The Role of Flame Retardants in Automotive Fire Safety

Date: April 17, 2025

Location: UL Prospector Webinar

American Chemistry Council | North American Flame Retardant Alliance

Moderator

Owen Jappen – Director, Chemical Products & Technology at American Chemistry Council

American Chemistry Council | North American Flame Retardant Alliance

Disclaimer

This webinar is for informational purposes only.

Any reference to brand names is purely for context and does not imply endorsement.

American Chemistry Council | North American Flame Retardant Alliance

Antitrust Compliance

Do not, in fact or appearance, discuss or exchange information on:

Prices, including:

- Individual company prices, price changes, price differentials, markups, discounts, allowances, credit terms, etc.;
- Individual company data on costs, production, capacity, inventories, sales, etc.; and
- Industry pricing policies, price levels, price changes, differentials, etc.

Production, including:

- Plans of individual companies concerning the design, production, distribution or marketing of particular products, including proposed territories or customers; and
- Changes in industry production, capacity, or inventories.

Transportation rates:

- Rates or rate policies for individual shipments, including basing point systems, zone prices, freight equalization, etc.

Market procedures, including:

- Company bids on contracts for particular products; company procedures for responding to bid invitations; and
- Matters relating to actual or potential individual suppliers or customers that might have the effect of excluding them from any market or influencing the business conduct of firms toward them.

Meeting Agenda

1. 12:00 – Welcome, Opening Remarks & Anti-Trust Guidelines
2. 12:10 – Panel Discussion: Flame Retardants in Automotive Safety
3. 12:45 – Q&A Session
4. 12:45 – Next Steps & Resources
5. 12:55 – Closing Remarks

NAFRA's Mission is to enhance fire safety through the development and promotion of flame retardant technologies in a wide range of products.

NAFRA represents the world's foremost producers of flame retardants.

Our members are dedicated to improving fire safety performance in consumer products, promoting compliance with rigorous safety standards.

NAFRA advocates for strong, science-based chemical safety regulations that protect both users and workers who may be exposed to flame retardant chemicals.

While safeguarding users, NAFRA also promotes fire safety as a vital public health issue, helping to prevent fire-related injuries and loss of life.

Opening Remarks

WELCOME

Steve Scherrer, LANXESS Corporation

American Chemistry Council | North American Flame Retardant Alliance

Life-Saving Benefits of FRs in Vehicles

Fire Hazard Reduction: Flame Retardants (FR) slow flame spread in vehicle fires, giving occupants critical time to escape.

Health Protection: They limit smoke and toxic gas release, protecting passenger health.

Regulatory Requirements

Auto Safety Standards: FRs support compliance with NHTSA and FMVSS fire safety rules.

EV & Charging Safety: Used to meet fire protection standards for EV batteries and charging stations.

Role in Automotive Applications

Targeted Protection: Found in seat foam, textiles, wiring, and EV batteries to prevent ignition.

Smarter Solutions: Innovation is making FRs safer and more sustainable for modern vehicles.

Panel Discussion

Welcome

John Holthus,
Materials, Substance Regulations & Sustainability
Core Engineering
Yazaki North America

Jim Moore
Vice President, OEM and Product Development
Specialty Equipment Market Association

Catherine Palin,
Senior Attorney & Director of Environmental Policy
Alliance for Automotive Innovation

FLAME RETARDANTS IN AUTOMOTIVE SAFETY

John Holthus
Senior Technical Specialist

YAZAKI

PRIMARY AUTOMOTIVE FLAMMABILITY STANDARDS

- **FMVSS 302** (Federal Motor Vehicle Safety Standard)
  - Applies to materials used in vehicle interiors
  - Requires a horizontal burn rate of ≤ 102 mm/min for materials >1.5 mm thick

- **UL 94** (Standard for Safety of Flammability of Plastic Materials)
  - This is the primary standard for plastics used in electronic components
  - UL 94 V-0 is a common requirement for automotive electronics, especially in high-voltage applications
  - Other classifications include UL 94 V-1, V-2, 5VA, and 5VB, depending on how the material self-extinguishes

- There are other flammability standards depending on the OEM, geographic location, and specific application of the automotive product, but FMVSS 302 and UL 94 are the primary standards for U.S. automotive applications

