Performance Number: EM4319 Change Level: 04

SALES MODEL:	C9.3B	**COMBUSTION:**	DIRECT INJECTION
BRAND:	CAT	**ENGINE SPEED (RPM):**	1,800
MACHINE SALES MODEL:		**PEAK TORQUE SPEED (RPM):**	1,400
ENGINE POWER (BHP):	416	**TORQUE RISE (%):**	35
PEAK TORQUE (FT-LB):	1,335.0	**ASPIRATION:**	TA
COMPRESSION RATIO:	16.5	**AFTERCOOLER TYPE:**	ATAAC
RATING LEVEL:	C-RATING	**AFTERCOOLER CIRCUIT TYPE:**	JW+OC, ATAAC
PUMP QUANTITY:	1	**INLET MANIFOLD AIR TEMP (F):**	122
FUEL TYPE:	DIESEL	**JACKET WATER TEMP (F):**	192.2
MANIFOLD TYPE:	DRY	**TURBO CONFIGURATION:**	SINGLE
GOVERNOR TYPE:	ELEC	**TURBO QUANTITY:**	1
CAMSHAFT TYPE:	STANDARD	**TURBOCHARGER MODEL:**	S310FG - A/R 1.1
IGNITION TYPE:	CI	**CERTIFICATION YEAR:**	2018
INJECTOR TYPE:	CR	**PISTON SPD @ RATED ENG SPD (FT/MIN):**	1,759.8
REF EXH STACK DIAMETER (IN):	4		
MAX OPERATING ALTITUDE (FT):	10,000		

INDUSTRY	SubIndustry	APPLICATION
OIL AND GAS	LAND PRODUCTION	INDUSTRIAL
INDUSTRIAL	AGRICULTURE	INDUSTRIAL
INDUSTRIAL	FORESTRY	INDUSTRIAL
INDUSTRIAL	MINING	INDUSTRIAL
INDUSTRIAL	GENERAL INDUSTRIAL	INDUSTRIAL
OIL AND GAS	WELL SERVICING	INDUSTRIAL
INDUSTRIAL	MATERIAL HANDLING	INDUSTRIAL
INDUSTRIAL	INDUSTRIAL POWER UNIT	INDUSTRIAL
INDUSTRIAL	CONSTRUCTION	INDUSTRIAL

General Performance Data

ENGINE SPEED	ENGINE POWER	ENGINE TORQUE	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	ISO BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	ISO VOL FUEL CONSUMPTN (VFC)
RPM	BHP	LB-FT	PSI	LB/BHP-HR	LB/BHP-HR	GAL/HR	GAL/HR
2,200	375	896	239	0.371	0.368	19.7	19.5
2,100	404	1,010	269	0.340	0.337	19.4	19.2
2,000	413	1,085	289	0.327	0.323	19.0	18.8
1,900	416	1,149	306	0.327	0.323	19.1	19.0
1,800	416	1,213	323	0.320	0.317	18.7	18.5

1,700	401	1,238	330	0.316	0.313	17.8	17.7
1,600	386	1,266	337	0.314	0.311	17.1	16.9
1,500	371	1,298	346	0.323	0.320	16.9	16.7
1,400	356	1,335	355	0.342	0.339	17.2	17.0
1,300	314	1,269	338	0.324	0.321	14.3	14.2
1,200	275	1,203	320	0.318	0.315	12.3	12.2
1,100	238	1,138	303	0.326	0.323	10.9	10.8
1,000	179	942	251	0.338	0.335	8.5	8.5
900	122	712	189	0.343	0.340	5.9	5.8
800	94.6	621	165	0.353	0.350	4.7	4.7
700	72.3	542	144	0.368	0.365	3.8	3.7
600	52.1	456	121	0.385	0.382	2.8	2.8

ENGINE SPEED	ENGINE POWER	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP
RPM	BHP	IN-HG	DEG F	DEG F	IN-HG	DEG F	IN-HG	DEG F
2,200	375	60.5	120.1	1,153.5	66.9	862.6	65	405.2
2,100	404	58.6	120.1	1,124.1	58.6	852.2	63	385.1
2,000	413	58.2	120.0	1,109.6	53.7	846.5	62	377.2
1,900	416	60.1	120.1	1,128.7	51.9	865.1	63	380.5
1,800	416	61.0	120.1	1,139.3	49.2	879.9	64	380.4
1,700	401	60.0	120.0	1,137.1	44.7	888.1	63	371.4
1,600	386	57.5	120.0	1,149.9	39.6	911.2	60	362.8
1,500	371	58.8	120.0	1,209.8	38.1	972.9	61	369.4
1,400	356	62.3	120.1	1,290.5	38.6	1,028.9	64	387.5
1,300	314	45.2	119.8	1,272.3	25.5	1,076.9	46	331.2
1,200	275	35.2	119.7	1,280.0	18.7	1,102.2	36	294.5
1,100	238	28.4	119.4	1,308.5	14.2	1,149.1	29	266.7
1,000	179	18.3	111.2	1,279.8	8.9	1,158.0	19	214.9
900	122	9.3	109.8	1,150.4	4.8	1,032.7	10	158.0
800	94.6	5.9	115.6	1,079.3	3.3	968.7	6	135.3
700	72.3	4.1	113.7	946.3	2.2	856.6	4	122.7
600	52.1	2.9	106.8	792.3	1.6	704.4	3	113.0

