

SEISMIC AND WIND REQUIREMENTS
RISK CATEGORIES I, II & III
INFORMATION FOR NCBC-2018 / ASCE 7-10

THE BUILDING IS RISK CATEGORY: II, SEISMIC DESIGN CATEGORY: C, WIND EXPOSURE CATEGORY: C (130 MPH)

REFER TO ARCHITECTURAL DRAWINGS TO DETERMINE FINAL RISK CATEGORY AND SEISMIC DESIGN CATEGORY. THE SUB-CONTRACTOR SHALL PROVIDE SEISMIC RESTRAINTS ON ALL MECHANICAL COMPONENTS AS REQUIRED PER THE FOLLOWING REQUIREMENTS. THE SUB-CONTRACTOR SHALL SUBMIT DETAILED SEISMIC RESTRAINT SHOP DRAWINGS SHOWING ALL DESIGN COMPONENTS. THE SHOP DRAWINGS SHALL BE SIGNED AND SEALED BY A REGISTERED ENGINEER.

COMPONENT IMPORTANCE FACTOR (Ip)		
Ip = 1.0		Ip = 1.5
• AIR HANDLING UNITS (FLOOR) • AIR HANDLING UNITS (SUSP) • AIR SEPARATOR • AIR SEPARATORS & EXP. TANKS • CABINET HEATERS (SUSP) • CABLE TRAY, BUS DUCT, TRAPEZOID SUPPORTED CONDUIT > 10 LB/FT (NOTE 6) • CEILING DIFFUSERS ≥ 20 LB • CEILING FANS > 20 LB • CEILING FANS < 20 LB • CHILLED WATER PIPING • CHILLERS (ROOF OR UPPER FLOORS) • CHILLERS (ON GRADE) • CONDUIT ≥ 2.5" DIA. • COOLING TOWERS (ON GRADE) • COOLING TOWERS (ROOF) • DOMESTIC WATER • DUCT • ELECTRIC WATER HEATERS • EXPANSION TANK • FAN COILS • FAN VAV TERMINAL • GENERATORS (ON GRADE) • GENERATORS (UPPER FLOORS) • HOT WATER PIPING • INLINE FANS • INLINE PUMPS < 5 HP • INLINE PUMPS ≥ 5 HP		• AIR COMPRESSORS • BOILERS (ON GRADE) • BOILERS (UPPER FLOORS) • COMPRESSED AIR PIPING • DUCT USED FOR SMOKE CONTROL • EMERGENCY, STANDBY, LIFE SAFETY COMPONENTS • FLASH TANK • GAS GENERATORS • GAS INFRARED HEATERS • GAS PACKAGED RTU ≤ 5 TONS • GAS PACKAGED RTU > 5 TONS • GAS PIPING • GAS UNIT HEATERS (SUSP) • GAS WATER HEATERS • KITCHEN HOODS • STEAM CONDENSATE PIPING • STEAM PIPING • STEAM TO WATER HEAT EXCHANGERS • STEAM WATER HEATERS • SUSPENDED GAS FURNACE

