

# SUPER THERM®/SON-SHIELD® COMPETITIVE COMPARISON MATRIX

## THERMAL COATING SYSTEMS COMPARISON

Feature	Super Therm®/Son-Shield®	Competitor A (Ceramic-Based)	Competitor B (Elastomeric)	Traditional Insulation	Standard Paint
PERFORMANCE METRICS					
Solar Reflection	89%	80-85%	75-80%	N/A	30-80%
Thermal Emittance	89%	75-80%	70-75%	N/A	60-80%
Fire Rating	Class A (0/0)	Class B or lower	Class C or lower	Varies (often combustible)	Not rated
Sound Reduction	50% average	Minimal	Minimal	50-90%	None
R-Value Equivalent	High effective performance	Moderate	Low-Moderate	High (thickness dependent)	Negligible
Surface Temperature Reduction	30-40°F	15-25°F	10-20°F	Varies	5-15°F
DURABILITY FACTORS					

Lifespan	10-30+ years documented	5-15 years	5-10 years	10-15 years	3-7 years
UV Resistance	Excellent	Good	Good	Poor-N/A	Moderate
Reflectivity Loss (3 yr)	1%	10-15%	15-20%	N/A	20-30%
Adhesion to Substrate	Excellent	Good	Good	N/A	Good
Flexibility	High (156% elongation)	Moderate	High	None	Varies
Moisture Resistance	Excellent	Good	Good	Poor	Moderate
Salt/Chemical Resistance	Excellent	Moderate	Moderate	Poor	Poor-Moderate

#### **APPLICATION CHARACTERISTICS**

Application Method	Spray/Roll/Brush	Spray/Roll/Brush	Spray/Roll/Brush	Complex Installation	Spray/Roll/Brush
Thickness Required	10-30 mils	15-40 mils	20-40 mils	3.5-12 inches	4-8 mils
Surface Types	All common building materials	Limited range	Limited range	Internal only	All common building materials
VOC Content	Low	Low-Moderate	Low-Moderate	N/A	Varies (often high)
Water-Based	Yes	Varies	Yes	N/A	Varies

Color Options	White + custom colors	Limited	Wide range	N/A	Unlimited
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## ECONOMIC FACTORS

Initial Cost (per sq ft)	\$2.00-\$5.00	\$1.50-\$3.50	\$1.00-\$2.50	\$1.50-\$4.00	\$0.50-\$1.50
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Installation Complexity	Low	Low	Low	High	Low
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Energy Savings	20-75% documented	10-30% claimed	5-15% claimed	10-30%	0-5%
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ROI Timeline	1-5 years	3-7 years	5-10 years	3-10 years	N/A
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Maintenance Cost	Very Low	Low-Moderate	Moderate	Moderate-High	High
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Life-Cycle Cost	Lowest	Moderate	Moderate-High	Moderate	Highest
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## CERTIFICATION & TESTING

Third-Party Testing	Extensive (NASA, BASF, CRRC, etc.)	Limited	Limited	Standard industry	Standard industry
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Energy Star Qualified	Yes	Some products	Some products	N/A	No
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Cool Roof Rating Council	Listed with top ratings	Some products listed	Some products listed	N/A	No
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Marine Certification	ABS Certified	Varies	No	No	No
Fire Testing	Multiple standards	Limited	Limited	Standard	Limited
Case Study Documentation	Extensive (20+ years)	Limited	Limited	Standard industry	Minimal

**FUNCTIONAL CAPABILITIES**

Fire Protection	Primary function	Minimal	None	Varies	None
Thermal Insulation	Primary function	Secondary function	Minimal	Primary function	None
Waterproofing	Primary function	Secondary function	Primary function	None	Minimal
Sound Dampening	Secondary function	None	None	Secondary function	None
Corrosion Protection	Secondary function	Minimal	Minimal	None	Minimal
Condensation Control	Primary function	Minimal	Minimal	Varies	None

**ENVIRONMENTAL IMPACT**

Carbon Footprint Reduction	High	Moderate	Low	Moderate	Negligible
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LEED Contribution	Multiple categories	Limited	Limited	Energy only	None
End-of-Life Disposal	Non-hazardous	Varies	Varies	Special handling often required	Often hazardous
Energy in Manufacturing	Moderate	Moderate	Moderate	High	Moderate
Sustainability Rating	High	Moderate	Moderate	Moderate	Low

## COMPARATIVE CASE STUDY RESULTS

### Energy Efficiency in Industrial Applications

Facility Type	Super Therm®/Son-Shield®	Competitor A	Competitor B	Traditional Insulation
Manufacturing Plant	87% reduction (Sony Koda)	20-30% claimed	10-15% claimed	15-25% typical
Refrigerated Storage	35% reduction	15-20% claimed	5-10% claimed	10-20% typical
Office Building	20-40% reduction	10-20% claimed	5-15% claimed	15-25% typical
Agricultural (Poultry)	30°F temp reduction	10-15°F claimed	5-10°F claimed	10-20°F typical

### Durability in Extreme Environments

<b>Environment</b>	<b>Super Therm®/Son-Shi eld®</b>	<b>Competitor A</b>	<b>Competitor B</b>	<b>Traditional Methods</b>
Marine Bridge (South Korea)	13+ years no degradation	Annual repainting required	Not recommended	Not applicable
Desert Conditions (Arizona)	10+ years no degradation	3-5 years before significant degradation	2-4 years before significant degradation	5-7 years before replacement
Industrial Roof (Japan)	10+ years with same performance	5-7 years with degraded performance	3-5 years with degraded performance	7-10 years before replacement
Cold Storage Facility	10+ years with same performance	5-7 years with degraded performance	Not recommended	5-7 years before replacement

