

Test Report

No. : KA/2020/41392

Date : 2020/04/29

Page: 1 of 13

HERAEUS MATERIALS SINGAPORE PTE LTD
BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871

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

Sample Submitted By : HERAEUS MATERIALS SINGAPORE PTE LTD
Sample Description : Palladium Coated Copper Bonding Wire
Style/Item No. : PdSoft and PdPRo
Sample Receiving Date : 2020/04/17
Testing Period : 2020/04/17 to 2020/04/29

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).

Test Result(s) : Please refer to next page(s).

Conclusion : (1) Based on the performed tests on submitted sample(s), the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Ray Chang Ph.D. / Manager
Signed for and on behalf of
SGS Taiwan Limited
Chemical Laboratory-Kaohsing



PIN CODE: 0C9A2EAC

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://web.sgs.com/Terms-and-Conditions.html> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://web.sgs.com/Terms-and-Conditions.html>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced, except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.



Test Report

No. : KA/2020/41392

Date : 2020/04/29

Page: 2 of 13

HERAEUS MATERIALS SINGAPORE PTE LTD

BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871

Test Result(s)

PART NAME NO.1 : Palladium coated copper bonding wire

Test Item (s)	Unit	Method	MDL	Result	Limit
				No.1	
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5: 2013 and performed by ICP-OES.	2	n.d.	100
Lead (Pb)	mg/kg	With reference to IEC 62321-5: 2013 and performed by ICP-OES.	2	n.d.	1000
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013+AMD1:2017 and performed by ICP-OES.	2	n.d.	1000
Hexavalent Chromium Cr(VI)(#2)	µg/cm ²	With reference to IEC 62321-7-1:2015 and performed by UV-VIS.	0.10	n.d.	-
Hexavalent Chromium Cr(VI)	mg/kg	With reference to IEC 62321-7-2:2017 and performed by UV-VIS.	8	n.d.	-
Hexavalent Chromium Cr(VI)	µg/cm ²	With reference to BS EN ISO 3613:2010. Analysis was performed by UV-VIS Spectrometry.	0.02	n.d.	-
Hexavalent Chromium Cr(VI)	mg/kg	With reference to US EPA 3060A & 7196A. Analysis was performed by UV-Vis Spectrometry.	2	n.d.	-
Sum of PBBs	mg/kg	With reference to IEC 62321-6:2015 and performed by GC/MS.	-	n.d.	1000
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		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.	1000
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.	-	

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/Terms-and-Conditions.html>, and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/terms-and-conditions.html>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced, except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Test Report

No. : KA/2020/41392

Date : 2020/04/29

Page: 3 of 13

HERAEUS MATERIALS SINGAPORE PTE LTD

BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871

Test Item (s)	Unit	Method	MDL	Result	Limit
				No.1	
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.	1000
DBP (Di-butyl phthalate) (CAS No.: 84-74-2)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	1000
BBP (Butyl Benzyl phthalate) (CAS No.: 85-68-7)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	1000
DEHP (Di- (2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	1000
DNOP (Di-n-octyl phthalate) (CAS No.: 117-84-0)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
DINP (Di-isononyl phthalate) (CAS No.: 28553-12-0, 68515-48-0)	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	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
DMEP (Bis (2-methoxyethyl) phthalate) (CAS No.: 117-82-8)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
DNHP (Di-n-hexyl phthalate) (CAS No.: 84-75-3)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
DNPP (Di-n-pentyl phthalate) (CAS No.: 131-18-0)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
Tetrabromobisphenol A (TBBP-A) (CAS No.: 79-94-7)	mg/kg	With reference to RSTS-E&E-121. Analysis was performed by LC/MS.	10	n.d.	-
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α - HBCDD, β - HBCDD, γ - 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.	-

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <https://www.sgs.com/terms-and-conditions.html> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/terms-and-conditions.html>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced, except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Test Report

