

# **InsulAggregate®**

**Thermal Barrier Paints by  
Pinnacle Coatings**

## Section 01

# About us

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**InsulAggregate® products are patented insulating products that were created while working in conjunction with NASA's Technology Exchange Program in the late 1990's. Formerly known as Insuladd.**

# InsulAggregate®

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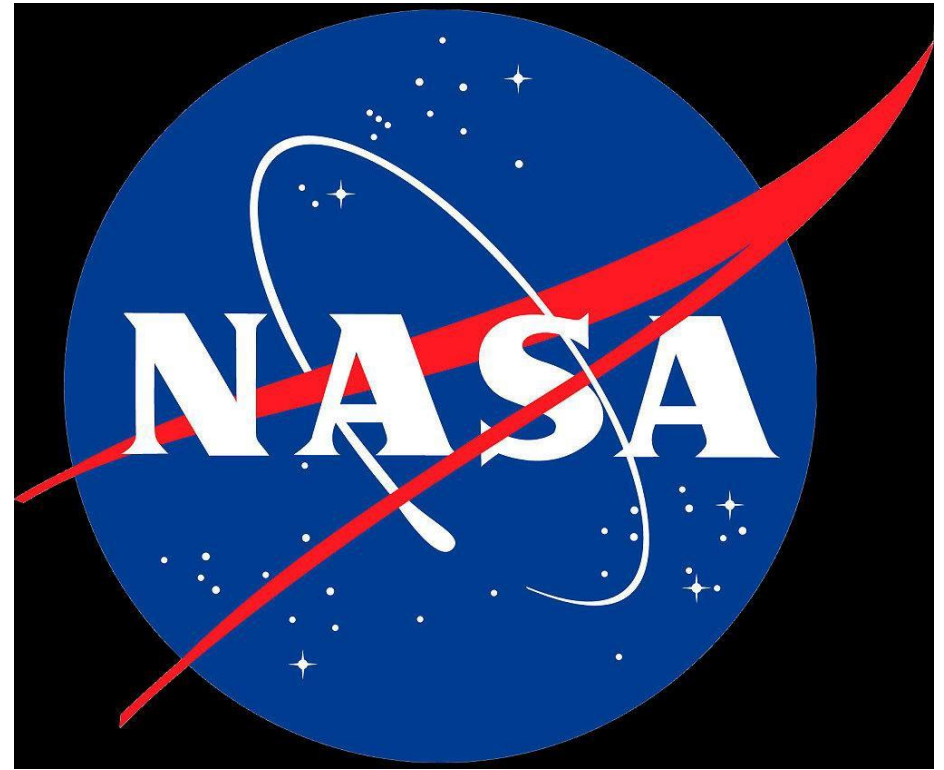
**InsulAggregate® product's from Pinnacle Coatings Group are specifically designed to reduce temperature intrusion and/or escape from railcars, tanks, vessels, planes, industrial equipment, trucks, cruise lines, oil tankers, and all other surfaces to which they are applied.**

**InsulAggregate® paint product's provide users with the equivalent value of installing a layer of R6 foam insulation, at just a tiny fraction of the cost. Many paint qualities are available that contain InsulAggregate® are available in order to satisfy all paint & coating requirements that may exist for quality, dry times, and specific operating environments. Our products control temperature variances providing more stable operating environments, with significantly less utility and fuel costs.**

# InsulAggregate<sup>®</sup>, how it started

**David Page was a captain on a ship and was sleeping close to the engine room which was warm and noisy. He worked on a solution and invented a product which reduced the heat and noise significantly. To perfect his invention, he contacted NASA Technologies who over a period of two years created the current version on InsulAggregate<sup>®</sup>.**

**After all final product development and testing was completed, NASA then initiated the use of InsulAggregate<sup>®</sup> to dissipate heat from the Space Shuttle, and other space vehicles upon atmospheric re-entry, it was then released for commercial use. It is still currently used on all NASA orbiting satellites and vessels, and the space station, as well on assets owned and operated by the US Air Force and US Navy.**



## **Section 02**

# **NASA spinoff**

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## InsulAggregate® is a real NASA Spinoff

InsulAggregate® is the only real “Insulation Paint Additive” spinoff from NASA Technologies. There are others who claim to be as well a NASA spinoff however if consulting the NASA spinoff database (<https://spinoff.nasa.gov/database/?k=reflective%20insulation>) only InsulAggregate® is documented.