ENGINE SPEED	ENGINE POWER	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
RPM	BHP	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
2,200	375	921.4	2,206.1	4,143.9	4,283.3	820.3	756.1
2,100	404	865.5	2,060.1	3,856.2	3,993.5	772.1	709.0
2,000	413	824.2	1,953.3	3,651.1	3,785.9	735.3	673.5
1,900	416	803.5	1,929.0	3,548.3	3,684.1	715.9	653.9
1,800	416	773.7	1,875.3	3,403.5	3,536.3	688.3	627.8
1,700	401	727.0	1,772.0	3,179.8	3,306.3	646.4	588.7
1,600	386	668.7	1,658.8	2,907.9	3,028.9	594.9	539.8
1,500	371	641.8	1,660.5	2,783.8	2,903.4	569.9	515.6
1,400	356	626.7	1,681.4	2,715.7	2,837.4	555.4	501.0
1,300	314	474.1	1,331.9	2,027.6	2,129.3	426.2	380.5
1,200	275	378.0	1,089.3	1,609.9	1,697.2	342.9	303.7
1,100	238	309.3	926.2	1,313.1	1,390.7	283.1	248.4
1,000	179	233.2	705.3	988.5	1,049.1	214.4	187.3
900	122	169.5	472.3	717.7	759.6	155.6	136.7
800	94.6	135.9	362.3	575.5	608.9	124.7	109.7
700	72.3	112.7	276.4	477.4	504.0	103.2	91.2
600	52.1	93.7	203.6	396.7	416.8	86.0	76.7

Heat Rejection Data

ENGINE SPEED	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHAUST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
RPM	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
2,200	375	7,967	2,021	14,906	9,258	2,277	4,731	15,923	42,759	45,549
2,100	404	7,807	1,941	13,894	8,468	2,243	4,092	17,118	42,104	44,851
2,000	413	7,614	1,881	13,281	7,944	2,203	3,760	17,516	41,354	44,052
1,900	416	7,526	1,869	13,605	8,042	2,216	3,701	17,629	41,614	44,330
1,800	416	7,309	1,836	13,063	7,954	2,169	3,548	17,629	40,728	43,386
1,700	401	7,057	1,775	12,297	7,562	2,066	3,201	16,996	38,795	41,326
1,600	386	6,803	1,706	11,819	7,250	1,976	2,826	16,361	37,095	39,515
1,500	371	6,774	1,782	12,021	7,757	1,954	2,781	15,725	36,690	39,084
1,400	356	6,909	1,960	12,905	8,309	1,989	2,908	15,090	37,336	39,772
1,300	314	6,549	1,982	9,678	6,734	1,662	1,716	13,321	31,209	33,246
1,200	275	5,937	1,781	8,042	5,586	1,427	1,127	11,659	26,797	28,546
1,100	238	5,634	1,671	7,163	4,901	1,267	775	10,104	23,794	25,346
1,000	179	4,941	1,546	5,299	3,749	990	411	7,606	18,590	19,803
900	122	3,801	1,188	3,381	2,267	684	139	5,174	12,845	13,683

800	94.6	3,326	1,056	2,470	1,639	545	46	4,011	10,240	10,909
700	72.3	3,800	898	919	1,100	435	17	3,066	8,167	8,700
600	52.1	2,551	637	1,148	626	328	10	2,211	6,155	6,557

Sound Data

EXHAUST:SOUND POWER(1/3 Octave Frequencies)

ENGINE SPEED	ENGINE POWER	OVERALL SOUND	100 HZ	125 HZ	160 HZ	200 HZ	250 HZ	315 HZ	400 HZ	500 HZ	630 HZ	800 HZ
RPM	BHP	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
2,200	375	129.8	107.0	101.9	97.4	114.5	109.8	119.9	117.4	119.0	118.3	119.1
2,100	404	129.9	104.5	93.5	96.2	111.0	104.1	116.8	117.7	118.7	118.1	118.8
2,000	413	132.6	104.9	90.4	97.1	115.8	105.3	119.6	119.8	120.6	120.9	121.1
1,900	416	130.7	103.2	93.1	101.2	112.3	110.5	116.4	118.6	119.3	119.1	119.5
1,800	416	129.7	101.5	95.8	105.7	108.8	115.8	113.2	117.6	118.5	117.9	118.3
1,700	401	127.7	93.6	95.5	107.2	103.4	113.0	112.5	114.9	115.9	115.4	115.6
1,600	386	126.0	85.6	95.1	108.8	98.0	110.3	111.7	112.2	113.4	112.9	112.9
1,500	371	129.9	86.9	102.3	107.4	105.4	114.3	115.8	116.6	117.9	118.0	118.4
1,400	356	134.5	88.3	109.6	106.2	112.8	118.4	119.9	120.8	122.3	123.1	123.8
1,300	314	125.7	88.7	109.0	95.6	110.1	114.7	110.3	113.6	115.0	115.8	114.9
1,200	275	122.8	86.6	99.9	97.1	100.9	103.4	105.8	105.5	109.9	113.7	115.7
1,100	238	120.7	102.3	97.5	104.0	104.3	100.6	100.3	105.6	108.6	111.0	112.7
1,000	179	118.4	96.1	88.0	96.7	102.1	95.0	99.3	101.9	107.6	111.6	110.1
900	122	115.8	88.0	91.3	96.2	94.7	96.6	99.5	102.2	107.3	108.6	108.0
800	94.6	115.0	80.3	95.8	98.6	94.0	98.9	99.7	100.8	105.2	107.7	107.6
700	72.3	110.4	79.8	88.7	89.9	92.6	95.5	95.5	96.6	100.9	103.6	102.2
600	52.1	106.2	78.1	86.2	88.9	91.6	91.7	91.6	93.3	97.0	99.0	96.9

