


HEAT REJECTION 3

HEAT REJECTION AND OPERATING DATA MODEL L36GL/GLD; LOW SPEED TURBOS. 130° F (54.5° C) AUX. WATER TEMPERATURE 180° F (82° C) JACKET WATER TEMPERATURE						
	BMEP (PSI)	ENGINE SPEED - RPM				
		1100	1200	1400	1500	1600
POWER (BHP)	176	540	585	685	735	785
	160	490	530	620	665	710
	130	396	432	504	540	576
	100	305	332	388	415	443
	70	213	233	271	291	310
	40	122	133	155	166	177
BRAKE SPEC FUEL CONS. (BTU/BHP-HR)	176	6681	6703	6934	7026	7117
	160	6777	6813	7045	7141	7237
	130	7011	7081	7315	7422	7529
	100	7383	7508	7744	7869	7993
	70	8074	8300	8541	8698	8855
	40	9803	10280	10534	10771	11009
FUEL CONSUMPTION (BTU/HR x 1000)	176	3605	3945	4760	5170	5585
	160	3305	3625	4375	4755	5135
	130	2775	3060	3685	4010	4335
	100	2250	2495	3000	3270	3540
	70	1720	1930	2315	2530	2745
	40	1194	1366	1635	1790	1950
HEAT TO JACKET WATER (BTU/HR x 1000)	176	972	1076	1325	1438	1550
	160	913	1012	1241	1347	1453
	130	809	897	1091	1185	1280
	100	705	782	941	1025	1108
	70	602	668	792	864	936
	40	498	553	642	703	764
HEAT TO LUBE OIL (BTU/HR x 1000)	176	99	112	149	171	193
	160	95	108	144	166	187
	130	89	102	135	156	177
	100	84	95	127	147	167
	70	78	89	118	137	156
	40	72	83	110	128	146
HEAT TO INTERCOOLER (BTU/HR x 1000)	176	141	179	241	282	322
	160	109	141	202	241	279
	130	63	85	139	172	204
	100	28	42	83	108	132
	70	6	13	35	49	62
	40	-5	-5	-5	-4	-4
HEAT TO RADIATION (BTU/HR x 1000)	176	93	95	100	102	105
	160	92	94	99	101	103
	130	92	94	98	100	102
	100	92	94	98	99	101
	70	90	92	97	98	100
	40	85	88	94	96	99
TOTAL ENERGY IN EXHAUST (BTU/HR x 1000)	176	927	1010	1222	1338	1454
	160	835	910	1103	1214	1325
	130	693	763	921	1010	1099
	100	552	623	749	817	885
	70	396	468	571	627	684
	40	229	294	382	437	492

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HEAT REJECTION AND OPERATING DATA MODEL L36GL/GLD; LOW SPEED TURBOS. 130° F (54.5° C) AUX. WATER TEMPERATURE 180° F (82° C) JACKET WATER TEMPERATURE						
	BMEP (PSI)	ENGINE SPEED - RPM				
		1100	1200	1400	1500	1600
EXHAUST TEMP AFTER TURBINE (+/- 50 °F)	176	721	735	759	769	780
	160	723	732	751	761	772
	130	723	731	744	752	759
	100	714	727	741	745	750
	70	692	710	731	737	743
	40	653	671	705	722	739
INDUCTION AIR FLOW (SCFM)	176	1030	1135	1355	1470	1585
	160	930	1025	1230	1340	1450
	130	775	855	1025	1120	1215
	100	625	695	830	905	980
	70	460	525	630	695	755
	40	285	355	435	485	540
EXHAUST GAS FLOW (LBS/HR)	176	4710	5170	6180	6705	7225
	160	4255	4670	5625	6130	6630
	130	3550	3895	4690	5115	5540
	100	2860	3165	3790	4130	4475
	70	2105	2410	2885	3170	3450
	40	1310	1620	1985	2225	2470
NOx EMISSIONS (g/bhp-hr)	176	3.42	2.88	1.92	1.79	1.62
	160	3.24	2.70	1.88	1.68	1.54
	120	2.52	2.22	1.64	1.50	1.34
	80	1.80	1.61	1.25	1.14	0.90
	40	0.96	0.84	0.66	0.61	0.54
	CO EMISSIONS (g/bhp-hr)	176	1.23	1.20	1.31	1.31
160		1.29	1.32	1.34	1.36	1.38
120		1.49	1.47	1.47	1.47	1.46
80		1.68	1.62	1.65	1.69	1.67
40		2.38	2.39	2.21	2.20	2.22
NMHC EMISSIONS (g/bhp-hr)		176	0.38	0.33	0.29	0.25
	160	0.38	0.37	0.30	0.29	0.28
	120	0.45	0.43	0.39	0.35	0.32
	80	0.59	0.52	0.51	0.47	0.45
	40	1.21	1.16	0.91	0.82	0.70
	THC EMISSIONS (g/bhp-hr)	176	2.50	2.14	1.85	1.67
160		2.48	2.37	1.96	1.86	1.77
120		2.92	2.77	2.56	2.23	2.07
80		3.82	3.34	3.28	3.08	2.94
40		7.82	7.56	5.93	5.28	4.57


