

**REPORT OF
PRODUCT EVALUATION
CONDUCTED ON**

IntegraSpec Insulating Concrete System

FOR

**PHIL-INSUL CORPORATION
Unit 11U-735 Arlington Park Place
Kingston, Ontario
Canada K7M 8M8
Attn: Michel Philippe**

MANUFACTURED BY

**CONTOUR PRODUCTS FACILITY
KANSAS CITY, KANSAS**

REPORT PREPARED BY:

**INTERTEK TESTING SERVICES NA LTD.
3210 AMERICAN DRIVE,
MISSISSAUGA, ON. CANADA
L4V 1B3**

PROJECT NUMBER: 3050148

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Phil-Insul Corporation
Contour Products-Kansas City,
Kansas Facility
December 16, 2003

Project No. 3051048
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PREFACE

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INTRODUCTION

Intertek Testing Services NA Ltd has conducted a testing program for Phil-Insul Corporation on the IntegraSpec Insulating Concrete System comprised of expanded polystyrene thermal foam insulation connected with polystyrene reinforcing web material as follows:

This report covers the screw withdrawal and lateral resistance tests on the high impact polystyrene channels cast into EPS foam to create a positive connection between interior and exterior EPS walls and to serve as an anchor point for surface finishing materials.

The EPS foam panels complete with high impact polystyrene channels were sampled by Gene Wheat, of Intertek Testing Services NA Ltd. on November 25, 2003 from Contour Products – Kansas City, Kansas facility. Samples were received for testing December 4, 2003. Testing was performed between the dates of December 9, 2003 and December 12, 2003.

PRODUCT DESCRIPTION

<u>Foam Description:</u>	Phil-Insul Corporation IntegraSpec Insulating Concrete System manufactured at Contour Products Kansa City, Kansas facility.
<u>Material:</u>	Expanded polystyrene foam manufactured from one (1) bead type identified as BASF BFL 327.
<u>Foam Panel Dimensions:</u>	Standard Panel: 12-1/4" (311 mm) high X 48" (1219 mm) long X 2-1/2" (64 mm) thick including ribs each side. Inside Corner Panel: 12-1/4" (311 mm) high X 21-1/2" (546 mm) long X 5-1/2" (140mm) wide X 2-1/2" (64 mm) thick including ribs. Outside Corner Panel: 12-1/4" (311 mm) high X 32-1/2" (825 mm) long X 16-1/2" (419 mm) wide 2-1/2" (64 mm) thick including ribs.
<u>Color:</u>	White
<u>Web Description:</u>	High Impact Polystyrene reinforcing webs are cast into EPS foam to create a positive connection between interior and exterior EPS walls and to serve as an anchor point for surface finishing materials.
<u>Web Material:</u>	High Impact Polystyrene
<u>Web Spacing:</u>	Every 8" (203 mm) on centre oriented vertically
<u>Web Color:</u>	Black

TEST PROGRAM

Testing of Fasteners

Testing of foam insulating panels with high impact polystyrene channels cast into EPS foam to create a positive connection between interior and exterior EPS walls and to serve as an anchor point for surface finishing materials for screw withdrawal and lateral resistance test

Testing was conducted in general accordance with sections 3.9 and 3.10 of ICBO ES AC116 (July 2001) "Acceptance Criteria for Nails And Spikes" and in conjunction with ASTM D 1761-88 (Reapproved 2000) "Standard Test Methods for Mechanical Fasteners in Wood" using the following test methods:

A. Screw Withdrawal:

ASTM D1761-88 (Reapproved 2000) Modified

B. Lateral Screw Resistance Test:

ASTM D1761-88 (Reapproved 2000) Modified

SUMMARY OF TEST RESULTS

Testing of Fasteners

	TEST TYPE	TEST METHOD	RESULT
A	Screw Withdrawal	ASTM D 1761-88 (Reapproved 2000) Modified	Average Ultimate Load: 680 N (153 lb.)
B	Lateral Screw Resistance Test	ASTM D 1761-88 (Reapproved 2000) Modified	Average Ultimate Load: 630 N (141 lb.) Average Load At 75% of Proportional Limit: 150 N (34 lb.)

