Heat rejection

All-speed engines

Table of heat rejection in kW through a heat exchanger or radiator in an all-speed engine with full engine power.

Ambient conditions: 25°C, 1,013 mbar.

Note:

For engines with heat exchangers and for keel cooling engines with one cooling circuit, the values also include charge air cooling. For keel cooling engines with 2 cooling circuits the values only apply to the main cooling circuit of the engine. Values for the charge air cooling circuit are available in the next section.

Engine type	Engine power	Heat rejection (kW), engine speed (rpm)				
		1,200	1,500	1,800	2,100	2,300
DI09 070M	162 kW/220 hp	123	117	130	-	-
DI09 070M[1]	162 kW/220 hp	108	99	104	-	-
DI09 070M	184 kW/250 hp	135	131	144	-	-
DI09 070M[1]	184 kW/250 hp	117	109	113	-	-
DI09 070M	221 kW/300 hp	154	157	163	-	-
DI09 070M[1]	221 kW/300 hp	131	128	128	-	-
DI09 070M	257 kW/350 hp	154	175	183	-	-
DI09 070M[1]	257 kW/350 hp	131	144	148	-	-
DI09 072M	221 kW/300 hp	155	156	164	178	-
DI09 072M[1]	221 kW/300 hp	135	127	129	142	-
DI09 072M	257 kW/350 hp	155	182	185	200	-
DI09 072M[1]	257 kW/350 hp	135	147	146	159	-

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Engine type	Engine power	Heat rejection (kW), engine speed (rpm)				
		1,200	1,500	1,800	2,100	2,300
DI09 072M	294 kW/400 hp	156	182	211	226	-
DI09 072M[1]	294 kW/400 hp	136	147	169	177	-
DI13 070M	294 kW/400 hp	156	186	221	-	-
DI13 070M	331 kW/450 hp	174	205	242	-	-
DI13 070M	368 kW/500 hp	194	228	267	-	-
DI13 070M	405 kW/550 hp	214	254	296	-	-
DI13 071M	294 kW/400 hp	164	182	208	-	-
DI13 071M	331 kW/450 hp	184	204	233	-	-
DI13 071M	368 kW/500 hp	205	231	262	-	-
DI13 072M	441 kW/600 hp	184	250	259	297	323
DI13 072M	478 kW/650 hp	192	274	281	323	350
DI13 073M	331 kW/450 hp	147	202	214	269	-
DI13 073M	368 kW/500 hp	162	221	234	293	-
DI13 073M	405 kW/550 hp	175	243	249	317	-
DI13 077M	515 kW/700 hp	203	292	330	373	394
DI13 077M	551 kW/750 hp	203	313	353	402	429
DI13 078M	331 kW/450 hp	139	204	210	255	-
DI13 078M	368 kW/500 hp	153	223	233	274	-
DI13 078M	405 kW/550 hp	164	244	254	300	-
DI13 080M	162 kW/220 hp	103	124	150	-	-
DI13 080M[1]	162 kW/220 hp	97	111	125	-	-
DI13 080M	184 kW/250 hp	116	139	159	-	-
DI13 080M[1]	184 kW/250 hp	107	122	131	-	-
DI13 080M	221 kW/300 hp	164	165	160[2]	-	-
DI13 080M[1]	221 kW/300 hp	144	139	134[2]	-	-

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Engine type	Engine power	Heat rejection (kW), engine speed (rpm)				
		1,200	1,500	1,800	2,100	2,300
DI13 080M	221 kW/300 hp	133	159	176	-	-
DI13 080M[1]	221 kW/300 hp	121	135	141	-	-
DI13 080M	249 kW/338 hp	147	173	192	-	-
DI13 080M[1]	249 kW/338 hp	131	144	150	-	-
DI13 080M	257 kW/350 hp	152	178	198	-	-
DI13 080M[1]	257 kW/350 hp	135	147	153	-	-
DI13 080M	294 kW/400 hp	172	202	227	-	-
DI13 080M[1]	294 kW/400 hp	150	162	170	-	-
DI13 081M	162 kW/220 hp	104	125	152	-	-
DI13 081M[1]	162 kW/220 hp	97	111	125	-	-
DI13 081M	331 kW/450 hp	192	219	249	-	-
DI13 081M[1]	331 kW/450 hp	162	168	180	-	-
DI13 081M	368 kW/500 hp	212	247	278	-	-
DI13 081M[1]	368 kW/500 hp	175	184	199	-	-
DI13 082M	331 kW/450 hp	158	208	224	268	-
DI13 082M[1]	331 kW/450 hp	142	168	169	192	-
DI13 082M	368 kW/500 hp	176	226	248	293	-
DI13 082M[1]	368 kW/500 hp	155	178	182	208	-
DI13 083M	405 kW/550 hp	153	243	255	299	-
DI13 083M[1]	405 kW/550 hp	139	200	192	211	-
DI13 083M	441 kW/600 hp	153	261	279	328	-
DI13 083M[1]	441 kW/600 hp	139	211	206	229	-
DI13 085M	478 kW/650 hp	168	259	281	335	377
DI13 085M[1]	478 kW/650 hp	153	210	208	234	257
DI13 086M	441 kW/600 hp	182	252	272	323	352

