

Performance Number: DM7694

Change Level: 01

SALES MODEL:	C11	COMBUSTION:	DIRECT INJECTION
BRAND:	CAT	ENGINE SPEED (RPM):	2,100
MACHINE SALES MODEL:		PEAK TORQUE SPEED (RPM):	1,400
ENGINE POWER (BKW):	336.0	TORQUE RISE (%):	34
PEAK TORQUE (NM):	2,056.0	ASPIRATION:	TA
COMPRESSION RATIO:	17.8	AFTERCOOLER TYPE:	ATAAC
RATING LEVEL:	E-RATING	AFTERCOOLER CIRCUIT TYPE:	JW+OC, ATAAC
PUMP QUANTITY:	1	INLET MANIFOLD AIR TEMP (C):	49
FUEL TYPE:	DIESEL	JACKET WATER TEMP (C):	89
MANIFOLD TYPE:	DRY	TURBO CONFIGURATION:	SINGLE
GOVERNOR TYPE:	ELEC	TURBO QUANTITY:	1
CAMSHAFT TYPE:	STANDARD	TURBOCHARGER MODEL:	GTA4502BS-44T-1.33
IGNITION TYPE:	CI	CERTIFICATION YEAR:	2005
INJECTOR TYPE:	EUI	PISTON SPD @ RATED ENG SPD (M/SEC):	9.8
REF EXH STACK DIAMETER (MM):	127		
MAX OPERATING ALTITUDE (M):	1,007		

INDUSTRY	SUBINDUSTRY	APPLICATION
INDUSTRIAL	GENERAL INDUSTRIAL	INDUSTRIAL
INDUSTRIAL	MATERIAL HANDLING	INDUSTRIAL
INDUSTRIAL	CONSTRUCTION	INDUSTRIAL
INDUSTRIAL	AGRICULTURE	INDUSTRIAL
INDUSTRIAL	MINING	INDUSTRIAL
INDUSTRIAL	INDUSTRIAL POWER UNIT	INDUSTRIAL
INDUSTRIAL	FORESTRY	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	BKW	NM	KPA	G/BKW-HR	G/BKW-HR	L/HR	L/HR
2,100	336	1,526	1,720	218.5	214.4	86.3	84.6
2,000	336	1,602	1,806	215.5	211.4	85.1	83.5
1,900	336	1,687	1,901	215.0	210.9	84.9	83.3
1,800	336	1,780	2,007	214.0	209.9	84.5	82.9
1,700	332	1,865	2,102	213.1	209.0	83.2	81.6
1,600	325	1,939	2,185	213.4	209.3	81.5	80.0
1,500	315	2,005	2,259	211.1	207.0	78.2	76.7
1,400	302	2,057	2,318	212.9	208.8	75.5	74.0
1,300	276	2,030	2,288	208.4	204.5	67.7	66.4
1,200	249	1,984	2,236	215.8	211.7	63.3	62.1
1,100	211	1,831	2,064	217.7	213.6	54.0	53.0

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	BKW	KPA	DEG C	DEG C	KPA	DEG C	KPA	DEG C
2,100	336	167.3	50.3	686.4	140.2	537.3	189	174.5
2,000	336	164.2	41.5	648.3	131.7	453.5	184	160.7
1,900	336	172.1	45.9	694.7	129.8	541.7	191	172.9
1,800	336	176.0	45.9	705.5	125.3	554.1	194	174.2
1,700	332	179.2	45.9	715.8	120.0	566.1	195	175.9
1,600	325	180.6	45.4	722.7	113.7	573.2	196	176.6
1,500	315	180.8	44.2	727.4	105.5	581.9	193	176.5
1,400	302	180.5	43.3	737.9	98.3	589.9	192	178.3
1,300	276	171.6	41.1	718.7	87.9	580.2	181	174.7
1,200	249	169.6	39.2	725.4	81.3	585.9	178	172.4
1,100	211	134.5	36.2	745.5	60.7	609.1	140	156.8

General Performance Data (Continued)

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	ENGINE OUTLET WET EXH VOL FLOW RATE (0 DEG C AND 101	ENGINE OUTLET DRY EXH VOL FLOW RATE (0 DEG C AND 101
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RPM	BKW	M3/MIN	M3/MIN	KG/HR	KG/HR	KPA)	
						M3/MIN	M3/MIN
2,100	336	26.7	75.4	1,861.0	1,934.3	25.4	23.1
2,000	336	25.9	65.4	1,799.5	1,871.7	24.6	22.4
1,900	336	25.2	71.5	1,750.9	1,823.0	24.0	21.7
1,800	336	24.5	70.4	1,697.2	1,769.0	23.2	21.1
1,700	332	23.5	68.4	1,623.0	1,693.7	22.3	20.1
1,600	325	22.4	65.9	1,548.8	1,618.1	21.3	19.2
1,500	315	21.1	62.6	1,455.7	1,522.1	20.0	18.0
1,400	302	19.7	58.9	1,355.5	1,419.6	18.7	16.7
1,300	276	17.9	52.6	1,224.7	1,282.3	16.9	15.1
1,200	249	16.8	49.7	1,149.8	1,203.6	15.8	14.2
1,100	211	13.3	40.6	910.8	956.8	12.6	11.2