- **NASA Spinoff Database: Additive Transforms Paint into Insulation**
- **NASA Center: Kennedy Space Center**
- **Public Release Year: 2007**
- **Reference Number: KSC-SO-90**
- **Category: Consumer/Home/Recreation**
- **Origin: Marshall Convergent Coating-1**
  
- **Full Article:**
- <http://hdl.handle.net/hdl:2060/20080003924>
- **Page Number in Published book: 72**
- **Manufacturer: Tech Traders Inc./The Insulaggregate Company**
- **Website: [http://www.sti.nasa.gov/tto/Spinoff2007/ch\\_4.html](http://www.sti.nasa.gov/tto/Spinoff2007/ch_4.html)**

# NASA spinoff

**Spinoff profiles NASA technologies that have transformed into commercial products and services. About 50 spinoff technologies are featured annually in the publication, demonstrating the wider benefits of America's investment in its space program.**

**Spinoff is available online in multiple digital formats, and print copies are distributed to the public and to politicians, representatives at the United Nations, economic decision makers, company CEOs, academics, scientists, engineers, professionals in technology transfer, the news media, and many others.**

**NASA has a long history of transferring technology to the private sector. The Technology Transfer Program was formally established in 1964 in response to a congressional mandate to facilitate the process, and the program has functioned under various names ever since, making it NASA's longest continuously operated mission**



## **Section 03**

# **Commercial Uses**

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# Forms of Thermal Loss

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Heat is a form of energy which is transmitted from a hot zone to a cold zone, due to a temperature difference. Heat is transmitted in 4 different ways, these are also forms of thermal loss: radiation, convection, conduction and phase change (humidity/wind)



## Radiation

**Thermal transfer without physical contact.**

**E.g. you can feel the heat being given off by a fire when you sit near to it**

**How InsulAggregate® insulation acts against radiation:**

**The composition of InsulAggregate® insulation is extremely effective at reflecting infrared radiation and UV radiation back towards the source of heat (heating systems in the winter, and solar radiation in the summer). Each internal microsphere acts as an additional barrier to thermal transfer by radiation**



## Convection

**Movement of warm air due to a difference in temperature and volume: hot air rises and heat escapes.**

**E.g. a radiator heats the air in contact with it (conduction) and the hot air escapes upwards (convection)**

**How InsulAggregate® insulation acts against convection: InsulAggregate® insulation reduces cold air infiltration in the winter, and warm air infiltration in the summer, both creators of thermal loss**

# Forms of Thermal Loss

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## Conduction

Heat transfer via physical contact between solids, liquids or gases.

E.g. an electric hob in contact with a saucepan transmits heat by conduction

**How InsulAggregate® insulation acts against conduction: The microspheres in InsulAggregate® increase the surface which will reduce the conductive heat transfer of the surface**



## Phase change

Heat transmission by changing of state: solids, liquids, gases (the transformation from a gas state to liquid loses heat). Example: The condensation on the bathroom window is due to the water vapour from the heat that condenses on the cold glass

**How does InsulAggregate® insulation react to phase change? InsulAggregate® insulation is waterproof (waterproof base paint) in case water penetrates the roof area**

**InsulA® has a very high melting point, which makes it very suitable in case the temperatures are extremely high**

**Furthermore, its thermal performance prevents any internal condensation**

# What is the right Insulation

	Thermal efficiency in summer	Thermal efficiency in winter	Gain in living space	Acoustic performance	Durability	Ease of installation	Value for money over time
Mineral wool	**	****	*	****	**	*	**
Polystyrene foam	**	****	*	**	**	**	***
Multi foil	***	****	**	**	***	***	***
InsulAdd® insulation	****	****	****	**	****	****	****

**For the different environments and applications, the usage and application of InsulAggregate® is different. Proportionate to the temperature control desired, InsulAggregate® may be applied to the interior or exterior of the surfaces to be protected.. It is very versatile, no affecting the performance of the coatings in which it has been formulated, instead acting as only an inert filler, with no chemical properties, as its solely formulated with nano technology ceramic raw materials.**

