



IKEA of Sweden AB

Specification

Recycled plastic material from external source – quality assurance

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Replaces:
AA-323807-2

Recycled plastic material from external source – quality assurance

Contents

This specification describes IKEA requirements and the quality assurance procedure of recycled plastic materials from external source.

About this specification

This specification concerns the raw material and aims to assure the quality of recycled plastic material from external source.

This specification is aimed at the supplier of the recycled plastic raw material and at the supplier of the IKEA sales product (hereinafter called the IKEA supplier), for material/parts/components with approved use of externally recycled plastic materials.

Implementation of changes

Changes in this specification, version no AA-323807-3, shall be implemented in production at the latest from packaging date stamp 1418 (year 2014 week 18).

Products having a packaging date stamp earlier than 1418 shall be shipped to IKEA before shipping products compliant with this version of the specification.

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1 Requirements

The supplier of the IKEA sales product is responsible to make sure the requirements in this specification are fulfilled and documented.

1.1 IKEA approval

Use of recycled plastic material from an external source is only allowed after approval by IKEA. Such an approval is based on the specific producer of the raw material. Documenting compliance with the requirements defined in this specification is a pre-requisite for this approval.

1.2 Securing compliance in the raw material

The producer of the raw material shall secure that the raw material sourcing, production site, production processes and material handling routines are such that risks are minimized. A production risk assessment according to FMEA principle (Failure Mode and Effect Analysis) shall be carried out. In case of deviations from IKEA requirements in final raw material or of major changes in the process map, a new risk assessment shall be performed. The production risk assessment shall be revised minimum once per year.

1.2.1 Screening of certain elements

The producer of the raw material shall have routines in place to carry out elemental analysis screening by XRF, AAS or ICP-MS of:

- a) incoming deliveries of their recycled material (number of scans per delivery batch shall be enough for statistical confidence and also be assessed depending on the homogeneity of the batch);
- b) each batch delivered to the IKEA supplier and include the result in to the Certificate of Analysis.

Warning limits shall be implemented for the occurrence of certain elements that are banned or that could indicate the presence of banned compounds. Minimum requirements for warning limits and actions are as follows:

- **Banned elements:** If the screening clearly shows that lead (Pb), cadmium (Cd) or mercury (Hg) occur over one half of their contamination limit value (CLV) according to IKEA requirements, further investigation of the contamination is needed, such as further screening to see if the other samples indicate significant levels of the element; and if they do, then the source shall be investigated in order to take corrective action to prevent future contamination. In case of XRF scanning giving clear indication of contamination but still some uncertainty due to imprecision of XRF scanning, wet testing of these elements can also be carried out.

Note: The XRF detection limits for Cd and Hg can be in the same order of magnitude as the contamination limit values for these elements. If one half of the CLV is below the detection limit for XRF scanning, then the warning limit shall instead be when the element is detectable.

- **Elements that occur in some banned substances:** If the screening clearly shows that antimony (Sb), chromium (Cr) or bromine (Br) occur at levels over half the contamination limit values according to IKEA requirements, further investigation of the contamination is needed. This can start with further screening to see if the other samples indicate significant levels of the element, and then include one or both of the following:
 - researching into the supply chain what substance causes the presence of the element in question,
 - wet testing.

If it is established that presence of such an element is due to **banned** substances, corrective action to prevent future contamination is needed.

If it is established that presence of such an element is due to **non-banned** substances,

a new investigation does not need to be made every future time that that element is identified, as long as the raw material supplier remains confident that the source is the same.

- **Chlorine:** Chlorine (Cl) may occur in many normally used compounds. However, the raw material supplier shall follow the level of chlorine in the scanning and any unexpected significant increases shall be investigated (with consideration both of risk of PVC contamination and as a possible indication of changes in the raw material sources).
- **Other heavy metals than mentioned above:** Other heavy metals shall be followed in the scanning, and if any significant increases (e.g. more than doubling) are found, further investigations shall be made, e.g. scanning of more samples and then investigating the source finding if these further scanings indicate a contamination.

Note: wet-testing when needed as part of investigations to verify XRF scanning results shall be done at IKEA-approved laboratories or other laboratories that are accredited for testing the elements or substances in question.

2 Documentation

Documentation management requirements in IOS-MAT-0010, and other chemical specifications if applicable, are valid in addition to the below, unless otherwise specified.

The raw material supplier shall provide the IKEA supplier with the following documents, which shall be registered in Connect by the IKEA supplier:

- Technical data sheets (TDS, example in *Appendix A*);
- Safety data sheets (SDS);
- A delivery specification (DS, example in *Appendix B*). This shall contain target values for critical-to-quality properties, including their tolerances;
- Documentation of any investigation carried out after warning limits have been exceeded (see *section 1.2.1 Screening of certain elements* above), including external verifying tests;
- Documentation of the FMEA production risk assessment.

