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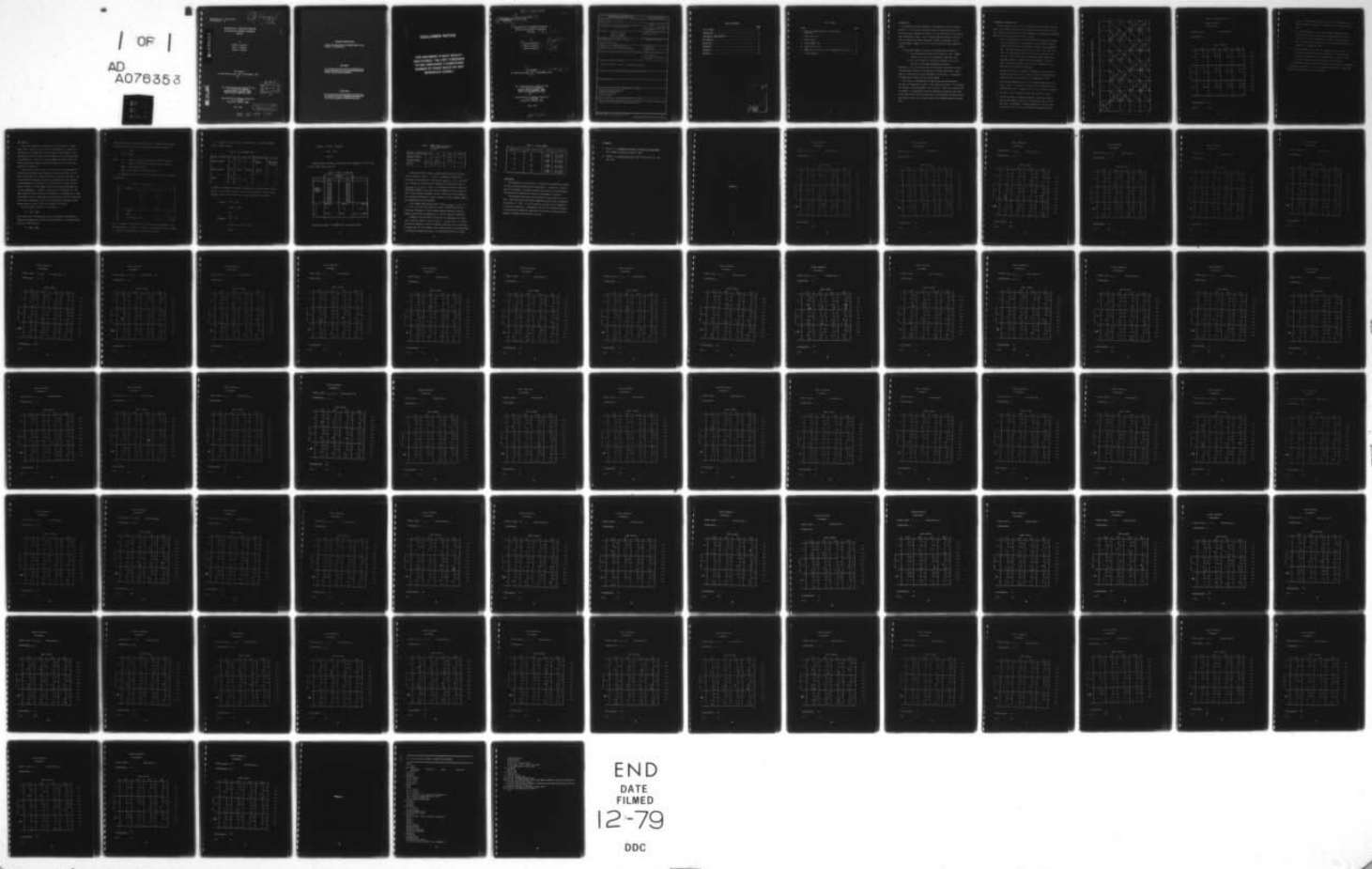

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AN EVALUATION OF TEMPERATURE REDUCTION METHODS ON DOW ETHAFOAM 2 CUSHIONING MATERIAL

by

Richard M. Wyskida
James D. Johannes
Mickey R. Wilhelm

Final Report
For the Period 8 June, 1978 - 30 September, 1979
Vol. I

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U. S. Army Missile Command
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The University of Alabama in Huntsville
P. O. Box 1247
Huntsville, Alabama 35807

July, 1979

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(6) AN EVALUATION OF TEMPERATURE REDUCTION METHODS ON DOW ETHAFOAM 2 CUSHIONING MATERIAL. Volume I.

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This research report evaluates the two common methods of achieving temperature reduction in the Ethafoam 2 cushioning material.

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INTRODUCTION

In conducting extreme temperature experimentation on bulk cushioning materials, it is necessary to provide a means of heating the material to the desired upper temperature extreme or to cool the material to the desired lower temperature extreme. Since resistance heating techniques are available for achieving the upper temperature extreme, the procedure is very straightforward. However, this is not the case with the lower temperature extreme.

Two available methods to achieve the low temperature extreme are:

(1) the introduction of carbon dioxide (CO_2) gas into a chamber containing the items to be temperature conditioned, and

(2) the use of mechanical refrigeration methods such as those available in the common household refrigerator.

Inherently, it is more difficult and time and energy consuming to achieve a low temperature extreme with the mechanical refrigeration method. Consequently, a large portion of the experimental testing which is conducted at low temperature extremes utilizes the CO_2 method.

This report is concerned with evaluating the above two methods of achieving low temperature extremes in bulk cushioning testing. In particular, the Ethafoam 2 cushioning material was utilized as a basis for evaluating the two methods. An experimental design was developed to guide the acquisition of test data for the specified conditions. The experimental design was based upon specific statistical tests which were to be conducted upon the acquired data.

EXPERIMENTAL CONSIDERATIONS

The efficient utilization of test equipment and test personnel dictates that a test procedure be developed which optimizes the data acquisition process. With this objective in mind, the following test procedure was developed and utilized in the acquisition of the test data.

