

Introduction:

This CO and, where available, CO2 data is intended to provide baseline data for performing the loaded repeatable engine test required by §75.1914(g). Generally, if the CO emissions of the engine at torque stall conditions exceeds twice the baseline given for the engine, maintenance is required. The CO2 data is provided to ensure the test is performed on the lug curve. Where CO2 data is not listed, it should be approximately 10% for a naturally aspirated engine when operating on the lug curve or 8% for an altitude compensated (turbocharged or supercharged) engine operating on the lug curve.

Each nonpermissible engine approval number is listed as a tab at the bottom of the spread sheet. Select the approval number you are interested in.

Permission to post CO data could not be obtained from Isuzu, Cummins, or Ford-New Holland. Please contact these companies directly for more information.

A training video can be obtained by contacting Bob Setren at 304-547-2070, Setren.Robert@dol.gov

Best Practices guidance for Machines with Torque Converters and Hydrostatic Transmissions is also available. See the links below.

[Machines with Hydrostatic Transmissions](#)

[Machines with Torque Converter Transmissions](#)

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Or [Jeff Moninger at 304-547-2324, Moninger.Jeffery@dol.gov](mailto:Moninger.Jeffery@dol.gov)

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B001-0	
Engine:	Deutz - MWM 916-6	
Engine Rating:	94 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2300	259	9.6
2200	270	9.5
2100	290	9.6
2000	305	9.7
1900	300	9.7
1800	248	9.3
1700	250	9.4
1600	255	9.2

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B002-0	
Engine:	Deutz BF6M1015C	
Engine Rating:	402 HP @ 2100 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2100	96	7.6
1300	249	10.3

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B003-0	
Engine:	Caterpillar 3306 PCNA	
Engine Rating:	150 HP @ 2200 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2200	392	10.8
2100	394	10.9
2000	352	10.8
1900	348	10.7
1800	330	10.6
1700	332	10.5
1600	315	10.4
1500	313	10.3
1400	314	10.2

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B004-0	
Engine:	Caterpillar 3304 PCNA	
Engine Rating:	100 HP @ 2200 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2200	392	10.8
2100	394	10.9
2000	352	10.8
1900	348	10.7
1800	330	10.6
1700	332	10.5
1600	315	10.4
1500	313	10.3
1400	314	10.2

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B005-0	
Engine:	General Motors L57 (6.5L)	
Engine Rating:	160 HP @ 3400 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
3400	227	-
1700	385	-
1000	475	-

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B007-0	
Engine:	Deutz BF6M 1013CP	
Engine Rating:	261 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2300	216	8.7
2200	199	8.9
2100	186	9
2050	190	9
1600	164	8.6
1350	211	9
1300	241	9.3
1200	378	9.8
1150	439	10
1000	1210	10.8

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B008-0	
Engine:	Deutz BF4M 1013CP	
Engine Rating:	158 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2300	129	8.4
2200	142	8.5
2100	147	8.6
1800	155	9
1500	483	10.5
1450	630	10.9
1400	1098	11.5

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B009-0	
Engine:	Deutz BF8M 1015C	
Engine Rating:	536 HP @ 2100 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2100	96	7.6
1300	249	10.3

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B010-0	
Engine:	Caterpillar 3306 DITA	
Engine Rating:	165 HP @ 2200 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2200	62	6.1
1980	53	6.5
1440	58	8.2
1320	69	8.8

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B011-0	
Engine:	Deutz BF4M1012C	
Engine Rating:	113 HP @ 2500 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2500	150	8.9
2400	141	8.9
2300	135	8.9
2250	130	8.8
1900	105	9.1
1650	184	10
1600	217	10.2
1500	360	10.6
1400	610	11.1
1350	782	11.2
1000	1186	11.3

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B012-0	
Engine:	Caterpillar 3176 ATAAC	
Engine Rating:	335 HP @ 2100 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2100	107	7.8
1900	131	8.3
1700	114	8.4
1600	109	8.3
1575	107	8.3

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B013-0	
Engine:	Deutz F4L1011F	
Engine Rating:	59 HP @ 3000 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
3000	582	11.6
2700	506	11.6
2400	317	11.2
2100	273	10.8
2000	347	11.3
1800	475	11.6
1600	411	11.5
1500	452	11.3
1250	305	10.2
1000	205	9.2

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B014-0	
Engine:	Deutz F3L1011F	
Engine Rating:	44 HP @ 3000 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
3000	582	11.6
2700	506	11.6
2400	317	11.2
2100	273	10.8
2000	347	11.3
1800	475	11.6
1600	411	11.5
1500	452	11.3
1250	305	10.2
1000	205	9.2

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B015-0	
Engine:	Deutz F2L1011F	
Engine Rating:	30 HP @ 3000 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
3000	582	11.6
2700	506	11.6
2400	317	11.2
2100	273	10.8
2000	347	11.3
1800	475	11.6
1600	411	11.5
1500	452	11.3
1250	305	10.2
1000	205	9.2

