MIL-HDBK-739

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MILITARY STANDARDIZATION HANDBOOK

FIELD REFRIGERATION EQUIPMENT

SEAL OF THE

DEPARTMENT OF DEFENSE

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Field Refrigeration Equipment

1. This standardization handbook was developed by the Department of Defense.

2. This publication was approved 18 June 1970 for printing and inclusion in the Military Standardization Handbook series.

3. This handbook provides information and guidance to personnel preparing technical manuals, technical bulletins and other documents for field use. The handbook is not intended to be referenced in purchase specifications, nor shall it supersede any specification requirements

4. Every effort has been made to reference the latest information on field refrigeration equipment. It is the intent to revise this handbook periodically to insure its completeness and currency. Users of this document are encouraged to report any errors discovered and any recommendations for changes or inclusions to the US Army Natick Laboratories, Natick, MA 01760.

FOREWORD

The intent of this handbook is to provide fundamental guidelines for field refrigeration equipment. These guidelines are intended to aid in the preparation of technical manuals, technical bulletins and other documents for field use.

Readers are cautioned that this handbook is not intended for procurement purposes and that information on commercial items is neither complete nor an indorsement of these products.

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INTRODUCTION

This handbook was developed to present a composite picture under one cover of the standard DOD field refrigeration equipment. It is intended to serve as a general reference in engineering application, standardization and maintenance operations.

SCOPE

This handbook covers all major standard field refrigeration end items, standard components utilized in design of these end items and engineering criteria applicable to component selection and systems design.

CONTENTS

Section I - Major End Items

Description of major end items of field refrigeration equipment, including intended use, design features, physical characteristics and reference procurement document.

Section II - Standard Components

Included in this section are all the Military Standards(MS) applicable to field refrigeration equipment.

Section III - Engineering Criteria

This section deals with the method by which the capacities and low side operating conditions of systems made up of standard components and items of ancillary equipment can be predicted.

SECTION ONE

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SECTION ONE

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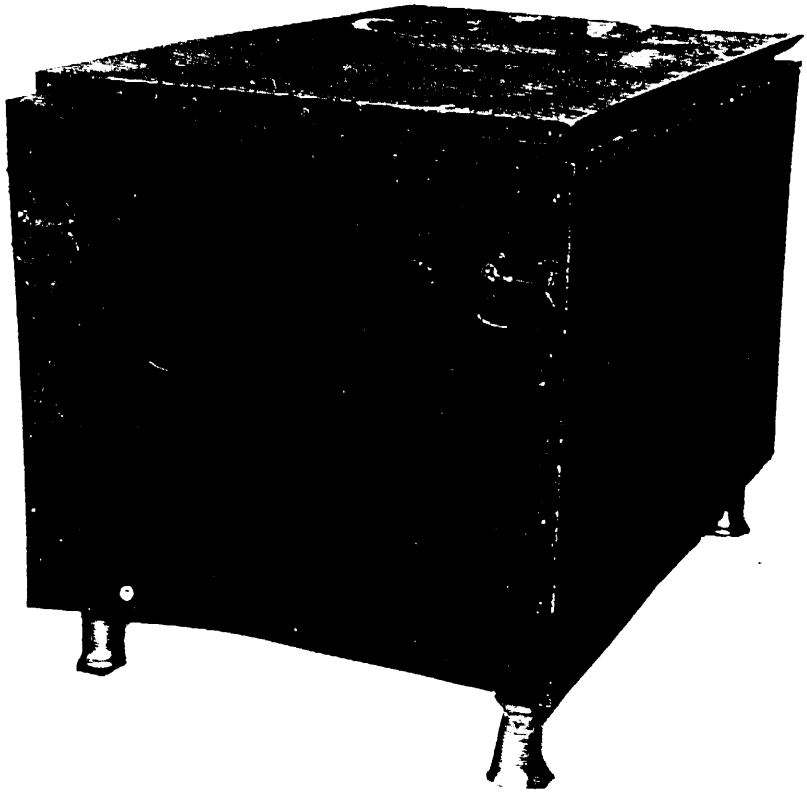
Chests, Ice Storage



Specification: MIL-C-11198

Intended Use:

These ice chests are intended for the storage of bulk ice at military installations.

General Description:

The chests are available in two sizes, 200 and 400 pound ice capacity. They are of military design to insure satisfactory performance under the stress of military usage. The capacities are based on a 300-pound block of ice being cut into three 100-pound pieces approximately ll x 22 x 15 inches.

Special Features:

Aluminum inner and outer shell

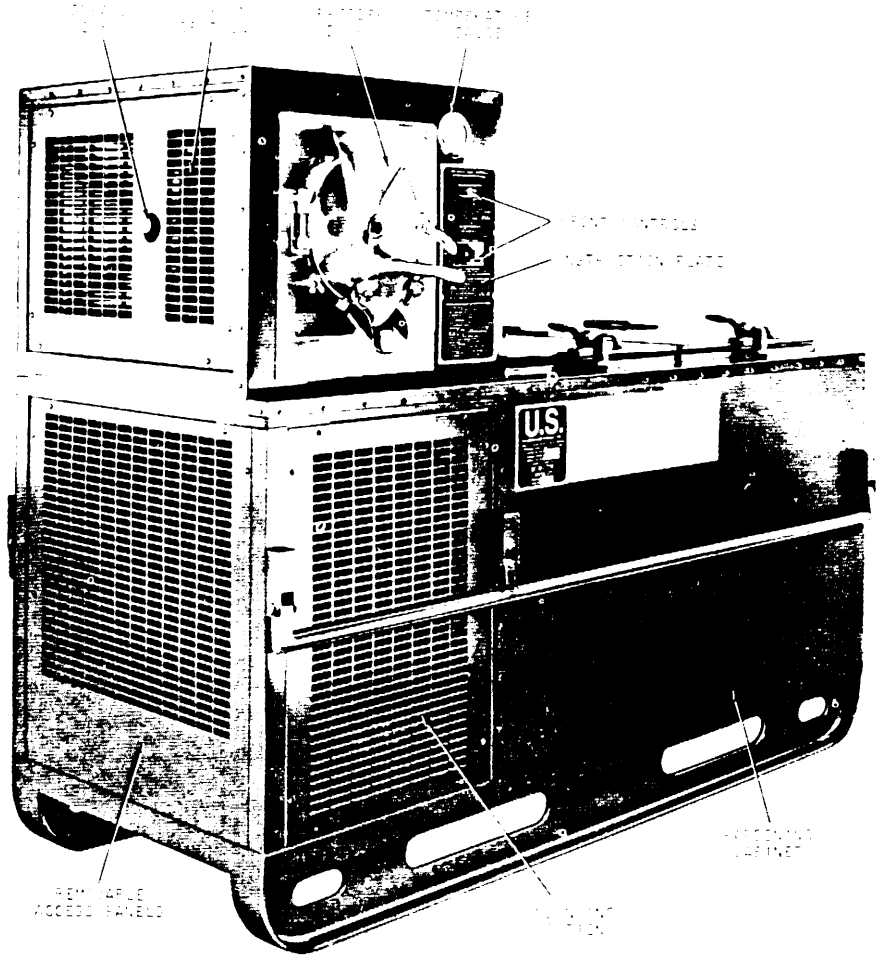
Adjustable feet

Lid stay

Drain Hole 1

Physical Characteristics:

	200 Pound	400 Pound
Length	2 ft. 4-1/2 inches	3 ft. 7 inches
Width	2 ft. 4-1/8 inches	2 ft. 6-3/4 inches
Height	2 ft. 7-9/16 inches	3 ft. 3 inches
Weight	150 pounds	225 pounds



Specification: MIL-I-20564

Intended Use:

The portable ice cream plants are intended for the production of hard ice cream in the field under all environent conditions.

General Description:

The ice cream plants utilize military standard refrigeration components to the maximum extent practicable. The cabinet closure is of military design to insure satisfactory performance under the stress of military field conditions. The plants consist of a freezer section, a hardening cabinet, a single self-contained refrigeration system, all contained within a single skid mounted closure. The plants are available in two types which differ in the type of prime mover:

Type I - Electrically operated utilizing a 3 horsepower, 208 volt, 3 phase, 60 Hertz motor.

Type II - Government furnished engine generator set developing 5 KW, 208 volts, 4 wire, 3 phase, 60 Hertz Model SF5-OMD/SIED.

The prime mover for the Type I Plant is comtained within the basic cabinet. For the Type II Plant, the prime mover is mounted within a structural frame-work which is attached to the hardening end of the cabinet.

The capacity is the same for both the Type I and II plants:

Freezer Section - Produce three 2-1/2 gallon batches of ice cream per hour.

Hardening Cabinet - Storing 40 gallons of ice cream as it comes from the freezer and reducing it to a temperature of 5°F or lower within 18 hours.

Capacities obtainable in an ambient temperature of 110°F.

Special Features:

Utilize military standard components.

Skid mounted

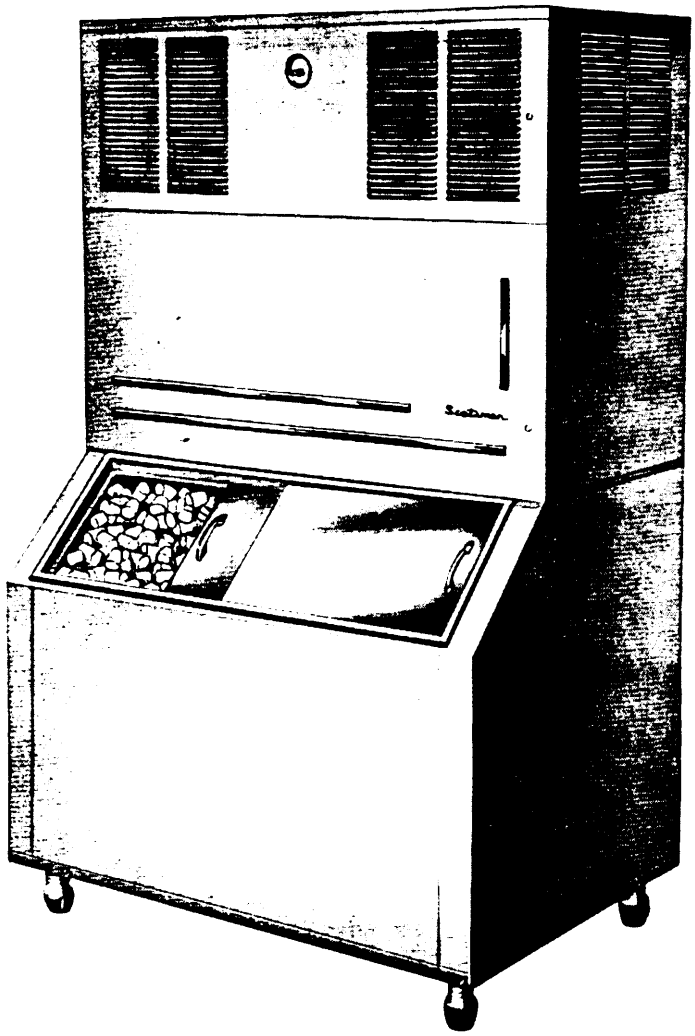
Full length handles for man handling

Polyurethane insulated hardening cabinet

Physical Characteristics:

	Type I	Type II
Length	6 ft. 8 inches	10 ft. 2 inches
Width	2 ft. 9 inches	2 ft. 9 inches
Height at Hardening Cabinet	2 ft. 10 inches	2 ft. 10 inches
Height at Freezer	5 ft. 2 inches	5 ft. 2 inches
Weight	1050 pounds (approx.)	1400 pounds (approx.)

Ice Making Machines. Cube
180, 270, 360, and 450 Pounds Per 24 Hour Capacity



Specification: MIL-I-11867

Intended Use:

To be used in garrison dining halls, hospitals and other Military installations where a continuous supply of cubed ice is required.

General Description:

Ice making machines of MIL-I-11867 are electrically powered and are available with either a steel or corrosion resisting steel cabinet. Water cooled condensers or air cooled condensers are also available at the option of the user. Ice storage bin capacity is sufficient to hold 12 hours of ice production. The quantity of ice in the bin is automatically maintained between predetermined levels.

Machine Capacity per 24 hours

Size	Pounds of Ice
1	200
2	300
3	400
4	500

Special Features:

Available with ice crusher.

Approved by National Sanitation Foundation.

Physical Characteristics:

Approximate Overall Dimensions

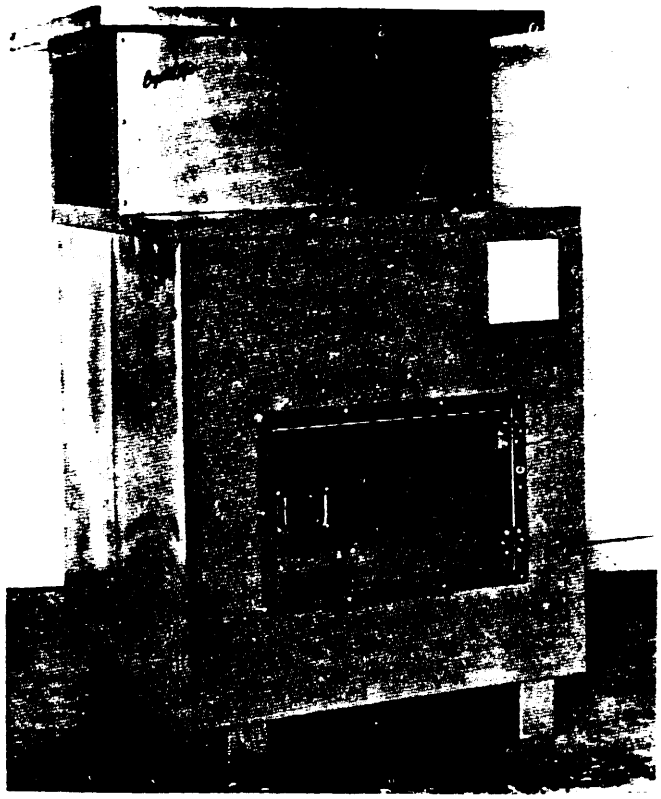
Width - 36 inches

Depth - 30 inches

Height - 72 inches

Approximate Weight - 600 pounds

Ice Makinges Machines, Flakes, Electric, Self-Contained, .1000 Pound/24 Hours



Specification: MIL-I-16341

Intended Use:

Duty A machines are intended for use by troops in the field. Duty B machines are intended for use in military dining halls, hospitals, and laboratories.

General Description:

The ice making machines are designed to operate on nominal 208 volt, 60 Hertz, 1 phase electrical power. Duty A machines are provided with an air cooled condenser, while the Duty B machines are available with either an air cooled or water cooled condenser at the option of the user. Both machines automatically maintain the quantity of ice in the storage bin or box within predetermined levels.

Special Features:

Duty A Machine

Fitted with lifting eyes

Air cooled condenser

Ice storage box utilized as a shipping container for machine.

CRES cabinet

Physical Characteristics:

Duty A Machine

Approximate overall dimensions

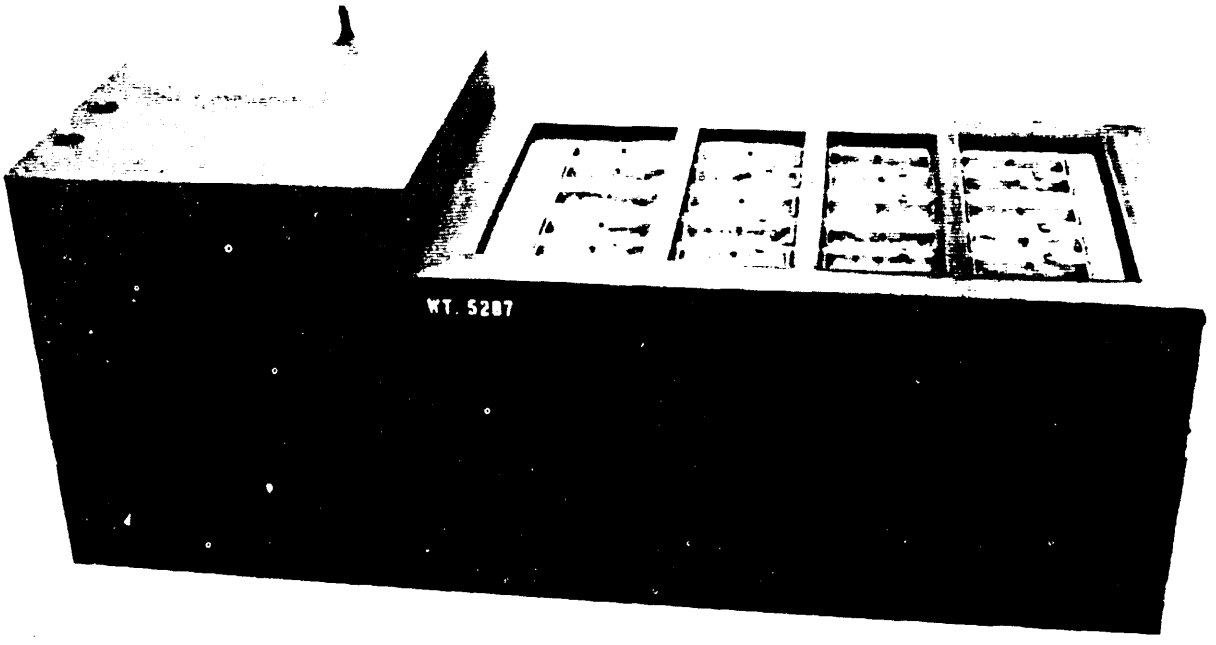
Length - 50 inches

Width - 50 inches

Height - 75 inches

Approximate weight 1000 pounds

Ice Making Plant, Block, Self-Contained Skid-Mounted, 1 Ton



Specification: MIL-I-3624

Intended Use:

The ice making plant is intended for use in a theater of operations.

General Description:

The ice making plant has a capacity of producing 1900 pounds of ice in 50 pound blocks in a 24 hour period. The plant is powered by a gasoline engine and utilizes Military Standard components wherever possible. It has been configurated for ease of maintenance and designed for reliable operation.

Special Features:

a. Rings for tie down and slinging provided.

b. Powered brine agitator.

c. Self-contained with no special installation requirements.

Physical Characteristics:

Approximate Overall Dimensions

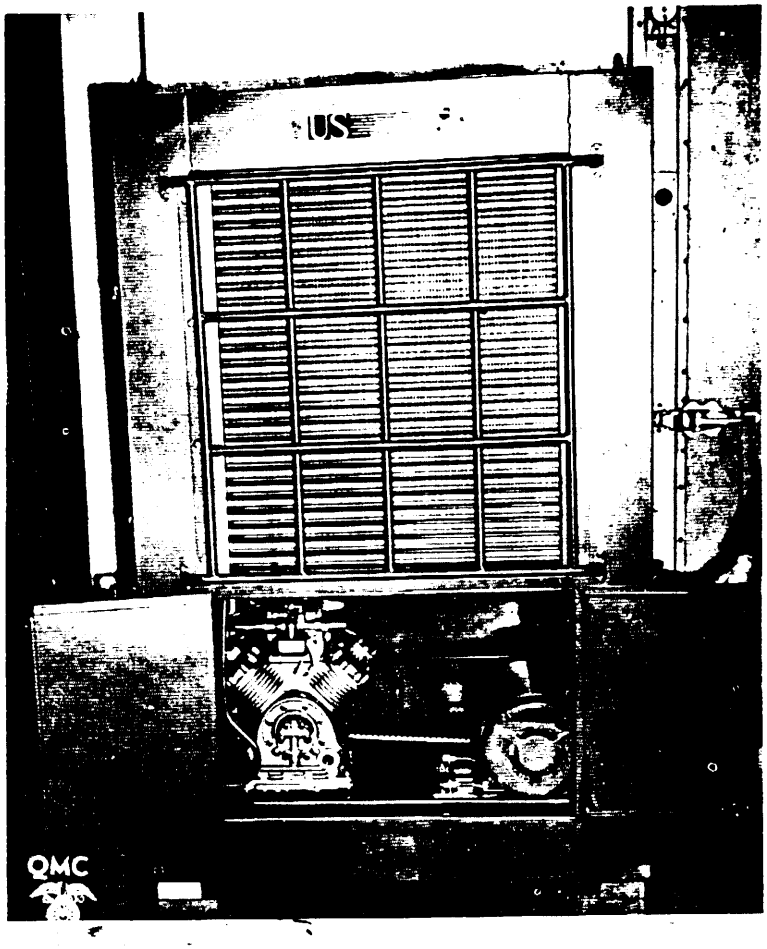
Width - 12 feet

Depth - 4 feet 6 inches

Height - 5 feet

Approximate Weight 5250 pounds

Refrigeration Units, Mechanical. Panel Mounted for Refrigerator. Prefabricated. Panel Type



Specification: MIL-R-13312

Intended Use:

These refrigeration units are intended for field use under all environmental conditions to provide refrigeration for the prefabricated refrigerators of MIL-R-10932.

General Description:

The refrigeration units are completely self-contained and have been designed to utilize military standard components to the maximum extent practicable and insure rugged, reliable and high performance units which are completely compatible with the requirements of military field use. The configuration of the units are such as to provide for ease of maintenance.

The units are rated when operating in an ambient temperature of 110°F as follows:

10,000 BTU/Hr at 0°F refrigerator temperature
18,000 BTU/Hr at 35°F refrigerator temperature

Units are available in three Types:

Type I - Gasoline engine driven with automatic control. Powered by a military standard air cooled engine or an engine conforming to MIL-E-11275.

Type II - Electric motor powered with automatic control. Powered by a 7-1/2 horsepower, 208 Volt, 3 phase, 4 wire, 60 Hertz motor. The Type II unit is available for 50 Hertz operation on a when-specified basis.

Type III - Gasoline engine driven with manual control. Powered by a military standard air cooled engine or an engine conforming to MIL-E-11275.

Special Features:

Compressor conforms to Type II of MIL-C-14370 and MIL-STD-279.

Condenser conforms to Type II, Class 1 of MIL-C-23122 and MIL-STD-759.

The compressor, engine or motor and clutch are replaceable as complete assemblies.

Urethane insulated heat sheid.

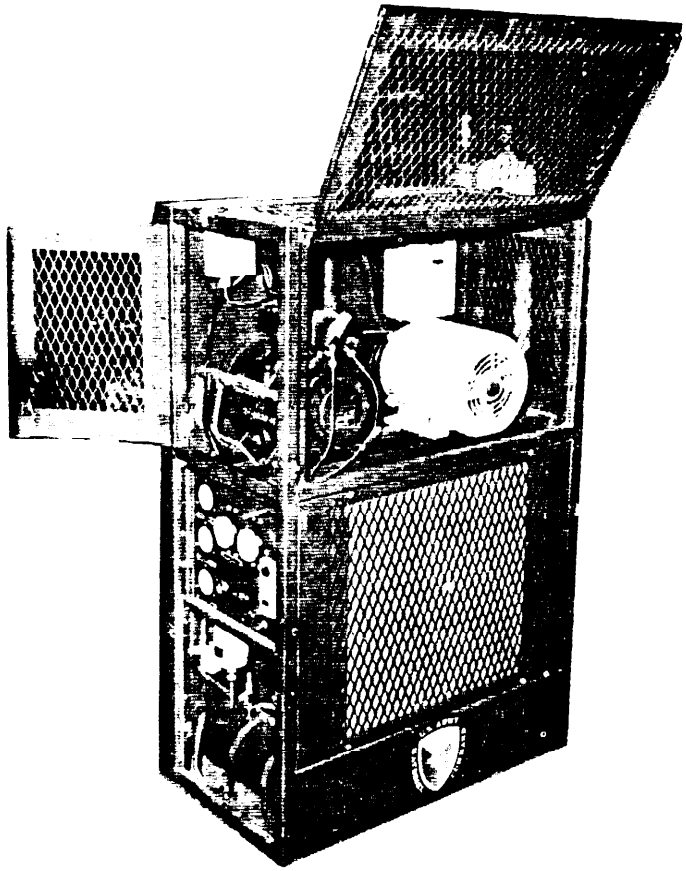
Lifting rings

Physical Characteristics:

Refrigeration Unit Complete	
Width	45 inches max.
Depth	43 inches max.
Height	74 inches max.
Weight	1300 pounds max. for Type and III 1100 pounds max. for Type II

Evaporator	
Width	37 inches max.
Depth	17 inches max.
Height	53 inches max.

Refrigeration Units. Mechanical. Panel Type. 3000 BTU/Hr Capacity



Specification: MIL-R-43031

Intended Use:

These refrigeration units are intended for field use, under all environmental conditions, to provide refrigeration for the 70 cubic foot portable refrigerator conforming to MIL-R-43024

General Description:

These refrigeration units are completely self-contained and have been designed utilizing military standard components. The configuration of the units are such as to provide for ease of maintenance. The units are rated when operating in an ambient temperature of 110°F as follows:

3000 BTU/Hr at 0°F refrigerator temperature
4,500 BTU/Hr at 35°F refrigerator temperature

Units are available in two types:

Type I - Gasoline engine driven with manual control. Powered by a military standard air cooled engine or an engine conforming to MIL-E-11275. The Type I unit may be converted to Type II by use of a conversion kit which includes a 3 horsepower electric motor, sheave, starter, on-off switch, high pressure cut out with automatic reset and other necessary components to effect conversion.

Type II - Electric motor driven with automatic control. Powered by a 3 horsepower, 208 volt, 3 phase, 60 Hertz motor.

Special Features:

Compressor conforms to Type I of MIL-C-14370 and MIL-STD-279.

Condenser conforms to Class I, Type V of MIL-C-23122.

The compressor, engine or motor and clutch are replaceable as complete assemblies.

Urethane insulated heat shield.

Skid mounted

Lifting eyes.

Physical Characteristics:

Refrigeration Unit complete

Width O/A - 36 inches $+\frac{1}{4}$ -0

Depth O/A - 32 inches ±2

Height (exclusive of lifting eyes) 54 inches max.

Weight - 550 pounds (approx.)

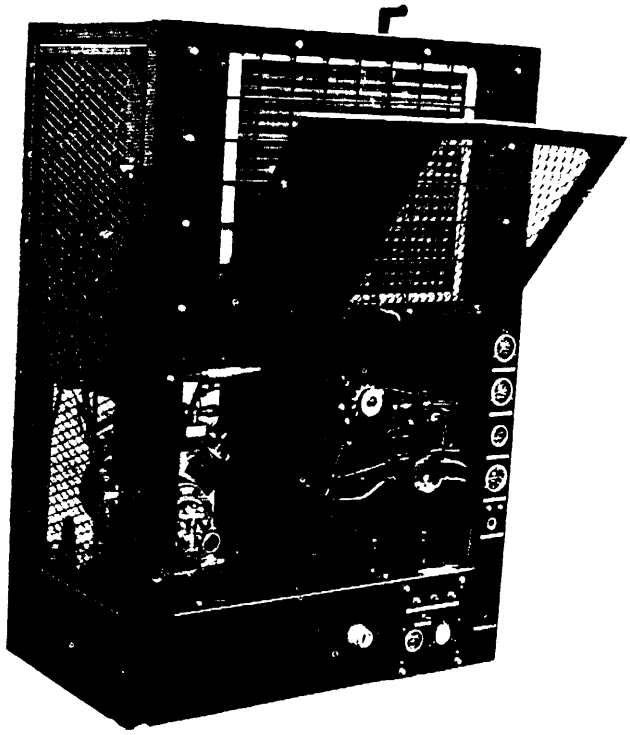
Evaporator Section

Width 0/A - 28 inches $+0$ $-\frac{1}{4}$

Depth 0/A - 13 inches +1

Height 0/A - 28 inches $+0$ $-\frac{1}{4}$

Refrigeration Units, Mechanical. Panel Type, Gasoline Engine and Electric Motor Driven, For Semi-trailer Refrigerators



Specification: MIL-R-10735

Intended Use:

These refrigeration units are intended for worldwide Military field service under severe operational and load conditions, directly exposed to the elements except for the evaporator section. The units are used with semi-trailer refrigerators for the preservation of temperature sensitive products.

General Description:

The refrigeration units are completely self-contained and have been designed to utilize military standard components to the maximum extent practicable and insure rugged, reliable and high performance units which are completely compatible with the requirements of military field use. Ease of maintenance has also been provided for in the design of the units.

The units are furnished complete with accessories, instruments and necessary controls to permit maintenance of selected temperatures between 35° F and 50° F by refrigerant by-pass; to provide sub-zero temperatures without by-pass and to provide manual defrost. Removal of major components of the power unit may be made from the front of the unit.

There are three types of refrigeration units rated at 13,500 BTU/Hr at 35°F refrigerator temperature and 9,000 BTU/Hr at O°F refrigerator temperature with ambient air at 110°F.

Type I - Gasoline Engine Driven
Type II - Gasoline Engine and Electric Motor Driven
Type III - Refrigeration Unit/Heating Unit Gasoline Engine Driven

Type I - Refrigeration Unit, Gasoline Engine Drive. Powered by a military standard air cooled engine to an engine conforming to MIL-E-11275. The unit utilizes the hot gas defrosting system.

Type II - Refrigeration Unit, Gasoline Engine and Electric Motor Driven. Powered by a military standard air cooled engine conforming to MIL-E-11275 or electric motor operating on 208 Volts, 3 phase, 60 Hertz power supply, both engine and motor are mounted in the condensing section of the unit. The unit utilizes the hot gas defrosting system.

Type III - Refrigeration Unit/Heating Unit, Gasoline Engine Driven. Powered by a military standard air cooled engine or an engine conforming tO MIL-E-11275. Defrosting is accomplished by the reverse cycle system. In addition to the refrigeration capacity indicated above, the unit has a-gross heating capacity of 7,000 BTU/Hr when the ambient temperature is minus 25°F; air entering evaporator 35°F; and the air leaving the evaporator is not nigher than 40°F. Selection of refrigeration or heating cycle and temperature desired is manual. Maintenance of selected temperature is automatic.

Special Features:

Compressor conforms to Type II of MIL-C-14370 and MIL-STD-279 for all units.

Condenser conforms to Type VI, Class 1 of MIL-STD-759 for Type I and II units. The condenser for Type III unit is not specified as a military standard condenser.

Lifting rings

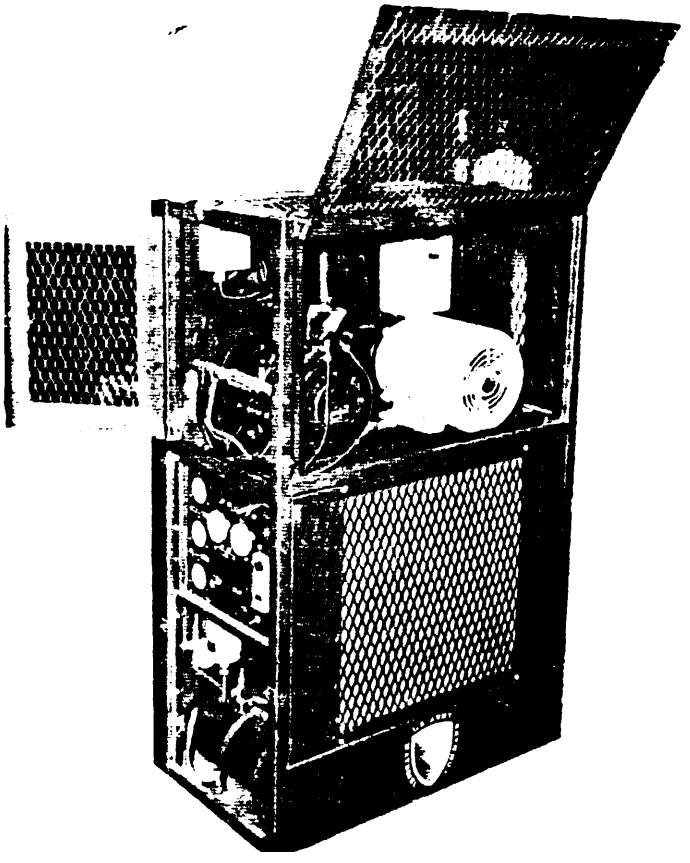
24 Volt storage battery system

Controls, gages and meters are visible from front of unit.

