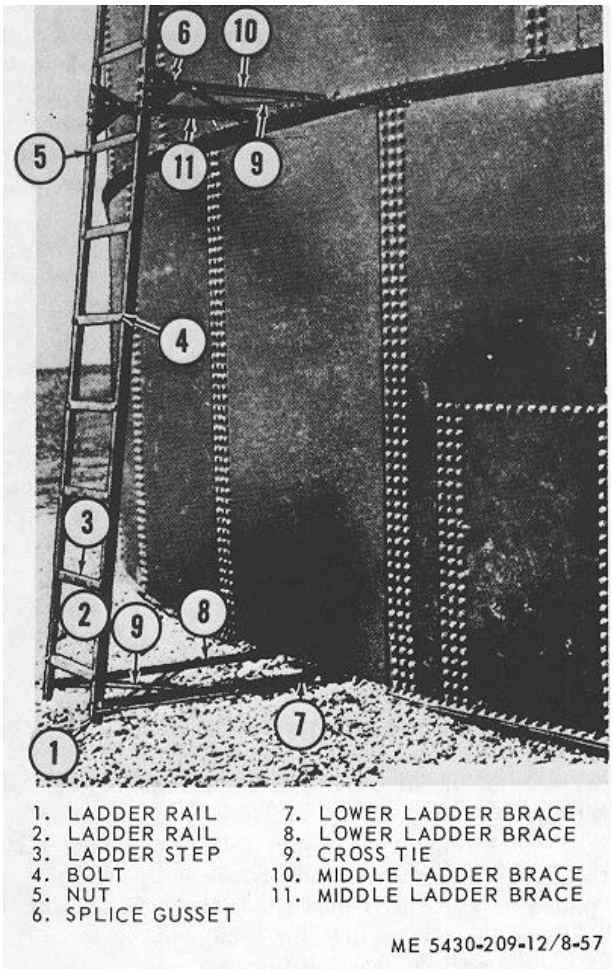

Figure 8-57. Ladder bottom section installed.

(2) Select bottom end of ladder. Insert 1/2-by 1-inch bolts (4) through the ends of step (3) and rails (1 and 2) in that order. Install nut (5) on each bolt (4) protruding through the rails. Tighten the bolts after all steps are installed.

(3) Install splice gussed plate (6) at top of rails (1 and 2). The short sheared edge is the top of the plate.

(4) Insert bolts (4) through bolt holes in the vertical legs at the top of rails (1 and 2) and plates (6) in that order. Install nut (5) on each bolt (4) protruding through the plate (6). Tighten the bolts.

(5) Install lower ladder braces (7 and 8) with crosstie (9) at the bottom of rails.

(6) The leg with one bolt hole near the end of braces (7 and 8) is attached at the outside face of the vertical legs of the rails.

(7) Insert bolts (4) through the second bolt hole in the rails and braces (7 and 8) in that order. Install nuts (5) on the bolts (4). Finger tighten the bolts.

(8) Lay two ties (9) on the ground in the form of an "X" with their center bolt holes in alinement Insert a bolt (4) through the ties (9). Install a nut (5) on the bolt.

(9) Install ties (9) with bolt head up. Place the boltholes in the ends of the ties under the bolt holes in the outstanding legs of braces (7 and 8). Insert bolts (4) through braces and ties, in that order. Install nut (5) on each bolt protruding through the ties. Tighten the bolts.

(10) Assemble middle ladder braces (10 and 1) with ties (9). Follow the procedure in steps (8) and (9) above.

(11) Install braces (10 and 11) on plates (6). Insert bolts (4) through the inside bolt holes of plates (6) and braces (10 and 11) in that order. Install nut (5) on each bolt protruding through the braces. Tighten the bolts.

c. Assembling Middle and Top Sections.

(1) Middle Section.

(a) Assemble the ladder rails (1 and 2, fig. 8-58) and steps (3) with bolts (4) and nuts (5).

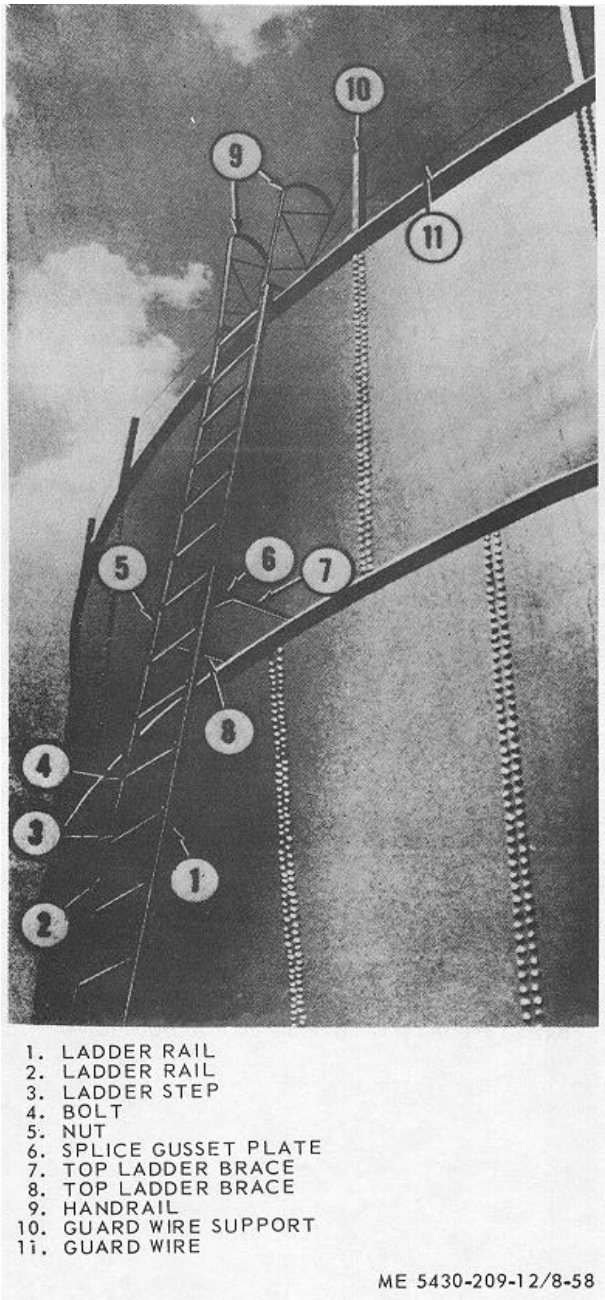

Figure 8-58. Middle and top ladder sections installed.

(b) Install plates (6) at the top of rails (1 and 2). Follow the procedure in b above.

(c) Install top ladder braces (7 and 8) on plates (6). Insert bolts (4) through the inside bolt holes of plates (6) and braces (7 and 8) in that order. Install nuts (5) on bolts (4). Tighten the bolts.

(2) Top Section.

(a) Assemble ladder rails (1 and 2) and step

(3) with bolts (4) and nuts (5). Follow the procedures in b above.

(b) Install handrails (9) at top of ladder rails. Insert bolts (4) through the horizontal leg of ladder rails and handrails (9), in that order. Secure with nuts (5) and bolts (4).

d. Installing Ladder Sections. Place access ladder (13, fig. 1-5) where convenient to pressure vacuum valve (6) at outer perimeter of the deck.

(1) Bottom Section.

(a) Lift bottom section and set the end bolt holes of lower braces (7 and 8, fig. 8-67) over the bolts in bottom chime of first ring staves. Set end boltholes of middle braces (10 and 11) over the bolts in bottom chime of second ring staves. Mark the bolts, move section to one side, and remove the nuts.

(b) Set braces back over the bolts in the chimes. Install nuts and tighten the bolts.

(c) Tighten bolts in ladder rails (1 and 2) and lower braces (7 and 8).

(2) Middle Section.

(a) Place the temporary ladder along the installed bottom section. Carry a haul line to the deck.

(b) Attach lower end of haul line to top step of the section.

(c) Raise the section and temporarily aline boltholes in bottom of ladder rails with boltholes in plates (6, fig. 8-57). Insert bolt through bolthole in each ladder rail (1 and 2, fig. 8-58) and plates (6, fig. 8-57) to hold the section in place.

(d) Set end boltholes of top braces (7 and 8, fig. 8-58) over bolts in the bottom chime of third ring staves. Mark the bolts.

(e) Remove temporarily installed bolts and move section to one side. Remove nuts on bolts in the chime.

(f) Set the section back in position with braces over bolts in the chime. Install nuts on the bolts.

(g) Insert bolts through ladder rails (1 and 2). Install nuts on bolts protruding through plates. Tighten bolts in plates and chime. Remove the haul line.

(3) Top Section.

(a) Attach haul line to top step of section and follow procedure in (2) above.

(b) Mark bolts on the deck and move section to one side. Remove the nuts.

(c) Set the section back in position with handrails (9) over the bolts in the deck. Install nuts on the bolts.

(d) Insert bolts through ladder rails and plates (6). Install nuts on bolts protruding through plates. Tighten bolts in the plates and rails. Remove the haul line.

8-22. Deck Guard

a. General. The deck guard consists of 36 steel angle supports bolted in the outer bolt circle of the deck. Two steel guard wires are threaded through holes in the supports to form guard rails around the outer perimeter of the deck.

b. Installation.

(1) Measure 56 inches each way from the center line of the access ladder. Install a support (10, fig. 8-58) at each of these points.

(2) Locate and install the remaining support in line with each vertical seam around the third ring.

(3) Attach the free end of wires (11) to a handrail (9) and thread the wires through the holes in supports (10). Follow around the deck and attach the wires to opposite handrail (9).

c. Scaffold.

(1) Remove the scaffold after the deck guard is installed. Work from the top down.

(2) As the brackets are removed, install a washer on each bolt. Tighten the bolts.

(3) Check all bolts in the vertical seams for washers. Tighten any loose bolts.

8-23. Water Drawoff Valve

a. General. Refer to paragraph 3-21a for a general description of the valve.

b. Installation. Refer to paragraph 3-21b and install the valve.

