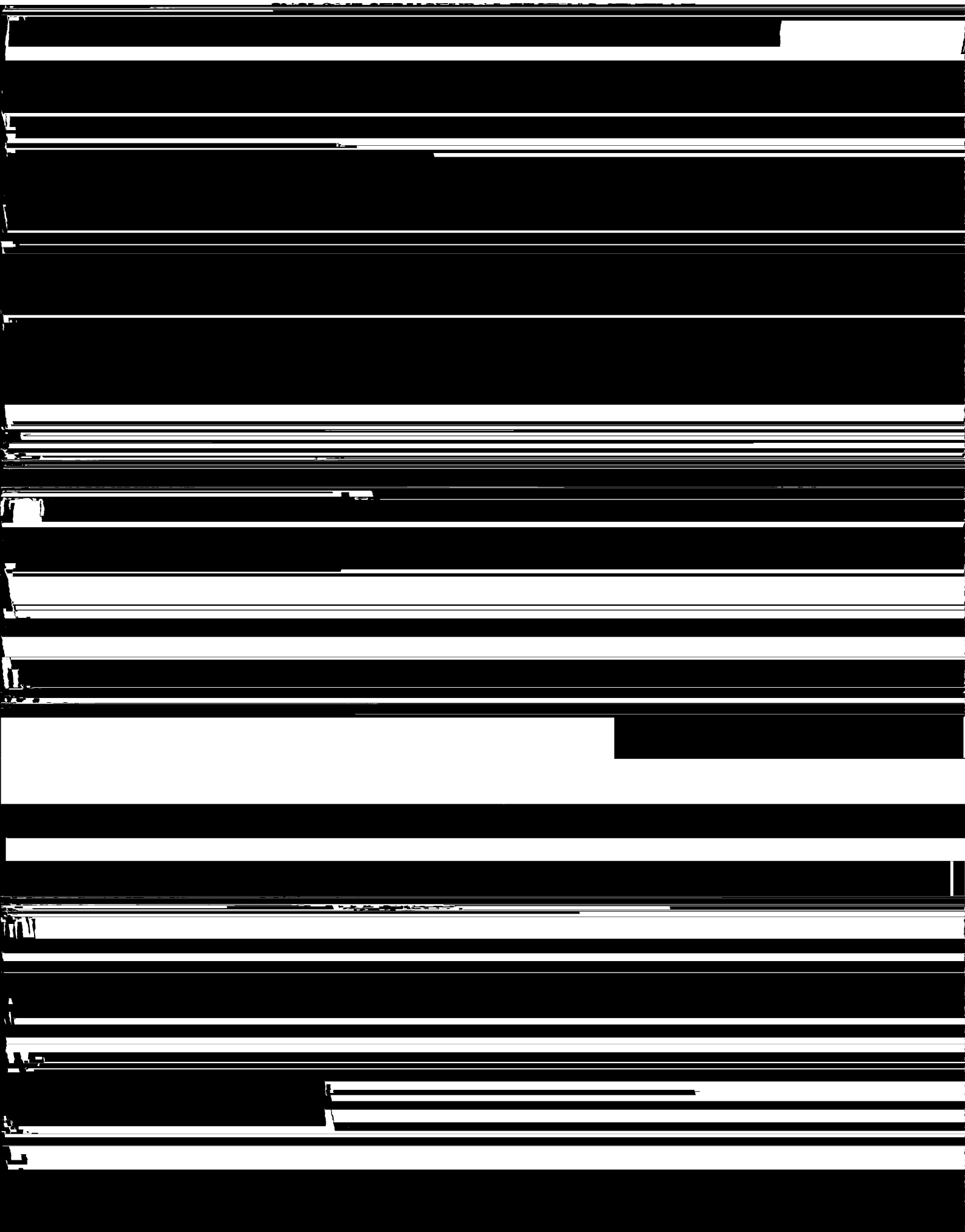