Physical Characteristics:

	Units Overall		Evaporator Section
	Type I & III	Type II	Type I, II & III
Width	42 inches max.	42 inches approx.	36 inch +0 -¼
Depth	58 inches max.	58 inches approx.	34 inches MAX.
Height	60 inches max.	60 inches approx.	27 inches +0 -¼
Weight	1000 pounds max.	1150 pounds max.	----

Refrigeration Units. Mechanical, Panel Type for Refrigerator, Field, Portable (150 Cubic Foot)



Specification: MIL-R-12574

Intended Use:

These refrigeration units are intended for field. use, under all environmental conditions, to provide refrigeration for the 150 cubic foot refrigerator conforming to MIL-R-12571.

General Description:

The refrigeration units are completely self-contained and have been designed utilizing military standard components. The configuration of the units are such as to provide for ease of maintenance. The units are rated when operating in an ambient temperature of 110°F as follows:

5,000 BTU/Hr at O°F refrigerator temperature
7,500 BTU/Hr at 35°F refrigerator temperature

Units are available in three types:

Type I - Gasoline engine driven with automatic controls. Powered by a military standard air cooled engine or an engine conforming to MIL-E-11275 equipped for automatic start-stop operation.

Type II - Electric motor driven with automatic controls. The motor is a 5 horsepower operated on 208 volt, 3 phase, 60 Hertz power equipped for automatic start-stop operation.

Type IV - Gasoline engine driven designed for continuous operation. Powered by a military standard air cooled engine or an engine conforming to MIL-E-11275. High temperature control (35 F or above) is accomplished by means of a thermomechaanical by-pass valve.

The Type I and IV units can be converted to Type II by means of a conversion kit which includes a 5 horsepower motor, sheave, starter, on-off switch, high pressure cut out relay.

Special Features:

Compressor conforms to Type I of MIL-G-14370 and MIL-STD-279.

Condenser conforms to Class I, Type V of MIL-C-23122 and MIL-STD-759.

The compressor, engine or motor and clutch shall be replaceable as complete assemblies.

Uretane insulated heat sheild.

Physical Characteristics:

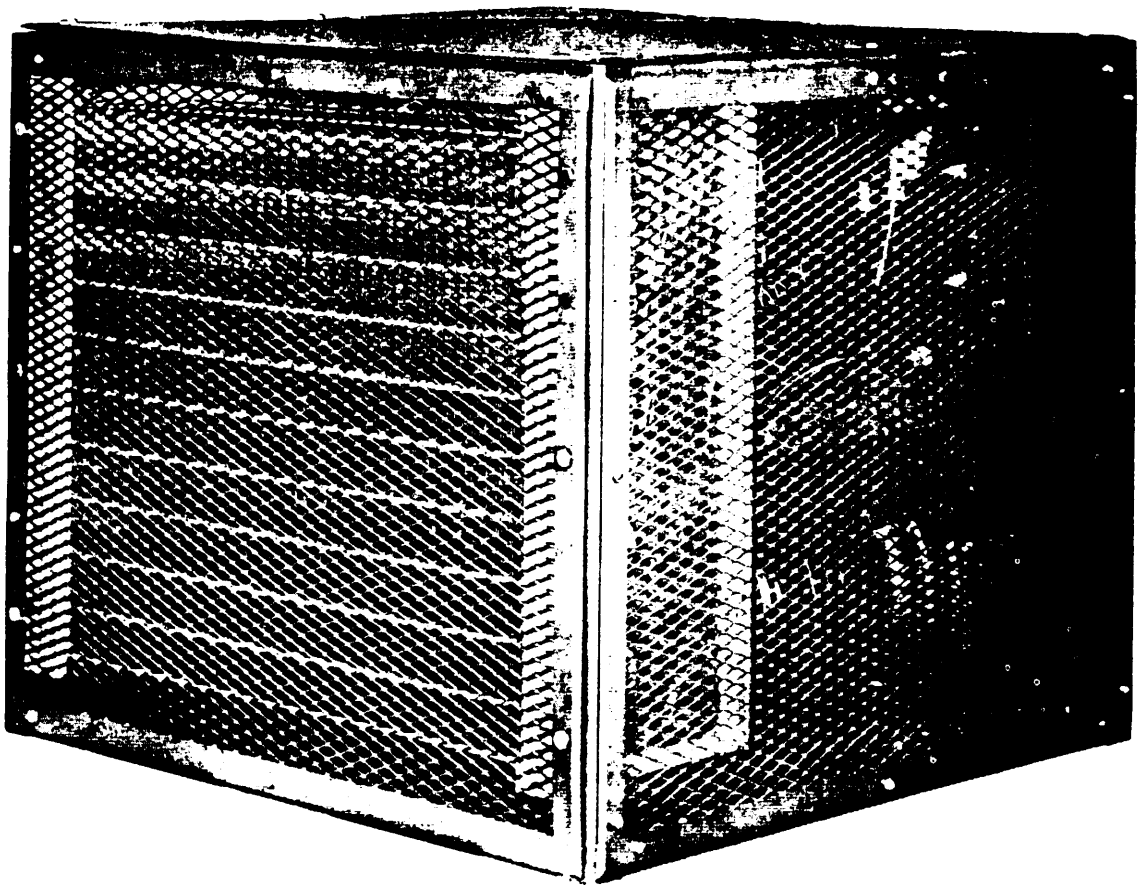
Refrigeration Unit Complete

Width	36 inches max.
Depth	36 inches
Height	54 inches max.
Weight	550 pounds (approx.)

Evaporator Section Dimensions

28 inches +¼ inch X 28 inches high

Refrigeration Units, Mechanical (Remote Type) for Refrigerator, Prefabricated, Panel Type (Post, Camp and Station Use)



Specification: MIL-R-40633

Intended Use:

These refrigeration units are intended for use at military camp, post and stations under all environmental conditions to provide refrigeration for the prefabricated refrigerators of MIL-R-10932.

General Description:

The refrigeration units are comprised of a forced air convection unit cooler and a remotely located, air cooled condensing unit. Tubing to connect the condenser and unit cooler must be provided by the installing activity. The unit cooler and the condensing unit are also available as separate units being self-contained within their own housing and having all necessary instruments, accessories, controls, etc., to provide proper performance as self-contained units.

Military standard parts have been incorporated into the design of both the unit cooler and the condensing unit to the maximum extent practicable. The unit cooler is mounted on a backet provided by the using activity.

The refrigeration units are available in two sizes and rated as follows:

Size 1 - 5,000 BTU/Hr at O°F refrigerator temperature
- 1,000 BTU/Hr at 35°F refrigerator temperature

Size 2 - 10,000 BTU/Hr at O°F refrigerator temperature
- 18,000 BTU/Hr at 35°F refrigerator temperature

The condensing unit for the Size 1 refrigeration unit is powered by a 3 horsepower, 208 volt, 3 phase, 60 Hertz motor. For Size 2, the motor is of 5 horsepower.

Special Features:

Size 1 utilizes Type I, Group B compressor of MIL-C-14370 and MIL-STD-279.

Size 2 utilizes Type II, Group B compressor of MIL-C-14370 and MIL-STD-279.

Condenser conforms to Type I, Class 1 of MIL-C-23122 and MIL-STD-759, except fan shall be directly driven by motor.

Automatic defrost available at option of user.

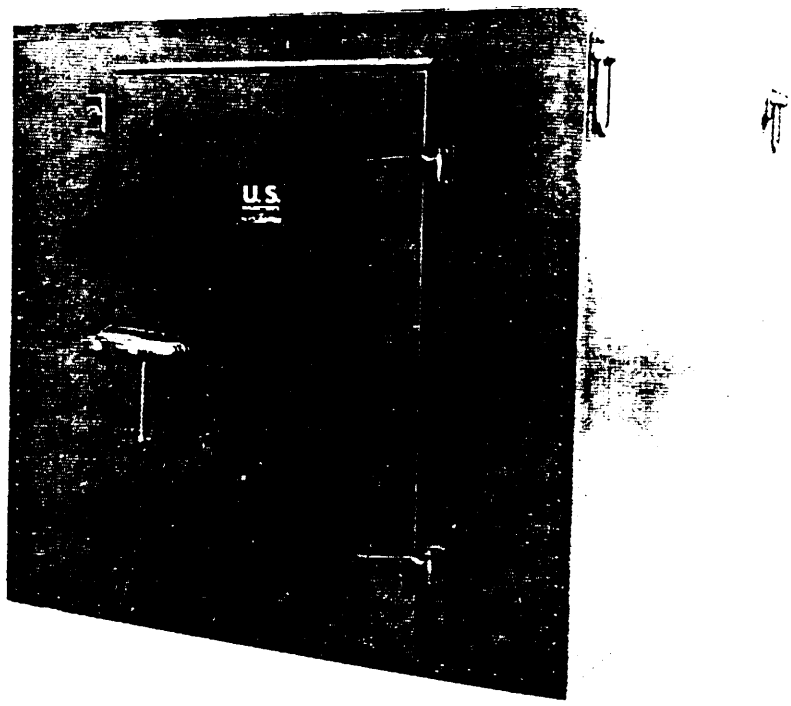
Thermostatic temperature range 0°F to 55°F

Physical Characteristics:

Condensing Unit	Size 1	Size 2
Width	31-3/4 inches	34 inches
Depth	29-1/2 inches	32-1/2 inches
Height	26-1/4 inches	27 inches
Weight	435 pounds	520 pounds

Unit Cooler	Size 1 and 2
Width	35 inches
Depth	25 inches
Height	25-1/2 inches
Weight	100 pounds

Refrigerator. Mechanical, Commercial, Field Portable Walk-In, Plug-In, 150 Cubic Foot Capacity



Specification: MIL-R-12571

Intended Use:

The 150 cubic foot refrigerator is intended for use to store temperature sensitive items of all descriptions within a temperature range of O°F to 35°F as required under all adverse climatic and operating conditions without further protection from the elements,

General Description:

The 150 cubic foot refrigerator is a completely assembled lightweight portable structure designed for static field use or mobile use on a 2-1/2 ton vehicle. Any one of the refrigeration units of MIL-R-12574 may be used to provide required refrigeration capacity. (See description of Refrigeration Units, Mechanical, Panel Type For Refrigerator Field, Portable (150 cubic feet)).

Special Features:

a. Skid mounted for material handling equipment.

b. Lifting rings for helicopter transport.

c. Walk-in door.

d. Internal safety release mechanism on walk-in door.

e. Interior vapor proof light fixture.

f. Polyrethane foam-in-place insulation.

g. 28-1/2 inches X 28-1/2 inches opening for refrigeration unit

h. External dial thermometer.

Physical Characteristics:

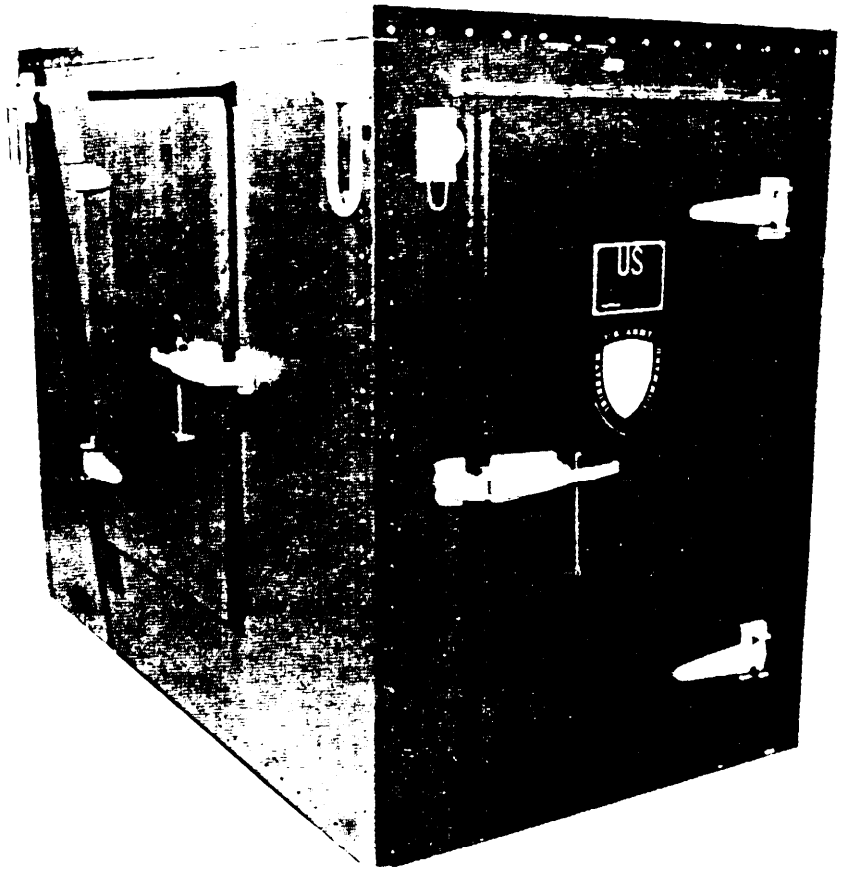
External Dimensions

Width	6 ft. 1 inch - less hardware
Depth	7 ft. - less hardware
Height	6 ft. 5-3/4 inches

Internal Dimensions

Width	5 ft. 7 inches
Depth	6 ft. 5 inches
Height	5 ft. 5-3/4 inches
Weight	845 pounds

Refrigerator, Mechanical, Portable, Reach-In
70 Cubic Foot Capacity



Specification: MIL-R-43024

Intended Use:

The 70 cubic foot refrigerator is intended for use to store temperature sensitive items of all descriptions within a temperature range of 0°F to 35°F as required under all adverse climatic and operating conditions without further protection from the elements.

General Description:

The refrigerator is a completely assembled lightweight portable structure designed for static field use or mobile use on a 1-1/2 ton trailer. Any one of the refrigeration units of MIL-R-43031 may be used to provide required refrigeration capacity. (See description of Refrigeration Units, Mechanical, Panel Type, 3000 BTU/Hr.).

Special Features:

a. Skid mounted for material handling equipment.

b. Lifting rings for helicopter transport.

c. Two side reach in doors.

d. Walk-in door.

e. Internal safety release mechanism on walk-in door.

i. Four (4) adjustable shelves.

g. Removable floor racks.

h. Interior vapor proof light fixture.

i. Polyurethane foam-in-place insulation.

j. 28-1/2 inches X 28-1/2 inches opening for refrigeration unit.

Physical Characteristics :

External Dimensions

Width	3 ft. 7-1/2 inches - less hardware
Depth	6 ft. 4 inches - less hardware
Height	5 ft. 5 inches

Internal Dimensions

Width	3 ft. 1-1/2 inches
Depth	5 ft. 10 inches
Height	4 ft 5 inches
Weight	600 pounds

Refrigerators, Prefabricated, 600, 1200, 1800 and 4000 CU. ft.

Specification: MIL-R-10932

Intended Use:

The prefabricated refrigerator is intended to provide suitable storage space in the field for the refrigeration of bulk perishable subsistence and other temperature sensitive items within a temperature range of O°F to 35°F as required under all adverse climatic and operating conditions without protection from the elements.

General Description:

The refrigerator is of the panel type designed on a basic size of 600 cubic feet. With the addition of standard panels, the size may be increased to 1200, 1800 and 9000 cubic feet. Sizes 1800 and 4000 cubic feet are provided with partition panels dividing the interior of the refrigerator in sections with each section having its individual refrigeration unit panel to allow for desired temperature. The refrigerator is capable of being easily and quickly assembled or disassembled by a minimum of personnel and a standard hexagonal panel fastener wrench.

Refrigeration Unit - Two types of refrigeration units are available to provide required refrigeration capacity. Units of MIL-R-13312 are self-contained units of the plug-in design and are used in field application. Units of MIL-R-40633 are of the remote type design and are used in camp, post and station applications.

See following description of specific size refrigerators for detail information.

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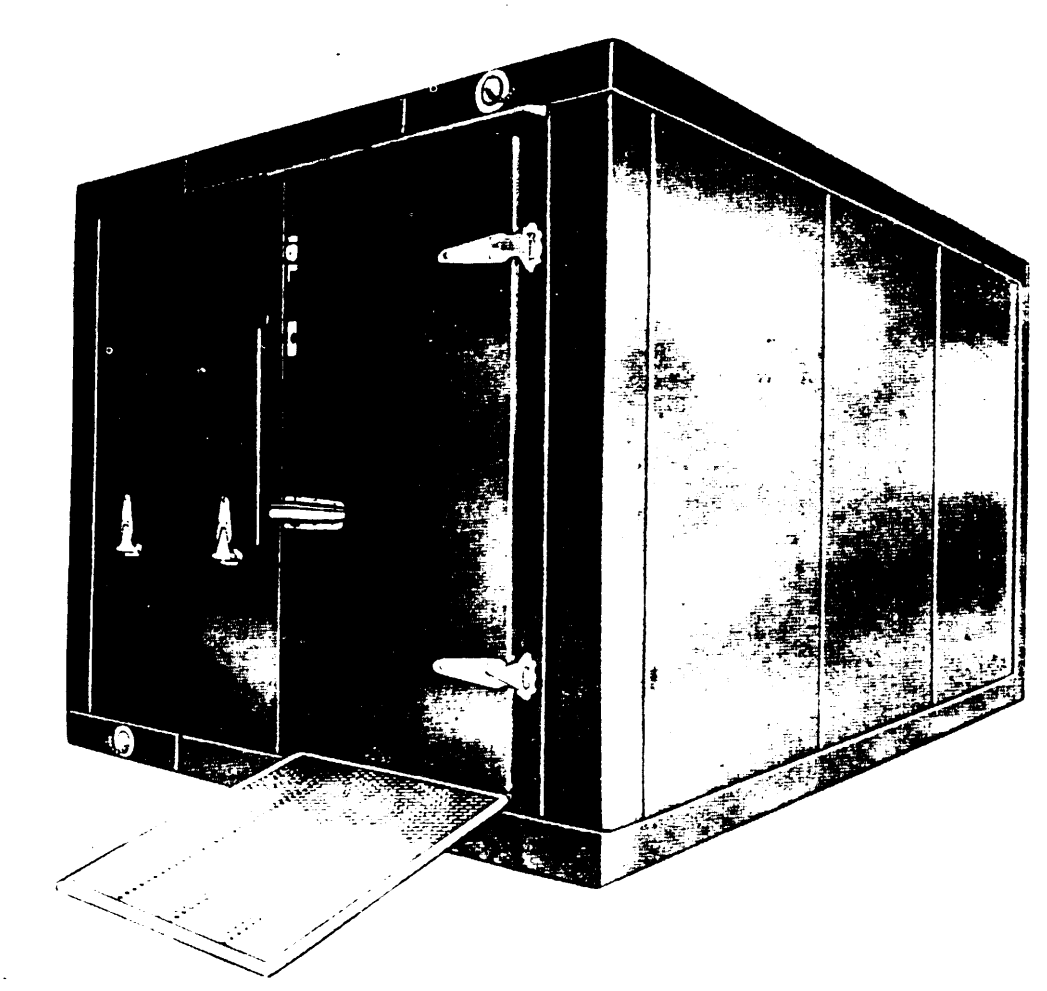
Refrigerator, Prefabricated, 600 Cubic Foot Capacity



Specification: MIL-R-10932

Special Features:

a. Military Standard Panel Fastener (Spec. MIL-F-14187).

b. Interior Vapor Proof Light Fixture.

c. Floor Racks.

d. Internal Safety Release Mechanism.

e. Door Ramp (Optional with user).

f. Conveyor Door Panel (Optional with user).

Physical Characteristics:

Exterior Dimensions

Length	8 ft 11 inches
Width	12 ft. 10 inches
Height	7 ft. 6 inches

Interior Dimensions

Length	8 ft.
Width	11 ft. 11 inches
Height	6 ft. 7 inches
Weight	3300 pounds

Panel Requirements:

The panel requirements for one refrigerator are one each of Pack A, B and C of MIL-R-10932. For user options, see specification.

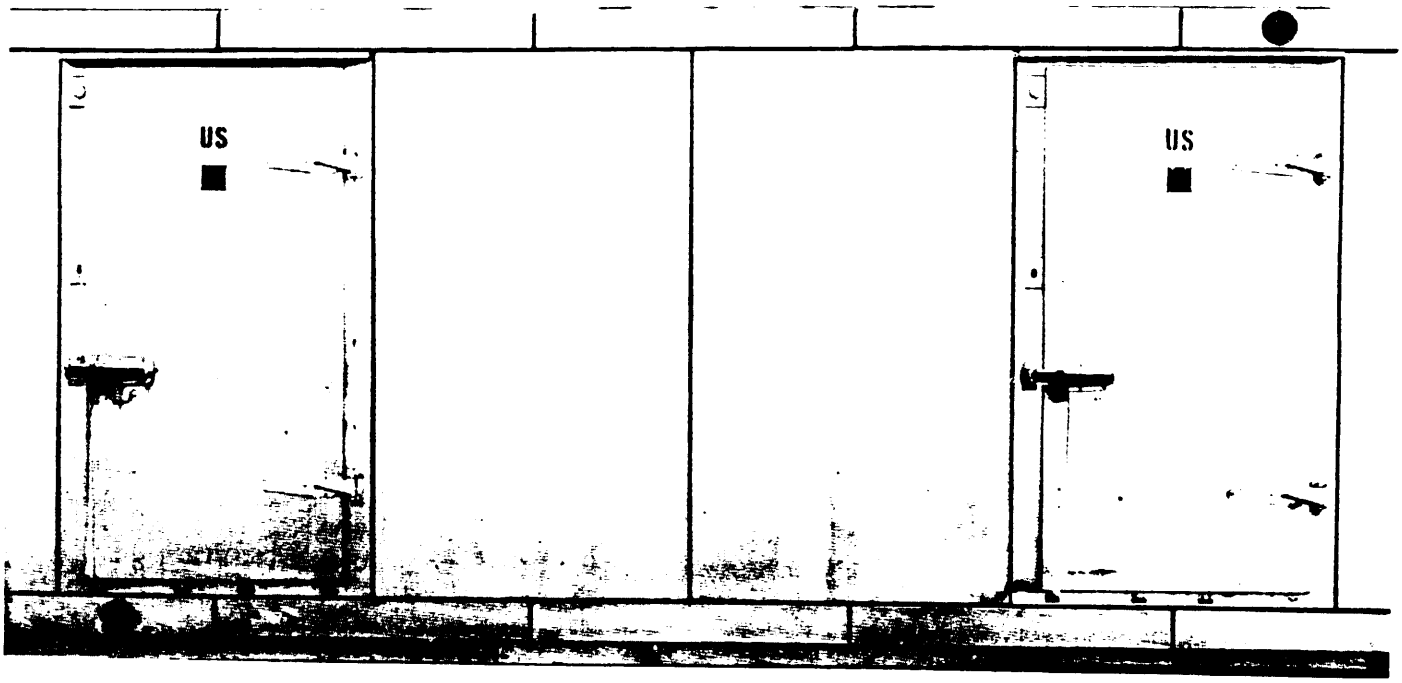
Refrigeration Unit:

For field type applications, any one unit of MIL-R-13312 will provide required refrigeration capacity.

For post, camp and station applications where the remote type of refrigeration unit is desired, use number of units of MIL-R-40633 as indicated below:

Size	Number of Units Required	Refrigeration Temp. Desired
1	2	0°F
2	1	0°F
1	1	35°F

Refrigerator, Prefabricated, 1200 Cubic Foot Capacity



Specification: MIL-R-10932

Special Features:

a. Military Standard Panel Fastener (Spec. MIL-F-14187).

b. Interior Vapor Proof Light Fixture.

c. Floor Racks.

d. Internal Safety Release Mechanism.

e. Door Ramp (Optional with user).

f. Conveyor Door Panel (Optional with user).

Physical Characteristics:

Exterior Dimensions	
Length	16 ft. 7 inches
Width	12 ft. 10 inches
Height	7 ft. 6 inches
Interior Dimensions	
Length	15 ft. 8 inches
Width	11 ft. 11 inches
Height	6 ft. 7 inches
Weight	5,600 pounds

Panel Requirements:

The panel requirements for one refrigerator are one each of pack A, B, C, D, and H. For user options, see specification.

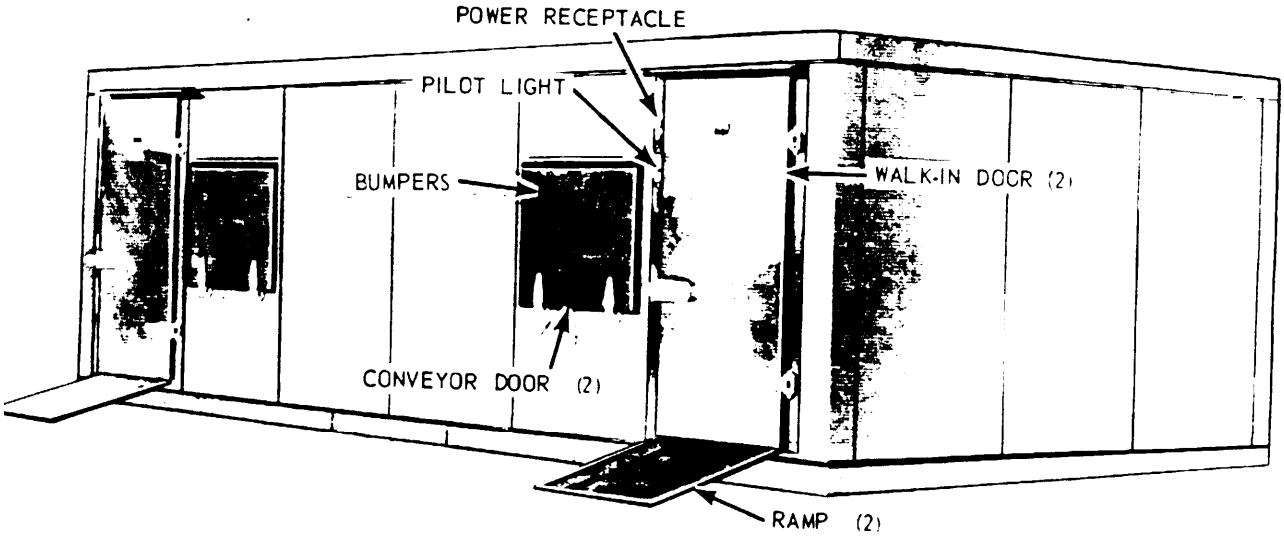
Refrigeration Units:

For field applications, any two units of MIL-R-13312 will provide required refrigeration capacity.

For post, camp and station applications where the remote type of refrigeration unit is desired, use number of units of MIL-R-40633 as indicated below:

Size per MIL-R-40633	Number of Units Required	Refrigeration Temp. Desired
1	4	0°F
2	2	0°F
1	2	35°F
2	1	35°F

Refrigeraor, Prefabricated, 1800 Cubic Foot Capacity



Specification: MIL-R-1O932

Special Features:

a. Two compartments (may be omitted at option of user).

b. Partition Panels (may be omitted at option of user).

c. MIL STD Panel Fastener (Spec. MIL-F-14187).

d. (2) Interior Vapor Proof Light Fixtures.

e. Floor Racks.

f. (2) Walk-In Doors.

g. (2) Refrigeration Unit Plug Panels.

h. Internal Safety Release Mechanism.

i. Door Ramps (Optional with user).

j. Conveyor Door Panels (Optional with user).

Physical Characteristics:

Exterior Dimensions

Length	24 ft. 3 inches
Width	12 ft. 10 inches
Height	7 ft. 6 inches

Interior Dimensions

Length	23 ft. 4 inches
Width	11 ft. 11 inches
Height	6 ft. 7 inches
Weight	8,180 pounds

Panel Requirements:

The panel requirements for one refrigerator are one each of Pack A, B, C, D and E and two each of Pack H.

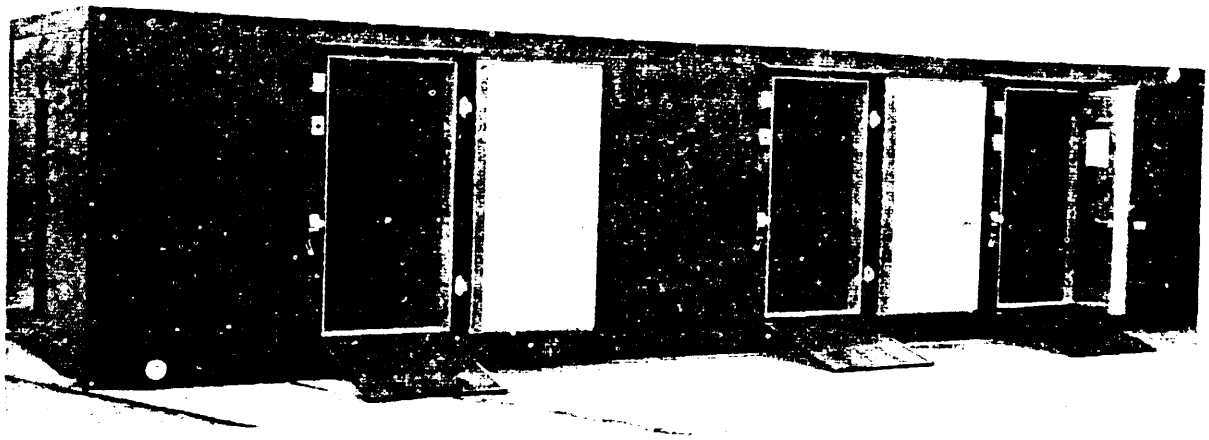
Refrigeration Units:

For field applications, any two units of MIL-R-13312 will provide required refrigeration capacity.

For post, camp and station applications where the remote type of refrigeration unit is desired, use number of units of MIL-R-40633 as indicated below:

Size per MIL-R-40633	Number of Units Required	Refrigerator Temp. Desired
1	6	0°F
2	3	0°F
1	3	35°F
2	2	35°F

Regrigeration, Prefabricated, 4000 Cubic Foot Capacity



Specification: MIL-R-10932

Special Features:

a. Four compartments (may be omitted at option of user).

b. Partition Panels (may be oimitted at option of user).

c. MIL STD Panel Fastener (Spec. MIL-F-14187).

d. (4) Interior Vapor Proof Light Fixtures.

e. Floor Racks

f. (4) Walk-In Doors

g. (4) Refrigeration Unit Plug panels.

h. Internal Safety Release Mechanism.

i. Door Ramps (Optional with user).

j. Conveyor Door Panels (Optional with user).

Physical Characteristics:

Exterior Dimensions

Length	54 ft. 9 inches
Width	12 ft. 10 inches
Height	7 ft. 6 inches

Interior Dimensions

Length	53 ft. 10 inches
Width	11 ft. 11 inches
Height	6 ft. 7 inches
Weight	16,000 pounds

Panel Requirements:

The panel requirements for one refrigerator are one each of Pack A, B, C and D and two each of Packs F and G.

Refrigeration Units:

For field applications, any four units of MIL-R-13312 will provide required refrigeration capacity.