8-24. Tank Outlets (6-Inch, 8-Inch, and 12-Inch)

a. General. Each outlet consists of a fabricated steel pipe elbow made up with an inside flange and a gasket installed inside the tank. An adapter made up with a flange and a gasket is installed outside the tank. The outlet end of the adapter is sealed with a cap held in place by a bolted split coupling. The adapter and elbow bolt together through the side of the tank.

b. Installation. The 6-, 8-, and 12-inch outlets are installed in the same manner as the outlets for the 100-barrel tank. Refer to paragraph 3-22 and install the tank outlets.

Section VI. TANK TESTING AND FINALLY ASSEMBLY

8-25. General

The inside of the tank must be cleaned and inspected, and the tank must be test for leakage prior to installation of the cleanout cover. After installation of the cover the tank site must be cleaned.

8-26. Tank Cleaning and Inspection

Refer to paragraph 3-24 and clean and inspect the tank.

8-27. Water Test

Refer to paragraph 3-26 and test the tank for leaks.

8-28. Cleanout Cover

a. General. Refer to paragraph 3-27 for a general description of the cleanout cover.

b. Installation. Refer to paragraph 3-27 and install the cleanout cover.

8-29. Cleaning the Tank Site

Refer to paragraph 3-28 and clean the tank site.

Section VII. IDENTIFICATION OF COMPONENT ITEMS

8-30. General

This section contains a list of component items for identifying individual components of the 10,000-barrel capacity tank. Items required for reassembly of the tank are listed as components of the re-erection kit and are grouped at the end of the listing.

8-31. Component Items

a. Refer to Table 8-1 for the listing of component items.

b. The following is a list of Manufacturers Codes

Code	*Manufacturer*
79154	Victaulic Co of America 3100 Hamilton Blvd South Plainfield, N.J 07080
81348	Federal Specifications Promulgated by General Services Administration
81349	Military Specifications
97403	U.S. Army Mobility Research and Development Center, Fort Belvoir, Virginia 22060

Table 8-1. IDENTIFICATION OF COMPONENT ITEMS

FSN	Description	Part No	Mfg Code	Qty Per Unit	Fig No	Item No
	TANK ACCESSORIES					
	ACCESS LADDER ASSEMBLY	13211E8041	97403	1	8-57	-
5:106-010-9216	BOLT, SQUARE HEAD: l/2-13 thd size, 1 in lg	FF-B-575	81348	82	8-57	4
	BRACE, ACCESS LADDER	13211E8063	97403	2	8-58	7
	BRACE, CROSS	13211E8068	97403	4	8-57	9
	BRACE LOWER: left hand	13216E7385	97403	1	8-57	8
	BRACE, LOWER: right hand	13211E8066	97403	1	8-57	7
	BRACE, MIDDLE: left hand	13211E8064	97403	1=	8-57	11
	BRACE, MIDDLE: right hand	13211E8065	97403	1	8-57	10
	HAND RAIL	13211E8060	97403	2	8-58	9
5310-982-4940	NUT: i-13 thd size	FF-N-836	81348	82	8-58	5
	PLATE GUSSET	13211E8069	97403	4	8-57	6
	RAIL, LADDER	13211E8661	97403	6	8-57	1
	STEP, LADDER	13211E8062	97403	21	8-57	3
	ADAPTER, GROOVED AND THREADED: 6 in size	40-6	79154	1	3-29	3
	ADAPTER, GROOVED AND THREADED: 8 in size	40-8	79154	1	3-29	3
	ADAPTER, GROOVED AND THREADED 12 IN SIZE	40-12	79154	2	3-29	3
	CAP GROOVED: 6 IN SIZE	60-6	79154	1	3-29	5
	CAP GROOVED: 8 IN SIZE	60-8	79154	1	3-29	5
	CAP GROOVED: 12 IN SIZE	60-12	79154	2	3-29	5
	COUPLING GROOVED: 6 IN SIZE	77D-6	79154	1	3-29	6
	COUPLING GROOVED:	77D-8	79154	1	3-29	6
	COUPLING GROOVED: 12 IN SIZE	77D-12	79154	2	3-39	6
	ELBOW: 6 in size 90 deg	13215E9716	97403	1	3-28	2
	ELBOW: 8 in size 90 deg	13215E9719	97403	1	3-28	2
	ELBOW: 12 in size 90 deg	13216E7384	97403	2	3-28	2
	FLANGE SET THREADED: 2 in size	13211E8081	97403	1	3-27	4
	FLANGE SET, THREADED: 6 in size	13215E9719	97403	1	3-29	2
	FLANGE SET, THREADED: 8 in size	13215E9720	97403	1	3-29	2
	FLANGE SET THREADED: 12 in size	13211E8083	97403	2		
	GAGE INDICATING: liquid level	13200E9129-2	97403	1		
	GASKET FLANGE: 2 in size	13211E8057	97403	2	3-27	1
	GASKET, FLANGE: 6 in size	13215E9722	97403	2	3-28	6
	GASKET FLANGE: 8 in size	13215E9723	97403	2	3.28	6
	GASKET FLANGE: 12 in size	13216E7382	97403	4		
4730-196-1511	NIPPLE, PIPE: 2'2 in size	MIL-P-10388	81349	1	6-22	6
4730-278-3410	PLUG, PIPE: 2 in size	USAS-B16.15	81350	1		
	REDUCER GROOVED: 8 in to 6 in size	50-8X6	79154	1		
	REDUCER GROOVED: 12 in to 4 in size	50-12-12X4	79154	1		
	VALVE NON-FREEZING: water drawoff	13211E8082	97403	1	3-27	7
	VALVE EMERGENCY: 20 in size	13216E7393	97403	1	8-56	9
	VALVE, PRESSURE-VACUUM	13213E4596	97403	1	-54	2
	TANK DECK					
	CHANNEL: bottom plate 45 hole	13216E7391	97403	37	8-49	2
	CHANNEL: deck plate 17 hole	13216E7394	97403	2	8-18	5
	CHANNEL: hatch bolt clip 2 hole	13215E9706	97403	49	6-12	2
	CHANNEL: stave, 48 hole	13215E9704	97403	74	8-49	2
	COVER, HATCH: 8 in size, 16 hole	13215E9728	97403	6	8-54	3
	COVER, MANHOLE	13215E9715	97403	1	fi-18	3
	HANGER, RAFTER	13211E8096	97403	3	P-48	5
	GASKET: hatch, 16 hole	13215E9724	97403	6		
	GASKET: manhole deck, 20 in size, 30 hole	13215E9727	97403	1	8-56	5
	GASKET: manhole cover, 20 in size, 28 hole	13215E9726	97403	1	8-56	7
	MANHOLE DOME	13211E8048	97403	1	8-56	6
	PLATE, DECK: center	13211E8035	97403	2	8-56	1
	PLATE, DECK: hatch	13211E8098	97403	5	8-54	4
	PILATE, DECK: hatch	13211E8099	97403	1	8-54	1

FSN	Description	Part No	Mfg Code	Qty Per Unit	Fig No	Item No
	PLATE, DECK: inner	13211E8104	97403	37	8-47	1
	PLATE, DECK: level indicator	13211E8116	97403	1	8-54	6
	PLATE, DECK: outer plain	13211E8105	97403	30	8-47	2
	RAFTER ASSEMBLY	13211E8101	97403	17	8-4	-
5306-010-9216	BOLT: '/2-13 thd size 1 in lg	FF-B-575	81348	64	8-49	16
	BRACE, RAFTER: center	13211E8089	97403	1	8-48	10
	BRACE, RAFTER: inner	13216E7393	97403	1	4-48	11
	BRACE, RAFTER: outer	13211E8081	97403	1	8-4S	12
5310-982-4940	NUT: 1/2-13 thd size	FF-N-836	81348	64	8-48	1S
	POST, RAFTER: inner	13211E8087	97403	1	8-48	4
	POST, RAFTER: outer	13211E8086	97403	1	8-48 :	
	RAFTER: center	13211E8093	97403	1	8-48	8
	RAFTER: inner	13211E8092	97403	1	8-.48	7
	RAFTER: outer	13211E8094	97403	1	8-48	9
	RETAINING, BOLT	13216E7395	97403	1	S -48	14
	STIFFENER, RAFTER	13211E8085	97403	4	8-48	15
	SUPPORT: board wire	13211E8049	97403	16	8-5S	10
	WIRE, GUARD: no 9, 100 ft lg	QQ-W-461	81348	AR	8-58	11
	SIDE STAVES					
	CHANNEL: cleanout cover, side, 23 hole	13211E8084	97403	6	3-30	5
	CHANNEL: stave, 48 hole	13215E9704	97403	259	8-49	1
	COVER, CLEANOUT	13216E7407	97403	1	-	
	RETAINER, BOLT: cleanout cover, side	13211E7390	97403	6	-31	6
	RETAINER, BOLT: cleanout cover top	13211E8067	97403	1	:310	4
	STAVE: cleanout cover	13216E7406	97403	1	8-30	2
	STAVE: plain, lower ring	13216E7404	97403	11	8-22	6
	STAVE: plain, upper rings	13216E7408	97403	4	8-32	2
	STAVE: 2 in outlet	13216E7402	97403	1	8-22	3
	STAVE: 6 in outlet	13216E7403	97403	1	-22	4
	STAVE: 8 in outlet	13216E7401	97403	1	8-22	2
	STAVE: 12 in outlet	13216E7405	97403	2	8.22	1
	TANK BOTTOM AND CENTER SUPPORT					
	CENTER SUPPORT ASSEMBLY	13216E7400	97403	1		
	BASE CENTER SUPPORT	13211E8029	97403	1	8-40	2
5306-010-9216	BOLT: 2-13 thd size 1 in lg	FF-B-575	81348	74		
5306-959-7813	BOLT: '2-13 thd size 114 in lg	FF-B-575	81348	72	8-39	4
5.306-298-8639	BOLT- 3,-10 thd size, 3 in lg	FF-B-575	81348	1h	-44	8
5306-964-0966	BOLT: 1-8 thd size 9 in lg	FF-B-575	81348	:1	-39	6
	BRACE: gathering	13211E8034	97403	10	8-39	2
	CLIP rafter support	13216E7389	97403	:137	-4	13
	COLLAR GUSSET	13215E7388	97403	1	8-39	3
5310-982-4940	NUT 2-13 thd size	FF-N-836	81348	146		
5310-934-9727	NUT: 34-10 thd size	FF-N-836	81348	16		
5310-891-3462	NUT 1-8 thd size	FF-N-836	81348	1	8-39	7
	PLATE	13216E7383	97403	2		
	PLATE STEP	13216E7386	97403	1	8-39	5
	RING SUPPORT: left hand	13211E8043	97403	1	-39	1
	RING SUPPORT: right hand	13211E8042	97403	1	8-39	1
	SUPPORT CENTER: bottom	13211E8038	97403	1	8-40	1
	SUPPORT CENTER- middle	13211E8037	97403	1	8-42	1
	SUPPORT CENTER: top	13211E8036	97403	1	S -44	1
	CHANNEL- adapter 4 hole	13216E7397	97403	:27	8-4	2
	CHANNEL adapter 12 hole	13216E7396	97403	2	8-4	2
	CHANNEL- bottom plate 15 hole	13216E7398	97403	37	8-4	2
	CHANNEL: bottom plate 45 hole	13216E7391	97403	37	8-49	2
	CHANNEL: hatch bolt clip 2 hole	13215E9706	97403	:33	8-2	2
	CHANNEL: stave 48 hole	13215E9704	97403	74	8-49	1
	PLATE BOTTOM adapter	13211E8090-1	97403	1	8-5	2
	PLATE BOTTOM- adapter	13211E8090-2	97403	1	8-5	1
	PLATE BOTTOM inner	13211E8102	97403	:27	8-6	1
	PLATE BOTTOM outer	1321IE8103	97403	:17	8-6	2