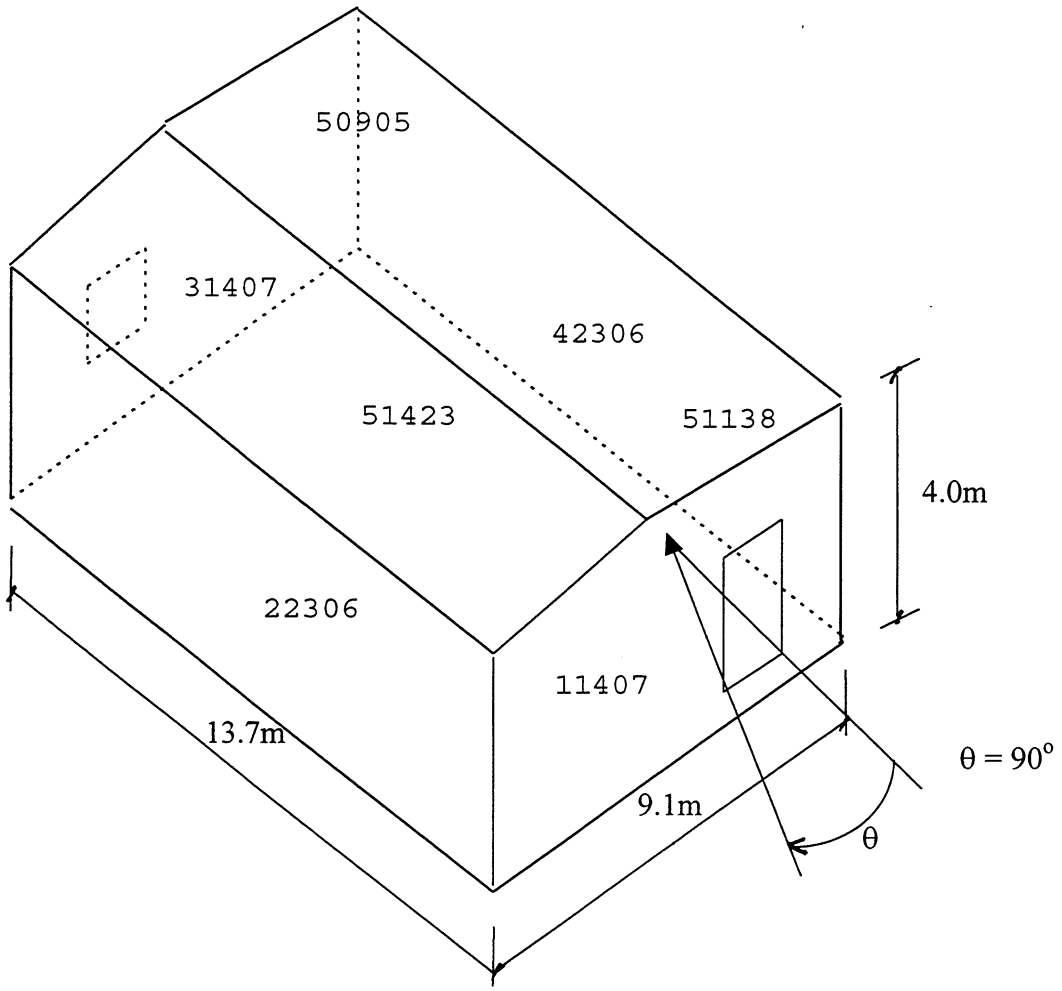


