

THERMAL EXPANSION AND COMPRESSIBILITY OF ROCKS
AS A FUNCTION OF PRESSURE AND TEMPERATURE

by

HARVEY HARTMAN HAINES

S.B., Massachusetts Institute of Technology
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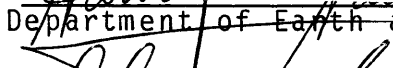
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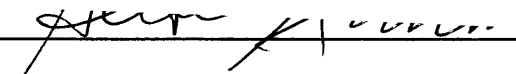
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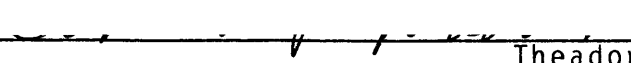
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Submitted to the Department of Earth and Planetary
Science on June 21, 1982 in partial fulfillment of the
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ABSTRACT

The coefficient of thermal expansion and compressibility were measured on six igneous rocks (granite, dunite, diabase, gabbro, and felsite). The range of pressure and temperature varied from room pressure and temperature to 200MPa and 125°C. Thermal expansion and compressibility were measured with strain gages attached directly to the surface of the sample.

Thermal expansion coefficients and compressibilities behaved linearly as a function of pressure and temperature above the crack closing pressure. This pressure varied with rock type. Upon reducing pressure, cracks may not open if the pressure is not reduced to 0.1 MPa.

Thesis supervisor: Dr. Gene Simmons

Title: Professor of Geophysics

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Lou Caruso provided petrographic descriptions, Debbie Rogers typed the manuscript, and Chris Mungennast did the drafting. Undergraduates, Dave Bower, Jim Danna, Lee Mallett, and Chris Mungenast deserve thanks for their help in preparing the samples.

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Introduction

The thermal expansion and compressibility of rocks as a function of temperature and pressure is important in many geological applications. Laboratory measurements at in situ conditions of natural and manmade geothermal sources and radioactive waste facilities can be used to examine the effects of temperature and pressure on crack populations (Heard and Page, 1981) and stress concentrations, and apply these to long term stability of underground openings. (Thirumalai and Demou, 1973).

Until recently, thermal expansion data were restricted to measurements at room pressure. A notable early study is Wheeler (1910) who measured meter long samples of Westerly RI granite to 1000°C. He found permanent lengthening of the samples which he attributed to thermal expansion contrasts between grains. Hockman and Kessler (1950) studied 48 granites from -20 to 60°C and incorporated a heating rate of .04°C/minute. Their study detected no permanent changes in sample length. A good summary of mineral thermal expansions is Skinner's (1966).

Since Skinner's compilation, the effects of cracks in rocks on the coefficient of thermal expansion have been studied. Cooper and Simmons (1978) measured the coefficient of thermal expansions of seven igneous rocks to 400°C. They used a slow heating rate of 1-2°C recommended by Todd (1973) who measured acoustic emissions during heating with rates of

8, 5, and 2°C/minute and found the smallest number of emissions occurred at the 2°C/minute heating rate. Cooper and Simmons compared their results with the thermal expansion coefficients calculated from Turner's formula for the thermal expansion coefficient of an aggregate (Baldrige et al., 1972):

$$\alpha_r = \frac{\sum \alpha_j K_j V_j}{\sum K_j V_j} \quad (1)$$

where α_r is the predicted coefficient of volume expansion of the rock, α_j , K_j , and V_j are the coefficient of volume expansion, bulk modulus, and volume fraction of the i^{th} phase, respectively. Measured expansion coefficients were about the same or less than calculated values at 25°C. A lower measured thermal expansion was reported also by Baldrige et al. (1972) and was attributed to the expansion of grains into cracks. At 400°C measured α 's were approximately twice the calculated aggregate α 's. These large coefficients at high temperature were attributed to the creation of thermal cycling cracks by unequal thermal expansions of the mineral grains at grain boundaries.

Reversible thermal expansions were not observed until Wong and Brace (1978) measured thermal expansions from 2-38°C at pressures to 600 MPa. They used strain gages epoxied to copper foil jackets with a linear strain resolution of 10×10^{-6} . They compared their measured α to theoretical upper and lower bounds that Walsh (1973) derived from Reuss and Voigt limits. To calculate these bounds,

the change of the thermoelastic moduli must be known with respect to both pressure and temperature. Unfortunately at that time, the thermoelastic moduli variations were unknown for both feldspars and pyroxene, major constituent minerals in that study.

Heard (1980) measured the coefficient of thermal expansion of Climax NV quartz monzonite to 300°C and 27.6 MPa. He used a triaxial vessel with a dial gage with accuracy of 8×10^{-4} mm and stated sample lengths of 64 mm which yields a precision of $\sim 12 \times 10^{-6}$. His measured α 's are larger than those calculated from Turner's formula. At 300°C Heard's measured α 's are much lower than α 's measured at room pressure by Cooper and Simmons (1977).

Compressibility, Young's modulus, and thermal expansion of Westerly granite and Stripa granite (central Sweden) were measured to 350°C and 55 MPa by Heard and Page (1981). Their study was apparently the first attempt to measure thermal expansion and compressibility at the same time. However, both the conditions chosen for the two granites and Climax quartz monzite have confining pressures lower than the crack closing pressure P_c estimated from thermal expansion, resistivity, and compressibility measurements (Wong & Brace, 1979).

In the present study thermal expansion has been measured on six igneous rocks to 200 MPa and a maximum of 125°C. These pressures are sufficient to close cracks in most igneous rock.

Experimental Method

There are several methods that have been used previously for measuring thermal expansion at room pressure (Bartlett, 1832; Wheeler, 1910; Hahn and Kirby, 1971; Baldrige et al., 1972; Singh and Simmins, 1976). However, none of these methods is easily modified for use under pressure.

The approach used here is a modification of the differential strain analysis (DSA) technique of Simmons et al. (1974) and Siegfried and Simmons (1978). DSA uses fused silica as a reference material which is exposed to the same pressure and temperature conditions as the rocks. The silica strain is subtracted from the sample strain yielding differential strain. Accuracies obtained under pressure at room temperature are $2-3 \times 10^{-6}$. The technique was modified in the following ways: First, a temperature bath has been added to the system to control and also vary temperature. Second, strain is presented as true strain instead of differential strain. True strain is calculated by adding measured values for compression and thermal expansion of fused silica (Hahn and Kirby, 1971; Kingery, 1960; Peselnick et al., 1966; Primenko, et al., 1979) to the differential strain.

Two different sample techniques were used, one for low temperature (1st) blocks and the other for high temperature (2nd) blocks. The differences were the number of gages,

epoxy to cement gages, solder, and encapsulant. Cubes 5 to 6 cm on a side were cut for each block. Three faces were ground orthogonal and polished with successively finer powder to 600 grit. Prefatory drying was done in vacuum at 40°C overnight. Gages were attached to each block, nine on the first (fig 1) with Tra-Con 2101 epoxy and twelve on the second (fig 2) with BLH EPY-500 epoxy. The epoxies were cured overnight, the first at 40°C and the second at 150°C. Coiled copper leads were attached with Pb-Sn solder (1st block) and Ag-Sn solder (2nd block) and then returned to vacuum at 40°C for approximately a week to dry. Immediately upon removal from the vacuum oven, the samples were encapsulated in TRA-CON 3010 flexible epoxy (1st block) or Dow Corning 3112 RTV (2nd block) and cured at room conditions.

A problem with using strain gages is attaching them to the specimen. Epoxies are available that can be used to most temperatures (350°C), but they must be cured at or near the temperature of use. Curing the gage epoxy thermally cycles the specimen and may introduce cracks (Richter & Simmons, 1974), hence, the reason for using two blocks per specimen.

During sample preparation the first block is never cycled above 40°C -- a hot summer day on an outcrop -- in order to minimize the production of new cracks. The epoxy used, Tra-Con 2101, has been used with good success by previous DSA experiments (Simmons et al., 1974, 1982;

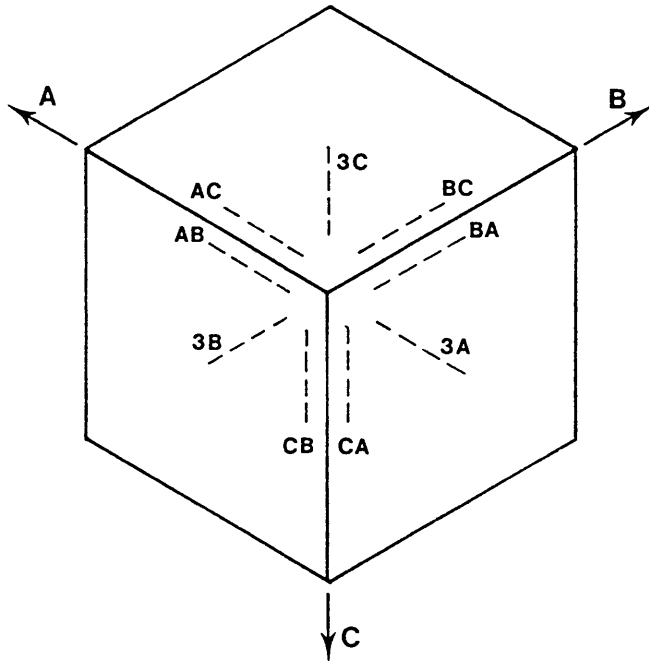


FIGURE 1.
DSA block with 9 gages
(low temperature block)

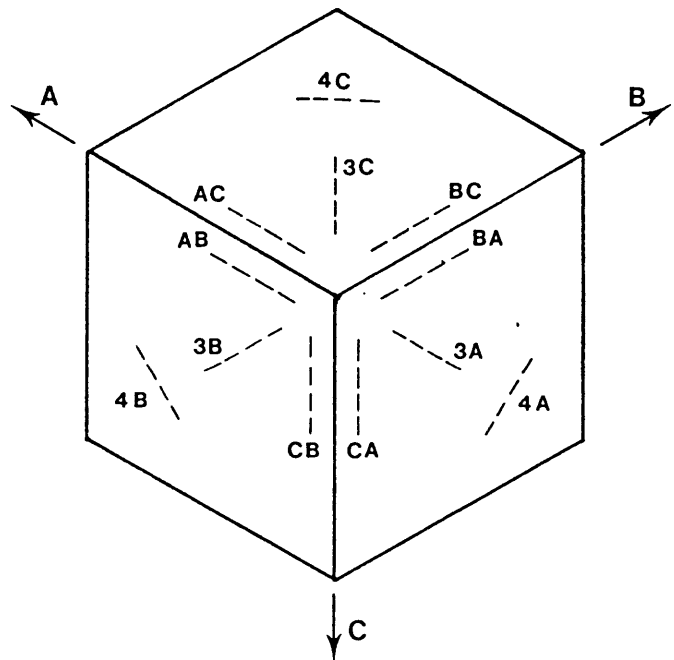


FIGURE 2.
DSA block with 12 gages
(high temperature block)

Siegfried and Simmons, 1978). The epoxy is rated to 120° to 140°C, but gage slippage was observed in this study at 122°C. Satisfactory data were obtained to 110°C.

The second block had gages attached with an epoxy recommended by the gage manufacturer. This epoxy has a reported maximum use to 260°C and can be cured at lower temperatures with a reduced maximum temperature. In study the the samples were cured at 150°C giving them a usable range to 170°C.

Unfortunately, the RTV encapsulent did not perform as well as had been hoped and leaked oil after 4 to 6 cycles. As a result data were obtained on only one rock above 125°C. Although most high temperature data was not useful, the high temperature samples did provide knowledge of the effects of thermal cycling on cracks by comparing them to low temperature samples.

The last two samples -- 1381 Mellon gabbro and 1407 Middlebrook felsite -- had only one block which prepared similarly to the high temperature block. There were three fused silica samples, all cut from the same rod. Each was prepared with two gages in the same manner as the high temperature blocks. For each run, two samples and 4-6 gages from the three fused silica pieces were used.

The pressure medium was Dow Corning FS1260-300. Temperature was controlled by an external heating system. Fluid was circulated through copper tubing around the pressure vessel and through top and bottom plates for

thermal uniformity inside the vessel. A manganin coil was used to measure the pressure to 0.1 MPa. Temperature was measured to 1°C with a thermistor inside high pressure tubing submerged in the pressure vessel. Both the manganin coil and thermistor were connected to the Vishay for automatic reading with each scan of the strain gages. The pressure was incremented automatically by a controller at a rate of ~3.3 MPa every ten minutes. A reading of the time, pressure, temperature, and strain was taken by the Vishay just prior to incrementing the pressure, giving a minimum of 4 to 5 minutes for conditions to approach equilibrium. A run was started at ambient conditions. Pressure was incremented isothermally to 200 to 210 MPa and then reduced to ~5 MPa. Temperature was increased 20 to 30°C overnight with an initial heating rate of ~10°C/hour. The temperature increase raised the pressure to 40 to 50 MPa which was reduced to ~5 MPa before starting the next cycle. Cycles were repeated for a total of 5 to 8 days. After using this procedure for two runs the cycling procedure was modified slightly. Pressure was reduced to 0.1 MPa and the dump valve left open while the temperature was increased overnight. The open dump valve prevented the pressure from rising 40 MPa and allowed cracks to relax which modified the behavior of β below 20 MPa.

During the first two runs the O-ring blew after 2 to 4 cycles. To replace it, the temperature had to be reduced to room conditions. This was not thought to affect the

measurements since the samples were not cycled to a higher temperature. The problem was alleviated in subsequent runs by adding a steel backing ring.

The Samples

The samples used in this study were cut from the same field specimens that provided samples for previous work by Simmons and colleagues, and can be identified in various publications by the MIT number. Coordinate directions are consistent for all pieces with the same MIT number. Table Ia lists modal analyses with references. Table Ib lists measured density and average grain size. Petrographic descriptions are provided below.

83 Troy OK granite

POTASSIUM FELDSPAR (PERTHITE) occurs as large (2-6mm) anhedral grains. Many grains contain exsolutions of albite. Occasional slight alteration to sericite can be recognized in several grains.

QUARTZ is present as large to medium ($1/2$ -5mm) anhedral grains. Many partially healed intergranular cracks (bubble planes) occur with most grains which are typically randomly oriented.

PLAGIOCLASE occurs as medium size ($1/2$ -2mm) subhedral grains. Alteration is moderate to extreme in several grains, typically forming a core composed of sericite, epidote, and opaques.

BIOTITE is present as medium size ($1/2$ -2 $1/2$ mm) subhedral grains. The degree of alteration varies from low to extremely altered. Chlorite is the predominant alteration mineral. Splene, apatite and opaque minerals

TABLE Ib

MEASURED DENSITIES AND AVERAGE GRAIN SIZE

Name:	Troy OK granite	Twin Sisters WA dunite	Pageland SC diabase	Westerly RI granite	Mellen WI gabbro	Middlebrook MO felsite
MIT	83	178	812	1132	1381	1407

Average
grain size

2.5

3.5

1.0

0.8

4.5

<0.1

Measured
density
(kg/m³)

2630

3280

2930

2660

2850

2680

TABLE Ia MODAL ANALYSES AND THIN SECTION ESTIMATES OF SAMPLE COMPOSITION

Name:	Troy OK granite	Twin Sisters WA dunite	Pageland SC diabase	Westerly RI granite	Mellen WI gabbro	Middlebrook MO felsite
MIT #:	83	178	812	1132	1381	1407

Modal composition

quartz	14.2			29.3		6.7
K. feldspar			63.7	31.4		
perthite	41.4					
plagioclase	43.2	2		31.3	73	0.3
pyroxene		tr	29.2		15	
epidote	0.4					12.1
olivine		95	2.0		2	
muscovite				3.0		
biotite	0.8			3.8		
chlorite			4.0		5	
opaque	tr	3	1.1	0.8		79.9†
others				0.4	5	1.0
total	100.0	100	100.0	100.0	100	100.0
of counts	2000		1000	1831		1000

Reference	Feves et al. [1977]	Current thin- section estimate	Simmons & Cooper [1978]	Richter & Simmons [1974]	Current thin- section estimate	Feves et al. [1977]
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†Fine grained groundmass

(Fe-oxide) occur in association with biotite.

178 Twin Sisters WA dunite

OLIVINE occurs as medium to large grains (0.3-7mm). Intergranular and grain-boundary cracks are abundant. Associated hematization is common. Pyroxene occurs as small subhedral to anhedral grains, typically located at grain boundaries.

812 Pageland SC diabase

PLAGIOCLASE occurs as medium to fine (2-<.1mm) subhedral rectangular laths intimately associated with pyroxene and olivine. Many crystals are compositionally zoned. Many grains contain short, open intergranular cracks.

CLINOPYROXENE occurs as medium to fine (1-.2mm) subhedral grains which typical form elongated, curved clusters composed of several grains. Isolated grains also present partially healed intergranular cracks (bubble planes) and open intergranular cracks.

OLIVINE is present as medium size (1-.5mm) anhedral grains, typically associated with clinopyroxene, sometimes poikilitically. Most olivine grains are partially to totally altered to biotite possibly with brown opaque (hematite). Alteration is typically along intergranular cracks, which are common in these grains.

1132 Westerly RI granite

PLAGIOCLASE is present as subhedral to anhedral irregularly shaped crystals which range in size from 2mm to

<.5mm. Many grains are partially altered to muscovite and/or calcite. Alteration typically occurs in the core of individual grains.

QUARTZ occurs as relatively rounded, anhedral grains which range in size from .75 to .1mm.

POTASSIUM FELDSPAR is present as subhedral grains which range in size from 1 to .1mm. The degree of alteration is less than that of plagioclase.

BIODITE is present as rectangular, subhedral crystals. Size ranges from 1 to .2mm.

ACCESSORY MINERALS include hematite, ilmenite, and smaller amounts of zircon. These typically occur as small (.3 to 1mm) rounded grains randomly distributed throughout the sample.

1381 Mellon WI gabbro

PLAGIOCLASE is the predominant mineral and occurs as coarse-grained (.5 to 8.5mm) subhedral, lath-like crystals. Slight alteration occasionally occurs of an occasional grain.

PYROXENE occurs in two forms:

Orthopyroxene is present in minor amounts of the total pyroxene and occurs as exsolution blebs in the clinopyroxene. Grains are irregularly shaped subhedral to anhedral (.75-3.5mm) and contain perpendicular fractures. Clinopyroxene morphology is similar to the orthopyroxene grains, however, cleavage is developed in one direction.

OPAQUE (MAGNETITE) occur as subhedral, irregularly shaped crystals which are always surrounded by an alteration rim composed of mucacious chlorite and/or biotite. Size ranges from 7 to .5mm.

OLIVINE is present as anhedral grains surrounded by an alteration halo and typallly associated with pyroxene. 50-70 of the olivine grains are altered to chlorite and/or opaque.

1407 Middlebrook MO felsite (from Richter and Simmons, 1977)

The matrix is very fine grained (<.1mm) composed of quartz and feldspar. Very few open cracks are present, but rutile sealed cracks are common. 1-3 μm voids are associated with the rutile. The voids do not occur elsewhere in the matrix.

PHENOCRYSTS are composed of pyroxene with aggregate replacements of epidote-chlorite-splene-quartz.

Linear Compressibility

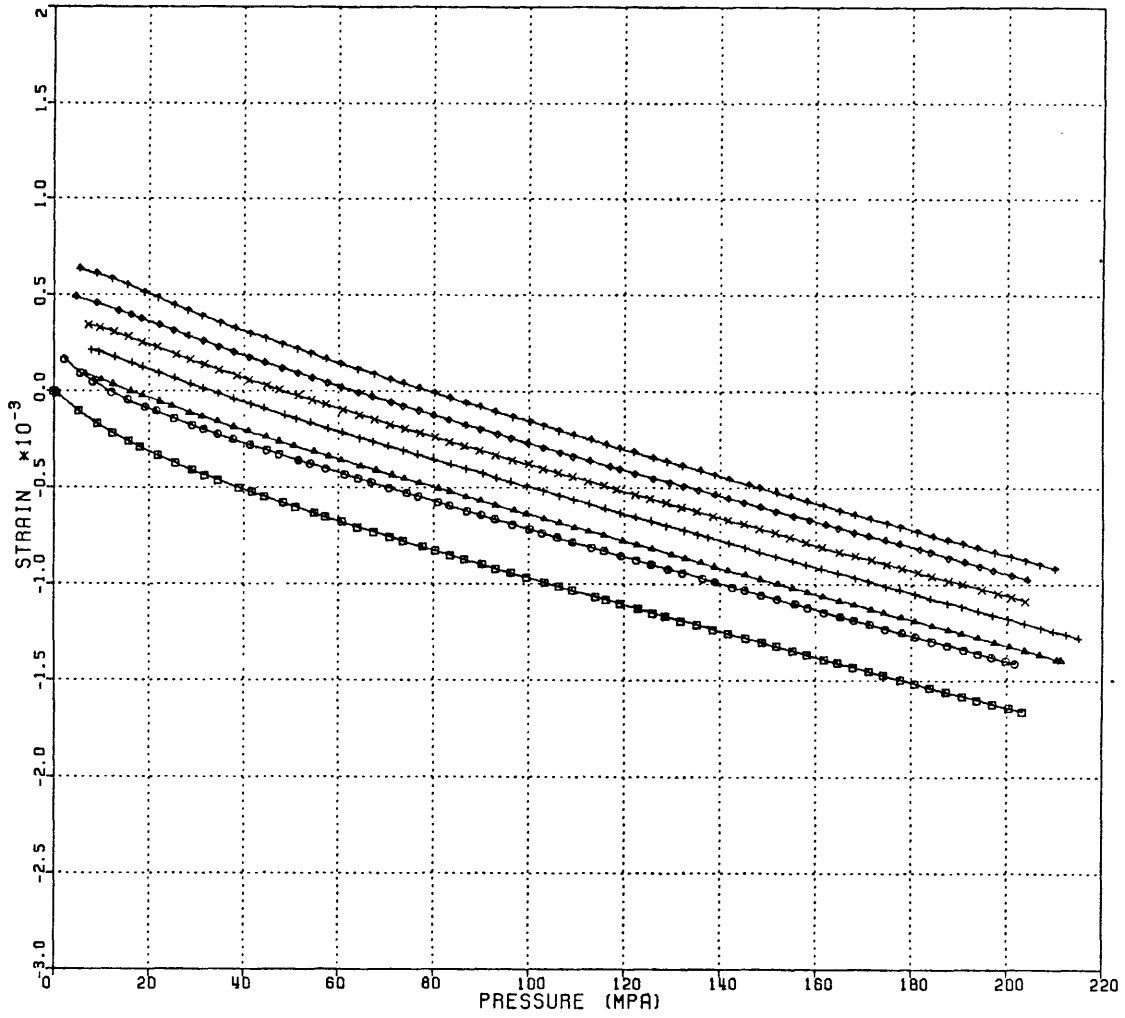
Linear compressibility β , a second order symmetric tensor, is defined as:

$$\beta_{ij} \equiv -\frac{\partial \epsilon_{ij}}{\partial P} \quad (2)$$

where ϵ is linear strain, P is pressure, and subscripts i and j are coordinate directions. β was calculated with a moving second order polynomial fit across seven points, which span ~ 20 MPa, centered at each data point. The three points at each end of a curve were weighted to favor the points closest to them.

Plots of ϵ and the resulting β are shown as connected points in figures 3 to 5. Plots of ϵ vs pressure for different temperatures are shown in figure 3. Plots of β vs. pressure are shown in figure 4. Plots of β vs. temperature are shown in figure 5. These figures show data and results for a single gage in the A direction for the low temperature run of 83 Troy OK Granite. These plots are typical of those for 83 Troy OK granite and the other five samples as well. Plots of all ϵ , α and β , are given in the appendix.

Above 60 MPa the compressibility is a linear function of pressure. The point where β becomes linear corresponds to the crack closure parameter v approaching zero, or where all cracks are closed (Simmons et al, 1974). This point is also defined as P_C , the crack closure pressure. Above P_C , β varies linearly with respect to pressure.

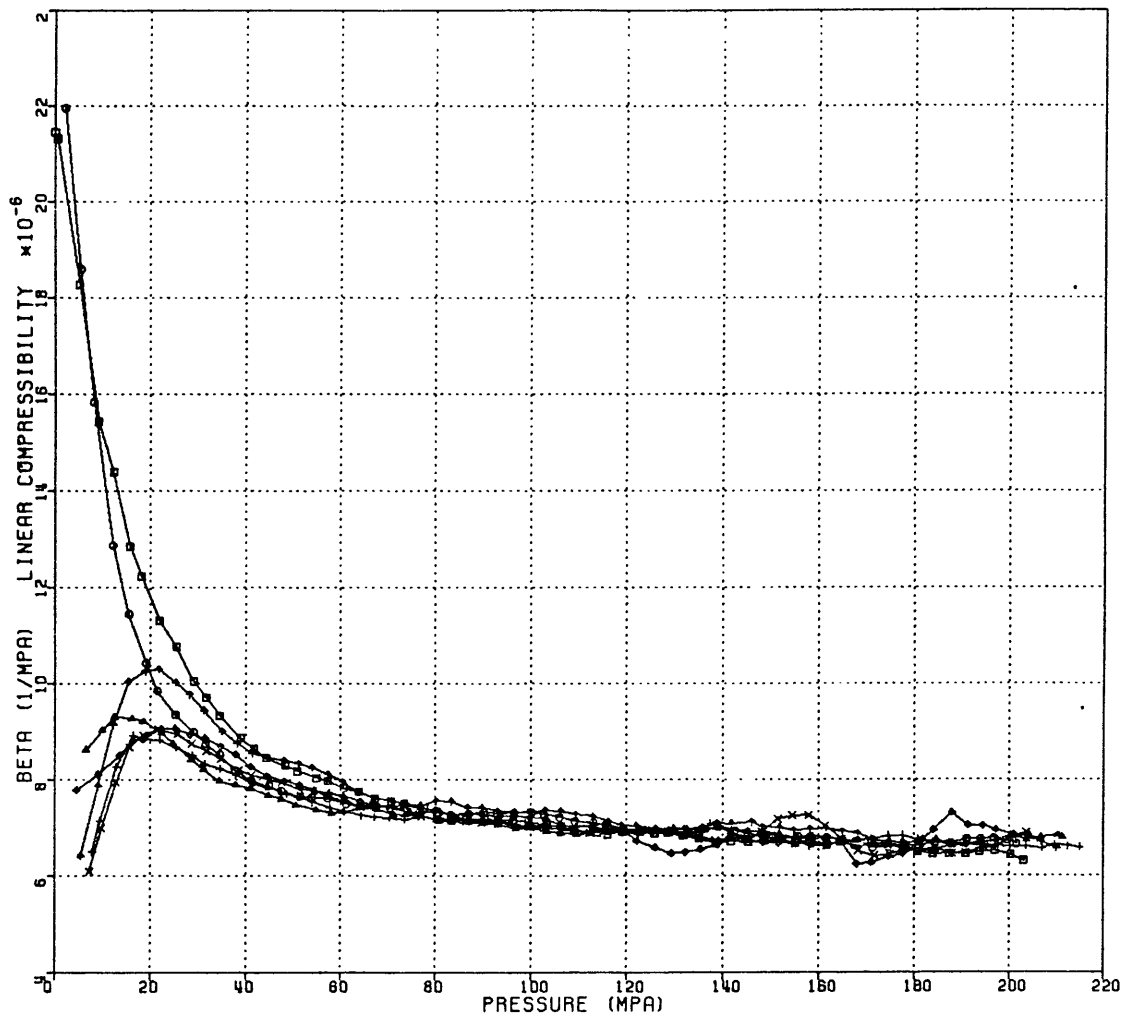


83 TRØY ØK GRANITE

GAGE: AB

- - 22°C
- - 46°C
- △ - 55°C
- + - 70°C
- X - 83°C
- ◇ - 96°C
- ♠ - 110°C

FIGURE 3. Plot of ϵ vs. P . ϵ is in units of mm/m. P is in MPa.

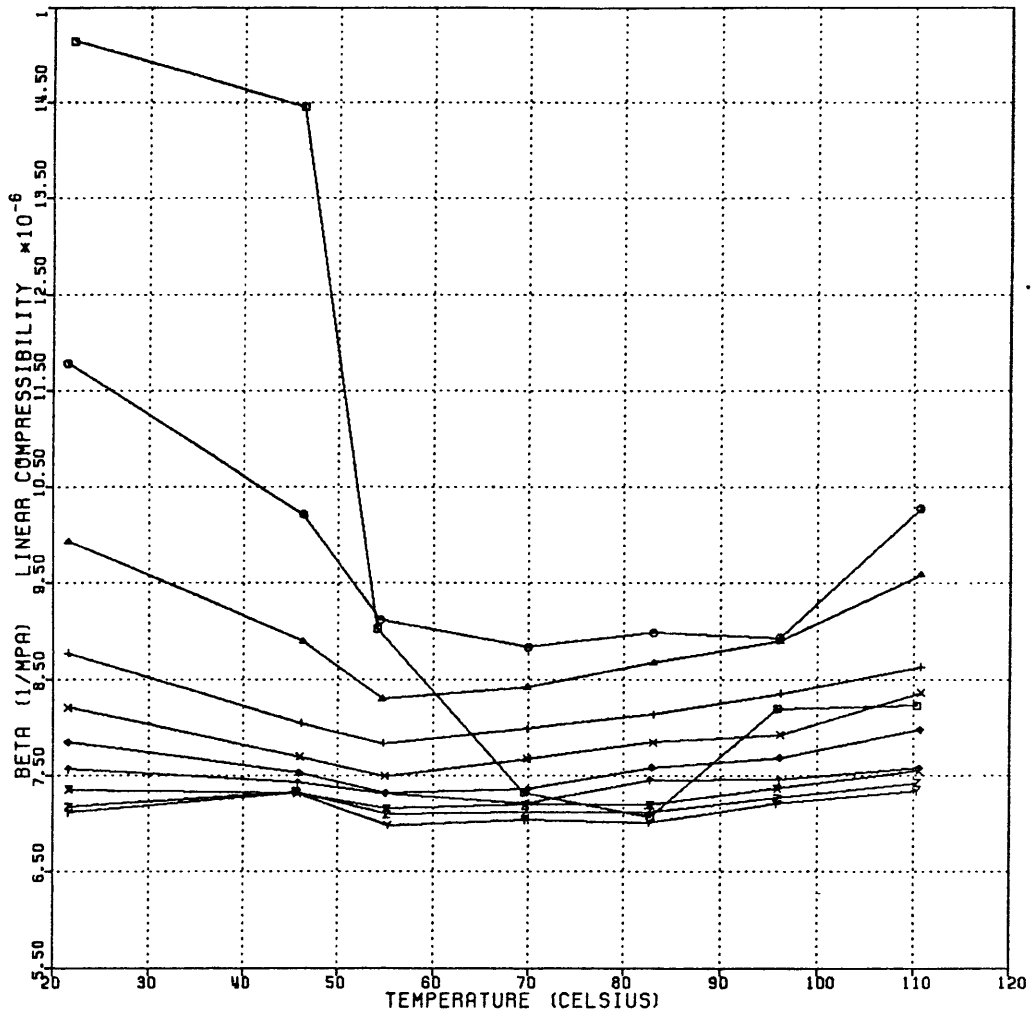


83 TROY OK GRANITE

GAGE: AB

- - 22°C
- - 46°C
- △ - 55°C
- + - 70°C
- × - 83°C
- ◇ - 96°C
- * - 110°C

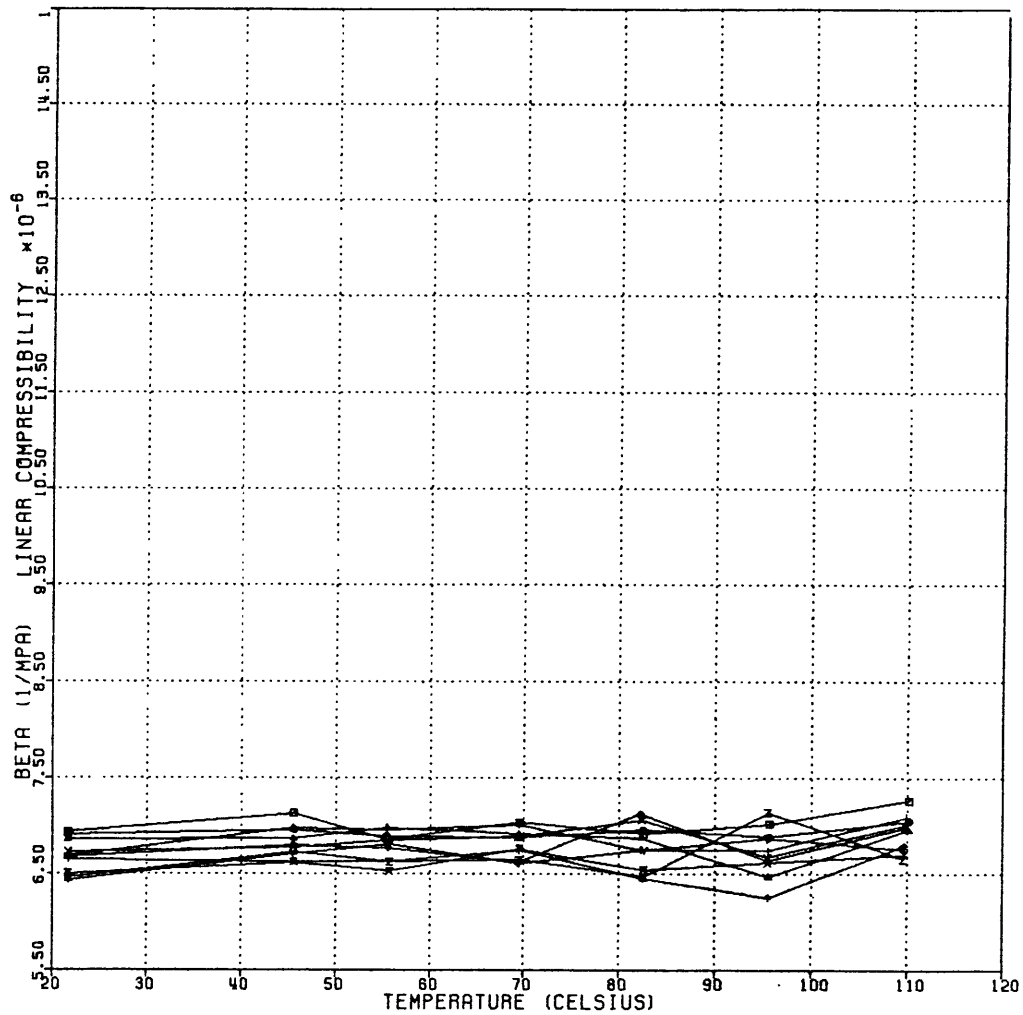
FIGURE 4. Plot of β vs. P . β is in units of $10^{-6}/\text{MPa}$. P is in MPa.



83 TROY OK GRANITE
GAGE: AB

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ‡ - 70 MPA
- ⊗ - 80 MPA
- ∇ - 90 MPA
- γ - 100 MPA

FIGURE 5a. Plot of β vs. T at 10 MPa intervals up to 100 MPa. β is in units of $10^{-6}/\text{MPa}$. T is in $^{\circ}\text{C}$.



83 TROY OK GRANITE
GAGE: AB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♣ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA

FIGURE 5b. Plot of β vs. t at 10 MPa intervals above 100 MPa. β is in units of $10^{-6}/\text{MPa}$. T is in $^{\circ}\text{C}$.

β vs. temperature has not been smoothed. The lack of smoothing, in addition to the lower density of points, does not yield as precise an estimate of the isobaric change as the isothermal change in β . $\frac{\partial \beta}{\partial T}$ may be compared to $\frac{\partial \alpha}{\partial T}$ since $\frac{\partial \alpha}{\partial P} = -\frac{\partial \beta}{\partial T}$. Below P_c , β exhibits behavior which is attributed to opening and closing of cracks and is dependent on the pressure temperature path. The rapid decrease of β with pressure is very typical of granites. This decrease is due to cracks closing in the rock. The first two cycles of figure 4 show this behavior but the five higher temperature cycles do not. After the second pressure cycle only 10 to 20 minutes elapsed between completion of one pressure cycle and the beginning of the next. In the latter five cycles β at ~5 MPa is close to the values at 40-50 MPa from which the pressure was reduced. β gradually rose to a maximum at ~20 MPa and equaled the early cycle β about 40 MPa or two hours after the pressure was reduced. The increase in β indicates that more cracks are closing. This behavior could be caused by either of two phenomena: (1) failure of cracks to close or (2) a time dependent relaxation effect. A pressure of ~5 MPa is sufficient to keep cracks closed that, if open, would take higher pressures to close. Evidence for the latter phenomena was found by Simmons et al (1982). While using the DSA technique to measure permanent deformation of sandstones, they found the relaxation time after reducing the pressure to be ~2 hours. This time interval is the same observed here for the return of β to those of earlier

cycles. To determine which behavior is dominant, the original cycling procedure should be modified with a 2-3 hour wait between the second pressure reduction and the start of the next cycle.

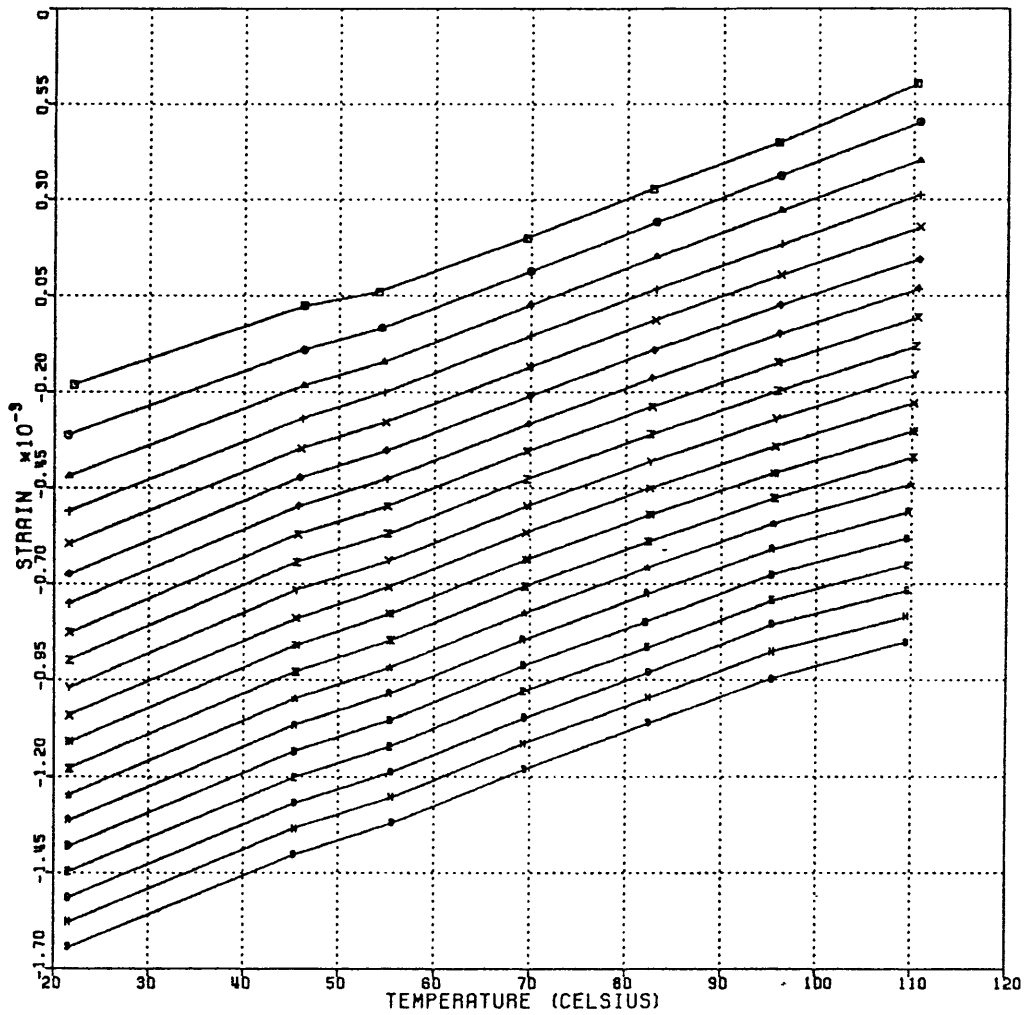
Linear Thermal Expansion

The coefficient of linear thermal expansion, like linear compressibility is a second order symmetric tensor defined as:

$$\alpha_{ij} \equiv -\frac{\partial \epsilon_{ij}}{\partial T} \quad (3)$$

where T is temperature.

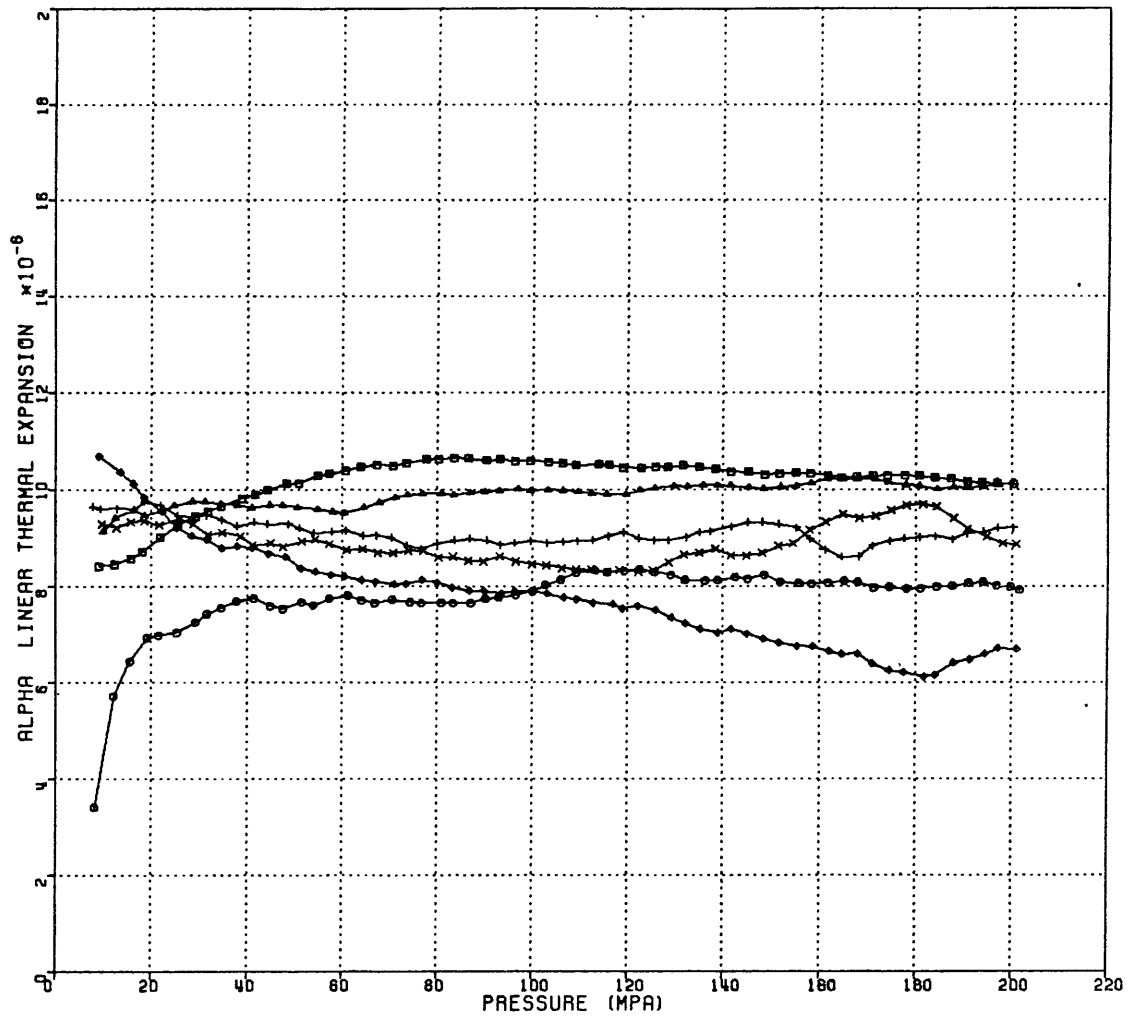
Figure 6 shows plots of strain vs. temperature at 10 MPa intervals. The strain was smoothed in the pressure direction, a by-product of the numerical differentiation that yielded β . α was calculated from two adjacent cycles of smoothed strain and plotted at their midpoint. In figures 7 and 8, α is plotted against pressure and temperature for a single gage in the A direction of 83 Troy OK granite. Above P_C α is fairly linear with respect to pressure. This linearity is apparent for both the high and low temperature blocks of Troy OK granite and all the remaining samples. As a function of temperature, α behaves more erratically than the smooth behavior of α vs. pressure. The strong initial decrease in α as a function of temperature is pervasive throughout the data set. The isobaric and isothermal changes in α have significant scatter but nevertheless show consistent gradual change above P_C . Isobaric change in α may be compared to isothermal changes in β since $\frac{\partial \alpha}{\partial P} = -\frac{\partial \beta}{\partial T}$. The isobaric change of α is atypical of most materials in that α usually increases with temperature. Heard and Page (1981) did not



83 TROY OK GRANITE
GAGE: AB

□ - 10 MPA	× - 110 MPA
○ - 20 MPA	* - 120 MPA
△ - 30 MPA	⊗ - 130 MPA
+ - 40 MPA	★ - 140 MPA
× - 50 MPA	⊠ - 150 MPA
◇ - 60 MPA	⊡ - 160 MPA
⊕ - 70 MPA	⊢ - 170 MPA
⊗ - 80 MPA	⊣ - 180 MPA
⊘ - 90 MPA	⊤ - 190 MPA
⊙ - 100 MPA	⊥ - 200 MPA

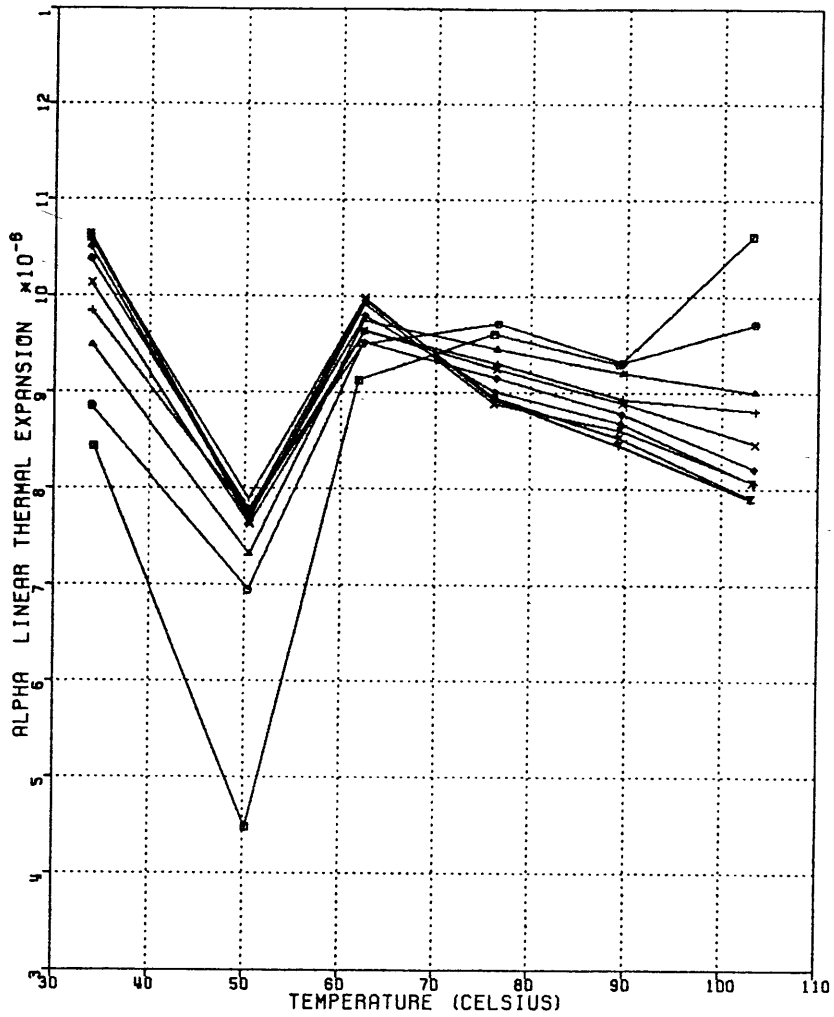
FIGURE 6. Plot of ϵ vs. T at 10 MPa intervals. ϵ is in units of mm/m. T is in $^{\circ}\text{C}$.



83 TROY OK GRANITE
GAGE: AB

- - 22°C-46°C
- - 46°C-55°C
- △ - 55°C-70°C
- + - 70°C-83°C
- X - 83°C-96°C
- ◇ - 96°C-110°C

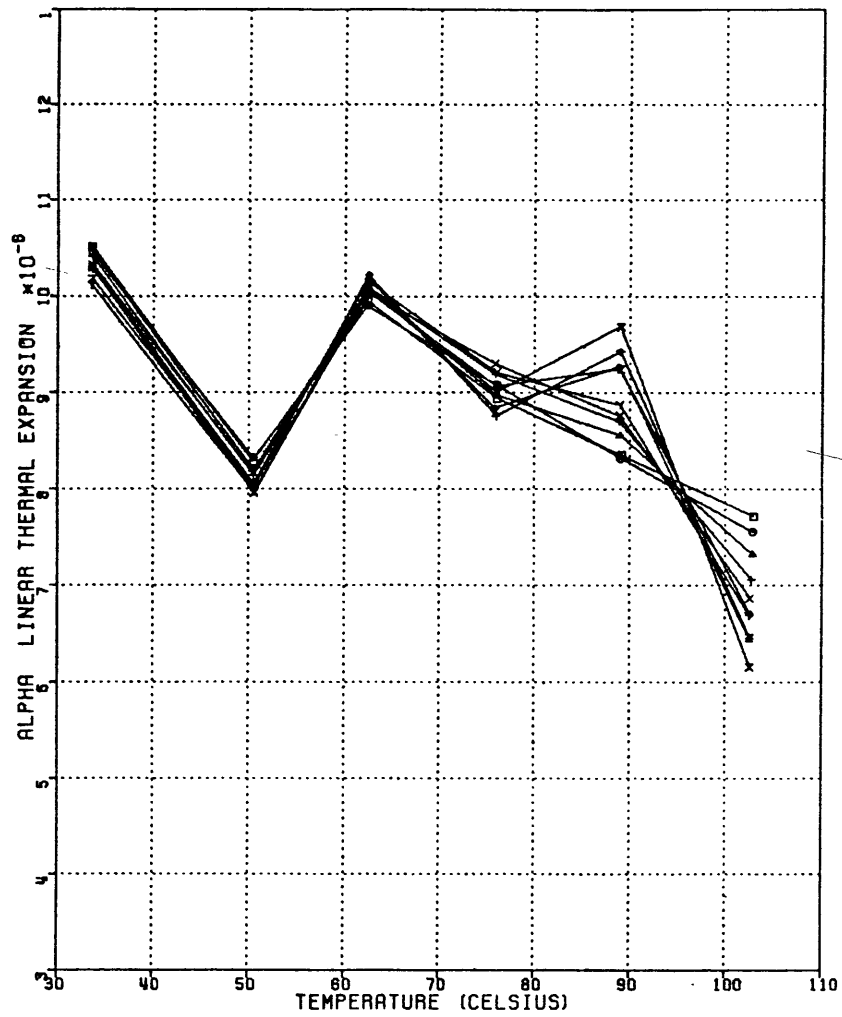
FIGURE 7. Plot of α vs. P . α is in units of $10^{-6}/^{\circ}\text{C}$. P is in MPa.



83 TROY OK GRANITE
GAGE:AB

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ♣ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA

FIGURE 8a. Plot of α vs. T at 10 MPa intervals up to 100 MPa. α is in units of $10^{-6}/^{\circ}\text{C}$. T is in $^{\circ}\text{C}$.



83 TROY OK GRANITE
GAGE: AB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- † - 170 MPA
- × - 180 MPA
- Z - 190 MPA
- Y - 200 MPA

FIGURE 8b. Plot of α vs. T at 10 MPa intervals above 100 MPa. α is in units of $10^{-6}/^{\circ}\text{C}$. T is in $^{\circ}\text{C}$.

observe this type of behavior for granites nor is it observed in (Cooper and Simmons 1977). Both of these measurements were made below P_c . Figures 7 and 8a show that α vary unsystematically below P_c and such measurements are crack dependent. This nonlinearity implies that Heard and Page's (1981) and Cooper & Simmons' (1977) measurements are not applicable above P_c .

Results and Discussion

On the average, eight gages for each of the ten blocks survived. These blocks were cycled on the average five times with sixty points per cycle. Each of these strain values was differentiated twice to yield three points for each value and a total of ~70,000 points. It is not difficult to see that the data set quickly became very large. The data, plotted for all gages similarly to figures 3 to 8, are included in the appendix. Table II lists volumetric data for β , $\frac{\partial \beta}{\partial P}$, $\frac{\partial \beta}{\partial T}$, α , $\frac{\partial \alpha}{\partial P}$, $\frac{\partial \alpha}{\partial T}$, and a volumetric aggregate average α_r calculated for room temperature and pressure from Turner's formula (eq 1). K_j and α_j were taken from Simmons and Wang (1971) and Skinner (1966), respectively. V_j are from Table I. In many cases the minor elements have not had K and/or α data reported in the literature. The calculated α_r for such rocks were made with the assumption that the major elements control the coefficient of thermal expansion for the rock.

Figure 9 shows a plot of the volumetric crack closure spectrum of 83 Troy OK granite. This plot provides a comparison of data from the current study and an unpublished plot from a study by Feves et al. (1977).

In addition to P_c the crack closing pressure discussed earlier, Richter and Simmons (1974) defined a thermal cracking temperature T_c from measurements of thermal expansion at room pressure. T_c is the minimum cycling

TABLE III VOLUMETRIC COMPRESSIBILITY AND THERMAL EXPANSION COEFFICIENT

MIT #	P_c	β @ P_c	$\frac{\partial \beta}{\partial P}$	$\frac{\partial \beta}{\partial T}$	α @ P_c	α_r	$\frac{\partial \alpha}{\partial P}$	$\frac{\partial \alpha}{\partial T}$
83 L	60	22	-17	5	28	15.3	-2	-100
83 H	60	22	-24	0	32	15.3	-1	-
178 L	60	21	-2	26	38	24.0	-32	-
178 H	80	10	-5	22	20	24.0	-28	-
812 L	60	14	-8	2	17	17.7	2	-100
812 H	60	11	0	9	19	17.7	-20	-
1132 L	80	24	-29	2	33	24.5	-10	-
1132 H	80	11	-30	21	13	24.5	-27	-
1381	70	13	-12	15	14	18.9	-22	-
1407	20	15	-4	26	19	‡	-27	-60

34

L = low temp block
H = high temp block

Units: $\beta = 10^{-6} \text{ MPa}^{-1}$ $\frac{\partial \beta}{\partial P} = 10^{-9} \text{ MPa}^{-2}$ $\frac{\partial \beta}{\partial T} = 10^{-9} \text{ MPa}^{-1} \text{ } ^\circ\text{C}^{-1}$
 $P_c = \text{MPa}$ $\alpha = 10^{-6} \text{ } ^\circ\text{C}^{-1}$ $\frac{\partial \alpha}{\partial T} = 10^{-9} \text{ } ^\circ\text{C}^{-2}$ $\frac{\partial \alpha}{\partial P} = 10^{-9} \text{ } ^\circ\text{C}^{-1} \text{ MPa}^{-1}$

‡ Modal composition not determined due to fine grain size and α_r was not calculated

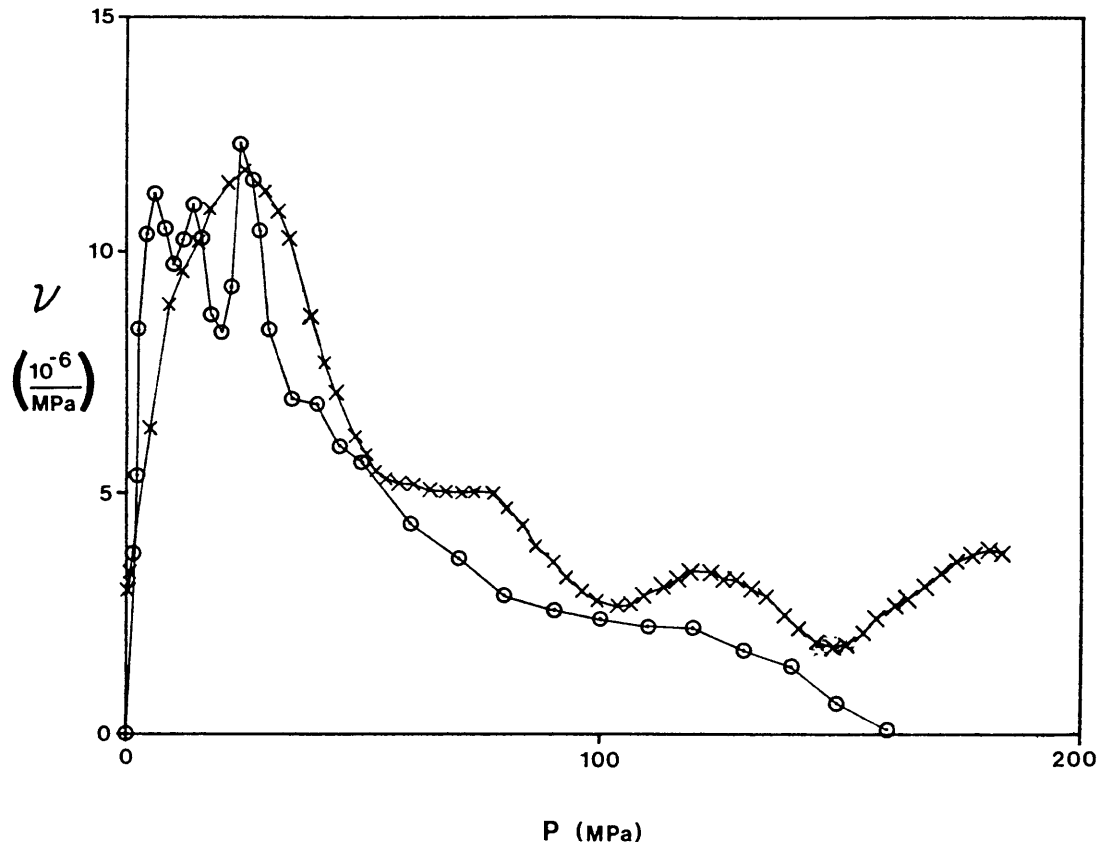
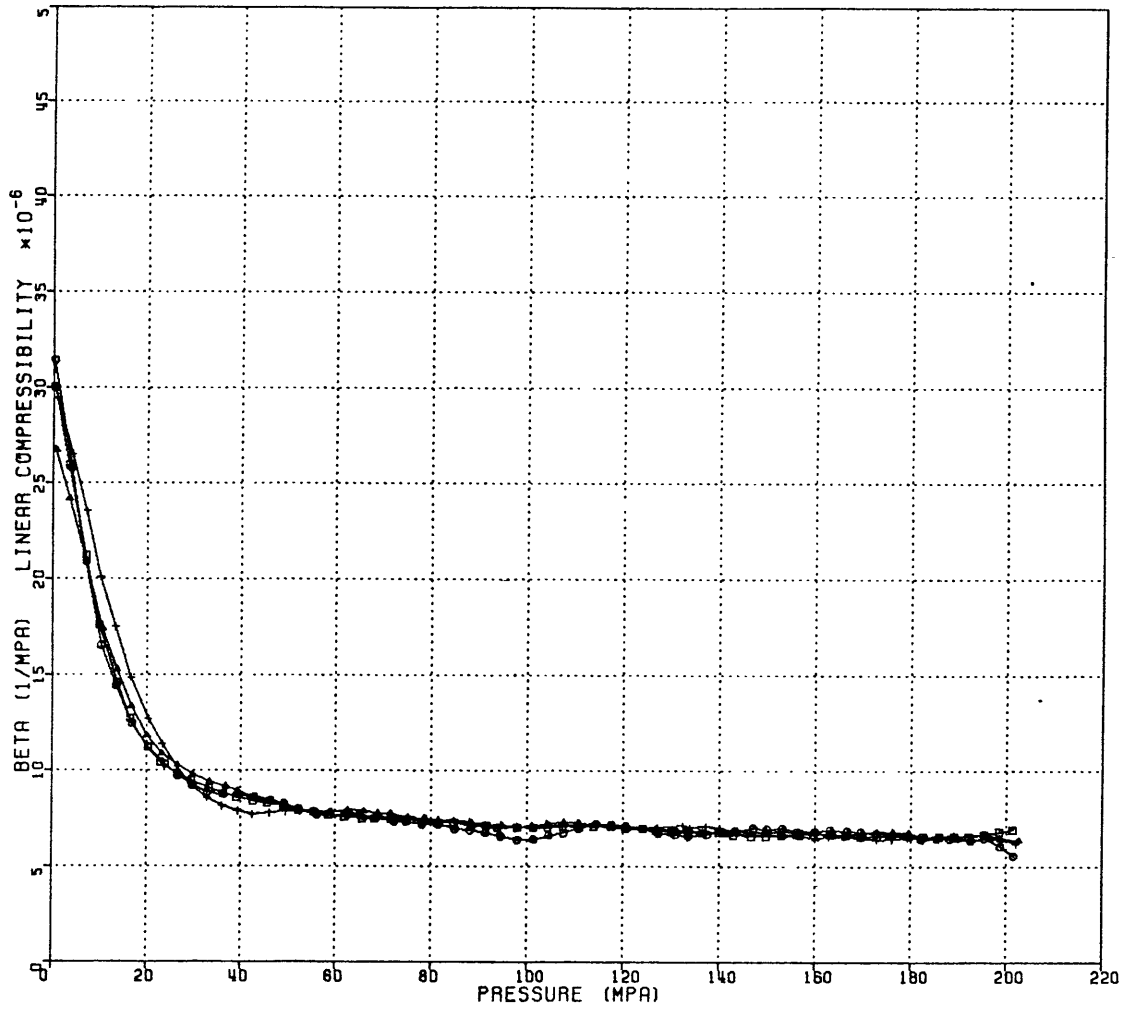


FIGURE 9. Volumetric crack closure spectrum v versus pressure. 'x's are data from the low temperature run. Circles are from an unpublished plot by Feves et al. Both are for 83 Troy granite.

temperature at which permanent lengthening of the sample was observed. Their permanent lengthening criteria was $.2 \times 10^{-3}$ strain units. In this study, T_C was observed in some of the specimens from an increase in β at low pressures. The increase in β was observed between first cycles of the low and high temperature blocks (figures 4 and 10) and in subsequent cycles of a run (figure 11). Figures 4 and 10 are plots of 83 Troy OK granite. Troy shows no indication of thermal cracking from subsequent cycles. This indicates that thermal cracking is occurring between the temperature of the highest temperature cycle (85°C) and the epoxy curing temperature of the high temperature block (150°C). Figure H is a plot of 1331 Mellon gabbro. After the second cycle, plotted as circles, β increases for each successive cycle. Thermal cracking occurs between 50 and 65°C .

Westerly granite is the only sample that was used both here and by Richter and Simmons (1974). Westerly shows no evidence of thermal cracking in this study. Richter and Simmons reported that thermal cracking occurred between 260 and 300°C .

The effects of fine grain size are shown in Figure 12 by sample 1407 Middlebrook felsite. There are 1 to $3 \mu\text{m}$ voids in this sample but no open cracks. Below P_C there is no positive deviation of β above the linear trend, which confirms the absence of cracks. Below P_C the deviation of β is negative. This negative deviation is a work softening

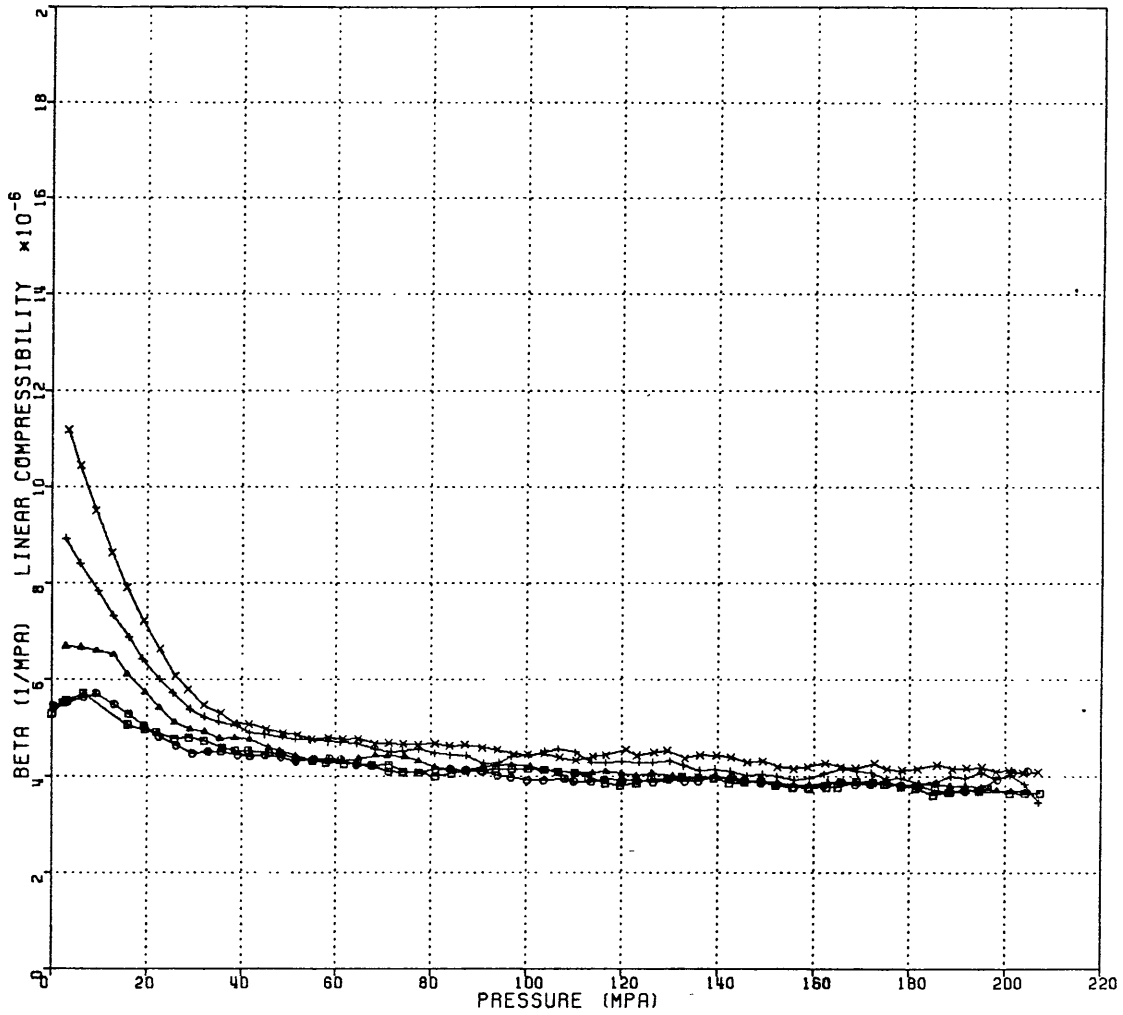


83 TROY OK GRANITE

GAGE: CA

□ - 23°C
 ○ - 48°C
 △ - 68°C
 + - 85°C

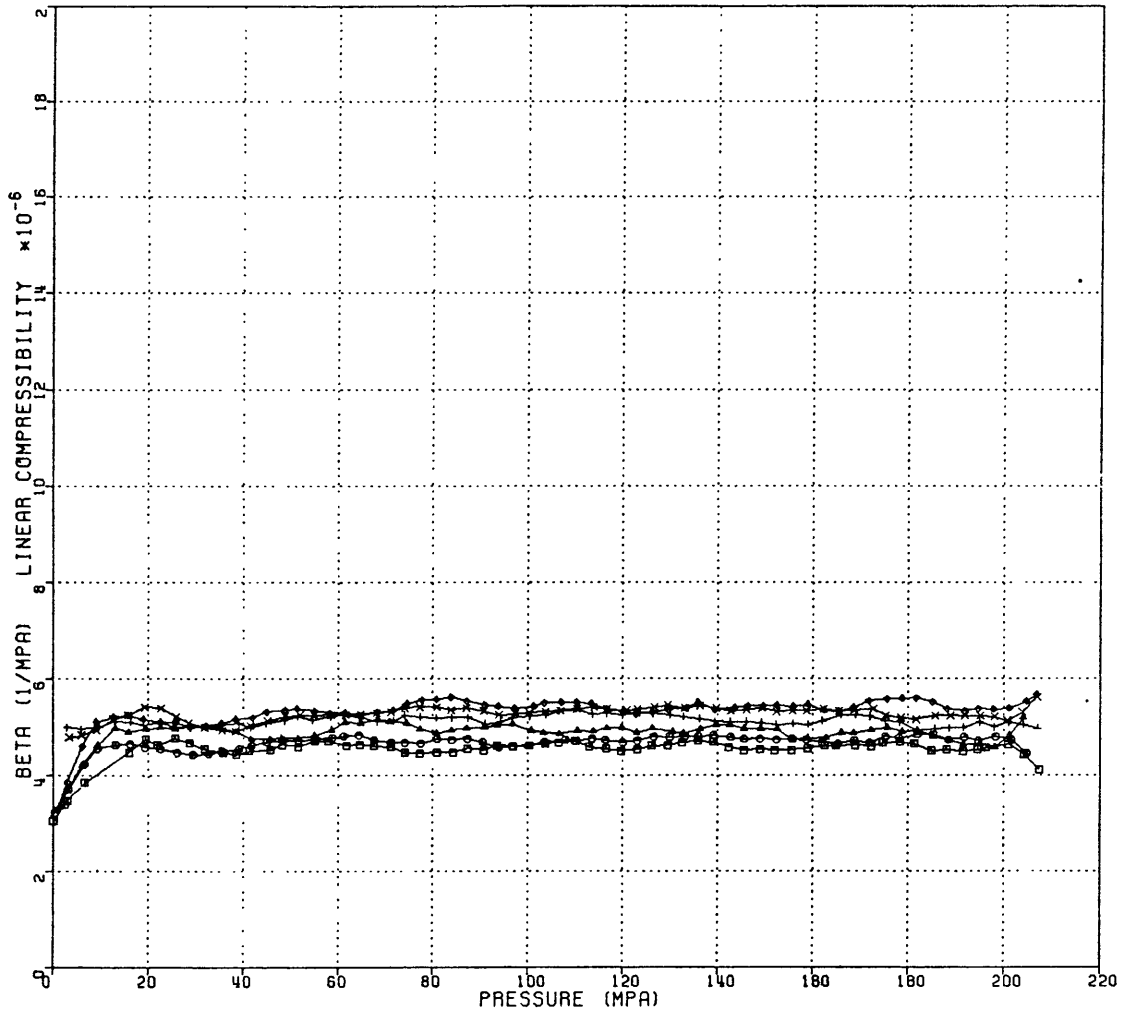
FIGURE 10. Plot of β vs. P for the high temperature block of 83 Troy granite. β is in units of $10^{-6}/\text{MPa}$. T is in MPa.



1381 MELLON WI GABBRO
GAGE: 4A

□ - 23°C
○ - 49°C
△ - 65°C
+ - 85°C
× - 107°C

FIGURE 11. Plot of β vs. P for 1381 Mellon gabbro. β shows an increase at low pressure for each successive cycle after 49°C. β is in units of $10^{-6}/\text{MPa}$. P is in MPa.



1407 MIDDLEBROOK M0 FELSITE

GAGE: BA

- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- × - 107°C
- ◇ - 125°C

FIGURE 12. Plot of β vs. P for 1407 Middle brook felsite. β shows no increase at low pressure which is attributed to the absence of open cracks. β is in units of $10^{-6}/\text{MPa}$. P is in MPa.

effect which is also demonstrated more prominently in 812
Pageland diabase.

