

Marine Engineering Exam Resource – Review of Turbines and Seals

1. What does a turbine do?
Is a prime mover that can be used to drive pumps, generators, and gearboxes. Used in inflammable or explosive areas. Page 436
2. What are the two classifications of turbines? Explain each.
Impulsive and Reaction.
3. What are nozzles used for?
Are used to direct the steam onto the turbine blades at the most efficient angle to get the maximum energy out of the steam flow.
4. What are sleeve seals?
Are used on the bearing housing to keep water and dirt out and keep oil in.
5. Why are intake guide vanes required in a turbine?
Turbines with more than one stage has to redirect the steam leaving the first stage and direct on to the blades of the second stage this is the job of the intake guide vanes. There are similarly blades between the stages of turbines that help the steam to hit the blades at the most efficient angle. Page 1140
6. Why are blades shrouded?
Prevent steam escaping over the end of the blades. To help reduce vibration. Maintain the blade tip spacing.
7. If a few blades break off a turbine, what could be done to get it running?
Replace for balance. Replace wheel.
8. Why are glands used on turbines?
They act much like packing used in pumps. They prevent the steam from escaping up the drive shaft and prevent air from coming in.
9. What is the most common type of gland used?
Carbon rings, three segments held together by a garter spring.
10. What are methods of speed control?
Governor to maintain constant shaft rpm. Mechanical, hand speed control. Over speed safety tries to shut off steam supply in case the governor fails or the turbine runaways.
11. When using anti-friction bearings in a turbine, which bearing is fixed?
Hydraulic - phemactical - mechanical (fly bore). A bearing at the governor end is fixed and the rest are allowed to float for expansion.
12. How is bearing wear normally checked on turbines? (Friction bearings)
Lead wire. Plastic gauge. Feeler gauges.
13. A steam turbine has steam tight (carbon ring) glands on?
Both ends of the casing, they are part of the casing and do not rotate with the shaft.

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14. Critical speed of a rotating element is what?
The speed where vibration increases to a point where the unit may self disintegrate.
15. When starting a steam turbine, what should be checked first?
No water in the housing and steam supply line. Water drops and blasts against blades.
16. What is the purpose of a seal?
Used to control and prevent leakage of fluids or gases between moving and stationary parts or between two stationary parts.
17. What motion does a radial lip seal primarily seal?
Rotating Shafts.
18. When fitting a lip seal, which way does the lip face?
Lip should face pressure side. (Oil seal) Lip should face out (exclusion seal, vacuum seal).
What are bellows and boot seals?
No friction contact?
19. What is a labyrinth seal?
A clearance seal, No friction contact. Used on steam turbines as shaft seals.
20. What are two classes of O- Rings?
Static used for stationary surfaces. Dynamic, used for moving surfaces.
21. What is diametral squeeze and how much is recommended for an O-Ring?
The O-Ring is squeezed between the bottom and the groove and the outer wall of the cylinder.
This is required for a good seal, which is 10% of the O-Ring diameter. $\frac{1}{4}$ O-Ring $\frac{1}{32}$ squeeze.
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22. What are anti-extrusion or back up rings used for?
Used to support O-Ring at pressure above 1500 psi. Prevents the O-Ring from being squeezed between the clearance of the piston and cylinder wall. Page 323
23. Should O-Rings be used for high or low-pressure applications?
Yes any pressure. Better seal at high speed but need more force to move them.
24. Where would you use a static O-Ring?
Same as gasket to seal stationary parts. Page 324.
25. What types of seals are installed in sets?
V packing or cherron seals. Page 325
26. Explain where a wiper seal would be used?
To prevent entry of foreign material into moving parts. Example seal on a cylinder rod. Page 330
27. What is a gasket?

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To seal stationary parts.

28. What materials are gaskets made of?
Rubber, Neoprene, Cork, Paper, Asbestos compound, copper.
29. Describe how you would tighten up a flange with eight bolts and a gasket in between?
Tighten 1/3 torque repeat tightening 2/3 torque then repeat to full torque. Cris cross manhole cover to tighten equally.
30. If you were to cut holes in a gasket for bolts, what size should the holes be and why?
1/32 oversize to prevent distortion of the gasket when tightening bolts. Stops gasket from interfering with the bolt threads.ional Standards Organization.