Objective: After studying this chapter, you will be able to describe and explain the construction of an engine's bottom end and its related parts.

**Cylinder Block Construction**

1. What are engine cylinder blocks normally made of?  
2. A(n) __ cylinder block dissipates heat better than a(n) __ block.  
3. Many vehicles use __ blocks to reduce weight and increase fuel economy.  
4. A(n) __ is relatively thin and is not exposed to engine coolant.  
5. A(n) __ is exposed to engine coolant and must withstand combustion pressure and heat without the added support of the cylinder block.  
6. Define *line boring.*

**Piston Construction**

9. Define *piston diameter.*
10. What is meant by the term *pinhole diameter*?

11. Define *ring groove width*.

12. A(n) ___ piston is machined slightly out-of-round when viewed from the top.

13. What is the purpose of *piston taper*?

14. ___ generally refers to the contour of the piston head.

15. The head of a(n) ___ piston is almost flat and is parallel with the block's deck surface.

16. Define *valve reliefs*.

17. A(n) ___ provides clearance between the piston and the crankshaft counterweights.

18. A(n) ___ piston is a two-piece design controlled by engine oil pressure.

19. Identify the following piston dimensions.

   ![Piston Diagram]

   (A) ___
   (B) ___
   (C) ___
   (D) ___
   (E) ___
   (F) ___
   (G) ___
   (H) ___

**Piston Ring Construction**

20. Automotive pistons normally use ___ rings: ___, compression rings and ___ oil ring.
Chapter 14  Engine Bottom End Construction  65

21. The _____ prevent pressure leakage into the crankcase and wipe oil from the cylinder walls.

22. Explain ring seating.

23. Name the two basic oil ring designs.

24. What is the function of a piston’s oil ring?

25. The piston _____ is the distance from the top of the ring to the bottom of the ring.

26. Piston ring _____ is the distance from the face of the ring to its inner wall.

27. Piston _____ is the distance between the ends of the ring when installed in the cylinder.

28. Hard ring coatings, such as _____, are used in new or freshly machined cylinders that are perfectly round.

29. When are soft ring coatings desirable?

Piston Pin Construction

30. What are piston pins normally made of?

31. _____ is a heating and cooling process that increases the wear resistance of the piston pin.

32. A(n) _____ piston pin is secured by snap rings and is free to rotate in both the rod and piston.

33. A press-fit piston pin is forced tightly into the connecting rod’s _____.

34. What is the purpose of piston pin offset?

35. A(n) _____ on the head of the piston is frequently used to indicate piston pin offset and the front of the piston.

Connecting Rod Construction

36. Most connecting rods are made of _____.

37. Explain low-inertia parts.
38. What is the purpose of a hole machined through the entire length of a drilled connecting rod?

39. _______ are used to ensure proper location of each connecting rod in the engine.

40. Define powdered metal forging.

---

**Crankshaft Construction**

41. What are engine crankshafts usually made of?

42. Turbocharged or diesel engines are normally equipped with crankshafts made of _______.

43. Oil enters the crankshaft at the _______ and passes through holes in the main bearing journals.

44. With a V-type engine, _______ connecting rods bolt to each rod journal.

45. A(n) _______ crankshaft has weights formed opposite every crankpin.

46. A(n) _______ crankshaft only has weights formed on the center areas.

---

**Engine Bearing Construction**

47. Identify the three basic types of engine bearings.

![Diagram]

(A) _______

(B) _______

(C) _______

48. _______ is the bearing’s ability to withstand pounding and crushing during engine operation.

49. _______ is the bearing’s ability to adjust to imperfections in the journal surface.

50. _______ refers to the bearing’s ability to absorb dirt, metal, or other hard particles.

51. _______ is the bearing’s ability to withstand being acted on by acids, water, and other impurities in the engine oil.
52. Define bearing crush.

53. _____ is used on split-type engine bearings to hold the bearing in place during assembly.

54. A(n) ____ bearing has the original dimensions specified by the engine manufacturer for a new, unworn, or unmachined crankshaft.

55. An undersize bearing is designed to be used on a crankshaft journal that has been machined to a(n) ____ diameter.

56. Connecting rod and main bearings are available in undersizes of ____.
   (A) 0.125", 0.135", 0.145", 0.155"
   (B) 0.010", 0.020", 0.030", 0.040"
   (C) 0.225", 0.235", 0.245", 0.255"
   (D) 1.010", 1.020", 1.030", 1.040"

57. _____ or dowels position split bearings in their bores.

58. Identify the following bottom end components.

   (A) 
   (B) 
   (C) 
   (D) 
   (E) 
   (F) 
   (G) 
   (H) 

59. How are engine bearings lubricated?

60. What is the function of a main thrust bearing?

Rear Main Bearing Oil Seal Construction

61. Describe the purpose of a rear main bearing oil seal.

62. Name three types of rear main bearing oil seals.

63. A(n) __ rear oil seal is simply a woven rope filled with graphite.

Additional Exercises

64. _____ means that some engine parts are selected and installed in a certain position to improve the fit or clearance between parts.

65. _____ are used in some engines to cancel the vibrating forces produced by crankshaft, piston, and rod movement.