EXHAUST:SOUND POWER(1/3 Octave Frequencies)

ENGINE SPEED	ENGINE POWER	1000 HZ	1250 HZ	1600 HZ	2000 HZ	2500 HZ	3150 HZ	4000 HZ	5000 HZ	6300 HZ	8000 HZ	10000 HZ
RPM	BHP	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
2,200	375	119.1	119.1	121.7	119.1	116.4	116.8	115.4	111.6	105.8	101.2	93.9
2,100	404	119.3	120.1	123.4	120.0	117.5	115.9	113.4	110.7	106.7	100.8	93.9
2,000	413	121.8	122.5	124.8	124.0	120.2	120.2	118.2	114.6	110.2	107.1	101.8
1,900	416	120.0	121.1	124.1	121.2	117.6	117.5	115.4	111.6	106.7	101.9	95.7
1,800	416	118.4	120.0	124.0	118.9	115.8	115.7	113.5	109.8	104.3	98.1	91.3
1,700	401	115.9	117.8	122.1	118.4	114.5	113.9	111.5	106.4	100.2	93.7	85.5
1,600	386	113.5	115.6	120.4	118.1	113.5	112.4	109.7	103.4	96.4	89.6	80.0
1,500	371	118.8	119.9	122.2	121.1	118.5	117.3	116.3	112.3	107.0	101.8	95.6
1,400	356	124.1	124.2	124.1	124.0	123.4	122.1	122.8	121.0	117.5	113.9	111.1

1,300	314	115.9	116.2	115.7	114.5	112.2	110.9	109.5	104.4	96.8	90.2	81.6
1,200	275	114.5	113.4	112.2	112.0	110.6	108.7	107.6	102.4	93.3	85.7	75.6
1,100	238	111.3	110.8	109.2	109.6	109.3	107.9	106.7	102.1	93.4	86.1	75.7
1,000	179	107.6	107.1	107.4	106.8	107.5	106.2	104.4	100.7	92.4	84.8	74.7
900	122	106.2	105.5	103.5	102.4	102.3	101.2	98.7	93.9	86.6	79.5	72.2
800	94.6	106.4	104.4	102.6	100.0	99.8	98.9	95.9	91.6	84.8	79.1	73.6
700	72.3	101.3	99.7	97.5	97.3	96.4	95.6	92.5	87.3	80.3	74.2	70.2
600	52.1	95.5	95.3	92.1	95.1	92.4	91.2	89.7	83.0	74.9	68.2	64.8

MECHANICAL:SOUND POWER(1/3 Octave Frequencies)

ENGINE SPEED	ENGINE POWER	OVERALL SOUND	100 HZ	125 HZ	160 HZ	200 HZ	250 HZ	315 HZ	400 HZ	500 HZ	630 HZ	800 HZ
RPM	BHP	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
2,200	375	110.6	79.8	85.1	83.9	88.1	87.7	88.5	94.8	96.6	96.5	97.5
2,100	404	110.8	85.1	81.8	83.8	87.6	87.3	88.8	94.4	95.8	96.0	98.4
2,000	413	111.1	86.9	81.2	82.7	87.7	88.4	91.3	94.8	95.7	99.1	99.5
1,900	416	110.8	84.5	82.2	82.4	86.6	87.5	90.6	93.4	94.4	98.4	98.4
1,800	416	110.6	82.3	83.6	82.1	85.8	86.9	90.1	92.2	93.1	98.1	97.6
1,700	401	109.1	77.7	84.5	82.6	85.0	86.7	89.3	92.6	93.4	96.8	96.4
1,600	386	107.8	73.1	85.8	83.2	84.6	86.6	88.6	93.0	93.7	95.5	95.2
1,500	371	106.4	73.0	83.0	79.2	83.8	85.7	86.8	89.4	91.6	92.6	93.6
1,400	356	105.2	73.0	80.3	75.4	83.2	84.6	84.9	85.9	89.4	89.9	92.1
1,300	314	105.5	78.4	78.6	74.7	81.0	84.4	83.3	88.3	89.4	93.3	93.1
1,200	275	106.8	75.3	77.7	76.3	82.8	84.8	87.3	88.8	89.8	92.0	93.2
1,100	238	107.1	73.5	75.3	80.0	80.5	85.2	83.8	86.6	89.7	92.0	91.5
1,000	179	106.6	73.6	77.7	77.7	81.9	85.3	84.0	85.7	87.6	91.7	90.6
900	122	107.4	70.3	75.6	77.6	80.0	83.3	83.3	86.5	89.6	90.9	92.2
800	94.6	107.3	68.9	74.3	75.6	78.7	81.7	81.4	86.0	90.5	91.0	91.6
700	72.3	107.7	66.2	71.6	74.5	76.6	80.6	80.3	86.1	89.6	91.9	93.1
600	52.1	107.9	63.9	69.6	73.1	74.6	79.5	79.1	86.1	88.5	92.1	94.2

