



General Subjects

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Referring to the illustrated psychrometric chart, if the dry bulb temperature is 70°F and the relative humidity is 40%, what is the absolute humidity? Illustration GS-RA-22

45 grains of moisture per pound of dry air

Illustrations: RA0022_WM_091818, GSRA22_032717WM, GSRA22_45GRAIN_GRAPH

Referring to the illustrated psychrometric chart, if the dry bulb temperature is 70°F and the relative humidity is 50%, what is the absolute humidity? Illustration GS-RA-22

45 grains of moisture per pound of dry air

Illustrations: RA0022_WM_091818, GSRA22_032717WM, GSRA22_45GRAIN_GRAPH

What statement is true concerning a one-pipe hydronic heating system? Illustration GS-0192

Each heating coil inlet temperature is different, as the hot water inlet temperature to each heating coil progressively drops as the water passes through each successive series-connected coil.

Illustrations: GS0192_WM_072020

What advantage does a 4-pipe hydronic heating/cooling system have over a 2-pipe hydronic heating/cooling system?

Illustration GS-0192

A 4-pipe hydronic heating/cooling system allows simultaneous heating and cooling of different zones, whereas a 2-pipe hydronic heating/cooling system does not.

Illustrations: GS0192_WM_072020

What statement is true concerning a one-pipe hydronic heating system? Illustration GS-0192

Each heating coil inlet temperature is different, as the hot water inlet temperature to each heating coil progressively drops as the water passes through each successive series-connected coil.

Illustrations: GS0192_WM_072020

What advantage does a 4-pipe hydronic heating/cooling system have over a 2-pipe hydronic heating/cooling system?

Illustration GS-0192

A 4-pipe hydronic heating/cooling system allows simultaneous heating and cooling of different zones, whereas a 2-pipe hydronic heating/cooling system does not.

Illustrations: GS0192_WM_072020

Expansion tanks when used in a ship's low temperature hot water heating system may be of the open or closed type.

Referring to the illustrated central-station hookup for a hot-water heating system drawing, what would be the normal temperature range of the water? Illustration GS-0191

180°F to 200°F

Illustrations: GS0191_WM_061220

Referring to the illustrated diagram for a central-station hookup for a hot-water heating system, what statement represents the configuration of the system? Illustration GS-0191

The system is a multi-zone system, with one circulating pump and one heating coil.

Illustrations: GS0191_WM_061220

Referring to the illustrated drawing of the central-station hookup for a hot-water heating system, what statement is true concerning the air separator on the heated water outlet of the converter? Illustration GS-0191

The air separator removes the entrained air introduced with the makeup water at the expansion tank and ultimately released by the heating process within the converter.

Illustrations: GS0191_WM_061220

Expansion tanks when used in a ship's low temperature hot water heating system may be of the open or closed type. Referring to the illustrated central-station hookup for a hot-water heating system drawing, what would be the normal temperature range of the water? Illustration GS-0191

180°F to 200°F

Illustrations: GS0191_WM_061220

Which of the figures in illustration would be used in conjunction with figure "B" of the device shown in illustration GS-0124?
figure F

Illustrations: GS0124_WM_092618

The open end wrench size for a 3/4 inch American National Standard hex head machine bolt is _____.
1 1/4 inches

Illustrations: WRENCHSIZES

The terms rough, coarse, bastard, second cut, smooth, and dead smooth refer to the _____.
distance between the parallel cuts of a file
coarseness of file teeth
Both A and C are correct.

Illustrations: PARTS OF A FILE

See REF2253

Double cut files are most effective when used for _____.
rough work

Illustrations: PARTS OF A FILE

See REF2253

When responding to a 'right rudder' command from the amidships position, which parts of the steering gear system illustrated will be subjected to the highest pressure? Illustration GS-0137

"E" and "B"

Illustrations: GS0137_WM_052919

The rudder torque capacity of the four ram steering gear illustrated is rated at 44,210,000 inch-pounds with one power unit in operation. If the four ram system was able to be operated as a two ram system with both power units on line, what would be the available torque? Illustration GS-0067

22,105,000 inch pounds

Illustrations: GS0067_WM_092418

See REF2251

The rudder torque capacity of the four ram steering gear illustrated, is rated at 44,210,000 inch-pounds with one power unit in operation. If the four ram system was able to be operated as a two ram system with both power units on line, what would be the available torque? Illustration GS-0067

22,105,000 inch pounds

Illustrations: GS0067_WM_092418

See REF2251

Work that cannot readily be mounted between lathe centers is usually held in a _____.
chuck

Illustrations: 3JAWUNIVERSALCHUCK, 4JAWINDEPENDENTCHUCK

See REF2250

Work that cannot readily be mounted between lathe centers is usually held in a _____.
chuck

Illustrations: 3JAWUNIVERSALCHUCK, 4JAWINDEPENDENTCHUCK

See REF2250

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Illustrations: 3JAWUNIVERSALCHUCK, 4JAWINDEPENDENTCHUCK

See REF2250

Work that cannot readily be mounted between lathe centers is usually held in a _____.
chuck

Illustrations: 3JAWUNIVERSALCHUCK, 4JAWINDEPENDENTCHUCK

See REF2250

For proper support when turning a long thin piece of work between lathe centers, you should use a _____.
steady rest

Illustrations: STEADYREST

See REF2248

For proper support when turning a long thin piece of work between lathe centers, you should use a _____.
steady rest

Illustrations: STEADYREST

See REF2248

To properly cut even numbered threads using the lathe thread dial indicator shown in the illustration, you should close the lathe split or half-nut on _____.

any line on the dial

Illustrations: GS0084_WM_092518

See REF2246

To properly cut an odd numbered thread with a lathe using the thread dial indicator illustrated, you should close the lathe split, or half-nut on _____.

any numbered line on the dial

Illustrations: GS0084_WM_092518

See REF2246

To properly cut even numbered threads using the lathe thread dial indicator shown in the illustration, you should close the lathe split or half-nut on _____.

Illustration GS-0084
any line on the dial

Illustrations: GS0084_WM_092518

See REF2246

To properly cut an odd numbered thread with a lathe using the thread dial indicator illustrated, you should close the lathe split, or half-nut on _____.

Illustration GS-0084
any numbered line on the dial

Illustrations: GS0084_WM_092518

See REF2246

If the distances "A" and/or "B" as shown in the illustration are excessively increased, the tool will _____.

Illustration GS-0085
chatter

Illustrations: GS0085_AO_120215WM

See REF2245

If the distances "A" and/or "B" as shown in the illustration are excessively increased, the tool will _____.

