

# CRANKSHAFT COMPARISON



Volvo D13

International®  
MaxxForce® 11/13\*

## Volvo D13 vs. International® MaxxForce® 11/13

This document compares crankshafts from the Volvo D13 12.8L engine and the International® MaxxForce® 11/13 (10.5L & 12.4L) engines.\*

\*The crankshaft photos depict the crankshaft from the 10.5L engine. All critical machined crankshaft surfaces are exactly identical between the 10.5L crankshaft and the 12.4L crankshaft except for the connecting rod offset, which is greater on the 12.4L engine due to its longer stroke.



INTERNATIONAL® MAXXFORCE® 11/13

VOLVO D13

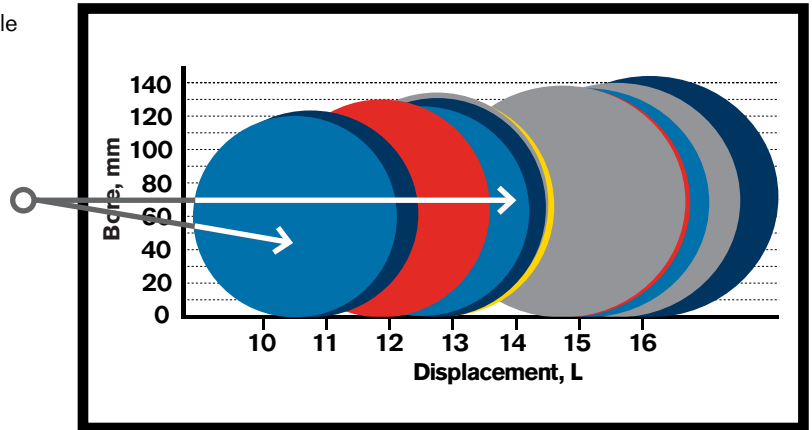
	Displacement	Crankshaft Length	Bore	Stroke	Connecting Rod Offset
<b>MaxxForce® 11</b>	10.5L 642 in <sup>3</sup>	1010.5 mm 39.8 in.	120 mm 4.72 in.	155 mm 6.10 in.	77.5 mm 3.05 in.
<b>MaxxForce® 13</b>	12.4L 758 in <sup>3</sup>	1010.5 mm 39.8 in.	126 mm 4.96 in.	166 mm 6.54 in.	83 mm 3.27 in.
<b>Volvo D13</b>	12.8L 780 in <sup>3</sup>	1150.5 mm 45.3 in.	131 mm 5.16 in.	158 mm 6.22 in.	79 mm 3.11 in.

# BORE/STROKE COMPARISON

International® calls its 11 and 13L engines “Big-Bore,” while the industry generally uses that term for displacements of 14L and higher.

Yet the International® “Big-Bore” engines have a relatively small bore. The 12.4L MaxxForce® 13 has a bore only 3 mm greater than the Volvo D11 with 10.8L displacement. And its stroke is 1 mm greater than the Volvo D16, the largest displacement truck engine sold in North America!

MaxxForce® 11/13’s very low bore-to-stroke ratio means less bearing area, greater piston speed, and more piston travel per mile compared to other engines of the same displacement with same vehicle specs.



	Displacement, Liters	Bore, mm	Stroke, mm	Bore/Stroke Ratio
<b>MaxxForce® 11</b>	10.5	120	155	0.77
<b>Volvo D11</b>	10.8	123	152	0.81
<b>Cummins ISX11.9</b>	11.9	130	150	0.87
<b>MaxxForce® 13</b>	12.4	126	166	0.76
<b>Volvo D13</b>	12.8	131	158	0.83
<b>Detroit DD13</b>	12.8	132	156	0.85
<b>PACCAR MX</b>	12.9	130	162	0.80
<b>Detroit DD15</b>	14.8	139	163	0.85
<b>Cummins ISX</b>	14.9	137	169	0.81
<b>MaxxForce® 15</b>	15.1	137	171	0.80
<b>Detroit DD16</b>	15.6	139	171	0.81
<b>Volvo D16</b>	16.1	144	165	0.87

# BEARING COMPARISON

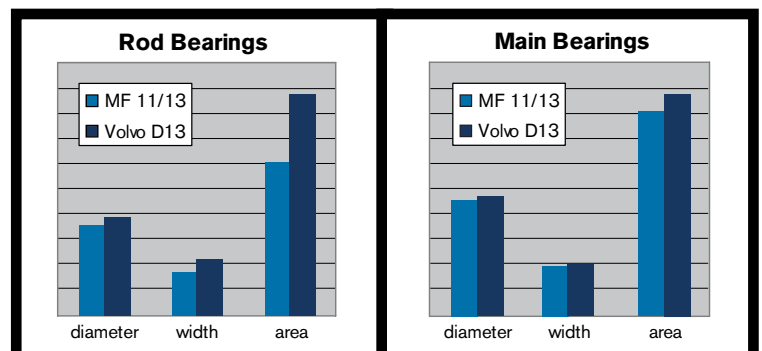
International®’s small bore design means a shorter crankshaft with less room for bearing width, meaning less bearing area. Bearing area is directly related to bearing wear and the useful life of the engine.



