

interberg



OPzS Vented Tubular Plate Batteries



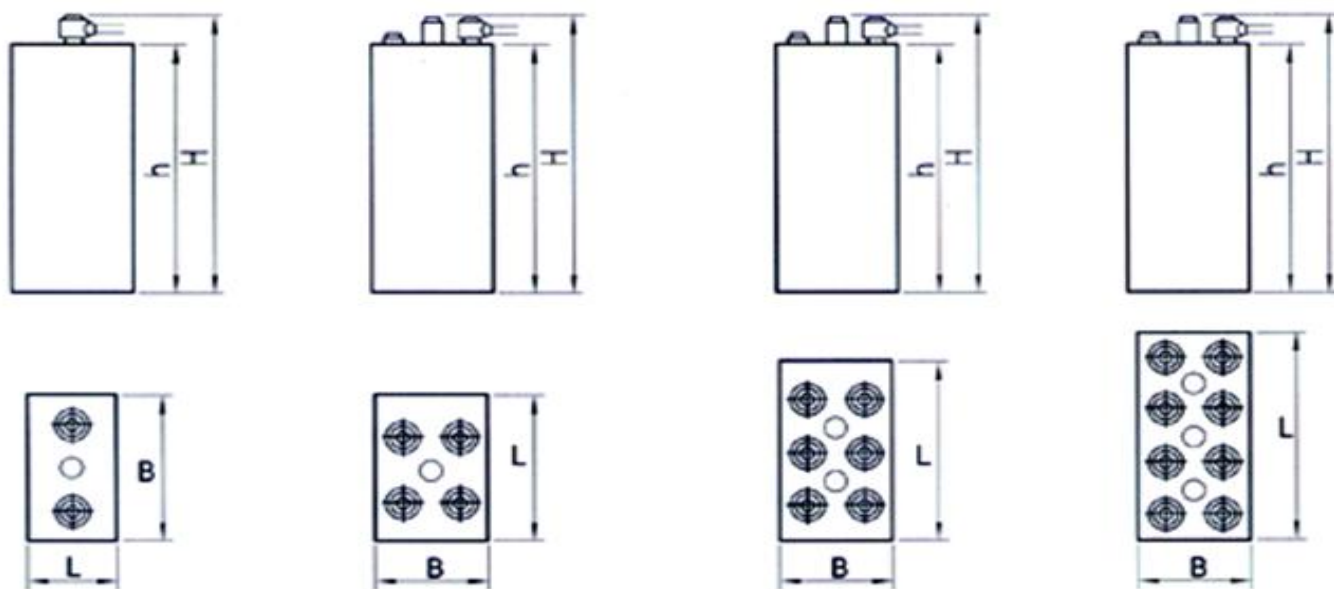
catalogue

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ISO 9001:08 -- ISO 14001:04
OHSAS 18001:07
Certificate No.: 09-QEO-01427-TIC

OPzS Batteries Cell Terminal Positions





Compliant Standards

Interberg OPzS Batteries meet or exceed the performance parameters and requirement of german Standard DIN-40736, 40737 and IEC-EN-60896-1.

Main Applications

Interberg OPzS Batteries are ideally suited to operate, among others, in:

- back-up power supply for communication and signaling systems
- telecommunication,
- back-up power supply for UPS and Emergency Lighting
- Emergency Power Supply in Public Buildings, Ships, etc.
- Operation of equipments in conventional and Nuclear Power Plants

Product Characteristics

- The positive electrodes are tubular plates, which effectively prevent the active materials from falling off. The skeleton of the positive plate is made of a die cast PbSb multi-alloy that ensures a corrosion proof excellent performance.

Operation Conditions

- * Maximum operation altitude
- * Operation Temperature Range
- * Best Operation Temperature Range
- * Relative Humidity
- * Nominal Electrolyte Specific Gravity
- * Electrolyte Refilling Interval
- * Electrolyte Gravity Temp. Coefficient

The Design Life of these batteries exceeds 20 years.

- **Negative Plates :** they are pasted on radial-shaped structured grids. This leads to a substantial improve of the battery's behavior as regard to large current discharge capacity and to charge acceptance capability.

