

	GLOBAL QUALITY ASSURANCE SAFETY & RELIABILITY SPECIFICATIONS		
	TITLE: HEAVY METAL CONTENT SPECIFICATION		NUMBER: SRS-018
	REVISION:	AUTHOR:	DATE:
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		APPROVED BY QA TECHNICAL COMMITTEE	2/4/21

1.0 PURPOSE

- 1.1 To set requirements for the heavy metal content of various materials in all Hasbro products to ensure compliance with US federal and state regulations as well as Global regulatory requirements such as the European Toy Safety Directive, Canadian CCPSA and ISO 8124.

2.0 SCOPE

- 2.1 All accessible components and materials, including retainable packaging materials, used in Hasbro, Inc. products shall comply with the requirements of this SRS.
- 2.2 Additional requirements for Heavy Metals exist in the following specifications: SRS-082 Heavy Metals Requirements for Packaging.
- 2.3 All inaccessible polymeric materials and coatings.

3.0 DEFINITIONS

3.1 Accessible

Materials that are accessible using the probes in SRS-002.

NOTE: A children's product that is or contains a part which is enclosed, encased, or covered by fabric and passes the appropriate use and abuse tests on such covers, is inaccessible to a child unless the product or part of the product in one dimension is smaller than 5.0 cm.

3.2 Required limit

Heavy metal content limits which materials are not allowed to exceed.

3.3 Action limit

Heavy metal content limits that, if exceeded, require some further action.

NOTE: In this specification, the action limit is generally defined as 70% of the corresponding required limit except for certain specific heavy metals and where the existing required limit is too low to effectively allow for an action limit to be in place.

3.4 Coating

Layer of material formed or deposited on a base material of a toy, including

paints, varnishes, lacquers, printing inks, polymeric coatings or other substances of a similar nature, whether they contain metallic particles or not, no matter how they have been applied to the toy, and which can be removed by scraping. Materials which become an integral part of the substrate, such as colorants in plastic materials and materials which are bonded to the substrate such as by electroplating or ceramic glazing are not regarded as coatings.

3.5 General material

Solid toy materials and substrates with or without a coating which can be ingested as a result of biting, tooth scraping, sucking or licking. This definition includes coatings, plastics, textiles, paper, wood, metal, glass and ceramics.

3.6 Liquid and sticky material

Fluid or viscous toy materials which can be ingested and/or to which dermal exposure occurs during playing. This definition includes such materials as glues, gels, slimes, marker inks and finger paints.

3.7 Dry, Brittle and Powder-like material

Solid toy materials from which powder-like material is released during playing. This definition includes such materials as chalks, crayons, graphite, paint powders or tablets, the graphite materials in pencils, plaster of Paris, Play-Doh and most modelling compounds.

3.8 Children's jewelry

A product principally designed or intended primarily as an ornament worn by children.

3.9 Food Contact Product

A product that meets one or more of the following conditions:

- intended to come into contact with food,
- already in contact with food,
- which can reasonably be expected to come into contact with food.

NOTE: This definition includes packaging elements (e.g. candy wrappers) that come into contact with food, food utensils and feeding bottles.

3.10 Oral Contact Product

A product that meets one or more of the following conditions:

- primarily intended to be placed in a child's mouth during normal use (e.g. teethers, pacifiers, mouth-operated musical instruments, etc.),
- can be expected to be placed in a child's mouth under reasonably foreseeable conditions of use (e.g. bibs, rattles, squeeze toys, food imitating toy, etc.).

3.11 Toy Utensil

Toy products intended for children to imitate handling and processing food during play. This includes toy cooking sets and toy tableware.

3.12 Cosmetic Product

Any substance or mixture intended to be placed in contact with the external parts of the human body or with the teeth and the mucous membranes of the oral cavity with the intention of cleaning, perfuming, promoting attractiveness, protection, maintaining or altering the appearance thereof.

NOTE: Cosmetic products are separate from the categories defined in sections 3.6 or 3.7 for the purposes of testing and have category-specific requirements.

