Sealed "N" Safe® Products LLC

Introduction

Whenever one undertakes the development of new products and ideas, there are always challenges to overcome. The Sealed "N" Safe® Thermal Block System has been no exception. We have succeeded at both the development of a new product, and at the design and development of the equipment necessary to produce the product. My thanks and appreciation goes out to the staff and designers here at Sealed "N" Safe® for their tireless efforts to make it all happen.

Prior to making the new Sealed "N" Safe® Thermal Block System available to the Pre-engineered Building Industry, every effort has been made to determine the true effects both positive and negative resulting in the use of these products. There are four items of major importance that were considered in the final product design.
First, structural integrity of the metal building must be maintained.
Second, weather and water tightness cannot be compromised.
Third, the life expectancy of the Thermal Block must meet or exceed that of the other components involved. And **fourth, overcome the issues of energy loss** in metal buildings in whatever ways we could determine possible and beneficial. We believe we have taken the necessary steps to understand all the effects from use of the SNS® Thermal Block System. A summary of that information is included herein. That information is of utmost importance to anyone using and installing Thermal Blocks in a "screw down" type roof. **There are negative effects that must be overcame to maintain structural safety and soundness of the building.** Complete Test Results are posted on our website at www.sealednsafe.com.

We at Sealed "N" Safe® Products, LLC are excited about our future and the impact we expect to have in reducing the amount of energy "lost" in the use of Metal Buildings world-wide. We understand that energy is a requirement of a thriving economy but also realize the importance of making the best use of all the resources we consume, including energy. Tests results show that use of this product can reduce energy use by as much as 50% and more. They also show that simply adding more insulation is not necessarily a benefit. Let us show you the details. We look forward to the future and working with all of you involved in the metal building industry.

Sincerely,

Craig D. Oberg
Pres.

Tests conducted include:

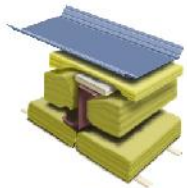
(i) Thermal Analysis conducted at Johns Manville Testing Facility in Littleton, CO.
(ii) Smoke and Flame Spread Testing conducted at QAI, Rancho Cucamonga, CA
(iii) AISI TS-7-02 Testing Diaphragm Shear Strength at Encon Technologies, Tulsa, OK.
(iv) AISI S908-08 Test the value of Rτ (Purlin Rollover) at Encon Technologies, Tulsa, OK
(v) SNS® Purlin Strut System (Patent Pending) Encon Technologies, Tulsa, OK.
(vi) ASTM E1646-95 and ASTM E1680-95 Test Water and Air Infiltration 15 min at Encon
(vii)ASTM E1646-95 and ASTM E1680-95 Test Water and Air Infiltration 2 hr at QAI, Rancho Cucamungo, Ca
(viii) ASTM E1592-05 Test Uplift Resistance at Encon Technologies, Tulsa, OK

Test Summaries and Notes (See complete test results at www.sealednsafe.com)

Thermal Analysis from JM-Tests were conducted at Johns Manville Technical Facility in Littleton, Co. Double Layer Samples tested included 1 with 2 layers of 3" and another with 2 layers of 4"MBI. Both were tested in horizontal position for roof values as well as vertical position for wall applications.

Full Cavity Samples included one with 6" Faced MBI as the lower blanket with a 3" unfaced blanket over the purlins. Another Sample test included an 8" Faced MBI as the lower blanket with a 3" unfaced blanket over the top. Values for the SNS Suspended System are calculated per inch of added fiberglass MBI. Results are shown below. Complete Results are available on our website.

SNS® Continuous Insulation Systems with Typical Market Values

		MBI Blanket Rated R-Value	Insulation Layer Thickness (Inches) Upper (Outer Layer)	Cavity (Middle Layer)	Suspended (Inner Layer)	With the SNS® Thermal Block System U-Values by SNS*	With an R3 Thermal Block System *U-Values by ASHRAE	Without a Thermal Block System *U-Values by ASHRAE	Improved Performance using the SNS® Thermal Block System R3	Without
 Double Layer Roof & Wall Insulation System (Patents Pending) Double Layer Wall Insulation System (Patents Pending)		R-20	3" & 3"	0"	0"	0.076	NA	0.151 (calculated)	-	199%
		R-23	3" & 4"	0"	0"	0.075	NA	0.148 (calculated)	-	193%
		R-26	4" & 4"	0"	0"	0.074	NA	0.145 (calculated)	-	196%
 Full Cavity Roof Insulation System with tabs below the Purlin (Patents Pending)	8" Purlin	R-29	3"	6"	0"	0.047	0.074	0.107	157%	228%
	10" Purlin	R-35	3"	8"	0"	0.042	0.065	0.095	155%	226%
 Suspended Full Cavity Roof Insulation System (Patents Pending)	8" Purlin	R-39	3"	6"	3"	0.032	NA	NA	-	-
		R-42	3"	6"	4"	0.029	NA	NA	-	-
		R-48	3"	6"	6"	0.025	NA	NA	-	-
		R-54	3"	6"	8"	0.021	NA	NA	-	-
	10" Purlin	R-45	3"	8"	3"	0.029	NA	NA	-	-
		R-48	3"	8"	4"	0.027	NA	NA	-	-
		R-54	3"	8"	6"	0.023	NA	NA	-	-
		R-60	3"	8"	8"	0.020	NA	NA	-	-

