



Batteries in the SOPzS range has the highest levels of reliability and has been used in all solar and wind power plant application.

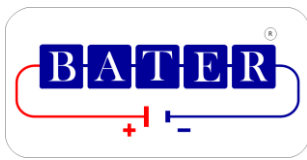
SOPzS range offers high cycle consistency. Our batteries has increased capacity compared to the requirements of the DIN standard.

Stationary SOPzS batteries are used for energy storage in solar, wind and hybrid power plants. Characteristics of the battery life in the solar system is very different from a classic stationary battery. In solar system the battery is the energy storage, which is used at night, with no power from solar

panels. Thus, in practice it is cycling with loading during the day and discharging at night. Bater's response to the needs of solar applications is the development of new types of cells well adapted to the way of working through the use of cores special alloys and a special type of separator improving electrical parameters and life of cell.

## MAIN FEATURES

- capacity range: 161Ah ÷ 3340Ah ( $C_{10}$ ,  $U_{END}=1.80V/cell @ +20^{\circ}C$ ) is higher than DIN standard capacity,
- dimensions accordance to DIN 40736-1 standard,
- service life: 1500 cycles @  $+20^{\circ}C$ , DOD 80% or 20 year,
- high reliability,
- low maintenance,
- container is made of transparent SAN,
- cells equipped with patented BATER recombination plug RecPlug1 results in:
  - low explosion risk,
  - topping-up interval: a couple of years.



## TECHNICAL DATA

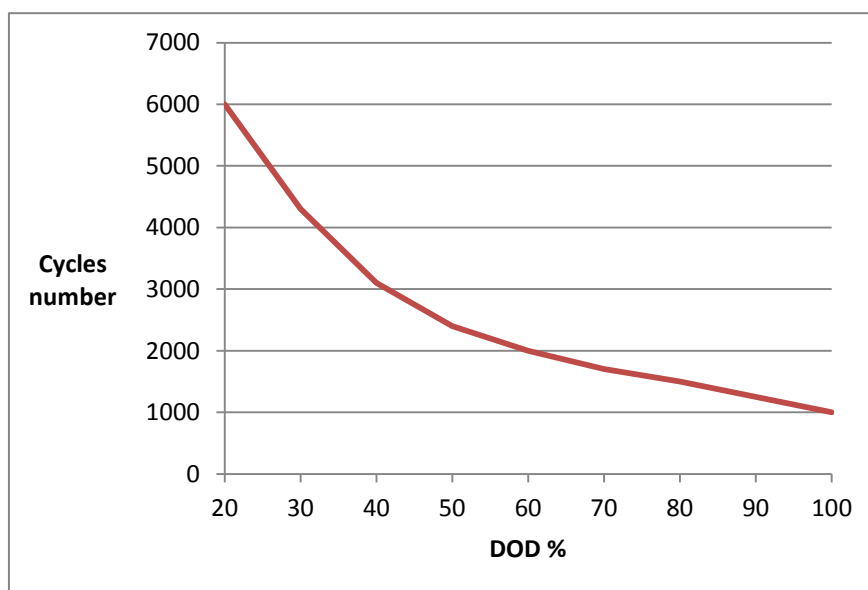
- operating mode:
  - floating and cycles mode with daily cycle,
- recommended charging characteristic „IU” acc. to EN 50272-2 and DIN 41773,
- stand-by floating mode recommended float charge voltage:
  - 2.25 V/cell ÷ 2,30 V/cell @ +20°C acc. to DIN 41773,
- boost charging: 2.4V/cell and  $4 \times I_{10}$  max. for 24h and  $t < +30^\circ\text{C}$ ,
- maximum charging current: IU characteristic acc. to DIN 41773:
  - $t < 25^\circ\text{C}$  unlimited ,
  - $t > 25^\circ\text{C}$   $4 \times I_{10}$ ,
- float voltage compensation in function of temperature:  $-2 \text{ mV}/^\circ\text{C} \div -4 \text{ mV}/^\circ\text{C}$ ,
- ventilation requirements: acc. to EN 50272-2,
- operating temperature range:
  - recommended:
    - +15°C ÷ +25°C,
  - maximum long term operating temperature:
    - +30°C (with ventilation assured - reduced service life),
  - maximum short term operating temperature (for hours):
    - +50°C (with ventilation assured - reduced service life),
  - minimum long term operating temperature:
    - +5°C (operating in lower temperature is not preferred according to possibility battery freezing in discharge case),
- self-discharge  $< 3\%$ /month @ +20 °C acc to EN 60896-21,
- topping-up interval with recombination plug: a couple of years ,
- stands and racks: special BATER racking and bases. Bases are made of steel (square tubes) coated with polyethylene fluidization method. Resistance to electrostatic short circuit above 7kV. We project and produce structures according to customer documentation, or perform individual project for the special rooms or spaces,

