TYPE APPROVAL CERTIFICATE

Certificate No:
TAS00004U

This is to certify:

That the Gears

with type designation(s)
PWD / CTU / CTD

Issued to
BREVINI POWER TRANSMISSION SPA
REGGIO EMILIA RE, Italy

is found to comply with
Standard for Certification No. 2.22 Lifting Appliances

Application :

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

This Certificate is valid until **2018-12-31**.

Issued at **Høvik** on **2015-10-29**

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

- Planetary gear units with 2, 3 or more stages and rotating housing.
- In case of presence of the right angle unit at the gearbox input, the type approval of the whole unit is covered by the Type Approval of the single stages it is assembled of.
- Brakes are available as internal version (CF type) or external version (FL type). Brakes are connected to input shaft and can be delivered with or without backstop device.

Manufactured by:

- Brevini Power Transmission S.p.A.
  Via Luciano Brevini 1/A
  42124 Reggio Emilia – ITALY

- Brevini (Yancheng) Planetary Drives Co., Ltd
  15, South Hope Avenue, 224007
  Yancheng Economic Development Zone - Yancheng - Jiangsu - PRC

Responsibility:

- Brevini Power Transmission S.p.A.
  Via Luciano Brevini 1/A
  42124 Reggio Emilia – ITALY

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 programme ISO BreCal 2000.
- 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

Output torque according to L1 [Nm]

Job Id: **262.1-006800-8**
Certificate No: **TAS000004U**

Name	Gear Ratio	T1 M1	T2 M1	T3 M2	T4 M3	T5 M4	T6 M5	T7 M6	T8 M7	SOLAS
2100 *	14,995	8597	7826	7109	6446	5848	5289	4767	4596	7210
2100 *	17,874	8684	7906	7181	6512	5908	5343	4816	4643	7284
2100 **	22,63	8782	7995	7262	6585	5974	5404	4870	4695	7366
2100 **	26,42	8836	8043	7306	6626	6011	5437	4900	4724	7411
2100 **	31,46	8215	7481	6795	6162	5590	5055	4556	4238	6705
2100 **	38,22	8260	7522	6832	6195	5620	5083	4581	4261	6742
2100 **	49,48	7642	6768	6017	5185	4390	3774	3487	3274	6781
2500S	33,56	37984	34750	30889	27298	24121	21149	19553	17948	30933
31100	83,51	107401	98685	90634	83197	76478	70193	64317	62456	86132
31100	108,89	107689	98958	90885	83427	76690	70387	64495	62629	86376
31100	132,65	107874	99120	91033	83564	76815	70502	64600	62731	86517
31100	157,76	108003	99238	91142	83663	76907	70586	64677	62806	86620
31100	175,31	108071	99301	91188	83716	76955	70630	64718	62856	86675
31100	198,26	108142	99366	91259	83771	77006	70677	64761	62887	86732
3150	65,69	13865	12648	11522	10483	9544	8666	7846	7625	12227
3150	72,56	13885	12666	11539	10497	9557	8678	7857	7636	12245
3150	81,55	13906	12685	11556	10513	9572	8691	7869	7647	12263
3150	93,97	13928	12706	11574	10530	9587	8705	7882	7659	12283
3150	112,12	13952	12727	11594	10548	9603	8720	7895	7672	12304
3150	141,21	13977	12419	10426	8599	8088	7755	7432	7123	12326
3200	67,12	21267	19432	17735	16169	14754	13431	12011	10475	17948
3200	73,43	21293	19457	17758	16189	14772	13448	12026	10488	17970
3200	81,48	21322	19482	17781	16211	14792	13466	12042	10502	17994
3200	92,34	21352	19510	17807	16234	14813	13485	12060	10517	18020
3200	107,58	21385	19540	17834	16258	14836	13506	12078	10533	18047
3200	118,869	21403	19557	17849	16273	14849	13517	12089	10542	18063
3200	130,34	21419	19571	17863	16285	14860	13527	12097	10550	18077
3200	144	21435	19585	17875	16296	14870	13537	12106	10558	18090
3300	66,915	30679	28074	25666	23443	21434	19557	17417	15257	24651
3300	73,2	30718	28109	25698	23472	21462	19581	17439	15276	24682