FSN	Descrlptlon	Part No	Mfg. Code	Qty Per Unit	Fig No	Item No
	ATTACHING COMPONENTS					
5306-010-9216	BOLT SQUARE HEAD- 1/2-13 thd size, 1 in lg	FF-B-575	81348	5000	8-50	2
5306-959-7813	BOLT SQUARE HEAD:1/2-13 thd size, 11/4 m lg	FF-B-575	81340	29000	8-6	3
5306-042-6916	BOLT SQUARE HEAD 1/2-13 thd size, 1'1/2 min lg	FF-B-575	81348	400	8-12	3
	GASKET FILLET: 5 in size	13211E8097	97403	160	8-26	1
	GASKET, FILLET- 7 in size	13211E8109	97403	80	8-27	1
	GASKET, STRIP	13211E8054	97403	5300 ft	8-7	1
	GASKET, WEDGE	13211E8056	97403	650	8-7	2
5430-693-2968	PLUG, BOLT REPLACEMENT	13211Es8058	97403	12	3-5	-
	WASHER, SEALING '2 in screw size	13211E8059	97403	27000	8-6	5
	RE-ERECTION KIT					
5430-319-0113	KIT, RE-ERECTION	13217 E5410	97403	1		
5306-010-9216	BOLT: 1/2-13 thd size, 1 in lg	FF-B-575	81348	5000		
5306-959-7813	BOLT: 1/2-13 thd size, 1 '4 in lg	FF-B-575	81348	29000		
5306fi-042-6916	BOLT: 1/2-13 thd size, 1'2 In lg	FF-B-575	4M1)			
5306-011-1195	BOLT- 1/2-13 thd size, 2'2 in lg	FF-B-575	81348	4		
5306-964-0963	BOLT: 5/8-11 thd size, 3'2 in lg	FF-B-575	81348	6		
5306-019-1857	BOLT- 5/8-11 thd size 4 In lg	FF-B-575	81348	16		
5101-298-8639	BOLT: 1/4-10 thd size 3 in lg	FF-B-575	81348	16		
5306-426-4069	BOLT 7/8-9 thd size 5 In lg	FF-B-575	81348	24		
5306-964-0966	BOLT 1-8 thd size 9 in lg	FF-B-575	81348	3		
	BRUSH, APPLICATION: sealing compound	H-B-420	81348	6		
	GASKET, FILLET 5 in size	13211E8097	97403	160		
	GASKET FILLET: 7 in size	13211E8109	97403	80		
	GASKET, FLANGE' 2 in size	13211E8057	97403	4		
	GASKET FLANGE: 6 in size	13215E9722	97403	4		
	GASKET, FLANGE: 8 in size	13215E9723	97403	8		
	GASKET FLANGE12 in size	13216E7382	97403			
	GASKET HATCH	13215E9724	97403	4		
	GASKET MANHOLE' 28 hole	13215E9726	97403	2		
	GASKET MANHOLE 30 hole	13215E9727	97403	2		
	GASKET STRIP	13211E8054	97403	5300 ft		
	GASKET WEDGE	13211E8056	97403	570		
5310-982-4940	NUT 1/2-13 thd size	FF-N-836	81348	:34.404		
5310-012-5550	NUT 5/8-11 thd size	FF-N-836	81348	22		
5310-934-9727	NUT: ¾ -10 thd size	FF-N-836	81348	1F		
5310-891-3425	NUT: 7/8 -9 thd size	FF-N-836	81348	21		
	NUT: 1-8 thd size	FF-N-836	81348			
5430-693-2968	PLUG BOLT REPLACEMENT	1211 F0518	97403	12		
8030-800-6382	PUTTY SEALING	MIL-P 201628	81349	4 gal		
7920-205-1711	RAGS	DDD-R-30	81348	25 lb		
8030-598-4503	SEALING COMPOUND	MIL-S-14231	81349	68qt		
	WASHER SEALING- ½ In screw size	13211E8059	97403	27,000		

CHAPTER 9
MOVEMENT OF TANKS TO A NEW WORKSITE

Section I. DISMANTLING FOR MOVEMENT

9-1. Tank Disassembly Precautions

a. General. Disassembly and re-erection of bolted storage tanks require much more skill than assembly of new tanks. A bolted tank will usually settle and warp. Therefore, each stave and panel must be placed back into its same relative position during reerection. All joints must be thoroughly cleaned, prefereably with a powered wire brush and sanding disk. All panels and staves must be lowered and handled with extreme care so as not to change their shape relative to their adjacent components. Airborne lead from tank joints and rusty surfaces is extremely toxic.

(1) Determine contents stored in the tank. If tank has been used for petroleum products, make sure that upon re-erection it is not used for potable water storage. If possible, prepare for disassembly several weeks in advance. Drain and flush tank bottom. Open all inspection hatches and manholes. Remove clean out door and allow tank to ventilate for a week or two. If tank has been used for storage of petroleum products containing lead, atmosphere within the tank should be tested frequently for lead vapors. Lead fumes are highly toxic and dangerous.

(2) Be sure the tank has been emptied of its contents before beginning disassembly.

(3) Do not save or attempt to salvage gasket material .

(4) Do not save or attempt to salvage nuts and bolts that show the slightest amount of damage.

(5) Do not remove nuts and bolts from any component until it is time for that component to be removed from the tank. Drive bolts out with a hammer and tapered drift pin. Do not bend staves or panels with hammer blows - handle each component with care.

(6) Do not attempt to disassemble the tank without using gin poles (as applicable), center pole boom (as applicable), and scaffolding. Be careful not to bend tank components.

(7) Match-mark or tag components as they are removed. Use paint to mark staves, bottom and top sections. Any system must be obvious to the re-erection; such as 1-1, 1-2, 1-3 for the bottom rings; 2-1, 2-2, 2-3 for the second ring, etc.

(8) Clean each component thoroughly as it is removed. Particular attention must be paid to lap seam mating surfaces. All tank sealing compound and rust near joints must be removed before reassembly .

b. Specific Disassembly Precautions.

(1) Use extreme caution in opening and venting the tank so as not to create a spark which might ignite exposive vapors. Do not smoke, or light inflammables near the tank.

(2) Open pressure vacuum valve and emergency vent in the tank deck.

(3) Remove cleanout cover and allow tank to vent until all fumes and vapors have dissipated.

(4) Use windsails directed into the cleanout opening to aid in circulation of air through the tank.

(5) Clean the tank as instructed in TM 10-1109.

9-2. Disassembly of Tanks

a. General. Disassembly procedures are the reverse of those followed when erecting the tank.

b. Tank Disassembly. Refer to the appropriate erection instructions and disassemble the tank in the following sequence:

(1) Remove cleanout cover, tank outlets, water drawoff valve, and manhole air intake or emergency vent.

(2) Install the scaffold around the top chime of top staves. Remove deck guard and access ladder.

(3) Install gin pole or center pole boom on the center support (as appropriate). Remove tank deck and disassemble the rafter (as appropriate). Do not disassemble special deck plates.

(4) Remove umbrella-type deck support and center column (as appropriate).

(5) Remove the side staves. Use gin pole and scaffold for 3000-and 10,000-barrel tanks.

(6) Disassemble tank bottom plates and center support base (as appropriate).

(7) Discard all gasket material and any damaged bolts and nuts. Hammer out any dented parts.

Section II. TRANSPORTING TANK COMPONENTS

9-3. General

This section contains information on packaging tank components for transporting to the new worksite.

9-4. Tank Packaging

a. Like components of the tank should be stacked or arranged together in bundles of a weight consistent with available handling methods.

b. Wire or strap each bundle and identify it with the description and part number of each item. Do not bend any component during banding and tie down. down.

c. Protect all lap seam surfaces from damage.

d. Use wooden blocks or separators between staves to maintain their curvature and protect the flanges.

Section III. REINSTALLATION AFTER MOVEMENT

9-5. General

This section contains instructions for the re-erection of tanks at the new worksite.

9-6. Tank Site, Soil Test, and Foundation

Refer to Chapter 2 for information covering the tank site, soil test, and foundation preparation.

9-7. Re-erection of Tanks

a. Inspecting the Equipment. Check all components for damage due to shipping, unloading or uncrating. Inspect all plates, staves, and channels for poor alinement and damage.

b. Re-erection Kit.

(1) All gasket material and damaged nuts and bolts, discarded at time of disassembly, are replaced with new components supplied in the tank re-erection kit.

