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Air Flow Measurements in a Laboratory Fume Hood,
Fisher Scientific Co., Type 17-105

by

William F. Goddard

Report to

Naval Security Agency
Washington, D. C.

NBS

U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

Report on

Air Flow Measurements in a Laboratory Fume Hood,
Fisher Scientific Co., Type 17-105

for
The Naval Security Agency
(Attn: Mr. George A. Smith)

1. Introduction

In accordance with the request of Mr. George A. Smith, Naval Security Agency, on December 3, 1958, air measurement tests were made on one of two identical laboratory hoods, Fisher Scientific Co., Type 17-105. These measurements were made on December 10, 1958, to ascertain the velocity through these fume hoods with the front window in open and closed positions and to also ascertain the flow through the hoods while operating them at a static pressure (outlet) of 1/4-in. water gauge, as specified by the manufacturer.

It was requested by the Naval Security Agency that a vane type anemometer be used for these measurements.

2. Description of the Test Specimen

The fume hood superstructure, inside dimensions 46 in. x 23 in. x 36 to 41 in., consisted of a steel frame with side and roof panels resting on a steel base and laboratory type top. A vertical baffle was situated 2 in. out from the rear wall, beginning 10 1/2 in. up from the table top and extending 23 1/2 in. upwards, at which height it met an overhead adjustable type baffle positioned at an angle of 45 degrees with the back wall and ceiling. There were adjustable dampers at both the upper and lower edges of this inclined baffle. The plenum thus formed by the vertical and inclined baffles was connected to the exhaust system by an adapter measuring 16 in. x 4 in. x 12 1/2 in.

A motor-blower utility set located on top of the hood and connected to the adapter through a 7-in. diameter duct provided the air circulation through the hood. The motor-blower assembly, as specified in American Blower Bulletin No. 8314, consisted of a 1/3 H.P., 1725 RPM, 50-60 cycles motor driving a blower rated by the manufacturer at 855 CFM at 1/4 in. S.P.

A movable window panel at the front of the cabinet provided access to the hood. The face dimensions of the window opening in an open position were 40 1/4 in. x 30 1/2 in.; in a "closed" position, 40 1/4 in. x 1/8 in. The attached side view sketch shows the arrangement and principal dimensions of the baffles inside the hood,and the front view sketch shows the dimensions of the window opening and the opening to which the exhaust blower was attached.

3. <u>Test Procedure</u>

With the blower running continuously, and restricted at the outlet to produce a 1/4-in. S.P. on the discharge side, a 4-in. calibrated vane type anemometer was used to make four air-velocity traverses, as follows:

(1) In a vertical plane defined by the opening existing when the window was in a fully raised position. This was an area of 40 1/4 in. x 30 1/2 in.

(2) In a vertical plane defined by the opening existing when the window was raised 4 5/8 in. from the table top. (This was the smallest vertical dimension in which the vane type anemometer could be used.) The area of the traverse was 40 1/4 in. x 4 5/8 in.

(3) In a vertical plane 9 in. from the back wall and parallel to it; from the table top to 30 in. above the table top with the front window fully open. Traverse area was 46 in. x 30 in.

(4) In a vertical plane 9 in. from the back wall and parallel to it for a height of 7 in. from the table top. This afforded an area for traverse measuring 46 in. x 7 in. The front window was closed for this measurement.

Each traverse was made twice--once with the dampers open and a second time with the dampers closed. In addition to these, there were some measurements made with the front and then the back dampers of the inclined baffle open, in turn.

A traverse in the 46 in. x 10 1/2 in. opening under the vertical baffle could not be made because of the presence of fittings and a drain in this space.

4. <u>Test Results</u>

The traverse made with the access window open 4 5/8 in. showed an average velocity of 535 feet/minute in the opening corresponding to a total air flow rate of 690 cu ft/min. It would be safe to assume that the air flow rate with the window fully open would be equal to or greater than 690 cu ft/min Thus, the equipment meets the minimum air flow requirement of 500 cu ft/min reported to be incorporated in the purchase specification.

When the access window was fully open the air flow would not turn the vane anemometer steadily in any part of the opening. Calibrations of the instrument at the National Bureau of Standards indicated that a velocity