

Job Ref. C&P/2021-03-09-027

DYNACRAFT INDUSTRIES SDN. BHD.

NO. 255-A, BLOCK D, PHASE II, BAYAN LEPAS INDUSTRIAL ZONE, 11900 PENANG, MALAYSIA.

The following sample(s) was/were submitted and identified by applicant as:

SAMPLE DESCRIPTION : PRE-PLATED LEADFRAME C7025 (STANDARD/MICRO NIPdAu & ADVANCED MICRO/RT PPF

NiPdAuAg)

SAMPLE RECEIVED : 09-March-2021

TESTING PERIOD : 09-March-2021 to 26-March-2021

TEST REQUESTED : Selected test(s) as requested by customer

TEST METHOD : -PLEASE REFER TO NEXT PAGE(S)TEST RESULTS : -PLEASE REFER TO NEXT PAGE(S)-

CONCLUSION : Based on the performed tests on submitted sample(s), the result(s) of Cadmium (Cd), Lead (Pb),

Mercury (Hg), Hexavalent Chromium (CrVI), Polybrominated biphenyl, PBB, Polybrominated diphenyl ether, PBDE, Dibutyl phthalate (DBP), Benzyl butyl phthalate (BBP), Di(2-ethylhexyl) phthalate (DEHP), Diisobutyl phthalate (DIBP) complies/comply with the limits as set by RoHS

Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

SIGNED FOR AND ON BEHALF OF SGS (MALAYSIA) SDN BHD

TAY SIAM PINE
TECHNICAL MANAGER
IKM No. M/3452/6047/11/12

Test Report Form No.: SGS/TR/CP/013, Ver: 2.0, Effective Date: 15/03/2021

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TEST RESULTS:

Test Part Description

Sample Description: -PLEASE REFER TO PAGE 1-

RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

| Test Parameter(s): | Unit | Test Method | Result | MDL | Limit |
|----------------------------|--------|--|--------|------|----------|
| Cadmium (Cd) | mg/kg | With reference to IEC 62321-5:2013.Analysis performed by ICP-OES.(Decision rule:refer Appendix, category1) | N.D. | 2 | Max 100 |
| Lead (Pb) | mg/kg | With reference to IEC 62321-5:2013.Analysis performed by ICP-OES.(Decision rule:refer Appendix, category1) | N.D. | 2 | Max 1000 |
| Mercury (Hg) | mg/kg | With reference to IEC 62321-4:2013+A1:2017.Analysis performed by ICP-OES.(Decision rule:refer Appendix, category1) | N.D. | 2 | Max 1000 |
| Hexavalent Chromium (CrVI) | μg/cm² | With reference to IEC 62321-7-1:2015.Analysis performed by Colorimetric Method using UV-Vis. (Decision rule:Refer Appendix category 2) | N.D. | 0.10 | - |
| Sum of PBBs | mg/kg | With reference to IEC 62321-6:2015. Analysis performed by GC-MS.(Decision rule: refer to Appendix, category 1) | N.D. | 5 | Max 1000 |
| Monobromobiphenyl | mg/kg | With reference to IEC 62321-6:2015. Analysis performed by GC-MS.(Decision rule: refer to Appendix, category 1) | N.D. | 5 | - |
| Dibromobiphenyl | mg/kg | With reference to IEC 62321-6:2015. Analysis performed by GC-MS.(Decision rule: refer to Appendix, category 1) | N.D. | 5 | - |
| Tribromobiphenyl | mg/kg | With reference to IEC 62321-6:2015. Analysis performed by GC-MS.(Decision rule: refer to Appendix, category 1) | N.D. | 5 | - |
| Tetrabromobiphenyl | mg/kg | With reference to IEC 62321-6:2015. Analysis performed by GC-MS.(Decision rule: refer to Appendix, category 1) | N.D. | 5 | - |
| Pentabromobiphenyl | mg/kg | With reference to IEC 62321-6:2015. Analysis performed by GC-MS.(Decision rule: refer to Appendix, category 1) | N.D. | 5 | - |
| Hexabromobiphenyl | mg/kg | With reference to IEC 62321-6:2015. Analysis performed by GC-MS.(Decision rule: refer to Appendix, category 1) | N.D. | 5 | - |
| Heptabromobiphenyl | mg/kg | With reference to IEC 62321-6:2015. Analysis performed by GC-MS.(Decision rule: refer to Appendix, category 1) | N.D. | 5 | - |
| Octabromobiphenyl | mg/kg | With reference to IEC 62321-6:2015. Analysis performed by GC-MS.(Decision rule: refer to Appendix, category 1) | N.D. | 5 | - |

