

MIL-C-15730K(SH)  
 AMENDMENT-1  
 5 July 1977

MILITARY SPECIFICATION

COOLERS, FOR NAVAL SHIPBOARD: LUBRICATING OIL,  
 HYDRAULIC OIL, AND FRESH WATER

This amendment forms a part of Military Specification MIL-C-15730K(SHIPS), dated 12 November 1973, and is approved for use by the Naval Sea Systems Command and is available for use by all Departments and Agencies of the Department of Defense.

PAGE 2

- 2.1, under "SPECIFICATIONS, FEDERAL" delete reference to "WW-T-756".
- 2.1, under "SPECIFICATIONS, FEDERAL" add:  
 "HR-P-46 - Packing; Asbestos, Sheet, Compressed."
- 2.1, under "SPECIFICATIONS, MILITARY" delete reference to "MIL-B-857" and "MIL-A-17472".
- 2.1, under "SPECIFICATIONS, MILITARY" add:  
 "MIL-S-1222 - Studs, Bolts, Hex Cap Screws, and Nuts."  
 "MIL-T-22214 - Tube, Condenser and Heat Exchanger With Integral Fins (Copper Alloy Numbers 715, 706 and 122)."

PAGE 3

- 2.2, under "AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)" add:  
 "A105 - Forged or Rolled Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service."  
 "A179 - Seamless Cold-Drawn Low-Carbon Steel Heat-Exchanger and Condenser Tubes."  
 "B359 - Copper and Copper-Alloy Seamless Condenser and Heat-Exchanger Tubes with Integral Fins."  
 "B584 - Copper Alloy Sand Castings for General Applications."
- 2.2, delete: "ASTM B143 - Tin Bronze and Leaded Tin Bronze Sand Castings."

PAGE 6

- 3.2.8.1, first line, delete reference to "MIL-B-857" and substitute "MIL-S-1222".
- 3.2.8.1.3, add as item "(e)":  
 "(e) For submarine coolers subject to submergence pressure, all submergence pressure boundary studs and bolts shall be of a reduced shank design to reduce bending stresses."

PAGE 7

- 3.2.10, delete and substitute:  
 "3.2.10 Allowable pressure drop. Unless otherwise specified (see 6.1.1), the maximum permissible fluid side pressure drops at design conditions shall be as follows:  
 (a) For main propulsion turbine lubricating oil coolers using scoop injection of circulating water:  
 Tube (salt water) side --- 4 pounds per square inch (psi)  
 Shell (oil) side ----- 15 psi

FSC 4420

MIL-C-15730K(SH)  
AMENDMENT-1

- (b) For other lubricating oil coolers and fresh water coolers:  
 Coolant side ----- 6 psi  
 Cooled fluid side (oil) ----- 12 psi  
 Cooled fluid side (fresh water) ----- 6 psi
- (c) For hydraulic oil coolers:  
 Tube (coolant) side ----- 6 psi  
 Shell (oil) side ----- 25 psi"

PAGE 10

3.2.23, sentences one and two: Delete and substitute "In order to limit the use of asbestos material, flat gaskets for type A coolers shall be of cloth inserted rubber unless cloth inserted rubber is not compatible with the temperature or composition of the fluid involved. Cloth inserted rubber gaskets shall be 1/16 inch thick. When used, compressed asbestos gaskets shall be 1/16 or 1/32 inch thick."

PAGE 11

- 3.2.26.2.1, end of item "(d)", add as item "(17)".  
 "(17) Dry weight and operating weight of cooler."

PAGE 12

- 3.2.28, item "(e)": Delete and substitute:  
 "(e) National stock number. 1/"
- 3.2.28, "footnote 1": Delete and substitute:  
 "1/Allow 20 spaces."

PAGE 13

- Table III, column 1, delete "Other tubes" and substitute "Outer tubes".  
 Table III, column 3, delete "ASTM B143" and substitute "ASTM B584".

PAGE 14

- Table III, columns 2 and 3, opposite "Spacers": Delete and substitute:

<u>Material</u>	<u>Applicable documents</u>
Copper-nickel-alloy; or	MIL-C-15726
Brass	MIL-T-20168
Admiralty metal copper alloy	
Nos. 443, 444 or 445	ASTM B111"

- Table III, columns 2 and 3, opposite "Gaskets<sup>3/</sup>": Delete and substitute:

<u>Material</u>	<u>Applicable document</u>
"Rubber, synthetic, cloth insertion, class 2; or asbestos, compressed class 1	HH-P-151 HH-P-46"

PAGE 15

- Table III, footnote 3, delete and substitute:  
 "<sup>3/</sup>See 3.2.23 and 3.2.25."