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Measurement Uncertainty - Since this test was conducted in compliance with a standard that sets limits on the sources of uncertainty and specified the form of reported results, no measurement uncertainty evaluation has been included in this report.

Tested and reported by Paul Roberts

Respectfully submitted,

INTERTEK TESTING SERVICES NA LTD.

REVIEWED BY:

Paul Roberts
Physical Testing Services

Vern W. Jones, C.E.T.
Manager
Physical Testing Services

PR:VWJ:pr

2 cc: Client

cc: ITS, Coquitlam Office, B.C.

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APPENDIX 1

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TEST DATA

Testing of Fasteners

A. Screw Withdrawal ASTM D 1761–88 (Reapproved 2000) Modified

Procedure:

Number 6 size drywall screws were driven into the centre of the flat 40 mm (1-9/16") wide face of the polystyrene channels for a distance of 10 mm (3/8") without pre-drilling holes. The screw insertion depth was based on the use of 41 mm (1-5/8") long screws being driven through 13 mm (1/2") thick drywall wallboard and approximately 19 mm (3/4") thick plastic foam thermal insulation before contacting the faces of the polystyrene channels during normal installation procedures. The screws were driven into areas centered between the reinforcement walls that join two sections of the polystyrene channels together. Some of the screws were inserted approximately 108 mm (4-1/4") and others 70 mm (2-3/4") from the end of the face of the polystyrene channels (see photographs No. 1, 2 and 3).

The outer layer of plastic foam insulation was removed and the polystyrene channel specimens were placed in a holding fixture affixed to the bed of the testing machine having a 13 mm wide slot to support the edges of the face of the polystyrene channel for a length of approximately 216 mm (8-1/2"). The heads of the screws were gripped using a suitable fixture and the screws were extracted at a cross head speed of 2.5 mm/min (0.10 in/min) (see photograph No. 4).

Results :

Test Number	Location	Load N (lb)
1	108 mm (4-1/4") from end of face	641 (144)
2	70 mm (2-3/4") from end of face	658 (148)
3	108 mm (4-1/4") from end of face	672 (151)
4	70 mm (2-3/4") from end of face	703 (158)
5	108 mm (4-1/4") from end of face	703 (158)
6	70 mm (2-3/4") from end of face	703 (158)
7	108 mm (4-1/4") from end of face	698 (157)
8	70 mm (2-3/4") from end of face	685 (154)
9	108 mm (4-1/4") from end of face	667 (150)
10	70 mm (2-3/4") from end of face	667 (150)
Average		680 (153)

APPENDIX 1 continued

TEST DATA continued

Testing of Fasteners continued

B. Lateral Screw Resistance ASTM D 1761–88 (Reapproved 2000) Modified

Procedure:

Oriented strand board 305 mm (12") long by 51 mm (2") wide by 13mm (1/2") thick was attached to specimens of foam panels 40 mm (1-9/16") wide containing the polystyrene channels using number 6 size drywall screws 41 mm (1-5/8") long. Screws were driven through predrilled and counter sunk holes in the oriented strand board into the centre of the flat 40 mm (1-9/16") wide face of the polystyrene channels without pre-drilling holes in the channels. One screw for each board was driven through the centre of each board 51 mm (2") from the end of the board into the centre of a foam panel specimen 40 mm (1-9/16") wide by 333 mm (12-3/4") long (including all protrusions) by 64 mm (2-1/2") thick at a distance of 100 mm (4") from the end of the specimen. This placed the position of the screws centered between the reinforcement walls that join two sections of the polystyrene channels together and 70 mm (2-3/4") from the end of the face of the polystyrene channels (see photographs No. 1, 2 and 3). A board was attached to each end of each foam panel tested using one screw per board forming a specimen approximately 508 mm (20") long with an over lap section 150 mm (6") long on each end of each foam panel specimen tested.

