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Effective length factors for solid round diagonals in guyed communication towers.

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Effective Length Factors
for
Solid Round Diagonals in Guyed Communication Towers

By

YEAN SUN

A Thesis Submitted to
The College of Graduate Studies and Research
Through The Faculty of Engineering
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Yean Sun

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ABSTRACT

The objective of this investigation is to determine the effective length factors for solid round diagonals in all-welded communication towers. A total of thirty-three welded towers were tested in the investigation with all the towers in a horizontal position and concentrated load at mid-span. Of the thirty-three specimens, fifteen specimens were six-panel cross-braced towers with a span of 4572 mm (180 in). The leg sizes were 38.1 mm (1.5 in), 50.8 mm (2 in), 69.85 mm (2.75 in) diameter, and diagonal sizes were 12.7 mm (0.5 in), 14.29 mm (0.563 in),15.88 mm (0.625 in) diameter. Sixteen specimens were eight-panel cross-braced towers with a span of 5690 mm (224 in). The leg sizes were 38.1 mm (1.5 in), 50.8 mm (2 in), 57.15 mm (2.25 in) diameter, and the diagonal sizes were 19.05 mm (0.75 in), 22.23 mm (0.875 in),15.88 mm (0.625 in) diameter. Two specimens were six-panel single-braced towers with leg sizes of 50.8 mm (2.0 in) and 76.2 mm (3.0 in) and diagonal sizes of 22.23 mm (0.875 in), 28.58 mm (1.125 in) diameter.

Two specimens were fixed with strain gauges on every member, while all other specimens were tested with strain gauges fixed on only one panel.

After the test, tensile specimens were cut from the diagonals of the tower, and tested for the yield stress and tensile strength. Axial forces in the diagonal and leg members were calculated based on the actual yield stress and strain readings, assuming an elastic perfectly-plastic stress-strain curve for steel.

The buckling loads were determined from the maximum axial forces in the tested members, and effective length factors were calculated according to CSA-S37-94 Standard and AISC-LRFD Specifications. The average effective length based on CSA-S37-94 for cross-braced diagonals is 0.35 of the total diagonal length, while

the effective length is 0.37 of the total diagonal length based on AISC-LRFD. The effective length factor for single-braced diagonals is 0.50 and 0.56 based on CSA-S37-94 and AISC-LRFD, respectively.

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NOTATION

A	cross-sectional area
B_m	the thickness of slice "m"
C	force in the cross-braced compression member
C_{cr}	the critical load for compression member
C_e	Euler critical load
C_T	the critical tangent modulus load
C_r	compressive resistance
D	diameter of the test member
dy	the thickness of slice
E	modulus of elasticity
E_T	tangent modulus of elasticity
E_r	reduced modulus of elasticity
E_{eff}	effective modulus of elasticity
F	resultant axial force in the test member
F_{cr}	critical load according to AISC-LRFD Specification
F_m	resultant force in the slice "m"
F_y	yield stress of material
I	moment of inertia
I_t	moment of inertia of the tension diagonal

I_c moment of inertia of the compression diagonal

K effective length factor

KL/r effective slenderness ratio of the member

L length of compressive member

Ld total length of diagonal center to center of legs

T force in the cross-braced tension member

X the depth of neutral axis

Y_m the distance measured from the center of slice to centroidal axis of the cross section

r the radius of gyration

α stiffness furnished by the tension member to compression member

α_{lim} the limiting value of the stiffness of the elastic support

λ the nondimensional slenderness parameter

ϕ resistance factor for compression

ε_m the strain in the center of the slice "m"

σ_m the stress for slice "m"

ε_1, ε_2 strain readings in the opposite sides of the test member

CHAPTER 1

INTRODUCTION

1.1 General

With the rapid development of world economy and technology, in the fields of construction and telecommunication, more and more welded towers are constructed and used. The welded towers are either self-supporting or guyed towers. Self-supporting latticed towers are of variable cross-section, whereas guyed communication towers are of constant triangular or square cross-section.

Welded towers consist of legs, diagonals, and sometimes horizontals, which are connected together by welding. Solid rounds, tubes, as well as angles are used for the components of the welded towers. Diagonals can be arranged in cross-braced or single-braced configuration.

Towers with cross-braced diagonals can be fabricated in one of the following ways:

Type I: one diagonal straight and the other bent around and welded at the intersection.

Type II: both the cross-braced diagonals are in-plane with one of them continuous and the other cut and welded to the continuous member.

Type III: both the cross-braced diagonals are out-plane at mid-span and then welded together at their intersection.

During the design of welded towers, effective length factors for diagonals are a major parameter in the computation of the compressive strength of diagonals. Effective length factors for cross-braced diagonals of type III are the subject of this investigation.

1.2 Necessity for the Investigation

To the best of author's knowledge, though many experiments have been carried out on the behavior of cross-braced angle diagonals, little experimental investigation was carried out on the behavior of cross-braced solid round members. CSA-S37-94 "Antennas, Towers and Antenna-Supporting Structures" (CSA 1994) doesn't give specific effective length factors for solid rounds. It only gives 0.75 for the cross-braced angle diagonals, and notes that for the cross-braced solid round diagonals, the philosophy is the same as that of angles. Based on the preliminary results of investigation carried out at the University of Windsor (Jaboo 1998), the effective length was found to be less than 0.5 of the diagonal length. There is a need to confirm this result by carrying out tests on additional specimens fabricated by different manufacturers.

1.3 Objectives of Present Research

The objectives of this investigation are:

- To study the failure patterns of cross-braced and of single-braced solid round diagonals for welded towers.

- To determine effective length factors of type III cross-braced and of single-braced solid round diagonals for welded towers.

CHAPTER 2

LITERATURE REVIEW

2.1 General

The use of solid round columns dates back many centuries. The materials used varied from stone, wood, concrete, and metals. Steel has been widely used in many structural elements. Solid round steel bars have been used in constructing trusses, frames, and towers. In lattice towers, solid rounds are used for legs, horizontals, and bracing diagonals. Single and cross-braced diagonals are frequently used in such structures.

A large amount of literature is available, theoretical and experimental, about the design of cross-bracings, but most of the work carried out was on angles and flat bars. Very little literature is available on cross-bracings made of solid round bars, although this type of section is quite common for antenna towers.

Structural member buckling capacities are dependent upon the mode of buckling. For axisymmetrical solid round cross sections, the mode of buckling is flexural buckling.

2.2 Flexural Buckling Theory and Experimental Investigation

2.2.1 Euler Formula

Stability of columns has been one of the most widely known aspects of structural engineering. Research with regard to a solution to column problem dates back to many centuries. One of the most important contributions to the problem was made by Euler (1759) who established a formula for the buckling of columns in analyzing the elastic stability of many engineering structures. Euler's formula is as follows:

$$C_e = \frac{\pi^2 EA}{\left(\frac{KL}{r}\right)^2} \qquad (2.1)$$

where, E is the modulus of elasticity, A is the area of the cross-section, K is the effective length factor, L is the length of the column, and r is the radius of gyration. Euler's load, C_e, is the critical load at which a slender elastic column can be held in a bent configuration under axial load alone. The formula is valid only when the stress does not go beyond the elastic limit of the material.

2.2.2 Tangent Modulus Theory

Due to lack of knowledge as to relationship between stress, strain, curvature, and bending moment beyond the elastic range, progress beyond Euler's early statements concerning inelastic behavior remained dormant for many years. In 1889, Engesser proposed that the Euler's formula be extended to include the inelastic range by introducing a variable quantity E_T which is called the tangent modulus, instead of the constant modulus E. Thus for a hinged-end column, the buckling formula should be changed to tangent modulus formula:

$$C_T = \frac{\pi^2 E_T A}{\left(\frac{KL}{r}\right)^2} \qquad (2.2)$$

where, E_T is the slope of the tangent to stress-strain curve corresponding to the the stress at failure, KL/r is the effective slenderness ratio of the member, and C_T is the critical tangent modulus load.

2.2.3 Reduced Modulus Theory

Independent of Engesser, Considere in 1889 conducted a series of 32 column tests and suggested that if buckling occurred above the proportional limit, the elastic modulus, E, should be replaced in Euler's formula by the effective modulus E_{eff}. He stated that the effective modulus should be somewhere between E and E_t. Jasinsky (1889) brought Considere's work to the attention of

Engesser, who revised his theory by introducing two different moduli for the two parts, convex and concave sides of the buckled shape of the cross-section.

In 1910 Karman derived explicit expressions for the reduced modulus for both rectangular and idealized H-section columns. The formula for critical reduced modulus stress in a pinned-end column is the same as equation (2.2) except that E_T (tangent modulus) is replaced by E_r (reduced modulus), where

$$E_r = f(E_T, E) \qquad (2.3)$$

2.2.4 Effect of Residual Stress and Initial Out-of-Straightness

The need for information on the strength of solid round compression members became necessary from the increased use of these bars in communication towers. For this reason, an extensive program of experimental and analytical work was initiated in 1954 at Lehigh University, Bethlehem, Pennsylvania. Beedle, Galambos, and Tall (Beedle et al. 1961) studied the effect of heat-treatment and cold bending on the residual stresses and column strength. Effects of initial out-of-straightness were also illustrated. It was stated that for solid round bars, the residual stress distribution is triaxial, i.e. there are longitudinal, tangential and radial residual stresses. Different final heat treatment methods like quenching, air cooling, and stress relieving were considered in the study. It was found that of the three types of heat treatment, quenching leads to high residual stresses while the other two methods reduce the stresses considerably. It was also shown that columns with initial out-of-straightness have lower strength than straight columns. Fujita and Driscoll (1962) presented results of the aforementioned experimental investigation on the strength of axially and eccentrically loaded solid round columns of 69.9 mm (2-3/4 in.) diameter. Comparison with a theory based on "the tangent modulus" concept for axially loaded columns showed that the strength of solid round columns may be predicted adequately. Galambos (1965) presented the research on the strength

of solid rounds carried out between 1954 and 1965 at Lehigh University. Recommendations for the design of axially loaded steel columns were presented based on the research program. It was stated that both residual stresses and initial crookedness have a significant influence on the strength of round columns in the inelastic region. Galambos' paper was discussed by Williamson and Johnston (1965).

2.2.5 Flexural Buckling - Experimental Investigation

Experimental investigations on columns date back to the first half of the eighteenth century. A practical investigation of the phenomenon of lateral buckling was first undertaken by Mussghenbrock (Timoshenko 1953). As a result of this research, it was stated that the buckling load was inversely proportional to the square of the length of the strut. During the closing years of the eighteenth century, a series of investigations with wooden struts were made.

Hodgkinson in 1840 (Timoshenko 1953) tested specimens of cast iron. Cylindrical, solid and hollow specimens with rounded and flat ends were tested. For slender, solid struts, good agreement was found with Euler's formula. At the end of the nineteenth century, more experiments on buckling of columns were conducted by Bauschinger, Tetmajer, and Considere (Timoshenko 1953).

Several researchers studied the column buckling criteria in the first half of this century and found that the results showed column failure at tangent modulus loads. Templin and others (Templin et al. 1938) also discovered that practical tests on columns yielded capacities that were closer to tangent modulus theory than to the seemingly more refined reduced modulus theory.

As discussed earlier, the primary research on the strength of solid rounds was carried out between 1954 and 1965 at Lehigh University. The tests were performed primarily on stress relieved constructional alloy steel bars. Twenty-

seven bars, some with 69.9 mm (2-3/4 in) diameter and others with 190.5 mm (7-1/2 in) diameter were tested to failure as axially loaded columns. In the main phase of the research program, the effect of residual stresses and initial crookedness on the strength of the axially loaded columns was investigated. To the best of author's knowledge, no major research work in this area was undertaken after this time.

2.3 Buckling Theory and Experimental Investigation of Bracing

Bracings are widely used in many structures. Bracings in wooden bridge trusses and roof trusses were used by the Romans. The first metal trusses in England were built in 1845 (Timoshenko 1953).

The first experiments on lattice girders, treated as cantilevers, were made in 1857 by Lohse (Todhunter 1960). Single, double, triple, and fourfold types of bracings were used. The bars were riveted to each other. The loads at which the bracing buckled were noted. It is noteworthy that in several cases the bracing bars failed elastically into an approximate S-form, a result which the researchers at the time did not take into account in their theoretical analysis. From these experiments, a great increase of strength, due to multiple bracing and to the riveting together of the bracing bars, was noticed.

Wohler in 1855 (Todhunter 1960) deduced that the stresses in the bracing bars of a girder from purely statistical consideration. De clercq in 1857 and Winkler in 1859 theoretically analyzed lattice girders and the stresses in the bracing bars (Todhunter 1960).

For cross-braced or tension-compression diagonals, Jasinsky was the first to investigate the stability of the compressed diagonals and to evaluate the strengthening afforded by the diagonals in tension in lattice trusses (Timoshenko 1953).

Dewolf and Pelliccione (1979) reported that the design practice for cross- braced members adopted at that time, which entirely neglected the contribution of the compression member and relied solely on the tension member, was conservative and would result in overdesign. Eight sets of cross-bracings, using flat bars with rectangular cross section, were tested to failure. A square frame was used with connections at each corner of the frame designed to allow all members to rotate in the plane of the frame and for the two diagonals to rotate out of the plane. Strain gauges were placed in pairs on opposite sides of the members on the faces parallel to the plane of the frame. From the tests in that investigation, it was observed that using the design practice, which neglects the contribution of compression members, predicted frame load ranged from 40% to 78% of the failure load. The critical load of the compression member about its in-plane axis is related to the force in the tension member that braces it at the center, and when the two members are made of the same material, the tension member is equivalent to an unyielding support. Thus the compression member buckles into a full sine wave, S-shape, at a load equal to four times that without any center bracing. The stiffness, α, furnished by the tension member acting on compression member in the out-of-plane direction was given as follows:

$$\alpha = \frac{48EI}{L^3}\left(\frac{\mu^3}{3(\mu - \tanh\mu)}\right) \qquad (2.4)$$

where L represents the total length of the diagonal, and

$$\mu = \frac{L}{2}\sqrt{\frac{T}{EI}} \qquad (2.5)$$

in which T is the force in tension member.

It was also stated that following buckling of the compression member, its load decreased and the load in the tension member then increased with an overall increase in frame load. Predicted frame loads, based on the critical load in the compression member determined by using the tension member as a brace, were within 10% of the test load for compression members with low slenderness ratios and on the conservative side for those with higher ratios.

A theoretical investigation was made by Vickers (1982) into the behavior and design of cross-bracing. His discussion emphasized the use of cruciform (star shaped) double angle struts for bracing members. The extent of lateral support provided to the compression diagonal by the tension diagonal at their point of intersection was analyzed. From his study, it was concluded that the design concept of shared load between tension and compression members with the compression member designed using effective length equal to half the total length of the diagonals is more realistic than "tension only" bracing design.

El-Tayem and Goel (1986) studied experimentally and theoretically full-scale cross-bracing specimens. Five single-angle cross-braced specimens and one double-angle cross-braced specimen were included in the study. Quasi-static cyclic loading was used in the tests and strain gauges were attached to measure the loads. It was noted that the interconnection provided an elastic restraint against both lateral and rotational deformations of the compression diagonal at the point of intersection. It was concluded that for cross-braced systems made from single equal-leg angles, an effective length of 0.85 times the half diagonal length is reasonable.

Picard and Beaulieu (1987) did a theoretical study aimed at the determination of the transverse stiffness offered by the tension diagonal in cross-braced systems and at the evaluation of this stiffness on the out-of-plane buckling resistance of the compression diagonal. When the diagonals were continuous and attached at the intersection, it was concluded that the effective length of the compression

diagonal is 0.5 times the total diagonal length. A simpler form of equation was given by the writers for the stiffness, α, provided by the tension diagonal, assuming the two diagonals to be equal in length and to have the same cross-sectional area:

$$\alpha = \frac{48\ EI}{L^3} + 4.36\ \frac{T}{L} \qquad (2.6)$$

where, L is the total length of the diagonal, and T is the force in tension diagonal. They also suggested that the effective length factor, K, for calculating the buckling load of the compression diagonal to be as follows:

$$K = \sqrt{0.523 - \frac{0.428}{C/T}} \geq 0.5 \qquad (2.7)$$

where C and T are the forces, just before buckling, in the compression and the tension diagonals respectively.

Picard and Beaulieu (1988) performed two series of tests to demonstrate the validity of their theoretical study. Seven transverse stiffness tests and fifteen buckling tests were performed on flat bars and the results verified the validity of the equations presented by them.

The theoretical analysis carried out in 1987 by the same authors was generalized in 1989 (Picard and Beaulieu 1989), which gives the following the effective length factor for cross bracings:

$$K = \sqrt{\frac{1 - 0.818\ (C/T)}{1 + 0.911\ (I_t / I_c)}} \qquad (2.8)$$

where, C/T is the ratio of the force in compression member just before buckling to the force in tension diagonal, and I_t/I_c is the ratio of moment of inertia of the

tension diagonal to the moment of inertia of the compression diagonal. This theoretical study was also verified by fifteen buckling tests carried out in 1988 (Picard and Beaulieu 1988).

Kemp and Behncke (1998) described a series of tests on cross-braced systems with slenderness ratios in the range of 102 to 160. Other variables included the inclination of the main legs and bracing, the number of bolts in each end connection, and the size of the main leg relative to the bracing. The measured behaviour was compared with the results of a flexibility-based analysis and the formulas from the American and European Transmission Tower Design manuals. The results confirmed the complexity of the behavior of cross-bracing in latticed towers. Strain measurements showed that yielding of the extreme fiber of the strut in the central region of the largest sub-span is the primary cause of failure. The effect of the end eccentricity was partially alleviated by the restraint provided by the main legs to the ends of the compression diagonal. Consequently the ultimate strength in the tests was increased up to 17% by changing the number of bolts at the end connection from one to two. A smaller but nevertheless significant, 10%, benefit was obtained by increasing the size ratio of the main leg relative to the bracing.

Jaboo (1998) conducted an experimental investigation on 8 single-braced and 18 cross-braced towers to determine effective length factors for solid round members. He found effective length factor, K = 0.525 for single-braced solid round diagonal, K=0.429 and 0.365 for type I and type II cross-braced solid round members, respectively.

2.4 Cross-Bracing as a Continuous Beam on Elastic Support

Connections in trusses and frames are treated in many different ways, but the traditional assumption of considering these connections to be perfectly hinged joints in an idealized frame made the design of such frames or trusses simpler.

In cross-braced diagonals, the tension diagonal acts as an elastic spring at the point of intersection with the compression diagonal. Thus the compression diagonal could be assumed as a continuous bar simply supported at the ends and having an intermediate elastic support.

Timoshenko and Gere (1961) discussed such a problem. A case where the intermediate elastic support is at the middle and the axial force does not change within the two halves of the member was explained. It was shown that if the stiffness of the elastic support, α, approaches infinity, the deflected shape of a bar on three hinged supports will be a full-sine wave, and the critical load, C_{cr}, for the compression member will be:

$$C_{cr} = \frac{\pi^2 EA}{\left(\frac{0.5L}{r}\right)^2} \qquad (2.9)$$

And when α approaches zero assuming the intermediate support to be absolutely flexible, the shape of the deflection curve of the buckled bar will be as half sine wave, and the critical load, C_{cr}, will be:

$$C_{cr} = C_e = \frac{\pi^2 EA}{\left(\frac{L}{r}\right)^2} \qquad (2.10)$$

The limiting value of the stiffness of the elastic support, at which the full sine wave shape of the buckled bar occurs, is given as below:

$$\alpha_{lim} = \frac{16\pi^2 EI}{L^3} \qquad (2.11)$$

For values of α smaller than α_{lim}, the flexibility of the intermediate support should be considered, and it is shown that the relation between the elastic critical load C_{cr} and the stiffness of the elastic support α is:

$$C_{cr} = C_e + \frac{3\alpha L}{16} \leq 4C_e \qquad (2.12)$$

It has to be mentioned that the assumption of hinged joints does not represent correctly all the types of connections in trusses or frames as the rotational restraint exists in cases where the joints are welded or even bolted. But because of the complexity associated, especially with the degree of rotational constraint provided by different types of connections, it is always preferable to assume a hinged end condition which is a conservative assumption.

2.5 Design Specifications for Cross-Bracings Based on CSA-S37-94 and AISC-LRFD

2.5.1 CSA-S37-94 Standard

CSA-S37-94 is the Canadian Standard for communication towers. The maximum slenderness ratio for bracing members is limited to 200 as stated in Clause 6.1.5.2 of CSA-S37.

For the computation of compressive strength of solid rounds as single bracing in towers, Clause 6.2.2.1 of the Standard states:

> "The unbraced length, L_d of compression members other than leg members, shall be the distance along the axis of the member to which it is attached. For simple web bracing systems, with web member connected directly or by gussets to the leg member, the slenderness ratio is L_d/r, where, L_d is the length of the diagonal, and r is the radius of gyration."

As for cross bracing, Clause 6.2.2.2 of the Standard states:

> "For tension-compression web systems the diagonals shall be connected where they intersect and the lengths of the compression member (L_1 and L_2 in Figure 2.5.1) shall be the distances from the intersection of the two diagonal members to the center of the leg members at the ends of the compression member."

The effective slenderness ratio of the compression member is KL/r, where KL =L_1+0.5L_2 (L_1 larger than L_2), and r = radius of gyration.

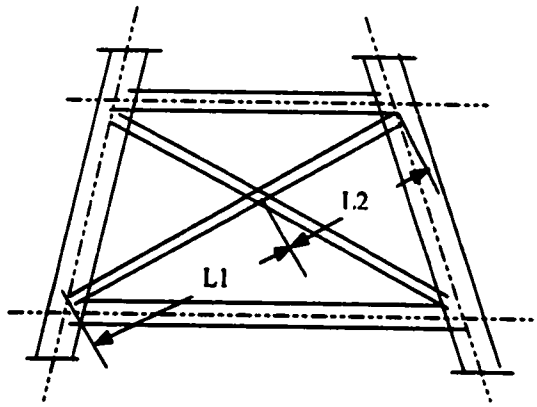


Figure 2.5.1 Tension-Compression Web System

After determining the slenderness ratio of the member, the nondimensional slenderness parameter, λ, is calculated as:

$$\lambda = \frac{KL_d}{r}\sqrt{\frac{F_y}{E\pi^2}} \qquad (2.13)$$

This nondimensional slenderness parameter, λ, is used in computing factored compressive resistance C_r of the member:

$$C_r = \phi A F_y \left(1 + \lambda^{2n}\right)^{-\frac{1}{n}} \qquad (2.14)$$

where

ϕ resistance factor for compression

A cross-sectional area of the member

F_y yield stress

λ nondimensional slenderness parameter

n =1.34

2.5.2 AISC-LRFD Specifications

Formula given by above specifications is as follows:

$$\lambda = \frac{KL}{r\pi}\sqrt{\frac{F_y}{E}} \tag{2.15}$$

For

$\lambda \leq 1.5,$

$$F_{cr} = \left(0.685^{\lambda_c^2}\right)F_y \tag{2.16}$$

$\lambda > 1.5,$

$$F_{cr} = \left\{\frac{0.877}{\lambda_c^2}\right\}F_y \tag{2.17}$$

where

F_y = specified yield stress

E = modulus of elasticity

K = effective length factor

L = unbraced length of member

r = governing radius of gyration about plane of buckling

CHAPTER 3

EXPERIMENTAL INVESTIGATION

3.1 General

For this investigation, tests were conducted on thirty-three specimens that were fabricated by three different American tower manufactures. Fifteen of the specimens were six-panel cross-braced towers with seven of the specimens having horizontals and the others no horizontals. Sixteen of the specimens were eight-panel cross-braced towers with half of the specimens having horizontals and the other half no horizontals. Finally, the last two specimens were six-panel single-braced towers with flat horizontals. Three sizes of legs (38.1 mm, 50.8 mm, 69.9 mm diameter), three sizes of diagonals (12.7 mm, 14.3 mm, 15.9 mm diameter) and one size of horizontal (19.1 mm diameter) were used for the six-panel towers. Similarly, the eight-panel towers were fabricated with three sizes of legs (38.1 mm, 50.8 mm, 57.2 mm diameter) and three sizes of diagonals (15.9 mm, 19.1 mm, 22.2 mm diameter). Two sizes of diagonals (28.6 mm, 22.2 mm diameter) and two sizes of legs (50.8 mm and 76.2 mm diameter) were used for the two single-braced specimens.

3.2 Details of Specimens

3.2.1 Cross-Braced Specimens

Fifteen six-panel specimens and sixteen eight-panel specimens are included in the investigation. They all have a 914.4 mm triangular section with all legs, horizontals (where present), and diagonal members connected together by welding. The six-panel specimens have a total length of 4572 mm (one panel of 762 mm) with the diagonals continuously-bent and welded at the leg junction. The eight–panel specimens have a total length of 5690 mm (one panel length of 711 mm) with the diagonals cut and welded at the leg junction. Each pair of cross-braced diagonals is welded together at their junction. The details of the specimens are shown in Tables 3.2.1a and b and Figures 3.2.1a and b.

Table 3.2.1a: DETAILS OF TEST SPECIMENS

6-PANEL CROSS-BRACED SPECIMENS

Serial No.	Test No.	Specimen I.D.	Span Length (mm)	Panel Length (mm)	Face Width (mm)	Leg Size (mm)	Diagonal Size (mm)	Horizontal Size (mm)	Fabricator
1	6	S1A	4572	762	914.4	38.1	12.7	No	ERI, Inc., Chandler, IN
3	4	S2A	4572	762	914.4	38.1	12.7	19.1	ERI, Inc., Chandler, IN
4	8	S2B	4572	762	914.4	38.1	12.7	19.1	ERI, Inc., Chandler, IN
5	23	S2C	4572	762	914.4	38.1	12.7	19.1	ERI, Inc., Chandler, IN
6	7	S3A	4572	762	914.4	50.8	14.3	No	ERI, Inc., Chandler, IN
7	25	S3B	4572	762	914.4	50.8	14.3	No	ERI, Inc., Chandler, IN
8	1	S4A	4572	762	914.4	50.8	14.3	19.1	ERI, Inc., Chandler, IN
9	3	S4B	4572	762	914.4	50.8	14.3	19.1	ERI, Inc., Chandler, IN
10	5	S4C	4572	762	914.4	50.8	14.3	19.1	ERI, Inc., Chandler, IN
11	2	S5A	4572	762	914.4	69.9	15.9	No	ERI, Inc., Chandler, IN
12	10	S5B	4572	762	914.4	69.9	15.9	No	ERI, Inc., Chandler, IN
13	12	S5C	4572	762	914.4	69.9	15.9	No	ERI, Inc., Chandler, IN
14	11	S6A	4572	762	914.4	69.9	15.9	19.1	ERI, Inc., Chandler, IN
15	13	S6B	4572	762	914.4	69.9	15.9	19.1	ERI, Inc., Chandler, IN
16	24	S6C	4572	762	914.4	69.9	15.9	19.1	ERI, Inc., Chandler, IN

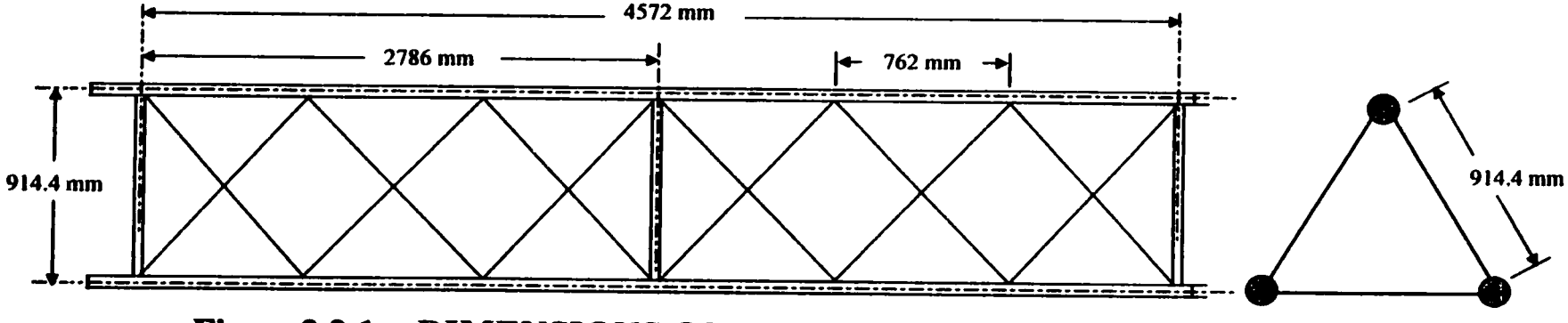
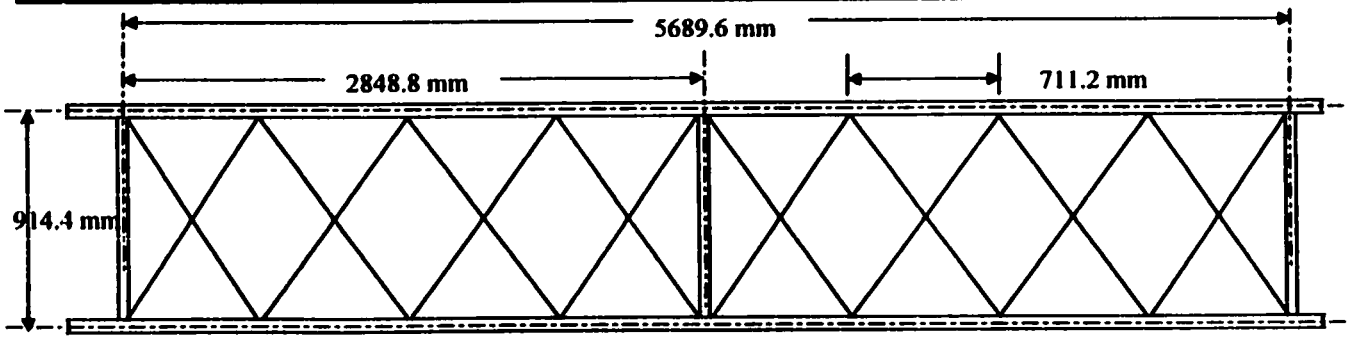


Figure3.2.1a: DIMENSIONS OF 6-PANEL SPECIMEN **CROSS-SECTION**

Table 3.2.1b: DETAILS OF TEST SPECIMENS

(8-PANEL CROSS-BRACED SPECIMENS)

Serial No.	Test No.	Specimen I.D.	Span Length (mm)	Panel Length (mm)	Face Width (mm)	Leg Size (mm)	Diagonal Size (mm)	Horizontal	Fabricator
1	22	P1A	5690	711.2	914.4	38.1	15.9	Yes	PIROD Inc., Plymouth, IN
2	31	P1B	5690	711.2	914.4	38.1	15.9	Yes	PIROD Inc., Plymouth, IN
3	21	P2A	5690	711.2	914.4	38.1	15.9	No	PIROD Inc., Plymouth, IN
4	27	P2B	5690	711.2	914.4	38.1	15.9	No	PIROD Inc., Plymouth, IN
5	30	P3A	5690	711.2	914.4	50.8	19.1	Yes	PIROD Inc., Plymouth, IN
6	32	P3B	5690	711.2	914.4	50.8	19.1	Yes	PIROD Inc., Plymouth, IN
7	29	P4A	5690	711.2	914.4	50.8	19.1	No	PIROD Inc., Plymouth, IN
8	20	P4B	5690	711.2	914.4	50.8	19.1	No	PIROD Inc., Plymouth, IN
9	26	P5A	5690	711.2	914.4	57.2	22.2	Yes	PIROD Inc., Plymouth, IN
10	34	P5B	5690	711.2	914.4	57.2	22.2	Yes	PIROD Inc., Plymouth, IN
11	28	P6A	5690	711.2	914.4	57.2	22.2	No	PIROD Inc., Plymouth, IN
12	15	P6B	5690	711.2	914.4	57.2	22.2	No	PIROD Inc., Plymouth, IN
13	18	P7A	5690	711.2	914.4	38.1	22.2	Yes	PIROD Inc., Plymouth, IN
14	17	P7B	5690	711.2	914.4	38.1	22.2	Yes	PIROD Inc., Plymouth, IN
15	33	P8A	5690	711.2	914.4	38.1	22.2	No	PIROD Inc., Plymouth, IN
16	19	P8B	5690	711.2	914.4	38.1	22.2	No	PIROD Inc., Plymouth, IN



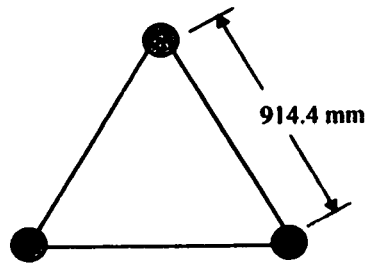


Figure.3.2.1b DIMENSIONS OF 8-PANEL SPECIMEN

CROSS-SECTION

3.2.2 Single-Braced Specimens

Two six-panel single-braced specimens were tested in the investigation. They also have a triangular cross-section with all legs, horizontals and diagonal members welded together. The specimens have a total length of 6096 mm (one panel length of 1016 mm). The details of the specimens are given in Table 3.2.2 and Figure 3.2.2.

3.3 Test Set-up

3.3.1 Specimen Set-up

The tests of specimens were carried out in the Structural Laboratory, University of Windsor, with the specimens tested as horizontal simply supported beams, loaded with a central concentrated load which was provided by a hydraulic jack attached to the steel test frame. A laboratory crane was used to set up the test specimens in proper position. i.e. the specimens were seated on the two end supports with the middle of the specimen just under the load jack.

3.3.2 Reinforcement of Compression Diagonals

All compression diagonals in panels, other than the one under investigation, were reinforced with four U-bolted angles to make sure that the diagonals of interest would buckle. Details of specimen reinforcement are given in Figures 3.3.2a and b.

3.3.3 Strain Gauges

Electric resistance strain gauges, fabricated by KYOWA, JAPAN, type KFG-5-120-c1-11, with a gauge length of 5 mm and a gauge factor of 2.12 were used to measure the strain in the members of the test panel of the specimen.

Table 3.2.2:DETAILS OF TEST SPECIMENS

(6-PANEL SINGLE-BRACED SPECIMENS)

Serial No.	Test No.	Specimen I.D.	Span Length (mm)	Panel Length (mm)	Face Width (mm)	Leg Size (mm)	Diagonal Size (mm)	Horizontal	Fabricator
1	14	31SRB	6096	1016	787	50.8	22.23	Yes	Rohn Inc., Peoria, Illinois, USA
2	16	33SRC	6096	1016	838	76.2	28.58	Yes	Rohn Inc., Peoria, Illinois, USA

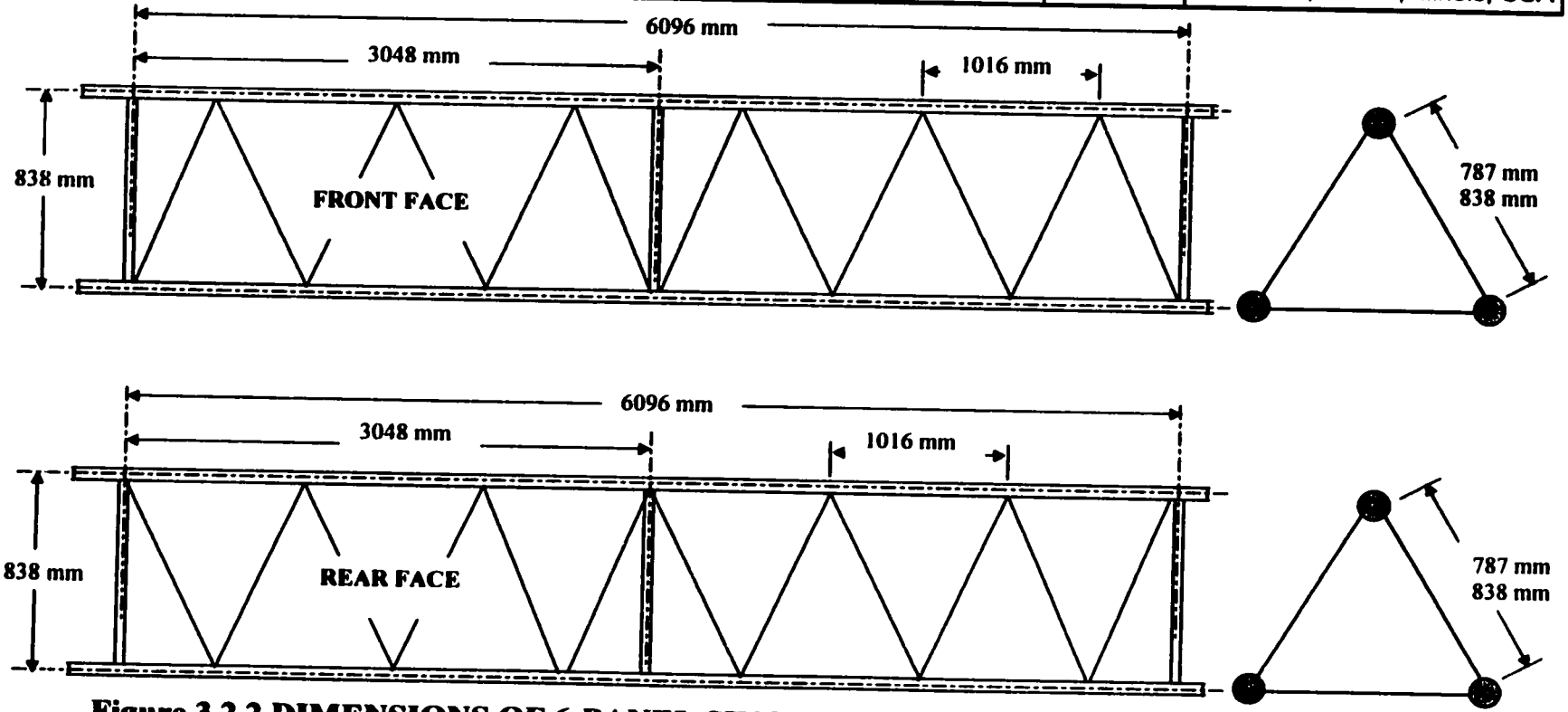


Figure 3.2.2 DIMENSIONS OF 6-PANEL SINGLE-BRACED SPECIMEN **CROSS-SECTION**

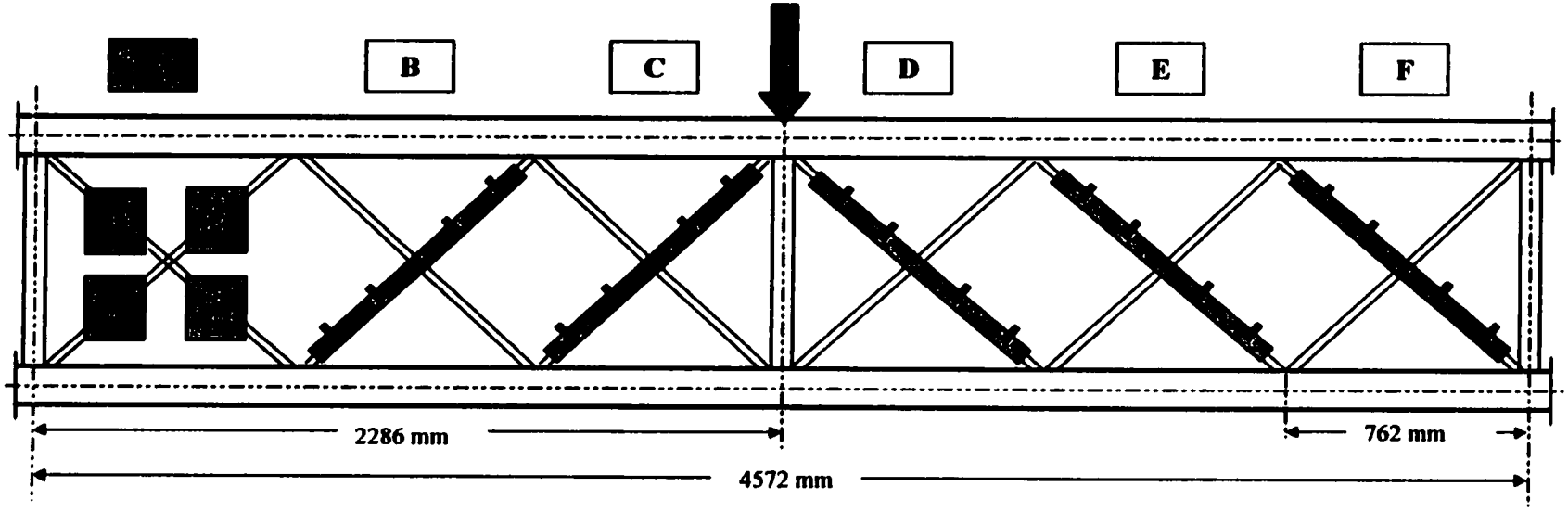


Figure 3.3.2a Test Panel A (strain gauges attached). Compression Diagonals in panels B, C, D, E and F were Reinforced with Angles as Shown

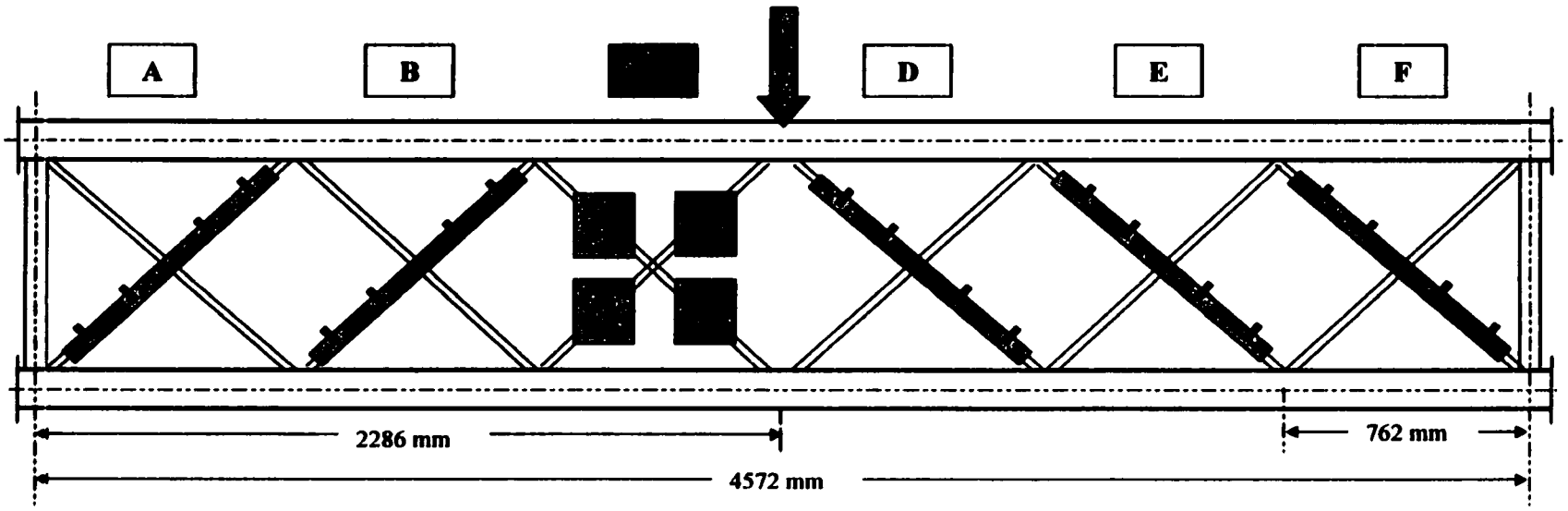


Figure 3.3.2b: Test Panel C (strain gauges attached). Compression Diagonals in Panels A, B, D, E and F were Reinforced with Angles as Shown

The strain gauges were fixed to individual members of the test specimen at the proper position after the surface was properly polished, cleaned with chemicals, and dried with Q-tips.

Based on previous experience of buckling of diagonal members, all the strain gauges were located at one-third the diagonal length, measured from the leg. For the first specimen, each panel was tested with 18 strain gauges to determine the force distribution in the diagonals and legs of the specimen whereas 14 strain gauges are used for each panel of the second specimen. For all other specimens, only the one pre-selected failure panel was tested with 16, 24 or 32 strain gauges fixed on both the compressive and tensile diagonals (strain gauges were put on legs for a few cases). Details of strain gauge location and numbering for each specimen are shown in Appendix A (Strain gauge location on specimens).

3.3.4 Data-Acquisition System

Readings of load cell and strain gauges were recorded automatically in the hardware of the computer as a text file with Datascan data acquisition system. The load cell and strain gauges were connected to the Datascan channels twelve hours after the strain gauges were fixed to the specimens. Microsoft Word and Excel programs were used to transfer the text file into Excel table for the convenience of data output and axial force calculations.

3.3.5 Load Application

The load was applied with a mechanical pump through a hydraulic jack attached to the beam of the steel test frame. Previously calibrated 445 kN (100 kip) and 890 kN (200 kip) load cells were used to measure the applied load. Details of load application are shown in Figures 3.3.5a and b.

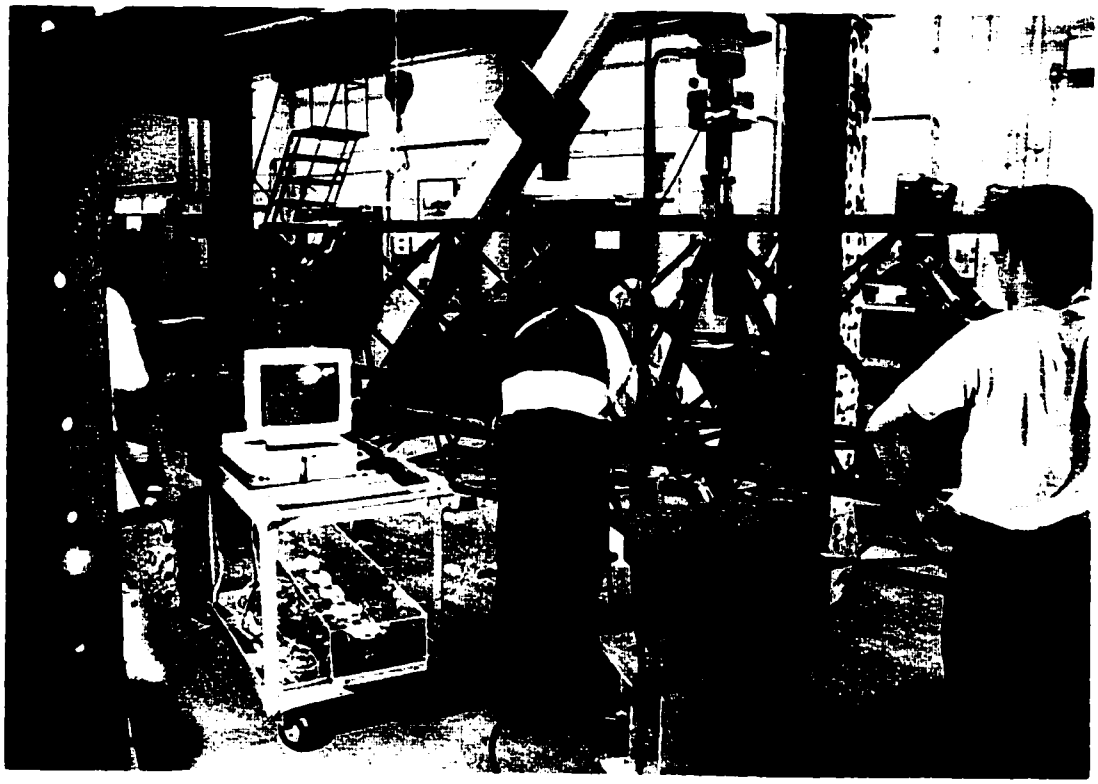


Figure 3.3.5a: Photograph of Test Set-up

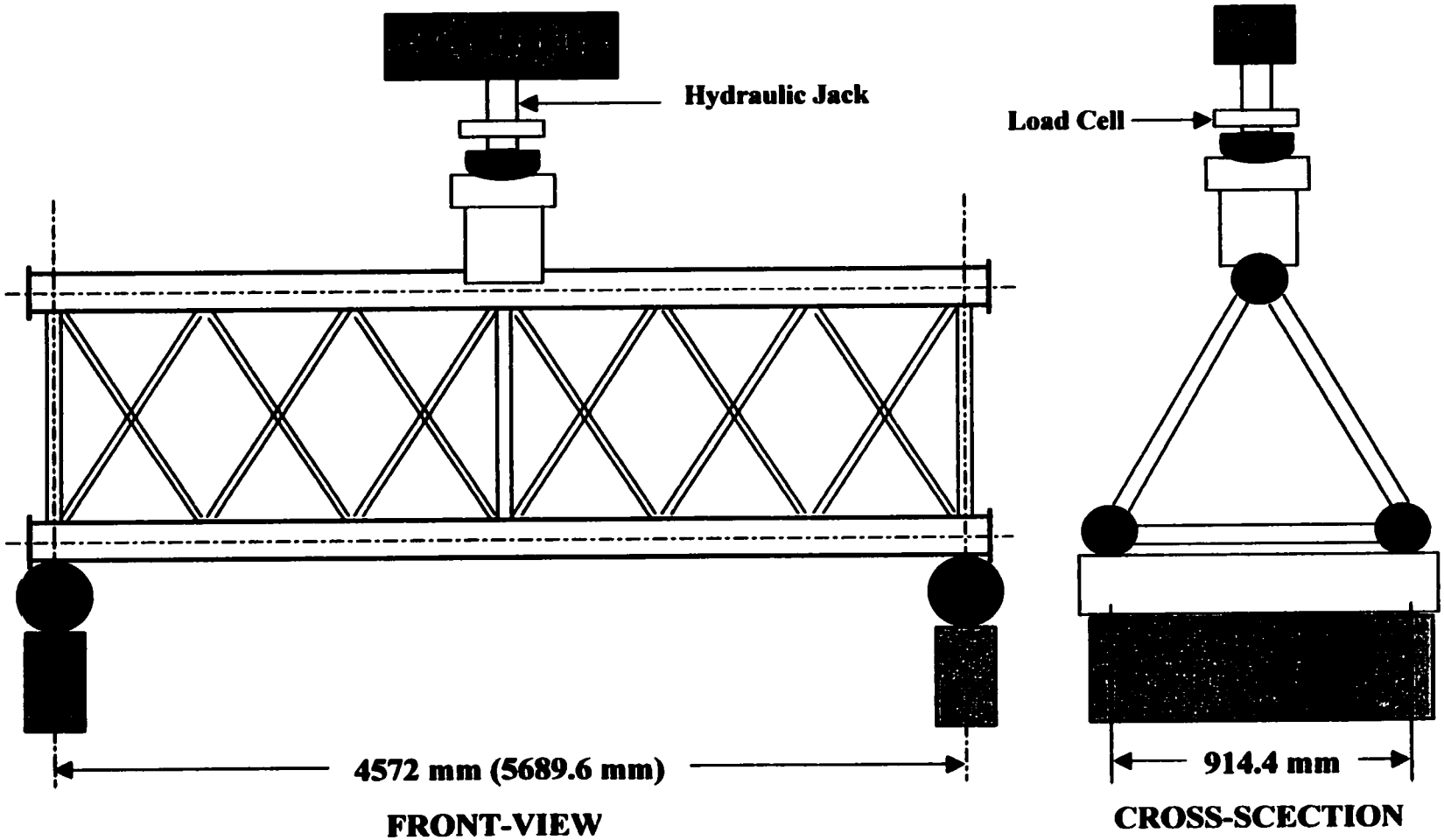


Figure 3.3.5b: Test Set-Up (not to scale)

Before starting the test, a Tinius Olsen Universal Testing Machine and a strain indicator were used to calibrate the load cells. Calibration data and curves are shown in Tables 3.3.5a and b and Figures 3.3.5c and d.

