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Yield Surfaces and Elastic-Plastic Behavior of Type 304 Stainless Steel at Room Temperature

K. C. Liu

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K. C. Liu

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ABSTRACT

Results are reported for tests in which thin-walled tubular specimens of type 304 stainless steel were subjected to selected stress histories by imposing axial force and torsional moment loadings at room temperature. Detailed discussions on experimental techniques and test procedures are given. In order to make a systematic study of yield surface behavior, four well-defined loading programs were selected for these tests. Proportional, or radial, prestress loadings were emphasized in the first specimen, while nonproportional prestress loadings with a systematic change in prestress direction were emphasized in the others. Initial and subsequent yield surfaces were determined experimentally for each specimen at every occurrence of segmental prestress loadings along the given loading path. Stress-strain data along prestress loadings were monitored by a small digital computer and plotted in the same coordinate system as if all the prestress loadings were one continuous loading. Plastic strain trajectories were calculated from the data and plotted in a specialized strain space to facilitate comparison with the corresponding stress paths.

Results from these tests show that there is a simple correlation between the incremental translation vector of the yield surface and the incremental plastic strain vector under proportional prestress loadings. However, the relationship between the two vectors is complex under general nonproportional prestress loadings. Under such loadings, incremental translation of the yield surface appeared to be directionally independent of the instantaneous plastic strain increment. Apparently, the representation of the plastic behavior of type 304 stainless steel requires loading-history-dependent descriptions of subsequent yield surfaces and the motion of these surfaces.

Key words: yield surface, plasticity, material testing, constitutive equations, continuum mechanics, inelastic, elastic-plastic, kinematic hardening, mechanical properties, stainless steel.

1. INTRODUCTION

The experimental work described in this report is a part of the concerted effort at Oak Ridge National Laboratory (ORNL) to develop a verified high-temperature structural design technology applicable to components for the liquid-metal fast breeder reactor (LMFBR) and other reactor systems. This report presents the results of experiments in which uniformly thin-walled tubular specimens of annealed type 304 stainless steel were subjected to combined axial force and torsional moment loadings in the plastic region. The purpose of these experiments is threefold: (1) to determine yield surfaces and obtain basic stress-strain characteristic data for the assessment of existing elastic-plastic theories, (2) to form a data base for the development of a new or improved theory through careful planning and the application of well-defined loading programs, and (3) to generate test data for use as simple benchmark problems for developers and users of inelastic analysis computer programs to verify and qualify, in part, their analysis methods.

Three ingredients are required to describe elastic-plastic behavior of a work-hardening material such as type 304 stainless steel, as noted by Shield and Ziegler.[1] These ingredients are: (1) the initial yield condition or surface that defines the onset of plastic flow, (2) the relationship between stress and plastic strain, and (3) a hardening law that describes the manner in which the yield condition changes as a result of plastic deformation. The concept of yield surface is not all new; it is a generalization of yield point in multidimensional stress space. In a two-dimensional stress space, it is reduced to a closed curve by connecting a group of yield points individually determined by the method described in this report. Hence, a yield curve, or locus in two-dimensional stress space, is meant to be synonymous with yield surface, and the two terms are often used interchangeably in this report.

Yield surface investigations for stainless steels do not parallel the wide use of these materials. A critical review of the literature on yield surface investigations for metals is given in Ref. 2. Systematic studies on the yield surfaces of type 304 stainless steel are even more scarce. The high strength of stainless steel, in comparison with that of aluminum, brass, and copper, requires the use of large test machines, and its pronounced work-hardening characteristics add another dimension of difficulty. One of the few yield surface studies of type 304 stainless steel is that of Michno and Findley,[3] who tested tubular specimens of AISI 304L stainless steel under combined tension and torsion. They investigated yield surfaces in the first and fourth quadrants of axial-torsional stress space. Another yield surface study of type 304 stainless steel is the pilot test[4] of the experiments reported here. In this pilot test, two tubular specimens of type 304 stainless steel, which were made from the same heat of stainless steel used in the present experiments, were tested under combined axial force and torsional moment loadings. Yield surfaces in the four quadrants were determined, and basic stress-strain responses were obtained for use as simple benchmark problems.

In the experiments described in this report, four thin-walled tubular specimens of type 304 stainless steel (heat 9T2796) were used in a series of tests. An initial yield surface and a sequence of subsequent yield surfaces were determined for each specimen along a selected prestress loading path, which consisted of a number of segmental loadings; each subsequent yield surface was associated with one of the straight-line prestress loadings. The first specimen was subjected to radial (or proportional) cyclic loadings. Tests were conducted in three groups of three different stress ratios, and the extent of the possible colinear relation[5,6] between the incremental translation of the yield surface and the incremental plastic strain vector under radial loadings was examined. In the other three specimens, emphasis was placed on the behavioral features of the material under nonproportional types of prestress loadings. Attention was focused on the hardening manner of the subsequent yield surfaces as well as on the stress-strain response characteristics in general. In each of these nonproportional tests, the direction of prestress loading was rotated systematically in a clockwise direction by a constant angle. Plastic strain paths were then calculated from the stress-strain curves and plotted in a specialized plastic strain space.

All the tests described here were carried out with a sophisticated control network of analog computer programs interfaced with a PDP 8/E digital computer. Precise load control and fast, accurate operation of these computers were key factors in the success of these difficult experiments.

2. SPECIMEN DESCRIPTION

2.1 Material and Specimen

The test specimens used in these experiments were made from the ORNL reference heat (heat 9T2796) of type 304 stainless steel, which was procured under USERDA material specification RDT M3-3T for the LMFBR High-Temperature Structural Design Methods Program. Ten specimens were cut from a gun-drilled tubular stock slightly more than 1.83 m (6 ft) long with a 63.5-mm (2 1/2-in.) outside diameter and a nominal 14.3-mm (0.562-in.) wall thickness. The dimensions of the finished specimens are as shown in Fig. 1. The nominal inside diameter, wall thickness, and length of the uniform section of each specimen were 34.93 mm (1 3/8 in.), 1.9 mm (0.075 in.), and ∿76.2 mm (∿3 in.), respectively. The machining operations were performed in accordance with the following directions:

1. Rough turn the inside and outside surfaces to finish size and the wall thickness to within about 2.5 mm (0.100 in.).
2. Mill both ends partially in square to transmit torques.
3. Drill and tap the fastening holes in the ends.
4. Turn the inside diameter to remove all die marks resulting from extrusion, if necessary.
5. Turn the outside diameter to achieve a nominal 1.9-mm (0.075-in.) wall thickness.
6. Finish the inside and outside surfaces to within the specified surface roughness, while controlling eccentricity for wall thickness variation to less than 1%.

The wall thickness and the outside diameter were measured at 12 points where the midlength circumference and the two circumferential lines located 25.4 mm (1 in.) from each side of the midlength circumference intersect with four axial lines spaced 90° apart around the circumference of the thin-walled section, as shown in Fig. 2a. The maximum variations of wall thickness and outside diameter from their average values for a particular specimen were less than 0.025 mm (0.001 in.) and 0.64 mm (0.0025 in.), respectively.

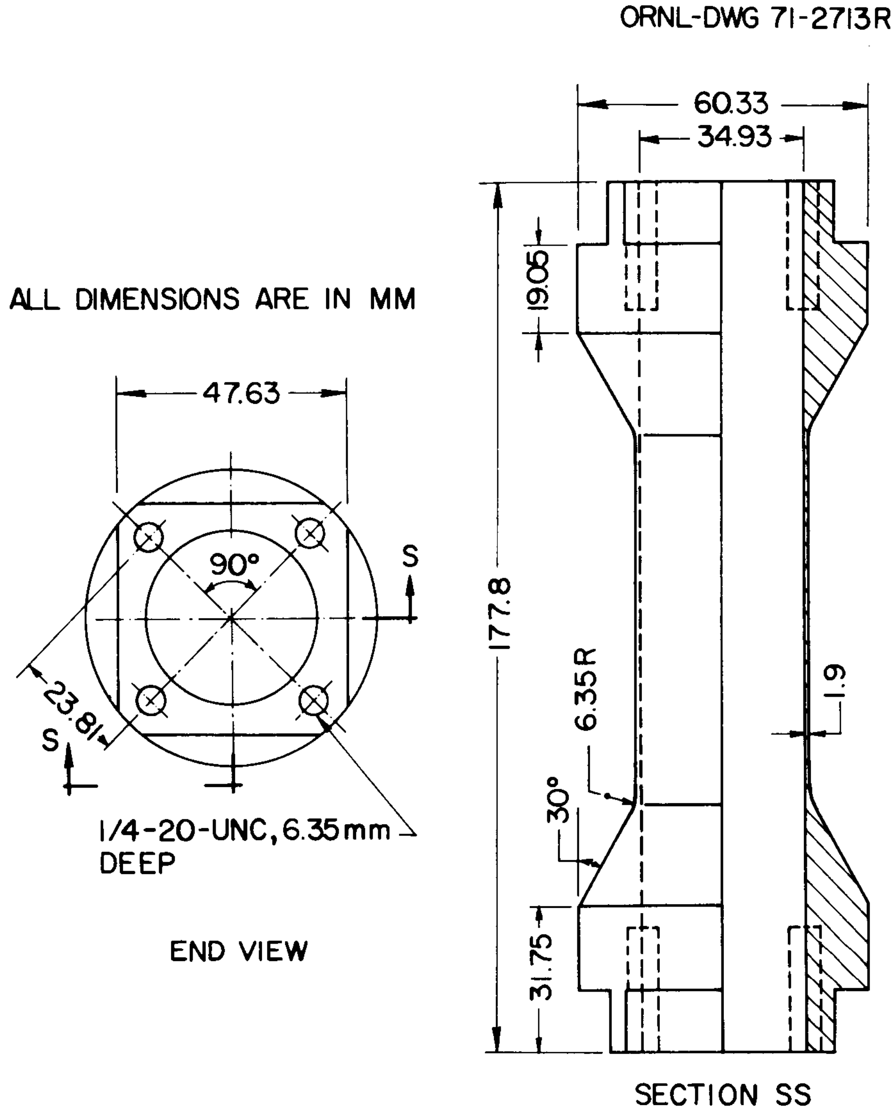

Fig. 1. Test specimen details (1 in. = 25.4 mm).

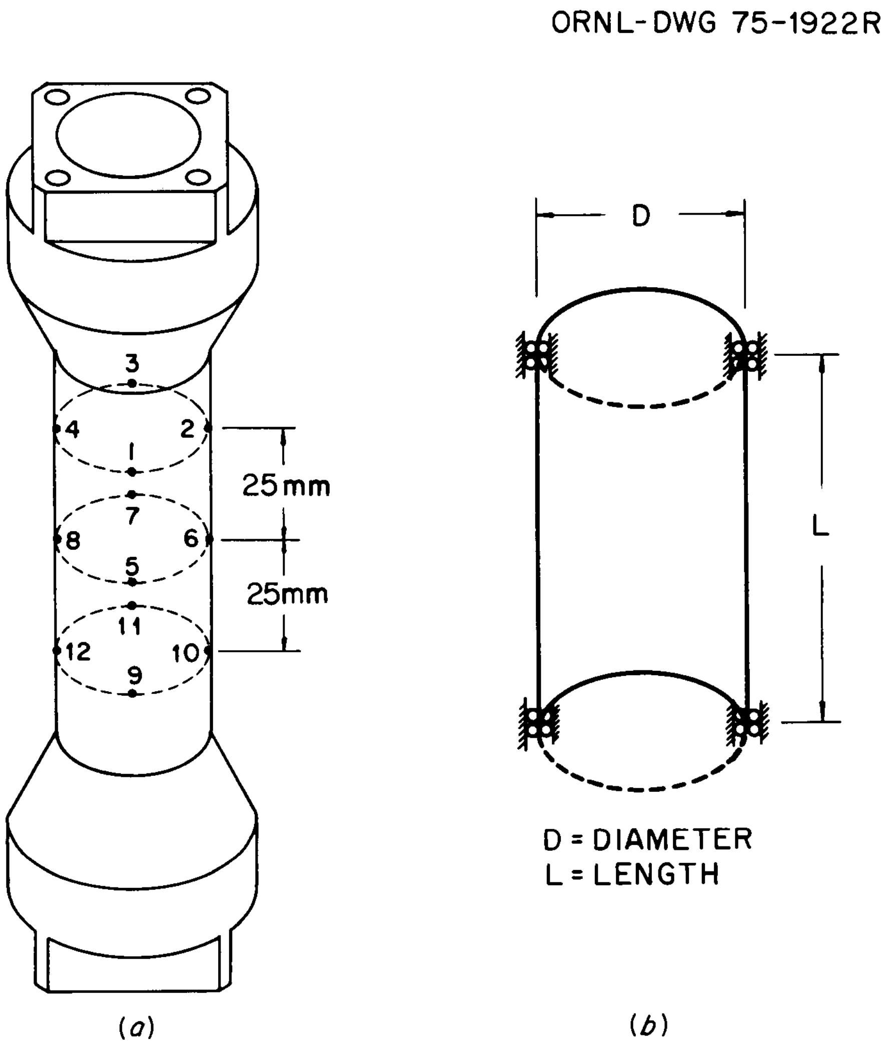

Fig. 2. Biaxial test specimen geometry; (a) measurement locations, (b) idealized uniform cylindrical thin shell with roller-guided ends. (1 in. = 25.4 mm).

The uniform test section of the specimen gives a length-to-mean-diameter ratio of ∿2 and a mean-diameter-to-wall-thickness ratio of ∿19. These ratios are often used as indices to measure the effect of the ends on the uniformity of stress distribution along the axis and on the uniformity of shear-stress distribution across the wall dimension, respectively. With the values of the indices given above, the uniform section of the specimen can be considered as an idealized cylindrical thin shell with both ends rigidly guided by rollers around the circumferences, as shown in Fig. 2b. This idealization is appropriate, since the end sections are much more rigid than the thin-walled section. Axial and torsional loads are applied from both ends. On the basis of St. Venant's principle, these loads are assumed to be uniformly distributed around the cross section. Therefore, stresses in the test sections are calculated as follows:

$$\text{axial stress } \sigma_{11} = \frac{P_{11}}{2\pi R_m t} \tag{1}$$

and

$$\text{shear stress } \tau_{12} = \frac{T_{12}}{2\pi R_m^2 t} , \tag{2}$$

where P_{11} is the axial load, T_{12} the torsional load, R_m the mean radius, and t the average wall thickness.

The 30° taper and 6.35-mm (1/4-in.) transition radius further reduce the influence of the ends on the uniformity of stress distribution.

2.2 Heat Treatment and Strain Gage Preparation

After machining, the specimens were annealed at 1092°C (2000°F) in argon for 1/2 hr and then cooled at a rate of ∿100°C (180°F) per minute. In order to bond the strain gages securely on the test specimen, two areas ∿645 mm^2 (∿1 $in.^2$) on the outside surface of the thin-walled section at midlength and diametrically opposite each other were lightly sand-blasted with 200-grit aluminum oxide. This procedure is recommended by the manufacturer of the strain gages to ensure good bonding. Two strain gage rosettes (Micro-Measurements EA-06-125RA-120) were cemented on these prepared areas with Micro-Measurements epoxy cement (M-Bond 610), and then the cement was oven-cured for 2 hr at 205°C (400°F) under a bond pressure of approximately 103 kPa (15 psi). The strain gages were carefully aligned on the specimen using a microscope, and the alignment was checked after the cement was cured. The specimens with improperly aligned strain gages were reinstrumented. A properly prepared specimen with strain gage rosettes and lead wires attached is shown in Fig. 3.

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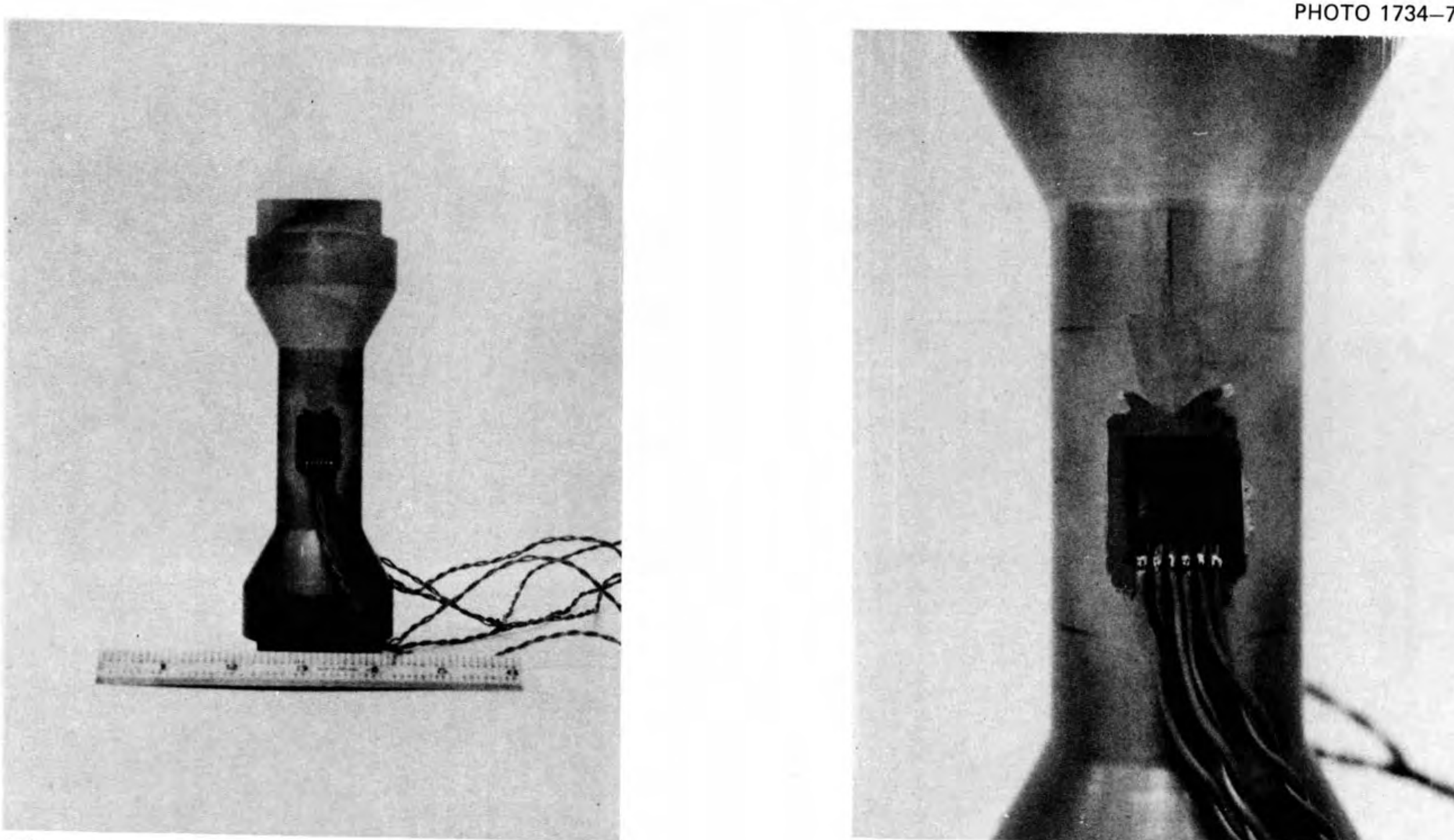

(a) (b)

Fig. 3. Test specimen and strain gages.

3. TESTING MACHINE AND CONTROL EQUIPMENT

A closed-loop, combined tension-torsion testing machine with electro-hydraulic servocontrollers, as shown in Fig.4, was used for these experiments. This is an MTS testing system, which consists of a load frame, two servo-controlled hydraulic actuators (axial and rotational), and a two-bay control console. The load frame is rated for ±222.4-kN (±50,000-lb) axial loads and ±2.26 kN-m (±20,000 in.-lb) torsional moments. The testing system can independently apply controlled axial loads and torsional moments as well as any combination of these loads.

Basically, the load frame (Fig. 5) consists of two smooth vertical columns (C) that join two stiff structural cross members; a movable upper crosshead (B) and a fixed platen (E) located at a convenient working height midway between the top and bottom of the frame. The columns, which are made from 76.2-mm-diam (3-in.) high-strength steel, stand 71.1 cm (28 in.) apart on the fixed platen and are held together by tension nuts located at the bottom of each post. The upper crosshead is vertically adjustable by two slim hydraulic cylinders (D) attached to the ends of the crosshead, which slides along the two side posts. Locking bolts (A) rigidly clamp the split ends of the crosshead to the posts.

The biaxial load cell (F) is mounted to the upper crosshead. The specimen (G), high-temperature grips (I), and water coolers (H) are aligned in the loading column between the load cell and the ram head (J) of the linear actuator. The water coolers protect the load cell and hydraulic ram from overheating when tests are performed at elevated temperatures. For room-temperature tests, the high-temperature grips are replaced by an adapter plate (AP), as shown in Fig. 6, and the crosshead is lowered. This stiffens the torsional rigidity of the upper load frame.

The lower part of the load frame is also a rigid frame which holds load-application mechanisms. A double-end linear actuator (K) is mounted to the center of the lower surface of the fixed platen. To transmit torsional moment to the specimen, the axis of the vane-type rotary actuator (N) is rigidly connected to the lower end of the linear actuator rod. As a result, the rotary actuator moves vertically along with the motion of the linear actuator rod. The housing of the rotary actuator, however, is

Fig. 4. Closed-loop, combined tension-torsion testing system with electrohydraulic servocontrollers.

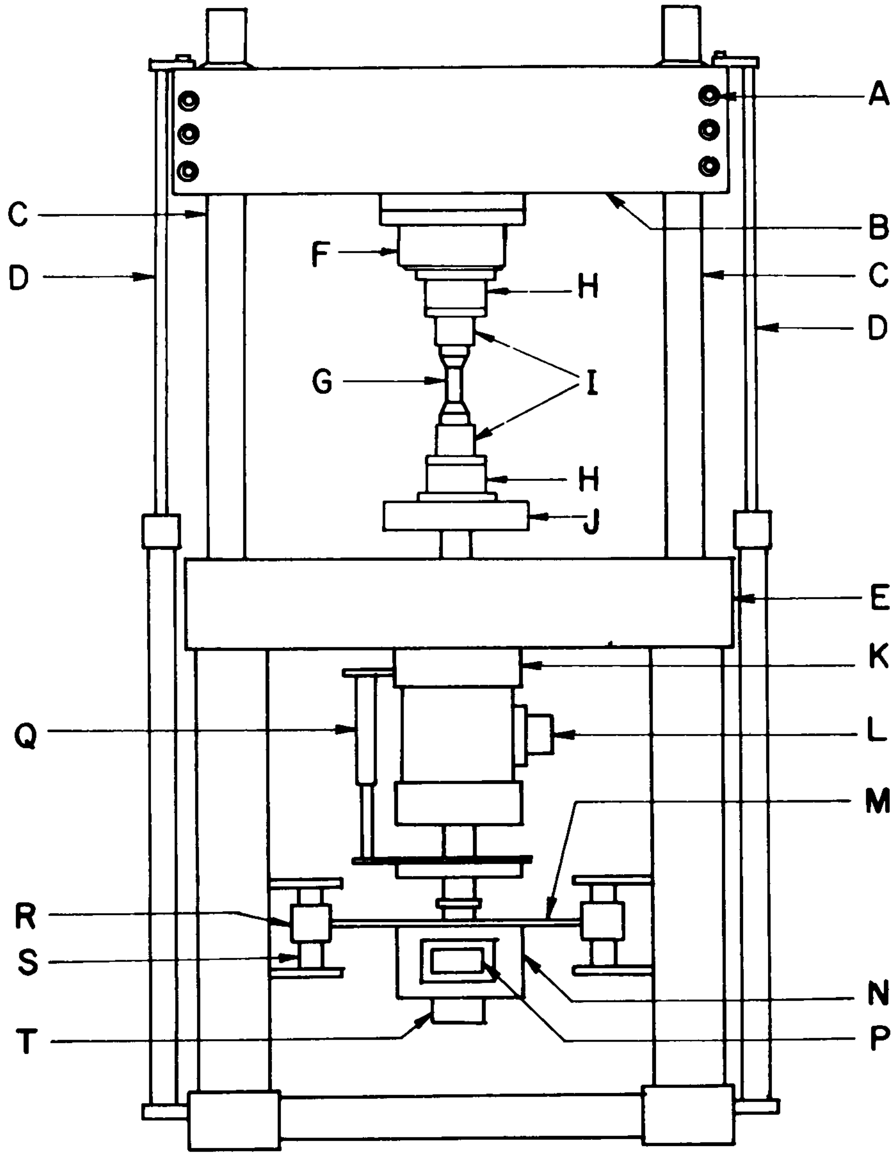

Fig. 5. Loading frame for biaxial testing.

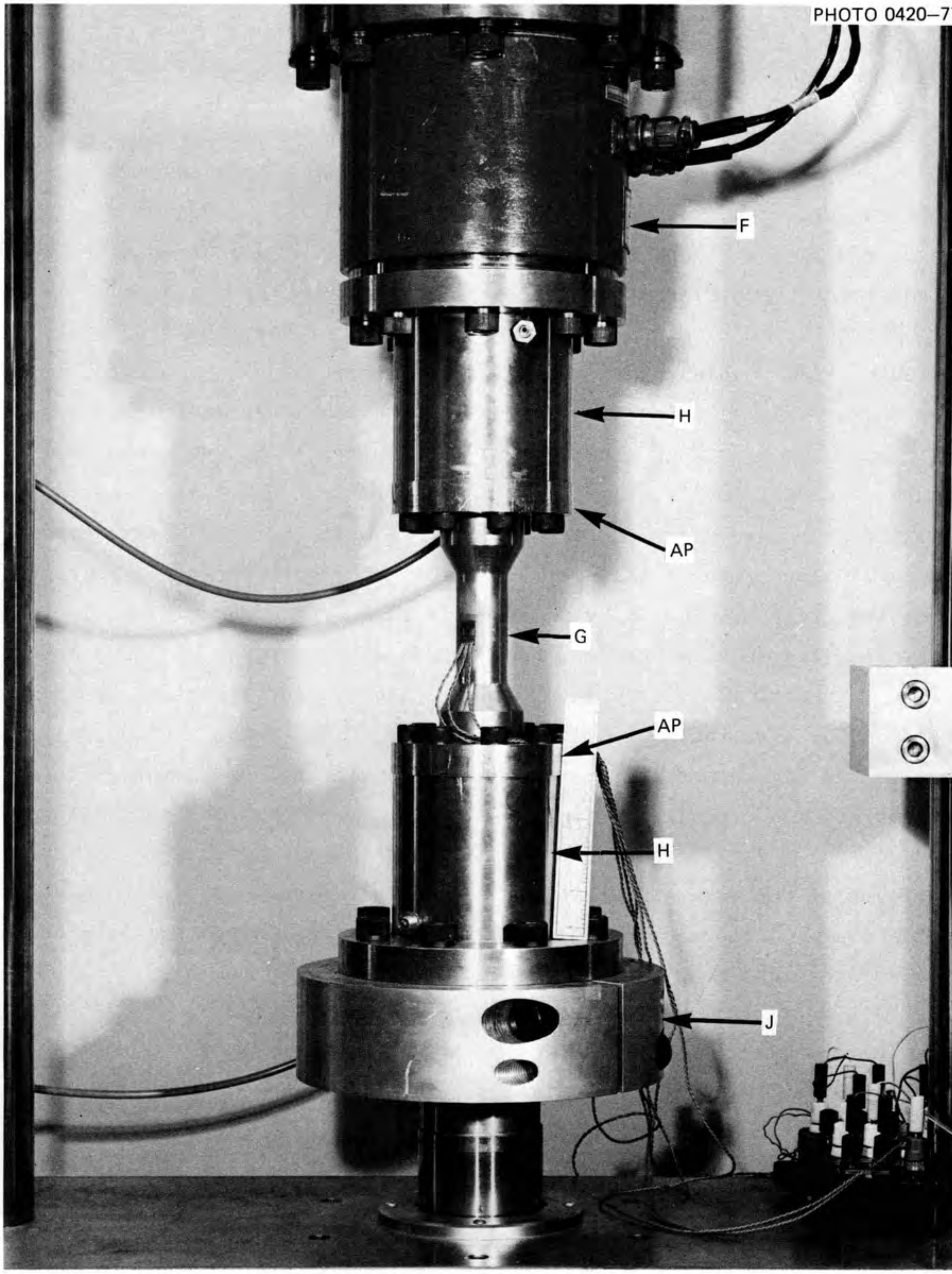

Fig. 6. Biaxial test specimen fixture (1 in. = 25.4 mm).

retained by the countertorque bar (M), which is guided by two smooth steel rods (S) at both ends of the torque bar. To minimize friction between the countertorque bar and the guide rods, ball bushings (R) are used on the rods.

Hydraulic pressure is supplied to the actuators by a 189-cm^3/sec (3-gpm) hydraulic pump for static tests and a 631-cm^3/sec (10-gpm) pump for faster tests. Axial and torsional loads are regulated independently by the servovalves (L and P) that are directly attached to the actuators.

The operational block diagram shown in Fig. 7 describes the biaxial testing system developed for yield surface study. The load control electronics for axial loading is identical to that for torsional loading. Each basic system consists of a servovalve driver, a feedback selector, and two transducer conditions that amplify the signals from the load sensor and the strain gage bridge circuit. A small digital computer (PDP 8/E) coupled to a small analog computer (AEI TR-10) is the main control for the system. Since the digital computer system used in this experiment did not include a digital/analog (D/A) converter, the TR-10 analog computer was used here as a D/A converter. The software program for the yield surface study was prepared in FOCAL (Formula Calculation) language. The set-point control signals to the servocontrollers are generated by the PDP 8/E computer through the integration circuits in the TR-10 analog computer. The servovalves regulate the hydraulic pressure in the actuators in response to control signals from the servocontrollers. Forces and torques applied to the specimen are monitored by the load cell. The signals from the load cell are fed back into both the analog computer and the servocontrollers. Necessary corrections for load control are then iterated in the closed-loop control circuit.

Two other types of control modes, strain and stroke, are also possible with this testing system. In either case, the signal from the respective transducer is used as the feedback for the closed-loop control. A load-controlled mode was used in this experiment because loads were the prescribed variables. Using the digital computer, tests can be run at a constant strain rate during plastic loading. The stress-strain responses are scanned periodically by the digital computer system and reduced to engineering units for the determination of yield surfaces; stress-strain analog signals are also recorded by X-Y plotters.

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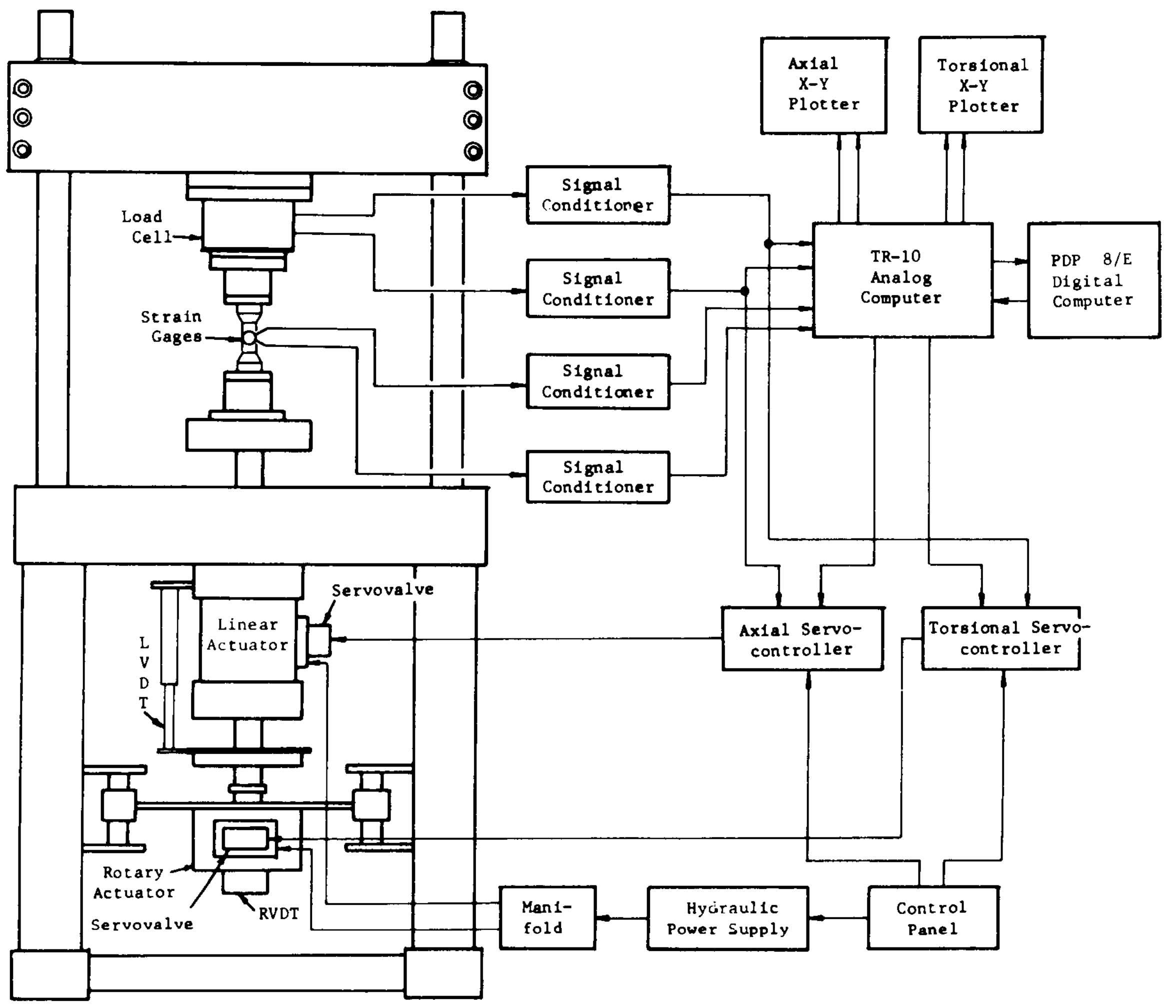

Fig. 7. Block diagram of biaxial testing system.

4. DEFINITION OF YIELD POINT IN STRESS SPACE

In the experimental study of yield surfaces, there are always two particular points upon which the experimentalist must decide before tests are initiated. The first point is concerned with the definition of yielding, and the second with the number of specimens needed in the experiment.

1. The definition of yielding used is crucial to both the results of the experiment and the interpretation of the results. The onset of yielding has been variously defined as (a) the stress at the proportional limit; (b) the stress at a strain offset of a given amount, the so-called proof strain; (c) the stress at the intersection of the elastic line and a line extrapolated backward from the stress-strain curve in the plastic range. There are some advantages and disadvantages in each type of yield definition. For further discussion of this subject, pertinent literature is available.[7]

2. Whether one, or more than one, specimen should be used for obtaining the complete yield surface and its subsequent surfaces is an important consideration. Use of multiple specimens is expensive and results in an inevitable scattering of results. The disadvantage of using a single specimen is that, in order to obtain each indication of yield, it is necessary to probe into the plastic region and therefore to deform the yield surface.

In these experiments, yielding was defined as occurring when axial and torsional stress-strain responses deviated from the linear-elastic responses by a specified amount of plastic strain. To account for the effect of multiaxiality, an effective offset plastic strain is defined by

$$\Delta\varepsilon_y = \left[1/2\Delta\varepsilon^p_{ij}\ \Delta\varepsilon^p_{ij}\right]^{1/2} = 10\ \mu\text{in./in.}\ , \tag{3}$$

where 1 μin./in. is defined as 10^{-6} in./in. and $\Delta\varepsilon^p_{ij}$ denotes the tensor components of the offset plastic strain. Equation (3) is derived from the second invariant of plastic strain. In the tension-torsion test, Eq. (3) becomes

$$\Delta\varepsilon_y = \left[3/4(\Delta\varepsilon^p_{11})^2 + (\Delta\varepsilon^p_{12})^2\right]^{1/2} = 10\ \mu\text{in./in.}\ , \tag{4}$$

where $\Delta\varepsilon^p_{11}$ denotes the axial component and $\Delta\varepsilon^p_{12}$* the shear. The basis for selecting this offset strain value was its compatibility with strain readout equipment sensitivity. When the amount of the offset plastic strain becomes sufficiently small, the yield point determined by this method falls close to the proportional limit. The proportional limit definition is often used in tests with a deadweight type of testing machine,[8-10] because the stress loadings are generally applied slowly and controlled manually. The offset strain definition is more practical when the testing machine is operated by an electrohydraulic closed-loop control system such as that described earlier.

Stress loadings into the plastic range of the order of 10 μin./in. are considered sufficiently small to preclude significant changes to the yield surface. On the basis of this assumption and with carefully planned test procedures that are detailed in a following section, a single specimen was used for the determination of the initial and subsequent yield surfaces for each set of tests. The present technique has been widely used by other researchers[11,12] and has been shown to give consistent results.

As described earlier, the biaxial testing is controlled by a PDP 8/E computer with a test control program† in FOCAL, which is given in Appendix A. The PDP 8/E generates programmed control signals in the TR-10; these, in turn, control the electrohydraulic testing system. The electric signals from the load cell and strain gages are amplified, conditioned, and then transmitted back to the digital computer for the determination of the yield point. Basically, there are four test control subprograms in the FOCAL software: subprogram 1 executes a single yield point probe; subprogram 2 determines the midpoint between two yield points determined prior to the execution of this command and resets the initiation of yield probe loading; subprogram 3 executes 16 yield probes for the determination of the yield curve; and subprogram 4 executes preprogrammed prestress loadings and records the stress-strain data.

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*The shear strain used throughout this report equals one-half the engineering shear strain, γ_{12}.

†This test control program has been updated; detailed discussions concerning the program and its updated version are given in Ref. 13.

The following procedure was used in the determination of the yield point:

1. Loads were applied to the specimen at an effective strain rate* of approximately 300 μin./in./min.

2. The stresses and strains were monitored continuously at 1-sec intervals, and the linear elastic responses were determined for both axial and torsional channels by the least-squares method.

3. The recording of stress and strain data was continued at the same speed, and the offset plastic strain components were calculated until they satisfied the yield criterion given in Eq. (4).

4. The loading was returned to the point of origin, and the values of stresses and strains at the yield stress point were printed out.

5. The values of the offset plastic strain components at the yield point were recorded for the determination of the plastic strain incremental vector.

6. Loads were applied in the reverse direction, and a yield point was determined as described above. A yield probe loading must always be followed by a reversed yield probe loading to balance out plastic incursions. Net residual plastic strains were usually less than 100 μin./in. in either the axial or the torsional component when subprogram 3 was completed.

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*The effective strain rate is defined as

$$\left[\frac{3}{4}\,(\Delta\varepsilon_{11})^2 + (\Delta\varepsilon_{12})^2\right]^{1/2}/\Delta t$$

in this experiment. Here, $\Delta\varepsilon_{11}$ and $\Delta\varepsilon_{12}$ are the axial and shear srain increments, respectively.

5. TEST PROCEDURE

The loading program used for specimen C-9, as shown in Fig. 8, is discussed here in detail so as to better describe the procedures for the determination of yield surfaces.

The initial yield surface was first determined using subprogram 3, in which a circular array of yield points was determined from 16 radial loading paths. These paths all emanated from the origin of the coordinate system and were evenly spaced. The ascending numbers at the yield points indicate the loading sequence. From the origin, O, the specimen was first loaded in the direction of point 1, where yielding occurred; then the loading was reversed and carried to point 2, where yielding again occurred; finally, the loading was returned to the point of origin, thus completing a loading cycle in the same direction. Two yield points were determined on the diameter of the yield surface. This method balanced out the residual plastic strains incurred at the two yield points and restored the yield surface to a neutral position. Yield points in the other directions were determined in the same manner according to the loading sequence indicated. Two consecutive loading paths were at least 90° apart. This loading strategy was chosen, in part, to minimize the motion and possible distortion of the yield surface as a result of many local yield point probes.

At each indication of yielding, two components of the small offset plastic strain were measured, and the direction of the plastic strain increment was computed. Short-line segments attached to the measured yield points shown in Fig. 8 represent the direction of the incremental plastic strain vectors. These vectors, in almost all cases, were normal to the yield curve obtained.

An initial prestressing was then imposed on the specimen along the 45° path to point P; partial unloading in the reverse direction followed to point D. It should be noted that this unloaded point was strategically important, because the yield points on the subsequent yield curve were determined by a set of straight-line paths emanating from this point. For this reason, partial unloading from the prestress point should be terminated approximately at the center of the subsequent yield curve.

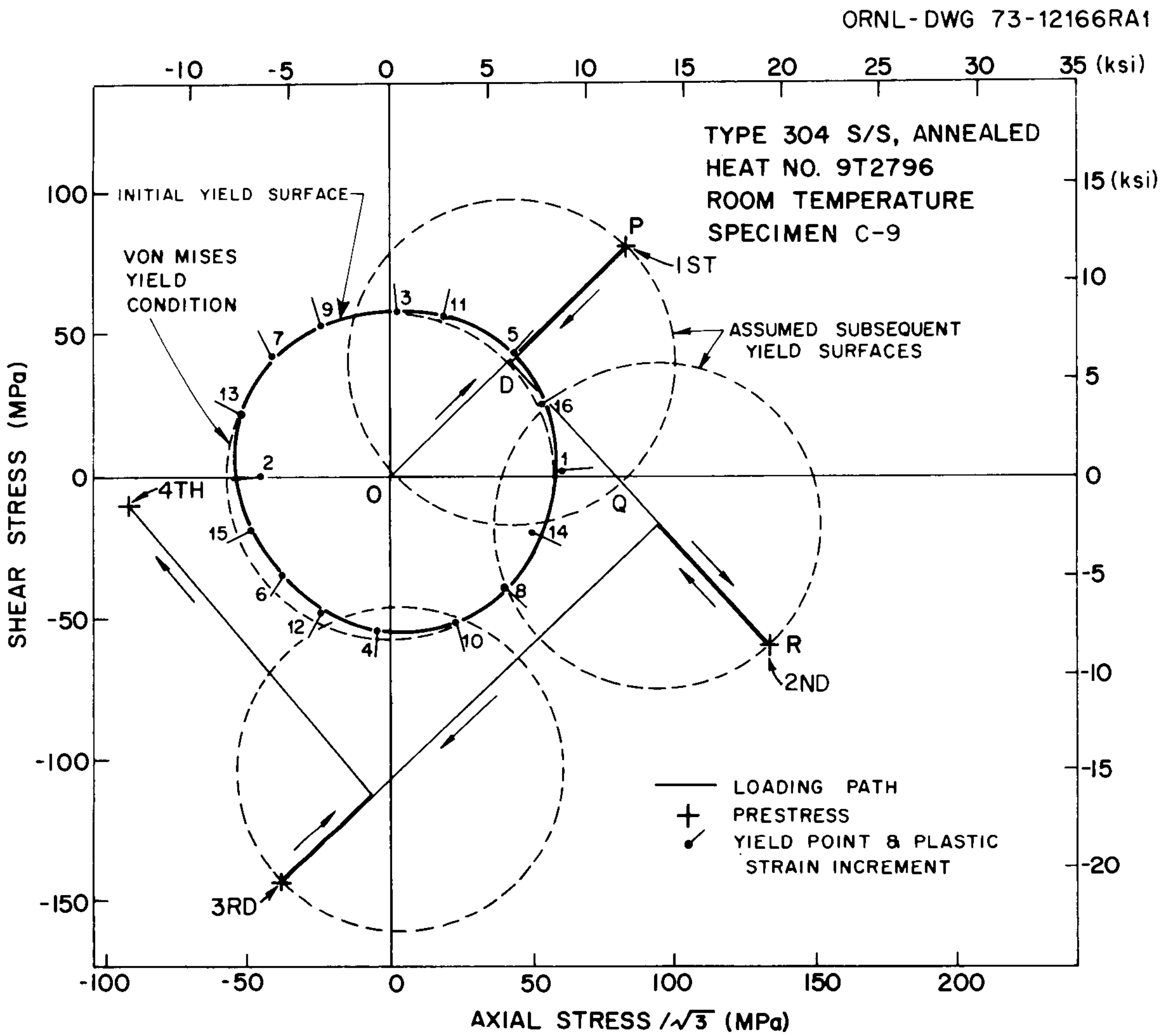

Fig. 8. Loading paths for specimen C-9.

Results from earlier experiments[4] showed that this point was on the path of the initial prestressing. To ascertain if the point remained approximately at the center of the subsequent yield curve, the lower yield point was first determined upon unloading from the prestress point P, and then the upper yield point was determined by reloading the specimen toward P. The upper yield point fell substantially lower than point P. The average point between the upper and lower points was considered here as the center of the subsequent yield curve. These two yield points were determined using subprogram 1. The average point was calculated by subprogram 2, and unloading from the upper yield point was then executed. The test procedure for the determination of the subsequent yield curve was the same as that used in the case of the initial yield curve.

The second prestressing from point D to point R was not a proportional prestressing. Under nonproportional prestressing, the motion of the subsequent yield surface was rather complex, and the center of the surface could not be known a priori. In such a situation, special care should be exercised to unload the specimen from the prestress point to a stress point just inside the subsequent yield surface to be investigated. This was done, and a more accurate center position of the surface was determined later. Two yield points on the subsequent yield surface were first determined by subprogram 1, as described earlier. The specimen was then unloaded to the midpoint between the yield points by subprogram 2. Two additional yield points, in turn, were determined by the same method, but in the 90° direction measured from the preceding probe path. The average of the last two yield points was subsequently used as the center point of the subsequent yield surface in the probe. The method of probing the subsequent yield surface was repeated after the center of the subsequent yield curve was selected.

Figure 9 shows five typical prestress loading paths that are considered essential to the study of yield surface behavioral features under general prestress loadings. The loading paths emanate from the center of the subsequent yield surface and are equally spaced in the half plane. Paths 1 and 5 are radial prestress loadings that are directly in opposition, and the remaining paths are nonradial prestress loadings. In the following tests, each specimen was assigned to one of the loading directions, and

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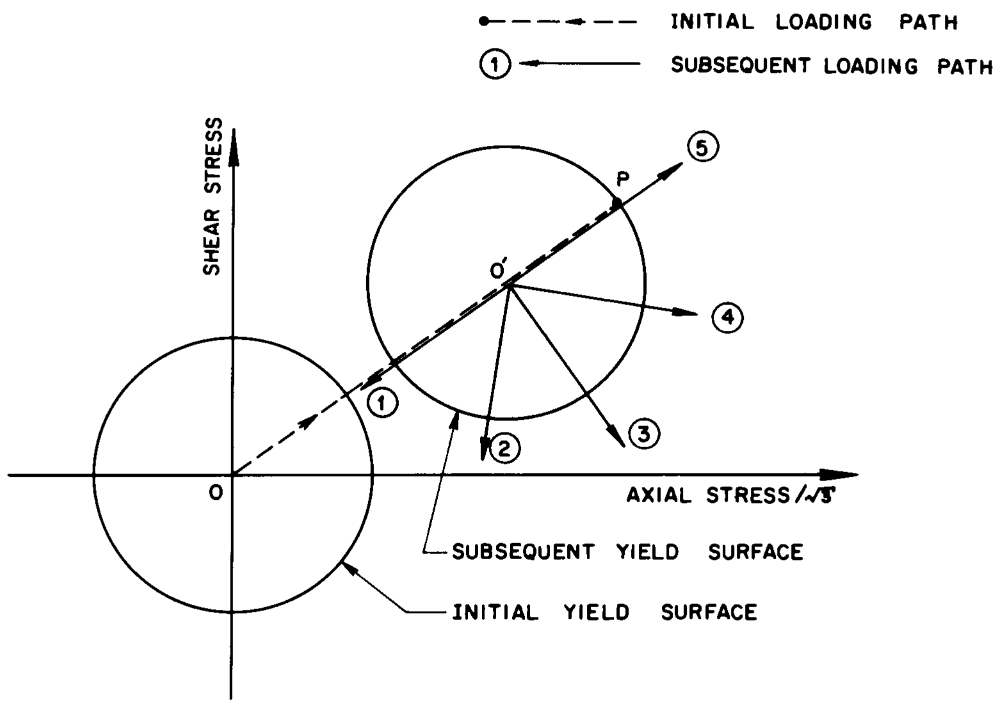

Fig. 9. Schematic of loading paths.

straight-line segmental prestress loadings were applied to the specimen in succession. These patterns of loading sequences were contrived primarily to assess the extent of the validity of the classical kinematic-hardening theory and, secondly, to obtain information for the development of a new or improved theory. More detailed discussion concerning the selection of these loading paths is presented in Chapter 7.

