

**Michigan Mechanical Code
Chapter 5 – Exhaust Systems**

2012	2015	Change
SECTION 501 - GENERAL	SECTION 501 - GENERAL	
501.1 Scope. This chapter shall govern the design, construction and installation of mechanical exhaust systems, including exhaust systems serving clothes dryers and cooking appliances; hazardous exhaust systems; dust, stock and refuse conveyor systems; subslab soil exhaust systems; smoke control systems; energy recovery ventilation systems and other systems specified in Section 502.	501.1 Scope. This chapter shall govern the design, construction and installation of mechanical exhaust systems, including exhaust systems serving clothes dryers and cooking appliances; hazardous exhaust systems; dust, stock and refuse conveyor systems; subslab soil exhaust systems; smoke control systems; energy recovery ventilation systems and other systems specified in Section 502.	None
501.2 Independent system required. Single or combined mechanical exhaust systems for environmental air shall be independent of all other exhaust systems. Dryer exhaust shall be independent of all other systems. Type I exhaust systems shall be independent of all other exhaust systems except as provided in Section 506.3.5. Single or combined Type II exhaust systems for food-processing operations shall be independent of all other exhaust systems. Kitchen exhaust systems shall be constructed in accordance with Section 505 for domestic equipment and Sections 506 through 509 for commercial equipment.	501.2 Independent system required. Single or combined mechanical exhaust systems for environmental air shall be independent of all other exhaust systems. Dryer exhaust shall be independent of all other systems. Type I exhaust systems shall be independent of all other exhaust systems except as provided in Section 506.3.5. Single or combined Type II exhaust systems for food-processing operations shall be independent of all other exhaust systems. Kitchen exhaust systems shall be constructed in accordance with Section 505 for domestic equipment and Sections 506 through 509 for commercial equipment.	None
501.2.1 Exhaust discharge. Exhaust air shall not be directed onto walkways. Exhaust openings shall not terminate within 3 feet of a ventilated section in a soffit. R 408.30945a		None. Moved requirement to §501.3.
501.3 Exhaust discharge. The air removed by every mechanical exhaust system shall be discharged outdoors at a point where it will not cause a nuisance and not less than the distances specified in Section 501.3.1. The air shall be discharged to a location from which it cannot again be readily drawn in by a ventilating system. Air shall not be exhausted into an attic or crawl space.	501.3 Exhaust discharge. The air removed by every mechanical exhaust system shall be discharged outdoors at a point where it will not cause a public nuisance and not less than the distances specified in Section 501.3.1 of the code. The air shall be discharged to a location from which it cannot again be readily drawn in by a ventilating system. Air shall not be exhausted into an attic or a crawl space, be directed onto walkways, or terminate within 3 feet of a ventilated section in a soffit.	Incorporated requirements of former §501.2.1 above and §501.3.1.1 below.

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<p>Exceptions:</p> <p>1. Whole-house ventilation-type attic fans shall be permitted to discharge into the attic space of <i>dwelling units</i> having private attics.</p> <p>2. Commercial cooking recirculating systems.</p>	<p>Exceptions:</p> <p>1. Whole-house ventilation-type attic fans shall be permitted to discharge into the attic space of dwelling units that have private attics.</p> <p>2. Commercial cooking recirculating systems.</p> <p>3. When installed in accordance with the manufacturer’s instructions and when mechanical or natural ventilation is otherwise provided in accordance with Chapter 4 of the code, listed and labeled domestic ductless range hoods shall not be required to discharge to the outdoors.</p> <p>R 408.30945a</p>	Added exception for ductless range hoods.
<p>501.3.1 Location of exhaust outlets. The termination point of exhaust outlets and ducts discharging to the outdoors shall be located with the following minimum distances:</p>	<p>501.3.1 Location of exhaust outlets. The termination point of exhaust outlets and ducts discharging to the outdoors shall be located with the following minimum distances:</p>	None
<p>1. For ducts conveying explosive or flammable vapors, fumes or dusts: 30 feet (9144 mm) from property lines; 10 feet (3048 mm) from operable openings into buildings; 6 feet (1829 mm) from exterior walls and roofs; 30 feet (9144 mm) from combustible walls and operable openings into buildings which are in the direction of the exhaust discharge; 10 feet (3048 mm) above adjoining grade.</p>	<p>1. For ducts conveying explosive or flammable vapors, fumes or dusts: 30 feet (9144 mm) from property lines; 10 feet (3048 mm) from operable openings into buildings; 6 feet (1829 mm) from exterior walls and roofs; 30 feet (9144 mm) from combustible walls and operable openings into buildings which are in the direction of the exhaust discharge; 10 feet (3048 mm) above adjoining grade.</p>	None
<p>2. For other product-conveying outlets: 10 feet (3048 mm) from the property lines; 3 feet (914 mm) from exterior walls and roofs; 10 feet (3048 mm) from operable openings into buildings; 10 feet (3048 mm) above adjoining grade.</p>	<p>2. For other product-conveying outlets: 10 feet (3048 mm) from the property lines; 3 feet (914 mm) from exterior walls and roofs; 10 feet (3048 mm) from operable openings into buildings; 10 feet (3048 mm) above adjoining grade.</p>	None
<p>3. For all <i>environmental air</i> exhaust: 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable openings into buildings for all occupancies other than Group U, and 10 feet (3048 mm) from mechanical air intakes. Such exhaust shall not be considered hazardous or noxious.</p>	<p>3. For all <i>environmental air</i> exhaust: 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable openings into buildings for all occupancies other than Group U, and 10 feet (3048 mm) from mechanical air intakes. Such exhaust shall not be considered hazardous or noxious</p>	None

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4. Exhaust outlets serving structures in flood hazard areas shall be installed at or above the elevation required by Section 1612 of the <i>International Building Code</i> for utilities and attendant equipment.	4. Exhaust outlets serving structures in flood hazard areas shall be installed at or above the elevation required by Section 1612 of the <i>International Building Code</i> for utilities and attendant equipment.	None
5. For specific systems see the following sections: 5.1. Clothes dryer exhaust, Section 504.4. 5.2. Kitchen hoods and other kitchen exhaust <i>equipment</i> , Sections 506.3.13, 506.4 and 506.5. 5.3. Dust stock and refuse conveying systems, Section 511.2. 5.4. Subslab soil exhaust systems, Section 512.4. 5.5. Smoke control systems, Section 513.10.3. 5.6. Refrigerant discharge, Section 1105.7. 5.7. Machinery room discharge, Section 1105.6.1.	5. For specific systems see the following sections: 5.1. Clothes dryer exhaust, Section 504.4. 5.2. Kitchen hoods and other kitchen exhaust <i>equipment</i> , Sections 506.3.13, 506.4 and 506.5. 5.3. Dust stock and refuse conveying systems, Section 511.2. 5.4. Subslab soil exhaust systems, Section 512.4. 5.5. Smoke control systems, Section 513.10.3. 5.6. Refrigerant discharge, Section 1105.7. 5.7. Machinery room discharge, Section 1105.6.1.	None
501.3.1.1 Exhaust discharge. <i>Exhaust air</i> shall not be directed onto walkways.		None. Moved requirement to §501.3.
501.3.2 Exhaust opening protection. Exhaust openings that terminate outdoors shall be protected with corrosion resistant screens, louvers or grilles. Openings in screens, louvers and grilles shall be sized not less than 1/4 inch (6 mm) and not larger than 1/2 inch (13 mm). Openings shall be protected against local weather conditions. Louvers that protect exhaust openings in structures located in hurricane-prone regions, as defined in the <i>International Building Code</i> , shall comply with AMCA Standard 550. Outdoor openings located in exterior walls shall meet the provisions for exterior wall opening protectives in accordance with the <i>International Building Code</i> .	501.3.2 Exhaust opening protection. Exhaust openings that terminate outdoors shall be protected with corrosion resistant screens, louvers or grilles. Openings in screens, louvers and grilles shall be sized not less than 1/4 inch (6 mm) and not larger than 1/2 inch (13 mm). Openings shall be protected against local weather conditions. Louvers that protect exhaust openings in structures located in hurricane-prone regions, as defined in the <i>International Building Code</i> , shall comply with AMCA Standard 550. Outdoor openings located in exterior walls shall meet the provisions for exterior wall opening protectives in accordance with the <i>International Building Code</i> .	None

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<p>501.4 Pressure equalization. Mechanical exhaust systems shall be sized to remove the quantity of air required by this chapter to be exhausted. The system shall operate when air is required to be exhausted. Where mechanical exhaust is required in a room or space in other than occupancies in R-3 and <i>dwelling units</i> in R-2, such space shall be maintained with a neutral or negative pressure. If a greater quantity of air is supplied by a mechanical ventilating supply system than is removed by a mechanical exhaust for a room, adequate means shall be provided for the natural or mechanical exhaust of the excess air supplied. If only a mechanical exhaust system is installed for a room or if a greater quantity of air is removed by a mechanical exhaust system than is supplied by a mechanical ventilating supply system for a room, adequate <i>makeup air</i> consisting of supply air, transfer air or outdoor air shall be provided to satisfy the deficiency. The calculated building infiltration rate shall not be used to satisfy the requirements of this section.</p>	<p>501.4 Pressure equalization. Mechanical exhaust systems shall be sized to remove the quantity of air required by this chapter to be exhausted. The system shall operate when air is required to be exhausted. Where mechanical exhaust is required in a room or space in other than occupancies in R-3 and <i>dwelling units</i> in R-2, such space shall be maintained with a neutral or negative pressure. If a greater quantity of air is supplied by a mechanical ventilating supply system than is removed by a mechanical exhaust for a room, adequate means shall be provided for the natural or mechanical exhaust of the excess air supplied. If only a mechanical exhaust system is installed for a room or if a greater quantity of air is removed by a mechanical exhaust system than is supplied by a mechanical ventilating supply system for a room, adequate <i>makeup air</i> consisting of supply air, transfer air or outdoor air shall be provided to satisfy the deficiency. The calculated building infiltration rate shall not be used to satisfy the requirements of this section.</p>	None
<p>501.5 Ducts. Where exhaust duct construction is not specified in this chapter, such construction shall comply with Chapter 6.</p>	<p>501.5 Ducts. Where exhaust duct construction is not specified in this chapter, such construction shall comply with Chapter 6.</p>	None
SECTION 502 - REQUIRED SYSTEMS	SECTION 502 - REQUIRED SYSTEMS	
<p>502.1 General. An exhaust system shall be provided, maintained and operated as specifically required by this section and for all occupied areas where machines, vats, tanks, furnaces, forges, salamanders and other <i>appliances, equipment</i> and processes in such areas produce or throw off dust or particles sufficiently light to float in the air, or which emit heat, odors, fumes, spray, gas or smoke, in such quantities so as to be irritating or injurious to health or safety.</p>	<p>502.1 General. An exhaust system shall be provided, maintained and operated as specifically required by this section and for all occupied areas where machines, vats, tanks, furnaces, forges, salamanders and other <i>appliances, equipment</i> and processes in such areas produce or throw off dust or particles sufficiently light to float in the air, or which emit heat, odors, fumes, spray, gas or smoke, in such quantities so as to be irritating or injurious to health or safety.</p>	None
<p>502.1.1 Exhaust location. The inlet to an exhaust system shall be located in the area of heaviest concentration of contaminants.</p>	<p>502.1.1 Exhaust location. The inlet to an exhaust system shall be located in the area of heaviest concentration of contaminants.</p>	None
<p>502.1.2 Fuel-dispensing areas. The bottom of an air inlet or exhaust opening in fuel-dispensing areas shall be located not more than 18 inches (457 mm) above the floor.</p>	<p>502.1.2 Fuel-dispensing areas. The bottom of an air inlet or exhaust opening in fuel-dispensing areas shall be located not more than 18 inches (457 mm) above the floor.</p>	None

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<p>502.1.3 Equipment, appliance and service rooms. <i>Equipment, appliance</i> and system service rooms that house sources of odors, fumes, noxious gases, smoke, steam, dust, spray or other contaminants shall be designed and constructed so as to prevent spreading of such contaminants to other occupied parts of the building.</p>	<p>Equipment, appliance and service rooms. <i>Equipment, appliance</i> and system service rooms that house sources of odors, fumes, noxious gases, smoke, steam, dust, spray or other contaminants shall be designed and constructed so as to prevent spreading of such contaminants to other occupied parts of the building.</p>	None
<p>502.1.4 Hazardous exhaust. The mechanical exhaust of high concentrations of dust or hazardous vapors shall conform to the requirements of Section 510.</p>	<p>502.1.4 Hazardous exhaust. The mechanical exhaust of high concentrations of dust or hazardous vapors shall conform to the requirements of Section 510.</p>	None
<p>502.2 Aircraft fueling and defueling. Compartments housing piping, pumps, air eliminators, water separators, hose reels and similar <i>equipment</i> used in aircraft fueling and defueling operations shall be adequately ventilated at floor level or within the floor itself.</p>	<p>502.2 Aircraft fueling and defueling. Compartments housing piping, pumps, air eliminators, water separators, hose reels and similar <i>equipment</i> used in aircraft fueling and defueling operations shall be adequately ventilated at floor level or within the floor itself.</p>	None
<p>502.3 Battery-charging areas for powered industrial trucks and equipment. Ventilation shall be provided in an <i>approved</i> manner in battery-charging areas for powered industrial trucks and <i>equipment</i> to prevent a dangerous accumulation of flammable gases.</p>	<p>502.3 Battery-charging areas for powered industrial trucks and equipment. Ventilation shall be provided in an <i>approved</i> manner in battery-charging areas for powered industrial trucks and <i>equipment</i> to prevent a dangerous accumulation of flammable gases.</p>	None
<p>502.4 Stationary storage battery systems. Stationary storage battery systems, as regulated by Section 608 of the <i>International Fire Code</i>, shall be provided with ventilation in accordance with this chapter and Section 502.4.1 or 502.4.2. Exception: Lithium-ion batteries shall not require ventilation.</p>	<p>502.4 Stationary storage battery systems. Stationary storage battery systems, as regulated by Section 608 of the <i>International Fire Code</i>, shall be provided with ventilation in accordance with this chapter and Section 502.4.1 or 502.4.2. Exception: Lithium-ion and lithium metal polymer batteries shall not require additional ventilation beyond that which would normally be required for human occupancy of the space.</p>	Added exception for lithium metal polymer batteries and added wording to emphasize that ventilation is still required for occupants.
<p>502.4.1 Hydrogen limit in rooms. For flooded lead acid, flooded nickel cadmium and VRLA batteries, the ventilation system shall be designed to limit the maximum concentration of hydrogen to 1.0 percent of the total volume of the room.</p>	<p>502.4.1 Hydrogen limit in rooms. For flooded lead acid, flooded nickel cadmium and VRLA batteries, the ventilation system shall be designed to limit the maximum concentration of hydrogen to 1.0 percent of the total volume of the room.</p>	None

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502.4.2 Ventilation rate in rooms. Continuous ventilation shall be provided at a rate of not less than 1 cubic foot per minute per square foot (cfm/ft ²) [0.00508 m ³ /(s • m ²)] of floor area of the room.	502.4.2 Ventilation rate in rooms. Continuous ventilation shall be provided at a rate of not less than 1 cubic foot per minute per square foot (cfm/ft ²) [0.00508 m ³ /(s • m ²)] of floor area of the room.	None
502.4.3 Supervision. Mechanical ventilation systems required by Section 502.4 shall be supervised by an approved central, proprietary or remote station service or shall initiate an audible and visual signal at a constantly attended on-site location.	502.4.3 Supervision. Mechanical ventilation systems required by Section 502.4 shall be supervised by an approved central, proprietary or remote station service or shall initiate an audible and visual signal at a constantly attended on-site location.	None
502.5 Valve-regulated lead-acid batteries in cabinets. Valve-regulated lead-acid (VRLA) batteries installed in cabinets, as regulated by Section 608.6.2 of the <i>International Fire Code</i> , shall be provided with ventilation in accordance with Section 502.5.1 or 502.5.2.	502.5 Valve-regulated lead-acid batteries in cabinets. Valve-regulated lead-acid (VRLA) batteries installed in cabinets, as regulated by Section 608.6.2 of the <i>International Fire Code</i> , shall be provided with ventilation in accordance with Section 502.5.1 or 502.5.2.	None
502.5.1 Hydrogen limit in cabinets. The cabinet ventilation system shall be designed to limit the maximum concentration of hydrogen to 1.0 percent of the total volume of the cabinet during the worst-case event of simultaneous boost charging of all batteries in the cabinet.	502.5.1 Hydrogen limit in cabinets. The cabinet ventilation system shall be designed to limit the maximum concentration of hydrogen to 1.0 percent of the total volume of the cabinet during the worst-case event of simultaneous boost charging of all batteries in the cabinet.	None
502.5.2 Ventilation rate in cabinets. Continuous cabinet ventilation shall be provided at a rate of not less than 1 cubic foot per minute per square foot (cfm/ft ²) [0.00508 m ³ /(s • m ²)] of the floor area covered by the cabinet. The room in which the cabinet is installed shall also be ventilated as required by Section 502.4.1 or 502.4.2.	502.5.2 Ventilation rate in cabinets. Continuous cabinet ventilation shall be provided at a rate of not less than 1 cubic foot per minute per square foot (cfm/ft ²) [0.00508 m ³ /(s • m ²)] of the floor area covered by the cabinet. The room in which the cabinet is installed shall be ventilated as required by Section 502.4.1 or 502.4.2.	None
502.5.3 Supervision. Mechanical ventilation systems required by Section 502.5 shall be supervised by an approved central, proprietary or remote station service or shall initiate an audible and visual signal at a constantly attended on-site location.	502.5.3 Supervision. Mechanical ventilation systems required by Section 502.5 shall be supervised by an approved central, proprietary or remote station service or shall initiate an audible and visual signal at a constantly attended on-site location.	None
502.6 Dry cleaning plants. Ventilation in dry cleaning plants shall be adequate to protect employees and the public in accordance with this section and DOL 29 CFR Part 1910.1000, where applicable.	502.6 Dry cleaning plants. Ventilation in dry cleaning plants shall be adequate to protect employees and the public in accordance with this section and DOL 29 CFR Part 1910.1000, where applicable.	None

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<p>502.6.1 Type II systems. Type II dry cleaning systems shall be provided with a mechanical ventilation system that is designed to exhaust 1 cubic foot of air per minute for each square foot of floor area (1 cfm/ft²) [0.00508 m³/(s • m²)] in dry cleaning rooms and in drying rooms. The ventilation system shall operate automatically when the dry cleaning <i>equipment</i> is in operation and shall have manual controls at an <i>approved</i> location.</p>	<p>502.6.1 Type II systems. Type II dry cleaning systems shall be provided with a mechanical ventilation system that is designed to exhaust 1 cubic foot of air per minute for each square foot of floor area (1 cfm/ft²) [0.00508 m³/(s • m²)] in dry cleaning rooms and in drying rooms. The ventilation system shall operate automatically when the dry cleaning <i>equipment</i> is in operation and shall have manual controls at an <i>approved</i> location.</p>	None
<p>502.6.2 Type IV and V systems. Type IV and V dry cleaning systems shall be provided with an automatically activated exhaust ventilation system to maintain a minimum of 100 feet per minute (0.51 m/s) air velocity through the loading door when the door is opened. Exception: Dry cleaning units are not required to be provided with exhaust ventilation where an exhaust hood is installed immediately outside of and above the loading door which operates at an airflow rate as follows: $Q = 100 \times A_{LD} \quad \text{(Equation 5-1)}$where: <i>Q</i> =Flow rate exhausted through the hood, cubic feet per minute. <i>A_{LD}</i>=Area of the loading door, square feet.</p>	<p>502.6.2 Type IV and V systems. Type IV and V dry cleaning systems shall be provided with an automatically activated exhaust ventilation system to maintain an air velocity of not less than 100 feet per minute (0.51 m/s) through the loading door when the door is opened. Exception: Dry cleaning units are not required to be provided with exhaust ventilation where an exhaust hood is installed immediately outside of and above the loading door which operates at an airflow rate as follows: $Q = 100 \times A_{LD} \quad \text{(Equation 5-1)}$where: <i>Q</i> =Flow rate exhausted through the hood, cubic feet per minute. <i>A_{LD}</i>=Area of the loading door, square feet.</p>	None
<p>502.6.3 Spotting and pretreating. Scrubbing tubs, scouring, brushing or spotting operations shall be located such that solvent vapors are captured and exhausted by the ventilating system.</p>	<p>502.6.3 Spotting and pretreating. Scrubbing tubs, scouring, brushing or spotting operations shall be located such that solvent vapors are captured and exhausted by the ventilating system.</p>	None
<p>502.7 Application of flammable finishes. Mechanical exhaust as required by this section shall be provided for operations involving the application of flammable finishes.</p>	<p>502.7 Application of flammable finishes. Mechanical exhaust as required by this section shall be provided for operations involving the application of flammable finishes.</p>	None
<p>502.7.1 During construction. Ventilation shall be provided for operations involving the application of materials containing flammable solvents in the course of construction, <i>alteration</i> or demolition of a structure.</p>	<p>502.7.1 During construction. Ventilation shall be provided for operations involving the application of materials containing flammable solvents in the course of construction, <i>alteration</i> or demolition of a structure.</p>	None

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502.7.2 Limited spraying spaces. Positive mechanical ventilation which provides a minimum of six complete air changes per hour shall be installed in limited spraying spaces. Such system shall meet the requirements of the <i>International Fire Code</i> for handling flammable vapors. Explosion venting is not required.	502.7.2 Limited spraying spaces. Positive mechanical ventilation that provides not less than six complete air changes per hour shall be installed in limited spraying spaces. Such system shall meet the requirements of the <i>International Fire Code</i> for handling flammable vapors. Explosion venting is not required.	None
502.7.3 Flammable vapor areas. Mechanical ventilation of flammable vapor areas shall be provided in accordance with Sections 502.7.3.1 through 502.7.3.6.	502.7.3 Flammable vapor areas. Mechanical ventilation of flammable vapor areas shall be provided in accordance with Sections 502.7.3.1 through 502.7.3.6.	None
502.7.3.1 Operation. Mechanical ventilation shall be kept in operation at all times while spraying operations are being conducted and for a sufficient time thereafter to allow vapors from drying coated articles and finishing material residue to be exhausted. Spraying <i>equipment</i> shall be interlocked with the ventilation of the flammable vapor area such that spraying operations cannot be conducted unless the ventilation system is in operation.	502.7.3.1 Operation. Mechanical ventilation shall be kept in operation at all times while spraying operations are being conducted and for a sufficient time thereafter to allow vapors from drying coated articles and finishing material residue to be exhausted. Spraying <i>equipment</i> shall be interlocked with the ventilation of the flammable vapor area such that spraying operations cannot be conducted unless the ventilation system is in operation.	None
502.7.3.2 Recirculation. Air exhausted from spraying operations shall not be recirculated.	502.7.3.2 Recirculation. Air exhausted from spraying operations shall not be recirculated.	None
Exceptions: 1. Air exhausted from spraying operations shall be permitted to be recirculated as <i>makeup air</i> for unmanned spray operations provided that: 1.1. The solid particulate has been removed. 1.2. The vapor concentration is less than 25 percent of the lower flammable limit (LFL). 1.3. <i>Approved equipment</i> is used to monitor the vapor concentration. 1.4. An alarm is sounded and spray operations are automatically shut down if the vapor concentration exceeds 25 percent of the LFL. 1.5. In the event of shutdown of the vapor concentration monitor, 100 percent of the air volume specified in Section 510 is automatically exhausted.	Exceptions: 1. Air exhausted from spraying operations shall be permitted to be recirculated as <i>makeup air</i> for unmanned spray operations provided that: 1.1. The solid particulate has been removed. 1.2. The vapor concentration is less than 25 percent of the lower flammable limit (LFL). 1.3. <i>Approved equipment</i> is used to monitor the vapor concentration. 1.4. An alarm is sounded and spray operations are automatically shut down if the vapor concentration exceeds 25 percent of the LFL. 1.5. In the event of shutdown of the vapor concentration monitor, 100 percent of the air volume specified in Section 510 is automatically exhausted.	None

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2. Air exhausted from spraying operations is allowed to be recirculated as <i>makeup air</i> to manned spraying operations where all of the conditions provided in Exception 1 are included in the installation and documents have been prepared to show that the installation does not pose a life safety hazard to personnel inside the spray booth, spraying space or spray room.	2. Air exhausted from spraying operations is allowed to be recirculated as <i>makeup air</i> to manned spraying operations where all of the conditions provided in Exception 1 are included in the installation and documents have been prepared to show that the installation does not pose a life safety hazard to personnel inside the spray booth, spraying space or spray room.	None
502.7.3.3 Air velocity. Ventilation systems shall be designed, installed and maintained such that the average air velocity over the open face of the booth, or booth cross section in the direction of airflow during spraying operations, is not less than 100 feet per minute (0.51 m/s).	502.7.3.3 Air velocity. The ventilation system shall be designed, installed and maintained so that the flammable contaminants are diluted in noncontaminated air to maintain concentrations in the exhaust air flow below 25 percent of the contaminant’s lower flammable limit (LFL). In addition, the spray booth shall be provided with mechanical ventilation so that the average air velocity through openings is in accordance with Sections 502.7.3.3.1 and 502.7.3.3.2.	Revised to required dilution of flammable contaminants to <25% LFL and refers to other sections to determine airflow.
	502.7.3.3.1 Open face or open front spray booth. For spray application operations conducted in an open face or open front spray booth, the ventilation system shall be designed, installed and maintained so that the average air velocity into the spray booth through all openings is not less than 100 feet per minute (0.51 m/s). Exception: For fixed or automated electrostatic spray application equipment, the average air velocity into the spray booth through all openings shall be not less than 50 feet per minute (0.25 m/s).	New Section with revised air velocity requirements for open face or open front spray booths.

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	<p>502.7.3.3.2 Enclosed spray booth or spray room with openings for product conveyance. For spray application operations conducted in an enclosed spray booth or spray room with openings for product conveyance, the ventilation system shall be designed, installed and maintained so that the average air velocity into the spray booth through openings is not less than 100 feet per minute (0.51 m/s).</p> <p>Exceptions:</p> <ol style="list-style-type: none"> 1. For fixed or automated electrostatic spray application equipment, the average air velocity into the spray booth through all openings shall be not less than 50 feet per minute (0.25 m/s). 2. Where methods are used to reduce cross drafts that can draw vapors and overspray through openings from the spray booth or spray room, the average air velocity into the spray booth or spray room shall be that necessary to capture and confine vapors and overspray to the spray booth or spray room. 	New Section addressing air velocity requirements for enclosed spray booth or spray room with openings for product conveyance.
502.7.3.4 Ventilation obstruction. Articles being sprayed shall be positioned in a manner that does not obstruct collection of overspray.	502.7.3.4 Ventilation obstruction. Articles being sprayed shall be positioned in a manner that does not obstruct collection of overspray.	None
502.7.3.5 Independent ducts. Each spray booth and spray room shall have an independent exhaust duct system discharging to the outdoors.	502.7.3.5 Independent ducts. Each spray booth and spray room shall have an independent exhaust duct system discharging to the outdoors.	None

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<p>Exceptions:</p> <p>1. Multiple spray booths having a combined frontal area of 18 square feet (1.67 m²) or less are allowed to have a common exhaust where identical spray-finishing material is used in each booth. If more than one fan serves one booth, such fans shall be interconnected so that all fans operate simultaneously.</p> <p>2. Where treatment of exhaust is necessary for air pollution control or energy conservation, ducts shall be allowed to be manifolded if all of the following conditions are met:</p> <p>2.1. The sprayed materials used are compatible and will not react or cause ignition of the residue in the ducts.</p> <p>2.2. Nitrocellulose-based finishing material shall not be used.</p> <p>2.3. A filtering system shall be provided to reduce the amount of overspray carried into the duct manifold.</p> <p>2.4. Automatic sprinkler protection shall be provided at the junction of each booth exhaust with the manifold, in addition to the protection required by this chapter.</p>	<p>Exceptions:</p> <p>1. Multiple spray booths having a combined frontal area of 18 square feet (1.67 m²) or less are allowed to have a common exhaust where identical spray-finishing material is used in each booth. If more than one fan serves one booth, such fans shall be interconnected so that all fans operate simultaneously.</p> <p>2. Where treatment of exhaust is necessary for air pollution control or energy conservation, ducts shall be allowed to be manifolded if all of the following conditions are met:</p> <p>2.1. The sprayed materials used are compatible and will not react or cause ignition of the residue in the ducts.</p> <p>2.2. Nitrocellulose-based finishing material shall not be used.</p> <p>2.3. A filtering system shall be provided to reduce the amount of overspray carried into the duct manifold.</p> <p>2.4. Automatic sprinkler protection shall be provided at the junction of each booth exhaust with the manifold, in addition to the protection required by this chapter.</p>	None
<p>502.7.3.6 Fan motors and belts. Electric motors driving exhaust fans shall not be placed inside booths or ducts. Fan rotating elements shall be nonferrous or nonsparking or the casing shall consist of, or be lined with, such material. Belts shall not enter the duct or booth unless the belt and pulley within the duct are tightly enclosed.</p>	<p>502.7.3.6 Fan motors and belts. Electric motors driving exhaust fans shall not be placed inside booths or ducts. Fan rotating elements shall be nonferrous or nonsparking or the casing shall consist of, or be lined with, such material. Belts shall not enter the duct or booth unless the belt and pulley within the duct are tightly enclosed.</p>	None

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502.7.4 Dipping operations. Flammable vapor areas of dip tank operations shall be provided with mechanical ventilation adequate to prevent the dangerous accumulation of vapors. Required ventilation systems shall be so arranged that the failure of any ventilating fan will automatically stop the dipping conveyor system.	502.7.4 Dipping operations. Flammable vapor areas of dip tank operations shall be provided with mechanical ventilation adequate to prevent the dangerous accumulation of vapors. Required ventilation systems shall be so arranged that the failure of any ventilating fan will automatically stop the dipping conveyor system.	None
502.7.5 Electrostatic apparatus. The flammable vapor area in spray-finishing operations involving electrostatic apparatus and devices shall be ventilated in accordance with Section 502.7.3.	502.7.5 Electrostatic apparatus. The flammable vapor area in spray-finishing operations involving electrostatic apparatus and devices shall be ventilated in accordance with Section 502.7.3.	None
502.7.6 Powder coating. Exhaust ventilation for powder-coating operations shall be sufficient to maintain the atmosphere below one-half of the minimum explosive concentration for the material being applied. Nondeposited, air-suspended powders shall be removed through exhaust ducts to the powder recovery system.	502.7.6 Powder coating. Exhaust ventilation for powder-coating operations shall be sufficient to maintain the atmosphere below one-half of the minimum explosive concentration for the material being applied. Nondeposited air-suspended powders shall be removed through exhaust ducts to the powder recovery system.	None
502.7.7 Floor resurfacing operations. To prevent the accumulation of flammable vapors during floor resurfacing operations, mechanical ventilation at a minimum rate of 1 cfm/ft ² [0.00508 m ³ /(s □□m ²)] of area being finished shall be provided. Such exhaust shall be by <i>approved</i> temporary or portable means. Vapors shall be exhausted to the exterior of the building.	502.7.7 Floor resurfacing operations. To prevent the accumulation of flammable vapors during floor resurfacing operations, mechanical ventilation at a minimum rate of 1 cfm/ft ² [0.00508 m ³ /(s □□m ²)] of area being finished shall be provided. Such exhaust shall be by <i>approved</i> temporary or portable means. Vapors shall be exhausted to the exterior of the building.	None
502.8 Hazardous materials—general requirements. Exhaust ventilation systems for structures containing hazardous materials shall be provided as required in Sections 502.8.1 through 502.8.5.	502.8 Hazardous materials—general requirements. Exhaust ventilation systems for structures containing hazardous materials shall be provided as required in Sections 502.8.1 through 502.8.5.	
502.8.1 Storage in excess of the maximum allowable quantities. Indoor storage areas and storage buildings for hazardous materials in amounts exceeding the maximum allowable quantity per control area shall be provided with mechanical exhaust ventilation or <i>natural ventilation</i> where <i>natural ventilation</i> can be shown to be acceptable for the materials as stored.	502.8.1 Storage in excess of the maximum allowable quantities. Indoor storage areas and storage buildings for hazardous materials in amounts exceeding the maximum allowable quantity per control area shall be provided with mechanical exhaust ventilation or <i>natural ventilation</i> where <i>natural ventilation</i> can be shown to be acceptable for the materials as stored.	None