In order to get an accurate value of the axial forces based on the readings of strain gauges, care was taken in positioning the strain gauges to ensure that they are diametrically opposite.

3.4 Experimental Results

3.4.1 Structural Response

With the application of a central concentrated load, the axial forces and bending moments in the tested diagonals increase until the tested diagonals buckled. During the tests, the buckled diagonals and their buckling sequences were noted and are presented in Table 4.1.1. The load increments towards the end were kept small by monitoring the maximum strain readings of the test diagonals. The strain readings and axial forces are shown in Appendix B (Load-Strain Data and Axial Forces).

3.4.2 Material Properties

A total of 132 diagonal tensile specimens were cut from the compression diagonals (four tensile specimens for each tower), and tested in the Tinius Olsen Universal Testing Machine. The yield load and maximum failure load were obtained and the yield stress and tensile strength for each specimen were determined. The values of yield stress and tensile strength for each tower are given in Tables 3.4.2a, b and c.

Table 3.3.5.a: Calibration Data for 445 kN (100 kip)Load Cell

LOAD(kN)	MICRO-STRAIN READINGS			
	READING1	READING2	READING3	AVERAGE
0	0	0	0	0
40	351	367	358	359
80	702	720	710	711
120	1059	1073	1062	1065
160	1405	1421	1412	1413
200	1762	1771	1762	1765
240	2098	2118	2109	2108
280	2448	2464	2454	2455
320	2797	2812	2801	2803
360	3147	3162	3148	3152
400	3500	3506	3497	3501.00

Figure 3.3.5c: Calibration Curve for 100 kip Load Cell (gauge factor 2.062)

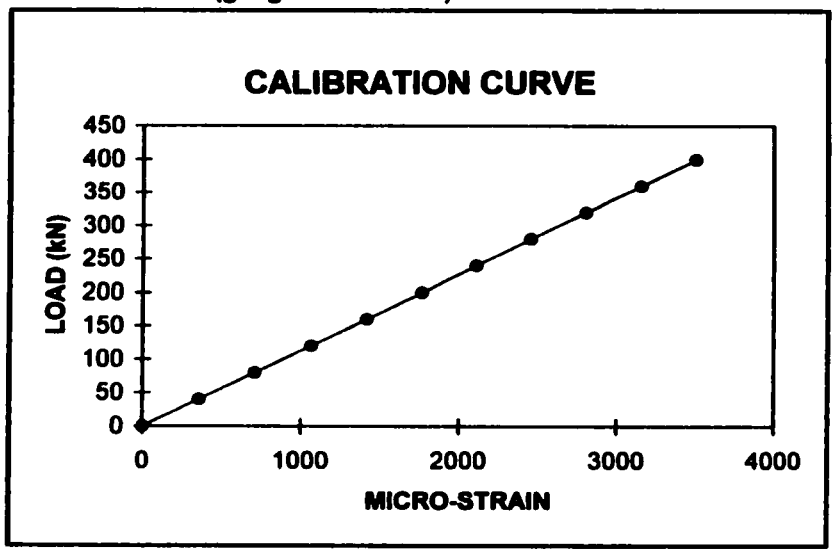


Table 3.3.5.b: Calibration Data for 890 kN (200 kip)Load Cell

LOAD(kN)	MICRO-STRAIN READINGS
0	0
10	30
20	65
30	108
40	151
50	194
60	238
70	281
80	325
90	368
100	411
150	628
200	847
250	1067
300	1285
350	1505
400	1724
450	1944
500	2164

Figure 3.3.5d: Calibration Curve for 200 kip Load Cell (gauge factor 2.062)

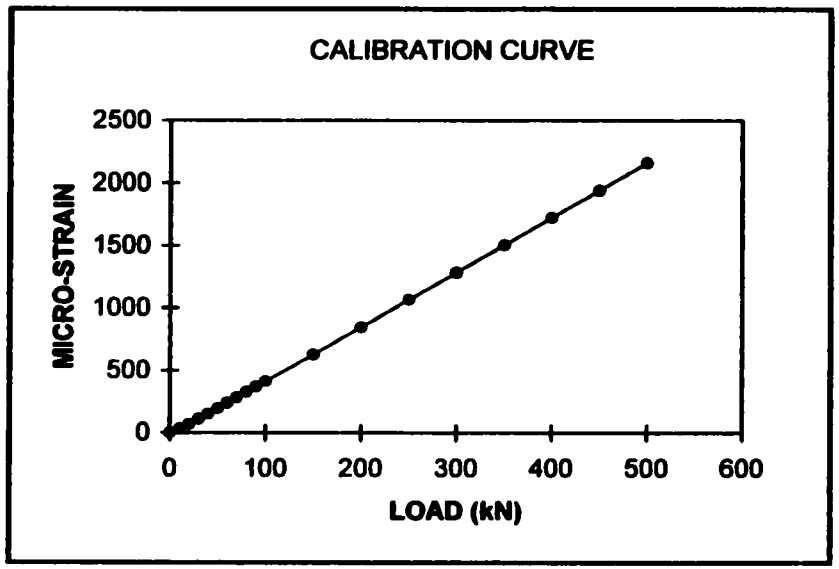


Table 3.4.2a: YIELD STRESSES AND TENSILE STRENGTHS OF DIAGONALS

(6-PANEL CROSS-BRACED SPECIMENS)

TEST SERIAL NO.	SPECIMEN I.D.	DIAMETER OF DIAGONAL (mm)	AVERAGE MEASURED YIELD STRESS (MPa)	AVERAGE MEASURED TENSILE STRENGTH (MPa)
6	S1A	12.7	367	488
9	S1B	12.7	396	502
4	S2A	12.7	378	498
8	S2B	12.7	369	498
23	S2C	12.7	353	478
7	S3A	14.3	385	532
25	S3B	14.3	398	532
1	S4A	14.3	378	535
3	S4B	14.3	378	535
5	S4C	14.3	387	527
2	S5A	15.9	385	504
10	S5B	15.9	385	504
12	S5C	15.9	378	535
11	S6A	15.9	385	502
13	S6B	15.9	382	502
24	S6C	15.9	385	502

Table 3.4.2b: YIELD STRESSES AND TENSILE STRENGTHS OF DIAGONALS

(8-PANEL CROSS-BRACED SPECIMENS)

TEST SERIAL NO.	SPECIMEN I.D.	DIAMETER OF DIAGONAL (mm)	AVERAGE MEASURED YIELD STRESS (MPa)	AVERAGE MEASURED TENSILE STRENGTH (MPa)
22	P1A	15.9	383	488
31	P1B	15.9	375	505
21	P2A	15.9	373	503
27	P2B	15.9	373	503
30	P3A	19.1	407	591
32	P3B	19.1	409	596
29	P4A	19.1	410	597
20	P4B	19.1	409	592
26	P5A	22.2	437	673
34	P5B	22.2	437	673
28	P6A	22.2	442	676
16	P6B	22.2	442	676
18	P7A	22.2	351	496
17	P7B	22.2	343	494
33	P8A	22.2	346	496
19	P8B	22.2	349	493

Table 3.4.2c: YIELD STRESSES AND TENSILE STRENGTHS OF DIAGONALS

(6-PANEL SINGLE-BRACED SPECIMENS)

TEST SERIAL NO.	SPECIMEN I.D.	DIAMETER OF DIAGONAL (mm)	AVERAGE MEASURED YIELD STRESS (MPa)	AVERAGE MEASURED TENSILE STRENGTH (MPa)
14	31SRB	22.2	328	490
16	33SRC	28.6	364	510

CHAPTER 4

ANALYSIS OF RESULTS

4.1 Failure Pattern of Tower Members

4.1.1 Cross-Braced Specimens

Thirty-one cross-braced specimens were tested in this investigation; fifteen of the specimens were with horizontals while the others were without horizontals. For the specimens with horizontals, the left-most panel was tested with all other panels reinforced and it was observed that the tested compression diagonals had buckled out-of-plane with an almost S-shape or an unsymmetrical S-shape. For the specimens without horizontals, left middle panel was strain-gauged while all other panels were reinforced. The tested diagonals had buckled with one half-sine wave failure shape due to very small tensile force in the tensile diagonals. (The failure pattern of all the compression diagonals are given in Table 4.1.1).

4.1. 2 Single-Braced Specimens

Two single-braced towers 31SRB and 33SRC were tested during the investigation. For tower 31SRB, the top leg of right middle panel buckled first due to the small leg-diagonal size ratio and no diagonals buckled. For tower 33SRC with a large leg-diagonal size ratio, two of the tested diagonals buckled out-of-plane almost at the same time with a one half sine wave shape.

4. 2 Calculation of Axial Forces in Tested Members

The finite strip method was used to determine the axial forces, assuming a linear variation of strain across the cross-section. The cross-section of each tested member was divided into 1000 strips, and the axial force in each strip was determined from the strain in the strip.

Table 4.1.1: FAILURE PATTERN OF ALL BUCKLED COMPRESSION DIAGONALS

Test No.	Specimen I.D.	Location of Buckled Diagonal	Failure Pattern	Test No.	Specimen I.D.	Location of Buckled Diagonal	Failure Pattern
6	S1A	panel C front diagonal	half-sine inside	22	P1A	test panel did not buckle; panel H buckled first	
		panel C rear diagonal	did not buckle				
4	S2A	panel A front diagonal	s-shape top half outside	31	P1B	panel A front diagonal	bottom half outside
		panel A rear diagonal	s-shape bottom half inside			panel A rear diagonal	top half inside
8	S2B	panel A front diagonal	s-shape top half inside	21	P2A	panel A front diagonal	did not buckle
		panel A rear diagonal	s-shape bottom half outside			panel A rear diagonal	top half outside
23	S2C	panel A front diagonal	s-shape top half inside	27	P2B	panel D front diagonal	top half outside
		panel A rear diagonal	s-shape top half inside			panel D rear diagonal	top half outside
7	S3A	panel C front diagonal	top half outside	30	P3A	panel A front diagonal	top half inside
		panel C rear diagonal	bottom half inside			panel A rear diagonal	bottom half outside
25	S3B	panel A front diagonal	s-shape top half outside	32	P3B	panel A front diagonal	top half inside
		panel A rear diagonal	s-shape top half inside			panel A rear diagonal	bottom half outside
1	S4A	panel A front diagonal	s-shape top half inside	29	P4A	panel D front diagonal	not buckle
		panel B front diagonal	s-shape top half inside			panel D rear diagonal	top half inside
3	S4B	panel A front diagonal	s-shape top half inside	20	P4B	panel D front diagonal	top half inside
		panel A rear diagonal	s-shape bottom half inside			panel D rear diagonal	top half outside
5	S4C	panel A front diagonal	s-shape top half inside	26	P5A	test panel did not buckle	
		panel A rear diagonal	s-shape bottom half inside				
2	S5A	panel C front(rear) diagonal	half-sine outside(inside)	34	P5B	panel A front diagonal	did not buckle
		panel D front(rear) diagonal	half-sine outside(inside)			panel A rear diagonal	top half inside
10	S5B	panel C front diagonal	half-sine outside(inside)	28	P6A	panel D front diagonal	half-sine inside
		panel C rear diagonal	did not buckle			panel D rear diagonal	half-sine outside
12	S5C	panel C front diagonal	half-sine inside	15	P6B	panel D front diagonal	did not buckle
		panel C rear diagonal	half-sine outside			panel D rear diagonal	top half inside
11	S6A	panel A front diagonal	s-shape top half inside	18	P7A	panel C diagonalf did not buckle; panel D top leg buckled first	
		panel A rear diagonal	s-shape bottom half inside				
13	S6B	panel A front diagonal	s-shape top half inside	17	P7B	panel A diagonal did not buckle; panel E top leg buckled first	
		panel A rear diagonal	s-shape bottom half inside				
24	S6C	panel A did not buckle; panels C and D buckled first after the horizontal buckled		33	P8A	panel D front diagonal	top half outside
						panel D rear diagonal	did not buckle
14	31SRB	no digonal buckled due to the right middle panel top leg buckling		19	P8B	panel D front diagonal	top half inside
						panel D rear diagonal	did not buckle
16	33SRC	panel B rear diagonal	half-sine out-of-plane				
		panel c rear diagonal					

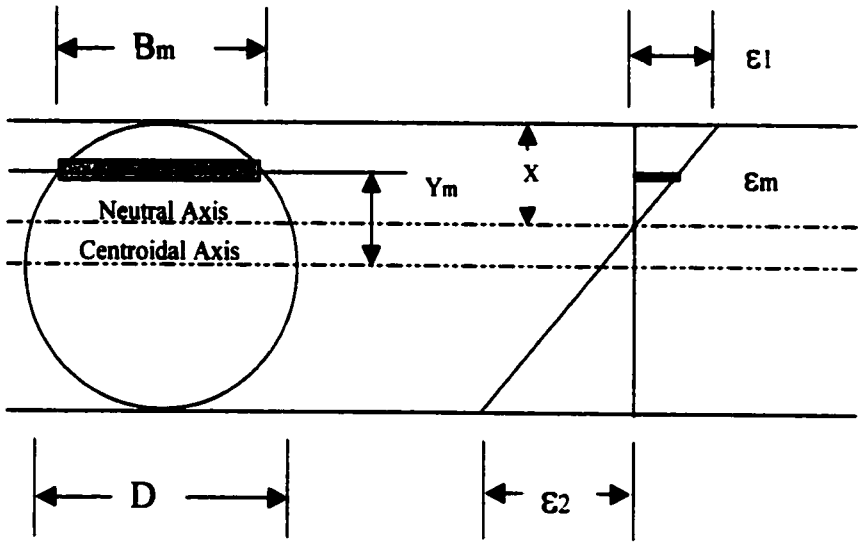


Figure 4.2.1. Diagram of Axial Force Calculation from Strains

The detailed calculation procedure is as follows:

Case 1: Strains at Top and Bottom are of Opposite Sign (Fig. 4.2.1)

The distance Y_m measured from the center of slice to centroidal axis of the cross-section is:

$$Ym = \frac{D}{2} - (m-1)dy - \frac{dy}{2} \qquad (4.1)$$

where dy = D/1000, and m = 1 to 1000 (from top to bottom)

The width of slice "m" is given by

$$B_m = 2\sqrt{\left(\tfrac{D}{2}\right)^2 - (Y_m)^2} \qquad (4.2)$$

The depth of neutral axis X measured from the strain ε_1 is calculated as:

$$X = \frac{|\varepsilon_1| D}{|\varepsilon_1| + |\varepsilon_2|} \tag{4.3}$$

The strain ε_m in the center of slice "m" is given by

$$\varepsilon_m = \frac{\varepsilon_1}{X}\left[Y_m - \left(\frac{D}{2} - X\right)\right] \tag{4.4}$$

The stress for slice "m" is calculated according to Hooke's law:

$$\sigma_m = \varepsilon_m E \tag{4.5}$$

The actual force in slice "m" is

If $\sigma_m < F_y$ then $F_m = \sigma_m B_m dy$ (4.6)

If $\sigma_m > F_y$ then $F_m = F_y B_m dy$ (4.7)

The axial force in the total cross-section of the member is the sum of all the slice forces:

$$F = \sum F_m \tag{4.8}$$

Case 2: Strains at the Top and Bottom are of Same Sign (Figure 4.2.2)

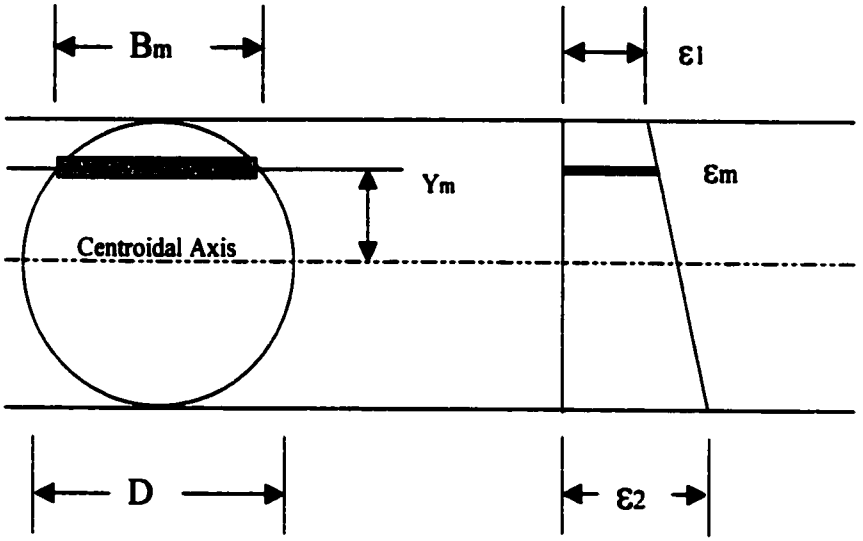


Figure 4.2.2. Diagram of Axial Force Calculation from Strains

The distance Y_m measured from the center of slice to centroidal axis of the cross-section is:

$$Y_m = \frac{D}{2} - (m-1)dy - \frac{dy}{2} \qquad (4.9)$$

where dy = D/1000, and m = 1 to 1000 (from top to bottom)

The width of slice "m" is given by

$$B_m = 2\sqrt{\left(\tfrac{D}{2}\right)^2 - (Y_m)^2} \qquad (4.10)$$

The strain ε_m in the center of slice "m" is given by

$$\varepsilon_m = \frac{D(\varepsilon_1 + \varepsilon_2) - 2Y_m(\varepsilon_2 - \varepsilon_1)}{2D} \qquad (4.11)$$

The stress for slice "m" is calculated according to Hooke's law:

$$\sigma_m = \varepsilon_m E \tag{4.12}$$

The actual force in slice "m" is

If $\sigma_m < F_y$ then $F_m = \sigma_m B_m dy$ (4.13)

If $\sigma_m > F_y$ then $F_m = F_y B_m dy$ (4.14)

The axial force in the total cross-section of the member is the sum of all the slice forces:

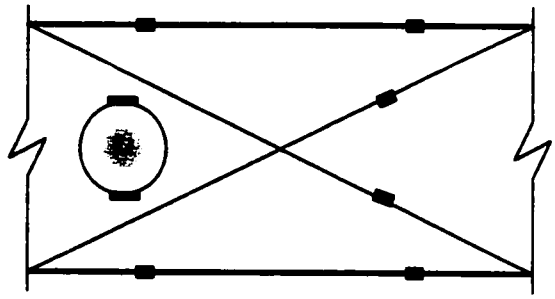
$$F = \sum F_m \tag{4.15}$$

4.3 Specimen Equilibrium Check

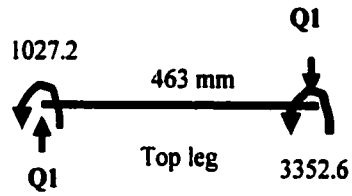
Accuracy of the axial forces based on the strain readings was verified with the tower's equilibrium check. In this investigation, a vertical equilibrium check was conducted on one tower (S5C) by calculating the axial forces and shears in the tension and compression diagonals and the shear forces in the three legs at one cross-section. The location of strain gauges are given in Appendix A. The equilibrium was checked as shown below:

Specimen S5C equilibrium check (applied load level 106 kN):

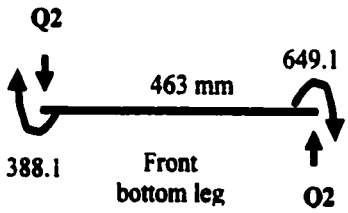
1) Diagram for strain gauge location (front-view)



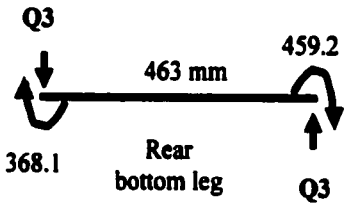
2) Shear forces in three legs (from Table S5C of Appendix B)



Q1 = (3352.6+1027.2)/463 = 9.46 kN



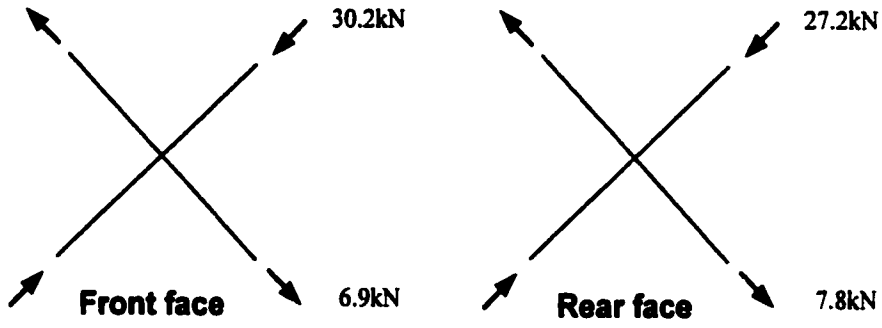
Q2 = (649.1+388.1)/463 = 2.24 kN



Q3 = (459.2+368.1)/463 = 1.79 kN

Q_{leg} = Q1+Q2+Q3 = 9.46-2.24-1.79 = 5.43 kN

3) Vertical component of axial forces in diagonals (from Table S5C of Appendix B)



$$Q_{diagonal} = (30.2+6.9+27.2+7.8)*\sin(41.71^{0}) = 47.97 \text{ kN}$$

4) Vertical component of shear forces in diagonals (ignored)

5) Total shear force in the cross-section

$$Q_{total} = Q_{leg} + Q_{diagonal} = 5.43+47.97 = 53.40 \text{ kN}$$

6) Support reaction

$$R = \text{Load Level}/2 = 106.0/2 = 53.0 \text{ kN}$$

7) Error

$$\text{Error} = (Q_{total} - R)/R = (53.4-53.0)/53.0 = 0.75\%.$$

4.4 Determination of Experimental Buckling Loads and Effective Length Factors

The buckled diagonals were noted during each tower test. The maximum axial force that occurred in the tested diagonal was taken as the buckling load. Only for specimen S5A, there was a large variation in the buckling loads of the front and rear diagonals (38.9 kN and 21.6 kN). This is probably due to the possibility of the strain gauges not being located diametrically opposite to each other on one of the diagonals. In this investigation, a total of 44 buckling loads were used and the corresponding effective length factors based on CSA-S37-94 Standard and AISC-LRFD Specifications were calculated, The details of the buckling loads and effective length factors are shown in Tables 4.4a to 4.4g.

The leg member of specimen 31SRB failed before any diagonal failed. The maximum axial compressive force recorded in the diagonals was 51.6 kN. This corresponds to an effective length factor of 0.64 according to CSA-S37-94 and 0.71 according to AISC-LRFD. Though it is not possible to determine the actual effective length factors of diagonal members based on this test, it can be stated that they will be less than the above values.

4.5 Effect of Axial Forces in Tension Diagonals on Effective Length Factors

Examining Tables 4.4a to 4.4f, it can be seen that although the ratio of forces in the compression diagonal and tension diagonal varied significantly, the effective length factors varied from a minimum of 0.296 to a maximum of 0.403. There is no definite relationship between the force in the tension diagonal and the resistance of the compression diagonal. The tension diagonals of the middle panels of specimens with no horizontals carried very little tensile forces. Still they were able to provide the necessary support to the compression diagonal. It can therefore be stated that even a small tensile force is able to provide the necessary support to the compression diagonal.

Table 4.4a: EFFECTIVE LENGTH FACTORS USING CAN/CSA-S16.1-94

(6-panel cross-braced specimens)

Test No.	Specimen I.D.	Diagonal Diameter (mm)	c/c Length of Diagonal Ld (mm)	Measured Yield Stress Fy (MPa)	Buckling Load (kN)	Force in the Tesion Diagonal (kN)	Compression/Tension Ratio	λ	Effective Length Factor K
6	S1A	12.7	1190	357	14.1	2.6	5.42	1.640	0.325
					12.4	3.3	3.76	1.776	0.352
9	S1B	12.7	1190	396	Did not buckle				
4	S2A	12.7	1190	378	14.8	15.0	0.99	1.649	0.318
					14.3	16.0	0.89	1.685	0.325
8	S2B	12.7	1190	369	13.7	13.6	1.01	1.706	0.333
					13.7	13.4	1.02	1.706	0.333
23	S2C	12.7	1190	353	14.5	16.6	0.87	1.598	0.319
					14.8	14.0	1.06	1.578	0.315
7	S3A	14.3	1190	385	21.3	4.6	4.63	1.537	0.331
					19.4			1.633	0.351
25	S3B	14.3	1190	396	20.4	8.1	2.52	1.617	0.342
					20.1	4.6	4.37	1.633	0.345
1	S4A	14.3	1190	378	20.1	16.9	1.19	1.578	0.343
3	S4B	14.3	1190	378	24.9			1.365	0.296
5	S4C	14.3	1190	367	21.4	19.3	1.11	1.485	0.327
					22.6	22.0	1.04	1.422	0.313
2	S5A	15.9	1190	385	21.6	1.9	11.37	1.741	0.416
					20.9	8.1	2.58	1.776	0.424
10	S5B	15.9	1190	385	33.2	10.4	3.19	1.306	0.312
12	S5C	15.9	1190	385	29.0	6.9	4.20	1.439	0.343
					30.2	9.8	3.08	1.399	0.334
11	S6A	15.9	1190	385	27.3	23.9	1.14	1.498	0.358
					29.2	13.8	2.12	1.431	0.342
13	S6B	15.9	1190	382	25.4	17.3	1.47	1.563	0.375
24	S6C	15.9	1190	385	Did not buckle				

Table 4.4b: EFFECTIVE LENGTH FACTORS USING CAN/CSA-S16.1-94

(8-panel cross-braced specimens)

Test No.	Specimen I.D.	Diagonal Diameter (mm)	c/c Length of Diagonal Ld (mm)	Measured Yield Stress Fy (MPa)	Buckling Load (kN)	Force in the Tesion Diagonal (kN)	Compression/Tension Ratio	λ	Effective Length Factor K
22	P1A	15.9	1158	363	Did not buckle				
31	P1B	15.9	1158	375	26.3	27.6	0.95	1.510	0.375
					29.0	25.6	1.13	1.413	0.361
21	P2A	15.9	1158	373					
					29.7	6.4	4.64	1.383	0.345
27	P2B	15.9	1158	373	23.5	7.2	3.26	1.619	0.403
					30.2	6.1	4.95	1.368	0.341
30	P3A	19.1	1158	407	55.0	44.6	1.23	1.225	0.351
					52.0	49.0	1.06	1.280	0.366
32	P3B	19.1	1158	409	60.0	53.2	1.13	1.144	0.327
					47.3	53.6	0.88	1.375	0.393
29	P4A	19.1	1158	410					
					48.7	7.0	6.96	1.348	0.385
20	P4B	19.1	1158	409	51.5	11.9	4.33	1.293	0.369
					50.2				0.376
26	P5A	22.2	1158	437	Did not buckle				
34	P5B	22.2	1158	437					
					88.2	89.6	0.98	1.144	0.367
28	P6A	22.2	1158	442	91.3	21.4	4.27	1.110	0.356
					82.5	8.7	9.48	1.209	0.388
15	P6B	22.2	1158	442					
					101.5	12.7	7.99	1.006	0.323
18	P7A	22.2	1158	351	Did not buckle				
17	P7B	22.2	1158	343	Did not buckle				
33	P8A	22.2	1158	346	75.4	12.5	6.03	1.058	0.383
19	P8B	22.2	1158	349	82.0	19.6	4.18	0.983	0.355

Table 4.4c: EFFECTIVE LENGTH FACTORS USING CAN/CSA-S16.1-94

(6-panel single-braced specimens)

Test No.	Specimen I.D.	Diagonal Diameter (mm)	c/c Length of Diagonal Ld (mm)	Measured Yield Stress Fy (MPa)	Buckling Load (kN)	λ	Effective Length Factor K
14	31SRB	22.2	937	328			
16	33SRC	28.6	979	364	148.6	0.93	0.502
					150.5	0.92	0.495

Table 4.4d: EFFECTIVE LENGTH FACTORS USING AISC-LRFD SPECIFICATIONS

(6-panel cross-braced specimens)

Test No.	Specimen I.D.	Diagonal Diameter (mm)	c/c Length of Diagonal Ld (mm)	Measured Yield Stress Fy (MPa)	Buckling Load (kN)	Force in the Tesion Diagonal (kN)	Compression/Tension Ratio	λ	Effective Length Factor K
6	S1A	12.7	1190	357	14.1	2.6	5.42	1.677	0.325
					12.4	3.3	3.76	1.788	0.352
9	S1B	12.7	1190	396	Did not buckle				
4	S2A	12.7	1190	378	14.8	15.0	0.99	1.684	0.318
					14.3	16.0	0.89	1.713	0.325
8	S2B	12.7	1190	369	13.7	13.6	1.01	1.731	0.333
					13.7	13.4	1.02	1.731	0.333
23	S2C	12.7	1190	353	14.5	16.6	0.87	1.643	0.319
					14.8	14.0	1.06	1.627	0.315
7	S3A	14.3	1190	385	21.3	4.6	4.63	1.595	0.331
					19.4			1.671	0.351
25	S3B	14.3	1190	396	20.4	8.1	2.52	1.658	0.342
					20.1	4.6	4.37	1.671	0.345
1	S4A	14.3	1190	378	20.1	16.9	1.19	1.627	0.343
3	S4B	14.3	1190	378	24.9			1.459	0.296
5	S4C	14.3	1190	367	21.4	19.3	1.11	1.554	0.327
					22.8	22.0	1.04	1.506	0.313
2	S5A	15.9	1190	385	21.6	1.9	11.37	1.759	0.416
					20.9	8.1	2.58	1.788	0.424
10	S5B	15.9	1190	385	33.2	10.4	3.19	1.409	0.312
12	S5C	15.9	1190	385	29.0	6.9	4.20	1.518	0.343
					30.2	9.8	3.08	1.487	0.334
11	S6A	15.9	1190	385	27.3	23.9	1.14	1.564	0.358
					29.2	13.8	2.12	1.512	0.342
13	S6B	15.9	1190	382	25.4	17.3	1.47	1.615	0.375
24	S6C	15.9	1190	385	Did not buckle				
14	31SRB	22.2	937	328	Did not buckle				

Table 4.4e: EFFECTIVE LENGTH FACTORS USING AISC-LRFD SPECIFICATIONS

(8-panel cross-braced specimens)

Test No.	Specimen I.D.	Diagonal Diameter (mm)	c/c Length of Diagonal Ld (mm)	Measured Yield Stress Fy (MPa)	Buckling Load (kN)	Force in the Tesion Diagonal (kN)	Compression/Tension Ratio	λ	Effective Length Factor K
22	P1A	15.9	1158	363					
31	P1B	15.9	1158	375	26.3	27.6	0.95	1.574	0.375
					29.0	25.6	1.13	1.499	0.361
21	P2A	15.9	1158	373					
					29.7	6.4	4.64	1.474	0.345
27	P2B	15.9	1158	373	23.5	7.2	3.26	1.660	0.403
					30.2	6.1	4.95	1.464	0.341
30	P3A	19.1	1158	407	55.0	44.6	1.23	1.361	0.351
					52.0	49.0	1.06	1.400	0.366
32	P3B	19.1	1158	409	60.0	53.2	1.13	1.305	0.327
					47.3	53.6	0.88	1.470	0.393
29	P4A	19.1	1158	410					
					48.7	7.0	6.96	1.445	0.385
20	P4B	19.1	1158	409	51.5	11.9	4.33	1.397	0.369
					50.2			1.419	0.376
26	P5A	22.2	1158	437					
34	P5B	22.2	1158	437					
					88.2	89.6	0.98	1.259	0.367
28	P6A	22.2	1158	442	91.3	21.4	4.27	1.226	0.356
					82.5	8.7	9.48	1.321	0.388
15	P6B	22.2	1158	442					
					101.5	12.7	7.99	1.118	0.323
18	P7A	22.2	1158	351					
17	P7B	22.2	1158	343					
33	P8A	22.2	1158	346	75.4	12.5	6.03	1.172	0.383
19	P8B	22.2	1158	349	82.0	19.6	4.18	1.093	0.355

Table 4.4f: EFFECTIVE LENGTH FACTORS USING AISC-LRFD SPECIFICATIONS

(6-panel single-braced specimens)

Test No.	Specimen I.D.	Diagonal Diameter (mm)	c/c Length of Diagonal Ld (mm)	Measured Yield Stress Fy (MPa)	Buckling Load (kN)	λ	Effective Length Factor K
14	31SRB	22.2	937	328	Did not buckle		
16	33SRC	28.6	979	364	148.6	1.039	0.502
					150.5	1.025	0.495

Table 4.4g: AVERAGE EFFECTIVE LENGTH FACTORS

Effective Length Factor	Single-Braced Diagonal	Cross-Braced Diagonal		
		6-Panel	8-Panel	Average value
Effective Length Factor Using CAN/CSA -S16.1-94	0.50	0.37	0.34	0.35
Effective Length Factor Using AISC-LRFD	0.56	0.39	0.35	0.37

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The following conclusions are based on this experimental investigation:

The distribution of forces in compression and tension diagonals and the force distribution in top half and bottom half of the compression or tension diagonals are not the same. No definite conclusions about the force distribution can be drawn.

- For identical specimens of each type, the compression diagonals for the same panel would not have the same buckling load due to minor fabrication differences.

- Diagonals in the end panels of specimens with horizontals at mid-span buckle suddenly at a high load, while the specimens without horizontals at mid-span would buckle at the middle panels at a much smaller load.

- Specimens with small leg-diagonal size ratio buckle due to the buckling of top leg, not due to the buckling of compression diagonals in any panel.

- For cross-braced specimens without horizontals, the tested compression diagonals buckle out-of-plane inside or outside with one almost half-sine wave due to the small axial force in the tension diagonals. On the other hand, for cross-braced specimens with horizontals, the tested compression diagonals buckle out-of-plane inside or outside with a symmetrical S-shape or an unsymmetrical S-shape due to the large force in the tension diagonals. For single-braced specimens, the compression diagonals buckle out-of-plane with one half-sine wave.

- The axial forces in the tension diagonals don't have a big effect on effective length factors for cross-braced compression diagonals.

- The average effective length factor for single-braced diagonals is 0.50. The effective length factor for cross-braced diagonals is 0.35, as compared to an effective length factor of 0.75 as given by CSA-S37-94 that is much too conservative.

5.2 Recommendation for Further Research

- To know the distribution of forces in the members, tests should be carried out on towers with loads applied at each panel point (instead of one load at mid-span of top chord as in the current investigation) to simulate the actual distributed wind load.

- Tests should be carried to study the effect of fabrication differences on the effective length factor.

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REFERENCES

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APPENDIX A

STRAIN GAUGE LOCATION

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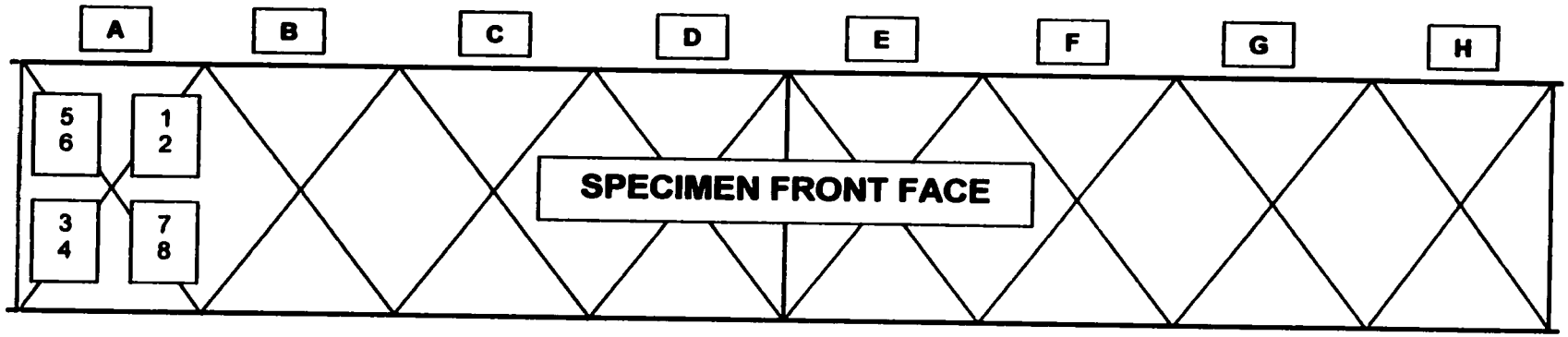
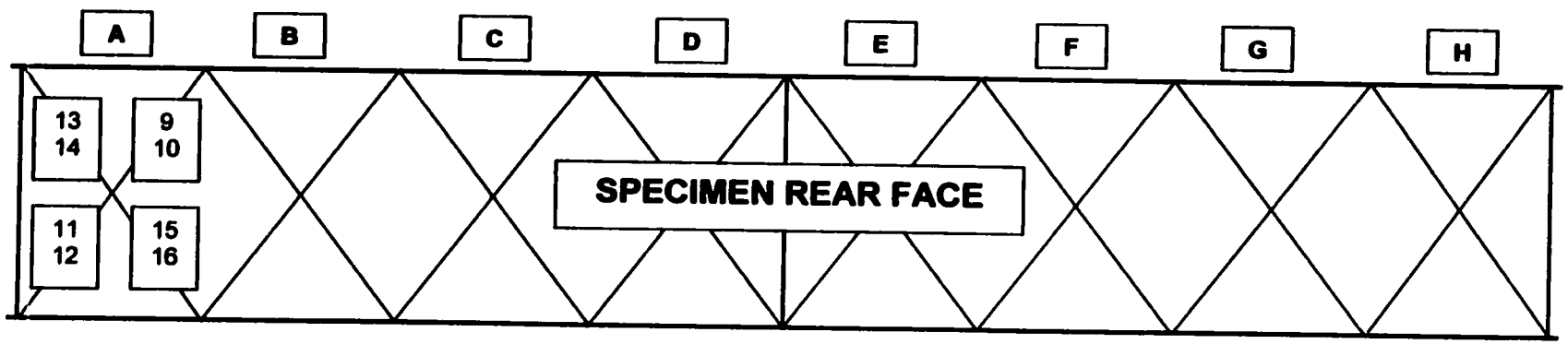
SPECIMEN P1-A (TEST # 22) STRAIN GAUGE IDENTIFICATION





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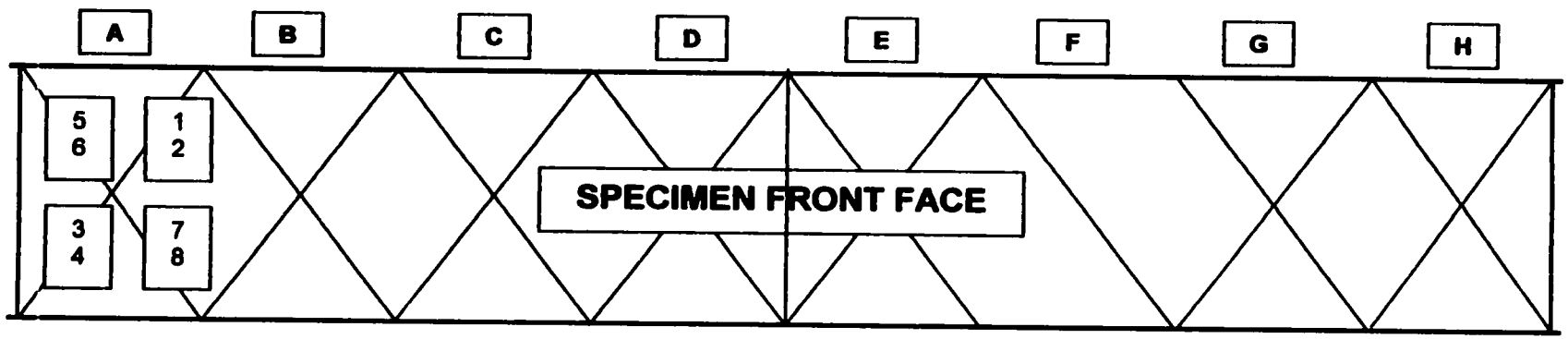

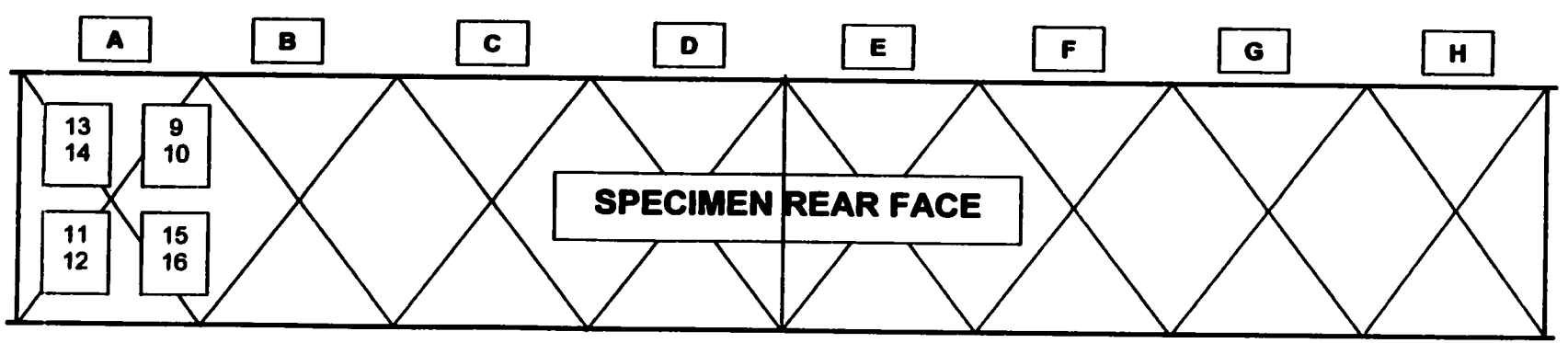

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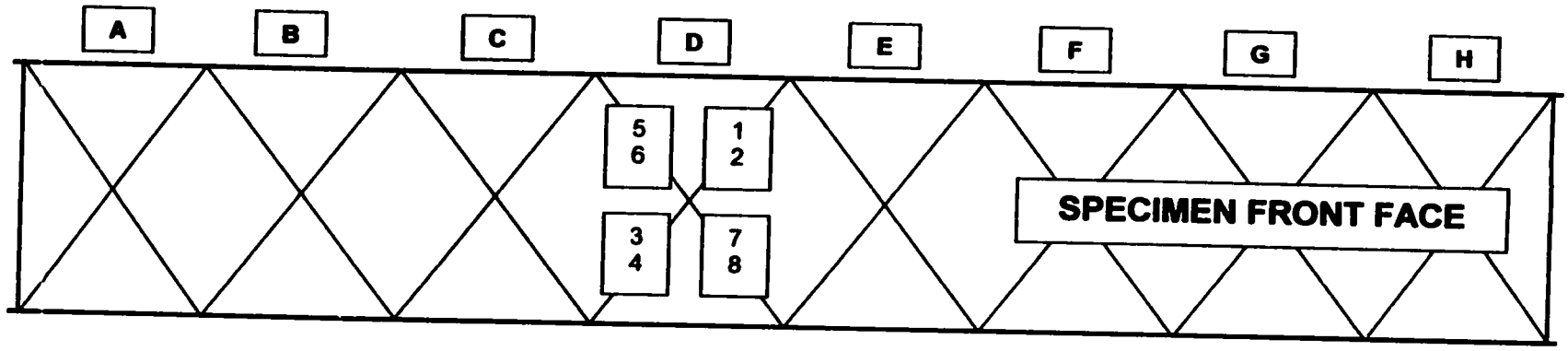

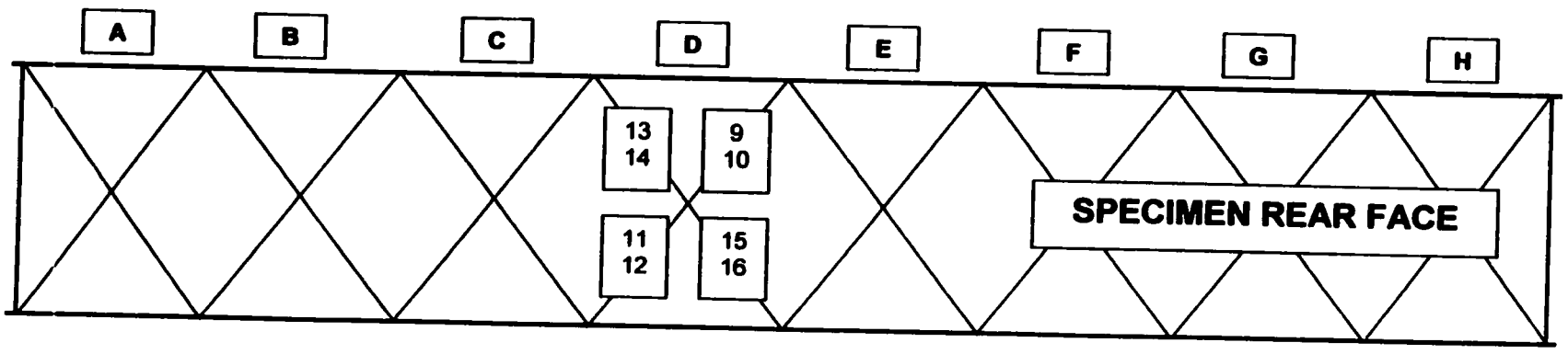

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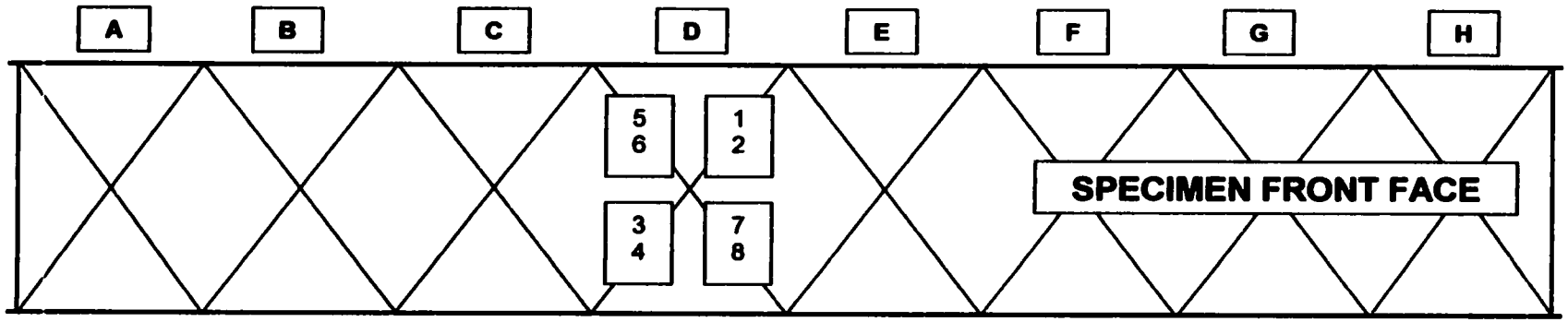