6. TEST RESULTS

The first specimen (D-2) was subjected to four complete cycles of tension-torsion loadings along three radial directions in a specialized two-dimensional stress space of $\sigma_{11}/\sqrt{3}$ vs σ_{12}, as shown in Figs. 10 through 14. An initial prestress loading to the first point (marked 1st in Fig. 10) was applied to the specimen and held constant, for this specimen only, until the plastic flow that followed diminished to an insignificant amount. The specimen was then partially unloaded for the investigation of the first subsequent yield curve. The second major segment of the loading path was also a straight line extending from a stress point inside the first subsequent yield curve to the second prestress point (marked 2nd in Fig. 10). A total of approximately 1% of equivalent plastic strain was accumulated, as shown in Fig. 17. Following partial unloading from the prestress point, another subsequent yield curve was determined. The third and fourth segments of the loading paths were applied in a similar manner but in the reverse direction. A loading cycle was completed after the fifth prestressing, which brought the center of the yield curve back to a position at the origin of the stress coordinates. However, the yield curve was considerably changed in size and shape from the initial one.

The second cycle of combined radial loadings consisted of six successive prestress loadings, beginning at the 6th and ending with the 11th. A subsequent yield curve was determined for each occurrence of the prestress loadings, as shown in Fig. 11. The subsequent yield curve was again centered approximately at the origin of the stress space by the 11th prestressing. The 11th yield surface grew slightly larger than the 5th; this lateral growth is a good indication of the so-called cross-effect.

The test procedure for the third cyclic loading was, in principle, similar to that for the preceding tests except that the direction of loadings was changed 90° clockwise. The test results, which are shown in Figs. 12 and 13, are practically self-explanatory. It can be seen that severe changes in the shape of the subsequent yield curves occurred during the third cycle of prestress loadings. The major diameter of the 11th yield surface was greatly suppressed, while the minor diameter gradually

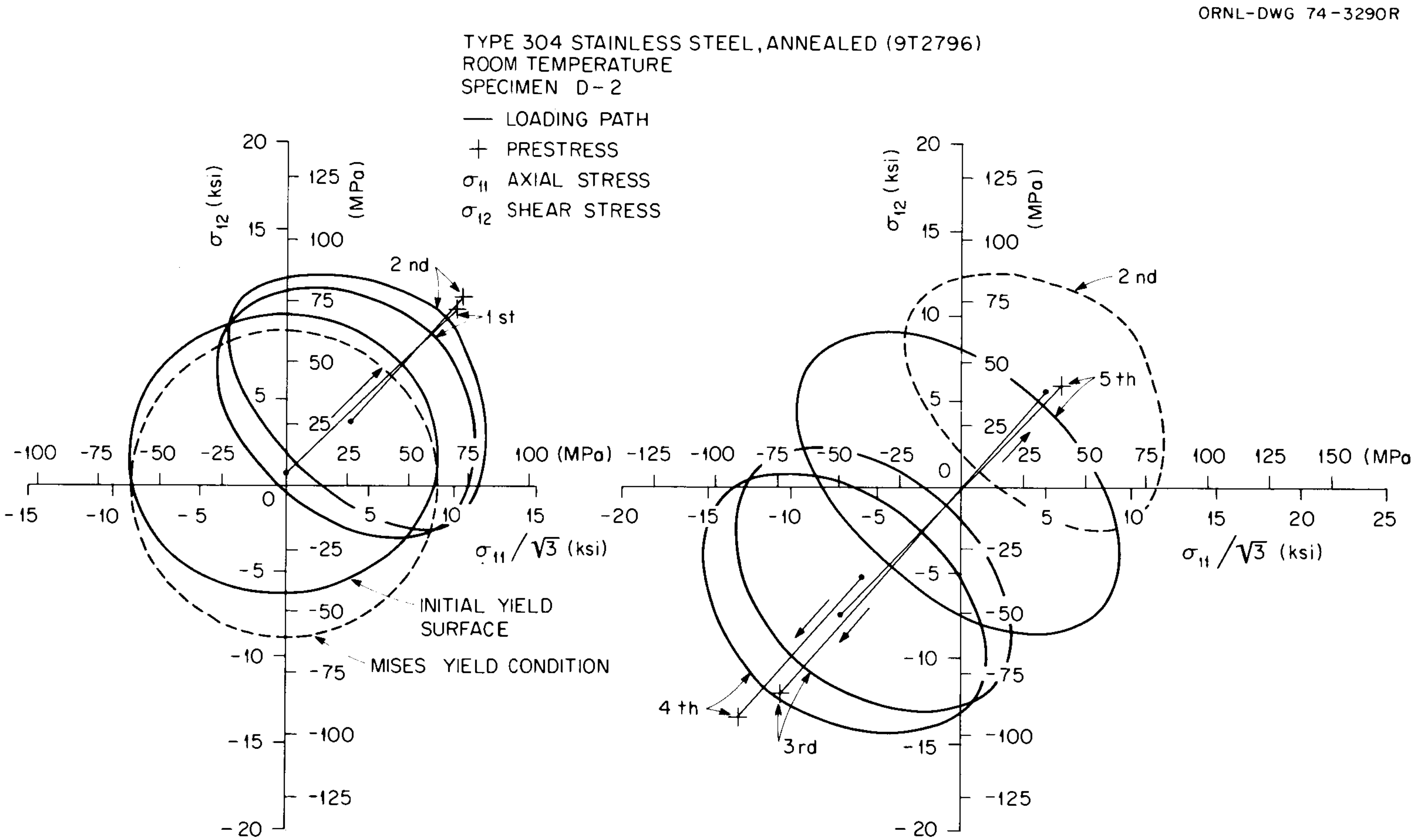

Fig. 10. Initial and subsequent yield surfaces for specimen D-2.

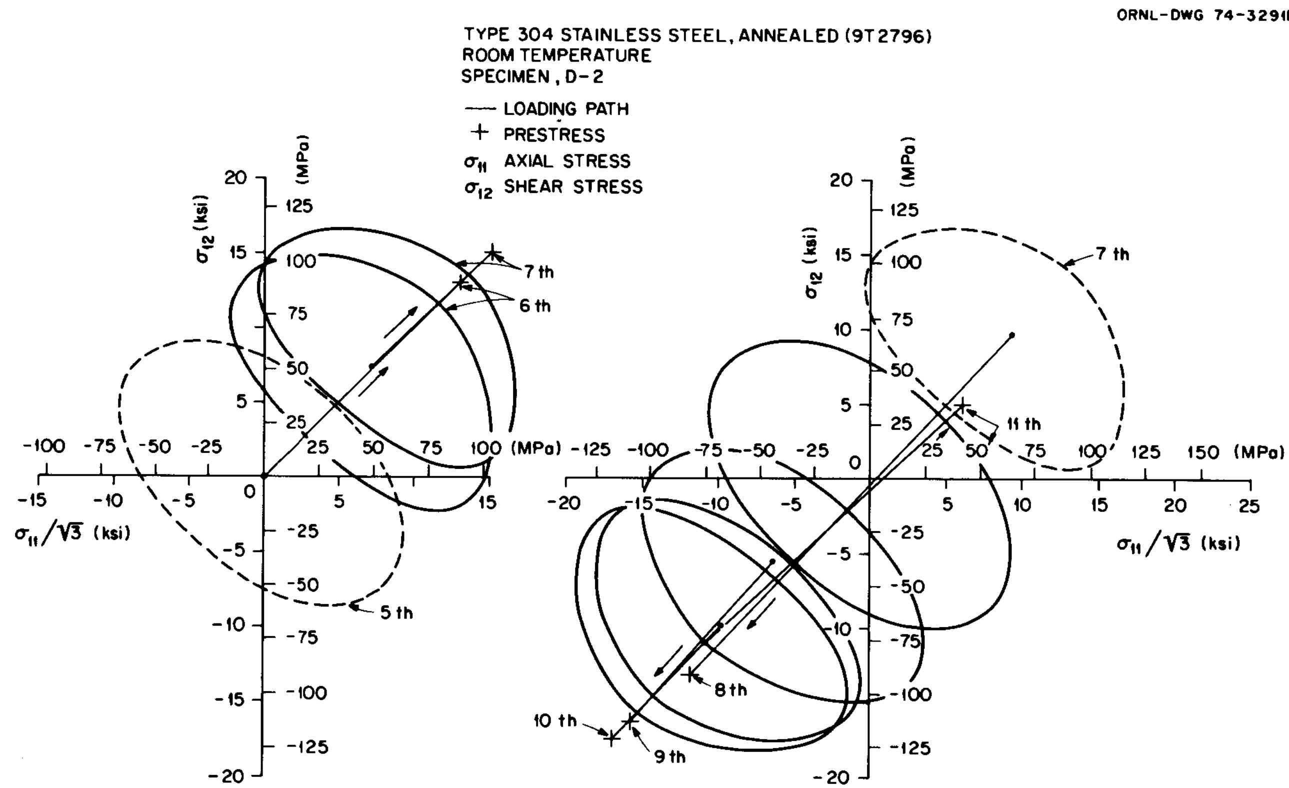

Fig. 11. Subsequent yield surfaces (5th through 11th) for specimen D-2.

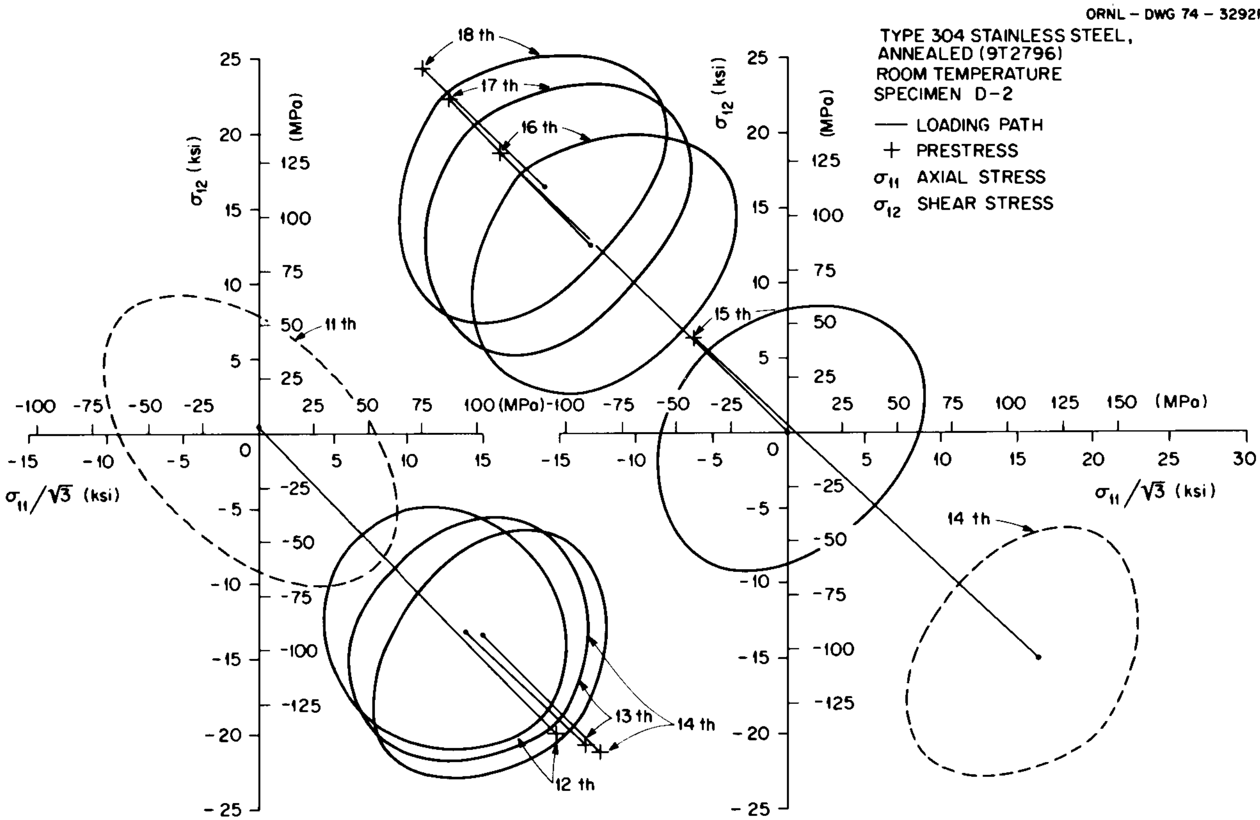

Fig. 12. Subsequent yield surfaces (12th through 18th) for specimen D-2.

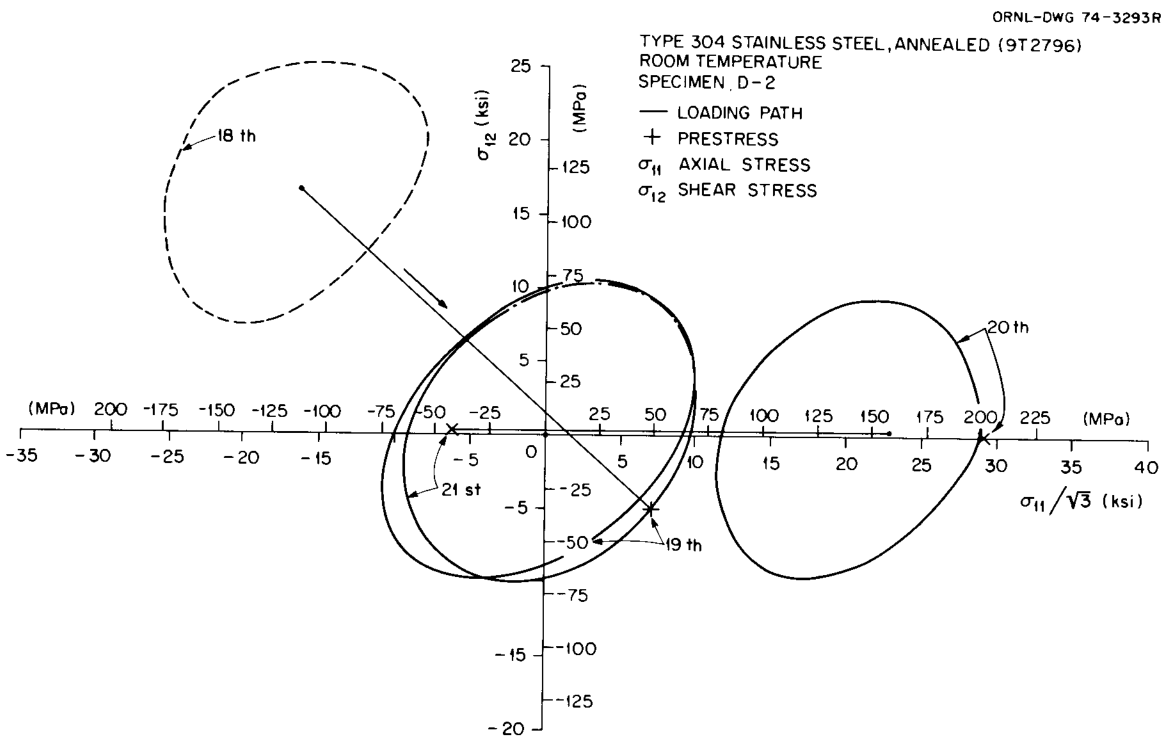

Fig. 13. Subsequent yield surfaces (19th through 21st) for specimen D-2.

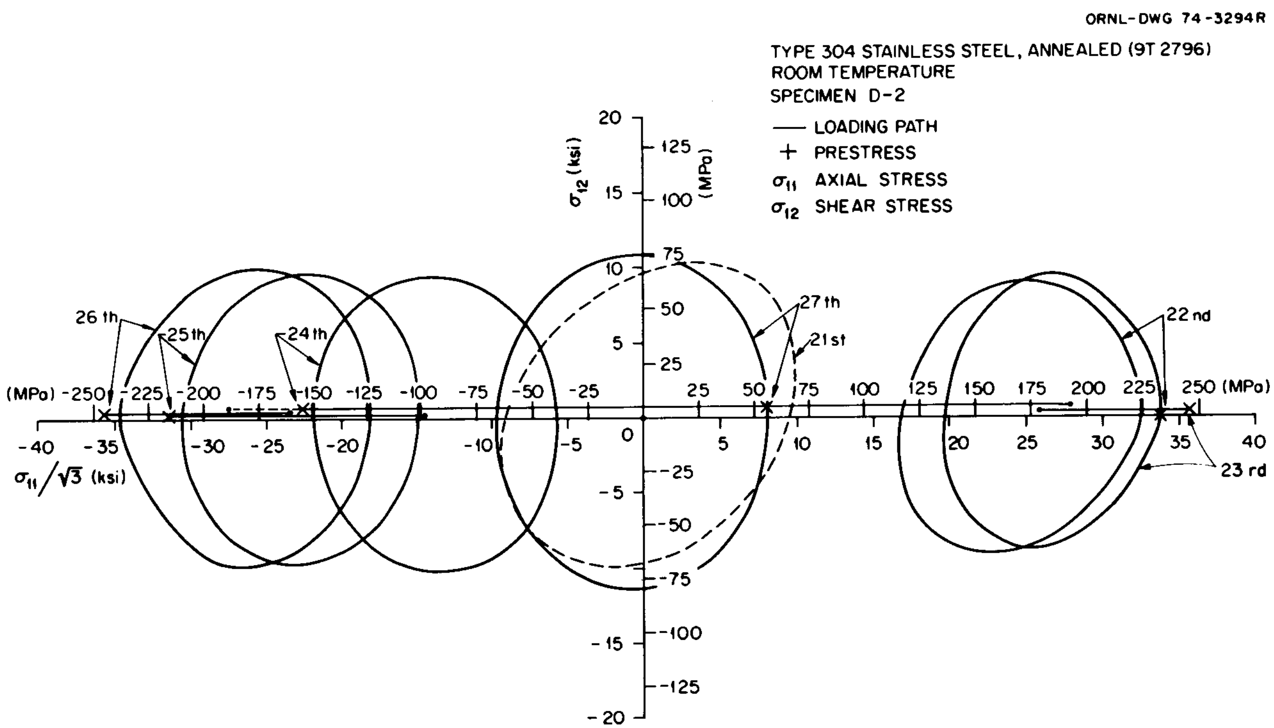

Fig. 14. Subsequent yield surfaces (22nd through 27th) for specimen D-2.

expanded to the magnitude of the major one. By the end of the loading cycle, the two principal diameters were completely interchanged, and a pronounced cross-effect was again demonstrated.

The fourth cyclic loading was a uniaxial tension-compression cyclic test that began with the 20th prestressing (Fig. 13). The subsequent yield curve corresponding to the 20th prestress loading was also determined. The next segment of the prestress loading was originally programmed to continue in the direction of the positive axial stress axis, but the load range of the control instrument then in use was too small for the next higher load. Therefore, the specimen was unloaded to a compressive stress of approximately $\sigma_{11}/\sqrt{3} = -41.4$ MPa (−6000 psi). This unscheduled unloading was designated the 21st prestressing; the yield curve associated with this loading is shown in Fig. 13. The shape of the curve, when compared with that for the 19th prestressing, was not significantly disturbed. The test program was resumed after the control instrument was properly adjusted. Two tensile prestressings (22nd and 23rd) were applied and were followed by three compressive prestressings in sequential order. Finally, the last prestressing (27th) was applied, and the corresponding subsequent yield curve was determined. Substantial changes in the shape and size of the yield curves were observed, and the results are shown in Fig. 14. The last subsequent yield curve (27th) was changed into a nearly perfect ellipse and became symmetric with respect to both coordinate axes. The key locations of the prestress loading paths are given in Table 1.

Figures 15 and 16 show two sets of biaxial stress-strain curves composed only of the stress-strain responses corresponding to the segmental prestress loadings. The responses during yield surface probes are, for all practical purposes, elastic and therefore are not shown in the figures. The residual plastic strains resulting from the yield probes were calculated and are given in Table 2. In all cases, the amount of the residual plastic strain is less than 150 μin./in. in both axial and torsional components. The biaxial stress-strain data for this specimen are tabulated in Appendix B. The small amount of strain shift between elastic unloading and reloading, such as that at the end of the 22nd prestress loading shown in Fig. 15, represents the residual strain.

Table 1. Key locations of prestress loadings[a]

Prestress sequence	Starting point (ksi)		Prestress point (ksi)	
	Axial, S_{11}	Shear, S_{12}	Axial, S_{11}	Shear, S_{12}
		Specimen D-2		
1	0.173	0.663	17.310	10.200
2	6.611	3.689	18.027	10.986
3	8.785	5.368	−18.637	−12.123
4	−9.881	−5.232	−23.419	−13.855
5	−12.159	−7.408	10.520	6.068
6	0.057	−0.051	22.449	13.067
7	12.273	7.266	26.054	15.152
8	16.044	9.639	−20.414	−13.155
9	−10.945	−5.591	−27.313	−16.289
10	−16.770	−9.815	−29.456	−17.466
11	−18.432	−10.925	10.642	4.941
12	0.300	0.322	34.164	−19.981
13	23.920	−13.260	37.367	−20.878
14	26.048	−13.483	39.297	−21.304
15	28.329	−15.040	−10.744	6.373
16	−0.161	0.186	−32.744	18.637
17	−22.283	12.607	−38.251	22.238
18	−27.531	16.258	−41.621	24.228
19	−30.732	18.120	12.446	−5.063
20	0.047	−0.054	50.335	−0.058
21	39.666	0.234	−10.566	0.315
22	0.092	−0.051	58.671	0.000
23	44.898	0.318	61.822	0.328
24	48.394	0.677	−39.311	0.697
25	−24.824	0.190	−54.534	0.193
26	−40.667	0.396	−61.777	0.389
27	−47.566	0.603	13.969	0.599

Table 1 (continued)

Prestress sequence	Starting point (ksi)		Prestress point (ksi)	
	Axial, S_{11}	Shear, S_{12}	Axial, S_{11}	Shear, S_{12}
		Specimen C-7		
1	0.052	−0.036	21.245	11.472
2	9.266	5.166	33.721	5.139
3	17.199	1.951	36.404	−8.274
4	22.186	−4.755	21.975	−18.027
		Specimen C-8		
1	0.099	−0.024	20.764	12.033
2	10.056	5.674	9.476	−18.930
3	9.038	−13.217	−35.221	12.097
4	−24.585	6.029	11.132	6.324
5	0.028	6.132	43.317	5.614
6	33.368	6.419	−12.377	−20.138
7	−2.222	−13.858	−1.917	25.222
8	−2.328	19.273	41.980	−7.112
9	27.268	−1.056	−16.177	−1.984
		Specimen C-9		
1	−0.059	−0.017	20.897	11.718
2	10.463	6.054	33.546	−8.581
3	23.736	−2.318	−9.379	−20.870
4	−4.642	−14.173	−23.067	−1.518
5	−14.475	−8.033	20.809	11.855
6	10.236	6.227	34.199	−8.636
7	22.072	−2.508	−11.218	−20.868
8	1.020	−14.869	−25.847	1.048
9	−12.230	−7.186	12.003	6.284
10	−0.023	0.030	29.696	17.945
11	18.287	11.735	46.642	−4.801
12	36.105	1.406	17.070	−11.859

Table 1 (continued)

Prestress sequence	Starting point (ksi)		Prestress point (ksi)	
	Axial, S_{11}	Shear, S_{12}	Axial, S_{11}	Shear, S_{12}
		Specimen C-9		
13	3.601	−13.999	−13.704	−27.562
14	−2.801	−21.928	−30.834	−5.402
15	−20.033	−11.756	10.141	6.257
16	0.132	0.186	32.483	19.566
17	23.765	13.474	−0.140	−0.076
18	−0.256	0.034	30.973	17.983
19	17.745	11.409	46.758	−3.924
20	35.358	1.600	−14.981	−27.550
21	−3.410	−22.279	−31.934	−4.987
22	−20.398	−12.420	9.921	6.299

[a]1 ksi = 6.895 MPa.

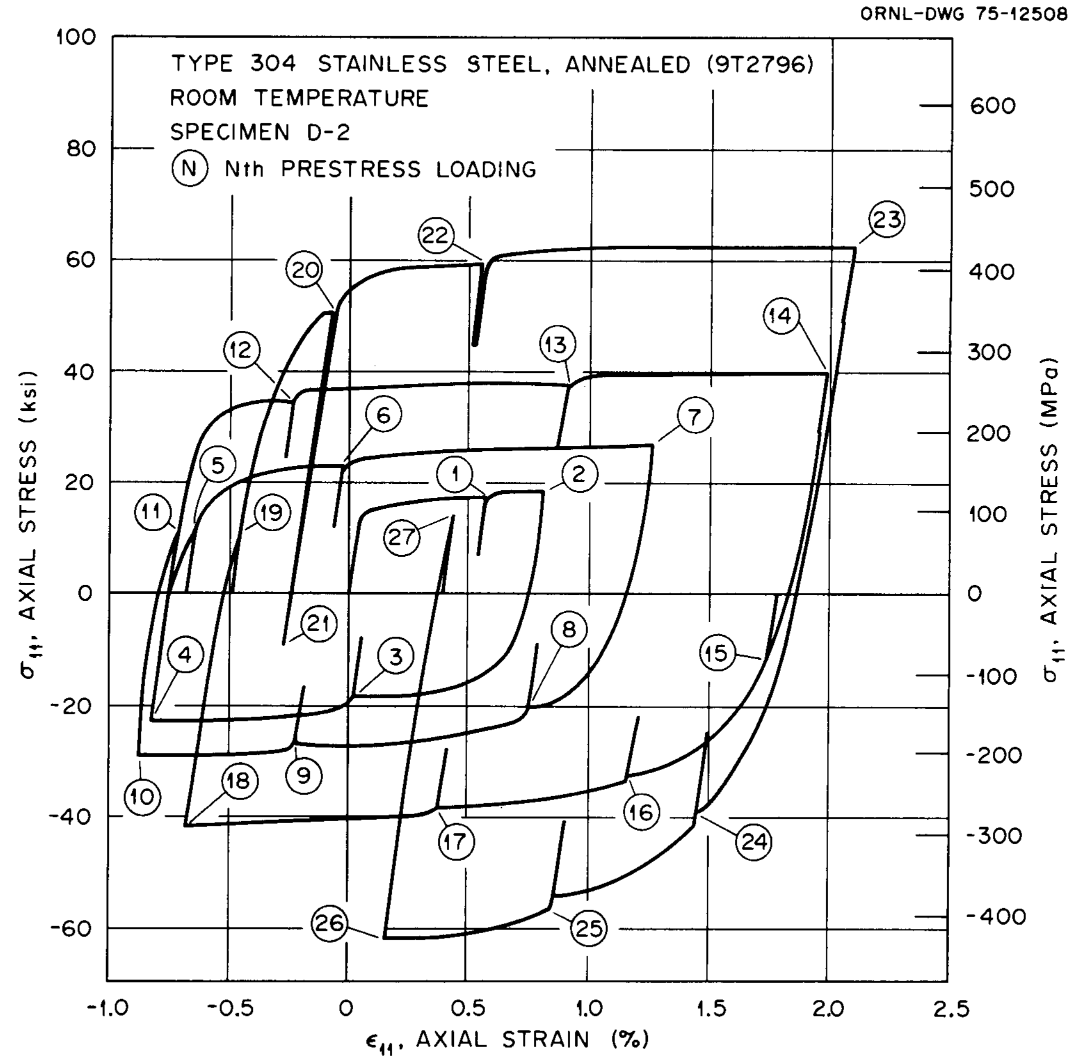

Fig. 15. Axial stress-strain curves for specimen D-2 under biaxial prestress loadings.

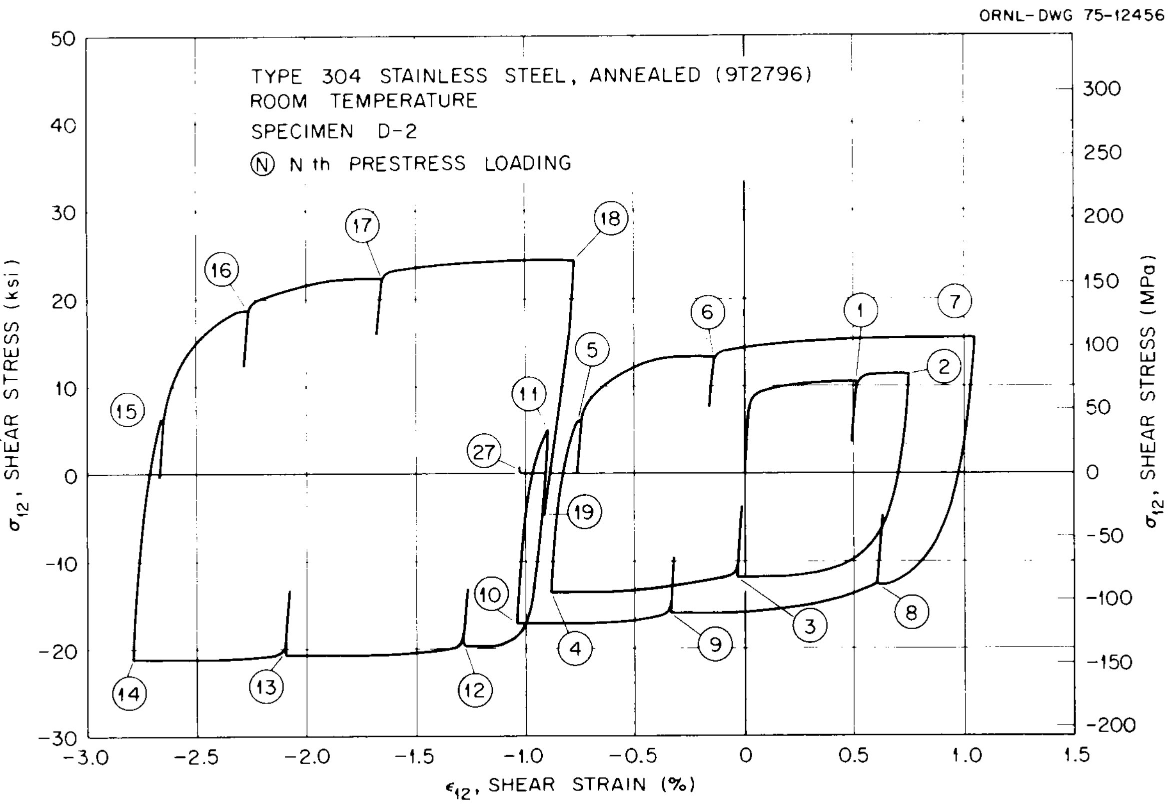

Fig. 16. Shear stress-strain curves for specimen D-2 under biaxial prestress loadings.

Table 2. Centroid of yield surfaces and residual plastic strains incurred by yield surface probes[a]

Yield surface sequence	Area (ksi^2)	Centroid (ksi)		Residual plastic strains (μin./in.)	
		Axial, S_{11}	Shear, S_{12}	Axial, ε_{11}^{p}	Shear, ε_{12}^{p}
		Specimen D-2			
0	231	0.03	2.02	7	19
1	165	3.89	4.66	−5	−10
2	164	4.78	5.55	7	−2
3	176	−5.15	−5.22	−26	−11
4	180	−6.87	−6.56	−17	−44
5	223	0.01	0.63	−1	−23
6	203	7.01	6.75	16	−9
7	188	8.76	9.15	−2	−13
8	214	−5.06	−6.84	−10	17
9	195	−9.48	−10.12	−18	9
10	202	−10.67	−10.91	−46	10
11	260	−0.48	−0.44	1	7
12	200	12.35	−13.15	41	−19
13	195	14.10	−13.15	55	−30
14	189	15.50	−14.99	68	−29
15	225	0.11	0.07	41	−19

Table 2 (continued)

Yield surface sequence	Area (ksi^2)	Centroid (ksi)		Residual plastic strains (μin./in.)	
		Axial, S_{11}	Shear, S_{12}	Axial, ε^p_{11}	Shear, ε^p_{12}
		Specimen D-2			
16	219	−12.06	11.64	18	−6
17	226	−15.21	14.73	−2	6
18	223	−16.97	16.81	−32	4
19	298	−0.48	0.52	40	−8
20	238	19.98	0.21	119	−34
21	290	0.42	0.44	−4	28
22	212	24.40	0.02	108	2
23	189	26.50	0.40	125	33
24	243	−13.60	−0.20	10	−25
25	234	−22.40	0.13	−31	10
26	243	−26.00	0.34	−49	30
27	305	−0.60	−0.14		
		Specimen C-7			
0	228	−0.36	0.70		
1	176	5.55	5.59	66	24
2	181	9.74	1.51	53	−66

Table 2 (continued)

Yield surface sequence	Area (ksi^2)	Centroid (ksi)		Residual plastic strains (μin./in.)	
		Axial, S_{11}	Shear, S_{12}	Axial, ε_{11}^p	Shear, ε_{12}^p
		Specimen C-7			
3	172	12.81	−4.11	104	−71
4	174	9.98	−7.89		
		Specimen C-8			
0	253	0.97	1.47		
1	174	5.54	6.36	−45	32
2	169	3.16	−11.50	−6	−27
3	188	−12.11	7.00	−61	11
4	219	−0.75	6.44	69	4
5	165	16.58	4.18	−63	−10
6	178	−2.29	−11.94	−49	−34
7	181	−0.74	16.55	−3	98
8	176	16.15	−1.80	79	8
9	189	−2.33	−1.68		
		Specimen C-9			
0	229	−0.06	0.45		
1	167	5.28	5.41	−15	−28

Table 2 (continued)

Yield surface sequence	Area (ksi^2)	Centroid (ksi)		Residual plastic strains (μin./in.)	
		Axial, S_{11}	Shear, S_{12}	Axial, ε_{11}^{p}	Shear, ε_{12}^{p}
		Specimen C-9			
2	178	11.47	−4.07	57	−12
3	173	−1.64	−13.17	12	−84
4	179	−7.27	−6.45	−74	−1
5	194	5.03	2.78	−14	−17
6	186	11.08	−4.35	0	−15
7	182	−0.46	−12.48	36	−53
8	198	−7.63	−4.80	−52	−9
9	200	0.87	0.45	8	9
10	167	10.56	10.89	−10	−6
11	149	18.67	−1.50	92	25
12	190	1.95	−13.33	36	30
13	186	−4.24	−18.19	−20	−3
14	189	−10.48	−9.99	−73	8
15	203	0.54	−0.08	−5	4
16	189	12.07	12.20	−5	9
17	187	2.62	3.61	−29	−12
18	218	10.68	11.18	−7	2

Table 2 (continued)

Yield surface sequence	Area (ksi^2)	Centroid (ksi)		Residual plastic strains (μin./in.)	
		Axial, S_{11}	Shear, S_{12}	Axial, ε^p_{11}	Shear, ε^p_{12}
		Specimen C-9			
19	210	18.46	2.86	80	27
20	189	−2.19	−18.94	53	−72
21	206	−10.83	−10.10	−50	−2
22	209	1.56	1.47		

[a] 1 ksi = 6.895 MPa; 1 ksi^2 = 47.54 MPa^2.

The plastic strain components were calculated from the stress-strain test data, and the plastic strain trajectories for the entire sequence are plotted in Fig. 17. Because the first 11 prestress loadings were typical radial loadings, the directions of the plastic strain trajectories follow closely the directions of the corresponding loading paths. The colinearity relation between incremental stress and incremental plastic strains did not hold well for the 12th, 13th, 20th, and 22nd prestress loadings, which were the first two loading segments of the third and fourth loading cycles, respectively. However, the colinearity relation held well on the return paths.

Figure 18 shows an equivalent stress—plastic strain relation, in which the quantities are calculated based on the following definitions:

$$\sigma^e = \text{sign}(d\sigma_{11}) \left[\frac{1}{3} (d\sigma_{11})^2 + (d\sigma_{12})^2\right]^{1/2} \tag{5}$$

and

$$\varepsilon_p^e = \int \text{sign}(d\varepsilon_{11}^p) \left[\frac{3}{4} (d\varepsilon_{11}^p)^2 + (d\varepsilon_{12}^p)^2\right]^{1/2} , \tag{6}$$

where σ^e is the equivalent stress, which represents the distance between the stress point and the coordinate origin of the specialized stress space used in Figs. 10 through 14, and ε_p^e is the equivalent plastic strain, which is the algebraic sum of the plastic strain trajectories accumulated in accordance with the sign of $d\varepsilon_{11}^p$. The intention of the diagram in Fig. 18 is to illustrate a continuous relation between a representative stress vector and a plastic strain vector, as if it were plotted for uniaxial cyclic loading curves. In the cases where the stress and the plastic strain components were not colinear, only that component of the stress increment lying along the corresponding plastic strain increment was considered effective and was accumulated in the stress integral calculation. Thus, small portions of the equivalent stress—strain curves for the 12th, 13th, 20th, and 22nd prestress loadings are regarded only as an approximation. The initial prestress introduced $\sim$0.66% of the equivalent plastic strain. Plateau sections of the equivalent stress—strain curve prior to each partial unloading for the yield surface probe indicate that plastic flow

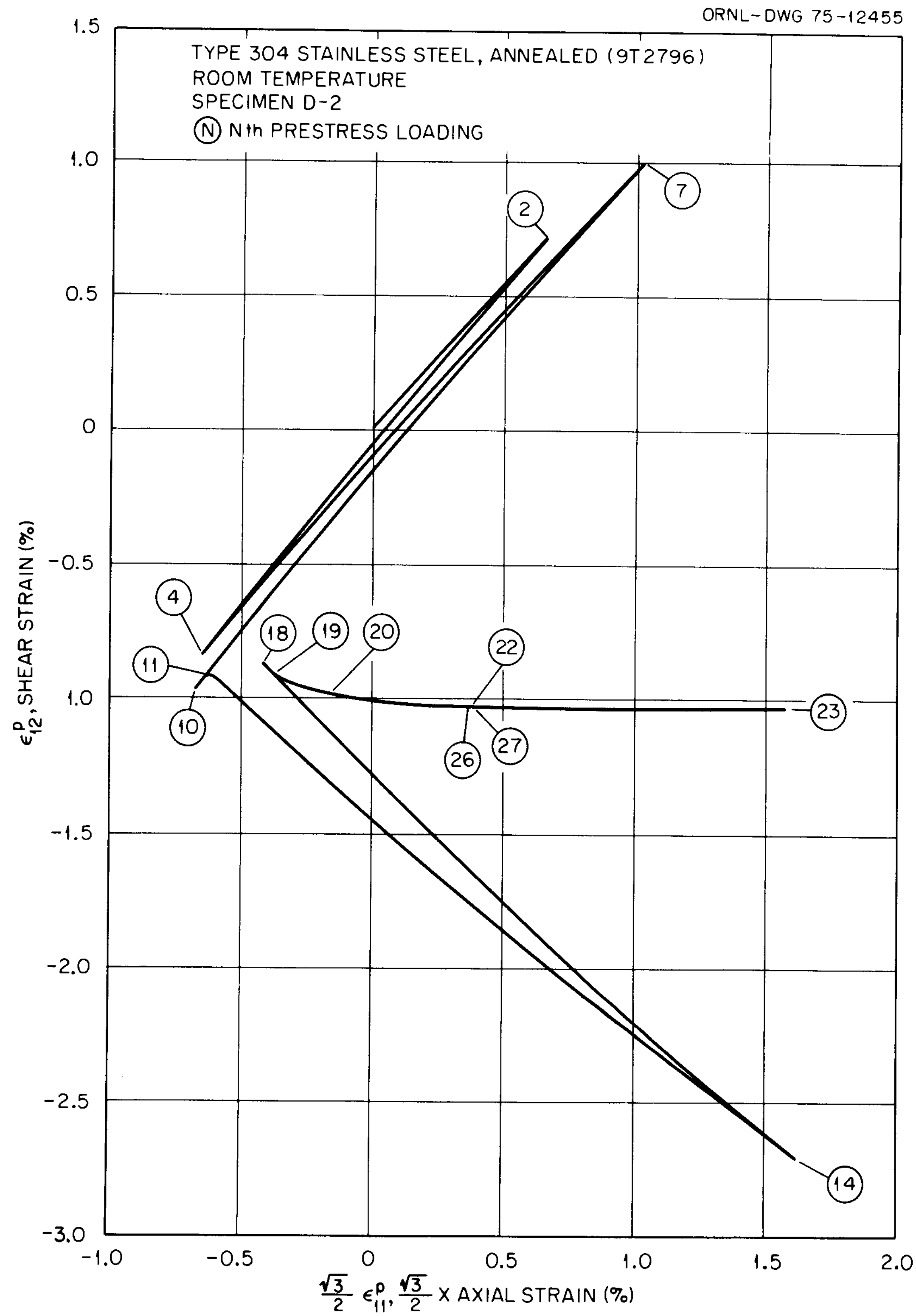

Fig. 17. Plastic strain trajectories for specimen D-2.

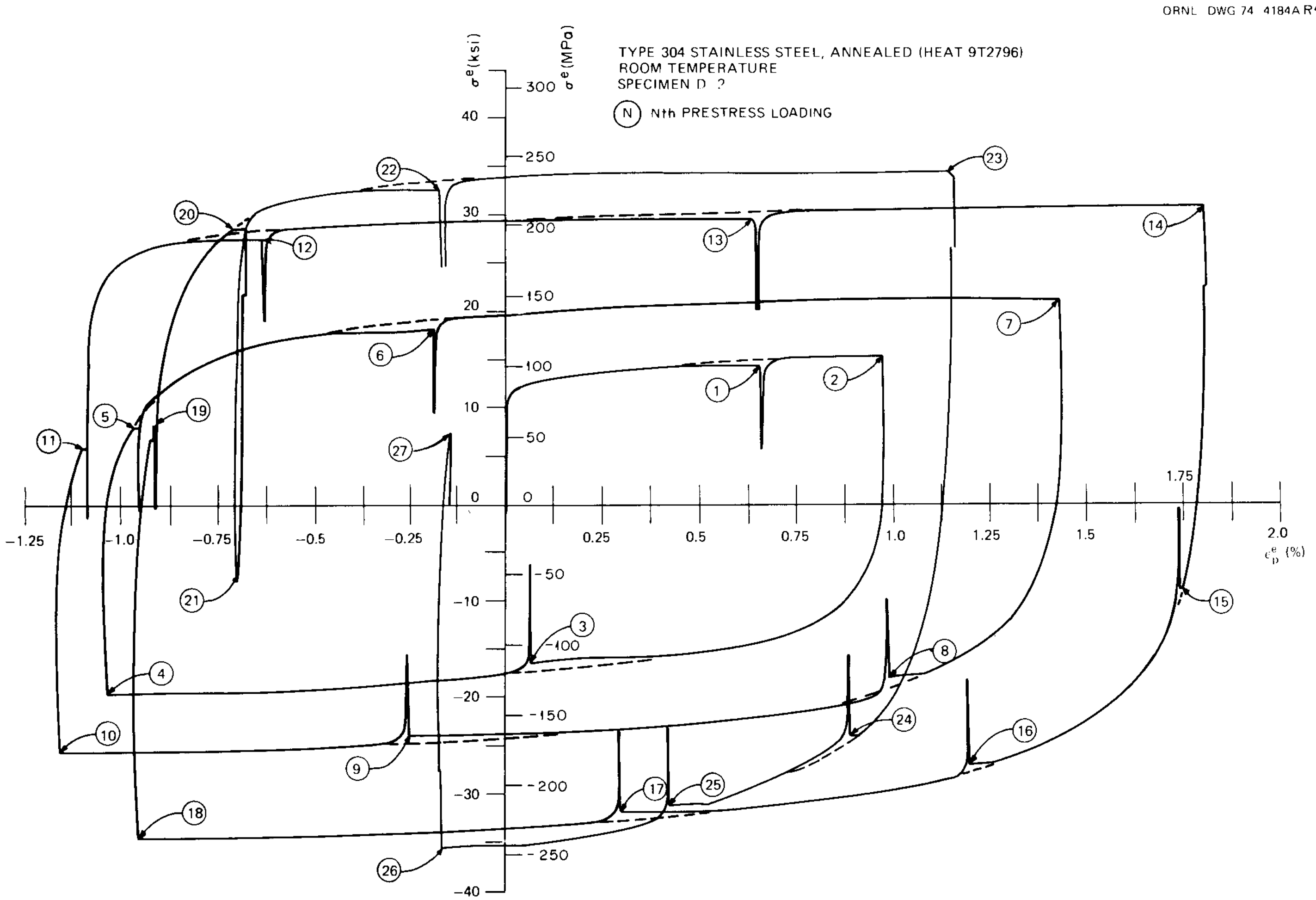

Fig. 18. Effective stress—effective plastic strain diagram for specimen D-2.

occurred at the constant prestress loadings. In the case of the first prestressing, plastic flow started from $\varepsilon_p^e \cong 0.4\%$. The dashed lines across the plateau sections indicate possible stress-strain responses that would be observed if the loadings were not interrupted for yield surface investigation. With the use of the dashed lines, smooth cyclic loading curves can be constructed similar to those for typical uniaxial cyclic curves. Significant material hardening due to segmental cyclic loadings was observed.

The next three tests, using specimens C-7, C-9, and C-8, were conducted in a series. Unlike the first test described earlier, the segmental loading paths used in each of these tests were systematically rotated with a given angle in a clockwise direction. The intention was to investigate the effects of nonradial loadings* on the geometrical changes of the yield surface and on the directional dependency, with respect to the prior prestress loading path, of the incremental stress—plastic strain responses along the yield curve. In each of the following tests, the initial yield curve was determined first, and then the first prestress loading, a radial path, was applied along a line at 45° to the stress axes, as shown in Fig. 19. The first subsequent yield surface was determined subsequently. The same loading was employed for all three specimens.

Including the first loading path, a total of four prestress loadings were applied to specimen C-7, as indicated by the four straight-line segments shown in Fig. 19. The key locations of the prestress loading paths are listed in Table 1. Upon completion of the first subsequent yield curve, a second prestress loading was applied approximately from the center of the measured yield curve to a point on a path that was about 45° clockwise from the prior prestress path. This resulted in continual tension under a constant torsional loading. Partial unloading followed in the reverse direction, and the second subsequent yield curve was determined. The method used in applying the third and fourth loading paths was analogous to that used for the second loading path. In each case, the direction of the loading path was rotated about 45° clockwise from the preceding one. Thus, three nonradial loadings were introduced in this experiment.

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*Nonradial loading is synonymous with nonproportional loading in which the incremental changes of the stress components are not proportional to the total stress components.