** Latest U-Factors published by ASHRAE (01/12/10) or Tested U-Factors by SNS® or noted otherwise.*

Notice the significant reduction in "U" Values when the SNS® Thermal Block is used. For Roof and Wall applications, simply replace the old 6" R19 Blanket with 2 layers of 3" insulation, add the SNS® Thermal Block and reduce the "U" Value from .151 down to .076. For roof application, use 1 layer of faced 6" MBI and 1 layer of 3"unfaced, include the SNS® Thermal Block and reduce the "U" Value from .117 down to .054. That is roughly a 50% reduction (1/2 the energy consumption) for very little added cost. That is a tremendous reduction!

Smoke and Flame Testing-Tests were conducted at Quality Auditing Institute in Rancho Cucamunga, Ca. to determine the Flame and Smoke Spread Properties of the Isocyanurate foam used in SNS® Thermal Blocks. Tests results show a Flame Spread Rating of 25 and the Smoke Index less than 150.

To comply with Section 26 of the ICC Code, foams and plastics used in roof applications must be covered with a minimum 15 minute fire rated thermal barrier, such as 0.016" minimum thickness corrosion resistant steel. 95% of the surface area of the SNS® Thermal Block is covered with 0.023" thick steel shell which leaves about ¼" of each edge (5%) of the SNS® Thermal Blocks unprotected. The Isocyanurate foam core carries a Class A Fire Rating with Flame Spread Rating of 25 and Smoke Index less than 150, (Allowable Flame Spread is 75 and Smoke Index is 450).

Typical MB Insulation facings are also subject to similar maximum Smoke and Flame Spread requirements, but are installed fully exposed in Metal Building Ceilings as an industry standard. You should note that other foams such as Polystyrene or Styrofoam melt, drip, and ignite when exposed to flame. Their use in roof applications also does not meet the requirements of Section 26. The Isocyanurate Foam used in the SNS® Thermal Block System does not melt, drip, or ignite, and when encased in the 24ga.Cladding, exposes very little available fuel source for fire, smoke, and fume buildup in case of fire. We are currently working with ICC to resolve these issues. We will update information regarding this matter as it develops.

AISI TS-7-02 Test was conducted to determine the Shear Strength and Shear Stiffness of 26 and 24ga panels under simulated loading conditions. Results showed slightly lower values than would be expected without use of the SNS® Thermal Block System however, the proven values are well within the required range. This test also documents compliance with AISI Standard S100-2007 Section D6.1.1 dealing with "Standoff" Type Screws. It proves the structural capabilities of the complete system.

SNS® Thermal Block System
Shear Load and Stiffness Calculation

Test No.	GA	a (ft)	B (ft)	P (lb)	LL (lb)	UL (lb)	LD (in)	UL (in)	Shear Deflection δ_s(in)	Shear Stiffness Lb/in	Ultimate Shear Load (lb)	Ultimate Shear (lb/ft)
1	26	15.50	16.25	1600	1500	1800	0.150	0.188	0.163	9387.4	4000.0	246.2
2	26	15.50	16.25	1560	1500	1800	0.154	0.154	0.154	9671.0	3900.0	240.0
										9529.2		**243.1**
3	24	15.50	16.25	1760	1600	2000	0.145	0.204	0.169	9944.0	4400.0	270.8
4	24	15.50	16.25	1840	1600	2000	0.143	0.194	0.173	10133.2	4600.0	283.1
										10038.6		**276.9**
3	24	15.50	16.25	1760	1600	2000	0.145	0.204	0.169	9944.0	4400.0	270.8
4	24	15.50	16.25	1840	1600	2000	0.143	0.194	0.173	10133.2	4600.0	283.1
										10038.6		**276.9**

Notes

1. Load (P) is 0.4 x Ultimate shear load. Shear stiffness is measured at 0.4 Ultimate load
2. Shear Stiffness = $(P/\delta_s) \times (a/b)$
3. Panels were fastened to the rake angles at 30" o.c.
4. Panels were fastened through 4" thick insulation, Sealed "N" Safe blocks and 3" thick insulation into 16ga supports.