MECHANICAL:SOUND POWER(1/3 Octave Frequencies)

ENGINE SPEED	ENGINE POWER	1000 HZ	1250 HZ	1600 HZ	2000 HZ	2500 HZ	3150 HZ	4000 HZ	5000 HZ	6300 HZ	8000 HZ	10000 HZ
RPM	BHP	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
2,200	375	101.3	101.9	100.8	99.3	99.4	99.3	97.5	98.4	97.4	97.3	96.6
2,100	404	101.6	103.1	100.7	99.0	99.5	99.3	97.9	97.6	97.2	96.7	95.5
2,000	413	100.9	104.1	101.7	99.2	99.9	99.8	98.0	97.6	96.8	95.9	94.8
1,900	416	101.1	103.2	101.4	99.3	99.7	99.7	98.0	97.6	96.6	95.9	95.2

1,800	416	101.3	102.5	101.3	99.3	99.6	99.8	98.2	98.0	96.7	96.4	95.3
1,700	401	100.0	100.7	99.4	97.5	97.8	97.8	96.5	96.3	95.3	94.7	95.3
1,600	386	98.7	98.9	97.5	95.7	96.1	95.8	94.7	94.6	94.0	93.3	95.4
1,500	371	96.8	97.4	96.1	94.3	94.9	94.6	93.8	94.1	93.9	93.4	95.2
1,400	356	94.7	95.9	94.7	93.0	93.6	93.3	92.8	93.6	93.9	93.7	95.0
1,300	314	96.4	98.1	94.9	92.9	93.7	93.5	92.3	93.1	92.3	91.5	92.7
1,200	275	99.6	101.4	95.5	93.6	94.7	93.5	92.1	94.1	91.9	91.6	89.6
1,100	238	99.8	102.5	97.2	93.3	94.3	92.9	91.7	94.9	91.4	90.7	85.5
1,000	179	97.5	101.4	99.4	93.6	94.3	92.8	91.1	95.5	91.2	85.3	82.5
900	122	99.6	102.4	98.7	93.8	94.7	92.5	90.8	98.5	90.0	82.7	78.8
800	94.6	99.0	102.2	98.5	92.9	93.9	91.7	90.2	99.7	89.7	81.5	77.7
700	72.3	100.1	102.9	98.5	93.3	93.9	92.4	90.1	99.7	89.6	82.1	78.0
600	52.1	100.8	102.9	98.1	93.5	93.7	92.7	89.8	99.9	89.9	83.1	78.2

Emissions Data

DIESEL

RATED SPEED NOMINAL DATA: 2200 RPM

ENGINE POWER		**BHP**	**375**	**282**	**188**	**93.9**	**37.5**
PERCENT LOAD		**%**	**100**	**75**	**50**	**25**	**10**
TOTAL NOX (AS NO2)		G/HR	990	605	325	221	190
TOTAL CO		G/HR	449	187	155	254	215
TOTAL HC		G/HR	54	64	65	68	73
TOTAL CO2		KG/HR	199	158	116	62	34
PART MATTER		G/HR	34.4	21.5	30.3	41.1	21.1
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	1,130.6	875.2	639.8	811.2	1,266.2
TOTAL CO	(CORR 5% O2)	MG/NM3	514.8	268.1	308.8	933.1	1,427.6
TOTAL HC	(CORR 5% O2)	MG/NM3	54.3	79.6	110.2	215.7	421.6
PART MATTER	(CORR 5% O2)	MG/NM3	33.6	26.4	53.9	134.7	129.2
TOTAL NOX (AS NO2)	(CORR 15% O2)	MG/NM3	419.5	324.8	237.4	301.0	469.8
TOTAL CO	(CORR 15% O2)	MG/NM3	191.0	99.5	114.6	346.2	529.7
TOTAL HC	(CORR 15% O2)	MG/NM3	20.1	29.5	40.9	80.0	156.4
PART MATTER	(CORR 15% O2)	MG/NM3	12.5	9.8	20.0	50.0	47.9
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	551	426	312	395	617
TOTAL CO	(CORR 5% O2)	PPM	412	214	247	746	1,142
TOTAL HC	(CORR 5% O2)	PPM	101	149	206	403	787
TOTAL NOX (AS NO2)	(CORR 15% O2)	PPM	204	158	116	147	229
TOTAL CO	(CORR 15% O2)	PPM	153	80	92	277	424