1. INTRODUCTION

The approach wind and its flow around a building generates a spatially and temporally varying


50905
31407
42306
51423
51138
4.0m
22306
11407
13.7m
9.1m
θ
θ = 90°

where,

$\bar{p}, \sigma_p, \hat{p}, \check{p}$	Mean, standard deviation, maximum and minimum pressure in a 15 min run
p_0	Reference pressure
ρ	Density of air
$\overline{U}$	Mean wind speed at roof height (ie. 4.0 m), over a 15 min run

The reference pressure (p_0) was obtained from a 1.4 × 1.1 × 1.0 m underground box with a 10mm diameter hole on the ground surface, located 23 m West of the building. The standard convention of

3.1 Mean Internal Pressure

The principles of conservation of mass and steady flow through an opening are used to obtain the relationship between mean internal pressure ($\bar{p}_I$), mean external windward pressure ($\bar{p}_W$) and mean external leeward pressure ($\bar{p}_L$) in a building with total windward opening area A_W and total leeward opening area A_L as shown by Equation 2. This relationship is also used in AS1170.2 to derive the internal pressure coefficient for a given A_W/A_L ratio.

$$C_{\bar{p}I} = \frac{C_{\bar{p}W}}{} + \frac{C_{\bar{p}L}}{} \qquad (2)$$

internal volume, $V_{Ie} = V_I\left(1+\frac{K_A}{K_B}\right)$, where K_A/K_B is the ratio of bulk modulus of the air contained

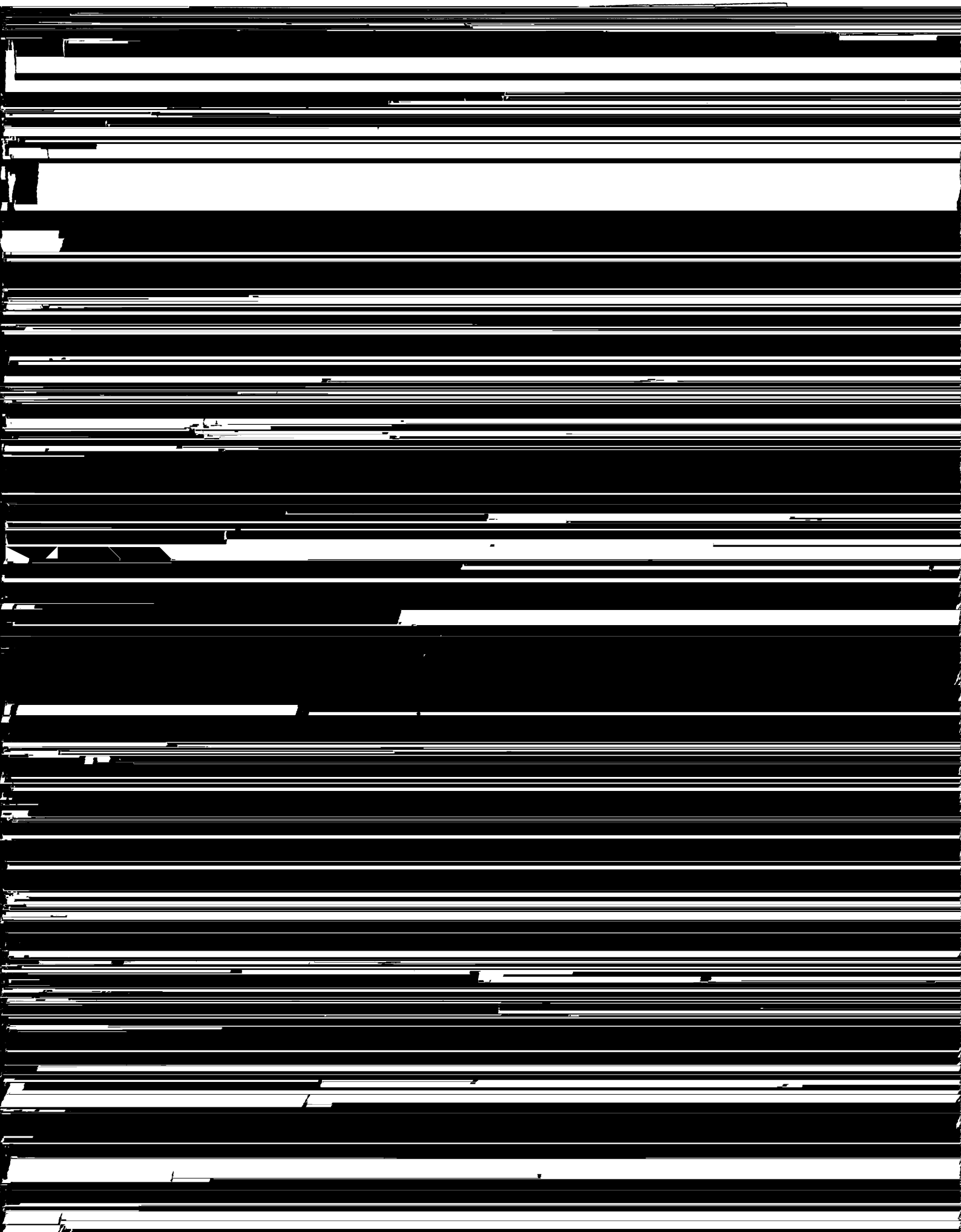
[redacted]