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Engine type	Engine power	Heat rejection (kW), engine speed (rpm)				
		1,200	1,500	1,800	2,100	2,300
DI13 086M	496 kW/675 hp	197	279	298	359	398
DI13 092M	257 kW/345 hp	142	162	178	-	-
DI13 092M[1]	257 kW/345 hp	130	141	149	-	-
DI13 092M	294 kW/395 hp	162	182	199	-	-
DI13 092M[1]	294 kW/395 hp	146	155	163	-	-
DI13 092M	331 kW/445 hp	180	202	222	-	-
DI13 092M[1]	331 kW/445 hp	159	167	177	-	-
DI13 092M	368 kW/495 hp	198	223	246	-	-
DI13 092M[1]	368 kW/495 hp	171	179	191	-	-
DI13 092M	405 kW/545 hp	215	250	276	-	-
DI13 092M[1]	405 kW/545 hp	182	196	211	-	-
DI16 070M	405 kW/550 hp	242	286	321	-	-
DI16 070M	460 kW/625 hp	278	320	354	-	-
DI16 070M	515 kW/700 hp	316	356	387	-	-
DI16 070M	552 kW/750 hp	338	382	418	-	-
DI16 071M	405 kW/550 hp	240	301	323	-	-
DI16 071M	460 kW/625 hp	266	341	366	-	-
DI16 072M	478 kW/650 hp	205	291	324	405	-
DI16 072M	515 kW/700 hp	222	317	344	437	-
DI16 072M	552 kW/750 hp	240	335	367	462	-
DI16 072M	588 kW/800 hp[3]	246	343	388	482	-
DI16 072M	588 kW/800 hp[4]	227	331	370	482	518
DI16 072M	625 kW/850 hp	244	341	392	505	551
DI16 072M	662 kW/900 hp	254	356	418	531	588
DI16 073M	478 kW/650 hp	194	264	278	313	-

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Engine type	Engine power	Heat rejection (kW), engine speed (rpm)				
		1,200	1,500	1,800	2,100	2,300
DI16 073M	515 kW/700 hp	210	280	294	335	-
DI16 073M	552 kW/750 hp	227	295	312	357	-
DI16 073M	588 kW/800 hp	234	306	330	382	-
DI16 076M	662 kW/900 hp	333	424	471	579	582
DI16 076M	736 kW/1,000 hp	333	476	526	633	652
DI16 076M	809 kW/1,100 hp	333	506	583	692	726
DI16 076M	846 kW/1,150 hp	333	506	612	734	767
DI16 077M	662 kW/900 hp	242	325	411	527	575
DI16 077M	736 kW/1,000 hp	242	325	440	564	598
DI16 079M	405 kW/550 hp	223	249	268	-	-
DI16 079M	460 kW/625 hp	253	277	294	-	-
DI16 079M	515 kW/700 hp	288	304	321	-	-
DI16 079M	552 kW/750 hp	300	326	346	-	-
DI16 080M	221 kW/300 hp	144	174	209	-	-
DI16 080M[1]	221 kW/300 hp	135	158	178	-	-
DI16 080M	257 kW/350 hp	166	199	239	-	-
DI16 080M[1]	257 kW/350 hp	154	177	198	-	-
DI16 080M	294 kW/400 hp	190	226	267	-	-
DI16 080M[1]	294 kW/400 hp	174	198	217	-	-
DI16 080M	331 kW/450 hp	213	251	295	-	-
DI16 080M[1]	331 kW/450 hp	193	215	235	-	-
DI16 080M	405 kW/550 hp	260	301	344	-	-
DI16 080M[1]	405 kW/550 hp	231	248	267	-	-
DI16 080M	460 kW/625 hp	281	341	380	-	-
DI16 080M[1]	460 kW/625 hp	247	276	292	-	-

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Engine type	Engine power	Heat rejection (kW), engine speed (rpm)				
		1,200	1,500	1,800	2,100	2,300
DI16 080M	515 kW/700 hp	289	384	416	-	-
DI16 080M[1]	515 kW/700 hp	254	305	317	-	-
DI16 081M	478 kW/650 hp	211	282	347	430	-
DI16 081M[1]	478 kW/650 hp	193	236	270	318	-
DI16 081M	515 kW/700 hp	229	302	364	452	-
DI16 081M[1]	515 kW/700 hp	208	250	282	333	-
DI16 082M	588 kW/800 hp	252	337	405	513	-
DI16 082M[1]	588 kW/800 hp	226	275	309	375	-
DI16 083M	588 kW/800 hp	236	317	387	505	575
DI16 083M	625 kW/850 hp	252	337	409	533	598
DI16 083M	662 kW/900 hp	261	360	436	556	627

1. Engines with keel cooling and two cooling circuits.

2. 1,600 rpm.

3. IFN classification.

4. Patrol craft long classification.

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Single-speed engines

Table of heat rejection in kW through a heat exchanger or radiator. The table applies to single-speed engines at full power according to power level MAP (Marine Auxiliary Power).

Ambient conditions: 25°C, 1,013 mbar.

Note:

For engines with heat exchangers and for keel cooling engines with one cooling circuit, the values also include charge air cooling. For keel cooling engines with 2 cooling circuits the values only apply to the main cooling circuit of the engine. Values for the charge air cooling circuit are available in the next section.

Engine type	Engine power	Heat rejection (kW), engine speed (rpm)	
		1,500	1,800
DI09 074M	199/199 kW	144	152
DI09 074M[1]	199/199 kW	118	121
DI09 074M	217/217 kW	155	161
DI09 074M[1]	217/217 kW	125	130
DI09 074M	269/269 kW	188	193
DI09 074M[1]	269/269 kW	154	155
DI09 074M	269/323 kW	188	233
DI09 074M[1]	269/323 kW	154	189
DI13 074M	285/285 kW	196	202
DI13 074M	323/323 kW	224	230
DI13 074M	323/376 kW	224	273
DI13 074M	376/426 kW	260	303
DI13 074M	426/426 kW	295	303

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Engine type	Engine power	Heat rejection (kW), engine speed (rpm)	
		1,500	1,800
DI13 075M	285/285 kW	203	207
DI13 075M	323/323 kW	228	232
DI13 075M	323/376 kW	228	269
DI13 075M[1]	323/376 kW	194	216
DI13 075M	376/426 kW	262	291
DI13 075M[1]	376/426 kW	217	230
DI13 075M	426/426 kW	284	291
DI13 075M[1]	426/426 kW	231	230
DI13 084M	269 kW	-	226
DI13 084M[1]	269 kW	-	173
DI13 084M	323 kW	-	258
DI13 084M[1]	323 kW	-	190
DI13 084M	376 kW	-	293
DI13 084M[1]	376 kW	-	211
DI13 084M	426 kW	-	331
DI13 084M[1]	426 kW	-	236
DI13 091M	269/285 kW	177	190
DI13 091M[1]	269/285 kW	154	161
DI13 091M	285/323 kW	187	212
DI13 091M[1]	285/323 kW	162	175
DI13 091M	323/374 kW	210	242
DI13 091M[1]	323/374 kW	177	194
DI13 091M	374/426 kW	240	276
DI13 091M[1]	374/426 kW	196	215
DI13 091M	426/426 kW	277	276