TOTAL HC	(CORR 15% O2)	PPM	38	55	76	149	292
TOTAL NOX (AS NO2)		G/HP-HR	2.67	2.17	1.74	2.37	5.09
TOTAL CO		G/HP-HR	1.21	0.67	0.83	2.72	5.74
TOTAL HC		G/HP-HR	0.14	0.23	0.35	0.72	1.96
PART MATTER		G/HP-HR	0.09	0.08	0.16	0.44	0.56
TOTAL NOX (AS NO2)		G/KW-HR	3.58	2.91	2.34	3.18	6.83
TOTAL CO		G/KW-HR	1.62	0.90	1.12	3.65	7.70
TOTAL HC		G/KW-HR	0.19	0.31	0.47	0.97	2.63
PART MATTER		G/KW-HR	0.12	0.10	0.22	0.59	0.76
TOTAL NOX (AS NO2)		LB/HR	2.18	1.33	0.72	0.49	0.42
TOTAL CO		LB/HR	0.99	0.41	0.34	0.56	0.47
TOTAL HC		LB/HR	0.12	0.14	0.14	0.15	0.16
TOTAL CO2		LB/HR	439	348	256	136	74
PART MATTER		LB/HR	0.08	0.05	0.07	0.09	0.05
OXYGEN IN EXH		%	11.1	12.5	13.9	15.1	16.9

RATED SPEED POTENTIAL SITE VARIATION: 2200 RPM

ENGINE POWER		**BHP**	**375**	**282**	**188**	**93.9**	**37.5**
PERCENT LOAD		**%**	**100**	**75**	**50**	**25**	**10**
TOTAL NOX (AS NO2)		G/HR	1,069	653	351	239	206
TOTAL CO		G/HR	839	350	291	475	401
TOTAL HC		G/HR	101	120	123	128	139
PART MATTER		G/HR	67.1	41.9	59.2	80.2	41.1
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	1,221.1	945.2	691.0	876.1	1,367.5
TOTAL CO	(CORR 5% O2)	MG/NM3	962.7	501.3	577.4	1,744.9	2,669.7
TOTAL HC	(CORR 5% O2)	MG/NM3	102.6	150.5	208.4	407.6	796.8
PART MATTER	(CORR 5% O2)	MG/NM3	65.5	51.4	105.1	262.6	251.9
TOTAL NOX (AS NO2)	(CORR 15% O2)	MG/NM3	453.1	350.7	256.4	325.1	507.4
TOTAL CO	(CORR 15% O2)	MG/NM3	357.2	186.0	214.2	647.5	990.6
TOTAL HC	(CORR 15% O2)	MG/NM3	38.1	55.8	77.3	151.2	295.7
PART MATTER	(CORR 15% O2)	MG/NM3	24.3	19.1	39.0	97.4	93.5
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	595	460	337	427	666
TOTAL CO	(CORR 5% O2)	PPM	770	401	462	1,396	2,136
TOTAL HC	(CORR 5% O2)	PPM	192	281	389	761	1,487
TOTAL NOX (AS NO2)	(CORR 15% O2)	PPM	221	171	125	158	247

TOTAL CO	(CORR 15% O2)	PPM	286	149	171	518	793
TOTAL HC	(CORR 15% O2)	PPM	71	104	144	282	552
TOTAL NOX (AS NO2)		G/HP-HR	2.88	2.34	1.88	2.56	5.50
TOTAL CO		G/HP-HR	2.26	1.26	1.56	5.09	10.73
TOTAL HC		G/HP-HR	0.27	0.43	0.66	1.37	3.71
PART MATTER		G/HP-HR	0.18	0.15	0.32	0.86	1.10
TOTAL NOX (AS NO2)		G/KW-HR	3.86	3.14	2.53	3.43	7.37
TOTAL CO		G/KW-HR	3.03	1.68	2.09	6.82	14.39
TOTAL HC		G/KW-HR	0.37	0.58	0.88	1.83	4.97
PART MATTER		G/KW-HR	0.24	0.20	0.43	1.15	1.47
TOTAL NOX (AS NO2)		LB/HR	2.36	1.44	0.77	0.53	0.45
TOTAL CO		LB/HR	1.85	0.77	0.64	1.05	0.88
TOTAL HC		LB/HR	0.22	0.26	0.27	0.28	0.31
PART MATTER		LB/HR	0.15	0.09	0.13	0.18	0.09

SECONDARY SPEED NOMINAL DATA: 1800 RPM

ENGINE POWER		**BHP**	**416**	**312**	**208**	**104**	**41.6**
PERCENT LOAD		**%**	**100**	**75**	**50**	**25**	**10**
TOTAL NOX (AS NO2)		G/HR	1,901	1,313	770	521	448
TOTAL CO		G/HR	418	225	204	116	117
TOTAL HC		G/HR	26	24	20	20	24
TOTAL CO2		KG/HR	198	151	105	55	29
PART MATTER		G/HR	18.0	13.4	22.4	8.6	1.7
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	2,202.7	1,988.2	1,672.7	2,148.2	3,495.2
TOTAL CO	(CORR 5% O2)	MG/NM3	482.4	341.7	444.0	479.0	906.0
TOTAL HC	(CORR 5% O2)	MG/NM3	26.5	31.0	37.3	72.9	164.5
PART MATTER	(CORR 5% O2)	MG/NM3	17.3	17.3	41.5	30.8	12.3
TOTAL NOX (AS NO2)	(CORR 15% O2)	MG/NM3	817.4	737.8	620.7	797.1	1,297.0
TOTAL CO	(CORR 15% O2)	MG/NM3	179.0	126.8	164.8	177.7	336.2
TOTAL HC	(CORR 15% O2)	MG/NM3	9.8	11.5	13.8	27.0	61.0
PART MATTER	(CORR 15% O2)	MG/NM3	6.4	6.4	15.4	11.4	4.6
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,073	968	815	1,046	1,702
TOTAL CO	(CORR 5% O2)	PPM	386	273	355	383	725
TOTAL HC	(CORR 5% O2)	PPM	49	58	70	136	307
TOTAL NOX (AS NO2)	(CORR 15% O2)	PPM	398	359	302	388	632