FLAME RETARDANT TYPES USED IN AUTOMOTIVE

- **Halogen-Based Flame Retardants**
  - Composition: Bromine or chlorine compounds
  - Mechanism: Radical quenching (interrupts combustion chain reactions in gas phase)
  - Trends: Phasing out in favor of phosphorus-based and inorganic-based flame retardants
- **Phosphorus-Based Flame Retardants**
  - Composition: Organophosphates, phosphonates, phosphinates
  - Mechanism: Char formation, oxygen barrier (solid phase)
- **Inorganic Flame Retardants**
  - Composition: Metal hydroxides (aluminum/magnesium hydroxides), boron compounds
  - Mechanism: Heat absorption & dilution (endothermic water release)
- **Nitrogen-Based Flame Retardants**
  - Composition: Melamine-based compounds
  - Mechanism: Char formation, intumescent action
  - Can cause processing challenges (decomposition at high temperatures)
- **Synergistic and Intumescent Systems**
  - Synergists: Antimony trioxide (with halogens) & zinc borates (with phosphorus-based FRs)
  - Intumescent systems: Combine phosphorus, nitrogen, and char-forming agents to create a protective layer upon heating

FLAME RETARDANT IMPACT ON VEHICLE DESIGN

- **How Have Plastics Improved Fuel Efficiency, Design, and Safety?**
  - Weight Reduction: Lightweight polymers replace metals, improving fuel efficiency
  - Complex Design Integration: Plastics enable complex geometries, reducing assembly complexity
  - Enhanced Safety: FR-treated plastics prevent fire spread in passenger cabins and electronic systems
  - Challenges: Balancing mechanical, thermal, and fire performance while maintaining sustainability goals
- **Challenges & Opportunities with Increasing Vehicle Electronics and Digitalization**
  - Challenge: Higher heat generation in compact electronic components increases fire risk
  - Challenge: Regulatory pressure to move away from halogenated FRs
  - Opportunity: Development of halogen-free FRs that maintain high electrical and thermal performance
  - Opportunity: Advanced polymer formulations for high-voltage connectors, PCB materials, and battery enclosures
- **Challenges & Opportunities in EV Market Growth**
  - Challenge: Lithium-ion battery fire risks necessitate stringent flame retardancy
  - Challenge: New materials needed for high-voltage insulation (>400V EV architectures)
  - Opportunity: Large part molding with non-halogenated FR polymer systems
  - Opportunity: Demand for self-extinguishing polymers with low smoke and toxicity emissions

THANK YOU VERY MUCH FOR YOUR ATTENTION!