## STANDARDS





- EN 60896
- DIN 40736, DIN 41773, DIN 41774, DIN 41775
- EN 50272-2:2003
- ISO 9001 i ISO 14001

**Charging time IU characteristic**

Charging characteristic "IU" 2.4 V/cell										
State of charge	Charging current I <sub>10</sub> (10A/100Ah)					Charging current I <sub>20</sub> (20A/100Ah)				
	60%	80%	95%	100%	Full of charge	60%	80%	95%	100%	Full of charge
DOD	Charging time [h]					Charging time [h]				
20%	< 0,5	0,5	1,5	2,6	16	< 0,5	<0,5	1	2,5	14
40%	< 0,5	2	3,5	4,6	17	<0,5	1	2	3,3	15
60%	2	4	5,5	6,6	18	1	2	3	4,3	16
80%	4	6	8	8,6	20	2	3	4	5,3	17
100%	6	8	10	10,6	24	3	4	5	6,3	18

**Cycles number vs DOD (Deep Of Discharge)**

## CONSTRUCTION

<ul style="list-style-type: none"> <li>➤ <b>positive plate</b> – the grid of the tubular positive plate consists of several lead spines which are joined together by the upper frame. Spines are being die-casted. These thin lead spines, which are equipped with small concentric vanes, are covered with acid permeable tubes. Between the lead spines and tubes is the active positive material. Tubes are being wet-filled. A special lead alloy which is used for positive plate,</li> <li>➤ <b>negative plate</b> – lead grid pasted with active material forms the negative plate. Grids are being die-casted. A special lead alloy which is used for negative grid. Negative plates are wrapped <b>Sireg</b> net prevented loss active mass,</li> <li>➤ <b>separators</b> – Daramic, polyethylen, low resistance, high acid proof, microporus material.</li> <li>➤ <b>container</b> – the cell container is made of transparent SAN,</li> <li>➤ <b>lid</b> – is made of grey ABS and equipped with well proven seal for leakage-proof insulation of the terminal construction. Lid and container are being glued and is proof against the escape of gas or leakage of electrolyte,</li> </ul>	
<ul style="list-style-type: none"> <li>➤ <b>terminals</b> – are being made from corrosion resistant lead alloy with brass inserted designed to give minimum resistance.,</li> <li>➤ <b>terminals sealing</b> – plastic grommet with special seal,</li> </ul>	
<ul style="list-style-type: none"> <li>➤ <b>connector</b> – fully insulated solid copper with full insulated screw with measurements hole,</li> </ul>	
<ul style="list-style-type: none"> <li>➤ <b>standard recombination plug RecPlug1</b> <ul style="list-style-type: none"> <li>• elimination of necessity of electrolyte refilling,</li> <li>• increased work safety of cells with liquid electrolyte (electrolyte fumes and gas poisoning compounds are not released to environment),</li> <li>• limiting of ventilation, battery rooms provided with cells with recombination plugs have smaller ventilation requirements.</li> </ul> </li> </ul>	
<ul style="list-style-type: none"> <li>➤ <b>electrolyte</b> – sulphuric acid with a density 1,24kg/dm<sup>3</sup> @+20°C/max level/full charged cell.</li> </ul>	

