DNV·GL

Certificate No:
TAS00000FY

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Gears

with type designation(s)

Issued to

Brevini Power Transmission S.p.A.

REGGIO EMILIA RE, Italy

is found to comply with

Standard for Certification No. 2.22 Lifting Appliances
DNV Offshore Standard DNV-OS-E101, Drilling Plant, October 2013
IMO SOLAS 1974 Convention, including 1996 Amendments

Application :

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

This Certificate is valid until **2017-12-31**.

Issued at **Høvik** on **2016-05-27**

for **DNV GL**

DNV GL local station: **Milan**

Approval Engineer: **Sorina Thompson**

Aldo Matteucci
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

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Product description

- EM standard gear – in line planetary gear unit with male/female shaft (spline or key)
- RPR gear – same as standard, multistage in line configuration but with slewing gear output shaft
- RPRC gear – same as standard, multistage right angle configuration but with slewing gear output shaft
- S gear – heavy duty line
- SL gear – heavy duty line, multistage in line configuration
- SLS gear – heavy duty line, multistage in line configuration but with slewing gear output shaft.
- SC gear – heavy duty line, multistage right angle configuration
- SCS gear – heavy duty line, multistage right angle configuration but with slewing gear output shaft
- CC gear - angle units (may also be used together with PWD gears and SLW/SCW gears)
- Planetary gear units may have 1, 2, 3 or 4 stages. The type approval of the whole unit is covered by the Type Approval of the single stages it is assembled of. Brakes are connected to input shaft and can be delivered with or without backstop device.

Application/Limitation

- Output speed is 15 rpm. If other output speed is required, the rating values are to be interpolated. These new values will be provided by Brevini Power Transmissions S.p.A. using their calculation program ISO BreCal2000.
- Load spectrum and classes of utilisation according to F.E.M. (1.001 3rd edition – Revised 1998.10.01) are defined below.

L1 (km = 0.1)

Load	Time
100 %	4 %
50 %	35 %
30 %	61 %

L2 (km = 0.2)

Load	Time
100 %	8 %
60 %	27 %
50 %	33 %
40 %	32 %

L3 (km = 0.4)

Load	Time
100 %	20 %
70 %	46 %
50 %	34 %

L4 (km = 0.8)

Load	Time
100 %	59 %
80 %	41 %

Classes of utilisation

Class	T1	T2	T3	T4	T5	T6	T7	T8
Hours	400	800	1600	3200	6300	12500	25000	50000

EM and RPR Series:

Output torque according to L1 [Nm]

Name	Gear Ratio	T1 M1	T2 M1	T3 M2	T4 M3	T5 M4	T6 M5	T7 M6	T8 M7	SOLAS
EM1010	3,38	1499	1357	1223	1099	988	884	797	781	1443
EM1010	4,39	1369	1243	1121	1008	907	812	723	697	1277
EM1010	6	1256	1144	1033	931	839	752	672	635	1044
EM1010	6,94	1209	1102	995	896	807	724	646	608	1072
EM1010	10,5	655	569	498	426	365	329	297	268	775
EM1020	3,08	4654	4253	3882	3540	3231	2942	2725	2679	3467
EM1020	3,5	4505	4117	3758	3427	3129	2849	2595	2551	3305
EM1020	4,13	4181	3821	3488	3180	2902	2643	2400	2331	2918
EM1020	5,17	3959	3619	3305	3015	2753	2508	2280	1993	2726
EM1020	6	3603	3293	3006	2741	2502	2278	2037	1770	2485
EM1020	7,25	3520	3175	2782	2476	2203	1939	1689	1459	2609
EM1045	3,5	8015	7299	6636	6023	5470	4953	4483	4402	6109
EM1045	4,13	7437	6773	6156	5587	5073	4592	4143	4015	5396
EM1045	5,17	7053	6427	5846	5309	4824	4371	3947	3714	5043
EM1045	6	6408	5839	5308	4817	4374	3960	3574	3277	4597
EM1045	7,25	6266	5711	5193	4636	4123	3624	3150	2713	4829
EM1065	3,5	16509	15083	13765	12548	11449	10421	9523	8906	10899
EM1065	3,86	15489	14151	12914	11772	10741	9776	8875	7939	10856
EM1065	4,33	15060	13757	12552	11439	10434	9494	8616	7667	11148
EM1065	5	14308	13067	11918	10858	9900	9004	8063	7035	10932
EM1065	6	13069	11523	10124	8975	8017	7082	6194	5377	9202
EM1090	4,08	19222	17554	16012	14588	13302	12099	10976	10639	14184
EM1090	5,05	17874	16328	14896	13574	12381	11264	10221	9783	12732
EM1090	5,81	17054	15584	14224	12968	11833	10772	9780	8555	12827
EM1090	6,92	15626	13792	12135	10848	9671	8537	7471	6495	10939
EM1090	8,7	12153	10644	9276	8262	7319	6407	5543	4748	11634
EM1150	3,9	34471	31570	28890	26415	24178	21665	19171	16874	24536
EM1150	5,14	28601	25362	22435	20005	17938	15935	14047	12319	20586
EM1150	6,27	26050	23068	20376	18253	16313	14451	12706	11113	21171
EM1250	4,04	47437	43443	39753	36344	33265	30385	27693	24955	32655
EM1250	5,12	45293	41467	37931	34665	31715	28956	25609	22524	34434
EM1250	6	41143	36480	32270	28927	25880	22958	20223	17728	29686
EM1320	4,89	58272	53313	48729	44495	40671	36407	32072	28120	46081
EM1400	4,08	62065	56679	51698	47098	42942	39055	35423	34493	47398
EM1400	5,05	57851	52845	48212	43932	40066	36450	33070	31472	42458
EM1400	5,81	57040	52115	47554	43342	39538	35979	32350	28303	39155
EM1520	4,34	79608	72591	66091	60087	54664	49593	44855	43435	67999
EM1600	4	118788	108795	99561	91033	83328	76121	69385	67784	89296
EM1600	5	111144	101815	93194	85230	78036	71306	65016	61644	82974
EM1600	7	99120	87969	78144	70217	62734	55643	49055	43068	39155
EM1800	4,04	157645	144301	131971	120582	110293	100668	91672	89629	67999
EM1800	4,95	148382	135850	124266	113567	103901	94859	86408	83419	89296
EM1800	6,64	137416	125859	115173	105304	95829	85118	75171	66137	82974