For post, camp and station applications where the remote type of refrigeration unit is desired, use number of units of MIL-R-40633 as indicated below:

Size per MIL-R-40633	Number of Units Required	Refrigerator Temp. Desired
1	14	0°F
2	7	0°F
1	7	35°F
2	4	35°F

SECTION TWO

STANDARD COMPONENTS

SECTION TWO

INDEX OF STANDARD COMPONENTS

SECTION TWO

INDEX OF STANDARD COMPONENTS (cont'd)

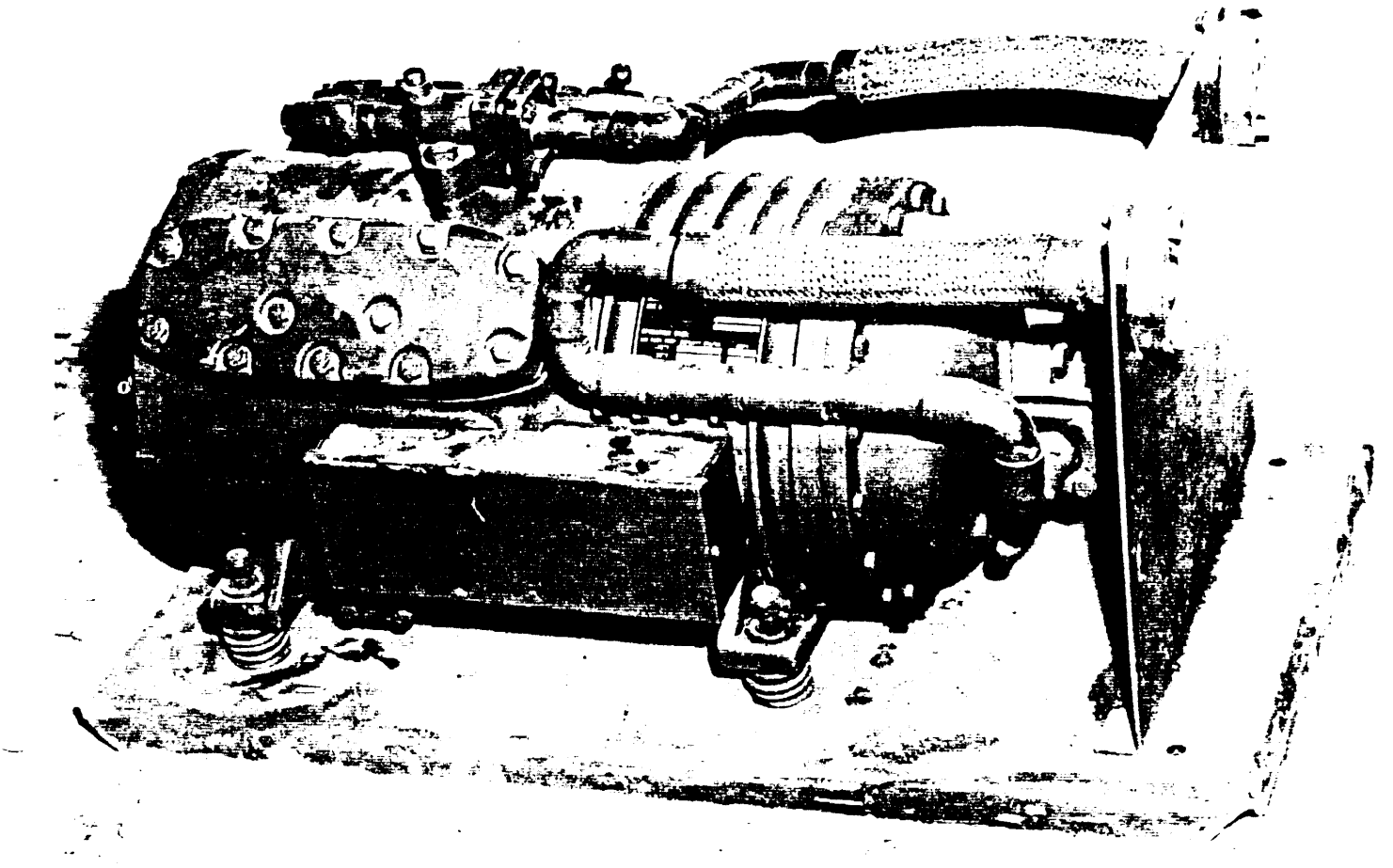
INDEX OF STANDARD FITTINGS

(Copy of Standards Not Included)

INDEX OF STANDARD FITTINGS (cont'd)

INDEX OF STANDARD FITTINGS (cont'd)

Compressors. Hermetic: For Use With Refrigerant-12



Reference

Specification: MIL-C-23365 (Qualified Products List has been proposed)

Intended Use:

The hermetic compressors covered by this standard are intended for use in combination with other military standard refrigeration components in refrigeration and air-conditioning systems designed for other than military field operation.

General Description:

There are 8 compressors included in this family of standard hermetic compressors designed for use with applied horsepowers ranging from 1/3 to 7-1/2 horsepower. The compressors are furnished with service valves conforming to MS 17248, electrical controls and motor protection as appropriate, and base and mounting plates. The design is controlled to permit unit replacement

without modification to piping, electrical system, or mounting arrangement regardless of manufacturer. The size of discharge and suction connector line and critical flange dimension have been standardized as have the mounting brackets for the motor starting relays. The eight compressors utilize one of three standard mounting plates and one of two base plates which affords flexibility in unit replacement.

The performance requirements of MIL-C-23305 and MIL-STD-773 assure a rugged, reliable, easily maintainable, high performance hermetic compressor which is completely compatible with military requirements other than field use.

Ratings and Electrical Requirements

	Nominal compressor capacities for condensing temperature +135°F and the following saturated refrigerant suction temperature at:			Motor Rating at 60 Hertz	
Size	-10°F	+25°F	+50°F	Volts	Phase
H-1	900	2,500	- - -	115	1
H-2	1,200	3,400	- - -	115	1
H-3	1,800	4,800	- - -	230	1
H-4	2,400	6,500	10,700	230	1
H-5	4,600	13,700	23,000	208	3
H-6	5,900	16,800	30,500	208	3
H-7	9,000	29,200	50,700	208	3
H-8	12,400	40,200	73,000	208	3

Special Features:

Electromagnetic compatibility in accordance with Class IIB of MIL-STD-461

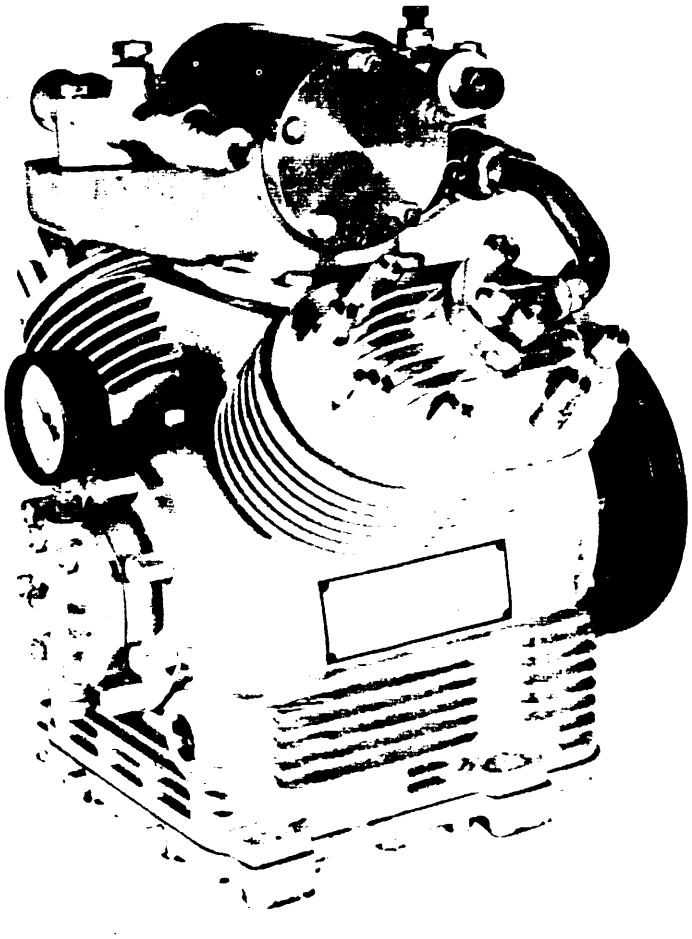
Motors not having inherent motor protection shall be equipped with appropriate protection.

Physical Characteristics:

Size	Maximum Overall Dimensions (inches) Length	Width	Height	Weight (pounds)*
H-1 thru H-4	17	13	18	H-1 & H-2 - 105 H-3 & H-4 - 115
H-5 & H-6	26-3/4	17	18	H-5 - 215 H-6 - 265
H-7 & H-8	26-3/4	17	20	H-7 - 315 H-8 - 375

*Includes compressor charged with oil, mounting plates, controls, piping flanges and service valves

Compressors, Reciprocating, Power-Driven
Open-Type, For Use With Refrigerant-12



Reference Documents: MIL-STD-279
MIL-C-14370 (Qualified products list has been established)

Intended Use:

For use in combination with other Military Standard refrigeration components in refrigerant ion and air conditioning systems designed for military field Operation.

General Description:

There are 2 compressor sizes included in this family of compressors designed for use with applied horsepowers ranging up to 10 horsepower. The design is controlled to permit unit replacement within groups and types without modification to piping or mounting arrangement regardless of manufacturer. The mounting arrangements of both suction and discharge valves have been fixed and the design of the shaft seal housing has been standardized on all units for maintenance purposes.

The two compressors are divided into two types; Type I covering the lower capacity range and Type II, the high capacity range as indicated below. Critical mounting dimensions have been standardized within each type, as have the maximum envelope dimensions and weight.

The performance requirements of MIL-C-14370 and MIL-STD-279 assure a rugged, reliable, easily maintainable, high performance compressor which is completely compatible with the requirements of military field use.

Rating:

Operating Conditions at 110°F ambient temperatures

1. Condensing temperature 135°F.
2. Saturated suction vapor temperature 55°F.
3. Compressor suction vapors temperature 65°F.
4. Capacities at this rating.

Type I - Group A -23,200 BTU/Hr (minimum)

Group B -30,000

Type II - Group C - 45,000

Group D - 60,000

Special Features:

Service Valves in accordance with MS 17428

	Type I	Type II
Suction Valve	MS 17248-4	MS 17248-5
Discharge Valve	MS 17248-3	MS 17248-4

Gage Ports - 1/8 NPTF connection

Lubrication -positive force feed system utilizes oil conforming to Type II of VV-L-825

Strainer, suction gas - Removable. internal, 40 mesh min.

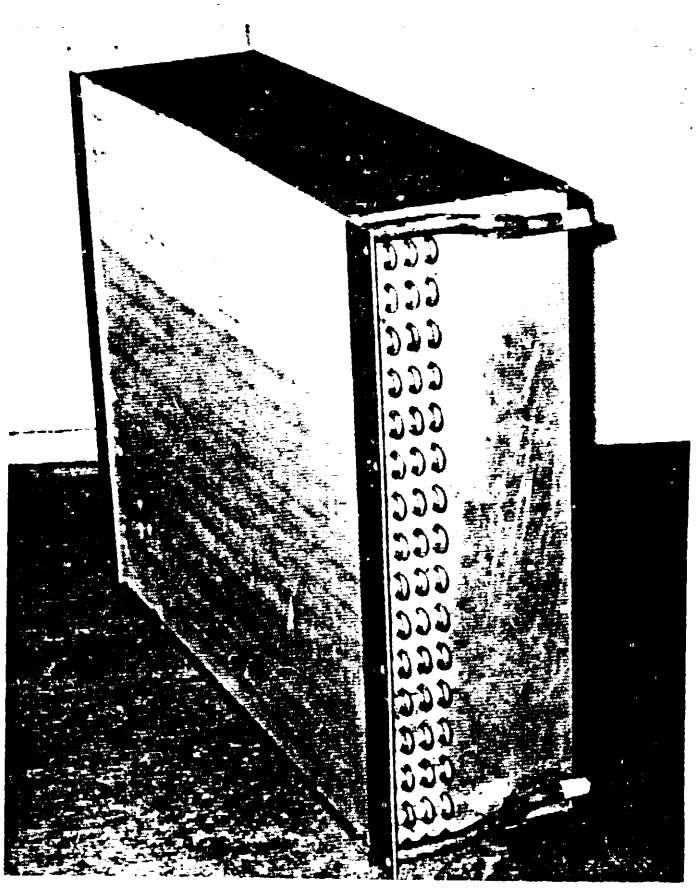
Interchangeable 1 inch shaft seal on all models of Type I and Type II Compressors

Physical Characteristics:

Maximum Overall Dimensions W/O Valves

Type	Length	Width	Height	Weight (with oil)
I	14-1/2 inches	11 inches	14 inches	90 pounds
II	15-1/2 inches	15-1/2 inches	18 inches	112 pounds

Condensers, Air-Cooled, Refrigerant-12



Reference Documents: MIL-STD-759
MIL-C-23122

Intended Use:

The standard air-cooled condensers are intended for use with Military standard open type and hermetic compressors in refrigeration and air-conditioning systems.

General Description:

There are six standard size air-cooled condensers ranging in capacities from 16,000 to 57,000 BTU/Hr. The condensers, in addition to the coil, are furnished with a shroud and fan orifice, and fan. The design is controlled to insure unit replacement within any one size regardless of manufacturer. Each of the six sizes is available in four material combinations which provide the optimum in design options for varying operational and environmental conditions:

Copper tubing, aluminum fins, aluminum housing - For general field applications subjected to wide variance in climatic conditions exclusive of high salt laden atmosphere.

Copper tubing, copper fins, aluminum housing - For field applications in high salt laden atmosphere.

Aluminum tubing, aluminum fins, aluminum housing - For lightweight construction where coils are not subject to moisture.

Steel tubing, steel fins, steel housing - For use when there is a shortage of critical materials.

Ratings

Condenser Heat Rejection Capacity

Condenser Type	Heat Rejection Capacity-BTU/Hr (Min)	Refrigerant-12 Saturated Gas Temperature	Air Volume CFM (min) at 75F and 14.7 cu. ft. per lb.	Air Temperature Dry Bulb	Electrical Characteristics 60 Herts Power Supply (volts)
I	22,000	135 F.	2,000	110 F.	230
II	35,000	135 F.	4,000	110 F.	115/230
III	46,000	135 F.	4,000	110 F.	115/230
IV	57,000	135 F.	5,000	110 F.	115/230
V	16,000	135 F.	1,500	110 F.	230
VI	28,000	135 F.	3,500	110 F.	115/230

Special Features:

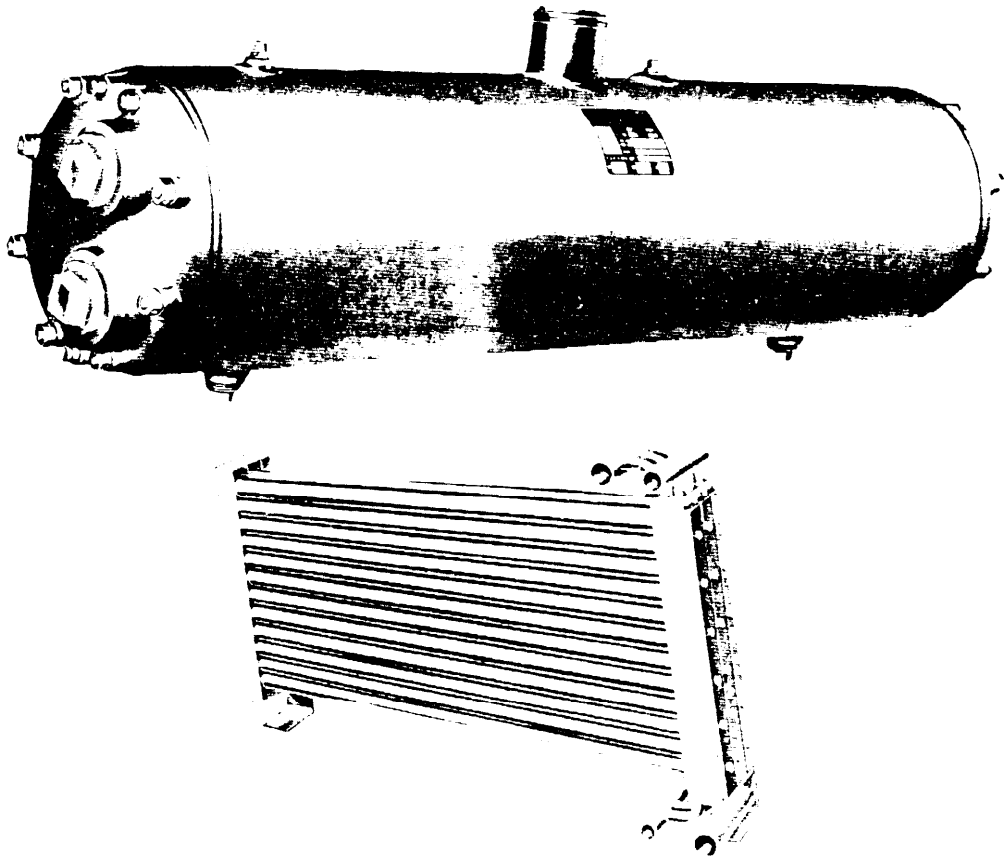
Inlet and outlet connection in accordance with MS 35925.

Pressure drop through coil tube between inlet and outlet headers not to exceed 12 psi.

Physical Characteristics:

Condenser Coil and Shroud Assy	Condenser					
	I	II	III	IV	V	VI
Length overall (inches)	30-1/8	32-1/2	43-1/2	30-1/8	32-1/2	
Height overall (inches)	22-1/8	34-1/8	32-1/8	34-1/4	18-1/8	27-1/8
Depth overall (inches)	11	11	11	11	11	11
Weight (pounds)	30	50	60	75	25	40

Condenser, Refrigerating, Water-Cooled, Refrigerant-12



Reference Documents: MIL-STD-760
MIL-C-23136

Intended Use:

The standard water-cooled condensers are intended for use with Military standard open type and hermetic compressors in refrigeration and air conditioning systems.

General Description:

There are five standard water-cooled condensers ranging in capacity from 25,000 to 85,000 BTU/Hr. The design is controlled to insure unit replacement size for size within a type without modification and size for size between types with piping and mounting plate modifications. The closed shell-and-coil condensers (Type II) water and refrigerant connection are of female pipe thread type. The condensers of the closed shell-and-tube (Type I) and double tube type (Type III) are provided with solder type connections.

Condenser Ratings

Conditions:

a. Saturated temperature of entering refrigerant vapor 105°F

b. Minimum actual temperature of entering refrigerant vapor 135°F

c. Temperature of entering water 85°F

d. Temperature of leaving water 98°F

e. Temperature of ambient air 110°F

Condenser Size	Heat Rejected BTU/Hr.	Water Flow G.P.M. (includes 4% fouling allowances)
1	25,000	4.0
2	37,500	6.0
3	50,000	8.0
4	65,000	10.4
5	85,000	13.6

Special Features:

Replaceable finned tubing provided on Type I and Type II condensers.

Working pressures all types

300 psi on refrigerant side

125 psi on water side

Physical Characteristics:

Condenser Sizes

Dimension (Overall)	1	2	3	4	5
Length (inches)	29	32	42	49	49
Height (inches)					
Types I & II	9-1/4	9-1/4	9-1/4	11-1/2	13-1/2
Type III	16-3/4	16-3/4	16-3/4	16-3/4	16-3/4
Depth (inches)					
Types I & II	7-1/2	7-1/2	7-1/2	9-1/2	10-1/2
Type III	7	7	7	7	7

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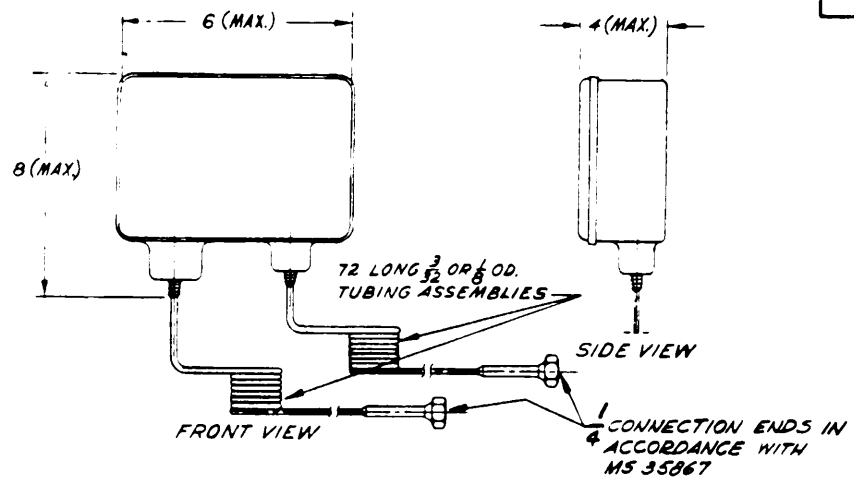

DASH NO.	ELECTRICAL CHARACTERISTICS	PRESSURE CONTROL		HIGH PRESSURE SAFETY CUT-OUT		
		RANGE: MIN. CUT-OUT TO MAX. CUT-IN	DIFFERENTIAL	RANGE	CUT-IN DIFFERENTIAL	TYPE OF RESET
-1	115/230 V. 50 TO 60 CYCLE A.C.	20 INCHES HG. VACUUM CUT-OUT TO 50 PSIG CUT IN	5 TO 35 PSI	100 TO 300 PSI	30 TO 55 PSI BELOW CUT-OUT SETTING	AUTOMATIC
-2	24 V. D.C.					
-3	115/230 V. 50 TO 60 CYCLE A.C.				NONE	MANUAL
-4	24 V. D.C.					

NOTES

1. FOR USE WITH DICHLORODIFLUOROMETHANE (CCl_2F_2), R-12 REFRIGERANT.
2. SUITABLE FOR OUTDOOR USE, EXCEPT SHIPBOARD.
3. SWITCHES ARE SINGLE POLE, SINGLE THROW. FOR PRESSURE CONTROL, CONTACTS OPEN AT LOW PRESSURES AND CLOSE AT HIGH PRESSURES. FOR HIGH PRESSURE SAFETY CUT-OUT, CONTACTS OPEN AT HIGH PRESSURES AND CLOSE AT LOW PRESSURES.
4. CONTROLS HAVE GRADUATED SCALES FOR MAKING SETTINGS.
5. DASH NOS. 1 AND 3 MAY BE USED FOR DIRECT CONTROL OF MOTORS WITH A MAXIMUM LOAD OF 13.0 AMPS AT 115 VOLTS AND 6.5 AMPS AT 230 VOLTS. FOR LOADS EXCEEDING THESE RATINGS, DASH NOS. 1 AND 3 ARE FOR PILOT DUTY. DASH NOS. 2 AND 4 ARE FOR PILOT DUTY ONLY.
6. DIMENSIONS IN INCHES.
7. FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
8. REFERENCED DOCUMENTS SHALL BE THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BIDS OR REQUEST FOR PROPOSAL.

APPROVED 16 MAY 62, REVISED (A) 25 JULY 1968

(A) ENTIRE STANDARD REVISED

P.A. ARMY - GL Other Cust NAVY - YD USAF - 82	TITLE CONTROL, PRESSURE, REFRIGERANT-12 — WITH HIGH PRESSURE CUT-OUT	MILITARY STANDARD MS 17843
PROCUREMENT SPECIFICATION MIL-C-23291	SUPERSEDES:	SHEET / OF /

DD FORM 1 SEP 67 672-1 (Coordinated)

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE.

This Military standard is mandatory for use by all Departments and Agencies of the Department of Defense. Selection for all new engineering and design applications and for repetitive use shall be made from this document.

Revise User
Army - MR
Navy - YD
USAF - 82, 85
MC

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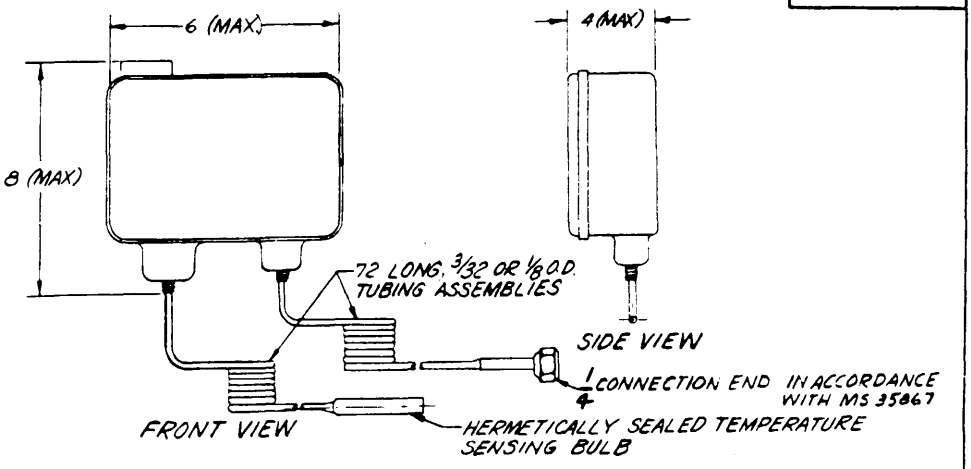

DASH NUMBER	ELECTRICAL CHARACTERISTICS	TEMPERATURE CONTROL		HIGH PRESSURE SAFETY CUT-OUT		
		RANGE MIN. CUT-OUT TO MAX. CUT-IN	DIFFERENTIAL	RANGE	CUT-IN DIFFERENTIAL	TYPE OF RESET
— 1.	115/230V, 50 TO 60 CYCLE, A.C.	-10F TO 55F	5F TO 20F TOP OF RANGE	100 TO 240 PSIG	30 TO 55 PSI BELOW CUT-OUT SETTING	AUTOMATIC
— 2.	24V, D.C.	-10F TO 55F				
— 3.	115/230V, 50 TO 60 CYCLE, A.C.	50F TO 90F	7F TO 40F BOTTOM OF RANGE			MANUAL
— 4.	24V, D.C.	50F TO 90F			NONE	

NOTES

1. FOR USE WITH DICHLORODIFLUOROMETHANE (CCl_2F_2), R-12 REFRIGERANT.
2. SUITABLE FOR OUTDOOR USE, EXCEPT SHIPBOARD.
3. SWITCHES ARE SINGLE POLE, SINGLE THROW. FOR TEMPERATURE CONTROL, CONTACTS OPEN AT LOW TEMPERATURES AND CLOSE AT HIGH TEMPERATURES. FOR HIGH PRESSURE SAFETY CUT-OUT, CONTACTS OPEN AT HIGH PRESSURES AND CLOSE AT LOW PRESSURES.
4. CONTROLS HAVE GRADUATED SCALES FOR MAKING SETTINGS.
5. DASH NOS. 1 AND 3 MAY BE USED FOR DIRECT CONTROL OF MOTORS WITH A MAXIMUM LOAD OF 13.0 AMPS AT 115 VOLTS AND 6.5 AMPS AT 230 VOLTS. FOR LOADS EXCEEDING THESE RATINGS, DASH NOS. 1 AND 3 ARE FOR PILOT DUTY. DASH NOS. 2 AND 4 ARE FOR PILOT DUTY ONLY.
6. DIMENSIONS IN INCHES.
7. FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
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(A) ENTIRE STANDARD REVISED

APPROVED 16 MAY 1962 REVISED (A) 25 JULY 1968

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Review User
Army - ME
Navy - YD
USAF - 82, 85
MC

P.A. ARMY - GL Other Cust NAVY - YD USAF - 82	TITLE CONTROL, TEMPERATURE, REFRIGERANT-12, — WITH HIGH PRESSURE CUT-OUT	MILITARY STANDARD MS 17844
PROCUREMENT SPECIFICATION MIL-C-23292	SUPERSEDES:	SHEET / OF /

DD FORM 1 SEP 67 672-1 (Coordinated)

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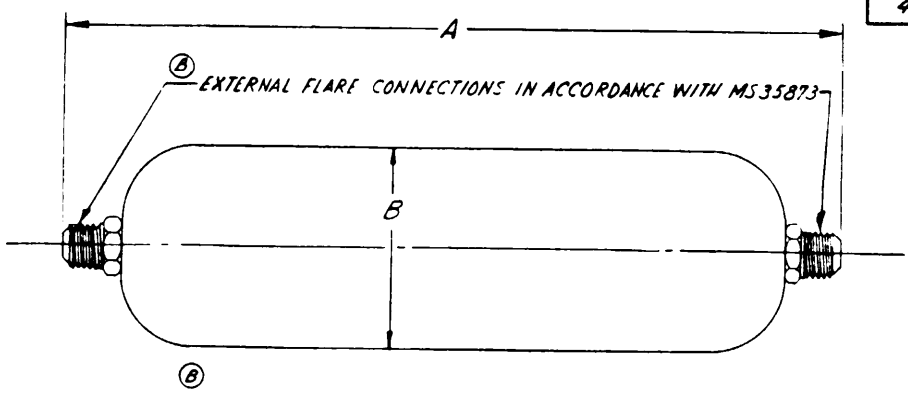

DASH NO.	DIMENSIONS A (±1/2)	DIMENSIONS B (MAX OD)	FLARE CONNECTION SIZE	CAPACITY WATER (MINIMUM) AT 125 F	CAPACITY DRYING TONNAGE TR
	INCHES	INCHES	INCHES	DROPS	
-1	6	2 19/32	3/8	80	2
-2	6 3/4	3 1/16	3/8	120	3
-3	9 1/8	3 1/16	1/2	200	5
-4	10 1/4	3 9/16	5/8	300	7 1/2
-5	10 5/16	3 9/16	5/8	400	10

(C) NOTES

1. RATING CONDITIONS: DEHYDRATORS SHALL CONFORM TO THE STANDARD CONDITION, GROUP II REQUIREMENTS SPECIFIED IN AIR CONDITIONING AND REFRIGERATION INSTITUTE (ARI) STANDARD 710-64, "LIQUID LINE DRIERS".

2. MATERIALS: (B)
   A. DESICCANT-ACTIVATED ALUMINA, SILICA GEL, ANHYDROUS CALCIUM SULPHATE, MOLECULAR SIEVE, OR ANY COMBINATION OF THESE IN MOLDED OR GRANULAR FORM.
   B. SHELL-COPPER, BRASS, OR STEEL.
   C. STRAINER-CORROSION-PROOF STRAINERS SUITABLE TO RETAIN THE TYPE OF DESICCANT USED.

3. STRENGTH: (C) CONFORM TO UL STANDARD 207c.

4. DEHYDRATORS SHALL BE OF A NON-REFILLABLE TYPE FOR USE WITH TYPE 12 REFRIGERANT CONFORMING TO BB-C-310.

5. DIMENSION "A" MAY BE ATTAINED ON SHORTER UNITS BY USE OF AN ADAPTOR OR EXTENSION SUPPLIED WITH THE UNIT AND HAVING THE SAME TYPE END CONNECTION.

6. FINISH: (D) THE SHELL, WHEN STEEL, SHALL BE CORROSION-RESISTANT TREATED OUTSIDE.

7. (D) THE SHELL WHEN FABRICATED OF STEEL SHALL BE BRAZED, SILVER SOLDERED, OR WELDED, WHEN BRASS OR COPPER SHALL BE BRAZED OR SILVER SOLDERED.

8. (D) MAXIMUM SHELL DIAMETERS ARE NOT INTENDED TO PRECLUDE DEHYDRATORS HAVING WELDED BEADS AROUND THE CIRCUMFERENCE OF THE SHELL IN EXCESS OF DIAMETERS SHOWN.

9. (D) FOR DESIGN FEATURE PURPOSES THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.

10. REFERENCED DOCUMENTS SHALL BE THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BIDS OR REQUEST FOR PROPOSAL.

APPROVED 21 JUNE 1957 REVISED (A) 20 FEB 1961 (B) 3 AUG 1962 (C) 9 APR 1965 (D) 1 NOV 1968

User activities
Army - MC
Navy - SH

Review
Army-MR, CE
Navy-YD
Air Force-82

This military standard has been approved by the Department of Defense and is mandatory for use by all Departments and Agencies of the Department of Defense. Selection for all new engineering and design applications and for repetitive use shall be made from this document.

