

**ezù****Elektrotechnický zkušební ústav, s. p.**  
Pod lisem 129/2, Troja, 182 00 Praha 8**TEST REPORT**

Test Report No.: 242158-01/01

Issued: 21. 10. 2024

<b>Name of product:</b>	<b>Materials</b>
<b>Type of product:</b>	<b>ABS, PS, PP</b>
<b>Ratings:</b>	-
<b>Serial number:</b>	-
<b>Manufacturer:</b>	-
<b>Production site:</b>	-
<b>Ordering firm:</b>	<b>WANSIDA Int. s.r.o.</b> Nademlejská 600/1, 198 00 Praha - Hloubětín, Czech Republic
<b>Number of tested samples:</b>	3
<b>Samples submitted on:</b>	16. 9. 2024
<b>Location of testing:</b>	Elektrotechnický zkušební ústav, s. p.
<b>Tests performed</b>	<b>from 18. 9. 2024 through 11. 10. 2024</b>
<b>Other data:</b>	-
<b>Tested according to:</b>	Directive RoHS 2011/65/EU as amended; NV 481/2012 Sb. as amended; ZP 344/02; method ZM-14

Compiled by: Monika Hájková

Approved by: Zdeněk Dvořák  
Testing laboratory technical manager

No. of pages: 8

No. of attachments: 4

No. of attachments pages: 7

The test results stated in the test report apply only to the tested subject as received and unless specified otherwise in the test report, the tests were performed using the method and under the conditions determined in the test regulations, technical norm, instructions for use and information provided by the manufacturer on the tested subject and using accessories required by the manufacturer.  
Without written consent from Elektrotechnický zkušební ústav, s. p., this report must not be reproduced in any other way than as a whole.

## 1. Specimen description

Materials were provided for testing.

Type: ABS, PS, PP



ABS



PS



PP

## 2. Testing

### 2.1 Determination of certain substances in electrotechnical products

#### 2.1.1 Determination of Pb, Cd, Cr, Hg, Br – spectral analysis

according to ZP 344/02 – Determination of substances in materials using X-ray fluorescence spectrometry

using ČSN EN 62321-1:2014 and ČSN EN 62321-3-1:2014

#### Test apparatus:

analyser MESA-50K HORIBA, inv. No. 110324

#### Test parameters:

principle of the method: EDXRF, energetical dispersive X-ray fluorescence spectrometry

test conditions: temperature  $(23 \pm 3) ^\circ\text{C}$ , relative humidity  $(35 \pm 5) \%$

#### Decision rule:

measured value of element concentration is below limit (BL): value  $< (L_i - U_i)$

measured value of element concentration is over limit (OL): value  $> (L_i + U_i)$

measured value of element concentration is inconclusive (X): value  $\geq (L_i - U_i)$  and value  $\leq (L_i + U_i)$

#### Explanations:

BL ... below limit

OL ... over limit

X ..... inconclusive, further examination is required  
value measured value of element concentration

$L_i$  ..... concentration limit (see section 3)

$U_i$  ..... expanded combined uncertainty based on standard deviation multiplied by coverage factor ( $k = 2$ ), defines an interval having a level of confidence of approximately 95 %

**Measured values:**

No.	Pb (mg/kg)		Cd (mg/kg)		Cr (mg/kg)		Hg (mg/kg)		Br (mg/kg)		result
	value	U <sub>i</sub>	value	U <sub>i</sub>	value	U <sub>i</sub>	value	U <sub>i</sub>	value	U <sub>i</sub>	
1	ND	±23	28	±18	21	±23	ND	±12	868	±299	OL
2	11	±23	15	±18	ND	±23	ND	±12	1395	±299	OL
3	25	±23	ND	±18	20	±23	ND	±12	223	±299	BL

**Explanations:**

BL ... below limit

OL ... over limit

X ..... inconclusive, further examination is required

value measured value of element concentration

ND... not detected <10 ppm (method detection limit)

U<sub>i</sub>..... expanded combined uncertainty based on standard deviation multiplied by coverage factor (k = 2), defines an interval having a level of confidence of approximately 95 %

Br .... Determination of total bromine. A different analytical method must be used to determine the presence of PBB, PBDE.