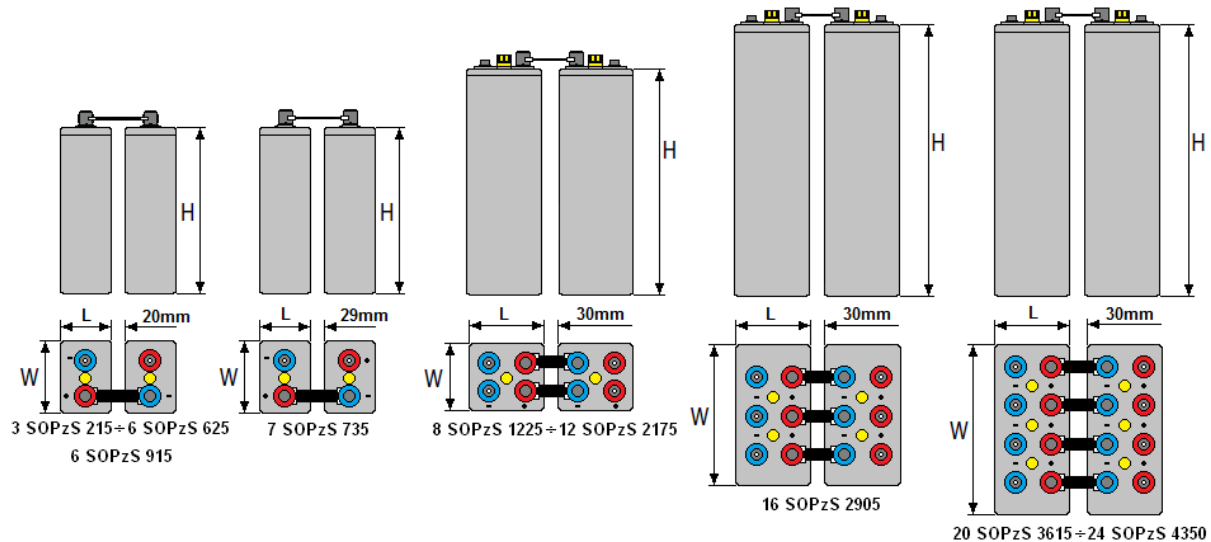
## DIMENSIONS AND TECHNICAL DATA

@ +20°C

No	Cell type	Volt.	Capacity					Charging current	Lenght	Widht	Hight	Weight	
			C <sub>100</sub> Ue =1.85 V/cell	C <sub>50</sub> Ue =1.85 V/cell.	C <sub>24</sub> Ue =1.83 V/cell	C <sub>10</sub> <sup>(2)</sup> Ue =1.80 V/cell	C <sub>nom</sub> <sup>(1)</sup> Ue =1.80 V/cell	I <sub>nom</sub> <sup>(1)</sup>	L	W	H	dry +/-5%	wet +/-5%
		[V]	[Ah]					[A]	[mm]			[kg]	
1	3 SOPzS 215	2	212	201	185	161	150	15	103	206	369	11	16
2	4 SOPzS 285	2	283	268	247	215	200	20	103	206	369	13	18
3	5 SOPzS 355	2	353	333	310	268	250	25	124	206	369	16	22
4	6 SOPzS 425	2	423	398	372	322	300	30	145	206	369	18	26
5	5 SOPzS 525	2	523	493	456	388	350	35	124	206	485	20	29
6	6 SOPzS 625	2	623	588	545	465	420	42	145	206	485	24	34
7	7 SOPzS 735	2	733	688	636	542	490	49	166	206	485	28	39
8	6 SOPzS 915	2	913	863	799	656	600	60	145	206	660	35	50
9	8 SOPzS 1225	2	1223	1148	1066	875	800	80	210	191	660	46	65
10	10 SOPzS 1525	2	1523	1428	1327	1093	1000	100	210	233	660	57	80
11	12 SOPzS 1825	2	1823	1718	1594	1312	1200	120	210	275	660	66	93
12	12 SOPzS 2175	2	2173	2013	1846	1670	1500	150	210	275	810	88	119
13	16 SOPzS 2905	2	2903	2688	2474	2227	2000	200	212	397	792	106	152
14	20 SOPzS 3615	2	3616	3355	3077	2783	2500	250	212	487	792	145	200
15	24 SOPzS 4350	2	4351	4030	3706	3340	3000	300	212	576	792	170	240

