

# Memo



Daly • Standlee & Associates, Inc.

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**Date:** April 1, 2008

**To:** Dan Zinzer

**Clackamas County Business and Community Services  
9101 SE Sunnybrook Blvd  
Clackamas, Oregon 97015**

**From:** Kerrie G. Standlee, P.E.

**Re:** North Clackamas Park Environmental Sound Reduction

**DSA File #: 198071**

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**Dan:**

After my visit with you at the North Clackamas Park facility last December, I had one of our engineers run a brief analysis to determine how much dugout generated sound might be contributed to residences to north of the ballpark by the sloped roof of the west dugout of the northwest ball field. The results of the analysis indicated that there is not a direct reflection off the underside of the dugouts that reaches the residents but it shows there could be up to three sound reflections off the underside of the roof that, when added to the sound that reflects off the ground likely increases the level at the residences by up to 4 dB.

While a 4 dB increase in the sound reaching the residences would not necessarily be considered a significant change in level, it could be considered a very noticeable change. Therefore, it appears that it could be beneficial to treat the underside of the roof of the west dugout of the northwest field and the east dugout of the northeast field; both dugouts that place the players facing toward the north residences with the roof sloped up toward the north.

Treating the underside of the sloped roofs could be as simple as placing 2" thick fiberglass board material on the underside of the roofs. Of course, you would likely not want to leave the fiberglass directly exposed to the dugout area because it may become an attractant to kids and they may try to pull it off or birds may want to borrow some of it to build their nests in the area. So, I recommend you consider using what is called duct liner board (a black color fiberglass board material like that shown in the attached two product literature sheets – Owens Corning and Johns Manville) and covering it with a wood lattice since the existing roof deck is exposed wood. You might want to cover the top of the lattice (the side facing the



## North Clackamas Park Environmental Sound Reduction

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fiberglass) with a screen cloth to hide the fiberglass from being in direct sight of the kids but I don't think it will be necessary if the lattice material has small openings. The only restriction in using the lattice is that the openings through the lattice be at least 25% of the area of the lattice.

Attaching the fiberglass board to the underside of the roof could be accomplished by gluing stic-clips to the underside of the roof and impaling the fiberglass board on the clips. The ends of the clips would be covered with a metal cap. If a lattice material is used to cover the fiberglass, the stic-clips would not be necessary because the lattice would hold the material up. The lattice could be attached to the underside of the roof deck using furring strips running from the high side to the low side of the roof every four feet or so along the length to attach the lattice through to the roof deck.

If there is a concern with sound radiating in other directions, then it would be advisable to treat the underside of the other dugout roofs in a similar fashion.



**Permacote® Linacoustic® R-300**

*Rigid Fiber Glass Plenum Liner Board*

**Description**

Permacote Linacoustic R-300 is a rigid fiber glass board that meets or exceeds all ASTM C 1071 Type II duct liner requirements. The airstream surface and the long edges are coated with a tough, smooth, state-of-the-art acrylic polymer.

**Uses**

R-300 is specifically designed for use as an extended performance lining insulation for HVAC plenums and air distribution ductwork. It offers exceptional durability and superior acoustical and thermal performance in systems operating at velocities up to 6,000 fpm (30.5 m/sec) and temperatures up to 250°F (121°C).

**Advantages**

**Improves Indoor Building Environment.** Permacote Linacoustic R-300 helps improve indoor environmental quality by helping to control both temperature and sound.

**Withstands High Velocity.** Permacote Linacoustic R-300 has been tested to the recommended maximum velocity of 6,000 fpm (30.5 m/sec). Fiber erosion test results were determined using the Isokinetic Sampling Method described in Johns Manville Fiber Erosion Testing Fact Sheet HSE-133FS.

**Absorbs Disturbing Sound.** Permacote Linacoustic R-300 has exceptional sound-absorbing properties far exceeding the requirements of ASTM C 1071. Duct-transmitted noise, such as crosstalk and sound energy from air movement and mechanical equipment is noticeably reduced.

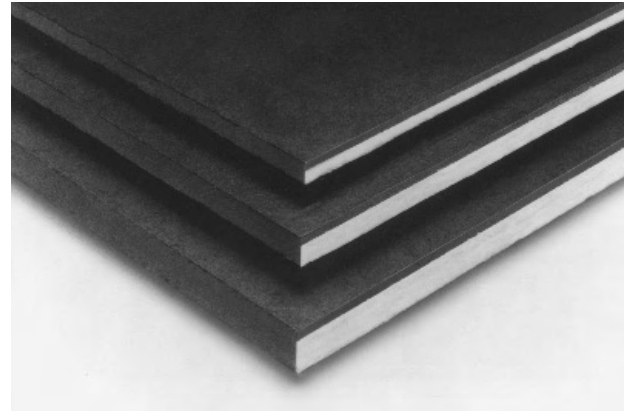
**Resistant to Dust and Dirt.** The acrylic polymer airstream surface coating helps guard against incursion of dust or dirt into the substrate, minimizing the potential for biological growth.