Cr .... Determination of total chromium. A different analytical method must be used to determine hexavalent chromium.

### 2.1.2 Determination of phthalic acid esters (DIBP, DBP, BBP and DEHP) in polymer materials according to GC-MS, EPA Method 506, EPA Method 525.2

using method ZM-14 of UCT Prague

The test results were taken from the Testing Protocol of the Independent packaging laboratory of UCT Prague,

No. EZU 12-en/24-01 of 26. 9. 2024 (see Attachment No. 1 of this Report).

#### Measured values:

No.	DIBP (mg/kg)		DBP (mg/kg)		BBP (mg/kg)		DEHP (mg/kg)		result
	value	U	value	U	value	U	value	U	
1	1	±2	9	±2	<1	-	44	±2	BL
2	3	±2	11	±2	<1	-	79	±2	BL
3	<1	-	<1	-	<1	-	<1	-	BL

#### Explanations:

U ..... expanded combined measurement uncertainty

BL ... below limit

OL... over limit

### 2.1.3 Determination of brominated flame retardants (BFR) in the polymeric material:

The test results were taken from the Testing Protocol of the facilities of MZL UCT Prague, No. LN 2335/24 and 2336/24 of 2. 10. 2024 (see Attachment No. 2, 3 and 4 of this Report).

Overview of monitored substances:

- polybrominated diphenyl ethers (PBDE)
- polybrominated biphenyls (PBB)
- hexabromocyclododecane (HBCD)
- 1,2-bis (2,4,6-tribromo-phenoxy) ethane (BTBP)
- hexabrombenzen (HBB)
- pentabrometylbenzen (PBEB)
- pentabromtoluen (PBT)
- oktabromtrimetylfenylindan (OBIND)
- dekabromdifenyletan (DBDPE)

## Measured values:

Analyte	Content of brominated flame retardants (BFR) (ng / g material)			
	Sample 1	Expanded uncertainty	Sample 2	Expanded uncertainty
PBDE 28	< 0,5	-	< 0,5	-
PBDE 47	3,04	0,46	< 0,5	-
PBDE 49	< 0,5	-	< 0,5	-
PBDE 66	< 0,5	-	< 0,5	-
PBDE 85	< 0,5	-	< 0,5	-
PBDE 99	8,64	1,30	31,1	3,7
PBDE 100	< 0,5	-	62,2	7,5
PBDE 153	135	13	181	18
PBDE 154	19,5	2,3	31,4	3,8
PBDE 183	1771	177	1882	188
PBDE 196	250	25	397	40
PBDE 197	453	45	505	50
PBDE 203	183	18	260	26
PBDE 206	677	68	2205	220
PBDE 207	801	80	1239	124
PBDE 209	5843	584	124716	12471
∑PBDE	10145	1014	131509	13151
PBB 3	< 0,5	-	< 0,5	-
PBB 15	< 0,5	-	< 0,5	-
PBB 18	< 0,5	-	< 0,5	-
PBB 52	< 0,5	-	< 0,5	-
PBB 101	< 0,5	-	< 0,5	-
PBB 153	6,91	1,04	< 0,5	-
PBB180	3,91	0,59	3,88	0,58
PBB 194	68,0	8,2	56,9	6,8
PBB 206	17,0	2,0	112	11
PBB 209	< 2,5	-	205	21
∑PBB	95,8	11,5	378	38

### 3. Evaluation criteria

Limits of the concentrations of hazardous substances in homogeneous material according to the requirements of Directive 2011/65/EU of the European Parliament and of the Council of 8. 6. 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS 2) and its amending Directive 2015/863/EU (RoHS 3):