- Tables III and IV, column 3, delete "ASTM B143" and substitute "ASTM B584".

PAGE 16

- Table IV, columns 2 and 3, opposite "Gaskets<sup>3/</sup>": Delete and substitute:

MIL-C-15730K (SH)  
AMENDMENT-1

<u>Material</u>	<u>Applicable document</u>
"Rubber, synthetic, cloth insertion, class 2; or asbestos, compressed class 1	HH-P-151 HH-P-46"

Table IV, delete "ASTM B143" and substitute "ASTM B584".

## PAGE 17

Table IV, column 3 delete "MIL-G-22610" and substitute "MIL-G-21610".  
 Table IV, footnote 3: Delete and substitute: "<sup>3/</sup>See 3.2.23 and 3.2.25."  
 Table V, columns 2 and 3, opposite "Tubes" add:

"Copper-nickel-alloy, composition 90-10                   MIL-T-22214"

Table V, delete "ASTM B143" and substitute "ASTM B584".

## PAGE 18

Table V, columns 2 and 3, opposite "Gaskets<sup>3/</sup>": Delete and substitute:

<u>Material</u>	<u>Applicable document</u>
"Rubber, synthetic, cloth insertion class 2; or asbestos, compressed class 1	HH-P-151 HH-P-46"

Table V, delete "ASTM B143" and substitute "ASTM B584".

Table V, footnote 3, delete and substitute: "<sup>3/</sup>See 3.2.23 and 3.2.25."

## PAGE 19

Table VI, column 1, delete "Tubes" and substitute "Tubes<sup>2/</sup>".

Table VI, opposite "Tubes" columns 2 and 3: Delete and substitute:

Copper-nickel-alloy, composition 90-10	MIL-T-15005
Copper-nickel-alloy, composition 90-10	MIL-T-22214
Admiralty metal, copper alloy 443, 444, or 445	ASTM B111
Admiralty metal, copper alloy 443, 444, or 445	ASTM B359"

Table VI, delete "ASTM B143" and substitute "ASTM B584".

## PAGE 20

Table VI, columns 2 and 3, opposite "Gaskets<sup>1/</sup>": Delete and substitute:

<u>Material</u>	<u>Applicable document</u>
"Rubber, synthetic, cloth insertion class 2; or asbestos, compressed class 1	HH-P-151 HH-P-46"

Table VI, footnote 1: Delete and substitute:

"<sup>1/</sup>See 3.2.23 and 3.2.25.

"<sup>2/</sup>See 3.3.9.1.5 and 4.2.4."

3.3.1.5, delete, "table VIII" and substitute "table VII."

MIL-C-15730K(SH)  
AMENDMENT-1

Table VII, columns 2 and 3, opposite "Tubes", delete and substitute:

<u>Material</u>	<u>Applicable Document</u>
"Admiralty metal, copper alloy Nos. 443, 444 and 445	ASTM B111, ASTM B359
Red brass, copper alloy No. 230	ASTM B111"

PAGES 20 and 21

Table VIII, delete and substitute:

"TABLE VIII. Optional shell side materials for oil cooling applications.

Part	Material	Applicable documents
Shell	Steel pipe, type S Seamless carbon steel pipe, grade B; Steel plate, grade C; Seamless drawn steel tubing; Steel plate, hull structural, type 1, grade M Cast steel Carbon steel plate	ASTM A53 ASTM A106 ASTM A285 MIL-T-20157 MIL-S-16113 MIL-S-15083 ASTM A515
Flanges	Carbon steel plate Steel plate, grade C Cast steel Steel pipe flange Carbon steel forgings	ASTM A515 ASTM A285 MIL-S-15083 ASTM A181 ASTM A105
Shell supports	Carbon steel Carbon steel plate Cast steel, grade B Steel plate, grade C Steel plate, class C	ASTM A105 ASTM A515 MIL-S-15083 ASTM A285 QQ-S-691
Tube, outer	Brass, class A Steel	MIL-T-20168 MIL-T-20157
Tube sheet, inner	Steel plate, grade C	ASTM A285
Baffles	Steel plate, hull structural, type 1, grade M Steel plate grade C Steel plate Steel plate Steel Steel plate, class 1018 or 1020 Steel plate, class C	MIL-S-16113 ASTM A285 ASTM A515 ASTM A516 ASTM A569 QQ-S-631 QQ-S-691
Stay rods	Carbon steel, bolt material, grade 2 or 5	MIL-S-1222
Nuts	Steel	MIL-S-1222
Spacers	Steel	MIL-T-20157, ASTM A179 and ASTM A214

PAGE 21

Table X, column 2, opposite "Shells", delete reference to "Seamless carbon steel pipe, grade b," and substitute "Seamless carbon steel pipe, grade B,".

