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Arctic Sealant Technology & Innovation

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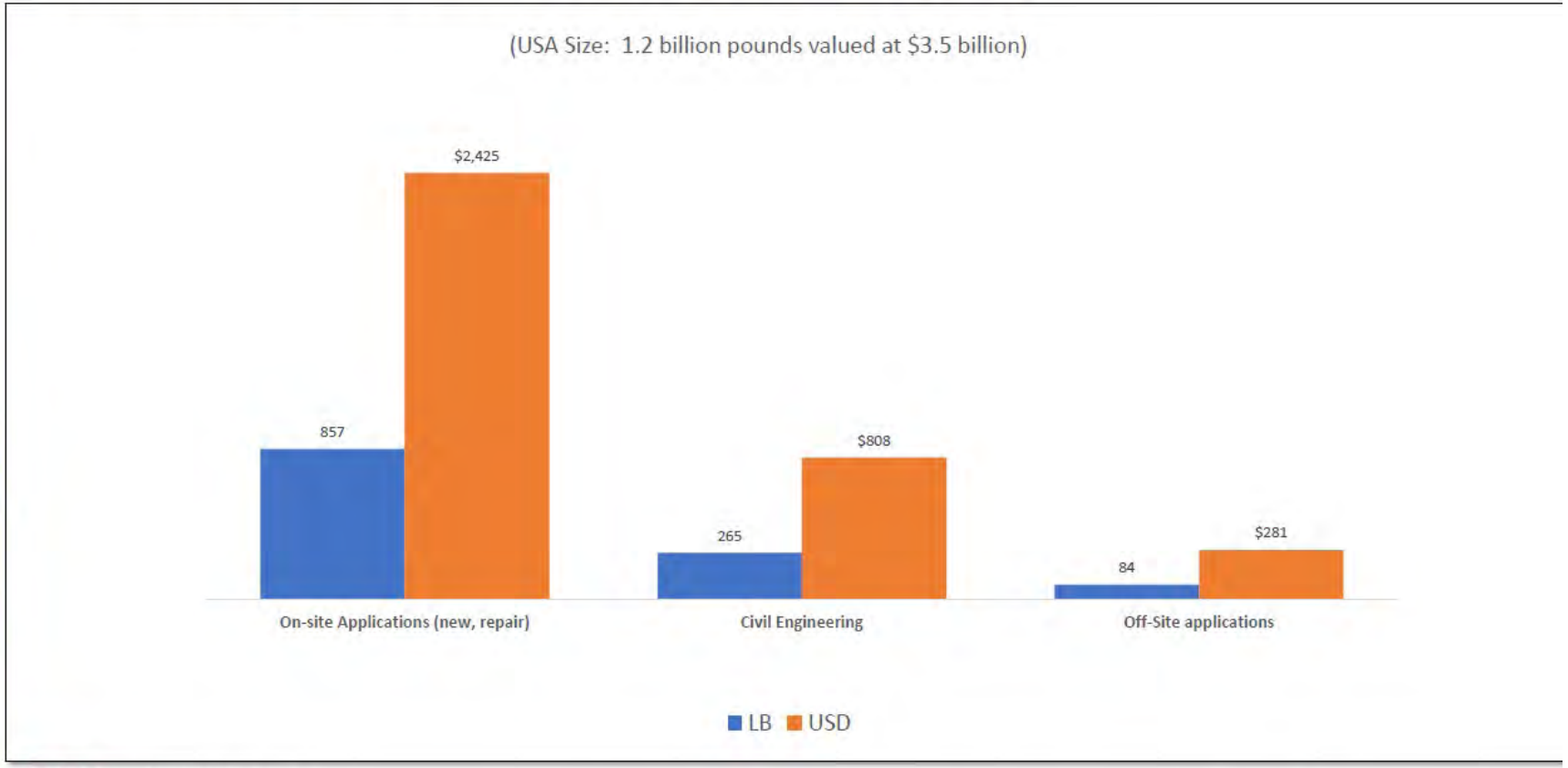
The Commercial Sealant Market - $3.5 Bio

2020-2023 NORTH AMERICAN MARKET REPORT

USA Building & Construction Demand (2020)



Source: ChemQuest

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The Sealant Market – Global Trends