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TEST RESULTS:

Test Part Description

Sample Description: -PLEASE REFER TO PAGE 1-

RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

| Test Parameter(s): | Unit | Test Method | Result | MDL | Limit |
|--------------------------|-------|--|--------|-----|----------|
| Nonabromobiphenyl | mg/kg | With reference to IEC 62321-6:2015. Analysis performed by GC-MS.(Decision rule: refer to Appendix, category 1) | N.D. | 5 | - |
| Decabromobiphenyl | mg/kg | With reference to IEC 62321-6:2015. Analysis performed by GC-MS.(Decision rule: refer to Appendix, category 1) | | 5 | - |
| Sum of PBDEs | mg/kg | With reference to IEC 62321-6:2015.Analysis performed by GC-MS(Decision rule:refer Appendix category 1) | N.D. | 5 | Max 1000 |
| Monobromodiphenyl ether | mg/kg | With reference to IEC 62321-6:2015.Analysis performed by GC-MS(Decision rule:refer Appendix category 1) | N.D. | 5 | - |
| Dibromodiphenyl ether | mg/kg | With reference to IEC 62321-6:2015.Analysis performed by GC-MS(Decision rule:refer Appendix category 1) | N.D. | 5 | - |
| Tribromodiphenyl ether | mg/kg | With reference to IEC 62321-6:2015.Analysis performed by GC-MS(Decision rule:refer Appendix category 1) | N.D. | 5 | - |
| Tetrabromodiphenyl ether | mg/kg | With reference to IEC 62321-6:2015.Analysis performed by GC-MS(Decision rule:refer Appendix category 1) | N.D. | 5 | - |
| Pentabromodiphenyl ether | mg/kg | With reference to IEC 62321-6:2015.Analysis performed by GC-MS(Decision rule:refer Appendix category 1) | N.D. | 5 | - |
| Hexabromodiphenyl ether | mg/kg | With reference to IEC 62321-6:2015.Analysis performed by GC-MS(Decision rule:refer Appendix category 1) | N.D. | 5 | - |
| Heptabromodiphenyl ether | mg/kg | With reference to IEC 62321-6:2015.Analysis performed by GC-MS(Decision rule:refer Appendix category 1) | N.D. | 5 | - |
| Octabromodiphenyl ether | mg/kg | With reference to IEC 62321-6:2015.Analysis performed by GC-MS(Decision rule:refer Appendix category 1) | N.D. | 5 | - |
| Nonabromodiphenyl ether | mg/kg | With reference to IEC 62321-6:2015.Analysis performed by GC-MS(Decision rule:refer Appendix category 1) | N.D. | 5 | - |
| Decabromodiphenyl ether | mg/kg | With reference to IEC 62321-6:2015.Analysis performed by GC-MS(Decision rule:refer Appendix category 1) | N.D. | 5 | - |

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Note: (a) mg/kg = ppm; ug/kg = ppb (0.01 mg/kg = 10 ug/kg); 0.1wt% = 1000ppm

(b) N.D. = Not Detected

(c) MDL = Method Detection Limit

(d) - = Not regulated

- (e) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.
- (f) IEC 62321 series is equivalent to EN 62321 series. https://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101::::FSP_ORG_ID,FSP_LANG_ID:1258637,25
- (g) a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 µg/cm². The sample coating is considered to contain CrVI.
 - b. The sample is negative for CrVI if CrVI is N.D. (concentration less than 0.10 µg/cm²). The coating is considered a non-CrVI 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.

For corrosion protection coatings on metals: Information on storage conditions and production date of the tested sample is unavailable and thus results of Cr(VI) represent status of the sample at the time of testing.

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TEST RESULTS:

Test Part Description

Sample Description: -PLEASE REFER TO PAGE 1-

Optional: RoHS Directive 2011/65/EU, priority substances

| Test Parameter(s): | Unit | Test Method | Result | MDL |
|--|-------|--|--------|-----|
| Hexabromocyclododecane (HBCDD)(CAS No.: 3194-55-6,25637-99-4 | mg/kg | In-house method, SGS-TM-RSTS-O-012, with reference to IEC 62321-6:2015. Analysis was performed by GCMS | N.D. | 5 |

Note: (a) Reference Information: Directive 2011/65/EU recasting RoHS directive 2002/95/EC: Hexabromocyclododecane (HBCDD), Bis (2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) are considered as a priority for risk evaluation and substance restriction.