- A. PER THE 2015 INTERNATIONAL BUILDING CODE, MECHANICAL, PLUMBING AND ELECTRICAL EQUIPMENT AND COMPONENTS, INCLUDING THEIR SUPPORTS AND ATTACHMENTS, SHALL BE DESIGNED FOR SEISMIC FORCES IN ACCORDANCE WITH CHAPTER 13 OF ASCE 7-10.
- B. EXTERIOR EQUIPMENT (INCLUDING ROOF CURBS, RAILS, SUPPORTS) EXPOSED TO WIND SHALL BE DESIGNED AND INSTALLED TO RESIST THE WIND PRESSURES DETERMINED IN ACCORDANCE WITH CHAPTERS 26 TO 29 OF ASCE 7-10.
- C. WHERE DESIGN FOR WIND AND FLOOR LOADS IS REQUIRED, THE MORE DEMANDING FORCE MUST BE USED.
- D. WHERE THE STRUCTURAL DRAWINGS FOR SITE SPECIFIC INFORMATION ON SEISMIC DESIGN CATEGORY, WIND SPEEDS, ETC.
- E. SEE EQUIPMENT SCHEDULES AND DETAILS FOR SPECIFIC COMPONENT IMPORTANCE FACTOR DESIGNATIONS.
- F. USE TABLE BELOW TO DETERMINE SEISMIC RESTRAINT REQUIREMENTS FOR EACH COMPONENT.
- G. FOR ALL COMPONENTS REQUIRING SEISMIC RESTRAINT, THE COMPONENT SUPPORTS AND ATTACHMENTS SHALL BE DESIGNED BY A REGISTERED DESIGN PROFESSIONAL.
- H. WHERE SEISMIC RESTRAINT IS REQUIRED, HOUSEKEEPING PADS NEEDED FOR THE INSTALLATION OF EQUIPMENT UNDER THIS CONTRACT MUST BE DESIGNED BY THE SEISMIC ENGINEER. DO NOT POUR ANY HOUSEKEEPING PADS PRIOR TO THE RECEIPT OF THE APPROVED SEISMIC SUBMITTAL.
- I. SEISMIC RESTRAINTS FOR DUCTWORK, PIPING, CONDUIT, CABLE TRAY AND BUS DUCT MUST BE SHOWN ON LAYOUT DRAWINGS SHOWING SPECIFIC RESTRAINT LOCATIONS ALONG WITH ACCOMPANYING DETAILS AND CALCULATIONS.

SEISMIC DESIGN CATEGORY C					
COMPONENT IDENTIFICATION		COMPONENT IMPORTANCE FACTOR (Ip)			
		1.0		1.5	
		SEISMIC RESTRAINT REQUIREMENT	ASCE 7-10 REFERENCE	SEISMIC RESTRAINT REQUIREMENT	ASCE 7-10 REFERENCE
ROOF MOUNTED		NOT REQUIRED	13.1.4.5	RESTRAIN ALL	13.1.4.5
FLOOR MOUNTED		NOT REQUIRED	13.1.4.5	RESTRAIN ALL	13.1.4.5
WALL MOUNTED		NOT REQUIRED	13.1.4.5	RESTRAIN ALL	13.1.4.5
COMPONENT SUPPORTS		NOT REQUIRED	13.1.4.5	RESTRAIN ALL	13.6.5
SUSPENDED EQUIPMENT	INLINE W/ DUCT/PIPE	NOT REQUIRED	13.1.4.5	RESTRAIN IF >75 LBS PROVIDE FLEX. CONN. (SEE NOTE 1)	13.6.7
	NOT INLINE W/ DUCT/PIPE	NOT REQUIRED	13.1.4.5	RESTRAIN ALL	13.1.4.5
SUSPENDED DUCTILE PIPING (STEEL, ALUMINUM, COPPER, ETC.)		NOT REQUIRED	13.1.4.5	RESTRAINT IF > 2" (SEE NOTE 2)	13.6.8.3.3.a
SUSPENDED NON DUCTILE PIPING (CAST IRON, PLASTIC, CERAMIC)		NOT REQUIRED	13.1.4.5	RESTRAIN ALL (SEE NOTE 2)	13.6.8.3.3
SUSPENDED PIPE ON TRAPEZE		NOT REQUIRED	13.1.4.5	RESTRAIN IF ANY PIPE ON TRAPEZE > 2" (SEE NOTE 2) RESTRAIN IF TOTAL WEIGHT OF PIPES ON TRAPEZE > 10 LBS/FT (SEE NOTE 2)	13.6.8.3.1
DUCTWORK		NOT REQUIRED	13.6.7	RESTRAIN IF > 6 SQ.FT. AND > 17 LBS/FT (SEE NOTE 2.3)	13.6.7
MULTIPLE DUCTS ON TRAPEZE		NOT REQUIRED	13.6.7	RESTRAIN IF TOTAL WEIGHT OF DUCTS ON TRAPEZE > 10 LBS/FT (SEE NOTE 2.3)	13.6.7
SINGLE CONDUIT		NOT REQUIRED	13.6.5.6	RESTRAIN IF ≥ 2.5" (SEE NOTE 2)	13.6.5.6
CABLE TRAY/BUS DUCT/ TRAPEZED CONDUIT		NOT REQUIRED	13.6.5.6	RESTRAIN IF TOTAL WEIGHT OF RACEWAY > 10 LBS/FT (SEE NOTE 2)	13.6.5.6
PENDANT, LAY-IN, & CAN LIGHTS		REQUIRED (SEE NOTE 4)	13.5.6.2	REQUIRED (SEE NOTE 4)	13.5.6.2
COMPONENT CERTIFICATION		NOT REQUIRED	13.2.2	REQUIRED (SEE NOTE 5)	13.2.2