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<p>Exceptions:</p> <p>1. Storage areas for flammable solids complying with Section 5904 of the <i>International Fire Code</i>.</p> <p>2. Storage areas and storage buildings for fireworks and explosives complying with Chapter 56 of the <i>International Fire Code</i>.</p>	<p>Exceptions:</p> <p>1. Storage areas for flammable solids complying with Section 5904 of the <i>International Fire Code</i>.</p> <p>2. Storage areas and storage buildings for fireworks and explosives complying with Chapter 56 of the <i>International Fire Code</i>.</p>	None
<p>502.8.1.1 System requirements. Exhaust ventilation systems shall comply with all of the following:</p>	<p>502.8.1.1 System requirements. Exhaust ventilation systems shall comply with all of the following:</p>	None
<p>1. The installation shall be in accordance with this code.</p>	<p>1. The installation shall be in accordance with this code.</p>	None
<p>2. Mechanical ventilation shall be provided at a rate of not less than 1 cfm per square foot [0.00508 m³/(s•m²)] of floor area over the storage area.</p>	<p>2. Mechanical ventilation shall be provided at a rate of not less than 1 cfm per square foot [0.00508 m³/(s•m²)] of floor area over the storage area.</p>	None
<p>3. The systems shall operate continuously unless alternate designs are <i>approved</i>.</p>	<p>3. The systems shall operate continuously unless alternate designs are <i>approved</i>.</p>	None
<p>4. A manual shutoff control shall be provided outside of the room in a position adjacent to the access door to the room or in another <i>approved</i> location. The switch shall be a break-glass or other <i>approved</i> type and shall be <i>labeled</i>: VENTILATION SYSTEM EMERGENCY SHUTOFF.</p>	<p>4. A manual shutoff control shall be provided outside of the room in a position adjacent to the access door to the room or in another <i>approved</i> location. The switch shall be a break-glass or other <i>approved</i> type and shall be <i>labeled</i>: VENTILATION SYSTEM EMERGENCY SHUTOFF.</p>	None
<p>5. The exhaust ventilation shall be designed to consider the density of the potential fumes or vapors released. For fumes or vapors that are heavier than air, exhaust shall be taken from a point within 12 inches (305 mm) of the floor. For fumes or vapors that are lighter than air, exhaust shall be taken from a point within 12 inches (305 mm) of the highest point of the room.</p>	<p>5. The exhaust ventilation shall be designed to consider the density of the potential fumes or vapors released. For fumes or vapors that are heavier than air, exhaust shall be taken from a point within 12 inches (305 mm) of the floor. For fumes or vapors that are lighter than air, exhaust shall be taken from a point within 12 inches (305 mm) of the highest point of the room.</p>	None
<p>6. The location of both the exhaust and inlet air openings shall be designed to provide air movement across all portions of the floor or room to prevent the accumulation of vapors.</p>	<p>6. The location of both the exhaust and inlet air openings shall be designed to provide air movement across all portions of the floor or room to prevent the accumulation of vapors.</p>	None

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7. The <i>exhaust air</i> shall not be recirculated to occupied areas if the materials stored are capable of emitting hazardous vapors and contaminants have not been removed. Air contaminated with explosive or flammable vapors, fumes or dusts; flammable, highly toxic or toxic gases; or radioactive materials shall not be recirculated.	7. The <i>exhaust air</i> shall not be recirculated to occupied areas if the materials stored are capable of emitting hazardous vapors and contaminants have not been removed. Air contaminated with explosive or flammable vapors, fumes or dusts; flammable, highly toxic or toxic gases; or radioactive materials shall not be recirculated.	None
502.8.2 Gas rooms, exhausted enclosures and gas cabinets. The ventilation system for gas rooms, exhausted enclosures and gas cabinets for any quantity of hazardous material shall be designed to operate at a negative pressure in relation to the surrounding area. Highly toxic and toxic gases shall also comply with Sections 502.9.7.1, 502.9.7.2 and 502.9.8.4.	502.8.2 Gas rooms, exhausted enclosures and gas cabinets. The ventilation system for gas rooms, exhausted enclosures and gas cabinets for any quantity of hazardous material shall be designed to operate at a negative pressure in relation to the surrounding area. Highly toxic and toxic gases shall comply with Sections 502.9.7.1, 502.9.7.2 and 502.9.8.4.	None
502.8.3 Indoor dispensing and use. Indoor dispensing and use areas for hazardous materials in amounts exceeding the maximum allowable quantity per control area shall be provided with exhaust ventilation in accordance with Section 502.8.1. Exception: Ventilation is not required for dispensing and use of flammable solids other than finely divided particles.	502.8.3 Indoor dispensing and use. Indoor dispensing and use areas for hazardous materials in amounts exceeding the maximum allowable quantity per control area shall be provided with exhaust ventilation in accordance with Section 502.8.1. Exception: Ventilation is not required for dispensing and use of flammable solids other than finely divided particles	None
502.8.4 Indoor dispensing and use—point sources. Where gases, liquids or solids in amounts exceeding the maximum allowable quantity per control area and having a hazard ranking of 3 or 4 in accordance with NFPA 704 are dispensed or used, mechanical exhaust ventilation shall be provided to capture gases, fumes, mists or vapors at the point of generation. Exception: Where it can be demonstrated that the gases, liquids or solids do not create harmful gases, fumes, mists or vapors.	502.8.4 Indoor dispensing and use—point sources. Where gases, liquids or solids in amounts exceeding the maximum allowable quantity per control area and having a hazard ranking of 3 or 4 in accordance with NFPA 704 are dispensed or used, mechanical exhaust ventilation shall be provided to capture gases, fumes, mists or vapors at the point of generation. Exception: Where it can be demonstrated that the gases, liquids or solids do not create harmful gases, fumes, mists or vapors.	None

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<p>502.8.5 Closed systems. Where closed systems for the use of hazardous materials in amounts exceeding the maximum allowable quantity per control area are designed to be opened as part of normal operations, ventilation shall be provided in accordance with Section 502.8.4.</p>	<p>502.8.5 Closed systems. Where closed systems for the use of hazardous materials in amounts exceeding the maximum allowable quantity per control area are designed to be opened as part of normal operations, ventilation shall be provided in accordance with Section 502.8.4</p>	None
<p>502.9 Hazardous materials—requirements for specific materials. Exhaust ventilation systems for specific hazardous materials shall be provided as required in Section 502.8 and Sections 502.9.1 through 502.9.11.</p>	<p>502.9 Hazardous materials—requirements for specific materials. Exhaust ventilation systems for specific hazardous materials shall be provided as required in Section 502.8 and Sections 502.9.1 through 502.9.11.</p>	None
<p>502.9.1 Compressed gases—medical gas systems. Rooms for the storage of compressed medical gases in amounts exceeding the permit amounts for compressed gases in the <i>International Fire Code</i>, and that do not have an exterior wall, shall be exhausted through a duct to the exterior of the building. Both separate airstreams shall be enclosed in a 1-hour-rated shaft enclosure from the room to the exterior. <i>Approved</i> mechanical ventilation shall be provided at a minimum rate of 1 cfm/ft² [0.00508 m³/(s □ m²)] of the area of the room. Gas cabinets for the storage of compressed medical gases in amounts exceeding the permit amounts for compressed gases in the <i>International Fire Code</i> shall be connected to an exhaust system. The average velocity of ventilation at the face of access ports or windows shall be not less than 200 feet per minute (1.02 m/s) with a minimum velocity of 150 feet per minute (0.76 m/s) at any point at the access port or window.</p>	<p>502.9.1 Compressed gases—medical gas systems. Rooms for the storage of compressed medical gases in amounts exceeding the permit amounts for compressed gases in the <i>International Fire Code</i>, and that do not have an exterior wall, shall be exhausted through a duct to the exterior of the building. Both separate airstreams shall be enclosed in a 1-hour-rated shaft enclosure from the room to the exterior. <i>Approved</i> mechanical ventilation shall be provided at a minimum rate of 1 cfm/ft² [0.00508 m³/(s □ m²)] of the area of the room. Gas cabinets for the storage of compressed medical gases in amounts exceeding the permit amounts for compressed gases in the <i>International Fire Code</i> shall be connected to an exhaust system. The average velocity of ventilation at the face of access ports or windows shall be not less than 200 feet per minute (1.02 m/s) with a minimum velocity of 150 feet per minute (0.76 m/s) at any point at the access port or window.</p>	None
<p>502.9.2 Corrosives. Where corrosive materials in amounts exceeding the maximum allowable quantity per control area are dispensed or used, mechanical exhaust ventilation in accordance with Section 502.8.4 shall be provided.</p>	<p>502.9.2 Corrosives. Where corrosive materials in amounts exceeding the maximum allowable quantity per control area are dispensed or used, mechanical exhaust ventilation in accordance with Section 502.8.4 shall be provided.</p>	None

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<p>502.9.3 Cryogenics. Storage areas for stationary or portable containers of cryogenic fluids in any quantity shall be ventilated in accordance with Section 502.8. Indoor areas where cryogenic fluids in any quantity are dispensed shall be ventilated in accordance with the requirements of Section 502.8.4 in a manner that captures any vapor at the point of generation.</p> <p>Exception: Ventilation for indoor dispensing areas is not required where it can be demonstrated that the cryogenic fluids do not create harmful vapors.</p>	<p>502.9.3 Cryogenics. Storage areas for stationary or portable containers of cryogenic fluids in any quantity shall be ventilated in accordance with Section 502.8. Indoor areas where cryogenic fluids in any quantity are dispensed shall be ventilated in accordance with the requirements of Section 502.8.4 in a manner that captures any vapor at the point of generation.</p> <p>Exception: Ventilation for indoor dispensing areas is not required where it can be demonstrated that the cryogenic fluids do not create harmful vapors.</p>	None
<p>502.9.4 Explosives. Squirrel cage blowers shall not be used for exhausting hazardous fumes, vapors or gases in operating buildings and rooms for the manufacture, assembly or testing of explosives. Only nonferrous fan blades shall be used for fans located within the ductwork and through which hazardous materials are exhausted. Motors shall be located outside the duct.</p>	<p>502.9.4 Explosives. Squirrel cage blowers shall not be used for exhausting hazardous fumes, vapors or gases in operating buildings and rooms for the manufacture, assembly or testing of explosives. Only nonferrous fan blades shall be used for fans located within the ductwork and through which hazardous materials are exhausted. Motors shall be located outside the duct.</p>	None
<p>502.9.5 Flammable and combustible liquids. Exhaust ventilation systems shall be provided as required by Sections 502.9.5.1 through 502.9.5.5 for the storage, use, dispensing, mixing and handling of flammable and combustible liquids. Unless otherwise specified, this section shall apply to any quantity of flammable and combustible liquids.</p> <p>Exception: This section shall not apply to flammable and combustible liquids that are exempt from the <i>International Fire Code</i>.</p>	<p>502.9.5 Flammable and combustible liquids. Exhaust ventilation systems shall be provided as required by Sections 502.9.5.1 through 502.9.5.5 for the storage, use, dispensing, mixing and handling of flammable and combustible liquids. Unless otherwise specified, this section shall apply to any quantity of flammable and combustible liquids.</p> <p>Exception: This section shall not apply to flammable and combustible liquids that are exempt from the <i>International Fire Code</i>.</p>	None

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<p>502.9.5.1 Vaults. Vaults that contain tanks of Class I liquids shall be provided with continuous ventilation at a rate of not less than 1 cfm/ft² of floor area [0.00508 m³/(s □□m²)], but not less than 150 cfm (4 m³/min). Failure of the exhaust airflow shall automatically shut down the dispensing system. The exhaust system shall be designed to provide air movement across all parts of the vault floor. Supply and exhaust ducts shall extend to a point not greater than 12 inches (305 mm) and not less than 3 inches (76 mm) above the floor. The exhaust system shall be installed in accordance with the provisions of NFPA 91. Means shall be provided to automatically detect any flammable vapors and to automatically shut down the dispensing system upon detection of such flammable vapors in the exhaust duct at a concentration of 25 percent of the LFL.</p>	<p>502.9.5.1 Vaults. Vaults that contain tanks of Class I liquids shall be provided with continuous ventilation at a rate of not less than 1 cfm/ft² of floor area [0.00508 m³/(s □□m²)], but not less than 150 cfm (4 m³/min). Failure of the exhaust airflow shall automatically shut down the dispensing system. The exhaust system shall be designed to provide air movement across all parts of the vault floor. Supply and exhaust ducts shall extend to a point not greater than 12 inches (305 mm) and not less than 3 inches (76 mm) above the floor. The exhaust system shall be installed in accordance with the provisions of NFPA 91. Means shall be provided to automatically detect any flammable vapors and to automatically shut down the dispensing system upon detection of such flammable vapors in the exhaust duct at a concentration of 25 percent of the LFL.</p>	None
<p>502.9.5.2 Storage rooms and warehouses. Liquid storage rooms and liquid storage warehouses for quantities of liquids exceeding those specified in the <i>International Fire Code</i> shall be ventilated in accordance with Section 502.8.1.</p>	<p>502.9.5.2 Storage rooms and warehouses. Liquid storage rooms and liquid storage warehouses for quantities of liquids exceeding those specified in the <i>International Fire Code</i> shall be ventilated in accordance with Section 502.8.1.</p>	None
<p>502.9.5.3 Cleaning machines. Areas containing machines used for parts cleaning in accordance with the <i>International Fire Code</i> shall be adequately ventilated to prevent accumulation of vapors.</p>	<p>502.9.5.3 Cleaning machines. Areas containing machines used for parts cleaning in accordance with the <i>International Fire Code</i> shall be adequately ventilated to prevent accumulation of vapors.</p>	None

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<p>502.9.5.4 Use, dispensing and mixing. Continuous mechanical ventilation shall be provided for the use, dispensing and mixing of flammable and combustible liquids in open or closed systems in amounts exceeding the maximum allowable quantity per control area and for bulk transfer and process transfer operations. The ventilation rate shall be not less than 1 cfm/ft² [0.00508 m³/(s • m²)] of floor area over the design area. Provisions shall be made for the introduction of <i>makeup air</i> in a manner that will include all floor areas or pits where vapors can collect. Local or spot ventilation shall be provided where needed to prevent the accumulation of hazardous vapors.</p> <p>Exception: Where <i>natural ventilation</i> can be shown to be effective for the materials used, dispensed or mixed.</p>	<p>502.9.5.4 Use, dispensing and mixing. Continuous mechanical ventilation shall be provided for the use, dispensing and mixing of flammable and combustible liquids in open or closed systems in amounts exceeding the maximum allowable quantity per control area and for bulk transfer and process transfer operations. The ventilation rate shall be not less than 1 cfm/ft² [0.00508 m³/(s • m²)] of floor area over the design area. Provisions shall be made for the introduction of <i>makeup air</i> in a manner that will include all floor areas or pits where vapors can collect. Local or spot ventilation shall be provided where needed to prevent the accumulation of hazardous vapors.</p> <p>Exception: Where <i>natural ventilation</i> can be shown to be effective for the materials used, dispensed or mixed.</p>	None
<p>502.9.5.5 Bulk plants or terminals. Ventilation shall be provided for portions of properties where flammable and combustible liquids are received by tank vessels, pipelines, tank cars or tank vehicles and which are stored or blended in bulk for the purpose of distributing such liquids by tank vessels, pipelines, tank cars, tank vehicles or containers as required by Sections 502.9.5.5.1 through 502.9.5.5.3.</p>	<p>502.9.5.5 Bulk plants or terminals. Ventilation shall be provided for portions of properties where flammable and combustible liquids are received by tank vessels, pipelines, tank cars or tank vehicles and which are stored or blended in bulk for the purpose of distributing such liquids by tank vessels, pipelines, tank cars, tank vehicles or containers as required by Sections 502.9.5.5.1 through 502.9.5.5.3.</p>	None
<p>502.9.5.5.1 General. Ventilation shall be provided for rooms, buildings and enclosures in which Class I liquids are pumped, used or transferred. Design of ventilation systems shall consider the relatively high specific gravity of the vapors. Where <i>natural ventilation</i> is used, adequate openings in outside walls at floor level, unobstructed except by louvers or coarse screens, shall be provided. Where <i>natural ventilation</i> is inadequate, mechanical ventilation shall be provided.</p>	<p>502.9.5.5.1 General. Ventilation shall be provided for rooms, buildings and enclosures in which Class I liquids are pumped, used or transferred. Design of ventilation systems shall consider the relatively high specific gravity of the vapors. Where <i>natural ventilation</i> is used, adequate openings in outside walls at floor level, unobstructed except by louvers or coarse screens, shall be provided. Where <i>natural ventilation</i> is inadequate, mechanical ventilation shall be provided.</p>	None

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502.9.5.5.2 Basements and pits. Class I liquids shall not be stored or used within a building having a basement or pit into which flammable vapors can travel, unless such area is provided with ventilation designed to prevent the accumulation of flammable vapors therein.	502.9.5.5.2 Basements and pits. Class I liquids shall not be stored or used within a building having a basement or pit into which flammable vapors can travel, unless such area is provided with ventilation designed to prevent the accumulation of flammable vapors therein.	None
502.9.5.5.3 Dispensing of Class I liquids. Containers of Class I liquids shall not be drawn from or filled within buildings unless a provision is made to prevent the accumulation of flammable vapors in hazardous concentrations. Where mechanical ventilation is required, it shall be kept in operation while flammable vapors could be present.	502.9.5.5.3 Dispensing of Class I liquids. Containers of Class I liquids shall not be drawn from or filled within buildings unless a provision is made to prevent the accumulation of flammable vapors in hazardous concentrations. Where mechanical ventilation is required, it shall be kept in operation while flammable vapors could be present.	None
502.9.6 Highly toxic and toxic liquids. Ventilation exhaust shall be provided for highly toxic and toxic liquids as required by Sections 502.9.6.1 and 502.9.6.2.	502.9.6 Highly toxic and toxic liquids. Ventilation exhaust shall be provided for highly toxic and toxic liquids as required by Sections 502.9.6.1 and 502.9.6.2.	None
502.9.6.1 Treatment system. This provision shall apply to indoor and outdoor storage and use of highly toxic and toxic liquids in amounts exceeding the maximum allowable quantities per control area. Exhaust scrubbers or other systems for processing vapors of highly toxic liquids shall be provided where a spill or accidental release of such liquids can be expected to release highly toxic vapors at normal temperature and pressure.	502.9.6.1 Treatment system. This provision shall apply to indoor and outdoor storage and use of highly toxic and toxic liquids in amounts exceeding the maximum allowable quantities per control area. Exhaust scrubbers or other systems for processing vapors of highly toxic liquids shall be provided where a spill or accidental release of such liquids can be expected to release highly toxic vapors at normal temperature and pressure.	None
502.9.6.2 Open and closed systems. Mechanical exhaust ventilation shall be provided for highly toxic and toxic liquids used in open systems in accordance with Section 502.8.4. Mechanical exhaust ventilation shall be provided for highly toxic and toxic liquids used in closed systems in accordance with Section 502.8.5. Exception: Liquids or solids that do not generate highly toxic or toxic fumes, mists or vapors.	502.9.6.2 Open and closed systems. Mechanical exhaust ventilation shall be provided for highly toxic and toxic liquids used in open systems in accordance with Section 502.8.4. Mechanical exhaust ventilation shall be provided for highly toxic and toxic liquids used in closed systems in accordance with Section 502.8.5. Exception: Liquids or solids that do not generate highly toxic or toxic fumes, mists or vapors.	None

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502.9.7 Highly toxic and toxic compressed gases—any quantity. Ventilation exhaust shall be provided for highly toxic and toxic compressed gases in any quantity as required by Sections 502.9.7.1 and 502.9.7.2.	502.9.7 Highly toxic and toxic compressed gases—any quantity. Ventilation exhaust shall be provided for highly toxic and toxic compressed gases in any quantity as required by Sections 502.9.7.1 and 502.9.7.2.	None
502.9.7.1 Gas cabinets. Gas cabinets containing highly toxic or toxic compressed gases in any quantity shall comply with Section 502.8.2 and the following requirements: 1. The average ventilation velocity at the face of gas cabinet access ports or windows shall be not less than 200 feet per minute (1.02 m/s) with a minimum velocity of 150 feet per minute (0.76 m/s) at any point at the access port or window. 2. Gas cabinets shall be connected to an exhaust system. 3. Gas cabinets shall not be used as the sole means of exhaust for any room or area.	502.9.7.1 Gas cabinets. Gas cabinets containing highly toxic or toxic compressed gases in any quantity shall comply with Section 502.8.2 and the following requirements: 1. The average ventilation velocity at the face of gas cabinet access ports or windows shall be not less than 200 feet per minute (1.02 m/s) with a minimum velocity of 150 feet per minute (0.76 m/s) at any point at the access port or window. 2. Gas cabinets shall be connected to an exhaust system. 3. Gas cabinets shall not be used as the sole means of exhaust for any room or area.	None
502.9.7.2 Exhausted enclosures. Exhausted enclosures containing highly toxic or toxic compressed gases in any quantity shall comply with Section 502.8.2 and the following requirements: 1. The average ventilation velocity at the face of the enclosure shall be not less than 200 feet per minute (1.02 m/s) with a minimum velocity of 150 feet per minute (0.76 m/s). 2. Exhausted enclosures shall be connected to an exhaust system. 3. Exhausted enclosures shall not be used as the sole means of exhaust for any room or area.	502.9.7.2 Exhausted enclosures. Exhausted enclosures containing highly toxic or toxic compressed gases in any quantity shall comply with Section 502.8.2 and the following requirements: 1. The average ventilation velocity at the face of the enclosure shall be not less than 200 feet per minute (1.02 m/s) with a minimum velocity of 150 feet per minute (0.76 m/s). 2. Exhausted enclosures shall be connected to an exhaust system. 3. Exhausted enclosures shall not be used as the sole means of exhaust for any room or area.	None
502.9.8 Highly toxic and toxic compressed gases—quantities exceeding the maximum allowable quantity per control area. Ventilation exhaust shall be provided for highly toxic and toxic compressed gases in amounts exceeding the maximum allowable quantities per control area as required by Sections 502.9.8.1 through 502.9.8.6.	502.9.8 Highly toxic and toxic compressed gases—quantities exceeding the maximum allowable quantity per control area. Ventilation exhaust shall be provided for highly toxic and toxic compressed gases in amounts exceeding the maximum allowable quantities per control area as required by Sections 502.9.8.1 through 502.9.8.6.	None

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502.9.8.1 Ventilated areas. The room or area in which indoor gas cabinets or exhausted enclosures are located shall be provided with exhaust ventilation. Gas cabinets or exhausted enclosures shall not be used as the sole means of exhaust for any room or area.	502.9.8.1 Ventilated areas. The room or area in which indoor gas cabinets or exhausted enclosures are located shall be provided with exhaust ventilation. Gas cabinets or exhausted enclosures shall not be used as the sole means of exhaust for any room or area.	None
502.9.8.2 Local exhaust for portable tanks. A means of local exhaust shall be provided to capture leakage from indoor and outdoor portable tanks. The local exhaust shall consist of portable ducts or collection systems designed to be applied to the site of a leak in a valve or fitting on the tank. The local exhaust system shall be located in a gas room. Exhaust shall be directed to a treatment system where required by the <i>International Fire Code</i> .	502.9.8.2 Local exhaust for portable tanks. A means of local exhaust shall be provided to capture leakage from indoor and outdoor portable tanks. The local exhaust shall consist of portable ducts or collection systems designed to be applied to the site of a leak in a valve or fitting on the tank. The local exhaust system shall be located in a gas room. Exhaust shall be directed to a treatment system where required by the <i>International Fire Code</i> .	None
502.9.8.3 Piping and controls—stationary tanks. Filling or dispensing connections on indoor stationary tanks shall be provided with a means of local exhaust. Such exhaust shall be designed to capture fumes and vapors. The exhaust shall be directed to a treatment system where required by the <i>International Fire Code</i> .	502.9.8.3 Piping and controls—stationary tanks. Filling or dispensing connections on indoor stationary tanks shall be provided with a means of local exhaust. Such exhaust shall be designed to capture fumes and vapors. The exhaust shall be directed to a treatment system where required by the <i>International Fire Code</i> .	None
502.9.8.4 Gas rooms. The ventilation system for gas rooms shall be designed to operate at a negative pressure in relation to the surrounding area. The exhaust ventilation from gas rooms shall be directed to an exhaust system.	502.9.8.4 Gas rooms. The ventilation system for gas rooms shall be designed to operate at a negative pressure in relation to the surrounding area. The exhaust ventilation from gas rooms shall be directed to an exhaust system.	None
502.9.8.5 Treatment system. The exhaust ventilation from gas cabinets, exhausted enclosures and gas rooms, and local exhaust systems required in Sections 502.9.8.2 and 502.9.8.3 shall be directed to a treatment system where required by the <i>International Fire Code</i> .	502.9.8.5 Treatment system. The exhaust ventilation from gas cabinets, exhausted enclosures and gas rooms, and local exhaust systems required in Sections 502.9.8.2 and 502.9.8.3 shall be directed to a treatment system where required by the <i>International Fire Code</i> .	None

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<p>502.9.8.6 Process equipment. Effluent from indoor and outdoor process <i>equipment</i> containing highly toxic or toxic compressed gases which could be discharged to the atmosphere shall be processed through an exhaust scrubber or other processing system. Such systems shall be in accordance with the <i>International Fire Code</i>.</p>	<p>502.9.8.6 Process equipment. Effluent from indoor and outdoor process <i>equipment</i> containing highly toxic or toxic compressed gases which could be discharged to the atmosphere shall be processed through an exhaust scrubber or other processing system. Such systems shall be in accordance with the <i>International Fire Code</i>.</p>	None
<p>502.9.9 Ozone gas generators. Ozone cabinets and ozone gas-generator rooms for systems having a maximum ozone-generating capacity of 1/2 pound (0.23 kg) or more over a 24-hour period shall be mechanically ventilated at a rate of not less than six air changes per hour. For cabinets, the average velocity of ventilation at <i>makeup air</i> openings with cabinet doors closed shall be not less than 200 feet per minute (1.02 m/s).</p>	<p>502.9.9 Ozone gas generators. Ozone cabinets and ozone gas-generator rooms for systems having a maximum ozone-generating capacity of 1/2 pound (0.23 kg) or more over a 24-hour period shall be mechanically ventilated at a rate of not less than six air changes per hour. For cabinets, the average velocity of ventilation at <i>makeup air</i> openings with cabinet doors closed shall be not less than 200 feet per minute (1.02 m/s).</p>	None
<p>502.9.10 LP-gas distribution facilities. LP-gas distribution facilities shall be ventilated in accordance with NFPA 58.</p>	<p>502.9.10 LP-gas distribution facilities. LP-gas distribution facilities shall be ventilated in accordance with NFPA 58.</p>	None
<p>502.9.10.1 Portable container use. Above-grade underfloor spaces or basements in which portable LPgas containers are used or are stored awaiting use or resale shall be provided with an <i>approved</i> means of ventilation. Exception: Department of Transportation (DOT) specification cylinders with a maximum water capacity of 2.5 pounds (1 kg) for use in completely self-contained hand torches and similar applications. The quantity of LP-gas shall not exceed 20 pounds (9 kg).</p>	<p>502.9.10.1 Portable container use. Above-grade underfloor spaces or basements in which portable LPgas containers are used or are stored awaiting use or resale shall be provided with an <i>approved</i> means of ventilation. Exception: Department of Transportation (DOT) specification cylinders with a maximum water capacity of 2.5 pounds (1 kg) for use in completely self-contained hand torches and similar applications. The quantity of LP-gas shall not exceed 20 pounds (9 kg).</p>	None
<p>502.9.11 Silane gas. Exhausted enclosures and gas cabinets for the indoor storage of silane gas in amounts exceeding the maximum allowable quantities per control area shall comply with Chapter 64 of the <i>International Fire Code</i>.</p>	<p>502.9.11 Silane gas. Exhausted enclosures and gas cabinets for the indoor storage of silane gas in amounts exceeding the maximum allowable quantities per control area shall comply with Chapter 64 of the <i>International Fire Code</i>.</p>	None

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<p>502.10 Hazardous production materials (HPM). Exhaust ventilation systems and materials for ducts utilized for the exhaust of HPM shall comply with this section, other applicable provisions of this code, the <i>International Building Code</i> and the <i>International Fire Code</i>.</p>	<p>502.10 Hazardous production materials (HPM). Exhaust ventilation systems and materials for ducts utilized for the exhaust of HPM shall comply with this section, other applicable provisions of this code, the <i>International Building Code</i> and the <i>International Fire Code</i>.</p>	None
<p>502.10.1 Where required. Exhaust ventilation systems shall be provided in the following locations in accordance with the requirements of this section and the <i>International Building Code</i></p>	<p>502.10.1 Where required. Exhaust ventilation systems shall be provided in the following locations in accordance with the requirements of this section and the <i>International Building Code</i>.</p>	None
<p>1. Fabrication areas: Exhaust ventilation for fabrication areas shall comply with the <i>International Building Code</i>. Additional manual control switches shall be provided where required by the code official.</p>	<p>1. Fabrication areas: Exhaust ventilation for fabrication areas shall comply with the <i>International Building Code</i>. Additional manual control switches shall be provided where required by the code official.</p>	None
<p>2. Workstations: A ventilation system shall be provided to capture and exhaust gases, fumes and vapors at workstations.</p>	<p>2. Workstations: A ventilation system shall be provided to capture and exhaust gases, fumes and vapors at workstations.</p>	None
<p>3. Liquid storage rooms: Exhaust ventilation for liquid storage rooms shall comply with Section 502.8.1.1 and the <i>International Building Code</i>.</p>	<p>3. Liquid storage rooms: Exhaust ventilation for liquid storage rooms shall comply with Section 502.8.1.1 and the <i>International Building Code</i>.</p>	None
<p>4. HPM rooms: Exhaust ventilation for HPM rooms shall comply with Section 502.8.1.1 and the <i>International Building Code</i>.</p>	<p>4. HPM rooms: Exhaust ventilation for HPM rooms shall comply with Section 502.8.1.1 and the <i>International Building Code</i>.</p>	None
<p>5. Gas cabinets: Exhaust ventilation for gas cabinets shall comply with Section 502.8.2. The gas cabinet ventilation system is allowed to connect to a workstation ventilation system. Exhaust ventilation for gas cabinets containing highly toxic or toxic gases shall also comply with Sections 502.9.7 and 502.9.8.</p>	<p>5. Gas cabinets: Exhaust ventilation for gas cabinets shall comply with Section 502.8.2. The gas cabinet ventilation system is allowed to connect to a workstation ventilation system. Exhaust ventilation for gas cabinets containing highly toxic or toxic gases shall also comply with Sections 502.9.7 and 502.9.8.</p>	None
<p>6. Exhausted enclosures: Exhaust ventilation for exhausted enclosures shall comply with Section 502.8.2. Exhaust ventilation for exhausted enclosures containing highly toxic or toxic gases shall also comply with Sections 502.9.7 and 502.9.8.</p>	<p>6. Exhausted enclosures: Exhaust ventilation for exhausted enclosures shall comply with Section 502.8.2. Exhaust ventilation for exhausted enclosures containing highly toxic or toxic gases shall also comply with Sections 502.9.7 and 502.9.8.</p>	None