3300	81,23	30759	28147	25733	23504	21490	19607	17462	15296	24715
3300	92,06	30803	28187	25770	23537	21521	19636	17487	15318	24751
3300	107,25	30850	28230	25809	23573	21554	19666	17514	15342	24788
3300	120,125	30880	28258	25834	23596	21575	19685	17531	15357	24813
3300	129,94	30900	28275	25851	23420	21318	19697	17542	15367	24828
3300	145,523	30925	28299	25872	23630	21606	19713	17556	15379	24849
3500	87,118	38365	35090	32064	29269	26745	23771	20881	18241	31518
3500	95,27	38402	35124	32095	29297	26771	23794	20901	18259	31548
3500	105,69	38442	35161	32128	29328	26798	23818	20923	18277	31581
3500	119,74	38484	35199	32163	29360	26828	23844	20946	18298	31615
3500	139,45	38529	35240	32201	29394	26859	23872	20970	18319	31652
3500	168,89	38577	35284	32241	28248	26452	23902	20996	18342	31692
3700	54,64	62545	57319	52094	46832	41849	37116	32775	28734	47083
3700	98,29	62560	57320	52479	47208	42185	37414	32974	28936	47499
3700	107,48	62614	57369	52524	47249	42221	37446	33002	28961	47540
3700	119,22	62671	57422	52572	47292	42260	37480	33032	28988	47583
3700	135,04	62732	57478	52623	47338	42301	37517	33065	29016	47630
3700	157,25	62797	57537	52678	47387	42345	37556	33099	29046	47679
3700	190,43	62866	57601	52736	47439	42392	37597	33136	29078	47732

* CTD2100.1
** CTD2100.1 or PWD2100
All other units are CTU-series and PWD-series (CTU3150.1 or PWD3150, CTU3200.1 or PWD3200 etc.)

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**
2100 *	14,995	7738	7102	6446	5835	5283	4767	4596	4511	7210
2100 *	17,874	7817	7125	6512	5894	5337	4816	4643	4557	7284
2100 **	22,63	7905	7255	6585	5961	5397	4870	4695	4609	7366
2100 **	26,42	7953	7300	6625	5997	5430	4900	4724	4637	7411
2100 **	31,46	7385	6786	6161	5577	5049	4556	4217	3755	6705
2100 **	38,22	7425	6823	6195	5607	5077	4581	4240	3775	6742
2100 **	49,48	6517	5775	5101	4360	3769	3487	3274	3138	6781
2500S	33,56	33826	30444	27103	23949	21116	19553	17874	15856	30933

31100	83,51	98900	90882	83427	76539	70316	64495	62629	58563	86376
31100	108,89	99062	91031	83564	76664	70431	64600	62731	58459	86517
31100	132,65	99180	91139	83663	76856	70515	64677	62806	58528	86620
31100	157,76	99242	91197	83716	76804	70560	64718	62846	59565	86675
31100	175,31	99307	91257	83771	76855	70606	64761	62887	58604	86732
31100	198,26	12585	11519	10482	9523	8656	7846	7625	7438	12227
3150	72,56	12603	11535	10497	9536	8669	7857	7636	7448	12245
3150	81,55	12622	11552	10513	9551	8682	7869	7647	7459	12263
3150	93,97	12642	11571	10530	9566	8695	7882	7659	7471	12283
3150	112,12	12664	11591	10548	9582	8710	7895	7672	7484	12304
3150	141,21	12183	10394	8596	8080	7751	7432	7123	6826	12326
3200	67,12	19354	17731	16168	14722	13416	11911	10431	9140	17948
3200	73,43	19379	17753	16189	14741	13433	11926	10444	9152	17970
3200	81,48	19405	17777	16210	14760	13451	11942	10458	9164	17994
3200	92,34	19432	17802	16234	14781	13470	11959	10473	9177	18020
3200	107,58	19462	17829	16258	14804	13491	11977	10489	9191	18047
3200	118,869	19479	17845	16272	14817	13503	11988	10498	9199	18063
3200	130,34	19493	17858	16284	14828	13512	11996	10506	9206	18077
3200	144	19507	17871	16296	14839	13522	12005	10514	9212	18090
3300	66,915	28010	25663	23442	21390	19468	17290	15203	13275	24651
3300	73,2	28046	25695	23472	21417	19492	17312	15222	13291	24682
3300	81,23	28083	25729	23503	21445	19518	17335	15242	13309	24715
3300	92,06	28123	25766	23537	21476	19546	17360	15264	13328	24751
3300	107,25	28166	25806	23573	21509	19576	17386	15288	13349	24788
3300	120,125	28194	25831	23596	21530	19596	17403	15303	13362	24813
3300	129,94	28212	25847	23309	21238	19608	17414	15312	13370	24828
3300	145,523	28235	25868	23630	21561	19624	17428	15325	13381	24849
3500	87,118	34999	32059	29269	26153	23428	20743	18182	16152	31518

