

**Test Report** Page: 1 of 15 No.: CE/2020/82758 Date: 2020/09/01

VALE CANADA LIMITED

200 BAY STREET, ROYAL BANK PLAZA, SUITE 1600, SOUTH TOWER, P.O. BOX 70, TORONTO, ONTARIO, M5J 2K2, CANADA

#### The following sample(s) was/were submitted and identified by/on behalf of the applicant as:

Sample Submitted By : VALE CANADA LIMITED Sample Description : VALE S Nickel Pellets

Sample Receiving Date : 2020/08/18

**Testing Period** : 2020/08/18 to 2020/09/01

#### **Test Requested**

- (1) As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample(s).
- (2) Please refer to next pages for the other item(s).

: Please refer to following pages. Test Result(s)

Troy Chang / Manager - Tes Signed for and behalf of SGS TAIWAN LTD. Chemical Laboratory - Taipei



PIN CODE: 62215439



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#### Test Result(s)

PART NAME No.1 : SILVER COLORED METAL

Test Item(s)	Unit	Method	MDL	Result
	Oilit	wethod		No.1
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5: 2013 and performed by ICP-OES.	2	n.d.
Lead (Pb)	mg/kg	With reference to IEC 62321-5: 2013 and performed by ICP-OES.	2	n.d.
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013+ AMD1:2017 and performed by ICP-OES.	2	n.d.
Hexavalent Chromium Cr(VI)(#2)	μg/cm²	With reference to IEC 62321-7-1: 2015 and performed by UV-VIS.	0.10	n.d.
Sum of PBBs	mg/kg		-	n.d.
Monobromobiphenyl	mg/kg	]	5	n.d.
Dibromobiphenyl	mg/kg	]	5	n.d.
Tribromobiphenyl	mg/kg	]	5	n.d.
Tetrabromobiphenyl	mg/kg	]	5	n.d.
Pentabromobiphenyl	mg/kg	]	5	n.d.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321-6: 2015 and performed by GC/MS.	5	n.d.
Heptabromobiphenyl	mg/kg		5	n.d.
Octabromobiphenyl	mg/kg		5	n.d.
Nonabromobiphenyl	mg/kg		5	n.d.
Decabromobiphenyl	mg/kg		5	n.d.
Sum of PBDEs	mg/kg		-	n.d.
Monobromodiphenyl ether	mg/kg	]	5	n.d.
Dibromodiphenyl ether	mg/kg		5	n.d.
Tribromodiphenyl ether	mg/kg		5	n.d.
Tetrabromodiphenyl ether	mg/kg		5	n.d.
Pentabromodiphenyl ether	mg/kg		5	n.d.
Hexabromodiphenyl ether	mg/kg		5	n.d.
Heptabromodiphenyl ether	mg/kg		5	n.d.
Octabromodiphenyl ether	mg/kg		5	n.d.
Nonabromodiphenyl ether	mg/kg		5	n.d.
Decabromodiphenyl ether	mg/kg		5	n.d.



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Test Item(s)	Unit	Method	MDL	Result
. ,				No.1
BBP (Butyl Benzyl phthalate) (CAS No.: 85-68-7)	mg/kg		50	n.d.
DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	mg/kg		50	n.d.
DEHP (Di- (2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	mg/kg		50	n.d.
DIBP (Di-isobutyl phthalate) (CAS No.: 84-69-5)	mg/kg	With reference to IEC 62321-8: 2017. Analysis was performed by GC/MS.	50	n.d.
DIDP (Di-isodecyl phthalate) (CAS No.: 26761-40-0; 68515-49-1)	mg/kg		50	n.d.
DINP (Di-isononyl phthalate) (CAS No.: 28553-12-0; 68515-48-0)	mg/kg		50	n.d.
DNOP (Di-n-octyl phthalate) (CAS No.: 117-84-0)	mg/kg		50	n.d.
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified ( $\alpha$ - HBCDD, $\beta$ - HBCDD, $\gamma$ - HBCDD) (CAS No.: 25637-99-4 and 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	mg/kg	With reference to IEC 62321: 2008. Analysis was performed by GC/MS.	5	n.d.
Halogen				
Halogen-Fluorine (F) (CAS No.: 14762-94-8)	mg/kg	With reference to BS EN 14582: 2016. Analysis was performed by IC.	50	n.d.
Halogen-Chlorine (CI) (CAS No.: 22537-15-1)	mg/kg		50	n.d.
Halogen-Bromine (Br) (CAS No.: 10097-32-2)	mg/kg		50	n.d.
Halogen-Iodine (I) (CAS No.: 14362-44-8)	mg/kg		50	n.d.
PFOS and its salts (CAS No.: 1763- 23-1 and its salts)	mg/kg	With reference to CEN/TS 15968: 2010. Analysis was performed by LC/MS.	0.01	n.d.
PFOA and its salts (CAS No.: 335-67-1 and its salts)	mg/kg		0.01	n.d.
Polyvinyl chloride (PVC)	**	Analysis was performed by FTIR and FLAME Test.	-	Negative