No. : KA/2020/41392

Date : 2020/04/29

Page: 4 of 13

HERAEUS MATERIALS SINGAPORE PTE LTD

BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871

Test Item (s)	Unit	Method	MDL	Result	Limit
				No.1	
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 (Cl) (CAS No.: 22537-15-1)	mg/kg	With reference to BS EN 14582:2016. Analysis was performed by IC.	50	n.d.	-
Halogen-Bromine (Br) (CAS No.: 10097-32-2)	mg/kg	With reference to BS EN 14582:2016. Analysis was performed by IC.	50	n.d.	-
Halogen-Iodine (I) (CAS No.: 14362-44-8)	mg/kg	With reference to BS EN 14582:2016. Analysis was performed by IC.	50	n.d.	-
Antimony (Sb)	mg/kg	With reference to US EPA 3052: 1996. Analysis was performed by ICP-OES.	2	n.d.	-
PFOA (CAS No.: 335-67-1)	mg/kg	With reference to CEN/TS 15968 (2010). Analysis was performed by LC/MSMS.	0.01	n.d.	-
Perfluorooctane sulfonates (PFOS-Acid, Metal Salt, Amide)	mg/kg	With reference to CEN/TS 15968 (2010). Analysis was performed by LC/MSMS.	0.01	n.d.	-

Note :

1. mg/kg = ppm ; 0.1wt% = 1000ppm
2. n.d. = Not Detected
3. MDL = Method Detection Limit
4. " - " = Not Regulated
5. (#2) =
 - a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13 µg/cm². 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.
6. Method Detection Limit = 0.02 µg/cm².

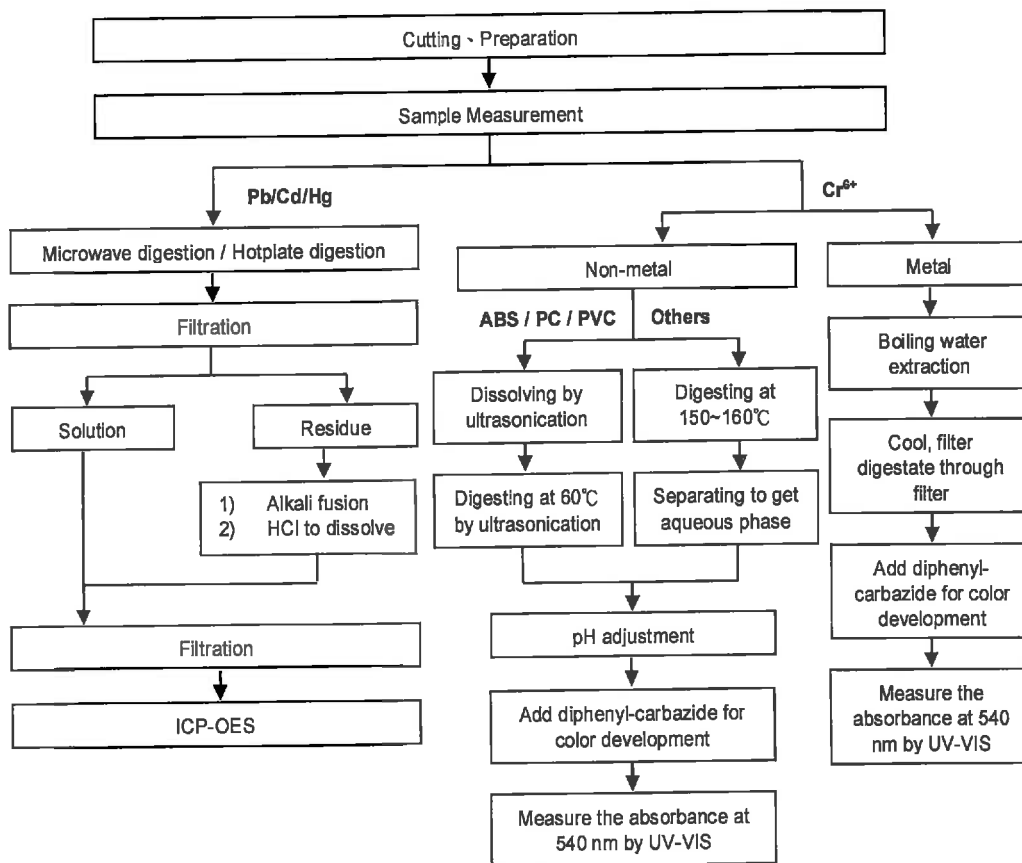
PFOS Reference Information : POPs - (EU) 2019/1021

