

STRONG COMPANY, STRONG CHARACTER.

Advantages of Using Silicone Foam in E-mobility & Electronic Applications

Bob Gabriel, Senior Chemist, CHT USA



BOB GABRIEL SENIOR CHEMIST, CHT USA

Robert Gabriel, Senior Chemist - Over 35 years experience in the field of phosphate esters with the last 15 compounding of silicones for CHT USA. Specializes in sustainability and environmental green chemistry. B.S. Chemistry Virginia Commonwealth University.

AGENDA

- ▶ Introduction to the CHT Group
- ▶ CHT & Sustainability
- ▶ Why choose Silicone Elastomers?
- ▶ Silicone Foam Market Applications
- ▶ Silicone Foam Offerings
- ▶ Product Highlights
- ▶ Flammability and Silicone Foams
- ▶ Why Work with CHT?
- ▶ Solving Challenges with Silicone
- ▶ Q&A



SilSo ADHESIVES
Industrial Adhesives



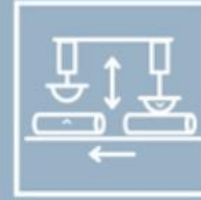
SilSo MOULDING
Mould Making &
Rapid Prototyping



SilSo ELECTRONICS
Electronic Potting



SilSo TRANSPORTATION
Mobility &
Transportation



SilSo PAD PRINTING
Silicone Print Pads



SilSo INJECTION MOULDING
Liquid Silicone Rubber



SilSo MEDICAL
Medical Applications



- ▶ CHT Group is a global silicone manufacturer specializing in custom formulations for industrial and consumer use.
- ▶ U.S. R&D and ISO certified manufacturing facilities located in Michigan and Virginia.
- ▶ Foundation-owned company benefiting charities focusing on Education, Environment, and Equity.
- ▶ Customer and Quality Focused since 1953

SUSTAINABILITY & ECOVADIS FOCUS

- ▶ **EcoVadis** is a globally recognized assessment platform that rates businesses' sustainability practices
- ▶ CHT has a focused target for net zero carbon footprint by 2045
- ▶ By end of 2025, 80% of sales with sustainable classified products by 2025
- ▶ All sustainable products meet the following classifications:



▶ **No toxicological classification**



▶ **Regulatory & social criteria**



▶ **No "SVHC/CMR" content**



▶ **<0.1% D4, D5, D6**



▶ **No critical classification in SDS**





WHY CHOOSE SILICONES?

Protect Battery Modules & Electronics from:

- ▶ Corrosion
- ▶ Vibration
- ▶ Mechanical Shock / Impact
- ▶ Harsh Environments / Outdoor Elements
 - ▷ Moisture
 - ▷ UV Exposure
 - ▷ Salt
 - ▷ Chemical / Solvents
- ▶ Thermal Stress and/or Propagation
- ▶ Heat Dissipation
- ▶ High Voltage Arcing

SILICONE FOAM MARKET APPLICATIONS

E-mobility

- ▶ Thermal Runaway Protection
- ▶ Spine / Cable Run moisture and vibration protection
- ▶ Firewall Penetrations
- ▶ Amplifier / ECU Protection

Electronics

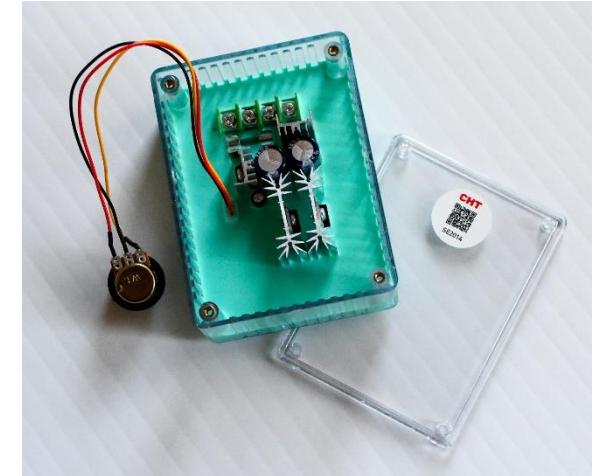
- ▶ Potting Replacement / Moisture Dust Mitigation
- ▶ Lightweight for Automotive/EV, or consumer electronics reduced shipping costs.

Aerospace

- ▶ Lightweight, flame-retardant protection

Appliances

- ▶ Thermal and Moisture Protection
- ▶ Dryer, Oven, Dishwasher, etc.