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Engine type	Engine power	Heat rejection (kW), engine speed (rpm)	
		1,500	1,800
DI13 091M[1]	426/426 kW	218	215
DI16 074M	430/468 kW	315	360
DI16 074M	450/511 kW	328	386
DI16 074M	480/553 kW	351	416
DI16 074M	511/596 kW	376	449
DI16 075M	430/468 kW	269	293
DI16 075M	450/511 kW	278	315
DI16 075M	480/553 kW	294	335
DI16 075M	511/596 kW	312	361
DI16 084M	468 kW	-	386
DI16 084M[1]	468 kW	-	296
DI16 085M	522 kW	-	424
DI16 085M[1]	522 kW	-	322
DI16 085M	553 kW	-	444
DI16 085M[1]	553 kW	-	335
DI16 090M	430/468 kW	325	359
DI16 090M[1]	430/468 kW	272	283
DI16 090M	450/511 kW	339	394
DI16 090M[1]	450/511 kW	282	308
DI16 090M	480/553 kW	362	427
DI16 090M[1]	480/553 kW	298	331
DI16 090M	511/596 kW	386	465
DI16 090M[1]	511/596 kW	315	358
DI16 090M	535/640 kW	406	501
DI16 090M[1]	535/640 kW	329	384

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Engine type	Engine power	Heat rejection (kW), engine speed (rpm)	
		1,500	1,800
DI16 091M	430/468 kW	320	354
DI16 091M[1]	430/468 kW	273	293
DI16 091M	450/511 kW	335	386
DI16 091M[1]	450/511 kW	284	315
DI16 091M	480/553 kW	359	418
DI16 091M[1]	480/553 kW	302	338
DI16 091M	480/596 kW	359	457
DI16 091M[1]	480/596 kW	302	366

1. Engines with keel cooling and two cooling circuits.

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Heat rejection in a separate charge air cooling circuit

All-speed engines

Table of heat rejection in kW in a separate charge air cooling circuit. The table applies to all-speed engines with keel cooling and 2 coolant circuits.

Ambient conditions: 25°C, 1,013 mbar.

Engine type	Engine power	Heat rejection in the charge air coolant circuit (kW), engine speed (rpm)				
		1,200	1,500	1,800	2,100	2,300
DI09 070M	162 kW/220 hp	15	18	26	-	-
DI09 070M	184 kW/250 hp	18	22	31	-	-
DI09 070M	221 kW/300 hp	23	29	35	-	-
DI09 070M	257 kW/350 hp	23	31	35	-	-
DI09 072M	221 kW/300 hp	20	29	35	36	-
DI09 072M	257 kW/350 hp	20	35	39	41	-
DI09 072M	294 kW/400 hp	20	35	42	49	-
DI13 080M	162 kW/220 hp	6	13	25	-	-
DI13 080M	184 kW/250 hp	9	17	28	-	-
DI13 080M	221 kW/300 hp	20	26	26[1]		
DI13 080M	221 kW/300 hp	12	24	35	-	-
DI13 080M	249 kW/338 hp	16	29	42	-	-
DI13 080M	257 kW/350 hp	17	31	45	-	-
DI13 080M	294 kW/400 hp	22	40	57	-	-
DI13 081M	162 kW/220 hp	7	14	27	-	-
DI13 081M	331 kW/450 hp	30	51	69	-	-
DI13 081M	368 kW/500 hp	37	63	79	-	-

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Engine type	Engine power	Heat rejection in the charge air coolant circuit (kW), engine speed (rpm)				
		1,200	1,500	1,800	2,100	2,300
DI13 082M	331 kW/450 hp	16	40	55	76	-
DI13 082M	368 kW/500 hp	21	48	66	85	-
DI13 083M	405 kW/550 hp	14	43	63	88	-
DI13 083M	441 kW/600 hp	14	50	73	99	-
DI13 085M	478 kW/650 hp	15	49	73	101	120
DI13 092M	257 kW/345 hp	12	21	29	-	-
DI13 092M	294 kW/395 hp	16	27	36	-	-
DI13 092M	331 kW/445 hp	21	35	45	-	-
DI13 092M	368 kW/495 hp	26	43	55	-	-
DI13 092M	405 kW/545 hp	33	54	65	-	-
DI16 073M	478 kW/650 hp	17	52	68	93	-
DI16 073M	515 kW/700 hp	20	58	74	101	-
DI16 073M	552 kW/750 hp	24	63	81	109	-
DI16 073M	588 kW/800 hp	25	67	88	118	-
DI16 079M	405 kW/550 hp	25	45	63	-	-
DI16 079M	460 kW/625 hp	32	54	73	-	-
DI16 079M	515 kW/700 hp	41	65	82	-	-
DI16 079M	552 kW/750 hp	44	72	91	-	-

1. 1,600 rpm.

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Engine type	Engine power	Heat rejection in the charge air coolant circuit (kW), engine speed (rpm)				
		1,200	1,500	1,800	2,100	2,300
DI16 080M	221 kW/300 hp	9	16	31	-	-
DI16 080M	257 kW/350 hp	12	22	41	-	-
DI16 080M	294 kW/400 hp	16	28	50	-	-
DI16 080M	331 kW/450 hp	20	36	60	-	-
DI16 080M	405 kW/550 hp	29	53	77	-	-
DI16 080M	460 kW/625 hp	34	65	88	-	-
DI16 080M	515 kW/700 hp	35	79	99	-	-
DI16 081M	478 kW/650 hp	18	46	77	112	-
DI16 081M	515 kW/700 hp	21	52	82	119	-
DI16 082M	588 kW/800 hp	26	62	96	138	-

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Single-speed engines

Table of heat rejection in kW in a separate charge air cooling circuit. The table applies to single-speed engines with keel cooling and two cooling circuits as well as to single-speed engines without heat exchanger with or without coolant-cooled charge air cooler.