P.A. ARMY-GL Other Cust NAVY-YD ASAF-82	TITLE DEHYDRATORS, DESICCANT, REFRIGERANT-12	MILITARY STANDARD MS 35845
PROCUREMENT SPECIFICATION MIL-D-22825	SUPERSEDES:	SHEET 1 OF 1

DD FORM 1 SEP 67 672-1 (Coordinated)

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

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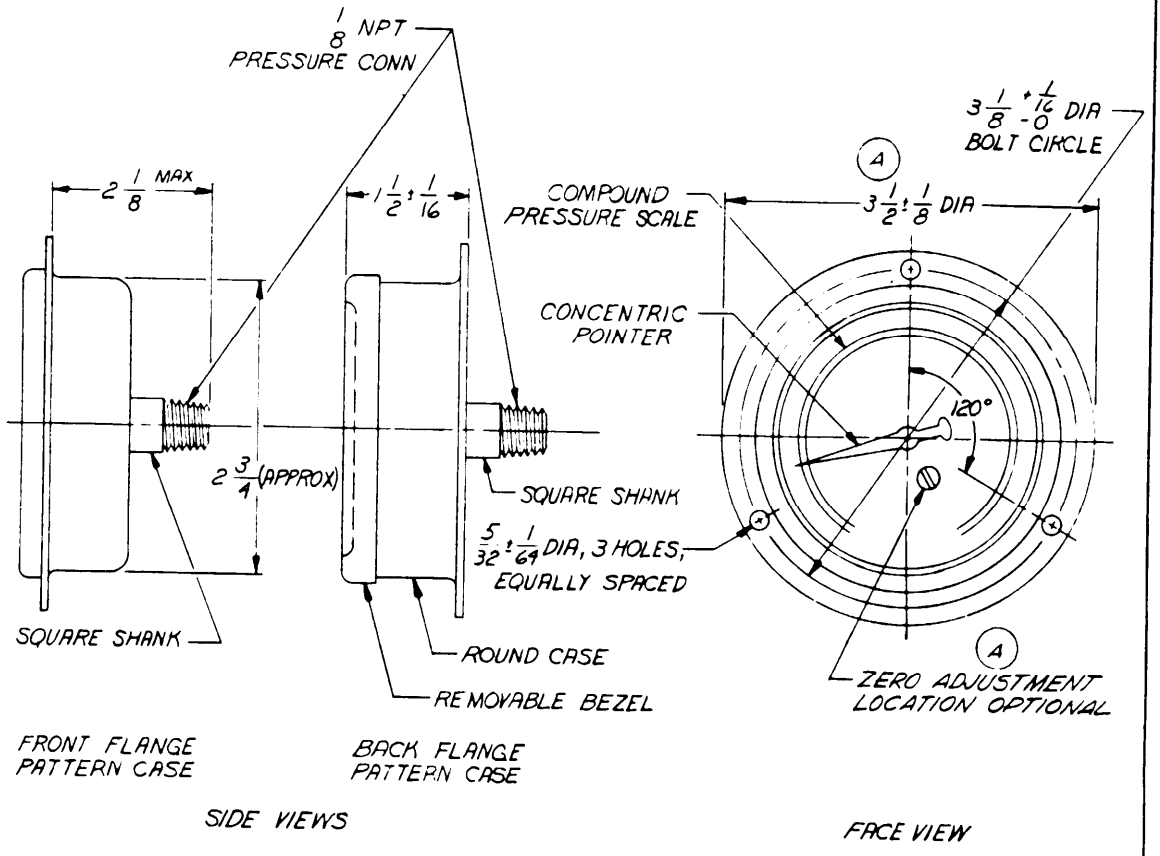
6685



FRONT FLANGE PATTERN CASE

BACK FLANGE PATTERN CASE

SIDE VIEWS

FACE VIEW

PART NUMBER	DESCRIPTION
MS 27900-1	FRONT FLANGE PATTERN CASE
MS27900-2	BACK FLANGE PATTERN CASE

NOTES

1. ALL DIMENSIONS IN INCHES
2. FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
(A) 3. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BIDS OR REQUEST FOR PROPOSAL.

APPROVED 17 JAN 1962 REVISED (A) 12 NOV 1965

P.A. ARMY GL Other Cust NAVY MC USAF 67	TITLE GAGES, COMPOUND, PRESSURE & VACUUM, DIAL INDICATING, PANEL MOUNTED, REFRIGERANT 12	MILITARY STANDARD MS 27900
PROCUREMENT SPECIFICATION MIL-G-9942	SUPERSEDES:	SHEET 1 OF 1

DD FORM 1 SEP 67 672-1 (Coordinated)

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE.

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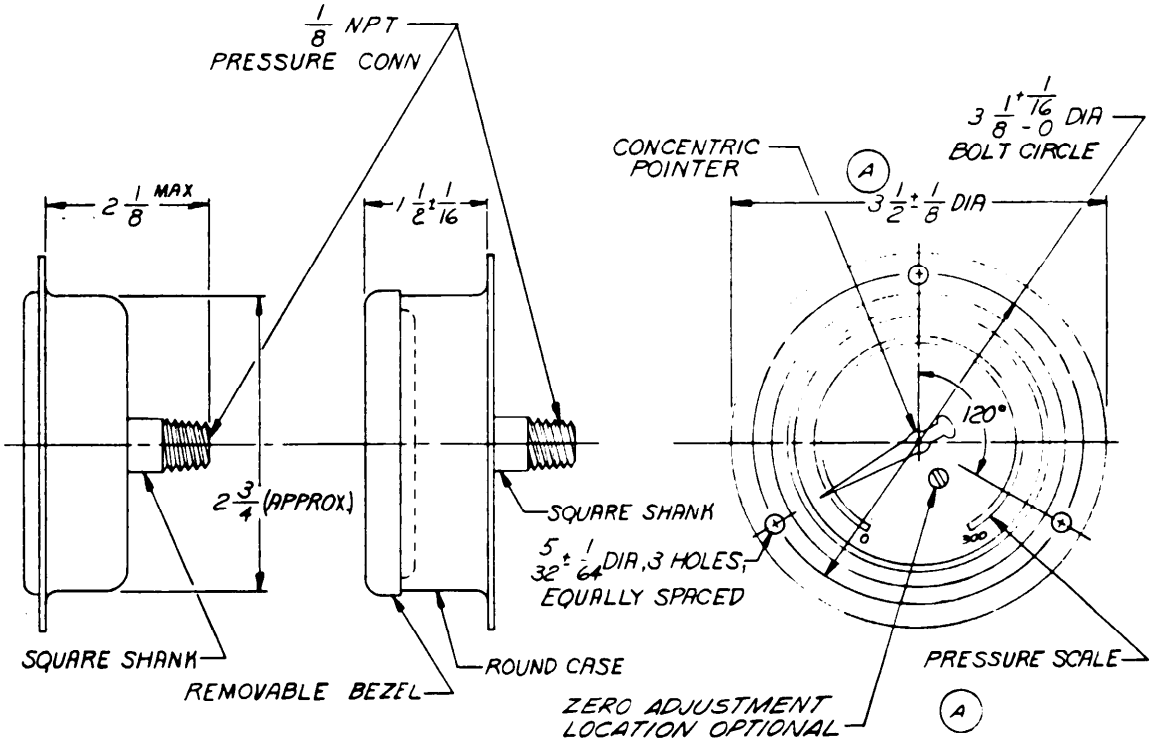
6685



FRONT FLANGE PATTERN CASE

BACK FLANGE PATTERN CASE

SIDE VIEWS

FACE VIEW

PART NUMBER	DESCRIPTION
MS27901-1	FRONT FLANGE PATTERN CASE
MS27901-2	BACK FLANGE PATTERN CASE

NOTES:

1. ALL DIMENSIONS IN INCHES
2. FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
(A) 3. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BIDS OR REQUEST FOR PROPOSAL

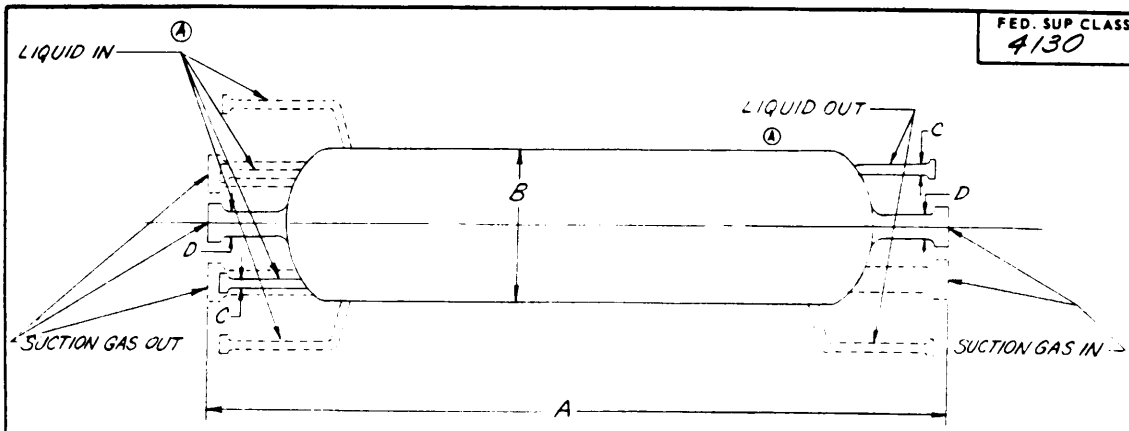
APPROVED 7 JAN 1965 REVISED (A) 12 NOV 1965

P.A. ARMY GL Other Cust NAVY MC USAF 67	TITLE GAGES, PRESSURE, DIAL INDICATING, PANEL MOUNTED, REFRIGERANT 12	MILITARY STANDARD MS27901
PROCUREMENT SPECIFICATION MIL-G-9942	SUPERSEDES:	SHEET 1 OF 1

DD FORM 1 SEP 67 672-1 (Coordinated)

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE.

FED. SUP CLASS 4130



THE DOTTED LINES REPRESENT ACCEPTABLE LOCATIONS OF CONNECTION ENDS (A)

MS PART NO.	CAPACITY (M.N)	DIMENSIONS		FEMALE SOLDER JOINT (A)	
		A ± 1/2	B (MAX)	C	D
	T.R	INCHES	INCHES	INCHES	INCHES
17241-1	1/12	9 1/2	1 5/8	1/4	1/2
17241-2	1/6	11 7/8	1 5/8	1/4	1/2
17241-3	1/4	15	2 1/8	3/8	5/8
17241-4	1/3	15	2 1/8	3/8	5/8
17241-5	1/2	15 1/4	2 1/4	3/8	7/8
17241-6	3/4	14 3/4	3 1/8	3/8	1 1/6
17241-7	1	15 5/8	3 5/8	1/2	1 1/8
17241-8	2	15 5/8	5	3/8	1 3/8

NOTES

RATING CONDITIONS: INTERCHANGERS SHALL BE CAPABLE OF RAISING THE SUCTION GAS TEMPERATURE FROM MINUS 5 F, AT A PRESSURE CORRESPONDING TO MINUS 10 F. SATURATED TO PLUS 30 F SUPERHEATED LEAVING TEMPERATURE, WITH THE ENTERING LIQUID TEMPERATURE NOT HIGHER THAN 100 F.

MATERIALS: SHELL - BRASS, COPPER, ALUMINUM-JACKETED, OR STEEL, CORROSION-RESISTANT TREATED.

LIQUID CIRCUIT AND GAS NIPPLES - SEAMLESS-DRAWN COPPER TUBING.

SOLDER CONNECTION ENDS: IN ACCORDANCE WITH MS 35925 (FEMALE ENDS).

(A) STRENGTH: FACTORY TEST PRESSURE - 235 P.S.I.G. (MIN.)

BURSTING PRESSURE (BOTH CIRCUITS) - 1175 P.S.I.G. (MIN.).

PRESSURE DROP: GAS CIRCUIT - 1/4 P.S.I.G. AT MINUS 10 F. EVAPORATING.

1/2 P.S.I.G. AT PLUS 25 F. EVAPORATING.

LIQUID CIRCUIT - NEGLIGIBLE.

DIMENSION "A" MAY BE OBTAINED ON SHORTER UNITS BY USE OF A TUBE EXTENSION SUPPLIED WITH THE UNIT AND HAVING THE SAME TYPE END CONNECTION.

1. FOR DESIGN FEATURE PURPOSES THIS STANDARD TAKES PRECEDENCE OVER DOCUMENTS REFERENCED HEREIN.

2. REFERENCED DOCUMENTS SHALL BE THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BIDS.

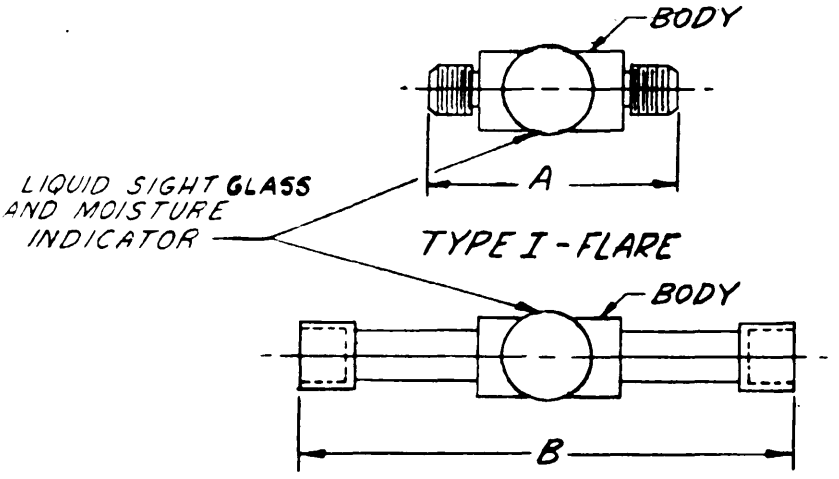
APPROVED 20 FEB 1961 REVISED (A) 12 AUG 1965

P.A. ARMY - GL Other Cust NAVY - YD USAF-82	TITLE HEAT INTERCHANGER, REFRIGERANT-12	MILITARY STANDARD MS 17241
PROCUREMENT SPECIFICATION MIL-H-22832	SUPERSEDES	SHEET / OF /

DD FORM 1 SEP 57 672-1 (Coordinated) PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

126

FED. SUP CLASS
6680



(B)

PART NUMBER	TYPE	SIZE	"A" DIMENSION ± 3/4 INCH	"B" DIMENSION ± 1 INCH
MS -7	I	3/8	3	
MS -8	I	1/2	3 1/2	
MS -9	I	5/8	3 3/4	
MS -10	II	3/8		5 1/2
MS -11	II	1/2		5 1/2
MS -12	II	5/8		5 3/4

CONNECTION END

TYPE I - EXTERNAL FLARE, REFRIGERATION, DIMENSIONS SPECIFIED ON MS 35873.

TYPE II - SOLDER JOINT, FEMALE, REFRIGERATION, DIMENSIONS SPECIFIED ON MS 35925.

(B) NOTES

1. INDICATORS SHALL BE SUITABLE FOR REFRIGERANT TYPE 12 OR TYPE 22 OF BB-C-310.
2. PROTECTIVE SIGHT GLASS CAPS OR COVERS ARE ACCEPTABLE IF INTEGRAL PART OF MANUFACTURER'S DESIGN.
3. FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
4. REFERENCED DOCUMENTS SHALL BE THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BIDS OR REQUEST FOR PROPOSAL.

APPROVED 26 FEB 1962 REVISED (A) 24 MAY 1965 (B) 29 MAY 1969

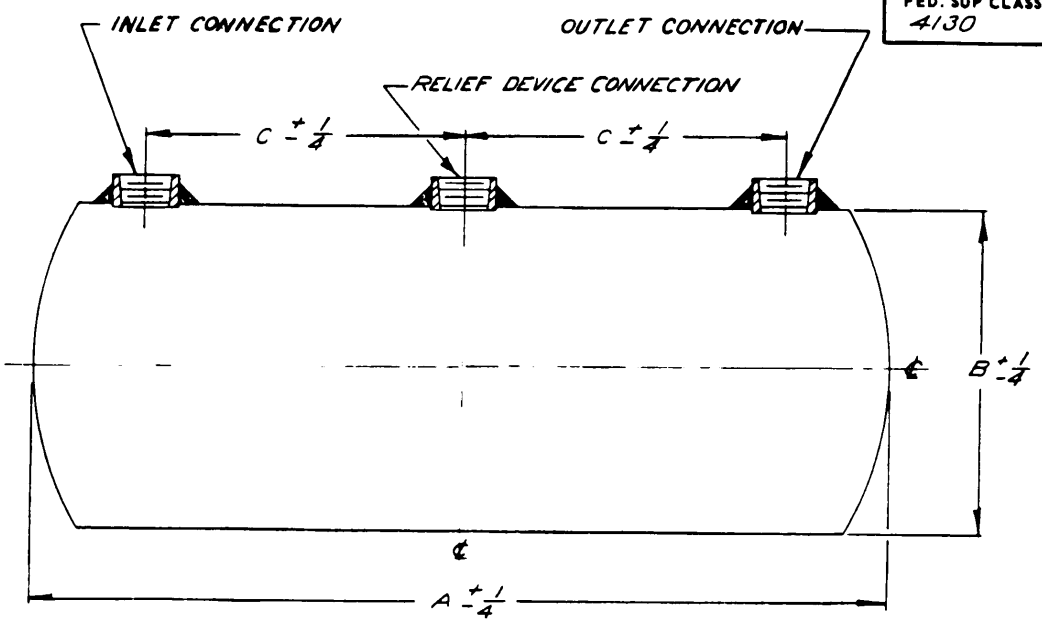
Review: ARMY YD, SH; NAVY CG
User: ME

This military standard has been approved by the Department of Defense and is mandatory for use by all Departments and Agencies of the Department of Defense. Selection for all new engineering and design applications and for repetitive use shall be made from this document.

P.A.	TITLE	MILITARY STANDARD
ARMY CL OTHER CUST NAVY YD	INDICATOR, SIGHT, LIQUID REFRIGERANT	MS 17798
Procurement Specification: MIL-I-23208	SUPERSEDES:	SHEET 1 OF 1

DD FORM 1 SEP 57 672

FED. SUP CLASS 4/30



MS PART NO.	CAPACITY (MIN)	DIMENSIONS			CONNECTIONS			CAPACITY OF R12 AT 135°F
		A (OVERALL)	B (OUT. DIAM)	C	INLET	OUTLET	RELIEF DEVICE	
	CU IN	INCHES	INCHES	INCHES				POUNDS
MS17291-1	200	12 1/2	5	3	3/8	1/2	3/8	7.5
MS17291-2	350	16	6	4	1/2			14
MS17291-3	450	20	6	6	1/2			18
MS17291-4	550	24	6	8	1/2			22
MS17291-5	1300	26 1/2	10 3/4	10	3/4			50

NOTES

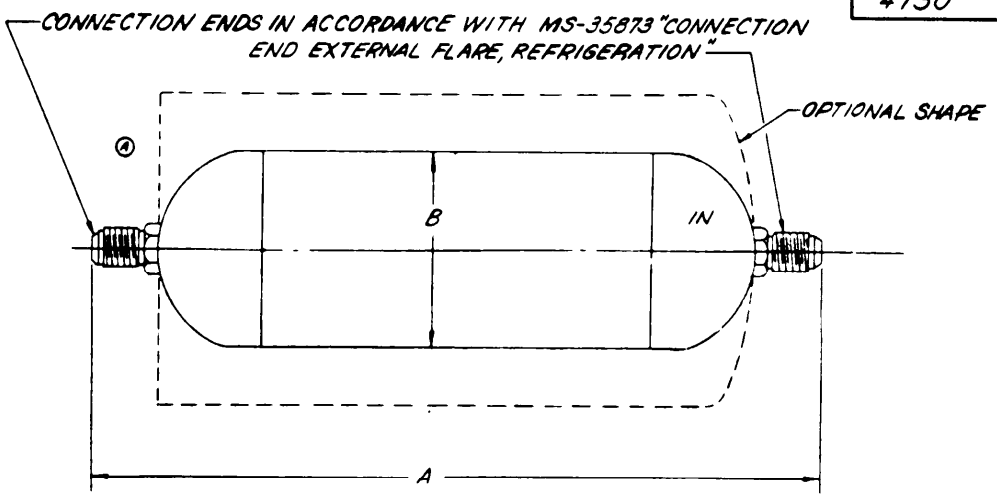
1. MATERIAL - STEEL
2. DESIGN WORKING PRESSURE - 235 P.S.I.G.
3. STRENGTH A. PARTS NO. 1, 2, 3, AND 4 IN ACCORDANCE WITH UL STANDARD 207C OR ASME UNFIRED PRESSURE VESSEL CODE.
   B. PART NO. 5 IN ACCORDANCE WITH ASME UNFIRED PRESSURE VESSEL CODE.
4. CONNECTIONS - IN ACCORDANCE WITH MS 35926.
5. FINISH - TREATED TO RESIST CORROSION.
6. SUPERSESSION DATA - DATA FOR EACH MS NUMBER OF MS 17291 DATED 1 JUNE 1961 HAS BEEN COMPLETELY REVISED BY THIS MS AND A NEW MS PART NUMBER ADDED.
7. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BIDS OR REQUEST FOR PROPOSAL.
8. FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.

Ⓐ ENTIRE [illegible] REVISED.

APPROVED 1 JUNE 1961 REVISED

P.A. A-GL Other Cust N-YD AF-82	TITLE RECEIVERS, LIQUID REFRIGERANT 12	MILITARY STANDARD MS 17291
PROCUREMENT SPECIFICATION MIL-R-22928	SUPERSEDES:	SHEET 1 OF 1

FED. SUP CLASS 4130



MS PART NO.	DIMENSIONS A ±1/2	DIMENSIONS B (MAX.)	FLARE CONNECTION SIZE	(A) SCREEN AREA	APPROX LIQUID (R-12) RATING
	INCHES	INCHES	INCHES	SQ INCHES	T.R.
17242-1	4 5/8	2 3/8	3/8	10	1 TO 3
17242-2	5 1/4	2 3/8	1/2	10	2 TO 4
17242-3	7 3/8	2 3/8	5/8	20	4 TO 10

NOTES

(A) RATING CONDITIONS: STRAINERS SHALL BE OF SUFFICIENT CAPACITY AND SCREEN AREA TO PASS 3.9 POUNDS PER MINUTE OF LIQUID REFRIGERANT 12 MULTIPLIED BY THE STRAINER TR RATING WITHOUT A PRESSURE DROP IN EXCESS OF 2 POUNDS PER SQUARE INCH.

MATERIALS: SHELL-COPPER, BRASS, OR STEEL CORROSION-RESISTANT TREATED.

(A) SCREEN-CORROSION-RESISTING STEEL OR MONEL METAL 80-100 MESH WOVEN WIRE CLOTH IN ACCORDANCE WITH TYPE I OF RR-W-360.

STRENGTH: (A) FACTORY TEST PRESSURE - 235 PSIG (MIN).

(A) BURSTING PRESSURE - 1175 PSIG (MIN).

STRAINERS SHALL BE OF THE LIQUID AND GAS, STRAIGHT-THROUGH, NON-CLEANABLE, THROW-AWAY TYPE.

DIMENSIONS: "A" - MAY BE ATTACHED ON SHORTER UNITS BY USE OF AN ADAPTER OR EXTENSION SUPPLIED WITH THE UNIT AND HAVING THE SAME TYPE END CONNECTION.

(A) "B" - MAXIMUM SHELL DIAMETER IS NOT INTENDED TO PRECLUDE STRAINERS HAVING WELDED BEADS AROUND THE CIRCUMFERENCE OF THE SHELL IN EXCESS OF DIAMETER SHOWN.

FOR DESIGN FEATURE PURPOSES THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.

REFERENCED DOCUMENTS SHALL BE THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BIDS OR REQUEST FOR PROPOSAL.

APPROVED 20 FEB 1961 REVISED (A) 18 OCT 1965

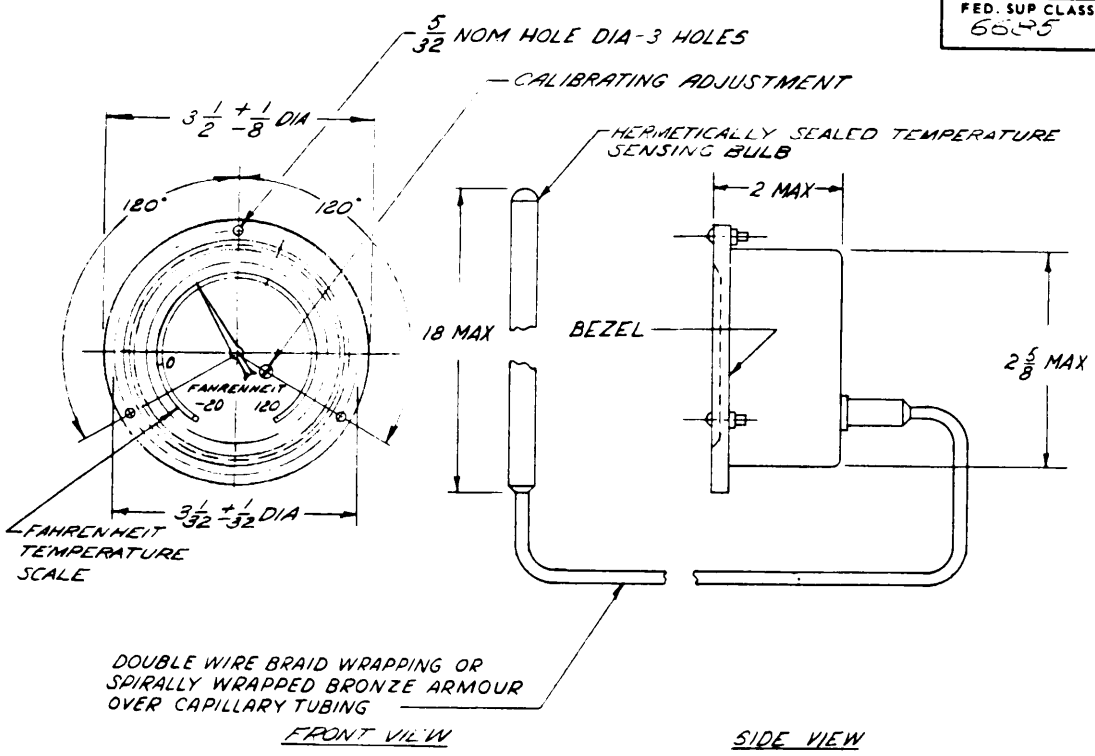
P.A.	TITLE	MILITARY STANDARD
Other Cust ARMY - GL NAVY - YD USAF - 82	STRAINER, SEDIMENT, REFRIGERANT-12	MS 17242
PROCUREMENT SPECIFICATION MIL-S-22833	SUPERSEDES:	SHEET 1 OF 1

DD FORM 672-1 (Coordinated) PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE.

MS125

Note: This draft, dated 10 February 1964, prepared by the U.S. Army Natick Laboratories (GL), has not been approved and is subject to modification. DO NOT USE PRIOR TO APPROVAL.

FED. SUP CLASS 6685



DASH PART NO	STYLE	RANGE & SCALE (DEGREES)
-2	FLUSH PANEL MOUNTING	FAHRENHEIT -20° TO +120°

NOTES

1. APPLICATION: TO MEASURE THE TEMPERATURE OF AN INCLOSED REFRIGERATED AIR SPACE, DUCT AIR FOR CONDITIONING INSTALLATIONS AND AIR STREAM ENTERING OR LEAVING AN EVAPORATOR COIL.
2. ACTUATION MEDIUM: VAPOR TENSION.
3. CALIBRATION: ADJUSTABLE WITHOUT REMOVING INDEX.
4. CAPILLARY TUBING: ANNEALED COPPER TUBING, 6 FEET IN LENGTH MINIMUM, NOMINAL 1/8 INCH OUTSIDE DIAMETER MAXIMUM.
5. ALL DIMENSIONS IN INCHES.
6. FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
7. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BIDS OR REQUEST FOR PROPOSAL.

Review / User
Army - MD / Ltr - MO
Navy - YD / MC, MS
Air Force - 67

Reviewer and user information is current as of the date of this document. For future coordination of changes to this document, draft circulation should be based on the information in the current Federal Supply Classification listings of NOD documents.

This military standard is approved by the Department of Defense and is mandatory on all activities. Selection for all new engineering and design applications and for repetitive use shall be made from this document.

APPROVED 25 MAY 62 REVISED (A) 10 JULY '64

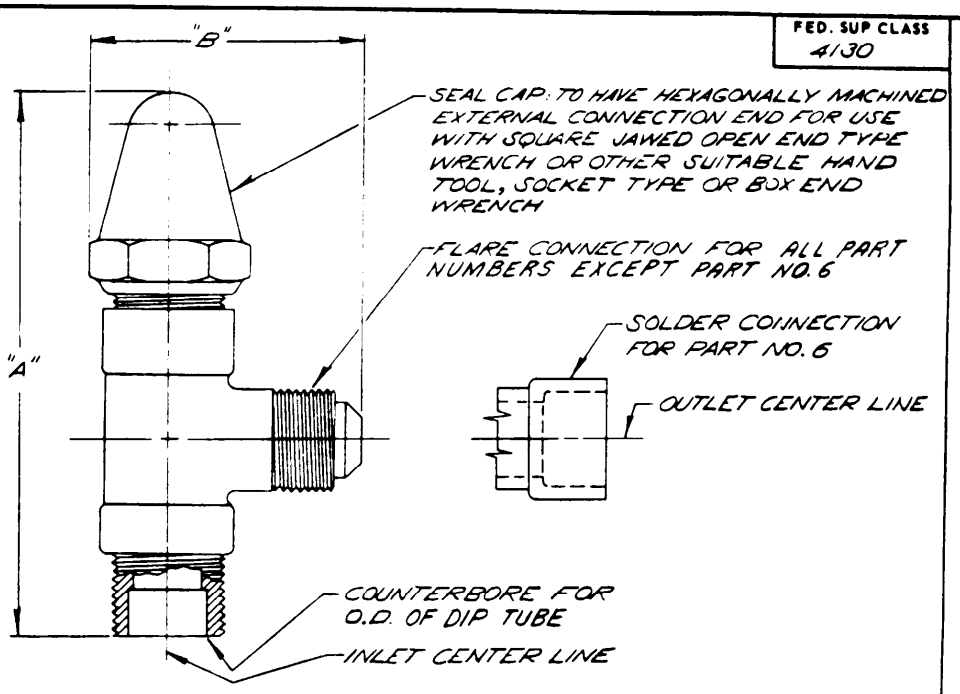
(A) ENTIRE STANDARD REVISED

P.A. ARMY-GL Other Cust NAVY-YD USAF-67	TITLE THERMOMETER, INDICATING, CAPILLARY TUBE AND BULB	MILITARY STANDARD MS 27211
PROCUREMENT SPECIFICATION MIL-T-9955	SUPERSEDES:	SHEET 1 OF 1

DD FORM 1 SEP 67 672-1 (Coordinated)

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE.

FED. SUP CLASS 4130



VALVE DIMENSIONS IN INCHES

MS PART NO.	SIZE INLET NPT	SIZE OUTLET O.D. FLARE	SIZE OUTLET O.D. SOLDER	A (MAX)	B (MAX)	
17243 -1	1/4	1/4	—	3 5/8	1 5/8	(A)
17243 -2	3/8	3/8	—	4	2	
17243 -3	3/8	1/2	—	4 1/4	2	
17243 -4	1/2	1/2	—	4 1/2	2 1/4	
17243 -5	1/2	5/8	—	5	2 1/2	
17243 -6	3/4	—	7/8	6	2 3/4	
17243 -7	1/2	3/8	—	4 1/2	2 1/4	

TYPE: (A) ANGLE, PACKED, BACK-SEATING OR NON-BACK-SEATING KEY OPERATED PLUG ELEMENT, WITH GASKETED SEAL CAP, VAVLE STEM SHANK TO BE 3/16, 1/4 OR 5/16 INCH SQUARE SHAPE.

MATERIALS: VALVE BODY AND SEAL CAP-BRASS OR STEEL.

RING GASKET - SOFT COPPER.

VALVE STEM (INCLUDING INTEGRAL PLUG): COMMERICAL BRONZE OR STEEL TREATED TO RESIST CORROSION.

OPERATING CONDITIONS: A. MAXIMUM OPERATING PRESSURE: 350 PSIG.
B. MAXIMUM OPERATING TEMPERATURE: 200 F.

CONNECTION ENDS: INLET: MALE PIPE THREAD IN ACCORDANCE WITH MS-35868.
OUTLET: A. FLARE TUBE MALE THREAD IN ACCORDANCE WITH MS-35873.
B. SOLDER TUBE FEMALE SOCKET IN ACCORDANCE WITH MS-35925 FOR O.D. TUBE SIZE 7/8 INCH.

NOTES:

1. DIMENSIONS IN INCHES.
2. FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
3. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON THE DATE OF INVITATION FOR BIDS OR REQUEST FOR PROPOSAL.
4. THIS IS A DESIGN STANDARD AND SHALL NOT BE USED AS A PART NUMBER.

