HP 3D HR PA12 GB

Summary of Regulatory Compliance and Environmental Attributes

Introduction

The purpose of this document is to describe the regulatory and environmental attributes of HP Inc.'s ("HP") HP 3D HR PA12 GB. Safety Data Sheets ("SDSs") such as those required by the Hazard Communication Standard of the U.S. Occupational Safety and Health Administration ("OSHA") and similar requirements in other countries can be found at www.hp.com/go/ecodata.

HP 3D HR PA12 GB is a polyamide and glass bead powder designed by HP and our partner to meet worldwide regulatory requirements and to address a broad range of health and environmental considerations throughout the entire life cycle of a print from production to disposal.

Regulatory Summary

Chemical Inventory Status

The following countries have chemical inventory requirements, and HP 3D HR PA12 GB can be imported without restriction:

- Australia (AICS)
- Canada (DSL, NDSL)
- Providence of Ontario
- China (IECSC)
- Japan (ISHL)
- Japan (CSCL/ENCS)
- Korea (KECI, K-REACH)
- New Zealand (NZIoC)
- Philippines (PICCS)
- Switzerland (ChemO)
- Taiwan (ECSI)
- United States (TSCA)

For EU REACH, HP and/or our partner have completed all necessary pre-registrations/registrations to import HP 3D HR PA12 GB.

Regulated Materials

HP 3D HR PA12 GB **DOES NOT** contain the following regulated materials:

- Arsenic, antimony, soluble barium, cadmium, chromium, cobalt, mercury, lead, nickel, copper, and selenium as intentionally added ingredients

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- Restricted azo colorants[1]
- Substances regulated as drugs and drug precursors or those requiring special permits for use
- Substances currently regulated under Annex XIV of EU REACH (authorisations) or substances currently restricted under Annex XVII of EU REACH (restrictions)
- Halogenated organics (< 2 ppm)

Health and Environmental Performance

Human and Ecological Health

HP 3D HR PA12 GB is considered non-hazardous according to the Globally Harmonized System of Classification and Labeling of Chemicals (GHS, as implemented by the EU Classification, Labeling and Packing Regulation No1272/2008/EC (CLP)), US HazCom 2012, and other country-specific GHS regulations.

HP 3D HR PA12 GB does not contain intentionally added components in the following categories:

- Carcinogens, mutagens, or reproductive toxins (CMRs);
- California Proposition 65 listed chemicals at concentrations requiring labeling;
- Substances identified as endocrine disruptors;
- Substances considered very toxic or toxic;
- Substances classified as respiratory sensitizers;
- Substances identified as "very high concern" (SVHC) according to EU REACH criteria; and
- Substances identified as “very persistent and/or very bioaccumulative” (vPvB) according to EU REACH criteria.

Transportation

HP 3D HR PA12 GB is Not Readily Combustible Solid of Division 4.1, Not Classified as a Flammable Solid[2], and does not require special handling, storage, or transportation-related conditions. This formulation is not classified as Dangerous Goods in accordance with international modes of transport (IATA, IMDG, U.S. DOT, and/or ADR) and does not contain listed marine pollutants.

[1] EU Directive 2002/61/EC, additionally referenced as Regulation (EC) No 1907/2006: REACH, Annex XVI (article 67), restricts the use of azo colorants that break down to aromatic amines known to cause cancer.

[2] HP 3D HR PA12 GB tested per the Flammability Regultaion (EC) No. 440/2008 – Test A10 Flammability (Solids) UN Recommendations on the Transport of Dangerous good, Manual of Tests and Criteria – For Solids: Test N1, sub-section 33.2.1.4.

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Waste Profile Datasheet

HP is providing the information in this section voluntarily as a service to assist customers in determining appropriate disposal methods for this product at the end of life.

Flammability

Not Readily Combustible Solid of Division 4.1, Not Classified as a Flammable Solid per Flammability Regulation (EC) No. 440/2008 – Test A10 Flammability (Solids) UN Recommendations on the Transport of Dangerous Good, Manual of Tests and Criteria – For Solids: Test N1, sub-section 33.2.1.4.

