

EXPT. No. — I

Determination of FLAME SPEED and BURNER LOADING in a Pre-Mixed Combustion of Gaseous Fuel and Study of Flame Stability

Objective :

- (i) To determine the variation of flame speed with air-fuel ratio.
- (ii) Demonstration of 'Lift-Off' and 'Flash Back'.
- (iii) To determine the variation of burner loading with air-fuel ratio.

Fuel used : L.P.G

Calorific value of the fuel : 70 MJ/m³

Burner Tube diameters used : 25 mm, 19 mm, 16 mm, 12.5 mm.

$$\text{Burner loading} = \frac{\text{Gas Flow} \times \text{Calorific Value}}{\text{Port Area}}$$

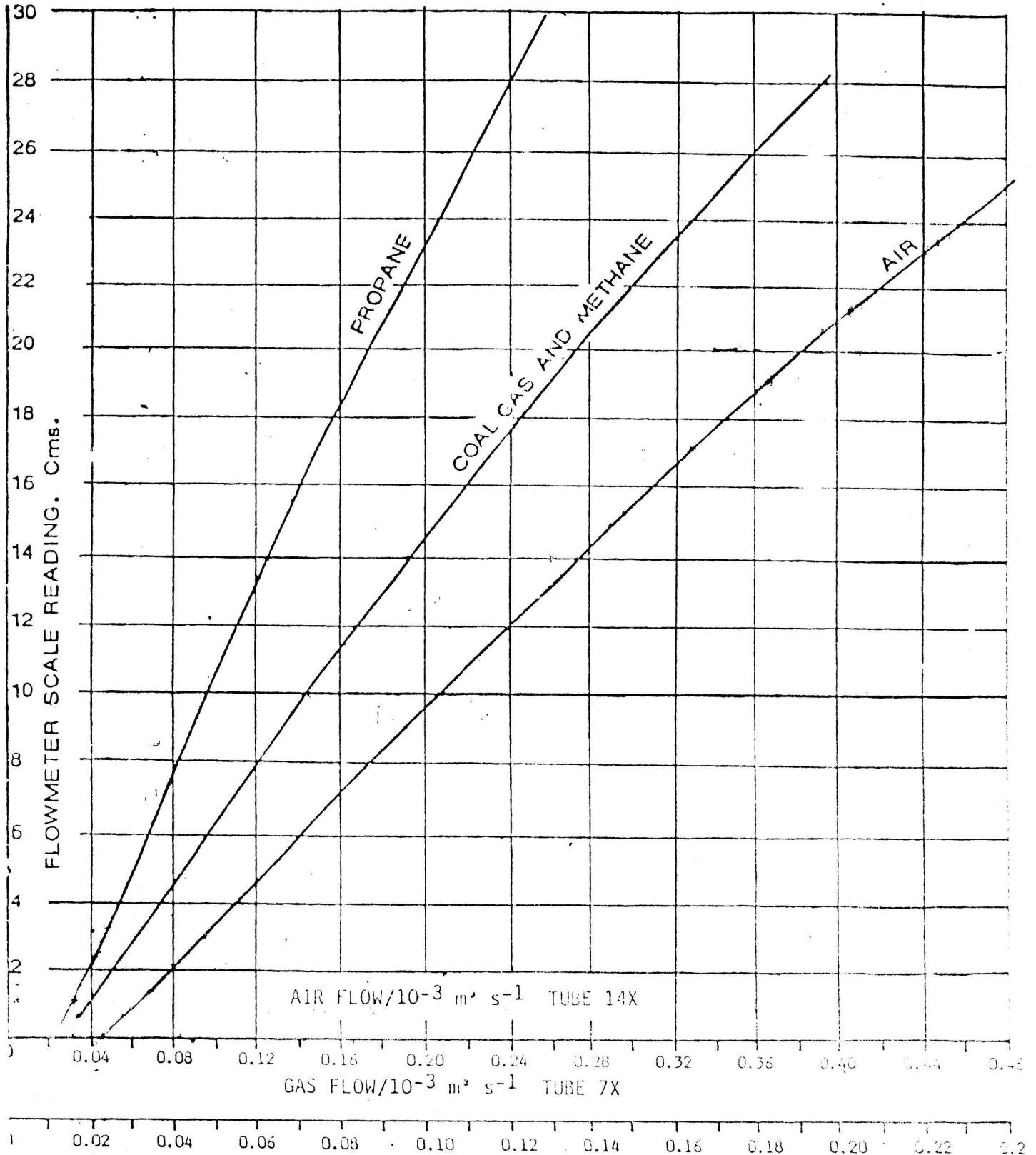
Burner Tube Diameters:

25 mm, 19 mm, 16 mm, 12.5 mm

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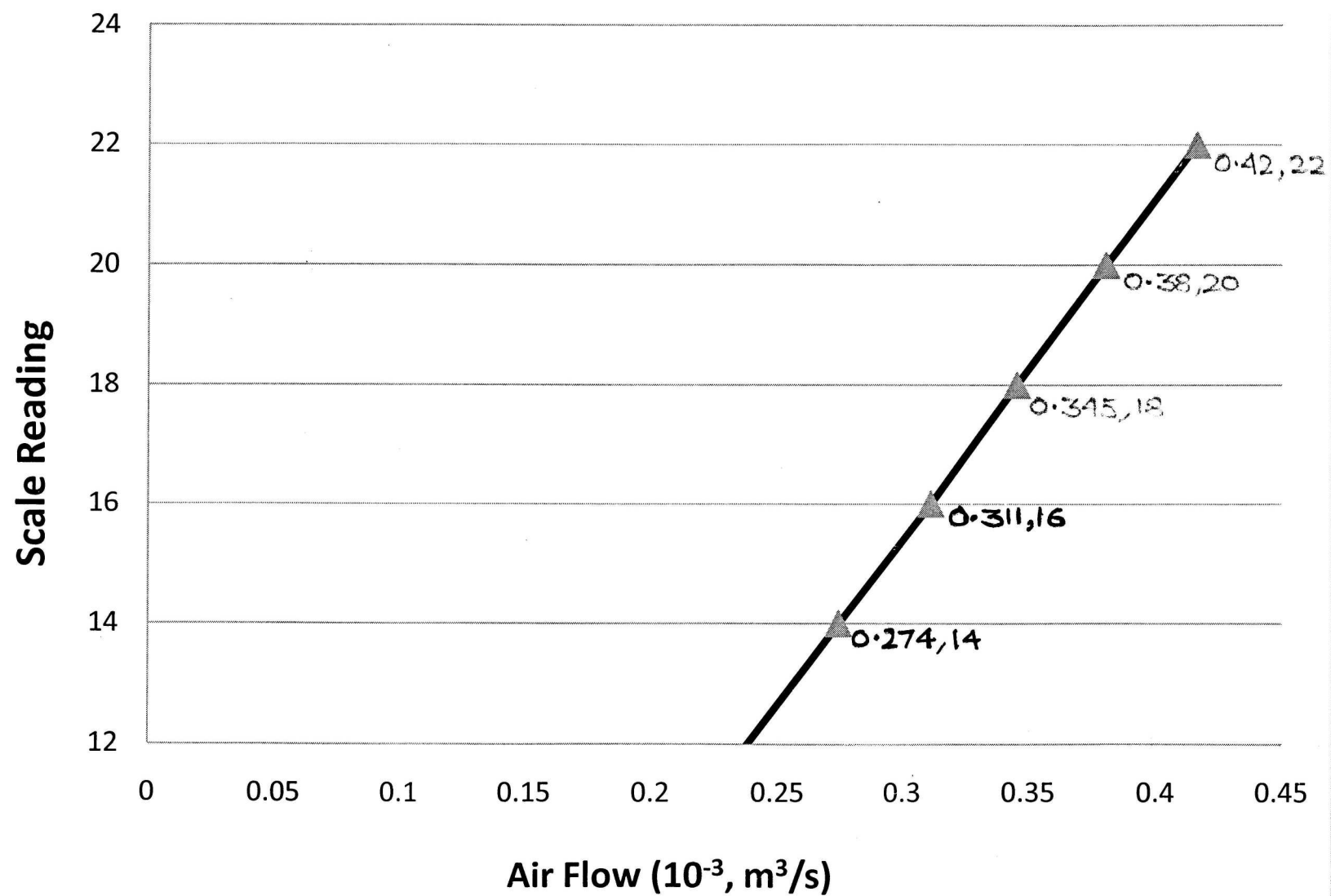
FLOWMETER CALIBRATION CURVES