(A) ADDED SIZE 7

APPROVED 15 MARCH 1961 / REVISED (A) 1 OCT 1968

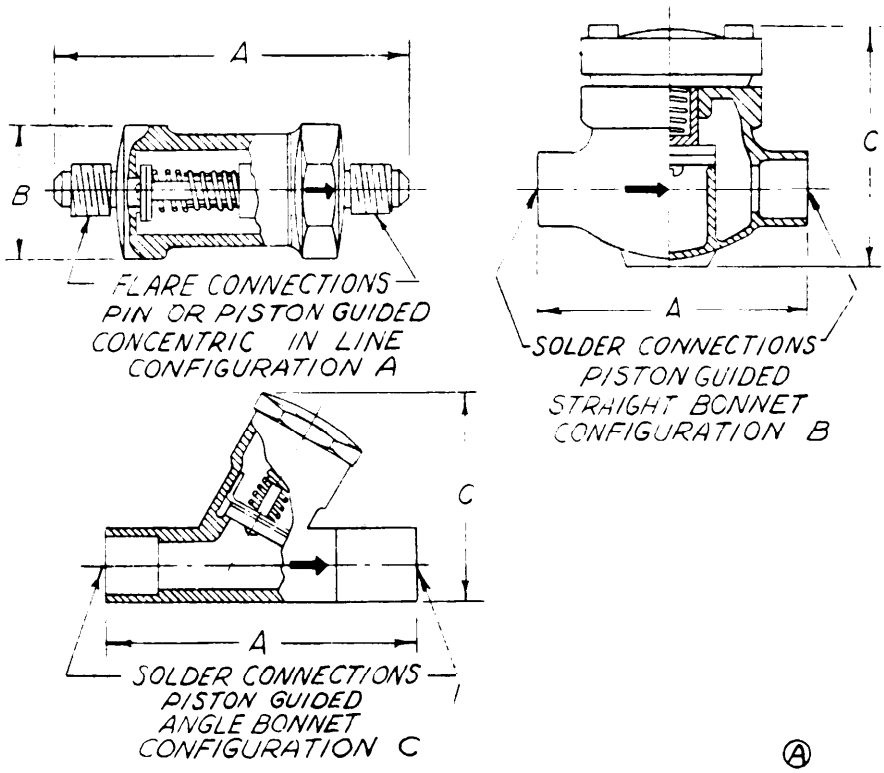
This military standard is approved by the Department of Defense and is mandatory on all activities. Selection for all new engineering and design applications and for repetitive use shall be made / in this document.

Review / User
Army - MR / MC
Navy - YD
USAF - 82

P.A. ARMY - GL Other Cust NAVY - YD USAF - 82	TITLE VALVES, ANGLE, SHUT-OFF, PACKED, RECEIVER, REFRIGERANT-12	MILITARY STANDARD MS 17243
PROCUREMENT SPECIFICATION MIL-V-22854	SUPERSEDES:	SHEET / OF /

DD FORM 1 SEP 67 672-1 (Coordinated) PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE.

FED. SUP CLASS 4130



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DASH NO.	CONFIGURATION Ⓐ	TUBING O.D. SIZE (INCHES)	DIMENSIONS (INCHES) LENGTH A ± 1/2	ACROSS FLATS B MAXIMUM	OVERALL HEIGHT C MAXIMUM
-1	A&C	3/8	2-7/8	1-3/4	4-1/8
-2	A&C	1/2	3-1/2	1-3/4	4-1/8
-3	A&C	5/8	3-3/4	1-3/4	4-1/8
-4	B&C	7/8	4-1/4	-	4-1/8
-5	B&C	1-1/8	5	-	4-1/8

TYPE:
SPRING LOADED DISC, OR OTHER EQUALLY SATISFACTORY METHOD OF DISC LOADING FOR POSITIVE SHUT-OFF AT A MAXIMUM PRESSURE DIFFERENTIAL OF 1-1/2 P.S.I.

OPERATIONAL REQUIREMENTS:
OPERATING PRESSURE (MAXIMUM) 350 PSIG
OPERATING TEMPERATURE (MAXIMUM) 200 DEGREES F.

MATERIAL:
SUITABLE FOR USE WITH REFRIGERANT 12

END CONNECTIONS:
FLARE - IN ACCORDANCE WITH MS 35873
SOLDER - IN ACCORDANCE WITH MS 35925

CONFIGURATIONS:
CONFIGURATIONS ARE OPTIONAL WITH THE MANUFACTURER WITHIN DIMENSIONAL LIMITATIONS INDICATED ABOVE

NOTES:
1. FOR DESIGN FEATURE PURPOSES THIS STANDARD TAKES PRECEDENT OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.

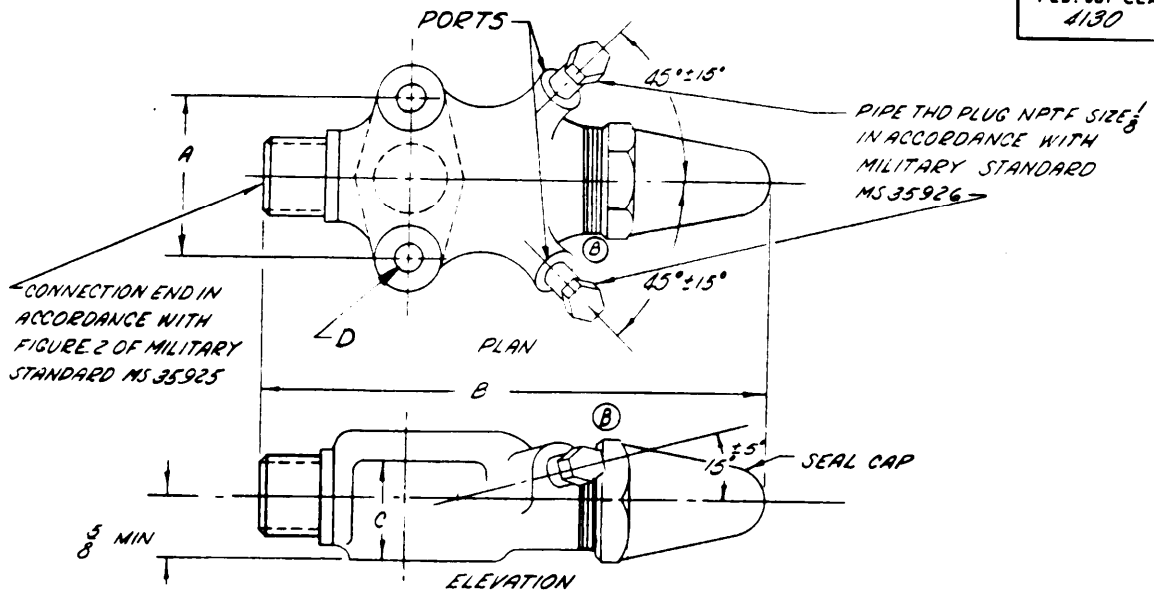
2. REFERENCED DOCUMENTS SHALL BE THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BID.

APPROVED 16 MAR 1962 REVISED Ⓐ 22 AUG 1967

P.A. ARMY - GL	TITLE	MILITARY STANDARD
Other Cust NAVY - YD USAF - 82	VALVES, CHECK, REFRIGERANT-12	MS 17810
Procurement Specification MIL-V-23221	SUPERSEDES:	SHEET 1 OF 1

DD FORM 1 SEP 67 672 (Coordinated) PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE.

FED. SUP CLASS 4130



MS PART NO	SOLDER-JOINT SIZE	A BOLT HOLE CENTERS (±1/32)	B MAX. LENGTH	C MIN. FLANGE HEIGHT	D DIA OF BOLT HOLES ± 1/64	MIN NO. OF PORTS
17248 — 1	3/8	1 5/8	3 3/4	1/2	11/32	1
17248 — 2	1/2	1 5/8	4 1/2	7/8	11/32	1
17248 — 3	3/4	1 5/8	4 5/8	7/8	11/32	1
17248 — 4	7/8	1 5/8	7 1/8	1 9/32	11/32	1
17248 — 5	1 1/8	1 3/4	7 3/8	1 9/32	11/32	1
17248 — 6	1 1/8	2 3/4	8	1 9/32	11/32	1

TYPE: BACKSEATING, PACKED, WITH LEAKPROOF SEAL CAP AND SINGLE OR DOUGLE GAGE PORTS FITTED WITH PIPE PLUGS.

MATERIALS: VALVE BODY AND SEAL CAP - BRASS OR STEEL.

RING GASKET - SOFT COPPER OR ALUMINUM.

VALVE STEM - STEEL TREATED TO RESIST CORROSION.

PIPE PLUGS - IRON, BRASS, OR STEEL.

SEATING DISC - MATERIAL TREATED TO RESIST CORROSION.

OPERATING REQUIREMENTS: A. MAXIMUM OPERATING PRESSURE: 350 PSIG.
B. MAXIMUM OPERATING TEMPERATURE: 200 F.

NOTES:

1. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BID.
2. FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
3. DRAWING SHOWS DOUBLE PORT VALVE ONLY.

APPROVED 21 MARCH 1961 REVISED (A) 1 APR 63 (B) 25 JULY 1968

(B) ENTIRE STANDARD REVISED

P.A. ARMY - GL Other Cust NAVY - YD USAF - 82	TITLE VALVES, COMPRESSOR SERVICE, REFRIGERANT-12	MILITARY STANDARD MS 17248
PROCUREMENT SPECIFICATION MIL-V-22862	SUPERSEDES:	SHEET 1 OF 1

DD FORM 1 SEP 67 672-1 (Coordinated) MS127

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE.

Review: Army - MR, Navy - YD, USAF - 82

This Military standard is mandatory for use by all Departments and Agencies of the Department of Defense. Selection for all new engineering and design applications and for repetitive use shall be made from this document.

FED. SUP CLASS 4130

TABLE I

CAPACITY - B.T.U./HR.

MS PART NO.		135°F CONDENSING, 125°F VAPOR FREE LIQUID ENTERING T.E.V.								105°F. COND. TEMP 95°F VAPOR FREE LIQUID ENT. TEV.
		(-)10°F. EVAP. TEMP. 175 P.S.I. P.D. ACROSS T.E.V.		25°F. EVAP. TEMP. 145 P.S.I. P.D. ACROSS T.E.V.		(-)10°F. EVAP. TEMP. 145 P.S.I. P.D. ACROSS T.E.V.		25°F. EVAP. TEMP. 125 P.S.I. P.D. ACROSS T.E.V.		50°F. EVAP. TEMP. 100 P.S.I. P.D. ACROSS T.E.V.		50°F. EVAP. TEMP. 35 P.S.I. P.D. ACROSS T.E.V.	
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
MS	-1	2000	3700	3400	7000								
MS	-2	3600	4200	6300	8800								
MS	-3					4500	8700	6200	15000				
MS	-4					8500	19200	18000	30000				
MS	-5					13000	28000	24000	43000				
MS	-6									13000	18000	10000	13000
MS	-7									28000	34000	19000	22000
MS	-8									40000	52000	29000	35000
MS	-9									57000	75000	36000	54000
MS	-10									72000	78000	49000	54000
MS	-11									109000	130000	71000	83000
MS	-12									145000	172000	100000	117000

THERMOSTATIC EXPANSION VALVE = T.E.V.
PRESSURE DROP = P.D.

CAPACITIES: MINIMUM CAPACITY REQUIREMENTS MUST BE MET. MAXIMUM CAPACITIES ARE MERELY A GUIDE FOR THE APPLICATION ENGINEER.

(A) FOR CHANGES SEE SHEETS 2 AND 3

APPROVED 28 SEPT 62 REVISED (A) 2 JUNE 1969

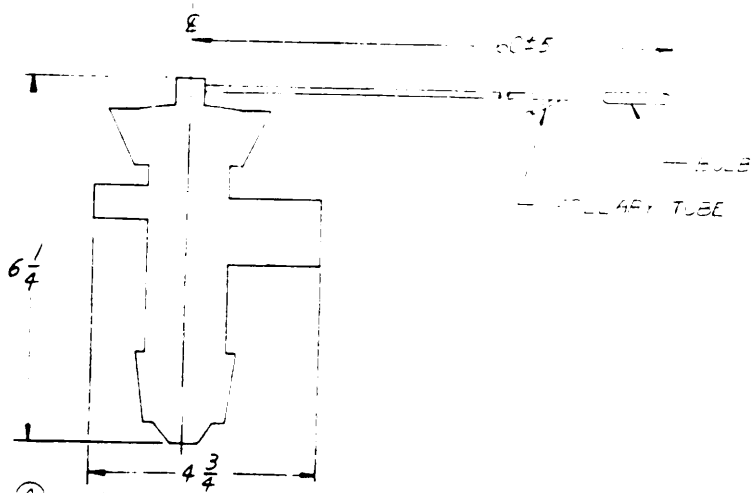
This Military standard is mandatory for use by all Departments and Agencies of the Department of Defense. Selection for all new engineering and design applications and for repetitive use shall be made from this document.

Review: ARMY - GL; NAVY - YD; USAF - 82
User: MEC, SH; SH; -

P.A. ARMY — GL Other Cust NAVY — YD USAF — 82	TITLE VALVES, EXPANSION, THERMOSTATIC, REFRIGERANT 12	MILITARY STANDARD MS 17982
PROCUREMENT SPECIFICATION MIL-V-23450	SUPERSEDES	SHEET 1

DD FORM 1 SEP 67 672-1 PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE PROPOSED REVISION

FED. SUP CLASS 4130



(A) MAXIMUM VALVE OVERALL DIMENSIONS

TABLE II

MS PART NO	EQUALIZER TYPE	EQUALIZER CONNECTION	PRESSURE LIMIT MEANS	CONNECTIONS SIZE (IN) INLET	CONNECTIONS SIZE (IN) OUTLET	CONNECTIONS TYPE
-1	INTERNAL		YES	3/8	1/2	F. FLARE
-2						
-3				1/2	5/8	
-4						
-5						
-6						
-7	EXTERNAL	FLARE 1/4	NO			
-8				5/8	5/8	SOLDER
-9						
-10						
-11				7/8	1 1/8	
-12						

METHOD OF RATING: IN ACCORDANCE WITH REFERENCED STANDARD.

CAPACITIES: AS PER TABLE I, BASED ON USE OF REFRIGERANT 12.

DIMENSIONS: DIMENSIONS ARE IN INCHES.

APPROVED 28 SEPT 62 REVISED (A) FOR CHANGES SEE SHEETS 2 AND 3

P.A. ARMY – GL Other Cust NAVY – YD USAF – 82	TITLE VALVES EXPANSION, THERMOSTATIC, REFRIGERANT 12	MILITARY STANDARD MS 17982
PROCUREMENT SPECIFICATION MIL-V-23450	SUPERSEDES:	SHEET 2

DD FORM 1 SEP 67 672-1 PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

PROPOSED REVISION

FED. SUP CLASS
4130

NOTES

1. DEFINITIONS:
   (A) FACTORY SUPERHEAT SETTING:
   THE "FACTORY SUPERHEAT SETTING" OF A THERMOSTATIC EXPANSION VALVE IS THE FINAL ADJUSTMENT MADE BY THE MANUFACTURER DURING PRODUCTION TESTS.
   (B) SUPERHEAT CHANGE:
   THE "SUPERHEAT CHANGE" (GRADIENT OF A THERMOSTATIC EXPANSION VALVE IS THE DIFFERENCE BETWEEN NO-FLOW SUPERHEAT AND THE SUPERHEAT REQUIRED TO PRODUCE RATED CAPACITY OR REQUIRED FLOW.)

2. OPERATING CHARACTERISTICS:
   (A) SUPERHEAT:
   1. TYPE: ADJUSTABLE
   2. SETTING: PARTS -1, -2, -3, -4 and -8; FACTORY SET AT 7 F. ± 2 F. AT BULB REFERENCE TEMPERATURE OF 0 F.
   PARTS -6 TO -12, INCL.; FACTORY SET AT 10 F. ± 1 F. AT BULB REFERENCE TEMPERATURE OF 32 F.
   3. SUPERHEAT CHANGE: THE SUPERHEAT CHANGE OF A THERMOSTATIC EXPANSION VALVE SHALL NOT BE MORE THAN 7 F. THROUGHOUT THE RANGE OF TEMPERATURE IN WHICH THE EVAPORATOR IS SPECIFIED TO OPERATE TO PRODUCE THE REQUIRED CAPACITY AT THOSE CONDITIONS.
   (B) PRESSURE LIMIT MEANS:
   1. SETTING: PARTS -1 AND -2; FACTORY SET AT MAXIMUM OPERATING PRESSURE OF 30 PSIG., (+) 7 PSI., (-) 0 PSI.

3. MATERIALS: SUITABLE FOR USE WITH REFRIGERANT 12.

4. CONNECTION ENDS - FLARE: EXTERNAL, IN ACCORDANCE WITH MS36873.
   SOLDER: FEMALE, IN ACCORDANCE WITH MS36926.

5. MARKING: DIRECTION OF FLOW TO BE LEGIBLY AND PERMANENTLY INDICATED.

Ⓐ 6. REFERENCED DOCUMENTS: ASA STANDARD B 9.1-1964 - SAFETY CODE FOR MECHANICAL REFRIGERATION.

Ⓐ 7. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BIDS OR REQUEST FOR PROPOSAL.

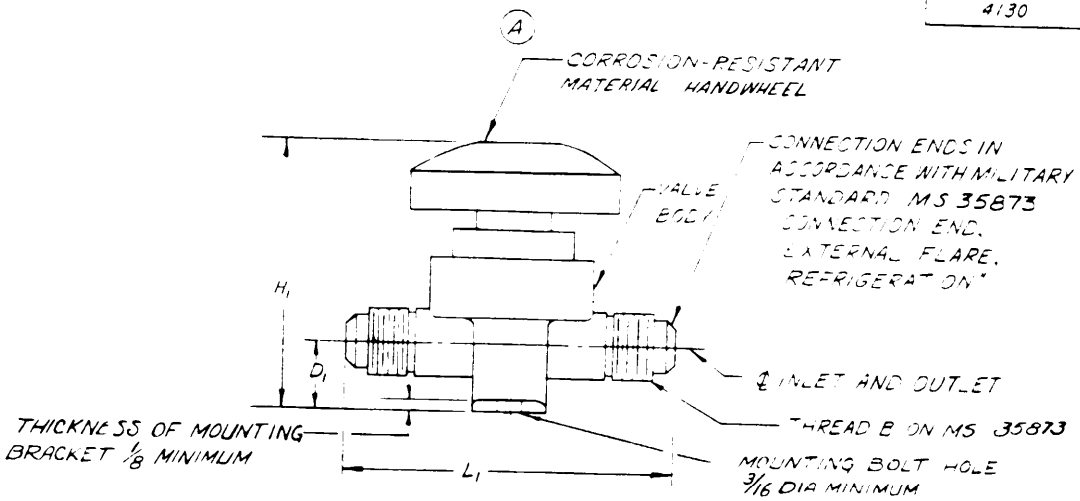
8. FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.

APPROVED 28 SEPT 62 REVISED Ⓐ FOR CHANGES SEE SHEETS 2 AND 3

P.A. ARMY — GL Other Cust NAVY — YD USAF — 82	TITLE VALVES, EXPANSION, THERMOSTATIC, REFRIGERANT 12	MILITARY STANDARD MS 17982
PROCUREMENT SPECIFICATION MIL-V-23450	SUPERSEDES.	SHEET 3

DD FORM 1 SEP 67 672-1 PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE. PROPOSED REVISION

FED SUP CLASS 4130



(A)

MS PART NO 1/	TUBE O.D. SIZE	L1 MIN	L1 MAX	H1 FULL OPEN MAX	D1 MIN
MS35881-1	1/4	2 5/8	3 1/8	3 5/8	9/16
MS35881-1U					
MS35881-2	3/8	2 5/8	3 1/8	3 5/8	9/16
MS35881-2U					
MS35881-3	1/2	3 1/8	3 5/8	3 7/8	5/8
MS35881-3U					
MS35881-4	5/8	3 1/2	4 1/8	4 1/8	3/4
MS35881-4U					

1/ MS DASH NUMBERS WITHOUT LETTER DESIGNATES VALVE BACKSEATING ABOVE DIAPHRAGM ONLY

MS DASH NUMBERS WITH LETTER "U" DESIGNATES VALVE BACKSEATING ABOVE AND BELOW DIAPHRAGM

NOTES

(A)

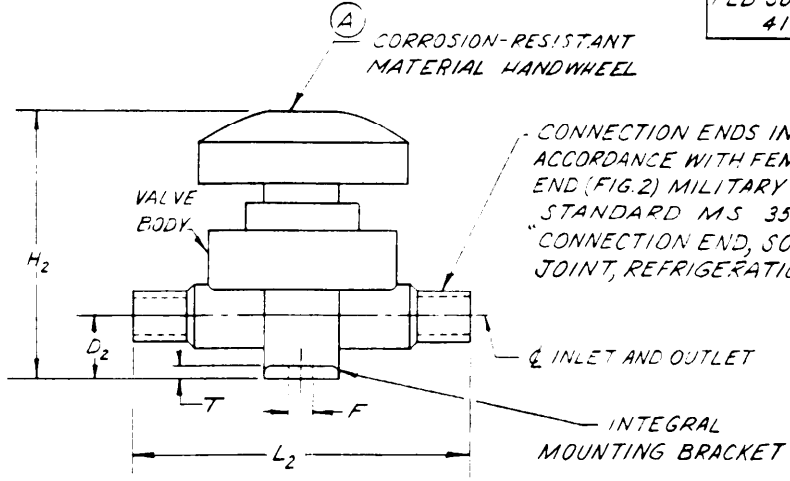
1. VALVE BODY:
   A. MATERIAL: FORGED BRASS, COMPOSITION 21 OF QQ-B-626.
   B. FINISH: MANUFACTURERS STANDARD COMMERCIAL.
2. OPERATING REQUIREMENTS:
   A. MAXIMUM OPERATING PRESSURE: 300 P.S.I.G.
   B. MAXIMUM OPERATING TEMPERATURE: 200 F.
   WHEN VALVE IS SUBJECTED TO MAXIMUM OPERATING REQUIREMENTS THERE SHALL BE NO LEAKAGE BY SEAT OR TO THE OUTSIDE AND THE VALVE SHALL OPEN READILY WITH MAXIMUM OPERATING PRESSURE ABOVE SEATING DISK.
3. SEATING DISK AND DIAPHRAGM.
   MATERIAL: RESILIENT, CORROSION-RESISTANT, LONG WEARING METAL OR COMPOSITION MATERIAL IMPERVIOUS TO ALL REFRIGERANTS OF THE CHLORO-METHANE FAMILY.
4. ALL SIZES SHOWN ARE OUTSIDE TUBE DIAMETER SIZES.
5. ALL DIMENSIONS GIVEN IN INCHES.
6. VALVE SHALL HAVE THE DIRECTION OF FLOW INDICATED ON BODY, UNLESS VALVE IS NON-DIRECTIONAL.
7. MOUNTING BOLT SPACING IS SUBJECT TO INDUSTRY PRACTICE.
8. VALVE SHALL HAVE AN UNRESTRICTED FLOW AREA AT LEAST EQUIVALENT TO THE AREA OF A CIRCLE HAVING A DIAMETER EQUAL TO THE INSIDE DIAMETER OF THE TUBING.
9. FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
10. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BID.

APPROVED 11 DECEMBER 1967 REVISED (A) 29 JULY 68

CUSTODIANS	MILITARY STANDARD	MS 35041
ARMY - GL NAVY - SH USAF - F	VALVES, ANGLES, STOP FLARE CONNECTION ENDS	
PROCUREMENT SPECIFICATION NONE	SUPERSEDES:	SHEET 1 OF 1

DD FORM 1 OCT 65 672-1 M-75

FED SUP CLASS 4130



MS PART NO. 1/	TUBE O.D. SIZE	L_2 MIN	L_2 MAX	H_2 FULL OPEN MAX	D_2 MIN	T MIN	F DIA MIN
MS35880-1 MS35880-1U	1/4	2 1/4	3 1/4	3 5/8	9/16	1/8	3/16
MS35880-2 MS35880-2U	3/8	2 1/4	3 1/2	3 5/8	9/16	1/8	3/16
MS35880-3 MS35880-3U	1/2	3 1/8	3 7/8	3 7/8	5/8	1/8	3/16
MS35880-4 MS35880-4U	5/8	3 1/2	4 3/8	4 1/8	3/4	1/8	3/16
MS35880-5 MS35880-5U	7/8	3 3/16	4 7/8	6	3/4	1/4	3/16
MS35880-6 MS35880-6U	1 1/8	4 15/16	6	7	15/16	1/4	25/64

1/ .MS DASH NUMBERS WITHOUT LETTER DESIGNATES VALVE BACKSEATING ABOVE DIAPHRAGM ONLY

MS DASH NUMBERS WITH LETTER "U" DESIGNATES VALVE BACKSEATING ABOVE AND BELOW DIAPHRAGM

NOTES

1. VALVE BODY:
   A. MATERIAL: FORGED BRASS, COMPOSITION 21 OF QQ-B-626.
   B. FINISH: MANUFACTURERS STANDARD COMMERCIAL.
2. OPERATING REQUIREMENTS:
   A. MAXIMUM OPERATING PRESSURE: 300 P.S.I.G.
   B. MAXIMUM OPERATING TEMPERATURE: 200 F.
   WHEN VALVE IS SUBJECTED TO MAXIMUM OPERATING REQUIREMENTS THERE SHALL BE NO LEAKAGE BY SEAT OR TO THE OUTSIDE AND THE VALVE SHALL OPEN READILY WITH MAXIMUM OPERATING PRESSURE ABOVE SEATING DISK.
3. SEATING DISK AND DIAPHRAGM.
   MATERIAL: RESILIENT, CORROSION-RESISTANT, LONG WEARING METAL OR COMPOSITION MATERIAL IMPERVIOUS TO ALL REFRIGERANTS OF THE CHLORO-METHANE FAMILY.
4. ALL SIZES SHOWN ARE OUTSIDE TUBE DIAMETER SIZES.
5. ALL DIMENSIONS GIVEN IN INCHES.
6. VALVE SHALL HAVE THE DIRECTION OF FLOW INDICATED ON BODY, UNLESS VALVE IS NON-DIRECTIONAL.
7. MOUNTING BOLT SPACING IS SUBJECT TO INDUSTRY PRACTICE.
8. VALVE SHALL HAVE AN UNRESTRICTED FLOW AREA AT LEAST EQUIVALENT TO THE AREA OF A CIRCLE HAVING A DIAMETER EQUAL TO THE INSIDE DIAMETER OF THE TUBING.
9. FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
10. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BID.

(A) APPROVED 11 DECEMBER 57 REVISED (A) 29 JULY 66

CUSTODIANS
ARMY-GL
NAVY-SH
USAF-82

MILITARY STANDARD

VALVES, PACKLESS STOP, SOLDER-JOINT CONNECTION ENDS

MS 35880

PROCUREMENT SPECIFICATION
NONE

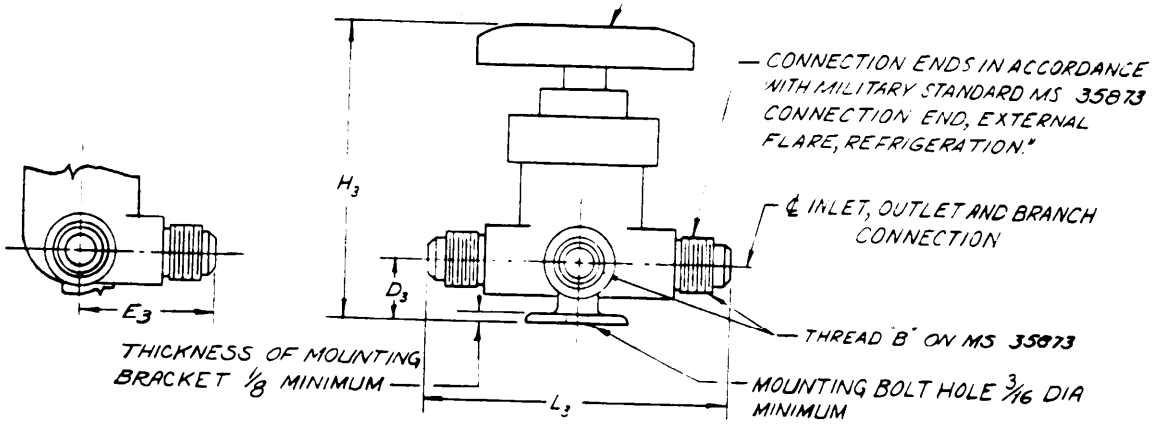
SUPERSEDES:

SHEET 1 OF 1

DD FORM 1 OCT 52 672-1

FED SUP CLASS 4130

(A) CORROSION-RESISTANT MATERIAL HANDWHEEL



(A)

MS PART NO. 1/	TUBE O.D. SIZE	L3 MIN	L3 MAX	H3 FULL OPEN MAX	D3 MIN	E3 MIN	E3 MAX
MS 35883-1	1/4	2 3/4	3 1/4	3 3/4	9/16	1 1/4	1 3/4
MS 35883-1U							
MS 35883-2	3/8	2 3/4	3 1/4	3 3/4	9/16	1 1/4	1 3/4
MS 35883-2U							
MS 35883-3	1/2	3	3 3/4	3 7/8	5/8	1 5/8	2 1/4
MS 35883-3U							
MS 35883-4	5/8	3 3/8	3 7/8	4 1/4	3/4	1 7/8	2 3/8
MS 35883-4U							

1/ MS DASH NUMBERS WITHOUT LETTER DESIGNATES VALVE BACKSEATING ABOVE DIAPHRAGM ONLY

MS DASH NUMBERS WITH LETTER "U" DESIGNATES VALVE BACKSEATING ABOVE AND BELOW DIAPHRAGM

(A)

NOTES

1. VALVE BODY:
   A. MATERIAL: FORGED BRASS, COMPOSITION 21 OF QQ-B-626.
   B. FINISH: MANUFACTURERS STANDARD COMMERCIAL
2. OPERATING REQUIREMENTS:
   A. MAXIMUM OPERATING PRESSURE: 300 P.S.I.G.
   B. MAXIMUM OPERATING TEMPERATURE: 200 F.
   WHEN VALVE IS SUBJECTED TO MAXIMUM OPERATING REQUIREMENTS THERE SHALL BE NO LEAKAGE BY SEAT OR TO THE OUTSIDE AND THE VALVE SHALL OPEN READILY WITH MAXIMUM OPERATING PRESSURE ABOVE SEATING DISK.
3. SEATING DISK AND DIAPHRAGM.
   MATERIAL: RESILIENT, CORROSION-RESISTANT, LONG WEARING METAL OR COMPOSITION MATERIAL IMPERVIOUS TO ALL REFRIGERANTS OF THE CHLORO-METHANE FAMILY.
4. ALL SIZES SHOWN ARE OUTSIDE TUBE DIAMETER SIZES.
5. ALL DIMENSIONS GIVEN IN INCHES
6. VALVE SHALL HAVE THE DIRECTION OF FLOW INDICATED ON BODY, UNLESS VALVE IS NON-DIRECTIONAL.
7. MOUNTING BOLT SPACING IS SUBJECT TO INDUSTRY PRACTICE.
8. VALVE SHALL HAVE AN UNRESTRICTED FLOW AREA AT LEAST EQUIVALENT TO THE AREA OF A CIRCLE HAVING A DIAMETER EQUAL TO THE INSIDE DIAMETER OF THE TUBING.
9. FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
10. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BID.