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Test Item(s)	Unit	Method	MDL	Result
				No.1
Antimony (Sb)	mg/kg	With reference to US EPA 3050B: 1996. Analysis was performed by ICP-OES.	2	n.d.
Beryllium (Be)	mg/kg	With reference to US EPA 3050B: 1996. Analysis was performed by ICP-OES.	2	n.d.
Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins) (CAS No.: 85535-84-8)	mg/kg	With reference to US EPA 3550C: 2007. Analysis was performed by GC/MS.	100	n.d.
Asbestos				
Chrysotile (CAS No.: 12001-29-5)	%	With reference to EPA 600/R-93/116: 1993. Analysis was performed by Stereo Microscope (SM), Dispersion Staining Polarized Light Microscope (DS-PLM) and X-ray Diffraction Spectrometer (XRD).	-	Negative
Amosite (CAS No.: 12172-73-5)	%		-	Negative
Crocidolite (CAS No.: 12001-28-4)	%		-	Negative
Anthophyllite (CAS No.: 77536-67-5)	%		-	Negative
Tremolite (CAS No.: 77536-68-6)	%		-	Negative
Actinolite (CAS No.: 77536-66-4)	%		-	Negative

#### Note:

- 1. mg/kg = ppm; 0.1wt% = 1000ppm
- 2. MDL = Method Detection Limit
- 3. n.d. = Not Detected = less than MDL
- 4. " " = Not Regulated
- 5. \*\* = Qualitative analysis (No Unit)
- 6. Negative = Undetectable / Positive = Detectable
- 7. Testing range of asbestos qualitative analysis is from less than 0.1% to 100%. The judgment criterion: asbestos fibers being found is shown as "Positive"; asbestos fibers not being found is shown as "Negative".
- 8. (#2) =
  - a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13 µg/cm<sup>2</sup>. The sample coating is considered to contain Cr(VI)
  - b. The sample is negative for Cr(VI) if Cr(VI) is n.d. (concentration less than 0.10 μg/cm²). The coating is considered a non-Cr(VI) based coating
  - c. The result between 0.10 µg/cm² and 0.13 µg/cm² is considered to be inconclusive unavoidable coating variations may influence the determination.
- 9. PFOS and its salts including CAS No.: 29081-56-9, 2795-39-3, 29457-72-5, 70225-14-8, 56773-42-3, 251099-16-8, 307-35-7.
- 10. PFOA and its salts including CAS No.: 3825-26-1, 335-95-5, 2395-00-8, 335-93-3, 335-66-0.



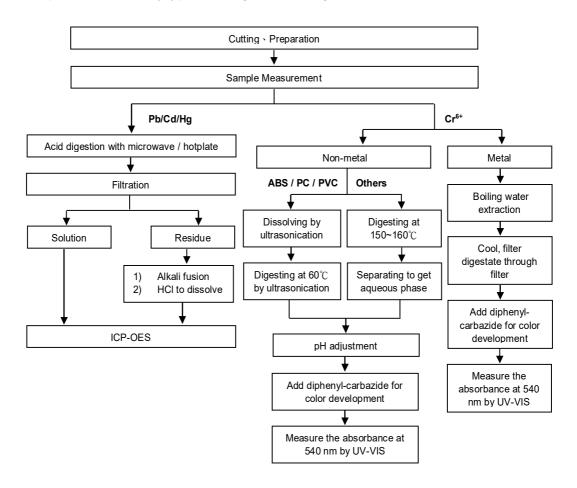
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#### **Analytical flow chart of Heavy Metal**

These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr6+ test method excluded)



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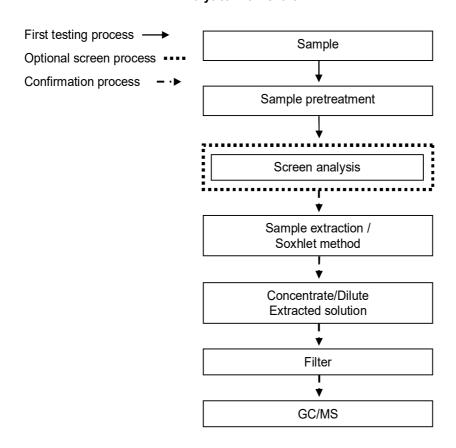
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## Analytical flow chart - PBB / PBDE