(b) N.D. = Not Detected

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TEST RESULTS:

Test Part Description

Sample Description: -PLEASE REFER TO PAGE 1-

RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

| Test Parameter(s): | Unit | Test Method | Result | MDL | Limit |
|--|-------|--|--------|-----|----------|
| Dibutyl phthalate (DBP) (CAS No. 84-74-2) | mg/kg | With reference to IEC 62321-8:2017. Analysis performed by GC-MS.(Decision rule:refer Appendix, category 1) | N.D. | 50 | Max 1000 |
| Benzyl butyl phthalate (BBP) (CAS No. 85-68-7) | mg/kg | With reference to IEC 62321-8:2017.Analysis performed by GC-MS.(Decision rule:refer Appendix, category 1) | N.D. | 50 | Max 1000 |
| Di(2-ethylhexyl) phthalate (DEHP) (CAS No. 117-81-7) | mg/kg | With reference to IEC 62321-8:2017.Analysis performed by GC-MS.(Decision rule:refer Appendix, category 1) | N.D. | 50 | Max 1000 |
| Diisobutyl phthalate (DIBP) (CAS No. 84-69-5) | mg/kg | With reference to IEC 62321-8:2017.Analysis performed by GC-MS.(Decision rule:refer Appendix, category 1) | N.D. | 50 | Max 1000 |

Note: (a) mg/kg = ppm; ug/kg = ppb (0.01 mg/kg = 10 ug/kg); 0.1wt% = 1000ppm

(b) N.D. = Not Detected

(c) MDL = Method Detection Limit

(d) - = Not regulated

(e) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.

(f) IEC 62321 series is equivalent to EN 62321 series.

https://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101::::FSP_ORG_ID,FSP_LANG_ID:1258637,25

(g)The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, from 22 July 2021.

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TEST RESULTS BY CHEMICAL METHOD:

Test Part Description

Sample Description: -PLEASE REFER TO PAGE 1-

| Test Parameter(s): | Unit | Test Method | Result | MDL |
|-----------------------|-------|---|--------|-----|
| Beryllium (Be) | mg/kg | With reference to EPA Method 3051A, and performed by ICP-OES. | N.D. | 2 |
| Antimony (Sb) | mg/kg | With reference to EPA Method 3051A, and performed by ICP-OES. | N.D. | 2 |
| Halogen | - | - | - | - |
| Halogen-Fluorine (F) | mg/kg | With reference to BS EN 14582:2016, analysis performed by IC method for Fluorine content. | N.D. | 50 |
| Halogen-Chlorine (CI) | mg/kg | With reference to BS EN 14582:2016, analysis performed by IC method for Chlorine content. | N.D. | 50 |
| Halogen-Bromine (Br) | mg/kg | With reference to BS EN 14582:2016, analysis performed by IC method for Bromine content. | N.D. | 50 |
| Halogen-lodine (I) | mg/kg | With reference to BS EN 14582:2016, analysis performed by IC method for lodine content. | N.D. | 50 |

Note: (a) mg/kg = ppm; ug/kg = ppb (0.01 mg/kg = 10 ug/kg); 0.1wt% = 1000ppm

(b) N.D. = Not Detected

(c) MDL = Method Detection Limit

(d) Negative = Undetectable / Positive = Detectable

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TEST RESULTS:

Test Part Description

Sample Description: -PLEASE REFER TO PAGE 1-

Test Method: With reference to CEN/TS 15968:2010. Analysis was performed by LC-MS

| Test Parameter(s): | Result (%) | Max. Limit (µg/m²) (Textile/Coated material) | Max.Limit(%) (Plastic) | Max. Limit(%) (Substances/ in mixtures) |
|--|------------|---|---------------------------|---|
| Perfluorooctanesulfonic acid (PFOS) | N.D. | 1 | 0.1 | 0.001 |
| Perfluorooctanoic acid (PFOA) (CAS No. 335-67-1) | N.D. | 1 | I | 1 |
| Conclusion | PASS | | | |

Note: (a) N.D. = Not Detected

(b) Detection limit = 1 µg/m² for Textile / Coated Material

= 0.001% for Plastic, substances or mixtures

- (c) Recommended requirement with reference to Commission Regulation (EU) 2019/1021 on Persistent Organic Pollutant.
- (d) PFOS refers to Perfluoroctanesulfonic acid and its derivatives including Perfluoroctanesulfonic acid, Perfluoroctane sulfonamide, N-Methylperfluoroctane sulfonamide, N-Ethylperfluoroctane sulfonamide, N-Methylperfluoroctane sulfonamidoethanol and N-Ethylperfluoroctane sulfonamidoethanol.

