
U.S. EPA Heavy-Duty Engine Compliance Testing Setup Requirements



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Compliance Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

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1. Aftertreatment system outlet must be supplied with a flange and appropriate clamp or a short (less than 12 inches) section of pipe (4.0, 5.0, or 6.0 inches in diameter) that EPA can modify to connect to the test cell exhaust system
2. Engine must be supplied with a detailed drawing, including dimensions, of front and rear mounting pads.
3. A dynamometer flywheel adapter plate must be supplied with the engine. This adapter must be machined to the specifications in Figure 1 below.
4. Engine must be supplied with an SAE Number 1, 2, or 3 standard SAE-type bell-housing as depicted in Figure 2 below.
5. A wiring harness (min. 8 feet in length) must be supplied with the following test-cell interfaces; all wires must be clearly marked:
 - a. 0-5 Volt (DC) throttle signal input
 - b. ECM Power input (constant power and ignition signal)
 - c. Diagnostic port (SAE J1939 preferred)
 - d. Vehicle speed sensor input (if required)
6. The manufacturer must supply software, data link, and laptop computer for engine diagnostic purposes as well as a description of any codes that may be expected when testing in the lab.
7. The rotational inertia of the engine, with the flywheel attached, must be supplied.
8. Fuel inlet and return ports should have a JIC fitting, sized appropriately by the manufacturer (-8 or -10 are the most common sizes).
9. Temperature Instrumentation - The following locations must have a female 1/8 inch National Pipe Thread (NPT) boss and be clearly labeled. Manufacturer should remove any thermocouples and plug any other ports appropriately that are not listed below. EPA will install our own thermocouples in the temperature port locations below:
 - a. Oil sump
 - b. Exhaust aftertreatment inlet (if equipped)
 - c. Exhaust aftertreatment core (if equipped)
10. Pressure Instrumentation – The following location must have a male -4 JIC fitting installed:
 - a. Oil galley
11. The engine must be supplied without an air pump or with the air pump disabled. Any necessary block-off plates must be installed.

12. The front accessory drive should have the minimal number of devices to allow the engine to function correctly. If accessories are required, they should be supplied with all the support equipment required to operate and maintain them.
13. The turbo compressor outlet and intake manifold inlet should have adjustable elbows that allow for changes in rotational orientation. If these elbows are fixed, they should both point straight forward.
14. Engine air inlet (or inlet to turbocharger) should be located above the valve cover. The inlet should be oriented vertically and allow for attachment of a 5- or 6-inch rubber hose. Contact EPA if the factory air cleaner and related pipe is required during testing. We will require a justification and dimensioned drawings of the intake system.
15. If crankcase emissions are not routed to the intake manifold, a blow-by hose and all associated hardware required for attachment must be supplied.
16. Aftertreatment Requirements:
 - a. The space available for aftertreatment devices is approximately 4- x 7-feet, (see Figures 3-4 below)
 - b. The aftertreatment system must be less than 75 inches in height
 - c. The aftertreatment system must have one inlet and one outlet
 - i. Both must have appropriate flanges affixed to both ends
 - d. All aftertreatment devices must be supplied with, and maintained by, their own ECM(s) or the engine ECM
 - i. All necessary wiring must be supplied and labeled accordingly
 - ii. Wiring between the aftertreatment system and engine ECM should be at least 8 feet in length
 - e. DC Power is available from 0-30 V and 0-50 A
 - f. For DEF-SCR systems, all required handling systems (pumps, tank, hoses, wiring, etc) must be supplied and connections labeled appropriately
 - g. All systems must be freestanding (should not have to be affixed to the floor)
 - i. You must include any stands/fixtures needed to hold aftertreatment system and all supplemental components (pumps, tank, hoses, wiring, etc)
 - h. A setup drawing must be supplied that shows the recommended location of the aftertreatment system (within the space shown in Figures 3-4 as well as suggested wire/hose routing and connection points
 - i. If the aftertreatment system requires DEF, the manufacturer must provide commercially available DEF in sufficient quantity for testing
 - i. The administrator reserves the right to conduct the test using either the manufacturer-supplied DEF or any other DEF meeting the specifications of ISO-22241
 - ii. Please include the MSDS when sending the DEF
 - j. Please include instructions for identifying when regeneration events are occurring, approximate duration of such events, and other relevant information related to testing

Figure 1
Flywheel Adapter Specifications
**Drawing not to scale*

-EPA uses a Dana-Spicer 1810 driveshaft flange. This flange requires a 7.25" bolt circle.
-EPA recommends the adapter be made from 1040 CRS steel.

