SUPERIOR PRODUCTS
INTERNATIONAL II, INC.

May 10, 2005

Bill Pennington
California Energy Commission
Sacramento, CA

Mr. Pennington,

Pursuant to communications with Elaine Hebert, I am writing in regard to the dry mil thickness requirement for roof coatings listed in Title 24. This currently requires a coating to be applied at a dry mil thickness of 20 dry mils.

The coating our company manufactures (SUPER THERM) is applied at 16 mils wet and dries to a thickness of 10 dry mils. It has performed in the field at this thickness for up to 15 years and additionally has had a variety of salt-spray, weathering, boiling, and aging tests done in the past to prove its endurance. We also provide a standard warranty for 10 years.

We have recently received an independent study from Japan stating that the performance of our product has not changed after comparing current test data to testing 10 years prior. Our Japanese distributor (Daiko Shokai) has applied millions of square meters of our product in Japan, and COOL THERM owns over 70% of the total market share for roof coatings. (COOL THERM is the private label name used in Japan) Some of their current customers are Sony, Mitsubishi, and Panasonic to mention a few, and Daiko has just completed a 2 million square foot multiple roofing application for Nissan Automotive.

Along with this letter, you are receiving documents supporting the claims made above. It is our desire that you recognize that our product is durable and continues to perform at the current designated 10 dry mil thickness for many years. We have found that adding additional product is not necessary and that it does not improve the performance of our coating. Requiring 20 dry mils would only result in doubling the cost of the product and labor costs to the end user. I appreciate your time and consideration.

Sincerely yours,

Cc: Elaine Hebert

SUPERIOR PRODUCTS INTERNATIONAL II, INC.

By: _____
Craig R. Smith
Technical Director

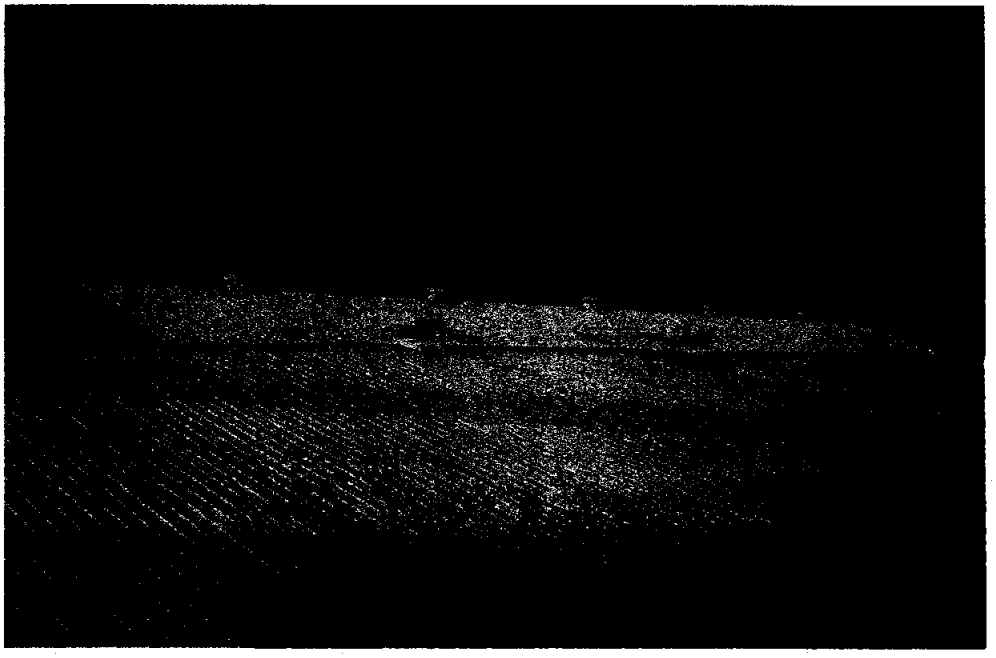
10835 W. 78th Street • Shawnee, Kansas 66214 • Phone: 913-962-4848; Fax: 913-962-6767
Supertherm help@aol.com

10 years after the coating it still maintains the same insulation effect as right after applying the coating.

KOKUYO CO., LTD. (Nagoya Distribution Center)

COOL THERM applied to Batten Seam Roofing

Application Year:1994 Application Area: 6,000sqm



[Temperature Result]

Measurement Points : 1.8m from the floor of the second-floor

	Date	Weather	Room Temp.	Outside Temperature
Before	July 9, 1997	Fine	37C	30.4C
	July 10, 1994	Fine	39C	33.5C
After	July 30, 1994	Cloudy	32C	32.5C
	July 31, 1994	Fine	34C	35C
After 10years	August 27, 2004	Fine/Cloudy	33.8C	33.1C
	August 28, 2004	Cloudy/Fine	33.5C	34.3C

When COOL THERM was applied in 1994, the room temperature had decreased by 5 to 7 °C, and it was kept below the outside temperature. The coating maintained the same insulation effect in 2004, even 10 years after it was applied.

SUPERIOR PRODUCTS
INTERNATIONAL II, INC.

INSULATION COATING
CORROSION PROTECTION

SUMMARY

1. SONY – KODA FACTORY;
   RESULTS: **KW (Power) USAGE INSIDE A SPECIFIC BUILDING**

	MAY		**JUNE**	
1994	3767 KW	5647 KW		Before SUPER THERM
1995	519 KW	1869 KW		After SUPER THERM applied
SAVINGS	**3248 KW**	**3778 KW**		

2. HITACHI ELECTRIC
   RESULTS: TEMPERATURE RECORDED ON UNDERSIDE OF ROOFING

UNCOATED:	82C
COATED WITH SUPER THERM:	47C
REDUCTION OF HEAT:	**35C/63F**

3. SEKISUI
   RESULTS: REDUCING ROOM TEMPERATURE

AMBIENT TEMPERATURE:	33C
ROOM TEMPERATURE:	43C
ROOM TEMPERATURE after applying SUPER THERM:	31C
REDUCTION OF ROOM TEMPERATURE:	**12C/22F**

4. YOKOHAMA TIRE-RUBBER
   RESULTS: REDUCED ROOM TEMPERATURE

UNCOATED:	47C
COATED WITH SUPER THERM:	28C
REDUCTION IN ROOM TEMPERATURE:	**19C/34F**

5. KIRIN BREWERY (Fukuoka) 52% share of beer business in Japan
   RESULTS: REDUCED ROOM TEMPERATURE

UNCOATED:	63C
COATED WITH SUPER THERM:	48C
REDUCTION IN ROOM TEMPERATURE:	**15C/27F**

6. MITSUBISHI MATERIAL

RESULTS: REDUCED METAL SURFACE TEMPERATURE

UNCOATED:	54C
COATED WITH SUPER THERM:	28C
REDUCTION IN SURFACE TEMPERATURE:	**26C/47F**

7. SUMITOMO LIGHT METAL INDUSTRY

RESULTS: REDUCED ROOM TEMPERATURE

UNCOATED:	52C
ROOF COATED WITH SUPER THERM:	35C
REDUCTION IN ROOM TEMPERATURE:	**17C/31F**

8. PANASONIC - MATSUSHITA ELECTRIC

RESULTS: SURFACE TEMPERATURE ROOF

UNCOATED SURFACE:	70C
SUPER THERM COATED SURFACE:	46C
REDUCTION IN SURFACE TEMPERATURE:	**24C/43F**

RESULTS: UNDERNEATH SIDE OF ROOF SURFACE TEMPERATURE

UNCOATED SURFACE:	59C
SUPER THERM COATED SURFACE:	43C
REDUCTION IN UNDERSIDE TEMPERATURE:	**16C/29F**

AMBIENT TEMPERATURE:	39C/70F

TESTING PERFORMED IN CONJUNCTION WITH:

DAIKO SHOKAI CO., LTD. (largest roofing/paint construction company in Japan)

(A) 1082

JULIANN PRITCHETT
NOTARY PUBLIC
STATE OF KANSAS
My Appt. Exp.

SONY・KODA Factory (1)
ソニー幸田㈱

『クールサーム』塗装温度測定比較表

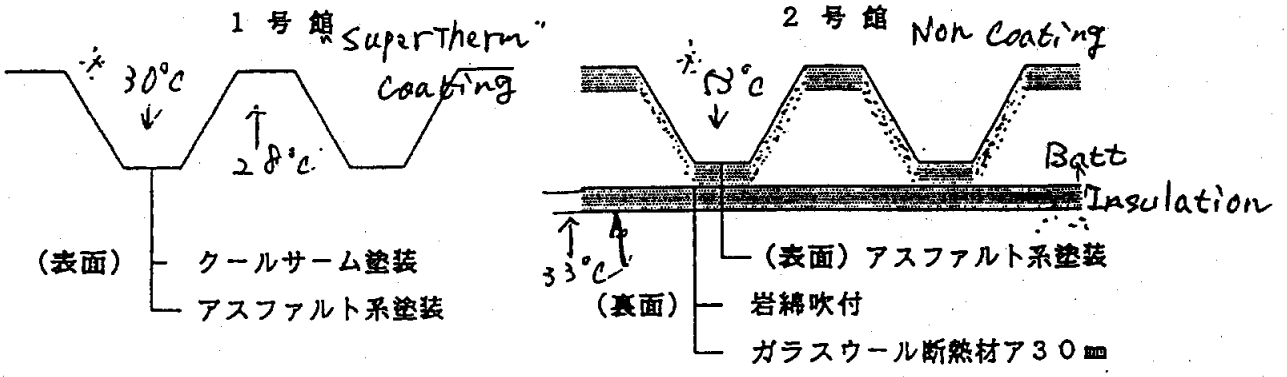
CERTIFIED

AUTHENTIC JAPAN USA TESTING RESULTS

- 塗装面　1号館大型折板屋根　13,000㎡
- 塗装日　1995年3月　Applied.
- 測定日　1995年5月18日　天気 晴　Measured
- 測定機器　表面 接触温度計 (CUSTOM LK500)
  裏面 放射温度計 (ミノルタ505)
- 測定立会者　ソニー幸田㈱ 施設課 加賀係長
- 測定結果

10:00 11:00 12:00 13:00 14:00 15:00

時間 Time	10時	11時	12時	13時	14時	15時
気温 Temperature(℃)	24.0℃	25	27	27	27	27
Surface 1号館表面・クールサーム塗装 (℃) "SuperTherm"	30.0℃	31	31	30	29	29
Surface 2号館表面・無塗装 (℃) Non Coating	53.0℃	53	53	52	49	49
Hidden Side 1号館裏面・クールサーム塗装 (℃) "SuperTherm"	28.0℃	29	28	26	27	27
Hidden Side 2号館裏面・無塗装 (℃) Non Coating	33.0℃	33	32	31	31	30



(1. 2号館とも表面にアスファルト系塗料が約7年前に塗装されている)

『クールサーム』塗装の1号館の裏面温度は、岩綿吹付30㎜厚ガラスウールの断熱処理がある2号館のそれよりも、4～5℃温度を下げる効果のあることが証明されました。

(A) 282

SONY KODA Factory (2)

ソニー幸田㈱

『クールサーム』塗装温度測定比較表

・塗装面　1号館大型折板屋根　13,000㎡

・塗装日　1995年3月　Applied day

・測定機器　表面　接触温度計　(CUSTOM LK500)

　　裏面　放射温度計　(ミノルタ505)

・測定立会者　ソニー幸田㈱　施設課　加賀係長

測定結果

1995年5月18日測定 measured

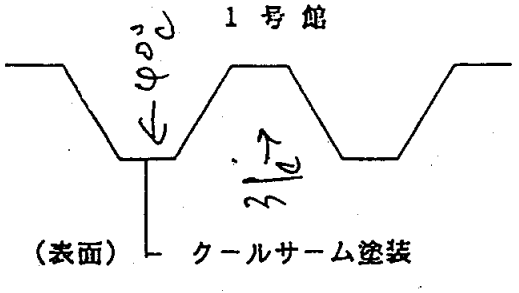
時間	10時	11時	12時	13時	14時	15時
気温 Temperature (℃)	24	25	27	27	27	27
1号館表面・クールサーム塗装 SuperTherm (℃)	30	31	31	30	29	29
2号館表面・無塗装 Non coating (℃)	53	53	53	52	49	49
1号館裏面 (℃)	28	29	28	26	27	27
2号館裏面 (℃)	33	33	32	31	31	30

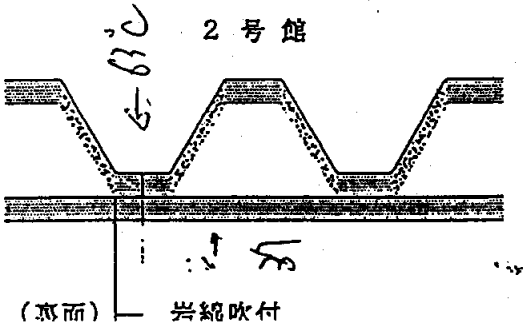
1995年7月26日測定 measure

時間	10時	11時	12時	13時	14時	15時
気温 (℃)	32	34	35	35	35	34
1号館表面・クールサーム塗装 (℃)	40	42	42	41	39	36
2号館表面・無塗装 (℃)	63	63	63	60	60	55
1号館裏面 (℃)	39	39	40	38	37	35
2号館裏面 (℃)	37	36	37	36	36	35

1995年8月23日測定 measured

時間	10時	11時	12時	13時	14時	15時
気温 (℃)	32	33	34	35	35	34
1号館表面・クールサーム塗装 (℃)	40	41	41	42	41	37
2号館表面・無塗装 (℃)	59	63	63	62	62	52
1号館裏面 (℃)	36	39	39	37	37	35
2号館裏面 (℃)	34	35	36	33	35	34





(B) 182

SONY. KODA Factory.