Outlawing PFOS as substances or preparations in concentrations above 0.001% (10ppm), in semi-finished products or articles or parts at a level above 0.1%(1000ppm), in textiles or other coated materials above 1µg/m². PFOS refer to Perfluorooctanesulfonic acid and its derivatives including Perfluorooctanesulfonic acid, Perfluorooctane sulfonamide, N-Methylperfluorooctane sulfonamide, N-Ethylperfluorooctane sulfonamide, N-Methylperfluorooctane sulfonamidoethanol and N-Ethylperfluorooctane sulfonamidoethanol.

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <https://www.sgs.com/terms-and-conditions.html> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/terms-and-conditions.html>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced, except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Analytical flow chart of Heavy Metal

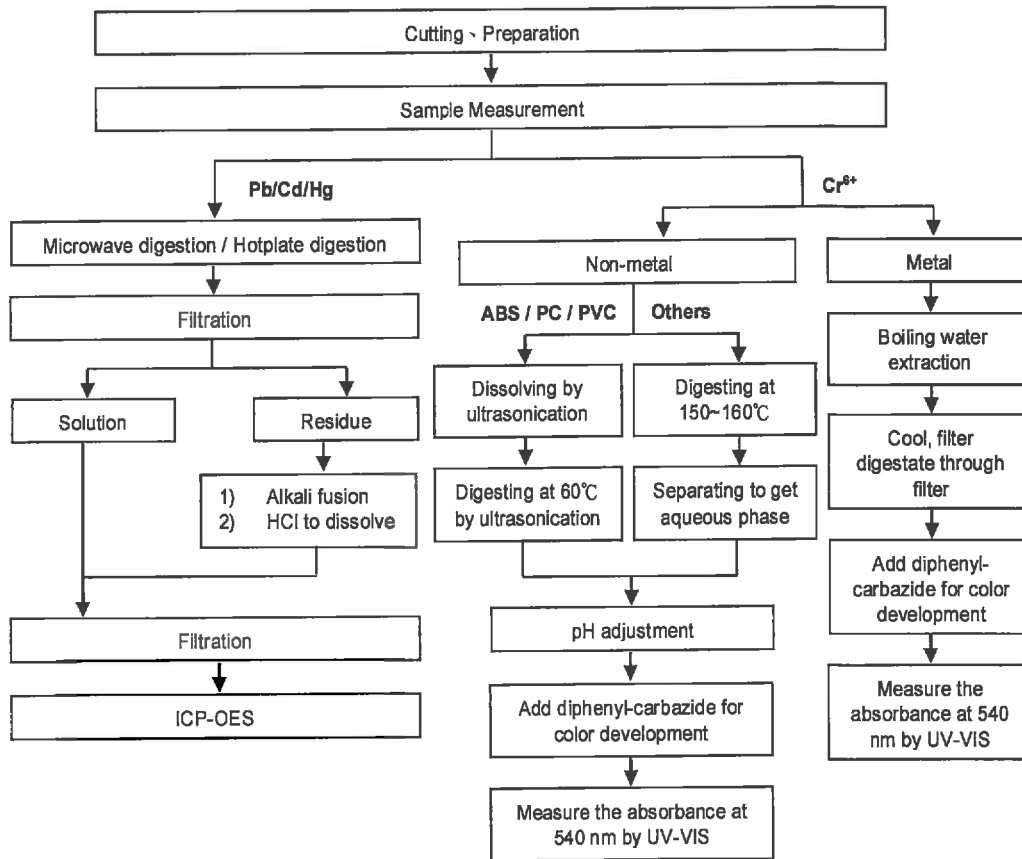
These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr⁶⁺ test method excluded)