Conclusions

Above the crack closure pressure P_c the thermal expansion coefficient α , and the compressibility β vary linearly with pressure and temperature. Isothermal increases in β are comparable to isobaric decreases in α .

Below P_c α behaves erratically and is dependent on the experimental pressure temperature path. β decreases rapidly with pressure if cracks are present reaching a smoothly varying value at P_c . If the pressure is reduced to 0.1 MPa while increasing temperature, new cracks may form if the temperature is raised above the thermal cracking temperature of the rock. If the pressure is not reduced to 0.1 MPa while increasing pressure cracks may not open that would normally take higher pressures to close.

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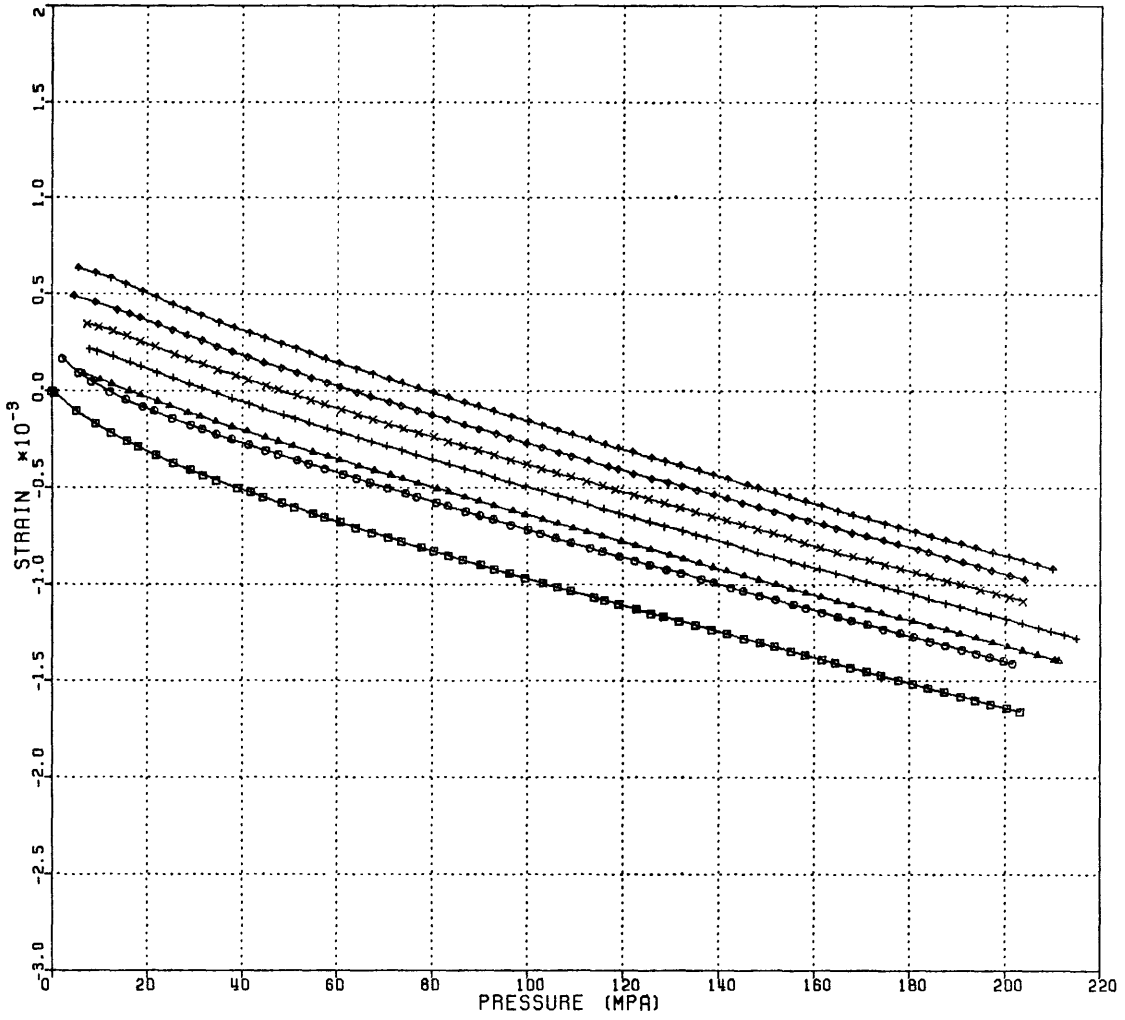
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APPENDIX

The following 556 pages are plots of all the gages that provided useful data and some brief descriptions of their behavior. Each gage is plotted six different ways: (1) ϵ vs. P, (2) ϵ vs. T, (3) β vs. P, (4) β vs. T, (5) α vs. P, and (6) α vs. T. ϵ is in units of $\frac{\Delta m}{m}$, β is reciprocal MPa, α is reciprocal $^{\circ}\text{C}$, P is in MPa, and T is in $^{\circ}\text{C}$. Units are often modified by a power of 10^{-3} or 10^{-6} . In either case the exponent modifies the units along the axis and not the label. Brief descriptions and starting page numbers for each sample block are indexed in the table of contents.

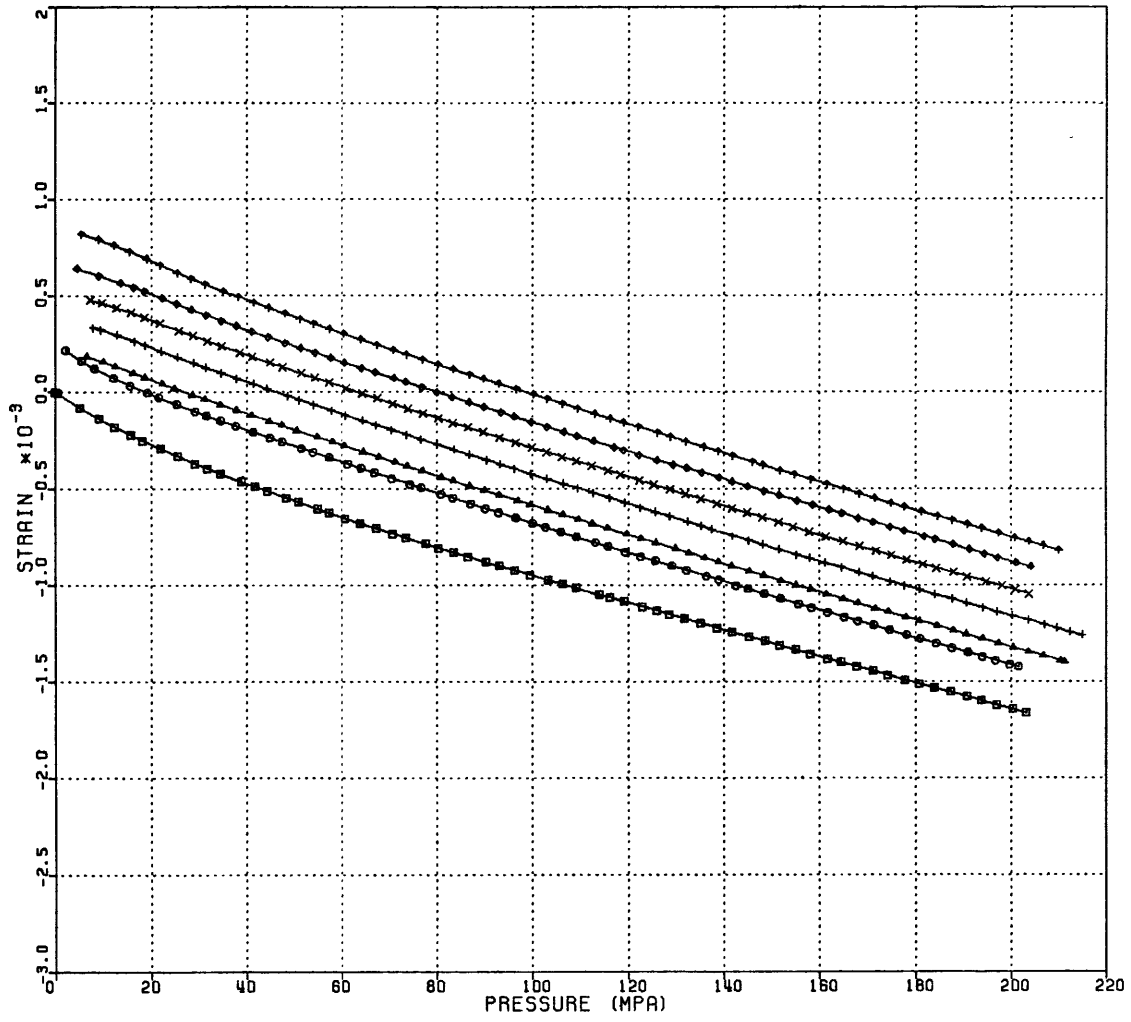
83 Troy granite shows an increase in β between the low and high temperature blocks indicating that T_c is less than 150°C . β does not show an increase between cycles of a run to the highest temperature of 85°C which serves as a lower bound for T_c . Troy granite is 15 anisotropic in β and 60* anisotropic in α . A characteristic of α vs. P is the strong linearity with no upward or downward trend. The variation of β with respect to pressure above P_c behaves similarly.



83 TROY OK GRANITE

GAGE: AB

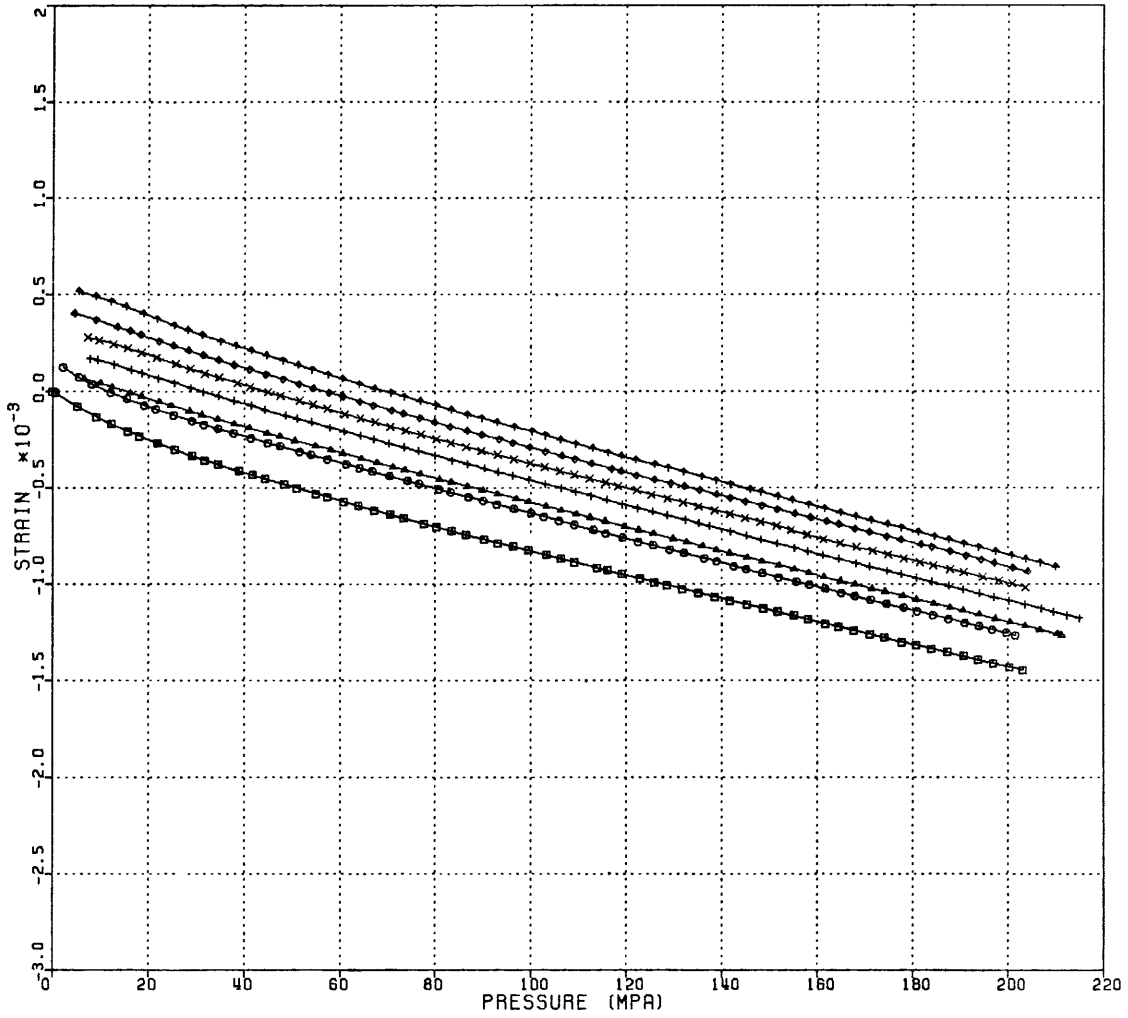
- - 22°C
- - 46°C
- △ - 55°C
- + - 70°C
- × - 83°C
- ◇ - 96°C
- ↑ - 110°C
- ↓ - 110°C



83 TROY OK GRANITE

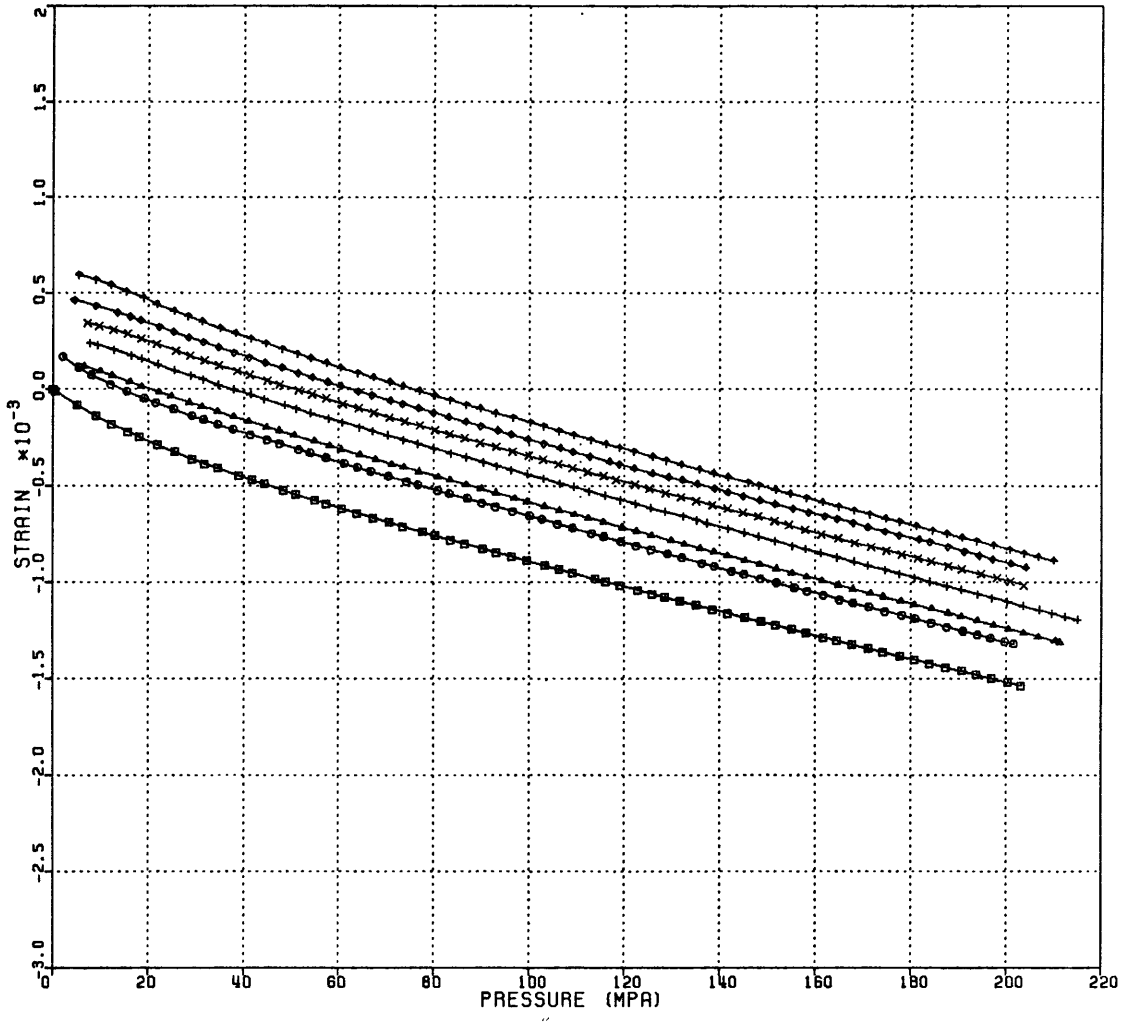
GAGE: 3B

- - 22°C
- - 46°C
- △ - 55°C
- + - 70°C
- × - 83°C
- ◇ - 96°C
- ↑ - 110°C



83 TROY OK GRANITE
GAGE: BA

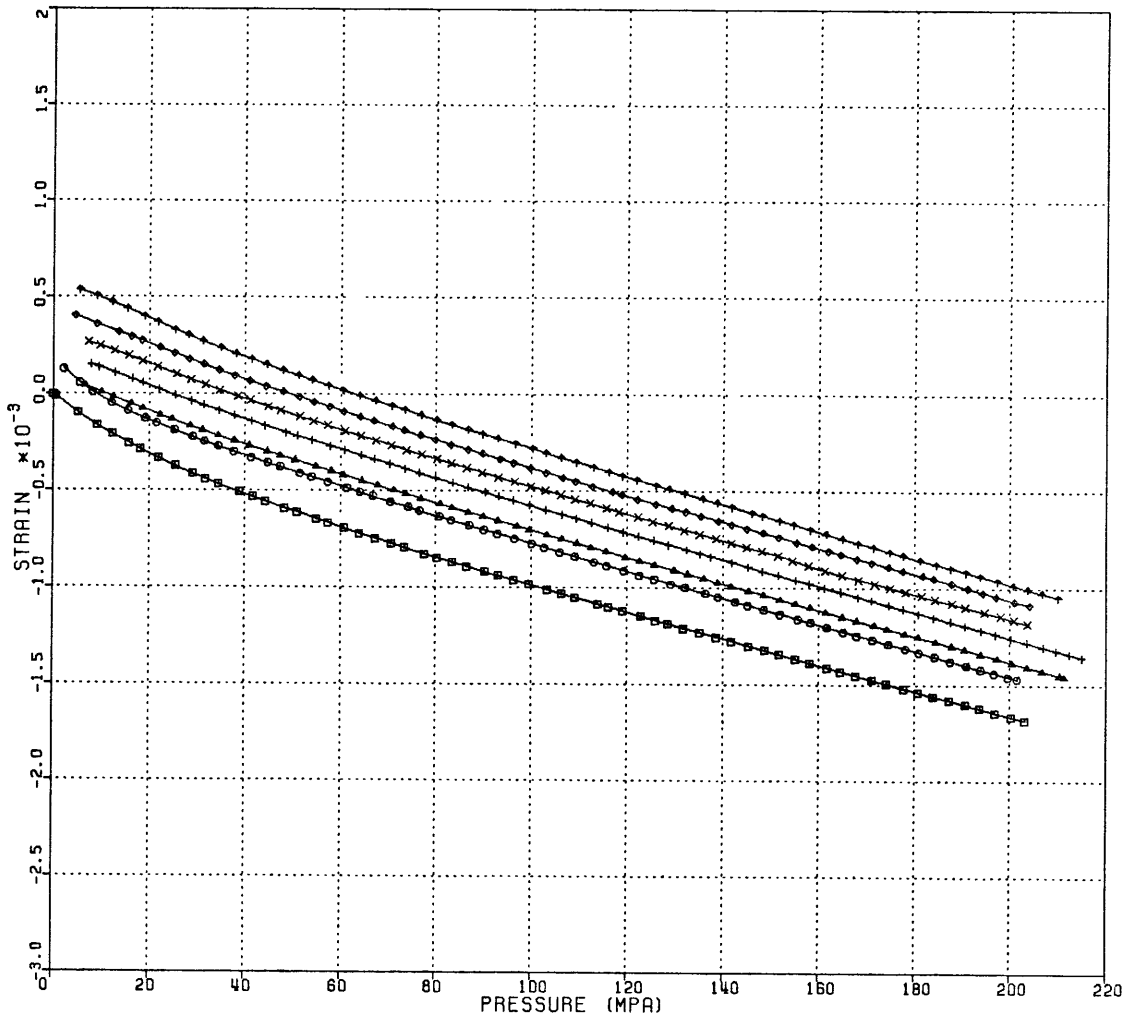
- - 22°C
- - 46°C
- △ - 55°C
- + - 70°C
- X - 83°C
- ◇ - 96°C
- ↑ - 110°C



83 TRØY ØK GRANITE

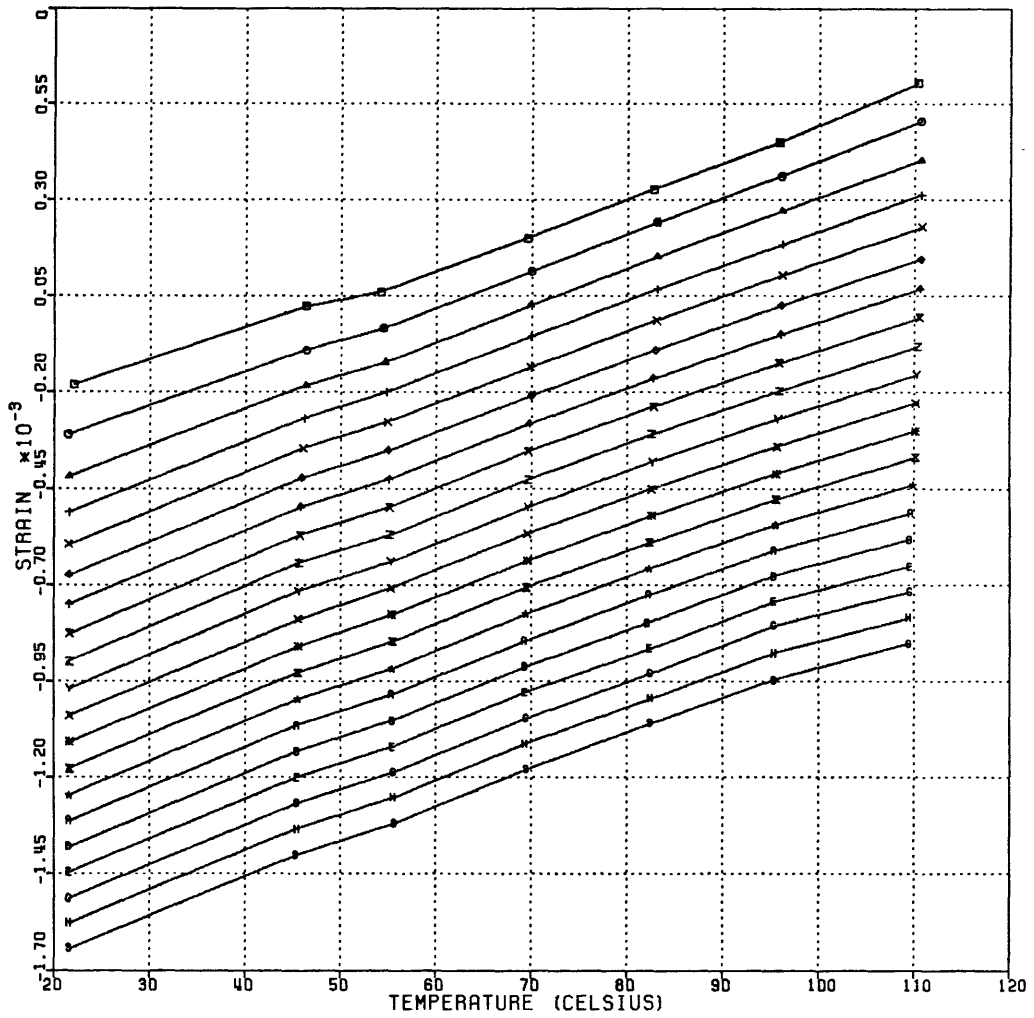
GAGE: CA

- - 22°C
- - 46°C
- △ - 55°C
- + - 70°C
- X - 83°C
- ◇ - 96°C
- ↑ - 110°C



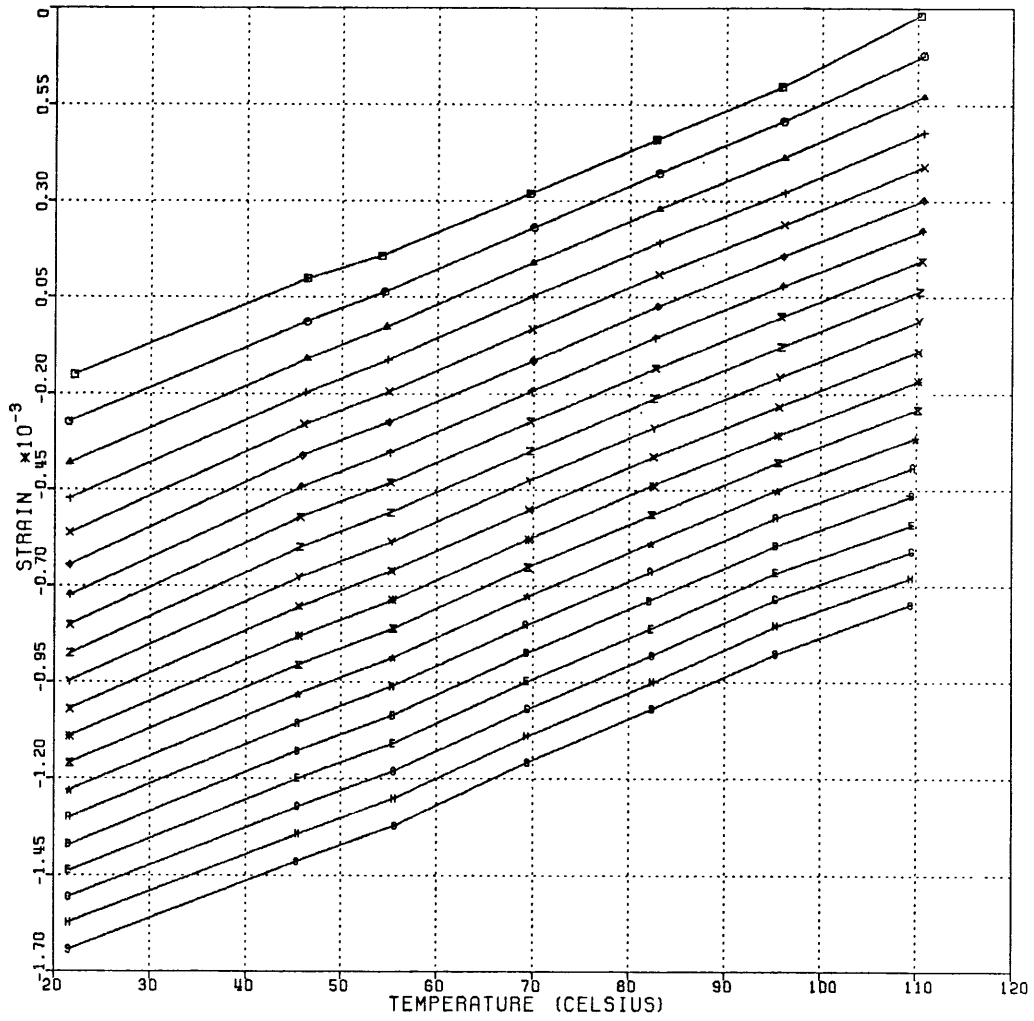
83 TROY OK GRANITE
GAGE: 3A

- - 22°C
- - 46°C
- △ - 55°C
- + - 70°C
- X - 83°C
- ◇ - 96°C
- ↗ - 110°C



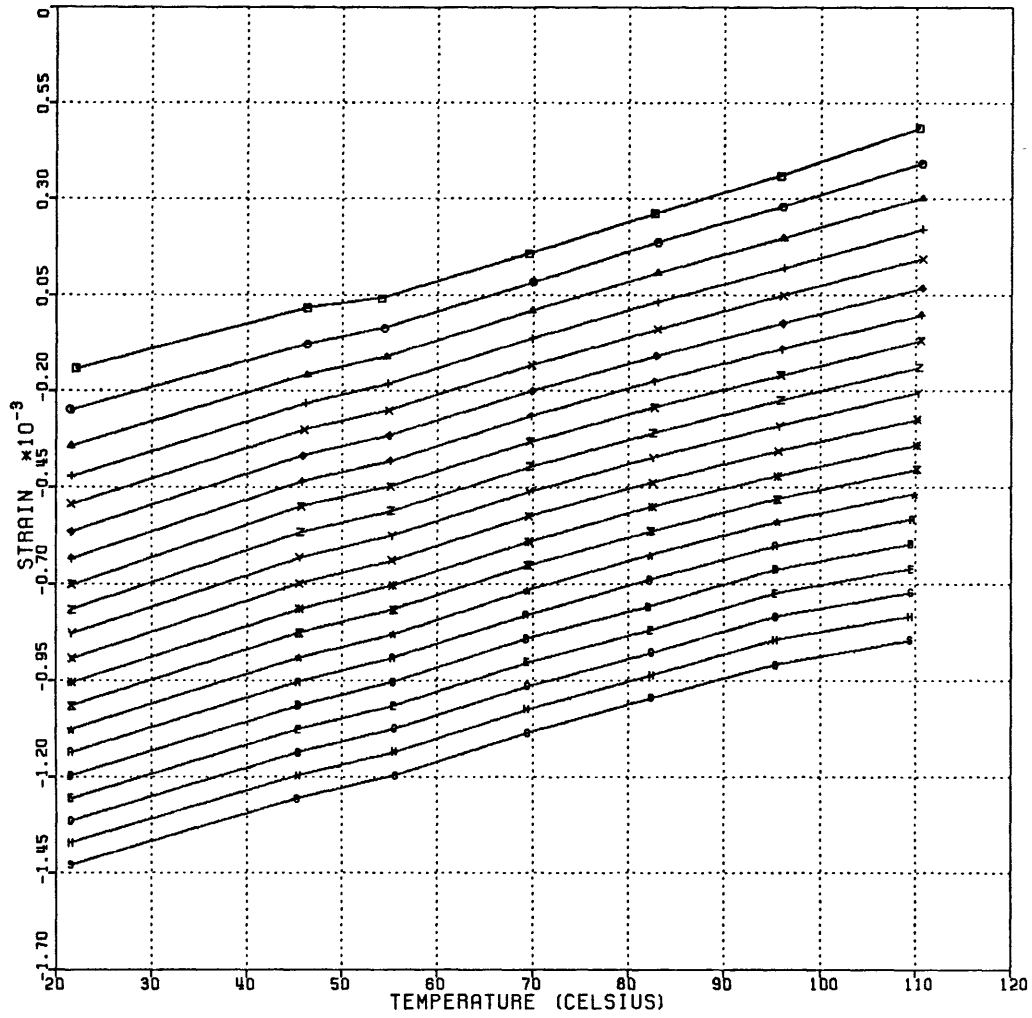
83 TROY OK GRANITE
GAGE: AB

- | | |
|-------------|-------------|
| □ - 10 MPA | ⋈ - 110 MPA |
| ○ - 20 MPA | ⋆ - 120 MPA |
| △ - 30 MPA | ⋈ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| × - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ⬆ - 70 MPA | E - 170 MPA |
| X - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



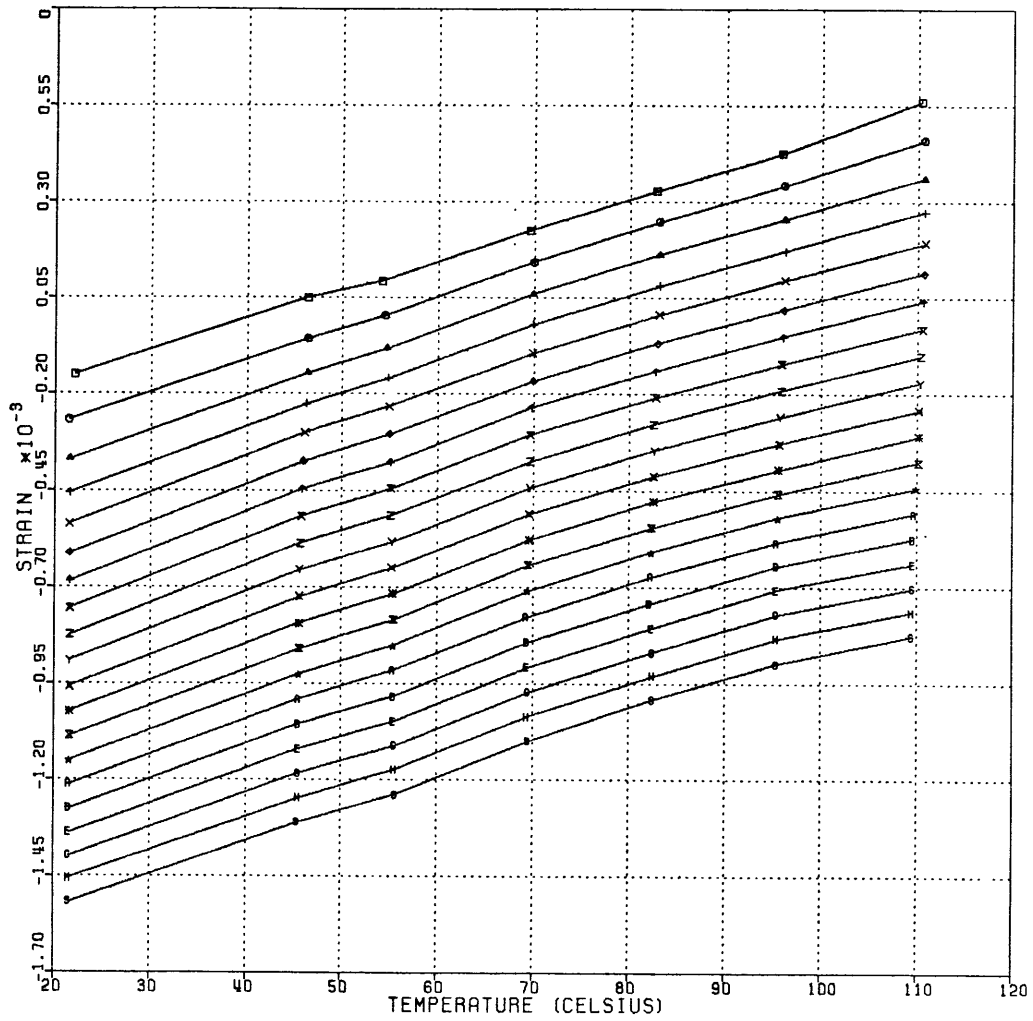
83 TROY OK GRANITE
GAGE: 3B

- | | |
|-------------|-------------|
| □ - 10 MPA | ⌘ - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | ⊗ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ⋈ - 70 MPA | E - 170 MPA |
| ⊗ - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



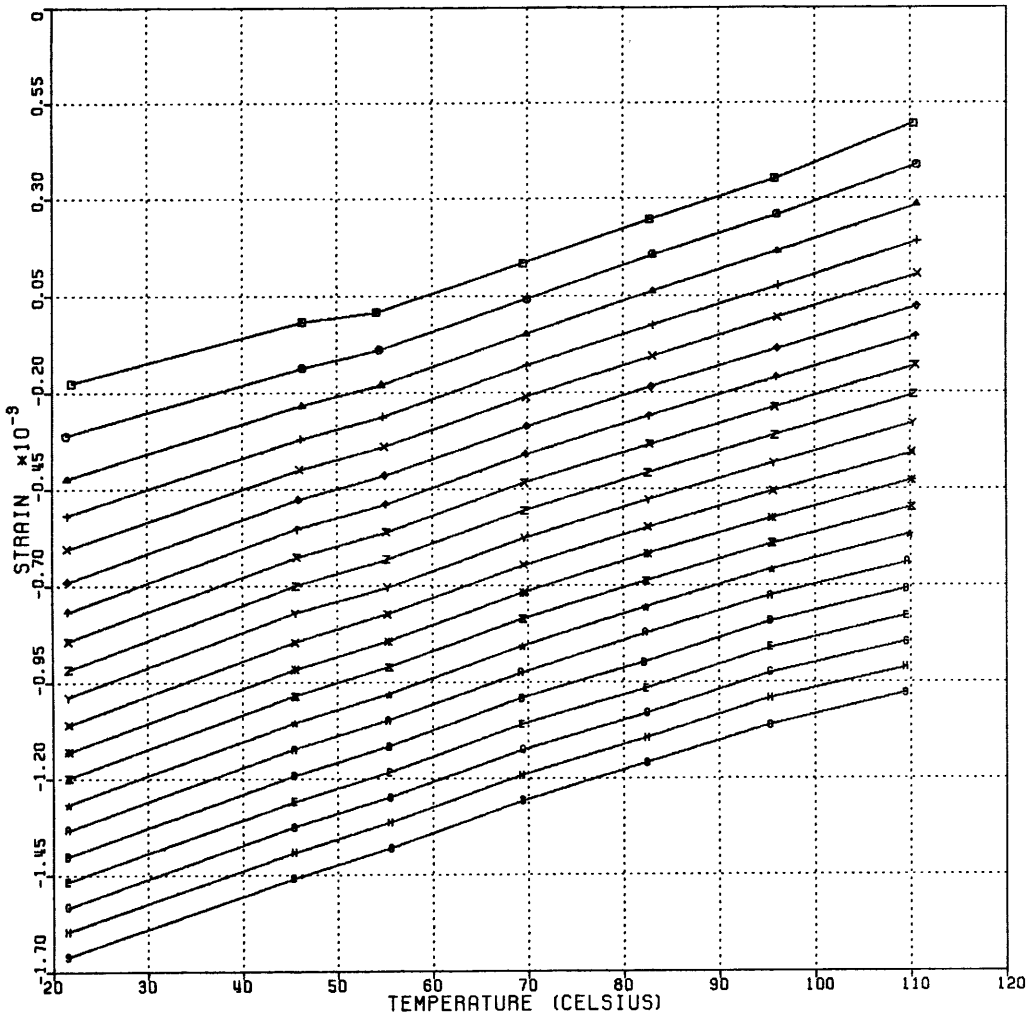
83 TROY OK GRANITE
GAGE: BA

- | | |
|-------------|-------------|
| □ - 10 MPA | × - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | ⊗ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| × - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ♠ - 70 MPA | E - 170 MPA |
| ⊗ - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



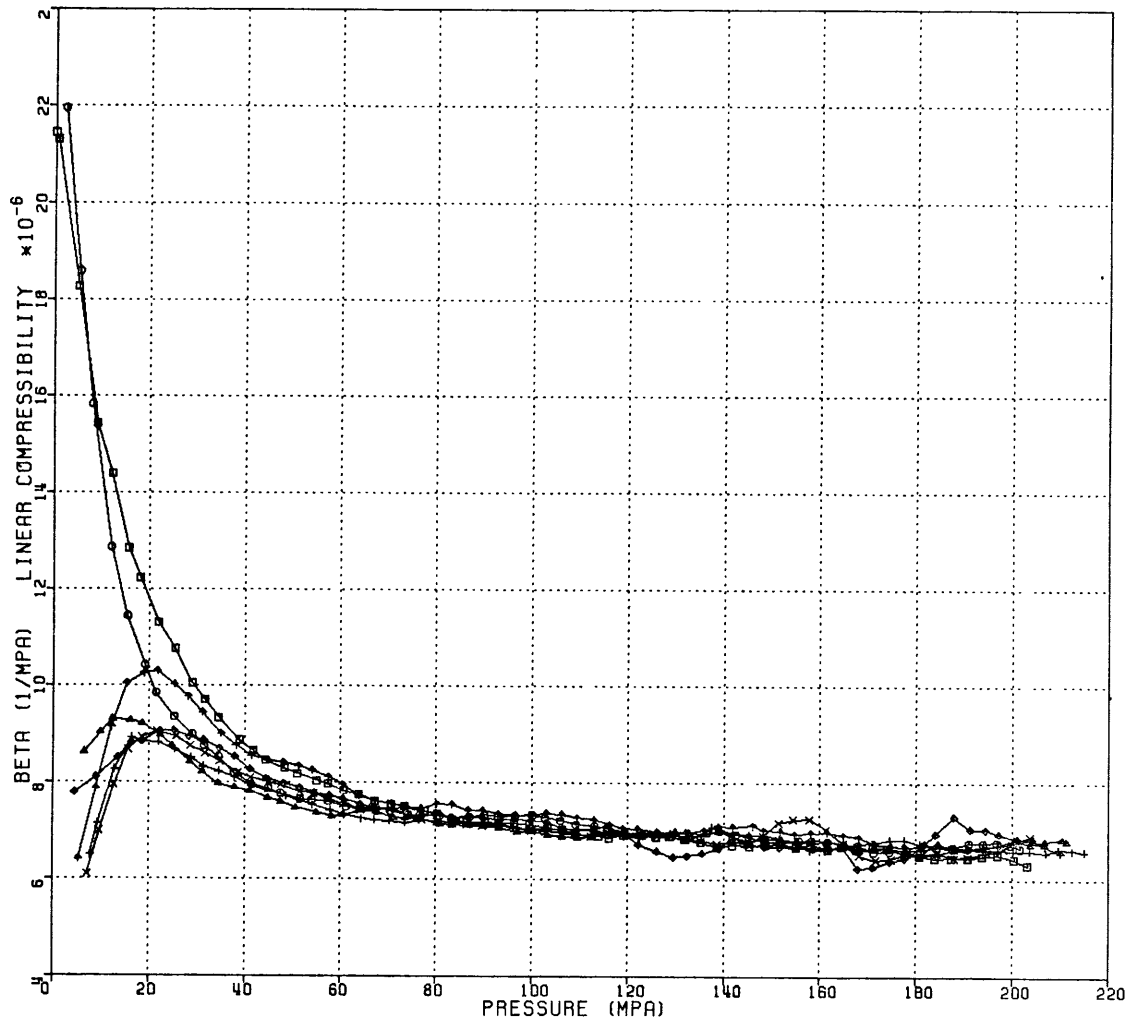
83 TROY OK GRANITE
GAGE: CA

- | | |
|-------------|-------------|
| □ - 10 MPA | ⋈ - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | ⊗ - 130 MPA |
| + - 40 MPA | ☆ - 140 MPA |
| X - 50 MPA | ⊕ - 150 MPA |
| ◇ - 60 MPA | ⊖ - 160 MPA |
| ⋈ - 70 MPA | ⊗ - 170 MPA |
| ⊗ - 80 MPA | ⊕ - 180 MPA |
| ⊕ - 90 MPA | ⊖ - 190 MPA |
| ⊖ - 100 MPA | ⊗ - 200 MPA |



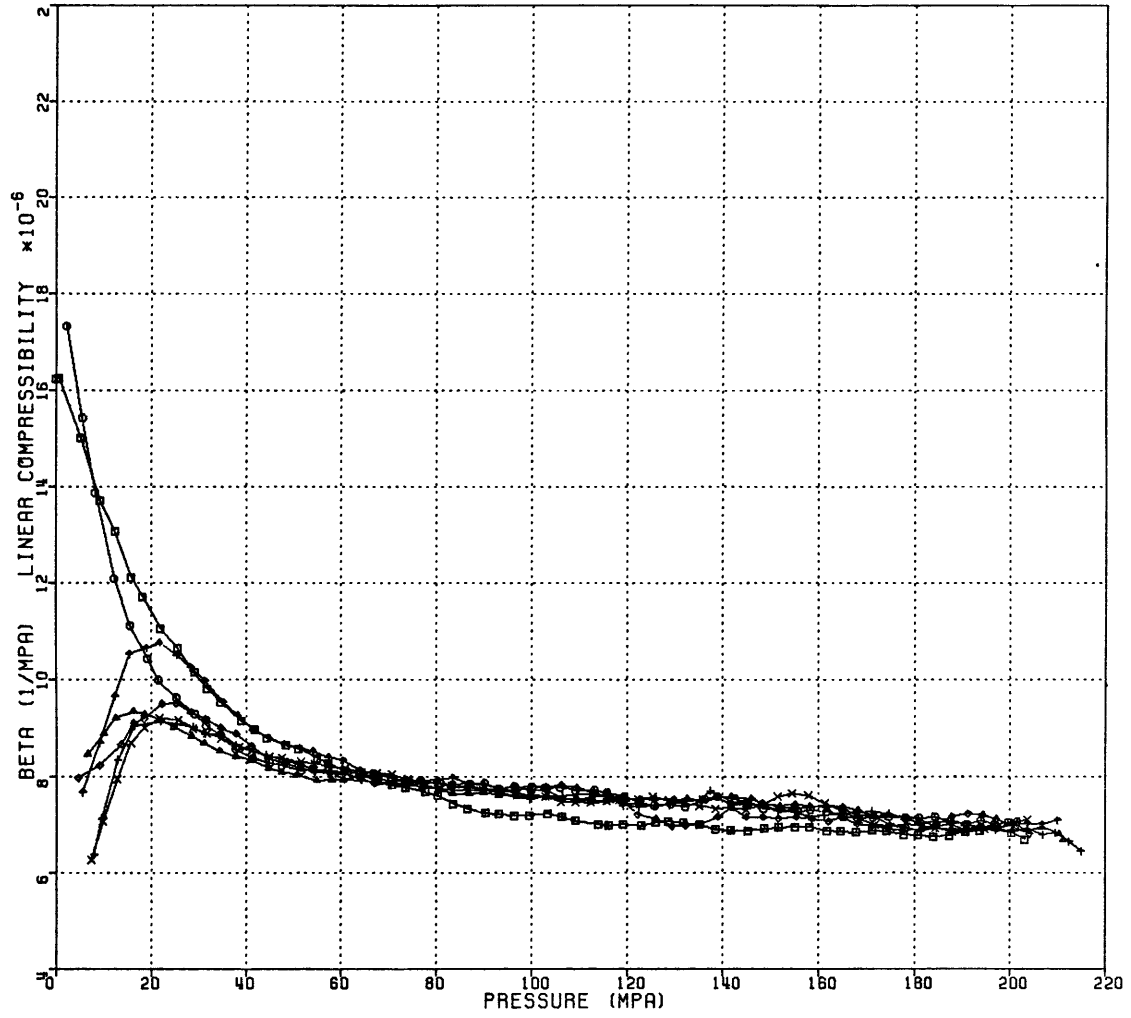
83 TROY OK GRANITE
GAGE: 3A

- | | |
|-------------|-------------|
| □ - 10 MPA | × - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | ⊗ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| × - 50 MPA | ⊙ - 150 MPA |
| ◇ - 60 MPA | ⊕ - 160 MPA |
| ⊙ - 70 MPA | ⊖ - 170 MPA |
| ⊗ - 80 MPA | ⊗ - 180 MPA |
| ⊗ - 90 MPA | ⊗ - 190 MPA |
| ⊗ - 100 MPA | ⊗ - 200 MPA |



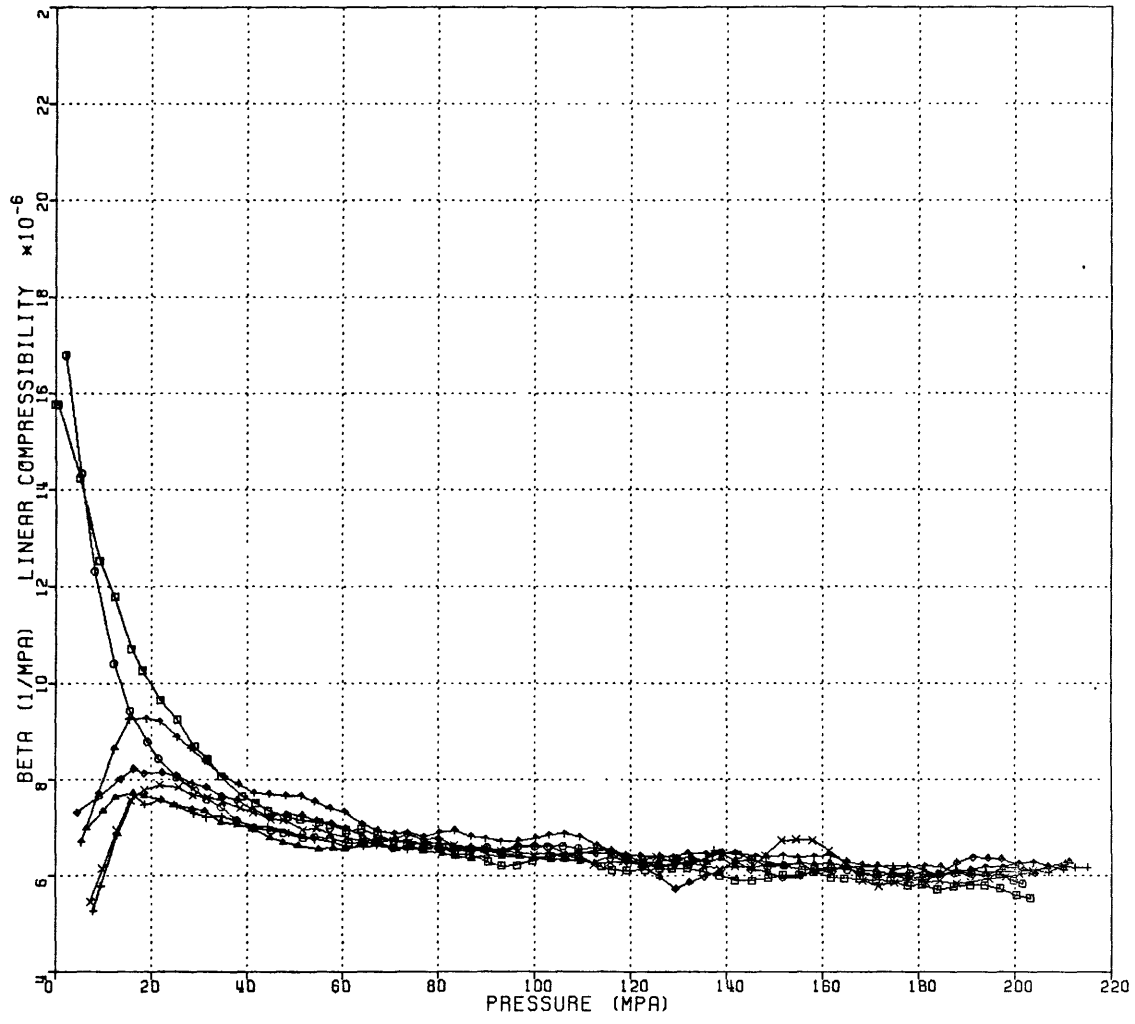
83 TROY OK GRANITE
GAGE: AB

- - 22°C
- - 46°C
- △ - 55°C
- + - 70°C
- x - 83°C
- ◇ - 96°C
- * - 110°C



83 TROY OAK GRANITE
GAGE: 3B

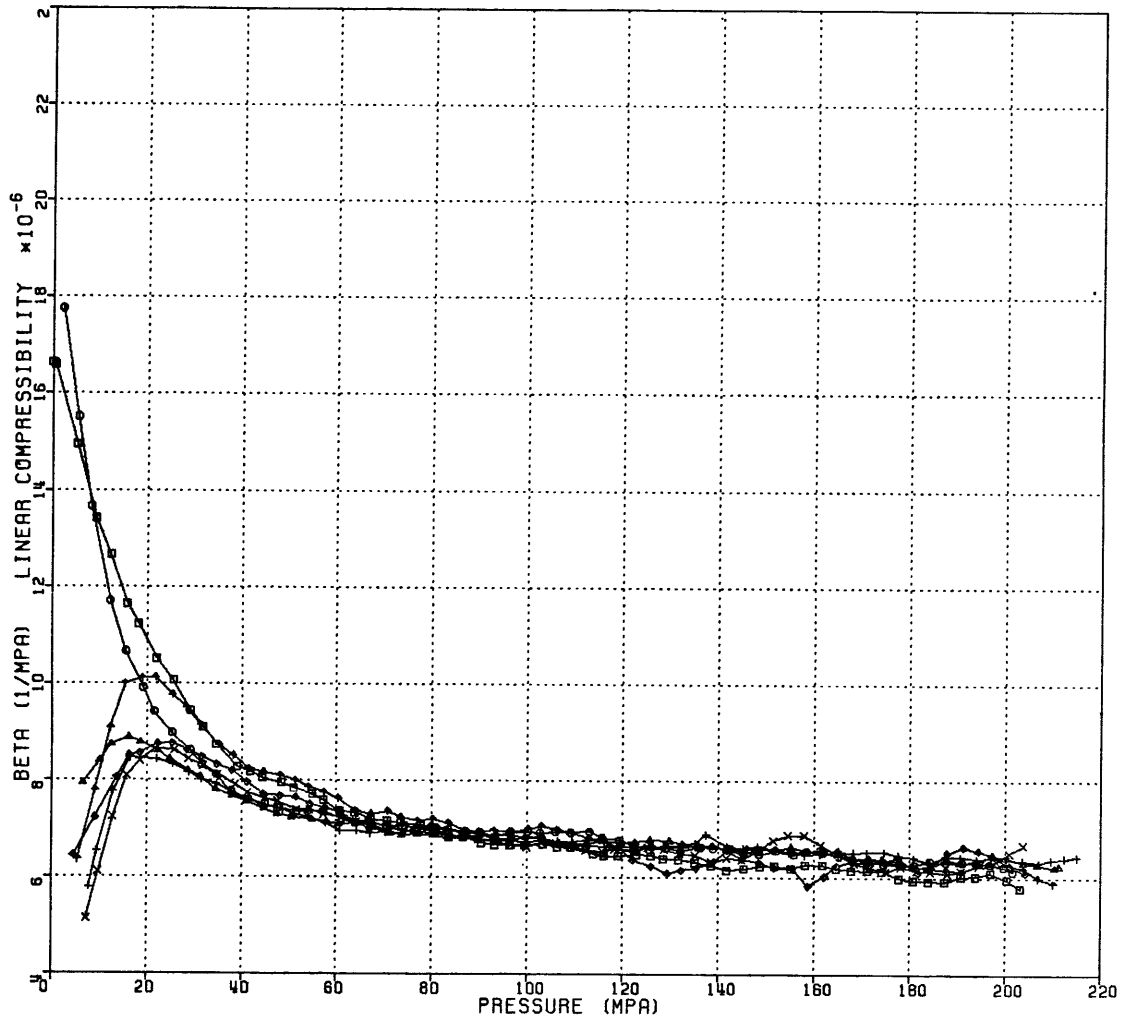
- - 22°C
- - 46°C
- △ - 55°C
- + - 70°C
- × - 83°C
- ◇ - 96°C
- * - 110°C



83 TROY OK GRANITE

GAGE: BA

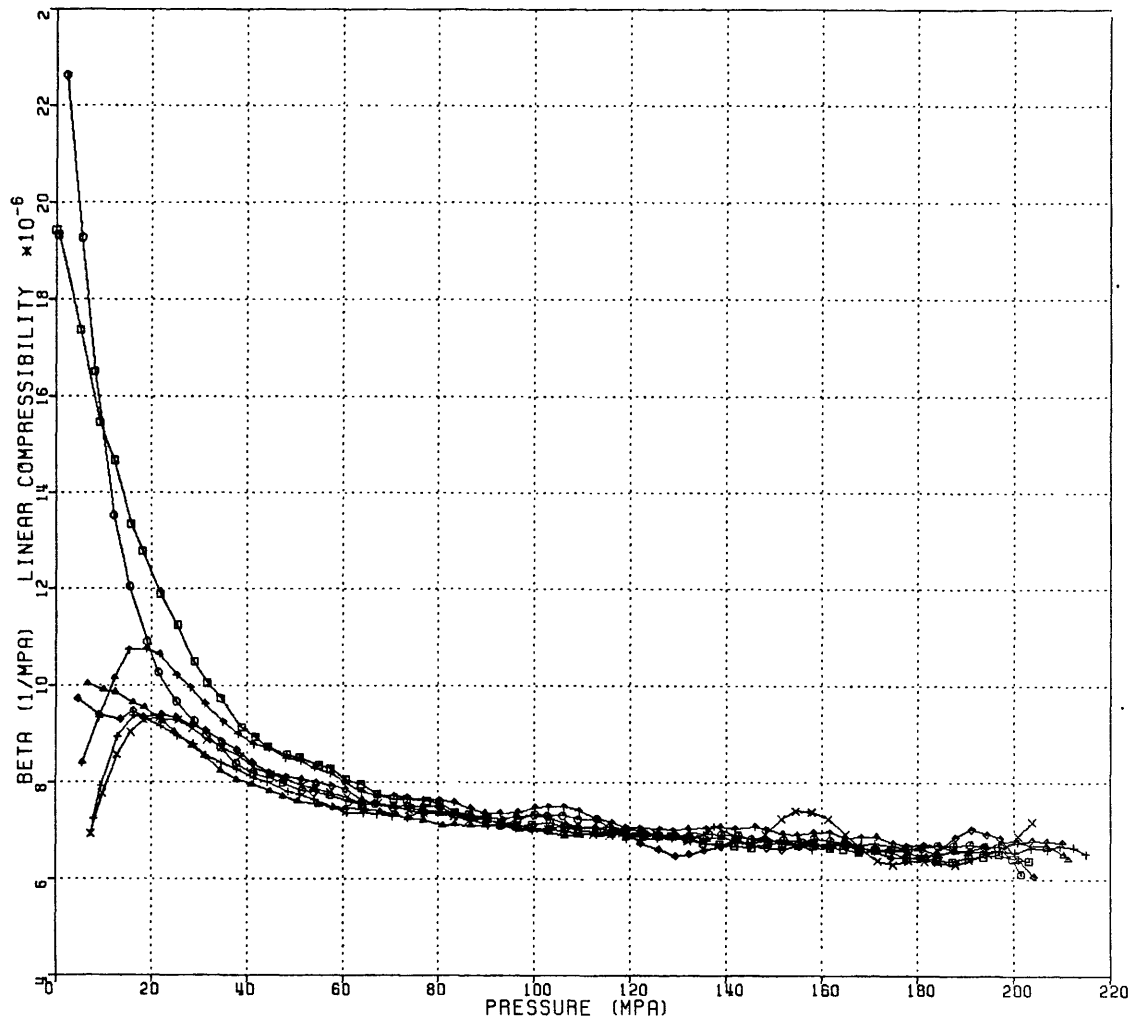
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- - 46°C
- △ - 55°C
- + - 70°C
- X - 83°C
- ◇ - 96°C
- ∇ - 110°C



83 TROY OK GRANITE

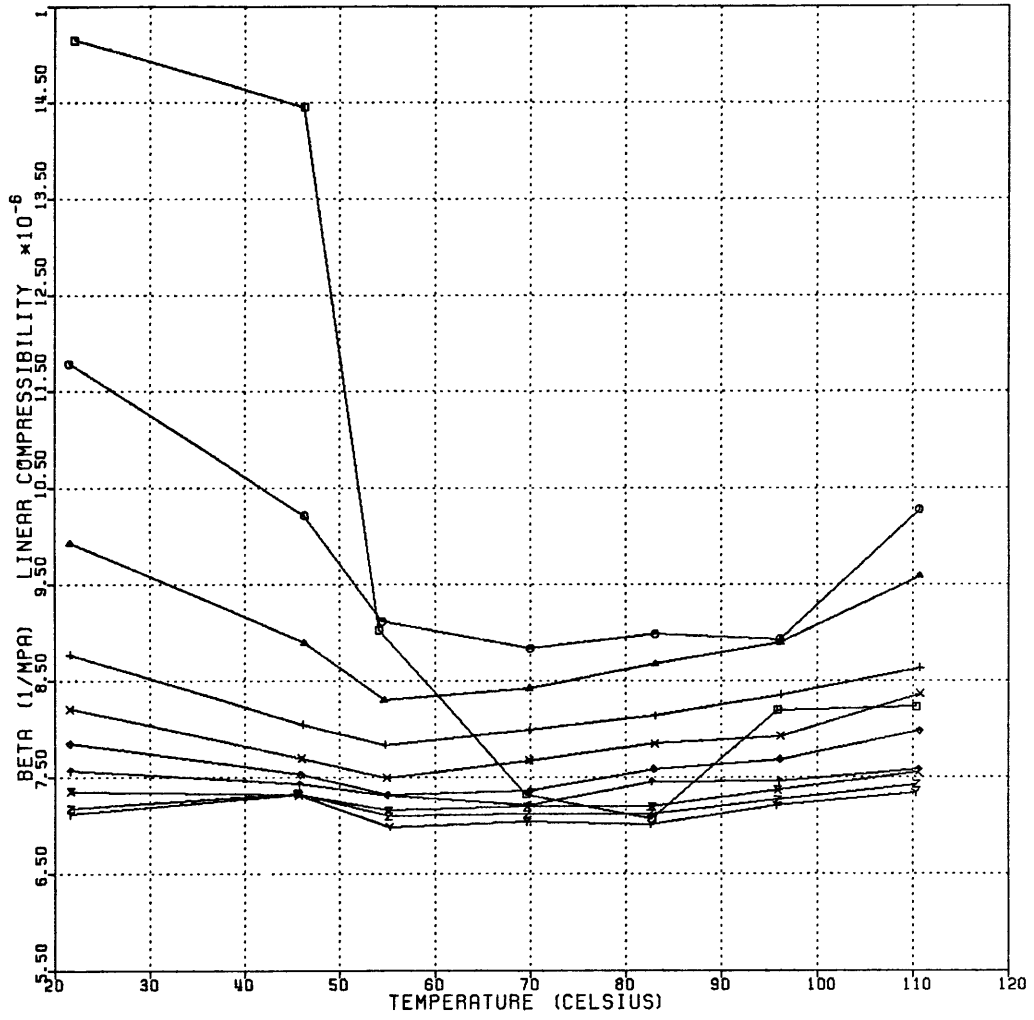
GAGE: CA

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- - 46°C
- △ - 55°C
- + - 70°C
- X - 83°C
- ◇ - 96°C
- ↑ - 110°C



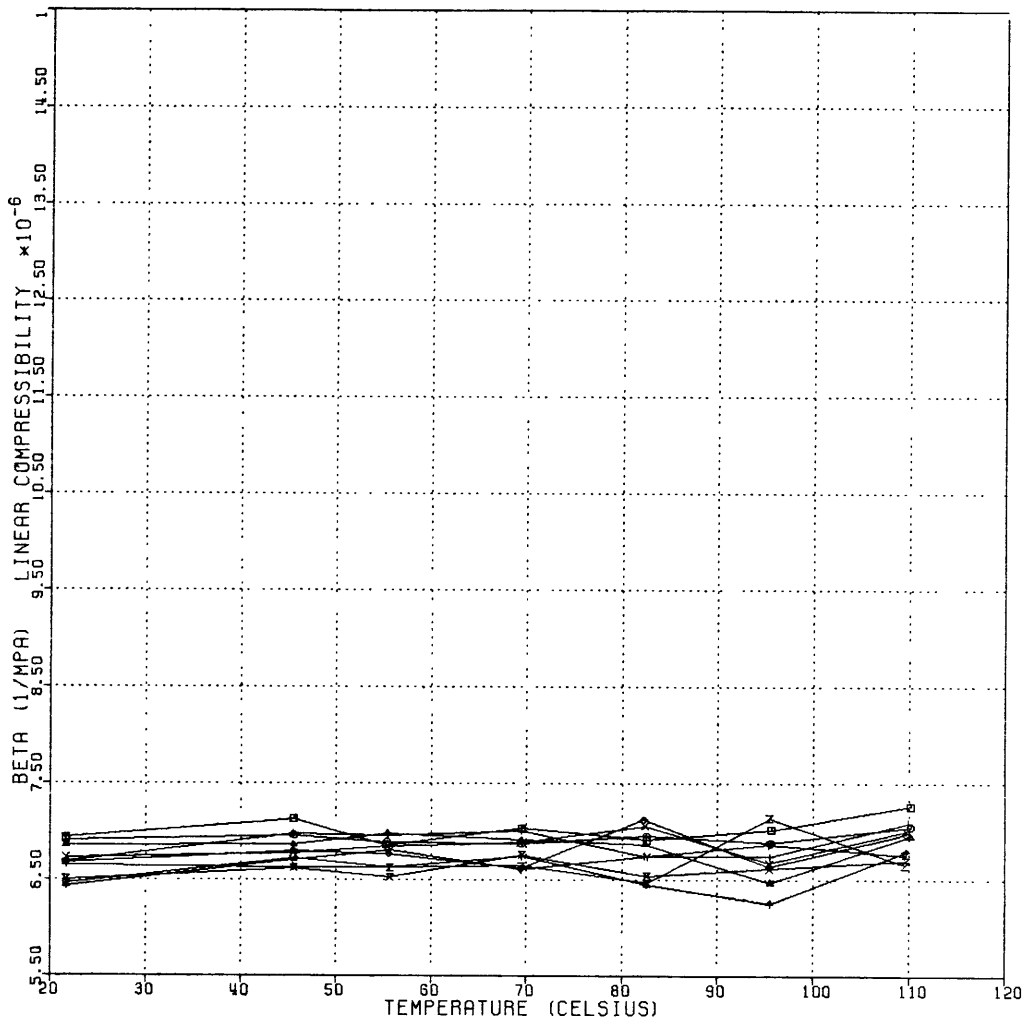
83 TROY OK GRANITE
GAGE: 3A

- - 22°C
- - 46°C
- △ - 55°C
- + - 70°C
- X - 83°C
- ◇ - 96°C
- ‡ - 110°C



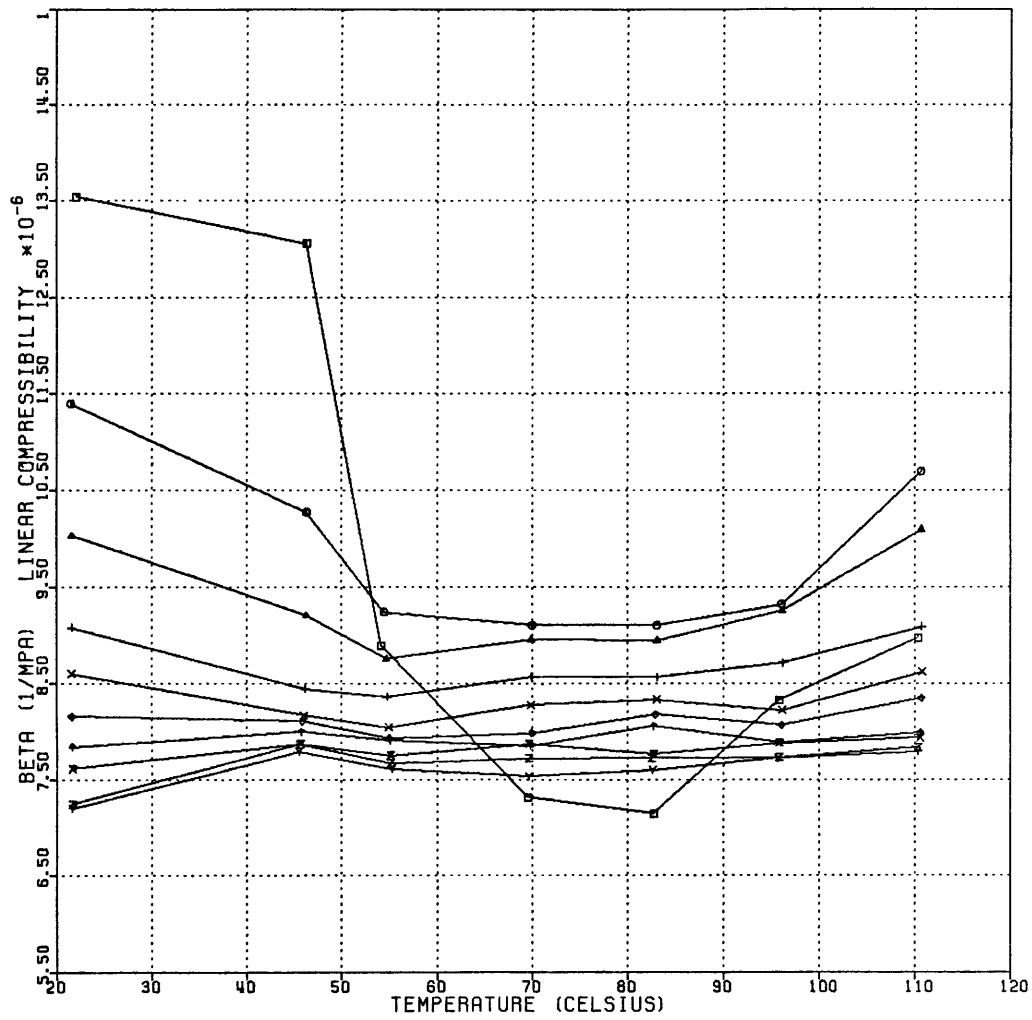
83 TROY OK GRANITE
GAGE:AB

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- × - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



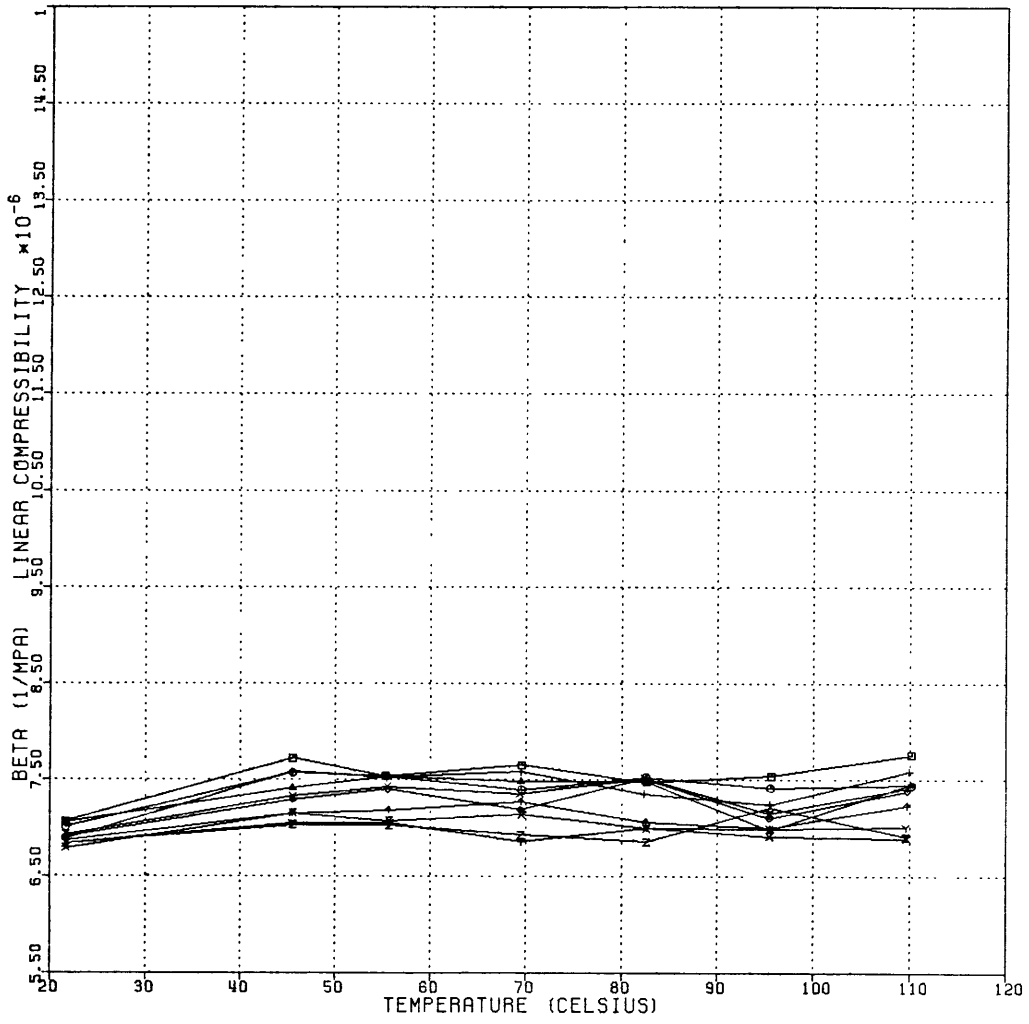
83 TROY OK GRANITE
GAGE: AB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