3.13 Heavy Metal

One or more of the following elements, compounds or chemical species (with their associated chemical symbol):

Aluminium (Al)	Antimony (Sb)	Arsenic (As)
Barium (Ba)	Beryllium (Be)	Boron (B)
Cadmium (Cd)	Chromium (Cr)	Chromium (III) (Cr (III))
Chromium (VI) (Cr (VI))	Cobalt (Co)	Copper (Cu)
Iron (Fe)	Lead (Pb)	Lithium (Li)
Manganese (Mn)	Mercury (Hg)	Molybdenum (Mo)
Nickel (Ni)	Selenium (Se)	Silver (Ag)
Strontium (Sr)	Tin (Sn)	Organic Tin (OSn)
Thallium (Tl)	Vanadium (V)	Zinc (Zn)

3.14 Retainable Packaging

Packaging elements that are likely to be retained and incorporated into the play pattern of the toy or game and/or can be reasonably expected to be used by the child (e.g. PlayDoh containers).

NOTE: Packaging of packaging components that have the statement “retain this package for future reference” (or similar wording) are intended to be retained by an adult as opposed to the child for the purposes of this specification, and are considered as non-retainable packaging.

3.15 Non-Retainable Packaging

Packaging which is normally intended to be discarded by the consumer.

3.16 ICP

Inductively Coupled Plasma, referring to test equipment. The two main test systems are ICP-MS (Mass Spectrometer) and ICP-OES (Optical Emission Spectrometer).

3.17 AAS

Atomic Absorption Spectrometer, referring to test equipment.

4.0 EXEMPTIONS

4.1 All inaccessible electronic components.

5.0 SPECIFICATIONS

- 5.1 All materials shall meet the *required limits* listed in APPENDIX 1 where applicable. In addition, *children's jewelry* shall also be assessed with reference to Table 2, *toy utensils* shall also be assessed with reference to the requirements for food contact materials listed in Table 3, and textiles which are intended to come into contact with human skin shall also be assessed with reference to Table 5.
- 5.2 All inaccessible polymeric materials and *coatings* are also required to meet the total Cadmium (Cd) requirements of this specification.
- 5.3 For metal, glass and/or ceramic materials in toy and childcare articles, soluble metal requirements only apply to Hasbro small parts (as defined in SRS-001) before and/or after test plan testing.
- NOTE:** metal, glass and ceramic materials, regardless of whether or not they are small parts, are not exempted from total Lead (Pb) requirements.
- 5.4 Where a test result exceeds the applicable content limits(s) listed in APPENDIX 1, apply the following condition(s):
- 5.4.1 When a total or soluble *heavy metal* content exceeds the *required limit*, the material fails the requirements of this specification.
- 5.4.2 When a total or soluble *heavy metal* content exceeds the *action limit*, retest to confirm the result. If the second test result is confirmed to exceed the *action limit*, a corrective action plan shall be determined and implemented by QA management and the development team in order to ensure the final total and/or soluble *heavy metal* concentrations are below the *action limit(s)*.
- 5.5 The requirement for total nickel content is applicable unless one or both of the following conditions are applicable:
- 5.5.1 Nickel is present in stainless steel that contains at least 10.5 % chromium and a maximum of 1.2 % carbon (as defined per EN10020).
- 5.5.2 The metal parts are intended for conducting electricity.
- NOTE:** Nickel content is prohibited for certain items as specified in SRP-025 Chemical Requirements for Vendor Compliance Programs.
- 5.6 The following variances to the total lead (Pb) requirements for *general materials* are permitted for *accessible* component parts of electronic devices up to a maximum required level of 210 ppm total Pb:
- 5.6.1 Lead used as an alloying element in steel.
- 5.6.2 Lead used in the manufacture of aluminium.
- 5.6.3 Lead used in copper-based alloys (e.g. brass).
- 5.6.4 Lead used in lead-bronze bearing shells and bushings.
- 5.6.5 Lead used in compliant pin connector systems.