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B016-0	
Engine:	General Motors	
Engine Rating:	195 HP @ 3400 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
3400	213	13.2
1800	354	13.3

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B017-0	
Engine:	Caterpillar 3306E ATAAC	
Engine Rating:	300 HP @ 2200 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2200	160	8.1
1600	133	9

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B018-0	
Engine:	Caterpillar 3406E ATAAC	
Engine Rating:	500 HP @ 2100 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2100	65	9.6
1800	177	8.9

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B019-0	
Engine:	Deutz BF4L1011F	
Engine Rating:	74 HP @ 2800 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2800	189	7.6
2750	166	7.6
2400	141	8.3
2100	140	9.2
1800	168	10
1650	235	10.5
1500	367	10.9

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B020-0	
Engine:	Perkins 1004-40TW	
Engine Rating:	122 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2300	78	9.1
2200	67	9
2000	46	8.9
1800	41	9.1
1600	49	9.6
1500	72	10.1
1400	122	10.6
1200	728	11.1
1000	1952	11.3

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B021-0	
Engine:	Perkins 1006-60T	
Engine Rating:	152 HP @ 2200 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2200	80	8.4
2000	63	8.6
1800	64	9
1600	50	9.4
1500	56	9.7
1400	80	10.2
1200	748	11.5
1000	865	10.7

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B022-0	
Engine:	Perkins 1004-40T	
Engine Rating:	108 HP @ 2400 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2400	83	9.4
2200	115	9.6
2000	136	9.9
1800	232	10.6
1600	300	11
1400	529	11.5
1200	877	11.4
1000	1466	11.5

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B023-0	
Engine:	Deutz F6L912W	
Engine Rating:	80 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2300	129	9.5
2265	127	9.5
2000	115	9.6
1800	112	9.7
1600	108	10
1550	112	10
1500	109	9.9
1250	110	9.7
1000	111	9.7

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B024-0	
Engine:	Deutz F5L912W	
Engine Rating:	67 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2300	129	9.5
2265	127	9.5
2000	115	9.6
1800	112	9.7
1600	108	10
1550	112	10
1500	109	9.9
1250	110	9.7
1000	111	9.7

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B025-0	
Engine:	Deutz F4L912W	
Engine Rating:	54 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2300	129	9.5
2265	127	9.5
2000	115	9.6
1800	112	9.7
1600	108	10
1550	112	10
1500	109	9.9
1250	110	9.7
1000	111	9.7

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B026-0	
Engine:	Deutz F3L912W	
Engine Rating:	40 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2300	129	9.5
2265	127	9.5
2000	115	9.6
1800	112	9.7
1600	108	10
1550	112	10
1500	109	9.9
1250	110	9.7
1000	111	9.7

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B027-0	
Engine:	Perkins 704-26	
Engine Rating:	58 HP @ 2600 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2600	480	12.7
2400	312	12.3
2200	472	12.3
2000	735	12.6
1800	912	12.6
1600	787	12.2
1400	172	11.3
1200	100	10.3
1000	90	9.2

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B028-0	
Engine:	Deutz F6L912W	
Engine Rating:	93 HP @ 2500 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2500	130	9.7
2465	131	9.7
2200	118	9.6
2000	99	9.3
1800	84	9.3
1600	77	9.5
1550	77	9.6
1500	77	9.5
1250	63	8.9
1000	59	8.2

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B029-0	
Engine:	Deutz F4L912W	
Engine Rating:	62 HP @ 2500 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2500	130	9.7
2465	131	9.7
2200	118	9.6
2000	99	9.3
1800	84	9.3
1600	77	9.5
1550	77	9.6
1500	77	9.5
1250	63	8.9
1000	59	8.2

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B030-0	
Engine:	Deutz F5L912W	
Engine Rating:	76 HP @ 2500 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2500	130	9.7
2465	131	9.7
2200	118	9.6
2000	99	9.3
1800	84	9.3
1600	77	9.5
1550	77	9.6
1500	77	9.5
1250	63	8.9
1000	59	8.2

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B031-0	
Engine:	Deutz F3L912W	
Engine Rating:	47 HP @ 2500 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2500	130	9.7
2465	131	9.7
2200	118	9.6
2000	99	9.3
1800	84	9.3
1600	77	9.5
1550	77	9.6
1500	77	9.5
1250	63	8.9
1000	59	8.2

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B032-0	
Engine:	Detroit Diesel 8V-2000TA	
Engine Rating:	650 HP @ 2100 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2100	47	7.8
2000	44	7.8
1900	47	8
1800	53	8.4
1700	66	8.8
1600	97	9.4
1500	211	10
1400	565	10.7
1300	1247	11.2
1200	1390	11.2
1050	1944	11.3