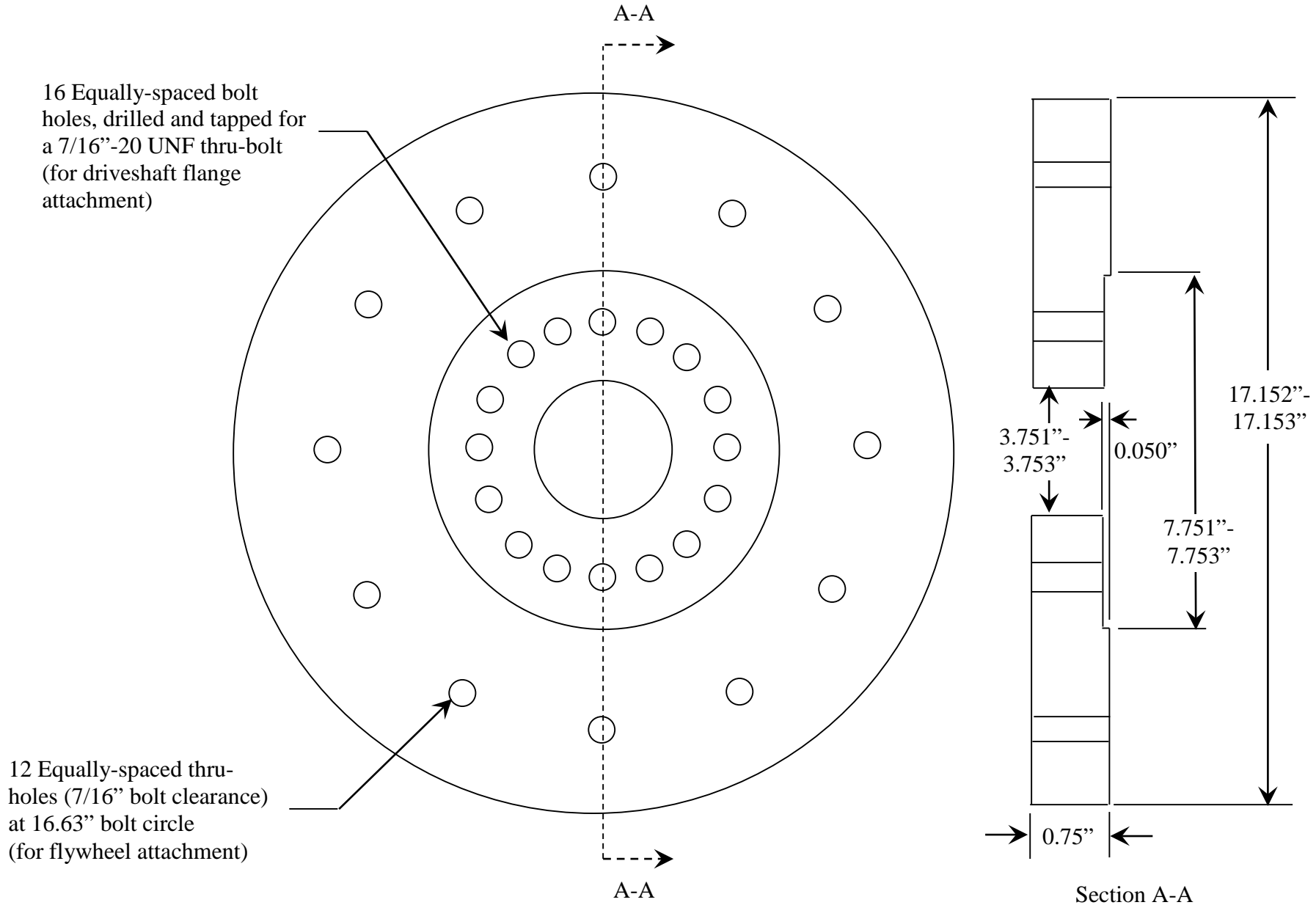


Figure 2
SAE Bell Housing Dimensions

SAE BELL HOUSING DIMENSIONS									
SAE No.	A		B		C		Bolt Holes		
	inch	mm	inch	mm	inch	mm	No.	Diameter	
								inch	mm
00	31	787,40	33 ¹ / ₂	850,90	34 ³ / ₄	882,65	16	¹⁷ / ₃₂	13,49
0	25 ¹ / ₂	647,70	26 ³ / ₄	679,45	28	711,20	16	¹⁷ / ₃₂	13,49
1/2	23	584,20	24 ³ / ₈	619,13	25 ¹ / ₂	647,70	12	¹⁷ / ₃₂	13,49
1	20 ¹ / ₈	511,18	20 ⁷ / ₈	530,23	21 ³ / ₄	552,45	12	¹⁵ / ₃₂	11,91
2	17 ⁵ / ₈	447,68	18 ³ / ₈	466,73	19 ¹ / ₂	488,95	12	¹⁵ / ₃₂	10,32
3	16 ¹ / ₈	409,58	16 ⁷ / ₈	428,63	17 ³ / ₄	450,85	12	¹³ / ₃₂	10,32
4	14 ¹ / ₄	361,95	15	381,00	15 ⁷ / ₈	403,23	12	¹⁹ / ₃₂	10,32
5	12 ³ / ₈	314,33	13 ¹ / ₈	333,38	14	355,60	8	¹³ / ₃₂	10,32
6	10 ¹ / ₂	266,70	11 ¹ / ₄	285,75	12 ¹ / ₈	307,98	8	¹⁹ / ₃₂	10,32