Illustration GS-0085
chatter

Illustrations: GS0085_AO_120215WM

See REF2245

The main difference between a common lathe dog and a safety lathe dog is that the latter _____.

has a headless set screw

Illustrations: LATHEDOGS

See REF2244

The main difference between a common lathe dog and a safety lathe dog is that the latter _____.

has a headless set screw

Illustrations: LATHEDOGS

See REF2244

Which of the illustrated lathe tools would be used to produce a smooth finish cut for figure I? Illustration GS-0009

A

Illustrations: GS0009_WM_092118, LATHETOOLS

Which single illustrated lathe tool could be used to turn down the stock in figure II? Illustration GS-0009

B

Illustrations: GS0009_WM_092118, LATHETOOLS

Which single illustrated lathe tool could be used to turn down the stock in figure II? Illustration GS-0009

B

Illustrations: GS0009_WM_092118, LATHETOOLS

Which of the illustrated lathe tools would be used to produce a smooth finish cut for figure I? Illustration GS-0009
A

Illustrations: GS0009_WM_092118, LATHETOOLS

Which single illustrated lathe tool could be used to turn down the stock in figure II? Illustration GS-0009
B

Illustrations: GS0009_WM_092118, LATHETOOLS

Which single illustrated lathe tool could be used to turn down the stock in figure II? Illustration GS-0009
B

Illustrations: GS0009_WM_092118, LATHETOOLS

Which of the illustrated lathe tools would be used to produce a smooth finish cut for figure I? Illustration GS-0009
A

Illustrations: GS0009_WM_092118, LATHETOOLS

Which of the illustrated lathe tools would be used to produce a smooth finish cut for figure I? Illustration GS-0009
A

Illustrations: GS0009_WM_092118, LATHETOOLS

The angle "A" shown on the illustrated lathe tool bit is properly called the _____. Illustration GS-0164
nose angle

Illustrations: GS0164_WM_092718

The angle "A" shown on the illustrated lathe tool bit is properly called the _____. Illustration GS-0164
nose angle

Illustrations: GS0164_WM_092718

The lathe tools shown as figure "M" in the illustration are commonly known as _____. Illustration GS-0090
form tools

Illustrations: GS0090_WM_092518, GS0090_2

The lathe tool shown as figure "R" in the illustration would best be used to _____. Illustration GS-0090
form a right-cut square shoulder

Illustrations: GS0090_WM_092518, GS0090_2

The lathe tool shown as figure "N" in the illustration is commonly known as a/an _____. Illustration GS-0090
knurling tool

Illustrations: GS0090_WM_092518, GS0090_2

Which lathe tool shown in the illustration would best be used on a work piece to perform a right hand facing operation? Illustration GS-0090

R

Illustrations: GS0090_WM_092518, GS0090_2

The lathe tool shown as "Q" in the illustration is a _____. Illustration GS-0090
left hand side facing tool

Illustrations: GS0090_WM_092518, GS0090_2

Which lathe tool shown in the illustration would best be used on a work piece to perform a right hand facing operation?
Illustration GS-0090

R

Illustrations: GS0090_WM_092518, GS0090_2

The lathe tool shown as figure "N" in the illustration is commonly known as a/an _____. Illustration GS-0090
knurling tool

Illustrations: GS0090_WM_092518, GS0090_2

Which of the illustrated figures represents the use of a right hand roughing tool? Illustration GS-0090
Figure T

Illustrations: GS0090_WM_092518, GS0090_2

The lathe tool shown as "Q" in the illustration is a _____. Illustration GS-0090
left hand side facing tool

Illustrations: GS0090_WM_092518, GS0090_2
See REF2271

The lathe tool shown as figure "U" in the illustration is commonly known as a/an _____. Illustration GS-0090
cutting-off tool

Illustrations: GS0090_WM_092518, GS0090_2

The lathe tool shown as figure "R" in the illustration would best be used to _____. Illustration GS-0090
form a right-cut square shoulder

Illustrations: GS0090_WM_092518, GS0090_2

Which of the illustrated figures represents the use of a right hand roughing tool? Illustration GS-0090
Figure T

Illustrations: GS0090_WM_092518, GS0090_2

The lathe tool shown as figure "T" in the illustration is commonly known as a/an _____. Illustration GS-0090
right-cut roughing tool

Illustrations: GS0090_WM_092518, GS0090_2

The lathe tool shown as figure "T" in the illustration is commonly known as a/an _____. Illustration GS-0090
right-cut roughing tool

Illustrations: GS0090_WM_092518, GS0090_2

The lathe tool shown as figure "U" in the illustration is commonly known as a/an _____. Illustration GS-0090
cutting-off tool

Illustrations: GS0090_WM_092518, GS0090_2

The lathe tools shown as figure "M" in the illustration are commonly known as _____. Illustration GS-0090
form tools

Illustrations: GS0090_WM_092518, GS0090_2

The lathe tool shown as figure "R" in the illustration would best be used to _____. Illustration GS-0090
form a right-cut square shoulder

Illustrations: GS0090_WM_092518, GS0090_2

The lathe tool shown as figure "N" in the illustration is commonly known as a/an _____. Illustration GS-0090
knurling tool

Illustrations: GS0090_WM_092518, GS0090_2

Which lathe tool shown in the illustration would best be used on a work piece to perform a right hand facing operation?
Illustration GS-0090

R

Illustrations: GS0090_WM_092518, GS0090_2

The lathe tool shown as "Q" in the illustration is a _____. Illustration GS-0090
left hand side facing tool

Illustrations: GS0090_WM_092518, GS0090_2

Which lathe tool shown in the illustration would best be used on a work piece to perform a right hand facing operation?
Illustration GS-0090

R

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The lathe tool shown as figure "N" in the illustration is commonly known as a/an _____. Illustration GS-0090
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left hand side facing tool

Illustrations: GS0090_WM_092518, GS0090_2

See REF2271

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cutting-off tool

Illustrations: GS0090_WM_092518, GS0090_2

The lathe tool shown as figure "R" in the illustration would best be used to _____. Illustration GS-0090
form a right-cut square shoulder

Illustrations: GS0090_WM_092518, GS0090_2

Which of the illustrated figures represents the use of a right hand roughing tool? Illustration GS-0090
Figure T

Illustrations: GS0090_WM_092518, GS0090_2

The lathe tool shown as figure "T" in the illustration is commonly known as a/an _____. Illustration GS-0090
right-cut roughing tool

Illustrations: GS0090_WM_092518, GS0090_2

The lathe tool shown as figure "T" in the illustration is commonly known as a/an _____. Illustration GS-0090
right-cut roughing tool

Illustrations: GS0090_WM_092518, GS0090_2

The lathe tool shown as figure "U" in the illustration is commonly known as a/an _____. Illustration GS-0090
cutting-off tool

Illustrations: GS0090_WM_092518, GS0090_2

The lathe tools shown as figure "M" in the illustration are commonly known as _____. Illustration GS-0090
form tools

Illustrations: GS0090_WM_092518, GS0090_2

The lathe tools shown as figure "M" in the illustration are commonly known as _____. Illustration GS-0090
form tools

Illustrations: GS0090_WM_092518, GS0090_2

The tool shown in the illustration is called a _____. Illustration GS-0072
center gage

Illustrations: GS0072_AO_112015WM
See REF2243

The tool shown in the illustration is called a _____. Illustration GS-0072
center gage

Illustrations: GS0072_AO_112015WM
See REF2243

Which of the figures in illustration GS-0080 would be used in conjunction with figure "B" of the device shown in illustration GS-0124? Illustrations GS-0080 and GS-0124
figure F

Illustrations: GS0080_WM_092418, GS0124WM_041116

With regards to the American National Screw Thread nomenclature, 'pitch' is the _____.
distance between corresponding points on adjacent threads

Illustrations: SCREW-THREAD-PRINCIPLE
See REF2237

With regards to the American National Screw Thread nomenclature, 'pitch' is the _____.
distance between corresponding points on adjacent threads

Illustrations: SCREW-THREAD-PRINCIPLE
See REF2237

What is the primary function of the devices shown in the illustration? Illustration GS-0156
The locking plates are used to prevent the fastening devices from vibrating loose.