**Will Not Support Microbial Growth.** Permacote coating is formulated with a protective agent to protect the coating against potential growth of fungus and bacteria. The protective agent is EPA registered for use in HVAC applications, and designed to last the life of the system.

Permacote Linacoustic R-300 passes ASTM C 1071 fungi testing, as well as the more stringent ASTM G 21. Bacteria tests were conducted in accordance with ASTM G 22. Detailed information is available in Johns Manville fact sheet HSE-103FS.

Note: As with any type of surface, microbial growth may occur in accumulated duct system dirt, given certain conditions. This risk is minimized with proper design, filtration, maintenance and operation of the HVAC system.

**Resists Damage.** The specially designed Permacote airstream surface enhances the ability of R-300 to resist damage from typical in-shop handling, fabrication, and jobsite shipment. If necessary, the surface may be cleaned using standard industry-recognized dry methods. See the North American Insulation Manufacturers Association (NAIMA) "Cleaning Fibrous Glass Insulated Air Duct Systems."



**Operating Temperature Limit:** 250°F (121°C)

**ISO 9000 Certification**

Johns Manville mechanical insulation products are designed, manufactured and tested in our own facilities, which are certified and registered to stringent ISO 9000 (ANSI/ASQC 90) series quality standards. This certification, along with regular, independent third-party auditing for compliance, is your assurance that Johns Manville products deliver consistent high quality.

**Available Forms**

Thickness		Width		Length	
(in)	(mm)	(in)	(mm)	(in)	(mm)
1	25	48	1219	96	2438
1½	38	48	1219	96	2438
2	51	48	1219	96	2438

Non-standard sizes up to 4" (102 mm) thickness and 120" (3.1 m) lengths available on special request.

**Specification Compliance**

ASTM C 1071, Type II (Replaces HH-I-545B and NAIMA AHC 101)

ASTM G21 and G22

SMACNA Application Standards for Duct Liners

NAIMA Fibrous Glass Duct Liner Installation Standard

NFPA 90A and 90B

- FHC 25/50

- Limited Combustibility <3500 Btu/lb.

Conforms to ASHRAE 62-01

NYC MEA 353-93-M

State of Washington Building Services Department

requirements for emissions of total volatile organic compounds (TVOC) and formaldehyde (CHOH) in accordance with ASTM D 5116-90

Canada: CGSB 51. 10-92

CAN/ULC S102-M88

# Permacote® Linacoustic® R-300

Rigid Fiber Glass Plenum Liner Board

## Thermal Performance

Thickness		R-Value		Conductance	
(in)	(mm)	(hr•ft <sup>2</sup> •°F)	m <sup>2</sup> •°C	Btu	W
		(hr•ft <sup>2</sup> •°F)	W	(hr•ft <sup>2</sup> •°F)	m <sup>2</sup> •°C
1	25	4.3	0.76	0.23	1.31
1½	38	6.3	1.11	0.16	0.91
2	51	8.7	1.53	0.12	0.68

R-value and Conductance are calculated from the material thermal conductivity tested in accordance with ASTM C 518 at 75°F (24°C) mean temperature.

## Sound Absorption Coefficients Type "A" Mounting

Thickness		Sound Absorption Coefficient at Frequency (Cycles per Second) of:						
(in)	(mm)	125	250	500	1000	2000	4000	NRC
1	25	0.04	0.26	0.69	1.00	1.07	1.02	0.75
1½	38	0.14	0.52	1.01	1.07	1.03	0.97	0.90
2	51	0.26	0.73	1.10	1.10	1.04	1.03	1.00

Coefficients were tested in accordance with test method ASTM C 423-90.

## Surface Burning Characteristics\*

Flame Spread	not over 25
Smoke Developed	not over 50

\*Tested per ASTM E 84, UL 723 and CAN/ULC S102-M88.

Permacote Linacoustic R-300 is a UL Class 1 product. If UL labels are required, they may be requested at time of order.