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/Terms-and-Conditions.html> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/Terms-and-Conditions.html>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced, except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Analytical flow chart of Heavy Metal

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



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/Terms-and-Conditions.html> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/Terms-and-Conditions.html>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced, except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Test Report

No. : KA/2020/41392

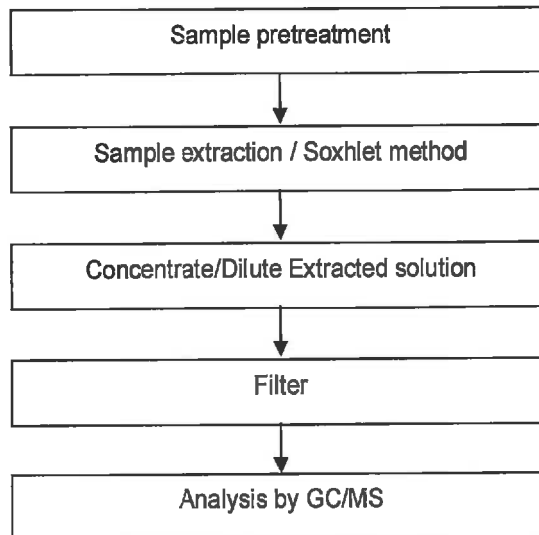
Date : 2020/04/29

Page: 6 of 13

HERAEUS MATERIALS SINGAPORE PTE LTD

BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871

PBB/PBDE analytical FLOW CHART



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <https://www.sgs.com/Terms-and-Conditions.html> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/Terms-and-Conditions.html>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced, except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Test Report

No. : KA/2020/41392

Date : 2020/04/29

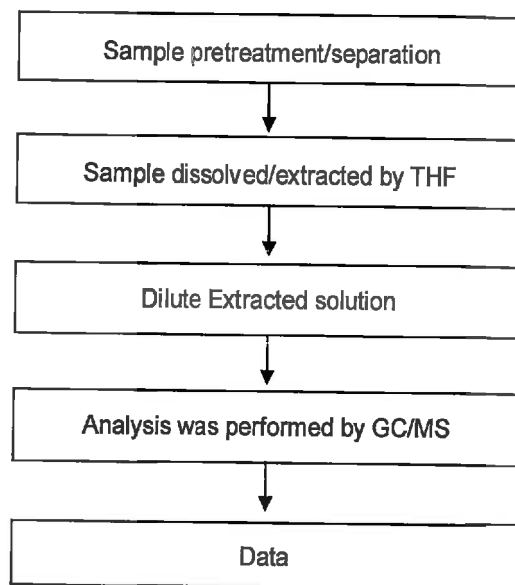
Page: 7 of 13

HERAEUS MATERIALS SINGAPORE PTE LTD

BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871

Analytical flow chart of phthalate content

【 Test method: IEC 62321-8】



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/terms-and-conditions.html> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/terms-and-conditions.html>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced, except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Test Report

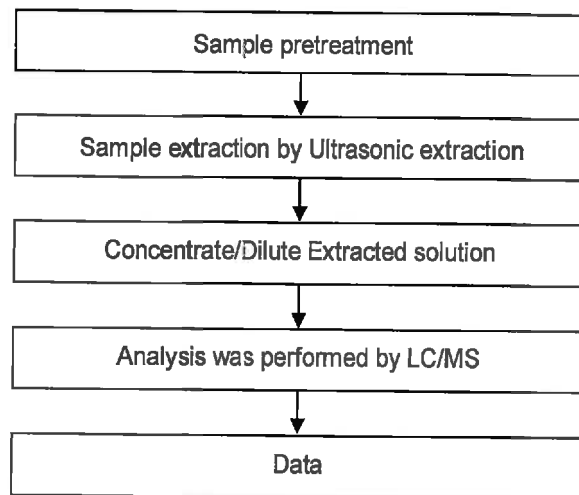
No. : KA/2020/41392

Date : 2020/04/29

Page: 8 of 13

HERAEUS MATERIALS SINGAPORE PTE LTD
BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871