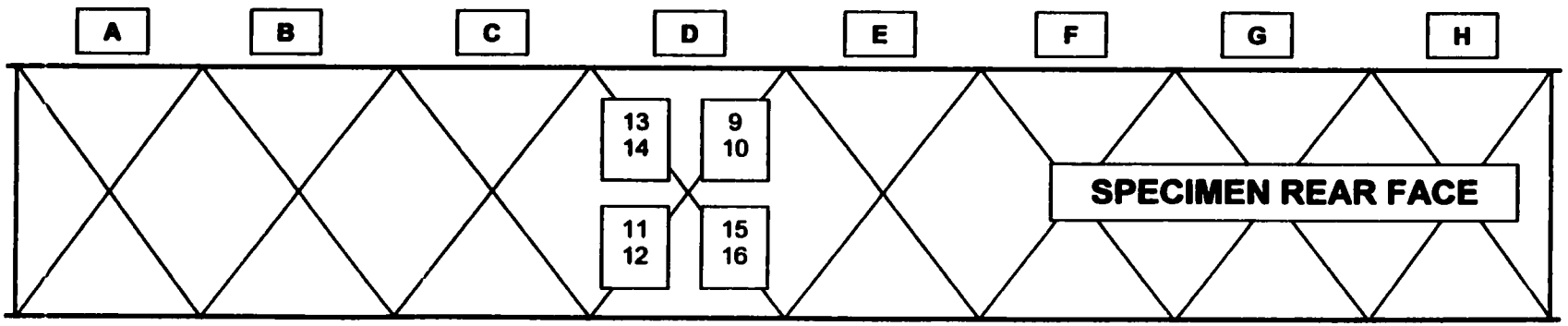

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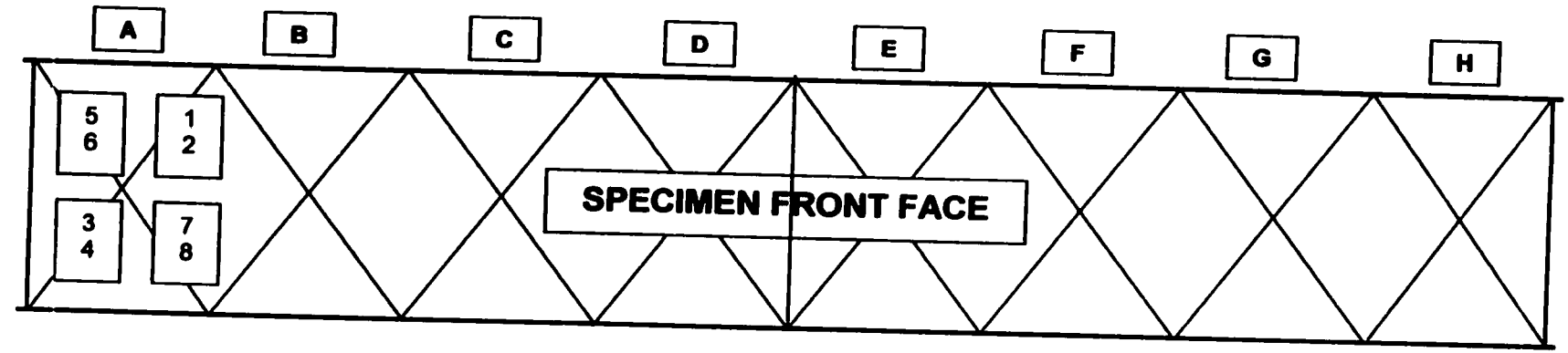
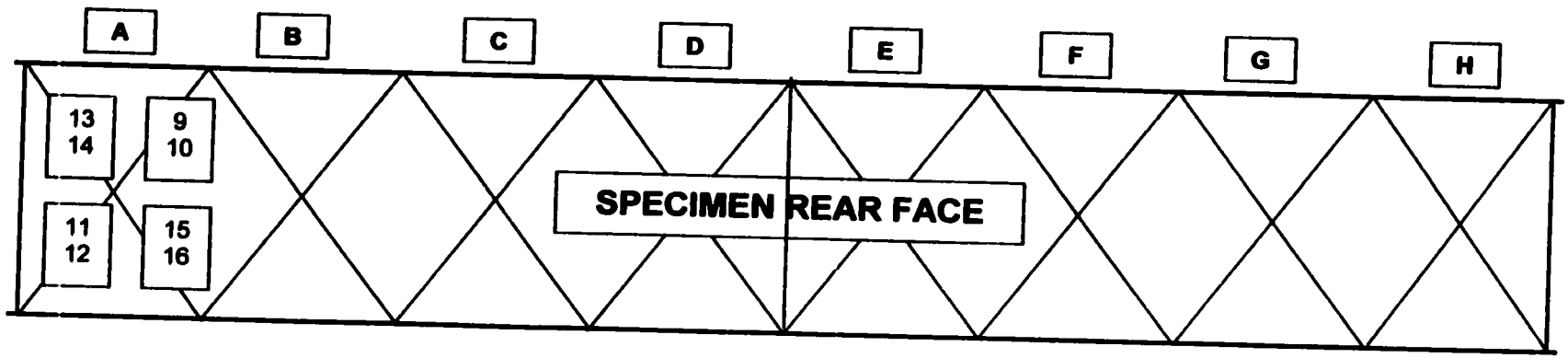
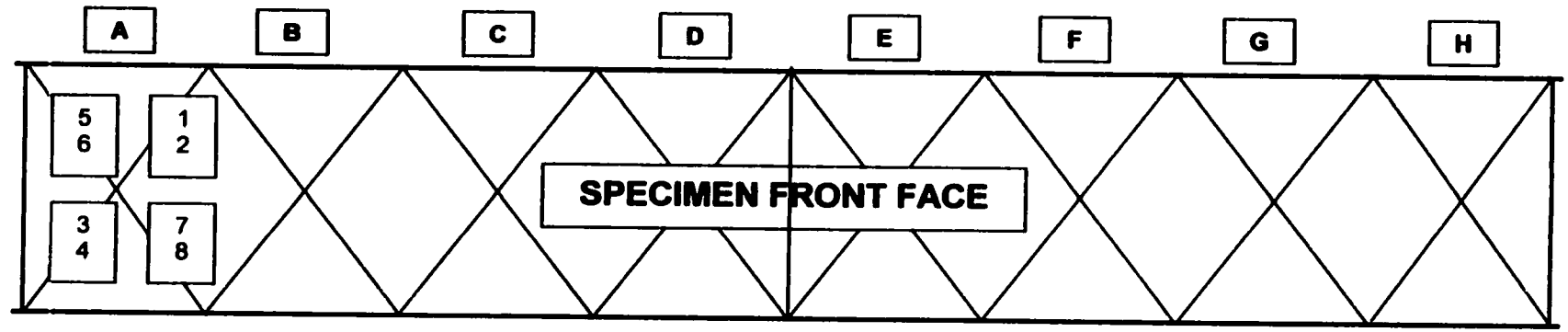
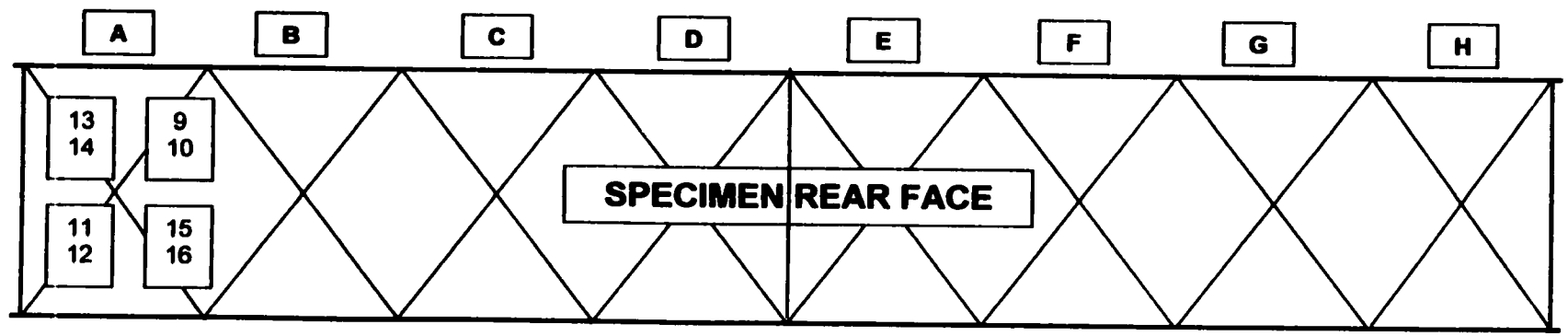


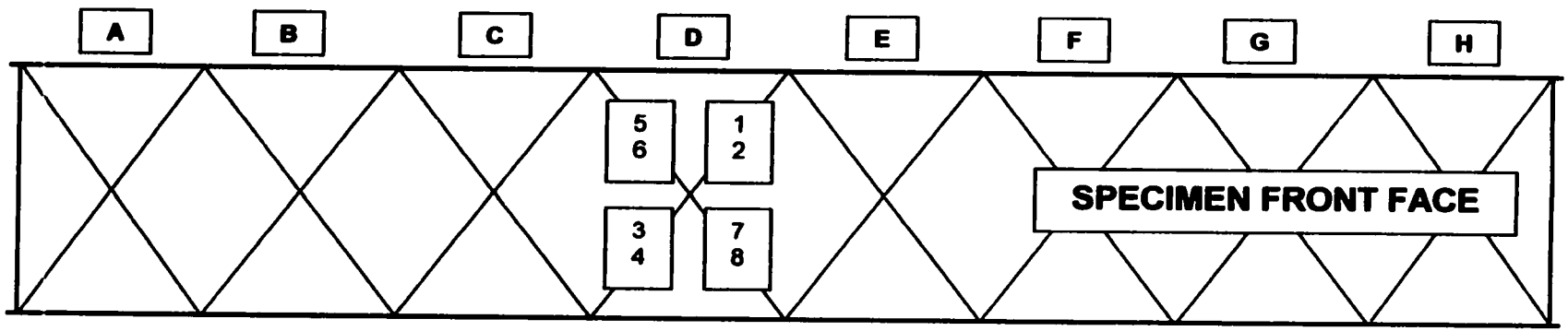


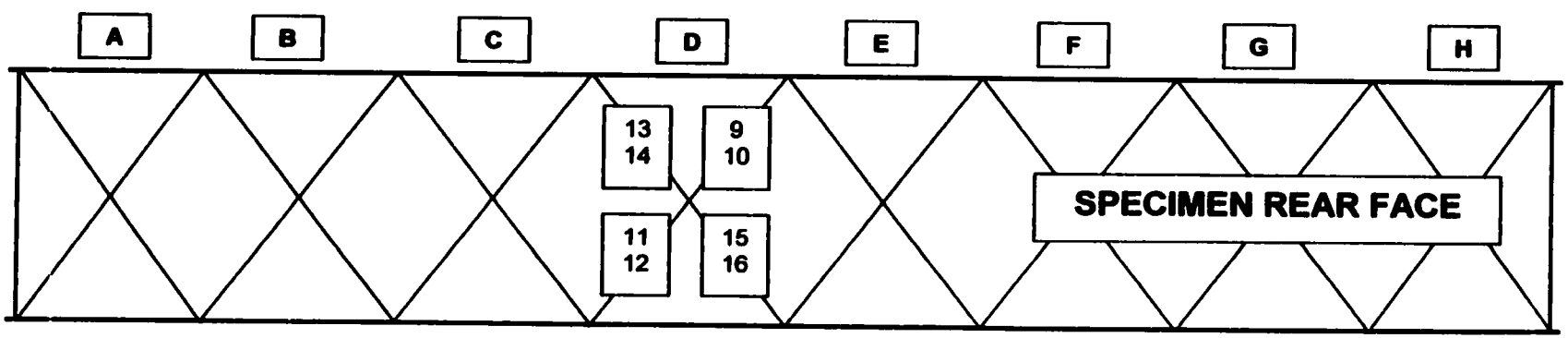
SPECIMEN P3-B (TEST # 32) STRAIN GAUGE IDENTIFICATION



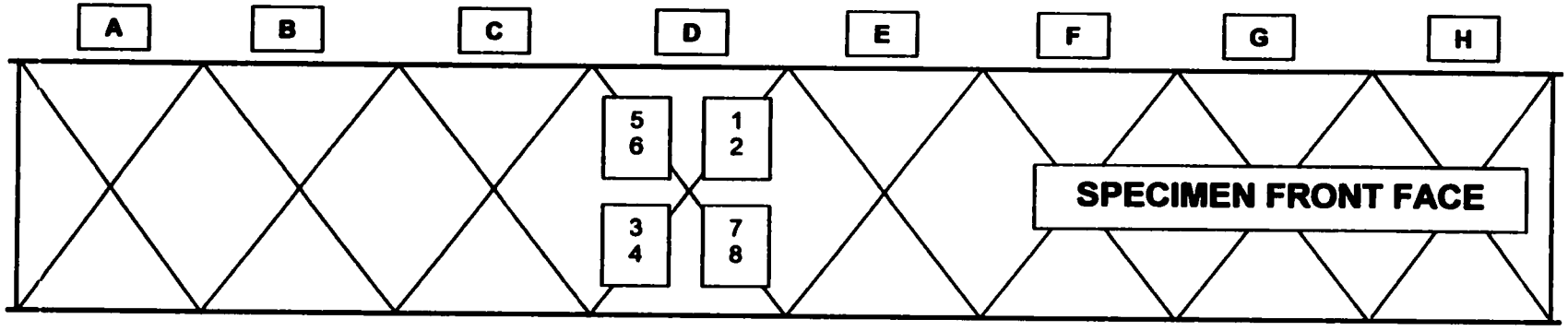


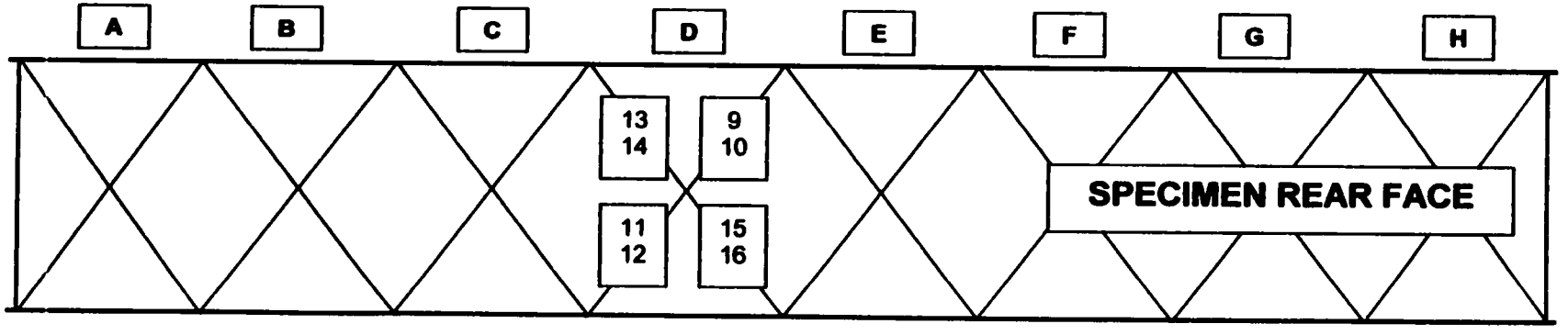
SPECIMEN P4-A (TEST # 29) STRAIN GAUGE IDENTIFICATION



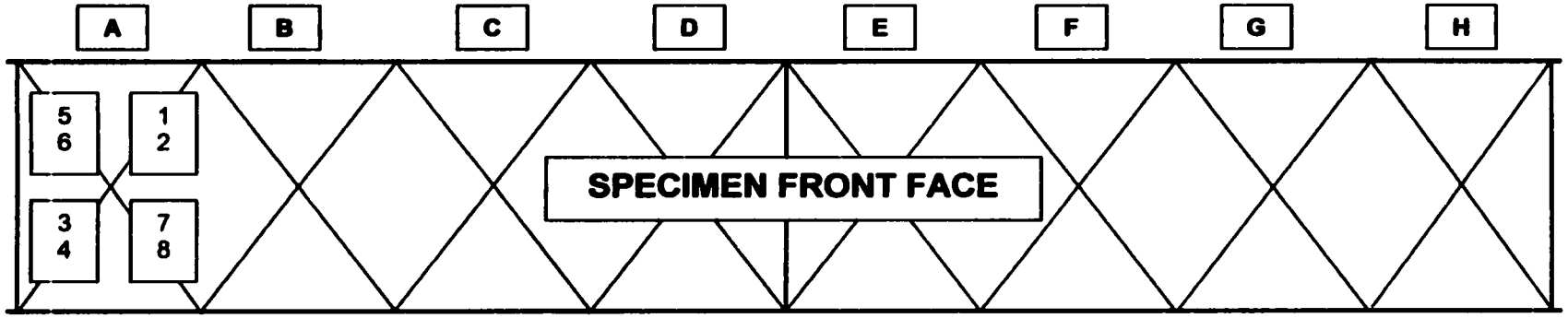


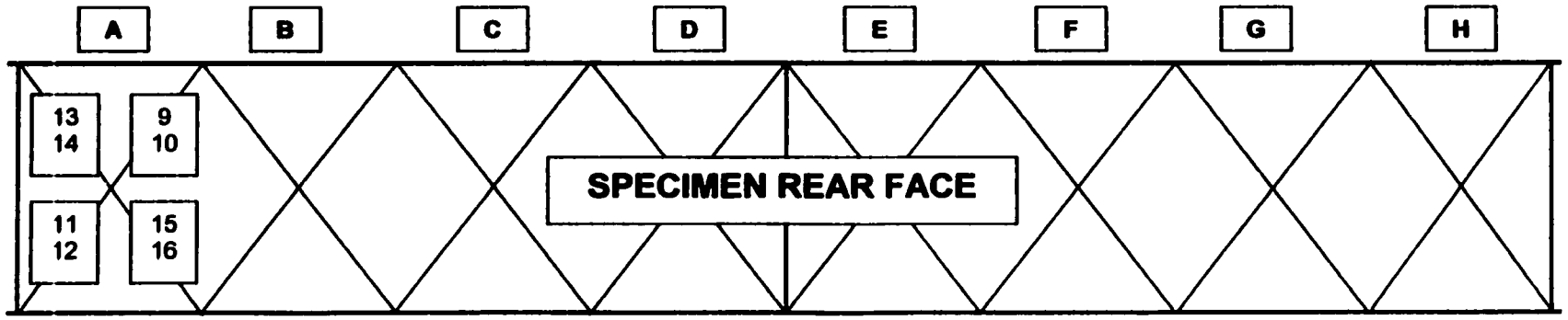
SPECIMEN P4-B (TEST # 20) STRAIN GAUGE IDENTIFICATION



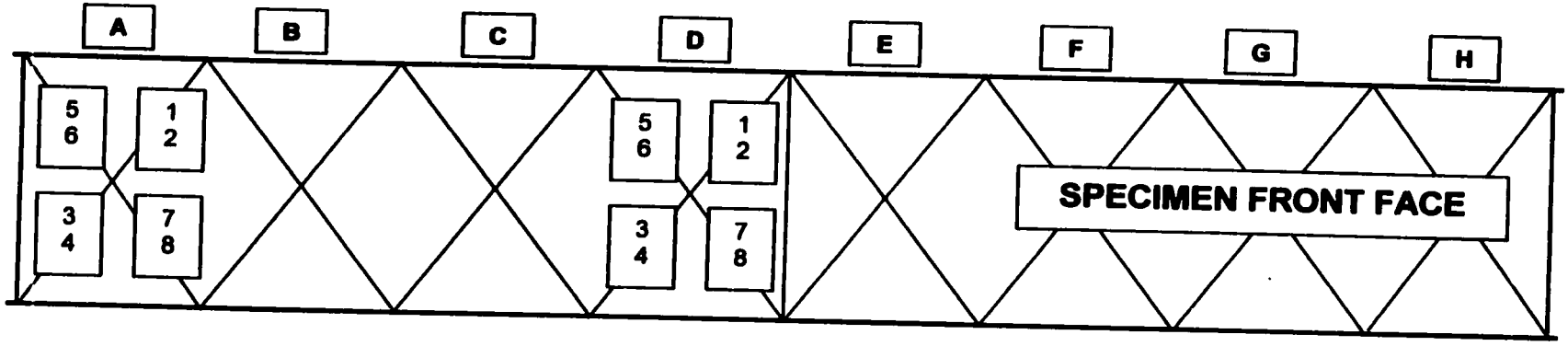


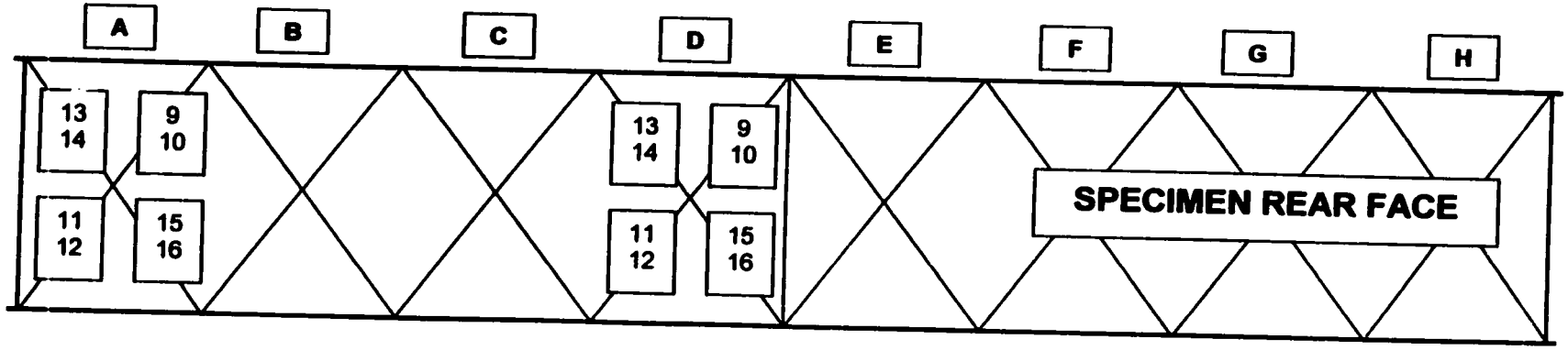
SPECIMEN P5-A (TEST # 26) STRAIN GAUGE IDENTIFICATION



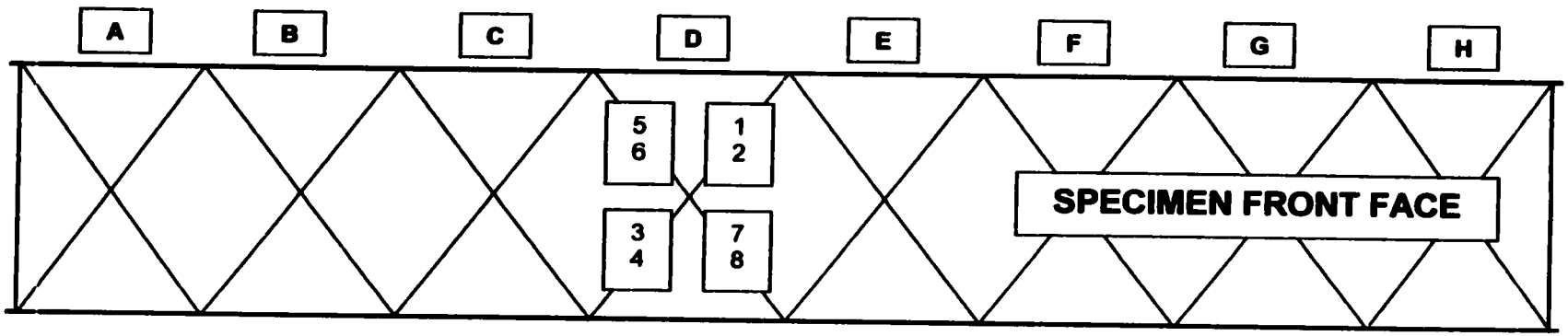


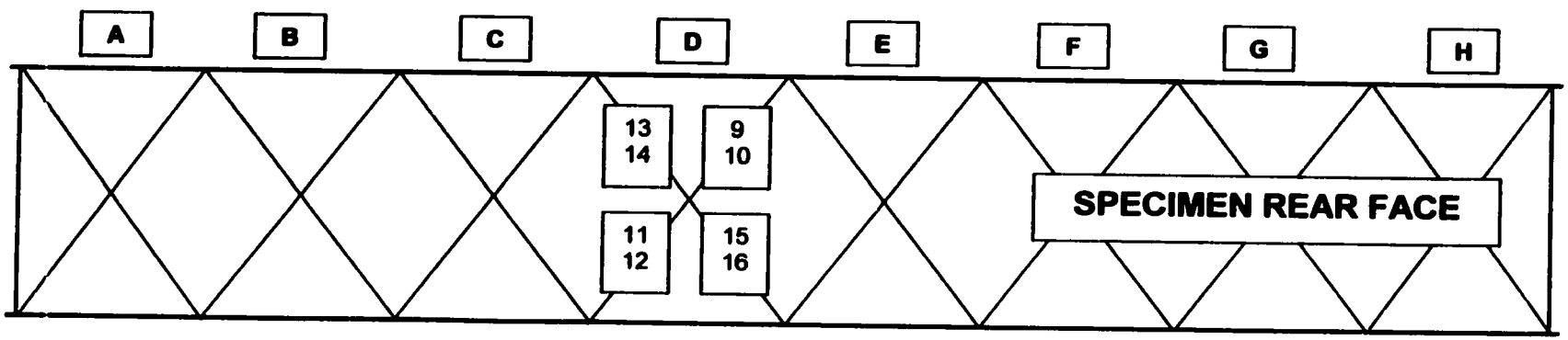
SPECIMEN P5-B (TEST # 34) STRAIN GAUGE IDENTIFICATION



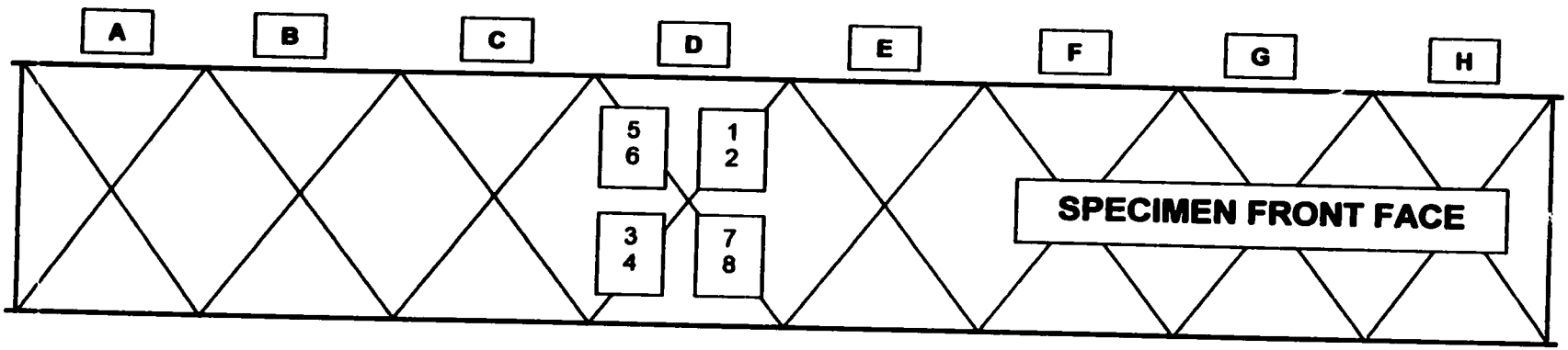


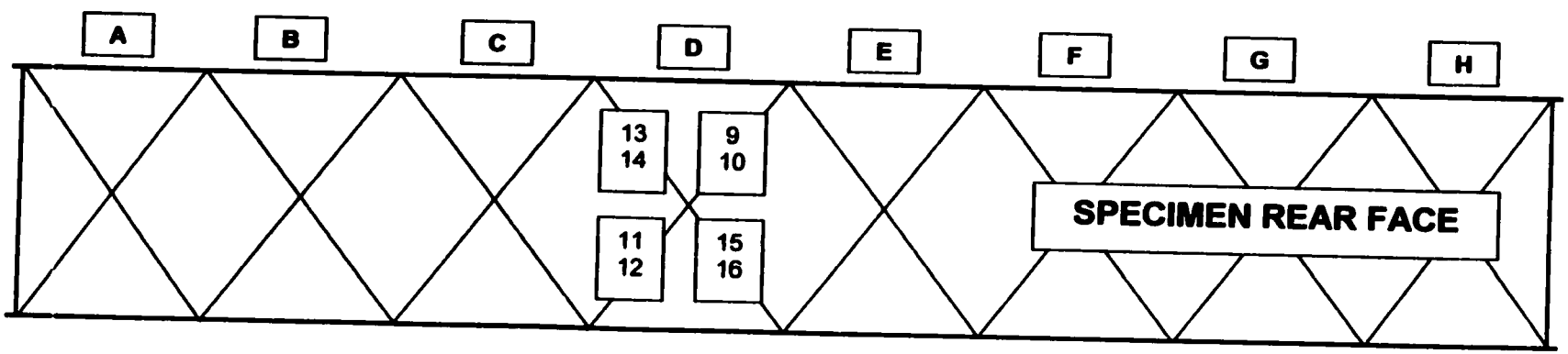
SPECIMEN P6-A (TEST # 28) STRAIN GAUGE IDENTIFICATION



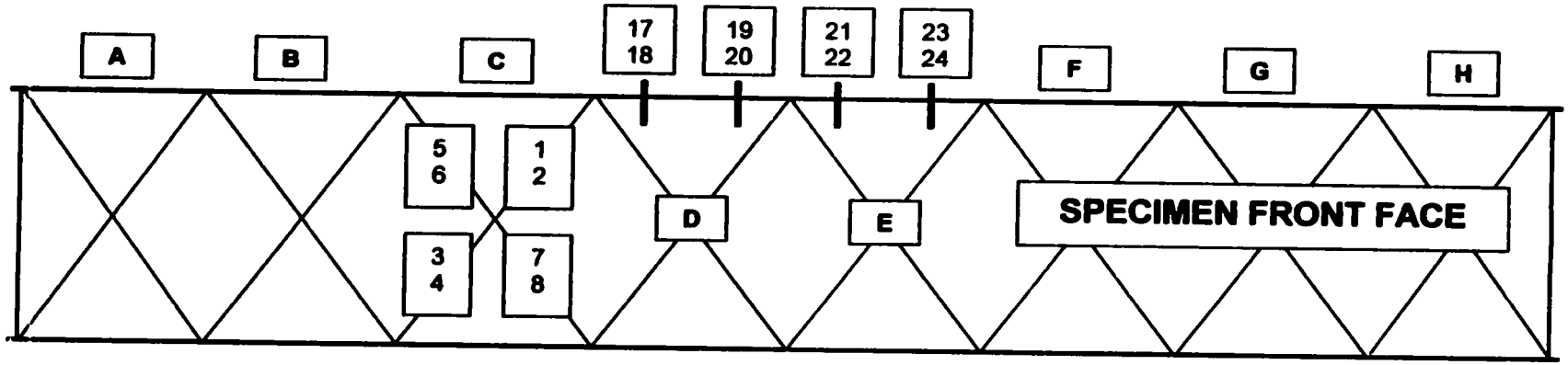


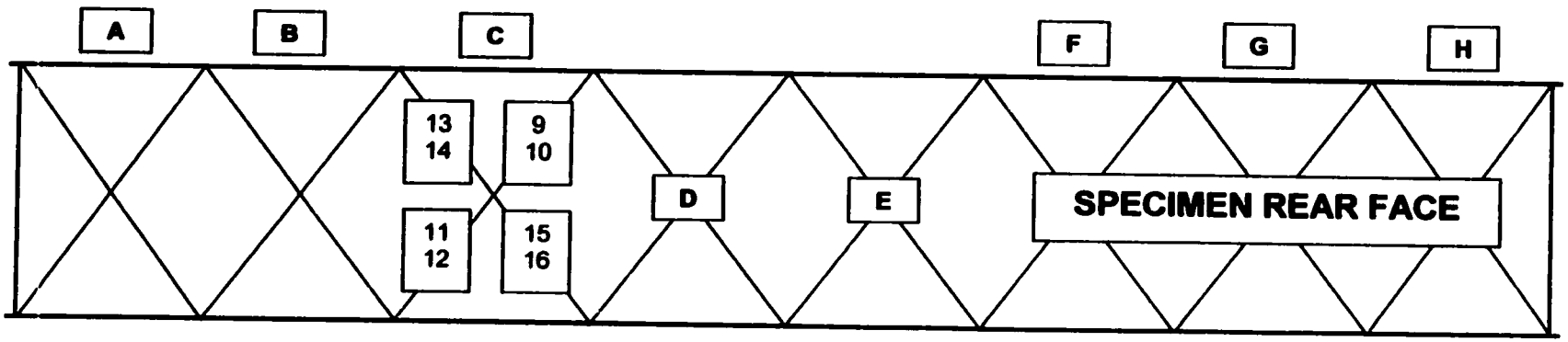
SPECIMEN P6-B (TEST # 15) STRAIN GAUGE IDENTIFICATION



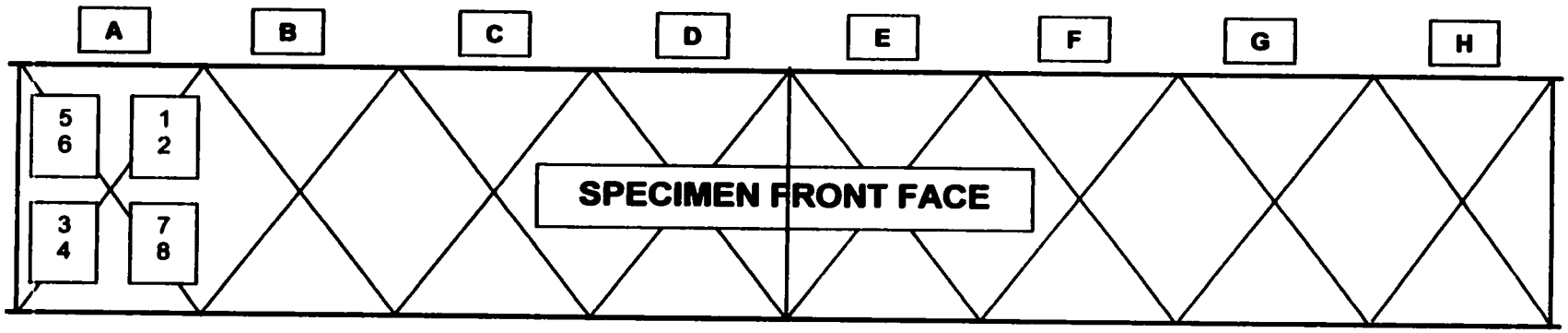


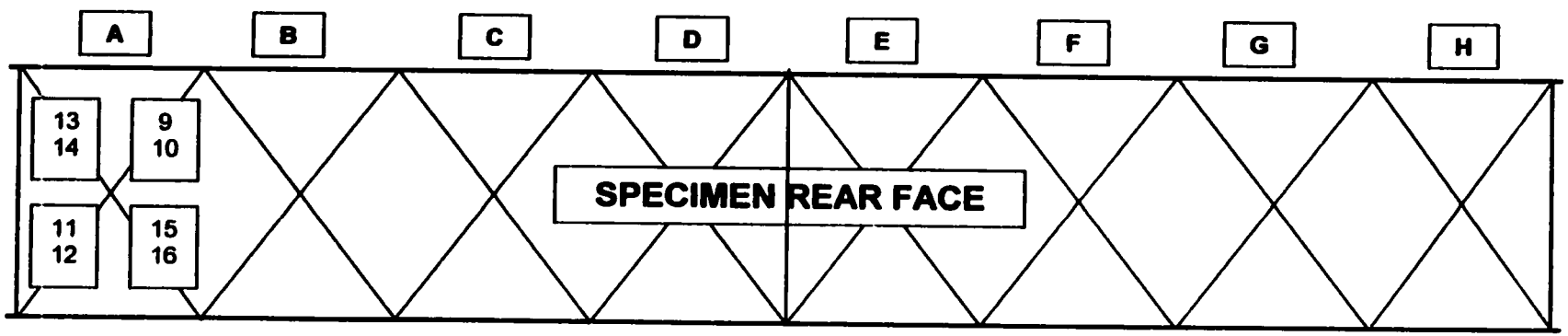
SPECIMEN P7-A (TEST # 18) STRAIN GAUGE IDENTIFICATION



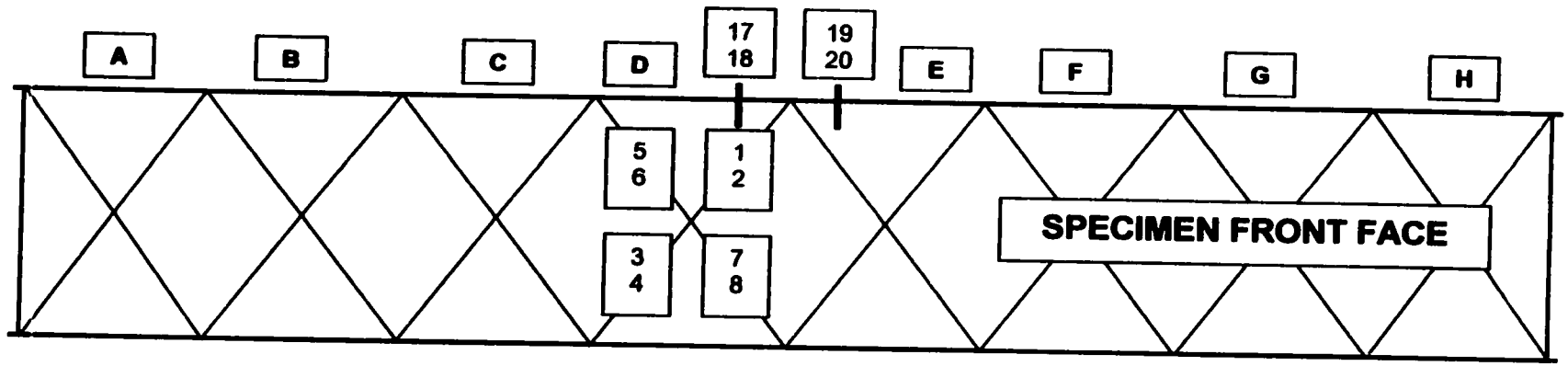


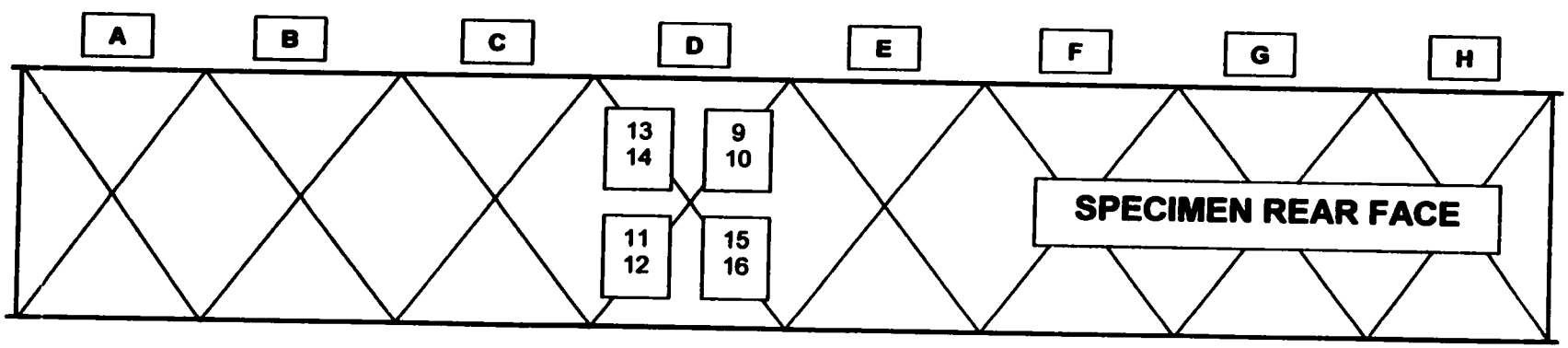
SPECIMEN P7-B (TEST # 17) STRAIN GAUGE IDENTIFICATION



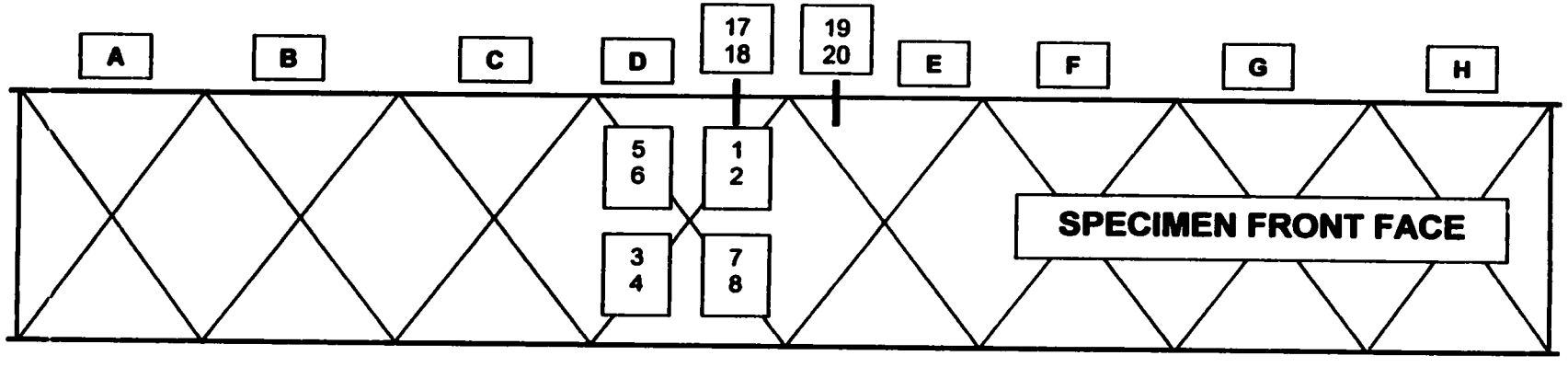


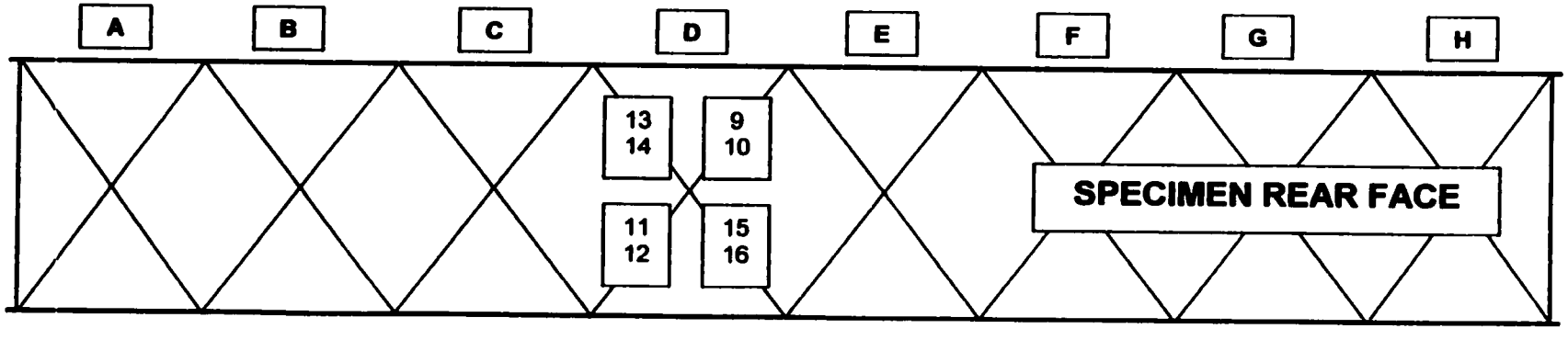
SPECIMEN P8-A (TEST # 33) STRAIN GAUGE IDENTIFICATION



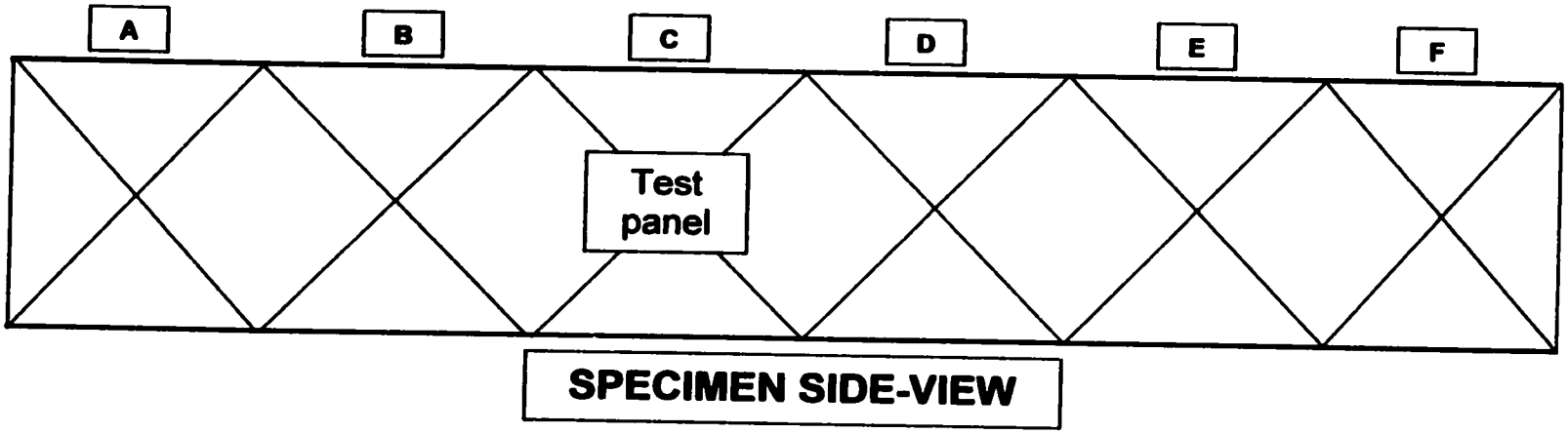


SPECIMEN P8-B (TEST # 19) STRAIN GAUGE IDENTIFICATION

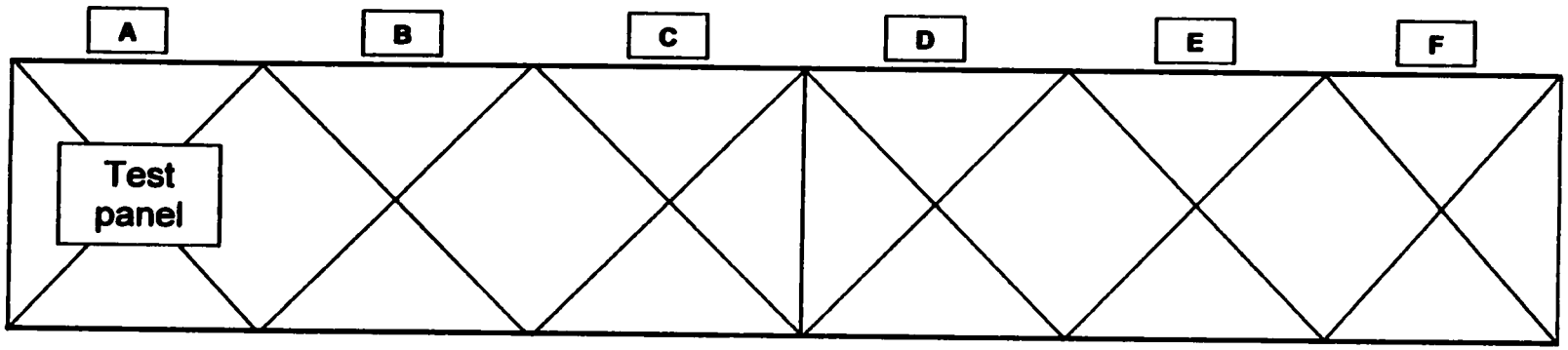




SPECIMEN S1-A (TEST # 6) STRAIN GAUGE IDENTIFICATION

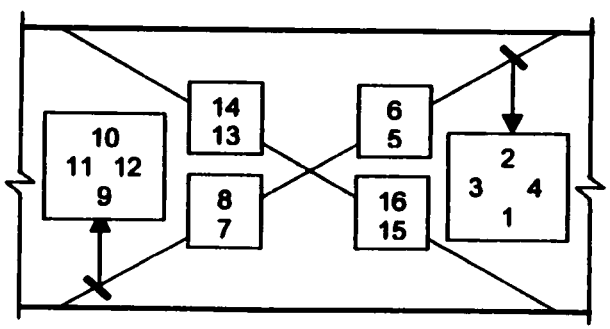


SPECIMEN S2-A (TEST # 4) STRAIN GAUGE IDENTIFICATION

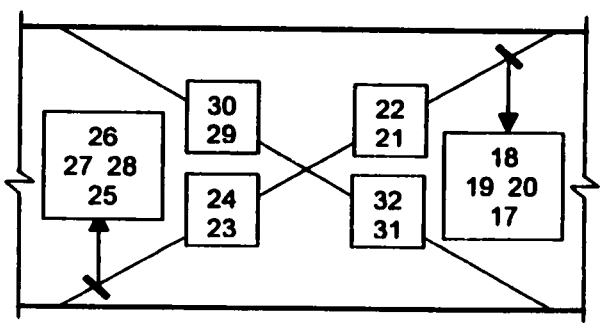


SPECIMEN SIDE-VIEW

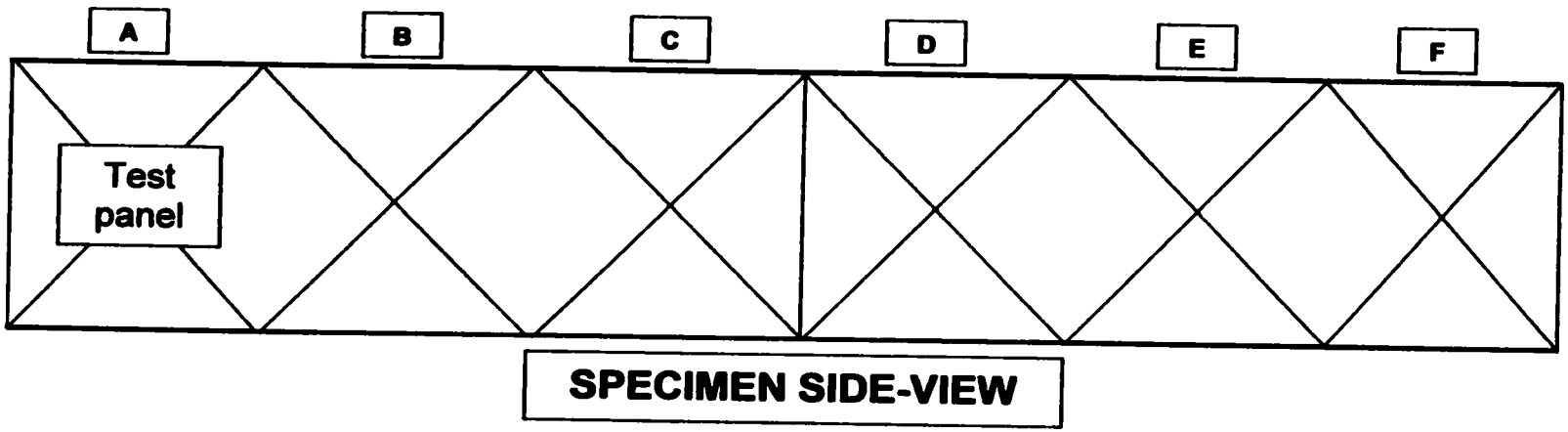
SPECIMEN FRONT FACE

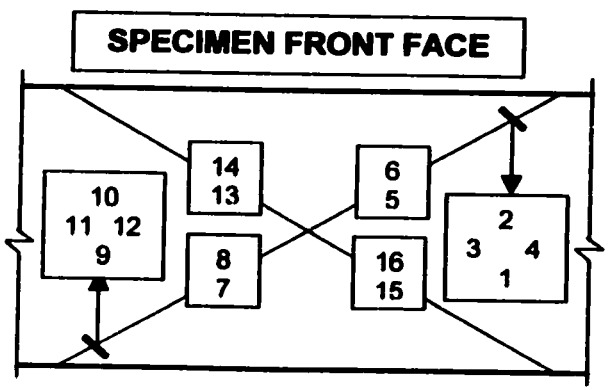


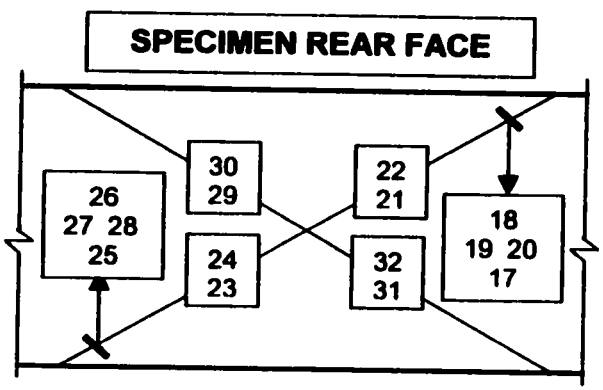
SPECIMEN REAR FACE



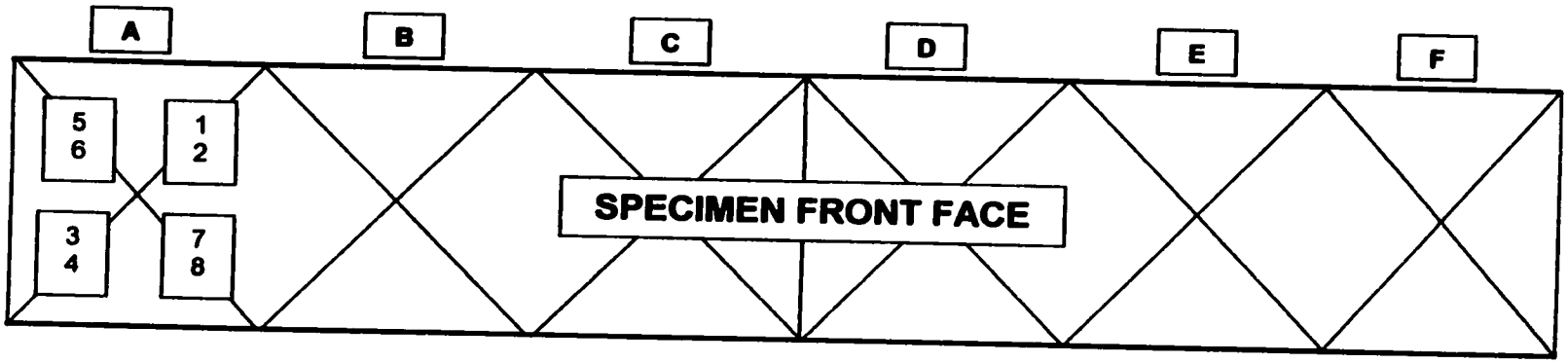
SPECIMEN S2-B (TEST # 8) STRAIN GAUGE IDENTIFICATION

