

**MSB**

# OPzV Range

Sealed Tubular Lead Acid Battery

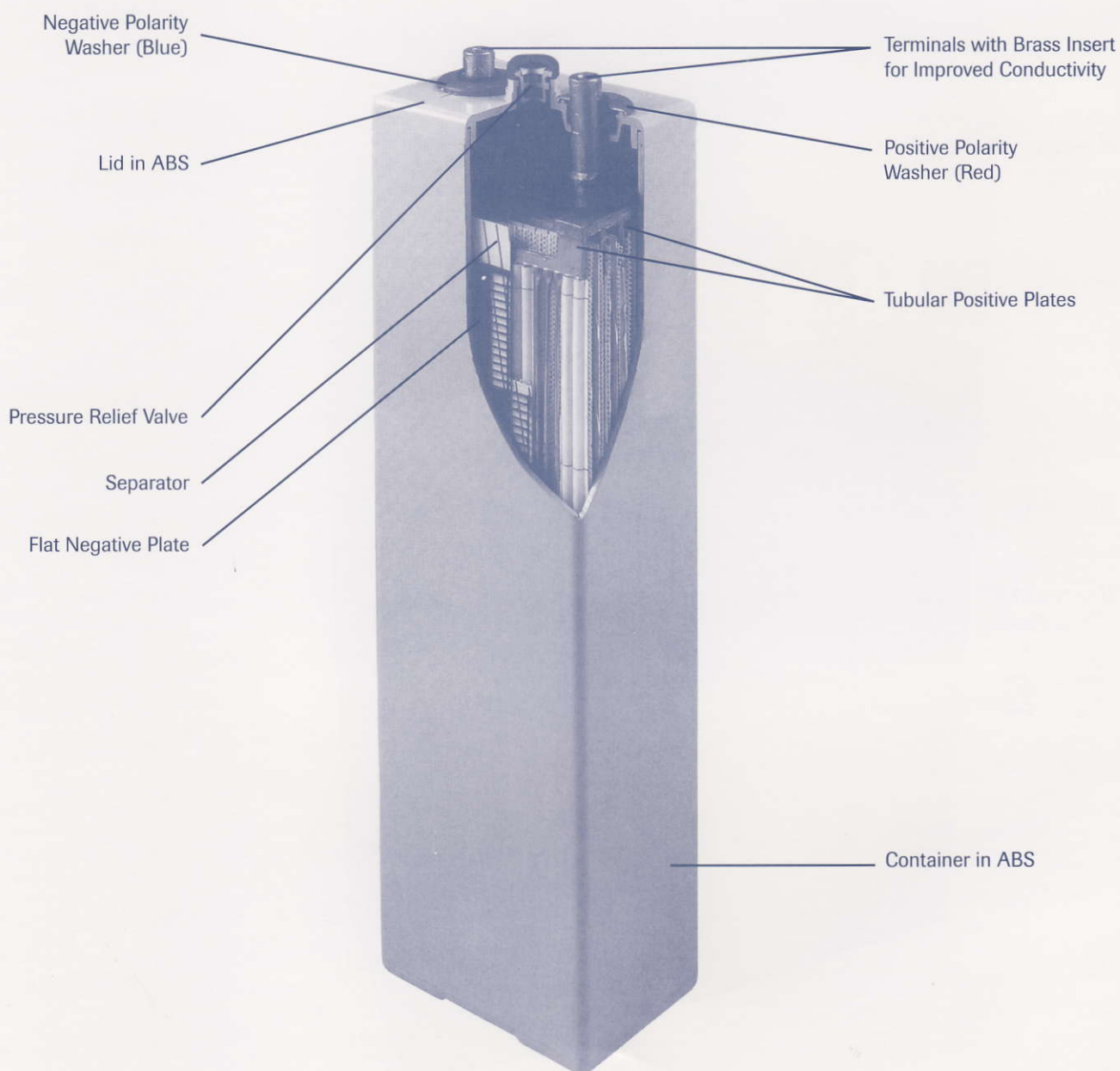


# OPzV Range Sealed Tubular Lead Acid Battery

## Construction & Operating Principle

The **MSB OPzV** Battery uses the gas recombination technology where by:

- Plate composed of special lead calcium alloy which provides the grids with high mechanical strength a high level of hydrogen over-tension.
- Microporous separators
- A capillary network gelled electrolyte:
  - To retain the electrolyte in a thixotropic gel
  - To help oxygen penetration into the negative plate
- A pressure relief valve which allows gas to be released if necessary in the case of an accidental overcharge.



