Technical File
For 3500 Marine Engines

(Engine Family 3500PA10001)

Engine Model	**3512**
Engine Serial No.	**MXN00208**
Performance Spec.	**4369345**
Family approval no.	**97436-10 HH**

This document meets the requirements of IMO NOx Technical Code Regulation 2.4.1. Caterpillar does not consent to the use of the information contained here to obtain additional or further IMO approvals (i.e. IMO Tier III), per guideline 3.1.2 of IMO Guidelines MEPC 198(62)

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3500 Engine Part Number Table*

Performance Specification		349-6321 4183022	349-6343 4182950 4182956	349-6344 4182951 4182957	0K7382 4182943	0K7399 4182946	0K7378 4182948	0K7395 4182958	0K7376 4182949	0K7393 4182959
Engine Ratings (Advertised)	rpm	1900	1900	1900	1900	1900	1900	1900	1900	1900
	BkW	1864	1678	1678	1864	1752	1678	1603	1678	1603
	bhp	*2500*	*2250*	*2250*	*2500*	*2349*	*2250*	*2150*	*2250*	*2150*
	Cycle	C1	C1	C1	C1	C1	C1	C1	C1	C1
Engine Ratings (Overload)	rpm	1900	1900	1900	1900	1900	1900	1900	1900	1900
NOTE: Applies to Marine	BkW	1864	1678	1678	1864	1752	1678	1603	1678	1603
Auxiliary Engines Only	*bhp*	*2500*	*2250*	*2250*	*2500*	*2349*	*2250*	*2150*	*2250*	*2150*
Engine Model	Part Number	3512	3512	3512	3512	3512	3512	3512	3512	3512
Compression Ratio		14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1
Static Timing[1]	Deg.	NA	NA	NA	NA	NA	NA	NA	NA	NA
Piston	Part Number	3393028 3485357 4925077 5788865	3393028 3485357 4925077 5788865	3393028 3485357 4925077 5788865	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865
Cylinder Head	Part Number	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351
Camshaft	Part Number	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354	2835731 2835733 2835735 2835737	2835731 2835733 2835735 2835737	2835731 2835733 2835735 2835737	2835731 2835733 2835735 2835737	2835731 2835733 2835735 2835737	2835731 2835733 2835735 2835737
Aftercooler	Part Number	3424864 3363803	3424864 3363803	3424864 3363803	NA*	NA*	NA*	NA*	NA*	NA*
Turbocharger Basic Group	Part Number	3016873 5905667	3016873 5905667	3016873 5905667	2877215	2877215	2877215	2877215	3016873 5905667	3016873 5905667
Injector	Part Number	2800681 3861777 3920225	2501305 3861757 3920205	2501305 3861757 3920205	2481079 3861768 3920216	2481079 3861768 3920216	2481079 3861768 3920216	2481079 3861768 3920216	2481079 3861768 3920216	2481079 3861768 3920216
Personality Module Software	Part Number	3502971 3810361	3502971 3607466 3810362 4508279 4639194 5703284 5818799	3502971 3607466 3810362 4508279 4639194 5703284 5818799	2686340 2712048 3105964 3286951 3529326 3818952 4152400 4215597 4624048 5703283 5818798	2686340 2712048 3105964 3286951 3529326 3818952 4152400 4215597 4624048 5703283 5818798	2843092 2844807 2949325 3105962 3286950 3529325 3818953 4152421 4213142	2843092 2844807 2949325 3105962 3286950 3529325 3818953 4152421 4213142	2843091 2844806 2949599 3042340 3105961 3286949 3529324 3687620	2843091 2844806 2949599 3042340 3105961 3286949 3529324 3687620

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3500 Engine Part Number Table*

Performance Specification		0K7380 4182945	0K7397 4182947	0K6381 4182954	0K7377 4182952	0K7392 4182961	0K7394 4182960	0K7381	0K7398
Engine Ratings (Advertised)	rpm	1900	1900	1900	1900	1900	1900	1900	1900
	BkW	1864	1752	1678	1678	1603	1603	1864	1752
	bhp	*2500*	*2349*	*2250*	*2250*	*2150*	*2150*	*2500*	*2349*
	Cycle	C1	C1	C1	C1	C1	C1	C1	C1
Engine Ratings (Overload)	rpm	1900	1900	1900	1900	1900	1900	1900	1900
NOTE: Applies to Marine	BkW	1864	1752	1678	1678	1603	1603	1864	1752
Auxiliary Engines Only	*bhp*	*2500*	*2349*	*2250*	*2250*	*2150*	*2150*	*2500*	*2349*
Engine Model	Part Number	3512	3512	3512	3512	3512	3512	3512	3512
Compression Ratio		14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1
Static Timing[1]	Deg.	NA	NA	NA	NA	NA	NA	NA	NA
Piston	Part Number	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865
Cylinder Head	Part Number	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351
Camshaft	Part Number	2835731 2835733 2835735 2835737	2835731 2835733 2835735 2835737	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835731 2835733 2835735 2835737	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835731 2835733 2835735 2835737	2835731 2835733 2835735 2835737	2835731 2835733 2835735 2835737
Aftercooler	Part Number	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*
Turbocharger Basic Group	Part Number	3016873 5905667	2877215	3016873 5905667	3016873 5905667	2877215	2877215	2877215	2877215

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Injector	**Part Number**	2481079 3861768 3920216	2481079 3861768 3920216	2481079 3861768 3920216	2481079 3861768 3920216	2481079 3861768 3920216	2481079 3861768 3920216	2481079 3861768 3920216	2481079 3861768 3920216
Personality Module Software	**Part Number**	2686340 2712048 3105964 3286951 3529326 3818952 4152400 4215597 4624048 5703283 5818798	2686340 2712048 3105964 3286951 3529326 3818952 4152400 4215597 4624048 5703283 5818798	2843092 2844807 2949325 3105962 3286950 3529325 3818953 4152421 4213142	2843091 2844806 2949599 3042340 3105961 3286949 3529324 3687620	2843092 2844807 2949325 3105962 3286950 3529325 3818953 4152421 4213142	2843091 2844806 2949599 3042340 3105961 3286949 3529324 3687620	2686340 2712048 3105964 3286951 3529326 3818952 4152400 4215597 4624048 5703283 5818798	2686340 2712048 3105964 3286951 3529326 3818952 4152400 4215597 4624048 5703283 5818798

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Performance Specification		**0K7379**	**0K7023**	**0K7396**	**0K7391**	**0K7405 4485822 4486039 4576946**	**0K7850 4369587 4485934**	**0K8054 4369342 4576951 4485993**	**0K8055 4369341 4576955 4485992**
Engine Ratings (Advertised)	**rpm**	1900	1900	1900	1900	1200	1800	1800	1800
	BkW	1678	1678	1603	1603	1101	2225	1628	1785
	bhp	*2250*	*2250*	*2150*	*2150*	*1476*	*2984*	*2183*	*2394*
	Cycle	C1	C1	C1	C1	D2 E2	D2 E2	D2 E2	D2 E2
Engine Ratings (Overload)	**rpm**	1900	1900	1900	1900	1200	1800	1800	1800
NOTE: Applies to Marine	**BkW**	1678	1678	1603	1603	1235	2450	1825	2000
Auxiliary Engines Only	***bhp***	*2250*	*2250*	*2150*	*2150*	*1656*	*3285*	*2447*	*2682*
Engine Model	**Part Number**	3512	3512	3512	3512	3512	3516	3512	3512
Compression Ratio		14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1
Static Timing[1]	**Deg.**	NA	NA	NA	NA	NA	NA	NA	NA
Piston	**Part Number**	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865	2816140 3145006 3742082	2796770 2935428 3393028 3485357 4925077 5788865	2796770 2935428 3393028 3485357 4925077 5788865	2796770 2935428 3393028 3485357 4925077 5788865
Cylinder Head	**Part Number**	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351

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Camshaft	**Part Number**	2835731 2835733 2835735 2835737	2835731 2835733 2835735 2835737	2835731 2835733 2835735 2835737	2835731 2835733 2835735 2835737	2837631 2837633 2837635 2837637	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354
Aftercooler	**Part Number**	NA*	NA*	NA*	NA*	2454622	2454621	2454622	2454622
Turbocharger Basic Group	**Part Number**	3016873 5905667	2963616	2877215	2877215	2506110 4463318	3284277 4682952 5288355	3043748 3284268 4682947 5198017 3219033 3809763 4682949 5288347	3043748 3284268 4682947 5198017 3219033 3809763 4682949 5288347
Injector	**Part Number**	2481079 3861768 3920216	2481079 3861768 3920216	2481079 3861768 3920216	2481079 3861768 3920216	2461854 3861771 3920219	2501368 3760511 3920221	2501368 3760511 3920221	2501368 3760511 3920221
Personality Module Software	**Part Number**	2843092 2844807 2949325 3105962 3286950 3529325 3818953 4152421 4213142	2843091 2844806 2949599 3042340 3105961 3286949 3529324 3687620	2843092 2844807 2949325 3105962 3286950 3529325 3818953 4152421 4213142	2843091 2844806 2949599 3042340 3105961 3286949 3529324 3687620	3471251 3555370 4228050 4358655 4553580 5990089	3203324 3489873 3505880 3623092 4450295 5242885	3035955 3175988 3420501 3919018 4515848 5242884 6058666	3035955 3175988 3420501 3919018 4515848 5242884 6058666

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Performance Specification		0K8124* 4486030* 4576963*	0K8125* 3704933* 4183028* 4486032*	0K8381 4369589 4485937	0K8382	0K8383 4369586 4485933	0K8384 4369588 4485936	0K8539 4182919 4369343 4485994	0K8554 4182918 4369344 4485995
Engine Ratings (Advertised)	rpm	1200	1200	1800	1800	1800	1800	1800	1800
	BkW	1603	1383	2350	2200	2350	2095	1790	1630
	bhp	*2150*	*1855*	*3151*	*2950*	*3151*	*2809*	*2400*	*2186*
	Cycle	D2 E2	D2 E2	D2 E2	D2 E2	D2 E2	D2 E2	D2 E2	D2 E2
Engine Ratings (Overload)	rpm	1200	1200	1800	1800	1800	1800	1800	1800
NOTE: Applies to Marine	BkW	1800	1553	2585	2420	2585	2305	2000	1825
Auxiliary Engines Only	*bhp*	*2414*	*2083*	*3467*	*3245*	*3467*	*3091*	*2682*	*2447*
Engine Model	Part Number	3516	3516	3516	3516	3516	3516	3512	3512
Compression Ratio		14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1
Static Timing[1]	Deg.	NA	NA	NA	NA	NA	NA	NA	NA
Piston	Part Number	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865	2796770 2935428 3393028 3485357 4925077 5788865	2796770 2935428 3393028 3485357 4925077 5788865	2796770 2935428 3393028 3485357 4925077 5788865	2796770 2935428 3393028 3485357 4925077 5788865	2796770 2935428 3393028 3485357 4925077 5788865	2796770 2935428 3393028 3485357 4925077 5788865
Cylinder Head	Part Number	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351
Camshaft	Part Number	2853777 2853779 2853781 2853783	2853777 2853779 2853781 2853783	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354
Aftercooler	Part Number	2454621	2454621	2454621	2454621	2454621	2454621	2454622	2454622
Turbocharger Basic Group	Part Number	3069393	3069393	3048650 3284277 4682952 5288355	2908066 3284277 4682952 5288355	3284277 4682952 5288355	3284277 4682952 5288355	3370758 4682944 5288341	3370758 4682944 5288341

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Injector	Part Number	2693152 3861774 3920222	2693152 3861774 3920222	2501368 3760511 3920221	2501368 3760511 3920221	2501368 3760511 3920221	2501368 3760511 3920221	2501368 3760511 3920221	2501368 3760511 3920221
Personality Module Software	Part Number	3002970 3142913 3450830 3510092 3985089 4432159 4880749	3002970 3142913 3450830 3510092 3985089 4432159 4880749	3035957 3489872 4512433	3035957 3489872 4512433	3203324 3489873 3505880 3623092 4450295 5242885	3203324 3489873 3505880 3623092 4450295 5242885	3228545 3489871 4515847	3228545 3489871 4515847

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Performance Specification		0K9236 4369345 4485996	0K9237 4369346 4485997	0K8000 0K8001 349-6305 4369349 4369352 4486000 4486004	0K8002 0K8003 349-6306 4369348 4369351 4485999 4486003	0K8004 0K8005 349-6307 4369347 4369350 4485998 4486001	0K8006 0K8007 349-6302 4369356 4369359 4486007 4486010	0K8008 0K8009 349-6303 4369355 4369358 4486006 4486009	0K8010 0K8011 349-6304 4369353 4369357 4486005 4486008
Engine Ratings (Advertised)	rpm	1800	1800	1200	1200	1200	1600	1600	1600
	BkW	1432	1432	578	634	671	746	783	820
	bhp	*1920*	*1920*	*775*	*850*	*900*	*1000*	*1050*	*1100*
	Cycle	D2 E2	D2 E2	E2 E3	E2 E3	E2 E3	E2 E3	E2 E3	E2 E3
Engine Ratings (Overload)	rpm	1800	1800	1200	1200	1200	1600	1600	1600
NOTE: Applies to Marine	BkW	1603	1603	578	634	671	746	783	820
Auxiliary Engines Only	*bhp*	*2150*	*2150*	*775*	*850*	*900*	*1000*	*1050*	*1100*
Engine Model	Part Number	3512	3512	3508	3508	3508	3508	3508	3508
Compression Ratio		14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1
Static Timing[1]	Deg.	NA	NA	NA	NA	NA	NA	NA	NA
Piston	Part Number	2816140 3145006 3742082 5607760	2816140 3145006 3742082 5607760	3145007 3145006 3485356 3742082 3742083 5607760	3145007 3145006 3485356 3742082 3742083 5607760	3145007 3145006 3485356 3742082 3742083 5607760	2816140 3145006 3742082 5607760	2816140 3145006 3742082 5607760	2816140 3145006 3742082 5607760
Cylinder Head	Part Number	1011176 2901351	1011176 2901351	2901351	2901351	2901351	1541612 2901351	2901351	2901351
Camshaft	Part Number	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354	2837624 2837622 2627582 2627581	2837624 2837622 2627582 2627581	2837624 2837622 2627582 2627581	1275402 1275403	1275402 1275403	1275402 1275403
Aftercooler	Part Number	2454622	2454622	2831001	2831001	2831001	2831001	2831001	2831001
Turbocharger Basic Group	Part Number	3226291 3435687 5289753 3435684 3523459 5198019 3551661 5288388	3226291 3435687 5289753 3435684 3523459 5198019 3551661 5288388	2768961	2768961	2768961	2949323 3048354 3523459 5905663	2949323 3048354 3523459 5905663	2949323 3048354 3523459 5905663