1. It will be necessary to utilize the present CO_2 method of achieving the cold temperatures for the cushions as the standard or control method, while utilizing a refrigeration method as the experimental one. The temperatures to be utilized are -65°F, -20°F, 20°F, and 70°F. The usual drop heights of 12", 18", 24", and 30" will be utilized. It will be necessary to keep the samples from the two different methods of cooling, physically separated. The first static stress to be tested will be 0.5 psi, followed by 1.0 psi. Only two static stresses are necessary.

2. Condition the 200 test specimens of Ethafoam 2 to be utilized by dropping on them once, one at a time, from a 24" drop height measured from the top of the sample, at a temperature of 70°F.

3. The drop test temperature/static stress/day/set combinations are shown in Table 1. A total of four sets of test specimens will be required where a set is defined as 16-1", 16-2", and 16-3" cushions.

4. The data is to be recorded on a data sheet similar to Table 2.

5. The test specimens associated with the CO_2 testing are loaded in conditioning chambers according to the right most column on the data form. Each chamber is loaded according to a specific replication with a total of four replications per temperature/static

Table 1. Drop test temperature/static stress/day/set combinations.

SET \ DAY	1	2	3	4	5	6	7	8
1	70^0 .5 psi CO_2		-20^0 .5 psi CO_2		70^0 1.0 psi CO_2		-20^0 1.0 psi CO_2	
2	70^0 .5 psi REF.		-20^0 .5 psi REF.		70^0 1.0 psi REF.		-20^0 1.0 psi REF.	
3		20^0 .5 psi CO_2		-65^0 .5 psi CO_2		20^0 1.0 psi CO_2		-65^0 1.0 psi CO_2
4		20^0 .5 psi REF.		-65^0 .5 psi REF.		20^0 1.0 psi REF.		-65^0 1.0 psi REF.

Table 2. Sample data form.

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: REPLICATION:

TEMPERATURE:

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
					1''
1''	1	6	5	9	2''
					3''
					3''
					1''
2''	2	11	7	8	1''
					2''
					2''
					1''
3''	3	4	12	10	3''
					2''
					3''

REFRIGERATED ---

CO 2 ---

stress. The refrigeration method will utilize two separate refrigeration chambers each capable of holding 24 test specimens (2 reps/each).

6. The testing sequence (1-12) has been randomly established by the representative numbers for each of the twelve blocks on the data sheet. The first test specimen to be tested is identified with a one in the upper right-hand corner of one of the twelve identically shaped blocks on each data sheet.

7. Two experimental values are to be recorded for each drop test. The value to be recorded on the upper portion of the individual data location on the data sheet is the peak G value. Below this value should be recorded the shock pulse width in milliseconds.

The experimental data, collected according to the outlined test procedure, is contained in Appendix A. The data is organized according to a lowest temperature, lowest static stress level sequence.

DATA ANALYSIS

Statistical methods are widely utilized in the analysis of experimental data. The basis of this study is to determine if a significant difference exists between the G-level response for the Ethafoam 2 cushioning material utilizing two different methods of attaining the desired low temperatures. A statistical method commonly utilized to detect differences between two methods of accomplishing some task is the one-way analysis of variance [1].

Since the only item of interest in this study is the two methods of achieving low temperature test conditions, the one-way analysis of variance is applicable with a slight modification in the basic test data. Due to anticipated experimental variation, the experimental design required each experimental test combination to be replicated four times, and the results recorded. This may suggest that all four observations should be utilized independently. However, this would not be legitimate [2]. The impact response from any particular experimental test combination will show some unknown variation, suggesting that the average of the four replications be utilized. Consequently, the four replications were averaged, and the average values utilized in the one-way analysis of variance.

The null hypothesis which is to be tested is:

$$H_o: \ M_{CO_2} = M_{REF}$$

which states that a difference does not exist between the two methods of attaining low temperatures for the cushioning material. The alternate hypothesis for consideration is:

$$H_1: \ M_{CO_2} \neq M_{REF}$$

which states that a significant difference exists between the two methods. The test statistic utilized in evaluating the two stated hypotheses is

$$F_{n_1,n_2} = \frac{MS_M}{MS_{ER}}$$

where n_1 = degrees of freedom associated with the M's (methods)

n_2 = degrees of freedom associated with error variation

MS_M = mean square of the M's

MS_{ER} = mean square of the error variation.

To review the basis for the F test in a one-way analysis of variance, consider Table 3.

Table 3. Sample layout

Method	1	2	
	$X_{1,1}$	$X_{1,2}$	
	$X_{2,1}$	$X_{2,2}$	
	$X_{3,1}$	$X_{3,2}$	
	.	.	
	.	.	
	.	.	
	$X_{12,1}$	$X_{12,2}$	
Totals:	$T_{.1}$	$T_{.2}$	$T_{..}$
Number:	n_1	n_2	N
Sum of Squares:	ΣX^2_{i1}	ΣX^2_{i2}	$\Sigma\Sigma X^2_{ij}$

Here $T_{.j}$ represents the total value of the observations taken under a particular method and n_j represents the number of observations taken for a method. $T_{..}$ represents the grand total of all observations taken.

It is then possible to develop a one-way Analysis of Variance (ANOVA) table as shown in Table 4.

Table 4. One-way ANOVA table.

