भारतीय मानक ब्यूरो /BUREAU OF INDIAN STANDARDS

(पूर्वी क्षेत्रीय प्रयोगशाला)/Eastern Regional Laboratory

हमारा संदर्भ/Our Ref: ERL(C)/ IS 4985 : 2021 26/03/2024

विषय / Subject: Comments on inclusion of method for Chemical Analysis of Other toxic substances such as di-n-octyl-tin-s-s bis iso-octyl mercapto acetate and butyl stearate and inclusion of additional test method as ICP-MS for estimation of Cd, Pb & Hg in effect on water test parameter.

इस संबंध में प्रस्तावित बदलाव(ओं) पर विचार करने के लिए सी ई डी तथा संबंधित तकनीकी समिति द्वारा निम्नलिखित टिप्पणियों पर ध्यान दिया जाए:

क्र. सं. Sl.No	Clause no of IS	**प्रस्तावित बदलाव/ Proposed change**	**वजह/Justification**
1	*Cl.10.3*	*a) The pipes shall not have any detrimental effect on the composition of water flowing through them. When tested by the method described in IS 12235 (Part 4)/IS 3025(Part 2)/IS 3025 (Part 65) and IS 12235 (Part 10), the quantities of lead, dialkyl tin C4 and higher homologues (measured as tin), cadmium, mercury and any other toxic substances extracted from the internal walls of the pipes shall not exceed the following concentrations in the test solution as mentioned in Table 18.* **(For Table 18 please see annex A of this comment)**	a) For estimation of Pb, Cd and Hg, the test method referred is IS 12235 (Part 4) which again refers to IS 3025(Part41) for Cd, IS 3025(Part47) for Pb and IS 3025(Part48)for Hg which are either AAS or UV-Vis spectro photometric methods. Currently such parameters for other water based matrices are being analysed by ICP-MS as per IS 3025(Part 65) which is more reliable, modern, convenient and faster technique. Our data for CRM calibration shows a very accurate & acceptable results. (Please see Annex B of this comment). This is also being proposed in line with other drafts [e.g. Cl. 8 of CHD 36 (25012)] where ICP-MS based technique are being incorporated as alternate methods.
		b) Suitable established standard test methods may be incorporated for estimation Other toxic substances such as 'di-n-octyl-tin-s-s bis iso-octyl mercapto acetate' and 'butyl stearate.	b) For effect on water test, method of test mentioned in cl.10.3 of IS 4985 are 12235 (Part 4)& 12235 (Part 10) and these are relevant to estimation of Lead, Cadmium, Mercury and Dialkyl tin C4 and higher homologues (measured as tin). No method has been specified for estimation of di-n-octyl-tin-s-s bis iso-octyl mercapto acetate and butyl stearate.

26.03.24
Avijit Paul,
LO (Chem)

26/3/24
प्रभारी (रासायनिक)

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प्रमुख (पू: क्षे: प्र:)

प्रमुख (सी ई डी)

Annex A

Table 18- Effect on Water
(Clause 10.3)

Sl. No	Parameter	Requirement	Test Method
a)	Lead (first extraction)	1.0 mg/l (1.0 ppm by mass)	*IS 12235 (Part 4)/IS 3025(Part 2)/IS 3025 (Part 65)*
b)	Lead (third extraction)	0.05 mg/l (0.05 ppm by mass)	*IS 12235 (Part 4)/IS 3025(Part 2)/IS 3025 (Part 65)*
c)	Dialkyl tin C4 and higher homologues (measured as tin)(third extraction)	0.02 mg/l (0.02 ppm by mass)	*IS 12235 (Part 4)*
d)	Cadmium(mean of first extraction, second extraction and third extraction)	0.01 mg/l (0.01 ppm by mass)	*IS 12235 (Part 4)/IS 3025(Part 2)/IS 3025 (Part 65)*
e)	Mercury(mean of first extraction, second extraction and third extraction)	0.001 mg/l (0.001 ppm by mass)	*IS 12235 (Part 4)/IS 3025(Part 2)/IS 3025 (Part 65)*
f)	Other toxic substances such as 'di-n-octyl-tin-s-s bis iso-octylmercapto acetate' and 'butyl stearate' (third extraction)	0.01 mg/l (0.01 ppm by mass)	-

However, the pipes manufactured without lead stabilizer, which are also termed as Lead-Free (LF) shall meet the requirements of lead extraction as given below:
Lead (first extraction): 0.01 mg/l (0.01 ppm by mass)

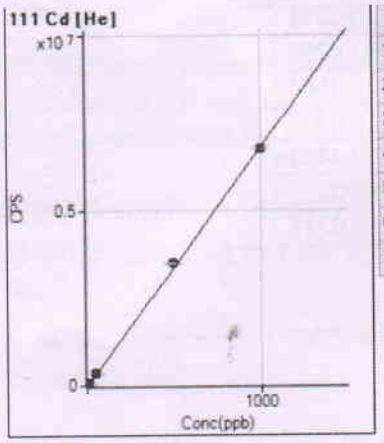
The limits for dialkyl tin C4 and higher homologues (measured as tin), and any other toxic substances shall remain the same as given in 10.3 (c) to (f). These pipes shall be marked as LF (see 13.1).