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B033-0	
Engine:	Perkins 104-19	
Engine Rating:	42.5 HP @ 2800 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2800	376	11.8
2600	478	12
2500	468	12.1
2400	440	12
2200	377	11.6
2100	329	11.1
2000	297	10.9
1875	309	11
1800	328	11.1
1600	471	11.4
1500	484	11.4

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B034-0	
Engine:	Deutz F6L413FW	
Engine Rating:	137 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2300	112	9.6
2200	109	9.7
2000	93	9.4
1800	128	9.8
1600	121	9.7
1500	140	9.7
1400	183	9.7
1300	435	10.3
1150	1186	10.4
1000	1064	10

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B035-0	
Engine:	Deutz F8L413FW	
Engine Rating:	182 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2300	112	9.6
2200	109	9.7
2000	93	9.4
1800	128	9.8
1600	121	9.7
1500	140	9.7
1400	183	9.7
1300	435	10.3
1150	1186	10.4
1000	1064	10

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B036-0	
1000	1064	10
1150	1186	10.4
1050	435	10.3
950	183	9.7
850	140	9.7
1600	121	9.7
1800	128	9.8
2000	93	9.4
1900	109	9.7
2300	112	9.6
Engine Rating:	228 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
Engine:	Deutz F10L413FW	

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B037-0	
Engine:	Deutz F12L413FW	
Engine Rating:	274 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2300	112	9.6
2200	109	9.7
2000	93	9.4
1800	128	9.8
1600	121	9.7
1500	140	9.7
1400	183	9.7
1300	435	10.3
1150	1186	10.4
1000	1064	10

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B040-0	
Engine:	Lister-Petter LPU-4 MKI	
Engine Rating:	35 HP @ 3000 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
3000	693	10.8
2900	820	10.7
2800	778	11.6
2700	715	11.7
2600	655	11.5
2500	615	11.4
2400	650	11.5
2300	638	11.3
2200	638	11.2
2100	563	11.1
2000	530	11
1900	473	10.9
1800	565	10.9
1700	560	11
1600	565	11
1500	500	10.7

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B041-0	
Engine:	Lister-Petter LPU-3 MKI	
Engine Rating:	26.3 HP @ 3000 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
3000	693	10.8
2900	820	10.7
2800	778	11.6
2700	715	11.7
2600	655	11.5
2500	615	11.4
2400	650	11.5
2300	638	11.3
2200	638	11.2
2100	563	11.1
2000	530	11
1900	473	10.9
1800	565	10.9
1700	560	11
1600	565	11
1500	500	10.7

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B042-0	
Engine:	Lister-Petter LPU-2 MKI	
Engine Rating:	17.5 HP @ 3000 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
3000	693	10.8
2900	820	10.7
2800	778	11.6
2700	715	11.7
2600	655	11.5
2500	615	11.4
2400	650	11.5
2300	638	11.3
2200	638	11.2
2100	563	11.1
2000	530	11
1900	473	10.9
1800	565	10.9
1700	560	11
1600	565	11
1500	500	10.7

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B043-0	
Engine:	Lister-Petter LPU-4 MKII	
Engine Rating:	38.6 HP @ 3000 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
3000	250	10.7
2900	295	10.6
2800	360	10.7
2700	348	10.8
2600	412	10.6
2500	508	10.9
2400	385	11.3
2300	325	11
2200	280	10.7
2100	300	10.6
2000	295	10.5
1900	317	10.4
1800	372	10.4
1700	368	10.3
1600	330	10.1
1500	280	9.7

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B044-0	
Engine:	Lister-Petter LPU-3 MKII	
Engine Rating:	29 HP @ 3000 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
3000	250	10.7
2900	295	10.6
2800	360	10.7
2700	348	10.8
2600	412	10.6
2500	508	10.9
2400	385	11.3
2300	325	11
2200	280	10.7
2100	300	10.6
2000	295	10.5
1900	317	10.4
1800	372	10.4
1700	368	10.3
1600	330	10.1
1500	280	9.7

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B047-0	
Engine:	Detroit Diesel Series 50	
Engine Rating:	315 HP @ 2100 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2100	35	6.7
2000	34	6.8
1900	33	7
1800	33	7.1
1700	32	7.3
1600	35	7.5
1500	40	7.9
1400	49	8.3
1350	55	8.6
1300	66	8.8
1200	119	9.3

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B048-0	
Engine:	Detroit Diesel Series 60 (11.1L)	
Engine Rating:	325 HP @ 2100 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2100	39	6.8
2000	36	6.7
1900	35	6.8
1800	35	7
1700	36	7.2
1600	40	7.4
1500	48	7.6
1400	62	8.1
1300	95	8.7
1200	214	9.5

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B049-0	
Engine:	Detroit Diesel Series 60 (12.7L)	
Engine Rating:	475 HP @ 2100 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2100	47	7.3
2000	44	7.2
1900	40	7.3
1800	37	7.5
1700	40	7.6
1600	44	7.7
1500	49	7.9
1400	65	8.3
1300	121	8.8
1200	356	9.5

