Test Project

Module 1 - Diesel Engine Systems

Heavy Vehicle Technology

Submitted by:
Thomas Wozniak - Madison Area Technical College, Independent Test Project Designer
Tim Allan - Centennial College, Independent Test Project Designer

Gerry Brymer - Toromont CAT, Independent Test Project Validator

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Equipment, machinery, installations, and materials required. **3**

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This module includes the following documents:

1. TP Skill 49 repair order form (supplied).
2. Task 2 Checklist – Measure and Assemble Engine Components (supplied).

Tasks

Complete the following two tasks in any order. You may begin with either task one or task two.

If you complete both tasks early or can no longer progress, give your documents to your judge and return to the Competitor's briefing room to await the next station rotation.

Task 1

Customer Complaint: The engine is difficult to start or fails to start entirely. When the engine does start, it runs unevenly and exhibits poor fuel efficiency.

For marking purposes, you must show the judge what you are doing as you work (for example, measurements, fault locations, torque wrench settings, adjustments, and conclusions).

Complete the following:

1. Inspect the engine – diagnose and repair the cause of the customer's complaint.
2. Using the supplied repair order form, document in proper industry standard service reporting format what you diagnosed and what was required to return the system to its normal condition.

Task 2

Measure, Determine Reusability, and Assemble Engine Components to OEM specifications.

For marking purposes, you must show the judge what you are doing as you work (for example, measurements, fault locations, torque wrench settings, adjustments, and conclusions).

Complete the following:

1. Follow a logical order measurement process, compare to OEM specifications to determine the component(s) reusability.

- You may use the supplied Task 2 checklist for your measuring recording and reference

2. Assemble the engine according to OEM assembly procedures

- ONLY torque to 50% of the final torque sequence and value.

3. Using the supplied repair order form, document in proper industry standard service reporting format what you diagnosed and what was required to return the engine to OEM specifications.

Equipment, machinery, installations, and materials required.

No requirements to post.

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Measuring the Cylinder Bore; Evaluation worksheet

Measure 3 locations on 2 axis to the nearest 0.001mm then determine the cylinder / liner diameter, out of round and taper and compare to OEM specifications.

OEM specifications for cylinder:

Diameter: _____**min, mm.** _____**max, mm.**

Taper: _____**max, mm.**

Out of Round: _____**max, mm.**

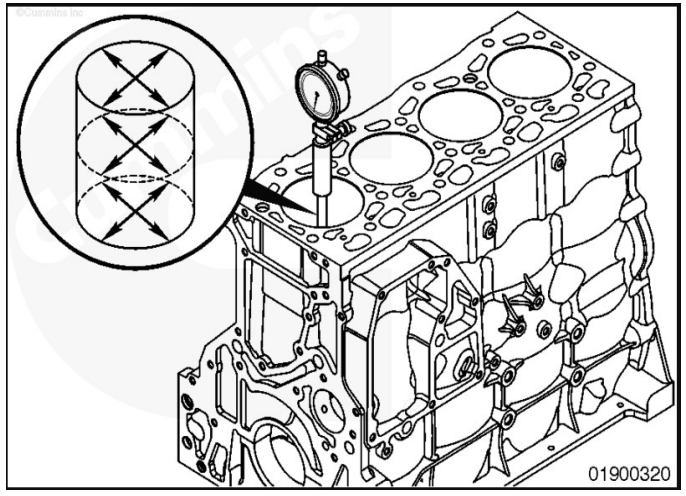


Image courtesy of Cummins Inc.

Cylinder bore / Liner Number: _____			
Location	Trans. Axis (X)	Long. Axis (Y)	Out of Round
	1	*2*	
A			
B			
C			
Taper			

Cylinder Bore / Liner Number: _____			
Location	Trans. Axis (X)	Long. Axis (Y)	Out of Round
	1	*2*	
A			
B			
C			
Taper			

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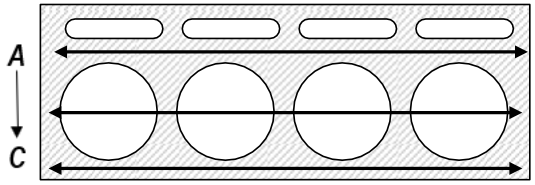
Measuring the Engine Cylinder Block Deck Flatness: Evaluation worksheet

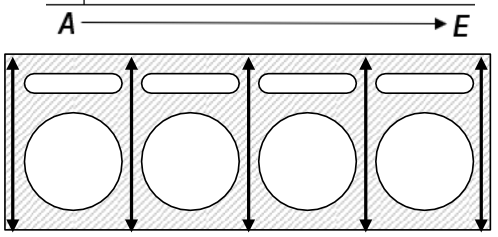
Measure the cylinder block deck flatness to the nearest 0.01 mm both longitudinally and transversely and compare to OEM specifications:

OEM Specification MAX deviation end to end _____ mm

OEM Specification MAX deviation side to side _____mm

Cylinder Block Deck Flatness Chart			
Plane (long)	Longitudinal plane (end to end)		Transverse plane (side to side)
	Measured max deviation from 0.00mm		*Measured max deviation from 0.00mm*
A		A	
B		B	
C		C	
		D	
		E	





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Measuring the crankshaft Rod Bearing Journal: Evaluation worksheet

Measure 3 locations on 2 axis to the nearest 0.001mm then determine the rod bearing journal diameter, out of round and taper and compare to OEM specifications.