(1) Nominal and parameters according to DIN 40736

(2) Capacity  $C_{10}$  after 10 cycles





## RANGE SUMMARY

# SOPzS

### Constant power discharge (in W/cell) @ +20°C

BATTERY 24V											
Battery type	No. of string x no. of cell	Min. discharge end voltage									
		20,4V	20,4V	20,4V	20,4V	21,0V	21,0V	21,6V	21,6V	22,6V	22,6V
		Discharge time									
		2h	3h	4h	5h	6h	8h	10h	24h	50h	100h
3 SOPzS 215	1x12	1 172	904	749	635	551	450	371	184	94	49
	2x12	2 345	1 807	1 498	1 270	1 102	900	742	367	187	98
	3x12	3 517	2 711	2 246	1 904	1 652	1 350	1 112	551	281	148
	4x12	4 690	3 614	2 995	2 539	2 203	1 800	1 483	734	374	197
4 SOPzS 285	1x12	1 564	1 206	997	846	734	600	494	245	125	66
	2x12	3 127	2 412	1 994	1 692	1 469	1 200	989	490	250	132
	3x12	4 691	3 618	2 992	2 538	2 203	1 800	1 483	734	374	198
	4x12	6 254	4 824	3 989	3 384	2 938	2 400	1 978	979	499	264
5 SOPzS 355	1x12	1 958	1 504	1 253	1 057	918	734	617	308	156	83
	2x12	3 917	3 007	2 506	2 114	1 836	1 469	1 234	617	312	166
	3x12	5 875	4 511	3 758	3 172	2 754	2 203	1 850	925	468	248
	4x12	7 834	6 014	5 011	4 229	3 672	2 938	2 467	1 234	624	331
6 SOPzS 425	1x12	2 352	1 802	1 492	1 265	1 103	881	739	370	186	100
	2x12	4 704	3 605	2 983	2 530	2 206	1 762	1 478	739	372	199
	3x12	7 056	5 407	4 475	3 794	3 308	2 642	2 218	1 109	558	299
	4x12	9 408	7 210	5 966	5 059	4 411	3 523	2 957	1 478	744	398
5 SOPzS 525	1x12	2 782	2 160	1 778	1 516	1 313	1 070	892	457	232	122
	2x12	5 563	4 320	3 557	3 031	2 626	2 141	1 783	914	463	245
	3x12	8 345	6 480	5 335	4 547	3 938	3 211	2 675	1 372	695	367
	4x12	11 126	8 640	7 114	6 062	5 251	4 282	3 566	1 829	926	490
6 SOPzS 625	1x12	3 355	2 590	2 136	1 825	1 574	1 288	1 069	547	275	145
	2x12	6 710	5 179	4 272	3 650	3 149	2 575	2 138	1 094	550	290
	3x12	10 066	7 769	6 408	5 476	4 723	3 863	3 208	1 642	824	436
	4x12	13 421	10 358	8 544	7 301	6 298	5 150	4 277	2 189	1 099	581
7 SOPzS 735	1x12	3 904	3 020	2 495	2 124	1 837	1 502	1 253	638	322	172
	2x12	7 807	6 041	4 990	4 248	3 674	3 005	2 506	1 277	643	343
	3x12	11 711	9 061	7 484	6 372	5 512	4 507	3 758	1 915	965	515
	4x12	15 614	12 082	9 979	8 496	7 349	6 010	5 011	2 554	1 286	686
6 SOPzS 915	1x12	4 847	3 748	3 127	2 614	2 255	1 789	1 502	798	404	214
	2x12	9 694	7 495	6 254	5 227	4 510	3 578	3 005	1 596	809	427
	3x12	14 540	11 243	9 382	7 841	6 764	5 368	4 507	2 394	1 213	641
	4x12	19 387	14 990	12 509	10 454	9 019	7 157	6 010	3 192	1 618	854
8 SOPzS 1225	1x12	6 458	4 990	4 165	3 496	3 006	2 374	2 016	1 066	538	287
	2x12	12 917	9 979	8 330	6 991	6 012	4 747	4 032	2 131	1 075	574
	3x12	19 375	14 969	12 496	10 487	9 018	7 121	6 048	3 197	1 613	860
	4x12	25 834	19 958	16 661	13 982	12 024	9 494	8 064	4 262	2 150	1 147
10 SOPzS 1525	1x12	8 094	6 242	5 203	4 367	3 757	2 958	2 516	1 330	671	358
	2x12	16 188	12 485	10 406	8 734	7 514	5 916	5 033	2 659	1 342	715
	3x12	24 282	18 727	15 610	13 100	11 272	8 874	7 549	3 989	2 012	1 073
	4x12	32 376	24 970	20 813	17 467	15 029	11 832	10 066	5 318	2 683	1 430
12 SOPzS 1825	1x12	9 707	7 496	6 241	5 238	4 522	3 554	3 018	1 590	806	428
	2x12	19 414	14 993	12 482	10 476	9 043	7 109	6 036	3 180	1 613	857
	3x12	29 120	22 489	18 724	15 714	13 565	10 663	9 054	4 770	2 419	1 285
	4x12	38 827	29 986	24 965	20 952	18 086	14 218	12 072	6 360	3 226	1 714
12 SOPzS 2175	1x12	12 178	9 538	7 901	6 778	5 845	4 771	3 841	1 895	943	509
	2x12	24 355	19 075	15 802	13 555	11 690	9 542	7 682	3 790	1 886	1 018
	3x12	36 533	28 613	23 702	20 333	17 536	14 314	11 524	5 684	2 830	1 526
	4x12	48 710	38 150	31 603	27 110	23 381	19 085	15 365	7 579	3 773	2 035
16 SOPzS 2905	1x12	16 249	12 689	10 525	9 032	7 801	6 356	5 117	2 549	1 256	678
	2x12	32 498	25 378	21 050	18 065	15 602	12 713	10 234	5 098	2 513	1 356
	3x12	48 748	38 066	31 576	27 097	23 404	19 069	15 350	7 646	3 769	2 034
	4x12	64 997	50 755	42 101	36 130	31 205	25 426	20 467	10 195	5 026	2 712
20 SOPzS 3615	1x12	20 320	15 852	13 151	11 287	9 746	7 943	6 394	3 155	1 577	850
	2x12	40 639	31 704	26 302	22 574	19 493	15 886	12 787	6 310	3 154	1 699
	3x12	60 959	47 556	39 452	33 862	29 239	23 828	19 181	9 464	4 730	2 549
	4x12	81 278	63 408	52 603	45 149	38 986	31 771	25 574	12 619	6 307	3 398
24 SOPzS 4350	1x12	24 343	19 027	15 788	13 542	11 702	9 768	7 669	3 800	1 889	1 020
	2x12	48 686	38 054	31 577	27 084	23 405	19 536	15 338	7 601	3 778	2 040
	3x12	73 030	57 082	47 365	40 626	35 107	29 304	23 008	11 401	5 666	3 060
	4x12	97 373	76 109	63 154	54 168	46 810	39 072	30 677	15 202	7 555	4 080



