CALIFORNIA
AIR RESOURCES BOARD

Tier 5 Rulemaking Workshop II

Useful Life, Warranty, and Defects Reporting

October 30-31, 2023

CARB

Outline

- Useful Life (UL) Proposal
- Warranty Proposal
- Defect Investigation, Reporting, and Corrective Action Proposal

Useful Life Background

- Manufacturers must certify that their engines would comply with applicable emission standards throughout the UL.
- The UL of off-road engines ≥ 37 kilowatt (kW) is **8,000 hours or 10 years.**
- In the Nov. 2021 workshop, CARB staff asked for feedback for **potentially lengthening UL to 12,000 hours**. Feedback/data provided:
  - Low-usage equipment (especially seasonal agriculture usage) would not reach UL hours.
  - Equipment life can be shorter than engine's life.
  - Longer UL exacerbates the aftertreatment system packaging challenge.

Staff's Analysis of Useful Life

- New data from CARB staff's contractor showed that the average life of engines in construction and agriculture sectors is approximately **10,000 hours/18 years.**
  - In 10 years, average equipment only reaches ~5,600 hours whereas UL is 8,000 hours.
  - In 15 years, average equipment fully utilizes 8,000-hour UL.
- Therefore, staff proposes to **maintain the current UL hour limits but extend the year limits by ~50%.**

Emission Warranty Background

- Manufacturers shall warrant to the purchaser that the engine is free from defects which cause the failure of a warranted part to be identical in all material respects to the part as described in the engine manufacturer's application for certification.
- Manufacturers are required to track information on possible defects and submit reports to CARB staff.

Staff's Analysis of Warranty

- Available data suggest most of off-road equipment reach the year limit of warranty periods before reaching the hour limit.
- Recent surveys to engine manufacturers conducted by staff's contractor, 44 Energy, suggested that the cost impact of lengthening only the year limits in Useful Life and Warranty would be small (e.g., average incremental cost per engine would be $401 for 56 ≤ kW < 130)
  - The final report to be made available after completion of the project
- Our proposal is **to keep hours the same but lengthen years by ~50% for both Useful Life and Warranty for all power categories**.
- 1st time off-road on-board diagnostics/on-board monitoring requirement would encourage more owners to fix malfunctioning parts within the Warranty period.

Tier 5 UL / Warranty Proposal

Power	Constant speed		Variable speed
kW < 19	UL: 3,000 hours/5 years→8 years Warranty: 1,500 hours/2 years→3 years		
19 ≤ kW < 37	RPM >= 3,000 UL: 3,000 hours/ 5 years→8 years Warranty: 1,500 hours/ 2 years→3 years	RPM < 3,000 UL: 5,000 hours/ 7 years→11 years Warranty: 3,000 hours/ 5 years→8 years	Any speed UL: 5,000 hours/ 7 years→11 years Warranty: 3,000 hours/ 5 years→8 years
kW ≥ 37	UL: 8,000 hours/10 years→15 years Warranty: 3,000 hours/5 years→8 years		

- No change in the hour limits.
- The number of years are increased by 50% and rounded up to the nearest integer.
- UL would also apply to CARB's in-use compliance testing and manufacturer-run in-use testing.

RPM: Revolutions per minute

Maintenance Interval Amendments

- 13 CCR § 2425 (c)(3) allows for the truncation of a manufacturer's warranty liability after the first scheduled replacement of an emission-related component
  - Some emission-related components have minimum allowable maintenance intervals that are shorter than the warranty period of the engine, e.g., positive crankcase ventilation valves
  - Staff proposes to revise 13 CCR § 2425 (c)(3) to require that all emission-related components listed in § 1039.125(a)(2) and (3) of the California Test Procedures, Part I-D, remain covered throughout the full warranty period regardless of their minimum allowable maintenance interval
- EGR coolers are critical components for controlling NOx emissions
  - CARB data show that the replacement frequency for EGR coolers in off-road construction equipment are approximately 4,500 hours
  - Staff proposes revising the minimum maintenance interval for EGR coolers from 1,500 hours to 3,000 hours and 4,500 hours for < 130 kW and ≥ 130 kW, respectively, aligning with the rest of the EGR system (except filters)

Background: Current Investigation, Reporting, and Corrective Action Requirements

Defect Investigation[a]

If unscreened warranty claims suggest an issue with an emission-related component (ERC), manufacturers must investigate for defects.

Defect Report[b]

If the investigation shows the ERC is defective, manufacturers must submit a defect report.

Corrective Action[c]

If the failure rate exceeds 4% or 50 units, manufacturers must conduct corrective action. CARB currently allows manufacturers to issue extended warranty instead of recalls for certain components.

a: Title 40, Code of Federal Regulations, § 1068.501(e)
b: Title 40, Code of Federal Regulations, § 1068.501(f)
c: Title 13, California Code of Regulations, § 2143

Tier 5 Corrective Action Proposal

Would codify the current policy by identifying which components would be subject to recall or lengthened warranty:

- Recall for failures of exhaust after-treatment devices, on-board computers or systems, urea dosers, and hydrocarbon injectors.
- Lengthened warranty to full useful life for other components.
- Executive Officer retains the flexibility to determine whether a recall is necessary.*

* Title 13, California Code of Regulations, § 2148

Defect Investigation, Reporting, and Corrective Action Thresholds

Current:

Engine power	Investigation (Nationwide number; Unscreened defect)	Defect Reporting (Nationwide number; Screened defect)	Corrective Action (California number; Screened defect)
kW ≤ 560	50 or 10% (whichever is greater)[a,b]	20 or 2% (whichever is greater)[c,d]	50 or 4% (whichever is greater)[e]
560 < kW	25 or 10% (whichever is greater)[a,b]	10 if sales is less than 150 15 if sales is 150-750 2% if sales is 750+	50 or 4% (whichever is greater)[e]

Tier 5 Proposal:

Engine power	Investigation (California number; Unscreened defect)	Defect Reporting (California number; Screened defect)	Corrective Action (California number; Screened defect)
All kW	12 or 10% (whichever is greater)	12 or 4% (whichever is greater)	12 or 4% (whichever is greater)

a: 5,000 if engine family sales are more than 50,000, b: Title 40, Code of Federal Regulations, § 1068.501(e)
c: 1,000 if engine family sales are more than 50,000, d: Title 40, Code of Federal Regulations, § 1068.501(f)
e: Title 13, California Code of Regulations, § 2143

Rationale for Tier 5 Defect Investigation, Reporting, and Corrective Action Proposal

- For a California only Tier 5 program, investigation thresholds need to be lowered to reflect lower sales numbers to maintain the capability of identifying potential defects in most engine families.
- Corrective action threshold with absolute number (50) needs to be lowered because staff's analysis suggested nearly half of engine families would be effectively exempted without lowering the threshold.*
  - Details of staff analyses based on California sales numbers are not shown here to protect confidential business information.

* Based on model year 2020 California sales numbers reported by manufacturers