Source of Variation	df	Sum of Squares(SS)	Mean Square(MS)	F-ratio
Between methods	k-1	$\Sigma \frac{T^2_{\cdot j}}{n_j} - \frac{T_{\cdot\cdot}^2}{N}$	$\frac{SS_{between}}{k-1}$	$\frac{MS_{between}}{MS_{within}}$
Within methods	N-k	$SS_{total} - SS_{between}$	$\frac{SS_{within}}{N-k}$	
Totals	N-1	$\Sigma\Sigma X^2_{ij} - \frac{T_{\cdot\cdot}^2}{N}$		

In Table 4, k represents the number of methods, N is the total number of data points, SS is the sum of squares, and MS is the mean square. Based upon the equations given in Table 4, the sums of squares may now be calculated.

$$SS_{total} = \Sigma\Sigma X^2_{ij} - \frac{T_{\cdot\cdot}^2}{N}$$

$$= 116673 - 115336$$

$$= 1337$$

$$SS_{between} = \frac{\Sigma T_{\cdot j}^2}{n_j} - \frac{T_{\cdot\cdot}^2}{N}$$

$$= 53533.52 + 61956.26 - 115336$$

$$= 153.78$$

$$SS_{within} = SS_{total} - SS_{between}$$

$$= 1337 - 153.78$$

$$= 1183.22$$

Table 5 presents the sample calculations for a temperature of -65°F, and a static stress level of 0.5 psi.

Table 5. Sample calculations.

	METHOD		
	CO_2	REF	
Impact Response in G's	65.00 67.00 71.25 69.00 63.50 74.50 73.00 67.25 79.50 85.00 67.75 79.50	59.25 58.00 68.50 64.50 55.50 68.25 70.50 61.75 73.50 81.75 63.00 77.00	
$T._j$	801.50	862.25	$T.. = 1663.75$
n_j	12	12	$N = 24$
ΣX^2_{ij}	54232	62441	$\Sigma\Sigma X^2_{ij} = 116673$

Placing these values in an ANOVA table, we acquire Table 6.

Table 6. ANOVA table for data at a -65°F temperature and 0.5 psi.

Source of Variation	df	SS	MS	F-ratio
Between methods	1	153.78	153.78	2.86
Within methods	22	1183.22	53.78	---
Totals	23	1337.00	---	---

Utilizing the tables from any standard statistical text, the value of the F-statistic, with $n_1 = 1$ and $n_2 = 22$ degrees of freedom and a 0.05 level of significance, is found to be $F_{.025}(1,22) = 5.79$. The rejection criterion for testing the null hypothesis as previously stated is $F_{calculated} > F_{\alpha/2}(n_1,n_2)$. Thus, if a calculated F-statistic exceeds the appropriate tabulated value, then the null hypothesis must be rejected in favor of the alternative hypothesis which in this case is the assumption of a significant difference in impact response of cushion samples temperature conditioned by the two methods.

In the example under consideration, since $F_{calculated} < F_{\alpha/2}(n_1,n_2)$, i.e., $2.86 < 5.79$, the null hypothesis cannot be rejected indicating no significant difference in cushion impact response obtained by the two methods for achieving low temperatures in the test samples of Ethafoam 2.

A summary of the calculated F-ratios for all temperature and static stress conditions tested is given in Table 7. In every case, it is noted that the null hypothesis cannot be rejected, indicating that a significant difference does not exist between the CO_2 method and the refrigerated method of attaining low temperature levels for cushioning material test samples.

Table 7. F-ratio summary.

Temperature (°F)	Static Stress (psi)	F-ratio	H_o Decision
-65°	0.5	2.8587	not reject
	1.0	0.0106	not reject
-20°	0.5	0.5313	not reject
	1.0	0.0005	not reject
20°	0.5	0.1970	not reject
	1.0	0.0254	not reject
70°	0.5	0.0040	not reject
	1.0	0.0102	not reject

CONCLUSIONS

The evaluation of the two methods of achieving low temperature extremes in bulk cushioning testing has been accomplished. In particular, test samples of the Ethafoam 2 cushioning material were utilized in an experimental design which was randomized to minimize any experimental variations.

The experimental data was analyzed through a one-way analysis of variance. Each of the eight experimental temperature/static stress combinations was tested at $\alpha = 0.05$. It was not possible to reject the null hypothesis in any of the eight cases. Consequently, the CO_2 and refrigeration methods for attaining low temperature conditions for testing of cushioning material samples are deemed to be essentially the same.

REFERENCES

1. Hicks, C. R., Fundamental Concepts in the Design of Experiments, Holt, Rinehart and Winston, New York, 1964.

2. Langley, R., Practical Statistics, Dover Publications, Inc., New York, 1970.

APPENDIX A

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 1

TEMPERATURE: -65°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	6	7	12	5	2''
	55	70	74	84	2''
	9	9	10	10	4''
2''	3	1	9	2	1''
	71	65	67	71	1''
	9	10	11	12	4''
3''	11	10	4	8	4''
	74	79	83	72	1''
	9	9	10	12	

REFRIGERATED ---

CO 2 ✓

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 2

TEMPERATURE: -65°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
	8	9	1	3	1''
1''	67	69	74	85	1''
	10	10	10	10	4''
	7	6	5	12	2''
2''	67	60	69	65	2''
	9	10	10	12	1''
	4	11	2	10	4''
3''	73	72	53	82	2''
	9	10	11	11	

REFRIGERATED ---

CO 2 -X-

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 3

TEMPERATURE: ~65°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''
1''	7	4	9	11
	64	71	74	83
	9	10	10	11
2''	2	10	6	12
	62	62	69	68
	9	11	11	12
3''	1	8	5	3
	67	70	79	83
	9	10	10	10

REFRIGERATED ---

CO 2 ✓

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 4

TEMPERATURE: -65°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	7	8	1	12	1''
	64	66	70	84	2''
	9	10	10	11	4''
2''	5	11	9	3	2''
	68	67	64	67	4''
	9	10	12	12	1''
3''	2	10	4	6	2''
	71	77	73	81	1''
	9	9	10	11	

REFRIGERATED ---

CO 2 -✓-

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 1

TEMPERATURE: -65°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	5	1	10	4	1''
	62	68	73	79	4''
	10	10	10	11	1''
2''	7	9	11	8	1''
	60	60	64	63	4''
	10	11	11	13	2''
3''	6	3	2	12	2''
	71	69	76	79	1''
	8	10	10	12	2''
					4''

REFRIGERATED ---✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 REPLICATION: 2