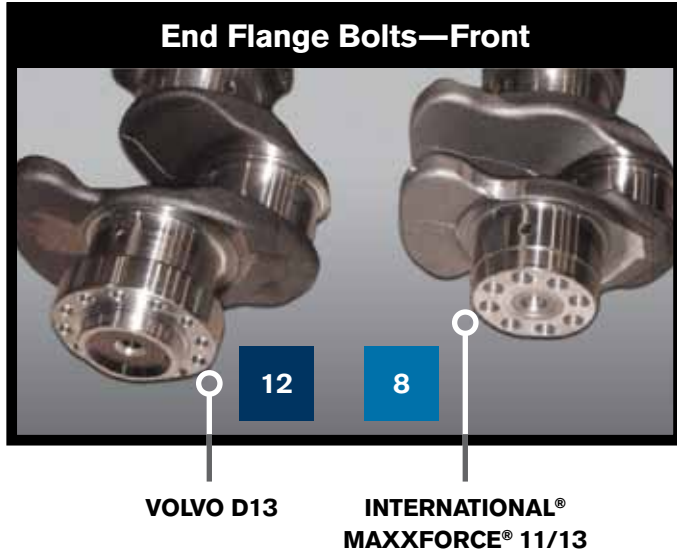
**INTERNATIONAL®  
MAXXFORCE® 11/13**

**VOLVO D13**

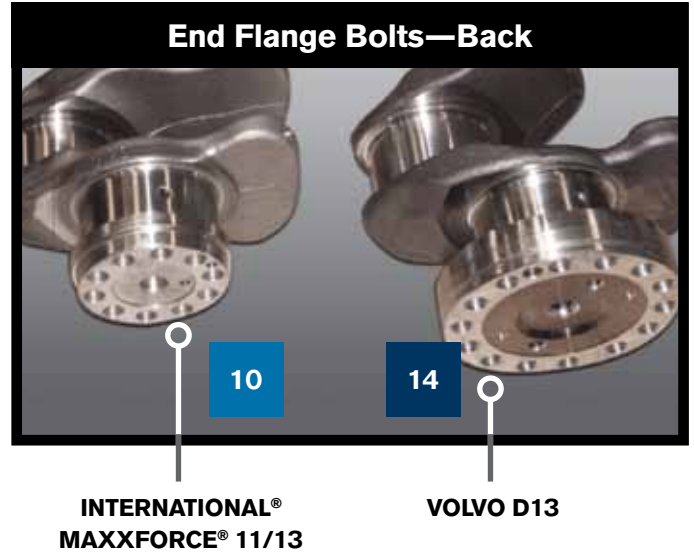
		Diameter	Width	Area
Main Journal Bearing	Volvo D13	108 mm 4.25"	47 mm 1.85"	50.8 cm <sup>2</sup> 7.87 in <sup>2</sup>
	MaxxForce® 11/13	104 mm 4.09"	45 mm 1.77"	46.8 cm <sup>2</sup> 7.25 in <sup>2</sup>
Connecting Rod Bearing	Volvo D13	99 mm 3.90"	57 mm 2.24"	56.4 cm <sup>2</sup> 8.74 in <sup>2</sup>
	MaxxForce® 11/13	90 mm 3.54"	43.5 mm 1.71"	39.1 cm <sup>2</sup> 6.07 in <sup>2</sup>



# END FLANGE COMPARISON



The Volvo D13 crankshaft has larger end flanges that accommodate more bolts per end flange. The improved clamping load provides a stronger joint and helps to keep everything tight.