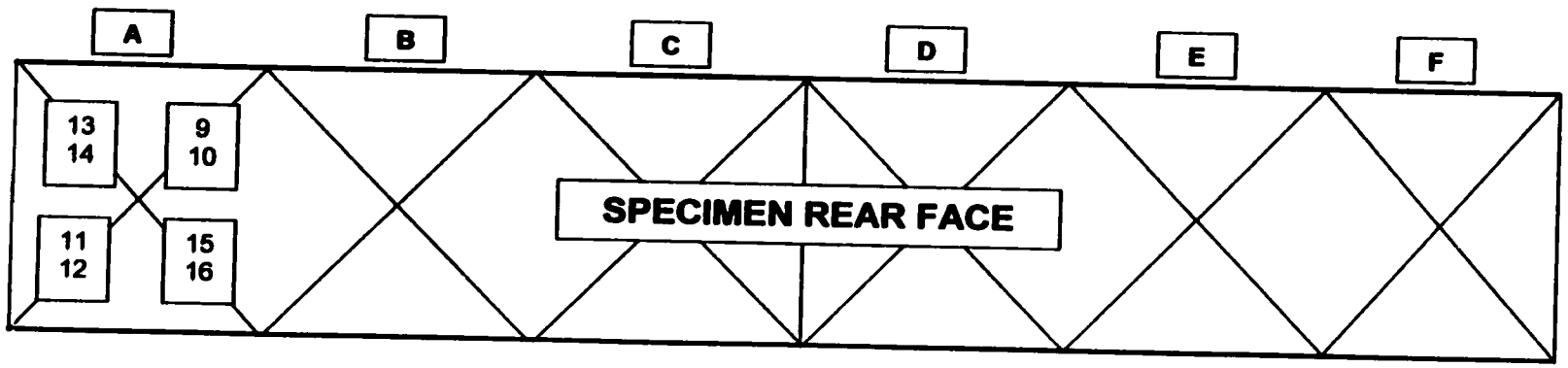




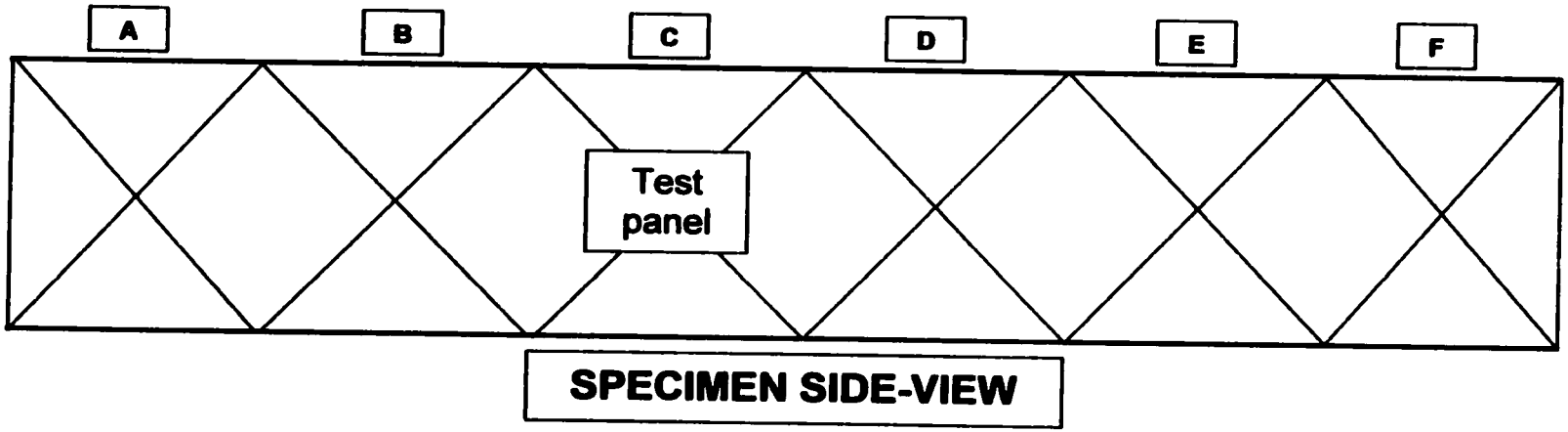


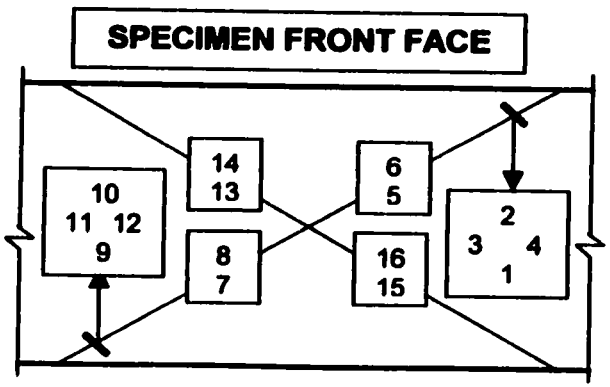
SPECIMEN S2-C (TEST # 23) STRAIN GAUGE IDENTIFICATION

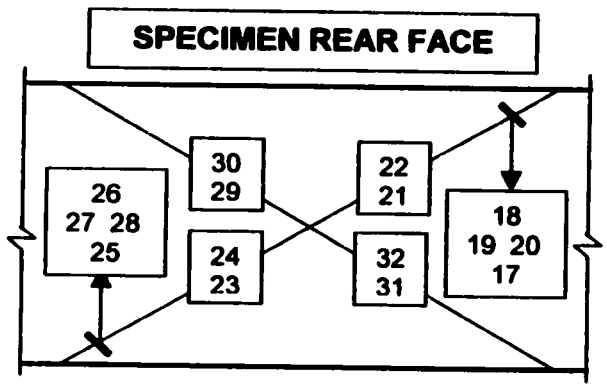




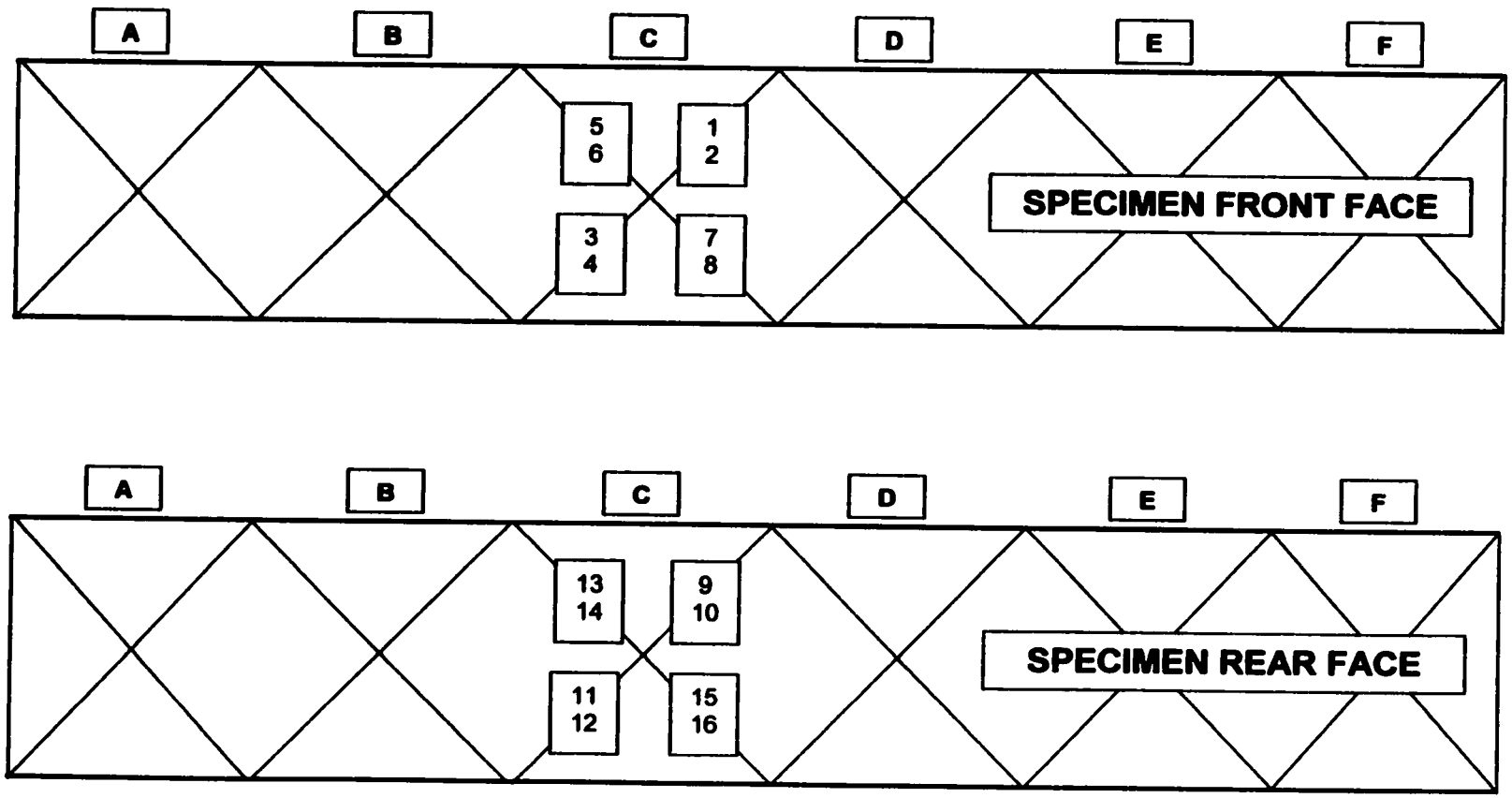
SPECIMEN S3-A (TEST # 7) STRAIN GAUGE IDENTIFICATION



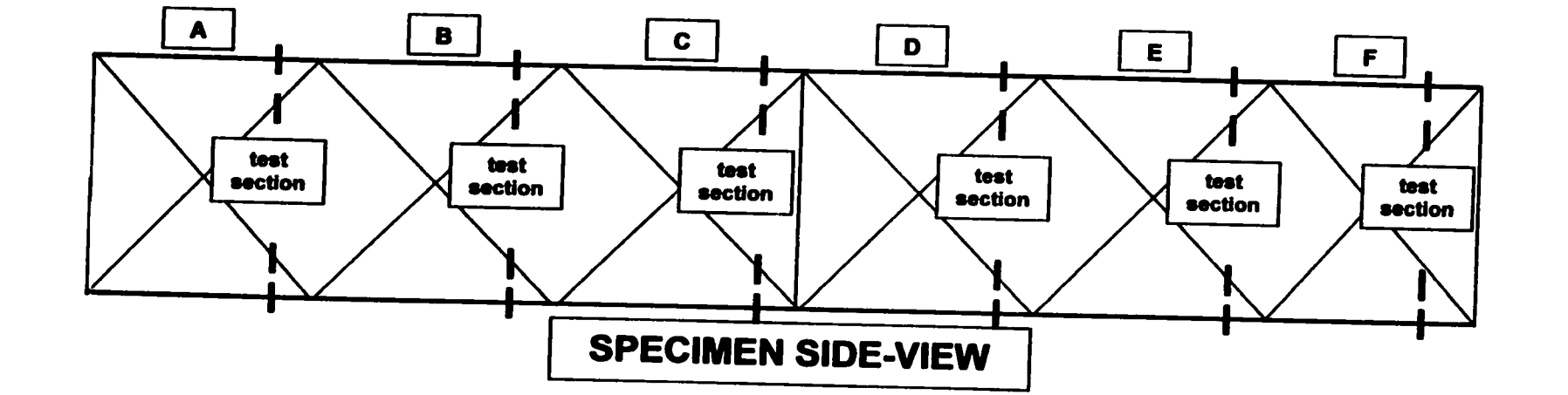


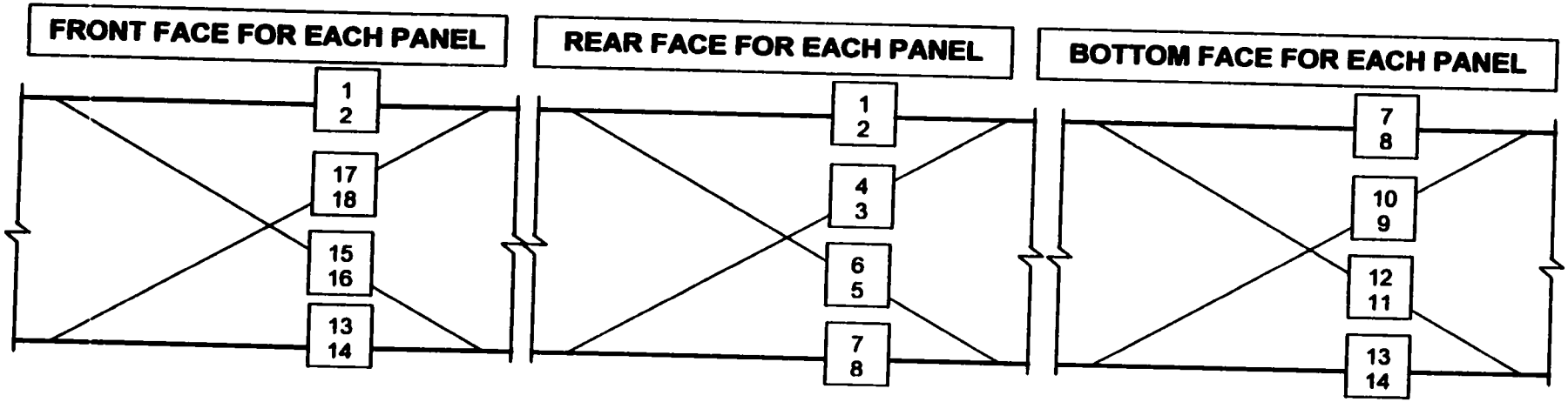


SPECIMEN S3-B (TEST # 25) STRAIN GAUGE IDENTIFICATION

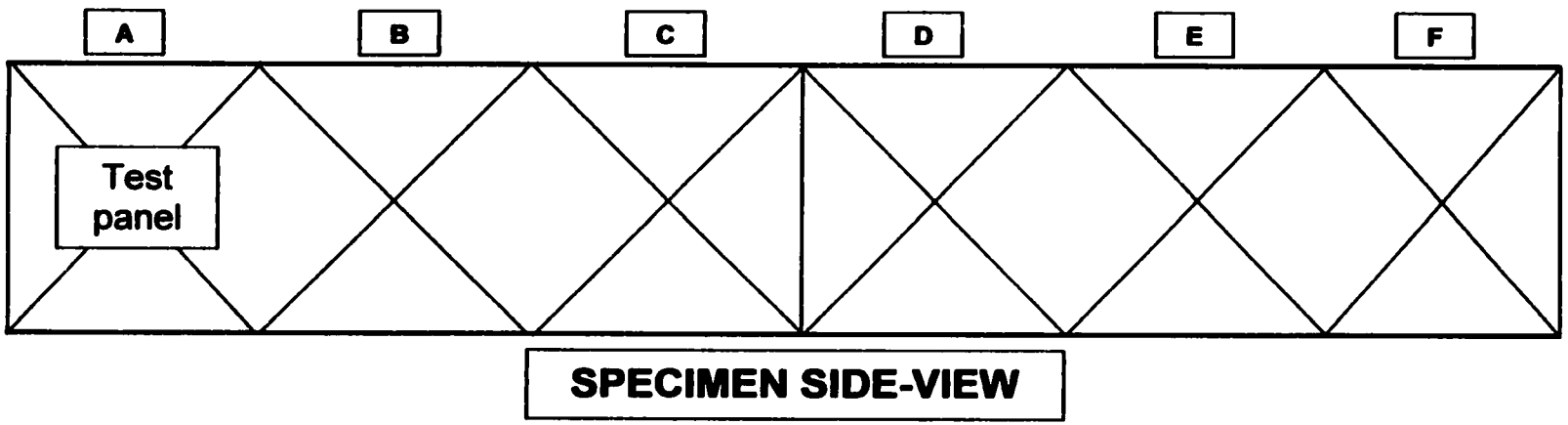


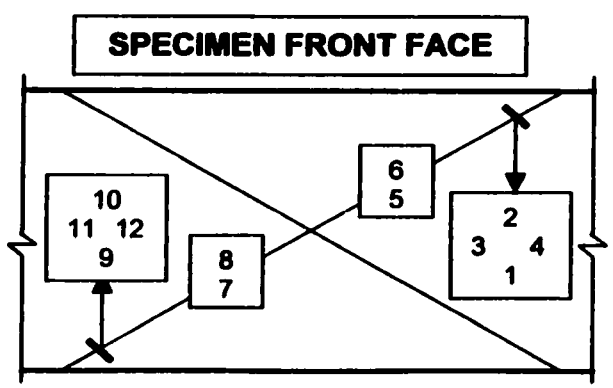
SPECIMEN S4-A (TEST # 1) STRAIN GAUGE IDENTIFICATION

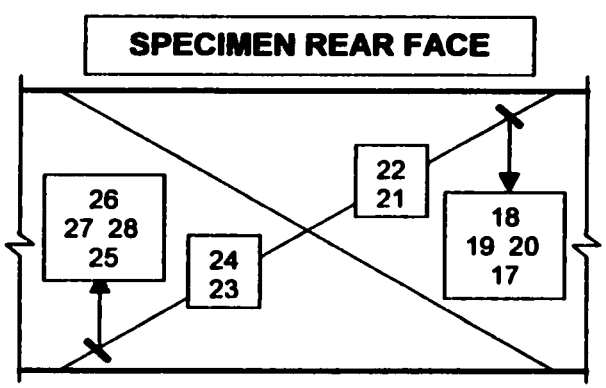




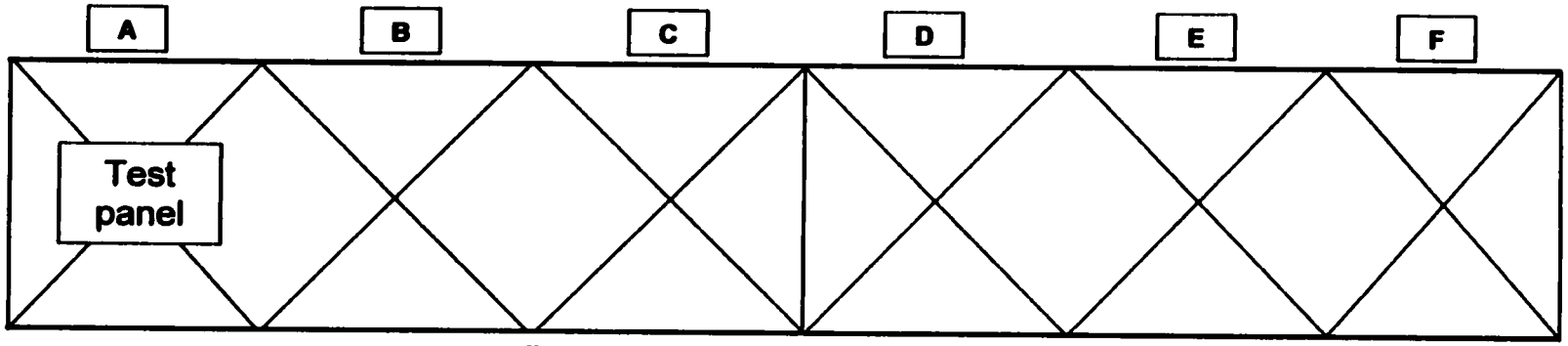
SPECIMEN S4-B (TEST # 3) STRAIN GAUGE IDENTIFICATION





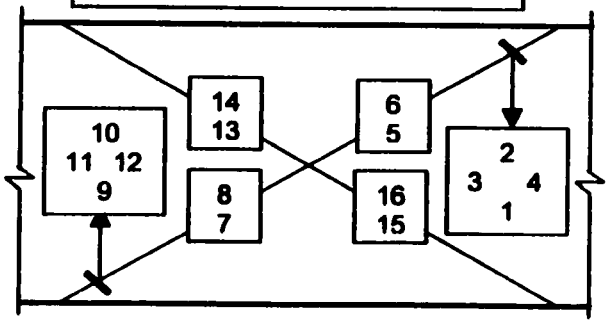


SPECIMEN S4-C (TEST # 5) STRAIN GAUGE IDENTIFICATION

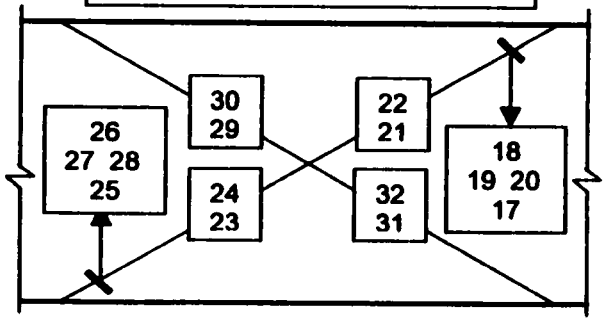


SPECIMEN SIDE-VIEW

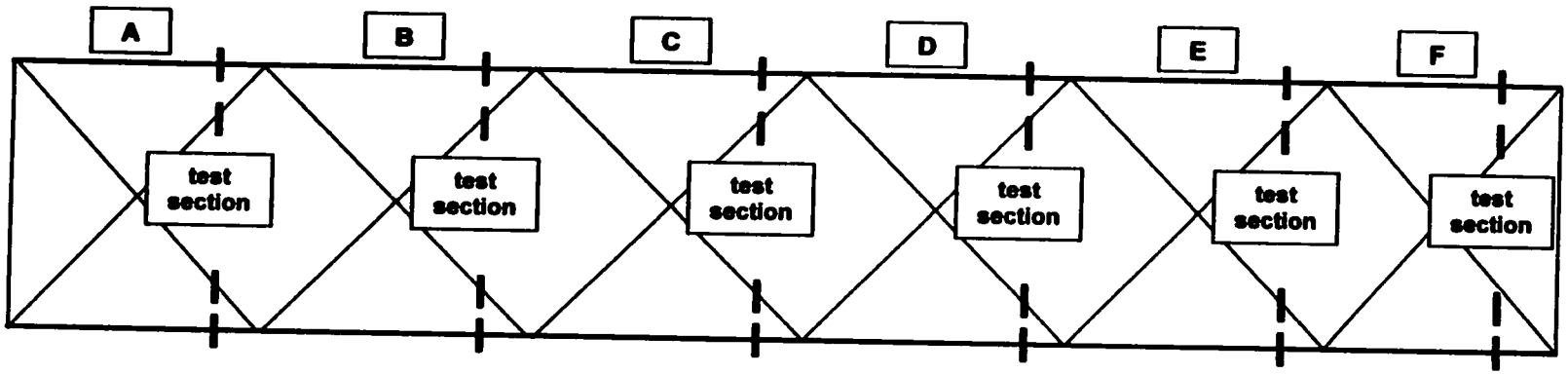
SPECIMEN FRONT FACE



SPECIMEN REAR FACE

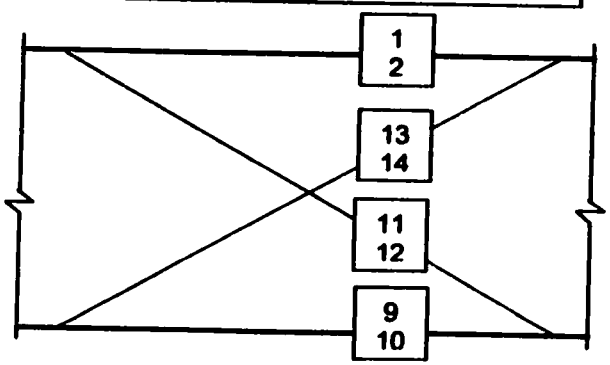


SPECIMEN S5-A (TEST # 2) STRAIN GAUGE IDENTIFICATION

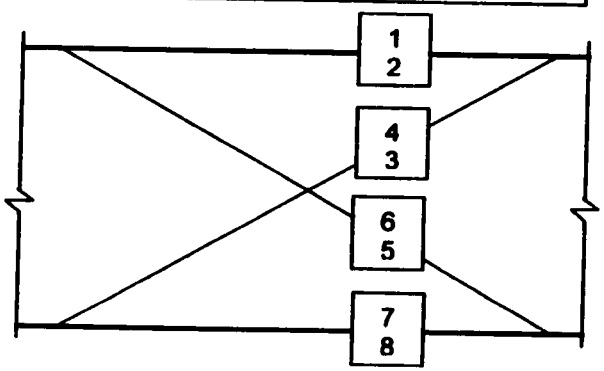


SPECIMEN SIDE-VIEW

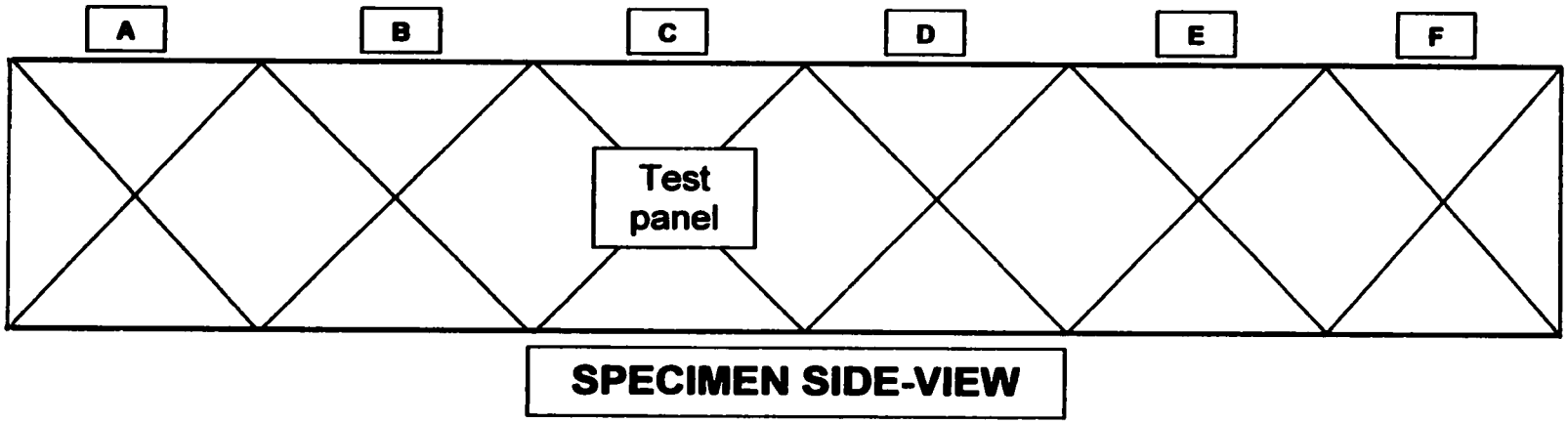
FRONT FACE FOR EACH PANEL

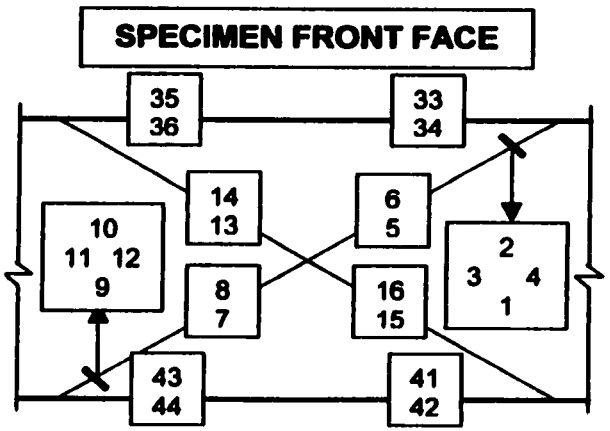


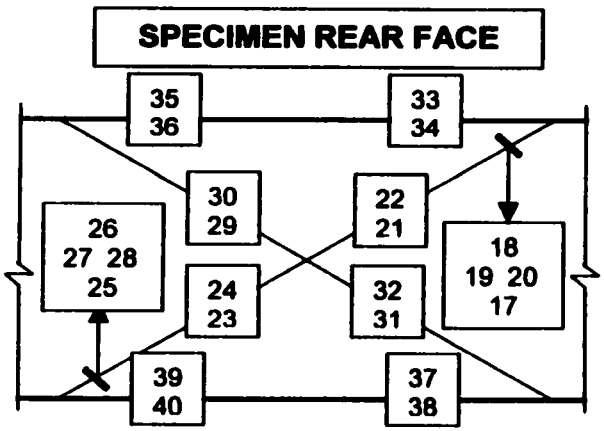
REAR FACE FOR EACH PANEL



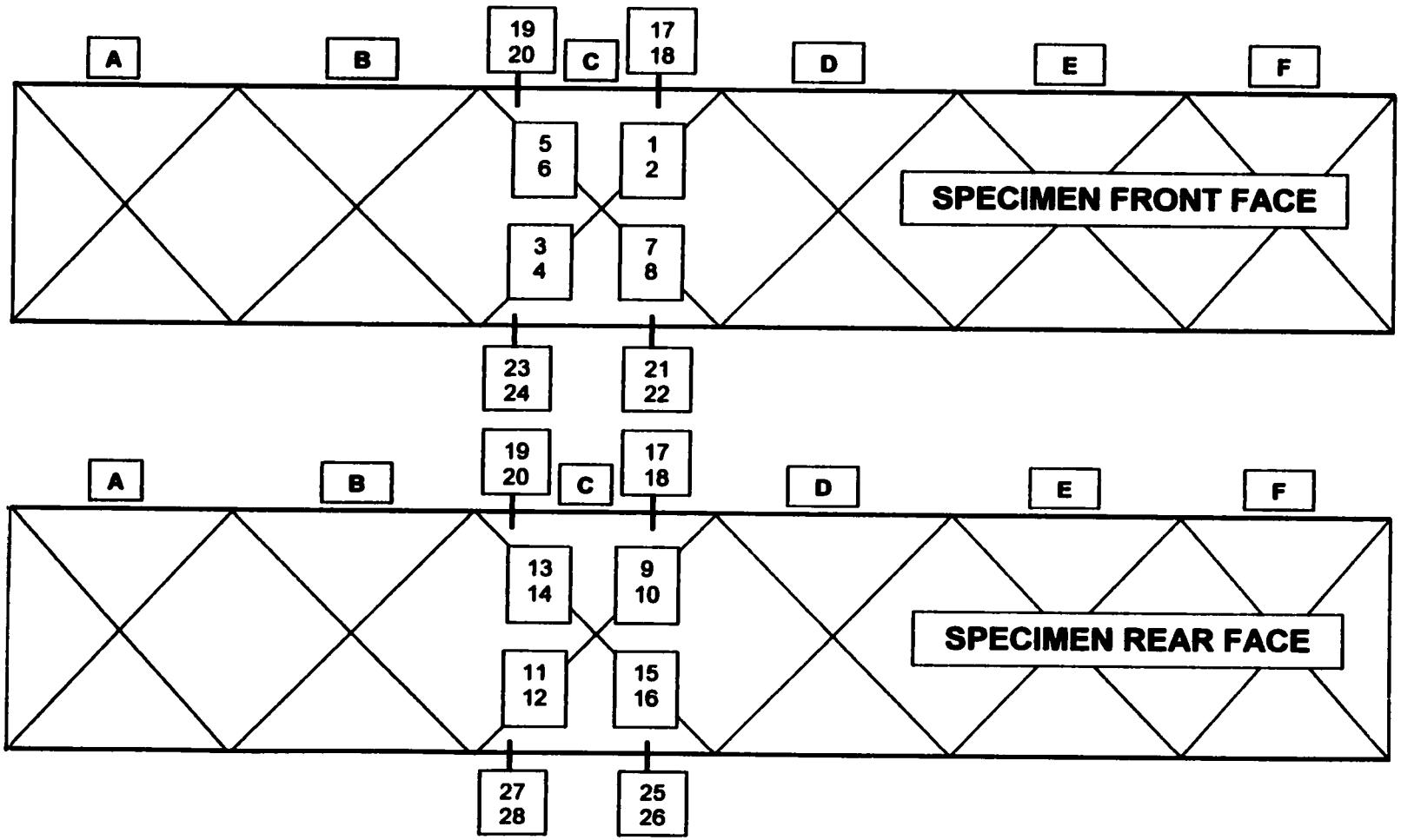
SPECIMEN S5-B (TEST # 10) STRAIN GAUGE IDENTIFICATION



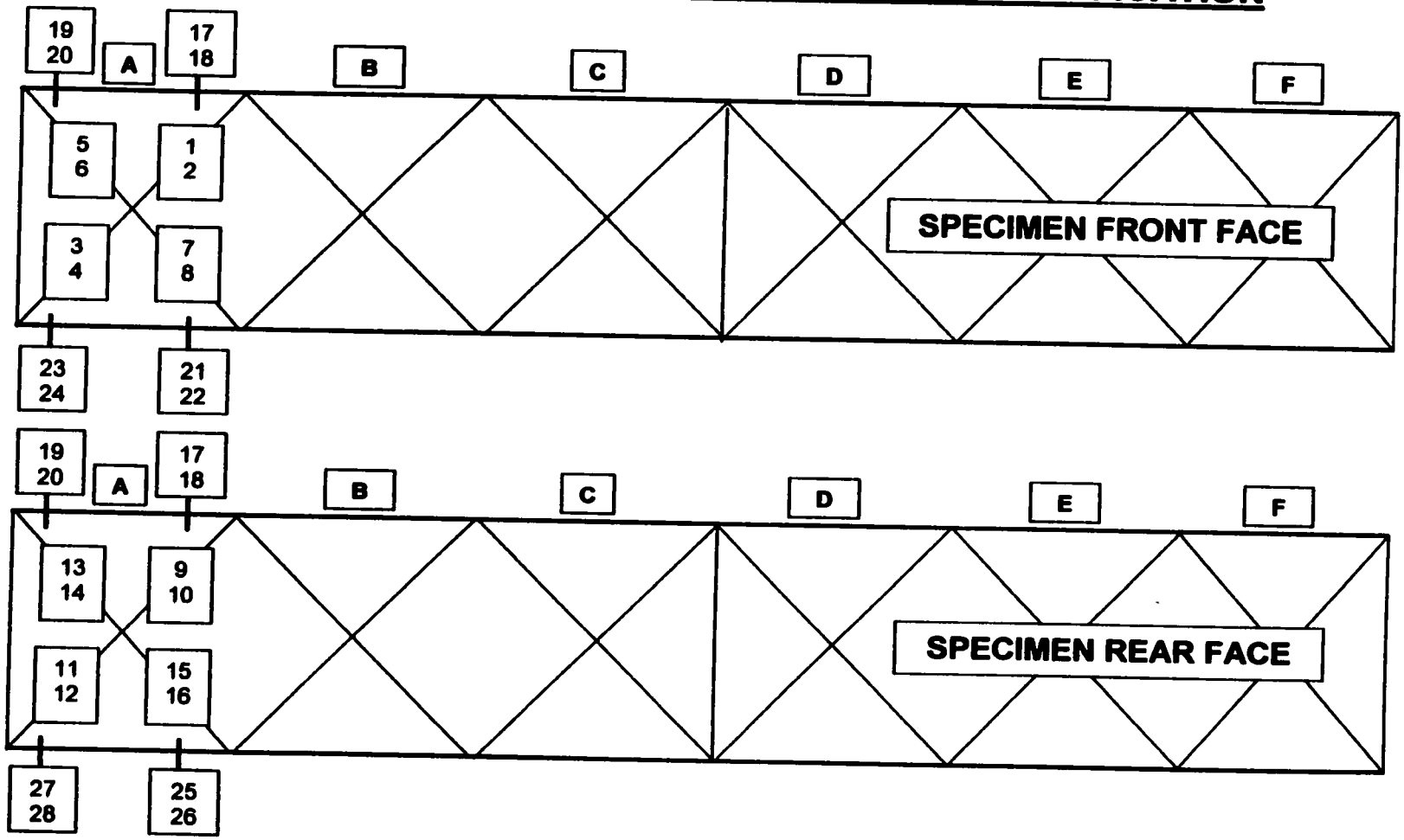




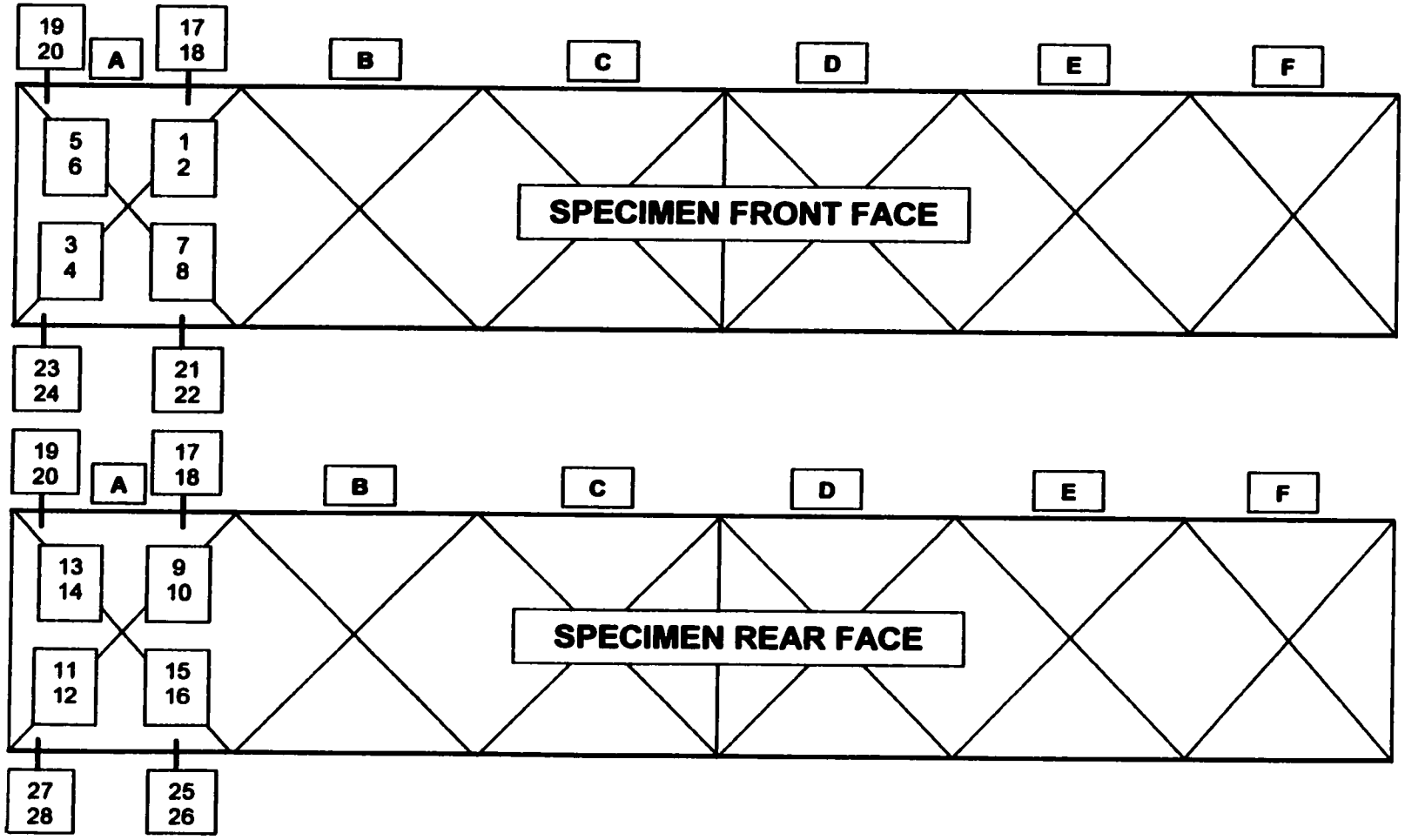
SPECIMEN S5-C (TEST # 12) STRAIN GAUGE IDENTIFICATION



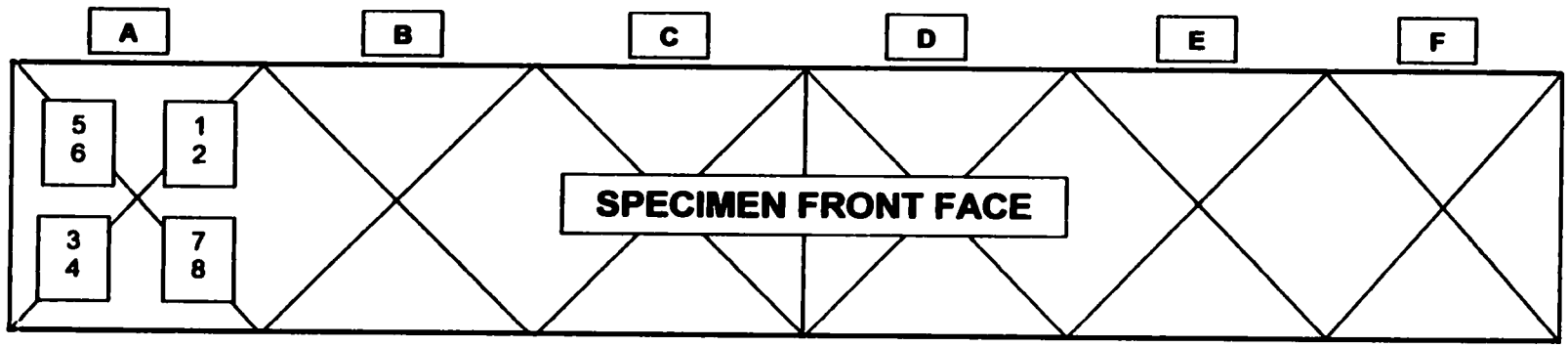
SPECIMEN S6-A (TEST # 11) STRAIN GAUGE IDENTIFICATION

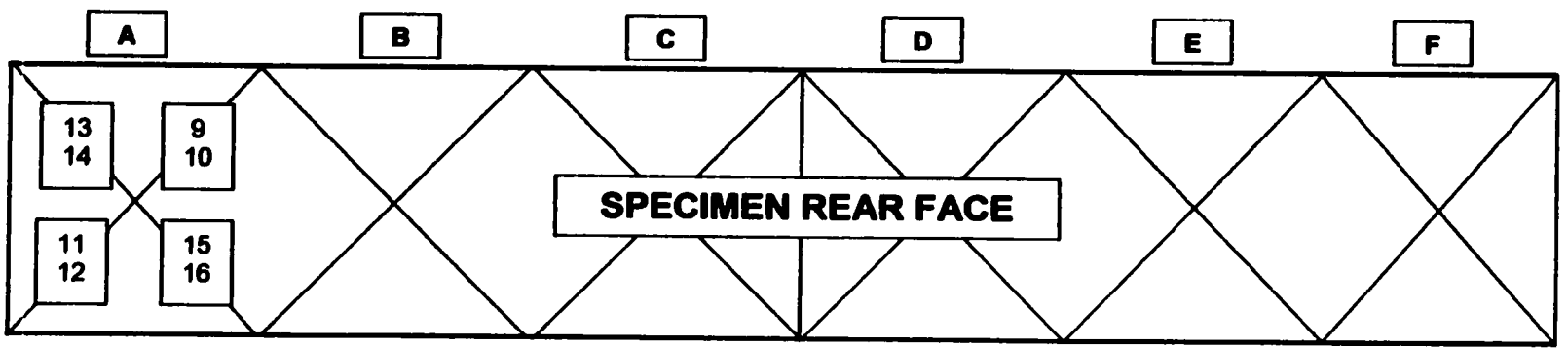


SPECIMEN S6-B (TEST # 13) STRAIN GAUGE IDENTIFICATION

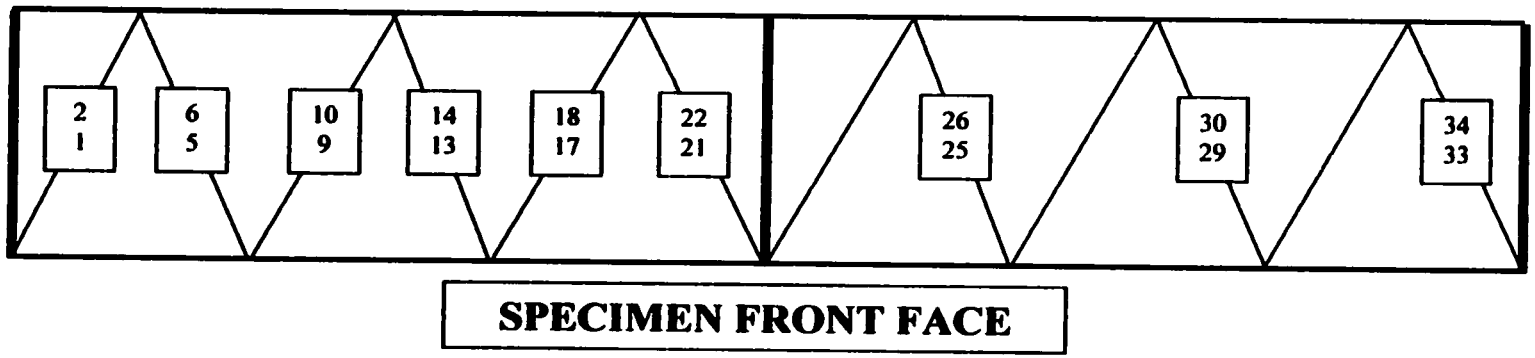


SPECIMEN S6-C (TEST # 24) STRAIN GAUGE IDENTIFICATION

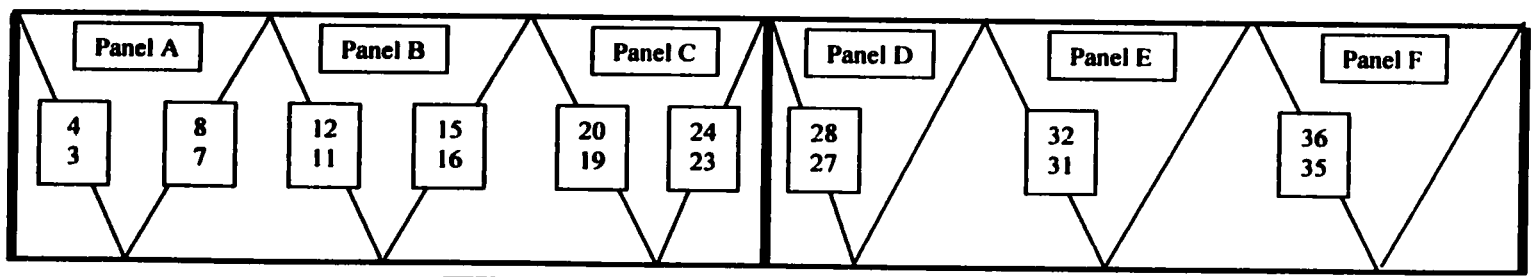




SPECIMEN 31SRB (TEST # 14) STRAIN GAUGE IDENTIFICATION

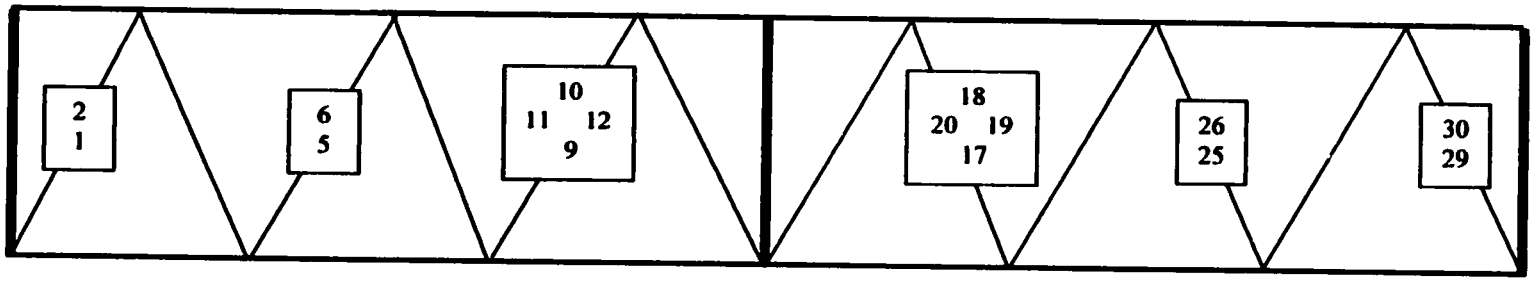


SPECIMEN FRONT FACE

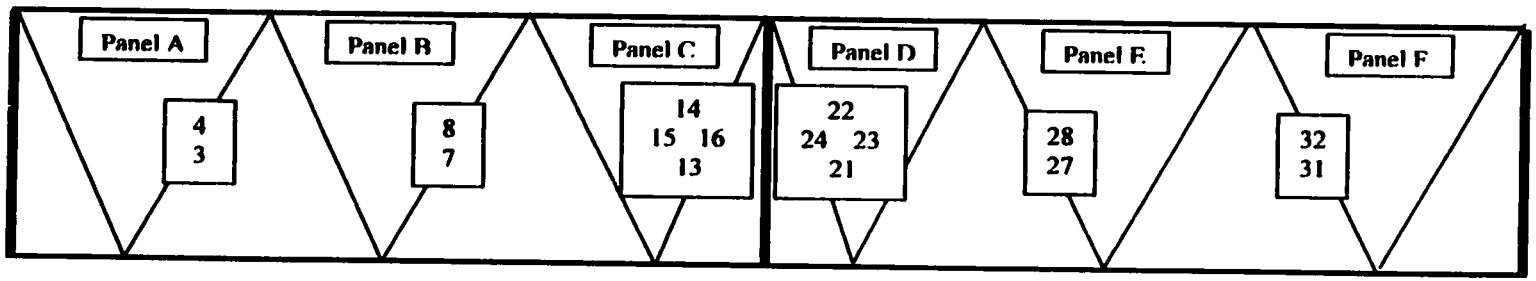


SPECIMEN REAR FACE

SPECIMEN 33SRC (TEST # 16) STRAIN GAUGE IDENTIFICATION



SPECIMEN FRONT FACE



SPECIMEN REAR FACE

APPENDIX B

LOAD-STRAIN DATA AND AXIAL FORCES

TABLE OF CONTENTS

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P1-A

TEST PANEL A (TEST PANEL NOT BUCKLED BECAUSE PANEL E BUCKLED FIRST.)

