



# HOW TO PERFORM SAMPLING FOR RSL TESTING

## Purpose

All brands test raw materials and products and, based on the test results, make crucial business decisions on topics such as suppliers, components, raw materials, sales markets, and more.

This guide defines methods for sampling all possible material types in the apparel and footwear industry to align sampling methods between brands and laboratories.

For sampling footwear, EN/ISO 21061 can be followed.

If a brand gives the laboratory specific sampling instructions, those requirements overrule this guidance.



## Test Result Considerations

**Before starting the testing process, it is vital to consider the purpose(s) for which the test results will be used. Will the result be used to demonstrate compliance with legislation? To identify a potential risk to consumers? Or to determine a hazard that might affect manufacturing staff?**

Once the purpose of test results is clear, the sample must be packed accordingly. At the laboratory, the technician needs clear instructions to ensure that the final test results can be used for their purpose(s) since the separation of the different parts of the product (sampling) totally determines the result of the analyses — and therefore the information the brand will get as the basis for potential critical decision making.

## Table 1. Definitions of Sampling Terminology

These definitions of common terms help all involved parties share a common understanding.

Term	Description
<b>Skin Contact</b>	A part or sample that comes in contact with human skin under “reasonably foreseeable conditions of use.”
<b>Prolonged Skin Contact</b>	<p>This definition, defined in relation to Nickel release, is from the EU. AFIRM uses it generally, as definitions are not found in other markets.</p> <ul style="list-style-type: none"> <li>• 10 minutes on three or more occasions within two weeks</li> <li>• 30 minutes on one or more occasions within two weeks</li> </ul> <p>Please refer to: <a href="https://echa.europa.eu/documents/10162/17233/nickel_restriction_prolonged_contact_skin_en.pdf/b6f35357-da40-4a04-8085-fe42f6f543ab">https://echa.europa.eu/documents/10162/17233/nickel_restriction_prolonged_contact_skin_en.pdf/b6f35357-da40-4a04-8085-fe42f6f543ab</a></p>
<b>Composite Test</b>	A combination of part samples combined into ONE composite test.
<b>Placement Print</b>	<p>A print on top of the fabric of a final product. The nature of the printing can vary:</p> <ul style="list-style-type: none"> <li>• Discharge print (colors embedded in the fabric)</li> <li>• Plastisol print (a polymer on top of the fabric)</li> </ul>
<b>Coating</b>	A layer on top of a fabric or other material that cannot be removed to create two homogenous parts; for example, a PU-layer on a fabric.
<b>Finish</b>	A non-visible layer on a fabric or other materials, such as water-repellent or anti-odor treatments.

Term	Description
<b>Placement Embroidery</b>	A single embroidery placed on a final product.
<b>All-Over Embroidery</b>	Fabric that is embroidered all over the surface.
<b>All-Over Print (AOP)</b>	Fabric that is printed all over the surface.
<b>Dyed Fabric</b>	If the fabric has one single colour, it can be yarn dyed or fabric dyed. Both resemble dyed fabric.
<b>Non-Colored Fabric</b>	Fabric that is prepared for dyeing (PFD) or print (PDP) is without color. Non-colored samples will never be part of a final product unless it is specified as undyed.
<b>Non-Colored Leather</b>	Natural leather is non-coloured but is a part of the final product in contrast to non-coloured fabric.
<b>Badge</b>	A badge can vary from very small to big badges covering the whole front or back of a garment. They also vary in material but are always sewn on the fabric.
<b>Label</b>	A permanent label in the garment; for example, a care label, logo label, etc.
<b>Hangtag</b>	A non-permanent label of paper, cardboard, or plastic in the final product.
<b>Pattern Repeat</b>	An AOP that consists of smaller or larger repeated patterns.

## Components & Parts

The various components or parts that constitute a final product can include:

- Fabric
- Zippers
- Buttons
- Thread
- Patches and labels
- Coatings and finishes
- Glue
- And more

Some components are easily separated from others, and some might have a changed state of matter since production, such as glue, water-repellent treatments, prints, etc. All components must be separated into homogenous parts at the sampling and marked thoroughly. This will result in a variety of components, parts, and subparts. Naming the different components is vital for the final evaluation of the test result; some brands may have specific wording or terminology for parts and subparts that the laboratory must use.