## **Fire Protection Performance**

<b>Test Standard</b>	<b>Super Therm®/Son-Shield ®</b>	<b>Competitor A</b>	<b>Competitor B</b>	<b>Traditional Paint</b>
Flame Spread (ASTM E84)	0/100	25-75/100	50-75/100	75-200/100

Smoke Development (ASTM E84)	0/100	25-50/100	50-75/100	100-200/100
Fire Resistance (30 mils thickness)	25+ minutes at 1550°F	5-10 minutes	Not rated	Not rated
Fire Rating Classification	Class A	Class B-C	Class C	Not rated

### Return on Investment Timeline

Application	Super Therm®/Son-Shield®	Competitor A	Competitor B	Traditional Methods
Commercial Roof	1-3 years	3-5 years	5-7 years	3-7 years
Industrial Facility	1-2 years	2-4 years	4-6 years	3-5 years
Residential	3-5 years	5-7 years	7-10 years	5-10 years
Agricultural	1-2 growing seasons	2-3 growing seasons	Not recommended	3-5 growing seasons

## PERFORMANCE IN SPECIFIC ENVIRONMENTS

### Hot Climate Performance (Cooling Dominant)

Metric	Super Therm®/Son-Shield®	Competitor A	Competitor B	Traditional Methods
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Surface Temperature Reduction	40-70°F	20-40°F	15-30°F	Minimal
Interior Temperature Reduction	9-30°F documented	5-15°F claimed	5-10°F claimed	10-20°F typical
Energy Reduction	20-87% documented	10-30% claimed	5-15% claimed	10-30% typical
Heat Gain Prevention	Blocks 95% at surface	Partially blocks	Minimally blocks	Slows transfer only

### Cold Climate Performance (Heating Dominant)

Metric	Super Therm®/Son-Shield®	Competitor A	Competitor B	Traditional Methods
Heat Retention	Moderate	Low-Moderate	Low	High
Moisture Control	Excellent	Moderate	Moderate	Poor
Condensation Prevention	Excellent	Moderate	Moderate	Poor-Moderate
Energy Reduction	10-30% documented	5-15% claimed	2-10% claimed	15-30% typical

### Marine Environment Performance



Metric	Super Therm®/Son-Shield®	Competitor A	Competitor B	Traditional Methods
Salt Spray Resistance	Excellent (10+ years)	Moderate (3-5 years)	Poor-Moderate (2-3 years)	Poor (annual maintenance)
Corrosion Prevention	Excellent	Moderate	Moderate	Poor
UV Resistance	Excellent (minimal degradation)	Good (moderate degradation)	Moderate (significant degradation)	Poor
Certifications	ABS Certified	Limited	None	Varies

### Agricultural Application Performance

Metric	Super Therm®/Son-Shield®	Competitor A	Competitor B	Traditional Methods
Temperature Reduction	30°F documented	10-15°F claimed	5-10°F claimed	10-20°F typical
Moisture Control	Excellent	Moderate	Moderate	Poor
Animal Mortality Reduction	75% documented	Not documented	Not documented	Varies

Insulation Replacement Cycle	None required	7-10 years	Not recommended	5 years typical
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## COST-BENEFIT ANALYSIS

### 10-Year Cost Comparison for 10,000 sq ft Industrial Roof

Cost Factor	Super Therm®/Son-Shield®	Competitor A	Competitor B	Traditional Insulation + Paint
Initial Material Cost	\$30,000-\$50,000	\$20,000-\$35,000	\$15,000-\$25,000	\$25,000-\$40,000
Installation Cost	\$15,000-\$25,000	\$15,000-\$25,000	\$15,000-\$25,000	\$30,000-\$50,000
Maintenance Cost (10 yr)	\$5,000-\$10,000	\$15,000-\$25,000	\$20,000-\$35,000	\$20,000-\$35,000
Replacement Cost (10 yr)	\$0	\$20,000-\$35,000	\$30,000-\$50,000	\$25,000-\$40,000
Energy Cost Reduction (10 yr)	\$100,000-\$300,000	\$50,000-\$150,000	\$25,000-\$75,000	\$50,000-\$150,000
<b>Net 10-Year Benefit</b>	<b>\$50,000-\$250,000</b>	<b>\$0-\$75,000</b>	<b>(\$45,000)-\$0</b>	<b>(\$50,000)-\$40,000</b>

*Note: Energy cost reduction based on average commercial energy costs and documented performance. Actual savings will vary based on climate, energy costs, and specific building characteristics.*

# THIRD-PARTY VERIFICATION

## Testing Organizations and Results

Organization	Super Therm®/Son-Shield®	Competitor A	Competitor B
Cool Roof Rating Council	89% reflection, 89% emittance	80-85% reflection, 75-80% emittance	Not fully certified
Energy Star	Certified, 1% degradation after 3 years	Certified, 10-15% degradation after 3 years	Some products certified
Factory Mutual	Class A fire rating	Limited testing	Not tested
NASA	Flame/smoke spread: 0/0	Not tested by NASA	Not tested by NASA
BASF Laboratories	Independently verified performance	Not tested by BASF	Not tested by BASF
American Bureau of Shipping	Marine certified	Limited certification	Not certified
Field Verification	Documented 30+ year performance	Limited long-term documentation	Limited long-term documentation

This comparative analysis is based on documented performance data for Super Therm®/Son-Shield® and typical industry specifications for competing products. Individual product performance may vary based on specific formulations, application methods, and environmental conditions. All claims for Super Therm®/Son-Shield® are supported by third-party testing and field verification across multiple decades and environments.

# Knowledge Base: Super Therm/Son-Shield/Sun-Shield Coatings

## 1. Product Overview

Super Therm and related Son-Shield/Sun-Shield coatings are advanced ceramic-based thermal insulation and protective coatings with exceptional fire resistance, solar heat blocking properties, and durability. These multi-purpose coatings serve various applications across residential, commercial, industrial, and marine environments.