In case of questions please do not hesitate to contact

Yazaki North America

Name: John Holthus

Tel: 734-983-1212

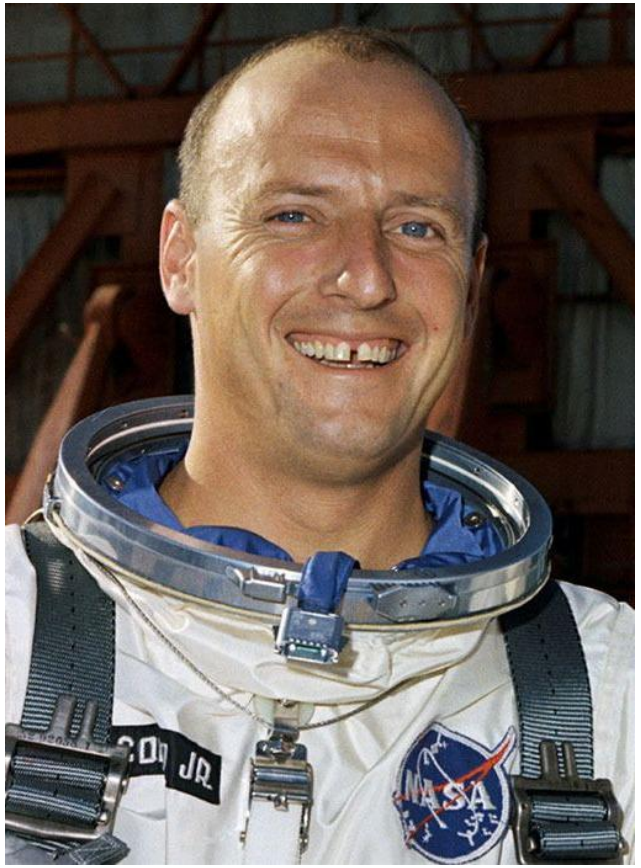
Email: John.Holthus@us.yazaki.com

Driving Automotive Innovation: NAFRA & SEMA Shared Purpose

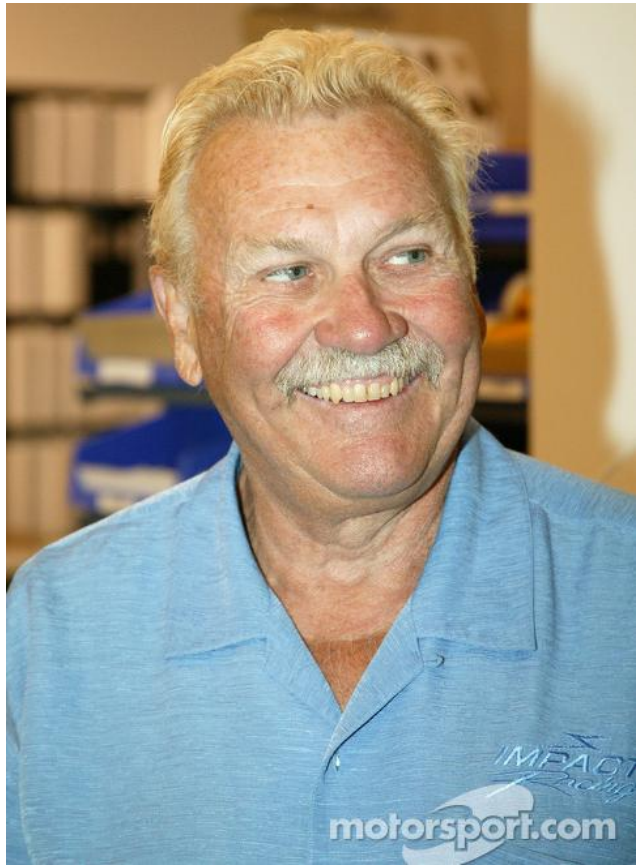
Advancing Safety, Performance & Sustainability in the Automotive Industry

Jim Moore
VP, OEM & Product Development
Specialty Equipment Manufacturers Association


FIA
OMP
OMP
MEDICAL
DELEGATE
F1
ACTION



NASA Astronaut
Charles “Pete” Conrad, Jr.