クールサーム塗装による省エネルギー効果資料

平成７年３月にソニー幸田㈱にて１号館屋根を「クールサーム」で塗装しました。
「クールサーム」施工前の平成６年５月～６月度と施行後の平成７年５月～６月度の電気消費量を比較した結果です。

１．空調機のしくみ
タンクの水により夏は冷水に、冬は温水に替え、その水の温度により空気を変化させ室内へ送るしくみとなっています。

２．電気代の変化

MAY JUNE (表 1)

	5月	6月
平成６年 1994	３７６７KW	５６４７KW
平成７年 1995	５１９KW	１８６９KW
昨年との比較	－３２４８KW	－３７７８KW

Reduced KW usage
by 3248KW - MAY
3778KW - June

この表は、別紙図のＥファンのみの電気消費量の変化です。
Ｇサーモは室内温度２７℃に設定しており、自動的にＥファン及び冷水を送るパイプＣ開閉バルブが止まるようになっています。
平成６年度～７年度に工場内のレイアウトを変更した為、状況が同じとは言えませんが、平成６年度は、冷水を送るＢポンプを２台稼動させていましたが、今年度は今のところ１台の稼動ですんでいます。

＊消費電力を計算すると
３７７８KW×１５円＝５６，６７０円 （６月分）
これはＥファンのみの電気代ですが、タンクＡ水を冷水に替える電気代及び、Ｂポンプを稼動させる電気代を加えて考えると１５万円／月節約できるだろうと考えられています。

（施設課　加賀係長談）

AUTHENTIC JAPAN USA TESTING RESULTS

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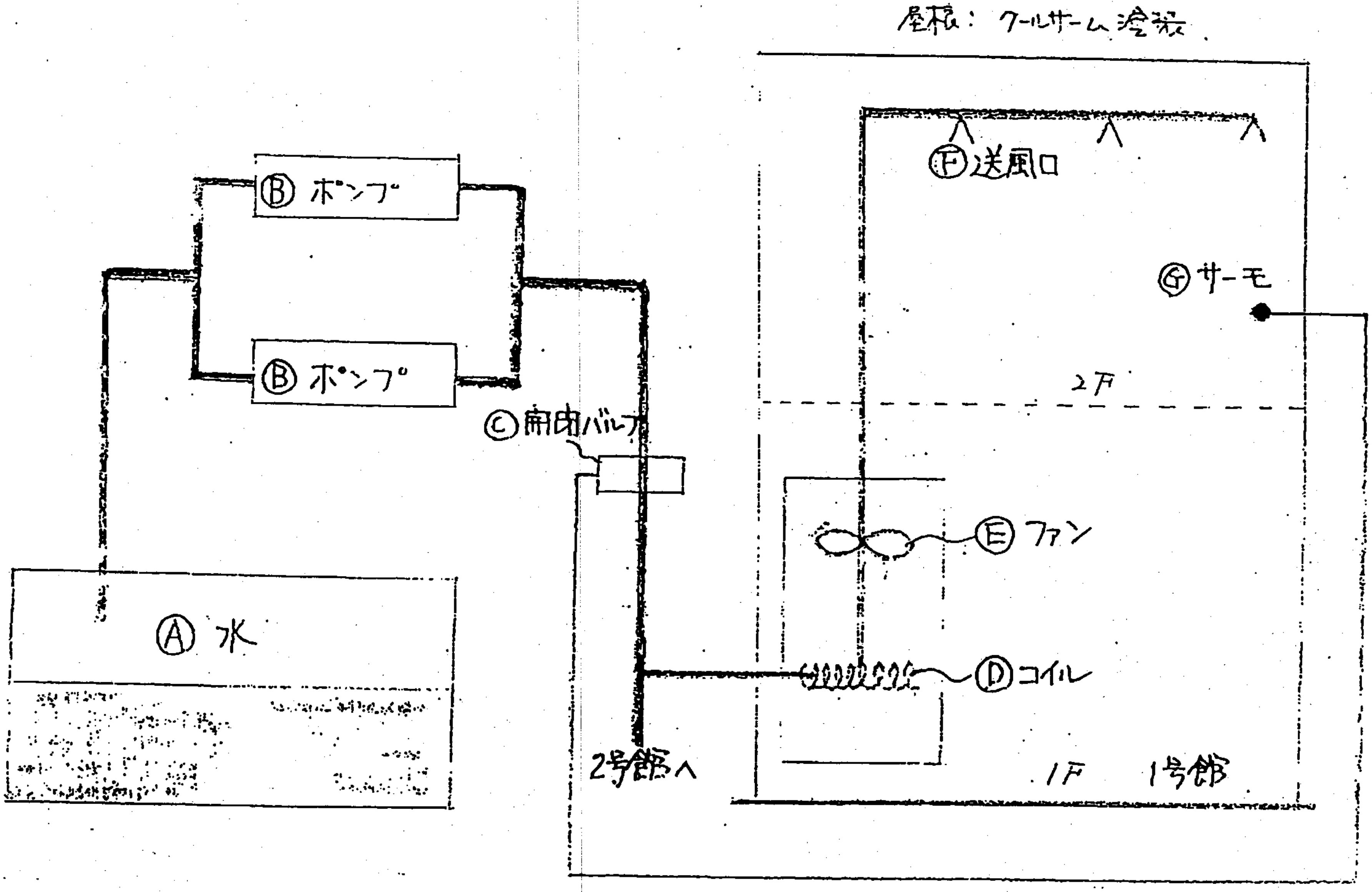
JULIANN PRITCHETT
NOTARY PUBLIC
STATE OF KANSAS
My Appt. Exp.



(B) 2の2

(c) 182

HITACHI ELECTRIC.

スレート外面塗装による断熱効果試験表

1．試　供　体　　新品スレート大波板

2．塗装製品　　A．国産アスファルト系塗料　ASPALT COATING
B．クールサーム　（大高商会）　SUPER THERM

3．試験測定者　　㈱日立製作所　日立工場
生産技術課　　根津氏

4．試　　験　　A、B両製品をスレート面に塗装したものと、無塗装のものを用意し、投光器（５００W）と扇風機を用いて、出来るだけ自然実体に近い環境を作り出し、スレートの裏面温度を測定した。

5．結　　果　　Aの国産アスファルト系塗装は、無塗装のものよりも温度が上がることが分かった。
Bのクールサーム塗装は、無塗装のものよりも大幅に温度を下げることが分かった。
最大値で、８２℃－４７℃＝３５℃の差があった。
スレート屋根の断熱塗装として、大いに期待できる。

181°F - 117°F = 64°F Reduction in Temperature INSIDE, of Roof.

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STATE OF KANSAS

スレート外面塗装による断熱効果試験

(℃)

非接触温度計測定値 Non Touch Thermometer

接触温度計測定値 Touch Thermometer

94℃ 国産アスファルト系塗装 ASPALT Coating

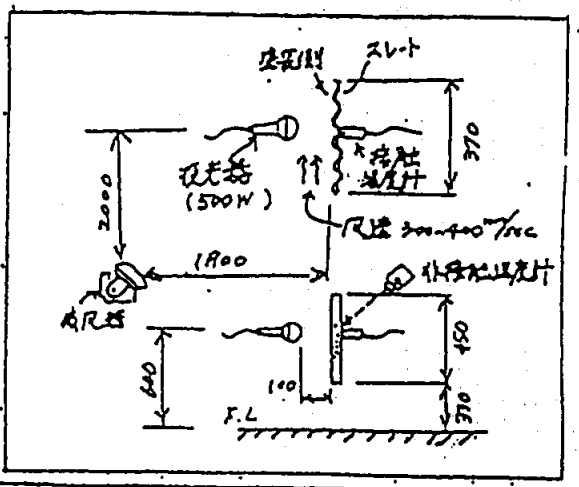
82℃ 無塗装(スレートのみ) No Coating

Aspalt Coating 国産アスファルト系塗装

No coating 無塗装(スレートのみ)

SuperTherm クールサーム塗装 47℃

SuperTherm クールサーム塗装



90 80 70 60 50 40 30 20

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 (分)

HITACHI ELECTRIC

(D) 183

中部積水化工㈱　SEKISUI

「クールサーム」塗装による室温改善記録

Room Temperture Improvement by "SuperTherm"

・塗　装　第1工場　折板屋根　700㎡　1995年7月中旬
　　第3工場　折板屋根　2，500㎡　1995年8月中旬

・環　境　**第1工場**
２階は天井まで高さ3m．床から1．5m高で室温測定。
１階では塗装前からクーラーを運転していたが、２階への影響は少なく暑さが厳しいため、屋根に換気扇２基を塗装時に取り付けた。

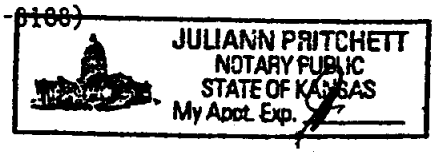
第3工場
２階は天井までの高さ7m．床から1．5m高で室温測定。
製造ラインに熱源があり、スポットクーラーを取り付けていたが、全く効き目がなかった。

・結　果　**第1工場2階**では、
外気温３４℃の時４２℃だった室温が、「クールサーム」塗装後は、
外気温３５℃の時室温は３２℃になった。
「クールサーム」は、10℃もの室温改善をもたらした。

第3工場2階は、
第１工場の良結果から第３工場の塗装を行った。
その結果、外気温３５℃の時４２℃だった室温が３７℃と、5℃の改善があった。
環境条件からみて、大きな効果である。