Ambient conditions: 25°C, 1,013 mbar.

Engine type	Engine power	Heat rejection in the charge air coolant circuit (kW), engine speed (rpm)	
		1,500	1,800
DI09 074M	199/199 kW	26	31
DI09 074M	217/217 kW	30	31
DI09 074M	269/269 kW	34	38
DI09 074M	269/323 kW	34	44
DI13 075M	323/376 kW	34	53
DI13 075M	376/426 kW	45	61
DI13 075M	426/426 kW	53	61
DI13 084M	269 kW	-	53
DI13 084M	323 kW	-	68
DI13 084M	376 kW	-	82
DI13 084M	426 kW	-	95
DI13 091M	269/285 kW	23	29
DI13 091M	285/323 kW	25	36
DI13 091M	323/374 kW	32	48
DI13 091M	374/426 kW	44	61
DI13 091M	426/426 kW	58	61
DI16 075M	430/468 kW	56	78
DI16 075M	450/511 kW	60	86

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Engine type	Engine power	Heat rejection in the charge air coolant circuit (kW), engine speed (rpm)	
		1,500	1,800
DI16 075M	480/553 kW	67	94
DI16 075M	511/596 kW	74	104
DI16 084M	468 kW	-	90
DI16 085M	522 kW	-	102
DI16 085M	553 kW	-	109
DI16 090M	430/468 kW	53	76
DI16 090M	450/511 kW	57	86
DI16 090M	480/553 kW	64	96
DI16 090M	511/596 kW	71	107
DI16 090M	535/640 kW	77	117
DI16 091M	430/468 kW	46	60
DI16 091M	450/511 kW	51	71
DI16 091M	480/553 kW	57	80
DI16 091M	480/596 kW	57	91

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Air consumption

All-speed engines

Table of air consumption in kg/min for an all-speed engine with full engine power.

Ambient conditions: 25°C, 1,013 mbar.

Engine type	Engine power	Air consumption (kg/min), engine speed (rpm)				
		1,200	1,500	1,800	2,100	2,300
DI09 070M	162 kW/220 hp	12	15	18	-	-
DI09 070M	184 kW/250 hp	12	16	20	-	-
DI09 070M	221 kW/300 hp	14	18	21	-	-
DI09 070M	257 kW/350 hp	14	18	21	-	-
DI09 072M	221 kW/300 hp	13	17	21	22	-
DI09 072M	257 kW/350 hp	13	19	22	23	-
DI09 072M	294 kW/400 hp	13	19	22	25	-
DI13 070M	294 kW/400 hp	16	23	29	-	-
DI13 070M	331 kW/450 hp	18	25	31	-	-
DI13 070M	368 kW/500 hp	19	27	32	-	-
DI13 070M	405 kW/550 hp	21	29	33	-	-
DI13 071M	294 kW/400 hp	16	23	29	-	-
DI13 071M	331 kW/450 hp	18	25	31	-	-
DI13 071M	368 kW/500 hp	19	27	32	-	-
DI13 072M	441 kW/600 hp	16	27	35	41	45
DI13 072M	478 kW/650 hp	16	29	36	43	47
DI13 073M	331 kW/450 hp	14	23	28	35	-
DI13 073M	368 kW/500 hp	15	24	30	35	-

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Engine type	Engine power	Air consumption (kg/min), engine speed (rpm)				
		1,200	1,500	1,800	2,100	2,300
DI13 073M	405 kW/550 hp	16	26	31	36	-
DI13 077M	515 kW/700 hp	17	29	38	43	46
DI13 077M	551 kW/750 hp	17	30	39	45	47
DI13 078M	331 kW/450 hp	15	25	29	34	-
DI13 078M	368 kW/500 hp	16	26	31	35	-
DI13 078M	405 kW/550 hp	16	28	32	36	-
DI13 080M	162 kW/220 hp	11	16	22	-	-
DI13 080M	184 kW/250 hp	12	17	23	-	-
DI13 080M	221 kW/300 hp	16	20	21[1]		
DI13 080M	221 kW/300 hp	13	19	25	-	-
DI13 080M	249 kW/338 hp	15	21	26	-	-
DI13 080M	257 kW/350 hp	15	21	27	-	-
DI13 080M	294 kW/400 hp	17	24	29	-	-
DI13 081M	162 kW/220 hp	12	16	23	-	-
DI13 081M	331 kW/450 hp	19	26	32	-	-
DI13 081M	368 kW/500 hp	20	29	33	-	-
DI13 082M	331 kW/450 hp	15	24	30	35	-
DI13 082M	368 kW/500 hp	16	26	32	36	-
DI13 083M	405 kW/550 hp	14	24	32	40	-
DI13 083M	441 kW/600 hp	14	25	34	42	-
DI13 085M	478 kW/650 hp	14	25	34	42	46
DI13 086M	441 kW/600 hp	15	25	34	42	46
DI13 086M	496 kW/675 hp	16	28	36	44	48
DI13 092M	257 kW/345 hp	13	19	23	-	-
DI13 092M	294 kW/395 hp	15	21	26	-	-