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B050-0	
Engine:	Detroit Diesel Series 40	
Engine Rating:	230 HP @ 2200 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2200	59	7.5
2100	55	7.7
2000	48	7.7
1900	44	7.8
1800	40	8
1700	28	8.3
1600	32	8
1500	69	7.2
1230	154	5.2

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B053	
Engine:	Kubota V1200	
Engine Rating:	25.8 HP @ 3000 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
3000	122	12.3
2900	147	12.4
2800	145	12.5
2700	149	12.6
2600	150	12.6
2500	151	12.4
2400	152	12.4
2300	156	12.4
2200	169	12.3
2100	146	12
2000	141	11.8
1900	145	11.5
1800	170	11.6

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B054	
Engine:	Deutz F3M 1011F	
Engine Rating:	46 HP @ 2800 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2800	399	11.2
2750	391	11.1
2500	432	11.4
2200	515	11.7
1900	575	11.8
1800	735	11.9
1700	776	11.9
1500	770	11.6
1250	724	11.1
1000	595	10.3

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B055	
Engine:	Deutz F4M 1011F	
Engine Rating:	61 HP @ 2800 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2800	399	11.2
2750	391	11.1
2500	432	11.4
2200	515	11.7
1900	575	11.8
1800	735	11.9
1700	776	11.9
1500	770	11.6
1250	724	11.1
1000	595	10.3

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B056	
Engine:	Deutz BF4M 1011F	
Engine Rating:	82 HP @ 2800 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2800	201	8.2
2750	200	8.3
2500	189	8.8
2200	204	9.9
1900	353	11
1800	449	11.4
1700	581	11.8
1500	1427	12.6

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B057-0	
Engine:	Deutz BF6M1013C / BF6M1013EC	
Engine Rating:	233 HP @ 2300 RPM / 228 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO ₂ , %
2300	90	7.3
2250	91	7.4
2200	87	7.4
2000	89	7.3
1700	124	7.9
1500	208	8.7
1400	281	9.1
1200	826	10.3
1000	1746	11.2

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B058	
Engine:	Deutz BF6M 1013	
Engine Rating:	189 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2300	92	8.2
2250	94	8.3
2000	109	8.9
1800	126	9.2
1600	237	9.7
1500	362	10.1
1400	1689	10.5
1200	1494	11.5
1100	1989	11.6

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B059	
Engine:	Deutz BF4M 1013	
Engine Rating:	125 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2300	89	8.4
2250	98	8.5
2000	99	9.1
1800	132	9.6
1600	230	10.1
1500	471	10.9
1400	908	11.5
1200	1890	11.9
1000	1989	11.6

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B060	
Engine:	Deutz F4L1011	
Engine Rating:	56.3 HP @ 3000 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
3000	489	9.6
2900	469	9.6
2800	470	9.6
2700	419	9.6
2600	412	9.7
2500	371	9.6
2400	322	9.5
2300	289	9.5
2200	295	9.5
2100	279	9.4
2000	298	9.4
1900	301	9.2
1800	378	10.1
1700	457	10
1600	605	10
1500	830	10.1
1400	1144	10.2
1300	1476	10.2
1200	1716	10.2

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B061	
Engine:	Deutz F3L1011	
Engine Rating:	41.6 HP @ 3000 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
3000	489	9.6
2900	469	9.6
2800	470	9.6
2700	419	9.6
2600	412	9.7
2500	371	9.6
2400	322	9.5
2300	289	9.5
2200	295	9.5
2100	279	9.4
2000	298	9.4
1900	301	9.2
1800	378	10.1
1700	457	10
1600	605	10
1500	830	10.1
1400	1144	10.2
1300	1476	10.2
1200	1716	10.2

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B062	
Engine:	Deutz F2L1011	
Engine Rating:	28.2 HP @ 3000 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
3000	489	9.6
2900	469	9.6
2800	470	9.6
2700	419	9.6
2600	412	9.7
2500	371	9.6
2400	322	9.5
2300	289	9.5
2200	295	9.5
2100	279	9.4
2000	298	9.4
1900	301	9.2
1800	378	10.1
1700	457	10
1600	605	10
1500	830	10.1
1400	1144	10.2
1300	1476	10.2
1200	1716	10.2

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B063	
Engine:	Caterpillar 3306 PCTA	
Engine Rating:	215 HP @ 2200 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2200	153	8.4
2100	145	8.4
2000	133	8.5
1900	120	8.7
1800	114	8.9
1700	114	9.1
1575	130	9.5

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B064-0	
Engine:	Caterpillar3054 DIT	
Engine Rating:	108 HP @ 2400 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2400	83	9.4
2200	115	9.6
2000	136	9.9
1800	232	10.6
1600	300	11
1400	529	11.5
1200	877	11.4
1000	1466	11.5