Organics (US EPA Method SW8260B and SW8270C)

None of the substances and compounds with a regulatory threshold as set by California 22 CCR Section 66261.24 Table 1 were detected above the regulatory threshold except for vinyl chloride which was detected at 2.4 mg/kg in the powder.

Metals Content – (US EPA Method SW6010B and SW7471A)

Antimony	<0.050 mg/kg
Arsenic	<0.15 mg/kg
Barium	<0.055 mg/kg
Beryllium	<0.055 mg/kg
Cadmium	<0.10 mg/kg
Chromium	<0.075 mg/kg
Cobalt	<0.070 mg/kg
Copper	<0.20 mg/kg
Lead	<0.10 mg/kg
Mercury	<0.083 mg/kg
Molybdenum	<0.050 mg/kg
Nickel	<0.50 mg/kg
Selenium	<0.22 mg/kg
Silver	<0.15 mg/kg
Thallium	<0.20 mg/kg
Vanadium	<0.10 mg/kg
Zinc	<0.30 mg/kg

Aquatic Toxicity

- LC50 for fish is >750 mg/L per DOHS (Title 22) Hazardous Waste Bioassay using Fathead Minnow
- The powder does not carry an aquatic toxicity classification according to EC Regulation No. 1272/2008.

Restriction of Hazardous Substances (RoHS)

Parts printed on an HP 3D printer using HP 3D600/700 Agents and HP 3D HR PA 12 GB have been tested for RoHS (Directive 2011/65/EU as amended by Directive EU 2015/863) restricted substances following IEC 62321 standards. RoHS heavy metals (cadmium, chromium, lead, and mercury), bromine, and chlorine were not detected by XRF. No regulated phthalates were detected above 50 ppm.

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Polycyclic Aromatic Hydrocarbons (PAHs)

Parts printed on an HP 3D printer using HP 3D600/700 Agents and HP 3D HR PA 12 GB were tested for PAHs. No PAHs stated in table 1 were detected above the detection limit of 1 ppb using GC/MS.

Table 1. PAHs Tested

Naphthalene
Acenaphthylene
Acenaphthene
Fluorene
Phenanthrene
Anthracene
Fluoranthrene
Pyrene
Benzo[c]phenanthrene
Benzo[c]anthracene
Chrysene
Benzo[b]fluoranthene
Benzo[k]fluoranthene
Benzo[j]fluoranthene
Benzo[a]pyrene
Benzo[e]pyrene
3-Methylcholanthrene
Dibenzo[a,h]anthracene
Indeno[1,2,3-cd]pyrene
Benzo[g,h,i]perylene

Phthalates

Parts printed on an HP 3D printer using HP 3D600/700 Agents and HP 3D HR PA 12 GB were tested for regulated phthalates listed in table 2 and the results were <50 ppm.

Table 2. Phthlates Tested

Di-butyl phthalate (DBP)

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Butyl benzyl phthalate (BBP)
Di(2-ethylhexyl) phthalate (DEHP)
Di(n-octyl) phthalate (DnOP)
Di(iso-nonyl) phthalate (DINP)
Di-(is-decyl) phthalate (DIDP)
Di-n-hexyl phthalate (DnHP)

Recyclability

HP 3D HR PA12 GB powder is supplied in containers of which approximately 80% of the weight of the used empty container is a recyclable cardboard. For disassembly instructions of the container please visit the following page: https://h30248.www3.hp.com/recycle/supplies/pdf/powder_container_recycling_instructions.pdfe.

HP Design for Environment (DfE) Program

In 1992, HP adopted a pioneering company-wide Design for the Environment program that considers environmental impact in the design of every product and solution, from the smallest ink cartridge to entire data centers.

For more information about HP's social and environmental responsibility programs, see www.hp.com/livingprogress.