Type	No. of Terminal per Pole	Capacity Ah acc. to DIN 40742	Capacity Ah					Internal Resistance (m ohm/cell)	Short Circuit Current	Dimensions (mm)			Weight (kg) cell
			C <sub>10</sub>	C <sub>8</sub>	C <sub>5</sub>	C <sub>3</sub>	C <sub>1</sub>			Length	Width	Overall height	
			at final voltage										
			1.80V	1.75V	1.77V	1.75V	1.67V						
4 OPzV 200	1	200	200	195	180	160	130	0.92	2000	103	206	403	18
5 OPzV 250	1	250	250	245	220	200	160	0.74	2600	124	206	403	22
6 OPzV 300	1	300	300	290	265	240	195	0.63	3050	145	206	403	26
5 OPzV 350	1	350	350	340	325	290	230	0.57	3345	124	206	520	30
6 OPzV 420	1	420	420	405	400	345	275	0.49	3893	145	206	520	35
7 OPzV 490	1	490	490	480	465	410	320	0.43	4380	166	206	520	40
6 OPzV 600	1	600	600	590	580	520	395	0.55	3660	145	206	695	48
8 OPzV 800	2	800	800	780	760	705	525	0.40	4880	210	191	695	66
10 OPzV 1000	2	1000	1000	950	930	890	655	0.32	5920	210	233	695	80
12 OPzV 1200	2	1200	1200	1120	1080	980	790	0.27	6950	210	275	695	95
12 OPzV 1500	2	1500	1500	1430	1380	1150	890	0.28	6850	210	275	845	115
16 OPzV 2000	3	2000	2000	1900	1820	1550	1190	0.21	9050	212	397	820	158
20 OPzV 2500	4	2500	2500	2390	2250	1950	1485	0.17	11080	212	487	820	193
24 OPzV 3000	4	3000	3000	2890	2680	2350	1785	0.14	13050	212	576	820	232

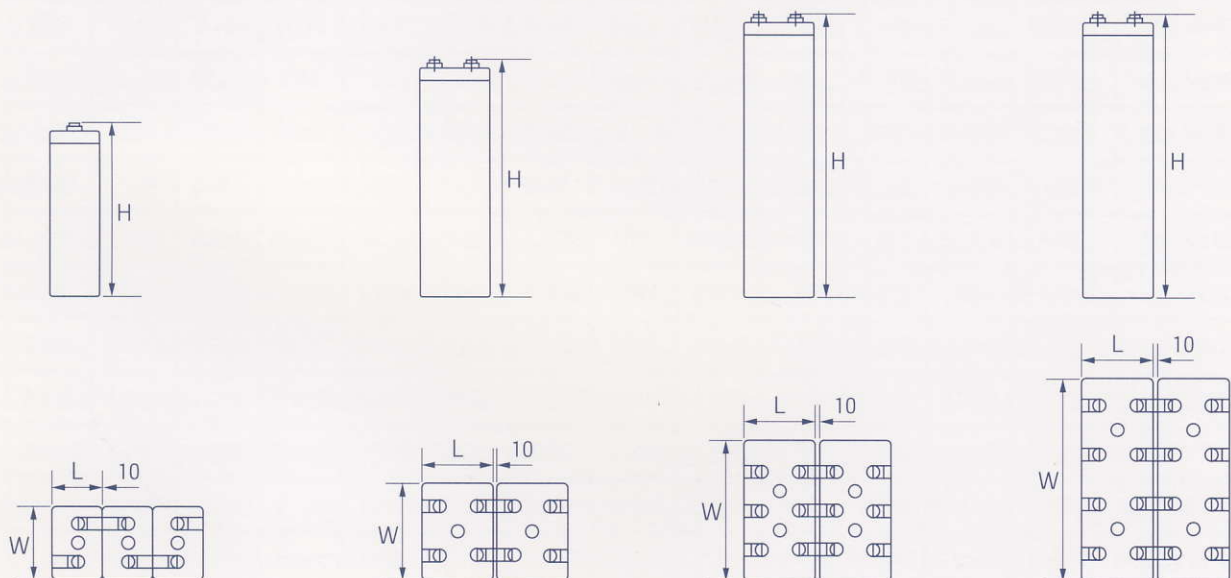
All dimensions and weights shown are subject to the usual manufacturing tolerances

**4 OPzV 200 - 6 OPzV 600**

**8 OPzV 800 - 12 OPzV 1500**

**16 OPzV 2000**

**20 OPzV 2500 - 24 OPzV 3000**



# OPzV Range Sealed Tubular Lead Acid Battery

## Electrical Performances at 20°C

**Constant current discharge in amperes**

**Voltage end of discharge: 1.60 V/cell**

Type	15'	30'	1H	2H	3H	4H	5H	6H	7H	8H	9H	10H	12H	20H
4 OPzV 200	286.9	204.25	126.35	75.145	54.815	43.795	36.48	31.635	27.93	24.985	22.705	20.805	17.955	11.685
5 OPzV 250	356.25	254.6	158.65	93.86	68.495	54.72	45.6	39.52	34.865	31.255	28.405	26.03	22.515	14.63
6 OPzV 300	425.6	304.95	190	113.05	82.175	65.645	54.815	47.405	41.895	37.525	34.01	31.255	26.98	17.575
5 OPzV 350	443.65	341.05	225.15	133.95	97.85	78.66	65.74	56.715	49.875	44.555	40.565	37.24	32.11	20.805
6 OPzV 420	528.2	407.55	269.8	161.5	117.8	94.43	78.85	68.02	59.945	53.485	48.64	44.65	38.57	24.985
7 OPzV 490	611.8	473.1	314.45	188.1	137.75	110.2	91.96	79.42	69.92	62.415	56.715	52.155	45.03	29.165
6 OPzV 600	682.1	565.25	402.8	242.25	177.65	142.5	118.75	102.6	90.725	81.13	73.72	67.735	58.52	38
8 OPzV 800	939.55	768.55	540.55	323	237.5	190	158.65	137.75	120.65	108.3	98.8	90.345	78.09	50.73
10 OPzV 1000	1163.75	954.75	674.5	403.75	296.4	237.5	198.55	171.95	151.05	134.9	122.55	113.05	97.85	63.365
12 OPzV 1200	1384.15	1139.05	808.45	484.5	356.25	285	238.45	206.15	181.45	162.45	147.25	135.85	116.85	76.095
12 OPzV 1500	1385.1	1207.45	922.45	563.35	409.45	324.9	268.85	231.8	204.25	181.45	164.35	150.1	130.15	84.455
16 OPzV 2000	1883.85	1634	1237.85	750.5	545.3	433.2	359.1	309.7	271.7	242.25	219.45	200.45	173.85	112.1
20 OPzV 2500	2331.3	2027.3	1542.8	938.6	682.1	541.5	448.4	386.65	340.1	303.05	274.55	250.8	216.6	140.6
24 OPzV 3000	2770.2	2414.9	1844.9	1126.7	818.9	648.85	537.7	463.6	407.55	363.85	329.65	301.15	260.3	169.1