Output torque according to L2 [Nm]

Name	Gear Ratio	T1 M1	T2 M2	T3 M3	T4 M4	T5 M5	T6 M6	T7 M7	T8 M8	SOLAS
EM1010	3,38	1332	1221	1099	985	883	797	781	765	1443
EM1010	4,39	1221	1116	1008	904	811	723	697	683	1277
EM1010	6	1125	1027	931	836	751	672	635	623	1044
EM1010	6,94	1083	988	896	805	723	646	608	596	1072
EM1010	10,5	552	481	418	364	329	296	268	257	775
EM1020	3,08	4249	3882	3540	3224	2939	2725	2679	2634	3467
EM1020	3,5	4110	3758	3427	3122	2846	2595	2551	2508	3305
EM1020	4,13	3809	3487	3180	2896	2640	2400	2331	2201	2918
EM1020	5,17	3603	3304	3015	2747	2506	2262	1982	1720	2726
EM1020	6	3274	3005	2741	2496	2276	2017	1761	1543	2485
EM1020	7,25	3120	2736	2412	2136	1904	1674	1452	1302	2609
EM1045	3,5	7262	6633	6023	5458	4948	4483	4402	4323	6109
EM1045	4,13	6715	6152	5587	5061	4587	4143	4015	3942	5396
EM1045	5,17	6355	5841	5309	4813	4366	3947	3690	3193	5043
EM1045	6	5767	5301	4817	4364	3956	3574	3258	2846	4597
EM1045	7,25	5641	5137	4518	3989	3552	3117	2698	2413	4829
EM1065	3,5	15057	13763	12548	11424	10409	9523	8833	7733	10899
EM1065	3,86	14112	12912	11772	10718	9766	8875	7880	6882	10856
EM1065	4,33	13707	12549	11439	10411	9483	8616	7617	6641	11148
EM1065	5	13004	11915	10858	9878	8983	7975	6995	6080	10932
EM1065	6	11324	9960	8783	7750	6940	6131	5348	4678	9202
EM1090	4,08	17483	16008	14588	13273	12086	10976	10639	10456	14184
EM1090	5,05	16230	14891	13574	12354	11252	10221	9783	8608	12732
EM1090	5,81	15487	14218	12967	11807	10760	9714	8523	7469	12827
EM1090	6,92	13570	11947	10579	9405	8404	7415	6471	5787	10939
EM1090	8,7	10450	9117	8013	7096	6288	5489	4724	4329	11634
EM1150	3,9	31533	28888	26414	23641	21203	18969	16787	14747	24536
EM1150	5,14	24975	22110	19626	17405	15669	13937	12272	10730	20586
EM1150	6,27	22720	20079	17837	15893	14247	12624	11079	9821	21171
EM1250	4,04	43376	39750	36344	33196	30353	27693	24851	21875	32655
EM1250	5,12	41365	37926	34665	31649	28558	25438	22453	19698	34434
EM1250	6	35943	31811	28293	25227	22644	20099	17676	15607	29686
EM1320	4,89	53150	48721	44495	40050	35933	31887	28043	24867	46081
EM1400	4,08	56478	51687	47097	42849	39011	35423	34493	33561	47398
EM1400	5,05	52564	48195	43931	39979	36409	33070	31349	27415	42458
EM1400	5,81	51811	47536	43341	39453	35939	32116	28203	24742	39155
EM1520	4,34	72126	66062	60085	54543	49536	44855	43435	41628	67999
EM1600	4	108650	99554	91032	83156	76041	69385	67784	66622	89296
EM1600	5	101596	93183	85230	77875	71231	65016	61489	54172	82974
EM1600	7	86742	77032	68529	61471	55064	48843	42981	38800	39155
EM1800	4,04	144079	131960	120581	110063	100561	91672	89629	88154	67999
EM1800	4,95	135525	124250	113566	103685	94758	86408	83419	80355	89296
EM1800	6,64	125444	115152	104676	93927	84252	74858	66010	59283	82974

Output torque according to L3 [Nm]

Name	Gear Ratio	T1 M2	T2 M3	T3 M4	T4 M5	T5 M6	T6 M7	T7 M8	T8 M8	SOLAS
EM1010	3,38	1142	1057	950	849	792	776	760	744	1443
EM1010	4,39	1048	964	872	779	707	692	678	664	1277
EM1010	6	968	887	807	723	647	631	618	606	1044
EM1010	6,94	931	853	776	695	622	604	592	553	1072