2020-2023 NORTH AMERICAN MARKET REPORT

Several global trends across a diverse range of markets

Trend	Innovation
Shift from mechanical fasteners to adhesives	• Bonding/fastening dissimilar materials of design • NVH, Corrosion protection, crash worthiness (load management and distribution).
Increased use of composites, plastics, and light metal alloys	• Aerospace (Boeing Dreamliner 787) • Automotive (2025 CAFÉ Standards) • Implementation of carbon fiber and bonding dissimilar materials • Resilient veneer-laminated wood flooring
Demand for alternative, sustainable energy sources	• Wind Energy • Long-term, durable solar panels
Globally aging population	• Comfortable adult incontinence products
Electric vehicles and vehicle light-weighting	• Engineered Structural Adhesives • Thermally-conductive encapsulants; lightweight adhesives
Demand for energy efficient buildings	• Highly durable, easy-to-apply insulating adhesives and tapes • Adhesive fastening via Direct Glazing
Micro-electronics and electronic light-weighting	• Shock-resistant component assembly • Waterproof and lighter weight next-generation smartphones
E-commerce and demand for sustainable packaging	• Automated, lower-cost, more sustainable packaging solution for online retailers • Flexible packaging innovations substituting rigid packaging
Emergence Of New Adhesive Types	• The various types of adhesives being developed are dual-stage pressure-sensi adhesives, pre-cut layered adhesive films and stick-to-skin adhesives • Stick-to-skin adhesives are used in monitoring and drug delivery devices
Building & Construction	• Consumer trend away from U.S. brick and mortar retail stores -commerce. More warehouse and distribution center construction, less retail. • Life Cycle Assessment and demands from end users and th pecification community. • Complex new corrosion challenges
Increased penetration by meeting previously unmet needs	• Reduce asset out-of-service time during re • Improved manufacturing throughput fficiency • Joining mixed materials – Enables u more composites, plastics and metal alloys • Enable low-temperature curing • Customized packaging options for precision dispensing, minimizing waste

Source: ChemQuest

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ChemQuest

Enable Low-Temperature Curing!

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Problem To Be Solved

Greater demand for faster project completion – time pressure.

Pressure to use existing available products/technology in conditions not meant for.

Risk for everyone!

Problem To Be Solved

CONTRACTORS THAT WANT TO WORK THROUGH THE COLDER MONTHS AND KEEP EMPLOYEES RETAINED.

THIS MEANS WORKING IN WEATHER CONDITIONS THAT ARE NOT IDEAL.

The Decision

- Decision to work on a 2-component polyurethane sealant:
  - Better fit for the construction projects that would desire to continue to work during winter months.
  - Wider range of colors (i.e. on-site color tinting)

2-component PU Sealants

2-component PU Sealants

How Contractors Worked Previously

- Existing sealants must be used above 40F and rising temperatures.
- When material gets too cold or is not conditioned properly it cannot be applied.
- Delays and work stoppages.

Arctic Sealant Project Objective

- Develop a Sealant that:
  - Can be mixed down to 15F – just as regular sealant mixes as room temperature.
  - Can gunned and tooled down to 15F – similar to room temp application of standard product.
  - Will cure down to 15F.

Let’s start with the basics

PU Sealants and Cold Weather

1 Component

- Low temperature
  - Viscosity increase
    - Difficult to gun and tool
- Low moisture
  - Slow adhesion development
  - Slow tensile strength development

2 Component

- Low temperature
  - Viscosity increase
    - Difficult to mix, gun and tool
- Low moisture
  - Slow adhesion development
  - Slow tensile strength development

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Important factors – Sealing at Low T

Installation ease

- Mixing (2 component)
- Applying
- Tooling

Cure speed

- Adhesion strength development
- Tensile strength development

Performance in the joint

- Movement during cure
- Compression as Temperature rise

Solution

Cold Temperature Sealing – Patented Solution for 2 C PU

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(11) EP 3 336 114 A1

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(54) TWO-COMPONENT POLYURETHANE SEALANT FOR APPLICATION AT LOW TEMPERATURE

(57) A two-component composition is described which comprises A) an isocyanate component comprising an isocyanate-terminated urethane prepolymer, B) a water component comprising water, and at least one latent amine hardener in component A) and/or component B).

The two-component composition of the invention is suitable as a sealant, in particular as a joint sealant. Particular advantages are that primerless application is possible with good adhesion, even at low temperatures, such as 4.4 °C or below. The substrate to be sealed are preferably concrete substrates.