6.0 TEST METHODS

- 6.1 All *accessible* materials used in Hasbro products are sampled using the procedures as described in the relevant standards below.
- NOTE:** For total Cadmium (Cd), all polymeric & coating materials are tested regardless of accessibility (ref. Section 5.2 above).
- 6.2 Testing is carried out in accordance with the latest version of the referenced standards. Test methods are as follows:
- 6.2.1 Total *heavy metal* testing is carried out in accordance with ISO 8124-5 or any other validated test method.
- NOTE:** For analysis of total content of certain elements (e.g. Sn, Sb), a suitable volume of HCl shall be added to ensure proper digestion.
- 6.2.2 Due to spectral interference, for total *heavy metal* testing of Pb in zinc alloy materials, verification testing shall be carried out using AAS whenever a result of 30 ppm or greater is observed using ICP equipment.
- 6.2.3 Total chromium (VI) testing is carried out in accordance with ISO 17075, DIN 38405-24, or Okeo-Tex® Standard 201-M-12. The following parameters shall be applied during Cr VI testing:
- 6.2.3.1 Neutralization pH range of 7.0 – 8.0.
- 6.2.3.2 Use of a chromatographic column that works optimally at the required pH range, e.g. Bio WAX column.
- 6.2.3.3 If UV/Vis is used as a detection method, confirmation using ICP-MS will be required for any observed positive result.
- 6.2.4 Total arsenic, cadmium and lead testing according to the textile product requirements is carried out in accordance with EN 16711-2.
- 6.2.5 Soluble *heavy metal* testing, chromium (VI) and organic tin analysis are carried out in accordance with EN71-3.
- 6.2.6 Canadian soluble *heavy metal* testing is carried out in accordance with method C03 of part 5 of the Canadian product safety reference manual.
- 6.2.7 Migration of *heavy metals* from food and oral contact materials, and *toy utensils* is carried out in accordance with Commission Regulation (EU) No 10/2011, EU Technical Guide on Metals and Alloys used in food contact materials and articles, EN 14350-2, EN 14372, EN 1400:2013, and any applicable standards and national requirements.
- 6.2.8 Soluble nickel test under the *cosmetic product* requirements is carried out in accordance with DIN EN 71 using artificial sweat solution using DIN 53160-1974 as the extraction solution.
- 6.3 For chemical tests at pilot stages, all samples shall be taken from finished products. For surface coatings, the samples shall be obtained from 10 pieces of finished products, or up to a maximum of 40 pieces of decorated components from production lines of the finished products. For testing carried out on other stages, samples may be taken from specific materials.

NOTE 1: If the weight of a surface coating sample is ≥ 50 mg, then it shall be sampled from the finished products. For a surface coating sample with a weight of < 50 mg or a surface area less than 3 mm x 3 mm, the factory shall submit repeatedly decorated components (applying identical coating process on the same substrate as that of the finished product) for testing.

NOTE 2: Overlapped coatings that are not able to be mechanically separated into individual colours can be regarded as an individual sample.

6.4 Solvent recovery techniques may be used to take sample coatings provided it can be shown the results of the *heavy metal* extraction are not affected.

6.5 Printed materials using CMYK or similar printed techniques shall always be tested as a cross-section.

NOTE: Even though large areas of single color are available they are always likely to have been a mix of the CMYK colors.

6.6 Screening testing is utilized for the requirements specified in Table 1 and Table 2.

6.6.1 If the total content of a tested *heavy metal* is below the soluble action limit of that element, additional soluble testing is not required for compliance.

6.6.2 If the total content of a tested *heavy metal* exceeds the soluble test action limit of that element:

6.6.2.1 Where the total weight of the tested material available from one toy is greater than 10 mg, all soluble requirements are applicable. Refer to sections 6.2.5 and 6.2.6.

6.6.2.2 Where the total weight of the tested material available from one toy is smaller than 10 mg, only the Canada soluble requirement is applicable. Refer to section 6.2.6.

6.7 Composite testing up to three samples of equal weight may be utilized for total content screening test whenever analytically feasible. Only identical materials with secondary variances may be composited (e.g. differing colors). If any of the *heavy metals* are detected at levels that would exceed a limit if the weights were calculated individually (i.e. one third of the limit for 3-in-1 mix of equal weights), then individual retests shall be carried out.

NOTE: Composite testing is not allowed for any soluble testing or for total boron testing.

