

# High-performance, Flame-retardant Material Results in Battery Connector that Can Take the Heat



Phone shown does not use SMK battery connector.

## Project

When a global cell phone supplier wanted products that are safer for consumers, they turned to SMK with a request: help us develop a battery connector that is flame retardant.

DuPont delivered the technical expertise and high-performance material that allowed SMK to successfully launch a new flame-retardant battery connector.

SMK produces connectors for electronics such as cell phones, digital home appliances, and wearable devices. With an SMK design center in Japan and a production site in China, the project required a high level of cross-region coordination and communication.

## Challenges

In order to supply a flame-retardant battery connector, SMK has always required material that could stand up to the extreme conditions of the reflow soldering process, where the soldering plate is heated to 260°C.

### High-temperature resistance

SMK found that most flame-retardant, high-temperature polyamides pose problems when exposed to high temperatures. Specifically, they created excessive out-gassing during the molding process and blistered during reflow soldering. Blistering causes poor appearance and potentially decreases product reliability and performance.

## Sustainability

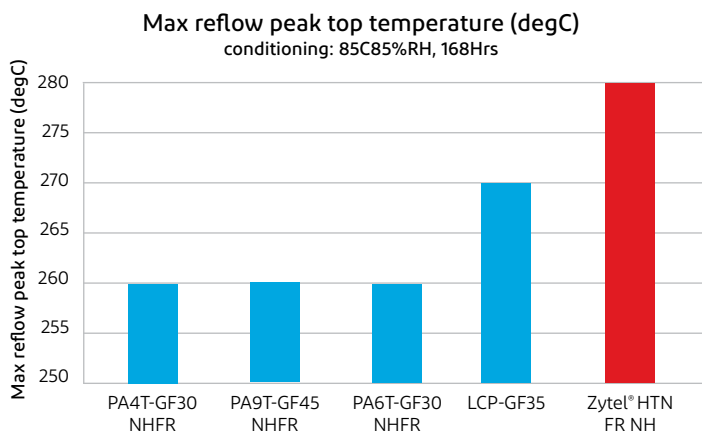
To address the environmental issues, SMK also was looking for non-halogenated and bio-based materials that would meet those parameters.

## Solution

The DuPont Japan sales team joined forces with the SMK design team in Japan to initiate the project and to do the material recommendation. Technical teams from SMK and DuPont China then collaborated to run the trial at the SMK facility in China. The onsite technical support from DuPont China's technical team also optimized the processing for the cell phone battery connector. The great team collaboration helped ensure the mass production of the component.

### Meets the demands of reflow soldering

DuPont's high-performance material, Zytel® HTN flame-retardant and non-halogenated grade, proved to be a superior material for overcoming out-gassing during the production of the battery connector and blistering during the reflow soldering process.



Source: DuPont Lab

## Low environmental impact

Zytel® HTN FR NH bio-based nylon, also lowers CO2 emissions and reduces dependence on fossil fuels while meeting health, safety, and sustainability requirements.

## Increased productivity

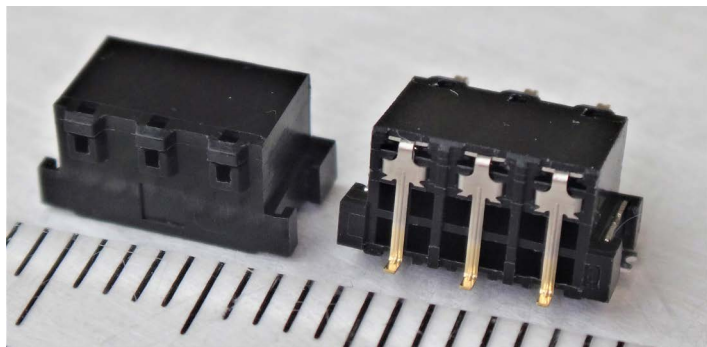
Zytel® HTN FR NH grade also outperformed every other material SMK tested because of its easy moldability by high flow. Plus, lower out-gassing increased productivity because it required less maintenance of the tool.

SMK's assembly process was trouble-free in large part because of the mechanical performance of the connector.

## Knowledge and expertise

In addition to being pleased with product performance, SMK noted how impressed they were with the DuPont team's depth of understanding and breadth of local support. Their knowledge and expertise were an integral factor in SMK's successful product launch of a flame-retardant cell phone battery connector.

As a non-halogenated, flame-retardant material, Zytel® HTN FR NH is certain to become a solution for connector applications across the electrical industry as manufacturers seek to protect consumers and comply with safety and environmental regulations.



Zytel® HTN FR NH grade makes it possible to produce a flame-retardant battery connector that stands up to the rigors of the reflow soldering process.

## Zytel® HTN Bridges the Performance Gap

DuPont™ Zytel® HTN cost-effectively bridges the performance gap between conventional engineering resins and high-end specialty polymers.

Zytel® HTN PPA grades retain stiffness, strength, and mechanical properties despite exposure to high temperatures, chemicals, and moisture, making them ideal for automotive underhood components and systems, as well as electrical and electronic connectors and bushings.

Zytel® HTN can replace metal parts that must withstand high temperature tolerances (such as engine cooling, hand-held devices, and non-halogenated connectors), while reducing total cost and weight through parts consolidation.

Structural grades of Zytel® HTN help provide larger display areas when used in backbones for cell phones, tablets, and other hand-held devices.

The Zytel® HTN series has recently added a high-performance bio-based offering, HTN 42, that is able to withstand reflow process up to 280°C.

### When to use Zytel® HTN (PPA)

- Zytel® HTN 51 (PPA) series offers outstanding chemical resistance and retention of properties when exposed to moisture
- Zytel® HTN 52 (PPA) series offers a higher melting point and deflection temperature, and is moldable in water-heated tools
- Zytel® HTN 53 series offers improved stiffness and toughness at ambient/moderate temperatures, an excellent surface appearance, and is moldable in water-heated tools
- Zytel® HTN 54 (PPA) series offers high burst pressure, retention of properties with moisture, high level of stiffness up to 110°C, and is moldable in water-heated tools
- Zytel® HTN 92 (PPA) series, enhanced with DuPont™ SHIELD Technology, offers high performance at temperatures up to 230°C
- Zytel® HTN 42 (PPA) series offers bio-based high-performance nylon resin solutions with good balance between improved performance and cost effectiveness especially when reflow process is needed

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