APPROVED 11 DECEMBER '57 REVISED (A) 29 JULY '66

CUSTODIANS
ARMY - CL
NAVY - SH
USAF - 82

PROCUREMENT SPECIFICATION
NONE

MILITARY STANDARD

VALVES, PACKLESS, STOP, THREE-WAY, FLARE CONNECTION ENDS

MS 35883

SUPERSEDES:

SHEET 1 OF 1

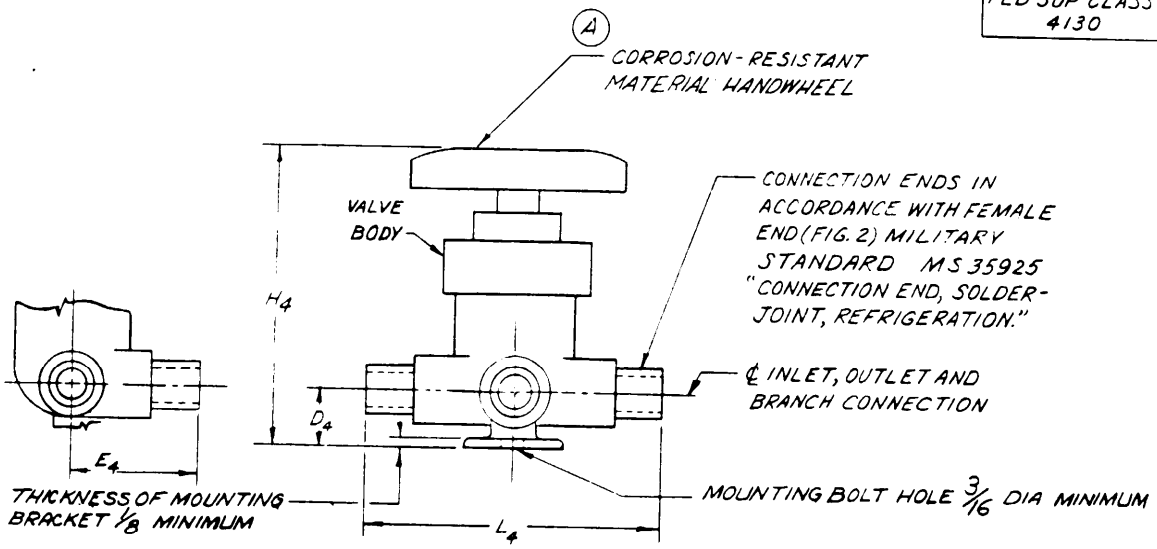
DD FORM 1 OCT 62 672-1 M 78

Review activities: Navy - SH & YD, USAF - 82
User activities: Army - MO, Navy - ME

Review and user information is current as of the date of this document. For future coordination of changes to this document, draft circulation should be based on the information in the current Federal Supply Classification Listing of DOD documents.

This military standard has been approved by the Department of Defense and is mandatory for use by all Departments and Agencies of the Department of Defense. Selection for all new engineering and design applications and for repetitive use shall be made from this document.

FED SUP CLASS 4130



MS PART NO. 1/	TUBE OD SIZE	L_4 MIN	L_4 MAX	H_4 FULL OPEN MAX	D_4 MIN	E_4 MIN	E_4 MAX
MS 35882-1	1/4	2 3/4	3 3/4	3 3/4	9/16	1 3/8	1 7/8
MS 35882-1 U							
MS 35882-2	3/8	2 3/4	3 3/4	3 3/4	9/16	1 3/8	1 7/8
MS 35882-2 U							
MS 35882-3	1/2	3	3 3/4	3 7/8	5/8	1 5/8	2 1/4
MS 35882-3 U							
MS 35882-4	5/8	3 3/8	3 7/8	4 1/4	3/4	1 7/8	2 3/8
MS 35882-4 U							

(A)

1/ MS DASH NUMBERS WITHOUT LETTER DESIGNATES VALVE BACKSEATING ABOVE DIAPHRAGM ONLY

MS DASH NUMBERS WITH LETTER "U" DESIGNATES VALVE BACKSEATING ABOVE AND BELOW DIAPHRAGM

NOTES

(A)

1. VALVE BODY:
   A. MATERIAL: FORGED BRASS, COMPOSITION 21 OF QQ-B-626.
   B. FINISH: MANUFACTURERS STANDARD COMMERCIAL.
2. OPERATING REQUIREMENTS:
   A. MAXIMUM OPERATING PRESSURE: 300 P.S.I.G.
   B. MAXIMUM OPERATING TEMPERATURE: 200 F.
   WHEN VALVE IS SUBJECTED TO MAXIMUM OPERATING REQUIREMENTS THERE SHALL BE NO LEAKAGE BY SEAT OR TO THE OUTSIDE AND THE VALVE SHALL OPEN READILY WITH MAXIMUM OPERATING PRESSURE ABOVE SEATING DISK.
3. SEATING DISK AND DIAPHRAGM.
   MATERIAL: RESILIENT, CORROSION-RESISTANT, LONG WEARING METAL OR COMPOSITION MATERIAL IMPERVIOUS TO ALL REFRIGERANTS OF THE CHLORO-METHANE FAMILY
4. ALL SIZES SHOWN ARE OUTSIDE TUBE DIAMETER SIZES.
5. ALL DIMENSIONS GIVEN IN INCHES.
6. VALVE SHALL HAVE THE DIRECTION OF FLOW INDICATED ON BODY, UNLESS VALVE IS NON-DIRECTIONAL.
7. MOUNTING BOLT SPACING IS SUBJECT TO INDUSTRY PRACTICE.
8. VALVE SHALL HAVE AN UNRESTRICTED FLOW AREA AT LEAST EQUIVALENT TO THE AREA OF A CIRCLE HAVING A DIAMETER EQUAL TO THE INSIDE DIAMETER OF THE TUBING.
9. FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
10. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BID.

APPROVED 11 DECEMBER '57 REVISED (A) 29 JULY '66

CUSTODIANS
ARMY - CL
NAVY - SH
USAF - 71

PROCUREMENT SPECIFICATION
NONE

MILITARY STANDARD

VALVES, PACKLESS, STOP, THREE-WAY, SOLDER-JOINT CONNECTION ENDS

MS 35882

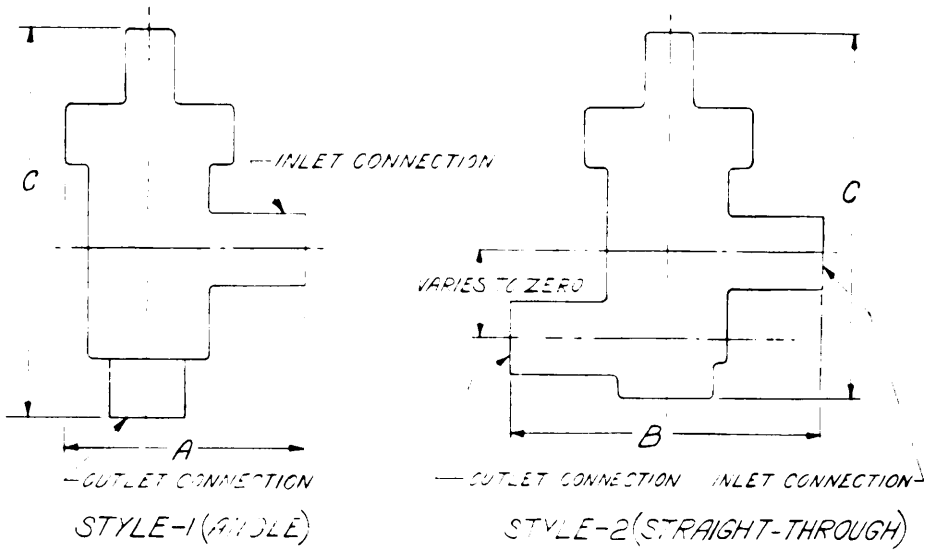
SUPERSEDES:

SHEET 1 OF 1

DD FORM 1 OCT 52 672-1

M-77

FED. SUP CLASS 4130



MS PART NO.	MIN. CAPACITIES (BTU/HR) EVAPORATOR TEMPERATURE -10F 10 PS MAX PRESSURE DROP	+20F 2 PS MAX PRESSURE DROP	INLET AND OUTLET CONNECTIONS (INCHES)	MAXIMUM DIMENSIONS (INCHES) A	B	C
17846-7	6,000	12,000	7/8	6 1/2	3	9 1/2
17846-8	9,000	18,000	7/8	7	9 1/2	12
17846-9	12,000	24,000	1 1/8	7	9 1/2	12

NOTES

1. FOR USE WITH DICHLORODIFLUOROMETHANE (CCL_2F_2) R-12 REFRIGERANT.
2. ALL CONNECTIONS SHALL BE FEMALE SOLDER TYPE CONFORMING TO MS 35925.
3. CAPACITIES BASED ON MAXIMUM PRESSURE DIFFERENTIAL OF 15 POUNDS BETWEEN VALVE SETTING AND NORMAL OPERATING SUCTION PRESSURE AND 100 F. VAPOR FREE ENTERING LIQUID TEMPERATURE.
4. MS PART NUMBERS 1 THROUGH 6 OF MS 17846 DATED 21 MAY 1962, DELETED BY THIS REVISION. PART NUMBERS 7, 8 AND 9 ADDED.
5. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BID OR REQUEST FOR PROPOSAL.
6. FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.

APPROVED 21 MAY 1962 REVISED (A) 9 APRIL 1965

REVIEW ACTIVITIES
ARMY - GL
NAVY - YD
AIR FORCE - 87

USER ACTIVITY
NAVY - YD

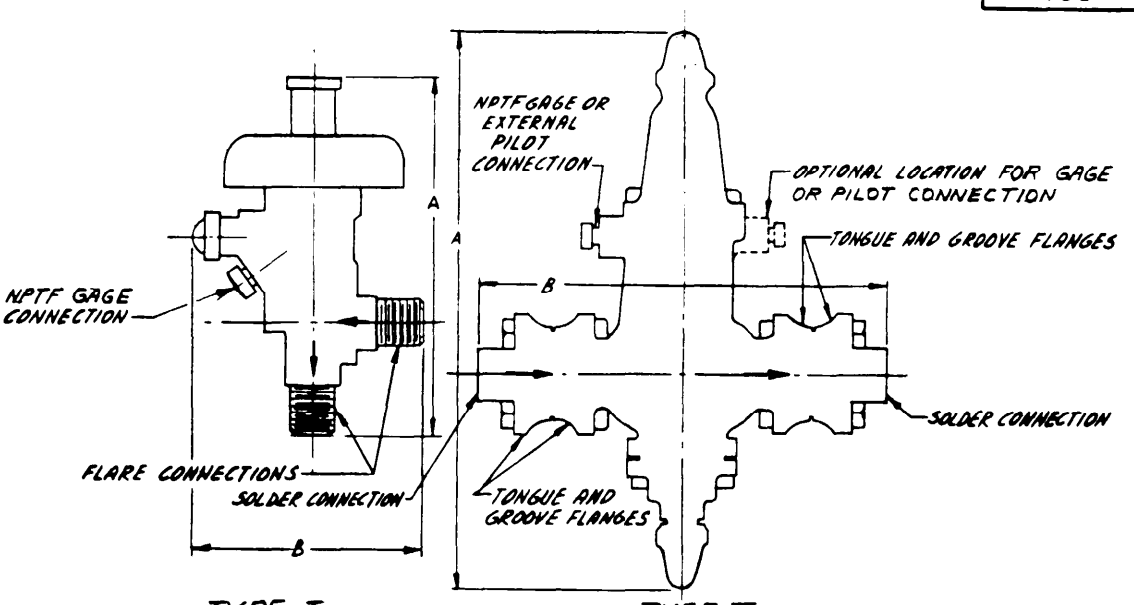
Review and User information is current as of the date of this document. For future coordination of changes to this document, draft circulation should be based on the information in the current Federal Supply Classification Listing of DOD Documents.

This military standard has been approved by the Department of Defense and is mandatory for use by all Departments and Agencies of the Department of Defense. Selection for all new engineering and design applications and for repetitive use shall be made from this document.

P.A. Army-GL Other Cust Navy-YD USAF-82	TITLE VALVES, PRESSURE REGULATING CRANKCASE, REFRIGERANT-12	MILITARY STANDARD MS 17846
PROCUREMENT SPECIFICATION MIL-V-2330	SUPERSEDES	SHEET 1 OF 1

DD FORM 1 SEP 67 672-1 (Coordinated) PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

FED. SUP CLASS 4130



TYPE I ANGLE PATTERN

TYPE II STRAIGHT-THROUGH PATTERN

DASH NUMBER	CAPACITIES IN BTU PER HOUR (MIN) AT 25F EVAPORATOR TEMP WITH A (MAX) PSI PRESSURE DROP ACROSS THE VALVE.	OVERALL DIMENSIONS (MAX.)		CONNECTIONS		
				END		GAGE NPTF (NOMINAL)
		A	B	TYPE	O.D. TUBE SIZE (NOMINAL)	
-1	6,800	6	5	I FLARE	5/8	1/8
-2	14,600	8	5	II SOLDER WITH OR WITHOUT FLANGES	7/8	1/4
-3	32,200	14 1/2	10 1/4	II SOLDER WITH FLANGES	1 1/8	1/4

NOTES

1. RATING CONDITION 135F (SATURATED) CONDENSING TEMPERATURE HAVING VAPOR-FREE LIQUID ENTERING EXPANSION VALVE AT 125F.
2. SETTING ADJUSTABLE FROM ZERO P.S.I.G TO 35 P.S.I.G PLUS OR MINUS 5 P.S.I.G.
3. FLARE CONNECTION IN ACCORDANCE WITH MS-35873.
4. SOLDER CONNECTION IN ACCORDANCE WITH MS-35925.
5. NPTF IN ACCORDANCE WITH MS-35926 or MS-35868.
6. DIMENSIONS IN INCHES.
7. REFERENCED DOCUMENTS SHALL BE THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BIDS OR REQUEST FOR PROPOSAL.
8. FOR DESIGN FEATURE PURPOSES THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.

A ENTIRE STANDARD REVISED

APPROVED 5 JUNE 1962 REVISED A 18 MAR 1969

P.A. ARMY - GL Other Cust NAVY - YD USAF - 82	TITLE VALVES, PRESSURE REGULATING, EVAPORATOR, REFRIGERANT -12	MILITARY STANDARD MS 17854
PROCUREMENT SPECIFICATION MIL-V-23318	SUPERSEDES:	SHEET 1 OF 1

DD FORM 1 SEP 67 672-1 (Coordinated)

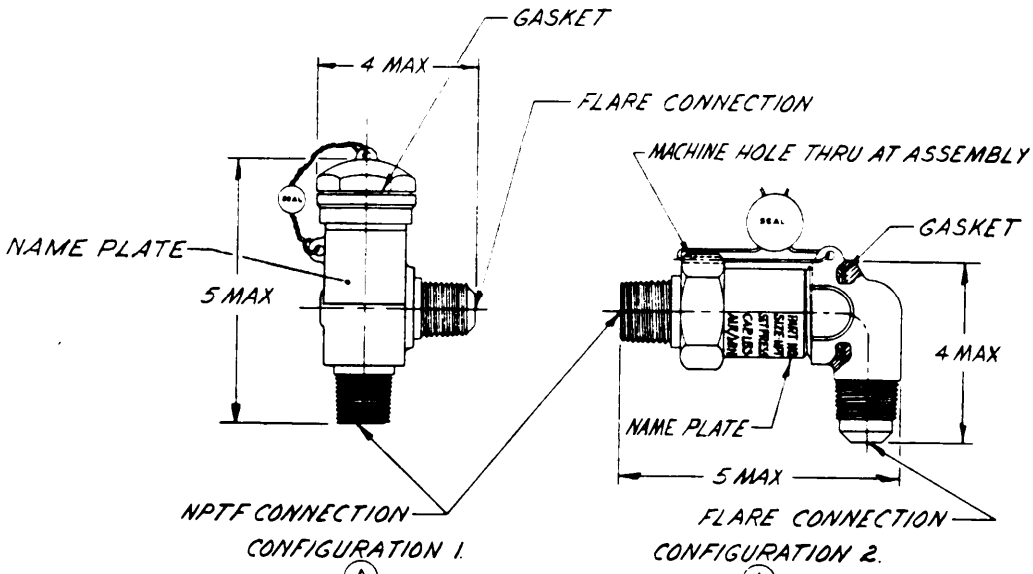
PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE.

M-186

Review Activities: Army - MR, CE, MI, SM; Navy - YD; USAF - 82
User: MC

This Military standard is mandatory for use by all Departments and Agencies of the Department of Defense. Selection for all new engineering and design applications and for repetitive use shall be made from this document.

FED. SUP CLASS 4130



(A)

PART NO.	CAPACITY LBS AIR/MIN (MIN)	RELIEF SETTING (P.S.I.G.)	CONNECTION SIZE (INCHES)	
			NPTF	FLARE
MS17415-1	3.2	300	3/8	3/8

(A)

NOTES (A)

1. FOR USE WITH DICHLORODIFLUOROMETHANE (CCl_2F_2) R-12, REFRIGERANT.
2. ALL CONNECTIONS SHALL BE MALE. FLARE CONNECTION SHALL CONFORM TO MS 35873. NPTF CONNECTION SHALL CONFORM TO MS 35868.
3. VALVE SHALL BE SPRING LOADED, ANGLE TYPE BODY, CONFIGURATION 1 OR 2.
4. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BID OR REQUEST FOR PROPOSAL.
5. FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.

APPROVED 2 JAN 62 REVISED (A) 24 NOV '65

Review activities:
Army - CR
Navy - YD
USAF - 82
User activities:
Army - MO
Navy - MC

Review and User information is current as of the date of this document. For future coordination of changes to this document, draft circulation should be based on the information in the current Federal Supply Classification Listing of DOD Documents.

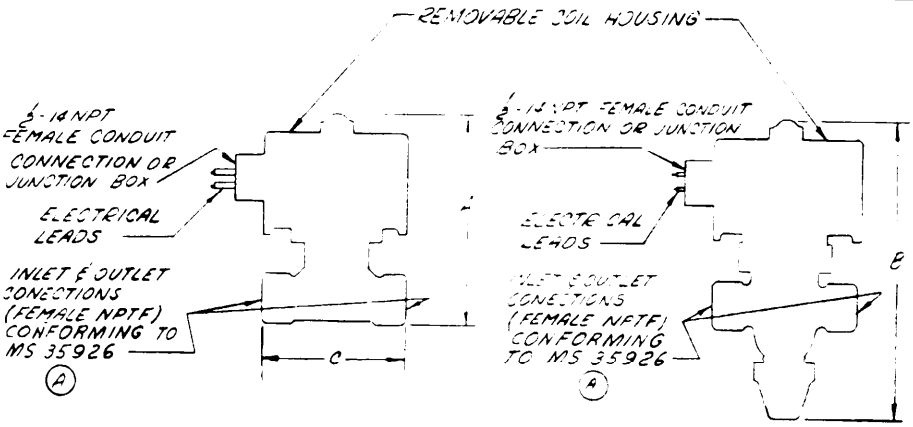
This military standard has been approved by the Department of Defense and is mandatory for use by all Departments and Agencies of the Department of Defense. Selection for all new engineering and design applications and for repetitive use shall be made from this document.

P.A. ARMY GL Other Cust USAF - 82 NAVY - YD	TITLE VALVE, SAFETY RELIEF, REFRIGERANT-12	MILITARY STANDARD MS 17415
PROCUREMENT SPECIFICATION MIL-V-23135	SUPERSEDES:	SHEET OF

DD FORM 1 SEP 67 672-1 (Coordinated)

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE.

FED. SUP CLASS 4130



STYLE 1 - WITHOUT MANUAL OPENING STEM

STYLE 2 - WITH MANUAL OPENING STEM

(A)

DASH NO.	TYPE	STYLE	MAX DIMENSIONS (IN.) A	B	C	CAP. RATING	ELEC. RATING	CONNEC-TION SIZE
1	1	1 or 2	6-1/4	8-1/4	3-1/4	3 TR	115 V 60 C	3/8 IN.
2	1	1 or 2	6-1/4	8-1/4	3-1/4	3 TR	208 V 60 C	3/8 IN.
3	1	1 or 2	6-1/4	8-1/4	3-1/4	3 TR	12 V DC	3/8 IN.
4	1	1 or 2	6-1/4	8-1/4	3-1/4	3 TR	24 V DC	3/8 IN.
5	1	2	--	8-1/2	3-1/4	7.5 TR	115 V 60 C	1/2 IN.
6	1	2	--	8-1/2	3-1/4	7.5 TR	208 V 60 C	1/2 IN.
7	1	2	--	8-1/2	3-1/4	7.5 TR	12 V DC	1/2 IN.
8	1	2	--	8-1/2	3-1/4	7.5 TR	24 V DC	1/2 IN.
9	2	1 or 2	8 --	8-1/2	3-1/4	2.5 CFM	115 V 60 C	1/2 IN.
10	2	1 or 2	8 --	8-1/2	3-1/4	2.5 CFM	208 V 60 C	1/2 IN.
11	2	1 or 2	8 --	8-1/2	3-1/4	2.5 CFM	12 V DC	1/2 IN.
12	2	1 or 2	8 --	8-1/2	3-1/4	2.5 CFM	24 V DC	1/2 IN.
13	2	2	--	8-3/4	3-1/4	5.0 CFM	115 V 60 C	1/2 IN.
14	2	2	--	8-3/4	3-1/4	5.0 CFM	208 V 60 C	1/2 IN.
15	2	2	--	8-3/4	3-1/4	5.0 CFM	12 V DC	1/2 IN.
16	2	2	--	8-3/4	3-1/4	5.0 CFM	24 V DC	1/2 IN.

MAXIMUM OPERATING PRESSURE DIFFERENTIALS (MOPD)

ELECTRIC CURRENT	PERCENT OF RATED VOLTAGE	MOPD (PSI)
AC	100	250
	85	200
DC	100	200
	80	170

(A) RATING CONDITIONS FOR LIQUID REFRIGERANT BASED ON A FLOW OF 3.9 LBS./MIN./TON OF REFRIGERATION WITH A 2 P.S.I. PRESSURE DROP ACROSS THE VALVE, A CONDENSING TEMPERATURE OF 100 F., AND A SUCTION TEMPERATURE OF 40 F. RATING CONDITIONS FOR REFRIGERANT GAS BASED ON A FLOW IN C.F.M. OF REFRIGERATION WITH A 5 P.S.I. PRESSURE DROP ACROSS THE VALVE, A CONDENSING TEMPERATURE OF 100 F., GAS WITH A 20 F.-SUPERHEAT ENTERING THE VALVE, AN EVAPORATOR TEMPERATURE OF 40 F.

NOTES

1. VALVES SHALL BE NORMALLY CLOSED.
2. VALVES SHALL OPERATE WHEN INSTALLED UP TO 20 DEGREES OF VERTICAL.
3. COILS SHALL BE REPLACEABLE.
(A) 4. COIL HOUSING ROTATES 360 DEGREES.
5. FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
6. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BID.

APPROVED 15 MAY 1962 REVISED (A) 30 AUG 1968

REVIEW ACTIVITIES
Army - ME
Navy - YD-SH
Air Force - 82

USER ACTIVITIES
Army - MEC

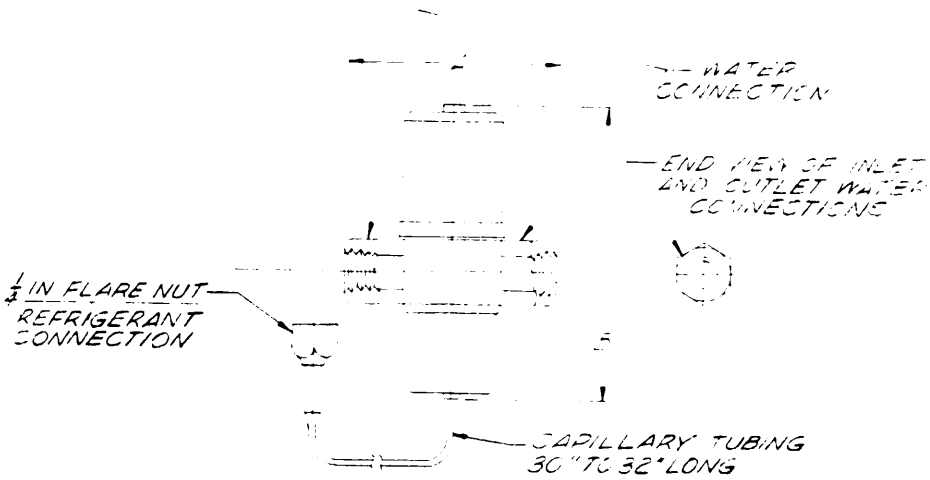
This military standard has been approved by the Department of Defense and is mandatory for use by all Departments and Agencies of the Department of Defense. Selection for all new engineering and design applications and for repetitive use shall be made from this document.

P.A. ARMY GL Other Cust ARMY GL NAVY YD USAF 82	TITLE VALVES, SOLENOID, REFRIGERANT-12	MILITARY STANDARD MS17841
PROCUREMENT SPECIFICATION MIL-V-23289	SUPERSEDES:	SHEET 1 OF 1

DD FORM 1 SEP 67 672-1 (Coordinated)

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE.

FED. SUP CLASS 4130



TOP OR BOTTOM POWER UNIT

DASH NO.	WATER INLET & OUTLET CONNECTIONS (INCHES) NPT	RATE OF WATER FLOW (GPM) MIN	MAX DIMENSIONS (INCHES) A	B
-1	3/8	6	2 15/16	7 5/16
-2	1/2	9	3 1/2	6 5/16
-3	3/4	15	3 11/16	8 1/2

NOTES

1. FOR USE WITH DICHLORODIFLUOROMETHANE (CCl_2F_2), R-12.
2. RATING CONDITIONS.
   (a) CONDENSER HOT GAS PRESSURE TO BE MAINTAINED 126 P.S.I.G.
   (b) WATER PRESSURE DROP ACROSS VALVE FOR RATED CAPACITY 25 P.S.I.
   (c) VALVE OPENING PRESSURE BELOW CONDENSER PRESSURE 25 P.S.I.
   (d) RANGE OF OPERATING HEAD PRESSURES 65 TO 200 P.S.I.G
   (e) ALLOWABLE WATER PRESSURES 125 P.S.I.G (MAX), 35 P.S.I.G (MIN).
   (f) MAXIMUM REFRIGERANT PRESSURE 235 P.S.I.G.
   (g) AMBIENT TEMPERATURE OPERATION 85 F, ± 10 F.
3. MATERIALS IN CONTACT WITH REFRIGERANT SHALL BE SUITABLE FOR USE WITH REFRIGERANT-12 AND OIL. METALS IN CONTACT WITH WATER SHALL BE CORROSION-RESISTANT.
4. DIRECTION OF FLOW OF WATER TO BE PERMANENTLY MARKED ON VALVE BODY.
5. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BIDS OR REQUEST FOR PROPOSAL.
6. FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.

APPROVED 21 FEB 62 REVISED (A) 22 OCT 65

REVIEW ACTIVITIES: ARMY - AO NAVY - YD AIR FORCE - 82

This military standard is approved by the Department of Defense and is mandatory for use by all Departments and Agencies of the Department of Defense. Selection for all new engineering and design applications and for repetitive use shall be made from this document.

P.A. ARMY - GL Other Cust NAVY - YD USAF - 82	TITLE VALVES, WATER REGULATING, REFRIGERANT-12	MILITARY STANDARD MS 17797
PROCUREMENT SPECIFICATION MIL-V-23181	SUPERSEDES:	SHEET OF

DD FORM 1 SEP 57 672-1 (Coordinated) PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

End Item Application of Standard Components

Standard Component (Military Standard No.)	End Item Application (Specification No.)	
17211	MIL-I-20564 R-10735 R-12574	R-13312 -43031
17241	MIL-R-10735 -12574 -13312	R-40633 -43031
17242	- -	
17243	MIL-R-40633	
17248 & 17291	MIL-R-10735 -12574 -13312	R-40633 -43031
17415	--	
17797	--	
17798	MIL-I-20564 R-10735 R-12574	R-13312 -40633 -43031
17810	MIL-R-10735 -12574	
17841	MIL-R-10735 -13312 -40633	
17843	MIL-R-10735 -12574 -13312	R-40633 -43031
17844	- -	
17846	MIL-R-10735 -12574 -13312	R-40633

Standard Component (Military Standard No.)	End Item Application (Specification No.)	
17854	—-	
17982	MIL-R-10735 -12574 -13312	R-40633 -43031
27900	MIL-I-20564	R-13312
27901	MIL-R-10735 R-12574	R-40633 -43031
35845	MIL-R-10735 -12574 -13312	R-40633 -43031
35880	MIL-R-10735 -12574 -13312	R-40633 -43031
35881	MIL-R-12574 -40633 -43031	
35882 & 35883	MIL-R-40633 R-43031	

SECTION THREE

ENGINEERING CRITERIA

SECTION THREE

PART 1

TABLE OF CONTENTS

SYSTEM CAPACITIES AND THE BALANCE CHART

This section deals with the method by which the capacities and low side operating conditions of systems made up of standard components and items of ancillary equipment can be predicted.

Discussion will be limited to systems using air cooled condensers and evaporators employing forced circulation air coolers.

Certain data pertinent to the selection of the various items for assembly into systems are summarized below.

COMPRESSORS

Figure 1, "Consolidated Capacity Chart", shows the capacity curves of all standard compressors at 135°F. condensing temperature. (Design condition for air cooled condenser application at 110°F. ambient).

There are eight (8) hermetic compressor capacity groups, and six (6) open type compressor capacity groups.

Capacity Groups A and B and Hermetic Capacity Groups H-5 and H-6 are for practical purposes interchangeable. All of the others vary sufficiently that they can be considered separate capacity groups.

Hermetic Compressors H-1, H-2 and H-3 are rated and protected at saturated suction temperatures not in excess of 25°F. This precludes their use for air conditioning and high temperature refrigeration application.

AIR COOLED CONDENSERS

There are six (6) sizes of military standard air cooled condensers which were designed for military applications and are designated by Roman numerals.

Commercial type air cooled condensers designated by Arabic numerals merely represent heat rejection capacities at 25°F. temperature difference, entering air to condensing temperature. These condensers extend the range above and below that of the military standard condensers to cover the available compressor capacity range for refrigeration applications, as follows:

Condenser No.	Heat Rejection Capacity BTU/Hr.
1	4500
2	6000
3	8500
4	13000
I	22300
II	35600
III	46000
IV	57000
5	70000
V	16000
VI	28000

EVAPORATORS

There are four (4) sizes of standard evaporators (forced air circulation) for refrigeration applications and are designated by Roman numerals.

Evaporators designatd by Arabic numerals represent capacities only at 10 F. temperate difference, entering air to evaporating refrigerant, and extend the range above and below that of the military standard evaporators to cover the available compressor capacity range, as follows:

Evaporator No.	Capacity BTU/Hr.
1	1075
2	2250
3	3150
4	4500
I	4500
II	6500
III	9000
IV	13000
5	18000
6	26000
7	39000
8	52000

Evaporators No. 1, 2, *3* and 4 are single circuited and are for use with expansion valves MS17982-1 and MS17982-2.

ANCILLARY EQUIPMENT

Connection sizes for heat interchangers, dehydrators, refrigerant control valves, eight glasses and strainers correspond to the greatest extent possible with system line sizes which have been determined by sound application engineering to be correct.

BALANCE CHARTS

The preliminary design of a refrigeration system involves the selection of a compressor-evaporator combination which will produce the required system capacity at acceptable low side temperature conditions, (coil temperature and temperature difference, air-to-gas).

This can be determined by the use of balance charts which will be discussed in the pages to follow and the method used to obtain the system capacity tables in Section III, Part II.

Having determined the compressor-evaporator combination which gives the required capacity at acceptable conditions, the assembly of the remaining components and requisite connecting piping is then a matter of application engineering.

Characteristic capacity curves of a refrigeration compressor at a constant speed are shown in Figure 2, Curves A and B. These indicate that as the suction pressure increases, the capacity of the compressor increases, due to the increased density of the suction gas, causing the compressor to pump a greater weight of refrigerant gas with each stroke of the piston.

Comparison of Curves A and B also indicates that a reduction of condensing temperature increases the compressor capacity.

The capacity of an evaporator depends on the amount of coil surface, the quantity of air being passed through the coil, the wet and dry bulb temperatures of this air, and the temperature of the refrigerant. If the quantity of air or if the temperature difference between the air and coil is increased, the capacity of the evaporator will increase and a greater quantity of refrigerant per unit time will be evaporated. The rate of refrigerant evaporation and heat absorption will decrease as the temperature difference or air quantity is lowered.

For a compressor running at constant speed, an increase in the rate of evaporation raises the saturated suction temperature and, conversely a decrease in the rate of evaporation will lower this temperature.

Figure 2, Curve C, shows a characteristic evaporator tune. C^1 shows the effect on the capacity of this evaporator of increasing the air flow, and Curve D shows the effect of increasing the coil surface 50 percent over that of C while maintaining the original air flow.

Further examination of Figure 2 shows that when the capacity of an evaporator is increasing, the capacity of the compressor is decreasing and that there is a point at which the two will be in balance and their capacities identical.

points 1 to 6, inclusive, Figure 2, indicate the capacities at which the various compressor-evaporator combinations plotted will balance out and the resulting coil (saturated suction) temperatures.

For each change of coil condition, the compressor will seek a balance by raising or lowering the suction temperature.

Points 1 to 6, inclusive, show the balance points or "system capacities" based purely on evaporator and compressor capacity characteristics and make no allowance for a reduction of compressor capacity incident to the inevitable pressure drop in the compressor suction line.