CERTIFIED

・証明者　施設課　戸川課長　（愛知県知多郡東浦町　TEL 0562-83-8188）

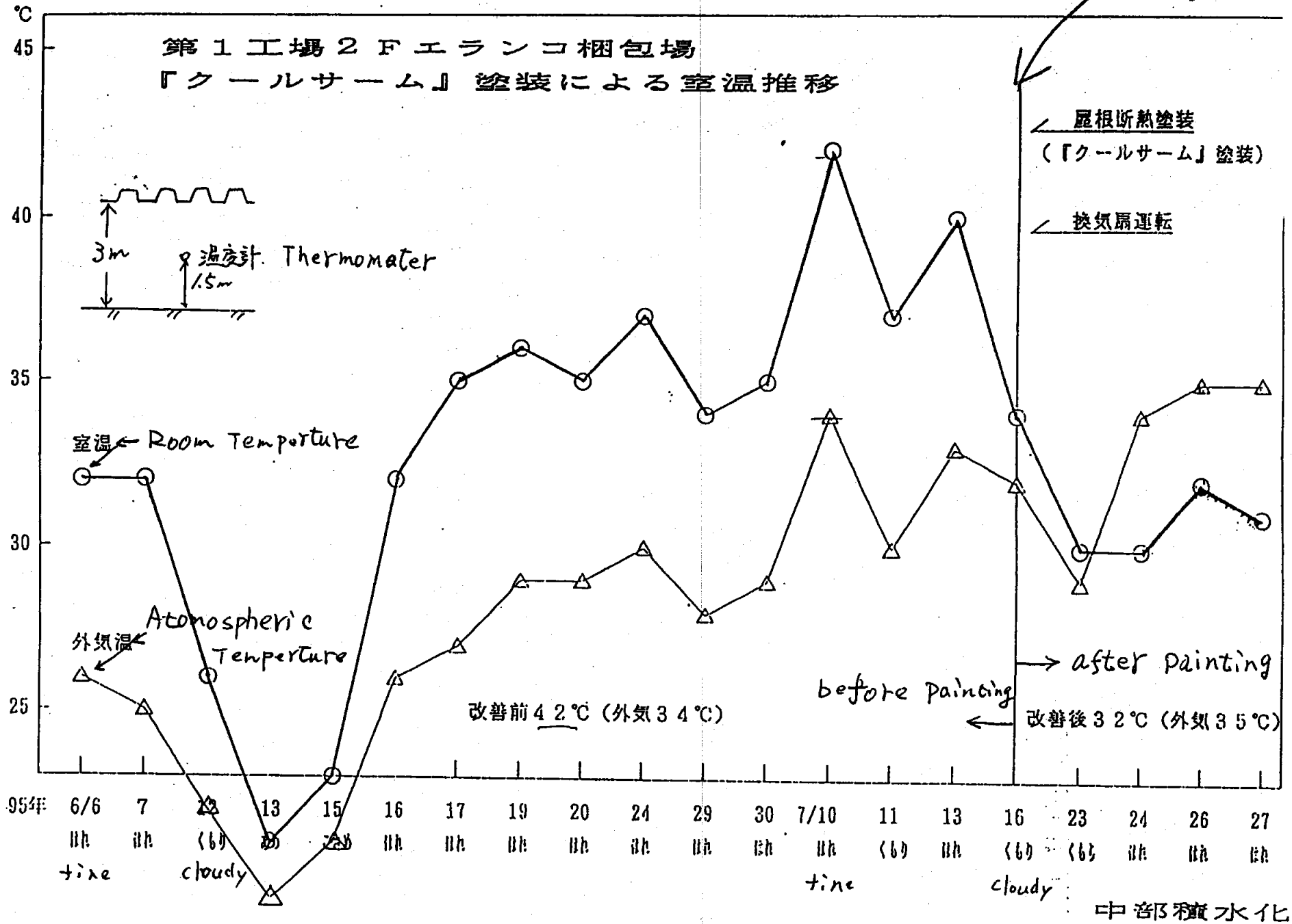


JEKISUI (1.)

INSIDER ON TO AMBIENT OR BELOW AMBIENT TEMP.

APPLICATION OF SUPER THE

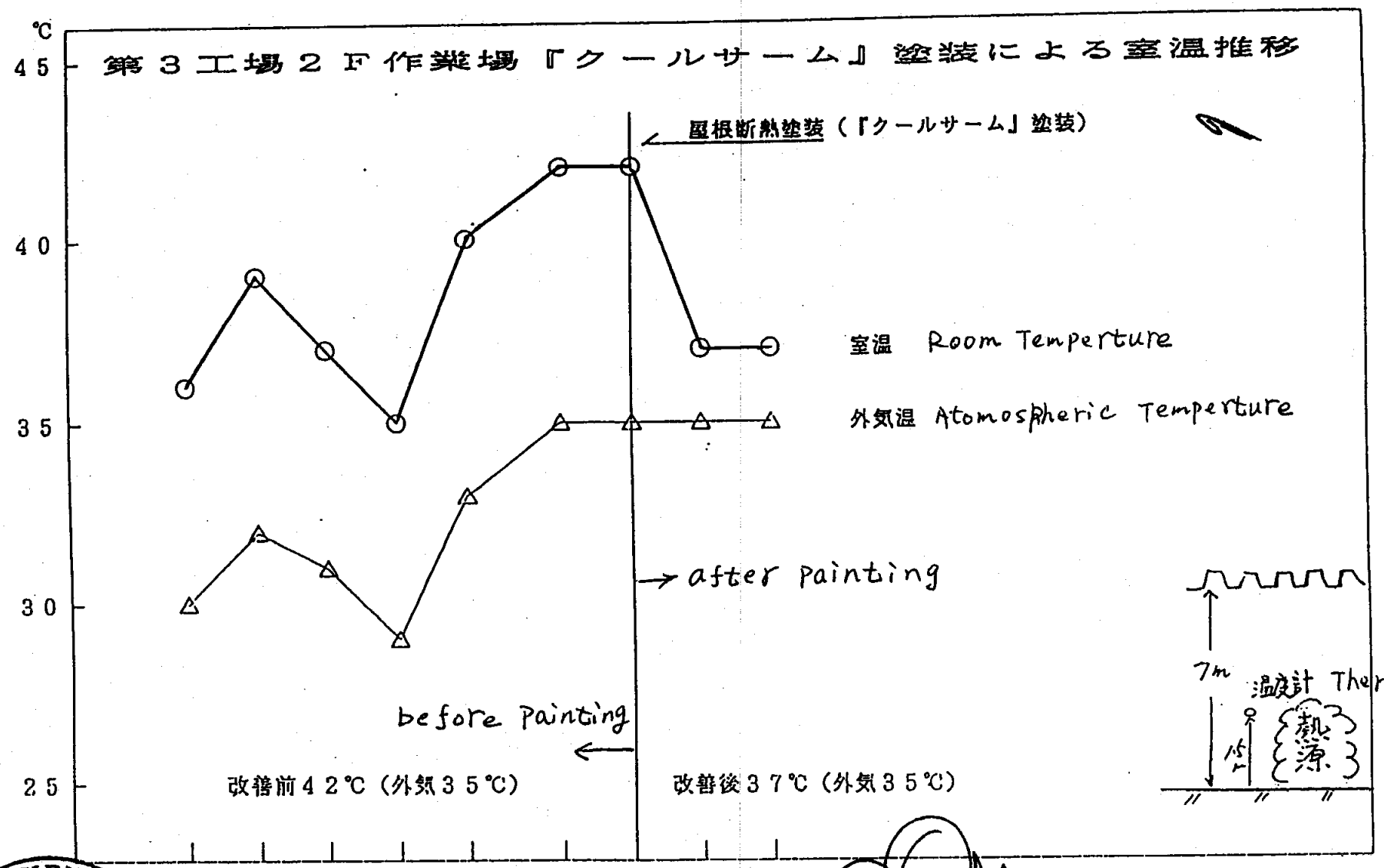
(D) 2003



中部精水化

SEKISUI (2)

(2) 3of3



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中部積水化工

(E) 192

YOKOHAMA TIRE・RUBBER
横浜ゴム㈱三重工場
ＴＢＳ工場成形ゾーン屋根

ＴＢＳ工場屋根断熱化対策工事を目的とした
「クールサーム」塗装による断熱効果のテスト結果報告書

目　的　現在までスレート屋根上に散水を行い、作業場の環境改善を期待してきたが、それ程効果は得られず、今回冷房設備を設置する方向で検討してきたが、断熱塗装でその効果が得られるなら、作業場改善及び省エネルギー効果が期待出来る為、試験的に「クールサーム」を塗装し、温度測定により効果を確認した。効果をよりよく把握する為、従来からの防食耐久塗料「ダイコート」との比較測定も行った。

屋根材　スレート屋根　Slate Roof

塗　料　「クールサーム」（特殊セラミック系断熱塗料）　㈱大高商会　Super Therm
「ダイコート」（天然アスファルト基材超耐久塗料）　㈱大高商会　Asphalt Coating

測定方法　接触温度計にて、屋根の屋外表面温度を測定する。

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STATE OF KANSAS
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AUTHENTIC JAPAN USA TESTING RESULTS

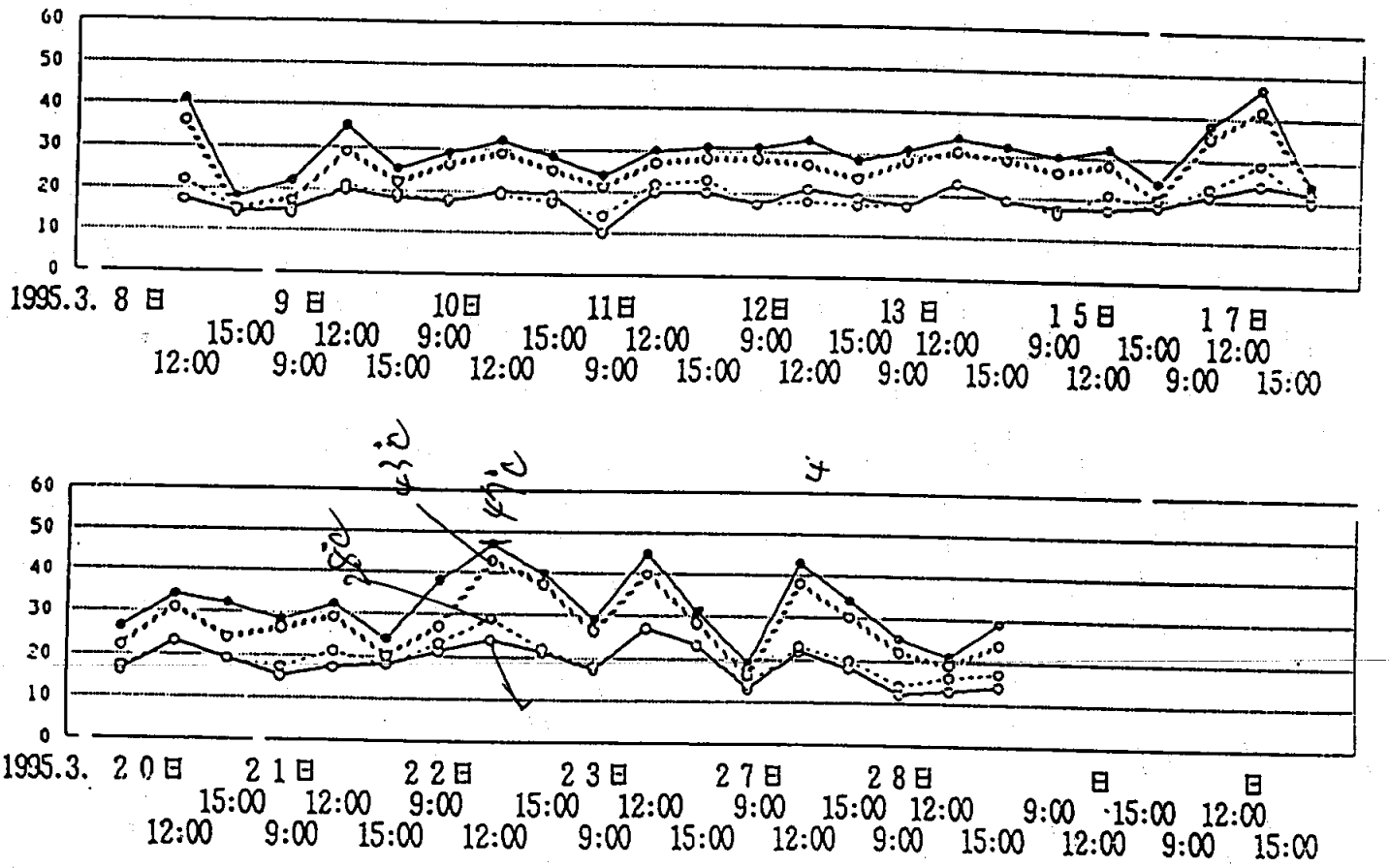
CERTIFIED

YOKOHAMA TIRE・RUBBER

測 定 者　横浜ゴム㈱　中西担当課長

測定結果

ＴＢＳ成形屋根表面温度グラフ表



●——● 無塗装面　Non coating

○- - - -○ 耐久塗料「ダイコート」 Ashalt coating

○·····○ 断熱塗料「クールサーム」Super Therm

○——○ 気　温 Atomospheric temperature　（設備課中西担当課長より測定表提供）

大阪市住吉区長居東４－２－１０
㈱ 大 阪 防 会

(F) 181

To KIRIN BREWERY. (FUKUOKA).
MARKET キリンビール(株)福岡工場 殿

大樽工場屋根断熱塗装面の温度測定報告書

測定日時 ：１９９５年7月２９日　午前１１時　晴れ

測定機器 ：屋根表面……接触温度計 （CUSTOM LK500）

屋根裏面……放射温度計 （MINOLTA 505）

立会者 ：エンジニアリング部 山見 茂樹様

測定結果 ：

Non Coating "Super Therm" Coated.