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Engine type	Engine power	Air consumption (kg/min), engine speed (rpm)				
		1,200	1,500	1,800	2,100	2,300
DI13 092M	331 kW/445 hp	16	23	28	-	-
DI13 092M	368 kW/495 hp	18	25	30	-	-
DI13 092M	405 kW/545 hp	19	27	31	-	-
DI16 070M	405 kW/550 hp	20	29	39	-	-
DI16 070M	460 kW/625 hp	22	32	41	-	-
DI16 070M	515 kW/700 hp	24	34	43	-	-
DI16 070M	552 kW/750 hp	25	36	44	-	-
DI16 071M	405 kW/550 hp	18	27	36	-	-
DI16 071M	460 kW/625 hp	19	30	38	-	-
DI16 072M	478 kW/650 hp	18	30	40	51	-
DI16 072M	515 kW/700 hp	19	32	41	52	-
DI16 072M	552 kW/750 hp	19	33	42	54	-
DI16 072M	588 kW/800 hp[2]	20	34	44	54	-
DI16 072M	588 kW/800 hp[3]	19	33	43	54	58
DI16 072M	625 kW/850 hp	19	34	44	55	59
DI16 072M	662 kW/900 hp	20	34	46	56	60
DI16 073M	478 kW/650 hp	18	31	39	49	-
DI16 073M	515 kW/700 hp	18	32	40	50	-
DI16 073M	552 kW/750 hp	19	33	42	52	-
DI16 073M	588 kW/800 hp	19	34	44	53	-
DI16 076M	662 kW/900 hp	20	29	40	55	57
DI16 076M	736 kW/1,000 hp	20	32	44	57	60
DI16 076M	809 kW/1,100 hp	20	33	47	60	63
DI16 076M	846 kW/1,150 hp	20	33	49	60	64
DI16 077M	662 kW/900 hp	18	29	43	55	59

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Engine type	Engine power	Air consumption (kg/min), engine speed (rpm)				
		1,200	1,500	1,800	2,100	2,300
DI16 077M	736 kW/1,000 hp	18	29	44	58	61
DI16 079M	405 kW/550 hp	20	29	38	-	-
DI16 079M	460 kW/625 hp	22	31	40	-	-
DI16 079M	515 kW/700 hp	24	34	42	-	-
DI16 079M	552 kW/750 hp	24	35	44	-	-
DI16 080M	221 kW/300 hp	15	21	29	-	-
DI16 080M	257 kW/350 hp	16	22	31	-	-
DI16 080M	294 kW/400 hp	17	24	34	-	-
DI16 080M	331 kW/450 hp	19	26	36	-	-
DI16 080M	405 kW/550 hp	21	30	40	-	-
DI16 080M	460 kW/625 hp	22	33	42	-	-
DI16 080M	515 kW/700 hp	22	36	44	-	-
DI16 081M	478 kW/650 hp	18	29	41	50	-
DI16 081M	515 kW/700 hp	19	31	42	51	-
DI16 082M	588 kW/800 hp	20	33	44	54	-
DI16 083M	588 kW/800 hp	19	32	44	56	61
DI16 083M	625 kW/850 hp	20	33	46	57	62
DI16 083M	662 kW/900 hp	20	35	47	58	62

1. 1,600 rpm.

2. IFN classification.

3. Patrol craft long classification.

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Single-speed engines

Table of air consumption in kg/min for a single-speed engine at full power according to power level MAP (Marine Auxiliary Power).

Ambient conditions: 25°C, 1,013 mbar.

Engine type	Engine power	Air consumption (kg/min), engine speed (rpm)	
		1,500	1,800
DI09 074M	199/199 kW	17	20
DI09 074M	217/217 kW	18	20
DI09 074M	269/269 kW	19	21
DI09 074M	269/323 kW	19	22
DI13 074M	285/285 kW	24	28
DI13 074M	323/323 kW	26	30
DI13 074M	323/376 kW	26	33
DI13 074M	376/426 kW	29	34
DI13 074M	426/426 kW	31	34
DI13 075M	285/285 kW	23	28
DI13 075M	323/323 kW	25	30
DI13 075M	323/376 kW	25	33
DI13 075M	376/426 kW	27	34
DI13 075M	426/426 kW	29	34
DI13 084M	269 kW	-	29
DI13 084M	323 kW	-	32
DI13 084M	376 kW	-	35
DI13 084M	426 kW	-	36
DI13 091M	269/285 kW	19	24
DI13 091M	285/323 kW	20	26

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Engine type	Engine power	Air consumption (kg/min), engine speed (rpm)	
		1,500	1,800
DI13 091M	323/374 kW	22	29
DI13 091M	374/426 kW	25	32
DI13 091M	426/426 kW	28	32
DI16 074M	430/468 kW	32	42
DI16 074M	450/511 kW	33	43
DI16 074M	480/553 kW	35	45
DI16 074M	511/596 kW	36	47
DI16 075M	430/468 kW	32	42
DI16 075M	450/511 kW	33	43
DI16 075M	480/553 kW	35	45
DI16 075M	511/596 kW	36	47
DI16 084M	468 kW	-	43
DI16 085M	522 kW	-	45
DI16 085M	553 kW	-	46
DI16 090M	430/468 kW	30	40
DI16 090M	450/511 kW	31	42
DI16 090M	480/553 kW	33	44
DI16 090M	511/596 kW	34	46
DI16 090M	535/640 kW	36	47
DI16 091M	430/468 kW	29	36
DI16 091M	450/511 kW	30	38
DI16 091M	480/553 kW	32	40
DI16 091M	480/596 kW	32	42

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Radiated heat

All-speed engines

Table of radiated heat in kW for an all-speed engine with full engine power.

Ambient conditions: 25°C, 1,013 mbar.

