

DPD

Director's Rule 29-2005

Applicant: City of Seattle Department of Planning and Development	Page 1 of 3	Supersedes: DR 28-96
	Publication: 11/14/05	Effective: 12/6/05
Subject: Structural Support of Ducts and Mechanical Equipment	Code and Section Reference: 2003 Seattle Mechanical Code, Chs. 3, 5, & 6 2003 Seattle Building Code, Chs. 16 & 17	
	Type of Rule: Code Interpretation	
Index: Seattle Mechanical Code – Technical Requirements	Approved (signature on file)	Date 12/1/05 Diane M. Sugimura, Director, DPD

BACKGROUND

Several factors make it difficult to ensure full compliance with code requirements for the design and installation of structural support for ducts and mechanical equipment. These factors include:

- (1) the wide variation in the sizes of ducts and equipment;
- (2) the importance to life safety of equipment differs (e.g. smoke control equipment vs. toilet room systems);
- (3) the risk of injury to people varies depending on the location of the equipment;
- (4) the burden imposed by requiring an engineered design is different depending on the size of the project, the knowledge of the applicant and the contractual relationships of the project consultants and contractors;
- (5) the infrequency of life-threatening incidents; and
- (6) DPD's need to allocate its resources carefully.

SELECTED CODE REFERENCES

Seattle Building Code

- **Chapter 16 Structural design.** This chapter requires design and construction to safely support all load combinations (Section 1604.2), use of actual weight of equipment in determining dead loads in design (Section 1606.2), and seismic design requirements (Section 1621.1.3).
- **Chapter 17 Structural tests and special inspections.** This chapter requires quality assurance for seismic resistance, including support for heating, ventilating and air-conditioning ductwork containing hazardous materials and anchorage of such ductwork (Section 1705) and special inspection requirements for HVAC ductwork containing hazardous materials (Section 1707.7).

Seattle Mechanical Code

- **Chapter 3 General regulations.** This chapter requires that a structure not be weakened by the installation of mechanical systems (Section 302), that installations of equipment and appliances be installed as required by the terms of their approval, in accordance with the conditions of the listing, the manufacturer's installation instructions and this code (Section 304).
- **Chapter 5 Exhaust systems.** This chapter requires that ducts for smoke control systems be supported directly from fire-resistance-rated structural elements (Section 513.10.2)
- **Chapter 6 Duct systems.** This chapter requires that ducts be supported by approved hangers, have adequate seismic bracing (Section 603.10), and are protective of fire-resistance-rated assemblies (Section 607).

RULE

I. ANCHORAGE OF ROOF-MOUNTED MECHANICAL EQUIPMENT

The owner and construction team are required to install all roof-mounted mechanical equipment in a safe manner, without overstressing the building structure. The anchorage must prevent the equipment from overturning, uplifting and sliding (SBC 1609.1.3).

In general, DPD will not play an active role in enforcing bracing requirements for roof-mounted equipment unless it appears to be an obvious life-safety hazard in the event of a bracing failure. Examples of hazards include (1) equipment located within 10 feet of the edge of a roof or skylight; (2) equipment located on a roof with a slope greater than 2:12; (3) equipment that is tall or is mounted with its frame more than four feet above the roof surface; (4) equipment that is part of a building's life safety systems, such as emergency generators, pressurization and smoke control fans, fire

pumps; or (5) other heavy equipment which, if knocked over in a seismic event, is likely to cause the failure of the roof's structural system.

For equipment which DPD considers to be potentially hazardous, the applicant shall submit engineered details and an analysis with the plans submitted for review. Upon agreement with DPD, such details may be submitted after issuance of the permit but before installation of the equipment. The engineering analysis may be done by a mechanical, structural, or civil engineer experienced in equipment anchorage, and must be reviewed by the project's structural engineer of record if the equipment is being installed in conjunction with the construction of a new building.

II. ANCHORAGE OF INTERIOR MECHANICAL EQUIPMENT

The owner and contractor are required to install interior mechanical equipment in a safe manner. In general, DPD will defer to the standards for support as defined by the equipment manufacturer and/or structural engineer. When a conflict exists between the Seattle Mechanical Code and the manufacturer's installation instructions the more restrictive will apply.

DPD field inspectors will require adequate vertical and lateral support if they encounter conditions in the field they consider unsafe. Suspended equipment shall be seismically restrained according to approved standards.

When plans having equipment weighing 1,000 pounds or greater are submitted, DPD plan reviewers will enforce code requirements for both vertical and lateral support to protect people in occupied portions of the building from risk.

III. SUPPORTING STRUCTURE

When equipment which weighs more than 400 pounds will be installed in a building, DPD will require the applicant to submit calculations or other information necessary to verify that the roof or floor supporting the equipment is adequate.