Heat Rejection Data

ENGINE SPEED	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXH RECOVERY TO 177C	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
RPM	BKW	KW	KW	KW	KW	KW	KW	KW	KW	KW
2,100	336	134	41.2	353	208	46.4	64.6	336	872	928
2,000	336	129	97.3	293	153	45.8	59.9	336	859	916
1,900	336	128	49.7	338	199	45.7	62.1	336	858	914
1,800	336	130	46.7	336	200	45.5	60.8	336	853	909
1,700	332	128	46.2	330	199	44.8	59.0	332	841	895
1,600	325	127	47.6	321	194	43.9	56.8	325	824	877
1,500	315	125	40.6	307	186	42.1	53.8	315	790	841
1,400	302	124	42.9	292	178	40.6	51.2	302	763	812
1,300	276	116	31.7	260	157	36.5	45.7	276	684	729
1,200	249	113	30.5	246	149	34.0	42.8	249	639	681
1,100	211	105	29.3	206	126	29.1	30.7	211	546	581

Emissions Data

DIESEL

RATED SPEED NOMINAL DATA: 2100 RPM

ENGINE POWER	BKW	336	252	168	84.0	33.6
PERCENT LOAD	%	100	75	50	25	10
TOTAL NOX (AS NO2)	G/HR	1,408	805	423	307	132
TOTAL CO	G/HR	656	468	364	499	297
TOTAL HC	G/HR	21	25	44	170	79
TOTAL CO2	KG/HR	232	192	137	79	42
PART MATTER	G/HR	53.3	53.3	43.7	37.5	41.8
TOTAL NOX (AS NO2) (CORR 5% O2)	MG/NM3	1,381.9	947.1	720.8	880.1	720.7
TOTAL CO (CORR 5% O2)	MG/NM3	659.0	570.6	623.3	1,430.6	1,621.1
TOTAL HC (CORR 5% O2)	MG/NM3	18.2	26.3	67.2	421.4	379.2
PART MATTER (CORR 5% O2)	MG/NM3	43.9	54.6	64.7	95.6	204.6
TOTAL NOX (AS NO2) (CORR 15% O2)	MG/NM3	512.8	351.4	267.5	326.6	267.4
TOTAL CO (CORR 15% O2)	MG/NM3	244.5	211.7	231.3	530.8	601.5
TOTAL HC (CORR 15% O2)	MG/NM3	6.8	9.8	24.9	156.4	140.7
PART MATTER (CORR 15% O2)	MG/NM3	16.3	20.3	24.0	35.5	75.9
TOTAL NOX (AS NO2) (CORR 5% O2)	PPM	673	461	351	429	351
TOTAL CO (CORR 5% O2)	PPM	527	456	499	1,145	1,297
TOTAL HC (CORR 5% O2)	PPM	34	49	125	787	708
TOTAL NOX (AS NO2) (CORR 15% O2)	PPM	250	171	130	159	130
TOTAL CO (CORR 15% O2)	PPM	196	169	185	425	481
TOTAL HC (CORR 15% O2)	PPM	13	18	47	292	263
TOTAL NOX (AS NO2)	G/HP-HR	3.16	2.41	1.89	2.74	2.95
TOTAL CO	G/HP-HR	1.47	1.40	1.63	4.46	6.62
TOTAL HC	G/HP-HR	0.05	0.07	0.20	1.52	1.77
PART MATTER	G/HP-HR	0.12	0.16	0.20	0.33	0.93
TOTAL NOX (AS NO2)	G/KW-HR	4.30	3.27	2.57	3.73	4.01

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TOTAL CO	G/KW-HR	2.00	1.90	2.21	6.06	9.00
TOTAL HC	G/KW-HR	0.06	0.10	0.27	2.06	2.41
PART MATTER	G/KW-HR	0.16	0.22	0.27	0.45	1.27
TOTAL NOX (AS NO2)	LB/HR	3.10	1.78	0.93	0.68	0.29
TOTAL CO	LB/HR	1.45	1.03	0.80	1.10	0.65
TOTAL HC	LB/HR	0.05	0.05	0.10	0.37	0.18
TOTAL CO2	LB/HR	511	423	302	174	92
PART MATTER	LB/HR	0.12	0.12	0.10	0.08	0.09
OXYGEN IN EXH	%	8.9	11.0	13.1	14.5	16.3
DRY SMOKE OPACITY	%	2.7	2.0	1.8	0.9	3.6
BOSCH SMOKE NUMBER		1.58	1.24	1.18	0.59	1.96