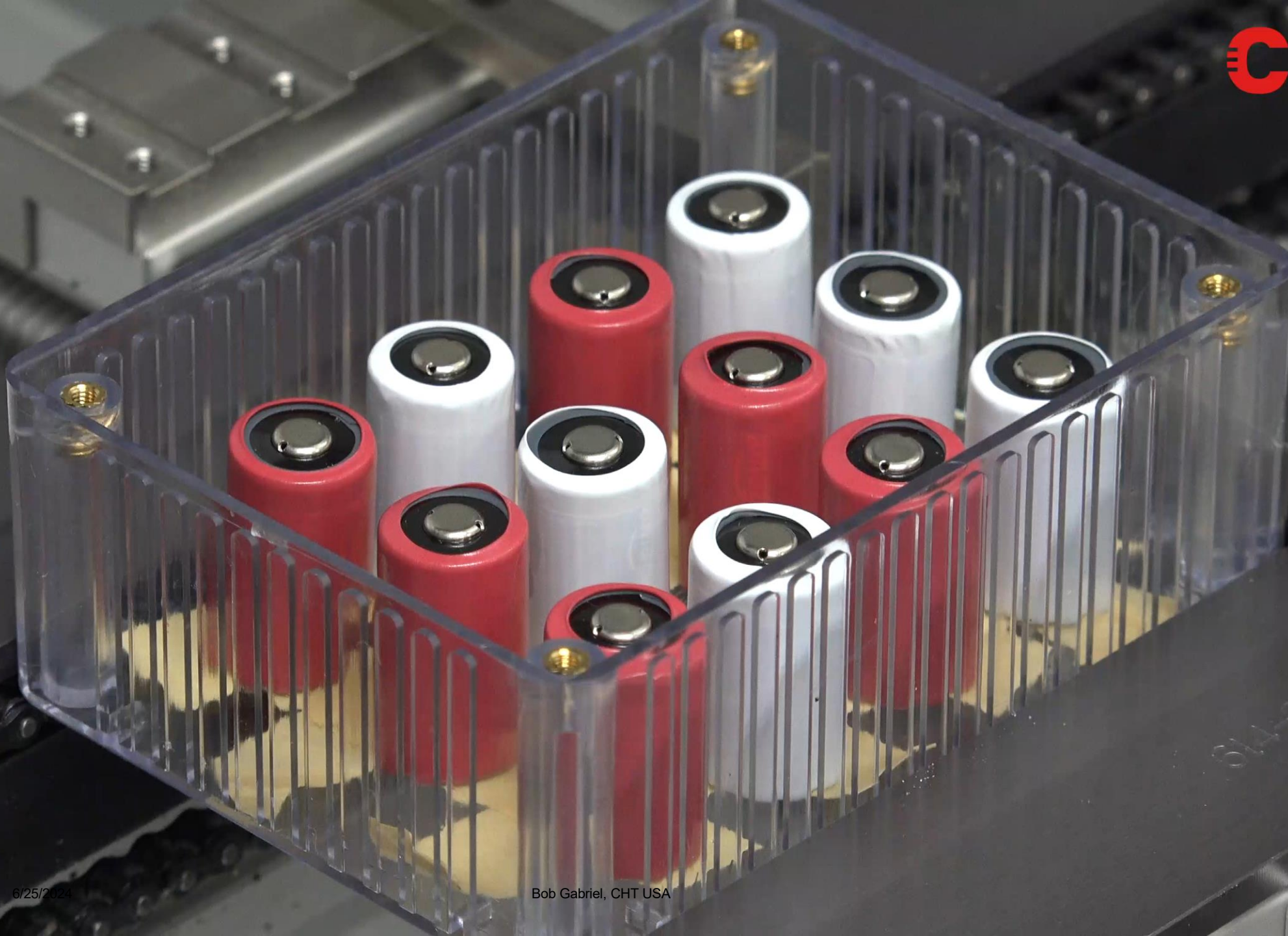


INDUSTRY
SOLUTIONS.

Material
Solutions.

CHT

SMART CHEMISTRY
WITH CHARACTER.



6/25/2024

Bob Gabriel, CHT USA

SUSTAINABLE LIGHTWEIGHT, SILICONE FOAMS

- Silicone Foam is a unique offering of a flame-retardant silicone material with many uses in industry and electronics. Obtain the benefits of Silicone in a foam, with low temperature flexibility, light weight encapsulation, and unmatched flame resistance in a foam.