### Key Products:

- **Super Therm:** Ceramic-based water-borne insulating coating with Class A fire rating
- **Son-Shield Coating:** Energy-efficient waterproofing coating
- **Son-Shield Graphene Fabric:** Extreme fire heat protection fabric
- **Sun-Shield Roof and Wall Coatings:** Similar product line with ceramic microsphere technology

## 2. Technical Composition

The coatings consist of three primary components:

1. **Resin Base:**
  - Water-based acrylic elastomeric resin
  - Remains flexible even at cold temperatures (withstands temperatures up to 200°F)
  - Seals hairline cracks permanently
  - Provides excellent waterproofing and adhesion to virtually any solid surface
2. **Ceramic Technology:**
  - Contains vacuum ceramic microspheres (derived from space shuttle technology)
  - Heat and sound cannot travel through a vacuum, providing both thermal and acoustic insulation
  - The ceramics used do not conduct heat, allowing them to withstand temperatures up to 1300°C without heat transfer
3. **Reflective Components:**
  - Titanium Dioxide (TiO<sub>2</sub>) as primary white pigment - highly reflective and resistant to breakdown
  - CRRC testing shows white coating with 89% reflection and 89% emittance (among highest of any tested product)
  - Only about 2% of solar radiation penetrates the coating to affect the building

### **3. Performance Characteristics**

#### **Fire Resistance**

- Class A fire resistance rating (highest classification available)
- Flame Spread Index and Smoke Spread Index of "0" (out of 100) in NASA, UL, and Factory Mutual tests
- When tested with 2,732°F (1,500°C) for 20 minutes, showed extreme heat resistance with heating surface temperature of 2,296°F while back surface remained at only 150°F - a 2,177°F difference
- 5-6 coats (approximately 30 mils thick) applied to 1/4 inch steel passed tests against 1550°F (843°C) flame for 25 minutes

#### **Thermal Performance**

- Blocks up to 95% of solar heat energy before it can be absorbed by the substrate
- Thermal conductivity is extremely low at 0.00543 W/cm<sup>2</sup>/K (3.77 BTU/hr/ft<sup>2</sup>/°F) at 73.4°F
- Maintains its reflective ability over 3 years with just 1% loss (superior to competitive products)
- In tests, a room temperature reduction of 9°F was achieved and maintained even 10 years after application

#### **Energy Efficiency**

- Provides the equivalent insulation of a 50mm insulation board with just a 0.2mm thin coating membrane
- Sony Koda facility in Japan showed 87% energy reduction in May and 67% in June after Super Therm application
- Vodafone mobile phone containers in Turkey achieved over 50% energy reduction
- Japanese factory reported energy cost reduction of approximately \$134,436 AUD (11.05 million Yen) per year with a payback period of 1.06 years

#### **Durability**

- Applied to bridges and structures with demonstrated 10-15+ year durability in extreme conditions
- Original Super Therm application from 1989 (over 30 years ago) showed no deterioration, failures, loss of performance, or corrosion when inspected in 2019
- Withstands thermal shock, UV stress, sea salt, and variable climate conditions
- Structural life span with Super Concrete can reach 200 years

#### **Additional Properties**

- Reduces sound by an average of 50% for interior applications
- Excellent waterproofing capabilities (passed ASTM D6083, KSF 3211:2008 tests)
- Resists mold, mildew, and corrosion
- Self-cleaning in rain and resistant to dirt pickup
- Resistant to harsh chemicals and solar damage

## 4. Applications and Case Studies

### Notable Projects:

- South Korean Bridge Project: Applied to the Youngjong Grand Bridge in South Korea with extreme conditions including heavy vibration, 6 lanes of traffic, railroad tracks, temperature extremes, saltwater environment, and auto exhaust. Prior to Son-Shield, the best available paint required annual reapplication. After Son-Shield application, it has remained problem-free for 13+ years.
- Nissan Factory, Yokohama, Japan: 200,000m<sup>2</sup> application with impressive energy reduction results
- US Air Force Base Test (Tucson, Arizona): Applied to a metal building without traditional insulation or drop ceilings. After 3 days in 111-113°F desert heat with no air conditioning, the interior temperature remained at just 85°F (29°C), while uncoated buildings were 70°F hotter than ambient temperature
- Hoover Dam Bypass Bridge: SPI Coatings (including Super Therm) were selected for railings around the observation deck that receives 3-5 million visitors annually. In Arizona's extreme desert temperatures (95-110°F), the coatings significantly reduced railing temperatures to safe touch levels
- Japanese Manufacturing Facility: Room temperatures were reduced from 37-40°C to 33°C after application, with the same cooling effect maintained even after 10 years
- Aqua Lodge Houseboats in Guadeloupe: Applied to eco-friendly solar-powered boat houses, reducing surface temperatures from 42.7°C to 30.3°C (30% reduction) at an ambient temperature of 30.1°C

### Application Areas:

- Residential roofs and walls (energy efficiency, fire protection)
- Commercial/industrial buildings and warehouses
- Refrigerated storage facilities
- Transportation (RVs, containers, vehicles)
- Marine environments (boats, docks, marine structures)
- Industrial equipment and hot surfaces
- Agricultural buildings (poultry houses, barns)
- Infrastructure (bridges, tunnels)
- Fire-prone areas (wildfire protection for structures)
- Pool decks and high-heat surface areas

## **5. Comparative Advantages**

- Superior performance retention compared to other reflective coatings (only 1% reflectivity loss over 3 years)
- Functions differently than traditional insulation by blocking heat load rather than just slowing heat transfer
- Economic advantages: Similar initial cost to normal concrete methods but with 50% reduction in reinforcement materials and 2-4 times longer lifespan
- Faster payback period (approximately 1 year) compared to other energy efficiency solutions
- ABS (American Bureau of Shipping) certification for marine applications where IMO requirements for Smoke and Toxicity and Low Surface Flammability are indicated