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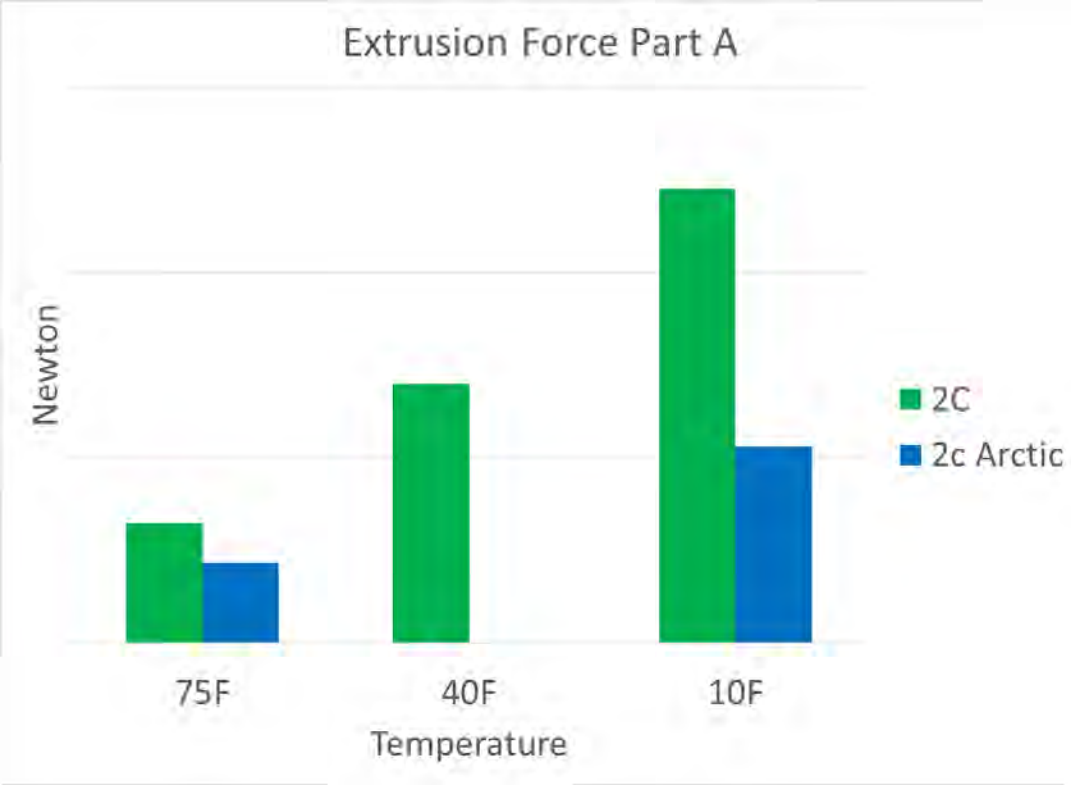
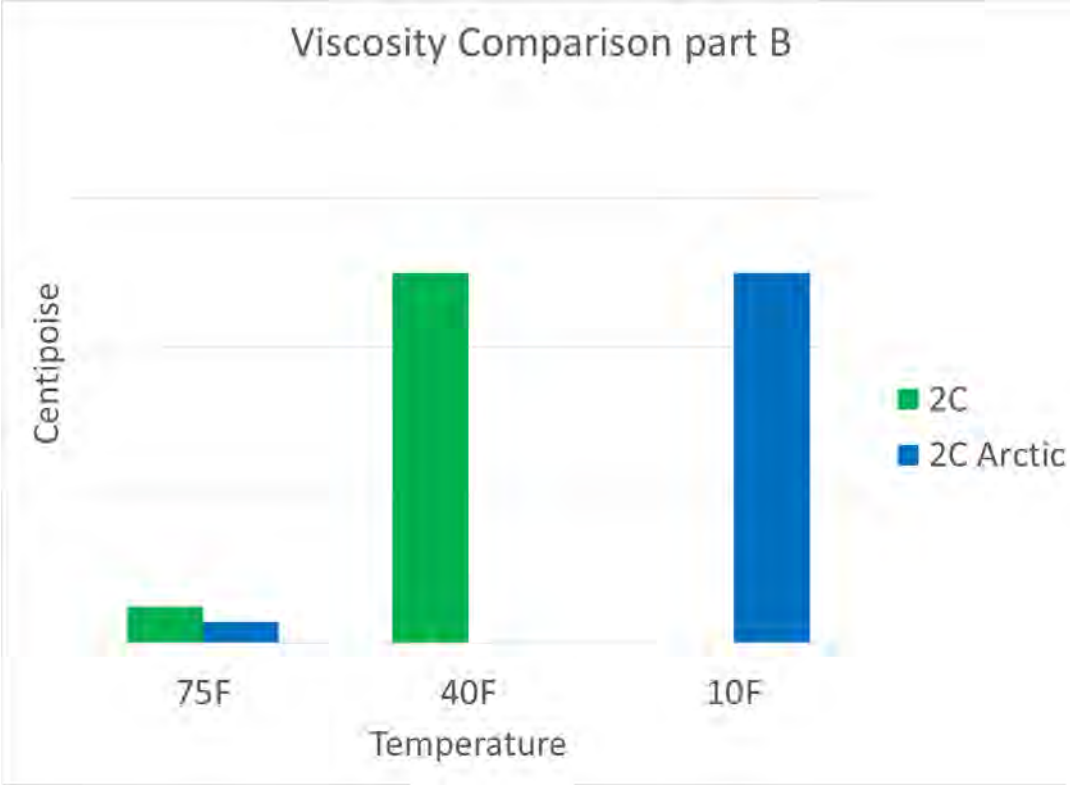
Installation Ease