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7. Gas rooms: Exhaust ventilation for gas rooms shall comply with Section 502.8.2. Exhaust ventilation for gas rooms containing highly toxic or toxic gases shall also comply with Sections 502.9.7 and 502.9.8.	7. Gas rooms: Exhaust ventilation for gas rooms shall comply with Section 502.8.2. Exhaust ventilation for gas rooms containing highly toxic or toxic gases shall also comply with Sections 502.9.7 and 502.9.8.	None
8. Cabinets containing pyrophoric liquids or Class 3 water-reactive liquids: Exhaust ventilation for cabinets in fabrication areas containing pyrophoric liquids shall be as required in Section 2705.2.3.4 of the <i>International Fire Code</i> .	8. Cabinets containing pyrophoric liquids or Class 3 water-reactive liquids: Exhaust ventilation for cabinets in fabrication areas containing pyrophoric liquids shall be as required in Section 2705.2.3.4 of the <i>International Fire Code</i> .	None
502.10.2 Penetrations. Exhaust ducts penetrating fire barriers constructed in accordance with Section 707 of the <i>International Building Code</i> or horizontal assemblies constructed in accordance with Section 711 of the <i>International Building Code</i> shall be contained in a shaft of equivalent fire-resistance-rated construction. Exhaust ducts shall not penetrate fire walls. Fire dampers shall not be installed in exhaust ducts.	502.10.2 Penetrations. Exhaust ducts penetrating fire barriers constructed in accordance with Section 707 of the <i>International Building Code</i> or horizontal assemblies constructed in accordance with Section 711 of the <i>International Building Code</i> shall be contained in a shaft of equivalent fire-resistance-rated construction. Exhaust ducts shall not penetrate fire walls. Fire dampers shall not be installed in exhaust ducts.	None
502.10.3 Treatment systems. Treatment systems for highly toxic and toxic gases shall comply with the <i>International Fire Code</i> .	502.10.3 Treatment systems. Treatment systems for highly toxic and toxic gases shall comply with the <i>International Fire Code</i> .	None
502.11 Motion picture projectors. Motion picture projectors shall be exhausted in accordance with Section 502.11.1 or 502.11.2.	502.11 Motion picture projectors. Motion picture projectors shall be exhausted in accordance with Section 502.11.1 or 502.11.2.	None
502.11.1 Projectors with an exhaust discharge. Projectors equipped with an exhaust discharge shall be directly connected to a mechanical exhaust system. The exhaust system shall operate at an exhaust rate as indicated by the manufacturer's installation instructions.	502.11.1 Projectors with an exhaust discharge. Projectors equipped with an exhaust discharge shall be directly connected to a mechanical exhaust system. The exhaust system shall operate at an exhaust rate as indicated by the manufacturer's installation instructions.	None

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<p>502.11.2 Projectors without exhaust connection. Projectors without an exhaust connection shall have contaminants exhausted through a mechanical exhaust system. The exhaust rate for electric arc projectors shall be a minimum of 200 cubic feet per minute (cfm) (0.09 m³/s) per lamp. The exhaust rate for xenon projectors shall be a minimum of 300 cfm (0.14 m³/s) per lamp. Xenon projector exhaust shall be at a rate such that the exterior temperature of the lamp housing does not exceed 130°F (54°C). The lamp and projection room exhaust systems, whether combined or independent, shall not be interconnected with any other exhaust or return system within the building.</p>	<p>502.11.2 Projectors without exhaust connection. Projectors without an exhaust connection shall have contaminants exhausted through a mechanical exhaust system. The exhaust rate for electric arc projectors shall be not less than 200 cubic feet per minute (cfm) (0.09 m³/s) per lamp. The exhaust rate for xenon projectors shall be not less than 300 cfm (0.14 m³/s) per lamp. Xenon projector exhaust shall be at a rate such that the exterior temperature of the lamp housing does not exceed 130°F (54°C). The lamp and projection room exhaust systems, whether combined or independent, shall not be interconnected with any other exhaust or return system within the building.</p>	None
<p>502.12 Organic coating processes. Enclosed structures involving organic coating processes in which Class I liquids are processed or handled shall be ventilated at a rate of not less than 1 cfm/ft² [0.00508 m³/(s □□m²)] of solid floor area. Ventilation shall be accomplished by exhaust fans that intake at floor levels and discharge to a safe location outside the structure. Noncontaminated intake air shall be introduced in such a manner that all portions of solid floor areas are provided with continuous uniformly distributed air movement.</p>	<p>502.12 Organic coating processes. Enclosed structures involving organic coating processes in which Class I liquids are processed or handled shall be ventilated at a rate of not less than 1 cfm/ft² [0.00508 m³/(s □□m²)] of solid floor area. Ventilation shall be accomplished by exhaust fans that intake at floor levels and discharge to a safe location outside the structure. Noncontaminated intake air shall be introduced in such a manner that all portions of solid floor areas are provided with continuous uniformly distributed air movement.</p>	None
<p>502.13 Public garages. Mechanical exhaust systems for public garages, as required in Chapter 4, shall operate continuously or in accordance with Section 404.</p>	<p>502.13 Public garages. Mechanical exhaust systems for public garages, as required in Chapter 4, shall operate continuously or in accordance with Section 404.</p>	None

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<p>502.14 Motor vehicle operation. In areas where motor vehicles operate, mechanical ventilation shall be provided in accordance with Section 403. Additionally, areas in which stationary motor vehicles are operated shall be provided with a <i>source capture system</i> that connects directly to the motor vehicle exhaust systems.</p> <p>Exceptions:</p> <ol style="list-style-type: none"> 1. This section shall not apply where the motor vehicles being operated or repaired are electrically powered. 2. This section shall not apply to one- and two-family dwellings. 3. This section shall not apply to motor vehicle service areas where engines are operated inside the building only for the duration necessary to move the motor vehicles in and out of the building. 	<p>502.14 Motor vehicle operation. In areas where motor vehicles operate, mechanical ventilation shall be provided in accordance with Section 403. Additionally, areas in which stationary motor vehicles are operated shall be provided with a <i>source capture system</i> that connects directly to the motor vehicle exhaust systems. Such system shall be engineered by a registered design professional or shall be factory-built equipment designed and sized for the purpose.</p> <p>Exceptions:</p> <ol style="list-style-type: none"> 1. This section shall not apply where the motor vehicles being operated or repaired are electrically powered. 2. This section shall not apply to one- and two-family dwellings. 3. This section shall not apply to motor vehicle service areas where engines are operated inside the building only for the duration necessary to move the motor vehicles in and out of the building. 	<p>Added requirement that source capture systems shall be engineered by a registered design professional or be factory -built for the purpose.</p>
<p>502.15 Repair garages. Where Class I liquids or LP-gas are stored or used within a building having a basement or pit wherein flammable vapors could accumulate, the basement or pit shall be provided with ventilation designed to prevent the accumulation of flammable vapors therein.</p>	<p>502.15 Repair garages. Where Class I liquids or LP-gas are stored or used within a building having a basement or pit wherein flammable vapors could accumulate, the basement or pit shall be provided with ventilation designed to prevent the accumulation of flammable vapors therein.</p>	<p>None</p>
<p>502.16 Repair garages for natural gas- and hydrogen-fueled vehicles. Repair garages used for the repair of natural gas- or hydrogen-fueled vehicles shall be provided with an <i>approved</i> mechanical ventilation system. The mechanical ventilation system shall be in accordance with Sections 502.16.1 and 502.16.2.</p> <p>Exception: Where <i>approved</i> by the code official, <i>natural ventilation</i> shall be permitted in lieu of mechanical ventilation.</p>	<p>502.16 Repair garages for natural gas- and hydrogen-fueled vehicles. Repair garages used for the repair of natural gas- or hydrogen-fueled vehicles shall be provided with an <i>approved</i> mechanical ventilation system. The mechanical ventilation system shall be in accordance with Sections 502.16.1 and 502.16.2.</p> <p>Exception: Where <i>approved</i> by the code official, <i>natural ventilation</i> shall be permitted in lieu of mechanical ventilation.</p>	<p>None</p>

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<p>502.16.1 Design. Indoor locations shall be ventilated utilizing air supply inlets and exhaust outlets arranged to provide uniform air movement to the extent practical. Inlets shall be uniformly arranged on exterior walls near floor level. Outlets shall be located at the high point of the room in exterior walls or the roof.</p> <p>Ventilation shall be by a continuous mechanical ventilation system or by a mechanical ventilation system activated by a continuously monitoring natural gas detection system, or for hydrogen, a continuously monitoring flammable gas detection system, each activating at a gas concentration of 25 percent of the lower flammable limit (LFL). In all cases, the system shall shut down the fueling system in the event of failure of the ventilation system.</p> <p>The ventilation rate shall be at least 1 cubic foot per minute per 12 cubic feet [0.00138 m³/(s • m³)] of room volume.</p>	<p>502.16.1 Design. Indoor locations shall be ventilated utilizing air supply inlets and exhaust outlets arranged to provide uniform air movement to the extent practical. Inlets shall be uniformly arranged on exterior walls near floor level. Outlets shall be located at the high point of the room in exterior walls or the roof.</p> <p>Ventilation shall be by a continuous mechanical ventilation system or by a mechanical ventilation system activated by a continuously monitoring natural gas detection system, or for hydrogen, a continuously monitoring flammable gas detection system, each activating at a gas concentration of 25 percent of the lower flammable limit (LFL). In all cases, the system shall shut down the fueling system in the event of failure of the ventilation system.</p> <p>The ventilation rate shall be not less than 1 cubic foot per minute per 12 cubic feet [0.00138 m³/(s • m³)] of room volume.</p>	None
<p>502.16.2 Operation. The mechanical ventilation system shall operate continuously.</p> <p>Exceptions:</p> <ol style="list-style-type: none"> 1. Mechanical ventilation systems that are interlocked with a gas detection system designed in accordance with the <i>International Fire Code</i>. 2. Mechanical ventilation systems in garages that are used only for the repair of vehicles fueled by liquid fuels or odorized gases, such as CNG, where the ventilation system is electrically interlocked with the lighting circuit. 	<p>502.16.2 Operation. The mechanical ventilation system shall operate continuously.</p> <p>Exceptions:</p> <ol style="list-style-type: none"> 1. Mechanical ventilation systems that are interlocked with a gas detection system designed in accordance with the <i>International Fire Code</i>. 2. Mechanical ventilation systems in garages that are used only for the repair of vehicles fueled by liquid fuels or odorized gases, such as CNG, where the ventilation system is electrically interlocked with the lighting circuit. 	None
<p>502.17 Tire rebuilding or recapping. Each room where rubber cement is used or mixed, or where flammable or combustible solvents are applied, shall be ventilated in accordance with the applicable provisions of NFPA 91.</p>	<p>502.17 Tire rebuilding or recapping. Each room where rubber cement is used or mixed, or where flammable or combustible solvents are applied, shall be ventilated in accordance with the applicable provisions of NFPA 91.</p>	None
<p>502.17.1 Buffing machines. Each buffing machine shall be connected to a dust-collecting system that prevents the accumulation of the dust produced by the buffing process.</p>	<p>502.17.1 Buffing machines. Each buffing machine shall be connected to a dust-collecting system that prevents the accumulation of the dust produced by the buffing process.</p>	None

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502.18 Specific rooms. Specific rooms, including bathrooms, locker rooms, smoking lounges and toilet rooms, shall be exhausted in accordance with the ventilation requirements of Chapter 4.	502.18 Specific rooms. Specific rooms, including bathrooms, locker rooms, smoking lounges and toilet rooms, shall be exhausted in accordance with the ventilation requirements of Chapter 4.	None
502.19 Indoor firing ranges. Ventilation shall be provided in an <i>approved</i> manner in areas utilized as indoor firing ranges. Ventilation shall be designed to protect employees and the public in accordance with DOL 29 CFR 1910.1025 where applicable.	502.19 Indoor firing ranges. Ventilation shall be provided in an <i>approved</i> manner in areas utilized as indoor firing ranges. Ventilation shall be designed to protect employees and the public in accordance with DOL 29 CFR 1910.1025 where applicable.	None
	502.20 Manicure and pedicure stations. Manicure and pedicure stations shall be provided with an exhaust system in accordance with Table 403.3.1.1, Note h. Manicure tables and pedicure stations not provided with factory-installed exhaust inlets shall be provided with exhaust inlets located not more than 12 inches (305 mm) horizontally and vertically from the point of chemical application.	New section specifying exhaust requirements for manicure and pedicure stations.
SECTION 503 - MOTORS AND FANS		
503.1 General. Motors and fans shall be sized to provide the required air movement. Motors in areas that contain flammable vapors or dusts shall be of a type <i>approved</i> for such environments. A manually operated remote control installed at an <i>approved</i> location shall be provided to shut off fans or blowers in flammable vapor or dust systems. Electrical <i>equipment</i> and appliances used in operations that generate explosive or flammable vapors, fumes or dusts shall be interlocked with the ventilation system so that the <i>equipment</i> and appliances cannot be operated unless the ventilation fans are in operation. Motors for fans used to convey flammable vapors or dusts shall be located outside the duct or shall be protected with <i>approved</i> shields and dustproofing. Motors and fans shall be provided with a means of access for servicing and maintenance.	503.1 General. Motors and fans shall be sized to provide the required air movement. Motors in areas that contain flammable vapors or dusts shall be of a type <i>approved</i> for such environments. A manually operated remote control installed at an <i>approved</i> location shall be provided to shut off fans or blowers in flammable vapor or dust systems. Electrical <i>equipment</i> and appliances used in operations that generate explosive or flammable vapors, fumes or dusts shall be interlocked with the ventilation system so that the <i>equipment</i> and appliances cannot be operated unless the ventilation fans are in operation. Motors for fans used to convey flammable vapors or dusts shall be located outside the duct or shall be protected with <i>approved</i> shields and dustproofing. Motors and fans shall be provided with a means of access for servicing and maintenance.	None

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<p>503.2 Fans. Parts of fans in contact with explosive or flammable vapors, fumes or dusts shall be of nonferrous or nonsparking materials, or their casing shall be lined or constructed of such material. When the size and hardness of materials passing through a fan are capable of producing a spark, both the fan and the casing shall be of nonsparking materials. When fans are required to be spark resistant, their bearings shall not be within the airstream, and all parts of the fan shall be grounded. Fans in systems-handling materials that are capable of clogging the blades, and fans in buffing or woodworking exhaust systems, shall be of the radial-blade or tube-axial type.</p>	<p>503.2 Fans. Parts of fans in contact with explosive or flammable vapors, fumes or dusts shall be of nonferrous or nonsparking materials, or their casing shall be lined or constructed of such material. Where the size and hardness of materials passing through a fan are capable of producing a spark, both the fan and the casing shall be of nonsparking materials. Where fans are required to be spark resistant, their bearings shall not be within the airstream, and all parts of the fan shall be grounded. Fans in systems-handling materials that are capable of clogging the blades, and fans in buffing or woodworking exhaust systems, shall be of the radial-blade or tube-axial type.</p>	None
<p>503.3 Equipment and appliance identification plate. <i>Equipment</i> and appliances used to exhaust explosive or flammable vapors, fumes or dusts shall bear an identification plate stating the ventilation rate for which the system was designed.</p>	<p>503.3 Equipment and appliance identification plate. <i>Equipment</i> and appliances used to exhaust explosive or flammable vapors, fumes or dusts shall bear an identification plate stating the ventilation rate for which the system was designed.</p>	None
<p>503.4 Corrosion-resistant fans. Fans located in systems conveying corrosives shall be of materials that are resistant to the corrosive or shall be coated with corrosion-resistant materials.</p>	<p>503.4 Corrosion-resistant fans. Fans located in systems conveying corrosives shall be of materials that are resistant to the corrosive or shall be coated with corrosion-resistant materials.</p>	None
SECTION 504 - CLOTHES DRYER EXHAUST	SECTION 504 - CLOTHES DRYER EXHAUST	
<p>504.1 Installation. Clothes dryers shall be exhausted in accordance with the manufacturer’s instructions. Dryer exhaust systems shall be independent of all other systems and shall convey the moisture and any products of <i>combustion</i> to the outside of the building. Exception: This section shall not apply to <i>listed</i> and <i>labeled</i> condensing (ductless) clothes dryers.</p>	<p>504.1 Installation. Clothes dryers shall be exhausted in accordance with the manufacturer’s instructions. Dryer exhaust systems shall be independent of all other systems and shall convey the moisture and any products of <i>combustion</i> to the outside of the building. Exception: This section shall not apply to <i>listed</i> and <i>labeled</i> condensing (ductless) clothes dryers.</p>	None

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<p>504.2 Exhaust penetrations. Where a clothes dryer exhaust duct penetrates a wall or ceiling membrane, the annular space shall be sealed with noncombustible material, <i>approved</i> fire caulking or a noncombustible dryer exhaust duct wall receptacle. Ducts that exhaust clothes dryers shall not penetrate or be located within any fireblocking, draftstopping or any wall, floor/ceiling or other assembly required by the <i>International Building Code</i> to be fire-resistance rated, unless such duct is constructed of galvanized steel or aluminum of the thickness specified in Section 603.4 and the fire-resistance rating is maintained in accordance with the <i>International Building Code</i>. Fire dampers, combination fire/smoke dampers and any similar devices that will obstruct the exhaust flow shall be prohibited in clothes dryer exhaust ducts.</p>	<p>504.2 Exhaust penetrations. Where a clothes dryer exhaust duct penetrates a wall or ceiling membrane, the annular space shall be sealed with noncombustible material, <i>approved</i> fire caulking or a noncombustible dryer exhaust duct wall receptacle. Ducts that exhaust clothes dryers shall not penetrate or be located within any fireblocking, draftstopping or any wall, floor/ceiling or other assembly required by the <i>International Building Code</i> to be fire-resistance rated, unless such duct is constructed of galvanized steel or aluminum of the thickness specified in Section 603.4 and the fire-resistance rating is maintained in accordance with the <i>International Building Code</i>. Fire dampers, combination fire/smoke dampers and any similar devices that will obstruct the exhaust flow shall be prohibited in clothes dryer exhaust ducts.</p>	None
<p>504.3 Cleanout. Each vertical riser shall be provided with a means for cleanout.</p>	<p>504.3 Cleanout. Each vertical riser shall be provided with a means for cleanout.</p>	None
<p>504.4 Exhaust installation. Dryer exhaust ducts for clothes dryers shall terminate on the outside of the building, shall not terminate within 3 feet of a ventilated section in a soffit, and shall be equipped with a back draft damper. Screens shall not be installed at the duct termination. Ducts shall not be connected or installed with sheet metal screws or other fasteners that will obstruct the exhaust flow. Clothes dryer exhaust ducts shall not be connected to a vent connector, vent, or chimney. Clothes dryer exhaust ducts shall not extend into or pass through ducts or plenums. R 408.30945a</p>	<p>504.4 Exhaust installation. Dryer exhaust ducts for clothes dryers shall terminate on the outside of the building, shall not terminate within 3 feet of a ventilated section in a soffit, and shall be equipped with a back draft damper. Screens shall not be installed at the duct termination. Ducts shall not be connected or installed with sheet metal screws or other fasteners that will obstruct the exhaust flow. Clothes dryer exhaust ducts shall not be connected to a vent connector, vent, or chimney. Clothes dryer exhaust ducts shall not extend into or pass through ducts or plenums. R 408.30945a</p>	None
	<p>504.5 Dryer exhaust duct power ventilators. Domestic dryer exhaust duct power ventilators shall be listed and labeled to UL 705 for use in dryer exhaust duct systems. The dryer exhaust duct power ventilator shall be installed in accordance with the manufacturer's instructions.</p>	New section addressing dryer exhaust duct power ventilators.

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504.5 Makeup air. Installations exhausting more than 200 cfm (0.09m ³ /s) shall be provided with <i>makeup air</i> . Where a closet is designed for the installation of a clothes dryer, an opening having an area of not less than 100 square inches (0.0645 m ²) shall be provided in the closet enclosure or <i>makeup air</i> shall be provided by other <i>approved</i> means.	504.6 Makeup air. Installations exhausting more than 200 cfm (0.09 m ³ /s) shall be provided with <i>makeup air</i> . Where a closet is designed for the installation of a clothes dryer, an opening having an area of not less than 100 square inches (0.0645 m ²) shall be provided in the closet enclosure or <i>makeup air</i> shall be provided by other <i>approved</i> means.	None
	504.7 Protection required. Protective shield plates shall be placed where nails or screws from finish or other work are likely to penetrate the clothes dryer exhaust duct. Shield plates shall be placed on the finished face of all framing members where there is less than 1 ¹ / ₄ inches (32 mm) between the duct and the finished face of the framing member. Protective shield plates shall be constructed of steel, have a thickness of 0.062 inch (1.6 mm) and extend not less than 2 inches (51 mm) above sole plates and below top plates.	Changed order. Formerly §504.6.7
504.6 Domestic clothes dryer ducts. Exhaust ducts for domestic clothes dryers shall conform to the requirements of Sections 504.6.1 through 504.6.7.	504.8 Domestic clothes dryer ducts. Exhaust ducts for domestic clothes dryers shall conform to the requirements of Sections 504.8.1 through 504.8.6	None
504.6.1 Material and size. Exhaust ducts shall have a smooth interior finish and shall be constructed of metal a minimum 0.016 inch (0.4 mm) thick. The exhaust duct size shall be 4 inches (102 mm) nominal in diameter.	504.8.1 Material and size. Exhaust ducts shall have a smooth interior finish and shall be constructed of metal a minimum 0.016 inch (0.4 mm) thick. The exhaust duct size shall be 4 inches (102 mm) nominal in diameter.	None
504.6.2 Duct installation. Exhaust ducts shall be supported at 4-foot (1219 mm) intervals and secured in place. The insert end of the duct shall extend into the adjoining duct or fitting in the direction of airflow. Ducts shall not be joined with screws or similar fasteners that protrude into the inside of the duct.	504.8.2 Duct installation. Dryer exhaust ducts shall be supported at 4-foot (1,219 mm) intervals and secured in place. The insert end of the duct shall extend into the adjoining duct or fitting in the direction of airflow. Ducts shall not be joined with screws or similar fasteners that protrude into the inside of the duct. R 408.30945a	None
504.6.3 Transition ducts. Transition ducts used to connect the dryer to the exhaust duct system shall be a single length that is <i>listed</i> and <i>labeled</i> in accordance with UL 2158A. Transition ducts shall be a maximum of 8 feet (2438 mm) in	504.8.3 Transition ducts. Transition ducts used to connect the dryer to the exhaust duct system shall be a single length that is <i>listed</i> and <i>labeled</i> in accordance with UL 2158A. Transition ducts shall be not greater than 8 feet (2438 mm) in length and shall not be concealed within construction.	Minor wording changes

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504.6.4 Duct length. The maximum allowable exhaust duct length shall be determined by one of the methods specified in Section 504.6.4.1 or 504.6.4.2.	504.8.4 Duct length. The maximum allowable exhaust duct length shall be determined by one of the methods specified in Sections 504.8.4.1 through 504.8.4.3.	Changed referenced section numbers.																																				
504.6.4.1 Specified length. The maximum length of the exhaust duct shall be 35 feet (10 668 mm) from the connection to the transition duct from the dryer to the outlet terminal. Where fittings are used, the maximum length of the exhaust duct shall be reduced in accordance with Table 504.6.4.1.	504.8.4.1 Specified length. The maximum length of the exhaust duct shall be 35 feet (10 668 mm) from the connection to the transition duct from the dryer to the outlet terminal. Where fittings are used, the maximum length of the exhaust duct shall be reduced in accordance with Table 504.8.4.1.	None																																				
<p>TABLE 504.6.4.1 DRYER EXHAUST DUCT FITTING EQUIVALENT LENGTH</p> <table border="1"> <thead> <tr> <th>DRYER EXHAUST DUCT FITTING TYPE</th> <th>EQUIVALENT LENGTH</th> </tr> </thead> <tbody> <tr> <td>4" radius mitered 45-degree elbow</td> <td>2 feet 6 inches</td> </tr> <tr> <td>4" radius mitered 90-degree elbow</td> <td>5 feet</td> </tr> <tr> <td>6" radius smooth 45-degree elbow</td> <td>1 foot</td> </tr> <tr> <td>6" radius smooth 90-degree elbow</td> <td>1 foot 9 inches</td> </tr> <tr> <td>8" radius smooth 45-degree elbow</td> <td>1 foot</td> </tr> <tr> <td>8" radius smooth 90-degree elbow</td> <td>1 foot 7 inches</td> </tr> <tr> <td>10" radius smooth 45-degree elbow</td> <td>9 inches</td> </tr> <tr> <td>10" radius smooth 90-degree elbow</td> <td>1 foot 6 inches</td> </tr> </tbody> </table> <p>For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 degree = 0.0175 rad.</p>	DRYER EXHAUST DUCT FITTING TYPE	EQUIVALENT LENGTH	4" radius mitered 45-degree elbow	2 feet 6 inches	4" radius mitered 90-degree elbow	5 feet	6" radius smooth 45-degree elbow	1 foot	6" radius smooth 90-degree elbow	1 foot 9 inches	8" radius smooth 45-degree elbow	1 foot	8" radius smooth 90-degree elbow	1 foot 7 inches	10" radius smooth 45-degree elbow	9 inches	10" radius smooth 90-degree elbow	1 foot 6 inches	<p>TABLE 504.8.4.1 DRYER EXHAUST DUCT FITTING EQUIVALENT LENGTH</p> <table border="1"> <thead> <tr> <th>DRYER EXHAUST DUCT FITTING TYPE</th> <th>EQUIVALENT LENGTH</th> </tr> </thead> <tbody> <tr> <td>4" radius mitered 45-degree elbow</td> <td>2 feet 6 inches</td> </tr> <tr> <td>4" radius mitered 90-degree elbow</td> <td>5 feet</td> </tr> <tr> <td>6" radius smooth 45-degree elbow</td> <td>1 foot</td> </tr> <tr> <td>6" radius smooth 90-degree elbow</td> <td>1 foot 9 inches</td> </tr> <tr> <td>8" radius smooth 45-degree elbow</td> <td>1 foot</td> </tr> <tr> <td>8" radius smooth 90-degree elbow</td> <td>1 foot 7 inches</td> </tr> <tr> <td>10" radius smooth 45-degree elbow</td> <td>9 inches</td> </tr> <tr> <td>10" radius smooth 90-degree elbow</td> <td>1 foot 6 inches</td> </tr> </tbody> </table> <p>For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 degree = 0.0175 rad.</p>	DRYER EXHAUST DUCT FITTING TYPE	EQUIVALENT LENGTH	4" radius mitered 45-degree elbow	2 feet 6 inches	4" radius mitered 90-degree elbow	5 feet	6" radius smooth 45-degree elbow	1 foot	6" radius smooth 90-degree elbow	1 foot 9 inches	8" radius smooth 45-degree elbow	1 foot	8" radius smooth 90-degree elbow	1 foot 7 inches	10" radius smooth 45-degree elbow	9 inches	10" radius smooth 90-degree elbow	1 foot 6 inches	None
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504.6.4.2 Manufacturer's instructions. The maximum length of the exhaust duct shall be determined by the dryer manufacturer's installation instructions. The code official shall be provided with a copy of the installation instructions for the make and model of the dryer. Where the exhaust duct is to be concealed, the installation instructions shall be provided to the code official prior to the concealment inspection. In the absence of fitting equivalent length calculations from the clothes dryer manufacturer, Table 504.6.4.1 shall be used.	504.8.4.2 Manufacturer's instructions. The maximum length of the exhaust duct shall be determined by the dryer manufacturer's installation instructions. The code official shall be provided with a copy of the installation instructions for the make and model of the dryer. Where the exhaust duct is to be concealed, the installation instructions shall be provided to the code official prior to the concealment inspection. In the absence of fitting equivalent length calculations from the clothes dryer manufacturer, Table 504.8.4.1 shall be used.	Changed referenced Table number.																																				