- **Separators :** the combined use of porous rubber and porous PVC, the separators offer a high porosity and an excellent corrosion resistance. This enables them to absorb more acid, what leads to a highly efficient internal short-circuit prevention, under a fast electrolyte diffusion, thus largely reducing the cell's resistance.

- **Cell cases :** cell jars are made of nice looking corrosion proof, flame retardant, strong shock and impact resistant transparent ABS plastic, which enables a perfect vision of the cell's internal parts.

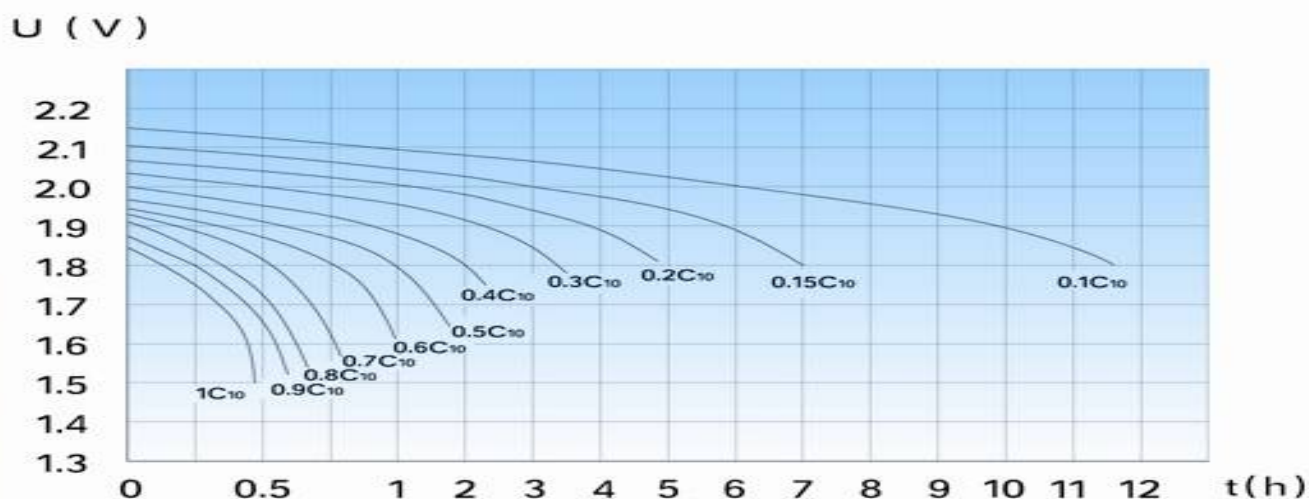
- **Terminal Posts /Pillars :** fitted with a built-in copper core insert. The cell terminals have an unique sealing structure which avoids stress on the posts caused by the elongation of the positive plates, thus ensuring a reliable terminal sealing and a quite long battery life expectancy.

- : shall not exceed 4000 m
- : between -10°C and +55°C
- : between 0°C and +30°C
- : ≤ 90 %
- : 1.24 +/- 0.010 at 20°C
- : ca. 3 years at normal float charge at 20°C
- : 0.0008 per 1°C

The battery shall be kept away from fire and organic solvents and shall be protected from direct sunshine. Battery cells of a same group shall be used at the same environmental temperature.