3500	95,27	35033	32090	29297	26179	23451	20763	18200	16168	31548
3500	105,69	35069	32123	29327	26205	23475	20784	18218	16184	31581
3500	119,74	35107	32159	29360	26234	23501	20807	18239	16202	31615
3500	139,45	35149	32196	29394	26265	23529	20831	18260	16221	31652
3500	168,89	35192	32236	28186	26298	23558	20857	18283	16241	31692
3700	54,64	57232	51380	45716	40968	36708	32587	28656	25763	47083
3700	98,29	57240	51804	46089	41292	37000	32820	28873	25949	47499
3700	107,48	57289	51848	46128	41328	37032	32848	28898	25971	47540
3700	119,22	57341	51896	46170	41365	37065	32878	28924	25995	47583
3700	135,04	57397	51946	46215	41405	37102	32910	28952	26020	47630
3700	157,25	57457	52000	46263	41448	37140	32944	28982	26047	47679
3700	190,43	57520	52057	46314	41494	37181	32981	29014	26076	47732

* CTD2100.1
** CTD2100.1 or PWD2100
All other units are CTU-series and PWD-series (CTU3150.1 or PWD3150, CTU3200.1 or PWD3200 etc.)

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
2100 *	14,995	6714	6222	5647	5099	4653	4569	4484	4401	7201
2100 *	17,874	6782	6285	5705	5151	4701	4615	4530	4446	7284
2100 **	22,63	6859	6356	5769	5209	4753	4667	4581	4496	7366
2100 **	26,42	6901	6395	5804	5240	4782	4696	4609	4523	7411
2100 **	31,46	6417	5938	5397	4872	4405	3988	3666	3434	6705
2100 **	38,22	6452	5971	5426	4899	4429	4009	3686	3453	6742
2100 **	49,48	5305	4679	4081	3665	3391	3229	3094	2965	6781
2500S	33,56	28424	25609	22768	20213	19141	16973	15536	12671	30933
31100	83,51	87704	80903	74231	68046	63101	61420	50750	41221	86138
31100	108,89	87946	81127	74436	68235	63275	61590	57453	46692	86376
31100	132,65	88090	81259	74557	68346	63379	61690	57547	46768	86517
31100	157,76	88195	81356	74646	68427	63454	61764	57615	46824	86620
31100	175,31	88251	81407	74693	68471	63494	61803	57652	46853	86675
31100	198,26	88309	81461	74742	68516	63536	61843	57690	46884	86732
3150	65,69	10977	10149	9229	8366	7715	7581	7216	6800	12227

