

January 15, 2019

# Physical Performance and Environmental Guidelines for Certification of **Molded** Flexible Polyurethane Foam for Use in Furniture and Bedding

JANUARY 15, 2019



For more information, contact

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CertiPUR-US® is a program of the Alliance for Flexible Polyurethane Foam, Inc.

[www.certipur.us](http://www.certipur.us)



**T**hank you for your interest in the CertiPUR-US® program for molded foam. For foam suppliers interested in certifying molded flexible polyurethane foam, this is the place to start – with the following pages that are the ***Physical Performance and Environmental Guidelines for Certification of Molded Flexible Polyurethane Foam for Use in Furniture and Bedding.***

This document, we call the *Technical Guidelines for Molded Foam*, contains the technical requirements for certification of molded flexible polyurethane foams through the CertiPUR-US® program. The only difference in criteria for certification of slabstock or molded foam is the sample size required for evaluation.

The CertiPUR-US® program is a testing, analysis and certification program for molded flexible polyurethane foam used as a cushioning material in home furnishings such as adult mattresses, crib mattresses, pillows, upholstered furniture and some accessory comfort products. Certified flexible polyurethane foams are independently laboratory tested and certified to be:

- Made without ozone depleters
- Made without PBDEs, TDCPP or TCEP (“Tris”) flame retardants
- Made without mercury, lead, and other heavy metals
- Made without formaldehyde
- Made without phthalates regulated by the Consumer Product Safety Commission
- Low VOC (Volatile Organic Compound) emissions for indoor air quality (less than 0.5 parts per million)

It is our policy to be transparent and to be responsive to changes in what we know about components of flexible polyurethane foam. We are continually evaluating information from the science community, stakeholders, and government and regulatory agencies to assess these *Technical Guidelines for Molded Foam*.

For that reason, we consider these *Technical Guidelines for Molded Foam* to be a living document that may be revised when good science and responsible regulatory concern warrant. Any changes are made by the consent of the Board of Directors of the Alliance for Flexible Polyurethane Foam, Inc., the organization that manages the CertiPUR-US® program.

Policies related to revisions of the document and appropriate forms to request a revision may be obtained through [info@certipur.us](mailto:info@certipur.us). Certification is restricted to flexible polyurethane foam intended for use in furniture and bedding product applications. Any questions related to the certification requirements or process should also be directed to [info@certipur.us](mailto:info@certipur.us).

Please contact me for guidance in the certification process. From application to submission of samples to navigating the testing requirements to using the CertiPUR-US® seal if you achieve certification, we are here to assist you every step of the way.

Sincerely,

**Michael Crowell**

Executive Director

CertiPUR-US® program

Alliance for Flexible Polyurethane Foam, Inc.

[mcrowell@certipur.us](mailto:mcrowell@certipur.us)

828.452.5400

## Section 1

### Internal Physical Performance Testing

Test	Pass	Test Method
1) Average Density <sup>1</sup>	Report	ASTM D3574 Test A
2) Average 25% IFD <sup>2</sup> and Tolerance	± 3.0 lbs or +/- 10% max <sup>3</sup>	ASTM D3574 Test B <sub>1</sub>
3) 25% IFD loss after Fatigue Test Only applies to foams within 25% IFD range <sup>4</sup> of 24 to 36 lbs (100 – 160 N)	Loss < 6 lbs (26.7 N)	ASTM D3574 Test I <sub>3</sub> (Procedure A) <sup>5</sup>
4) 75% Compression Set HR-type All others (Viscoelastic, etc)	20.0% max 10.0% max	ASTM D3574 Test D
5) Humid Aged 75% Compression Set HR-type All others (Viscoelastic, etc)	30.0% max 10.0% max	ASTM D3574 Test D and J <sup>6</sup>

<sup>1</sup> Average Density from testing of 15 in x 15 in x 4 in (38.1 cm x 38.1 cm x 10.2 cm) samples prepared by the procedure below – “Sampling Procedure for Physical Testing”

<sup>2</sup> Average IFD @ 25% from testing of 15 in x 15 in x 4 in (38.1 cm x 38.1 cm x 10.2 cm) samples prepared by the procedure below.

<sup>3</sup> Maximum deviation of ± 10% of the Average 25% IFD or of 3.0 lbs (13.3 N) – whichever is greater – by any single sample from the Average 25% IFD.

