Form 2H-4 Calculation of Replacement Velocity Values for a Method 1 Equal-Area Sector Closest to the Stack Wall for a 16-Point Method 1 Traverse, Using a Complete Traverse

1st Probe Type/ID/Pts. Sampled: *Type S Straight-up/S-13/All* Tester(s): *Test Team III*

2nd Probe Type/ID/Pts. Sampled: _____ Affiliation: *Contractor III*

Entry Port ID (e.g., A, B, C, or D): *A*

1. Diameter of the stack or duct (ft)	24	Radius, r, of the stack or duct (in.) (= diameter × 6)	144

2. Location (column A), measured and decay velocities (columns B and C), and volumetric flow (column G) associated with each successive wall effects traverse point.

(A)	(B)	(C)	(D)	(E)	(F)	(G)
Distance (d) from Wall	Measured Velocity (v_d) at Distance d	Decay Velocity ($vdec_d$)	Intermediate Calculations		Area of Sub-sector (A_d)	Volumetric Flow in Sub-sector (Q_d)
		$\frac{v_{d-1}+v_d}{2}$ Note: $v_0 = 0$	$\frac{1}{4}\pi[r-d+1]^2$	$\frac{1}{4}\pi[r-d]^2$	(Col. D - Col. E)	(Col. C × Col. F)
(in.)	(ft/sec)	(ft/sec)	(in.²)	(in.²)	(in.²)	(ft-in.²/sec)
$d = 1$	51.71 NM	25.85	16,286.00	16,060.59	225.41	5,827.47
$d = 2$	51.71 NM	51.71	16,060.59	15,836.76	223.84	11,573.72
$d = 3$	51.71	51.71	15,836.76	15,614.49	222.27	11,492.51
$d = 4$	62.26	56.98	15,614.49	15,393.79	220.70	12,576.24
$d = 5$	67.16	64.71	15,393.79	15,174.67	219.13	14,179.40
$d = 6$	69.44	68.30	15,174.67	14,957.11	217.56	14,858.32
$d = 7$	72.63	71.03	14,957.11	14,741.13	215.98	15,341.75
$d = 8$	71.37	72.00	14,741.13	14,526.71	214.41	15,437.01
$d = 9$	74.37	72.87	14,526.71	14,313.87	212.84	15,510.03
$d = 10$	75.80	75.08	14,313.87	14,102.60	211.27	15,863.30
$d = 11$	77.15	76.47	14,102.60	13,892.90	209.70	16,035.93
$d_{last} = 12$	78.58	77.86	13,892.90	13,684.77	208.13	16,205.92

3. Total volumetric flow for all sub-sectors located between stack wall and d_{last} (total Col. G).	164,901.59
4. Volumetric flow for remainder of the Method 1 equal-area sector.	
a. Velocity measurement at distance d_{rem} from stack wall (v_{drem}). (If d_{rem}- d_{last}<½ in., then no measurement at d_{rem} is necessary. Enter the velocity at d_{last} on this line.)	78.51
b. Total area in remainder of Method 1 equal-area segment (A_{drem}). Subtract $\frac{3}{16}\pi(r)^2$ from last entry in item 2, column E, and enter the result on this line.	1,470.26
c. Multiply values on lines 4a and 4b. (Q_{drem})	115,430.44
5. Wall effects-adjusted velocity in the Method 1 equal-area sector.	
a. Add the values on lines 3 and 4c. (Q_T)	280,332.03
b. Divide line 5a by $\frac{1}{16}\pi(r)^2$. The resulting value is one of four "replacement" point velocity values adjusted for wall effects, $\hat{v}e_{L}$, as derived in Equation 2H-16.	68.85
6. Substitute the value shown in 5b for the unadjusted velocity value in the Method 1 sector. (See Eq. 2H-18.)	