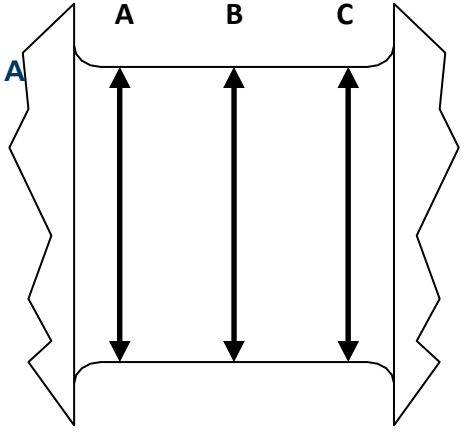
Rod Bearing Journal Number: _____			
Location	Trans. Axis (X)	Long. Axis (Y)	Out of Round
	1	*2*	
A			
B			
C			
Taper			

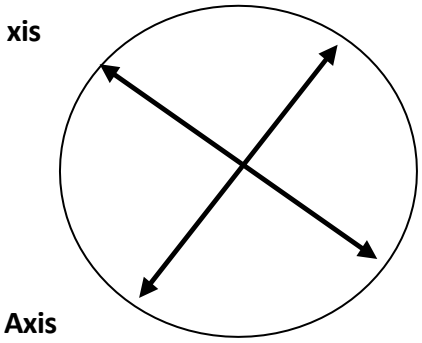
Rod Bearing Journal Number: _____			
Location	Trans. Axis (X)	Long. Axis (Y)	Out of Round
	1	*2*	
A			
B			
C			
Taper			

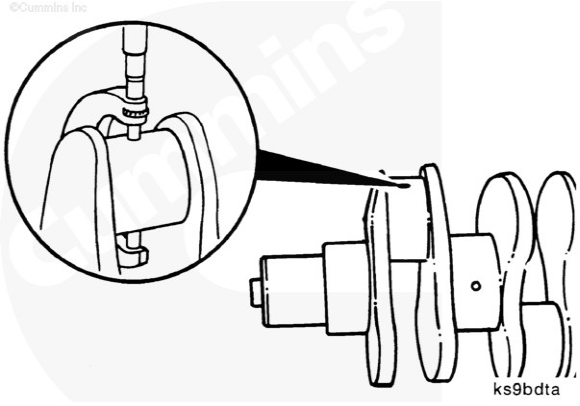
Engine Manufacture Specifications: *Diameter:* _____ min. _____ max

Taper: _____ max.

Out of Round: _____ max







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Measuring the Crank Shaft Endplay: Evaluation worksheet

Using a dial indicator w/magnetic base, Inspect and measure to the nearest .001mm the crankshaft endplay and compare to OEM specifications. Record your findings in the chart below.

OEM Spec. for crankshaft endplay: _____ - _____ mm.

Crankshaft Endplay	

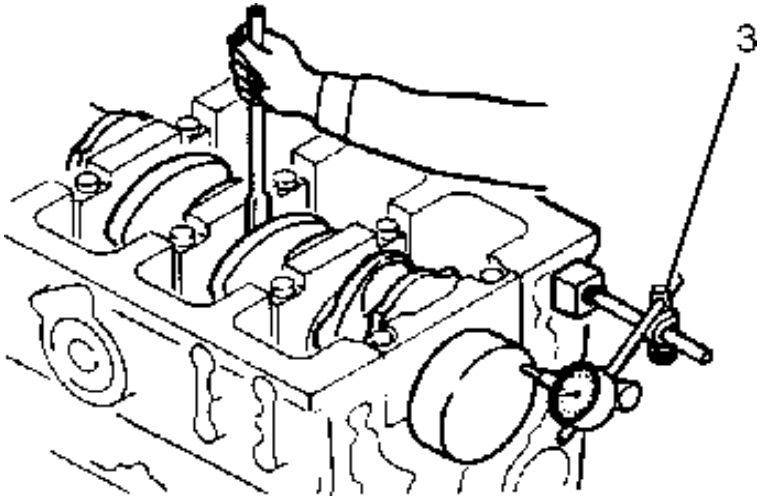


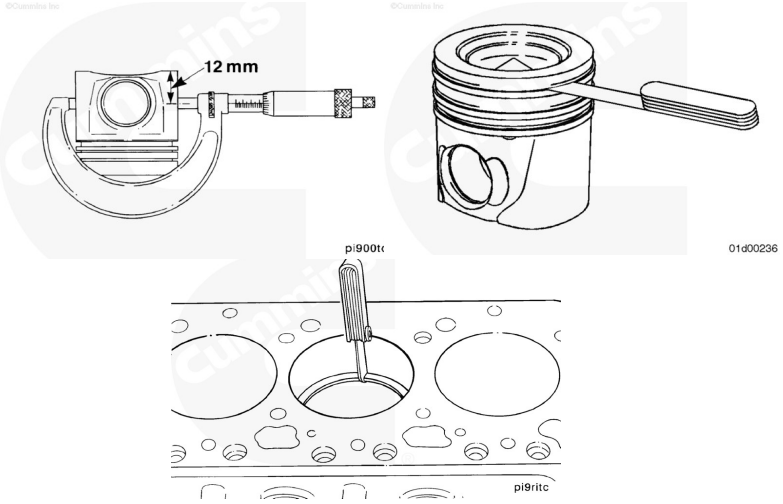
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Measuring the Piston and Rings: Evaluation worksheet

