

WAC 296-850-180 Appendix A—Control strategies to minimize beryllium exposure of this standard is nonmandatory. WAC 296-850-130(2) of this chapter requires employers to use one or more of the control methods listed in WAC 296-850-130(2) to minimize worker exposure in each operation in a beryllium work area, unless the operation is exempt under WAC 296-850-130 (2)(b). This appendix sets forth a nonexhaustive list of control options that employers could use to comply with WAC 296-850-130(2) for a number of specific beryllium operations.

Table A.1: Exposure Control Recommendations

Operation	Minimal Control Strategy*	Application Group
Beryllium Oxide Forming (e.g., pressing, extruding)	<p>For pressing operations:</p> <ul style="list-style-type: none"> (1) Install local exhaust ventilation (LEV) on oxide press tables, oxide feed drum breaks, press tumblers, powder rollers, and die set disassembly stations; (2) Enclose the oxide presses; and (3) Install mechanical ventilation (make-up air) in processing areas. <p>For extruding operations:</p> <ul style="list-style-type: none"> (1) Install LEV on extruder powder loading hoods, oxide supply bottles, rod breaking operations, centerless grinders, rod laydown tables, dicing operations, surface grinders, discharge end of extrusion presses; (2) Enclose the centerless grinders; and (3) Install mechanical ventilation (make-up air) in processing areas. 	Primary Beryllium Production; Beryllium Oxide Ceramics and Composites
Chemical Processing Operations (e.g., leaching, pickling, degreasing, etching, plating)	<p>For medium and high gassing operations:</p> <ul style="list-style-type: none"> (1) Perform operation with a hood having a maximum of one open side; and (2) Design process so as to minimize spills; if accidental spills occur, perform immediate cleanup. 	Primary Beryllium Production; Beryllium Oxide Ceramics and Composites; Copper Rolling, Drawing and Extruding
Finishing (e.g., grinding, sanding, polishing, deburring)	<ul style="list-style-type: none"> (1) Perform portable finishing operations in a ventilated hood. The hood should include both downdraft and backdraft ventilation, and have at least two sides and a top. (2) Perform stationary finishing operations using a ventilated and enclosed hood at the point of operation. The grinding wheel of the stationary unit should be enclosed and ventilated. 	Secondary Smelting; Fabrication of Beryllium Alloy Products; Dental Labs

Operation	Minimal Control Strategy*	Application Group
Furnace Operations (e.g., Melting and Casting)	<p>(1) Use LEV on furnaces, pelletizer; arc furnace ingot machine discharge; pellet sampling; arc furnace bins and conveyors; beryllium hydroxide drum dumper and dryer; furnace rebuilding; furnace tool holders; arc furnace tundish and tundish skimming, tundish preheat hood, and tundish cleaning hoods; dross handling equipment and drums; dross recycling; and tool repair station, charge make-up station, oxide screener, product sampling locations, drum changing stations, and drum cleaning stations.</p> <p>(2) Use mechanical ventilation (make-up air) in furnace building.</p>	Primary Beryllium Production; Beryllium Oxide Ceramics and Composites; Nonferrous Foundries; Secondary Smelting
Machining	<p>Use: (1) LEV consistent with ACGIH® ventilation guidelines on deburring hoods, wet surface grinder enclosures, belt sanding hoods, and electrical discharge machines (for operations such as polishing, lapping, and buffing);</p> <p>(2) High velocity low volume hoods or ventilated enclosures on lathes, vertical mills, CNC mills, and tool grinding operations;</p> <p>(3) For beryllium oxide ceramics, LEV on lapping, dicing, and laser cutting; and</p> <p>(4) Wet methods (e.g., coolants).</p>	Primary Beryllium Production; Beryllium Oxide Ceramics and Composites; Copper Rolling, Drawing, and Extruding; Precision Turned Products
Mechanical Processing (e.g., material handling (including scrap), sorting, crushing, screening, pulverizing, shredding, pouring, mixing, blending)	<p>(1) Enclose and ventilate sources of emission;</p> <p>(2) Prohibit open handling of materials; and</p> <p>(3) Use mechanical ventilation (make-up air) in processing areas.</p>	Primary Beryllium Production; Beryllium Oxide Ceramics and Composites; Aluminum and Copper Foundries; Secondary Smelting
Metal Forming (e.g., rolling, drawing, straightening, annealing, extruding)	<p>(1) For rolling operations, install LEV on mill stands and reels such that a hood extends the length of the mill;</p> <p>(2) For point and chamfer operations, install LEV hoods at both ends of the rod;</p> <p>(3) For annealing operations, provide an inert atmosphere for annealing furnaces, and LEV hoods at entry and exit points;</p> <p>(4) For swaging operations, install LEV on the cutting head;</p> <p>(5) For drawing, straightening, and extruding operations, install LEV at entry and exit points; and</p> <p>(6) For all metal forming operations, install mechanical ventilation (make-up air) for processing areas.</p>	Primary Beryllium Production; Copper Rolling, Drawing, and Extruding; Fabrication of Beryllium Alloy Products

Operation	Minimal Control Strategy*	Application Group
Welding	<p>For fixed welding operations: (1) Enclose work locations around the source of fume generation and use local exhaust ventilation; and (2) Install close capture hood enclosure designed so as to minimize fume emission from the enclosure welding operation.</p> <p>For manual operations: (1) Use portable local exhaust and general ventilation.</p>	Primary Beryllium Production; Fabrication of Beryllium Alloy Products; Welding

* All LEV specifications should be in accordance with the ACGIH® Publication No. 2094, "Industrial Ventilation – A Manual of Recommended Practice" wherever applicable.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, 49.17.060, and chapter 49.17 RCW. WSR 18-17-156, § 296-850-180, filed 8/21/18, effective 12/12/18.]