Batteries & Inverters

RAYLITE™

Battery Centre

THE ONLY BATTERY SPECIALISTS

Batteries and Inverters Basics

- Normal car batteries are designed to provide a large current for a very short period of time to your starter motor.
- They are not designed to be regularly discharged by more than 25% of their capacity.
- Car batteries are thus not suited to applications where one wants to extract as much of the stored energy as possible before re-charging.
- “Deep cycle” lead acid batteries are designed to be repeatedly discharged to at least 50% of their capacity, which makes them suitable for home power use.
- A deep cycle 100Ah battery thus has a “design” capacity of at least 50Ah

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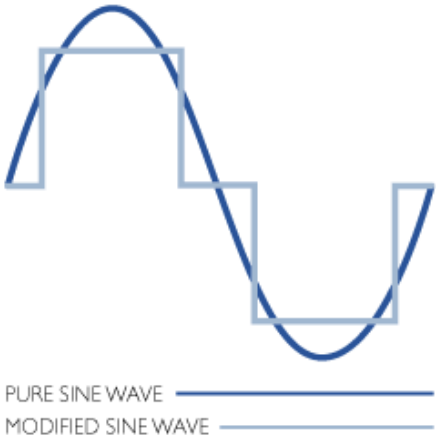
Battery and Inverter Basics

- The role of an inverter is to convert the direct current produced by the battery into alternating current required by all your house hold devices.
- Less expensive inverters do not produce a perfect sine wave, but what's called a "modified sine wave".
- Inverters also have a range of efficiencies, with poor designs being no more than 50-60% efficient, while good designs can reach 85-95% efficiency.
- Low efficiency means that a very large proportion of the battery's energy is wasted by the inverter
- For home standby use one normally needs an inverter with a built-in battery charger

http://www.powersaving.co.za



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Batteries and Inverters – Choosing the Right System

- Estimate the total power required by adding up the power consumption quoted for all devices you wish to power simultaneously.
- For example lets say you wish to light three rooms with 11W low energy light bulbs (one each) as well as run DSTV and a TV (lets say they consume 160W combined).
- Then your total requirement is 3 X 11 + 160 = 193 W.
- Remember to use the peak power consumption rating of devices that are reactive loads (e.g. contain electric motors), do not use their steady state power ratings.
- Decide whether you need a pure sine wave inverter or whether a modified sine wave inverter will do.
- Select an appropriate inverter that has a power rating at least 20% larger than your calculated requirement of 193W.
- In this case you should look for an inverter with a rating of at least say 250W.

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Batteries and Inverters – Choosing the Right System

- Bear in mind manufacturers may be slightly optimistic with their power ratings, so check with the supplier about what they would recommend if their rating is close to your target rating.
- Choose the highest efficiency inverter possible.
- An 80% efficient inverter will use 193 / 0.8 = 241W to produce 193W.
- So the power required from the battery is 241W.
- The electrical formula for power is:
- Power = Amps X Voltage
- So Amps = Power / Voltage
- A 12 volt battery will thus use 241 / 12 = 20.1 amps to produce 241 watts.

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Batteries and Inverters – Choosing the Right System

- Now a typical deep cycle battery has a capacity of 105 Ah.
- Remember that one should not aim to discharge the battery more than 50%.
- Thus for the purposes of design, there is only 52Ah available.
- So that battery would supply 20.1 amps for 52 / 20.1 = 2.6 hrs.
- Thus a single 105Ah battery would be sufficient to drive all those devices long enough to sustain the average load shedding power break of 2 hrs but not much longer before it discharged to too deep a level.
- Add another battery and thus double the time period.
- If one constrained the requirement to lighting only, a single battery would drive those three low energy bulbs for almost 15 hours.

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Batteries and Inverters – Choosing the Right System

- As you can see battery power is better suited for devices that consume small amounts of power.
- If you add another battery you need to ensure that the battery charger can charge at a high enough current to charge both batteries simultaneously within 12-18hrs.
- For a 12V inverter system, each 100Watts of inverter load requires approximately 10 DC amps from battery.
- For a 24V inverter system, each 200Watts of inverter load requires approximately 10 DC amps from battery.