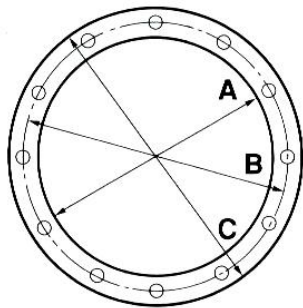


Figure 3
Test Cell Aftertreatment Space

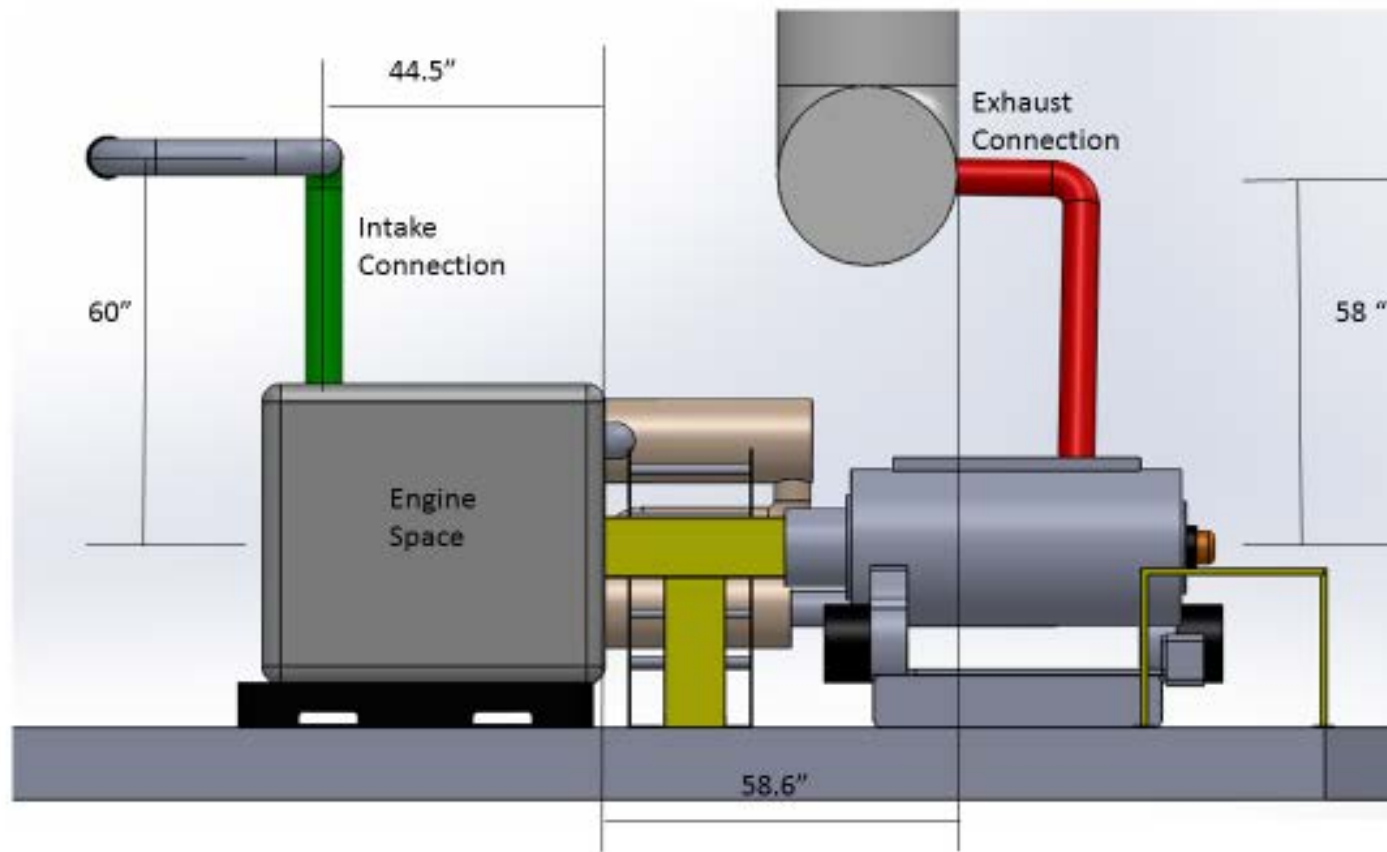


Figure 4
Test Cell Aftertreatment Space