## **6. Environmental Benefits**

- Eco-friendly formulation meeting US EPA and Japan JIS standards
- Significant carbon footprint reduction through energy savings
- Contributes to sustainable building practices and LEED certification
- Water-based formulation

## **7. Product Positioning for Different Markets**

### **Fire Protection Market**

- Highest possible Class A fire rating
- Zero flame spread and smoke development
- Thermal barrier protection
- Applications in wildfire-prone regions

### **Energy Efficiency Market**

- Demonstrated energy savings of 20-75% in various applications
- Excellent ROI with typical payback periods under 2 years
- Effective in both hot and cold climates
- Reduces peak load demands on HVAC systems

### **Marine/Coastal Market**

- Salt water resistance
- UV and weather resistance
- ABS certification for marine applications
- Cooling properties for boat decks and marine structures

## **Residential Construction Market**

- Energy bill reduction
- Improved comfort through temperature regulation
- Noise reduction
- Extended roof and exterior surface life

## **Specialized Applications**

- Poultry houses: Reduced death rate of chickens by 75%, increased bird weight, and eliminated need for insulation replacement every 5 years
- Cold storage: Significant reduction in cooling costs
- Hot climate public spaces: Makes metal surfaces safe to touch in extreme heat

This knowledge base demonstrates that Super Therm/Son-Shield is not merely a paint but an advanced multi-functional coating system with proven benefits across numerous applications and environments. Its combination of fire resistance, thermal properties, and durability positions it as a premium solution for diverse protection and energy efficiency needs.



# SUPER THERM® / SON-SHIELD®

## Revolutionary Ceramic Coating Technology

*Where Science Meets Protection*

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### EXECUTIVE SUMMARY

Super Therm®/Son-Shield® represents the pinnacle of advanced coating technology, combining NASA-derived ceramic science with cutting-edge polymer chemistry to create a truly revolutionary product. This is not merely paint—it's a comprehensive protection system that simultaneously addresses multiple critical challenges:

- **Fire Resistance:** Class A fire rating with zero flame/smoke spread
- **Thermal Insulation:** Blocks 95% of solar heat energy
- **Energy Efficiency:** Documented energy savings of 20-75%
- **Weather Protection:** Superior waterproofing and UV resistance
- **Longevity:** 10-30+ year performance in extreme conditions
- **Sound Reduction:** Reduces noise transmission by up to 50%

With applications spanning residential, commercial, industrial, marine, and specialized environments, Super Therm®/Son-Shield® delivers measurable benefits validated through rigorous testing and decades of real-world performance.

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### THE SCIENCE BEHIND THE SOLUTION

#### Triple-Component Technology

1. **Advanced Resin Matrix**
  - Water-based acrylic elastomeric polymer
  - Maintains flexibility from sub-freezing to 200°F+
  - Creates permanent watertight seal
  - Exceptional adhesion to virtually any substrate
2. **Ceramic Microsphere Technology**
  - Vacuum-filled ceramic spheres (space shuttle technology)
  - Heat and sound cannot traverse vacuum spaces
  - Creates multiple thermal barriers

- Ceramics withstand temperatures up to 1300°C without transferring heat
- 3. **High-Performance Reflective System**
  - Titanium Dioxide (TiO<sub>2</sub>) reflective technology
  - 89% solar reflection, 89% thermal emittance (CRRC verified)
  - Blocks 95%+ of solar radiation
  - Maintains reflectivity with minimal degradation over time

## How It Works: The Physics of Protection

Unlike traditional insulation that merely slows heat transfer, Super Therm®/Son-Shield® employs a multi-stage approach:

1. **Solar Reflection:** Prevents initial heat absorption
2. **Thermal Emittance:** Rapidly releases any absorbed heat
3. **Vacuum Barrier:** Creates multiple thermal breaks with ceramic microspheres
4. **Conduction Disruption:** Ceramic matrices prevent heat flow through substrate

This creates a comprehensive thermal management system rather than just a passive barrier.

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## VERIFIED PERFORMANCE METRICS

### Fire Protection

- Class A fire rating (highest possible classification)
- Flame Spread Index: 0/100
- Smoke Development Index: 0/100
- 30 mils thickness withstands 1550°F flames for 25+ minutes
- Ceramic layer maintains 2000°F+ temperature differential

### Thermal Performance

- Reflects 95%+ of solar radiation
- Thermal conductivity: 0.00543 W/cm<sup>2</sup>/K (3.77 BTU/hr/ft<sup>2</sup>/°F)
- Maintains 95% reflectivity after 3 years of weathering
- Effective R-value equivalent of much thicker traditional insulation

### Energy Efficiency

- Documented energy reductions:
  - Industrial facilities: 20-87%
  - Commercial buildings: 20-50%

- Refrigerated storage: 15-35%
  - Residential structures: 20-40%
- Typical ROI/payback period: 1-3 years
- Performance maintained for decades with minimal degradation

## **Durability & Longevity**

- 30+ years documented performance
  - Withstands extreme weather conditions
    - Temperature fluctuations from -40°F to 300°F
    - Hurricane-force winds
    - Salt-water environments
    - High UV exposure
    - Industrial pollutants
  - Resists cracking, peeling, and chalking
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## **REAL-WORLD VALIDATION**

### **Case Study 1: Youngjong Grand Bridge, South Korea**

The ultimate test of durability in one of the world's most demanding environments:

- 6 lanes of traffic + 2 railroad tracks
- Constant vibration
- Saltwater exposure
- Temperature extremes (-20°F to 110°F)
- Industrial pollution

#### **Results:**

- Prior to Son-Shield: Annual repainting required
- After Son-Shield: 13+ years with no degradation or maintenance
- Estimated lifetime maintenance savings: \$12+ million