### How to Sample Components & Parts

If components undergo testing before production, the state of the components must be considered since the analysis result units might not be the same units as the brand's RSL limits.

#### Solid components

Solid components must first be separated into parts of the same or similar materials. For example, the zipper can be separated into puller, teeth, tape, etc., representing different subparts and different materials.

When divided into the same or similar materials and parts, the samples must be cut/shredded or simply used as-is if the component is small enough.

#### Liquid parts

A liquid part is homogenous unless it is separated in phases. If so, the sample must be thoroughly mixed before a part sample is taken out. Samples can be analysed directly in the liquid state. However, the result cannot be compared to an AFIRM RSL limit. But if the aim is simply to detect a specific chemical and not include any quantification, this "no-sampling" procedure can be used.

For AFIRM compliance, liquid samples must be applied on an inert plate (e.g., glass) and left to evaporate (the time and temperature for this must be communicated to the laboratory), scraped off and analyzed as a solid component.

## Finished Products

### How to Access the Product

A final product sent for testing can either be:

- Accessed as *one product* such as, e.g., VOC, odor, etc.
- Accessed as *various components* for specific testing.

Therefore, it is essential to specify access instructions in the Test Request Form (TRF) for the laboratory.

### How to Sample a Final Product

The final products are divided in homogenous parts and tested individually:

- Coated/laminated/combined fabric that cannot easily and completely be separated must be tested as one fabric (example: PU coated fabric).
- Fabric that has been subject to a functional treatment like water-repellence must be tested as one fabric.
- Materials that are glued together (e.g., shoes, belts, bags) can perhaps be separated but will likely have some glue residue, which will contaminate the result of the material. If this is the case, it must be noted in the test report.
- Metal with a coating or paint must be tested as one part unless specifically designated otherwise. For very specific test methods only (e.g. CPSC methods), the coating can be scraped off as specified in the test method.

## Composite Samples

Whenever possible, the part samples of a final product should be combined in a composite test (individual brand requirement). If the composite result does not comply with the limit, the samples must be tested again individually without further instructions.

Up to three samples can be combined into one composite sample by using same or similar material, and always using an equal amount per sample. If more than three samples should be combined, the brand must communicate this specifically in the TRF.

The detection limit must always be significantly lower than the pass/fail limit in composite testing. This is to help ensure all sample parts meets the brand's RSL. It means we must define a pass/fail limit (also called split limit) for each composite testing and the pass/fail limit must be higher than the reporting limit for the testing procedure to be used for compliance.

- If two samples are combined, the pass/fail limit of the analysis must be at least 80% of one-half of the RSL limit value.
- If three samples are combined, the pass/fail limit of the analysis must be at least 80% of one-third of the RSL limit value.

## Example

This example uses SCCP analysis with an RSL limit of 100 ppm.

If three samples are wanted, the calculation will be as follows:

$$100 \text{ ppm}/3 \times 0.8 = 27 \text{ ppm}$$

The pass/fail limit for the composite test is now 27 ppm — but since the reporting limit is 30 ppm, we cannot know if the result is a pass or a fail.

Instead we can try for two samples:

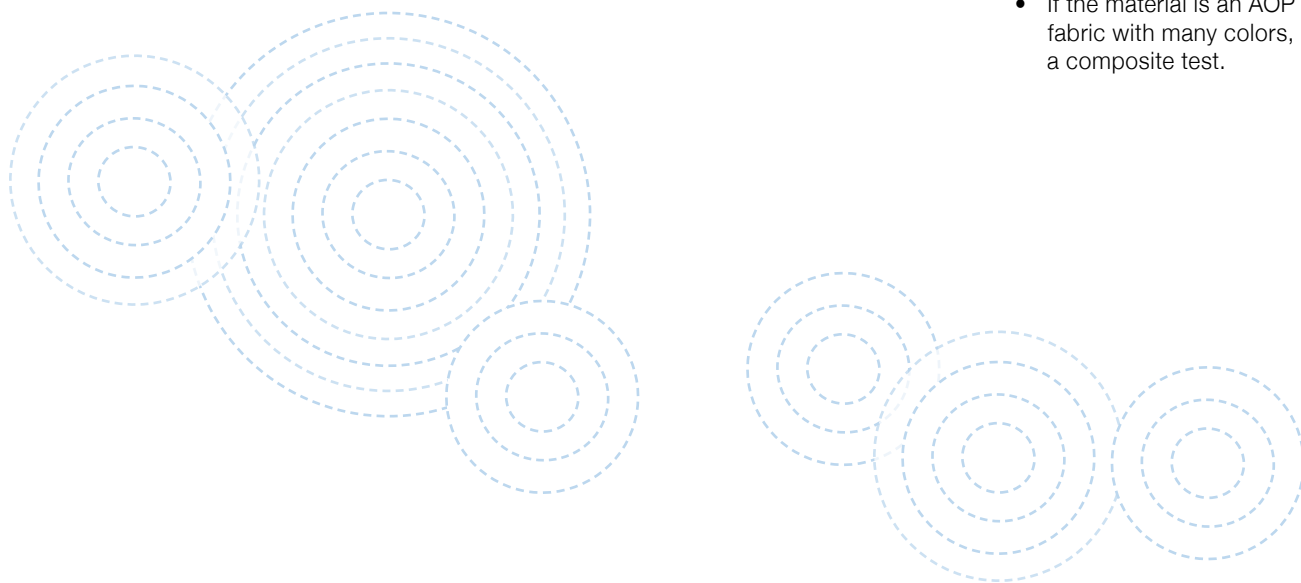
$$100 \text{ ppm}/2 \times 0.8 = 40 \text{ ppm}$$

As 40 ppm is above the reporting limit of 30 ppm, we can use a composite sample with two part samples.

For some parameters, it is obviously not possible to perform a composite test, e.g., pH, Nickel release, VOC, CrVI, and substrates such as PVC.

Other reasons it might not be possible to conduct a composite test include:

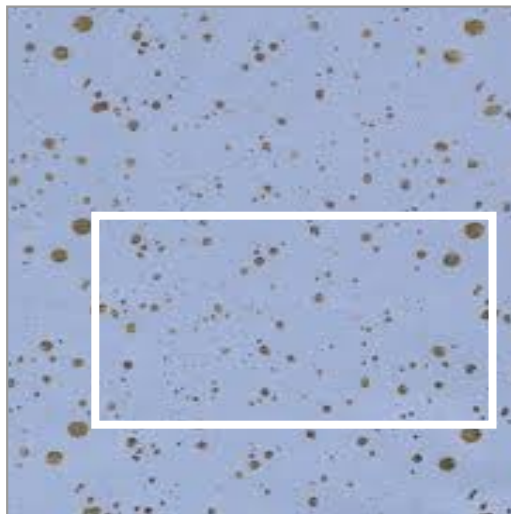
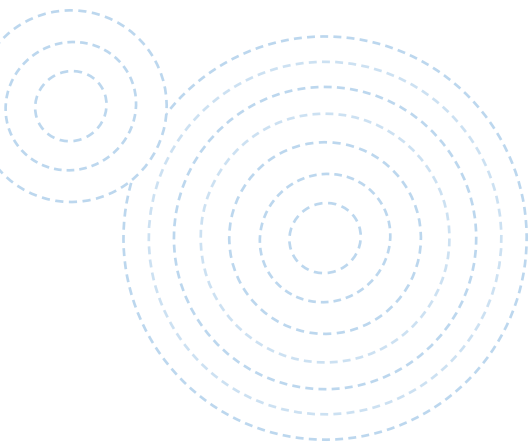
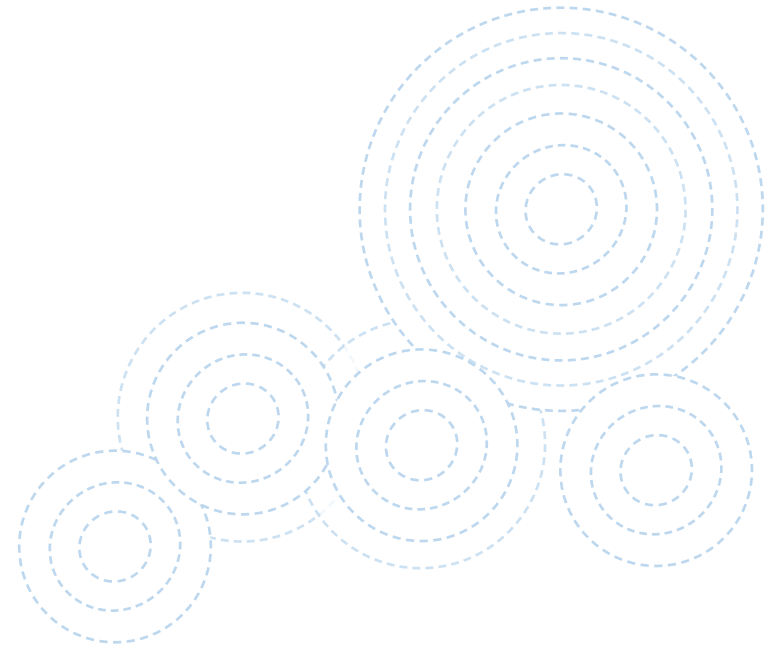
- If the part is too small for an additional test after failing the initial composite test, an individual test must be performed from the beginning instead of a composite test.
- If the material is an AOP fabric with many colors, a print or an all-over embroidered fabric with many colors, an individual test must be performed for that fabric instead of a composite test.