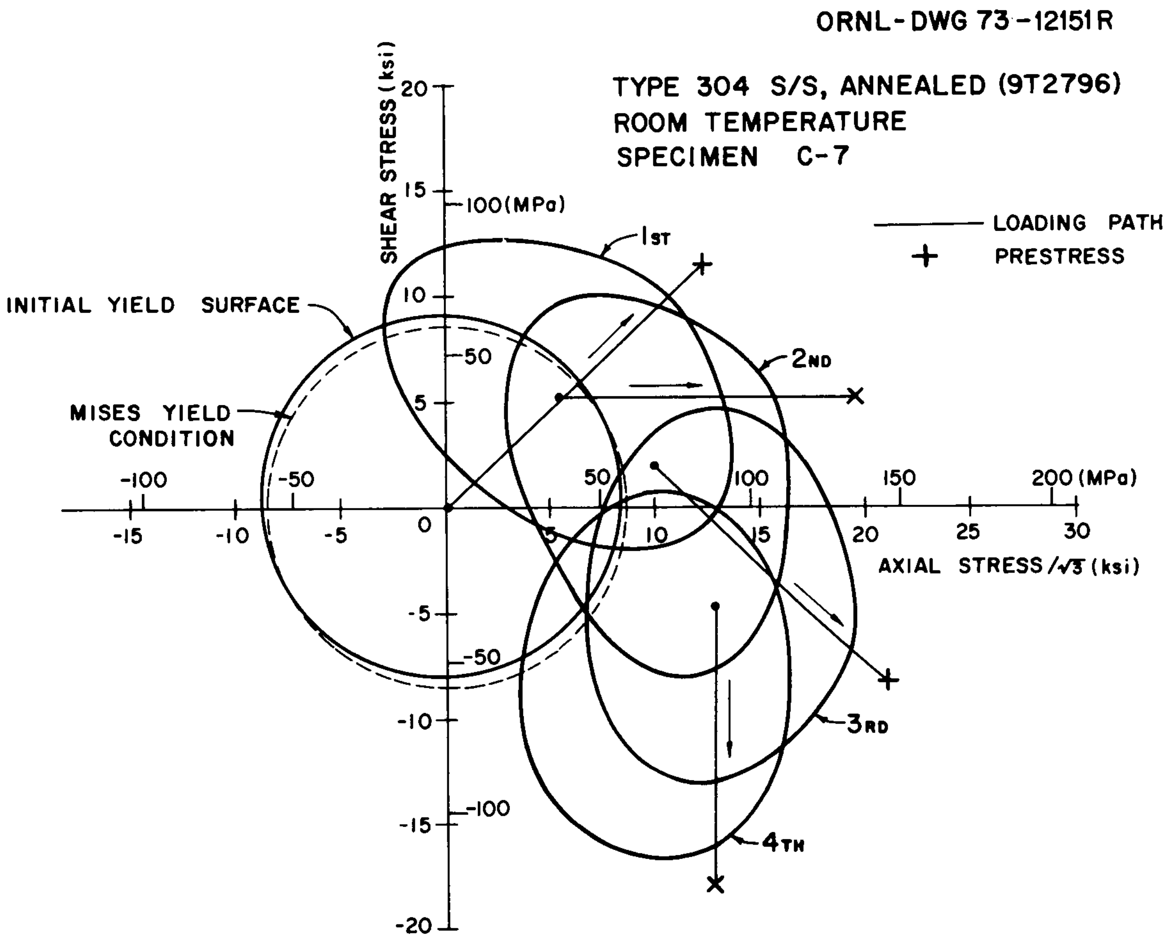

Fig. 19. Initial and subsequent yield surfaces for specimen C-7.

The measured initial yield curve fell close to the Mises yield condition, as shown in Fig. 19. A spectrum of yield curves for the four prestress loadings is also presented in the figure. Substantial changes in the shape of the subsequent yield curves were introduced by the plastic loadings. The net size of the subsequent yield curves, however, changed little throughout the plastic loadings. This can be seen from the data given in Table 2, where the net area and the coordinates of the centroid for each yield curve are listed. An examination of the test results seemed to indicate that the motion of the yield curves was a complex combination of translation and rotation in the stress space. Significant cross-effects were exhibited as a result of the rotation of the yield curves.

Axial and torsional (shear) stress-strain curves for the four segments of prestress loadings were combined and one presented in Figs. 20 and 21. The plastic strain trajectories shown in Fig. 22 were calculated from the stress-strain curves. A comparison between this figure and Fig. 19 shows that the direction of the strain trajectory does not follow the direction of the corresponding loading path except in the initial radial loading.

In order to impose the same initial prestressed condition on the second specimen (C-9), a radial initial prestress loading was applied to the second specimen also. The shape and size of the yield surfaces obtained for this specimen appeared to be in good agreement with those for specimen C-7. The net equivalent plastic strains resulting from the initial prestress loading were also about the same as those for specimen C-7. In order to investigate the directional dependency of the incremental stress-plastic strain responses on the periphery of the subsequent yield surfaces shown in Figs. 23 through 27, a high degree of consistency in test results was indeed desirable.

Again, a second straight loading was applied to the specimen from the stress point inside the measured yield curve to a point on a path about 90° clockwise from the prior prestress path. This imposed a nonradial loading on the specimen. The second subsequent yield curve was determined after a partial unloading from the prestress point. The third loading path was again rotated 90° in the clockwise direction. An inadvertent partial unloading occurred shortly before it reached the designated prestress loading point, as indicated in Fig. 23. Since the incident took place inside the

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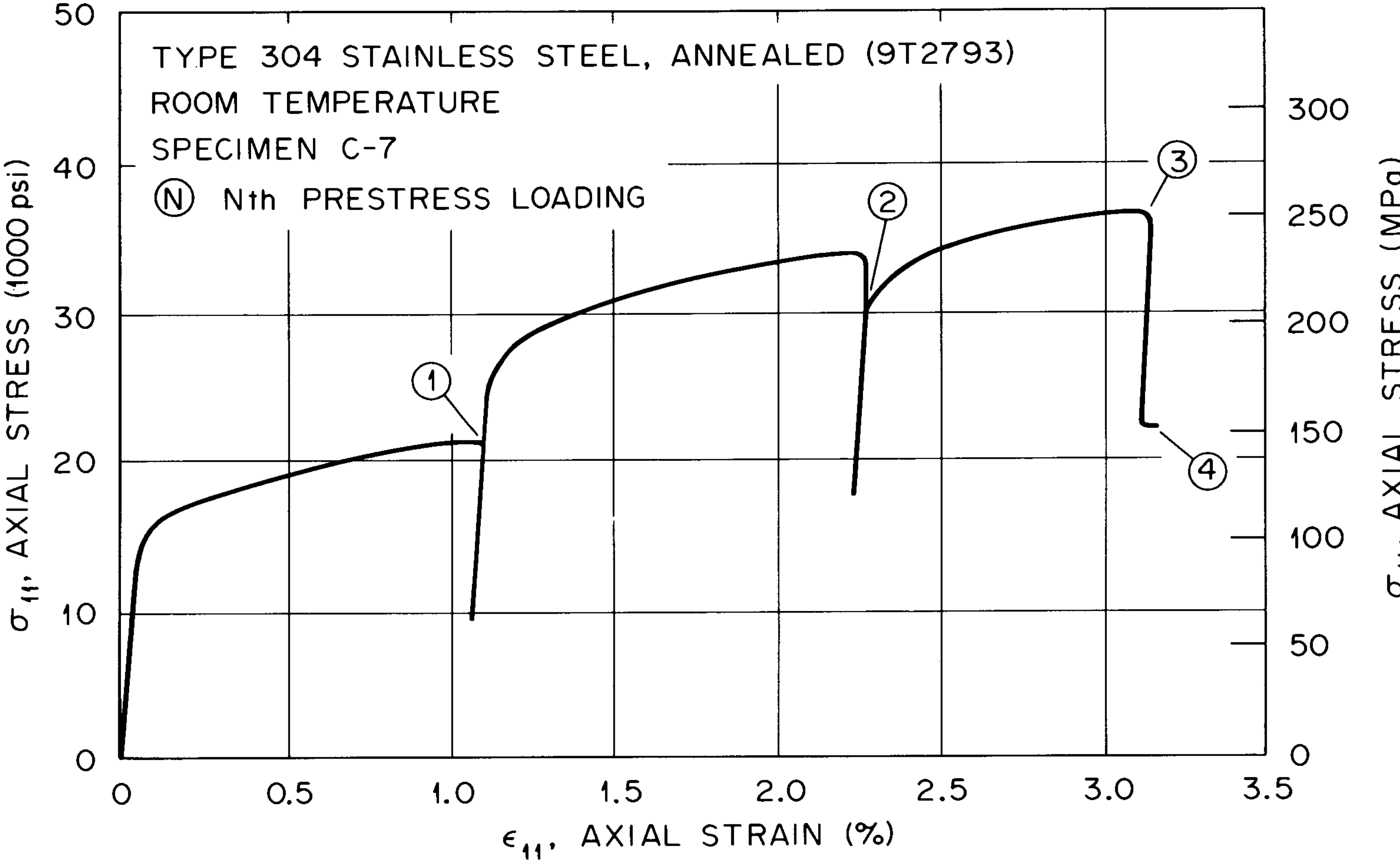

Fig. 20. Axial stress-strain curves for specimen C-7 under biaxial prestress loadings.

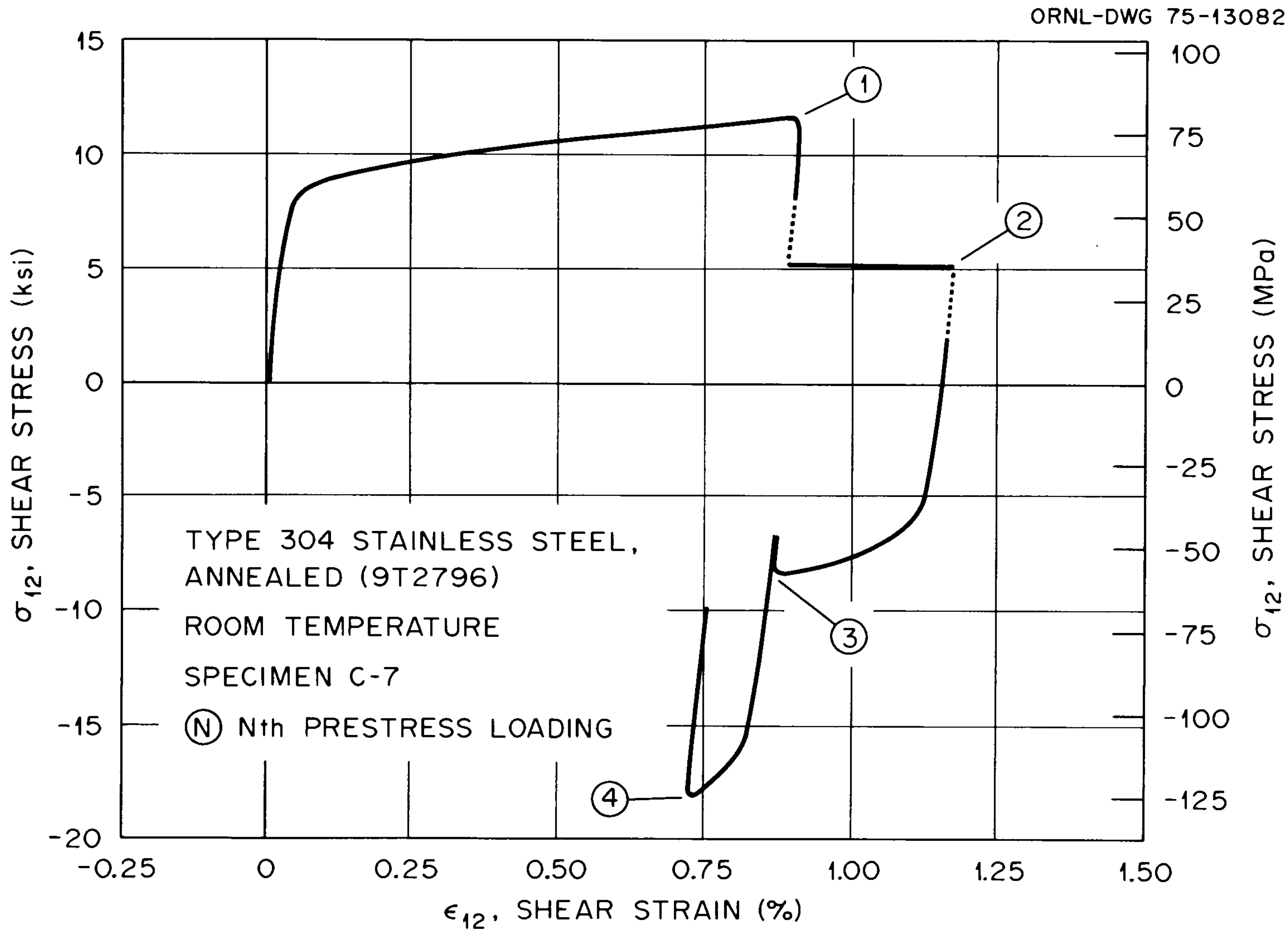

Fig. 21. Shear stress-strain curves for specimen C-7 under biaxial prestress loadings.

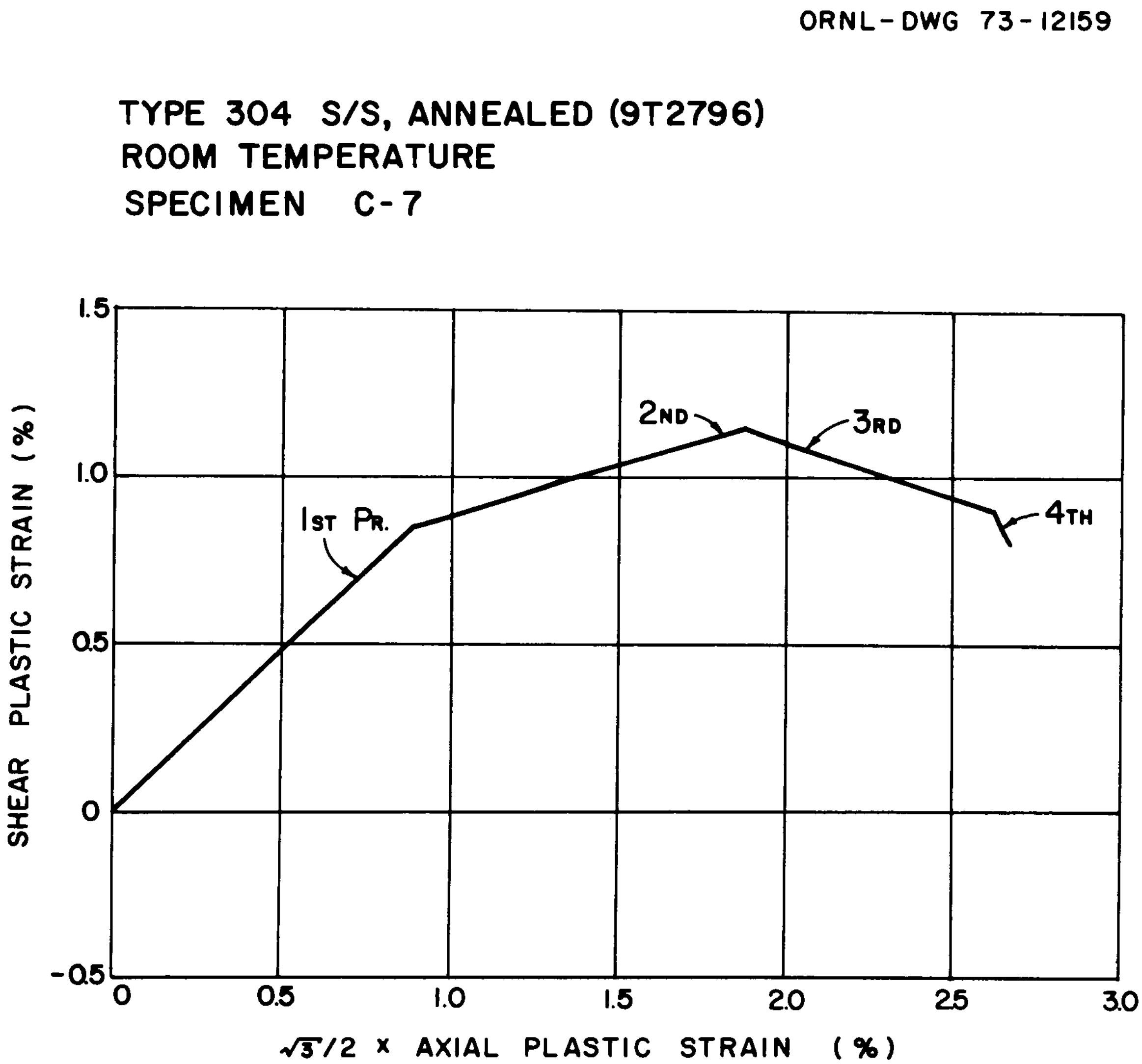

Fig. 22. Plastic strain trajectories for specimen C-7.

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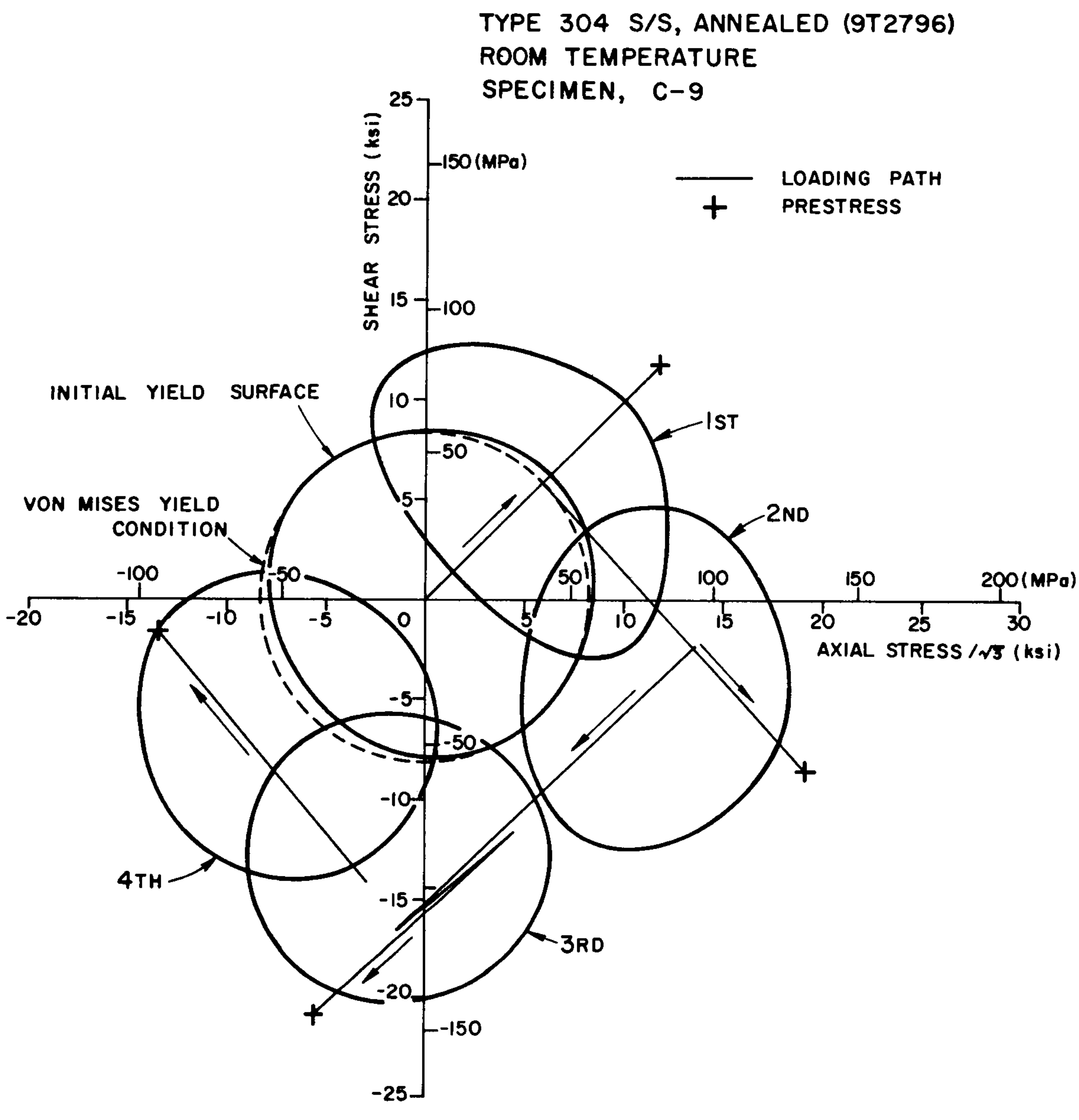

Fig. 23. Initial and subsequent yield surfaces for specimen C-9.

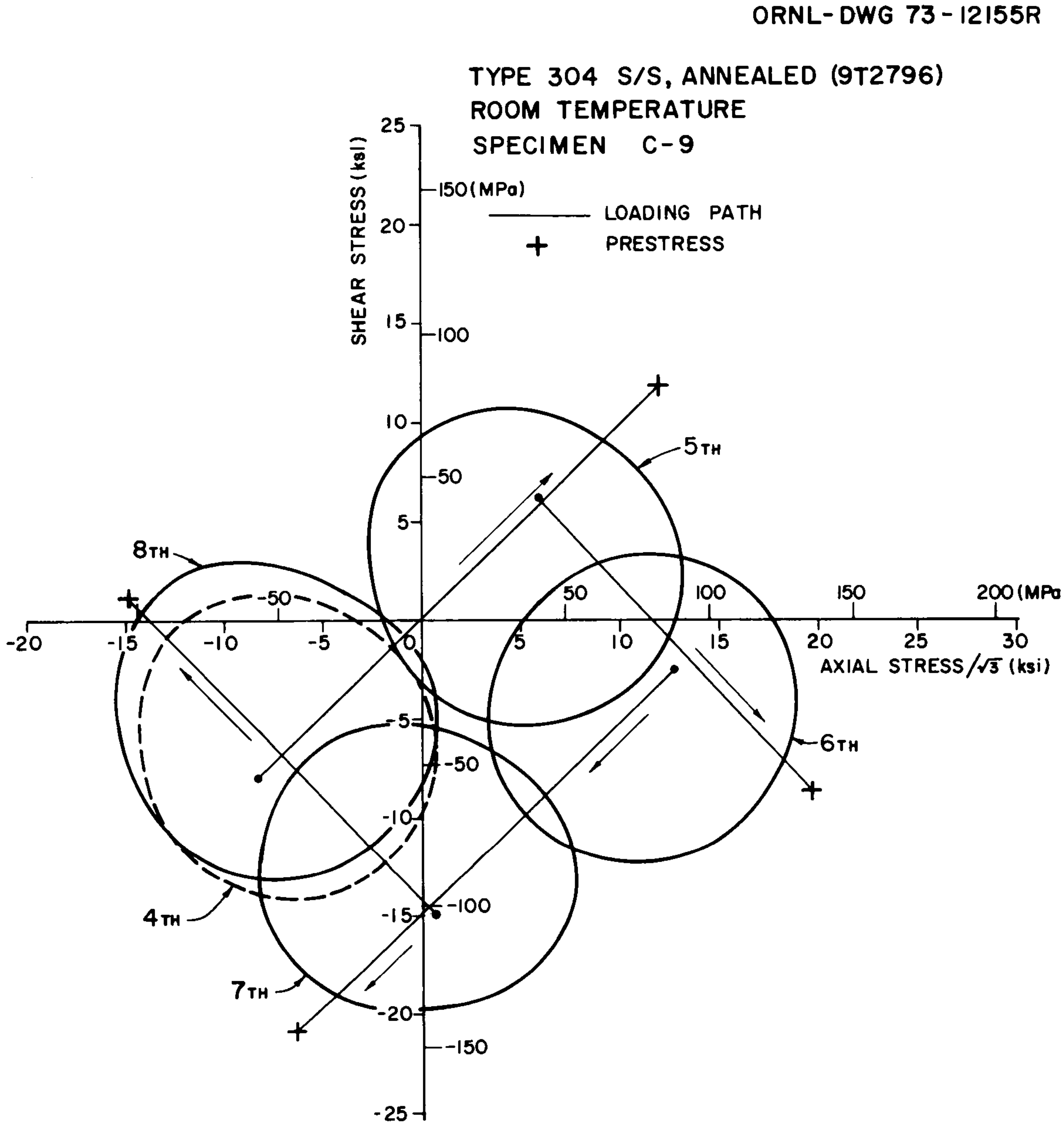

Fig. 24. Subsequent yield surfaces (4th through 8th) for specimen C-9.

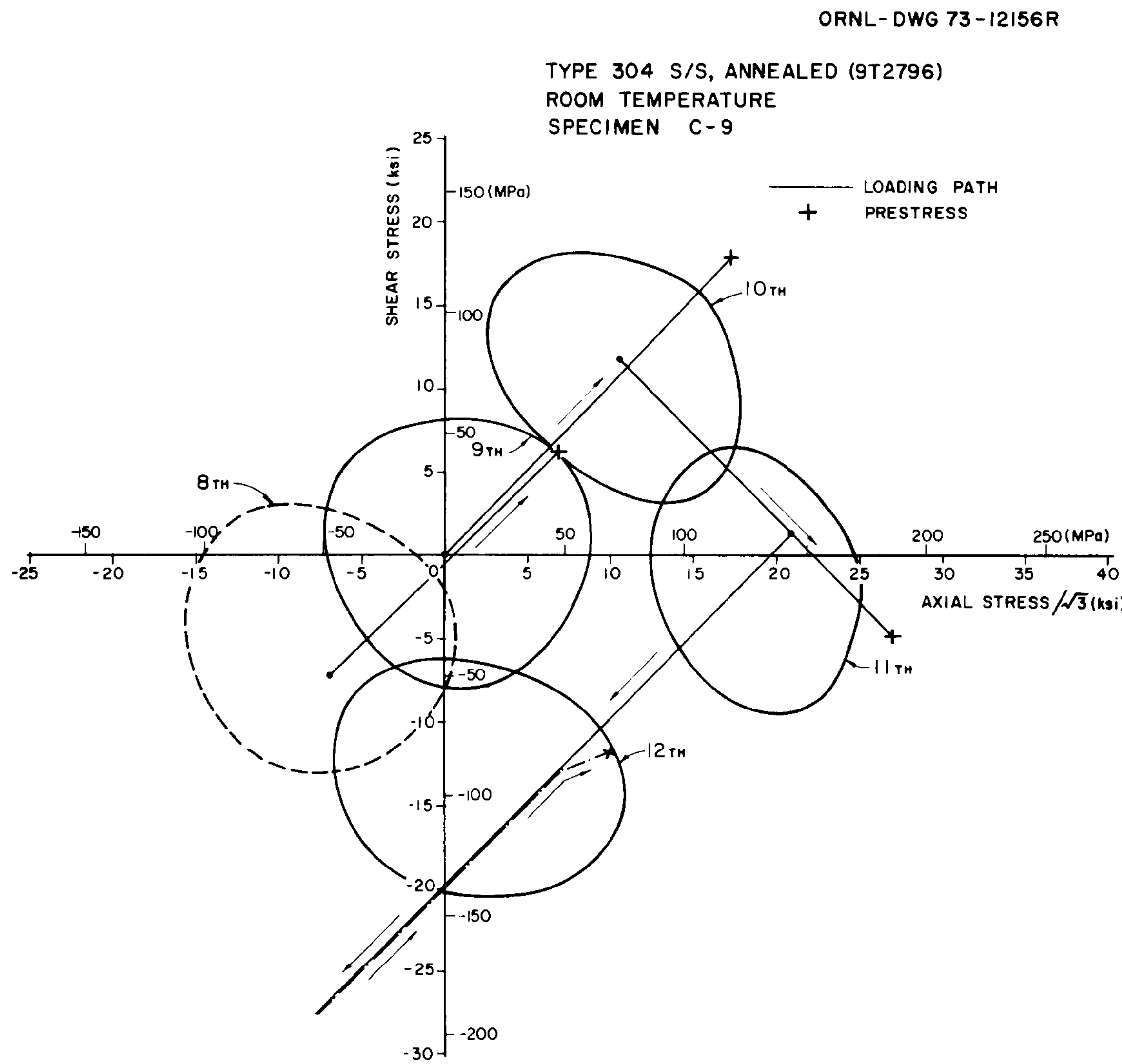

Fig. 25. Subsequent yield surfaces (8th through 12th) for specimen C-9.

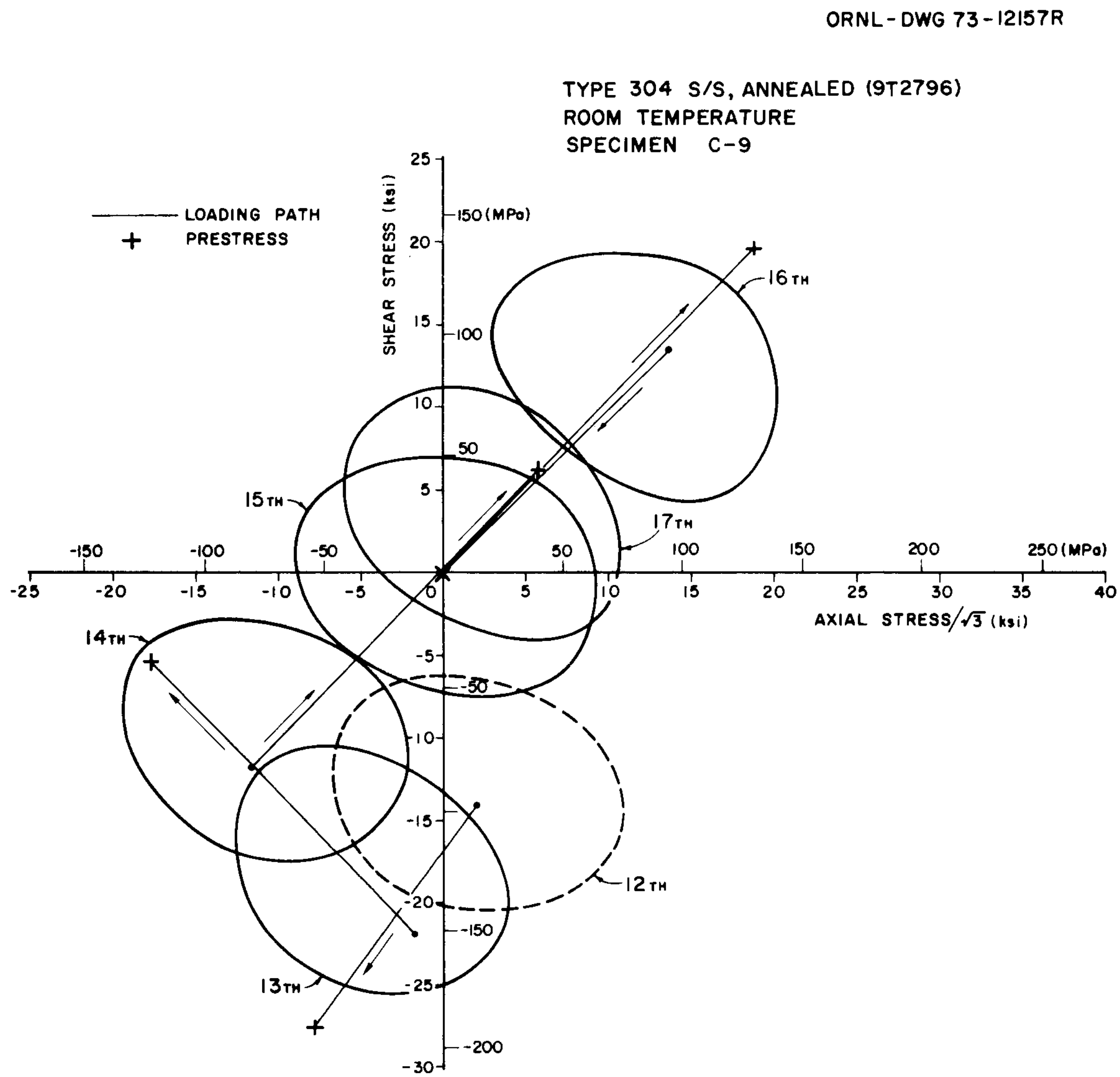

Fig. 26. Subsequent yield surfaces (12th through 16th) for specimen C-9.

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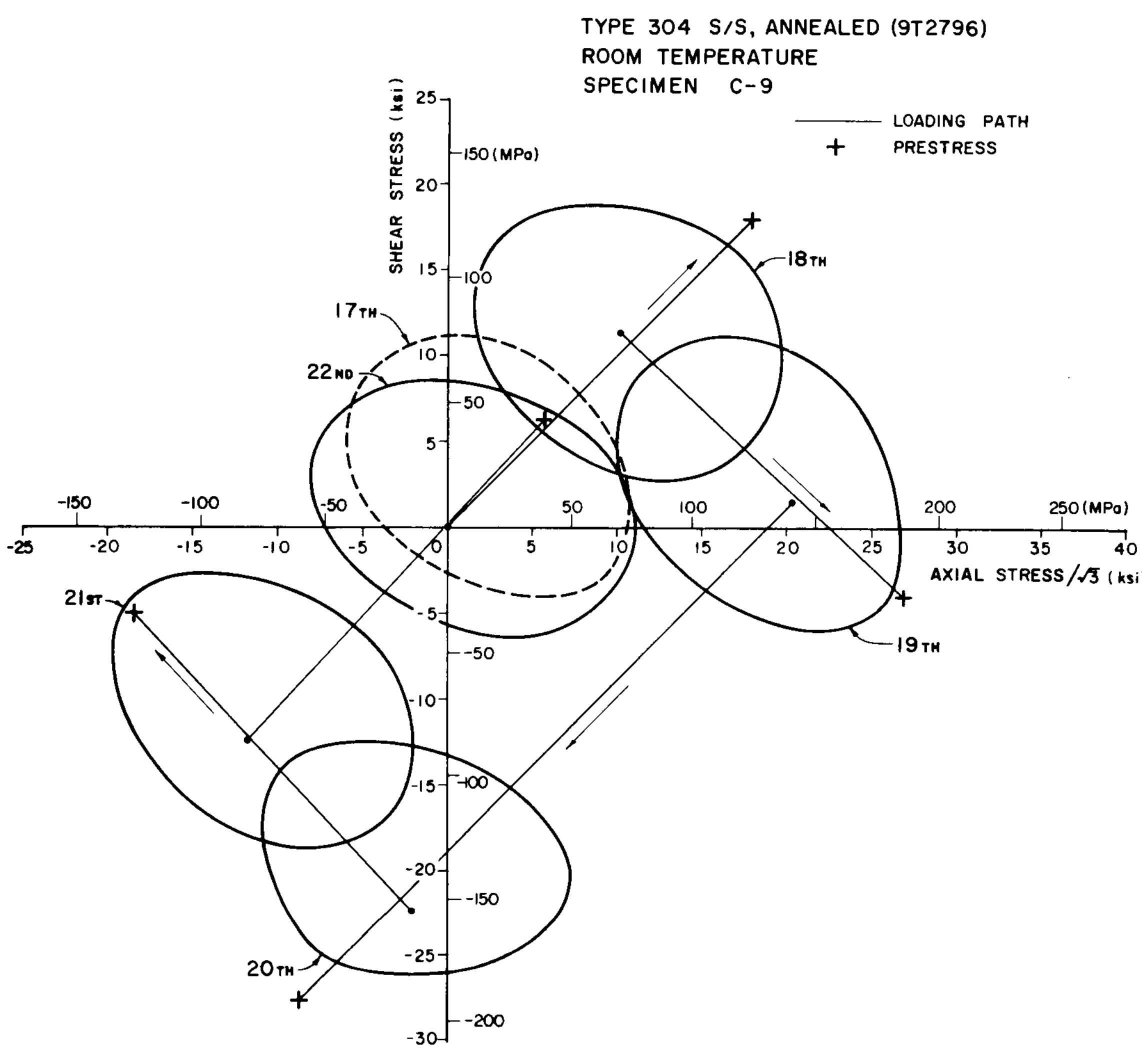

Fig. 27. Subsequent yield surfaces (17th through 22nd) for specimen C-9.

yield curve, the third subsequent yield curve, which is depicted in Fig. 23, should not have been influenced by the short unloading. Excess unloading resulted in the 12th prestress loading, as shown in Fig. 25. The 12th subsequent yield curve associated with the corresponding prestress point clearly indicated that permanent deformation had occurred. The specimen was again prestressed to the maximum stress level, and a subsequent yield curve for the load point was determined; the 13th yield curve is shown in Fig. 26. The 17th prestress loading, unloading from a stress point inside the 16th subsequent yield curve, was necessary to readjust the control instrument to enable it to perform higher prestress loadings. This test was interrupted at the end of the 9th subsequent yield curve probe for overnight shutdown. Except for those conditions stated earlier, all other prestress loadings imposed on the specimen were performed by the same test procedure used for the second prestress loading. In every case, the direction of prestress loading was rotated about 90° clockwise with respect to the prior prestress path. Because the prestress paths formed a closed loop and did not introduce excessive accumulated plastic strain that would cause structural instability, 22 yield curves were obtained for this specimen, as shown in Figs. 23 through 27.

The axial and shear stress-strain curves for specimen C-9 are shown in Figs. 28 through 30. The biaxial stress-strain data are tabulated in Appendix B, and the key prestress loading points are given in Table 1. The plastic strain trajectories obtained in response to these prestress loadings are shown in Fig. 31. As was the case for specimen C-7, the direction of the strain path did not follow the direction of the corresponding load path in general. More detailed descriptions of the plastic strain trajectories are given in the two insets in Fig. 31.

The initial yield surface obtained for specimen C-8, shown in Fig. 32, appears to be slightly perturbed from the Mises initial yield condition. The center of the measured initial yield surface is approximately 13.8 MPa (2000 psi) off the stress origin on the first prestress loading path. In view of the test results obtained for other specimens, we suspect that excessive axial and torsional forces may have been applied to the specimen when it was being mounted in the testing machine. However, the effects of the inadvertent loadings on the subsequent investigation were insignificant.

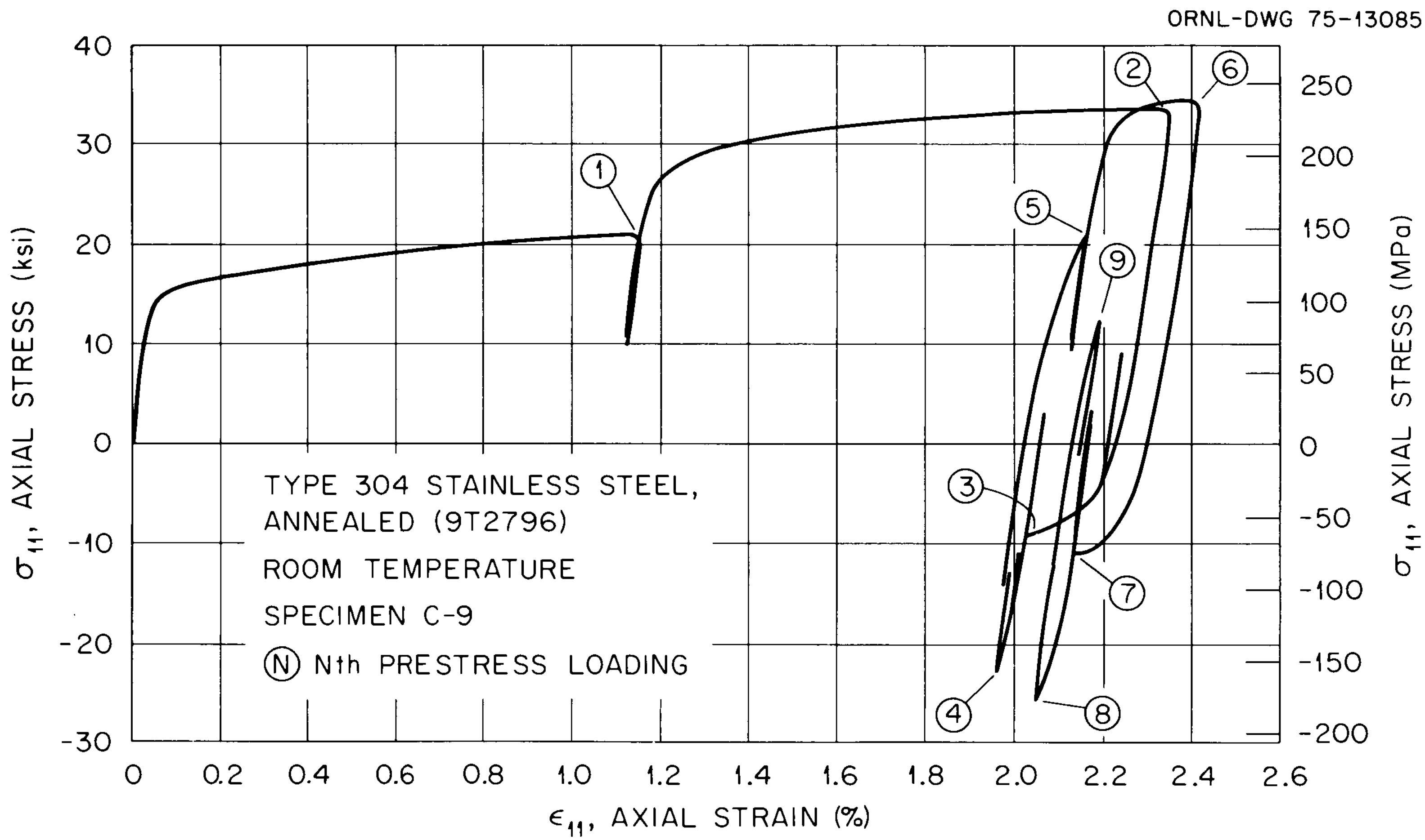

Fig. 28. Axial stress-strain curves for specimen C-9 under biaxial prestress loadings.

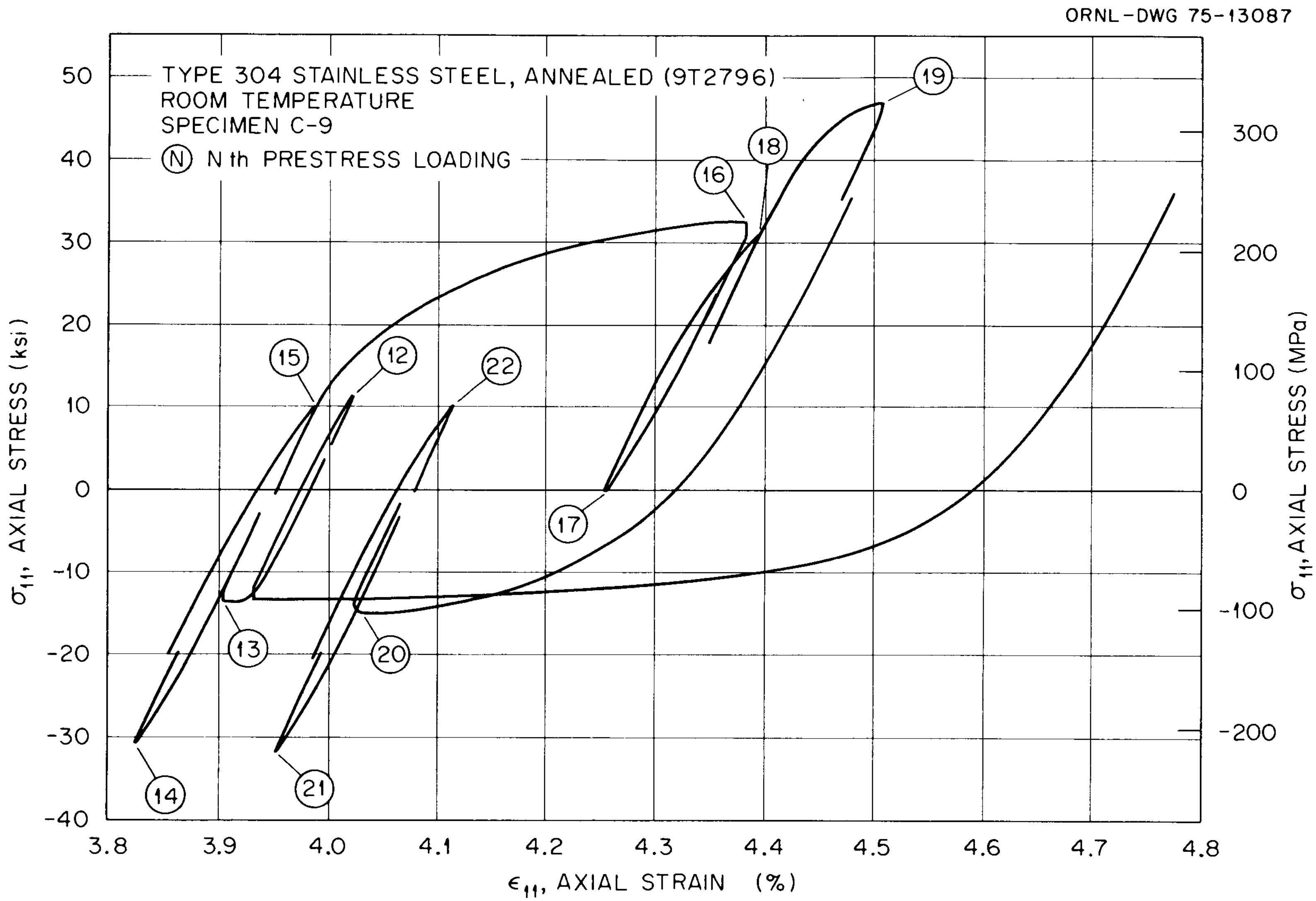

Fig. 29. Axial stress-strain curves for specimen C-9 under biaxial prestress loadings.

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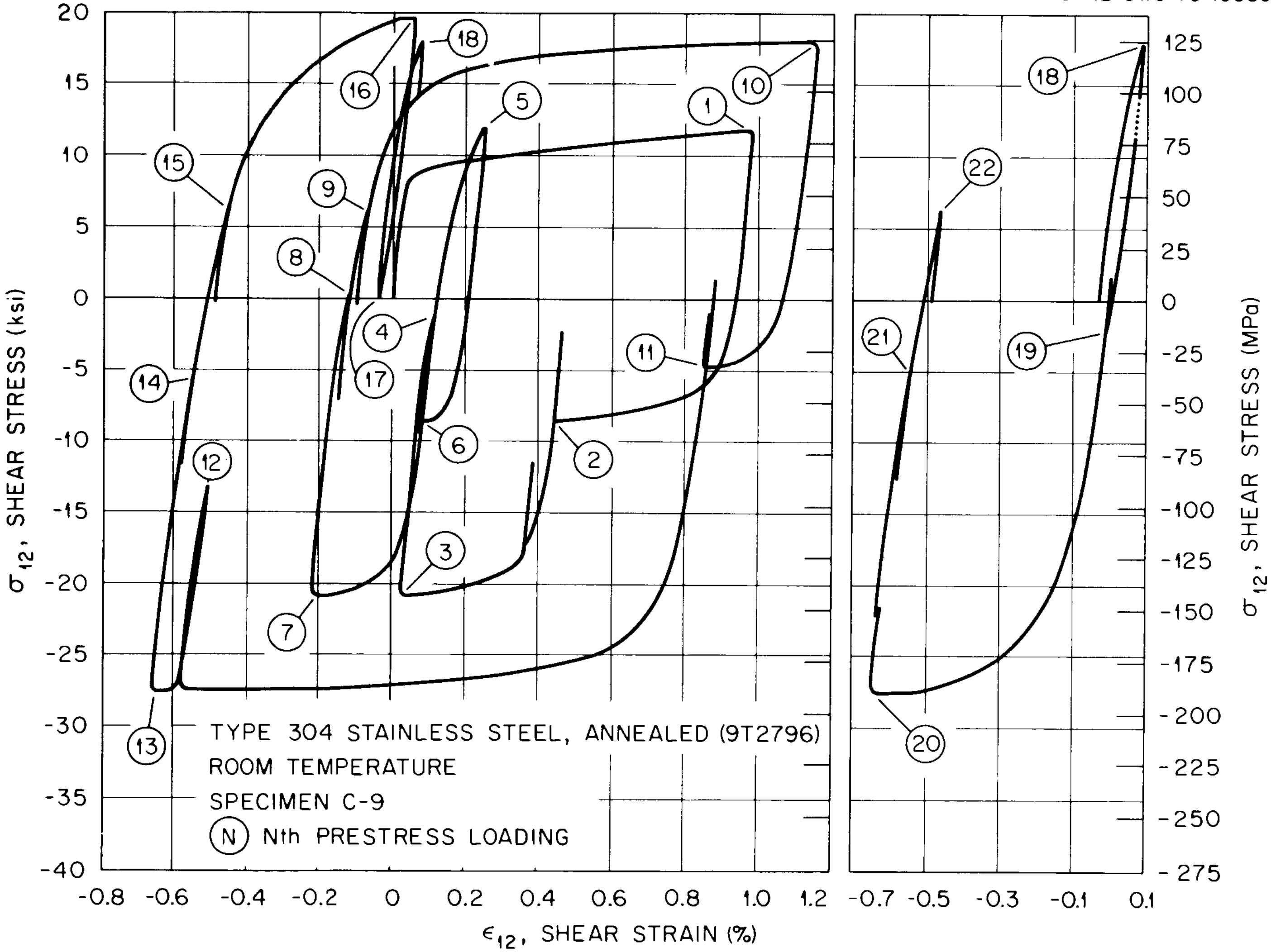

Fig. 30. Shear stress-strain curves for specimen C-9 under biaxial prestress loadings.