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B065-0	
Engine:	Caterpillar 3054 DITA	
Engine Rating:	122 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2300	78	9.1
2200	67	9
2000	46	8.9
1800	41	9.1
1600	49	9.6
1500	72	10.1
1400	122	10.6
1200	728	11.1
1000	1952	11.3

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B066-0	
Engine:	Caterpillar 3056 DITA	
Engine Rating:	152 HP @ 2200 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2200	80	8.4
2000	63	8.6
1800	64	9
1600	50	9.4
1500	56	9.7
1400	80	10.2
1200	748	11.5
1000	865	10.7

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B067-0	
Engine:	Navistar A185	
Engine Rating:	185 HP @ 3300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
3300	283	13.8
3200	215	13.6
3100	180	13.4
3000	163	13.3
2900	163	13.3
2800	173	13.3
2700	195	13.5
2600	268	13.7
2500	358	13.9
2400	418	14
2300	480	14.1
2200	653	14.2
2000	768	14.2
1900	650	14.1
1800	613	14
1700	595	13.9
1600	468	13.6
1500	723	13.9
1400	693	13.8
1300	645	13.7
1200	600	13.6
1100	595	13.5
1000	723	13.4

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B068-0	
Engine:	Navistar A215	
Engine Rating:	185 HP @ 3000 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
3000	140	8.8
2900	107	8.8
2800	90	8.8
2700	102	9.1
2600	110	9.3
2500	87	9.5
2400	77	9.6
2300	75	9.9
2200	70	10.2
2100	72	10.6
2000	85	10.8
1900	137	11.3
1800	282	11.7
1700	407	12.1
1600	427	12.4
1500	395	12.7
1400	340	12.9
1300	287	13.1
1200	252	13.2
1100	215	13.3
1000	197	13.3

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B069-0	
Engine:	Navistar B250	
Engine Rating:	250 HP @ 2600 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2600	106	9.1
2500	9	8.8
2400	85	8.6
2300	78	8.4
2200	73	8.4
2100	70	8.7
2000	70	8.7
1900	65	9
1800	68	9.3
1700	83	9.7
1600	165	10.2
1500	455	10.2
1400	1113	10.1
1300	2013	10

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B070-0	
Engine:	Farymann 43F	
Engine Rating:	14 HP @ 3000 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
3000	88	9.1
2900	74	9.4
2800	67	9.3
2700	109	9.1
2600	124	9
2500	92	8.9
2400	109	8.7
2300	131	8.5
2200	84	8.4
2100	77	8.2
2000	120	8.2

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B071-0	
Engine:	Kubota V2203-E	
Engine Rating:	48.4 HP @ 2800 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2800	143	10.8
2700	157	10.7
2600	150	10.7
2500	146	10.7
2400	143	10.7
2300	152	10.7
2200	156	10.9
2100	157	11
2000	192	11
1900	187	11.1
1800	234	11.4
1700	343	11.7

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B072-0	
Engine:	Detroit Diesel D704LTE	
Engine Rating:	84 HP @ 2600 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2600	233	10.5
2500	235	10.5
2400	227	10.7
2300	225	10.8
2200	221	10.7
2100	220	10.7
2000	248	10.8
1900	252	11
1800	276	11.3
1700	361	11.6
1600	523	12
1500	751	12.3
1400	1030	12.8
1300	1412	12.9
1200	1257	12.8

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B073-0	
Engine:	Detroit Diesel D706LTE	
Engine Rating:	123 HP @ 2600 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2600	288	10.3
2500	274	10.5
2400	273	10.6
2300	277	10.7
2200	308	11
2100	353	11.2
2000	359	11.3
1900	307	11.1
1800	242	11.1
1700	246	11.1
1600	276	11.3
1500	377	11.8
1400	558	12.2
1300	903	12.6
1200	1331	12.9

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B077	
Engine:	Deutz BF3M 1011F	
Engine Rating:	61 HP @ 2800 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2800	201	8.2
2750	200	8.3
2500	189	8.8
2200	204	9.9
1900	353	11
1800	449	11.4
1700	581	11.8
1500	1427	12.6

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B078	
Engine:	Deutz BF6M 1013FC-MVS	
Engine Rating:	282 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2300	82	8.9
2200	81	8.9
2100	77	9
2000	75	9
1750	63	8.7
1500	59	8.8
1400	61	9.1
1300	54	9.6
1100	69	10.8

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B080	
Engine:	Detroit Diesel Series 40	
Engine Rating:	250 HP @ 2200 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2100	37	7.4
2000	31	7.6
1900	28	7.8
1800	32	8.3
1700	44	8.6
1600	88	8.9
1500	261	9.4
1400	584	9.7
1300	747	9.9
1200	1132	10.3

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B082	
Engine:	Caterpillar 3408 E DITA	
Engine Rating:	510 HP @ 2000 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2000	243	8.1
1900	160	8.2
1800	200	8.4
1700	177	8.6
1600	171	9
1500	167	9.5
1400	206	10.2
1300	401	11.2