	無塗装面 (°C)	『クールサーム』塗装面 (°C)
屋根表面	63	48
屋根裏面	54～55	44～45

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＊屋根表面温度で１５度C差、裏面温度で１０度Cの差が認められました。

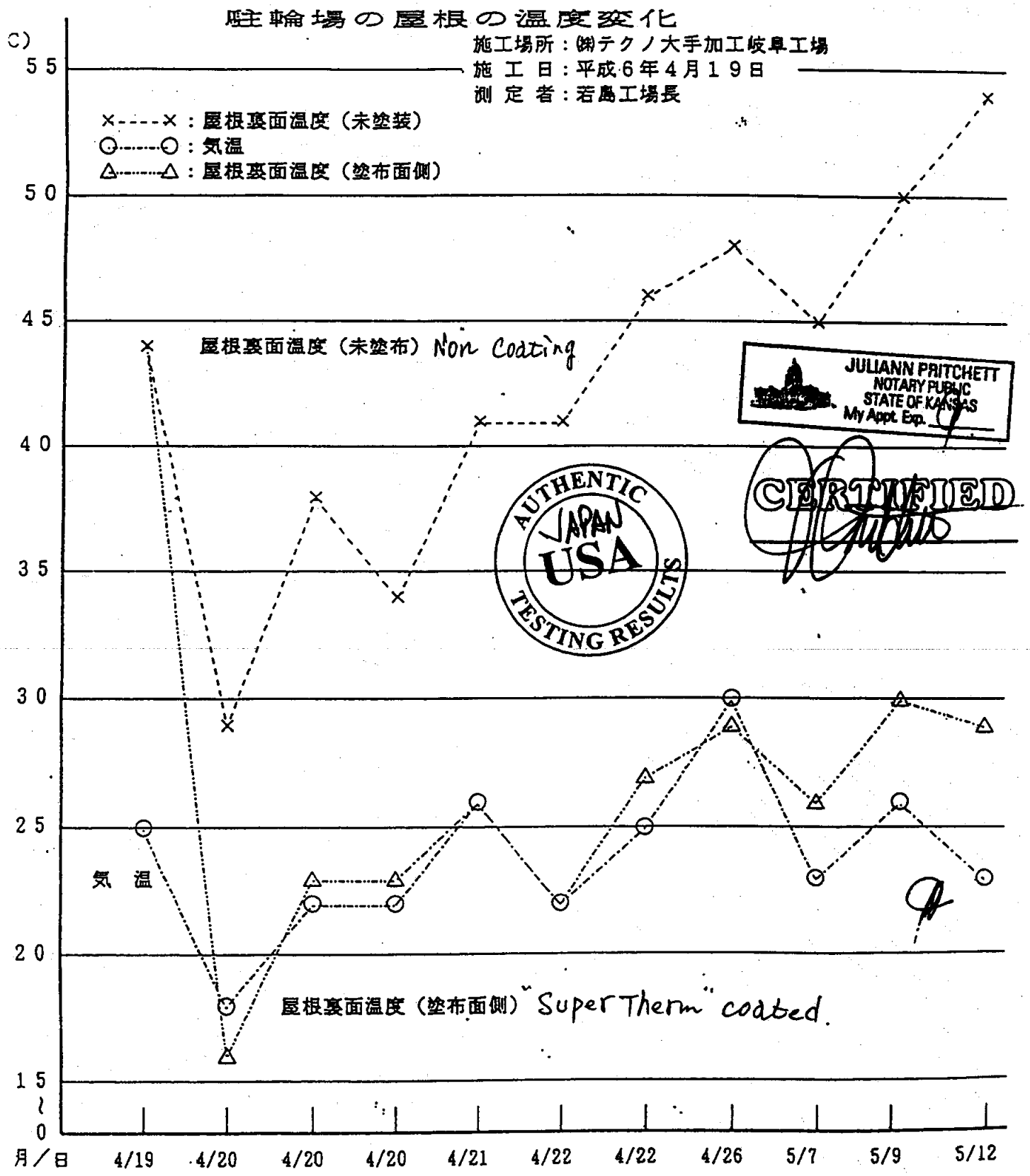
AUTHENTIC JAPAN USA TESTING RESULTS

JULIANN FRITCHETT NOTARY PUBLIC STATE OF KANSAS My Appt. Exp.

CERTIFIED

MITSUBISHI MATERIAL

『クールサーム』遮熱塗装試験



JULIANN PRITCHETT
NOTARY PUBLIC
STATE OF KANSAS
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AUTHENTIC JAPAN USA TESTING RESULTS

CERTIFIED

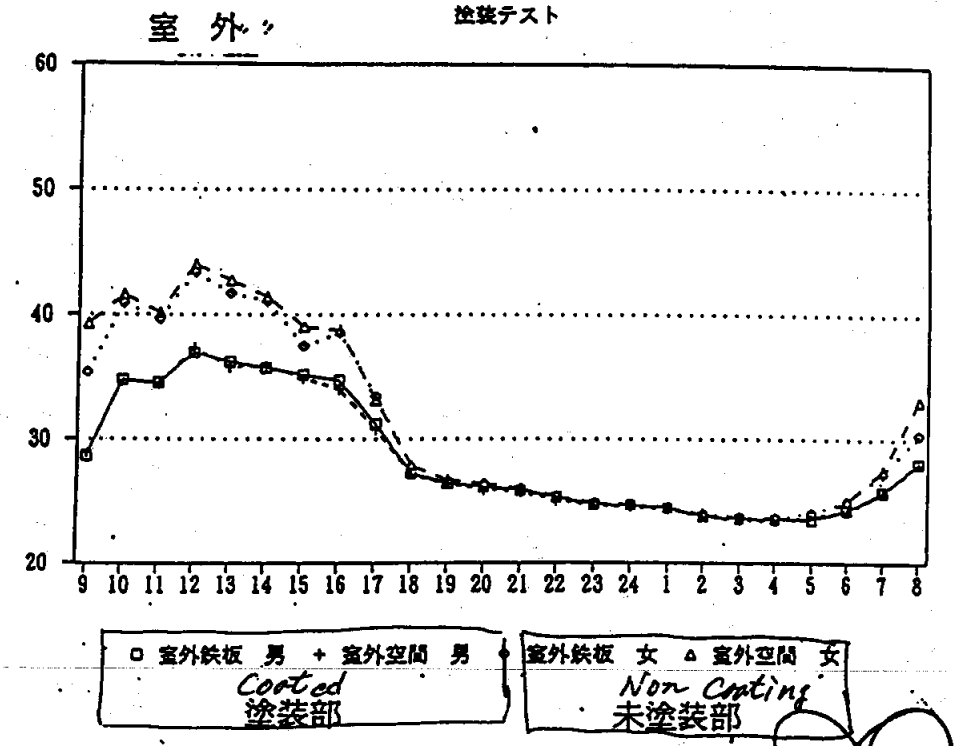
(H) 182

SUMITOMO LIGHT METAL INDUSTRY.

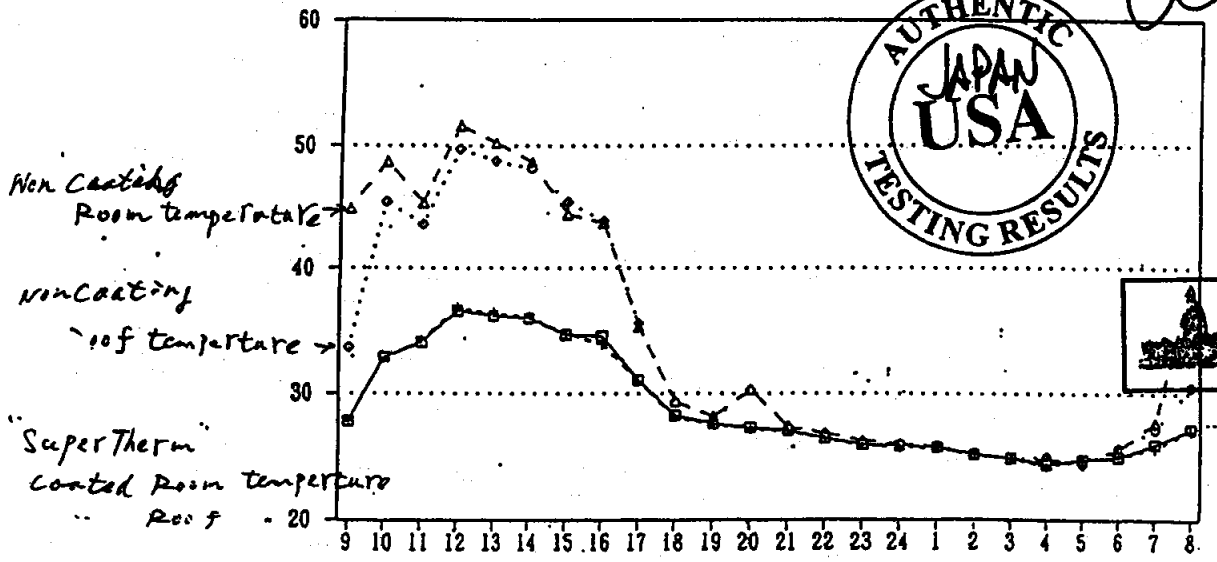
住友軽金属工業（株）名古屋伸銅所

男子トイレ（クールサーム塗装）と
女子トイレ（無塗装）　の屋根温度比較

Room Out side
室　外



Room In side
室　内



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STATE OF KANSAS
My Appt. Exp.