EM1010	10,5	446	381	348	316	286	264	253	242	775
EM1020	3,08	3749	3434	3128	2844	2710	2665	2575	2292	3467
EM1020	3,5	3616	3324	3029	2754	2580	2538	2404	2181	3305
EM1020	4,13	3338	3083	2809	2554	2358	2318	2089	1940	2918
EM1020	5,17	3150	2922	2665	2364	2122	1874	1664	1564	2726
EM1020	6	2858	2655	2398	2121	1895	1667	1508	1416	2485
EM1020	7,25	2617	2292	1994	1772	1573	1373	1271	1190	2609
EM1045	3,5	6325	5828	5285	4777	4456	4376	4297	4024	6109
EM1045	4,13	5822	5398	4900	4428	4065	3992	3884	3602	5396
EM1045	5,17	5531	5125	4661	4216	3820	3484	3088	2897	5043
EM1045	6	5018	4644	4225	3819	3451	3078	2780	2605	4597
EM1045	7,25	4911	4295	3726	3300	2924	2546	2354	2199	4829
EM1065	3,5	13248	12169	11081	10070	9315	8328	7333	6646	10899
EM1065	3,86	12380	11413	10395	9334	8344	7436	6527	5998	10856
EM1065	4,33	11999	11085	10097	9013	8104	7200	6303	5892	11148
EM1065	5	11356	10516	9485	8325	7481	6619	5856	5507	10932
EM1065	6	9518	8360	7301	6445	5756	5057	4571	4288	9202
EM1090	4,08	15286	14133	12871	11689	10763	10580	10187	9465	14184
EM1090	5,05	14153	13142	11980	10883	9896	9356	8312	7837	12732
EM1090	5,81	13521	12555	11452	10211	9155	8091	7312	6890	12827
EM1090	6,92	11426	10046	8786	7841	6988	6136	5660	5319	10939
EM1090	8,7	8734	7603	6567	5852	5152	4517	4217	3930	11634
EM1150	3,9	27862	25401	22447	19757	17801	15915	14044	12973	24536
EM1150	5,14	21119	18685	16459	14589	13133	11657	10393	9810	20586
EM1150	6,27	19197	16949	14897	13312	11922	10532	9619	9071	21171
EM1250	4,04	38269	35282	32234	29176	26397	23612	20867	19403	32655
EM1250	5,12	36376	33636	29949	26649	24023	21369	19083	18047	34434
EM1250	6	30411	26892	23682	21169	18996	16819	15294	14442	29686
EM1320	4,89	46642	42632	37548	33623	30156	26693	24372	23019	46081
EM1400	4,08	49437	45638	41549	37728	34894	34301	31971	29726	47398
EM1400	5,05	45868	42544	38769	35215	32148	29774	26487	25003	42458
EM1400	5,81	45191	41967	37936	33768	30292	26792	24232	22850	39155
EM1520	4,34	62761	58131	52844	47861	43956	43186	40662	38350	67999
EM1600	4	95943	88382	80749	73660	68528	67427	63701	59277	89296
EM1600	5	89469	82727	75626	69009	63349	58645	52370	49640	82974
EM1600	7	73522	65057	57364	51732	46324	40990	38047	35978	39155
EM1800	4,04	127060	117036	106848	97382	90623	89152	87684	86236	67999
EM1800	4,95	119207	110197	100663	91772	84344	82976	77606	73610	89296
EM1800	6,64	110106	99418	87817	79182	71041	63000	58162	55059	82974

Output torque according to L4 [Nm]

Name	**Gear Ratio**	**T1 M3**	**T2 M4**	**T3 M5**	**T4 M6**	**T5 M7**	**T6 M8**	**T7 M8**	**T8 M8**	**SOLAS**
EM1010	3,38	982	891	799	783	767	751	736	720	1443
EM1010	4,39	892	817	730	698	684	670	656	642	1277
EM1010	6	826	756	678	636	624	611	599	557	1044
EM1010	6,94	795	726	652	609	597	571	529	490	1072
EM1010	10,5	361	326	297	269	257	247	237	227	775
EM1020	3,08	3249	2965	2729	2683	2639	2385	2215	2085	3467
EM1020	3,5	3138	2871	2609	2555	2513	2236	2107	1983	3305
EM1020	4,13	2900	2662	2420	2334	2205	1991	1874	1762	2918
EM1020	5,17	2741	2526	2232	1966	1731	1607	1509	1415	2726
EM1020	6	2486	2282	1984	1753	1548	1455	1366	1280	2485
EM1020	7,25	2185	1899	1648	1451	1306	1225	1146	1070	2609
EM1045	3,5	5469	4992	4509	4409	4331	4129	3885	3651	6109

