FULL SEND DIESEL · INSTALLATION GUIDE

CLAMP LOCK HEAD STUD KIT

1998.5–2025 24V Cummins

Vehicle Fitment:
1998.5–2007 Dodge Ram 2500/3500 — 5.9L Cummins 24V
2007.5–2025 Ram 2500/3500 — 6.7L Cummins

FINAL TORQUE	STAGES
140 ft-lbs	**3-stage torque to spec**

KIT COUNT	RETORQUE
26 studs · nuts · washers	**Not required (hot or cold)**

Recommended up to 800 HP. For 6.7L Cummins applications, fire-rings are recommended at minimum under any horsepower.

INSTALLATION

TOOLS NEEDED

- 14 mm socket (for stud nut torque)
- 5 mm Allen wrench (stud install/remove — not for torque)
- Calibrated torque wrench, 0–150 ft-lbs minimum
- Feeler gauge set (0.010", 0.020", 0.026")
- 3/8" wrench or socket (rocker lock nuts, 18 ft-lbs)
- Compressed air or shop vacuum (for drying bolt holes)
- M12 × 1.75 thread chaser (optional — good practice)
- Engine assembly lube (light coat for valve train)

STEP 1 CLEAN & DRY THE BOLT HOLES

Blow out or vacuum every block bolt hole thoroughly. Holes **must be completely dry** — no oil, coolant, water, or debris. Trapped fluid in a blind hole can hydraulic-lock under torque and crack the block deck.

- Thread chasing with an M12 × 1.75 chaser is good practice and recommended, but not strictly required if the threads are visibly clean.

STEP 2 THREAD STUDS INTO BLOCK — HAND TIGHT ONLY, DRY THREADS

Thread all 26 Clamp Lock head studs into the block **HAND TIGHT ONLY** — do not apply torque to the studs themselves. Use the 5 mm Allen broach in the top of each stud only for install/remove.

- **Do NOT apply lubricant to the block-end (lower) threads of the studs.** They thread into the block dry. Lubricant goes on the nut end only (Step 3).
- The **6.625" long studs** install on the **exhaust manifold side**, at positions **3, 6, 11, 14, 19, and 22** of the factory Cummins torque sequence. See the diagram on page 5.

INSTALLATION (CONTINUED)

STEP 3 LUBRICATE WASHERS, TOP STUD THREADS, & NUT UNDERSIDES

Use the small packet of fastener assembly lubricant supplied with your FSD kit. Do **NOT** substitute motor oil — it produces inconsistent clamping load and unreliable final torque.

- Lube **both sides** of each washer; place over each stud onto the cylinder head spot face.
- Lube the **top (nut-end) threads** of each stud — only the section the nut threads onto. Block-end threads stay dry.
- Lube the bottom face of each nut.
- Thread the nuts down by hand until each one contacts its washer.

WHY THE LUBE SPEC MATTERS

ARP's R&D testing shows that substituting motor oil for assembly lube produces inconsistent friction at the threads and under the nut — the same indicated torque value yields a wildly different clamping load from stud to stud. Use the supplied fastener assembly lubricant exactly as specified.

INSTALLATION (CONTINUED)

STEP 4 TORQUE IN THREE STAGES

Follow the factory Cummins 24V head torque sequence (see diagram on the next page). Using a 14 mm socket, torque each nut in sequence:

STAGE	ACTION	TORQUE
Stage 1	Torque nuts 1 → 26 in sequence	**40 ft-lbs**
Stage 2	Torque nuts 1 → 26 in sequence	**80 ft-lbs**
Stage 3	Torque nuts 1 → 26 in sequence (final)	**140 ft-lbs**

No hot retorque is required.

STEP 5 CLEARANCE THE ROCKER COVER FOR POSITION #24

Position **#24** sits where the lower rocker arm cover meets the rear of the head. The cover **must be clearanced** here before reinstalling — if the stud, nut, or washer contacts the cover, the cover will not seat flat and you will have a major oil leak from the rear gasket on first start.