Food Contact

Currently, no HP 3D materials are designed or approved for direct or indirect food contact applications and accordingly they should not be used for food applications or direct and indirect food contact applications.

Automotive

Substances and heavy metals as itemized in the Gobal Automotive Declarable Substance List (GADSL) are not intentionally added to HP 3D HR PA12 GB. The occurrence of substances restricted by GADSL can be excluded, except negligible amounts on the level of natural/technical impurities. HP 3D HR PA12 GB is not routinely analyzed for GADSL substances.

Materials information on PA12 GB have been entered into the International Material Data System (IMDS) and UL Prospector.

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No critical particle emissions from HP Jet Fusion 3D printers

Device performance undergoes strict safety consideration

Customers expect safe particle release behavior from their HP Jet Fusion 3D printing solutions. Evaluation needs to include different particle types potentially emitted – in particular fine and ultrafine particles. Indicative testing demonstrates that HP devices provide a high level of safety.

Fine dust emissions are negligible

Emissions of HP Jet Fusion 3D printing solutions in the fine particles size range of 0.3 to 10.0 micrometers (μm) are well below below a variety of mandatory and voluntary environmental requirements, as indicative testing has shown. [3]

When compared against mandatory occupational limits and toxicologically based indoor air guide values, devices are far below relevant values. For example, the devices meet the fine particles criteria of the Germany AGW[4] and the U.S. Permissible Exposure Limits (PELs) [5]. Accordingly, testing concluded that no health risks are expected when the devices are used and maintained as intended.

Ultrafine particles release is very low as well

For the extremely small ultrafine particles (UFPs) with a diameter of below 0.1 μm, concentrations resulting from the operation of HP Jet Fusion 3D printers are also quite low.[6] Particle numbers lie well below the precautionary guide value of the German Blue Angel. [7] And due to the UFPs' volatile nature, they do not hold the health hazardous potential associated with the solid consistency of particles in the ultrafine size range. Based on these observations, no health risks due to UFP release by HP Jet Fusion 3D printers have to be expected under reasonably foreseeable conditions of use as well.

Larger particles uncritical from a safety perspective

Particles with an average diameter of more than 10 μm generally have a lower exposure potential due to the propensity of these particles dripping out of the air. And, if inhaled, particles of this size are deposited in the upper regions of the human respiratory tract where they are subject to efficient clearance mechanisms. In addition to these physical considerations, the inherent chemical properties of the HP 3D materials do not indicate a health risk as they are not classified or labelled as hazardous according to the Globally Harmonized system of classification and Labelling of chemicals (GHS) [8], the assessment criteria for mixtures in the European Union[9], and applicable requirements in the United States. [10]

[3] HP commissioned indicative testing of HP Jet Fusion 3D 3200 and 4200 Printers operated with HP 3D PA12 material, carried out by the Fraunhofer Wilhelm-Klauditz-Institue (WKI), Braunschweig, Germany, 2016/2017.
[4] Workplace limits (AGW), TRGS 900, German Ordinance of Hazardous Substances (GefStoffV), German Comitte on Hazardous Substances (AGS), 2006 (as amended).
[5] PELs-TWA, 29 CFR 1910.1000 Z-1 and Z-2, OSHA, 2006.
[6] HP commissioned indicative testing of HP Jet Fusion 3D 3200 and 4200 Printers operated with HP 3D PA12 material, carried out by the Fraunhofer Wilhelm-Klauditz-Institue (WKI), Braunschweig, Germany, 2016/2017.
[7] Basic criteria for award of the German Blue Angel (BA) environmental label for Office Equipment with Printing Function, RAL-UZ 171 or RALOUZ 205, RAL gGmH.
[8] GHS, ST/SG/AC. 10/30/Rev. 5, United Nations, 2013.
[9] REG. (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures, European Parliament and Council, 2008 (as amended).
[10] Occupational Safety and Health Standards, Toxic and Hazardous Substances, 1910.1200, OSHA, 2012 (as amended).

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