Engine type	Engine power	Radiated heat (kW), engine speed (rpm)				
		1,200	1,500	1,800	2,100	2,300
DI09 070M	162 kW/220 hp	8	8	8	-	-
DI09 070M	184 kW/250 hp	9	8	9	-	-
DI09 070M	221 kW/300 hp	10	10	10	-	-
DI09 070M	257 kW/350 hp	10	12	12	-	-
DI09 072M	221 kW/300 hp	10	10	10	11	-
DI09 072M	257 kW/350 hp	10	12	12	13	-
DI09 072M	294 kW/400 hp	10	12	14	15	-
DI13 070M	294 kW/400 hp	11	13	14	-	-
DI13 070M	331 kW/450 hp	12	14	16	-	-
DI13 070M	368 kW/500 hp	13	16	18	-	-
DI13 070M	405 kW/550 hp	15	18	19	-	-
DI13 071M	294 kW/400 hp	11	13	14	-	-
DI13 071M	331 kW/450 hp	13	15	16	-	-
DI13 071M	368 kW/500 hp	14	16	18	-	-
DI13 072M	441 kW/600 hp	13	18	19	21	22
DI13 072M	478 kW/650 hp	13	20	21	23	24
DI13 073M	331 kW/450 hp	10	14	15	18	-
DI13 073M	368 kW/500 hp	11	15	17	19	-

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Engine type	Engine power	Radiated heat (kW), engine speed (rpm)				
		1,200	1,500	1,800	2,100	2,300
DI13 073M	405 kW/550 hp	12	17	18	21	-
DI13 077M	515 kW/700 hp	13	21	23	26	27
DI13 077M	551 kW/750 hp	13	22	25	28	29
DI13 078M	331 kW/450 hp	10	14	15	17	-
DI13 078M	368 kW/500 hp	11	15	16	18	-
DI13 078M	405 kW/550 hp	11	17	18	20	-
DI13 080M	162 kW/220 hp	6	8	9	-	-
DI13 080M	184 kW/250 hp	7	9	10	-	-
DI13 080M	221 kW/300 hp	10	11	10[1]	-	-
DI13 080M	221 kW/300 hp	8	10	11	-	-
DI13 080M	249 kW/338 hp	9	11	12	-	-
DI13 080M	257 kW/350 hp	10	12	13	-	-
DI13 080M	294 kW/400 hp	11	13	14	-	-
DI13 081M	162 kW/220 hp	6	8	9	-	-
DI13 081M	331 kW/450 hp	12	15	16	-	-
DI13 081M	368 kW/500 hp	14	16	18	-	-
DI13 082M	331 kW/450 hp	10	14	15	17	-
DI13 082M	368 kW/500 hp	11	15	17	19	-
DI13 083M	405 kW/550 hp	10	17	19	21	-
DI13 083M	441 kW/600 hp	10	18	20	22	-
DI13 085M	478 kW/650 hp	11	19	21	23	25
DI13 086M	441 kW/600 hp	12	18	20	22	23
DI13 086M	496 kW/675 hp	13	20	22	24	26
DI13 092M	257 kW/345 hp	9	11	12	-	-
DI13 092M	294 kW/395 hp	11	13	14	-	-

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Engine type	Engine power	Radiated heat (kW), engine speed (rpm)				
		1,200	1,500	1,800	2,100	2,300
DI13 092M	331 kW/445 hp	12	14	15	-	-
DI13 092M	368 kW/495 hp	13	16	17	-	-
DI13 092M	405 kW/545 hp	15	18	19	-	-
DI16 070M	405 kW/550 hp	15	18	20	-	-
DI16 070M	460 kW/625 hp	17	21	22	-	-
DI16 070M	515 kW/700 hp	20	23	25	-	-
DI16 070M	552 kW/750 hp	21	25	26	-	-
DI16 071M	405 kW/550 hp	15	19	20	-	-
DI16 071M	460 kW/625 hp	16	22	23	-	-
DI16 072M	478 kW/650 hp	13	19	21	24	-
DI16 072M	515 kW/700 hp	14	20	22	26	-
DI16 072M	552 kW/750 hp	15	21	24	28	-
DI16 072M	588 kW/800 hp[2]	15	22	25	29	-
DI16 072M	588 kW/800 hp[3]	14	21	24	29	30
DI16 072M	625 kW/850 hp	15	22	25	31	32
DI16 072M	662 kW/900 hp	16	23	27	32	34
DI16 073M	478 kW/650 hp	13	20	22	24	-
DI16 073M	515 kW/700 hp	14	21	23	26	-
DI16 073M	552 kW/750 hp	15	22	25	28	-
DI16 073M	588 kW/800 hp	16	23	26	30	-
DI16 076M	662 kW/900 hp	18	25	29	34	34
DI16 076M	736 kW/1,000 hp	18	28	32	37	38
DI16 076M	809 kW/1,100 hp	18	29	35	40	42
DI16 076M	846 kW/1,150 hp	18	29	37	43	44
DI16 077M	662 kW/900 hp	15	21	27	33	35

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Engine type	Engine power	Radiated heat (kW), engine speed (rpm)				
		1,200	1,500	1,800	2,100	2,300
DI16 077M	736 kW/1,000 hp	15	21	29	37	37
DI16 079M	405 kW/550 hp	15	18	20	-	-
DI16 079M	460 kW/625 hp	17	21	23	-	-
DI16 079M	515 kW/700 hp	20	23	25	-	-
DI16 079M	552 kW/750 hp	21	25	27	-	-
DI16 080M	221 kW/300 hp	9	11	12	-	-
DI16 080M	257 kW/350 hp	10	12	14	-	-
DI16 080M	294 kW/400 hp	12	14	16	-	-
DI16 080M	331 kW/450 hp	13	16	18	-	-
DI16 080M	405 kW/550 hp	16	19	21	-	-
DI16 080M	460 kW/625 hp	17	21	23	-	-
DI16 080M	515 kW/700 hp	18	24	26	-	-
DI16 081M	478 kW/650 hp	13	18	22	25	-
DI16 081M	515 kW/700 hp	14	20	23	27	-
DI16 082M	588 kW/800 hp	16	22	26	31	-
DI16 083M	588 kW/800 hp	14	20	24	30	32
DI16 083M	625 kW/850 hp	15	22	26	32	34
DI16 083M	662 kW/900 hp	16	23	27	33	36

1. 1,600 rpm.

2. IFN classification.

3. Patrol craft long classification.

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Single-speed engines

Table of radiated heat in kW for a single-speed engine at full power according to power level MAP (Marine Auxiliary Power).

Ambient conditions: 25°C, 1,013 mbar.