TOTAL CO	(CORR 15% O2)	PPM	143	101	132	142	269
TOTAL HC	(CORR 15% O2)	PPM	18	21	26	50	114
TOTAL NOX (AS NO2)		G/HP-HR	4.62	4.24	3.73	5.03	10.81
TOTAL CO		G/HP-HR	1.02	0.73	0.99	1.12	2.82
TOTAL HC		G/HP-HR	0.06	0.08	0.10	0.20	0.59
PART MATTER		G/HP-HR	0.04	0.04	0.11	0.08	0.04
TOTAL NOX (AS NO2)		G/KW-HR	6.20	5.69	5.00	6.74	14.50
TOTAL CO		G/KW-HR	1.36	0.97	1.32	1.51	3.78
TOTAL HC		G/KW-HR	0.09	0.10	0.13	0.26	0.79
PART MATTER		G/KW-HR	0.06	0.06	0.15	0.11	0.06
TOTAL NOX (AS NO2)		LB/HR	4.19	2.89	1.70	1.15	0.99
TOTAL CO		LB/HR	0.92	0.50	0.45	0.26	0.26
TOTAL HC		LB/HR	0.06	0.05	0.04	0.05	0.05
TOTAL CO2		LB/HR	437	333	231	121	63
PART MATTER		LB/HR	0.04	0.03	0.05	0.02	0.00
OXYGEN IN EXH		%	8.9	10.1	11.2	13.4	16.2

SECONDARY SPEED POTENTIAL SITE VARIATION: 1800 RPM

ENGINE POWER		**BHP**	**416**	**312**	**208**	**104**	**41.6**
PERCENT LOAD		**%**	**100**	**75**	**50**	**25**	**10**
TOTAL NOX (AS NO2)		G/HR	2,052.8	1,418.0	831.8	562.2	483.7
TOTAL CO		G/HR	781.8	420.9	381.1	217.5	218.1
TOTAL HC		G/HR	50.1	44.6	37.5	38.6	46.2
PART MATTER		G/HR	35.1	26.2	43.6	16.7	3.4
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	2,378.9	2,147.3	1,806.5	2,320.1	3,774.8
TOTAL CO	(CORR 5% O2)	MG/NM3	902.0	639.0	830.3	895.7	1,694.2
TOTAL HC	(CORR 5% O2)	MG/NM3	50.0	58.5	70.5	137.8	310.9
PART MATTER	(CORR 5% O2)	MG/NM3	33.7	33.8	80.9	60.0	24.0
TOTAL NOX (AS NO2)	(CORR 15% O2)	MG/NM3	882.7	796.8	670.3	860.9	1,400.7
TOTAL CO	(CORR 15% O2)	MG/NM3	334.7	237.1	308.1	332.4	628.7
TOTAL HC	(CORR 15% O2)	MG/NM3	18.6	21.7	26.2	51.1	115.4
PART MATTER	(CORR 15% O2)	MG/NM3	12.5	12.5	30.0	22.3	8.9
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,159	1,046	880	1,130	1,839
TOTAL CO	(CORR 5% O2)	PPM	722	511	664	717	1,355
TOTAL HC	(CORR 5% O2)	PPM	93	109	132	257	580

TOTAL NOX (AS NO2)	(CORR 15% O2)	PPM	430	388	327	419	682
TOTAL CO	(CORR 15% O2)	PPM	268	190	246	266	503
TOTAL HC	(CORR 15% O2)	PPM	35	41	49	95	215
TOTAL NOX (AS NO2)		G/HP-HR	4.99	4.58	4.02	5.43	11.68
TOTAL CO		G/HP-HR	1.90	1.36	1.84	2.10	5.26
TOTAL HC		G/HP-HR	0.12	0.14	0.18	0.37	1.12
PART MATTER		G/HP-HR	0.09	0.08	0.21	0.16	0.08
TOTAL NOX (AS NO2)		G/KW-HR	6.7	6.1	5.4	7.3	15.7
TOTAL CO		G/KW-HR	2.5	1.8	2.5	2.8	7.1
TOTAL HC		G/KW-HR	0.2	0.2	0.2	0.5	1.5
PART MATTER		G/KW-HR	0.1	0.1	0.3	0.2	0.1
TOTAL NOX (AS NO2)		LB/HR	4.53	3.13	1.83	1.24	1.07
TOTAL CO		LB/HR	1.72	0.93	0.84	0.48	0.48
TOTAL HC		LB/HR	0.11	0.10	0.08	0.09	0.10
PART MATTER		LB/HR	0.08	0.06	0.10	0.04	0.01

