Report n. 19 / 12 / 2730

Determination of acoustic properties of PUR foam Icynene H2Foam Lite E

Customer: **Icynene-Lapolla Sprl.**
Clos Chapelle aux Champs 30
boite 3030, B-1200 Brussels
Belgie

Cooperatedi: **doc. Ing. Jiří Zach, Ph.D.**
Ing. Jan Bubeník

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Prof. Ing. Rostislav Drochytka, CSc., MBA.
Head of THD

1. Test methods and procedures

A. EN 1602 THERMAL INSULATING PRODUCTS FOR BUILDING APPLICATIONS - DETERMINATION OF THE APPARENT DENSITY,
B. EN 823 Thermal insulating products for building applications. Determination of thickness.
C. EN 12085 Thermal insulating products for building applications. Determination of linear dimensions of test specimens,
D. EN 822 Thermal insulating products for building applications. Determination of length and width
E. ISO 10534-1. Acoustics — Determination of sound absorption coefficient and impedance in impedance tubes — Part 1: Method using standing wave ratio
F. ISO 10534-2. Acoustics — Determination of sound absorption coefficient and impedance in impedance tubes — Part 2: Transfer-function method.
G. EN ISO 11654. Acoustics - Sound absorbers for use in buildings - Rating of sound absorption.

2. Test equipment

Dryer, caliper, scales, climte chamber, micrometer scale, apparatus for determining the sound absorption coefficient (acoustic interferometer).

The test equipment has been properly verified or calibrated.

3. Test samples

Samples of sprayed PUR foams in various thicknesses were delivered to the laboratory by Icynene-Lapolla:

- 30 mm (5 pcs samples 200x200x30 mm),
- 50 mm (5 pcs samples 200x200x50 mm),
- 80 mm (5 pcs samples 200x200x80 mm).

The samples were stored in a standard laboratory environment (see below) and individual test specimens were prepared from these samples (see below).

Cylindrical samples with a diameter of 100 and 30 mm were prepared to determine the sound absorption factor. The thickness of the samples was 50 mm. The samples were in a state of normal laboratory humidity.

Samples were stored under laboratory conditions prior to testing:
- air temperature: +20,5 – 22,5°C,
- air humidity: 40,1 – 43,2%.

4. Tests methods

Determination of the sound absorption coefficient was performed according to ISO 10534-1 on samples with a thickness of 30, 50 and 80 mm. Partial measurements were performed in third octave bands from 100 Hz to 6300 Hz. The samples were also determined by bulk density in accordance with EN 1602 and related standard procedures according to point 1 above

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5. Test results

The results of individual measurements are shown in the following tables::

Tab. 1: Results of determination of density according to EN 1602 of samples of PUR foam Icynene H2Foam Lite E - 30 mm

Sample	**Thickness** [mm]	**Density** [kg/m^3]
1	30,1	8,3
2	30,1	8,2
3	29,1	8,1
Average	**29,8**	**8,2**

Tab. 2: Results of determination of density according to EN 1602 of samples of PUR foam Icynene H2Foam Lite E - 50 mm

Sample	**Thickness** [mm]	**Density** [kg/m^3]
1	50,1	9,3
2	50,0	9,0
3	49,9	8,7
Average	**50,0**	**9,0**

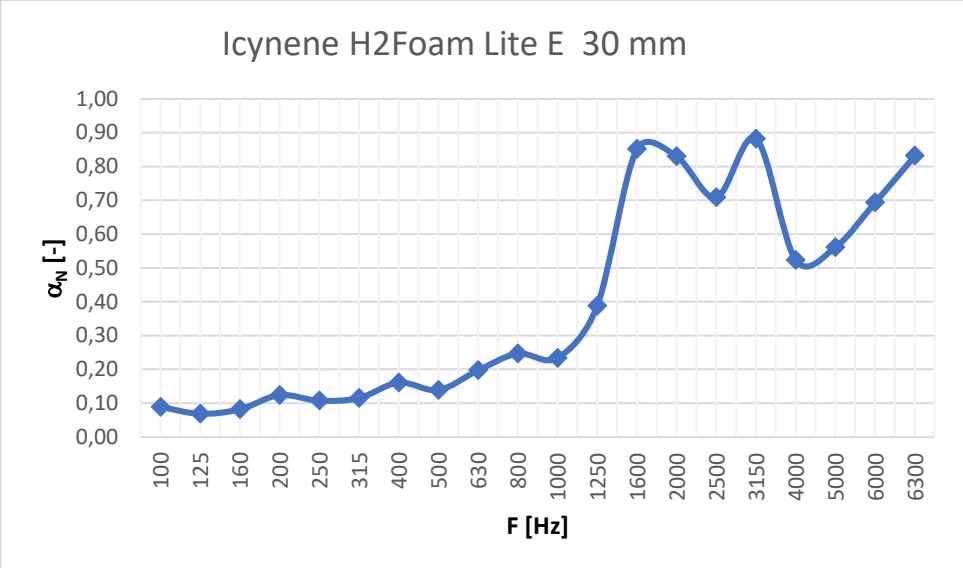
Tab. 3: Results of determination of density according to EN 1602 of samples of PUR foam Icynene H2Foam Lite E - 80 mm