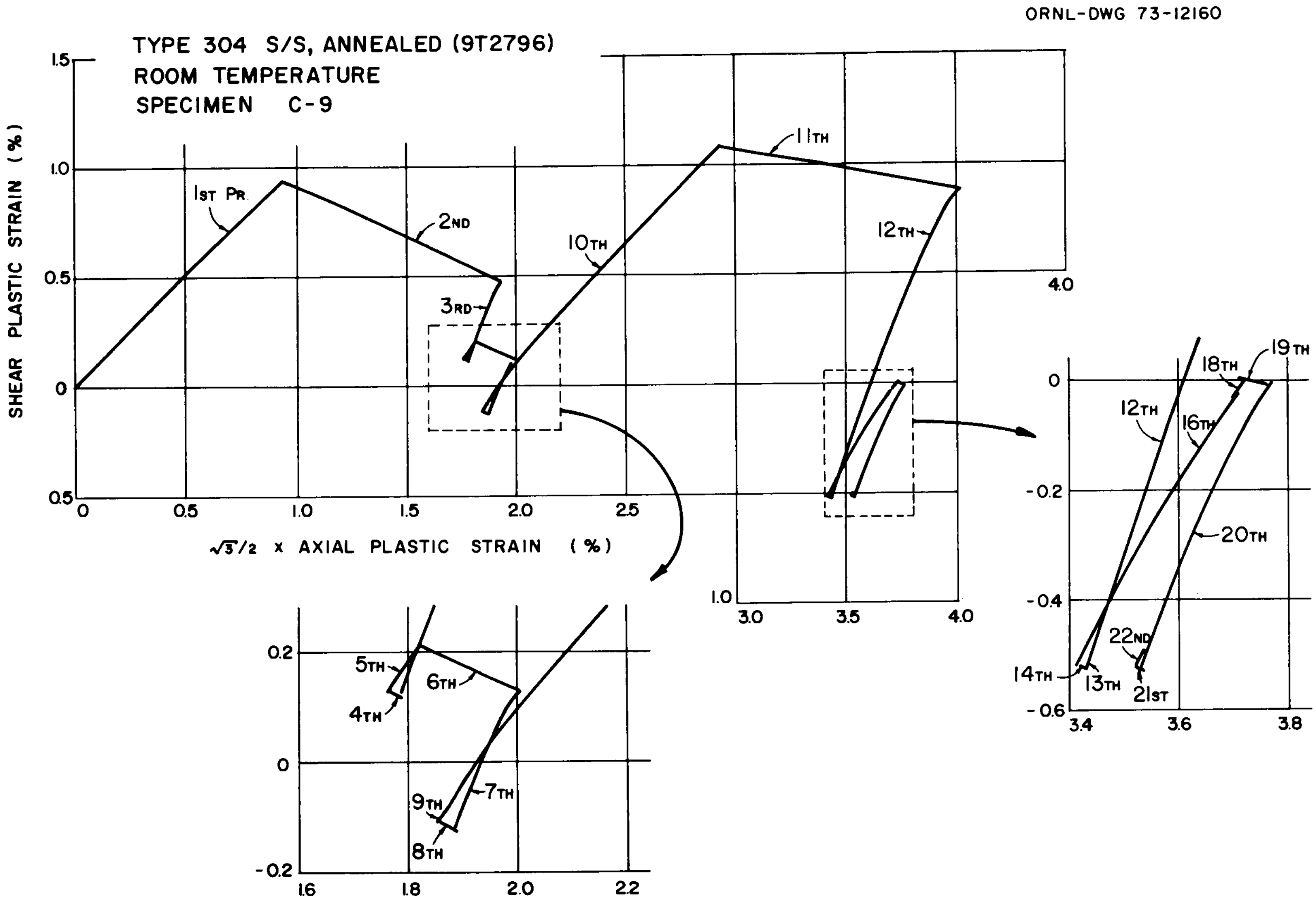

Fig. 31. Plastic strain trajectories for specimen C-9.

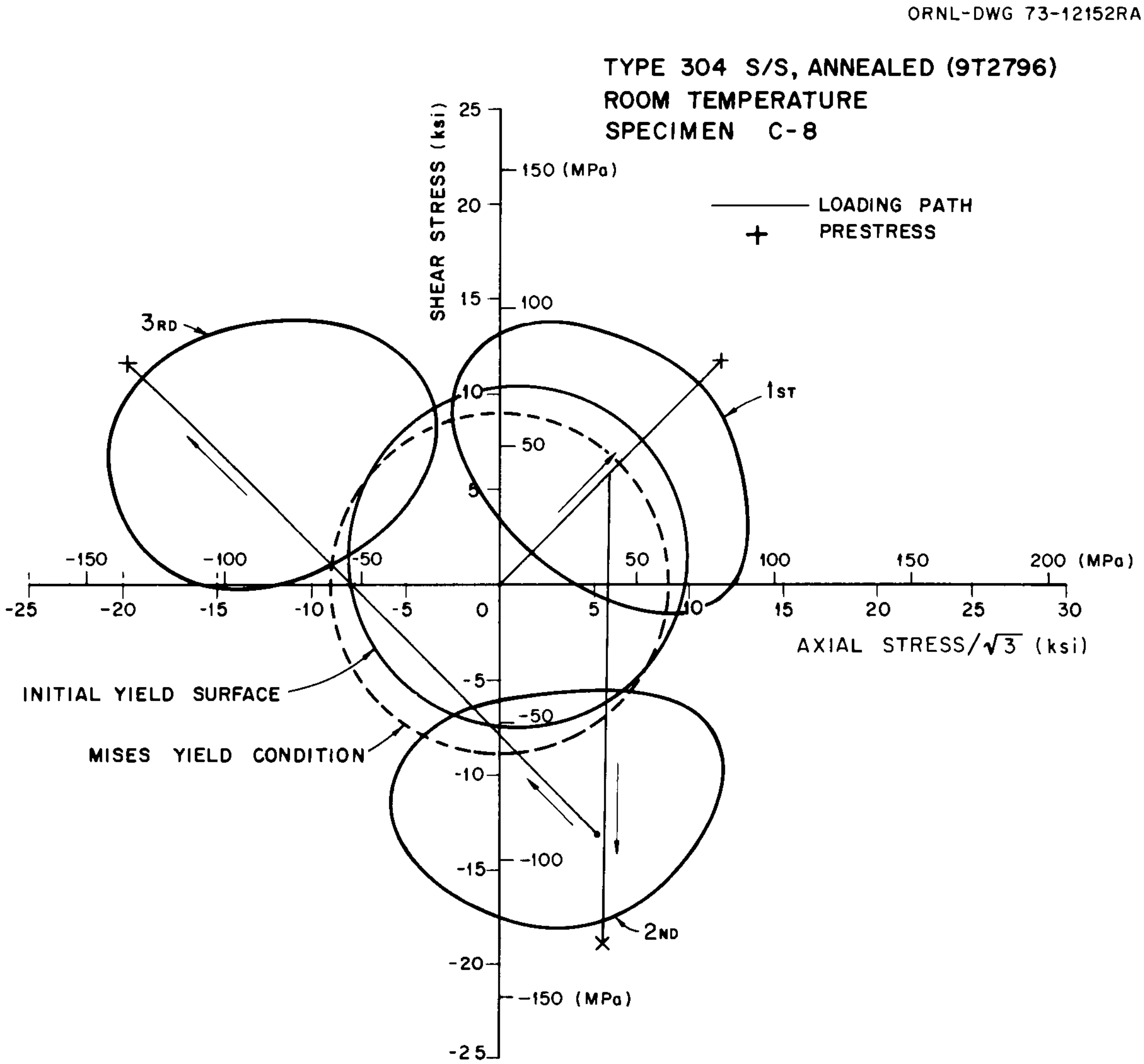

Fig. 32. Initial and subsequent yield surfaces for specimen C-8.

The total equivalent plastic strain resulting from the initial prestress loading was calculated to be 1.12%, which is slightly less than that obtained for earlier tests.

The direction of the second loading path was rotated approximately 135° clockwise from the initial path, and the directions of subsequent prestress loadings were successively rotated 135° except for the fifth loading, as shown in Figs. 32 through 34. An initial and nine subsequent yield surfaces were obtained for specimen C-8. Stress-strain responses for all prestress loadings were compiled and are presented in Figs. 35 and 36 as though they had been tested continuously. Residual plastic strains incurred from yield surface probes at the end of each prestress loading are included in these figures. Some discontinuities in the stress-strain responses resulting from the residual plastic strains are discernible in both figures. The sudden offset in the stress-strain curve occurring between the unloading from the seventh prestressing and the initiation of the eighth, which is shown in Fig. 35, is a typical case.

The plastic strain trajectories calculated from the stress-strain curves in Figs. 35 and 36 are plotted in Fig. 37 for comparison with the prestress loading paths. Except for the case in the first prestress loading, the plastic strain trajectories are not colinear with the corresponding prestress path.

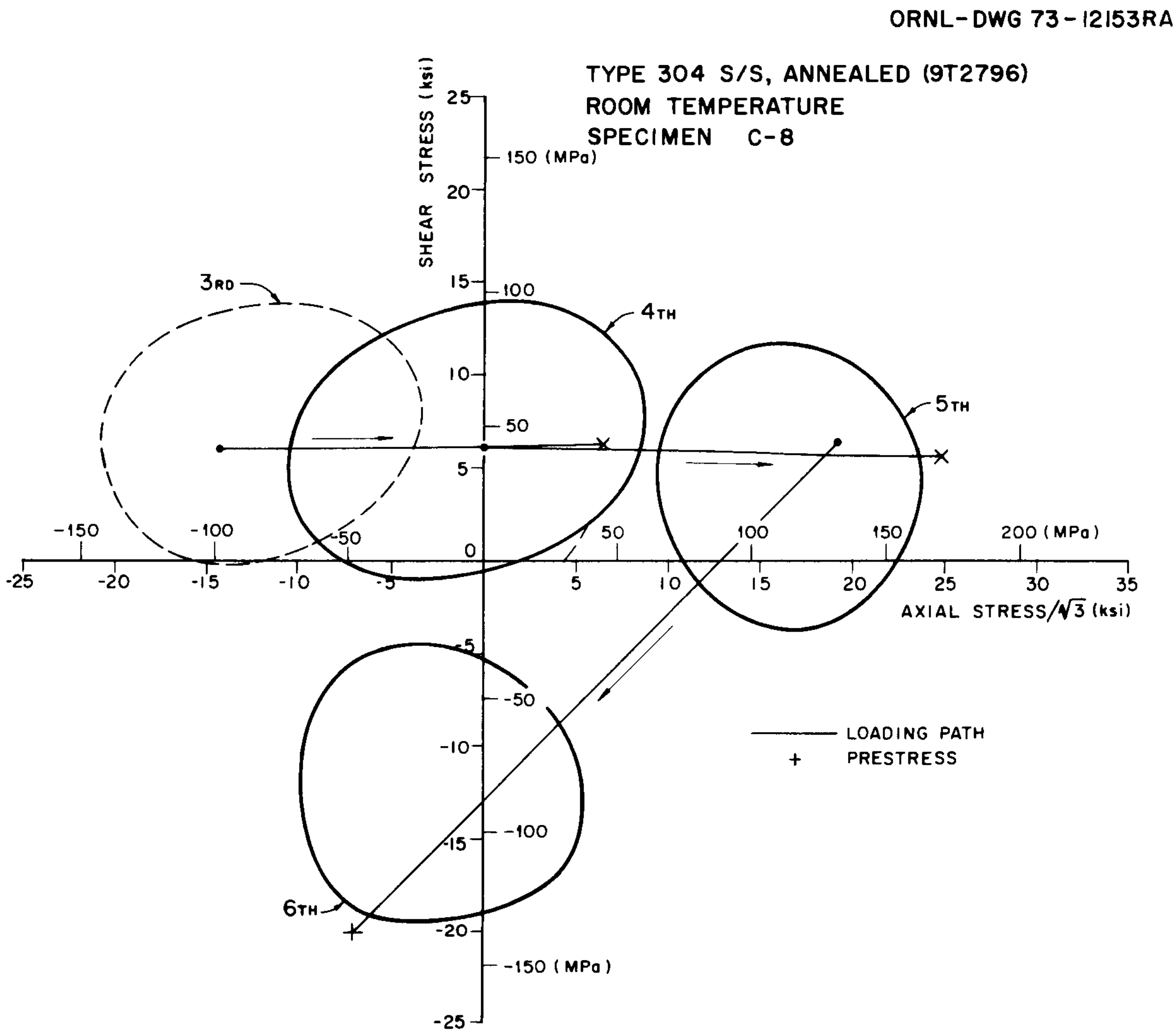

Fig. 33. Subsequent yield surfaces (3rd through 6th) for specimen C-8.

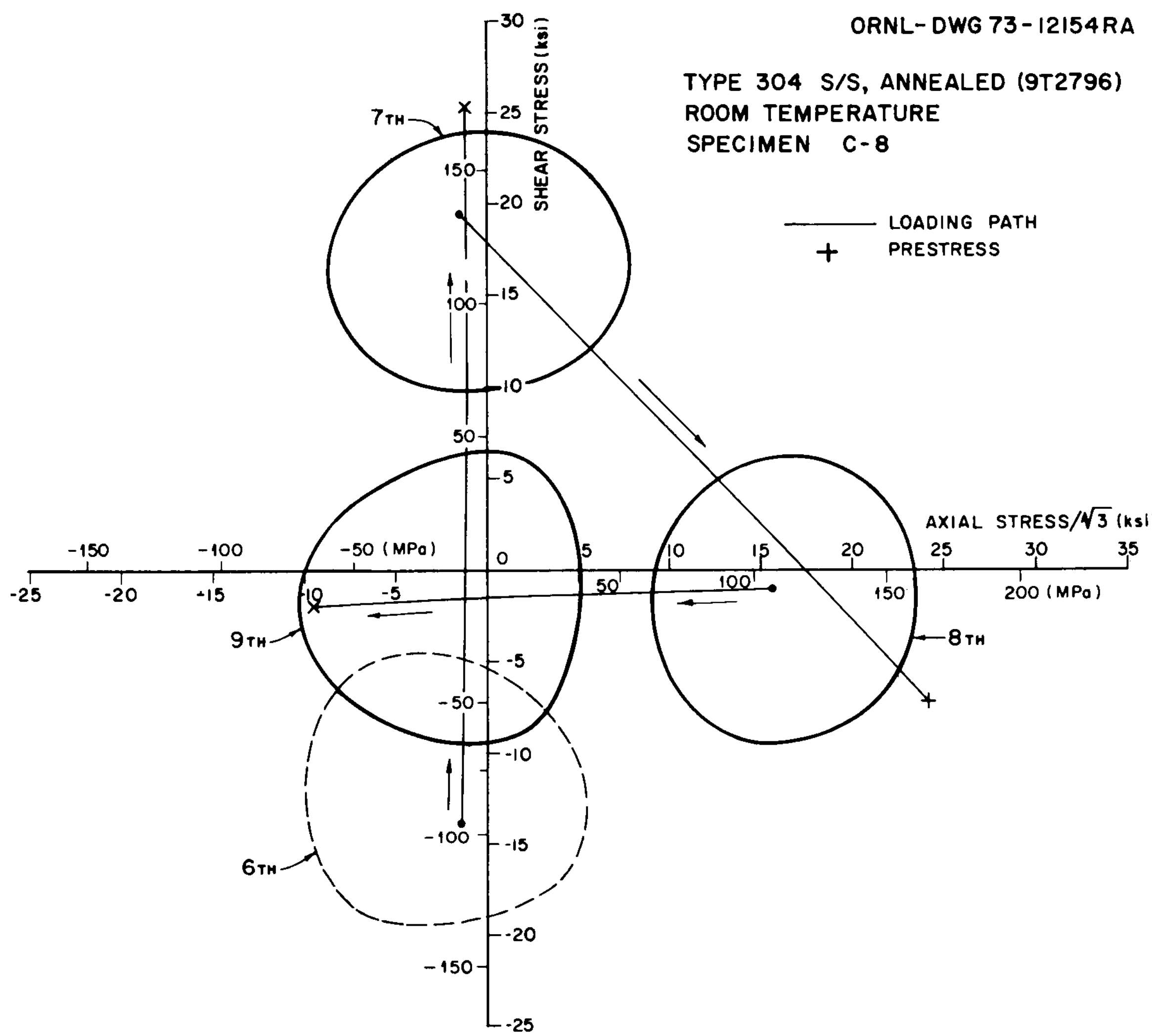

Fig. 34. Subsequent yield surfaces (6th through 9th) for specimen C-8.

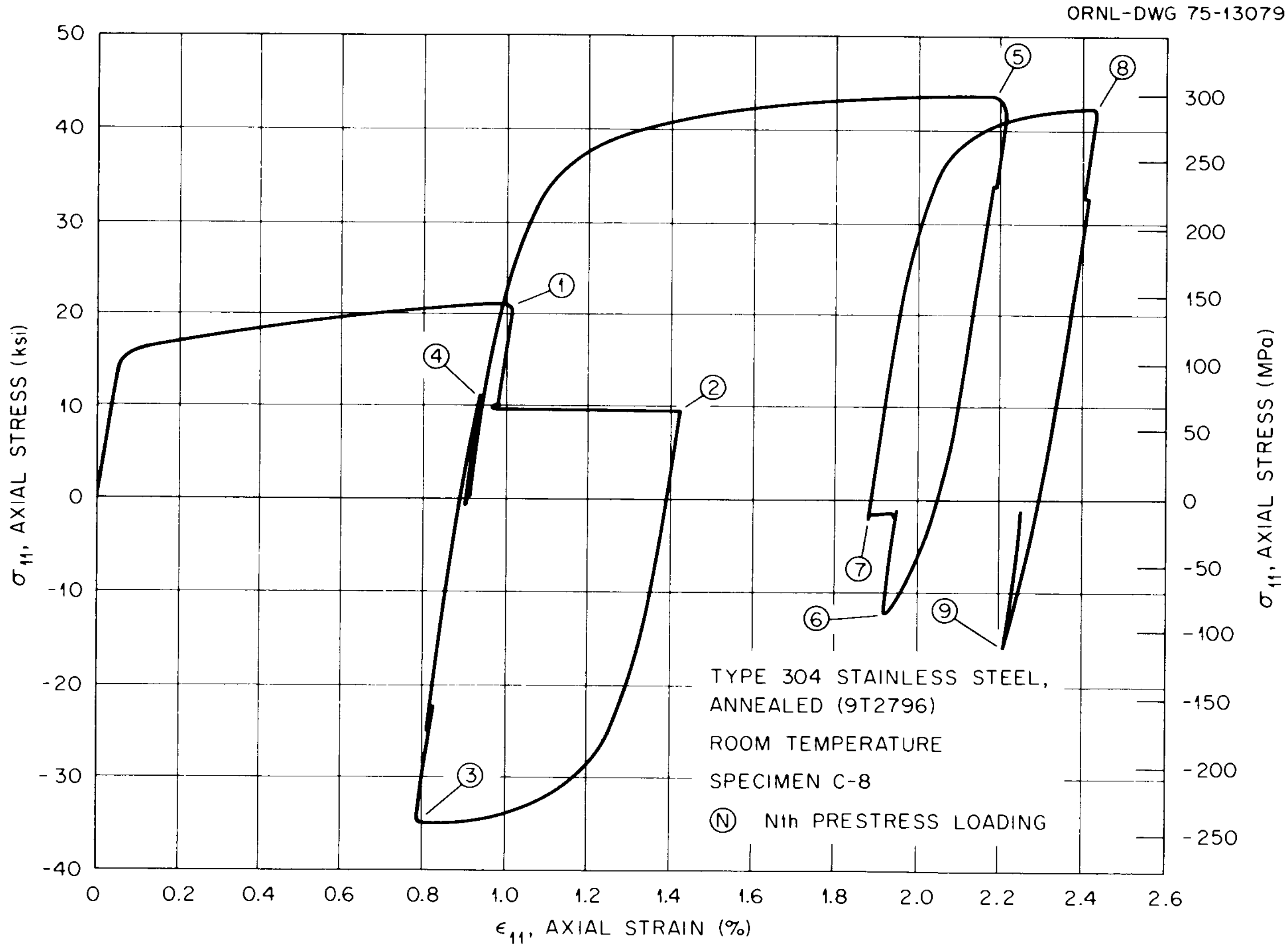

Fig. 35. Axial stress-strain curve for specimen C-8 under biaxial prestress loadings.

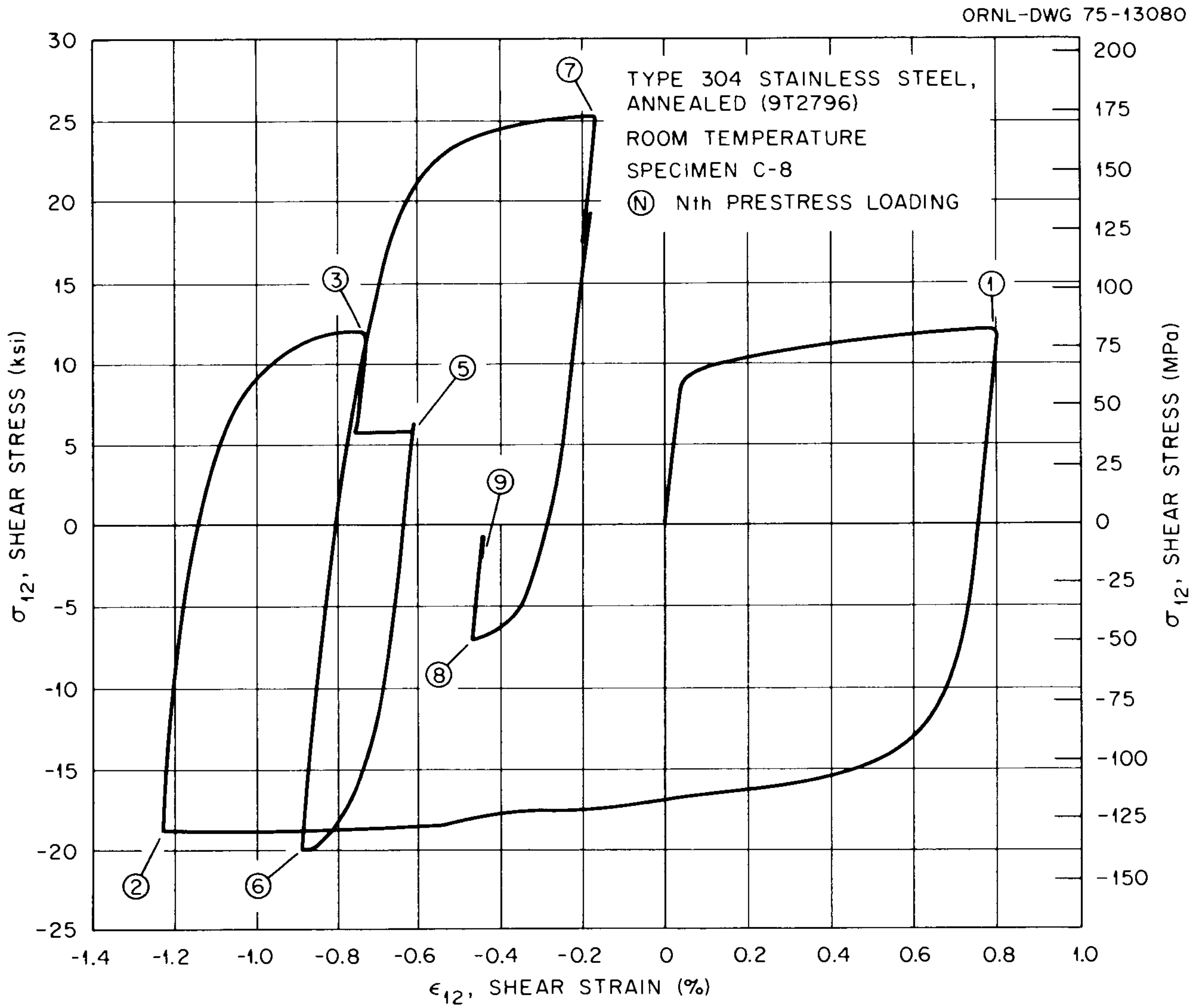

Fig. 36. Shear stress-strain curve for specimen C-8 under biaxial prestress loadings.

ORNL-DWG 73-12161

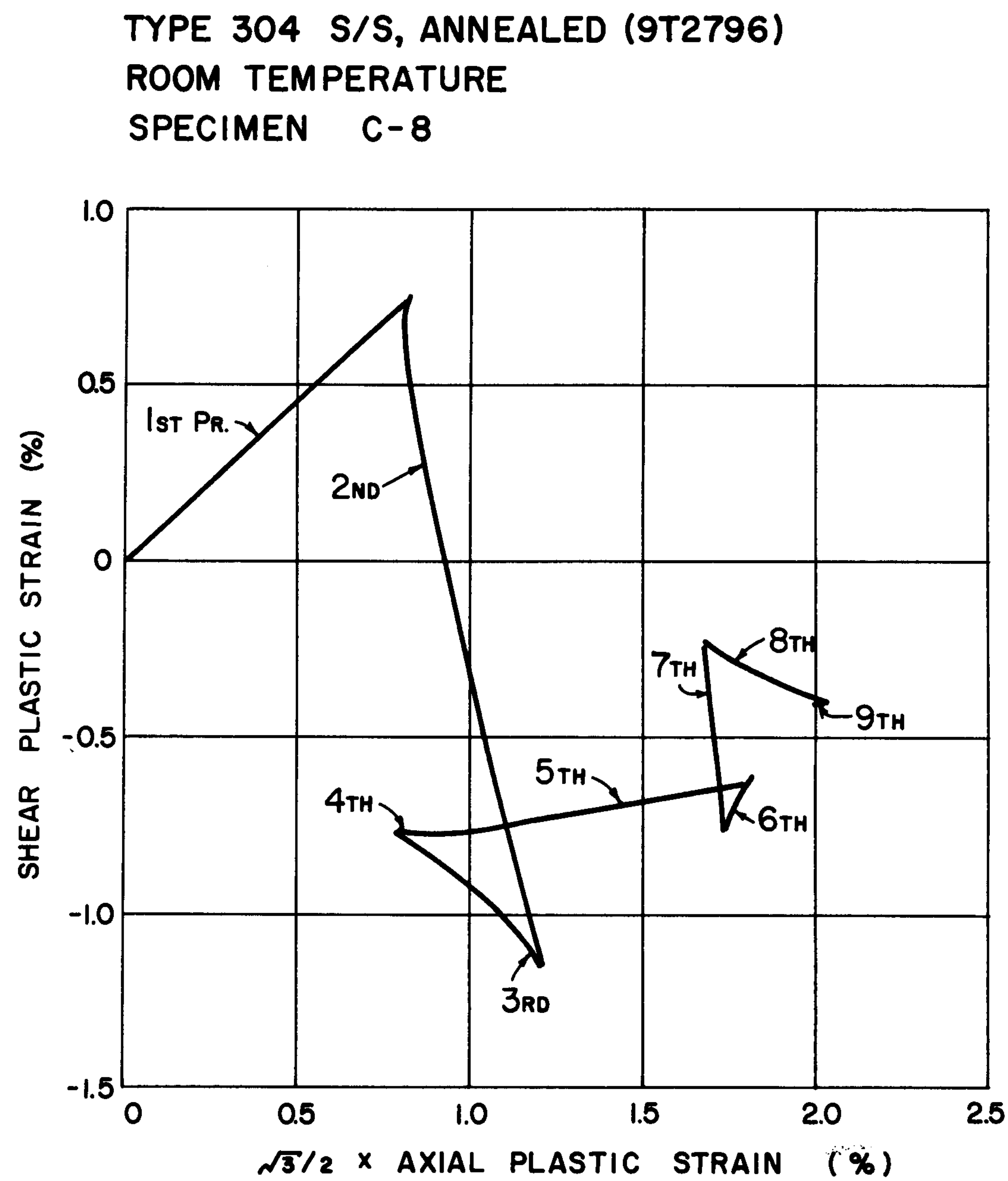

Fig. 37. Plastic strain trajectories for specimen C-8.

7. DISCUSSION OF RESULTS

As a result of careful test planning and a systematic method of investigation, new information was obtained from these experiments. Some features that were commonly observed and relatively well established were seen to be consistent with results obtained from other works. For example, the experimentally determined initial yield surfaces shown in Figs. 10, 19, 23, and 32 were in good agreement with the Mises theoretical yield condition, which is represented by a dashed circle in each of the figures. The slight disagreement shown in Figs. 10 and 32 for specimens D-2 and C-8, respectively, was probably caused by inadvertent work-hardening of the specimens during test preparation. Small disturbances such as those in the virgin specimens did not seem to affect the subsequent investigation significantly.

All of the first subsequent yield surfaces obtained from these tests were strikingly consistent both in shape and size. Apparently, the effects of the slight initial work-hardening were totally obscured by initial prestress loadings. In all cases, initial prestressing was imposed along the 45° path. The stress-strain responses resulting from the same prestress loadings were also consistent with each other. In Fig. 38, the response curves are plotted in terms of the relationship between the effective stress and the effective plastic strain as defined in Eqs. (5) and (6), respectively. Note that they are in good agreement with each other. In an earlier discussion, it was pointed out that, when initial prestress loadings were monotonic proportional loadings, the plastic strain path closely followed the corresponding stress path in the same direction. Under such loadings, there is a strong physical basis for relating the effective stress and the effective plastic strain.

Figures 39 and 40 show test results obtained from earlier experiments,[14] in which five specimens were subjected to proportional cyclic loading tests. In these experiments five proportional prestress loading paths emanating from the center of the yield surface were evenly spaced in the first quadrant of the given stress space. A comparison between the stress paths and the plastic strain paths shows a strong correlation. However, the responses were independent of the direction of prestressing. It should be noted that the yield points indicated in Fig. 39 were determined

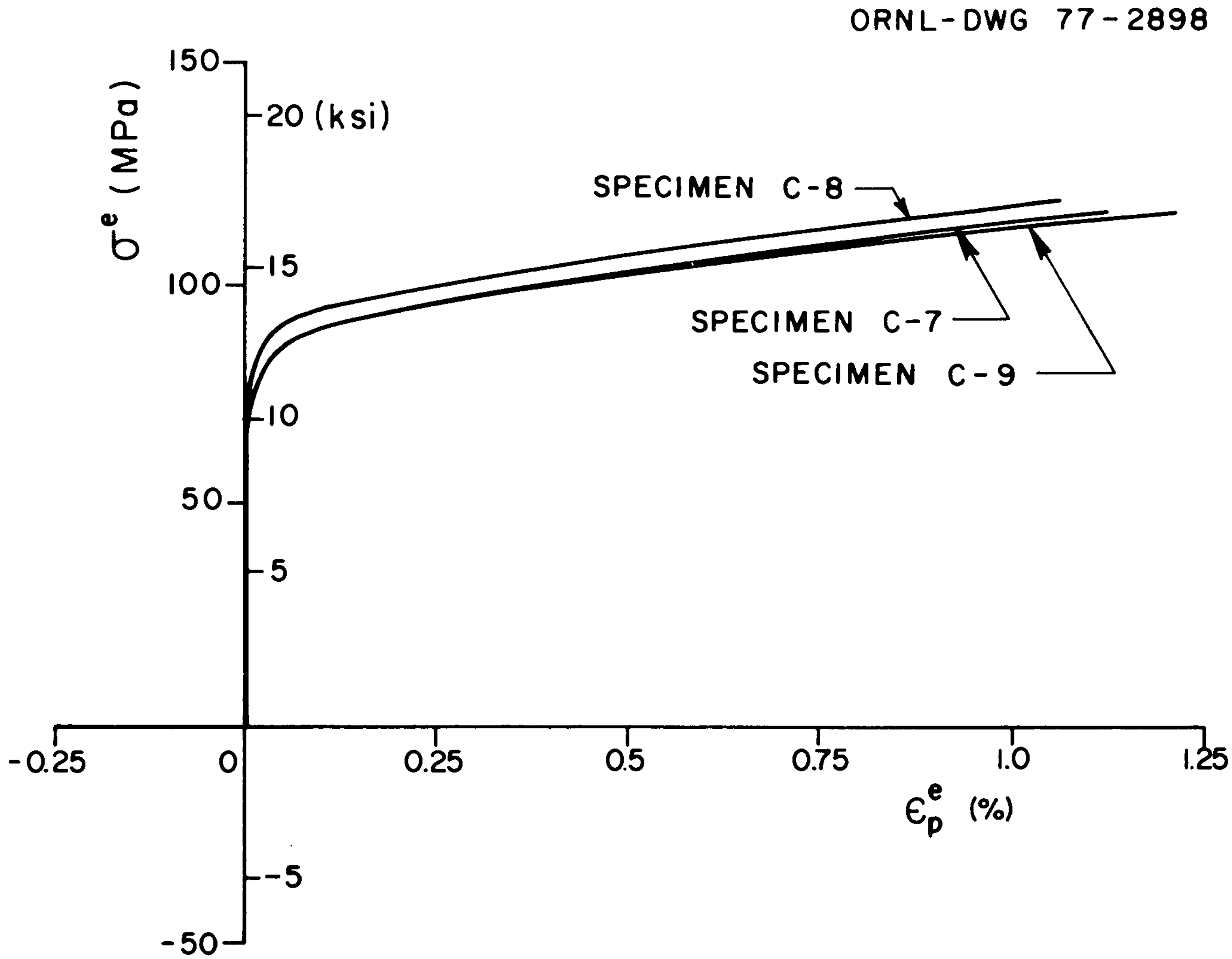

Fig. 38. Effective stress and effective plastic strain.

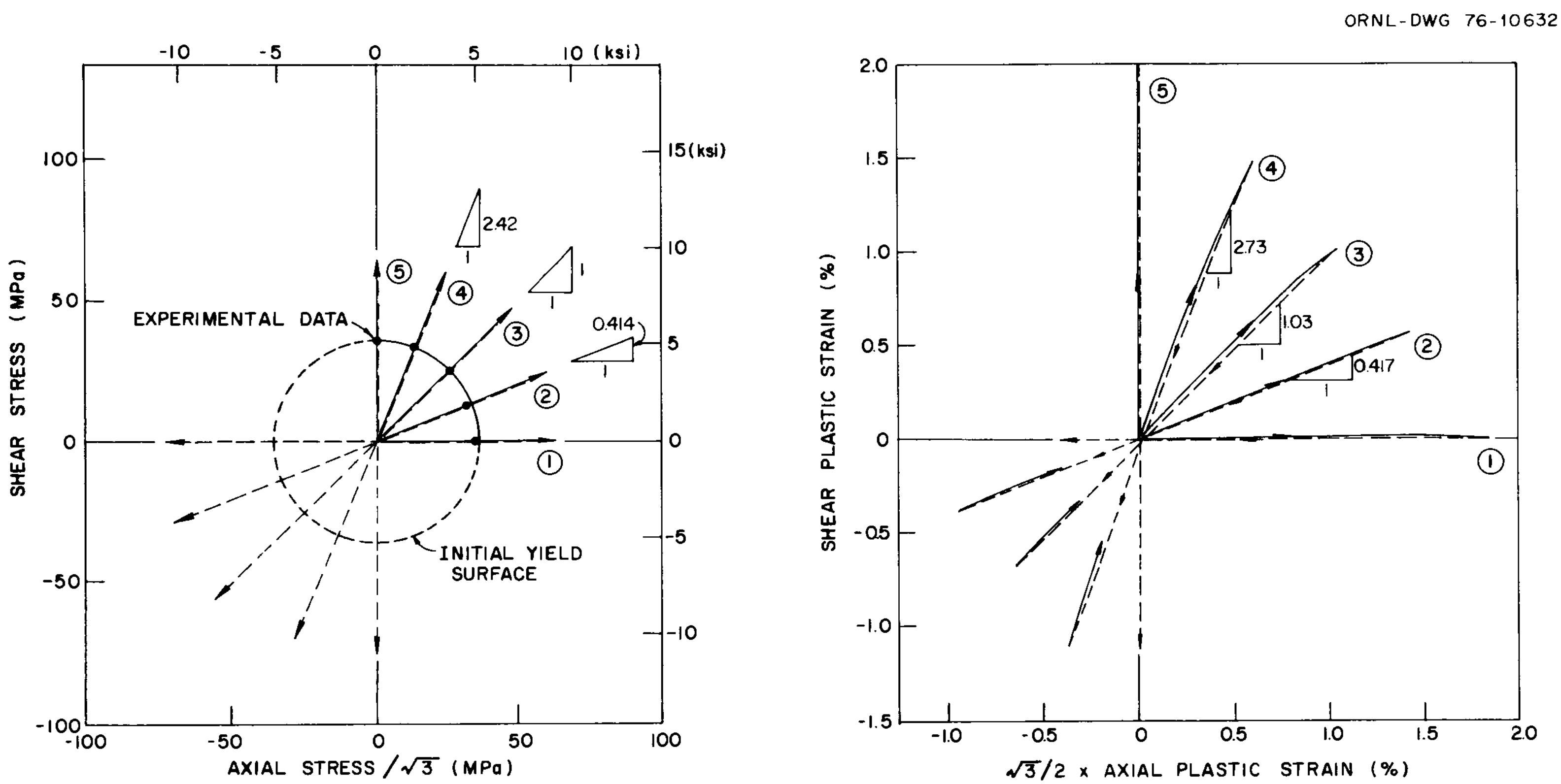

Fig. 39. Proportional cyclic loading paths and corresponding plastic strain trajectories.

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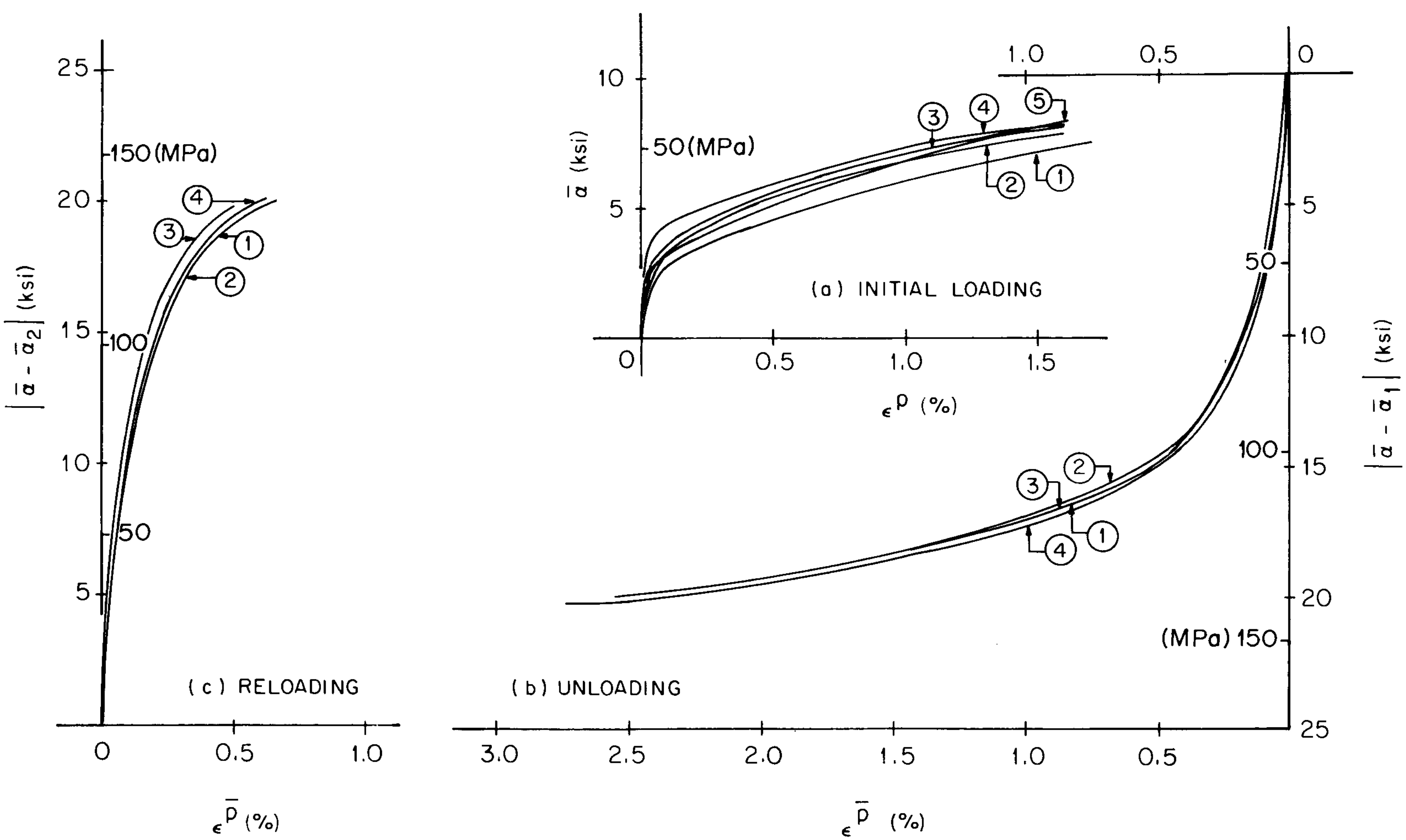

Fig. 40. $\overline{\alpha}$ vs effective plastic strain.

from the stress-strain curves plotted by a conventional X-Y recorder, because appropriate computers were not available for yield probes at that time. Since these yield points were given only as an indication, their values should not be compared with those reported in the preceding chapter. Figure 40 shows the relationship between $\bar{\alpha}$ and the effective plastic strain. The quantity $\bar{\alpha}$ is equivalent to the effective stress minus a constant value equal to the radius of the initial yield surface. The figure shows that the responses are independent of the direction of loading paths where the path along the horizontal axis is the uniaxial loading. Because of this consistent behavior, the classical hardening assumption,[1,15]

$$d\alpha_{ij} = g \, d\varepsilon_{ij}^{p} , \tag{7}$$

appears to be reasonable for the description of proportional loadings. Here, α_{ij} denotes the translation tensor of the yield surface and g is a function for nonlinear hardening and a constant for linear hardening.

Although the proportional loading results support a relatively simple effective stress—effective plastic strain relationship for multiaxial behavior, there can be no such relationship for general nonproportional loadings. Some test results obtained in this experiment were superposed in Fig. 41 for this study. The 45° path indicates the common initial prestressing. The first subsequent yield surface obtained from specimen C-8 is shown in Fig. 41a as a typical curve, since the first subsequent yield surfaces for the other specimens are similar. Loading was then imposed along one of the second straight-line paths. The specimen number is marked on the loading path with which it is associated. A fifth loading path, shown by a dashed line, indicates a hypothetical reloading along the initial prestressing.

The test results for specimen D-2 (Fig. 18) show that the response in the reverse direction with respect to the prior prestress direction differs significantly from that exhibited for reloading from the center of the subsequent yield surface. Therefore, it is logical to assume that a continuous change in response would be expected to occur with changes in angle for different straight-line paths emanating from the stress point which is approximately at the center of the subsequent yield surface. The results, which

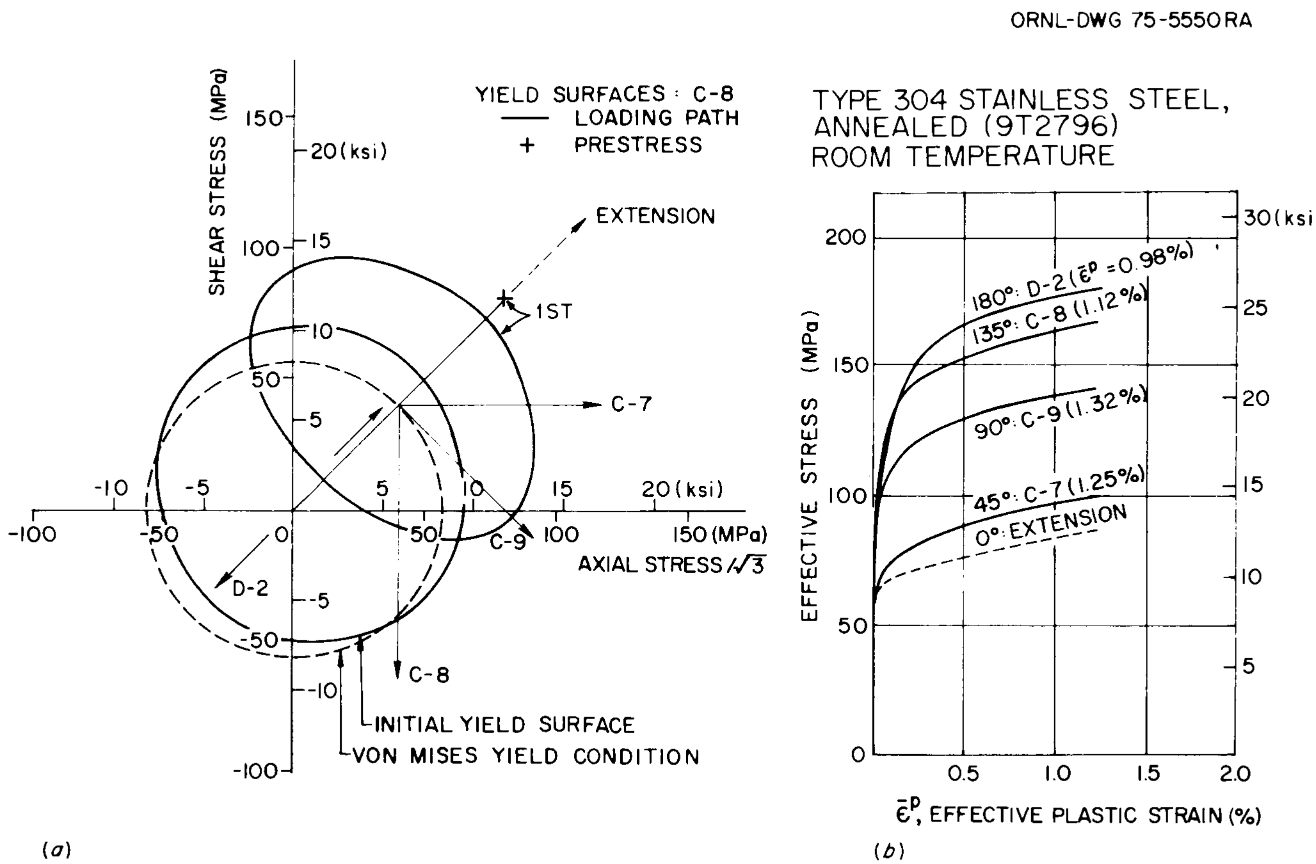

Fig. 41. Stress-plastic strain curves for tubular specimens subjected to radial and nonradial loading histories; (a) initial and subsequent yield surfaces, (b) effective stress-effective plastic strain correlations.

are calculated in terms of effective stress and effective plastic strain taking the center point of the first subsequent yield surface as a reference, are depicted in Fig. 41b. The response, as a function of direction with respect to the initial loading direction, is indicated in a qualitative sense. Direct comparisons cannot be made because (1) different specimens were used; (2) there were differences in prior plastic strain incurred during initial loading (values given on curves); and (3) for other than 0 and 180° directions, the stress and plastic strain increment vectors were not colinear. However, a continuous change in response with the change in angle can be inferred.

Responses for subsequent segmental prestressings were even more complicated. The physical relationship between effective stress and effective plastic strain becomes problematic in some situations where the plastic strain path does not follow the corresponding stress path.

General observation indicates that the yield surface was translated with the loading point and was deformed in the prestress direction. The yield surface determined subsequent to prestressing did not pass through the prestress point when the prestressing was directed outward from the stress origin. This indicates that early yielding would occur if the specimen should be reloaded toward the prior prestress point. When a yield surface was translated away from the origin of stress coordinates, it became elliptical and decreased in size; also the part of the yield surface adjacent to the outward moving prestress point tended to bulge. The yield surface increased in size when a program of reversed prestressing resulted in translating the yield surface toward the origin of the coordinates. A pronounced cross-effect was also observed. Finally, it is important to mention that the incremental plastic strain vector resulting from each yield point probe was approximately normal to the yield surface.

