

Calculating SOx Emissions Levels

For SOx as SO₂ , calculate the SO₂ by using the equation:

$$\text{SO}_2 \text{ mg/hr} = 1.998 \times (\text{fuel rate gm/hr}) \times (\% \text{ fuel sulfur by weight} / 100) \times 1000 \text{ mg} / \text{g}$$

because for diesel engines all of the Sulfur in the exhaust can be assumed to come from the combustion of the Sulfur compounds present in the fuel. The factor comes from:

MW Sulfur = 32.066, MW Oxygen = 15.999, MW SO₂ = 64.064

So Ratio of MWs of SO₂ to S = 1.9979

Example:

1. Look up CSFC [specific fuel consumption] in the TMI database using either the engine serial number or test specification number. Eg - for LLA00100

The screenshot shows a web browser window titled "TMIWEB Production(ws03) - Windows Internet Explorer". The page displays test specifications for engine LLA00100. The "TEST SPEC [LLA00100]" section is dated "NOVEMBER 29, 2006". The "Reference Number" is 0K6378 and the "Effective Serial Number" is LLA00001. The "Model" is 3512C DI TA SCAC. A table of "Test Spec Data" is shown below, with the "CSFC" row circled in red. The CSFC value is 206.1 G/KWH.

Description	Measure	Nominal	Ceiling	Floor
Corr Full Load Power	KW	1,101.0	1,134.1	1,067.9
Full Load Speed	RPM	1200	1210	1190
Governor Setting Speed	RPM			
High Idle Speed	RPM	1212	1224	1200
Low Idle Speed	RPM	900	910	890
FL Static Fuel Setting	mm	25.200		
FT Static Fuel Setting	mm	25.800		
Corrected Fuel Rate	G/MIN	3,853.0	4,124.0	3,583.0
CSFC	G/KWH	206.1	216.5	194.7
Adjusted Boost	KPA	253.3	291.3	215.3
Torque Check Speed	RPM	1100	1110	1090
Corr Torq Rise at TC RPM	%	8.7		
Corr Torque at TC RPM	N.M	9,524	10,190	8,857
C Fuel Rate at TC RPM	G/MIN	3,730.0	3,992.0	3,468.0
CSFC at TC RPM	G/KWH	204.0	214.2	192.7
ADJ Boost at TC RPM	KPA	246.0	292.1	215.9

2. Use engine test spec number to get CSFC = 206.1 g/kw-hr

$$\text{SO}_2 \text{ mg/hr} = 1.998 \times 206.1 \text{ g/kw-hr} \times (0.05 \% \text{ Sulfur in Fuel} / 100) \times 1000 \text{ mg} / \text{g}$$

$$\text{SO}_2 = 205.894 \text{ mg/kw-hr}$$

$$\text{SO}_2 = 0.21 \text{ g/kw-hr}$$