




"Lithium ion, and other long-term storage batteries, are the future of the transportation landscape."

HEV Battery Production Facilities

Camfil Farr	Segment Brochure	
Hybrid Electric Vehicle (HEV) Battery Production Facilities		
Camfil Farr - Clean Air Solutions		



*The future is electrifying
— “all new cars will be hybrids by 2020.”*

—125 Automotive Industry Executives

Green and sustainability are the axioms for future generations as we move away from fossil fuels and into renewable technologies. Rechargeable batteries are recognized as a regenerative power source and are now being used to power everything from wrist watches to automobiles. Because both pure electric vehicles and hybrid vehicles offer the prospect of reduced emissions and decreased reliance on imported petroleum, these vehicle types have attracted great interest from environmentalists and other groups over the past 20 years.

Although there are multiple types such as nickel metal hydride (NiMH) and various configurations of the lithium-ion battery, the lithium-ion type seems poised to dominate the market because of its high energy and power densities. It also has the potential to last the lifetime of the car, (150,000 miles is expected by consumers). This use period could span hundreds of thousands of charge/discharge cycles.

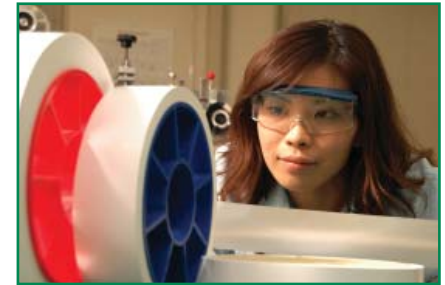
Camfil Farr's clean air systems concentrate on reducing

product flaws that could decrease the life of the battery during the battery's manufacturing process.

Camfil Farr's experience in BioPharma and containment-type laboratories ensures that production facilities produce the highest yield per production period. Research has shown that poor manufacturing processes can reduce yield by up to 50%.

Different types of lithium-ion batteries use different chemistries and have different performance, cost, and safety characteristics. Unlike primary lithium batteries, Li-ion cells use an intercalated lithium compound as the electrode material, instead of metallic lithium. The exact reaction that generates the electrons varies, depending on the type of battery. In a lithium-ion battery there are pressurized containers that house a coil of metal and a flammable, lithium-containing liquid. The manufacturing process creates tiny pieces of metal that float in the liquid. Manufacturers can't completely prevent these metal fragments, but good manufacturing techniques limit their size and number.

The cells of a lithium-ion battery also contain separators that keep the anodes and cathodes, or positive and negative poles, from touching each other. If a piece of metal gets too close to the



separator, it can puncture the separator and cause a short circuit. Controlling the air quality during the manufacturing process reduces this costly contamination, increases yield and assures that a quality product will make its way to the user.

Camfil Farr air filters:

- **Will protect your processes** by reducing the airborne contaminants that foul or short circuit cells. Yield is increased and a quality product is packaged for the user.
- **Reduce energy costs** required to move air through the filters. Savings can be as high as 30-50% when compared to other industry offerings.
- **Offer a longer life than comparable filters.** Labor to change the filters is reduced, so employees can concentrate on revenue-producing tasks and landfill waste is reduced, helping to create a greener environment.

Camfil Farr can review your project, or existing processes, with our Life Cycle Costing (LCC) Green software, to provide guidance on proper filter staging and selection. Camfil Farr LCC Green capitalizes on data garnered from systems over a period of more than 15 years.

Additionally, our Representatives can assist in your clean room design with our industry-proven Clean Software.



Camfil Farr Recommendations

“Humidity and cleanliness are equal factors in maintaining the integrity of battery production facility critical manufacturing areas. The Camfil Farr Pharmaseal, with its all-welded construction provides the required cleanliness level and eliminates the vapor intrusion that may be a factor with standard HEPA filter ceiling modules.”

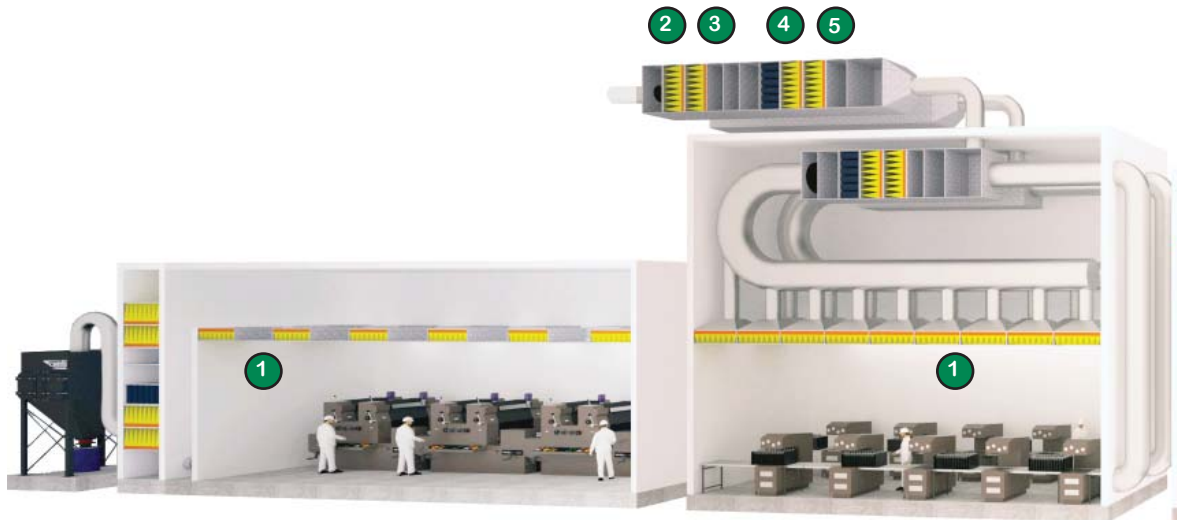
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The Camfil Pharmaseal®, with its all-welded construction creates a vapor-tight housing seal and precise airflow control through Camfil Farr HEPA filtration sets the industry standard for ducted ceiling modules.



