



ADVANCING FIRE SAFETY FOR LPG CYLINDERS

PRESENTED BY:

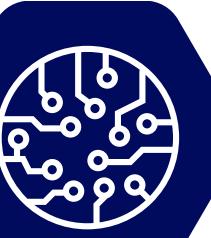
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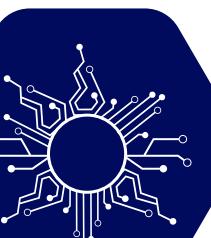
IDENTIFYING CRITICAL CHALLENGES



To provide an easy and efficient solution integrated into a cooking gas cylinder to protect from fire



The solution should be automatic , long lasting and easily used by people from remote areas



Designed to be unique, offers fire protection ensuring the safety of users and surroundings



The solution entails an automatic fire suppression system built directly into the cylinder

Ensuring the safety of individuals using cooking gas cylinders becomes paramount. Recognizing the need for a comprehensive solution, we aim to address this pressing issue by introducing an innovative fire protection system directly integrated into gas cylinders. This solution not only offers automatic and long-lasting fire suppression capabilities but also ensures ease of use for individuals residing in remote areas, thus significantly mitigating the risk of fire-related incidents.

PROBLEM OVERVIEW

WHY DOES A CYLINDER EXPLODE?

Majority of LPG accidents occur due to flashback.

A flashback occurs **when a flame reaches the LPG cylinder neck** resulting in an explosion. A leaky LPG cylinder spills gas, which ignites at the neck. The fire **weakens the metal and creates massive pressure** inside. This pressure buildup, combined with rapid gasification, leads to an explosive blowout.

A fire involving LPG has the potential to be **devastating**, given the pressurized nature of cylinder. The gas rarely causes fire, but if cylinders are heated sufficiently, they may rupture , causing flying debris and releasing additional fuel to fire, **making it much harder to control**.



HENCE, THE PROPOSED SOLUTION IS FOR THERMAL INSULATION WITHIN LPG CYLINDERS



WHY PYROGEL(SILICA AEROGEL) FITS THE BEST?

Aerogel - A Revolutionary Material for Thermal Insulation

1

THERMAL CONDUCTIVITY

Porosity: upto 99.9% air by volume
Thermal Conductivity: As low as 0.013 W/mK

2

LIGHTWEIGHT

Density: As low as 1 mg/cm³
(lighter than feathers)
Specific Strength: Exceptionally high strength-to-weight ratio

