Wind Loading Characteristics of Louvered Equipment Screen Designs

It is accepted knowledge that using louvers for vision barriers will reduce wind loading on a framing structure. Until now, the basis for the reduction has been an educated guess. In fact, most calculations were performed with the louvered portion of the equipment screen as a solid surface (like cladding or sheathing). This calculation had a natural safety factor built into it. Then another safety factor was added to ensure that the structural framing was fit for the design wind loading.

Now we can say, through measured calculation and virtual testing, that each model of equipment screen by Architectural Louvers has a specific capability to decrease the structural requirement used for supporting the screen. Each product has been assigned a horizontal coefficient of drag. A solid wall has a coefficient of 1. All of our products have a reduced factor (expressed as a coefficient) that is derived from calculation and testing. These factors can be seen in the chart below:

Coefficient Table*		
Model	Horizontal	Vertical
Wall	1.00	0.00
V2KS	0.66	0.16
V4JS	0.63	0.30
V4YH	0.81	0.00
V4YV	0.81	0.00
V6JN3	0.35	0.27
V6JN4	0.31	0.23
V6JN5	0.29	0.24

*Coefficients do not include the effects of structural framing members (by others)

If imposed lateral wind load is 30 psf, a solid wall will have a horizontal load of 30 psf (coefficient 1 x 30 psf) and a vertical load of 0 psf (coefficient 0 x 30 psf).

Correspondingly, model V4JS will have a horizontal load of 18.9 psf (coefficient 0.63 x 30 psf) and a vertical load (upward) of 9.0 psf (coefficient 0.30 x 30 psf).

In addition to horizontal drag, each product has been assigned an additional coefficient for vertical lift. Since most of our products have sloped blades, a vertical force will be created as air rushes through the blades. This coefficient also varies with the product model.

These coefficients were derived from testing of actual product designs in a virtual wind tunnel. Wind speed was set at a velocity of 100 miles per hour (Mach 0.13). The static pressure was set to achieve 30 pounds per square foot (about 14.4 hPa) on a solid wall. The calculated wind tunnel pressure for the test was 627 psf (300 hPa) to impose 30 psf upon a wall with the height of 49 inches. The testing was done in a 2 dimensional model, so that length was not a factor within the test results.

The wall test resulted in a pressure of 30.4 pounds per square foot upon the wall (see figure 1.1). An imposed load of 30 psf correlates with predominate building code requirements. The same settings were used to test each louvered equipment screen model. The resulting forces were calculated and coefficients derived from the results.

Figure 1.1 depicts the wind speeds as they meet a solid wall and pass over and under it. Additional tests were run with the same settings and the resulting wind variations are shown in Figure 1.2 (model V4JS), Figure 1.3 (model V2KS), Figure 1.4 (model V4YH), and Figure 1.5 (model V6JN).

The most efficient louver at reducing structural requirements is model V6JN5 (71% reduction), which utilizes a narrow blade profile and wide blade spacing. The mid range equipment screens are model V4JS (37% reduction) and V2KS (34% reduction). Model V4YH is the least efficient, with a reduction of 19%.

Figure 1.1 (Solid Wall)