Test No. 22

No.	Load (kN)	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8
1	-28.1	-18	-249	15	-274	229	23	292	-39
2	-41.4	-22	-372	28	-408	339	38	427	-52
3	-56.9	-24	-514	54	-569	464	59	580	-58
4	-69.0	-23	-625	77	-700	561	78	695	-60
5	-80.7	-22	-731	105	-828	649	98	802	-60
6	-88.8	-22	-787	123	-896	696	107	858	-58
7	-93.1	-19	-843	141	-967	742	117	913	-57
8	-102.3	-17	-925	172	-1074	811	135	993	-53
9	-107.2	-15	-971	192	-1135	847	145	1038	-50
10	-107.2	-14	-971	192	-1135	847	145	1036	-50
11	-114.2	-15	-1031	218	-1217	896	156	1094	-45
12	-120.7	-11	-1088	249	-1300	943	172	1150	-41
13	-120.5	-11	-1089	250	-1300	941	172	1148	-42
14	-127.0	-10	-1141	281	-1381	987	186	1201	-35
15	-133.7	-8	-1199	320	-1471	1033	196	1256	-30
16	-133.5	-8	-1195	345	-1493	1027	202	1246	-24
18	-146.3	-7	-1299	443	-1689	1112	229	1348	-14
19	-152.0	-8	-1355	512	-1812	1148	232	1394	-21
21	-88.3	-4295	3124	18857	-26715	955	58	1438	-426
AXIAL FORCE (kN)									

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P1-A

TEST PANEL A (TEST PANEL NOT BUCKLED BECAUSE PANEL E BUCKLED FIRST.)

Test No. 22

No.	Load (kN)	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16
1	-28.1	-18	-233	-34	-210	186	49	207	38
2	-41.4	-21	-347	-49	-310	270	71	299	55
3	-56.9	-19	-492	-64	-433	370	98	407	79
4	-69.0	-12	-612	-74	-531	448	118	499	97
5	-80.7	-1	-735	-85	-626	523	136	599	115
6	-86.8	9	-804	-90	-683	565	148	613	126
7	-93.1	19	-874	-95	-736	604	157	654	135
8	-102.3	38	-987	-101	-818	665	173	719	150
9	-107.2	52	-1052	-105	-861	698	182	752	158
10	-107.2	52	-1050	-105	-860	697	181	751	158
11	-114.2	74	-1142	-110	-924	744	193	801	170
12	-120.7	99	-1235	-115	-982	786	203	847	182
13	-120.5	100	-1234	-115	-981	787	204	848	181
14	-127.0	128	-1330	-121	-1040	832	216	891	192
15	-133.7	166	-1442	-129	-1101	877	227	939	206
16	-133.5	204	-1490	-132	-1103	879	226	938	206
18	-146.3	343	-1792	-158	-1199	971	245	1030	230
19	-152.0	515	-2210	-230	-1203	1017	252	1076	241
21	-88.3	21091	-30290	-2462	1822	986	76	822	275
AXIAL FORCE (kN)									

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P1-B

TEST PANEL A (FRONT DIAGONAL BOTTOM HALF BUCKLED OUTSIDE , TOP A LTTLE INSIDE)

Test Serial No. 31

No.	Load (kN)	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8
1	-26.7	-18	-237	14	-261	218	22	278	-37
2	-39.4	-21	-354	27	-389	323	37	406	-49
3	-54.2	-23	-489	51	-542	441	57	552	-55
4	-65.7	-22	-595	73	-666	534	74	662	-57
5	-76.8	-21	-686	100	-786	618	92	764	-57
6	-82.7	-21	-749	117	-853	663	102	817	-55
7	-88.6	-18	-803	135	-921	707	112	869	-54
8	-97.4	-16	-881	164	-1022	772	128	946	-50
9	-102.1	-14	-924	183	-1081	806	138	988	-46
10	-102.1	-14	-924	182	-1081	806	138	987	-46
11	-108.7	-14	-982	208	-1159	853	151	1042	-43
12	-115.0	-10	-1037	237	-1238	898	164	1095	-39
13	-114.8	-10	-1037	238	-1238	897	163	1093	-40
14	-120.9	-10	-1087	268	-1315	940	177	1144	-33
15	-127.4	-8	-1142	305	-1401	984	189	1196	-29
16	-133.5	-6	-1195	345	-1493	1027	202	1246	-24
17	-139.6	-8	-1248	388	-1586	1070	217	1297	-18
18	-146.3	-7	-1299	443	-1689	1112	229	1346	-14
19	-152.0	-8	-1355	512	-1812	1148	232	1394	-21
20	-154.9	-18	-1388	646	-1873	1186	233	1414	-23
21	-86.3	-4295	3124	18857	-26715	955	58	1438	-426
AXIAL FORCE (kN)		-27.5		-26.3		27.7		27.6	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P1-B

TEST PANEL A (REAR DIAGONAL TOP HALF BUCKLED INSIDE,BOTTOM A LITTLE OUTSIDE)

Test Serial No. 31

No.	Load (kN)	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16
1	-26.7	-18	-222	-33	-200	177	47	197	36
2	-39.4	-20	-331	-46	-296	257	68	284	53
3	-54.2	-18	-469	-61	-412	352	93	387	76
4	-65.7	-11	-583	-71	-506	426	112	466	92
5	-76.8	-1	-700	-81	-598	498	130	542	109
6	-82.7	9	-766	-85	-650	538	141	584	120
7	-88.6	18	-833	-90	-701	575	150	623	128
8	-97.4	37	-940	-98	-779	634	165	685	143
9	-102.1	49	-1002	-100	-820	665	173	716	151
10	-102.1	49	-1000	-100	-819	664	172	716	151
11	-108.7	70	-1088	-105	-880	708	184	763	162
12	-115.0	94	-1176	-110	-936	751	194	806	173
13	-114.8	95	-1175	-110	-935	750	194	806	172
14	-120.9	122	-1287	-116	-991	792	206	849	183
15	-127.4	150	-1373	-123	-1049	835	216	894	198
16	-133.5	204	-1490	-132	-1103	879	226	938	206
17	-139.6	258	-1619	-144	-1156	925	237	985	220
18	-146.3	343	-1782	-158	-1199	971	245	1030	230
19	-152.0	515	-2210	-230	-1203	1017	252	1076	241
20	-164.9	682	-2366	-258	-1297	1049	264	1098	246
21	-86.3	21091	-30290	-2462	1822	966	76	822	275
AXIAL FORCE (kN)		-34.5		-29.0		25.6		26.6	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P2-A

TEST PANEL A (FRONT DIAGONAL NOT BUCKLED)

Test Serial No. 21

No.	Load (kN)	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8
1	-27.6	-424	-48	-367	-102	-89	167	-85	149
2	-34.3	-553	-38	-476	-110	-118	222	-113	200
3	-41.1	-685	-15	-594	-106	-151	284	-145	257
4	-50.3	-907	38	-770	-89	-202	381	-194	347
5	-59.1	-1143	125	-955	-52	-259	491	-249	449
6	-70.0	-1492	293	-1204	22	-335	643	-324	592
7	-74.1	-1645	379	-1305	60	-365	707	-352	653
8	-78.1	-1809	474	-1407	97	-394	772	-382	714
9	-81.7	-1976	587	-1489	126	-420	836	-409	776
10	-83.6	-2059	641	-1529	138	-433	867	-422	805
11	-85.1	-2160	718	-1540	127	-445	900	-434	835
12	-86.4	-2278	818	-1623	83	-457	938	-444	868
13	-86.4	-2711	1018	-1434	-12	-469	984	-451	895
14	-56.6	-3023	1185	-1383	-98	-479	991	-453	915
15	-56.3	-2816	1154	-509	-641	-589	902	-375	659
16	-59.1	-2880	1199	-501	-666	-598	921	-381	675
17	-59.1	-2733	1249	-468	-708	-612	940	-385	683
18	-59.8	-2856	1360	-409	-784	-642	980	-394	704
19	-59.2	-2892	1414	-352	-830	-660	998	-397	707
20	-59.1	-2948	1473	-309	-875	-675	1017	-400	713
21	-59.2	-3047	1622	-218	-967	-704	1050	-405	724
22	-58.9	-3084	1698	-167	-1016	-718	1065	-406	728
23	-57.9	-3454	2032	45	-1207	-769	1115	-409	732
24	-57.7	-3607	2198	185	-1344	-802	1150	-411	740
25	-56.8	-3705	2300	339	-1475	-831	1171	-408	732
26	-55.3	-3610	2227	344	-1450	-830	1156	-403	713
27	-54.8	-3436	2084	391	-1468	-814	1116	-385	673
28	-52.4	-3290	1954	488	-1537	-833	1108	-378	641
AXIAL FORCE (kN)		-28.5		-28.9		9.4		8.3	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P2-A

TEST PANEL A (REAR DIAGONAL TOP HALF BUCKLED OUTSIDE)

Test Serial No. 21

No.	Load (kN)	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16
1	-27.6	-506	38	-435	10	-115	173	-108	162
2	-34.3	-653	73	-561	36	-155	225	-148	213
3	-41.1	-808	120	-694	78	-200	284	-191	270
4	-50.3	-1040	209	-893	158	-268	377	-257	359
5	-59.1	-1295	328	-1108	264	-341	483	-329	462
6	-70.0	-1641	517	-1387	410	-437	632	-420	605
7	-74.1	-1787	606	-1445	446	-477	697	-457	665
8	-78.1	-1948	719	-1491	461	-519	766	-491	727
9	-81.7	-2271	908	-1490	437	-556	834	-520	786
10	-83.6	-2396	995	-1509	442	-573	866	-533	815
11	-85.1	-2610	1139	-1462	389	-591	900	-541	842
12	-86.4	-3181	1428	-1316	246	-618	939	-543	866
13	-86.4	-5087	2490	-418	-578	-618	1014	-472	871
14	-56.6	-5889	2978	159	-1090	-618	1054	-426	872
15	-58.3	-21360	15566	938	-1560	-646	981	-602	760
16	-59.1	-22941	16835	983	-1625	-660	999	-609	771
17	-59.1	-25918	19186	1060	-1691	-668	1006	-610	772
18	-59.8	-29042	21689	1156	-1782	-691	1034	-626	794
19	-59.2	-31267	23458	1225	-1837	-686	1030	-626	796
20	-59.1	-32851	24584	1274	-1862	-693	1038	-630	803
21	-59.2	-35137	26676	1370	-1972	-900	1050	-634	814
22	-58.9	-36462	27823	1426	-2019	-697	1050	-631	814
23	-57.9	-40365	31202	1626	-2202	-689	1050	-618	814
24	-57.7	-42443	32987	1759	-2327	-897	1069	-613	819
25	-56.8	-44521	34785	1893	-2452	-889	1056	-595	813
26	-55.3	-45025	35212	1913	-2464	-882	1042	-577	796
27	-54.8	-46249	36226	2045	-2603	-886	1074	-572	805
28	-52.4	-48410	38043	2262	-2785	-874	1073	-541	788
AXIAL FORCE (kN)		-29.7		-21.2		6.5		6.4	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P2-B

TEST PANEL D (FRONT DIAGONAL TOP HALF BUCKLED OUTSIDE , BOTTOM INSIDE)

Test Serial No. 27

No.	Load (kN)	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8
1	-29.5	-22	-505	-29	-500	194	-90	196	-93
2	-34.3	-1	-605	-14	-596	236	-112	240	-117
3	-41.6	45	-772	23	-754	305	-154	309	-159
4	-49.5		-976	82	-935	391	-208	395	-212
5	-57.5	245	-1214	163	-1130	491	-268	498	-274
6	-65.5	409	-1485	257	-1330	606	-336	610	-343
7	-69.5	512	-1636	300	-1418	674	-377	675	-381
8	-73.5	638	-1807	320	-1477	747	-416	744	-416
9	-77.2	869	-2067	283	-1446	828	-457	811	-469
10	-77.1	877	-2077	239	-1418	830	-459	811	-450
11	-78.2	927	-2124	236	-1430	848	-469	829	-458
12	-79.7	1118	-2233	149	-1344	864	-485	856	-469
13	-80.7	1379	-2577	12	-1203	916	-496	876	-473
14	-81.3	1573	-2780	-97	-1089	939	-504	880	-476
15	-78.4	3566	-5459	-1853	991	1041	-434	873	-336
16	-79.5	5001	-7828	-2028	1194	1060	-418	863	-316
17	-80.7	6419	-9829	-2131	1305	1075	-410	894	-308
18	-82.3	10484	-14708	-2298	1498	1096	-393	907	-290
19	-83.1	13825	-17660	-2408	1628	1107	-379	916	-277
20	-83.9	16104	-19303	-2498	1728	1115	-368	923	-267
21	-44.7	14769	-17180	-1458	1003	615	-217	718	-186
AXIAL FORCE (kN)		-23.8		-23.5		7.3		7.2	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P2-B

TEST PANEL D (REAR DIAGONAL TOP HALF BUCKLED OUTSIDE,BOTTOM INSIDE)

Test Serial No. 27

No.	Load (kN)	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16
1	-29.5	-186	-288	-71	-369	99	-84	104	-84
2	-34.3	-186	-346	-73	-441	121	-106	127	-105
3	-41.6	-211	-444	-65	-567	166	-143	171	-141
4	-49.5	-224	-567	-39	-724	228	-191	232	-186
5	-57.5	-217	-712	13	-908	306	-254	311	-246
6	-65.5	-186	-878	98	-1124	413	-332	412	-321
7	-69.5	-155	-975	156	-1250	475	-379	473	-365
8	-73.5	-113	-1081	230	-1387	543	-423	539	-409
9	-77.2	-57	-1195	321	-1539	616	-470	608	-453
10	-77.1	-55	-1195	321	-1540	614	-469	606	-453
11	-78.2	-40	-1229	347	-1583	635	-483	626	-466
12	-79.7	-13	-1277	394	-1654	667	-501	659	-485
13	-80.7	9	-1315	433	-1712	693	-515	685	-500
14	-81.3	25	-1343	459	-1730	710	-526	704	-510
15	-78.4	103	-1452	402	-1686	751	-532	740	-512
16	-79.5	136	-1511	437	-1736	783	-545	772	-528
17	-80.7	162	-1553	485	-1787	813	-559	806	-544
18	-82.3	164	-1581	630	-2042	861	-579	865	-575
19	-83.1	93	-1618	867	-2436	886	-599	918	-602
20	-83.9	-167	-1238	1445	-3215	931	-586	987	-638
21	-44.7	-1966	1435	7249	-31458	658	-636	975	-955
AXIAL FORCE (kN)		-28.2		-30.2		6.1		6.3	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P3-A

TEST PANEL A (FRONT DIAGONAL TOP HALF BUCKLED INSIDE , BOTTOM A LITTLE INSIDE,FIRST)

Test Serial No. 30

No.	Load (kN)	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8
1	-33.7	-270	-14	-247	-37	53	210	22	245
2	-56.0	-436	-15	-395	-53	82	332	33	384
3	-83.5	-634	-8	-572	-69	117	475	51	544
4	-102.6	-779	3	-696	-76	142	571	64	654
5	-126.2	-957	23	-849	-83	173	689	81	785
6	-148.3	-1126	47	-991	-86	201	795	99	904
7	-175.6	-1354	90	-1168	-86	237	924	122	1048
8	-198.1	-1534	133	-1300	-92	265	1022	139	1156
9	-209.6	-1661	170	-1377	-101	279	1080	143	1223
10	-215.4	-1723	186	-1420	-102	288	1113	151	1259
11	-223.9	-1811	223	-1469	-110	299	1154	155	1308
12	-223.4	-1812	228	-1462	-113	298	1152	153	1305
13	-227.6	-1851	239	-1489	-115	303	1174	156	1327
14	-232.0	-1900	261	-1512	-121	308	1194	159	1352
15	-236.6	-1951	288	-1532	-131	312	1215	160	1377
16	-235.8	-1956	298	-1517	-141	308	1213	155	1375
17	-239.7	-1997	312	-1541	-143	313	1233	158	1395
18	-244.5	-2086	345	-1563	-153	317	1256	159	1422
19	-249.0	-2147	393	-1575	-171	319	1279	158	1447
20	-253.1	-2262	465	-1573	-202	313	1301	151	1473
21	-251.9	-2331	515	-1544	-229	300	1300	136	1470
22	-256.8	-2414	557	-1565	-241	304	1324	138	1497
23	-269.8	-3161	1839	-1466	-422	211	1368	66	1518
24	-234.8	-26331	16772	1612	-2910	-80	1499	-79	1443
25	-235.4	-27108	17449	1780	-3044	-84	1502	-70	1428
26	-235.4	-27752	18075	1898	-3066	-73	1486	-45	1397
27	-235.7	-28135	18456	1954	-3102	-58	1481	-22	1379
28	-235.1	-28466	18792	2003	-3110	-37	1474	9	1362
29	-201.5	-26932	19340	2101	-3099	25	1441	69	1307
AXIAL FORCE (kN)		-55.0		-53.2		44.6		47.8	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P3-A

TEST PANEL A (REAR DIAGONAL TOP HALF BUCKLED A LITTLE INSIDE ,BOTTOM OUTSIDE,SECOND)

Test Serial No. 30

No.	Load (kN)	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16
1	-33.7	-118	-19	-155	15	6	119	-8	134
2	-56.0	-218	-37	-291	30	10	218	-13	245
3	-83.5	-357	-62	-482	55	18	347	-21	398
4	-102.6	-453	-76	-618	78	25	439	-23	502
5	-126.2	-578	-93	-798	113	37	557	-25	634
6	-148.3	-696	-108	-972	155	49	666	-23	759
7	-175.6	-842	-124	-1199	215	69	805	-17	914
8	-196.1	-953	-134	-1378	271	84	910	-10	1030
9	-208.6	-1024	-139	-1491	311	94	976	-4	1104
10	-215.4	-1058	-142	-1549	332	100	1010	0	1141
11	-223.9	-1105	-146	-1629	359	108	1054	4	1188
12	-223.4	-1104	-145	-1626	359	108	1053	4	1187
13	-227.6	-1124	-147	-1664	374	112	1075	8	1210
14	-232.0	-1150	-148	-1706	390	116	1099	10	1237
15	-236.6	-1173	-151	-1750	406	120	1124	14	1263
16	-235.8	-1171	-149	-1747	406	118	1124	13	1261
17	-239.7	-1191	-151	-1783	420	122	1144	15	1284
18	-244.5	-1217	-153	-1830	440	128	1170	19	1311
19	-249.0	-1242	-155	-1880	461	132	1195	22	1339
20	-253.1	-1265	-154	-1930	482	134	1222	26	1367
21	-251.9	-1262	-153	-1935	484	131	1224	24	1366
22	-256.6	-1289	-155	-1984	504	137	1250	28	1393
23	-259.0	-1330	-126	-2055	543	141	1292	35	1433
24	-234.8	-1471	-89	-2747	962	144	1425	9	1597
25	-235.4	-1477	-126	-2984	1101	146	1473	5	1653
26	-235.4	-1435	-194	-3341	1330	142	1527	-10	1717
27	-236.7	-1319	-339	-3888	1662	139	1588	-29	1787
28	-235.1	-1024	-623	-5092	2227	132	1625	-70	1863
29	-201.5	1031	-2424	-23934	15192	-46	1489	-434	1895
AXIAL FORCE (kN)		-47.0		-52.0		49.0		50.1	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P3-B

TEST PANEL A (FRONT DIAGONAL TOP HALF BUCKLED INSIDE , BOTTOM A LITTLE INSIDE)

Test Serial No. 32

No.	Load (kN)	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8
1	-37.5	-273	-45	-270	-54	35	261	98	216
2	-67.6	-483	-65	-477	-86	66	448	164	374
3	-88.3	-630	-73	-617	-103	88	571	209	479
4	-119.2	-854	-74	-830	-123	121	749	275	632
5	-146.5	-1056	-83	-1016	-131	154	901	333	766
6	-194.0	-1427	-13	-1340	-136	209	1156	431	988
7	-202.5	-1506	6	-1398	-138	218	1202	449	1028
8	-213.1	-1594	26	-1465	-138	232	1257	472	1076
9	-222.6	-1705	60	-1517	-145	241	1308	489	1120
10	-228.4	-1755	71	-1552	-147	248	1336	500	1146
11	-233.7	-1816	92	-1578	-155	254	1365	511	1171
12	-239.1	-1865	120	-1598	-166	259	1395	521	1198
13	-234.2	-1878	127	-1588	-173	247	1383	510	1184
14	-243.5	-1958	155	-1622	-177	261	1430	528	1226
15	-252.4	-2147	259	-1620	-227	264	1486	542	1275
16	-260.4	-2266	338	-1633	-265	269	1533	555	1316
17	-267.9	-3223	899	-1379	-617	259	1899	563	1378
18	-222.1	-24877	16540	1986	-2831	-95	1563	289	1224
19	-221.6	-24863	16544	1979	-2816	-92	1560	292	1221
20	-225.9	-25004	16647	2011	-2866	-84	1580	304	1237
21	-229.5	-25081	16723	2059	-2915	-79	1597	315	1249
22	-232.5	-25100	16765	2079	-2921	-70	1605	330	1253
23	-234.2	-25094	16792	2076	-2900	-57	1607	346	1252
24	-203.3	-25094	16928	2195	-2938	7	1629	426	1259
25	0.3	-16623	10562	874	-622	-261	512	-159	426
26	-8.4	771	775	502	693	489	867	500	539
AXIAL FORCE (kN)		-60.0		-54.0		53.2		55.2	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P3-B

TEST PANEL A (REAR DIAGONAL ,BOTTOM BUCKLED OUTSIDE, TOP A LITTLE INSIDE)

Test Serial No. 32

No.	Load (kN)	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16
1	-37.5	-133	-18	-139	-4	7	141	17	134
2	-67.6	-265	-34	-277	-5	15	278	33	261
3	-88.3	-382	-45	-380	-5	23	375	48	354
4	-119.2	-511	-60	-541	2	37	523	72	492
5	-146.5	-652	-72	-693	12	53	659	98	622
6	-184.0	-910	-86	-982	45	90	900	151	849
7	-202.5	-956	-89	-1039	54	98	946	162	891
8	-213.1	-1010	-91	-1099	65	107	991	174	935
9	-222.6	-1050	-94	-1152	76	116	1028	185	971
10	-228.4	-1070	-96	-1177	82	120	1046	190	987
11	-233.7	-1089	-98	-1203	87	124	1063	194	1003
12	-239.1	-1105	-99	-1226	93	128	1079	199	1018
13	-234.2	-1134	-100	-1260	99	134	1105	207	1045
14	-243.5	-1160	-100	-1325	112	144	1153	221	1091
15	-252.4	-1243	-103	-1369	133	158	1201	235	1136
16	-260.4	-1290	-105	-1458	149	168	1241	246	1175
17	-267.9	-1343	-108	-1536	176	182	1284	261	1218
18	-222.1	-1655	0	-2258	695	226	1491	292	1445
19	-221.6	-1646	-7	-2263	699	225	1493	291	1448
20	-225.9	-1683	-2	-2317	725	230	1522	300	1475
21	-229.5	-1717	-4	-2466	783	235	1557	306	1508
22	-232.5	-1725	-29	-2568	873	241	1595	312	1545
23	-234.2	-1679	-199	-2784	1842	248	1637	313	1589
24	-203.3	1201	-2689	-25676	16799	100	1570	80	1567
25	0.3	944326	-787974	944354	944212	943879	943975	-935361	4084
26	-8.4	383	383	411	269	-60	134	116	379
AXIAL FORCE (kN)		-50.7		-47.3		53.6		54.2	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P4-A

TEST PANEL D (FRONT DIAGONAL NOT BUCKLED)

Test Serial No. 29

No.	Load (kN)	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8
1	-29.3	-75	-324	-51	-350	160	-43	140	-24
2	-40.4	-91	-441	-55	-478	215	-64	189	-38
3	-51.6	-100	-567	-53	-614	273	-86	240	-56
4	-62.7	-100	-697	-41	-756	334	-116	294	-77
5	-74.9	-88	-850	-16	-923	405	-153	356	-105
6	-86.6	-66	-1003	20	-1086	479	-192	421	-136
7	-99.8	-27	-1172	73	-1273	561	-238	493	-173
8	-105.8	-1	-1272	108	-1380	609	-267	536	-198
9	-112.4	31	-1374	145	-1487	662	-298	583	-222
10	-126.4	96	-1572	224	-1700	763	-368	690	-280
11	-129.5	111	-1619	243	-1747	812	-385	716	-294
12	-136.4	145	-1710	276	-1838	880	-425	776	-325
13	-139.7	162	-1752	287	-1873	919	-448	811	-343
14	-143.1	182	-1799	306	-1917	953	-465	842	-358
15	-146.1	204	-1842	324	-1957	984	-483	870	-372
16	-152.2	256	-1931	325	-1991	1064	-527	944	-406
17	-155.0	296	-1985	316	-1995	1103	-547	983	-425
18	-159.8	405	-2119	265	-1982	1167	-577	1049	-452
19	-164.3	618	-2368	181	-1799	1231	-608	1137	-479
20	-132.5	802	-2382	-194	-1214	1066	-521	982	-381
21	-133.5	844	-2473	-28	-1429	1144	-539	992	-355
22	-133.3	929	-2566	37	-1501	1171	-548	997	-345
23	-132.9	971	-2606	50	-1512	1179	-551	1003	-345
24	-133.9	1001	-2643	66	-1536	1192	-556	1012	-347
25	-133.8	1134	-2772	122	-1587	1226	-570	1040	-358
26	-134.4	1162	-2805	136	-1607	1236	-574	1050	-360
27	-134.0	1204	-2830	163	-1616	1243	-578	1051	-361
28	-133.4	1210	-2827	168	-1612	1241	-578	1047	-360
29	-120.8	1071	-2458	171	-1385	1063	-507	894	-315
AXIAL FORCE (kN)		-49.0		-48.4		17.8		18.5	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P4-A

TEST PANEL D (REAR DIAGONAL TOP HALF BUCKLED INSIDE AFTER PANEL-E BUCKLED FIRST)

Test Serial No. 29

No.	Load (kN)	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16
1	-29.3	-59	-196	-81	-174	38	-64	41	-71
2	-40.4	-73	-262	-110	-257	69	-90	72	-101
3	-51.6	-86	-392	-136	-343	104	-118	107	-133
4	-62.7	-90	-503	-159	-438	144	-151	147	-169
5	-74.9	-84	-636	-178	-550	197	-192	200	-215
6	-86.6	-69	-775	-186	-661	254	-235	257	-261
7	-98.8	-38	-936	-194	-787	326	-286	327	-315
8	-105.8	-16	-1032	-193	-862	369	-316	371	-347
9	-112.4	14	-1136	-190	-937	417	-349	418	-382
10	-126.4	95	-1370	-173	-1102	528	-420	528	-458
11	-129.5	116	-1428	-167	-1141	554	-437	554	-475
12	-136.4	168	-1553	-155	-1224	614	-475	615	-516
13	-139.7	200	-1622	-151	-1263	649	-496	650	-539
14	-143.1	230	-1686	-146	-1301	681	-516	682	-559
15	-146.1	260	-1748	-144	-1332	714	-534	713	-579
16	-152.2	340	-1887	-167	-1363	795	-579	793	-627
17	-155.0	389	-1957	-188	-1365	835	-602	834	-651
18	-159.8	501	-2102	-244	-1344	912	-642	904	-693
19	-164.3	711	-2443	-346	-1271	987	-686	979	-734
20	-132.5	5180	-6246	-1509	368	1190	-1009	1101	-1059
21	-133.5	12653	-17171	-1824	799	1253	-1069	1153	-1131
22	-133.3	16185	-21374	-1944	984	1253	-1070	1153	-1138
23	-132.9	17247	-22595	-1974	1038	1250	-1067	1151	-1136
24	-133.9	17761	-23180	-2007	1067	1262	-1075	1161	-1146
25	-133.8	21300	-27129	-2139	1247	1271	-1081	1160	-1149
26	-134.4	21925	-27824	-2173	1282	1282	-1087	1168	-1156
27	-134.0	24275	-30425	-2265	1400	1289	-1087	1169	-1154
28	-133.4	25106	-31330	-2295	1442	1287	-1085	1165	-1150
29	-120.8	29203	-35787	-2431	1626	1302	-1073	1168	-1132
AXIAL FORCE (kN)		-48.7		-46.1		8.9		7.0	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P4-B

TEST PANEL D (FRONT DIAGONAL TOP HALF BUCKLED INSIDE)

Test Serial No. 20

No.	Load (kN)	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8
1	-24.1	-273	-41	-238	-60	-26	109	-35	121
2	-41.1	-483	-51	-407	-125	-55	184	-65	206
3	-58.9	-715	-41	-592	-160	-92	269	-104	300
4	-77.5	-975	-6	-792	-184	-140	359	-154	403
5	-92.6	-1201	45	-958	-192	-184	439	-201	494
6	-107.8	-1445	119	-1126	-191	-236	525	-254	594
7	-118.9	-1638	189	-1246	-192	-279	598	-300	677
8	-126.3	-1772	245	-1316	-197	-309	647	-332	739
9	-132.4	-1929	306	-1362	-210	-335	692	-361	795
10	-135.9	-2025	355	-1378	-225	-354	722	-382	833
11	-139.5	-2119	410	-1395	-239	-371	751	-402	870
12	-142.9	-2254	503	-1381	-278	-391	784	-425	915
13	-146.1	-2402	606	-1362	-320	-409	814	-445	956
14	-149.3	-2627	788	-1369	-384	-429	846	-468	1003
15	-152.2	-3097	1108	-1136	-568	-452	879	-492	1062
16	-153.5	-4781	2159	-412	-1197	-481	916	-509	1163
17	-153.5	-9199	4662	103	-1620	-480	926	-499	1218
18	-154.8	-14026	7850	461	-1913	-468	936	-488	1262
19	-156.3	-17018	9949	997	-2108	-457	944	-477	1298
20	-157.8	-18293	11648	889	-2268	-445	952	-467	1329
21	-159.5	-20717	12735	1018	-2364	-436	959	-459	1354
22	-161.3	-22378	14043	1177	-2514	-422	967	-445	1379
23	-162.7	-23377	14816	1280	-2607	-412	973	-437	1398
24	-163.4	-24564	15782	1415	-2719	-398	976	-422	1416
25	-165.3	-25940	16717	1612	-2907	-375	987	-402	1450
26	-165.5	-26673	16874	1743	-3043	-359	990	-386	1465
27	-166.3	-27177	17137	1844	-3163	-347	993	-376	1477
28	-166.3	-27661	17432	1952	-3274	-336	996	-364	1489
29	-165.5	-28076	17707	2055	-3362	-324	995	-351	1493
30	-131.2	-27158	17019	1973	-3086	-406	972	-367	1383
AXIAL FORCE (kN)		-51.5		-48.5		11.9		15.2	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P4-B

TEST PANEL D (REAR DIAGONAL TOP HALF BUCKLED OUTSIDE)

Test Serial No. 20

No.	Load (kN)	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16
1	-24.1	-183	-63	-150	-73	-29	4	-34	4
2	-41.1	-292	-103	-270	-119	-56	14	-61	12
3	-56.9	-447	-138	-413	-163	-91	36	-100	33
4	-77.5	-626	-162	-581	-196	-137	70	-149	70
5	-92.6	-791	-170	-737	-211	-184	112	-201	115
6	-107.8	-977	-163	-914	-209	-245	167	-266	177
7	-118.9	-1130	-141	-1084	-190	-299	222	-329	237
8	-126.3	-1240	-119	-1173	-166	-340	264	-378	285
9	-132.4	-1336	-92	-1269	-139	-379	303	-421	331
10	-135.9	-1397	-73	-1331	-119	-404	330	-450	359
11	-139.5	-1460	-52	-1395	-96	-431	359	-482	394
12	-142.9	-1524	-27	-1458	-73	-461	390	-517	430
13	-146.1	-1583	-5	-1517	-49	-490	422	-551	465
14	-149.3	-1647	23	-1579	-22	-523	458	-589	508
15	-152.2	-1710	54	-1642	8	-559	500	-632	557
16	-153.5	-1768	81	-1709	44	-593	543	-679	612
17	-153.5	-1800	94	-1760	76	-610	568	-711	652
18	-154.8	-1842	117	-1805	100	-638	610	-751	705
19	-156.3	-1886	147	-1838	118	-669	654	-795	761
20	-157.6	-1937	186	-1858	127	-704	706	-838	820
21	-159.6	-1991	229	-1874	131	-738	764	-877	874
22	-161.3	-2063	304	-1854	109	-780	818	-919	938
23	-162.7	-2144	381	-1827	80	-817	873	-951	998
24	-163.4	-2323	543	-1689	-37	-871	954	-983	1050
25	-165.3	-2748	954	-1288	-380	-979	1124	-1026	1163
26	-165.5	-3146	1256	-956	-653	-1035	1222	-1035	1218
27	-166.3	-3490	1526	-700	-861	-1073	1293	-1039	1260
28	-166.3	-3842	1815	-467	-1050	-1101	1351	-1040	1297
29	-165.5	-4442	2209	-214	-1242	-1136	1401	-1052	1328
30	-131.2	-9251	5869	392	-1502	-1440	1410	-1348	1356
AXIAL FORCE (kN)		-50.2		-49.7		0.5		-0.1	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P5-A

TEST PANEL A (FRONT HORIZONTAL BUCKLED FIRST ,THEN FRONT PANEL D&E DIAGONAL BUCKLED OUTSIDE ,FRONT DIAGONAL NOT BUCKLED)

Test Serial No. 26

No.	Load (kN)	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8
1	-35.3	-179	2	-145	-26	43	135	27	153
2	-95.3	-469	16	-375	-64	111	347	73	394
3	-127.6	-633	29	-501	-84	149	461	97	522
4	-161.4	-807	49	-633	-104	189	575	124	653
5	-196.4	-994	77	-767	-124	230	693	152	788
6	-230.9	-1188	112	-902	-144	273	810	180	921
7	-265.3	-1407	160	-1036	-167	315	924	211	1052
8	-299.4	-1674	239	-1159	-197	360	1039	242	1183
9	-321.6	-1893	311	-1235	-226	390	1116	264	1269
10	-343.2	-2137	401	-1301	-261	421	1191	285	1357
11	-354.0	-2271	453	-1330	-279	437	1229	298	1401
12	-357.4	-2346	482	-1335	-291	443	1242	300	1418
13	-365.0	-2443	519	-1355	-305	453	1269	307	1449
14	-378.0	-2597	585	-1383	-330	469	1309	319	1495
15	-379.6	-2667	616	-1387	-341	476	1321	324	1509
16	-383.7	-2736	646	-1393	-352	481	1336	326	1525
17	-382.3	-2796	674	-1376	-363	481	1332	327	1524
18	-381.6	-2921	727	-1399	-383	494	1365	336	1560
19	-384.5	-2990	759	-1400	-395	499	1375	340	1572
20	-385.6	-3125	818	-1382	-417	502	1382	343	1581
21	-389.0	-3171	840	-1390	-425	507	1394	346	1595
22	-402.6	-3233	869	-1396	-436	512	1407	351	1609
23	-405.9	-3334	916	-1393	-453	518	1418	355	1622
24	-408.2	-3452	968	-1383	-473	522	1425	358	1632
25	-399.9	-3388	899	-1352	-473	523	1370	355	1575
26	-404.3	-3411	908	-1366	-483	528	1378	356	1587
27	-406.0	-3436	916	-1371	-489	528	1379	356	1593
28	-409.9	-3474	929	-1381	-496	534	1391	358	1608
29	-412.5	-3508	941	-1388	-503	536	1398	358	1615
30	-413.7	-3529	947	-1381	-509	538	1396	358	1617
AXIAL FORCE (kN)		-69.3		-73.4		75.0		76.7	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P5-A

TEST PANEL A (REAR DIAGONAL NOT BUCKLED)

Test Serial No. 26

No.	Load (kN)	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16
1	-35.3	-129	-29	-125	-29	19	107	13	117
2	-95.3	-372	-80	-361	-78	58	300	38	332
3	-127.6	-504	-104	-491	-100	80	401	52	445
4	-161.4	-649	-126	-634	-121	104	512	68	567
5	-198.4	-802	-145	-784	-136	131	626	86	692
6	-230.9	-957	-162	-938	-147	158	740	105	815
7	-265.3	-1118	-171	-1098	-154	186	853	125	942
8	-299.4	-1282	-176	-1254	-154	214	967	143	1089
9	-321.6	-1397	-173	-1361	-150	233	1042	153	1154
10	-343.2	-1513	-166	-1469	-143	251	1116	163	1237
11	-354.0	-1574	-163	-1523	-138	261	1153	171	1278
12	-357.4	-1587	-156	-1543	-135	263	1167	171	1293
13	-365.0	-1642	-156	-1583	-131	269	1192	175	1321
14	-376.0	-1703	-151	-1640	-125	280	1230	182	1364
15	-379.6	-1724	-147	-1658	-123	283	1242	183	1379
16	-383.7	-1747	-145	-1680	-120	286	1257	185	1393
17	-382.3	-1749	-142	-1678	-120	284	1253	183	1392
18	-391.6	-1801	-138	-1725	-113	293	1284	190	1426
19	-394.5	-1817	-135	-1739	-112	296	1295	191	1438
20	-395.6	-1836	-129	-1750	-109	296	1301	190	1446
21	-399.0	-1854	-128	-1767	-106	300	1313	194	1460
22	-402.6	-1873	-127	-1786	-104	304	1324	196	1472
23	-405.9	-1892	-124	-1803	-101	308	1335	196	1485
24	-408.2	-1905	-123	-1817	-100	312	1342	196	1493
25	-399.9	-1822	-171	-1766	-108	332	1305	208	1466
26	-404.3	-1833	-181	-1791	-104	343	1317	216	1481
27	-408.0	-1839	-184	-1803	-101	346	1324	221	1489
28	-409.9	-1854	-187	-1822	-98	351	1335	225	1501
29	-412.5	-1862	-194	-1838	-98	357	1343	230	1512
30	-413.7	-1868	-200	-1843	-93	363	1344	233	1516
AXIAL FORCE (kN)		-79.8		-75		66.3		67.9	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P5-B

TEST PANEL A (FRONT DIAGONAL NOT BUCKLED) ,PANEL H HORIZONAL AND REAR DIAGONAL BUCKLED

FIRST

Test Serial No. 34

No.	Load (kN)	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8
1	-40.2	-57	-187	-29	-214	165	4	174	9
2	-68.7	-86	-310	-39	-357	273	4	284	15
3	-98.6	-116	-441	-45	-509	384	4	397	25
4	-133.5	-143	-560	-43	-685	512	5	524	36
5	-226.7	-192	-980	-3	-1156	847	6	846	76
6	-261.2	-206	-1125	26	-1338	970	6	981	92
7	-293.6	-210	-1264	65	-1518	1086	5	1071	107
8	-323.5	-213	-1399	111	-1700	1200	3	1174	121
9	-354.4	-216	-1535	167	-1895	1314	2	1281	139
10	-365.9	-215	-1589	191	-1973	1359	2	1320	146
11	-377.0	-216	-1636	217	-2046	1400	3	1359	153
12	-389.6	-215	-1700	252	-2148	1453	0	1406	158
13	-397.3	-216	-1732	272	-2202	1481	0	1432	163
14	-408.3	-216	-1790	316	-2315	1533	-5	1478	167
15	-422.6	-218	-1851	359	-2423	1587	-4	1526	177
16	-426.8	-220	-1870	381	-2468	1606	-5	1544	179
17	-433.6	-225	-1901	422	-2567	1636	-16	1574	188
18	-440.3	-226	-1930	450	-2619	1656	-10	1599	184
19	-442.4	-228	-1941	468	-2656	1679	-12	1610	186
20	-445.8	-230	-1955	483	-2690	1692	-12	1622	187
21	-449.1	-234	-1968	505	-2731	1707	-13	1634	189
22	-446.3	-238	-1956	518	-2750	1705	-17	1631	184
23	-450.3	-239	-1969	534	-2784	1721	-15	1646	187
24	-449.9	-241	-1970	535	-2787	1719	-17	1645	186
25	-458.3	-246	-1999	575	-2867	1751	-18	1673	192
26	-461.9	-253	-2009	607	-2927	1768	-18	1687	192
27	-463.5	-258	-2006	655	-3008	1779	-24	1699	189
28	-459.5	-264	-1976	684	-3051	1773	-26	1693	183
29	-463.7	-267	-1990	704	-3091	1789	-26	1708	185
30	-380.0	-205	-1216	335	-1866	1035	-19	1030	65
AXIAL FORCE (kN)		**-82.5**		**-82.0**		**63.2**		**68.1**	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P5-B

TEST PANEL A (REAR DIAGONAL TOP HALF BUCKLED INSIDE,AND HORIZONTAL BUCKLED OUTSIDE INPLANE ND OUTPLANE)

Test Serial No. 34

No.	Load (kN)	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16
1	-40.2	20	-163	-14	-124	129	22	144	12
2	-68.7	41	-299	-25	-222	232	41	260	26
3	-98.6	68	-449	-36	-327	343	63	383	40
4	-133.5	108	-633	-49	-453	475	91	529	58
5	-226.7	252	-1197	-88	-810	846	182	940	129
6	-261.2	323	-1426	-105	-940	987	222	1093	162
7	-293.6	402	-1662	-126	-1054	1121	265	1239	196
8	-323.5	497	-1927	-163	-1138	1248	308	1379	233
9	-354.4	635	-2271	-212	-1210	1379	360	1524	278
10	-365.9	693	-2415	-233	-1237	1430	380	1579	298
11	-377.0	759	-2569	-256	-1255	1478	400	1630	314
12	-389.6	878	-2855	-302	-1253	1536	429	1697	339
13	-397.3	944	-3000	-324	-1257	1568	445	1733	354
14	-408.3	1186	-3566	-411	-1191	1628	481	1795	386
15	-422.6	1338	-3902	-465	-1191	1690	512	1862	416
16	-426.8	1477	-4231	-512	-1149	1713	527	1884	434
17	-433.9	1771	-4831	-607	-1067	1764	555	1925	463
18	-440.3	1925	-5256	-657	-1028	1787	575	1960	482
19	-442.4	2105	-5655	-706	-975	1803	587	1972	495
20	-445.8	2222	-5896	-739	-951	1820	598	1989	508
21	-449.1	2432	-6328	-791	-900	1839	613	2006	521
22	-446.3	2749	-6997	-854	-807	1839	621	2004	532
23	-450.3	2831	-7152	-877	-797	1857	632	2022	541
24	-449.9	2870	-7226	-885	-787	1857	632	2022	543
25	-456.3	3202	-7839	-962	-727	1896	658	2060	569
26	-461.9	3664	-8692	-1050	-633	1919	678	2079	591
27	-463.5	4318	-9865	-1165	-499	1940	704	2098	618
28	-459.5	4907	-10882	-1251	-369	1942	721	2092	637
29	-463.7	5036	-11108	-1285	-348	1963	732	2111	649
30	-380.0	8620	-18682	-1956	452	2083	945	2221	865
AXIAL FORCE (kN)		-88.2		-64.6		89.6		92.7	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P5-B

TEST PANEL D (FRONT DIAGONAL NOT BUCKLED)

Test Serial No. 34

No.	Load (kN)	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8
1	-40.2	-26	1	-173	-55	15	179	14	174
2	-68.7	-43	-2	-287	-92	26	287	23	281
3	-88.6	-60	-4	-408	-129	45	399	37	395
4	-133.5	-81	-5	-548	-171	71	525	56	524
5	-229.7	-138	20	-905	-282	131	832	97	839
6	-281.2	-180	41	-1036	-322	151	940	113	954
7	-293.6	-183	70	-1156	-361	175	1042	128	1063
8	-323.5	-207	112	-1289	-402	198	1143	142	1170
9	-354.4	-234	169	-1380	-444	225	1245	156	1281
10	-365.9	-244	193	-1423	-461	236	1285	166	1328
11	-377.0	-255	219	-1461	-477	247	1324	172	1367
12	-389.6	-271	267	-1501	-504	257	1389	176	1419
13	-397.3	-279	292	-1525	-517	265	1395	181	1446
14	-409.3	-302	374	-1543	-556	283	1446	189	1508
15	-422.6	-319	434	-1579	-591	300	1498	202	1564
16	-429.8	-329	477	-1577	-611	309	1518	209	1587
17	-433.6	-364	661	-1566	-669	316	1548	209	1625
18	-440.3	-367	638	-1561	-689	329	1578	216	1656
19	-442.4	-378	699	-1545	-712	332	1586	219	1671
20	-445.6	-387	730	-1540	-732	338	1603	222	1689
21	-449.1	-401	793	-1524	-761	343	1618	224	1704
22	-446.3	-421	894	-1471	-798	345	1620	225	1709
23	-450.9	-428	918	-1470	-814	349	1633	227	1725
24	-449.9	-430	929	-1464	-818	348	1631	226	1722
25	-456.3	-453	1031	-1449	-866	362	1696	237	1758
26	-461.9	-462	1164	-1404	-923	369	1682	242	1781
27	-463.5	-545	1444	-1292	-1025	380	1704	249	1805
28	-458.5	-609	1716	-1172	-1109	384	1707	252	1812
29	-463.7	-621	1777	-1161	-1135	390	1721	257	1827
30	-380.0	-507	1483	-894	-814	-92	1199	-128	1218
AXIAL FORCE (kN)		8.8		-86.0		72.3		71.1	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P5-B

TEST PANEL D (REAR DIAGONAL NOT BUCKLED)

Test Serial No. 34

No.	Load (kN)	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16
1	-40.2	-186	22	-143	-26	-9	141	11	116
2	-68.7	-327	31	-257	-47	-9	245	24	202
3	-98.6	-477	41	-379	-68	-8	351	37	295
4	-133.5	-656	52	-526	-92	-2	476	56	402
5	-226.7	-1207	114	-980	-147	22	818	104	704
6	-261.2	-1434	153	-1128	-164	33	944	124	819
7	-293.6	-1668	203	-1268	-178	42	1068	140	929
8	-323.5	-1916	267	-1433	-198	49	1183	155	1034
9	-354.4	-2192	351	-1574	-221	57	1303	171	1143
10	-365.9	-2301	388	-1628	-230	61	1350	177	1188
11	-377.0	-2411	429	-1675	-241	64	1395	183	1226
12	-389.6	-2582	500	-1722	-264	66	1450	189	1276
13	-397.3	-2673	540	-1751	-274	69	1481	194	1304
14	-408.3	-2945	673	-1759	-324	69	1539	201	1352
15	-422.6	-3142	766	-1804	-350	74	1598	210	1404
16	-426.6	-3278	838	-1797	-376	75	1619	214	1424
17	-433.6	-3691	1097	-1786	-437	77	1668	222	1468
18	-440.3	-3776	1097	-1764	-466	80	1691	227	1485
19	-442.4	-3953	1189	-1737	-499	80	1705	231	1497
20	-445.6	-4074	1252	-1731	-519	84	1721	234	1512
21	-449.1	-4281	1358	-1707	-555	84	1738	238	1527
22	-448.3	-4585	1512	-1633	-606	83	1739	240	1524
23	-450.3	-4679	1560	-1634	-620	86	1756	243	1540
24	-449.9	-4715	1579	-1626	-626	86	1756	243	1540
25	-458.3	-5023	1740	-1611	-677	92	1793	254	1573
26	-461.9	-5464	1969	-1550	-743	95	1815	261	1591
27	-463.5	-6332	2418	-1415	-861	100	1838	273	1609
28	-459.5	-7096	2820	-1283	-955	103	1842	278	1609
29	-463.7	-7253	2910	-1275	-960	108	1862	285	1626
30	-380.0	-10945	5129	-672	-1531	237	2050	445	1779
AXIAL FORCE (kN)		-88.8		-85.3		67.4		65.2	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P6-A

TEST PANEL D (FRONT DIAGONAL BUCKLED INSIDE TOTALLY)

Test Serial No. 28

No.	Load (kN)	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8
1	-34.7	-237	-88	-233	-73	-49	114	-39	100
2	-64.0	-445	-116	-434	-126	-99	207	-80	183
3	-86.9	-619	-143	-598	-160	-142	287	-117	255
4	-110.6	-806	-161	-776	-189	-192	374	-161	335
5	-134.9	-1013	-186	-984	-209	-250	466	-212	420
6	-159.0	-1233	-153	-1159	-220	-316	569	-270	516
7	-183.2	-1491	-116	-1380	-226	-398	686	-343	629
8	-202.5	-1711	-64	-1522	-230	-480	802	-418	740
9	-221.1	-1973	22	-1674	-232	-575	936	-506	872
10	-230.7	-2113	74	-1758	-227	-622	1004	-550	936
11	-239.0	-2260	157	-1808	-242	-683	1093	-610	1030
12	-243.3	-2377	200	-1836	-245	-711	1132	-635	1070
13	-251.0	-2544	268	-1885	-255	-761	1207	-682	1148
14	-254.9	-2629	334	-1898	-266	-787	1246	-707	1186
15	-252.7	-2780	438	-1909	-324	-812	1277	-732	1228
16	-258.3	-2907	507	-1841	-331	-842	1326	-759	1275
17	-263.1	-3216	705	-1783	-405	-892	1403	-803	1357
18	-267.8	-3884	1183	-1873	-611	-971	1529	-881	1478
19	-246.3	-4026	1256	-1277	-798	-1009	1519	-831	1418
20	-244.6	-4132	1327	-1220	-864	-1036	1551	-836	1432
21	-241.8	-4240	1408	-1152	-940	-1069	1586	-847	1448
22	-237.6	-4745	1689	-1028	-1090	-1129	1654	-876	1498
23	-236.0	-5303	1971	-936	-1188	-1158	1689	-893	1525
24	-234.9	-6018	2374	-805	-1312	-1186	1720	-908	1554
25	-233.6	-6908	2783	-689	-1434	-1213	1756	-922	1585
26	-232.3	-8055	3379	-524	-1584	-1234	1785	-932	1614
27	-229.9	-10584	4785	-186	-1895	-1274	1841	-948	1665
28	-227.2	-12762	6100	98	-2144	-1308	1885	-953	1699
29	-224.7	-14124	7001	292	-2307	-1338	1921	-956	1718
30	-221.9	-16297	8502	639	-2613	-1389	1984	-959	1752
AXIAL FORCE (kN)		-91.3		-84.8		21.4		24.0	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P6-A

TEST PANEL D (REAR DIAGONAL BUCKLED OUTSIDE TOTALLY)