EM1045	4,13	5044	4626	4179	4021	3950	3699	3477	3264	5396
EM1045	5,17	4774	4400	3981	3659	3214	2979	2793	2614	5043
EM1045	6	4326	3985	3604	3242	2856	2680	2510	2346	4597
EM1045	7,25	4098	3551	3070	2696	2422	2266	2115	1970	4829
EM1065	3,5	11489	10501	9537	8680	7721	6818	6419	6037	10899
EM1065	3,86	10748	9850	8879	7747	6887	6156	5791	5442	10856
EM1065	4,33	10422	9564	8572	7519	6662	6047	5688	5344	11148
EM1065	5	9867	9028	7871	6933	6114	5654	5314	4988	10932
EM1065	6	7972	6951	6032	5323	4693	4409	4133	3868	9202
EM1090	4,08	13276	12188	11065	10654	10475	9698	9154	8633	14184
EM1090	5,05	12304	11342	10304	9783	8658	8036	7574	7130	12732
EM1090	5,81	11748	10844	9548	8481	7492	7067	6656	6262	12827
EM1090	6,92	9567	8358	7297	6460	5806	5464	5132	4814	10939
EM1090	8,7	7256	6262	5435	4736	4345	4057	3777	3509	11634
EM1150	3,9	24202	21347	18775	16538	14770	13287	12553	11849	24536
EM1150	5,14	17787	15648	13722	12183	10795	10054	9486	8941	20586
EM1150	6,27	16127	14161	12397	11045	9851	9301	8767	8256	21171
EM1250	4,04	33325	30607	27717	24531	21931	19859	18789	17765	32655
EM1250	5,12	31685	28462	25036	22303	19820	18478	17469	16501	34434
EM1250	6	25583	22508	19739	17612	15655	14798	13968	13171	29686
EM1320	4,89	40551	35684	31321	27960	24944	23584	22264	21000	46081
EM1400	4,08	42914	39346	35713	34543	33643	30445	28763	27151	47398
EM1400	5,05	39875	36706	33340	31108	27576	25623	24176	22789	42458
EM1400	5,81	39300	36067	31561	28071	24819	23430	22082	20791	39155
EM1520	4,34	54437	49956	45232	43500	41914	39319	37064	34904	67999
EM1600	4	83541	76680	69924	67876	66797	60605	57481	54487	89296
EM1600	5	77986	71812	65519	61105	54503	50773	48109	45556	82974
EM1600	7	61847	54499	48190	42962	38920	36840	34822	32888	39155
EM1800	4,04	110549	101413	92392	89752	88309	86870	83690	79377	67999
EM1800	4,95	103827	95537	87083	83534	80843	75267	71368	67632	89296
EM1800	6,64	94501	83420	73789	65944	59469	56348	53322	50422	82974

S Series:

Output torque according to L1 [Nm]

Name	Gear Ratio	T1 M1	T2 M1	T3 M2	T4 M3	T5 M4	T6 M5	T7 M6	T8 M7	SOLAS
E150	3,955	34866	31977	29308	26843	24616	22533	20586	20205	24644
E150	4,421	31772	29138	26704	24456	22425	20525	18749	18213	22098
E150	5,062	31721	29096	26670	24429	22405	20511	18301	16174	23383
E150	6	27593	24522	21753	19569	17524	15578	13765	12117	20405
E150	7,5	18231	16122	14241	12778	11389	10063	8825	7697	17309
E250	4,043	47186	43322	39752	36455	33477	30690	28085	27144	32421
E250	4,5	45802	42047	38578	35373	32479	29771	27239	26113	33253
E250	5,118	43586	40011	36709	33658	30902	28324	25914	24383	32648
E250	6	40337	35929	32002	28831	25845	23024	20409	18036	28494
E250	7,364	28089	24943	22225	19956	17826	15816	13952	12261	23607
S300	4,04	69828	64139	58884	54030	49644	45541	41706	40673	49336
S300	4,5	67893	62357	57244	52520	48253	44260	40528	39346	50962
S300	5,12	64946	59667	54028	48700	43760	39080	34736	30793	44290
S300	6	60616	54044	48239	43462	38981	34759	30852	27310	44331
S300	7,36	41080	36528	32636	29309	26201	23279	20576	18126	35382
S400	4,18	86914	79788	73206	67125	61632	56493	51689	50396	71148
S400	4,89	82008	75295	69094	63365	58190	53348	48822	45796	65557
S400	6	77233	69023	61972	55651	49809	44352	39324	34776	59108
S600	4,18	113459	104092	95439	87446	80225	73470	67156	65457	94021

S600	4,89	107132	98302	90144	82609	75802	69433	63481	60521	86727
S600	6	100878	91790	82291	73881	66082	58783	52050	45955	78566
S850	4,18	159425	146293	134161	122955	112832	103361	94508	92124	132824
S850	4,89	150073	137732	126331	115800	106285	97384	89064	84432	121877
S850	6	141721	127608	114565	102878	92074	81983	72685	64272	110198
S1200	4,18	237430	218085	200215	183709	168796	154844	141802	138291	196408
S1200	4,89	225738	207376	190413	174744	160588	147344	134963	126273	183302
S1200	6	212316	189610	170487	153138	137154	122257	108547	96149	167918
S1800	4,18	338687	311318	286036	262682	241582	221843	203389	198421	280946
S1800	4,89	321748	295782	271794	249636	229617	210887	193379	179858	261995
S1800	6	300461	268313	241659	217149	194659	173750	154531	137163	237668
S2500	4,18	463695	426458	392060	360286	331578	304720	279611	272851	386450
S2500	4,89	440572	405234	372590	342436	315191	289702	265873	246368	360402
S2500	6	407661	364354	328540	295311	264910	236692	210779	187372	325903
S3500	4,18	657970	605361	556762	511870	471309	433362	397885	388334	552059
S3500	4,89	625007	575085	528968	486369	447879	411869	378204	350952	514711
S3500	6	577712	516698	466324	419276	376331	336523	299989	266998	468015
S5000	4,35	863898	794115	729650	670101	616295	565951	518877	504802	741855
S5000	5,05	821982	755635	694341	637722	586563	538696	493939	476870	693145

Output torque according to L2 [Nm]