	HEAT REJECTION AND OPERATING DATA MODEL L36GL/GLD; LOW SPEED TURBOS. 130° F (54.5° C) AUX. WATER TEMPERATURE 180° F (82° C) JACKET WATER TEMPERATURE	EN: 122553 DATE: 4/99	Ref. S <hr style="width: 50%; margin: 0 auto;"/> 7783-3
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HEAT REJECTION 3

NOTES:


1. All data are based on ISO standard conditions of 29.54 inches Hg. (100 kPa) barometric pressure, 77° F (25° C) ambient and induction air temperature, 30% relative humidity (0.3 inches Hg. / 1 kPa water vapor pressure), 180° F (82° C) engine jacket water outlet temperature, and standard ignition timing per Note 5 for 11:1 compression ratio.
2. All data are average values at the standard conditions and will vary for individual engines and with operating and ambient conditions and with changes to ignition timing or air/fuel ratio. An adequate reserve should be used for cooling system or heat recovery calculations. See also Cooling System Guidelines, S-6699-7, latest version.
3. ISO Standard (continuous) power ratings conform to ISO 3046/1, latest version, with a mechanical efficiency of 90% and auxiliary water temperature, T_{cra}, of 130° F (54.5° C) limited to ± 10° F (± 5.5° C).
4. Fuel standard: dry natural gas, 900 BTU/scf (35.38 MJ/m³ [25, V (0; 101.325)]) saturated lower heating value (SLHV) with a minimum Waukesha Knock Indexä of 91. Refer to S-7884-6, latest version, for the full fuel specification.
5. Standard ignition timing is 13° BTDC with J-type 60999T or 60999W spark plugs and 15° BTDC with 4-ground 60999S spark plugs.
6. For heat rejection changes due to engine jacket water outlet temperature higher than standard (Note 1), refer to S-7613-3, latest version.
7. Total Exhaust Energy includes both recoverable and non-recoverable heat. For a procedure to calculate recoverable heat refer to S-8117-1, latest version.
8. Exhaust oxygen concentration set to 7.8% at rated speed and load at standard timing to provide 2 g/bhp-hr or less NO_x. This oxygen level is measured at the port located in the exhaust manifold upstream of the turbocharger.
9. Low pressure (draw thru) fuel system on the GLD model.
10. Reference Engine Ratings and Fuel Consumption curve sheet C-1108-2.
11. Exhaust flow at nominal 29.54 inches Hg. (100 kPa) atmospheric pressure:

$$\text{Flow rate (English): ACFM} = \frac{(\text{Exh. flow, lb/hr}) \times (\text{Exh. temp. } ^\circ\text{F} + 460^\circ)}{2275}$$

	HEAT REJECTION AND OPERATING DATA MODEL L36GL/GLD; LOW SPEED TURBOS. 130° F (54.5° C) AUX. WATER TEMPERATURE 180° F (82° C) JACKET WATER TEMPERATURE	EN: 122553 DATE: 4/99	Ref. S <hr/> 7783-3
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HEAT REJECTION 3