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B083	
Engine:	Diamler Chrysler OM 906	
Engine Rating:	275 HP @ 2200 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2200	244	9.4
2000	260	9.7
1800	286	10.1
1600	227	10.1
1400	232	10
1200	804	11.2

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B083	
Engine:	Diamler Chrysler OM 906	
Engine Rating:	255 HP @ 2200 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2200	122	8.45
2000	135	8.7
1800	132	8.88
1600	125	9.01
1400	166	9.54
1200	762	10.96

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B083	
Engine:	Diamler Chrysler OM 906	
Engine Rating:	241 HP @ 2200 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2200	81	7.59
2000	87	7.81
1800	80	8.27
1600	124	8.95
1400	390	10.06
1200	1678	11.59

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B083	
Engine:	Diamler Chrysler OM 906	
Engine Rating:	228 HP @ 2200 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2200	80	7.41
2000	77	7.67
1800	73	8.03
1600	120	8.77
1400	614	10.18
1200	1696	10.18

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B083	
Engine:	Diamler Chrysler OM 906	
Engine Rating:	201 HP @ 2200 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2200	71	7.09
2000	72	7.48
1800	79	7.85
1600	111	8.59
1400	446	9.76
1200	1575	10.98

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B087-0	
Engine:	Detroit Diesel Series 60 Model 6063HK32	
Engine Rating:	575 HP @ 2100 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2100	38	8.28
2000	37	8.38
1900	35	8.53
1800	34	8.65
1700	28	8.39
1600	31	8.21
1500	29	8.13
1400	34	8.09
1300	52	8.11
1200	195	8.44

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B089	
Engine:	Deutz F4L 1011F	
Engine Rating:	59 HP @ 3000 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
3000	982	10.9
1800	1834	11.7

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B090	
Engine:	Deutz F3L 1011F	
Engine Rating:	44 HP @ 3000 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
3000	982	10.9
1800	1834	11.7

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B091	
Engine:	Deutz F2L 1011F	
Engine Rating:	30 HP @ 3000 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
3000	982	10.9
1800	1834	11.7

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B092-0	
Engine:	Detroit Diesel Series 50 Model 6043TK32	
Engine Rating:	315 HP @ 2100 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2100	68	7.7
2000	96	7.8
1900	70	8
1800	75	8.3
1700	81	8.4
1600	87	8.5
1500	92	8.5
1400	90	8.4
1350	110	8.6
1300	211	9
1200	960	9.9

TORQUE CURVE TEST ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B096-0	
Engine:	Deutz BF 4 M2011	
Engine Rating:	87 HP @ 2800 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1000	2135	8.17
1200	2034	9.67
1400	935	9.98
1660	440	10.45
1700	451	10.42
1740	385	10.36
1900	103	9.76
2100	73	9.3
2400	68	8.59
2600	72	8.22
2770	81	8.01
2800	82	7.9

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B097-0	
Engine:	Detroit Diesel Series 60 DDEC	
Engine Rating:	475 HP @ 2100 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1200	430	8.7
1300	210	8.15
1350	183	8.06
1400	145	7.86
1500	138	7.74
1600	145	7.79
1700	142	7.77
1800	138	7.75
1900	140	7.69
2000	136	7.58
2100	149	7.58

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B098-0	
Engine:	DaimlerChrysler OM 904LA	
Engine Rating:	174 HP @ 2200 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1200	1341	11.81
1400	318	10.32
1600	335	10.1
1800	299	10.09
2000	267	9.94
2200	222	9.58

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B098-0	
Engine:	DaimlerChrysler OM 904LA	
Engine Rating:	147 HP @ 2200 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1200	506	7.75
1400	220	7.75
1600	126	7.75
1800	118	7.75
2000	117	7.75
2200	114	7.75

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B098-0	
Engine:	DaimlerChrysler OM 904LA	
Engine Rating:	134 HP @ 2200 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1200	506	7.75
1400	147	7.75
1600	86	7.75
1800	74	7.72
2000	74	7.68
2200	81	7.62

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B098-0	
Engine:	DaimlerChrysler OM 904LA	
Engine Rating:	121 HP @ 2200 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1200	765	10.69
1400	130	9.22
1600	70	8.07
1800	62	7.6
2000	65	7.44
2200	66	6.95

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	7E-B098-0	
Engine:	DaimlerChrysler OM 904LA	
Engine Rating:	100 HP @ 2200 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1200	707	9.94
1400	109	8.72
1600	72	7.72
1800	54	6.71
2000	54	6.29
2200	55	5.99

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA030001	
Engine:	Mitsubishi S4S	
Engine Rating:	63 HP @ 2500 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2500	228	10.87
2400	306	11.33
2300	334	11.48
2200	382	11.47
2100	340	11.45
2000	323	11.66
1900	340	11.93
1800	376	12.26
1700	325	12.48
1600	286	12.54
1500	454	12.90
1400	369	12.80
1300	336	12.64
1200	202	11.98