All tests were conducted on September 28, 2009

Thermal Block Test Results

	UFP-SAMPLE	THICKNESS	K-VALUE*	R-VALUE
Standard Density	X-20176	1"	0.1629	6.14

The SNS® Thermal Block System is designed to withstand years of shear loads typically applied over a metal building roof or wall system. We have intentionally used 24ga cladding to out perform the standard 26ga. roof and wall panels typically used in the metal building industry. The SNS® Thermal Block System will perform equally to 24ga roof and wall panels. SNS® does not recommend the use of the diaphragm shear resistance as the bracing system for any application. Rather use of a diagonal brace, moment brace, or other means of bracing roof and wall planes is recommended when using this product. The 24 ga. Cladding is also resin coated over galvanized or Galvalume substrate to prevent corrosion. It resists those forces and is intended to perform as the roof and wall panels themselves.

Use of other products such as wood or plastics will result in displaced material around the fastener itself creating elongated holes in those products. Over time, this will result in "Fastener Fatigue" and breaking at the top of the purlin surface due to the constant rotation of the fastener used in a "Standoff" condition back and forth in the elongated holes. You should also avoid using any materials that will retain moisture under the roof sheet. Again, the design of the SNS® Thermal Block System helps prevent fastener fatigue and moisture retention.

The SNS® Thermal Block is also designed using high density Isocyanurate Foam. It is tested at specific intervals during production to insure the proper density and compressive values are met and maintained. The minimum density results in 45 lbs per square inch compressive resistance. We recommend it be used at 25% maximum of that value to insure to prevent compression under actual use. For example, at 5 ft purlin space and 30 lb/ft^2 roof load over a 2.5" purlin flange, that application results in about 5 lb/in^2 actual load. The maximum allowable recommended load would be 45 X .25 = 11.25 which is more than double the actual load applied. Reduction of width for radius of purlin flange also needs to be considered. The Sealed "N" Safe® Thermal Block System truly is designed to "Take the Punishment".

ASTM E1592-05 Test was conducted to determine the structural performance of the metal panel at 5'0" OC span configurations under uniform static pressure difference or measuring uplift performance. Tests proved the SNS® Thermal Block System has no negative effect in this application. The roof system with the SNS® Thermal Block System performed equal to a typical screw-down roof system.

ASTM E1646-95 (2003) and E1680-95(2003)
Test was conducted to determine water and/or air infiltration when using the SNS® Thermal Block System. Tests proved the SNS® Thermal Block System to perform equal to a typical screw-down type roof system under both the 15 minute requirement for ASTM and the 2 hour requirement for ICC approval. No water leakage was detected in either test.

AISI S9808-08 Test was conducted to determine the Value of $R\tau$ or Purlin Rollover in the design of Zee Purlins or Girts. This Purlin Base Test has been conducted on Screwdown Panels as well

as Standing Seam Panels. Testing according to AISI S908-08 to determine the value of Rτ or overturning of the purlin, revealed the negative effect of placing a 1" Spacer over the top of the purlin and under the roof sheet. Tests for gravity and uplift loads were conducted using 8" and 10" Zee Purlins from 12 Ga. Steel with 4" MBI between the Thermal Block and the Purlin and 3" MBI between the Thermal Block and the roof sheet with roof panels installed in a normal fashion,

Screwdown Panels
Test 1 27'6" span with side lap fasteners spaced 30" OC resulted in Rτ at 0.57 (Gravity)
Test 2 27'6' span with side lap fasteners spaced 15" OC resulted in Rτ at 0.75 (Gravity)
Test 3 27'6" span with side lap fasteners spaced 12" OC resulted in Rτ at 0.85. (Gravity)
Test 4 31'4" span with side lap fasteners spaced 12" OC resulted in Rτ at 0.65 (Uplift)
Test 5 31'4" span with side lap fasteners spaced 12" OC resulted in Rτ at 0.63. (Uplift)

Tests to this point were conducted with no form of additional purlin bracing. They bring to light to issues involved when placing a 1" spacer between the roof sheet and roof purlin. It is the opinion of SNS® that the results under gravity load are not acceptable. Simple installing any