Product	Description	Mixed Viscosity (cps)	Color	Puddle Flow (mm)	Density (g/cm ³)	Work Life
SilSo Lite 21025	Silicone foam, V ₀ rating	12,000	Black	143	0.4	2 mins
*SilSo Lite 21030	Silicone foam, low pressure – flat rise	8,000	Black	190	0.3	5 mins
*SilSo Lite 21010	Syntactic silicone foam, Low density additive, potting applications, low weight	9,000	Purple	--	0.58	6 hours
SilSo SE 2014	Syntactic silicone foam, Low density additive, potting applications under high pressures	10,000	Green	--	0.70	6 hours

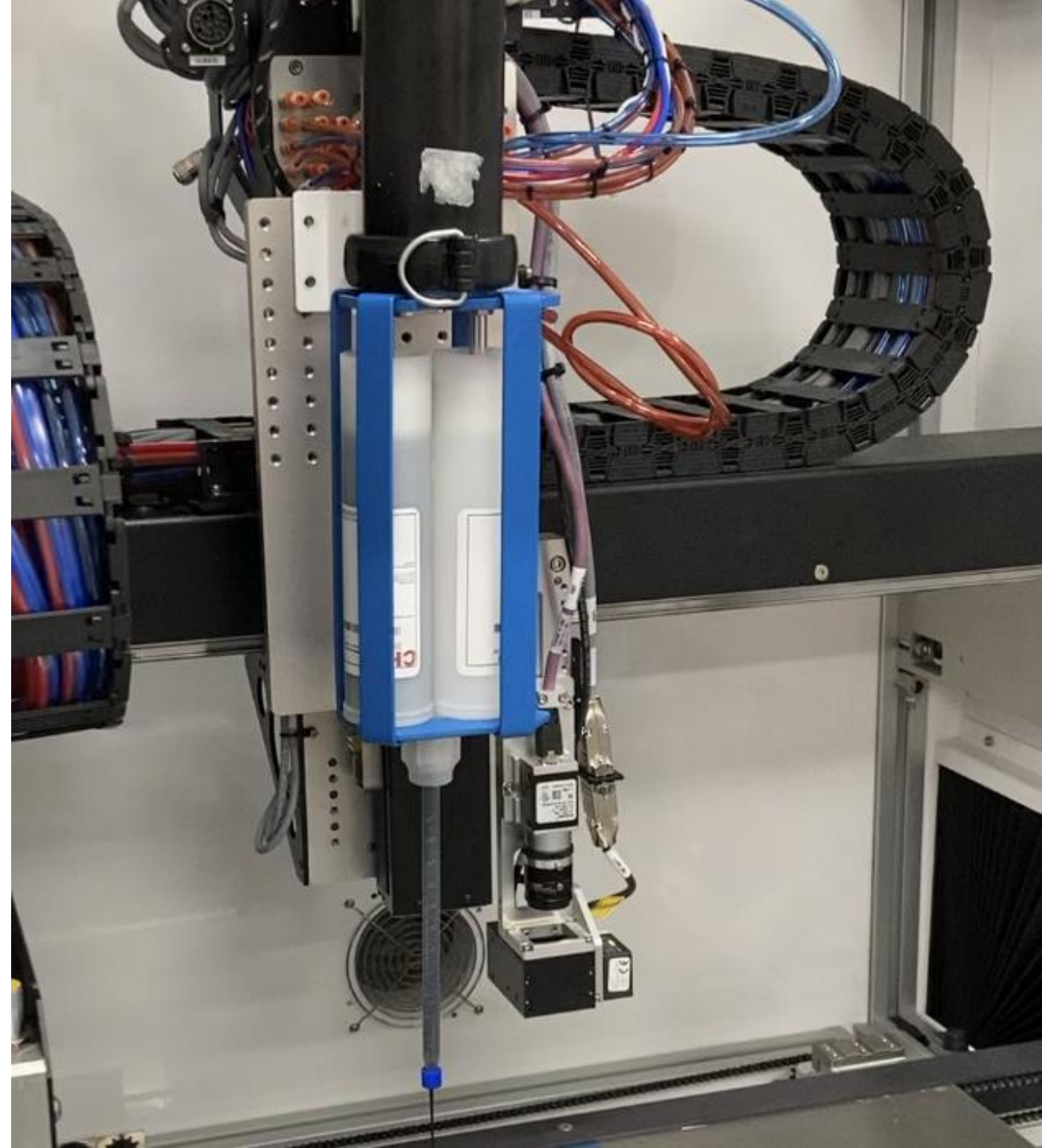
****New products***

PRODUCT HIGHLIGHT

SilSo Lite 21030 – New, Self-Blowing Silicone Foam

Key Benefits

- ▶ Easy meter mix and dispense, with great cell structure!
 - ▷ Investment in high-cost equipment not required
 - ▷ Quality foam from a cartridge or lower cost meter mix
- ▶ 18-20 lb/ft³ Foam Density