<sup>4</sup> Based on the Average 25% IFD in Test 2) using 15 in x 15 in x 4 in (38.1 cm x 38.1 cm x 10.2 cm) samples. Test 3) does not apply to foams outside this range.

<sup>5</sup> Constant Force Pounding, 8000 cycles ASTM D3574 Test I<sub>3</sub> (Procedure A) / ISO 3385. Final readings taken after 60 minute recovery.

<sup>6</sup> ASTM 3574 Section J1 with Humid Aging followed by Section D Compression Set.

### Sampling Procedure for Physical Testing

**Product Selection:** The product selected for Physical Testing shall be the same as for Analytical Testing (see Section 6).

**Sample Origin:** Two surrogate blocks shall be molded using the same chemical formulation and density as the production parts.

The samples shall be crushed 3 times at least 70% of its thickness immediately after demolding using nip rollers or other means. Identify the crushing method used. The blocks shall be submitted for testing no more than 7 days after being molded.

**Size of Samples:** 15 in x 15 in x 4 in (38.1 cm x 38.1 cm x 10.2 cm).

The full blocks shall be used for measuring the molded density and for the 25% IFD values. The blocks then shall be sliced horizontally (perpendicular to the foam rise direction) using the top two inches, including the "A" side top skin, for measuring the pounding fatigue. The next one inch slice shall be used for measuring compression sets on the core material.

**Physical Testing Report:** The test data shall be submitted initially and with each renewal for each Foam Group to the CertiPUR-US® program on the following “Internal Physical Performance Testing Report” form.

## Section 2

### Manufacturer Certifications

Foam or adhesives processed with CFC or Other Ozone Depleters	No
Foam or adhesives processed with MeCl <sub>2</sub> or nPB (dichloromethane or n-propyl bromide)	No
Foam processed with BHT Polyol Additives	No
Foam processed with any PBDE Additives, TDCPP or TCEP ("Tris") flame retardants	No

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**Internal Physical Performance Testing Report for Molded Foam**

Company Name:

Production Location:

Foam Product Group:

Foam Identification (Grade):

Test Results\*

Density and 25% IFD

Test Date:

Sample Number	Density	25% IFD	Limit
BLOCK 1			± 10% or 3.0 lbs (13.3 N)
BLOCK 2			
Average:			
25% IFD Variance:			
Test Date:			< 6 lbs (26.7 N)
25% IFD loss after Fatigue			
Test Date:			10% Viscoelastic (20% HR)
75% Compression Set			
Test Date:			10% Viscoelastic (30% HR)
Humid Aged 75% Compression Set			

\*See *Physical Performance and Environmental Guidelines for Certification of Molded Flexible Polyurethane Foam for Use in Furniture and Bedding*, Section 1 for sampling procedure and test methods.

I confirm the information above is accurate. Name (printed): \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**Section 3**  
**Independent Laboratory Emissions Testing<sup>7</sup>**

Substance	CAS-No.	Guideline Limit [mg/m <sup>3</sup> ]
Formaldehyde	50-00-0	<0.1
Benzene	71-43-2	<0.5
Toluene	108-88-3	<0.5
Styrene	100-42-5	<0.3
Vinylcyclohexene	100-40-3	< LOD*
4-Phenylcyclohexene	4994-16-5	< LOD*
Butadiene	106-99-0	< LOD*
Vinyl Chloride	75-01-4	< LOD*
Aromatic hydrocarbons		< 0.5
TVOC Emissions		< 0.5

<sup>7</sup> Average Density and Average 25% IFD measured using procedures in Section 1 must be reported for the foam production used in Analytical Testing.

\* Below the Limit of Detection

**Test Method:** ISO 16000-Parts 3, 6, 9, & 11 – with chamber volume of 0.5 or 1 m<sup>3</sup>. The foam sample is placed on the bottom of an emission test chamber and is conditioned for 72 hours at 23°C/50%RH, applying an air exchange rate n of 0.5 per hour and a chamber loading L of 0.4 m<sup>2</sup>/m<sup>3</sup> (=total exposed surface of sample in relation to chamber dimensions without sealing edges and back) in accordance with ISO 16000-9 and ISO 16000-11.