Name	Gear Ratio	T1 M1	T2 M2	T3 M3	T4 M4	T5 M5	T6 M6	T7 M7	T8 M8	SOLAS
E150	3,955	31954	29307	26843	24566	22510	20586	20205	18552	24644
E150	4,421	29105	26702	24456	22380	20504	18749	18213	16278	22098
E150	5,062	29058	26668	24429	22360	20392	18210	16138	14236	23383
E150	6	24185	21470	19146	17139	15400	13699	12090	10717	20405
E150	7,5	15878	14037	12446	11127	9938	8776	7676	6960	17309
E250	4,043	43294	39751	36455	33410	30659	28085	27077	24009	32421
E250	4,5	42012	38576	35373	32414	29740	27239	26058	23088	33253
E250	5,118	39971	36707	33658	30841	28295	25914	24342	21554	32648
E250	6	35466	31600	28225	25356	22806	20333	18006	16024	28494
E250	7,364	24602	21883	19468	17499	15668	13900	12240	11132	23607
S300	4,04	64104	58883	54030	49546	45496	41706	40673	37107	49336
S300	4,5	62314	57242	52520	48157	44216	40528	39346	35209	50962
S300	5,12	59613	53366	47787	42875	38686	34598	30740	27210	44290
S300	6	53366	47619	42563	38290	34457	30750	27271	24309	44331
S300	7,36	36046	32124	28610	25761	23084	20510	18100	16490	35382
S400	4,18	79735	73203	67125	61509	56436	51689	50396	49089	71148
S400	4,89	75224	69090	63365	58074	53294	48822	45742	41015	65557
S400	6	68166	60949	54416	49121	44058	39232	34740	31903	59108
S600	4,18	104005	95435	87446	80064	73395	67156	65457	64425	94021
S600	4,89	98187	90139	82609	75650	69362	63481	60442	54126	86727
S600	6	90623	80935	72143	65109	58362	51914	45901	42103	78566
S850	4,18	146178	134156	122955	112605	103255	94508	92124	90678	132824
S850	4,89	137582	126324	115799	106073	97285	89064	84328	75562	121877
S850	6	126021	112673	100588	90799	81438	72513	64206	58959	110198
S1200	4,18	217965	200210	183709	168463	154688	141802	138291	135453	196408
S1200	4,89	207217	190406	174744	160271	147196	134963	126142	113263	183302
S1200	6	187311	167672	149944	135384	121509	108320	96063	88323	167918
S1800	4,18	311187	286030	262682	241111	221622	203389	198421	192721	280946
S1800	4,89	295606	271786	249636	229170	210678	193379	179696	161599	261995

S1800	6	265159	237687	212980	192358	172791	154252	137059	126205	237668
S2500	4,18	426312	392054	360286	330937	304420	279611	272851	264700	386450
S2500	4,89	405038	372582	342435	314582	289417	265873	246170	221652	360402
S2500	6	360170	323174	289995	261979	235483	210440	187246	172608	325903
S3500	4,18	605181	556754	511870	470403	432937	397885	388334	376748	552059
S3500	4,89	574843	528958	486368	447020	411467	378204	350695	316078	514711
S3500	6	510875	458757	412125	372389	334908	299549	266837	246195	468015
S5000	4,35	793741	729636	670104	615099	565400	518899	504810	497136	741855
S5000	5,05	755145	694322	637725	585426	538171	493958	476877	434668	693145

Output torque according to L3 [Nm]

Name	Gear Ratio	T1 M2	T2 M3	T3 M4	T4 M5	T5 M6	T6 M7	T7 M8	T8 M8	SOLAS
E150	3,955	28340	26083	23871	21822	20421	19982	17756	16514	24644
E150	4,421	25759	23758	21745	19876	18408	17568	15582	14707	22098
E150	5,062	25700	23732	21341	19102	17258	15405	13791	13081	23383
E150	6	20524	18198	16081	14443	12984	11532	10515	9954	20405
E150	7,5	13403	11808	10354	9309	8298	7298	6814	6419	17309
E250	4,043	38451	35438	32480	29738	27671	25855	23002	21478	32421
E250	4,5	37272	34382	31510	28846	26715	24905	22127	20953	33253
E250	5,118	35426	32712	29980	27444	25305	23288	20933	19896	32648
E250	6	30183	26833	23789	21457	19324	17214	15737	14932	28494
E250	7,364	20870	18478	16308	14747	13201	11684	10919	10332	23607
S300	4,04	56998	52534	48177	44140	41096	39935	35589	33267	49336
S300	4,5	55354	51061	46824	42897	39756	37952	33776	32011	50962
S300	5,12	51042	45483	40431	36347	32873	29403	26424	25110	44290
S300	6	45473	40470	35930	32462	29258	26096	23883	22683	44331
S300	7,36	30628	27161	24051	21764	19506	17299	16185	15336	35382
S400	4,18	70797	65248	59793	54738	50925	50142	47853	45534	71148
S400	4,89	66702	61589	56457	51695	47678	43832	40317	38338	65557
S400	6	58079	51638	46049	41687	37415	33275	31342	29763	59108
S600	4,18	92201	84974	77808	71164	66152	65123	63141	60043	94021
S600	4,89	86915	80266	73523	67259	61976	57876	53188	50540	86727
S600	6	77128	68497	60959	55157	49463	43930	41348	39230	78566
S850	4,18	129655	119492	109443	100127	93100	91657	88437	84124	132824
S850	4,89	121857	112529	103100	94345	86961	80776	74264	70592	121877
S850	6	107368	95455	85115	77051	69152	61497	57921	55001	110198
S1200	4,18	193799	178621	163805	150080	139728	137602	132091	125784	196408
S1200	4,89	184018	169896	155849	142821	131833	120968	111371	105987	183302
S1200	6	159780	142221	127087	115106	103403	92088	86803	82503	167918
S1800	4,18	277160	255496	234521	215102	200454	197446	188011	179174	280946
S1800	4,89	262987	242796	222916	204492	188953	172471	158958	151403	261995
S1800	6	226516	201911	180875	163927	147425	131519	124088	118069	237668
S2500	4,18	380172	350520	321971	295548	275617	271525	258313	246323	386450
S2500	4,89	360832	333141	306073	280997	259849	236427	218089	207865	360402
S2500	6	308013	274845	246652	223645	201298	179808	169768	161658	325903
S3500	4,18	540134	498081	457736	420403	392242	386460	367749	350850	552059
S3500	4,89	512560	473251	434998	399572	369694	336991	311065	296641	514711
S3500	6	437281	390526	350965	318347	286732	256385	242207	230781	468015
S5000	4,35	706709	651767	598305	548780	509985	502334	494698	482335	741855