structural components are then determined by combining these peak external and internal pressures acting in the same direction. This implies that the pressure fluctuations follow the approach flow velocity fluctuations and the ratio of design peak pressure p_{pk} to mean pressure $\overline{p}$ is related to the velocity gust factor $G_U = \hat{U}_{3s}/\overline{U}$ by Equation 9.

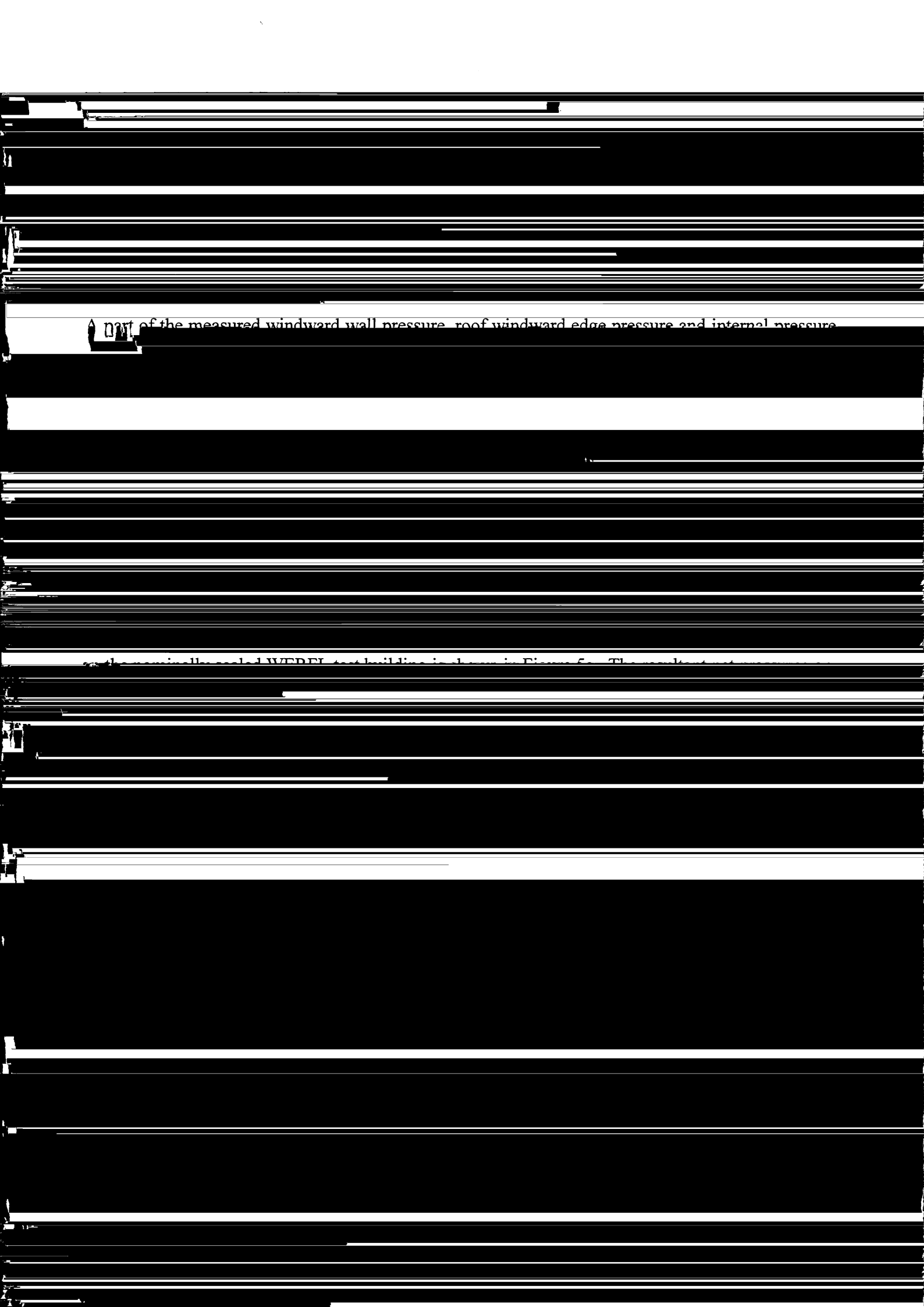
$$p_{pk} = \left(\frac{1}{2}\rho \hat{U}_{3s}\right) C_{\overline{p}} \tag{8}$$