<b>substance</b>	<b>concentration limit (mass fraction)</b>	
<b>Pb</b> – lead	1000 mg/kg	0,1 %
<b>Cd</b> – cadmium	100 mg/kg	0,01 %
<b>Cr<sup>VI</sup></b> – hexavalent chromium	1000 mg/kg	0,1 %
<b>Hg</b> – mercury	1000 mg/kg	0,1 %
<b>PBB</b> – polybrominated biphenyls	1000 mg/kg	0,1 %
<b>PBDE</b> – polybrominated diphenyl ethers	1000 mg/kg	0,1 %
<b>DEHP</b> – bis(2-ethylhexyl) phthalate	1000 mg/kg	0,1 %
<b>BBP</b> – benzyl butyl phthalate	1000 mg/kg	0,1 %
<b>DBP</b> – dibutyl phthalate	1000 mg/kg	0,1 %
<b>DIBP</b> – diisobutyl phthalate	1000 mg/kg	0,1 %

#### 4. Test result

The results of the measurements of the concentration of hazardous substances according to Directive 2011/65/EU (RoHS 2) and its amending Directive 2015/863/EU (RoHS 3) on the measured Materials (type: ABS, PS, PP) do not indicate that the concentration limits for lead, cadmium, hexavalent chromium, mercury, total bromine (therefore for polybrominated biphenyls and polybrominated diphenyl ethers), bis(2-ethylhexyl) phthalate, benzyl butyl phthalate, dibutyl phthalate and diisobutyl phthalate were exceeded.

Tested by: M. Hájková



---

The end of the test report





University of Chemistry and Technology, Prague  
**Independent packaging laboratory of UCT Prague**

UCT Prague, Department of Food Preservation, Technická 5, 166 28 Prague 6, Czech Republic  
homepage: nol.vscht.cz

Pages: 4

Page: 1

# TESTING PROTOCOL

No.: **EZU 12-en/24-01**

- Customer:** The Electrotechnical Testing Institute.  
Pod Lisem 129/2  
171 02 Prague 8 – Troja  
Czech Republic  
VAT CZ00001481
- Product:** Three samples of three types of the polymer materials.  
(Contract 242158).  
Sample labelling in the laboratory – customer designation \*):  
EZU 12/24/1 – ABS,  
EZU 12/24/2 – PP,  
EZU 12/24/3 – PS.
- Producer:** See customer.
- Objective:** RoHS analysis for four types of phthalates (BBP, DBP, DEHP, and DIBP).  
See testing method (page 2).
- Processed by:** Lenka Votavová, MSc, PhD
- Appendix:** None

Approved:

**NEZÁVISLÁ OBALOVÁ  
LABORATOŘ (NOL)  
VŠCHT Praha  
Technická 3, 166 28 Praha 6**

Prague, September 26, 2024

Eliška Václavíková, MSc, PhD  
quality manager

*\*) Customer-supplied data. The laboratory disclaims liability if the information provided by the customer may affect the validity of the results.*

*The results in this protocol apply for the testing samples only.*

*Without the IPL authorization, this protocol may not be reproduced unless in whole.*

## 1. Basic information

Sample collection	Samples collected by	Customer
	Date of the collection	None
	Date of the transfer to IPL	September 18, 2024
Used testing methods IPL	ZM-14 <sup>N)</sup>	Determination of phthalic acid esters in polymer materials (GC-MS, EPA Method 506, EPA Method 525.2).
Date of testing	September 24 – 26, 2024	
Used devices	<ul style="list-style-type: none"> <li>analytical balance AND HR-200-EC (A&amp;D Instruments LTD)</li> <li>vacuum evaporator (BUCHI, Rotavapor R-114, Waterbath B-480)</li> <li>gas chromatograph 6890 with mass spectrometry 5973N (Agilent Technologies, USA)</li> </ul>	

<sup>N)</sup> Method out of the scope of accreditation.