Test Serial No. 28

No.	Load (kN)	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16
1	-34.7	-207	-47	-22	-235	-41	49	-44	50
2	-64.0	-401	-79	-25	-459	-84	101	-90	104
3	-86.9	-562	-96	-16	-649	-124	148	-132	151
4	-110.6	-739	-104	8	-859	-172	205	-186	210
5	-134.9	-935	-99	49	-1096	-230	274	-247	281
6	-159.0	-1142	-79	115	-1355	-296	355	-317	367
7	-183.2	-1367	-44	202	-1645	-382	460	-404	476
8	-202.5	-1556	-5	286	-1897	-465	566	-486	586
9	-221.1	-1748	41	386	-2161	-563	689	-587	716
10	-230.7	-1850	73	450	-2301	-609	752	-635	779
11	-239.0	-1933	97	510	-2438	-665	830	-693	861
12	-243.3	-1987	116	543	-2512	-691	864	-720	897
13	-251.0	-2073	149	610	-2645	-738	927	-767	967
14	-254.9	-2114	166	645	-2714	-763	963	-795	1004
15	-252.7	-2095	155	642	-2719	-775	978	-808	1019
16	-256.3	-2164	186	692	-2814	-803	1016	-835	1061
17	-263.1	-2231	220	762	-2940	-850	1080	-884	1128
18	-267.8	-2367	309	912	-3186	-971	1196	-1003	1249
19	-246.3	-2527	563	1136	-3354	-1233	1303	-1256	1354
20	-244.6	-2602	671	1233	-3420	-1286	1341	-1308	1391
21	-241.8	-2607	751	1320	-3434	-1315	1372	-1340	1426
22	-237.6	-2591	834	1446	-3463	-1355	1427	-1375	1480
23	-236.0	-2550	842	1520	-3490	-1360	1446	-1382	1504
24	-234.9	-2497	826	1605	-3538	-1360	1466	-1386	1530
25	-233.6	-2422	786	1713	-3620	-1353	1478	-1384	1548
26	-232.3	-2310	711	1850	-3749	-1338	1486	-1375	1566
27	-229.9	-2103	554	2236	-4236	-1308	1499	-1352	1590
28	-227.2	-1954	441	2660	-4848	-1284	1507	-1324	1596
29	-224.7	-1891	398	3007	-5369	-1273	1520	-1317	1614
30	-221.9	-1776	307	3908	-6719	-1249	1540	-1300	1640
AXIAL FORCE (kN)		-79.8		-82.5		8.7		9.4	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P6-B

TEST PANEL D (FRONT DIAGONAL NOT BUCKLED)

Test Serial No. 15

No.	Load (kN)	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8
1	-26.6	-61	-178	-49	-182	66	-6	69	-14
2	-45.5	-99	-297	-77	-306	109	-14	113	-27
3	-68.6	-135	-449	-104	-464	150	-29	165	-48
4	-83.6	-156	-549	-117	-567	191	-40	200	-64
5	-101.1	-177	-666	-127	-693	233	-54	243	-83
6	-119.5	-193	-800	-131	-830	277	-73	291	-108
7	-138.3	-203	-937	-130	-975	326	-96	343	-135
8	-156.7	-207	-1077	-120	-1124	379	-121	398	-167
9	-169.0	-208	-1175	-108	-1228	414	-139	437	-188
10	-183.1	-204	-1292	-91	-1354	459	-162	484	-216
11	-203.2	-193	-1455	-55	-1537	523	-197	553	-259
12	-210.9	-189	-1520	-37	-1612	547	-210	583	-277
13	-221.9	-181	-1611	-8	-1718	584	-230	622	-302
14	-228.9	-179	-1667	13	-1793	606	-241	649	-319
15	-237.4	-162	-1746	42	-1865	641	-262	687	-343
16	-243.1	-151	-1788	65	-1948	666	-276	714	-359
17	-250.5	-143	-1855	96	-2045	699	-293	754	-383
18	-261.9	-126	-1947	144	-2178	769	-337	829	-431
19	-267.9	-120	-1991	170	-2248	809	-363	872	-457
20	-272.1	-118	-2015	186	-2298	849	-390	914	-485
21	-278.4	-103	-2068	217	-2373	897	-421	965	-519
22	-283.9	-96	-2116	246	-2449	956	-467	1023	-559
23	-285.7	-71	-2140	261	-2472	967	-479	1057	-577
24	-287.1	-60	-2160	278	-2503	1010	-492	1083	-591
25	-282.1	-56	-2154	317	-2536	1018	-489	1101	-597
26	-249.7	-102	-1739	167	-2039	795	-371	853	-450
27	-247.7	-112	-1717	182	-2043	779	-357	846	-440
28	-215.2	-81	-1467	185	-1776	627	-257	691	-335
29	-208.6	-87	-1409	217	-1756	583	-218	659	-304
30	-196.9	-72	-1340	248	-1705	530	-174	613	-264
AXIAL FORCE (kN)		-85.5		-84.9		19.3		18.1	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P6-B

TEST PANEL D (REAR DIAGONAL TOP HALF BUCKLED INSIDE)

Test Serial No. 15

No.	Load (kN)	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16
1	-26.6	-79	-126	-84	-119	26	-20	22	-24
2	-45.5	-131	-227	-143	-213	53	-35	45	-41
3	-68.6	-195	-362	-216	-338	95	-55	80	-62
4	-83.6	-233	-453	-261	-422	125	-70	107	-77
5	-101.1	-274	-563	-311	-523	161	-89	139	-95
6	-119.5	-315	-685	-362	-633	202	-111	176	-118
7	-136.3	-350	-815	-410	-751	249	-136	217	-143
8	-156.7	-381	-949	-452	-870	298	-165	260	-172
9	-169.0	-398	-1042	-478	-955	332	-185	290	-192
10	-183.1	-413	-1155	-504	-1055	375	-211	329	-218
11	-203.2	-430	-1320	-533	-1205	441	-250	390	-257
12	-210.9	-434	-1387	-542	-1268	468	-266	417	-273
13	-221.9	-438	-1486	-550	-1362	508	-290	455	-298
14	-229.9	-444	-1548	-551	-1430	535	-305	482	-316
15	-237.4	-442	-1634	-551	-1516	574	-332	520	-342
16	-243.1	-439	-1691	-547	-1576	602	-351	547	-363
17	-250.5	-445	-1770	-538	-1674	645	-378	593	-393
18	-261.9	-403	-1932	-528	-1806	736	-442	679	-454
19	-267.9	-366	-2037	-520	-1877	795	-483	735	-495
20	-272.1	-307	-2157	-521	-1927	862	-530	799	-539
21	-278.4	-205	-2341	-533	-1972	952	-592	881	-597
22	-283.9	69	-2729	-621	-1917	1084	-686	1001	-673
23	-285.7	555	-3455	-828	-1685	1210	-769	1105	-726
24	-287.1	1091	-4370	-1029	-1456	1306	-826	1180	-759
25	-282.1	4838	-11366	-1899	-366	1560	-954	1356	-779
26	-249.7	10971	-20316	-2501	418	1708	-1046	1462	-810
27	-247.7	12240	-21963	-2611	549	1732	-1077	1482	-832
28	-215.2	20169	-31482	-3037	1171	1778	-1243	1520	-973
29	-206.6	23157	-34855	-3205	1395	1791	-1292	1530	-1014
30	-196.9	26381	-38412	-3399	1632	1804	-1331	1544	-1046
AXIAL FORCE (kN)		-101.5		-98.5		15.5		12.7	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P7-A

TEST PANEL C (DIAGONAL NOT BUCKLED , THE D-PANEL TOP LEG OUTPLANE BUCKLED)

Test Serial No. 18

No.	Load (kN)	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8
1	-39.9	-31	-155	-13	-175	181	38	186	28
2	-53.7	-40	-210	-17	-235	244	51	250	39
3	-71.8	-53	-281	-22	-316	322	70	332	53
4	-90.2	-66	-355	-25	-396	401	92	411	70
5	-109.1	-77	-427	-27	-477	480	112	490	89
6	-128.4	-88	-500	-29	-557	555	135	568	108
7	-148.0	-97	-572	-31	-639	631	157	645	126
8	-167.3	-105	-643	-32	-718	706	180	719	149
9	-186.9	-114	-716	-33	-796	779	204	792	171
10	-198.2	-117	-759	-32	-845	822	220	834	185
11	-205.5	-120	-784	-32	-874	849	229	861	193
12	-213.0	-121	-811	-30	-904	877	239	890	202
13	-220.5	-127	-837	-30	-933	904	250	916	213
14	-224.2	-127	-850	-29	-948	920	255	932	219
15	-228.0	-127	-863	-30	-961	933	260	945	223
16	-231.3	-127	-873	-30	-970	946	266	956	229
17	-233.1	-124	-868	-30	-961	954	273	964	237
18	-236.7	-122	-872	-31	-966	967	279	973	246
19	-183.8	-45	-883	-54	-848	982	274	959	266
20	-164.6	342	-623	-64	-232	951	212	792	342
21	-160.2	396	-594	-58	-155	958	213	786	366
22	-154.1	421	-559	-50	-104	968	214	776	375
23	-149.2	448	-524	-41	-53	973	216	769	386
24	-144.1	473	-489	-30	-5	977	218	763	401
25	-138.0	500	-444	-17	53	981	223	756	416
AXIAL FORCE (kN)		-38.6		-38.5		48.4		47.3	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P7-A

TEST PANEL C

Test Serial No. 18

No.	Load (kN)	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16
1	-39.9	-11	-141	-33	-119	151	24	142	35
2	-53.7	-13	-190	-45	-159	202	33	189	47
3	-71.8	-15	-255	-61	-211	268	44	249	63
4	-90.2	-16	-324	-77	-265	336	57	314	80
5	-109.1	-17	-399	-95	-323	409	72	382	100
6	-128.4	-16	-479	-113	-383	482	88	450	119
7	-148.0	-14	-563	-134	-445	559	104	522	140
8	-167.3	-9	-650	-154	-506	635	122	592	163
9	-186.9	-1	-742	-175	-568	713	139	664	186
10	-196.2	6	-799	-190	-602	758	149	704	198
11	-205.5	14	-837	-198	-624	786	155	731	207
12	-213.0	21	-876	-206	-645	819	163	759	218
13	-220.5	30	-914	-216	-665	849	170	786	228
14	-224.2	35	-936	-221	-677	865	173	799	233
15	-228.0	41	-957	-225	-686	880	177	813	239
16	-231.3	52	-979	-230	-693	897	179	826	243
17	-233.1	82	-1003	-233	-696	915	180	836	251
18	-236.7	99	-1038	-236	-687	939	182	848	259
19	-183.8	155	-1018	-213	-634	943	166	855	279
20	-164.6	349	-882	-100	-384	850	130	732	282
21	-160.2	386	-865	-89	-361	856	125	728	291
22	-154.1	398	-841	-74	-339	846	122	716	232
23	-149.2	413	-821	-60	-318	838	120	705	299
24	-144.1	422	-795	-45	-297	827	120	692	304
25	-138.0	435	-763	-26	-272	818	120	678	312
AXIAL FORCE (kN)		-36		-35.8		43.2		42.8	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P7-A

TEST PANEL C (PANEL D&E LEGS,PANEL D TOP LEG BUCKLED OUTPLANE)

Test Serial No. 18

No.	Load (kN)	Strain 17	Strain 18	Strain 19	Strain 20	Strain 21	Strain 22	Strain 23	Strain 24
1	-39.9	-202	-336	-333	-205	-300	-249	-219	-322
2	-53.7	-273	-456	-447	-274	-403	-332	-292	-434
3	-71.6	-361	-610	-599	-365	-542	-440	-389	-579
4	-89.2	-451	-767	-750	-461	-695	-549	-495	-728
5	-109.1	-543	-932	-907	-556	-834	-664	-594	-882
6	-128.4	-633	-1101	-1070	-667	-987	-787	-693	-1042
7	-148.0	-722	-1275	-1242	-781	-1138	-882	-791	-1206
8	-167.3	-806	-1454	-1414	-945	-1295	-999	-877	-1369
9	-188.9	-896	-1642	-1592	-939	-1433	-1124	-970	-1542
10	-189.2	-931	-1798	-1704	-986	-1517	-1202	-1022	-1650
11	-205.5	-953	-1837	-1749	-1025	-1563	-1261	-1062	-1721
12	-213.0	-979	-1921	-1783	-1048	-1609	-1322	-1092	-1788
13	-220.9	-992	-2007	-2272	-1092	-1648	-1390	-1109	-1873
14	-224.2	-1004	-2049	-2384	-1103	-1666	-1420	-1122	-1911
15	-229.0	-1021	-2099	-2573	-1120	-1688	-1454	-1139	-1950
16	-231.3	-1044	-2111	-2831	-1135	-1688	-1468	-1144	-1980
17	-233.1	-1146	-2021	-3117	-1153	-1678	-1545	-1144	-2028
18	-236.7	-1289	-1999	-3269	-1179	-1681	-1679	-1151	-2056
19	-183.6	-861	-2020	-2647	-1489	-1461	-1620	-999	-1756
20	-184.6	-899	-1525	-2050	-1309	-2731	-2778	-830	-1453
21	-180.2	-858	-1478	-1987	-1301	-2698	-2977	-805	-1407
22	-154.1	-825	-1472	-1838	-1277	-2878	-3084	-777	-1381
23	-149.2	-488	-1371	-1886	-1257	-2898	-3124	-747	-1318
24	-144.1	-469	-1317	-1856	-1235	-2921	-3162	-715	-1275
25	-139.0	-431	-1251	-1811	-1208	-2945	-3199	-674	-1223
AXIAL FORCE (kN)		-359.6		-387.3		-371.7		-357.2	
		343.2		183.5		88.4		377.6	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P7-B

TEST PANEL A (FRONT DIAGONAL NOT BUCKLED THE E-PANEL TOP LEG INPLANE BUCKLED)

Test Serial No. 17

No.	Load (kN)	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8
1	-30.7	-28	-125	56	-203	165	-18	167	-18
2	-40.5	-37	-165	75	-271	218	-24	220	-24
3	-50.5	-47	-204	96	-339	269	-29	273	-27
4	-61.0	-57	-245	120	-413	324	-34	325	-33
5	-67.7	-63	-273	132	-457	357	-35	359	-34
6	-78.5	-71	-316	139	-514	405	-31	408	-30
7	-85.7	-77	-345	143	-551	436	-29	439	-27
8	-95.9	-84	-386	149	-607	481	-25	484	-23
9	-110.9	-94	-448	162	-689	547	-19	549	-15
10	-121.7	-101	-491	171	-748	591	-14	595	-10
11	-132.7	-110	-536	182	-810	638	-9	642	-4
12	-144.0	-114	-579	196	-871	685	-2	689	2
13	-158.5	-122	-635	212	-952	745	6	749	11
14	-173.7	-130	-694	232	-1036	807	16	810	22
15	-185.0	-135	-737	246	-1098	855	22	856	31
16	-199.3	-139	-791	269	-1178	913	32	912	43
17	-211.4	-143	-838	292	-1251	963	38	961	52
18	-223.1	-147	-883	313	-1339	1011	47	1007	63
19	-173.9	-149	-738	264	-1128	822	2	836	-3
20	-165.9	-150	-715	254	-1098	790	-5	810	-15
AXIAL FORCE (kN)		-40.0		39.1		41.1		41.5	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P7-B

TEST PANEL A (REAR DIAGONAL NOT BUCKLED)

Test Serial No. 17

No.	Load (kN)	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16
1	-30.7	17	-126	-33	-80	125	12	81	61
2	-40.5	23	-166	-45	-105	165	17	107	80
3	-50.5	30	-211	-57	-131	207	22	135	100
4	-61.0	37	-258	-70	-160	249	26	164	120
5	-67.7	41	-288	-78	-178	277	31	182	135
6	-78.5	47	-335	-92	-209	316	39	214	153
7	-85.7	52	-367	-100	-227	345	46	235	167
8	-95.9	57	-414	-112	-256	382	53	265	183
9	-110.9	69	-484	-132	-298	440	65	308	209
10	-121.7	76	-536	-147	-330	478	73	340	226
11	-132.7	86	-591	-160	-361	520	81	374	245
12	-144.0	96	-647	-176	-394	564	92	409	265
13	-158.5	112	-723	-194	-438	620	104	455	290
14	-173.7	129	-804	-210	-489	681	117	504	316
15	-185.0	143	-865	-218	-528	726	127	543	335
16	-199.3	163	-945	-231	-576	786	139	592	359
17	-211.4	180	-1015	-236	-622	837	150	635	380
18	-223.1	198	-1089	-246	-663	886	163	676	402
19	-173.9	139	-743	-202	-420	697	148	511	356
20	-165.9	133	-677	-190	-371	673	155	490	358
AXIAL FORCE (kN)		-34.2		-35.6		40.6		41.8	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P8-A

TEST PANEL D (FRONT DIAGONAL TOP HALF BUCKLED OUTSIDE, BOTTOM INSIDE)

Test Serial No. 33

No.	Load (kN)	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8
1	-33.6	-45	-323	-86	-269	116	-47	107	-40
2	-51.5	-57	-497	-120	-414	176	-77	162	-65
3	-70.3	-57	-681	-144	-567	239	-112	216	-94
4	-89.6	-43	-864	-159	-732	308	-159	275	-129
5	-112.0	-4	-1141	-158	-940	402	-224	355	-180
6	-124.9	22	-1291	-156	-1083	465	-272	408	-216
7	-140.6	50	-1466	-164	-1197	565	-348	485	-273
8	-152.9	73	-1598	-174	-1294	655	-419	556	-326
9	-158.4	108	-1689	-183	-1331	705	-459	595	-355
10	-163.3	126	-1753	-202	-1350	761	-503	638	-386
11	-168.6	164	-1842	-212	-1379	817	-547	681	-418
12	-173.7	228	-1980	-243	-1382	869	-604	736	-461
13	-176.0	273	-2136	-261	-1379	926	-634	783	-482
14	-181.2	368	-2393	-327	-1340	1015	-703	827	-530
15	-185.3	489	-2564	-378	-1308	1087	-757	877	-567
16	-188.9	576	-2731	-494	-1183	1158	-899	926	-894
17	-188.3	664	-2850	-708	-940	1262	-882	1002	-658
18	-189.7	751	-2937	-837	-795	1323	-920	1050	-691
19	-191.2	1097	-3418	-1096	-486	1433	-980	1144	-748
20	-192.4	1244	-3609	-1195	-367	1486	-992	1177	-766
21	-192.4	3121	-7351	-1773	375	1513	-912	1281	-769
22	-192.2	5014	-10200	-1909	543	1517	-889	1299	-767
23	-122.2	27892	-14414	-2639	1670	1468	-1045	1222	-933
24	-121.3	28696	-14328	-2699	1725	1495	-1086	1238	-946
25	-113.2	31131	-14017	-2762	1830	1447	-1023	1201	-916
26	-110.6	32489	-13853	-2832	1913	1449	-1022	1197	-912
AXIAL FORCE (kN)		**-75.4**		**-65.1**		**13.5**		**12.5**	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P8-A

TEST PANEL D (REAR DIAGONAL NOT BUCKLED)

Test Serial No. 33

No.	Load (kN)	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16
1	-33.6	-53	-182	-100	-126	46	-74	23	-55
2	-51.5	-78	-293	-155	-205	80	-118	41	-85
3	-70.3	-97	-431	-211	-302	131	-166	73	-120
4	-89.6	-108	-563	-268	-406	190	-221	112	-157
5	-112.0	-109	-777	-328	-536	270	-292	166	-205
6	-124.9	-98	-902	-359	-615	323	-339	202	-235
7	-140.6	-73	-1072	-395	-717	400	-406	253	-277
8	-152.9	-42	-1215	-420	-801	466	-463	297	-312
9	-158.4	-25	-1285	-430	-840	503	-492	320	-331
10	-163.3	-5	-1352	-439	-876	537	-521	341	-347
11	-168.6	18	-1422	-449	-915	575	-552	365	-366
12	-173.7	43	-1498	-459	-954	617	-587	390	-385
13	-176.0	57	-1535	-465	-971	638	-605	406	-396
14	-181.2	86	-1613	-481	-1006	691	-647	439	-418
15	-185.3	114	-1659	-493	-1036	735	-681	466	-437
16	-188.9	144	-1618	-508	-1042	786	-706	486	-449
17	-188.3	196	-1654	-529	-1044	809	-739	508	-465
18	-189.7	223	-1681	-545	-1048	837	-761	525	-476
19	-191.2	300	-1713	-580	-1045	893	-800	559	-497
20	-192.4	332	-1742	-596	-1046	917	-818	575	-507
21	-192.4	576	-2331	-719	-964	1014	-893	642	-554
22	-192.2	668	-2490	-763	-928	1043	-916	661	-570
23	-122.2	1009	-2301	-1132	-14	1222	-1235	642	-709
24	-121.3	1045	-2338	-1167	21	1261	-1275	665	-736
25	-113.2	1034	-2256	-1218	141	1310	-1343	701	-794
26	-110.6	1041	-2248	-1276	214	1365	-1405	733	-835
AXIAL FORCE (kN)		-57.1		-60.2		2.3		1.4	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P8-A

TEST PANEL D (PANEL D&E TOP LEDS NOT BUCKLED)

Test Serial No. 33

No.	Load (kN)	Strain 17	Strain 18	Strain 19	Strain 20
1	-33.6	-203	-183	-265	-131
2	-51.5	-329	-274	-403	-209
3	-70.3	-445	-366	-546	-281
4	-89.9	-575	-456	-695	-364
5	-112.0	-729	-561	-873	-436
6	-124.9	-819	-618	-976	-484
7	-140.6	-939	-688	-1107	-537
8	-152.9	-1026	-740	-1210	-579
9	-158.4	-1067	-763	-1256	-601
10	-163.3	-1105	-783	-1301	-606
11	-166.6	-1140	-806	-1346	-616
12	-173.7	-1183	-829	-1393	-626
13	-176.6	-1201	-838	-1414	-634
14	-181.2	-1242	-863	-1466	-645
15	-186.3	-1272	-883	-1495	-655
16	-186.9	-1279	-887	-1507	-658
17	-188.3	-1284	-916	-1521	-662
18	-189.7	-1294	-926	-1537	-649
19	-191.2	-1300	-952	-1556	-636
20	-192.4	-1308	-953	-1569	-639
21	-192.4	-1299	-1007	-1564	-669
22	-192.2	-1287	-1013	-1565	-676
23	-122.2	-791	-675	-1082	-362
24	-121.3	-741	-690	-1075	-356
25	-113.2	-631	-669	-950	-363
26	-119.6	-598	-662	-912	-394
AXIAL FORCE (kN)		-248.1		-248.6	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P8-B

TEST PANEL D (FRONT DIAGONAL TOP HALF BUCKLED INSIDE)

Test Serial No. 19

No.	Load (kN)	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8
1	-34.8	-269	-58	-273	-61	-49	151	-53	145
2	-54.0	-447	-78	-426	-86	-80	233	-90	226
3	-74.1	-617	-94	-587	-103	-120	318	-132	308
4	-94.6	-798	-100	-757	-113	-164	409	-181	398
5	-115.3	-988	-92	-937	-112	-218	508	-236	491
6	-136.1	-1199	-67	-1127	-99	-277	613	-300	595
7	-156.6	-1514	-17	-1323	-76	-347	732	-367	710
8	-169.6	-1925	46	-1409	-94	-410	835	-426	808
9	-175.4	-2084	80	-1423	-122	-451	898	-465	867
10	-181.2	-2189	127	-1434	-151	-492	966	-506	935
11	-183.4	-2292	159	-1417	-182	-518	1003	-532	973
12	-186.1	-2374	211	-1407	-208	-543	1045	-556	1017
13	-188.2	-2506	261	-1368	-254	-571	1088	-587	1064
14	-189.3	-2666	384	-1273	-348	-607	1147	-636	1131
15	-192.0	-2780	451	-1108	-504	-646	1211	-672	1210
16	-192.7	-2878	603	-776	-789	-690	1297	-733	1327
17	-191.9	-3281	932	-351	-1131	-696	1358	-771	1435
18	-191.6	-3474	1086	-209	-1242	-687	1368	-771	1462
19	-192.0	-3662	1349	43	-1444	-661	1383	-759	1503
20	-192.3	-4483	1702	277	-1630	-626	1391	-737	1534
21	-193.0	-5253	2201	431	-1756	-605	1402	-720	1556
22	-192.9	-7414	3305	612	-1902	-585	1415	-700	1577
23	-192.3	-9757	4564	726	-1987	-567	1419	-683	1586
24	-192.8	-12089	5954	826	-2076	-560	1434	-673	1603
25	-191.9	-15691	8411	970	-2193	-543	1440	-654	1615
26	-191.5	-18254	9911	1066	-2290	-534	1448	-643	1626
27	-190.1	-20249	11294	1165	-2461	-528	1457	-637	1639
28	-186.0	-21199	11946	1220	-2510	-520	1455	-632	1641
29	-188.1	-22089	12558	1279	-2565	-521	1457	-630	1644
30	-115.0	-20980	11926	1536	-2229	-775	1387	-715	1411
31	-113.8	-20956	11904	1517	-2205	-775	1376	-715	1403
AXIAL FORCE (kN)		**-82.0**		**-62.9**		**21.0**		**19.6**	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P8-B

TEST PANEL D (REAR DIAGONAL NOT BUCKLED)

Test Serial No. 19

No.	Load (kN)	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16
1	-34.6	-186	-67	-207	-47	10	-45	-36	-1
2	-54.0	-304	-103	-342	-66	29	-77	-61	12
3	-74.1	-437	-137	-496	-77	59	-114	-92	35
4	-94.6	-585	-167	-677	-80	97	-159	-131	66
5	-115.3	-749	-188	-877	-65	151	-214	-179	116
6	-136.1	-926	-196	-1103	-30	218	-281	-240	175
7	-156.6	-1122	-188	-1352	29	300	-363	-314	252
8	-169.6	-1233	-193	-1491	53	388	-450	-394	335
9	-175.4	-1285	-190	-1556	63	444	-504	-442	387
10	-181.2	-1344	-182	-1687	82	507	-564	-499	447
11	-183.4	-1367	-180	-1745	84	543	-600	-532	482
12	-186.1	-1392	-175	-1799	89	587	-641	-570	524
13	-188.2	-1415	-169	-1831	95	629	-681	-606	564
14	-189.2	-1442	-166	-1859	99	666	-733	-656	618
15	-192.0	-1465	-146	-1888	97	737	-779	-668	668
16	-192.7	-1486	-133	-1912	103	785	-822	-736	712
17	-191.9	-1489	-129	-1921	108	816	-847	-763	746
18	-191.6	-1492	-125	-1918	108	826	-853	-771	756
19	-192.0	-1513	-109	-1925	104	856	-878	-800	795
20	-192.3	-1544	-82	-1903	82	896	-909	-834	841
21	-193.0	-1567	-47	-1850	37	949	-955	-877	901
22	-192.9	-1605	10	-1750	-45	1023	-1016	-930	979
23	-192.3	-1610	46	-1646	-124	1076	-1060	-985	1032
24	-192.8	-1642	104	-1544	-205	1143	-1113	-1009	1100
25	-191.9	-1815	225	-1374	-327	1222	-1168	-1051	1180
26	-191.5	-1866	318	-1211	-445	1281	-1203	-1070	1237
27	-190.1	-1979	487	-962	-614	1322	-1205	-1086	1292
28	-189.0	-2061	597	-842	-692	1335	-1194	-1059	1319
29	-188.1	-2130	683	-712	-780	1332	-1172	-1045	1329
30	-115.0	-2987	1524	3	-1037	1283	-1237	-1048	1328
31	-113.8	-2934	1497	-5	-1005	1277	-1223	-1036	1309
AXIAL FORCE (kN)		-62		-68.5		-1.9		-1.5	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN P8-B

TEST PANEL D (PANEL D&E TOP LEDS NOT BUCKLED)

Test Serial No. 19

No.	Load (kN)	Strain 1	Strain 2	Strain 3	Strain 4
1	-34.9	-252	-182	-239	-178
2	-54.9	-395	-247	-367	-288
3	-74.1	-546	-336	-500	-384
4	-94.8	-700	-423	-667	-487
5	-119.3	-883	-509	-808	-549
6	-139.1	-1034	-589	-952	-636
7	-159.9	-1200	-669	-1118	-724
8	-169.8	-1329	-702	-1218	-773
9	-179.4	-1381	-722	-1283	-791
10	-181.2	-1438	-741	-1368	-819
11	-183.4	-1481	-752	-1327	-818
12	-186.1	-1485	-763	-1348	-825
13	-186.2	-1503	-779	-1369	-838
14	-186.3	-1521	-793	-1377	-837
15	-182.0	-1539	-806	-1390	-846
16	-182.7	-1547	-824	-1394	-834
17	-181.9	-1544	-836	-1391	-811
18	-181.6	-1543	-842	-1391	-802
19	-182.0	-1550	-853	-1400	-784
20	-182.3	-1551	-871	-1404	-771
21	-183.0	-1562	-886	-1411	-764
22	-182.0	-1542	-911	-1411	-748
23	-182.3	-1529	-925	-1404	-737
24	-182.8	-1530	-940	-1410	-731
25	-181.9	-1515	-950	-1403	-712
26	-181.9	-1511	-973	-1403	-695
27	-180.1	-1486	-983	-1395	-673
28	-180.0	-1475	-983	-1372	-661
29	-180.1	-1482	-999	-1378	-661
30	-115.0	-1043	-456	-824	-437
31	-113.8	-1019	-466	-795	-457
AXIAL FORCE (kN)		-263.8		-252.4	

AXIAL FORCES AND BENDING MOMENTS IN MEMBERS FOR SPECIMEN S1-A

PANEL C (FRONT DIAGONAL) — **Test Serial No. 6**

No.	Load kN	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8	Strain 9	Strain 10	Strain 11	Strain 12
1	0	0	0	0	0	0	0	0	0	0	0	0	0
2	10	-30	-230	-152	-130	-216	-48	-208	-44	70	-318	-68	-144
3	20	52	-552	-322	-262	-492	-10	-466	-28	224	-708	-104	-286
4	25	132	-730	-400	-326	-648	64	-600	24	330	-912	-104	-348
5	30	230	-924	-470	-382	-826	144	-738	64	454	-1134	-100	-410
6	35	364	-1142	-548	-440	-1028	256	-884	124	594	-1362	-84	-470
7	37.5	434	-1242	-578	-468	-1132	320	-936	148	664	-1464	-78	-498
8	40	532	-1394	-624	-504	-1268	420	-1012	182	748	-1596	-68	-528
9	42.5	604	-1500	-656	-530	-1376	492	-1070	200	800	-1686	-58	-556
10	45	702	-1640	-698	-560	-1520	594	-1130	222	864	-1790	-48	-580
11	47.5	812	-1788	-736	-590	-1684	724	-1176	230	928	-1890	-36	-614
12	50	1030	-2162	-830	-668	-1920	926	-1210					
13	33.3	2926	-4874	-1540	-1244	-2036	1278	-1762	964	2380	-3758	100	-700
AXIAL FORCE (kN)		-14.1		-19		-12.6							
MOMENT(N.m)		62.7		-3.3		57.1							

AXIAL FORCES AND BENDING MOMENTS IN MEMBERS FOR SPECIMEN S1-A

PANEL C (REAR DIAGONAL NOT BUCKLED) — Test Serial No. 6

No.	Load kN	Strain 17	Strain 18	Strain 19	Strain 20	Strain 21	Strain 22	Strain 23	Strain 24	Strain 25	Strain 26	Strain 27	Strain 28
1	0	-8	-30	-18	-9	-9	-61	0	8	22	0	0	-13
2	10	-78	-184	-152	-97	-189	-130	-158	-66	-47	-176	-130	-114
3	20	-70	-467	-326	-182	-436	-161	-394	-99	-43	-469	-302	-216
4	25	-12	-651	-412	-207	-581	-138	-536	-76	21	-652	-388	-243
5	30	103	-881	-493	-211	-757	-73	-702	-8	137	-879	-480	-250
6	35	256	-1152	-570	-200	-960	36	-901	96	302	-1158	-584	-240
7	37.5	340	-1279	-600	-187	-1057	94	-1000	164	386	-1282	-630	-226
8	40	447	-1453	-644	-172	-1190	172	-1129	253	513	-1459	-685	-213
9	42.5	528	-1564	-672	-157	-1281	230	-1219	324	593	-1570	-721	-199
10	45	618	-1703	-710	-140	-1390	305	-1334	404	695	-1708	-768	-184
11	47.5	707	-1839	-743	-118	-1495	378	-1432	490	802	-1859	-813	-167
12	50	803	-1976	-773	-96								
13	33.3	536	-1436	-578	-110	-990	-108	-1138	393	550	-1363	-637	-140
AXIAL FORCE (kN)		-14.8		-11									
MOMENT(N.m)		55.5		13.6									

AXIAL FORCES AND BENDING MOMENTS IN MEMBERS FOR SPECIMEN S1-A

PANEL C (FRONT AND REAR TENSION DIAGONAL)

Test Serial No. 6

No.	Load kN	Strain 13	Strain 14	Strain 15	Strain 16	Strain 29	Strain 30	Strain 31	Strain 32
1	0	0	0	0	0	0	0	0	0
2	10	-70	98	34	94	-34	48	-30	48
3	20	-175	234	-60	234	-104	140	-102	143
4	25	-234	312	-118	316	-156	206	-156	211
5	30	-293	400	-174	408	-224	296	-230	305
6	35	-352	502	-236	518	-300	412	-310	426
7	37.5	-376	548	-264	565	-330	468	-343	483
8	40	-408	608	-296	630	-372	544	-390	564
9	42.5	-430	650	-320	674	-398	594	-416	616
10	45	-455	700	-346	734	-428	660	-450	682
11	47.5	-478	754	-370	790	-452	714	-478	742
12	50	-879	934	-844	1048				
13	33.3								
AXIAL FORCE (kN)		0.8		2.6					
MOMENT(N.m)		-36.3		-38					

AXIAL FORCES AND BENDING MOMENTS IN MEMBERS FOR SPECIMEN S2-A

PANEL A (FRONT DIAGONAL BUCKLED WITH BOTTOM HALF OUTSIDE AND TOP INSIDE) Test Serial No. 4

No.	Load kN	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8	Strain 9	Strain 10	Strain 11	Strain 12
1	10	-138	20	-94	-54	-37	-102	140	-130	-124	-58	-30	-127
2	20	-281	16	-187	-114	-62	-206	-12	-265	-251	-78	-44	-254
3	30	-418	22	-276	-176	-90	-322	-18	-392	-388	-84	-60	-366
4	40	-582	35	-386	-237	-112	-458	36	-565	-565	-58	-110	-467
5	50	-754	55	-496	-300	-130	-584	92	-765	-770	8	-142	-571
6	60	-890	68	-574	-352	-148	-688	190	-986	-992	91	-174	-654
7	70	-1040	71	-670	-406	-190	-790	432	-1284	-1280	242	-210	-730
8	75	-1076	57	-696	-421	-222	-814	466	-1438	-1417	328	-232	-752
9	77.5	-1090	46	-710	-431	-240	-814	502	-1486	-1480	366	-242	-758
10	80	-1107	22	-734	-450	-262	-814	588	-1614	-1506	442	-258	-770
11	82.5	-1110	10	-740	-458	-306	-806	646	-1690	-1666	493	-274	-772
12	85	-1097	-42	-752	-476	-370	-782	776	-1846	-1814	602	-292	-777
13	87.5	-1088	-82	-756	-480	-430	-742	905	-1980	-1950	706	-310	-774
14	90	-1046	-148	-758	-492	-528	-680	1064	-2164	-2106	820	-326	-762
15	92.5	-930	-290	-726	-502	-762	-458	1490	-2798	-2552	1152	-358	-735
16	95	-512	-657	-506	-466	-1316	122	2250	-4324	-3360	1624	-432	-712
17	53.3	164	-640	-620	291	-3328	2250	3932	-5982	-4342	3120	-632	-220
AXIAL FORCE (kN)		-14.8		-12.3		-15.1		-17.7		-15.9		-14.5	
MOMENT(N.m)		2.9		0.8		28.9		93.8		86.9		5.6	

AXIAL FORCES AND BENDING MOMENTS IN MEMBERS FOR SPECIMEN S2-A

PANEL A (REAR DIAGONAL BUCKLED WITH TOP HALF OUTSIDE AND BOTTOM INSIDE,FIRST) Test Serial No. 4

No.	Load kN	Strain 17	Strain 18	Strain 19	Strain 20	Strain 21	Strain 22	Strain 23	Strain 24	Strain 25	Strain 26	Strain 27	Strain 28
1	10	-50	-22	-56	-77	-38	-82	-48	-90	-148	8	-54	-89
2	20	-88	-47	-140	-166	-63	-188	-96	-200	-340	16	-117	-202
3	30	-128	-67	-192	-242	-72	-297	-140	-300	-504	22	-175	-305
4	40	-170	-68	-271	-338	-62	-434	-184	-404	-676	38	-230	-400
5	50	-207	-36	-333	-436	-12	-588	-238	-496	-854	46	-292	-500
6	60	-254	28	-380	-538	94	-774	-310	-568	-1000	44	-350	-587
7	70	-324	206	-408	-676	308	-1054	-464	-556	-1106	-20	-400	-694
8	75	-354	336	-402	-738	470	-1207	-582	-486	-1102	-66	-414	-740
9	77.5	-356	394	-398	-770	554	-1280	-646	-444	-1088	-124	-410	-751
10	80	-378	538	-382	-828	726	-1428	-778	-340	-1036	-208	-408	-794
11	82.5	-386	638	-360	-860	854	-1528	-870	-259	-988	-274	-404	-810
12	85	-402	866	-328	-930	1174	-1756	-1062	-30	-864	-428	-380	-852
13	87.5	-458	1114	-298	-1008	1568	-2062	-1236	250	-690	-598	-337	-886
14	90	-497	1512	-264	-1122	2060	-2478	-1360	576	-472	-794	-265	-920
15	92.5	-527	2040	-314	-1316	2872	-3150	-1492	1000	-170	-1042	-150	-955
16	95	-644	2492	-336	-1456	3592	-3522	-1606	1385	80	-1210	-64	-972
17	53.3	-400	11916	-760	-2496	3850	-3202	-2326	3228	668	-1240	416	-844
AXIAL FORCE (kN)		23.8		-22.7		0.6		-2.8		-14.3		-13	
MOMENT(N.m)		-56.4		22.5		-111.6		60.2		25.9		18.5	

AXIAL FORCES AND BENDING MOMENTS IN MEMBERS FOR SPECIMEN S2-A

PANEL A (FRONT AND REAR TENSION DIAGONAL) — **Test Serial No. 4**

No.	Load kN	Strain 13	Strain 14	Strain 15	Strain 16	Strain 29	Strain 30	Strain 31	Strain 32
1	10	74	16	86	2	74	16	60	30
2	20	158	26	174	4	168	36	140	66
3	30	236	36	260	6	244	52	212	94
4	40	332	46	368	8	344	68	294	120
5	50	438	62	474	12	418	88	376	144
6	60	526	74	578	20	504	106	456	168
7	70	646	98	694	34	600	134	554	196
8	75	690	112	744	44	640	148	594	214
9	77.5	710	120	764	48	658	156	606	224
10	80	742	132	796	56	686	170	634	236
11	82.5	760	138	818	60	700	180	648	252
12	85	792	154	856	70	732	204	674	278
13	87.5	816	164	880	80	752	226	694	308
14	90	848	184	914	92	782	268	716	350
15	92.5	884	218	960	118	824	330	752	418
16	95	928	296	1010	178	866	396	792	488
17	53.3	780	208	932	10	716	116	610	184
AXIAL FORCE (kN)		15.4		15.0		16.0		16.2	
MOMENT(N.m)		-12.6		-16.7		-9.5		-6.1	

AXIAL FORCES AND BENDING MOMENTS IN MEMBERS FOR SPECIMEN S2-B

PANEL A (FRONT DIAGONAL) — **Test Serial No. 8**

No.	Load kN	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8	Strain 9	Strain 10	Strain 11	Strain 12
1	10	-202	60	-82	-60	10	-140	12	-147	-175	38	-40	-60
2	20	-410	128	-162	-126	10	-284	28	-304	-350	84	-83	-145
3	30	-616	190	-244	-188	25	-426	60	-470	-528	132	-123	-238
4	40	-800	254	-312	-254	35	-560	105	-644	-705	186	-162	-310
5	50	-990	316	-380	-326	54	-700	166	-838	-896	254	-205	-372
6	60	-1150	360	-420	-396	56	-820	252	-1040	-1086	330	-255	-432
7	70	-1293	388	-475	-474	44	-925	370	-1276	-1300	433	-300	-472
8	80	-1390	378	-494	-566	-18	-980	555	-1578	-1560	578	-360	-500
9	85	-1414	338	-498	-620	-82	-970	698	-1780	-1718	688	-400	-500
10	87.5	-1390	308	-498	-652	-144	-940	826	-1880	-1825	772	-420	-494
11	90	-1360	250	-490	-684	-244	-866	1038	-2075	-1960	885	-445	-488
12	91.25	-1258	154	-460	-700	-370	-745	1220	-2305	-2065	988	-462	-448
13	92.5	-1127	26	-434	-706	-580	-510	1600	-2745	-2203	1220	-480	-380
14	93.75	-810	-155	-348	-670	-854	-174	2030	-3180	-2368	1478	-505	-340
15	95	-450	-445	-268	-595	-1276	444	3080	-4190	-2880	2125	-475	-60
16	96.25	-157	-796	-297	-575	-1733	880	4025	-5236	-3290	2500	-520	-20
17	97.5												
18	54.54	640	-1166	-514	195	-5650	3660	6920	-7070	-4540	4350	-650	490
AXIAL FORCE (kN)		-13.6		-14.2		-13.3		-13.7		-13.0		-11.4	
MOMENT(N.m)		35.2		2.5		17.9		49.8		48.8		2	

AXIAL FORCES AND BENDING MOMENTS IN MEMBERS FOR SPECIMEN S2-B

PANEL A (REAR DIAGONAL)

Test Serial No. 10

No.	Load kN	Strain 17	Strain 18	Strain 19	Strain 20	Strain 21	Strain 22	Strain 23	Strain 24	Strain 25	Strain 26	Strain 27	Strain 28
1	10	-101	-35	-52	-82	-6	-94	-50	-74	-130	-8	-46	-110
2	20	-232	-60	-105	-180	-22	-206	-109	-165	-271	-17	-86	-226
3	30	-372	-72	-151	-281	28	-326	-170	-264	-410	-25	-130	-336
4	40	-516	-74	-189	-384	90	-455	-235	-353	-545	-38	-178	-436
5	50	-690	-58	-222	-501	34	-615	-314	-426	-674	-56	-234	-536
6	60	-883	-8	-236	-622	130	-804	-412	-466	-779	-90	-294	-620
7	70	-1138	102	-224	-767	230	-1068	-575	-428	-841	-172	-370	-686
8	80	-1517	334	-160	-949	507	-1496	-902	-218	-776	-376	-472	-716
9	85	-1791	543	-91	-1054	1002	-1990	-1204	40	-628	-578	-526	-702
10	87.5	-1989	718	-27	-1121	1317	-2377	-1445	271	-481	-744	-558	-682
11	90	-2184	903	45	-1181	1649	-2860	-1694	533	-292	-932	-582	-644
12	91.25	-2302	1029	4	-1216	1826	-3121	-1846	726	-150	-1067	-600	-612
13	92.5	-2410	1150	140	-1248	2055	-3323	-1968	923	-14	-1194	-616	-576
14	93.75	-2495	1233	187	-1269	2423	-3430	-2100	1088	100	-1295	-626	-550
15	95	-2662	1397	223	-1325	2696	-3609	-2349	1393	319	-1493	-648	-498
16	96.25	-2868	1570	252	-1377	2947	-3700	-2586	1665	525	-1652	-662	-444
17	97.5	-2986	1672	284	-1403	3197	-3849	-3073	1970	721	-1879	-686	-404
18	54.54	-2361	1593	-162	-456	4012	-4010	-3413	2676	2241	-3076	-994	156
AXIAL FORCE (kN)		-16.0		-14.4		-13.7		-14.7		-15.5		-15.5	
MOMENT(N.m)		60.9		24.7		81.4		44.8		12.9		1.2	

AXIAL FORCES AND BENDING MOMENTS IN MEMBERS FOR SPECIMEN S2-B

PANEL A (FRONT AND REAR TENSION DIAGONAL)

Test Serial No. 8

No.	Load kN	Strain 13	Strain 14	Strain 15	Strain 16	Strain 29	Strain 30	Strain 31	Strain 32
1	10	104	-8	106	-12	56	26	60	28
2	20	214	-6	222	-8	134	68	138	64
3	30	324	6	334	0	206	108	212	98
4	40	428	24	440	16	276	147	282	132
5	50	536	50	554	42	348	186	358	164
6	60	634	86	656	74	420	226	430	198
7	70	732	128	756	114	496	270	512	234
8	80	825	176	852	164	574	326	596	280
9	85	874	202	898	192	614	366	640	314
10	87.5	898	218	922	206	636	394	666	336
11	90	922	234	946	226	660	428	690	366
12	91.25	938	248	960	244	676	452	718	388
13	92.5	952	266	970	264	688	476	724	408
14	93.75	966	290	978	294	700	494	730	426
15	95	992	350	992	364	718	532	748	462
16	96.25	1006	416	1004	442	738	570	768	500
17	97.5								
18	54.54	850	45	746	150	366	622	462	500
AXIAL FORCE (kN)		13.6		13.8		13.8		13.4	
MOMENT(N.m)		-13.5		-14.2		-4.7		-6.5	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN S2-C

TEST PANEL A (FRONT DIAGONAL BUCKLED WITH BOTTOM HALF OUTSIDE AND TOP HALF INSIDE)

Test Serial No. 23

No.	Load (kN)	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8
1	-23.9	-6	-322	-61	-273		257	44	255
2	-30.6	5	-420	-69	-356		328	61	327
3	-37.3	21	-518	-73	-437		395	80	397
4	-43.9	42	-618	-74	-519		463	102	465
5	-54.2	84	-778	-69	-649		563	139	569
6	-60.8	119	-887	-62	-736		629	166	637
7	-67.4	159	-998	-53	-824		690	198	702
8	-70.9	180	-1054	-46	-869		722	215	736
9	-74.2	205	-1111	-39	-913		752	233	768
10	-77.6	231	-1170	-33	-957		783	250	799
11	-80.8	259	-1234	-26	-999		812	269	831
12	-80.7	260	-1233	-26	-998		811	269	830
13	-84.2	290	-1297	-22	-1041		842	286	863
14	-87.2	328	-1371	-18	-1076		870	308	892
15	-90.4	377	-1453	-20	-1108		901	330	924
16	-92.7	422	-1532	-22	-1123		926	389	951
17	-92.4	406	-1499	-18	-1116		924	362	948
18	-93.6	342	-1410	14	-1113		939	409	962
19	-53.2	729	-1766	1085	-1925		754	-358	873
20	-53.8	757	-1822	1222	-2088		790	-369	920
21	-53.6	789	-1870	1373	-2251		824	-395	967
22	-53.5	758	-1850	1608	-2444		857	-426	1010
23	-48.7	-2089	1203	16477	-20270		701	-155	907
24	-47.1	-2169	1305	16247	-22627		693	-148	903
AXIAL FORCE (kN)		-13.9		-14.5				16.6	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN S2-C

TEST PANEL A (REAR DIAGONALFIRST BUCKLED WITH BOTTOM HALF OUTSIDE AND TOP HALF INSIDE)

Test Serial No. 23

No.	Load (kN)	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16
1	-23.9	-25	-304	-77	-249	234	48	205	70
2	-30.6	-18	-398	-99	-319	297	64	263	89
3	-37.3	-4	-506	-119	-390	361	81	322	108
4	-43.9	22	-622	-141	-457	424	99	382	127
5	-54.2	86	-822	-186	-550	519	131	473	158
6	-60.8	151	-977	-227	-597	583	155	532	181
7	-67.4	245	-1157	-268	-622	646	179	590	206
8	-70.9	309	-1265	-332	-622	679	194	621	219
9	-74.2	386	-1385	-387	-609	712	210	649	234
10	-77.6	482	-1522	-456	-578	743	226	676	249
11	-80.8	603	-1683	-555	-520	775	242	703	266
12	-80.7	599	-1679	-551	-522	774	241	702	265
13	-84.2	760	-1878	-685	-427	808	261	728	284
14	-87.2	1022	-2191	-881	-257	842	282	747	308
15	-89.4	1489	-2768	-1178	27	877	312	783	343
16	-92.7	2353	-4057	-1838	536	916	358	767	397
17	-92.4	2437	-4187	-1647	566	916	359	765	399
18	-93.6	3334	-5565	-1891	846	942	394	772	437
19	-53.2	31309	-40347	-3890	3184	833	43	525	115
20	-53.8	31568	-40526	-3580	3113	822	65	513	139
21	-53.6	31844	-40647	-3496	3058	814	84	508	162
22	-53.5	32061	-40743	-3423	3008	808	100	500	180
23	-48.7	32252	-40813	-3361	2974	795	129	489	214
24	-47.1	32240	-40755	-3216	2852	776	131	477	217
AXIAL FORCE (kN)		-14.8		14.5		15.1		14.0	

AXIAL FORCES AND BENDING MOMENTS IN MEMBERS FOR SPECIMEN S3-A

PANEL C (FRONT DIAGONAL)

Test Serial No. 7

No.	Load kN	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8	Strain 9	Strain 10	Strain 11	Strain 12
1	10	-172	-28	-123	-92	-108	-77	-64	-138	-130	-74	-114	-88
2	20	-365	-40	-248	-186	-246	-145	-110	-298	-286	-126	-230	-180
3	30	-604	-25	-387	-290	-416	-194	-122	-504	-506	-130	-355	-270
4	40	-872	30	-513	-384	-613	-200	-75	-746	-774	-58	-470	-345
5	50	-1207	156	-634	-480	-848	-142	64	-1067	-1142	126	-574	-404
6	55	-1420	258	-696	-530	-968	-76	190	-1276	-1386	286	-626	-430
7	57.5	-1526	315	-724	-550	-1060	-36	264	-1388	-1515	378	-650	-440
8	60	-1643	372	-754	-570	-1126	5	336	-1492	-1536	467	-668	-447
9	62.5	-1770	435	-784	-590	-1200	56	420	-1608	-1770	570	-690	-452
10	65	-1877	496	-814	-606	-1272	110	500	-1718	-1895	668	-706	-460
11	67.5	-2025	580	-854	-630	-1326	180	594	-1843	-2040	784	-728	-470
12	70	-2144	632	-900	-664	-1116	230	644	-1936	-2127	852	-750	-484
13	72.5	-2460	766	-983	-718	-1643	350	745	-2078	-2250	1004	-795	-513
	63.1												
	45.6												
		72.5kN Front Diagonal Failure											
AXIAL FORCE (kN)		-26.4		-27.3		-11.1		-21.3		-19.8		-21.0	
MOMENT(N.m)		87.7		7.6		39.9		80.6		91.8		8.1	