TBBP-A analytical flow chart



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <https://trep.sgs.com/Terms-and-Conditions.html> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://trep.sgs.com/Terms-and-Conditions.html>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced, except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Test Report

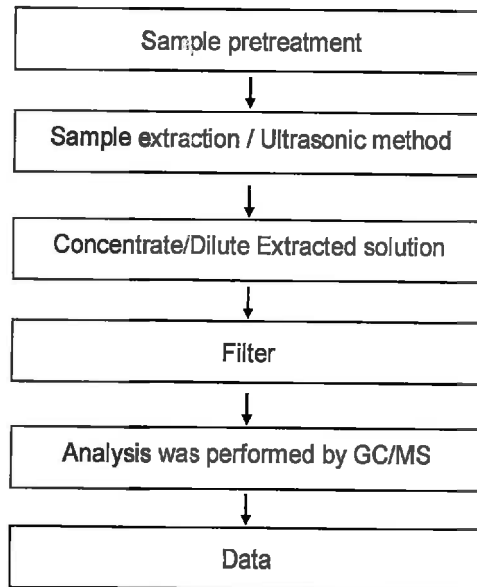
No. : KA/2020/41392

Date : 2020/04/29

Page: 9 of 13

HERAEUS MATERIALS SINGAPORE PTE LTD
BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871

HBCDD analytical flow chart



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <https://www.sgs.com/Terms-and-Conditions.html> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/Terms-and-Conditions.html>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced, except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Test Report

No. : KA/2020/41392

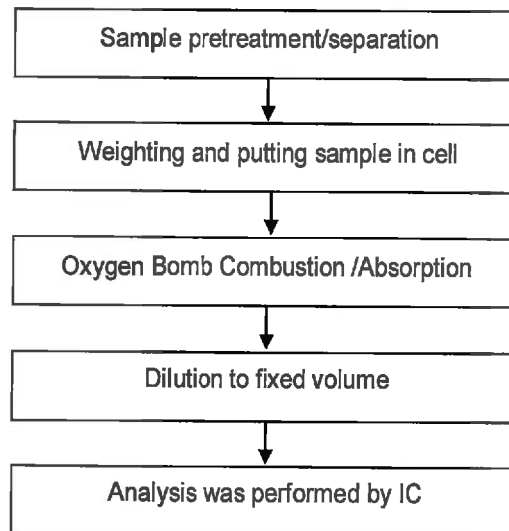
Date : 2020/04/29

Page: 10 of 13

HERAEUS MATERIALS SINGAPORE PTE LTD

BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871

Analytical flow chart of Halogen



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/Terms-and-Conditions.html> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/Terms-and-Conditions.html>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced, except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Test Report

