

Computed Volumes and Air Flow in Experimental Halls A, B & C

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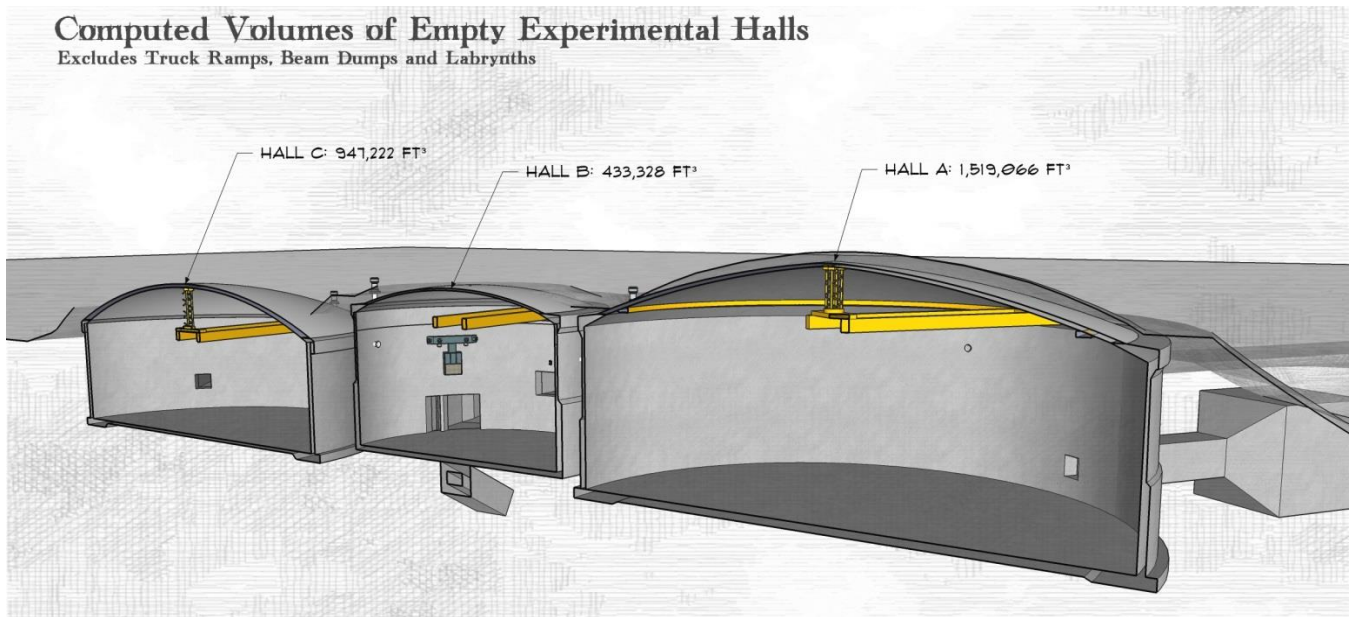


Figure 1. Air Volumes of Experimental Halls

I. INTRODUCTION

Following on the mechanical and ventilation study discussed in Jefferson Lab Tech Note 16-045, this document details the current expected air changes in each of the Experimental Halls A, B, & C using the existing equipment. Note that for the purpose of this document, the Halls are considered to be completely empty and the air volume does not include truck ramps, beam dumps, labyrinths, closets or enclosures that may be adjacent to the Hall.

Further, the numbers computed here assume a perfect replacement of air – where every CFM of air replaces an existing CFM of air and all air within the Hall is completely homogenous. The reader should note that this is unlikely to be the case, as some cryogenes are lighter than air and others are heavier.

The calculations provided here are based on various configurations of operating fans. In each case, the capacity of the fans will be listed along with the frequency with which the air in the Hall will be changed. The numbers of air changes per hour are also provided.

II. CALCULATIONS

1. Hall A Air Exchange Rates

Note that Hall A has an empty volume of 1,519,066 cubic feet.

- a. Using SAF-EA-1: Outside Supply Air Fan
 - Fan capacity: 1,300 CFM
 - Time for one air exchange: 19.47 Hours
 - Air changes per hour: 0.05
- b. Using EF-EA-1: Low Speed Exhaust Fan
 - Fan Capacity: 1,000 CFM
 - Time for one air exchange: 25.32 Hours
 - Air exchanges per hour: 0.04
- c. Using One Smoke Removal Fan
 - Fan capacity: 12,000 CFM
 - Time for one air exchange: 2.11 Hours
 - Air changes per hour: 0.47
- d. Using ALL Smoke Removal Fan
 - Fan capacity: 72,000 CFM
 - Time for one air exchange: 21 Minutes
 - Air changes per hour: 2.84

2. Hall B Air Exchange Rates

Note that Hall B has an empty volume of 433,328 cubic feet.

- a. Using SAF-EB-1: Outside Supply Air Fan
 - Fan capacity: 1,300 CFM
 - Time for one air exchange: 5.56 Hours
 - Air changes per hour: 0.18
- b. Using EF-EB-1: Low Speed Exhaust Fan
 - Fan Capacity: 1,000 CFM
 - Time for one air exchange: 7.22 Hours
 - Air exchanges per hour: 0.14
- c. Using One Smoke Removal Fan
 - Fan capacity: 25,500 CFM
 - Time for one air exchange: 17 Minutes
 - Air changes per hour: 3.53
- d. Using ALL Smoke Removal Fan
 - Fan capacity: 87,000 CFM
 - Time for one air exchange: 4.98 Minutes
 - Air changes per hour: 12.05

3. Hall C Air Exchange Rates

Note that Hall A has an empty volume of 947,222 cubic feet.

- a. Using SAF-EC-1: Outside Supply Air Fan
 - Fan capacity: 1,300 CFM
 - Time for one air exchange: 12.14 Hours
 - Air changes per hour: 0.08
- b. Using EF-EC-1: Low Speed Exhaust Fan
 - Fan Capacity: 1,000 CFM
 - Time for one air exchange: 15.79 Hours
 - Air exchanges per hour: 0.06
- c. Using One Smoke Removal Fan
 - Fan capacity: 15,000 CFM
 - Time for one air exchange: 63.15 Minutes
 - Air changes per hour: 0.95
- d. Using ALL Smoke Removal Fan
 - Fan capacity: 81,000 CFM
 - Time for one air exchange: 11.69 Minutes
 - Air changes per hour: 5.13

III. CONCLUSION

The calculations provided here are based on the fan systems that are installed and operational as of January 20, 2017. Please see Jefferson Lab Tech Note 16-045 for specific details about the capacity, configuration and location of each fan.