TEMPERATURE: −65°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	3	11	2	8	2''
	62	63	70	83	1''
	9	10	11	10	1''
2''	7	6	4	1	2''
	54	43	59	64	2''
	10	15	12	12	1''
3''	5	10	12	9	4''
	71	68	73	76	4''
	9	11	11	11	1''

REFRIGERATED ✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 psi REPLICATION: 3

TEMPERATURE: -65°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	11	10	1	9	1''
	57	65	70	81	4''
	10	11	12	11	4''
2''	8	6	7	12	4''
	62	64	59	64	2''
	9	11	12	13	2''
3''	3	2	5	4	1''
	69	70	75	75	2''
	9	11	10	11	

REFRIGERATED ✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 4

TEMPERATURE: -65°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''
1''	9	2	10	12
2''	56 / 10	62 / 11	69 / 11	84 / 12
2''	4	6	3	8
2''	56 / 10	55 / 11	65 / 12	61 / 13
1''	11	5	1	7
3.0''	63 / 9	66 / 11	70 / 11	78 / 12

REFRIGERATED ✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 10 PSI REPLICATION: 1

TEMPERATURE: -<8 F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	11	8	1	2	1''
	40	54	69	97	4''
	13	14	13	13	4''
2''	6	12	9	7	4''
					2''
	32	35	37	44	2''
	16	16	18	18	1''
	10	5	3	4	4''
4''					1''
	38	39	43	41	2''
	13	15	16	17	

REFRIGERATED ---

CO 2 ✓

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 10 PSI REPLICATION: 2

TEMPERATURE: -65°F

DROP HEIGHT

THICKNESS	12"	18"	24"	30"	
1"	6	5	2	1	1"
	38	54	70	87	2"
	13	14	13	14	4"
2"	8	10	11	3	1"
	32	35	40	41	4"
	15	17	17	18	2"
3"	7	4	12	9	2"
	34	40	41	45	4"
	15	15	17	16	4"

REFRIGERATED ---

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 1.0 psi REPLICATION: 5

TEMPERATURE: -65°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''
1''	5	2	1	9
1''	37	54	67	86
4''	13	14	14	15
4''				
1''	7	6	12	11
2''	32	34	36	42
2''	15	17	18	18
1''				
4''	10	4	3	8
2''	34	40	44	46
2''	14	16	16	16

REFRIGERATED ---

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: .0 PSI REPLICATION: 4

TEMPERATURE: -65 °F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	7	3	12	1	1''
	37	54	69	81	1''
	14	14	14	14	4''
2''	8	5	6	2	2''
	32	34	38	43	1''
	15	18	18	18	2''
3 0''	11	4	10	9	4''
	40	40	41	43	1''
	13	15	17	17	4''

REFRIGERATED ---

CO 2 -K-

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 1.0 PSI REPLICATION: 1

TEMPERATURE: -65°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	9	5	1	4	1''
	39	54	67	84	4''
	14	14	14	14	2''
					1''
2''	12	7	3	8	1''
	31	39	38	43	4''
	16	17	18	18	2''
					2''
3''	2	6	10	11	1''
	37	42	38	42	4''
	14	14	17	17	4''
					2''

REFRIGERATED ✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 1.0 PSI REPLICATION: 2

TEMPERATURE: -65°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''
1''	10	4	9	3
	37	53	68	85
	15	14	14	14
2''	5	7	1	8
2''	30	32	37	40
	16	20	18	19
1''	6	11	2	12
4''	36	39	37	41
	14	16	18	19

REFRIGERATED --✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 1.0 psi REPLICATION: 3

TEMPERATURE: -65°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	12	5	2	10	2''
	40	55	66	88	2''
	14	14	14	14	2''
2''	3	4	8	1	1''
	32	32	38	43	4''
	16	18	18	18	2''
3''	9	6	7	11	4''
	41	39	37	40	1''
	13	16	17	18	

REFRIGERATED ---

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 1.0 PSI REPLICATION: 4

TEMPERATURE: -65°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
	10	9	5	8	2''
1''	42	54	70	93	2''
	14	14	13	14	4''
	3	11	7	1	1''
2''	31	33	37	45	2''
	16	18	18	19	1''
	12	6	2	4	1''
3''	38	38	36	40	2''
	15	16	18	18	4''

REFRIGERATED --

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 1

TEMPERATURE: -20°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	1	10	11	6	1''
	54	63	72	87	4''
	10	12	12	12	2''
2''	5	4	8	12	2''
					1''
	50	52	53	56	4''
	13	13	13	15	2''
3''	7	9	2	3	4''
					1''
	53	56	58	58	1''
	11	12	12	13	2''