(2) Select the appropriate re-erection kit for the tank.

c. Assembly. Using the appropriate re-erection kit, assemble the tank in accordance with the applicable erection instructions contained in Chapters 3 through 8.

CHAPTER 10
TANK REPAIR AND CALIBRATION

Section I. NORMAL PROCEDURES

10-1. General
Most leaks in bolted steel tanks occur at bolted connections in the bottom plates and in an area of the side staves within two feet of the bottom. These leaks are usually caused by erosion of the foundation material which no longer provides the required support for the bottom and side stave plates. Weeping of several tank joints is not uncommon. A wetted area is formed and the tank is discolored. However, fuel never reaches the ground due to evaporation.

10-2. Repair of Leaking Tanks
a. Leaks at Bolted Connections.

(1) Locate point(s) of leakage.

(2) If possible, apply additional torque to existing bolts in area of the leak. Tighten bolts just enough to stop the leak.

(3) If leak cannot be corrected by tightening the bolts; refer to Chapter 9, disassemble and re-erect the tank using the appropriate re-erection kit.

b. Leaks caused by Small Arms Fire. Holes in the tank inflicted by small arms fire can be patched by using bolt replacement plugs. Refer to paragraph 3-4 for installation of bolt replacement plugs.

10-3. Burned-Out Tanks
Components of tanks which have burned out are usually unfit for salvage because of buckled plates. Any tank which has burned out must be completely dismantled because fire and heat destroy the gasket material. Disassemble and re-erect the tank using new gaskets, nuts and bolts as instructed in Chapter 9. Use new metal plates if old ones cannot be readily repaired.

Section II. ALTERNATE METHOD OF BOTTOM REPAIR FPR 3000-AND 10,000-BARREL CAPACITY TANKS.

10-4. General
This section contains an alternate method for tank bottom repair on 3000- and 10,000-barrel capacity tanks. Use of this alternate method, which employs a concrete cap over the original bottom, is limited to tanks used to store petroleum products.

NOTE

Utilization of this technique completely eliminates the capability of the tank to be totally disassembled and reerected Therefore. it is used only when permitted by the tactical situation.

10-5. Preparation
a. Completely drain contents of tank.

(1) Use extreme caution in opening and venting the tank so as not to create a spark which might ignite explosive vapors. Do not smoke or light inflammables near the tank.

(2) Open pressure vacuum valve and emergency vent in the tank.

b. Remove cleanout cover and allow tank to vent until all fumes and vapors have dissipated. Use windsails directed into the cleanout opening to aid in circulation of air through the tank. Check for trapped airborne lead vapors.

c. Clean the tank as instructed in TM 10-1109.

d. Perform any work required to raise the heights of the cleanout cover, water drawoff valve, and pipe connections to compensate for increased height of tank bottoms after installation of concrete cap.

10-6. Installation
a. Surface Preparation. The tank bottom, center support base, and side staves, to a height of 24 inches, should be prepared as follows:

(1) Clean the surface to be prepared by dry abrasive blast cleaning in accordance with Steel Structures Painting Council Specification SSPC-SP5-63, No. 5.

(2) Seal the prepared surface with an epoxy coating per MIL-L-2638C (tanks used in U.S. Army) or MIL-C-4556D (tanks used by U.S. Air Force).

b. Installation of Concrete Cap.

(1) Refer to table 10-1 for material required to install the concrete cap.

Table 10-1. Material for Installation of Concrete Cap

Description	3000-Barrel Capacity Tank	10,000-Barrel Capacity Tank
Concrete 1:2:4 (Cu Yds)	16	41
½ " Rope Oakum, Tarred (Lin Ft.)	166	415
Noah's Pitch (Gals)	30	77
½ "X6"x12" Y P Boards (Pcs)	132	330
6"x6"x6 Gad, Elec Welded Fabric Reinforcement 150' rolls-60" wide (Rolls)	3	6
5/8" dia steel Reinforcing Rods (Lin. Ft.)	188	470
3/4" dia x 4' steel tie Rods (PCS)	20	52
No 3d common nails (lbs)	1	2
Bates Wire Ties-3/2 " long (PCS)	240	600

(2) Install welded tie rods and reinforcement fabric per figure 10-1. Refer to TM 9-237 for information on welding theory and application.

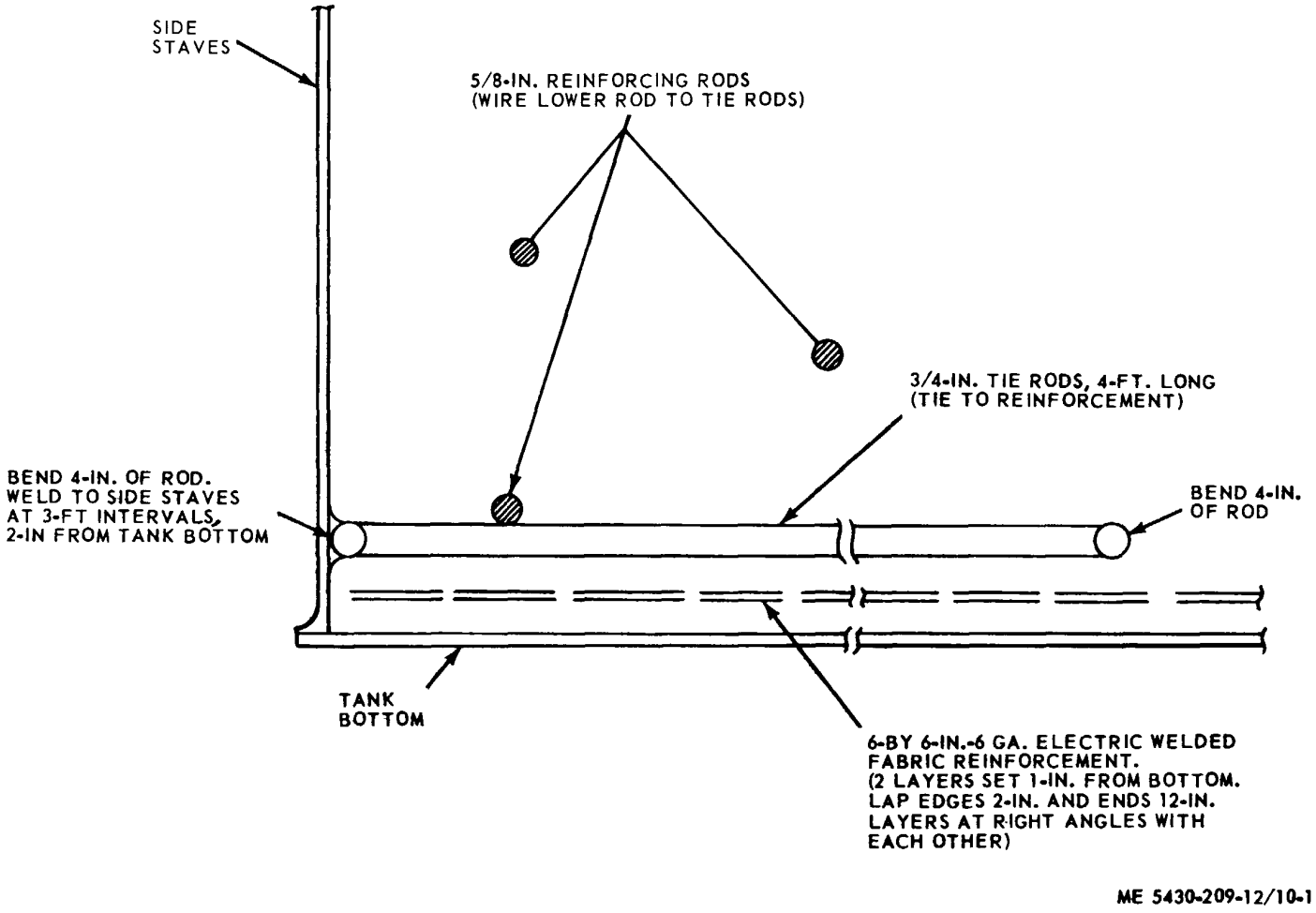

Figure 10-1. Installation of tie rods and reinforcement fabric.

(3) Position caulking groove boards and pour concrete cap per figure 10-2. Refer to TM 5-742 for information on the method and time of curing .