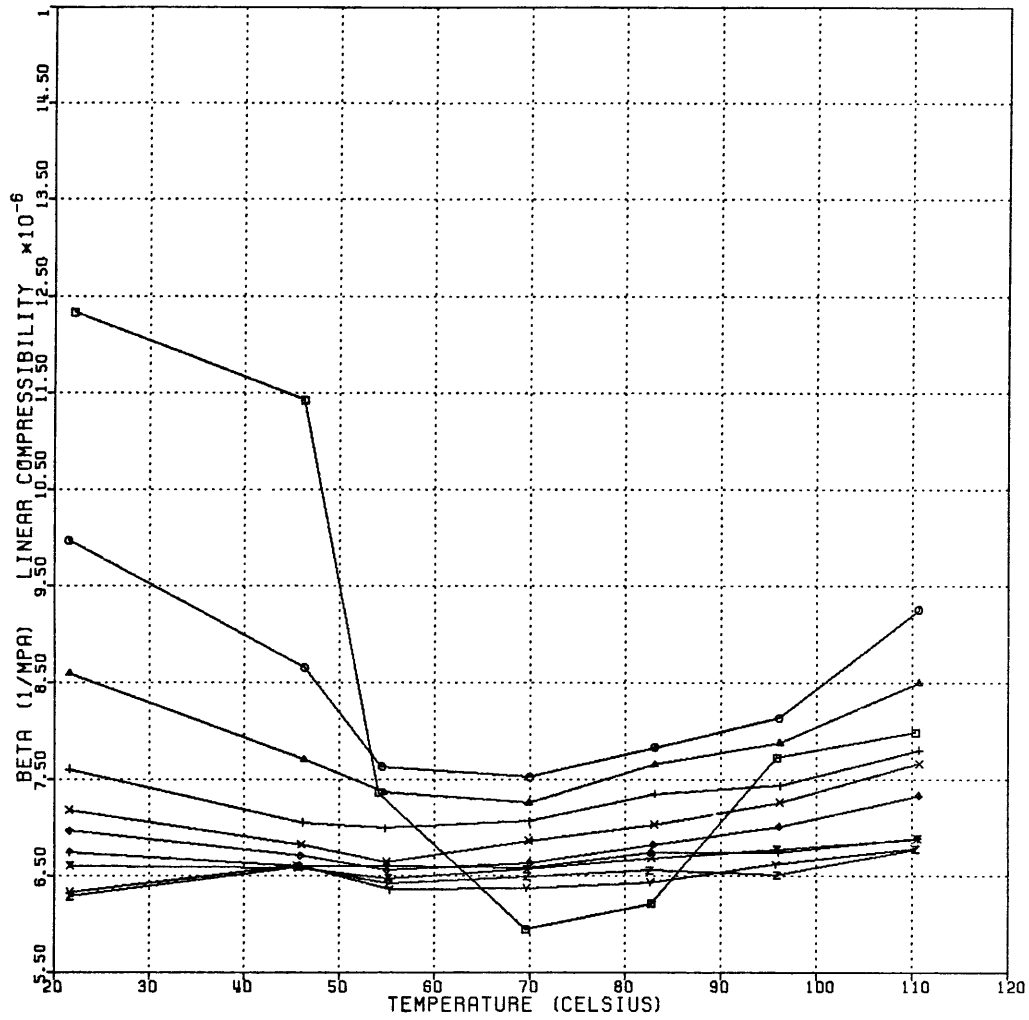
83 TROY OK GRANITE
GAGE: 3B

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- x - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- x - 80 MPA
- z - 90 MPA
- y - 100 MPA



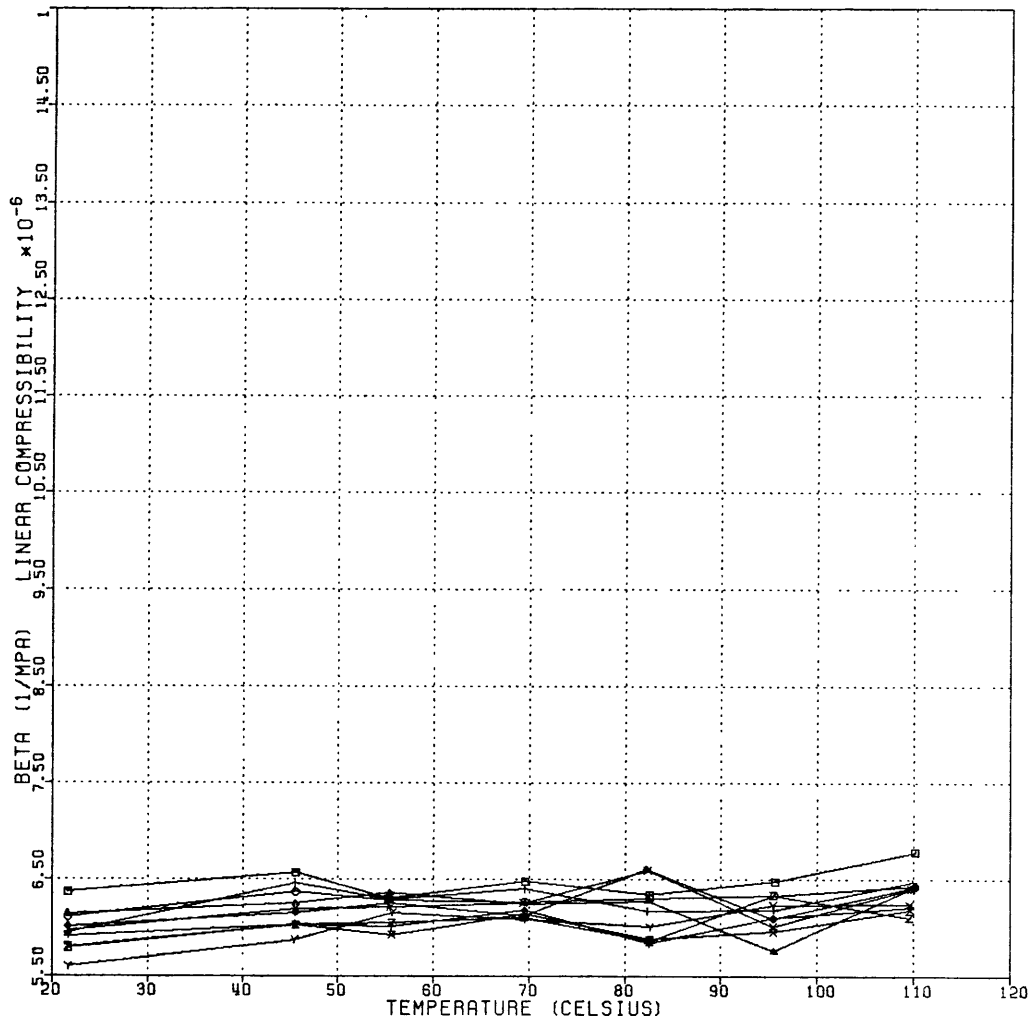
83 TROY OK GRANITE
GAGE: 3B

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



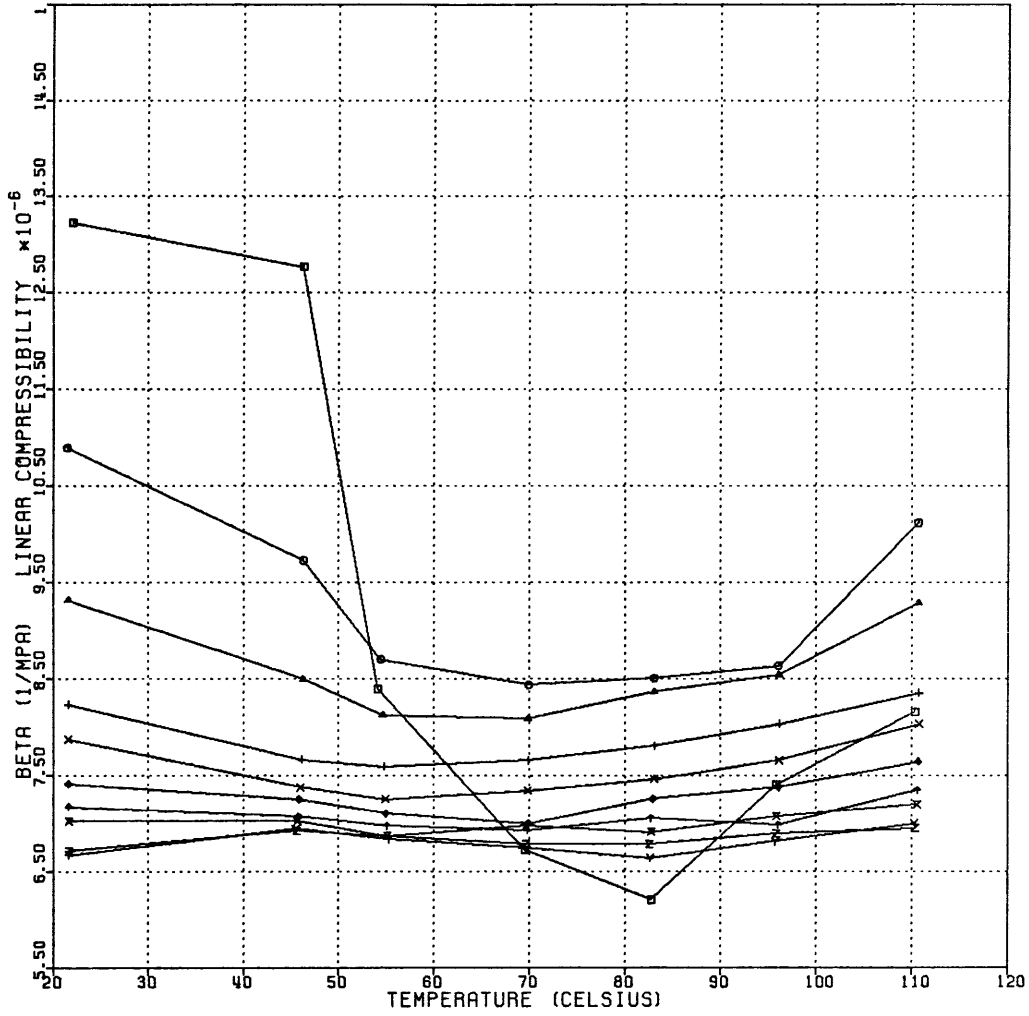
83 TROY OK GRANITE
GAGE: BA

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- x - 50 MPA
- ◇ - 60 MPA
- ♠ - 70 MPA
- ⊗ - 80 MPA
- ∇ - 90 MPA
- ∩ - 100 MPA



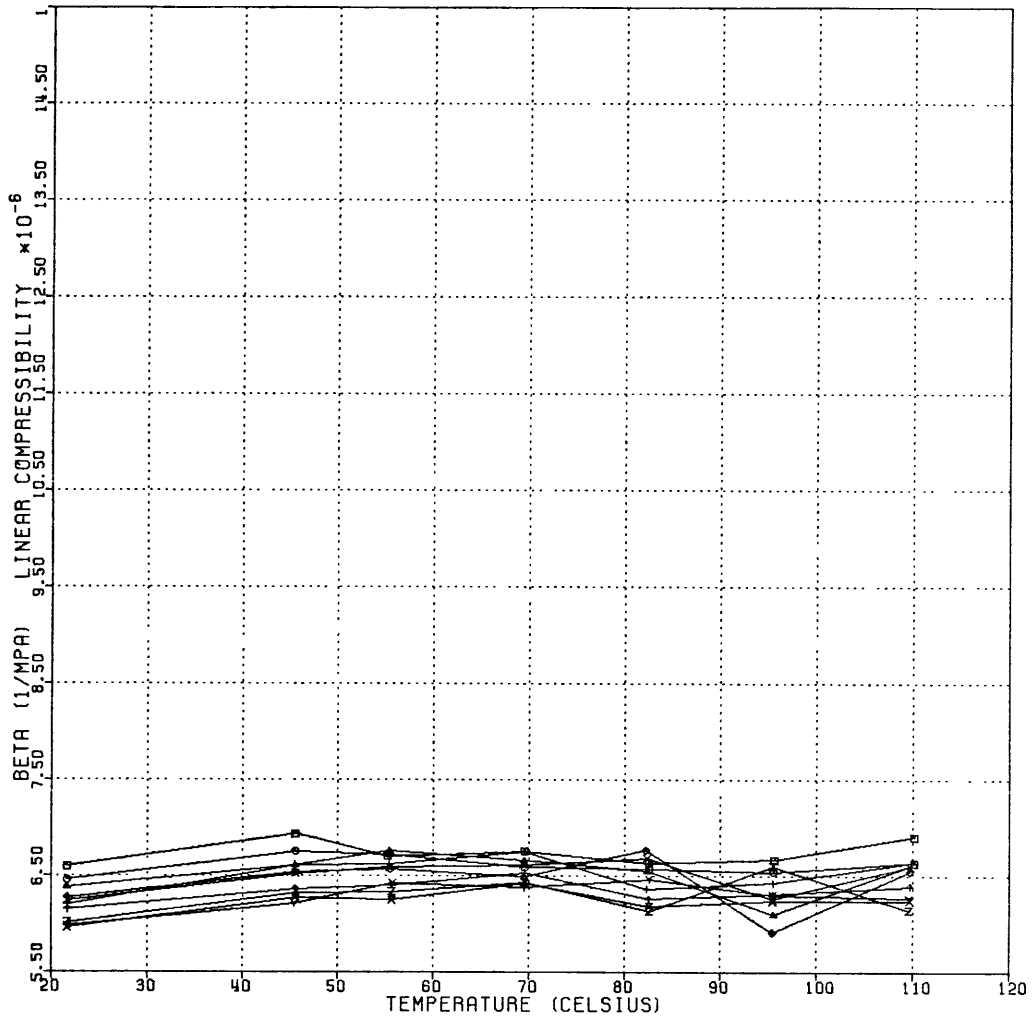
83 TROY OK GRANITE
GAGE:BA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



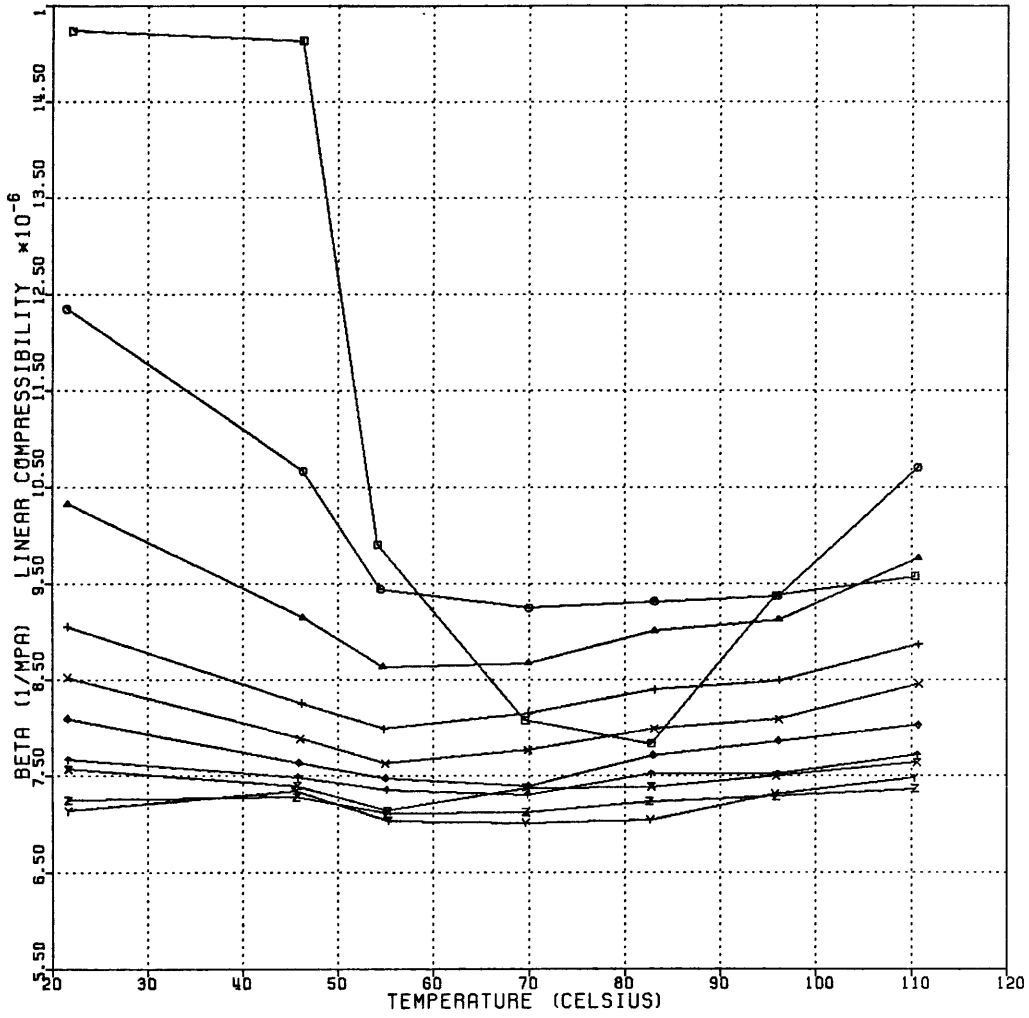
83 TROY OK GRANITE
GAGE: CA

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- x - 50 MPA
- ◇ - 60 MPA
- * - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



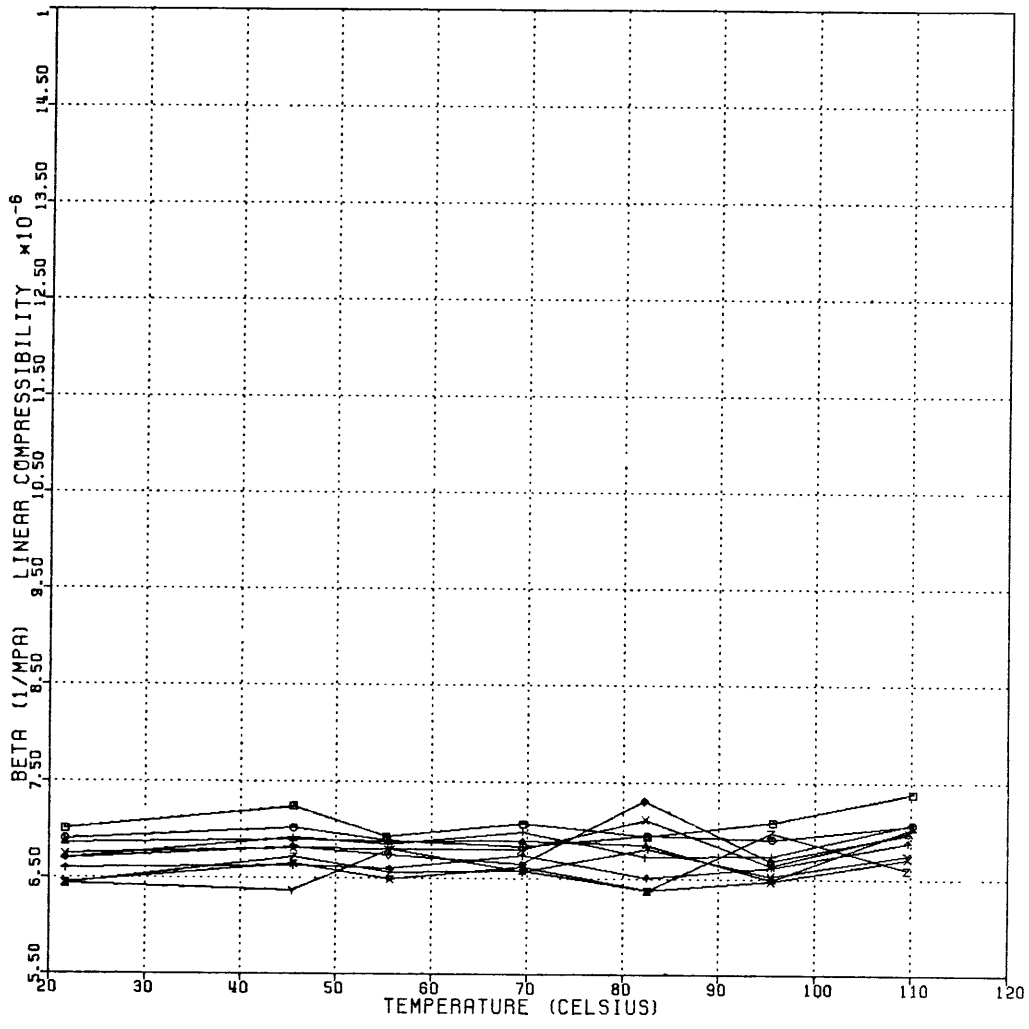
83 TROY OK GRANITE
GAGE:CA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



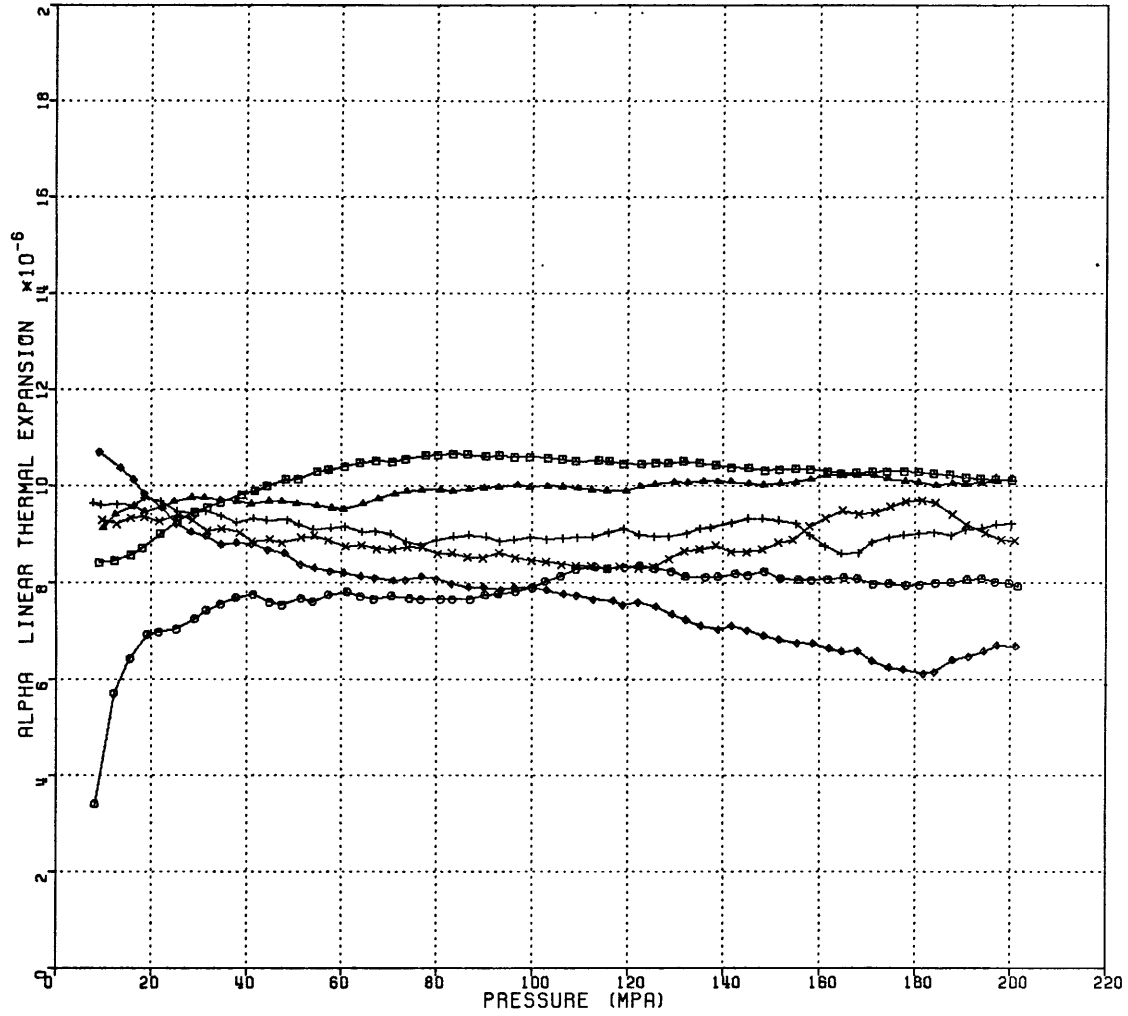
83 TROY OK GRANITE
GAGE: 3A

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ♣ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



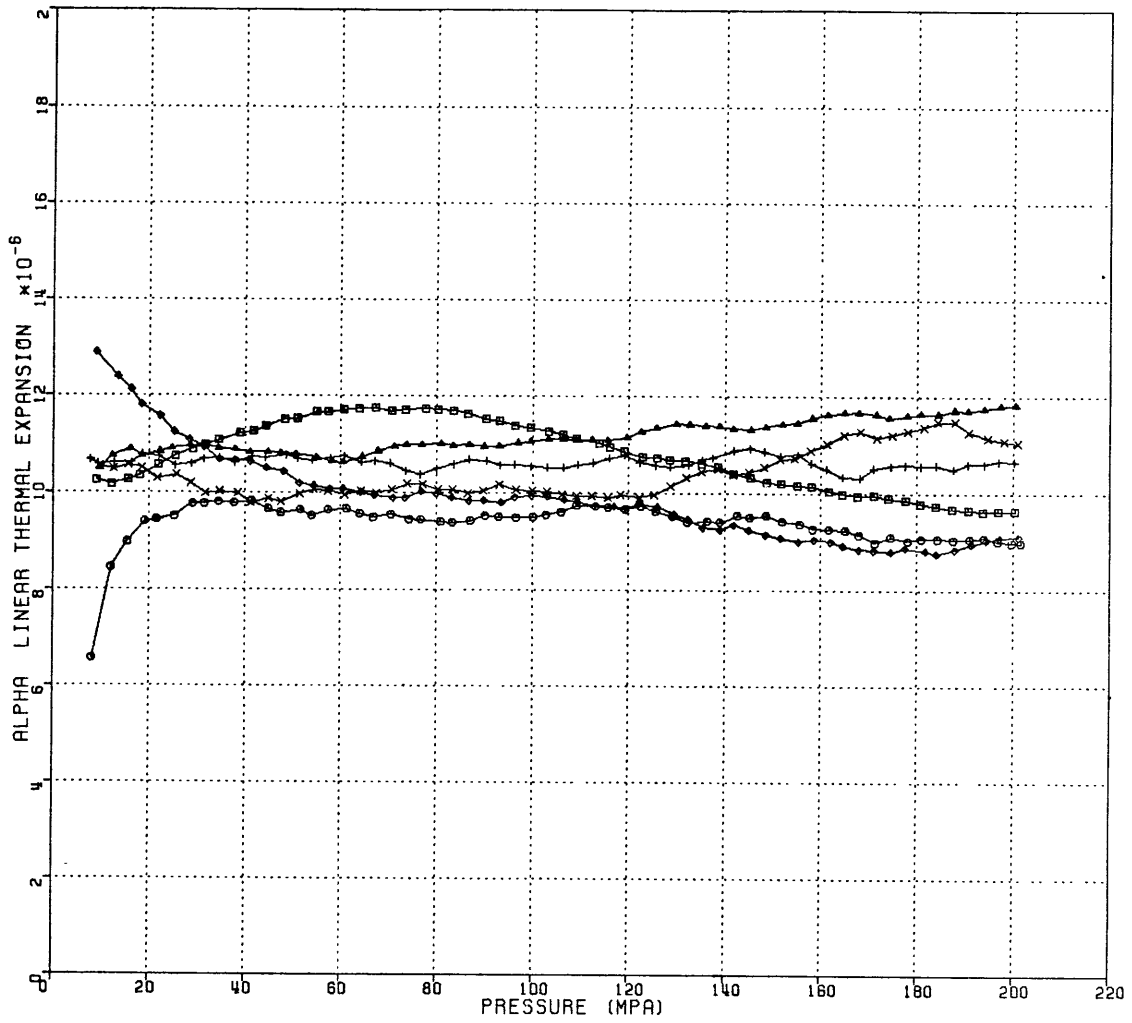
83 TROY OK GRANITE
GAGE: 3A

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⋈ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



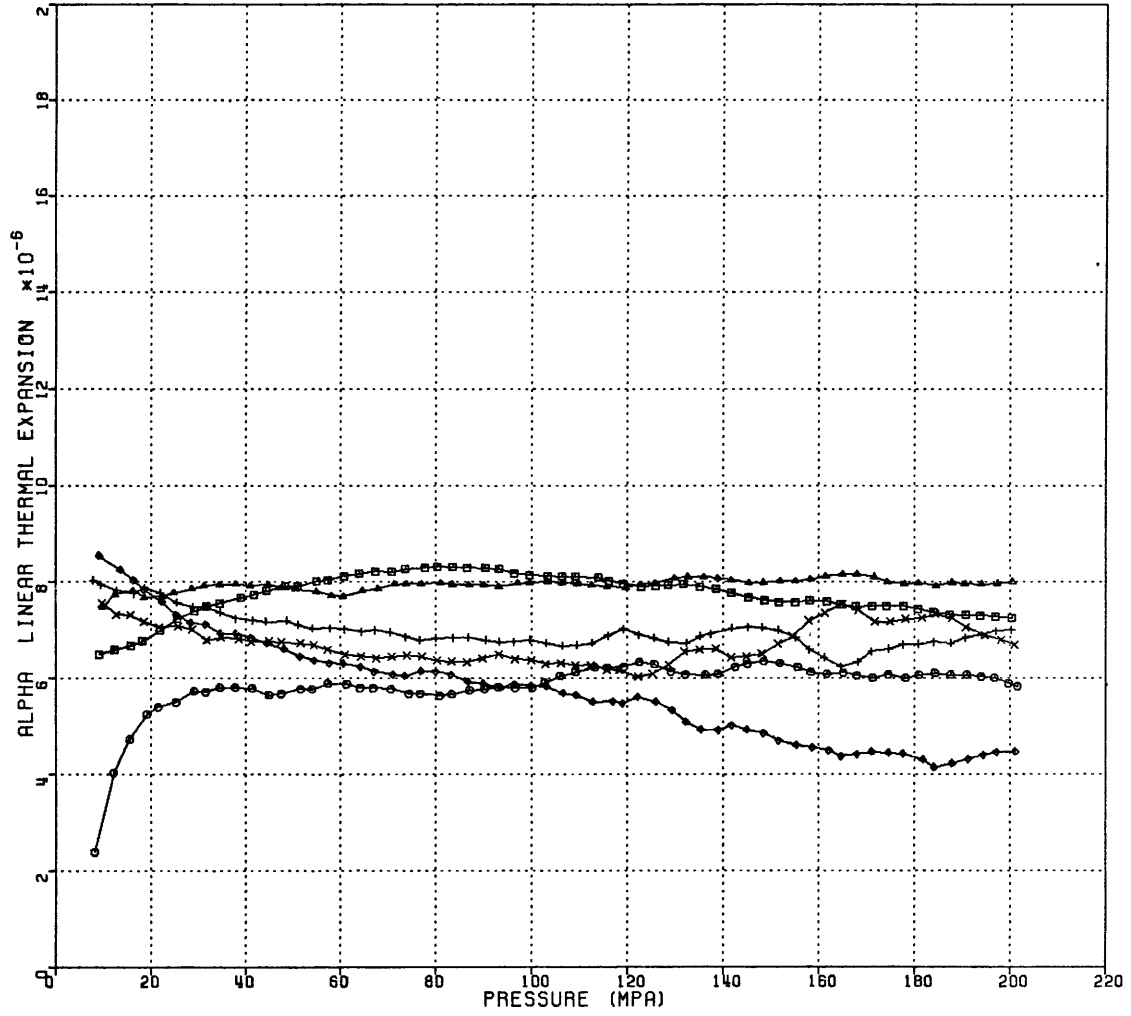
83 TROY OK GRANITE
GAGE: AB

- - 22°C-46°C
- - 46°C-55°C
- △ - 55°C-70°C
- + - 70°C-83°C
- X - 83°C-96°C
- ◇ - 96°C-110°C



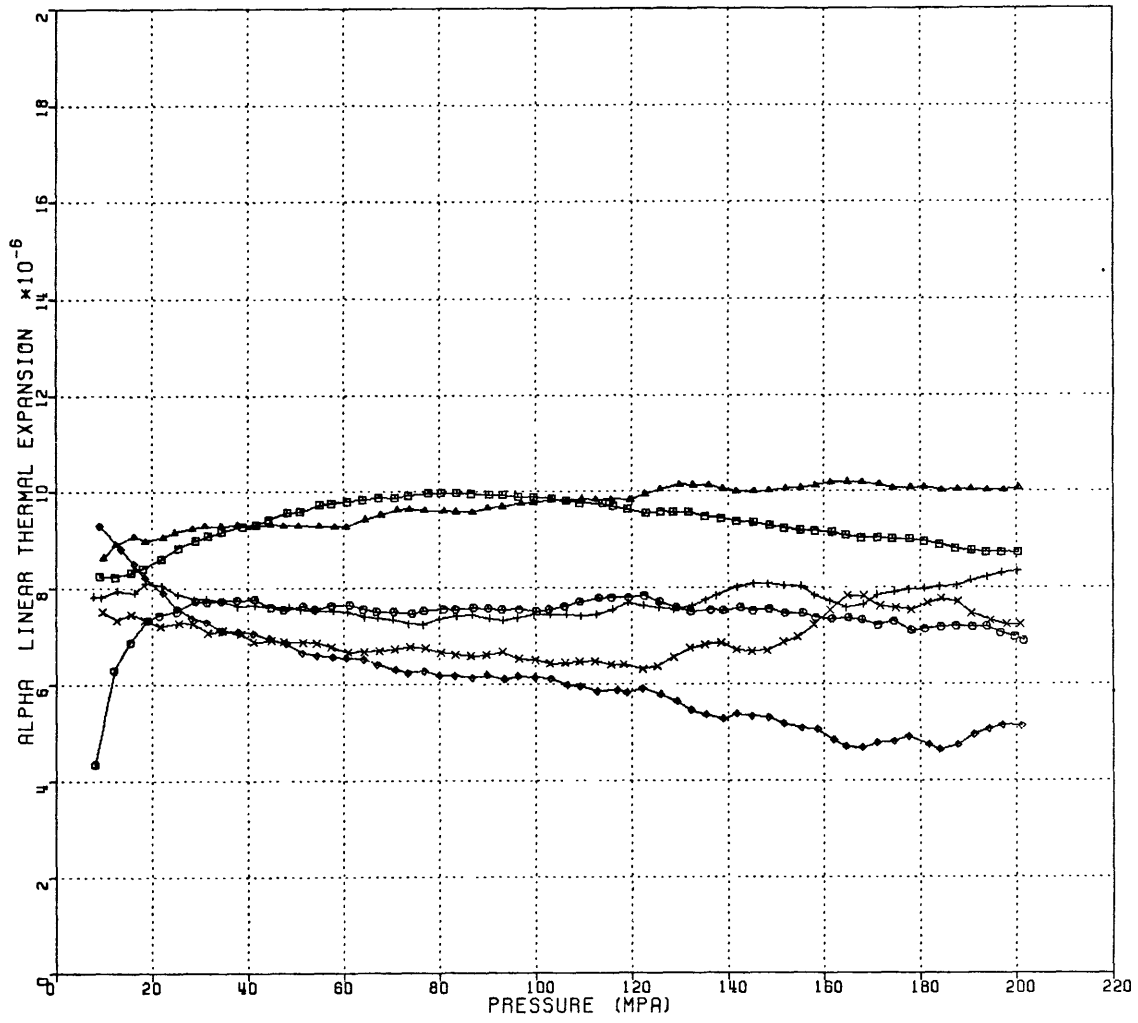
83 TROY OK GRANITE
GAGE: 3B

- - 22°C- 46°C
- - 46°C- 55°C
- △ - 55°C- 70°C
- + - 70°C- 83°C
- X - 83°C- 96°C
- ◇ - 96°C-110°C



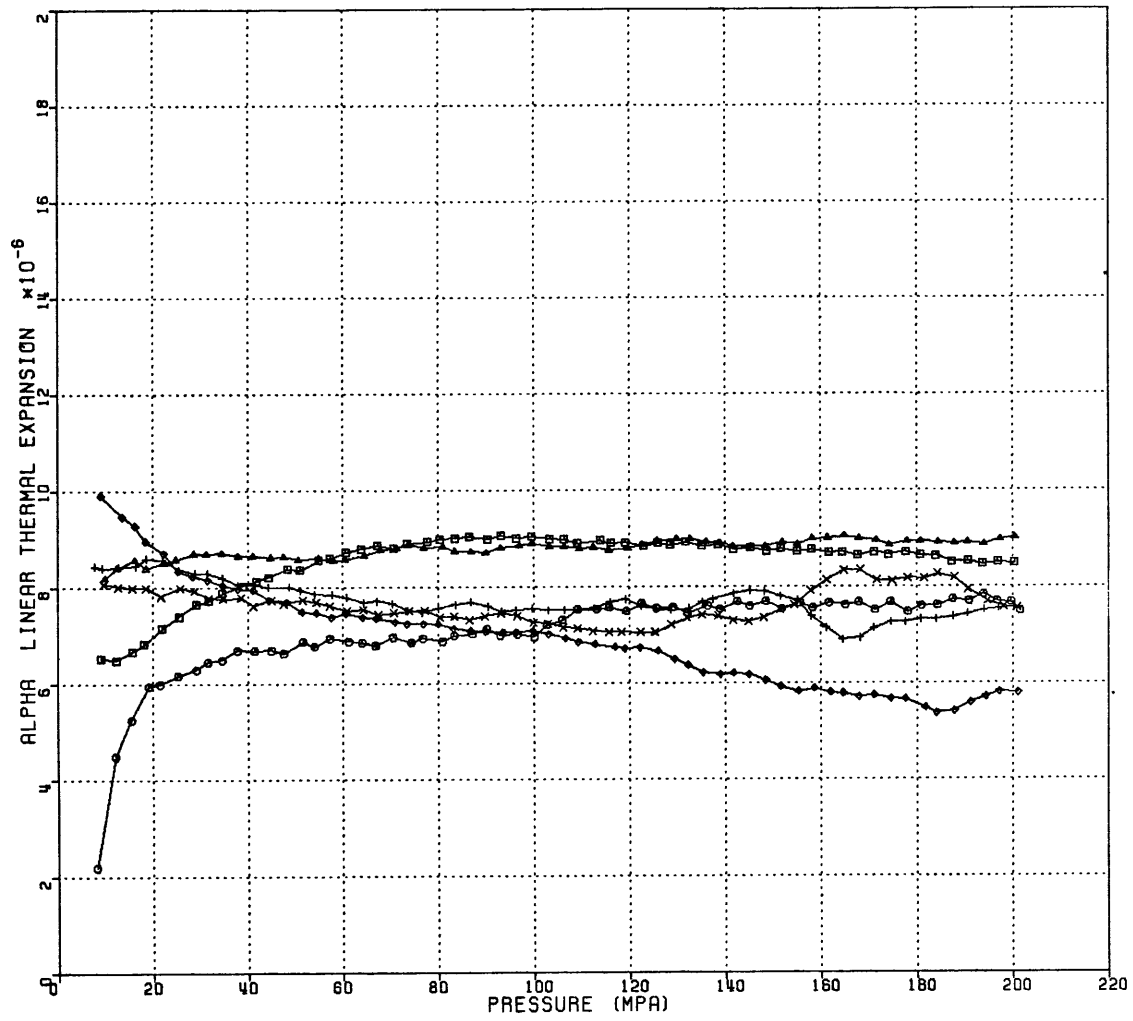
83 TROY OK GRANITE
GAGE:BA

- - 22°C- 46°C
- - 46°C- 55°C
- △ - 55°C- 70°C
- + - 70°C- 83°C
- X - 83°C- 96°C
- ◇ - 96°C-110°C



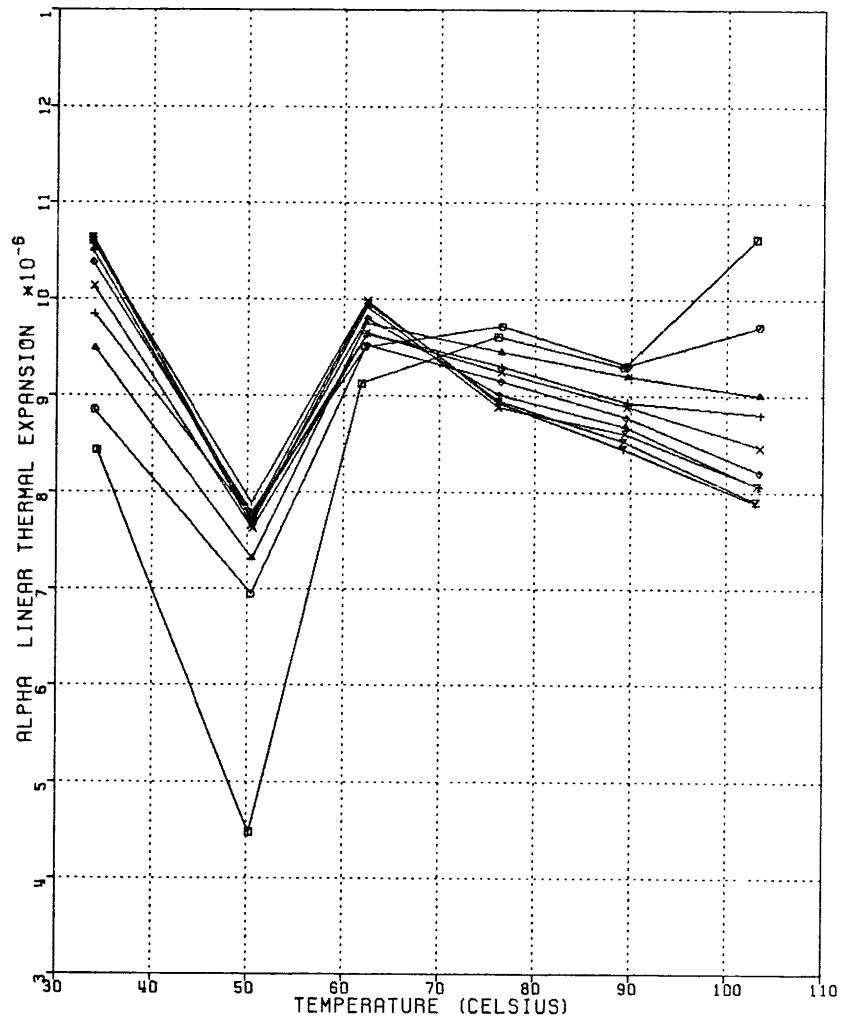
83 TROY OK GRANITE
GAGE: CA

- - 22°C-46°C
- - 46°C-55°C
- △ - 55°C-70°C
- + - 70°C-83°C
- × - 83°C-96°C
- ◇ - 96°C-110°C



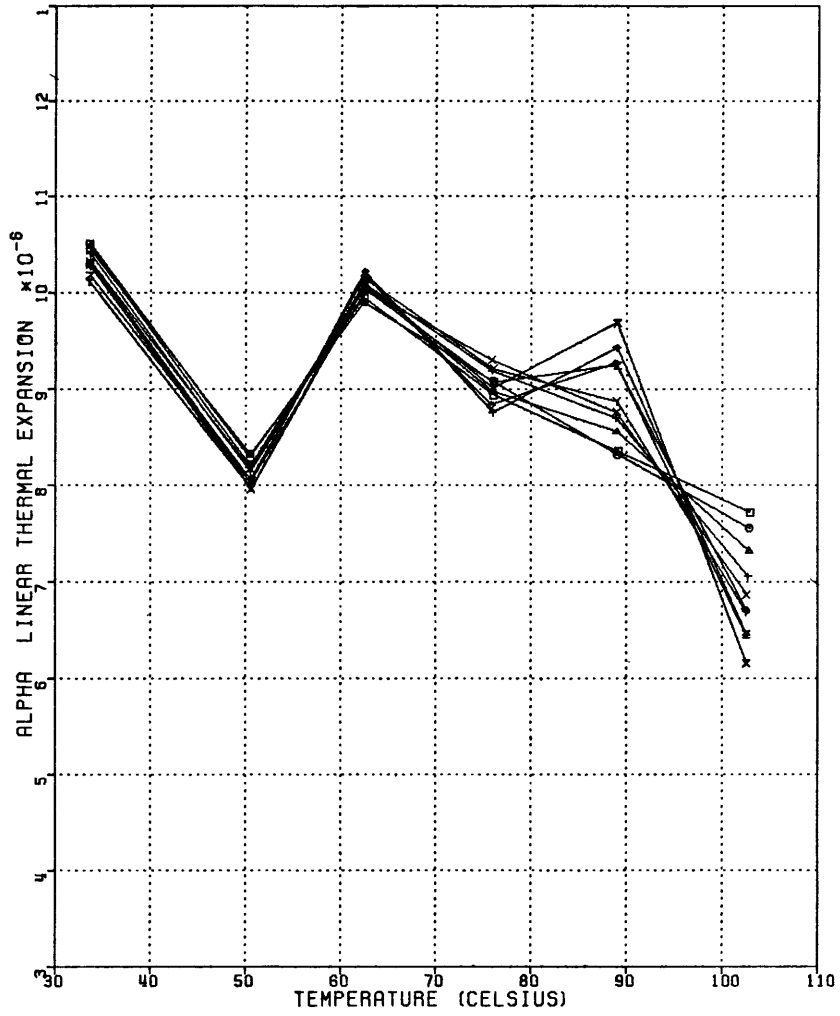
83 TROY OK GRANITE
GAGE: 3A

- - 22°C- 46°C
- - 46°C- 55°C
- △ - 55°C- 70°C
- + - 70°C- 83°C
- X - 83°C- 96°C
- ◇ - 96°C-110°C



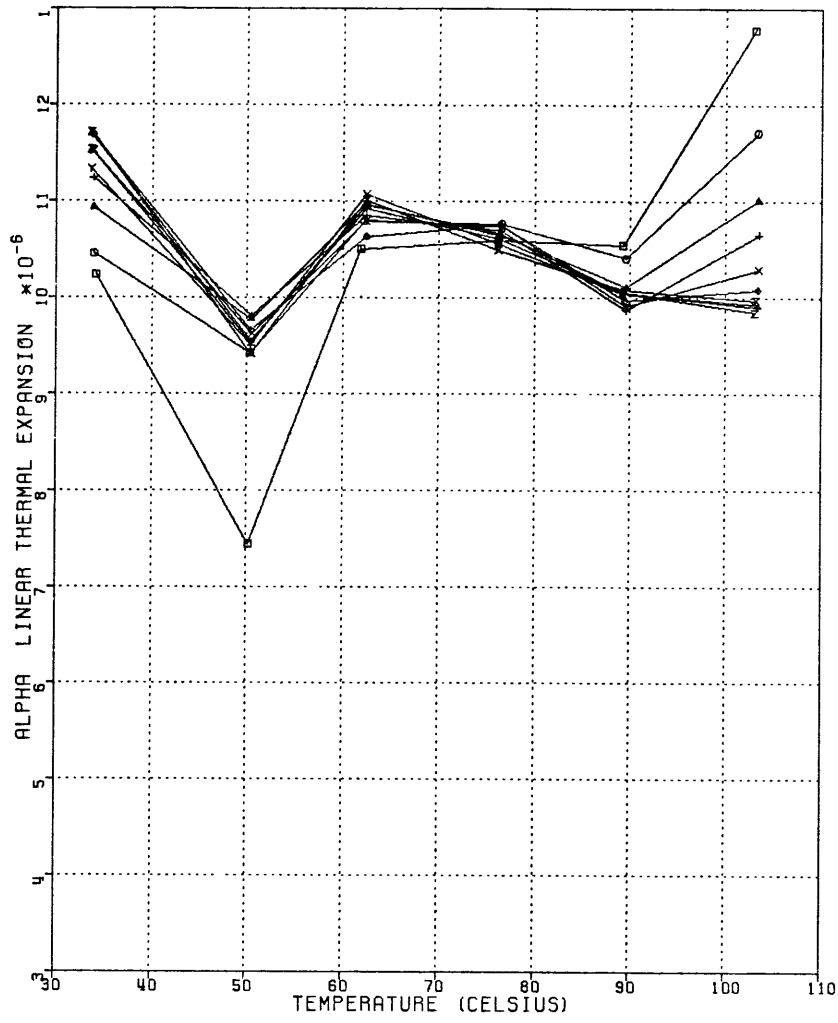
83 TROY OK GRANITE
GAGE: AB

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- x - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



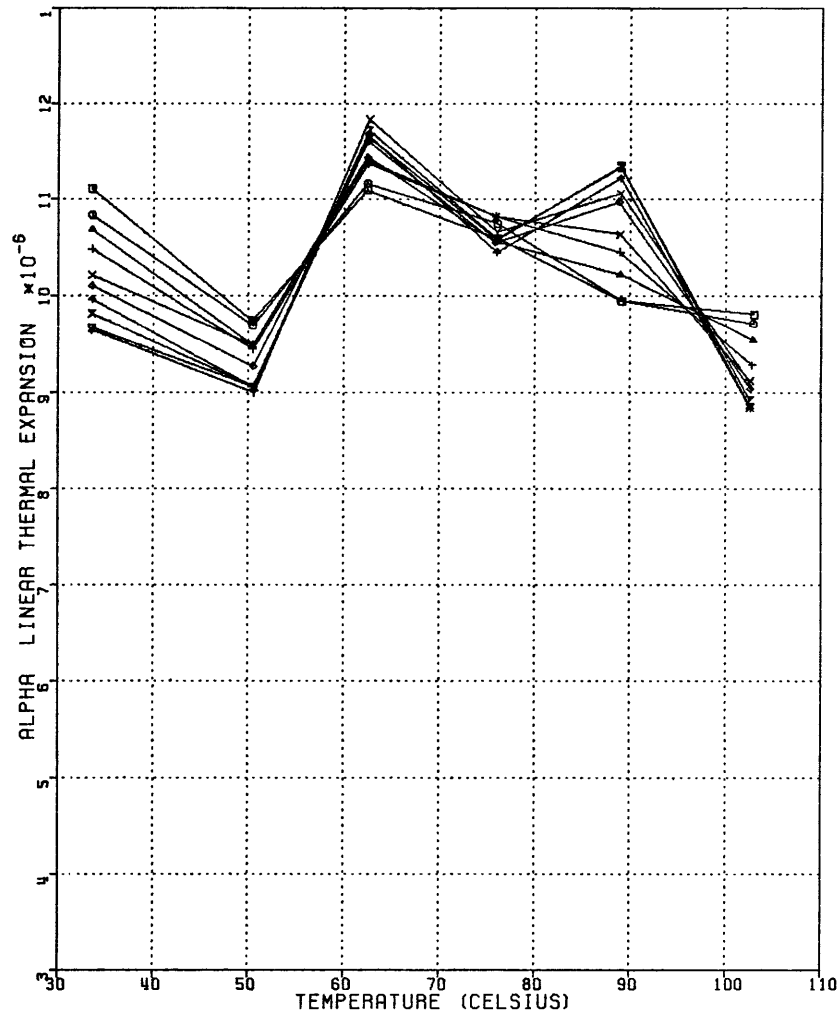
83 TROY OK GRANITE
GAGE: AB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♣ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



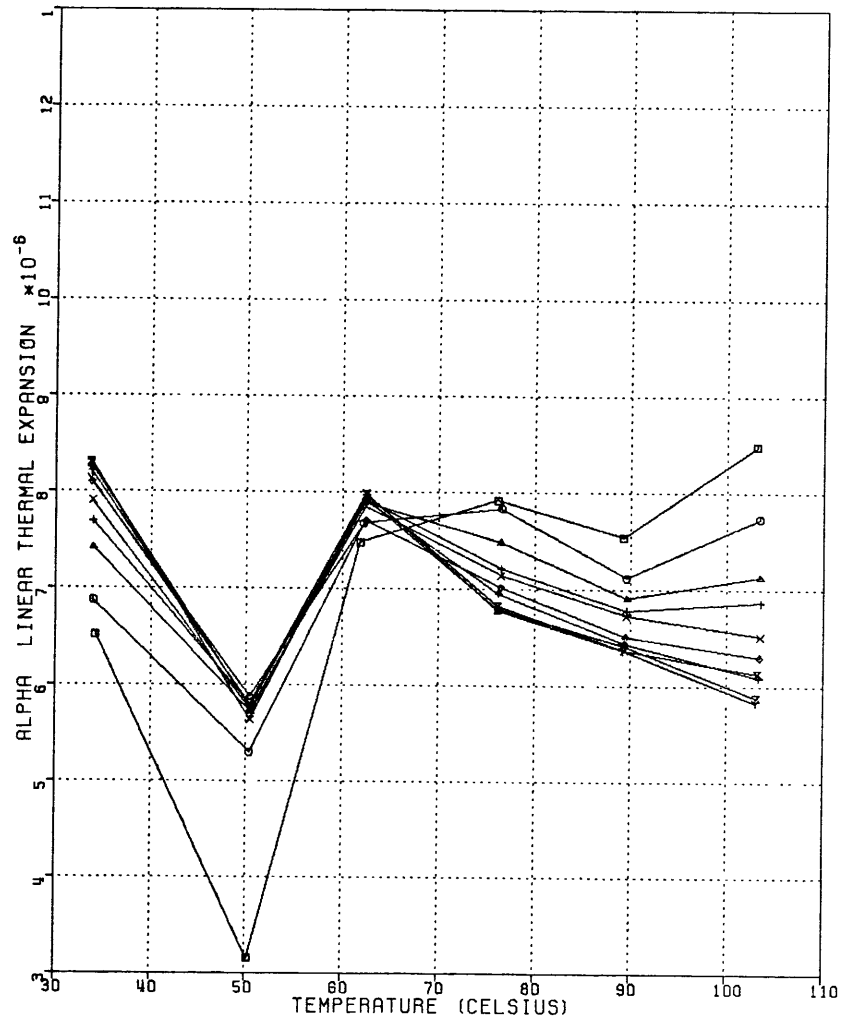
83 TROY OK GRANITE
GAGE: 3B

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



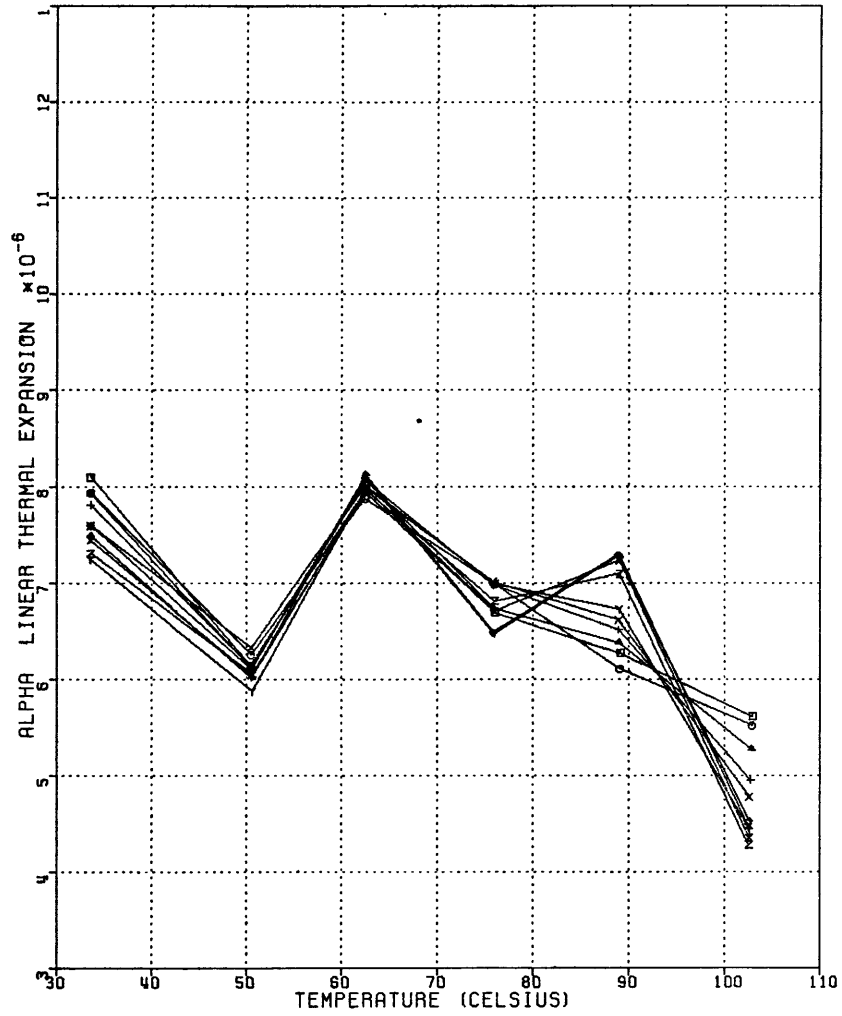
83 TROY OK GRANITE
GAGE: 3B

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- x - 150 MPA
- ◇ - 160 MPA
- * - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



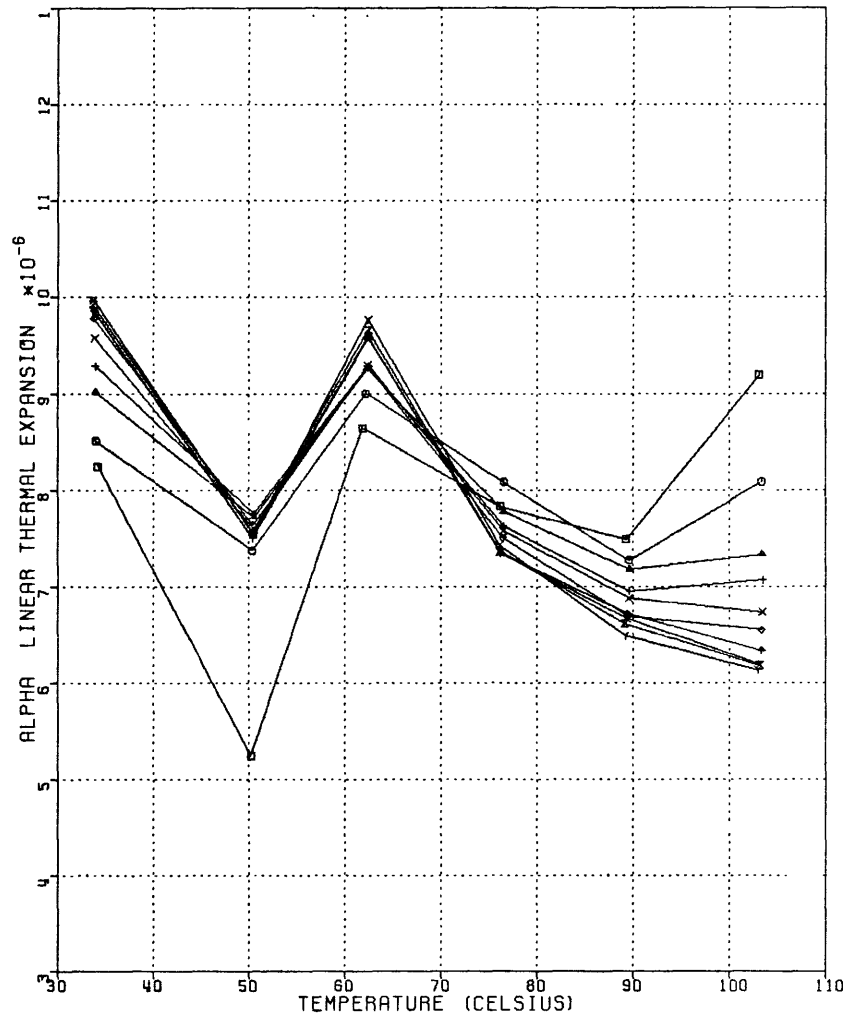
83 TROY OK GRANITE
GAGE:BA

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



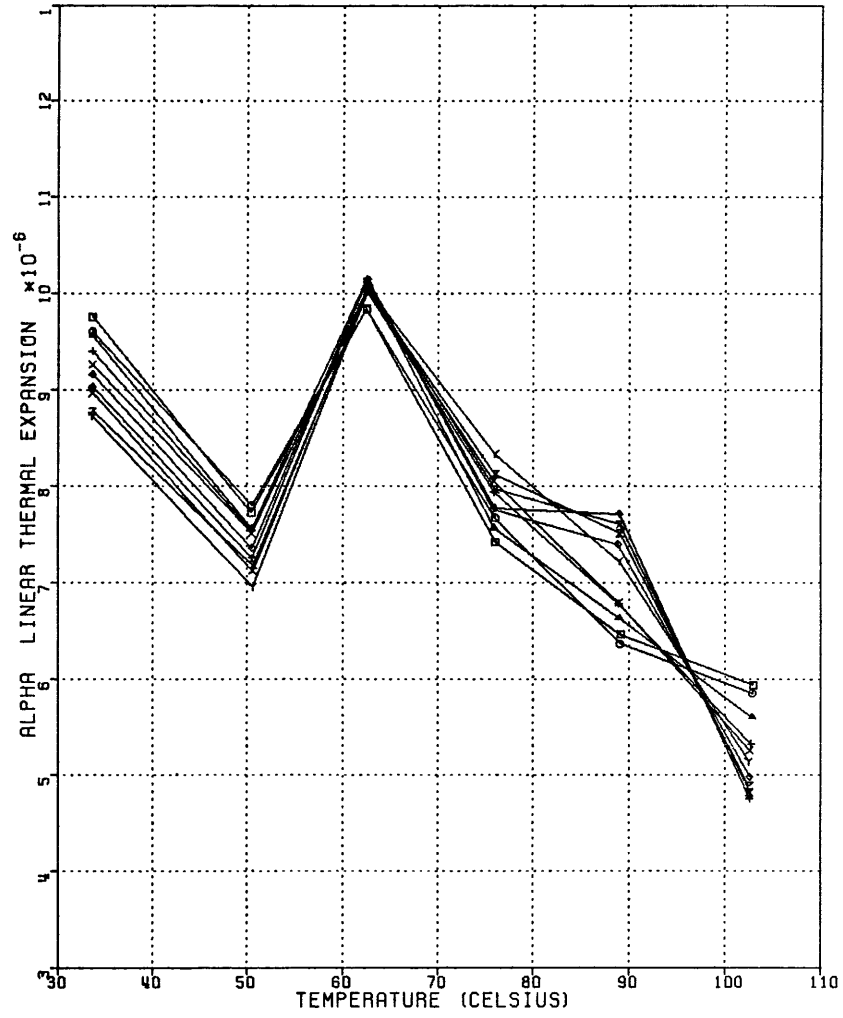
83 TROY OK GRANITE
GAGE:BA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



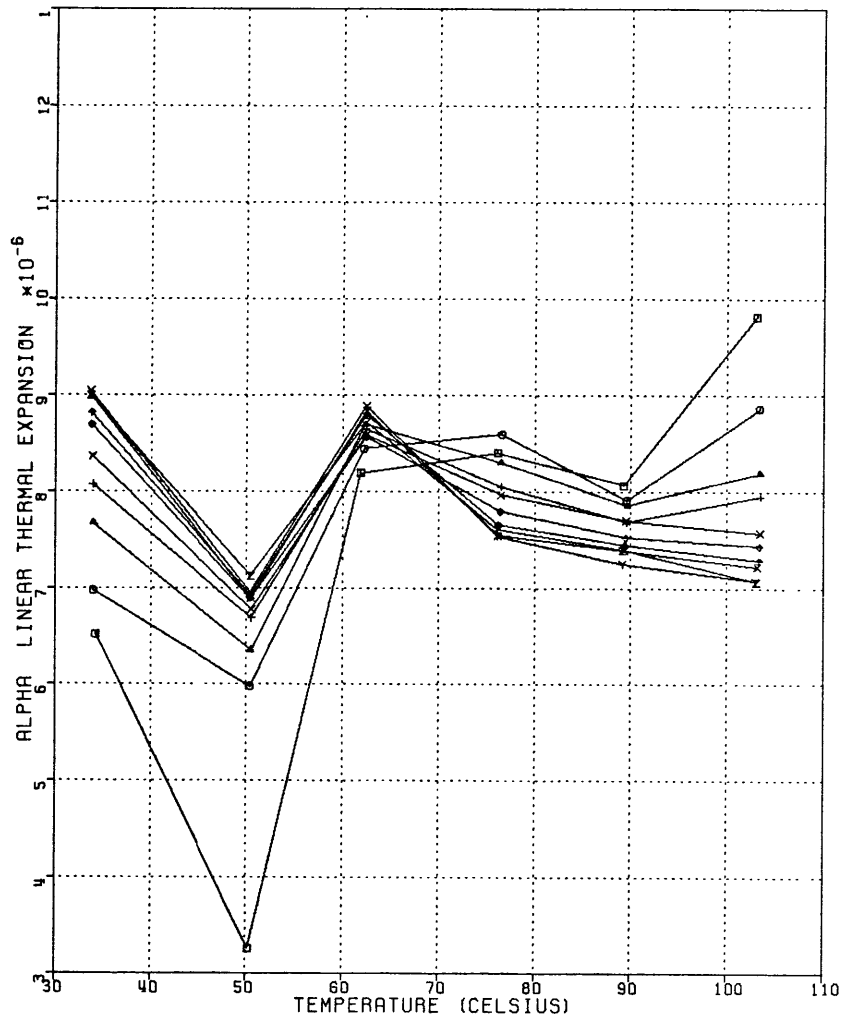
83 TROY OK GRANITE
GAGE: CA

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



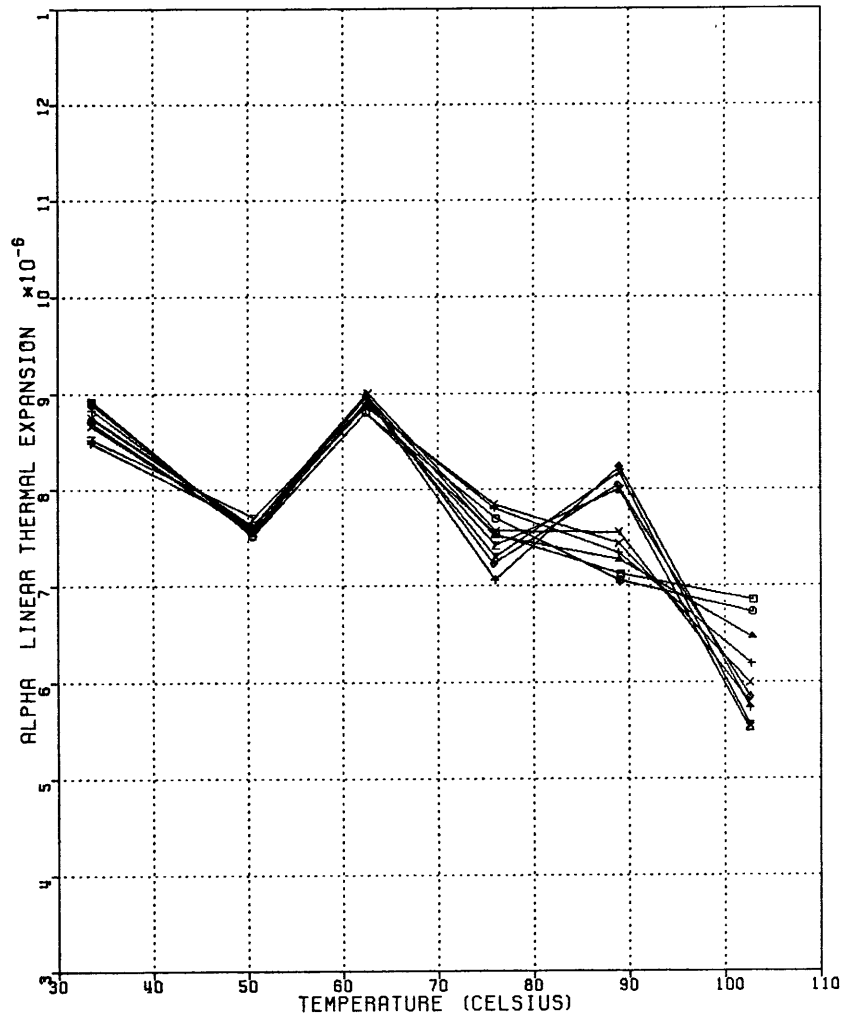
83 TROY OK GRANITE
GAGE:CA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- × - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



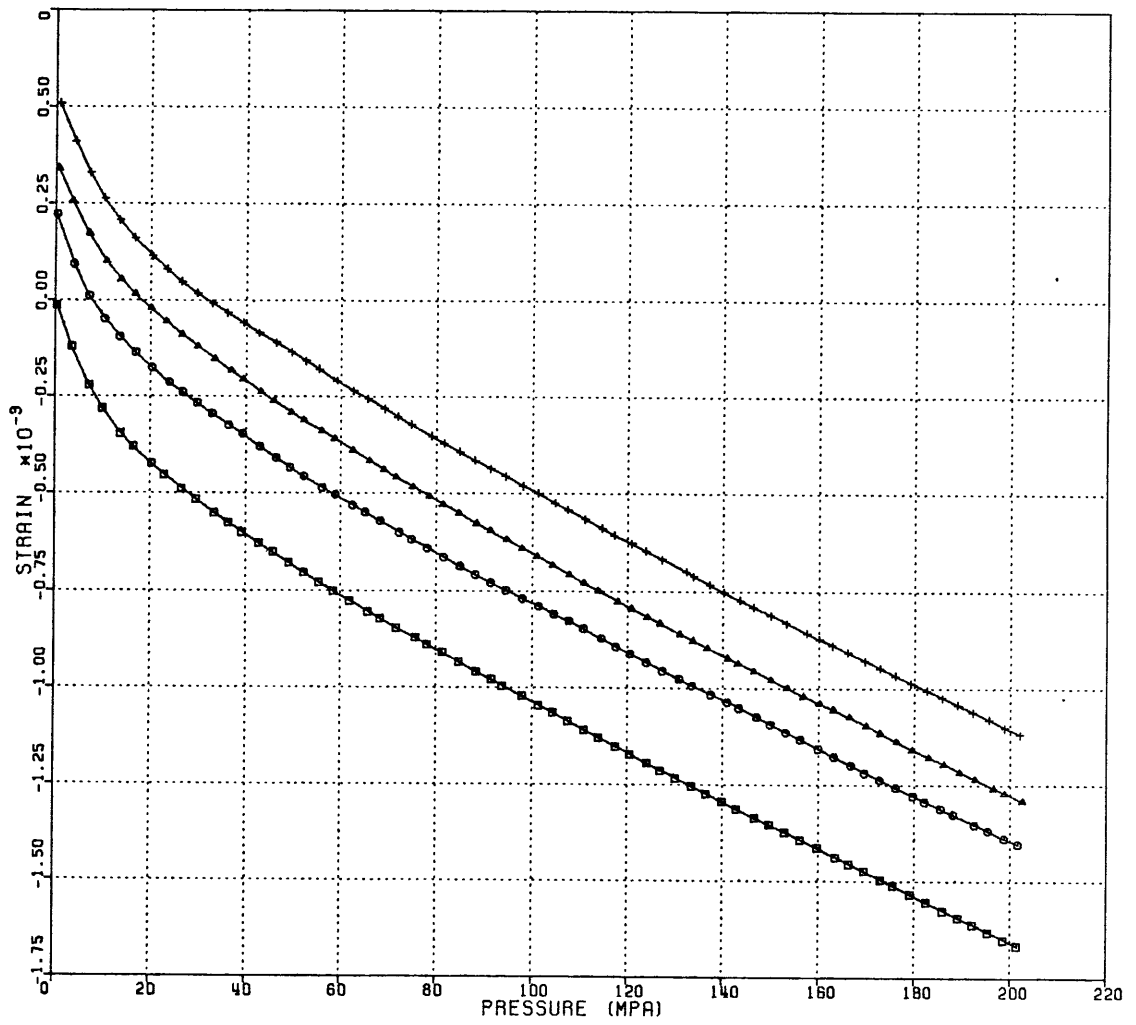
83 TROY OK GRANITE
GAGE: 3A

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- x - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- ↓ - 80 MPA
- z - 90 MPA
- y - 100 MPA