Illustrations: GS0156_WM_092718

Which figure shown in the illustration, is the nut lock improperly used? Illustration GS-0156
"C" and "E"

Illustrations: GS0156_WM_092718

When should the nut lock shown in the illustration, be replaced with standard lock washers or other similar devices used in the industry? Illustration GS-0156
Replacement with another nut locking device is unnecessary.

Illustrations: GS0156_WM_092718

The locking plates shown in the illustration are used in many marine applications. Which figure indicates the improper method for using these devices? Illustration GS-0156
"C"

Illustrations: GS0156_WM_092718

The locking plates shown in the illustration are used in many marine applications. Which figure indicates the improper method for using these devices? Illustration GS-0156
"C"

Illustrations: GS0156_WM_092718

The reading on the vernier caliper scale shown in figure "G" in the illustration is _____. Illustration GS-0082
2.368 inches

Illustrations: GS0082_AO_120115WM

The reading on the vernier caliper scale shown in figure "G" in the illustration is _____. Illustration GS-0082
2.368 inches

Illustrations: GS0082_AO_120115WM

What is the reading of the vernier micrometer caliper scale shown in figure "G" in the illustration? Illustration GS-0083
0.2470 inch

Illustrations: GS0083_WM_052919

What is the reading of the vernier micrometer caliper scale shown in figure "G" in the illustration? Illustration GS-0083
0.2470 inch

Illustrations: GS0083_WM_052919

The reading on the micrometer scale shown in figure "D" in the illustration is _____. Illustration GS-0081
0.4815 inch

Illustrations: GS0081_WM_052919

The reading on the micrometer scale shown in figure "D" in the illustration is _____. Illustration GS-0081
0.4815 inch

Illustrations: GS0081_WM_052919

The purpose of the instrument illustrated is to _____. Illustration GS-0079
measure wire diameter

Illustrations: GS0079_WM_092418
See REF2233

The purpose of the instrument illustrated is to _____. Illustration GS-0079
measure wire diameter

Illustrations: GS0079_WM_092418
See REF2233

Which of the instruments listed is used to measure the gauge of a piece of sheet metal?
Wire gauge

Illustrations: WIRE_GAUGE

Which of the instruments listed is used to measure the gauge of a piece of sheet metal?
Wire gauge

Illustrations: WIRE_GAUGE

The ruler indicated in the illustration is commonly referred to as a/an _____. Illustration GS-0023
Engineers Scale

Illustrations: GS0023_WM_092418

The best tool to use to measure the number of threads per inch on a bolt is a _____.
screw pitch gauge

Illustrations: SCREWPITCHGAGE
See REF2229

The best tool to use to measure the number of threads per inch on a bolt is a _____.
screw pitch gauge

Illustrations: SCREWPITCHGAGE
See REF2229

Which of the devices shown in the illustration is designed for both inside and outside measurements? Illustration GS-0073
C

Illustrations: GS0073_WM_092418
See REF2228

Which of the devices shown in the illustration should be used with a bridge gage? Illustration GS-0073
A

Illustrations: GS0073_WM_092418
See REF2228

Which of the devices shown in the illustration should be used with a bridge gage? Illustration GS-0073
A

Illustrations: GS0073_WM_092418
See REF2228

Which of the devices shown in the illustration is designed for both inside and outside measurements? Illustration GS-0073
C

Illustrations: GS0073_WM_092418
See REF2228

According to the illustration, which of the following conditions would most likely cause pump "A" to short cycle? Illustration GS-0173

The hydro-pneumatic expansion tank is operating with an insufficient air charge.

Illustrations: GS0173_WM_092718

According to the illustration, which of the following conditions would most likely cause Pump "A" to short cycle? Illustration GS-0173

The hydro-pneumatic expansion tank is operating with an insufficient air charge.

Illustrations: GS0173_WM_092718

Which of the following statements correctly describes the construction of the close coupled sanitary pump shown in the illustration? Illustration GS-0070

The pump and motor have a common shaft.

Illustrations: GS0070_WM_031416

An air-cooled refrigerated container unit using R-134a as a refrigerant has a box temperature set point of -15 °F, but it is currently operating with a stable return air temperature of 0 °F. The fresh air makeup vent is closed, the unit is operating at 460 VAC/60 Hz, and the unit is in full capacity cool (modulating valve 100% open). Using the illustrated troubleshooting guide, what would be the normal range of expected discharge pressures if the ambient air temperature is 90 °F?
Illustration GS-RA-52

150-190 psig

Illustrations: GSRA52_WM_051117

An air-cooled refrigerated container unit using R-134a as a refrigerant has a box temperature set point of -15 °F, but it is currently operating with a stable return air temperature of 0 °F. The fresh air makeup vent is closed, the unit is operating at 460 VAC/60 Hz, and the unit is in full capacity cool (modulating valve 100% open). Using the illustrated troubleshooting guide, what would be the normal range of expected discharge pressures if the ambient air temperature is 90 °F?

GS-RA-52

150-190 psig

Illustrations: GSRA52_WM_051117

Which of the following illustrated thermal expansion valves would be appropriate to use on an evaporator coil with a 2 psi pressure drop, where externally adjustable superheat and a replaceable power element are both desired? Illustration GS-RA-06

B

Illustrations: RA0006_WM_091718, GSRA06_AO_092314WM

Which of the following illustrated thermal expansion valves would be appropriate to use on an evaporator coil with a 2 psi pressure drop, where externally adjustable superheat and a replaceable power element are both desired? Illustration GS-RA-06

B

Illustrations: RA0006_WM_091718, GSRA06_AO_092314WM

Which of the following illustrated thermal expansion valves would be appropriate to use on an evaporator coil with a 2 psi pressure drop, where externally adjustable superheat and a replaceable power element are both desired? Illustration GS-RA-06

B

Illustrations: RA0006_WM_091718, GSRA06_AO_092314WM

Which of the following illustrated thermal expansion valves would be appropriate to use on an evaporator coil with a 2 psi pressure drop, where externally adjustable superheat and a replaceable power element are both desired? Illustration GS-RA-06

B

Illustrations: RA0006_WM_091718, GSRA06_AO_092314WM

As shown in the illustrated LP centrifugal chiller pressure maintenance system, what is its functional purpose? Illustration GS-RA-40

prevent the entrance of air into the chiller when the chiller is idle

Illustrations: GSRA40_WM_050317

As shown in the illustrated LP centrifugal chiller pressure maintenance system, what is its functional purpose? Illustration GS-RA-40

prevent the entrance of air into the chiller when the chiller is idle

Illustrations: GSRA40_WM_050317

If the valve labeled "D" in the illustration is a suction service valve, what will the port labeled "7" be connected to? Illustration RA-0008

to the line connected to the evaporator outlet

Illustrations: RA0008_WM_091718

If the valve labeled "D" in the illustration is a suction service valve, what will the port labeled "7" be connected to?
Illustration RA-0008

to the line connected to the evaporator outlet

Illustrations: RA0008_WM_091718

What is the purpose of the pressure transducer as shown in the illustration? Illustration GS-RA-17
it senses compressor suction pressure and controls the quench valve