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EXCIS FMF102 Battery

Standby Applications

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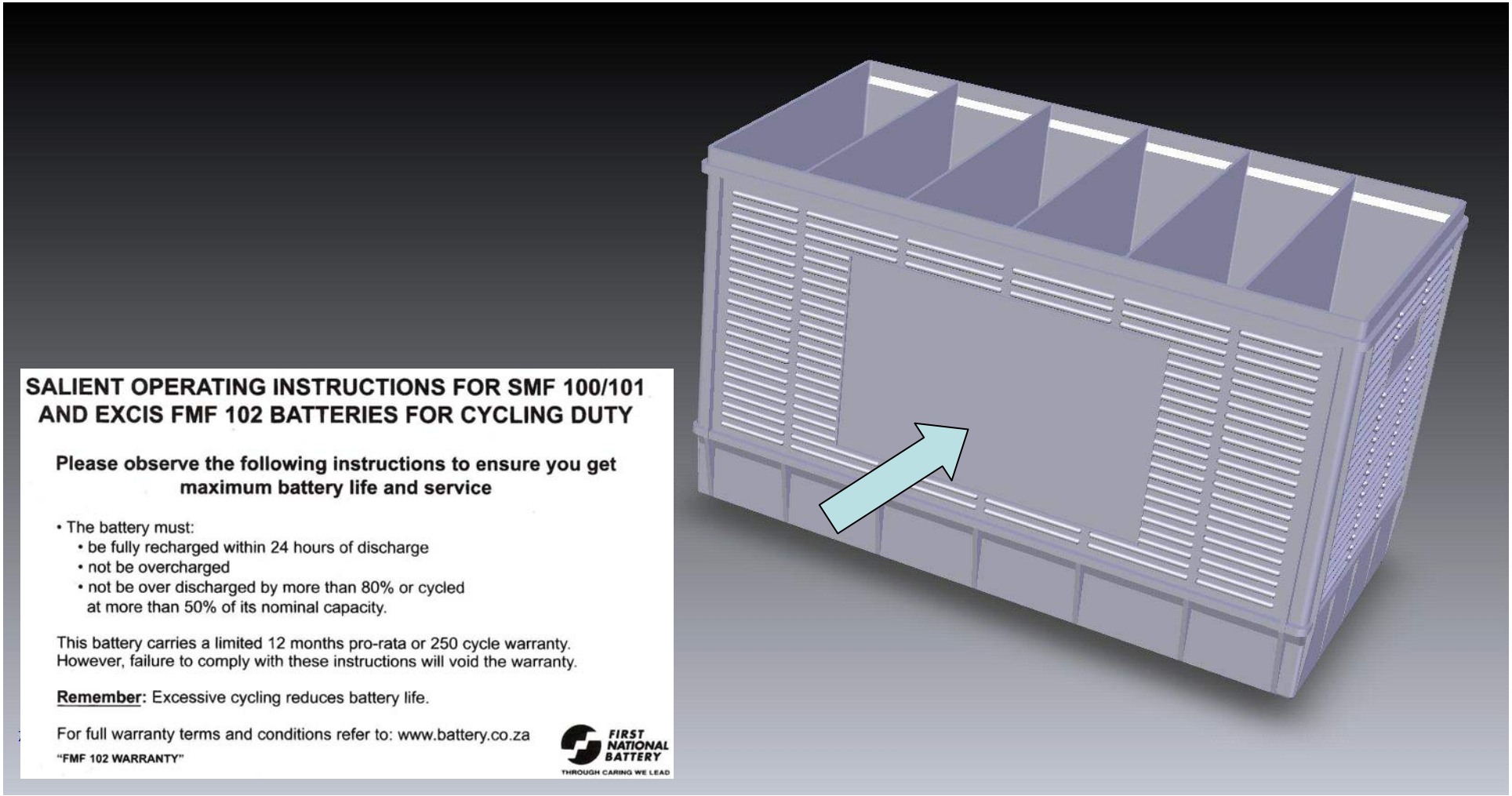
SMF100/101 Warranty Label for Cyclic Use