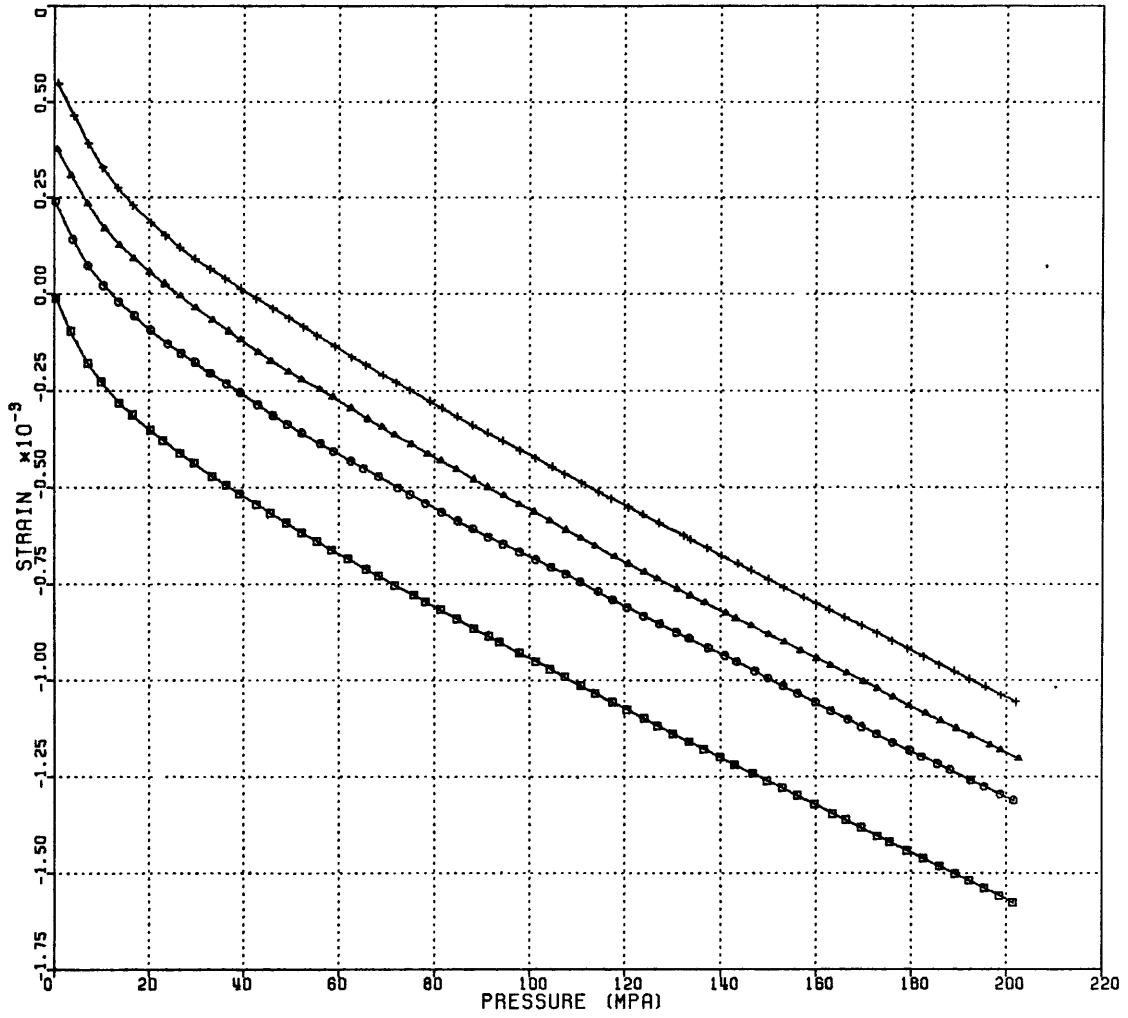
83 TROY OK GRANITE
GAGE: 3A

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



83 TROY OK GRANITE
GAGE: 3B

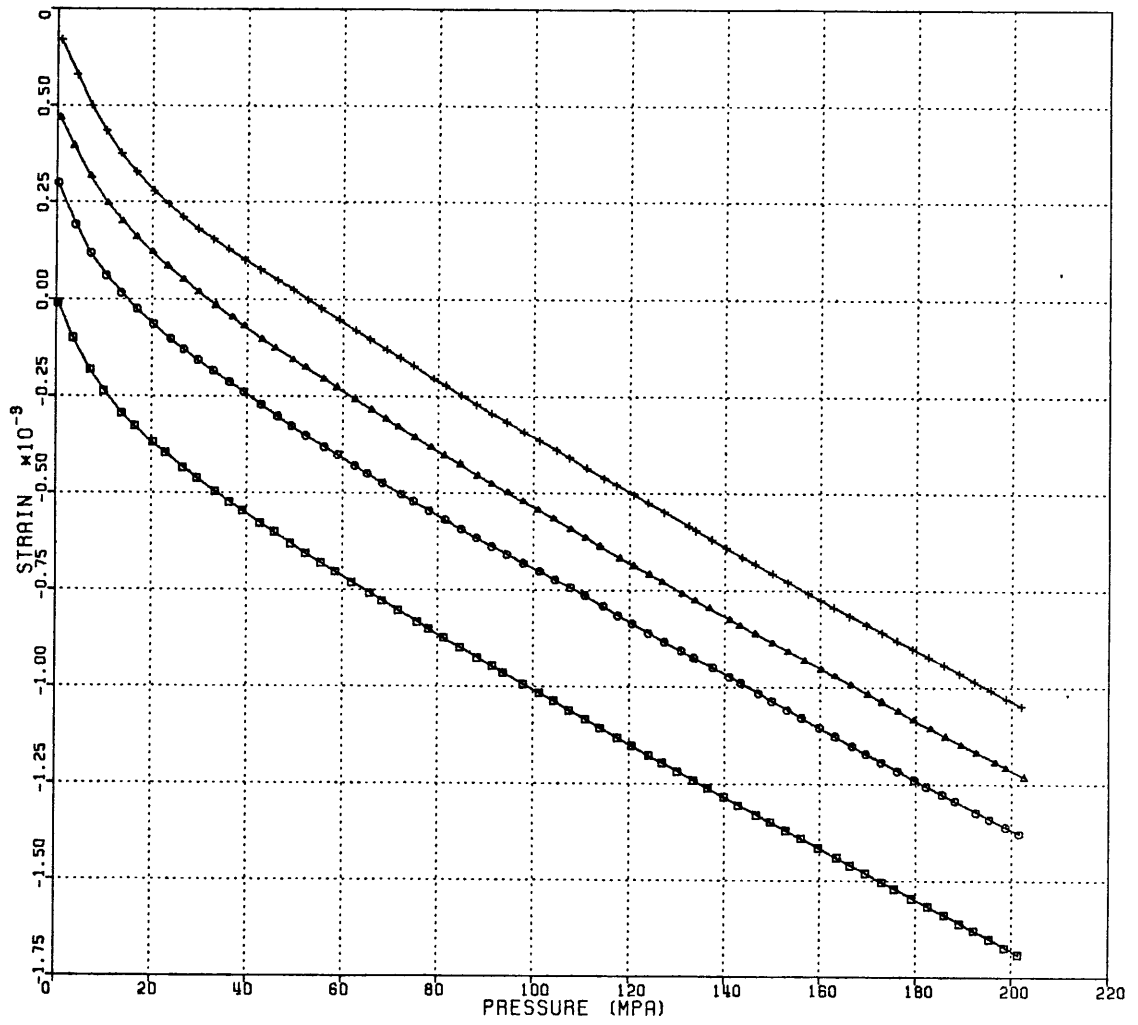
□ - 23°C
○ - 48°C
△ - 68°C
+ - 85°C



83 TROY OK GRANITE

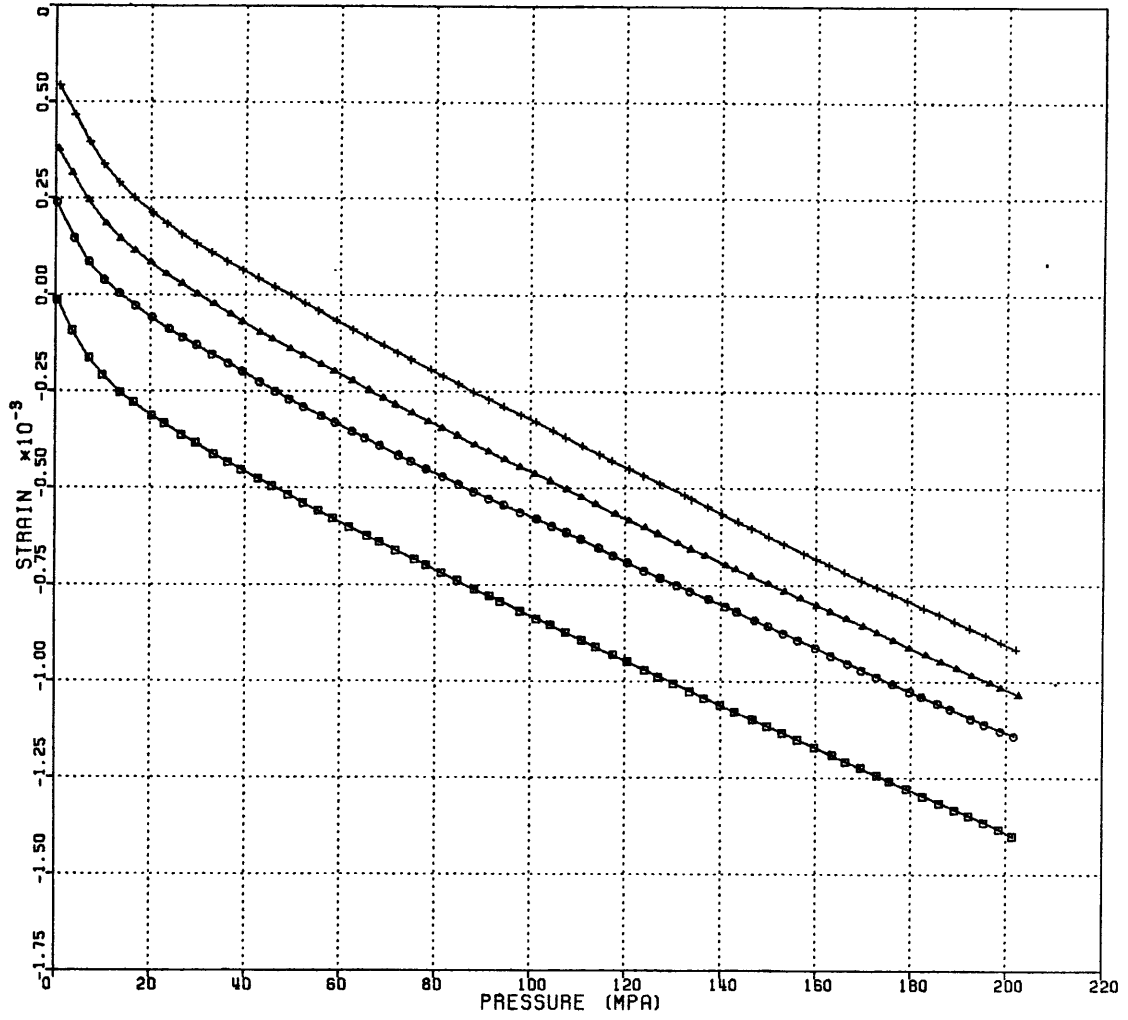
GAGE: 4B

□ - 23°C
 ○ - 48°C
 ▲ - 68°C
 + - 85°C



83 TROY OK GRANITE
GAGE:CA

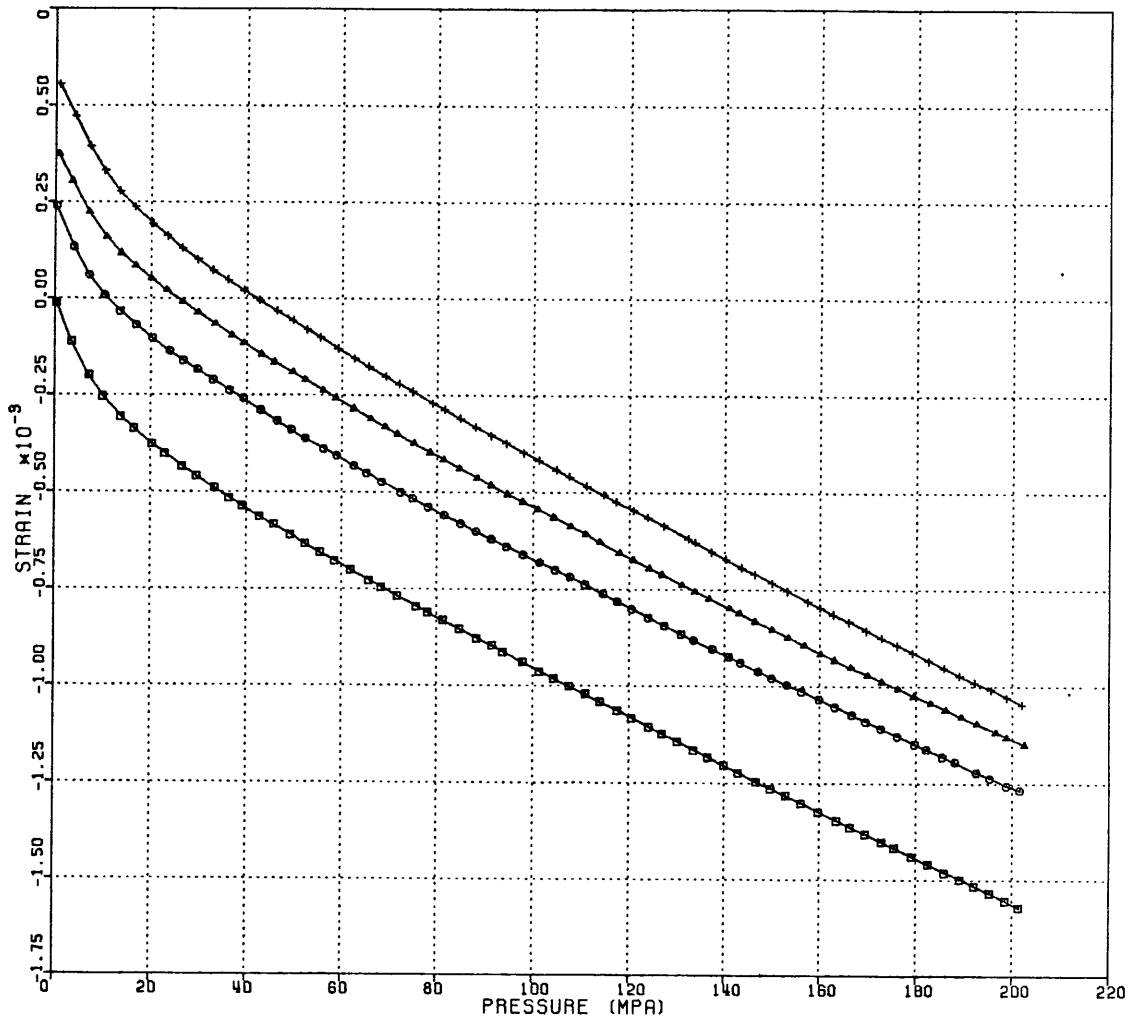
□ - 23°C
○ - 48°C
△ - 68°C
+ - 85°C



83 TROY OK GRANITE

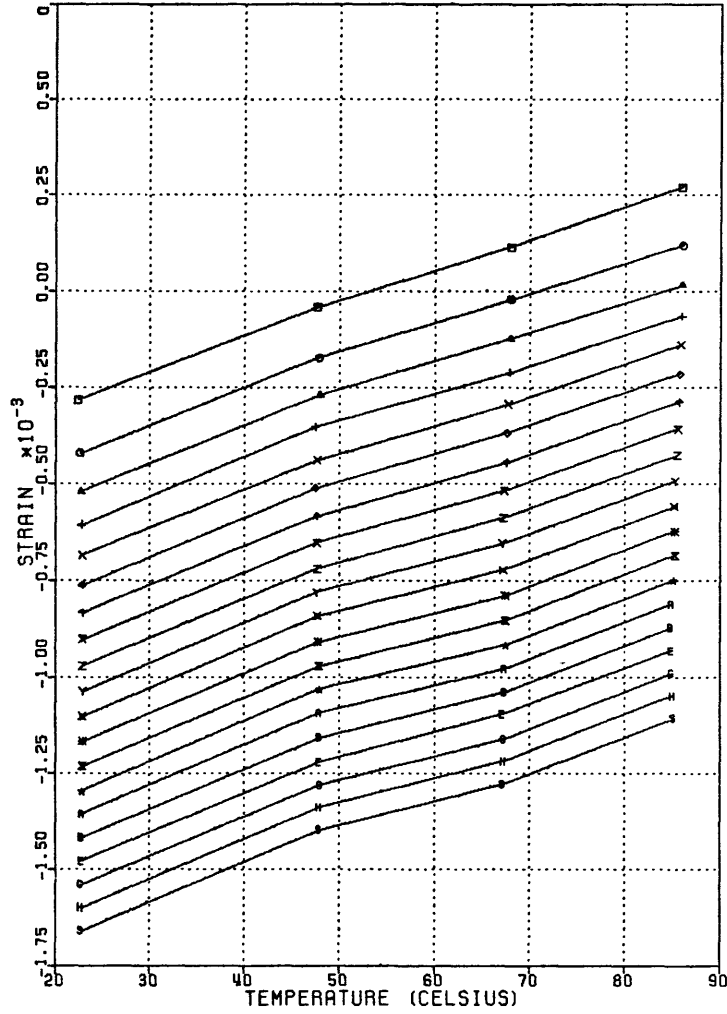
GAGE: 3A

- - 23°C
- - 48°C
- △ - 68°C
- + - 85°C



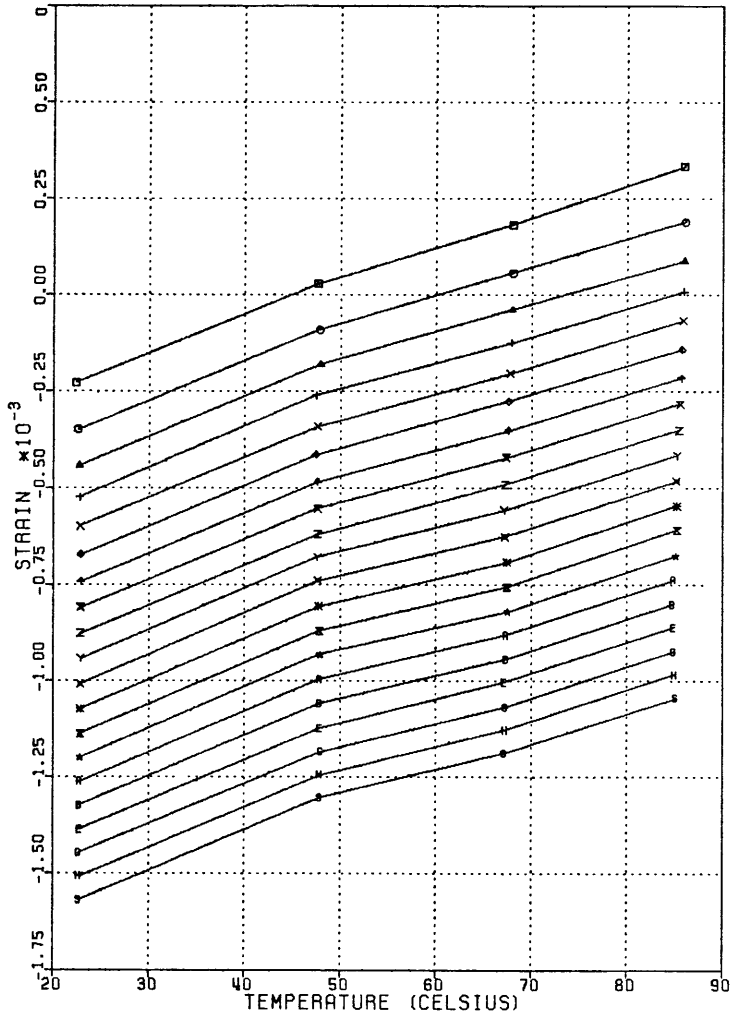
83 TROY OK GRANITE
GAGE: 4A

□ - 23°C
○ - 48°C
△ - 68°C
+ - 85°C



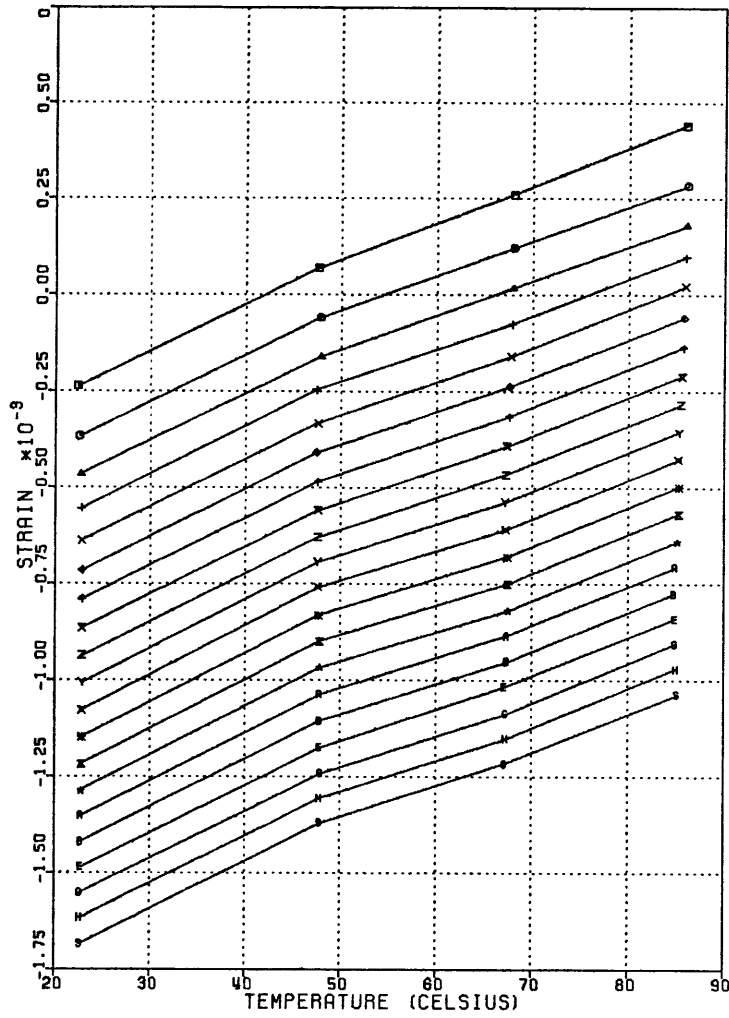
83 TROY OK GRANITE
GAGE: 3B

- | | |
|-------------|-------------|
| □ - 10 MPA | × - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | ⊗ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| × - 50 MPA | ⊙ - 150 MPA |
| ◇ - 60 MPA | ⊖ - 160 MPA |
| ⊕ - 70 MPA | ⊗ - 170 MPA |
| ⊗ - 80 MPA | ⊙ - 180 MPA |
| ⊘ - 90 MPA | ⊖ - 190 MPA |
| ⊙ - 100 MPA | ⊗ - 200 MPA |



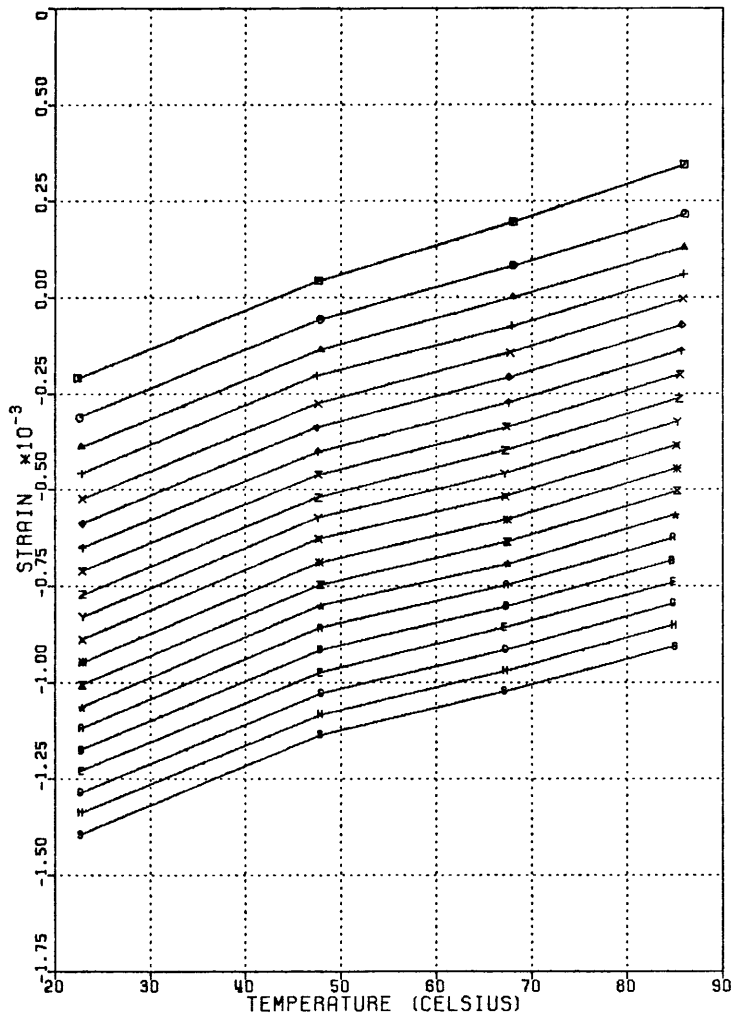
83 TRØY ØK GRANITE
GAGE: 4B

□ - 10 MPA	× - 110 MPA
○ - 20 MPA	* - 120 MPA
△ - 30 MPA	⊗ - 130 MPA
+ - 40 MPA	★ - 140 MPA
× - 50 MPA	A - 150 MPA
◇ - 60 MPA	B - 160 MPA
⋈ - 70 MPA	E - 170 MPA
X - 80 MPA	G - 180 MPA
Z - 90 MPA	H - 190 MPA
Y - 100 MPA	S - 200 MPA



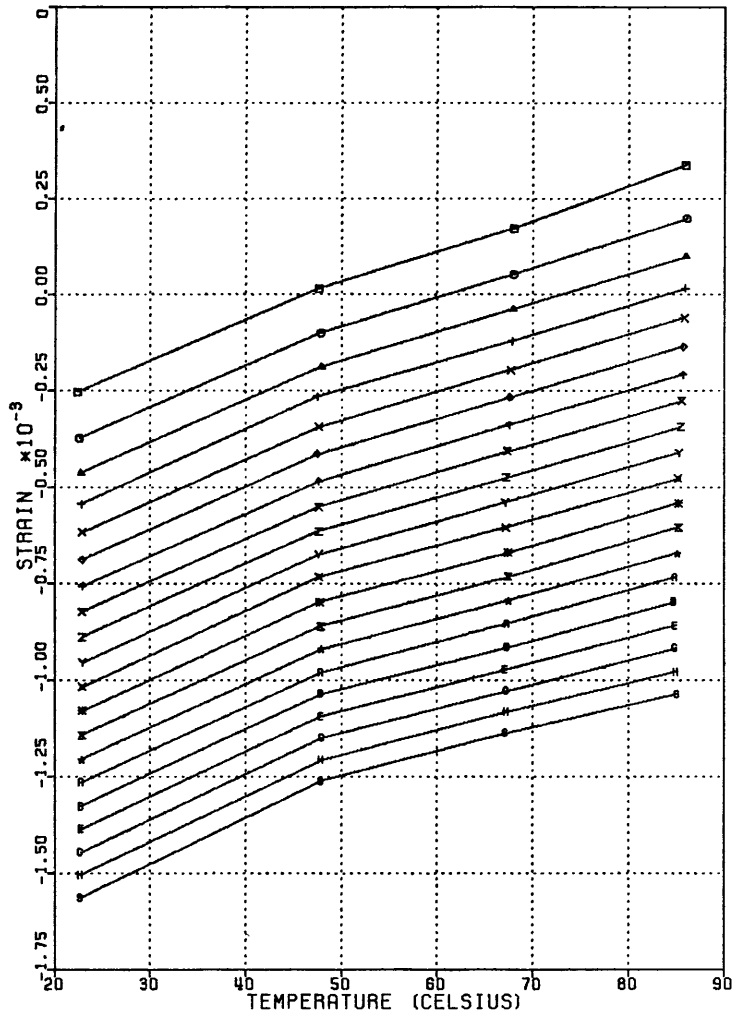
83 TROY OK GRANITE
GAGE:CA

- | | |
|-------------|-------------|
| □ - 10 MPA | × - 110 MPA |
| ○ - 20 MPA | ✱ - 120 MPA |
| △ - 30 MPA | ⊗ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| × - 50 MPA | ⊙ - 150 MPA |
| ◇ - 60 MPA | ⊕ - 160 MPA |
| ⊕ - 70 MPA | ⊖ - 170 MPA |
| ⊗ - 80 MPA | ⊙ - 180 MPA |
| ⊙ - 90 MPA | ⊕ - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



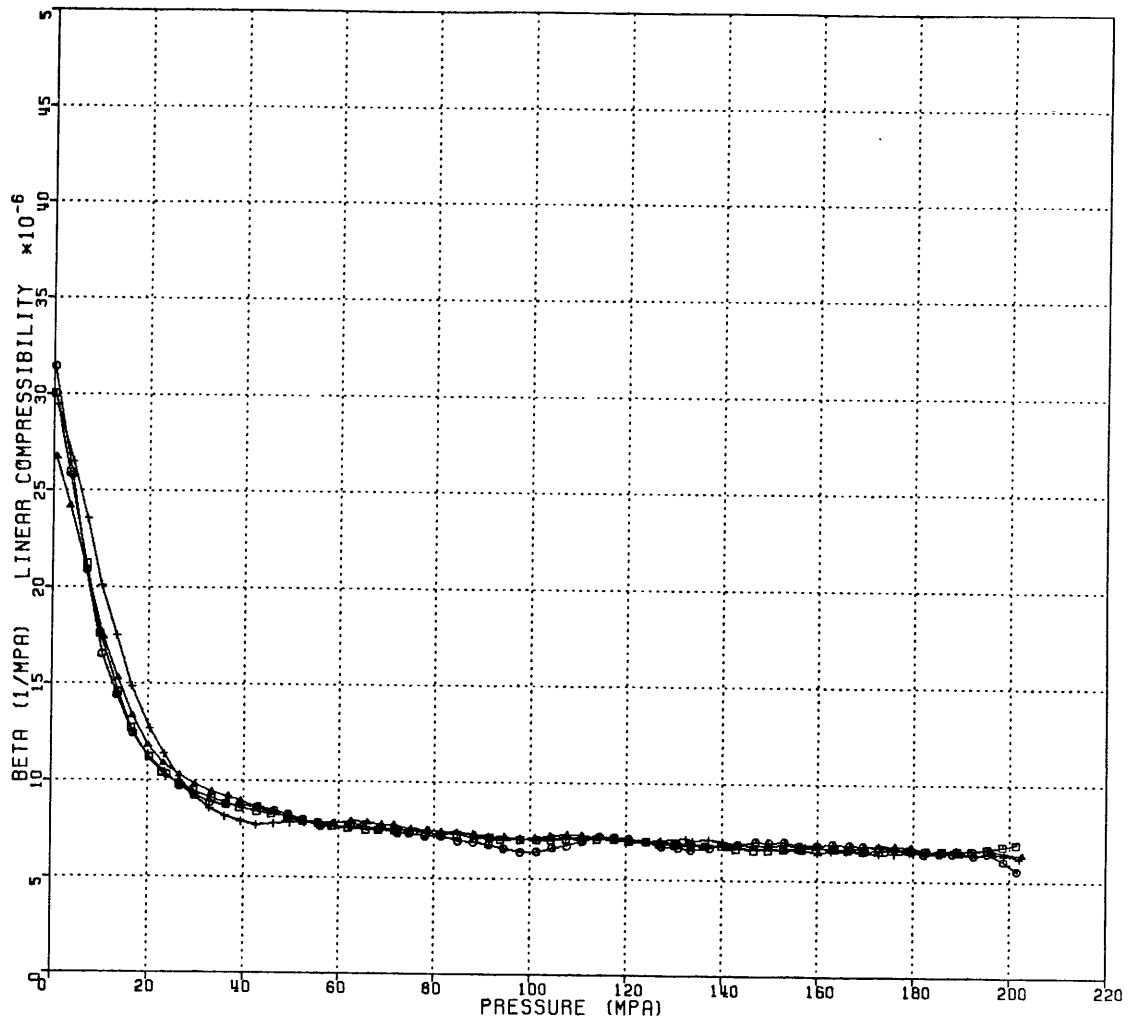
83 TROY OK GRANITE
GAGE: 3A

□ - 10 MPA	✕ - 110 MPA
○ - 20 MPA	✱ - 120 MPA
△ - 30 MPA	⊗ - 130 MPA
+ - 40 MPA	★ - 140 MPA
× - 50 MPA	A - 150 MPA
◇ - 60 MPA	B - 160 MPA
↗ - 70 MPA	E - 170 MPA
✕ - 80 MPA	G - 180 MPA
Z - 90 MPA	H - 190 MPA
Y - 100 MPA	S - 200 MPA



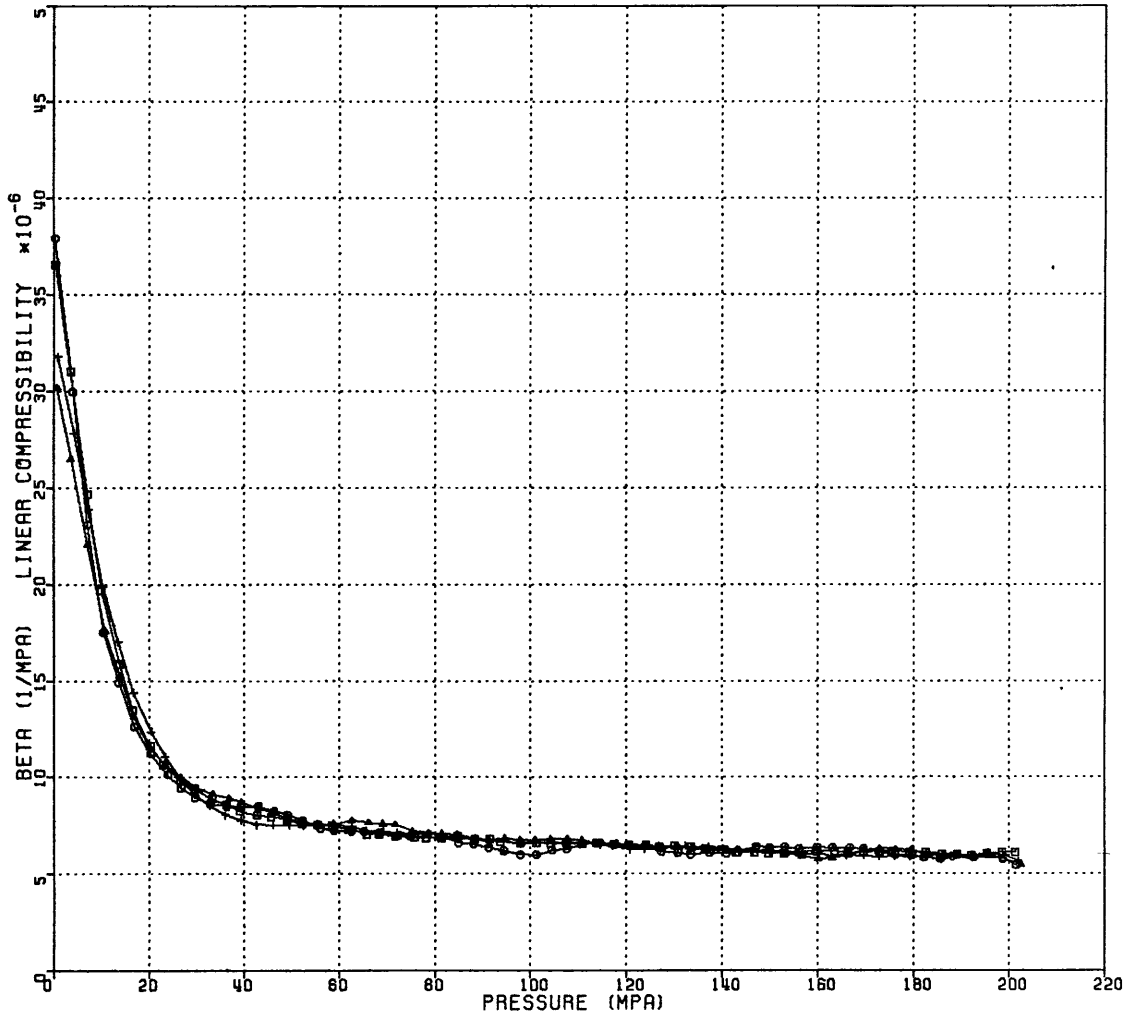
83 TRØY ØK GRANITE
GAGE: 4A

- | | |
|-------------|-------------|
| □ - 10 MPA | X - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | X - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ♠ - 70 MPA | E - 170 MPA |
| X - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



83 TROY OK GRANITE
GAGE: CA

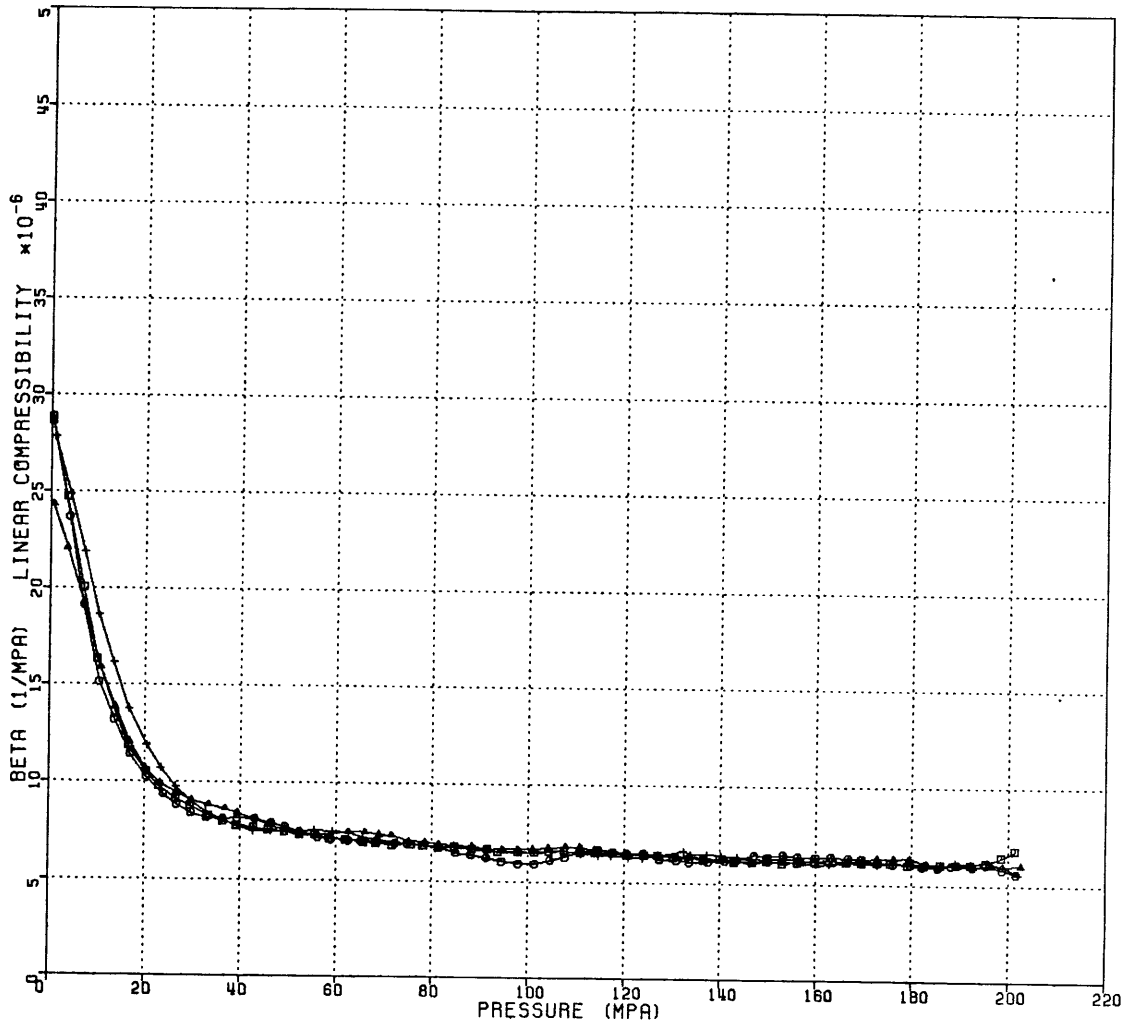
□ - 23°C
○ - 48°C
△ - 68°C
+ - 85°C



83 TROY OK GRANITE

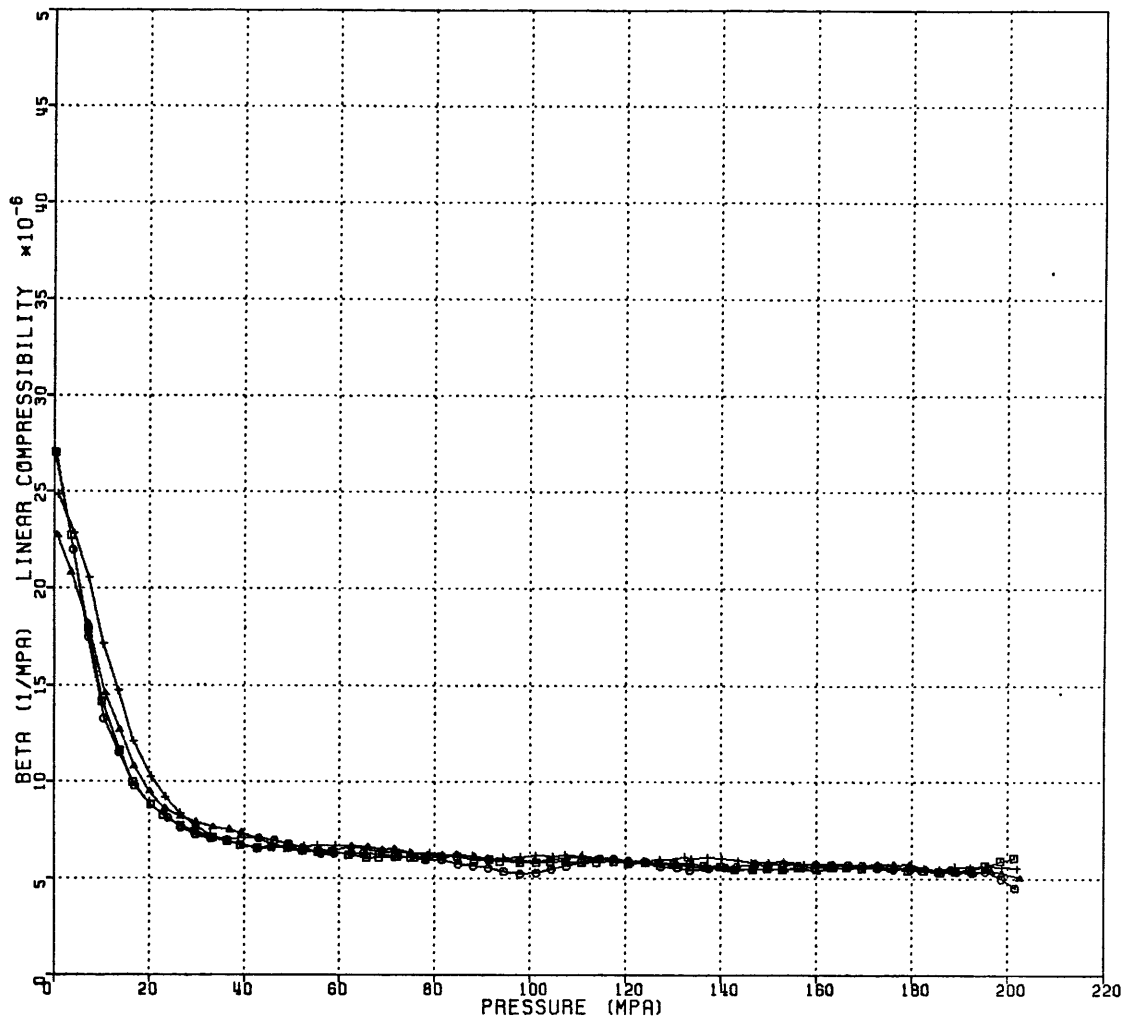
GAGE: 3B

- - 23°C
- - 48°C
- △ - 68°C
- + - 85°C



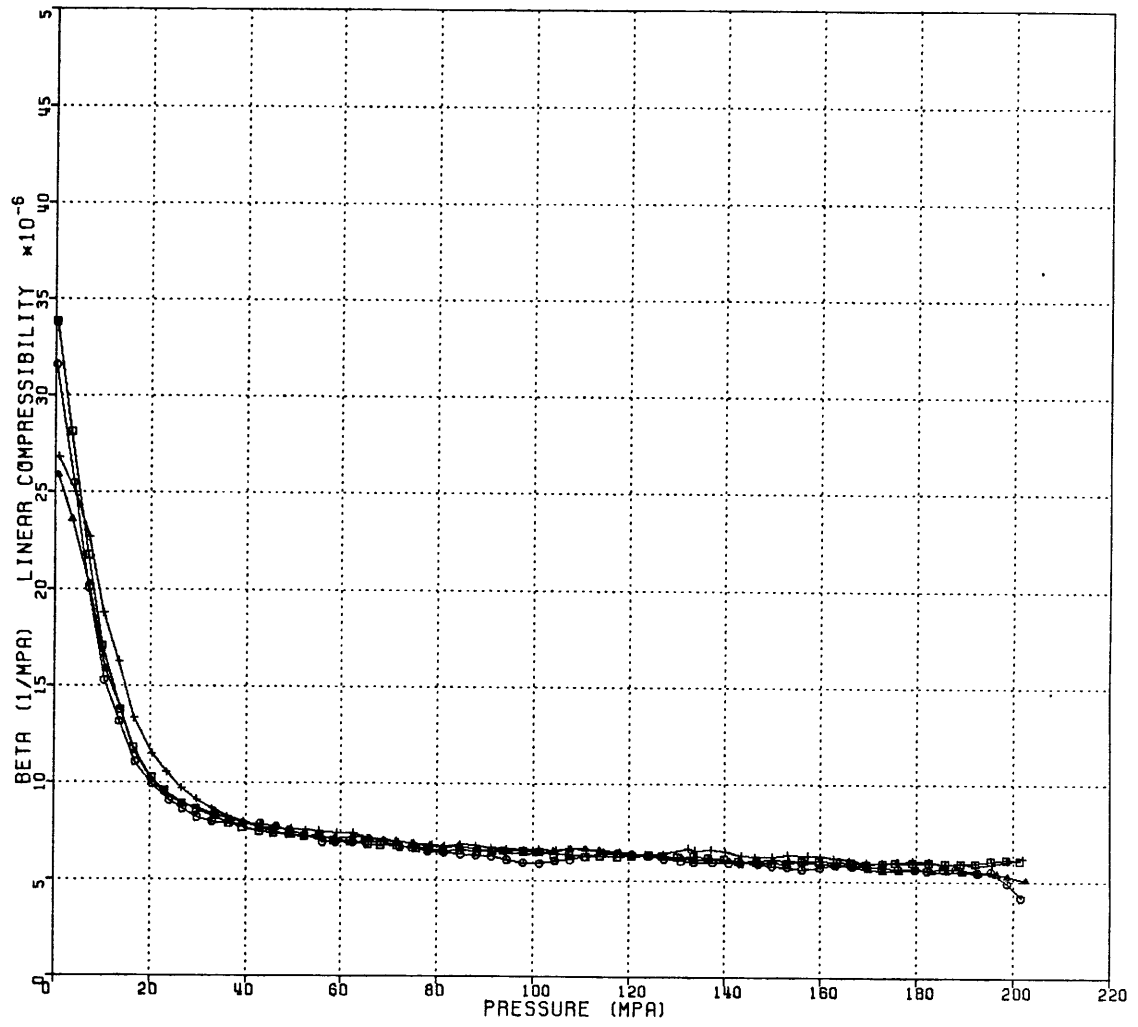
83 TROY OK GRANITE
GAGE: 4B

□ - 23°C
 ○ - 48°C
 △ - 68°C
 + - 85°C



83 TROY OK GRANITE
GAGE: 3A

□ - 23°C
○ - 48°C
△ - 68°C
+ - 85°C



83 TROY OK GRANITE

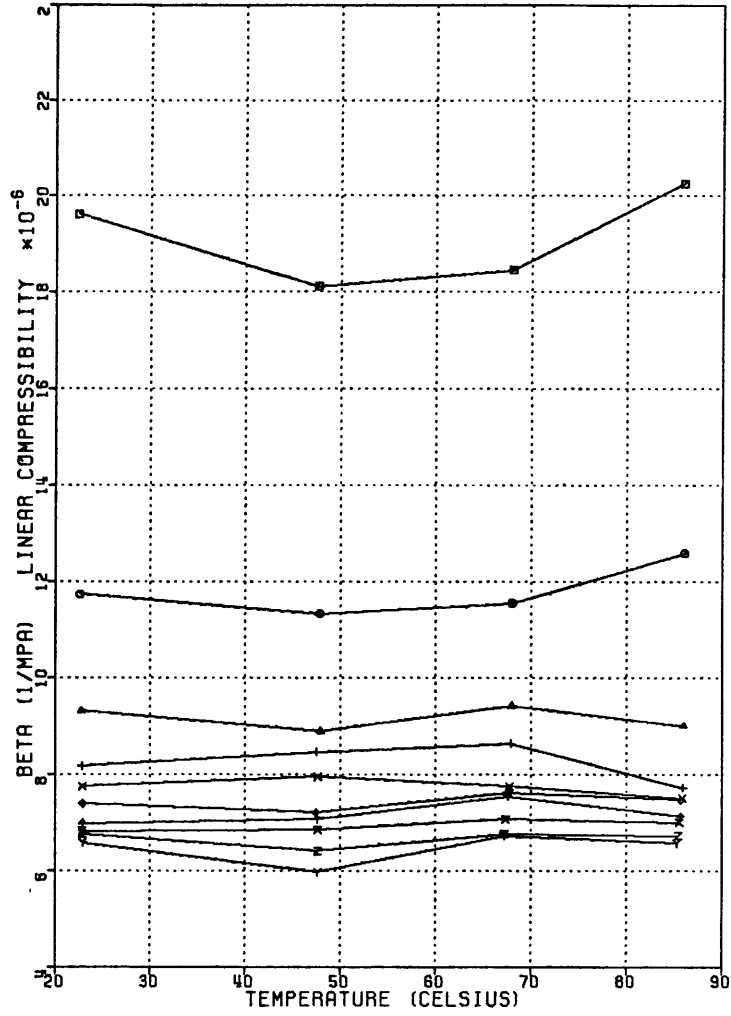
GAGE: 4A

□ - 23°C

○ - 48°C

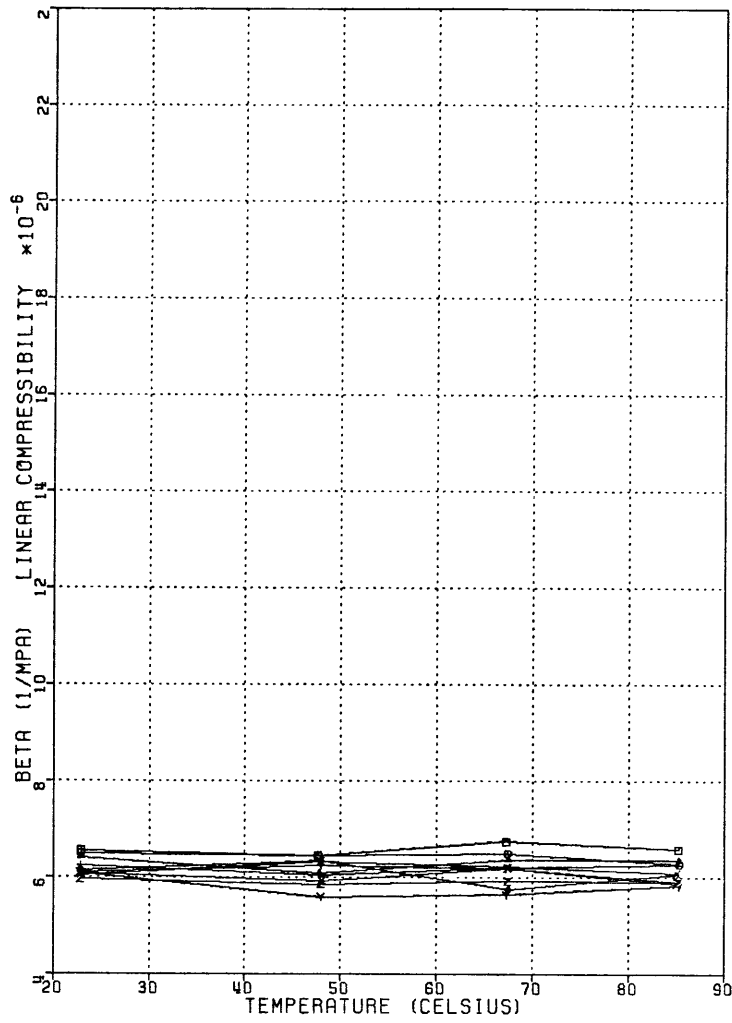
△ - 68°C

+ - 85°C



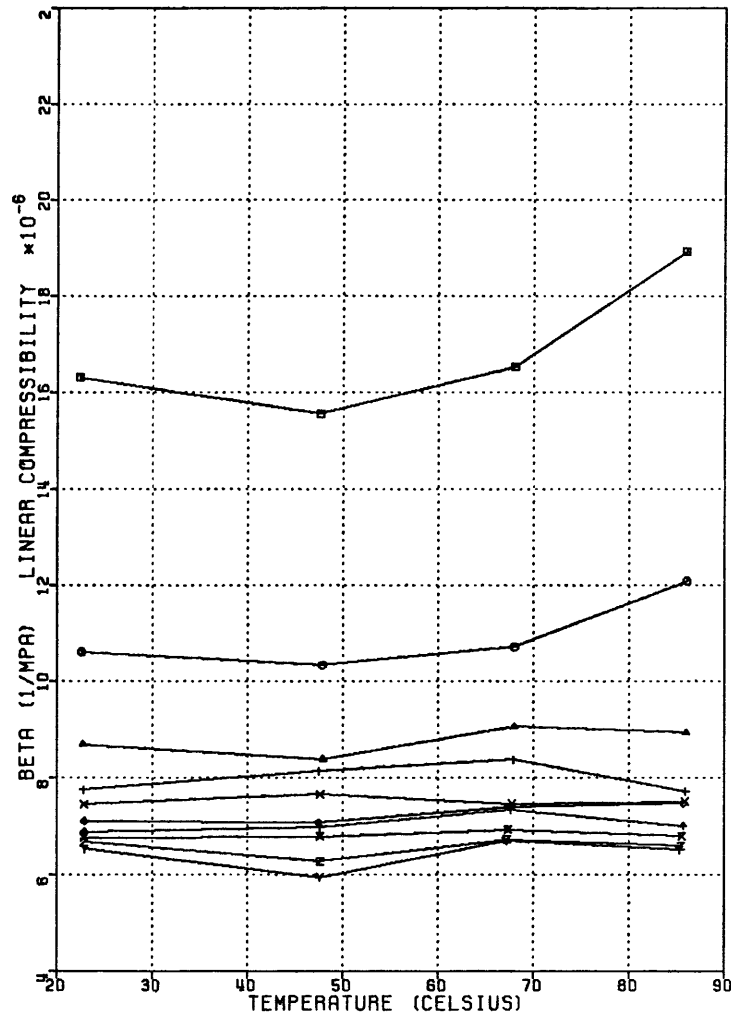
83 TROY OK GRANITE
GAGE: 3B

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ♣ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



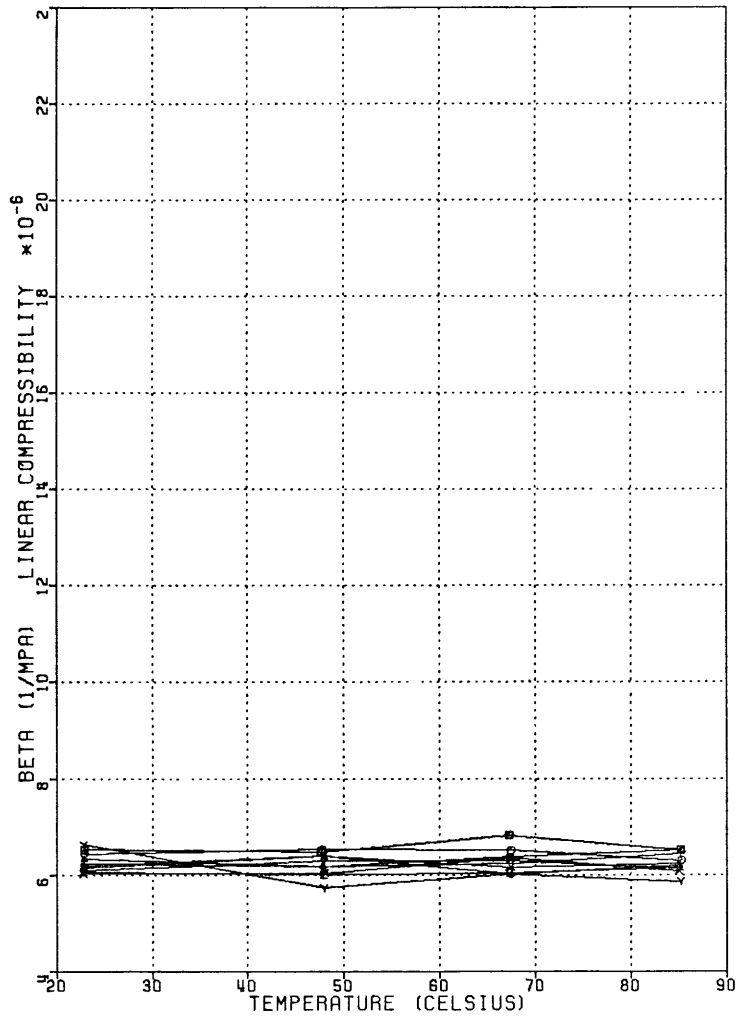
83 TROY OK GRANITE
GAGE: 3B

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- × - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



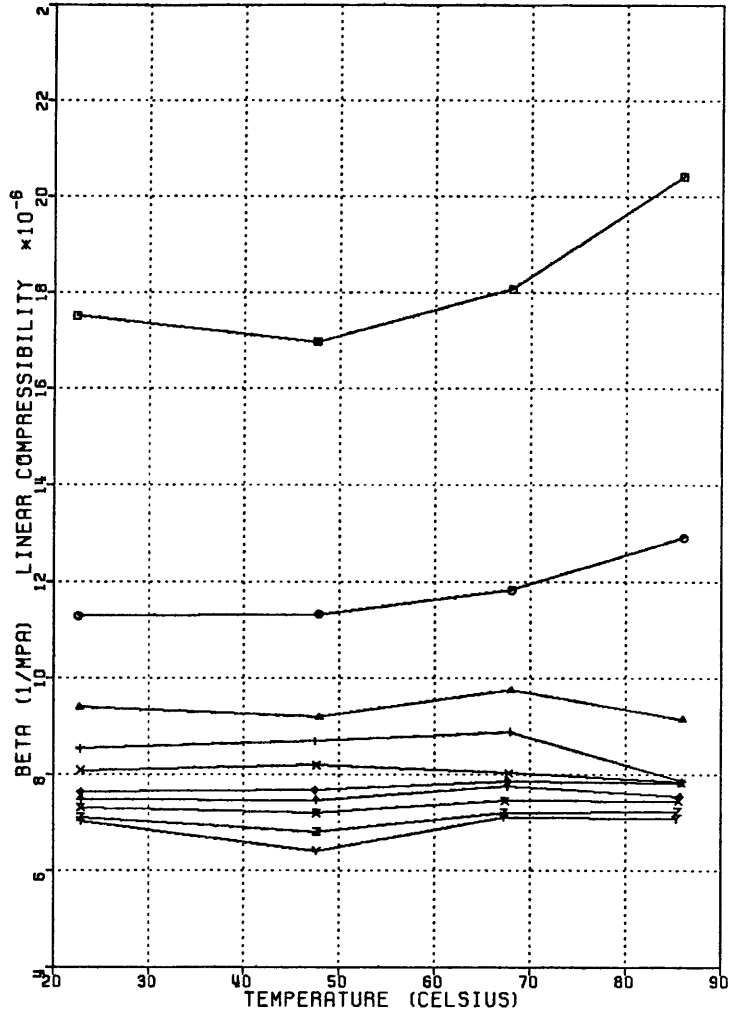
83 TROY OK GRANITE
GAGE: 4B

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- × - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



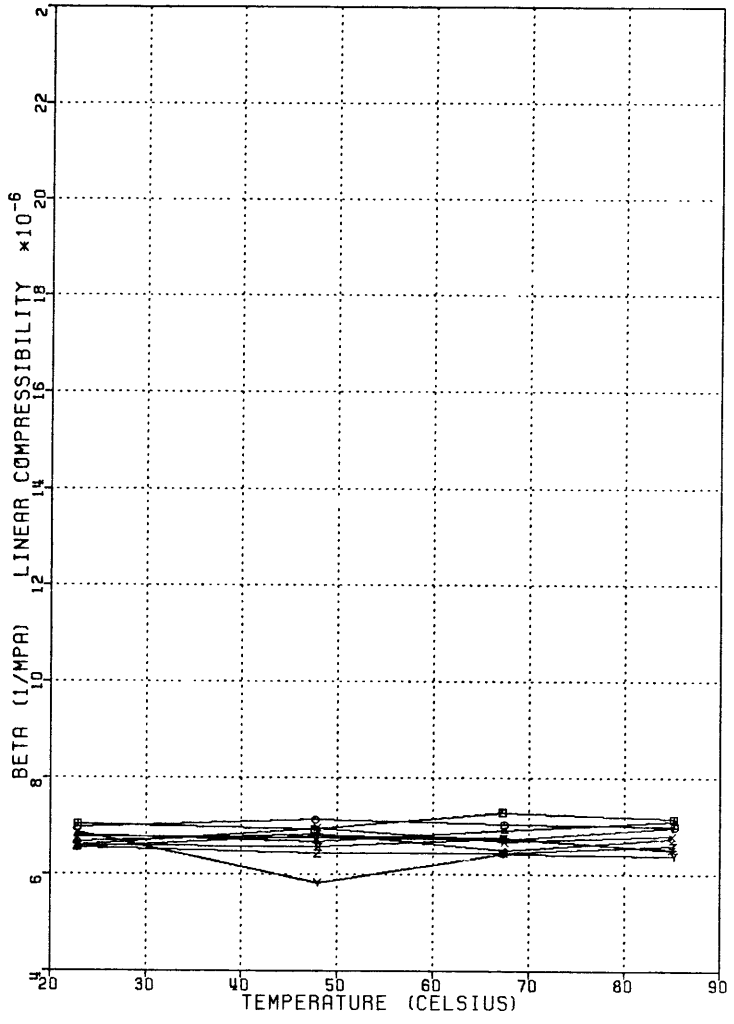
83 TROY OAK GRANITE
GAGE: 4B

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⋄ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



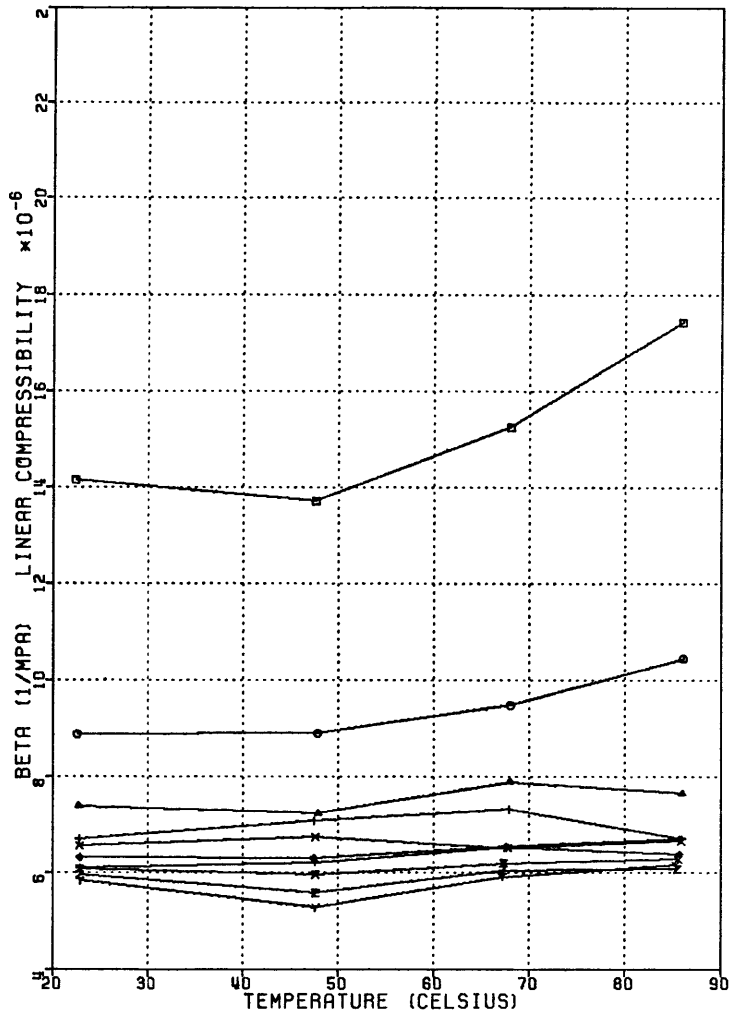
83 TROY OK GRANITE
GAGE:CA

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ▽ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



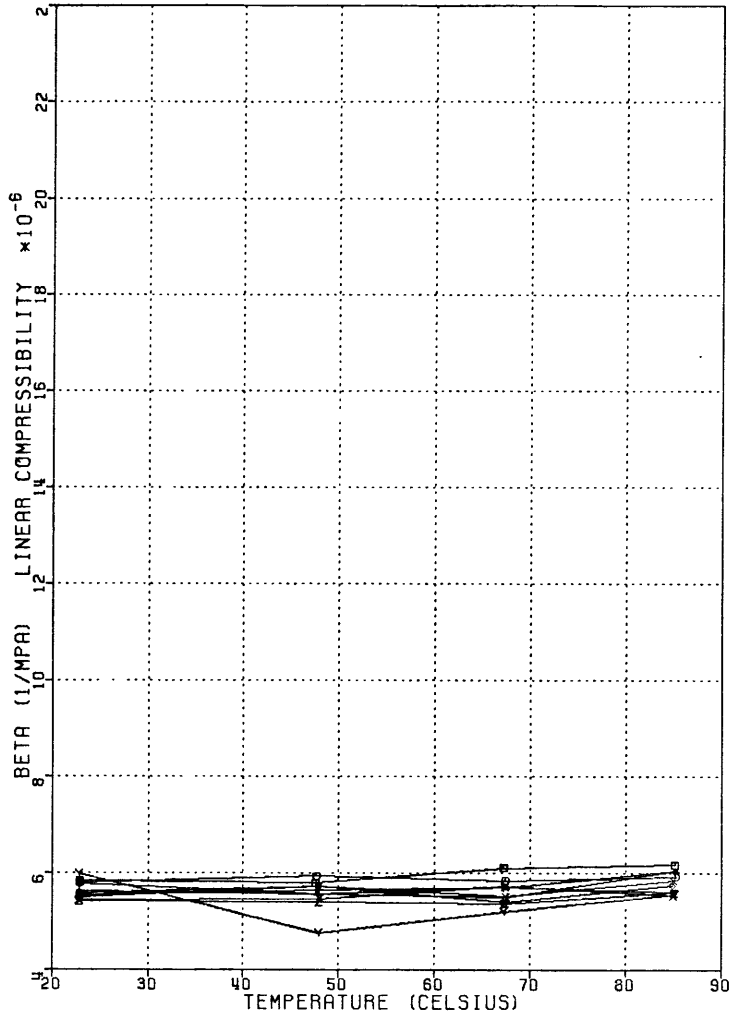
83 TROY OK GRANITE
GAGE:CA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- × - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



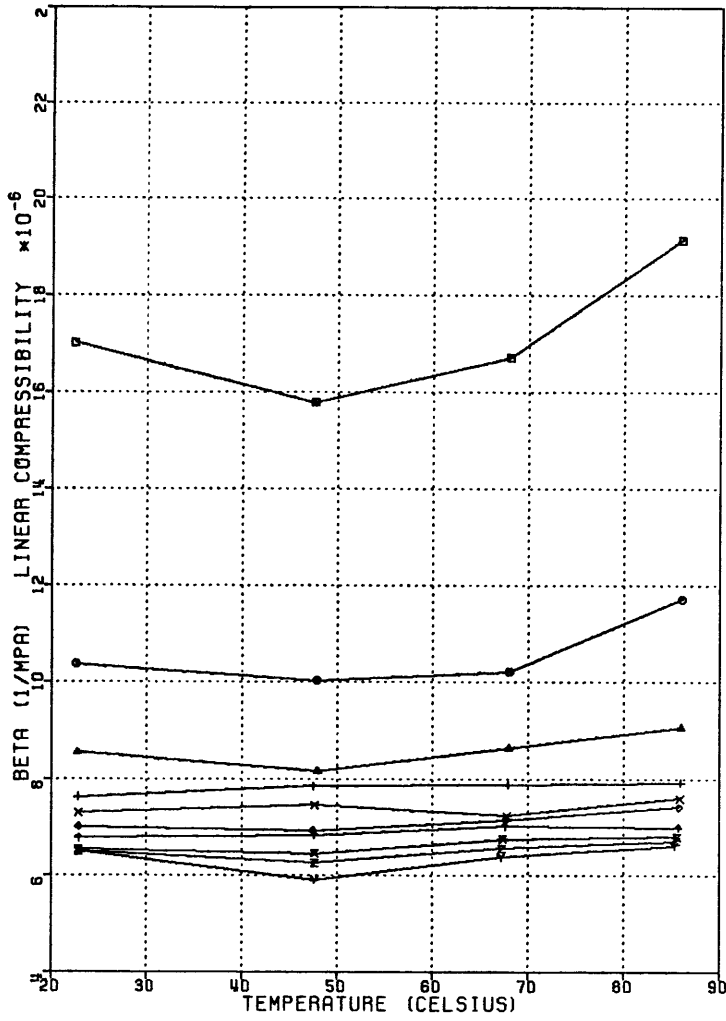
83 TROY OK GRANITE
GAGE: 3A

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- † - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



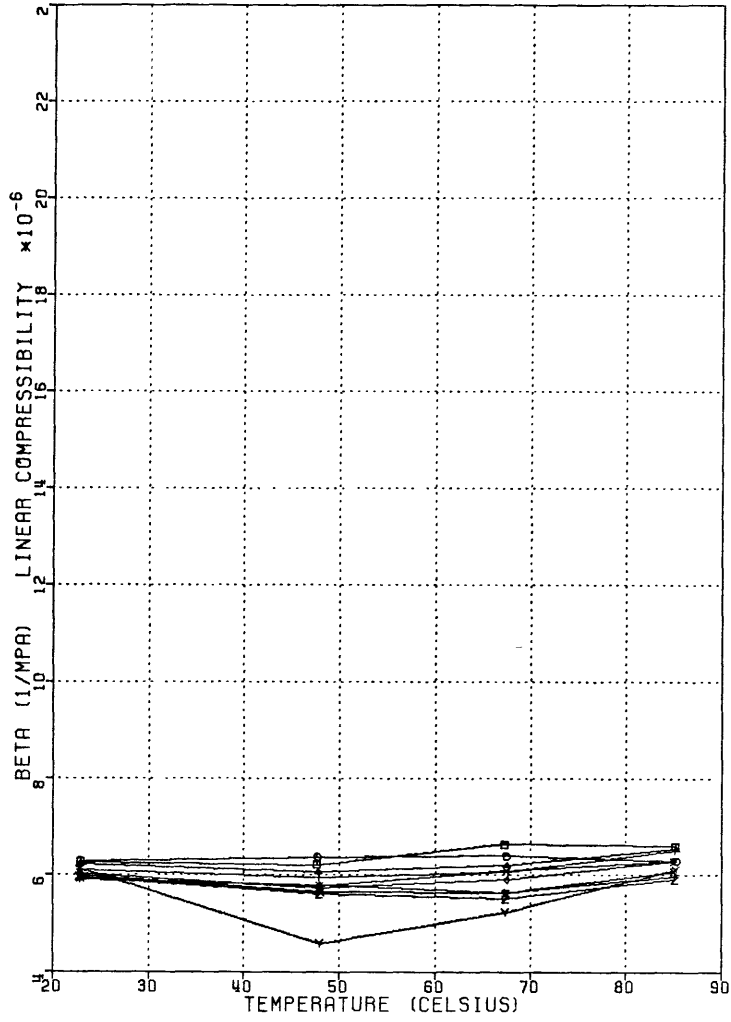
83 TROY OK GRANITE
GAGE: 3A

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- +
- X - 150 MPA
- ◇ - 160 MPA
- ♣ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