**Constant power in watts per cell**

**Voltage end of discharge: 1.60 V/cell**

Type	15'	30'	1H	2H	3H	4H	5H	6H	7H	8H	9H	10H	12H	20H
4 OPzV 200	469.3	346.75	226.1	138.7	102.6	82.65	69.35	59.85	53.2	47.5	42.75	39.9	34.2	21.85
5 OPzV 250	583.3	433.2	283.1	173.85	128.25	102.6	86.45	75.05	66.5	58.9	54.15	49.4	42.75	27.55
6 OPzV 300	695.4	517.75	339.15	208.05	153.9	123.5	103.55	89.3	79.8	71.25	64.6	59.85	51.3	33.25
5 OPzV 350	719.15	565.25	396.15	247	183.35	147.25	124.45	107.35	95	85.5	76.95	71.25	61.75	39.9
6 OPzV 420	855.95	675.45	475	296.4	219.45	177.65	149.15	129.2	114	102.6	93.1	85.5	74.1	48.45
7 OPzV 490	989.9	784.7	552.9	344.85	256.5	207.1	173.85	151.05	133	119.7	108.3	99.75	86.45	56.05
6 OPzV 600	1098.2	924.35	685.9	437.95	327.75	266	224.2	194.75	171.95	154.85	140.6	129.2	112.1	73.15
8 OPzV 800	1514.3	1259.7	925.3	586.15	438.9	355.3	299.25	259.35	229.9	206.15	187.15	171.95	149.15	97.85
10 OPzV 1000	1874.35	1564.65	1152.35	732.45	548.15	444.6	374.3	324.9	287.85	257.45	233.7	215.65	186.2	122.55
12 OPzV 1200	2228.7	1865.8	1379.4	877.8	657.4	532.95	449.35	389.5	344.85	309.7	281.2	258.4	224.2	147.25
12 OPzV 1500	2223.95	1957.95	1535.2	1009.85	750.5	604.2	506.35	437.95	387.6	346.75	315.4	288.8	249.85	163.4
16 OPzV 2000	3024.8	2651.45	2067.2	1349	1002.25	806.55	676.4	585.2	516.8	463.6	419.9	385.7	333.45	218.5
20 OPzV 2500	3743	3288.9	2571.65	1684.35	1252.1	1007.95	844.55	731.5	646	579.5	525.35	481.65	416.1	273.6
24 OPzV 3000	4447.9	3916.85	3071.35	2019.7	1501.95	1208.4	1012.7	876.85	775.2	694.45	630.8	577.6	499.7	327.75

### Constant current discharge in amperes

Voltage end of discharge: 1.65 V/cell

Type	15'	30'	1H	2H	3H	4H	5H	6H	7H	8H	9H	10H	12H	20H
4 OPzV 200	264.1	195.7	126.35	75.145	54.815	43.795	36.48	31.635	27.93	24.985	22.705	20.805	17.955	11.685
5 OPzV 250	327.75	244.15	157.7	93.86	68.495	54.72	45.6	39.52	34.865	31.255	28.405	26.03	22.515	14.63
6 OPzV 300	390.45	291.65	189.05	113.05	82.175	65.645	54.815	47.405	41.895	37.525	34.01	31.255	26.98	17.575
5 OPzV 350	404.7	322.05	223.25	133.95	97.85	78.66	65.74	56.715	49.875	44.555	40.565	37.24	32.11	20.805
6 OPzV 420	481.65	384.75	267.9	161.5	117.8	94.43	78.85	68.02	59.945	53.485	48.64	44.65	38.57	24.985
7 OPzV 490	556.7	446.5	311.6	188.1	137.75	110.2	91.96	79.42	69.92	62.415	56.715	52.155	45.03	29.165
6 OPzV 600	616.55	520.6	384.75	242.25	177.65	142.5	118.75	102.6	90.725	81.13	73.72	67.735	58.52	38
8 OPzV 800	850.25	710.6	518.7	323	237.5	190	158.65	137.75	120.65	108.3	98.8	90.345	78.09	50.73
10 OPzV 1000	1052.6	882.55	646	403.75	296.4	237.5	198.55	171.95	151.05	134.9	122.55	113.05	97.85	63.365
12 OPzV 1200	1251.15	1052.6	773.3	484.5	356.25	285	238.45	206.15	181.45	162.45	147.25	135.85	116.85	76.095
12 OPzV 1500	1242.6	1097.25	864.5	563.35	409.45	324.9	268.85	231.8	204.25	181.45	164.35	150.1	130.15	84.455
16 OPzV 2000	1691	1486.75	1163.75	750.5	545.3	433.2	359.1	309.7	271.7	242.25	219.45	200.45	173.85	112.1
20 OPzV 2500	2092.85	1843.95	1447.8	938.6	682.1	541.5	448.4	386.65	340.1	303.05	274.55	250.8	216.6	140.6
24 OPzV 3000	2486.15	2194.5	1729	1126.7	818.9	648.85	537.7	463.6	407.55	363.85	329.65	301.15	260.3	169.1