The free ends of the attached boards were placed in the jaws of the tester. A tension load was applied to each specimen using a cross head speed of 2.5 mm (0.10 in/min) (see photographs No. 5 and 6). The load, verses the amount of movement, the maximum load at failure at the weakest attachment point and the mode of failure was noted. The amount of movement at each attachment point was taken as the total amount of movement divided by two.

Test Number	Load Vs Movement N (lb.)					
	@ 0.25 mm (0.01 in.)	@ 0.38 mm (0.015 in.)	@ 1.27 mm (0.05 in.)	@ 2.54 mm (0.10 in.)	@ 5.08 mm (0.20 in.)	@ 7.62 mm (0.30 in.)
1	30 (6)	40 (10)	100 (23)	140 (32)	220 (50)	300 (68)
2	120 (28)	140 (32)	190 (42)	230 (52)	300 (67)	380 (86)
3	110 (25)	150 (34)	230 (52)	260 (58)	320 (72)	400 (90)
4	90 (20)	200 (44)	360 (80)	410 (92)	510 (114)	600 (135)
5	110 (24)	150 (34)	230 (51)	280 (62)	360 (82)	450 (102)
6	120 (28)	170 (38)	300 (67)	360 (72)	360 (82)	440 (99)
7	90 (20)	150 (34)	240 (54)	330 (74)	390 (88)	480 (107)
8	100 (22)	160 (36)	280 (62)	330 (74)	400 (89)	470 (106)
9	80 (17)	90 (21)	200 (44)	210 (48)	320 (73)	470 (105)
10	110 (24)	170 (39)	280 (62)	320 (71)	400 (90)	500 (113)
Average	100 (21)	140 (32)	240 (54)	280 (64)	360 (81)	450 (102)

APPENDIX 1 continued

TEST DATA continued

Testing of Fasteners continued

B. Lateral Screw Resistance ASTM D 1761-88 (Reapproved 2000) Modified continued

Test Number	Load @ Yield N (lb.)	Load 75% of Yield Load N (lb.)	Ultimate Load N (lb.)	Failure Mode
1	90 (21)	70 (16)	520 (116)	Screw Failed
2	110 (25)	80 (19)	560 (126)	Screw Pulled Out
3	210 (48)	160 (36)	560 (126)	Screw Pulled Out
4	330 (75)	250 (56)	890 (200)	Board Failed @ Screw Head
5	170 (38)	130 (29)	620 (140)	Screw Pulled Out
6	290 (66)	220 (50)	600 (136)	Screw Pulled Out
7	220 (50)	170 (38)	430 (96)	Screw Failed
8	250 (57)	190 (43)	590 (133)	Screw Failed
9	80 (17)	60 (13)	640 (143)	Screw Failed
10	250 (57)	190 (43)	870 (195)	Screw Pulled Out
Average		150 (34)	630 (141)	

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PHOTOGRAPHS



Photograph no. 1 : Typical test specimen of polystyrene channel.

APPENDIX 2 continued

PHOTOGRAPHS continued



Photograph no. 2 : Typical tested specimen of polystyrene channel showing positions of the screws.

APPENDIX 2 continued

PHOTOGRAPHS continued



Photograph no. 3: Cut edge of plastic foam insulation showing position of the polystyrene channel face.

APPENDIX 2 continued

PHOTOGRAPHS continued



Photograph no. 4: Test set-up for screw withdrawal tests, showing fixtures used to support the specimens and grip the screws.

APPENDIX 2 continued

PHOTOGRAPHS continued



Photograph no. 5: Test set-up for lateral screw resistance tests.

APPENDIX 2 continued

PHOTOGRAPHS continued



Photograph no. 6: Test set-up for lateral screw resistance tests.

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TEST EQUIPMENT

1. Screw withdrawal and lateral screw resistance tests were measured using an Instron Model 1000 tester (inventory number 280-01-0082).
2. Specimens were conditioned using a Hot Pack, 175 Series Environmental Chamber, Model No. 47532, Serial No. 74571 (inventory number 280-01-0133).