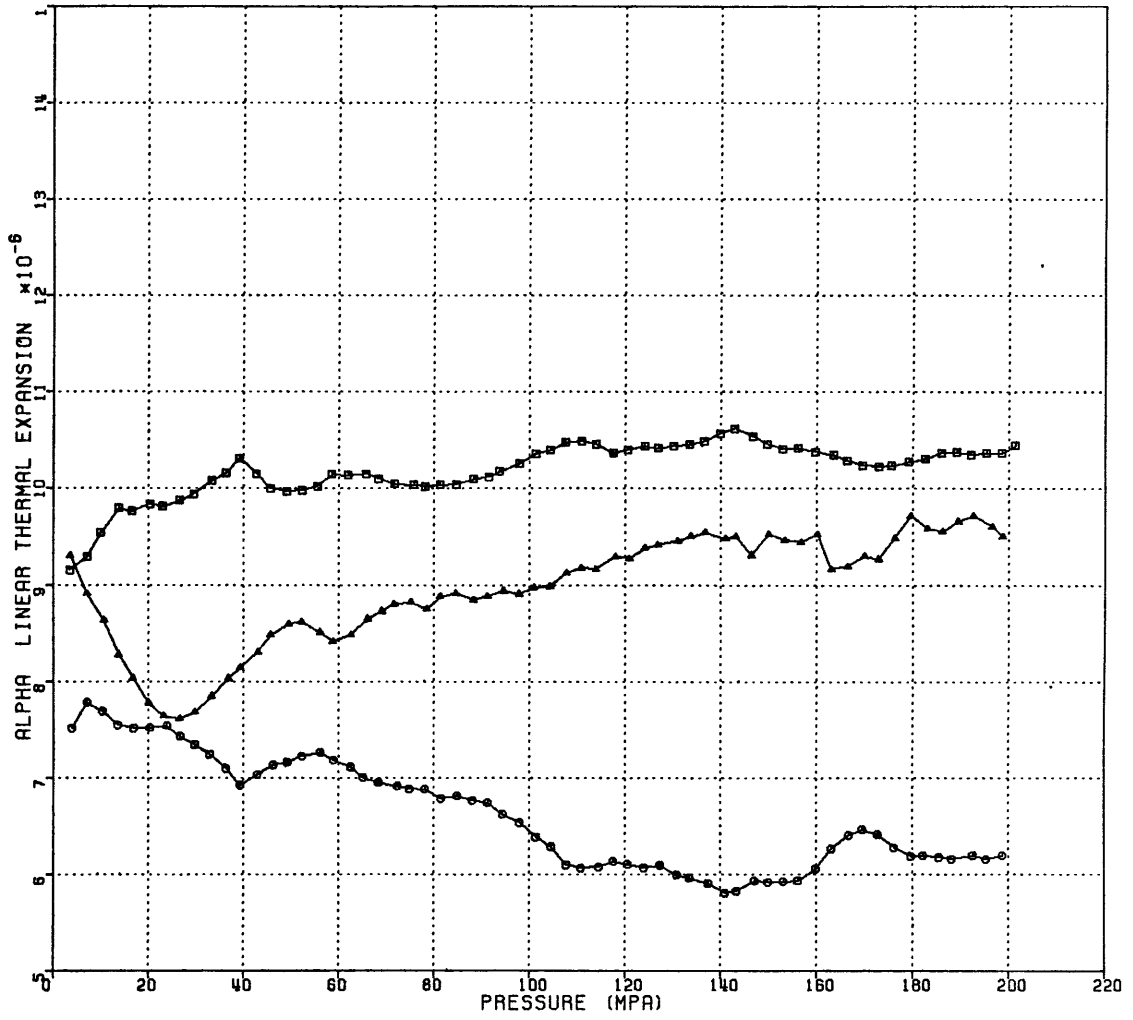
83 TROY OK GRANITE
GAGE: 4A

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- × - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



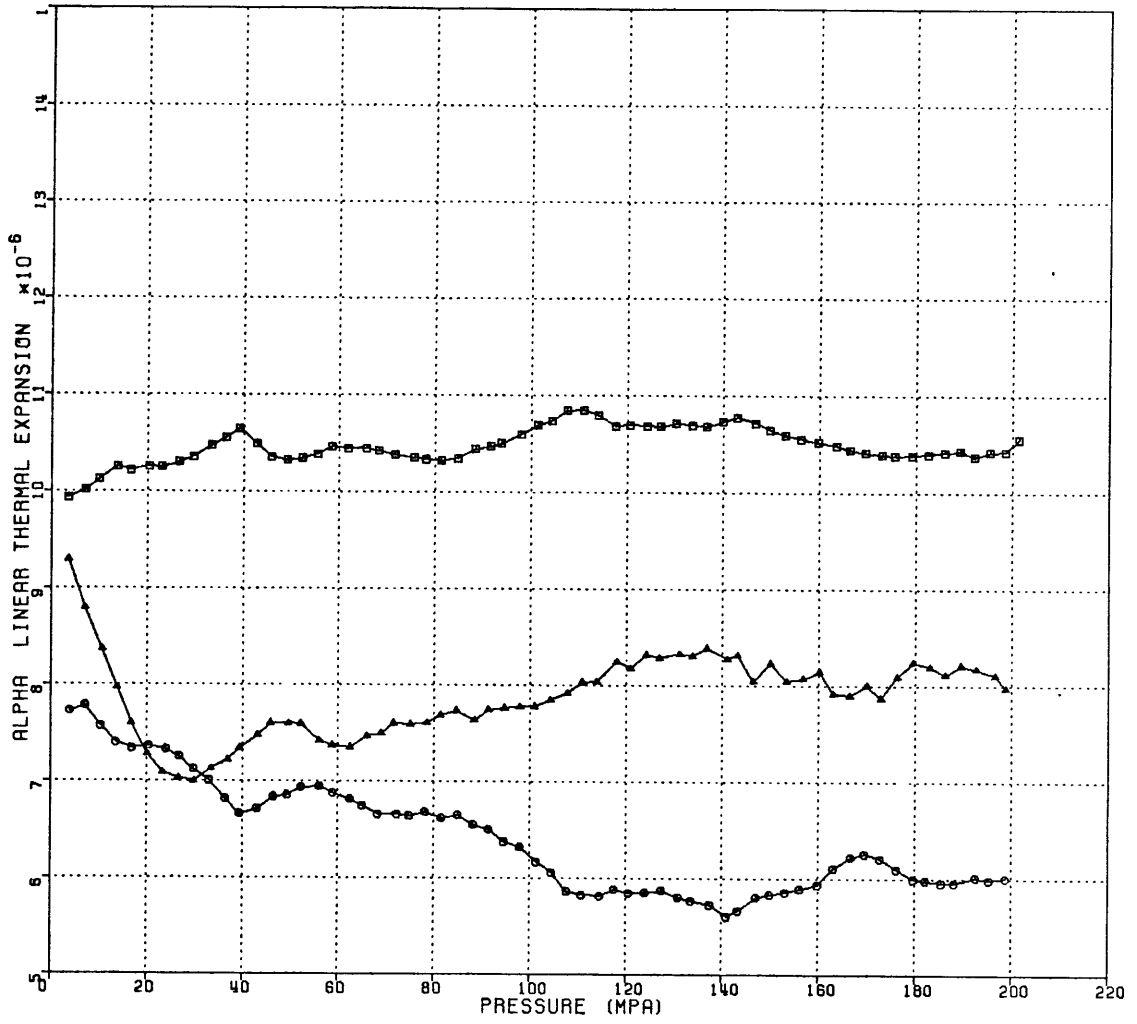
83 TROY OK GRANITE
GAGE: 4A

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⋈ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



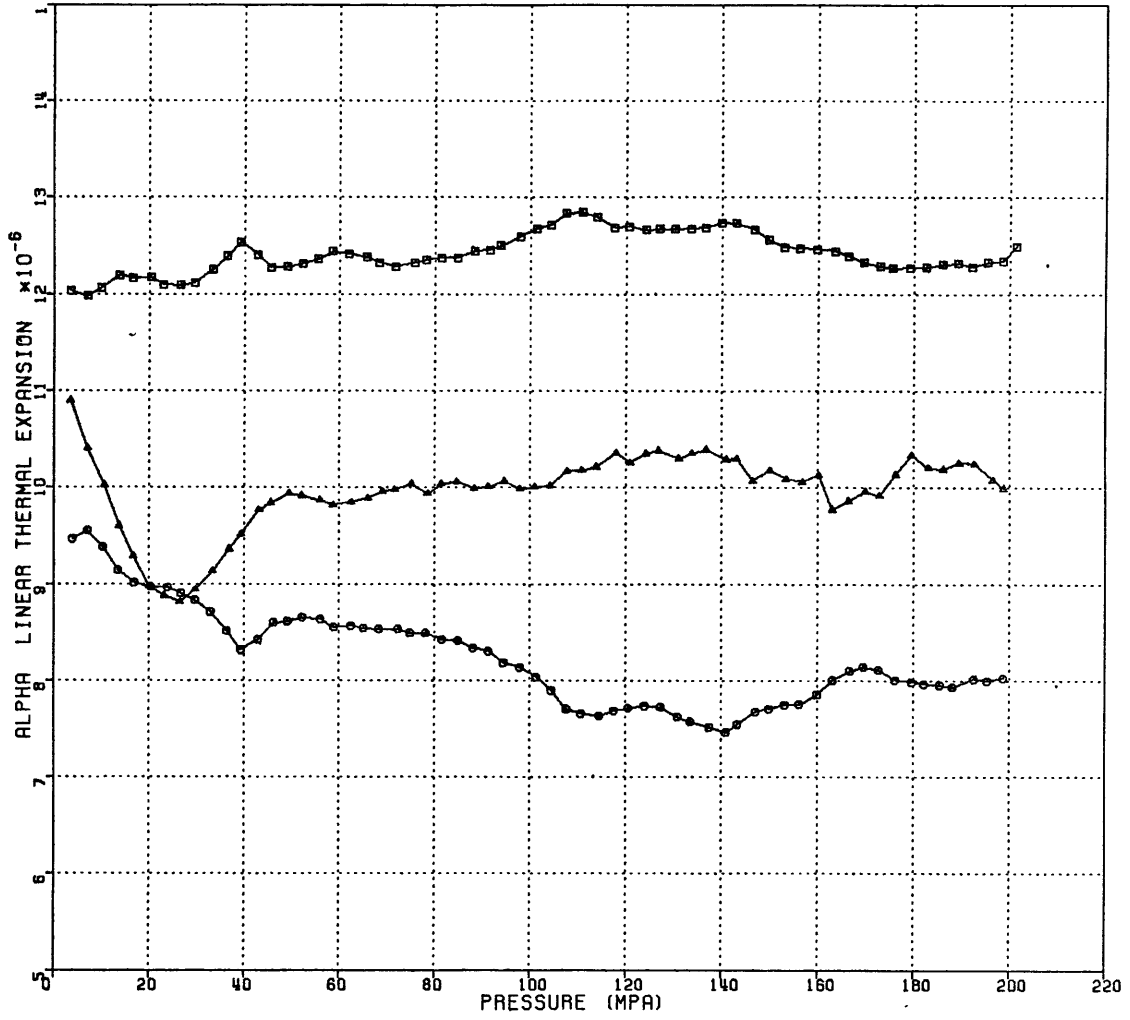
83 TROY OK GRANITE
GAGE: 3B

- - 23°C- 48°C
- - 48°C- 68°C
- △ - 68°C- 85°C



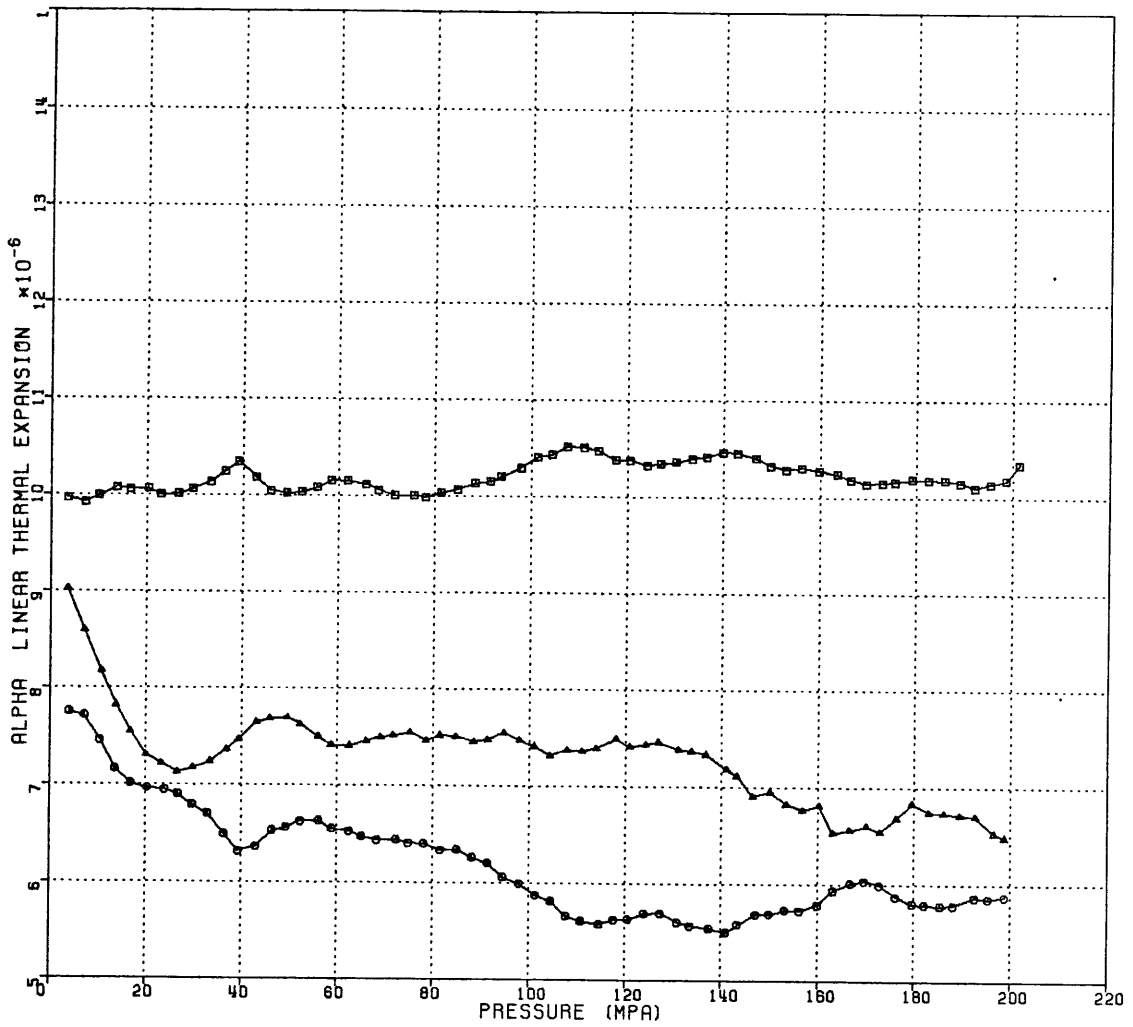
83 TROY OK GRANITE
GAGE: 4B

- - 23°C- 48°C
- - 48°C- 68°C
- △ - 68°C- 85°C



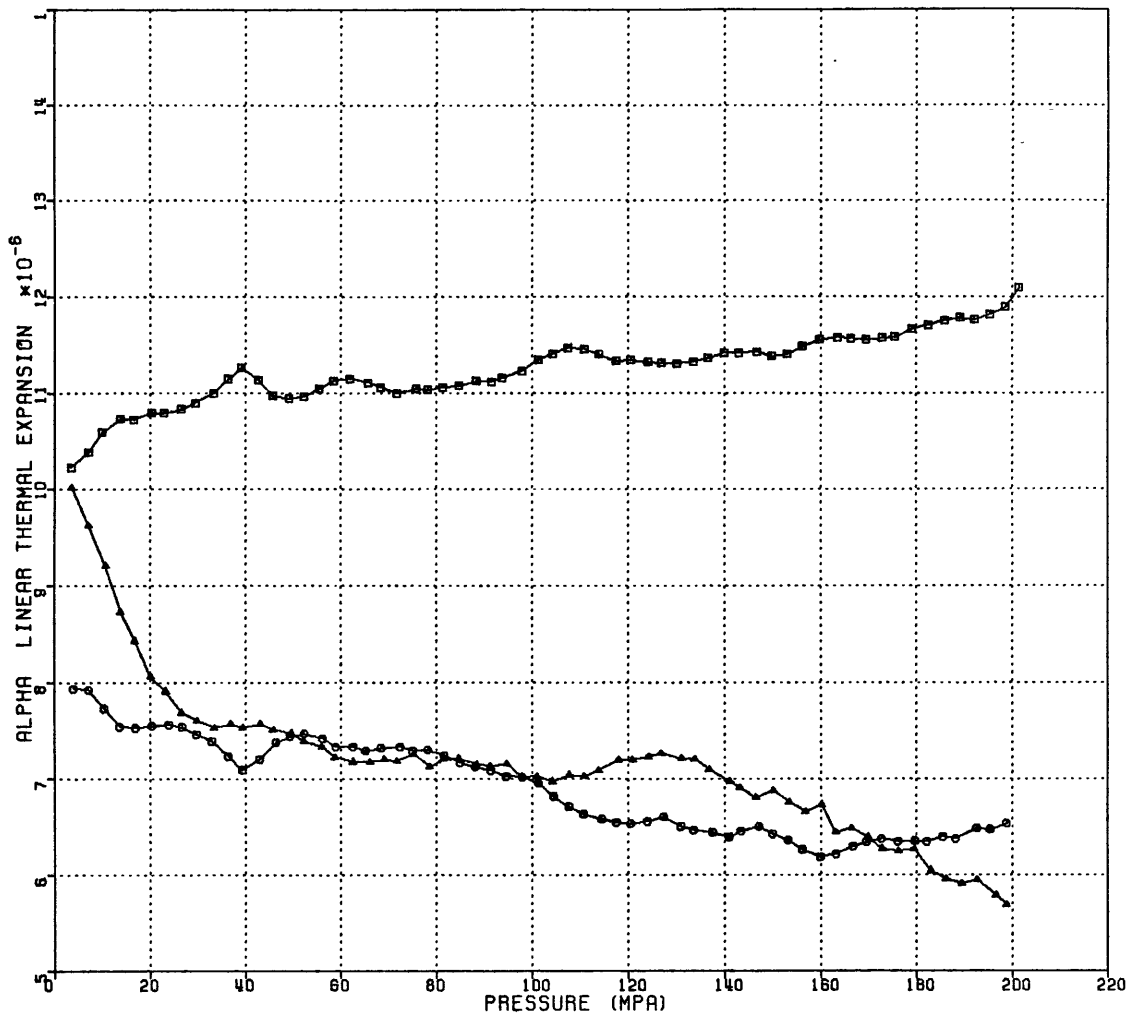
83 TROY OK GRANITE
GAGE: CA

- - 23°C- 48°C
- - 48°C- 68°C
- △ - 68°C- 85°C



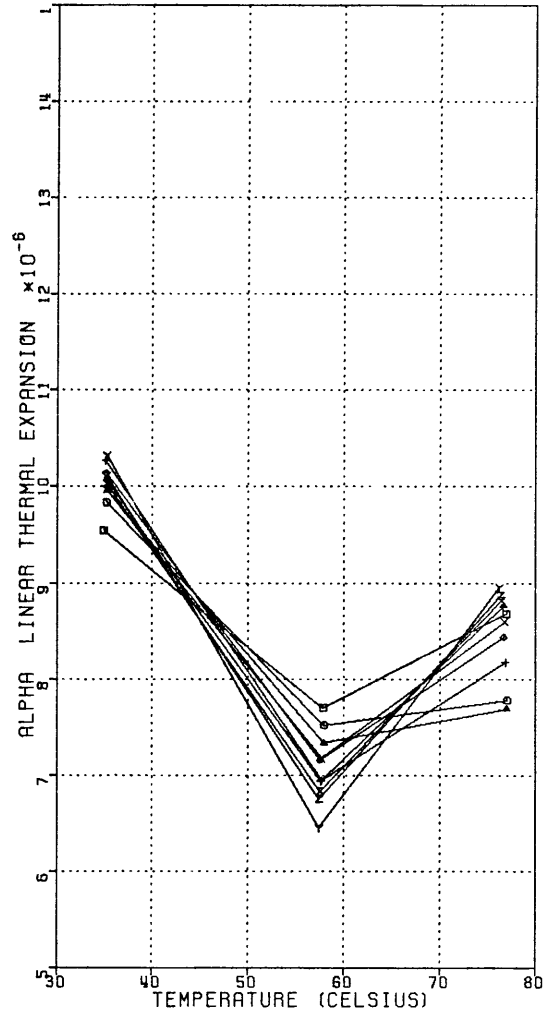
83 TROY ØK GRANITE
GAGE: 3A

- - 23°C- 48°C
- - 48°C- 68°C
- △ - 68°C- 85°C



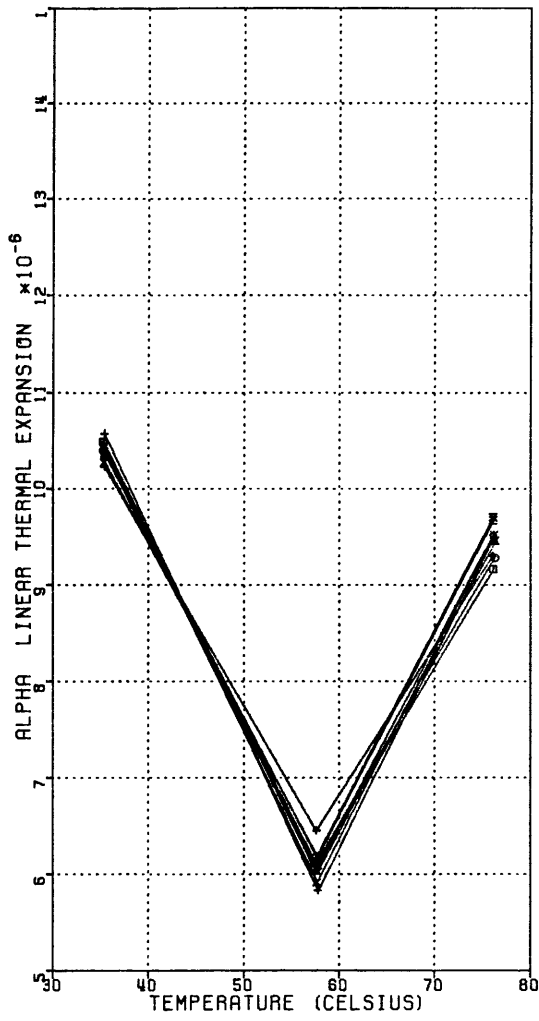
83 TROY OK GRANITE
GAGE: 4A

- - 23°C- 48°C
- - 48°C- 68°C
- △ - 68°C- 85°C



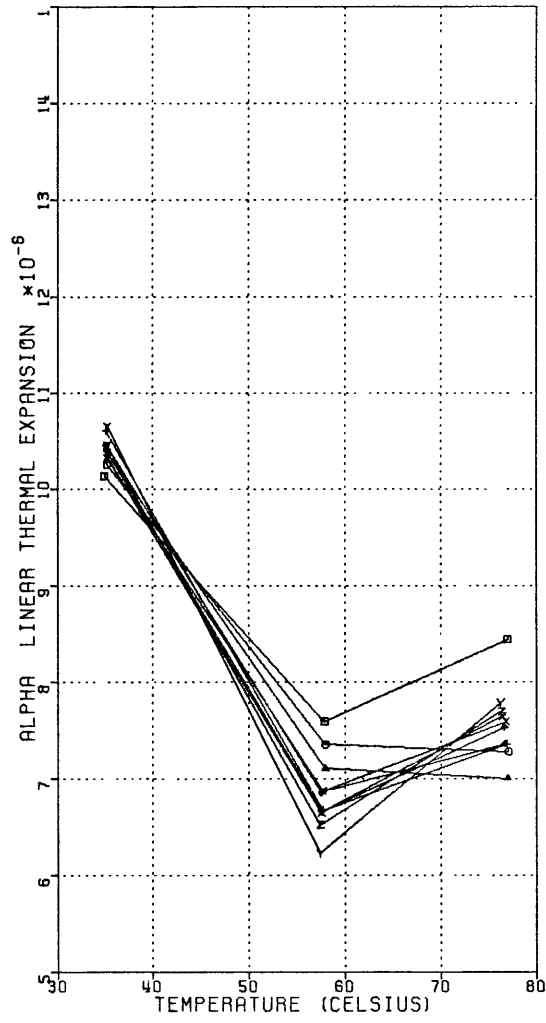
83 TROY OK GRANITE
GAGE: 3B

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ♣ - 70 MPA
- ⊗ - 80 MPA
- ⊘ - 90 MPA
- ⊙ - 100 MPA



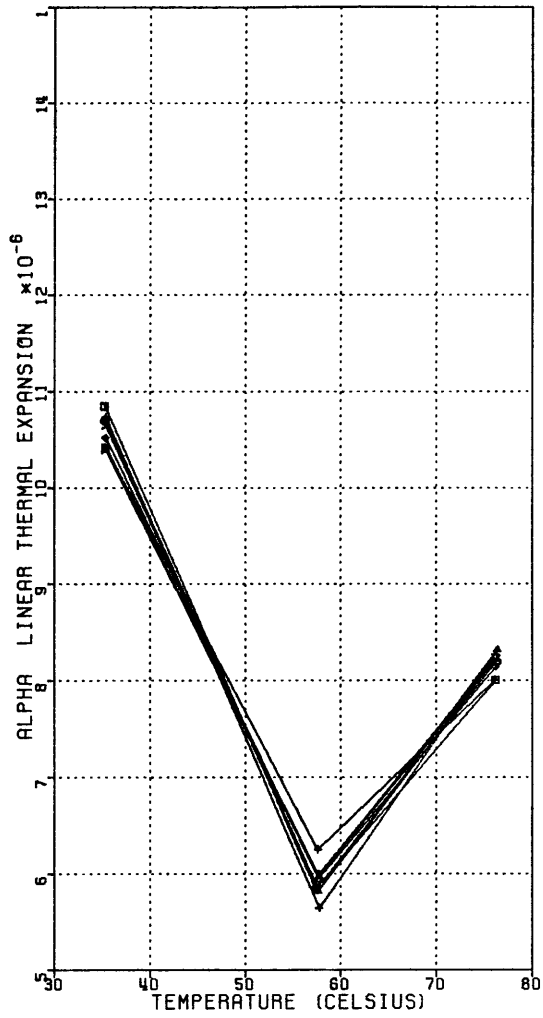
83 TROY OK GRANITE
GAGE: 3B

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA



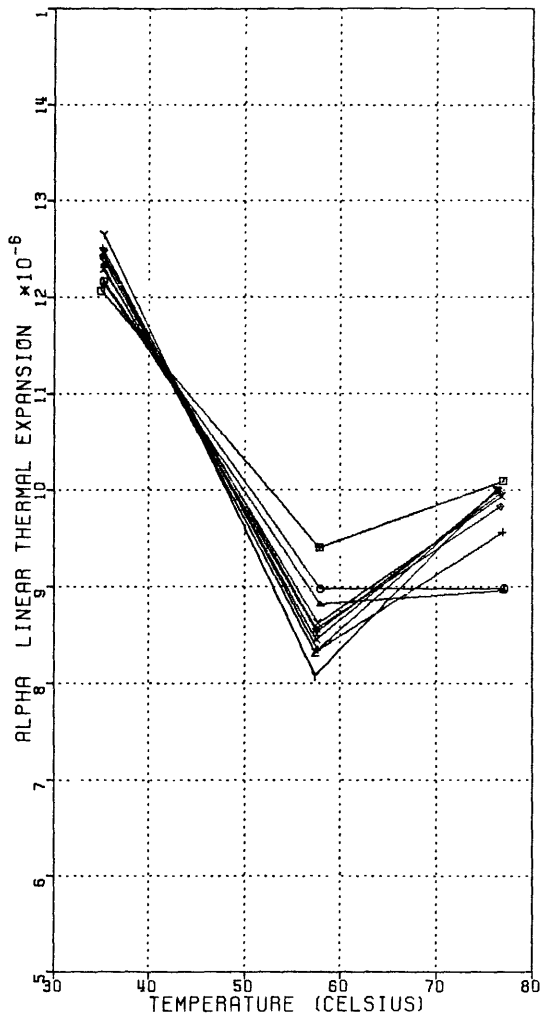
83 TROY OK GRANITE
GAGE: 4B

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ♠ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



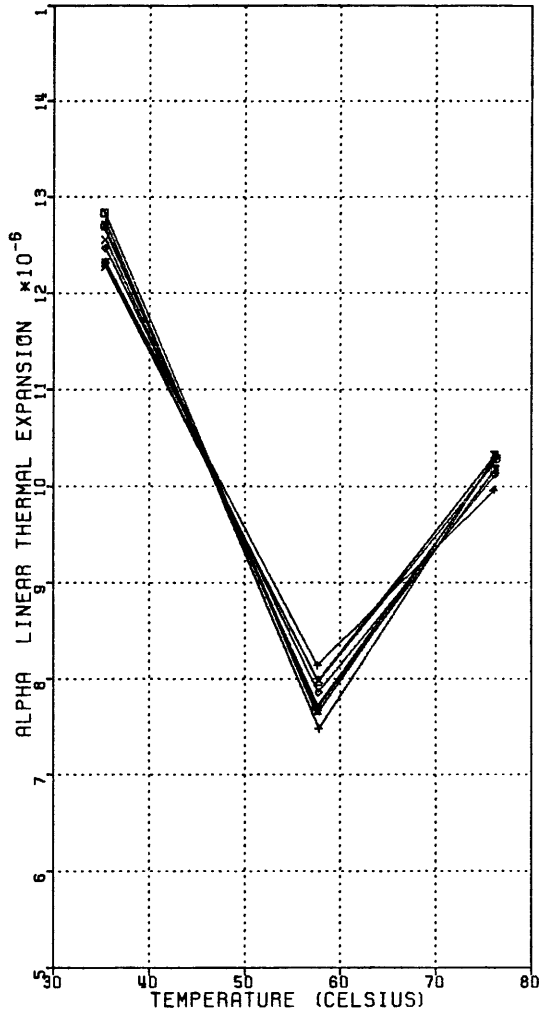
83 TROY OK GRANITE
GAGE: 4B

- - 110 MPA
- - 120 MPA
- ▲ - 130 MPA
- + - 140 MPA
- x - 150 MPA
- ◇ - 160 MPA
- ♣ - 170 MPA
- X - 180 MPA
- Z - 190 MPA



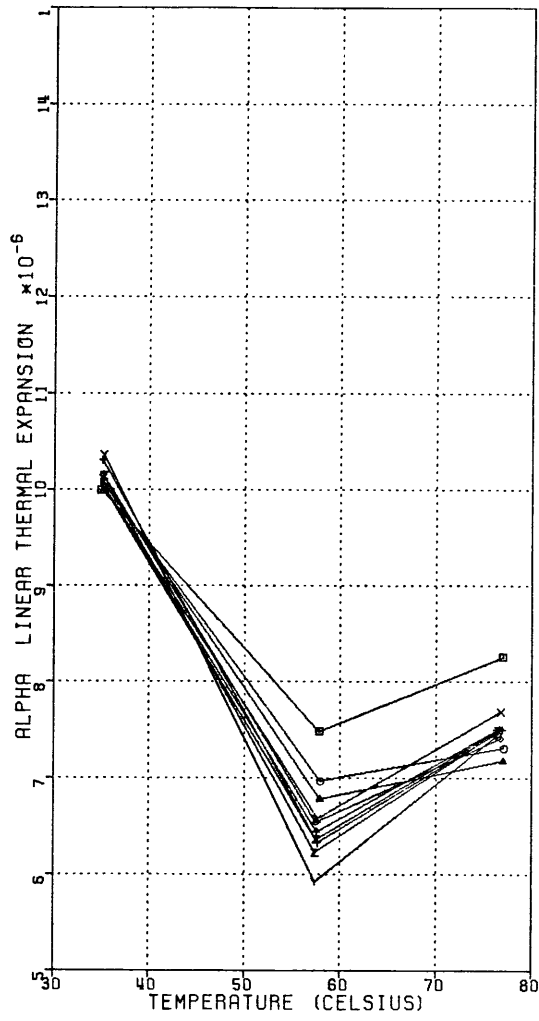
83 TROY OK GRANITE
GAGE:CA

- - 10 MPA
- - 20 MPA
- ▲ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⋈ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



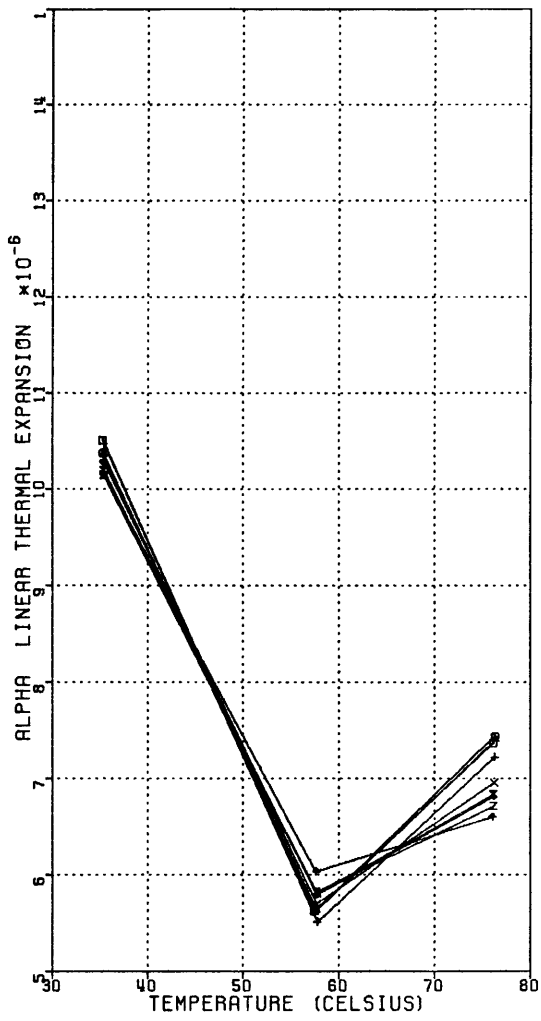
83 TROY OK GRANITE
GAGE: CA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- +
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- X - 180 MPA
- Z - 190 MPA



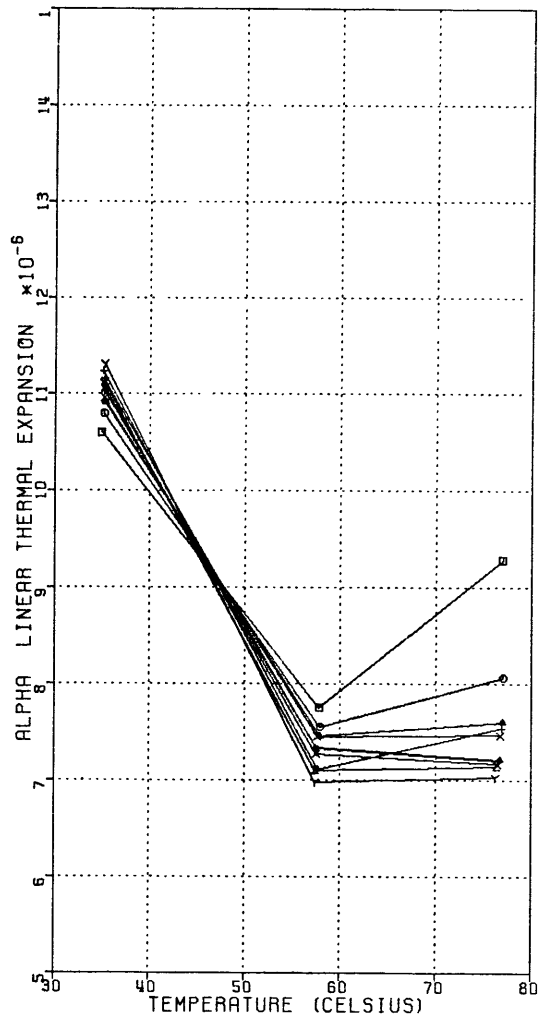
83 TRØY ØK GRANITE
GAGE: 3A

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



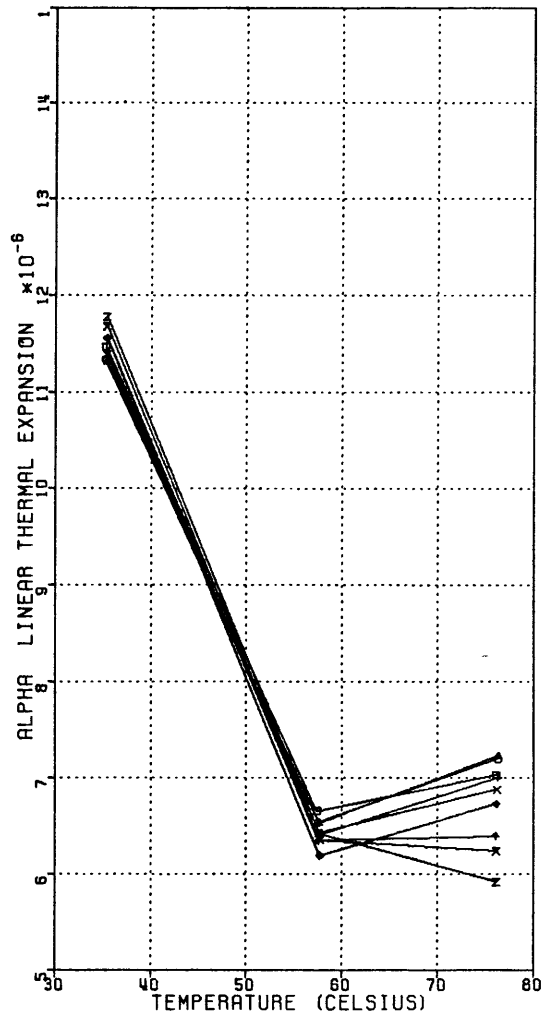
83 TROY OK GRANITE
GAGE: 3A

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- x - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- × - 180 MPA
- Z - 190 MPA



83 TROY OK GRANITE
GAGE: 4A

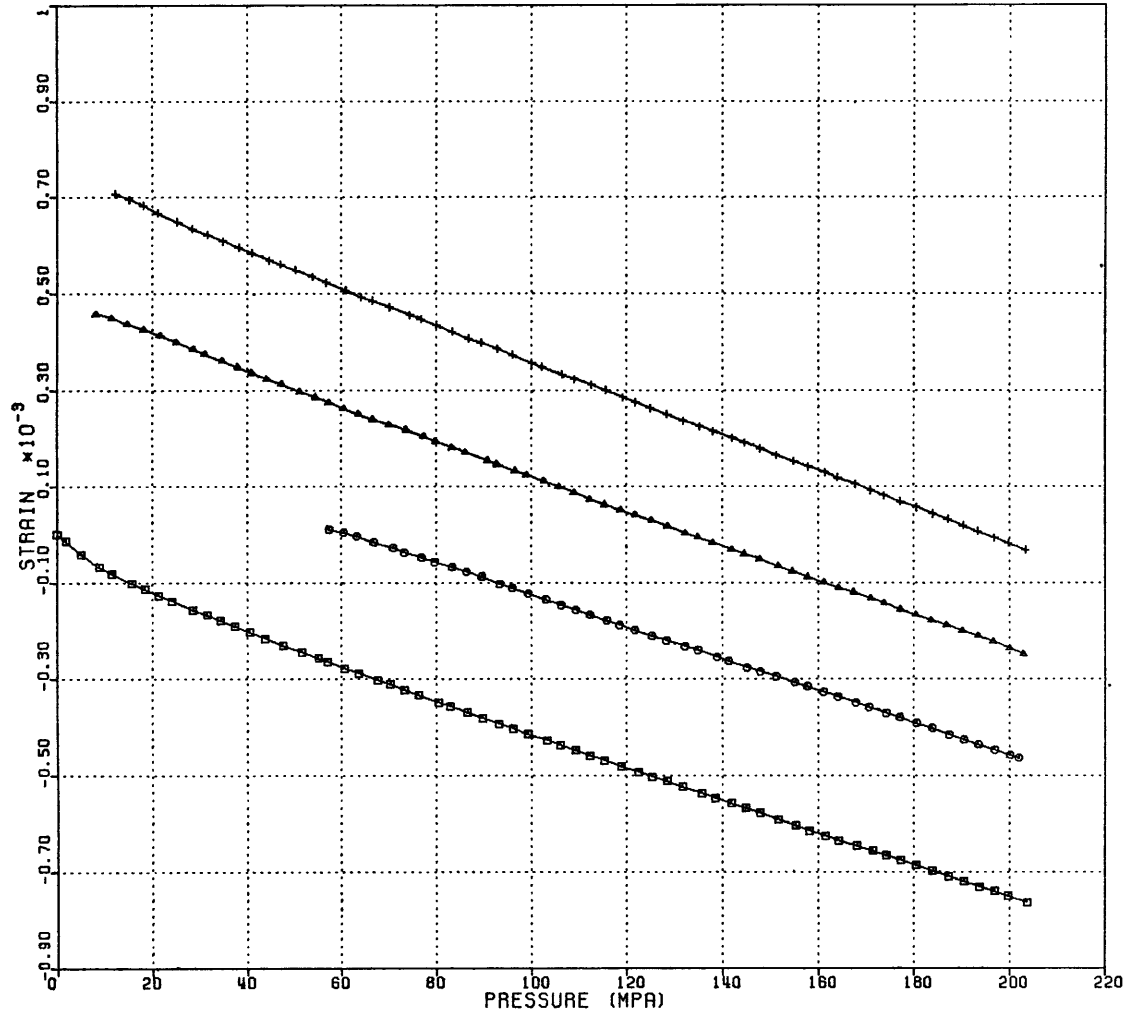
- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- x - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



83 TROY OK GRANITE
GAGE: 4A

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- x - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- X - 180 MPA
- Z - 190 MPA

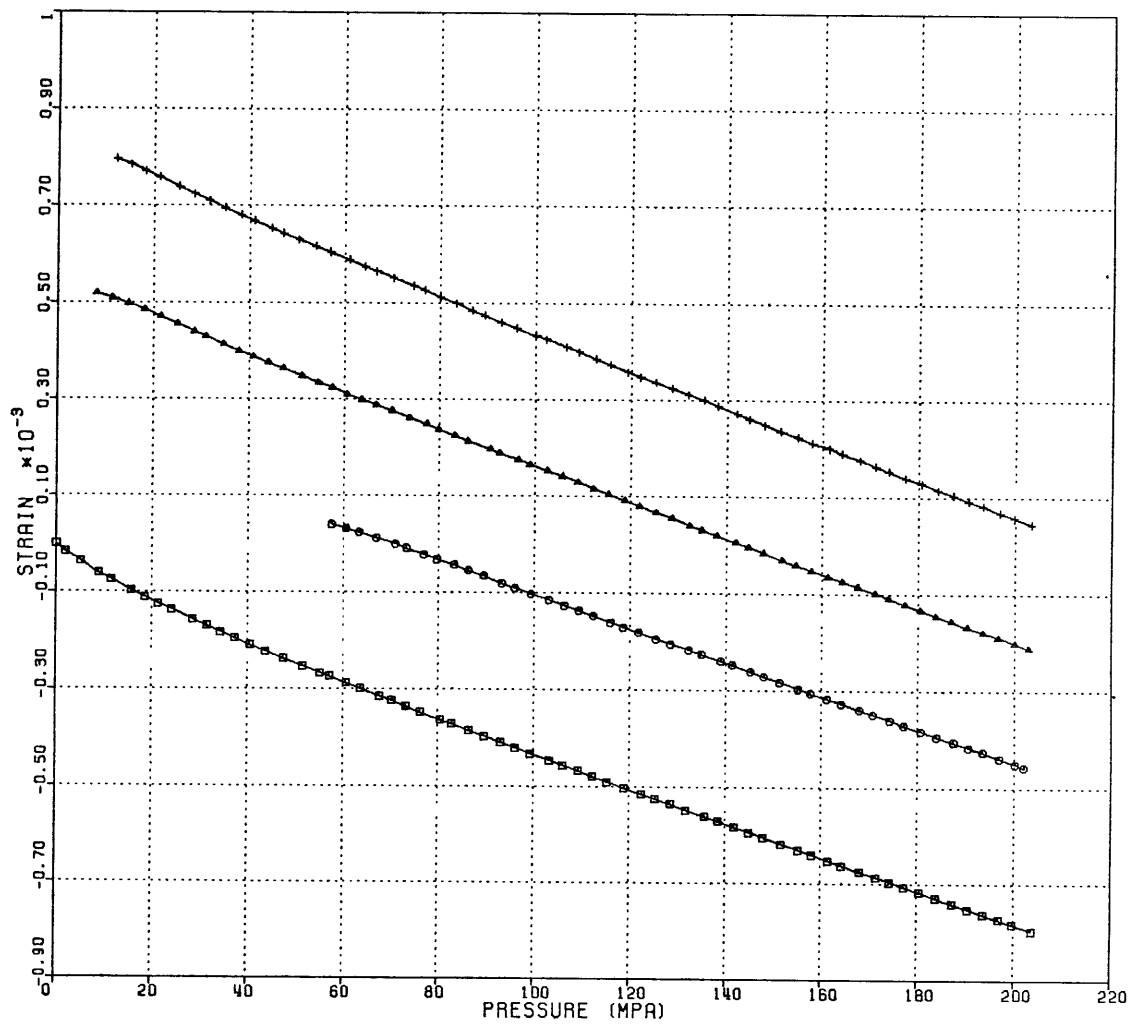
178 Twin Sisters dunite is 10 anisotropic and has many cracks in thin sections. The cracks do not appear in the compressibility of the rock. After cycling the rock to 200 MPa the compressibility shows a remarkably low value for β at room pressure, lower than initial β from the first cycle. The increase in β with temperature is closely matched by the decrease in α with pressure.



178 TWIN SISTERS WA DUNITE

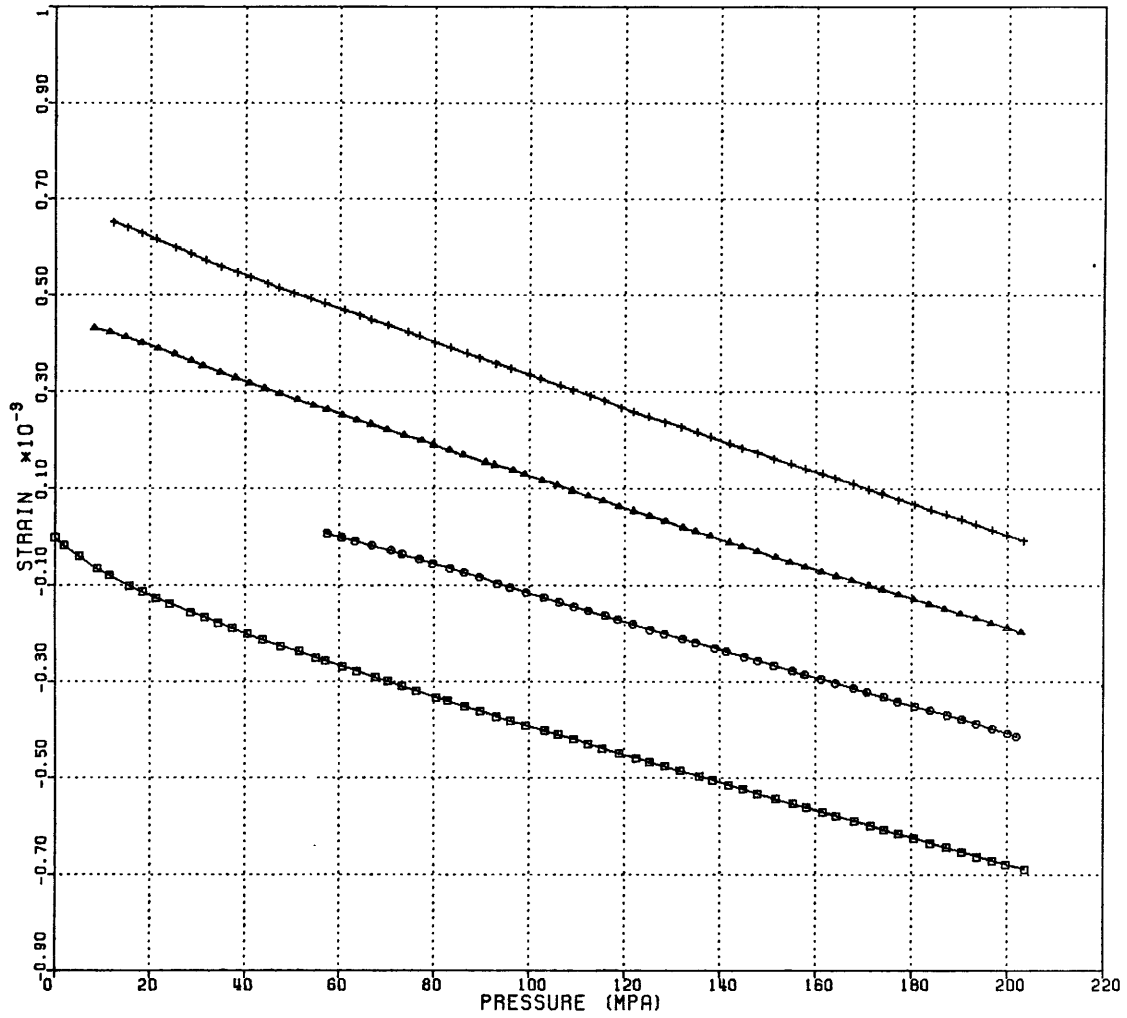
GAGE:AC

- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



178 TWIN SISTERS WA DUNITE
GAGE:BC

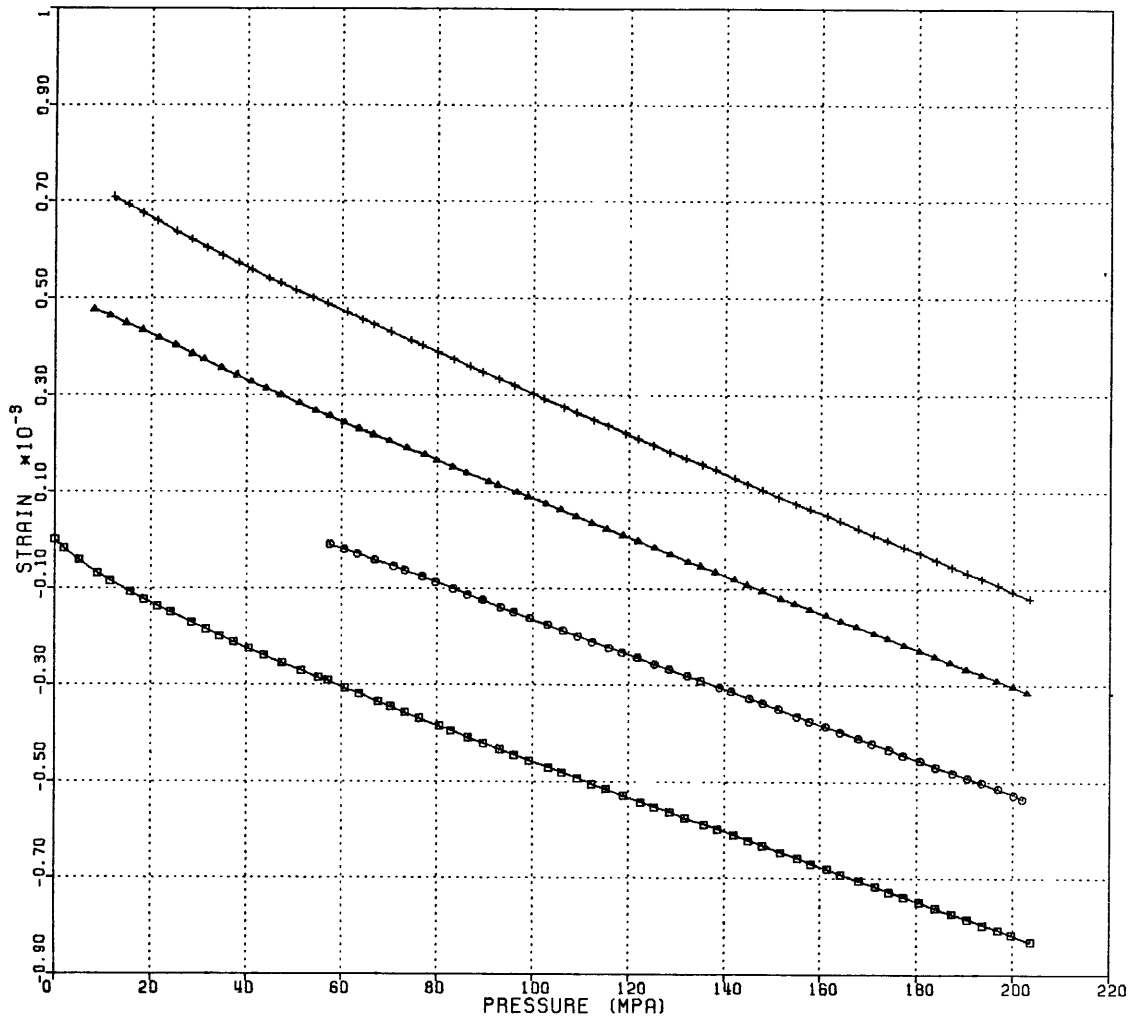
□ - 19°C
○ - 43°C
△ - 64°C
+ - 86°C



178 TWIN SISTERS WA DUNITE

GAGE: 3C

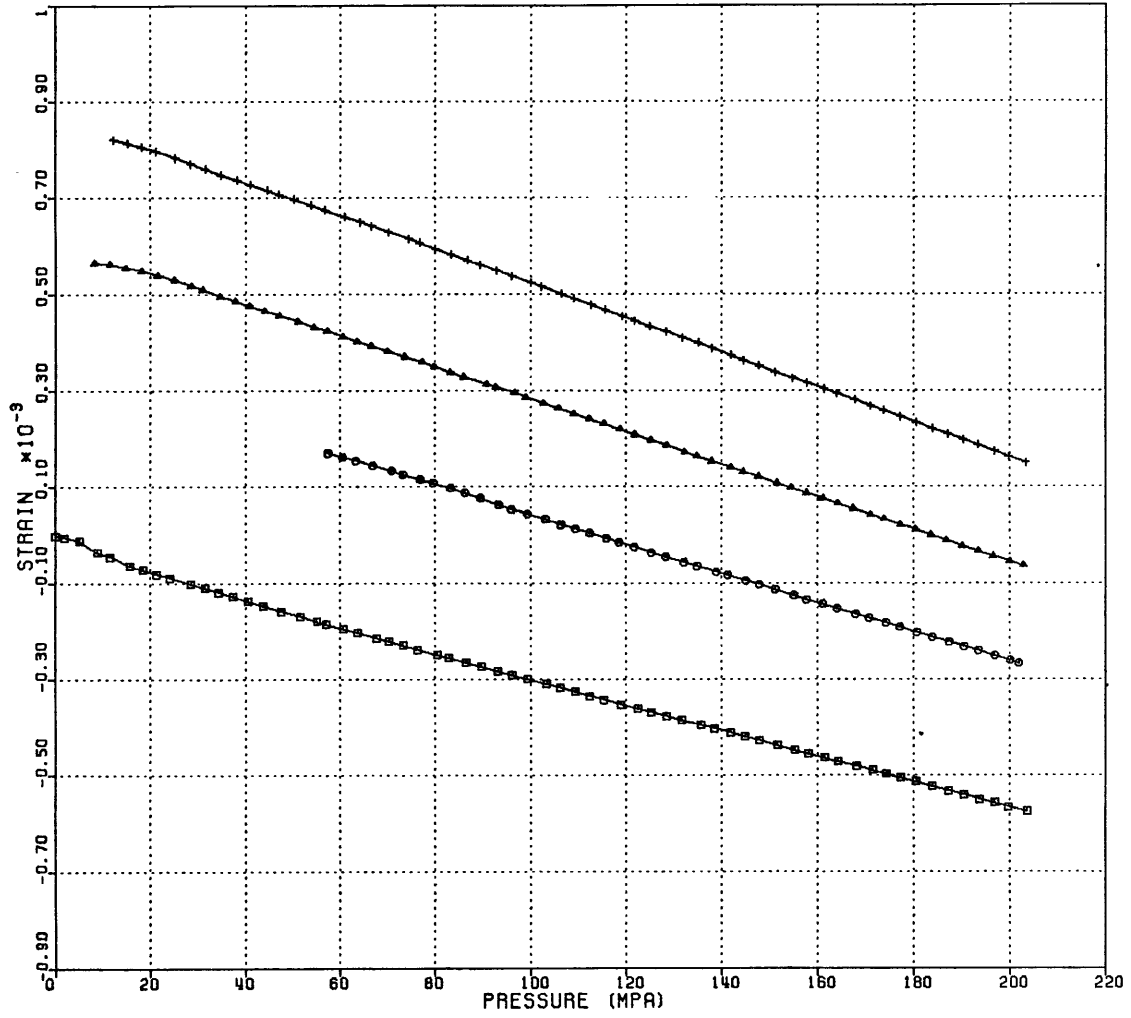
- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



178 TWIN SISTERS WA DUNITE

GAGE:AB

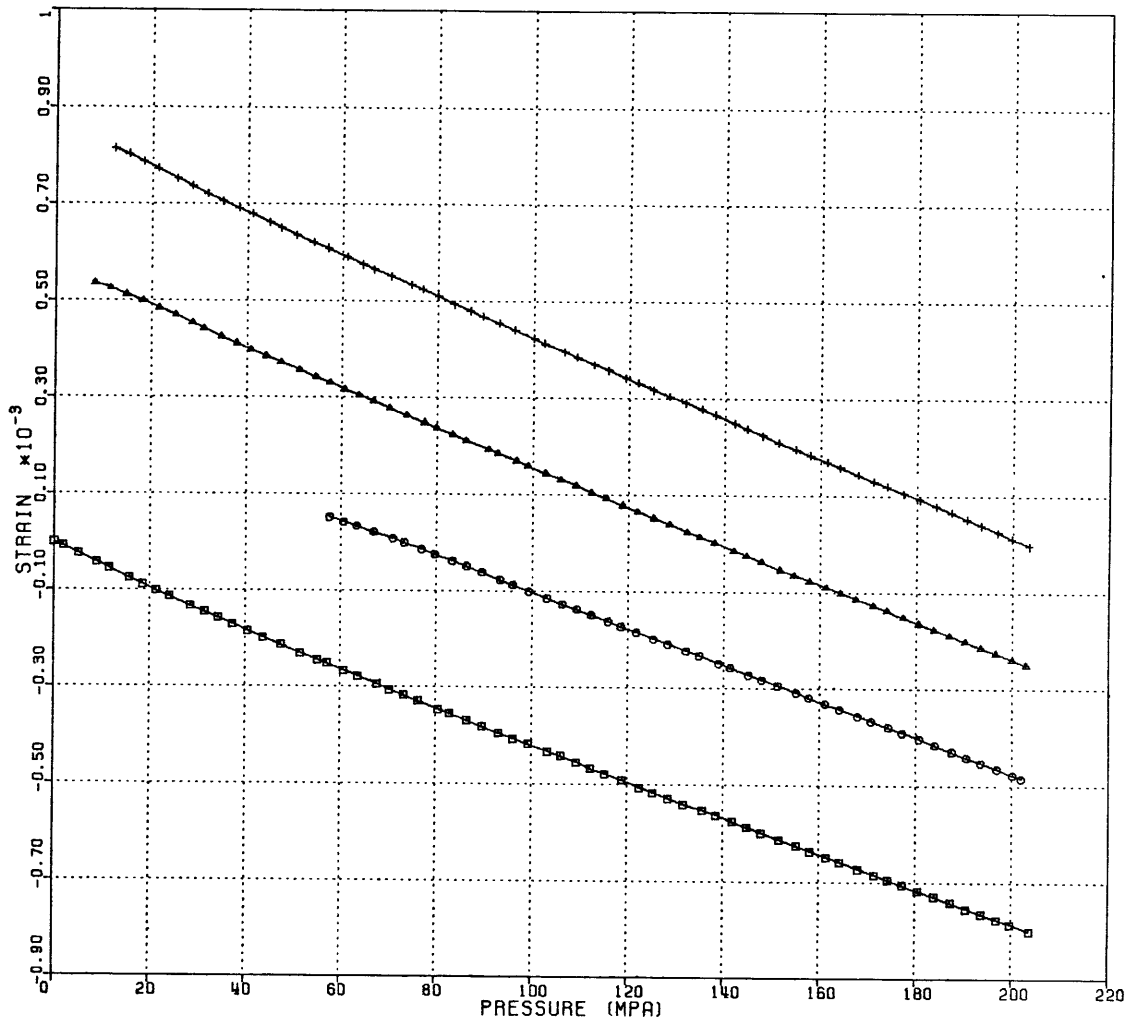
- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



178 TWIN SISTERS WA DUNITe

GAGE:CB

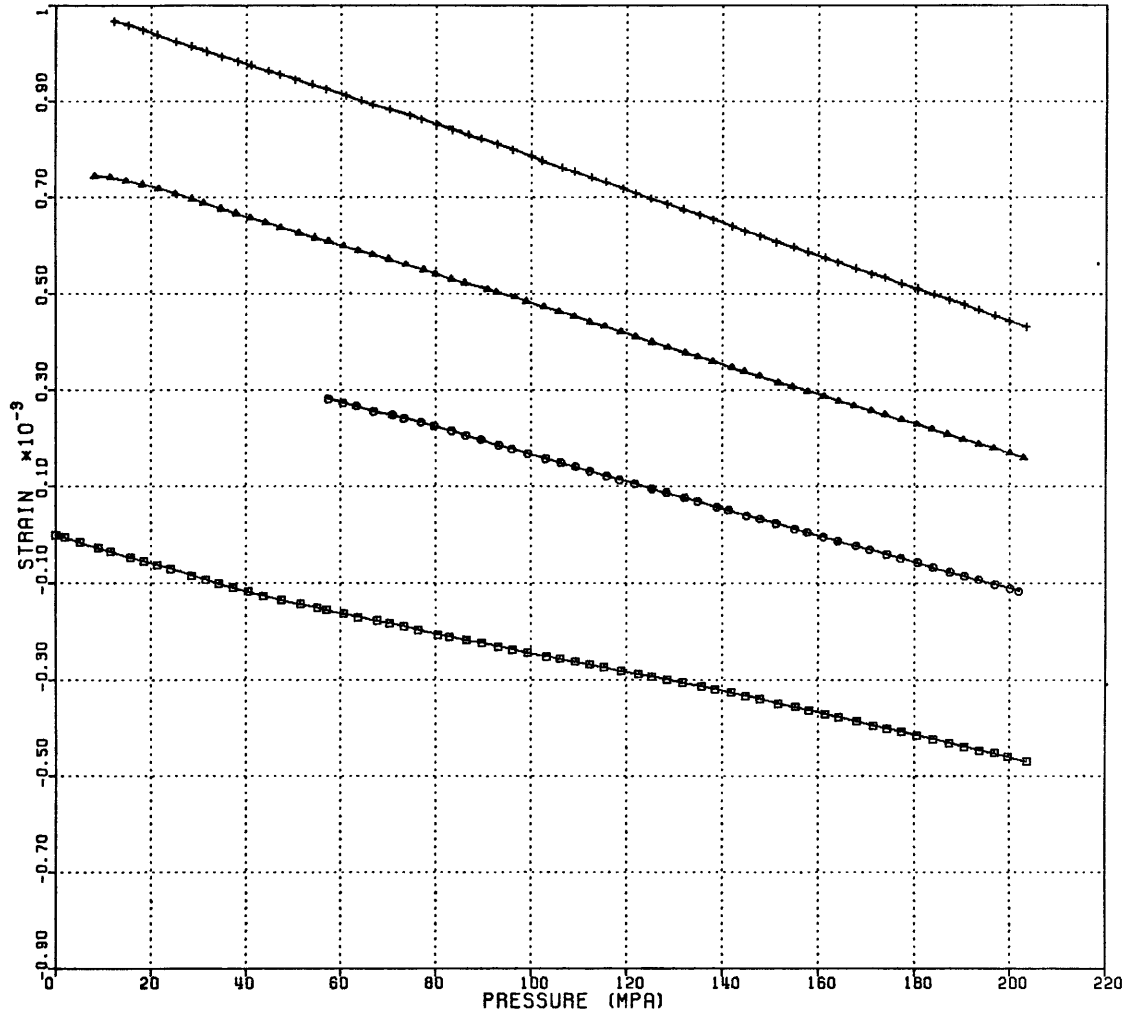
- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



178 TWIN SISTERS WA DUNITE

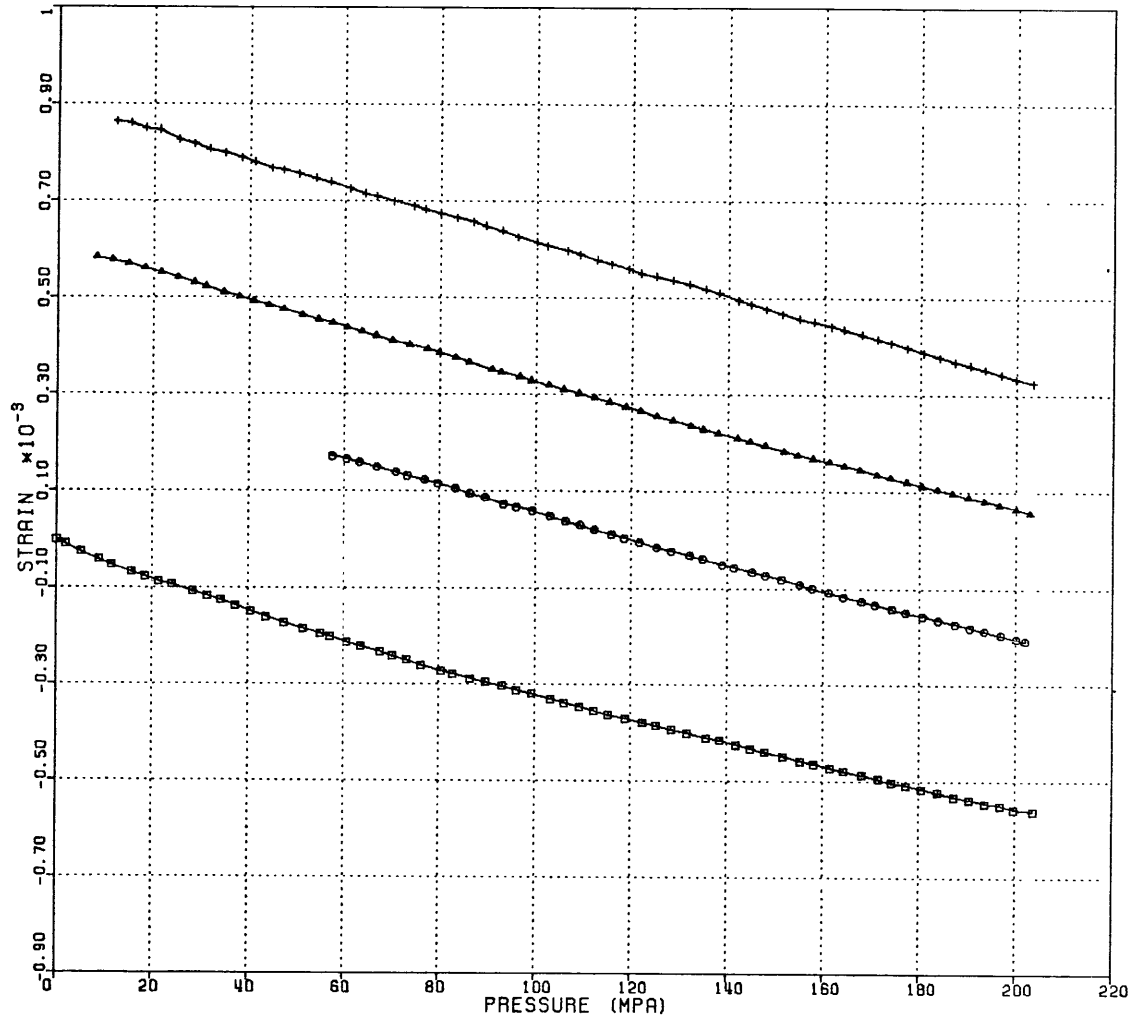
GAGE:3B

- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



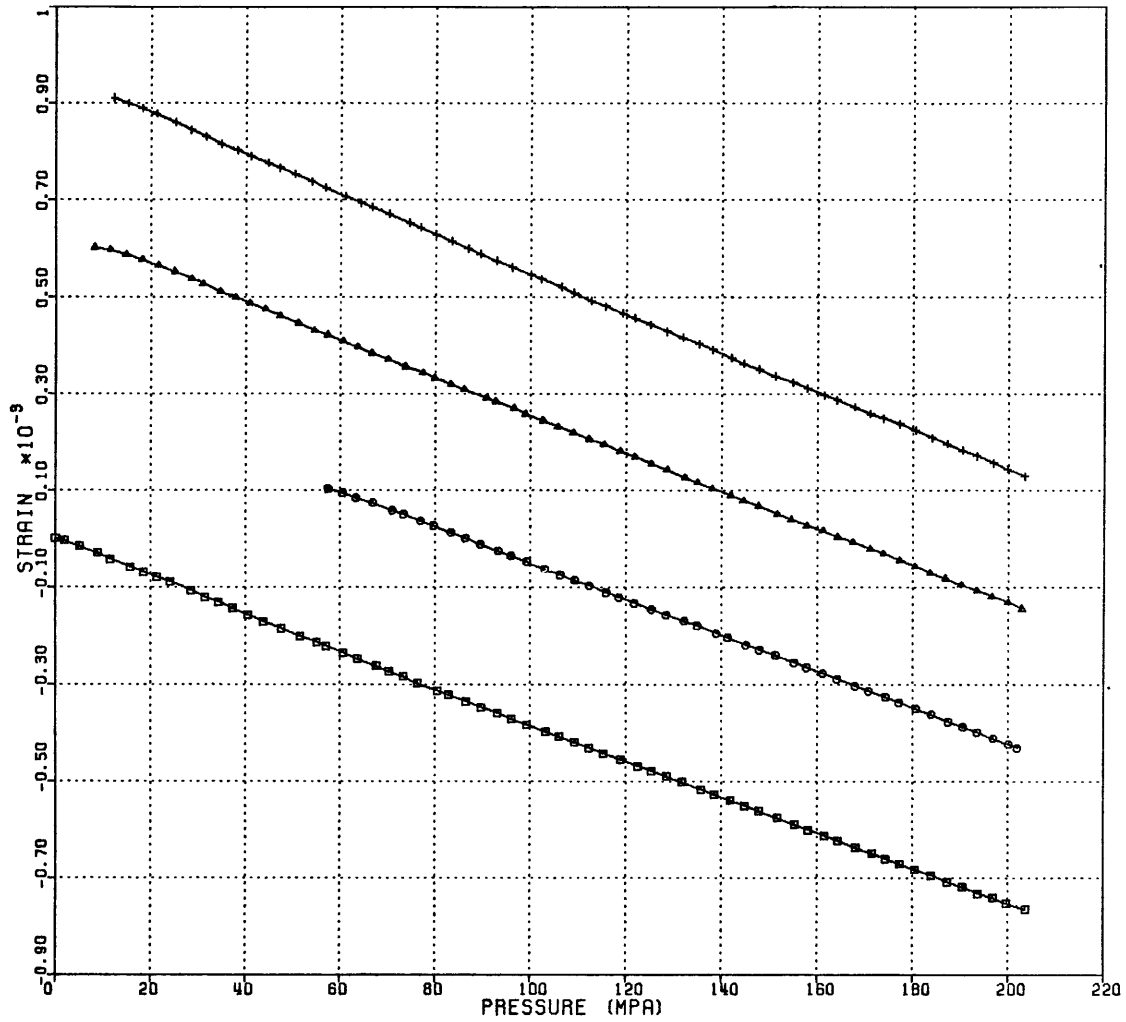
178 TWIN SISTERS WA DUNITE
CAGE:BA

- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



178 TWIN SISTERS WA DUNITE
GAGE:CA

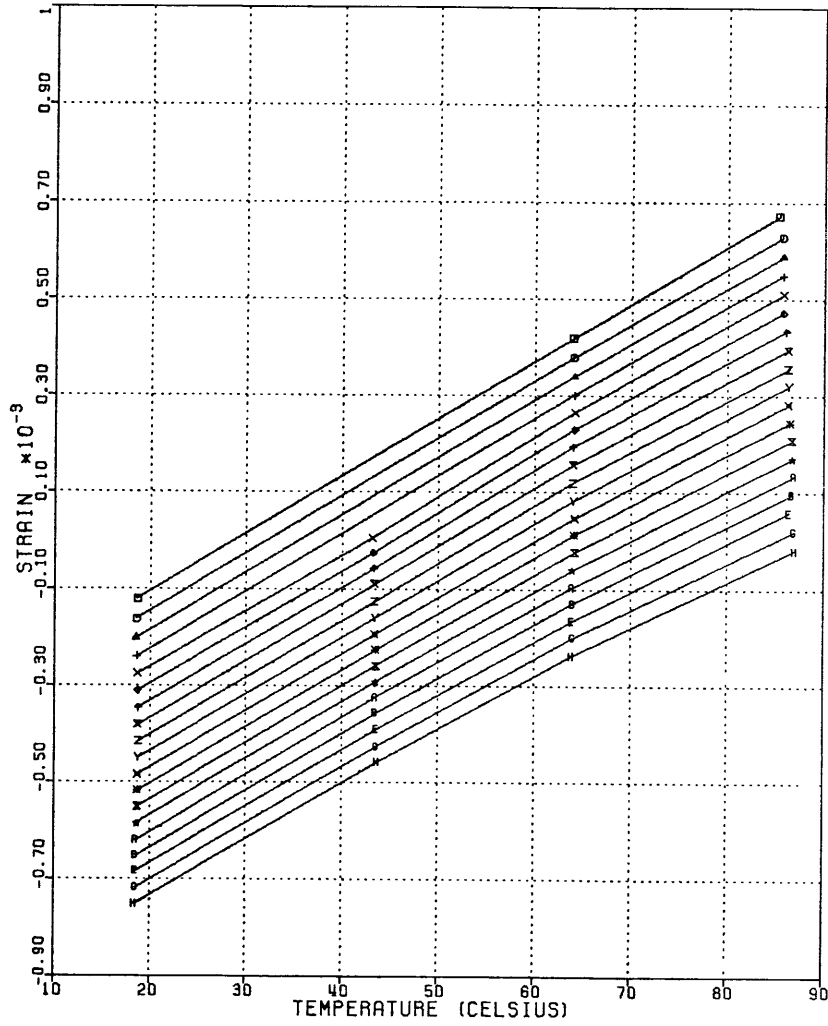
- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