## RANGE SUMMARY

# SOPzS

### Constant power discharge (in W/cell) @ +20°C

Battery 48V											
Battery type	No. of string x no. of cell	Min. discharge end voltage									
		40,8V	40,8V	40,8V	40,8V	42,0V	42,0V	43,2V	43,2V	45,2V	45,2V
		Discharge time									
		2h	3h	4h	5h	6h	8h	10h	24h	50h	100h
3 SOPzS 215	1x24	2 345	1 807	1 498	1 270	1 102	900	742	367	187	98
	2x24	4 690	3 614	2 995	2 539	2 203	1 800	1 483	734	374	197
	3x24	7 034	5 422	4 493	3 809	3 305	2 700	2 225	1 102	562	295
	4x24	9 379	7 229	5 990	5 078	4 406	3 600	2 966	1 469	749	394
4 SOPzS 285	1x24	3128	2 412	1 994	1 692	1 468	1 200	988	490	250	132
	2x24	6254	4 824	3 988	3 384	2 938	2 400	1 978	980	500	264
	3x24	9382	7 236	5 984	5 076	4 406	3 600	2 966	1 468	748	396
	4x24	12 508	9 648	7 978	6 768	5 876	4 800	3 956	1 958	998	528
5 SOPzS 355	1x24	3 917	3 007	2 506	2 114	1 836	1 469	1 234	617	312	166
	2x24	7 834	6 014	5 011	4 229	3 672	2 938	2 467	1 234	624	331
	3x24	11 750	9 022	7 517	6 343	5 508	4 406	3 701	1 850	936	497
	4x24	15 667	12 029	10 022	8 458	7 344	5 875	4 934	2 467	1 248	662
6 SOPzS 425	1x24	4 704	3 605	2 983	2 530	2 206	1 762	1 478	739	372	199
	2x24	9 408	7 210	5 966	5 059	4 411	3 523	2 957	1 478	744	398
	3x24	14 112	10 814	8 950	7 589	6 617	5 285	4 435	2 218	1 116	598
	4x24	18 816	14 419	11 933	10 118	8 822	7 046	5 914	2 957	1 488	797
5 SOPzS 525	1x24	5 563	4 320	3 557	3 031	2 626	2 141	1 783	914	463	245
	2x24	11 126	8 640	7 114	6 062	5 251	4 282	3 566	1 829	926	490
	3x24	16 690	12 960	10 670	9 094	7 877	6 422	5 350	2 743	1 390	734
	4x24	22 253	17 280	14 227	12 125	10 502	8 563	7 133	3 658	1 853	979
6 SOPzS 625	1x24	6 710	5 179	4 272	3 650	3 149	2 575	2 138	1 094	550	290
	2x24	13 421	10 358	8 544	7 301	6 298	5 150	4 277	2 189	1 099	581
	3x24	20 131	15 538	12 816	10 951	9 446	7 726	6 415	3 283	1 649	871
	4x24	26 842	20 717	17 088	14 602	12 595	10 301	8 554	4 378	2 198	1 162
7 SOPzS 735	1x24	7 807	6 041	4 990	4 248	3 674	3 005	2 506	1 277	643	343
	2x24	15 614	12 082	9 979	8 496	7 349	6 010	5 011	2 554	1 286	686
	3x24	23 422	18 122	14 969	12 744	11 023	9 014	7 517	3 830	1 930	1 030
	4x24	31 229	24 163	19 958	16 992	14 698	12 019	10 022	5 107	2 573	1 373
6 SOPzS 915	1x24	9 694	7 495	6 254	5 227	4 510	3 578	3 005	1 596	809	427
	2x24	19 387	14 990	12 509	10 454	9 019	7 157	6 010	3 192	1 618	854