**Section 4**  
**Independent Laboratory Analysis**

**Metals of Concern**

Substance	CAS-No.	Guideline Limit [ppm]
Antimony (Sb)	7440-36-0	0.5
Arsenic (As)	7440-38-2	0.2
Cadmium (Cd)	7440-43-9	0.1
Chromium total (Cr)	7440-47-3	1.0
Chromium VI (Cr VI)	18540-29-9	< LOD *
Cobalt (Co)	7440-48-4	0.5
Copper (Cu)	7440-50-8	2.0
Lead (Pb)	7439-92-1	0.2
Nickel (Ni)	7440-20-0	1.0
Mercury (Hg)	7439-97-6	0.02
Selenium (Se)	7782-49-2	0.5

\* Below the Limit of Detection

**Test Method:** The 0.2 in x 0.2 in x 0.2 in (5 mm x 5 mm x 5 mm) sample shall be cut by the laboratory and extracted for 8 hours with an artificial acidic sweat solution (cf. ISO 105-E04 (1994)) at 40°C on a shaking water bath using a ratio S/L=1/20 (S=solid, L=liquid). Determination by Atomic Absorption Spectroscopy (AAS) or Inductively Coupled Plasma (ICP). For Cr VI, by spectrophotometry (SP). The report must contain the measured level or show less than the value of the limit of detection, e.g. <0.05 not < LOD.

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## Tributyltin

Substance	CAS-No.	Guideline Limit [ppm]
Tributyltin (TBT)	688-73-3	0.5

**Test Method:** The 0.2 in x 0.2 in x 0.2 in (5 mm x 5 mm x 5 mm) sample must be a composite of 6 pieces to be taken from beneath each sample face (to a maximum of 2 cm from the surface). The sample is cut and extracted for 1 hour with the extracting agent\*\* in an ultrasonic bath at room temperature. After extraction the alkyl tin species are derivatized by adding sodium tetraethylborate solution in THF. The derivative is then extracted with n-hexane. The sample is then submitted to a second extraction procedure. Both hexane extracts are combined and further used to determine the organotin compounds by gas chromatography with mass selective detection in SIM modus.

\*\* Extracting agent: 250 ml buffer\*\*\* + 1750 ml methanol + 300 ml acetic acid

\*\*\* Buffer (pH 4,5): 164 g sodium acetate + 1200 ml water + 165 ml acetic acid, to be diluted to 2000 ml with water

## Phthalates

Substance	CAS-No.	Guideline Limit
Sum of 8 phthalates*		≤ 0.01 wt %

**Test Method:** Soxhlet extractor or heated ultrasonic bath as specified by CPSC test method, followed by analysis with gas chromatography/mass spectrometry (GC/MS), or high performance liquid ultraviolet chromatography (HPLC/UV).

\* Phthalates include: Di-(2-ethylhexyl) phthalate (DEHP) (CAS Reg. No. 117-81-7)- Dibutyl phthalate (DBP) (CAS Reg. No. 84-74-2)- Benzyl butyl phthalate (BBP) (CAS Reg. No. 85-68-7)- Diisononyl phthalate (DINP) (CAS Reg. No. 28553-12-0)- Diisobutyl phthalate (DIBP) (CAS Reg. No. 84-69-5)- Di-n-pentyl phthalate (DPENP) (CAS Reg. No. 131-18-0)- Di-n-hexyl phthalate (DHEXP) (CAS Reg. No. 84-75-3)- Dicyclohexyl phthalate (DCHP) (CAS Reg. No. 84-61-7)

## TDA/MDA

Substance	CAS-No.	Guideline Limit
2,4 – Toluenediamine (TDA)	95-80-7	≤ 5.0 ppm
4,4' – Diaminodiphenylmethane (MDA)	10 1-77-9	≤ 5.0 ppm
Sum of TDA (2,4) plus MDA (4,4')	95-80-7 + 10 1-77-9	≤ 5.0 ppm

**Test Method:** A subsample shall be cut and extracted with 1% aqueous acetic acid solution. To achieve optimal sensitivity and selectivity, the extracts are analyzed using high pressure liquid chromatography with detection using mass spectrometry/mass spectrometry (HPLC/MS/MS).