Installation Ease

✓ Mixing (2 component)

✓ Gunning

✓ Tooling

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Cure speed – Adhesion Development

Adhesion development on unprimed concrete	Standard 2-component Sealant	2-component Arctic Sealant
3 days @5°F		
7 days@ 5°F		
3 days @15F		
7 d@15F		
1 day @73°F		
2 days @73°F		

RED = not cured, no adhesion development
ORANGE = not fully cured, adhesion development on substrate
GREEN = cohesive failure on substrate

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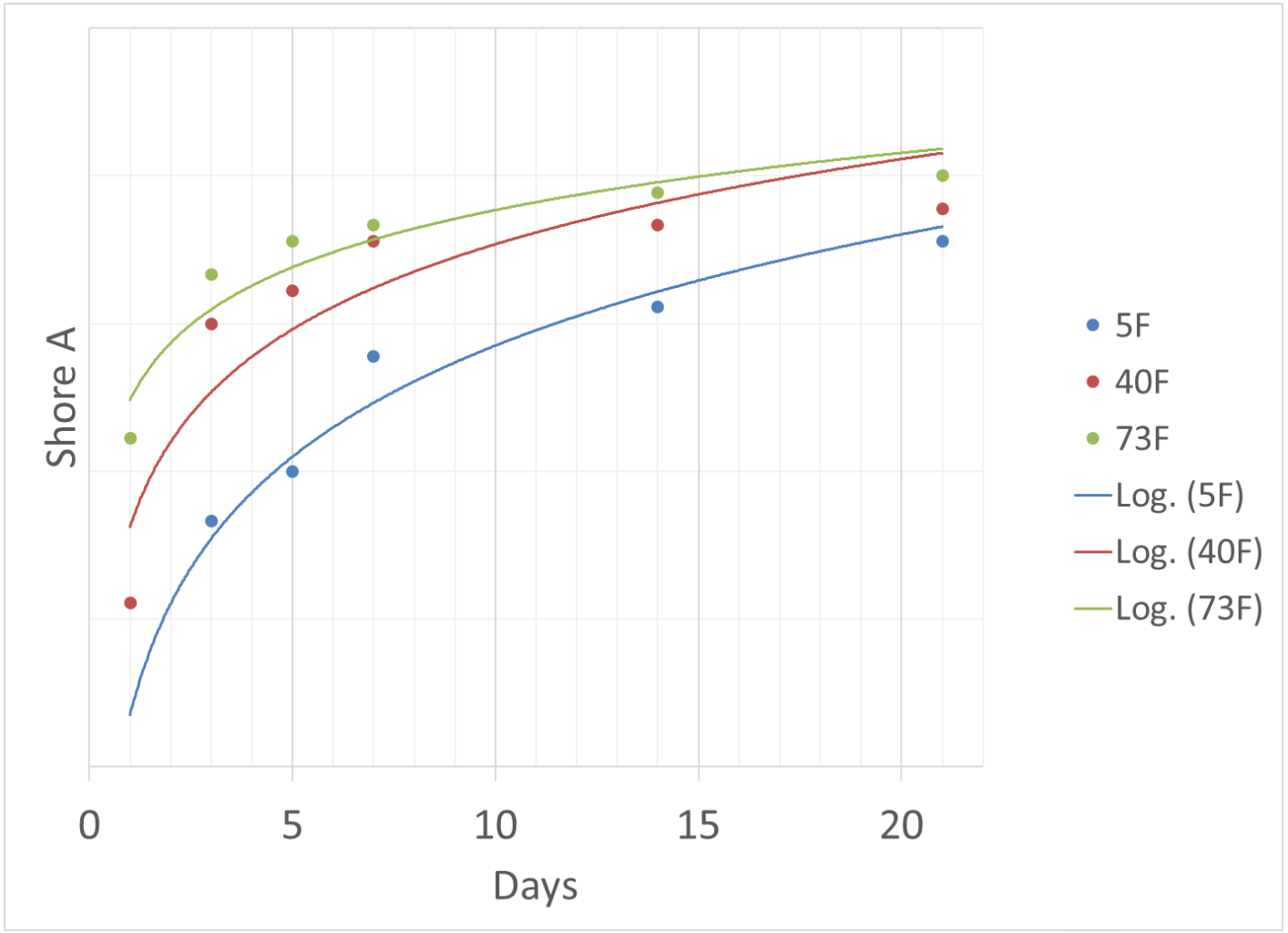
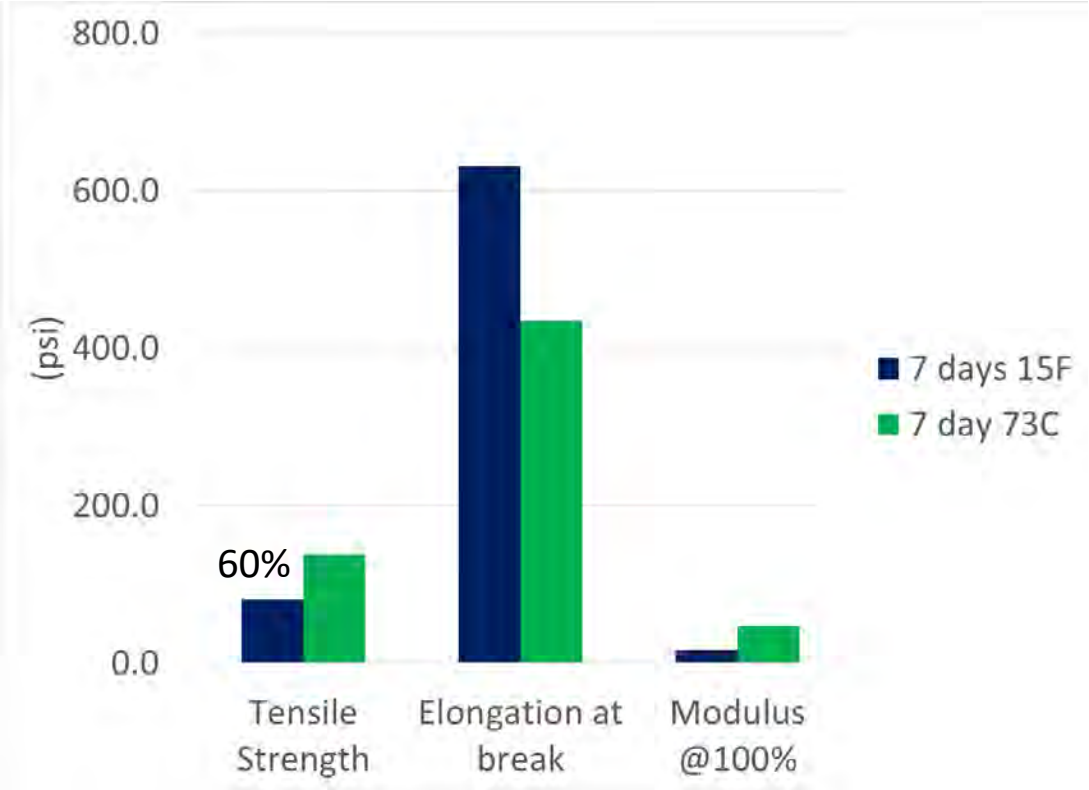
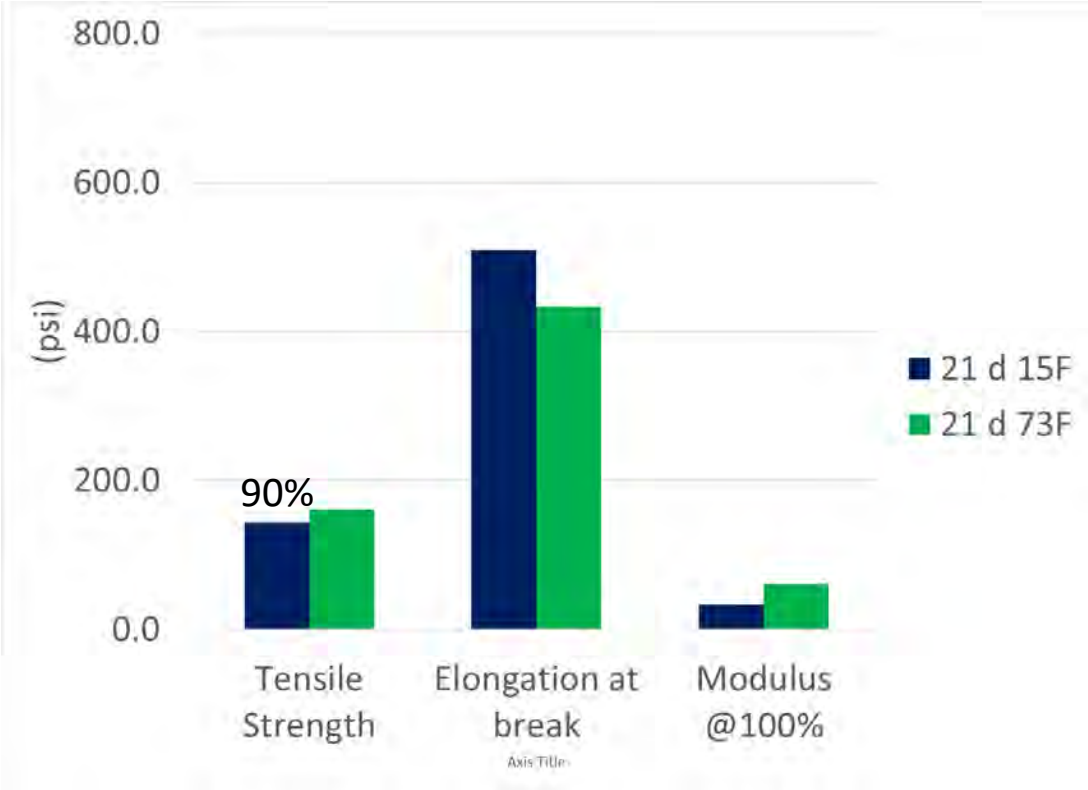
Cure Speed – shore A development