All documents registered in Connect shall be connected to the relevant material combination for the plastic. TDS, SDS and DS shall be registered in Connect with a maximum active period of five years. Documentation of warning-limits investigation and documentation of FMEA shall be registered in Connect with a maximum active period of one year. The documents' active period shall be ended if replaced by a new document.

The raw material supplier shall also provide the IKEA supplier with a certificate of analysis for each delivered production batch, to be provided together with the production batch. The certificate of analysis shall contain:

- specific needed critical-to-quality properties chosen from the DS. These critical-to-quality properties shall be agreed between IKEA and the IKEA supplier and be based on product needs.
- Test results from XRF, AAS or ICP-MS. This shall include at least the following elements: Pb, Cd, Hg; Sb, Cr, Br; Cl; any other heavy metals which show a significant increase as described in *section 1.2.1 Screening of certain elements* above. For values in mg/kg (ppm), decimals should not be given.

An example of a certificate of analysis is given in *Appendix C*. The delivery batch information content in this example is the minimum requirement.

The certificate of analysis shall be stored by the IKEA supplier for at least three years, and shall be provided to IKEA within one working day upon request.

Other screening results, such as for incoming inspection and in running manufacturing, shall be stored by the raw material manufacturer for at least three years, and shall be provided to IKEA within three working days upon request.



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3 Definitions

Term	Description
AAS	Atomic absorption spectroscopy
Critical to quality	Critical To Quality (CTQ) is an attribute of part/product or process that has a direct and significant impact on its quality.
External recycling source	<p>External recycling source is a material purchased from external sources and used in a product and then grinded/re-extruded, or re-compounded.</p> <p>IKEA differentiates between products:</p> <ol style="list-style-type: none"> 1. That never have been on the field or used for their purpose, like direct industrial scrap or scrap of extruded sheets (usually called post-industrial or pre-consumer material) 2. Used for their purpose on the field and then collected for recycling, like PET-bottles (usually called post-consumer material) 3. Used for their purpose on the field and collected for recycling in a unordered form, like: <ul style="list-style-type: none"> - Household plastic waste, like food packages such as butter, juice, and milk packages (usually called post-consumer material) - Machine-sorted plastic, e.g. from white goods.
FMEA	Failure Mode and Effect Analysis
Heavy metals	Metals and metalloids that in their elemental form have a density $\geq 5 \text{ g/cm}^3$, excluding iron (Fe). (Note: according to this definition, barium (Ba) and titanium (Ti) are not heavy metals.)
ICP-MS	Inductively coupled plasma - mass spectrometry
LOD	Limit of detection
NA	Not applicable
Producer of raw material	The supplier of processed and upgraded recycled plastic (supplier to the injection moulder/extruder, who is usually – but not necessarily – the IKEA supplier)
Technical Data Sheet, TDS	The TDS normally contains typical properties with the purpose to communicate capabilities by the producer of raw material. (This kind of document is also sometimes known as "Product Data Sheet" or "Material Data Sheet".)
XRF	X-ray fluorescence



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Appendix A: Example of Technical Data Sheet¹

Table 1 Material property	Value	Unit	Test method
Melt flow rate (230 °C/2.16 kg)	12	g/10 min	ISO 1133
Density	940	kg/m ³	ISO 1183
Tensile modulus (1 mm/min)	1150	MPa	ISO 527-2
Flexural modulus (2 mm/min)	1150	MPa	ISO 178
Stress at yield (50 mm/min)	16.5	MPa	ISO 527-2
Strain at yield (50 mm/min)	5	%	ISO 527-2
Strain at break (50 mm/min)	>100	%	ISO 527-2
Charpy impact:			
Notched, 23 °C	50	kJ/m ²	ISO 179
Notched, - 20 °C	7.0	kJ/m ²	ISO 179
Notched, - 40 °C	5.0	kJ/m ²	ISO 179
Unnotched, 23 °C	No break	kJ/m ²	ISO 179
Unnotched, - 30 °C	No break	kJ/m ²	ISO 179
Izod impact (notched, 40 °C)	6.0	kJ/m ²	ISO 179
IFW/Total penetration energy (-20 °C)	36	J	ISO 6603-2
Ball indentation hardness (132 N/10 sec)	35	MPa	ISO 2039-1
Hardness, shore D	70	--	ISO 868
Heat deflection temperature (0.45 N/mm ²)	89	°C	ISO 75-2
(1.80 N/mm ²)	50	°C	ISO 75-2
Vicat softening temperature A50 (10 N)	132	°C	ISO 306
Impurities:			
Total impurities	≤ 200	ppm	--
Metal impurities	≤ 20	ppm	--
Paper impurities	≤ 50	ppm	--
Other polymers	≤ 100	ppm	--
Other colors	--	--	--

¹ Appendix and properties described are only examples and should not be regarded as required to be stated exactly the same way.

