



EXPLODING BATTERY

Background



On Sunday 15th of January this year an after-market Makita impact-wrench “compatible” Lithium-ion battery exploded in the back of the van of a scaffolder. The van immediately filled with a thick smoke, partially setting the van on fire. The scaffolder was accompanied by his 10-year-old daughter in the passenger seat at the time luckily, neither of them was harmed.

The battery had been bought from an online purchasing hub that shares the same name as the largest river in World by means of discharge (209,000 m³/s) at a considerable discounted price than a genuine Makita battery (£20 compared to £80).

The Result



Discussion Points

- What kind of injuries could the scaffolder have sustained had he been using the wrench at the time of the explosion?
- How severe could those injuries have been? (life changing)
- How could those injuries affect his life, and of those close to him?
- What could have happened had his van been unattended?
- What could have happened had this been inside his house during the night?
- How far reaching could the consequences have been?

Although we should not make the assumption regarding the origin, price and the manner in which this particular item was sold in relation to its quality however, all those factors may play a role as to why the battery had an “thermal run-away” which resulted in the explosion.

Note: the smoke released would have contained toxic gases which are poisonous when inhaled and absorbed (Carbon Monoxide, Carbon Dioxide, Hydrogen Fluoride). The smoke would also have contained Hydrogen which is an explosive gas.

The question is how to stop sub-quality (assumption) products entering the market and potentially endangering lives? Simply put, stop buying knock-off stuff. If there is no demand, then there would not be a market for it.

Points to consider.

- Always purchase genuine replacement parts
- Purchase from a retailer in the UK
- Avoid purchasing from unknown or non-traceable sources.
- Always read the manufactures recommendations.
- Adhere to the recommended charging times (don't overcharge)
- Check your tools and equipment each time before use.
- Never misuse or abuse tools or equipment.
- Can you afford to replace everything at risk of losing for the equivalent in £ saved by purchasing a knock-off product?
- Consider your attitude on finding out that your employer bought knock-off products that might compromise your safety? So, why would you?

SAFETY ALERT

Battery care	Lead acid: Flooded, sealed, gel, AGM	Nickel-based: NiCd, NiMH	Lithium-ion: Cobalt, manganese, NMC
Best way to charge	Apply saturated charge to prevent sulfation; can remain on charge with the correct float voltage.	Avoid getting battery too hot on charge. Do not leave battery in charger for more than a few days Subject to memory.	Partial and random charge is fine; does not need full charge; lower voltage limit preferred; keep battery cool.
Charge methods	Constant voltage to 2.40–2.45/cell, float at 2.25–2.30V/cell. Battery should stay cool; no fast charge possible. Charge time 14–16h	Constant current, trickle charge at 0.05C, fast charge preferred. Slow charge = 14h Rapid charge = 3h Fast charge = 1h	Constant voltage to 4.20V/cell; no trickle charge; battery can stay in charger. Rapid charge = 3h Fast charge = 1h
Discharge	Can endure high peak currents. Avoid full discharges. Charge after each use.	Do not over-discharge on a heavy load; cell reversal causes short. Avoid full discharges.	Prevent full cycles, apply some charge after a full discharge to keep the protection circuit alive.
How to prolong battery	Limit deep cycling; do not deep-cycle starter battery. Apply fully saturation charge. Avoid heat.	To prevent memory, discharge packs in regular use to 1V/cell every 1–3 months (mainly NiCd)	Keep cool. Operate in mid SoC of 20–80%. Prevent ultra-fast charging and high loads (most Li-ion)
Storage	Keep cells at >2.05V. Apply topping charge every 6 months to prevent sulfation.	Store in cool place; NiCd stores for 5 years; prime before use	Store at 40% charge in cool place (40% SoC reads 3.75–3.80V/cell). Do not go below 2.0V/cell.
Disposal	Toxic. Do not dispose. Electrolyte corrosive. Profitable to recycle.	NiCd: Do not dispose. NiMH: May be disposed in low volume	Low toxicity. Can be disposed of in low volume. Best to recycle.

SAFETY ALERT

Toolbox Talk/Briefing Attendance Register			
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Subject:	SAFETY ALERT exploding battery		
Contract/Location:			
Talk Given By:		Signature:	
Start Time:		End Time:	
Duration:		Date:	

I acknowledge that I have attended, received and understood the Toolbox talk/Briefing			
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PRINT NAME	SIGNATURE	PRINT NAME	SIGNATURE