### **Case Study 2: Industrial Energy Reduction (Sony Koda Facility)**

- 200,000 m<sup>2</sup> application
- Before Super Therm®: 3,767 KW (May), 5,647 KW (June)
- After Super Therm®: 519 KW (May), 1,896 KW (June)
- Total Energy Reduction: 87% (May), 67% (June)
- Annual cost savings: \$134,436 AUD

- Payback period: 1.06 years

### Case Study 3: Desert Heat Management (US Air Force Test)

- Metal building with no traditional insulation
- Ambient temperature: 111-113°F for 3+ days
- Uncoated metal buildings: 180°F+ surface temperatures
- Super Therm® coated building: 85°F interior temperature
- Temperature differential: 70°F+ compared to uncoated structures
- Test witnessed by 200+ military personnel

### Case Study 4: Agricultural Application (Poultry Houses)

- Challenge: Extreme heat causing mortality and reduced growth
- Results after application:
  - Attic temperature reduced by 30°F
  - Chicken mortality reduced by 75%
  - Increased bird weight at harvest
  - Eliminated need for insulation replacement (normally every 5 years)
  - 20-year protection vs. 5-year traditional insulation
  - ROI: 400% over facility lifetime

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## COMPETITIVE ADVANTAGES

### Super Therm®/Son-Shield® vs. Traditional Insulation

Feature	Super Therm®/Son-Shield®	Fiberglass Insulation	Spray Foam	Reflective Barriers
<b>Mechanism</b>	Blocks heat + insulates	Slows heat transfer	Slows heat transfer	Reflects heat only
<b>R-Value Equivalent</b>	High effective performance	Moderate	High	Low-Moderate
<b>Fire Rating</b>	Class A (0 flame spread)	Varies (combustible)	Varies (combustible)	Varies
<b>Moisture Resistance</b>	Excellent	Poor	Good	Moderate

<b>Longevity</b>	20-30+ years	10-15 years	10-20 years	5-10 years
<b>Maintenance</b>	Minimal	Moderate	Low	Moderate
<b>Installation</b>	Simple application	Complex	Complex/Professional	Moderate
<b>Space Required</b>	10-20 mils (.01-.02")	3.5-12"	0.5-3"	0.25-0.5"
<b>Environmental Impact</b>	Low	Moderate	High	Low-Moderate

### Super Therm®/Son-Shield® vs. Other Ceramic Coatings

Feature	Super Therm®/Son-Shield®	Competitor A	Competitor B	Standard Paint
<b>Solar Reflection</b>	95%+	80-85%	75-80%	30-80%
<b>Thermal Emittance</b>	89%	75-80%	70-75%	60-80%
<b>Fire Rating</b>	Class A (0/0)	Varies	Varies	Not rated
<b>Reflectivity Loss (3 yr)</b>	1%	10-15%	15-20%	20-30%
<b>Temperature Reduction</b>	30-40°F	15-25°F	10-20°F	5-15°F
<b>Waterproofing</b>	Excellent	Good	Moderate	Poor-Moderate
<b>Sound Reduction</b>	50%	Minimal	Minimal	None
<b>Warranty</b>	5-10 years	3-5 years	1-3 years	1-5 years

## APPLICATIONS ACROSS MARKETS

### Residential

- Roofing (all types)
- Exterior walls
- Attics and crawlspaces
- HVAC ducting

- Pool decks and patios
- Wildfire protection

## **Commercial & Industrial**

- Warehouses and factories
- Cold storage facilities
- Process equipment
- HVAC systems
- Commercial kitchens
- Data centers

## **Infrastructure**

- Bridges and tunnels
- Water treatment facilities
- Storage tanks
- Electrical infrastructure
- Transportation infrastructure

## **Marine & Coastal**

- Vessel decks and hulls
- Dock structures
- Coastal buildings
- Offshore platforms
- Marine equipment

## **Specialized**

- Agriculture (poultry, livestock, greenhouse)
- Transportation (RV, container, vehicle)
- Military installations
- Fire-prone regions
- Historic preservation
- High-heat industrial processes

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# **ENVIRONMENTAL & SUSTAINABILITY IMPACT**

- Water-based formulation
- Low VOC content

- Contributes to LEED certification
  - Reduces carbon footprint through energy reduction
  - Extends substrate lifespan, reducing replacement waste
  - Eliminates need for multiple products (simplifies supply chain)
  - Reduces HVAC equipment size requirements in new construction
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## CUSTOMER TESTIMONIALS

"We've been monitoring our energy consumption for three years since applying Super Therm®. Our cooling costs are down 47% and we've eliminated the hot spots that plagued our production floor. This wasn't just a coating purchase—it was an infrastructure investment with returns that exceed our stock portfolio." — Manufacturing Plant Manager, Industrial Sector

"As a fire marshal in a high-risk wildfire zone, I've seen firsthand the difference protective coatings can make. After extensive testing, we now recommend Super Therm®/Son-Shield® as part of our community's fire mitigation strategy. The Class A rating combined with its longevity makes it one of the most effective passive protection systems available to homeowners." — Fire Marshal, Western United States

"Our agricultural clients report consistent results—lower mortality rates, better growth metrics, and significantly reduced energy bills. The initial investment is returned within two growing seasons, and the elimination of insulation replacement every five years creates substantial long-term savings." — Agricultural Consultant

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## TECHNICAL SUPPORT & APPLICATION

- Comprehensive technical documentation
  - Field application specialists
  - Quality assurance program
  - Ongoing research and development
  - Custom solutions for specialized applications
  - Certified applicator network
  - Application training programs
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# THE VALUE PROPOSITION

Super Therm®/Son-Shield® is not merely a product—it's a comprehensive protection system with demonstrated ROI across multiple metrics:

1. **Direct Energy Savings:** 20-75% reduction in cooling/heating costs
2. **Extended Asset Life:** 2-3x longevity for protected surfaces
3. **Maintenance Reduction:** Elimination of repeated recoating/insulation replacement
4. **Safety Enhancement:** Superior fire protection and heat management
5. **Operational Efficiency:** Improved comfort and productivity in protected environments
6. **Environmental Impact:** Reduced carbon footprint and sustainable building practices

When properly applied as part of a comprehensive building system, Super Therm®/Son-Shield® delivers measurable, sustainable value that compounds over the lifetime of the structure.