### Constant power in watts per cell

Voltage end of discharge: 1.65 V/cell

Type	15'	30'	1H	2H	3H	4H	5H	6H	7H	8H	9H	10H	12H	20H
4 OPzV 200	441.75	335.35	225.15	138.7	102.6	82.65	69.35	59.85	53.2	47.5	42.75	39.9	34.2	21.85
5 OPzV 250	549.1	418	281.2	173.85	128.25	102.6	86.45	75.05	66.5	58.9	54.15	49.4	42.75	27.55
6 OPzV 300	654.55	499.7	337.25	208.05	153.9	123.5	103.55	89.3	79.8	71.25	64.6	59.85	51.3	33.25
5 OPzV 350	672.6	544.35	391.4	247	183.35	147.25	124.45	107.35	95	85.5	76.95	71.25	61.75	39.9
6 OPzV 420	800.85	649.8	468.35	296.4	219.45	177.65	149.15	129.2	114	102.6	93.1	85.5	74.1	48.45
7 OPzV 490	925.3	754.3	545.3	344.85	256.5	207.1	173.85	151.05	133	119.7	108.3	99.75	86.45	56.05
6 OPzV 600	1022.2	872.1	662.15	437.95	327.75	266	224.2	194.75	171.95	154.85	140.6	129.2	112.1	73.15
8 OPzV 800	1408.85	1193.2	895	586.15	438.9	355.3	299.25	259.35	229.9	206.15	187.15	171.95	149.15	97.85
10 OPzV 1000	1744.2	1480.1	1114.35	732.45	548.15	444.6	374.3	324.9	287.85	257.45	233.7	215.65	186.2	122.55
12 OPzV 1200	2073.85	1764.15	1331.9	877.8	657.4	532.95	449.35	389.5	344.85	309.7	281.2	258.4	224.2	147.25
12 OPzV 1500	2055.8	1826.85	1466.8	1009.85	750.5	604.2	506.35	437.95	387.6	346.75	315.4	288.8	249.85	163.4
16 OPzV 2000	2797.75	2477.6	1976	1349	1002.25	806.55	676.4	585.2	516.8	463.6	419.9	385.7	333.45	218.5
20 OPzV 2500	3461.8	3071.35	2457.65	1684.35	1252.1	1007.95	844.55	731.5	646	579.5	525.35	481.65	416.1	273.6
24 OPzV 3000	4111.6	3654.65	2934.55	2019.7	1501.95	1208.4	1012.7	876.85	775.2	694.45	630.8	577.6	499.7	327.75

# OPzV Range Sealed Tubular Lead Acid Battery

## Constant current discharge in amperes

Voltage end of discharge: 1.70 V/cell

Type	15'	30'	1H	2H	3H	4H	5H	6H	7H	8H	9H	10H	12H	20H
4 OPzV 200	237.5	182.4	122.55	74.86	54.815	43.795	36.48	31.635	27.93	24.985	22.705	20.805	17.955	11.685
5 OPzV 250	295.45	228	152.95	93.48	68.495	54.72	45.6	39.52	34.865	31.255	28.405	26.03	22.515	14.63
6 OPzV 300	351.5	271.7	183.35	112.1	82.175	65.645	54.815	47.405	41.895	37.525	34.01	31.255	26.98	17.575
5 OPzV 350	361.95	297.35	213.75	133.95	97.85	78.66	65.74	56.715	49.875	44.555	40.565	37.24	32.11	20.805
6 OPzV 420	430.35	355.3	255.55	161.5	117.8	94.43	78.85	68.02	59.945	53.485	48.64	44.65	38.57	24.985
7 OPzV 490	496.85	412.3	297.35	188.1	137.75	110.2	91.96	79.42	69.92	62.415	56.715	52.155	45.03	29.165
6 OPzV 600	547.2	469.3	360.05	238.45	177.65	142.5	118.75	102.6	90.725	81.13	73.72	67.735	58.52	38
8 OPzV 800	755.25	643.15	486.4	319.2	237.5	190	158.65	137.75	120.65	108.3	98.8	90.345	78.09	50.73
10 OPzV 1000	934.8	798	606.1	399	296.4	237.5	198.55	171.95	151.05	134.9	122.55	113.05	97.85	63.365
12 OPzV 1200	1110.55	950	723.9	477.85	356.25	285	238.45	206.15	181.45	162.45	147.25	135.85	116.85	76.095
12 OPzV 1500	1096.3	977.55	792.3	551.95	405.65	324.9	268.85	231.8	204.25	181.45	164.35	150.1	130.15	84.455
16 OPzV 2000	1493.4	1326.2	1068.75	739.1	541.5	433.2	359.1	309.7	271.7	242.25	219.45	200.45	173.85	112.1
20 OPzV 2500	1846.8	1643.5	1328.1	921.5	676.4	541.5	448.4	386.65	340.1	303.05	274.55	250.8	216.6	140.6
24 OPzV 3000	2193.55	1955.1	1584.6	1103.9	811.3	648.85	537.7	463.6	407.55	363.85	329.65	301.15	260.3	169.1