Regulatory Information

CHINA STAGE 3 **2015 - ----**

THIS ENGINE HAS BEEN TESTED IN ACCORDANCE WITH THE PROVISIONS OF THE PEOPLE'S REPUBLIC OF CHINA NATIONAL STANDARD # GB 20891-2014, AND COMPLIES WITH THE STATED LIMITS OF CO, HC, NOX, AND PM FOR STAGE III

Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
CHINA	CHINA	NON-ROAD	STAGE 3	CO: 3.5 NOx + HC: 4.0 PM: 0.2

EU STAGE IIIA R96 **2006 - ----**

GASEOUS EMISSION DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EU 97/68/EC, ECE REGULATION NO. 96 AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSION VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.

Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
EUROPE	EU	NON-ROAD	STAGE IIIA R96	CO: 3.5 NOx + HC: 4.0 PM: 0.2

IBAMA MAR-1 **2015 - ----**

GASEOUS EMISSION DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN CONAMA RESOLUTION NO. 433/2011 AND ISO 8178-1 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSION VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.

Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
BRAZIL	IBAMA	NON-ROAD	MAR-1	CO: 3.5 NOx + HC: 4.0 PM: 0.2

Altitude Derate Data

STANDARD

ALTITUDE CORRECTED POWER CAPABILITY (BHP)

AMBIENT OPERATING TEMP (F)	50	60	70	80	90	100	110	120	130	140	NORMAL
ALTITUDE (FT)											
0	375	375	375	375	373	371	368	366	364	361	375
1,000	375	375	373	371	369	367	365	362	360	358	372
2,000	373	371	369	367	365	363	361	358	356	353	369
3,000	369	367	365	363	361	359	356	352	346	342	365
4,000	364	362	360	358	356	354	351	340	334	329	361
5,000	360	358	356	354	352	347	338	326	320	316	358
6,000	355	353	351	349	343	336	321	311	306	302	353
7,000	347	343	340	336	330	317	302	294	290	284	346
8,000	334	329	323	316	305	292	280	274	268	262	334
9,000	316	311	303	293	280	267	258	253	248	246	320
10,000	293	288	279	268	256	246	240	235	233	231	302
11,000	267	260	252	245	236	228	220	214	213	211	279
12,000	245	239	232	223	212	202	194	190	189	187	257
13,000	227	217	207	196	186	179	175	174	172	171	241
14,000	204	194	184	178	173	169	165	164	163	162	225
15,000	186	179	175	170	166	162	159	158	157	156	205

Cross Reference

Test Spec	Setting	Engine Arrangement	Engineering Model	Engineering Model Version	Start Effective Serial Number	End Effective Serial Number
5526466	PP7282	5477363	EE464	-	NGL00001	
5526470	PP7287	5477365	EE466	-	NGW00001	
5526466	PP7282	6182836	EE464	-	NGL00001	
5526470	PP7287	6182837	EE466	-	NGW00001	

6351901	PP7567	6531672	EE464	-	K9L00001	

Performance Parameter Reference

Parameters Reference: DM9600 - 15

PERFORMANCE DEFINITIONS

PERFORMANCE DEFINITIONS DM9600

APPLICATION: Engine performance tolerance values below are representative of a typical production engine tested in a calibrated dynamometer test cell at SAE J1995 standard reference conditions. Caterpillar maintains ISO9001:2000 certified quality management systems for engine test Facilities to assure accurate calibration of test equipment. Engine test data is corrected in accordance with SAE J1995. Additional reference material SAE J1228, J1349, ISO 8665, 3046-1:2002E, 3046-3:1989, 1585, 2534, 2288, and 9249 may apply in part or are similar to SAE J1995. Special engine rating request (SERR) test data shall be noted.

PERFORMANCE PARAMETER TOLERANCE FACTORS: Power +/- 3% Torque +/- 3% Exhaust stack temperature +/- 8% Inlet airflow +/- 5% Intake manifold pressure-gage +/- 10% Exhaust flow +/- 6% Specific fuel consumption +/- 3% Specific fuel consumption (C7-C18) +/- 4% Fuel rate +/- 5% Specific DEF consumption +/- 3% DEF rate +/- 5% Heat rejection +/- 5% Heat rejection exhaust only +/- 10% Heat rejection CEM only +/- 10%
Heat Rejection values based on using treated water.
Torque is included for truck and industrial applications, do not use for Gen Set or steady state applications.
On C7 - C18 engines, at speeds of 1100 RPM and under these values are provided for reference only, and may not meet the tolerance listed.
On 3500 and C175 engines, at speeds below Peak Torque these values are provided for reference only, and may not meet the tolerance listed.
These values do not apply to C280/3600. For these models, see the tolerances listed below.

C280/3600 HEAT REJECTION TOLERANCE FACTORS: Heat rejection +/- 10% Heat rejection to Atmosphere +/- 50% Heat rejection to Lube Oil +/- 20% Heat rejection to Aftercooler +/- 5%

TEST CELL TRANSDUCER TOLERANCE FACTORS: Torque +/- 0.5% Speed +/- 0.2% Fuel flow +/- 1.0% Temperature +/- 2.0 C degrees Intake manifold pressure +/- 0.1 kPa
OBSERVED ENGINE PERFORMANCE IS CORRECTED TO SAE J1995 REFERENCE AIR AND FUEL CONDITIONS.