Appendix

| Category | Decision Rule Statement | |
|----------|---|--|
| 1 | Based on binary statement with guard band (equal to the expanded measurement uncertainty with a 95% coverage probability, w=U95) in ILAC-G8:09/2019 Clause 4.2.2. | |
| 2 | According to IEC 62321-7-1 Edition 1.0 2015-09 Section 7: Table 1- Comparison to standard and interpretation of result. | |
| 3 | Based on binary statement for simple acceptance rule (w=0) in ILAC-G8:09/2009 Clause 4.2.1. | |
| 4 | Based on non-binary statement with guard band (equal to the expanded measurement uncertainty with a 95% coverage probability, w=U95) in ILAC-G8:09/2019 Clause 4.2.3. | |
| 5 | According to IEC 62321-3-1 Edition 1.0 2013-06 Annex A.3 Interpretation of result. | |
| Remark | When decision rule is not feasible to be used and the uncertainty of the result is available to be provided, the uncertainty range of result will be shown in the report. Otherwise, only result will be shown in the report. | |

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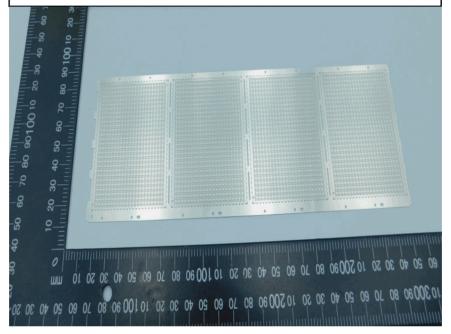
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Sample Description: -PLEASE REFER TO PAGE 1-

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1. <u>DETERMINATION OF CADMIUM CONTENT</u> <u>BY IEC 62321-52013</u>

Sample Receiving and Registration

Sample Preparation

Weigh sample (0.2-0.5g) into digestion vessel

Acid digestion (Hotplate)

"Totally Dissolved"

Filtration

Analyses by ICP

2. DETERMINATION OF LEAD CONTENT BY IEC 62321-5 2013

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Sample Receiving and Registration

Sample Preparation

Weigh sample (0.2-0.5g) into digestion vessel

Acid digestion (Hotplate)

"Totally Dissolved"

Filtration

Analyses by ICP

3. DETERMINATION OF MERCURY CONTENT BY IEC 62321-4 2013/AMD1 2017

Sample Receiving and Registration

Sample Preparation

Weigh sample (0.1-0.5g) into digestion vessel

Acid digestion (Hotplate)

"Totally Dissolved"

Filtration

Analyses by ICP

4. <u>DETERMINATION OF HEXAVALENT CHROMIUM</u> BY IEC 62321-7-1 2015

Sample Receiving and Registration

Sample Preparation

↓ Analyses by UV- Spectrophotometer

> ▼ Test Report

5. DETERMINATION OF PBB/PBDE WITH GC-MS BY IEC 62321-6 2015

Sample Preparation

Weigh sample (0.5-4.0g) into extraction thimble

Soxhlet Extraction with Toluene

Filter through 0.45 um membrane filter

Analyses by GC-MS (with appropriate dilution)

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DETERMINATION OF HBCDD CONTENT

Sample preparation

Weigh sample (0.5 - 4.0g) into extraction thimble

Solvent extraction with Toluene

Filter through 0.45 µm membrane filter

Analysis by GC-MS (with appropriate dilution)

DETERMINATION OF PHTHALATES WITH GC-MS BY IEC 62321-8:2017

Sample Cutting / Preparation

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Sample Measurement



Solvent Extraction



Concentrate / Dilute extracted solution



GC-MS analysis



DATA

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MICROWAVE ASSISTED ACID DIGESTION OF ORGANICALLY BASED METRICES BY US EPA 3051A Sample Preparation Weight sample (0.2-0.5g) into digestion vessel Acid digestion "Totally Dissolved" Filtration Analyses by ICP

DETERMINATION OF HALOGEN CONTENT Sample pre-treatment Weighting and putting sample in cell Combustion / Absorption Dilution to fixed volume Analyses by IC

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DETERMINATION OF PFOS AND PFOA CONTENTS Sample pre-treatment / separation Solvent extraction Concentrate / Dilute extracted solution Sample filtration Analysis performed by LC/MS Data

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