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Injector	**Part Number**	2664387 3861772 3920220	2664387 3861772 3920220	2776572 3861776 3920224	2776572 3861776 3920224	2776572 3861776 3920224	2664387 3861772 3920220	2664387 3861772 3920220	2664387 3861772 3920220
Personality Module Software	**Part Number**	3246638 3477340 4230253 4591590 5075127 5129902	3570837 4596429	2921900 3112135 3129034 4169989 4326887 4870425	2921900 3112135 3129034 4169989 4326887 4870425	2921900 3112135 3129034 4169989 4326887 4870425	2921902 3129036 3677573 4326851 4870415	2921902 3129036 3677573 4326851 4870415	2921902 3129036 3677573 4326851 4870415

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3500 Engine Part Number Table*

Performance Specification		0K8018 0K8019 4369620 4369623 4485960 4485963	0K8020 0K8021 4369619 4369622 4485959 4485962	0K8022 0K8023 4369618 4369621 4485958 4485961	0K8024 0K8025 4369613 4369616 4485954 4485957	0K8026 0K8027 4369612 4369615 4485953 4485956	0K8028 0K8029 4369611 4369614 4485952 4485955	0K8030 0K8031 4369601 4369604 4485940 4485944	0K8032 0K8033 4369599 4369603 4485939 4485943
Engine Ratings (Advertised)	rpm	1600	1600	1600	1800	1800	1800	1800	1800
	BkW	1350	1425	1500	1118.5	1174.5	1230.5	1678	1764
	bhp	*1810*	*1911*	*2012*	*1500*	*1575*	*1650*	*2250*	*2366*
	Cycle	E2 E3	E2 E3	E2 E3	E2 E3	E2 E3	E2 E3	E2 E3	E2 E3
Engine Ratings (Overload)	rpm	1600	1600	1600	1800	1800	1800	1800	1800
NOTE: Applies to Marine	BkW	1350	1425	1500	1118.5	1174.5	1230.5	1678	1764
Auxiliary Engines Only	*bhp*	*1810*	*1911*	*2012*	*1500*	*1575*	*1650*	*2250*	*2366*
Engine Model	Part Number	3512	3512	3512	3512	3512	3512	3512	3512
Compression Ratio		14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1
Static Timing[1]	Deg.	NA	NA	NA	NA	NA	NA	NA	NA
Piston	Part Number	2494512 2495496 2830245 3393027 4925077 5788865	2494512 2495496 2830245 3393027 4925077 5788865	2494512 2495496 2830245 3393027 4925077 5788865	2816140 3145006 3742082 5607760	2816140 3145006 3742082 5607760	2816140 3145006 3742082 5607760	2935428 3393028 3485357 4925077 5788865	2935428 3393028 3485357 4925077 5788865
Cylinder Head	Part Number	2901351	2901351	2901351	2901351	2901351	2901351	2901351	2901351
Camshaft	Part Number	2835731 2835733 2835735 2835737 3085352 3085354	2835731 2835733 2835735 2835737 3085352 3085354	2835731 2835733 2835735 2835737 3085352 3085354	2835731 2835733 2835735 2835737 3085352 3085354	2835731 2835733 2835735 2835737 3085352 3085354	2835731 2835733 2835735 2835737 3085352 3085354	2835731 2835733 2835735 2835737 3085352 3085354	2835731 2835733 2835735 2835737 3085352 3085354
Aftercooler	Part Number	2454622	2454622	2454622	2454622	2454622	2454622	2454622	2454622
Turbocharger Basic Group	Part Number	2906654 3043746 3043747 3435687 5289753 3435684 3523459	2906654 3043746 3043747 3435687 5289753 3435684 3523459	2906654 3043746 3043747 3435687 5289753 3435684 3523459	2831705 3048647 3114643 3435687 5289753 3435684 3523459 5198019	2831705 3048647 3114643 3435687 5289753 3435684 3523459 5198019	2831705 3048647 3114643 3435687 5289753 3435684 3523459 5198019	2906655 3036266 3284258 4682943 5198013	2906655 3036266 3284258 4682943 5198013

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Injector	**Part Number**	2501305 3861757 3920205	2501305 3861757 3920205	2501305 3861757 3920205	2664387 3861772 3920220	2664387 3861772 3920220	2664387 3861772 3920220	2481079 3861768 3920216	2481079 3861768 3920216
Personality Module Software	**Part Number**	2921908 3129040 3677569 4326847 4931967	2921908 3129040 3677569 4326847 4931967	2921908 3129040 3677569 4326847 4931967	2921904 3165736 3677585 4326863 4870423	2921904 3165736 3677585 4326863 4870423	2921904 3165736 3677585 4326863 4870423	2921910 3129042 3677571 4326849 4870413 5936585	2921910 3129042 3677571 4326849 4870413 5936585

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3500 Engine Part Number Table*

Performance Specification		0K8034 0K8035 4369598 4369602 4485938 4485941	0K8036 0K8037 4369579 4369576 4485923 4485926	0K8038 0K8039 4369575 4369578 4485921 4485925	0K8040 0K8041 4369574 4369577 4485920 4485924	0K8042 0K8043 4369590 4369593 4485905 4485908	0K8044 0K8045 4369567 4369592 4485904 4485907	0K8046 0K8047 4369566 4369591 4485903 4485906 4486013 4486167	0K8048 0K8049 4369582 4369585 4485929 4485932
Engine Ratings (Advertised)	rpm	1800	1600	1600	1600	1600	1600	1600	1800
	BkW	1902	1491.5	1566	1641	1825	1920	2000	2240
	bhp	*2551*	*2000*	*2100*	*2201*	*2447*	*2575*	*2682*	*3004*
	Cycle	E2 E3	E2 E3	E2 E3	E2 E3	E2 E3	E2 E3	E2 E3	E2 E3
Engine Ratings (Overload)	rpm	1800	1600	1600	1600	1600	1600	1600	1800
NOTE: Applies to Marine	BkW	1902	1491.5	1566	1641	1825	1920	2000	2240
Auxiliary Engines Only	*bhp*	*2551*	*2000*	*2100*	*2201*	*2447*	*2575*	*2682*	*3004*
Engine Model	Part Number	3512	3516	3516	3516	3516	3516	3516	3516
Compression Ratio		14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1
Static Timing[1]	Deg.	NA	NA	NA	NA	NA	NA	NA	NA
Piston	Part Number	2935428 3393028 3485357 4925077 5788865	2816140 3145006 3742082 5607760	2816140 3145006 3742082 5607760	2816140 3145006 3742082 5607760	2494512 2495496 2830245 3393027 4925077 5788865	2494512 2495496 2830245 3393027 4925077 5788865	2494512 2495496 2830245 3393027 4925077 5788865	2935428 3393028 3485357 4925077 5788865
Cylinder Head	Part Number	2901351	1541612 2901351	1541612 2901351	1541612 2901351	1541612 2901351	1541612 2901351	1541612 2901351	2901351
Camshaft	Part Number	2835731 2835733 2835735 2835737 3085352 3085354	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884
Aftercooler	Part Number	2454622	2454621	2454621	2454621	2454621	2454621	2454621	2454621
Turbocharger Basic Group	Part Number	2906655 3036266 3284258 4682943 5198013	2906654 3043746 3043747 3435687 5289753	2906654 3043746 3043747 3435687 5289753	2906654 3043746 3043747 3435687 5289753	2766428 2906656 3043748 3284268 4682947 5198017	2766428 2906656 3043748 3284268 4682947 5198017	2766428 2906656 3043748 3284268 4682947 5198017	2820057 3048646 3284273 4682953 5198015

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Injector	**Part Number**	2481079 3861768 3920216	2664387 3861772 3920220	2664387 3861772 3920220	2664387 3861772 3920220	2501305 3861757 3920205	2501305 3861757 3920205	2501305 3861757 3920205	2481079 3861768 3920216
Personality Module Software	**Part Number**	2921910 3129042 3677571 4326849 4870413 5936585	2921912 3129044 3563953 4169974 4326873 4656869	2921912 3129044 3563953 4169974 4326873 4656869	2921912 3129044 3563953 4169974 4326873 4656869	2921914 3129046 3571026 3677575 4326853 4870417	2921914 3129046 3571026 3677575 4326853 4870417	2921914 3129046 3571026 3677575 4326853 4870417	2921916 3129048 3677579 4326857 4870419

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3500 Engine Part Number Table*

Performance Specification		0K8050 0K8051 4369581 4369584 4485928 4485931	0K8052†† 0K8053†† 4369580†† 4369583†† 4485927†† 4485930††	0K9216 0K9217 4369634 4369639 4485973 4485976	0K9218 0K9219 4369633 4369638 4485972 4485975	0K9220 0K9221 4369632 4369637 4485971 4485974	0K9238 0K9239 4369562 4369565 4485899 4485902	0K9240 0K9241 4369561 4369564 4485897 4485901	0K9242 0K9243 4369560 4369563 4485896 4485900
Engine Ratings (Advertised)	rpm	1800	1800	1600	1600	1600	1200	1200	1200
	BkW	2350	2525	1044	1118.5	1193	1230.5	1305	1380
	bhp	*3151*	*3386*	*1400*	*1500*	*1600*	*1650*	*1750*	*1851*
	Cycle	E2 E3	E2 E3	E2 E3	E2 E3	E2 E3	E2 E3	E2 E3	E2 E3
Engine Ratings (Overload)	rpm	1800	1800	1600	1600	1600	1200	1200	1200
NOTE: Applies to Marine	BkW	2350	2525	1044	1118.5	1193	1230.5	1305	1380
Auxiliary Engines Only	*bhp*	*3151*	*3386*	*1400*	*1500*	*1600*	*1650*	*1750*	*1851*
Engine Model	Part Number	3516	3516	3512	3512	3512	3516	3516	3516
Compression Ratio		14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1
Static Timing[1]	Deg.	NA	NA	NA	NA	NA	NA	NA	NA
Piston	Part Number	2935428 3393028 3485357 4925077 5788865	2935428 3393028 3485357 4925077 5788865	3145006 3742082 5607760	3145006 3742082 5607760	3145006 3742082 5607760	2851993 3145007 3145006 3485356 3742083 5607761	2851993 3145007 3145006 3485356 3742083 5607761	2851993 3145007 3145006 3485356 3742083 5607761
Cylinder Head	Part Number	2901351	2901351	1011176 2901351	1011176 2901351	1011176 2901351	2901351	2901351	2901351
Camshaft	Part Number	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354	2853777 2853779 2853781 2853783	2853777 2853779 2853781 2853783	2853777 2853779 2853781 2853783
Aftercooler	Part Number	2454621	2454621	2454622	2454622	2454622	2454621	2454621	2454621
Turbocharger Basic Group	Part Number	2820057 3048646 3284273 4682953 5198015	2820057 3048646 3284273 4682953 5198015	3435684 3523459 5198019 3219028 3435682 5288390	3435684 3523459 5198019 3219028 3435682 5288390	3435684 3523459 5198019 3219028 3435682 5288390	3226291 3435687 5289753 3435682 5288390	3226291 3435687 5289753 3435682 5288390	3226291 3435687 5289753 3435682 5288390

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Injector	**Part Number**	2481079 3861768 3920216	2481079 3861768 3920216	2664387 3861772 3920220	2664387 3861772 3920220	2664387 3861772 3920220	2664387 2776572 3861776 3920224	2664387 2776572 3861776 3920224	2664387 2776572 3861776 3920224
Personality Module Software	**Part Number**	2921916 3129048 3677579 4326857 4870419	2921916 3129048 3677579 4326857 4870419	3246603 3477341 4169966 4326865 4656861	3246603 3477341 4169966 4326865 4656861	3246603 3477341 4169966 4326865 4656861	3642501 4169976 4326875 4656871	3642501 4169976 4326875 4656871	3642501 4169976 4326875 4656871

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3500 Engine Part Number Table*