Appendix B: Example of delivery specification²

Scope

The specification refers to the grade (*name*), produced by (*Company A*) and supplied to (*Company B*). It supersedes all previous delivery specifications between (*Company A*) and (*Company B*) for this grade. The content of this specification shall not be disclosed to third party, apart from IKEA, without a written consent from (*Company A*).

Application

(*Grade*) is intended for injection moulding of (*type of suitable type of articles*).

General characteristics

(*Grade*) is a (*resin type*). The material is natural coloured, and the product is delivered as free flowing granules.

Property	Test method	Unit	Target value	Tolerances
MFR (230 °C/2.16 kg)	ISO 1133	g/10 min	33	30 to 36
Density	ISO 1183	g/cm ³	0.94	+/- 1%
Tensile modulus	ISO 527-2	MPa	1150	1050 to 1250
Charpy impact, notched, 23 °C	ISO 179	kJ/m ²	min 7.0	min 7.0
Charpy impact, notched, - 20 °C	ISO 179	kJ/m ²	min 5.0	min 5.0
Impurities: <ul style="list-style-type: none"> • Total • Metal • Paper • Other polymers 	Visual	ppm	<ul style="list-style-type: none"> ≤ 200 ≤ 20 ≤ 50 ≤ 100 	NA

Quality system

(*Company A*) maintains a quality system according to (*quality assurance system*) and is registered and supervised by a third party.

Certificate of analysis

Based on quality inspection data at production, (*Company A*) supplies a "Certificate of analysis" for each delivery. This certificate contains:

- Product name
- Blend number
- Reference number
- Customer purchase reference
- All data from properties

Revision history

Issue No	Date of issue	Reason for re-issue

Approvals

.....
(Date, signature, and company)

.....
(Date, signature, and company)

² Appendix and properties described are only examples and should not be regarded as required to be stated exactly the same way



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Appendix C: Example of certificate of analysis³

Delivery batch information

Manufacturer Grade

Certificate identification Batch

Date Delivery quantity (kg)

Customer Vehicle

Order identification Shipped from

Property data

Property	Test method	Unit	Target value	Tolerances	Result
MFR (230 °C/2.16 kg)	ISO 1133	g/10 min	33	30 to 36	32.0
Density	ISO 1183	g/cm ³	0.940	+/- 1%	0.935
Tensile modulus	ISO 527-2	MPa	1150	1050 to 1250	1130
Charpy impact, notched, 23 °C	ISO 179	kJ/m ²	min 7.0	min 7.0	7.5
Impurities:	Visual	ppm		NA	Pass
Total			≤ 200		
Metal			≤ 20		
Paper			≤ 50		
Other polymers			≤ 100		
Other colour			NA		

XRF screening

Element	Result	Standard deviation (2 σ^4)	
Pb	18	13	mg/kg (= ppm)
Cd	< LOD	10	mg/kg (= ppm)
Hg	< LOD	5	mg/kg (= ppm)
Sb	8	6	mg/kg (= ppm)
Cr	25	17	mg/kg (= ppm)
Br	24	14	mg/kg (= ppm)
Cl	204	112	mg/kg (= ppm)

Responsible

.....
(Date, signature, and company)

Name of material supplier _____

Place and date: _____

Name, function and signature: _____

³ The properties described under property data are only examples, and should not be regarded as required to be stated exactly the same way.

⁴ σ = standard deviations



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Summary of Changes in version 3

Page	Section	Requirement	Amendment
			Major revision of the specification
1	Implementation of changes		Implementation time
2	1	Requirements	<ul style="list-style-type: none"> • Clarification that supplier of IKEA sales products is responsible for compliance • Use only after approval by IKEA • Risk analysis done by producer of material • Equipment to screen incoming raw material and batches delivered to IKEA supplier • Wet testing to be done at approved or accredited lab
3	2	Documentation	Clarification on: <ul style="list-style-type: none"> • Documentation according to IOS-MAT-0010 and other chemical specifications if applicable • Certificate of analysis per batch • TDS • Delivery specification • FMEA risk analysis summary
4	3	Definitions	New definitions: <ul style="list-style-type: none"> • AAS • FMEA • Heavy metals • ICP-MS • LOD • TDS • NA • Producer of raw materials • XRF
6		Appendix B: Example of delivery specification	Revised form
7		Appendix C: Example of certificate of analysis	Revised from