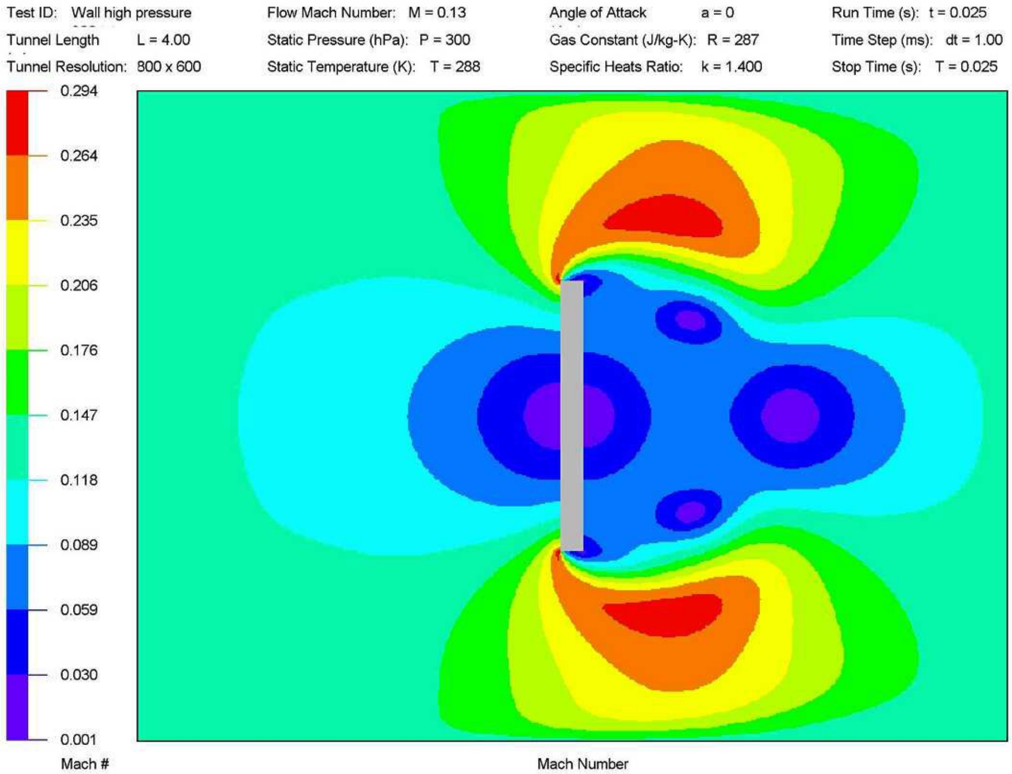

Figure 1.2 (Model V4JS)

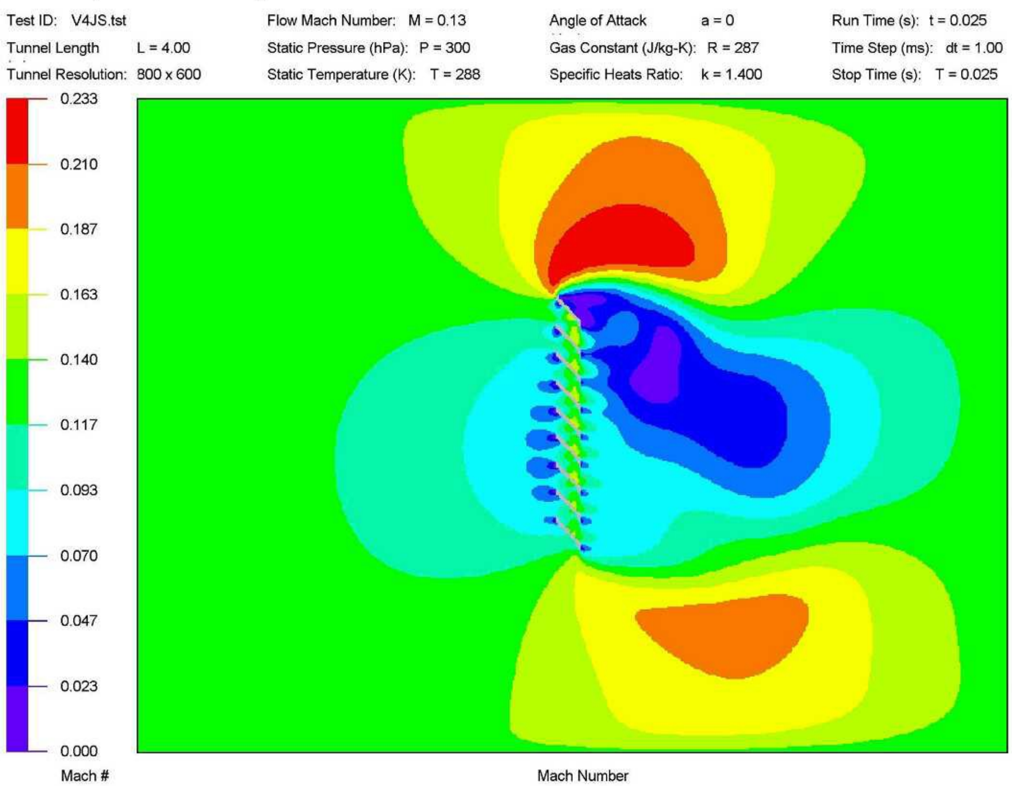

Figure 1.3 (Model V2KS)