Simpson Race Products
Bill Simpson

Started in 1963

7000+ Members

3500+ Manufacturers

$52B in Sales

1.3 Million+ Jobs

$337B Economic Impact

1 Mission:

To foster the success of the automotive aftermarket

SEMA SHOW

PRI SHOW

SEMA PRI PAC

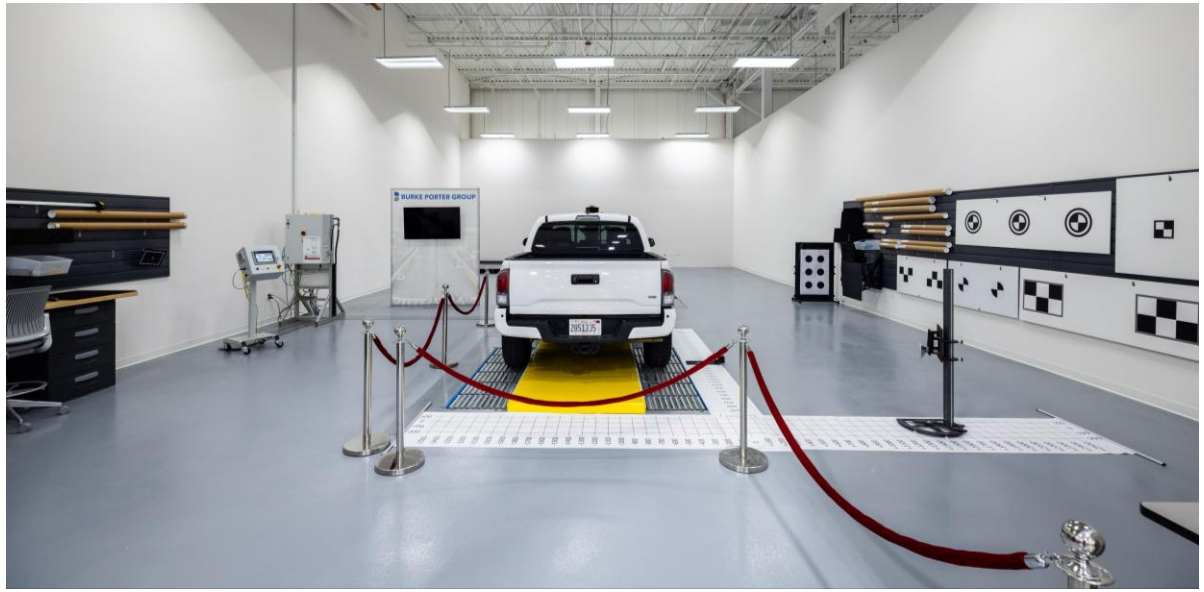
SEMA DATA

Powering The Industry

SEMA MARKET RESEARCH

SEMA GARAGE


BP
HUNTER


BURKE PORTER GROUP

Innovation Drives Collaboration

What drives innovation?

Necessity, risk, opportunity, and the demand for better solutions.

Why does it matter?

Because safety, progress, and relevance require it — especially in fast-moving industries like automotive and materials science.

Collaboration Drives Progress

NAFRA: Develops fire-retardant materials for EV batteries, fuel systems, and vehicle interiors.

SEMA: Supports material innovation in lightweight composites, ADAS integration, and performance tuning.

Shared Goal: Unlocking safety & performance that empowers innovation.

Progress Drives Success

NAFRA: Engages with EPA, DOE, NHTSA, and global regulatory bodies to set fire safety standards.

SEMA: Engages with CARB, EPA, NHTSA and SAE to set emissions and safety compliance standards.

Shared Goal: Supporting industry-wide compliance without stifling innovation.

A Safer, Smarter Industry

ALLIANCE FOR AUTOMOTIVE INNOVATION

NAFRA UL Prospector Webinar: The Role of Flame Retardants in Automotive Fire Safety

April 17, 2025

Catherine Palin

Senior Attorney & Director of Environmental Policy

Alliance for Automotive Innovation


AESC
AISIN GROUP
APTIV
Autoliv
BMW GROUP
BOSCH
DENSO
EMERGENCY SAFETY SOLUTIONS
Ford
gm
HARMAN
A SAMSUNG COMPANY
HONDA
HYUNDAI
INEOS Automotive
infineon
ISUZU
JLR
KIA
LG
LUMINAR
MAGNA
mazda
McLaren
Mercedes-Benz
MITSUBISHI MOTORS
NISSAN
nuro
Panasonic
PORSCHE
Qualcomm
RV INDUSTRY ASSOCIATION
SAMSUNG
SAMSUNG SDI
SK on
SiriusXM
CONNECTED VEHICLE SERVICES
STELLANTIS
SUBARU
Texas Instruments
TOYOTA
Uber
VINFAST
VOLKSWAGEN
GROUP OF AMERICA
VOLVO
ZOOX

Auto Innovators' Policy Role

- Advocacy before legislators, regulators, and policymakers concerning issues of interest to the auto industry.
  - Federal Motor Vehicle Safety Standards (FMVSS), including FMVSS 302 as previously discussed
  - Chemicals regulatory programs, including the federal Toxic Substances Control Act (TSCA), state consumer products programs like Safer Products for Washington and California's Safer Consumer Products
  - Policies that encourage and further electrification in the auto industry
  - Legislation that may impact flame retardant or other chemical availability

Our Mission

Cleaner, Safer, Smarter.

