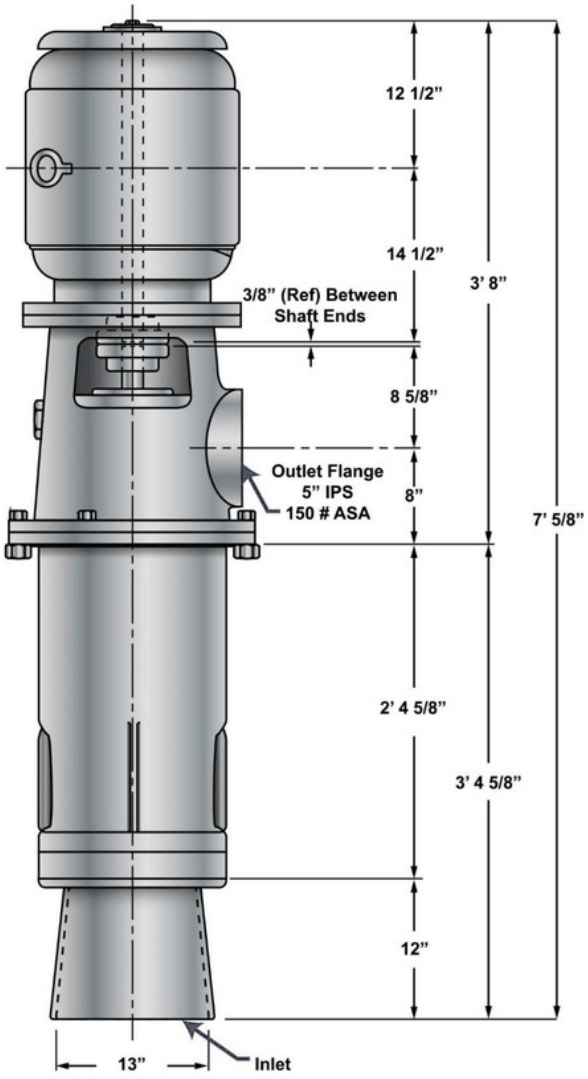

Q511 - General Subjects I

1. What is the distance between the center of the discharge outlet and the top of the motor illustrated

GS-0011



MOTOR CHARACTERISTICS

Motor (A. C.)	Electro Dynamic
Rating H. P.	25
Speed R. P. M. (SYN.)	1200
Frame	365 VY
Type	TN
Volts	440
Cycles	60
Phase	3

PUMP CHARACTERISTICS

Capacity G. P. M.	400
Speed R. P. M.	1150
Suction Lift "HG	10
B, H, P. @ 1200 SSU-75° F	24.9
Oil viscosity Range, SSU	74-7000
Viscosity Normal SSU @ 140° F	155
Discharge Normal PSIG	55
Fluid Handled, Lube Oil	2190 TEP.
Navy Specification	MIL-L-17331
Oil Temperature Range ° F	40-180

Illustration scale: 1" = 1'

- 34 5/8 inches
- 35 inches
- 35 5/8 inches
- **36 inches**

Note:
The correct answer is 36 inches. This distance is determined by summing the labeled vertical segments on the illustration, representing the total vertical distance from the discharge outlet centerline to the top of the motor.

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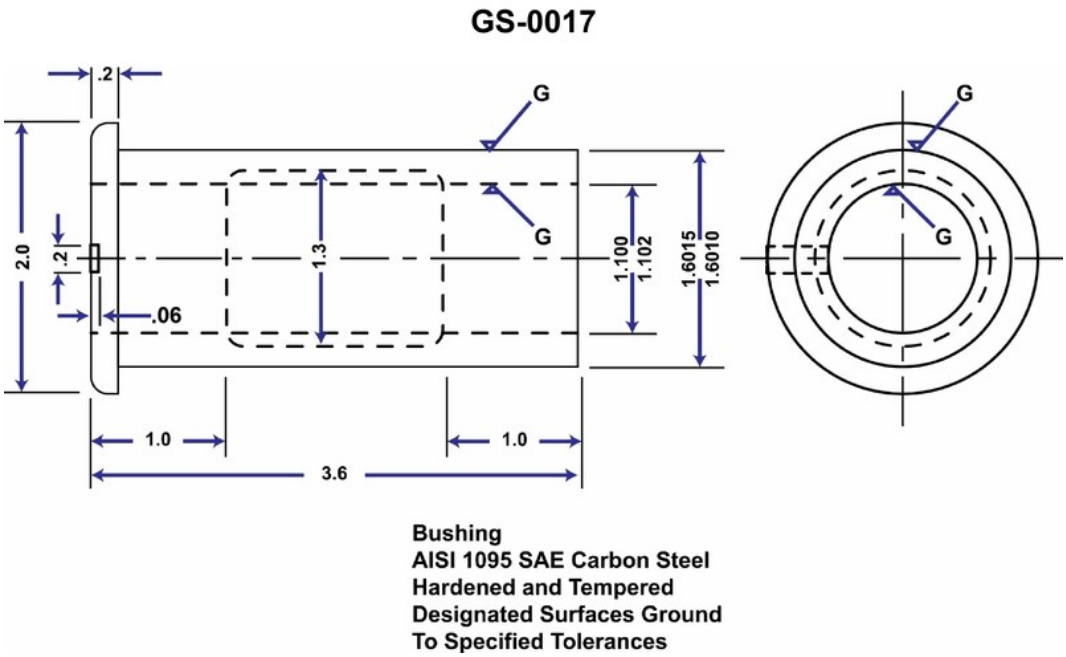
2. Which of the tolerances listed is allowed on the outside diameter of the bushing illustrated



- **0.0005 inch**
- 0.002 inch
- 0.060 inch
- 1.6015 inches

Note:
The correct tolerance for the outside diameter is 0.0005 inch, calculated as the difference between the maximum (1.6015 inch) and minimum (1.6010 inch) limits specified in the drawing.