AXIAL FORCES AND BENDING MOMENTS IN MEMBERS FOR SPECIMEN S3-A

PANEL C (REAR DIAGONAL) — **Test Serial No. 7**

No.	Load kN	Strain 17	Strain 18	Strain 19	Strain 20	Strain 21	Strain 22	Strain 23	Strain 24	Strain 25	Strain 26	Strain 27	Strain 28
1	10	-62	-122	-80	-96	-78	-96	-88	-94	-112	-60	-108	-70
2	20	-124	-262	-164	-212	-166	-212	-174	-194	-244	-120	-240	-138
3	30	-180	-412	-250	-336	-250	-344	-276	-294	-376	-184	-382	-210
4	40	-222	-552	-314	-464	-306	-478	-368	-388	-508	-234	-516	-270
5	50	-272	-712	-348	-626	-332	-658	-458	-484	-656	-270	-660	-320
6	55	-300	-800	-334	-748	-310	-794	-510	-536	-754	-276	-748	-354
7	57.5	-312	-838	-308	-824	-282	-878	-534	-560	-808	-272	-790	-366
8	60	-328	-872	-272	-912	-244	-970	-556	-586	-864	-264	-834	-378
9	62.5	-346	-912	-212	-1026	-176	-1090	-584	-610	-926	-246	-876	-390
10	65	-364	-942	-124	-1160	-88	-1230	-612	-632	-994	-218	-920	-402
11	67.5	-386	-968	20	-1354	66	-1430	-640	-650	-1090	-176	-970	-416
12	70	-424	-1000	160	-1530	202	-1616	-670	-660	-1168	-144	-1004	-434
13	72.5	-472	-1032	410	-1776	466	-1932	-756	-624	-1246	-110	-1034	-450
14	63.1	-540	-1048	1134	-2350	2314	-4016	-2592	1236	-144	-1088	-832	-360
15	45.6	-520	-756	2190	-2824	3064	-4376	-2620	1694	-536	-212	-346	-402
		63.1kN Rear Diagonal Failure											
AXIAL FORCE (kN)		-25.5		-19.1		-19.4		-20.7		-19.8		-19.1	
MOMENT(N.m)		14.6		97.3		139		103.4		27.0		13.5	

AXIAL FORCES AND BENDING MOMENTS IN MEMBERS FOR SPECIMEN S3-A

PANEL C (FRONT AND REAR TENSION DIAGONAL)

Test Serial No. 7

No.	Load kN	Strain 13	Strain 14	Strain 15	Strain 16	Strain 29	Strain 30	Strain 31	Strain 32
1	10	-22	46	36	0	28	10	62	6
2	20	-54	104	76	-14	60	10	86	4
3	30	-110	184	140	-50	76	0	104	-10
4	40	-188	268	220	-110	110	-10	132	-26
5	50	-294	448	350	-202	150	-30	176	-50
6	55	-370	554	446	-266	182	-46	214	-82
7	57.5	-410	612	500	-292	202	-60	240	-100
8	60	-440	672	550	-324	222	-70	262	-122
9	62.5	-482	730	606	-362	250	-92	310	-152
10	65	-520	780	658	-384	282	-112	348	-190
11	67.5	-562	864	720	-422	330	-152	410	-238
12	70	-600	910	758	-450	368	-194	458	-286
13	72.6	-652	972	810	-624	412	-244	538	-370
	63.1								
	45.6	-1282	1184	1120	-1062	618	-658	1070	-1058
AXIAL FORCE (kN)		5.1		4.6					
MOMENT(N.m)		-46.5		63.5					

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN S3-B

TEST PANEL A (FRONT DIAGONAL BUCKLED TOP HALF OUTSIDE AND BOTTOM INSIDE)

Test Serial No. 25

No.	Load (kN)	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8
1	-24.6	32	-520	4	-500	233	-117	285	-157
2	-33.8	103	-747	66	-721	351	-176	422	-230
3	-43.1	208	-995	161	-983	482	-239	575	-308
4	-52.2	342	-1255	284	-1218	620	-297	732	-383
5	-58.0	445	-1434	376	-1387	710	-331	834	-424
6	-63.4	575	-1630	480	-1540	795	-359	932	-463
7	-66.1	672	-1671	497	-1608	838	-373	981	-479
8	-68.0	773	-1995	511	-1644	870	-383	1014	-492
9	-69.3	887	-2178	482	-1641	893	-388	1039	-500
10	-69.1	989	-2260	456	-1599	893	-388	1038	-500
11	-70.6	1117	-2435	434	-1595	920	-394	1066	-509
12	-71.9	1254	-2603	410	-1567	946	-401	1094	-516
13	-67.3	12851	-20826	-1371	555	908	-273	955	-362
14	-67.2	19809	-25698	-1574	801	905	-238	953	-334
15	-67.4	20181	-26512	-1663	914	912	-219	959	-318
AXIAL FORCE (kN)		-20.4		-18.4		8.1		8.6	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN S3-B

TEST PANEL A (REAR DIAGONAL BUCKLED TOP HALF INSIDE AND BOTTOM HALF OUTSIDE)

Test Serial No. 25

No.	Load (kN)	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16
1	-24.6	-45	-414	-208	-261	130	-74	113	-57
2	-33.8	-2	-642	-282	-376	202	-128	179	-101
3	-43.1	113	-937	-341	-500	303	-201	261	-164
4	-52.2	329	-1316	-386	-621	435	-293	419	-246
5	-58.0	533	-1615	-417	-684	535	-359	535	-308
6	-63.4	800	-1990	-472	-709	639	-422	640	-366
7	-66.1	972	-2186	-522	-695	694	-451	697	-393
8	-68.0	1126	-2327	-563	-656	735	-471	740	-411
9	-68.3	1366	-2717	-669	-669	787	-483	778	-422
10	-69.1	1466	-2878	-720	-520	788	-483	777	-421
11	-70.6	1808	-3282	-864	-360	801	-491	820	-426
12	-71.9	2273	-3933	-1097	-136	831	-492	859	-425
13	-67.3	4238	-7200	-1681	618	831	-404	940	-335
14	-67.2	4663	-7744	-1858	971	824	-344	957	-281
15	-67.4	4616	-7814	-1983	1189	826	-297	977	-238
AXIAL FORCE (kN)		-20.1		-20.0		4.6		5.7	

AXIAL FORCES AND BENGING MOMENTS IN MEMBERS FOR SPECIMEN S4-A

PANEL A(FRONT DIAGONAL TOP HALF BUCKLED INSIDE AND BOTTOM OUTSIDE) **TEST SERIAL NO. 1**

No.	Load(KN)	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16	Strain 17	Strain 18
1	10	-11	0	-20	-81	56	6	32	-28	-2	26	-17	-424	178	-66	122	104	132	50
2	20	-24	5	-39	-174	124	12	72	-56	-6	53	100	-166	132	-102	90	224	-204	-42
3	30	-36	10	-50	-270	186	18	108	-92	-10	80	-40	-278	180	-110	114	266	-262	-48
4	40	-48	16	-58	-362	250	22	144	-122	-12	112	-22	-256	226	-178	136	328	-432	-40
5	50	-60	22	-60	-456	314	30	178	-234	-10	142	62	-366	266	-166	156	390	-630	-12
6	60	-76	28	-58	-578	394	40	222	-194	-20	158	66	-320	574	-244	164	448	-808	84
7	70	-90	34	-56	-686	468	50	264	-234	-24	182	14	-114	780	-290	194	530	-1024	150
8	80	-104	40	-50	-796	544	62	310	-276	-32	206	56	-314	386	-332	200	564	-1146	242
9	90	-120	46	-40	-916	622	76	358	-318	-36	230	46	-290	434	-334	228	624	-1414	388
10	100	-136	54	-32	-1034	702	94	402	-364	-44	256	32	-286	506	-368	268	698	-1830	610
11	110	-160	62	-22	-1144	776	116	450	-466	-60	284	20	-120	466	-438	296	756	-2644	1368
12	87	-194	116	-140	-1090	830	94	484	-432	-204	22	506	-236	508	-260	234	618		4908
13	81.25	-324	230	-2505	1684	892	-40	652	-602	-288	112	-210	206	778	-514	368	688		5034
14	63.6	-128	58	-2292	1534	796	-134	584	-534	-214	110	-160	-122	568	-532	296	604		5044
FORCE kN				-18.7		14.2										16.9		-20.1	
MOMENT (N.m)				32.2		-19.1										-13.2		105.4	

AXIAL FORCES AND BENGING MOMENTS IN MEMBERS FOR SPECIMEN S4-A

PANEL B(FRONT DIAGONAL BOTTOM HALF BUCKLED OUTSIDE AND TOP INSIDE) **TEST SERIAL NO. 1**

No	Load kn	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16	Strain 17	Strain 18
1	10	6	8	-8	14	14	64	6	28	12	22	8	12	22	26	140	36	-20	
2	20	-28	-34	-162	-16	70	172	0	48	18	30	18	9	6	42	212	76	-46	
3	30	-26	-56	-245	-32	114	246	0	66	34	40	12	20	6	60	316	106	-82	
4	40	-52	-76	-328	-32	158	324	-8	82	39	48	8	26	6	78	400	148	-110	
5	50	-64	-96	-410	-50	194	398	0	100	50	54	2	18	-8	98	492	190	-146	
6	60	-74	-110	-510	-60	242	484	-12	120	60	40	34	22	-8	110	570	226	-190	
7	70	-90	-126	-614	-70	286	570	-10	134	70	38	34	28	0	126	654	274	-230	
8	80	-100	-146	-724	-84	330	648	-16	150	68	30	56	24	4	146	726	304	-286	
9	90	-116	-156	-838	-98	382	736	-16	172	102	20	67	26	10	156	794	334	-374	
10	100	-134	-176	-944	-124	422	816	-16	188	110	2	78	28	8	166	870	374	-510	
11	110	-130	-190	-1026	-170	464	906	-16	200	126	-12	100	26	10	180	946	396	-766	
12	87	-164	-88	516	264	438	930	-32	188	124	-320	652	66	42	114	858	92	-1960	
13	81.25	-314	80	2120	-3084	222	914	-8	142	152	-100	382	48	30	116	964	62	-2962	
14	63.6	-340	150	1998	-2838	68	772	214	-86	140	-168	344	-20	196	-80	864	-56	-2762	
FORCE kN				-19.2		22										21.6			
MOMENT (N.m)				24.5		-12.7										-15.7			

AXIAL FORCES AND BENGING MOMENTS IN MEMBERS FOR SPECIMEN S4-A

PANEL C(FRONT DIAGONAL TOP HALF BUCKLED INSIDE AND REAR DIAGONAL TOP HALF BUCKLED OUTSIDE)

SERIAL NO. 1

No.	load	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	STRAIN 16	Strain 17	Strain 18
1	10	-42	-32	-64	-48	120	32	12	30	18	-16	-6	-16	22		10	8	-78	-36
2	20	-96	-58	-130	-292	266	62	28	66	30	-36	-20	-52	44		86	292	-392	-72
3	30	-70	-90	-198	-452	400	90	44	108	58	-52	-32	-86	54		136	442	-628	-104
4	40	-208	-120	-244	-602	526	114	62	152	90	-70	-38	-116	64		190	598	-852	-94
5	50	-236	-154	-284	-762	668	148	82	194	112	-80	-48	-50	74		252	762	-1090	-108
6	60	-296	-184	-300	-980	842	188	80	218	106	-96	-50	-144	82		304	890	-1344	-72
7	70	-240	-212	-320	-1170	1000	218	100	262	120	-120	-48	-160	88		366	1036	-1588	-32
8	80	-410	-240	-318	-1384	1170	260	108	294	130	-140	-54	-176	104		434	1174	-1840	46
9	90	-412	-272	-306	-1626	1340	302	120	340	148	-162	-46	-190	154		506	1314	-2126	126
10	100	-491	-302	-270	-1882	1510	344	120	384	164	-200	-46	-212	118		568	1460	-2458	246
11	110	-564	-324	-218	-2136	1686	390	132	426	198	-196	-36	-242	164		674	1584	-2822	440
12	97	-324	-286	-842	-1692	1766	516	84	330	146	-166	164	270	-86		10	738	-1842	-216
13	81.25	-294	-254	366	-3218	1582	-594	-284	706	238	40	146	136	-182		8	1014	-3124	704
14	63.6	-57	-6			1410	-370	-554	930	220	110	14	154	-376		-170	756		
FORCE kN				-37.5		33.3										36.4		-35.3	
MOMENT (N.m)				53.4		-37.1										26.4		77.7	

AXIAL FORCES AND BENGING MOMENTS IN MEMBERS FOR SPECIMEN S4-A

PANEL D(NOT BUCKLED) **TEST SERIAL NO. 1**

No	load kn	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16	Strain 17	Strain 18
1	10	-90	-120	-35	-70	-30	-62	-70	-80	9	44	100	200	136	-650	-1035	-400	-120	-368
2	20	-48	-38	194	-39	-22	-200	-42	28	55	43	660	320	340	65	-100	-10	800	450
3	30	-80	-20	320	55	30	-242	107	108	58	38	680	312	340	91	-223	-83	837	560
4	40	-148	-33	425	54	-6	-411	79	83	44	33	634	280	368	112	-222	-109	840	673
5	50	-146	-54	512	74	15	-516	130	115	72	21	667	295	412	138	-335	-160	870	770
6	60	-196	-56	560	61	25	-640	107	126	88	12	696	321	396	151	-371	-222	815	826
7	70	-152	-11	747	161	103	-713	176	228	115	66	516	312	436	189	-475	-214	935	1011
8	80	-269	-97	751	116	61	-905	128	174	103	-23	-469	-465	-224	-346	-1300	-912	-65	30
9	90	-250	-29	910	207	159	-941	194	255	145	29	-189	-688	-490	-574	-1395	-599	457	670
10	100	-275	-28	1032	233	178	-1092	233	299	148	12	-282	-422	-356	-487	-1353	-728	440	750
11	118	-382	-99	1163	247	199	-1294	236	318	161	-49	299	-306	-354	256	-1369	-928	932	1245
12	87	-246	187	677	137	237	-726	232	309	173	-193	-688	-540	-120	68	-700	-600	819	1297
13	81.25	-219	308	812	171	200	-793	210	252	170	-48	-1000	-500	260	13	-743	-1415	199	-322
14	63.6	-44	630	711	197	180	-400	47	440	161	41	-900	-1080	-600	-413	-180	-148	-621	1083
FORCE kN																			
MOMENT (N.m)																			

AXIAL FORCES AND BENGING MOMENTS IN MEMBERS FOR SPECIMEN S4-A

PANEL E(NOT BUCKLED) **TEST SERIAL NO. 1**

No	load kn	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16	Strain 17	Strain 18
1	10	-4	-17	48	97	-95	0	8	23	3	-13	3	20	20	43	9	-70	143	39
2	20	-18	-36	90	193	-202	-8	-1	41	0	8	-9	24	24	60	13	-163	241	60
3	30	-29	-56	137	284	-318	-14	0	59	-5	25	-20	27	23	70	17	-270	335	82
4	40	-44	-78	182	375	-440	-17	3	75	-6	44	-37	20	21	71	13	-375	409	98
5	50	-52	-97	231	467	-572	-18	2	90	-8	65	-51	26	28	98	35	-472	495	129
6	60	-66	-122	286	531	-687	-19	2	102	-22	69	-50	29	26	109	50	-630	592	160
7	70	-78	-136	309	612	-817	-15	6	116	-41	84	-55	31	25	125	70	-762	677	190
8	80	-92	-158	348	684	-942	-9	6	130	-48	97	-67	35	29	120	112	-928	740	207
9	90	-107	-174	387	762	-1074	-7	10	141	-57	111	-69	41	28	147	176	-1111	839	240
10	100	-119	-197	431	847	-1203	-19	14	155	-65	129	-81	48	36	163	275	-1324	927	270
11	110	-133	-214	471	929	-1256	-83	19	179	-73	150	-98	55	36	162	413	-1580	980	286
12	87	-98	-177	286	595	-686	-92	18	122	-171	-71	107	120	0	129	397	-1610	1037	274
13	81.25	-93	-156	320	643	-874	-53		118	-92	76	-18	84	24	131	268	-1239	818	210
14	63.6	-88	-120	307	523	-649	-47		59	-102	45	-40	55	50	66	136	-877	660	190
FORCE kN																			
MOMENT (N.m)																			

AXIAL FORCES AND BENGING MOMENTS IN MEMBERS FOR SPECIMEN S4-A

PANEL F(NOT BUCKLED)

TEST SERIAL NO. 1

No	Load kn	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16	Strain 17	Strain 18
1	10	0	0	42	0	0	0	14	0	0	38	0	16	24	-96	-156	-14	-78	98
2	20	-38	-12	94	-10	-22	-118	46	-52	0	65	0	35	58	-110	-266	-146	-82	176
3	30	-48	0	150	20	-16	-204	74	-78	0	86	10	46	84	-131	-367	-177	-88	263
4	40	-56	0	217	50	-9	-302	104	-102	0	103	8	54	104	-142	-448	-200	-90	344
5	50	-72	-2	288	84	14	-405	137	-132	6	127	7	63	125	-157	-540	-224	-90	426
6	60	-83	0	344	106	40	-489	170	-155	0	142	2	96	155	-162	-652	-246	-80	537
7	70	-94	0	400	143	82	-586	198	-187	-14	161	2	113	177	-202	-750	-270	-77	630
8	80	-105	0	462	170	135	-682	222	-205	-18	178	4	136	202	-222	-843	-295	-72	724
9	90	-122	0	525	212	196	-800	254	-236	-30	194	7	162	231	-244	-930	-326	-62	823
10	100	-134	0	588	258	297	-938	290	-262	-37	218	10	186	257	-265	-1004	-370	-52	925
11	110	-148	20	660	293	428	-1092	317	-290	-44	236	7	212	284	-287	-1038	-442	-39	1028
12	87	-126	0	366	167	130	-516	192	-170	-200	137	4	392	282	-308	-1034	-432	82	1013
13	81.25	-108	-5	456	180	144	-622	218	-195	-78	182	12	220	220	-244	-838	-352	-40	827
14	63.6	-97	0	360	60	90	-496	172	-155	-34	168	10	187	176	-209	-707	-296	-102	660
FORCE kN																			
MOMENT (N.m)																			

AXIAL FORCES AND BENDING MOMENTS IN MEMBERS FOR SPECIMEN S4-B

PANEL A (FRONT DIAGONAL BUCKLED WITH BOTTOM HALF OUTSIDE AND TOP INSIDE) Test Serial No. 3

No.	Load kN	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8	Strain 9	Strain 10	Strain 11	Strain 12
1	10	-99	-21	-70	-60	-58	-72	32	-160	-161	40	-94	-36
2	20	-190	-43	-136	-114	-110	-142	77	-322	-357	87	-186	-65
3	30	-272	-64	-197	-164	-164	-201	131	-486	-532	142	-277	-90
4	35	-313	-78	-228	-191	-194	-230	164	-579	-626	172	-322	-101
5	40	-350	-91	-260	-216	-224	-256	200	-668	-723	205	-371	-112
6	45	-383	-104	-286	-236	-254	-279	238	-756	-812	237	-417	-120
7	47.5	-402	-114	-303	-250	-272	-292	259	-807	-862	256	-440	-123
8	50	-416	-122	-315	-262	-297	-303	280	-852	-906	270	-465	-127
9	52.5	-431	-132	-328	-274	-303	-312	301	-900	-953	287	-488	-130
10	55	-445	-140	-342	-282	-320	-319	322	-948	-998	306	-510	-134
11	60	-472	-159	-368	-306	-354	-338	370	-1046	-1090	341	-560	-138
12	65	-494	-179	-390	-324	-389	-344	420	-1141	-1182	380	-603	-140
13	70	-513	-202	-415	-344	-430	-362	475	-1244	-1278	419	-648	-142
14	75	-530	-226	-439	-363	-472	-366	533	-1350	-1374	462	-696	-142
15	80	-542	-258	-461	-383	-520	-371	595	-1460	-1471	505	-744	-142
16	85	-551	-289	-482	-400	-569	-370	662	-1577	-1572	552	-793	-140
17	90	-554	-324	-501	-418	-624	-362	734	-1694	-1672	598	-842	-135
18	92.5	-553	-344	-512	-426	-652	-358	772	-1758	-1722	624	-866	-134
19	95	-552	-361	-519	-434	-679	-352	808	-1814	-1768	648	-890	-130
20	97.5	-547	-382	-528	-442	-712	-342	852	-1883	-1821	676	-916	-124
21	100	-542	-406	-538	-450	-750	-330	898	-1958	-1882	708	-944	-120
22	102.5	-536	-430	-544	-459	-780	-320	942	-2022	-1928	734	-968	-114
23	105	-530	-455	-552	-466	-814	-308	996	-2121	-1981	766	-996	-108
24	107.5	-518	-480	-558	-472	-854	-289	1075	-2163	-2040	796	-1024	-102
25	110	-507	-507	-564	-478	-895	-270	1150	-2264	-2097	832	-1052	-92
26	112.5	-490	-538	-570	-484	-942	-244	1240	-2450	-2156	870	-1082	-80
27	115	-468	-574	-573	-490	-998	-210	1347	-2676	-2222	910	-1114	-68
28	117.5	-444	-610	-576	-494	-1054	-173	1484	-3008	-2284	954	-1145	-35
29	120	-414	-648	-578	-498	-1118	-126	1616	-3284	-2350	998	-1178	-38

30	122.5	-380	-688	-578	-496	-1188	-75	1764	-3590	-2418	1050	-1212	-19
31	125	-338	-733	-576	-496	-1266	-10	1960	-4009	-2494	1112	-1249	5
32	127.5	-287	-782	-572	-496	-1357	68	2244	-4660	-2575	1182	-1290	36
33	130	-209	-840	-562	-482	-1480	200	2805	-5818	-2692	1309	-1346	94
34	132.5	-80	-923	-538	-450	-1658	405	4600	-8900	-2848	1492	-1424	183
35	135	108	-1022	-500	-384	-1906	722	8350	-13144	-3170	1766	-1580	310
36	137.5	212	-1088	-480	-350	-2068	913	10378	-15380	-3475	2006	-1720	395
37	140	274	-1132	-478	-330	-2171	1035	11317	-16438	-3608	2120	-1808	435
38	142.5	344	-1180	-473	-302	-2283	1164	12244	-17404	-3728	2220	-1888	468
39	145	1144	-1596	-570	190	-9450	5860	20850		-5193	3600	-2858	1006
AXIAL FORCE (kN)		-17.1		-17.1		-20.7		-24.9		-21.2		-20.1	
MOMENT(N.m)		14.2		2.2		40.8		130.8		100.9		38.0	

AXIAL FORCES AND BENDING MOMENTS IN MEMBERS FOR SPECIMEN S4-B

PANEL A (REAR DIAGONAL BUCKLED WITH TOP HALF OUTSIDE AND BOTTOM INSIDE) Test Serial No. 3

No.	Load kN	Strain 17	Strain 18	Strain 19	Strain 20	Strain 21	Strain 22	Strain 23	Strain 24	Strain 25	Strain 26	Strain 27	Strain 28
1	10	-94	-6	-56	-40	-10	-68	-22	-74	-90	10	-40	-84
2	20	-214	-4	-124	-84	-18	-198	-44	-166	-224	28	-88	-186
3	30	-336	2	-192	-126	-16	-312	-66	-254	-360	50	-132	-288
4	35	-396	8	-226	-146	-10	-370	-76	-296	-426	60	-152	-332
5	40	-460	14	-260	-166	-4	-430	-86	-344	-494	72	-176	-384
6	45	-526	24	-296	-186	0	-494	-96	-390	-562	84	-200	-432
7	47.5	-564	34	-315	-196	4	-530	-100	-414	-596	90	-208	-462
8	50	-596	36	-334	-206	10	-562	-106	-436	-630	96	-222	-488
9	52.5	-630	46	-352	-216	16	-596	-110	-460	-667	102	-234	-516
10	55	-666	48	-372	-226	30	-632	-116	-480	-698	107	-246	-542
11	60	-742	62	-410	-244	48	-704	-126	-526	-766	118	-266	-595
12	65	-816	82	-447	-262	70	-780	-140	-570	-836	130	-286	-650
13	70	-892	104	-484	-276	96	-855	-152	-612	-900	140	-306	700
14	75	-972	126	-522	-294	126	-936	-166	-652	-966	150	-326	-751
15	80	-1054	156	-562	-306	162	-1022	-180	-688	-1026	158	-350	-804
16	85	-1138	180	-600	-310	204	-1116	-200	-722	-1096	164	-368	-854
17	90	-1226	214	-638	-332	226	-1210	-224	-750	-1148	170	-386	-900
18	92.5	-1270	234	-658	-336	250	-1258	-235	-764	-1172	170	-390	-926
19	95	-1316	254	-680	-344	278	-1312	-248	-776	-1200	170	-400	-950
20	97.5	-1366	274	-700	-348	312	-1364	-264	-785	-1225	168	-406	-974
21	100	-1426	304	-720	-353	340	-1426	-283	-792	-1251	166	-414	-996
22	102.5	-1462	321	-739	-356	374	-1477	-299	-797	-1271	162	-426	-1019
23	105	-1512	344	-758	-358	410	-1534	-320	-800	-1290	158	-432	-1041
24	107.5	-1566	372	-778	-361	451	-1597	-343	-800	-1309	151	-438	-1062
25	110	-1618	401	-798	-364	497	-1662	-368	-795	-1325	143	-444	-1082
26	112.5	-1675	434	-821	-366	548	-1732	-398	-790	-1340	132	-449	-1102
27	115	-1741	468	-844	-368	602	-1812	-434	-779	-1352	117	-454	-1123
28	117.5	-1802	506	-864	-368	663	-1888	-472	-762	-1358	100	-455	-1142

29	120	-1868	552	-886	-369	733	-1973	-516	-741	-1383	79	-462	-1159
30	122.5	-1940	594	-911	-370	820	-2068	-570	-711	-1362	53	-462	-1175
31	125	-2021	649	-934	-369	979	-2163	-636	-666	-1351	18	-466	-1191
32	127.5	-2118	725	-958	-361	1280	-2370	-740	-576	-1312	-41	-454	-1195
33	130	-2262	852	-986	-344	2040	-2810	-922	-396	-1220	-143	-438	-1182
34	132.5	-2640	1194	-1046	-296			-135	62	-955	-378	-372	-1105
35	135	-3292	1842	-1174	-204			-1968	872	-462	-705	-217	-905
36	137.5		2166	-1250	-157			-2203	1284	-232	-848	-138	-812
37	140		2300	-1288	-138			-2449	1503	-122	-920	-99	-773
38	142.5		2386	-1305	-116			-2619	1684	-30	-981	-66	-740
39	145		2911	-1357	303					1714	-2220	506	-200
AXIAL FORCE (kN)				-22.8				-13.9		-16.2		-12.9	
MOMENT(N.m)				40.7				116.8		27.3		19.3	

AXIAL FORCES AND BENDING MOMENTS IN MEMBERS FOR SPECIMEN S4-C

PANEL A (FRONT DIAGONAL) — **Test Serial No. 5**

No.	Load kN	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8	Strain 9	Strain 10	Strain 11	Strain 12
1	10.0	-18	-128	-75	-72	-120	-28	-126	-35	48	-183	-14	-132
2	20.0	-30	-212	-116	-120	-207	-34	-190	-52	78	-300	-22	-210
3	30.0	-36	-316	-172	-172	-314	-42	-286	-70	120	-450	-32	-312
4	40.0	-34	-446	-228	-236	-440	-38	-304	-87	172	-624	-42	-430
5	50.0	-22	-578	-286	-294	-570	-32	-500	-105	224	-788	-48	-538
6	60.0	10	-720	-342	-354	-708	-8	-605	-116	280	-952	-54	-652
7	70.0	42	-864	-394	-408	-860	34	-706	-132	332	-1126	-56	-756
8	75.0	62	-936	-418	-438	-946	56	-760	-138	364	-1206	-62	-812
9	80.0	88	-1022	-442	-466	-1028	86	-810	-146	393	-1288	-62	-868
10	85.0	114	-1102	-466	-492	-1117	118	-860	-154	420	-1370	-65	-922
11	90.0	145	-1188	-490	-520	-1203	158	-902	-170	440	-1444	-70	-968
12	95.5	184	-1280	-513	-546	-1310	202	-944	-184	466	-1524	-72	-1024
13	97.5	212	-1345	-528	-564	-1378	236	-966	-196	476	-1572	-74	-1055
14	100.0	225	-1364	-532	-570	-1410	255	-972	-203	483	-1590	-75	-1070
15	102.5	250	-1426	-548	-586	-1474	290	-990	-220	492	-1628	-80	-1100
16	105.0	275	-1473	-558	-596	-1532	322	-1002	-232	500	-1660	-84	-1120
17	107.5	305	-1528	-566	-612	-1590	363	-1006	-250	502	-1690	-86	-1142
18	110.0	332	-1578	-576	-622	-1646	400	-1018	-266	504	-1716	-90	-1164
19	112.5	362	-1634	-585	-632	-1706	438	-1024	-286	506	-1740	-94	-1182
20	115.0	414	-1720	-598	-650	-1805	506	-1020	-324	506	-1772	-103	-1210
21	117.5	442	-1760	-604	-656	-1852	547	-1018	-346	500	-1784	-105	-1220
22	120.0	492	-1838	-610	-668	-1944	612	-1004	-384	490	-1800	-105	-1240
23	122.5	550	-1918	-620	-680	-2036	696	-982	-437	476	-1812	-124	-1256
24	125.0	614	-2000	-626	-690	-2096	796	-946	-492	454	-1812	-137	-1270
25	127.5	676	-2082	-630	-694	-2180	926	-876	-574	410	-1785	-152	-1272
26	130.0	903	-2393	-622	-698	-2656	1312	-690	-790	308	-1706	-189	-1288
27	133.1	1412	-2940	-636	-714	-4500	2786	28	-1410	-105	-1206	-280	-1074
28	135.0	2226	-3823	-652	-676	-9840	6236	798	-1942	-403	-728	-306	-874
29	137.5	2312	-3893	-652	-656	-10390	6716	1003	-2060	-470	-590	-300	-803

30	140.0	2376	-3894	-642	-626	-10590	6900	1140	-2180	-515	-522	-306	-760
31	142.5	2440	-3920	-635	-605	-10640	6974	1250	-2256	-538	-480	-295	-746
32	145.0	2470	-3930	-632	-594			1326	-2310	-598	-425	-295	-730
AXIAL FORCE (kN)		-23.1		-21.2		-19.9		-23.7		-22.4		-23.2	
MOMENT(N.m)		89.4		2.2		163.4		2.9		57.7		31.2	

AXIAL FORCES AND BENDING MOMENTS IN MEMBERS FOR SPECIMEN S4-C

PANEL A (REAR DIAGONAL) Test Serial No. 5

No.	Load kN	Strain 17	Strain 18	Strain 19	Strain 20	Strain 21	Strain 22	Strain 23	Strain 24	Strain 25	Strain 26	Strain 27	Strain 28
1	10.0	18	-124	-88	-30	-98	-18	-108	-18	-26	-94	-36	-64
2	20.0	38	-228	-150	-42	-177	-23	-178	-20	-34	-166	-57	-115
3	30.0	64	-360	-248	-73	-281	-23	-263	-18	-45	-265	-84	-178
4	40.0	94	-486	-330	-90	-379	-33	-389	-11	-53	-368	-108	-232
5	50.0	124	-605	-405	-106	-471	-30	-450	5	-55	-448	-129	-288
6	60.0	156	-733	-486	-124	-573	-27	-610	27	-50	-552	-150	-342
7	70.0	192	-855	-563	-140	-672	-11	-732	56	-41	-647	-163	-394
8	75.0	209	-920	-610	-150	-726	-15	-779	70	-35	-706	-172	-415
9	80.0	222	-982	-646	-155	-772	-7	-870	88	-28	-754	-178	-445
10	85.0	245	-1050	-686	-157	-825	0	-931	111	-20	-819	-186	-468
11	90.0	257	-1107	-723	-167	-878	4	-1000	140	-10	-873	-187	-491
12	95.5	273	-1172	-765	-172	-931	12	-1071	165	5	-930	-198	-514
13	97.5	287	-1205	-785	-183	-962	13	-1108	177	14	-972	-201	-528
14	100.0	290	-1224	-794	-184	-971	17	-1130	190	20	-985	-202	-538
15	102.5	300	-1255	-819	-185	-1005	23	-1172	202	28	-1118	-203	-550
16	105.0	305	-1288	-832	-195	-1031	27	-1205	218	35	-1047	-208	-560
17	107.5	311	-1315	-855	-200	-1055	25	-1255	235	46	-1170	-211	-569
18	110.0	318	-1341	-877	-200	-1074	30	-1285	250	55	-1104	-214	-581
19	112.5	325	-1360	-892	-192	-1098	27	-1342	274	61	-1130	-216	-592
20	115.0	332	-1406	-919	-193	-1134	30	-1389	306	75	-1185	-220	-607
21	117.5	338	-1424	-929	-217	-1149	35	-1432	322	80	-1217	-220	-614
22	120.0	343	-1455	-949	-204	-1175	35	-1475	347	95	-1257	-218	-624
23	122.5	345	-1488	-968	-211	-1202	40	-1540	371	108	-1298	-223	-636
24	125.0	352	-1512	-970	-226	-1226	40	-1550	401	125	-1330	-220	-647
25	127.5	354	-1533	-996	-238	-1246	38	-1640	430	139	-1355	-224	-655
26	130.0	358	-1565	-1024	-254	-1275	33	-1686	469	162	-1410	-222	-666
27	133.1	368	-1602	-1049	-255	-1310	40	-1767	523	197	-1471	-221	-675
28	135.0	394	-1661	-1085	-250	-1346	38	-1888	618	266	-1583	-212	-680

29	137.5	395	-1696	-1112	-266	-1363	22	-2031	705	317	-1657	-206	-685
30	140.0	366	-1717	-1130	-276	-1360	-19	-2190	825	379	-1771	-195	-690
31	142.5	341	-1699	-1133	-311	-1304	-101	-2457	1046	470	-1896	-180	-684
32	145.0	226	-1589	-1090	-356	-1145	-280	-3135	1467	615	-2044	-139	-652
AXIAL FORCE (kN)		-21.9		-23.2		-22.9		-22.8		-22.8		-12.7	
MOMENT(N.m)		52		21.1		24.8		110.1		75.5		14.4	

AXIAL FORCES AND BENDING MOMENTS IN MEMBERS FOR SPECIMEN S4-C

PANEL A (FRONT AND REAR TENSION DIAGONAL)

Test Serial No. 5

No.	Load kN	Strain 13	Strain 14	Strain 15	Strain 16	Strain 29	Strain 30	Strain 31	Strain 32
1	10.0	4	98	18	78	4	82	2	74
2	20.0	8	162	30	126	8	146	4	136
3	30.0	6	240	42	194	14	230	10	214
4	40.0	12	328	58	268	20	310	16	286
5	50.0	20	412	74	338	30	384	24	354
6	60.0	28	502	94	414	42	462	34	426
7	70.0	40	592	112	488	56	544	48	502
8	75.0	46	636	122	528	64	582	56	538
9	80.0	52	680	134	566	72	622	64	574
10	85.0	60	726	146	606	82	662	74	610
11	90.0	70	766	156	640	94	700	84	646
12	95.5	88	814	170	680	104	744	96	684
13	97.5	84	842	180	704	110	768	104	706
14	100.0	88	856	182	714	114	778	108	716
15	102.5	94	880	190	734	122	802	114	736
16	105.0	100	904	196	754	126	822	122	754
17	107.5	106	924	202	772	134	840	126	772
18	110.0	110	946	210	790	142	856	134	790
19	112.5	114	966	216	806	146	878	140	806
20	115.0	122	996	226	830	156	904	150	834
21	117.5	130	1012	232	842	160	918	154	844
22	120.0	138	1036	244	862	170	940	162	866
23	122.5	146	1062	254	882	178	964	174	886
24	125.0	156	1084	264	898	186	984	180	906
25	127.5	162	1104	274	910	194	1004	186	920
26	130.0	176	1132	294	912	202	1026	196	944
27	133.1	230	1172	364	922	212	1054	202	966
28	135.0	356	1240	506	926	222	1080	210	996

29	137.5	424	1288	568	956	234	1110	222	1024
30	140.0	472	1324	616	984	250	1140	238	1052
31	142.5	514	1356	656	1014	260	1170	254	1080
32	145.0	544	1380	686	1030	286	1190	272	1100
AXIAL FORCE (kN)		21		19.3		23.7		22.0	
MOMENT(N.m)		-27.4		-17.7		-25.9		-23.7	

AXIAL FORCES AND BENGING MOMENTS IN MEMBERS FOR SPECIMEN S5-A

PANEL A (NOT BUCKLED) **Test Serial No.2**

No.	Load kN	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14
1	10	-11	10	-9	-30	9	62	29	-30	20	-19	72	26	8	-100
2	20	-28	18	-206	-54	15	123	56	-52	56	-43	126	56	8	-202
3	30	-43	27	-299	-77	20	176	82	-73	70	-63	240	87	10	-330
4	40	-55	34	-400	-91	26	239	106	-96	92	-83	317	122	22	-436
5	50	-72	43	-516	-96	34	310	136	-120	114	-100	398	167	38	-538
6	60	-89	52	-648	-81	58	402	164	-146	134	-118	484	228	65	-626
7	65	-95	52	-705	-60	60	450	176	-158	138	-122	530	273	82	-660
8	70	-100	52	-745	-32	87	506	181	-163	140	-126	582	338	98	-670
9	**71.6**	**-98**	**48**	**-740**	**-14**	**112**	**528**	**179**	**-161**	**136**	**-124**	**604**	**378**	**105**	**-656**
10	69.3	-86	36	-586	14	168	518	140	-124	138	-126	601	400	99	-615
11	61.4	76	-134	-266	176	288	568	60	-56	172	-150	670	190	296	-1176

AXIAL FORCES AND BENGING MOMENTS IN MEMBERS FOR SPECIMEN S5-A

PANEL B(NOT BUCKLED) **Test Serial No.2**

No.	Load kN	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14
1	10	15	-18	-19	-74	23	41	4	24	26	-4	28	103	-76	-8
2	20	20	-50	-32	-144	230	80	-4	40	48	-13	57	234	-186	-15
3	30	29	-83	-49	-201	316	120	-4	56	64	-17	88	340	-282	-23
4	40	36	-113	-76	-270	412	165	-6	72	80	-28	106	440	-375	-28
5	50	53	-148	-113	-339	504	213	-8	89	101	-35	140	532	-476	-50
6	60	78	-198	-171	-430	598	265	-7	112	122	-48	176	628	-580	-86
7	65	100	-232	-214	-480	638	286	-9	124	133	-58	179	661	-646	-125
8	70	140	-284	-280	-556	668	292	-11	145	158	-72	174	700	-742	-184
9	71.6	170	-312	-314	-598	668	275	-11	149	162	-72	158	714	-801	-218
10	69.3	222	-362	-367	-708	633	181	-10	126	168	-74	140	712	-814	-238
11	61.4	492	-610	-684	-894	762	-60	-8	114	80	-10	-656	1056	2210	

AXIAL FORCES AND BENGING MOMENTS IN MEMBERS FOR SPECIMEN S5-A

PANEL C(FRONT COMPRESSION DIAGONAL BUCKLED OUTSIDE TOTALLY AND REAR DIAGONAL INSIDE

Test Serial No.2

No.	Load kN	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14
1	10	-27	0	-178	-24	-40	86	3	12	4	14	60	-101	-230	-52
2	20	-76	0	-378	-42	-94	168	10	25	10	32	156	-154	-462	-40
3	30	-108	0	-568	-38	-154	254	15	38	14	56	252	-220	-686	50
4	40	-140	6	-802	0	-228	370	22	52	20	58	368	-308	-954	130
5	50	-176	12	-1110	90	-328	522	32	64	28	77	514	-440	-1278	278
6	60	-228	30	-1542	287	-470	730	42	76	40	88	720	-636	-1700	736
7	65	-264	48	-1786	420	-568	870	50	78	48	92	860	-770	-2018	1156
8	70	-320	82	-2748	884	-732	1080	62	76	58	92	1050	-946	-2608	1548
9	71.6	-346	104	-4690	1780	-800	1160	70	66	60	92	1130	-1032	-3202	1906
10	69.3	-386	150			-760	1055	88	42	58	92	1140	-1036	-3660	
11	61.4	-718	514			-1054	1088	112	6	-718					
12															
FORCE kN				-38.9		7.1						1.9		-21.6	
MOMENT (N.m)				136.7		-77.1						-85		175.4	

AXIAL FORCES AND BENGING MOMENTS IN MEMBERS FOR SPECIMEN S5-A

PANEL D(FRONT COMPRESSION DIAGONAL BUCKLED OUTSIDE TOTALLY AND REAR DIAGONAL INSIDE

Test Serial No.2

No.	Load kN	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14
1	10	-150	-19	-90	59	-40	-30	61	-16	-27	-101	390	50	62	118
2	20	-220	-9	-170	153	-50	-44	66	-8	-5	-85	320	-202	172	22
3	30	-270	-16	-250	250	-47	-50	70	19	-22	-70	320	-440	266	-178
4	40	-290	5	-352	360	-50	-3	67	23	-12	-63	440	-664	390	-180
5	50	-318	21	-464	516	-42	83	80	40	16	-36	610	-1232	586	-292
6	60	-415	40	-685	730	-49	245	95	40	37	-49	934	-1585	826	-530
7	65	-454	56	-837	883	-52	367	112	47	49	-20	1332	-2378	996	-508
8	70	-492	84	-1049	1115	-57	658	116	49	66	-37	2278	-3340	1160	-754
9	71.6	-578	108	-1174	1245	-62	960	136	42	70	-85	3172	-5022	1218	-810
10	69.3	-505	146	-1296	1307	-55	1651	114	57	74	-76	4720	-7730	1160	-770
11	61.4	-970	535	-1414	1450	-85		117	23	-17	-20			1152	-1194
FORCE(kN)				1.4		17.8						-20.9		8.1	
MOMENT (N.m)				95.1		-40.2						212.5		-79.7	

AXIAL FORCES AND BENGING MOMENTS IN MEMBERS FOR SPECIMEN S5-A

PANEL E(NOT BUCKLED)

Test Serial No.2

No.	Load kN	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14
1	10	14	-29	80	60	-8	-58	-9	24	-6	26	-125	-22	60	143
2	20	12	-61	187	117	-20	-148	-17	40	-20	46	-225	-36	114	263
3	30	36	-92	280	172	-29	-224	-21	49	-29	62	-318	-51	129	366
4	40	38	-126	360	228	-35	-305	-28	67	-39	82	-426	-72	173	474
5	50	49	-161	454	285	-63	-386	-35	81	-47	100	-560	-98	218	578
6	60	74	-211	509	347	-84	-475	-47	104	-60	123	-736	-134	271	682
7	65	100	-245	542	375	-96	-537	-52	117	-68	139	-844	-154	309	721
8	70	130	-292	564	389	-115	-635	-65	132	-80	161	-1069	-170	315	746
9	**71.6**	**134**	**-345**	**539**	**367**	**-141**	**-720**	**-92**	**109**	**-106**	**122**	**-1137**	**-218**	**216**	**750**
10	69.3	132	-448	456	264	-191	-858	-155	56	-148	50	-1186	-276	134	710
11	61.4	380	-680	460	109	520	-2026	-164	61	-48	-50			-170	735

AXIAL FORCES AND BENGING MOMENTS IN MEMBERS FOR SPECIMEN S5-A

PANEL F(NOT BUCKLED)

Test Serial No.2

No.	Load kN	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14
1	10	-16	10	-10	70	-92	-25	22	-19	37	-32	-26	-125	106	9
2	20	-20	20	5	148	-210	-50	44	-36	71	-57	-31	-245	202	25
3	30	-40	27	15	217	-306	-62	66	-51	97	-78	-34	-343	292	27
4	40	-60	36	27	289	-411	-73	80	-65	124	-103	-20	-461	364	39
5	50	-71	44	33	370	-522	-79	103	-77	155	-127	0	-580	467	60
6	60	-80	51	35	451	-626	-68	110	-90	180	-154	33	-701	587	94
7	65	-91	52	38	511	-670	-64	117	-92	189	-164	49	-736	658	124
8	70	-96	50	60	561	-700	-44	110	-92	189	-166	69	-756	722	172
9	71.6	-95	45	80	596	-680	-40	110	-87	184	-157	76	-726	760	206
10	69.3	-80	44	128	596	-606	-37	102	-76	164	-140	78	-640	728	227
11	61.4	112	-152	276	701	-217	40	7	7	212	-176	87	-1082	788	-146

AXIAL FORCES AND BENDING MOMENTS IN MEMBERS FOR SPECIMEN S5-B

PANEL C (FRONT DIAGONAL BUDKLED)

Test Serial No. 10

No.	Load kN	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8	Strain 9	Strain 10	Strain 11	Strain 12
1	11.8	-50	-130	-106	-86	-152	-62	-156	-70	-10	-206	-126	-128
2	20	-83	-272	-181	-168	-273	-100	-267	-93	-11	-347	-197	-155
3	30	-58	-512	-323	-240	-502	-74	-511	-77	73	-688	-351	-215
4	40	-37	-588	-380	-326	-606	-63	-623	-71	157	-824	-390	-249
5	50	0	-837	-454	-389	-762	-61	-792	-61	180	-1053	-486	-304
6	60	20	-1024	-533	-477	-962	-15	-946	-15	306	-1298	-576	-352
7	70	84	-1208	-592	-512	-1117	0	-1092	0	390	-1475	-640	-359
8	75	100	-1296	-595	-566	-1188	0	-1140	0	406	-1581	-650	-374
9	80	144	-1371	-620	-566	-1294	7	-1238	0	462	-1694	-693	-394
10	85	206	-1525	-675	-623	-1382	42	-1340	0	570	-1832	-752	-405
11	90	277	-1675	-690	-675	-1592	128	-1461	51	674	-2096	-822	-468
12	95	352	-1796	-764	-717	-1694	176	-1521	80	722	-2185	-852	-446
13	87.5	164	-1667	-700	-729	-1734	188	-1440	0	512	-2112	-787	-447
14	100	432	-1937	-777	-754	-2225	537	-1430	20	926	-2199	-947	-820
15	96.6												
16													
AXIAL FORCE (kN)		-29.8		-30.3		-33.2		-27.9		-25.0		-33.0	
MOMENT(N.m)		93.1		0.9		-106.6		57		121.5		-1.1	

AXIAL FORCES AND BENDING MOMENTS IN MEMBERS FOR SPECIMEN S5-B

PANEL C (REAR DIAGONAL NOT BUCKLED) — Test Serial No. 10

No.	Load kN	Strain 17	Strain 18	Strain 19	Strain 20	Strain 21	Strain 22	Strain 23	Strain 24	Strain 25	Strain 26	Strain 27	Strain 28
1	11.8	33	-123	-72	-18	-98	5	-97	7	-108	24	-47	-36
2	20	55	-203	-117	-30	-163	12	-161	12	-180	42	-74	-55
3	30	164	-490	-272	-65	-383	48	-383	54	-422	123	-164	-118
4	40	217	-614	-334	-74	-478	71	-481	80	-528	166	-197	-140
5	50	323	-837	-440	-90	-642	116	-645	132	-707	245	-252	-173
6	60	433	-1050	-538	-98	-800	167	-804	190	-880	332	-300	-200
7	70	533	-1234	-620	-104	-936	219	-944	246	-1028	408	-340	-222
8	75	583	-1325	-660	-106	-1003	245	-1014	276	-1098	448	-360	-230
9	80	640	-1422	-700	-105	-1076	277	-1089	312	-1180	494	-378	-240
10	85	715	-1548	-755	-106	-1171	317	-1183	358	-1275	550	-402	-250
11	90	816	-1712	-825	-102	-1297	375	-1314	424	-1406	632	-430	-263
12	95	932	-1888	-897	-94	-1430	445	-1453	503	-1542	722	-462	-272
13	87.5	1322	-2274	-1048	33	-1704	900	-1706	750	-1904	1120	-474	-202
14	100	1745	-2666	-1290	120	-1884	891	-1948	904	-2178	1542	-557	-210
15	96.6	2324	-3122	-1693	168	-1950	1009	-2371	1100	-2390	1900	-642	-238
16													
AXIAL FORCE (kN)		-16.9		-23.2		-19.7		-20.7		-12.4		-17.4	
MOMENT(N.m)		164.4		55.4		109.1		112.1		145.3		15.9	

AXIAL FORCES AND BENDING MOMENTS IN MEMBERS FOR SPECIMEN S5-B

PANEL C (FRONT AND REAR TENSION DIAGONAL)

Test Serial No. 10

No.	Load kN	Strain 13	Strain 14	Strain 15	Strain 16	Strain 29	Strain 30	Strain 31	Strain 32
1	11.8	-10	64	-10	64	-34	40	-40	48
2	20	-18	104	-20	100	-54	70	-66	84
3	30	-56	228	-54	218	-118	168	-162	214
4	40	-74	284	-66	270	-142	214	-198	272
5	50	-104	374	-92	354	-188	294	-268	374
6	60	-138	458	-124	430	-224	370	-332	476
7	70	-168	534	-146	408	-256	434	-388	564
8	75	-182	572	-158	532	-268	468	-414	610
9	80	-196	612	-172	566	-286	504	-442	658
10	85	-220	666	-188	616	-304	550	-478	718
11	90	-246	738	-214	658	-334	612	-526	798
12	95	-276	808	-236	742	-374	678	-580	878
13	97.5	-278	788	-270	752	-830	910	-920	972
14	100	-324	896	-328	864	-1112	1168	-1296	1288
15	96.6	-714	1000	-848	1020	-1306	1380	-1396	1388
16									
AXIAL FORCE (kN)		11.1		10.4		1.1		0	
MOMENT(N.m)		-47.6		-46.5		-89.6		-94.9	

AXIAL FORCES AND BENDING MOMENTS IN MEMBERS FOR SPECIMEN S5-B

PANEL C (THREE LEGS)

