National Marine Manufacturers Association
Product Compliance Specialist Examination
Steering Systems (2013 MY)
P-14(10), P-17(08), P-21(03), P-22(08)

1. Wheel Dish is described as:

    a. the distance between the parallel planes formed by the inner and outer sections of the steering wheel

    b. the distance along the axis of the steering shaft, from the helm to the outer most section of the steering wheel

    c. the distance between the parallel planes formed by the aft rim surface and the forward hub surface

    d. the distance along the axis of the steering shaft, from the helm to the forward hub surface

2. A Tangential Load Test requires:

    a. a 100-pound force at any point on the steering wheel rim, tangentially in the plane of the steering wheel rim for ten cycles at five seconds per loading

    b. a 150-pound force at any point on the steering wheel rim, tangentially to the plane of the steering wheel rim for ten cycles at five seconds per loading

    c. a 100-pound force at any point on the steering wheel rim, parallel to the axis of the steering shaft for ten cycles at five seconds per loading

    d. a 150-pound force at any point on the steering wheel rim, parallel to the axis of the steering shaft for ten cycles at five seconds per loading

3. The clearance between the steering wheel and control levers shall be:

    a. at least 2-inches in all wheel and lever positions

    b. at least 2 ½-inches in all wheel and lever positions

    c. at least 2 ½-inches in all wheel and lever positions, single lever controls only

    d. at least 2-inches in all wheel and lever positions, side mounted controls only

4. It is required that the maximum diameter and deepest dish wheel that can be used with the helm shall be listed in the installation instructions:

a. for all boats

b. never required

c. for boats over 20'

d. for boats with dual station steering only

5. An Axial Load Test requires:

a. a 100-pound force distributed over not more then 4-inches of the steering wheel rim, tangentially to the plane of the steering wheel rim for ten cycles at five seconds per loading

b. a 150-pound force distributed over not more then 4-inches of the steering wheel rim, tangentially to the plane of the steering wheel rim for ten cycles at five seconds per loading

c. a 100-pound force distributed over not more then 4-inches of the steering wheel rim, parallel to the axis of the steering shaft for ten cycles at five seconds per loading

d. a 150-pound force distributed over not more then 4-inches of the steering wheel rim, parallel to the axis of the steering shaft for ten cycles at five seconds per loading

6. Upon application of the Axial Load Test and the Tangential Load Test, there shall be no _____ of the steering wheel structure, or _____such that the required loads cannot be achieved.

a. fracture/permanent deformation

b. radial play/tangential movement

c. fracture/catastrophic failure

d. fracture/loose fittings

7. What are the three different types of approved helm shafts?

a. Tapered round shaft, Square shaft, and Tapered spline shaft

b. Tapered square shaft, Tapered round shaft, and Spline shaft

c. Tapered spline shaft, Round shaft, and Tapered square shaft

d. Rounded square Shaft, Squared round Shaft, and Spline Shaft

8. When tested to the axial load test in P-22, there shall be no fracture of the steering wheel structure or permanent deformation in excess of ___ inch at the rim or spoke's handgrip such that the required loads cannot be achieved

a. 1/8

b. 1

c. ¼

d. 1/2

9. Steering systems shall not cause the operator to re-grip the steering wheel or handgrip more frequently than once every five seconds due to position drift of:

a. ¼ turn or less

b. 1 full turn

c. ¼ turn or more

d. ½ turn

10. Steering cables shall be permanently marked with:

    a. cable gauge and material

    b. the length from the center of the steering wheel shaft to the center of the hole in the steering ram in mid-travel position

    c. the cable manufacturer and maximum operating temperature

    d. the minimum bend radius allowed in the cable

11. The largest diameter and deepest dish steering wheel:

    a. must be used during the axial and tangential load test

    b. must be tested at its weakest point if 24 inches in diameter

    c. must be matched to the helm

    d. must be marked on the helm and visible when the wheel is removed

12. The steering stops on an outboard engine shall:

    a. be based on manufacture's recommendations

    b. be placed to provide 15-degrees of movement to each side of center

    c. be placed to provide 30-degrees of movement to each side of center

    d. be placed to provide 30-degrees of total movement

13. The mechanical steering cable (i.e. conduit and core) shall withstand a force of_____ in compression and tension, without separation of any components.

    a. 100 lbs

    b. 750 lbs

    c. 1500 lbs

    d. 2000 lbs

14. If a component of a cable steering system is mounted to the hull of a vessel, the hull shall be reinforced to withstand a force of:

a. 750 lbs

b. 1500 lbs

c. 2000 lbs

d. equal to the maximum rating of the component

15. If a pressure relief device is installed on a hydraulic steering system:

a. the system proof pressure is the same as the working pressure

b. the system relief pressure is the same as the working pressure

c. the system proof pressure is the same as the relief pressure

d. the system working pressure is two times the proof pressure

16. System proof pressure must be marked:

a. on the output device

b. on all hydraulic lines repeating every 12 inches

c. on all hydraulic fittings critical to the integrity of the steering system

d. and visible as installed on the front or back of the hydraulic helm

17. An outboard boat has a cable and pulley steering system. The cable has to be tested for a breaking load no less then:

a. 100 lbs

b. 750 lbs

c. 900 lbs

d. 1800 lbs

18. Hydraulic system components shall not be installed in areas where the operating temperatures exceeds:

a. 125° F

b. 185° F

c. 75° C

d. 100° C

19. Hydraulic system fittings shall not be installed

a. directly above exhaust system components

b. below the static float plane

c. through the side of an outboard motor wells

d. directly above potable water tanks

20. Hydraulic lines must be:

a. supported every 18 inches or less

b. supported every 36 inches or less

c. routed to prevent stretching, crushing, chaffing, or kinking

d. supported unless they are vertically installed and inaccessible

21. In a cable over pulley steering system, the angle formed between the pulley pin axis and the axis of both cables shall be:

a. 90°

b. between 85° and 95°

c. between 90° and 95°

d. between 85° and 90°

22. If an impulse load is applied to a steerable device, where the design peak pressure and ½ the design peak pressure for ½ second is achieved,

a. the steering wheel must not move more than 13 degrees relative to its axis

b. there shall be no less than 4% of the full range of steering movement of the steering wheel

c. position drift must be less than ¼ turn of the steering wheel every 5 seconds

d. the steering system must not allow more than 17 degrees of rotation about its steering axis

23. The helm should incorporate travel stops to eliminate:

a. overloading of the outboard engine connection

b. stress on the steering arm

c. overloading of the steering cable

d. stress between the drag link and output ram

24. Hydraulic lines shall accommodate the full range of intended travel without interference with the mechanical interface requirements of an outboard engine steering system and ABYC S-12, Outboard Motor, Transom, and Motor Well Dimensions, including the:

a. full rpm's at minimum trim and tilt

b. full range of tilt and trim

c. half range of tilt and trim

d. idle rpm, full range of tilt and trim

25. A vessel is outfitted with twin engines and a manual hydraulic steering system. Only one engine is actuated by the steering helm. What is the load required by the connection rod and end fittings?

a. Tangential load of 2000 lbs
b. Axial Load of 2000 lbs
c. Axial Load of 750 lbs
d. Tangential and axial load of 750 lbs