The magnitude of this pressure drop is, of course, dependent on the length of the suction line, the number of fittings, and the resistances of the liquid-to-suction heat interchanger and flow central devices. This drop, measured in psi., is readily convertible to degrees F., from which the new saturated suction temperature and compressor capacity can be obtained. The fcllowing Table, based on the thermodynamic properties of Refrigerant 12, shows the degree F. change per one psi. pressure drop at selected values of saturated suction temperature.

TABLE

Degree F. Change per One Psi. Pressure Drop

Suct. Temp.	-20	-15	-10	- 5	0	+5	+10	+15
change °F.	2.7	2.5	2.3	2.15	2	1.85	1.75	1.6
Suct. Temp	+20	+25	+30	+35	+40	+45	+50	
Change °F.	.15	1.4	1.3	1.2	1.1	1.05	1.0	

The above Table indicates that the effect of suction line pressure drop is most pronounced at low saturated suction temperatures, the same region in which the compressor capacity falls off rapidly.

Referring to Figure 2, Point 3; evaporator D with air entering at +1OF. will balance out with compressor B at a capacity of 17,500 BTU/Hr., coil temperature of (+)1.3F, and resulting TD, coil to entering air of 8.7 F. This neglects any suction line pressure drop.

Assuming a drop of *2* psi., the balance point will be at Point_3[1], giving a system capacity of 15800, a coil temperature and TD of (-)2.7F. and 12.7F., respectively.

A pressure drop of 2 psi. has caused a reduction in capacity of almost 10 percent.

The data contained in the System Capacity Tables of Section III, Part II has been obtained in the above manner. A pressure drop of 2 psi. was used since the suction lines in the compact military refrigeration equipment are relatively short. The method of obtaining the balance points can be adjusted to any desired pressure drop.

MIL-STD COMPRESSORS

REFRIGERANT 12

CONSOLIDATION OF CAPACITY CURVES

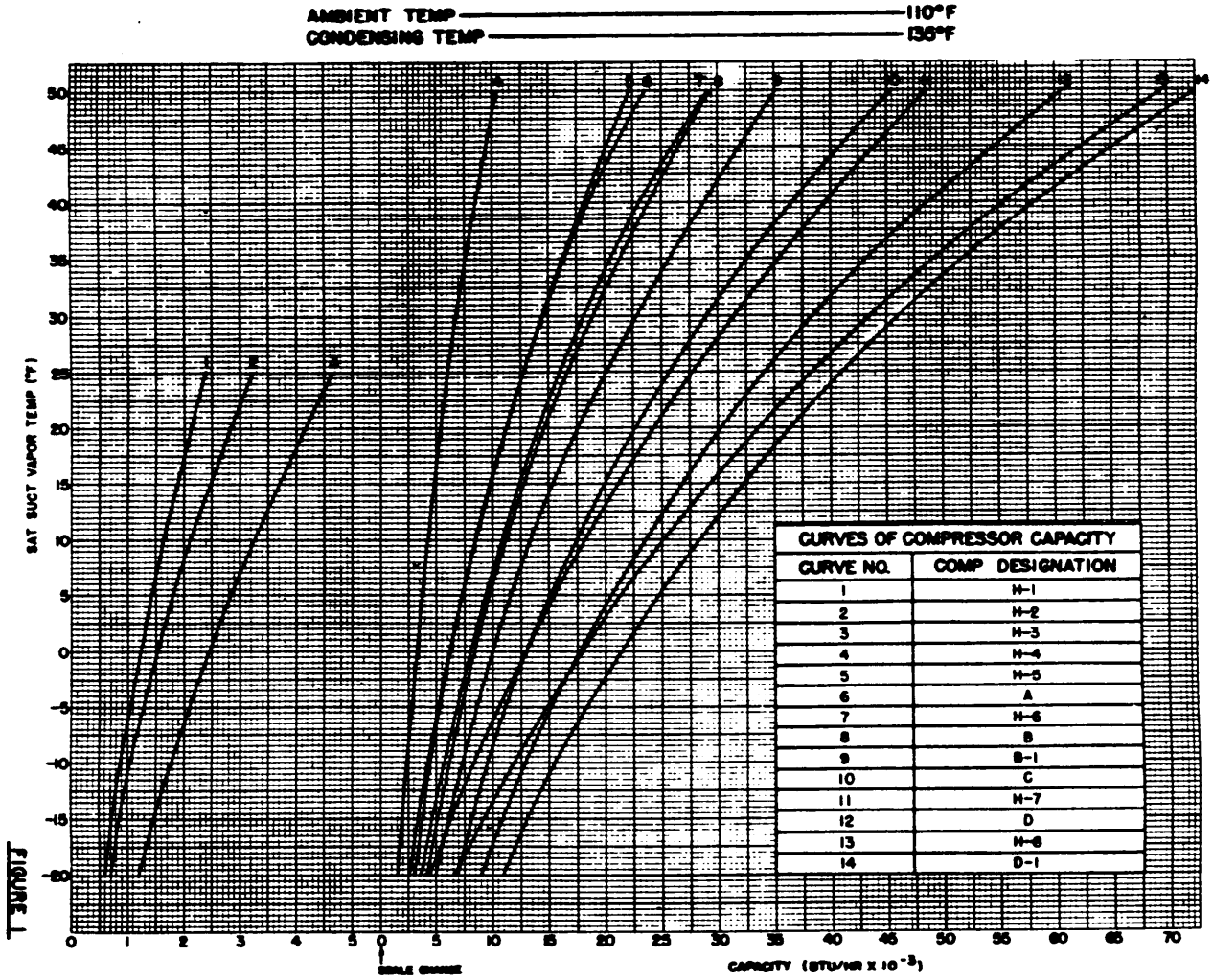
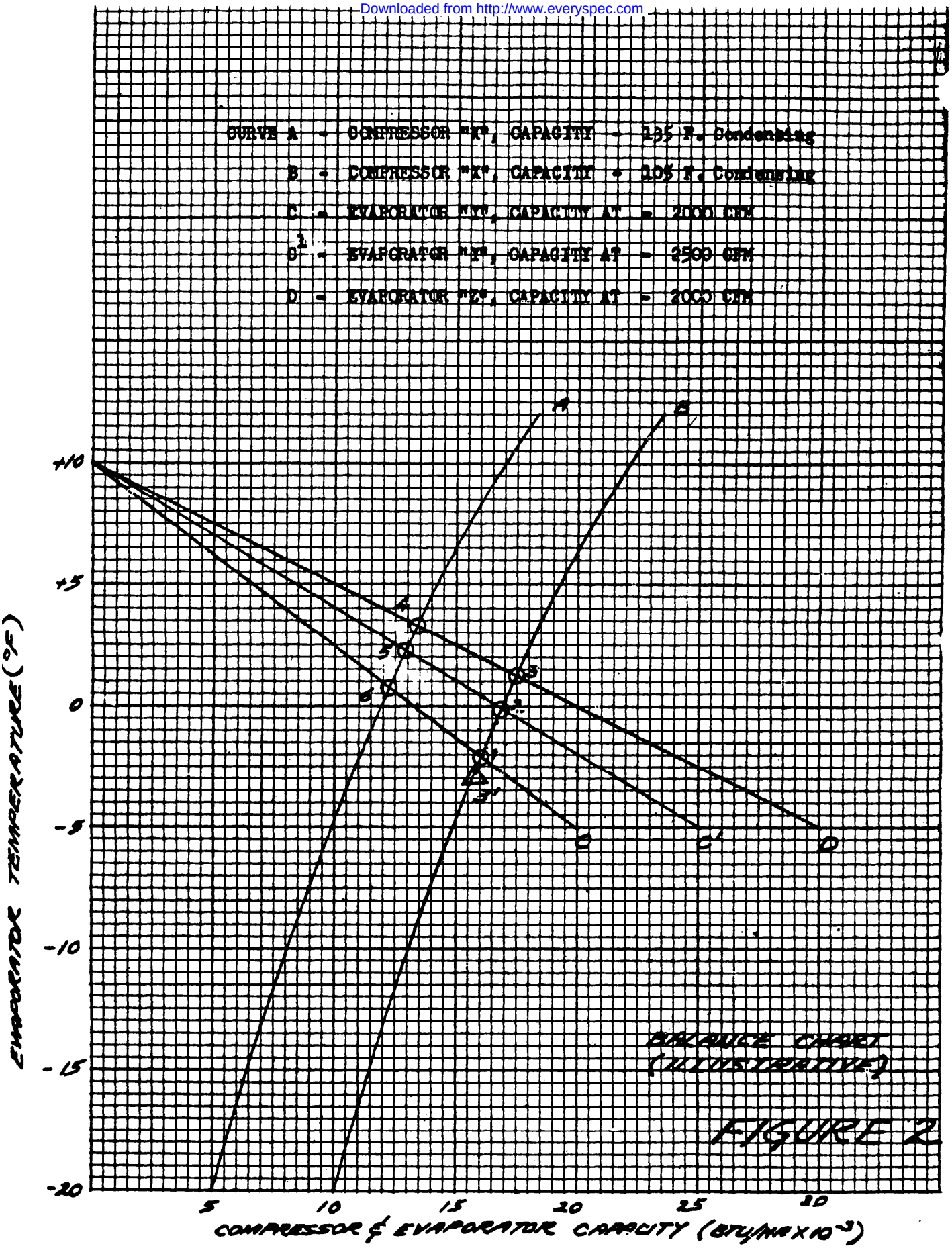


FIGURE 1



BALANCE CHART
(ILLUSTRATIVE)

FIGURE 2

SECTION THREE

PART II

REFRIGERATION SYSTEMS

REFRIGERATION SYSTEMS

System capacities and Bills of Material for refrigeration systems to maintain refrigerator temperatures of from (-) 5 F. to +35 F., inclusive, are detailed in the following pages.

Use of this information assumes that the application engineer will perform the basic work of computing the heat load for a given requirement. Then by referring to the section containing the various systems which will produce the required refrigerator temperature, select a system that comes closest to the requirement.

If application design indicates that the suction line pressure drop exceeds materially the 2 psi. drop on which the tabulated capacities were based, then all necessary data is contained in this handbook to construct a balance chart from which the desired capacity at acceptable conditions of temperature difference can be picked off and a Bill of Material for the major remaining items selected.

In short, the information contained in Section II is sufficient for the applications engineer to make up a standard system of required capacity, but not that by which the capacity (heat load) may be computed.

System Capacities and Bills of Material for low and medium temperature systems as obtained by use of the balance chart are contained in pages 97 to 137.

Data pertinent to all systems and not included in the above are as follows:

(a) Air cooled condensers only are used.
(b) Entering condenser air (ambient). 110°F.
(c) Refrigerant condensing temperature. 135°F.
(d) Suction line pressure drop 2 psi.

The equivalent pressure drop in °F., saturated suction, for refrigerant 12 as shown on the following sheets, is obtained at a temperature 10°F. lower than the refrigerator temperature as shown.

Selections for compressors, evaporators, condensers, thermostatic expansion valves, receivers and heat interchangers are included as well as recommendations for line sizes. Identifying numbers refer to applicable standard part number.

Selections for the remaining items of ancillary equipment have been omitted for the following reasons:

(a) Liquid line driers, strainers and sight glasses are picked to correspond to the selected liquid line size and are omitted in the interest of brevity.

(b) Suction (crankcase) pressure regulators are used to keep the compressor power demand, dependent on t-he saturated suction temperature, safely within the power capabilities of the applied prime mover. Consequently, their use would be dictated by the maximm power input that the application engineer places on the compressor prime mover.

(c) Evaporator pressure regulator use is governed by the character of the product load and the necessity or desirability of maintaining the refrigerator temperature within narrow limits.

(d) Remaining items of ancillary equipment have been standardized in capacities, operating ranges and connection sizes to provide ample coverage for systems within the scope of this handbook and selections are not listed in the interest of brevity.

DESIGN CONDITIONS FOR RATING MILITARY STANDARD MOBILE FIELD TYPE REFRIGERATION SYSTEMS

Ambient minimum Dry Bulb - 110°F.

Compressor Capacities Open-Type Compressors	Air Cooled Condensers	Water Cooled Condensers
Condensing Temperatures	135 F.	105 F.
Evaporating Temperatures	(-)10 F. & 25 F.	(-)10 F. & 25 F.
Refrigerant Suction Temps.	65 F.	65 F.
Compressor Discharge Temps. (max.)	200 psig.	130 psig.
Hermetic Compressors		
Condensing Temperatures	135 F.	105 F.
Evaporating Temperatures	(-)l0 F. & 25 F.	(-)10 F. & 25 F.
Refrigerant Suction Temperatures:		
at (-)10 F. Evaporating	50 F.	50 F.
at 25 F. Evaporating	65 F.	65 F.

Condensers

Heat Rejection Effects		
Air Entering Condenser, Temperatures	110 F.	
Refrigerant Condensing Temperatures	135 F.	
Cooling Water Inlet, Temperatures	-	85 F.
Cooling Water Outlet, Temperatures	-	98 F.

Evaporators

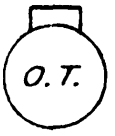
Grcss Cooling Effects		
Refrigerant Evaporating Temperatures	(-)10 F.	(-)10 F.
Air Entering Evaporating, Temperatures	0 F.	0 F.
Air Leaving Evaporator, Temp. (max.)	(-) 5 F.	(-) 5 F.

In all cases, the refrigeration field equipment shall operate satisfactorily when totally exposed to solar radiation equivalent to 360BTU/sq.ft./hr.

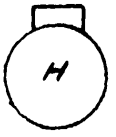
In all cases, refrigeration field equipment shall operate satisfactorily on a slope inclined fifteen (15) degrees from the horizontal plane in any direction.

In all cases, refrigeration field equipment shall operate satisfactorily in a maximum rate of rain precipitation of three (3) inches per hour.

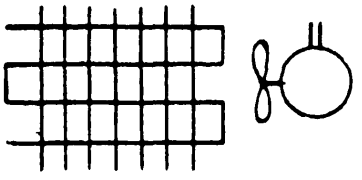
The maximum heat gain of the structure to be cooled by refrigeration should be computed on the basis of a 110°F differential between outside and inside ambient dry bulb temperature (zero F. and 110°F). This maximum heat gain is based on the storage of frozen food products at a temperature of zero F.



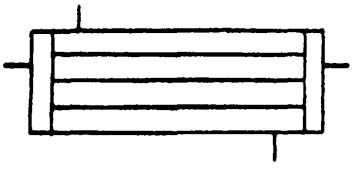
* COMPRESSOR, OPEN TYPE



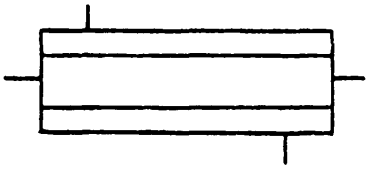
* COMPRESSOR, HERMETIC



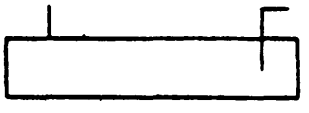
CONDENSER, AIR COOLED
FINNED, FORCED AIR



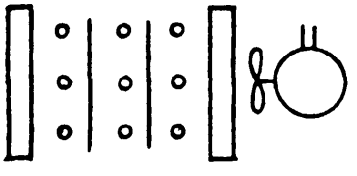
CONDENSER, WATER COOLED
SHELL AND TUBE



CONDENSER, WATER COOLED
CONCENTRIC TUBE-IN-TUBE



RECEIVER, HORIZONTAL

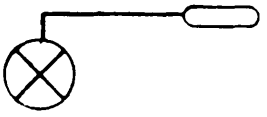


EVAPORATOR, MANIFOLDED
FINNED, FORCED CONVECTION

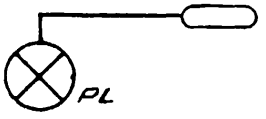
NOTES:

1. ASRE Handbook of fundamentals 1967
2. *Symbols not ASRE standard.

GRAPHICAL SYMBOLS
REFRIGERATION SYSTEMS

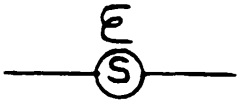


* EXPANSION VALVE, THERMOSTATIC, INTERNAL EQUALIZER



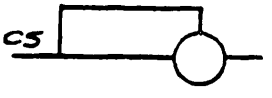
* EXPANSION VALVE, THERMOSTATIC, INTERNAL EQUALIZER, INCORPORATING PRESSURE LIMIT MEANS

* EXPANSION VALUE, THERMOSTATIC. EXTERNAL EQUALIZER

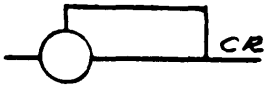


SOLERIOD VALVE

EVAPORATOR PRESSURE REGULATING VALVE, THROTTLING TYPE, EVAPORATOR SIDE



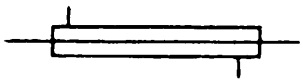
COMPRESSOR SUCTION VALVE,. PRESSURE LIMITING, THROTTLING TYPE, COMPRESSOR SIDE



* CONDENSER PRESSURE REGULATOR (FUNCTIONAL DESCRIPTION - NOT A SPECIFIC PIECE OF EQUIPMENT)

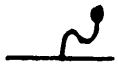
DRIER

STRAINER



HEAT EXCHANGER

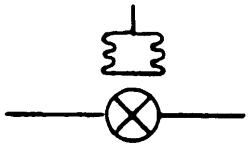
SIGHT GLASS



FUSIBLE PLUG

*CHECK VALVE

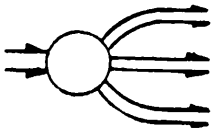
SAFETY (RELIEF) VALVE, SCREW CONNECTIONS



WATER REGULATING VALVE,
PRESSURE OPERATED

* STOP VALUE

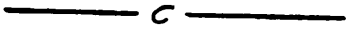
* STOP VALVE ANGLE



* DISTRIBUTOR

* DUAL PRESSURE CONTROL
WITH HIGH PRESSURE CUTOUT

* DUAL TEMPERATURE CONTROL
WITH HIGH PRESSURE CUTOUT



CONDENSER WATER FLOW

CONDENSER WATER RETURN

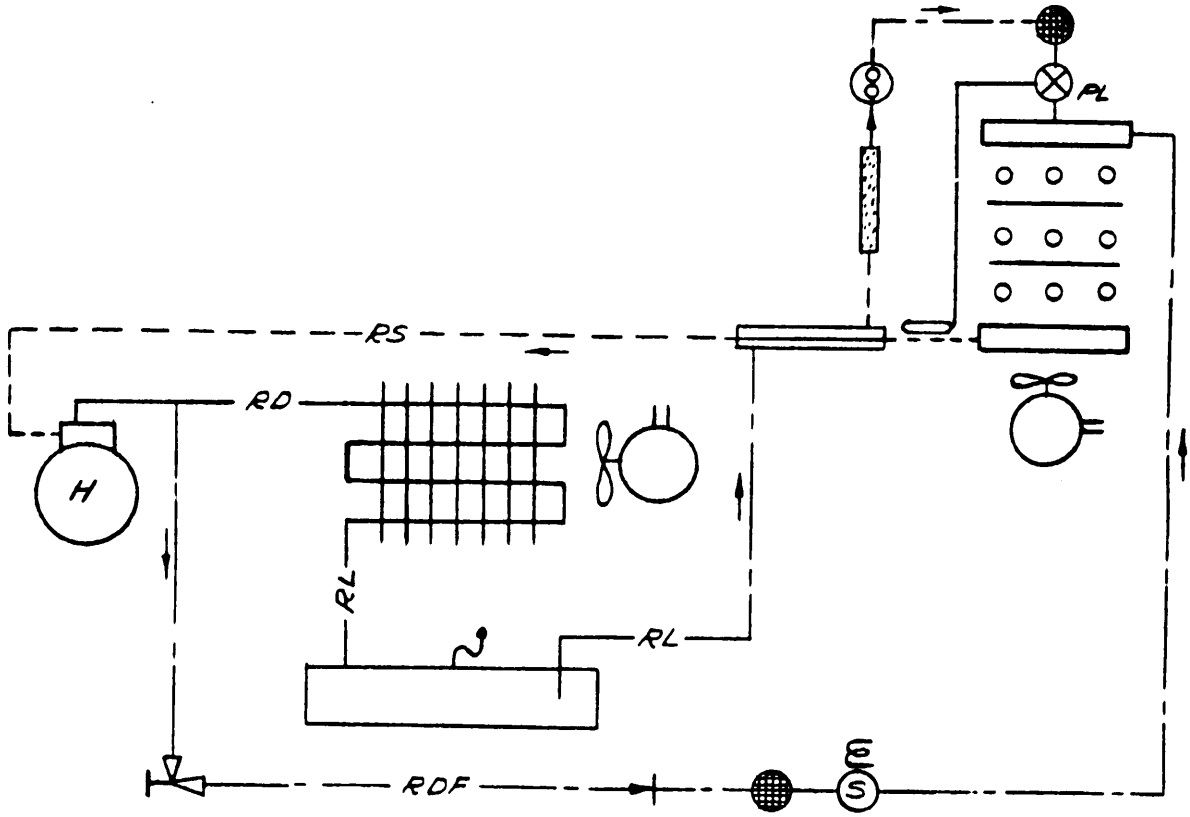
REFRIGERANT DISCHARGE

* REFRIGERANT DISCHARGE, DEFROST

REFRIGERANT SUCTION

* REFRIGERANT LIQUID

GRAPHICAL SYMBOLS
REFRIGERATION SYSTEMS



NOTES:

1. ALL SYMBOLS in accordance with Pages 99 - 103

2. HOT GAS DEFROST FEATURE is optional.

SYSTEMS, REFRIGERATION,
LOW AND MEDIUM TEMPERATURE
USING FRACT.H.P. COMPRESSORS

LOW TEMPERATURE REFRIGERATION SYSTEMS

Fractional

Capacities Based on Use of Standard Hermetic Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of (-) 5° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Inter-chgr. No.	Line Sizes Liq.	Line Sizes Suct.
F(-)5-1	650	-12.5	7.5	H-1	1	1	1	1	1	3/8	3/8
2	750	-13.5	8.5	H-2	1	1	1	1	1	↑	1/2
3	900	-10.0	5.0	H-2	1	2	1	1	1		1/2
4	1075	-17.5	12.5	H-3	1	1	1	1	1		1/2
5	1225	-19.5	14.5	H-4	1	1	1	1	1		5/8
6	1350	-12.3	7.3	H-3	1	2	1	1	1		1/2
7	1425	-10.5	5.5	H-3	1	3	1	1	1		1/2
8	1600	-13.8	8.8	H-4	1	2	1	1	1		5/8
9	1750	-11.7	6.7	H-4	1	3	1	1	1		5/8
↓ 10	1900	-10.0	5.0	H-4	1	4	1	1	1	↓	5/8

LOW TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Fractional Hermetic Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of 0° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Interchgr. No.	Line Sizes Liq.	Line Sizes Suct.
F-0-1	800	- 8.6	8.6	H-1	1	1	1	1	1	3/8	3/8
2	900	-10.0	10.0	H-2	1	1	1	1	1		1/2
3	1050	- 5.8	5.8	H-2	1	2	1	1	1		1/2
4	1275	-14.0	14.0	H-3	1	1	1	1	1		1/2
5	1600	- 8.4	8.4	H-3	1	2	1	1	1		1/2
6	1700	- 6.5	6.5	H-3	1	3	1	1	1		1/2
7	1900	-10.0	10.0	H-4	1	2	1	1	1		5/8
8	2050	- 7.8	7.8	H-4	1	3	1	1	1		5/8
9	2200	- 6.0	6.0	H-4	1	4	1	1	2		5/8

LOW TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Fractional Hermetic Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of + 5° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Inter-chgr. No.	Line Sizes Liq.	Line Sizes Suct.
F-5-1	925	-5.0	10.0	H-1	1	1	1	1	1	3/8	3/8
2	1050	- .5	5.5	H-1	1	2	1	1	1	"	3/8
3	1050	-6.5	11.5	H-2	1	1	1	1	1	"	1/2
4	1250	-1.6	6.6	H-2	1	2	1	1	1	"	1/2
5	1350	0.0	5.0	H-2	1	3	1	1	1	"	1/2
6	1825	-4.6	9.6	H-3	1	2	1	1	1	"	1/2
7	2000	-2.4	7.4	H-3	1	3	1	1	1	"	1/2
8	2125	- .5	5.5	H-3	1	4	1	1	2	"	1/2
9	2200	-6.5	11.5	H-4	1	2	1	1	2	"	5/8
10	2400	-4.0	9.0	H-4	1	3	1	1	2	"	5/8
11	2600	-1.8	6.8	H-4	1	4	1	1	3	3/8	5/8

LOW TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Fractional Hermetic Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of +10° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Interchgr. No.	Line Sizes Liq.	Line Sizes Suct.
F-10-1	1150	-1.0	11.0	H-1	1	1	1	1	1	3/8	3/8
2	1200	-3.0	13.0	H-2	1	1	1	1	1	↑	1/2
3	1250	3.8	6.2	H-1	1	2	1	1	1		3/8
4	1475	2.5	7.5	H-2	1	2	1	1	1		1/2
5	1550	4.3	5.7	H-2	1	3	1	1	1		1/2
6	2150	- .8	10.8	H-3	1	2	1	1	1		1/2
7	2300	1.7	8.3	H-3	1	3	1	1	2		1/2
8	2475	3.9	6.1	H-3	1	4	1	1	2		1/2
9	2500	-3.0	13.0	H-4	1	2	1	1	2		5/8
10	2800	0.0	10.0	H-4	1	3	1	1	2	↓	5/8
↓ 11	3000	3.9	6.1	H-4	1	4	1	1	3	3/8	5/8

LOW TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Fractional Hermetic Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of 15° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Inter-chgr. No.	Line Sizes Liq.	Line Sizes Suct.
F-15-1	1350	2.5	12.5	H-1	1	1	1	1	1	3/8	3/8
2	1425	8.0	7.0	H-1	1	2	1	1	1		1/2
3	1400	.5	14.5	H-2	1	1	1	1	1		1/2
4	1500	9.8	5.2	H-1	1	3	1	1	1		1/2
5	1700	6.5	8.5	H-2	1	2	1	1	1		1/2
6	1825	8.5	6.5	H-2	1	3	1	1	1		1/2
7	2425	3.0	12.0	H-3	1	2	1	1	2		1/2
8	2625	5.8	9.2	H-3	1	3	1	1	2		1/2
9	2800	8.0	7.0	H-3	1	4	1	1	2		1/2
10	2900	.6	14.4	H-4	1	2	1	1	2		5/8
11	3150	3.5	11.5	H-4	2	3	1	1	3		5/8
12	3450	6.5	8.5	H-4	2	4	1	1	3		5/8

MEDIUM TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Fractional Hermetic Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of 20° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Interchgr. No.	Line Sizes Liq.	Line Sizes Suct.
F-20-1	1350	6.0	14.0	H-1	1	1	1	1	1	3/8	3/8
2	1600	12.0	8.0	H-1	1	2	1	1	1		3/8
3	1700	14.0	6.0	H-1	1	3	1	1	1		3/8
4	1950	10.4	9.6	H-2	1	2	1	1	1		1/2
5	2100	12.6	7.4	H-2	1	3	1	1	1		1/2
6	2225	14.5	5.5	H-2	1	4	1	1	1		1/2
7	2725	6.5	13.5	H-3	1	2	1	1	2		1/2
8	2975	9.6	10.4	H-3	1	3	1	1	2		1/2
9	3200	12.3	7.7	H-3	2	4	1	1	3		1/2
10	3550	7.5	12.5	H-4	2	3	2	1	3		5/8

MEDIUM TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Fractional Hermetic Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of 25° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Inter-chgr. No.	Line Sizes Liq.	Line Sizes Suct.
F-25-1	1500	10.0	15.0	H-1	1	1	1	1	1	3/8	3/8
2	1800	16.2	8.8	H-1	1	2	1	1	1		3/8
3	1900	18.5	6.5	H-1	1	3	1	1	1		3/8
4	2200	14.1	10.9	H-2	1	2	1	1	2		1/2
5	2400	13.6	8.4	H-2	1	3	1	1	2		1/2
6	2525	18.8	6.2	H-2	1	4	1	1	2		1/2
7	3000	10.3	14.7	H-3	2	2	1	1	3		1/2
8	3300	13.5	11.5	H-3	2	3	1	1	3		1/2
9	3525	16.5	8.5	H-3	2	4	2	1	3		1/2
10	3975	11.1	13.9	H-4	2	3	2	1	3		5/8
11	4350	14.5	10.5	H-4	3	4	2	1	4	3/8	5/8

MEDIUM TEMPERATURE REFRIGERATION SYSTEMS

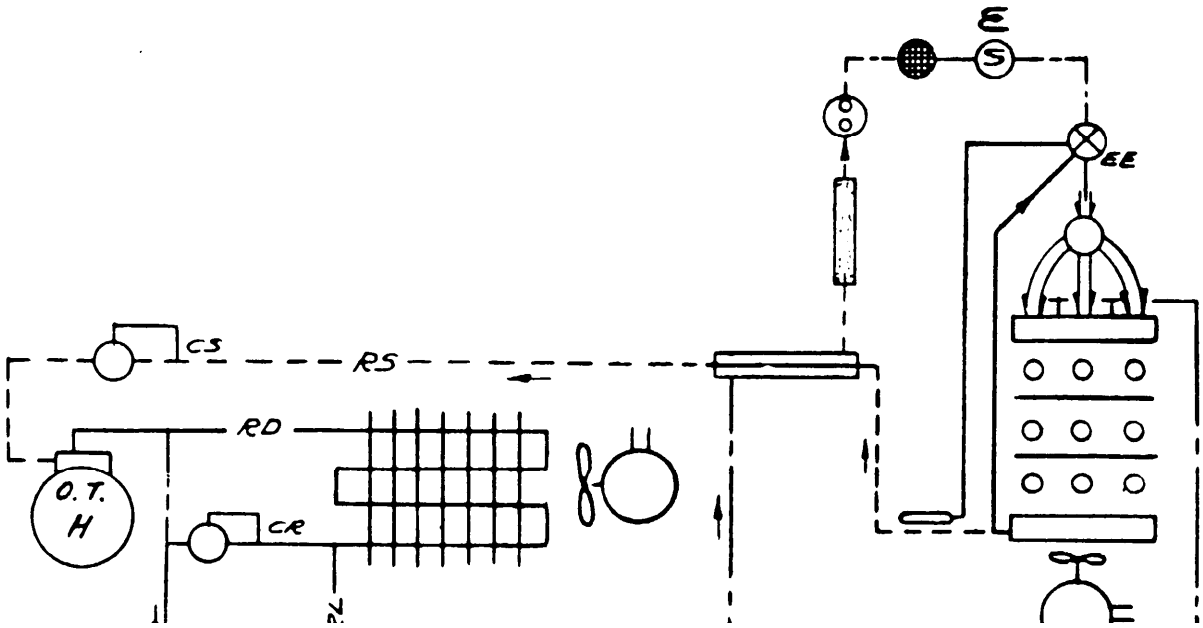
Capacities Based on Use of Standard Fractional Hermetic Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of 30° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Interchgr. No.	Line Sizes Liq.	Suct.
F-30-1	2000	20.5	9.5	H-1	1	2	1	1	1	3/8	3/8
2	2125	22.8	7.2	H-1	1	3	1	1	2		3/8
3	2475	18.0	12.0	H-2	1	2	1	1	2		1/2
4	2675	20.8	9.2	H-2	1	3	1	1	2		1/2
5	2850	23.0	7.0	H-2	1	4	1	1	2		1/2
6	3650	17.5	12.5	H-3	2	3	1	1	3		1/2
7	3925	23.0	7.0	H-3	2	4	2	1	3		1/2
8	4850	18.4	11.6	H-4	3	4	2	1	4		5/8

MEDIUM TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Fractional Hermetic Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of 35° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Inter-chgr. No.	Line Sizes Liq.	Suct.
F-35-1	2200	24.5	10.5	H-1	1	2	1	1	2	3/8	3/8
2	2750	22.0	13.0	H-2	1	3	1	1	2		1/2
3	3000	24.7	10.3	H-2	2	3	1	1	2		1/2
4	4050	22.5	13.5	H-3	2	3	1	1	3		1/2
5	4350	24.7	10.3	H-3	2	4	1	1	4		1/2
6	5350	22.5	12.5	H-4	3	4	2	1	4	3/8	5/8



NOTES:

1. ALL SYMBOLS in accordance with Pages 99 - 103
2. USE OF MULTI-CIRCUIT EVAPORATOR AND PRESSURE DISTIBUTOR optional.
3. CONDENSER PRESSURE REGULATORS are not Military Standard and must be specified functionally in the procurement papers.
4. DUAL TEMPERATURE OR DUAL PRESSURE CONTROL with high pressure cutout not shown.