Engine type	Engine power	Radiated heat (kW), engine speed (rpm)	
		1,500	1,800
DI09 074M	199/199 kW	9	9
DI09 074M	217/217 kW	10	10
DI09 074M	269/269 kW	13	13
DI09 074M	269/323 kW	13	16
DI13 074M	285/285 kW	14	14
DI13 074M	323/323 kW	15	16
DI13 074M	323/376 kW	15	18
DI13 074M	376/426 kW	18	21
DI13 074M	426/426 kW	20	21
DI13 075M	285/285 kW	14	14
DI13 075M	323/323 kW	16	16
DI13 075M	323/376 kW	16	19
DI13 075M	376/426 kW	18	21
DI13 075M	426/426 kW	20	21
DI13 084M	269 kW	-	14
DI13 084M	323 kW	-	16
DI13 084M	376 kW	-	19
DI13 084M	426 kW	-	21
DI13 091M	269/285 kW	12	13
DI13 091M	285/323 kW	13	15

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Engine type	Engine power	Radiated heat (kW), engine speed (rpm)	
		1,500	1,800
DI13 091M	323/374 kW	15	17
DI13 091M	374/426 kW	17	20
DI13 091M	426/426 kW	20	20
DI16 074M	430/468 kW	20	23
DI16 074M	450/511 kW	21	25
DI16 074M	480/553 kW	23	27
DI16 074M	511/596 kW	24	29
DI16 075M	430/468 kW	21	23
DI16 075M	450/511 kW	21	25
DI16 075M	480/553 kW	23	27
DI16 075M	511/596 kW	24	29
DI16 084M	468 kW	-	24
DI16 085M	522 kW	-	26
DI16 085M	553 kW	-	28
DI16 090M	430/468 kW	20	22
DI16 090M	450/511 kW	21	24
DI16 090M	480/553 kW	22	26
DI16 090M	511/596 kW	24	29
DI16 090M	535/640 kW	25	31
DI16 091M	430/468 kW	21	23
DI16 091M	450/511 kW	22	25
DI16 091M	480/553 kW	23	27
DI16 091M	480/596 kW	23	30

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Maximum intake air temperature

All-speed engines

Table of maximum intake air temperature downstream of the charge air cooler in °C for all-speed engines with keel cooling at full engine power.

Ambient conditions: 25°C, 1,013 mbar.

Note:

Check the temperature of the engine intake air when the installation is complete.

Engine type	Engine power	Maximum intake air temperature (°C), engine speed (rpm)				
		1,200	1,500	1,800	2,100	2,300
DI09 070M	162 kW/220 hp	39	39	39	-	-
DI09 070M	184 kW/250 hp	39	39	40	-	-
DI09 070M	221 kW/300 hp	40	41	41	-	-
DI09 070M	257 kW/350 hp	40	42	42	-	-
DI09 072M	221 kW/300 hp	40	42	43	42	-
DI09 072M	257 kW/350 hp	41	44	44	44	-
DI09 072M	294 kW/400 hp	41	44	45	47	-
DI13 071M	294 kW/400 hp	71	76	81	-	-
DI13 071M	331 kW/450 hp	74	80	85	-	-
DI13 071M	368 kW/500 hp	77	84	89	-	-
DI13 073M	331 kW/450 hp	66	75	78	87	-
DI13 073M	368 kW/500 hp	67	78	81	90	-
DI13 073M	405 kW/550 hp	68	81	83	92	-
DI13 080M	162 kW/220 hp	38	40	41	-	-

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Engine type	Engine power	Maximum intake air temperature (°C), engine speed (rpm)				
		1,200	1,500	1,800	2,100	2,300
DI13 080M	184 kW/250 hp	39	40	42	-	-
DI13 080M	221 kW/300 hp	39	42	42[1]	-	-
DI13 080M	221 kW/300 hp	39	42	43	-	-
DI13 080M	249 kW/338 hp	40	42	44	-	-
DI13 080M	257 kW/350 hp	40	43	44	-	-
DI13 080M	294 kW/400 hp	41	44	46	-	-
DI13 081M	162 kW/220 hp	39	40	42	-	-
DI13 081M	331 kW/450 hp	43	46	48	-	-
DI13 081M	368 kW/500 hp	45	48	49	-	-
DI13 082M	331 kW/450 hp	41	45	46	49	-
DI13 082M	368 kW/500 hp	42	46	48	51	-
DI13 083M	405 kW/550 hp	41	45	48	52	-
DI13 083M	441 kW/600 hp	41	45	50	54	-
DI13 085M	478 kW/650 hp	39	45	50	54	57
DI13 092M	257 kW/345 hp	42	43	44	-	-
DI13 092M	294 kW/395 hp	43	44	45	-	-
DI13 092M	331 kW/445 hp	43	45	47	-	-
DI13 092M	368 kW/495 hp	45	47	49	-	-
DI13 092M	405 kW/545 hp	45	49	50	-	-
DI16 071M	405 kW/550 hp	71	76	79	-	-
DI16 071M	460 kW/625 hp	71	78	82	-	-
DI16 073M	478 kW/650 hp	44	54	59	68	-
DI16 073M	515 kW/700 hp	45	56	61	71	-
DI16 073M	552 kW/750 hp	46	57	63	74	-
DI16 073M	588 kW/800 hp	46	58	65	76	-

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Engine type	Engine power	Maximum intake air temperature (°C), engine speed (rpm)				
		1,200	1,500	1,800	2,100	2,300
DI16 079M	405 kW/550 hp	46	52	58	-	-
DI16 079M	460 kW/625 hp	48	55	61	-	-
DI16 079M	515 kW/700 hp	52	58	64	-	-
DI16 079M	552 kW/750 hp	53	59	66	-	-
DI16 080M	221 kW/300 hp	40	41	43	-	-
DI16 080M	257 kW/350 hp	41	42	44	-	-
DI16 080M	294 kW/400 hp	41	42	45	-	-
DI16 080M	331 kW/450 hp	42	43	46	-	-
DI16 080M	405 kW/550 hp	43	45	48	-	-
DI16 080M	460 kW/625 hp	44	47	49	-	-
DI16 080M	515 kW/700 hp	44	48	51	-	-
DI16 081M	478 kW/650 hp	42	44	48	53	-
DI16 081M	515 kW/700 hp	42	45	49	54	-
DI16 082M	588 kW/800 hp	43	46	50	56	-

1. 1,600 rpm.