## 2. Procedure of preparation of the samples for testing

Three samples of three types of the polymer materials were delivered to the laboratory. The samples were tested in an original state.

Phthalic acid esters were extracted from the samples into n-hexane. The extract was evaporated to dryness and the residue was dissolved in 2 ml of n-hexane with internal standard (dipentyl phthalate) and analysed by gas chromatography under the following conditions: gas chromatograph Hewlett Packard 5890; detector Hewlett Packard 5972, quadrupole mass spectrometer, ionization: EI+ 70 eV; temperature of ion source 280 °C; scan range TIC; column DB-5HT, 30 m × 0.25 mm, film 0.10 µm; carrier gas He at 0.6 ml/min; inlet temperature 300 °C; injection volume 1 µl (splitless); the oven temperature program: 70 °C (5 min) to 300 °C at 15 °C/min, 300 °C to the end of analysis. Identification of phthalic acid esters (diisobutyl phthalate – DIBP, dibutyl phthalate – DBP, butyl benzyl phthalate – BBP and diethylhexyl phthalate – DEHP) was performed using the chromatographic software HP Chemstation equipped with the library of mass spectra NIST14.

Determination of phthalic acid esters was performed using internal standard dipentyl phthalate. Phthalic acid esters contents in the sample were expressed as a percentage by weight of the sample in agreement with the Directive No. 2011/65/EU

of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, the Commission Regulation (EU) No. 2018/2005 and Regulation of the Government of the Czech Republic No. 391/2016 Coll. and 101/2018 Coll.



Figure 1 – Tested samples.

### 3. Results

Tested parameter	Unit	Sample	Measurement uncertainty <sup>**</sup> )	Limit <sup>*)</sup>	Evaluation
		EZU 12/24/1			
Phthalic acid esters (ZM-14) <sup>N)</sup>	% (w/w)	DIBP	0.0001	± 0.0002	Within limit <sup>***)</sup>
		DBP	0.0009		
		BBP	<0.0001	–	
		DEHP	0.0044	± 0.0002	

**Notes:**

Symbol „<“ means less than the limit of detection of the method used.

**Annotations:**

<sup>\*)</sup> Limit according to the Regulation of the Government of the Czech Republic No. 391/2016 Coll.

<sup>\*\*)</sup> Stated uncertainty is expressed as expanded combined uncertainty based on standard deviation multiplied by coverage factor ( $k = 2$ ), defines an interval having a level of confidence of approximately 95 %.

<sup>\*\*\*)</sup> The result with addition of measurement uncertainty is lower or equal than the maximum value of the mass concentration tolerated in homogeneous materials.

<sup>N)</sup> Method out of the scope of accreditation.

Tested parameter	Unit	Sample	Measurement uncertainty <sup>**)</sup>	Limit <sup>*)</sup>	Evaluation
		EZU 12/24/2			
Phthalic acid esters (ZM-14) <sup>N)</sup>	DIBP	0.0003	± 0.0002	0.1	Within limit <sup>***)</sup>
	DBP	0.0011			
	BBP	<0.0001	–		
	DEHP	0.0079	± 0.0002		

**Notes:**

Symbol „<“ means less than the limit of detection of the method used.

**Annotations:**

<sup>\*)</sup> Limit according to the Regulation of the Government of the Czech Republic No. 391/2016 Coll.

<sup>\*\*)</sup> Stated uncertainty is expressed as expanded combined uncertainty based on standard deviation multiplied by coverage factor ( $k = 2$ ), defines an interval having a level of confidence of approximately 95 %.

<sup>\*\*\*)</sup> The result with addition of measurement uncertainty is lower or equal than the maximum value of the mass concentration tolerated in homogeneous materials.

<sup>N)</sup> Method out of the scope of accreditation.