## Constant power in watts per cell

Voltage end of discharge: 1.70 V/cell

Type	15'	30'	1H	2H	3H	4H	5H	6H	7H	8H	9H	10H	12H	20H
4 OPzV 200	408.5	319.2	220.4	137.75	102.6	82.65	69.35	59.85	53.2	47.5	42.75	39.9	34.2	21.85
5 OPzV 250	506.35	397.1	274.55	172.9	128.25	102.6	86.45	75.05	66.5	58.9	54.15	49.4	42.75	27.55
6 OPzV 300	603.25	474.05	329.65	207.1	153.9	123.5	103.55	89.3	79.8	71.25	64.6	59.85	51.3	33.25
5 OPzV 350	618.45	514.9	378.1	247	183.35	147.25	124.45	107.35	95	85.5	76.95	71.25	61.75	39.9
6 OPzV 420	735.3	613.7	452.2	296.4	219.45	177.65	149.15	129.2	114	102.6	93.1	85.5	74.1	48.45
7 OPzV 490	849.3	711.55	525.35	344.85	256.5	207.1	173.85	151.05	133	119.7	108.3	99.75	86.45	56.05
6 OPzV 600	931.95	806.55	628.9	431.3	327.75	266	224.2	194.75	171.95	154.85	140.6	129.2	112.1	73.15
8 OPzV 800	1288.2	1105.8	852.15	579.5	438.9	355.3	299.25	259.35	229.9	206.15	187.15	171.95	149.15	97.85
10 OPzV 1000	1594.1	1371.8	1060.2	723.9	548.15	444.6	374.3	324.9	287.85	257.45	233.7	215.65	186.2	122.55
12 OPzV 1200	1893.35	1633.05	1267.3	866.4	657.4	532.95	449.35	389.5	344.85	309.7	281.2	258.4	224.2	147.25
12 OPzV 1500	1866.75	1672.95	1373.7	983.25	745.75	604.2	506.35	437.95	387.6	346.75	315.4	288.8	249.85	163.4
16 OPzV 2000	2542.2	2270.5	1853.45	1319.55	996.55	806.55	676.4	585.2	516.8	463.6	419.9	385.7	333.45	218.5
20 OPzV 2500	3145.45	2812.95	2302.8	1644.45	1245.45	1007.95	844.55	731.5	646	579.5	525.35	481.65	416.1	273.6
24 OPzV 3000	3734.45	3345.9	2747.4	1967.45	1492.45	1208.4	1012.7	876.85	775.2	694.45	630.8	577.6	499.7	327.75

**Constant current discharge in amperes**
**Voltage end of discharge: 1.75 V/cell**

Type	15'	30'	1H	2H	3H	4H	5H	6H	7H	8H	9H	10H	12H	20H
4 OPzV 200	209	165.3	115.9	72.96	54.15	43.51	36.385	31.635	27.93	24.985	22.705	20.805	17.955	11.685
5 OPzV 250	259.35	206.15	144.4	91.105	67.64	54.435	45.505	39.52	34.865	31.255	28.405	26.03	22.515	14.63
6 OPzV 300	308.75	246.05	172.9	109.25	81.13	65.265	54.625	47.405	41.895	37.525	34.01	31.255	26.98	17.575
5 OPzV 350	318.25	267.9	198.55	129.2	97.85	78.66	65.74	56.715	49.875	44.555	40.565	37.24	32.11	20.805
6 OPzV 420	378.1	319.2	237.5	154.85	116.85	94.43	78.85	68.02	59.945	53.485	48.64	44.65	38.57	24.985
7 OPzV 490	437	369.55	275.5	180.5	136.8	110.2	91.96	79.42	69.92	62.415	56.715	52.155	45.03	29.165
6 OPzV 600	475	414.2	327.75	226.1	172.9	141.55	118.75	102.6	90.725	81.13	73.72	67.735	58.52	38
8 OPzV 800	656.45	568.1	444.6	304	231.8	190	158.65	137.75	120.65	108.3	98.8	90.345	78.09	50.73
10 OPzV 1000	812.25	704.9	552.9	380	289.75	236.55	198.55	171.95	151.05	134.9	122.55	113.05	97.85	63.365
12 OPzV 1200	964.25	838.85	660.25	454.1	347.7	284.05	238.45	206.15	181.45	162.45	147.25	135.85	116.85	76.095
12 OPzV 1500	947.15	856.9	707.75	512.05	398.05	321.1	268.85	231.8	204.25	181.45	164.35	150.1	130.15	84.455
16 OPzV 2000	1290.1	1162.8	955.7	687.8	532	428.45	359.1	309.7	271.7	242.25	219.45	200.45	173.85	112.1
20 OPzV 2500	1595.05	1441.15	1187.5	856.9	664.05	535.8	448.4	386.65	340.1	303.05	274.55	250.8	216.6	140.6
24 OPzV 3000	1894.3	1713.8	1416.45	1025.05	795.15	642.2	537.7	463.6	407.55	363.85	329.65	301.15	260.3	169.1