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA030002	
Engine:	Perkins 404C-22	
Engine Rating:	51 HP @ 3000 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
3000	106	11.14
2900	116	-
2800	120	-
2700	121	-
2600	118	-
2500	119	-
2400	118	-
2300	120	-
2200	132	-
2100	138	-
2000	159	-
1900	212	-
1800	228	11.76
1700	259	-
1600	229	-
1500	205	-
1400	225	-

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA040002	
Engine:	Deutz BF4M 2012	
Engine Rating:	100 HP @ 2500 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1000	1380	12.2
1200	748	11.9
1400	276	11.2
1500	177	10.9
1600	126	10.5
1700	101	10.2
1900	89	9.7
2100	83	9.3
2300	80	8.9
2450	83	8.7
2500	87	8.6

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA040003	
Engine:	Deutz BF4M 2012C	
Engine Rating:	138 HP @ 2500 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1000	500	12.8
1400	195	11.1
1500	100	10.4
1600	74	9.9
1700	63	9.7
1900	60	9.4
2100	63	8.5
2300	68	7.9
2450	68	7.6
2500	69	7.4

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA040003	
Engine:	Deutz BF4M 2012C	
Engine Rating:	127 HP @ 2200 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1000	1800	12.2
1200	1363	12.6
1400	181	11.1
1500	103	10.4
1600	79	9.9
1800	66	8.9
2000	70	8.2
2200	75	7.7

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA040004	
Engine:	Deutz BF4M/L 2011	
Engine Rating:	87 HP @ 2800 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1000	526	11.51
1200	322	11.06
1400	246	11.53
1600	158	11
1800	151	10.49
2000	175	10.2
2200	144	9.65
2400	139	9.34
2600	129	8.98
2800	153	8.56

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA040005	
Engine:	Deutz BF6M 1013	
Engine Rating:	268 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1050	615	10.05
1300	112	9.38
1400	78	8.95
1500	69	8.74
1600	64	8.66
1800	98	8.45
2000	93	8.41
2200	106	8.38
2300	123	8.42

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA040007	
Engine:	Deutz BF4M 1013FC	
Engine Rating:	173 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1000	1491	11.7
1200	238	11.26
1400	166	10.41
1600	112	9.48
1800	116	9.17
2000	123	8.88
2100	120	8.57
2300	125	8.57

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA040008	
Engine:	Deutz BF6M 2012C	
Engine Ra	208 HP @ 2500 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1000	1810	13.14
1200	1231	12.46
1400	375	11.67
1600	140	10.9
1700	111	10.42
1900	82	9.8
2100	76	9.25
2300	83	8.89
2500	90	8.56

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA040009	
Engine:	Kubota V2203-E	
Engine Rating:	48.4 HP @ 2800 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
2800	143	10.8
2700	157	10.7
2600	150	10.7
2500	146	10.7
2400	143	10.7
2300	152	10.7
2200	156	10.9
2100	157	11
2000	192	11
1900	187	11.1
1800	234	11.4
1700	343	11.7

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA040010	
Engine:	Deutz F2M/L 2011	
Engine Rating:	31.5 HP @ 2800 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1000	782	10.9
1200	835	11.2
1400	923	11.8
1600	841	12.0
1670	844	12.1
1700	814	12.1
1730	758	12.0
1800	698	12.0
2000	697	11.9
2200	568	11.7
2400	485	11.5
2600	385	11.2
2750	396	11.2
2800	370	11.1

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA040011	
Engine:	Deutz F3M/L 2011	
Engine Rating:	49 HP @ 2800 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1000	782	10.9
1200	835	11.2
1400	923	11.8
1600	841	12.0
1670	844	12.1
1700	814	12.1
1730	758	12.0
1800	698	12.0
2000	697	11.9
2200	568	11.7
2400	485	11.5
2600	385	11.2
2750	396	11.2
2800	370	11.1

TORQUE CURVE TEST		
ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA040012	
Engine:	Deutz F4M/L 2011	
Engine Rating:	65 HP @ 2800 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1000	782	10.9
1200	835	11.2
1400	923	11.8
1600	841	12.0
1670	844	12.1
1700	814	12.1
1730	758	12.0
1800	698	12.0
2000	697	11.9
2200	568	11.7
2400	485	11.5
2600	385	11.2
2750	396	11.2
2800	370	11.1

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA040013	
Engine:	Mitsubishi S4Q2	
Engine Rating:	48.3 HP @ 2500 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1200	343	10.95
1300	294	11.04
1400	309	11.16
1500	276	11.22
1600	207	11.05
1700	178	10.93
1800	175	10.93
1900	187	10.91
2000	175	11.13
2100	221	11.39
2200	185	11.33
2300	171	11.39
2400	198	11.63
2500	201	11.73