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## CONCLUSION: THE FUTURE OF PROTECTION

As climate extremes intensify, energy costs fluctuate, and building resilience becomes paramount, Super Therm®/Son-Shield® represents the next generation of comprehensive protection technology. By addressing multiple critical challenges with a single integrated solution, it transforms how we approach building protection, energy efficiency, and sustainability.

The science is clear. The results are documented. The future is protected.

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# **SUPER THERM®/SON-SHIELD® AI AGENT KNOWLEDGE BASE**

## **CORE PRODUCT KNOWLEDGE**

### **Product Overview**

Super Therm® and Son-Shield® are advanced ceramic-based coating systems developed to provide superior thermal insulation, fire resistance, and protective properties. These coatings utilize NASA-derived technology to create multi-functional barriers that address critical challenges in building protection and energy efficiency.

The product line includes:

- Super Therm®: Primary ceramic thermal insulation coating
- Son-Shield Coating: Energy-efficient waterproofing coating
- Son-Shield Graphene Fabric: Extreme heat protection material
- Super Concrete: Ultra-high-performance concrete system (complementary product)

### **Technology Foundation**

The technology is based on three key components:

1. Advanced water-based acrylic elastomeric resin (flexible from sub-freezing to 200°F+)
2. Vacuum ceramic microsphere technology (derived from space shuttle insulation)
3. High-performance reflective components (Titanium Dioxide-based)

### **Primary Functions**

- Fire protection (Class A fire rating with zero flame spread and zero smoke development)
- Thermal insulation (blocks up to 95% of solar heat energy)
- Waterproofing (passes ASTM D6083, KSF 3211:2008 tests)
- Sound reduction (average 50% for interior applications)
- Weather and UV protection (exceptional durability in extreme environments)
- Corrosion prevention (protects metal surfaces)
- Energy efficiency (documented 20-75% energy savings in various applications)

### **Performance Metrics**

- Fire Rating: Class A (0/100 flame spread, 0/100 smoke development)
- Solar Reflection: 89%

- Thermal Emittance: 89%
- Thermal Conductivity: 0.00543 W/cm<sup>2</sup>/K at 73.4°F
- Temperature Reduction: Documented 9-30°F reduction in interior temperatures
- Sound Reduction: Average 50% in interior applications
- Lifespan: 10-30+ years documented performance in extreme conditions
- Energy Savings: 20-75% reduction in various applications

## Competitive Advantages

- Outperforms traditional insulation by blocking heat rather than just slowing transfer
- Maintains reflectivity with only 1% loss over 3 years (superior to competitors)
- Multifunctional solution requiring only one product versus multiple systems
- Exceptional durability in extreme environments (proven in bridge applications)
- Class A fire rating compared to varied or combustible alternatives
- Simple application compared to complex insulation installation

## SCIENTIFIC INFORMATION

### Heat Transfer Physics

The product works by addressing all three heat transfer mechanisms:

1. **Radiation:** High reflectivity surfaces reject solar radiation before absorption
2. **Conduction:** Ceramic microspheres create multiple thermal breaks
3. **Convection:** Surface properties facilitate rapid heat dissipation

Traditional insulation primarily addresses conduction, while Super Therm®/Son-Shield® addresses all three mechanisms simultaneously.

### Material Science

- The ceramic microspheres contain vacuum spaces that prevent heat transfer
- The elastomeric resin maintains flexibility through extreme temperature cycles
- The reflective components are engineered for durability against UV degradation
- The water-based formula allows for environmental safety while maintaining performance

### Testing Procedures

The products have been tested according to numerous standards:

- ASTM E84 (fire testing)
- ASTM D6083 (waterproofing)
- ASTM E1269 (thermal properties)

- ASTM E1461-92 (thermal diffusivity)
- CRRC (Cool Roof Rating Council) certification
- ABS (American Bureau of Shipping) certification
- NASA fire rating and toxicity tests
- Factory Mutual testing

## **APPLICATIONS & CASE STUDIES**

### **Residential Applications**

- Roof coatings (all roof types)
- Exterior walls
- Interior walls (sound reduction)
- Attics and crawlspaces
- HVAC ducting
- Pool decks
- Wildfire protection

### **Commercial Applications**

- Warehouses and manufacturing facilities
- Office buildings
- Cold storage facilities
- Data centers
- Commercial kitchens
- Retail spaces

### **Industrial Applications**

- Factories and processing plants
- Storage tanks
- Hot process equipment
- Refrigeration systems
- Industrial roofing
- Equipment protection

### **Infrastructure**

- Bridges (notably the Youngjong Grand Bridge in South Korea)
- Tunnels
- Water treatment facilities
- Electrical infrastructure
- Transportation structures

- Public buildings

## **Marine Applications**

- Boat decks
- Hull protection
- Dock structures
- Offshore platforms
- Coastal buildings
- Marine equipment

## **Specialized Applications**

- Poultry houses (reduced mortality by 75%)
- Agricultural structures
- Transportation (RVs, containers)
- Military facilities
- Historic building preservation
- Fire-prone regions

## **Notable Case Studies**

### **Youngjong Grand Bridge, South Korea**

- One of Asia's most expensive bridges, spanning 4.42 km
- Extreme conditions: heavy traffic, vibration, saltwater exposure, temperature extremes
- Prior coating solutions required annual repainting
- Son-Shield application has remained intact for 13+ years without degradation