178 TWIN SISTERS WA DUNITE

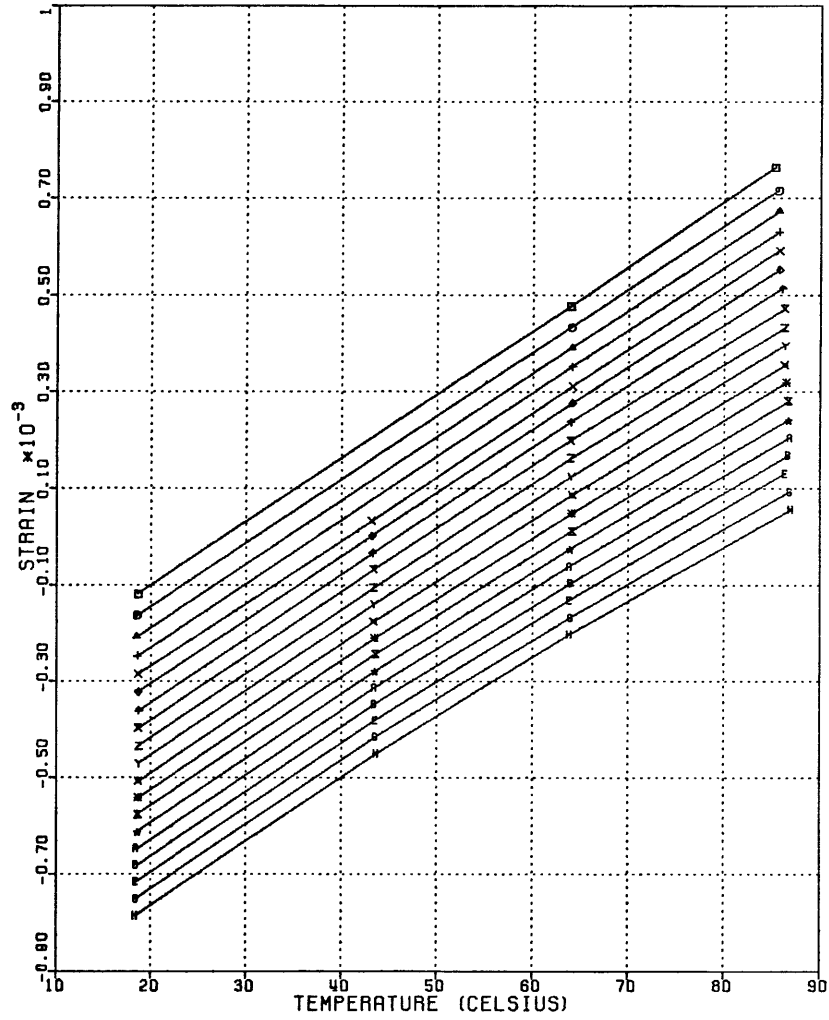
GAGE: 3A

□ - 19°C
 ○ - 43°C
 ▲ - 64°C
 + - 86°C



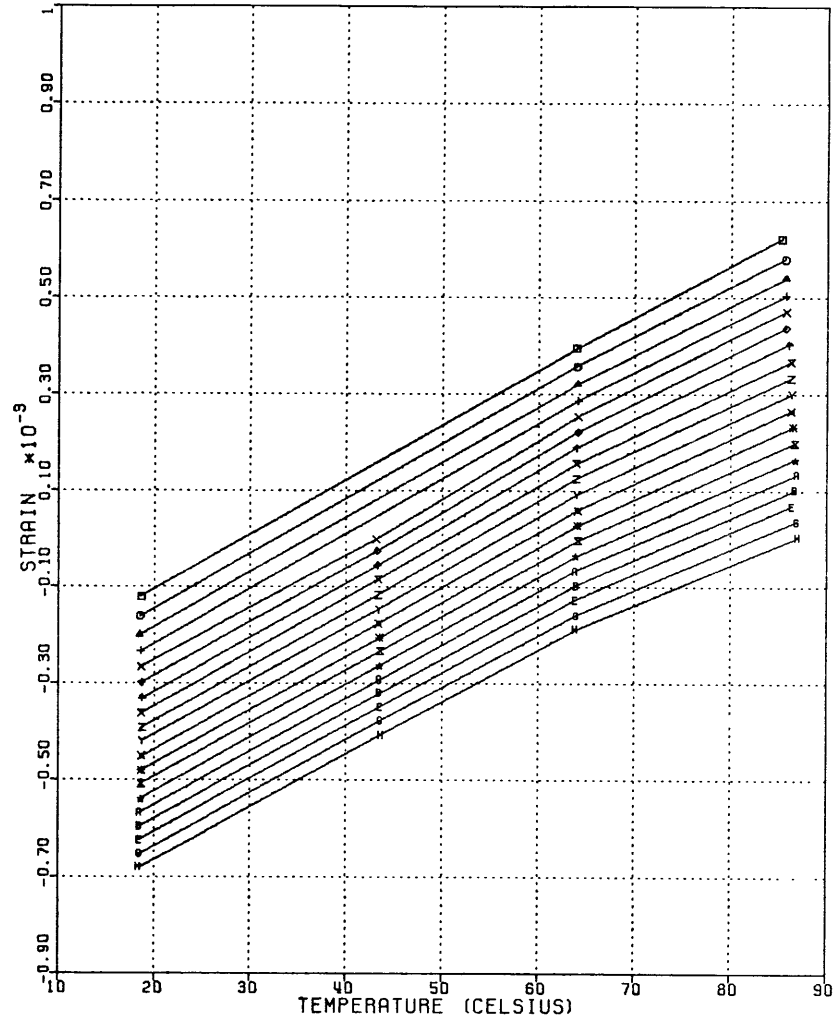
178 TWIN SISTERS WA DUNITE
GAGE:AC

- | | |
|-------------|-------------|
| □ - 20 MPA | X - 120 MPA |
| ○ - 30 MPA | * - 130 MPA |
| △ - 40 MPA | X - 140 MPA |
| + - 50 MPA | ★ - 150 MPA |
| X - 60 MPA | A - 160 MPA |
| ◇ - 70 MPA | B - 170 MPA |
| ↗ - 80 MPA | E - 180 MPA |
| X - 90 MPA | G - 190 MPA |
| Z - 100 MPA | H - 200 MPA |
| Y - 110 MPA | |



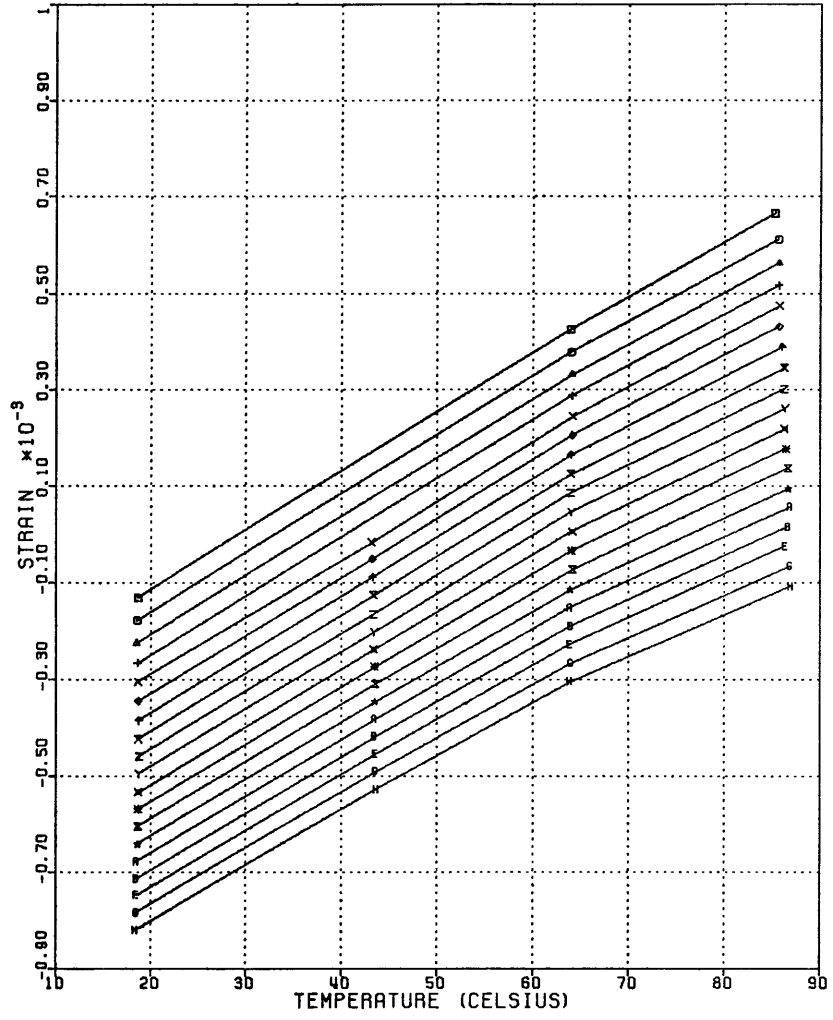
178 TWIN SISTERS WA DUNITE
GAGE:BC

- | | |
|-------------|-------------|
| □ - 20 MPA | × - 120 MPA |
| ○ - 30 MPA | * - 130 MPA |
| △ - 40 MPA | ⊗ - 140 MPA |
| + - 50 MPA | ★ - 150 MPA |
| × - 60 MPA | A - 160 MPA |
| ◇ - 70 MPA | B - 170 MPA |
| ⋈ - 80 MPA | E - 180 MPA |
| ⊗ - 90 MPA | G - 190 MPA |
| Z - 100 MPA | H - 200 MPA |
| Y - 110 MPA | |



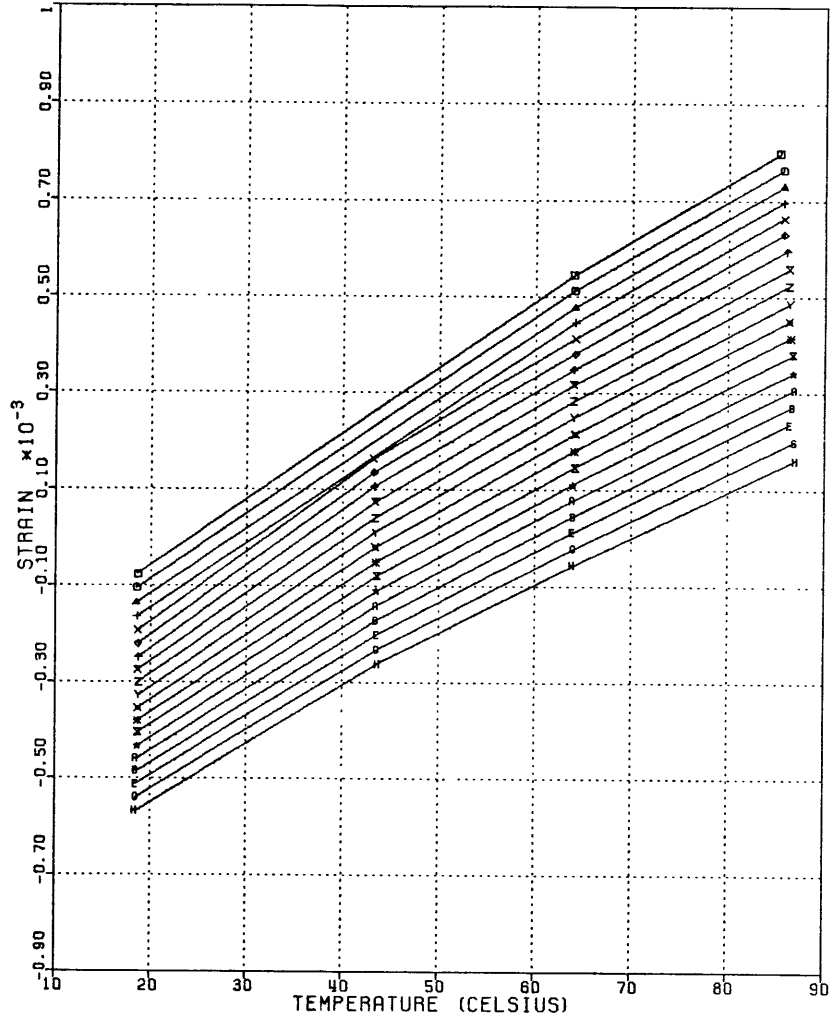
178 TWIN SISTERS WA DUNITE
GAGE:3C

- | | |
|-------------|-------------|
| □ - 20 MPA | X - 120 MPA |
| ○ - 30 MPA | * - 130 MPA |
| △ - 40 MPA | X - 140 MPA |
| + - 50 MPA | ★ - 150 MPA |
| X - 60 MPA | A - 160 MPA |
| ◇ - 70 MPA | B - 170 MPA |
| + - 80 MPA | E - 180 MPA |
| X - 90 MPA | G - 190 MPA |
| Z - 100 MPA | H - 200 MPA |
| Y - 110 MPA | |



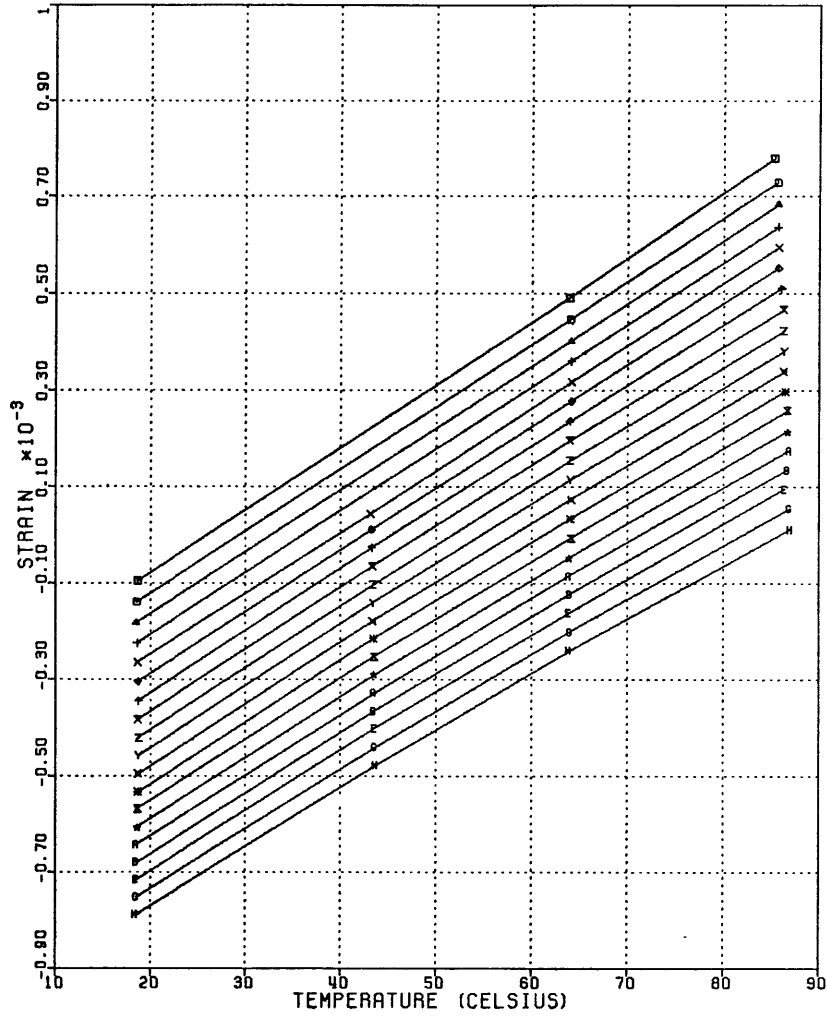
178 TWIN SISTERS WA DUNITE
GAGE:AB

- | | |
|-------------|-------------|
| □ - 20 MPA | ✕ - 120 MPA |
| ○ - 30 MPA | ✱ - 130 MPA |
| △ - 40 MPA | ⊗ - 140 MPA |
| + - 50 MPA | ★ - 150 MPA |
| ⊗ - 60 MPA | A - 160 MPA |
| ◇ - 70 MPA | B - 170 MPA |
| ↗ - 80 MPA | E - 180 MPA |
| ⊗ - 90 MPA | G - 190 MPA |
| Z - 100 MPA | H - 200 MPA |
| Y - 110 MPA | |



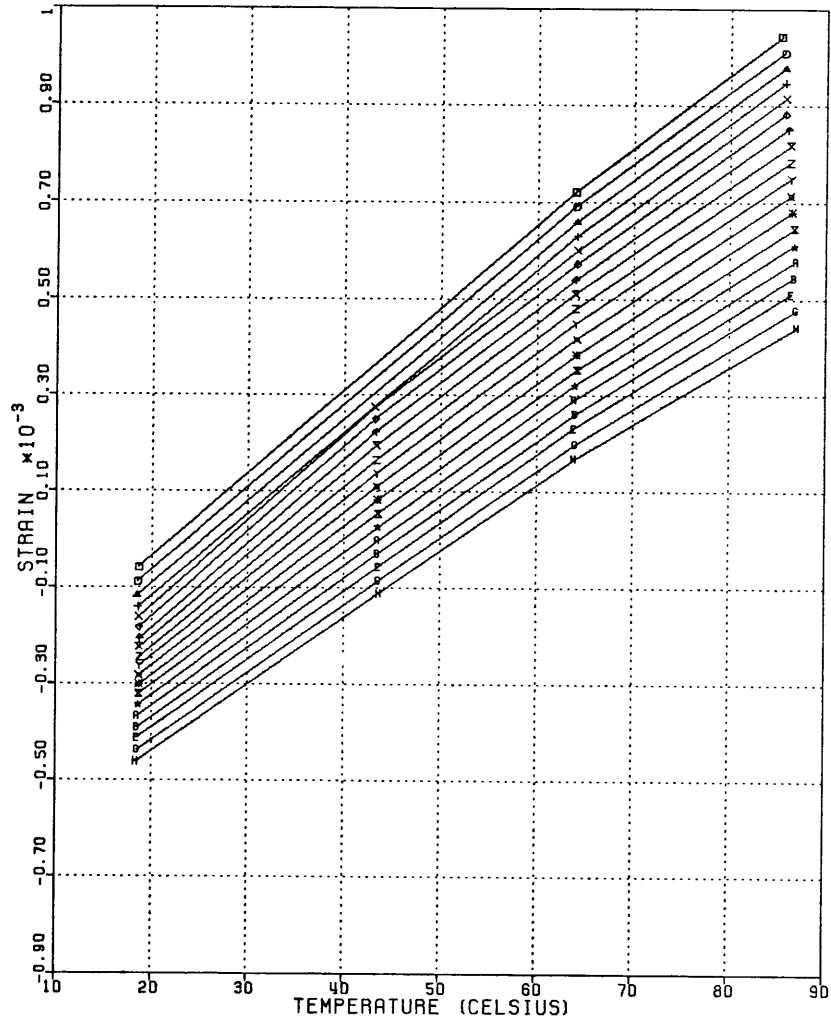
178 TWIN SISTERS WA DUNITE
GAGE:CB

- | | |
|-------------|-------------|
| □ - 20 MPA | ⌘ - 120 MPA |
| ○ - 30 MPA | ✱ - 130 MPA |
| △ - 40 MPA | ⌘ - 140 MPA |
| + - 50 MPA | ★ - 150 MPA |
| X - 60 MPA | A - 160 MPA |
| ◇ - 70 MPA | B - 170 MPA |
| ⊕ - 80 MPA | E - 180 MPA |
| X - 90 MPA | G - 190 MPA |
| Z - 100 MPA | H - 200 MPA |
| Y - 110 MPA | |



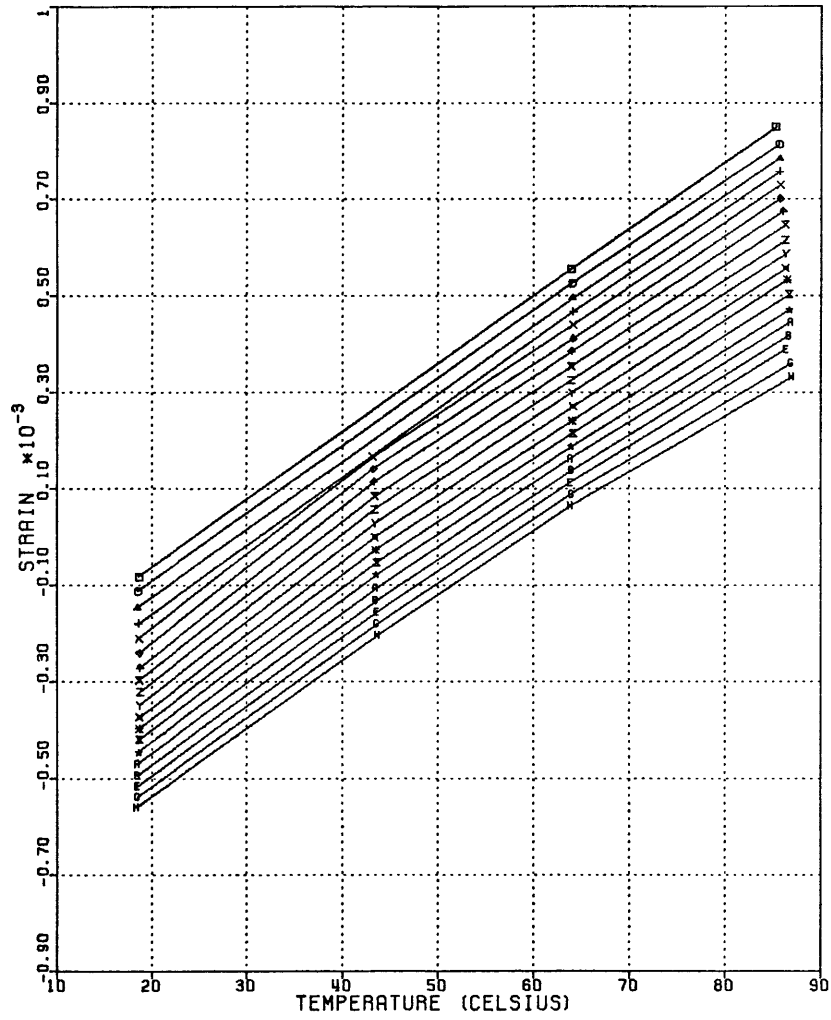
178 TWIN SISTERS WA DUNITE
GAGE: 3B

- | | |
|-------------|-------------|
| □ - 20 MPA | X - 120 MPA |
| ○ - 30 MPA | * - 130 MPA |
| △ - 40 MPA | X - 140 MPA |
| + - 50 MPA | ★ - 150 MPA |
| X - 60 MPA | A - 160 MPA |
| ◇ - 70 MPA | B - 170 MPA |
| ↑ - 80 MPA | E - 180 MPA |
| X - 90 MPA | G - 190 MPA |
| Z - 100 MPA | H - 200 MPA |
| Y - 110 MPA | |



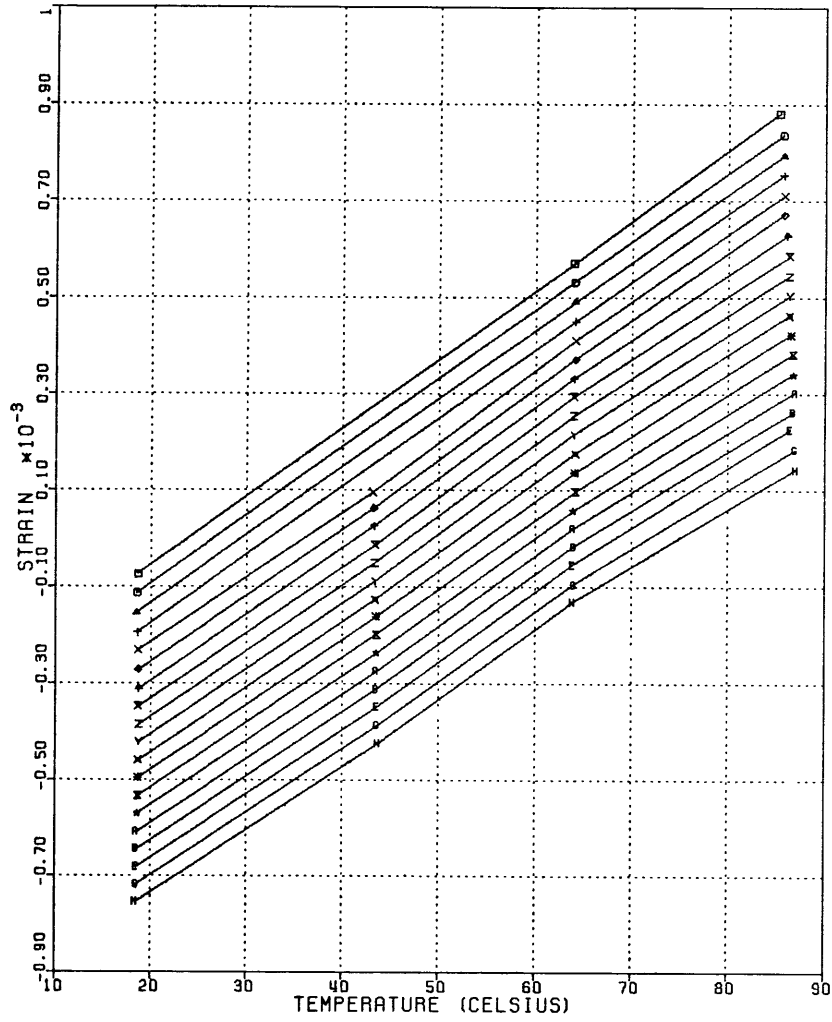
178 TWIN SISTERS WA DUNITE
GAGE:BA

- | | |
|-------------|-------------|
| □ - 20 MPA | ⌘ - 120 MPA |
| ○ - 30 MPA | ✱ - 130 MPA |
| △ - 40 MPA | ⌘ - 140 MPA |
| + - 50 MPA | ★ - 150 MPA |
| × - 60 MPA | A - 160 MPA |
| ◇ - 70 MPA | B - 170 MPA |
| ↑ - 80 MPA | E - 180 MPA |
| X - 90 MPA | G - 190 MPA |
| Z - 100 MPA | H - 200 MPA |
| Y - 110 MPA | |



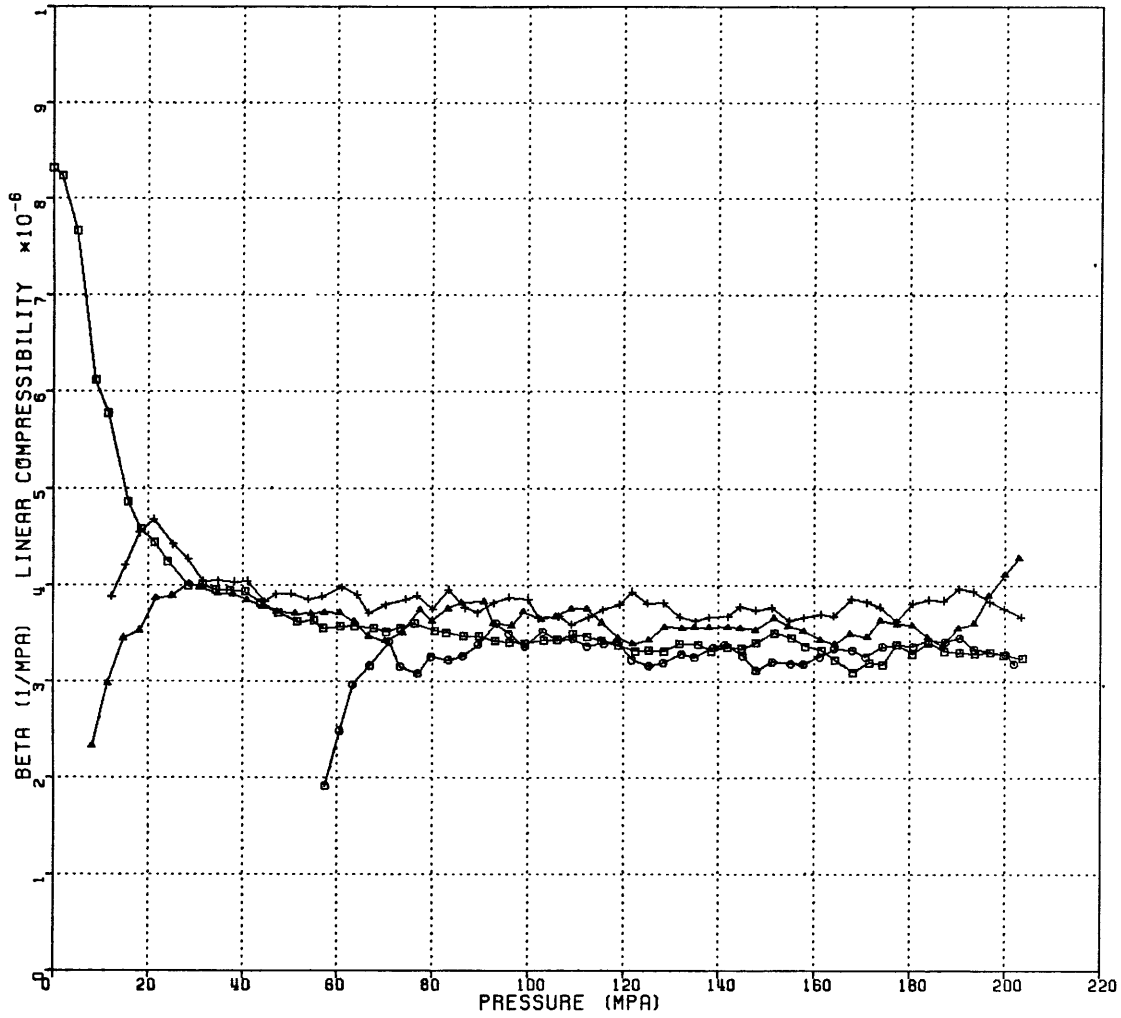
178 TWIN SISTERS WA DUNITE
GAGE:CA

- | | |
|-------------|-------------|
| □ - 20 MPA | ✕ - 120 MPA |
| ○ - 30 MPA | ✱ - 130 MPA |
| △ - 40 MPA | ⊗ - 140 MPA |
| + - 50 MPA | ★ - 150 MPA |
| × - 60 MPA | A - 160 MPA |
| ◇ - 70 MPA | B - 170 MPA |
| ⋈ - 80 MPA | E - 180 MPA |
| X - 90 MPA | G - 190 MPA |
| Z - 100 MPA | H - 200 MPA |
| Y - 110 MPA | |



178 TWIN SISTERS WA DUNITE
GAGE:3A

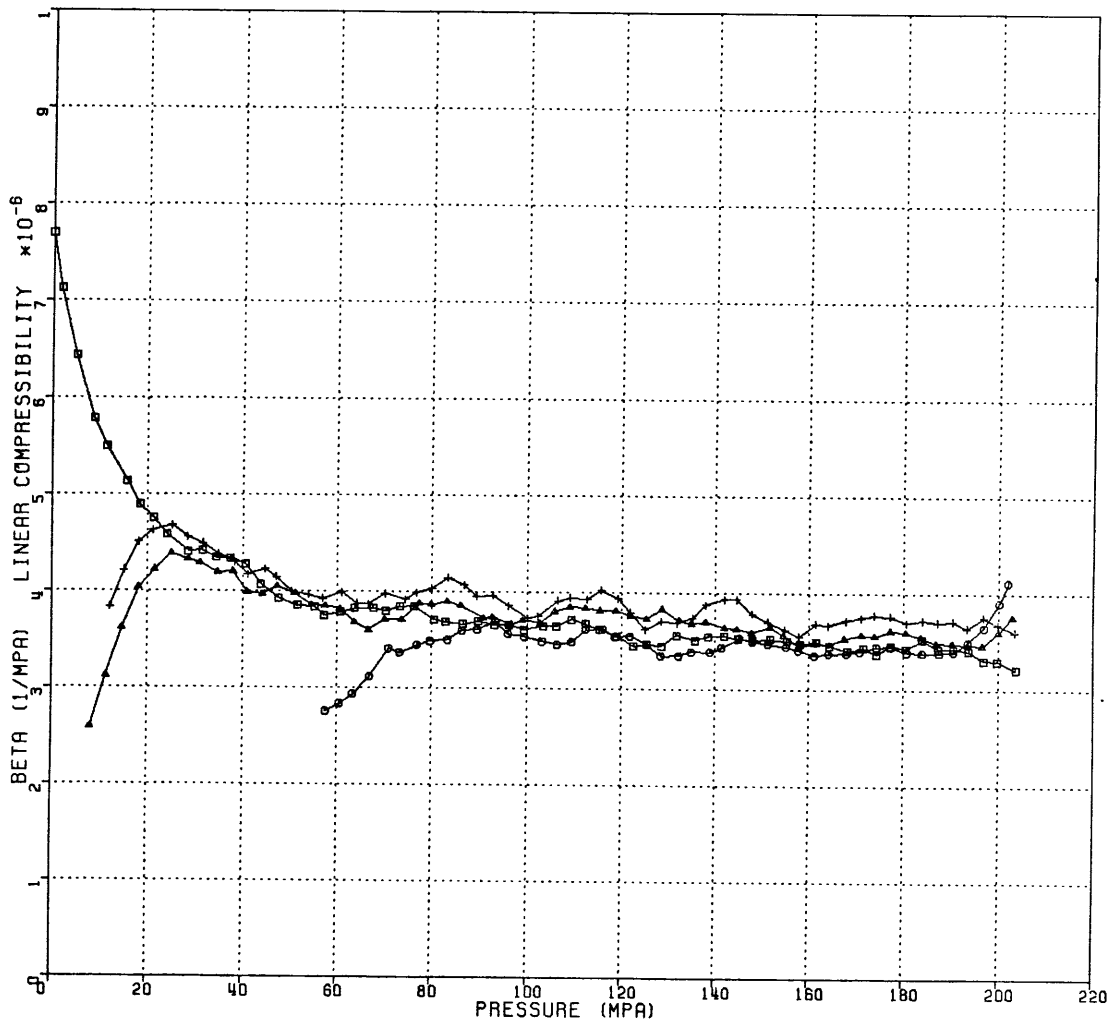
- | | |
|-------------|-------------|
| □ - 20 MPA | ⌘ - 120 MPA |
| ○ - 30 MPA | ✱ - 130 MPA |
| △ - 40 MPA | ⌘ - 140 MPA |
| + - 50 MPA | ★ - 150 MPA |
| X - 60 MPA | A - 160 MPA |
| ◇ - 70 MPA | B - 170 MPA |
| ⊕ - 80 MPA | E - 180 MPA |
| X - 90 MPA | G - 190 MPA |
| Z - 100 MPA | H - 200 MPA |
| Y - 110 MPA | |



178 TWIN SISTERS WA DUNITE

GAGE: AC

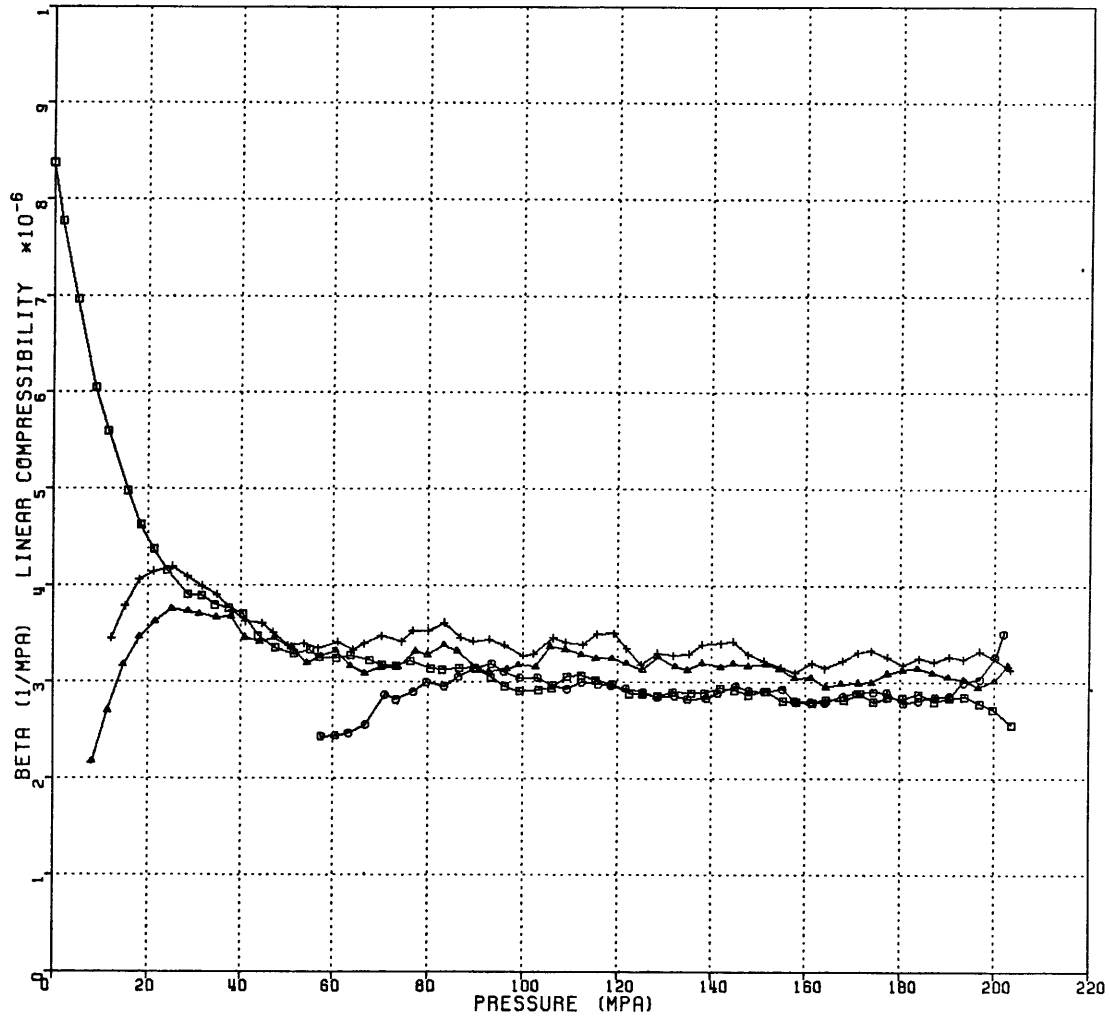
- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



178 TWIN SISTERS WA DUNITE

GAGE:BC

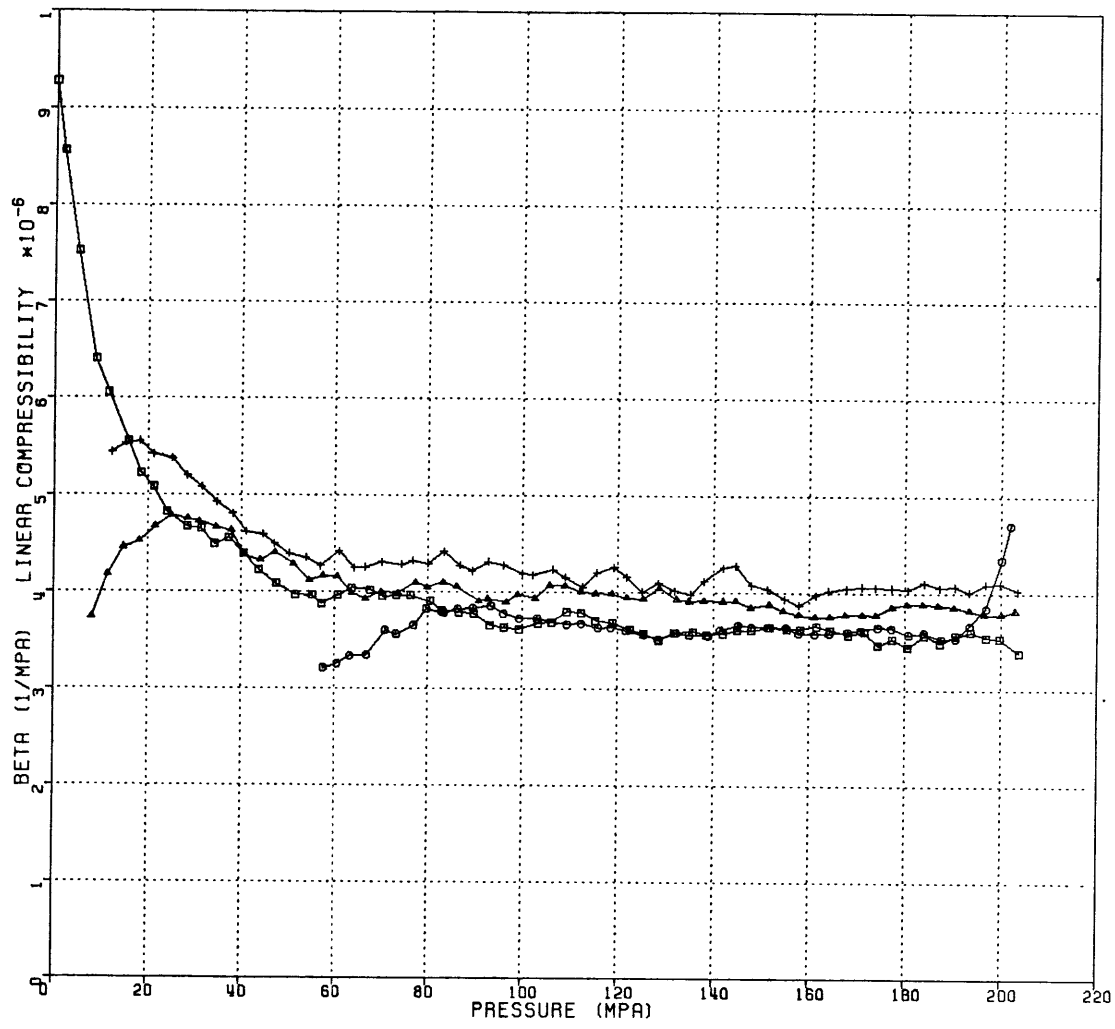
- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



178 TWIN SISTERS WA DUNITE

GAGE: 3C

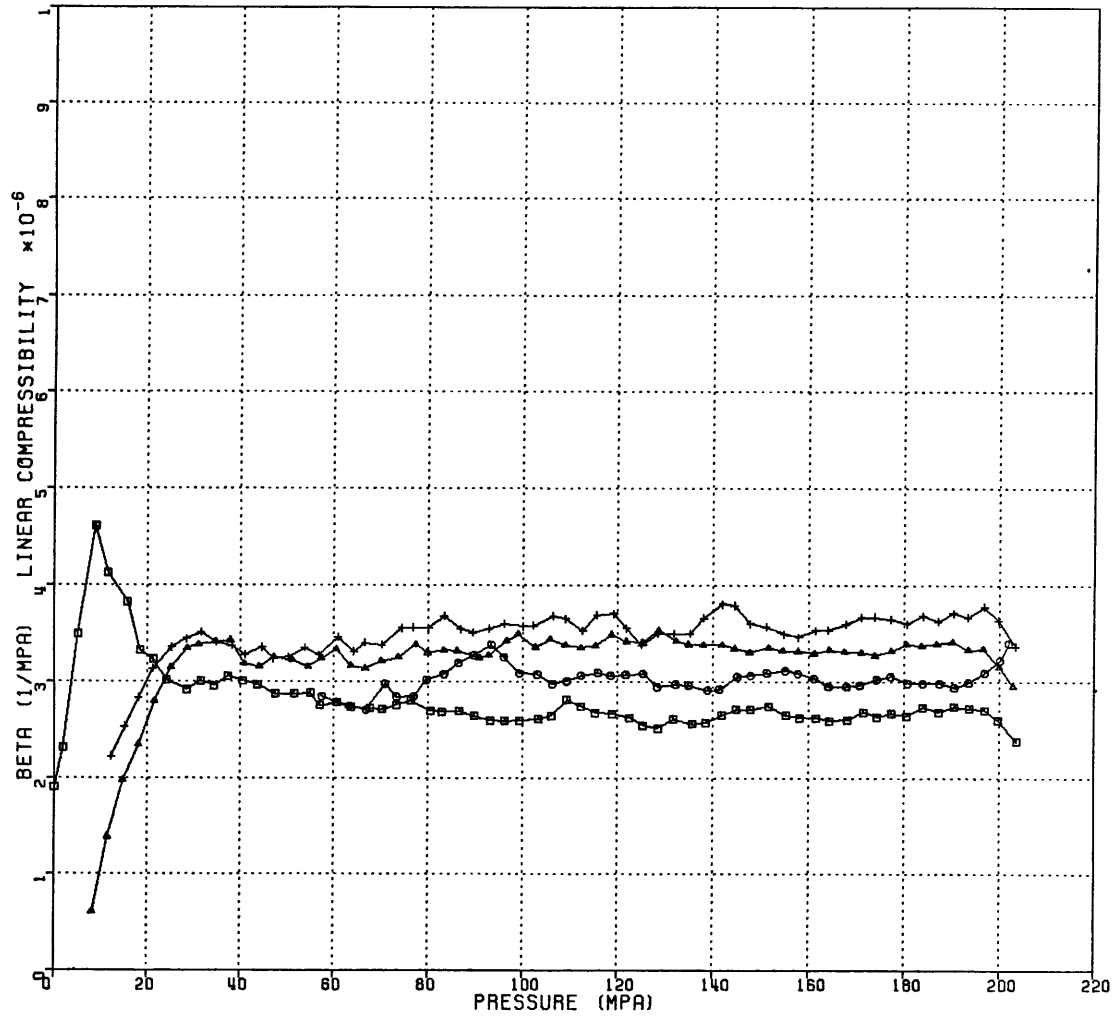
- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



178 TWIN SISTERS WA DUNITE

GAGE: AB

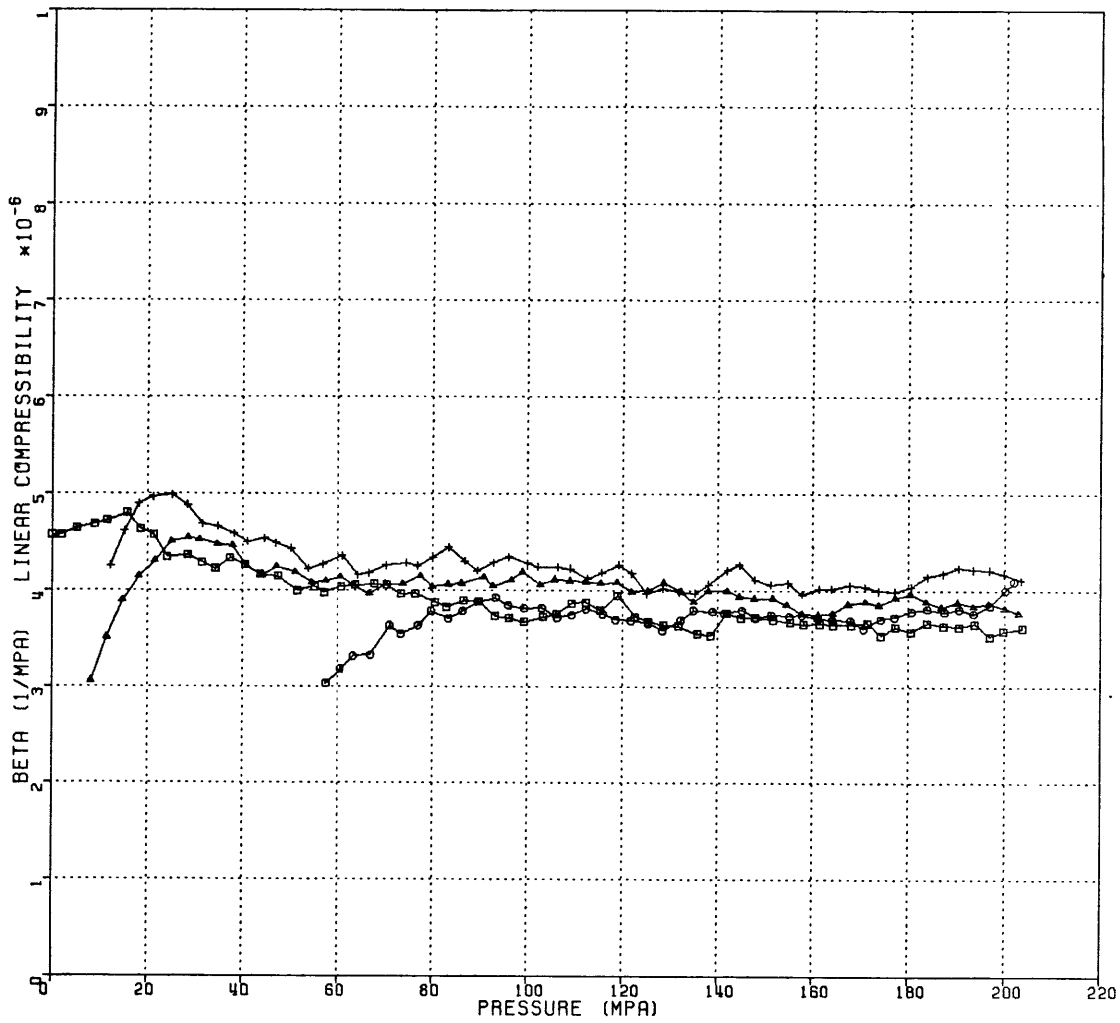
- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



178 TWIN SISTERS WA DUNITE

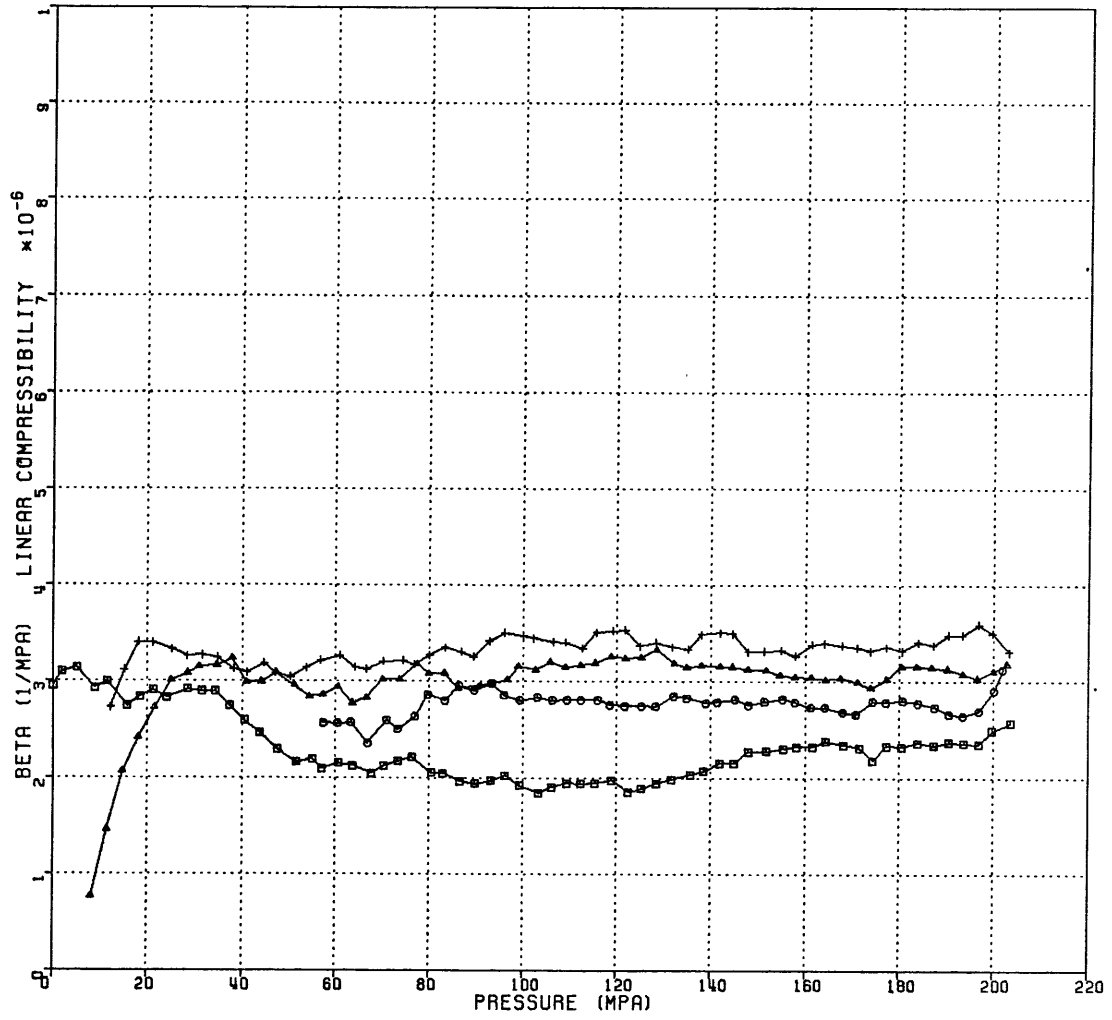
GAGE:CB

- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



178 TWIN SISTERS WA DUNITE
GAGE: 3B

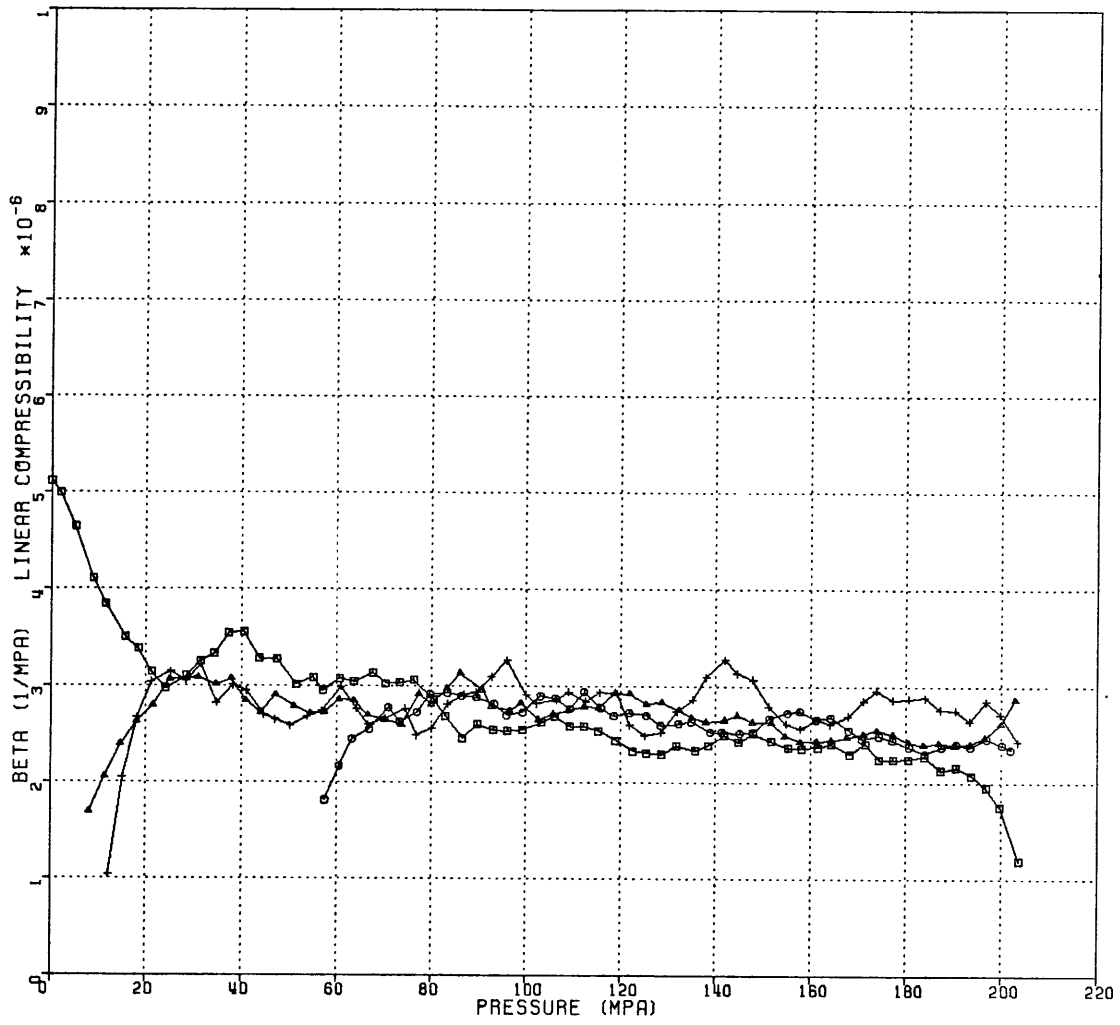
- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



178 TWIN SISTERS WA DUNITE

GAGE:BA

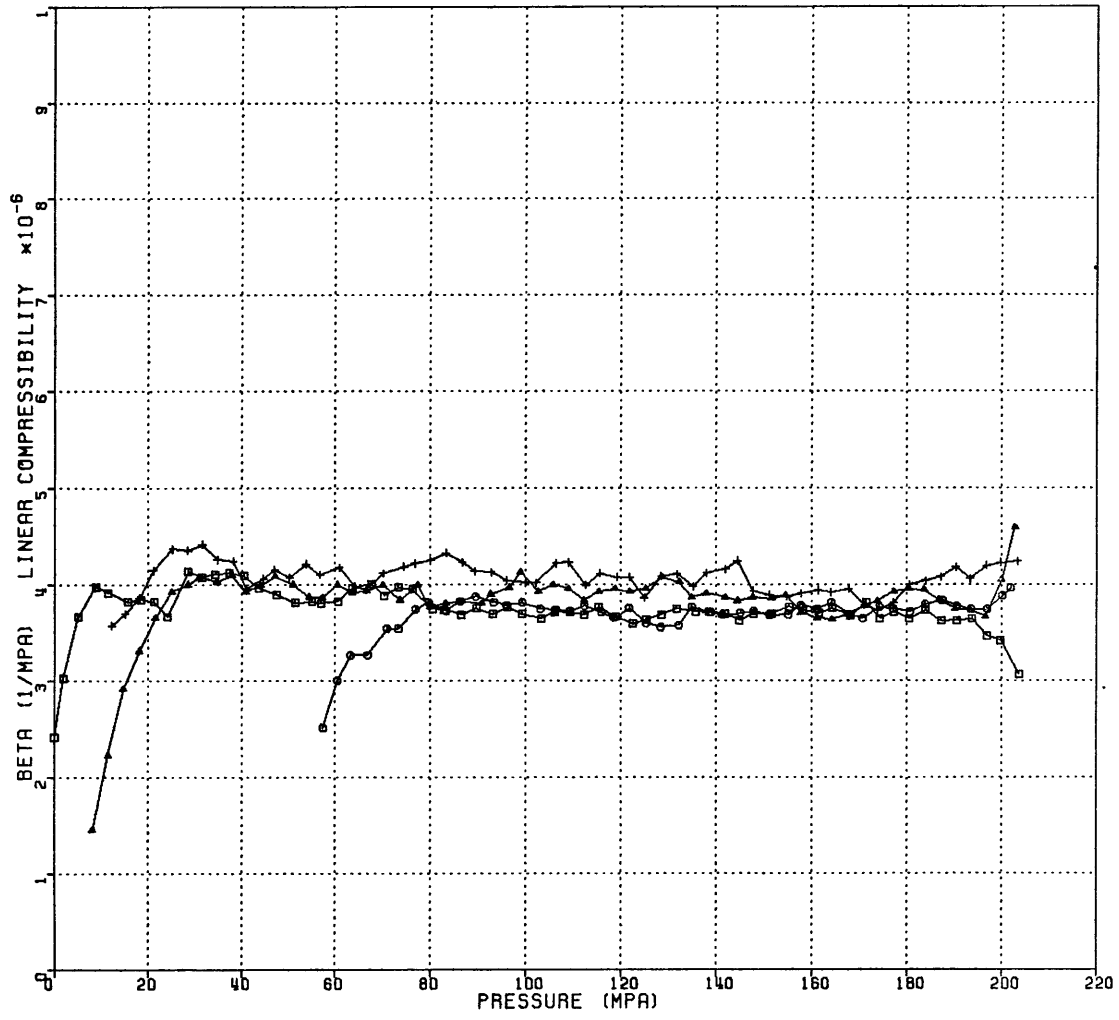
- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



178 TWIN SISTERS WA DUNITE

GAGE:CA

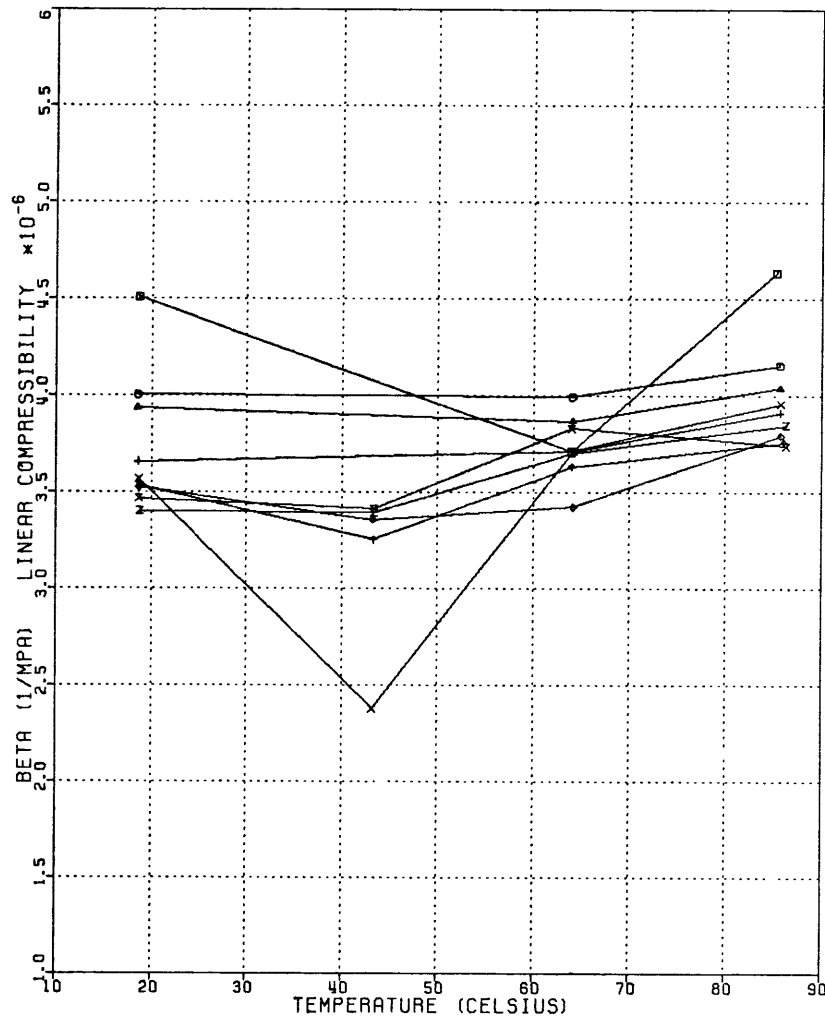
- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



178 TWIN SISTERS WA DUNITE

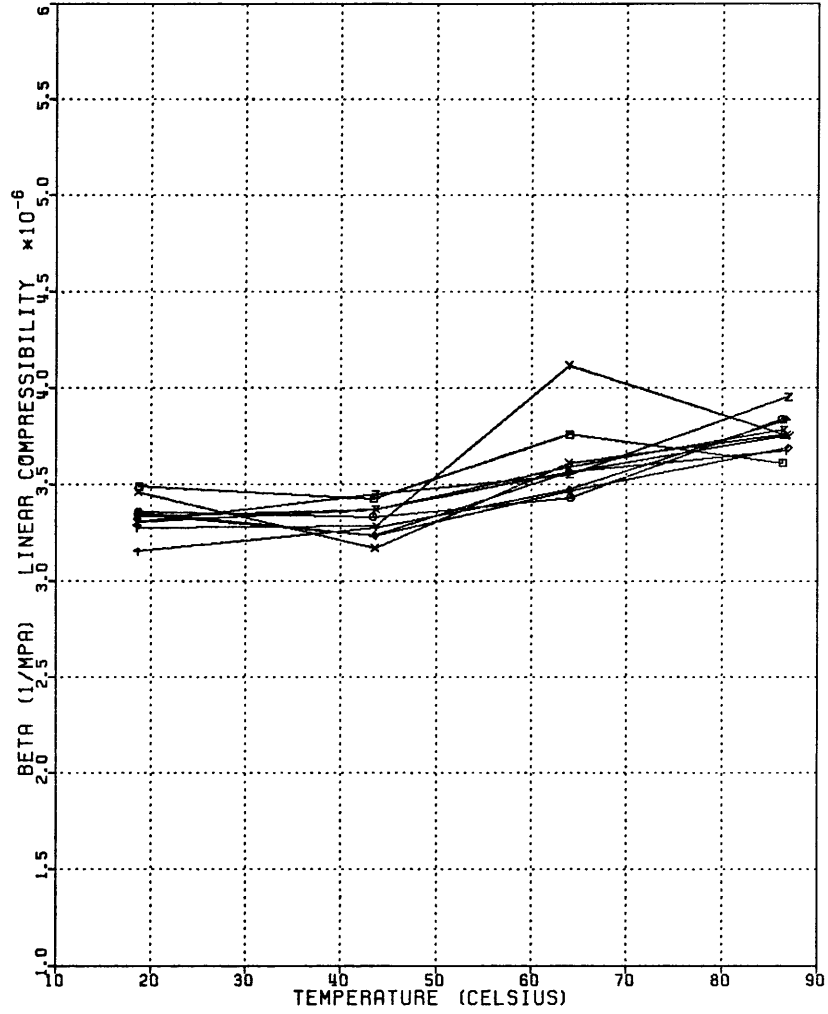
GAGE: 3A

- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



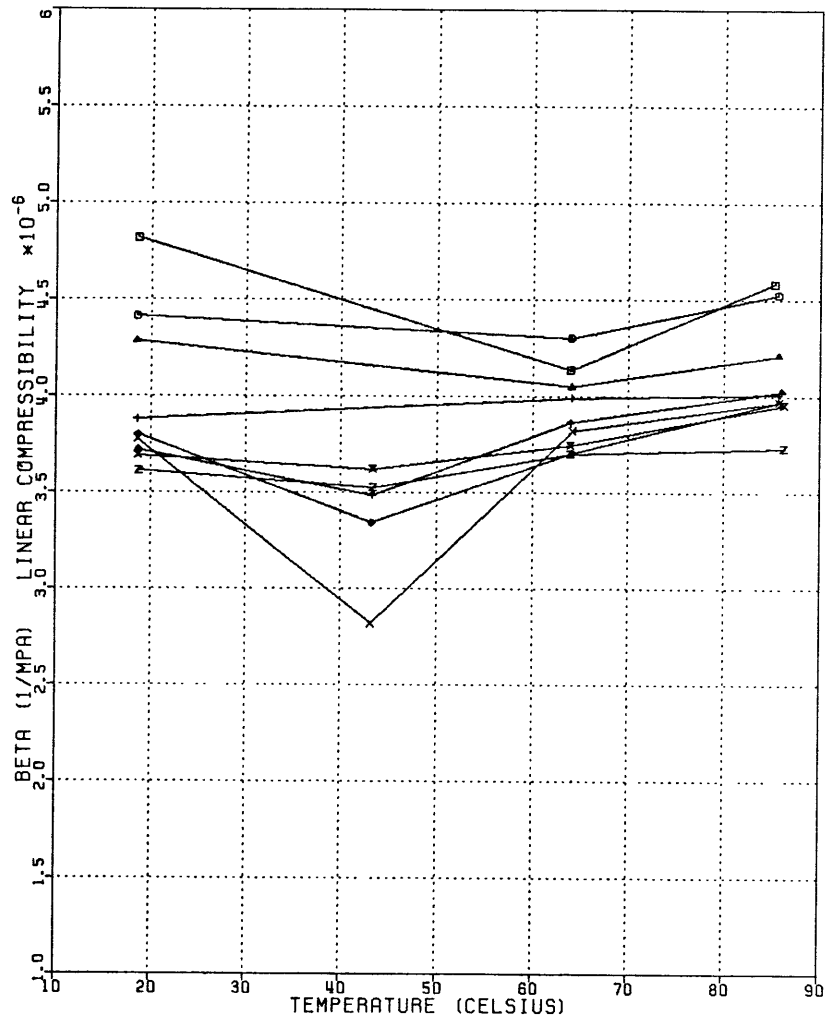
178 TWIN SISTERS WA DUNITE
GAGE:AC

- - 20 MPA
- - 30 MPA
- △ - 40 MPA
- + - 50 MPA
- x - 60 MPA
- ◇ - 70 MPA
- ↑ - 80 MPA
- ↓ - 90 MPA
- Z - 100 MPA



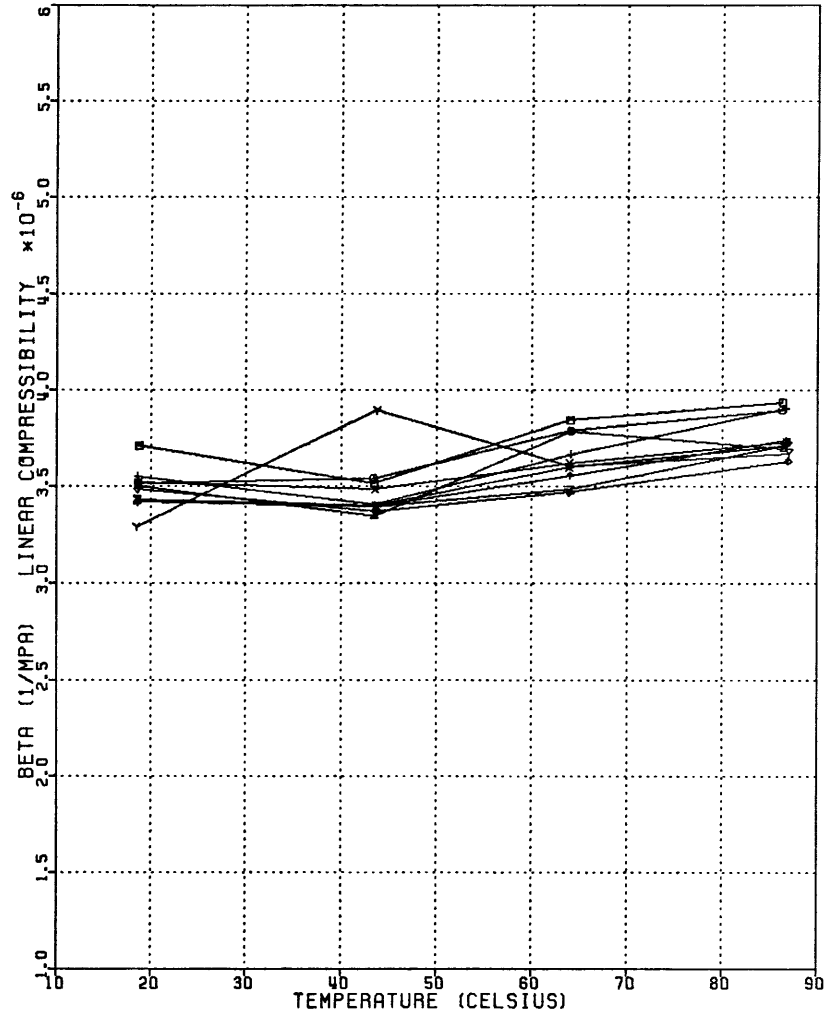
178 TWIN SISTERS WA DUNITITE
GAGE:AC

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♣ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