Sample	**Thickness** [mm]	**Density** [kg/m^3]
1	76,2	8,1
2	80,1	7,9
3	80,0	6,7
Average	**78,8**	**7,6**

Tab. 4: Results of determination of sound absorption coefficient α_N in third octave bands according to ISO 10534-1 of samples PUR foam Icynene H2Foam Lite E - 30 mm

Frequency [Hz]	**Sound absorption coeffcitient [-]**			
	1	2	3	Průměr
100	0,06	0,09	0,11	**0,09**
125	0,05	0,07	0,09	**0,07**
160	0,09	0,10	0,06	**0,08**
200	0,10	0,13	0,15	**0,12**
250	0,08	0,12	0,13	**0,11**
315	0,08	0,11	0,15	**0,12**
400	0,13	0,17	0,19	**0,16**
500	0,08	0,15	0,19	**0,14**
630	0,09	0,19	0,31	**0,20**
800	0,11	0,25	0,38	**0,25**
1000	0,16	0,32	0,22	**0,23**
1250	0,26	0,29	0,61	**0,39**
1600	0,85	0,82	0,89	**0,85**
2000	0,94	0,78	0,77	**0,83**
2500	0,71	0,73	0,70	**0,71**
3150	0,90	0,86	0,89	**0,88**
4000	0,60	0,48	0,49	**0,52**
5000	0,50	0,50	0,68	**0,56**
6000	0,78	0,69	0,61	**0,69**
6300	0,82	0,87	0,81	**0,83**

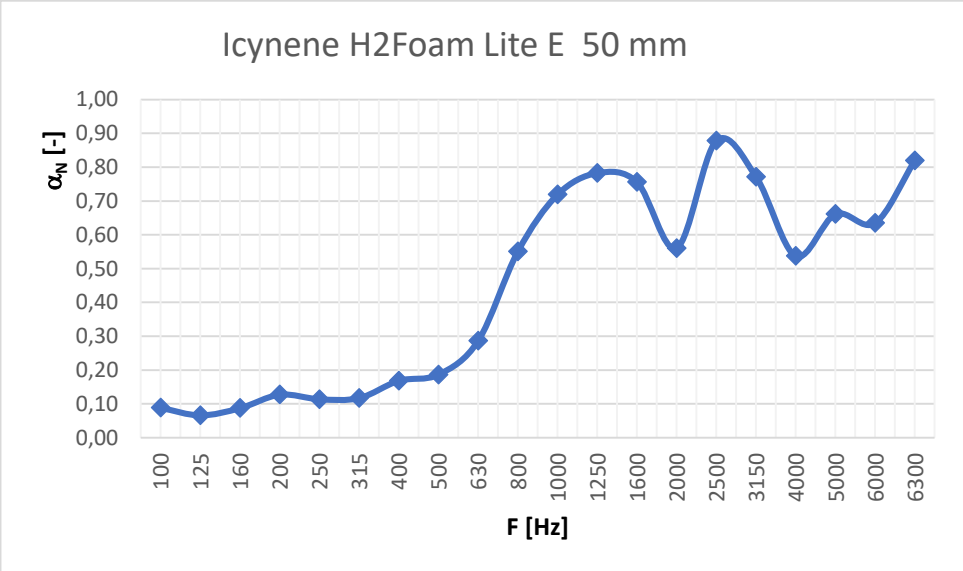
Graf 1: Results of determination of sound absorption coefficient α_N in third octave bands



Tab. 5: Results of determination of sound absorption coefficient α_N in third octave bands according to ISO 10534-1 of samples PUR foam Icynene H2Foam Lite E - 50 mm