## All-Over Prints

AOP fabrics (also called continuous print fabrics) can include numerous colors in different percentages and various motif sizes. All colors must be present in the sample in the percentage that best reflects the original fabric. This is done by cutting a repeated pattern from the fabric. If this sample is too big, then it should be cut into tiny pieces or shredded, mixed thoroughly and then a part sample taken out.

Refer to these examples for guidance.



## Placement Prints

Placement prints can vary greatly. There are many names and terms for different kinds of prints and for application types; for example, positional print, heat transfer, direct, etc.

In general, they can be divided into three categories:

- Discharge prints, where colors are embedded in the fabric.
- Plastisol prints, which are printed with a polymer or rubber.
- Puffed or thick prints.

Each category uses a different sampling technique, as described below.

### Discharge prints

Discharge prints use inks that are transferred directly to the fabric. They can be water-based or solvent-based but don't include a polymer. Therefore, the print must be tested by cutting:

- A part of the print. The cut must represent the distribution of colors as best possible.
- The whole print, shredded or cut in tiny pieces, mixed thoroughly, and a part of the sample is used for the analysis.



## Plastisol Prints

Plastisol prints are a thick or thin polymer or rubber layer on top of the fabric. Since prints vary greatly, different sampling methods can be used in the following order of preference:

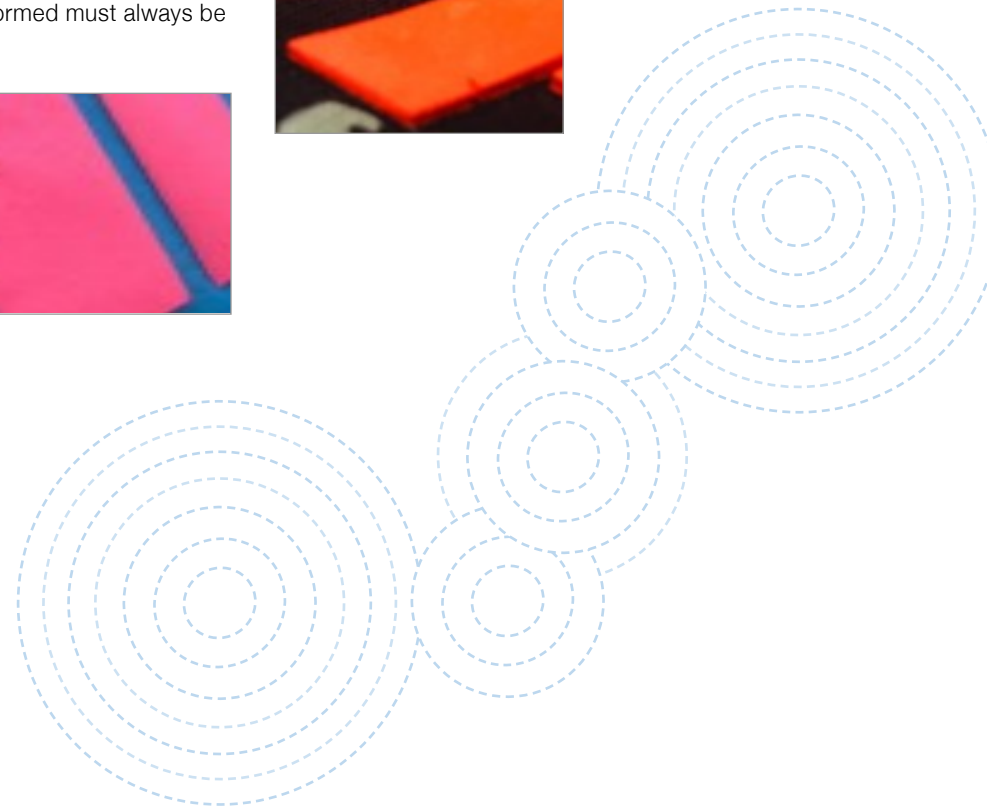
1. Sample the placement print separately before it is fixed to the fabric
2. Scrape off the print to obtain a homogenous sample.
3. For very specific test methods only (e.g. CPSC methods for total Pb and total Cd), specific solvents can be used, if needed, to ensure the scraping off.
4. If the print cannot be scraped off, it must be cut together with the fabric which is then the sample. This procedure is a dilution and will minimize the quantity of detected substances in the print. The extent of the impact depends on the weight of the fabric.