Measure piston skirt diameter to the nearest 0.001 mm. Measure the piston ring clearance and the piston ring gap to the nearest 0.01mm then determine the reusability and compare to OEM specifications.

OEM Specifications for Piston:		
	Minimum	Maximum
Diameter	mm	mm
Ring Clearance	mm	mm
Ring Gap		
Top	mm	mm
Intermediate	mm	mm
Oil	mm	mm



Images courtesy of Cummins Inc.

Piston Number: _____			
	Diameter	Ring Clearance	Ring Gap
Skirt			
Top			
Intermediate			
Oil			

Piston Number _____			
	Diameter	Ring Clearance	Ring Gap
Skirt			
Top			
Intermediate			
Oil			

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Calculating the Piston to Cylinder Bore Clearance: Evaluation worksheet

Using specifications established on your evaluation worksheets, calculate the minimum piston to cylinder bore clearance measurement and compare to OEM specifications.

OEM Specifications for piston to cylinder bore clearance: ____ mm.

CYLINDER / PISTON #	*3*	*4*	*COMMENTS*
Diameter from cylinder bore worksheet			
Diameter off the piston skirt worksheet			
Calculate the piston to bore clearance			

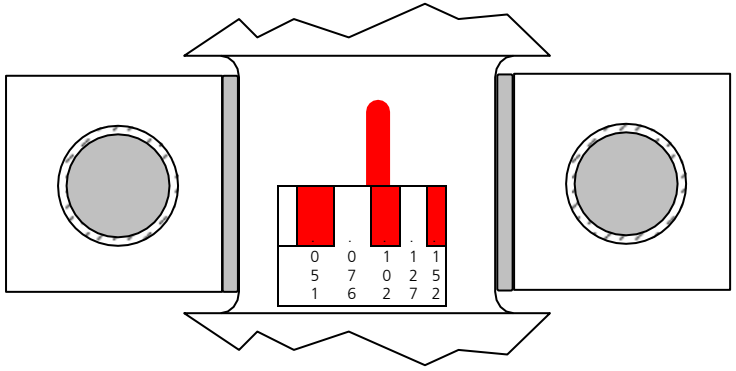
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Measuring the Main and Rod bearing Oil Clearance: Evaluation worksheet

Using Plasti-gauge, Inspect and measure to the nearest 0.005mm the following information pertaining to main and rod bearing oil clearance and compare to OEM specifications. Record your findings in the chart below.

OEM Spec. for Main bearing oil clearance: _____ - _____ mm. OEM Spec. for Rod bearing oil clearance: _____ - _____ mm.

MAIN BEARINGS	**OIL CLEARANCE**	*ROD BEARINGS*	**OIL CLEARANCE**
Main bearing #3		Rod bearing #3	
Main bearing #4		Rod bearing #4	
Main bearing #5			

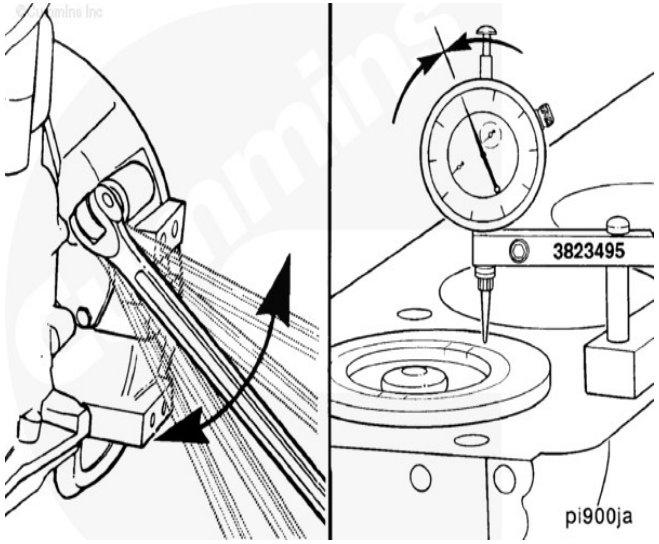


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Measuring the Piston Protrusion: Evaluation worksheet

Measure piston travel above deck to the nearest 0.001 mm. to determine the protrusion and compare to OEM specifications.

OEM Specifications for piston protrusion: _____min, mm. _____max, mm.



PISTON NUMBER	*1*	*2*	*3*	*4*
Piston Height				

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