1. FLEXIBLE CONNECTIONS REQUIRED FOR PIPE CONNECTIONS ONLY.
2. RESTRAINT IS NOT REQUIRED IF THE PIPING / DUCTWORK / CONDUIT IS SUPPORTED BY HANGERS AND EACH HANGER IN THE PIPING RUN IS 12 IN. OR LESS IN LENGTH FROM THE TOP OF THE PIPE TO THE SUPPORTING STRUCTURE. WHERE PIPES ARE SUPPORTED ON A TRAPEZE, THE TRAPEZE SHALL BE SUPPORTED BY HANGERS HAVING A LENGTH OF 12 IN. OR LESS. WHERE ROD HANGERS ARE USED, THEY SHALL BE EQUIPPED WITH SWIVELS, EYE NUTS OR OTHER DEVICES TO PREVENT BENDING IN THE ROD.
3. ALL DUCTWORK, REGARDLESS OF SIZE, SHALL BE PROTECTED FROM TOXIC, HIGHLY TOXIC, OR EXPLOSIVE GASES OR USED FOR SMOKE CONTROL MUST BE RESTRAINED.
4. THE RESTRAINT OF PENDANT, LAY-IN, & CAN LIGHTS IS ADDRESSED IN ASTM C636 & E580.
5. COMPONENT CERTIFICATION MUST BE SUPPLIED BY THE EQUIPMENT MANUFACTURER AT TIME OF SUBMITTAL FOR REVIEW BY ENGINEER OF RECORD.

SEISMIC DESIGN CATEGORIES D, E, F					
COMPONENT IDENTIFICATION		COMPONENT IMPORTANCE FACTOR (Ip)			
		1.0		1.5	
		SEISMIC RESTRAINT REQUIREMENT	ASCE 7-10 REFERENCE	SEISMIC RESTRAINT REQUIREMENT	ASCE 7-10 REFERENCE
ROOF MOUNTED		RESTRAIN ALL (SEE NOTE 1)	13.1.4.6	RESTRAIN ALL	13.1.4.6
FLOOR MOUNTED		RESTRAIN ALL (SEE NOTES 1,2)	13.1.4.6	RESTRAIN ALL	13.1.4.6
WALL MOUNTED		RESTRAIN ALL (SEE NOTE 1,2)	13.1.4.6	RESTRAIN ALL	13.1.4.6
COMPONENT SUPPORTS		RESTRAIN ALL (SEE NOTE 1)	13.6.5	RESTRAIN ALL	13.6.5
SUSPENDED EQUIPMENT	INLINE W/ DUCT/PIPE	RESTRAIN IF >75 LBS PROVIDE FLEX. CONN. (SEE NOTE 3)	13.6.7	RESTRAIN IF >75 LBS PROVIDE FLEX. CONN. (SEE NOTE 3)	13.6.7
	NOT INLINE W/ DUCT/PIPE	RESTRAIN ALL (SEE NOTE 1)	13.1.4.6	RESTRAIN ALL	13.1.4.6
SUSPENDED DUCTILE PIPING (STEEL, ALUMINUM, COPPER, ETC.)		RESTRAIN IF > 3" (SEE NOTE 4)	13.6.8.3.3.c	RESTRAIN IF > 1" (SEE NOTE 4)	13.6.8.3.3.b
SUSPENDED NON DUCTILE PIPING (CAST IRON, PLASTIC, CERAMIC)		RESTRAIN ALL (SEE NOTE 4)	13.6.8.3.3	RESTRAIN ALL (SEE NOTE 4)	13.6.8.3.3
SUSPENDED PIPE ON TRAPEZE		RESTRAIN IF ANY PIPE ON TRAPEZE > 3" RESTRAIN IF TOTAL WEIGHT OF PIPES ON TRAPEZE > 10 LBS/FT (SEE NOTE 4)	13.6.8.3.1	RESTRAIN IF ANY PIPE ON TRAPEZE > 1" > 17 LBS/FT (SEE NOTE 4,5)	13.6.8.3.1
DUCTWORK		RESTRAIN IF > 6 SQ.FT. AND > 17 LBS/FT (SEE NOTE 4,5)	13.6.7	RESTRAIN IF > 6 SQ.FT. AND > 17 LBS/FT (SEE NOTE 4,5)	13.6.7
MULTIPLE DUCTS ON TRAPEZE		RESTRAIN IF TOTAL WEIGHT OF DUCTS ON TRAPEZE > 10 LBS/FT (SEE NOTE 4,5)	13.6.7	RESTRAIN IF TOTAL WEIGHT OF DUCTS ON TRAPEZE > 10 LBS/FT (SEE NOTE 4,5)	13.6.7
SINGLE CONDUIT		RESTRAIN IF > 2.5" (SEE NOTE 4)	13.6.5.6	RESTRAIN IF > 2.5" (SEE NOTE 4)	13.6.5.6
CABLE TRAY/BUS DUCT/ TRAPEZED CONDUIT		RESTRAIN IF TOTAL WEIGHT OF RACEWAY > 10 LBS/FT (SEE NOTE 4)	13.6.5.6	RESTRAIN IF TOTAL WEIGHT OF RACEWAY > 10 LBS/FT (SEE NOTE 4)	13.6.5.6
PENDANT, LAY-IN, & CAN LIGHTS		REQUIRED (SEE NOTE 6)	13.5.6.2	REQUIRED (SEE NOTE 6)	13.5.6.2
COMPONENT CERTIFICATION		NOT REQUIRED	13.2.2	REQUIRED (SEE NOTE 7)	13.2.2