Illustrations: GSRA17_FAMEWM

What is the purpose of the pressure transducer as shown in the illustration? Illustration GS-RA-17
it senses compressor suction pressure and controls the quench valve

Illustrations: GSRA17_FAMEWM

Which of the following illustrated expansion valves is designed to maintain a constant evaporator pressure rather than a constant evaporator superheat? Illustration GS-RA-24

C

Illustrations: GSRA24_053116WM

Which of the following illustrated expansion valves is designed to maintain a constant evaporator pressure rather than a constant evaporator superheat? Illustration GS-RA-24

C

Illustrations: GSRA24_053116WM

Which of the following illustrated expansion valves is designed to maintain a constant evaporator pressure rather than a constant evaporator superheat? Illustration GS-RA-24

C

Illustrations: GSRA24_053116WM

Which of the following electrically operated refrigeration system valves would be most appropriate for use as a 2 position diverting hot gas bypass solenoid valve? Illustration GS-RA-19

B

Illustrations: RA0019_WM_091818, GSRA19_WM_032417

Which of the following electrically operated refrigeration system valves would be most appropriate for use as a 2 position diverting hot gas bypass solenoid valve? Illustration GS-RA-19

B

Illustrations: RA0019_WM_091818, GSRA19_WM_032417

Which of the following electrically operated refrigeration system valves would be most appropriate for use as a 2 position diverting hot gas bypass solenoid valve? Illustration GS-RA-19

B

Illustrations: RA0019_WM_091818, GSRA19_WM_032417

Which of the following electrically operated refrigeration system valves would be most appropriate for use as a 2 position diverting hot gas bypass solenoid valve? Illustration GS-RA-19

B

Illustrations: RA0019_WM_091818, GSRA19_WM_032417

A container unit's microprocessor-controlled temperature controller is set at -28.9°C , appropriate for a frozen cargo of ice cream. In this mode of operation, according to the illustrated temperature controller functional diagrams, what should be the operational status of the unit if the actual box temperature is -18.0°C ? Illustration GS-RA-35

cooling mode

Illustrations: RA0035_WM_091818

A container unit's microprocessor-controlled temperature controller is set at -28.9°C , appropriate for a frozen cargo of ice cream. In this mode of operation, according to the illustrated temperature controller functional diagrams, what should be the operational status of the unit if the actual box temperature is -18.0°C ? Illustration GS-RA-35

cooling mode

Illustrations: RA0035_WM_091818

Which of the following dehydrators or combination filter/driers features a core that can be replaced when the desiccant becomes saturated with moisture? Illustration GS-RA-10

A

Illustrations: GSRA10_AO_092314WM

Using the illustrated chart giving the boiling point of moisture at various depths of vacuum, with an ambient temperature of 72°F , what depth of vacuum would be associated with the BEST chance of achieving a dehydration evacuation with a deep vacuum pump? Illustration GS-RA-56

29.99" Hg or 254 microns of Hg absolute

Illustrations: RA0056_WM_091718, GSRA56_WM_100416

Using the illustrated chart giving the boiling point of moisture at various depths of vacuum, with an ambient temperature of 72°F , what depth of vacuum would be associated with the BEST chance of achieving a dehydration evacuation with a deep vacuum pump? Illustration GS-RA-56

29.99" Hg or 254 microns of Hg absolute

Illustrations: RA0056_WM_091718, GSRA56_WM_100416

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Using the illustrated chart giving the boiling point of moisture at various depths of vacuum, with an ambient temperature of 72°F , what depth of vacuum would be associated with the BEST chance of achieving a dehydration evacuation with a deep vacuum pump? Illustration GS-RA-56

29.99" Hg or 254 microns of Hg absolute

Illustrations: RA0056_WM_091718, GSRA56_WM_100416

When recovering the remaining R-134a refrigerant from the centrifugal chiller shown in the illustration as a vapor using the recovery unit's compressor, in addition to opening valves "1a", "1b", and the compressor suction and discharge isolation valves, which of the following would be the correct valve lineup? Illustration GS-RA-28
valves "3", "4", and "6" open; valves "2", "5", "7", "8", and "10" closed

Illustrations: GSRA28_053116WM

When recovering the remaining R-134a refrigerant from the centrifugal chiller shown in the illustration as a vapor using the recovery unit's compressor, in addition to opening valves "1a", "1b", and the compressor suction and discharge isolation valves, which of the following would be the correct valve lineup? Illustration GS-RA-28
valves "3", "4", and "6" open; valves "2", "5", "7", "8", and "10" closed

Illustrations: GSRA28_053116WM

Concerning the arrangement of equipment and associated hoses shown in the illustration, which statement is true?
Illustration GS-RA-59

When recovering refrigerant from the centrifugal chiller using this method, it is possible to achieve the recovery levels required by law without any further recovery.

Illustrations: RA0059_WM_091818, GSRA59_052317WM

Concerning the arrangement of equipment and associated hoses shown in the illustration, what statement is true?
Illustration GS-RA-59

When recovering refrigerant from the centrifugal chiller using this method, it is possible to achieve the recovery levels required by law without any further recovery.

Illustrations: GSRA59_052317WM, RA0059_WM_091818

Concerning the arrangement of equipment and associated hoses shown in the illustration, which statement is true?
Illustration GS-RA-59

When recovering refrigerant from the centrifugal chiller using this method, it is possible to achieve the recovery levels required by law without any further recovery.

Illustrations: RA0059_WM_091818, GSRA59_052317WM

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When recovering refrigerant from the centrifugal chiller using this method, it is possible to achieve the recovery levels required by law without any further recovery.

Illustrations: GSRA59_052317WM, RA0059_WM_091818

Which of the illustrated gauges is capable of measuring vacuums at the micron level for the purpose of proving system dehydration during system evacuation with a vacuum pump, but displays the achieved vacuums at incremental threshold intervals rather than continuously. Illustration GS-RA-37

B

Illustrations: GSRA37_WM_042617

Which of the illustrated devices would be the LEAST accurate for the purposes of weighing-in a refrigerant charge?
Illustration GS-RA-45

C

Illustrations: RA0045_WM_091818, GSRA45_053116WM

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Illustration GS-RA-45

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Illustrations: RA0045_WM_091818, GSRA45_053116WM

As shown in figure "B" of the illustrated self-contained recovery unit connection diagrams, what is the recovery method supported by the connection scheme? Illustration GS-RA-33

direct vapor recovery

Illustrations: RA0033_WM_091818, GSRA33_WM_041417

As shown in figure "B" of the illustrated self-contained recovery unit connection diagrams, what is the recovery method supported by the connection scheme? Illustration GS-RA-33

direct vapor recovery

Illustrations: RA0033_WM_091818, GSRA33_WM_041417

In addition to the indicated gauge pressure, what other information is presented on the compound gauge for the hypothetical refrigerant illustrated? Illustration GS-RA-16

the saturation temperature of the refrigerant that corresponds to the gauge pressure at the point of measurement

Illustrations: RA0016_WM_091818, GSRA16_032117WM

Which of the listed statements describes the method used to determine the amount of superheat present in the suction gas leaving the evaporator coil? Illustration GS-RA-16

Note the low side pressure, determine the corresponding saturation temperature, and subtract it from the temperature measured with a thermometer at the thermostatic expansion valve sensing bulb.