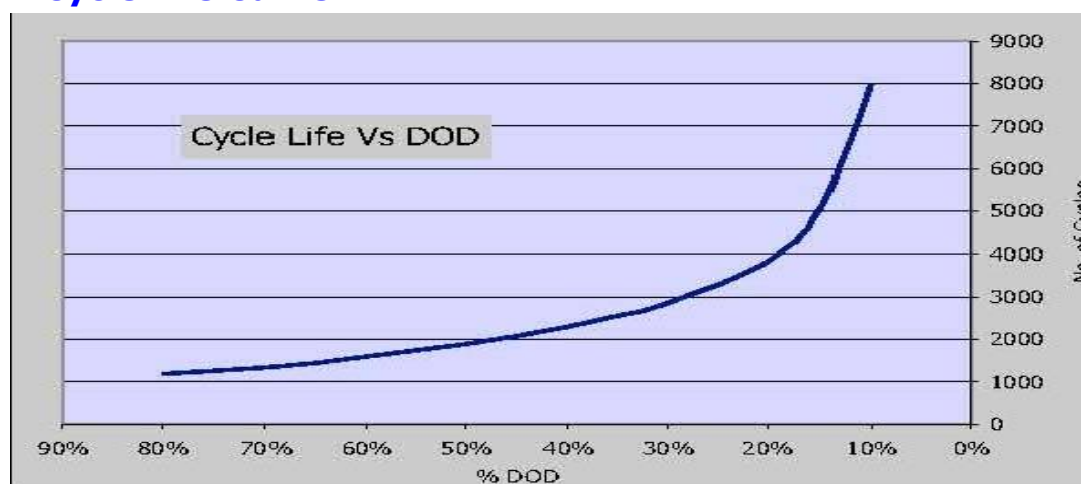
- * Floating Charge Voltage : 2.25 V/cell/20°C
- * Float Charge Life Expectancy : 18 – 20 years at 20°C
- * Self Discharge : approx. 2 % per month at 20°C
- * Cycling Endurance : approx. 1200 cycles at a 75% discharge depth.
- * Constant Current Charging : max. 0.05 A/Ah when $V > 2.40$

Characteristic Discharge Curves



Discharge characteristic at different rate (20°C)

Cycle Life Curve



Cell Types and Specifications

Cell Type	V	Capacity (Ah/10h)	Cell Length (mm)	Cell Width (mm)	Cell Height (mm)	Cell Total Height (mm)	Cell Weight (Dry) Kg	Cell Weight (Wet) Kg	Acid Weight (1.24 Kg/Lit)	Number of Terminals
4-OPzS-200	2	200	103	206	354	409	13.50	18.00	4.50	1+ / 1-
5-OPzS-250	2	250	124	206	354	409	16.00	21.00	5.00	1+ / 1-
6-OPzS-300	2	300	145	206	354	409	19.00	25.00	6.00	1+ / 1-
5-OPzS-350	2	350	124	206	470	525	21.50	28.00	6.50	1+ / 1-
6-OPzS-420	2	420	145	206	470	525	25.50	33.50	8.00	1+ / 1-
7-OPzS-490	2	490	166	206	470	525	29.00	39.00	10.00	1+ / 1-
6-OPzS-600	2	600	145	206	645	700	34.00	46.00	12.00	1+ / 1-
8-OPzS-800	2	800	191	210	645	700	48.00	64.00	16.00	2+ / 2-
10-OPzS-1000	2	1000	233	210	645	700	57.00	77.00	20.00	2+ / 2-
12-OPzS-1200	2	1200	275	210	645	700	68.00	92.00	24.00	2+ / 2-
12-OPzS-1500	2	1500	275	210	795	850	82.00	112.00	30.00	2+ / 2-
16-OPzS-2000	2	2000	399	214	771	826	110.00	150.00	40.00	3+ / 3-
20-OPzS-2500	2	2500	487	212	771	826	140.00	190.00	50.00	4+ / 4-
24-OPzS-3000	2	3000	576	212	771	826	163.00	225.00	62.00	4+ / 4-

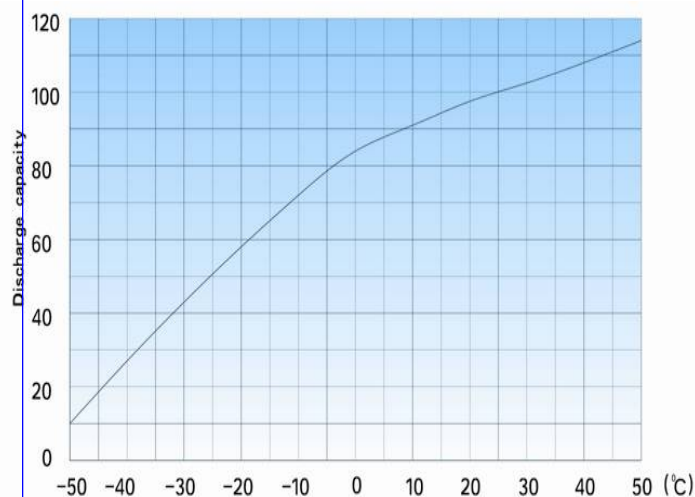
Nominal Electrical Discharge Parameters (Discharge Currents to the nominal Cut-Off Voltage of 1.80V/Cell)

