### *18.4.7.3 Discharge capacity*

The capacity that can be withdrawn from lead acid batteries depends strongly on the discharge conditions.

For stationary batteries usually the $C_{10}$ or $C_8$ capacity, for starter batteries usually the $C_{20}$ capacity and for traction batteries usually the $C_5$ capacity is specified. Solar batteries often are rated as $C_{100}$ and $C_{120}$ at 100 or 120-h discharge current, respectively. Typical end-of-discharge voltage is 1.8 V/cell or 1.85 V/cell for $C_{10}$, $C_{20}$ and $C_{100}$. For $C_5$, 1.7 V/cell is commonly used. All other ratings and voltage limits can be found as well.

The measured and the practical capacity increase when the discharge current decreases. If a battery is discharged with a lower current than the rated current, a higher capacity than the rated capacity can be withdrawn. If the state of charge is specified with respect to the rated capacity (a reasonable convention), negative values for the state of charge can arise. This is the reason Figure 18.6 displays negative states of charge.

Figure 18.16 shows the voltage during discharge as a function of the discharged capacity at different discharge currents. The lead acid batteries' capacity depends very much on the discharge current.

As a rule of thumb, it can be assumed that a battery with a nominal capacity of 100 Ah at $C_{10}$ has approximately 50 Ah at $C_1$ and approximately 130 Ah at $C_{100}$. Please note the fact that the corresponding currents $I_1$ and $I_{100}$ are not equivalent to $10 \times I_{10}$ res. $0.1 \times I_{10}$. In this example, $I_1$ is 50 A and $I_{100}$ is 1.3 A.

With respect to the electrical properties, the temperature influences the inner resistance (increasing conductivity of the electrolyte with increasing temperature), the diffusion

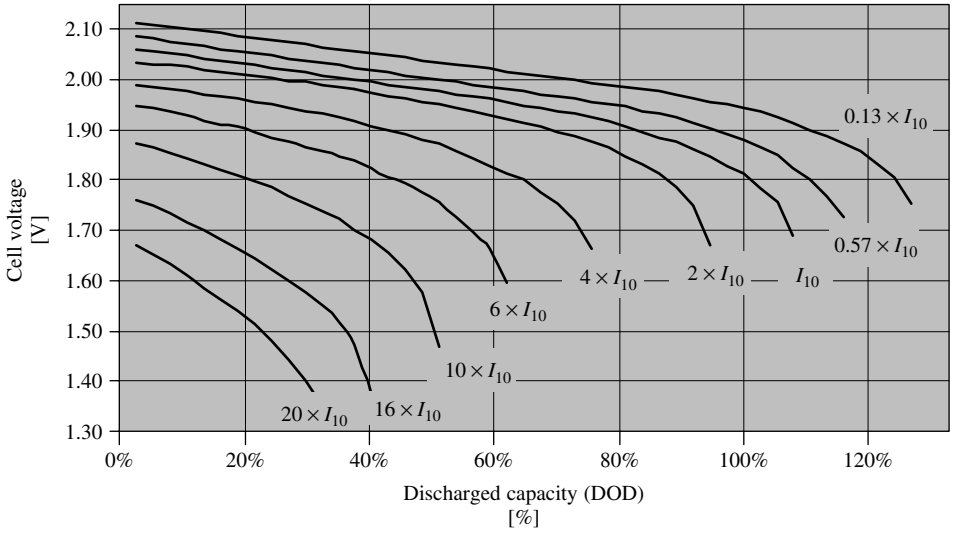


**Figure 18.16** Voltage during constant discharge as a function of the discharged capacity at different discharge currents (tubular-plate lead acid battery, $C_{10}$ capacity defined at $I_{10}$ and 1.8 V), data from Berndt D, *Blei-Akkumulatoren (Varta)*, VDI-Verlag, 11. Auflage, Düsseldorf (1986) [18]