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3. Which of the devices listed can be used to measure any angle on a blueprint or drawing?

- Vernier
- **Protractor**
- Planimeter
- Compass

Note:
A protractor is the correct answer; it is designed to measure angles on drawings. Verniers measure linear dimensions, planimeters measure area, and compasses draw circles or transfer distances; none directly measure angles.

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4. When renewing spiral packing in a centrifugal pump stuffing box, after the packing is firmly seated, the packing gland nuts should be _____.

- **loosened, and then retightened with the pump running under normal conditions**
- loosened until the gland clears the stuffing box
- left in that position
- tightened an additional 10% to compress the packing

Note:
After spiral packing is seated, the gland nuts should be loosened and retightened with the pump running to allow for proper cooling and prevent overheating or excessive wear.

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5. When installing a mechanical shaft seal on a pump, it is important to _____.

- make the final spring collar adjustments with the pump running
- **ensure that correct spring pressure is applied to the seating faces**
- polish the seating faces with emery cloth prior to assembly
- run the pump "dry" for initial break-in of the shaft seal

Note:
Proper spring pressure is essential for a mechanical shaft seal to maintain contact between the sealing faces, preventing leakage and minimizing wear. Incorrect pressure can lead to excessive friction, heat, or leakage, and seal faces should not be altered or run dry.

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6. Which of the following statements is true concerning centrifugal pumps?

- They are particularly well suited for pumping high viscosity fluids.
- They operate best under negative suction pressure conditions.
- **A flow is developed by imparting kinetic energy to the fluid by the rotation of an impeller.**
- They operate more efficiently when mounted in a horizontal position.

Note:
Centrifugal pumps function by imparting kinetic energy to a fluid through a rotating impeller, converting this energy into flow and pressure. They are not ideal for high-viscosity fluids, require positive suction pressure to prevent cavitation, and their efficiency is not dictated by mounting orientation.

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7. After a disassembly of a single stage centrifugal pump, one finds the outer circumference of the impeller badly pitted and worn. Not having a spare impeller on board, it is decided to turn down the impeller to eliminate the wear/pitting. What will be the pump capacity, in GPM, after the reduction of impeller diameter by 0.5 inches? GIVEN: Original pump capacity = 30 GPM Original impeller diameter = 8 in.

- **28.12 GPM**
- 24.78 GPM
- Capacity would not change.
- 26.37 GPM

Note:
Reducing impeller diameter proportionally decreases pump capacity. The new diameter of 7.5 inches results in a capacity of 28.12 GPM, calculated using the affinity law: Q2/Q1 = D2/D1.

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8. One is informed by the owner that two of the vessel's electrically driven centrifugal cooling water pumps will be replaced with two of higher capacity pumps. No modification of existing piping will be involved. What should be your concerns from an operational perspective?

- **Upgrading of circuit breakers and controllers and possible increased erosion of discharge piping due to increased system velocities.**
- Piping should be of no concern since it is designed with a safety factor. Electrical power should be of concern.
- Electrical power should be of no concern due to safety margins designed into power systems. Increased erosion may be a long term consideration.
- One should not be concerned operationally since all systems are designed with future modifications/upgrades in mind.

Note:
Increased pump capacity necessitates evaluation of electrical protection upgrades and potential piping erosion due to increased velocities, even without physical modifications.

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9. On disassembling a centrifugal pump for overhaul, the third engineer reports holes drilled axially in the back side of a single suction closed impeller. The reason for the these holes is which of the following?

- **To reduce the axial thrust forces on the impeller**
- To allow for water to recirculate for impeller cooling
- To reduce the power required for the pump
- To fit a puller for removing the impeller

Note:
Axial holes in a single-suction closed impeller's back shroud equalize pressure, reducing axial thrust on the rotor and thrust bearing. These balance holes allow liquid flow from the high-pressure front side to the low-pressure back side, minimizing pressure difference and protecting the thrust bearing.

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10. Your centrifugal ballast pump is producing a pressure less than the designed discharge pressure. What could be the cause?

- Excessive high suction head.
- Excessive pump speed.
- **Worn wearing rings.**
- Pump misalignment.

Note:
Worn wearing rings cause internal leakage, reducing discharge pressure by allowing fluid to flow from the high-pressure discharge side back to the low-pressure suction side. This recirculation diminishes the pump's ability to achieve its designed discharge pressure; other options either increase pressure, cause unrelated mechanical issues, or would facilitate pumping.