Illustrations: RA0016_WM_091818, GSRA16_032117WM

Which of the listed statements describes the method used to determine the amount of superheat present in the suction gas leaving the evaporator coil? Illustration GS-RA-16

Note the low side pressure, determine the corresponding saturation temperature, and subtract it from the temperature measured with a thermometer at the thermostatic expansion valve sensing bulb.

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Illustrations: RA0016_WM_091818, GSRA16_032117WM

The coil temperature measured at the expansion valve sensing bulb of an operating system is 10°F. The low side pressure with the compressor running as shown on the gauge illustrated indicates 15 psig. What adjustments or changes, if any, should be made to the system? Illustration GS-RA-16

The expansion valve should not be adjusted, as the degree of superheat is within the accepted range.

Illustrations: RA0016_WM_091818, GSRA16_032117WM

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Through which of the components shown in the illustration is flash gas formation a normal occurrence? Illustration GS-RA-25

thermostatic expansion valve

Illustrations: GSRA25_WM_033117

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As shown in the illustrated refrigeration system piping schematic diagram with the various accessories and controls and equipped with an air-cooled condenser with high side pressure controls, what statement is true concerning the fan cycling control pressure switch? Illustration GS-RA-39

With a condenser fitted with a single fan driven by a multi-speed electric motor, the fan speed would decrease under low ambient temperature conditions.

Illustrations: GSRA39_AO_050117

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If it is necessary to increase the operating head pressure of the refrigeration system using the device shown in the illustration, what should be done? Illustration GS-RA-14

"2" should be turned to further compress the spring

Illustrations: RA0014_WM_091718, GSRA14_WM_032017

In a refrigeration system, the valve shown in the illustration is used for what purpose? Illustration GS-RA-14
head pressure regulating valve

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The set point adjustment of the device shown in the illustration is made by rotating what component? Illustration GS-RA-14
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Note: Passive recovery is a recovery method that utilizes the refrigeration system's internal pressure and/or compressor to remove refrigerant from the system. This method of recovery can only be used with appliances that contain 15 lbs. or less of refrigerant. recovery from the high side only: Incorrect answer. Choice "C" is the only correct answer. recovery from the low side only: Incorrect answer. Choice "C" is the only correct answer. recovery from both the high and low sides: Correct answer. If the compressor of a small appliance fitted with a capillary tube metering device fails, the system pressure will equalize across the low- and high-pressure sides. To speed the recovery process as well as achieve the required recovery efficiency requirements, recovery should be made from both the low and high sides. by venting to the atmosphere, as the refrigerant cannot be recovered: Incorrect answer. As long as there is evidence of a refrigerant charge remaining in the system, the technician is obligated to properly recover the refrigerant to the levels required by law. Venting the refrigerant to the atmosphere is prohibited under the Clean Air Act rules.

REF2221

Bottles of refrigerant (R-12) should not be exposed to temperatures above 125°F. A Halide Torch flame turns from blue to green in the presence of R-12 refrigerant. You should wear eye goggles when working where there may be a refrigerant leak.

REF2222

Zinc anodes are installed in water cooled Condensers to prevent electrolysis. Zinc Anode means: A piece of zinc metal that attracts negative electric charges. Electrolysis = corrosion caused by the flow of electric current. Zinc, when used as a sacrificial anode, reduces and controls electrolysis (i.e., electrolytic action) in a heat exchanger.

REF2223

Subpart 58.20—Refrigeration Machinery

REF2224

A. before they can pump down the system in preparation for shifting over to the standby condensing unit Incorrect answer: Pumping down a system in preparation for shifting over to the standby condensing unit does not require opening up the system and as such it would not reasonably be expected to release Class I or Class II substances. Therefore, the person doing the pump down is not considered a technician under the venting prohibition rules, thus no certification is required for this particular task. B. before they can set the operating controls of the system Incorrect answer: Setting the operating controls of the system does not require opening up the system and as such it would not reasonably be expected to release Class I or Class II substances. Therefore, the person making the adjustments to the controls is not considered a "technician" under the venting prohibition rules, thus no certification is required for this particular task. C. before performing maintenance, service, or repair that could reasonably be expected to release Class I or Class II refrigerants into the atmosphere Correct answer: Those performing such maintenance, service, or repair activities that could be expected to release Class I or Class II refrigerants are considered a technician under the venting prohibition rules, thus certification is required. Examples of maintenance, service, and repair activities that would reasonably be expected to release Class I or Class II substances are those that require opening up the system (replacing a dehydrator cartridge, charging the system with refrigerant, etc.). D. before performing any maintenance or repair regardless of the actual procedure Incorrect answer: Only those activities that would be reasonably expected to release Class I or Class II substances must be performed by a certified technician. See explanation for choice C.

REF2225

What is a TXV? A TXV (TEV) is a type of metering device. The metering device's job is to create a pressure drop from the liquid line into the evaporator which will result in refrigerant boiling (changing from liquid to vapor) through the majority of the evaporator coil. This low temperature "boiling" absorbs heat from the space or product being cooled. How does a TXV Function? A TXV "measures" the temperature and (usually) the pressure at the end of the evaporator coil with a bulb and a tube called an external equalizer. The bulb measures temperature and provides an opening force, the equalizer measures pressure and provides a closing force. There is also a spring that may have an adjustable tension that provides additional closing force. When working properly these forces achieve a balance and maintain the evaporator superheat to the designed of set levels at the end of the evaporator. The TXV's job is to maintain superheat within certain operational ranges and conditions. How do they fail? A TXV may fail either too far open or too far closed. Too far open is also called "overfeeding" and it means that boiling refrigerant is being fed too far through the evaporator coil, and this would show up in low superheat. If the TXV fails closed it can be said to be "underfeeding," which means not enough boiling refrigerant is fed through the evaporator coil and superheat will be too high at the evaporator outlet. These failures can and do occur, but they are usually caused by contaminants or moisture in the system that have worked their way to the valve and caused it to stick or become restricted. Another cause of valve failure is a rub out on bulb tube and an external equalizer without a core depressor installed on a port that has a Schrader core in place. When a valve is overfeeding the first thing to check is