Cell Types	30 min	45 min	60 min	90 min	2 h	3 h	5 h	8 h	10 h	20 h
4-OPzS-200	125	106	93	75	63	49	34	25	21	12
5-OPzS-250	158	134	118	95	80	62	44	31	27	15
6-OPzS-300	187	159	139	113	96	74	52	37	32	18
5-OPzS-350	200	173	153	125	107	83	59	42	36	21
6-OPzS-420	238	206	182	150	128	100	71	51	43	25
7-OPzS-490	275	238	211	174	148	116	82	59	51	29
6-OPzS-600	316	278	249	207	179	141	101	73	62	36
8-OPzS-800	418	368	330	275	237	188	135	97	83	48
10-OPzS-1000	524	462	414	346	298	236	170	122	105	61
12-OPzS-1200	613	542	487	407	352	279	201	145	124	72
12-OPzS-1500	683	618	564	483	423	342	251	183	157	92
16-OPzS-2000	935	843	768	654	572	461	337	245	211	122
20-OPzS-2500	1155	1046	956	819	720	585	430	313	271	158
24-OPzS-3000	1370	1242	1135	973	854	692	509	371	319	186

Long Term Discharge Performance ($U_f=1.85V/C$)

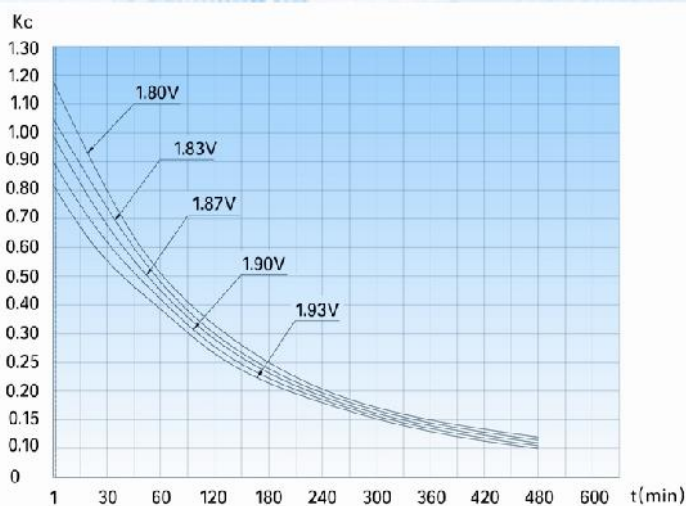
Cell Types	Ah/10h	Ah/20h	Ah/24h	Ah/48h	Ah/72h	Ah/96h	Ah/120h	Ah/240h
4-OPzS-200	194	228	250	268	280	282	284	295
5-OPzS-250	247	290	310	335	350	352	355	365
6-OPzS-300	296	348	375	402	420	420	425	430
5-OPzS-350	330	390	435	469	500	505	510	520
6-OPzS-420	395	468	525	562	600	605	610	620
7-OPzS-490	459	546	610	656	705	709	715	725
6-OPzS-600	565	674	732	804	864	865	870	882
8-OPzS-800	752	898	975	1072	1150	1155	1160	1175
10-OPzS-1000	948	1132	1210	1340	1440	1445	1450	1470
12-OPzS-1200	1118	1338	1460	1608	1725	1730	1740	1760
12-OPzS-1500	1402	1696	1800	2010	2100	2115	2130	2190
16-OPzS-2000	1884	2272	2400	2680	2800	2810	2820	2880
20-OPzS-2500	2430	2930	3000	3350	3500	3520	3540	3625
24-OPzS-3000	2850	3446	3600	4020	4200	4220	4250	4330