6.8 Chromium VI testing is required on genuine leather only.

6.9 Organic tin testing should be performed only if the total tin analysis and soluble tin analysis both exceed the triggering limits below:

Analysis	Triggering Limits (ppm)			Next Action
	General materials	Liquid or sticky materials	Dry, brittle, powder-like or pliable materials	

Total Sn content	12 (Detection limit \leq 5 ppm)	0.2	0.9	Soluble Sn analysis
Soluble Sn content	2.5	0.04	0.2	Organic Sn analysis

NOTE: The detection/reporting limit for Organic Sn analysis shall be 0.5 ppm or less.

6.10 The following compounds shall be included in the OSn analysis:

- 6.10.1 DMT
- 6.10.2 DProT
- 6.10.3 DBT
- 6.10.4 TBT
- 6.10.5 DOT
- 6.10.6 DPhT
- 6.10.7 MeT
- 6.10.8 BuT
- 6.10.9 TPhT
- 6.10.10 MOT
- 6.10.11 TeBT

7.0 REFERENCES

- 7.1 16 CFR 1303
- 7.2 CPSIA Section 101
- 7.3 Toys Safety Directive, 2009/48/EC
- 7.4 Canada Consumer Product Safety Act (CCPSA)
- 7.5 Canada Product Safety Reference Manual, Book 5 - Laboratory Policies and Procedures, Part B, Determination of Leachable Arsenic (As), Selenium (Se), Cadmium (Cd), Antimony (Sb), and Barium (Ba) in Applied Coatings
- 7.6 ISO 8124
- 7.7 ASTM F963
- 7.8 EN71-3
- 7.9 ASTM F2923
- 7.10 21 CFR 73, 74, 81, 82 and 700
- 7.11 European Cosmetics Regulation EC No. 1223/2009
- 7.12 TSD Migration of Certain Elements – Hasbro Risk Assessment
- 7.13 Canada Guidance on Heavy Metal Impurities in Cosmetics
- 7.14 SRS-002 Sharp Point Specification

- 7.15** SRP-025 Chemical Requirements for Vendor Compliance Programs
- 7.16** ISO 8124-5 Determination of total concentration of certain elements in toys
- 7.17** Danish Ordinance BEK nr 858 of 05/09/2009
- 7.18** Regulation (EC) No 1907/2006 – REACH
- 7.19** 410 ILCS 45/ Illinois Lead Poisoning Prevention Act
- 7.20** 430 ILCS 140/ Cadmium-Safe Kids Act
- 7.21** Washington State RCW 70.240 Children's Safe Products
- 7.22** Connecticut An Act Concerning Child Product Safety
- 7.23** Article 10.1.1., Chapter 6.5., Division 20, California Health and Safety Code [section 25214.1 - 25214.4.2] California's Metal-Containing Jewelry law
- 7.24** Chapter 347--S.F. No. 2510, Minnesota Session Law [Sec. 27]
- 7.25** Connecticut An Act Banning Cadmium in Children's Jewelry
- 7.26** SOR/2011-17 Toy Regulations
- 7.27** SOR/2010-273 Consumer Products Containing Lead (Contact with Mouth) Regulations
- 7.28** SOR/2016-193 Surface Coating Materials Regulations
- 7.29** SOR/2016-168 Children's Jewelry Regulations
- 7.30** Health Canada Proposed Guidelines for cadmium in children's jewelry
- 7.31** SOR/2014-254 Products Containing Mercury Regulations
- 7.32** Commission Regulation (EU) No 10/2011
- 7.33** Council of Europe Resolution CM/Res(2013)9, Technical Guide on Metals and Alloys used in food contact materials and articles
- 7.34** EN 14350-2 Child use and care articles - Drinking equipment
- 7.35** EN 14372 Child use and care articles - Cutlery and feeding utensils
- 7.36** EN 1400 Child use and care articles - Soothers for babies and young children
- 7.37** SRS-040 Food Contact and Oral Contact Product Specifications
- 7.38** Technically avoidable heavy metal contents in cosmetic products, Journal of Consumer Protection and Food Safety (2017) 12:51-53, Bundesamt für Verbraucherschutz und Lebensmittelsicherheit (BVL)
- 7.39** Mitteilungen des Bundesgesundheitsamts: Technisch vermeidbare Gehalte an Nickel in kosmetischen Mitteln, Bundesgesundheitsblatt 35(7), published in 1992 by the BGA
- 7.40** EN 10020 Definition and Classification of Grades of Steel
- 7.41** ISO 17075 Leather – Chemical determination of chromium (VI) content in leather
- 7.42** EN 16711 Textiles – Determination of metal content – Part 2: Determination of metals extracted by acidic artificial perspiration solution