bulb insulation, placement, and strapping. If the numbing isn't properly sensing the suction line it can lead to the valve remaining too far open. Why are they misdiagnosed so often? TXV's are often incorrectly condemned in cases of low evaporator airflow or load. This happens because techs will find a system with low suction pressure and assume that means it is low on refrigerant. They will then start to add refrigerant and the TXV will respond by closing further the more refrigerant is added. The tech will see that the suction isn't increasing and they will conclude that the TXV is failed. This occurs because the tech is paying too much attention to suction pressure without considering the other readings. What is the correct way to diagnose a TXV? First take all of your refrigerant readings as well as your liquid line and suction temperature at both ends (on a split system). This means superheat, subcooling, suction saturation (evaporator coil temp), and liquid saturation (condensing temp). For a TXV to do what it is supposed to you need a full line of liquid before the TXV, this means you need at least 1°F of subcooling in theory but in reality, you will want to make sure that you have the factory specified subcooling, which is usually around 10°. In refrigeration, we do this same thing by looking for a clear sight glass. On a split system checking the subcool outside and then confirming there is no big temperature difference inside to out is a great way to ensure that kinked lines or plugged line driers aren't an issue. The next thing that a TXV needs is enough liquid pressure to have the required pressure differential. This amount of required pressure differential will vary a bit based on the valve but usually, we want to see a 100 PSI minimum difference between the liquid line pressure and the desired evaporator pressure. If the head pressure drops too low due to low ambient conditions this can come into play and impact the ability of the valve to do its job. Once this is all confirmed then it is simply a matter of checking the superheat at the end of the evaporator. Most A/C systems will be maintaining 6-14° of superheat at the evaporator outlet. If it is in that range then the valve isn't bad, it's doing its job. If it is lower than 6° of superheat at the evap outlet then it could be overfeeding (double check your thermometer and gauges) and if the superheat is well above 14° at the evaporator outlet, with the proper subcool and liquid pressure entering... then you have a failed closed (underfeeding valve). Keep in mind that some valves will have a screen right before the valve and this can be the cause of the restriction rather than the valve. You can intentionally freeze the coil and try to see the freezing point or use thermal imaging to help spot if it's the valve or the screen. When you find the point of temperature you find the point of pressure drop, just remember that the TXV is designed to provide pressure to maintain a fairly fixed superheat. Do TXVs Ever Fail They can fail internally but most often they fail because of a blocked inlet screen (if they have one), contaminants entering the valve, loss of charge from the power head, bulb location, and positioning issues and overheating of the valve. In commercial and refrigeration applications you can often replace or clean the screen and replace the power head rather than replacing the entire valve.

REF2226

Most ships use an air cushion in the pressure tank to reduce cycling (i.e., continued turning on and off) of a pump while keeping a constant pressure on the potable and/or wash water systems.

REF2227

33 CFR 159

REF2228

A vernier caliper is designed to make both inside and outside measurements. [Refer to Illustration GS0073, "C".]

REF2229

It is quite difficult to count accurately fine pitches of screw threads. A screw pitch gage used "See Diagram 1" is very convenient for checking the finer screw threads. This gage consists of a number of sheet metal plates in which are cut the exact form of threads of the various pitches and each plate is stamped with a number indicating the number of threads per inch for which it is to be used. Final check for both diameter and pitch of the thread may be made with the nut that is to be used or with a ring thread gage, if one is available. The nut should fit snugly without play or shake but should not bind on the thread at any point.

REF2230

Set a pair of dividers to the proper radius with a scale.

REF2231

The center head of a combination square is used to find the center of round stock. What is a center head used for on a combination square? It is a highly versatile layout tool for scribing right angles and parallel lines, and a measuring tool that can be used as a tri-square, miter, depth gage, height gage, and level. The Center Head is an available attachment that provides an easy means of accurately locating the center of cylindrical or square work.

REF2232

Circumference is a measurement of the distance around a circular object. Use a flexible steel rule to measure circumference. Diameter is the distance across a circular object. Use a micrometer to measure the diameter of round stock.

REF2233

A wire gauge measures the thickness of wire and sheet metal.

REF2234

ECCENTRICITY - the variations of the shaft surface in reference to the centerline of the shaft.

REF2235

Precision tightening, such as done when installing crankpin bearings, should be done with a torque wrench. A micrometer setting torque wrench produces a distinctive sound (Le., an audible click) and the handle releases when you reach the value of the torque you set on the wrench.

REF2236

Designations such as 1/4 - 20, 8 - 32 on taps, dies and bolts indicate thread diameter and the threads per inch respectively.

REF2237

Pitch - Pitch of a thread is the distance between 2 crests. Angle - The thread angle of a screw is the angle between the threads. Crest - Crest of the thread is the top part of the groove that corresponds with the major diameter. Flank - The flank is the angle at which the helix is raised to form a crest.

REF2238

Drill to the smaller diameter of the taper prior to boring a blind tapered hole.

REF2239

Clamp straight-shanked twist drills in a drill chuck.

REF2240

To increase the speed of a drill press, decrease the spindle pulley size and/or increase the size of the drive pulley (Le., the pulley attached to the motor).

REF2241

Remove a taper shank drill with a drill drift.

REF2242

Prick punch the center of a hole before starting to drill.

REF2243

The center gage is used to adjust the point of the threading tool and if the tool is carefully set a perfect thread will result. of course , if the threading tool is not set perfectly square with the work, the angle of the thread will be incorrect.

REF2244

A safety lathe dog has a headless set screw. Lathe dogs are used in conjunction with a driving plate or faceplate to drive work being machined on centers. the frictional contact alone between the live center and the work not being sufficient to drive it. The common lathe dog, shown at the left in "Diagram 1" is used for round work or work having a regular section (square . hexagon. octagon) . The piece to be turned is held firmly in hole A by setscrew B. The bent tail C projects through a slot or hole in the driving plate or faceplate, so that when the latter revolves with the spindle it turns the work with it. The clamp dog, "Diagram 1", may be used for rectangular or irregular shaped work. Such work is clamped between the jaws.

REF2245

Chatter is vibration in either the tool or the work. The finished work surface appears to have a grooved or lined finish instead of the smooth surface that is to be expected. The vibration is set up by a weakness in the work, work support, tool, or tool support, and is about the most elusive thing to find in the entire field of machine work. As a general rule, strengthening the various parts of the tool support train will help. It is also advisable to support the work by a center rest or follower rest. Possibly the fault may be in the machine adjustments . Gibs may be too loose ; bearings may, after a long

period of heavy service, be worn; the tool may be sharpened improperly, etc. If the machine is in excellent condition, the fault may be in the tool or tool setup. Grind the tool with a point or as near a point as the finish specified will permit; avoid a wide round leading edge on the tool. Reduce the overhang of the tool as much as possible and be sure that all the gib and bearing adjustments are properly made. See that the work receives proper support for the cut and do not try to turn at a surface speed that is too high. Excessive speed is probably the greatest cause of chatter, and the first thing you should do when chatter occurs is to reduce the speed.

REF2246

When threads are being cut on a lathe, the half-nuts are clamped over the lead screw to engage the threading feed and released at the end of the cut by means of the threading lever. The threading dial provides a means for determining the time to engage the half-nuts so that the cutting tool follows same path during each cut. When an index mark on the threading dial is aligned with the witness mark on its housing, the half-nuts may be engaged. For some thread pitches however, the half-nuts may be engaged only when certain index marks are aligned with the witness mark. On most lathes the half-nuts can be engaged as follows: For all even-numbered threads per inch, close the half-nuts at any line on the dial. For all odd-numbered threads per inch, close the half-nuts at any numbered line on the dial. For all threads involving one-half of a thread in each inch, such as 11 1/2, close the half-nuts at any odd-numbered line.

