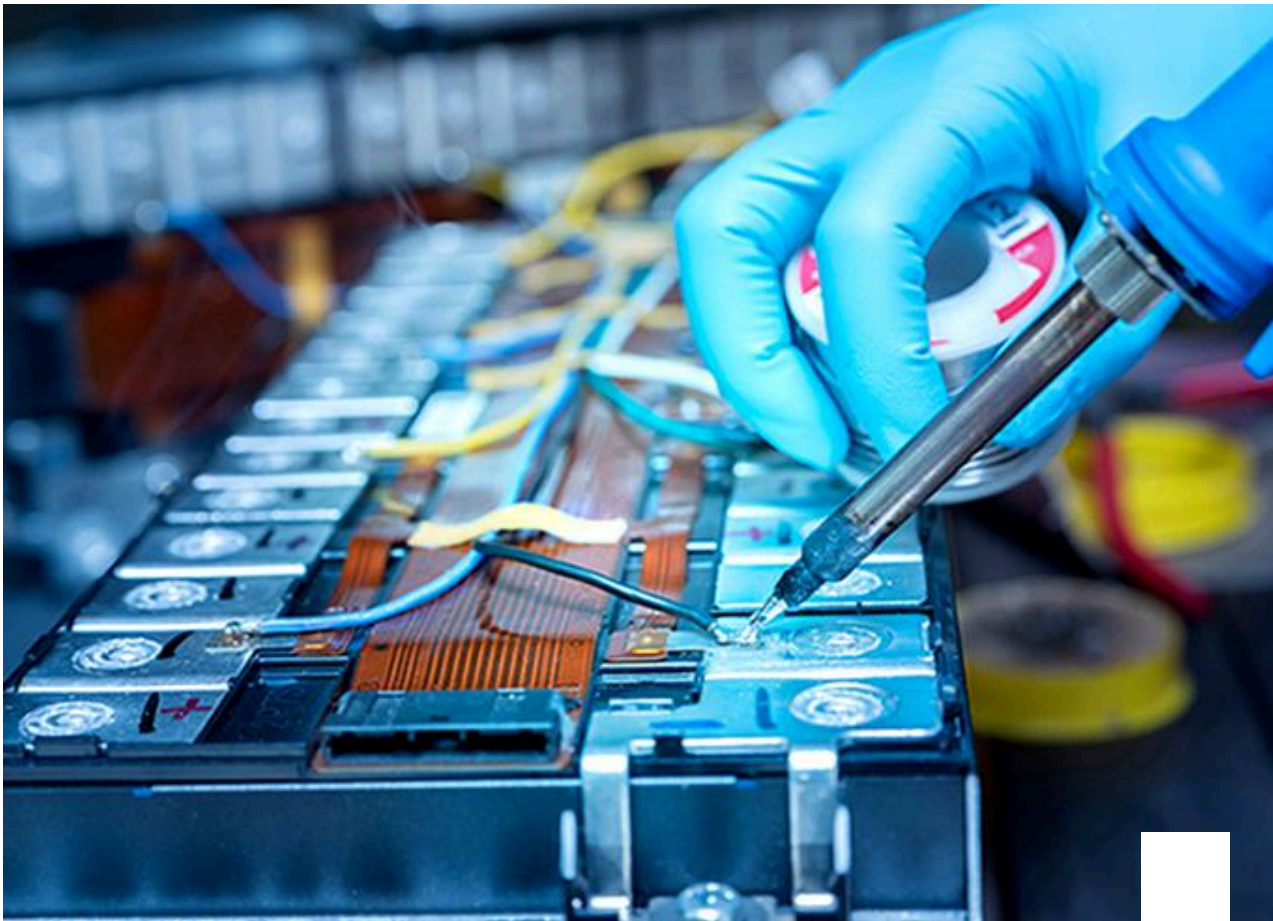


## Are lithium batteries on flights dangerous?

Why has the airline pilots' body called attention to fire risks? What causes lithium-ion batteries to catch fire? What are the fire-safety equipment and protocols that need to be in place? What happened when Hurricane Helene struck the U.S. in November last year?



New risks: A technician working on a lithium-ion battery. - Photo: iStockphoto

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Studies have found that existing fire kits have not been able to respond adequately to fires of lithium-ion batteries

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### The story so far:

On January 2, the International Federation of Air Line Pilots' Associations (IFALPA) issued three position papers on the fire risk due to the use of lithium-ion batteries in airport and aircraft settings. The papers are motivated by air operators' increasing

use of electric vehicles (EVs) and lithium-ion batteries as well as the batteries becoming more energy-dense.