No.	Purlin	Span (ft)	Loading	Bracing	SidelapFastener (in)	Purlin Attachment at Support	Reduction Factor R_t
1	8Z12	27.75	Gravity	None	30	CO Anti Roll Clip	**0.57**
2	8Z12	27.75	Gravity	None	15	CO Anti Roll Clip	**0.75**
3	8Z12	27.92	Gravity	None	12	ENCON Anti Roll Clip	**0.85**
4	10Z12	31.33	Gravity	None	12	ENCON Anti Roll Clip	**0.65**
5	10Z12	31.33	Uplift	None	12	ENCON Anti Roll Clip	**0.63**
1	10Z12	30	Gravity	Bracing 1	12	CO Anti Roll Clip	**0.79**
2	10Z12	30	Gravity	Bracing 2	12	CO Anti Roll Clip	**0.78**
3	10Z12	30	Gravity	Bracing 3	12	CO Anti Roll Clip	**0.77**
4	10Z12	30	Gravity	Bracing 3	12	CO Anti Roll Clip+ Plate	**0.92**
5	10Z12	30	Gravity	Bracing 3	12	CO Anti Roll Clip+ Plate	**0.98**
6	10Z12	30	Gravity	Bracing 3	12	CO Anti Roll Clip+ Plate	**0.96**
7	10Z12	30	Gravity	Retro	12	CO Anti Roll Clip+ Plate	**0.87**
8	8Z14	27	Gravity	None	12	CO Anti Roll Clip	**0.80**
9	8Z16	27	Gravity	None	12	CO Anti Roll Clip	**0.83**
10	10Z12	30	Uplift	Bracing 3	12	CO Anti Roll Clip+ Plate	**0.61**
11	10Z12	30	Gravity	Bracing 3	12	CO Anti Roll Clip+ Plate*	**0.92**
12	10Z12	30	Uplift	Bracing 3	12	CO AntiRoll Clip+Plate**	**0.73**

thermal block without purlin stabilization is not sound practice for several reasons. The uplift loads are within reason but could be better.

Further testing has been performed using the SNS® Purlin Strut System to evaluate the value of Rτ with its use. **When using the SNS® Purlin Strut System with a screwdown panel, the value of Rτ for gravity is .92 and for uplift .70 which is a significant improvement over the first tests.** Use of these values will have very minor affect on the final design and cost of the roof purlin system. Use of the SNS® Purlin Strut System is recommended by Sealed "N" Safe® in roof applications. Conventional support methods attached to the inside flange of wall girts can typically be used without obstructing the wall insulation system.

Purlin Base Test for Screwdown Panels

Notes:

1 Panels were fastened at 12" o.c. with #12 x 2" long SDS.
2 Sidelap fasteners were 1/4"-14 x 7/8" long SDS.
3 Plate: 7" high, 5" wide and 0.25" thick
4 ENCON anti-roll clip: Welded anti roll clip at eave & welded plate at ridge with (2) bolts located at top and bottom of web.

* 3" thick insulation was not used between purlin and thermal block.
** Purlin was bolted with 3 bolts to plates and anti-roll clip.

Testing has also been conducted using BRS TS-324 Standing Seam Roof Systems. Test data is posted on our website under Technical Data.

Depending on the design load of each individual building, the net effect of these reduced values of $R\tau$ may or may not affect the actual selection of the roof purlin profile. Obviously, heavy load designs will be affected more than lighter roof designs. In applications of little or no snow load, the net effect could be zero. Design professionals will want to make comparisons and become familiar with net results.

SNS® has designed and tested its Purlin Strut System to resolve the issues involved in Purlin Rollover or the Allowable Vaue of $R\tau$. This system is very cost effective from an overall perspective. Cost to produce these products is actually less than the cost of angle or rod brace system between the purlins simply because one or two of these struts replaces 4-8 angle or rod brace sets. The time required in the field to install the SNS® Purlin Strut System is also greatly reduced when compared to the typical angle or rod system placed between the purlins. That is a real money saver overall.

Specific details of the SNS® Purlin Strut System are available to Authorized Distributors only.

The SNS® Purlin Strut System provides significant cost savings in that it requires only one strut per pair of purlins. Install it between two, skip a space, and install it between the next two purlins at midspan only. Purlins can be pre-punched to allow for quick bolting and assembly. These struts can be installed in about ¼ the time it takes to install angle or rod bracing.