3150	72,56	10993	10163	9242	8378	7726	7592	7226	6810	12245
3150	81,55	11009	10178	9256	8391	7738	7604	7237	6820	12263
3150	93,97	11027	10195	9271	8404	7750	7616	7248	6831	12283
3150	112,12	11046	10212	9287	8419	7763	7629	7261	6843	12304
3150	141,21	9703	8313	7967	7636	7325	7023	6731	6451	12326
3200	67,12	16933	15668	14113	12521	11213	9891	8943	8416	17948
3200	73,43	16954	15688	14131	12537	11227	9904	8955	8427	17970
3200	81,48	16977	15709	14150	12554	11242	9917	8967	8438	17994
3200	92,34	17001	15731	14170	12572	11258	9931	8979	8450	18020
3200	107,58	17027	15755	14192	12591	11275	9946	8993	8463	18047
3200	118,869	17042	15769	14204	12602	11285	9955	9001	8470	18063
3200	130,34	17054	15781	14215	12611	11293	9962	9008	8476	18077
3200	144	17067	15792	14225	12620	11301	9969	9014	8482	18090
3300	66,915	24638	22745	20412	18152	16307	14446	13002	12268	24651
3300	73,2	24669	22773	20438	18175	16328	14464	13018	12284	24682
3300	81,23	24702	22804	20465	18199	16350	14484	13036	12300	24715
3300	92,06	24737	22836	20494	18226	16373	14504	13054	12318	24751
3300	107,25	24775	22871	20526	18253	16398	14526	13074	12336	24788
3300	120,125	24800	22894	20546	18271	16415	14541	13087	12349	24813
3300	129,94	24815	22134	20559	18283	16425	14550	13095	12356	24828
3300	145,523	24835	22927	20576	18298	16438	14562	13106	12366	24849
3500	87,118	30742	27896	24495	21886	19582	17277	15815	14905	31518
3500	95,27	30772	27924	24519	21907	19601	17293	15831	14920	31548
3500	105,69	30803	27952	24544	21930	19621	17311	15847	14935	31581
3500	119,74	30837	27983	24571	21954	19642	17330	15864	14951	31615
3500	139,45	30873	28016	24600	21980	19665	17350	15883	14969	31652
3500	168,89	30711	27472	24631	22007	19690	17372	15903	14988	31692
3700	54,64	49052	43403	38260	34446	30862	27305	25240	23927	47083

3700	98,29	49468	43762	38572	34725	31104	27522	25442	24050	47499
3700	107,48	49510	43800	38606	34755	31131	27545	25464	24070	47540
3700	119,22	49555	43839	38641	34786	31160	27570	25487	24092	47583
3700	135,04	49604	43882	38678	34820	31190	27597	25512	24116	47630
3700	157,25	49655	43928	38719	34857	31222	27626	25538	24141	47679
3700	190,43	49710	43976	38761	34895	31257	27656	25566	24167	47732

* CTD2100.1
** CTD2100.1 or PWD2100
All other units are CTU-series and PWD-series (CTU3150.1 or PWD3150, CTU3200.1 or PWD3200 etc.)

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
2100 *	14,995	5799	5327	4809	4603	4520	4438	4253	3994	7210
2100 *	17,874	5858	5381	4858	4650	4566	4483	4296	4034	7284
2100 **	22,63	5924	5442	4913	4702	4618	4533	4345	4080	7366
2100 **	26,42	5960	5475	4943	4731	4646	4561	4371	4105	7411
2100 **	31,46	5526	5088	4595	4209	3767	3534	3308	3092	6705
2100 **	38,22	5556	5115	4620	4232	3788	3553	3326	3109	6742
2100 **	49,48	4291	3779	3500	3282	3149	3019	2893	2773	6781
2500S	33,56	23828	21144	19571	17809	15914	15016	12487	10143	30933
31100	83,51	76737	70686	64788	62536	58380	50015	40625	32998	86138
31100	108,89	76949	70881	64967	62709	58541	55775	46016	37377	86376
31100	132,65	77075	70997	65073	62812	58637	55866	46091	37438	86517
31100	157,76	77167	71081	65151	62887	58707	55933	46146	37482	86620
31100	175,31	77215	71126	65192	62926	58744	55968	46175	37506	86675
31100	198,26	77266	71173	65235	62968	58782	56005	16206	37531	86732
3150	65,69	9522	8730	7912	7636	7484	6975	6570	6181	12227
3150	72,56	9535	8743	7923	7647	7495	6985	6579	6190	12245
3150	81,55	9549	8756	7935	7658	7506	6995	6589	6199	12263
3150	93,97	9565	8770	7948	7671	7518	7006	6599	6209	12283
3150	112,12	9581	8785	7961	7684	7531	7018	6611	6220	12304
3150	141,21	8112	7774	7451	7140	6850	6568	6294	6032	12326
3200	67,12	14718	13425	11708	10381	9168	8639	8125	7632	17948