(H) 282

"SuperTherm" Coated Roof — 塗装部 (rows 1–8)

Non Coating Roof — 未塗装部 (rows 11–18)

遮熱対策テスト測定表　8月26日

	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	1	2	3	4	5	6	7	8
1	27.1	30.3	31.0	38.8	39.4	38.5	36.0	36.7	33.1	27.6	26.3													
2	27.2	29.6	30.9	39.1	39.6	38.8	36.1	36.7	32.9	27.4	26.3													
3	27.3	30.0	30.7	35.2	35.7	35.3	35.0	37.9	32.7	29.6	28.8													
4	27.3	29.4	30.7	35.4	36.1	35.4	35.1	35.1	32.7	29.6	28.7													
5	27.6	31.3	31.2	37.9	38.1	37.3	35.3	35.9	32.7	27.6	26.3													
6	27.7	31.3	31.1	38.1	38.4	37.7	35.3	35.9	32.6	27.4	26.3													
7	28.7	30.4	30.6	38.1	36.0	37.4	34.7	36.8	33.0	27.7	26.4													
8	28.7	32.3	30.1	37.9	35.1	37.1	34.6	35.9	32.1	27.6	26.4													
平均	27.7	30.6	30.8	37.6	37.3	37.2	35.3	36.4	32.7	28.1	26.9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	31.0	44.6	36.7	56.5	56.9	56.7	47.8	51.8	41.3	28.9	26.7													
12	42.3	49.8	37.9	58.8	59.4	57.3	48.0	50.8	40.7	28.8	26.7													
13	32.4	40.3	36.9	48.7	49.4	47.9	46.0	47.1	39.0	31.3	29.5													
14	38.7	45.1	38.0	51.3	51.5	49.2	46.4	47.1	38.9	31.3	29.6													
15	32.6	45.0	38.0	52.4	51.4	49.3	46.4	46.9	39.0	29.0	26.8													
16	32.4	33.7	31.1	38.3	38.0	37.3	36.1	37.3	32.0	27.8	26.5													
17	29.6	35.1	30.9	37.1	36.3	37.5	35.1	37.2	32.8	27.7	26.4													
18	41.0	46.3	38.4	54.2	53.7	50.9	46.3	47.8	38.7	28.9	26.7													
平均	35.0	42.5	36.0	49.7	49.6	48.3	44.0	45.8	37.8	29.2	27.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19	37.5																							

遮熱対策テスト測定表　8月28日

	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	1	2	3	4	5	6	7	8
西側 1		33.4	41.0	41.0	41.3	39.3	37.9	34.4	30.2	26.6	26.0	26.5	25.0	24.6	24.5	24.5	24.3	23.7	23.7	23.9	23.8	23.8	25.0	26.5
〃 2		33.7	41.7	41.6	41.8	39.4	38.0	34.2	30.0	26.5	25.9	26.4	25.0	24.5	24.5	24.3	24.0	23.5	23.4	23.5	23.7	23.7	24.7	26.3
内空 3		30.7	36.7	37.1	37.6	37.3	35.7	33.9	31.5	29.6	29.0	28.9	28.0	27.4	27.0	26.7	26.5	26.0	25.9	23.8	25.5	25.5	26.2	27.1
〃 4		30.7	37.1	37.3	38.0	37.7	35.9	33.8	31.6	29.5	28.7	28.6	27.7	27.3	27.0	26.6	26.4	26.1	25.8	23.6	25.5	25.5	26.1	26.9
外側 5		33.3	39.7	39.5	39.3	37.9	36.9	34.0	30.7	26.6	25.9	26.2	24.8	24.4	24.5	24.3	23.9	23.3	23.3	23.4	23.4	23.8	25.0	26.9
〃 6		33.5	40.3	39.9	40.0	38.1	37.0	33.9	30.5	26.3	25.6	26.1	24.5	24.1	24.2	24.0	23.6	23.1	23.0	23.1	25.2	23.5	24.7	26.8
外空 7		37.3	39.6	38.3	39.4	34.4	39.9	35.5	31.7	26.9	26.2	26.3	25.1	24.7	24.5	24.4	24.0	23.5	23.5	23.4	23.4	24.2	25.8	28.2
〃 8		35.3	39.1	40.6	37.2	35.0	38.2	33.5	30.7	26.9	26.2	26.2	25.0	24.5	24.5	24.5	23.9	23.5	23.5	23.4	23.4	24.1	25.6	28.1
平均	[illegible]	33.5	39.4	39.4	39.3	37.4	37.4	34.2	30.9	27.4	26.7	26.9	25.6	25.2	25.1	24.9	24.6	24.1	24.0	23.5	24.2	24.3	25.4	27.1
11		46.4	60.9	60.7	61.9	54.4	53.9	45.2	34.7	27.8	26.6	37.1	25.6	25.2	25.0	24.9	24.5	24.2	23.9	23.9	24.1	24.8	26.2	29.4
12		48.2	63.8	62.8	63.4	54.6	52.0	44.9	34.1	27.9	26.7	37.1	25.6	25.1	24.9	24.7	24.2	23.8	23.5	23.5	23.7	24.6	26.6	45.7
13		38.5	52.0	51.7	53.3	51.1	53.1	42.6	35.7	30.8	29.5	29.5	28.6	27.8	27.4	26.9	26.7	26.0	25.7	25.9	23.7	26.0	26.8	29.9
14		40.3	55.1	54.2	55.1	51.8	48.2	42.6	35.8	31.2	29.9	29.6	28.4	28.0	27.7	27.1	26.8	26.5	26.1	25.6	25.7	25.8	27.1	40.1
15		42.2	56.4	54.6	54.6	50.6	37.9	42.1	36.2	27.9	26.5	26.8	25.4	24.9	24.8	24.7	24.3	23.8	23.6	23.7	25.4	25.1	27.1	30.5
16		35.6	40.2	39.2	39.8	37.4	36.9	33.4	31.0	27.3	26.4	26.5	25.3	24.8	24.7	24.6	24.1	23.6	23.5	23.6	23.8	24.3	25.9	32.7
17		34.9	40.8	40.5	39.7	36.7	37.7	34.2	31.2	27.1	26.2	26.3	25.1	24.5	24.5	24.5	23.9	23.5	23.5	23.4	23.5	24.2	26.0	28.8
18		44.7	58.7	56.5	56.3	50.8	47.8	42.2	35.9	27.8	26.5	26.7	25.3	24.9	24.7	24.5	24.1	23.6	23.5	23.5	23.3	25.1	27.9	45.5
平均	[illegible]	41.4	53.5	32.5	33.0	45.4	43.9	40.9	34.3	23.5	27.3	30.0	26.2	25.7	25.5	25.2	24.8	24.4	24.2	24.1	23.6	25.0	26.7	35.3
19																								

遮熱対策テスト測定表　8月29日

	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	1	2	3	4	5	6	7	8
1	29.3	33.3	32.7	34.7	31.9	33.5	31.9	32.5	29.0	27.0	27.1	25.9	27.1	26.0	25.2	25.2	25.3	24.5	24.0	24.0	23.8	24.5	25.8	27.5
2	28.4	38.6	32.6	34.2	31.8	35.5	31.8	32.4	28.7	26.9	26.8	25.7	26.9	25.9	24.9	25.0	25.1	24.3	23.8	23.8	23.5	24.4	25.5	27.4
3	28.4	34.9	32.3	33.6	31.5	32.2	31.6	32.0	29.7	28.9	25.6	27.8	28.1	27.6	26.9	26.7	26.7	26.2	25.8	25.7	25.5	25.9	26.6	27.6
4	28.4	35.2	32.4	33.4	31.1	32.2	31.5	31.8	29.7	28.5	25.4	27.6	28.1	27.5	26.7	25.6	26.3	26.3	25.9	25.8	25.5	25.7	26.3	27.3
5	29.7	37.0	32.8	34.2	31.9	33.1	31.8	32.4	29.0	27.0	26.9	25.8	26.7	25.9	24.9	24.9	25.0	24.1	23.6	23.6	23.4	24.4	25.8	27.9
6	28.9	37.5	32.8	34.3	32.9	33.0	31.7	32.4	28.7	26.7	26.7	25.5	26.5	25.6	24.6	24.6	24.8	23.9	23.4	23.4	23.1	24.2	25.6	27.0
7	29.4	38.9	33.0	33.3	32.2	33.8	32.0	33.3	29.7	27.3	27.0	26.2	26.8	26.1	25.1	25.0	24.9	24.3	24.1	23.8	23.8	24.7	26.4	29.2
8	30.0	37.5	32.7	32.9	31.5	34.0	32.1	32.4	29.6	27.3	26.8	25.9	26.7	26.0	25.1	25.0	24.9	24.3	23.9	23.7	23.6	24.7	26.6	28.9
平均	28.8	37.2	32.7	33.7	31.8	33.2	31.8	32.4	29.3	27.4	27.3	26.3	27.1	26.3	25.4	25.4	25.4	24.7	24.3	24.2	24.0	24.8	26.1	28.0
11	33.3	54.6	37.6	40.5	35.9	40.9	36.4	39.3	31.3	27.6	27.2	26.2	27.2	26.3	25.4	25.4	25.4	24.6	24.2	24.2	23.9	25.5	27.8	31.5
12	52.1	58.1	38.6	41.5	36.4	41.0	36.6	39.2	31.3	27.5	27.1	26.3	27.0	26.1	25.2	25.1	25.1	24.2	23.8	23.8	23.5	25.3	28.6	34.9
13	35.1	48.2	37.7	40.1	35.1	37.6	35.4	37.3	31.5	29.5	29.1	28.3	28.4	27.9	27.1	26.8	26.8	26.4	25.9	25.7	25.5	26.2	27.6	31.2
14	46.4	50.7	38.7	41.0	35.5	38.1	35.6	37.6	31.6	28.4	29.0	28.1	28.3	28.0	27.2	26.9	26.8	26.2	25.7	25.7	25.5	26.1	28.4	32.7
15	43.9	50.7	39.1	41.6	36.0	38.3	35.5	38.1	31.3	27.5	27.1	26.3	26.9	26.2	25.2	25.2	25.2	24.5	24.0	23.8	23.7	25.8	29.0	32.8
16	35.3	36.5	32.9	33.7	32.0	33.6	31.6	33.4	29.6	27.5	27.1	26.2	26.7	26.0	25.2	24.9	25.0	24.3	24.0	23.9	23.6	24.9	26.7	29.2
17	35.3	37.4	32.8	33.9	32.1	34.1	32.2	32.7	29.6	27.3	26.8	26.2	26.7	26.0	25.1	24.8	24.9	24.5	23.9	23.8	23.6	24.9	26.8	29.3
18	48.3	52.6	39.7	42.1	36.4	38.6	35.6	38.6	31.2	27.5	27.1	26.2	26.9	26.0	25.1	24.9	25.0	24.3	23.8	23.8	23.5	25.7	29.5	24.9
平均	41.6	48.6	37.1	39.3	34.9	37.8	34.9	37.0	30.9	28.0	27.6	26.7	27.3	26.6	25.7	25.5	25.5	24.9	24.4	24.3	24.1	25.6	28.1	30.8
19																								

(I) 1/3

"PANASONIC"
MATSUSHITA ELECTRIC

断熱塗料のテスト報告

-94.7.22 山口松下電器（株）総務課 松原

（目　的）　断熱塗料で作業環境改善及び省エネルギー効果がはかれるかテスト的に塗布し効果の確認をする。

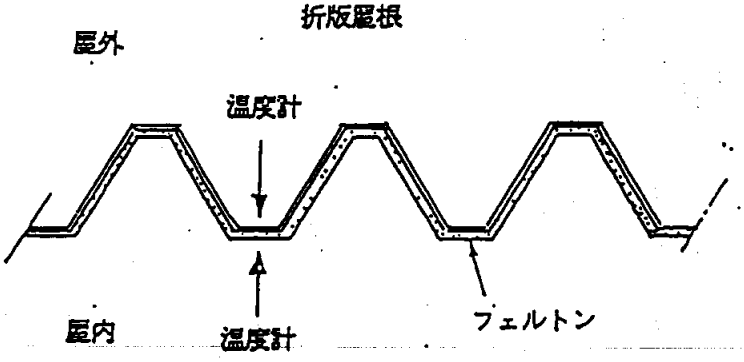
（場　所）　1～3棟間倉庫屋根（1988年建設）　約80㎡テスト施工
屋根 ―― カラー折版　t＝0．8㎜（大同鋼板　BL－333裏面フェルトン5㎜貼り）