RATED SPEED POTENTIAL SITE VARIATION: 2100 RPM

ENGINE POWER	BKW	336	252	168	84.0	33.6
PERCENT LOAD	%	100	75	50	25	10
TOTAL NOX (AS NO2)	G/HR	1,521	870	457	332	143
TOTAL CO	G/HR	1,228	875	680	933	555
TOTAL HC	G/HR	40	47	84	321	150
PART MATTER	G/HR	103.9	103.9	85.2	73.0	81.5
TOTAL NOX (AS NO2) (CORR 5% O2)	MG/NM3	1,492.5	1,022.9	778.4	950.5	778.4
TOTAL CO (CORR 5% O2)	MG/NM3	1,232.3	1,067.0	1,165.6	2,675.2	3,031.5
TOTAL HC (CORR 5% O2)	MG/NM3	34.4	49.7	127.0	796.5	716.6
PART MATTER (CORR 5% O2)	MG/NM3	85.6	106.6	126.1	186.4	399.0
TOTAL NOX (AS NO2) (CORR 15% O2)	MG/NM3	553.8	379.6	288.9	352.7	288.8
TOTAL CO (CORR 15% O2)	MG/NM3	457.3	395.9	432.5	992.7	1,124.9
TOTAL HC (CORR 15% O2)	MG/NM3	12.8	18.5	47.1	295.5	265.9
PART MATTER (CORR 15% O2)	MG/NM3	31.8	39.5	46.8	69.2	148.1
TOTAL NOX (AS NO2) (CORR 5% O2)	PPM	727	498	379	463	379
TOTAL CO (CORR 5% O2)	PPM	986	854	932	2,140	2,425
TOTAL HC (CORR 5% O2)	PPM	64	93	237	1,487	1,338
TOTAL NOX (AS NO2) (CORR 15% O2)	PPM	270	185	141	172	141
TOTAL CO (CORR 15% O2)	PPM	366	317	346	794	900
TOTAL HC (CORR 15% O2)	PPM	24	34	88	552	496
TOTAL NOX (AS NO2)	G/HP-HR	3.42	2.60	2.04	2.96	3.19
TOTAL CO	G/HP-HR	2.76	2.61	3.04	8.33	12.37
TOTAL HC	G/HP-HR	0.09	0.14	0.37	2.87	3.35
PART MATTER	G/HP-HR	0.23	0.31	0.38	0.65	1.82
TOTAL NOX (AS NO2)	G/KW-HR	4.65	3.53	2.78	4.03	4.33
TOTAL CO	G/KW-HR	3.75	3.55	4.14	11.33	16.82
TOTAL HC	G/KW-HR	0.12	0.19	0.51	3.90	4.55
PART MATTER	G/KW-HR	0.32	0.42	0.52	0.89	2.47
TOTAL NOX (AS NO2)	LB/HR	3.35	1.92	1.01	0.73	0.31
TOTAL CO	LB/HR	2.71	1.93	1.50	2.06	1.22
TOTAL HC	LB/HR	0.09	0.10	0.18	0.71	0.33
PART MATTER	LB/HR	0.23	0.23	0.19	0.16	0.18

Regulatory Information

EPA TIER 3		2005 - 2010			
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 89 SUBPART D AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.					
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR	
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 3	CO: 3.5 NOx + HC: 4.0 PM: 0.20	

EU STAGE IIIA		2006 - 2010			
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	CO: 3.5 NOx + HC: 4.0 PM: 0.20	

IMO II		2011 - ----			
GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN REGULATION 13 OF REVISED ANNEX VI OF MARPOL 73/78 AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THIS ENGINE CONFORMS TO INTERNATIONAL MARINE ORGANIZATIONS (IMO) MARINE COMPRESSION-IGNITION EMISSION REGULATIONS.					

Altitude Derate Data

STANDARD

ALTITUDE CORRECTED POWER CAPABILITY (BKW)

AMBIENT OPERATING TEMP (C)	10	15	20	25	30	35	40	45	50	NORMAL
ALTITUDE (M)										
0	336	336	336	336	336	336	336	336	336	336
250	336	336	336	336	336	336	336	336	336	336
500	336	336	336	336	336	336	336	336	330	336
750	336	336	336	336	336	336	330	325	320	336
1,000	336	336	336	336	331	325	320	315	310	336
1,250	336	336	331	326	320	315	310	305	301	329
1,500	332	326	321	316	310	305	300	296	291	320
1,750	322	316	311	306	300	296	291	286	282	312
2,000	311	306	301	296	291	286	282	277	273	303
2,250	301	296	291	286	282	277	272	268	264	295
2,500	292	287	282	277	272	268	264	260	256	287
2,750	282	277	272	268	264	259	255	251	247	280
3,000	273	268	264	259	255	251	247	243	239	272
3,250	264	259	255	250	246	242	238	235	231	264
3,500	255	250	246	242	238	234	230	227	223	257
3,750	246	242	238	234	230	226	223	219	216	250
4,000	238	234	230	226	222	219	215	212	209	243
4,250	230	226	222	218	215	211	208	205	201	236
4,500	222	218	214	211	207	204	201	198	194	229

Cross Reference

Test Spec	Setting	Engine Arrangement	Engineering Model	Engineering Model Version	Start Effective Serial Number	End Effective Serial Number
OK4908	PP5390	3606752	E706	-	HRA00001	

Performance Parameter Reference

<p>Parameters Reference:DM9600-14 PERFORMANCE DEFINITIONS</p>
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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%
 - 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.

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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 JAN2014 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

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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 : 10/27/21