How the sampling procedure is performed must always be clearly stated in the final test report.



## Puffed or High-build Prints

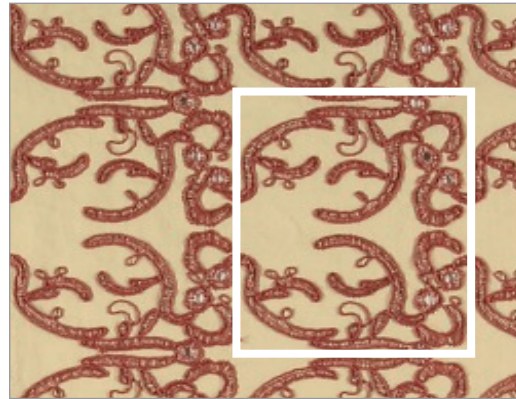
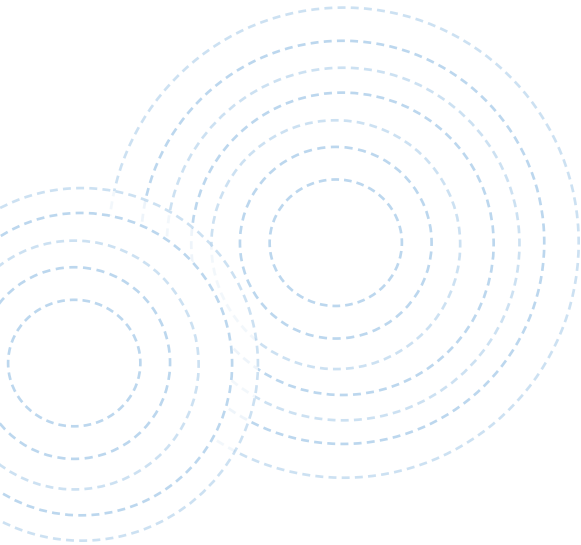
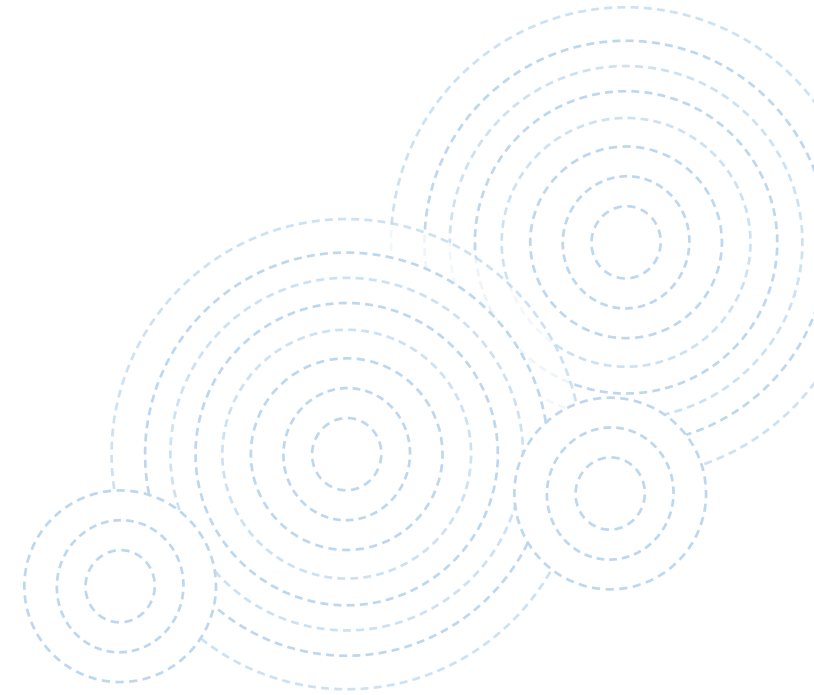
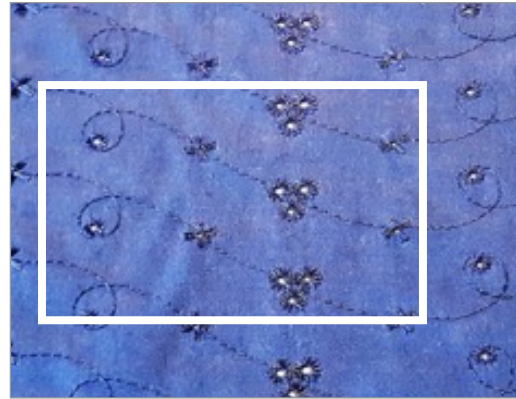
For most puffed or high-build prints, the height of the print provides the possibility of scraping off part of the print without scraping off any of the fabric. If scraping does not achieve a sample consisting of pure print, then the sampling method for plastisol prints must be used instead.