## **Section 04**

# **Advantages**

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# The benefits of InsulAggregate®



**Highly effective thermal insulation year round!**

**Pinnacle Coatings with InsulAggregate® is the first liquid insulation product on the market which insulates both in summer and winter preventing heat loss and saving energy in all seasons.**



**Space saving**

- **Pinnacle Coatings paint products with InsulAggregate® perform exceptionally with only a layer of paint..**
- **It is particularly suited to OEM applications and companies that prefer to avoid the expenses associated with the traditional foam insulation.**



**Energy saving, Cost saving**

- **As a result of using Pinnacle Coatings with InsulAggregate® insulation, energy consumption is reduced, contributing to the reduction of the greenhouse effect, reducing fuel and utility expenses.**
- **Contributes to a more sustainable environment**



# The benefits of InsulAggregate®



## Easy to install

- **InsulAggregate® is brushed or sprayed**
- **No cutting needed**
- **No dust**
- **Flexible**



## Clean and non-irritant product

- **InsulAggregate® does not contain irritant fibres**
- **No protective clothing or equipment is necessary**
- **Usable with water based paint**



## Durable Insulation

- **InsulAggregate® insulation does not weaken over time**
- **Weather resistant**



## Usage

- **Commercial**
- **Residential**
- **Industrial**
- **Interior Walls**
- **Exterior Walls**
- **Ceilings**
- **Attics**
- **Basements**
- **Roofs**
- **Mobile Homes**
- **Sheds**
- **Metal Buildings**
- **Storage tanks**
- **Trucks**
- **Pipelines**

## Benefits

- **Creates a more energy efficient home, office, facility**
- **Reduces your energy demands**
- **Creates a more comfortable living/working environment**
- **Simple and easy to use**
- **Safe and Non-Toxic**
- **Helps keep you warmer in the winter**
- **Helps keep you cooler in the summer**
- **Does not affect application of paint**
- **Has lifetime warranty**
- **Never stops working**
- **Pays for itself through increased energy efficiency**
- **Reduces utility bills**
- **Reduces heat transfer into and out of your home**
- **Available in anti-microbial paints**

## **Section 05**

# **Technical Facts**

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# InsulAggregate® Composition

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- **Ceramic microsphere blend (safe/non-toxic)**
- **Harmonization #: 6815-99-4000**
- **CAS # :1302-98-8**
- **Compressive strength: 98% survival @ 280 kg/cm<sup>3</sup> (7,000 psi)**
- **Hardness (Mohs scale) 5**
- **Bulk Density: .37 g/cc**
- **Mean Particle size: 25 - 100 microns**
- **Melting point: 1650-1850 deg. C**
- **Relative Density: 6-.8 g/cc**
- **Silica 37 %**
- **Alumina 24 %**
- **Titanium Dioxide 4.%**
- **Other (secret) Proprietary 35 %**
- **Hardness 7 Mohs scale**
- **Refractive Index 1.53**
- **Emissivity .62 @ 1000 deg. C**
- **Thermal Conductivity 0.060 W/m/Deg. C**

## Section 06

# Standards

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# International Insulation Standards

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Most of the international testing & certification companies or institutes are member of ASTM.



ASTM International is an international standards organization that develops and publishes voluntary consensus technical standards for a wide range of materials, products, systems, and services. Some 12,575 ASTM voluntary consensus standards operate globally. The organization's headquarters is in West Conshohocken, Pennsylvania.

