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Occupational Health and Safety

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April 2025 NEWSLETTER

Contact details:

Pat: 082 442 8521 (08h00 – 16h30)

Email: p.wessels@topcompliance.co.za

Solar power, inverters & lithium batteries – Safety measures and legal compliance

As the demand for alternative energy sources continues to grow, many workplaces have turned to solar photovoltaic (PV) systems supported by inverters and lithium-based battery storage. While these systems offer a sustainable solution to energy reliability and rising electricity costs, they also introduce unique occupational health and safety risks that must be properly addressed. Under the [Occupational Health and Safety Act](#) (Act 85 of 1993), employers are legally required to provide and maintain a working environment that is safe and without risk to the health of employees, contractors, and the public. This responsibility extends to all energy infrastructure installed on the premises, including solar panels, inverters, and battery systems.

One of the most significant hazards associated with these systems is the potential for electrical fires, particularly those involving lithium batteries. Improper installation, overloading, or lack of ventilation can result in overheating, which in turn may trigger thermal runaway in lithium batteries—a chemical reaction that causes extreme temperatures, fires, and in some cases, explosions. It is therefore vital to do a comprehensive [Hazard Identification and Risk Assessment \(HIRA\)](#) by a competent person to identify and mitigate the risks. To mitigate such risks, it is essential that all installations are performed by competent persons and in accordance with relevant SANS standards. Employers must ensure that appropriate Certificates of Compliance (COCs) are obtained and retained. Also request the electricians qualifications and registration documents. In addition, battery enclosures should be well-ventilated and clearly labelled, with [warning signage as stipulated in SANS 10105-1:2010](#) to indicate the presence of high-voltage systems and hazardous energy sources.

Electrical shock is another notable concern, especially since solar panels can continue to produce voltage during daylight hours, even when disconnected from the main power supply. Inverters can also pose electrical risks if not properly isolated during servicing. In terms of Section 8 of the Occupational Health and Safety Act, employers must implement systems of work that are safe and without risk, which includes proper lock-out/tag-out (LOTO) procedures, the use of insulated tools, and comprehensive training for all personnel expected to work on or around electrical systems. Emergency response plans should also be reviewed and updated to include procedures specific to solar energy and lithium battery incidents, including the provision of lithium-rated fire extinguishers (Vermiculite extinguisher) and [staff training in the use of such equipment](#).

Material Safety Data Sheets (MSDS) for all battery types must be readily accessible in accordance with the Hazardous Chemical Substances Regulations, and employers should conduct regular inspections and maintenance checks on all components. These activities should be documented and included as part of the organisation's overall occupational risk management programme. Furthermore, appropriate signage, physical barriers, and routine system monitoring can play a vital role in preventing unauthorized access and identifying early warning signs of system malfunction.

When selecting battery technologies for energy storage, it is important to understand the safety differences between the available options. Standard lithium-ion batteries—often composed of lithium cobalt oxide (LiCoO₂)—are widely

used due to their high energy density but are more susceptible to overheating and thermal runaway. These batteries can pose a greater fire and explosion risk, especially if damaged, overcharged, or exposed to extreme heat. By contrast, lithium iron phosphate (LiFePO₄) batteries offer a much safer chemical composition. They are more thermally stable, less prone to combustion, and capable of withstanding higher temperatures without decomposing or igniting. LiFePO₄ batteries also have a longer life cycle and lower risk of toxic gas release in the event of damage, making them more suitable for use in schools, office buildings, and industrial environments where human exposure is a concern.

Equally important in the management of solar and battery systems is the need for structured [firefighting and evacuation training](#), not only within formal workplaces but also among private individuals who install these systems in their homes. In accordance with Sections 8 and 13 of the Occupational Health and Safety Act, employers are required to inform, instruct, train, and supervise employees to ensure safe practices. This includes practical firefighting drills, familiarisation with the use of lithium-specific fire extinguishers (Vermiculite extinguishers, and regular evacuation exercises tailored to the risks associated with electrical (Class C fires) and battery-related fires (Class D fires). In environments where lithium batteries are present, traditional water or dry chemical powder (DCP) extinguishers may be ineffective or even hazardous emphasising the critical need for correct equipment and proper training.

Private individuals and families are equally encouraged to increase their awareness of emergency procedures. As more households adopt solar systems, it becomes essential that residents understand how to isolate power, identify signs of overheating or malfunction, and react safely in the event of a fire. Basic knowledge of fire response and clear escape routes can significantly reduce the risk of injury or loss of life.