$$C_{pk} / C_{\overline{p}} = \left(\hat{U}_{3s}/\overline{U}\right)^2 = G_U^2 \tag{9}$$

Greenway (1979) obtained an analytical expression for wind velocity gust factor $G_U = \hat{U}/\overline{U}$ from



A part of the measured windward wall pressure, roof windward edge pressure and internal pressure



The mean, standard deviation, maximum and minimum pressure coefficients and the pressure peak factors, $g_p = \left| p_{pk} - \bar{p} \right| / \sigma_p$ and pressure gust factors, $G_p = p_{pk} / \bar{p}$ on the windward wall, leeward

Table 1b. Net, Mean, Standard Deviation, Maximum and Minimum Pressure Coefficients - Nominally Sealed Building

[redacted]

The net (external - internal) pressure spectra $fS_p(f)/\left(\frac{1}{2}\rho\bar{U}^2\right)^2$ on the windward wall, and roof

4.2 Building Containing Large Opening(s)

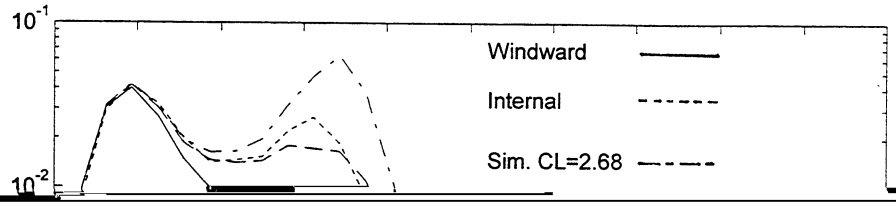
The mean, standard deviation, maximum and minimum pressure coefficients obtained on the windward wall, leeward wall and interior, for a range of windward and leeward wall opening A_W/A_L ratios of WERFL test building (background porosity neglected) are given in Table 2. For a single wall opening, the internal pressure closely follows the pressure on the wall containing the