**Constant power in watts per cell**
**Voltage end of discharge: 1.75 V/cell**

Type	15'	30'	1H	2H	3H	4H	5H	6H	7H	8H	9H	10H	12H	20H
4 OPzV 200	367.65	294.5	209	134.9	101.65	81.7	68.4	59.85	53.2	47.5	42.75	39.9	34.2	21.85
5 OPzV 250	456	366.7	261.25	169.1	126.35	102.6	86.45	74.1	66.5	58.9	54.15	49.4	42.75	27.55
6 OPzV 300	543.4	437.95	312.55	202.35	152	122.55	103.55	89.3	79.8	71.25	64.6	59.85	51.3	33.25
5 OPzV 350	558.6	473.1	357.2	238.45	181.45	147.25	124.45	107.35	95	85.5	76.95	71.25	61.75	39.9
6 OPzV 420	663.1	564.3	426.55	285.95	217.55	177.65	149.15	129.2	114	102.6	93.1	85.5	74.1	48.45
7 OPzV 490	766.65	653.6	495.9	332.5	253.65	207.1	173.85	151.05	133	119.7	108.3	99.75	86.45	56.05
6 OPzV 600	832.2	729.6	584.25	411.35	320.15	264.1	224.2	194.75	171.95	154.85	140.6	129.2	112.1	73.15
8 OPzV 800	1151.4	1002.25	794.2	553.85	429.4	353.4	299.25	259.35	229.9	206.15	187.15	171.95	149.15	97.85
10 OPzV 1000	1424.05	1242.6	987.05	690.65	535.8	441.75	374.3	324.9	287.85	257.45	233.7	215.65	186.2	122.55
12 OPzV 1200	1691	1478.2	1178.95	826.5	642.2	529.15	449.35	389.5	344.85	309.7	281.2	258.4	224.2	147.25
12 OPzV 1500	1659.65	1505.75	1255.9	925.3	729.6	597.55	506.35	437.95	387.6	346.75	315.4	288.8	249.85	163.4
16 OPzV 2000	2259.1	2044.4	1696.7	1243.55	977.55	798.95	676.4	585.2	516.8	463.6	419.9	385.7	333.45	218.5
20 OPzV 2500	2794.9	2532.7	2107.1	1548.5	1218.85	997.5	844.55	731.5	646	579.5	525.35	481.65	416.1	273.6
24 OPzV 3000	3319.3	3012.45	2511.8	1850.6	1459.2	1196.05	1012.7	876.85	775.2	694.45	630.8	577.6	499.7	327.75

# OPzV Range Sealed Tubular Lead Acid Battery

## Constant current discharge in amperes

Voltage end of discharge: 1.80 V/cell

Type	15'	30'	1H	2H	3H	4H	5H	6H	7H	8H	9H	10H	12H	20H
4 OPzV 200	179.55	145.35	105.45	68.59	51.775	41.99	35.245	30.78	27.265	24.415	22.23	20.425	17.765	11.59
5 OPzV 250	222.3	181.45	131.1	85.69	64.695	52.44	44.08	38	34.01	30.59	27.835	25.555	22.135	14.535
6 OPzV 300	265.05	216.6	156.75	102.6	77.52	62.985	52.915	46.075	40.85	36.67	33.345	30.685	26.6	17.48
5 OPzV 350	271.7	233.7	178.6	120.65	92.15	75.145	63.555	55.575	49.305	44.175	40.375	37.145	32.11	20.805
6 OPzV 420	323	278.35	212.8	144.4	110.2	90.06	76.19	66.595	59.09	53.01	48.45	44.555	38.57	24.985
7 OPzV 490	372.4	323	247	168.15	128.25	105.45	88.825	77.615	68.97	61.845	56.525	52.06	45.03	29.165
6 OPzV 600	400.9	356.25	286.9	207.1	162.45	133.95	114	99.75	88.255	79.325	72.58	66.975	58.235	38
8 OPzV 800	554.8	489.25	391.4	279.3	218.5	179.55	152	133	117.8	106.4	96.9	89.395	77.71	50.73
10 OPzV 1000	685.9	606.1	485.45	347.7	271.7	224.2	190	166.25	147.25	132.05	121.6	112.1	96.9	63.365
12 OPzV 1200	815.1	721.05	579.5	416.1	325.85	267.9	228	199.5	176.7	158.65	145.35	133.95	116.85	76.095
12 OPzV 1500	795.15	730.55	611.8	456.95	363.85	301.15	257.45	225.15	200.45	180.5	164.35	150.1	130.15	84.455
16 OPzV 2000	1088.7	991.8	827.45	615.6	488.3	402.8	343.9	301.15	267.9	241.3	219.45	200.45	173.85	112.1
20 OPzV 2500	1341.4	1228.35	1026.95	765.7	608.95	502.55	429.4	376.2	334.4	301.15	274.55	250.8	216.6	140.6
24 OPzV 3000	1591.25	1461.1	1224.55	914.85	728.65	602.3	513.95	450.3	400.9	361	329.65	301.15	260.3	169.1