Performance Specification		0K9255 0K9256 4369333 4369340 4485987 4485991	0K9257 0K9258 4369332 4369338 4485986 4485990	0K9259 0K9260 4369331 4369335 4485985 4485989	0K9281 0K9282 4369607 4369610 4485948 4485951	0K9283 0K9284 4369606 4369609 4485947 4485950	0K9285 0K9286 4369605 4369608 4485946 4485949	3496298 3496299 4369572 4369573 4485918 4485919	3496362 3704757 4369596 4369570 4485910 4485916	3496368 3704756 4369594 4369569 4485909 4485915	3496367 3704735 4369624 4369628 4485964 4485967
Engine Ratings (Advertised)	rpm	1200	1200	1200	1200	1200	1200	1600	1600	1600	1600
	BkW	969.5	1044	1118.5	1118.5	1193	1268	2100	1771	1864	1380
	bhp	*1300*	*1400*	*1500*	*1500*	*1600*	*1700*	*2816*	*2375*	*2500*	*1851*
	Cycle	E2 E3	E2 E3	E2 E3	E2 E3	E2 E3	E2 E3	E2 E3	E2 E3	E2 E3	E2 E3
Engine Ratings (Overload)	rpm	1200	1200	1200	1200	1200	1200	1600	1600	1600	1600
NOTE: Applies to Marine	BkW	969.5	1044	1118.5	1118.5	1193	1268	2100	1771	1864	1380
Auxiliary Engines Only	*bhp*	*1300*	*1400*	*1500*	*1500*	*1600*	*1700*	*2816*	*2375*	*2500*	*1851*
Engine Model	Part Number	3512	3512	3512	3512	3512	3512	3516	3516	3516	3512
Compression Ratio		14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1
Static Timing[1]	Deg.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Piston	Part Number	2816140 3145006 3742082 5607760	2816140 3145006 3742082 5607760	2816140 3145006 3742082 5607760	2830245 3393027 4925077 5788865	2830245 3393027 4925077 5788865	2830245 3393027 4925077 5788865	2796770 2935428 2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865
Cylinder Head	Part Number	2901351	2901351	2901351	2901351	2901351	2901351	2901351	2901351	2901351	2901351
Camshaft	Part Number	2837631 2837637 3085347 3085350	2837631 2837637 3085347 3085350	2837631 2837637 3085347 3085350	2837631 2837637 3085347 3085350	2837631 2837637 3085347 3085350	2837631 2837637 3085347 3085350	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835731 2835737 3085352 3085354
Aftercooler	Part Number	2454622	2454622	2454622	2454622	2454622	2454622	2454621	2454621	2454621	2454622
Turbocharger Basic Group	Part Number	3226288 3435684 3523459 5198019 3277739 5288383	3226288 3435684 3523459 5198019 3277739 5288383	3226288 3435684 3523459 5198019 3277739 5288383	3277738 5134709	3277738 5134709	3277738 5134709	3043748 3284268 4682947 5198017	3284268 4682947 5198017	3284268 4682947 5198017	3435687 5289753

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Injector	Part Number	2693152 3861774 3920222	2693152 3861774 3920222	2693152 3861774 3920222	2693152 3861774 3920222	2693152 3861774 3920222	2693152 3861774 3920222	2501305 3861757 3920205	2501305 3861757 3920205	2501305 3861757 3920205	2501305 3861757 3920205
Personality Module Software	Part Number	2921904 3129038 3165736 3246600 3552699 3677581 4326859 4870421	2921904 3129038 3165736 3246600 3552699 3677581 4326859 4870421	2921904 3129038 3165736 3246600 3552699 3677581 4326859 4870421	2921906 2921907 4169997 4326895 4870427	2921906 2921907 4169997 4326895 4870427	2921906 2921907 4169997 4326895 4870427	3129046 3129047 3540194 4170046 4326941 4870429	3657836 4170050 4326945 4870433	3657836 4170050 4326945 4870433	3656714 4170048 4326943 4870431 5158481

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3500 Engine Part Number Table*

Performance Specification		3496392	3496393 3704733 4369627 4369631 4485966 4485969	3496394 3704734 4369625 4369629 4485965 4485968	0K9214	0K9244 0K9245	3704748 3704749 4369642 4369643 4369330 4485981 4485984	3704750 3704752 4369641 4369645 4485978 4485983	3704753 3704754 4369640 4369644 4485977 4485982	3704730 4576997	3704731 3704732 4576978 4576979
Engine Ratings (Advertised)	rpm	1600	1600	1600	1200	1800	1600	1600	1600	1900	1900
	BkW	1771	1250	1305	682	2525	955	1014	1051	1864	1678
	bhp	*2375*	*1676*	*1750*	*915*	*3386*	*1281*	*1360*	*1409*	*2500*	*2250*
	Cycle	E2 E3	E2 E3	E2 E3	D2	E3	E2 E3	E2 E3	E2 E3	C1	C1
Engine Ratings (Overload)	rpm	1600	1600	1600	1200	1800	1600	1600	1600	1900	1900
NOTE: Applies to Marine	BkW	1771	1250	1305	682	2525	955	1014	1051	1864	1678
Auxiliary Engines Only	*bhp*	*2375*	*1676*	*1750*	*915*	*3386*	*1281*	*1360*	*1409*	*2500*	*2250*
Engine Model	Part Number	3516	3512	3512	3508	3516	3512	3512	3512	3512	3512
Compression Ratio		14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1
Static Timing[1]	Deg.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Piston	Part Number	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865	3145006 3742082	2935428 3393028 3485357 4925077 5788865	3145006 3742082 5607760	3145006 3742082 5607760	3145006 3742082 5607760	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865
Cylinder Head	Part Number	2901351	2901351	2901351	2901351	2901351	2901351	2901351	2901351	2901351	2901351
Camshaft	Part Number	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354	2837622 2837624	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354
Aftercooler	Part Number	2454621	2454622	2454622	2831001	2454621	2454622	2454622	2454622	3363803	3363803
Turbocharger Basic Group	Part Number	3284268 4682947	3435687 5289753	3435687 5289753	2588011	3284273 4682953 5198015	3435682 5288390	3435682 5288390	3435682 5288390	3016873 5905667	3016873 5905667

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Injector	Part Number	2501305 3861757 3920205	2501305 3861757 3920205	2501305 3861757 3920205	2461854 3861771 3920219	2481079 3861768 3920216	2664387 3861772 3920220	2664387 3861772 3920220	2664387 3861772 3920220	2800681 3861777 3920225	3861757 3920205
Personality Module Software	Part Number	3657836 4170050 4326945 4870433	2921908 3129040 3677569 4326847 4931967 3656714 4170048 4326943 4870431 5158481	2921908 3129040 3677569 4326847 4931967 3656714 4170048 4326943 4870431 5158481	2662983 2876074 3450831 3510093 4432157 5594497 5990097	2921916 3112139 3129048 3677579 4326857 4870419	3656702 4617887 4870441	3656702 4617887 4870441	3656702 4617887 4870441	3502971 3636667 3810361 4624046 4640955 5703285 5818800	3607466 3810362 4508279 4639194 5703284 5818799

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3500 Engine Part Number Table*

Performance Specification		0K5486 3704929 4182942 4576961	3704887†	3704886†	3704885†	3704851	3704850	3704849	3704809	3704807	3704808
Engine Ratings (Advertised)	rpm	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
	BkW	1901	2368	2211	1921	2368	2211	1921	2525	2240	2350
	bhp	*2549*	*3176*	*2965*	*2576*	*3176*	*2965*	*2576*	*3386*	*3004*	*3151*
	Cycle	D2	D2	D2	D2	E2	E2	E2	E3	E3	E3
Engine Ratings (Overload)	rpm	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
NOTE: Applies to Marine	BkW	2091	2652	2476	2152	2652	2476	2152	2525	2240	2350
Auxiliary Engines Only	*bhp*	*2804*	*3556*	*3320*	*2886*	*3556*	*3320*	*2886*	*3386*	*3004*	*3151*
Engine Model	Part Number	3516	3516	3516	3516	3516	3516	3516	3516	3516	3516
Compression Ratio		14.0:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1
Static Timing[1]	Deg.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Piston	Part Number	1440720 2332431 2780247 2995204	3691284 3768090 4861270 5789832	3691284 3768090 4861270 5789832	3691284 3768090 4861270 5789832	3768090 5140433 5789207	3768090 5140433 5789207	3768090 5140433 5789207	3768090 5140433 5789207	3768090 5140433 5789207	3768090 5140433 5789207
Cylinder Head	Part Number	1011176 1541612 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351
Camshaft	Part Number	1278256 1278257 1278258 1278259	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884
Aftercooler	Part Number	1115059	3363804	3363804	3363804	3363804	3363804	3363804	3363804	3363804	3363804
Turbocharger Basic Group	Part Number	4P2582	3686434 4682958 5288359 3643727 4682954 5288358	3686434 4682958 5288359 3643727 4682954 5288358	3686434 4682958 5288359 3643727 4682954 5288358	3686434 4682958 5288359 3643727 4682954 5288358	3686434 4682958 5288359 3643727 4682954 5288358	3686434 4682958 5288359 3643727 4682954 5288358	3686434 4682958 5288359	3686434 4682958 5288359	3686434 4682958 5288359

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Injector	**Part Number**	1504456 2290193 2309457 2501314 3861769 3920217	3657436 3657433	3657436 3657433	3657436 3657433	3657436	3657436	3657436	3657436	3657436	3657436
Personality Module Software	**Part Number**	2319964 2548119 2603784 2739051 3050825 3165269 3440310 3637541 4579040	3862991 4171593 4199373 4830421 5655051	3862991 4171593 4199373 4830421 5655051	3862991 4171593 4199373 4830421 5655051	3862993 3961673 3997912 4171594 4199374 4432012 4516171 4830422 5655052	3862993 3961673 3997912 4171594 4199374 4432012 4516171 4830422 5655052	3862993 3961673 3997912 4171594 4199374 4432012 4516171 4830422 5655052	3848452 4162504 4199372 4830420 5655050	3848452 4162504 4199372 4830420 5655050	3848452 4162504 4199372 4830420 5655050

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3500 Engine Part Number Table*

Performance Specification		3496411	3704811	3704810	3704817	3704816	3704815	3704814	3496417	3704803	3704736
Engine Ratings (Advertised)	rpm	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
	BkW	1500	1425	1350	1230	1175	1120	1000	1995	1920	1825
	bhp	*2012*	*1911*	*1810*	*1649*	*1576*	*1502*	*1341*	*2675*	*2575*	*2447*
	Cycle	E3	E3	E3	E3	E3	E3	E3	E3	E3	E3
Engine Ratings (Overload)	rpm	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
NOTE: Applies to Marine	BkW	1500	1425	1350	1230	1175	1120	1000	1995	1920	1825
Auxiliary Engines Only	*bhp*	*2012*	*1911*	*1810*	*1649*	*1576*	*1502*	*1341*	*2675*	*2575*	*2447*
Engine Model	Part Number	3512	3512	3512	3512	3512	3512	3512	3516	3516	3516
Compression Ratio		14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1
Static Timing[1]	Deg.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Piston	Part Number	3768090 5140433 5789207	3768090 5140433 5789207	3768090 5140433 5789207	3768090 5140433 5789207	3768090 5140433 5789207	3768090 5140433 5789207	3768090 5140433 5789207	3768090 5140433 5789207	3768090 5140433 5789207	3768090 5140433 5789207
Cylinder Head	Part Number	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351
Camshaft	Part Number	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884
Aftercooler	Part Number	3363803	3363803	3363803	3363803	3363803	3363803	3363803	3363804	3363804	3363804
Turbocharger Basic Group	Part Number	3435684 5198010	3435684 5198010	3435684 5198010	3435684 5198010	3435684 5198010	3435684 5198010	3435684 5198010	3219033 3643722 4682948 5288351	3219033 3643722 4682948 5288351	3219033 3643722 4682948 5288351
Injector	Part Number	3754106	3754106	3754106	3754106	3754106	3754106	3754106	3595469	3595469	3595469
Personality Module Software	Part Number	3704535 4162500 4199365 4830413 5332820 5655041 5972956	3704535 4162500 4199365 4830413 5332820 5655041 5972956	3704535 4162500 4199365 4830413 5332820 5655041 5972956	3862983 4162499 4199363 4830412 5655040	3862983 4162499 4199363 4830412 5655040	3862983 4162499 4199363 4830412 5655040	3862983 4162499 4199363 4830412 5655040	3704539 4162503 4199371 4830419 5655049	3704539 4162503 4199371 4830419 5655049	3704539 4162503 4199371 4830419 5655049

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3500 Engine Part Number Table*

Performance Specification		3704806	3704805	3704804	3704827	3704826	3704825	3496419	3704746	3704905	3704893†
Engine Ratings (Advertised)	rpm	1600	1600	1600	1800	1800	1800	1800	1800	1800	1800
	BkW	1750	1670	1590	1230	1175	1120	1765	1678	1821	1821
	bhp	*2347*	*2240*	*2132*	*1649*	*1576*	*1502*	*2367*	*2250*	*2442*	*2442*
	Cycle	E3	E3	E3	E3	E3	E3	E3	E3	E2	D2
Engine Ratings (Overload)	rpm	1600	1600	1600	1800	1800	1800	1800	1800	1800	1800
NOTE: Applies to Marine	BkW	1750	1670	1590	1230	1175	1120	1765	1678	2040	2040
Auxiliary Engines Only	*bhp*	*2347*	*2240*	*2132*	*1649*	*1576*	*1502*	*2367*	*2250*	*2736*	*2736*
Engine Model	Part Number	3516	3516	3516	3512	3512	3512	3512	3512	3512	3512
Compression Ratio		14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.0:1	14.0:1	14.7:1	14.7:1
Static Timing[1]	Deg.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Piston	Part Number	3768090 5140433 5789207	3768090 5140433 5789207	3768090 5140433 5789207	3768090 5140433 5789207	3768090 5140433 5789207	3768090 5140433 5789207	3691284 3768090 4861270 5789832	3691284 3768090 4861270 5789832	3691284 3768090 4861270 5789832	3691284 3768090 4861270 5789832
Cylinder Head	Part Number	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351
Camshaft	Part Number	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354
Aftercooler	Part Number	3363804	3363804	3363804	3363803	3363803	3363803	3363803	3363803	3363803	3363803
Turbocharger Basic Group	Part Number	3219033 3643722 4682948 5288351	3219033 3643722 4682948 5288351	3219033 3643722 4682948 5288351	3435684 5198010	3435684 5198010	3435684 5198010	3633587 3729132 4682946 5288345	3633587 3729132 4682946 5288345	3680636 3892272 4682951 5288352	3633587 3729132 4682946 5288345 3680636 3892272 4682951 5288352

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Injector	**Part Number**	3595469	3595469	3595469	3754106	3754106	3754106	3657439	3657439	3657439 3657433	3657439 3657433
Personality Module Software	**Part Number**	3848450 4162502 4199370 4830418 5655048	3848450 4162502 4199370 4830418 5655048	3848450 4162502 4199370 4830418 5655048	3862985 4162501 4199366 4830414 5655042	3862985 4162501 4199366 4830414 5655042	3862985 4162501 4199366 4830414 5655042	3704537 4199367 4249112 4430992 4830415 5655043	3704537 4199367 4249112 4430992 4830415 5655043	3862989 4199369 4430993 4830417 5655047	3862987 4199368 4830416 5536939 5655046