No. : KA/2020/41392

Date : 2020/04/29

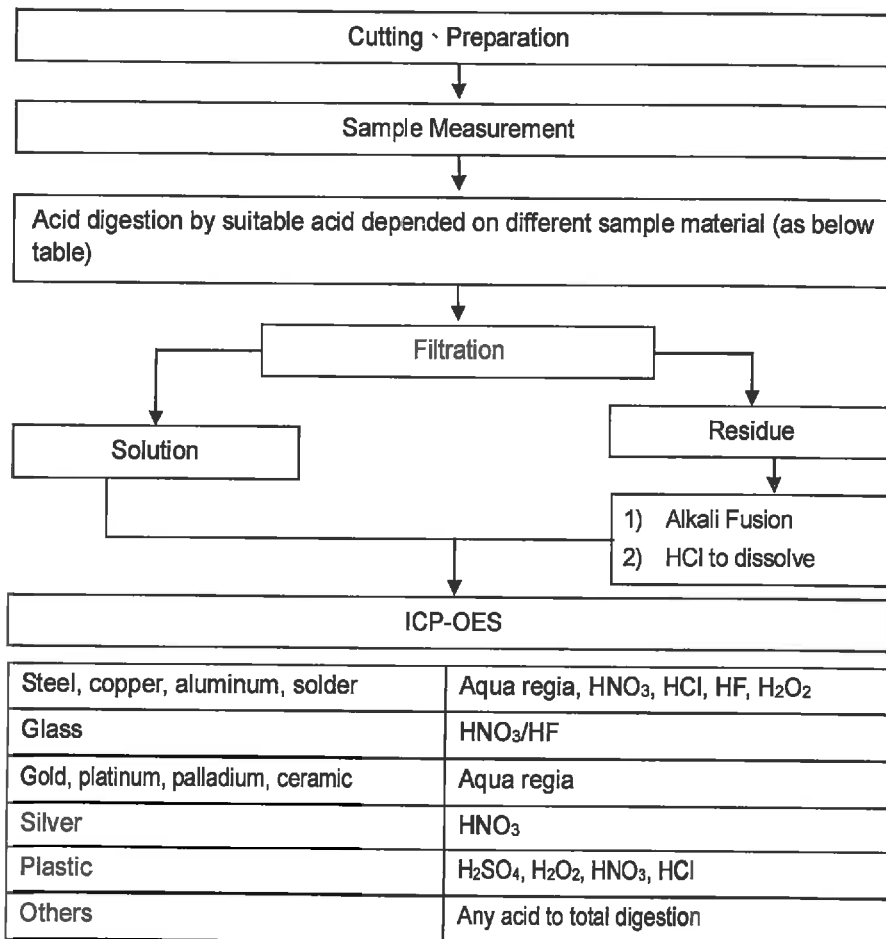
Page: 11 of 13

HERAEUS MATERIALS SINGAPORE PTE LTD

BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871

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.



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <https://www.sgs.com/Terms-and-Conditions.html> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/Terms-and-Conditions.html>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced, except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Test Report

No. : KA/2020/41392

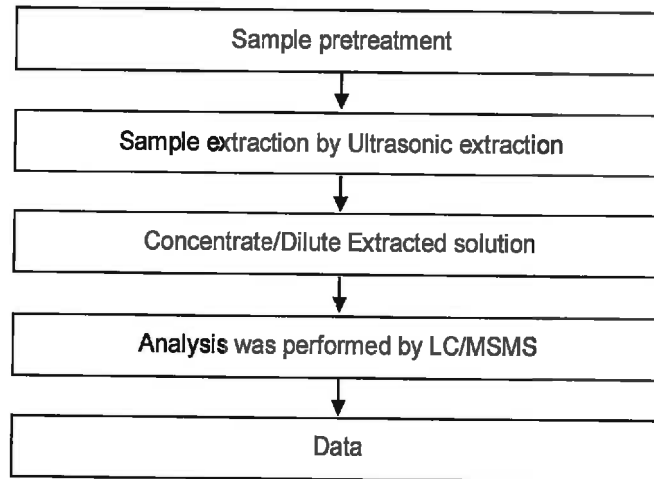
Date : 2020/04/29

Page: 12 of 13

HERAEUS MATERIALS SINGAPORE PTE LTD

BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871

Analytical flow chart - PFOA/PFOS



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <https://www.sgs.com/Terms-and-Conditions.html>, and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/Terms-and-Conditions.html>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced, except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Test Report