TABLE NOTES:

1. EQUIPMENT 20 LBS. OR LESS IS EXEMPT IF THE COMPONENT IS POSITIVELY ATTACHED TO THE STRUCTURE, AND FLEXIBLE CONNECTIONS ARE PROVIDED BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING, AND CONDUIT.
2. RESTRAINTS ARE NOT REQUIRED IF THE COMPONENT WEIGHTS 400 LBS. OR LESS, IS MOUNTED WITH THE CENTER OF MASS AT 4 FT. OR LESS ABOVE A FLOOR, IS POSITIVELY ATTACHED TO THE STRUCTURE, AND HAS FLEXIBLE CONNECTIONS BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING, AND CONDUIT.
3. FLEXIBLE CONNECTIONS REQUIRED FOR PIPE CONNECTIONS ONLY.
4. RESTRAINT IS NOT REQUIRED IF THE PIPING / DUCTWORK / CONDUIT IS SUPPORTED BY HANGERS AND EACH HANGER IN THE PIPING RUN IS 12 IN. OR LESS IN LENGTH FROM THE TOP OF THE PIPE TO THE SUPPORTING STRUCTURE. WHERE PIPES ARE SUPPORTED ON A TRAPEZE, THE TRAPEZE SHALL BE SUPPORTED BY HANGERS HAVING A LENGTH OF 12 IN. OR LESS. WHERE ROD HANGERS ARE USED, THEY SHALL BE EQUIPPED WITH SWIVELS, EYE NUTS OR OTHER DEVICES TO PREVENT BENDING IN THE ROD.
5. ALL DUCTWORK, REGARDLESS OF SIZE, DESIGNED TO CARRY TOXIC, HIGHLY TOXIC, OR EXPLOSIVE GASES USED FOR SMOKE TESTING, SHALL BE RESTRAINED.
6. THE RESTRAINT OF PENDANT, LAY-IN, AND CAN LIGHTS IS ADDRESSED IN ASTM C638 & E580.
7. COMPONENT CERTIFICATION MUST BE SUPPLIED BY THE EQUIPMENT MANUFACTURER AT TIME OF SUBMITTAL FOR REVIEW BY ENGINEER OF RECORD.



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PHASE	PERMIT SET
DATE	05.29.2026
TD PROJECT #	25-009
SCO ID #	N/A

DRAWING TITLE