3500 Engine Part Number Table*

Performance Specification		**0K5497 3704946 4369361 4577003**	**0K5492**	**0K7025**	**0K7404 4182927 4576909 5957600 5957688**	**3496347 3496319 4182940 4485826**	**4182907**	**4183027**	**4183090**	**4183105**	**3704930 4183029 4576937**
Engine Ratings (Advertised)	**rpm**	1800	1800	1200	1200	1200	1800	1800	1800	1800	1200
	BkW	968	1125	1603	1101	1305	2240	1118	1920	1729	1603
	bhp	*1298*	*1509*	*2150*	*1476*	*1750*	*3004*	*1499*	*2575*	*2319*	*2150*
	Cycle	D2	D2 E2	D2 E2	D2 E2	D2 E2	E3	D2 E2	D2 E2	E2	D2
Engine Ratings (Overload)	**rpm**	1800	1800	1200	1200	1200	1800	1800	1800	1800	1200
NOTE: Applies to Marine	**BkW**	1065	1240	1765	1101	1332	2240	1255	2150	1936	1800
Auxiliary Engines Only	***bhp***	*1428*	*1663*	*2367*	*1476*	*1786*	*3004*	*1683*	*2883*	*2596*	*2414*
Engine Model	**Part Number**	3508	3512	3516	3512	3512	3516	3512	3516	3512	3516
Compression Ratio		14.0:1	14.0:1	15.5:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1
Static Timing[1]	**Deg.**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Piston	**Part Number**	1440720 2332431 2780247 2995204	1440720 2332431 2780247 2995204	1720919 3319822 5788717	2816140 3145006 3742082	3437301	3768090 5140433 5789207	3145006 3742082	2935428 3393028 3485357 4925077 5788865	2935428 3393028 3485357 4925077 5788865	3393027 4925077 5788865
Cylinder Head	**Part Number**	1541612 2901351	1541612 2901351	1541612 2901351	1541612 2901351	1541612 2901351	1011176 2901351	1011176 2901351	2901351	2901351	2901351

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Camshaft	**Part Number**	1275402 1275403	1275406 1275407 1275408 1275409 4522505 4522506 4522507 4522508	1631454 1631456 1631452 1631460	2837631 2837633 2837635 2837637	2837631 2837637 3085347 3085350	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835731 2835737 3085352 3085354	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835731 2835737 3085352 3085354	2853777 2853779 2853781 2853783
Aftercooler	**Part Number**	1115059	1167012 2828217	1969200 2518431 2659105 3373224	2454622	3424864	3363804	2454622	2454621	2454622	2454621
Turbocharger Basic Group	**Part Number**	1135180	1884621 2994614	1884621 2994614	2506110 4463318	3605358 5288365	3686434	3551661 5288388	3284277 4682952 5288355	3284258 4682943 5198013	3069393
Injector	**Part Number**	1504456 2290193 2501314 3861766 3920214 2309457 3861769 3920217	1504456 2290193 2501314 3861766 3920214 2309457 3861769 3920217	1647905 2290198 2501301 3861753 3920201	3861771 3920219	3861774 3920222	3657436	3920220	3920221	3920216	3920222
Personality Module Software	**Part Number**	2319944 2548115 2603780 2739059 3050833 3165277 3440315 4596428 5663901	2319982 2548123 2603788 2846855 2739055 3050829 3165273 3440317 4572205	2562193 2926028 3050822 3165266 2788321 2926029 3165278 3440312 3440322 3985118	2662979 2876075 2902214 3450829 3471251 3555370 4228050 4358655 4553580 5990089	3484532 4259776 4432158 5594498 5990091	3969050 4261913	4336942	3623092 4450295	3677571 4326849 4870413 5936585 4398655 4870437	3985089 4432159 4880749

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3500 Engine Part Number Table*

Performance Specification		3704992	3704993	3704994	4183160 4486076	3704758 3704759 4369597 4369571 4485911 4485917	4485835	4486082 4577004	4486088	4576896
Engine Ratings (Advertised)	rpm	1900	1900	1900	1800	1600	1800	1600	1800	1800
	BkW	2461	2349	2237	1920	1686	1815	1771	1959	1620
	bhp	*3300*	*3150*	*3000*	*2574*	*2261*	*2434*	*2375*	*2627*	*2172*
	Cycle	C1	C1	C1	D2 E2	E2 E3	E2	E2	D2 E2	E3
Engine Ratings (Overload)	rpm	1900	1900	1900	1800	1600	1800	1600	1800	1800
NOTE: Applies to Marine	BkW	2461	2349	2237	2150	1686	1995	2000	2194	1620
Auxiliary Engines Only	*bhp*	*3300*	*3150*	*3000*	*2883*	*2261*	*2675*	*2682*	*2942*	*2172*
Engine Model	Part Number	3516	3516	3516	3516	3516	3516	3516	3516	3512
Compression Ratio		14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1
Static Timing[1]	Deg.	NA	NA	NA	NA	NA	NA	NA	NA	NA
Piston	Part Number	3393027 4925077 5788865	3393027 4925077 5788865	3393027 4925077 5788865	3485357 4925077 5788865	3393027 4925077 5788865	3768090 5140433 5789207	3393027 4925077 5788865	3485357 4925077 5788865	2935428 3393028 3485357 4925077 5788865
Cylinder Head	Part Number	2901351	2901351	2901351	2901351	2901351	2901351	2901351	2901351	2901351
Camshaft	Part Number	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835731 2835733 2835735 2835737 3085352 3085354
Aftercooler	Part Number	3363804	3363804	3363804	2454621	2454621	3363804	2454621	2454621	2454622
Turbocharger Basic Group	Part Number	3643727 4682954 5288358	3643727 4682954 5288358	3643727 4682954 5288358	3284277 4682952 5288355	3284268 4682947 5198017	3686434 4682958 5288359	3284268 4682947 5198017	3284277 4682952 5288355	2906655 3036266 3284258 4682943 5198013

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Injector	**Part Number**	3920225	3920225	3920225	3920221	2501305 3861757 3920205	3657436	3920205	3920221	2481079 3861768 3920216
Personality Module Software	**Part Number**	3964552 5703286 5818802	3964552 5703286 5818802	3964552 5703286 5818802	3489872 4512433	3657836 4170050 4326945 4870433	4516170 4830423 5655053	4326853 4870417	4512433	2921910 3129042 3677571 4326849 4870413 5936585

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3500 Engine Part Number Table*

Performance Specification		4576873	4576897 4576898	4486209	4577021	4577111 4577115	4577112 4577116	4577113* 4577117*	4582057	4577027†	4577128†
Engine Ratings (Advertised)	rpm	1800	1800	1600	1800	1200	1200	1200	1600	1800	1800
	BkW	2300	2000	1425	1764	1383	1603	1383	1350	2211	1821
	bhp	*3084*	*2682*	*1911*	*2366*	*1855*	*2150*	*1855*	*1810*	*2965*	*2442*
	Cycle	E3	E3	D2 E2	E2	D2 E2	D2 E2	D2 E2	E3	D2	D2 E2
Engine Ratings (Overload)	rpm	1800	1800	1600	1800	1200	1200	1200	1600	1800	1800
NOTE: Applies to Marine	BkW	2300	2000	1568	1940	1553	1800	1553	1350	2476	2040
Auxiliary Engines Only	*bhp*	*3084*	*2682*	*2103*	*2602*	*2083*	*2414*	*2083*	*1810*	*3320*	*2736*
Engine Model	Part Number	3516	3516	3512	3512	3516	3516	3516	3512	3516	3512
Compression Ratio		14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1
Static Timing[1]	Deg.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Piston	Part Number	3485357 4925077 5788865	3485357 4925077 5788865	3393027 4925077 5788865	3485357 4925077 5788865	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865	2494512 3393027 4925077 5788865	3768090 5140433 5789207	3691284 3768090 4861270 5789832	3691284 3768090 4861270 5789832
Cylinder Head	Part Number	2901351	2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351
Camshaft	Part Number	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835731 2835737 3085352 3085354	2835731 2835737 3085352 3085354	2853777 2853779 2853781 2853783	2853777 2853779 2853781 2853783	2853777 2853779 2853781 2853783	2835731 2835737 3085352 3085354	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835731 2835737 3085352 3085354
Aftercooler	Part Number	2454621	2454621	2454622	2454622	2454621	2454621	2454621	3363803	3363804	3363803
Turbocharger Basic Group	Part Number	3284273 4682953 5198015	3284273 4682953 5198015	3435687 5289753	3284258 4682943 5198013	3069393	3069393	3069393	3435684 5198010	3686434 4682958 5288359 3643727 4682954 5288358	3680636 3892272 4682951 5288352
Injector	Part Number	3861768 3920216	3861768 3920216	3920205	3920216	2693152 3861774 3920222	2693152 3861774 3920222	2693152 3861774 3920222	3754106	3657436 3657433	3657439 3657433
Personality Module Software	Part Number	4702970 4870439	4702970 4870439	5031064	4326849 4870413 5936585	4868465 4976394	4868465 4976394	4868465 4976394	5018729 5655045	4830421 5655051	3862987 4199368 4830416 5536939 5655046

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3500 Engine Part Number Table*

Performance Specification		4582049	4582060	4581672** 4581673**	4577020 4577301	4577019 4577300	4577322	4581462	4581800	4581801	0K5498†††
Engine Ratings (Advertised)	rpm	1800	1800	1800	1800	1800	1600	1600	1600	1600	1800
	BkW	2525	2350	2350	1920	1920	995	1910	746	1350	760
	bhp	*3386*	*3386*	*3151*	*2575*	*2574*	*1334*	*2561*	*1000*	*1810*	*1019*
	Cycle	E2 E3	E2 E3	E2 E3	D2 E2	D2 E2	E3	E2 E3	E3 E2	E3 E2	D2 E2
Engine Ratings (Overload)	rpm	1800	1800	1800	1800	1800	1600	1600	1600	1600	1800
NOTE: Applies to Marine	BkW	2525	2585	2350	2150	2150	995	2100	820	1500	840
Auxiliary Engines Only	*bhp*	*3386*	*3386*	*3151*	*2883*	*2883*	*1334*	*2816*	*1100*	*2012*	*1126*
Engine Model	Part Number	3516	3516	3516	3516	3516	3512	3516	3508	3512	3508
Compression Ratio		14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.7:1	14.0:1
Static Timing[1]	Deg.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Piston	Part Number	2935428 3393028 3485357 4925077 5788865	2935428 3393028 3485357 4925077 5788865	2935428 3393028 3485357 4925077 5788865	2935428 3393028 3485357 4925077 5788865	3485357 4925077 5788865	3768090 5140433 5789207	2796770 2935428 2494512 3393027 4925077 5788865	3742082 5607760	3393027 4925077 5788865	1440720 2332431 2780247 2995204
Cylinder Head	Part Number	2901351	2901351	2901351	2901351	2901351	2901351	2901351	2901351	2901351	1011176 1541612
Camshaft	Part Number	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835731 2835737 3085352 3085354	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	1275402 1275403	2835731 2835737 3085352 3085354	1275402 1275403
Aftercooler	Part Number	2454621	2454621	2454621	2454621	2454621	3363803	2454621	2831001	2454622	1115059
Turbocharger Basic Group	Part Number	2820057 3048646 3284273 4682953	2820057 3048646 3284273 4682953 5198015	2820057 3048646 3284273 4682953 5198015	3284277 4682952 5288355	3284277 4682952 5288355	3435684 5198010	3043748 3284268 4682947 5198017	2949323	3435687	1135180 4947641

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Injector	**Part Number**	2481079 3861768 3920216	2481079 3861768 3920216	2481079 3861768 3920216	3920221	3920221	3754106	2501305 3861757 3920205	3920220	3920205	1504456 2290193 2501314 3861766 3920214 2309457 3861769 3920217
Personality Module Software	**Part Number**	2921916 3129048 3677579 4326857 4870419	2921916 3129048 3677579 4326857 4870419	2921916 3129048 3677579 4326857 4870419	5200504	5199896	5218446 5655044	2921914 3129046 3571026 3677575 4326853 4870417	2921902 3112137 3129036 3677573 4326851 4870415	2921908 3129040 3677569 4326847 4931967	2319944 2548115 2603780 2739059 3050833 3165277 3440315 4596428 5663901

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Performance Specification		5643520	4582032 (not commercially available)	5526335 5526336	5526337 5526338	5526333 5526334	5526313 5526373 5526619 5526620	5526312 5526372	5526311 5526371
Engine Ratings (Advertised)	rpm	1800	1800	1800	1800	1800	1800	1800	1800
	BkW	1305	1901	1632	1789	1432	2525	2350	2240
	bhp	*1750*	*2549*	*2189*	*2399*	*1920*	*3386*	*3151*	*3004*
	Cycle	E3	D2 E2 E3	D2 E2	D2 E2	D2 E2	E3 E2	E3 E2	E3 E2
Engine Ratings (Overload)	rpm	1800	1800	1800	1800	1800	1800	1800	1800
NOTE: Applies to Marine	BkW	1305	1901	1828	2004	1603	2525	2350	2240
Auxiliary Engines Only	*bhp*	*1750*	*2549*	*2451*	*2687*	*2150*	*3386*	*3151*	*3004*
Engine Model	Part Number	3512	3512	3512	3512	3512	3516	3516	3516
Compression Ratio		14.7:1	14.3:1	14.3:1	14.3:1	14.3:1	14.3:1	14.3:1	14.3:1
Static Timing[1]	Deg.	NA	NA	NA	NA	NA	NA	NA	NA
Piston	Part Number	2816140 3145006 3742082 5607760	4532335 5790210	4532335 5790210	4532335 5790210	4532335 5790210	4532335 5790210	4532335 5790210	4532335 5790210
Cylinder Head	Part Number	2901351	4803131 5256570 4985662	5256570 4985662	5256570 4985662	5256570 4985662	5256570 4985662	5256570 4985662	5256570 4985662
Camshaft	Part Number	2835731 2835733 2835735 2835737 3085352 3085354	5134777 5134779 5134780 5134782	5134777 5134779 5134780 5134782	5134777 5134779 5134780 5134782	5134777 5134779 5134780 5134782	5130880 5130887 5130888 5130889	5130880 5130887 5130888 5130889	5130880 5130887 5130888 5130889
Aftercooler	Part Number	2454622	4713275	4713275	4713275	4713275	4629090	4629090	4629090
Turbocharger Basic Group	Part Number	2831705 3048647 3114643 3435687 5289753 3435684 3523459 5198019	4652693 4799077	4652693 4799077	4652693 4799077	4652693 4799077	4638402 4799079	4638402 4799079	4638402 4799079
Injector	Part Number	2664387 3861772 3920220	4575312	4575312	4575312	4575312	4575312	4575312	4575312
Duct-Exhaust	Part Number	NA	NA	5511971	5511971	5511971	5511975	5511975	5511975