—METRIC—						
HEAT REJECTION AND OPERATING DATA						
MODEL L36GL/GLD; LOW SPEED TURBOS.						
54.5° C (130° F) AUX. WATER TEMPERATURE						
82° C (180° F) JACKET WATER TEMPERATURE						
	BMEP (bar)	ENGINE SPEED - RPM				
		1100	1200	1400	1500	1600
POWER (kW)	12.21	402	439	512	548	585
	11.05	364	397	463	496	529
	8.97	295	322	376	403	429
	6.90	227	248	289	310	330
	4.83	159	173	202	217	231
	2.76	91	99	116	124	132
BRAKE SPECIFIC FUEL CONSUMPTION (kJ/kWh)	12.21	9452	9484	9811	9949	10070
	11.05	9588	9640	9968	10113	10240
	8.97	9919	10019	10349	10511	10652
	6.90	10446	10622	10957	11145	11309
	4.83	11424	11743	12084	12321	12528
	2.76	13870	14545	14904	15263	15576
FUEL CONSUMPTION (kW)	12.21	1056	1156	1395	1516	1636
	11.05	969	1063	1282	1393	1505
	8.97	813	896	1080	1175	1271
	6.90	659	731	880	959	1038
	4.83	504	566	679	742	805
	2.76	350	400	479	525	572
HEAT TO JACKET WATER (kW)	12.21	285	315	388	421	454
	11.05	268	297	364	395	426
	8.97	237	263	320	347	375
	6.90	207	229	276	300	325
	4.83	176	196	232	253	274
	2.76	146	162	188	206	224
HEAT TO LUBE OIL (kW)	12.21	29	33	44	50	57
	11.05	28	32	42	49	55
	8.97	26	30	40	46	52
	6.90	24	28	37	43	49
	4.83	23	26	35	40	46
	2.76	21	24	32	38	43
HEAT TO INTERCOOLER (kW)	12.21	41	52	71	83	94
	11.05	32	41	59	71	82
	8.97	18	25	41	50	60
	6.90	8	12	24	32	39
	4.83	2	4	10	14	18
	2.76	-2	-2	-2	-2	-2
HEAT TO RADIATION (kW)	12.21	27	28	29	30	31
	11.05	27	28	29	30	30
	8.97	27	28	29	29	30
	6.90	27	28	29	29	30
	4.83	26	27	28	29	29
	2.76	25	26	27	28	29
TOTAL ENERGY IN EXHAUST (kW)	12.21	272	296	358	392	426
	11.05	245	267	323	356	388
	8.97	203	223	270	296	322
	6.90	162	183	220	239	259
	4.83	116	137	167	184	200
	2.76	67	86	112	128	144

	HEAT REJECTION AND OPERATING DATA MODEL L36GL/GLD; LOW SPEED TURBOS. 54.5° C (130° F) AUX. WATER TEMPERATURE 82° C (180° F) JACKET WATER TEMPERATURE	EN: 122553 DATE: 4/99	Ref. S <hr style="width: 50%; margin: 0 auto;"/> 7783-3
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HEAT REJECTION 3

—METRIC—						
HEAT REJECTION AND OPERATING DATA						
MODEL L36GL/GLD; LOW SPEED TURBOS.						
54.5° C (130° F) AUX. WATER TEMPERATURE						
82° C (180° F) JACKET WATER TEMPERATURE						
	BMEP (bar)	ENGINE SPEED - RPM				
		1100	1200	1400	1500	1600
EXHAUST TEMPERATURE AFTER TURBINE ± 30° C	12.21	383	390	404	410	416
	11.05	384	389	399	405	411
	8.97	384	388	396	400	404
	6.90	379	386	394	396	399
	4.83	367	377	388	392	395
	2.76	345	355	374	383	393
INDUCTION AIR FLOW (nm³/h)	12.21	1586	1741	2081	2257	2433
	11.05	1432	1572	1893	2063	2232
	8.97	1195	1310	1578	1721	1865
	6.90	962	1065	1274	1389	1505
	4.83	708	810	970	1065	1160
	2.76	437	544	666	748	830
EXHAUST GAS FLOW (kg/h)	12.21	2136	2345	2804	3041	3278
	11.05	1930	2119	2552	2780	3008
	8.97	1610	1767	2127	2320	2514
	6.90	1297	1436	1718	1874	2030
	4.83	955	1093	1309	1437	1565
	2.76	593	736	900	1010	1120
NOx EMISSIONS (g/nm³ @5%O₂)	12.14	1.38	1.16	0.77	0.72	0.65
	11.04	1.31	1.09	0.76	0.68	0.62
	8.28	1.02	0.90	0.66	0.60	0.54
	5.52	0.73	0.65	0.50	0.46	0.36
	2.76	0.39	0.34	0.27	0.25	0.22
	CO EMISSIONS (g/nm³ @5%O₂)	12.14	0.50	0.48	0.53	0.53
11.04		0.52	0.53	0.54	0.55	0.55
8.28		0.60	0.59	0.59	0.59	0.59
5.52		0.68	0.65	0.67	0.68	0.67
2.76		0.96	0.96	0.89	0.89	0.90
NMHC EMISSIONS (g/nm³ @5%O₂)		12.14	0.15	0.13	0.12	0.10
	11.04	0.15	0.15	0.12	0.12	0.11
	8.28	0.18	0.17	0.16	0.14	0.13
	5.52	0.24	0.21	0.20	0.19	0.18
	2.76	0.49	0.47	0.37	0.33	0.28
	THC EMISSIONS (g/nm³ @5%O₂)	12.14	1.01	0.86	0.75	0.67
11.04		1.00	0.96	0.79	0.75	0.71
8.28		1.18	1.12	1.03	0.90	0.83
5.52		1.54	1.34	1.32	1.24	1.19
2.76		3.15	3.05	2.39	2.13	1.84