PAGE 22

Table X, delete "ASTM B143" and substitute "ASTM B584".

MIL-C-15730K(SH)  
AMENDMENT-1

Table X, column 3, opposite "Spacers," add "ASTM A179".

Table X, column 3, opposite "Spacer rods" and "Spacer rod nuts", delete "MIL-B-857" and substitute "MIL-S-1222."

Table X, columns 2 and 3, opposite "Gaskets<sup>4/</sup>": Delete and substitute:

<u>Material</u>	<u>Applicable document</u>
"Rubber, synthetic, cloth insertion, class 2; or asbestos, compressed class 1	HH-P-151 HH-P-46"

PAGE 23

Table X, footnote 4: Delete and substitute:

"<sup>4/</sup>See 3.2.23 and 3.2.25."

PAGE 25

3.3.6, fourth sentence: Delete and substitute:

"(For guidance, figures 4 and 5 show two acceptable methods of welding tube sheets)."

3.3.8, delete and substitute:

"3.3.8 For submarine battery cooling and for other application when specified (see 6.1.1), the shell side shall be completely tinned by electroplating or dipping. The tinning shall include the following surfaces:

- Inside surface of shell subassembly.
- Outside surface of tubes.
- Support plates, baffles, spacers, tie rods, nuts and locking devices.
- Areas of the tube sheets exposed to the shell side fluid.

For the electroplating method the parts shall be tinned to a thickness of from 0.001 to 0.0015 inch. The plating shall be smooth and of fine grain appearance, and free from "burnt" deposits such as may result from high-current-density areas. For those parts for which the dipping method is used, a lead-tin solution with a lead content of not more than 25 percent may be used."

PAGE 26

Add as paragraph 3.3.9.1.5:

"3.3.9.1.5 When tubes are furnished to ASTM B111 or B359, tolerance on the outside diameter (plain tubes) and outside diameter of unfinned sections (finned tubes) shall be plus 0.000 inch and minus 0.005 inch."

PAGE 29

3.3.14.1, delete formulas for "piping bending moment" and "piping torsional moment" and substitute:

$$\text{Piping bending moment} = 1.3 \pi r_m^2 t \left( S_y - \frac{P r_i}{2t} \right)$$

$$\text{Piping torsional moment} = \pi r_m^2 t \sqrt{S_y^2 - \left( \frac{P r_i}{2t} \right)^2}$$

Add as paragraph 3.3.14.3:

"3.3.14.3 Threaded fasteners securing waterbox inspection openings on coolers subject to submergence pressure shall be designed so that 300 inspection cover removal and

MIL-C-15730K(SH)  
AMENDMENT-1

reinstallation cycles and 20,000 submergence pressure cycles will not cause the maximum cumulative usage factor to exceed 1.0. The effect of threaded fastener stress levels caused by any relative movement between the inspection cover and inspection cover flange when the seawater side of waterbox is pressurized shall be specifically evaluated."

PAGE 31

Table XVII, columns 2 and 3, opposite "Gaskets, flat": Delete and substitute:

<u>Materials</u>	<u>Applicable document</u>
"Asbestos, compressed, class 1	HH-P-46"

Table XVII, delete "ASTM B143" and substitute "ASTM B584".

PAGE 32

Table XVIII, columns 2 and 3, opposite "Gaskets, flat": Delete and substitute:

<u>Materials</u>	<u>Applicable document</u>
"Asbestos, compressed, class 1	HH-P-46"

Table XVIII, column 3, delete "ASTM B143" and substitute "ASTM B584".

PAGE 33

Tables XIX and XX, columns 2 and 3, opposite "Gaskets, flat": Delete and substitute:

<u>Materials</u>	<u>Applicable document</u>
"Asbestos, compressed, class 1	HH-P-46"

Tables XIX and XX, column 3, delete "ASTM B143" and substitute "ASTM B584".

PAGE 35

Add as paragraph 4.2.4

"4.2.4 When tubes are furnished in accordance with ASTM B111 or B359 each tube shall be subjected to the eddy current test in addition to either the hydrostatic test or the pneumatic test of the applicable specification."

Preparing activity:  
Navy - SH  
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