8.0 REVISION LOG

Revision Letter	Section Revised	By	Date
G	3.15, 3.16, 6.2.1, 6.2.2 (& re-number remainder), 6.8, Table 1.2, Table 3	JGH	2/4/21
F	6.2, 7.0, Table 1.1, Table 1.2, Table 5	JGH	7/21/20
E	Full re-write	RT/JGH	9/12/18
D	3.6, 3.7, 5.1, 5.3, 5.4, 5.8, 5.10, 6.4.1, 6.10, 7.15, 7.16, 7.17, Appendix 1 Tables 1.1, 1.2, 1.3, 1.4, 1.6, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, Table 4, Table 5	JGH	9/19/17
C	Table 1 Cosmetics, Table 2 Cosmetics, 7.14	JGH	6/7/16
B	3.6, 3.7	JGH	2/5/15
A	3.7, 3.10, 5.1, 5.2, 5.3, 5.10, 5.11, Tables 2, 5 & 6	JGH	7/8/13

APPENDIX 1

Table 1.1 Limits for heavy metals in toys and child care articles – general materials

No.	Toxic Elements / Compounds		Toys and child care articles					
			General materials					
			Total limit (ppm)		Soluble limit ^{#1} (ppm)		Soluble limit (Canada) ^{#2} (ppm)	
			Action	Required	Action	Required	Action	Required
1	Aluminium	Al			19641	28130		
2	Antimony	Sb			42	60	700	1000
3	Arsenic	As			18	25	70	100
4	Barium	Ba			700	1000	700	1000
5	Boron	B			10500	15000		
6	Cadmium	Cd	28	40	12	17	700	1000
7	Chromium	Cr			42	60		
8	Chromium III	Cr III			322	460		
9	Chromium VI	Cr VI				0.053		
10	Cobalt	Co			91	130		
11	Copper	Cu			5390	7700		
12	Lead	Pb	10 / 60 ^{#3}	20 / 75 ^{#3}	10	20		
13	Manganese	Mn			10500	15000		
14	Mercury	Hg		5		5		
15	Nickel	Ni		10000	651	930		
16	Selenium	Se			322	460	700	1000
17	Strontium	Sr			39200	56000		
18	Tin	Sn			126000	180000		
19	Organic Tin	oSn			8	12		
20	Zinc	Zn			32200	46000		

^{#1} Applicable for all materials, however for metal, glass & ceramic materials: applicable to small parts only.

^{#2} Applicable to coatings only.

^{#3} The second value is applicable to metal, glass and ceramics only UNLESS it is jewelry, when Table 2 is applicable.

Table 1.2 Limits for heavy metals in toys and child care articles – liquid or sticky materials and dry, brittle, powder-like or pliable materials

No.	Toxic Elements / Compounds		Toys and child care articles							
			Liquid or sticky materials				Dry, brittle, powder-like or pliable materials			
			Total limit (ppm)		Soluble limit (ppm)		Total limit (ppm)		Soluble limit (ppm)	
			Action	Required	Action	Required	Action	Required	Action	Required
1	Aluminium	Al			392	560			1575	2250
2	Antimony	Sb			7.9	11.3			31.5	45
3	Arsenic	As				0.9				3.8
4	Barium	Ba			175	250			175	250
5	Boron	B		108/260 ^{#1}	210/250 ^{#2}	300			840	1200
6	Cadmium	Cd		30		0.3		30		1.3
7	Chromium	Cr			17.5	25			17.5	25
8	Chromium III	Cr III			6.5	9.4			26	37.5
9	Chromium VI	Cr VI				0.005				0.02
10	Cobalt	Co				2.6			7	10.5
11	Copper	Cu			109	156			435	622.5
12	Lead	Pb	10	30		0.5	10	30		2
13	Manganese	Mn			210	300			840	1200
14	Mercury	Hg				1.9				5
15	Nickel	Ni		10000	13	18.8		10000	52.5	75
16	Selenium	Se			6.5	9.4			26	37.5
17	Strontium	Sr			787	1125			3150	4500
18	Tin	Sn			2625	3750			10500	15000
19	Organic Tin	oSn				0.2				0.9
20	Zinc	Zn			656	938			2625	3750

^{#1} The lower value relates to materials with borax, the higher value relates to materials with diboron trioxide

^{#2} The 250 ppm value relates to water-based non-Newtonian fluids.

