

<b>Topic:</b>	<b>3D Printer Selection and Usage</b>
<b>Effective:</b>	<b>May 2016</b>
<b>Cross Reference:</b>	<b>Occupational Health and Safety Act; Workplace Safety and Insurance Act; Health and Safety Policy;</b>
<b>Review Date:</b>	<b>May 2018, May 2019, June 2021, June 2023</b>
<b>Revision Date:</b>	<b>June 2027</b>
<b>Responsibility:</b>	<b>Superintendent of Human Resources Superintendent of Program Services</b>

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**INTENDED PURPOSE:**

To provide guidance on the safe use of 3D printers in the delivery of curriculum.

**PREAMBLE:**

3D printers provide students with a dynamic design opportunity and use of evolving technology. As 3D printers utilize nanotechnology, this document outlines minimum safety requirements for safe use that must be implemented within all Halton District School Board schools.

**PROCEDURES:****Selection:**

1. Only HDSB approved 3D printer models may be used (Refer to Purchasing Tendered Lists).
2. 3D printers must only be used to meet curriculum expectations.
3. Certain design features of specific printers are unique and appear to be designed as a control technique, whereas others appear to be a design of convenience. To ensure safety for staff and students, 3D printers must only be purchased from the approved for use list on the Board tender. These models have been approved because they meet the following criteria:
  - a) To protect against physical hazards, select a model of 3D printer that is enclosed or guarded from moving parts, pinch points and the heating plate.
  - b) To control emission hazards, select a model of 3D printer that is fully enclosed, and has a good seal.
  - c) The power supply AND the printer assembly must be Canadian Standards Association (CSA) or Electrical Safety Authority (ESA) certified for Canada. If this criterion is not met, the 3D printer will require an ESA Field Evaluation to be completed.
4. Where a unique or new 3D printer model is on the market but not yet on the Board tender list or where a school is to receive a donated 3D printer, the model should be reviewed in consultation with School Programs and Information Services departments. The model being considered must be approved by the Health & Safety Department prior to acquisition or use to ensure it meets the Board's standard with respect to safety. If an older model is currently in use and is not enclosed, contact the Health & Safety Department for assessment and recommendations for safe use.
5. All 3D printers must be purchased through a Purchase Order.

**General:**

1. A malfunctioning 3D printer poses a fire hazard; therefore, projects that require an extended run time (beyond the school day) must be printed in a room that complies with Fire Code requirements (fixed-temperature-rate-of-rise heat detector or smoke detector).
2. 3D printers must be plugged directly into a wall outlet. No power bars or extension cords.
3. If no interlock system is present, users must always disengage the printer by turning off the printer's main power before opening the door while printing
4. Follow manufacturer's instructions for the unit.
5. Students using 3D printers must receive instruction on the safe use of the specific model of 3D printer they will be using prior to use. Included in these instructions should be general hazards associated with 3D printing.
6. Modifications to 3D printers are NOT allowed (e.g., to accommodate filament spools, to by-pass interlock, etc).

**Feedstock:**

1. Use 100% Virgin Grade A feedstock that is obtained from the printer's manufacturer or Board approved suppliers (refer to the Standard Supply List).
2. Only polylactic acid (PLA) feedstock is to be used in common areas (e.g., libraries) and K-12 regular classrooms.
3. PLA and acrylonitrile butadiene styrene (ABS) may be used in secondary schools in technology speciality rooms (e.g., I-STEM, Manufacturing, Computer Engineering).
4. Obtain Safety Data Sheets (SDS) for filament feedstock.

**Ventilation:**

1. Printers must be installed away from staff and student desks/work areas.
2. The room where the 3D printer will be located must have general ventilation. Refer to the following chart for specifics.
  - a. In the absence of general ventilation, a local exhaust system is required. Contact the Health and Safety Department and/or Facilities Department for assistance.

**Ventilation Control Matrix for Emissions for Printers**

Risk Group	3D Printer Parameters for Classroom Use	Minimum Controls Recommended
<b>A</b>	1 3D printer (without HEPA & carbon filters) using PLA filament	<p>The room should meet general HVAC ventilation requirements in ANSI/ASHRAE 62.1-2022.</p> <p>The room should maintain a slightly negative air pressure differential with respect to adjacent rooms/hallways.</p> <p>The HVAC system servicing the room should be reviewed. CAV systems or systems allowing continual air movement are preferred.</p> <p>The printer should be located as far away as practicable from a workstation that can be occupied.</p> <p>Follow manufacturer's recommendations for</p>

<b>Risk Group</b>	<b>3D Printer Parameters for Classroom Use</b>	<b>Minimum Controls Recommended</b>
		installation, care and maintenance.
<b>B</b>	3D printers (without HEPA & carbon filters) using ABS filament  AND/OR  Multiple 3D printers (without HEPA & carbon filters) using PLA	Capture hood or local exhaust ventilation designed and/or verified for each printer is required to remove emissions from the room. If air is to be re-circulated into the room, the exhaust system must be equipped with a HEPA filter and an adsorbent filter such as activated carbon. The room should maintain a slightly negative air pressure differential with respect to adjacent rooms/hallways. Follow manufacturer's recommendations for installation, care and maintenance.
<b>C</b>	1 fully enclosed 3D printer containing built-in carbon and HEPA filters with PLA filament.  *Installation of additional printers requires review and approval from Health and Safety.	No additional controls required. Follow manufacturer's recommendations for installation, care and maintenance.
<b>D</b>	1 fully enclosed 3D printer containing built-in carbon and HEPA filters with ABS filament.  *Installation of additional printers requires review and approval from Health and Safety.	The printer should be located as far away as practicable from a workstation that can be occupied. Follow manufacturer's recommendations for installation, care and maintenance.