## Fabric with Embroidery

Embroidery can be placed all over the fabric or be represented by a single (placement embroidery), a few, or many widely spread across the fabric.

If the embroidery thread is sent separately for testing (all colors), the fabric and the thread should be sampled individually. If this is not possible, the embroidery should be sampled representing the weight of the final fabric. Examples are shown below.



## Small-Part Samples

When a smaller part sample must be tested, it can be necessary to send additional material for analysis. This could be sewing thread, embroidery thread, labels, sequins, pearls, etc. If the final product is washed, the additional material must also be washed (together with the garment) to resemble the exact garment parts.

If a brand has a minimum weight exemption from testing, the laboratory must be informed before testing.

## Specification and Assessment of Materials for Testing

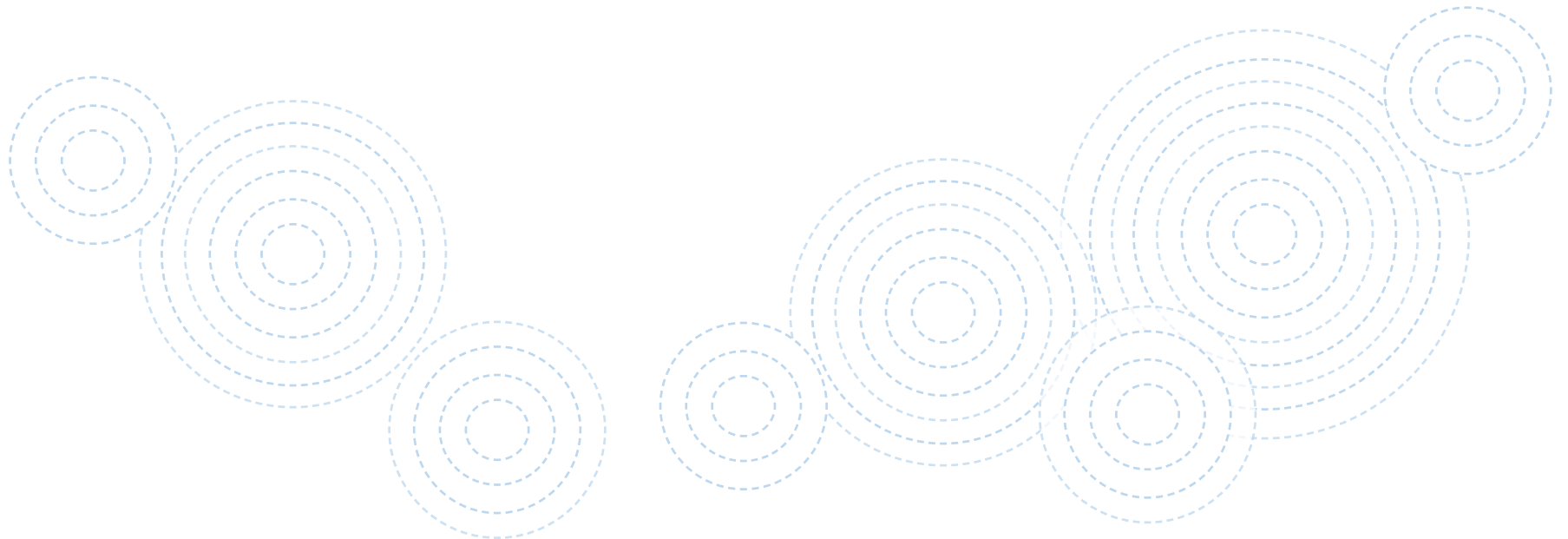
- Fur is seen as two different samples: the fur hair is natural fibers and the fur skin is natural leather. The hair must be cut off to represent one sample, and the skin must be scraped to represent the other sample.
- Only final samples of metal, leather, or natural material will contain parts that have *not* been dyed/colored/printed, etc. All other samples will have a color and must be treated as such.
- Hook and loop can be made of polymers and must then be tested as polymers, or it can be made of woven synthetic fibers and must then be tested as synthetic fibers.
- Natural fibers containing elastane/spandex should be tested as natural fibers (unless the brand specifies otherwise).