SYSTEMS, REFRIGERATION,
LOW TEMPERATURE USING
INTEGRAL H.P. COMPRESSORS

LOW TEMPERATURE REFRIGERATION SYSTEMS
(At Standard) Design Conditions)

System Designation	Motor HP	Refrig. Temp. °F.	Sat. Suct. °F.	Compr. Suct. °F.	Compr. Cap. Btu/hr
H-1-L	1/3 *	0	(-)10	50	900
H-2-L	1/2 *				1075
H-3-L	3/4 *				1755
H-4-L	1 *				2200
H-5-L	2 *			50	4350
A-L	2			65	4500
H-6-L	3 *			50	5600
B-L	3			65	6250
B-l-L	3			65	7500
H-7-L	5 *			50	8450
C-1	5			65	9375
H-8-L	7-1/2*			50	11700
D-L	5			65	12750
D-l-L	7-1/2	0	(-)10	65	15300

* Nominal horsepower of hermetic compressors.

LOW TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Open Type Compressors and a Suction Line Pressure Drop of 2 psi. System to Maintain a Refrigerator Temperature of (-) 5 °F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Inter-chgr. No.	Line Sizes Liq.	Line Sizes Suct.
0(-)5-1	3200	-13.5	8.5	A	1	I	3	2	3	3/8	7/8
-2	3500	-12.4	7.4	A	2	I	3	2	3	3/8	7/8
3	3700	-10.0	5.0	A	2	I	3	2	3	↑	↑
4	4000	-15.8	10.8	B	2	I	3	3	4		
5	4500	-13.2	8.2	B	3	I	3	3	4		
6	4700	-11.4	6.4	B	3	II	3	3	4		
7	5100	-12.5	7.5	B-1	3	II	3	3	4	↓	↓
8	5200	-20.0	15.0	C	3	II	3	5	4	1/2	1-1/8
9	6400	-16.6	11.6	C	4	II	4	5	5	↑	↑
10	7000	-14.0	9.0	C	4	III	4	5	5		
11	7500	-11.7	6.7	C	4	IV	4	5	5		
12	7800	-19.2	14.2	D	4	III	4	5	6		
13	8600	-16.4	11.4	D	4	III	4	5	6		
14	9500	-13.6	8.6	D	I	IV	4	5	6		
15	10800	-15.0	10.0	D-1	I	IV	4	5	6	↓	↓

LOW TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Open Type Compressors and a Suction Line Pressure Drop of 2 psi. System to Maintain a Refrigerator Temperature of 0° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Inter-chgr. No.	Line Sizes Liq.	Line Sizes Suct.
0-0-1	3750	- 9.9	9.9	A	2	I	3	2	3	3/8	7/8
2	4375	- 5.8	5.8	A	2	III	3	2	4		
3	4800	-12.3	12.3	B	3	I	3	3	4		
4	5250	- 9.4	9.4	B	3	II	3	3	4		
5	5625	- 7.3	7.3	B	3	III	3	3	5		
6	6000	- 5.4	5.4	B	3	IV	4	3	5		
7	6750	- 8.5	8.5	B-1	4	III	4	3	5		
8	7125	- 6.3	6.3	B-1	4	IV	4	3	5		
9	7250	-13.0	13.0	C	4	II	4	4	5	1/2	1-1/8
10	7875	-10.3	10.3	C	4	III	4	4	6		
11	8625	- 7.7	7.7	C	4	IV	4	4	6		
12	9800	-12.8	12.8	D	I	III	4	4	6		
13	10875	- 9.8	9.8	D	I	IV	4	4	6		
14	11125	-14.4	14.4	D-1	I	III	4	4	7		
15	12375	-11.2	11.2	D-1	I	IV	5	4	7		

LOW TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Open Type Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of 5° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Inter-chgr. No.	Line Sizes Liq.	Line Sizes Suct.
0-5-1	4300	-6.8	11.2	A	2	I	3	2	4	3/8	7/8
2	4800	-3.5	8.5	A	3	II	3	2	4		
3	5200	-1.5	6.5	A	3	III	3	2	4		
4	5400	-8.8	13.8	B	3	I	3	3	4		
5	6000	-5.8	10.8	B	3	II	3	3	5		
6	6500	-3.4	8.4	B	4	III	3	3	5		
7	7000	-1.2	6.2	B	4	IV	4	3	5		
8	7600	-4.6	9.6	B-1	4	III	4	3	5		
9	8200	-2.2	7.2	B-1	4	IV	4	3	6		
10	8300	-9.5	14.5	C	4	II	4	4	6	1/2	1-1/8
11	9000	-6.6	11.6	C	I	III	4	4	6		
12	10000	-3.3	8.3	C	I	IV	4	4	7		
13	11200	-9.5	14.5	D	I	III	4	4	7		
14	12500	-6.2	11.2	D	I	IV	4	4	7		
15	14300	-7.6	12.6	D-1	I	IV	5	4	7		

LOW TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Open Type Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of 10° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Inter-chgr. No.	Line Sizes Liq.	Line Sizes Suct.
0-10-1	5100	-2.6	12.6	A	3	I	3	2	4	3/8	7/8
2	5600	+ .4	9.6	A	3	II	3	2	4		
3	6000	2.6	7.4	A	3	III	3	2	5		
4	6300	4.5	5.5	A	4	IV	3	2	5		
5	7000	-2.0	12.5	B	4	II	4	3	5		
6	7500	1.1	8.9	B	4	III	4	3	5		
7	8200	- .8	10.8	B-1	4	III	4	3	6		
8	8500	4.7	5.3	B	4	5	4	3	6		
9	9300	2.0	8.0	B-1	I	IV	4	3	6		
10	10300	-3.0	13.0	C	I	III	4	4	6	1/2	1-1/8
11	11400	0.0	10.0	C	I	IV	4	4	7		
12	12200	2.4	7.6	C	I	5	4	4	7		
13	14500	-2.5	12.5	D	I	IV	4	4	7		
14	15600	.3	9.7	D	I	5	5	4	7		
15	16200	-4.3	14.3	D-1	II	IV	5	4	7		
16	18100	-1.3	11.3	D-1	II	5	5	4	8		

LOW TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Open Type Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of 15° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V No.	Recvr. No.	Heat Inter-chgr. No.	Line Sizes Liq.	Line Sizes Suct.
0-15-1	5600	.8	14.2	A	3	I	3	2	4	3/8	7/8
2	6300	4.2	10.8	A	4	II	3	2	5		
3	6800	5.7	8.3	A	4	III	3	2	5		
4	7300	8.7	6.3	A	4	IV	3	2	5		
5	7700	1.7	13.3	B	4	II	3	3	5		
6	8500	4.5	10.5	B	4	III	3	3	6		
7	9100	7.2	7.8	B	4	IV	4	3	6		
8	9700	3.0	12.0	B-1	I	III	4	3	6		
9	10000	6.0	9.0	B-1	I	IV	4	3	6		
10	11300	8.0	7.0	B-1	I	5	4	3	7		
11	11800	.5	14.5	C	I	III	4	4	7	1/2	1-1/8
12	12900	4.8	11.2	C	I	IV	4	4	7		
13	14100	6.4	8.6	C	I	5	4	4	7		
14	16500	1.0	14.0	D	I	IV	5	4	7		
15	17900	4.1	10.9	D	II	5	5	4	7		
16	20500	2.5	12.5	D-1	II	5	5	4	8		

LOW TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Hermetic Compressors and a Suction Line Pressure Drop of 2 psi. System to Maintain a Refrigerator Temperature of (-) 5° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Inter-chgr. No.	Line Sizes Liq.	Line Sizes Suct.
H(-)5-1	2750	-13.0	8.0	H-5	1	I	3	2	2	3/8	7/8
2	3250	-11.0	6.0	H-5	2	II	3	2	2		
3	3600	-15.0	10.0	H-6	2	I	3	3	2		
4	4000	-12.7	7.7	H-6	2	II	3	3	3		
5	4250	-11.0	6.0	H-6	3	III	3	3	3		
6	4500	-14.8	9.8	H-7	3	II	3	4	3	1/2	1-1/8
7	5100	-13.0	8.0	H-7	3	III	3	4	3		
8	5750	-11.0	6.0	H-7	3	IV	3	4	4		
9	6300	-15.2	10.2	H-8	4	III	4	4	4		
10	7500	-13.0	8.0	H-8	4	IV	4	4	5		

LOW TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Hermetic Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of 0° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Interchgr. No.	Line Sizes Liq.	Line Sizes Suct.
H-0-1	3500	- 9.5	9.5	H-5	2	I	3	2	2	3/8	7/8
2	3750	- 7.2	7.2	H-5	2	II	3	2	2		
3	4250	- 5.5	5.5	H-5	3	III	3	2	3		
4	4750	- 9.0	9.0	H-6	3	II	3	3	3		
5	5250	- 7.0	7.0	H-6	3	III	3	3	4		
6	5750	- 5.2	5.2	H-6	3	IV	3	3	4		
7	6750	- 9.5	9.5	H-7	4	III	4	4	4	1/2	1-1/8
8	7000	-14.5	14.5	H-8	4	II	4	4	5		
9	7500	- 7.3	7.3	H-7	4	IV	4	4	5		
10	8500	-12.0	12.0	H-8	4	III	4	4	5		
11	9750	- 9.4	9.4	H-8	I	IV	4	4	5		

LOW TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Hermetic Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of 5° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Inter-chgr. No.	Line Sizes Liq.	Line Sizes Suct.
H-5-1	4000	- 6.0	11.0	H-5	2	I	3	2	3	3/8	7/8
2	4500	- 3.5	8.5	H-5	3	II	3	2	3		
3	5000	- 1.5	6.5	H-5	3	III	3	2	4		
4	5250	0	5.0	H-5	3	IV	3	2	4		
5	5500	- 3.5	8.5	H-6	3	III	3	3	4		
6	6500	- 1.0	6.0	H-6	4	IV	3	3	4		
7	6750	- 9.3	14.3	H-7	4	II	3	4	4	1/2	1-1/8
8	8000	- 6.3	11.3	H-7	4	III	4	4	5		
9	9000	- 3.5	8.5	H-7	4	IV	4	4	5		
10	10000	- 9.0	14.0	H-8	I	III	4	4	6		
11	11500	- 6.0	11.0	H-8	I	IV	4	4	6		

LOW TEMPERATURE REFRIGERATION SYSTEMS

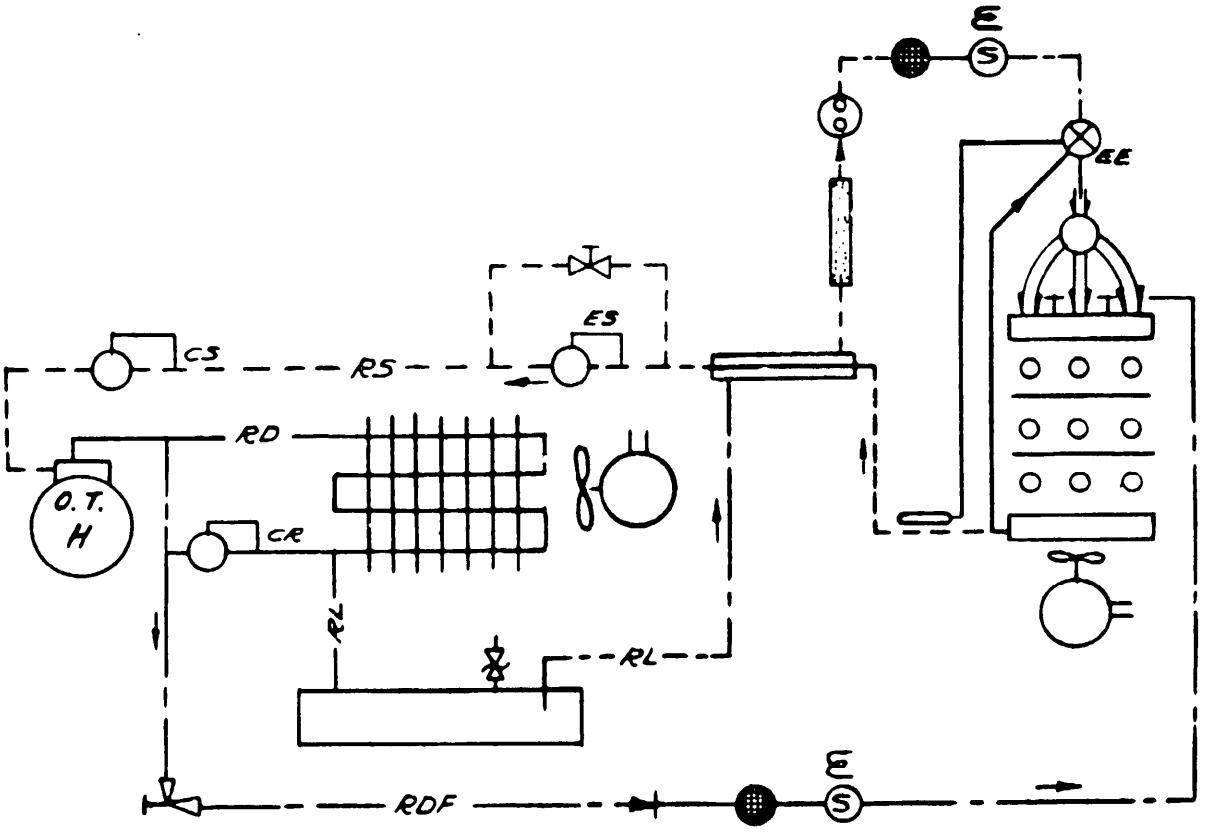
Capacities Based on Use of Standard Hermetic Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of 10° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Inter-chgr. No.	Line Sizes Liq.	Line Sizes Suct.
H-10-1	4750	- 2.5	12.5	H-5	3	I	3	2	4	3/8	7/8
2	5500	+ .3	9.7	H-5	3	II	3	2	4		
3	5750	- 5.0	15.0	H-6	3	I	3	3	4		
4	6000	2.5	7.5	H-5	3	III	3	2	4		
5	6250	4.5	5.5	H-5	3	IV	3	2	4		
6	7250	.8	9.2	H-6	4	III	4	3	5		
7	8000	3. 2	6.8	H-6	4	IV	4	3	5		
8	8500	- 3.0	13.0	H-7	4	II	4	4	5	1/2	1-1/8
9	9750	- 3.0	13.0	H-7	I	III	4	4	6		
10	11000	0.0	10.0	H-7	I	IV	4	4	6		
11	12250	2.7	7.7	H-7	I	5	4	4	6		
12	13750	- 2.5	12.5	H-8	I	IV	4	4	7		
13	15500	+ .2	9.8	H-8	I	5	5	4	7		

LOW TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Hermetic Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of 15° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Inter-chgr. No.	Line Sizes Liq.	Line Sizes Suct.
H-15-1	5750	1.0	14.0	H-5	3	I	3	2	4	3/8	7/8
2	6250	4.0	11.0	H-5	3	II	3	2	4		
3	6750	6.3	8.7	H-5	4	III	3	2	5		
4	7500	1.8	13.2	H-6	4	II	3	3	5		
5	7750	10.0	5.0	H-5	4	5	3	2	5		
6	8250	4.6	10.4	H-6	4	III	3	3	5		
7	9000	7.3	7.7	H-6	4	IV	4	3	5		
8	9500	9.0	6.0	H-6	I	5	4	3	6		
9	11250	.3	14.7	H-7	I	III	4	4	6	1/2	1-1/8
10	13000	3.5	11.5	H-7	I	IV	4	4	7		
11	14250	6.0	9.0	H-7	I	5	4	4	7		
12	16000	1.0	14.0	H-8	II	IV	5	4	7		
13	17750	3.7	11.3	H-8	II	5	5	4	7		



NOTES:

1. ALL SYMBOLS in accordance with Pages 99 - 103

2. USE OF MULTI-CIRCUIT EVAPORATOR AND PRESSURE DISTRIBUTOR optional.

3. CONDENSER PRESSURE REGULATORS are not Military Standard and must be specified functionally in the procurement papers.

4. DUAL TEMPERATURE OR DUAL PRESSURE CONTROL with high pressure cutout not shown.

SYSTEM, REFRIGERATION
MEDIUM TEMPERATURE USING
INTEGAL H.P. COMPPRESSORS

MEDIUM TEMPERATURE RFFRIGERATION SYSTEMS
(At Standard Design Conditions)

System Designation	Motor HP	Refrig. Temp. °F.	Sat. Suct. °F.	Compr. Suct. °F.	Compr. Cap. Btu/hr
H-1-M	1/3 *	35	25	65	2400
H-2-M	1/2 *				3200
H-3-M	3/4 *				4600
H-4-M	1 *				6275
H-5-M	2 *				13000
A-M	3				12900
H-6-M	3 *				16000
B-M	5				16750
B-1-M	5				20100
H-7-M	5 *				27700
C-M	5				25500
H-8-M	7-1/2*				38300
D-M	7-1/2				34000
D-1-M	10	35	25	65	40800

* Nominal horsepower of hermetic compressors.

MEDIUM TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Open Type Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of 20° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Interchgr. No.	Line Sizes Liq.	Line Sizes Suct.
0-20-1	7100	7.8	12.2	A	4	II	3	2	5	3/8	7/8
2	7600	11.5	9.5	A	4	III	3	2	5		
3	8300	13.0	7.0	A	4	IV	3	2	6		
4	8600	5.1	14.9	B	4	II	3	3	6		
5	9600	8.4	11.6	B	4	III	3	3	6		
6	10400	11.3	8.7	B	I	IV	3	3	6		
7	10800	6.7	13.3	B-1	I	III	3	3	6		
8	11900	9.9	10.1	B-1	I	IV	4	3	7		
9	12600	12.2	7.8	B-1	I	5	4	3	7		
10	13500	14.1	5.9	B-1	I	6	4	3	7		
11	14700	7.5	12.5	C	I	IV	4	4	7	1/2	1-1/8
12	15900	10.4	9.6	C	I	5	4	4	7		
13	17000	12.7	7.3	C	II	6	4	4	7		
14	20300	7.8	12.2	D	II	5	5	4	8		
15	21800	10.7	9.3	D	II	6	5	4	8		
16	25500	9.3	10.7	D-1	III	6	5	4	8		

MEDIUM TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Open Type Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of 25° F.

System Design-nation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Inter-chgr. No.	Line Sizes Liq.	Line Sizes Suct.
O-25-1	8000	11.5	13.5	A	4	II	3	2	6	3/8	7/8
2	8750	14.0	11.0	A	4	III	3	2	6		
3	9500	17.0	8.0	A	4	IV	3	2	6		
4	10000	19.0	6.0	A	I	5	3	2	6		
5	10750	12.0	13.0	B	I	III	3	3	6		
6	11750	15.0	10.0	B	I	IV	4	3	7		
7	12500	17.5	7.5	B	I	5	4	3	7		
8	13500	13.5	11.5	B-1	I	IV	4	3	7		
9	14500	17.0	8.0	B-1	I	5	4	3	7		
10	15300	18.5	6.5	B-1	I	6	4	3	7		
11	16500	11.0	14.0	C	II	IV	4	4	7	1/2	1-1/8
12	18000	14.5	10.5	C	II	5	5	4	7		
13	19250	17.0	8.0	C	II	6	5	4	7		
14	22600	11.5	13.5	D	II	5	5	4	8		
15	24500	15.0	10.0	D	III	6	5	4	8		
16	28500	13.0	12.0	D-1	III	6	5	4	8		

MEDIUM TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Open Type Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of 30° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Interchgr. No.	Line Sizes Liq.	Line Sizes Suct.
C-30-1	8900	15.0	15.0	A	I	II	3	2	6	3/8	7/8
2	9900	19.2	11.8	A	I	III	3	2	6		
3	10700	21.0	9.0	A	I	IV	3	2	6		
4	11300	23.2	6.8	A	I	5	3	2	7		
5	12000	15.8	14.2	B	I	III	3	3	7		
6	13100	19.1	10.9	B	I	IV	4	3	7		
7	14100	21.6	8.4	B	I	5	4	3	7		
8	15000	17.5	12.5	B-1	I	IV	4	3	7		
9	16300	20.3	9.7	B-1	I	5	4	3	7		
10	17400	22.7	7.3	B-1	II	6	4	3	7		
11	18200	14.9	15.1	C	II	IV	4	4	7	1/2	1-1/8
12	20000	18.2	11.8	C	II	5	4	4	7		
13	21500	21.1	8.9	C	II	6	5	4	7		
14	25000	15.2	14.8	D	III	5	5	4	8		
15	27300	18.7	11.3	D	III	6	5	4	8		
16	31300	17.0	13.0	D-1	III	6	5	4	8		

MEDIUM TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Open Type Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of 35° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Interchgr. No.	Line Sizes Liq.	Line Sizes Suct.
0-35-1	11000	24.0	11.0	A	I	III	3	2	6	3/8	7/8
2	12000	25.0	10.0	A	I	IV	3	2	6		
3	12750	27.5	7.5	A	I	5	3	2	6		
4	14500	23.0	12.0	B	I	IV	3	3	7		
5	15750	22.5	9.5	B	I	5	4	3	7		
6	17000	21.0	14.0	B-1	I	IV	4	3	7		
7	18250	24.0	11.0	B-1	II	5	4	3	7		
8	19500	27.0	8.0	B-1	II	6	4	3	7		
9	22500	22.0	13.0	C	III	5	4	4	8	1/2	1-1/8
10	24000	25.0	10.0	C	III	6	5	4	8		
11	30000	22.5	12.5	D	III	6	5	4	8		
12	34500	21.0	14.0	D-1	IV	6	5	4	8		

MEDIUM TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Hermetic Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of 20° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Interchgr. No.	Line Sizes Liq.	Line Sizes Suct.
H-20-1	7250	7.6	12.4	H-5	4	II	3	2	5	3/8	7/8
2	8000	11.4	9.6	H-5	4	III	3	2	5		
3	8500	13.0	7.0	H-5	4	IV	3	2	5		
4	9000	14.5	5.5	H-5	4	5	3	2	5		
5	9400	8.5	11.5	H-6	4	III	3	3	6		
6	10250	11.5	8.5	H-6	I	IV	3	3	6		
7	11000	13.5	6.5	H-6	I	5	4	3	6		
8	15000	7.2	12.8	H-7	I	IV	4	4	7	1/2	1-1/8
9	16500	10.0	10.0	H-7	I	5	4	4	7		
10	20700	7.5	12.5	H-8	II	5	5	4	7		

MEDIUM TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Hermetic Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of 25° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Inter-chgr. No.	Line Sizes Liq.	Line Sizes Suct.
H-25-1	8000	11.4	13.6	H-5	4	II	3	2	5	3/8	7/8
2	8700	14.3	10.7	H-5	4	III	3	2	5		
3	9500	17.0	8.0	H-5	4	IV	3	2	6		
4	10000	19.0	6.0	H-5	I	5	3	2	6		
5	10500	12.2	12.8	H-6	I	III	3	3	6		
6	11400	15.5	9.6	H-6	I	IV	4	3	6		
7	12100	17.7	7.3	H-6	I	5	4	3	7		
8	16800	10.7	14.3	H-7	II	IV	4	4	7	1/2	1-1/8
9	18500	14.0	11.0	H-7	II	5	5	4	7		
10	23000	11.0	14.0	H-8	II	5	5	4	8		
11	25700	15.2	9.8	H-8	III	6	5	4	8		

MEDIUM TEMPERATURE REFRIGERATION SYSTEMS

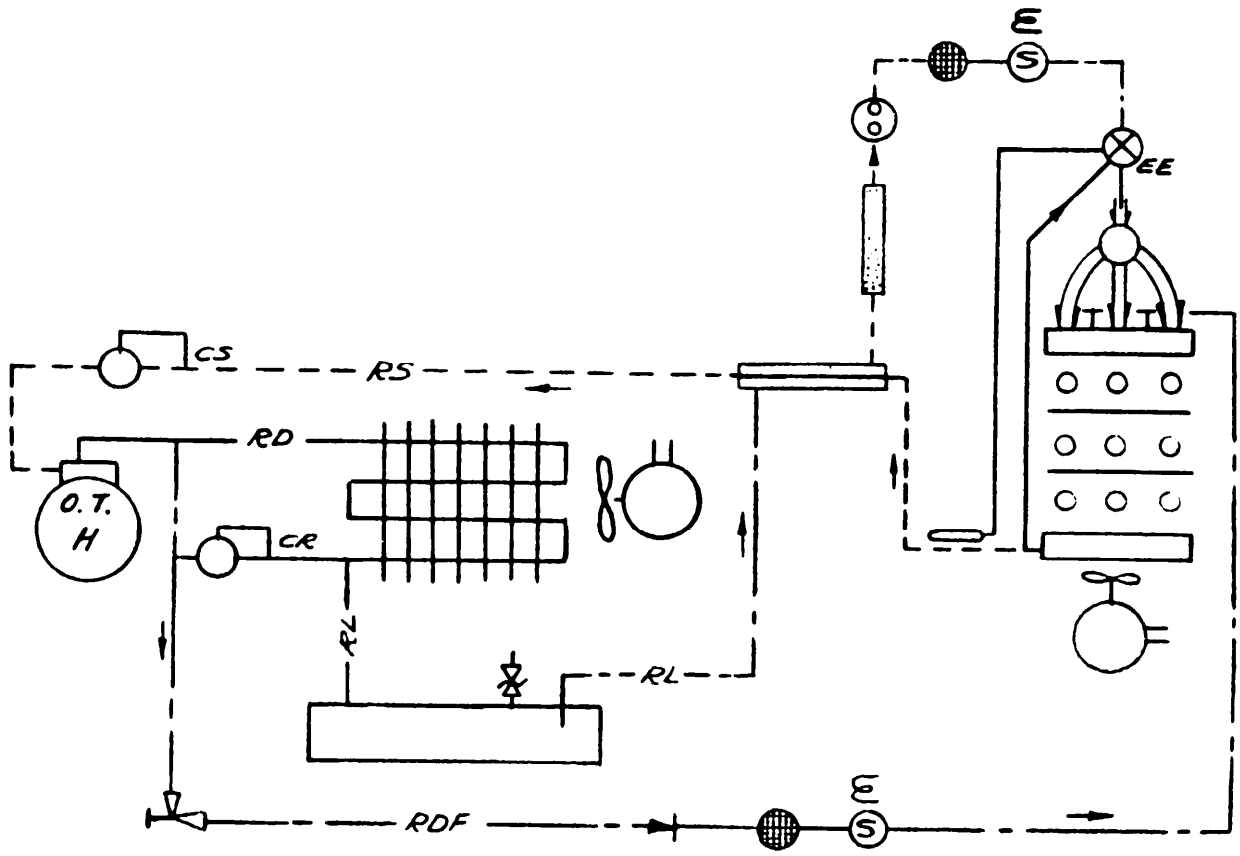
Capacities Based on Use of Standard Hermetic Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of 30° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Interchgr. No.	Line Sizes Liq.	Line Sizes Suct.
H-30-1	10000	18.0	12.0	H-5	I	III	3	2	6	3/8	7/8
2	10750	21.0	9.0	H-5	I	IV	3	3	6		
3	11500	23.4	6.6	H-5	I	5	3	2	6		
4	12000	25.0	5.0	H-5	I	6	3	2	7		
5	12250	16.0	14.0	H-6	I	III	4	3	7		
6	13000	19.3	10.7	H-6	I	IV	4	3	7		
7	13750	22.0	8.0	H-6	I	5	4	3	7		
8	14500	24.0	6.0	H-6	I	6	4	3	7		
9	20750	17.7	12.3	H-7	II	5	5	4	8	1/2	1-1/8
10	22750	20.5	9.5	H-7	II	6	5	4	8		
11	29000	18.0	12.0	H-8	III	6	5	4	8		

MEDIUM TEMPERATURE REFRIGERATION SYSTEMS

Capacities Based on Use of Standard Hermetic Compressors
and a Suction Line Pressure Drop of 2 psi.
System to Maintain a Refrigerator Temperature of 35.0° F.

System Designation & No.	System Operating Characteristics			BILL OF MATERIAL - MAJOR COMPONENTS							
	Cap. Btu/ HR.	Sat. Suct. Temp. °F	Temp. Diff. Air to Gas, °F	Comp. Cap. Grp.	Cond. No.	Evap. No.	T.E.V. No.	Recvr. No.	Heat Inter-chgr. No.	Line Sizes Liq.	Line Sizes Suct.
H-35-1	11250	21.3	13.7	H-5	I	III	3	2	6	3/8	7/8
2	12000	25.0	10.0	H-5	I	IV	3	2	7		
3	12750	27.5	7.5	H-5	I	5	3	2	7		
4	13500	29.5	5.5	H-5	I	6	3	2	7		
5	14250	33.3	11.7	H-6	I	IV	4	3	7		
6	15250	26.0	9.0	H-6	I	5	4	3	7		
7	16250	28.5	6.5	H-6	I	6	4	3	7		
8	23250	21.3	13.7	H-7	II	5	5	4	8	1/2	1-1/8
9	25500	24.5	10.5	H-7	III	6	5	4	8		
10	32500	31.5	13.5	H-8	III	6	5	4	8		



NOTES:

1. ALL SYMBOLS in accordance with Pages 99 - 103
2. USE OF MULTI-CIRCUIT EVAPORATOR AND PRESSURE DISTRIBUTOR optional.
3. CONDENSER PRESSURE REGULATORS are not Military Standard and must be specified functionally in the procurement papers.
4. DUAL TEMPERATURE OR DUAL PRESSURE CONTROL with high pressure cutout not shown.

SYSTEMS, REFRIGERATION
DUAL TEMPERATURE USING
INTEGRAL H.P. COMPRESSORS

DUAL TEMPERATURE REFRIGERATION SYSTEMS
(At Standard Design Conditions)

System Desig-nation	Motor HP	Refrig. Temp. °F.	Sat. Suct. °F.	Compr. Suct. °F.	Compr. Cap. Btu/hr
H-5-LM	2 *	0	(-)10	50	4350
		35	25	65	13000
A-LM	3	0	(-) 10	65	4500
		35	25	65	12900
H-6-LM	3 *	0	(-)10	50	5600
		35	25	65	16000
B-LM	5	0	(-)10	65	6250
		35	25	65	16750
B-1-LM	5	0	(-)10	65	7500
		35	25	65	20100
H-7-LM	5 *	0	(-)10	50	8450
		35	25	65	27700
C-LM	5	0	(-)10	65	9375
		35	25	65	25500
H-8-LM	7-1/2*	0	(-)10	50	11700
		35	25	65	38300
D-LM	7-1/2	0	(-)10	65	12750
		35	25	65	34000
D-1-LM	10	0	(-)10	65	15300
		35	25	65	40800

* Nominal horsepower of hemetic coppressors.

BILL OF MATERIAL

LOW AND MEDIUM (PLUG TYPE) EQUIPEMENT

System Cap. at 0° F. Refrig-erator* Btu/Hr.	Compr. Model	A/c Cond.	Evap.	Receiver	Drier	Strainer	Exp. Valve
3500	H-5	I	1	2-2	2	1	3
3750	I	I	I	2-2	2	1	3
4750	H-6	I	II	2-2	2	1	3
5250	I	I	II	2-3	2	1	3
6000	I	I	II	2-3	2	1	3
6750	H-7	II	III	2-3	2	1	3
7875	II	II	XII	5	3	2	4
9750	H-8	III	IV	5	3	2	5
10850	II	III	IV	5	3	2	5
12375	II	IV	IV	5	3	2	5

* For 25° F. Refrigerator - Increase 50%

Custodians:

Army - GL
Navy - YD
Air Force - 82

Review activity:

Army - ME

User activity:

Amy - CE

Preparing activity:

Army - GL

Project No. 4130-0117

*U.S. GOVERNMENT PRINTING OFFICE: 1970-433-689/8216

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