（塗　料）　クールサーム（アルリル樹脂・ウレタン樹脂の混合材＋3種類のセラミック微粒子）

（施　工）　大高商会　6月30日　水洗い
7月1日　プライマー処理 ＆ クールサーム 塗布

（担当者）　施設原動係　松原

（測定場所）



（測定機器）　放射温度計　505（ミノルク製）

（塗布状況）　別紙スナップ参照　No1

（測定結果）　別紙参照　No2

（考　察）　○ 断熱効果は別紙データーでもわかるように期待出来る。

AUTHENTIC JAPAN USA TESTING RESULTS

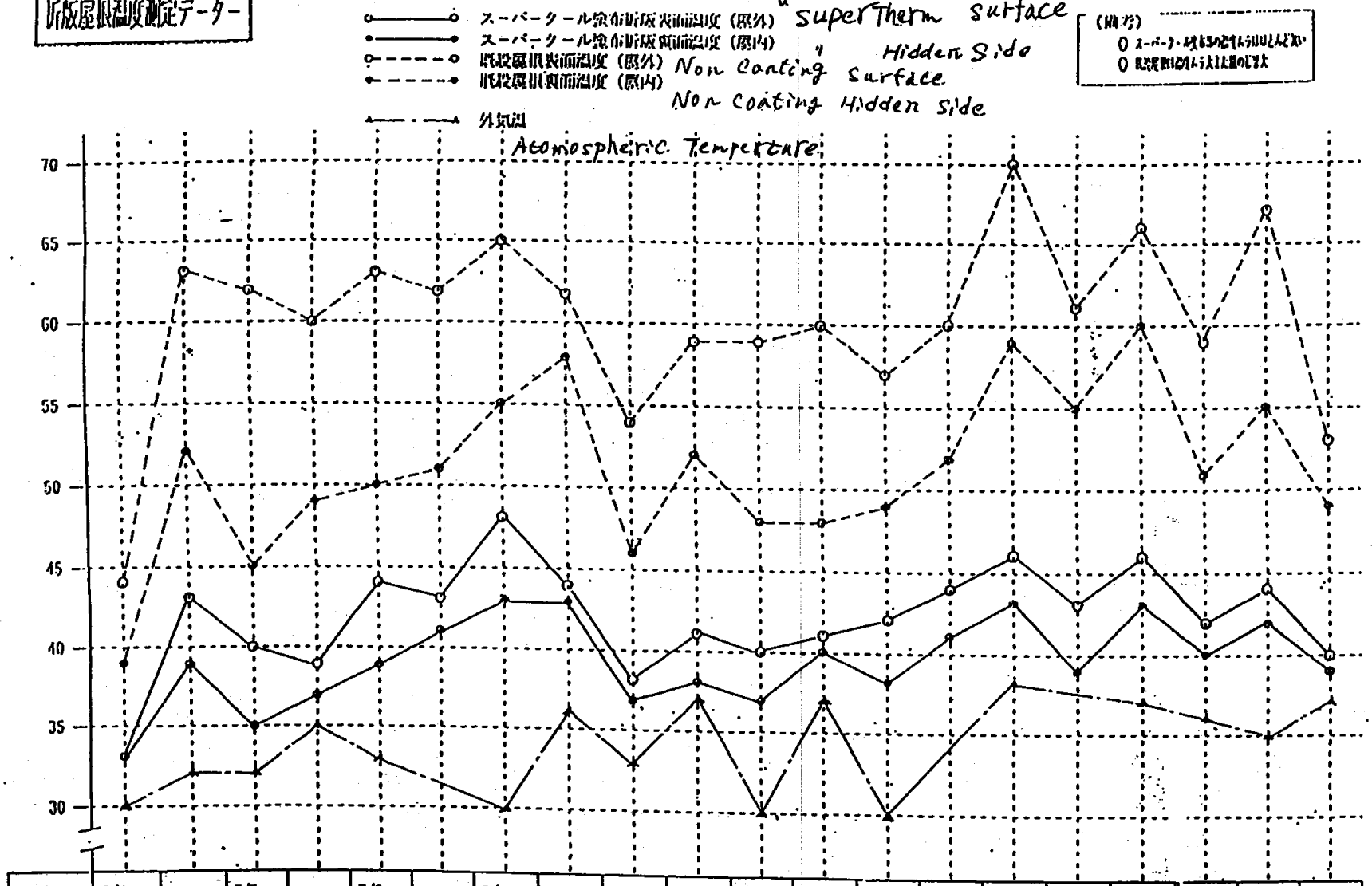
CERTIFIED

JULIANN PRITCHETT
NOTARY PUBLIC
STATE OF KANSAS
My Appt. Exp.

"PA" "NIC" MATSUSHITA ELECTRIC.

(I) 2of3

折版屋根温度測定データー



月日	7/4 10:00	15:00	7/5 10:00	16:00	7/6 10:00	15:00	7/7 11:45	15:00	7/8 10:00	7/11 17:00.	7/12 10:00	15:00	7/13 15:00	7/14 15:00	7/15 10:30	7/16 15:00	7/18 11:30	7/20 10:00	7/21 10:30	7/22 15:40
天候	晴	晴	晴	晴	晴	晴	晴	晴	晴	晴	晴	晴	晴	晴	晴	晴	晴	晴	晴	曇
気温	30	32	32	35	33		30	36	33	37	30	37	30		38		37	36	35	37

(I) 383

試験結果報告書

株式会社大　高　商　会　殿

(社)日本塗料検査協会
西支部検査所

No. 051955

報告日：平成6年1月24日

判定	支部長

品名	クールサーム	試料受付日	平成　5年11月16日
		試料採取日	平成　5年11月　9日
		試料採取場所	提出
製造者名		試料数量	塗板　2組

試験項目	成績	規格 試験方法
鋼板		
促進耐候試験		JIS B 7753 サンシャインカーボンアーク灯式による。 ただし ブラックパネルの示度63±3℃ 噴霧の時間 120分中で18分間ずつ
（500時間）	異常を認めない。	
（1000時間）	異常を認めない。	
耐塩水噴霧性		JIS K 5400(1990) 9.1による。
（500時間）	異常を認めない。	
（1000時間）	異常を認めない。	

以上

AUTHENTIC JAPAN USA TESTING RESULTS

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STATE OF KANSAS
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Table of Presentation of Written Estimates for 1996 (for Super Therm)*

COMPANY	AREA
Canon	7,000 sq.m.
Daihatsu Automobile	1,500 sq.m.
Hisamitsu Pharmacy	5,000 sq.m.
Hitati Electric	5,000 sq.m.
Hitati Shipyard	5,000 sq.m.
Honsyu Paper Mill	3,000 sq.m.
Japan Paper Mill	3,000 sq.m.
Japan Glass	2,000 sq.m.
JR (Japan Railway -Hakata)	20,000 sq.m.
JR (Japan Railway-Nagoya)	800 sq.m.
JR (Japan Railway-Tokyo)	800 sq.m.
Kojin	2,000 sq.m.
Kokuyo	5,000 sq.m.
Koyo Seiko	10,000 sq.m.
Kyosera	8,000 sq.m.
Matsushita Denko	2,000 sq.m.
Matsushita Electric industry	5,000 sq.m.
Matsushita Kotobuki Electric	4,000 sq.m.
Marine Self-Defense Force (Okinawa)	1,000 sq.m.
Marine Self-Defense Force (Ozuki)	3,000 sq.m.
Self-Defense Force School	2,000 sq.m.
Self-Defense Force - Yokosuka	1,500 sq.m.
Mitsubishi Material	1,000 sq.m.
Mitsubishi Warehouse-Tokyo	3,000 sq.m.
Mitsubishi Electric-Shizuoka	730 sq.m.
Mitsubishi Paper Mill	4,000 sq.m.
Murata Machine	5,000 sq.m.
NKK (Japan Steel-Fukuyama)	4,000 sq.m.
New Oji Paper Mill	3,500 sq.m.
Oki Electric	600 sq.m.
Sanwa Shutter	26,000 sq.m.
Sekisui-Shizuoka	4,300 sq.m.
Sekisui-Nogoya	2,500 sq.m.
Sekisui-Kagosima	2,000 sq.m.
Shiseido	16,000 sq.m.
Sony-Koda	40,000 sq.m.
Sony-Kokubu	1,200 sq.m.
Sony Broadcast	15,000 sq.m.
Sony Creative	660 sq.m.
Suntory	4,000 sq.m.
Sumitomo Heavy industry	3,500 sq.m.
Sumitomo light metal industry	8,000 sq.m.
Telmo	1,500 sq.m.

COMPANY	AREA
Tokyu Vehicles	2,000 sq.m.
Tichibu Concrete	6,000 sq.m.
Toshiba-Kaga	10,000 sq.m.
Toshiba-Oita	5,000 sq.m.
Toshiba-Yokohama	1,000 sq.m.
Toshiba Warehouse	5,000 sq.m.
Toyo tire	2,700 sq.m.
Yokohama Tire	3,400 sq.m.
YKK	20,000 sq.m.
the others	25,000 sq.m.
TOTAL through 10/95	333,000 sq.m.
Sony-Kokubu	18,880 sq.m.
Matsushita Seiko (Kasugai)	4,000 sq.m.
Shin-Oji Seishi (Kasugai)	4,000 sq.m.
Matsushita Denko (Seto)	800 sq.m.
Teijin Butsuryu (Yamaguchi)	680 sq.m.
Nitta Gelatin, Inc.	500 sq.m.
NEC Corporation (Kagoshima)	760 sq.m.
Teipa Kako Co., Ltd.	2,000 sq.m.
Nitto Denko Corp. (Kameyama)	5,000 sq.m.
Nippon Steel Corp (Hirohata)	2,300 sq.m.
NGK Insulators Ltd (Komaki)	4,000 sq.m.
Yamaha Motor	10,530 sq.m.
Sugino Machine	3,000 sq.m.
Furukawa Co., Ltd (Takasaki)	7,200 sq.m.
Furukawa Co., Ltd (Yoshii)	14,500 sq.m.
Nippon Light Metal (Funabashi)	6,600 sq.m.
Toshiba (Yokohama)	6,300 sq.m.
Marine Self-Defense (Yokosuka)	1,300 sq.m.
Sky Aluminium	1,600 sq.m.
Nihon Kentetsu Co., Ltd.	2,200 sq.m.
OTE Tech. Engineering Corp.	6,500 sq.m.
Kao Corp.	500 sq.m.
Kyoto Machine Tool	12,000 sq.m.
Exedy	5,800 sq.m.
Nichii (Kinki Mikal Center)	7,000 sq.m.
TOTAL 10/95-1/96	127,950 sq.m.
TOTAL combined to date	460,950 sq.m.
TOTAL square footage	4,609,500 sq.ft.

AUTHENTIC JAPAN USA TESTING RESULTS

** Information provided by Daiko Shokai Co., Ltd. the largest roofing/paint construction company in Japan.*

TWO EXAMPLES OF SUPER THERM AT WORK:

Saving utility cost and reduction of heat transfer into buildings or tanks causing heat build up and/ or evaporation. The two examples are pulled from test results performed in Japan.

1. SONY - KODA FACTORY

Reduced KW usage in a building with the roof painted with SUPER THERM. The reduction was recorded over two months. In May a reduction of 3248 KW and in June a reduction of 3778 KW. Translated to dollars saved, we used the cost of KW's in Kansas City which is $5.66 per KW.

Month	KW Saved	Cost/KW	Total Dollar Savings
May	3248	$5.66 =	$18,383.68
June	3778	$5.66 =	$21,383.48
	Savings over two months		**$39,767.16**

Dollar savings over a 12 month period ($19,883.58 avg. month X 12 months) is **$238,602.96**

2. HITACHI ELECTRIC

Reduced temperature on the underside of roofing from 181°F (82°C) down to 117°F (47°C) by using SUPER THERM painted on the top side (exterior).

Using the engineering chart from the Metal Architecture Journal of June 1991, we can find the reduction in the amount of BTU's that is allowed to conduct through the metal skin (roof).

Reference the chart. The chart only goes up to 150°F (66°C) so we have made a conservative calculation to gauge our 181°F (82°C) reading. The point here is to show how much SUPER THERM will **reduce** the BTU heat load from penetrating into the interior of a facility or tank as shown in the first example above.

-At 181°F (82°C), the interior is receiving approx. 131,747 BTU's per 1000 sq.ft. (100 m^2) of roofing area.

-SUPER THERM applied, the interior surface is reduced to 117°F (47°C) and the BTU's are reduced to approx. 45,253 BTU's per 1000 sq.ft. (100 m^2) of roofing area.

-This is an approx. reduction in BTU heating units of 86,494 BTU's (131,747 - 45,253) per 1000 sq.ft. (100 m^2) of roofing area.