## ASTM International

- C727 - 12
  - Standard Practice for Installation and Use of Reflective Insulation in Building Constructions (<https://www.astm.org/Standards/C727.htm>)
- C1224 - 15
  - Standard Specification for Reflective Insulation for Building Applications (<https://www.astm.org/Standards/C1224.htm>)
- C1313 / C1313M - 13
  - Standard Specification for Sheet Radiant Barriers for Building Construction Applications (<https://www.astm.org/Standards/C1313.htm>)

# International Insulation Standards

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## ASTM International

- C1321 - 15
  - Standard Practice for Installation and Use of Interior Radiation Control Coating Systems (IRCCS) in Building Construction (<https://www.astm.org/Standards/C1321.htm>)
- C1340 / C1340M - 10(2015)
  - Standard Practice for Estimation of Heat Gain or Loss Through Ceilings Under Attics Containing Radiant Barriers by Use of a Computer Program (<https://www.astm.org/Standards/C1340.htm>)
- C1483 / C1483M - 04(2009)
  - Standard Specification for Exterior Solar Radiation Control Coatings on Buildings (<https://www.astm.org/Standards/C1483.htm>)
- C1668 - 13a
  - Standard Specification for Externally Applied Reflective Insulation Systems on Rigid Duct in Heating, Ventilation, and Air Conditioning (HVAC) Systems (<https://www.astm.org/Standards/C1668.htm>)
- C1743 - 12
  - Standard Practice for Installation and Use of Radiant Barrier Systems (RBS) in Residential Building Construction (<https://www.astm.org/Standards/C1743.htm>)
- C1744 - 12
  - Standard Practice for Installation and Use of Radiant Barrier Systems (RBS) in Commercial/Industrial Building Construction (<https://www.astm.org/Standards/C1744.htm>)

## **Section 07**

# **Building Codes**

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# International Code Council (ICC)

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- The International Code Council (ICC) Family of Companies includes the ICC Evaluation Service (ICC-ES), S.K. Ghosh Associates, the Solar Rating & Certification Corporation (ICC-SRCC) and the International Accreditation Service (IAS), which are dedicated to the construction of safe, sustainable, affordable and resilient structures
- The International Code Council is a member-focused association. It is dedicated to developing model codes and standards used in the design, build and compliance process to construct safe, sustainable, affordable and resilient structures. Most U.S. communities and many global markets choose the International Codes
- The International Codes<sup>®</sup>, or I-Codes<sup>®</sup>, published by ICC, provide minimum safeguards for people at home, at school and in the workplace. The I-Codes are a complete set of comprehensive, coordinated building safety and fire prevention codes. Building codes benefit public safety and support the industry's need for one set of codes without regional limitations
- Fifty states and the District of Columbia have adopted the I-Codes at the state or jurisdictional level. Federal agencies including the Architect of the Capitol, General Services Administration, National Park Service, Department of State, U.S. Forest Service and the Veterans Administration also enforce the I-Codes. The Department of Defence references the International Building Code<sup>®</sup> for constructing military facilities, including those that house U.S. troops around the world and at home. Amtrak uses the International Green Construction Code<sup>®</sup> for new and extensively renovated sites and structures. Puerto Rico and the U.S. Virgin Islands enforce one or more of the I-Codes

# ICC, International Codes

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- The ICC has developed and made available a comprehensive and coordinated set of International Codes, most of them will be renewed to the 2018 version soon, including:
  - International Building Code (IBC - 2015) ([InsulAggregate®](#))
    - The International Building Code (IBC) is the foundation of the complete Family of International Codes®. It is an essential tool to preserve public health and safety that provides safeguards from hazards associated with the built environment. It addresses design and installation of innovative materials that meet or exceed public health and safety goals
  - International Energy Conservation Code (IECC - 2015) ([InsulAggregate®](#))
    - This code contains separate provisions for commercial buildings and for low-rise residential buildings (three stories or less in height above grade). Each set of provisions, IECC—Commercial Provisions and IECC—Residential Provisions, is separately applied to buildings within their respective scopes. Each set of provisions is to be treated separately. Each contains a Scope and Administration chapter, a Definitions chapter, a General Requirements chapter, a chapter containing energy efficiency requirements and existing building provisions applicable to buildings within its scope
  - International Existing Building Code (IEBC - 2015) ([InsulAggregate®](#))
    - Contains requirements intended to encourage the use and reuse of existing buildings. The scope covers repair, alteration, addition and change of occupancy for existing buildings and historic buildings, while achieving appropriate levels of safety without requiring full compliance with the new construction requirements contained in the other I-Codes