S5000	5,05	671559	620233	569457	522369	481763	461988	428116	407893	693145

Output torque according to L4 [Nm]

Name	Gear Ratio	T1 M3	T2 M4	T3 M5	T4 M6	T5 M7	T6 M8	T7 M8	T8 M8	SOLAS
E150	3,955	24720	22697	20742	20232	18609	16877	16023	15205	24644
E150	4,421	22475	20672	18891	18237	16355	15032	14267	13534	22098
E150	5,062	22433	20272	17921	16048	14326	13376	12683	12020	23383
E150	6	17301	15277	13460	12056	10751	10187	9640	9116	20405
E150	7,5	11233	9843	8662	7676	6981	6585	6200	5832	17309
E250	4,043	33599	30909	28294	26803	24098	21941	20851	19807	32421
E250	4,5	32568	29981	27442	25868	23209	21405	20340	19319	33253
E250	5,118	30957	28523	26107	24237	21699	20326	19314	18344	32648
E250	6	25500	22594	20011	17970	16075	15266	14481	13729	28494
E250	7,364	17562	15489	13739	12247	11166	10576	10004	9456	23607
S300	4,04	49840	45864	42013	40726	37256	33969	32316	30733	49336
S300	4,5	48402	44572	40827	39397	35400	32688	31093	29564	50962
S300	5,12	43228	38399	34051	30604	27392	25654	24373	23144	44290
S300	6	38455	34121	30284	27227	24387	23180	22010	20888	44331
S300	7,36	25809	22810	20287	18115	16542	15689	14861	14067	35382
S400	4,18	61853	56896	52074	50462	49439	46495	44233	42065	71148
S400	4,89	58301	53722	49184	45714	41149	39158	37227	35377	65557
S400	6	49052	43495	38896	34808	32005	30417	28877	27401	59108
S600	4,18	80481	73998	67662	65543	64534	61326	58303	55406	94021
S600	4,89	75906	69923	63957	60387	54301	51637	49054	46578	86727
S600	6	65073	57621	51442	45981	42238	40108	38043	36063	78566
S850	4,18	113206	104102	95216	92246	90830	85910	81702	77669	132824
S850	4,89	106451	98070	89730	84263	75807	72113	68531	65097	121877
S850	6	90675	80397	71891	64331	59148	56211	53362	50632	110198
S1200	4,18	169459	155943	142846	138469	136385	128397	122244	116347	196408
S1200	4,89	160970	148372	135953	126104	113634	108218	102965	97930	183302
S1200	6	135088	119951	107453	96273	88610	84284	80089	76068	167918
S1800	4,18	242628	223403	204867	198674	194132	182837	174214	165950	280946
S1800	4,89	230284	212351	194780	179706	162134	154534	147163	140099	261995
S1800	6	191772	170580	153126	137397	126619	120562	114689	109060	237668
S2500	4,18	333104	306848	281622	273195	266659	251296	239597	228385	386450
S2500	4,89	316226	291700	267780	246252	222390	212103	202127	192567	360402
S2500	6	261035	232486	209013	187748	173177	165018	157106	149523	325903
S3500	4,18	473561	436374	400726	388820	379559	357861	341372	325568	552059
S3500	4,89	449457	414699	380899	350889	317136	302623	288549	275061	514711
S3500	6	370898	330672	297646	267598	247013	235517	224369	213684	468015
S5000	4,35	618711	569938	522689	505458	497955	490469	468815	446816	741855
S5000	5,05	588051	542441	497561	477489	436226	415964	396315	377668	693145

CC Series:

Output torque according to L1 [Nm]

Name	Gear Ratio	T1 M1	T2 M1	T3 M2	T4 M3	T5 M4	T6 M5	T7 M6	T8 M7	SOLAS
CC10	3	550	508	499	492	486	479	468	449	576
CC10	4,89	477	431	388	349	315	284	270	259	544
CC10	6,78	270	243	219	197	178	161	152	146	311
CC40	3	1927	1780	1749	1725	1702	1678	1655	1632	2496

CC40	4,62	2260	2039	1837	1655	1494	1347	1279	1225	2826
CC41	1,69	1549	1431	1406	1386	1368	1349	1330	1312	2106
CC41	2,75	4793	4428	4350	4290	4232	3943	3743	3587	6592
CC41	3,5	2869	2650	2603	2406	2172	1958	1859	1782	3877
CC41	4,87	2943	2655	2392	2155	1945	1753	1665	1595	4105
CC42	2,54	5319	4914	4827	4761	4696	4632	4440	4255	7236
CC42	2,92	8055	7441	7311	7211	7113	7016	6864	6578	11503
CC42	4,56	8262	7581	6831	6152	5554	5007	4753	4555	10325

Output torque according to L2 [Nm]