Table 2 Limits for children's jewelry

No.	Toxic Elements / Compounds		Children's jewelry							
			Surface coatings						Substrate	
			Total limit (ppm)		Soluble limit (ppm)		Soluble limit (Canada) (ppm)		Total limit (ppm)	
			Action	Required	Action	Required	Action	Required	Action	Required
1	Antimony	Sb			42	60	700	1000		
2	Arsenic	As			17.5	25	700	1000		
3	Barium	Ba			700	1000	700	1000		
4	Cadmium	Cd	28	40	52.5	75	700	1000	28	40
5	Chromium	Cr			42	60				
6	Lead	Pb	10	30	10	30			10	30
7	Mercury	Hg		5		5				5
8	Selenium	Se			350	500	700	1000		

Table 3 Limits for food and oral contact materials

No.	Toxic Elements / Compounds		Food and oral contact materials								
			Food contact materials						Oral contact materials		
			Plastic		Metals and alloys		Additional requirements for specific drinking equipment, cutlery and feeding utensils				
			SM limit (mg/kg)		SM limit (mg/kg)		Migration limit (mg/kg)		Migration limit (mg/kg)		
		Action	Required	Action	Required	Action	Required	Action	Required		
1	Aluminium	Al		1		5				1001	1430
2	Antimony	Sb				0.04		10.5	15	42	60
3	Arsenic	As		0.01		0.002			0.01		2.5
4	Barium	Ba		1		1.2		70	100	140	200
5	Beryllium	Be				0.01					
6	Boron	B								1120	1600
7	Cadmium	Cd		0.002		0.005			0.002		1.8
8	Chromium	Cr		0.01		0.25			0.01	35	50
9	Cobalt	Co		0.05		0.02				11.9	14
10	Copper	Cu		5		4				581	830
11	Iron	Fe	33.6	48	28	40					
12	Lanthanide*	-		0.05					0.05		
13	Lead	Pb		0.01		0.01			0.01		2.5
14	Lithium	Li		0.6		0.048					
15	Manganese	Mn		0.6		1.8				210	300
16	Mercury	Hg		0.01		0.003			0.01	7	10
17	Molybdenum	Mo				0.12					
18	Nickel	Ni				0.14				70	100
19	Selenium	Se						70	100	35	50
20	Silver	Ag				0.08					
21	Strontium	Sr								4200	6000
22	Tin	Sn			70	100				14000	20000
23	Thallium	Tl				0.0001					
24	Vanadium	V				0.01					
25	Zinc	Zn		5		5				3500	5000

* Lanthanide substances include the following: Europium, Gadolinium, lanthanum and terbium. The sum of all lanthanide substances shall not exceed 0.05 ppm.

Table 4 Required limits for cosmetics

No.	Toxic Elements / Compounds		Cosmetic products			
			General	Make-up powder, rouge, eye shadow, eye liner, kajal	Theater, fan or carnival make-up	Toothpaste
			Total (mg/kg)			
1	Antimony	Sb	0.5	0.5	0.5	0.5
2	Arsenic	As	0.5	0.5	2.5	0.5
3	Cadmium	Cd	0.1	0.1	0.1	0.1
4	Lead	Pb	2	5	5	0.5
5	Mercury	Hg	0.1	0.1	0.1	0.1
6	Nickel	Ni	10 (soluble)	10 (soluble)	10 (soluble)	10 (soluble)

Table 5 Required limits for textiles

No.	Toxic Elements / Compounds		Textiles ^{#1}
			Total (mg/kg)
			1
2	Cadmium	Cd	1
3	Chromium VI	Cr VI	1
4	Lead	Pb	1

^{#1} Also applicable to prints and coatings applied directly on textile article surfaces (such as decorations or logos).