3

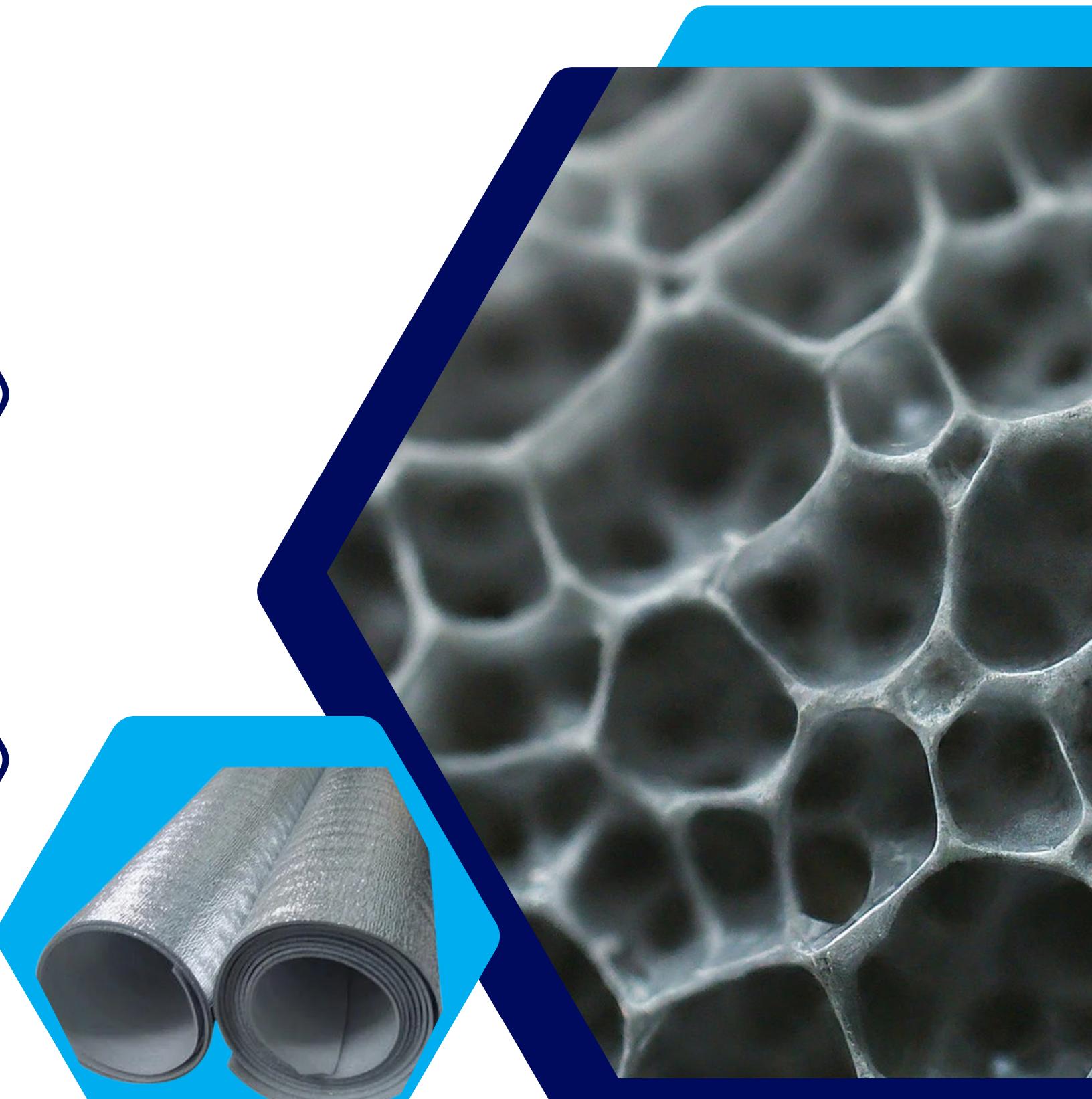
FIRE RESISTANCE

Can withstand temperatures exceeding 1600C without burning.

4

FLEXIBLE

Flexibility of aerogel allows it to conform to irregular surfaces while maintaining its structural integrity.



STRATEGY

This solution is entirely passive, requiring no electricity, batteries, or user actions. The aerogel material itself provides the fire protection function, ensuring continuous and reliable operation without external triggers. Additionally, the blanket's durability and weather resistance ensure long-term effectiveness.

Pre-fabricated Aerogel Jackets:

- Develop pre-molded or pre-fabricated aerogel jackets specifically designed for different cylinder sizes and shapes.
- Can be secured with heat-resistant straps, Velcro, or adhesive.
- Offers ease of installation and removal if needed, but requires investment in mold development and mass production for cost-effectiveness

Aerogel Spray Coating:

- Develop a sprayable aerogel formulation that can be applied directly to the cylinder surface.
- This method offers a seamless and potentially lightweight solution, but requires advancements in aerogel formulations for sprayability and adherence to curved surfaces.
- Ensuring uniform coating thickness and minimizing inhalation risks during application are crucial considerations.



HOW WILL THE INSULATION ACTUALLY WORK?

If leaked liquefied petroleum gas ignites, it can travel through the pipeline to the cylinder neck, causing the entire cylinder body to heat up. As the temperature rises, the pressure inside the already pressurized LPG exceeds safe limits, leading to a potential blast. Here, insulation becomes critical.

After insulation is applied, it acts as a protective barrier, helping to mitigate the rapid increase in temperature within the cylinder. By slowing down the heat transfer process, insulation helps to maintain the internal pressure of the LPG within safe limits, reducing the risk of a catastrophic blast.

THANK YOU

LET'S BUILD TOGETHER A SAFER FUTURE
FOR EVERYONE .

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