	3x24	29 081	22 486	18 763	15 682	13 529	10 735	9 014	4 788	2 426	1 282
	4x24	38 774	29 981	25 018	20 909	18 038	14 314	12 019	6 384	3 235	1 709
8 SOPzS 1225	1x24	12 917	9 979	8 330	6 991	6 012	4 747	4 032	2 131	1 075	574
	2x24	25 834	19 958	16 661	13 982	12 024	9 494	8 064	4 262	2 150	1 147
	3x24	38 750	29 938	24 991	20 974	18 036	14 242	12 096	6 394	3 226	1 721
	4x24	51 667	39 917	33 322	27 965	24 048	18 989	16 128	8 525	4 301	2 294
10 SOPzS 1525	1x24	16 188	12 485	10 406	8 734	7 514	5 916	5 033	2 659	1 342	715
	2x24	32 376	24 970	20 813	17 467	15 029	11 832	10 066	5 318	2 683	1 430
	3x24	48 564	37 454	31 219	26 201	22 543	17 748	15 098	7 978	4 025	2 146
	4x24	64 752	49 939	41 626	34 934	30 058	23 664	20 131	10 637	5 366	2 861
12 SOPzS 1825	1x24	19 414	14 993	12 482	10 476	9 043	7 109	6 036	3 180	1 613	857
	2x24	38 827	29 986	24 965	20 952	18 086	14 218	12 072	6 360	3 226	1 714
	3x24	58 241	44 978	37 447	31 428	27 130	21 326	18 108	9 540	4 838	2 570
	4x24	77 654	59 971	49 930	41 904	36 173	28 435	24 144	12 720	6 451	3 427
12 SOPzS 2175	1x24	24 355	19 075	15 802	13 555	11 690	9 542	7 682	3 790	1 886	1 018
	2x24	48 710	38 150	31 603	27 110	23 381	19 085	15 365	7 579	3 773	2 035
	3x24	73 066	57 226	47 405	40 666	35 071	28 627	23 047	11 369	5 659	3 053
	4x24	97 421	76 301	63 206	54 221	46 762	38 170	30 730	15 158	7 546	4 070
16 SOPzS 2905	1x24	32 498	25 378	21 050	18 065	15 602	12 713	10 234	5 098	2 513	1 356
	2x24	64 997	50 755	42 101	36 130	31 205	25 426	20 467	10 195	5 026	2 712
	3x24	97 495	76 133	63 151	54 194	46 807	38 138	30 701	15 293	7 538	4 068
	4x24	129 994	101 510	84 202	72 259	62 410	50 851	40 934	20 390	10 051	5 424
20 SOPzS 3615	1x24	40 639	31 704	26 302	22 574	19 493	15 886	12 787	6 310	3 154	1 699
	2x24	81 278	63 408	52 603	45 149	38 986	31 771	25 574	12 619	6 307	3 398
	3x24	121 918	95 112	78 905	67 723	58 478	47 657	38 362	18 929	9 461	5 098
	4x24	162 557	126 816	105 206	90 298	77 971	63 542	51 149	25 238	12 614	6 797
24 SOPzS 4350	1x24	48 686	38 054	31 577	27 084	23 405	19 536	15 338	7 601	3 778	2 040
	2x24	97 373	76 109	63 154	54 168	46 810	39 072	30 677	15 202	7 555	4 080
	3x24	146 059	114 163	94 730	81 252	70 214	58 608	46 015	22 802	11 333	6 120
	4x24	194 746	152 218	126 307	108 336	93 619	78 144	61 354	30 403	15 110	8 160