- ▶ 1/3 the weight of a traditional potting silicone
- ▶ UL 94 V-0 expected, test pending
- ▶ 1:1 Mix Ratio, 5-minute work life
- ▶ Rheology allows flow between 1 to 2 mm gaps



PRODUCT HIGHLIGHT

SilSo Lite 21010 – New Low Density, Syntactic Silicone Foam

Key Benefits

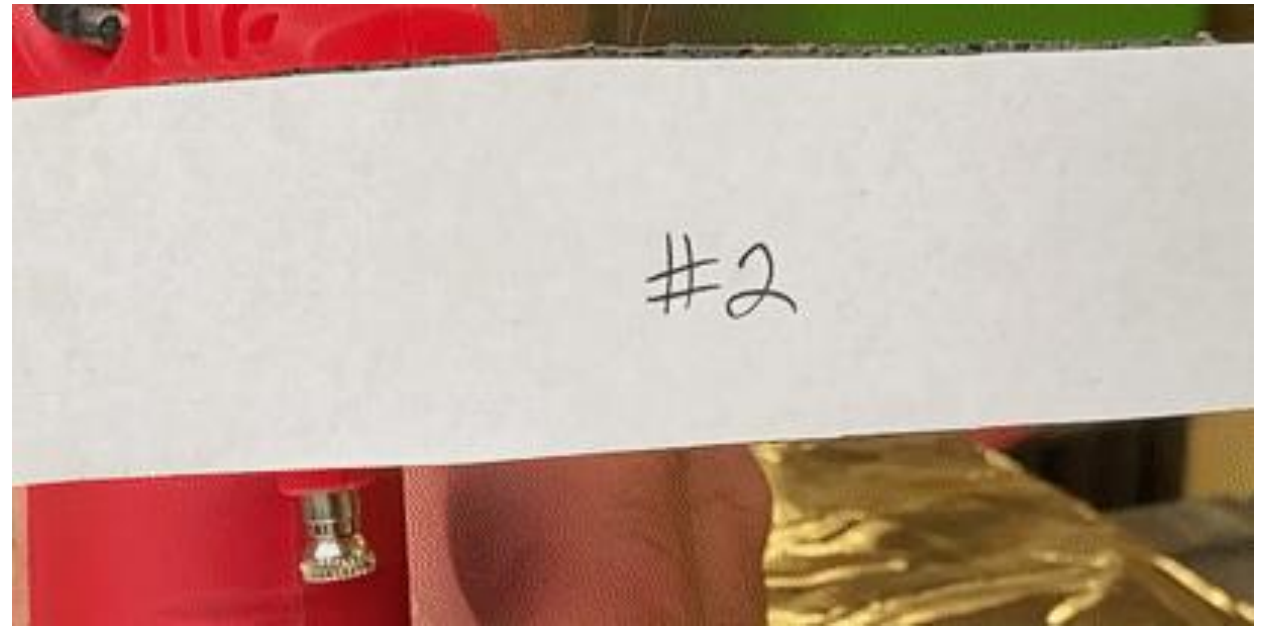
- ▶ Two-component, silicone elastomer system specially designed for electronic potting and encapsulation applications
- ▶ Offers protection against chemicals, environmental contamination, mechanical shock, vibration and impact damage
- ▶ Can be employed in areas where low flammability is a prerequisite
- ▶ The cured elastomer can be repaired



SILSO LITE 21025 FLAMMABILITY TESTING



- ▶ Substrate is 20lb weight copy paper
- ▶ Liquid foam drawn-down using wood shims (~3.2 mm)
- ▶ Final thickness was ~4.2 mm