4.2.1 Building Containing a Dominant Opening

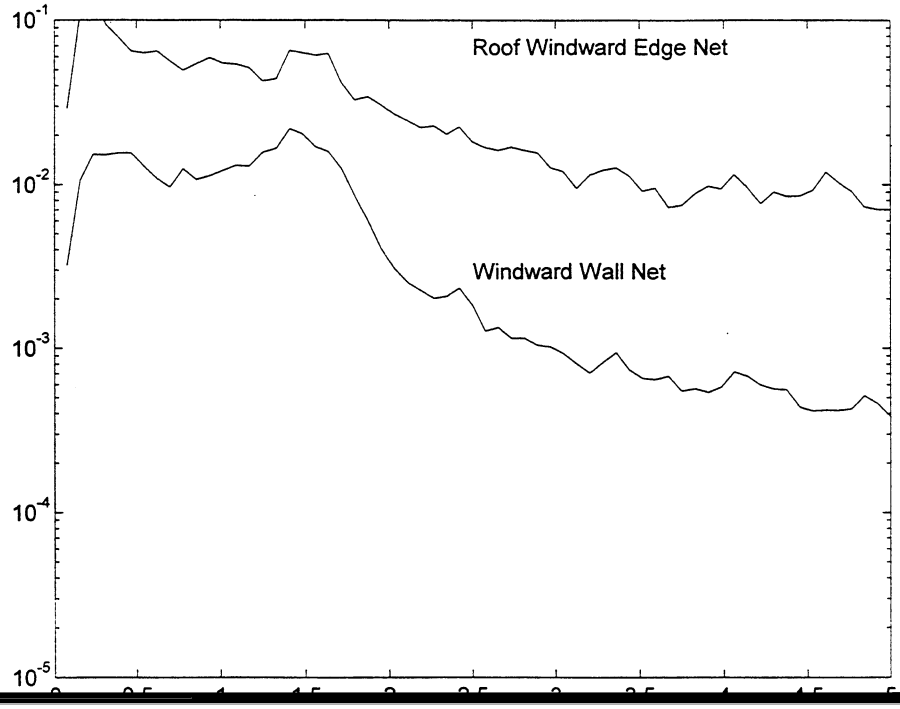
A part of the measured windward wall pressure, roof windward edge pressure and internal pressure on the building with a 2% windward wall opening is shown in Figure 9a. The resultant net

The mean, standard deviation, maximum and minimum pressure coefficients, the pressure peak factors, g_p and the pressure gust factors, G_p on the windward wall, leeward wall, side wall, roof, roof windward edge and interior of the building with a 2% windward wall opening, and the pressure

generally unconservative, acknowledging that the measured pressures were 1/8 sec peaks acting over area of ~ $0.5m^2$. Cochran and Cermak (1992) showed that peak suction pressures measured on the full scale Texas Tech building gave significantly larger values compared with wind tunnel


10^{-1}
10^{-2}
Windward
Internal
Sim. CL=2.68

[redacted]


Roof Windward Edge Net
Windward Wall Net
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
$\frac{fS_p(f)}{\left(\frac{1}{2}\rho\overline{U}^2\right)^2}$

[redacted]

Windward and leeward pressure coefficients for use in Eqns 2 & 14 are +0.7 and -0.478 respectively

The mean internal pressure coefficient derived from Equation 2 is = -0.242.

6. CONCLUSIONS AND RECOMMENDATIONS

[redacted]

cladding. Partly due to these studies, wind load standards have been updated with more reliable values. Typically wind load standards provide a range of internal pressure coefficients depending

[redacted]

dominant windward opening were generally unconservative compared with the measured values. The net peak suction pressure in this region was 93% of the (peak external - peak internal) value

pressures were well correlated.

The measured internal pressure spectra show an increase of pressure energy close to the Helmholtz

6. Ginger, J. D., and Letchford, C. W. (1997), "Net Pressure on Low-rise Full Scale Buildings", Proc. IVAPSOWE Gold Coast Australia July 1997.
7. Ginger, J. D., Mehta K. C. and Yeatts B. B(1997), "Internal Pressures in a Low-Rise Full Scale Building", (Accepted Jour. of Wind Engineering and Industrial Aerodynamics.
8. Greenway, M. E. (1979), An analytical approach to wind velocity gust factors, Jour. of Industrial