REFERENCE ATMOSPHERIC INLET AIR FOR 3500 ENGINES AND SMALLER SAE J1228 AUG2002 for marine engines, and J1995 JAN2014 for other engines, reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity at the stated aftercooler water temp, or inlet manifold temp.
FOR 3600 ENGINES Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JANJAN2014 reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity and 150M altitude at the stated aftercooler water temperature.

MEASUREMENT LOCATION FOR INLET AIR TEMPERATURE Location for air temperature measurement air cleaner inlet at stabilized operating conditions.

REFERENCE EXHAUST STACK DIAMETER The Reference Exhaust Stack Diameter published with this dataset is only used for the calculation of Smoke Opacity values displayed in this dataset. This value does not necessarily represent the actual stack diameter of the engine due to the variety of exhaust stack adapter options available. Consult the price list, engine order or general dimension drawings for the actual stack diameter size ordered or options available.

REFERENCE FUEL DIESEL Reference fuel is #2 distillate diesel with a 35API gravity; A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 15 deg C (59 deg F), where the density is 850 G/Liter (7.0936 Lbs/Gal).
GAS Reference natural gas fuel has a lower heating value of 33.74 KJ/L (905 BTU/CU Ft). Low BTU ratings are based on 18.64 KJ/L (500 BTU/CU FT) lower heating value gas. Propane ratings are based on 87.56 KJ/L (2350 BTU/CU Ft) lower heating value gas.

ENGINE POWER (NET) IS THE CORRECTED FLYWHEEL POWER (GROSS) LESS EXTERNAL AUXILIARY LOAD Engine corrected gross output includes the power required to drive standard equipment; lube oil, scavenge lube oil, fuel transfer, common rail fuel, separate circuit aftercooler and jacket water pumps. Engine net power available for the external (flywheel) load is calculated by subtracting the sum of auxiliary load from the corrected gross flywheel out put power. Typical auxiliary loads are radiator cooling fans, hydraulic pumps, air compressors and battery charging alternators. For Tier 4 ratings additional Parasitic losses would also include Intake, and Exhaust Restrictions.

ALTITUDE CAPABILITY Altitude capability is the maximum altitude above sea level at standard temperature and standard pressure at which the engine could develop full rated output power on the current performance data set.
Standard temperature values versus altitude could be seen on TM2001.
When viewing the altitude capability chart the ambient temperature is the inlet air temp at the compressor inlet.
Engines with ADEM MEUI and HEUI fuel systems operating at conditions above the defined altitude capability derate for atmospheric pressure and temperature conditions outside the values defined, see TM2001.
Mechanical governor controlled unit injector engines require a setting change for operation at conditions above the altitude defined on the engine performance sheet. See your Caterpillar technical representative for non standard ratings.

REGULATIONS AND PRODUCT COMPLIANCE TMI Emissions information is presented at 'nominal' and 'Potential Site Variation' values for standard ratings. No tolerances are applied to the emissions data. These values are subject to change at any time. The controlling federal and local emission requirements need to be verified by your Caterpillar technical representative.
Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.

EMISSION CYCLE LIMITS: Cycle emissions Max Limits apply to cycle-weighted averages only. Emissions at individual load points may exceed the cycle-weighted limit.

WET & DRY EXHAUST/EMISSIONS DESCRIPTION: Wet - Total exhaust flow or concentration of total exhaust flow Dry - Total exhaust flow minus water vapor or concentration of exhaust flow with water vapor excluded

EMISSIONS DEFINITIONS: Emissions : DM1176

EMISSION CYCLE DEFINITIONS
1. For constant-speed marine engines for ship main propulsion, including,diesel-electric drive, test cycle E2 shall be applied, for controllable-pitch propeller sets test cycle E2 shall be applied.
2. For propeller-law-operated main and propeller-law-operated auxiliary engines the test cycle E3 shall be applied.
3. For constant-speed auxiliary engines test cycle D2 shall be applied.
4. For variable-speed, variable-load auxiliary engines, not included above, test cycle C1 shall be applied.

HEAT REJECTION DEFINITIONS: Diesel Circuit Type and HHV Balance : DM9500

HIGH DISPLACEMENT (HD) DEFINITIONS: 3500: EM1500

RATING DEFINITIONS: Agriculture : TM6008
Fire Pump : TM6009
Generator Set : TM6035
Generator (Gas) : TM6041
Industrial Diesel : TM6010
Industrial (Gas) : TM6040
Irrigation : TM5749
Locomotive : TM6037
Marine Auxiliary : TM6036
Marine Prop (Except 3600) : TM5747
Marine Prop (3600 only) : TM5748

MSHA : TM6042
Oil Field (Petroleum) : TM6011
Off-Highway Truck : TM6039
On-Highway Truck : TM6038

SOUND DEFINITIONS: Sound Power : DM8702
Sound Pressure : TM7080

Date Released : 03/12/24