The SNS® Purlin Strut System Options 1 and 2 do not occupy space between the purlins as does an angle or rod brace system. Blanket insulation can be rolled out with little or no interference as compared to traditional bracing approximately every 5-8 feet that creates open gaps and spaces and compresses insulation above and below the braces. The SNS® Purlin Strut System saves labor and allows the insulation to expand fully to reach its full Insulative "R" and "U" Values.

The SNS® Purlin Strut System is designed and tested with the following options:
Option 1 Fully adjustable, installs under the purlin lower flange using 4 ea. ½" bolts
Option 2 Built to fit the exact purlin space, installs under the purlin lower flange.
Option 3 Built to fit the exact purlin space, installs at bottom of the purlin cavity
Option 4 Retro fit fastened to the lower purlin flange with SDS Fasteners

Sealed "N" Safe® holds the Patent Rights to this system. These products are available through SNS®. However, as part of the Distributor Agreement, licenses at no cost, the right for its Distributors to manufacture and market this product "**for use Only with the SNS® Thermal Block Systems it markets**". Labeling of the product will be required by SNS®. This offer makes it possible for each Distributor to choose the most beneficial option for them.

Notice: Unauthorized use of the SNS® Purlin Strut System in any way not including the SNS® Thermal Block System will be in direct violation of applicable Patent Rights and Applications according to US and International Law and will subject you to all available legal remedies..

Sealed "N" Safe® also holds the Patent Rights to the two layer MB Insulation System used in Roof and Wall applications. However, it also extends at no cost, rights to use that system to its Distributors, again, "**for use Only with the SNS® Thermal Block Systems it markets"**. This system allows for more total insulation thickness in roof and wall systems without the "Dimpling Effect" associated with thick insulation blankets at the fastener location. It is recommended for use with two layers of 3", or one layer of 3" and one layer of 4", or two layers of 4". Note that use of a Two-Layer System allows installers to offset the side edges of the insulation blanket. That will also help resist energy loss at open seams and joints. SNS® has also tested to determine the true "R and U" value using this system. Installers must ensure they allow the proper amount of "slack or drooping" per normal industry standards in the both blankets to allow for full insulation expansion. This allows our distributors to specify and provide confidence to their customers of true overall insulation values to be installed. Tests have also been performed using the SNS® Thermal Block System with Two Layer Systems and Full Cavity Filled Systems. Complete Thermal Test results are available at www.sealednsafe.com.

Rights to both these products will prove to be a very valuable selling tool and will take you well beyond your competitors. Not only are the Thermal Blocks required in many cases, use of SNS® Patent Rights makes it possible to install the most cost effective and efficient insulation system in the Metal Building Industry today. The SNS® insulation system using the SNS® Thermal Blocks and the SNS® Purlin Strut System will out- perform any system using typical angle or rod bracing between the purlins, including Standing Seam Roofs, using the exact same insulation thickness and products simply because the obstructions between purlins do not exist with the SNS® Systems.

This information is available for use by our customers holding valid Distributor Agreements.

Sealed "N" Safe® Thermal Block System (Patent Pending)
Sealed "N" Safe® Purlin Strut System (Patent Pending)

**The contents of this document are not intended to be complete, are only designed as initial marketing information to prospective purchasers, and are limited in their entirety by the Sealed "N" Safe Limited Warranty. You must properly design and install the Thermal Block System® in order for it to accomplish its intended use.*

Sealed "N" Safe® Thermal Block Material Makeup

Outer Cladding	24 ga Steel Top and Bottom with AZ50 Galvalume finish with Epoxy Resin Coat	
Foam Core	Isocyanurate High Density	
	Compressive Strength	>45 PSI at 10% deflection
	Flame Spread	<25
	Smoke Index	<150
Allowable Working Load		
	Ultimate Compressive Strength	45 PSI
	Working Load @ 25% of Ultimate	11.25 PSI
	Allowable Load/ Lineal Inch Example	

2.5” Flange Width -.25” for Radius = 2.25”x 11.25 PSI
Working Load= 25.3125 Lbs/Lin Inch
(Deduction for Radius varies per actual member used)
Allowable Working Load per Lineal Foot 303.75 Lbs

(Note) Typical load case using 5 foot purlin space, 30 psf roof load and 2.5” purlin flange (-.25” for radius = 2.25”)
Actual load applied would be about 5.5lbs/ lin inch
Or about 66.6 lbs/ lin foot which is well below allowable Values.

Sealed “N” Safe Products, LLC
320 West 100 North
Ephraim, Utah 84627
Telephone: 888-340-4767 (4SNS)