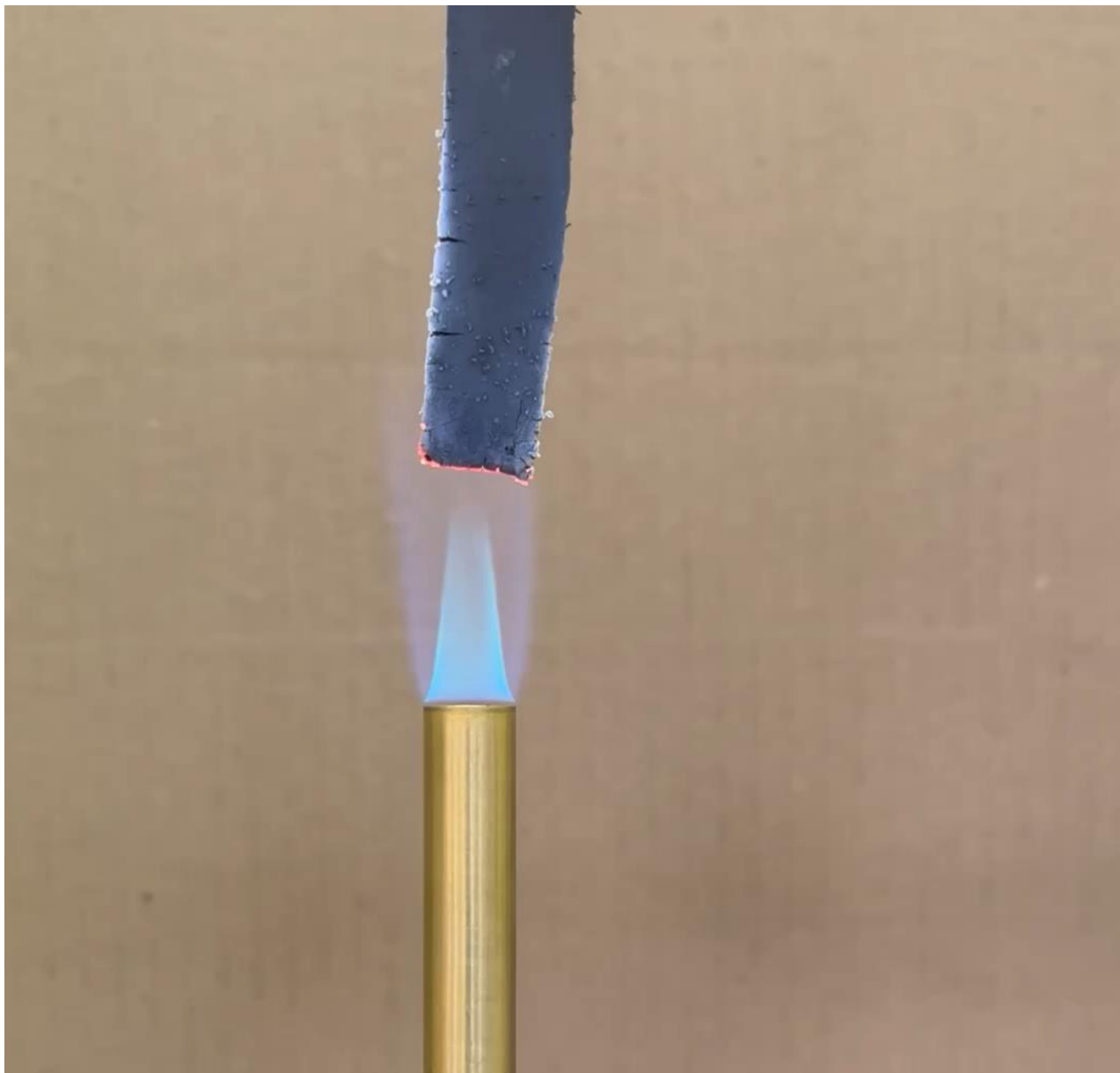


- ▶ Total time is about 30 seconds
- ▶ Flame temp is ~1400 °C (2600 °F)
- ▶ Backside temp after 10 seconds was ~150 ° F



SILSO LITE 21025 FLAMMABILITY TESTING

- ▶ Flame test with SilSo Lite 21025
- ▶ 3 MM



SILSO LITE 21030

UL FLAMABILITY TESTING

- ▶ 2 MM
- ▶ Second repeated flame



WHY WORK WITH CHT?