Discharge Capacity Vs Ambient Temperature



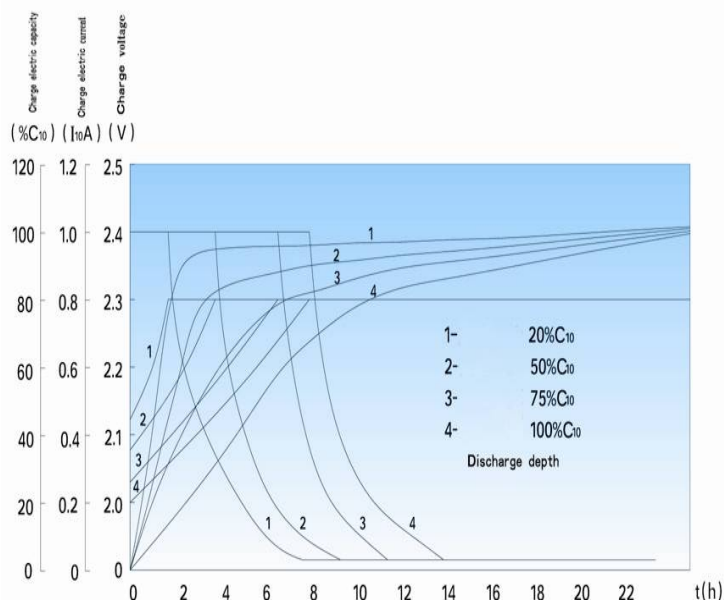
Discharge capacity vs. ambient temperature curve (10A)

Capacity Conversion Coefficient



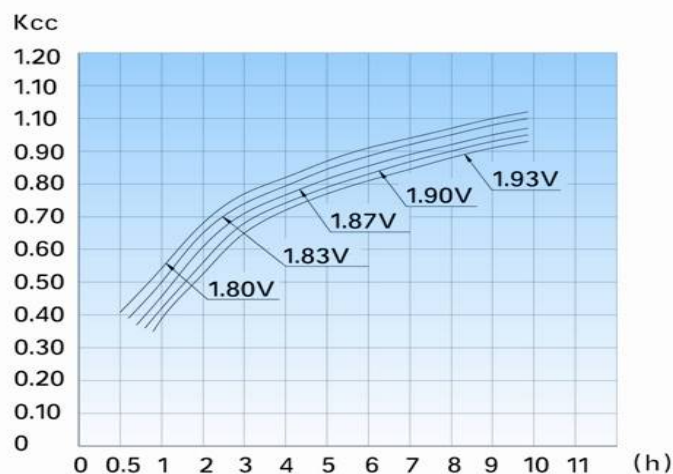
Capacity conversion coefficient curve (20°C)

Characteristic Charging Curves



Charge characteristic curve (20°C)

Discharge Capacity Coefficient VS Discharge Time



Discharge capacity coefficient vs. discharge time curve (20°C)

A short Battery Sizing Guideline

For the case of a constant discharge operation at an ambient temperature of 20°C, where the float charge voltage is set to 2.23 Volts per cell and with the following system data :

- a) output power requirement : 32.4 kW
- b) Minimum System Voltage : 493 Volts
- c) Maximum System Voltage : 635 Volts
- d) Required Back up time : 5 hours

the battery sizing calculation will be as follows :

- * number of cells required : $635 \text{ V} / 2.23 \text{ V} = 285 \text{ cells}$
- * Discharge Current Output required : $32400 \text{ W} / 493 \text{ V} = 66 \text{ Amperes}$
- * Minimum Cell Voltage (Cut-off Voltage) : $493 / 285 = 1.73 \text{ V}$.

According to the above calculation and as per the discharge tables contained in the "Technical Manual for Interberg OPzS Batteries", cell type 6-OPzS-420 shall be selected and the battery will then consist of 285 cells type 6-OPzS-420.

When considering an ambient operation temperature of only 0°C, for which the float charge voltage will be set at 2.35 Volts per cell,

The battery sizing calculation will be :

- * number of cells required : $635 \text{ V} / 2.35 \text{ V} = 270 \text{ cells}$
- * required discharge current output : $32400 \text{ W} / 493 \text{ V} = 66 \text{ amperes}$
- * Cut-off voltage : $493 / 270 = 1.83 \text{ V}$

Now the temperature correction factor indicated in the Technical Manual (in this case, 0.80) must be applied to the discharge current output : $66 / 0.80 = 82.50 \text{ Amps}$.