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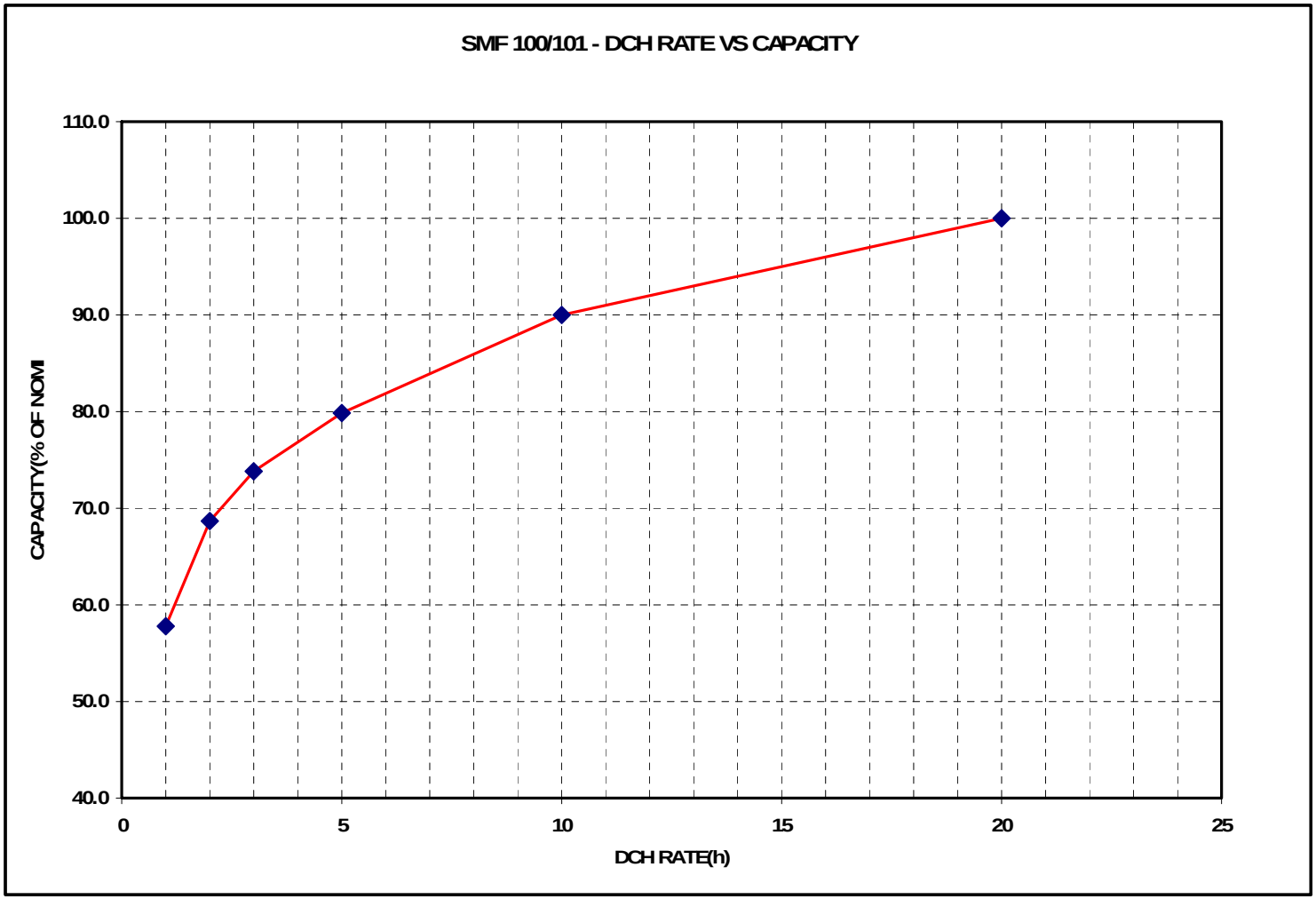
Higher Discharge Rates Reduce Battery Capacity



20 hours = 100 Ah

10 hours = 90 Ah

5 hours = 80 Ah

3 hours = 74 Ah

2 hours = 67 Ah

1 hour = 58 Ah

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ONE STRING OF SMF 100/101 BATTERIES

POWER	I (A)	TIME(h)	TIME(h)	I (A)	TIME(h)	TIME(h)	I (A)	TIME(h)	TIME(h)
REQUIRED (W)	12V	50% DOD	80% DOD	24V	50% DOD	80% DOD	48V	50% DOD	80% DOD
150	13.9	3.6	5.8	6.9	7.0	11.2	3.5	15.0	24.0
250	23.1	1.7	2.7	11.6	3.8	6.1	5.8	9.1	14.6
500	**46.3**	**0.7**	**1.1**	**23.1**	**1.7**	**2.7**	**11.6**	**3.8**	**6.1**
750	69.4	0.4	0.6	34.7	1.0	1.6	17.4	2.3	3.6
1000				46.3	0.7	1.1	23.1	1.7	2.7
1250							28.9	1.2	1.9
1500							34.7	1.0	1.6
1750							40.5	0.9	1.4
2000							46.3	0.7	1.1

500W load will draw 46.3A from battery for 0.7 hours to 50%DOD

500W load will draw 46.3A from battery for 1.1 hours to 80% DOD

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2 PARALLEL STRINGS OF SMF 100/101 BATTERIES