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Engine software	Part Number	5729494	5432923	5691171 5844959	5691171 5844959	5691171 5844959	5691172 5844963 5913962	5691172 5844963 5913962	5691172 5844963 5913962
Max. Exhaust back pressure (turbine outlet)	kPa	6.7	20.4	18.0	19.5	16.0	20.4	19.4	18.8

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3500 Engine Part Number Table*

Performance Specification		5526318 5526319	5526316 5526317	5526314 5526315	5526343 5526384	5526344 5526385	5526345 5526386	5526346 5526387	5526347 5526388	5526348 5526389	5526349 5526390
Engine Ratings (Advertised)	rpm	1800	1800	1800	1600	1600	1600	1600	1600	1600	1600
	BkW	2368	2105	1921	1000	1120	1268	1350	1491	1575	1650
	bhp	*3176*	*2823*	*2576*	*1341*	*1502*	*1700*	*1810*	*2000*	*2112*	*2213*
	Cycle	D2 E2	D2 E2	D2 E2	E3 E2	E3 E2	E3 E2	E3 E2	E3 E2	E3 E2	E3 E2
Engine Ratings (Overload)	rpm	1800	1800	1800	1600	1600	1600	1600	1600	1600	1600
NOTE: Applies to Marine	BkW	2653	2358	2152	1000	1120	1268	1350	1491	1575	1650
Auxiliary Engines Only	*bhp*	*3558*	*3162*	*2886*	*1341*	*1502*	*1700*	*1810*	*2000*	*2112*	*2213*
Engine Model	Part Number	3516	3516	3516	3512	3512	3512	3512	3512	3512	3512
Compression Ratio		14.3:1	14.3:1	14.3:1	14.3:1	14.3:1	14.3:1	14.3:1	14.3:1	14.3:1	14.3:1
Static Timing[1]	Deg.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Piston	Part Number	4532335 5790210	4532335 5790210	4532335 5790210	4532335 5790210	4532335 5790210	4532335 5790210	4532335 5790210	4532335 5790210	4532335 5790210	4532335 5790210
Cylinder Head	Part Number	5256570 4985662	5256570 4985662	5256570 4985662	5256570 4985662	5256570 4985662	5256570 4985662	5256570 4985662	5256570 4985662	5256570 4985662	5256570 4985662
Camshaft	Part Number	5130880 5130887 5130888 5130889	5130880 5130887 5130888 5130889	5130880 5130887 5130888 5130889	5134777 5134779 5134780 5134782	5134777 5134779 5134780 5134782	5134777 5134779 5134780 5134782	5134777 5134779 5134780 5134782	5134777 5134779 5134780 5134782	5134777 5134779 5134780 5134782	5134777 5134779 5134780 5134782
Aftercooler	Part Number	4629090	4629090	4629090	4713275	4713275	4713275	4713275	4713275	4713275	4713275
Turbocharger Basic Group	Part Number	4638402 4799079	4638402 4799079	4638402 4799079	5134715	5134715	5134715	5134715	5134715	5134715	5134715
Injector	Part Number	4575312	4575312	4575312	3735507	3735507	3735507	3735507	3735507	3735507	3735507
Duct-Exhaust	Part Number	5511975	5511975	5511975	5511979	5511979	5511979	5511979	5511979	5511979	5511979
Engine software	Part Number	5502707 5844965	5502707 5844965	5502707 5844965	5502683 5844953	5691170 5844954	5691170 5844954	5691170 5844954	5502687 5844955	5502687 5844955	5502687 5844955
Max. Exhaust back pressure (turbine outlet)	kPa	19.5	18.0	17.0	11.4	12.7	14.3	15.1	16.7	17.6	18.4

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3500 Engine Part Number Table*

Performance Specification		5526340 5526381	5526341 5526382	5526342 5526383	5526330 5526378	5526331 5526379	5526332 5526380	5526339	5526322 5526374	5526323 5526375
Engine Ratings (Advertised)	rpm	1800	1800	1800	1800	1800	1800	1800	1600	1600
	BkW	1120	1175	1230	1678	1771	1901	1789	1865	2000
	bhp	*1502*	*1575*	*1649*	*2250*	*2375*	*2549*	*2399*	*2501*	*2682*
	Cycle	E3 E2	E3 E2	E3 E2	E3 E2	E3 E2	E3 E2	E3 E2	E3 E2	E3 E2
Engine Ratings (Overload)	rpm	1800	1800	1800	1800	1800	1800	1800	1600	1600
NOTE: Applies to Marine	BkW	1120	1175	1230	1678	1771	1901	2004	1865	2000
Auxiliary Engines Only	*bhp*	*1502*	*1575*	*1649*	*2250*	*2375*	*2549*	*2565*	*2501*	*2682*
Engine Model	Part Number	3512	3512	3512	3512	3512	3512	3512	3516	3516
Compression Ratio		14.3:1	14.3:1	14.3:1	14.3:1	14.3:1	14.3:1	14.3:1	14.3:1	14.3:1
Static Timing[1]	Deg.	NA	NA	NA	NA	NA	NA	NA	NA	NA
Piston	Part Number	4532335 5790210	4532335 5790210	4532335 5790210	4532335 5790210	4532335 5790210	4532335 5790210	4532335 5790210	4532335 5790210	4532335 5790210
Cylinder Head	Part Number	5256570 4985662	5256570 4985662	5256570 4985662	4803131 5256570 4985662	4803131 5256570 4985662	4803131 5256570 4985662	4803131 5256570 4985662	4803131 5256570 4985662	4803131 5256570 4985662
Camshaft	Part Number	5134777 5134779 5134780 5134782	5134777 5134779 5134780 5134782	5134777 5134779 5134780 5134782	5134777 5134779 5134780 5134782	5134777 5134779 5134780 5134782	5134777 5134779 5134780 5134782	5134777 5134779 5134780 5134782	5130880 5130887 5130888 5130889	5130880 5130887 5130888 5130889
Aftercooler	Part Number	4713275	4713275	4713275	4713275	4713275	4713275	4713275	4630864	4630864
Turbocharger Basic Group	Part Number	5134715	5134715	5134715	4652693 4799077	4652693 4799077	4652693 4799077	4652693 4799077	4799078 4800331	4799078 4800331
Injector	Part Number	3735507	3735507	3735507	4575312	4575312	4575312	4575312	3735507	3735507
Duct-Exhaust	Part Number	5511979	5511979	5511979	5511971	5511971	5511971	5511971	5511973	5511973
Engine software	Part Number	5502689 5844956	5502689 5844956	5502689 5844956	5697241 5844957	5697241 5844957	5697241 5844957	5502697 5844960	5502699 5844961	5502699 5844961
Max. Exhaust back pressure (turbine outlet)	kPa	17.5	17.9	18.3	18.8	19.4	20.4	19.5	16.2	17.0

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3500 Engine Part Number Table*

Performance Specification		5526324 5526376	5526325 5526377	5526320	5526321	5644190 5644191	5644192 5644193	5644172 5644173	4486027	4369493	5644189 5644209	5957543
Engine Ratings (Advertised)	rpm	1600	1600	1800	1800	1600	1600	1800	1600	1800	1200	1600
	BkW	2100	2200	1921	2368	1500	2000	2240	1920	2240	749	1500
	bhp	*2816*	*2950*	*2576*	*3176*	*2012*	*2682*	*3004*	*2575*	*3004*	*1004*	*2012*
	Cycle	E3 E2	E3 E2	E3 E2	E3 E2	E2 E3	E2 E3	D2 E2	E3	E3	E2 E3	E3
Engine Ratings (Overload)	rpm	1600	1600	1800	1800	1600	1600	1800	1600	1800	1200	1600
NOTE: Applies to Marine	BkW	2100	2200	2152	2653	1500	2000	2508	1920	2525	749	1500
Auxiliary Engines Only	*bhp*	*2816*	*2950*	*2886*	*3558*	*2012*	*2682*	*3363*	*2575*	*3386*	*1004*	*2012*
Engine Model	Part Number	3516	3516	3516	3516	3512	3516	3516	3516	3516	3512	3512
Compression Ratio		14.3:1	14.3:1	14.3:1	14.3:1	14.7:1	14.7:1	14.3:1	14.7:1	14.7:1	14.7:1	14.7:1
Static Timing[1]	Deg.	NA	NA	NA	NA	NA	NA	N/A	NA	NA	NA	NA
Piston	Part Number	4532335 5790210	4532335 5790210	4532335 5790210	4532335 5790210	2494512 2495496 2830245 3393027 4925077 5788865	2494512 2495496 2830245 3393027 4925077 5788865	4532335 5790210	3768090 5140433 5789207	3768090 5140433 5789207	2816140 3145006 3742082 5607760	3768090 5140433 5789207
Cylinder Head	Part Number	4803131 5256570 4985662	4803131 5256570 4985662	4803131 5256570 4985662	4803131 5256570 4985662	2901351	1541612 2901351	5256570 4985662	1011176 2901351	1011176 2901351	2901351	1011176 2901351
Camshaft	Part Number	5130880 5130887 5130888 5130889	5130880 5130887 5130888 5130889	5130880 5130887 5130888 5130889	5130880 5130887 5130888 5130889	2835731 2835733 2835735 2835737 3085352 3085354	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	5130880 5130887 5130888 5130889	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2837631 2837637 3085347 3085350	2835731 2835737 3085352 3085354
Aftercooler	Part Number	4630864	4630864	4629090	4629090	2454622	2454621	4629090	3363804	3363804	2454622	3363803
Turbocharger Basic Group	Part Number	4799078 4800331	4799078 4800331	4638402 4799079	4638402 4799079	2906654 3043746 3043747 3435687 5289753 3435684 3523459	2766428 2906656 3043748 3284268 4682947 5198017	4638402 4799079	3219033 3643722 4682948 5288351	3686434 4682958 5288359	3226288 3435684 3523459 5198019 3277739 5288383	3435684 5198010
Injector	Part Number	3735507	3735507	4575312	4575312	2501305 3861757 3920205	2501305 3861757 3920205	4575312	3595469	3657436	2693152 3861774 3920222	3754106
Duct-Exhaust	Part Number	5511973	5511973	5511975	5511975	NA	NA	5511975	NA	NA	NA	NA
Engine software	Part Number	5502701	5502701	5502709	5502709	5935469	5935467	5915912	3704539	3848452	2921904	5972956

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		5844962	5844962	5844966	5844966	5955271			4162503 4199371 4830419 5655049	4162504 4199372 4830420 5655050	3129038 3165736 3246600 3552699 3677581 4326859 4870421	
Max. Exhaust back pressure (turbine outlet)	**kPa**	17.7	18.4	17.0	19.5	6.7	6.7	18.7	6.7	6.7	6.7	6.7

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3500 Engine Part Number Table*

Performance Specification		5973493	5973492	5973491	4577114 4577118	5957603
Engine Ratings (Advertised)	rpm	1800	1800	1800	1200	1800
	BkW	2525	2350	2240	1603	1439
	bhp	*3386*	*3151*	*3004*	*2150*	*1930*
	Cycle	E3 E2	E3 E2	E3 E2	D2 E2	D2 E2
Engine Ratings (Overload)	rpm	1800	1800	1800	1200	1800
NOTE: Applies to Marine	BkW	2525	2350	2240	1800	1612
Auxiliary Engines Only	*bhp*	*3386*	*3151*	*3004*	*2414*	*2162*
Engine Model	Part Number	3516	3516	3516	3516	3512
Compression Ratio		14.7:1	14.7:1	14.7:1	14.7:1	14.7:1
Static Timing[1]	Deg.	NA	NA	NA	NA	NA
Piston	Part Number	3768090 5140433 5789207	3768090 5140433 5789207	3768090 5140433 5789207	2494512 3393027 4925077 5788865	2816140 3145006 3742082 5607760
Cylinder Head	Part Number	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351	1011176 2901351
Camshaft	Part Number	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2835739 2835741 2835743 2835786 4531885 4531882 4531883 4531884	2853777 2853779 2853781 2853783	2835731 2835737 3085352 3085354
Aftercooler	Part Number	3363804	3363804	3363804	2454621	2454622
Turbocharger Basic Group	Part Number	3686434 4682958 5288359	3686434 4682958 5288359	3686434 4682958 5288359	3069393	3226291 3435687 5289753 3435684 3523459 5198019 3551661 5288388
Injector	Part Number	3657436	3657436	3657436	2693152 3861774 3920222	2664387 3861772 3920220
Duct-Exhaust	Part Number	NA	NA	NA	NA	NA
Engine software	Part Number	3848452 4162504 4199372	3848452 4162504 4199372	3848452 4162504 4199372	4868465 4976394	3246638 3477340 4230253

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		4830420 5655050 5965846	4830420 5655050 5965846	4830420 5655050 5965846		4591590 5075127
Max. Exhaust back pressure (turbine outlet)	**kPa**	6.7	6.7	6.7	15	6.7

Note [1]: Engine timing is electronically controlled by the engine Electronic Control Module (ECM). There are no adjustments that can be made to change engine timing.