From a heating and air conditioning engineer in Portland, Oregon, a single BTU = 3.41 watts or .00341 KW. Using this relationship, we find that the **KW reduction is,** based on the reduction of BTU's that are transfering through the metal (86,494 BTU's X .00341) **295 KW per 1000 sq.ft. (100 m^2) surface area.**

CONCLUSION: For every 1000 sq.ft. (100 m^2), SUPER THERM can reduce 295 KW of energy from entering a building or facility (tank).

Additional Note: In applying heat to the front side of SUPER THERM, we find that SUPER THERM tends to stablize the amount of heat that will penetrate to the interior side at 117°F ± 3°F (47°C ± 2C) in all situations.

Also, in comparing to fiberglass or batt insulation materials. To apply heat for a short period of time and measure results will not show you how the two different insulation materials work. The batt type insulations will resist heat for several hours then fill with heat and allow it to pass through. Because the batt is now hotter than the ambient temperature, it will not let the hot air to escape in the afternoons or evenings which extends the heat build up problem. Whereas SUPER THERM with its ceramics, will reflect and slow heat passage continually during the day and in the afternoons, it will release the heat off the surface which allows the interior to cool down quickly -- measured over a 12 hour period.

Date　　Weather　　H6. 7月度　　Weather Station Record

日	曜日	天気	Room 温度	Room 湿度	気象台 温度	気象台 湿度	温度差	備考
			Room Temp	Humidity	Temperature	Humidity	difference	
1	金	曇	32.℃	90%	29.2	73	+2.8.℃	
2	土	晴 fine	36	88	34.3	54	+1.7	
3	日	晴	36	85	32.6	55	+3.4	
4	月	晴	36	80	34.5	48	+1.5	
5	火	晴	32.2	74	36.0	39	+0.2	
6	水	晴	36	74	34.8	50	+1.2	
7	木	曇・雨	32	80	30.9	67	+1.1	
8	金	晴	35	68	33.0	51	+2.0	
9	土	晴	37	82	30.4	65	+6.6	
10	日	晴	39	77	33.5	55	+5.5	
11	月	晴	38	76	35.7	46	+2.3	
12	火	晴	38	72	36.1	45	+1.9	大高商会 "Super Therm."
13	水	晴	36	72	32.9	57	+3.1	Applicatio. start
14	木	曇 cloudy	36	80	33.7	51	+2.3	
15	金	晴	40	80	38.1	44	+1.9	
16	土	曇	42	75	37.2	52	+4.8	
17	日	晴	41	76	36.1	44	+4.9	
18	月	曇	37	77	35.1	52	+1.9	
19	火	雨. rain	31	88	30.0	71	+1.0	
20	水	晴	35	85	32.8	57	+2.2	
21	木	晴	32	75	32.9	57	−0.9	
22	金	晴	32	82	32.7	56	−0.7	大高商会 finished
23	土	晴	34	82	34.5	48	−0.5	
24	日	曇	33	82	34.5	52	−1.5	
25	月	晴	32	88	32.9	57	−0.9	
26	火	晴	34	82	34.4	49	−0.4	
27	水	曇	34	85	34.9	43	−0.9	
28	木	晴	35	75	36.7	49	−1.7	
29	金	曇	34	80	35.5	48	−1.5	
30	土	曇	32	83	32.5	67	−0.5	
31	日	晴	34	83	35.0	50	−1.0	

AUTHENTIC JAPAN USA TESTING RESULTS

CERTIFIED

JULIANN PRITCHETT NOTARY PUBLIC STATE OF KANSAS

(株)コクヨ物流中部 業務課 大橋義郎

KOKUYO

Good-Standing Factories in Energy Control Improvement Case Examples

Factories that were awarded by
the Secretary of State for Trade and Industry-Director
and General of the Agency of Natural Resources and Energy.

(1998 Electric Category : 19 Case Examples)

April, 1999

National Electricity Saving Committee

Good-Standing Factories in Energy Control in 1998
Electric Category □ List of Awarded Factories

(1) Secretary of State for Trade and Industry-Director (5 Cases)

(by Area)

Area	Company	Industry
Tohoku District	Tohoku NEC Corporation	Manufacturer of Electric Machinery and Equipment
Chubu District	Sony Koda Corporation	Manufacturer of Electric Machinery and Equipment
Kinki District	Osaka Gas Co., Ltd.	Gas Provider
Chugoku District	Seibu Oil Co., Ltd Yamaguchi Oil Factory	Manufacturer of Petroleum and Coal Products
Kyushu District	Miyazaki Tourist Hotel	Accommodation¥

(2) General of the Agency of Natural Resources and Energy (14 Cases)

(by Area)

Area	Company	Industry
Tohoku District	Tohoku Paper Industry Co., Ltd	Manufacturer of Paper and Paper Products
Tohoku District	Miyagi Oki Electric Industry Co., Ltd	Manufacturer of Electric Machinery and Equipment
Kanto District	Ricoh Co., Ltd Gotenba Branch	Manufacturer of general Machinery and Equipment
Kanto District	Asahi Glass Co., Ltd. Sagami Branch	Manufacturer of Glass Products
Kanto District	Torii Pharmaceutical Co., Ltd. Sakura Factory	Chemical Industry
Kanto District	Topcon Corporation	Manufacturer of Precision Machinery and Equipment
Chubu District	Melco Inc. Kakegawa Factory	Manufacturer of Electric Machinery and Equipment
Chubu District	Showa Gousei Co., Ltd.	Manufacturer of Transport Machinery and Equipment
Chubu District	Denso Corporation Nishio Factory	Manufacturer of Transport Machinery and Equipment
Hokuriku District	BFU Co., Ltd.	Manufacturer of Electric Machinery and Equipment
Chugoku District	Kanebo Ltd. Boufu Factory	Chemical Industry
Chugoku District	Japan Tobacco Inc. Yonego Factory.	Tobacco Manufacturer
Shikoku District	Teijin Ltd. Matsuyama Branch	Chemical Industry
Kyushu District	Bank of Saga Ltd.	Banking and Trust

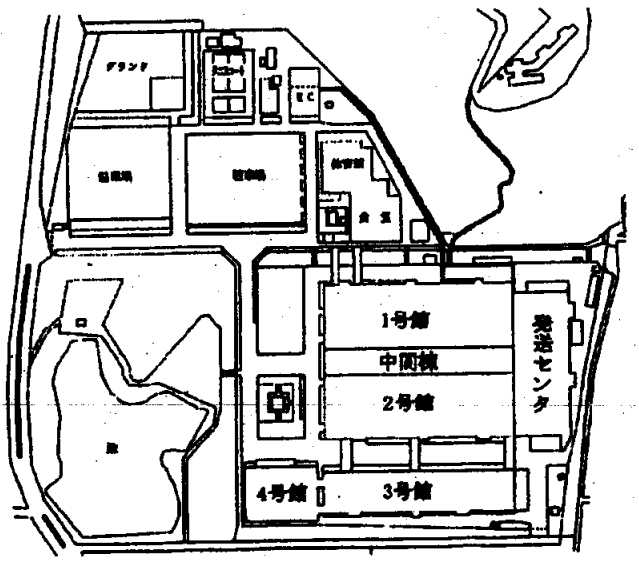
Manufacturer of Electric Machinery and Equipment

Application of Insulation Coating on Factory Roofs

o Factory Information

Capital	¥2000Million ($17Million)	Contract Demand	4,700kW	Voltage	33kV	Site Area	181,751 sqm	Building Area	86,000 sqm
Main Product	Video Camera	Electric Power Consumption Rate	1,320,000kwh/ ¥1million	%of Electricity Cost in Production Price	0.18%	Workers	2,500	Electricity Related Workers	7

o Factory Site Map



Bldg. Name	Area (sqm)	Note
Bldg.1	12,600	
Bldg.2	12,600	
Bldg.3	7,100	Not Applied
Bldg.4	Not Included	
Middle Bldg.	4,400	
Shipping Center	6,900	
Dining Bldg.	2,400	
Gym	1,600	Not Applied
Energy Center	1,400	
TOTAL	49,000	

*40,300sqm is applied so far.

o Reasons for improvement

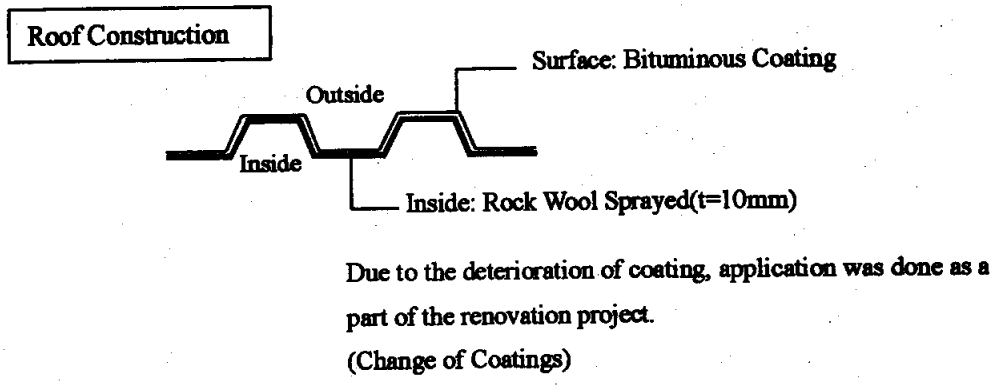
Out of all electric energy that this factory consumes, the energy used for air conditioning is high, and it takes up about 30%. The energy consumption rate for air-conditioning in summer is especially increasing due to the automation of offices and factories.
There are nine buildings in this factory and the first construction of Building 1 began in 1973, and the construction of the roofs was corrugated metal sheets + paint. Due to this roof construction, it had poor insulation performance, and it was a burden to the air conditioners in summer.

The temperature of the roof surface was very high due to the radiant heat, and the work

environment was also poor. They had to lower the temperature setting of the air conditioner. Therefore, there was a need for improvement in energy saving.

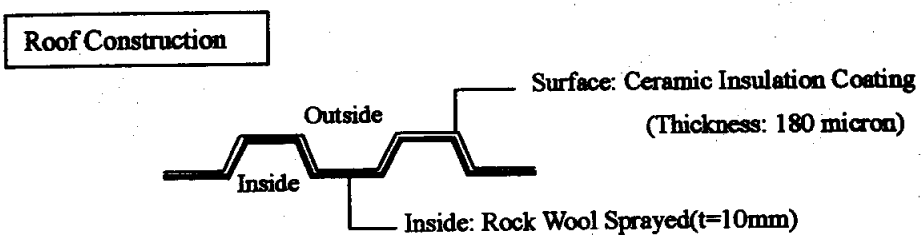
o **Improvements**

Before:



Due to the deterioration of coating, application was done as a part of the renovation project.
(Change of Coatings)

After:



Ceramic Insulation Coating was applied by spray in two layers to the surface of corrugated metal sheet roof.

Composition:

Water-Base Paint (Acrylic Resin + Urethane Resin + Three Kinds of Ceramics)

*Insulation Mechanism-----Two kinds of ceramics repel sun light.
The third ceramic works as a vapor barrier

o **Results**

1. Energy Saving

Condition: Fine day in summerOutside Temperature: 32C (90F)

	Outside Surface Temp	Room Surface Temp.
Before	63C (145F)	61C (141F)
After	41C (105F)	38C (100F)
Difference	▲22C (71F)	▲23C (73F)

Energy Saving Effect:

40,300sqm × 23C (73F) × 2.76Kcal/h□sqm□C

(K Value: over-all coefficient of heat transfer for steel)

= 2,558,244kcal/h

2,558,244kcal/h × 8h/day × 20 days/month × 6 months/year × 0.75

(Period of Air-conditioning Used) (Fine Sky Ratio)

= 1,841,760 Mcal/year

Calculation of Electricity:

1,841,760 × 10^3kcal/year □ 3,000kcal/h□RT × 1.2kW/RT

= 736,704kWh/year

Energy Saving Cost:

736,704kWh/year × ¥15/kWh = ¥11,050,560/year

2. Prolongation of Life Span

The re-painting cycle has extended from seven years to nine years.

o **Improvement Evaluation**

Initial Cost for Improvement (¥10,000) (A)	Energy Saving Effect (¥10,000/year) (B)	Pay-Back Period (year) Excluding Interest (A/B)
Ceramic Insulation Coating 6,850 Bituminous Coating 5,680 Difference 1,170	1,105	1.06

NOTE: Segment from the SUPER THERM Standard Specification regarding durability and adhesion testing. See: 2.4, 6.2, 6.4, 6.5, 6.6, 6.9, 6.10, 6.12, 6.16, 6.17, 6.18, and 6.19

Standard Specifications for Liquid Applied Insulation Coating

1. Scope

1.1 This scope covers a liquid-applied water-dispersed urethane/acrylic blend coating used for insulation of roofs, attic spaces, wall voids, exterior walls, flooring, and interior walls and ceilings.