Frequency [Hz]	**Sound absorption coeffcitient [-]**			
	1	2	3	Průměr
100	0,09	0,08	0,10	**0,09**
125	0,06	0,06	0,07	**0,07**
160	0,08	0,10	0,08	**0,09**
200	0,12	0,12	0,14	**0,13**
250	0,12	0,12	0,10	**0,11**
315	0,12	0,13	0,11	**0,12**
400	0,17	0,18	0,15	**0,17**
500	0,22	0,21	0,13	**0,19**
630	0,38	0,30	0,18	**0,29**
800	0,72	0,60	0,34	**0,55**
1000	0,70	0,61	0,86	**0,72**
1250	0,78	0,79	0,77	**0,78**
1600	0,76	0,74	0,76	**0,76**
2000	0,60	0,56	0,53	**0,56**
2500	0,94	0,77	0,93	**0,88**
3150	0,92	0,80	0,60	**0,77**
4000	0,52	0,58	0,51	**0,54**
5000	0,61	0,72	0,66	**0,66**
6000	0,64	0,60	0,66	**0,64**
6300	0,83	0,83	0,81	**0,82**

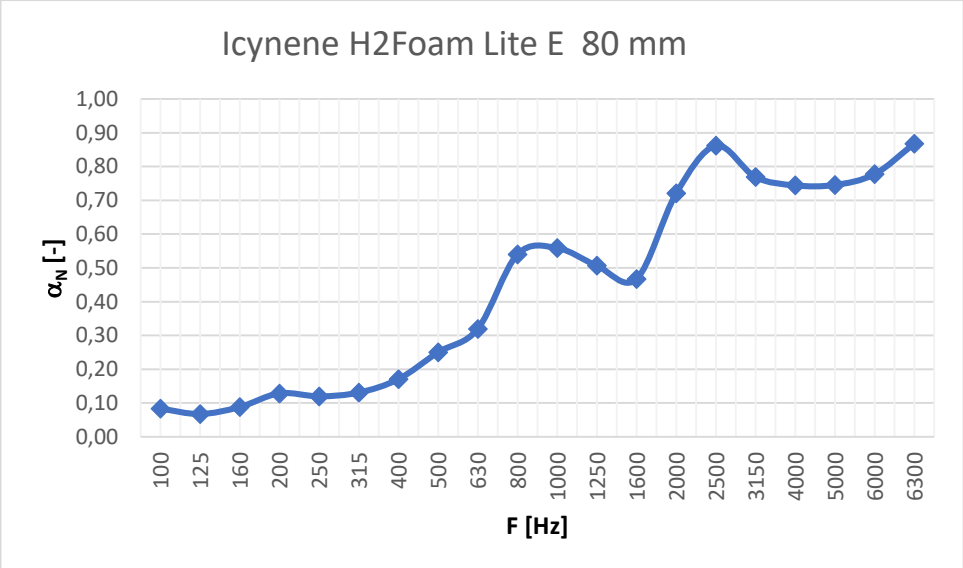
Graf 2: Results of determination of sound absorption coefficient α_N in third octave bands



Tab. 6: Results of determination of sound absorption coefficient α_N in third octave bands according to ISO 10534-1 of samples PUR foam Icynene H2Foam Lite E - 80 mm

Frequency [Hz]	**Sound absorption coeffcitient [-]**			
	1	2	3	Průměr
100	0,08	0,09	0,08	**0,08**
125	0,07	0,07	0,06	**0,07**
160	0,09	0,10	0,08	**0,09**
200	0,11	0,13	0,14	**0,13**
250	0,10	0,13	0,13	**0,12**
315	0,11	0,14	0,14	**0,13**
400	0,16	0,18	0,18	**0,17**
500	0,25	0,25	0,25	**0,25**
630	0,34	0,34	0,27	**0,32**
800	0,51	0,75	0,36	**0,54**
1000	0,65	0,57	0,45	**0,56**
1250	0,50	0,70	0,32	**0,51**
1600	0,47	0,46	0,47	**0,47**
2000	0,69	0,66	0,80	**0,72**
2500	0,76	0,89	0,93	**0,86**
3150	0,66	0,90	0,75	**0,77**
4000	0,69	0,85	0,69	**0,74**
5000	0,61	0,86	0,76	**0,75**
6000	0,88	0,76	0,69	**0,78**
6300	0,87	0,87	0,87	**0,87**

Graf 3: Results of determination of sound absorption coefficient α_N in third octave bands



Responsible person: _____.

Assc. prof. Ing. Jiří Zach, Ph.D.

Brno: 20. 12. 2019