HILTON FLAME PROPAGATION AND STABILITY UNIT, C551



Calorific value of propane $\approx 70 \text{ MJ/m}^3$

Burner Tube Diameter: 25 mm, 16 mm, 12.5 mm



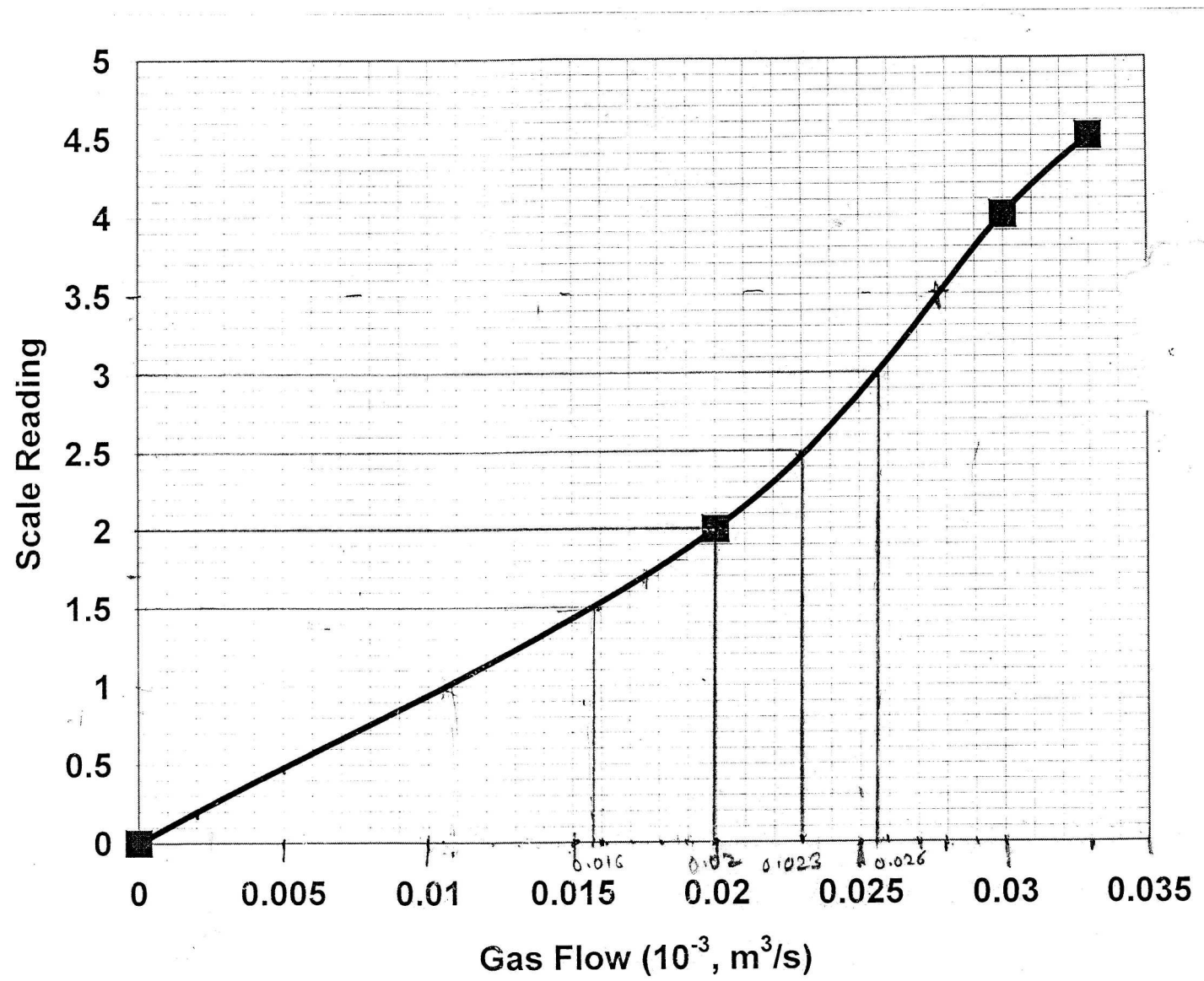


TABLE: 1

Sl. No.	Indicated Gas Flow (cm)	Gas Flow ($\times 10^{-3} \text{m}^3/\text{s}$)	Indicated Air Flow (cm)	Air Flow ($\times 10^{-3} \text{m}^3/\text{s}$)	Distance (mt)	Time (sec)	GFlame Propagation Speed (m/s)	Air-Flow Ratio
1	2.0							
2	2.0							
3	2.0							
4	2.0							
5	2.5							
6	2.5							
7	2.5							
8	2.5							
9	1.0							
10	1.0							
11	1.0							
12	1.0							
13	1.5							
14	1.5							
15	1.5							
16	1.5							

TABLE : 1

Determination of Flame Speed

Flame Front Timed Over

Indicated Gas Flow	<u>Gas Flow</u> $10^{-3} \text{ m}^3/\text{s}$	Indicated Air Flow	<u>Air Flow</u> $10^{-3} \text{ m}^3/\text{s}$	Time Secs	Av. Time Secs	Flame Speed m/s	Air/Fuel Ratio

TABLE 2

Port Area 10^{-6} m^2	Ind. Gas Flow cm	Gas Flow 10^{-3} m^3/s	Air Flow Indicated cm				Air Flow $10^{-3} m^3 s^{-1}$				Primary Air/Fuel Ratio				Burner Loading $MW m^{-2}$
			YT	LB	LBO	LO	YT	LB	LBO	LO	YT	LB	LBO	LO	