## What is IFALPA?

The IFALPA is a global nonprofit representing the international community of professional pilots. After the Second World War, the UN established the International Civil Aviation Organisation (ICAO) in 1947 to coordinate air transport and its principles worldwide. A year later, ICAO organised a conference in London where pilots could interact with its leaders. The IFALPA was born at this event with 13 pilots' associations. According to a source on the ICAO website, IFALPA encompassed 104 member associations representing one lakh professional pilots worldwide around 2013. Per the same source, "The belief [is] that the unique perspective of pilots operating in scheduled flying would be of significant benefit to the creation and adaptation of ICAO Standards and Recommended Practices (SARPs) through which ICAO regulates international civil aviation." The IFALPA also provides inputs to the International Air Transport Association, the Airports Council International, and the International Federation of Air Traffic Controllers' Association.

## Why are there fears about lithium batteries?

Almost every major industry in the world is mechanised to a significant degree, and the energy for these machines has traditionally been produced by burning fossil fuels. As climate mitigation has become more pressing, industries are under pressure to replace this thermal energy — the principal cause of global warming — with electric energy.

For example, EVs draw electric energy from a battery to drive an electric motor and supply kinetic energy to the wheels. In an internal combustion engine, heat energy released by burning fossil fuel moves pistons, whose motion is converted to rotary motion of the wheels.

Lithium-ion batteries have emerged as a popular solution to storing electric energy because they are energy-dense, rechargeable, and can be made in almost any shape, which is useful when there are space constraints as onboard an aircraft. But lithium-ion batteries have been known to catch fire when they are subjected to certain physical stresses.

The fire is the result of the stress creating a short-circuit inside the battery, leaving it to keep producing electric current, heat, and oxygen. The battery's internal components can become corroded while the risk of catching fire increases. The short circuit can be the result of mechanical, electric, and/or thermal abuse, which respectively deforms the internal structure, degrades its electric performance, and causes heat to accumulate.

For example, after Hurricane Helene struck the U.S. in November 2024, 48 lithium-ion batteries reportedly caught fire.

University of South Carolina mechanical engineer Xinyu Huang said they may have been the result of EV batteries rarely being rated to be waterproof when they are

sitting in salt water for more than 30 minutes. Such situations are more likely to occur during flooding, which is becoming more common due to climate change and poor urban planning.

### What do the IFALPA papers say?

The three position papers are numbered POS01, POS02, and POS03. POS02 and POS03 are more general whereas POS01 is more specific.

POS02 is motivated by the different kind of fires caused by lithium-ion batteries (compared to internal combustion engines). As Mr. Xinyu wrote, “When a lithium-ion battery pack bursts into flames, it releases toxic fumes, burns violently and is extremely hard to put out. Frequently, firefighters’ only option is to let it burn out by itself.” The position paper thus asks “airports, rescue and fire-fighting services, operators, and ground service providers” to acquire or develop purpose-built fire-safety equipment and protocols.

POS03 extends these concerns to the flight deck — the area colloquially called the “cockpit” in civilian aircraft — where the batteries may be present in components required to operate the aircraft. It also calls attention to studies by the U.S. Federal Aviation Administration and the European Union Aviation Safety Agency finding that existing fire kits couldn’t respond adequately to fires of lithium-ion batteries with an energy rating of 100 Wh or higher.

POS01 is concerned with the safe transport of lithium-ion batteries, especially UN regulations 3480 and 3481. Since the UN classifies these batteries as “miscellaneous dangerous goods”, the regulations specify the packaging and labelling standards required to transport them by air. UN3480 applies to lithium-ion batteries transported in bulk and UN3481 to lithium-ion batteries fit inside some equipment that’s being transported in bulk.

One difference between the two regulations is that UN3480 requires the batteries to be charged to less than 30%, also known as state of charge (SOC) 30%, whereas UN3481 doesn’t. POS01 contends that UN3481 didn’t adopt this restriction because it assumed manufacturers would install safeguards in the equipment to prevent a fire from one battery spreading to others. But as the energy density of batteries and the number of settings in which they are used is increasing and the size of the equipment that uses them is shrinking, IFALPA’s position is that the SOC 30% limit should be extended to UN3481 as well.