Auto Innovators Policy Work

- *“Automakers are committed to sustainability and include approved flame retardants in all passenger vehicles to meet the flammability standards required by the federal government ‘to reduce… deaths and injuries to motor vehicle occupants caused by vehicle fires…’ Changes to these standards are made by the National Highway Traffic Safety Administration.”*
- Sharing information on EV fire risk
  - Electric vehicles are safe.
  - EV fires may require different firefighting techniques.
  - Automakers are working with first responders and stakeholders like the National Fire Protection Association to develop guidance and provide further support of safety.
- Providing information on industry’s chemical uses, and on competing regulatory requirements, to regulators so that they can make informed policy choices

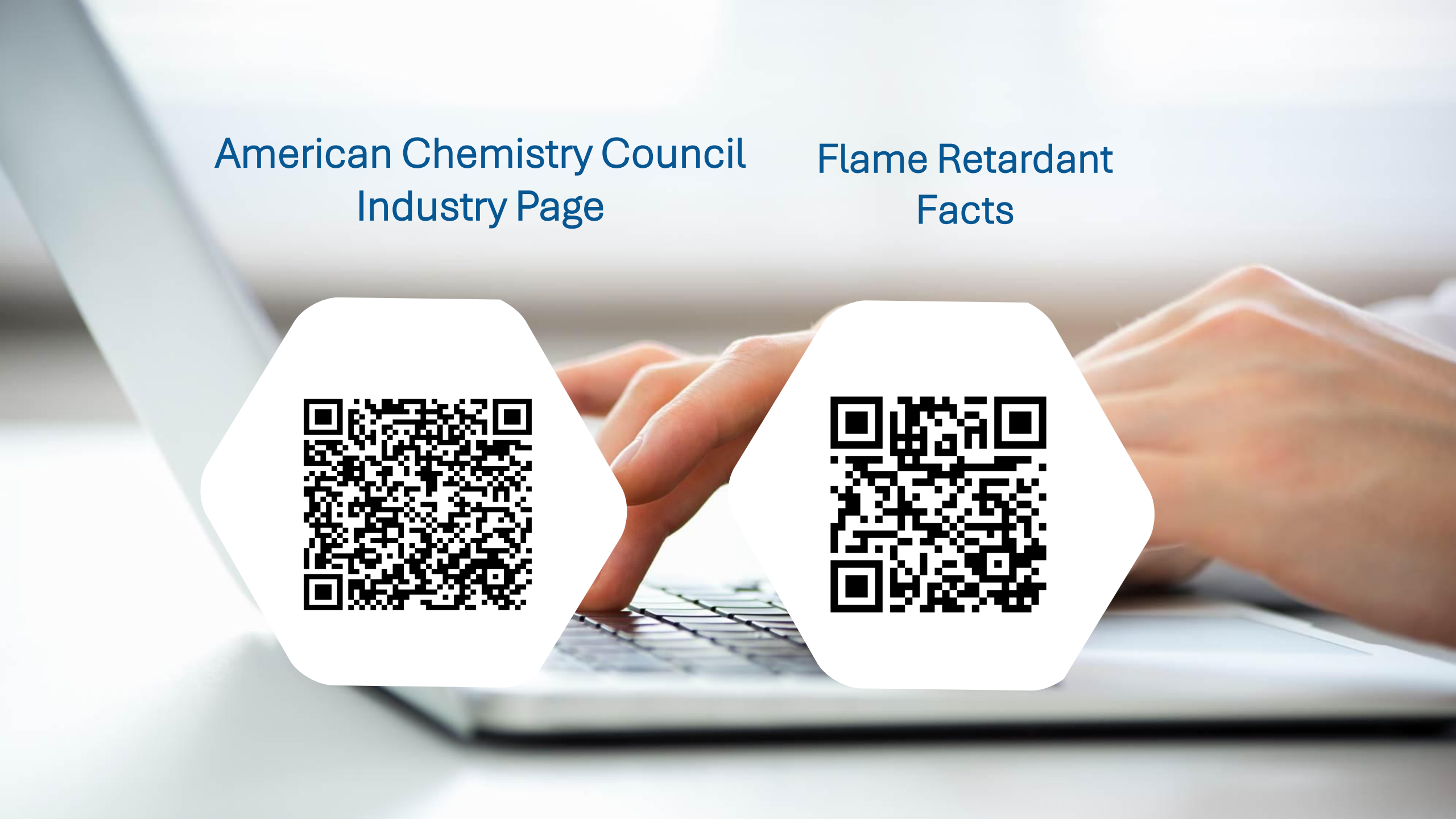
ALLIANCE
FOR AUTOMOTIVE
INNOVATION

Q&A

American Chemistry Council | North American Flame Retardant Alliance

American Chemistry Council Industry Page

Flame Retardant Facts



American Chemistry Council

North American Flame Retardant Alliance

Thank you