*Air to air charge air cooler provided by customer. Max allowable inlet manifold temp according to page 40 is to be observed

*Maximum exhaust backpressure is higher for these test specifications (see Note 1 on page 40); **See Note 3 on page 40

†Maximum AC temp is different for these test specifications (see Note 2 on page 40); ††See Note 4 on page 40; †††See Note 5 on page 40

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Installation Requirements

The following installation requirements must be met at rated load and speed to enable the engine to comply with the nitrogen oxides (NOx) emission limits of Regulation 13 of Revised Annex VI of MARPOL 73/78:

Max. Jacket Water Outlet Temperature	99 ºC (210 ºF)
Max. Aftercooler Water Temperature	
(With 25 ºC seawater temperature)	50 ºC (122 ºF)
Note 2:	59 ºC (133 ºF)
Note 4:	52 ºC (125.6 ºF)
Note 5:	30 ºC (86 ºF)
Maximum Inlet Manifold Temp. For customer provided aftercooler	50 ºC (122 ºF) for air to air aftercooler, used with radiator
Maximum Air Inlet Restriction	-3.7 kPa (15" Water)
Maximum Exhaust Backpressure	6.7 kPa (27" Water)
Note 1:	15.0 kPa (60" Water)
Note 3:	8.5 kPa (34” Water)

Engine Performance

The rated speed and rated power of the engine is included on the engine information nameplate. This nameplate is located on the engine cylinder block forward of the front left cylinder head.

Engine Emissions

Emissions data measurement is consistent with the procedures described in Resolution 2 of the 1997 MARPOL Conference “Technical Code on Control of Emissions of Nitrogen Oxides from Marine Diesel Engines 2008”. This engine’s exhaust emissions are in compliance with the International Maritime Organization’s Regulation 13 of Revised Annex VI to the MARPOL 73/78 Convention. The Tier II NOx limits for the engines in this family is 7.8 g/kW-hr.

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On-board NOx Verification procedure

Engine Parameter Check Method

Introduction:
The engine parameter check method that follows shall be used by the surveyor to verify that the engine, as installed on board the ship, complies with the nitrogen oxides (NOx) emission limits of Regulation 13 Revised Annex VI of MARPOL 73/78. This method is to be used for the initial certification survey, periodic and intermediate surveys.

Procedures:
The procedures listed below are detailed on the following pages. They can be used to demonstrate compliance with the NOx emissions limits.

Steps of Engine Parameter Check Method:

1. Check Engine Parameter
2. Identify Emission-Related Engine Components
3. Record Changes to Emissions Related Components
4. Identify Adjustable Features

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1. Check Engine Parameters:

There are no adjustable engine parameters related to NOx emissions that are physically capable of being adjusted without taking the engine outside of the manufacturers' limits. Other than the parameters programmed in the ECM (Electronic Control Module), all programmable features are set at the factory. Therefore, a section to record adjustable parameters becomes unnecessary.

2. Identify Emission-Related Engine Components:

The table below lists the components that influence the engine's NOx emissions for this engine model. The list under section Engine Part Numbers Table* of this document shows the part numbers of those components as shipped from Caterpillar Inc. factories.
These part numbers can be identified through the personality module part number and the engine rating, which is also listed in this same table of this Technical File.
The personality module part number and the engine rating can be found on the Information Plate or film on this engine.

Note to surveyor:
See also section "Record Changes to Emission Related Components"

Note to Caterpillar dealers:
Part numbers for the components influencing the NOx can also be found in the Technical Marketing Information (TMI) system by viewing the engine test specification number.

Compare the observed part number with the part number from the Engine Part Number Tables to ensure that the part numbers are correct for these emissions related components.

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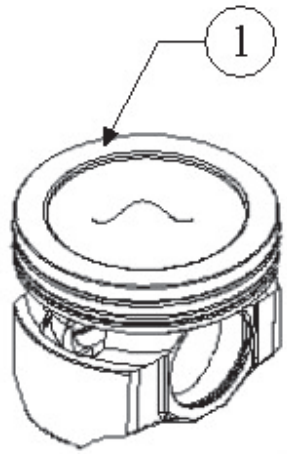
Emission Related Component List:

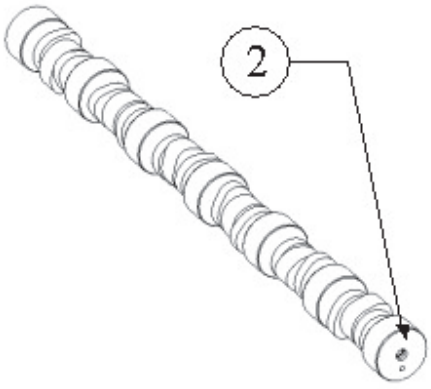
Component Description:	Location on engine of component part No.:
1. Piston (See note 1)	On the bottom of the piston pin bore.
2. Camshaft (See note 1)	Stamped on the center of the camshaft.
3. Injector (See note 1)	Etched on top of injector tappet.
4. Duct Gp-Exhaust (See note 1) Maintain system back pressure when SCR is not installed	Etched on the flat inner face of the plate.
5. Cylinder Head	Stamped into the rear face of the cylinder head.
6. Aftercooler	Etched on the aftercooler core housing on the rear right hand side.
7. Turbocharger	On nameplate of turbocharger.
Personality module software	On Information Plate of engine or use the Electronic Technician (ET) Service Tools.

Note 1:
Part number not accessible without significant engine disassembly. Therefore, it is not necessary to be checked by the surveyor.

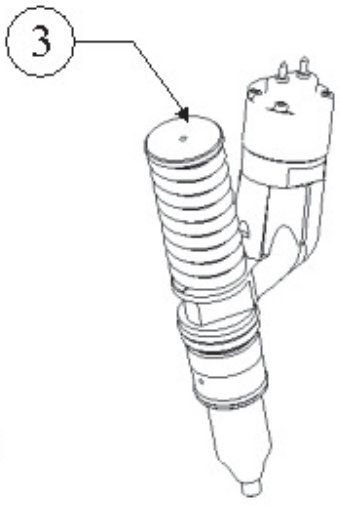
Part Number Locations:



1. Piston



2. Camshaft



3. Injector

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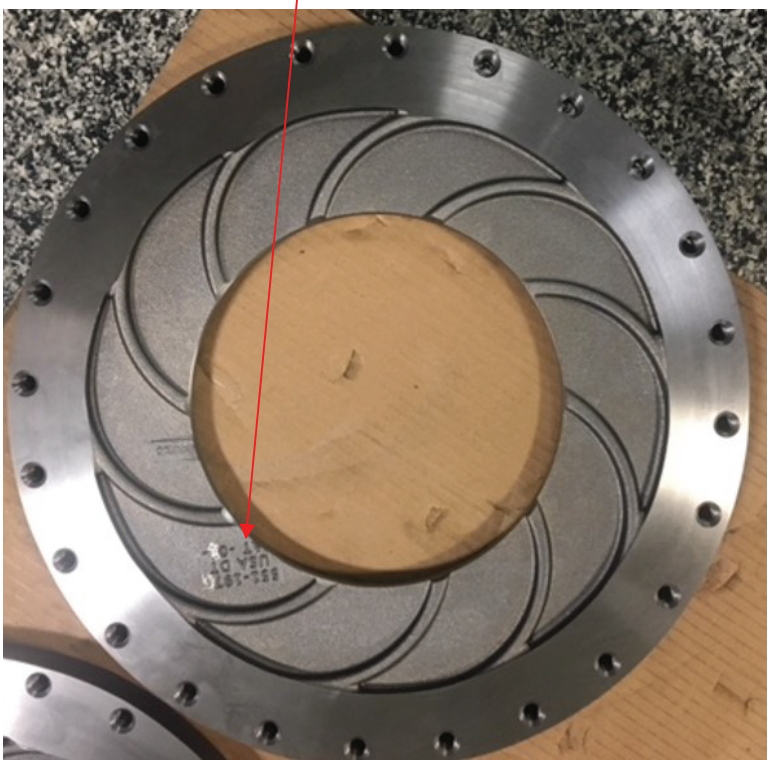
4. Duct Gp-Exhaust



4. Duct Gp-Exhaust

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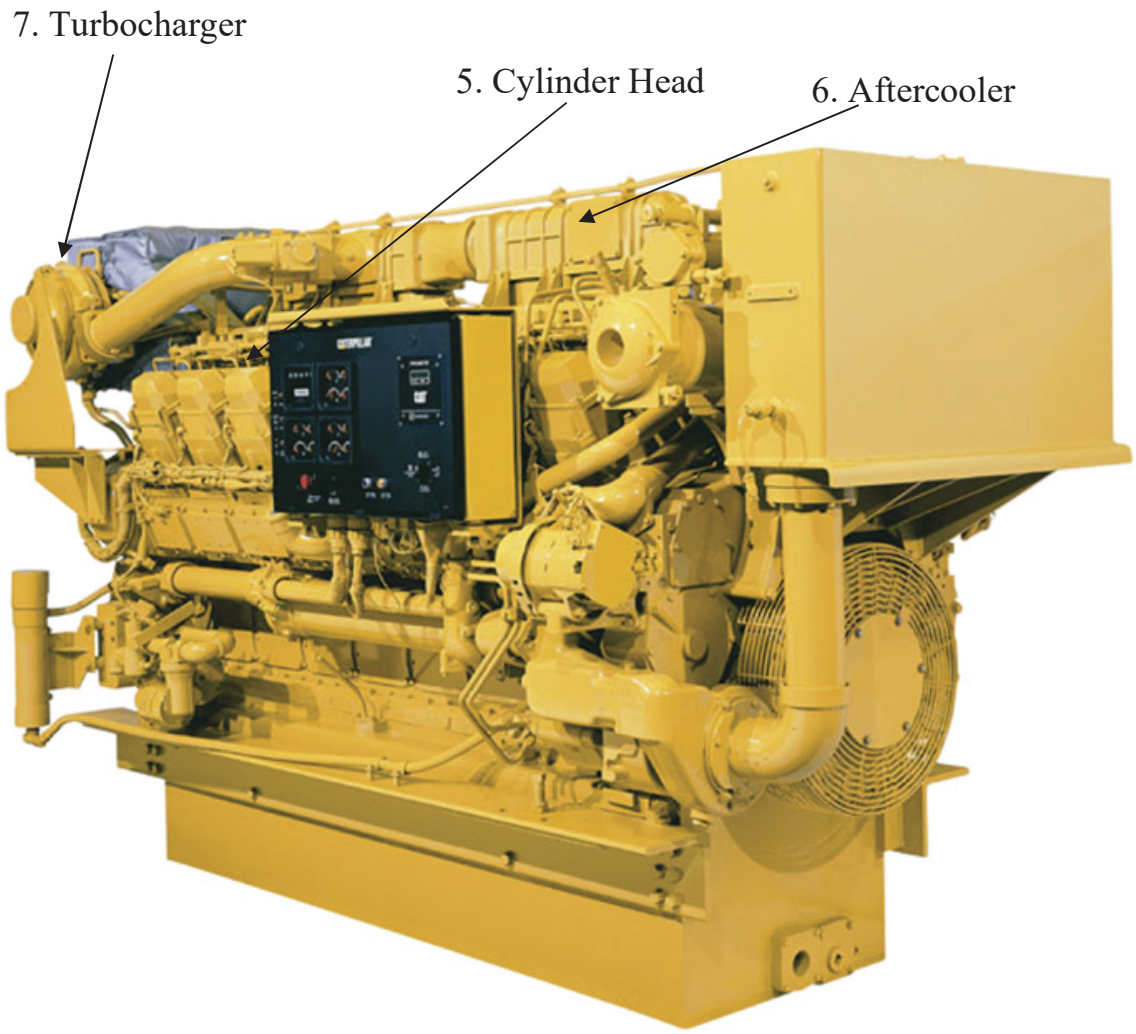

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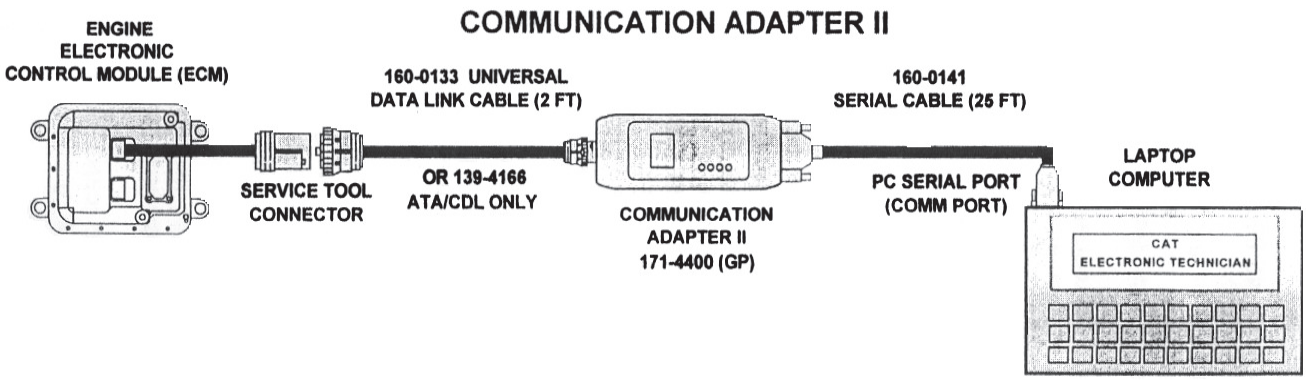
Verification procedure for the Electronic Engine Software:

1. Hook up the laptop computer (with ET) to the engine Electronic Control Module (ECM) as shown in the diagram below.



2. Start the Electronic Technician (ET) program on the computer.

3. Select the desired ECM from the displayed list. If the engine has only one ECM, only one ECM option will be displayed.