## How to Package Samples

**The purpose of the analyses must always be considered.**

1. Focus on volatile substances:
  - Wrap smaller samples tightly in aluminium foil, and then place in a PE polybag, squeezing out all the air.
  - Pack larger samples in a PE polybag, squeezing out all the air, followed by a dark wrapping (such as a dark polybag or paper/cardboard) to avoid light exposure.
  - Avoid high temperatures as much as possible.
2. Regular testing, no specific focus:
  - Pack in PE polybags, squeezing out all the air.

After the individual wrapping, the samples must be sent to the laboratory in cardboard boxes or heavy, dark polybags. All samples must be marked with a unique identifier (name, number, code).





# Sampling Size

The sampling size depends on the specific parameters and the amounts of analyses.

The laboratory can provide information on the quantity or weight needed per homogenous part. Table 2 offers guidance on minimum sampling sizes. Please note that the listed weights are only sufficient for one analysis, and it is advisable always to send enough of any given sample for potential confirmation analyses.

**Table 2. Minimum Sampling Sizes**

Parameter	Sample Size	Parameter	Sample Size
Acetophenone and 2-Phenyl-2-propanol	0.5 g	Heavy Metals, CrVI	2 g
APEOS	AP: 1 g, APEO: 1 g	Monomers, Styrene & Vinyl Chloride	1 g
Azo Amines	1 g	N-nitrosamines	5 g
Bisphenols	1 g	Organotin	1 g
Chlorinated Paraffins	0.5 g	OPP	2 g
Chlorinated Benzenes and Toluenes	2 g	Ozone-depleting Substances	1 g
Chlorophenols	2 g	PFAS	100 cm <sup>2</sup> ; 1g
Dimethylfumarate (DMFu)	1 g	Pesticides	5 g
Dyes, Disperse + Navy Blue	1 g	Phthalates	0.1 g
Flame Retardants	Both methods: 1 g	PAHs	0.5 g
Fluorinated Greenhouse Gases	1 g	Quinoline	1 g
Formaldehyde	1 g	Solvents, Dimethylformamide (DMFa)	1 g
Heavy Metals, Extractable (Sb, As, Ba, Cd, Cr, Co, Cu, Pb, Hg, Ni, Se)	1 g	Solvents, Dimethylacetamide (DMAC) and N-Methyl-2-pyrrolidone (NMP)	1 g
Heavy Metals, Total (Pb, Cd)	0.25 g	Solvents, Formamide	1 g
Heavy Metals, Total	0.5 g	UV Absorbers	1 g
		Volatile Organic Compounds (VOCs)	0.5 g



[www.afirm-group.com](http://www.afirm-group.com)