8. CONCLUSIONS

Yield surfaces and biaxial stress-strain response data obtained from segmental prestress loadings represent a class of specialized biaxial mechanical behavior of type 304 stainless steel. Although the data obtained from these tests are still far from complete, they do provide good insight into the general plastic deformation. Proper interpretation of these data will provide new information for many other applications.

In general, the test results support the concept of kinematic hardening, since the net size of the yield surfaces changed little throughout the various loadings. Therefore, the kinematic hardening coupled with the Mises yield condition is a good first-order approximation for the representation of elastic-plastic behavior of type 304 stainless steel at room temperature. The classical hardening law expressed in Eq. (7) is adequate for the description of proportional loading. Unfortunately, the simple relation does not hold well for the cases where loadings are nonproportional, since the yield surface is not always translated along the incremental plastic strain vector.

The colinear relation assumed in Eq. (7) is by far the most serious deficiency in the overall modeling. A more general description of the translation tensor, α_{ij}, is required, and the assumption of colinearity between the translation and plastic strain incremental tensors apparently needs modification.

Other observations indicate that the stress—plastic strain responses for loadings commencing from the periphery of the subsequent yield surface are not at all the same. The incremental stress—plastic strain responses demonstrate that the change in response is a function of the angle measured from the direction of the prior prestressing. Apparently, the representation of the plastic behavior of type 304 stainless steel requires loading-history-dependent descriptions of subsequent yield surfaces and the motion of these surfaces. Once an appropriate hardening rule for the motion of this surface is established, the representation of nonlinear stress-strain response characteristics may follow.

ACKNOWLEDGMENTS

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Appendix A

FOCAL PROGRAM FOR YIELD SURFACE TESTS

C-FOCAL,1969 - OSW 12/17/71 3W

```
Ø1.1Ø A "SET FULL SCALE STRESS & STRAIN (Y OR N)?"A;I (A-ØY)1.4
Ø1.2Ø A !"F.S. STRESS-11"S1," -12"S2,"  STRAIN-11"E1," -12"E2,!
Ø1.3Ø S K(1)=S1/1Ø;S K(2)=S2/1Ø;S K(3)=E1/1Ø;S K(4)=E2/1Ø
Ø1.4Ø A !"ESTIMATE S/E SLOPES?"A;I (A-ØY)1.5;A "-11"SS," -12"TS
Ø1.5Ø A !"SET STRAIN RATE?"A;I (A-ØY)1.6;A ?MIN MAX?;S SR=(MI+MA)/2
Ø1.6Ø A !"SET PROG SEQ?"A;I (A-ØY)2.1;S P(9)=Ø;S I=Ø
Ø1.7Ø S I=I+1;I (8-I)2.1;A ?P(I)?;I (P(I)-1)2.1,1.9;I (P(I)-4)1.7
Ø1.8Ø A "S*"S(I)," T*"T(I)," E11 LIM"L1(I)," E12 LIM"L2(I),!;G 1.7
Ø1.9Ø A "ANGLE"AD(I),!;G 1.7
Ø2.1Ø S I=Ø;A !"RTN TO START"A;S SD=1;S TD=1;S SF=A(1);S TF=A(2)
Ø2.15 Z T;S SC=1;S TB=FTIM()
Ø2.2Ø S I=I+1;S P=P(I);S JJ=3Ø;I (P-1)1.6,2.3;I (P-3)4.4,5.1,6.1
Ø2.3Ø T !"PROG 1, ANG="%4.Ø1,AD(I);S RA=AD(I)/57.3;D 11;S N=5
Ø2.35 I (P(I+1)-2)2.4,2.37,2.4
Ø2.37 S N=4Ø
Ø2.4Ø S W=Ø;S X=Ø;S Y=Ø;S Z=Ø;S T=FTIM()+1;S D=FCNO(5,1);S TR=T
Ø2.5Ø F K=1,N;D 2.8
Ø2.53 S R=N*(N+1)/2;S D=P*(N*(2*N+1)/3-R)/6Ø
Ø2.56 S Q1=(N*Y-W*R)/D;S Q2=(N*Z-X*R)/D;S M=FSQT(.75*Q1↑2+Q2↑2)
Ø2.58 I (M-MI)2.6;I (MA-M)2.6
Ø2.59 G 2.7
Ø2.6Ø S J=5;S V=((SR/M-1)*.6+1)*RV;I (.7-V)2.63;S V=.7;G 2.65
Ø2.63 I (V-1Ø)2.65;S V=1Ø;G 2.65
Ø2.65 S RV=V;D 3.4
Ø2.7Ø S N=1Ø;D 2.95;S RR=M;T "    REF RATE="%4,RR,!;S NN=35
Ø2.75 D 5.4;G 4.1
Ø2.8Ø D 14;D 3;I (1-K)2.9;S P=A(3);S Q=A(4);G 2.9
Ø2.9Ø S W=W+A(3)-P;S X=X+A(4)-Q;S Y=Y+K*(A(3)-P);S Z=Z+K*(A(4)-Q)
Ø2.95 D 2.4;D 2.5;D 2.53;D 2.56
Ø3.1Ø F J=1,2;S A(J)=FDVM(J+99,1,4,2)*K(J)
Ø3.15 F J=3,4;S A(J)=FDVM(J+99,1,4,3)*K(J)
Ø3.16 F J=1,4;D 21.2
Ø3.17 F J=8,9;D 3.3;D 21.2
Ø3.19 I (JJ-56ØØ)3.2,21.1
Ø3.2Ø R
Ø3.3Ø S A(J)=FDVM(J+99,1,4,2)
Ø3.4Ø D 3.3;S PO=V-A(J);I (FABS(PO)-.Ø3)3.2;D 3.9;I (PO)3.5,3.2,3.7
Ø3.5Ø S D=FCNO(J-3,1);G 3.6
Ø3.6Ø D 3.3;I (V-A(J))3.6;S D=FCNO(J-3,Ø)
Ø3.7Ø S D=FCNO(J-3,1);G 3.8
Ø3.8Ø D 3.3;I (A(J)-V)3.8;S D=FCNO(J-3,Ø)
Ø3.9Ø I (PO)3.95;S D=FCNO(1,Ø)
Ø3.95 S D=FCNO(1,1)
Ø4.1Ø D 5.5;S N=N+1;T %2,QS;I (N-NN)4.15,4.3,4.15
Ø4.15 I (QS-1Ø)4.1;D 4.9;D 9;T " ";P %4.Ø1,WS," "WT,!
Ø4.2Ø D 2Ø.2;S SØ=SF;S TØ=TF;S SF=A(1);S TF=A(2);G 2.2
Ø4.3Ø T !;S NN=NN+23;G 4.15
Ø4.4Ø T !"PROG 2,";S CT=(TØ+TF)/2;S CS=(SØ+SF)/2
Ø4.5Ø T " TARGET (S,T)="%7.Ø2,CS,CT,!;S N=5
Ø4.6Ø D 8.4;S G=B;S H=U;D 7;S RA=A;G 4.65
Ø4.65 D 11;D 2Ø;D 2.95;D 2.58
Ø4.7Ø D 3;D 8
Ø4.8Ø I (L)4.7
Ø4.9Ø S D=FCNO(5,Ø);T !;D 3
Ø4.95 G 2.2
Ø4.97 S RA=RA-3.142;G 4.65
```

```
05.10 D 16;T !"PROG 3"!;D 20;S CS=A(1);S CT=A(2)
05.20 F QD=1,16;S RA=FSTR(QD)/57.3;D 11;S N=5;D 2.95;D 2.58;D 5.6
05.30 G 2.2
05.40 S C1=(W-Q1*R/60)/N+P;S C2=(X-Q2*R/60)/N+Q;S T=TR+11;S N=12
05.50 D 14;D 3;S WS=.86603*(A(3)-C1-Q1*N/60);G 5.55
05.55 S WT=A(4)-C2-Q2*N/60;S QS=FSQT(WS↑2+WT↑2)
05.60 D 2.7;D 5.4;D 4.1;D 5.8;D 5.7
05.70 D 3;D 8;I (L)5.7;D 4.9;D 20.2
05.80 S J=5;S V=-2*RV;D 3.4;S D=FCNO(5,1);D 9;T " ";D 20.2;D 8.4
06.10 D 16;T !"PROG 4, S,T*";S CS=SD*(S(I)-S0)+S0;S CT=TD*(T(I)-T0)+T0
06.20 S LO=L1(I);S LT=L2(I);T %5.03,CS,CT," E1,2 LIM
06.30 T %5,LO,LT,!;D 3;S N=5;D 4.6;S N=3
06.40 D 2.95;D 2.58;D 4.7;I (L)6.6,6.8
06.60 I (LO)6.9;I (LO-A(3))6.7,6.7
06.65 I (LT)6.95;I (LT-A(4))6.7,6.7
06.68 D 20;G 6.4
06.70 T "STRAIN>LIM"!;S SD=(A(1)-SF)/(CS-SF);S TD=(A(2)-TF)/(CT-TF)
06.80 D 4.9;G 4.2
06.90 I (LO-A(3))6.65,6.7,6.7
06.95 I (LT-A(4))6.68,6.7,6.7
07.10 I (H)7.2,7.4
07.20 S A=FATN(G/H);I (H)7.3;R
07.30 S A=A-3.142;R
07.40 S A=1.571;I (-G)7.5;R
07.50 S A=-A
08.10 S L=0;I (FABS(SV)-FABS(TV))8.2;I (U*(CS-A(1)))8.3;S L=-1;R
08.20 I (B*(CT-A(2)))8.3;S L=-1
08.30 R
08.40 S U=CS-A(1);S B=CT-A(2)
09.10 T %4,FTIM()-TB
11.10 S G=FSIN(RA)*K(1);S H=FCOS(RA)*K(2);D 7
11.20 S SV=10*FCOS(A);S TV=10*FSIN(A)
11.30 S J=6;S V=SV;D 3.4;S J=7;S V=TV;D 3.4
11.40 S EM=FSQT((SV*K(1)/SS)↑2+(TV*K(2)/TS)↑2)
11.50 S RV=10*SR/EM;S M=SR;D 2.6
14.30 I (FTIM()-T)14.3;S T=FTIM()+1
15.10 F K=1,5;S D=FCNO(K,0);D 3
16.10 F JK=1,20;P "  "
20.10 D 3
20.20 P %5.03,A(1)," "A(2)," "%5,A(3)," "A(4),!
21.10 T "FSTR>5600",!
21.20 S JJ=JJ+1;S D=FSTR(JJ,A(J))
22.30 S II=6*I+24;F K=1,6;S JJ=II+K;S A(K)=FSTR(JJ)
22.40 P %5.03,A(1),A(2),%4,A(3),A(4),%5.03,A(5),A(6),!
```

Appendix B

BIAXIAL STRESS-STRAIN DATA

Nomenclature

S11, axial stress (ksi)

S12, shear stress (ksi)

E11, axial strain (10^{-6} in./in.)

E12, shear strain (10^{-6} in./in.)

(1 ksi = 6.895 MPa)

SPECIMEN NO. : C - 7
PRESTRESS LOADING PATH NO. : 1

	S11	S12	E11	E12
1	0.052	-0.036	2	-2
2	0.066	-0.021	2	-1
3	1.722	0.872	58	38
4	2.588	1.361	86	60
5	3.492	1.869	117	83
6	4.375	2.348	147	105
7	5.293	2.869	178	128
8	6.322	3.371	213	151
9	7.247	3.870	246	176
10	8.151	4.347	278	199
11	9.062	4.849	312	225
12	9.966	5.351	347	251
13	10.886	5.849	384	279
14	11.790	6.338	422	308
15	12.694	6.842	467	341
16	13.649	7.373	529	387
17	14.282	7.737	593	436
18	14.705	7.976	652	481
19	15.048	8.148	714	529
20	15.246	8.262	770	572
21	15.464	8.371	833	622
22	15.566	8.442	891	670
23	15.793	8.555	961	727
24	15.909	8.614	1035	788
25	16.120	8.730	1127	865
26	16.252	8.789	1230	951
27	16.470	8.910	1361	1060
28	16.586	8.978	1509	1184
29	16.820	9.083	1691	1336
30	16.915	9.167	1885	1500
31	17.127	9.261	2107	1686
32	17.258	9.349	2338	1880
33	17.476	9.452	2591	2093
34	17.601	9.521	2845	2307
35	17.812	9.643	3116	2536
36	17.951	9.696	3385	2762
37	18.162	9.813	3672	3006
38	18.292	9.870	3953	3243
39	18.505	10.013	4252	3496
40	18.635	10.067	4547	3745
41	18.846	10.191	4863	4010
42	18.985	10.257	5174	4271
43	19.205	10.372	5507	4550
44	19.314	10.460	5829	4819
45	19.503	10.542	6160	5093
46	19.628	10.605	6484	5362
47	19.846	10.702	6830	5649
48	19.971	10.788	7171	5931
49	20.145	10.874	7519	6218
50	20.284	10.949	7862	6501
51	20.459	11.052	8213	6789
52	20.611	11.136	8567	7079
53	20.802	11.237	8946	7390
54	20.932	11.296	9321	7694
55	21.129	11.432	9707	8010
56	21.245	11.472	10093	8322
57	20.589	11.101	10858	8935
58	20.604	11.103	10957	9019
59	20.575	11.101	11031	9085
60	17.104	9.437	10942	9034
61	17.113	9.444	10941	9033
62	17.104	9.444	10940	9033
63	15.807	8.822	10894	9005
64	14.837	8.371	10861	8985
65	13.867	7.936	10827	8966

SPECIMEN NO. : C - 7
PRESTRESS LOADING PATH NO. : 2

	S11	S12	E11	E12
1	9.266	5.166	10729	8856
2	10.827	5.160	10782	8856
3	12.088	5.158	10824	8855
4	13.313	5.164	10866	8855
5	14.582	5.164	10908	8854
6	15.814	5.160	10950	8854
7	17.047	5.162	10992	8853
8	18.315	5.160	11035	8852
9	19.532	5.158	11079	8852
10	20.802	5.158	11124	8852
11	22.011	5.160	11169	8852
12	23.280	5.158	11218	8852
13	24.555	5.160	11281	8854
14	25.350	5.162	11357	8859
15	26.000	5.158	11458	8871
16	26.350	5.153	11560	8887
17	26.611	5.158	11663	8907
18	26.970	5.160	11784	8932
19	27.268	5.160	11918	8963
20	27.713	5.153	12095	9005
21	28.019	5.158	12298	9058
22	28.465	5.147	12559	9127
23	28.749	5.147	12835	9204
24	29.194	5.153	13173	9298
25	29.485	5.153	13536	9400
26	29.937	5.149	13969	9521
27	30.228	5.158	14424	9647
28	30.687	5.162	14957	9792
29	30.979	5.151	15510	9941
30	31.432	5.153	16146	10110
31	31.738	5.147	16796	10279
32	32.190	5.160	17534	10468
33	32.495	5.149	18280	10656
34	32.947	5.162	19117	10863
35	33.261	5.151	19956	11067
36	33.721	5.139	20893	11290
37	33.706	5.156	22391	11647
38	32.627	5.147	22772	11749
39	32.372	5.151	22807	11760
40	32.007	5.153	22823	11769
41	31.118	5.147	22803	11772
42	29.587	5.147	22752	11773
43	28.158	5.147	22701	11773
44	26.729	5.147	22651	11774
45	25.307	5.149	22602	11774
46	23.878	5.149	22552	11775
47	22.449	5.149	22502	11775
48	21.041	5.145	22452	11776
49	19.635	5.145	22402	11775
50	19.394	5.145	22393	11775
51	19.387	5.143	22392	11775
52	19.380	5.145	22390	11774

SPECIMEN NO. : C - 7
PRESTRESS LOADING PATH NO. : 3

	S11	S12	E11	E12
1	17.199	1.951	22366	11553
2	17.177	1.951	22365	11552
3	18.542	1.201	22411	11516
4	19.576	0.624	22446	11490
5	20.634	0.044	22480	11463
6	21.677	-0.525	22515	11437
7	22.726	-1.092	22550	11410
8	23.769	-1.676	22585	11383
9	24.812	-2.239	22620	11357
10	25.868	-2.825	22656	11330
11	26.911	-3.402	22691	11304
12	27.967	-3.980	22729	11276
13	29.092	-4.580	22783	11241
14	29.848	-4.981	22847	11205
15	30.432	-5.292	22925	11168
16	30.818	-5.496	23003	11133
17	31.089	-5.641	23076	11104
18	31.270	-5.725	23142	11079
19	31.445	-5.817	23208	11055
20	31.591	-5.884	23270	11034
21	31.774	-5.977	23336	11011
22	31.920	-6.054	23404	10989
23	32.131	-6.166	23483	10961
24	32.277	-6.237	23565	10936
25	32.459	-6.321	23657	10907
26	32.606	-6.393	23754	10877
27	32.831	-6.506	23868	10842
28	32.977	-6.577	23990	10806
29	33.210	-6.689	24134	10764
30	33.349	-6.766	24283	10722
31	33.524	-6.863	24449	10675
32	33.662	-6.932	24621	10627
33	33.851	-7.020	24811	10574
34	34.005	-7.090	25010	10519
35	34.180	-7.180	25230	10458
36	34.326	-7.253	25463	10394
37	34.508	-7.346	25717	10324
38	34.653	-7.424	25988	10248
39	34.880	-7.527	26299	10160
40	35.026	-7.604	26626	10068
41	35.223	-7.697	26979	9968
42	35.362	-7.768	27351	9862
43	35.550	-7.850	27748	9748
44	35.689	-7.932	28160	9629
45	35.886	-8.020	28610	9496
46	36.032	-8.112	29076	9360
47	36.266	-8.209	29593	9204
48	36.404	-8.274	30133	9043
49	36.368	-8.295	31221	8725
50	35.310	-7.881	31492	8660
51	34.049	-7.398	31473	8679
52	31.548	-6.458	31388	8722
53	31.402	-6.468	31372	8724

SPECIMEN NO. : C - 7
PRESTRESS LOADING PATH NO. : 4

	S11	S12	E11	E12	S11	S12	E11	E12
1	22.186	- 4.755	31148	8736				
2	22.156	- 4.755	31145	8736				
3	22.156	- 5.903	31145	8682				
4	22.149	- 6.699	31140	8645				
5	22.143	- 7.503	31138	8607				
6	22.136	- 8.314	31136	8570				
7	22.136	- 9.135	31134	8533				
8	22.120	- 9.937	31131	8495				
9	22.120	-10.744	31130	8458				
10	22.113	-11.565	31127	8421				
11	22.113	-12.369	31125	8383				
12	22.106	-13.169	31124	8346				
13	22.092	-13.984	31122	8307				
14	22.092	-14.784	31122	8257				
15	22.084	-15.666	31138	8166				
16	22.077	-16.193	31163	8076				
17	22.070	-16.504	31194	8005				
18	22.070	-16.708	31222	7942				
19	22.047	-16.865	31249	7885				
20	22.056	-16.987	31275	7833				
21	22.047	-17.090	31300	7785				
22	22.040	-17.210	31325	7736				
23	22.033	-17.315	31351	7691				
24	22.026	-17.409	31377	7642				
25	22.026	-17.499	31404	7594				
26	22.018	-17.617	31433	7542				
27	22.018	-17.699	31464	7489				
28	22.004	-17.819	31496	7431				
29	22.004	-17.894	31531	7372				
30	21.997	-18.022	31569	7307				
31	21.975	-18.027	31651	7180				
32	21.968	-16.370	31684	7219				
33	21.968	-15.364	31687	7265				
34	21.954	-14.408	31689	7309				
35	21.954	-13.474	31691	7352				
36	21.945	-12.525	31693	7396				
37	21.938	-11.573	31695	7440				
38	21.938	-10.637	31697	7484				
39	21.924	- 9.717	31699	7526				

SPECIMEN NO. : C - 8
PRESTRESS LOADING PATH NO. : 1

	S11	S12	E11	E12
1	0.099	-0.024	3	-1
2	1.282	0.721	46	32
3	2.208	1.267	76	55
4	3.121	1.793	105	78
5	4.041	2.331	142	104
6	5.045	2.925	169	127
7	6.298	3.646	211	159
8	7.444	4.307	249	187
9	8.584	4.961	287	216
10	9.717	5.618	325	245
11	10.863	6.280	365	275
12	11.996	6.941	407	306
13	13.177	7.626	454	341
14	14.125	8.184	506	380
15	14.925	8.650	578	433
16	15.478	8.969	670	501
17	15.817	9.160	776	581
18	16.037	9.280	891	668
19	16.390	9.507	1058	797
20	16.609	9.623	1272	962
21	16.900	9.802	1529	1166
22	17.120	9.918	1879	1441
23	17.416	10.089	2247	1735
24	17.636	10.224	2683	2081
25	17.982	10.412	3176	2477
26	18.216	10.555	3660	2862
27	18.555	10.778	4191	3288
28	18.746	10.850	4642	3646
29	19.094	11.069	5222	4109
30	19.326	11.197	5785	4557
31	19.674	11.408	6405	5050
32	19.893	11.535	7009	5526
33	20.255	11.738	7673	6054
34	20.473	11.874	8320	6561
35	20.764	12.033	8918	7031
36	20.743	12.049	9977	7846
37	19.744	11.467	10167	7988
38	18.846	10.942	10143	7970
39	17.599	10.220	10100	7938
40	16.425	9.547	10058	7909
41	15.251	8.858	10017	7879
42	14.076	8.188	9975	7849
43	12.909	7.511	9934	7820
44	11.733	6.838	9893	7789
45	10.517	6.128	9850	7759
46	9.405	5.491	9809	7731

SPECIMEN NO. : C - 8
PRESTRESS LOADING PATH NO. : 2

	S11	S12	E11	E12		S11	S12	E11	E12
1	10.056	5.674	9789	7772	46	9.680	-14.838	9684	4855
2	10.042	4.542	9785	7721	47	9.674	-15.034	9710	4664
3	10.036	3.658	9784	7682	48	9.667	-15.149	9742	4460
4	10.036	2.781	9781	7643	49	9.660	-15.348	9780	4225
5	10.022	1.905	9780	7605	50	9.653	-15.512	9824	3970
6	10.022	1.008	9781	7565	51	9.646	-15.803	9891	3596
7	10.015	0.120	9777	7526	52	9.639	-15.962	9970	3193
8	10.006	- 0.745	9775	7485	53	9.625	-16.141	10048	2806
9	9.992	- 1.642	9772	7443	54	9.618	-16.317	10136	2397
10	9.985	- 2.518	9768	7397	55	9.604	-16.552	10262	1817
11	9.964	- 3.455	9760	7345	56	9.589	-16.735	10400	1208
12	9.964	- 4.188	9752	7300	57	9.582	-16.922	10533	644
13	9.951	- 4.865	9743	7256	58	9.575	-17.090	10672	70
14	9.958	- 5.547	9734	7210	59	9.575	-17.261	10824	- 553
15	9.937	- 6.240	9722	7158	60	9.568	-17.420	10983	- 1183
16	9.937	- 6.873	9710	7108	61	9.554	-17.628	11154	- 1857
17	9.914	- 7.475	9698	7057	62	9.554	-17.759	11333	- 2544
18	9.914	- 7.961	9688	7012	63	9.519	-17.759	11583	- 3464
19	9.907	- 8.495	9675	6960	64	9.519	-18.560	12075	- 5336
20	9.893	- 8.941	9664	6910	65	9.511	-18.715	12402	- 6505
21	9.887	- 9.324	9655	6865	66	9.497	-18.915	12677	- 7474
22	9.887	- 9.730	9644	6813	67	9.497	-18.911	12900	- 8228
23	9.873	-10.061	9635	6766	68	9.476	-18.930	13080	- 8828
24	9.873	-10.412	9626	6714	69	9.469	-18.922	13216	- 9275
25	9.866	-10.706	9619	6667	70	9.469	-18.903	13324	- 9631
26	9.859	-10.981	9612	6616	71	9.299	-18.958	14100	-12151
27	9.843	-11.276	9605	6562	72	9.263	-18.966	14152	-12322
28	9.843	-11.475	9599	6511	73	9.249	-15.480	14158	-12218
29	9.822	-11.647	9596	6467	74	9.242	-13.751	14151	-12139
30	9.829	-11.830	9592	6422	75	9.228	-12.611	14147	-12090
31	9.802	-12.013	9589	6375					
32	9.795	-12.221	9587	6323					
33	9.795	-12.444	9584	6264					
34	9.788	-12.627	9582	6196					
35	9.767	-12.886	9582	6117					
36	9.767	-13.045	9582	6040					
37	9.758	-13.241	9583	5965					
38	9.745	-13.392	9585	5890					
39	9.738	-13.575	9590	5806					
40	9.731	-13.735	9595	5716					
41	9.724	-13.994	9604	5585					
42	9.717	-14.157	9615	5449					
43	9.703	-14.352	9628	5316					
44	9.696	-14.520	9644	5179					
45	9.689	-14.707	9662	5022					

SPECIMEN NO. : C - 8
PRESTRESS LOADING PATH NO. : 3

	S11	S12	E11	E12		S11	S12	E11	E12
1	9.038	-13.217	14134	-12143	46	-24.486	6.228	12514	-10685
2	7.813	-12.492	14090	-12113	47	-24.846	6.435	12479	-10649
3	6.850	-11.922	14056	-12088	48	-25.208	6.650	12441	-10608
4	5.887	-11.352	14022	-12066	49	-25.548	6.830	12404	-10569
5	4.919	-10.794	13987	-12043	50	-25.789	6.961	12370	-10533
6	3.949	-10.232	13953	-12019	51	-26.007	7.081	12342	-10504
7	2.972	- 9.663	13918	-11996	52	-26.220	7.204	12316	-10475
8	2.025	- 9.105	13883	-11972	53	-26.440	7.316	12288	-10448
9	1.055	- 8.539	13849	-11948	54	-26.658	7.443	12261	-10420
10	0.085	- 7.973	13814	-11924	55	-26.871	7.551	12233	-10392
11	- 0.878	- 7.407	13778	-11898	56	-27.075	7.674	12204	-10363
12	- 1.846	- 6.834	13742	-11873	57	-27.302	7.786	12174	-10334
13	- 2.802	- 6.288	13707	-11847	58	-27.522	7.909	12143	-10304
14	- 3.772	- 5.726	13669	-11820	59	-27.734	8.025	12111	-10273
15	- 4.735	- 5.164	13632	-11790	60	-27.954	8.148	12079	-10241
16	- 5.704	- 4.594	13593	-11759	61	-28.167	8.268	12044	-10210
17	- 6.667	- 4.032	13553	-11727	62	-28.385	8.387	12009	-10175
18	- 7.623	- 3.471	13513	-11694	63	-28.605	8.495	11972	-10140
19	- 8.591	- 2.905	13472	-11659	64	-28.816	8.607	11934	-10105
20	- 9.589	- 2.335	13429	-11621	65	-29.050	8.734	11892	-10067
21	-10.339	- 1.889	13395	-11592	66	-29.327	8.890	11844	-10023
22	-11.026	- 1.506	13364	-11564	67	-29.525	9.009	11794	- 9978
23	-11.705	- 1.100	13333	-11535	68	-29.850	9.180	11734	- 9926
24	-12.391	- 0.705	13301	-11506	69	-30.070	9.292	11680	- 9877
25	-13.086	- 0.311	13269	-11475	70	-30.346	9.451	11617	- 9823
26	-13.772	0.088	13236	-11443	71	-30.536	9.551	11551	- 9767
27	-14.444	0.482	13201	-11411	72	-30.869	9.730	11474	- 9703
28	-15.131	0.877	13167	-11376	73	-31.096	9.866	11403	- 9645
29	-15.817	1.279	13131	-11340	74	-31.386	10.009	11321	- 9579
30	-16.503	1.686	13093	-11304	75	-31.605	10.137	11235	- 9512
31	-17.198	2.072	13055	-11263	76	-31.889	10.284	11138	- 9436
32	-17.890	2.478	13014	-11222	77	-32.114	10.424	11037	- 9360
33	-18.505	2.833	12976	-11181	78	-32.391	10.575	10921	- 9273
34	-19.058	3.164	12942	-11146	79	-32.589	10.671	10794	- 9182
35	-19.610	3.459	12906	-11108	80	-32.907	10.862	10647	- 9076
36	-20.177	3.773	12870	-11069	81	-33.141	10.973	10507	- 8978
37	-20.734	4.092	12831	-11028	82	-33.439	11.141	10342	- 8864
38	-21.287	4.411	12791	-10985	83	-33.664	11.248	10164	- 8746
39	-21.755	4.682	12753	-10944	84	-33.941	11.424	9960	- 8610
40	-22.186	4.925	12720	-10908	85	-34.166	11.547	9740	- 8467
41	-22.603	5.152	12686	-10871	86	-34.437	11.699	9483	- 8305
42	-23.021	5.403	12651	-10833	87	-34.641	11.786	9193	- 8124
43	-23.445	5.658	12613	-10793	88	-34.967	11.981	8857	- 7917
44	-23.793	5.837	12581	-10758	89	-35.200	12.093	8531	- 7719
45	-24.140	6.041	12548	-10723	90	-35.221	12.097	7890	- 7347

SPECIMEN NO. : C - 8
PRESTRESS LOADING PATH NO. : 3

	S11	S12	E11	E12	S11	S12	E11	E12
91	-32.829	10.854	7814	- 7311				
92	-28.724	8.770	7954	- 7396				
93	-26.454	7.622	8032	- 7444				
94	-24.961	6.869	8085	- 7476				
95	-23.587	6.176	8133	- 7505				
96	-22.376	5.570	8175	- 7532				

SPECIMEN NO. : C - 8
PRESTRESS LOADING PATH NO. : 4

	S11	S12	E11	E12	S11	S12	E11	E12
1	-24.585	6.029	8040	-7480				
2	-22.872	6.053	8098	-7479				
3	-21.450	6.065	8145	-7477				
4	-20.028	6.072	8192	-7476				
5	-18.620	6.084	8239	-7475				
6	-17.198	6.104	8286	-7474				
7	-15.774	6.112	8333	-7473				
8	-14.352	6.124	8381	-7472				
9	-12.937	6.140	8429	-7471				
10	-11.515	6.144	8477	-7470				
11	-10.107	6.152	8525	-7469				
12	-8.683	6.164	8574	-7468				
13	-7.275	6.176	8623	-7467				
14	-5.853	6.184	8673	-7466				
15	-4.444	6.200	8723	-7466				
16	-3.022	6.212	8774	-7466				
17	-1.621	6.220	8826	-7466				
18	-0.199	6.232	8878	-7466				
19	1.218	6.236	8933	-7467				
20	2.626	6.252	8988	-7468				
21	4.027	6.264	9044	-7469				
22	5.499	6.268	9103	-7471				
23	6.724	6.288	9153	-7472				
24	7.820	6.296	9200	-7474				
25	8.930	6.304	9248	-7476				
26	10.049	6.316	9296	-7477				
27	11.132	6.324	9345	-7479				
28	11.111	6.316	9355	-7483				
29	9.476	6.252	9302	-7486				
30	8.160	6.212	9259	-7489				
31	6.836	6.160	9215	-7492				
32	5.527	6.120	9172	-7495				
33	4.218	6.072	9128	-7497				
34	2.901	6.037	9085	-7500				
35	1.592	5.985	9041	-7502				
36	0.284	5.941	8997	-7505				
37	-1.012	5.897	8955	-7507				

SPECIMEN NO. : C - 8
PRESTRESS LOADING PATH NO. : 5

	S11	S12	E11	E12
1	0.028	6.132	9059	-7499
2	0.078	6.124	9057	-7498
3	0.064	6.124	9056	-7498
4	1.727	6.100	9116	-7499
5	3.291	6.088	9168	-7498
6	4.883	6.068	9221	-7498
7	6.454	6.053	9274	-7498
8	8.040	6.041	9327	-7498
9	9.611	6.017	9381	-7497
10	11.182	6.005	9435	-7497
11	12.767	5.989	9491	-7497
12	14.338	5.957	9546	-7496
13	15.980	5.953	9607	-7497
14	17.267	5.937	9664	-7500
15	18.491	5.921	9724	-7503
16	19.512	5.905	9778	-7508
17	20.622	5.869	9839	-7514
18	21.578	5.877	9896	-7520
19	22.461	5.857	9948	-7525
20	23.326	5.841	10002	-7530
21	24.195	5.829	10059	-7536
22	25.080	5.806	10120	-7542
23	25.951	5.794	10183	-7549
24	26.587	5.786	10235	-7554
25	27.268	5.758	10289	-7559
26	27.940	5.758	10345	-7564
27	28.633	5.742	10405	-7570
28	29.185	5.730	10457	-7573
29	29.765	5.722	10511	-7577
30	30.339	5.710	10569	-7581
31	30.926	5.702	10630	-7585
32	31.371	5.694	10684	-7587
33	31.839	5.686	10740	-7590
34	32.355	5.678	10803	-7592
35	32.886	5.670	10871	-7595
36	33.219	5.666	10934	-7595
37	33.524	5.666	10985	-7596
38	33.806	5.670	11035	-7596
39	34.104	5.670	11085	-7595
40	34.393	5.662	11137	-7595
41	34.698	5.662	11192	-7594
42	35.024	5.662	11252	-7593
43	35.398	5.666	11322	-7591
44	35.632	5.662	11387	-7588
45	36.008	5.658	11464	-7585
46	36.233	5.658	11538	-7581
47	36.622	5.654	11627	-7576
48	36.856	5.650	11714	-7571
49	37.239	5.658	11818	-7564
50	37.478	5.650	11923	-7555
51	37.854	5.646	12047	-7545
52	38.116	5.642	12195	-7532
53	38.512	5.638	12346	-7518
54	38.831	5.638	12521	-7499
55	39.221	5.642	12736	-7476
56	39.453	5.638	12955	-7451
57	39.835	5.634	13216	-7420
58	40.076	5.630	13492	-7384
59	40.480	5.622	13824	-7341
60	40.785	5.622	14214	-7287
61	41.195	5.630	14695	-7220
62	41.512	5.622	15240	-7141
63	41.916	5.618	15896	-7045
64	42.227	5.626	16629	-6936
65	42.624	5.602	17494	-6806
66	42.950	5.618	18444	-6664
67	43.317	5.606	19538	-6500
68	43.317	5.614	21471	-6209
69	42.285	5.666	22020	-6117
70	41.810	5.682	22065	-6105
71	41.280	5.694	22073	-6100
72	40.189	5.758	22044	-6096
73	38.746	5.810	21993	-6094
74	37.402	5.865	21947	-6092
75	36.056	5.917	21899	-6090
76	34.719	5.977	21852	-6088
77	33.375	6.021	21804	-6086
78	32.045	6.076	21758	-6085

SPECIMEN NO. : C - 8
PRESTRESS LOADING PATH NO. : 6

	S11	S12	E11	E12
1	33.368	6.419	21753	- 6074
2	29.227	3.993	21608	- 6184
3	25.541	1.849	21483	- 6284
4	21.734	- 0.371	21353	- 6384
5	18.053	- 2.518	21223	- 6489
6	14.409	- 4.638	21078	- 6599
7	11.125	- 6.563	20943	- 6704
8	7.848	- 8.455	20798	- 6819
9	4.573	-10.372	20638	- 6944
10	1.289	-12.280	20463	- 7084
11	- 1.995	-14.197	20268	- 7249
12	- 5.662	-16.317	20008	- 7494
13	- 5.974	-16.464	19943	- 7564
14	- 5.974	-16.472	19928	- 7579
15	- 5.988	-16.464	19918	- 7589
16	- 6.121	-16.492	19879	- 7643
17	- 6.144	-16.500	19876	- 7646
18	- 7.288	-17.173	19830	- 7687
19	- 8.187	-17.675	19769	- 7754
20	- 8.726	-18.002	19706	- 7831
21	- 9.086	-18.225	19657	- 7896
22	- 9.327	-18.353	19622	- 7943
23	- 9.575	-18.488	19588	- 7989
24	- 9.731	-18.604	19562	- 8029
25	- 9.914	-18.707	19536	- 8067
26	-10.107	-18.803	19510	- 8106
27	-10.276	-18.926	19485	- 8145
28	-10.460	-19.010	19459	- 8184
29	-10.630	-19.126	19432	- 8225
30.	-10.820	-19.233	19406	- 8268
31	-11.012	-19.345	19376	- 8316
32	-11.253	-19.476	19343	- 8371
33	-11.451	-19.604	19309	- 8428
34	-11.797	-19.843	19258	- 8513
35	-12.024	-19.927	19209	- 8602
36	-12.350	-20.150	19149	- 8708
37	-12.377	-20.138	19069	- 8875
38	-10.283	-18.919	19121	- 8859
39	- 9.052	-18.209	19161	- 8826
40	- 7.898	-17.536	19199	- 8796
41	- 6.745	-16.870	19238	- 8765
42	- 5.577	-16.213	19276	- 8734
43	- 4.438	-15.524	19315	- 8704
44	- 3.284	-14.874	19354	- 8673
45	- 2.130	-14.201	19393	- 8641
46	- 0.998	-13.555	19431	- 8611

SPECIMEN NO. : C - 8
PRESTRESS LOADING PATH NO. : 7

	S11	S12	E11	E12
1	2.222	-13.858	19351	8659
2	2.172	-12.631	19350	8603
3	2.144	-11.790	19349	8564
4	2.117	-10.914	19348	8525
5	2.087	-10.057	19347	8485
6	2.059	- 9.184	19346	8446
7	2.025	- 8.308	19345	8406
8	1.988	- 7.431	19345	8366
9	1.961	- 6.559	19344	8325
10	1.924	- 5.678	19343	8284
11	1.897	- 4.821	19343	8242
12	1.876	- 3.957	19343	8200
13	1.869	- 3.096	19342	8156
14	1.876	- 2.215	19341	8111
15	1.876	- 1.359	19340	8067
16	1.883	- 0.482	19340	8020
17	1.897	0.375	19338	7973
18	1.883	1.243	19338	7925
19	1.862	2.116	19338	7876
20	1.826	3.000	19338	7825
21	1.798	3.698	19339	7783
22	1.777	4.367	19340	7744
23	1.748	5.001	19341	7705
24	1.727	5.638	19342	7665
25	1.706	6.276	19343	7624
26	1.685	6.929	19344	7581
27	1.656	7.579	19343	7537
28	1.635	8.220	19343	7493
29	1.599	8.870	19344	7447
30	1.571	9.507	19344	7400
31	1.557	10.141	19344	7351
32	1.536	10.810	19344	7299
33	1.529	11.368	19344	7254
34	1.543	11.938	19344	7206
35	1.550	12.519	19343	7156
36	1.557	13.117	19342	7104
37	1.564	13.643	19342	7055
38	1.571	14.097	19342	7011
39	1.578	14.563	19342	6966
40	1.585	15.046	19340	6921
41	1.592	15.500	19340	6873
42	1.599	15.958	19339	6823
43	1.614	16.428	19338	6771
44	1.621	16.831	19337	6726
45	1.628	17.233	19335	6677
46	1.628	17.647	19333	6625
47	1.635	17.970	19331	6580
48	1.649	18.329	19329	6533
49	1.656	18.683	19326	6481
50	1.663	18.966	19323	6437
51	1.677	19.269	19320	6391
52	1.677	19.544	19316	6342
53	1.692	19.851	19312	6288
54	1.699	20.194	19308	6228
55	1.706	20.405	19301	6171
56	1.713	20.648	19297	6119
57	1.720	20.799	19292	6071
58	1.727	20.947	19287	6031
59	1.734	21.086	19283	5993
60	1.741	21.210	19279	5954
61	1.741	21.369	19274	5915
62	1.748	21.485	19268	5873
63	1.761	21.632	19264	5831
64	1.777	21.771	19258	5787
65	1.777	21.899	19252	5740
66	1.784	22.046	19246	5691
67	1.791	22.202	19238	5634
68	1.798	22.481	19228	5548
69	1.805	22.676	19216	5456
70	1.812	22.955	19201	5339
71	1.826	23.118	19184	5218
72	1.839	23.413	19164	5065
73	1.846	23.596	19142	4905
74	1.846	23.859	19115	4705
75	1.869	24.070	19087	4489
76	1.869	24.298	19056	4260
77	1.876	24.473	19019	3972
78	1.890	24.740	18972	3602
79	1.897	24.935	18921	3191
80	1.917	25.222	18858	2673
81	1.933	25.210	18758	1844
82	1.981	23.102	18732	1737
83	2.059	19.923	18732	1879
84	2.117	18.193	18732	1959
85	2.151	17.428	18732	1994

SPECIMEN NO. : C - 8
PRESTRESS LOADING PATH·NO. : 8

	S11	S12	E11	E12
1	-2.328	19.273	18723	-1813
2	-1.126	18.540	18765	-1846
3	-0.092	17.934	18799	-1873
4	0.942	17.333	18837	-1901
5	1.981	16.715	18874	-1927
6	3.022	16.093	18911	-1955
7	4.062	15.488	18947	-1982
8	5.082	14.870	18984	-2010
9	6.114	14.273	19022	-2037
10	7.148	13.663	19059	-2065
11	8.187	13.065	19096	-2093
12	9.228	12.448	19134	-2121
13	10.262	11.834	19172	-2149
14	11.295	11.244	19210	-2178
15	12.329	10.631	19249	-2208
16	13.361	10.033	19289	-2239
17	14.379	9.423	19330	-2271
18	15.427	8.818	19372	-2304
19	16.439	8.212	19414	-2337
20	17.514	7.587	19458	-2372
21	18.322	7.100	19493	-2399
22	19.072	6.654	19524	-2425
23	19.801	6.220	19557	-2450
24	20.551	5.782	19589	-2477
25	21.294	5.331	19623	-2504
26	22.030	4.901	19656	-2530
27	22.773	4.451	19690	-2558
28	23.516	4.020	19725	-2586
29	24.259	3.566	19760	-2615
30	25.009	3.132	19796	-2644
31	25.738	2.689	19834	-2674
32	26.481	2.251	19872	-2705
33	27.224	1.813	19912	-2736
34	27.967	1.379	19952	-2769
35	28.697	0.925	19994	-2803
36	29.460	0.478	20038	-2839
37	30.098	0.108	20078	-2870
38	30.756	-0.291	20122	-2904
39	31.428	-0.705	20168	-2940
40	32.008	-1.048	20214	-2973
41	32.540	-1.363	20254	-3003
42	33.070	-1.666	20297	-3034
43	33.600	-2.004	20341	-3066
44	34.139	-2.307	20391	-3100
45	34.577	-2.574	20437	-3132
46	34.946	-2.801	20478	-3159
47	35.327	-3.032	20522	-3187
48	35.717	-3.275	20567	-3217
49	36.106	-3.506	20617	-3248
50	36.403	-3.682	20662	-3275
51	36.707	-3.877	20709	-3303
52	37.047	-4.088	20761	-3334
53	37.409	-4.303	20820	-3367
54	37.613	-4.435	20875	-3396
55	37.804	-4.546	20922	-3420
56	37.996	-4.662	20967	-3444
57	38.180	-4.785	21013	-3467
58	38.370	-4.889	21061	-3491
59	38.590	-5.025	21115	-3519
60	38.943	-5.248	21195	-3558
61	39.184	-5.395	21282	-3599
62	39.546	-5.614	21391	-3650
63	39.771	-5.758	21506	-3701
64	40.026	-5.913	21618	-3750
65	40.225	-6.041	21736	-3800
66	40.487	-6.188	21873	-3857
67	40.691	-6.324	22022	-3918
68	40.939	-6.467	22196	-3987
69	41.145	-6.606	22393	-4064
70	41.512	-6.830	22690	-4180
71	41.739	-6.977	23032	-4307
72	41.980	-7.112	23375	-4432
73	41.959	-7.132	24113	-4682
74	40.883	-6.395	24275	-4708
75	39.900	-5.742	24246	-4679
76	38.937	-5.092	24213	-4650
77	37.975	-4.459	24178	-4622
78	37.026	-3.809	24144	-4592
79	36.063	-3.180	24109	-4563
80	35.109	-2.546	24074	-4534
81	34.146	-1.901	24039	-4504
82	33.198	-1.259	24004	-4475
83	32.249	-0.650	23971	-4447
84	32.207	-0.650	23967	-4445

SPECIMEN NO. : C - 8
PRESTRESS LOADING PATH NO. : 9

	S11	S12	E11	E12
1	27.268	-1.056	23869	-4455
2	25.752	-1.092	23816	-4456
3	24.557	-1.108	23774	-4458
4	23.367	-1.128	23732	-4459
5	22.172	-1.152	23690	-4460
6	20.982	-1.176	23647	0
7	19.787	-1.195	23604	-1
8	18.576	-1.219	23561	-2
9	17.381	-1.239	23517	-3
10	16.177	-1.263	23474	-4
11	14.982	-1.283	23430	-4
12	13.792	-1.315	23384	-5
13	12.590	-1.331	23339	-6
14	11.400	-1.355	23292	-7
15	10.191	-1.383	23245	-7
16	9.001	-1.407	23197	-7
17	7.813	-1.427	23148	-8
18	6.616	-1.454	23099	-9
19	5.421	-1.474	23050	-9
20	4.218	-1.498	22999	-10
21	3.029	-1.522	22948	-10
22	1.819	-1.546	22897	-11
23	0.624	-1.562	22844	-11
24	-0.566	-1.594	22790	-12
25	-1.770	-1.622	22736	-13
26	-2.951	-1.634	22681	-13
27	-4.190	-1.666	22622	-13
28	-5.194	-1.690	22573	-14
29	-6.100	-1.717	22527	-14
30	-7.020	-1.737	22481	-14
31	-7.933	-1.761	22435	-15
32	-8.846	-1.789	22388	-15
33	-9.751	-1.813	22339	-15
34	-10.664	-1.833	22289	-15
35	-11.593	-1.861	22239	-15
36	-12.492	-1.881	22187	-15
37	-13.404	-1.909	22133	-14
38	-14.324	-1.933	22078	-14
39	-15.223	-1.953	22022	-13
40	-16.150	-1.980	21962	-12
41	-16.177	-1.964	21934	-11
42	-14.494	-1.845	21987	-3
43	-13.035	-1.717	22037	3
44	-11.570	-1.598	22087	9
45	-10.120	-1.466	22137	16
46	-8.662	-1.343	22187	22
47	-7.212	-1.223	22238	28
48	-5.747	-1.092	22289	34
49	-4.295	-0.968	22339	40
50	-2.860	-0.849	22390	46
51	-1.415	-0.729	22440	53

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 1

	S11	S12	E11	E12
1	-0.059	-0.017	-2	-1
2	1.225	0.696	41	31
3	2.082	1.183	70	52
4	2.925	1.657	98	72
5	3.791	2.148	126	93
6	4.626	2.625	154	114
7	5.477	3.097	183	134
8	6.336	3.592	212	156
9	7.186	4.058	241	177
10	8.021	4.538	270	199
11	8.873	5.040	300	220
12	9.724	5.507	331	243
13	10.581	5.990	364	267
14	11.418	6.479	398	292
15	12.268	6.968	436	319
16	13.169	7.472	485	356
17	13.903	7.882	551	406
18	14.438	8.187	626	465
19	14.804	8.399	709	532
20	15.046	8.528	790	600
21	15.207	8.623	863	660
22	15.405	8.718	947	732
23	15.559	8.818	1049	821
24	15.795	8.949	1178	933
25	15.942	9.015	1325	1061
26	16.228	9.197	1526	1240
27	16.382	9.300	1764	1451
28	16.629	9.444	2039	1694
29	16.770	9.499	2318	1941
30	17.012	9.624	2624	2211
31	17.158	9.713	2925	2479
32	17.400	9.836	3248	2765
33	17.561	9.883	3563	3045
34	17.788	10.058	3900	3344
35	17.958	10.136	4229	3636
36	18.192	10.270	4582	3950
37	18.339	10.327	4929	4256
38	18.588	10.454	5300	4584
39	18.743	10.556	5651	4903
40	18.976	10.697	6015	5246
41	19.137	10.755	6398	5580
42	19.373	10.886	6807	5939
43	19.534	10.968	7268	6290
44	19.783	11.119	7718	6663
45	19.929	11.195	8152	7028
46	20.178	11.328	8611	7419
47	20.348	11.387	9062	7799
48	20.582	11.527	9544	8205
49	20.736	11.633	10012	8597
50	20.897	11.718	10417	8935
51	20.897	11.711	11242	9623
52	19.768	11.089	11394	9754
53	19.754	11.091	11524	9857
54	19.747	11.087	11542	9868
55	18.287	10.253	11498	9836
56	17.203	9.648	11460	9810
57	16.124	9.040	11422	9783
58	15.039	8.428	11383	9757
59	13.953	7.821	11343	9731
60	12.847	7.211	11304	9704
61	11.783	6.604	11266	9677
62	10.699	5.999	11228	9651
63	9.620	5.402	11190	9625