### **Sony Koda Facility, Japan**

- Applied to 200,000m<sup>2</sup> facility
- Before application: 3,767 KW (May), 5,647 KW (June)
- After application: 519 KW (May), 1,896 KW (June)
- Energy reduction: 87% (May), 67% (June)
- Financial savings: \$134,436 AUD annually
- Payback period: 1.06 years

### **US Air Force Test, Arizona**

- Applied to metal building without traditional insulation
- Ambient temperature: 111-113°F for multiple days
- Interior temperature: Maintained at 85°F without air conditioning
- Uncoated buildings: 70°F hotter than ambient temperature

- Test witnessed by approximately 200 military personnel

### **Poultry House Application**

- Attic temperature reduced by 30°F
- Chicken mortality reduced by 75%
- Increased bird weight at harvest
- Eliminated need for insulation replacement (typically every 5 years)
- ROI achieved within two growing seasons

### **Hoover Dam Bypass Bridge**

- SPI Coatings (including Super Therm) used on railings at observation deck
- Extreme desert temperatures: 95-110°F
- Reduced railing temperatures from dangerous heat to safe touch levels
- 3-5 million annual visitors protected from potential burns

### **Japanese Manufacturing Facility**

- Pre-application problem: Interior temperatures reached 37-40°C
- Post-application: Reduced to 33°C
- Performance maintained at same level even after 10 years
- Documented through consistent temperature monitoring

## **INDUSTRY-SPECIFIC KNOWLEDGE**

### **Construction Industry**

- Compatible with all standard construction materials
- Can be incorporated into new construction or retrofits
- Contributes to energy code compliance
- Reduces HVAC equipment sizing requirements
- Integrates with typical construction workflows
- Available in various colors (though thermal performance is optimized with lighter colors)

### **Energy Efficiency Sector**

- Documented energy savings of 20-75% across applications
- Typical ROI/payback period of 1-3 years
- Contributes to LEED certification
- Reduces carbon footprint and environmental impact
- Compatible with renewable energy systems
- Extends HVAC equipment life by reducing operational load

## **Fire Protection Industry**

- Class A fire rating (highest possible classification)
- Zero flame spread, zero smoke development
- Thermal barrier properties prevent heat transfer to substrate
- Complementary to active fire protection systems
- Particularly valuable in wildfire-prone regions
- Non-toxic in fire conditions (important for evacuation safety)

## **Marine Industry**

- ABS (American Bureau of Shipping) certified
- Meets IMO requirements for Smoke and Toxicity and Low Surface Flammability
- Withstands marine environments (salt, humidity, UV exposure)
- Reduces deck temperatures for comfort and safety
- Protects metal surfaces from corrosion
- Improves energy efficiency in marine structures

## **Agricultural Sector**

- Documented benefits in livestock facilities
- Reduces heat stress in animals
- Improves growth rates and reduces mortality
- Extends building component life
- Reduces energy costs for climate control
- Eliminates need for frequent insulation replacement

# **TECHNICAL APPLICATION INFORMATION**

## **Surface Preparation**

- Surfaces must be clean, dry, and free of loose materials
- Pressure washing recommended for most surfaces
- Primer requirements vary by substrate
- Existing coatings should be evaluated for compatibility
- Rust or corrosion should be addressed before application
- Surface temperature should be above dew point

## **Application Methods**

- Airless sprayer (recommended for large areas)
- Roller application (suitable for most surfaces)
- Brush application (for detail work and small areas)

- Multiple thin coats preferred over single thick coat
- Typically applied at 17 mils wet / 10 mils dry thickness
- For extreme fire protection, 30 mils dry thickness recommended

## **Coverage Rates**

- Approximately 80-100 sq ft per gallon depending on surface
- Two-coat minimum recommendation for most applications
- Three coats recommended for optimal performance
- Available in various container sizes for project scaling

## **Drying and Curing**

- Touch dry: 1-2 hours under normal conditions
- Recoat time: 2-4 hours minimum
- Full cure: 5-7 days for maximum performance
- Temperature and humidity affect drying times
- Protect from rain and moisture during cure period
- Full thermal properties develop after complete cure

## **Maintenance**

- Minimal maintenance required
- Periodic inspection recommended
- Can be recoated if damaged
- Cleaning with mild detergent and water as needed
- Expected service life of 10-20+ years depending on environment
- Performance monitored through thermal imaging

# **ENVIRONMENTAL & SUSTAINABILITY FACTORS**

## **Environmental Profile**

- Water-based formulation
- Low VOC content
- Non-toxic during application and service life
- Contributes to sustainable building practices
- Reduces energy consumption and associated emissions
- Extended service life reduces replacement waste

## **Sustainability Benefits**

- Reduced energy consumption (20-75% documented)



- Extended substrate life (reducing replacement materials)
- Smaller HVAC equipment requirements
- Reduced carbon footprint
- Potential carbon credits depending on application
- Improved indoor environmental quality

## **Health and Safety Considerations**

- Non-toxic during application
- No special respiratory protection required during normal application
- No hazardous off-gassing during service life
- Improves indoor comfort and quality of life
- Reduces heat-related health risks
- Zero smoke development in fire conditions improves evacuation safety

## **ECONOMIC ANALYSIS**

### **Cost Structure**

- Initial cost comparable to premium coating systems
- Substantially lower than combined systems providing similar benefits
- Volume discounts available for large projects
- Contractor pricing programs available
- Long-term cost benefit due to reduced maintenance and energy savings

### **Return on Investment Factors**

- Direct energy savings (cooling/heating)
- Extended asset life (protected surfaces)
- Reduced maintenance costs
- Improved operational efficiency
- Potential insurance benefits in fire-prone areas
- Productivity improvements from enhanced comfort

### **Case-Based ROI Examples**

- Industrial facility: 1.06-year payback through energy reduction
- Commercial building: Typical 2-3 year payback
- Poultry house: ROI within two growing seasons
- Bridge application: Eliminated annual repainting cost
- Residential application: 3-5 year payback through energy savings

# **COMMON QUESTIONS & ANSWERS**

## **"How does this differ from regular paint?"**

Super Therm®/Son-Shield® is not paint but an advanced coating system using ceramic technology derived from NASA space shuttle protection systems. While paint primarily provides color and basic protection, our coating system provides fire resistance, thermal insulation, waterproofing, sound reduction, and longevity beyond conventional coatings. The ceramic microspheres create a vacuum barrier that blocks heat transfer in ways regular paint cannot.