## Constant power in watts per cell

Voltage end of discharge: 1.80 V/cell

Type	15'	30'	1H	2H	3H	4H	5H	6H	7H	8H	9H	10H	12H	20H
4 OPzV 200	323.95	265.05	193.8	128.25	97.85	79.8	67.45	57.95	51.3	46.55	42.75	38.95	33.25	21.85
5 OPzV 250	400.9	329.65	241.3	159.6	121.6	99.75	83.6	73.15	64.6	57.95	53.2	48.45	41.8	27.55
6 OPzV 300	477.85	393.3	288.8	191.9	146.3	118.75	100.7	87.4	77.9	70.3	63.65	58.9	50.35	33.25
5 OPzV 350	489.25	423.7	326.8	224.2	172.9	141.55	120.65	105.45	94.05	84.55	76.95	71.25	61.75	39.9
6 OPzV 420	581.4	504.45	389.5	267.9	207.1	170.05	144.4	126.35	113.05	101.65	92.15	85.5	74.1	48.45
7 OPzV 490	671.65	584.25	452.2	311.6	241.3	198.55	168.15	147.25	131.1	117.8	107.35	99.75	86.45	56.05
6 OPzV 600	722	643.15	522.5	381.9	303.05	251.75	214.7	188.1	168.15	151.05	137.75	127.3	111.15	73.15
8 OPzV 800	1000.35	884.45	713.45	515.85	407.55	337.25	287.85	252.7	224.2	202.35	184.3	171	148.2	97.85
10 OPzV 1000	1236.9	1096.3	885.4	643.15	508.25	421.8	360.05	315.4	280.25	252.7	230.85	212.8	185.25	122.55
12 OPzV 1200	1467.75	1304.35	1056.4	769.5	608	504.45	431.3	378.1	336.3	303.05	276.45	255.55	222.3	147.25
12 OPzV 1500	1442.1	1317.65	1111.5	840.75	676.4	564.3	482.6	425.6	380	343.9	314.45	288.8	249.85	163.4
16 OPzV 2000	1964.6	1790.75	1503.85	1131.45	907.25	755.25	646.95	569.05	508.25	459.8	419.9	385.7	333.45	218.5
20 OPzV 2500	2429.15	2217.3	1866.75	1407.9	1131.45	942.4	806.55	710.6	634.6	573.8	524.4	481.65	416.1	273.6
24 OPzV 3000	2885.15	2636.25	2223.95	1682.45	1353.75	1128.6	966.15	852.15	760.95	687.8	628.9	577.6	499.7	327.75



### Constant current discharge in amperes

Voltage end of discharge: 1.85 V/cell

Type	15'	30'	1H	2H	3H	4H	5H	6H	7H	8H	9H	10H	12H	20H
4 OPzV 200	147.25	123.5	91.39	61.75	47.215	38.475	32.585	28.405	25.175	22.705	20.71	19.19	16.72	11.02
5 OPzV 250	182.4	152.95	114	76.95	58.995	47.975	40.755	35.53	31.445	28.405	25.935	23.94	20.9	13.87
6 OPzV 300	216.6	182.4	135.85	92.15	70.68	57.475	48.83	42.56	37.715	34.01	31.065	28.69	24.985	16.625
5 OPzV 350	221.35	194.75	152.95	106.4	82.84	68.115	58.235	51.015	45.315	41.04	37.62	34.77	30.305	20.045
6 OPzV 420	263.15	231.8	182.4	127.3	98.8	81.605	69.73	61.085	54.34	49.21	45.125	41.705	36.29	24.035
7 OPzV 490	303.05	267.9	211.85	148.2	115.9	95	81.32	71.25	63.27	57.285	52.535	48.64	42.37	28.025
6 OPzV 600	323	293.55	241.3	180.5	145.35	120.65	103.55	91.01	81.035	73.34	67.165	62.13	54.055	35.815
8 OPzV 800	451.25	403.75	328.7	244.15	195.7	162.45	139.65	121.6	108.3	97.85	89.87	83.125	72.295	47.785
10 OPzV 1000	556.7	499.7	408.5	304	244.15	203.3	173.85	152	135.85	122.55	112.1	103.55	90.345	59.66
12 OPzV 1200	659.3	594.7	486.4	363.85	292.6	243.2	208.05	182.4	162.45	147.25	134.9	124.45	108.3	71.63
12 OPzV 1500	614.65	595.65	508.25	390.45	318.25	266.95	230.85	203.3	181.45	164.35	150.1	139.65	121.6	81.605
16 OPzV 2000	843.6	810.35	687.8	526.3	426.55	358.15	309.7	272.65	243.2	220.4	201.4	186.2	162.45	109.25
20 OPzV 2500	1039.3	1003.2	853.1	654.55	532	446.5	385.7	340.1	303.05	274.55	250.8	232.75	203.3	135.85
24 OPzV 3000	1229.3	1192.25	1016.5	780.9	636.5	533.9	461.7	406.6	362.9	328.7	301.15	279.3	244.15	163.4