No. : KA/2020/41392

Date : 2020/04/29

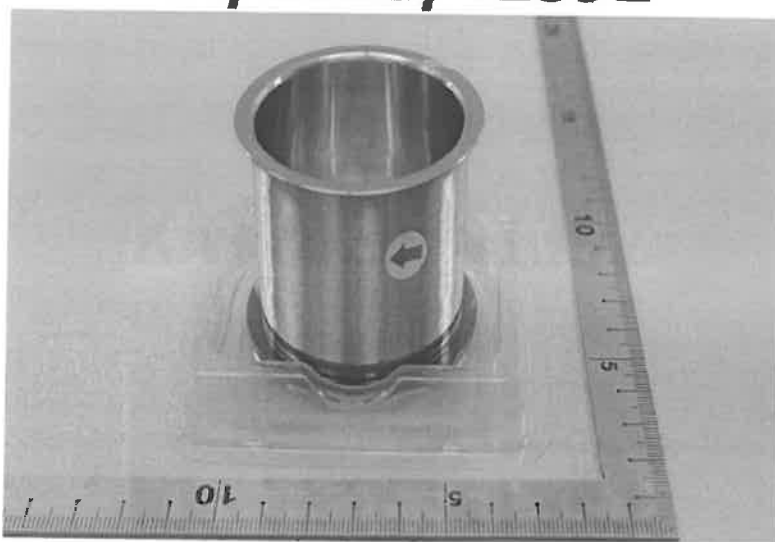
Page: 13 of 13

HERAEUS MATERIALS SINGAPORE PTE LTD

BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871

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

KA/2020/41392



** End of Report **

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <https://www.sgs.com/Terms-and-Conditions.html> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/Terms-and-Conditions.html>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced, except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Test Report

No. : KA/2020/41404

Date : 2020/04/29

Page: 1 of 4

HERAEUS MATERIALS SINGAPORE PTE LTD
BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871

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

Sample Submitted By : HERAEUS MATERIALS SINGAPORE PTE LTD
Sample Description : Palladium Coated Copper Bonding Wire
Style/Item No. : PdSoft and PdPRo
Sample Receiving Date : 2020/04/17
Testing Period : 2020/04/17 to 2020/04/29

Test Result(s) : Please refer to next page(s).

Ray Chang
Ray Chang Ph.D. / Manager
Signed for and on behalf of
SGS Taiwan Limited
Chemical Laboratory-Kaohsiung



PIN CODE: 3C39CCCA

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/Terms-and-Conditions.html> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/Terms-and-Conditions.html>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced, except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.



Test Report

No. : KA/2020/41404

Date : 2020/04/29

Page: 2 of 4

HERAEUS MATERIALS SINGAPORE PTE LTD
BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871

Test Result(s)

PART NAME NO.1 : Palladium coated copper bonding wire

Test Item (s)	Unit	Method	MDL	Result
				No.1
Beryllium (Be)	mg/kg	With reference to US EPA 3052: 1996. Analysis was performed by ICP-OES.	2	n.d.

Note :

1. mg/kg = ppm ; 0.1wt% = 1000ppm
2. n.d. = Not Detected
3. MDL = Method Detection Limit

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/Terms-and-Conditions.html> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/Terms-and-Conditions.html>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced, except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Test Report