MaxxForce® 13 drives 475 hp/1700 lb-ft through this flange

Volvo D13 drives 500 hp/1750 lb-ft through this flange

# CONN ROD COMPARISON

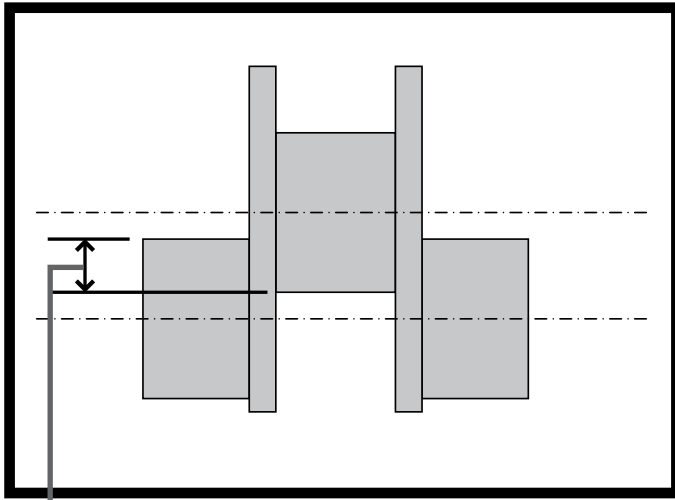


International®'s small bore design means a shorter crankshaft with less room for bearing width. Volvo D13's 57 mm connecting rod bearing width allows four bolts per connecting rod, while MaxxForce®'s 43.5 mm bearing width allows only 2 bolts per rod.

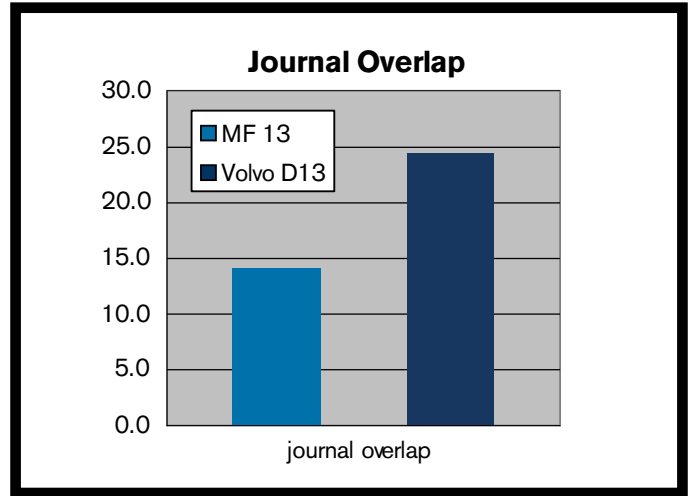


**VOLVO D13 • 57 MM WIDE • 4 BOLTS**

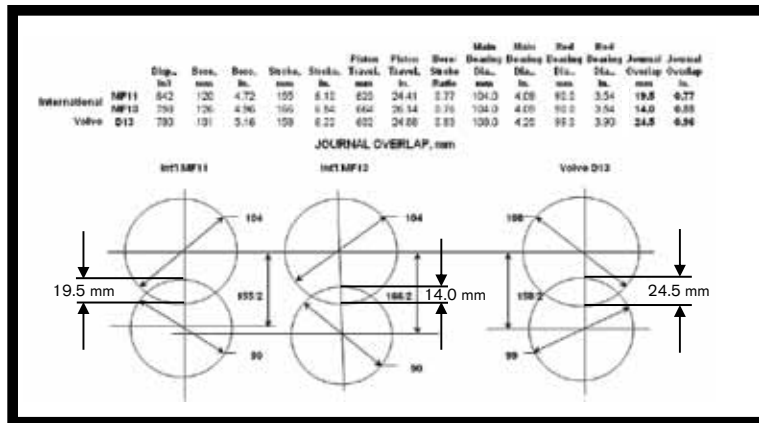
## OVERLAP COMPARISON



Journal overlap, or the amount of overlap between two adjacent bearing surfaces, is an important facet of engine design and indicates crankshaft strength and stiffness.



**Journal overlap:**  
**Volvo D13—24.5 mm**  
**MaxxForce® 13—14.0 mm**



## IN SUMMARY

Volvo D13 engines feature a higher bore/stroke ratio than International® MaxxForce® 11/13. This means Volvo D13's crankshaft is longer and permits more bearing surface area, which can extend the useful life of the engine. This also means Volvo's D13 has less piston speed and less piston travel per mile with the same vehicle specs compared to the MaxxForce® 13. In addition, Volvo's D13 engine has more conservative and robust engine design features, such as greater journal overlap for greater stiffness, larger end flanges, and use of more bolts for greater clamping force.

**BENEFIT TO CUSTOMER: Volvo D13 has potentially longer engine life and lower cost of operation.**

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 MaxxForce® is a registered trademark of International Engine Intellectual Property Company LLC

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**VOLVO**