Test Serial No. 10

No.	Load kN	Strain 33	Strain 34	Strain 35	Strain 36	Strain 37	Strain 38	Strain 39	Strain 40	Strain 41	Strain 42	Strain 43	Strain 44
1	11.8	-61	32	0	-31	13	0	0	24	24	14	0	20
2	20	-86	52	10	-46	24	0	0	32	32	14	0	28
3	30	-200	110	20	-94	42	0	0	60	60	8	0	52
4	40	-242	134	10	-112	56	0	10	66	72	14	-10	66
5	50	-322	180	16	-144	70	-8	12	80	84	12	0	76
6	60	-390	220	28	-170	80	-12	12	92	104	10	0	94
7	70	-450	256	26	-196	92	-12	16	102	118	10	4	104
8	75	-478	270	26	-206	102	-14	18	106	120	0	0	108
9	80	-512	284	28	-222	100	-20	20	114	136	4	0	122
10	85	-552	318	32	-236	110	-20	22	120	142	8	0	130
11	90	-606	350	36	-256	120	-20	26	126	150	0	0	134
12	95	-666	390	50	-278	124	-20	24	136	168	-6	10	154
13	87.5	-758	496	88	-306	82	42	-12	162	176	-18	-6	158
14	100	-906	620	120	-354	72	60	-14	174	284	-30	-8	162
15	96.6	-1280	964	248	-466	80	50	-30	190	114	50	48	110
16													
AXIAL FORCE(kN)		-5.7		-4.6		2.6		3.2		4.6		3.1	
MOMENT(N.m)		60.0		18.6		-0.5		-7.4		-11.6		-6.7	

AXIAL FORCES AND BENDING MOMENT IN TEST MEMBERS FOR SPECIMEN S5-C

TEST PANEL C (FRONT DIAGONAL BUCKLED FIRST)

Test Serial No. 12

No.	Load(kN)	strain 1	strain 2	strain 3	strain 4	strain 5	strain 6	strain 7	strain 8
1	14.8	-126	-56	-132	-49	-26	54	-21	47
2	29.3	-253	-107	-266	-88	-51	107	-43	98
3	43.9	-437	-160	-471	-119	-92	189	-82	176
4	56.5	-593	-186	-644	-123	-133	257	-124	244
5	70.7	-795	-188	-875	-96	-199	352	-189	336
6	84.8	-1336	-37	-1502	149	-396	647	-382	630
7	91.8	-1406	-8	-1588	197	-421	691	-406	673
8	94.7	-1462	9	-1685	257	-446	738	-436	721
9	98.9	-1476	12	-1723	283	-456	757	-448	740
10	100.5	-1506	27	-1762	308	-467	780	-457	763
11	102.2	-1521	24	-1824	353	-481	808	-474	793
12	104.0	-1524	12	-1895	410	-494	837	-489	824
13	106.0	-1526	2	-1948	467	-504	861	-502	848
14	108.0	-1487	-53	-2025	618	-519	904	-525	896
15	111.1	-1337	-211	-2165	928	-528	950	-549	954
16	114.3	-1134	-403	-2318	1283	-524	973	-559	988
17	116.3	-564	-910	-3695	2305	-489	997	-557	1031
18	118.8	101	-1451	-6636	4818	-422	989	-523	1042
19	120.4	788	-1966	-14938	12376	-332	991	-482	1059
20	122.6	843	-2001	-15446	12830	-324	995	-458	1064
21	123.9	864	-2388	-16273	13886	-315	1006	-451	1076
22	107.4	747	-2031	-15823	13190	-378	996	-464	1025
23	109.4	763	-2062	-15897	13250	-379	1009	-465	1038
24	110.8	770	-2084	-15958	13297	-384	1022	-468	1049
25	113.2	785	-2111	-16033	13358	-388	1037	-472	1062
26	114.5	795	-2136	-16116	13423	-396	1052	-478	1076
27	115.4	816	-2177	-16274	13550	-406	1078	-488	1100
28	105.0	711	-2084	-16674	13915	-451	1153	-505	1151
29	106.7	903	-1955	-24797	22269	-963	1120	-1166	1267
AXIAL FORCE (kN) FOR 106.0kN		30.2		29.0		7.1		6.9	
BENDING MOMENT(N.m)		60.1		91		-53.7		-53.1	
AXIAL FORCE (kN)for 123.9kN		-26.4		-8.7		13.7		12.4	
BENDING MOMENT(N.m)		125.4		251.7		-51.9		-60.0	

AXIAL FORCES AND BENDING MOMENT IN TEST MEMBERS FOR SPECIMEN S5-C

TEST PANEL C (REAR DIAGONAL BUCKLED SECOND)

Test Serial No. 12

No.	Load(kN)	strain 9	strain 10	strain 11	strain 12	strain 13	strain 14	strain 15	strain 16
1	14.8	-131	-21	-123	-24	-29	48	-24	50
2	28.3	-276	-39	-268	-43	-61	104	-55	110
3	43.9	-487	-44	-478	-46	-114	190	-107	202
4	56.5	-662	-26	-658	-24	-162	265	-156	283
5	70.7	-866	16	-892	31	-231	368	-221	392
6	84.8	-1429	208	-1481	277	-398	640	-383	681
7	91.8	-1495	238	-1558	318	-417	677	-401	719
8	94.7	-1564	268	-1638	362	-437	713	-421	759
9	98.9	-1586	279	-1668	378	-444	726	-428	773
10	100.5	-1618	293	-1704	399	-452	744	-437	792
11	102.2	-1652	308	-1749	426	-463	765	-448	816
12	104.0	-1685	323	-1793	451	-473	787	-457	839
13	106.0	-1709	333	-2881	491	-482	806	-466	858
14	108.0	-1752	350	-2148	542	-497	837	-482	894
15	111.1	-1798	368	-2300	602	-512	875	-498	936
16	114.3	-1822	375	-2395	643	-519	897	-506	960
17	116.3	-1836	365	-2582	734	-526	928	-517	1001
18	118.6	-1831	343	-2965	856	-522	951	-519	1031
19	120.4	-1741	226	-3637	1161	-520	1002	-531	1101
20	122.6	-1719	201	-3790	1230	-523	1011	-536	1115
21	123.9	-1662	156	-4116	1386	-542	1039	-568	1151
22	107.4	-1826	499	-4246	1650	-1050	1125	-1105	1301
23	109.4	-1839	504	-4319	1702	-1061	1144	-1119	1326
24	110.8	-1776	457	-4798	1875	-1074	1155	-1146	1355
25	113.2	-1680	381	-5079	2023	-1082	1165	-1170	1384
26	114.5	-1516	250	-5695	2281	-1089	1171	-1197	1416
27	115.4	-1212	9	-6866	2679	-1097	1176	-1236	1462
28	105.0	-548	-401	-7874	3386	-1222	1177	-1431	1541
29	106.7	-156	-583	-8768	3882	-1140	1003	-1448	1464
AXIAL FORCE (kN) FOR 106.0kN		-27.3		-29.9		6.4		7.8	
BENDING MOMENT(N.m)		80.3		97.9		-50.6		-52.1	
AXIAL FORCE (kN)for 123.9kN		30.2		-40.4		9.8		11.5	
BENDING MOMENT(N.m)		72.1		145.3		-62.1		-67.6	

AXIAL FORCES AND BENDING MOMENT IN TEST MEMBERS FOR SPECIMEN S5-C

TEST PANEL C (LEGS)

Test Serial No. 12

No.	Load(kN)	Strain 17	Strain 18	Strain 19	Strain 20	Strain 21	Strain 22	Strain 23	Strain 24	Strain 25	Strain 26	Strain 27	Strain 28
1	14.8	-56	29	2	-28	17	-1	0	17	18	2	2	17
2	28.3	-114	62	3	-55	36	-2	1	34	36	4	3	36
3	43.9	-193	105	6	-96	59	-3	2	57	58	5	4	58
4	56.5	-256	141	9	-128	78	-4	3	74	75	7	6	77
5	70.7	-333	185	14	-165	99	-5	4	93	93	10	7	96
6	84.8	-519	297	22	-247	148	-10	13	126	134	12	16	132
7	91.8	-542	311	22	-255	155	-11	16	130	140	12	18	134
8	94.7	-565	327	22	-264	161	-13	17	133	145	12	21	137
9	98.9	-577	333	22	-269	163	-13	17	133	148	11	23	139
10	100.5	-580	340	22	-272	167	-13	19	135	149	11	24	139
11	102.2	-605	350	22	-277	171	-14	21	137	153	11	26	139
12	104.0	-620	360	21	-283	174	-16	22	137	156	10	28	140
13	106.6	-634	368	20	-287	176	-16	23	138				
14	108.0	-657	384	20	-294	183	-17	26	141	162	9	34	139
15	111.1	-686	400	17	-302	189	-19	28	142	166	9	41	139
16	114.3	-704	415	19	-307	193	-20	31	144	169	9	47	132
17	116.3	-737	438	18	-315	199	-21	34	144	167	13	65	117
18	118.9	-770	460	18	-321	203	-23	36	143	159	17	89	90
19	120.4	-833	508	20	-336	210	-27	42	141	149	28	128	51
20	122.6	-843	518	20	-338	211	-26	43	141	149	28	133	48
21	123.9	-868	537	22	-346	211	-24	44	141				
22	107.4	-956	701	77	-382	116	47	9	153	153	6	107	54
23	109.4	-973	716	79	-386	119	47	11	156	156	6	110	54
24	110.8	-996	736	81	-371	116	50	13	153	159	5	109	57
25	113.2	-1018	760	81	-377	114	51	16	152	162	3	109	58
26	114.5	-1049	780	84	-381	111	56	20	147	165	2	110	58
27	115.4	-1089	833	83	-381	101	66	27	140	168	1	111	60
28	105.0	-1097	874	-45	-200	0	148	29	117	148	13	137	23
29	108.7	-1473	1261	39	-203	-56	180	24	100	15	124	132	6
AXIAL FORCE (kN) FOR 108.6kN		-181.9		-182.3		82.1		82.1		84.4		86.1	
BENDING MOMENT(kN.m)		3362.6		1827.2		-648.1		-368.1		-488.2		-388.1	
AXIAL FORCE (kN)for 123.6kN		127.2		124.2		71.7		70.9		68.2		69	
BENDING MOMENT(kN.m)		4703.6		1231.3		-786.3		-324.6		-408.2		-328	

AXIAL FORCES AND BENDING MOMENT IN TEST MEMBERS FOR SPECIMEN S6-A

TEST PANEL A (FRONT DIAGONAL)

Test Serial No. 11

No.	Load(kN)	strain 1	strain 2	strain 3	strain 4	strain 5	strain 6	strain 7	strain 8
1	10.0	-88	-17	-77	-24	2	63	6	57
2	20.2	-163	-28	-146	-45	2	117	12	109
3	30.0	-248	-40	-223	-67	6	175	19	164
4	40.0	-347	-53	-309	-89	11	239	27	227
5	50.0	-442	-60	-392	-110	16	302	36	287
6	60.0	-538	-63	-476	-127	21	362	43	345
7	70.5	-641	-62	-561	-145	27	425	51	407
8	80.2	-734	-57	-637	-157	33	480	58	461
9	91.0	-848	-46	-726	-171	39	545	66	524
10	100.9	-948	-28	-799	-184	44	600	73	578
11	110.5	-1056	-8	-875	-194	49	656	81	634
12	115.9	-1130	12	-924	-201	54	696	87	673
13	121.9	-1208	32	-973	-208	58	734	92	710
14	127.6	-1287	59	-1021	-215	62	774	98	749
15	132.6	-1359	84	-1062	-221	66	809	104	784
16	138.9	-1427	110	-1097	-227	69	840	108	814
17	144.1	-1521	152	-1143	-236	75	882	114	857
18	149.5	-1649	214	-1192	-253	81	935	122	909
19	152.0	-1719	249	-1220	-261	85	962	126	938
20	157.6	-1832	332	-1220	-291	69	991	116	963
21	160.2	-1887	388	-1225	-305	66	1009	114	983
22	144.5	-1794	364	-1167	-285	36	961	87	931
23	140.2	-1842	411	-1178	-295	42	988	93	959
24	141.6	-1911	453	-1189	-313	49	1019	103	992
25	142.0	-2113	683	-1170	-381	55	1097	114	1068
26	142.7	-2196	781	-1147	-419	58	1124	121	1096
27	144.3	-2239	864	-1119	-456	63	1144	127	1116
28		-2233	860	-1074	-480	70	1142	137	1113
29	108.0	-9909	8131	1824	-2554	-192	1236	36	1134
AXIAL FORCE (kN)		**-27.3**		**-31.2**		**23.9**		**24.6**	
BENDING MOMENT(N.m)		**120.8**		**26.1**		**-42.5**		**-38.9**	

AXIAL FORCES AND BENDING MOMENT IN TEST MEMBERS FOR SPECIMEN S6-A

TEST PANEL A (REAR DIAGONAL)

Test Serial No. 11

No.	Load(kN)	strain 9	strain 10	strain 11	strain 12	strain 13	strain 14	strain 15	strain 16
1	10.0	-77	-12	-80	-11	0	64	6	58
2	20.2	-163	-27	-174	-23	5	136	11	125
3	30.0	-234	-37	-256	-28	9	196	17	181
4	40.0	-315	-47	-347	-32	17	261	25	243
5	50.0	-398	-56	-442	-32	24	326	36	302
6	60.0	-474	-62	-535	-29	32	388	44	362
7	70.5	-558	-68	-636	-21	41	453	54	423
8	80.2	-632	-70	-729	-9	50	512	62	478
9	91.0	-720	-72	-840	9	60	580	76	542
10	100.9	-792	-71	-939	32	69	639	86	595
11	110.5	-869	-69	-1043	58	80	696	97	650
12	115.9	-921	-66	-1116	80	88	739	106	688
13	121.9	-969	-62	-1187	102	93	778	114	722
14	127.6	-1022	-58	-1262	127	100	817	123	759
15	132.6	-1066	-54	-1330	152	107	853	131	790
16	138.9	-1104	-50	-1392	176	114	883	139	819
17	144.1	-1159	-43	-1476	211	124	925	149	857
18	149.5	-1224	-32	-1581	267	135	977	163	904
19	152.0	-1262	-28	-1645	296	142	1007	170	931
20	157.6	-1348	-3	-2042	420	146	1071	178	989
21	160.2	-1372	3	-2155	462	153	1093	186	1010
22	144.5	-1136	32	-1750	303	188	986	223	904
23	140.2	-1307	117	-1926	391	12	958	44	883
24	141.6	-1469	208	-2087	477	-118	972	-84	895
25	142.0	-1788	441	-2473	669	-317	1060	-267	970
26	142.7	-2001	555	-2867	778	-365	1099	-308	1003
27	144.3	-2194	624	-2999	863	-401	1134	-339	1033
28		-2202	715	-3126	904	-433	1167	-366	1062
29	108.0	-8457	7298	248	-1959	-279	1298	13	1042
AXIAL FORCE (kN)		**-29.2**		**-38.5**		**14.5**		**13.8**	
BENDING MOMENT(N.m)		198.6		127.1		-60.3		-53.9	

AXIAL FORCES AND BENDING MOMENT IN TEST MEMBERS FOR SPECIMEN S6-A

TEST PANEL A (LEGS)

Test Serial No. 11

No.	Load(kN)	Strain 17	Strain 18	Strain 19	Strain 20	Strain 21	Strain 22	Strain 23	Strain 24	Strain 25	Strain 26	Strain 27	Strain 28
1	10.0	-5	3	-3	-2	5	-3	15	-17	3	-1	20	-15
2	20.2	-15	6	-5	-3	10	-7	41	-36	7	-1	39	-29
3	30.0	-24	9	-7	-4	17	-9	62	-54	11	-1	58	-44
4	40.0	-32	13	-9	-5	22	-15	82	-73	14	-2	81	-62
5	50.0	-41	15	-12	-7	28	-18	104	-92	19	-2	103	-78
6	60.0	-49	19	-15	-9	34	-23	125	-111	22	-4	122	-96
7	70.5	-58	23	-18	-9	40	-26	147	-131	25	-5	144	-113
8	80.2	-66	26	-21	-10	47	-30	167	-148	29	-6	162	-128
9	91.0	-76	31	-23	-11	54	-35	189	-168	33	-7	182	-145
10	100.9	-84	35	-24	-10	59	-38	209	-185	37	-7	201	-159
11	110.5	-92	39	-27	-12	65	-43	230	-204	40	-9	219	-175
12	115.9	-99	43	-29	-13	69	-46	243	-216	43	-9	232	-185
13	121.9	-105	44	-31	-12	74	-48	256	-228	45	-10	244	-196
14	127.6	-112	48	-34	-13	77	-51	270	-241	47	-11	257	-205
15	132.6	-118	51	-35	-13	81	-54	283	-252	49	-13	268	-214
16	138.9	-122	53	-36	-13	85	-56	294	-261	51	-13	277	-223
17	144.1	-129	56	-38	-13	89	-60	308	-276	54	-14	289	-232
18	149.5	-139	62	-40	-14	95	-64	326	-291	58	-17	306	-246
19	152.0	-144	64	-42	-15	99	-68	338	-302	59	-17	314	-253
20	157.6	-153	81	-47	-10	115	-81	359	-323	64	-21	321	-258
21	160.2	-159	85	-49	-10	118	-84	367	-330	68	-22	328	-263
22	144.5	-122	36	-36	-21	24	2	290	-260	74	-36	315	-258
23	140.2	-79	-2	-24	-30	72	-39	283	-247	76	-39	322	-264
24	141.6	-51	-32	-14	-38	107	-70	284	-245	77	-39	332	-276
25	142.0	-4	-81	0	-51	160	-118	291	-246	82	-46	354	-298
26	142.7	9	-95	3	-56	176	-133	297	-250	82	-47	359	-304
27	144.9	16	-107	6	-60	190	-146	301	-255	81	-46	356	-300
28		37	-126	13	-66	204	-159	306	-260	66	-31	359	-304
29	108.0	9	-93	12	-75	370	-340	316	-284	305	-272	333	-282
AXIAL FORCE (kN)		-33.9		-20.6		16.9		17.6		13.9		22.1	
BENDING MOMENT(N.m		417.3		221.9		-1125		-1859.2		-422.6		-2252.7	

AXIAL FORCES AND BENDING MOMENT IN TEST MEMBERS FOR SPECIMEN S6-B

TEST PANEL A (FRONT DIAGONAL BUCKLED)

Test Serial No. 13

No.	Load (kN)	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8
1	-23.7	13	-177	2	-178	144	18	171	-5
2	-40.8	23	-313	10	-321	253	38	300	-1
3	-58.8	40	-458	26	-476	368	63	434	7
4	-77.4	64	-606	50	-639	484	93	567	23
5	-96.1	91	-757	83	-808	598	125	696	41
6	-105.5	106	-832	106	-898	654	143	759	52
7	-114.5	123	-903	131	-990	710	159	823	63
8	-124.1	140	-983	159	-1088	768	179	889	76
9	-133.4	159	-1059	194	-1188	826	196	952	90
10	-142.4	179	-1134	234	-1293	882	219	1016	103
11	-151.7	202	-1217	277	-1406	940	239	1078	117
12	-154.4	220	-1269	317	-1489	976	242	1120	116
13	-153.8	237	-1306	356	-1551	1000	236	1148	109
14	-154.9	245	-1319	375	-1579	1015	243	1165	111
15	-122.1	179	-845	199	-974	850	313	987	192
16	-121.8	181	-845	197	-967	853	320	991	198
17	-122.2	184	-849	198	-971	859	323	997	202
18	-122.0	186	-849	195	-968	863	328	1000	207
19	-121.2	190	-851	193	-960	869	333	1005	214
20	-121.3	186	-851	192	-967	872	331	1007	213
21	-120.4	211	-904	196	-997	871	302	1003	187
22	-115.1	329	-1179	267	-1232	860	83	972	-14
23	-114.9	349	-1218	279	-1263	865	60	976	-35
24	-114.4	367	-1264	300	-1317	880	25	987	-66
25	-113.8	416	-1334	314	-1356	889	-5	994	-92
26	-112.9	518	-1501	369	-1485	934	-85	1031	-165
27	-111.4	689	-1755	449	-1665	1011	-188	1097	-253
28	-111.7	791	-1989	476	-1732	1050	-218	1132	-278
29	-109.0	1297	-2662	446	-1806	1157	-283	1228	-328
30	-103.5	4008	-5630	-1451	354	1199	-132	1234	-63
AXIAL FORCE (kN)		**-25.4**		**-26.9**		**17.3**		**17.9**	
BENDING MOMENT(N.m)		**144.9**		**88.5**		**-56.6**		**-61.1**	

AXIAL FORCES AND BENDING MOMENT IN TEST MEMBERS FOR SPECIMEN S6-B

TEST PANEL A (REAR DIAGONAL BUCKLED FIRST)

Test Serial No. 13

No.	Load (kN)	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16
1	-23.7	-49	-194	-84	-173	148	17	133	29
2	-40.8	-77	-331	-103	-296	242	31	222	47
3	-58.8	-96	-487	-140	-428	347	45	320	67
4	-77.4	-101	-661	-174	-567	459	61	422	90
5	-96.1	-88	-853	-206	-710	575	78	528	113
6	-105.5	-73	-955	-220	-779	631	88	582	125
7	-114.5	-53	-1062	-237	-844	689	97	634	138
8	-124.1	-23	-1179	-253	-913	749	107	691	151
9	-133.4	14	-1301	-272	-975	807	118	744	165
10	-142.4	61	-1430	-297	-1029	864	128	797	179
11	-151.7	120	-1564	-321	-1079	922	139	850	194
12	-154.4	150	-1600	-338	-1066	930	134	853	194
13	-153.6	164	-1582	-354	-1019	912	118	829	185
14	-154.9	186	-1613	-369	-1030	920	114	833	182
15	-122.1	155	-1314	-261	-856	736	-5	639	80
16	-121.8	160	-1314	-259	-852	733	-10	634	77
17	-122.2	165	-1319	-259	-852	734	-13	634	75
18	-122.0	168	-1316	-257	-847	731	-19	630	71
19	-121.2	176	-1311	-253	-839	724	-29	620	64
20	-121.3	181	-1314	-253	-837	724	-33	620	61
21	-120.4	184	-1312	-255	-831	726	-35	620	61
22	-115.1	174	-1295	-267	-810	740	-18	638	73
23	-114.9	177	-1297	-269	-807	743	-19	640	73
24	-114.4	186	-1303	-269	-803	748	-22	645	73
25	-113.8	189	-1300	-268	-798	750	-24	645	71
26	-112.9	206	-1308	-268	-785	761	-30	654	69
27	-111.4	227	-1299	-264	-757	773	-42	660	65
28	-111.7	241	-1305	-264	-749	782	-45	667	64
29	-106.0	227	-1148	-224	-645	730	-90	603	33
30	-103.5	255	-1223	-293	-621	776	-125	634	15
AXIAL FORCE (kN)		**-28.3**		**-27.3**		**20.5**		**20.1**	
BENDING MOMENT(N.m)		79.7		26.9		-31.7		-25.6	

AXIAL FORCES AND BENDING MOMENT IN TEST MEMBERS FOR SPECIMEN S6-8

TEST PANEL A (LEGS)

Test Serial No. 13

No.	Load (kN)	Strain 17	Strain 18	Strain 19	Strain 20	Strain 21	Strain 22	Strain 23	Strain 24	Strain 25	Strain 26	Strain 27	Strain 28
1	-23.7	-18	6	-10	-1	2	3	43	-37	1	2	43	-32
2	-40.8	-29	10	-16	-2	2	5	73	-63	1	4	77	-59
3	-58.8	-42	16	-24	-2	6	7	104	-90	1	5	112	-86
4	-77.4	-57	22	-32	-3	9	10	135	-119	2	5	149	-119
5	-96.1	-73	29	-40	-4	11	11	168	-147	2	6	186	-149
6	-105.5	-80	32	-44	-4	13	11	184	-162	2	6	204	-165
7	-114.5	-88	35	-48	-6	14	11	200	-175	3	6	222	-180
8	-124.1	-96	38	-53	-6	15	12	217	-190	3	6	242	-196
9	-133.4	-105	41	-57	-6	16	14	233	-203	3	6	261	-214
10	-142.4	-113	45	-61	-6	18	14	247	-218	3	5	281	-230
11	-151.7	-121	49	-66	-7	18	14	262	-231	4	3	300	-246
12	-154.4	-126	51	-69	-6	19	14	263	-231	4	1	313	-256
13	-153.8	-129	56	-69	-6	18	15	256	-223	5	-4	321	-266
14	-154.9	-134	61	-69	-4	20	16	257	-223	5	-6	324	-269
15	-122.1	-114	51	-58	-4	36	-8	210	-183	-7	82	218	-182
16	-121.8	-114	52	-58	-4	37	-9	209	-182	-7	85	218	-182
17	-122.2	-116	52	-58	-5	37	-9	210	-182	-7	87	219	-182
18	-122.0	-115	52	-58	-5	38	-10	208	-182	-7	89	219	-182
19	-121.2	-112	49	-57	-6	41	-11	206	-180	-8	94	218	-181
20	-121.3	-111	47	-56	-6	41	-12	206	-180	-8	92	217	-182
21	-120.4	-101	38	-52	-10	40	-12	206	-180	-6	80	220	-183
22	-115.1	-42	-14	-26	-27	33	-6	209	-183	5	-12	236	-191
23	-114.9	-35	-22	-25	-29	33	-7	209	-186	6	-22	237	-194
24	-114.4	-21	-37	-18	-34	31	-6	209	-186	8	-35	242	-197
25	-113.8	-10	-48	-14	-39	30	-6	210	-186	9	-45	244	-198
26	-112.9	29	-86	2	-53	29	-3	210	-187	13	-78	254	-206
27	-111.4	92	-150	27	-77	24	-1	209	-186	19	-128	270	-219
28	-111.7	117	-175	37	-86	22	1	210	-188	21	-148	279	-226
29	-106.8	189	-217	55	-104	14	7	182	-163	36	-210	316	-256
30	-103.5	132	-195	48	-103	10	14	186	-163	38	-301	320	-277
AXIAL FORCE (kN)		**-22.2**		**-18.8**		**8**		**7.3**		**-69.7**		**20.7**	
BENDING MOMENT(N.m)		1258.1		532		-23.4		-1154.3		796.3		-1893.8	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN S6-C

TEST PANEL A (FRONT ,PANEL A NOT BUCKLED BECAUSE OF PANEL C,D BUCKLED AFTER THE FIRST HORINZONTAL BUCKLED)

Test Serial No. 24

No.	Load (kN)	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8
1	-34.8	-255	-80	-267	-71	39	202	47	202
2	-55.6	-416	-114	-434	-103	66	323	77	324
3	-71.9	-551	-134	-568	-124	88	416	100	419
4	-88.8	-695	-147	-709	-139	112	513	125	518
5	-106.4	-851	-147	-857	-150	140	614	152	622
6	-118.2	-963	-141	-958	-155	159	681	172	692
7	-136.4	-1144	-116	-1112	-159	191	787	202	802
8	-154.1	-1336	-73	-1262	-158	225	886	232	911
9	-171.9	-1548	-4	-1411	-154	264	989	262	1025
10	-182.9	-1693	57	-1497	-152	285	1051	278	1096
11	-186.6	-1749	90	-1519	-155	288	1070	280	1116
12	-187.1	-1787	128	-1518	-156	273	1072	267	1116
13	-185.4	-1803	149	-1510	-159	255	1064	252	1107
14	-184.6	-1832	177	-1508	-161	241	1061	239	1102
15	-184.9	-1739	172	-1449	-131	186	988	185	1027
16	-185.0	-1783	200	-1465	-131	183	998	183	1036
17	-183.6	-1771	197	-1456	-131	178	991	179	1029
18	-187.9	-1881	260	-1493	-139	185	1026	186	1065
19	-189.3	-1928	292	-1502	-149	185	1040	189	1078
20	-171.7	-1988	335	-1509	-163	189	1059	194	1097
21	-175.0	-2121	452	-1499	-204	193	1092	200	1128
22	-168.0	-2134	519	-1437	-155	115	1040	126	1070
23	-138.4	-1236	184	-932	-92	198	860	214	875
24	-141.0	-1187	177	-897	-84	234	878	250	895
25	-143.4	-1051	166	-796	-61	310	911	324	927
26	-148.4	-923	171	-693	-33	402	965	418	980
27	-150.2	-879	178	-655	-20	434	986	450	1000
AXIAL FORCE (kN)									

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN S6-C

TEST PANEL A (REAR DIAGONAL) — Test Serial No. 24

No.	Load (kN)	Strain 9	Strain 10	Strain 11	Strain 12	Strain 13	Strain 14	Strain 15	Strain 16
1	-34.8	-237	-43	-261	-15	60	185	32	211
2	-55.6	-383	-61	-430	-10	96	294	53	335
3	-71.9	-502	-74	-569	2	130	381	73	433
4	-88.8	-626	-84	-722	22	168	473	97	535
5	-106.4	-756	-91	-885	53	207	568	128	638
6	-118.2	-842	-93	-999	80	237	632	151	708
7	-136.4	-976	-98	-1185	132	285	730	190	816
8	-154.1	-1104	-101	-1379	202	339	827	232	919
9	-171.9	-1225	-110	-1591	294	398	921	281	1020
10	-182.9	-1298	-120	-1712	398	436	982	314	1085
11	-186.6	-1326	-125	-1779	457	452	1009	326	1113
12	-187.1	-1341	-117	-1810	508	454	1022	326	1126
13	-185.4	-1342	-108	-1828	539	448	1022	320	1126
14	-184.6	-1342	-92	-1805	531	446	1020	320	1124
15	-164.9	-978	-45	-1187	304	490	908	389	994
16	-165.0	-942	-37	-1130	291	512	912	415	998
17	-163.6	-922	-33	-1101	284	513	906	417	990
18	-167.9	-902	-22	-1085	280	555	934	461	1014
19	-169.3	-882	-14	-1036	275	573	944	480	1023
20	-171.7	-880	-10	-1029	277	590	959	499	1037
21	-175.0	-869	10	-1003	279	622	987	534	1063
22	-168.0	-856	81	-919	277	542	936	469	1001
23	-138.4	-806	67	-855	249	484	881	414	945
24	-141.0	-825	60	-886	254	498	900	424	965
25	-143.4	-759	54	-826	252	556	927	480	993
26	-148.4	-666	57	-731	246	649	979	573	1046
27	-150.2	-634	58	-697	246	678	997	602	1062
AXIAL FORCE (kN)									

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN 31SRB

(TOP LEG BUCKLED FIRST, NO DIAGONAL BUCKLED)

Test Serial No. 14

No.	Load kN	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8	Strain 9	Strain 10	Strain 11	Strain 12
1	-8.2	-39	-28	32	37	40	29	-34	-33	-37	-35	32	38
2	-15.5	-68	-49	64	75	73	53	-71	-68	-69	-61	65	77
3	-23.7	-104	-73	100	119	109	80	-112	-106	-103	-94	104	124
4	-27.9	-124	-88	117	138	130	96	-131	-124	-123	-112	122	143
5	-32.3	-147	-102	135	156	152	112	-151	-140	-144	-131	139	163
6	-36.7	-169	-116	151	175	177	130	-171	-157	-169	-149	156	184
7	-41.2	-192	-131	169	196	200	147	-190	-175	-190	-170	176	204
8	-45.6	-216	-147	186	215	224	163	-210	-192	-215	-190	194	225
9	-50.1	-241	-161	204	234	248	181	-231	-209	-237	-209	214	246
10	-54.7	-267	-176	222	254	272	201	-251	-226	-261	-229	233	267
11	-54.6	-264	-175	221	255	271	201	-250	-225	-260	-229	230	266
12	-62.4	-306	-198	253	289	313	232	-285	-254	-300	-264	264	303
13	-66.9	-332	-213	270	308	335	249	-308	-273	-323	-284	284	324
14	-71.4	-356	-228	287	329	359	268	-328	-289	-347	-303	302	345
15	-75.8	-381	-238	304	348	383	286	-347	-304	-370	-323	320	363
16	-80.4	-407	-251	323	368	406	306	-371	-321	-394	-343	339	386
17	-85.0	-435	-264	342	386	430	323	-393	-339	-418	-363	358	406
18	-89.6	-461	-275	359	407	453	342	-414	-354	-442	-383	378	428
19	-94.1	-488	-286	377	426	477	360	-437	-370	-465	-403	396	446
20	-98.5	-513	-296	395	446	499	378	-457	-385	-486	-422	415	467
21	-103.0	-542	-305	414	465	523	398	-481	-401	-510	-441	434	487
22	-107.5	-570	-315	433	484	544	414	-503	-416	-533	-461	453	508
23	-111.8	-595	-321	449	502	566	434	-524	-428	-555	-480	471	527
24	-116.3	-625	-329	469	521	590	449	-547	-443	-579	-500	491	547
25	-120.7	-655	-336	486	540	610	469	-571	-457	-598	-520	510	567
26	-124.9	-684	-342	503	557	631	485	-594	-468	-616	-540	528	585
27	-128.9	-710	-346	517	574	650	502	-615	-478	-633	-560	546	603
28	-133.0	-740	-350	532	591	669	519	-638	-489	-650	-582	564	621
29	-136.9	-768	-351	548	606	689	532	-661	-498	-665	-602	583	638
30	-139.8	-792	-351	559	618	701	543	-680	-503	-665	-624	598	651
31	-142.2	-814	-349	567	627	710	550	-697	-502	-660	-647	613	661
32	-143.6	-834	-347	576	633	716	553	-714	-500	-651	-668	626	668
33	-89.8	-507	-265	332	384	418	320	-474	-249	-417	-361	462	426
34	-88.3	-499	-260	325	376	411	312	-466	-244	-414	-351	456	419
AXIAL FORCES(kN)		-46.1		47.2		49.6		-47.4		-51.5		50.5	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN 31SRB

Test Serial No. 14

No.	Load kN	Strain 13	Strain 14	Strain 15	Strain 16	Strain 17	Strain 18	Strain 19	Strain 20	Strain 21	Strain 22	Strain 23	Strain 24
1	-8.2	37	33	-33	-37	-31	-38	29	33	38	22	-26	-43
2	-15.5	69	61	-69	-74	-55	-72	101	69	72	40	-53	-86
3	-23.7	103	92	-109	-118	-83	-109	155	109	108	59	-83	-137
4	-27.9	124	112	-128	-137	-100	-130	186	128	129	71	-98	-161
5	-32.3	146	131	-147	-157	-116	-152	227	145	152	86	-107	-185
6	-36.7	169	151	-165	-176	-134	-176	266	163	176	100	-119	-210
7	-41.2	190	171	-182	-196	-151	-200	303	182	198	116	-129	-236
8	-45.6	213	191	-201	-216	-171	-225	339	200	222	131	-142	-261
9	-50.1	235	213	-219	-237	-188	-249	371	219	246	147	-151	-288
10	-54.7	259	234	-237	-257	-205	-273	398	238	270	163	-163	-316
11	-54.6	258	233	-237	-257	-206	-273	406	237	270	163	-161	-316
12	-62.4	297	268	-269	-294	-235	-316	481	269	311	190	-179	-363
13	-66.9	321	292	-285	-315	-252	-343	522	288	335	208	-188	-392
14	-71.4	343	313	-302	-336	-268	-367	554	307	359	224	-197	-421
15	-75.8	365	332	-321	-358	-284	-394	591	324	381	239	-206	-449
16	-80.4	389	355	-338	-379	-300	-421	630	345	406	257	-213	-478
17	-85.0	411	376	-355	-402	-316	-448	663	363	430	274	-220	-510
18	-89.6	434	396	-372	-425	-332	-476	693	381	456	291	-226	-542
19	-94.1	456	418	-388	-449	-346	-504	727	399	481	308	-230	-574
20	-98.5	479	439	-402	-470	-359	-532	764	418	504	325	-235	-606
21	-103.0	502	460	-418	-496	-372	-560	807	437	528	343	-239	-640
22	-107.5	524	481	-432	-520	-385	-591	847	455	555	361	-241	-674
23	-111.8	545	501	-444	-544	-395	-618	930	473	578	378	-241	-706
24	-116.3	567	522	-455	-573	-407	-649	963	491	603	396	-241	-744
25	-120.7	590	543	-465	-602	-417	-681	999	509	629	413	-241	-783
26	-124.9	611	563	-469	-634	-426	-713	1046	525	653	429	-237	-820
27	-128.9	630	583	-469	-668	-430	-745	1102	542	677	445	-232	-857
28	-133.0	650	601	-466	-705	-434	-779	1132	558	703	459	-225	-895
29	-136.9	669	618	-461	-745	-439	-812	1171	574	727	474	-218	-933
30	-139.8	685	633	-430	-802	-426	-850	1214	584	751	485	-203	-965
31	-142.2	699	644	-380	-873	-407	-894	1239	593	773	490	-194	-991
32	-143.6	708	652	-315	-958	-372	-946	1289	600	783	492	-190	-1008
33	-89.6	453	388	314	-1149	215	-1030	1058	359	594	230	-158	-581
34	-88.3	446	381	319	-1145	214	-1014	1069	350	585	226	-155	-571
AXIAL FORCES(kN)		53.1		-49.7		-51.5		73		50.2		-46.7	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN 31SRB

Test Serial No. 14

No.	Load kN	Strain 25	Strain 26	Strain 27	Strain 28	Strain 29	Strain 30	Strain 31	Strain 32	Strain 33	Strain 34	Strain 35	Strain 36
1	-8.2	-43	-36	-29	-36	-38	-39	-37	-29	-4	-37		-35
2	-15.5	-84	-74	-51	-67	-79	-77	-66	-54	-8	-74		-65
3	-23.7	-127	-111	-73	-99	-120	-118	-100	-81	-13	-115		-97
4	-27.9	-151	-131	-89	-120	-143	-136	-120	-97	-15	-132		-116
5	-32.3	-168	-149	-104	-142	-160	-156	-143	-116	-17	-151		-138
6	-36.7	-189	-168	-120	-167	-181	-175	-164	-135	-20	-171		-160
7	-41.2	-210	-187	-137	-191	-198	-194	-188	-153	-22	-189		-182
8	-45.6	-229	-206	-151	-211	-218	-214	-212	-172	-24	-207		-206
9	-50.1	-249	-226	-167	-236	-238	-233	-233	-190	-26	-226		-227
10	-54.7	-269	-245	-181	-261	-257	-253	-258	-209	-29	-244		-250
11	-54.6	-270	-246	-182	-262	-257	-253	-257	-210	-29	-243		-250
12	-62.4	-307	-284	-209	-310	-296	-288	-298	-241	-32	-276		-289
13	-66.9	-324	-300	-221	-332	-313	-306	-322	-261	-35	-295		-313
14	-71.4	-345	-324	-236	-358	-333	-328	-345	-279	-37	-313		-336
15	-75.8	-362	-340	-247	-381	-351	-347	-367	-297	-39	-329		-359
16	-80.4	-383	-362	-261	-410	-370	-367	-391	-317	-41	-350		-382
17	-85.0	-405	-385	-275	-441	-390	-387	-414	-336	-44	-368		-406
18	-89.6	-421	-405	-285	-469	-410	-409	-440	-355	-46	-386		-429
19	-94.1	-440	-425	-295	-494	-428	-428	-461	-375	-49	-403		-452
20	-98.5	-457	-444	-304	-522	-445	-449	-484	-394	-51	-421		-475
21	-103.0	-476	-467	-314	-554	-464	-469	-505	-412	-53	-438		-498
22	-107.5	-493	-488	-321	-583	-481	-489	-530	-433	-56	-456		-522
23	-111.8	-511	-512	-331	-616	-500	-509	-549	-452	-58	-473		-543
24	-116.3	-528	-534	-337	-649	-518	-531	-571	-472	-60	-489		-567
25	-120.7	-543	-557	-339	-681	-535	-551	-591	-493	-62	-508		-590
26	-124.9	-556	-579	-340	-716	-550	-572	-610	-516	-65	-524		-612
27	-128.9	-573	-605	-342	-751	-564	-592	-626	-537	-67	-537		-634
28	-133.0	-587	-630	-339	-791	-579	-613	-642	-561	-69	-554		-655
29	-136.9	-598	-653	-334	-829	-594	-633	-656	-584	-71	-569		-677
30	-139.8	-606	-678	-322	-868	-603	-650	-661	-610	-73	-579		-692
31	-142.2	-613	-698	-308	-900	-608	-665	-663	-631	-75	-588		-703
32	-143.6	-613	-709	-288	-925	-607	-677	-662	-645	-78	-595		-712
33	-89.8	-399	-465	-150	-629	-400	-441	-411	-420	-48	-397		-454
34	-88.3	-392	-458	-147	-619	-394	-433	-404	-414	-47	-390		-447
AXIAL FORCES(kN)		-51.6		-47.4		-50.1		-51.0		-26.2			

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN 338RC

Test Serial No. 16

No.	Load kN	Strain 1	Strain 2	Strain 3	Strain 4	Strain 5	Strain 6	Strain 7	Strain 8	Strain 9	Strain 10	Strain 11	Strain 12
1	-46.0	-97	-109	-149	-86	-108	-120	-134	-105	-80	-132	-115	-121
2	-56.4	-121	-138	-181	-104	-134	-149	-161	-127	-100	-164	-142	-151
3	-68.2	-147	-168	-218	-123	-163	-182	-193	-151	-123	-201	-174	-184
4	-87.3	-190	-219	-277	-152	-211	-237	-245	-190	-156	-262	-225	-239
5	-110.8	-243	-284	-351	-188	-269	-304	-308	-237	-197	-339	-288	-306
6	-124.0	-272	-320	-392	-208	-302	-342	-344	-265	-219	-384	-324	-348
7	-136.5	-300	-354	-434	-227	-333	-379	-379	-290	-239	-427	-357	-386
8	-162.2	-355	-424	-519	-264	-393	-453	-450	-343	-277	-515	-425	-462
9	-177.8	-387	-468	-572	-284	-430	-500	-494	-376	-300	-571	-466	-509
10	-192.9	-419	-509	-624	-305	-465	-544	-536	-406	-320	-625	-506	-555
11	-220.3	-477	-586	-724	-340	-527	-626	-617	-461	-353	-727	-577	-640
12	-235.4	-507	-629	-779	-357	-560	-672	-660	-492	-369	-783	-616	-687
13	-251.8	-540	-675	-840	-375	-595	-720	-709	-525	-386	-845	-657	-736
14	-265.5	-567	-715	-895	-390	-624	-762	-751	-553	-398	-899	-692	-782
15	-282.1	-599	-762	-958	-407	-657	-813	-801	-584	-410	-964	-733	-834
16	-297.0	-626	-805	-1018	-421	-687	-858	-846	-614	-419	-1026	-770	-881
17	-323.1	-676	-882	-1128	-441	-737	-943	-927	-664	-432	-1138	-835	-970
18	-338.5	-703	-929	-1192	-450	-765	-992	-975	-693	-436	-1207	-873	-1023
19	-353.4	-731	-977	-1259	-456	-792	-1042	-1022	-720	-437	-1279	-909	-1076
20	-367.0	-753	-1020	-1320	-464	-815	-1089	-1066	-745	-434	-1347	-944	-1125
21	-378.7	-771	-1057	-1373	-468	-834	-1129	-1104	-766	-431	-1405	-973	-1168
22	-392.3	-793	-1103	-1436	-470	-855	-1179	-1148	-790	-422	-1478	-1006	-1220
23	-407.8	-814	-1155	-1517	-469	-876	-1234	-1202	-815	-407	-1569	-1042	-1281
24	-421.2	-832	-1201	-1597	-461	-893	-1288	-1252	-836	-381	-1666	-1077	-1344
25	-433.3	-843	-1253	-1695	-434	-897	-1352	-1306	-852	-301	-1834	-1121	-1440
26	-438.3	-847	-1276	-1744	-418	-897	-1379	-1329	-857	-256	-1922	-1143	-1485
27	-443.7	-850	-1301	-1789	-404	-895	-1411	-1353	-861	-207	-2015	-1165	-1536
28	-448.8	-851	-1330	-1848	-381	-888	-1450	-1381	-866	-116	-2164	-1199	-1619
29	-454.7	-854	-1363	-1905	-361	-879	-1490	-1409	-873	20	-2392	-1254	-1746
30	-460.3	-857	-1392	-1957	-343	-869	-1532	-1438	-881	254	-2843	-1371	-1970
31	2.6	112	18	-198	-48	60	-435	-58780	31908	40698	-23604	-10430	-13307
								buckled inside		buckled outside			
AXIAL FORCES (kN)		-144.3		-147.3		-154		-148.6		-150.5		-212.8	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN 338RC

Test Serial No. 16

No.	Load kN	Strain 13	Strain 14	Strain 15	Strain 16	Strain 17	Strain 18	Strain 19	Strain 20	Strain 21	Strain 22	Strain 23	Strain 24
1	-46.0	-121	-113	-122	-112	-92	-127	-105	-114	-115	-122	-128	-108
2	-56.4	-147	-136	-147	-135	-112	-155	-128	-139	-143	-151	-159	-135
3	-68.2	-174	-163	-175	-159	-135	-186	-154	-167	-175	-183	-191	-161
4	-87.3	-219	-206	-222	-202	-168	-240	-195	-214	-222	-237	-249	-206
5	-110.8	-273	-260	-278	-252	-210	-308	-247	-271	-280	-304	-319	-264
6	-124.0	-303	-291	-312	-279	-231	-346	-274	-303	-316	-345	-358	-296
7	-136.5	-332	-321	-342	-307	-253	-383	-302	-334	-343	-379	-393	-323
8	-162.2	-388	-382	-406	-361	-292	-460	-356	-398	-404	-456	-472	-386
9	-177.8	-423	-421	-445	-394	-317	-509	-390	-437	-445	-507	-519	-420
10	-192.9	-457	-457	-485	-426	-339	-556	-422	-475	-476	-550	-561	-453
11	-220.3	-519	-526	-556	-484	-383	-646	-482	-547	-536	-633	-639	-511
12	-235.4	-552	-565	-596	-516	-404	-697	-515	-588	-568	-680	-685	-543
13	-251.8	-588	-606	-640	-549	-426	-752	-551	-631	-600	-728	-732	-577
14	-265.5	-618	-641	-676	-577	-445	-801	-580	-669	-630	-774	-771	-606
15	-282.1	-655	-685	-721	-611	-468	-861	-617	-714	-662	-823	-819	-638
16	-297.0	-688	-725	-763	-642	-487	-915	-649	-756	-691	-870	-863	-665
17	-323.1	-743	-795	-834	-693	-517	-1014	-704	-829	-738	-953	-939	-716
18	-338.5	-775	-836	-877	-723	-532	-1073	-736	-873	-766	-1004	-983	-745
19	-353.4	-806	-877	-920	-751	-546	-1133	-767	-916	-790	-1056	-1029	-773
20	-367.0	-832	-916	-959	-777	-557	-1188	-795	-955	-812	-1102	-1069	-798
21	-378.7	-856	-948	-993	-798	-566	-1238	-817	-991	-831	-1142	-1101	-818
22	-392.3	-882	-986	-1033	-822	-575	-1297	-846	-1030	-853	-1191	-1145	-839
23	-407.8	-912	-1030	-1079	-849	-583	-1366	-876	-1077	-877	-1246	-1193	-865
24	-421.2	-940	-1072	-1124	-872	-589	-1430	-904	-1120	-897	-1297	-1238	-885
25	-433.3	-962	-1114	-1166	-890	-589	-1483	-931	-1159	-910	-1342	-1277	-893
26	-438.3	-970	-1132	-1185	-897	-588	-1522	-943	-1175	-917	-1364	-1297	-901
27	-443.7	-979	-1150	-1204	-904	-587	-1552	-954	-1192	-922	-1384	-1317	-904
28	-448.8	-986	-1172	-1226	-912	-580	-1587	-967	-1210	-922	-1407	-1336	-904
29	-454.7	-995	-1196	-1248	-920	-574	-1629	-983	-1231	-924	-1434	-1356	-904
30	-460.3	-1003	-1220	-1271	-928	-563	-1672	-999	-1252	-927	-1466	-1381	-904
31	2.6	-18	-390	-378	-49	106	-61	-41	14	68	-74	10	14
AXIAL FORCES (kN)		-142.6		-141.1		-143.4		-144.4		-153.5		-146.6	

AXIAL FORCES IN TEST MEMBERS FOR SPECIMEN 33SRC

Test Serial No. 16

No.	Load kN	Strain 26	Strain 28	Strain 27	Strain 28	Strain 29	Strain 30	Strain 31	Strain 32	Strain 33	Strain 34	Strain 35	Strain 36
1	-46.0	-13	-108	-129	-116	-119	-78	-139	-103				
2	-56.4	-15	-132	-160	-143	-145	-95	-173	-127				
3	-68.2	-18	-159	-194	-171	-174	-116	-210	-153				
4	-87.3	-23	-203	-250	-222	-223	-146	-272	-197				
5	-110.8	-29	-258	-320	-282	-283	-185	-348	-249				
6	-124.0	-33	-289	-357	-316	-312	-209	-391	-277				
7	-136.5	-36	-320	-394	-349	-341	-230	-433	-304				
8	-162.2	-42	-382	-469	-415	-407	-277	-519	-359				
9	-177.8	-46	-420	-515	-456	-447	-304	-571	-392				
10	-192.9	-49	-457	-557	-493	-481	-331	-622	-422				
11	-220.3	-56	-527	-637	-562	-551	-381	-716	-475				
12	-235.4	-60	-566	-681	-598	-591	-408	-767	-502				
13	-251.8	-64	-609	-727	-636	-634	-440	-824	-530				
14	-265.5	-67	-646	-766	-670	-671	-466	-873	-553				
15	-282.1	-71	-690	-813	-708	-712	-497	-932	-579				
16	-297.0	-75	-731	-855	-743	-752	-525	-986	-602				
17	-323.1	-81	-802	-930	-802	-820	-574	-1084	-639				
18	-338.5	-84	-845	-975	-838	-861	-602	-1142	-658				
19	-353.4	-88	-886	-1018	-872	-904	-630	-1203	-677				
20	-367.0	-91	-925	-1059	-901	-940	-653	-1259	-692				
21	-378.7	-93	-959	-1094	-927	-971	-675	-1309	-703				
22	-392.3	-96	-998	-1141	-954	-1010	-700	-1379	-711				
23	-407.8	-100	-1044	-1200	-982	-1056	-725	-1472	-709				
24	-421.2	-103	-1084	-1257	-1000	-1099	-749	-1564	-699				
25	-433.3	-106	-1124	-1316	-1010	-1138	-771	-1674	-673				
26	-438.3	-107	-1140	-1342	-1012	-1154	-779	-1722	-660				
27	-443.7	-108	-1157	-1365	-1017	-1171	-788	-1768	-649				
28	-448.8	-109	-1176	-1395	-1018	-1190	-797	-1830	-630				
29	-454.7	-111	-1198	-1421	-1022	-1209	-806	-1883	-615				
30	-460.3	-112	-1218	-1446	-1025	-1233	-814	-1936	-599				
31	2.6	2	-20	-54	5	6	11	-175	57				
AXIAL FORCES (kN)		-85.3		-158.5		-131.3		-162.4					

VITA AUCTORIS

Yean Sun was born in Weifang, China on March 3rd, 1966.

He graduated with a Bachelors Degree of Civil Engineering from Harbin Architectural University, China in July 1988. Later on, he had been working as a senior professional engineer in the field of civil and environmental engineering during the period 1988-1998.

He registered as a student pursuing the degree of Master of Applied Science in Civil Engineering at the University of Windsor, Windsor, Ontario, Canada in September 1998.