Name	Gear Ratio	T1 M1	T2 M2	T3 M3	T4 M4	T5 M5	T6 M6	T7 M7	T8 M8	SOLAS
CC10	3	508	499	492	485	479	468	449	430	576
CC10	4,89	428	387	349	315	284	270	259	248	544
CC10	6,78	241	219	197	178	160	152	146	140	311
CC40	3	1780	1749	1725	1701	1678	1655	1632	1601	2496
CC40	4,62	2025	1832	1653	1490	1345	1278	1225	1174	2826
CC41	1,69	1431	1406	1386	1367	1349	1330	1312	1294	2106
CC41	2,75	4428	4350	4290	4231	3937	3743	3587	3438	6592
CC41	3,5	2650	2603	2404	2166	1956	1859	1781	1707	3877
CC41	4,87	2637	2386	2152	1940	1751	1665	1595	1529	4105
CC42	2,54	4914	4827	4761	4695	4632	4440	4255	4078	7236
CC42	2,92	7441	7311	7211	7111	7015	6864	6578	6304	11503
CC42	4,56	7530	6813	6146	5539	5000	4753	4555	4365	10325

Output torque according to L3 [Nm]

Name	Gear Ratio	T1 M2	T2 M3	T3 M4	T4 M5	T5 M6	T6 M7	T7 M8	T8 M8	SOLAS
CC10	3	497	490	483	477	461	442	424	406	576
CC10	4,89	370	336	304	277	266	255	245	234	544
CC10	6,78	209	190	171	157	150	144	138	132	311
CC40	3	1741	1717	1693	1670	1648	1625	1578	1513	2496
CC40	4,62	1751	1590	1437	1313	1260	1208	1158	1110	2826
CC41	1,69	1400	1380	1361	1342	1324	1306	1284	1231	2106
CC41	2,75	4330	4271	4209	3845	3689	3537	3390	3249	6592
CC41	3,5	2546	2313	2090	1910	1832	1757	1683	1613	3877
CC41	4,87	2280	2071	1872	1710	1641	1573	1508	1445	4105
CC42	2,54	4806	4739	4674	4561	4375	4195	4021	3853	7236
CC42	2,92	7279	7178	7079	6982	6764	6486	6216	5957	11503
CC42	4,56	6510	5914	5345	4883	4684	4491	4304	4125	10325

Output torque according to L4 [Nm]

Name	Gear Ratio	T1 M3	T2 M4	T3 M5	T4 M6	T5 M7	T6 M8	T7 M8	T8 M8	SOLAS
CC10	3	486	480	469	450	431	414	396	380	576
CC10	4,89	316	286	271	259	249	239	229	219	544
CC10	6,78	178	161	153	146	140	135	129	124	311
CC40	3	1704	1680	1657	1634	1606	1540	1476	1415	2496

CC40	4,62	1496	1354	1282	1228	1178	1130	1083	1038	2826
CC41	1,69	1370	1351	1332	1314	1296	1253	1201	1151	2106
CC41	2,75	4238	3964	3752	3596	3449	3308	3170	3038	6592
CC41	3,5	2175	1969	1863	1786	1713	1643	1574	1509	3877
CC41	4,87	1947	1763	1669	1599	1534	1471	1410	1351	4105
CC42	2,54	4703	4638	4451	4265	4092	3923	3760	3603	7236
CC42	2,92	7123	7024	6881	6594	6326	6065	5813	5571	11503
CC42	4,56	5561	5034	4765	4566	4380	4200	4025	3858	10325

Brakes

- Standard multidisc static brake design.
- Listed Static Torque values are the effective brake torque (with tolerance) for each configuration.
- When a gearbox is delivered for an application according to Standard for Certification 2.22 – Lifting Appliances, the brake torque for the specific application shall be calculated taking into consideration the factor as given in Ch.2 Sec.5 B305.
- Factor: 1,8 or dynamic factor if this exceeds 1.8 for the application.
- Static Torque for the brake ≥ Factor * Nominal_Output_torque / i (gearbox overall ratio)

Brake – FL type (external version) Brake model	Static Torque [Nm]
FL620	239 ÷ 285
FL635.14M	352 ÷ 401
FL635.16M	505 ÷ 575
FL250.4C / FLs250.4C / FL250.4C-RL	171 ÷ 191
FL250.6C / FLs250.6C / FL250.6C-RL	263 ÷ 293
FL250.8C / FLs250.8C / FL250.8C-RL	361 ÷ 400
FL350.6C / FLs350.6C / FL350.6C-RL	394 ÷ 440
FL350.8C / FLs350.8C / FL350.8C-RL	541 ÷ 600
FL450.6C / FLs450.6C / FL450.6C-RL	512 ÷ 568
FL450.8C / FLs450.8C / FL450.8C-RL	701 ÷ 774
FL650.10C / FLs650.10C / FL650.10C-RL	588 ÷ 696
FL650.12C / FLs650.12C / FL650.12C-RL	728 ÷ 856
FL650.14C / FLs650.14C / FL650.14C-RL	875 ÷ 1023
FL750.10C / FLs750.10C / FL750.10C-RL	767 ÷ 901
FL750.12C / FLs750.12C / FL750.12C-RL	947 ÷ 1106
FL750.14C / FLs750.14C / FL750.14C-RL	1137 ÷ 1321
FL960.8C / FLs960.8C / FL960.8C-RL	923 ÷ 1115
FL960.10C / FLs960.10C / FL960.10C-RL	1153 ÷ 1394
FL960.12C / FLs960.12C / FL960.12C-RL	1384 ÷ 1673
FL960.14C / FLs960.14C / FL960.14C-RL	1615 ÷ 1952
FL960.16C / FLs960.16C / FL960.16C-RL	1845 ÷ 2231
FL960.18C / FLs960.18C / FL960.18C-RL	2076 ÷ 2509
FL875.6C / FLs875.6C / FL875.6C-RL	1060 ÷ 1265
FL875.8C / FLs875.8C / FL875.8C-RL	1414 ÷ 1687
FL875.10C / FLs875.10C / FL875.10C-RL	1767 ÷ 2108
FL875.12C / FLs875.12C / FL875.12C-RL	2121 ÷ 2530
FL875.14C / FLs875.14C / FL875.14C-RL	2474 ÷ 2952
FL875.16C / FLs875.16C / FL875.16C-RL	2828 ÷ 3373