For both the corporate sector and the public, a proactive approach to fire safety—backed by training and clear evacuation protocols—is vital in minimising the risks associated with renewable energy systems. Fire safety awareness should be integrated into all stages of energy system planning, installation, and maintenance, ensuring a culture of safety and preparedness that aligns with the legal and moral obligations set out in the Occupational Health and Safety Act.

While solar energy systems provide clear environmental and financial benefits, they must be managed responsibly. Compliance with the Occupational Health and Safety Act, informed selection of battery technology, structured fire prevention planning, and comprehensive training are all essential components of a safe and sustainable energy future.

Lithium-based fires present several serious hazards, including thermal runaway, where a chain reaction caused by heat from a failing battery cell leads to nearby cells failing and triggering rapid temperature increases. This can result in explosions or intense fires that are difficult to extinguish. Thermal runaway can be triggered by overcharging, short circuits, mechanical damage, manufacturing defects, or exposure to high temperatures. Additionally, lithium battery fires release toxic and flammable gases, such as hydrogen fluoride (HF) and carbon monoxide (CO), which can cause respiratory irritation, chemical burns, and long-term health effects if inhaled. Even after being extinguished, damaged lithium batteries can reignite minutes or hours later due to ongoing internal chemical reactions. The accumulated thermal pressure or gases within battery cells can also cause violent explosions, which pose significant risks to people and property. Furthermore, fire-damaged batteries or inverters may expose live terminals, increasing the risk of electrical shock or electrocution. Some lithium battery chemistries, especially metallic lithium, can react with water, producing flammable hydrogen gas and heightening the risk of fire. Finally, fire-damaged batteries can leak electrolyte fluids, which are corrosive and environmentally harmful. To mitigate these hazards, it is essential to use Class D or lithium-rated fire extinguishers, train staff in emergency isolation procedures, ensure proper ventilation in battery storage areas, and include lithium fire response in the [Emergency Evacuation Plan](#). [Regular risk assessments](#), along with the review of fire [safety signage and equipment](#) as required by the OHS Act, are also critical to ensuring a safe environment.

Sustainable energy is only truly safe when powered by knowledge, protected by compliance, and supported by preparedness.

A webinar recently done with a fire consultant with SAIOSH may give more insights to the dangers and how to best manage them. [Lithium Battery Fire Safety - From Risk to Response](#)

Should you require further assistance or advice feel free to email us on info@topcompliance.co.za

				
Occupational health and safety auditing and consulting		Online safety shop		
				
Appointments, checklists and templates	First aid equipment	Signage	Legal posters	Safety Equipment

Courses offered by Top Compliance (Pty) Ltd

ONLINE ACADEMY - https://academy.topcompliance.co.za/		
Occupational Health and Safety Courses	Online	Onsite Excluding travel
Safety representative – Legal Liability	R980.00	R1300.00
The Occupational Health and Safety Act & responsibilities of management – Legal Liability	R1250.00	R 1730.00
Hazard Identification and Risk Assessment	R735.00	R875.00
Food facility health & safety course in terms of R638	R735.00	R875.00
Basic Ladder Safety Course	R735.00	R810.00
Fire Fighting and Prevention Courses		
Fire Marshal - Basic firefighting	R735.00	R875.00
Fire & Evacuation marshal - Basic firefighting with emergency action planning	R810.00	R950.00

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Occupational Health and Safety Courses		
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ONSITE TRAINING

First Aid Courses:	
Level 1 - US 119567 - Perform basic life support and first aid procedures	2 days
Level 2 - US 120496 - Provide risk-based primary emergency care/first aid in the workplace	3 days
Level 3 - US 376480 - Provide first aid as an advanced first responder	3 days
Level 1 & 2 - US 119567 & 120496	3 days
Level 1, 2 & 3 - US 119567, 120496 & 376480	5 days
Level 2 & 3 - US 120496 & 376480	3 days
Child and infant CPR & choking	6 hours
Adult CPR & choking	6 hours
Adult CPR & choking and AED	1 day
Occupational Health and Safety Courses	
Safety representative – Legal Liability	1 day
The Occupational Health and Safety Act & responsibilities of management – Legal Liability	1 day
Hazard Identification and Risk Assessment	1 day
Food facility health & safety course in terms of R638	6 hours
Basic Ladder Safety	6 hours
Fire Fighting and Prevention Courses	
Fire Marshal - Basic firefighting	6 hours
Fire & Evacuation marshal - Basic firefighting with emergency action planning	1 day