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA040014	
Engine:	Deutz BF4M 1013(MVS)	
Engine Rating:	170 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1000	2047	11.62
1100	1012	11.36
1200	516	11.12
1300	100	10.6
1400	59	10.14
1500	43	9.78
1600	45	9.46
1700	48	9.22
1800	41	9.02
1900	36	8.72
2000	35	8.54
2100	33	8.34
2200	40	8.22
2300	42	8.22

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA040018	
Engine:	Deutz F6L 914	
Engine Rating:	117 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1000	208	10.4
1200	198	10.85
1300	243	11.4
1400	345	12.03
1500	485	12.64
1600	523	12.67
1700	525	12.55
1800	480	12.24
1900	493	11.82
2000	460	11.55
2100	443	11.32
2300	413	10.86

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA050001	
Engine:	Mitsubishi S4S-DT	
Engine Rating:	77 HP @ 2500 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1200	1075	8.43
1300	696	8.35
1400	533	8.39
1500	384	8.31
1600	226	8.09
1700	154	7.92
1800	130	7.73
1900	118	7.61
2000	109	7.33
2100	104	7.16
2200	110	7.01
2300	109	6.8
2400	110	6.61
2500	113	6.36

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA050002	
Engine:	Deutz BF6M1013FC (MVS)	
Engine Rating:	241 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1000	1184	11
1200	200	9.6
1370	52	8.5
1400	54	8.5
1430	55	8.4
1700	46	7.7
1900	52	7.6
2100	57	7.6
2270	64	7.7
2300	65	7.7

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA050003	
Engine:	Mitsubishi 3044C-T	
Engine Rating:	80.5 HP @ 2600 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1500	1681	10.5
1600	1262	10.4
1700	886	10.3
1800	533	10.1
1900	418	10
2000	339	9.8
2100	304	9.9
2200	256	9.7
2300	199	9.4
2400	176	9.3
2500	143	8.9
2600	126	8.6

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA050003	
Engine:	Mitsubishi 3044C-T	
Engine Rating:	71 HP @ 2600 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1500	1663	10.5
1600	1170	10.4
1700	712	10.1
1800	501	9.8
1900	387	9.7
2000	275	9.5
2100	206	9.3
2200	164	9
2300	145	8.7
2400	127	8.4
2500	119	8.1
2600	115	7.9

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA050004	
Engine:	Perkins 404C-22T	
Engine Rating:	61 HP @ 3000 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1400	147	-
1500	105	-
1600	121	-
1700	101	-
1800	94	11.2
1900	88	-
2000	81	-
2100	89	-
2200	96	-
2300	93	-
2400	95	-
2500	91	-
2600	93	-
2700	84	-
2800	75	-
2900	76	-
3000	98	10.1

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA050007	
Engine:	Deutz BF3M 2011	
Engine Rating:	65 HP @ 2800 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1000	517	11.6
1200	715	12.5
1400	295	11.7
1475	459	12.3
1500	346	12.1
1600	252	10.6
1700	231	10.7
1725	230	10.6
1900	172	10
2100	145	9.5
2300	135	9.2
2500	134	9
2750	169	8.7
2800	172	8.6

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA050007	
Engine:	Deutz BF3M 2011	
Engine Rating:	56.3 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1000	632	12
1200	655	12.2
1400	464	12.6
1475	461	12.7
1500	412	12.6
1600	297	11.5
1700	263	11.1
1725	250	11.1
1900	183	10.2
2250	143	9.7
2300	129	9.4

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA050008	
Engine:	Kubota V2203-M-DI-E2B	
Engine Rating:	48.8 HP @ 2800 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1700	656	12.2
1800	769	12.4
1900	1000	12.5
2000	960	12.6
2100	1257	12.8
2200	1451	12.8
2300	314	11.4
2400	559	11.7
2500	420	11.6
2600	403	11.4
2700	375	11.2
2800	397	11.1

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA060001	
Engine:	Kubota V2203-M-DI-TE2B	
Engine Rating:	59 HP @ 2800 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1700	221	10.8
1800	221	10.7
1900	201	10.6
2000	184	10.5
2100	198	10.5
2200	194	10.5
2300	212	10.5
2400	217	10.5
2500	220	10.4
2600	237	10.4
2700	244	10.3
2800	271	10.3

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA060002	
Engine:	Caterpillar 3126MUI	
Engine Rating:	230 HP @ 2600 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1950	299	8.99
2000	246	8.73
2100	183	8.31
2200	146	7.95
2300	122	7.66
2400	104	7.41
2500	95	7.19
2600	86	7

TORQUE CURVE TEST - ALL TESTS AT FULL THROTTLE		
MSHA # :	07-ENA060003	
Engine:	IVECO N45 MSS	
Engine Rating:	99 HP @ 2300 RPM	
Engine Speed, RPM	CO, ppm	CO2, %
1300	170	10.7
1400	139	10.3
1500	118	10
1600	108	9.6
1700	94	9.3
1800	88	9
1900	80	8.8
2000	74	8.6
2100	75	8.5
2200	83	8.4
2300	86	8.3