## BATTERY STANDS

BATER is a manufacturer of all types of corrosion resistant stands for SOPzS batteries. The stands are made of square tube and covered with polyethylene by fluidization. We design housing in accordance with customer's documentation or carry out our own project individually according to the target room dimension.



## CONSTRUCTION

- purpose: to put together any type of battery cells on one or more levels,
- construction: made of closed metal profiles. Produced sets are fully welded,
- corrosion protection: protected against electrolyte by a coating made of high quality polyethylene thicker than 1 mm, immersed in fluidized bed reactor on our modern technological line,
- resistance to electrostatic short circuit above 7kV,
- separation from the ground: insulators made of ABS plastic with adjustable height,
- location of cells: on carrier brackets, which spacing can be adjusted to their width. Versatile design of stands enables the use of additional stands brackets for cells of more than 200kg.

## DIMENSIONS AND TECHNICAL DATA OF BATTERY STANDS

No	Cell type	B1	B2	h1	t	$I = N \times (L + t)$ (N – cells number)
1	3 SOPzS 215	250	500	610	20	<p>Single-row stands</p>
2	4 SOPzS 285	250	500	610	20	
3	5 SOPzS 355	250	500	610	20	
4	6 SOPzS 425	250	500	610	20	
5	5 SOPzS 525	250	500	725	20	
6	6 SOPzS 625	250	500	725	20	
7	7 SOPzS 735	250	500	725	29	
8	6 SOPzS 915	250	500	940	20	<p>Double-row stands</p>
9	8 SOPzS 1225	250	470	940	30	
10	10 SOPzS 1525	320	550	940	30	
11	12 SOPzS 1825	320	640	940	30	
12	12 SOPzS 2175	320	640	1090	30	
13	16 SOPzS 2905	400	880	1070	30	
14	20 SOPzS 3615	470	1060	1070	30	
15	24 SOPzS 4350	620	1240	1070	30	



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