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 2

	S11	S12	E11	E12		S11	S12	E11	E12
1	10.463	6.054	11202	9627	46	30.056	-6.454	13781	8353
2	11.527	5.353	11237	9593	47	30.254	-6.578	13955	8285
3	12.414	4.777	11264	9568	48	30.385	-6.659	14139	8214
4	13.293	4.208	11292	9542	49	30.598	-6.773	14344	8133
5	14.180	3.647	11320	9516	50	30.716	-6.854	14561	8049
6	15.046	3.078	11348	9491	51	30.907	-6.974	14805	7953
7	15.919	2.513	11376	9465	52	31.038	-7.046	15058	7853
8	16.806	1.943	11405	9439	53	31.244	-7.175	15342	7740
9	17.686	1.374	11434	9414	54	31.361	-7.241	15638	7623
10	18.566	0.811	11462	9388	55	31.560	-7.366	15966	7491
11	19.446	0.248	11491	9362	56	31.691	-7.446	16306	7356
12	20.319	-0.324	11520	9336	57	31.889	-7.586	16681	7204
13	21.199	-0.893	11553	9308	58	32.029	-7.649	17069	7048
14	22.072	-1.469	11592	9278	59	32.220	-7.766	17493	6874
15	23.002	-2.047	11645	9241	60	32.351	-7.842	17928	6698
16	23.772	-2.542	11699	9208	61	32.556	-7.973	18401	6503
17	24.446	-2.968	11758	9174	62	32.680	-8.047	18886	6305
18	24.968	-3.306	11810	9146	63	32.900	-8.185	19407	6088
19	25.444	-3.624	11865	9117	64	33.018	-8.251	19937	5869
20	25.861	-3.893	11919	9090	65	33.224	-8.373	20505	5632
21	26.242	-4.161	11981	9060	66	33.340	-8.456	21077	5394
22	26.530	-4.331	12035	9036	67	33.546	-8.581	21690	5135
23	26.771	-4.483	12086	9014	68	33.531	-8.579	22864	4656
24	27.027	-4.652	12141	8990	69	32.571	-8.041	23138	4565
25	27.269	-4.817	12201	8964	70	32.498	-8.047	23499	4431
26	27.476	-4.928	12265	8938	71	32.469	-8.052	23529	4418
27	27.680	-5.059	12325	8913	72	31.199	-7.226	23503	4452
28	27.791	-5.116	12384	8892	73	30.224	-6.595	23472	4481
29	27.886	-5.173	12432	8874	74	29.235	-5.958	23439	4511
30	27.974	-5.228	12478	8856	75	28.274	-5.332	23406	4541
31	28.077	-5.279	12524	8839	76	27.299	-4.695	23374	4570
32	28.172	-5.334	12568	8823	77	26.324	-4.068	23340	4600
33	28.274	-5.395	12614	8805	78	25.342	-3.433	23307	4630
34	28.369	-5.446	12661	8787	79	24.373	-2.805	23274	4660
35	28.471	-5.497	12709	8769	80	23.861	-2.487	23257	4674
36	28.567	-5.563	12759	8751					
37	28.655	-5.605	12811	8731					
38	28.780	-5.685	12867	8709					
39	28.970	-5.795	12944	8678					
40	29.088	-5.876	13027	8646					
41	29.294	-5.994	13126	8607					
42	29.417	-6.066	13231	8567					
43	29.609	-6.187	13352	8519					
44	29.741	-6.259	13481	8470					
45	29.938	-6.386	13627	8412					

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 3

	S11	S12	E11	E12		S11	S12	E11	E12
1	23.736	- 2.318	23310	4670	46	8.146	-11.705	22423	3902
2	22.496	- 3.001	23269	4637	47	9.093	-11.254	22458	3922
3	21.573	- 3.524	23236	4614	48	8.821	-11.284	22450	3922
4	20.627	- 4.039	23202	4592	49	8.624	-11.303	22443	3921
5	19.695	- 4.557	23169	4569	50	8.601	-11.305	22442	3921
6	18.772	- 5.063	23136	4546	51	7.340	-12.008	22397	3889
7	17.840	- 5.586	23102	4523	52	6.402	-12.520	22364	3867
8	16.894	- 6.096	23068	4500	53	5.456	-13.021	22330	3844
9	15.985	- 6.612	23034	4478	54	4.510	-13.540	22297	3821
10	15.039	- 7.116	23002	4455	55	3.578	-14.056	22264	3798
11	14.101	- 7.635	22968	4432	56	2.633	-14.571	22231	3776
12	13.169	- 8.155	22934	4409	57	1.701	-15.085	22197	3753
13	12.246	- 8.668	22900	4385	58	0.748	-15.599	22164	3729
14	11.307	- 9.188	22866	4362	59	- 0.206	-16.107	22130	3706
15	10.375	- 9.698	22832	4339	60	- 1.122	-16.622	22096	3683
16	9.445	-10.215	22796	4315	61	- 2.082	-17.134	22062	3659
17	8.513	-10.723	22759	4290	62	- 3.014	-17.648	22026	3630
18	7.574	-11.241	22720	4264	63	- 4.018	-18.188	21971	3567
19	6.644	-11.754	22679	4237	64	- 4.685	-18.548	21897	3464
20	5.719	-12.274	22636	4209	65	- 5.096	-18.774	21828	3360
21	4.774	-12.782	22592	4179	66	- 5.368	-18.914	21771	3272
22	3.791	-13.320	22544	4145	67	- 5.558	-19.011	21728	3200
23	2.970	-13.766	22500	4115	68	- 5.756	-19.102	21691	3140
24	2.207	-14.175	22460	4086	69	- 5.917	-19.174	21656	3082
25	1.460	-14.588	22418	4054	70	- 6.116	-19.278	21619	3021
26	0.667	-15.007	22372	4018	71	- 6.270	-19.352	21583	2960
27	- 0.073	-15.400	22327	3981	72	- 6.467	-19.445	21543	2893
28	- 0.748	-15.771	22283	3943	73	- 6.629	-19.536	21504	2825
29	- 1.349	-16.110	22240	3904	74	- 6.826	-19.632	21460	2750
30	- 1.914	-16.429	22198	3865	75	- 6.980	-19.718	21417	2671
31	- 2.406	-16.704	22157	3825	76	- 7.186	-19.826	21368	2585
32	- 2.860	-16.948	22118	3786	77	- 7.347	-19.875	21319	2494
33	- 3.234	-17.172	22084	3750	78	- 7.538	-19.987	21265	2395
34	- 3.622	-17.380	22046	3708	79	- 7.699	-20.049	21210	2290
35	- 3.644	-17.369	22011	3661	80	- 7.896	-20.131	21148	2174
36	- 2.148	-16.658	22057	3683	81	- 8.037	-20.216	21082	2042
37	- 1.122	-16.167	22094	3704	82	- 8.264	-20.324	21006	1895
38	- 0.095	-15.671	22131	3727	83	- 8.411	-20.404	20933	1748
39	0.946	-15.166	22167	3748	84	- 8.631	-20.512	20850	1582
40	1.966	-14.672	22203	3770	85	- 8.769	-20.565	20768	1413
41	3.000	-14.169	22240	3792	86	- 9.005	-20.692	20674	1223
42	4.032	-13.673	22276	3814	87	- 9.166	-20.775	20588	1044
43	5.059	-13.187	22313	3836	88	- 9.357	-20.870	20493	845
44	6.100	-12.695	22350	3858	89	- 9.379	-20.870	20294	400
45	7.120	-12.207	22387	3880	90	- 8.125	-20.212	20286	302

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 3

	S11	S12	E11	E12	S11	S12	E11	E12
91	-6.864	-19.545	20329	328				
92	-5.601	-18.870	20374	358				
93	-4.334	-18.203	20419	387				
94	-3.087	-17.540	20464	416				
95	-1.805	-16.874	20508	447				
96	-0.528	-16.207	20553	477				
97	0.733	-15.536	20599	507				
98	2.082	-14.827	20648	539				
99	3.102	-14.298	20684	564				

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 4

	S11	S12	E11	E12
1	-4.642	-14.173	20427	485
2	-5.742	-13.411	20390	521
3	-6.511	-12.880	20364	545
4	-7.275	-12.370	20338	569
5	-8.030	-11.847	20311	593
6	-8.806	-11.318	20285	617
7	-9.554	-10.805	20258	642
8	-10.316	-10.285	20232	666
9	-11.094	-9.760	20206	691
10	-11.858	-9.243	20178	717
11	-12.613	-8.720	20151	742
12	-13.382	-8.200	20123	768
13	-14.137	-7.675	20093	794
14	-14.899	-7.156	20062	822
15	-15.677	-6.638	20029	850
16	-16.425	-6.113	19995	880
17	-17.187	-5.594	19958	909
18	-17.958	-5.086	19920	939
19	-18.706	-4.574	19880	969
20	-18.727	-4.574	19864	975
21	-17.554	-5.349	19902	939
22	-16.616	-5.960	19933	911
23	-15.699	-6.566	19964	884
24	-14.774	-7.175	19996	856
25	-13.844	-7.783	20027	828
26	-12.912	-8.395	20058	800
27	-11.981	-9.000	20089	772
28	-11.064	-9.593	20120	746
29	-11.380	-9.616	20110	747
30	-11.409	-9.622	20109	747
31	-12.597	-8.790	20069	786
32	-13.434	-8.206	20041	813
33	-14.277	-7.618	20012	839
34	-15.112	-7.038	19984	866
35	-15.963	-6.449	19956	893
36	-16.799	-5.859	19927	920
37	-17.643	-5.275	19898	947
38	-18.484	-4.688	19869	975
39	-19.321	-4.102	19838	1004
40	-20.165	-3.520	19798	1036
41	-21.051	-2.904	19746	1075
42	-21.748	-2.415	19700	1109
43	-22.423	-1.945	19653	1141
44	-23.047	-1.513	19606	1172
45	-23.067	-1.518	19578	1183
46	-21.852	-2.314	19614	1148
47	-20.949	-2.906	19644	1121
48	-20.054	-3.495	19675	1094
49	-19.146	-4.083	19705	1066
50	-18.244	-4.676	19735	1039
51	-17.334	-5.266	19766	1012
52	-16.432	-5.859	19797	985
53	-15.530	-6.451	19828	958
54	-14.620	-7.042	19858	931
55	-13.727	-7.628	19889	903
56	-12.833	-8.206	19919	877

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 5

	S11	S12	E11	E12
1	-14.475	-8.033	19786	884
2	-13.330	-7.387	19825	914
3	-12.466	-6.902	19855	935
4	-11.608	-6.435	19885	956
5	-10.749	-5.950	19915	978
6	-9.885	-5.472	19945	1000
7	-9.026	-5.000	19976	1021
8	-8.168	-4.517	20006	1043
9	-7.311	-4.043	20037	1064
10	-6.445	-3.560	20068	1086
11	-5.588	-3.082	20099	1108
12	-4.730	-2.610	20130	1130
13	-3.871	-2.132	20162	1153
14	-3.014	-1.651	20194	1176
15	-2.141	-1.171	20226	1199
16	-1.290	-0.699	20260	1223
17	-0.433	-0.222	20293	1248
18	0.417	0.256	20327	1274
19	1.283	0.743	20363	1301
20	2.134	1.215	20400	1329
21	2.984	1.681	20438	1359
22	3.842	2.153	20475	1389
23	4.692	2.635	20515	1420
24	5.551	3.112	20555	1453
25	6.438	3.607	20599	1489
26	7.171	4.011	20636	1521
27	7.846	4.392	20669	1550
28	8.513	4.752	20705	1580
29	9.189	5.129	20741	1611
30	9.848	5.514	20777	1645
31	10.522	5.880	20815	1679
32	11.218	6.257	20855	1716
33	11.799	6.593	20891	1750
34	12.429	6.955	20930	1788
35	12.978	7.256	20967	1824
36	13.484	7.561	21001	1858
37	13.983	7.848	21035	1892
38	14.475	8.138	21071	1928
39	14.987	8.437	21107	1965
40	15.502	8.744	21146	2006
41	15.942	9.010	21183	2045
42	16.344	9.241	21215	2079
43	16.740	9.472	21249	2115
44	17.137	9.732	21283	2151
45	17.539	9.952	21318	2188
46	17.935	10.192	21355	2229
47	18.339	10.429	21393	2270
48	18.684	10.630	21430	2310
49	18.999	10.816	21461	2345
50	19.321	10.994	21495	2380
51	19.622	11.165	21528	2416
52	19.929	11.349	21562	2454
53	20.246	11.540	21597	2492
54	20.553	11.722	21636	2533
55	20.809	11.855	21669	2570
56	20.788	11.851	21708	2618
57	19.357	11.068	21666	2592
58	18.419	10.560	21632	2569
59	17.482	10.054	21599	2546
60	16.550	9.535	21566	2523
61	15.611	9.030	21532	2500
62	14.679	8.519	21500	2478
63	13.740	8.022	21466	2455
64	12.795	7.518	21433	2432
65	11.858	7.002	21399	2409
66	10.926	6.498	21365	2387
67	9.994	5.990	21332	2364
68	9.055	5.514	21299	2342

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 6

	S11	S12	E11	E12
1	10.236	6.227	21327	2359
2	11.527	5.414	21372	2320
3	12.575	4.756	21407	2290
4	13.617	4.096	21443	2260
5	14.672	3.450	21479	2231
6	15.706	2.796	21515	2200
7	16.754	2.157	21551	2171
8	17.804	1.499	21588	2140
9	18.838	0.851	21625	2110
10	19.886	0.201	21662	2079
11	20.920	-0.442	21700	2049
12	21.961	-1.084	21738	2018
13	23.002	-1.751	21779	1986
14	24.101	-2.428	21825	1952
15	25.011	-2.989	21866	1922
16	25.847	-3.512	21907	1893
17	26.682	-4.020	21949	1864
18	27.512	-4.540	21994	1834
19	28.385	-5.076	22045	1801
20	29.176	-5.558	22096	1770
21	29.902	-6.011	22151	1739
22	30.562	-6.416	22212	1707
23	31.097	-6.761	22272	1677
24	31.528	-7.008	22329	1650
25	31.889	-7.252	22394	1620
26	32.175	-7.434	22455	1594
27	32.410	-7.563	22519	1567
28	32.601	-7.677	22589	1538
29	32.791	-7.793	22657	1511
30	32.945	-7.887	22734	1479
31	33.165	-8.011	22827	1440
32	33.304	-8.109	22926	1399
33	33.539	-8.238	23050	1348
34	33.685	-8.329	23187	1291
35	33.839	-8.414	23323	1235
36	33.971	-8.500	23476	1172
37	34.199	-8.636	23697	1080
38	34.176	-8.634	24163	895
39	32.512	-7.709	24245	889
40	30.027	-6.333	24160	953
41	28.684	-5.579	24113	988
42	27.453	-4.894	24071	1020
43	26.338	-4.267	24032	1050
44	25.210	-3.624	23992	1079
45	24.081	-2.995	23952	1110
46	22.965	-2.371	23912	1140
47	21.852	-1.751	23874	1169

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 7

	S11	S12	E11	E12
1	22.072	- 2.508	23882	1119
2	20.854	- 3.203	23839	1088
3	19.879	- 3.749	23805	1063
4	18.926	- 4.293	23770	1039
5	17.958	- 4.841	23736	1014
6	16.983	- 5.391	23701	990
7	16.015	- 5.929	23668	965
8	15.053	- 6.477	23633	940
9	14.085	- 7.031	23599	916
10	13.125	- 7.567	23564	891
11	12.150	- 8.119	23530	866
12	11.198	- 8.661	23494	841
13	10.221	- 9.207	23459	816
14	9.261	- 9.760	23424	791
15	7.325	-10.837	23351	738
16	6.350	-11.392	23311	709
17	5.381	-11.940	23270	679
18	4.429	-12.480	23227	648
19	3.402	-13.057	23180	613
20	2.581	-13.502	23141	584
21	1.819	-13.913	23104	557
22	1.048	-14.334	23066	528
23	0.301	-14.749	23027	498
24	- 0.469	-15.163	22988	466
25	- 1.225	-15.578	22946	432
26	- 2.016	-16.008	22901	394
27	- 2.750	-16.406	22858	356
28	- 3.440	-16.789	22816	318
29	- 4.048	-17.123	22776	279
30	- 4.612	-17.447	22736	240
31	- 5.082	-17.708	22702	204
32	- 5.595	-17.998	22663	162
33	- 6.021	-18.249	22625	119
34	- 6.416	-18.463	22590	78
35	- 6.826	-18.690	22552	32
36	- 7.164	-18.884	22516	- 14
37	- 7.465	-19.041	22482	- 59
38	- 7.715	-19.157	22450	- 102
39	- 7.955	-19.293	22417	- 148
40	- 8.132	-19.367	22387	- 192
41	- 8.279	-19.458	22361	- 229
42	- 8.433	-19.517	22336	- 266
43	- 8.586	-19.593	22311	- 305
44	- 8.740	-19.663	22285	- 345
45	- 8.894	-19.737	22258	- 386
46	- 9.071	-19.822	22227	- 435
47	- 9.341	-19.970	22184	- 504
48	- 9.481	-20.032	22143	- 574
49	- 9.724	-20.152	22094	- 655
50	- 9.885	-20.231	22050	- 733
51	-10.082	-20.322	21998	- 824
52	-10.229	-20.387	21940	- 931
53	-10.456	-20.525	21871	- 1057
54	-10.624	-20.590	21807	- 1179
55	-10.831	-20.707	21731	- 1322
56	-10.992	-20.775	21650	- 1479
57	-11.189	-20.885	21557	- 1660
58	-11.218	-20.868	21361	- 2072
59	- 9.906	-20.247	21355	- 2161
60	- 8.615	-19.638	21399	- 2136
61	- 7.340	-19.011	21443	- 2110
62	- 6.079	-18.404	21487	- 2082
63	- 4.810	-17.801	21533	- 2055
64	- 3.535	-17.195	21577	- 2028
65	- 2.259	-16.596	21622	- 2000
66	- 0.998	-15.991	21667	- 1972
67	0.272	-15.375	21712	- 1944
68	1.533	-14.774	21758	- 1916
69	2.787	-14.186	21803	- 1889

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 8

	S11	S12	E11	E12
1	1.020	-14.869	21777	- 1974
2	- 0.220	-14.111	21734	- 1938
3	- 1.173	-13.553	21702	- 1913
4	- 2.120	-12.969	21669	- 1886
5	- 3.087	-12.401	21636	- 1860
6	- 4.025	-11.832	21603	- 1833
7	- 4.987	-11.256	21570	- 1807
8	- 5.939	-10.689	21537	- 1780
9	- 6.892	-10.109	21503	- 1753
10	- 7.831	- 9.542	21469	- 1726
11	- 8.799	- 8.972	21436	- 1699
12	- 9.753	- 8.399	21401	- 1671
13	-10.699	- 7.832	21366	- 1642
14	-11.658	- 7.256	21331	- 1614
15	-12.613	- 6.689	21295	- 1585
16	-13.572	- 6.115	21257	- 1553
17	-14.518	- 5.541	21217	- 1522
18	-15.472	- 4.978	21175	- 1490
19	-16.425	- 4.407	21131	- 1456
20	-17.437	- 3.797	21082	- 1420
21	-18.258	- 3.334	21040	- 1391
22	-19.006	- 2.893	21001	- 1363
23	-19.777	- 2.451	20958	- 1334
24	-20.532	- 2.017	20916	- 1305
25	-21.316	- 1.562	20869	- 1274
26	-22.056	- 1.132	20822	- 1243
27	-22.723	- 0.745	20778	- 1216
28	-23.391	- 0.362	20733	- 1187
29	-24.072	0.025	20683	- 1156
30	-24.696	0.390	20633	- 1126
31	-25.246	0.722	20588	- 1098
32	-25.832	1.052	20538	- 1071
33	-25.847	1.048	20502	- 1055
34	-24.586	0.311	20539	- 1087
35	-23.662	- 0.222	20571	- 1112
36	-22.761	- 0.754	20601	- 1136
37	-21.836	- 1.285	20633	- 1160
38	-20.920	- 1.814	20664	- 1185
39	-20.010	- 2.347	20695	- 1209
40	-19.087	- 2.879	20726	- 1233
41	-18.185	- 3.410	20758	- 1258
42	-17.262	- 3.948	20789	- 1283
43	-16.352	- 4.475	20821	- 1307
44	-15.443	- 5.008	20852	- 1332
45	-14.541	- 5.546	20885	- 1357
46	-13.624	- 6.071	20917	- 1382
47	-12.708	- 6.602	20949	- 1407
48	-11.828	- 7.127	20980	- 1431

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 9

	S11	S12	E11	E12	S11	S12	E11	E12
1	-12.230	-7.186	20913	-1443				
2	-10.978	-6.483	20958	-1409				
3	-10.060	-5.975	20991	-1385				
4	-9.159	-5.469	21023	-1361				
5	-8.250	-4.966	21056	-1337				
6	-7.332	-4.453	21089	-1313				
7	-6.424	-3.952	21122	-1289				
8	-5.522	-3.450	21156	-1264				
9	-4.612	-2.944	21190	-1240				
10	-3.710	-2.438	21224	-1215				
11	-2.794	-1.933	21259	-1190				
12	-1.884	-1.433	21293	-1165				
13	-0.991	-0.925	21328	-1140				
14	-0.081	-0.421	21364	-1113				
15	0.821	0.078	21401	-1086				
16	1.716	0.582	21439	-1057				
17	2.633	1.099	21478	-1027				
18	3.535	1.592	21519	-996				
19	4.436	2.104	21560	-963				
20	5.375	2.616	21604	-928				
21	6.225	3.078	21645	-894				
22	6.996	3.514	21683	-863				
23	7.773	3.941	21722	-831				
24	8.536	4.369	21761	-797				
25	9.305	4.779	21802	-762				
26	10.105	5.209	21846	-723				
27	10.779	5.586	21885	-688				
28	11.395	5.924	21920	-655				
29	12.003	6.284	21956	-622				
30	11.960	6.267	21971	-604				
31	10.669	5.596	21927	-634				
32	9.679	5.091	21892	-657				
33	8.690	4.587	21857	-682				
34	7.706	4.081	21822	-705				
35	6.724	3.573	21786	-729				
36	5.726	3.071	21750	-753				
37	4.730	2.565	21715	-777				
38	3.739	2.051	21680	-801				
39	2.750	1.554	21644	-825				
40	1.767	1.048	21608	-850				
41	0.778	0.546	21573	-874				
42	-0.206	0.040	21537	-898				
43	-1.188	-0.455	21502	-921				

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 10

	S11	S12	E11	E12
1	- 0.023	0.030	21552	- 889
2	1.166	0.749	21599	- 856
3	1.921	1.202	21625	- 836
4	2.685	1.651	21651	- 815
5	3.440	2.104	21678	- 795
6	4.179	2.557	21705	- 774
7	4.935	3.006	21731	- 754
8	5.683	3.454	21758	- 733
9	6.431	3.890	21785	- 712
10	7.186	4.348	21812	- 691
11	7.935	4.801	21839	- 670
12	8.681	5.245	21867	- 649
13	9.422	5.694	21894	- 627
14	10.184	6.147	21921	- 605
15	10.926	6.591	21949	- 584
16	11.674	7.057	21978	- 559
17	12.429	7.489	22011	- 530
18	13.184	7.975	22053	- 490
19	13.770	8.306	22091	- 451
20	14.321	8.627	22126	- 415
21	14.878	8.958	22165	- 373
22	15.318	9.220	22198	- 338
23	15.788	9.499	22232	- 301
24	16.271	9.787	22270	- 260
25	16.792	10.105	22311	- 215
26	17.165	10.329	22345	- 176
27	17.502	10.537	22375	- 141
28	17.840	10.752	22405	- 108
29	18.178	10.947	22435	- 74
30	18.514	11.155	22467	- 38
31	18.859	11.362	22498	- 2
32	19.196	11.574	22532	36
33	19.557	11.781	22567	77
34	19.945	12.014	22608	123
35	20.178	12.162	22641	162
36	20.391	12.281	22668	194
37	20.604	12.408	22695	224
38	20.802	12.535	22721	254
39	21.015	12.653	22747	284
40	21.212	12.801	22773	314
41	21.441	12.903	22800	346
42	21.632	13.051	22829	379
43	21.836	13.153	22859	413
44	22.056	13.284	22889	447
45	22.253	13.398	22921	484
46	22.466	13.529	22955	522
47	22.693	13.661	22992	565
48	22.972	13.834	23035	613
49	23.178	13.970	23080	664
50	23.450	14.126	23132	723
51	23.632	14.245	23186	784
52	23.956	14.435	23252	856
53	24.183	14.562	23313	924
54	24.453	14.736	23387	1004
55	24.637	14.837	23466	1091
56	24.952	15.041	23563	1196
57	25.187	15.176	23659	1297
58	25.466	15.341	23774	1419
59	25.678	15.485	23901	1553
60	25.957	15.654	24056	1713
61	26.192	15.803	24230	1890
62	26.462	15.955	24441	2103
63	26.675	16.095	24680	2341
64	26.961	16.264	24975	2633
65	27.190	16.400	25311	2960
66	27.467	16.582	25721	3358
67	27.680	16.709	26184	3802
68	27.959	16.865	26742	4333
69	28.156	16.988	27388	4940
70	28.480	17.178	28136	5643
71	28.707	17.310	28870	6320
72	28.986	17.487	29706	7090
73	29.206	17.640	30594	7896
74	29.485	17.801	31578	8785
75	29.696	17.945	32598	9696
76	29.682	17.919	34462	11324
77	28.787	17.382	34828	11640
78	28.471	17.195	34848	11658
79	27.775	16.772	34830	11645
80	26.668	16.116	34789	11616
81	25.627	15.481	34748	11586
82	24.571	14.854	34707	11556
83	23.523	14.215	34665	11526
84	22.473	13.589	34623	11496
85	21.432	12.962	34581	11466
86	20.378	12.331	34539	11436
87	19.328	11.701	34497	11405
88	18.280	11.074	34455	11373
89	17.224	10.452	34411	11342
90	16.189	9.817	34368	11310

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 10

	S11	S12	E11	E12	S11	S12	E11	E12
91	15.736	9.576	34347	11297				
92	15.736	9.576	34345	11295				
93	15.736	9.571	34344	11295				
94	15.713	9.571	34342	11294				
95	15.677	9.563	34335	11290				

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 11

	S11	S12	E11	E12		S11	S12	E11	E12
1	18.287	11.735	34413	11388	46	43.717	-3.061	38085	10234
2	19.593	10.973	34456	11351	47	44.098	-3.294	38513	10160
3	20.532	10.418	34487	11325	48	44.361	-3.450	38997	10081
4	21.484	9.880	34518	11298	49	44.758	-3.683	39597	9979
5	22.423	9.322	34549	11273	50	45.007	-3.823	40257	9871
6	23.369	8.776	34582	11246	51	45.286	-3.984	40887	9765
7	24.308	8.229	34613	11220	52	45.498	-4.115	41557	9654
8	25.260	7.671	34646	11194	53	45.776	-4.271	42302	9526
9	26.199	7.133	34677	11167	54	46.003	-4.420	43103	9390
10	27.145	6.578	34709	11141	55	46.400	-4.652	44220	9192
11	28.077	6.045	34741	11115	56	46.642	-4.801	45413	8985
12	29.029	5.486	34775	11088	57	46.613	-4.792	47429	8657
13	29.982	4.944	34809	11061	58	45.556	-4.492	47907	8598
14	30.921	4.407	34848	11032	59	45.080	-4.352	47939	8600
15	31.866	3.848	34893	11001	60	44.223	-4.094	47927	8611
16	32.850	3.294	34946	10968	61	42.799	-3.691	47879	8633
17	33.553	2.887	34993	10941	62	41.436	-3.285	47830	8653
18	34.199	2.510	35037	10917	63	40.064	-2.891	47781	8674
19	34.851	2.134	35086	10892	64	38.701	-2.493	47732	8694
20	35.504	1.744	35140	10866	65	37.338	-2.100	47682	8715
21	36.075	1.422	35193	10842	66	35.973	-1.702	47632	8736
22	36.538	1.156	35244	10822	67	34.617	-1.304	47582	8757
23	37.043	0.855	35300	10800					
24	37.447	0.635	35352	10782					
25	37.857	0.385	35410	10763					
26	38.261	0.148	35472	10743					
27	38.569	-0.025	35534	10727					
28	38.833	-0.178	35587	10712					
29	39.098	-0.335	35641	10697					
30	39.397	-0.517	35702	10682					
31	39.735	-0.707	35770	10663					
32	39.969	-0.851	35845	10647					
33	40.248	-1.012	35917	10630					
34	40.454	-1.139	35988	10615					
35	40.724	-1.300	36070	10596					
36	40.944	-1.431	36156	10579					
37	41.341	-1.660	36280	10552					
38	41.590	-1.808	36411	10527					
39	41.862	-1.973	36539	10503					
40	42.082	-2.108	36675	10478					
41	42.477	-2.337	36874	10440					
42	42.712	-2.468	37090	10403					
43	42.998	-2.637	37303	10365					
44	43.211	-2.764	37531	10328					
45	43.474	-2.925	37795	10283					

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 12

	S11	S12	E11	E12		S11	S12	E11	E12
1	36.105	1.406	47731	8908	46	0.052	-19.731	45908	7564
2	34.866	0.686	47685	8873	47	-0.404	-20.002	45866	7525
3	33.862	0.085	47647	8846	48	-0.762	-20.209	45829	7489
4	32.850	-0.500	47609	8819	49	-1.093	-20.413	45796	7458
5	31.830	-1.088	47571	8792	50	-1.422	-20.603	45764	7426
6	30.825	-1.668	47533	8765	51	-1.746	-20.789	45731	7393
7	29.821	-2.269	47495	8738	52	-2.075	-20.988	45697	7360
8	28.809	-2.853	47456	8711	53	-2.390	-21.166	45663	7324
9	27.798	-3.442	47416	8683	54	-2.728	-21.357	45627	7286
10	26.793	-4.030	47377	8655	55	-3.073	-21.564	45587	7244
11	25.795	-4.623	47338	8627	56	-3.454	-21.780	45543	7197
12	24.784	-5.211	47299	8600	57	-3.667	-21.898	45507	7156
13	23.772	-5.808	47258	8571	58	-3.850	-22.013	45477	7122
14	22.775	-6.401	47217	8543	59	-4.048	-22.106	45450	7090
15	21.777	-6.981	47174	8513	60	-4.231	-22.229	45422	7059
16	20.772	-7.565	47129	8483	61	-4.415	-22.330	45395	7027
17	19.768	-8.157	47084	8453	62	-4.612	-22.445	45368	6995
18	18.734	-8.759	47036	8421	63	-4.789	-22.550	45340	6961
19	17.892	-9.262	46995	8393	64	-4.980	-22.648	45311	6926
20	17.114	-9.715	46958	8368	65	-5.177	-22.758	45282	6890
21	16.359	-10.168	46920	8343	66	-5.352	-22.868	45252	6853
22	15.582	-10.621	46882	8316	67	-5.551	-22.978	45221	6814
23	14.812	-11.070	46843	8290	68	-5.756	-23.101	45187	6769
24	14.042	-11.527	46804	8263	69	-6.137	-23.317	45134	6702
25	13.273	-11.972	46765	8235	70	-6.386	-23.482	45082	6633
26	12.502	-12.429	46724	8207	71	-6.760	-23.681	45017	6546
27	11.740	-12.882	46683	8178	72	-7.003	-23.812	44954	6458
28	10.969	-13.335	46641	8149	73	-7.377	-24.049	44879	6351
29	10.200	-13.783	46599	8119	74	-7.619	-24.193	44806	6244
30	9.445	-14.245	46555	8087	75	-7.993	-24.417	44718	6113
31	8.638	-14.702	46510	8054	76	-8.241	-24.527	44633	5981
32	7.948	-15.104	46469	8023	77	-8.631	-24.756	44530	5819
33	7.340	-15.472	46431	7995	78	-8.873	-24.900	44428	5653
34	6.710	-15.832	46393	7966	79	-9.254	-25.111	44304	5449
35	6.093	-16.205	46354	7936	80	-9.488	-25.285	44180	5236
36	5.477	-16.556	46314	7906	81	-9.885	-25.484	44029	4973
37	4.846	-16.929	46274	7874	82	-10.126	-25.619	43876	4695
38	4.238	-17.293	46232	7841	83	-10.508	-25.848	43688	4350
39	3.608	-17.648	46189	7806	84	-10.749	-25.983	43493	3979
40	2.977	-18.017	46143	7769	85	-11.123	-26.225	43257	3522
41	2.456	-18.326	46104	7736	86	-11.388	-26.364	43011	3030
42	1.914	-18.647	46062	7700	87	-11.769	-26.580	42714	2424
43	1.460	-18.910	46025	7669	88	-12.010	-26.716	42402	1771
44	0.991	-19.189	45988	7635	89	-12.400	-26.944	42032	980
45	0.535	-19.464	45950	7601	90	-12.656	-27.088	41651	142

SPECIMEN NO. : C - 9
PPESTRESS LOADING PATH NO. : 12

	S11	S12	E11	E12	S11	S12	E11	E12
91	-13.030	-27.325	41209	- 852				
92	-13.280	-27.457	40761	- 1888				
93	-13.359	-27.465	39474	- 5127				
94	-13.389	-27.486	39296	- 5601				
95	-12.135	-26.741	39288	- 5716				
96	-10.831	-25.979	39334	- 5684				
97	- 9.518	-25.230	39379	- 5649				
98	- 8.484	-24.633	39417	- 5620				
99	- 7.524	-24.074	39451	- 5593				
100	- 6.585	-23.524	39485	- 5567				
101	- 5.631	-22.978	39520	- 5540				
102	- 4.678	-22.428	39554	- 5512				
103	- 3.739	-21.877	39589	- 5484				
104	- 2.787	-21.335	39625	- 5456				
105	- 1.833	-20.772	39659	- 5429				
106	- 0.887	-20.222	39696	- 5400				
107	0.059	-19.676	39731	- 5373				
108	0.998	-19.172	39768	- 5342				
109	1.936	-18.584	39805	- 5313				
110	2.889	-18.029	39842	- 5282				
111	3.842	-17.483	39880	- 5253				
112	4.780	-16.937	39918	- 5223				
113	5.719	-16.383	39957	- 5192				
114	6.672	-15.849	39995	- 5160				
115	7.611	-15.286	40034	- 5129				
116	8.565	-14.749	40074	- 5097				
117	9.504	-14.207	40113	- 5066				
118	10.434	-13.661	40153	- 5033				
119	11.366	-13.123	40193	- 5003				

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 13

	S11	S12	E11	E12	S11	S12	E11	E12
1	3.601	-13.999	39945	-5018				
2	2.531	-14.850	39907	-5061				
3	1.708	-15.494	39878	-5093				
4	0.880	-16.154	39848	-5125				
5	0.059	-16.806	39819	-5158				
6	-0.755	-17.445	39789	-5190				
7	-1.592	-18.089	39760	-5223				
8	-2.406	-18.728	39730	-5257				
9	-3.234	-19.397	39700	-5291				
10	-4.055	-20.036	39669	-5325				
11	-4.876	-20.675	39638	-5361				
12	-5.697	-21.331	39606	-5398				
13	-6.533	-21.975	39572	-5436				
14	-7.354	-22.631	39539	-5475				
15	-8.205	-23.295	39503	-5517				
16	-8.930	-23.854	39472	-5553				
17	-9.583	-24.362	39444	-5587				
18	-10.243	-24.883	39415	-5622				
19	-10.889	-25.378	39385	-5659				
20	-11.549	-25.886	39354	-5699				
21	-12.223	-26.420	39319	-5747				
22	-12.810	-26.877	39282	-5805				
23	-13.235	-27.203	39244	-5880				
24	-13.507	-27.414	39200	-5979				
25	-13.668	-27.537	39150	-6106				
26	-13.704	-27.562	39026	-6442				
27	-12.502	-26.860	39022	-6542				
28	-11.101	-26.051	39071	-6507				
29	-10.016	-25.433	39110	-6477				
30	-9.019	-24.853	39146	-6449				
31	-8.014	-24.282	39182	-6420				
32	-7.017	-23.702	39218	-6391				
33	-6.021	-23.135	39254	-6362				
34	-5.016	-22.559	39290	-6333				
35	-4.025	-21.979	39327	-6303				
36	-3.028	-21.416	39364	-6273				

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 14

	S11	S12	E11	E12	S11	S12	E11	E12
1	- 2.801	-21.928	39352	- 6301				
2	- 4.011	-21.221	39309	- 6266				
3	- 4.994	-20.620	39274	- 6238				
4	- 5.991	-20.036	39239	- 6210				
5	- 6.989	-19.435	39204	- 6182				
6	- 7.985	-18.851	39169	- 6153				
7	- 8.982	-18.258	39134	- 6125				
8	- 9.973	-17.674	39099	- 6097				
9	-10.962	-17.085	39063	- 6069				
10	-11.953	-16.501	39027	- 6040				
11	-12.949	-15.908	38992	- 6011				
12	-13.953	-15.320	38957	- 5983				
13	-14.944	-14.715	38920	- 5954				
14	-15.933	-14.147	38884	- 5925				
15	-16.924	-13.555	38848	- 5895				
16	-17.922	-12.975	38812	- 5866				
17	-18.917	-12.374	38776	- 5836				
18	-19.915	-11.798	38739	- 5807				
19	-20.897	-11.214	38702	- 5776				
20	-21.895	-10.621	38664	- 5745				
21	-22.886	-10.037	38624	- 5714				
22	-23.882	- 9.457	38583	- 5681				
23	-24.865	- 8.873	38542	- 5649				
24	-25.891	- 8.272	38497	- 5615				
25	-26.646	- 7.823	38462	- 5589				
26	-27.342	- 7.417	38429	- 5565				
27	-28.047	- 7.002	38396	- 5541				
28	-28.736	- 6.608	38363	- 5517				
29	-29.426	- 6.198	38328	- 5493				
30	-30.122	- 5.795	38292	- 5469				
31	-30.818	- 5.393	38256	- 5446				
32	-30.834	- 5.402	38240	- 5441				
33	-29.616	- 6.109	38281	- 5473				
34	-28.619	- 6.672	38315	- 5500				
35	-27.630	- 7.247	38350	- 5527				
36	-26.632	- 7.819	38385	- 5554				
37	-25.641	- 8.390	38419	- 5581				
38	-24.652	- 8.962	38454	- 5609				
39	-23.655	- 9.525	38490	- 5636				
40	-22.673	-10.092	38525	- 5663				
41	-21.689	-10.659	38560	- 5690				
42	-20.686	-11.227	38595	- 5718				
43	-19.718	-11.785	38629	- 5744				

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 15

	S11	S12	E11	E12
1	-20.033	-11.756	38544	-5735
2	-18.801	-11.019	38588	-5697
3	-17.863	-10.452	38622	-5670
4	-16.931	-9.893	38655	-5642
5	-15.985	-9.326	38690	-5613
6	-15.046	-8.771	38724	-5585
7	-14.108	-8.221	38759	-5556
8	-13.155	-7.654	38793	-5527
9	-12.230	-7.091	38828	-5498
10	-11.284	-6.532	38864	-5468
11	-10.346	-5.969	38899	-5438
12	-9.408	-5.402	38935	-5408
13	-8.470	-4.864	38971	-5378
14	-7.531	-4.301	39008	-5346
15	-6.585	-3.738	39046	-5313
16	-5.653	-3.175	39084	-5278
17	-4.730	-2.629	39124	-5242
18	-3.755	-2.053	39166	-5203
19	-2.977	-1.604	39200	-5172
20	-2.281	-1.160	39231	-5142
21	-1.569	-0.732	39262	-5111
22	-0.866	-0.313	39294	-5081
23	-0.147	0.102	39326	-5049
24	0.551	0.521	39358	-5017
25	1.254	0.944	39391	-4984
26	1.950	1.367	39425	-4950
27	2.655	1.778	39458	-4916
28	3.365	2.197	39493	-4881
29	4.070	2.633	39528	-4844
30	4.774	3.035	39563	-4807
31	5.470	3.463	39598	-4768
32	6.196	3.886	39635	-4727
33	6.783	4.250	39667	-4692
34	7.406	4.614	39701	-4654
35	8.030	4.991	39735	-4615
36	8.667	5.364	39771	-4574
37	9.202	5.694	39803	-4536
38	9.686	5.977	39832	-4503
39	10.141	6.257	39859	-4470
40	10.112	6.244	39872	-4447
41	8.806	5.440	39827	-4484
42	8.030	4.953	39799	-4509
43	7.245	4.466	39771	-4533
44	6.461	3.984	39743	-4557
45	5.669	3.501	39715	-4581
46	4.876	3.006	39686	-4606
47	4.091	2.523	39658	-4630
48	3.306	2.045	39629	-4655
49	2.531	1.566	39600	-4680
50	1.730	1.067	39572	-4705
51	0.961	0.593	39543	-4729
52	0.168	0.106	39514	-4755
53	-0.608	-0.356	39487	-4778

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 16

	S11	S12	E11	E12		S11	S12	E11	E12
1	0.132	0.186	39509	- 4746	46	22.144	13.330	40832	- 3234
2	1.342	0.910	39552	- 4710	47	22.460	13.508	40867	- 3187
3	2.186	1.410	39581	- 4686	48	22.636	13.635	40899	- 3141
4	3.007	1.901	39611	- 4661	49	22.818	13.745	40926	- 3104
5	3.842	2.405	39641	- 4637	50	22.988	13.847	40951	- 3068
6	4.671	2.913	39672	- 4612	51	23.163	13.940	40976	- 3034
7	5.515	3.395	39702	- 4587	52	23.346	14.059	41001	- 3000
8	6.350	3.903	39733	- 4562	53	23.530	14.164	41025	- 2965
9	7.186	4.390	39763	- 4536	54	23.691	14.258	41050	- 2930
10	8.007	4.877	39794	- 4511	55	23.875	14.363	41076	- 2895
11	8.828	5.389	39825	- 4485	56	24.043	14.465	41101	- 2859
12	9.679	5.888	39856	- 4459	57	24.226	14.575	41128	- 2824
13	10.508	6.388	39888	- 4431	58	24.403	14.672	41155	- 2786
14	11.336	6.888	39921	- 4400	59	24.571	14.787	41182	- 2749
15	12.187	7.383	39961	- 4361	60	24.748	14.880	41210	- 2711
16	12.876	7.789	40002	- 4316	61	24.916	14.986	41238	- 2672
17	13.411	8.124	40036	- 4277	62	25.099	15.087	41267	- 2632
18	13.851	8.373	40066	- 4240	63	25.267	15.185	41296	- 2591
19	14.305	8.653	40098	- 4202	64	25.451	15.290	41326	- 2550
20	14.783	8.936	40132	- 4160	65	25.657	15.434	41359	- 2505
21	15.142	9.157	40160	- 4125	66	26.002	15.646	41409	- 2439
22	15.530	9.385	40190	- 4088	67	26.235	15.777	41456	- 2372
23	15.926	9.622	40219	- 4050	68	26.596	15.985	41514	- 2293
24	16.307	9.859	40249	- 4011	69	26.829	16.124	41568	- 2216
25	16.697	10.075	40280	- 3972	70	27.190	16.366	41634	- 2128
26	17.085	10.321	40313	- 3929	71	27.401	16.497	41694	- 2044
27	17.459	10.558	40345	- 3887	72	27.775	16.696	41765	- 1948
28	17.738	10.702	40374	- 3849	73	28.002	16.827	41831	- 1858
29	17.972	10.858	40397	- 3818	74	28.369	17.068	41908	- 1753
30	18.228	10.998	40420	- 3789	75	28.589	17.204	41981	- 1654
31	18.464	11.142	40442	- 3758	76	28.956	17.411	42066	- 1541
32	18.713	11.286	40464	- 3728	77	29.190	17.555	42147	- 1433
33	18.954	11.426	40488	- 3698	78	29.551	17.780	42241	- 1309
34	19.196	11.578	40511	- 3667	79	29.777	17.923	42330	- 1191
35	19.439	11.722	40535	- 3635	80	30.027	18.067	42410	- 1085
36	19.688	11.870	40559	- 3603	81	30.247	18.182	42490	- 981
37	19.922	12.014	40584	- 3570	82	30.605	18.410	42600	- 838
38	20.171	12.145	40609	- 3536	83	30.841	18.554	42710	- 697
39	20.421	12.306	40635	- 3501	84	31.193	18.770	42843	- 528
40	20.656	12.454	40661	- 3467	85	31.419	18.901	42971	- 366
41	20.906	12.607	40688	- 3430	86	31.684	19.062	43089	- 219
42	21.147	12.742	40715	- 3393	87	31.904	19.185	43208	- 72
43	21.389	12.882	40743	- 3355	88	32.278	19.422	43375	131
44	21.639	13.038	40771	- 3317	89	32.483	19.566	43548	341
45	21.881	13.170	40800	- 3277	90	32.476	19.553	43819	666

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 16

	S11	S12	E11	E12	S11	S12	E11	E12
91	30.900	18.571	43819	686				
92	29.542	17.758	43771	649				
93	28.451	17.098	43730	617				
94	27.446	16.493	43693	587				
95	26.435	15.883	43655	557				
96	25.430	15.278	43618	527				
97	24.425	14.681	43579	496				
98	23.428	14.067	43542	466				
99	22.416	13.474	43503	435				
100	21.419	12.861	43464	404				
101	20.414	12.251	43424	372				
102	19.416	11.654	43386	342				

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 17

	S11	S12	E11	E12	S11	S12	E11	E12
1	23.765	13.474	43544	443				
2	22.489	12.746	43497	405				
3	21.498	12.183	43460	377				
4	20.516	11.616	43424	349				
5	19.541	11.061	43387	320				
6	18.552	10.507	43350	292				
7	17.568	9.948	43313	264				
8	16.593	9.381	43276	235				
9	15.618	8.818	43239	206				
10	14.636	8.268	43202	177				
11	13.661	7.721	43163	148				
12	12.670	7.158	43125	118				
13	11.688	6.595	43086	87				
14	10.699	6.041	43045	55				
15	9.731	5.491	43005	21				
16	8.719	4.919	42959	- 15				
17	7.978	4.487	42927	- 41				
18	7.304	4.123	42897	- 66				
19	6.622	3.725	42867	- 90				
20	5.939	3.349	42837	- 115				
21	5.272	2.972	42807	- 140				
22	4.590	2.591	42776	- 165				
23	3.916	2.206	42745	- 190				
24	3.241	1.820	42714	- 216				
25	2.560	1.448	42683	- 242				
26	1.884	1.063	42651	- 268				
27	1.202	0.677	42619	- 295				
28	0.528	0.292	42586	- 322				
29	- 0.140	- 0.076	42554	- 348				