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Single-speed engines

Table of maximum intake air temperature downstream of charge air cooler in °C. The table applies to single-speed engines with keel cooling at full power according to power level MAP (Marine Auxiliary Power).

Ambient conditions: 25°C, 1,013 mbar.

Note:

Check the temperature of the engine intake air when the installation is complete.

Engine type	Engine power	Maximum intake air temperature (°C), engine speed (rpm)	
		1,500	1,800
DI09 074M	199/199 kW	40	40
DI09 074M	217/217 kW	41	41
DI09 074M	269/269 kW	42	43
DI09 074M	269/323 kW	42	45
DI13 075M	285/285 kW	76	77
DI13 075M	323/323 kW	80	81
DI13 075M	323/376 kW	80	87
DI13 075M	376/426 kW	85	90
DI13 075M	426/426 kW	88	90
DI13 084M	269 kW	-	48
DI13 084M	323 kW	-	50
DI13 084M	376 kW	-	53
DI13 084M	426 kW	-	55
DI13 091M	269/285 kW	44	45
DI13 091M	285/323 kW	44	46

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Engine type	Engine power	Maximum intake air temperature (°C), engine speed (rpm)	
		1,500	1,800
DI13 091M	323/374 kW	45	48
DI13 091M	374/426 kW	47	50
DI13 091M	426/426 kW	49	50
DI16 075M	430/468 kW	54	60
DI16 075M	450/511 kW	55	62
DI16 075M	480/553 kW	56	64
DI16 075M	511/596 kW	58	67
DI16 084M	468 kW	-	50
DI16 085M	522 kW	-	52
DI16 085M	553 kW	-	53
DI16 090M	430/468 kW	47	50
DI16 090M	450/511 kW	47	51
DI16 090M	480/553 kW	48	53
DI16 090M	511/596 kW	49	55
DI16 090M	535/640 kW	50	56
DI16 091M	430/468 kW	46	48
DI16 091M	450/511 kW	47	49
DI16 091M	480/553 kW	47	50
DI16 091M	480/596 kW	47	52

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Exhaust flow and exhaust gas temperature

All-speed engines

Table for determining the preliminary and final inside diameter of the exhaust pipe (Dp) in mm for all-speed engines at full engine power. Ambient conditions: 25°C, 1,013 mbar.

The Dimensioning the exhaust system section in *02:04 Exhaust system* describes how to calculate the diameter of the exhaust pipes.

Engine type	Engine power	Engine speed (rpm)	Exhaust flow (kg/min**)	Exhaust gas temp. (°C*)	Length of the exhaust pipe (metres), inside diameter of the exhaust pipe (mm)					
					5	10	20	30	40	50
DI09 070M	162 kW/220 hp	1,200	12	481	80	85	95	105	110	115
		1,500	15	373	85	90	100	110	115	120
		1,800	19	321	90	100	110	120	125	130
DI09 070M	184 kW/250 hp	1,200	13	492	80	90	100	105	110	115
		1,500	16	384	85	95	105	115	120	125
		1,800	20	335	95	100	115	120	125	130
DI09 070M	221 kW/300 hp	1,200	14	508	85	95	105	110	115	120
		1,500	18	419	90	100	110	120	125	130
		1,800	21	376	95	105	115	125	130	135
DI09 070M	257 kW/350 hp	1,200	14	508	85	95	105	110	115	120
		1,500	19	470	95	105	115	125	130	135
		1,800	21	448	100	105	120	125	135	140
DI09 072M	221 kW/300 hp	1,200	13	514	80	90	100	110	115	120
		1,500	18	401	90	100	110	120	125	130
		1,800	21	359	95	105	115	125	130	135
		2,100	23	388	100	110	120	130	135	140

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Engine type	Engine power	Engine speed (rpm)	Exhaust flow (kg/min**)	Exhaust gas temp. (°C*)	Length of the exhaust pipe (metres), inside diameter of the exhaust pipe (mm)					
					5	10	20	30	40	50
DI09 072M	257 kW/350 hp	1,200	13	514	80	90	100	110	115	120
		1,500	20	441	95	105	115	125	130	135
		1,800	22	402	100	110	120	130	135	140
		2,100	24	427	105	115	125	135	140	145
DI09 072M	294 kW/400 hp	1,200	13	515	80	90	100	110	115	120
		1,500	20	441	95	105	115	125	130	135
		1,800	23	476	105	110	125	135	140	145
		2,100	26	456	105	115	130	140	145	150
DI13 070M	294 kW/400 hp	1,200	17	471	90	100	110	120	125	130
		1,500	24	422	105	110	125	135	140	145
		1,800	30	386	110	120	135	145	150	155
DI13 070M	331 kW/450 hp	1,200	19	482	95	105	115	125	130	135
		1,500	26	430	105	115	130	140	145	150
		1,800	32	400	115	125	140	150	155	160
DI13 070M	368 kW/500 hp	1,200	20	489	95	105	120	125	135	140
		1,500	28	436	110	120	135	140	150	155
		1,800	33	417	120	130	140	150	160	165
DI13 070M	405 kW/550 hp	1,200	22	493	100	110	125	130	140	145
		1,500	30	444	115	125	135	145	155	160
		1,800	34	440	120	130	145	155	160	165
DI13 071M	294 kW/400 hp	1,200	17	519	90	100	110	120	125	130
		1,500	24	460	105	115	125	135	140	145
		1,800	30	411	115	125	135	145	150	160
DI13 071M	331 kW/450 hp	1,200	19	530	95	105	115	125	130	135
		1,500	26	467	110	120	130	140	145	150

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