Cure Speed – Tensile Development





Cure Speed

- ✓Adhesion built up at low temperatures
- ✓Tensile strength development at low temperatures

Movement capability

Installation ease – safer installation as

- ✓ Mixing (2 component)
  - ✓ No pre-heat needed
- ✓ Gunning
  - ✓ Guns easy at 15F
- ✓ Tooling
  - ✓ Tools easy at 15F

Cure speed – development at low T

- ✓ Adhesion strength built up
  - ✓ Fully developed in 3 days @ 15°F
- ✓ Tensile strength built up
  - ✓ 0% of ultimate strength reached after 7 days at 15F

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Laboratory Test Report

Report for:	Grimaldo Ramos Sika Corporation 201 Polito Avenue Lyndhurst, NJ 071
Product Name:	Sikaflex® -2C NS Arctic
Project No.:	557T0019 & 557T0020
Dates Tested:	October 14, 2019 – December 12, 2019
Test Methods:	ASTM C 920
Results Summary:	Compliant: ASTM C 920: Type S, Class 35,

Movement capability

- Externally tested
- +/-35% movement on unprimed mortar

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Field Testing Phase – Establish Success

- Two full winter seasons for field testing.
- Market feedback helped adjust to get a final desired product.
- Practical applications and monitoring helps with skeptics.
- Full release with resounding success and acceptance.

Field Testing Phase – Mixing and Applying

Arctic Sealant Application

- Sound, well prepared substrate – just as with any other sealant application.
- No Frost.
- Watch the Dew Point.
- Dry Surface

Where Arctic Sealant is Being Used

Helping Contractors Work Through the Winter

Distribution Center Construction

Amazon Building

Warehouse Construction

Questions?

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