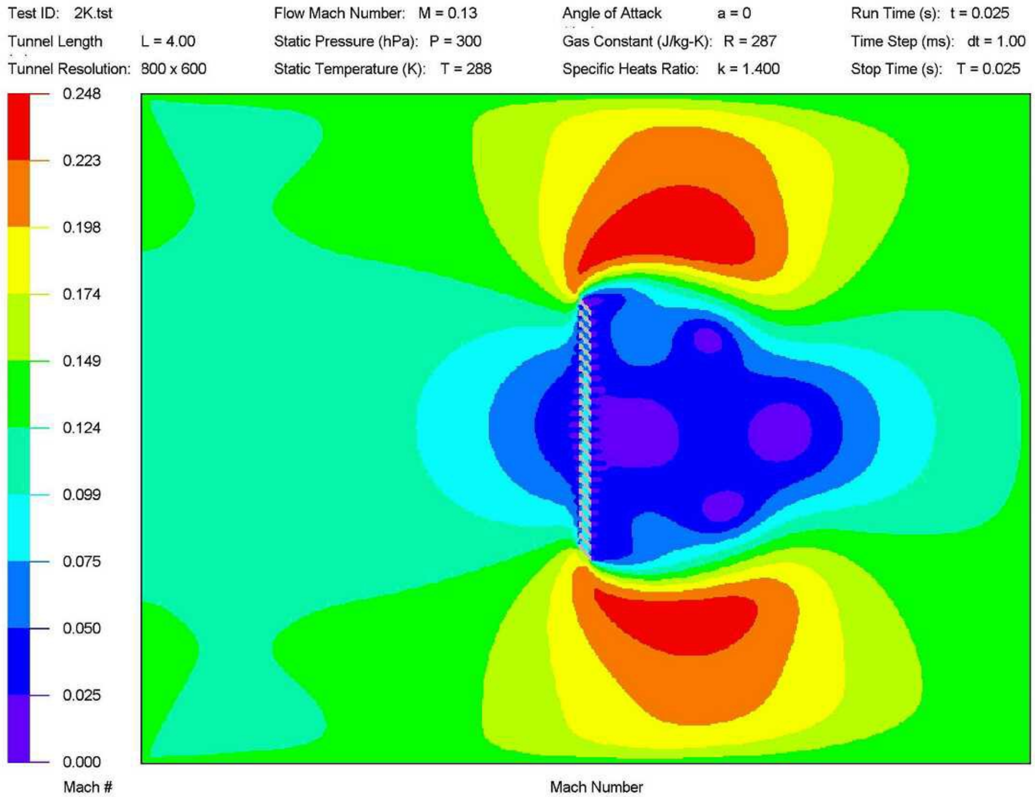

Figure 1.4 (Model V4YH)

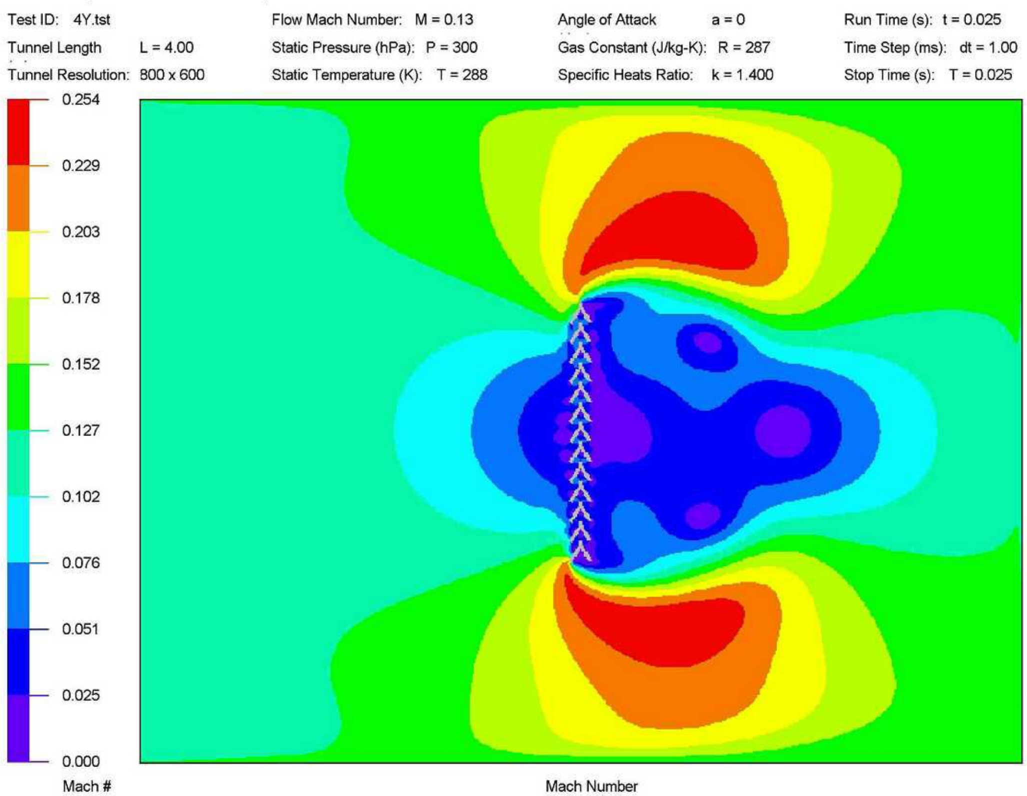

Figure 1.5 (Model V6JN5)