	HEAT REJECTION AND OPERATING DATA MODEL L36GL/GLD; LOW SPEED TURBOS. 54.5° C (130° F) AUX. WATER TEMPERATURE 82° C (180° F) JACKET WATER TEMPERATURE	EN: 122553 DATE: 4/99	Ref. S <hr style="width: 50%; margin: 0 auto;"/> 7783-3
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HEAT REJECTION 3

NOTES:

1. All data are based on ISO standard conditions of 100 kPa (29.54 inches Hg.) barometric pressure, 25° C (77° F) ambient and induction air temperature, 30% relative humidity (1 kPa / 0.3 inches Hg. water vapor pressure), 82° C (180° F) engine jacket water outlet temperature, and standard ignition timing per Note 5 for 11:1 compression ratio.
2. All data are average values at the standard conditions and will vary for individual engines and with operating and ambient conditions and with changes to ignition timing or air/fuel ratio. An adequate reserve should be used for cooling system or heat recovery calculations. See also Cooling System Guidelines, S-6699-7, latest version.
3. ISO Standard (continuous) power ratings conform to ISO 3046/1, latest version, with a mechanical efficiency of 90% and auxiliary water temperature, T_{cra}, of 54.5° C (130° F) limited to ± 5.5° C (± 10° F).
4. Fuel standard: dry natural gas, 35.38 MJ/m³ [25, V (0; 101.325)] (900 BTU/scf) saturated lower heating value (SLHV) with a minimum Waukesha Knock Indexä of 91. Refer to S-7884-6, latest version, for the full fuel specification.
5. Standard ignition timing is 13° BTDC with J-type 60999T or 60999W spark plugs and 15° BTDC with 4-ground 60999S spark plugs.
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7. Total Exhaust Energy includes both recoverable and non-recoverable heat. For a procedure to calculate recoverable heat refer to S-8117-1, latest version.
8. Exhaust oxygen concentration set to 7.8% at rated speed and load at standard timing to provide 2 g/bhp-hr or less NO_x. This oxygen level is measured at the port located in the exhaust manifold upstream of the turbocharger.
9. Low pressure (draw thru) fuel system on the GLD model.
10. Reference Engine Ratings and Fuel Consumption curve sheet C-1108-2.
11. Exhaust flow at nominal 100 kPa (29.54 inches Hg.) atmospheric pressure:

$$\text{Flow rate (metric): } m^3/h = \frac{(\text{Exh. flow, kg/h}) \times (\text{Exh. temp. } ^\circ\text{C} + 273^\circ)}{336.66}$$

	<p>HEAT REJECTION AND OPERATING DATA MODEL L36GL/GLD; LOW SPEED TURBOS. 54.5° C (130° F) AUX. WATER TEMPERATURE 82° C (180° F) JACKET WATER TEMPERATURE</p>	<p>EN: 122553 DATE: 4/99</p>	<p>Ref. S <hr/> 7783-3</p>
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