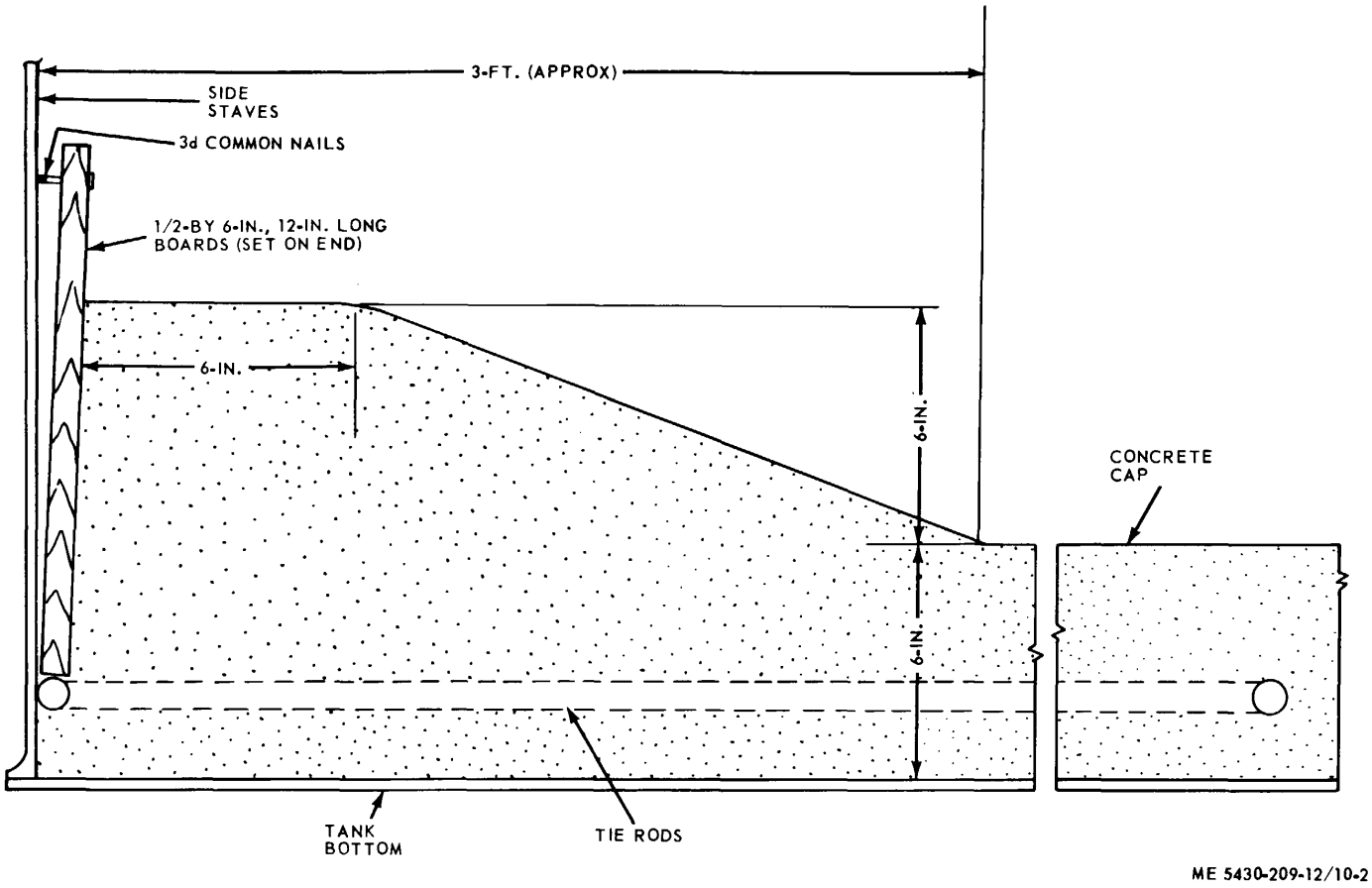

Figure 10-2. Caulking groove boards and concrete cap installed.

(4) Remove caulking groove boards and seal the groove according to figure 10-3.

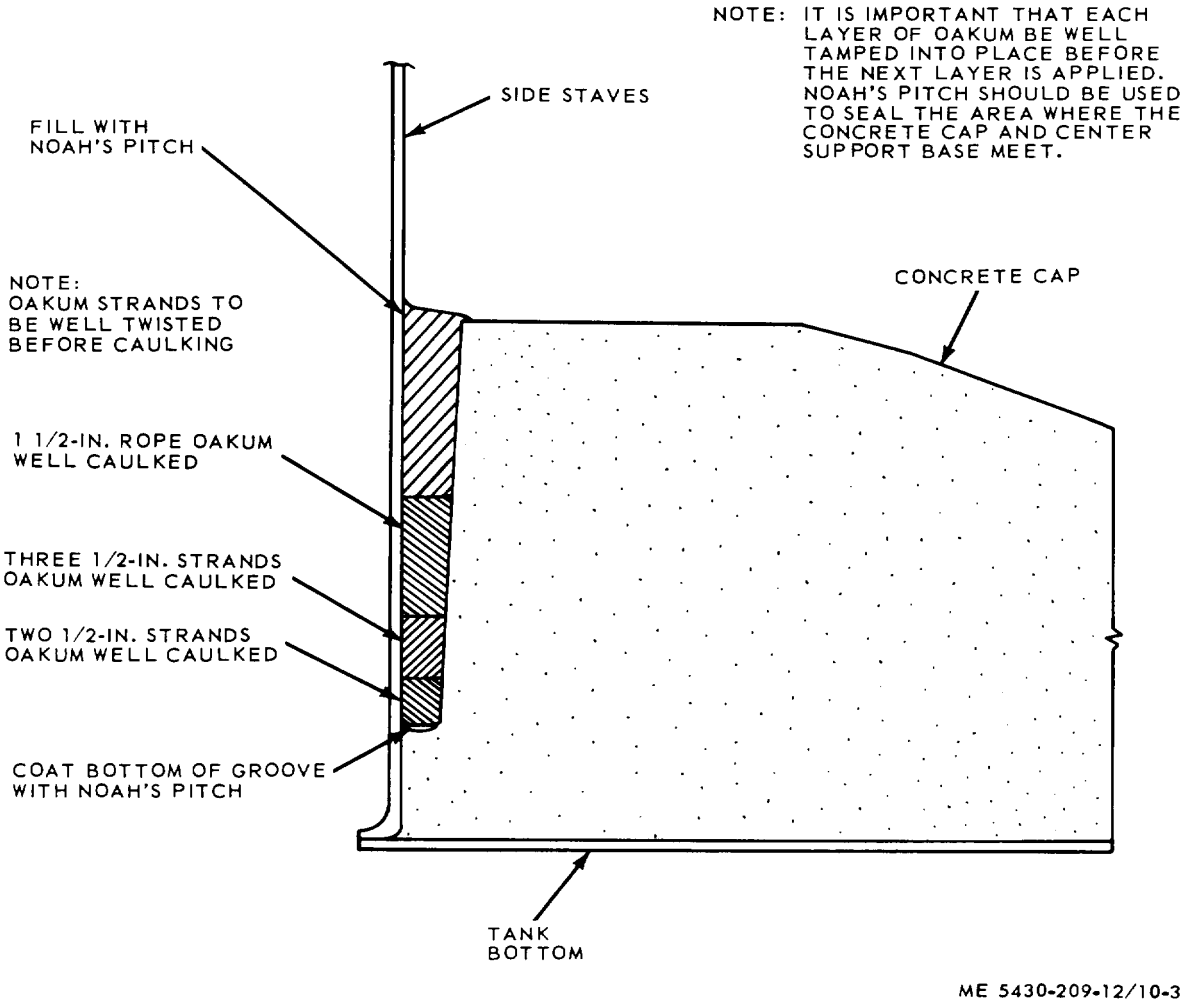

Figure 10-3. Caulking installed.

Section III. TANK STRAPPING AND CALIBRATION

10-7. General

"Tank Strapping" is the term commonly applied to the method of taking and reporting the dimensions of a tank. The installation of a concrete cap over the original bottom of the tank proportionately reduces the capacity of the tank and thereby creates the need for remeasurement or strapping. Detailed instructions for gaging. measuring, and sampling are contained in TM 10-1101 (Petroleum Handling Equipment and Operation.)

10-8. Definitions

a. Deadwood.

(1) Internal deadwood is any object within the shell of the tank that displaces fluids (columns. braces, ladders, steam coils, etc.) and decreases the capacity of the tank.

(2) External deadwood is any object that projects outside the tank shell that will increase the capacity of the tank (pipe connections, manholes, cleanout openings, etc.).

b. Depth or Tank Height. The vertical distance from the top of the stave, shell, or top angle iron to the inside surface of the tank is defined as the tank height.

c. Oil Height. The highest point to which the tank can be filled without overflowing is known as the oil height. It may be the same as the tank height or it may be below the top due to connections, overflow lines or vent lines.

d. Circumference. Circumference is the circular distance around the outside of the tank.

10-9. Measurement Techniques

a. General. Tank strapping encompasses measuring the depth, circumference, thickness of tank walls, deadwood, and pipe connections.

b. Deadwood Measurement. Measure and record deadwood length, breadth, and thickness in order to compute the volume of fluid that will be displaced by any object within the tank shell after it is filled and to compute the added volume outside the shell due to projections.

c. Depth or Tank Height Measurement. Depth measurements are usually taken on the outside of the tank and then compared to measurements taken inside the tank through the gage hatch in order to determine if cement or other material has been placed on the tank bottom. If cement is present on the bottom, measure and record the depth at three places as illustrated in figure 10-4. Using the three measurements, compute the average depth of the tank. Average depth should be recorded in feet, tenths, and hundredths.