REF2247

If lathe centers start to squeal, stop the lathe.

REF2248

A steady rest is used when turning a long piece of work between centers. The center rest, also called the steady rest, is used for the following purposes: 1. To provide an intermediate support or rest for long slender bars or shafts being machined between centers. It prevents them from springing under cut, or sagging as a result of their otherwise unsupported weight. 2. To support and provide a center bearing for one end of work, such as a spindle, being bored or drilled from the end when it is too long to be supported by a chuck alone. The center rest is clamped in the desired position on the bed on which it is properly aligned by the ways. "See Diagram". It is important that the jaws (A) be carefully adjusted to allow the work (B) to turn freely and at the same time keep it accurately centered on the axis of the lathe. The top half of the frame is hinged at C to facilitate placing it in position without removing the work from the centers or changing the position of the jaws.

REF2249

The follower rest is used to back up work of small diameter to keep it from springing under the stress of cutting. It gets its name from the fact it follows the cutting tool along the work. "See Diagram". It is attached directly to the saddle by bolts (B). The adjustable jaws bear directly on the finished diameter of the work opposite the cutting tool.

REF2250

The 3-jaw universal or scroll chuck, "See diagram 1", can be used only for holding round or hexagonal work. All three jaws are moved in and out together in one operation. They move universally to bring the work on center automatically. This chuck is easier to operate than the 4-jaw type, but when its parts become worn, its accuracy in centering cannot be relied upon. Proper lubrication and constant care in use are necessary to ensure reliability. The 4-jaw independent lathe chuck, "See diagram 2", is the most practical for general work. The four jaws are adjusted one at a time, making it possible to hold work of various shapes and to adjust the center of the work to coincide with the center of the lathe. The jaws are reversible.

REF2251

There are two power units (i.e., electric motors driving hydraulic pumps) in parallel, as such the total output pressure does not increase when they both are on line, only the volumetric flow rate increases. Force = pressure * area Torque = Force * distance If the pressure does not increase with both power units on line then the output Force does not increase thus, neither does the torque. Thus, the total torque with one or both power units running is 44,210,000 inch-pounds. But operating as a two-ram system instead of a 4-ram system decreases the area of the actuators by half. Thus, the total force is cut in half and so is the torque. Available torque = 44,210,000 inch-pounds / 2 Available torque = 22,105,000 inch-pounds Reference Material for this question courtesy of the FAME Foundation, Inc. Mass. Maritime Academy.

REF2252

Convective heat transfer, often referred to simply as convection, is the transfer of heat from one place to another by the movement of fluids. Convection is usually the dominant form of heat transfer in liquids and gases. Although often discussed as a distinct method of heat transfer, convective heat transfer involves the combined processes of unknown

conduction (heat diffusion) and advection (heat transfer by bulk fluid flow).

REF2253

A single cut file (i.e., "Mill file") is used for a fine finish on soft metals and for draw filing whereas double cut files are used for rough work. Heavy pressure on the ends of a file causes the work surface to be rounded. Install a file handle on the tang for greater safety, control and comfort. Clean a file with a card if it becomes clogged with filings. The pointed end of a file is its tang.

REF2254

Install a hacksaw blade with its teeth pointing away from the handle. To start a hacksaw with greater ease or certainty, file a nick where you wish to start the cut. Only apply pressure on a hacksaw on the forward stroke. Reduce pressure and speed at the end of a hacksaw stroke. Use an "all-hard" hacksaw blade when cutting soft metals such as brass.

REF2255

Hacksaw blades, designed to cut mainly metal, are categorized by the number of teeth per inch. The standard hacksaw blade has 14 to 32 teeth per inch. The set of the teeth, how they are angled in relation to the sides of the blade, determines how well the blade cuts. Hacksaw blades cut many things from thin copper tubing to unruly rusted bolts. Garden hose, water pipes, plastics and old fencing all succumb to the hacksaw blade.

REF2256

Needle-nose pliers have narrow jaws that can be used in tight spaces.

REF2257

Open-end wrenches are non-adjustable solid wrenches. A box-end wrench is least likely to slip off while tightening a nut or bolt.

REF2258

Only use a pipe wrench also known as a Stillson wrench on round stock. Adjust a pipe wrench to take its bite midway up on the jaw teeth. You can rotate large sized pipe easily with a chain-pipe wrench.

REF2259

Type of chisel Use Cape Cutting keyways Diamond point V grooves; inside sharp angles Round nose Oil grooves Flat Flat stock

REF2260

A head becomes "mushroomed" by constantly beating it with a hammer.

REF2261

An aligning punch has a long, gradual taper and is used to line-up holes in flanges, etc.

REF2262

An offset screwdriver has a 90° angle and is used to turn screws you cannot reach with a straight screwdriver. A heavy-duty screwdriver with a square shank allows you to use a wrench to turn it.

REF2263

Grease guns are normally used to lubricate ball bearings of condensate and other pumps. Grease lubricated ball or roller bearings will run cooler if the grease has a high grease penetration number (is hard). Grease contaminated with dirt is very abrasive. A grease gun is used with a "zerk" or other type of lubrication fitting to apply grease to bearings. Pumps often are lubricated this way.

REF2264

To open a flanged joint use a flange spreader. The flange spreader utilizes a high load compact hydraulic cylinder together with a unique design wedge and retaining mechanism to smoothly and evenly force open the flanged joint.

REF2265

Hammers and mauls are sized according to the weight of their heads.

REF2266

If you start to cut external threads with the die at an angle you will have crooked threads.

REF2267

Soft metals such as copper, brass, etc. as well as cast iron do not need a lubricant when drilling or cutting threads. However you may use lard oil on these soft metals. Cast iron needs no lubricant when drilling or machining. Kerosene should be used to lubricate aluminum when drilling.

REF2268

A grinding wheel is trued (i.e., reshaped) with a dressing tool. Trued means: Returned to its original circular shape.

REF2269

Power hacksaws normally use a liquid coolant to cool the cutting blade.

REF2270

The "dead center" does not rotate and is held by the tailstock. Dead centers can only be used when the stock is center drilled.

REF2271

This tool is intended for facing on the left-hand side of the work. The direction of feed is away from the lathe center. The cutting edge is on the right-hand side of the tool and the point of the tool is sharp to permit machining a square corner.