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	504.8.4.3 Dryer exhaust duct power ventilator length. The maximum length of the exhaust duct shall be determined by the dryer exhaust duct power ventilator manufacturer’s installation instructions.	New section addressing dryer exhaust duct power ventilators.
504.6.5 Length identification. Where the exhaust duct is concealed within the building construction, the equivalent length of the exhaust duct shall be identified on a permanent label or tag. The label or tag shall be located within 6 feet (1829 mm) of the exhaust duct connection.	504.8.5 Length identification. Where the exhaust duct equivalent length exceeds 35 feet (10 668 mm), the equivalent length of the exhaust duct shall be identified on a permanent label or tag. The label or tag shall be located within 6 feet (1829 mm) of the exhaust duct connection.	Changed to require label or tag only on exhaust ducts greater than 35ft.
504.6.6 Exhaust duct required. Where space for a clothes dryer is provided, an exhaust duct system shall be installed. Where the clothes dryer is not installed at the time of occupancy, the exhaust duct shall be capped at the location of the future dryer. Exception: Where a <i>listed</i> condensing clothes dryer is installed prior to occupancy of structure.	504.8.6 Exhaust duct required. Where space for a clothes dryer is provided, an exhaust duct system shall be installed. Where the clothes dryer is not installed at the time of occupancy, the exhaust duct shall be capped at the location of the future dryer. Exception: Where a <i>listed</i> condensing clothes dryer is installed prior to occupancy of structure.	None
504.6.7 Protection required. Protective shield plates shall be placed where nails or screws from finish or other work are likely to penetrate the clothes dryer exhaust duct. Shield plates shall be placed on the finished face of all framing members where there is less than 1¼ inches (32 mm) between the duct and the finished face of the framing member. Protective shield plates shall be constructed of steel, have a thickness of 0.062 inch (1.6 mm) and extend a minimum of 2 inches (51 mm) above sole plates and below top plates.		None. Moved to §504.7

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<p>504.7 Commercial clothes dryers. The installation of dryer exhaust ducts serving commercial clothes dryers shall comply with the <i>appliance</i> manufacturer’s installation instructions. Exhaust fan motors installed in exhaust systems shall be located outside of the airstream. In multiple installations, the fan shall operate continuously or be interlocked to operate when any individual unit is operating. Ducts shall have a minimum <i>clearance</i> of 6 inches (152 mm) to combustible materials. Clothes dryer transition ducts used to connect the <i>appliance</i> to the exhaust duct system shall be limited to single lengths not to exceed 8 feet (2438 mm) in length and shall be <i>listed</i> and <i>labeled</i> for the application. Transition ducts shall not be concealed within construction.</p>	<p>504.9 Commercial clothes dryers. The installation of dryer exhaust ducts serving commercial clothes dryers shall comply with the <i>appliance</i> manufacturer’s installation instructions. Exhaust fan motors installed in exhaust systems shall be located outside of the airstream. In multiple installations, the fan shall operate continuously or be interlocked to operate when any individual unit is operating. Ducts shall have a minimum <i>clearance</i> of 6 inches (152 mm) to combustible materials. Clothes dryer transition ducts used to connect the <i>appliance</i> to the exhaust duct system shall be limited to single lengths not to exceed 8 feet (2438 mm) in length and shall be <i>listed</i> and <i>labeled</i> for the application. Transition ducts shall not be concealed within construction.</p>	None
<p>504.8 Common exhaust systems for clothes dryers located in multistory structures. Where a common multistory duct system is designed and installed to convey exhaust from multiple clothes dryers, the system shall be engineered by a registered design professional and installed in accordance with the Michigan building codes. R 408.30945a</p>	<p>504.10 Common exhaust systems for clothes dryers located in multistory structures. When a common multistory duct system is designed and installed to convey exhaust from multiple clothes dryers, the system shall be engineered by a registered design professional and installed in accordance with the Michigan building construction codes. R 408.30945a</p>	None
<p>SECTION 505 DOMESTIC KITCHEN EXHAUST EQUIPMENT</p>	<p>SECTION 505 DOMESTIC KITCHEN EXHAUST EQUIPMENT</p>	
<p>505.1 Domestic systems. Where domestic range hoods and domestic appliances equipped with downdraft exhaust are located within dwelling units, such hoods and appliances shall discharge to the outdoors through sheet metal ducts constructed of galvanized steel, stainless steel, aluminum or copper. Such ducts shall have smooth inner walls, shall be air tight, shall be equipped with a backdraft damper, and shall be independent of all other exhaust systems.</p>	<p>505.1 Domestic systems. Where domestic range hoods and domestic appliances equipped with downdraft exhaust are provided, such hoods and appliances shall discharge to the outdoors through sheet metal ducts constructed of galvanized steel, stainless steel, aluminum or copper. Such ducts shall have smooth inner walls, shall be air tight, shall be equipped with a backdraft damper, and shall be independent of all other exhaust systems.</p>	Minor wording changes

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<p>Exceptions: 1. Where installed in accordance with the manufacturer’s installation instructions and where mechanical or <i>natural ventilation</i> is otherwise provided in accordance with Chapter 4, <i>listed</i> and <i>labeled</i> ductless range hoods shall not be required to discharge to the outdoors.</p>	<p>Exceptions: 1. In other than Group I-1 and I-2, where installed in accordance with the manufacturer’s instructions and where mechanical or natural ventilation is otherwise provided in accordance with Chapter 4, listed and labeled ductless range hoods shall not be required to discharge to the outdoors.</p>	Excludes Group I-1 and I-2 from exceptions.
<p>2. Ducts for domestic kitchen cooking appliances equipped with downdraft exhaust systems shall be permitted to be constructed of Schedule 40 PVC pipe and fittings provided that the installation complies with all of the following: 2.1. The duct shall be installed under a concrete slab poured on grade. 2.2. The underfloor trench in which the duct is installed shall be completely backfilled with sand or gravel. 2.3. The PVC duct shall extend not more than 1 inch (25 mm) above the indoor concrete floor surface. 2.4. The PVC duct shall extend not more than 1 inch (25 mm) above grade outside of the building. 2.5. The PVC ducts shall be solvent cemented.</p>	<p>2. Ducts for domestic kitchen cooking appliances equipped with downdraft exhaust systems shall be permitted to be constructed of Schedule 40 PVC pipe and fittings provided that the installation complies with all of the following: 2.1. The duct shall be installed under a concrete slab poured on grade. 2.2. The underfloor trench in which the duct is installed shall be completely backfilled with sand or gravel. 2.3. The PVC duct shall extend not more than 1 inch (25 mm) above the indoor concrete floor surface. 2.4. The PVC duct shall extend not more than 1 inch (25 mm) above grade outside of the building. 2.5. The PVC ducts shall be solvent cemented.</p>	None
<p>505.2 Makeup air required. Exhaust hood systems capable of exhausting in excess of 400 cfm (0.19 m³/s) shall be provided with <i>makeup air</i> at a rate approximately equal to the <i>exhaust air</i> rate. Such <i>makeup air</i> systems shall be equipped with a means of closure and shall be automatically controlled to start and operate simultaneously with the exhaust system.</p>	<p>505.2 Makeup air required. Exhaust hood systems capable of exhausting in excess of 400 cfm (0.19 m³/s) shall be provided with <i>makeup air</i> at a rate approximately equal to the <i>exhaust air</i> rate. Such <i>makeup air</i> systems shall be equipped with a means of closure and shall be automatically controlled to start and operate simultaneously with the exhaust system.</p>	None

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	<p>505.3 Common exhaust systems for domestic kitchens located in multistory structures. When a common multistory duct system is designed and installed to convey exhaust from multiple domestic kitchens, the system shall be engineered by a registered design professional and installed in accordance with the Michigan building construction codes. R 408.30945a</p>	New section requiring engineered exhaust systems for multiple domestic kitchens exhausting to a common multistory duct system.
	<p>505.4 Other than Group R. In other than Group R occupancies, where domestic cooking appliances are utilized for domestic purposes, such appliances shall be provided with domestic range hoods. Hoods and exhaust systems shall be in accordance with Sections 505.1 and 505.2</p>	New section requiring domestic range hoods in other than Group R occupancies, where domestic cooking appliances are utilized for domestic purposes.
<p>SECTION 506 COMMERCIAL KITCHEN HOOD VENTILATION SYSTEM DUCTS AND EXHAUST EQUIPMENT</p>	<p>SECTION 506 COMMERCIAL KITCHEN HOOD VENTILATION SYSTEM DUCTS AND EXHAUST EQUIPMENT</p>	
<p>506.1 Ventilation requirements for commercial kitchens. Commercial kitchen hood ventilation ducts and exhaust equipment shall be in compliance with NFPA-96-2011, the standard of the national fire protection association listed in chapter 15. R 408.30935a</p>	<p>506.1 Ventilation requirements for commercial kitchens. Commercial kitchen hood ventilation ducts and exhaust equipment shall be in compliance with NFPA-96-2014, which is the standard of the national fire protection association listed in Chapter 15 of the code. R 408.30935a</p>	Updates reference from NFPA-96-2011 to NFPA-96-2014
<p>506.2 Corrosion protection. Ducts exposed to the outside atmosphere or subject to a corrosive environment shall be protected against corrosion in an <i>approved</i> manner.</p>	<p>506.2 Corrosion protection. Ducts exposed to the outside atmosphere or subject to a corrosive environment shall be protected against corrosion in an <i>approved</i> manner.</p>	None

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506.3 Ducts serving Type I hoods. Type I exhaust ducts shall be independent of all other exhaust systems except as provided in Section 506.3.5. Commercial kitchen duct systems serving Type I hoods shall be designed, constructed and installed in accordance with Sections 506.3.1 through 506.3.13.3.	506.3 Ducts serving Type I hoods. Type I exhaust ducts shall be independent of all other exhaust systems except as provided in Section 506.3.5. Commercial kitchen duct systems serving Type I hoods shall be designed, constructed and installed in accordance with Sections 506.3.1 through 506.3.13.3.	None
506.3.1 Duct materials. Ducts serving Type I hoods shall be constructed of materials in accordance with Sections 506.3.1.1 and 506.3.1.2.	506.3.1 Duct materials. Ducts serving Type I hoods shall be constructed of materials in accordance with Sections 506.3.1.1 and 506.3.1.2.	None
506.3.1.1 Grease duct materials. Grease ducts serving Type I hoods shall be constructed of steel having a minimum thickness of 0.0575 inch (1.463 mm) (No. 16 gage) or stainless steel not less than 0.0450 inch (1.14 mm) (No. 18 gage) in thickness. Exception: Factory-built commercial kitchen grease ducts <i>listed</i> and <i>labeled</i> in accordance with UL 1978 and installed in accordance with Section 304.1.	506.3.1.1 Grease duct materials. Grease ducts serving Type I hoods shall be constructed of steel having a minimum thickness of 0.0575 inch (1.463 mm) (No. 16 gage) or stainless steel not less than 0.0450 inch (1.14 mm) (No. 18 gage) in thickness. Exception: Factory-built commercial kitchen grease ducts <i>listed</i> and <i>labeled</i> in accordance with UL 1978 and installed in accordance with Section 304.1.	None
506.3.1.2 Makeup air ducts. Makeup air ducts connecting to or within 18 inches (457 mm) of a Type I hood shall be constructed and installed in accordance with Sections 603.1, 603.3, 603.4, 603.9, 603.10 and 603.12. Duct insulation installed within 18 inches (457 mm) of a Type I hood shall be noncombustible or shall be <i>listed</i> for the application.	506.3.1.2 Makeup air ducts. Makeup air ducts connecting to or within 18 inches (457 mm) of a Type I hood shall be constructed and installed in accordance with Sections 603.1, 603.3, 603.4, 603.9, 603.10 and 603.12. Duct insulation installed within 18 inches (457 mm) of a Type I hood shall be noncombustible or shall be <i>listed</i> for the application.	None

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<p>506.3.2 Joints, seams and penetrations of grease ducts. Joints, seams and penetrations of grease ducts shall be made with a continuous liquid-tight weld or braze made on the external surface of the duct system.</p> <p>Exceptions:</p> <ol style="list-style-type: none"> 1. Penetrations shall not be required to be welded or brazed where sealed by devices that are <i>listed</i> for the application. 2. Internal welding or brazing shall not be prohibited provided that the joint is formed or ground smooth and is provided with ready access for inspection. 3. Factory-built commercial kitchen grease ducts <i>listed</i> and <i>labeled</i> in accordance with UL 1978 and installed in accordance with Section 304.1. 	<p>506.3.2 Joints, seams and penetrations of grease ducts. Joints, seams and penetrations of grease ducts shall be made with a continuous liquid-tight weld or braze made on the external surface of the duct system.</p> <p>Exceptions:</p> <ol style="list-style-type: none"> 1. Penetrations shall not be required to be welded or brazed where sealed by devices that are <i>listed</i> for the application. 2. Internal welding or brazing shall not be prohibited provided that the joint is formed or ground smooth and is provided with ready access for inspection. 3. Factory-built commercial kitchen grease ducts <i>listed</i> and <i>labeled</i> in accordance with UL 1978 and installed in accordance with Section 304.1. 	None
<p>506.3.2.1 Duct joint types. Duct joints shall be butt joints, welded flange joints with a maximum flange depth of 1/2 inch (12.7 mm) or overlapping duct joints of either the telescoping or bell type. Overlapping joints shall be installed to prevent ledges and obstructions from collecting grease or interfering with gravity drainage to the intended collection point. The difference between the inside cross-sectional dimensions of overlapping sections of duct shall not exceed 1/4 inch (6 mm). The length of overlap for overlapping duct joints shall not exceed 2 inches (51 mm).</p>	<p>506.3.2.1 Duct joint types. Duct joints shall be butt joints, welded flange joints with a maximum flange depth of 1/2 inch (12.7 mm) or overlapping duct joints of either the telescoping or bell type. Overlapping joints shall be installed to prevent ledges and obstructions from collecting grease or interfering with gravity drainage to the intended collection point. The difference between the inside cross-sectional dimensions of overlapping sections of duct shall not exceed 1/4 inch (6.4 mm). The length of overlap for overlapping duct joints shall not exceed 2 inches (51 mm).</p>	None

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<p>506.3.2.2 Duct-to-hood joints. Duct-to-hood joints shall be made with continuous internal or external liquid-tight welded or brazed joints. Such joints shall be smooth, accessible for inspection, and without grease traps.</p> <p>Exceptions: This section shall not apply to:</p> <p>1. A vertical duct-to-hood collar connection made in the top plane of the hood in accordance with all of the following:</p> <p>1.1. The hood duct opening shall have a 1-inch-deep (25 mm), full perimeter, welded flange turned down into the hood interior at an angle of 90 degrees (1.57 rad) from the plane of the opening.</p> <p>1.2. The duct shall have a 1-inch-deep (25 mm) flange made by a 1-inch by 1-inch (25 mm by 25 mm) angle iron welded to the full perimeter of the duct not less than 1 inch (25 mm) above the bottom end of the duct.</p> <p>1.3. A gasket rated for use at not less than 1,500°F (815°C) is installed between the duct flange and the top of the hood.</p> <p>1.4. The duct-to-hood joint shall be secured by stud bolts not less than 1/4 inch (6.4 mm) in diameter welded to the hood with a spacing not greater than 4 inches (102 mm) on center for the full perimeter of the opening. All bolts and nuts are to be secured with lockwashers.</p> <p>2. <i>Listed</i> and <i>labeled</i> duct-to-hood collar connections installed in accordance with Section 304.1.</p>	<p>506.3.2.2 Duct-to-hood joints. Duct-to-hood joints shall be made with continuous internal or external liquid-tight welded or brazed joints. Such joints shall be smooth, accessible for inspection, and without grease traps.</p> <p>Exceptions: This section shall not apply to:</p> <p>1. A vertical duct-to-hood collar connection made in the top plane of the hood in accordance with all of the following:</p> <p>1.1. The hood duct opening shall have a 1-inch-deep (25 mm), full perimeter, welded flange turned down into the hood interior at an angle of 90 degrees (1.57 rad) from the plane of the opening.</p> <p>1.2. The duct shall have a 1-inch-deep (25 mm) flange made by a 1-inch by 1-inch (25 mm by 25 mm) angle iron welded to the full perimeter of the duct not less than 1 inch (25 mm) above the bottom end of the duct.</p> <p>1.3. A gasket rated for use at not less than 1500°F (816°C) is installed between the duct flange and the top of the hood.</p> <p>1.4. The duct-to-hood joint shall be secured by stud bolts not less than 1/4 inch (6.4 mm) in diameter welded to the hood with a spacing not greater than 4 inches (102 mm) on center for the full perimeter of the opening. The bolts and nuts shall be secured with lockwashers.</p> <p>2. <i>Listed</i> and <i>labeled</i> duct-to-hood collar connections installed in accordance with Section 304.1.</p>	<p>Minor change to exception 1.3 -- changed "1,500°F (815°C)" to "1500°F (816°C)"</p>
<p>506.3.2.3 Duct-to-exhaust fan connections. Duct-to-exhaust fan connections shall be flanged and gasketed at the base of the fan for vertical discharge fans; shall be flanged, gasketed and bolted to the inlet of the fan for side-inlet utility fans; and shall be flanged, gasketed and bolted to the inlet and outlet of the fan for in-line fans. Gasket and sealing materials shall be rated for continuous duty at a temperature of not less than 1500°F (816°C).</p>	<p>506.3.2.3 Duct-to-exhaust fan connections. Duct-to-exhaust fan connections shall be flanged and gasketed at the base of the fan for vertical discharge fans; shall be flanged, gasketed and bolted to the inlet of the fan for side-inlet utility fans; and shall be flanged, gasketed and bolted to the inlet and outlet of the fan for in-line fans. Gasket and sealing materials shall be rated for continuous duty at a temperature of not less than 1500°F (816°C).</p>	<p>None</p>

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<p>506.3.2.4 Vibration isolation. A vibration isolation connector for connecting a duct to a fan shall consist of noncombustible packing in a metal sleeve joint of <i>approved</i> design or shall be a coated-fabric flexible duct connector <i>listed</i> and <i>labeled</i> for the application. Vibration isolation connectors shall be installed only at the connection of a duct to a fan inlet or outlet.</p>	<p>506.3.2.4 Vibration isolation. A vibration isolation connector for connecting a duct to a fan shall consist of noncombustible packing in a metal sleeve joint of <i>approved</i> design or shall be a coated-fabric flexible duct connector <i>listed</i> and <i>labeled</i> for the application. Vibration isolation connectors shall be installed only at the connection of a duct to a fan inlet or outlet.</p>	None
<p>506.3.2.5 Grease duct test. Prior to the use or concealment of any portion of a grease duct system, a leakage test shall be performed. Ducts shall be considered to be concealed where installed in shafts or covered by coatings or wraps that prevent the ductwork from being visually inspected on all sides. The permit holder shall be responsible to provide the necessary <i>equipment</i> and perform the grease duct leakage test. A light test shall be performed to determine that all welded and brazed joints are liquid tight. A light test shall be performed by passing a lamp having a power rating of not less than 100 watts through the entire section of ductwork to be tested. The lamp shall be open so as to emit light equally in all directions perpendicular to the duct walls. A test shall be performed for the entire duct system, including the hood-to-duct connection. The duct work shall be permitted to be tested in sections, provided that every joint is tested. For <i>listed</i> factory-built grease ducts, this test shall be limited to duct joints assembled in the field and shall exclude factory welds.</p>	<p>506.3.2.5 Grease duct test. Prior to the use or concealment of any portion of a grease duct system, a leakage test shall be performed. Ducts shall be considered to be concealed where installed in shafts or covered by coatings or wraps that prevent the ductwork from being visually inspected on all sides. The permit holder shall be responsible to provide the necessary <i>equipment</i> and perform the grease duct leakage test. A light test shall be performed to determine that all welded and brazed joints are liquid tight. A light test shall be performed by passing a lamp having a power rating of not less than 100 watts through the entire section of ductwork to be tested. The lamp shall be open so as to emit light equally in all directions perpendicular to the duct walls. A test shall be performed for the entire duct system, including the hood-to-duct connection. The duct work shall be permitted to be tested in sections, provided that every joint is tested. For <i>listed</i> factory-built grease ducts, this test shall be limited to duct joints assembled in the field and shall exclude factory welds.</p>	None
<p>506.3.3 Grease duct supports. Grease duct bracing and supports shall be of noncombustible material securely attached to the structure and designed to carry gravity and seismic loads within the stress limitations of the <i>International Building Code</i>. Bolts, screws, rivets and other mechanical fasteners shall not penetrate duct walls</p>	<p>506.3.3 Grease duct supports. Grease duct bracing and supports shall be of noncombustible material securely attached to the structure and designed to carry gravity and seismic loads within the stress limitations of the <i>International Building Code</i>. Bolts, screws, rivets and other mechanical fasteners shall not penetrate duct walls.</p>	None

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<p>506.3.4 Air velocity. Grease duct systems serving a Type I hood shall be designed and installed to provide an air velocity within the duct system of not less than 500 feet per minute (2.5 m/s).</p> <p>Exception: The velocity limitations shall not apply within duct transitions utilized to connect ducts to differently sized or shaped openings in hoods and fans, provided that such transitions do not exceed 3 feet (914 mm) in length and are designed to prevent the trapping of grease.</p>	<p>506.3.4 Air velocity. Grease duct systems serving a Type I hood shall be designed and installed to provide an air velocity within the duct system of not less than 500 feet per minute (2.5 m/s).</p> <p>Exception: The velocity limitations shall not apply within duct transitions utilized to connect ducts to differently sized or shaped openings in hoods and fans, provided that such transitions do not exceed 3 feet (914 mm) in length and are designed to prevent the trapping of grease.</p>	None
<p>506.3.5 Separation of grease duct system. A separate grease duct system shall be provided for each Type I hood. A separate grease duct system is not required where all of the following conditions are met:</p> <ol style="list-style-type: none"> 1. All interconnected hoods are located within the same story. 2. All interconnected hoods are located within the same room or in adjoining rooms. 3. Interconnecting ducts do not penetrate assemblies required to be fire-resistance rated. 4. The grease duct system does not serve solid-fuel fired appliances. 	<p>506.3.5 Separation of grease duct system. A separate grease duct system shall be provided for each Type I hood. A separate grease duct system is not required where all of the following conditions are met:</p> <ol style="list-style-type: none"> 1. All interconnected hoods are located within the same story. 2. All interconnected hoods are located within the same room or in adjoining rooms. 3. Interconnecting ducts do not penetrate assemblies required to be fire-resistance rated. 4. The grease duct system does not serve solid-fuel fired appliances. 	None
<p>506.3.6 Grease duct clearances. Grease duct systems and exhaust equipment serving a type I hood shall have clearances to combustibles as required by NFPA 96-2011, as listed in chapter 15.</p> <p>Exception: Listed and labeled factory-built commercial kitchen grease ducts and exhaust equipment installed in accordance with section 304.1 of the code.</p> <p>R 408.30935a</p>	<p>506.3.6 Grease duct clearances. Grease duct systems and exhaust equipment serving a Type I hood shall have clearances to combustibles as required by NFPA-96-2014, as listed in Chapter 15 of the code.</p> <p>Exception: Listed and labeled factory-built commercial kitchen grease ducts and exhaust equipment installed in accordance with Section 304.1 of the code.</p> <p>R 408.30935a</p>	Updates reference from NFPA 96-2011 to NFPA-96-2014

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<p>506.3.7 Prevention of grease accumulation in grease ducts. Duct systems serving a Type I hood shall be constructed and installed so that grease cannot collect in any portion thereof, and the system shall slope not less than one-fourth unit vertical in 12 units horizontal (2-percent slope) toward the hood or toward a grease reservoir designed and installed in accordance with Section 506.3.7.1. Where horizontal ducts exceed 75 feet (22 860 mm) in length, the slope shall be not less than one unit vertical in 12 units horizontal (8.3 percent slope).</p>	<p>506.3.7 Prevention of grease accumulation in grease ducts. Duct systems serving a Type I hood shall be constructed and installed so that grease cannot collect in any portion thereof, and the system shall slope not less than one-fourth unit vertical in 12 units horizontal (2-percent slope) toward the hood or toward a grease reservoir designed and installed in accordance with Section 506.3.7.1. Where horizontal ducts exceed 75 feet (22 860 mm) in length, the slope shall be not less than one unit vertical in 12 units horizontal (8.3-percent slope).</p>	None
<p>506.3.7.1 Grease reservoirs. Grease reservoirs shall:</p> <ol style="list-style-type: none"> 1. Be constructed as required for the grease duct they serve. 2. Be located on the bottom of the horizontal duct or the bottommost section of the duct riser. 3. Have a length and width of not less than 12 inches (305 mm). Where the grease duct is less than 12 inches (305 mm) in a dimension, the reservoir shall be not more than 2 inches (51 mm) smaller than the duct in that dimension. 4. Have a depth of not less than 1 inch (25.4 mm). 5. Have a bottom that is sloped to a point for drainage. 6. Be provided with a cleanout opening constructed in accordance with Section 506.3.8 and installed to provide direct access to the reservoir. The cleanout opening shall be located on a side or on top of the duct so as to permit cleaning of the reservoir. 7. Be installed in accordance with the manufacturer’s instructions where manufactured devices are utilized. 	<p>506.3.7.1 Grease duct reservoirs. Grease duct reservoirs shall:</p> <ol style="list-style-type: none"> 1. Be constructed as required for the grease duct they serve. 2. Be located on the bottom of the horizontal duct or the bottommost section of the duct riser. 3. Extend across the full width of the duct and have a length of not less than 12 inches (305 mm). 4. Have a depth of not less than 1 inch (25 mm). 5. Have a bottom that slopes to a drain. 6. Be provided with a cleanout opening constructed in accordance with Section 506.3.8 and installed to provide direct access to the reservoir. The cleanout opening shall be located on a side or on top of the duct so as to permit cleaning of the reservoir. 7. Be installed in accordance with the manufacturer’s instructions where manufactured devices are utilized. 	Requires reservoirs to extend the full duct width. Minor wording changes and clarifications.

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<p>506.3.8 Grease duct cleanouts and openings. Grease duct cleanouts and openings shall comply with all of the following:</p> <ol style="list-style-type: none"> 1. Grease ducts shall not have openings except where required for the operation and maintenance of the system. 2. Sections of grease ducts that are inaccessible from the hood or discharge openings shall be provided with cleanout openings. 3. Cleanouts and openings shall be equipped with tight-fitting doors constructed of steel having a thickness not less than that required for the duct. 4. Cleanout doors shall be installed liquid tight. 5. Door assemblies including any frames and gaskets shall be approved for the application and shall not have fasteners that penetrate the duct. 6. Gasket and sealing materials shall be rated for not less than 1500°F (816°C). 7. Listed door assemblies shall be installed in accordance with the manufacturer’s instructions. 	<p>506.3.8 Grease duct cleanouts and openings. Grease duct cleanouts and openings shall comply with all of the following:</p> <ol style="list-style-type: none"> 1. Grease ducts shall not have openings except where required for the operation and maintenance of the system. 2. Sections of grease ducts that are inaccessible from the hood or discharge openings shall be provided with cleanout openings spaced not more than 20 feet (6096 mm) apart and not more than 10 feet (3048 mm) from changes in direction greater than 45 degrees (0.79 rad). 3. Cleanouts and openings shall be equipped with tight-fitting doors constructed of steel having a thickness not less than that required for the duct. 4. Cleanout doors shall be installed liquid tight. 5. Door assemblies including any frames and gaskets shall be approved for the application and shall not have fasteners that penetrate the duct. 6. Gasket and sealing materials shall be rated for not less than 1500°F (816°C). 7. Listed door assemblies shall be installed in accordance with the manufacturer’s instructions. 	<p>Adds requirement for spacing of cleanout openings for grease ducts inaccessible from hood or discharge openings.</p>
<p>506.3.8.1 Personnel entry. Where ductwork is large enough to allow entry of personnel, not less than one <i>approved or listed</i> opening having dimensions not less than 22 inches by 20 inches (559 mm by 508 mm) shall be provided in the horizontal sections, and in the top of vertical risers. Where such entry is provided, the duct and its supports shall be capable of supporting the additional load, and the cleanouts specified in Section 506.3.8 are not required.</p>	<p>506.3.8.1 Personnel entry. Where ductwork is large enough to allow entry of personnel, not less than one <i>approved or listed</i> opening having dimensions not less than 22 inches by 20 inches (559 mm by 508 mm) shall be provided in the horizontal sections, and in the top of vertical risers. Where such entry is provided, the duct and its supports shall be capable of supporting the additional load, and the cleanouts specified in Section 506.3.8 are not required.</p>	<p>None</p>

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<p>506.3.8.2 Cleanouts serving in-line fans. A cleanout shall be provided for both the inlet side and outlet side of an in-line fan except where a duct does not connect to the fan. Such cleanouts shall be located within 3 feet (914 mm) of the fan duct connections.</p>	<p>506.3.8.2 Cleanouts serving in-line fans. A cleanout shall be provided for both the inlet side and outlet side of an in-line fan except where a duct does not connect to the fan. Such cleanouts shall be located within 3 feet (914 mm) of the fan duct connections.</p>	None
<p>506.3.9 Grease duct horizontal cleanouts. Cleanouts serving horizontal sections of grease ducts shall:</p> <ol style="list-style-type: none"> 1. Be spaced not more than 20 feet (6096 mm) apart. 2. Be located not more than 10 feet (3048 mm) from changes in direction that are greater than 45 degrees (.79 rad). 3. Be located on the bottom only where other locations are not available and shall be provided with internal damming of the opening such that grease will flow past the opening without pooling. Bottom cleanouts and openings shall be approved for the application and installed liquid-tight. 4. Not be closer than 1 inch (25.4 mm) from the edges of the duct. 5. Have opening dimensions of not less than 12 inches by 12 inches (305 mm by 305 mm). Where such dimensions preclude installation, the opening shall be not less than 12 inches (305 mm) on one side and shall be large enough to provide access for cleaning and maintenance. 6. Shall be located at grease reservoirs. 	<p>506.3.9 Grease duct horizontal cleanouts. Cleanouts serving horizontal sections of grease ducts shall:</p> <ol style="list-style-type: none"> 1. Be spaced not more than 20 feet (6096 mm) apart. 2. Be located not more than 10 feet (3048 mm) from changes in direction that are greater than 45 degrees (0.79 rad). 3. Be located on the bottom only where other locations are not available and shall be provided with internal damming of the opening such that grease will flow past the opening without pooling. Bottom cleanouts and openings shall be approved for the application and installed liquid-tight. 4. Not be closer than 1 inch (25 mm) from the edges of the duct. 5. Have opening dimensions of not less than 12 inches by 12 inches (305 mm by 305 mm). Where such dimensions preclude installation, the opening shall be not less than 12 inches (305 mm) on one side and shall be large enough to provide access for cleaning and maintenance. 6. Shall be located at grease reservoirs. 	None

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<p>506.3.10 Underground grease duct installation. Underground grease duct installations shall comply with all of the following:</p> <ol style="list-style-type: none"> 1. Underground grease ducts shall be constructed of steel having a minimum thickness of 0.0575 inch (1.463 mm) (No. 16 gage) and shall be coated to provide protection from corrosion or shall be constructed of stainless steel having a minimum thickness of 0.0450 inch (1.140 mm) (No. 18 gage). 2. The underground duct system shall be tested and approved in accordance with Section 506.3.2.5 prior to coating or placement in the ground. 3. The underground duct system shall be completely encased in concrete with a minimum thickness of 4 inches (102 mm). 4. Ducts shall slope toward grease reservoirs. 5. A grease reservoir with a cleanout to allow cleaning of the reservoir shall be provided at the base of each vertical duct riser. 6. Cleanouts shall be provided with access to permit cleaning and inspection of the duct in accordance with Section 506.3. 7. Cleanouts in horizontal ducts shall be installed on the topside of the duct. 8. Cleanout locations shall be legibly identified at the point of access from the interior space. 	<p>506.3.10 Underground grease duct installation. Underground grease duct installations shall comply with all of the following:</p> <ol style="list-style-type: none"> 1. Underground grease ducts shall be constructed of steel having a minimum thickness of 0.0575 inch (1.463 mm) (No. 16 gage) and shall be coated to provide protection from corrosion or shall be constructed of stainless steel having a minimum thickness of 0.0450 inch (1.140 mm) (No. 18 gage). 2. The underground duct system shall be tested and approved in accordance with Section 506.3.2.5 prior to coating or placement in the ground. 3. The underground duct system shall be completely encased in concrete with a minimum thickness of 4 inches (102 mm). 4. Ducts shall slope toward grease reservoirs. 5. A grease reservoir with a cleanout to allow cleaning of the reservoir shall be provided at the base of each vertical duct riser. 6. Cleanouts shall be provided with access to permit cleaning and inspection of the duct in accordance with Section 506.3. 7. Cleanouts in horizontal ducts shall be installed on the topside of the duct. 8. Cleanout locations shall be legibly identified at the point of access from the interior space. 	None