## Polybrominated (PBDE) Flame Retardant Additives

Substance	CAS-No.	Guideline Limit
pentabromodiphenyl ether	32534-81-9	≤ 0.01 wt %
octabromodiphenyl ether	32536-52-0	≤ 0.01 wt %
decabromodiphenyl ether	1163-19-5	≤ 0.01 wt %

**Test Method:** Analysis with gas chromatography/mass spectrometry (GC/MS)

# TECHNICAL GUIDELINES FOR MOLDED FOAM

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## Section 5 Prohibited Substances

GHS* (Globally Harmonized System of Classification and Labeling of Chemicals)		
GHS Hazard Class	Category	United States GHS Hazard Statements
Carcinogen	1A, 1B	May Cause Cancer
Germ Cell Mutagen	1A, 1B	May Cause Genetic Defects
Reproductive toxicity	1A, 1B	May Damage Fertility or the Unborn Child

\*GHS replaced R-Phrases (Based upon European Union Risk Assessments)

Blowing Agents
CFC
HCFC
Dichloromethane (methylene chloride)

Prohibited Flame Retardant Additives	CAS-No.
Antimony (see Section 4)	7440-36-0
Chlorinated or brominated dioxins or furans	Various
Chlorinated hydrocarbons (1,1-,2,2-Tetrachloroethane; Pentachloroethane; 1,1-,2-Trichloroethane;1,1-Dichloroethylene)	Various
Decabromodiphenyl ether (PBDE) (see Section 4)	1163-19-5
Dimethyl methylphosphonate (DMMP)	756-79-6
Hexabromocyclododecane or HBCD	3194-55-6
Nitrites	Various
Octabromodiphenyl ether (PBDE) (see Section 4)	32536-52-0
Polybrominated Biphenyls (PBB)	59536-65-1
Polychlorinated Terphenyls (PCT)	61788-33-8
Polychlorinated Biphenyls (PCB)	1336-36-3
Pentabromodiphenyl ether (PBDE) (see Section 4)	32534-81-9
Tri-(2,3-dibromo-propyl)-phosphate (TRIS)	126-72-7
Tris-(aziridiny)-phosphin oxide (TEPA)	5455-55-1
Tris (2-chloroethyl)-phosphate (TCEP)	115-96-8
Tris (1,3-dichloro-2-propyl) phosphate (TDCPP)	13674-87-8
Vinyl Chloride (see Section 3)	75-01-4

Other Prohibited Substances	CAS-No.
Chlorinated phenols (PCP, TeCP)	87-86-5
Trimethylphosphate	5455-55-1
Hexachlorocyclohexane	58-89-9
Monomethyldibromo-Diphenylmethane	99688-47-8
Monomethyldichloro-Diphenylmethane	81161-70-8

## Section 6

### Sampling Procedure for Analytical Testing for Molded Products

**Product Selection:** The product selected for Analytical Testing shall be the same density and chemical formulation as the molded product. Identify the mold release, if any, being used. The mold release shall be the same as that used in production.

**Sample Origin:** Surrogate blocks shall be molded using the same chemical formulation and density as the production parts. They shall be crushed 3 times at least 70% immediately after demolding using nip rollers or other means. Identify the crushing method used. The blocks shall be cut and packaged for testing no more than 7 days after being molded.

**Size of Samples:** 10 in x 10 in x 4 in (25.4 cm x 25.4 cm x 10.2 cm). The samples shall be cut out of the surrogate blocks leaving the "A" and "B" surface (top and bottom skins) along with two of the side skins in place, no later than 7 days after production of the foam, and shall be immediately packaged.

**Photo Verification:** Take a photo of the sample blocks of molded foam (prior to cutting) that shows the foam type, production date, and size. Include the chemist or supervisor responsible in the photo. This photo will be part of your submittal package to the CertiPUR-US® program. See photos on page 10.

**Number of Samples:** Two adjacent samples shall be prepared for the baseline study and then shall be sent to the laboratory. Care shall be taken to assure that no oils, silicones or other volatile materials are present on the saw blade or saw table. Protective phthalate-free gloves should be worn to prevent sample exposure to soap or hand lotion. The samples each shall be conditioned using standard production procedures, packaged and identified as recommended below.

**Time Constraints:** Samples must be shipped to arrive at the testing lab within 14 days of cutting and the lab must start VOC chamber testing within 35 days of receiving the samples.