For the very same system requirement but for the system operating at an ambient temperature of 0°C, according to the Discharge Tables contained in the Technical Manual, cell type 6-OPzS-600 shall be selected and so, the battery will then consist, in this case, of 270 cells type 6-OPzS-600.

These two examples do clearly show that the battery power is increased (from 420 Ah/10h nominal to 600 Ah/10h nominal, in the above examples) while the number of cells required to operate the system is reduced, when, as in the above case, the operational ambient temperature drops.

Electrical Discharge Parameters

(Discharge Currents to the nominal Cut-Off Voltage of 1.60V/Cell)

Cell Types	30 min	45 min	60 min	90 min	2 h	3 h	5 h	8 h	10 h	20 h
4-OPzS-200	172	137	115	89	74	56				
5-OPzS-250	217	173	145	113	93	71				
6-OPzS-300	257	205	173	134	111	84				
7-OPzS-350	292	234	198	153	127	96				
6-OPzS-420	349	280	237	183	151	115				
7-OPzS-490	405	326	275	213	176	133				
6-OPzS-600	486	397	337	262	217	165	114			
8-OPzS-800	645	527	448	349	289	219	152			
10-OPzS-1000	809	663	563	438	363	275	191			
12-OPzS-1200	954	784	667	519	430	325	225			
12-OPzS-1500	1123	957	828	653	543	413	287			
16-OPzS-2000	1523	1290	1112	875	727	552	383			
20-OPzS-2500	1893	1616	1400	1107	924	704	491			
24-OPzS-3000	2257	1930	1672	1321	1100	836	581			

Electrical Discharge Parameters

(Discharge Currents to the nominal Cut-Off Voltage of 1.65V/Cell)

Cell Types	30 min	45 min	60 min	90 min	2 h	3 h	5 h	8 h	10 h	20 h
4-OPzS-200	167	134	113	88	73	56	39			
5-OPzS-250	210	169	143	111	92	70	49			
6-OPzS-300	249	200	170	132	109	83	58			
5-OPzS-350	279	228	193	151	125	95	66			
6-OPzS-420	332	272	231	180	149	113	79			
7-OPzS-490	385	316	268	209	174	132	92			
6-OPzS-600	456	381	327	257	214	162	113			
8-OPzS-800	604	506	434	341	284	215	150			
10-OPzS-1000	758	635	546	428	356	271	188			
12-OPzS-1200	891	749	645	508	423	321	223			
12-OPzS-1500	1030	896	790	634	532	406	283			
16-OPzS-2000	1401	1213	1063	850	712	543	379			
18-OPzS-2250	1563	1362	1202	968	813	623	437			
20-OPzS-2500	1737	1513	1335	1076	903	692	485			
24-OPzS-3000	2068	1803	1593	1283	1076	822	573			

Electrical Discharge Parameters

(Discharge Currents to the nominal Cut-Off Voltage of 1.70V/Cell)

Cell Types	30 min	45 min	60 min	90 min	2 h	3 h	5 h	8 h	10 h	20 h
4-OPzS-200	157	129	110	86	72	55	39	28	24	
5-OPzS-250	199	163	139	109	90	71	48	35	30	
6-OPzS-300	234	193	164	128	107	82	57	41	35	
5-OPzS-350	259	216	186	147	122	93	65	47	40	
6-OPzS-420	308	258	222	175	145	111	78	55	48	
7-OPzS-490	356	299	258	203	170	129	90	64	55	
6-OPzS-600	417	356	311	248	208	159	111	79	68	40
8-OPzS-800	551	472	412	330	276	211	148	105	90	52
10-OPzS-1000	691	592	518	414	347	265	185	131	113	65
12-OPzS-1200	811	697	611	490	410	314	219	155	133	77
12-OPzS-1500	924	817	731	603	512	396	278	198	168	98
16-OPzS-2000	1261	1109	989	811	687	530	372	264	226	130
20-OPzS-2500	1560	1380	1236	1022	870	675	476	339	290	168
24-OPzS-3000	1855	1642	1473	1217	1035	801	563	699	342	196

Electrical Discharge Parameters

(Discharge Currents to the nominal Cut-Off Voltage of 1.75V/Cell)