POWER	I (A)	TIME(h)	TIME(h)	I (A)	TIME(h)	TIME(h)	I (A)	TIME(h)	TIME(h)
REQUIRED (W)	12V	50% DOD	80% DOD	24V	50% DOD	80% DOD	48V	50% DOD	80% DOD
150	2x6.95	7.2	11.5	2x3.45	14.0	22.4	2x1.75	30.0	48.0
250	2x11.55	3.4	5.4	2x5.80	7.6	12.2	2x2.90	18.2	29.1
500	**2x23.15**	**1.4**	**2.2**	**2x11.55**	**3.4**	**5.4**	**2x5.80**	**7.6**	**12.2**
750	2x34.7	0.8	1.2	2x17.35	2.0	3.2	2x8.70	4.6	7.3
1000				2x23.15	1.4	2.2	2x11.55	3.4	5.4
1250							2x14.45	2.4	3.9
1500							2x17.35	2.0	3.2
1750							2x20.25	1.8	2.8
2000							2x23.15	1.4	2.2

500W load will draw 46.3A from battery for 1.4 hours to 50%DOD

500W load will draw 46.3A from battery for 2.2 hours to 80% DOD

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RAYLITE Tubular Batteries for UPS and Inverter Use

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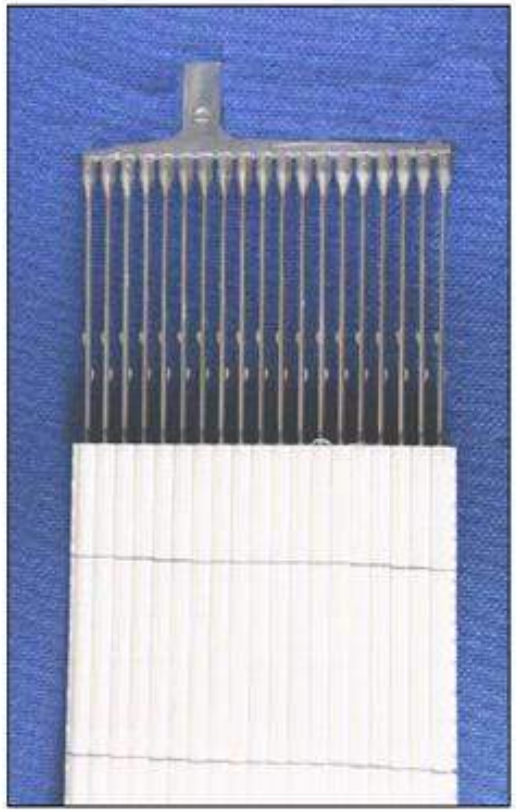
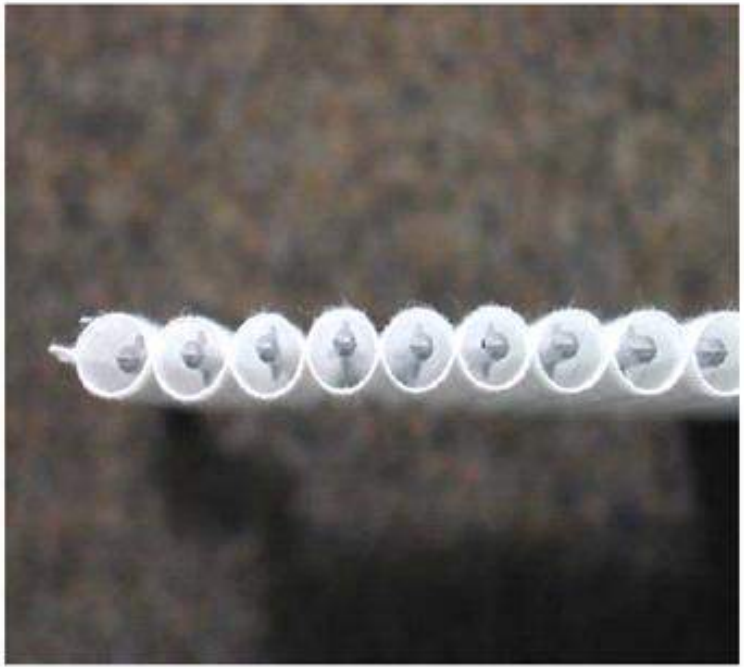
Tubular Positive Plate – The Best for Deep Cycling

Lead Spine & gauntlet





Tubular plate

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4V and 6V Batteries for Standby Applications

Typical Raylite M-Solar Battery Installations in Australia

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