# ICC, International Codes

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- International Fire Code (IFC - 2015)
  - This comprehensive fire code establishes minimum regulations for fire prevention and fire protection systems using prescriptive and performance-related provisions. It is founded on broad-based principles that make possible the use of new materials and new system designs
- International Fuel Gas Code (IFGC - 2015)
  - This comprehensive fuel gas code establishes minimum regulations for fuel gas systems and gas fired appliances using prescriptive and performance-related provisions. It is founded on broad-based principles that make possible the use of new materials and new fuel gas system and appliance designs
- International Green Construction Code (IGCC - 2015)
  - The IgCC is the first model code to include sustainability measures for the entire construction project and its site - from design through construction, certificate of occupancy and beyond. The new code is expected to make buildings more efficient, reduce waste, and have a positive impact on health, safety and community welfare
- International Mechanical Code (IMC - 2015)
  - Establishes minimum regulations for mechanical systems using prescriptive and performance-related provisions. The IMC<sup>®</sup> was developed with broad-based principles that make possible the use of new materials, methods and design



# ICC, International Codes

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- ICC Performance Code (ICCPC - 2015)
  - Presents regulations based on outcome rather than prescription. It encourages new design methods by allowing a broader parameter for meeting the intent of the International Codes®
- International Plumbing Code (IPC - 2015)
  - Provides minimum regulations for plumbing facilities in terms of both performance and prescriptive objectives, and provides for the acceptance of new innovative products, materials, and systems. The IPC® also includes its companion document, 2015 International Private Sewage Disposal Code® that contains provisions for design, installation, and inspection of private sewage disposal systems, and provides flexibility in the development of safe sanitary systems
- International Private Sewage Disposal Code (IPSDC - 2015)
  - This companion to the IPC includes provisions for design, installation, and inspection of private sewage disposal systems, and provides flexibility in the development of safe systems
- International Property Maintenance Code (IPMC - 2015)
  - Provides requirements for continued use and maintenance of plumbing, mechanical, electrical and fire protection systems in existing residential and non-residential structures
- International Residential Code (IRC - 2015) ([InsulAggregate®](#))
  - This comprehensive code compiles all building, plumbing, mechanical, fuel gas and electrical requirements for non-commercial one- and two-family dwellings in one convenient code. The regulations cover dwellings and townhouses up to three stories

# ICC, International Codes

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- International Swimming Pool and Spa Code (ISPSC - 2015)
  - This comprehensive swimming pool code is coordinated with the current requirements in the International Codes® and APSP standards. Developed with the Association of Pool & Spa Professionals (APSP), the ISPSC establishes minimum regulations for public and residential pools, spas, and hot tubs using prescriptive and performance-related provisions
- International Wildland Urban Interface Code (IWUIC - 2015)
  - Contains provisions addressing fire spread, accessibility, defensible space, water supply and more for buildings constructed near wildland areas
- International Zoning Code (IZC - 2015)
  - Promotes uniformity and consistency in zoning for city planners, code officials and developers

## Section 08

# Summary

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# InsulAggregate® the difference

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## What makes InsulAggregate® different

- Conventional insulation materials like fiberglass, cellulose, rock wool and Styrofoam, no matter how thick, have almost no ability to block radiant heat energy which can account for as much as 93 percent of summer heat gain and up to 75 percent winter heat loss in conventional structures
- InsulAggregate® has been scientifically proven to decrease heat intake and lessen the amount of heat loss, even reducing heat gain by as much as 40 percent !  
Additional Insulative values can be achieved by increasing the paint film thicknesses and loading.

# InsulAggregate®

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- Provide significant energy savings
- Complete line of products for roofs, walls, refrigerated trucks, warehouses, storage tanks, valves, and pipelines
- Applies like standard coatings of the same chemistry
- Long service life and warranty, proportionate to the paint qualities chosen or preferred
- 20% to 50% documented energy savings over traditional coatings
- Fast return on investment. Most cases 12-14 months
- Low or no VOC Paint options are available
- Over 20 years of global applications
- Over 20 years of certified testing

## Section 09

# Contact Us

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**Get in touch with us**

# **Pinnacle Coatings Group**

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**Get in touch with us**  
**Pinnacle Coatings Group**  
**Exclusive US Distributor**