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 18

	S11	S12	E11	E12
1	-0.256	0.034	42521	-354
2	0.932	0.720	42561	-321
3	1.723	1.168	42589	-300
4	2.515	1.617	42617	-279
5	3.293	2.062	42644	-258
6	4.077	2.510	42673	-237
7	4.869	2.963	42701	-215
8	5.653	3.412	42729	-193
9	6.445	3.865	42757	-172
10	7.223	4.314	42786	-151
11	8.014	4.767	42813	-129
12	8.806	5.207	42842	-107
13	9.590	5.673	42870	-85
14	10.375	6.113	42900	-62
15	11.160	6.557	42930	-38
16	11.953	7.010	42960	-14
17	12.729	7.467	42991	10
18	13.513	7.912	43022	36
19	14.298	8.356	43054	61
20	15.076	8.818	43086	87
21	15.874	9.279	43119	115
22	16.652	9.720	43152	142
23	17.443	10.168	43186	170
24	18.228	10.613	43221	199
25	19.013	11.070	43256	228
26	19.797	11.523	43292	259
27	20.589	11.976	43328	290
28	21.374	12.429	43365	323
29	22.167	12.886	43404	356
30	22.965	13.352	43445	392
31	23.537	13.673	43475	420
32	24.072	13.978	43502	445
33	24.578	14.274	43531	471
34	25.113	14.588	43559	497
35	25.634	14.884	43588	524
36	26.170	15.193	43618	553
37	26.691	15.506	43648	581
38	27.217	15.794	43679	611
39	27.739	16.107	43711	642
40	28.251	16.400	43744	675
41	28.780	16.713	43779	709
42	29.315	17.013	43814	744
43	29.843	17.314	43851	781
44	30.401	17.640	43891	822
45	30.973	17.974	43935	866
46	30.973	17.983	43964	903
47	29.630	17.288	43921	876
48	28.730	16.827	43889	854
49	27.827	16.361	43857	833
50	26.925	15.904	43824	811
51	26.015	15.439	43791	789
52	25.113	14.981	43758	766
53	24.205	14.528	43725	744
54	23.310	14.067	43691	722

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 19

	S11	S12	E11	E12		S11	S12	E11	E12
1	17.745	11.409	43487	594	46	35.123	1.816	44694	-4
2	18.962	10.740	43529	561					
3	19.974	10.211	43564	536					
4	20.986	9.669	43600	510					
5	21.990	9.123	43635	484					
6	23.002	8.593	43670	458					
7	24.013	8.047	43706	432					
8	25.018	7.501	43742	406					
9	26.031	6.972	43778	380					
10	27.036	6.435	43815	353					
11	28.047	5.901	43852	326					
12	29.074	5.359	43888	300					
13	30.086	4.822	43925	273					
14	31.104	4.293	43962	246					
15	32.131	3.751	44000	219					
16	33.150	3.222	44038	191					
17	34.177	2.680	44079	163					
18	35.188	2.146	44120	134					
19	36.209	1.617	44163	105					
20	37.249	1.067	44208	76					
21	38.297	0.521	44257	44					
22	39.089	0.068	44298	21					
23	39.823	-0.288	44335	-2					
24	40.542	-0.665	44376	-25					
25	41.259	-1.054	44418	-48					
26	41.987	-1.431	44465	-72					
27	42.712	-1.812	44515	-96					
28	43.452	-2.214	44573	-123					
29	44.127	-2.557	44635	-148					
30	44.772	-2.908	44697	-173					
31	45.198	-3.112	44754	-191					
32	45.601	-3.323	44806	-208					
33	46.019	-3.535	44864	-227					
34	46.459	-3.768	44930	-247					
35	46.758	-3.924	44997	-265					
36	46.752	-3.929	45082	-280					
37	45.241	-3.179	45051	-245					
38	44.119	-2.629	45013	-219					
39	42.983	-2.070	44973	-192					
40	41.862	-1.520	44933	-165					
41	40.733	-0.965	44893	-138					
42	39.610	-0.411	44853	-111					
43	38.481	0.152	44813	-83					
44	37.359	0.703	44772	-57					
45	36.229	1.266	44733	-29					

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 20

	S11	S12	E11	E12		S11	S12	E11	E12
1	35.358	1.600	44782	13	46	-0.866	-19.422	43123	-1457
2	34.229	0.931	44745	-18	47	-1.313	-19.672	43091	-1495
3	33.378	0.474	44713	-41	48	-1.753	-19.930	43056	-1533
4	32.556	-0.017	44683	-64	49	-2.207	-20.209	43019	-1576
5	31.589	-0.559	44648	-90	50	-2.567	-20.404	42989	-1613
6	30.342	-1.279	44603	-124	51	-2.932	-20.628	42957	-1652
7	29.197	-1.939	44561	-156	52	-3.306	-20.832	42924	-1692
8	28.061	-2.595	44520	-188	53	-3.696	-21.060	42888	-1736
9	26.925	-3.251	44478	-220	54	-4.121	-21.310	42849	-1785
10	25.782	-3.907	44436	-253	55	-4.386	-21.454	42816	-1827
11	24.607	-4.580	44391	-289	56	-4.619	-21.598	42789	-1863
12	23.698	-5.101	44355	-318	57	-4.862	-21.733	42764	-1896
13	22.877	-5.596	44322	-345	58	-5.111	-21.856	42738	-1929
14	22.049	-6.071	44289	-372	59	-5.338	-22.013	42712	-1963
15	21.221	-6.549	44254	-401	60	-5.572	-22.140	42686	-1997
16	20.385	-7.040	44219	-430	61	-5.814	-22.292	42660	-2031
17	19.564	-7.522	44184	-459	62	-6.050	-22.428	42632	-2067
18	18.734	-7.992	44149	-488	63	-6.284	-22.555	42605	-2104
19	17.906	-8.479	44114	-518	64	-6.526	-22.686	42577	-2142
20	17.085	-8.979	44078	-548	65	-6.760	-22.826	42548	-2181
21	16.257	-9.444	44041	-579	66	-7.003	-22.965	42519	-2221
22	15.434	-9.923	44005	-610	67	-7.245	-23.096	42488	-2261
23	14.599	-10.401	43968	-642	68	-7.472	-23.228	42458	-2304
24	13.778	-10.892	43930	-675	69	-7.735	-23.393	42424	-2350
25	12.949	-11.375	43892	-708	70	-8.044	-23.566	42386	-2402
26	12.128	-11.853	43853	-742	71	-8.264	-23.681	42349	-2455
27	11.300	-12.331	43814	-777	72	-8.615	-23.909	42304	-2518
28	10.479	-12.810	43774	-813	73	-8.873	-24.032	42266	-2573
29	9.649	-13.288	43735	-849	74	-9.180	-24.210	42222	-2636
30	8.799	-13.788	43692	-888	75	-9.436	-24.354	42180	-2699
31	8.051	-14.224	43653	-923	76	-9.738	-24.531	42133	-2768
32	7.377	-14.613	43619	-956	77	-9.951	-24.654	42086	-2840
33	6.710	-15.007	43584	-989	78	-10.309	-24.870	42031	-2922
34	6.034	-15.405	43548	-1022	79	-10.545	-24.993	41982	-2999
35	5.361	-15.794	43511	-1057	80	-10.889	-25.192	41924	-3087
36	4.678	-16.205	43474	-1094	81	-11.116	-25.319	41871	-3172
37	4.114	-16.531	43440	-1126	82	-11.468	-25.539	41807	-3272
38	3.506	-16.865	43406	-1160	83	-11.688	-25.658	41748	-3369
39	2.912	-17.217	43372	-1194	84	-12.039	-25.861	41679	-3482
40	2.317	-17.559	43335	-1231	85	-12.268	-25.996	41613	-3594
41	1.723	-17.940	43299	-1268	86	-12.641	-26.195	41535	-3725
42	1.107	-18.266	43260	-1309	87	-12.899	-26.339	41463	-3851
43	0.617	-18.554	43228	-1344	88	-13.191	-26.525	41379	-3999
44	0.095	-18.867	43192	-1381	89	-13.418	-26.648	41289	-4167
45	-0.447	-19.177	43155	-1422	90	-13.785	-26.885	41180	-4370

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 20

	S11	S12	E11	E12	S11	S12	E11	E12
91	-14.012	-26.991	41071	- 4583				
92	-14.373	-27.190	40936	- 4847				
93	-14.593	-27.330	40796	- 5140				
94	-14.951	-27.524	40616	- 5521				
95	-14.981	-27.550	40291	- 6274				
96	-14.123	-27.160	40227	- 6487				
97	-13.749	-26.978	40230	- 6507				
98	-12.935	-26.610	40255	- 6501				
99	-11.842	-26.102	40292	- 6479				
100	-10.824	-25.645	40328	- 6458				
101	- 9.803	-25.179	40364	- 6436				
102	- 8.776	-24.709	40400	- 6413				
103	- 7.758	-24.248	40436	- 6390				
104	- 6.753	-23.761	40472	- 6368				
105	- 5.742	-23.312	40508	- 6345				
106	- 4.715	-22.851	40545	- 6321				
107	- 3.696	-22.385	40582	- 6298				
108	- 2.676	-21.911	40619	- 6274				
109	- 1.680	-21.454	40656	- 6252				

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 21

	S11	S12	E11	E12
1	- 3.410	-22.279	40647	- 6364
2	- 4.495	-21.602	40609	- 6331
3	- 5.381	-21.065	40577	- 6305
4	- 6.261	-20.527	40546	- 6279
5	- 7.150	-19.981	40514	- 6254
6	- 8.044	-19.447	40483	- 6229
7	- 8.917	-18.918	40451	- 6202
8	- 9.810	-18.364	40420	- 6176
9	-10.690	-17.835	40388	- 6150
10	-11.579	-17.297	40356	- 6124
11	-12.472	-16.755	40323	- 6098
12	-13.352	-16.222	40291	- 6071
13	-14.232	-15.693	40260	- 6044
14	-15.128	-15.146	40227	- 6017
15	-16.008	-14.600	40195	- 5990
16	-16.894	-14.075	40162	- 5963
17	-17.774	-13.538	40129	- 5936
18	-18.661	-12.992	40096	- 5908
19	-19.541	-12.467	40061	- 5880
20	-20.428	-11.917	40027	- 5852
21	-21.308	-11.387	39992	- 5823
22	-22.203	-10.841	39956	- 5795
23	-23.083	-10.312	39920	- 5765
24	-23.970	- 9.775	39883	- 5736
25	-24.857	- 9.241	39846	- 5707
26	-25.730	- 8.712	39807	- 5677
27	-26.616	- 8.174	39768	- 5647
28	-27.505	- 7.641	39729	- 5617
29	-28.392	- 7.103	39688	- 5588
30	-29.279	- 6.583	39647	- 5557
31	-30.165	- 6.041	39604	- 5526
32	-31.045	- 5.507	39560	- 5495
33	-31.925	- 4.970	39516	- 5466
34	-31.934	- 4.987	39499	- 5461
35	-30.687	- 5.715	39541	- 5495
36	-29.696	- 6.295	39575	- 5522
37	-28.691	- 6.866	39610	- 5550
38	-27.695	- 7.463	39645	- 5577
39	-26.705	- 8.039	39680	- 5605
40	-25.700	- 8.615	39716	- 5632
41	-24.711	- 9.186	39751	- 5660
42	-23.707	- 9.758	39787	- 5687
43	-22.709	-10.363	39822	- 5715
44	-21.711	-10.922	39857	- 5743
45	-20.714	-11.497	39893	- 5771
46	-19.747	-12.077	39927	- 5798

SPECIMEN NO. : C - 9
PRESTRESS LOADING PATH NO. : 22

	S11	S12	E11	E12
1	-20.398	-12.420	39854	-5817
2	-19.124	-11.616	39897	-5778
3	-18.192	-11.053	39929	-5751
4	-17.341	-10.532	39958	-5726
5	-16.498	-10.012	39988	-5701
6	-15.640	-9.478	40018	-5675
7	-14.797	-8.958	40048	-5649
8	-13.940	-8.437	40078	-5624
9	-13.103	-7.912	40109	-5598
10	-12.253	-7.383	40140	-5572
11	-11.409	-6.862	40171	-5546
12	-10.552	-6.350	40201	-5519
13	-9.715	-5.821	40233	-5492
14	-8.865	-5.309	40264	-5465
15	-8.021	-4.784	40296	-5438
16	-7.186	-4.263	40329	-5408
17	-6.336	-3.738	40363	-5377
18	-5.485	-3.222	40397	-5346
19	-4.649	-2.705	40432	-5314
20	-3.798	-2.180	40467	-5282
21	-2.962	-1.664	40503	-5248
22	-2.111	-1.147	40539	-5213
23	-1.277	-0.614	40575	-5178
24	-0.426	-0.102	40612	-5142
25	0.410	0.415	40649	-5105
26	1.283	0.953	40688	-5066
27	2.052	1.427	40724	-5030
28	2.750	1.858	40756	-4997
29	3.431	2.290	40787	-4963
30	4.129	2.726	40820	-4928
31	4.810	3.150	40853	-4894
32	5.499	3.560	40887	-4858
33	6.204	4.009	40921	-4820
34	6.900	4.428	40957	-4781
35	7.495	4.796	40988	-4747
36	8.103	5.182	41020	-4710
37	8.710	5.546	41053	-4674
38	9.327	5.944	41087	-4635
39	9.921	6.299	41120	-4597
40	9.899	6.295	41134	-4575
41	8.749	5.554	41096	-4607
42	7.728	4.906	41060	-4638
43	6.717	4.271	41025	-4668
44	5.705	3.619	40989	-4699
45	4.692	2.972	40954	-4730
46	3.681	2.341	40918	-4762
47	2.662	1.710	40883	-4793
48	1.651	1.041	40846	-4824
49	0.637	0.411	40811	-4856
50	-0.367	-0.224	40776	-4886

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 1

	S11	S12	E11	E12	S11	S12	E11	E12
1	0.173	0.663	13	49				
2	1.391	1.350	56	79				
3	2.259	1.821	84	100				
4	3.138	2.295	113	121				
5	3.989	2.789	141	142				
6	4.851	3.269	170	164				
7	5.714	3.740	198	185				
8	6.589	4.227	227	206				
9	7.467	4.701	256	228				
10	8.329	5.188	285	249				
11	9.204	5.665	315	272				
12	10.060	6.153	346	295				
13	10.929	6.630	378	319				
14	11.797	7.114	412	345				
15	12.665	7.594	453	376				
16	13.579	8.095	521	429				
17	14.222	8.447	606	499				
18	14.613	8.664	699	579				
19	14.896	8.813	805	671				
20	15.079	8.928	920	773				
21	15.360	9.090	1069	908				
22	15.550	9.192	1251	1073				
23	15.838	9.375	1490	1292				
24	16.034	9.466	1766	1547				
25	16.321	9.628	2092	1850				
26	16.505	9.720	2435	2169				
27	16.780	9.889	2808	2515				
28	16.993	9.994	3181	2860				
29	17.263	10.160	3578	3229				
30	17.372	10.197	3955	3574				
31	17.338	10.207	5368	4866				
32	17.310	10.200	5789	5251				
33	13.079	7.625	5667	5155				
34	11.296	6.569	5607	5110				
35	10.060	5.811	5566	5076				
36	8.830	5.073	5524	5043				
37	7.593	4.329	5482	5011				
38	6.985	3.977	5461	4996				

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 2

	S11	S12	E11	E12	S11	S12	E11	E12
1	6.611	3.689	5443	4973				
2	7.697	4.390	5481	5006				
3	8.572	4.934	5511	5032				
4	9.428	5.489	5541	5057				
5	10.313	6.044	5573	5083				
6	11.175	6.599	5604	5110				
7	12.043	7.155	5637	5136				
8	12.923	7.689	5670	5164				
9	13.773	8.251	5705	5193				
10	14.653	8.799	5742	5223				
11	15.516	9.351	5781	5256				
12	16.435	9.940	5831	5299				
13	17.149	10.410	5899	5360				
14	17.637	10.691	6010	5468				
15	17.918	10.884	6195	5653				
16	18.086	10.975	6431	5884				
17	18.086	10.979	6659	6104				
18	18.074	10.992	6839	6276				
19	18.086	10.975	6987	6418				
20	18.086	10.986	7112	6537				
21	18.074	10.979	7220	6639				
22	18.062	10.999	7316	6731				
23	18.086	11.013	7402	6813				
24	18.079	10.982	7480	6887				
25	18.069	10.999	7551	6955				
26	18.074	10.989	7616	7017				
27	18.057	10.996	7676	7075				
28	18.062	11.002	7733	7128				
29	18.057	10.989	7786	7179				
30	18.027	10.986	8221	7592				
31	14.722	8.799	8128	7511				
32	13.158	7.798	8073	7465				
33	11.998	7.039	8033	7431				
34	10.905	6.322	7994	7397				
35	9.796	5.611	7955	7364				
36	8.721	4.897	7918	7332				

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 3

	S11	S12	E11	E12		S11	S12	E11	E12
1	8.785	5.368	7927	7351	46	-12.796	-8.461	6219	5810
2	7.640	4.640	7885	7318	47	-13.044	-8.603	6168	5761
3	6.807	4.082	7857	7294	48	-13.228	-8.732	6117	5712
4	5.962	3.564	7828	7271	49	-13.406	-8.843	6072	5669
5	5.129	3.043	7800	7248	50	-13.562	-8.958	6026	5625
6	4.301	2.518	7771	7225	51	-13.746	-9.060	5977	5578
7	3.473	1.963	7743	7201	52	-13.969	-9.239	5914	5518
8	2.640	1.428	7715	7178	53	-14.160	-9.341	5850	5456
9	1.794	0.907	7686	7153	54	-14.338	-9.452	5792	5399
10	0.954	0.366	7656	7128	55	-14.596	-9.615	5718	5328
11	0.121	-0.166	7621	7098	56	-14.769	-9.730	5642	5254
12	-0.701	-0.697	7582	7064	57	-14.935	-9.855	5572	5187
13	-1.599	-1.259	7535	7024	58	-15.188	-10.004	5484	5099
14	-2.259	-1.682	7498	6991	59	-15.394	-10.123	5391	5009
15	-2.858	-2.095	7461	6959	60	-15.620	-10.285	5286	4906
16	-3.473	-2.471	7422	6923	61	-15.791	-10.383	5184	4806
17	-4.088	-2.867	7378	6884	62	-16.034	-10.542	5072	4695
18	-4.690	-3.246	7333	6844	63	-16.229	-10.684	4950	4574
19	-5.255	-3.591	7288	6805	64	-16.458	-10.816	4812	4438
20	-5.795	-3.929	7242	6764	65	-16.661	-10.958	4664	4291
21	-6.209	-4.214	7202	6727	66	-16.896	-11.104	4499	4126
22	-6.599	-4.437	7166	6694	67	-17.090	-11.239	4323	3949
23	-6.991	-4.701	7128	6659	68	-17.345	-11.409	4126	3749
24	-7.399	-4.945	7088	6623	69	-17.539	-11.513	3914	3536
25	-7.784	-5.195	7044	6584	70	-17.769	-11.683	3675	3291
26	-8.175	-5.459	6997	6540	71	-17.942	-11.788	3437	3048
27	-8.503	-5.648	6958	6503	72	-18.178	-11.940	3171	2775
28	-8.761	-5.828	6923	6471	73	-18.327	-12.041	2899	2493
29	-9.043	-6.004	6887	6438	74	-18.453	-12.129	2621	2206
30	-9.308	-6.187	6851	6405	75	-18.458	-12.126	2416	1993
31	-9.589	-6.373	6813	6369	76	-18.458	-12.109	2257	1829
32	-9.876	-6.552	6772	6331	77	-18.453	-12.116	2128	1694
33	-10.245	-6.782	6720	6283	78	-18.458	-12.109	2019	1581
34	-10.463	-6.924	6678	6244	79	-18.458	-12.113	1924	1481
35	-10.675	-7.067	6642	6210	80	-18.465	-12.133	1841	1394
36	-10.870	-7.205	6607	6177	81	-18.476	-12.119	1768	1316
37	-11.096	-7.341	6571	6143	82	-18.483	-12.119	1708	1253
38	-11.291	-7.473	6534	6108	83	-18.471	-12.116	1644	1186
39	-11.497	-7.605	6496	6072	84	-18.483	-12.129	1585	1125
40	-11.716	-7.747	6456	6035	85	-18.476	-12.109	1531	1068
41	-11.934	-7.882	6415	5996	86	-18.483	-12.126	1481	1014
42	-12.107	-8.011	6373	5956	87	-18.476	-12.123	1434	964
43	-12.279	-8.126	6335	5920	88	-18.483	-12.113	1388	916
44	-12.447	-8.227	6298	5885	89	-18.483	-12.123	1349	874
45	-12.625	-8.353	6260	5849	90	-18.483	-12.116	1315	837

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 3

	S11	S12	E11	E12	S11	S12	E11	E12
91	-18.488	-12.113	1282	803				
92	-18.500	-12.116	1250	769				
93	-18.483	-12.113	1220	736				
94	-18.493	-12.106	1191	706				
95	-18.493	-12.109	1164	676				
96	-18.500	-12.109	1136	648				
97	-18.510	-12.119	1110	620				
98	-18.505	-12.113	1084	593				
99	-18.493	-12.119	1060	567				
100	-18.510	-12.102	1036	542				
101	-18.517	-12.113	968	470				
102	-18.517	-12.109	903	400				
103	-18.540	-12.113	838	331				
104	-18.523	-12.126	775	263				
105	-18.535	-12.116	719	204				
106	-18.540	-12.116	665	147				
107	-18.557	-12.109	614	93				
108	-18.552	-12.109	566	42				
109	-18.568	-12.109	522	- 5				
110	-18.575	-12.116	479	- 51				
111	-18.568	-12.113	438	- 95				
112	-18.637	-12.123	186	- 362				
113	-17.102	-11.043	227	- 323				
114	-15.900	-10.234	266	- 286				
115	-14.619	- 9.331	307	- 248				
116	-13.555	- 8.610	341	- 216				
117	-12.578	- 7.923	374	- 185				
118	-11.584	- 7.232	406	- 155				
119	-10.583	- 6.552	439	- 124				
120	- 9.583	- 5.862	471	- 94				
121	- 8.612	- 5.168	504	- 63				
122	- 7.600	- 4.484	538	- 31				
123	- 7.082	- 4.122	557	- 14				

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 4

	S11	S12	E11	E12
1	-9.831	-5.232	435	-75
2	-11.106	-6.038	395	-111
3	-12.119	-6.691	362	-140
4	-13.061	-7.300	331	-167
5	-13.998	-7.926	302	-194
6	-14.941	-8.532	271	-221
7	-15.890	-9.141	241	-247
8	-16.849	-9.750	210	-275
9	-17.774	-10.370	176	-305
10	-18.781	-11.006	132	-345
11	-19.655	-11.578	74	-397
12	-20.315	-12.008	-26	-488
13	-20.696	-12.234	-198	-651
14	-20.902	-12.373	-433	-877
15	-21.069	-12.515	-699	-1137
16	-21.270	-12.624	-1030	-1465
17	-21.495	-12.779	-1411	-1849
18	-21.678	-12.894	-1803	-2247
19	-21.886	-13.057	-2221	-2676
20	-22.058	-13.145	-2639	-3106
21	-22.271	-13.263	-3066	-3551
22	-22.437	-13.395	-3470	-3973
23	-22.621	-13.520	-3919	-4443
24	-22.828	-13.676	-4370	-4919
25	-23.017	-13.798	-4790	-5364
26	-23.081	-13.862	-5223	-5820
27	-23.087	-13.839	-5531	-6145
28	-23.093	-13.855	-5762	-6390
29	-23.104	-13.845	-5945	-6584
30	-23.109	-13.839	-6099	-6747
31	-23.104	-13.842	-6216	-6872
32	-23.109	-13.852	-6334	-6997
33	-23.104	-13.845	-6438	-7108
34	-23.109	-13.842	-6532	-7207
35	-23.109	-13.845	-6616	-7297
36	-23.099	-13.842	-6693	-7379
37	-23.121	-13.839	-6764	-7455
38	-23.126	-13.852	-6829	-7525
39	-23.121	-13.845	-6889	-7589
40	-23.121	-13.839	-6938	-7641
41	-23.121	-13.842	-6986	-7692
42	-23.126	-13.849	-7039	-7748
43	-23.133	-13.852	-7087	-7801
44	-23.133	-13.845	-7133	-7850
45	-23.138	-13.849	-7177	-7897
46	-23.138	-13.842	-7217	-7939
47	-23.138	-13.845	-7251	-7976
48	-23.151	-13.842	-7284	-8011
49	-23.126	-13.839	-7316	-8045
50	-23.144	-13.849	-7347	-8078
51	-23.133	-13.849	-7377	-8109
52	-23.144	-13.852	-7405	-8141
53	-23.151	-13.852	-7433	-8171
54	-23.151	-13.849	-7460	-8200
55	-23.144	-13.835	-7487	-8228
56	-23.156	-13.835	-7512	-8256
57	-23.161	-13.842	-7537	-8282
58	-23.156	-13.835	-7561	-8307
59	-23.168	-13.842	-7584	-8333
60	-23.168	-13.835	-7607	-8357
61	-23.161	-13.845	-7629	-8381
62	-23.242	-13.855	-8112	-8896
63	-20.863	-12.380	-8052	-8844
64	-19.598	-11.615	-8014	-8810
65	-18.327	-10.820	-7976	-8775
66	-17.050	-10.048	-7937	-8741
67	-15.786	-9.246	-7897	-8706
68	-14.499	-8.447	-7857	-8671
69	-13.222	-7.672	-7817	-8635
70	-12.642	-7.334	-7799	-8620

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 5

	S11	S12	E11	E12
1	-12.159	-7.408	-7800	-8667
2	-10.912	-6.664	-7761	-8632
3	-10.025	-6.139	-7733	-8608
4	-9.130	-5.615	-7705	-8583
5	-8.232	-5.070	-7676	-8558
6	-7.325	-4.545	-7647	-8533
7	-6.433	-4.014	-7618	-8507
8	-5.565	-3.479	-7588	-8481
9	-4.651	-2.955	-7557	-8454
10	-3.778	-2.437	-7526	-8426
11	-2.880	-1.892	-7493	-8396
12	-1.983	-1.361	-7456	-8362
13	-1.036	-0.806	-7412	-8323
14	-0.300	-0.366	-7375	-8288
15	0.391	0.034	-7340	-8255
16	1.076	0.467	-7303	-8220
17	1.777	0.856	-7264	-8183
18	2.489	1.286	-7221	-8142
19	3.093	1.669	-7181	-8104
20	3.644	1.983	-7145	-8068
21	4.237	2.328	-7105	-8030
22	4.817	2.677	-7063	-7989
23	5.340	2.995	-7024	-7952
24	5.863	3.310	-6982	-7911
25	6.358	3.584	-6942	-7870
26	6.800	3.848	-6904	-7834
27	7.249	4.126	-6864	-7794
28	7.657	4.362	-6825	-7755
29	8.025	4.610	-6790	-7720
30	8.371	4.796	-6754	-7685
31	8.738	5.005	-6718	-7648
32	9.112	5.242	-6678	-7609
33	9.480	5.452	-6638	-7569
34	9.755	5.625	-6601	-7532
35	10.015	5.760	-6570	-7501
36	10.255	5.919	-6539	-7470
37	10.520	6.068	-6508	-7439
38	10.481	6.068	-6434	-7361
39	10.469	6.072	-6425	-7350
40	10.451	6.068	-6414	-7338
41	10.429	6.061	-6409	-7331
42	10.330	6.058	-6395	-7316
43	9.123	5.357	-6434	-7349
44	8.227	4.843	-6463	-7373
45	7.340	4.308	-6491	-7397
46	6.445	3.804	-6520	-7421
47	5.543	3.269	-6548	-7444
48	4.633	2.762	-6577	-7469
49	3.736	2.230	-6605	-7493
50	2.846	1.726	-6634	-7516
51	1.949	1.205	-6663	-7541
52	1.051	0.690	-6692	-7565
53	0.156	0.163	-6721	-7590
54	-0.402	-0.146	-6738	-7604

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 6

	S11	S12	E11	E12
1	0.257	-0.051	-6724	-7623
2	1.351	0.721	-6633	-7588
3	2.335	1.279	-6652	-7563
4	3.322	1.861	-6621	-7538
5	4.301	2.430	-6590	-7511
6	5.283	3.012	-6559	-7486
7	6.260	3.577	-6527	-7459
8	7.266	4.173	-6494	-7432
9	8.245	4.742	-6461	-7404
10	9.215	5.307	-6427	-7375
11	10.210	5.885	-6390	-7343
12	11.205	6.454	-6350	-7307
13	12.246	7.070	-6296	-7256
14	13.022	7.534	-6222	-7184
15	13.520	7.821	-6146	-7109
16	13.872	8.028	-6077	-7041
17	14.103	8.166	-6023	-6987
18	14.296	8.285	-5983	-6947
19	14.561	8.441	-5934	-6899
20	14.774	8.559	-5888	-6855
21	15.039	8.708	-5839	-6805
22	15.258	8.830	-5792	-6758
23	15.459	8.955	-5750	-6717
24	15.659	9.084	-5705	-6672
25	15.838	9.165	-5662	-6628
26	16.108	9.354	-5605	-6572
27	16.314	9.446	-5551	-6518
28	16.517	9.578	-5502	-6469
29	16.740	9.700	-5449	-6416
30	16.919	9.808	-5398	-6365
31	17.194	9.960	-5331	-6299
32	17.390	10.082	-5266	-6234
33	17.598	10.217	-5207	-6175
34	17.769	10.302	-5149	-6117
35	17.982	10.424	-5087	-6056
36	18.155	10.532	-5026	-5995
37	18.367	10.647	-4961	-5930
38	18.575	10.786	-4889	-5858
39	18.758	10.874	-4818	-5788
40	19.028	11.033	-4725	-5694
41	19.234	11.162	-4632	-5602
42	19.430	11.277	-4547	-5517
43	19.621	11.382	-4462	-5432
44	19.834	11.523	-4373	-5344
45	20.040	11.635	-4273	-5243
46	20.223	11.740	-4172	-5143
47	20.501	11.896	-4040	-5011
48	20.712	12.008	-3904	-4876
49	20.994	12.177	-3750	-4722
50	21.190	12.312	-3592	-4565
51	21.391	12.444	-3448	-4421
52	21.574	12.536	-3298	-4273
53	21.770	12.664	-3135	-4111
54	21.943	12.739	-2965	-3942
55	22.156	12.860	-2779	-3758
56	22.323	12.962	-2582	-3563
57	22.437	13.050	-2380	-3363
58	22.437	13.033	-2221	-3207
59	22.449	13.033	-2078	-3068
60	22.442	13.043	-1963	-2954
61	22.442	13.050	-1878	-2870
62	22.449	13.040	-1802	-2796
63	22.449	13.036	-1734	-2728
64	22.442	13.040	-1672	-2667
65	22.442	13.040	-1615	-2611
66	22.449	13.047	-1562	-2559
67	22.442	13.043	-1505	-2502
68	22.437	13.043	-1452	-2450
69	22.442	13.040	-1409	-2407
70	22.442	13.040	-1368	2368
71	22.449	13.040	-1331	-2332
72	22.442	13.043	-1294	-2295
73	22.437	13.040	-1259	-2260
74	22.442	13.040	-1225	-2226
75	22.449	13.043	-192	-2194
76	22.437	13.047	-1161	-2163
77	22.449	13.047	-1130	-2134
78	22.442	13.050	-1101	-2105
79	22.449	13.050	-1073	-2076
80	22.442	13.047	-1045	-2050
81	22.442	13.043	-1018	-2023
82	22.449	13.040	-992	-1997
83	22.437	13.050	-967	-1973
84	22.432	13.043	-943	-1949
85	22.442	13.050	-919	-1925
86	22.442	13.047	-895	-1903
87	22.449	13.060	-872	-1879
88	22.442	13.053	-850	-1857
89	22.449	13.057	-828	-1835
90	22.442	13.070	-803	-1811

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 6

	S11	S12	E11	E12	S11	S12	E11	E12
91	22.442	13.050	-778	-1787				
92	22.449	13.063	-755	-1763				
93	22.442	13.060	-731	-1740				
94	22.442	13.060	-709	-1718				
95	22.449	13.067	-239	-1256				
96	20.139	11.659	-302	-1308				
97	18.919	10.908	-341	-1341				
98	17.689	10.160	-382	-1374				
99	16.453	9.412	-422	-1407				
100	15.233	8.664	-462	-1441				
101	13.986	7.906	-503	-1475				
102	12.774	7.175	-544	-1510				
103	12.107	6.772	-567	-1527				

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 7

	S11	S12	E11	E12	S11	S12	E11	E12
1	12.273	7.266	-545	-1513				
2	13.607	8.014	-501	-1478				
3	14.509	8.539	-471	-1455				
4	15.424	9.043	-441	-1432				
5	16.344	9.574	-411	-1408				
6	17.241	10.079	-380	-1385				
7	18.148	10.600	-350	-1360				
8	19.058	11.124	-317	-1335				
9	19.971	11.635	-285	-1309				
10	20.873	12.150	-251	-1282				
11	21.782	12.671	-210	-1247				
12	22.747	13.219	-138	-1184				
13	23.339	13.551	-17	-1068				
14	23.714	13.764	217	-840				
15	23.904	13.882	546	-519				
16	24.167	14.021	1006	-70				
17	24.375	14.160	1537	442				
18	24.628	14.289	2152	1036				
19	24.817	14.404	2806	1660				
20	25.116	14.553	3536	2354				
21	25.300	14.688	4293	3065				
22	25.553	14.833	5122	3841				
23	25.761	14.945	5969	4624				
24	26.041	15.101	6867	5450				
25	26.105	15.165	7722	6223				
26	26.099	15.131	8325	6763				
27	26.105	15.138	8775	7165				
28	26.099	15.148	9085	7442				
29	26.093	15.155	9360	7686				
30	26.093	15.148	9597	7898				
31	26.105	15.141	10422	8631				
32	26.093	15.152	11322	9426				
33	26.076	15.152	11924	9958				
34	26.054	15.152	12662	10608				
35	21.621	12.536	12537	10516				
36	19.886	11.517	12475	10470				
37	18.661	10.799	12431	10437				
38	17.378	10.031	12385	10402				
39	16.217	9.361	12341	10370				
40	15.689	9.060	12321	10356				
41	15.706	9.063	12321	10355				
42	15.699	9.063	12320	10355				

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 8

	S11	S12	E11	E12
1	16.044	9.639	12330	10370
2	12.412	7.334	12205	10265
3	9.928	5.794	12120	10195
4	7.405	4.224	12030	10125
5	4.898	2.643	11925	10035
6	2.065	0.866	11780	9910
7	- 0.488	- 0.728	11630	9780
8	- 3.052	- 2.325	11455	9625
9	- 5.962	- 4.139	11215	9415
10	- 8.354	- 5.659	10975	9200
11	-10.377	- 6.911	10735	8980
12	-12.119	- 8.014	10480	8750
13	-13.515	- 8.904	10245	8535
14	-14.752	- 9.669	10000	8305
15	-15.781	-10.309	9765	8090
16	-16.666	-10.857	9535	7880
17	-17.395	-11.307	9325	7685
18	-18.074	-11.737	9115	7485
19	-18.741	-12.157	8880	7265
20	-19.264	-12.508	8670	7070
21	-19.730	-12.772	8480	6890
22	-20.230	-13.097	8265	6685
23	-20.357	-13.162	8095	6525
24	-20.357	-13.162	8005	6440
25	-20.362	-13.162	7940	6380
26	-20.350	-13.138	7890	6335
27	-20.350	-13.145	7860	6305
28	-20.357	-13.145	7835	6280
29	-20.357	-13.141	7810	6255
30	-20.350	-13.148	7790	6240
31	-20.362	-13.151	7770	6220
32	-20.362	-13.155	7755	6205
33	-20.350	-13.148	7740	6190
34	-20.362	-13.162	7725	6175
35	-20.367	-13.145	7715	6165
36	-20.362	-13.158	7705	6155
37	-20.379	-13.138	7690	6145
38	-20.367	-13.141	7685	6135
39	-20.374	-13.145	7675	6130
40	-20.379	-13.145	7665	6120
41	-20.367	-13.148	7660	6115
42	-20.379	-13.145	7650	6105
43	-20.414	-13.155	7535	6000
44	-16.976	-10.738	7650	6105
45	-14.194	- 8.772	7745	6195
46	-11.348	- 6.762	7840	6285
47	- 8.969	- 5.110	7925	6360
48	- 8.991	- 5.121	7925	6365
49	-10.572	- 6.116	7875	6320

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 9

	S11	S12	E11	E12
1	-10.945	-5.591	7852	6361
2	-12.112	-6.356	7813	6328
3	-12.945	-6.894	7785	6302
4	-13.798	-7.469	7756	6277
5	-14.643	-8.014	7727	6253
6	-15.493	-8.569	7698	6228
7	-16.321	-9.104	7668	6201
8	-17.177	-9.666	7638	6176
9	-18.017	-10.238	7608	6150
10	-18.855	-10.786	7576	6123
11	-19.700	-11.314	7544	6094
12	-20.558	-11.879	7508	6063
13	-21.465	-12.458	7463	6023
14	-22.196	-12.962	7404	5973
15	-22.754	-13.294	7314	5894
16	-23.099	-13.527	7183	5775
17	-23.287	-13.663	7042	5646
18	-23.478	-13.781	6902	5516
19	-23.649	-13.886	6742	5366
20	-23.857	-14.052	6567	5202
21	-24.018	-14.140	6392	5038
22	-24.237	-14.295	6203	4858
23	-24.420	-14.424	6030	4695
24	-24.621	-14.529	5841	4514
25	-24.812	-14.674	5613	4297
26	-25.000	-14.810	5399	4091
27	-25.151	-14.901	5157	3858
28	-25.369	-15.057	4894	3605
29	-25.588	-15.189	4612	3332
30	-25.766	-15.311	4346	3072
31	-25.967	-15.429	4017	2751
32	-26.157	-15.561	3706	2445
33	-26.324	-15.683	3345	2090
34	-26.530	-15.842	2949	1698
35	-26.686	-15.940	2542	1296
36	-26.916	-16.086	2098	853
37	-27.127	-16.211	1612	366
38	-27.238	-16.299	1176	-70
39	-27.221	-16.292	786	-460
40	-27.231	-16.279	526	-721
41	-27.226	-16.279	283	-965
42	-27.226	-16.268	80	-1169
43	-27.238	-16.285	-94	-1345
44	-27.243	-16.272	-245	-1498
45	-27.249	-16.279	-381	-1635
46	-27.249	-16.282	-486	-1742
47	-27.238	-16.285	-599	-1857
48	-27.249	-16.282	-689	-1948
49	-27.249	-16.289	-785	-2046
50	-27.254	-16.292	-864	-2126
51	-27.261	-16.282	-948	-2212
52	-27.261	-16.302	-1027	-2292
53	-27.261	-16.275	-1102	-2368
54	-27.261	-16.282	-1162	-2430
55	-27.261	-16.279	-1220	-2488
56	-27.266	-16.279	-1276	-2545
57	-27.271	-16.279	-1338	-2608
58	-27.266	-16.279	-1396	-2668
59	-27.266	-16.275	-1452	-2725
60	-27.283	-16.296	-1498	-2772
61	-27.271	-16.279	-1550	-2825
62	-27.278	-16.275	-1592	-2869
63	-27.278	-16.282	-1640	-2917
64	-27.313	-16.289	-2134	-3423
65	-22.730	-13.676	-2017	-3332
66	-20.908	-12.651	-1959	-3286
67	-19.465	-11.835	-1914	-3250
68	-18.223	-11.111	-1873	-3216
69	-17.045	-10.447	-1835	-3185
70	-16.626	-10.238	-1820	-3174

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 10

	S11	S12	E11	E12
1	-16.770	- 9.815	- 1843	- 3145
2	-17.935	-10.525	- 1881	- 3178
3	-18.890	-11.104	- 1912	- 3204
4	-19.844	-11.683	- 1942	- 3230
5	-20.793	-12.265	- 1973	- 3256
6	-21.748	-12.844	- 2004	- 3283
7	-22.702	-13.439	- 2036	- 3311
8	-23.656	-14.001	- 2068	- 3338
9	-24.616	-14.583	- 2101	- 3367
10	-25.553	-15.152	- 2138	- 3399
11	-26.571	-15.757	- 2186	- 3444
12	-27.387	-16.265	- 2255	- 3510
13	-27.967	-16.603	- 2375	- 3632
14	-28.267	-16.790	- 2569	- 3833
15	-28.439	-16.895	- 2843	- 4121
16	-28.691	-17.020	- 3244	- 4545
17	-28.847	-17.128	- 3730	- 5059
18	-29.095	-17.287	- 4286	- 5649
19	-29.266	-17.378	- 4802	- 6198
20	-29.383	-17.436	- 5317	- 6743
21	-29.376	-17.436	- 5704	- 7154
22	-29.388	-17.453	- 6001	- 7471
23	-29.388	-17.470	- 6272	- 7762
24	-29.388	-17.470	- 6491	- 7996
25	-29.398	-17.470	- 6654	- 8171
26	-29.398	-17.470	- 6796	- 8324
27	-29.398	-17.470	- 6922	- 8462
28	-29.405	-17.450	- 7037	- 8585
29	-29.398	-17.453	- 7141	- 8697
30	-29.405	-17.463	- 7238	- 8803
31	-29.405	-17.470	- 7340	- 8913
32	-29.415	-17.466	- 7433	- 9014
33	-29.410	-17.473	- 7508	- 9095
34	-29.410	-17.466	- 7578	- 9172
35	-29.415	-17.480	- 7645	- 9244
36	-29.422	-17.463	- 7707	- 9312
37	-29.405	-17.466	- 7766	- 9377
38	-29.457	-17.466	- 8311	- 9971
39	-27.663	-17.433	- 8296	-10016
40	-26.133	-17.399	- 8249	-10017
41	-24.720	-17.365	- 8206	-10017
42	-24.713	-17.365	- 8207	-10018
43	-24.800	-17.362	- 8216	-10037
44	-26.433	-17.416	- 8269	-10043
45	-27.767	-17.463	- 8314	-10050
46	-29.169	-17.490	- 8379	-10073
47	-29.398	-17.500	- 8725	-10437
48	-24.891	-14.955	- 8617	-10350
49	-22.967	-13.869	- 8559	-10301
50	-21.604	-13.114	- 8519	-10267
51	-20.270	-12.353	- 8478	-10232
52	-18.838	-11.564	- 8434	-10195
53	-18.074	-11.131	- 8410	-10175

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 11

	S11	S12	E11	E12
1	-18.431	-10.925	- 8467	-10155
2	-17.102	-10.204	- 8429	-10122
3	-16.051	- 9.628	- 8397	-10097
4	-14.970	- 9.053	- 8365	-10072
5	-13.924	- 8.474	- 8334	-10047
6	-12.860	- 7.916	- 8302	-10021
7	-11.797	- 7.344	- 8270	- 9995
8	-10.744	- 6.752	- 8238	- 9969
9	- 9.687	- 6.193	- 8205	- 9942
10	- 8.634	- 5.625	- 8171	- 9914
11	- 7.578	- 5.060	- 8133	- 9881
12	- 6.519	- 4.488	- 8092	- 9847
13	- 5.392	- 3.862	- 8045	- 9808
14	- 4.507	- 3.391	- 8006	- 9774
15	- 3.662	- 2.921	- 7969	- 9743
16	- 2.823	- 2.477	- 7932	- 9710
17	- 1.995	- 2.058	- 7893	- 9677
18	- 1.145	- 1.567	- 7853	- 9640
19	- 0.282	- 1.090	- 7809	- 9602
20	0.488	- 0.670	- 7769	- 9565
21	1.202	- 0.278	- 7731	- 9532
22	1.904	0.098	- 7693	- 9498
23	2.628	0.494	- 7654	- 9462
24	3.357	0.897	- 7610	- 9423
25	4.013	1.259	- 7570	- 9387
26	4.599	1.581	- 7534	- 9353
27	5.181	1.902	- 7496	- 9319
28	5.761	2.213	- 7458	- 9284
29	6.353	2.548	- 7419	- 9248
30	6.973	2.887	- 7376	- 9208
31	7.536	3.191	- 7334	- 9168
32	8.054	3.493	- 7294	- 9131
33	8.548	3.750	- 7254	- 9095
34	8.974	3.980	- 7220	- 9063
35	9.405	4.227	- 7185	- 9030
36	9.836	4.474	- 7149	- 8996
37	10.278	4.704	- 7111	- 8960
38	10.687	4.938	- 7074	- 8925
39	10.642	4.941	- 7006	- 8856
40	9.325	4.312	- 7047	- 8884
41	8.319	3.841	- 7077	- 8904
42	7.301	3.361	- 7108	- 8925
43	6.289	2.887	- 7139	- 8947
44	5.283	2.437	- 7170	- 8967
45	4.283	1.943	- 7201	- 8989
46	3.277	1.455	- 7233	- 9011
47	2.266	0.982	- 7265	- 9032
48	1.254	0.504	- 7295	- 9054
49	0.241	0.051	- 7327	- 9075
50	- 0.047	- 0.081	- 7337	- 9082
51	- 0.064	- 0.081	- 7337	- 9082

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 12

	S11	S12	E11	E12		S11	S12	E11	E12
1	0.300	0.322	-7323	-9059	46	31.128	-18.170	-5587	-10192
2	1.524	-0.416	-7280	-9090	47	31.359	-18.316	-5536	-10227
3	2.345	-0.907	-7252	-9109	48	31.537	-18.428	-5484	-10264
4	3.163	-1.418	-7223	-9128	49	31.750	-18.563	-5427	-10306
5	3.961	-1.899	-7195	-9148	50	31.951	-18.695	-5367	-10349
6	4.794	-2.372	-7167	-9167	51	32.159	-18.810	-5300	-10398
7	5.593	-2.863	-7138	-9186	52	32.343	-18.915	-5223	-10456
8	6.421	-3.340	-7111	-9206	53	32.601	-19.067	-5135	-10523
9	7.231	-3.841	-7082	-9225	54	32.784	-19.179	-5051	-10588
10	8.032	-4.322	-7054	-9245	55	33.002	-19.301	-4955	-10663
11	8.859	-4.809	-7025	-9265	56	33.188	-19.426	-4840	-10755
12	9.670	-5.300	-6997	-9285	57	33.434	-19.561	-4706	-10861
13	10.491	-5.794	-6968	-9304	58	33.624	-19.670	-4576	-10966
14	11.291	-6.271	-6939	-9324	59	33.843	-19.802	-4424	-11091
15	12.107	-6.759	-6910	-9343	60	34.033	-19.920	-4253	-11232
16	12.935	-7.253	-6881	-9363	61	34.170	-20.011	-4065	-11386
17	13.740	-7.747	-6853	-9383	62	34.165	-19.995	-3909	-11514
18	14.549	-8.244	-6824	-9403	63	34.170	-19.998	-3784	-11617
19	15.367	-8.715	-6795	-9423	64	34.165	-19.995	-3678	-11703
20	16.183	-9.222	-6765	-9443	65	34.165	-19.984	-3586	-11779
21	17.005	-9.700	-6734	-9464	66	34.170	-20.001	-3505	-11846
22	17.804	-10.204	-6702	-9485	67	34.165	-19.991	-3430	-11908
23	18.632	-10.684	-6669	-9506	68	34.182	-19.981	-3363	-11963
24	19.437	-11.155	-6635	-9528	69	34.165	-19.991	-3300	-12015
25	20.258	-11.652	-6599	-9552	70	34.170	-19.984	-3241	-12064
26	21.069	-12.133	-6561	-9575	71	34.165	-19.984	-3187	-12109
27	21.879	-12.637	-6522	-9601	72	34.170	-19.995	-3135	-12152
28	22.690	-13.121	-6481	-9626	73	34.182	-19.988	-3086	-12192
29	23.495	-13.612	-6436	-9655	74	34.165	-19.981	-3039	-12231
30	24.358	-14.136	-6385	-9685	75	34.170	-20.005	-2994	-12268
31	25.065	-14.546	-6338	-9714	76	34.177	-19.991	-2945	-12309
32	25.719	-14.932	-6292	-9741	77	34.160	-19.995	-2900	-12346
33	26.398	-15.351	-6241	-9773	78	34.177	-19.998	-2861	-12378
34	26.996	-15.700	-6190	-9803	79	34.170	-20.001	-2823	-12409
35	27.536	-16.025	-6140	-9835	80	34.160	-19.984	-2491	-12683
36	28.054	-16.343	-6087	-9866	81	34.170	-19.974	-2440	-12724
37	28.525	-16.620	-6036	-9898	82	34.165	-19.981	-2296	-12844
38	28.944	-16.874	-5985	-9929	83	30.152	-17.676	-2414	-12769
39	29.341	-17.108	-5929	-9965	84	28.451	-16.691	-2475	-12729
40	29.635	-17.304	-5885	-9993	85	27.179	-15.967	-2521	-12700
41	29.933	-17.460	-5835	-10025	86	25.950	-15.263	-2565	-12671
42	30.186	-17.626	-5790	-10055	87	24.713	-14.556	-2609	-12642
43	30.474	-17.791	-5740	-10089	88	23.513	-13.862	-2652	-12614
44	30.727	-17.940	-5684	-10125					
45	30.952	-18.079	-5634	-10159					

