Valve & Spring Condition

Inspect each valve for signs of burning, pitting and heavy carbon deposits. Burned or pitted valves can be caused by valves sticking in guides, insufficient tappet clearance, weak springs, clogged coolant passage, improper ignition or valve timing, etc, Fig. 13-8.

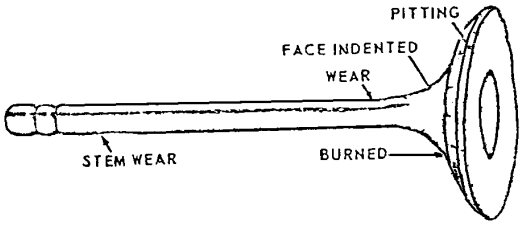

Fig. 13-8. A burned valve indicates problems. (Albertson-Sioux)

Heavy carbon deposits, especially under the head of the intake valve, indicates worn valve guides, damaged seals, worn rocker arm bushings allowing over-lubrication, clogged oil drain holes in head, rocker arm shaft oil holes facing the wrong direction, etc. Fig. 13-9.

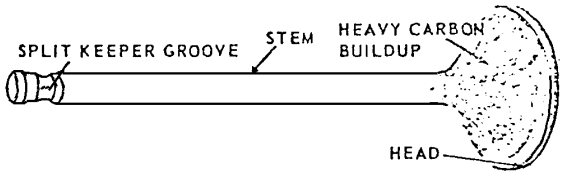

Fig. 13-9. Heavy carbon deposits under valve heads indicate excess oil consumption through valve guides. (Clevite)

Discard all badly burned, cracked or warped valves. The grinding necessary to clean them up will leave insufficient valve margin, Fig. 13-9A.

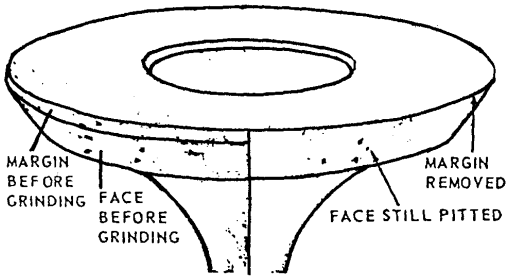

Fig. 13-9A. The amount of grinding required to clean up a valve in this condition will remove the margin and render the valve useless.

To provide fast initial seating, 30-degree valves are frequently ground to an angle of 29 degrees and 45 to 44 degrees. This provides an interference fit that produces a hairline contact between the valve face and the top of the valve seat. Some manufacturers feel that due to valve design and material, the valve when heated, will then form a perfect fit, Fig. 13-11.

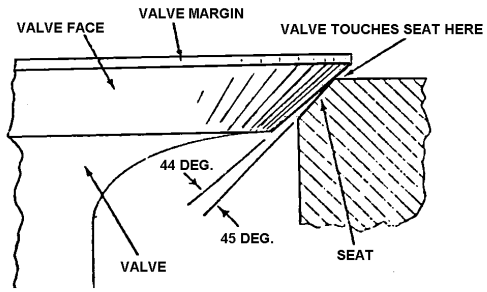

Fig 13-11 Interference Angle. Note the ONE degree difference in angles and how the valve face contacts the TOP of the seat.

The valve seat must be cut at the correct angle. It must be smooth, clean and free of cracks, nicks, pits, etc. It must be of the correct width, and should engage the face of the valve near the central portion.

Common seat angles are 45 and 30 degrees. Where an interference fit is desired, it is customary to grind the interference angle on the valve itself.

Seat width varies (see manufacturer's specs.) but will average around 1/16 inch for both intake and exhaust. A seat that is too narrow will pound out of shape more easily. It will also fail to dissipate enough heat from the valve face. A seat that is too wide will tend to collect carbon, thus eventually preventing a good seal, with resultant valve overheating and burning. Fig. 13-51.