REFRIGERATED ---

CO 2 ---✓

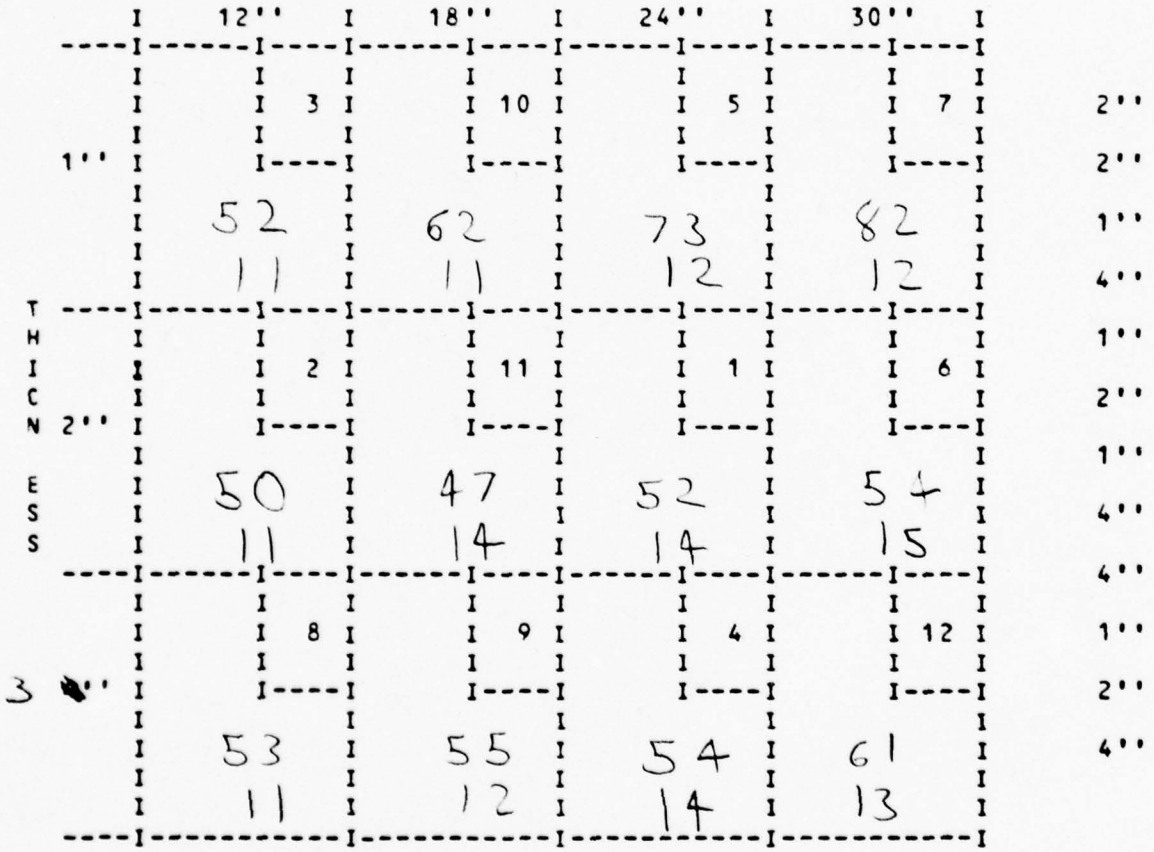
SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 2

TEMPERATURE: 20°F

DROP HEIGHT



REFRIGERATED ---

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 3

TEMPERATURE: -20°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	5	9	11	4	4''
	52	61	68	80	2''
	11	12	12	12	1''
2''	7	6	3	8	1''
	48	51	50	54	2''
	11	13	15	15	2''
3''	1	2	10	12	1''
	55	60	58	60	4''
	10	12	13	14	

REFRIGERATED ---

CO 2 -✓

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 psi REPLICATION: 4

TEMPERATURE: -20°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	7	10	12	6	2''
					4''
	52	61	70	82	2''
	11	11	12	12	4''
2''	3	9	1	8	4''
					1''
	55	52	54	53	1''
	11	13	14	15	2''
					2''
4''	11	5	4	2	1''
					4''
	55	60	61	62	1''
	11	12	13	13	

REFRIGERATED ---

CO 2 ✓

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 1

TEMPERATURE: -20°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''
1''	10 57 11	5 60 12	12 67 13	6 80 12
2''	8 48 12	7 48 14	3 52 14	2 53 15
3''	11 47 11	9 53 13	4 54 14	1 60 14

REFRIGERATED ---

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 psi REPLICATION: 2

TEMPERATURE: -20°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	8	4	3	1	1''
	47	55	69	[illegible]	4''
	11	12	12	12	1''
2''	9	7	6	12	1''
	44	46	49	48	4''
	13	14	14	17	2''
3''	10	5	2	11	2''
	48	57	60	62	4''
	12	12	13	14	2''

REFRIGERATED ---

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 3

TEMPERATURE: -20°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	9	5	1	3	1''
	48	57	69	88	2''
	12	12	13	12	1''
2''	4	10	8	2	2''
	47	50	50	52	4''
	12	13	14	15	4''
3''	12	11	7	6	1''
	56	57	59	52	2''
	11	12	13	15	4''

REFRIGERATED ✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 4

TEMPERATURE: −20°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	5	1	3	6	1''
	46	58	67	78	1''
	12	13	12	13	4''
2''	12	9	7	8	1''
	41	46	49	50	2''
	13	14	15	15	2''
3''	10	11	2	4	4''
	55	51	52	54	2''
	11	13	14	15	

REFRIGERATED ✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 1.0 PSI REPLICATION: 1

TEMPERATURE: -20°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
					4''
	11	6	3	12	
					4''
1''					
	37	75	83	98	1''
	17	16	15	14	4''
					2''
	5	8	7	10	
					1''
2''					
					2''
	25	30	35	40	
	19	20	21	20	2''
					4''
	1	4	2	9	
					2''
3 0''					1''
	26	28	30	36	1''
	18	21	23	20	

REFRIGERATED ---

CO 2 ✓ ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 1.0 PSI REPLICATION: 2

TEMPERATURE: -20° F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	9	10	12	1	1''
2''	37	53	75	100	4''
	16	16	15	14	2''
2''	2	5	7	4	2''
	25	31	35	39	4''
	19	22	20	21	1''
4''	6	8	11	3	1''
	29	27	31	35	4''
	17	21	20	21	1''

REFRIGERATED ---

CO 2 ---✓

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 1.0 PSI REPLICATION: 3

TEMPERATURE: -20°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	9	1	3	2	1''
	37	56	72	98	1''
	15	16	14	14	4''
2''	8	11	6	10	4''
	26	29	36	41	2''
	18	21	21	20	1''
3''	5	12	7	4	2''
	26	30	31	35	2''
	19	20	20	22	4''

REFRIGERATED ---

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 10 ; I REPLICATION: 4

TEMPERATURE: -2

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	2	10	4	9	4''
	37	58	81	98	4''
	15	15	15	14	1''
2''	5	8	11	7	4''
	25	30	36	44	2''
	19	20	20	20	2''
3''	12	6	3	1	1''
	27	30	32	36	4''
	17	19	20	21	4''

REFRIGERATED ---

CO 2 ---✓

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 1.0 PSI REPLICATION: 1

TEMPERATURE: -20°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''
1''	1	10	5	12
2''	38	57	80	97
2''	15	15	14	14
1''	3	4	2	9
4''	24	30	34	42
4''	19	20	20	21
2''	11	6	8	7
4''	26	28	31	34
1''	18	20	20	23