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<p>506.3.11 Grease duct enclosures. A grease duct serving a Type I hood that penetrates a ceiling, wall, floor or any concealed spaces shall be enclosed from the point of penetration to the outlet terminal. A duct shall penetrate exterior walls only at locations where unprotected openings are permitted by the <i>International Building Code</i>. The duct enclosure shall serve a single grease duct and shall not contain other ducts, piping or wiring systems. Duct enclosures shall be either field-applied or factory-built. Duct enclosures shall have a fire-resistance rating of not less than that of the assembly penetrated and not less than 1 hour. Duct enclosures shall be as prescribed by Section 506.3.10.1, 506.3.10.2 or 506.3.10.3.</p>	<p>506.3.11 Grease duct enclosures. A <i>commercial kitchen</i> grease duct serving a Type I hood that penetrates a ceiling, wall, floor or any concealed space shall be enclosed from the point of penetration to the outlet terminal. <i>In-line exhaust fans not located outdoors shall be enclosed as required for grease ducts.</i> A duct shall penetrate exterior walls only at locations where unprotected openings are permitted by the <i>International Building Code</i>. The duct enclosure shall serve a single grease duct and shall not contain other ducts, piping or wiring systems. Duct enclosures shall be <i>a shaft enclosure in accordance with Section 506.3.11.1</i>, a field-applied enclosure <i>assembly in accordance with Section 506.3.11.2</i> or a factory-built <i>enclosure assembly in accordance with Section 506.3.11.3</i>. Duct enclosures shall have a fire-resistance rating of not less than that of the assembly penetrated and not less than 1 hour. <i>Fire dampers and smoke dampers shall not be installed in grease ducts.</i> <i>Exception: A duct enclosure shall not be required for a grease duct that penetrates only a nonfire-resistance rated roof/ceiling assembly.</i></p>	<p>See highlighted text.</p>
<p>506.3.11.1 Shaft enclosure. Commercial kitchen grease ducts constructed in accordance with Section 506.3.1 shall be permitted to be enclosed in accordance with the <i>International Building Code</i> requirements for shaft construction. Such grease duct systems and exhaust <i>equipment</i> shall have a <i>clearance</i> to combustible construction of not less than 18 inches (457 mm), and shall have a <i>clearance</i> to noncombustible construction and gypsum wallboard attached to noncombustible structures of not less than 6 inches (76 mm). Duct enclosures shall be sealed around the duct at the point of penetration and vented to the outside of the building through the use of weather-protected openings.</p>	<p>506.3.11.1 Shaft enclosure. Grease ducts constructed in accordance with Section 506.3.1 shall be permitted to be enclosed in accordance with the <i>International Building Code</i> requirements for shaft construction. Such grease duct systems and exhaust <i>equipment</i> shall have a <i>clearance</i> to combustible construction of not less than 18 inches (457 mm), and shall have a <i>clearance</i> to noncombustible construction and gypsum wallboard attached to noncombustible structures of not less than 6 inches (76 mm). Duct enclosures shall be sealed around the duct at the point of penetration and vented to the outside of the building through the use of weather-protected openings.</p>	<p>Expands duct enclosure and clearance requirements to all grease ducts constructed in accordance with Section 506.3.1.</p>

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<p>506.3.11.2 Field-applied grease duct enclosure. Commercial kitchen grease ducts constructed in accordance with Section 506.3.1 shall be enclosed by field-applied grease duct enclosure that is a listed and labeled material, system, product, or method of construction specifically evaluated for such purpose in accordance with ASTM E 2336.</p> <p>The surface of the duct shall be continuously covered on all sides from the point at which the duct originates to the outlet terminal. Duct penetrations shall be protected with a through-penetration fire-stop system classified in accordance with ASTM E 814 or UL 1497 and having a “F” and “T” rating equal to the fire-resistance rating of the assembly being penetrated. Such systems shall be installed in accordance with the listing and the manufacturer’s installation instructions. Partial application of a field-applied grease duct enclosure system shall not be installed for the sole purpose of reducing clearances to combustibles at isolated sections of grease duct. Exposed duct-wrap systems shall be protected where subject to physical damage.</p>	<p>506.3.11.2 Field-applied grease duct enclosure. Grease ducts constructed in accordance with Section 506.3.1 shall be enclosed by a <i>listed</i> and <i>labeled</i> field-applied grease duct enclosure material, systems, product, or method of construction specifically evaluated for such purpose in accordance with ASTM E 2336.</p> <p>The surface of the duct shall be continuously covered on all sides from the point at which the duct originates to the outlet terminal. Duct penetrations shall be protected with a through-penetration firestop system tested and <i>listed</i> in accordance with ASTM E 814 or UL 1479 and having a “F” and “T” rating equal to the fire-resistance rating of the assembly being penetrated. The grease duct enclosure and firestop system shall be installed in accordance with the listing and the manufacturer’s instructions. Partial application of a field-applied grease duct enclosure shall not be installed for the sole purpose of reducing clearances to combustibles at isolated sections of grease duct. Exposed duct-wrap systems shall be protected where subject to physical damage.</p>	Expands requirements all grease ducts constructed in accordance with §506.3.
<p>506.3.11.3 Factory-built grease duct assemblies. Factory-built grease duct assemblies incorporating integral enclosure materials shall be <i>listed</i> and <i>labeled</i> for use as commercial kitchen grease duct assemblies in accordance with UL 2221. Duct penetrations shall be protected with a through-penetration firestop system classified in accordance with ASTM E 814 or UL 1479 and having an “F” and “T” rating equal to the fire-resistance rating of the assembly being penetrated. Such assemblies shall be installed in accordance with the listing and the manufacturer’s installation instructions.</p>	<p>506.3.11.3 Factory-built grease duct enclosure assemblies. Factory-built grease ducts incorporating integral enclosure materials shall be <i>listed</i> and <i>labeled</i> for use as grease duct enclosure assemblies specifically evaluated for such purpose in accordance with UL 2221. Duct penetrations shall be protected with a through-penetration firestop system tested and <i>listed</i> in accordance with ASTM E 814 or UL 1479 and having an “F” and “T” rating equal to the fire-resistance rating of the assembly being penetrated. The grease duct enclosure assembly and firestop system shall be installed in accordance with the listing and the manufacturer’s instructions.</p>	Minor clarifications

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506.3.11.4 Duct enclosure not required. A duct enclosure shall not be required for a grease duct that penetrates only a nonfire-resistance-rated roof/ceiling assembly.		Moved to §506.3.11
506.3.12 Grease duct fire-resistive access opening. Where cleanout openings are located in ducts within a fire-resistance-rated enclosure, access openings shall be provided in the enclosure at each cleanout point. Access openings shall be equipped with tight-fitting sliding or hinged doors that are equal in fire-resistive protection to that of the shaft or enclosure. An <i>approved</i> sign shall be placed on access opening panels with wording as follows: “ACCESS PANEL. DO NOT OBSTRUCT.”	506.3.12 Grease duct fire-resistive access opening. Where cleanout openings are located in ducts within a fire-resistance-rated enclosure, access openings shall be provided in the enclosure at each cleanout point. Access openings shall be equipped with tight-fitting sliding or hinged doors that are equal in fire-resistive protection to that of the shaft or enclosure. An <i>approved</i> sign shall be placed on access opening panels with wording as follows: “ACCESS PANEL. DO NOT OBSTRUCT.”	None
506.3.13 Exhaust outlets serving Type I hoods. Exhaust outlets for grease ducts serving Type I hoods shall conform to the requirements of Sections 506.3.13.1 through 506.3.13.3.	506.3.13 Exhaust outlets serving Type I hoods. Exhaust outlets for grease ducts serving Type I hoods shall conform to the requirements of Sections 506.3.13.1 through 506.3.13.3.	None
506.3.13.1 Termination above the roof. Exhaust outlets that terminate above the roof shall have the discharge opening located not less than 40 inches (1016 mm) above the roof surface.	506.3.13.1 Termination above the roof. Exhaust outlets that terminate above the roof shall have the discharge opening located not less than 40 inches (1016 mm) above the roof surface.	None
506.3.13.2 Termination through an exterior wall. Exhaust outlets shall be permitted to terminate through exterior walls where the smoke, grease, gases, vapors and odors in the discharge from such terminations do not create a public nuisance or a fire hazard. Such terminations shall not be located where protected openings are required by the <i>International Building Code</i> . Other exterior openings shall not be located within 3 feet (914 mm) of such terminations.	506.3.13.2 Termination through an exterior wall. Exhaust outlets shall be permitted to terminate through exterior walls where the smoke, grease, gases, vapors and odors in the discharge from such terminations do not create a public nuisance or a fire hazard. Such terminations shall not be located where protected openings are required by the <i>International Building Code</i> . Other exterior openings shall not be located within 3 feet (914 mm) of such terminations.	None

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<p>506.3.13.3 Termination location. Exhaust outlets shall be located not less than 10 feet (3048 mm) horizontally from parts of the same or contiguous buildings, adjacent buildings and adjacent property lines and shall be located not less than 10 feet (3048 mm) above the adjoining grade level. Exhaust outlets shall be located not less than 10 feet (3048 mm) horizontally from or not less than 3 feet (914 mm) above air intake openings into any building.</p> <p>Exception: Exhaust outlets shall terminate not less than 5 feet (1524 mm) horizontally from parts of the same or contiguous building, an adjacent building, adjacent property line and air intake openings into a building where air from the exhaust outlet discharges away from such locations.</p>	<p>506.3.13.3 Termination location. Exhaust outlets shall be located not less than 10 feet (3048 mm) horizontally from parts of the same or contiguous buildings, adjacent buildings and adjacent property lines and shall be located not less than 10 feet (3048 mm) above the adjoining grade level. Exhaust outlets shall be located not less than 10 feet (3048 mm) horizontally from or not less than 3 feet (914 mm) above air intake openings into any building.</p> <p>Exception: Exhaust outlets shall terminate not less than 5 feet (1524 mm) horizontally from parts of the same or contiguous building, an adjacent building, adjacent property line and air intake openings into a building where air from the exhaust outlet discharges away from such locations.</p>	None
<p>506.4 Ducts serving Type II hoods. Commercial kitchen exhaust systems serving Type II hoods shall comply with Sections 506.4.1 and 506.4.2.</p>	<p>506.4 Ducts serving Type II hoods. Commercial kitchen exhaust systems serving Type II hoods shall comply with Sections 506.4.1 and 506.4.2.</p>	None
<p>506.4.1 Ducts. Ducts and plenums serving Type II hoods shall be constructed of rigid metallic materials. Duct construction, installation, bracing and supports shall comply with Chapter 6. Ducts subject to positive pressure and ducts conveying moisture-laden or waste-heat-laden air shall be constructed, joined and sealed in an <i>approved</i> manner.</p>	<p>506.4.1 Ducts. Ducts and plenums serving Type II hoods shall be constructed of rigid metallic materials. Duct construction, installation, bracing and supports shall comply with Chapter 6. Ducts subject to positive pressure and ducts conveying moisture-laden or waste-heat-laden air shall be constructed, joined and sealed in an <i>approved</i> manner.</p>	None

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<p>506.4.2 Type II terminations. Exhaust outlets serving Type II hoods shall terminate in accordance with the hood manufacturer’s installation instructions and shall comply with all of the following:</p> <ol style="list-style-type: none"> 1. Exhaust outlets shall terminate not less than 3 feet (914 mm) in any direction from openings into the building. 2. Outlets shall terminate not less than 10 feet (3048 mm) from property lines or buildings on the same lot. 3. Outlets shall terminate not less than 10 feet (3048 mm) above grade. 4. Outlets that terminate above a roof shall terminate not less than 30 inches (762 mm) above the roof surface. 5. Outlets shall terminate not less than 30 inches (762 mm) from exterior vertical walls 6. Outlets shall be protected against local weather conditions. 7. Outlets shall not be directed onto walkways. 8. Outlets shall meet the provisions for exterior wall opening protectives in accordance with the International Building Code. 	<p>506.4.2 Type II terminations. Exhaust outlets serving Type II hoods shall terminate in accordance with the hood manufacturer’s installation instructions and shall comply with all of the following:</p> <ol style="list-style-type: none"> 1. Exhaust outlets shall terminate not less than 3 feet (914 mm) in any direction from openings into the building. 2. Outlets shall terminate not less than 10 feet (3048 mm) from property lines or buildings on the same lot. 3. Outlets shall terminate not less than 10 feet (3048 mm) above grade. 4. Outlets that terminate above a roof shall terminate not less than 30 inches (762 mm) above the roof surface. 5. Outlets shall terminate not less than 30 inches (762 mm) from exterior vertical walls 6. Outlets shall be protected against local weather conditions. 7. Outlets shall not be directed onto walkways. 8. Outlets shall meet the provisions for exterior wall opening protectives in accordance with the <i>International Building Code</i>. 	None
<p>506.5 Exhaust equipment. Exhaust equipment, including fans and grease reservoirs, shall comply with Sections 506.5.1 through 506.5.5 and shall be of an approved design or shall be listed for the application.</p>	<p>506.5 Exhaust equipment. Exhaust <i>equipment</i>, including fans and grease reservoirs, shall comply with Sections 506.5.1 through 506.5.5 and shall be of an <i>approved</i> design or shall be <i>listed</i> for the application.</p>	None
<p>506.5.1 Exhaust fans. Exhaust fan housings serving a Type I hood shall be constructed as required for grease ducts in accordance with Section 506.3.1.1. Exception: Fans listed and labeled in accordance with UL 762.</p>	<p>506.5.1 Exhaust fans. Exhaust fan housings serving a Type I hood shall be constructed as required for grease ducts in accordance with Section 506.3.1.1. Exception: Fans <i>listed</i> and <i>labeled</i> in accordance with UL 762.</p>	None
<p>506.5.1.1 Fan motor. Exhaust fan motors shall be located outside of the exhaust airstream.</p>	<p>506.5.1.1 Fan motor. Exhaust fan motors shall be located outside of the exhaust airstream.</p>	None

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	506.5.1.2 In-line fan location. Where enclosed duct systems are connected to in-line fans not located outdoors, the fan shall be located in a room or space having the same fire-resistance rating as the duct enclosure. Access shall be provided for servicing and cleaning of fan components. Such rooms or spaces shall be ventilated in accordance with the fan manufacturer’s installation instructions.	New section specifying location of, access to, and ventilation for in-line fans connected to duct systems.
506.5.2 Exhaust fan discharge. Exhaust fans shall be positioned so that the discharge will not impinge on the roof, other equipment or appliances or parts of the structure. A vertical discharge fan shall be manufactured with an approved drain outlet at the lowest point of the housing to permit drainage of grease to an approved grease reservoir.	506.5.2 Exhaust fan discharge. Exhaust fans shall be positioned so that the discharge will not impinge on the roof, other <i>equipment</i> or appliances or parts of the structure. A vertical discharge fan shall be manufactured with an <i>approved</i> drain outlet at the lowest point of the housing to permit drainage of grease to an <i>approved</i> grease reservoir.	None
506.5.3 Exhaust fan mounting. An upblast fan shall be hinged and supplied with a flexible weatherproof electrical cable to permit inspection and cleaning. The ductwork shall extend a minimum of 18 inches (457 mm) above the roof surface.	506.5.3 Exhaust fan mounting. Up-blast fans serving Type I hoods and installed in a vertical or horizontal position shall be hinged, supplied with a flexible weatherproof electrical cable to permit inspection and cleaning and shall be equipped with a means of restraint to limit the swing of the fan on its hinge. The ductwork shall extend not less than 18 inches (457 mm) above the roof surface.	Limits requirement for hinging up-blast fans to those serving Type I hoods.
506.5.4 Clearances. Exhaust equipment serving a Type I hood shall have a clearance to combustible construction of not less than 18 inches (457 mm). Exception: Factory-built exhaust equipment installed in accordance with Section 304.1 and listed for a lesser clearance.	506.5.4 Clearances. Exhaust <i>equipment</i> serving a Type I hood shall have a <i>clearance</i> to combustible construction of not less than 18 inches (457 mm). Exception: Factory-built exhaust <i>equipment</i> installed in accordance with Section 304.1 and <i>listed</i> for a lesser <i>clearance</i> .	None
506.5.5 Termination location. The outlet of exhaust equipment serving Type I hoods shall be in accordance with Section 506.3.13. Exception: The minimum horizontal distance between vertical discharge fans and parapet-type building structures shall be 2 feet (610 mm) provided that such structures are not higher than the top of the fan discharge opening.	506.5.5 Termination location. The outlet of exhaust <i>equipment</i> serving Type I hoods shall be in accordance with Section 506.3.13. Exception: The minimum horizontal distance between vertical discharge fans and parapet-type building structures shall be 2 feet (610 mm) provided that such structures are not higher than the top of the fan discharge opening.	None

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SECTION 507 COMMERCIAL KITCHEN HOODS	SECTION 507 COMMERCIAL KITCHEN HOODS	
507.1 General. Commercial kitchen exhaust hoods shall comply with the requirements of this section and NFPA 96-2011, as listed in chapter 15. Hoods shall be type I or type II and shall be designed to capture and confine cooking vapors and residues.	507.1 General. Commercial kitchen exhaust hoods shall comply with the requirements of this subrule and NFPA 96-2014. Hoods shall be Type I or Type II and shall be designed to capture and confine cooking vapors and residues. A Type I or Type II hood shall be installed at or above all commercial cooking appliances in accordance with Sections 507.2 and 507.3 of the code. When a cooking appliance under a single hood requires a Type I hood, a Type I hood shall be installed. When a Type II hood is required, a Type I or Type II hood shall be installed. When a Type I hood is installed, the installation of the entire system, including the hood, ducts, exhaust equipment, and makeup air system, shall comply with the requirements of Sections 506, 507, 508, and 509 of the code.	Updates NFPA reference to 96-2014. Includes requirement of former §507.2.
Exceptions:	Exceptions:	
1. Factory-built commercial exhaust hoods which are tested in accordance with UL 710-2007, as listed in chapter 15, listed, labeled, and installed in accordance with section 304.1 shall not be required to comply with sections 507.4, 507.7, 507.11, 507.12, 507.13, 507.14, and 507.15 of the code.	1. Factory-built commercial exhaust hoods that are listed and labeled in accordance with UL 710, and installed in accordance with Section 304.1 of the code, shall not be required to comply with Sections 507.1.5, 507.2.3, 507.2.5, 507.2.8, 507.3.1, 507.3.3, 507.4, and 507.5 of the code.	Minor wording changes
2. Factory-built commercial cooking recirculating systems which are tested in accordance with UL 710B-2011, as listed in chapter 15, listed, labeled, and installed in accordance with section 304.1 of the code shall not be required to comply with sections 507.4, 507.5, 507.7, 507.12, 507.13, 507.14, and 507.15 of the code. Spaces in which these systems are located shall be considered to be kitchens and shall be ventilated in accordance with table 403.3. For the purpose of determining the floor area required to be ventilated, each individual appliance shall be considered as occupying not less than 100 square feet.	2. Factory-built commercial cooking recirculating systems that are listed and labeled in accordance with UL 710B and installed in accordance with Section 304.1 of the code, shall not be required to comply with Sections 507.1.5, 507.2.3, 507.2.5, 507.2.8, 507.3.1, 507.3.3, 507.4, and 507.5 of the code. Spaces in which these systems are located shall be considered kitchens and shall be ventilated in accordance with Table 403.3.1.1. For the purpose of determining the floor area required to be ventilated, each appliance shall be considered as occupying not less than 100 square feet (9.3 m ²).	Minor wording changes

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<p>3. Net exhaust volumes for hoods may be reduced during no-load cooking conditions, where engineered or listed multi-speed or variable-speed controls automatically operate the exhaust system to maintain, capture and removal of cooking effluents as required. Reduced volumes shall not be below that required to maintain, capture, and remove effluents from the idle cooking appliances that are operating in a standby mode. R 408.30935a</p>	<p>3. When cooking appliances are equipped with integral down-draft exhaust systems and these appliances and exhaust systems are listed and labeled for the application in accordance with NFPA 96-2014, a hood shall not be required at or above these appliances. R 408.30935a</p>	<p>Deletes exception allowing flow reductions during no-load cooking conditions and adds exception for cooking appliances with integral down-draft exhaust systems.</p>
<p>507.2 Where required. A Type I or Type II hood shall be installed at or above all <i>commercial cooking appliances</i> in accordance with Sections 507.2.1 and 507.2.2. Where any cooking <i>appliance</i> under a single hood requires a Type I hood, a Type I hood shall be installed. Where a Type II hood is required, a Type I or Type II hood shall be installed. Exception: Where cooking appliances are equipped with integral down-draft exhaust systems and such appliances and exhaust systems are listed and labeled for the application in accordance with NFPA 96, a hood shall not be required at or above them.</p>		<p>Requirements moved to 507.1.</p>
<p>507.2.1 Type I hoods. Type I hoods shall be installed where cooking <i>appliances</i> produce grease or smoke as a result of the cooking process. Type I hoods shall be installed over <i>medium-duty, heavy-duty</i> and <i>extra-heavy-duty cooking appliances</i>. Type I hoods shall be installed over <i>light-duty cooking appliances</i> that produce grease or smoke. Exception: A Type I hood shall not be required for an electric cooking appliance where an approved testing agency provides documentation that the appliance effluent contains 5 mg/m³ or less of grease when tested at an exhaust flow rate of 500 cfm (0.236 m³/s) in accordance with Section 17 of UL 710B</p>	<p>507.2 Type I hoods. Type I hoods shall be installed where cooking <i>appliances</i> produce grease or smoke as a result of the cooking process. Type I hoods shall be installed over <i>medium-duty, heavy-duty</i> and <i>extra-heavy-duty cooking appliances</i>. Exception: A Type I hood shall not be required for an electric cooking appliance where an approved testing agency provides documentation that the appliance effluent contains 5 mg/m³ or less of grease when tested at an exhaust flow rate of 500 cfm (0.236 m³/s) in accordance with UL 710B.</p>	<p>Deletes requirement that Type I hoods be installed over <i>light-duty cooking appliances</i> that produce grease or smoke.</p>

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<p>507.2.1.1 Operation. Type I hood systems shall be designed and installed to automatically activate the exhaust fan whenever cooking operations occur. The activation of the exhaust fan shall occur through an interlock with the cooking appliances, by means of heat sensors or by means of other <i>approved</i> methods. A method of interlock between an exhaust hood system and appliances equipped with standing pilot burners shall not cause the pilot burners to be extinguished. A method of interlock between an exhaust hood system and cooking appliances shall not involve or depend upon any component of a fire extinguishing system.</p>	<p>507.1.1 Operation. Commercial kitchen exhaust hood systems shall operate during the cooking operation. The hood exhaust rate shall comply with the listing of the hood or shall comply with Section 507.5. The exhaust fan serving a Type I hood shall have automatic controls that will activate the fan when any appliance that requires such Type I Hood is turned on, or a means of interlock shall be provided that will prevent operation of such appliances when the exhaust fan is not turned on. Where one or more temperature or radiant energy sensors are used to activate a Type I hood exhaust fan, the fan shall activate not more than 15 minutes after the first appliance served by that hood has been turned on. A method of interlock between an exhaust hood system and appliances equipped with standing pilot burners shall not cause the pilot burners to be extinguished. A method of interlock between an exhaust hood system and cooking appliances shall not involve or depend upon any component of a fire-extinguishing system.</p> <p>The net exhaust volumes for hoods shall be permitted to be reduced during part-load cooking conditions, where engineered or <i>listed</i> multispeed or variable speed controls automatically operate the exhaust system to maintain capture and removal of cooking effluents as required by this section. Reduced volumes shall not be below that required to maintain capture and removal of effluents from the idle cooking appliances that are operating in a standby mode.</p>	<p>Expands requirements regarding interlocks between commercial kitchen exhaust hood fans and the appliances served.</p> <p>Allows reduced exhaust airflow during part-load cooking conditions and for idle appliances in standby mode.</p>
	<p>507.1.1.1 Multiple hoods utilizing a single exhaust system. Where heat or radiant energy sensors are utilized in hood systems consisting of multiple hoods served by a single exhaust system, such sensors shall be provided in each hood. Sensors shall be capable of being accessed from the hood outlet or from a cleanout location.</p>	<p>New section addressing use of heat or radiant energy sensors.</p>

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<p>507.2.1.2 Exhaust flow rate label. Type I hoods shall bear a label indicating the minimum exhaust flow rate in cfm per linear foot (1.55 L/s per linear meter) of hood that provides for capture and containment of the exhaust effluent for the cooking appliances served by the hood, based on the cooking appliance duty classifications defined in this code.</p>	<p>507.2.1 Type I exhaust flow rate label. Type I hoods shall bear a label indicating the minimum exhaust flow rate in cfm per linear foot (1.55 L/s per linear meter) of hood that provides for capture and containment of the exhaust effluent for the cooking appliances served by the hood, based on the cooking appliance duty classifications defined in this code.</p>	None
<p>507.2.2 Type II hoods. Type II hoods shall be installed above dishwashers and appliances that produce heat or moisture and do not produce grease or smoke as a result of the cooking process, except where the heat and moisture loads from such appliances are incorporated into the HVAC system design or into the design of a separate removal system. Type II hoods shall be installed above all appliances that produce products of <i>combustion</i> and do not produce grease or smoke as a result of the cooking process. Spaces containing cooking appliances that do not require Type II hoods shall be provided with exhaust at a rate of 0.70 cfm per square foot (0.00033 m³/s). For the purpose of determining the floor area required to be exhausted, each individual <i>appliance</i> that is not required to be installed under a Type II hood shall be considered as occupying not less than 100 square feet (9.3 m²). Such additional square footage shall be provided with exhaust at a rate of 0.70 cfm per square foot [.00356 m³/(s · m²)].</p>		None. Moved requirements to §507.3
<p>507.2.3 Domestic cooking appliances used for commercial purposes. Domestic cooking appliances utilized for commercial purposes shall be provided with Type I or Type II hoods as required for the type of appliances and processes in accordance with Sections 507.2, 507.2.1 and 507.2.2.</p>	<p>507.1.2 Domestic cooking appliances used for commercial purposes. Domestic cooking appliances utilized for commercial purposes shall be provided with Type I or Type II hoods as required for the type of appliances and processes in accordance with Sections 507.2 and 507.3. Domestic cooking appliances utilized for domestic purposes shall comply with Section 505.</p>	None. Minor wording pointing to §505 for domestic uses.

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507.2.4 Extra-heavy-duty. Type I hoods for use over <i>extra-heavy-duty cooking appliances</i> shall not cover <i>heavy-, medium- or light-duty appliances</i> . Such hoods shall discharge to an exhaust system that is independent of other exhaust systems.	507.2.2 Type I extra-heavy-duty. Type I hoods for use over <i>extra-heavy-duty cooking appliances</i> shall not cover <i>heavy-, medium- or light-duty appliances</i> . Such hoods shall discharge to an exhaust system that is independent of other exhaust systems.	Minor wording changes.
507.3 Fuel-burning appliances. Where vented fuel-burning appliances are located in the same room or space as the hood, provisions shall be made to prevent the hood system from interfering with normal operation of the <i>appliance</i> vents.	507.1.3 Fuel-burning appliances. Where vented fuel-burning appliances are located in the same room or space as the hood, provisions shall be made to prevent the hood system from interfering with normal operation of the <i>appliance</i> vents.	None
507.4 Type I materials. Type I hoods shall be constructed of steel having a minimum thickness of 0.0466 inch (1.181 mm) (No. 18 gage) or stainless steel not less than 0.0335 inch [0.8525 mm (No. 20 MSG)] in thickness.	507.2.3 Type I materials. Type I hoods shall be constructed of steel having a minimum thickness of 0.0466 inch (1.181 mm) (No. 18 gage) or stainless steel not less than 0.0335 inch [0.8525 mm (No. 20 MSG)] in thickness.	None
	507.2.4 Type I supports. Type I hoods shall be secured in place by noncombustible supports. Type I hood supports shall be adequate for the applied load of the hood, the unsupported ductwork, the effluent loading and the possible weight of personnel working in or on the hood.	None. Requirement formerly in §507.6
	507.3 Type II hoods. Type II hoods shall be installed above dishwashers and appliances that produce heat or moisture and do not produce grease or smoke as a result of the cooking process, except where the heat and moisture loads from such appliances are incorporated into the HVAC system design or into the design of a separate removal system. Type II hoods shall be installed above all appliances that produce products of combustion and do not produce grease or smoke as a result of the cooking process. Spaces containing cooking appliances that do not require Type II hoods shall be provided with exhaust at a rate of 0.70 cfm per square foot (0.00033 m ³ /s). For the purpose of determining the floor area required to be exhausted, each individual appliance that is not required to be installed under a Type II hood shall be considered as occupying not less than 100 square feet (9.3 m ²). Such additional square footage shall be provided with exhaust at a rate of 0.70 cfm per square foot [.00356 m ³ /(s × m ²)].	Formerly §507.2.2.

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<p>507.5 Type II hood materials. Type II hoods shall be constructed of steel having a minimum thickness of 0.0296 inch (0.7534 mm) (No. 22 gage) or stainless steel not less than 0.0220 inch (0.5550 mm) (No. 24 gage) in thickness, copper sheets weighing not less than 24 ounces per square foot (7.3 kg/m²) or of other <i>approved</i> material and gage.</p>	<p>507.3.1 Type II hood materials. Type II hoods shall be constructed of steel having a minimum thickness of 0.0296 inch (0.7534 mm) (No. 22 gage) or stainless steel not less than 0.0220 inch (0.5550 mm) (No. 24 gage) in thickness, copper sheets weighing not less than 24 ounces per square foot (7.3 kg/m²) or of other <i>approved</i> material and gage.</p>	None
<p>507.6 Supports. Type I hoods shall be secured in place by non-combustible supports. All Type I and Type II hood supports shall be adequate for the applied load of the hood, the unsupported ductwork, the effluent loading and the possible weight of personnel working in or on the hood.</p>	<p>507.3.2 Type II supports. Type II hood supports shall be adequate for the applied load of the hood, the unsupported ductwork, the effluent loading and the possible weight of personnel working in or on the hood.</p>	Moved reference to Type I supports to §507.2.4.
<p>507.7 Hood joints, seams and penetrations. Hood joints, seams and penetrations shall comply with Sections 507.7.1 and 507.7.2.</p>	<p>507.3.3 Type II hood joint, seams and penetrations. Joints, seams and penetrations for Type II hoods shall be constructed as set forth in Chapter 6, shall be sealed on the interior of the hood and shall provide a smooth surface that is readily cleanable and water tight.</p>	None. Moved wording from §507.7.2
<p>507.7.1 Type I hoods. External hood joints, seams and penetrations for Type I hoods shall be made with a continuous external liquid-tight weld or braze to the lowest outermost perimeter of the hood. Internal hood joints, seams, penetrations, filter support frames and other appendages attached inside the hood shall not be required to be welded or brazed but shall be otherwise sealed to be grease tight.</p> <p>Exceptions:</p> <ol style="list-style-type: none"> 1. Penetrations shall not be required to be welded or brazed where sealed by devices that are <i>listed</i> for the application. 2. Internal welding or brazing of seams, joints and penetrations of the hood shall not be prohibited provided that the joint is formed smooth or ground so as to not trap grease, and is readily cleanable. 	<p>507.2.5 Type I hoods. External hood joints, seams and penetrations for Type I hoods shall be made with a continuous external liquid-tight weld or braze to the lowest outermost perimeter of the hood. Internal hood joints, seams, penetrations, filter support frames and other appendages attached inside the hood shall not be required to be welded or brazed but shall be otherwise sealed to be grease tight.</p> <p>Exceptions:</p> <ol style="list-style-type: none"> 1. Penetrations shall not be required to be welded or brazed where sealed by devices that are <i>listed</i> for the application. 2. Internal welding or brazing of seams, joints and penetrations of the hood shall not be prohibited provided that the joint is formed smooth or ground so as to not trap grease, and is readily cleanable. 	