Brake – FL type (external version) Brake model	Static Torque [Nm]
FL7,5.8C (30ext.spring)	1259 ÷ 1478
FL7,5.10C (30ext.spring)	1574 ÷ 1847
FL7,5.12C (30ext.spring)	1811 ÷ 2300
FL7,5.14C (30ext.spring)	2113 ÷ 2683
FLs7,5.14C (30ext.+15int.spring)	2403 ÷ 3130
FL7,5.18C (30ext.spring)	2717 ÷ 3450
FL7,5.18C (30ext.+30int.spring)	3546 ÷ 4455
FL7,5.18C/FLs7,5.18C(30ext.+15int.spring)	3090 ÷ 4024
FL7,5.20C/FLs7,5.20C (30ext.+30int.spring)	3839 ÷ 5089

Brake – CF type (internal version) Gearbox Size	Static Torque [Nm] PWD series	Static Torque [Nm] CTU-CTD series
2100 - 12C	448 ÷ 509	(all ratios) 262 ÷ 303
2100 - 10C	373 ÷ 424	
2100 - 8C	299 ÷ 339	
2100 - 6C	224 ÷ 254	
2100 - 4C	149 ÷ 170	
2100 - 2C	75 ÷ 85	
3150 - 10C	362 ÷ 428	i <= 81,6 174 ÷ 214
3150 - 8C	290 ÷ 342	i > 81,6 140 ÷ 175
3150 - 6C	217 ÷ 257	
3150 - 4C	145 ÷ 171	
3150 - 2C	72 ÷ 86	
3200 - 10C	492 ÷ 582	i <= 81,2 326 ÷ 395
3200 - 8C	394 ÷ 466	i > 81,2 261 ÷ 316
3200 - 6C	295 ÷ 349	
3200 - 4C	197 ÷ 233	
3200 - 2C	98 ÷ 116	
3300 - 12C	566 ÷ 676	i <= 91 450 ÷ 553
3300 - 10C	472 ÷ 563	i > 91 313 ÷ 384
3300 - 8C	377 ÷ 451	
3300 - 6C	283 ÷ 338	
3300 - 4C	189 ÷ 225	
3300 - 2C	94 ÷ 113	
3500 - 12C	551 ÷ 704	i <= 105,8 438 ÷ 577
3500 - 10C	459 ÷ 587	i > 105,8 292 ÷ 384
3500 - 8C	367 ÷ 469	
3500 - 6C	276 ÷ 352	
3500 - 4C	184 ÷ 235	
3500 - 2C	92 ÷ 117	
3700 - 12C	744 ÷ 916	(all ratios) 444 ÷ 562
3700 - 10C	620 ÷ 763	
3700 - 8C	496 ÷ 611	
3700 - 6C	372 ÷ 458	
3700 - 4C	248 ÷ 305	
3700 - 2C	124 ÷ 153	

General Comments

1. Materials with 3.1 certificates are to be used when manufacturing load carrying parts. Traceability is assumed taken care of by the manufacturer's quality system.

2. Upon final installation of gear unit to foundation/frame the fastening bolts are to be pre-stressed according to procedures acceptable to the attending surveyor. We have assumed that the load carrying bolts are of 8.8 quality or higher.

3. Our gear calculations are based on that optimum hardening depths have been achieved according to recognised standards and manufacturer's experience. Material fatigue values based on 90% reliability of survival have been applied according to the requirements for lifting appliances in our rules. Load distribution factors as stated by the manufacturer (based on his experience) have been used and we have not considered these.

4. The bearing lifetime for the gear units are not evaluated in this Type Approval. It is assumed that the manufacturer delivers bearings with sufficient capacity for the class of utilisation they are intended for with respect to strength and materials.

Type Approval documentation

Drawings of sun wheels, planets, ring gears, planetary carriers, housing, brakes and shafts and calculations for all stages and brakes.

Tests carried out

- Test carried out with Vestdavit winch C-273-1 on 95.06.12, witnessed by DNV Bergen and NMD.
- Test carried out with Vestdavit winch C-356-1 on 98.04.21, witnessed by BV Bergen.
- Test carried out with Vestdavit winch C-194-1 in July 93 and September 97, witnessed by LR, RS and USCG.
- Test carried out with Vestdavit winch C-244-2 in 1998, witnessed by NMD, LR, BV and Dutch authorities.

For delivery according to Lifting Appliances, gear unit and winch or similar is to be function and load tested according to Section 6 of the Rules before a DNV product certificate can be issued.

For delivery according to SOLAS a functional test is to be carried out showing compliances with IMO Resolution MSC 81(70) “Testing Part II”

Marking of product

The product to be marked with manufacturer’s name/trademark and type number identification.

Periodical assessment

For retention of the Type Approval, DNV GL surveyor shall perform a survey every second year and before expiry date of this certificate in order to verify that the conditions of the type approval are complied with.

END OF CERTIFICATE