REFRIGERATED ✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: [illegible] REPLICATION: 2

TEMPERATURE: [illegible] F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	5	6	4	8	2''
	40	55	74	124	4''
	15	16	15	14	1''
2''	12	9	1	11	1''
	24	31	33	44	4''
	20	20	21	19	1''
4''	2	3	10	7	2''
	28	31	31	35	4''
	18	19	20	21	2''

REFRIGERATED ---

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: [illegible] REPLICATION: 3

TEMPERATURE: — 20°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	12	10	7	9	2''
	37	55	83	99	4''
	16	10	15	14	4''
2''	1	6	2	11	4''
	23	29	33	40	2''
	22	21	21	21	1''
3''	4	5	8	3	4''
	26	29	29	34	2''
	18	20	21	22	1''

REFRIGERATED ---

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 1.0 PSI REPLICATION: 4

TEMPERATURE: −20°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	10	5	7	9	2''
	37	56	81	105	2''
	16	16	14	15	4''
2''	11	12	1	3	4''
	24	30	33	43	1''
	20	20	21	20	4''
3''	4	6	8	2	1''
	29	29	32	33	2''
	18	20	20	21	2''

REFRIGERATED ✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 1

TEMPERATURE: +20°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	1	2	3	6	1''
	49	61	70	85	1''
	11	12	13	12	2''
2''	8	5	4	9	1''
	36	39	43	45	4''
	14	15	16	17	2''
3''	7	12	10	11	4''
	39	40	45	45	4''
	14	15	16	16	

REFRIGERATED ---

CO 2 ✓

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 2

TEMPERATURE: +20°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	8	10	1	2	1''
	47	57	71	85	2''
	12	13	13	12	2''
2''	11	4	6	3	2''
	37	40	43	48	4''
	13	16	16	17	1''
3''	9	7	12	5	1''
	43	40	44	46	4''
	12	15	16	17	

REFRIGERATED ---

CO 2 ✓

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: .25 PSI REPLICATION: 3

TEMPERATURE: + 20°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	2	4	7	10	4''
2''	46	58	70	83	2''
	12	13	13	12	1''
2''	9	3	11	5	4''
	36	40	43	45	1''
	13	16	16	17	4''
3''	12	8	6	1	2''
	41	42	44	41	4''
	13	14	16	16	

REFRIGERATED ---

CO 2 ✓

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 4

TEMPERATURE: + 20°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
	1	5	8	9	1''
1''	44	59	67	86	4''
	1	11	13	11	2''
	7	4	10	6	1''
2''	37	40	43	46	2''
	13	16	17	18	1''
	11	2	12	3	2''
3''	41	43	43	45	4''
	13	14	16	16	4''

REFRIGERATED ---

CO 2 -V-

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 1

TEMPERATURE: ~ 20°F

DROP HEIGHT

THICKNESS	12"	18"	24"	30"	
1"	12	5	8	9	2"
	42	56	70	84	4"
	14	13	14	12	2"
2"	2	1	6	4	1"
	35	36	39	52	2"
	15	17	17	20	4"
3"	10	11	7	3	1"
	40	40	41	42	4"
	14	15	16	16	4"
					1"

REFRIGERATED ✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 2

TEMPERATURE: +

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
					4''
1''	8	9	2	7	1''
	42	55	67	58	4''
	13	13	14	12	2''
					2''
2''	5	4	12	10	4''
					1''
	33	36	38	45	1''
	15	16	17	18	1''
					2''
3''	3	11	1	6	4''
	40	35	40	41	2''
	12	16	16	16	

REFRIGERATED ✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 psi REPLICATION: 3

TEMPERATURE: +20°F

DROP HEIGHT

THICKNESS	12"	18"	24"	30"
1"	6	10	7	3
	42	55	67	81
	12		14	12
2"	1	5	12	11
	33	37	40	43
	16	17	16	19
3"	9	4	8	2
	36	38	43	45
	15	16	16	16

REFRIGERATED -✓-

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 [illegible] REPLICATION: 4

TEMPERATURE: [illegible] °F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
					1''
1''	6	3	2	1	1''
	41	53	67	79	1''
	14	13	13	13	2''
					4''
	4	8	9	10	
2''					1''
	33	35	40	45	4''
	15	16	17	17	2''
					2''
	5	7	12	11	2''
3''					4''
	42	40	42	41	4''
	13	15	16	18	

REFRIGERATED ✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: [illegible] REPLICATION: 1

TEMPERATURE: +2[illegible]

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	3	12	8	5	2''
	40	59	77	10[illegible]	1''
	20	18	16	14	2''
1''	4	10	11	1	1''
2''	22	29	[illegible]5	37	4''
	25	26	24	24	1''
	7	6	9	2	2''
3[illegible]''	22	[illegible]5	27	32	1''
	25	[illegible]3	[illegible]6	26	

REFRIGERATED ---

CO 2 ✓

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 1.0 PSI REPLICATION: 2

TEMPERATURE: +20° F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	6	11	1	8	1''
	34	56	78	95	2''
	19	18	16	15	4''
2''	5	10	12	2	4''
	4	29	36	44	2''
	5	25	25	24	1''
3''	4	7	3	9	4''
	23	25	28	33	2''
	23	25	28	26	1''

REFRIGERATED ---

CO 2 ✓

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: [illegible] REPLICATION: 3

TEMPERATURE: [illegible]

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	9	4	1	7	1''
	38	55	76	101	4''
	18	17	16	15	1''
2''	11	8	6	5	2''
	23	29	34	41	1''
	23	26	25	25	2''
3''	2	10	12	3	4''
	21	25	28	32	4''
	24	25	26	27	

REFRIGERATED ---

CO 2 ---✓

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 1.0 PSI REPLICATION: 4

TEMPERATURE: +20 F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	2	3	1	9	1''
	29	56	70	97	1''
	17	17	16	15	4''
2''	11	5	8	6	2''
	23	29	26	42	4''
	23	25	24	24	2''
3''	12	7	10	4	1''
	25	24	27	31	4''
	23	24	26	27	2''