Tested parameter	Unit	Sample	Measurement uncertainty <sup>**)</sup>	Limit <sup>*)</sup>	Evaluation
		EZU 12/24/3			
Phthalic acid esters (ZM-14) <sup>N)</sup>	DIBP	<0.0001	–	0.1	Within limit <sup>***)</sup>
	DBP	<0.0001			
	BBP	<0.0001			
	DEHP	<0.0001			

**Notes:**

Symbol „<“ means less than the limit of detection of the method used.

**Annotations:**

<sup>\*)</sup> Limit according to the Regulation of the Government of the Czech Republic No. 391/2016 Coll.

<sup>\*\*)</sup> Stated uncertainty is expressed as expanded combined uncertainty based on standard deviation multiplied by coverage factor ( $k = 2$ ), defines an interval having a level of confidence of approximately 95 %.

<sup>\*\*\*)</sup> The result with addition of measurement uncertainty is lower or equal than the maximum value of the mass concentration tolerated in homogeneous materials.

<sup>N)</sup> Method out of the scope of accreditation.

#### 4. Deviations from recorded testing procedures, additional information

None

*The end of the testing protocol.*

Print no. ENG\_918/24

page 1 of 1



University of Chemistry and Technology, Prague  
Metrological and Testing Laboratory ÚCT Prague

Department of Food Analysis and Nutrition

Address: VSCHT Praha, Technická 1905/5, 166 28 Prague 6, Czech Republic (tel.: +420 602833424; +420 220443184; <https://www.vscht.cz/mzl>)

**Test certificate LN: 2335/24**

Print no.: ENG\_918/24

Client: Elektrotechnický zkušební ústav, s. p.

Pod lísem 129/2  
182 00 Praha - Praha 8  
Česká republika

Sample received: 20.9.2024  
Order no.: EXT2400772  
Sample description (client's): Materiál elektrosoučástek ABS

Testing item: Material of electrical components  
packaging: polyethylene bag (PE)  
quantity: 1 g

Date of testing: 20.09.2024 - 02.10.2024

Location of testing: facilities of the MZL UTC, Technická 1903/3, 166 28 Prague 6 - Dejvice

Testing methods used: see Appendix

#### **TEST RESULTS:**

***see Appendix***

This certificate shall not be reproduced except in full, without written approval of the Laboratory. The results given herein apply only to the sample as received. The certificate does not substitute any other legal document. Laboratory is not responsible for information supplied by customer, if such information can affect the validity of results.

***The appendix is an integral part of this Testing certificate!***

Date of issue: 2.10.2024

Digitálně podepsal prof. Ing. Vladimír Kocourek, CSc.

Prof. Dr. Jana Hajšlová, head of the laboratory

*The end of Certificate*

Print no. ENG\_919/24

page 1 of 1



University of Chemistry and Technology, Prague  
Metrological and Testing Laboratory UCT Prague

Department of Food Analysis and Nutrition

Address: VSCHT Praha, Technická 1905/5, 166 28 Prague 6, Czech Republic (tel.: +420 602833424; +420 220443184; https://www.vscht.cz/mzl)

**Test certificate LN: 2336/24**

Print no.: ENG\_919/24

Client: Elektrotechnický zkušební ústav, s. p.

Pod lisem 129/2  
182 00 Praha - Praha 8  
Česká republika

Sample received: 20.9.2024

Order no.: EXT2400772

Sample description (client's): Materiál elektrosoučástek PS

Testing item: Material of electrical components  
packaging: polyethylene bag (PE)  
quantity: 1 g

Date of testing: 20.09.2024 - 02.10.2024

Location of testing: facilities of the MZL UTC, Technická 1903/3, 166 28 Prague 6 - Dejvice

Testing methods used: see Appendix

#### **TEST RESULTS:**

***see Appendix***

This certificate shall not be reproduced except in full, without written approval of the Laboratory. The results given herein apply only to the sample as received. The certificate does not substitute any other legal document. Laboratory is not responsible for information supplied by customer, if such information can affect the validity of results.