Cell Types	30 min	45 min	60 min	90 min	2 h	3 h	5 h	8 h	10 h	20 h
4-OPzS-200	144	121	104	83	69	53	38	27	24	14
5-OPzS-250	182	152	132	105	88	67	47	34	30	18
6-OPzS-300	214	180	156	124	104	80	56	40	35	21
5-OPzS-350	233	199	174	140	118	90	64	46	39	23
6-OPzS-420	277	236	207	167	140	109	76	54	47	28
7-OPzS-490	320	274	240	193	163	125	88	63	54	32
6-OPzS-600	371	322	285	233	198	154	108	78	67	39
8-OPzS-800	489	425	378	309	263	204	144	103	88	51
10-OPzS-1000	613	534	474	388	330	256	181	129	111	64
12-OPzS-1200	719	627	558	458	390	303	214	152	131	76
12-OPzS-1500	810	724	655	552	478	378	270	193	166	96
16-OPzS-2000	1107	984	888	746	644	507	361	257	222	128
20-OPzS-2500	1367	1223	1108	936	812	644	461	331	285	164
24-OPzS-3000	1623	1454	1318	1113	965	764	545	390	335	193

Electrical Discharge Parameters

(Discharge Currents to the nominal Cut-Off Voltage of 1.85V/Cell)

Cell Types	30 min	45 min	60 min	90 min	2 h	3 h	5 h	8 h	10 h	20 h
4-OPzS-200	107	92	82	67	58	46	34	25	21	13
5-OPzS-250	135	116	103	85	73	58	42	31	27	17
6-OPzS-300	158	137	122	100	86	68	50	37	32	19
5-OPzS-350	167	147	131	110	95	76	55	41	35	22
6-OPzS-420	198	174	156	130	113	90	66	49	42	25
7-OPzS-490	228	201	180	151	130	104	76	57	48	29
6-OPzS-600	260	232	210	178	155	125	92	69	59	36
8-OPzS-800	342	306	277	235	205	165	122	91	77	47
10-OPzS-1000	428	384	348	294	257	207	153	114	97	59
12-OPzS-1200	500	449	408	346	302	244	180	134	114	69
12-OPzS-1500	550	505	466	404	359	295	221	167	142	87
16-OPzS-2000	754	690	635	548	485	397	297	224	190	116
20-OPzS-2500	926	853	788	685	609	501	377	285	245	149
24-OPzS-3000	1099	1011	934	812	720	592	445	337	286	174

Electrical Discharge Parameters

(Discharge Currents to the nominal Cut-Off Voltage of 1.90V/Cell)

Cell Types	30 min	45 min	60 min	90 min	2 h	3 h	5 h	8 h	10 h	20 h
4-OPzS-200	83	73	66	55	48	38	28	21	18	12
5-OPzS-250	105	92	83	69	60	49	35	26	23	14
6-OPzS-300	123	109	97	81	71	57	42	31	27	17
5-OPzS-350	127	114	103	87	76	62	46	34	30	18
6-OPzS-420	150	135	122	104	90	73	54	40	35	21
7-OPzS-490	173	155	141	120	105	84	63	46	40	24
6-OPzS-600	194	177	162	140	123	101	76	56	49	30
8-OPzS-800	256	233	214	184	164	133	100	74	64	39
10-OPzS-1000	320	292	268	232	204	166	125	92	81	48
12-OPzS-1200	373	341	314	271	239	196	147	109	95	57
12-OPzS-1500	403	377	353	312	279	233	178	134	117	71
16-OPzS-2000	554	516	482	424	379	315	241	180	157	94
20-OPzS-2500	682	637	597	529	474	397	306	228	201	122
24-OPzS-3000	606	754	707	624	562	468	361	270	236	142

interberg batteries



Interberg Batteries Ltd.
Mirador de Despeñaperros 17
28400 Collado Villalba (Madrid)
Spain

tel: 34-91-6263872

fax: 34-91-6263870

e-mail: info@interberg.com

website: www.interberg.com



ISO 9001:2008 - ISO 14001:04 - OHSAS 18001:07
Certificate No. 09-QEO-01427-TIC

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