- ▶ Access to Technical Experts
- ▶ Custom Formulations with Lower Minimum Order Quantities
- ▶ Faster Response Time
- ▶ Global Manufacturing with Global Distribution Network
- ▶ Sampling Program



CHT

**INDUSTRY
SOLUTIONS.**

**Silicone
Experts.**

SOLVING CHALLENGES WITH SILICONE

Design for Manufacturing

- ▶ How many parts do you need to make?
- ▶ What cure method and speed is needed?
- ▶ How will it be applied?
- ▶ What production equipment is needed?
 - ▷ Meter Mix
 - ▷ Pumps
 - ▷ Ovens
 - ▷ Molds / Injection Equipment
 - ▷ Syringe, Gallon, Pail, Drums, Totes
- ▶ Is there a waste stream?
- ▶ Is the material package size availability suitable?
 - ▷ Syringe, Gallon, Pail, Drums, Totes

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WITH CHARACTER.

SB
Pristine



SB+O₂
Pristine



SOLVING PROBLEMS WITH SILICONE

Design for Performance

- ▶ What cured properties do you need?
 - ▷ Adhesion to Substrate
 - ▷ Durometer
 - ▷ Environmental Resistance
- ▶ What test criteria will you use?
 - ▷ Shear, Peel, Salt Fog, 85°/85%, Thermal Shock
- ▶ What material specifications do you require?
 - ▷ Mil-Spec
 - ▷ UL Listing
 - ▷ ISO
 - ▷ FDA / NSF

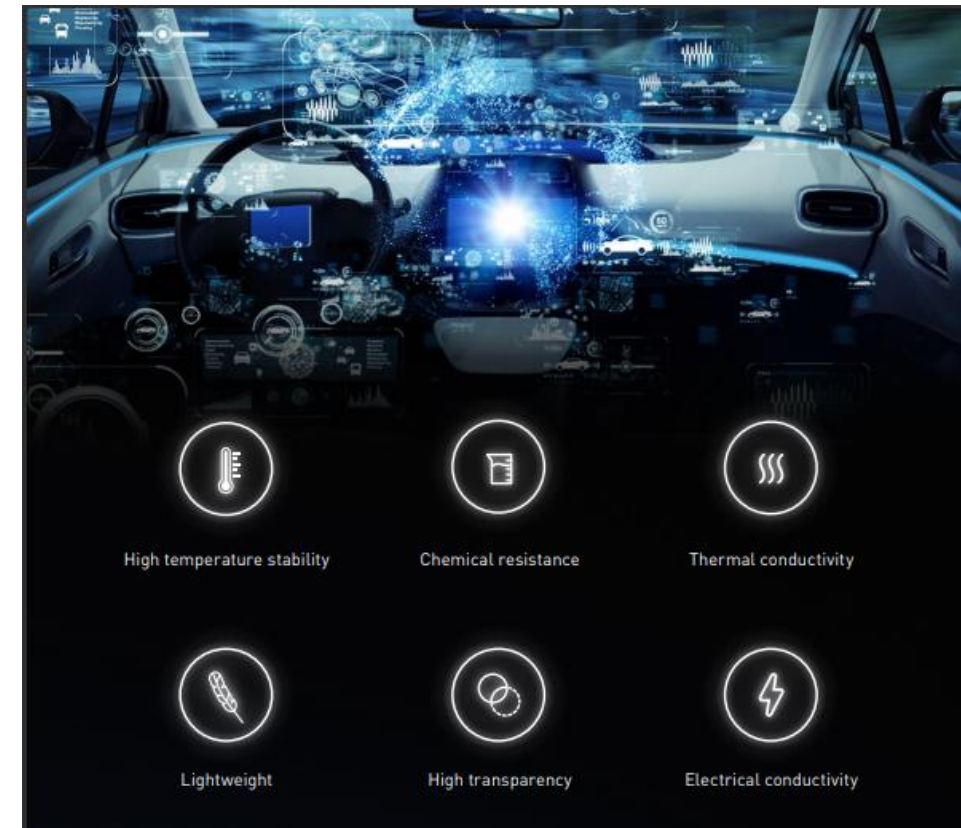
CHT E-MOBILITY MATERIALS

Below is a link to our E-Paper for E-mobility, showcasing materials for the following applications:

- ▶ Lightweight Potting and Thermal runaway protection
- ▶ Assembly & Bonding
- ▶ Gasketing
- ▶ Thermal Interface materials
- ▶ General protection and potting



[CHT ePaper Portal](#)



THANK YOU FOR ATTENDING!

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Q & A SESSION