***The appendix is an integral part of this Testing certificate!***

Date of issue: 2.10.2024

Digitálně podepsal prof. Ing. Vladimír Kocourek, CSc.

Prof. Dr. Jana Hajšlová, head of the laboratory

*The end of Certificate*

Appendix to the Test Certificate LN 2335-2336

List 1 of 1

LN 2335-2336/24

Appendix No. 1 to the Test certificate  
The other tests (out of accreditation scope)

Testing method: KM07b: GC-MS (NCI)

Test results:

Sample/analyte	PBDE 28		PBDE 47		PBDE 49		PBDE 66		PBDE 85		PBDE 99		PBDE 100	
	ng/g	Expanded uncertainty	Result*	Expanded uncertainty	ng/g	Expanded uncertainty	Result*	Expanded uncertainty	ng/g	Expanded uncertainty	Result*	Expanded uncertainty	ng/g	Expanded uncertainty
Units														
LN 2335/24	<0.5	/	3.04	0.46	<0.5	/	<0.5	/	<0.5	/	8.64	1.30	<0.5	/
LN 2336/24	<0.5	/	<0.5	/	<0.5	/	<0.5	/	<0.5	/	31.1	3.7	62.2	7.5
Sample/analyte	PBDE 153		PBDE 154		PBDE 183		PBDE 196		PBDE 197		PBDE 203		PBDE 206	
	ng/g	Expanded uncertainty	Result*	Expanded uncertainty	ng/g	Expanded uncertainty	Result*	Expanded uncertainty	ng/g	Expanded uncertainty	Result*	Expanded uncertainty	ng/g	Expanded uncertainty
Units														
LN 2335/24	135	13	19.5	2.3	1.771	177	250	25	453	45	183	18	677	68
LN 2336/24	181	18	31.4	3.8	1.882	188	397	40	505	50	260	26	2,205	220
Sample/analyte	PBDE 207		PBDE 209		ΣPBDE		PBDE 3		PBDE 15		PBDE 18		PBDE 52	
	ng/g	Expanded uncertainty	Result*	Expanded uncertainty	ng/g	Expanded uncertainty	ng/g	Expanded uncertainty	ng/g	Expanded uncertainty	Result*	Expanded uncertainty	ng/g	Expanded uncertainty
Units														
LN 2335/24	801	80	5,843	584	10,145	1,014	<0.5	/	<0.5	/	<0.5	/	<0.5	/
LN 2336/24	1,239	124	124,716	12,471	131,509	13,151	<0.5	/	<0.5	/	<0.5	/	<0.5	/
Sample/analyte	PBB 101		PBB 153		PBB 180		PBB 194		PBB 206		PBB 209		ΣPBB	
	ng/g	Expanded uncertainty	Result*	Expanded uncertainty	ng/g	Expanded uncertainty	ng/g	Expanded uncertainty	ng/g	Expanded uncertainty	Result*	Expanded uncertainty	ng/g	Expanded uncertainty
Units														
LN 2335/24	<0.5	/	6.91	1.04	3.91	0.59	68.0	8.2	17.0	2.0	<2.5	/	95.8	11.5
LN 2336/24	<0.5	/	<0.5	/	3.88	0.58	56.9	6.8	112	11	205	21	378	38

\* the sign "<" indicate that concentration is lower than this value, i.e. below limit of quantitation (LOQ)

Expanded uncertainty was calculated using coverage factor  $k = 2$  corresponding to a coverage probability of approximately 95%. Uncertainty was calculated and stated according to the documents ILAC G17:01(2011) and Kvalimetri 11 (issued as EURACHEM/CITAC 4). Uncertainty of sampling is not covered.

The results given herein apply only to the test sample as received. This certificate shall not be reproduced except in full, without written approval of the Laboratory. The certificate does not substitute any other legal document. Laboratory is not responsible for information supplied by customer, if such information can affect the validity of results.

The End of Appendix