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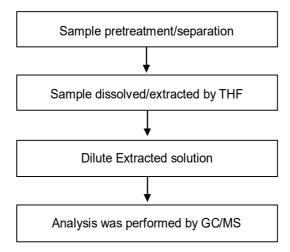
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## **Analytical flow chart - Phthalate**

[Test method: IEC 62321-8]



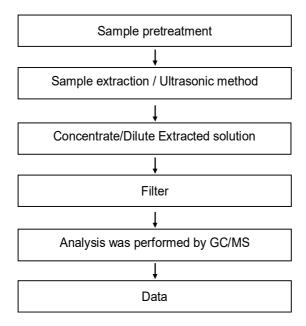


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## **Analytical flow chart - HBCDD**



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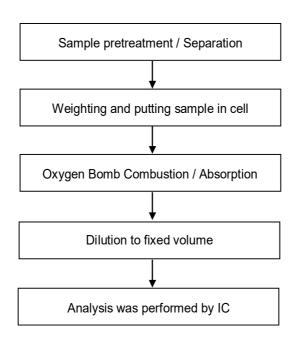


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#### Analytical flow chart - Halogen



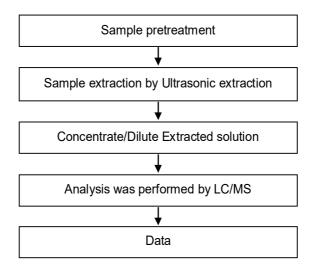


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## Analytical flow chart - PFOA/PFOS



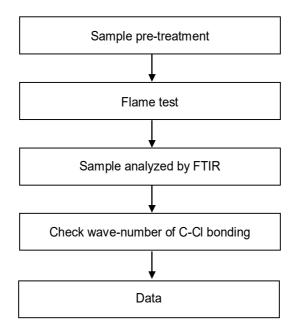


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### Analysis flow chart - PVC





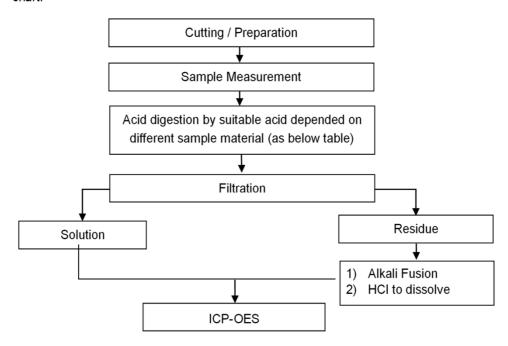
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#### Flow Chart of digestion for the elements analysis performed by ICP-OES

These samples were dissolved totally by pre-conditioning method according to below flow chart.



Steel, copper, aluminum, solder	Aqua regia, HNO <sub>3</sub> , HCI, HF, H <sub>2</sub> O <sub>2</sub>
Glass	HNO <sub>3</sub> /HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO <sub>3</sub>
Plastic	H <sub>2</sub> SO <sub>4</sub> , H <sub>2</sub> O <sub>2</sub> , HNO <sub>3</sub> , HCI
Others	Added appropriate reagent to total digestion

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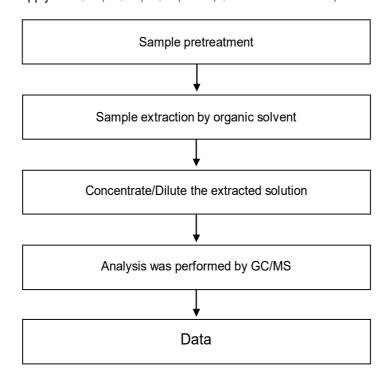
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#### **Analytical flow chart**

\* Apply to: PCBs, PCNs, PCTs, Mirex, Chlorinated Paraffins, DBBT





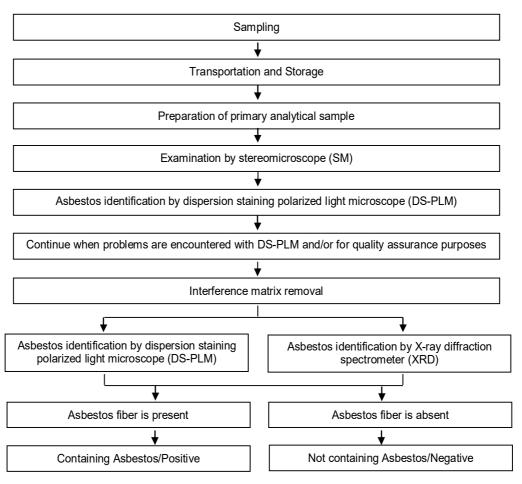
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#### Analysis flow chart for determination of Asbestos

#### [Reference method: EPA 600/R-93/116]



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\* The tested sample / part is marked by an arrow if it's shown on the photo. \*

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\*\* End of Report \*\*