4. The display screen will show the engine model, engine location, and engine serial number. Displayed below this information will be a list of two columns, the first column lists the "Parameter". The second column lists the value for that parameter. The fourth parameter listed is the "Personality Module Part Number". This is the engine software. The corresponding value is the software part number.

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3. Record Changes to Emissions Related Components:

A record must be kept of the changes to the emissions related components listed on the previous table. Use the table below to record these changes in chronological order as they occur.

Note:
Emission related components may only be replaced as listed in this Technical File or otherwise approved by the Administration or Recognized Organization, which has approved the Technical File.

Caterpillar recommends emission related components and all other components be replaced with parts approved by your Caterpillar Dealer.

Record of Changes to Emissions Related Components:

Date of Change	Old Part No.	New Part No.	Component	Manufacturer of Component	Approved By:

4. Identify Adjustable Features:

There are no adjustable features on the engine that will significantly affect NOx emissions. Other than the parameters programmed in the ECM (Electronic Control Module), all programmable features are set at the factory. Therefore, a section to record adjustable features becomes unnecessary.

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Appendix A: IMO II Certification Test Report – C1
Parent Engine

Emissions- Test Report No.	Engine Information	Sheet 1/4
Engine		
Manufacturer	Caterpillar Inc., Lafayette, IN USA	
Engine type	3512	
Family or Group identification	3500PA10001	
Serial number	R1S00103	
Rated speed	1900	rpm
Rated power	1864	kW
Intermediate speed	1400	rpm
Max torque at intermediate speed	10020	Nm
Static injection timing	N/A	deg CA
Electr. injection control	Yes	
Variable injection timing	Yes	
Variable turbocharger geom.	No	
Bore	170	mm
Stroke	215	mm
Nominal compression ratio	14.7:1	
Mean effective pressure, at rated power	1993	kPa
Maximum cylinder pressure, at rated power	17750	kPa
Cylinder number and configuration	12 cyl. , V:12	V
Auxiliaries	N/A	
Specified ambient conditions		
Max. Seawater temperature	32	°C
Max. Charge air temperature, if applicable	NA	°C
Cooling system spec., intermediate cooler	Yes	
Cooling system spec., charge air stages	2 stage	
Low / high temp. cooling system set points	NA	°C
Maximum inlet depression	3.7	kPa
Maximum exhaust backpressure	6.7	kPa
Fuel oil specification	ISO – F - DMA	
Fuel oil temperature	30	°C
Lubricating oil specification	CI4 15W40 CAT PT#8T9548	
Application / intended for		
Customer		
Final application/ installation, Ship		
Final application/ installation, Engine		
Emissions test results		
Cycle	C1	
NOx	5.89	g/kWh
Test identification	3500 Certification Test	
Date	10 May 2010	
Test site / bench	Test Cell 515; Lafayette, IN USA	
Test number		
Surveyor	Dan Woods, GL USA; Hua Shu, CCS	
Date and Place of report	Lafayette, IN USA	
Signature		

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Emissions Test Report No.	Engine Family / Group Inform.	Sheet 2/4
Engine family / group information (common specifications)		
Combustion cycle	4-stroke cycle	
Cooling medium	water	
Cylinder configuration	V8, V12. V16	
Method of air aspiration	pressure charged	
Fuel type to be used on board	distillate	
Combustion chamber	Open chamber	
Valve port configuration	Cylinder head	
Valve port size and number	4 valves per cylinder; Intake dia.: 56mm; Exhaust dia.: 56mm	
Fuel system type	Electronic Unit Injector	
Miscellaneous features		
Exhaust gas recirculation	No	
Water injection / emulsion	No	
Air injection	No	
Charge cooling system	Yes	
Exhaust after treatment	No	
Exhaust after treatment type	N/A	
Dual fuel	No	
Engine family / group information (selection of parent engine for test-bed test)		
Family/group identification	3500PA10001	
Method of pressure charging	Turbocharged	
Charge air cooling system	Seawater aftercooled	
Criteria of selection (specify)	Highest NOx emission (g/kWh)	
Engine Type	3512	
Number of cylinder	12	
Max rated power per cylinder	155.3 kW	
Rated speed	1900 rpm	
Injection timing range	-1.5 to 20 ºBTDC	
Selected parent engine	3512, test spec 349-6321	
Application (Test cycle)	Variable Speed Auxiliary (C1)	

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Emissions Test Report No.:			Test Cell Information		Sheet 3/4
Exhaust pipe					
Diameter			495		mm
Length			62		m
Insulation			Yes		
Probe location			1-2 m from engine		
Remark					
Measurement equipment					
Analyzer	Manufacturer	Model	Measurement ranges	Calibration	
				Span gas conc.	Deviation
NOx Analyzer	Horiba	CLA-720MA	0-1000 ppm	962 ppm	± 1 %
CO Analyzer	Horiba	AIA-721A	0-1000 ppm	948 ppm	± 1 %
CO2 Analyzer	Horiba	AIA-722	0-16 %	15.36%	± 1 %
O2 Analyzer	Horiba	MPA-720	0-25 %	23.98%	± 1 %
HC Analyzer	Horiba	FIA-725A	0-200 ppm	180.18 ppm	± 1 %
Speed	HP	CENC-TAC8	0-10000 rpm		± 1 %
Torque	Horiba / HBM	DT6300-2e / W26	0-70000 Nm		± 1 %
Power, if appl.	N/A	N/A	N/A kW		N/A
Fuel flow	Max Machinery	285-512	0-220 ml/sec		± 1 %
Air flow	Brandt	B-NZP1042	0-50000 lbm/hr		± 2 %
Exhaust flow	N/A	N/A	N/A		N/A
Temperatures					
Coolant	Omega	HP 1413	300 °C		± 2 °C
Lubricant	Omega	HP 1413	300 °C		± 2 °C
Exhaust gas	Omega	HP 1413	800 °C		± 6 °C
Inlet air	Omega	HP 1413	300 °C		± 2 °C
Intercooled air	Omega	HP 1413	300 °C		± 2 °C
Fuel	Omega	HP 1413	300 °C		± 2 °C
Pressures					
Exhaust gas	Viatran	245AAGBLDH	-10 to 10 kPa		± 2 %
Inlet manifold	Viatran	234AMGBL	0-682 kPa		± 2 %
Atmospheric	Omega	PX961-16A5V	54.2 - 108.4		± 0.5 %
Humidity					
Intake air	Honeywell	4114	-104.7 to 100 °C		± 1.4 °C

Fuel Characteristics					
Fuel type	ISO – F - DMA				
Fuel properties			**Fuel elemental analysis**		
Density ISO 3675	0.8389	kg/l	Carbon	87.00	%mass
Viscosity ISO 3104	2.70	mm²/s	Hydrogen	12.79	%mass
			Nitrogen	<0.001	%mass
			Oxygen	NA	%mass
			Sulphur	0.037	%mass
			LHV / Hu	42.78	MJ/kg

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Mode		1	2	3	4	5	6	7	8
Power / Torque	%	100	75	50	10	100	75	50	0
Speed	%	100	100	100	100	Peak T.	Peak T.	Peak T.	Low
Time at beginning of mode		10:21	10:41	11:02	11:22	11:46	12:06	12:27	12:47
Ambient data									
Atmospheric pressure	kPa	100.3	100.3	100.3	100.3	100.3	100.3	100.2	100.2
Intake air temp.	°C	23.7	23.7	23.9	23.7	24.2	24.3	24.7	24.1
Intake air humidity rel.	%	24.2	24.2	23.7	23.5	22.6	22.3	21.7	22.3
Atmospheric factor (fa)	-	0.990	0.990	0.991	0.990	0.992	0.993	0.995	0.992
Gaseous emissions data									
NOx conc. dry/wet	ppm	903.6	472.6	305.2	217.9	828.2	520.8	454.6	266.3
CO conc. dry	ppm	148.08	84.47	52.07	274.03	299.69	356.45	164.71	126.49
CO2 conc. dry	%	7.96	6.75	5.63	3.78	8.17	7.63	7.41	1.35
O2 conc. dry	%	10.13	11.80	13.34	15.84	9.85	10.58	10.90	19.23
HC conc. dry/wet	ppm	54.8	62.8	76.8	164.6	36.4	43.9	65.1	122.6
NOx hum. corr. factor		0.9272	0.9272	0.9272	0.9259	0.9266	0.9265	0.9273	0.9256
Dry/wet corr .factor		0.9352	0.9446	0.9535	0.9684	0.9337	0.9379	0.9397	0.9892
NOx mass flow	kg/h	14.213	7.057	3.852	1.272	9.359	5.128	3.164	0.467
CO mass flow	kg/h	1.530	0.829	0.432	1.053	2.226	2.307	0.753	0.146
CO2 mass flow	kg/h	1290.9	1039.2	733.6	228.2	953.0	775.8	532.0	24.4
O2 mass flow	kg/h	1195.1	1321.5	1263.0	694.7	835.5	781.9	569.1	253.5
HC mass flow	kg/h	0.300	0.324	0.331	0.324	0.144	0.150	0.157	0.071
SO2 mass flow	kg/h	NA	NA	NA	NA	NA	NA	NA	NA
NOx spec.	g/kWh	7.693	5.041	4.128	6.818	6.507	4.706	4.357	42.384
Engine data									
Speed	rpm	1900	1900	1900	1900	1400	1400	1400	700
Auxiliary power	kW	NA	NA	NA	NA	NA	NA	NA	NA
Dynamometer setting	kW	NA	NA	NA	NA	NA	NA	NA	NA
Power	kW	1847.6	1399.8	933.2	186.6	1438.3	1089.6	726.4	11.0
Mean eff. pressure	bar	19.93	15.10	10.07	2.01	21.06	15.95	10.63	0.32
Fuel rack	mm^3	694.9	561.8	398.8	126.6	704.6	571.5	397.6	36.9
Uncorrected spec. fuel	g/kWh	215.8	230.3	245.2	389.3	207.1	221.8	231.4	707.5
Fuel flow	kg/h	398.76	322.38	228.84	72.66	297.90	241.62	168.12	7.80
Air flow	kg/h	11038.2	10426.8	8773.4	4033.4	7937.8	6902.4	4868.8	1200.6
Exhaust flow (gexhw)	kg/h	11437.0	10749.2	9002.2	4106.1	8235.7	7144.0	5036.9	1208.4
Exhaust temp.	°C	464.7	419.9	382.8	290.2	476.9	480.7	480.5	137.4
Exhaust back pressure	mbar	66.8	59.3	41.8	10.0	27.4	22.9	15.1	5.7
Cyl. coolant temperature out	°C	93.0	91.4	90.0	87.3	92.4	91.3	90.1	86.0
Cyl. coolant temperature in	°C	85.0	84.7	85.0	85.4	84.8	84.8	85.5	85.5
Charge air pressure	bar	2.67	2.40	1.82	0.33	2.21	1.77	1.00	-0.004
Charge air temperature	°C	60.4	58.8	56.5	54.4	57.9	57.6	56.8	55.4
Charge air reference	°C	60.4	58.8	56.5	54.4	57.9	57.6	56.8	55.4
Inlet depression	mbar	-36.9	-32.6	-23.4	-5.7	-19.1	-14.4	-7.6	-1.2

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Appendix B: IMO II Certification Test Report – D2 / E2

Parent Engine

Emissions- Test Report No.	Engine Information		Sheet 1/4
Engine			
Manufacturer	Caterpillar Inc., Lafayette, IN USA		
Engine type	3512		
Family or Group identification	3500PA10001		
Serial number	00512103		
Rated speed	1800		rpm
Rated power	1901		kW
Intermediate speed	NA		rpm
Max torque at intermediate speed	NA		Nm
Static injection timing	NA		deg CA
Electr. injection control	Yes		
Variable injection timing	Yes		
Variable turbocharger geom.	No		
Bore	170		mm
Stroke	215		mm
Nominal compression ratio	14.3:1		
Mean effective pressure, at rated power	2165		kPa
Maximum cylinder pressure, at rated power	18000		kPa
Cylinder number and configuration	12 cyl. , Vee		
Auxiliaries	None		
Specified ambient conditions			
Max. Seawater temperature	25		°C
Max. Charge air temperature, if applicable	NA		°C
Cooling system spec., intermediate cooler	Yes		
Cooling system spec., charge air stages	1 stage		
Low / high temp. cooling system set points	NA		°C
Maximum inlet depression	3.7		kPa
Maximum exhaust backpressure	20.3 kPa after engine		kPa
Fuel oil specification	ULSD (< 15 ppm sulfur)		
Fuel oil temperature	30		°C
Emissions test results			
Cycle	D2	E2	
NOx	7.65	7.64	g/kWh
Test identification	3500 Certification Test		
Date	14 November 2017		
Test site / bench	TC-L, Cell 506		
Test number			
Surveyor	Anthony Melomo, DNV GL & Qing Song Zhang, CCS		
Date and Place of report	TC-L Mossville, IL USA		
Signature			

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Emissions Test Report No.	Engine Family / Group Inform.	Sheet 2/4
Engine family / group information (common specifications)		
Combustion cycle	4-stroke cycle	
Cooling medium	Water	
Cylinder configuration	V12, V16	
Method of air aspiration	pressure charged	
Fuel type to be used on board	distillate	
Combustion chamber	Open chamber	
Valve port configuration	Cylinder head	
Valve port size and number	4 valves per cylinder; Intake dia.: 56mm; Exhaust dia.: 56mm	
Fuel system type	Electronic Unit Injector	
Miscellaneous features		
Exhaust gas recirculation	No	
Water injection / emulsion	No	
Air injection	No	
Charge cooling system	Yes	
Exhaust after treatment	No	
Exhaust after treatment type	NA	
Dual fuel	No	
Engine family / group information (selection of parent engine for test-bed test)		
Family/group identification	3500PA10001	
Method of pressure charging	Turbocharged	
Charge air cooling system	Separate Circuit Aftercooled	
Criteria of the selection of Parent Engine	Highest NOx emission (g/kWh)	
Number of cylinders	12	
Max rated power per cylinder	158.4 kW	
Rated speed	1800 rpm	
Injection timing range	0-20 ºBTDC	
Selected parent engine	3512, Test spec 4582032	
Test cycle(s)	D2	