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507.7.2 Type II hoods. Joints, seams and penetrations for Type II hoods shall be constructed as set forth in Chapter 6, shall be sealed on the interior of the hood and shall provide a smooth surface that is readily cleanable and water tight.		None. Moved to §507.3.3.
507.8 Cleaning and grease gutters. A hood shall be designed to provide for thorough cleaning of the entire hood. Grease gutters shall drain to an <i>approved</i> collection receptacle that is fabricated, designed and installed to allow access for cleaning.	507.1.4 Cleaning. A hood shall be designed to provide for thorough cleaning of the entire hood. 507.2.9 Grease gutters for Type I hood. Grease gutters shall drain to an <i>approved</i> collection receptacle that is fabricated, designed and installed to allow access for cleaning.	None
507.9 Clearances for Type I hood. A type I hood shall be installed with clearances from combustibles as required by NFPA 96-2011 as listed in chapter 15. R 408.30935a	507.2.6 Clearances for Type I hood. A Type I hood shall be installed with clearances from combustibles as required by NFPA-96-2014 as listed in Chapter 15 of the code. R 408.30935a	None. Updated reference to NFPA-96-2014.
507.10 Hoods penetrating a ceiling. Type I hoods or portions thereof penetrating a ceiling, wall or furred space shall comply with Section 506.3.11. Field-applied grease duct enclosure systems, as addressed in Section 506.3.11.2 shall not be utilized to satisfy the requirements of this section.	507.2.7 Type I hoods penetrating a ceiling. Type I hoods or portions thereof penetrating a ceiling, wall or furred space shall comply with Section 506.3.11. Field-applied grease duct enclosure systems, as addressed in Section 506.3.11.2, shall not be utilized to satisfy the requirements of this section.	None
507.11 Grease filters. Type I hoods shall be equipped with grease filters listed and labeled in accordance with UL 1046 and designed for the specific purpose. Grease-collecting <i>equipment</i> shall be provided with access for cleaning. The lowest edge of a grease filter located above the cooking surface shall be not less than the height specified in Table 507.11.	507.2.8 Type I grease filters. Type I hoods shall be equipped with grease filters listed and labeled in accordance with UL 1046. Grease filters shall be provided with access for cleaning or replacement. The lowest edge of a grease filter located above the cooking surface shall be not less than the height specified in Table 507.2.8.	None

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<p>TABLE 507.11 MINIMUM DISTANCE BETWEEN THE LOWEST EDGE OF A GREASE FILTER AND THE COOKING SURFACE OR THE HEATING SURFACE</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">TYPE OF COOKING APPLIANCES</th> <th style="text-align: center;">HEIGHT ABOVE COOKING SURFACE (feet)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Without exposed flame</td> <td style="text-align: center;">0.5</td> </tr> <tr> <td style="text-align: center;">Exposed flame and burners</td> <td style="text-align: center;">2</td> </tr> <tr> <td style="text-align: center;">Exposed charcoal and charbroil type</td> <td style="text-align: center;">3.5</td> </tr> </tbody> </table> <p>For SI: 1 foot = 304.8 mm.</p>	TYPE OF COOKING APPLIANCES	HEIGHT ABOVE COOKING SURFACE (feet)	Without exposed flame	0.5	Exposed flame and burners	2	Exposed charcoal and charbroil type	3.5	<p>TABLE 507.2.8 MINIMUM DISTANCE BETWEEN THE LOWEST EDGE OF A GREASE FILTER AND THE COOKING SURFACE OR THE HEATING SURFACE</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">TYPE OF COOKING APPLIANCES</th> <th style="text-align: center;">HEIGHT ABOVE COOKING SURFACE (feet)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Without exposed flame</td> <td style="text-align: center;">0.5</td> </tr> <tr> <td style="text-align: center;">Exposed flame and burners</td> <td style="text-align: center;">2</td> </tr> <tr> <td style="text-align: center;">Exposed charcoal and charbroil type</td> <td style="text-align: center;">3.5</td> </tr> </tbody> </table> <p>For SI: 1 foot = 304.8 mm.</p>	TYPE OF COOKING APPLIANCES	HEIGHT ABOVE COOKING SURFACE (feet)	Without exposed flame	0.5	Exposed flame and burners	2	Exposed charcoal and charbroil type	3.5	None
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<p>507.11.1 Criteria. Filters shall be of such size, type and arrangement as will permit the required quantity of air to pass through such units at rates not exceeding those for which the filter or unit was designed or <i>approved</i>. Filter units shall be installed in frames or holders so as to be readily removable without the use of separate tools, unless designed and installed to be cleaned in place and the system is equipped for such cleaning in place. Removable filter units shall be of a size that will allow them to be cleaned in a dishwashing machine or pot sink. Filter units shall be arranged in place or provided with drip-intercepting devices to prevent grease or other condensate from dripping into food or on food preparation surfaces.</p>	<p>507.2.8.1 Criteria. Filters shall be of such size, type and arrangement as will permit the required quantity of air to pass through such units at rates not exceeding those for which the filter or unit was designed or <i>approved</i>. Filter units shall be installed in frames or holders so as to be readily removable without the use of separate tools, unless designed and installed to be cleaned in place and the system is equipped for such cleaning in place. Where filters are designed and required to be cleaned, removable filter units shall be of a size that will allow them to be cleaned in a dishwashing machine or pot sink. Filter units shall be arranged in place or provided with drip-intercepting devices to prevent grease or other condensate from dripping into food or on food preparation surfaces.</p>	Clarifies that only removable filters designed to be cleaned need be sized to fit dishwashers or pot sinks.																
<p>507.11.2 Mounting position. Filters shall be installed at an angle of not less than 45 degrees (0.79 rad) from the horizontal and shall be equipped with a drip tray beneath the lower edge of the filters.</p>	<p>507.2.8.2 Mounting position of grease filters. Filters shall be installed at an angle of not less than 45 degrees (0.79 rad) from the horizontal and shall be equipped with a drip tray beneath the lower edge of the filters.</p>	None																
	<p>507.4 Hood size and location. Hoods shall comply with the overhang, setback and height requirements in accordance with Sections 507.4.1 and 507.4.2, based on the type of hood.</p>	New section addressing hood overhang, setback and height requirements.																

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<p>507.12 Canopy size and location. The inside lower edge of canopy-type Type I and II commercial hoods shall overhang or extend a horizontal distance of not less than 6 inches (152 mm) beyond the edge of the top horizontal surface of the <i>appliance</i> on all open sides. The vertical distance between the front lower lip of the hood and such surface shall not exceed 4 feet (1219 mm).</p> <p>Exception: The hood shall be permitted to be flush with the outer edge of the cooking surface where the hood is closed to the <i>appliance</i> side by a noncombustible wall or panel.</p>	<p>507.4.1 Canopy size and location. The inside lower edge of canopy-type Type I and II commercial hoods shall overhang or extend a horizontal distance of not less than 6 inches (152 mm) beyond the edge of the top horizontal surface of the <i>appliance</i> on all open sides. The vertical distance between the front lower lip of the hood and such surface shall not exceed 4 feet (1219 mm).</p> <p>Exception: The hood shall be permitted to be flush with the outer edge of the cooking surface where the hood is closed to the <i>appliance</i> side by a noncombustible wall or panel</p>	None																								
<p>507.13 Capacity of hoods. Commercial food service hoods shall exhaust a minimum net quantity of air determined in accordance with this section and Sections 507.13.1 through 507.13.5. The net quantity of <i>exhaust air</i> shall be calculated by subtracting any airflow supplied directly to a hood cavity from the total exhaust flow rate of a hood. Where any combination of <i>heavy-duty</i>, <i>medium-duty</i> and <i>light-duty cooking appliances</i> are utilized under a single hood, the exhaust rate required by this section for the heaviest duty <i>appliance</i> covered by the hood shall be used for the entire hood.</p>	<p>507.5 Capacity of hoods. Commercial food service hoods shall exhaust a minimum net quantity of air determined in accordance with this section and Sections 507.5.1 through 507.5.5. The net quantity of <i>exhaust air</i> shall be calculated by subtracting any airflow supplied directly to a hood cavity from the total exhaust flow rate of a hood. Where any combination of <i>heavy-duty</i>, <i>medium-duty</i> and <i>light-duty cooking appliances</i> are utilized under a single hood, the exhaust rate required by this section for the heaviest duty <i>appliance</i> covered by the hood shall be used for the entire hood.</p>	None																								
<p>507.13.1 Extra-heavy-duty cooking appliances. The minimum net airflow for hoods, as determined by Section 507.2, used for <i>extra-heavy-duty cooking appliances</i> shall be determined as follows:</p> <table border="0"> <thead> <tr> <th align="left">Type of Hood</th> <th align="center">CFM per linear foot of hood</th> </tr> </thead> <tbody> <tr> <td>Backshelf/pass-over</td> <td align="center">Not allowed</td> </tr> <tr> <td>Double island canopy (per side)</td> <td align="center">550</td> </tr> <tr> <td>Eyebrow</td> <td align="center">Not allowed</td> </tr> <tr> <td>Single island canopy</td> <td align="center">700</td> </tr> <tr> <td>Wall-mounted canopy</td> <td align="center">550</td> </tr> </tbody> </table> <p>For SI: 1 cfm per linear foot = 1.55 L/s per linear meter.</p>	Type of Hood	CFM per linear foot of hood	Backshelf/pass-over	Not allowed	Double island canopy (per side)	550	Eyebrow	Not allowed	Single island canopy	700	Wall-mounted canopy	550	<p>507.5.1 Extra-heavy-duty cooking appliances. The minimum net airflow for hoods, as determined by Section 507.1, used for <i>extra-heavy-duty cooking appliances</i> shall be determined as follows:</p> <table border="0"> <thead> <tr> <th align="left">Type of Hood</th> <th align="center">CFM per linear foot of hood</th> </tr> </thead> <tbody> <tr> <td>Backshelf/pass-over</td> <td align="center">Not allowed</td> </tr> <tr> <td>Double island canopy (per side)</td> <td align="center">550</td> </tr> <tr> <td>Eyebrow</td> <td align="center">Not allowed</td> </tr> <tr> <td>Single island canopy</td> <td align="center">700</td> </tr> <tr> <td>Wall-mounted canopy</td> <td align="center">550</td> </tr> </tbody> </table> <p>For SI: 1 cfm per linear foot = 1.55 L/s per linear meter.</p>	Type of Hood	CFM per linear foot of hood	Backshelf/pass-over	Not allowed	Double island canopy (per side)	550	Eyebrow	Not allowed	Single island canopy	700	Wall-mounted canopy	550	None
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<p>507.13.2 Heavy-duty cooking appliances. The minimum net airflow for hoods, as determined by Section 507.2, used for <i>heavy-duty cooking appliances</i> shall be determined as follows:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Type of Hood</th> <th style="text-align: right;">CFM per linear foot of hood</th> </tr> </thead> <tbody> <tr> <td>Backshelf/pass-over</td> <td style="text-align: right;">400</td> </tr> <tr> <td>Double island canopy (per side)</td> <td style="text-align: right;">400</td> </tr> <tr> <td>Eyebrow</td> <td style="text-align: right;">Not allowed</td> </tr> <tr> <td>Single island canopy</td> <td style="text-align: right;">600</td> </tr> <tr> <td>Wall-mounted canopy</td> <td style="text-align: right;">400</td> </tr> </tbody> </table> <p>For SI: 1 cfm per linear foot = 1.55 L/s per linear meter.</p>	Type of Hood	CFM per linear foot of hood	Backshelf/pass-over	400	Double island canopy (per side)	400	Eyebrow	Not allowed	Single island canopy	600	Wall-mounted canopy	400	<p>507.5.2 Heavy-duty cooking appliances. The minimum net airflow for hoods, as determined by Section 507.1, used for <i>heavy-duty cooking appliances</i> shall be determined as follows:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Type of Hood</th> <th style="text-align: right;">CFM per linear foot of hood</th> </tr> </thead> <tbody> <tr> <td>Backshelf/pass-over</td> <td style="text-align: right;">400</td> </tr> <tr> <td>Double island canopy (per side)</td> <td style="text-align: right;">400</td> </tr> <tr> <td>Eyebrow</td> <td style="text-align: right;">Not allowed</td> </tr> <tr> <td>Single island canopy</td> <td style="text-align: right;">600</td> </tr> <tr> <td>Wall-mounted canopy</td> <td style="text-align: right;">400</td> </tr> </tbody> </table> <p>For SI: 1 cfm per linear foot = 1.55 L/s per linear meter.</p>	Type of Hood	CFM per linear foot of hood	Backshelf/pass-over	400	Double island canopy (per side)	400	Eyebrow	Not allowed	Single island canopy	600	Wall-mounted canopy	400	None
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<p>507.13.4 Light-duty cooking appliances. The minimum net airflow for hoods, as determined by Section 507.2, used for <i>light-duty cooking appliances</i> and food service preparation shall be determined as follows:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Type of Hood</th> <th style="text-align: right;">CFM per linear foot of hood</th> </tr> </thead> <tbody> <tr> <td>Backshelf/pass-over</td> <td style="text-align: right;">250</td> </tr> <tr> <td>Double island canopy (per side)</td> <td style="text-align: right;">250</td> </tr> <tr> <td>Eyebrow</td> <td style="text-align: right;">250</td> </tr> <tr> <td>Single island canopy</td> <td style="text-align: right;">400</td> </tr> <tr> <td>Wall-mounted canopy</td> <td style="text-align: right;">200</td> </tr> </tbody> </table> <p>For SI: 1 cfm per linear foot = 1.55 L/s per linear meter.</p>	Type of Hood	CFM per linear foot of hood	Backshelf/pass-over	250	Double island canopy (per side)	250	Eyebrow	250	Single island canopy	400	Wall-mounted canopy	200	<p>507.5.4 Light-duty cooking appliances. The minimum net airflow for hoods, as determined by Section 507.1, used for <i>light-duty cooking appliances</i> and food service preparation shall be determined as follows:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Type of Hood</th> <th style="text-align: right;">CFM per linear foot of hood</th> </tr> </thead> <tbody> <tr> <td>Backshelf/pass-over</td> <td style="text-align: right;">250</td> </tr> <tr> <td>Double island canopy (per side)</td> <td style="text-align: right;">250</td> </tr> <tr> <td>Eyebrow</td> <td style="text-align: right;">250</td> </tr> <tr> <td>Single island canopy</td> <td style="text-align: right;">400</td> </tr> <tr> <td>Wall-mounted canopy</td> <td style="text-align: right;">200</td> </tr> </tbody> </table> <p>For SI: 1 cfm per linear foot = 1.55 L/s per linear meter.</p>	Type of Hood	CFM per linear foot of hood	Backshelf/pass-over	250	Double island canopy (per side)	250	Eyebrow	250	Single island canopy	400	Wall-mounted canopy	200	None
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<p>507.13.5 Dishwashing appliances. The minimum net airflow for Type II hoods used for dishwashing appliances shall be 100 CFM per linear foot of hood length. Exception: Dishwashing appliances and <i>equipment</i> installed in accordance with Section 507.2.2.</p>	<p>507.5.5 Dishwashing appliances. The minimum net airflow for Type II hoods used for dishwashing appliances shall be 100 cfm per linear foot (155 L/s per linear meter) of hood length. Exception: Dishwashing appliances and <i>equipment</i> installed in accordance with Section 507.3.</p>	Adds metric conversion																								
<p>507.14 Noncanopy size and location. Noncanopy-type hoods shall be located a maximum of 3 feet (914 mm) above the cooking surface. The edge of the hood shall be set back a maximum of 1 foot (305 mm) from the edge of the cooking surface.</p>	<p>507.4.2 Noncanopy size and location. Noncanopy-type hoods shall be located not greater than 3 feet (914 mm) above the cooking surface. The edge of the hood shall be set back not greater than 1 foot (305 mm) from the edge of the cooking surface.</p>	None																								
<p>507.15 Exhaust outlets. Exhaust outlets located within the hood shall be located so as to optimize the capture of particulate matter. Each outlet shall serve not more than a 12-foot (3658 mm) section of hood.</p>	<p>507.1.5 Exhaust outlets. Exhaust outlets located within the hood shall be located so as to optimize the capture of particulate matter. Each outlet shall serve not more than a 12-foot (3658 mm) section of hood.</p>	None																								

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<p>507.16 Performance test. A performance test shall be conducted upon completion and before final approval of the installation of a ventilation system serving <i>commercial cooking appliances</i>. The test shall verify the rate of exhaust airflow required by Section 507.13, makeup airflow required by Section 508 and proper operation as specified in this chapter. The permit holder shall furnish the necessary test <i>equipment</i> and devices required to perform the tests.</p>	<p>507.6 Performance test. A performance test shall be conducted upon completion and before final approval of the installation of a ventilation system serving <i>commercial cooking appliances</i>. The test shall verify the rate of exhaust airflow required by Section 507.5, makeup airflow required by Section 508 and proper operation as specified in this chapter. The permit holder shall furnish the necessary test <i>equipment</i> and devices required to perform the tests.</p>	None
<p>507.16.1 Capture and containment test. The permit holder shall verify capture and containment performance of the exhaust system. This field test shall be conducted with all appliances under the hood at operating temperatures with all sources of outdoor air providing <i>makeup air</i> for the hood operating and with all sources of recirculated air providing conditioning for the space in which the hood is located operating. Capture and containment shall be verified visually by observing smoke or steam produced by actual or simulated cooking, such as with smoke candles, smoke puffers, etc.</p>	<p>507.6.1 Capture and containment test. The permit holder shall verify capture and containment performance of the exhaust system. This field test shall be conducted with all appliances under the hood at operating temperatures, with all sources of outdoor air providing <i>makeup air</i> for the hood operating and with all sources of recirculated air providing conditioning for the space in which the hood is located operating. Capture and containment shall be verified visually by observing smoke or steam produced by actual or simulated cooking, such as with smoke candles, smoke puffers, and similar means.</p>	None
<p>507.16.1.1 Smoke test. The field test identified in section 507.16.1 of the code shall be conducted in accordance with the smoke testing procedures established by the bureau of construction codes, which are available at no cost from the bureau's web site at www.michigan.gov/bcc, or, from the Michigan Department of Licensing and Regulatory Affairs, Bureau of Construction Codes, 2501 Woodlake Circle, Okemos, Michigan, 48864. R 408.30935a</p>	<p>507.6.1.1. Smoke test. The field test identified in Section 507.6.1 of the code shall be conducted in accordance with the smoke testing procedures established by the bureau of construction codes, which are available at no cost from the bureau's website at www.michigan.gov/bcc, or from the Michigan Department of Licensing and Regulatory Affairs, Bureau of Construction Codes, 611 W. Ottawa St., 1st Floor Ottawa Building, Lansing, MI 48933. R 408.30935a</p>	Updates address for LARA BCC.
SECTION 508 - COMMERCIAL KITCHEN MAKEUP AIR	SECTION 508 - COMMERCIAL KITCHEN MAKEUP AIR	

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<p>508.1 Makeup air. <i>Makeup air</i> shall be supplied during the operation of commercial kitchen exhaust systems that are provided for <i>commercial cooking appliances</i>. The amount of <i>makeup air</i> supplied to the building from all sources shall be approximately equal to the amount of <i>exhaust air</i> for all exhaust systems for the building. The <i>makeup air</i> shall not reduce the effectiveness of the exhaust system. <i>Makeup air</i> shall be provided by gravity or mechanical means or both. Mechanical <i>makeup air</i> systems shall be automatically controlled to start and operate simultaneously with the exhaust system. <i>Makeup air</i> intake opening locations shall comply with Section 401.4.</p>	<p>508.1 Makeup air. <i>Makeup air</i> shall be supplied during the operation of commercial kitchen exhaust systems that are provided for <i>commercial cooking appliances</i>. The amount of <i>makeup air</i> supplied to the building from all sources shall be approximately equal to the amount of <i>exhaust air</i> for all exhaust systems for the building. The <i>makeup air</i> shall not reduce the effectiveness of the exhaust system. <i>Makeup air</i> shall be provided by gravity or mechanical means or both. Mechanical <i>makeup air</i> systems shall be automatically controlled to start and operate simultaneously with the exhaust system. <i>Makeup air</i> intake opening locations shall comply with Section 401.4.</p>	None
<p>508.1.1 Makeup air temperature. The temperature differential between <i>makeup air</i> and the air in the conditioned space shall not exceed 10°F (6°C) except where the added heating and cooling loads of the <i>makeup air</i> do not exceed the capacity of the HVAC system.</p>	<p>508.1.1 Makeup air temperature. The temperature differential between <i>makeup air</i> and the air in the conditioned space shall not exceed 10°F (6°C) except where the added heating and cooling loads of the <i>makeup air</i> do not exceed the capacity of the HVAC system.</p>	None
	<p>508.1.2 Air balance. Design plans for a facility with a commercial kitchen ventilation system shall include a schedule or diagram indicating the design outdoor air balance. The design outdoor air balance shall indicate all exhaust and replacement air for the facility, plus the net exfiltration if applicable. The total replacement air airflow rate shall equal the total exhaust airflow rate plus the net exfiltration.</p>	New section requiring plans including commercial kitchen ventilation system to include schedule or diagram for design outdoor air balance.
<p>508.2 Compensating hoods. Manufacturers of compensating hoods shall provide a label indicating minimum exhaust flow and/or maximum makeup airflow that provides capture and containment of the exhaust effluent. Exception: Compensating hoods with <i>makeup air</i> supplied only from the front face discharge and side face discharge openings shall not be required to be labeled with the maximum makeup airflow.</p>	<p>508.2 Compensating hoods. Manufacturers of compensating hoods shall provide a label indicating minimum exhaust flow and/or maximum makeup airflow that provides capture and containment of the exhaust effluent. Exception: Compensating hoods with <i>makeup air</i> supplied only from the front face discharge and side face discharge openings shall not be required to be labeled with the maximum makeup airflow.</p>	None

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SECTION 509 - FIRE SUPPRESSION SYSTEMS	SECTION 509 - FIRE SUPPRESSION SYSTEMS	
509.1 Where required. <i>Commercial cooking appliances</i> required by Section 507.2.1 to have a Type I hood shall be provided with an <i>approved</i> automatic fire suppression system complying with the <i>International Building Code</i> and the <i>International Fire Code</i> .	509.1 Where required. <i>Commercial cooking appliances</i> required by Section 507.2 to have a Type I hood shall be provided with an <i>approved</i> automatic fire suppression system complying with the <i>International Building Code</i> and the <i>International Fire Code</i> .	None
SECTION 510 - HAZARDOUS EXHAUST SYSTEMS	SECTION 510 - HAZARDOUS EXHAUST SYSTEMS	
510.1 General. This section shall govern the design and construction of duct systems for hazardous exhaust and shall determine where such systems are required. Hazardous exhaust systems are systems designed to capture and control hazardous emissions generated from product handling or processes, and convey those emissions to the outdoors. Hazardous emissions include flammable vapors, gases, fumes, mists or dusts, and volatile or airborne materials posing a health hazard, such as toxic or corrosive materials. For the purposes of this section, the health hazard rating of materials shall be as specified in NFPA 704. For the purposes of the provisions of Section 510, a laboratory shall be defined as a facility where the use of chemicals is related to testing, analysis, teaching, research or developmental activities. Chemicals are used or synthesized on a nonproduction basis, rather than in a manufacturing process.	510.1 General. This section shall govern the design and construction of duct systems for hazardous exhaust and shall determine where such systems are required. Hazardous exhaust systems are systems designed to capture and control hazardous emissions generated from product handling or processes, and convey those emissions to the outdoors. Hazardous emissions include flammable vapors, gases, fumes, mists or dusts, and volatile or airborne materials posing a health hazard, such as toxic or corrosive materials. For the purposes of this section, the health-hazard rating of materials shall be as specified in NFPA 704. For the purposes of the provisions of Section 510, a laboratory shall be defined as a facility where the use of chemicals is related to testing, analysis, teaching, research or developmental activities. Chemicals are used or synthesized on a nonproduction basis, rather than in a manufacturing process.	None

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<p>510.2 Where required. A hazardous exhaust system shall be required wherever operations involving the handling or processing of hazardous materials, in the absence of such exhaust systems and under normal operating conditions, have the potential to create one of the following conditions:</p> <ol style="list-style-type: none"> 1. A flammable vapor, gas, fume, mist or dust is present in concentrations exceeding 25 percent of the lower flammability limit of the substance for the expected room temperature. 2. A vapor, gas, fume, mist or dust with a health-hazard rating of 4 is present in any concentration. 3. A vapor, gas, fume, mist or dust with a health-hazard rating of 1, 2 or 3 is present in concentrations exceeding 1 percent of the median lethal concentration of the substance for acute inhalation toxicity. <p>Exception: Laboratories, as defined in Section 510.1, except where the concentrations listed in Item 1 are exceeded or a vapor, gas, fume, mist or dust with a health hazard rating of 1, 2, 3 or 4 is present in concentrations exceeding 1 percent of the median lethal concentration of the substance for acute inhalation toxicity.</p>	<p>510.2 Where required. A hazardous exhaust system shall be required wherever operations involving the handling or processing of hazardous materials, in the absence of such exhaust systems and under normal operating conditions, have the potential to create one of the following conditions:</p> <ol style="list-style-type: none"> 1. A flammable vapor, gas, fume, mist or dust is present in concentrations exceeding 25 percent of the lower flammability limit of the substance for the expected room temperature. 2. A vapor, gas, fume, mist or dust with a health-hazard rating of 4 is present in any concentration. 3. A vapor, gas, fume, mist or dust with a health-hazard rating of 1, 2 or 3 is present in concentrations exceeding 1 percent of the median lethal concentration of the substance for acute inhalation toxicity. <p>Exception: Laboratories, as defined in Section 510.1, except where the concentrations listed in Item 1 are exceeded or a vapor, gas, fume, mist or dust with a health hazard rating of 1, 2, 3 or 4 is present in concentrations exceeding 1 percent of the median lethal concentration of the substance for acute inhalation toxicity.</p>	None
<p>510.2.1 Lumber yards and woodworking facilities. <i>Equipment</i> or machinery located inside buildings at lumber yards and woodworking facilities which generates or emits combustible dust shall be provided with an <i>approved</i> dust-collection and exhaust system installed in conformance with this section and the <i>International Fire Code</i>.</p> <p><i>Equipment</i> and systems that are used to collect, process or convey combustible dusts shall be provided with an <i>approved</i> explosion-control system.</p>	<p>510.2.1 Lumber yards and woodworking facilities. <i>Equipment</i> or machinery located inside buildings at lumber yards and woodworking facilities which generates or emits combustible dust shall be provided with an <i>approved</i> dust-collection and exhaust system installed in accordance with this section and the <i>International Fire Code</i>. <i>Equipment</i> and systems that are used to collect, process or convey combustible dusts shall be provided with an <i>approved</i> explosion-control system.</p>	None
<p>510.2.2 Combustible fibers. <i>Equipment</i> or machinery within a building which generates or emits combustible fibers shall be provided with an <i>approved</i> dust-collecting and exhaust system. Such systems shall comply with this code and the <i>International Fire Code</i>.</p>	<p>510.2.2 Combustible fibers. <i>Equipment</i> or machinery within a building which generates or emits combustible fibers shall be provided with an <i>approved</i> dust-collecting and exhaust system. Such systems shall comply with this code and the <i>International Fire Code</i>.</p>	None

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510.3 Design and operation. The design and operation of the exhaust system shall be such that flammable contaminants are diluted in noncontaminated air to maintain concentrations in the exhaust flow below 25 percent of the contaminant's lower flammability limit.	510.3 Design and operation. The design and operation of the exhaust system shall be such that flammable contaminants are diluted in noncontaminated air to maintain concentrations in the exhaust flow below 25 percent of the contaminant's lower flammability limit.	None
510.4 Independent system. Hazardous exhaust systems shall be independent of other types of exhaust systems. Incompatible materials, as defined in the <i>International Fire Code</i>, shall not be exhausted through the same hazardous exhaust system. Hazardous exhaust systems shall not share common shafts with other duct systems, except where such systems are hazardous exhaust systems originating in the same fire area.	510.4 Independent system. Hazardous exhaust systems shall be independent of other types of exhaust systems.	Highlighted wording moved to §510.5.
	510.5 Incompatible materials and common shafts. Incompatible materials, as defined in the <i>International Fire Code</i> , shall not be exhausted through the same hazardous exhaust system. Hazardous exhaust systems shall not share common shafts with other duct systems, except where such systems are hazardous exhaust systems originating in the same fire area.	Formerly included in §510.4.