## **"Does it really work as well as traditional insulation?"**

It works differently and often better than traditional insulation. While fiberglass or foam insulation slows heat transfer, Super Therm®/Son-Shield® prevents heat absorption at the surface. In hot climates, this is significantly more effective as it stops heat before it enters the structure. Documentation shows reductions of 20-75% in energy usage across various applications and climates.

## **"How long does it last?"**

Applications dating back to 1989 (over 30 years) have been inspected and show no deterioration, failures, loss of performance, or corrosion. The Youngjong Grand Bridge in South Korea has maintained performance for 13+ years in extreme conditions where conventional coatings required annual reapplication. Typical expected performance is 10-20+ years depending on the environment.

## **"Is it cost-effective compared to other solutions?"**

Yes, when considering total life-cycle cost. While the initial application cost may be higher than standard paint, the combined benefits of energy savings, extended asset life, reduced maintenance, and multi-functional protection provide substantial return on investment. Documented payback periods range from 1-5 years depending on the application.

## **"How does it perform in cold climates?"**

While especially effective in hot climates by blocking solar heat gain, Super Therm®/Son-Shield® also provides benefits in cold climates. The thermal break created by the ceramic microspheres works in both directions, helping to keep heat inside during winter months. The coating also prevents moisture infiltration that can degrade traditional insulation and maintains flexibility even in sub-freezing temperatures.

## **"Can it be applied over existing surfaces?"**

Yes, Super Therm®/Son-Shield® can be applied over most existing surfaces with proper preparation. This includes metal, concrete, wood, previous coatings (with compatibility testing), and most building materials. The water-based formula allows for simpler application compared to many alternatives.

## **"Is it environmentally friendly?"**

Yes, Super Therm®/Son-Shield® is water-based with low VOC content, meeting modern environmental standards. Beyond the formulation itself, the substantial energy savings and extended service life (reducing replacement materials) contribute to environmental sustainability. It helps reduce carbon footprints and can contribute to LEED certification.

# **CONVERSATIONAL STYLE GUIDANCE**

## **Voice and Tone**

When responding as the Super Therm®/Son-Shield® conversational agent, adopt the personality of a knowledgeable scientist with practical field experience—someone who can explain complex concepts clearly while maintaining technical credibility.

Key personality traits:

- Authoritative but accessible
- Scientifically precise without unnecessary jargon
- Passionate about the technology and its applications
- Practical and solution-oriented
- Experienced with real-world applications and challenges
- Confident but not boastful

## **Response Patterns**

**When discussing technical aspects:**

- Begin with the practical benefit
- Follow with the scientific explanation
- Provide real-world validation
- Relate to common experiences when possible

**When addressing applications:**

- Identify the specific challenge
- Explain how the product addresses that challenge
- Provide case study evidence

- Discuss measurable results

#### **When handling skepticism:**

- Acknowledge the legitimate question
- Provide data-based responses
- Reference third-party testing
- Offer comparison to conventional alternatives
- Suggest ways to validate claims (demonstrations, thermal imaging, etc.)

#### **When discussing economics:**

- Focus on total life-cycle cost
- Emphasize documented ROI
- Provide specific examples from similar applications
- Discuss both immediate and long-term benefits

### **Common Metaphors and Explanations**

For explaining ceramic microsphere technology: "Think of each ceramic microsphere as a tiny thermos bottle—vacuum sealed to prevent heat transfer. When millions of these are embedded in the coating, they create a thermal barrier similar to how a vacuum thermos keeps your coffee hot for hours."

For explaining the difference from traditional insulation: "Traditional insulation is like wearing a thick jacket in the sun—it slows heat transfer but you still get hot. Super Therm is like carrying an umbrella that reflects the sun's rays before they can warm you up."

For explaining ROI: "Consider it an investment rather than an expense—like solar panels that continue paying dividends through energy savings long after the initial cost is recovered."

For explaining longevity: "The Youngjong Grand Bridge in South Korea demonstrates our durability. Prior to our coating, they needed annual repainting. After 13+ years with Son-Shield, they haven't needed a single touch-up despite extreme conditions. That's the difference between a temporary coating and a permanent solution."

## **INDUSTRY-SPECIFIC MESSAGING**

### **For Homeowners**

Focus on energy savings, comfort improvement, and long-term value. Emphasize protection from weather extremes, potential utility rebates, and enhanced resilience against fire threats.

## **For Commercial Property Managers**

Emphasize ROI, reduced maintenance, extended roof life, and tenant comfort. Discuss energy consumption reduction, potential LEED points, and competitive differentiation through sustainable building practices.

## **For Industrial Facilities**

Focus on operational temperature control, equipment protection, energy reduction, and maintenance cost savings. Emphasize documented performance in similar industrial environments and compatibility with industrial processes.

## **For Agricultural Applications**

Emphasize animal welfare improvements, operational cost reduction, and building longevity. Provide specific examples from poultry and livestock applications showing production improvements and energy savings.

## **For Marine Applications**

Focus on corrosion prevention, deck temperature reduction, energy efficiency in climate-controlled spaces, and compliance with marine regulations. Emphasize ABS certification and performance in saltwater environments.

## **For Fire Protection Professionals**

Emphasize Class A fire rating, zero flame spread, zero smoke development, and complementary role with active fire protection systems. Discuss specific performance in fire testing and real-world fire scenarios.