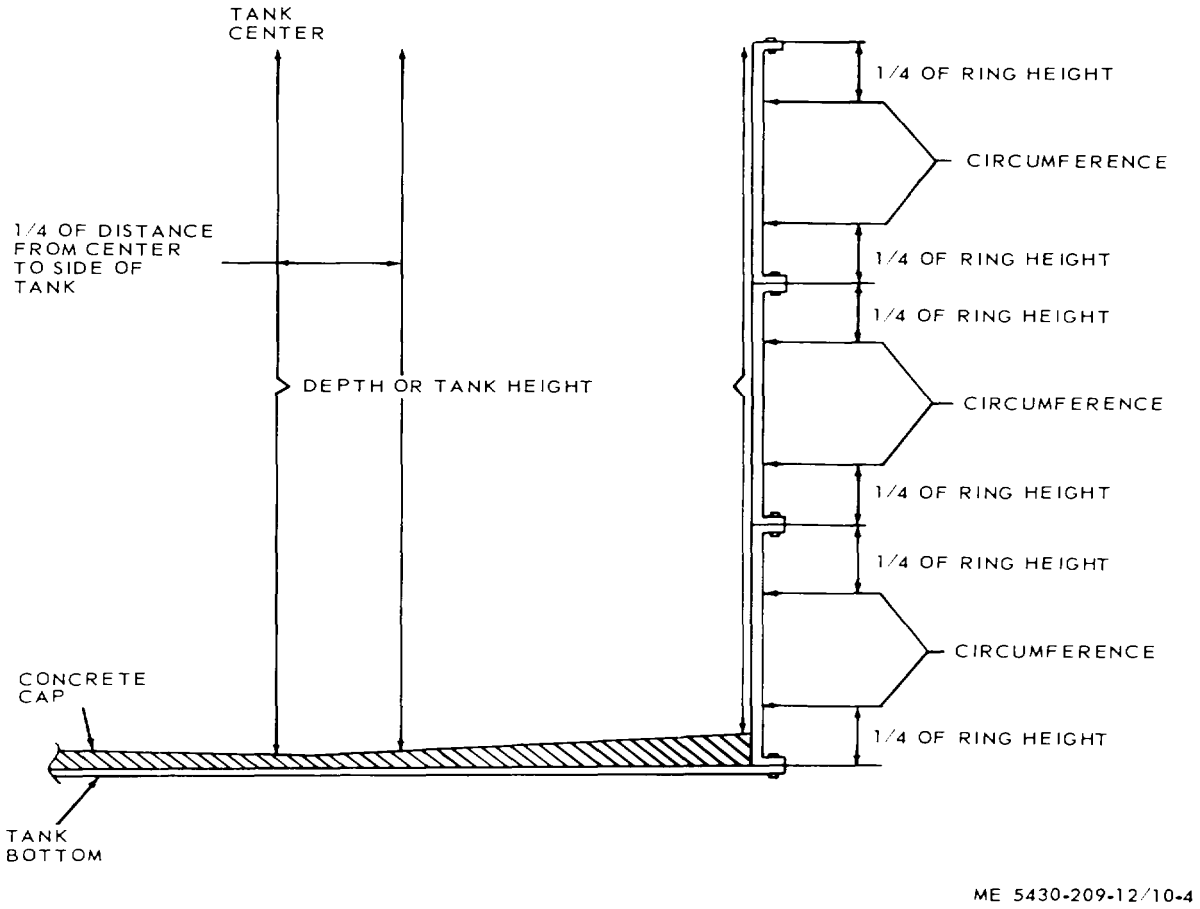

Figure 10-4. Tank measuring technique

d. Circumference Measurements. Circumference measurements are taken on each ring at points located by measuring down from the top and up from the bottom of each ring 1/4 the height of the ring as shown in figure 10-4. Since these tanks normally have 8 foot rings. measurements would be taken at 2, 6, 10, 14. 18 and 22 feet above the tank bottom. If bolts prevent the close contact of the tape with the

shell at the vertical joints, one or more nuts may be loosened allowing the tape to lie flat. However, if this is not practical, dividers should be used to span such obstructions. Each course or ring in a cylindrical tank should be consider by the "Strapper" to be true cylinder. Using the ring measurements, compute the average circumference of the tank. Average circumference should be recorded in feet, tenths, and hundredths.

10-10. Conversion Formulas

a. General. In order to compute tank volume, it is necessary to convert outside (measured) circumference to inside circumference. The inside circumference will then be used to find the radius of the inner tank.

b. Inside Circumference. In converting the outside (measured) circumference to inside circumference, deduction for metal thickness should be exact, with results shown in feet to three decimal places. The deduction of metal thickness is computed by the following formula:

Deduction = 2 x 3 1416 x T

Where T = thickness of metal, expressed in decimals of a foot.

T (Plate thickness = '4 Inch (0 0208 foot)

Deduction = 2 x 3.1416 x 0.0208

= 0.13069

= 0 131 foot (results to three decimals)

c. Radius. The inside circumference is used to find the radius of the tank, as follows:

$$R \text{ (radius of tank)} = \frac{1/2 \times C}{3.1416}$$

Where C = Inside circumference of tank.

10-11. Deadwood Computations

a. General. Separate computations are made for internal deadwood and external deadwood. Both computations are accomplished using the same basic formula.

b. Deadwood Formula. Deadwood is computed as follows:

D (Deadwood in U.S. Gallons) = L (Deadwood length in feet) X

B (Deadwood breadth in feet) x T (Deadwood thickness in feet) x 7.48 (gallons in one cubic foot.

10-12. Volume Computations

a. Unadjusted Volume is computed as follows: V (Volume in U.S. Gallons) = 3.1416 x R 2 (radius in feet, squared) X

H (Height of liquid fuel in feet) x 7.48 (Gallons in one cubic foot)

b. Actual volume is computed by subtracting internal deadwood and adding external deadwood to the unadjusted volume shown above.

10-13. Strapping Tools and Components

Refer to table 10-2 for the list of recommended strapping tools and components.

Table 10-2. Recommended Strapping Tools and Components

FSN	Descrlptlon	Qty	
5210-221-1886	Tape, Measuring, Tank Gaging Type, 50 ft long, Graduated in standard Units of inches and feet, 1/8 in Increments, left to Right Hand Reading, '/2 in wide, steel Nubian Finish, with Reel Handcrank Rewind with 20 oz Plumb Bob and one (1) Tape Wiper (Used to measure product and tank heights)	1	
5210-238-1734	Plumb Bob, Brass, Solid Body, 20 oz weight, Non-hardened, Non-removable Point 1/8 m Graduations (Extra Plumb Bob for FSN 5210-221-1886 above).	1	
5210-078-8948	Square, Combination, Grooved Type Blade, 12 in long, 1/100, 1/64, 1/50 and 1/32 in. smallest unit of graduation for each Graduated Edge, Cast Iron Square and Miter Head with Scriber and One Level (Used for making '4 the distance from the top of each ring on each side of the vertical seam on fange type tanks)	1	
5210-287-3335	Tape, Measuring General Purpose Distance Measuring Type, 72 in long, Graduated in Standard Units of 1/32, 1/6 and 1 inch, 1/32 inch Increments on First 6 in of Upper side, 1/6 inch Increments of Balance of Ribbon, Left Hand to Right Hand Reading, l/z in wide with steel protective finish, with case, butt end type Pull-Push Rewind. (Used for measuring pipeline connections and "deadwood)	1	
5210-221-1899	Gage, Depth Rule 6 in Rule and Rod Length, Rule Graduated in 32nds and 64ths inch, Non-Graduated Rod 30, 45 and 60 degree head graduations both sides. (Used to measure tank shell thickness)		
4240-269-7911	Goggles, Industrial, Clear Glass Lens (Used as eye protection when scraping scale or rust)	1	
5210-720-7982	Level and Plumb, Alurmnum, 48 in long, double face, adjustable to True Vials only, 2 non-graduated unground level vials in pairs, 4 non-graduated unground level vials in pairs (Used to determine pitch of bottoms, "deadwood." and as an aid in circumferential measurement)	1	

FSN	Description	Qty	
5210 -221-1888	Tape, Measuring General Purpose Distance Measuring type, 100 feet long, Graduated in Standard Units of 1/100, 1/10 and 1 foot increments, left hand to right hand reading, 2.8 inch wide steel paint finish, with case, nonbutt ent type, hand crank rewind (Used for circumferential measurement)	1	
'5210-243-2878	rape, Measuring, General Purpose Distance Measuring Type, 300 foot long, Graduated in Standard Units of Feet, 1/10 ft Increments, Left hand to right hand reading, 5/16 inch wide, steel, with reel, hand crank rewind, with blank space on each end and 1 hardwood "D" handle Used for circumferential measurement}	1	
5110-221-1538	Knife, scraping, 41/2 inch blade (Used to clean tank shell to secure a more accurate measurement).	1	
5210-229-3060	Caliper, Spring, Rectangular Leg, Adjusting Screw, 8 inch (Used to measure openings, "deadwood" or places that are difficult to measure with a tape)	1	
6675-641-3512	Divider, Drafing, Longitudinal Corrugated Handle with Split Leg Joint, 6 inch (Used for spanning flanges)	1	
7520-269-9012	Stencil Set, Marking, Brass, Interlocking, 4 inch letters (Used to mark tank heights, fluid heights and/or tank numbers).	1	
7520-223-7998	Brush, stencil, 1 inch X 1 inch X 9 inches long (USED with stencil set, FSN 7520-269-9012, above).	1	
5440-223-6026	Ladder, Extension, 32 feet (Used in measuring tank and fluid heights).	1	
5140-331-5496	Box, Tool, Steel (Used to carry and safeguard "strapping" tools).	1	

CHAPTER 11

DEMOLITION TO PREVENT ENEMY USE

11-1. General

When capture or abandonment of the tank to an enemy is imminent, the responsible unit commander makes the decision either to destroy the unit or to render it inoperative. Based on this decision, orders are issued which cover the desired extent of destruction. Explosives, weapons fire, and burn-ing, either alone or in combination, are the most effective methods to employ. Whatever method of destruction is used, it is essential to destroy the same vital items of all tanks.

11-2. Preferred Demolition Methods

a. Demolition by Explosives. Place as many of the following charges as the situation permits and detonate them simultaneously with detonating cord and a suitable detonator.

(1) 100-, 250-, and 500-barrel capacity tanks (fig. 11-1).

(a) One 2-pound charge against the base of the tank.

(b) One 2-pound charge against the base of the manhole dome in the deck.

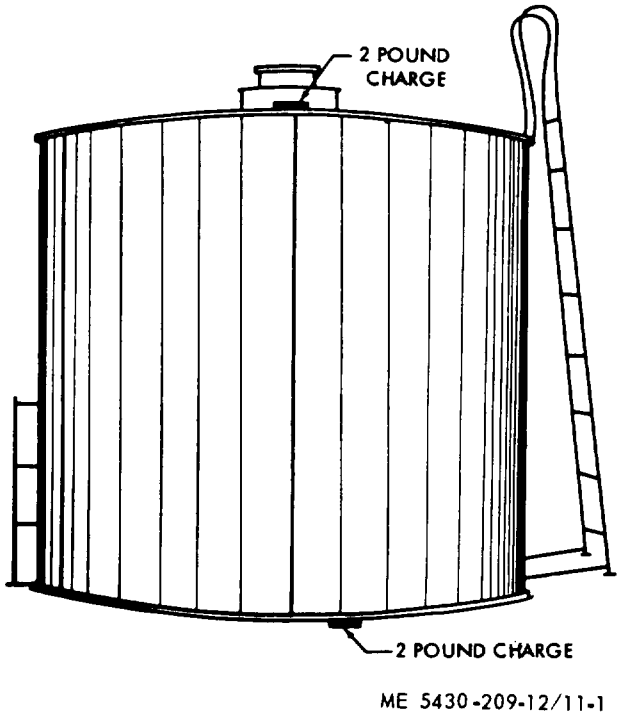

Figure 11-1. Placement of demoltio.n charges

(100-, 25-, and 500-brrel tanks).

(2) 1000, 3000-, and 10,000-barrel capacity tanks (fig. 11-2).

(a) Five 2-pound charges equally spaced against the base of the tank.

(b) Three 2-pound charges equally spaced around the outside endge of the center deck section.

(c) Five 2-pound charges equally spaced around the outside of the tank just above the bottom chime of the second ring.