## Maximum Spacing for Fasteners. Actual Intervals Are Approximate.

Velocity*	Dimensions							
	A		B		C		E	
	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)
0-2500 fpm (0-12.7 m/sec)	3	76	12	305	4	102	18	457
2501-6000 fpm (12.7-30.5 m/sec)	3	76	6	152	4	102	16	406

\*Unless a lower level is set by the listing agency.

## Installation Recommendations

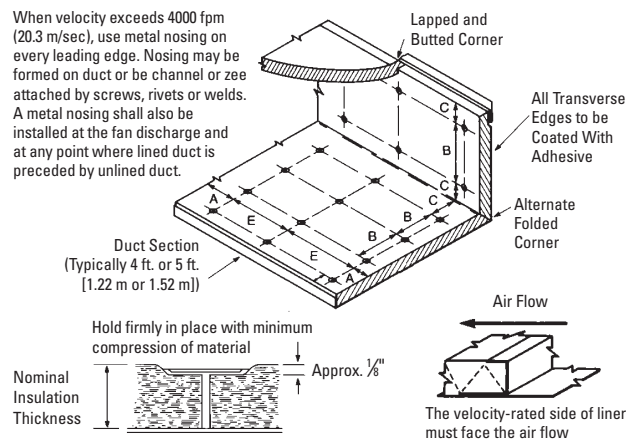
### Duct Liner Installation

All portions of duct designated to receive duct liner shall be completely covered with Permacote Linacoustic R-300. The smooth, black Permacote surface of the Linacoustic R-300 shall face the airstream. All Permacote Linacoustic R-300 shall be cut to assure tight, overlapped corner joints. The top pieces shall be supported by the side pieces.

Permacote Linacoustic R-300 shall be adhered to the sheet metal with full coverage of an approved adhesive that meets ASTM C 916, and all exposed leading edges and transfer joints shall be coated with Johns Manville SuperSeal® Duct Butter, Johns Manville SuperSeal® Edge Treatment or an approved adhesive.

The Permacote Linacoustic R-300 shall be additionally secured with mechanical fasteners spaced per the schedule shown in the diagram below. The pin length should be such as to hold the material firmly in place with minimum compression of the material.

All material shall be installed in accordance with the NAIMA Fibrous Glass Duct Liner Installation Standard.



Liner adhered to the duct with 90% min. area coverage of adhesive. Adhesive shall conform to ASTM C 916.

Shop or field cuts shall be liberally coated with SuperSeal Edge Treatment or approved adhesive.



## North American Sales Offices, Insulation Systems

### Eastern Region

P.O. Box 158  
Defiance, OH 43512  
(800) 334-2399  
Fax: (419) 784-7866

### Western Region and Canada

P.O. Box 5108  
Denver, CO 80217  
(800) 368-4431  
Fax: (303) 978-4661



# Johns Manville

Insulation Systems

P.O. Box 5108

Denver, CO 80217-5108

Product Information: (800) 654-3103

pic@jm.com

www.jmairhandling.com

AHS-156 2-07 (Replaces 11-06)



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The physical and chemical properties of Permacote® Linacoustic® R-300 Rigid Fiber Glass Plenum Liner Board represent typical, average values obtained in accordance with accepted test methods and are subject to normal manufacturing variations. They are supplied as a technical service and are subject to change without notice. Any references to numerical flame spread or smoke developed ratings are not intended to reflect hazards presented by this or any other materials under actual fire conditions. Check with the Regional Sales Office nearest you to assure current information. **All Johns Manville products are sold subject to Johns Manville's Limited Warranty and Limitation of Remedy. For a copy of the Johns Manville Limited Warranty and Limitation of Remedy, and information on other Johns Manville thermal insulations and systems, call (800) 654-3103.**



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## FEATURES & BENEFITS

- Used to enhance indoor environmental quality by absorbing noise within sheet metal ducts, and contributing to indoor comfort by lowering heat loss or gain through duct walls.
- Acoustically efficient
- Thermally effective
- Tough, abuse-resistant surface
- Cleanable surface
- Meets fire resistance codes
- Bacterial and fungal growth resistance

## CALCULATORS

▶ [Commercial Energy Calculator](#)

## APPLICATIONS

▶ [Sheet Metal Ducts - Acoustical Lining Insulation](#)

## SPECIFICATIONS

▶ [Guide Spec for Acoustical Lining of Sheet Metal Ducts.doc](#)

## OTHER INFO

▶ [LEED Certification - Mechanical and Air Handling Insulations](#)

[Submittal Sheet](#)

English

This product is used in the following systems:  
(Click on a system to link to that individual system page.)

▶ [Air Handling Insulating System](#)