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<p>Exception: The provision of this section shall not apply to laboratory exhaust systems where all of the following conditions apply:</p> <ol style="list-style-type: none"> 1. All of the hazardous exhaust ductwork and other laboratory exhaust within both the occupied space and the shafts are under negative pressure while in operation. 2. The hazardous exhaust ductwork manifolded together within the occupied space must originate within the same fire area. 3. Each control branch has a flow regulating device. 4. Perchloric acid hoods and connected exhaust shall be prohibited from manifolding. 5. Radioisotope hoods are equipped with filtration and/or carbon beds where required by the <i>registered design professional</i>. 6. Biological safety cabinets are filtered. 7. <i>Provision is made for continuous maintenance of negative static pressure in the ductwork. Contaminated air shall not be recirculated to occupiable areas. Air containing explosive or flammable vapors, fumes or dusts; flammable, highly toxic or toxic gases; or radioactive material shall be considered to be contaminated.</i> 	<p>Exception: The provisions of this section shall not apply to laboratory exhaust systems where all of the following conditions apply:</p> <ol style="list-style-type: none"> 1. All of the hazardous exhaust ductwork and other laboratory exhaust within both the occupied space and the shafts are under negative pressure while in operation. 2. The hazardous exhaust ductwork manifolded together within the occupied space must originate within the same fire area. 3. <i>Hazardous exhaust ductwork originating in different fire areas and manifolded together in a common shaft shall meet the provisions of Section 717.5.3, Exception 1, Item 1.1 of the International Building Code.</i> 4. Each control branch has a flow regulating device. 5. Perchloric acid hoods and connected exhaust shall be prohibited from manifolding. 6. Radioisotope hoods are equipped with filtration, carbon beds or both where required by the <i>registered design professional</i>. 7. Biological safety cabinets are filtered. 8. <i>Each hazardous exhaust duct system shall be served by redundant exhaust fans that comply with either of the following:</i> <ol style="list-style-type: none"> 8.1. <i>The fans shall operate simultaneously in parallel and each fan shall be individually capable of providing the required exhaust rate.</i> 8.2. <i>Each of the redundant fans is controlled so as to operate when the other fan has failed or is shut down for servicing.</i> 	<p>Deletes highlighted exception #7 from MMC 2012 and adds highlighted exceptions #3 and #8 in MMC 2015.</p>
<p>510.5 Design. Systems for removal of vapors, gases and smoke shall be designed by the constant velocity or equal friction methods. Systems conveying particulate matter shall be designed employing the constant velocity method.</p>	<p>510.6 Design. Systems for removal of vapors, gases and smoke shall be designed by the constant velocity or equal friction methods. Systems conveying particulate matter shall be designed employing the constant velocity method.</p>	<p>None</p>

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510.5.1 Balancing. Systems conveying explosive or radioactive materials shall be prebalanced by duct sizing. Other systems shall be balanced by duct sizing with balancing devices, such as dampers. Dampers provided to balance airflow shall be provided with securely fixed minimum-position blocking devices to prevent restricting flow below the required volume or velocity.	510.6.1 Balancing. Systems conveying explosive or radioactive materials shall be prebalanced by duct sizing. Other systems shall be balanced by duct sizing with balancing devices, such as dampers. Dampers provided to balance airflow shall be provided with securely fixed minimum-position blocking devices to prevent restricting flow below the required volume or velocity.	None
510.5.2 Emission control. The design of the system shall be such that the emissions are confined to the area in which they are generated by air currents, hoods or enclosures and shall be exhausted by a duct system to a safe location or treated by removing contaminants.	510.6.2 Emission control. The design of the system shall be such that the emissions are confined to the area in which they are generated by air currents, hoods or enclosures and shall be exhausted by a duct system to a safe location or treated by removing contaminants.	None
510.5.3 Hoods required. Hoods or enclosures shall be used where contaminants originate in a limited area of a space. The design of the hood or enclosure shall be such that air currents created by the exhaust systems will capture the contaminants and transport them directly to the exhaust duct.	510.6.3 Hoods required. Hoods or enclosures shall be used where contaminants originate in a limited area of a space. The design of the hood or enclosure shall be such that air currents created by the exhaust systems will capture the contaminants and transport them directly to the exhaust duct.	None
510.5.4 Contaminant capture and dilution. The velocity and circulation of air in work areas shall be such that contaminants are captured by an airstream at the area where the emissions are generated and conveyed into a product conveying duct system. Contaminated air from work areas where hazardous contaminants are generated shall be diluted below the thresholds specified in Section 510.2 with air that does not contain other hazardous contaminants.	510.6.4 Contaminant capture and dilution. The velocity and circulation of air in work areas shall be such that contaminants are captured by an airstream at the area where the emissions are generated and conveyed into a product conveying duct system. Contaminated air from work areas where hazardous contaminants are generated shall be diluted below the thresholds specified in Section 510.2 with air that does not contain other hazardous contaminants.	None
510.5.5 Makeup air. <i>Makeup air</i> shall be provided at a rate approximately equal to the rate that air is exhausted by the hazardous exhaust system. <i>Makeup-air</i> intakes shall be located so as to avoid recirculation of contaminated air.	510.6.5 Makeup air. <i>Makeup air</i> shall be provided at a rate approximately equal to the rate that air is exhausted by the hazardous exhaust system. Makeup air intakes shall be located in accordance with Section 401.4.	None
510.5.6 Clearances. The minimum <i>clearance</i> between hoods and combustible construction shall be the <i>clearance</i> required by the duct system.	510.6.6 Clearances. The minimum <i>clearance</i> between hoods and combustible construction shall be the <i>clearance</i> required by the duct system.	None
510.5.7 Ducts. Hazardous exhaust duct systems shall extend directly to the exterior of the building and shall not extend into or through ducts and plenums.	510.6.7 Ducts. Hazardous exhaust duct systems shall extend directly to the exterior of the building and shall not extend into or through ducts and plenums.	None

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<p>510.6 Penetrations. Penetrations of structural elements by a hazardous exhaust system shall conform to Sections 510.6.1 through 510.6.4. Exception: Duct penetrations within H-5 occupancies as allowed by the <i>International Building Code</i>.</p>	<p>510.7 Penetrations. Penetrations of structural elements by a hazardous exhaust system shall conform to Sections 510.7.1 through 510.7.4. Exception: Duct penetrations within Group H-5 occupancies as allowed by the <i>International Building Code</i>.</p>	None
<p>510.6.1 Fire dampers and smoke dampers. Fire dampers and smoke dampers are prohibited in hazardous exhaust ducts.</p>	<p>510.7.1 Fire dampers and smoke dampers. Fire dampers and smoke dampers are prohibited in hazardous exhaust ducts.</p>	None
	<p>510.7.1.1 Shaft penetrations. Hazardous exhaust ducts that penetrate fire-resistance-rated shafts shall comply with Section 714.3.1 or 714.3.1.2 of the <i>International Building Code</i>.</p>	New section addressing ducts penetrating fire-resistance-rated shafts.
<p>510.6.2 Floors. Hazardous exhaust systems that penetrate a floor/ceiling assembly shall be enclosed in a fire-resistance-rated shaft constructed in accordance with the <i>International Building Code</i>.</p>	<p>510.7.2 Floors. Hazardous exhaust systems that penetrate a floor/ceiling assembly shall be enclosed in a fire-resistance-rated shaft constructed in accordance with the <i>International Building Code</i>.</p>	None
<p>510.6.3 Wall assemblies. Hazardous exhaust duct systems that penetrate fire-resistance-rated wall assemblies shall be enclosed in fire-resistance-rated construction from the point of penetration to the outlet terminal, except where the interior of the duct is equipped with an approved automatic fire suppression system. Ducts shall be enclosed in accordance with the <i>International Building Code</i> requirements for shaft construction and such enclosure shall have a minimum fire-resistance-rating of not less than the highest fire-resistance-rated wall assembly penetrated.</p>	<p>510.7.3 Wall assemblies. Hazardous exhaust duct systems that penetrate fire-resistance-rated wall assemblies shall be enclosed in fire-resistance-rated construction from the point of penetration to the outlet terminal, except where the interior of the duct is equipped with an approved automatic fire suppression system. Ducts shall be enclosed in accordance with the <i>International Building Code</i> requirements for shaft construction and such enclosure shall have a minimum fire-resistance-rating of not less than the highest fire-resistance-rated wall assembly penetrated.</p>	None
<p>510.6.4 Fire walls. Ducts shall not penetrate a fire wall.</p>	<p>510.7.4 Fire walls. Ducts shall not penetrate a fire wall.</p>	None

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<p>510.7 Suppression required. Ducts shall be protected with an <i>approved</i> automatic fire suppression system installed in accordance with the <i>International Building Code</i>.</p> <p>Exceptions:</p> <ol style="list-style-type: none"> 1. An approved automatic fire suppression system shall not be required in ducts conveying materials, fumes, mists and vapors that are nonflammable and noncombustible under all conditions and at any concentrations. 2. Automatic fire suppression systems shall not be required in metallic and noncombustible, nonmetallic exhaust ducts in semiconductor fabrication facilities. 3. An <i>approved</i> automatic fire suppression system shall not be required in ducts where the largest cross-sectional diameter of the duct is less than 10 inches (254 mm). 4. For laboratories, as defined in Section 510.1, automatic fire protection systems shall not be required in laboratory hoods or exhaust systems. 	<p>510.8 Suppression required. Ducts shall be protected with an <i>approved</i> automatic fire suppression system installed in accordance with the <i>International Building Code</i>.</p> <p>Exceptions:</p> <ol style="list-style-type: none"> 1. An approved automatic fire suppression system shall not be required in ducts conveying materials, fumes, mists and vapors that are nonflammable and noncombustible under all conditions and at any concentrations. 2. Automatic fire suppression systems shall not be required in metallic and noncombustible, nonmetallic exhaust ducts in semiconductor fabrication facilities. 3. An <i>approved</i> automatic fire suppression system shall not be required in ducts where the largest cross-sectional diameter of the duct is less than 10 inches (254 mm). 4. For laboratories, as defined in Section 510.1, automatic fire protection systems shall not be required in laboratory hoods or exhaust systems. 	None
<p>510.8 Duct construction. Ducts used to convey hazardous exhaust shall be constructed of <i>approved</i> G90 galvanized sheet steel, with a minimum nominal thickness as specified in Table 510.8. Nonmetallic ducts used in systems exhausting nonflammable corrosive fumes or vapors shall be <i>listed</i> and <i>labeled</i>.</p> <p>Nonmetallic ducts shall have a flame spread index of 25 or less and a smoke-developed index of 50 or less, when tested in accordance with ASTM E 84 or UL 723. Ducts shall be <i>approved</i> for installation in such an exhaust system. Where the products being exhausted are detrimental to the duct material, the ducts shall be constructed of alternative materials that are compatible with the exhaust.</p>	<p>510.9 Duct construction. Ducts used to convey hazardous exhaust shall be constructed of materials <i>approved</i> for installation in such an exhaust system and shall comply with one of the following:</p> <ol style="list-style-type: none"> 1. Ducts shall be constructed of <i>approved</i> G90 galvanized sheet steel, with a minimum nominal thickness as specified in Table 510.9. 2. Ducts used in systems exhausting nonflammable corrosive fumes or vapors shall be constructed of nonmetallic materials that exhibit a flame spread index of 25 or less and a smoke-developed index of 50 or less when tested in accordance with ASTM E 84 or UL 723 and that are <i>listed</i> and <i>labeled</i> for the application. <p>Where the products being exhausted are detrimental to the duct material, the ducts shall be constructed of alternative materials that are compatible with the exhaust.</p>	Clarifications only

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<p>510.8.1 Duct joints. Ducts shall be made tight with lap joints having a minimum lap of 1 inch (25 mm). Joints used in ANSI/SMACNA Round Industrial Duct Construction Standards and ANSI/SMACNA Rectangular Industrial Duct Construction Standards are also acceptable.</p>				<p>510.9.1 Duct joints. Ducts shall be made tight with lap joints having a minimum lap of 1 inch (25 mm). Joints used in ANSI/SMACNA Round Industrial Duct Construction Standards and ANSI/SMACNA Rectangular Industrial Duct Construction Standards are also acceptable.</p>				None																																														
<p>510.8.2 Clearance to combustibles. Ducts shall have a <i>clearance</i> to combustibles in accordance with Table 510.8.2. Exhaust gases having temperatures in excess of 600°F (316°C) shall be exhausted to a <i>chimney</i> in accordance with Section 511.2.</p>				<p>510.9.2 Clearance to combustibles. Ducts shall have a <i>clearance</i> to combustibles in accordance with Table 510.9.2. Exhaust gases having temperatures in excess of 600°F (316°C) shall be exhausted to a <i>chimney</i> in accordance with Section 511.2.</p>				None																																														
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<p>510.8.3 Explosion relief. Systems exhausting potentially explosive mixtures shall be protected with an <i>approved</i> explosion relief system or by an <i>approved</i> explosion prevention system designed and installed in accordance with NFPA 69. An explosion relief system shall be designed to minimize the structural and mechanical damage resulting from an explosion or deflagration within the exhaust system. An explosion prevention system shall be designed to prevent an explosion or deflagration from occurring.</p>	<p>510.9.3 Explosion relief. Systems exhausting potentially explosive mixtures shall be protected with an <i>approved</i> explosion relief system or by an <i>approved</i> explosion prevention system designed and installed in accordance with NFPA 69. An explosion relief system shall be designed to minimize the structural and mechanical damage resulting from an explosion or deflagration within the exhaust system. An explosion prevention system shall be designed to prevent an explosion or deflagration from occurring.</p>	None
<p>510.9 Supports. Ducts shall be supported at intervals not exceeding 10 feet (3048 mm). Supports shall be constructed of noncombustible material.</p>	<p>510.10 Supports. Ducts shall be supported at intervals not exceeding 10 feet (3048 mm). Supports shall be constructed of noncombustible material.</p>	None
<p>SECTION 511 DUST, STOCK AND REFUSE CONVEYING SYSTEMS</p>	<p>SECTION 511 DUST, STOCK AND REFUSE CONVEYING SYSTEMS</p>	None
<p>511.1 Dust, stock and refuse conveying systems. Dust, stock and refuse conveying systems shall comply with the provisions of Section 510 and Sections 511.1.1 through 511.2.</p>	<p>511.1 Dust, stock and refuse conveying systems. Dust, stock and refuse conveying systems shall comply with the provisions of Section 510 and Sections 511.1.1 through 511.2.</p>	None
<p>511.1.1 Collectors and separators. Collectors and separators involving such systems as centrifugal separators, bag filter systems and similar devices, and associated supports shall be constructed of noncombustible materials and shall be located on the exterior of the building or structure. A collector or separator shall not be located nearer than 10 feet (3048 mm) to combustible construction or to an unprotected wall or floor opening, unless the collector is provided with a metal vent pipe that extends above the highest part of any roof with a distance of 30 feet (9144 mm).</p>	<p>511.1.1 Collectors and separators. Collectors and separators involving such systems as centrifugal separators, bag filter systems and similar devices, and associated supports shall be constructed of noncombustible materials and shall be located on the exterior of the building or structure. A collector or separator shall not be located nearer than 10 feet (3048 mm) to combustible construction or to an unprotected wall or floor opening, unless the collector is provided with a metal vent pipe that extends above the highest part of any roof with a distance of 30 feet (9144 mm).</p>	None

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<p>Exceptions: 1. Collectors such as “Point of Use” collectors, close extraction weld fume collectors, spray finishing booths, stationary grinding tables, sanding booths, and integrated or machine-mounted collectors shall be permitted to be installed indoors provided the installation is in accordance with the <i>International Fire Code</i> and NFPA 70. 2. Collectors in independent exhaust systems handling combustible dusts shall be permitted to be installed indoors provided that such collectors are installed in compliance with the <i>International Fire Code</i> and NFPA 70.</p>	<p>Exceptions: 1. Collectors such as “Point of Use” collectors, close extraction weld fume collectors, spray finishing booths, stationary grinding tables, sanding booths, and integrated or machine-mounted collectors shall be permitted to be installed indoors provided the installation is in accordance with the <i>International Fire Code</i> and NFPA 70. 2. Collectors in independent exhaust systems handling combustible dusts shall be permitted to be installed indoors provided that such collectors are installed in compliance with the <i>International Fire Code</i> and NFPA 70.</p>	None
<p>511.1.2 Discharge pipe. Discharge piping shall conform to the requirements for ducts, including clearances required for high-heat appliances, as contained in this code. A delivery pipe from a cyclone collector shall not convey refuse directly into the firebox of a boiler, furnace, dutch oven, refuse burner, incinerator or other <i>appliance</i>.</p>	<p>511.1.2 Discharge pipe. Discharge piping shall conform to the requirements for ducts, including clearances required for high-heat appliances, as contained in this code. A delivery pipe from a cyclone collector shall not convey refuse directly into the firebox of a boiler, furnace, dutch oven, refuse burner, incinerator or other <i>applianc</i></p>	None
<p>511.1.3 Conveying systems exhaust discharge. An exhaust system shall discharge to the outside of the building either directly by flue or indirectly through the bin or vault into which the system discharges except where the contaminants have been removed. Exhaust system discharge shall be permitted to be recirculated provided that the solid particulate has been removed at a minimum efficiency of 99.9 percent at 10 microns (10.01 mm), vapor concentrations are less than 25 percent of the LFL, and <i>approved equipment</i> is used to monitor the vapor concentration.</p>	<p>511.1.3 Conveying systems exhaust discharge. An exhaust system shall discharge to the outside of the building either directly by flue or indirectly through the bin or vault into which the system discharges except where the contaminants have been removed. Exhaust system discharge shall be permitted to be recirculated provided that the solid particulate has been removed at a minimum efficiency of 99.9 percent at 10 microns (10.01 mm), vapor concentrations are less than 25 percent of the LFL, and <i>approved equipment</i> is used to monitor the vapor concentration.</p>	None
<p>511.1.4 Spark protection. The outlet of an open-air exhaust terminal shall be protected with an <i>approved</i> metal or other noncombustible screen to prevent the entry of sparks.</p>	<p>511.1.4 Spark protection. The outlet of an open-air exhaust terminal shall be protected with an <i>approved</i> metal or other noncombustible screen to prevent the entry of sparks.</p>	None

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511.1.5 Explosion relief vents. A safety or explosion relief vent shall be provided on all systems that convey combustible refuse or stock of an explosive nature, in accordance with the requirements of the <i>International Building Code</i> .	511.1.5 Explosion relief vents. A safety or explosion relief vent shall be provided on all systems that convey combustible refuse or stock of an explosive nature, in accordance with the requirements of the <i>International Building Code</i> .	None
511.1.5.1 Screens. Where a screen is installed in a safety relief vent, the screen shall be attached so as to permit ready release under the explosion pressure.	511.1.5.1 Screens. Where a screen is installed in a safety relief vent, the screen shall be attached so as to permit ready release under the explosion pressure.	None
511.1.5.2 Hoods. The relief vent shall be provided with an <i>approved</i> noncombustible cowl or hood, or with a counterbalanced relief valve or cover arranged to prevent the escape of hazardous materials, gases or liquids.	511.1.5.2 Hoods. The relief vent shall be provided with an <i>approved</i> noncombustible cowl or hood, or with a counterbalanced relief valve or cover arranged to prevent the escape of hazardous materials, gases or liquids.	None
511.2 Exhaust outlets. Outlets for exhaust that exceed 600°F (315°C) shall be designed as a <i>chimney</i> in accordance with Table 511.2.	511.2 Exhaust outlets. Outlets for exhaust that exceed 600°F (315°C) shall be designed as a <i>chimney</i> in accordance with Table 511.2.	None

**TABLE 511.2
CONSTRUCTION, CLEARANCE AND TERMINATION REQUIREMENTS FOR SINGLE-WALL METAL CHIMNEYS**

CHIMNEYS SERVING	MINIMUM THICKNESS		TERMINATION				CLEARANCE			
	Walls (inch)	Lining	Above roof opening (feet)	Above any part of building within (feet)			Combustible construction (inches)		Noncombustible construction	
				10	25	50	Interior inst.	Exterior inst.	Interior inst.	Exterior inst.
High-heat appliances (Over 2,000°F) ^a	0.127 (No. 10 MSG)	4½" laid on 4½" bed	20	—	—	20	See Note c			
Low-heat appliances (1,000°F normal operation)	0.127 (No. 10 MSG)	none	3	2	—	—	18	6	Up to 18" diameter, 2" Over 18" diameter, 4"	
Medium-heat appliances (2,000°F maximum) ^b	0.127 (No. 10 MSG)	Up to 18" dia.—2½" Over 18"—4½" On 4½" bed	10	—	10	—	36	24		

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, °C = [(°F)-32]/1.8.

a. Lining shall extend from bottom to top of outlet.

b. Lining shall extend from 24 inches below connector to 24 feet above.

c. Clearance shall be as specified by the design engineer and shall have sufficient clearance from buildings and structures to avoid overheating combustible materials (maximum 160°F).

SECTION 512 - SUBSLAB SOIL EXHAUST SYSTEMS	SECTION 512 - SUBSLAB SOIL EXHAUST SYSTEMS	None
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512.1 General. When a subslab soil exhaust system is provided, the duct shall conform to the requirements of this section.	512.1 General. Where a subslab soil exhaust system is provided, the duct shall conform to the requirements of this section.	None
512.2 Materials. Subslab soil exhaust system duct material shall be air duct material <i>listed</i> and <i>labeled</i> to the requirements of UL 181 for Class 0 air ducts, or any of the following piping materials that comply with the <i>International Plumbing Code</i> as building sanitary drainage and vent pipe: cast iron; galvanized steel; brass or copper pipe; copper tube of a weight not less than that of copper drainage tube, Type DWV; and plastic piping.	512.2 Materials. Subslab soil exhaust system duct material shall be air duct material <i>listed</i> and <i>labeled</i> to the requirements of UL 181 for Class 0 air ducts, or any of the following piping materials that comply with the <i>International Plumbing Code</i> as building sanitary drainage and vent pipe: cast iron; galvanized steel; brass or copper pipe; copper tube of a weight not less than that of copper drainage tube, Type DWV; and plastic piping.	None
512.3 Grade. Exhaust system ducts shall not be trapped and shall have a minimum slope of one-eighth unit vertical in 12 units horizontal (1-percent slope).	512.3 Grade. Exhaust system ducts shall not be trapped and shall have a minimum slope of one-eighth unit vertical in 12 units horizontal (1-percent slope).	None
512.4 Termination. Subslab soil exhaust system ducts shall extend through the roof and terminate at least 6 inches (152 mm) above the roof and at least 10 feet (3048 mm) from any operable openings or air intake.	512.4 Termination. Subslab soil exhaust system ducts shall extend through the roof and terminate not less than 6 inches (152 mm) above the roof and not less than 10 feet (3048 mm) from any operable openings or air intake.	None
512.5 Identification. Subslab soil exhaust ducts shall be permanently identified within each floor level by means of a tag, stencil or other <i>approved</i> marking.	512.5 Identification. Subslab soil exhaust ducts shall be permanently identified within each floor level by means of a tag, stencil or other <i>approved</i> marking.	None
SECTION 513 - SMOKE CONTROL SYSTEMS	SECTION 513 - SMOKE CONTROL SYSTEMS	
513.1 Scope and purpose. This section applies to mechanical and passive smoke control systems that are required by the <i>International Building Code</i> or the <i>International Fire Code</i> . The purpose of this section is to establish minimum requirements for the design, installation and acceptance testing of smoke control systems that are intended to provide a tenable environment for the evacuation or relocation of occupants. These provisions are not intended for the preservation of contents, the timely restoration of operations, or for assistance in fire suppression or overhaul activities. Smoke control systems regulated by this section serve a different purpose than the smoke- and heat-venting provisions found in Section 910 of the <i>International Building Code</i> or the <i>International Fire Code</i> .	513.1 Scope and purpose. This section applies to mechanical and passive smoke control systems that are required by the <i>International Building Code</i> or the <i>International Fire Code</i> . The purpose of this section is to establish minimum requirements for the design, installation and acceptance testing of smoke control systems that are intended to provide a tenable environment for the evacuation or relocation of occupants. These provisions are not intended for the preservation of contents, the timely restoration of operations, or for assistance in fire suppression or overhaul activities. Smoke control systems regulated by this section serve a different purpose than the smoke- and heat-venting provisions found in Section 910 of the <i>International Building Code</i> or the <i>International Fire Code</i> .	None

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<p>513.2 General design requirements. Buildings, structures, or parts thereof required by the <i>International Building Code</i> or the <i>International Fire Code</i> to have a smoke control system or systems shall have such systems designed in accordance with the applicable requirements of Section 909 of the <i>International Building Code</i> and the generally accepted and well-established principles of engineering relevant to the design. The <i>construction documents</i> shall include sufficient information and detail to describe adequately the elements of the design necessary for the proper implementation of the smoke control systems. These documents shall be accompanied with sufficient information and analysis to demonstrate compliance with these provisions.</p>	<p>513.2 General design requirements. Buildings, structures, or parts thereof required by the <i>International Building Code</i> or the <i>International Fire Code</i> to have a smoke control system or systems shall have such systems designed in accordance with the applicable requirements of Section 909 of the <i>International Building Code</i> and the generally accepted and well-established principles of engineering relevant to the design. The <i>construction documents</i> shall include sufficient information and detail to describe adequately the elements of the design necessary for the proper implementation of the smoke control systems. These documents shall be accompanied with sufficient information and analysis to demonstrate compliance with these provisions.</p>	None
<p>513.3 Special inspection and test requirements. In addition to the ordinary inspection and test requirements which buildings, structures and parts thereof are required to undergo, smoke control systems subject to the provisions of Section 909 of the <i>International Building Code</i> shall undergo special inspections and tests sufficient to verify the proper commissioning of the smoke control design in its final installed condition. The design submission accompanying the <i>construction documents</i> shall clearly detail procedures and methods to be used and the items subject to such inspections and tests. Such commissioning shall be in accordance with generally accepted engineering practice and, where possible, based on published standards for the particular testing involved. The special inspections and tests required by this section shall be conducted under the same terms as found in Section 1704 of the <i>International Building Code</i>.</p>	<p>513.3 Special inspection and test requirements. In addition to the ordinary inspection and test requirements that buildings, structures and parts thereof are required to undergo, smoke control systems subject to the provisions of Section 909 of the <i>International Building Code</i> shall undergo special inspections and tests sufficient to verify the proper commissioning of the smoke control design in its final installed condition. The design submission accompanying the <i>construction documents</i> shall clearly detail procedures and methods to be used and the items subject to such inspections and tests. Such commissioning shall be in accordance with generally accepted engineering practice and, where possible, based on published standards for the particular testing involved. The special inspections and tests required by this section shall be conducted under the same terms as found in Section 1704 of the <i>International Building Code</i>.</p>	None
<p>513.4 Analysis. A rational analysis supporting the types of smoke control systems to be employed, their methods of operation, the systems supporting them and the methods of construction to be utilized shall accompany the submitted <i>construction documents</i> and shall include, but not be limited to, the items indicated in Sections 513.4.1 through 513.4.6.</p>	<p>513.4 Analysis. A rational analysis supporting the types of smoke control systems to be employed, their methods of operation, the systems supporting them and the methods of construction to be utilized shall accompany the submitted <i>construction documents</i> and shall include, but not be limited to, the items indicated in Sections 513.4.1 through 513.4.7</p>	None

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513.4.1 Stack effect. The system shall be designed such that the maximum probable normal or reverse stack effects will not adversely interfere with the system’s capabilities. In determining the maximum probable stack effects, altitude, elevation, weather history and interior temperatures shall be used.	513.4.1 Stack effect. The system shall be designed such that the maximum probable normal or reverse stack effects will not adversely interfere with the system’s capabilities. In determining the maximum probable stack effects, altitude, elevation, weather history and interior temperatures shall be used.	None
513.4.2 Temperature effect of fire. Buoyancy and expansion caused by the design fire in accordance with Section 513.9 shall be analyzed. The system shall be designed such that these effects do not adversely interfere with its capabilities.	513.4.2 Temperature effect of fire. Buoyancy and expansion caused by the design fire in accordance with Section 513.9 shall be analyzed. The system shall be designed such that these effects do not adversely interfere with its capabilities.	None
513.4.3 Wind effect. The design shall consider the adverse effects of wind. Such consideration shall be consistent with the wind-loading provisions of the <i>International Building Code</i> .	513.4.3 Wind effect. The design shall consider the adverse effects of wind. Such consideration shall be consistent with the wind-loading provisions of the <i>International Building Code</i> .	None
513.4.4 HVAC systems. The design shall consider the effects of the heating, ventilating and air-conditioning (HVAC) systems on both smoke and fire transport. The analysis shall include all permutations of systems’ status. The design shall consider the effects of fire on the HVAC systems.	513.4.4 HVAC systems. The design shall consider the effects of the heating, ventilating and air-conditioning (HVAC) systems on both smoke and fire transport. The analysis shall include all permutations of systems’ status. The design shall consider the effects of fire on the HVAC systems.	None
513.4.5 Climate. The design shall consider the effects of low temperatures on systems, property and occupants. Air inlets and exhausts shall be located so as to prevent snow or ice blockage.	513.4.5 Climate. The design shall consider the effects of low temperatures on systems, property and occupants. Air inlets and exhausts shall be located so as to prevent snow or ice blockage.	None
513.4.6 Duration of operation. All portions of active or passive smoke control systems shall be capable of continued operation after detection of the fire event for a period of not less than either 20 minutes	513.4.6 Duration of operation. All portions of active or engineered smoke control systems shall be capable of continued operation after detection of the fire event for a period of not less than either 20 minutes or 1.5 times the calculated egress time, whichever is greater.	None
	513.4.7 Smoke control system interaction. The design shall consider the interaction effects of the operation of multiple smoke control systems for all design scenarios.	New section adding smoke control system interactions as a consideration.

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<p>513.5 Smoke barrier construction. Smoke barriers shall comply with the <i>International Building Code</i>. Smoke barriers shall be constructed and sealed to limit leakage areas exclusive of protected openings. The maximum allowable leakage area shall be the aggregate area calculated using the following leakage area ratios:</p> <ol style="list-style-type: none"> 1. Walls: $A/A_w = 0.00100$ 2. Interior exit stairways and ramps and exit passageways: $A/A_w = 0.00035$ 3. Enclosed exit access stairways and ramps and all other shafts: $A/A_w = 0.00150$ 4. Floors and roofs: $A/A_F = 0.00050$ <p>where: A = Total leakage area, square feet (m_2). A_F = Unit floor or roof area of barrier, square feet (m_2). A_w = Unit wall area of barrier, square feet (m_2). The leakage area ratios shown do not include openings due to doors, operable windows or similar gaps. These shall be included in calculating the total leakage area</p>	<p>513.5 Smoke barrier construction. Smoke barriers required for passive smoke control and a smoke control system using the pressurization method shall comply with Section 709 of the <i>International Building Code</i>. The maximum allowable leakage area shall be the aggregate area calculated using the following leakage area ratios:</p> <ol style="list-style-type: none"> 1. Walls: $A/A_w = 0.00100$ 2. Interior exit stairways and ramps and exit passageways: $A/A_w = 0.00035$ 3. Enclosed exit access stairways and ramps and all other shafts: $A/A_w = 0.00150$ 4. Floors and roofs: $A/A_F = 0.00050$ <p>where: A = Total leakage area, square feet (m_2). A_F = Unit floor or roof area of barrier, square feet (m_2). A_w = Unit wall area of barrier, square feet (m_2). The leakage area ratios shown do not include openings created by gaps around doors and operable windows. <i>The total leakage area of the smoke barrier shall be determined in accordance with Section 513.5.1 and tested in accordance with Section 513.5.2.</i></p>	<p>Adds requirement to test for total leakage.</p>
<p>513.5.1 Leakage area. Total leakage area of the barrier is the product of the smoke barrier gross area times the allowable leakage area ratio, plus the area of other openings such as gaps and operable windows. <i>Compliance shall be determined by achieving the minimum air pressure difference across the barrier with the system in the smoke control mode for mechanical smoke control systems. Passive smoke control systems tested using other approved means such as door fan testing shall be as approved by the code official.</i></p>	<p>513.5.1 Total leakage area. Total leakage area of the barrier is the product of the smoke barrier gross area times the allowable leakage area ratio, plus the area of other openings such as gaps around doors and operable windows.</p>	<p>Moves highlighted wording to §513.5.2.</p>

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	513.5.2 Testing of leakage area. Compliance with the maximum total leakage area shall be determined by achieving the minimum air pressure difference across the barrier with the system in the smoke control mode for mechanical smoke control systems utilizing the pressurization method. Compliance with the maximum total leakage area of passive smoke control systems shall be verified through methods such as door fan testing or other methods, as <i>approved</i> by the fire code official.	Wording moved §from 513.5.1. Clarifies requirement that total leakage be determined by testing.
513.5.2 Opening protection. Openings in smoke barriers shall be protected by automatic-closing devices actuated by the required controls for the mechanical smoke control system. Door openings shall be protected by door assemblies complying with the requirements of the <i>International Building Code</i> for doors in smoke barriers. Exceptions:	513.5.3 Opening protection. Openings in smoke barriers shall be protected by automatic-closing devices actuated by the required controls for the mechanical smoke control system. Door openings shall be protected by door assemblies complying with the requirements of the <i>International Building Code</i> for doors in smoke barriers. Exceptions:	None
1. Passive smoke control systems with automatic closing devices actuated by spot-type smoke detectors <i>listed</i> for releasing service installed in accordance with the <i>International Building Code</i> .	1. Passive smoke control systems with automatic closing devices actuated by spot-type smoke detectors <i>listed</i> for releasing service installed in accordance with the <i>International Building Code</i> .	None
2. Fixed openings between smoke zones which are protected utilizing the airflow method.	2. Fixed openings between smoke zones which are protected utilizing the airflow method.	None
3. In Group I-2 where such doors are installed across corridors, a pair of opposite-swinging doors without a center mullion shall be installed having vision panels with <i>approved</i> fire-rated glazing materials in <i>approved</i> fire-rated frames, the area of which shall not exceed that tested. The doors shall be close-fitting within operational tolerances, and shall not have undercuts, louvers or grilles. The doors shall have head and jamb stops, astragals or rabbets at meeting edges and automatic-closing devices. Positive latching devices are not required.	3. In Group I-1 Condition 2, Group I-2 and ambulatory care facilities, where a pair of opposite-swinging doors are installed across a corridor in accordance with Section 513.5.3.1, the doors shall not be required to be protected in accordance with Section 716 of the <i>International Building Code</i> . The doors shall be close-fitting within operational tolerances and shall not have a center mullion or undercuts in excess of 3/4 inch (19.1 mm), louvers or grilles. The doors shall have head and jamb stops and astragals or rabbets at meeting edges and, where permitted by the door manufacturer’s listing, positive-latching devices are not required	Adds Group I-1 Condition 2 and ambulatory care facilities. Clarifies requirements for opposite-swinging doors in some applications.