10.3.1 The manufacturer, for the purpose of these tests, shall disclose any other toxic substances present. The limit of all the 'other toxic substances', including the two mentioned in 10.3 shall not exceed the specified limit of 0.01 mg/l.

NOTE — Implementation of the lead phase out programme of the Government of India for phasing out use of lead stabilizers in PVC pipes and fittings manufacturing, shall be borne in mind'.

Annex B

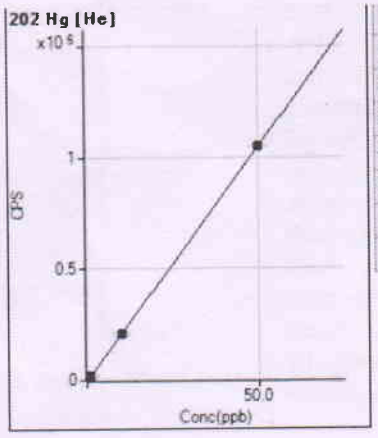
Evidence of accurate analysis by ICP-MS (Cd, Pb and Hg)



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD	%RE
1	☐	0.0000	0.0000	240.01		P	12.5	
2	☐	0.5000	0.5018	3663.93		P	5.7	0.4
3	☐	1.0000	1.0580	7458.87		P	3.0	5.8
4	☐	10.0000	10.9058	74651.40		P	0.9	9.1
5	☐	50.0000	55.8681	381433.48		P	0.3	11.7
6	☐	500.0000	511.8904	3492919.11		**A**	0.5	2.4
7	☐	1000.0000	993.7523	6780710.94		A	0.5	-0.6

y = 6823.0997 * x + 240.0100
R = 0.9999
%RSE = 8.1
DL = 0.01319 ppb
BEC = 0.03518 ppb

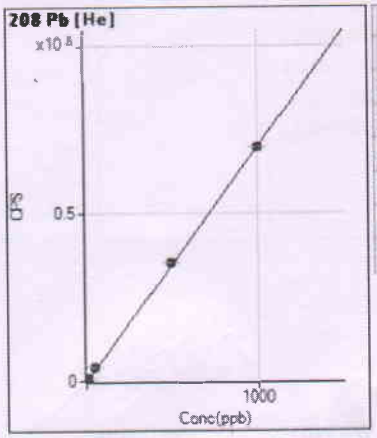
Weight: <None>
Min Conc: 0



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD	%RE
1	☐	0.0000	0.0000	740.05		**P**	**4.1**	
2	☐	0.5000	0.4821	10861.35		P	0.5	-3.6
3	☐	1.0000	0.9399	20472.78		P	0.3	-6.0
4	☐	10.0000	9.8681	207916.88		P	0.4	-1.3
5	☐	50.0000	50.0278	1051055.35		P	0.5	0.1
6	☐			5197.86		P	4.0	
7	☐			2643.69		P	3.7	

y = 20994.6474 * x + 740.0533
R = 1.0000
%RSE = 5.0
DL = 0.004288 ppb
BEC = 0.03525 ppb

Weight: <None>
Min Conc: 0



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD	%RE
1	☐	0.0000	0.0000	29519.87		P	1.8	
2	☐	0.5000	0.2398	46263.96		P	1.3	-52.0
3	☐	1.0000	0.8077	85920.99		P	0.4	-19.2
4	☐	10.0000	11.0499	801164.08		P	0.3	10.5
5	☐	50.0000	57.5972	4051686.40		A	0.3	15.2
6	☐	500.0000	504.2610	35243400.31		**A**	0.6	0.9
7	☐	1000.0000	997.4794	69686143.96		A	0.1	-0.3

y = 69832.6414 * x + 29519.8667
R = 1.0000
%RSE = 29.2
DL = 0.0228 ppb
BEC = 0.4227 ppb

Weight: <None>
Min Conc: 0

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	Sample Name	111 Cd [He] Conc. [ppb]	202 Hg [He] Conc. [ppb]	208 Pb [He] Conc. [ppb]
	Blank	0	0	0
STD-1	0.5 ppb	0.5018	0.4821	0.2398
STD-2	1 ppb	1.058	0.9399	0.8077
STD-3	10 ppb	10.9058	9.8681	11.0499
STD-4	50 ppb	55.8681	50.0278	57.5972
STD-5	500 ppb	511.8904	0.2123	504.261
STD-6	1000 ppb	993.7523	0.0907	997.4794
	blank	0.0518	0.0494	0.1564
	blank	<0.0000	0.0357	0.0365
QC	10ppb	10.188	9.4339	10.4463
	Blank	<0.0000	0.0618	<0.0000
	Blank	<0.0000	0.0308	0.0211