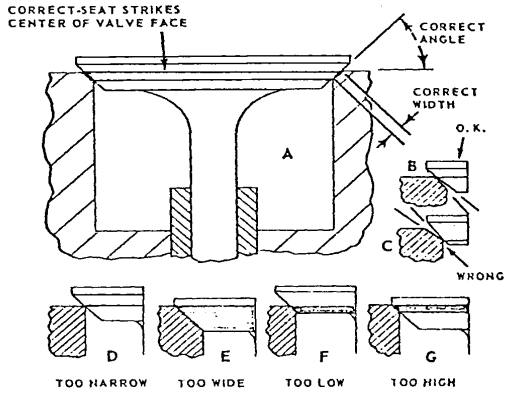

Fig. 13-51. Correct and incorrect valve seats. Note the interference angles in B and C.

CHECK SPRING TENSION

After extended service, valve springs tend to lose tension. Since correct tension is important to proper valve action, each spring must be tested to make certain it meets minimum requirements. Manufacturers provide specifications listing the amount of force, in pounds, that a given spring should exert when compressed to a specific length.

The spring is placed in an appropriate measuring device, compressed to the specified length, and the pressure in pounds determined, Fig. l.3-68A.

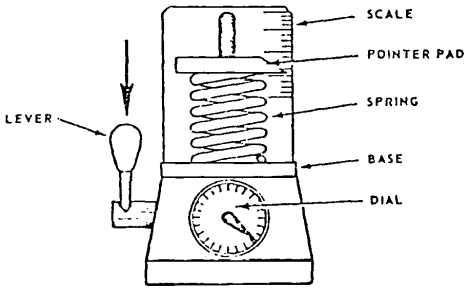

Fig. 13-68A. Testing valve spring tension. Spring is placed on base. When lever is pulled down, pointer pad compresses spring to specified distance on the scale. Tension, in pounds, is then read on the dial.

CHECK VALVE SPRING FREE LENGTH AND SQUARENESS

Place the spring on a flat surface. Slide a combination square up to the spring (do not tip the spring) . Using the scale on the blade, measure free length (length when spring is not under pressure). It should meet specifications.

Carefully sight between the edge of the spring and the blade. The spring should be parallel to the blade. Give the spring a partial turn and check again. If both sightings indicate that the spring is parallel (not more than 1/16 inch difference between top and bottom) you can assume that the spring is square. Place on the opposite end and check it for squareness, Fig. l.3-68B.

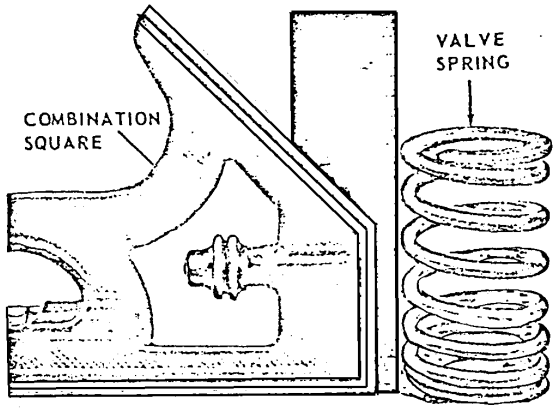

Fig. 13-68B. Checking spring free length and squareness. (Plymouth)

INSPECT SPRING FOR ETCHING OR OTHER DAMAGE

Check the spring for any signs of rusting, corrosive etching and for scratches, nicks, etc.

CHECK DAMPER SPRINGS AND CLIPS

Inspect damper springs (used inside the regular spring to reduce spring-vibration) and damper clips if used. Discard any that are worn or fail to meet specs.

POOR SPRINGS ARE EXPENSIVE

Reject springs that fail to meet specified compressed pressure) free length, squareness, or that shows signs of rusting, etc.

A weak spring will cause valve float (valve closing so slowly that the lobe on the camshaft starts to open it again before it has fully seated). Valves may start sticking in the guide causing heavy tappet-noise, missing, burning and broken valves.

Remember that using poor valve springs can be expensive. New springs are inexpensive and will certainly raise the level of reliability and aid performance.