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	4. In Group I-2 and ambulatory care facilities, where such doors are special-purpose horizontal sliding, accordion or folding door assemblies installed in accordance with Section 1010.1.4.3 of the <i>International Building Code</i> and are automatic closing by smoke detection in accordance with Section 716.5.9.3 of the <i>International Building Code</i> .	Adds exception for some doors in Group I-2 and ambulatory care facilities
4. Group I-3.	5. Group I-3.	
5. Openings between smoke zones with clear ceiling heights of 14 feet (4267 mm) or greater and bank down capacity of greater than 20 minutes as determined by the design fire size.	6. Openings between smoke zones with clear ceiling heights of 14 feet (4267 mm) or greater and bank down capacity of greater than 20 minutes as determined by the design fire size	Group I-2 and ambulatory care facilities
	513.5.3.1 Group I-1 Condition 2; Group I-2 and ambulatory care facilities. In Group I-1 Condition 2; Group I-2 and <i>ambulatory care facilities</i> , where doors are installed across a <i>corridor</i> , the doors shall be automatic closing by smoke detection in accordance with Section 716.5.9.3 of the <i>International Building Code</i> and shall have a vision panel with fire-protection-rated glazing materials in fire-protection-rated frames, the area of which shall not exceed that tested.	New section addressing doors installed across corridors in Group I-1 Condition 2; Group I-2 and <i>ambulatory care facilities</i>
513.5.2.1 Ducts and air transfer openings. Ducts and air transfer openings are required to be protected with a minimum Class II, 250°F (121°C) smoke damper complying with the <i>International Building Code</i> .	513.5.3.2 Ducts and air transfer openings. Ducts and air transfer openings are required to be protected with a minimum Class II, 250°F (121°C) smoke damper complying with the <i>International Building Code</i> .	None
513.6 Pressurization method. The primary mechanical means of controlling smoke shall be by pressure differences across smoke barriers. Maintenance of a tenable environment is not required in the smoke control zone of fire origin.	513.6 Pressurization method. The primary mechanical means of controlling smoke shall be by pressure differences across smoke barriers. Maintenance of a tenable environment is not required in the smoke control zone of fire origin.	None

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<p>513.6.1 Minimum pressure difference. The minimum pressure difference across a smoke barrier shall be 0.05-inch water gage (12.4 Pa) in fully sprinklered buildings. In buildings permitted to be other than fully sprinklered, the smoke control system shall be designed to achieve pressure differences at least two times the maximum calculated pressure difference produced by the design fire.</p>	<p>513.6.1 Minimum pressure difference. The minimum pressure difference across a smoke barrier shall be 0.05-inch water gage (12.4 Pa) in fully sprinklered buildings. In buildings permitted to be other than fully sprinklered, the smoke control system shall be designed to achieve pressure differences not less than two times the maximum calculated pressure difference produced by the design fire.</p>	None
<p>513.6.2 Maximum pressure difference. The maximum air pressure difference across a smoke barrier shall be determined by required door-opening or closing forces. The actual force required to open exit doors when the system is in the smoke control mode shall be in accordance with the <i>International Building Code</i>. Opening and closing forces for other doors shall be determined by standard engineering methods for the resolution of forces and reactions. The calculated force to set a side-hinged, swinging door in motion shall be determined by: $F = F_{dc} + K(WA\Delta P)/2(W-d)$ (Equation 5-2) where: A = Door area, square feet (m²). d = Distance from door handle to latch edge of door, feet (m). F = Total door opening force, pounds (N). F_{dc} = Force required to overcome closing device, pounds (N). K = Coefficient 5.2 (1.0). W = Door width, feet (m). ΔP = Design pressure difference, inches (Pa) water gage.</p>	<p>513.6.2 Maximum pressure difference. The maximum air pressure difference across a smoke barrier shall be determined by required door-opening or closing forces. The actual force required to open exit doors when the system is in the smoke control mode shall be in accordance with the <i>International Building Code</i>. Opening and closing forces for other doors shall be determined by standard engineering methods for the resolution of forces and reactions. The calculated force to set a side-hinged, swinging door in motion shall be determined by: $F = F_{dc} + K(WA\Delta P)/2(W-d)$ (Equation 5-1) where: A = Door area, square feet (m²). d = Distance from door handle to latch edge of door, feet (m). F = Total door opening force, pounds (N). F_{dc} = Force required to overcome closing device, pounds (N). K = Coefficient 5.2 (1.0). W = Door width, feet (m). ΔP = Design pressure difference, inches (Pa) water gage.</p>	None
	<p>513.6.3 Pressurized stairways and elevator hoistways. Where stairways or elevator hoistways are pressurized, such pressurization systems shall comply with Section 513 as smoke control systems, in addition to the requirements of Sections 909.20 of the <i>International Building Code</i> and 909.21 of the <i>International Fire Code</i>.</p>	New section addressing pressurized stairways and elevator hoistways.

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<p>513.7 Airflow design method. When <i>approved</i> by the code official, smoke migration through openings fixed in a permanently open position, which are located between smoke control zones by the use of the airflow method, shall be permitted. The design airflows shall be in accordance with this section. Airflow shall be directed to limit smoke migration from the fire zone. The geometry of openings shall be considered to prevent flow reversal from turbulent effects.</p>	<p>513.7 Airflow design method. Where <i>approved</i> by the code official, smoke migration through openings fixed in a permanently open position, which are located between smoke control zones by the use of the airflow method, shall be permitted. The design airflows shall be in accordance with this section. Airflow shall be directed to limit smoke migration from the fire zone. The geometry of openings shall be considered to prevent flow reversal from turbulent effects. Smoke control systems using the airflow method shall be designed in accordance with NFPA 92.</p>	Refers to NFPA for design of smoke control systems.
<p>513.7.1 Velocity. The minimum average velocity through a fixed opening shall not be less than: $v = 217.2[h(T_f - T_o)/(T_f + 460)]^{1/2}$ (Equation 5-3) For SI: $v = 119.9 [h(T_f - T_o)/T_f]^{1/2}$ where: <i>H</i> = Height of opening, feet (m). <i>T_f</i> = Temperature of smoke, °F (K). <i>T_o</i> = Temperature of ambient air, °F (K). <i>v</i> = Air velocity, feet per minute (m/minute).</p>		Deletes section on Velocity.
<p>513.7.2 Prohibited conditions. This method shall not be employed where either the quantity of air or the velocity of the airflow will adversely affect other portions of the smoke control system, unduly intensify the fire, disrupt plume dynamics or interfere with exiting. In no case shall airflow toward the fire exceed 200 feet per minute (1.02 m/s). Where the formula in Section 513.7.1 requires airflow to exceed this limit, the airflow method shall not be used.</p>	<p>513.7.1 Prohibited conditions. This method shall not be employed where either the quantity of air or the velocity of the airflow will adversely affect other portions of the smoke control system, unduly intensify the fire, disrupt plume dynamics or interfere with exiting. Airflow toward the fire shall not exceed 200 feet per minute (1.02 m/s). Where the calculated airflow exceeds this limit, the airflow method shall not be used.</p>	Minor wording changes.
<p>513.8 Exhaust method. When <i>approved</i> by the building official, mechanical smoke control for large enclosed volumes, such as in atriums or malls, shall be permitted to utilize the exhaust method. Smoke control systems using the exhaust method shall be designed in accordance with NFPA 92B.</p>	<p>513.8 Exhaust method. Where <i>approved</i> by the building official, mechanical smoke control for large enclosed volumes, such as in atriums or malls, shall be permitted to utilize the exhaust method. Smoke control systems using the exhaust method shall be designed in accordance with NFPA 92.</p>	None

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513.8.1 Exhaust rate. The height of the lowest horizontal surface of the accumulating smoke layer shall be maintained at least 6 feet (1829 mm) above any walking surface which forms a portion of a required egress system within the smoke zone.	513.8.1 Exhaust rate. The height of the lowest horizontal surface of the accumulating smoke layer shall be maintained not less than 6 feet (1829 mm) above any walking surface which forms a portion of a required egress system within the smoke zone.	None
513.9 Design fire. The design fire shall be based on a rational analysis performed by the <i>registered design professional</i> and <i>approved</i> by the code official. The design fire shall be based on the analysis in accordance with Section 513.4 and this section.	513.9 Design fire. The design fire shall be based on a rational analysis performed by the <i>registered design professional</i> and <i>approved</i> by the code official. The design fire shall be based on the analysis in accordance with Section 513.4 and this section.	None
513.9.1 Factors considered. The engineering analysis shall include the characteristics of the fuel, fuel load, effects included by the fire and whether the fire is likely to be steady or unsteady.	513.9.1 Factors considered. The engineering analysis shall include the characteristics of the fuel, fuel load, effects included by the fire and whether the fire is likely to be steady or unsteady.	None
513.9.2 Design fire fuel. Determination of the design fire shall include consideration of the type of fuel, fuel spacing and configuration.	513.9.2 Design fire fuel. Determination of the design fire shall include consideration of the type of fuel, fuel spacing and configuration.	None
513.9.3 Heat-release assumptions. The analysis shall make use of the best available data from <i>approved</i> sources and shall not be based on excessively stringent limitations of combustible material.	513.9.3 Heat-release assumptions. The analysis shall make use of the best available data from <i>approved</i> sources and shall not be based on excessively stringent limitations of combustible material.	None
513.9.4 Sprinkler effectiveness assumptions. A documented engineering analysis shall be provided for conditions that assume fire growth is halted at the time of sprinkler activation.	513.9.4 Sprinkler effectiveness assumptions. A documented engineering analysis shall be provided for conditions that assume fire growth is halted at the time of sprinkler activation.	None
513.10 Equipment. <i>Equipment</i> such as, but not limited to, fans, ducts, automatic dampers and balance dampers shall be suitable for their intended use, suitable for the probable exposure temperatures that the rational analysis indicates, and as <i>approved</i> by the code official.	513.10 Equipment. <i>Equipment</i> such as, but not limited to, fans, ducts, automatic dampers and balance dampers shall be suitable for their intended use, suitable for the probable exposure temperatures that the rational analysis indicates, and as <i>approved</i> by the code official.	None

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<p>513.10.1 Exhaust fans. Components of exhaust fans shall be rated and certified by the manufacturer for the probable temperature rise to which the components will be exposed. This temperature rise shall be computed by: $T_s = (Q_c/mc) + (T_a)$ (Equation 5-4) where: c = Specific heat of smoke at smoke-layer temperature, Btu/lb°F (kJ/kg °K). m = Exhaust rate, pounds per second (kg/s). Q_c = Convective heat output of fire, Btu/s (kW). T_a = Ambient temperature, °F (K). T_s = Smoke temperature, °F (K). Exception: Reduced T_s as calculated based on the assurance of adequate dilution air.</p>	<p>513.10.1 Exhaust fans. Components of exhaust fans shall be rated and certified by the manufacturer for the probable temperature rise to which the components will be exposed. This temperature rise shall be computed by: $T_s = (Q_c/mc) + (T_a)$ (Equation 5-2) where: c = Specific heat of smoke at smoke-layer temperature, Btu/lb°F (kJ/kg °K). m = Exhaust rate, pounds per second (kg/s). Q_c = Convective heat output of fire, Btu/s (kW). T_a = Ambient temperature, °F (K). T_s = Smoke temperature, °F (K). Exception: Reduced T_s as calculated based on the assurance of adequate dilution air.</p>	None
<p>513.10.2 Ducts. Duct materials and joints shall be capable of withstanding the probable temperatures and pressures to which they are exposed as determined in accordance with Section 513.10.1. Ducts shall be constructed and supported in accordance with Chapter 6. Ducts shall be leak tested to 1.5 times the maximum design pressure in accordance with nationally accepted practices. Measured leakage shall not exceed 5 percent of design flow. Results of such testing shall be a part of the documentation procedure. Ducts shall be supported directly from fire-resistance-rated structural elements of the building by substantial, noncombustible supports. Exception: Flexible connections, for the purpose of vibration isolation, that are constructed of <i>approved</i> fire-resistance-rated materials.</p>	<p>513.10.2 Ducts. Duct materials and joints shall be capable of withstanding the probable temperatures and pressures to which they are exposed as determined in accordance with Section 513.10.1. Ducts shall be constructed and supported in accordance with Chapter 6. Ducts shall be leak tested to 1.5 times the maximum design pressure in accordance with nationally accepted practices. Measured leakage shall not exceed 5 percent of design flow. Results of such testing shall be a part of the documentation procedure. Ducts shall be supported directly from fire-resistance-rated structural elements of the building by substantial, noncombustible supports. Exception: Flexible connections, for the purpose of vibration isolation, that are constructed of <i>approved</i> fire-resistance-rated materials.</p>	None

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<p>513.10.3 Equipment, inlets and outlets. <i>Equipment</i> shall be located so as to not expose uninvolved portions of the building to an additional fire hazard. Outdoor air inlets shall be located so as to minimize the potential for introducing smoke or flame into the building. Exhaust outlets shall be so located as to minimize reintroduction of smoke into the building and to limit exposure of the building or adjacent buildings to an additional fire hazard.</p>	<p>513.10.3 Equipment, inlets and outlets. <i>Equipment</i> shall be located so as to not expose uninvolved portions of the building to an additional fire hazard. Outdoor air inlets shall be located so as to minimize the potential for introducing smoke or flame into the building. Exhaust outlets shall be so located as to minimize reintroduction of smoke into the building and to limit exposure of the building or adjacent buildings to an additional fire hazard.</p>	None
<p>513.10.4 Automatic dampers. Automatic dampers, regardless of the purpose for which they are installed within the smoke control system, shall be <i>listed</i> and conform to the requirements of <i>approved</i> recognized standards.</p>	<p>513.10.4 Automatic dampers. Automatic dampers, regardless of the purpose for which they are installed within the smoke control system, shall be <i>listed</i> and conform to the requirements of <i>approved</i> recognized standards.</p>	None
<p>513.10.5 Fans. In addition to other requirements, belt-driven fans shall have 1.5 times the number of belts required for the design duty with the minimum number of belts being two. Fans shall be selected for stable performance based on normal temperature and, where applicable, elevated temperature. Calculations and manufacturer’s fan curves shall be part of the documentation procedures. Fans shall be supported and restrained by noncombustible devices in accordance with the structural design requirements of the <i>International Building Code</i>. Motors driving fans shall not be operating beyond their nameplate horsepower (kilowatts) as determined from measurement of actual current draw. Motors driving fans shall have a minimum service factor of 1.15.</p>	<p>513.10.5 Fans. In addition to other requirements, belt-driven fans shall have 1.5 times the number of belts required for the design duty with the minimum number of belts being two. Fans shall be selected for stable performance based on normal temperature and, where applicable, elevated temperature. Calculations and manufacturer’s fan curves shall be part of the documentation procedures. Fans shall be supported and restrained by noncombustible devices in accordance with the structural design requirements of the <i>International Building Code</i>. Motors driving fans shall not be operating beyond their nameplate horsepower (kilowatts) as determined from measurement of actual current draw. Motors driving fans shall have a minimum service factor of 1.15.</p>	None

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<p>513.11 Power systems. The smoke control system shall be supplied with two sources of power. Primary power shall be the normal building power systems. Secondary power shall be from an <i>approved</i> standby source complying with Chapter 27 of the <i>International Building Code</i>. The standby power source and its transfer switches shall be in a room separate from the normal power transformers and switch gear and ventilated directly to and from the exterior. The room shall be enclosed with not less than 1-hour fire-resistance rated fire barriers constructed in accordance with Section 707 of the <i>International Building Code</i> or horizontal assemblies constructed in accordance with Section 711 of the <i>International Building Code</i>, or both. Power distribution from the two sources shall be by independent routes. Transfer to full standby power shall be automatic and within 60 seconds of failure of the primary power. The systems shall comply with NFPA 70.</p>	<p>513.11 Standby power. The smoke control system shall be supplied with standby power in accordance with Section 2702 of the <i>International Building Code</i>.</p>	<p>Moves requirement for equipment room to section 513.11.1</p>
	<p>513.11.1 Equipment room. The standby power source and its transfer switches shall be in a room separate from the normal power transformers and switch gear and ventilated directly to and from the exterior. The room shall be enclosed with not less than 1-hour fire-resistance-rated fire barriers constructed in accordance with Section 707 of the <i>International Building Code</i> or horizontal assemblies constructed in accordance with Section 711 of the <i>International Building Code</i>, or both.</p>	<p>Moved from 513.11 and deletes requirements for automatic transfer within 60s of primary power loss.</p>
<p>513.11.1 Power sources and power surges. Elements of the smoke management system relying on volatile memories or the like shall be supplied with uninterruptible power sources of sufficient duration to span 15-minute primary power interruption. Elements of the smoke management system susceptible to power surges shall be suitably protected by conditioners, suppressors or other <i>approved</i> means.</p>	<p>513.11.2 Power sources and power surges. Elements of the smoke management system relying on volatile memories or the like shall be supplied with uninterruptible power sources of sufficient duration to span 15-minute primary power interruption. Elements of the smoke management system susceptible to power surges shall be suitably protected by conditioners, suppressors or other <i>approved</i> means.</p>	<p>None</p>

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<p>513.12 Detection and control systems. Fire detection systems providing control input or output signals to mechanical smoke control systems or elements thereof shall comply with NFPA 72 and the requirements of Chapter 9 of the <i>International Building Code</i> or the <i>International Fire Code</i>. Such systems shall be equipped with a control unit complying with UL 864 and listed as smoke control <i>equipment</i>.</p> <p><i>Control systems for mechanical smoke control systems shall include provisions for verification. Verification shall include positive confirmation of actuation, testing, manual override, the presence of power downstream of all disconnects and, through a preprogrammed weekly test sequence report, abnormal conditions audibly, visually and by printed report.</i></p>	<p>513.12 Detection and control systems. Fire detection systems providing control input or output signals to mechanical smoke control systems or elements thereof shall comply with the requirements of Section 907 of the <i>International Building Code</i>. Such systems shall be equipped with a control unit complying with UL 864 and listed as smoke control <i>equipment</i>.</p>	<p>Moved highlighted portion to 513.12.1.</p>
	<p>513.12.1 Verification. Control systems for mechanical smoke control systems shall include provisions for verification. Verification shall include positive confirmation of actuation, testing, manual override and the presence of power downstream of all disconnects. A preprogrammed weekly test sequence shall report abnormal conditions audibly, visually and by printed report. <i>The preprogrammed weekly test shall operate all devices, equipment and components used for smoke control.</i></p>	<p>Moved from 513.12.</p> <p>Added highlighted wording requiring operation of items used for smoke control during weekly test.</p>

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	<p>Exception: Where verification of individual components tested through the preprogrammed weekly testing sequence will interfere with, and produce unwanted effects to, normal building operation, such individual components are permitted to be bypassed from the preprogrammed weekly testing, where <i>approved</i> by the building official and in accordance with both of the following:</p> <ol style="list-style-type: none"> 1. Where the operation of components is bypassed from the preprogrammed weekly test, presence of power downstream of all disconnects shall be verified weekly by a listed control unit. 2. Testing of all components bypassed from the preprogrammed weekly test shall be in accordance with Section 909.20.6 of the <i>International Fire Code</i>. 	New section exempting items from testing where such testing would have adverse consequences.
<p>513.12.1 Wiring. In addition to meeting the requirements of NFPA 70, all wiring, regardless of voltage, shall be fully enclosed within continuous raceways.</p>	<p>513.12.2 Wiring. In addition to meeting the requirements of NFPA 70, all wiring, regardless of voltage, shall be fully enclosed within continuous raceways.</p>	None
<p>513.12.2 Activation. Smoke control systems shall be activated in accordance with the <i>International Building Code</i> or the <i>International Fire Code</i>.</p>	<p>513.12.3 Activation. Smoke control systems shall be activated in accordance with the <i>International Building Code</i> or the <i>International Fire Code</i>.</p>	None
<p>513.12.3 Automatic control. Where completely automatic control is required or used, the automatic control sequences shall be initiated from an appropriately zoned automatic sprinkler system complying with Section 903.3.1.1 of the <i>International Fire Code</i>, from manual controls that are readily accessible to the fire department, and any smoke detectors required by engineering analysis.</p>	<p>513.12.4 Automatic control. Where complete automatic control is required or used, the automatic control sequences shall be initiated from an appropriately zoned automatic sprinkler system complying with Section 903.3.1.1 of the <i>International Fire Code</i>, from manual controls that are readily accessible to the fire department, and any smoke detectors required by engineering analysis.</p>	None
<p>513.13 Control-air tubing. Control-air tubing shall be of sufficient size to meet the required response times. Tubing shall be flushed clean and dry prior to final connections. Tubing shall be adequately supported and protected from damage. Tubing passing through concrete or masonry shall be sleeved and protected from abrasion and electrolytic action.</p>	<p>513.13 Control-air tubing. Control-air tubing shall be of sufficient size to meet the required response times. Tubing shall be flushed clean and dry prior to final connections. Tubing shall be adequately supported and protected from damage. Tubing passing through concrete or masonry shall be sleeved and protected from abrasion and electrolytic action.</p>	None

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<p>513.13.1 Materials. Control-air tubing shall be harddrawn copper, Type L, ACR in accordance with ASTM B 42, ASTM B 43, ASTM B 68, ASTM B 88, ASTM B 251 and ASTM B 280. Fittings shall be wrought copper or brass, solder type in accordance with ASME B 16.18 or ASME B 16.22. Changes in direction shall be made with appropriate tool bends. Brass compression-type fittings shall be used at final connection to devices; other joints shall be brazed using a BCuP5 brazing alloy with solidus above 1,100°F (593°C) and liquids below 1,500°F (816°C). Brazing flux shall be used on copper-to-brass joints only.</p>	<p>513.13.1 Materials. Control-air tubing shall be harddrawn copper, Type L, ACR in accordance with ASTM B 42, ASTM B 43, ASTM B 68, ASTM B 88, ASTM B 251 and ASTM B 280. Fittings shall be wrought copper or brass, solder type in accordance with ASME B 16.18 or ASME B 16.22. Changes in direction shall be made with appropriate tool bends. Brass compression-type fittings shall be used at final connection to devices; other joints shall be brazed using a BCuP5 brazing alloy with solidus above 1,100°F (593°C) and liquids below 1,500°F (816°C). Brazing flux shall be used on copper-to-brass joints only.</p>	None
<p>Exception: Nonmetallic tubing used within control panels and at the final connection to devices provided all of the following conditions are met:</p> <ol style="list-style-type: none"> 1. Tubing shall comply with the requirements of Section 602.2.1.3. 2. Tubing and connected device shall be completely enclosed within a galvanized or paint-grade steel enclosure having a minimum thickness of 0.0296 inch (0.7534 mm) (No. 22 gage). Entry to the enclosure shall be by copper tubing with a protective grommet of Neoprene or Teflon or by suitable brass compression to male barbed adapter. 3. Tubing shall be identified by appropriately documented coding. 4. Tubing shall be neatly tied and supported within the enclosure. Tubing bridging cabinets and doors or moveable devices shall be of sufficient length to avoid tension and excessive stress. Tubing shall be protected against abrasion. Tubing serving devices on doors shall be fastened along hinges. 	<p>Exception: Nonmetallic tubing used within control panels and at the final connection to devices provided all of the following conditions are met:</p> <ol style="list-style-type: none"> 1. Tubing shall comply with the requirements of Section 602.2.1.3. 2. Tubing and connected device shall be completely enclosed within a galvanized or paint-grade steel enclosure having a minimum thickness of 0.0296 inch (0.7534 mm) (No. 22 gage). Entry to the enclosure shall be by copper tubing with a protective grommet of Neoprene or Teflon or by suitable brass compression to male barbed adapter. 3. Tubing shall be identified by appropriately documented coding. 4. Tubing shall be neatly tied and supported within the enclosure. Tubing bridging cabinets and doors or moveable devices shall be of sufficient length to avoid tension and excessive stress. Tubing shall be protected against abrasion. Tubing serving devices on doors shall be fastened along hinges. 	None
<p>513.13.2 Isolation from other functions. Control tubing serving other than smoke control functions shall be isolated by automatic isolation valves or shall be an independent system.</p>	<p>513.13.2 Isolation from other functions. Control tubing serving other than smoke control functions shall be isolated by automatic isolation valves or shall be an independent system.</p>	None

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513.13.3 Testing. Test control-air tubing at three times the operating pressure for not less than 30 minutes without any noticeable loss in gauge pressure prior to final connection to devices.	513.13.3 Testing. Control-air tubing shall be tested at three times the operating pressure for not less than 30 minutes without any noticeable loss in gauge pressure prior to final connection to devices.	None
513.14 Marking and identification. The detection and control systems shall be clearly marked at all junctions, accesses and terminations.	513.14 Marking and identification. The detection and control systems shall be clearly marked at all junctions, accesses and terminations.	None
513.15 Control diagrams. Identical control diagrams shall be provided and maintained as required by the <i>International Fire Code</i> .	513.15 Control diagrams. Identical control diagrams shall be provided and maintained as required by the <i>International Fire Code</i> .	None
513.16 Fire fighter’s smoke control panel. A fire fighter’s smoke control panel for fire department emergency response purposes only shall be provided in accordance with the <i>International Fire Code</i> .	513.16 Fire fighter’s smoke control panel. A fire fighter’s smoke control panel for fire department emergency response purposes only shall be provided in accordance with the <i>International Fire Code</i> .	None
513.17 System response time. Smoke control system activation shall comply with the <i>International Fire Code</i> .	513.17 System response time. Smoke control system activation shall comply with the <i>International Fire Code</i> .	None
513.18 Acceptance testing. Devices, <i>equipment</i> , components and sequences shall be tested in accordance with the <i>International Fire Code</i> .	513.18 Acceptance testing. Devices, <i>equipment</i> , components and sequences shall be tested in accordance with the <i>International Fire Code</i> .	None
513.19 System acceptance. Acceptance of the smoke control system shall be in accordance with the <i>International Fire Code</i> .	513.19 System acceptance. Acceptance of the smoke control system shall be in accordance with the <i>International Fire Code</i> .	None
SECTION 514 ENERGY RECOVERY VENTILATION SYSTEMS	SECTION 514 ENERGY RECOVERY VENTILATION SYSTEMS	
514.1 General. Energy recovery ventilation systems shall be installed in accordance with this section. Where required for purposes of energy conservation, energy recovery ventilation systems shall also comply with the <i>International Energy Conservation Code</i> . Ducted heat recovery ventilators shall be listed and labeled in accordance with UL 1812. Nonducted heat recovery ventilators shall be listed and labeled in accordance with UL 1815.	514.1 General. Energy recovery ventilation systems shall be installed in accordance with this section. Where required for purposes of energy conservation, energy recovery ventilation systems shall comply with the <i>International Energy Conservation Code</i> . Ducted heat recovery ventilators shall be listed and labeled in accordance with UL 1812. Nonducted heat recovery ventilators shall be listed and labeled in accordance with UL 1815.	None

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<p>514.2 Prohibited applications. Energy recovery ventilation systems shall not be used in the following systems:</p> <ol style="list-style-type: none"> 1. Hazardous exhaust systems covered in Section 510. 2. Dust, stock and refuse systems that convey explosive or flammable vapors, fumes or dust. 3. Smoke control systems covered in Section 513. 4. Commercial kitchen exhaust systems serving Type I and Type II hoods. 5. Clothes dryer exhaust systems covered in Section 504. 	<p>514.2 Prohibited applications. Energy recovery ventilation systems shall not be used in the following systems:</p> <ol style="list-style-type: none"> 1. Hazardous exhaust systems covered in Section 510. 2. Dust, stock and refuse systems that convey explosive or flammable vapors, fumes or dust. 3. Smoke control systems covered in Section 513. 4. Commercial kitchen exhaust systems serving Type I or Type II hoods. 5. Clothes dryer exhaust systems covered in Section 504. <p>Exception: The application of ERV equipment that recovers sensible heat only utilizing coil-type heat exchangers shall not be limited by this section.</p>	Excludes Energy recovery ventilation (ERV) equipment utilizing coil-type heat exchangers.
<p>514.3 Access. A means of access shall be provided to the heat exchanger and other components of the system as required for service, maintenance, repair or replacement.</p>	<p>514.3 Access. A means of access shall be provided to the heat exchanger and other components of the system as required for service, maintenance, repair or replacement.</p>	None
<p>514.4 Recirculated air. Air conveyed within energy recovery systems shall not be considered as recirculated air where the energy recovery ventilation system is constructed to limit cross-leakage between air streams to less than 10 percent of the total airflow design capacity.</p>	<p>514.4 Recirculated air. Air conveyed within energy recovery systems shall not be considered as recirculated air where the energy recovery ventilation system is constructed to limit cross-leakage between air streams to less than 10 percent of the total airflow design capacity.</p>	None