PEFRIGERATED ---

CO 2 -✓-

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: [illegible] REPLICATION: 1

TEMPERATURE: [illegible]

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
	11	10	2	3	2''
1''					1''
	37	60	83	117	1''
	22	16	15	15	2''
	4	8	9	1	4''
2''					4''
	23	35	35	41	4''
	24	26	25	25	2''
	6	12	7	5	2''
3''					1''
	20	23	27	32	1''
	24	28	26	24	4''

REFRIGERATED --

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: [illegible] REPLICATION: 2

TEMPERATURE: [illegible]

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	9	8	12	10	2''
	29	65	83	[illegible]	4''
	18	17	15	14	1''
					2''
2''	6	1	4	5	2''
	22	29	36	46	4''
	25	25	24	24	1''
					4''
3''	7	11	9	2	1''
	23	24	[illegible]	30	4''
	22	25	26	27	1''

REFRIGERATED ✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 10 PSI REPLICATION: 3

TEMPERATURE: +20°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
	2	5	11	6	4''
1''					1''
	37	56	82	107	4''
	-1	17	15	5	4''
	12	8	10	9	1''
2''					1''
	21	30	34	45	4''
	24	25	26	24	2''
	4	3	7	1	2''
3''					1''
	21	24	26	33	2''
	26	25	28	26	

REFRIGERATED ---✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 1.0 PSI REPLICATION: 4

TEMPERATURE: +2? F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	7	5	11	6	4''
	39	57	76	104	2''
	18	18	16	15	4''
2''	3	2	9	8	1''
	21	30	35	46	1''
	24	24	26	24	2''
3''	10	4	12	1	4''
	23	24	27	23	1''
	22	27	27	27	4''

REFRIGERATED ---✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 1

TEMPERATURE: +70°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
	4	2	10	5	4''
1''	42	60	77	107	4''
	15	14	14	13	1''
	12	9	8	11	1''
2''	27	36	42	51	4''
	20	21	21	20	2''
	3	1	6	7	2''
3''	24	30	32	36	1''
	21	22	23	24	2''

REFRIGERATED ---

CO 2 ✓

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 2

TEMPERATURE: +70°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	6	2	11	7	2''
	43	63	80	98	2''
	16	14	14	14	2''
2''	3	4	9	1	4''
					1''
	26	34	43	49	1''
	21	20	15	20	4''
3''	5	10	8	12	2''
					4''
	25	29	33	38	1''
	21	23	23	22	4''

REFRIGERATED ---

CO 2 -X-

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 3

TEMPERATURE: +70° F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	11	5	1	3	1''
	43	60	73	95	1''
	15	14	14	13	2''
2''	4	10	6	7	1''
	26	39	40	46	2''
	20	20	21	21	4''
3''	2	8	12	9	2''
	25	29	33	37	1''
	20	22	23	22	4''

REFRIGERATED ---

CO 2 -√-

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 4

TEMPERATURE: + 70°F

DROP HEIGHT

THICKNESS	12"	18"	24"	30"	
					4"
	6	2	10	9	
1"					1"
	41	65	84	104	4"
	15	14	14	12	2"
					2"
	4	11	12	5	
2"					1"
	26	33	40	47	4"
	21	21	21	21	4"
					1"
	8	3	7	1	
3"					1"
	24	29	33	36	2"
	22	23	23	26	2"

REFRIGERATED ---

CO 2 -✓--

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 psi REPLICATION: 1

TEMPERATURE: + 70°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
	5	8	11	6	4''
1''					2''
	44	60	74	101	2''
	14	15	14	13	2''
	4	7	2	3	1''
2''					1''
					2''
	25	33	41	47	
	20	21	21	21	1''
					4''
	12	9	10	1	4''
3''					1''
	25	27	33	34	4''
	20	21	22	22	

REFRIGERATED ✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 2

TEMPERATURE: +70°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	43 / 15	61 / 14	76 / 14	97 / 13	2'' / 1''
2''	28 / 19	32 / 21	40 / 21	49 / 20	1'' / 2''
3''	24 / 20	30 / 22	33 / 22	37 / 23	2'' / 4''
	2 / 12	7 / 9	4 / 6	5 / 1	4'' / 2''
	11	10	8	3	1'' / 4''

REFRIGERATED ✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 3

TEMPERATURE: +70°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
	9	8	3	4	2''
1''					4''
	43	59	74	101	1''
	15	15	14	12	1''
	5	10	7	1	2''
2''					4''
	25	33	41	45	2''
	20	21	21	21	1''
	11	12	2	6	2''
3''					4''
	25	29	33	36	4''
	20	22	23	24	

REFRIGERATED ✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 3

TEMPERATURE: +70°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
	9	8	3	4	2''
1''	43	59	74	101	4''
	15	15	14	12	1''
	5	10	7	1	1''
2''	25	33	41	45	2''
	20	21	21	21	1''
	11	12	2	6	1''
3''	25	29	33	36	2''
	20	22	23	24	4''

REFRIGERATED ✓

CO 2 ---

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 0.5 PSI REPLICATION: 4

TEMPERATURE: 70°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	6	11	3	12	4''
	41	63	76	97	1''
	15	14	14	13	2''
2''	8	4	9	5	1''
	26	33	41	46	4''
	20	21	21	21	2''
3''	1	10	7	2	4''
	24	29	32	37	1''
	21	22	22	23	1''

REFRIGERATED ✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 1.0 PSI REPLICATION: 1

TEMPERATURE: +70°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
	11	6	9	10	4''
1''					4''
	45	77	95	148	4''
	19	17	17	14	4''
	12	7	5	8	2''
2''					1''
	21	31	41	51	2''
	30	28	27	25	2''
	4	3	2	1	1''
3''					1''
	17	24	31	35	2''
	33	32	32	30	