1.2 This specification does not provide guidance for application.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.4 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. Referenced Documents

2.1 *ASTM Standards:*
B 117 / D 1654 Test and Evaluation Method for 450 Hour Salt Spray (Fog)
C 236-89(93) Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box
C 411 Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation
D 412 Test Method for Tensile Properties of Fiber-Resin Composites
D 522 Test Method for Mandrel Bend Test of Attached Organic Coatings
D1653 Test Method for Water Vapor Permeability of Organic Coatings
D3273-82T Test Method for Determination of Fungal Resistance
D4060 Test Method for Resistance to Abrasion of Organic Coatings
E 84-89a Test Method for Surface Burning Characteristics of Building Materials
E 96 Test Method for Determination of Water Vapor Transmission (WVT)
E 108-00 Test Method for Approval Standard for Class 1 Roof Cover (2-12 Pitched)
E 903-96 Test Method for Solar Absorption, Reflectance and Transmittance of Materials Using Integrating Spheres
E 1269 Test Method for Heat Capacity by Differential Scanning Colorimeter
E 1461(92) Test Method for Thermal Diffusivity/Conductivity by Flash Method
G 53 Test Method for Visual Effects of UV Exposure

2.2 *NASA (National Aeronautics and Space Administration) Testing:*
NASA STD 6001 Test 1 (formerly NHB 8060.1B/C Test 1) Test Method for Flammability
NASA STD 6001 Test 7 (formerly NHB 8060.1C Test 7) Test Method for Toxic Off-Gassing

2.2 ABS (American Bureau of Shipping), IMO (Internal Maritime Organization), and US Coast Guard:
IMO A. 653 (16) Test Method for Flame Spread
MSC 41 Test Method for Smoke Toxicity

2.3 *JIS (Japanese Institute of Standards):*
JIS A 5759 Test Method for Sunshine Reflective Ratio and Long Wave Radiation Ratio

2.4 *China Center for Technical Testing:*
GB/T 1771-91 Test Method for Salt Fog (2000 Hours)
GB/T 1866-88 Test Method for Manuel Aging (2000 Hours)
GB/T 10834-88 Test Method for Resistance to Salt Water (1000 Hours)
GB/T 5210-85 Test Method for Adhesion (pulling apart method)
GB/T 1733-93 Test Method for Boiling Water Immersion (8 Hours)

3. Packaging and Materials

3.1 Shipping containers shall be marked with the name of the material and the batch number identifying the particular batch from which the product was made and the date.

4. Materials and Manufacture

4.1 *Composition-* The product, as manufactured, shall be in liquid form for application by brushing, rolling, or spraying. The product shall be composed of a water-dispersed urethane/acrylic blend, to which various pigments and other additives have been added to give the required physical properties.

5. Liquid and Physical Properties

5.1 Although the product is supplied as a liquid, its performance is based on the functional properties of the dried material in film form. The coating is formed into a film fully adhered to the substrate surface.
5.2 *Liquid Property Requirements-* The liquid coating shall comply with the property requirements in Table 1.
5.3 *Film Physical Property Requirements-* Specimen preparation (dry time) films are prepared by applying 2 coats at 8 mils wet each coat, with a minimum of a 4 hour drying period between coats to the testing substrate to give a total dry maximum thickness of 10 dry mils, plus or minus 1 mil. The film is allowed to dry at 70° F (21.1° C) for a period of 21 to allow for complete drying. (see Table 2)

TABLE 1 Liquid Property Requirements

Physical Property	Requirement
Viscosity	105-110 KU
Volume by Solids	65-70%
Volume by Weight	60-65%

6. Test Methods

6.1 *Viscosity-* Canon LV2000 Viscometer No.4 spindle, 12 RPM.
6.2 *Salt Spray (Fog) Testing-* (Test Method B 117):
- 6.2.1 Test methods: 95° ± 4.8° F (35° ± 1.8° C) Chamber Temperature.
- 6.2.2 5% ± 1% Salt Solution
- 6.2.3 6.9 pH
- 6.2.4 1.4 ml/hour
- 6.2.5 Total Exposure: 450 Hours

6.3 Steady State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box (Test Method C 236-89):
- 6.3.1 Test methods: 70.5° F (21.39° C) average *Room Side* air temperature
- 6.3.2 0.1° F (17.72° C) average *Weather Side* air temperature
- 6.3.3 73.1° F (22.83° C) average *Guard Box* air temperature
- 6.3.4 12% RH
- 6.3.5 14.3 mph (23.0 kilometers per hour)

6.3.6 0.00 "H_2O Static Pressure Difference Across Specimen
6.3.7 Cut specimen measuring 48 in. (1218.2) long by 24 in. (609.6mm) wide ± 10%

6.4 *Hot Surface Performance of High-Temperature Thermal Insulation* (Test Method C 411)
6.4.1 Test methods: 296.6° F (147° C) ± 14.8° F (7.35° C)
6.4.2 96 Hours

6.5 *Tensile Strength* (Test Method D 412):
6.5.1 Test methods: 78° ± 3.9° F (25.5° ± 2.5° C) at 45% RH
6.5.2 Cut specimen measuring 4.5 in. (114.3 mm) long by .24 in. (6.147 mm) wide ± 10%.
6.5.3 *Test Type or Functional Equivalent:*
Cross Head Speed 20 in./min (508mm/min)
Die D and 2 in. (50.8mm) initial jaw separation.

6.6 *Mandrel Bend Test of Attached Organic Coatings* (Test Method D 522):
6.6.1 Test methods: 2 specimens on smooth surface
6.6.2 6 mandrel sizes ranging from 1/4 in. (6.35mm) to 1 in. (25.4mm)

6.7 *Water Vapor Permeability of Organic Coatings* (Test Method D 1653)
6.7.1 Test methods: 75° ± 3.75° F (23.89° ± 1.19° C) at 50% RH
6.7.2 3 specimens
6.7.3 24 hour cycle
6.7.4 Method A, Condition B

6.8 *Mold and Fungal Resistance* (Test Method D 3273 82T)
6.8.1 Test method: 90 ± 2° F (32.22 ± .64° C) at 95-98% RH
6.8.2 Soil contained Aspergillus niger, Aspergillus oryzai, and an unknown species of Penicillium
6.8.3 Exposed in chamber 5 ½ weeks

6.9 *Abrasion Resistance of Organic Coatings by the Tabor Abraser* (Test Method D 4060)
6.9.1 Test method: 2 specimens painted on metal disks
6.9.2 3,000 cycles
6.9.3 CS 17 wheel size
6.9.4 1,000 grams load on wheels

6.10 *Surface Burning Characteristics of Building Materials* (Test Method E 84-89a)
6.10.1 Test method: Coating applied to glass reinforced cement board at 10 dry mils
6.10.2 24 in. (609.6mm) wide by 24 ft. (7.32 meters) long specimen size
6.10.3 73° F (22.8° C) at 50% RH specimen conditioning time

6.11 *Water Vapor Transmission* (Test Method E 96)
6.11.1 Test method: Water Method – Three Specimens
6.11.2 90° F (32.2° C) at 50% RH for 24 hours
6.11.3 0.5 RH in chamber, 1 RG in cup

6.12 *Flame Spread on Metal Panels* (Test Method E 108-00)
6.12.1 Test method: 2 in 12 slope
6.12.2 2 - 3.33 ft (1.0 meter) wide by 8 ft (2.4 meters) long standard metal panels used
6.12.3 Applied 16 mils wet, 10 mils dry, allowed to cure 28 days
6.12.4 12 ± 0.5 mph (5.3 ± 0.2 m/s) wind velocity
6.12.5 1400° ± 50° F (760° ± 28° C) for Class A test

6.13 *Solar Absorption, Reflectance and Transmittance of Materials Using Integrating Spheres* (Test Method E 903-96)
6.13.1 Test method: Beckman 5240 Spectrophotometer
6.13.2 Reflectance measurements obtained from 2500nm to 300nm at a 15 degree incident angle
6.13.3 Integrated against Air Mass 1.5 global spectrum utilizing 109 weighted ordinates
6.13.4 3 specimens used

6.14 *Heat Capacity by Differential Scanning Colorimeter* (Test Method E 1269)
6.14.1 Test method: Perkin-Elmer Model DSC-2 Differential Scanning Colorimeter
6.14.2 Sapphire as reference material
6.14.3 1.28cm long by 1.28cm wide by .084cm standard metal test plates
6.14.4 5 specimens used

6.15 *Thermal Diffusivity/Conduction by Flash Method* (Test Method E 1461-92)
6.15.1 Test method: Laser Flash Diffusivity Technique
6.15.2 Half time value corrected by using the Cowan Correction procedure.

6.15.3 TWOLA or THRLA computer program used
6.15.4 Korad K2 laser
6.15.5 5 specimens used

6.16 *Visual Effects of UV Exposure* (Test Method G 53)
6.16.1 Test Method: 1000 Hours
6.16.2 9in (22.86cm) by 3in (7.62cm) standard test plates
6.16.3 3 specimens used
6.16.4 Exposed to UV, elevated temperature and humidity

6.17 *Upward Flame Propagation* (Test Method NASA STD 6001 Test 1)
- Formerly NASA NHB 8060.1B/C Test 1
6.17.1 Test Method: Complete combustion in chamber
6.17.2 2.5in (6.35cm) by 12in (30.48cm) standard test plates
6.17.3 3 specimens used
6.17.4 30%, 34%, and 40% oxygen at 10.2psia (pounds/square inch absolute)
6.14.5 3000 J (Joules) for 25 seconds
6.17.6 No more than 5% relative depletion of oxygen concentration

6.18 *Toxic Off-gassed Products* (Test Method NASA STD 6001 Test 7)
- Formerly NHB 8060.1C Test 7
6.18.1 Test method: Controlled temperature test chamber and analytical instrumentation
6.18.2 Toxic Hazard Index (T) values must be less than 0.5
6.18.3 120° ± 5° F (248° ± 3° C) Test Temperature
6.18.4 2276.87 lbs (1032.77kg) Maximum Limit Weight

6.19 *Flame Spread* (Test Method IMO A.653 (16)
6.19.1 Test method: Non-Impinging Pilot Flame
6.19.2 6.02in (153mm) by 31.46in. (799mm) standard test plates
6.19.3 3 specimens used
6.19.4 6.81 MJ/m^2 Heat of Ignition
6.19.5 Heat of Sustained Burning at 150mm, 200mm, 250mm, 300mm, 350mm, 400mm

6.20 *Toxic Gas Generation at 25 KW/m^2 and 50 KW/m^2* (Test Method MSC.41 (64)
6.20.1 Test method: Smoke Chamber using Colorimetric Gas Detector Tubes
6.20.2 61° F (16.1° C) Ambient Temperature, 44 RH
6.20.3 30.20 Inches of Mercury for Barometric Pressure

6.21 *Sunshine Reflective Ratio* (Test Method JIS A 5759) (Japanese Industrial Standard)
6.21.1 Test method: Film for Window 5.3.4 (c) for Light Reflectivity Ratio and Long Wave Radiation
6.21.2 Tested July 1-August 31st and January 1-February 28th
6.21.3 Monitored interior temperatures and intruding calories