




City of Phoenix

FIRE DEPARTMENT
FIRE PREVENTION DIVISION

Explanatory Policy – Voltage Drop Calculations

SUBJECT: Voltage Drop Calculations	EFFECTIVE DATE: May 18, 2020
REFERENCES: 2018 Phoenix Fire Code Section Chapter 9 Section 907.1.2 #9 & 2016 NFPA 72 Chapter 10 Section 10.3.5	REVIEW DATE: July 2024
APPROVED:  John Merteris, Fire Marshal	

Scope:

This policy covers the City of Phoenix Fire Prevention Division’s interpretation on how to submit complaint voltage drop calculations. These calculations are a requirement of the submitted Fire Alarm Shop Drawings outlined in Section 907.1.2 (2018 Phoenix Fire Code). Metrics for this calculation are provided in Section 10.3.5 (2016 NFPA 72).

2018 Phoenix Fire Code - Chapter 9 Section 907 - Fire Alarm and Detection - Voltage drop calculations.

The two predominant methods of voltage drop calculations are point-to-point and end-of-line lump sum. Center loading of the circuits is also an acceptable method.

2016 NFPA 72 - Chapter 10 - Section 10.3 – Equipment.

Equipment shall be designed so that it is capable of performing its intended functions under the following conditions:

1. At 85 percent and at 110 percent of the nameplate primary (main) and secondary (standby) input voltage(s)
2. At ambient temperatures of 0°C (32°F) and 49°C (120°F)
3. At a relative humidity of 85 percent and an ambient temperature of 30°C (86°F)

Example: Assume 100% input is 24V (typical). 85% of 24V would be 20.4V. The range of operation starts at 16V. The drop between 20.4V and 16V is 4.4V. So, the maximum voltage drop permitted for this circuit is 4.4V. This is the most conservative approach no matter what the input voltage is as long as it’s above 20.4V. The voltage at the end of this circuit must never be less than 16V.

Note: This is an example of a typical circuit. Calculations may vary based on the range of operation for devices noted in the manufacturer’s cutsheets.