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 13

	S11	S12	E11	E12	S11	S12	E11	E12
1	23.920	-13.260	- 2596	-12609				
2	25.139	-13.943	- 2552	-12639				
3	26.014	-14.434	- 2521	-12658				
4	26.875	-14.935	- 2490	-12678				
5	27.749	-15.429	- 2459	-12698				
6	28.612	-15.923	- 2428	-12717				
7	29.492	-16.417	- 2397	-12737				
8	30.359	-16.908	- 2366	-12757				
9	31.239	-17.406	- 2334	-12777				
10	32.100	-17.910	- 2301	-12797				
11	32.963	-18.390	- 2269	-12817				
12	33.843	-18.878	- 2233	-12840				
13	34.717	-19.372	- 2186	-12868				
14	35.625	-19.876	- 2084	-12940				
15	36.131	-20.201	- 1836	-13132				
16	36.418	-20.340	- 1343	-13509				
17	36.636	-20.451	- 675	-14005				
18	36.844	-20.583	- 16	-14492				
19	37.016	-20.648	692	-15011				
20	37.224	-20.783	1485	-15592				
21	37.407	-20.891	2336	-16210				
22	37.407	-20.908	3084	-16743				
23	37.390	-20.891	3670	-17160				
24	37.367	-20.878	6582	-19222				
25	37.390	-20.878	6958	-19486				
26	37.390	-20.891	7138	-19613				
27	37.395	-20.885	7287	-19718				
28	37.385	-20.905	7426	-19816				
29	37.372	-20.874	7562	-19910				
30	37.367	-20.871	9132	-21007				
31	35.912	-20.022	9153	-21022				
32	34.532	-19.209	9102	-20989				
33	33.377	-18.539	9058	-20962				
34	32.278	-17.893	9016	-20936				
35	31.210	-17.270	8974	-20909				
36	30.124	-16.634	8931	-20882				
37	29.031	-15.988	8887	-20855				
38	27.938	-15.355	8845	-20827				
39	26.857	-14.718	8802	-20800				
40	25.771	-14.089	8759	-20774				

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 14

	S11	S12	E11	E12
1	26.064	-13.483	8825	-20779
2	27.335	-14.224	8872	-20809
3	28.146	-14.698	8903	-20828
4	28.974	-15.189	8934	-20848
5	29.779	-15.693	8965	-20867
6	30.595	-16.150	8996	-20887
7	31.423	-16.644	9028	-20906
8	32.239	-17.118	9059	-20926
9	33.061	-17.598	9091	-20945
10	33.872	-18.076	9123	-20965
11	34.688	-18.563	9156	-20985
12	35.511	-19.054	9191	-21006
13	36.337	-19.524	9229	-21029
14	37.182	-20.028	9279	-21060
15	37.883	-20.435	9355	-21108
16	38.384	-20.722	9489	-21195
17	38.671	-20.905	9733	-21357
18	38.872	-21.003	10140	-21627
19	39.073	-21.138	10687	-21990
20	39.281	-21.240	11475	-22507
21	39.316	-21.298	12341	-23068
22	39.333	-21.294	13035	-23514
23	39.309	-21.301	13604	-23878
24	39.304	-21.314	14083	-24186
25	39.304	-21.274	14497	-24451
26	39.309	-21.277	14860	-24685
27	39.304	-21.274	15185	-24894
28	39.316	-21.281	15478	-25082
29	39.309	-21.270	15750	-25257
30	39.292	-21.291	15998	-25416
31	39.304	-21.281	16261	-25585
32	39.299	-21.284	16502	-25740
33	39.286	-21.274	16725	-25883
34	39.292	-21.284	16929	-26015
35	39.286	-21.281	17095	-26121
36	39.286	-21.277	17252	-26222
37	39.286	-21.270	17398	-26315
38	39.286	-21.264	17543	-26408
39	39.281	-21.264	17679	-26496
40	39.286	-21.298	17829	-26592
41	39.286	-21.270	17971	-26682
42	39.286	-21.291	18105	-26769
43	39.286	-21.304	18231	-26850
44	39.264	-21.274	18337	-26918
45	39.264	-21.287	18439	-26984
46	39.269	-21.260	18553	-27057
47	39.224	-21.284	19949	-27951
48	36.820	-19.883	19910	-27929
49	36.780	-19.883	19910	-27930
50	35.654	-19.189	19865	-27902
51	35.620	-19.196	19860	-27901
52	34.470	-18.522	19813	-27872
53	33.578	-18.005	19777	-27852
54	32.658	-17.480	19741	-27830
55	31.785	-16.972	19705	-27807
56	30.900	-16.444	19668	-27786
57	29.990	-15.930	19631	-27763
58	29.100	-15.409	19594	-27741
59	28.783	-15.229	19579	-27733
60	28.783	-15.233	19579	-27733

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 15

	S11	S12	E11	E12
1	28.329	-15.040	19628	-27754
2	27.134	-14.370	19581	-27726
3	26.324	-13.930	19548	-27707
4	25.530	-13.493	19517	-27689
5	24.713	-13.040	19484	-27670
6	23.920	-12.617	19451	-27652
7	23.116	-12.170	19419	-27632
8	22.305	-11.703	19386	-27613
9	21.505	-11.263	19353	-27594
10	20.696	-10.830	19319	-27575
11	19.891	-10.393	19286	-27555
12	19.098	-9.936	19252	-27536
13	18.287	-9.500	19218	-27516
14	17.476	-9.070	19183	-27496
15	16.678	-8.613	19148	-27475
16	15.890	-8.177	19112	-27454
17	15.074	-7.740	19074	-27432
18	14.286	-7.286	19038	-27411
19	13.475	-6.853	19000	-27388
20	12.670	-6.407	18962	-27366
21	11.871	-5.977	18923	-27343
22	11.056	-5.537	18883	-27320
23	10.268	-5.090	18845	-27297
24	9.462	-4.650	18805	-27273
25	8.659	-4.210	18765	-27250
26	7.853	-3.780	18723	-27225
27	7.055	-3.320	18682	-27201
28	6.237	-2.890	18640	-27177
29	5.444	-2.474	18598	-27153
30	4.645	-1.997	18555	-27125
31	3.840	-1.564	18511	-27099
32	3.041	-1.117	18467	-27073
33	2.236	-0.684	18422	-27046
34	1.432	-0.237	18376	-27018
35	0.632	0.213	18329	-26990
36	-0.218	0.663	18278	-26960
37	-0.909	1.039	18236	-26934
38	-1.547	1.398	18195	-26910
39	-2.179	1.740	18155	-26885
40	-2.834	2.085	18114	-26861
41	-3.478	2.430	18073	-26835
42	-4.105	2.772	18030	-26809
43	-4.749	3.131	17986	-26783
44	-5.381	3.472	17941	-26755
45	-6.031	3.828	17896	-26727

	S11	S12	E11	E12
46	-6.668	4.180	17849	-26698
47	-7.347	4.532	17799	-26667
48	-7.950	4.884	17749	-26637
49	-8.508	5.168	17705	-26609
50	-9.060	5.473	17660	-26581
51	-9.623	5.774	17614	-26552
52	-10.204	6.088	17563	-26521
53	-10.709	6.393	17516	-26491
54	-10.744	6.373	17450	-26450
55	-9.589	5.662	17496	-26478
56	-8.790	5.185	17527	-26498
57	-7.992	4.704	17557	-26517
58	-7.191	4.224	17589	-26536
59	-6.403	3.750	17620	-26555
60	-5.610	3.266	17651	-26575
61	-4.817	2.765	17683	-26595
62	-4.013	2.308	17715	-26614
63	-3.220	1.828	17746	-26634
64	-2.432	1.354	17778	-26655
65	-1.644	0.866	17810	-26674
66	-0.840	0.383	17843	-26695
67	-0.052	-0.085	17874	-26714

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 16

	S11	S12	E11	E12		S11	S12	E11	E12
1	- 0.161	0.186	17911	-26721	46	-22.839	13.053	15927	-25442
2	- 1.391	0.900	17864	-26692	47	-23.069	13.179	15877	-25410
3	- 2.345	1.432	17828	-26669	48	-23.242	13.277	15836	-25382
4	- 3.294	1.980	17790	-26646	49	-23.414	13.378	15794	-25354
5	- 4.244	2.508	17751	-26624	50	-23.582	13.487	15752	-25326
6	- 5.196	3.056	17714	-26601	51	-23.765	13.568	15711	-25299
7	- 6.145	3.604	17675	-26577	52	-23.949	13.673	15670	-25271
8	- 7.094	4.132	17636	-26554	53	-24.122	13.774	15629	-25243
9	- 8.049	4.674	17597	-26530	54	-24.289	13.872	15587	-25216
10	- 8.996	5.225	17559	-26506	55	-24.472	13.974	15545	-25187
11	- 9.933	5.757	17518	-26482	56	-24.651	14.082	15502	-25158
12	-10.882	6.295	17477	-26456	57	-24.829	14.177	15458	-25129
13	-11.825	6.830	17433	-26429	58	-24.990	14.285	15414	-25099
14	-12.843	7.415	17373	-26392	59	-25.186	14.366	15369	-25069
15	-13.636	7.862	17306	-26349	60	-25.380	14.488	15321	-25036
16	-14.199	8.177	17245	-26309	61	-25.588	14.607	15270	-25002
17	-14.653	8.437	17194	-26276	62	-25.789	14.701	15219	-24967
18	-15.067	8.677	17146	-26244	63	-26.071	14.864	15150	-24921
19	-15.419	8.870	17104	-26216	64	-26.284	14.989	15083	-24876
20	-15.786	9.080	17060	-26188	65	-26.490	15.118	15023	-24835
21	-16.160	9.293	17014	-26158	66	-26.668	15.219	14965	-24795
22	-16.482	9.486	16969	-26129	67	-26.892	15.341	14903	-24753
23	-16.787	9.656	16930	-26104	68	-27.077	15.463	14841	-24711
24	-17.075	9.811	16891	-26079	69	-27.380	15.622	14761	-24656
25	-17.367	9.974	16852	-26053	70	-27.583	15.747	14684	-24604
26	-17.672	10.139	16812	-26027	71	-27.794	15.849	14615	-24556
27	-17.960	10.305	16771	-26000	72	-27.973	15.974	14547	-24510
28	-18.264	10.468	16730	-25973	73	-28.198	16.082	14476	-24461
29	-18.545	10.627	16687	-25945	74	-28.376	16.187	14407	-24413
30	-18.845	10.816	16644	-25916	75	-28.587	16.302	14333	-24363
31	-19.137	10.972	16599	-25888	76	-28.766	16.404	14261	-24313
32	-19.430	11.134	16554	-25857	77	-28.991	16.536	14186	-24261
33	-19.730	11.287	16508	-25827	78	-29.209	16.658	14103	-24204
34	-20.052	11.466	16457	-25795	79	-29.405	16.759	14023	-24149
35	-20.374	11.669	16405	-25760	80	-29.611	16.898	13940	-24091
36	-20.615	11.784	16355	-25726	81	-29.802	16.999	13856	-24033
37	-20.838	11.920	16312	-25698	82	-30.082	17.158	13750	-23959
38	-21.058	12.035	16271	-25671	83	-30.307	17.287	13643	-23885
39	-21.277	12.170	16229	-25644	84	-30.600	17.453	13526	-23803
40	-21.505	12.299	16189	-25616	85	-30.808	17.582	13411	-23724
41	-21.718	12.414	16145	-25588	86	-31.037	17.707	13311	-23653
42	-21.943	12.539	16104	-25560	87	-31.215	17.812	13210	-23581
43	-22.167	12.678	16060	-25531	88	-31.503	17.967	13081	-23491
44	-22.397	12.793	16016	-25503	89	-31.716	18.089	12954	-23403
45	-22.621	12.935	15971	-25473	90	-31.929	18.225	12841	-23322

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 16

	S11	S12	E11	E12	S11	S12	E11	E12
91	-32.117	18.323	12727	-23242				
92	-32.412	18.495	12581	-23139				
93	-32.630	18.617	12438	-23038				
94	-32.675	18.651	12331	-22961				
95	-32.675	18.634	12252	-22906				
96	-32.687	18.644	12185	-22857				
97	-32.687	18.634	12131	-22820				
98	-32.692	18.651	12096	-22794				
99	-32.687	18.644	12062	-22771				
100	-32.692	18.654	12034	-22750				
101	-32.692	18.651	12006	-22731				
102	-32.705	18.644	11981	-22712				
103	-32.699	18.641	11959	-22697				
104	-32.705	18.641	11937	-22681				
105	-32.705	18.644	11916	-22666				
106	-32.710	18.648	11895	-22652				
107	-32.744	18.637	11752	-22551				
108	-31.232	17.744	11801	-22582				
109	-30.176	17.081	11841	-22608				
110	-29.118	16.465	11881	-22633				
111	-28.077	15.852	11922	-22659				
112	-27.013	15.216	11963	-22684				
113	-25.955	14.586	12004	-22711				
114	-24.909	13.967	12045	-22737				
115	-23.857	13.348	12086	-22763				
116	-22.811	12.728	12128	-22790				
117	-22.127	12.326	12155	-22806				

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 17

	S11	S12	E11	E12
1	-22.283	12.607	12167	-22800
2	-23.495	13.324	12120	-22770
3	-24.341	13.822	12089	-22749
4	-25.179	14.333	12056	-22723
5	-26.036	14.837	12023	-22706
6	-26.864	15.317	11990	-22685
7	-27.702	15.828	11957	-22664
8	-28.537	16.323	11924	-22642
9	-29.388	16.837	11891	-22620
10	-30.209	17.334	11856	-22597
11	-31.054	17.839	11821	-22574
12	-31.894	18.329	11783	-22548
13	-32.784	18.864	11731	-22512
14	-33.550	19.328	11648	-22450
15	-34.050	19.632	11518	-22352
16	-34.314	19.788	11352	-22227
17	-34.527	19.927	11166	-22087
18	-34.740	20.028	10988	-21953
19	-34.923	20.143	10799	-21812
20	-35.199	20.313	10555	-21627
21	-35.401	20.458	10306	-21442
22	-35.630	20.553	10086	-21276
23	-35.791	20.671	9862	-21108
24	-36.084	20.851	9582	-20897
25	-36.304	20.946	9299	-20683
26	-36.515	21.074	9049	-20494
27	-36.700	21.213	8795	-20300
28	-36.981	21.362	8472	-20053
29	-37.189	21.477	8144	-19803
30	-37.407	21.609	7851	-19578
31	-37.591	21.731	7552	-19349
32	-37.878	21.910	7170	-19053
33	-38.069	22.005	6781	-18753
34	-38.287	22.130	6433	-18482
35	-38.465	22.259	6074	-18202
36	-38.493	22.255	5058	-17411
37	-38.505	22.269	4572	-17030
38	-38.510	22.259	4321	-16834
39	-38.540	22.238	3848	-16463
40	-35.699	20.587	3926	-16512
41	-34.073	19.629	3985	-16551
42	-32.843	18.939	4031	-16580
43	-31.676	18.255	4075	-16608
44	-30.520	17.585	4118	-16636
45	-29.358	16.932	4161	-16665
46	-28.208	16.258	4205	-16693
47	-27.893	16.079	4217	-16700
48	-27.893	16.082	4218	-16701

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 18

	S11	S12	E11	E12
1	-27.531	16.258	4230	-16688
2	-28.807	16.986	4183	-16658
3	-29.658	17.460	4151	-16639
4	-30.520	17.940	4119	-16617
5	-31.371	18.424	4087	-16596
6	-32.233	18.915	4055	-16576
7	-33.079	19.409	4022	-16554
8	-33.934	19.886	3989	-16533
9	-34.780	20.377	3956	-16511
10	-35.647	20.858	3923	-16489
11	-36.487	21.348	3887	-16465
12	-37.355	21.849	3846	-16438
13	-38.252	22.367	3785	-16393
14	-38.885	22.705	3694	-16322
15	-39.321	22.959	3530	-16189
16	-39.546	23.074	3286	-15987
17	-39.792	23.223	2950	-15711
18	-39.983	23.328	2445	-15295
19	-40.196	23.447	1938	-14876
20	-40.402	23.568	1360	-14400
21	-40.620	23.677	737	-13887
22	-40.793	23.826	134	-13388
23	-41.081	23.981	- 612	-12768
24	-41.292	24.100	- 1351	-12153
25	-41.500	24.188	- 2001	-11608
26	-41.552	24.215	- 2601	-11108
27	-41.535	24.225	- 3051	-10732
28	-41.547	24.232	- 3410	-10432
29	-41.557	24.238	- 3744	-10151
30	-41.547	24.215	- 4022	- 9917
31	-41.547	24.228	- 4259	- 9717
32	-41.562	24.222	- 4467	- 9541
33	-41.557	24.232	- 4651	- 9384
34	-41.562	24.222	- 4816	- 9245
35	-41.557	24.238	- 4944	- 9137
36	-41.557	24.238	- 5065	- 9034
37	-41.574	24.232	- 5182	- 8936
38	-41.574	24.215	- 5289	- 8845
39	-41.574	24.225	- 5405	- 8746
40	-41.580	24.222	- 5513	- 8654
41	-41.587	24.232	- 5616	- 8567
42	-41.574	24.242	- 5712	- 8484
43	-41.587	24.225	- 5805	- 8406
44	-41.621	24.228	- 6646	- 7690
45	-38.862	22.563	- 6601	- 7716
46	-37.417	21.707	- 6552	- 7751
47	-36.170	20.973	- 6509	- 7782
48	-34.998	20.275	- 6468	- 7811
49	-33.843	19.582	- 6427	- 7840
50	-32.670	18.888	- 6386	- 7870
51	-31.503	18.187	- 6343	- 7900
52	-31.083	17.950	- 6328	- 7910

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 19

	S11	S12	E11	E12
1	-30.732	18.120	-6348	-7898
2	-29.209	17.274	-6296	-7933
3	-27.876	16.532	-6250	-7963
4	-26.438	15.747	-6201	-7994
5	-25.208	15.074	-6158	-8023
6	-24.063	14.431	-6118	-8048
7	-22.915	13.815	-6078	-8074
8	-21.770	13.185	-6037	-8100
9	-20.620	12.556	-5996	-8126
10	-19.472	11.937	-5954	-8153
11	-18.315	11.317	-5912	-8180
12	-17.166	10.691	-5868	-8208
13	-16.021	10.055	-5823	-8237
14	-14.809	9.392	-5774	-8268
15	-13.723	8.816	-5730	-8296
16	-12.710	8.271	-5689	-8324
17	-11.710	7.733	-5647	-8351
18	-10.709	7.185	-5605	-8379
19	-9.710	6.633	-5563	-8406
20	-8.709	6.095	-5520	-8434
21	-7.704	5.561	-5477	-8463
22	-6.686	5.022	-5433	-8492
23	-5.686	4.494	-5388	-8521
24	-4.685	3.946	-5343	-8551
25	-3.686	3.422	-5298	-8582
26	-2.685	2.867	-5252	-8612
27	-1.633	2.301	-5202	-8645
28	-0.707	1.801	-5158	-8675
29	0.121	1.340	-5118	-8703
30	0.966	0.883	-5076	-8731
31	1.817	0.427	-5034	-8759
32	2.655	-0.031	-4992	-8789
33	3.500	-0.484	-4947	-8818
34	4.341	-0.948	-4903	-8849
35	5.174	-1.398	-4857	-8881
36	6.048	-1.875	-4809	-8914
37	6.842	-2.315	-4762	-8946
38	7.566	-2.708	-4721	-8975
39	8.272	-3.104	-4678	-9005
40	8.986	-3.472	-4635	-9035
41	9.698	-3.868	-4590	-9067
42	10.439	-4.274	-4543	-9099
43	10.422	-4.261	-4528	-9111
44	10.359	-4.264	-4498	-9137
45	11.676	-4.769	-4450	-9160
46	12.447	-5.063	-4413	-9179
47	12.417	-5.066	-4383	-9203
48	11.014	-4.484	-4430	-9180
49	10.015	-4.071	-4465	-9163
50	9.014	-3.662	-4499	-9147
51	7.997	-3.249	-4534	-9130
52	6.991	-2.836	-4568	-9113
53	5.979	-2.450	-4603	-9098
54	4.968	-2.007	-4638	-9080
55	3.961	-1.587	-4673	-9062
56	2.950	-1.185	-4708	-9045
57	1.955	-0.772	-4744	-9028
58	0.942	-0.362	-4779	-9011
59	-0.069	0.051	-4815	-8995
60	-0.081	0.051	-4816	-8993

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 20

	S11	S12	E11	E12		S11	S12	E11	E12
1	0.047	- 0.054	- 4772	- 9006	46	41.173	- 0.058	- 2529	- 9326
2	1.633	- 0.061	- 4720	- 9006	47	41.632	- 0.058	- 2470	- 9341
3	2.782	- 0.061	- 4681	- 9005	48	42.040	- 0.051	- 2419	- 9354
4	3.949	- 0.047	- 4643	- 9004	49	42.459	- 0.051	- 2368	- 9367
5	5.104	- 0.047	- 4605	- 9004	50	42.873	- 0.061	- 2316	- 9380
6	6.267	- 0.064	- 4566	- 9004	51	43.293	- 0.058	- 2262	- 9393
7	7.434	- 0.047	- 4527	- 9003	52	43.701	- 0.051	- 2208	- 9406
8	8.582	- 0.047	- 4489	- 9003	53	44.115	- 0.051	- 2150	- 9421
9	9.745	- 0.068	- 4449	- 9004	54	44.455	- 0.058	- 2099	- 9434
10	10.895	- 0.064	- 4410	- 9003	55	44.812	- 0.054	- 2047	- 9447
11	12.072	- 0.054	- 4370	- 9002	56	45.167	- 0.061	- 1992	- 9459
12	13.216	- 0.047	- 4331	- 9002	57	45.523	- 0.058	- 1939	- 9472
13	14.383	- 0.047	- 4291	- 9001	58	45.892	- 0.071	- 1883	- 9486
14	15.528	- 0.064	- 4251	- 9002	59	46.254	- 0.051	- 1824	- 9500
15	16.688	- 0.054	- 4211	- 9002	60	46.535	- 0.051	- 1773	- 9511
16	17.844	- 0.051	- 4169	- 9002	61	46.829	- 0.054	- 1719	- 9525
17	18.994	- 0.054	- 4124	- 9003	62	47.122	- 0.051	- 1666	- 9537
18	20.156	- 0.054	- 4077	- 9005	63	47.422	- 0.058	- 1613	- 9549
19	21.311	- 0.054	- 4026	- 9009	64	47.715	- 0.058	- 1559	- 9561
20	22.472	- 0.058	- 3971	- 9013	65	48.007	- 0.061	- 1503	- 9574
21	23.696	- 0.054	- 3910	- 9020	66	48.307	- 0.058	- 1445	- 9587
22	24.638	- 0.051	- 3858	- 9027	67	48.617	- 0.054	- 1386	- 9600
23	25.541	- 0.058	- 3807	- 9035	68	48.899	- 0.061	- 1325	- 9613
24	26.421	- 0.058	- 3756	- 9042	69	49.152	- 0.058	- 1266	- 9625
25	27.318	- 0.054	- 3702	- 9051	70	49.542	- 0.051	- 1191	- 9641
26	28.198	- 0.054	- 3647	- 9061	71	49.819	- 0.058	- 1117	- 9657
27	29.078	- 0.061	- 3589	- 9072	72	50.221	- 0.051	- 1036	- 9673
28	30.008	- 0.058	- 3526	- 9085	73	50.422	- 0.054	- 961	- 9688
29	30.796	- 0.047	- 3468	- 9098	74	50.410	- 0.054	- 916	- 9699
30	31.532	- 0.058	- 3415	- 9110	75	50.417	- 0.051	- 881	- 9707
31	32.251	- 0.051	- 3362	- 9121	76	50.410	- 0.061	- 851	- 9715
32	32.975	- 0.061	- 3307	- 9134	77	50.417	- 0.061	- 823	- 9721
33	33.721	- 0.061	- 3248	- 9147	78	50.399	- 0.054	- 799	- 9727
34	34.405	- 0.058	- 3190	- 9162	79	50.399	- 0.058	- 778	- 9732
35	35.027	- 0.058	- 3138	- 9174	80	50.399	- 0.061	- 756	- 9737
36	35.637	- 0.054	- 3085	- 9187	81	50.399	- 0.061	- 742	- 9740
37	36.269	- 0.064	- 3031	- 9200	82	50.392	- 0.058	- 732	- 9743
38	36.855	- 0.051	- 2976	- 9214	83	50.387	- 0.064	- 721	- 9746
39	37.499	- 0.054	- 2916	- 9228	84	50.377	- 0.058	- 710	- 9748
40	38.069	- 0.058	- 2857	- 9243	85	50.335	- 0.058	- 618	- 9769
41	38.585	- 0.054	- 2805	- 9256	86	48.374	- 0.058	- 679	- 9771
42	39.091	- 0.054	- 2753	- 9270	87	46.984	- 0.061	- 725	- 9772
43	39.614	- 0.047	- 2700	- 9283	88	45.563	- 0.061	- 772	- 9773
44	40.132	- 0.058	- 2646	- 9296	89	44.179	- 0.058	- 819	- 9773
45	40.667	- 0.061	- 2588	- 9311	90	42.794	- 0.061	- 866	- 9774

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 21

	S11	S12	E11	E12
1	39.666	0.234	-852	-9795
2	37.993	0.254	-906	-9794
3	36.648	0.271	-950	-9794
4	35.412	0.284	-991	-9793
5	34.205	0.298	-1032	-9793
6	32.970	0.311	-1073	-9793
7	31.762	0.318	-1115	-9793
8	30.543	0.315	-1156	-9793
9	29.313	0.315	-1197	-9793
10	28.106	0.315	-1240	-9793
11	26.869	0.315	-1282	-9793
12	25.645	0.315	-1323	-9793
13	24.420	0.318	-1366	-9792
14	23.203	0.315	-1408	-9792
15	21.978	0.315	-1451	-9792
16	20.759	0.311	-1493	-9792
17	19.539	0.315	-1536	-9792
18	18.327	0.318	-1579	-9791
19	17.102	0.315	-1623	-9791
20	15.878	0.318	-1667	-9791
21	14.631	0.311	-1712	-9791
22	13.423	0.315	-1757	-9790
23	12.204	0.315	-1802	-9789
24	10.992	0.318	-1848	-9788
25	9.755	0.315	-1893	-9787
26	8.537	0.315	-1940	-9787
27	7.318	0.315	-1986	-9786
28	6.111	0.315	-2032	-9785
29	4.869	0.315	-2079	-9784
30	3.656	0.315	-2126	-9783
31	2.427	0.315	-2174	-9782
32	1.195	0.315	-2221	-9781
33	0.074	0.318	-2269	-9780
34	-1.242	0.318	-2317	-9779
35	-2.444	0.318	-2366	-9778
36	-3.674	0.315	-2414	-9777
37	-4.886	0.315	-2463	-9776
38	-6.118	0.315	-2513	-9775
39	-7.330	0.318	-2563	-9773
40	-8.582	0.315	-2614	-9771
41	-9.784	0.311	-2665	-9770
42	-10.543	0.315	-2700	-9768
43	-10.566	0.315	-2714	-9766
44	-8.974	0.318	-2662	-9765
45	-7.687	0.315	-2620	-9765
46	-6.376	0.315	-2577	-9764
47	-5.099	0.315	-2535	-9764
48	-3.788	0.315	-2492	-9763
49	-2.479	0.315	-2449	-9763
50	-1.178	0.315	-2406	-9762
51	-0.057	0.315	-2370	-9762

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 22

	S11	S12	E11	E12		S11	S12	E11	E12
1	0.092	-0.051	-2370	-9751	46	51.026	-0.020	-459	-9769
2	1.817	-0.047	-2314	-9750	47	51.899	-0.017	-399	-9773
3	2.920	-0.051	-2278	-9749	48	52.762	-0.017	-329	-9780
4	4.036	-0.051	-2242	-9749	49	53.441	-0.017	-239	-9789
5	5.151	-0.051	-2205	-9748	50	53.969	-0.017	-143	-9800
6	6.279	-0.047	-2169	-9748	51	54.556	-0.014	-8	-9813
7	7.405	-0.044	-2132	-9747	52	55.039	-0.014	163	-9832
8	8.520	-0.041	-2095	-9747	53	55.649	-0.010	395	-9858
9	9.635	-0.041	-2059	-9747	54	56.155	-0.010	670	-9887
10	10.751	-0.044	-2021	-9746	55	56.752	-0.017	1011	-9923
11	11.866	-0.041	-1984	-9746	56	57.236	-0.010	1424	-9964
12	12.982	-0.044	-1946	-9746	57	57.913	-0.014	1934	-10009
13	14.108	-0.041	-1907	-9745	58	58.408	-0.014	2498	-10055
14	15.223	-0.034	-1869	-9744	59	58.696	0.000	3090	-10097
15	16.338	-0.037	-1831	-9744	60	58.684	-0.010	3443	-10122
16	17.454	-0.034	-1792	-9744	61	58.684	-0.010	3709	-10138
17	18.569	-0.034	-1754	-9744	62	58.684	-0.010	3954	-10153
18	19.695	-0.044	-1715	-9744	63	58.671	0.000	4153	-10165
19	20.798	-0.041	-1675	-9744	64	58.671	0.000	4302	-10173
20	21.926	-0.041	-1636	-9744	65	58.696	0.000	4435	-10180
21	23.052	-0.034	-1596	-9743	66	58.684	-0.007	4575	-10187
22	24.167	-0.031	-1556	-9743	67	58.684	-0.003	4700	-10193
23	25.295	-0.031	-1515	-9744	68	58.684	0.000	4814	-10199
24	26.410	-0.031	-1474	-9743	69	58.684	-0.003	4919	-10204
25	27.526	-0.037	-1433	-9744	70	58.684	-0.007	5017	-10208
26	28.641	-0.034	-1392	-9744	71	58.684	-0.003	5108	-10212
27	29.757	-0.034	-1350	-9744	72	58.684	0.000	5181	-10215
28	30.870	-0.034	-1308	-9745	73	58.671	0.000	5661	-10235
29	31.986	-0.027	-1266	-9745	74	51.073	0.007	5454	-10240
30	33.101	-0.034	-1223	-9746	75	48.059	0.007	5349	-10241
31	34.217	-0.027	-1180	-9746	76	45.898	0.007	5273	-10242
32	35.355	-0.027	-1137	-9747	77	44.576	0.007	5227	-10242
33	36.460	-0.031	-1093	-9748					
34	37.586	-0.024	-1049	-9748					
35	38.689	-0.024	-1005	-9749					
36	39.816	-0.024	-960	-9750					
37	40.920	-0.024	-914	-9751					
38	42.035	-0.027	-869	-9752					
39	43.163	-0.024	-823	-9754					
40	44.289	-0.020	-775	-9755					
41	45.404	-0.014	-727	-9756					
42	46.530	-0.020	-678	-9759					
43	47.635	-0.024	-628	-9760					
44	48.761	-0.017	-576	-9762					
45	49.876	-0.017	-521	-9765					

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 23

	S11	S12	E11	E12	S11	S12	E11	E12
1	44.898	0.318	5347	-10225				
2	46.542	0.318	5404	-10225				
3	47.670	0.315	5442	-10224				
4	48.773	0.315	5480	-10223				
5	49.876	0.322	5518	-10222				
6	50.992	0.322	5556	-10221				
7	52.119	0.322	5596	-10221				
8	53.222	0.315	5635	-10220				
9	54.338	0.322	5675	-10220				
10	55.453	0.322	5716	-10219				
11	56.591	0.322	5760	-10219				
12	57.695	0.322	5812	-10219				
13	58.833	0.325	5903	-10220				
14	59.524	0.332	6054	-10219				
15	60.040	0.311	6306	-10219				
16	60.649	0.325	6877	-10218				
17	61.143	0.325	8101	-10227				
18	61.869	0.335	10141	-10243				
19	61.857	0.318	11822	-10253				
20	61.834	0.318	13045	-10257				
21	61.812	0.325	17433	-10251				
22	61.822	0.328	18122	-10247				
23	61.834	0.328	18464	-10245				
24	61.822	0.328	18779	-10243				
25	61.822	0.328	19072	-10241				
26	61.777	0.328	20935	-10228				
27	60.535	0.328	21059	-10228				
28	59.281	0.332	21027	-10229				
29	57.764	0.335	20975	-10229				
30	56.396	0.335	20927	-10230				
31	55.039	0.335	20878	-10231				
32	53.681	0.335	20829	-10232				
33	52.303	0.332	20778	-10233				
34	50.947	0.332	20727	-10234				
35	49.566	0.328	20677	-10235				
36	48.210	0.345	20626	-10234				
37	48.037	0.342	20618	-10234				
38	48.037	0.332	20616	-10235				

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 24

	S11	S12	E11	E12		S11	S12	E11	E12
1	48.393	0.677	20754	-10185	46	2.414	0.690	18847	-10195
2	46.750	0.684	20695	-10186	47	1.438	0.687	18796	-10195
3	45.737	0.677	20659	-10187	48	0.414	0.684	18744	-10196
4	44.737	0.677	20623	-10187	49	-0.575	0.687	18693	-10196
5	43.736	0.680	20587	-10187	50	-1.599	0.687	18640	-10196
6	42.724	0.684	20550	-10188	51	-2.588	0.690	18586	-10196
7	41.701	0.680	20513	-10189	52	-3.587	0.690	18532	-10196
8	40.689	0.677	20477	-10189	53	-4.611	0.687	18477	-10196
9	39.690	0.684	20440	-10189	54	-5.610	0.684	18420	-10195
10	38.678	0.680	20402	-10190	55	-6.599	0.687	18363	-10196
11	37.667	0.684	20365	-10190	56	-7.635	0.687	18301	-10196
12	36.666	0.684	20328	-10190	57	-8.520	0.690	18246	-10195
13	35.665	0.680	20290	-10190	58	-9.313	0.690	18197	-10195
14	34.653	0.680	20252	-10191	59	-10.107	0.690	18148	-10195
15	33.642	0.680	20214	-10191	60	-10.912	0.687	18098	-10195
16	32.630	0.684	20176	-10192	61	-11.716	0.690	18047	-10195
17	31.606	0.684	20137	-10192	62	-12.498	0.694	17995	-10195
18	30.595	0.687	20097	-10192	63	-13.302	0.690	17941	-10195
19	29.596	0.680	20057	-10192	64	-14.095	0.690	17887	-10195
20	28.607	0.684	20017	-10192	65	-14.878	0.690	17830	-10195
21	27.583	0.684	19976	-10193	66	-15.717	0.687	17771	-10195
22	26.571	0.684	19934	-10192	67	-16.349	0.687	17720	-10195
23	25.570	0.684	19892	-10193	68	-16.924	0.694	17675	-10194
24	24.559	0.680	19850	-10193	69	-17.523	0.690	17630	-10195
25	23.559	0.680	19807	-10193	70	-18.096	0.690	17584	-10195
26	22.558	0.687	19765	-10193	71	-18.684	0.690	17539	-10195
27	21.535	0.684	19721	-10193	72	-19.271	0.690	17491	-10195
28	20.535	0.684	19679	-10194	73	-19.844	0.690	17444	-10195
29	19.524	0.687	19635	-10194	74	-20.419	0.694	17395	-10195
30	18.523	0.680	19591	-10194	75	-21.006	0.690	17344	-10194
31	17.499	0.687	19548	-10194	76	-21.581	0.690	17293	-10195
32	16.500	0.680	19503	-10194	77	-22.156	0.694	17241	-10195
33	15.523	0.687	19459	-10195	78	-22.754	0.690	17187	-10195
34	14.499	0.687	19415	-10194	79	-23.317	0.690	17133	-10195
35	13.487	0.687	19370	-10195	80	-23.904	0.694	17077	-10195
36	12.474	0.687	19324	-10195	81	-24.489	0.694	17019	-10195
37	11.475	0.687	19278	-10195	82	-25.099	0.694	16957	-10196
38	10.474	0.684	19231	-10195	83	-25.766	0.690	16889	-10196
39	9.474	0.684	19185	-10195	84	-26.306	0.690	16826	-10196
40	8.463	0.684	19138	-10195	85	-26.790	0.694	16771	-10196
41	7.439	0.687	19092	-10195	86	-27.261	0.690	16717	-10196
42	6.450	0.687	19044	-10195	87	-27.754	0.690	16662	-10196
43	5.439	0.684	18995	-10195	88	-28.215	0.690	16607	-10196
44	4.450	0.687	18946	-10195	89	-28.693	0.694	16550	-10197
45	3.438	0.684	18897	-10196	90	-29.169	0.694	16492	-10197

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 24

	S11	S12	E11	E12	S11	S12	E11	E12
91	-29.698	0.694	16430	-10197				
92	-30.285	0.690	16361	-10197				
93	-30.779	0.694	16293	-10197				
94	-31.354	0.694	16219	-10198				
95	-31.849	0.690	16148	-10198				
96	-32.447	0.690	16069	-10198				
97	-32.952	0.690	15992	-10199				
98	-33.746	0.694	15885	-10199				
99	-34.308	0.694	15786	-10199				
100	-34.906	0.701	15696	-10199				
101	-35.379	0.694	15610	-10199				
102	-35.999	0.697	15516	-10200				
103	-36.493	0.694	15423	-10200				
104	-37.263	0.690	15295	-10200				
105	-37.838	0.690	15175	-10201				
106	-38.413	0.694	15067	-10201				
107	-38.931	0.697	14963	-10201				
108	-39.160	0.694	14875	-10201				
109	-39.150	0.694	14828	-10201				
110	-39.172	0.694	14794	-10201				
111	-39.160	0.697	14766	-10201				
112	-39.195	0.697	14744	-10201				
113	-39.195	0.694	14676	-10200				
114	-39.311	0.697	14560	-10199				
115	-37.667	0.606	14614	-10202				
116	-36.344	0.545	14660	-10204				
117	-35.022	0.467	14706	-10206				
118	-33.664	0.403	14752	-10208				
119	-32.355	0.325	14799	-10211				
120	-31.009	0.261	14846	-10213				
121	-29.687	0.193	14893	-10215				
122	-28.354	0.122	14940	-10217				
123	-27.030	0.051	14988	-10219				
124	-25.709	- 0.020	15035	-10222				
125	-24.536	- 0.075	15077	-10224				

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 25

	S11	S12	E11	E12
1	-24.824	0.190	15076	-10238
2	-26.490	0.193	15018	-10239
3	-27.628	0.193	14979	-10239
4	-28.768	0.190	14940	-10240
5	-29.893	0.193	14900	-10240
6	-31.031	0.193	14860	-10240
7	-32.171	0.193	14820	-10241
8	-33.285	0.190	14780	-10242
9	-34.425	0.196	14739	-10241
10	-35.562	0.190	14699	-10242
11	-36.700	0.193	14658	-10242
12	-37.826	0.190	14616	-10242
13	-38.966	0.193	14572	-10242
14	-40.081	0.190	14524	-10243
15	-41.254	0.193	14448	-10244
16	-42.058	0.196	14351	-10245
17	-42.667	0.190	14239	-10247
18	-43.289	0.193	14115	-10250
19	-43.830	0.190	13972	-10252
20	-44.541	0.193	13800	-10254
21	-45.059	0.190	13633	-10255
22	-45.771	0.193	13437	-10257
23	-46.289	0.193	13252	-10258
24	-47.037	0.193	13039	-10259
25	-47.553	0.190	12837	-10261
26	-48.255	0.193	12609	-10262
27	-48.773	0.193	12390	-10263
28	-49.519	0.193	12141	-10265
29	-50.037	0.190	11903	-10265
30	-50.761	0.196	11633	-10267
31	-51.267	0.196	11372	-10268
32	-51.981	0.196	11078	-10269
33	-52.533	0.196	10791	-10269
34	-53.235	0.193	10470	-10271
35	-53.763	0.190	10184	-10271
36	-54.303	0.190	9882	-10272
37	-54.326	0.193	9662	-10272
38	-54.338	0.193	9510	-10271
39	-54.338	0.196	9404	-10271
40	-54.348	0.193	9325	-10271
41	-54.348	0.193	9265	-10271
42	-54.338	0.193	9219	-10270
43	-54.338	0.193	9178	-10270
44	-54.348	0.196	9143	-10270
45	-54.360	0.196	9110	-10270
46	-54.383	0.193	9080	-10270
47	-54.383	0.193	9049	-10270
48	-54.383	0.193	9020	-10270
49	-54.383	0.193	8992	-10270
50	-54.395	0.196	8967	-10269
51	-54.407	0.193	8945	-10269
52	-54.395	0.193	8927	-10269
53	-54.418	0.196	8910	-10269
54	-54.418	0.193	8895	-10269
55	-54.418	0.196	8879	-10269
56	-54.430	0.190	8865	-10269
57	-54.440	0.196	8851	-10269
58	-54.452	0.193	8837	-10269
59	-54.440	0.193	8825	-10269
60	-54.452	0.196	8812	-10269
61	-54.452	0.193	8800	-10269
62	-54.464	0.196	8788	-10269
63	-54.534	0.193	8658	-10269
64	-52.762	0.196	8710	-10267
65	-51.302	0.196	8760	-10267
66	-49.796	0.193	8810	-10266
67	-48.324	0.200	8860	-10265
68	-46.852	0.196	8911	-10264
69	-45.369	0.200	8962	-10263
70	-43.875	0.193	9014	-10263
71	-42.368	0.196	9065	-10262
72	-40.942	0.193	9117	-10262
73	-40.402	0.196	9136	-10261

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 26

	S11	S12	E11	E12
1	-40.667	0.396	9096	-10242
2	-42.345	0.396	9041	-10242
3	-43.736	0.389	8995	-10243
4	-45.013	0.389	8952	-10244
5	-46.289	0.393	8908	-10244
6	-47.566	0.393	8865	-10244
7	-48.830	0.393	8821	-10244
8	-50.119	0.393	8777	-10245
9	-51.371	0.396	8733	-10245
10	-52.670	0.389	8688	-10245
11	-53.912	0.393	8638	-10245
12	-55.211	0.393	8568	-10244
13	-56.189	0.389	8460	-10244
14	-56.832	0.389	8296	-10244
15	-57.315	0.393	8087	-10244
16	-58.039	0.386	7683	-10243
17	-58.592	0.389	7177	-10241
18	-59.338	0.389	6562	-10238
19	-59.891	0.389	5961	-10233
20	-60.431	0.383	5431	-10228
21	-60.890	0.403	4902	-10222
22	-61.547	0.389	4203	-10216
23	-61.557	0.389	3722	-10210
24	-61.569	0.393	3428	-10206
25	-61.569	0.389	3220	-10203
26	-61.581	0.393	3057	-10201
27	-61.604	0.393	2926	-10199
28	-61.581	0.386	2829	-10198
29	-61.581	0.389	2743	-10196
30	-61.592	0.393	2654	-10195
31	-61.626	0.389	2575	-10194
32	-61.616	0.389	2504	-10193
33	-61.626	0.389	2442	-10192
34	-61.626	0.389	2389	-10192
35	-61.626	0.389	2341	-10191
36	-61.616	0.389	2295	-10190
37	-61.651	0.389	2252	-10189
38	-61.651	0.396	2211	-10189
39	-61.651	0.389	2171	-10189
40	-61.661	0.393	2134	-10188
41	-61.673	0.389	2098	-10188
42	-61.661	0.386	2063	-10188
43	-61.661	0.389	2030	-10187
44	-61.696	0.393	1996	-10186
45	-61.696	0.389	1961	-10186
46	-61.696	0.393	1927	-10185
47	-61.708	0.393	1893	-10185
48	-61.718	0.393	1861	-10185
49	-61.730	0.389	1828	-10184
50	-61.730	0.389	1798	-10184
51	-61.777	0.389	1581	-10181
52	-58.453	0.389	1671	-10179
53	-56.499	0.389	1735	-10178
54	-54.821	0.389	1791	-10177
55	-53.292	0.389	1841	-10176
56	-51.785	0.389	1893	-10176
57	-50.255	0.386	1944	-10175
58	-48.726	0.389	1996	-10175
59	-47.553	0.393	2036	-10174
60	-47.566	0.389	2037	-10174

SPECIMEN NO. : D - 2
PRESTRESS LOADING PATH NO. : 27

	S11	S12	E11	E12		S11	S12	E11	E12
1	-47.566	0.603	1988	-10134	46	7.301	0.603	4096	-10113
2	-45.853	0.609	2045	-10133	47	8.532	0.603	4157	-10113
3	-44.645	0.603	2085	-10132	48	9.519	0.599	4206	-10113
4	-43.426	0.606	2125	-10131	49	10.417	0.599	4251	-10113
5	-42.219	0.603	2166	-10131	50	11.302	0.603	4296	-10113
6	-41.001	0.606	2206	-10130	51	12.221	0.599	4342	-10113
7	-39.782	0.603	2247	-10129	52	13.119	0.596	4388	-10113
8	-38.552	0.603	2288	-10129	53	13.993	0.603	4435	-10113
9	-37.355	0.603	2329	-10127	54	13.969	0.599	4455	-10114
10	-36.138	0.599	2371	-10127	55	12.291	0.589	4401	-10116
11	-34.953	0.606	2412	-10126	56	10.808	0.606	4352	-10116
12	-33.688	0.606	2454	-10125	57	9.348	0.599	4304	-10117
13	-32.492	0.603	2495	-10125	58	7.876	0.596	4256	-10118
14	-31.296	0.603	2538	-10124	59	6.428	0.599	4206	-10118
15	-30.089	0.603	2581	-10123	60	4.978	0.599	4157	-10119
16	-28.882	0.606	2624	-10123	61	3.483	0.596	4108	-10119
17	-27.652	0.606	2667	-10122	62	2.047	0.599	4059	-10120
18	-26.445	0.606	2711	-10122	63	0.575	0.599	4009	-10121
19	-25.226	0.599	2756	-10121	64	- 0.518	0.596	3972	-10121
20	-24.030	0.603	2801	-10121					
21	-22.834	0.606	2846	-10120					
22	-21.604	0.603	2893	-10120					
23	-20.385	0.603	2938	-10119					
24	-19.189	0.606	2985	-10119					
25	-17.994	0.599	3031	-10118					
26	-16.775	0.603	3078	-10117					
27	-15.568	0.603	3125	-10117					
28	-14.373	0.603	3172	-10117					
29	-13.141	0.603	3220	-10116					
30	-11.934	0.603	3268	-10116					
31	-10.751	0.603	3317	-10116					
32	- 9.531	0.603	3365	-10116					
33	- 8.302	0.603	3414	-10115					
34	- 7.129	0.606	3464	-10115					
35	- 5.922	0.603	3513	-10115					
36	- 4.690	0.603	3563	-10115					
37	- 3.530	0.599	3614	-10114					
38	- 2.323	0.603	3665	-10114					
39	- 1.115	0.603	3717	-10114					
40	0.104	0.599	3769	-10114					
41	1.322	0.599	3822	-10114					
42	2.484	0.599	3875	-10114					
43	3.703	0.599	3929	-10113					
44	4.910	0.599	3984	-10113					
45	6.118	0.599	4039	-10113					

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