**Packaging of Samples:** Each 10 in x 10 in x 4 in (25.4 cm x 25.4 cm x 10.2 cm) sample shall be tightly wrapped and separately sealed in aluminum foil (one sample per foil package) or packaged separately inside sealed aluminized Mylar bags (one sample per bag). See photos on page 10.

**Sample Identification:** Sample Identification shall be recorded and attached to the outside packaging box. The information shall include the Foam Product Group (as in Section 8), density and firmness, company production reference code number, production date, date of sampling, and date of mailing to the laboratory. See form on page 9.

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## Section 7

### Test Failures and Retesting

If a molded flexible foam manufacturer fails the requirements of the CertiPUR-US® program in one area of the analytical or physical property testing, the company will be allowed to have the same foam formulation retested under either of the following parameters:

- ▶ The CertiPUR-US® program will accept the retesting of the failed item of the program at the flexible foam manufacturer's expense, if
  - ▶ The failure does not exceed the relative standard deviation of analysis, and
  - ▶ The retest is completed within 30 days of the original analytical or physical property testing.

Or

- ▶ If the failure exceeds the relative standard of deviation of the analysis, the CertiPUR-US® program will accept an entire retest at the flexible foam manufacturer's expense, if the retest is completed within 45 days of the original analytical or physical property testing.

Both the original test results with the failed item and the applicable retest, that now shows a passing result, must be submitted with the remainder of the required paperwork and photos.



## Section 8 Certification Groupings

The manufacturer may apply certification to groups of equivalent qualified flexible polyurethane foam products (i.e. a number of FPF products having various physical characteristics, but sharing the same raw materials). Separate application and registration would be necessary for foam products manufactured from differing raw materials. It is the responsibility of the foam manufacturer to notify raw material suppliers when registration has been achieved so that they can advise the foam manufacturer if raw material formulation changes are anticipated during the duration of the guidelines registration period.

Molded foam producers have the option to add a branded name for any foam family category, including using that branded name as the sole identifier in the "other" foam family category. This enables customers to recognize a branded name as being certified. The branded names may appear in two places on the CertiPUR-US® website: 1) foam producer's individual page, and 2) foam producer's certificate.

### Molded Foam Product Groups:

- ▶ Super-soft (low density/low index) molded foams –25% IFD ≤15 lbs. (65 N) and density ≤1.5 lbs/ft<sup>3</sup> (24 kg/m<sup>3</sup>)
- ▶ High resilience foams
- ▶ Viscoelastic (memory) foams
- ▶ Viscoelastic (memory) foams with gel
- ▶ Other (please describe in detail – to be reviewed by administrator)

*For slabstock foams, see separate Technical Guidelines for certification of slabstock foam.*

## Section 9 Registration Duration

To maintain registration, sample evaluations are necessary at 6 month intervals for each product group category to help demonstrate formulation and raw material content consistency. After completing two consecutive 6 month successful certifications, the registration frequency shall change to an annual basis. Any significant changes to the formulation shall require analysis and re-registration.

### CertiPUR-US® testing and analysis laboratory options:

#### Hall Analytical

Unit A Millbrook Business Centre  
Floats Road  
Manchester M23 9YJ  
United Kingdom  
Attn: Nick Ordsmith  
Telephone: (Country exit code) +44 161 286 7889  
Fax: (Country exit code) +44 161 286 7676  
[Email: nick@hallanalytical.co.uk](mailto:nick@hallanalytical.co.uk)

#### Eurofins Product Testing A/S

Smedeskovvej 38  
DK-8464  
Galten, Denmark  
Telephone: (Country exit code) +45 7022 4276  
Fax: (Country exit code) +45 7022 4275  
[Email: voc@eurofins.com](mailto:voc@eurofins.com)

#### TÜV Rheinland LGA Products GmbH

Tillystraße 2  
90431 Nuremberg  
Germany  
Attn: Dr. Jelena Galinkina  
Telephone: (Country exit code) +49 911 655 5614  
(Country exit code) +49 911 655 5604  
Fax: (Country exit code) +49 911 655 5604  
[Email: Jelena.Galinkina@de.tuv.com](mailto:Jelena.Galinkina@de.tuv.com)

#### Intertek

Attn: VOC Lab/CertiPUR-US® Testing  
4700 Broadmoor, Ste. 200  
Kentwood, MI 49512 USA  
Attn: Dr. Jesse Ondersma  
Telephone: 616.656.7401  
[Email: certipur.us@Intertek.com](mailto:certipur.us@Intertek.com)