No. : KA/2020/41404

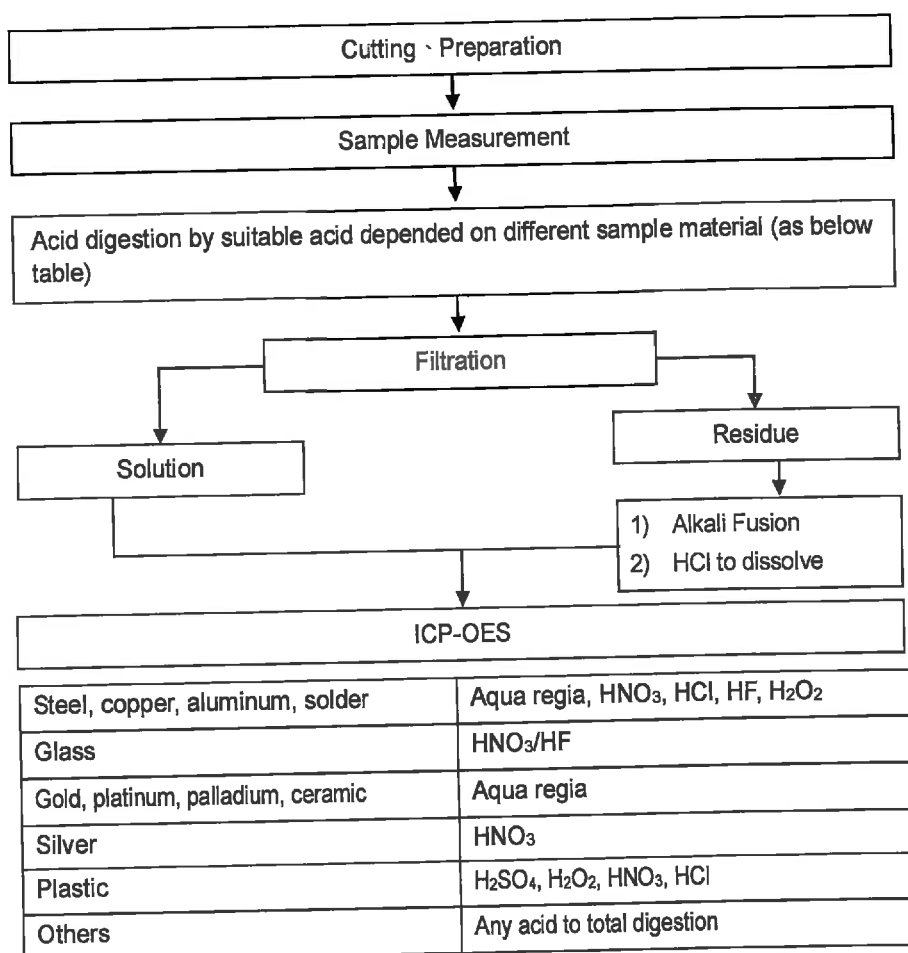
Date : 2020/04/29

Page: 3 of 4

HERAEUS MATERIALS SINGAPORE PTE LTD
 BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871

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.



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/Terms-and-Conditions.html> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/Terms-and-Conditions.html>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document is unlawful and offenders may be prosecuted to the fullest extent of the law. Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Test Report

No. : KA/2020/41404

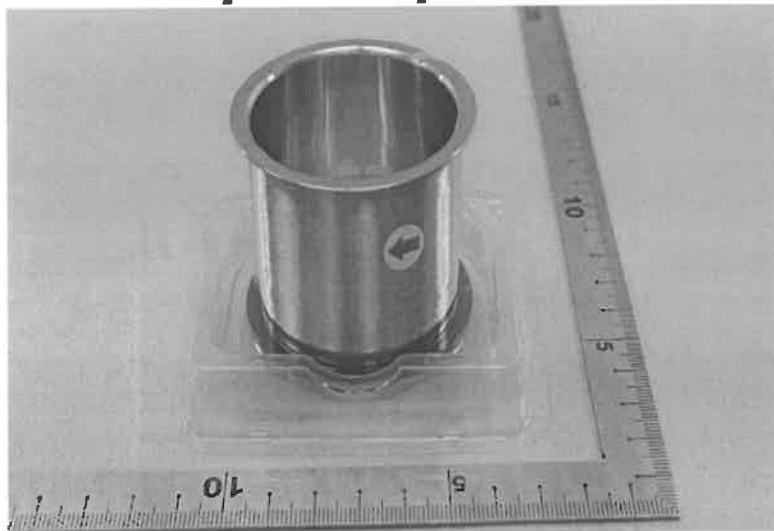
Date : 2020/04/29

Page: 4 of 4

HERAEUS MATERIALS SINGAPORE PTE LTD
BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871

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

KA/2020/41404



** End of Report **

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <https://www.sgs.com/terms-and-conditions.html> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <https://www.sgs.com/terms-and-conditions.html>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced, except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.