



## Piston to Valve

When installing a high-performance camshaft, there is a real risk of insufficient clearance between the valves and pistons near Top Dead Center (TDC) on overlap. Even if the valves clear the pistons when you turn the crankshaft slowly by hand, contact can still occur at high RPM due to valve float, connecting-rod stretch, valvetrain deflection, and other dynamic forces.

### Recommended Minimum Clearances

- Intake valves: At least 0.080"
- Exhaust valves: At least 0.100" (exhaust valves run hotter and expand more)

These are widely accepted conservative minimums for most performance engines. Some builders add extra margin (especially with aluminum rods, high RPM, or very aggressive cams).

### Easiest Method with Cylinder Heads Installed: Light Checking Springs + Dial Indicator

This is the most practical way to check clearance without disassembling the short block.

### Tools Needed

- Light-duty checking springs (replace the regular valve springs)
- Degree wheel on the crankshaft (properly degreed cam is ideal)
- Dial indicator with magnetic base
- Rocker arms and pushrods installed (zero lash or per your normal procedure)
- Correct lifters for your cam (flat tappet or roller)



## Step-by-Step Procedure

1. Install the camshaft and degree it. Leave the degree wheel mounted.
2. Install the cylinder heads with your intended head gaskets.
3. Replace the regular valve springs with light checking springs. These allow you to easily depress the valves by hand.
4. Install rockers and pushrods. Set to zero lash (or your normal cold lash if preferred).
5. Mount the dial indicator so its plunger contacts the valve spring retainer (or valve tip) and is parallel to the valve stem movement.

## Critical Measurement Points (Overlap Period)

The closest piston-to-valve approach occurs during overlap (both valves open near TDC).

- **Exhaust valve:** Check between **15° BTDC** and **5° BTDC** on overlap
- **Intake valve:** Check between **TDC** and **15° ATDC** on overlap.

These points are measured from the overlap TDC (360° from compression TDC).

## How to Take the Measurement

- Rotate the engine in its normal direction of rotation to the desired checking angle (e.g., 15° BTDC overlap for the exhaust valve).
- Zero the dial indicator with the valve fully seated (on its seat).
- Gently push down on the rocker arm until the valve contacts the piston.

**The reading on the dial indicator is your piston-to-valve clearance at that point.**

- Check several points around the critical area (every 2–5°) to confirm you have found the minimum clearance.
- Repeat the process for the intake valve at its critical points.
- Perform this check on all cylinders (or at least representative ones).



### Important Notes & Tips

- **Checking springs vs. real springs:** Light checking springs usually show **slightly less** clearance than you will actually have with stiff race springs (due to less valvetrain deflection). Many experienced builders treat the measured number as conservative.
- If clearance is marginal, some builders also verify with modeling clay using the actual valve springs.
- Always check **both** intake and exhaust valves.
- If clearance is too tight:
  - Fly-cut deeper/wider valve reliefs in the pistons
  - Retard cam timing slightly (helps intake clearance)
  - Advance cam timing slightly (helps exhaust clearance)
  - Switch to different pistons or a milder cam

This method is straightforward, repeatable, and commonly used by engine builders when the heads are already installed. Always err on the side of more clearance — contact between piston and valve is almost always catastrophic at high RPM.

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