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Emissions Test Report No.:	Test Cell Information	Sheet 3/4
Exhaust Pipe		
Diameter	355.6	mm
Length	5.82	m
Insulation	Yes	
Probe location	14.78	m

Measurement equipment

Analyzer	Manufacturer	Model	Measurement ranges	Calibration	
				Span gas conc.	Deviation of calibration
NOx Analyzer	Horiba	CLA-720MA	0-2500 ppm	2396 ppm	± 1 %
CO Analyzer	Horiba	AIA-721	0-5000 ppm	4777 ppm	± 1 %
CO2 Analyzer	Horiba	AIA-722	0-16 %	15.21%	± 1 %
O2 Analyzer	Horiba	MPA-720	0-25 %	20.85%	± 1 %
HC Analyzer	Horiba	FIA-725A	0-500 ppm	471 ppm	± 1 %
Speed	Smith Systems Inc	D261844	550-1900 rpm		± 1 %
Torque	Revere	USP2-10-A	0-18000 Nm		± 1 %
Power, if	N/A	N/A	N/A kW		N/A
Fuel flow	Micro-Motion	2700 / CMF025M	0-8000 g/min		± 1 %
Air flow	CAT / BRANT	0305 / 16NZP	0-16,000 kg/hr		± 2 %
Exhaust flow	N/A	N/A	N/A		N/A
Temperatures					
Charge air coolant inlet	VXI Technologies	EX1048	1023 °C		± 2 °C
Exhaust gas	VXI Technologies	EX1048	1023 °C		± 2 °C
Inlet air	VXI Technologies	EX1048	1023 °C		± 2 °C
Charge air	VXI Technologies	EX1048	1023 °C		± 2 °C
Fuel	VXI Technologies	EX1048	1023 °C		± 2 °C
Pressures					
Exhaust gas	Setra	207	17 kPa		± 2 %
Charge air	Setra	207	340 kPa		± 2 %
Atmospheric	Setra	370	1100 mbar		± 0.5 %
Vapor pressure					
Intake air	Viatran	422 ACADMDN	103.4kPa		± 0.5 %
Humidity					
Intake air	Edgetech	Dew Prime 2	0-20 C Dewpt.		N/A

Fuel Characteristics

Fuel type	ULSD (< 15 ppm sulfur): ISO - F - DMA

Fuel properties			**Fuel elemental analysis**		
Density ISO 3675	0.845	kg/l	Carbon	86.8	%mass
Viscosity ISO	2.5	mm²/s	Hydrogen	13.2	%mass
			Nitrogen	NA	%mass
			Oxygen	NA	%mass
			Sulfur	0.0011	%mass
			LHV / Hu	42.92	MJ/kg

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Mode		1	2	3	4	5
Power / Torque	%	100	75	50	25	10
Speed	%	100	100	100	100	100
Time at beginning of mode		16:18	16:30	16:41	16:53	17:04
Ambient Data						
Atmospheric pressure	kPa	100.0	100.0	100.0	100.0	99.0
Intake air temperature	°C	24.7	24.8	24.9	24.9	25.0
Intake air humidity	g/kg	10.62	10.80	10.67	10.65	10.69
Test condition parameter (*fa*)	-	1.004	1.004	1.005	1.005	1.005
Gaseous Emissions Data						
NOx conc. dry	ppm	975.6	659.4	654.2	441.7	311.8
CO conc. dry	ppm	73.6	21.7	44.9	114.4	236.6
CO2 conc. dry	%	7.83	6.38	5.64	4.86	3.58
O2 conc. dry	%	10.15	12.09	13.09	14.15	15.90
HC conc. wet	ppm	38.0	33.8	31.4	22.2	19.1
Dry/wet corr. factor, k_{wr}		0.9264	0.9375	0.9436	0.9500	0.9604
NOx mass flow	kg/h	16.09	10.09	7.62	3.43	1.83
CO mass flow	kg/h	0.74	0.20	0.32	0.54	0.85
CO2 mass flow	kg/h	1236.46	932.57	628.38	360.86	200.66
O2 mass flow	kg/h	1166.15	1285.82	1061.09	764.56	648.59
HC mass flow	kg/h	0.21	0.17	0.12	0.06	0.04
NOx specific	g/kWh	8.527	7.130	8.077	7.266	9.695
Engine data						
Speed	rpm	1800	1800	1800	1800	1800
Auxiliary power	kW	NA	NA	NA	NA	NA
Dynamometer setting	kW	NA	NA	NA	NA	NA
Power	kW	1887.1	1415.4	943.7	472.0	188.7
Mean effective pressure	kPa	2147	1611	1074	537	215
Fuel rack	mm^3/stroke	709.8	536.4	360.8	208.1	116.5
Uncorrected spec. fuel cons.	g/kWh	205.9	207.5	209.3	241.3	338.2
Fuel flow	kg/h	388.58	293.66	197.50	113.89	63.80
Air flow	kg/h	10851.4	9987.6	7590.7	5042.5	3786.4
Exhaust flow (q_{mew})	kg/h	11239.9	10281.3	7788.2	5156.4	3850.2
Exhaust temperature	°C	459.5	383.8	349.5	330.6	269.6
Exhaust back pressure	kPa	20.4	16.2	9.9	5.2	3.1
Charge air coolant temp. in	°C	84.7	84.3	83.5	82.9	82.6
Charge air coolant temp. out	°C	93.0	90.9	88.1	85.8	84.4
Charge air temperature	°C	51.80	49.97	46.63	45.73	44.90
Charge air reference temp.	°C	51.80	49.97	46.63	45.73	44.90
Charge air pressure	kPa	252.76	221.21	141.13	60.52	21.05

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Appendix C: IMO II Certification Test Report – E3

Parent Engine

Emissions- Test Report No.	Engine Information	Sheet 1/4
Engine		
Manufacturer	Caterpillar Inc., Lafayette, IN USA	
Engine type	3512	
Family or Group identification	3500PA10001	
Serial number	00512103	
Rated speed	1800	rpm
Rated power	1901	kW
Intermediate speed	NA	rpm
Max torque at intermediate speed	NA	Nm
Static injection timing	NA	deg CA
Electronic injection control	Yes	
Variable injection timing	Yes	
Variable turbocharger geometry	No	
Bore	170	mm
Stroke	215	mm
Nominal compression ratio	14.3:1	
Mean effective pressure, at rated power	2165	kPa
Maximum cylinder pressure, at rated power	18000	kPa
Cylinder number and configuration	12 cyl. , Vee	
Auxiliaries	None	
Specified ambient conditions		
Maximum seawater temperature	25	°C
Maximum charge air temperature, if applicable	NA	°C
Cooling system spec., intermediate cooler	Yes	
Cooling system spec., charge air stages	1 stage	
Low / high temperature cooling system set points	NA	°C
Maximum inlet depression	-3.7	kPa
Maximum exhaust back pressure	20.3kPa after engine	kPa
Fuel oil specification	ULSD (< 15 ppm sulfur)	
Fuel oil temperature	30	°C
Emissions test results		
Cycle	E3	
NOx	7.65	g/kWh
Test identification	3500 Certification Test	
Date	14 November 2017	
Test site / bench	TC-L Cell 506	
Test number		
Surveyor	Anthony Melomo, DNV GL & Qing Song Zhang, CCS	
Date and place of report	TC-L Mossville, IL	
Signature		

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Emissions Test Report No.	Engine Family / Group Inform.	Sheet 2/4
Engine Family / Engine Group Information (Common specifications)		
Combustion cycle	4-stroke cycle	
Cooling medium	water	
Cylinder configuration	V12, V16	
Method of aspiration	pressure charged	
Fuel type to be used on board	distillate	
Combustion chamber	Open chamber	
Valve port configuration	Cylinder head	
Valve port size and number	4 valves per cylinder; Intake dia.: 56mm; Exhaust dia.: 56mm	
Fuel system type	Electronic Unit Injector	
Miscellaneous features		
Exhaust gas recirculation	No	
Water injection / emulsion	No	
Air injection	No	
Charge cooling system	Yes	
Exhaust after- treatment	No	
Exhaust after- treatment type	NA	
Dual fuel	No	
Engine Family / Engine Group Information (Selection of Parent Engine for test-bed test)		
Family/Group Identification	3500PA10001	
Method of pressure charging	Turbocharged	
Charge air cooling system	Separate Circuit Aftercooled	
Criteria of the selection of Parent Engine	Highest NOx emission (g/kWh)	
Number of cylinders	12	
Max rated power per cylinder	158.4 kW	
Rated speed	1800 rpm	
Injection timing (range)	0-20 ºBTDC	
Selected Parent Engine	3512, Test spec 4582032	
Test cycle(s)	E3	

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Emissions Test Report No.:			**Test Cell Information**		**Sheet 3/4**
Exhaust Pipe					
Diameter			355.6		mm
Length			5.82		m
Insulation			Yes		
Probe location			14.78		m
Measurement equipment					
Analyzer	Manufacturer	Model	Measurement ranges	Calibration	
				Span gas conc.	Deviation of calibration
NOx Analyzer	Horiba	CLA 720	0-2500 ppm	2396 ppm	± 1 %
CO Analyzer	Horiba	AIA 721 CO(L)	0-5000 ppm	4777 ppm	± 1 %
CO2 Analyzer	Horiba	AIA 722	0-16 %	15.21%	± 1 %
O2 Analyzer	Horiba	MPA 720	0-25 %	20.85%	± 1 %
HC Analyzer	Horiba	FIA 725	0-500 ppm	471 ppm	± 1 %
Speed	CAT	3103	1800 rpm		± 2 rpm
Torque	Revere	USP2-10-A	0-18000 Nm		± 1 %
Power, if applicable	-	-	N/A kW		N/A
Fuel flow	Micro-Motion	CMF025M	8000 g/min		± 2 %
Air flow	CAT / Brandt	MKS 3440	16200 kg/hr		± 2 %
Exhaust flow	N/A	N/A	N/A		N/A
Temperatures					
Charge air coolant inlet	VXI-HP	E1413C	750 °C		± 1 °C
Exhaust gas	VXI-HP	E1413C	750 °C		± 1 °C
Inlet air	VXI-HP	E1413C	750 °C		± 1 °C
Charge air	VXI-HP	E1413C	750 °C		± 1 °C
Fuel	VXI-HP	E1413C	750 °C		± 1 °C
Pressures					
Exhaust gas	Setra	C239	85 kPa		± 0.5 %
Charge air	Setra	207	340 kPa		± 0.5 %
Atmospheric	Setra	370	80-110 kPa		± 0.5 %
Vapor pressure					
Intake air	Setra	C239	17 kPa		± 0.5 %
Humidity					
Intake air	EG&G	660	0-20 °C		± 1 °C

Fuel Characteristics					
Fuel type	ULSD (< 15 ppm sulfur): ISO – F - DMA				
Fuel properties			**Fuel elemental analysis**		
Density ISO 3675	0.845	kg/l	Carbon	86.8	%mass
Viscosity ISO 3104	2.5	mm²/s	Hydrogen	13.2	%mass
			Nitrogen	NA	%mass
			Oxygen	NA	%mass
			Sulfur	0.0011	%mass
			LHV / Hu	42.92	MJ/kg

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Emissions Test Report No. .....

Mode		1	2	3	4
Power / Torque	%	100	75	50	25
Speed	%	100	91	80	63
Time at beginning of mode		14:44	15:00	15:07	15:18
Ambient Data					
Atmospheric pressure	kPa	100.1	100.1	100.1	100.0
Intake air temperature	°C	24.6	24.7	24.9	25.0
Intake air humidity	g/kg	10.73	10.85	10.72	10.64
Test condition parameter (*fa*)	-	1.002	1.003	1.004	1.004
Gaseous Emissions Data					
NOx conc. dry	ppm	971.8	720.8	863.4	778.6
CO conc. dry	ppm	80.5	22.7	74.4	362.6
CO2 conc. dry	%	7.84	6.73	7.35	8.13
O2 conc. dry	%	10.11	11.60	10.77	9.73
HC conc. wet	ppm	36.4	25.1	20.3	8.6
Dry/wet corr. factor, k_{wr}		0.926	0.935	0.930	0.924
NOx mass flow	kg/h	16.07	10.23	7.41	3.19
CO mass flow	kg/h	0.811	0.196	0.389	0.906
CO2 mass flow	kg/h	1240.1	911.9	603.2	319.2
O2 mass flow	kg/h	1163.4	1143.3	642.4	277.6
HC mass flow	kg/h	0.196	0.115	0.056	0.012
NOx specific	g/kWh	8.515	7.230	7.846	6.761
Engine data					
Speed	rpm	1800	1638	1440	1134
Auxiliary power	kW	NA	NA	NA	NA
Dynamometer setting	kW	NA	NA	NA	NA
Power	kW	1886.8	1415.1	944.0	472.2
Mean effective pressure	kPa	2147	1769	1343	853
Fuel rack	mm^3/stroke	712.5	575.6	432.0	295.0
Uncorrected spec. fuel cons.	g/kWh	206.7	202.7	200.4	215.5
Fuel flow	kg/h	390.05	286.77	189.19	101.76
Air flow	kg/h	10872.1	9275.0	5625.7	2698.4
Exhaust flow (q_{mew})	kg/h	11262.2	9561.8	5814.9	2800.1
Exhaust temperature	°C	462.0	400.6	444.1	478.9
Exhaust back pressure	kPa	20.67	14.22	6.93	2.77
Charge air coolant temp. in	°C	84.7	84.4	83.7	83.2
Charge air coolant temp. out	°C	92.9	91.2	88.7	86.8
Charge air temperature	°C	51.93	49.86	46.18	45.13
Charge air reference temp.	°C	51.93	49.86	46.18	45.13
Charge air pressure	kPa	253.52	223.03	118.95	35.00

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