

Typical Values for Valve Regulated Lead-Acid (VRLA), Nickel Cadmium (NiCd) and Lithium Iron Phosphate (LiFePO4) batteries.

Battery Type	Nominal Voltage per cell	Typical Float Voltage per cell ¹	Typical Boost Voltage per cell ¹	Typical End-of-Discharge Voltage per cell	Typical Numbers of Cells				Typical Float Voltages ¹				Typical Boost Voltages ^{1,6}				Recommended Charging Current Limits as % of Battery Capacity (C) ⁷			
					110V	48V	24V	12V	110V	48V	24V	12V	110V	48V	24V	12V				
VRLA	2	2.25	not usually boosted in standby applications	1.85... 1.67 ³	54	24	12	6	121.5	54	27	13.5	not usually boosted in standby applications				10% of C			
NiCd	1.2	1.42	1.65	1	88...93	34...40	18...20	9...12	127.8	53.96	26.98	14.2	148.5	64.35	31.35	16.5	20% of C	for vented NiCds ⁴	10% of C	for valve-regulated NiCds ⁵
LiFePO4	3.2	3.6	not usually boosted in standby applications	3	33...37	15	7...8	4	126	54	25.2	14.4	not usually boosted in standby applications				10...20% of C			

Notes:

- 1 All types and brands of batteries should always be charged exactly according to the battery manufacturers recommendations, which will from time to time vary from the above typical settings.
- 2 Size battery to 1.85V per cell for 'normal' industrial applications.
- 3 The lowest of end-of-discharge voltages, such as 1.67V per cell, are used in conjunction with the shortest of discharge times, such as 5 to 30 minutes, as commonly used in high-power commercial AC UPS applications. Do not use 1.67V or 1.7V per cell for longer battery run-times like 3 or more hours. The amount of damage done (usually sulfation) to a lead-acid battery is in part a combination of depth of discharge and time the battery is kept at depth. Hence a long slow shallow discharge can be as damaging to a lead-acid battery as a short, sharp, deeper discharge. That is why solar battery designs, in which the duration the battery may spend lightly discharged, the depth of discharge may be as little as 1.9 V per cell.
- 4 Vented wet-cell NiCd ranges, such as Saft Pocket-Plate SBL, SBM, SBH, and Hoppeke Fibre NiCd (FNC) ranges, for example.
- 5 Valve regulated (VR) wet-cell NiCd ranges, from companies such as Saft and Hoppecke , for example.
- 6 To prevent damage to load equipment, loads are usually disconnected before boosting NiCds.
- 7 Rule of thumb: Using a constant voltage charger, if the charging current is limited to 25% of the battery's capacity, 80... 85% of the capacity of a 'flat' battery will be recovered within 3 hours. The remaining 20... 15% of C will take approximately 13...14 hours to recover.
- 8 Rule of thumb: for every ten degrees centigrade rise in average operating temperature, the service-life of a lead-acid battery can be expected to halve. If a VRLA battery has a design-life of 10 years at 25°C, its best service-life may only be six to seven. If operated continuously or on average at 35°C , expect that same battery's service-life to be 3 years, approximately.