REFRIGERATED ---

CO 2 ✓

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 1.0 PSI REPLICATION: 2

TEMPERATURE: + 70°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	9	1	4	11	1''
	13	75	100	149	4''
	20	17	16	14	2''
2''	6	3	5	12	1''
	23	31	40	58	2''
	29	28	28	25	4''
3''	2	8	7	10	4''
	17	24	27	37	1''
	32	33	32	32	2''

REFRIGERATED ---

CO 2 -√-

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 1.0 (

REPLICATION: 3

TEMPERATURE: +70°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	11	4	5	1	1''
	46	75	99	144	2''
	17	17	16	14	1''
2''	3	8	9	6	1''
	23	33	42	50	2''
	29	28	27	27	2''
3''	10	7	12	2	1''
	13	23	29	36	4''
	32	34	2	22	4''

REFRIGERATED ---

CO 2 ✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 10 | 32 REPLICATION: 4

TEMPERATURE: 170°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''	8	3	10	5	4''
	44	74	111	162	1''
	20	14	15	12	2''
2''	7	6	11	4	1''
	23	34	42	53	2''
	28	28	26	25	1''
3''	1	2	9	12	4''
	16	23	28	32	2''
	32	32	35	33	4''

REFRIGERATED ---

CO 2 ✓

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 101.5 REPLICATION: 1

TEMPERATURE: 70°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
	9	3	4	12	2''
1''					2''
	47	60	102	152	1''
	19	18	16	14	1''
	1	3	6	2	4''
2''					2''
					4''
	30	37	29	54	2''
					1''
	5	10	11	7	4''
30''					4''
	17	22	27	31	1''

REFRIGERATED ✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 1.0 PSI REPLICATION: 2

TEMPERATURE: +70°F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''
1''	4	5	2	1
	43	80	115	164
	19	17	15	13
2''	9	10	9	12
	23	35	41	49
	31	28	27	27
3''	3	11	7	6
	18	23	27	24
	33	33	32	32

REFRIGERATED -✓-

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: [illegible] REPLICATION: 3

TEMPERATURE: [illegible]

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
	9	3	10	6	4''
1''					4''
	45	16	101	136	1''
	20	17	16	15	2''
	8	4	7	5	2''
2''					1''
	23	31	45	49	2''
	29	29	26	26	2''
	11	1	12	2	1''
3''					4''
	17	23	30	36	4''
	-	31	32	31	

REFRIGERATED ✓

CO 2 ---

SINGLE MATERIAL

ETHAFOAM-2

STRESS LEVEL: 1.0 [illegible] REPLICATION: 4

TEMPERATURE: +70° F

DROP HEIGHT

THICKNESS	12''	18''	24''	30''	
1''					
	5	11	4	9	2''
4''					
	46	72	105	140	2''
	20	17	16	14	1''
1''					
	8	12	3	1	1''
2''					
4''					
	21	33	29	54	4''
	29	27	26	25	2''
1''					
	7	6	10	2	4''
0''					
1''					
	17	24	28	34	2''
	33	33	32	31	

REFRIGERATED ✓

CO 2 ---

APPENDIX B

```
C     ****************************************************************
C
C     CO2 VERSUS REFRIGERATION ANALYSIS OF VARIANCE
C
C     ****************************************************************
      REAL
     +    MSW
      DIMENSION
     +    CA(12,2),       CG(48,2),       P(2),           RA(12,2),
     +    RG(48,2)
      PRINT 90
      FV=4.30
   10 CONTINUE
      DO 20 N=1,12
      DO 20 M=1,2
      RA(N,M)=0.0
      CA(N,M)=0.0
   20 CONTINUE
      I1=1
      I2=4
      DO 40 N=1,12
      DO 30 M=1,2
      DO 30 I=I1,I2
      READ (5,100,END=80) TOUH,H,P(M),RG(I,M)
      READ (5,100) TOUH,H,P(M),CG(I,M)
      RA(N,M)=RA(N,M)+RG(I,M)
      CA(N,M)=CA(N,M)+CG(I,M)
   30 CONTINUE
      I1=I2+1
      I2=I2+4
   40 CONTINUE
      DO 70 M=1,2
      DO 50 I=1,12
      RA(I,M)=RA(I,M)/4.0
      CA(I,M)=CA(I,M)/4.0
   50 CONTINUE
      WRITE (6,110) (RA(I,M),CA(I,M),I=1,12)
      T1=0.0
      T2=0.0
      TS1=0.0
      TS2=0.0
      DO 60 I=1,12
      T1=CA(I,M)+T1
      T2=RA(I,M)+T2
      TS1=CA(I,M)**2+TS1
      TS2=RA(I,M)**2+TS2
   60 CONTINUE
      TOO=T1+T2
      TOO2=TOO*TOO
      TS12=TS1+TS2
      SSTOT=TS12-TOO2/24.0
      SSTRT=(T1*T1)/12.+(T2*T2)/12.-TOO2/24.0
```

```
      SSE=SSTOT-SSTRT
      MSW=SSE/22.0
      F=SSTRT/MSW
      PRINT 120, TEMP,TH,P(M)
      PRINT 130, SSTOT,SSTRT,SSE,MSW,F
      IF (ABS(F).LE.FV) PRINT 140
   70 CONTINUE
      GO TO 10
   80 PRINT 150
      CALL EXIT
   90 FORMAT (1H1)
  110 FORMAT (4X,6F10.1)
  120 FORMAT (///,12(5X,2F14.3,/))
  130 FORMAT (///,5X,'TEMP= ',F6.2,3X,'DROP HEIGHT= ',F6.2,3X,'THICKNESS
     += ',F4.2,3X,'PSI= ',F6.2)
  150 FORMAT (5X,'SSTOT=',F12.4,2X,'SSTRT=',F12.4,2X,'SSE=',F12.4,2X,'MS
     +W=',F12.4,2X,'F=',F12.4)
  140 FORMAT ('+',T103,'CAN NOT REJECT H0')
  150 FORMAT (1H1,5X,'END OF JOB')
      END
```