### Constant power in watts per cell

Voltage end of discharge: 1.85 V/cell

Type	15'	30'	1H	2H	3H	4H	5H	6H	7H	8H	9H	10H	12H	20H
4 OPzV 200	272.65	229.9	171	116.85	90.25	73.15	62.7	54.15	48.45	43.7	39.9	36.1	32.3	20.9
5 OPzV 250	337.25	285	213.75	145.35	112.1	92.15	77.9	68.4	60.8	54.15	49.4	45.6	39.9	26.6
6 OPzV 300	401.85	340.1	255.55	174.8	134.9	110.2	93.1	81.7	72.2	65.55	59.85	55.1	48.45	31.35
5 OPzV 350	409.45	361.95	285.95	201.4	157.7	130.15	111.15	97.85	87.4	78.85	72.2	66.5	57.95	38.95
6 OPzV 420	486.4	430.35	341.05	241.3	188.1	155.8	133	116.85	104.5	94.05	86.45	79.8	70.3	46.55
7 OPzV 490	561.45	497.8	395.2	280.25	219.45	181.45	155.8	136.8	121.6	110.2	100.7	93.1	81.7	54.15
6 OPzV 600	603.25	544.35	449.35	339.15	275.5	230.85	198.55	173.85	155.8	140.6	129.2	119.7	104.5	69.35
8 OPzV 800	839.8	748.6	613.7	459.8	371.45	309.7	266	233.7	209	189.05	172.9	159.6	139.65	92.15
10 OPzV 1000	1037.4	928.15	761.9	571.9	462.65	386.65	332.5	291.65	260.3	235.6	216.6	199.5	174.8	115.9
12 OPzV 1200	1229.3	1103.9	908.2	684	553.85	462.65	398.05	349.6	312.55	282.15	259.35	239.4	209	138.7
12 OPzV 1500	1148.55	1104.85	945.25	731.5	600.4	506.35	439.85	389.5	348.65	316.35	289.75	267.9	234.65	157.7
16 OPzV 2000	1566.55	1501	1280.6	986.1	806.55	680.2	589.95	521.55	466.45	423.7	387.6	359.1	314.45	210.9
20 OPzV 2500	1936.1	1859.15	1588.4	1226.45	1005.1	847.4	735.3	650.75	582.35	528.2	483.55	448.4	392.35	263.15
24 OPzV 3000	2297.1	2209.7	1891.45	1463.95	1201.75	1013.65	880.65	779	697.3	632.7	579.5	536.75	470.25	316.35

## Battery Storage

### 1. Calculating the storage time

The storage time is indicated on the battery lid. This takes into account the shipping time of equipment, frequently quite lengthy (in the case of exports in particular).

### 2. Storage Conditions

The battery should be stored away from any moisture source of heat.

### 3. Storage Times

The self-discharge of OPzV batteries as a function of temperatures is as follows:

2% per month at 20°C
4% per month at 30°C
8% per month at 40°C

In order to ensure that battery can be charged easily after a long period of storage, it is recommended that batteries should not be stored for more than the following periods without recharging:

6 months at 20°C
4 months at 30°C
2 months at 40°C

Failure to comply with these recommendations may compromise the life expectancy of the battery.

### 4. Recharging stored batteries

The batteries should be recharged at the float charge voltage to suit the temperature (2.25 volts at 20°C per cell for example) with a current limit of 0.4C10 and for a minimum period of 96 hours.

The battery will be charged when the charging current has remained constant for a period of 3 hours.

### 5. State of charge

The battery state of charge can be determined approximately by measuring the open circuit voltage after the battery has been at rest for minimum of 24 hours.

State of charge	Voltage
100%	2.13V/cell
70%	2.09V/cell
50%	2.06V/cell
20%	2.02V/cell

The necessity of a refreshing charge can also be determined by measuring the open circuit voltage of a stored battery.

Refreshing charge is advised if the voltage drops below 2.07V/cell.

## Commissioning Charge

When commissioning a new battery (first charge), follow procedure A or B.

Procedure A is recommended.

### A. Boost charge

At a raised voltage of 2.33-2.40 Vpc. The charging time will be 12 to 24 hours depending on the initial charge condition. The current must be limited to  $0.4 \cdot C_{10}$ .

Boost charging must be switched off or switched over to float charging as soon as the fully charged state is reached.

### B. Float Charge

With a voltage of 2.25 Vpc. Full capacity will be obtained after a longer period of 4 to 6 weeks depending on state of charge.

## Maintenance/ Checks

- Every month, check the total floating voltage at the battery terminals. It should be  $N \times 2.25$  volts at a temperature of  $20^{\circ}\text{C}$  (tolerance 2.23-2.25 Vpc), where N is the number of cells in the battery.
- Once each year, effect a reading of the voltage of cells constituting the battery.
- A difference of plus or minus 3.5% between these individual floating voltages and the average voltage may be observed. This is due to the gas recombination process.
- A check on capacity (independent operation on load can be performed once a year).

## Safety

When carrying out any work on the battery, the applicable safety standards should be followed.

Note: Keep a logbook battery in which the measured values can be noted as well as power cuts, discharge tests (current, time,  $T^{\circ}$ ...) etc.

### **The main factors causing reduction in the life expectancy of OPzV cells**

- Deep discharges
- Poor regulation of the float voltage
- Poor quality (smoothing) of the charging current
- High ambient temperatures