3200	73,43	14737	13442	11723	10394	9180	8649	8135	7642	17970
3200	81,48	14756	13460	11739	10408	9192	8661	8146	7652	17994
3200	92,34	14777	13479	11756	10423	9205	8673	8157	7663	18020
3200	107,58	14800	13499	11773	10439	9219	8687	8170	7674	18047
3200	118,869	14813	13511	11784	10448	9227	8694	8177	7681	18063
3200	130,34	14824	13521	11792	10456	9234	8701	8183	7687	18077
3200	144	14834	13531	11801	10463	9241	8707	8189	7692	18090
3300	66,915	21441	19405	17001	15119	13369	12575	11860	11174	24651
3300	73,2	21468	19430	17023	15139	13386	12591	11875	11188	24682
3300	81,23	21496	19456	17046	15159	13404	12608	11891	11203	24715
3300	92,06	21527	19484	17070	15180	13423	12626	11908	11219	24751
3300	107,25	21560	19513	17096	15204	13444	12645	11926	11237	24788
3300	120,125	21581	19533	17113	15219	13457	12658	11938	11248	24813
3300	129,94	21320	19545	17124	15228	13465	12666	11945	11255	24828
3300	145,523	21613	19561	17138	15241	13476	12676	11955	11264	24849
3500	87,118	26548	23289	20379	18132	16202	15287	14400	13550	31518
3500	95,27	26574	23311	20399	18150	16218	15302	14414	13563	31548
3500	105,69	26601	23335	20420	18169	16234	15318	14429	13577	31581
3500	119,74	26630	23361	20443	18189	16252	15335	14445	13592	31615
3500	139,45	26662	23388	20467	18210	16271	15353	14462	13608	31652
3500	168,89	26438	23417	20492	18233	16291	15372	14480	13625	31692
3700	54,64	41258	36348	32085	28612	25821	24433	23086	21796	47083
3700	98,29	41608	36649	32346	28843	26029	24630	23272	21971	47499
3700	107,48	41644	36680	32374	28868	26052	24651	23292	21990	47540
3700	119,22	41682	36714	32403	28894	26076	24673	23313	22010	47583
3700	135,04	41723	36749	32435	28923	26101	24697	23336	22031	47630
3700	157,25	41766	36788	32469	28953	26128	24723	23360	22054	47679
3700	190,43	41812	36828	32504	28985	26157	24750	23386	22078	47732

* CTD2100.1
** CTD2100.1 or PWD2100
All other units are CTU-series and PWD-series (CTU3150.1 or PWD3150, CTU3200.1 or PWD3200 etc.)

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	352 ÷ 401
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-	2474 ÷ 2952

RL	
FL875.16C / FLs875.16C / FL875.16C-RL	2828 ÷ 3373
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 for all load-carrying members are documented with EN 10204 3.1 material certificates reporting chemical composition and mechanical properties
2. Alternative materials may be acceptable provided Brevini's "Rule NPI 031" is followed and mechanical testing and properties are according to the material specified on the drawing.
3. Traceability is assumed taken care of by the manufacturer's quality system.
4. 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.
5. 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.
6. The bearing lifetime is not evaluated in this Type Approval. It is assumed that the manufacturer delivers bearings with sufficient capacity for the class of utilization.
7. Manufacturer's specifications for operations at low temperatures to be followed. At temperatures below -20 degrees Celsius, special considerations may apply.
8. The approval is based on min steel grade MQ (ref. ISO 6336-5) for all main structural gearing components.

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

- Survey report MIL-09-0097-1 from DNV Milan.
- Survey report 372D0575 from DNV Nantong dated 2010-03-19.
- Survey report GEN040917-1 for PWD3500 gearbox, witnessed by DNV Venice
- For delivery according to The Standard for Certification 2.22 - Lifting Appliances, gear units and winches or similar is to be function and load tested according to Ch.2 Sec.7 the standard 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, type number identification and DNV GL type approval number.

Periodical assessment

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

END OF CERTIFICATE