The Camfil Farr APC Gold Series® cartridge fume and dust collector combines contaminant removal performance with ease of service. Safe-change options are available for cartridge filters and discharge system for containment of hazardous materials.



2



The 30/30® pleated panel filter extends the life of secondary filters at the lowest life cycle cost; consistent energy savings over the life of the filter.

3



The Hi-Flo® ES is an excellent choice for constant volume systems. Its maintained efficiency and low pressure drop are performance parameters unmatched by any other non-supported media product.

4



The Durafil® ES provides a maintained high particle capture efficiency at the lowest life cycle cost. Fan horsepower requirements are the lowest in the industry.

Camfil Farr Recommendations

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For environments that do not require precise humidity control, but still require an ISO level of cleanliness the Megalam® Ducted Ceiling Module is an excellent choice.

6



A room side replacable ducted terminal filter housing offering high efficiency performance and ease of maintenance.

5



The Filtra 2000® Absolute®, with media area up to 400 square feet, provides HEPA grade efficiency when installed in air handlers supplying critical areas. Offering the lowest pressure drop of any HEPA filter, energy savings can be significant.



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For installations where gaseous contaminants from processes may be a problem, Camfil Farr offers solutions for contaminant removal.

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Housings for built-up equipment or free-standing equipment are available to ensure that all of the recirculated air is filtered properly. Camfil Farr housings are guaranteed to have less than 1% leakage.

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Our Absolute® filter housings ensure that the efficiency of the system will be the same as the efficiency of the filters; HEPA grade for protection of intricate processes.

The Meaning of "Sustainability"



**Be
green
- Keep
clean**



Camfil Farr is a proud member of the United States Green Building Council.



All Camfil Farr facilities are ISO certified and operate under a stringent quality control program.

"I want Camfil Farr to be recognized as the 'sustainability leader' in the air filtration industry by our clients, our partners and the markets in which we compete."

Alan O'Connell
CEO, Camfil Farr



The Camfil Farr Sustainability Model is threefold:

Social - We are committed to health preservation through controlled indoor air quality in public, residential, and work environments, the safety of materials used in filter construction, and cleanliness of ventilation installations.

Environmental - Camfil Farr reduces greenhouse gas emissions through energy-efficient filters, and reduces environmental impact through good manufacturing practices and by supplying filters that perform to their rated efficiency throughout their service life.

Economic - Our Life Cycle Cost Reduction Strategy is a powerful tool that helps customers achieve the greatest air filtration value, at the lowest total cost. And because Camfil Farr filters perform at their rated efficiency through the filter's life, they directly contribute to higher overall productivity and fewer days of sick leave.

Sustainable development meets the needs of the present generation without compromising the ability of future generations to meet their needs.

Sustainability as a business approach creates long-term shareholder value by embracing opportunities, and managing risks from economic, environmental and social developments.

Sustainability and social responsibility combine in a concept whereby organizations take responsibility for the impact of their activities on customers, employees, shareholders, communities and the environment.

Camfil Farr has a long and successful track record in the pursuit of green and sustainable strategies.

Developments as diverse as Durafil ES, Filtra 2000 and improvements to the 30/30, Life Cycle Costing tools, and Energy Cost Indexing illustrate a decades-long commitment to environmental principles and practices, and environment-driven decision-making.



Camfil Farr is the leader in clean air technology and air filter protection.

Camfil Farr has its own product development, R&D and worldwide local representation.

Our overall quality goal is to develop, produce and market products and services of such a quality that we aim to exceed our customers expectations.

We see our activities and products as an expression of our quality.

To reach a level of total quality, it is necessary to establish an internal work environment where all Camfil Farr employees can succeed together. This means an environment characterized by openness, confidence and good business understanding.

www.camfilfarr.com
www.green-air-filters.com

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North American Manufacturing Locations

Concord Ontario Conover North Carolina Corcoran California Crystal Lake Illinois
Laval Quebec Riverdale New Jersey Washington North Carolina

Worldwide Manufacturing Locations

Belgium France Germany Ireland Malaysia Sweden Switzerland United Kingdom