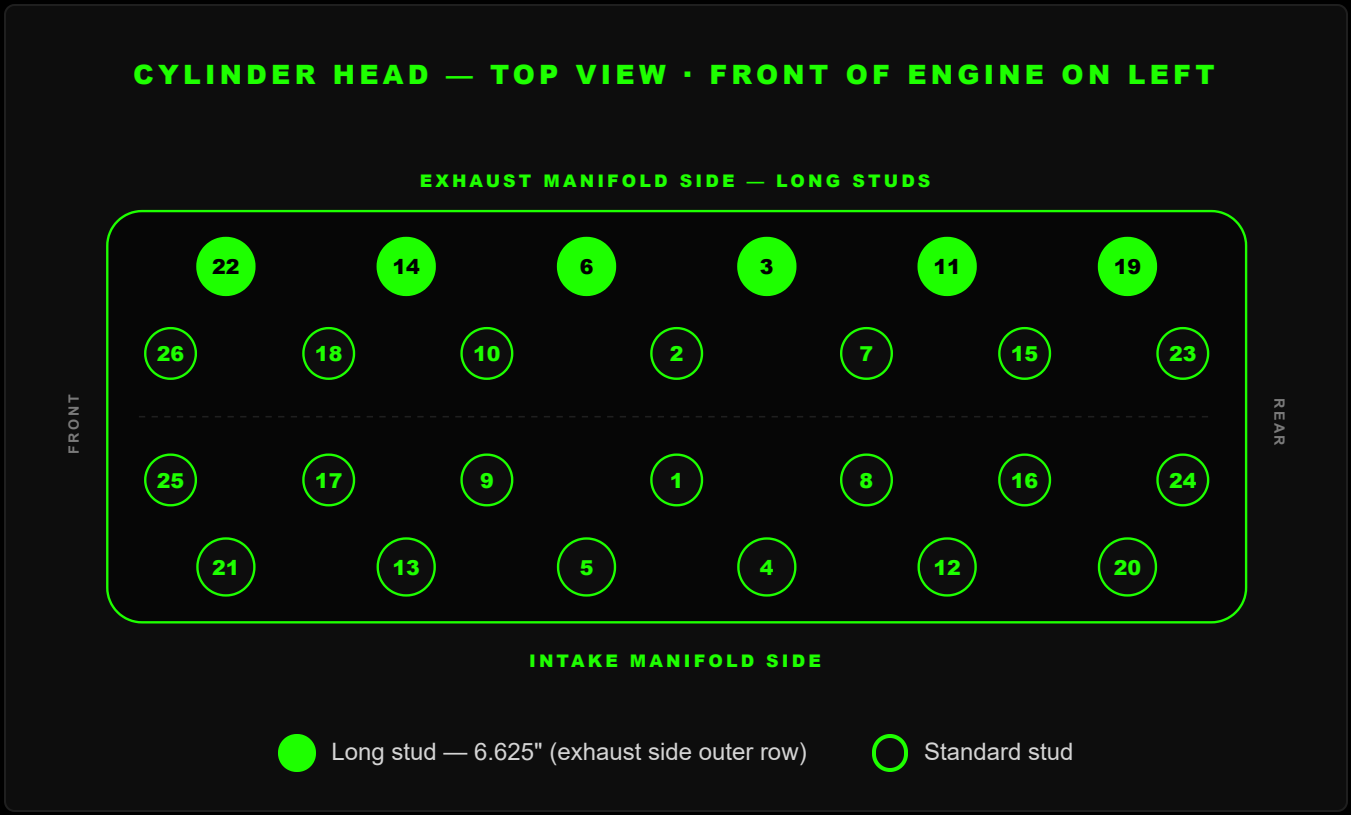
- Use a **die-grinder bit** to remove material from the underside of the lower rocker cover where it would contact the position-#24 stud, nut, and washer.
- Test-fit the cover by setting it in place and confirming there is no contact with the stud, nut, or washer.
- Continue removing material in small passes until the cover sits flat against the head with zero contact at the #24 location.

TROUBLESHOOTING — BIG OIL LEAK ON FIRST START

If the engine fires up and you have a significant oil leak from the rocker cover area, **check the rear of the cover first**. Almost every time, the cover wasn't clearanced enough at position #24 and is sitting on the stud, nut, or washer — holding the cover off its sealing surface. Pull the cover, grind a little more material from the contact point, refit, and verify the cover seats flat before reinstalling.

TORQUE SEQUENCE

Factory Cummins 24V head bolt torque sequence — torque all 26 nuts in numerical order during each of the three stages. The six green-filled positions (**3, 6, 11, 14, 19, 22**) receive the longer 6.625" studs on the exhaust manifold side.



NOTES ON THE SEQUENCE

- Sequence starts at the center of the head (positions 1 & 2) and spirals outward in a cross pattern, alternating between the intake and exhaust sides.
- Torque the same numerical order for all three stages (40 → 80 → 140 ft-lbs).
- Sequence layout per Cummins B-series factory service spec.

VALVE LASH ADJUSTMENT

Adjust valve lash after head studs are torqued and the rocker arm assembly is reinstalled. Engine must be **COLD** (coolant < 140°F / 60°C). Cummins firing order: **1 – 5 – 3 – 6 – 2 – 4**.

COLD VALVE LASH CLEARANCES

5.9L 24V CUMMINS (1998.5–2007)	6.7L CUMMINS (2007.5–2025)
Intake 0.010" · Exhaust 0.020"	**Intake 0.010" · Exhaust 0.026"**

TWO-POSITION METHOD

POSITION 1 CRANKSHAFT AT TDC — CYLINDER #1 COMPRESSION

Measure and adjust:

- **Intake valves** — cylinders 1, 2, 4
- **Exhaust valves** — cylinders 1, 3, 5

POSITION 2 ROTATE CRANKSHAFT 360° — TDC CYLINDER #6 COMPRESSION

Measure and adjust:

- **Intake valves** — cylinders 3, 5, 6
- **Exhaust valves** — cylinders 2, 4, 6

AFTER EACH ADJUSTMENT

Torque the rocker arm lock nut to **18 ft-lbs (24 N·m)**, then re-check the clearance with the feeler gauge.

REASSEMBLY & FINAL CHECKS

1. Reinstall the lower and upper rocker arm covers (verify position-#24 clearance from Step 5).
2. Reinstall intake horn, intercooler piping, accessories, and battery cables.
3. Reconnect the battery negative terminal.
4. Refill engine coolant; top off transmission and engine oil.
5. Start the engine and let it idle in **NEUTRAL**.
6. Inspect for leaks at the head gasket, valve cover, and coolant connections.
7. Test drive the vehicle.
8. Recheck all fluid levels and re-inspect for leaks after the engine has fully cooled.

NEED HELP?

Call or text 908-223-9744. Send pictures or video and we'll walk you through it.

sales@fullsenddiesel.com · joe@fullsenddiesel.com