(d) Two- 2-pound charges equally spaced around the main supply pipeline at the face of the tank flange.

NOTE

The above charges are the minimum requirement for this method.

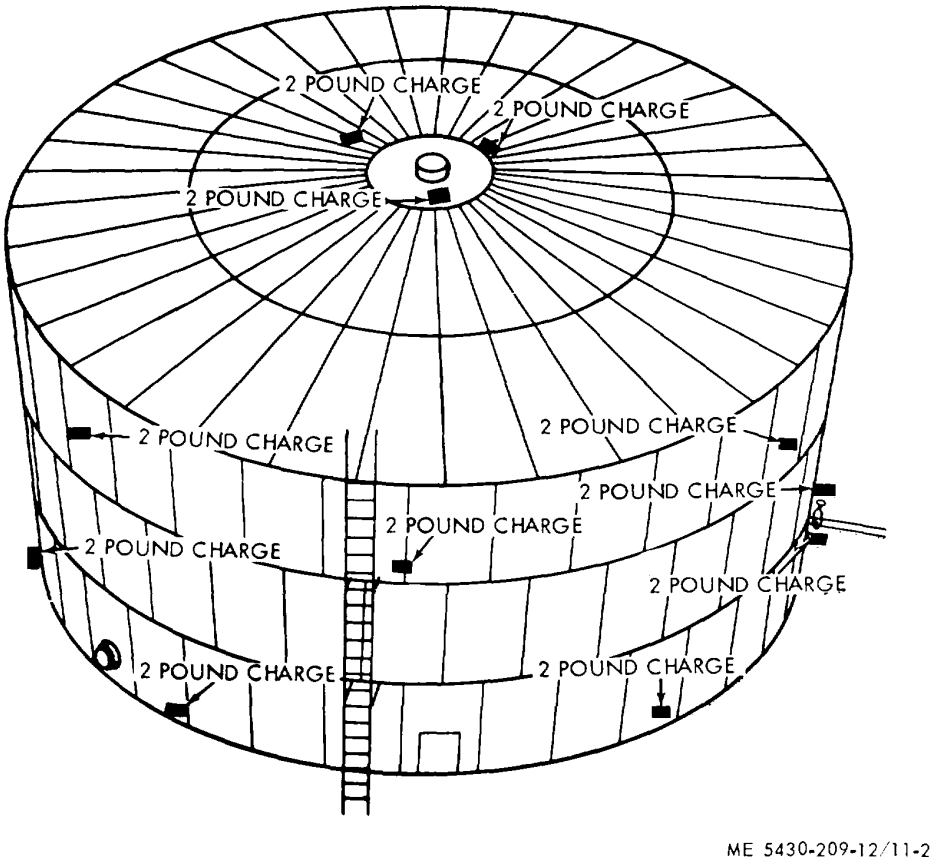

Figure 11-2. Placement of demolition charges (1000-, 3000-, and 10,000-barrel tanks).

WARNING

Do not use mechanical means for destruction if the tank is used for storage of flammable liquids.

b. Demolition by Mechanical Means. Use sledge hammers, crowbars, picks, axes, or any other heavy tools which may be available, and destroy the following:

(1) Outlet fittings
(2) Staves
(3) Deck

11-3. Other Demolition Methods

If the situation prohibits employing either of the preferred methods, fire on the tank with the heaviest weapons possible.

APPENDIX A

REFERENCES

A-1. Destruction of Army Materiel

TM 750-244-3	Procedures for Destruction of Equipment to Prevent Enemy Use

A-2. Fire Protection

TB 5-4200-200-10	Hand Portable Fire Extinguishers for Army Users
TM 5-315	Firefighting and Rescue Procedures in Theaters of Operation

A-3. Maintenance

TM 9-213	Painting Instructions for Field use.
TM 9-037	Operators Manual, Welding Theory and Application
TM 5-302	Engineer Functional Components, System Staff Tables of Installations, Facilities and Equipages.
TM 5-303	Construction in the Theater of Operations
TM 5-330	Bills of Materials and Equipment of the Engineers Functional Components System
TM 5-335	Planning and Design of Roads, Air-bases and Heliports in the Theater of Operations
TM 5-343	Drainage Structures, Sub-grades and Base Courses
	Military Petroleum Pipeline Systems
TM 5-349	Arctic Construction
TM 5-530/AFM 88-51	Materials Testing
TM 5-661	Inspection and Preventative Maintenance Services for Water Supply Systems at Fixed Installations
TM 5-678	Repair and Utilities-Petroleum Oils and Lubricants
TM 5-742	Concrete and Masonry
TM 10-1101	Petroleum Handling Equipment and Operations
TM 10-1109	Organizational Maintenance: Military Petroleum Pipelines, Tanks and
TM 10-1118	Related Equipment
TM 750-187	Petroleum Terminal and Pipeline Operations
	Procedures for Rapid Deployment, Redepoloyment and Retrograde for

A-4. Military Specifications — Utility Equipment

MIL-L-2638C	Lacquer, Vinyl Resin, Gasoline and Water Resistant
MIL-C-4556D	Coating Kit, Epoxy, for Interior of Steel Fuel Tanks
MIL-T-10086F	Tanks, Liquid Storage, Metal; Vertical, Bolted
MIL-I-12215C	Kits, Re-erection; for Tanks; Liquid Storage, Metal, Vertical, Bolted

A-5. Shipment and Storage

TM 38-230	Preservation; Packaging and Packing of Military Supplies and Equipment
TM 38-460	Storage, Inspection and Preservation of POL Pipeline Equipment

A-6. Supply

SC5420-30-IL	Department of the Army Supply Catalog Identification List for FSC Group 54, Class 5430, Storage Tanks
SC 5180-93-CL-EO1	Erection Outfit, High Bolted Storage Tanks (FSN 5180-566-5549)
SC 5180-93-CL-E03	Erection Outfit, Low Bolted Storage Tanks (FSN 5180-540-3833)
SC 5-4-6630-S02	Test Set, Soil
SC 5-4-6630-S04	Test Set, Concrete

INDEX

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C4

CHANGE NO.4

HEADQUARTERS
DEPARTMENTS OF THE ARMY AND THE AIR FORCE
WASHINGTON, D. C., .30 August 1989

Operator and Organizational Maintenance Manual

TANK STEEL, VERTICAL, BOLTED, KNOCKDOWN, SEALED OPENINGS, STANDARD BOTTOM, AND ROOF, GASOLINE, OIL OR WATER (TYPE I-POL AND POTABLE WATER TYPE II-POL AND NON-POTABLE WATER)

100BARREL CAPACITY	TYPE I,	NSN 5430-)00-263-6076
	TYPE II,	NSN 5430-00-139-3778
250 BARREL CAPACITY	TYPE I,	NSN 5430-00-263-6080
	TYPE II,	NSN 5430-00-138-1823
500 BARRELCAPACITY	TYPE I,	NSN 5430-00-253-6077
	TYPE II,	NSN 5430-00-138-1822
1,000 BARRELCAPACITY	TYPE I,	NSN 5430-00-263-6078
	TYPE II,	NSN 5430-00-138-1821
3,000 BARRELCAPACITY	TYPE I,	NSN 5430-00-263-6075
	TYPE II,	NSN 5430-00-138-1820
10,000 BARRELCAPACITY	TYPE I,	NSN 5430-00-255-6073
	TYPE II,	NSN 5430-00-138-1824

Approved for public release; distribution is unlimited.

TM 5-5430-209-12/TO 36Y31-1-101, 15 May 1974, is changed as follows:

Page 5-5, Line 58, TANK BOTTOM, Part No. Column. Change 132115E9705 to 13215E9705.

By Order of the Secretaries of the Army and the Air Force:

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General, United States Army
Chief of Staff

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To be distributed in accordance with DA Form 12-25A, Operator and Unit Maintenance requirements for Storage Tanks.

CHANGE
NO.1

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON, DC 15 April 1975

Operator and Organizational Maintenance Manual
TANK, STEEL, VERTICAL, BOLTED, KNOCKDOWN,
SEALED OPENINGS, STANDARD BOTTOM, AND ROOF,
GASOLINE, OIL OR WATER
(TYPE I-POL AND POTABLE WATER
TYPE II-POL AND NON-POTABLE WATER)

10,000 BARRELCAPACITY	TYPE I,	NSN 5430-00-255-6073
	TYPE II,	NSN 5430-00-138-1824
100 BARREL CAPACITY,	TYPE I,	NSN 5430-00-263-6076
	TYPE II,	NSN 5430-00-139-3778
250 B.ARRE L CAPACITY,	TYPE I,	NSN 5430-00-263-6080
	TYPE II,	NSN 5430-00-138-1823
500 B.ARRE L CAPACITY,	TYPE I,	NSN 5430-00-263-6077
	TYPE II,	NSN 5430-00-138-1822
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	TYPE II,	NSN 5430-00-138-1821
3,000 BARREL CAPACITY,	TYPE I,	NSN 5430-00-263-6075
	TYPE I,	NSN 5430-00-138-1820
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	TYPE II,	NSN 5430-00-138-1824

TM 5-5430-209-12/TO 36Y31-1-101, 15 May 1974, is changed as follows:

The title is changed as shown above.

All "Federal Stock Numbers" appearing in this publication should be corrected to the new "National Stock Numbers" before using.This can be done by inserting -00after the Federal Stock Class.For example Federal Stock Number 5430-263-6076 will be corrected to the following National Stock Number 5430-00-2636076.Wherever the word "Federal Stock Number" or abbreviation "FSN" appears, throughout the publication, correct to read "National Stock Number" or "NSN". Page 2 of cover.SAFETY PRECAUTIONS are superseded as follows:

WARNING
SAFETY PRECAUTIONS

It is mandatory that the safety precautions prescribed in FM 10-20 be followed whenever a bolted steel tank is being disassembled, repaired, or reassembled.

If a tank has been used for petroleum products, it must not be used for potable water.

If a tank is to be used for potable water storage, do not apply sealing compound or sealing putty to the tank sides or bottom.