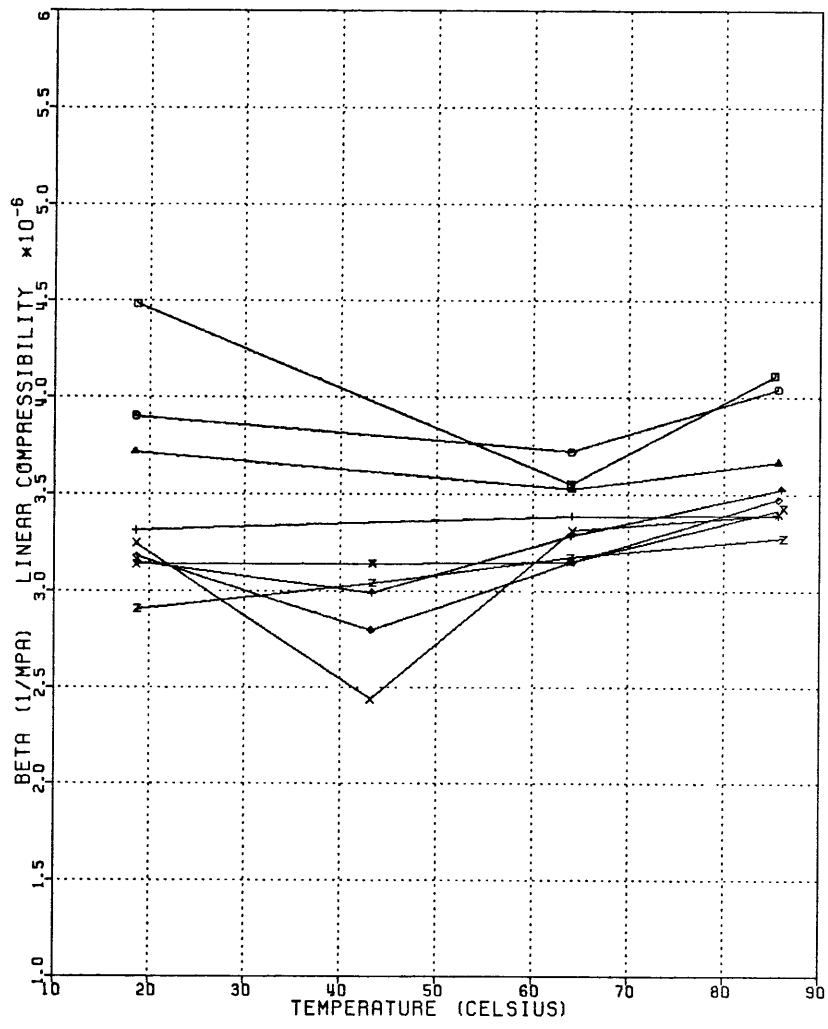
178 TWIN SISTERS WA DUNITE
GAGE: BC

- - 20 MPA
- - 30 MPA
- △ - 40 MPA
- + - 50 MPA
- X - 60 MPA
- ◇ - 70 MPA
- ↑ - 80 MPA
- ↓ - 90 MPA
- Z - 100 MPA



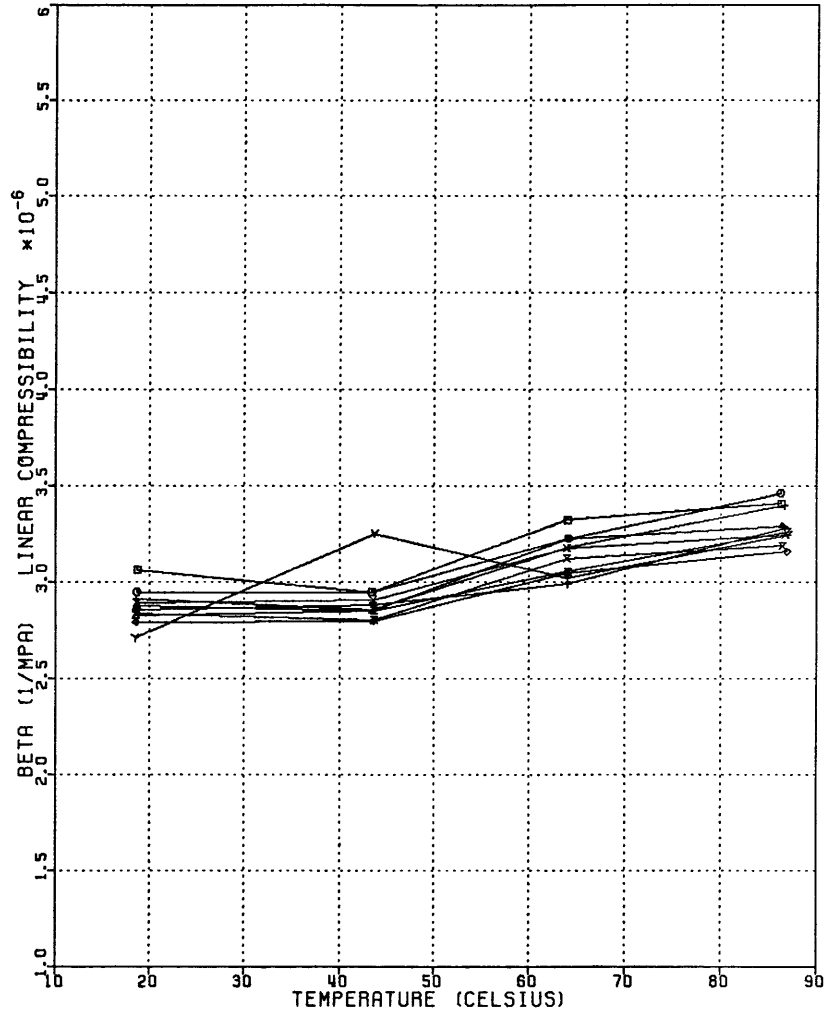
178 TWIN SISTERS WA DUNITE
GAGE:BC

- - 110 MPA
- ⊙ - 120 MPA
- ▲ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⋈ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



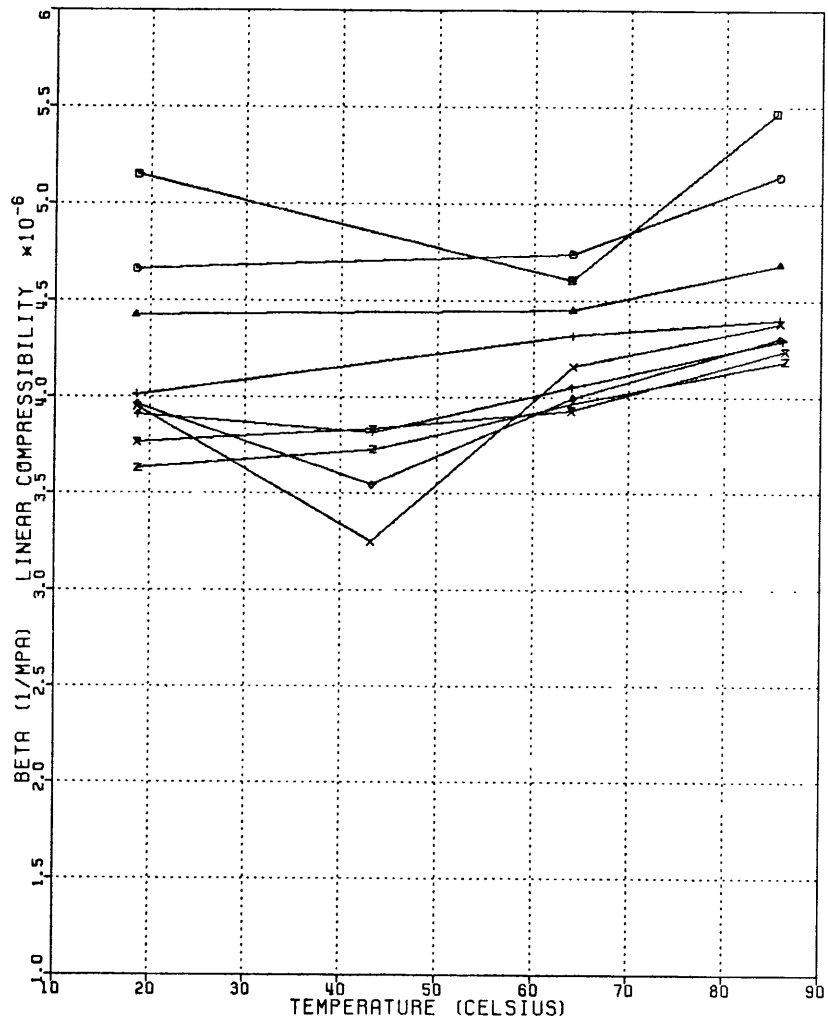
178 TWIN SISTERS WA DUNITE
GAGE:3C

- - 20 MPA
- - 30 MPA
- △ - 40 MPA
- + - 50 MPA
- X - 60 MPA
- ◇ - 70 MPA
- ♠ - 80 MPA
- X - 90 MPA
- Z - 100 MPA



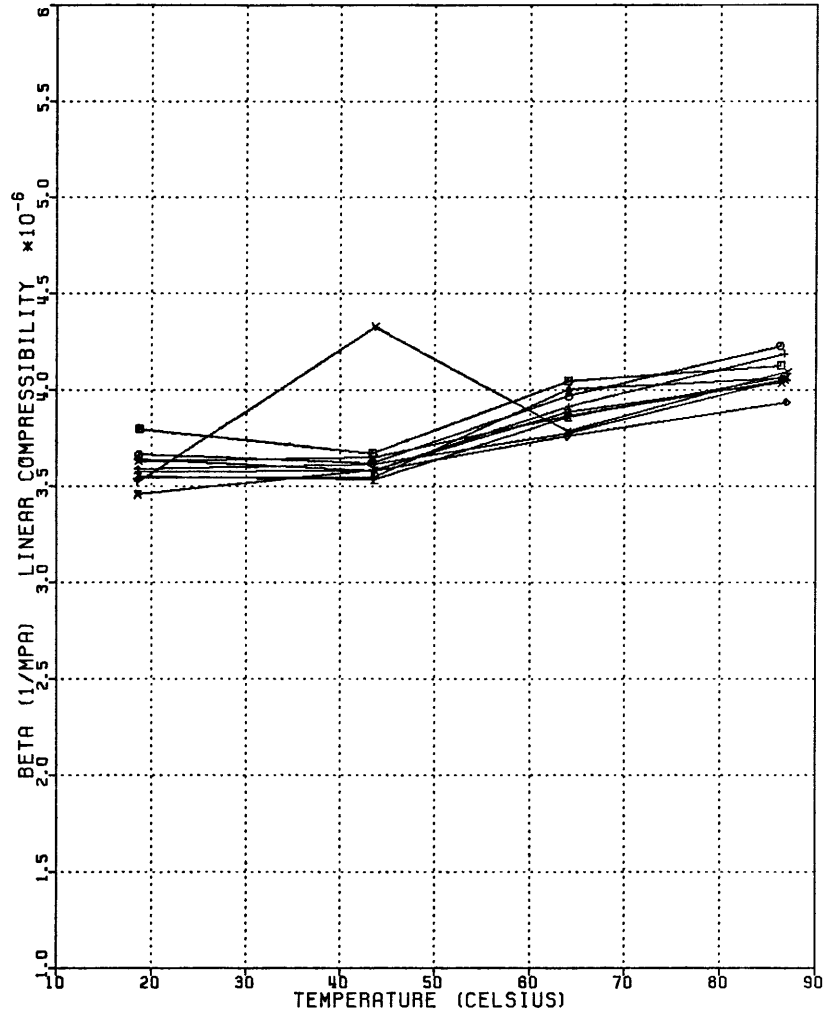
178 TWIN SISTERS WA DUNITE
GAGE: 3C

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



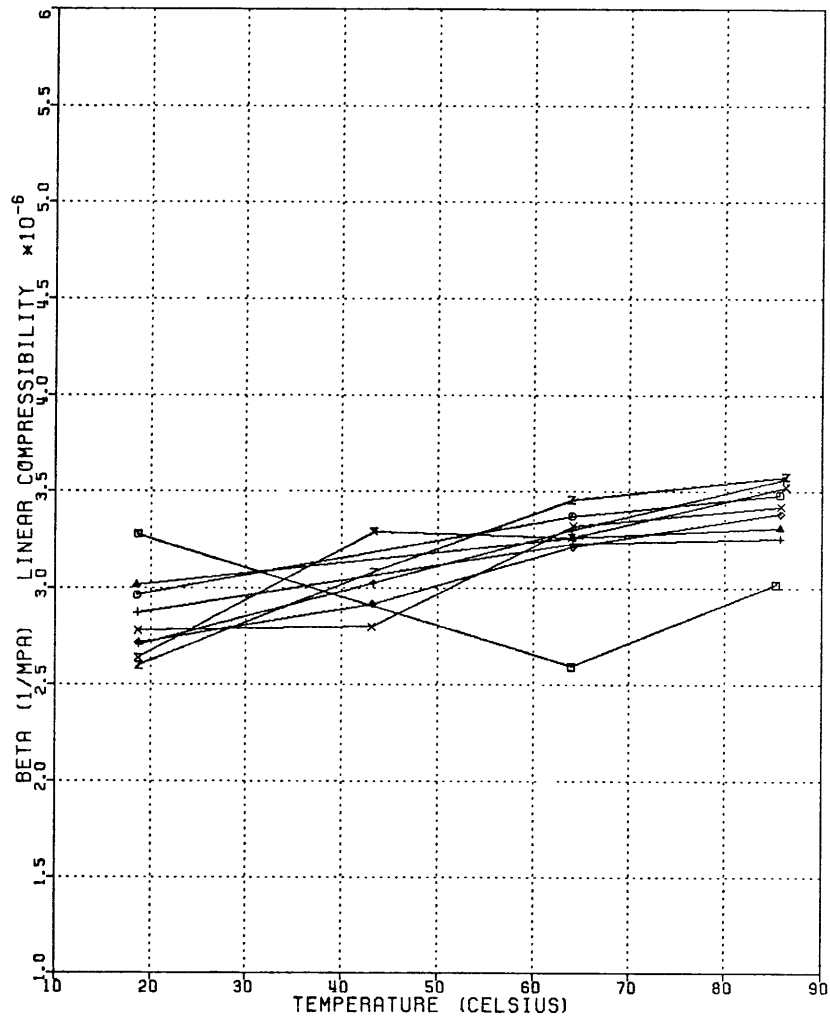
178 TWIN SISTERS WA DUNITE
GAGE: AB

- - 20 MPA
- - 30 MPA
- △ - 40 MPA
- + - 50 MPA
- X - 60 MPA
- ◇ - 70 MPA
- ♠ - 80 MPA
- ⊗ - 90 MPA
- Z - 100 MPA



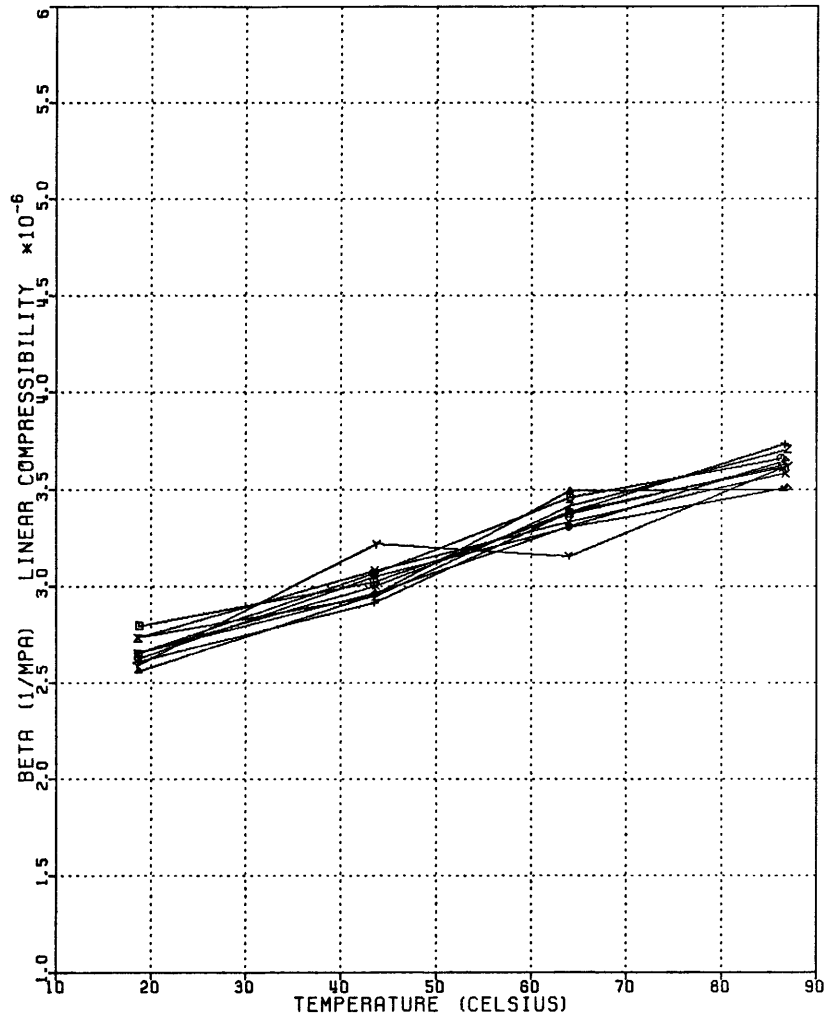
178 TWIN SISTERS WA DUNITITE
GAGE:AB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- × - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- ⊗ - 180 MPA
- ⊘ - 190 MPA
- ⊙ - 200 MPA



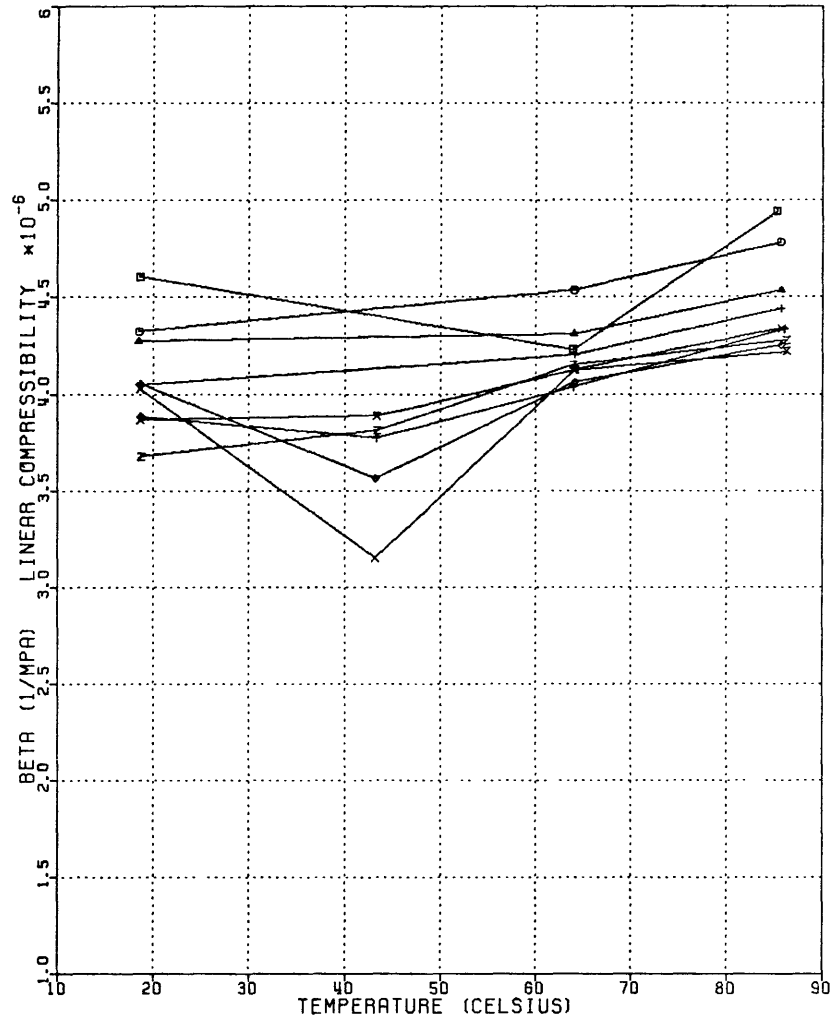
178 TWIN SISTERS WA DUNITE
GAGE:CB

- - 20 MPA
- - 30 MPA
- △ - 40 MPA
- + - 50 MPA
- x - 60 MPA
- ◇ - 70 MPA
- ↑ - 80 MPA
- ↓ - 90 MPA
- z - 100 MPA



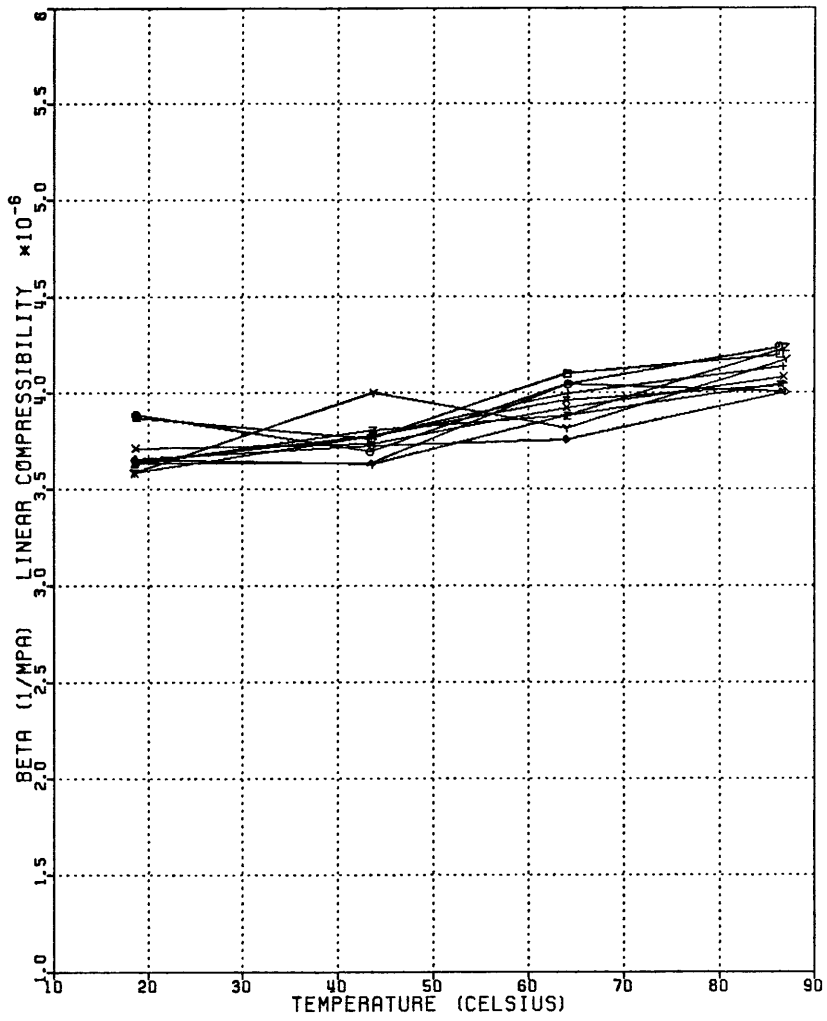
178 TWIN SISTERS WA DUNITE
GAGE:CB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- × - 150 MPA
- ◇ - 160 MPA
- ♣ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



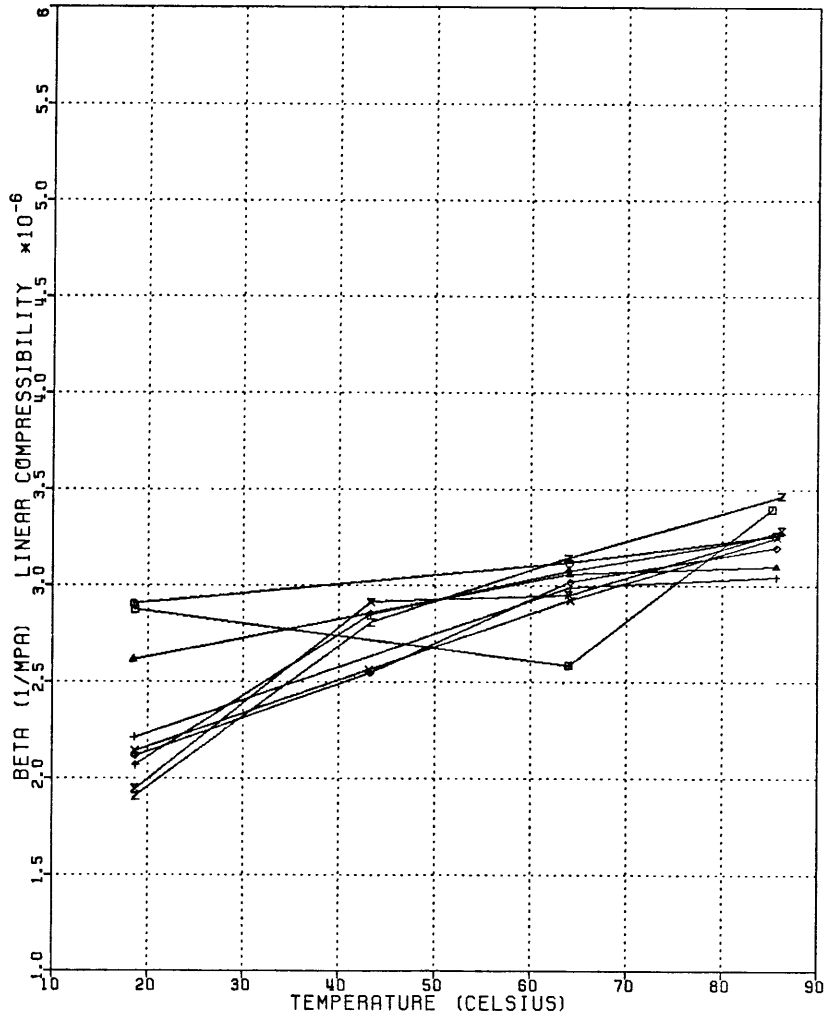
178 TWIN SISTERS WA DUNITE
GAGE: 3B

- - 20 MPA
- - 30 MPA
- △ - 40 MPA
- + - 50 MPA
- X - 60 MPA
- ◇ - 70 MPA
- ♠ - 80 MPA
- ⊗ - 90 MPA
- Z - 100 MPA



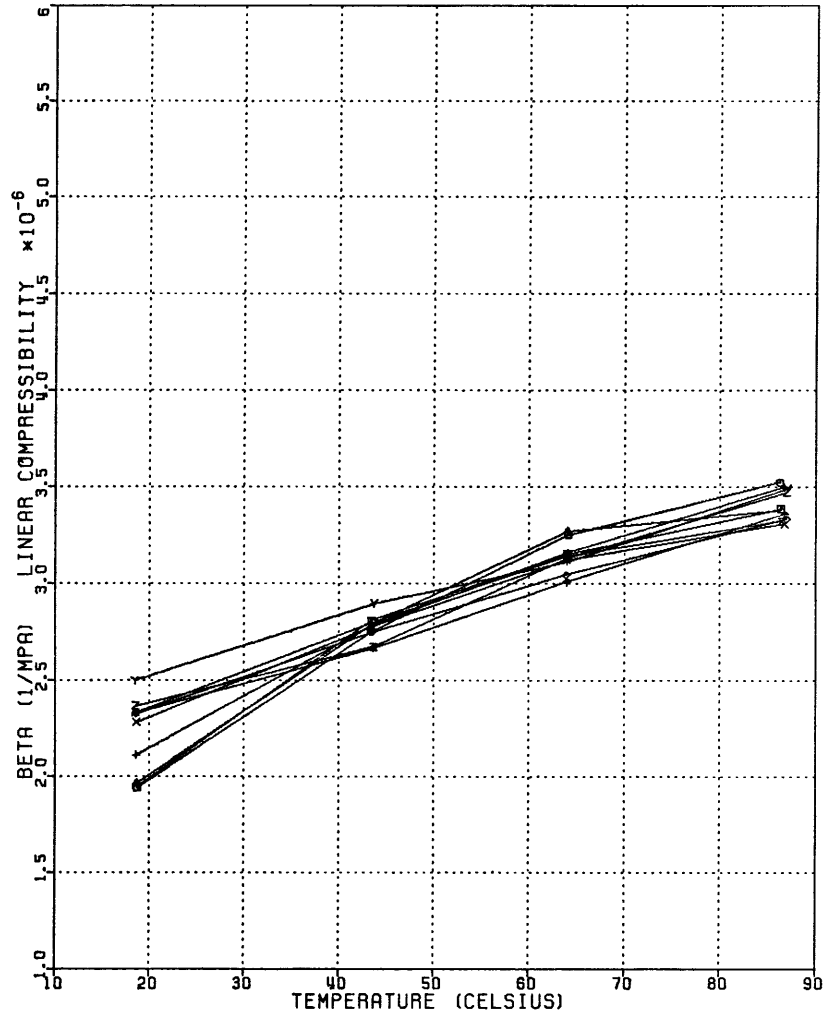
178 TWIN SISTERS WA DUNITE
GAGE: 3B

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♣ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



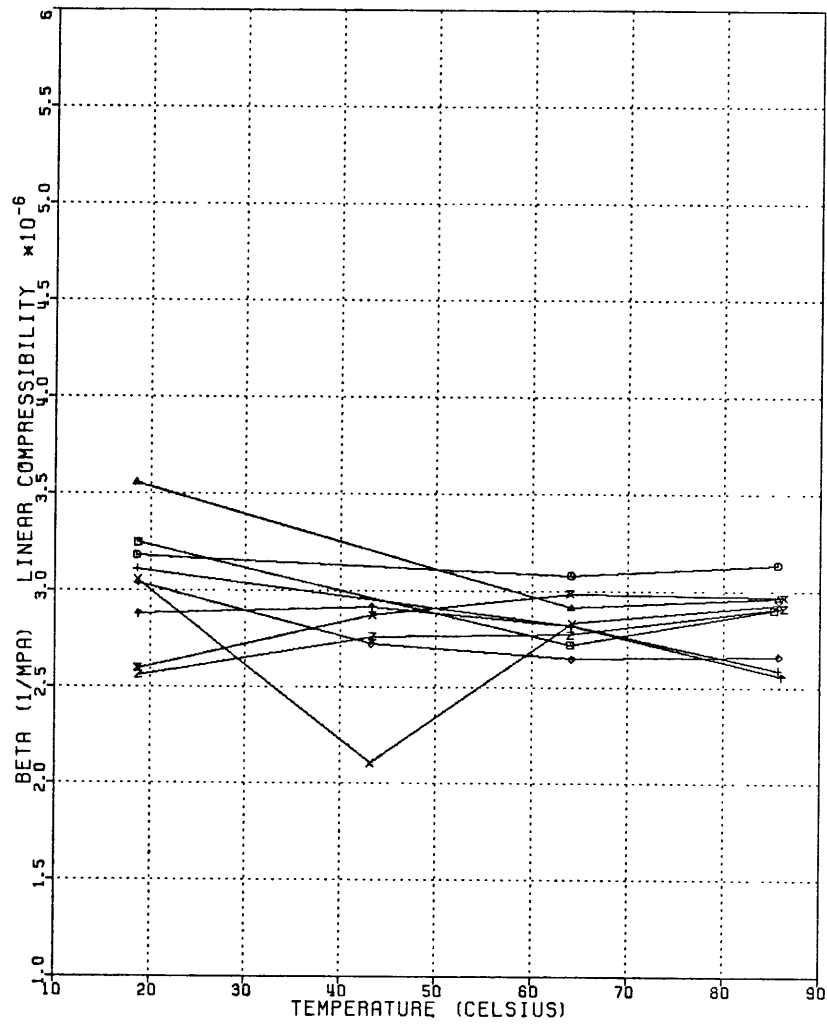
178 TWIN SISTERS WA DUNITE
GAGE:BA

- - 20 MPA
- - 30 MPA
- △ - 40 MPA
- + - 50 MPA
- X - 60 MPA
- ◇ - 70 MPA
- ↑ - 80 MPA
- ↓ - 90 MPA
- Z - 100 MPA



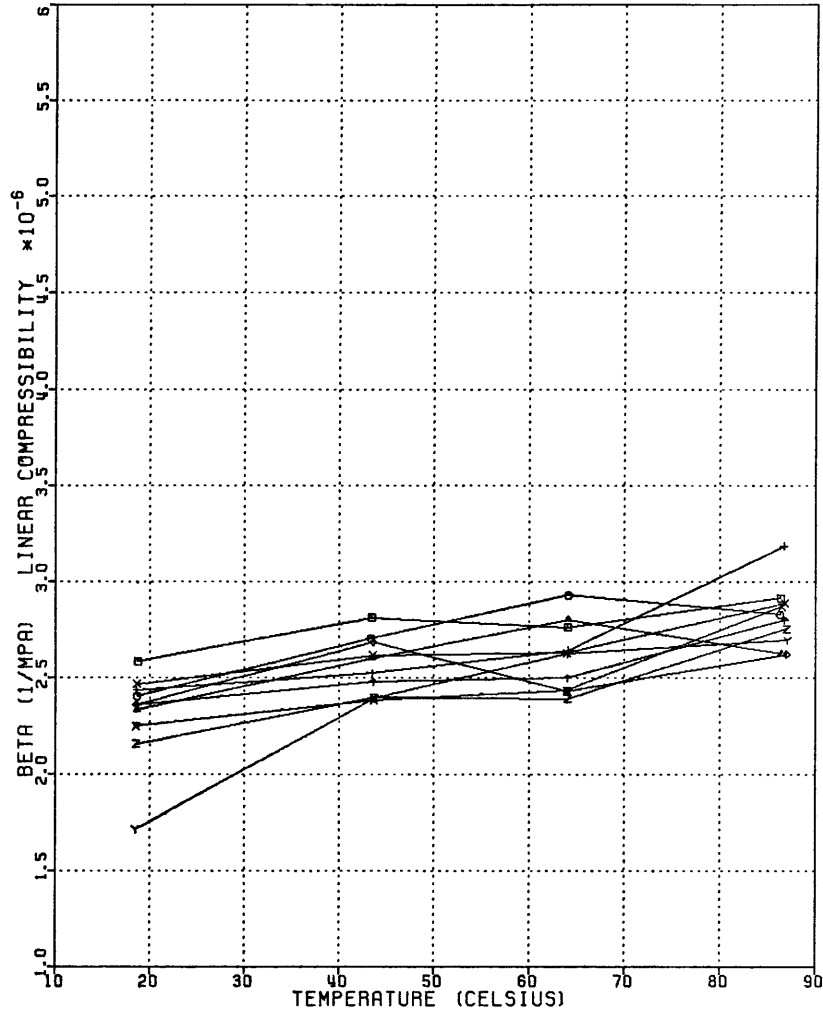
178 TWIN SISTERS WA DUNITE
GAGE:BA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



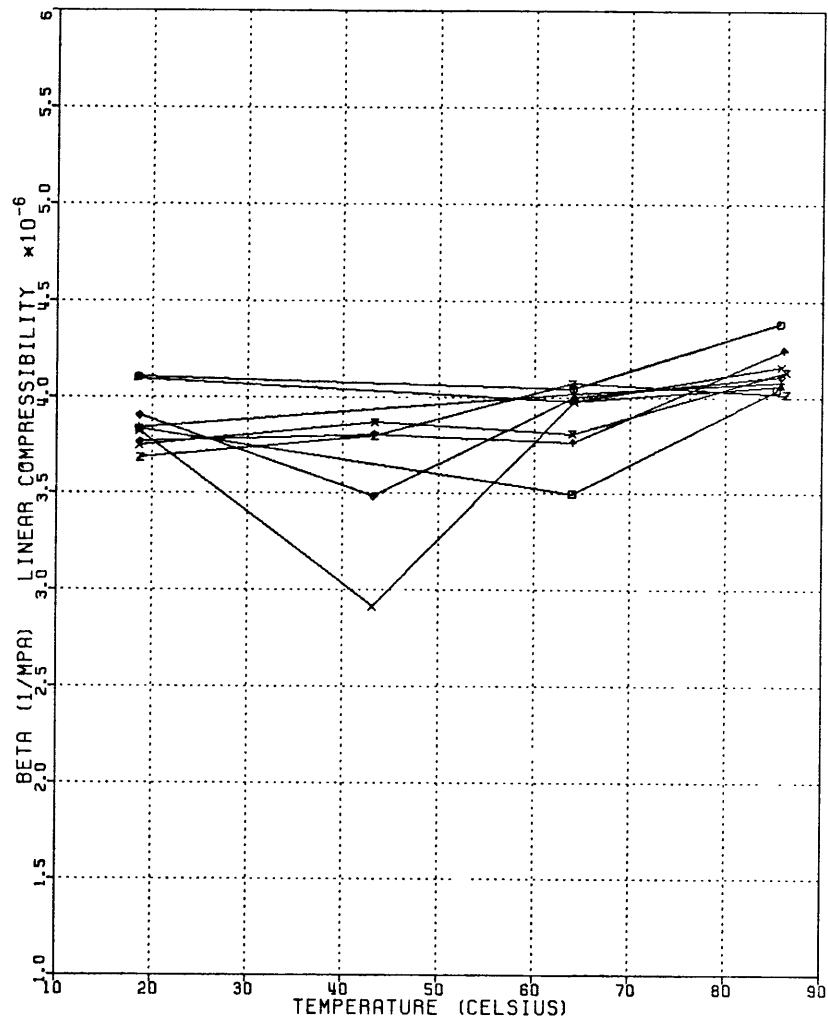
178 TWIN SISTERS WA DUNITE
GAGE:CA

- - 20 MPA
- - 30 MPA
- △ - 40 MPA
- + - 50 MPA
- × - 60 MPA
- ◇ - 70 MPA
- ↑ - 80 MPA
- X - 90 MPA
- Z - 100 MPA



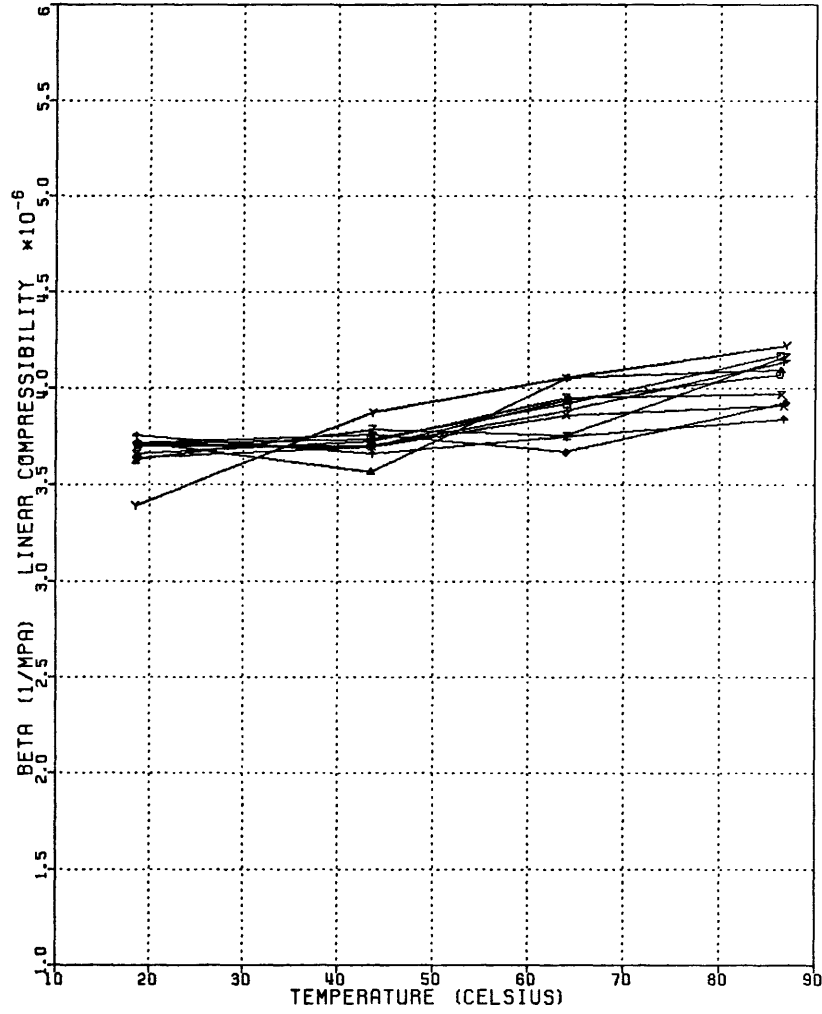
178 TWIN SISTERS WA DUNITE
GAGE:CA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- × - 150 MPA
- ◇ - 160 MPA
- ⋈ - 170 MPA
- ⊗ - 180 MPA
- ⊘ - 190 MPA
- ⋈ - 200 MPA



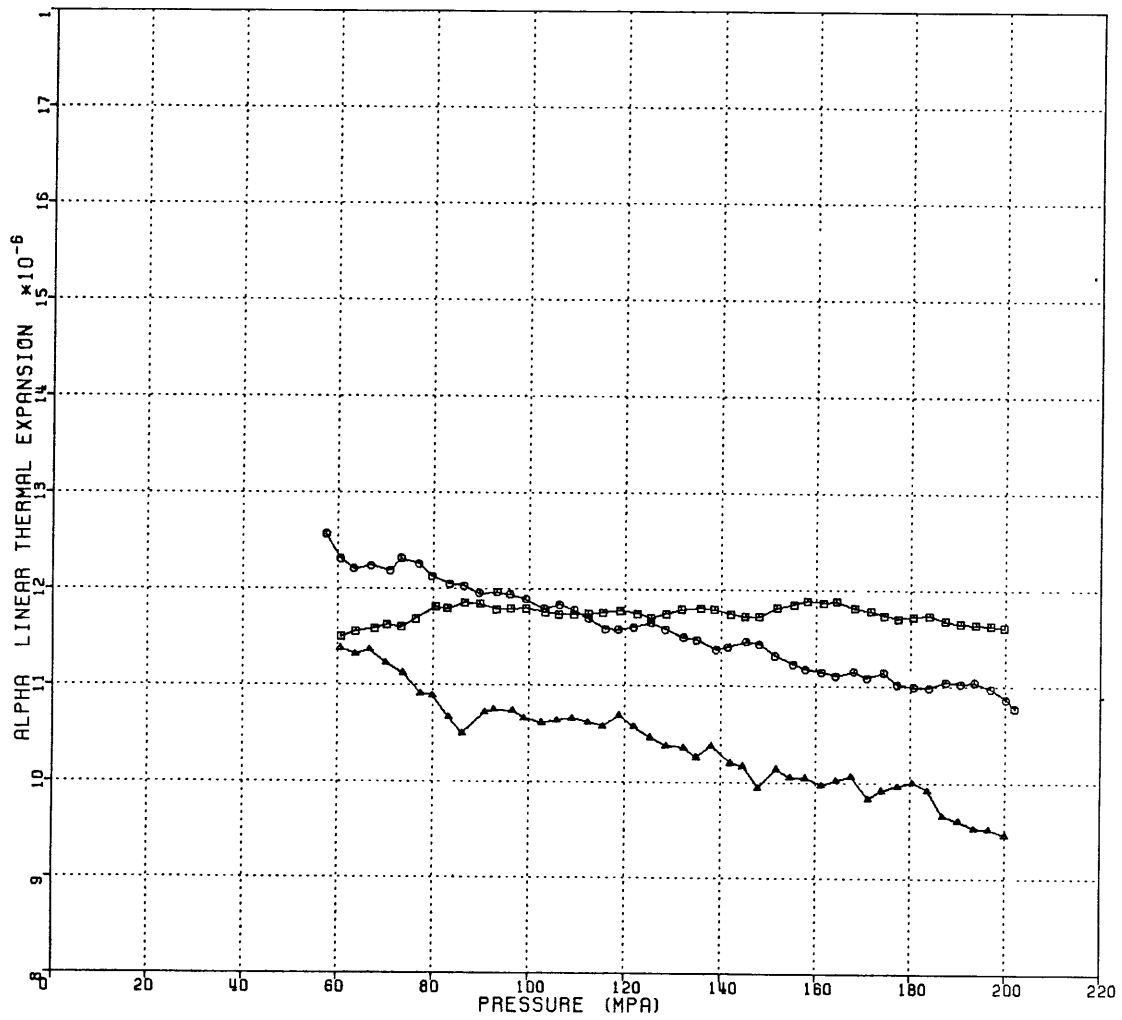
178 TWIN SISTERS WA DUNITE
GAGE: 3A

- - 20 MPA
- - 30 MPA
- △ - 40 MPA
- + - 50 MPA
- x - 60 MPA
- ◇ - 70 MPA
- ↑ - 80 MPA
- ⊗ - 90 MPA
- Z - 100 MPA



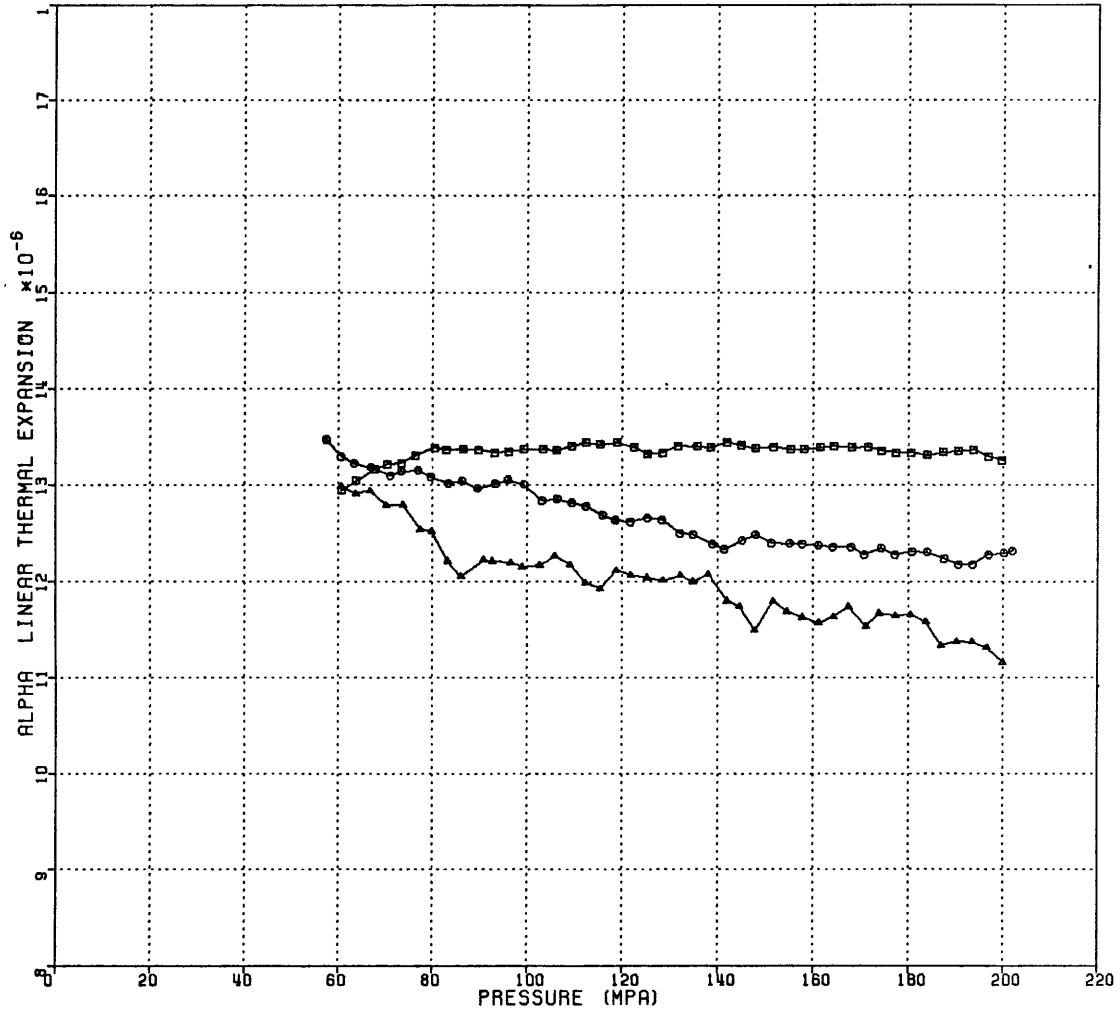
178 TWIN SISTERS WA DUNITE
GAGE: 3A

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- × - 150 MPA
- ◇ - 160 MPA
- ⋈ - 170 MPA
- ⊗ - 180 MPA
- ⊘ - 190 MPA
- ⊙ - 200 MPA



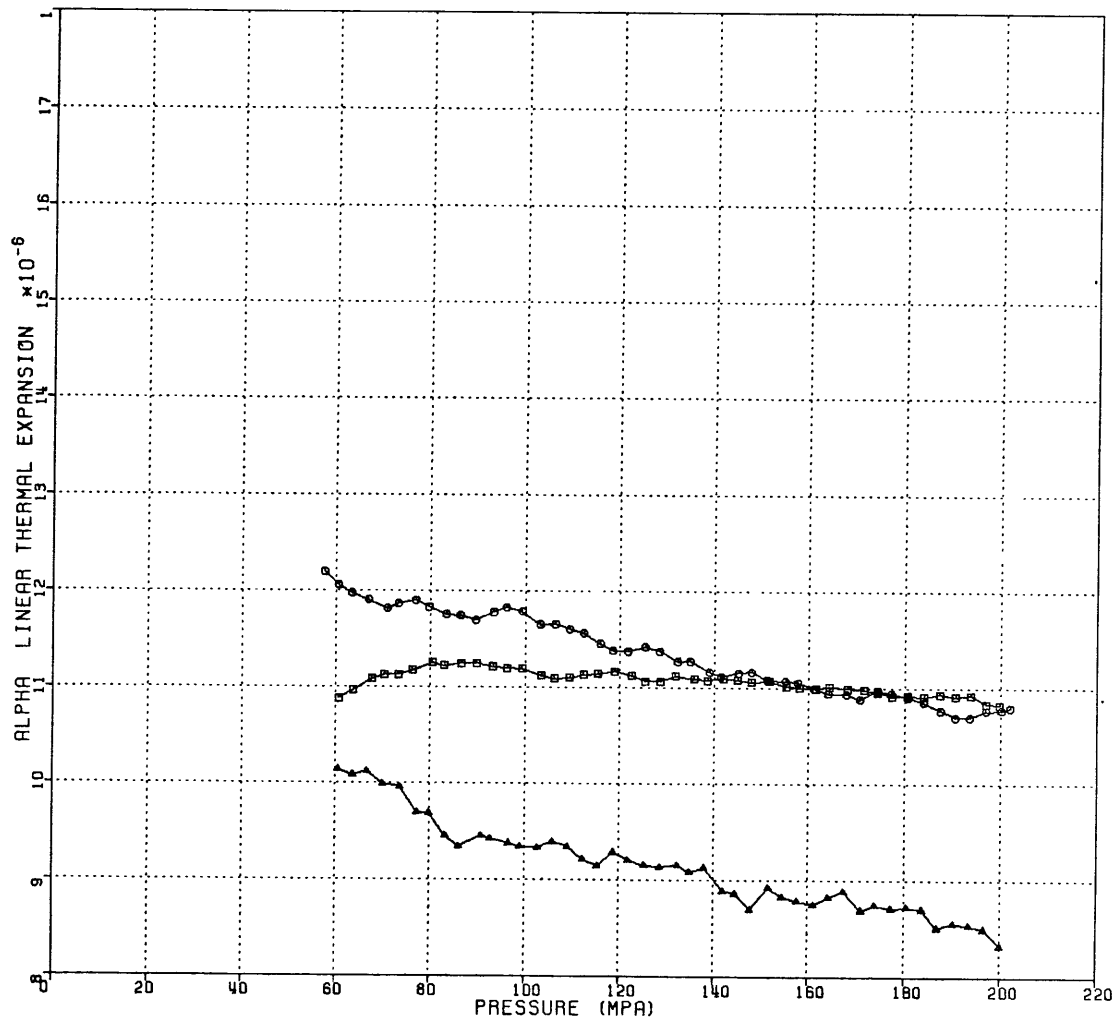
178 TWIN SISTERS WA DUNITE
GAGE: AC

- - 19°C- 43°C
- - 43°C- 64°C
- △ - 64°C- 86°C



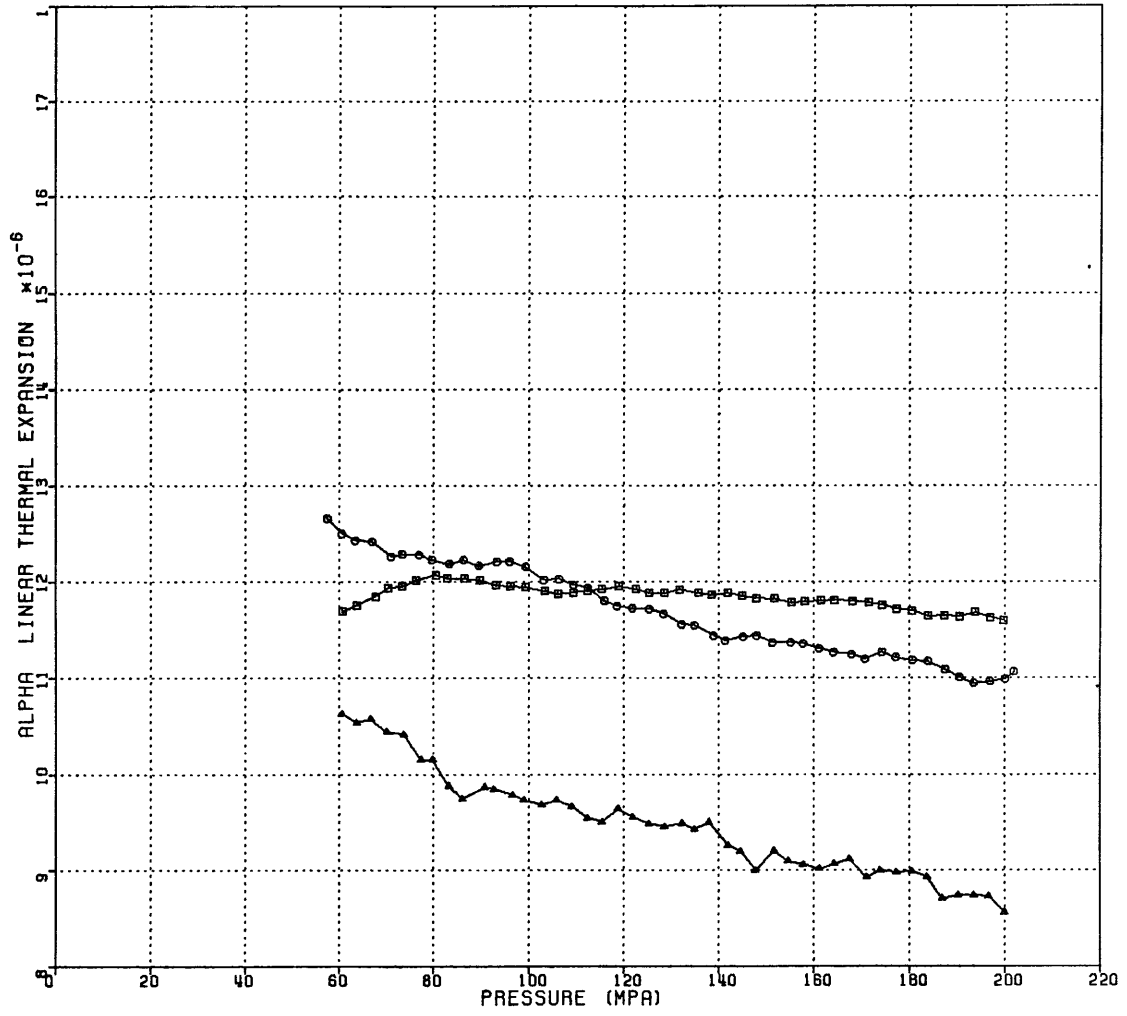
178 TWIN SISTERS WA DUNITE
GAGE:BC

□ - 19°C- 43°C
 ○ - 43°C- 64°C
 ▲ - 64°C- 86°C



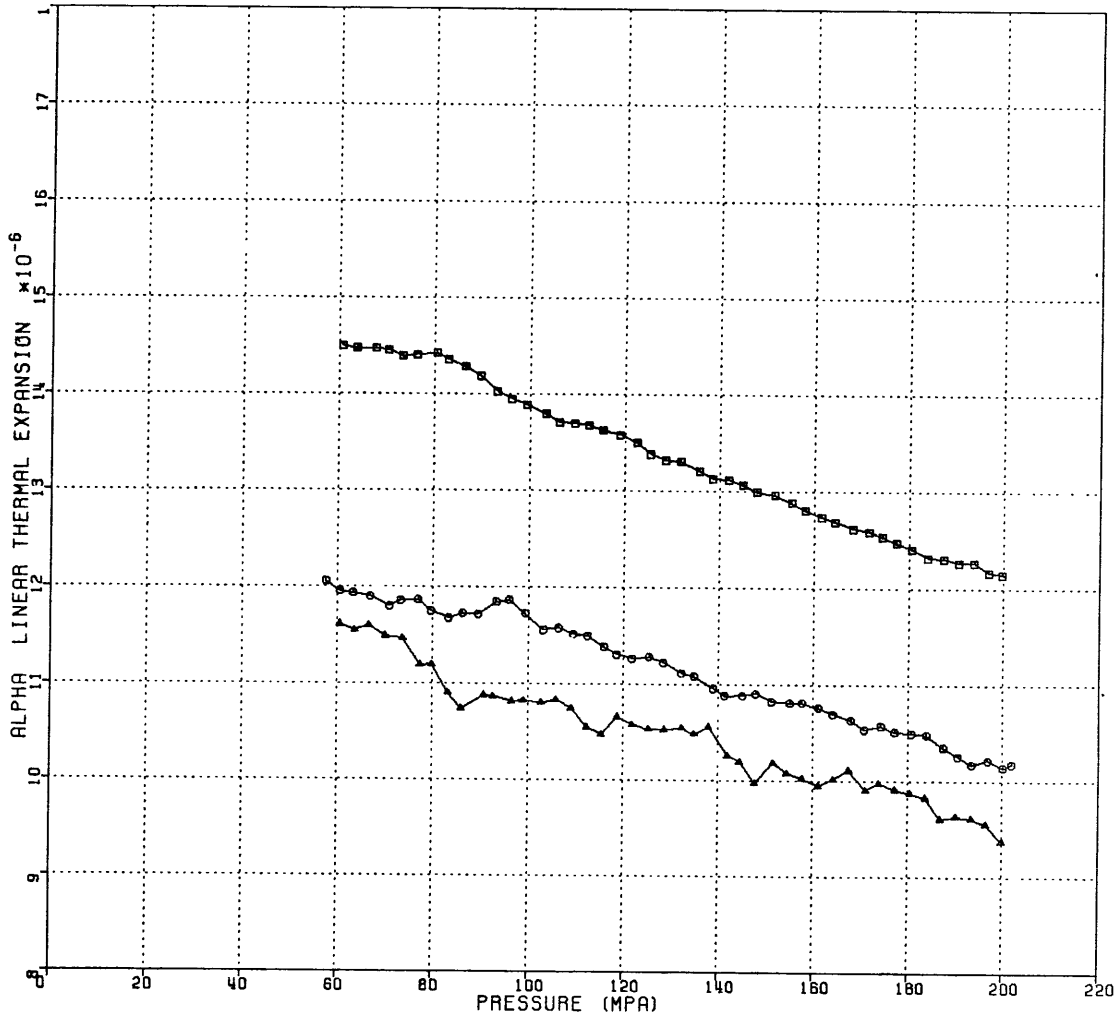
178 TWIN SISTERS WA DUNITE
GAGE: 3C

- - 19°C- 43°C
- - 43°C- 64°C
- △ - 64°C- 86°C



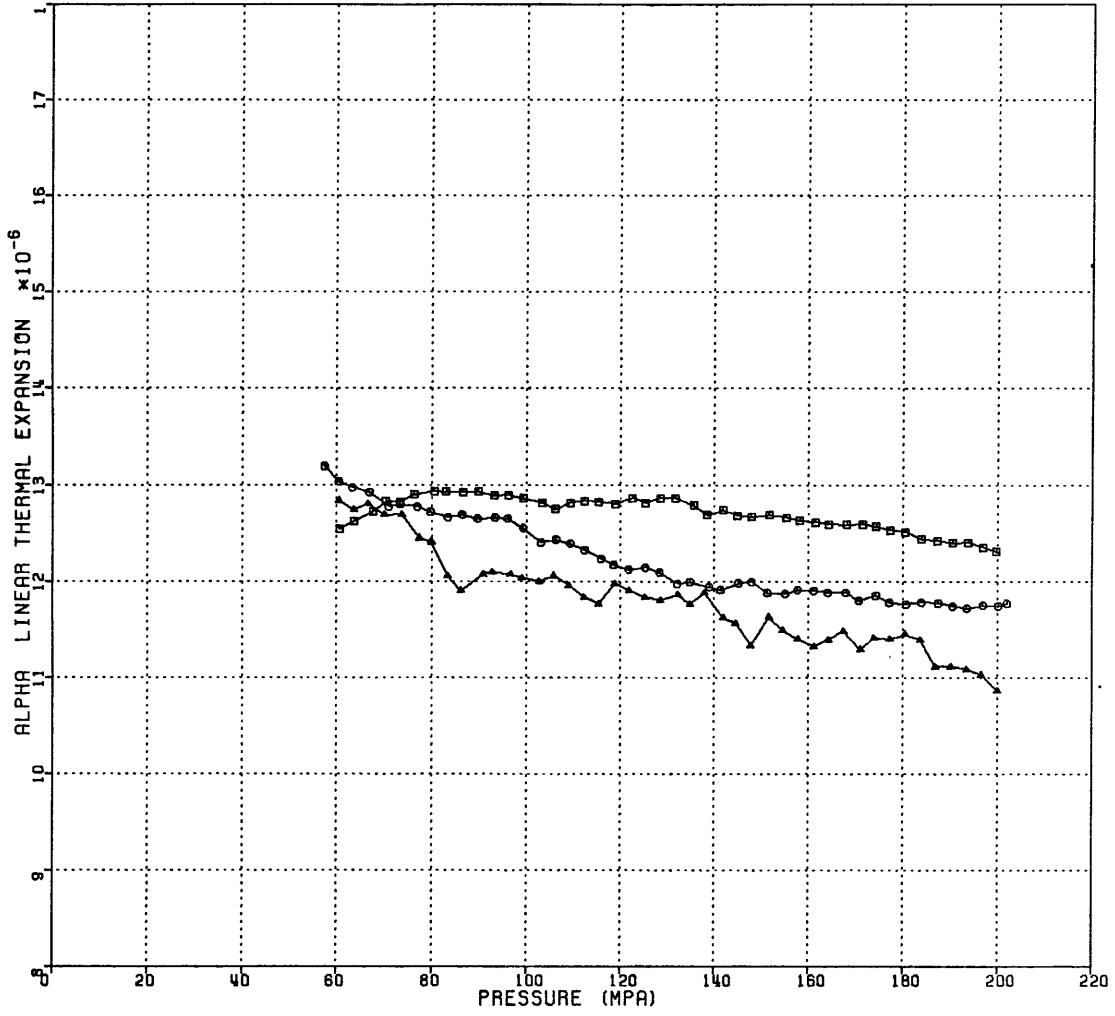
178 TWIN SISTERS WA DUNITE
GAGE: AB

- - 19°C- 43°C
- - 43°C- 64°C
- △ - 64°C- 86°C



178 TWIN SISTERS WA DUNITÉ
GAGE:CB

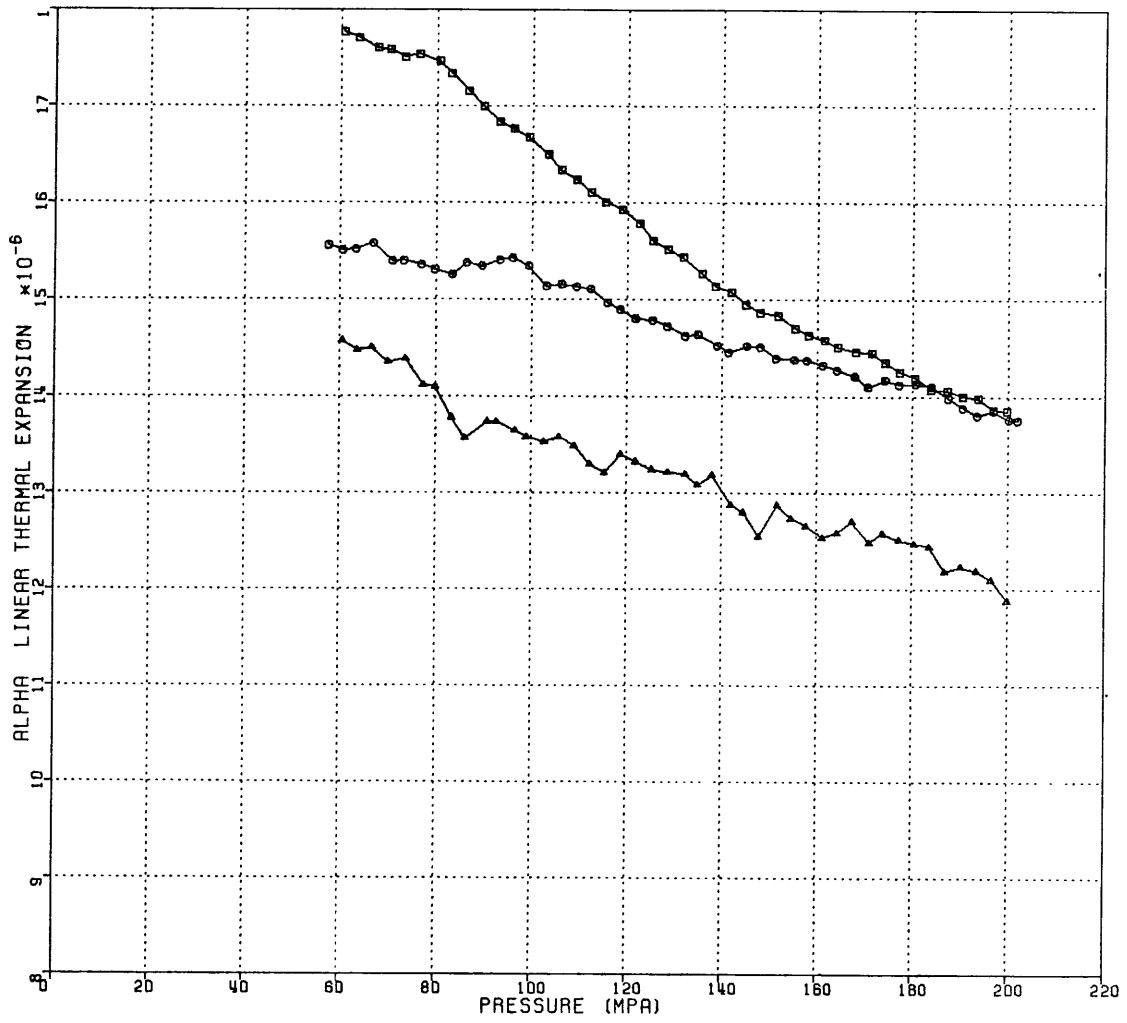
- - 19°C- 43°C
- - 43°C- 64°C
- △ - 64°C- 86°C