# Sample Submittal and Analytical Request CertiPUR-US® Molded Foam Certification Program

Attention: \_\_\_\_\_

Date: \_\_\_\_\_

**Invoice to:**

**Ship via express to:**

Company Name: \_\_\_\_\_

Lab Name: \_\_\_\_\_

Email: \_\_\_\_\_

Address 1: \_\_\_\_\_

Address 1: \_\_\_\_\_

Address 2: \_\_\_\_\_

Address 2: \_\_\_\_\_

City / State / Zip: \_\_\_\_\_

City / State / Zip: \_\_\_\_\_

Country: \_\_\_\_\_

Country: \_\_\_\_\_

Attention: \_\_\_\_\_

P.O. Number: \_\_\_\_\_

**Sample Identification:**

Your Product Identification Code	
Foam Product Group*	
Brand Name of Foam (optional)	
Foam Density/IFD	
Production Date	
Date Sample Cut (<7 days from Production)	
Date Sample Shipped	
Sample Arrival Date (<21 days from Production)	This information will be reported by the testing laboratory
Date VOC Chamber Testing Started (<42 days from Production)	This information will be reported by the testing laboratory

\*See Section 8 for Product Grouping – If “other,” please specify

**Analytical Request:**

- TVOC Emissions Testing Extractable heavy metals
- Tributyltin (TBT)
- Sum of eight specified phthalates
- Penta, Octa, Deca bromodiphenylethers (PBDE's) – flame retardants
- 2,4-Toluediamine (TDA) and 4,4'-Diaminodiphenylmethane (MDA)
- Specified Volatile Organic Compounds and total Volatile Organic Compounds

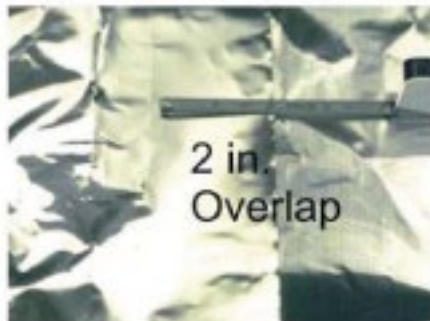
## Sample Packaging Instructions for Molded Foam

1. Please be sure to wear phthalate-free PU or latex gloves while handling samples. This will keep the samples from contamination by soap or fragrances.
2. Check and clean the knife blade and saw table before cutting samples to prevent contamination from residue.
3. Individually seal three samples tightly in heavy gauge aluminum foil wrappers. Before making the final fold and seal, evacuate as much excess air as possible without resulting in a compressed sample. Submit two samples to the laboratory and keep one packaged sample as a control.
4. Please complete the *Sample Submittal Form* (page 8).
5. Tape a duplicate *Sample Submittal Form* to the outside of each foil package/sample.
6. Place the samples in a cardboard box, including complete *Sample Submission Forms*, (see Section 6) and ship to a selected laboratory via express delivery service.

Note: Before taking samples, review details in Section 6.



Use 18" wide heavy duty aluminum foil.  
Place 2, 26" pieces side-by-side.



Overlap the two pieces by 2" – lengthwise.



Lift the overlap, crease and fold flat for the length of the seam (26").



Place the foam sample in the center of the joined foil sheet lengthwise on top of the seam.



Join the side panels together at the top. Pinch the overlap, roll over twice and fold flat to seal.



Pinch the foil on the ends and squeeze together.

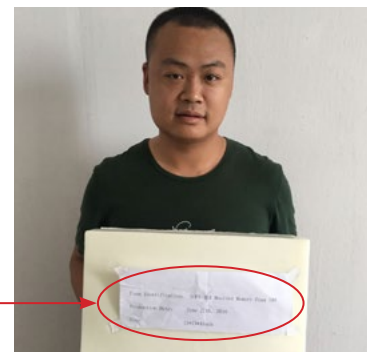


Roll the ends twice and press flat against the foam block.



The finished foil wrapped sample should be tightly sealed on all sides.

Remember: Only one sample per foil package.



Take a photo of chemist or supervisor with the molded foam sample. Affix a label to the sample with this information:

**Foam Identification:** (Example: 100)  
**Production Date:** Month/Day/Year  
**Size:** Width x Length x Height