REF297

An oil water separator (OWS) is a piece of shipboard or in general waste water treatment equipment that separates oil from oily waste water such as bilge water before the waste water is discharged. Bilge water is an almost unavoidable product in ship operations. Bilge water that is generated in proximity to shipboard equipment (such as in the engine room) often contains oil and its direct discharge would result in undesirable transfer of waste oil to the marine environment. By international agreement under the MARPOL convention, most commercial vessels need to be fitted with an oily water separator to remove oil contaminants before bilge water is pumped overboard. Oily water separator equipment has been a shipboard requirement since the 1970s but recently it has become evident that oily water separators have not been as effective as had been assumed, and alleged improper operation of this equipment by crewmembers (sometimes called the magic pipe) has resulted in criminal prosecutions in the United States and to a lesser extent in Europe. There are different technologies that can be used to separate oil from waste water. Most economic are those based on the gravity effect, where oil droplets are separated from the water by floating to the surface due to the difference in viscosity between oil and water. This phenomenon is expressed by Stoke's Law. Other technologies employ membrane filtration, centrifugation, adsorption on active carbon granules, heating, ultrasonic energy, electro-coagulation and chemical methods such as Wet Air Oxidation Zimpro Process. Oil in waste water can be present as free oil, emulsified oil, a chemically stabilized dispersion or molecularly dissolved oil. Oily waste water can also contain suspended solids (silt). Oil water separators can be manufactured for above ground or under ground use or in the case of ships for onboard use. The shell can be made from concrete, steel, stainless steel or GRP. They can contain a single treatment step or a combination thereof. Some manufacturers of oil water separator equipment are: Mercer International (USA), San Dizier Environment (France), Conder Environmental Solutions (UK), and Sulzer Chemtec (Switzerland). Oil water separators can be by-pass separators or full retention separators. By pass separators as the name implies by-pass the treatment step above a certain flow. Full retention oil water separators treat 100% of the flow. Class 1 oil water separators guarantee a maximum of 5 ppm oil in the effluent whereas Class 2 oil water separators guarantee a maximum of 100 ppm oil in the effluent. Common legislative requirements for OWS design are alarm devices and an automatic closure device which is activated when the full oil storage capacity of the oil water separator has been reached.

REF305

Type I : Incorrect answer. A type I MSD is one that through treatment of the sewage produces an effluent (pumped overboard) having a fecal coliform bacteria count not greater than 1,000 per 100 milliliters and visible floating solids. Type II : Incorrect answer. A type II MSD is one that through treatment of the sewage produces an effluent (pumped overboard) having a fecal coliform bacteria count not greater than 200 per 100 milliliters and suspended solids not greater than 150 milligrams per liter. Type III : Correct answer. A type III MSD is one that is designed to prevent the overboard discharge of treated or untreated sewage or waste derived from sewage. This type of device requires the storage of all sewage and waste onboard. Type IV : Incorrect answer. A type IV MSD does not exist.

REF325

An "accumulator" contains hydraulic oil under pressure and is ready to do "work". An accumulator is an "unfired pressure vessel" (i.e., one that does not use an outside source of heat) in which energy is stored at high pressure in the form of a gas or a gas and hydraulic fluid. An example of an accumulator would be a tank that stores hydraulic fluid under pressure that, when released, can be used to start a lifeboat engine. Such an accumulator can be designed to recharge itself as the engine runs (assuming that the engine will run) or can be recharged manually by using a hand pump.

REF468

46 CFR 31.25; 46 CFR Parts 42, 44, and 45. 31.25–1 Load lines required—TB/ OCL. All tank vessels of 150 gross tons or over, or 79 feet in length or greater, navigating the oceans, coastwise waters, and Great Lakes are subject to the regulations in parts 42 to 45, inclusive, subchapter E (Load Lines), of this chapter, as applicable.

REF504

33 CFR 151.25 Oil Record Book. (a) Each oil tanker of 150 gross tons and above, ship of 400 gross tons and above other than an oil tanker, and manned fixed or floating drilling rig or other platform shall maintain an Oil Record Book Part I (Machinery Space Operations). An oil tanker of 150 gross tons and above or a non oil tanker that carries 200 cubic meters or more of oil in bulk, shall also maintain an Oil Record Book Part II (Cargo/Ballast Operations). (b) An Oil Record Book printed by the U.S. Government is available to the masters or operators of all U.S. ships subject to this section, from any Coast Guard Sector Office, Marine Inspection Office, or Captain of the Port Office. (c) The ownership of the Oil Record Book of all U.S. ships remains with the U.S. Government. (d) Entries shall be made in the Oil Record Book on each occasion, on a tank to tank basis if appropriate, whenever any of the following machinery space operations take place on any ship to which this section applies— (1) Ballasting or cleaning of fuel oil tanks; (2) Discharge of ballast containing an oily mixture or cleaning water from fuel oil tanks; (3) Disposal of oil residue; and (4) Discharge overboard or disposal otherwise of bilge water that has accumulated in machinery spaces. (e) Entries shall be made in the Oil Record Book on each occasion, on a tank to tank basis if appropriate, whenever any of the following cargo/ ballast operations take place on any oil tanker to which this section applies— (1) Loading of oil cargo; (2) Internal transfer of oil cargo during voyage; (3) Unloading of oil cargo; (4) Ballasting of cargo tanks and dedicated clean ballast tanks; (5) Cleaning of cargo tanks including crude oil washing; (6) Discharge of ballast except from segregated ballast tanks; (7) Discharge of water from slop tanks; (8) Closing of all applicable valves or similar devices after slop tank discharge operations; (9) Closing of valves necessary for isolation of dedicated clean ballast tanks from cargo and stripping lines after slop tank discharge operations; and (10) Disposal of oil residue. (f) Entries shall be made in the Oil Record Book on each occasion, on a tank-to-tank basis if appropriate, whenever any of the following operations take place on a fixed or floating drilling rig or other platform to which this section applies— (1) Discharge of ballast or cleaning water from fuel oil tanks; and (2) Discharge overboard of platform machinery space bilge water. (g) In the event of an emergency, accidental or other exceptional discharge of oil or oily mixture, a statement shall be made in the Oil Record Book of the circumstances of, and the reasons for, the discharge. (h) Each operation described in paragraphs (d), (e) and (f) of this section shall be fully recorded without delay in the Oil Record Book so that all the entries in the book appropriate to that operation are completed. Each completed operation shall be signed by the person or persons in charge of the operations concerned and each completed page shall be signed by the master or other person having charge of the ship. (i) The Oil Record Book shall be kept in such a place as to be readily available for inspection at all reasonable times and shall be kept on board the ship. (j) The master or other person having charge of a ship required to keep an Oil Record Book shall be responsible for the maintenance of such record. (k) The Oil Record Book for a U.S. ship shall be maintained on board for not less than three years. (l) This section does not apply to a barge or a fixed or floating drilling rig or other platform that is not equipped to discharge overboard any oil or oily mixture. (m) This section does not apply to a fixed or floating drilling rig or other platform that is operating in compliance with a valid National Pollutant Discharge Elimination System (NPDES) permit. (Approved by the Office of Management and Budget under control number 1625–0009) [CGD 75–124a, 48 FR 45709, Oct. 6, 1983; 48 FR 54977, Dec. 8, 1983, as amended by CGD 88– 002A, 55 FR 18582, May 2, 1990; USCG–2000– 7641, 66 FR 55571, Nov. 2, 2001; USCG–2006–25150, 71 FR 39209, July 12, 2006; USCG–2006–25556, 72 FR 36328, July 2, 2007]

REF523

The rudder is prevented from over-traveling the helm command (i.e., the bridge signal) by the follow-up gear. The position of the rudder is displayed on the vessel's bridge by a Rudder Angle Indicator (RAI).