Scaffold boards must be tested on the ground, prior to being installed in the scaffold, to be sure they are sound and free from defects. Nail overlap of scaffold board together. Install a guard rail on all scaffolding. Securely tie rope safety railing to each post. Individually, they are not resistant to lateral bending; but tied together, they form a strong resistance to lateral and outward bending .Adiagonal line from the top of every 4th or 5th post to the bottom of the adjacent post is also recommended .Do not install guard wire supports over stave chine-lap seams or deck lap seams.

The motor starting switch of the vacuum seam tester must be in OFF position before connecting the motor to an electric power source outside the tank.

Do not use mechanical means for tank destruction if the tank is used for storage of flammable liquids.

All personnel should wear hard hats or steel helmets during erection or dismantling of tanks for protection against falling nuts, bolts, or tools. When using the gin pole, always try to keep the pole in as near a vertical position as is possible in order to minimize stress and avoid the possibility of bending.

Page 1-1.Paragraph 1-3 is superseded as follows:

1-3 Reporting of Errors

You can improve this manual be recommending improvements using DA Form 2028 (Recommended Changes to Publications and Blank Forms) and/or DA Form 202S-2 (Recommended Changes to Equipment Technical Manuals) located in the back of the manual. Mail the forms direct to Commander, US Army Troop Support Command, ATTN: AMSTS-MPP, 4300) Goodfellow Blvd., St. Louis, MO 63120.A reply will be furnished direct to you.

Page 2-5, paragraph 2-9b.Note is superseded as follows:

NOTE

Apply sealing compound and sealing putty to the sides and bottoms of only those tanks which are to be used to store petroleum products.

Page 3-6, Paragraph 3-5g.Warning is superseded as follows:

WARNING

If tank is to be used for water storage. Do not apply sealing compound or sealing putty to the tank bottom or seams.

Paragraph 3-7b(3)(b) is superseded as follows:

(b) Install strip gasket (2) to cover all bolt holes. When starting a new roll of gasket material after one roll has been used up, an overlap should be extended to cover two bolt holes. Apply sealing putty at each end of the overlap (petroleum tanks only)

Page 3-16.Paragraph 3-9a is superseded as follows:

a. scaffold and install strip gasket (1.Fig.:3-18) to cover all bolt holes. When one roll of gasket material is expended and a new roll started, the overlap should extend over two bolt holes. Apply sealing putty at each end of the overlap (petroleum tanks only).

Page 3-24.Paragraph 3-22b(2)(d) is superseded as follows.

(d) If a water seal blanket is required due to bottom leakage, omit the elbow (2, Fig. 3-28).

Page 3-26.Paragraph 3-24a(2) Is superseded as follows:

(2) Check the bottom seam for breaks or misses in the sealing compound. Apply compound to bare spots (petroleum tanks only).

Paragraph :3-25b(2)(d) is superseded as follows.

(d) Apply sealing putty at overlap of top and ,vertical seam gaskets (petroleum tanks only)

Para .3-27.Paragraph :3-26a(4) is superseded as follows.

(4) Repair leaks by tightening nuts and applying sealing compound at points of leakage (petroleum tanks only).

Page 4-2.Paragraph 4-2b.Note is superseded as follows

When there is a break in the basket material, ends should t overlap two holes and be cut squarely across the second hole. Sealing putty must he applied to each end of the overlap strip to, insure a leak proof joint (petroleum tanks only).

Page4-3. Paragraph 4-3d(1) is superseded as follows:

(1) Installing Wedge Gaskets. Apply heave coating of sealing compound to both faces of gaskets (3, fig.4-3) and install them over bolts (4).Use generous amounts of sealing putty at their overlap to seal the opening under the small end (petroleum tanks only).

Page 4-5. Paragraph 4-7 is superseded as follows:

4-7. Sealing Seams

WARNING

If the tank is to be used for water storage, do not apply sealing compound or sealing putty to the tank bottom or seams.

Sweep tank bottom clean after testing the seams. With bottom dry, apply sealing compound to all bolts and seams (petroleum tanks only).

Page 5-1. Paragraph 5-7 is superseded as follows:

5-7. Sealing Seams

WARNING

If the tank is to be used for water storage, do not apply sealing compound or sealing putty to the tank bottom or seams.

Sweep tank bottom clean after testing the seams. With bottom dry, apply sealing compound to all bottom seams (fig.3-16) (petroleum tanks only).

Page 6-1. Paragraph 6-2c.Note is superseded as follows:

NOTE

When there is a break in the gasket material, the ends should overlap 2 bolt holes and be cut squarely across the second hole Sealing putty must be applied to each end of the overlap strip to insure a leak proof joint (petroleum tanks only).

Page 6-3.Paragraph 6-7 is superseded as follows:

6-7. Sealing Seams

WARNING

If the tank is to be used for water storage, Do Not apply sealing compound or sealing putty to the tank bottom or seams.

Sweep bottom of tank clean after testing seams. With bottom dry, apply sealing compound to all bolts and seams (petroleum tanks only).

Page 6-4. Paragraph 6-8d(2) is superseded as follows:

(2) Install strip gasket (2) to cover all bolt holes. When one roll of gasket is used up and another started, the overlap should extend over two bolt holes. Apply sealing putty at each overlap.

Page 6-5. Paragraph 6-9f(4).After last line, add (petroleum tanks only).

Page 6-12. Paragraph 6-14c(3).Note is superseded as follows:

NOTE

When there is a break in the gasket material, the ends should overlap two bolt holes and be cut squarely across the second hole. Apply sealing putty to each end of the overlapped gasket to insure a leak proof joint (petroleum tanks only).

Page 6-15. Paragraph 615b(1), line 4.Change "Compound" to read "putty".

Page 7-1. Paragraph 7-6 is superseded as follows:

7-6 Sealing Seams

WARNING

If tank is to be used for water storage, Do Not apply sealing compound or sealing putty to the tank bottom or seams.

Sweep bottom clean after testing seams. With bottom dry, apply sealing compound to all bolts and seams (petroleum tanks only).

Page 8-1. Paragraph 8-1b(8), line 1.Change "Compound" to read, "Putty".

Page 8-6. Paragraph 8-4f, line 2.Change "Compound" to read, 'Putty".

Page 8-11. Paragraph 8-8 is superseded as follows:

8-8 Sealing Seams

WARNING

If tank is to be used for water storage, Do Not apply sealing compound or sealing putty to the tank bottom or seams.

Sweep bottom clean after testing seams. With bottom dry, apply sealing compound to all bolts and seams (petroleum tanks only).

Page 8-12. Paragraph 8-9d(2), line 4.Change "Compound" to read, "Putty".

Page 8-14. Paragraph 8-10e(6).Add the following at the end of the paragraph: (petroleum tanks only).

Page 8-17. Paragraph 8-12a, line 4.Change "Compound" to read, "putty".

Page 8-28. Paragraph 8-1 7b(4).Add the following at the end of the paragraph: "Apply sealing putty to each end of the overlap".

Page 10-1. Paragraph 10-2a(3) is superseded as follows.
(3). If the leak cannot be corrected by tightening the bolts, or by the alternate method described in c below, refer to Chapter 9 to disassemble and re-erect the tank using the appropriate re-erection kit.

Page 10-1. Paragraph 10-2.Add subparagraph c as follows:
c . Method for Repair of Leaks. One of the most common causes of leaks in bolted steel tanks is the wedge gaskets splitting due to the over tightening of chime bolts. Wedge gaskets can be replaced without completely disassembling the tank.

If the tank has previously been drained and cleaned, opposing driven-type wedges (one from the inside of the tank and one from the outside) can be used to open the chime seam sufficiently to permit the replacement of the wedge gaskets as follows:

(1) Loosen, but do not remove, the horizontal chime bolts three (3) feet on each side of the leaking wedge gasket.

(2) Fabricate sixteen (16) each hardwood or non-sparking metal wedges, 1'/4 inches wide, 8 inches long, tapering in thickness from 1/32 to '/2 inches. The surfaces of the wedges should be smooth in order to avoid further damage to the strip or chime gasket.

(3) Using the wedges in pairs, with the pairs spaced about 6 inches apart, drive one wedge from the out-side and one from the inside in order to start spreading the chime apart. Start the first two pairs on each side of the wedge gasket .on top of the strip gasket, and gradually drive them into the seam simultaneously. The chime seam should open equally on both sides of the wedge gasket. When the space between the two chimes is sufficient, start two additional pairs of wedges about 6 inches from the first pairs. Gradually wedge the chimes apart for a distance of 18 inches on each side of the wedges in order to avoid undue bending of the chimes.

(4) Next, remove the bolts which are holding the damaged wedge gasket in place. Remove the damaged gasket and replace it and the bolts. Be sure to keep the new gasket shoved back against the thick end. A rolled thread of sealing putty (1/s inch diameter - 11/2 inch long) should be placed behind the thick end of the gasket in order to insure a seal. Avoid smearing putty on the wide, flat surface of the gasket as this will act as a lubricant and could cause the wedge gasket to spread and split when the chime bolts are tightened.

(5) Gradually remove the wedges in reverse order. They can be extracted from the chime seam by tap-ping them back and forth sideways with a hammer while pulling on them with a pair of pliers. Page, 10-1.Paragraph 10-5c.Change "TM 10-1109" to read, "FM 10-20".

Page 10-1. Paragraph 10-6a(2) is superseded as follows:

(2) Seal the prepared surface as follows:

(a) Tanks used by US Army or Navy - Coat the newly prepared surface with a Vinyl Resin Lacquer coating as prescribed by Specification MIL-L-2638.

(b) Tanks used by US Air Force -- Coat the newly prepared surface with an Epoxy Resin Coating as prescribed by Specification MILC-4556.

NOTE

The referenced coatings can be visually identified as follows:

MIL,L-2638	Reddish Brown
MIL,C-4556	Off White

Page A-1. Paragraph A-3, line 15.Change "TM 10-1109" to read "FM 10-20".

Line 16.Change "TM 10-1118" to read "FM 10-20".

Page 1-1. Under "Gin Pole", line 2, page number column. Change "4-9" to read "4-10".

Line 4, page number column. Change "6-10" to read "6-12".

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