178 TWIN SISTERS WA DUNITE

GAGE: 3B

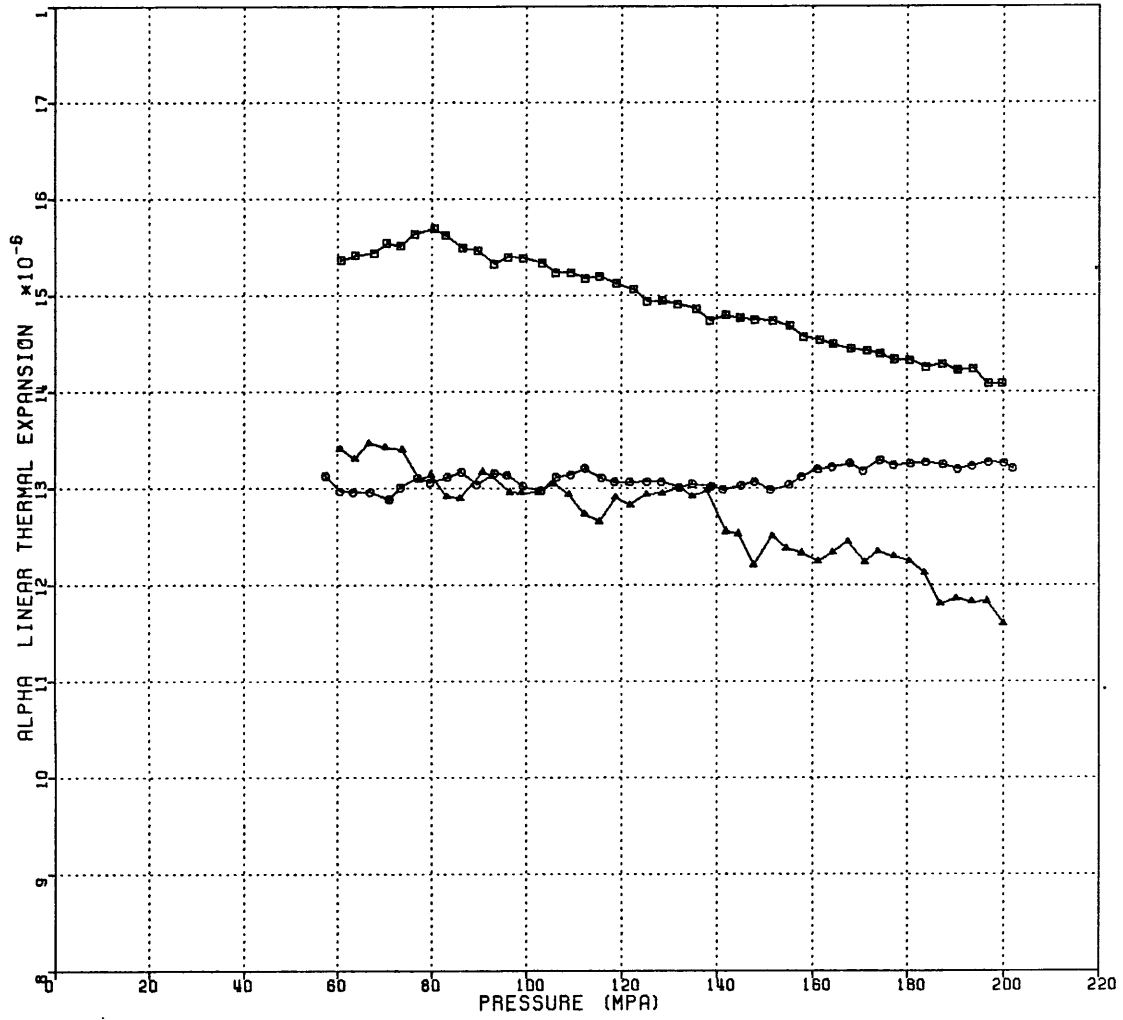
- - 19°C- 43°C
- - 43°C- 64°C
- △ - 64°C- 86°C



178 TWIN SISTERS WA DUNITE

GAGE:BA

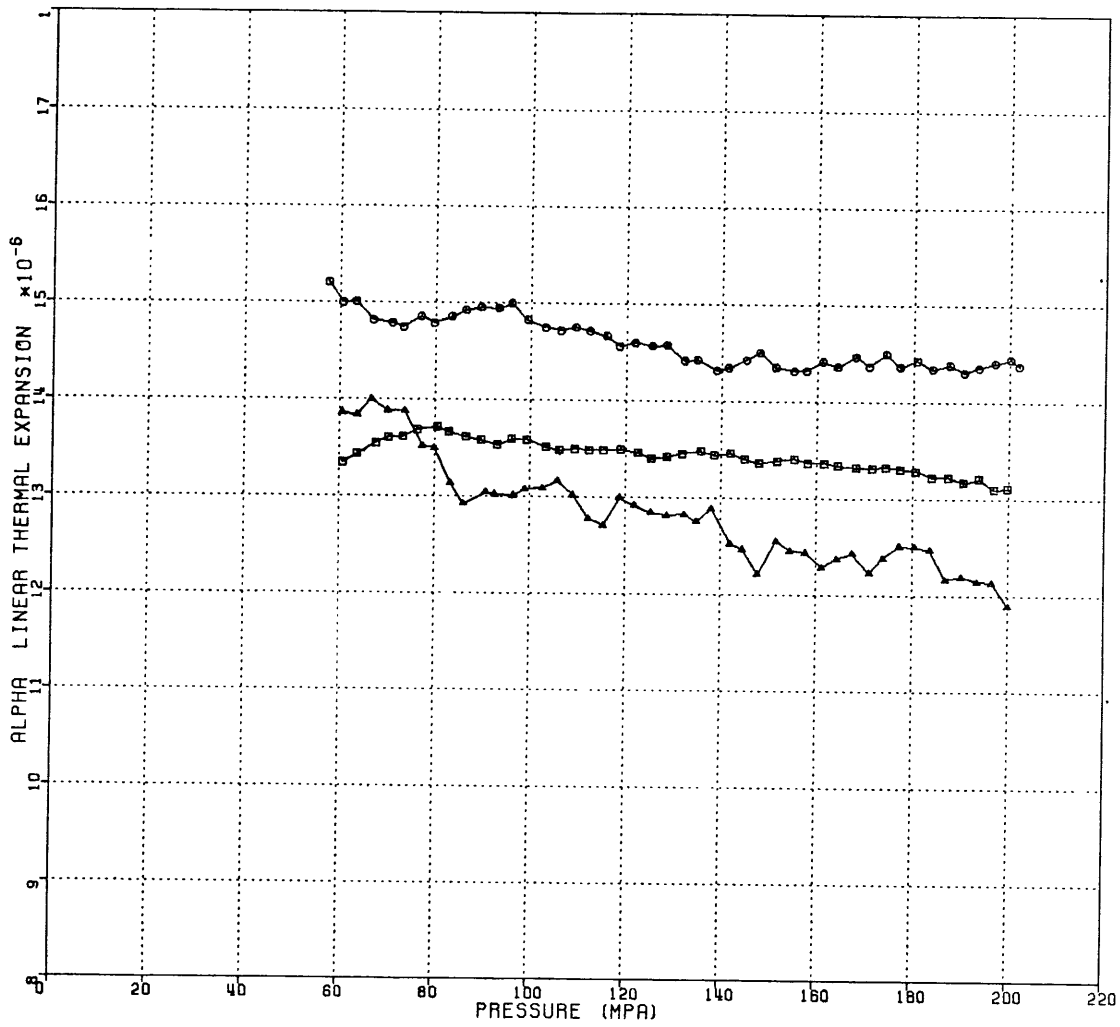
- - 19°C- 43°C
- - 43°C- 64°C
- △ - 64°C- 86°C



178 TWIN SISTERS WA DUNITE

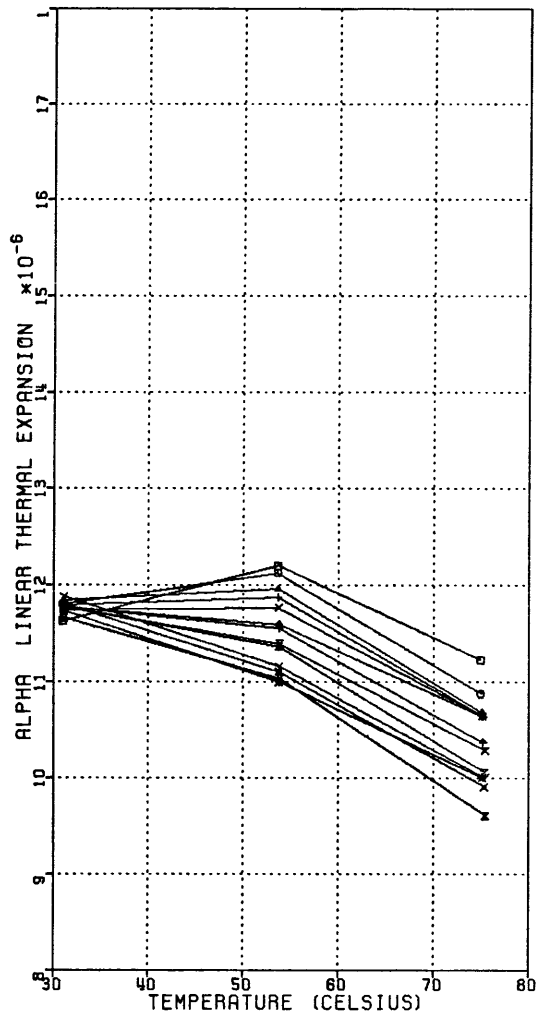
GAGE: CA

- - 19°C- 43°C
- - 43°C- 64°C
- △ - 64°C- 86°C



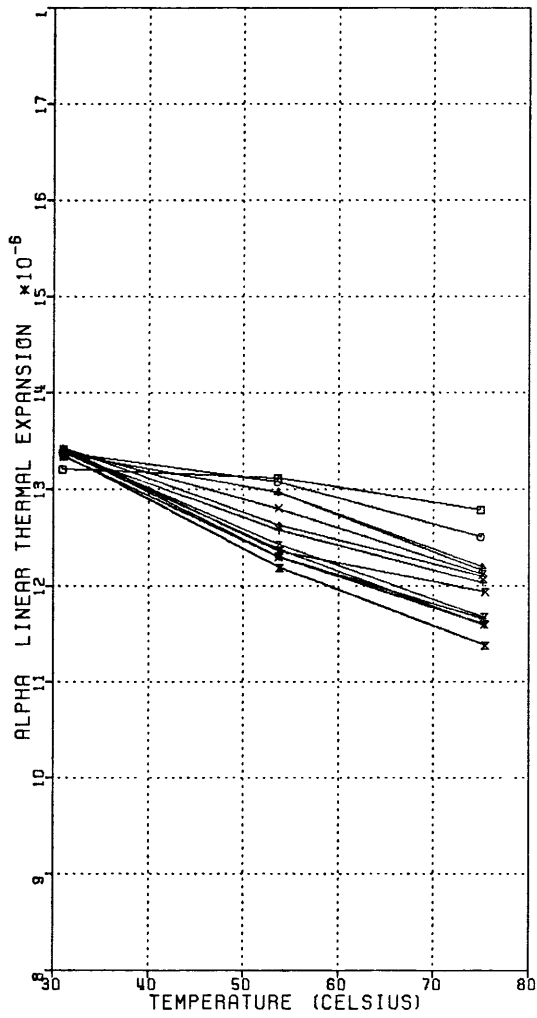
178 TWIN SISTERS WA DUNITE
GAGE: 3A

□ - 19°C - 43°C
 ○ - 43°C - 64°C
 △ - 64°C - 86°C



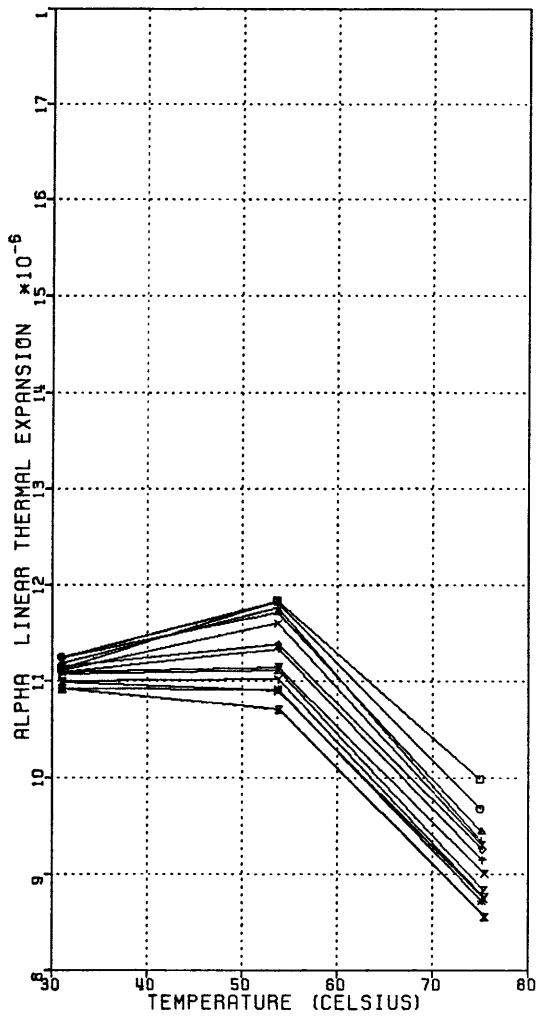
178 TWIN SISTERS WA DUNITE
GAGE: AC

- | | |
|-------------|-------------|
| □ - 70 MPA | ⊗ - 170 MPA |
| ○ - 80 MPA | * - 180 MPA |
| △ - 90 MPA | ⊗ - 190 MPA |
| + - 100 MPA | |
| X - 110 MPA | |
| ◇ - 120 MPA | |
| ↑ - 130 MPA | |
| X - 140 MPA | |
| Z - 150 MPA | |
| Y - 160 MPA | |



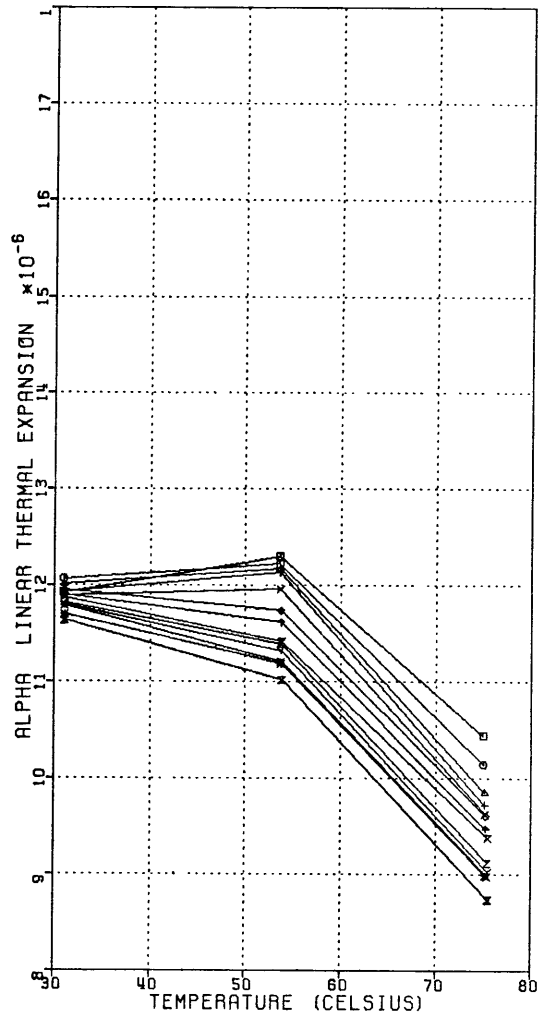
178 TWIN SISTERS WA DUNITE
GAGE:BC

- | | |
|-------------|-------------|
| □ - 70 MPA | ⊗ - 170 MPA |
| ○ - 80 MPA | * - 180 MPA |
| △ - 90 MPA | ⊗ - 190 MPA |
| + - 100 MPA | |
| X - 110 MPA | |
| ◇ - 120 MPA | |
| ⊕ - 130 MPA | |
| ⊗ - 140 MPA | |
| Z - 150 MPA | |
| Y - 160 MPA | |



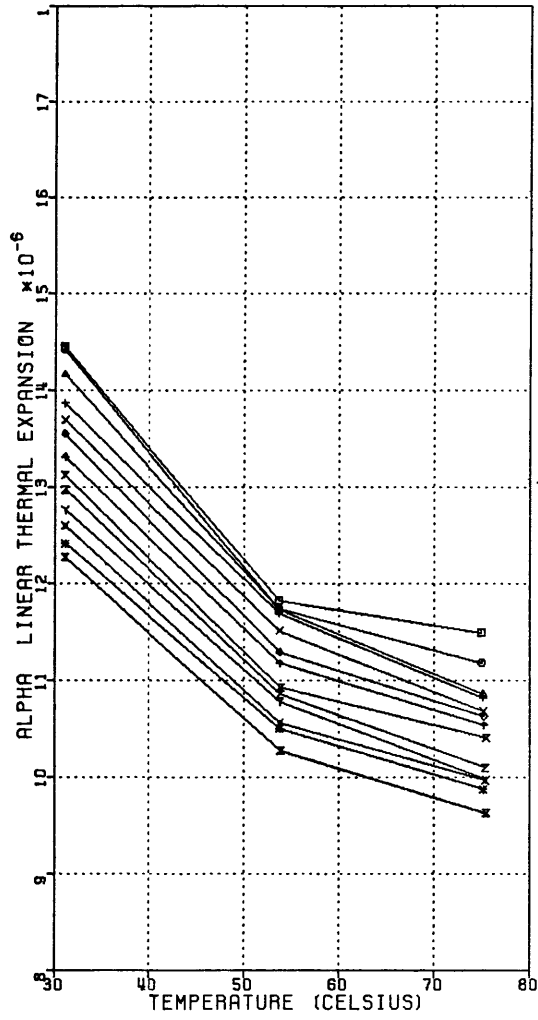
178 TWIN SISTERS WA DUNITE
GAGE: 3C

- | | |
|-------------|-------------|
| □ - 70 MPA | ⌘ - 170 MPA |
| ○ - 80 MPA | * - 180 MPA |
| △ - 90 MPA | ⌘ - 190 MPA |
| + - 100 MPA | |
| × - 110 MPA | |
| ◇ - 120 MPA | |
| ⋈ - 130 MPA | |
| ⌘ - 140 MPA | |
| Z - 150 MPA | |
| Y - 160 MPA | |



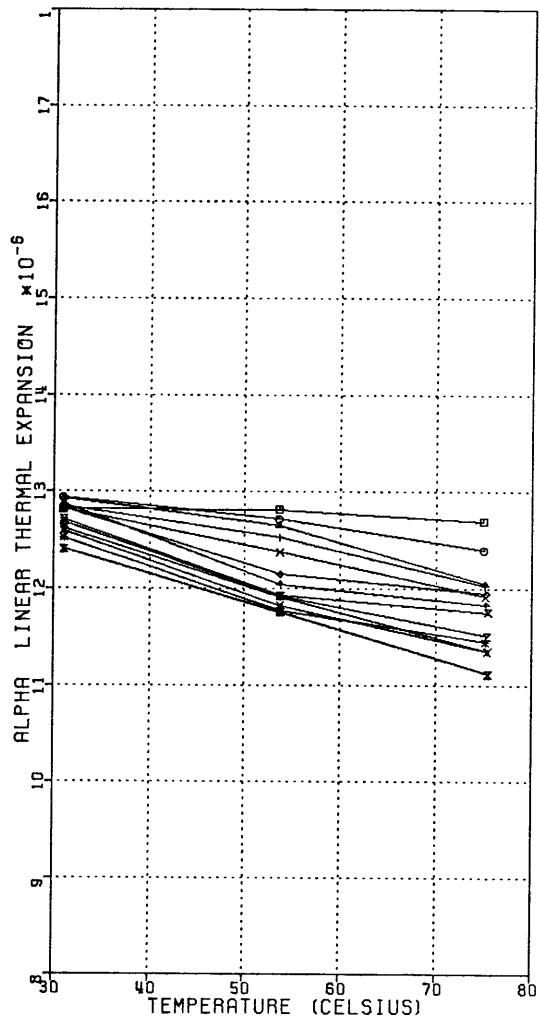
178 TWIN SISTERS WA DUNITE
GAGE: AB

- | | |
|-------------|-------------|
| □ - 70 MPA | ⊗ - 170 MPA |
| ○ - 80 MPA | * - 180 MPA |
| △ - 90 MPA | ⊗ - 190 MPA |
| + - 100 MPA | |
| X - 110 MPA | |
| ◇ - 120 MPA | |
| ⊕ - 130 MPA | |
| X - 140 MPA | |
| Z - 150 MPA | |
| Y - 160 MPA | |



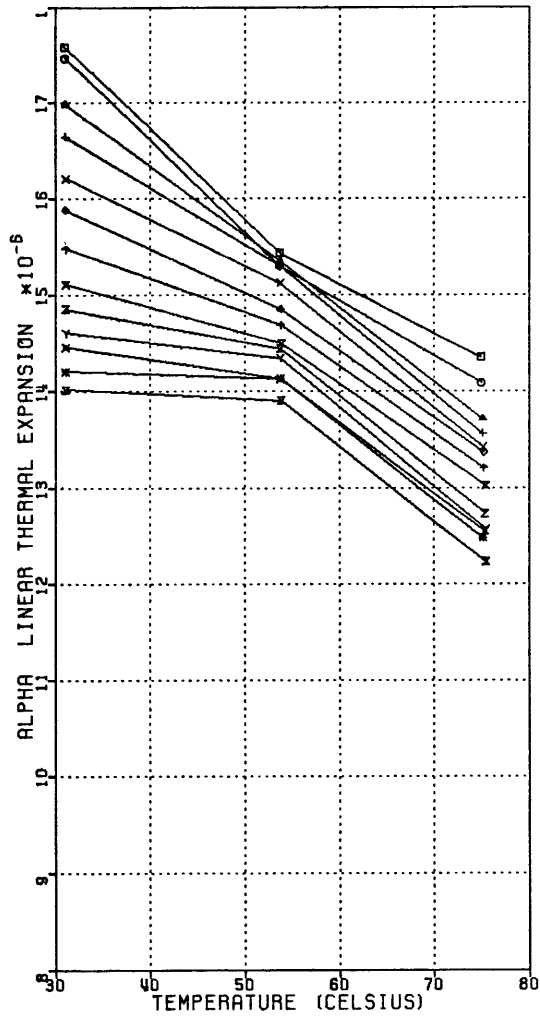
178 TWIN SISTERS WA DUNITE
GAGE:CB

- | | |
|-------------|-------------|
| □ - 70 MPA | ⌘ - 170 MPA |
| ○ - 80 MPA | ✱ - 180 MPA |
| △ - 90 MPA | ⌘ - 190 MPA |
| + - 100 MPA | |
| X - 110 MPA | |
| ◇ - 120 MPA | |
| ⋈ - 130 MPA | |
| X - 140 MPA | |
| Z - 150 MPA | |
| Y - 160 MPA | |



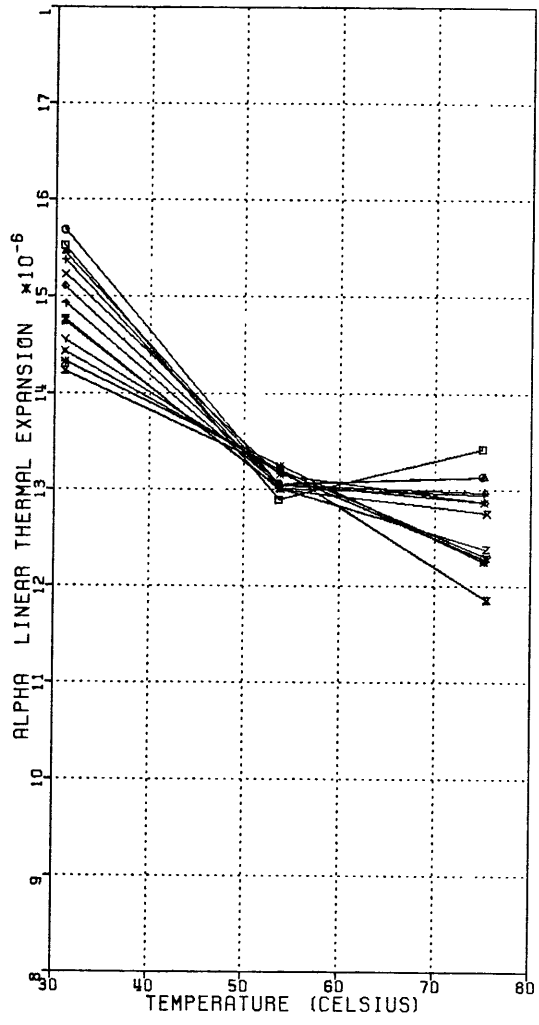
178 TWIN SISTERS WA DUNITE
GAGE: 3B

- - 70 MPA
- ⊙ - 80 MPA
- △ - 90 MPA
- + - 100 MPA
- X - 110 MPA
- ◇ - 120 MPA
- ♠ - 130 MPA
- ⊗ - 140 MPA
- Z - 150 MPA
- Y - 160 MPA
- ⊗ - 170 MPA
- * - 180 MPA
- ⊗ - 190 MPA



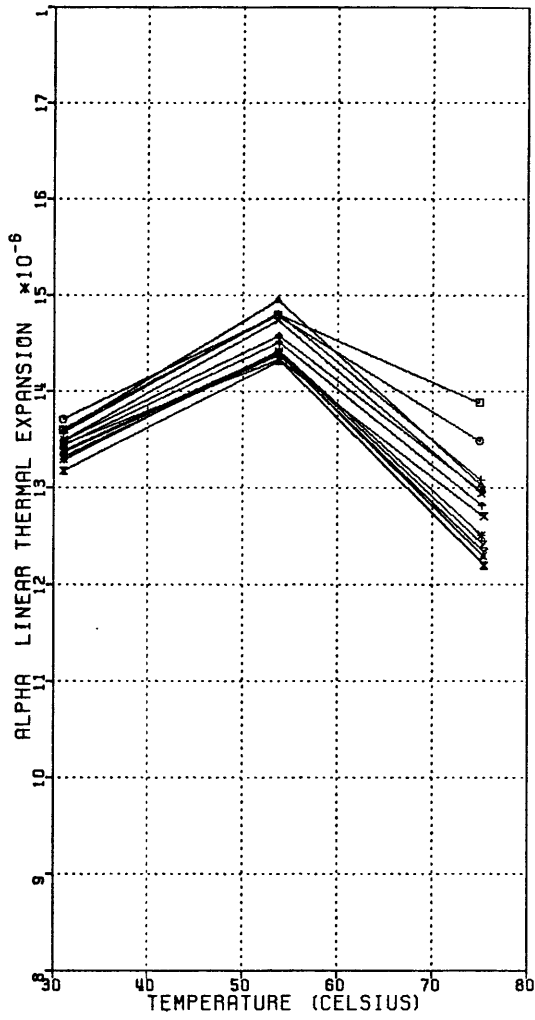
178 TWIN SISTERS WA DUNITE
GAGE:BA

- - 70 MPA
- - 80 MPA
- △ - 90 MPA
- + - 100 MPA
- X - 110 MPA
- ◇ - 120 MPA
- ♠ - 130 MPA
- ⊗ - 140 MPA
- Z - 150 MPA
- Y - 160 MPA
- ⊗ - 170 MPA
- ✱ - 180 MPA
- ⊗ - 190 MPA



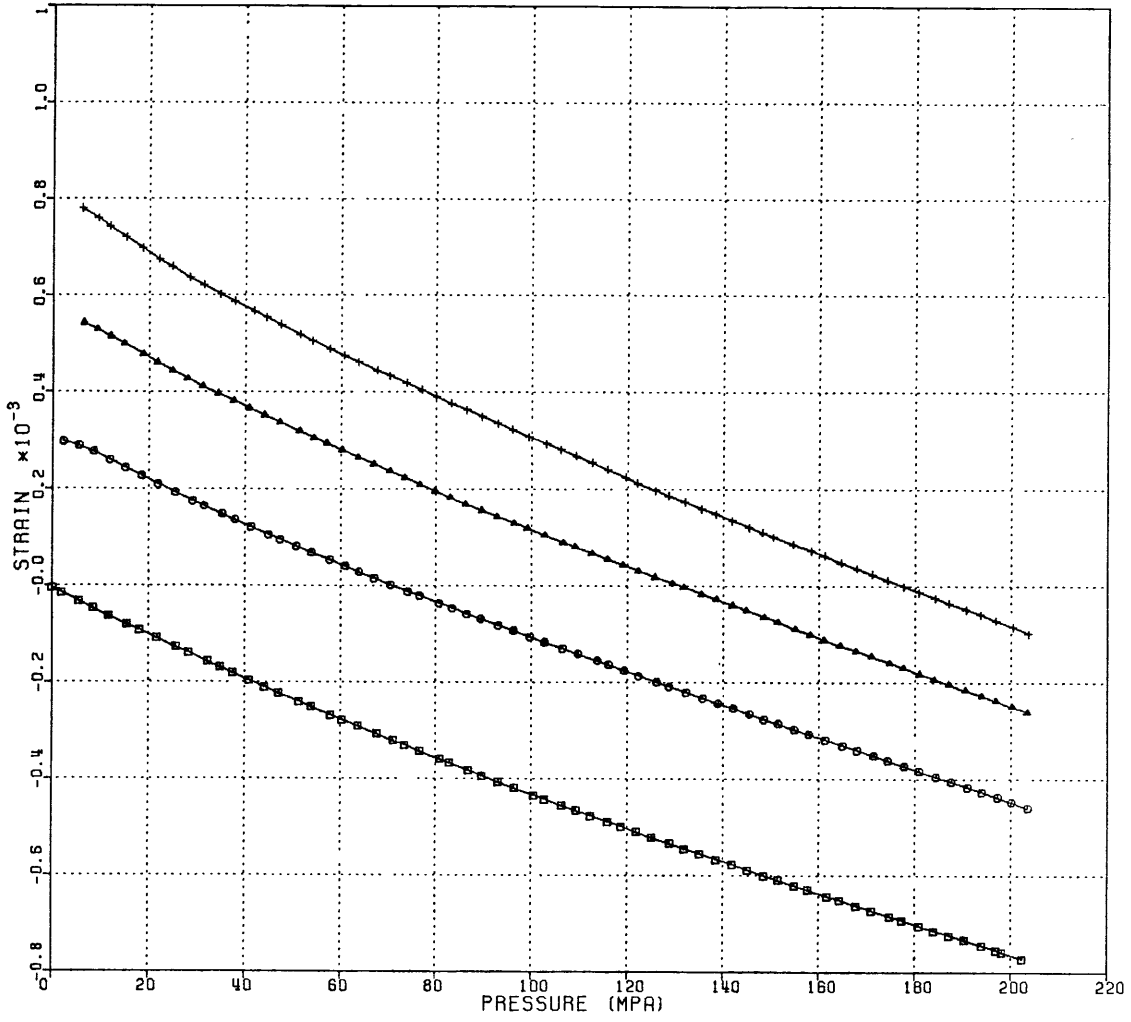
178 TWIN SISTERS WA DUNITE
GAGE:CA

- - 70 MPA
- - 80 MPA
- △ - 90 MPA
- + - 100 MPA
- X - 110 MPA
- ◇ - 120 MPA
- ⊕ - 130 MPA
- ⊗ - 140 MPA
- Z - 150 MPA
- Y - 160 MPA
- ⊗ - 170 MPA
- * - 180 MPA
- ⊗ - 190 MPA



178 TWIN SISTERS WA DUNITE
GAGE: 3A

- | | |
|-------------|-------------|
| □ - 70 MPA | ✕ - 170 MPA |
| ○ - 80 MPA | ✱ - 180 MPA |
| △ - 90 MPA | ✖ - 190 MPA |
| + - 100 MPA | |
| X - 110 MPA | |
| ◇ - 120 MPA | |
| ⊕ - 130 MPA | |
| X - 140 MPA | |
| Z - 150 MPA | |
| Y - 160 MPA | |



178 TWIN SISTERS WA DUNITE

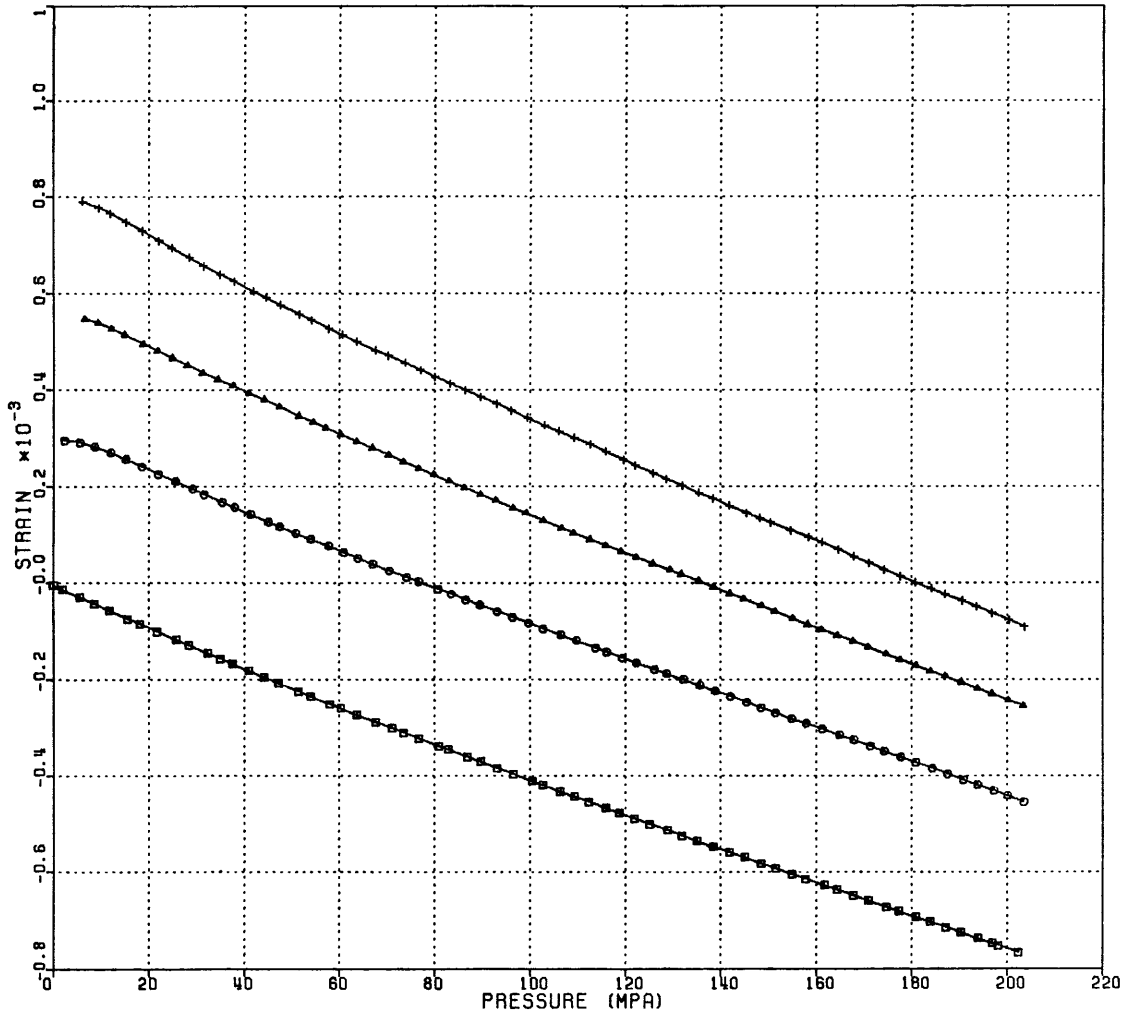
GAGE: BC

□ - 19°C

○ - 50°C

△ - 83°C

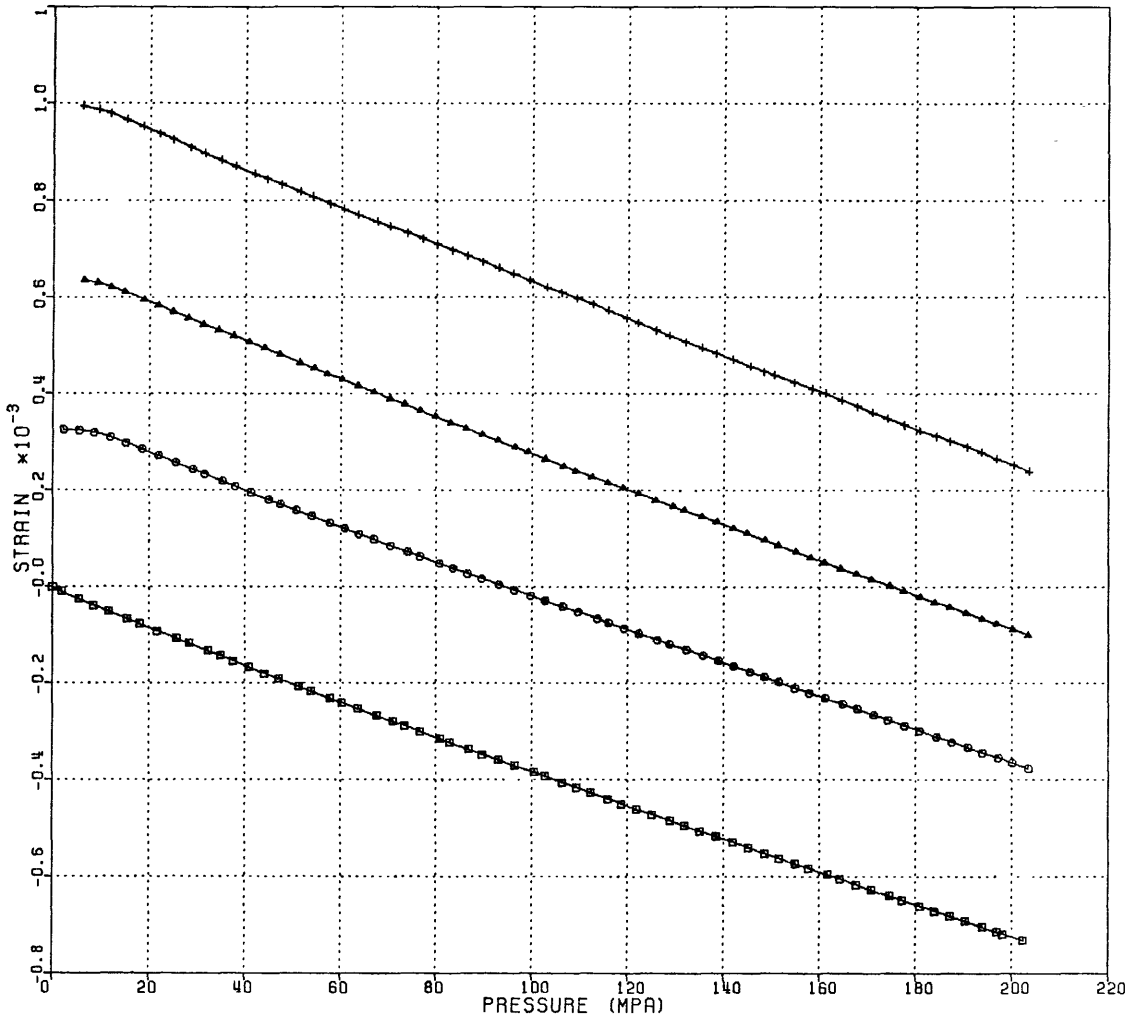
+ - 118°C



178 TWIN SISTERS WA DUNITE

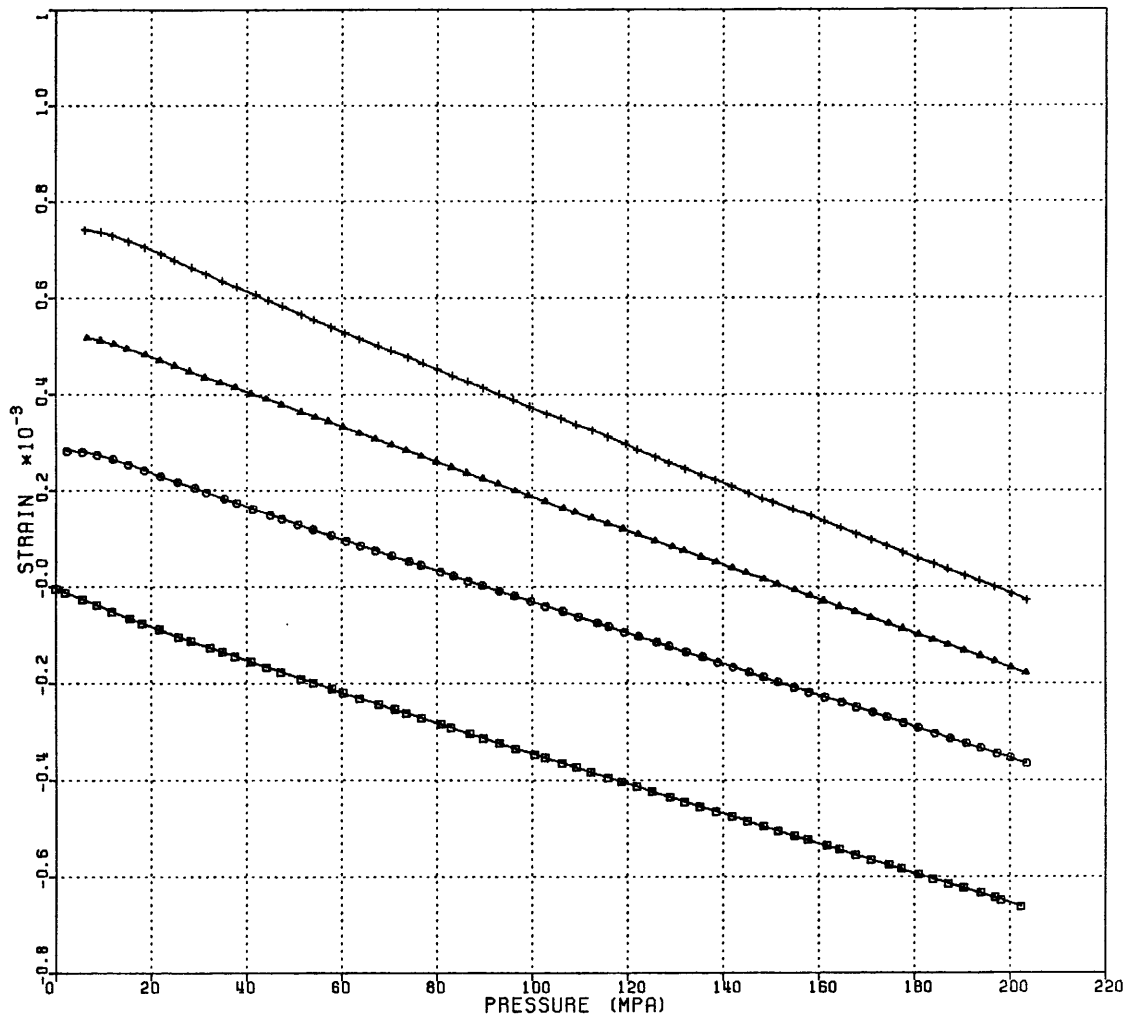
GAGE: 3C

- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



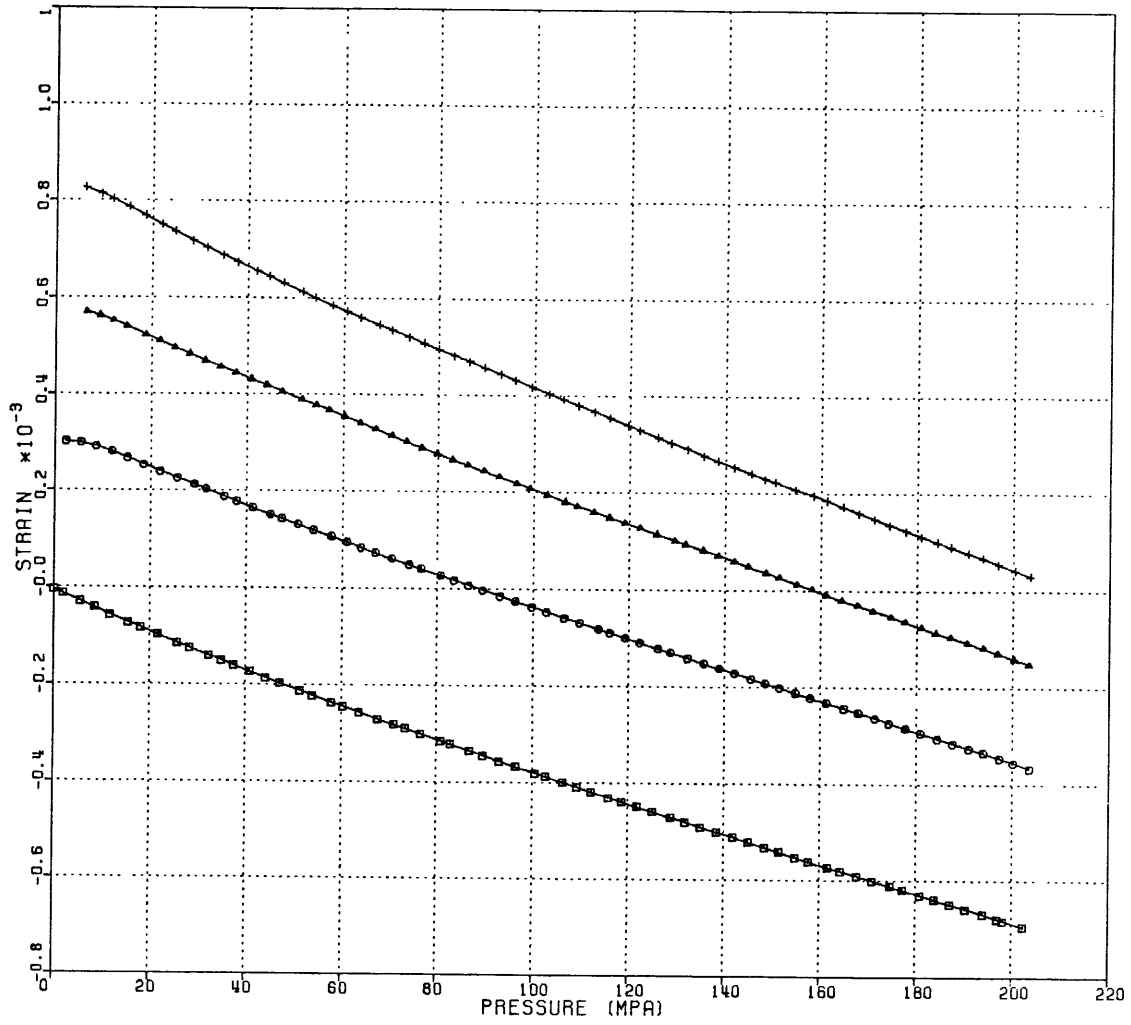
178 TWIN SISTERS WA DUNITE
GAGE: 4C

- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



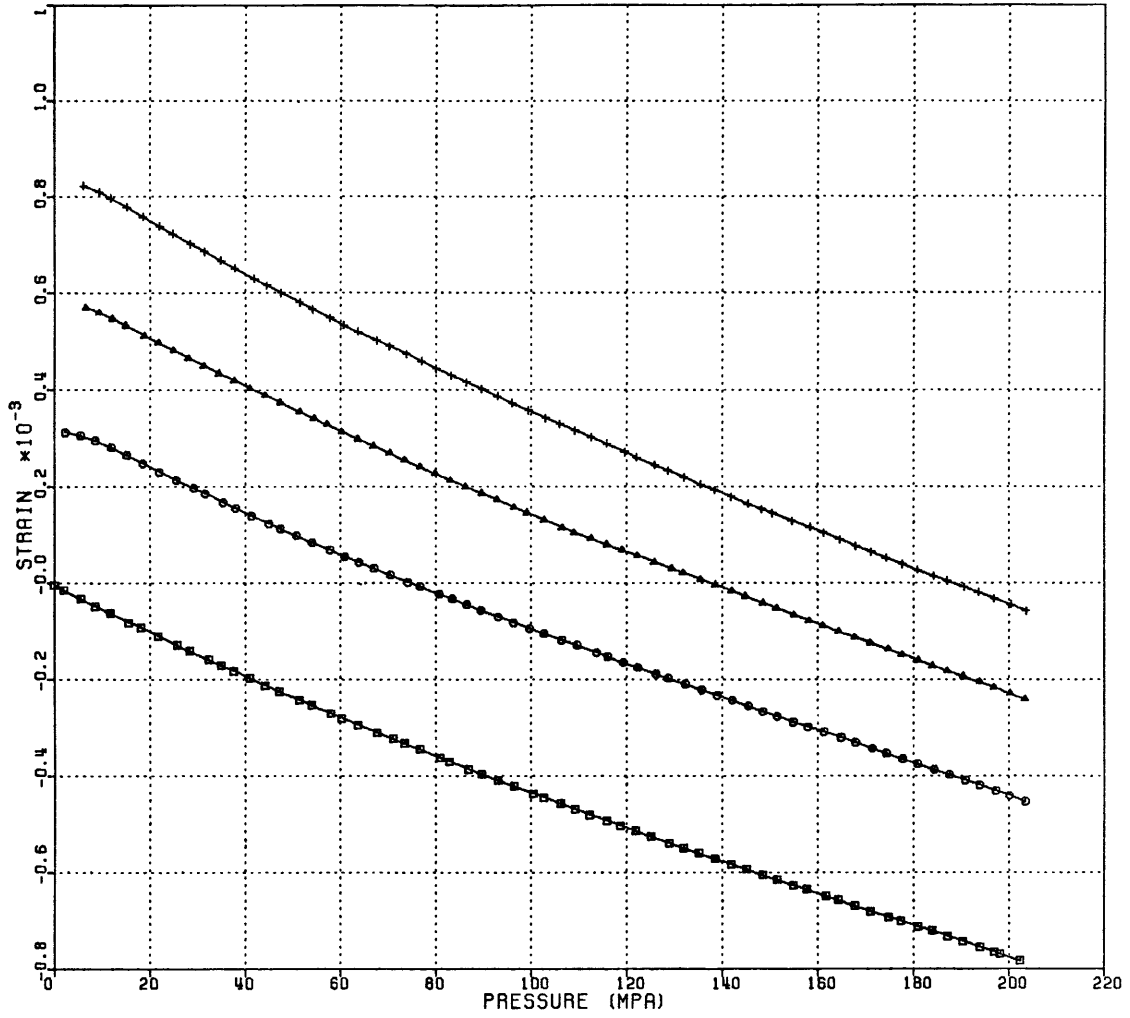
178 TWIN SISTERS WA DUNITE
GAGE: AB

- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



178 TWIN SISTERS WA DUNITE
GAGE:CB

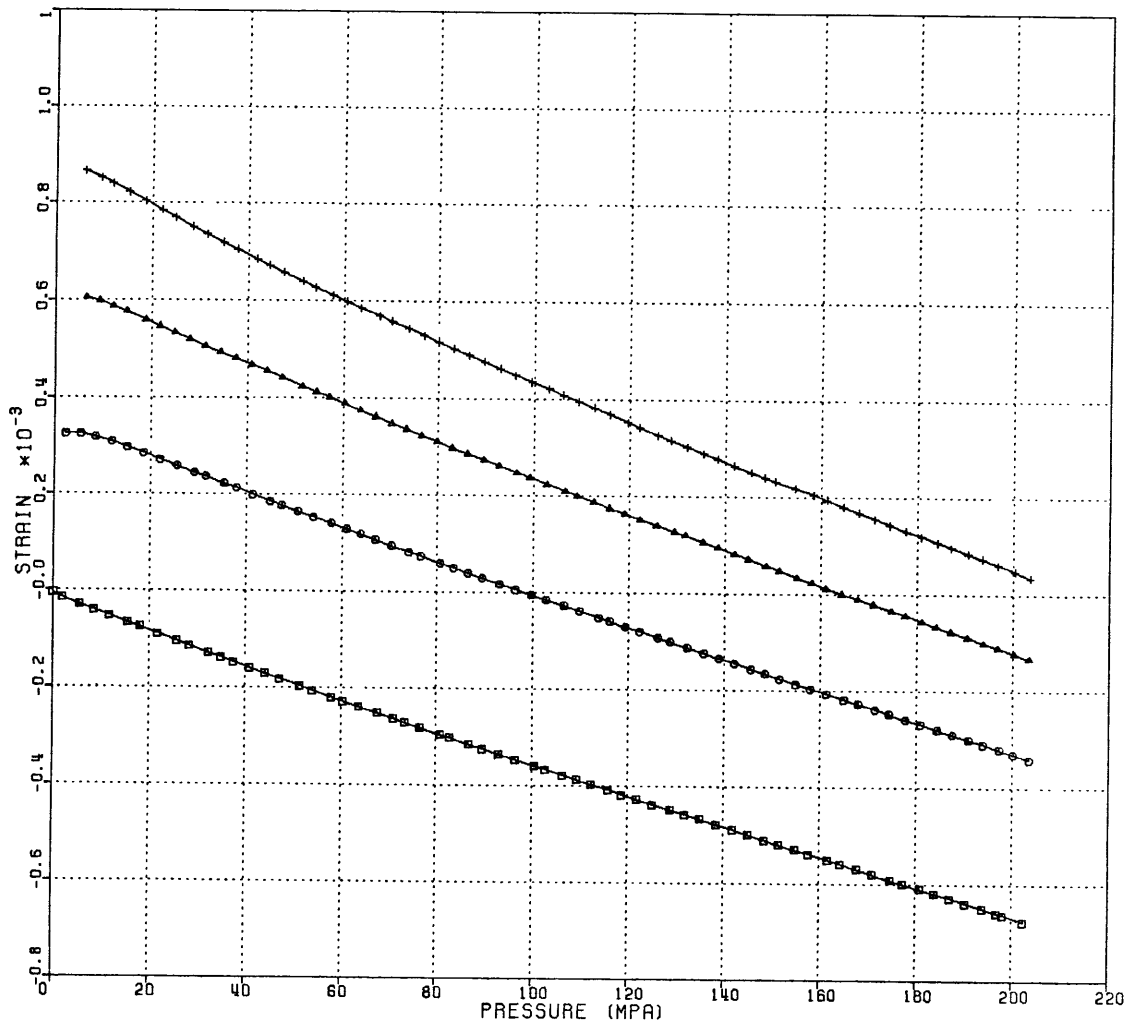
- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



178 TWIN SISTERS WA DUNITE

GAGE: 4B

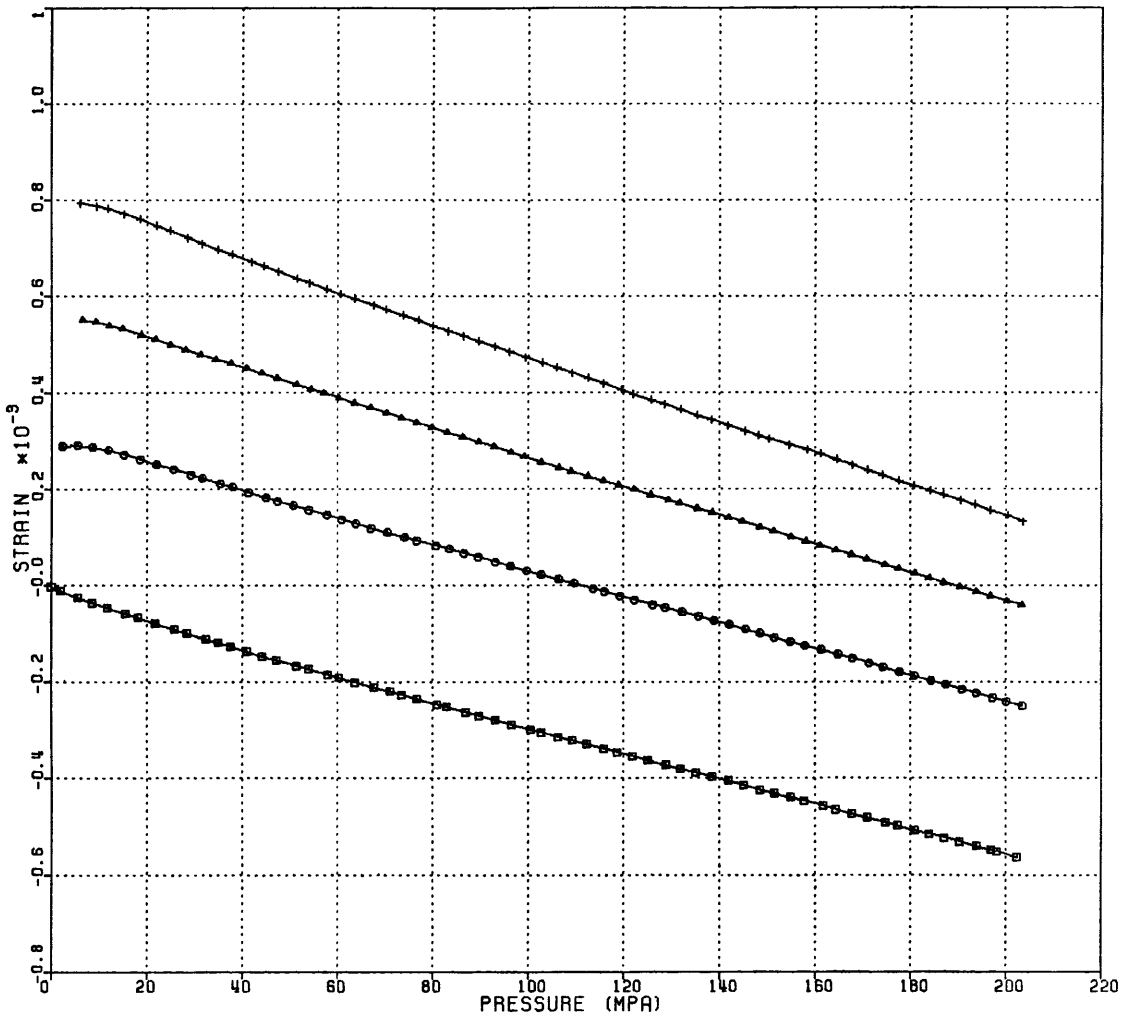
□ - 19°C
 ○ - 50°C
 △ - 83°C
 + - 118°C



178 TWIN SISTERS WA DUNITE

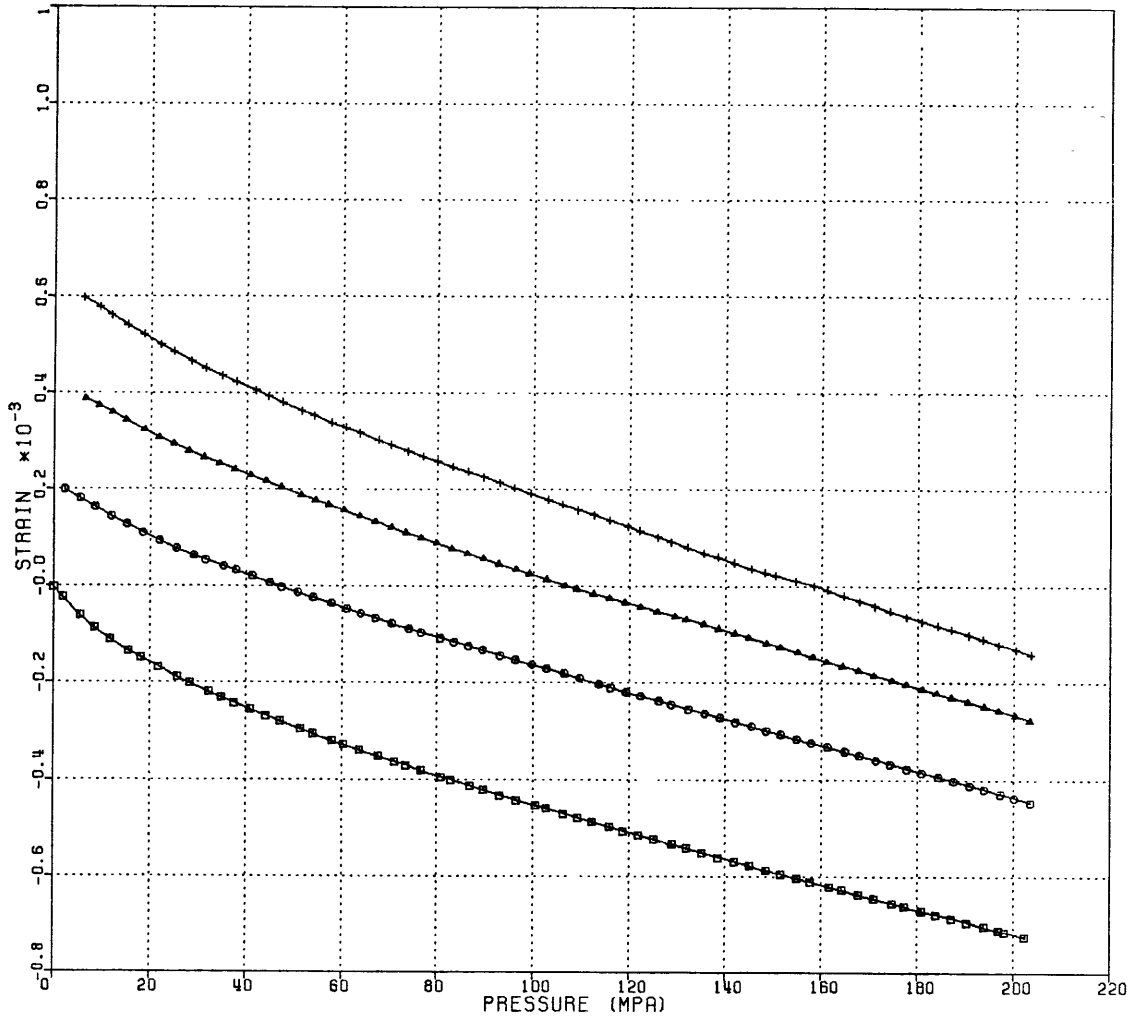
GAGE: BA

□ - 19°C
 ○ - 50°C
 △ - 83°C
 + - 116°C



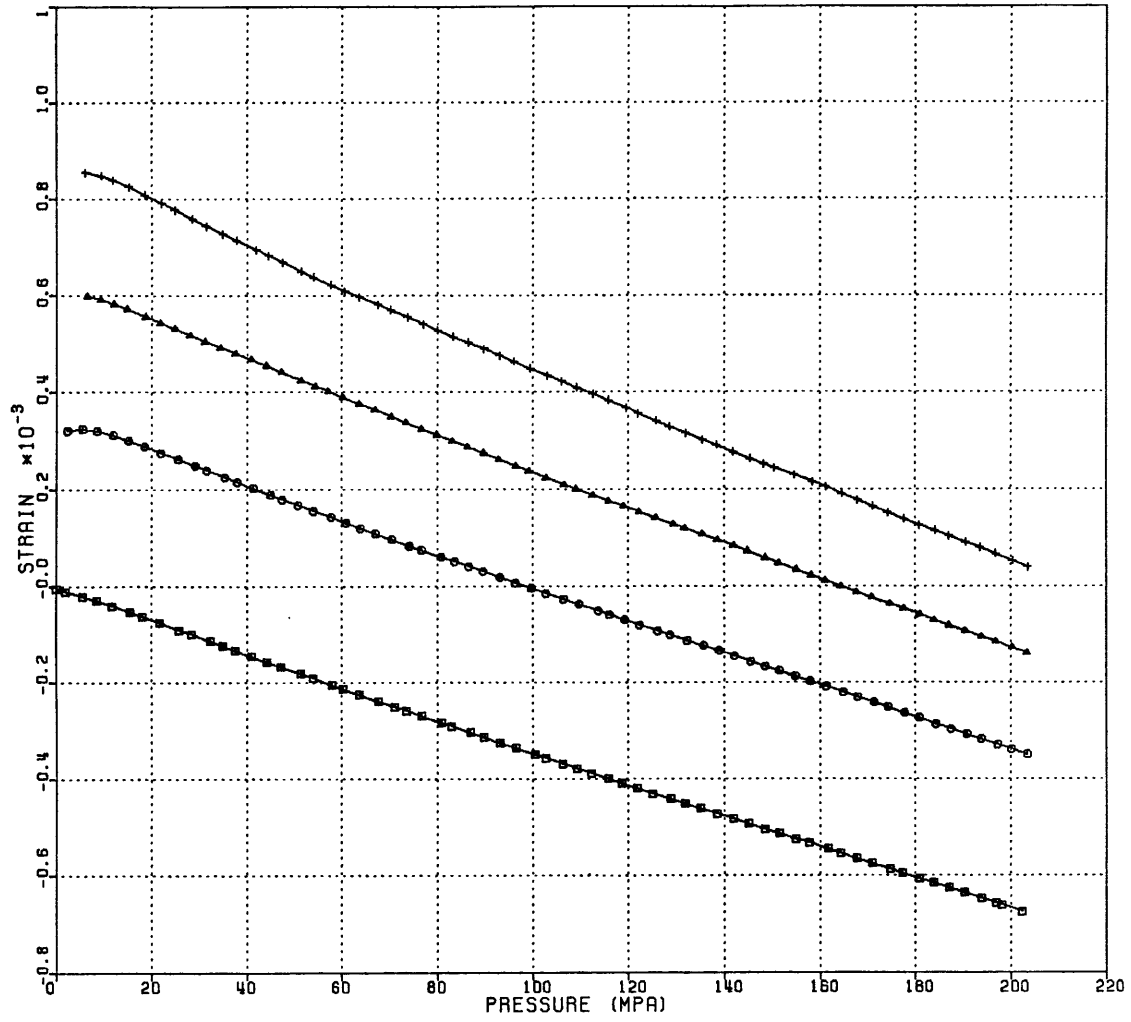
178 TWIN SISTERS WA DUNITE
GAGE: CA

□ - 19°C
○ - 50°C
△ - 83°C
+ - 118°C



178 TWIN SISTERS WA DUNITE
GAGE: 3A

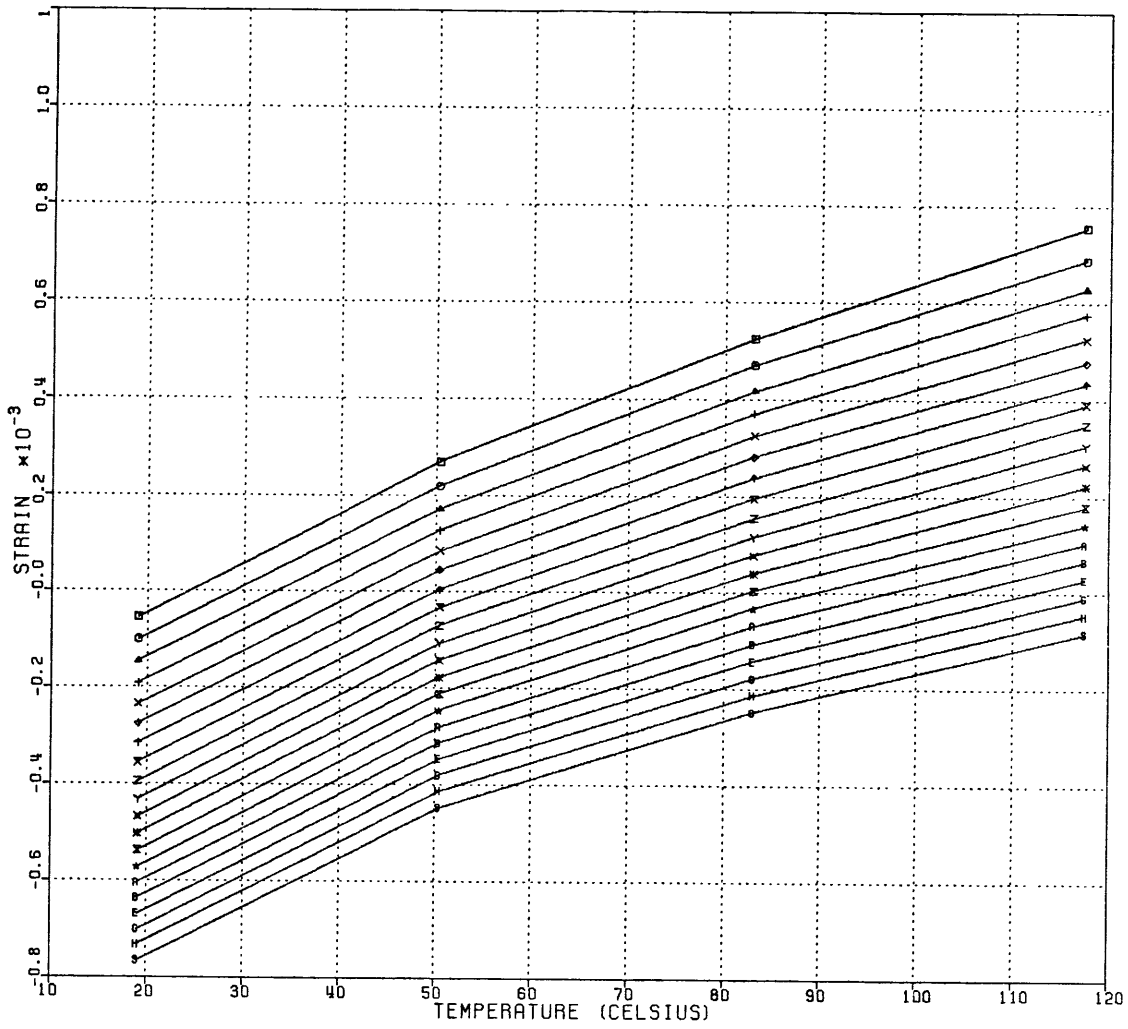
□ - 19°C
○ - 50°C
△ - 83°C
+ - 118°C



178 TWIN SISTERS WA DUNITE

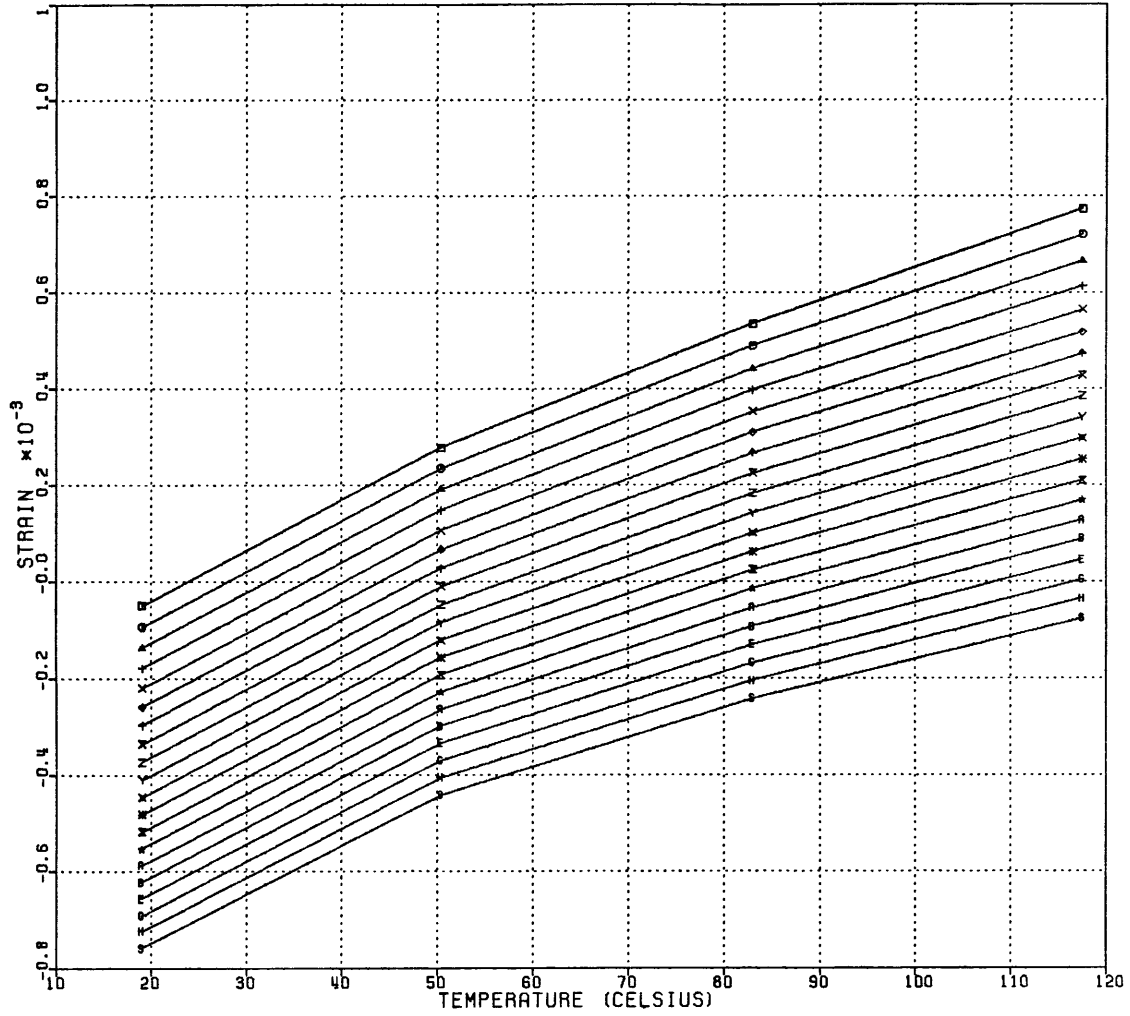
GAGE: 4A

- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



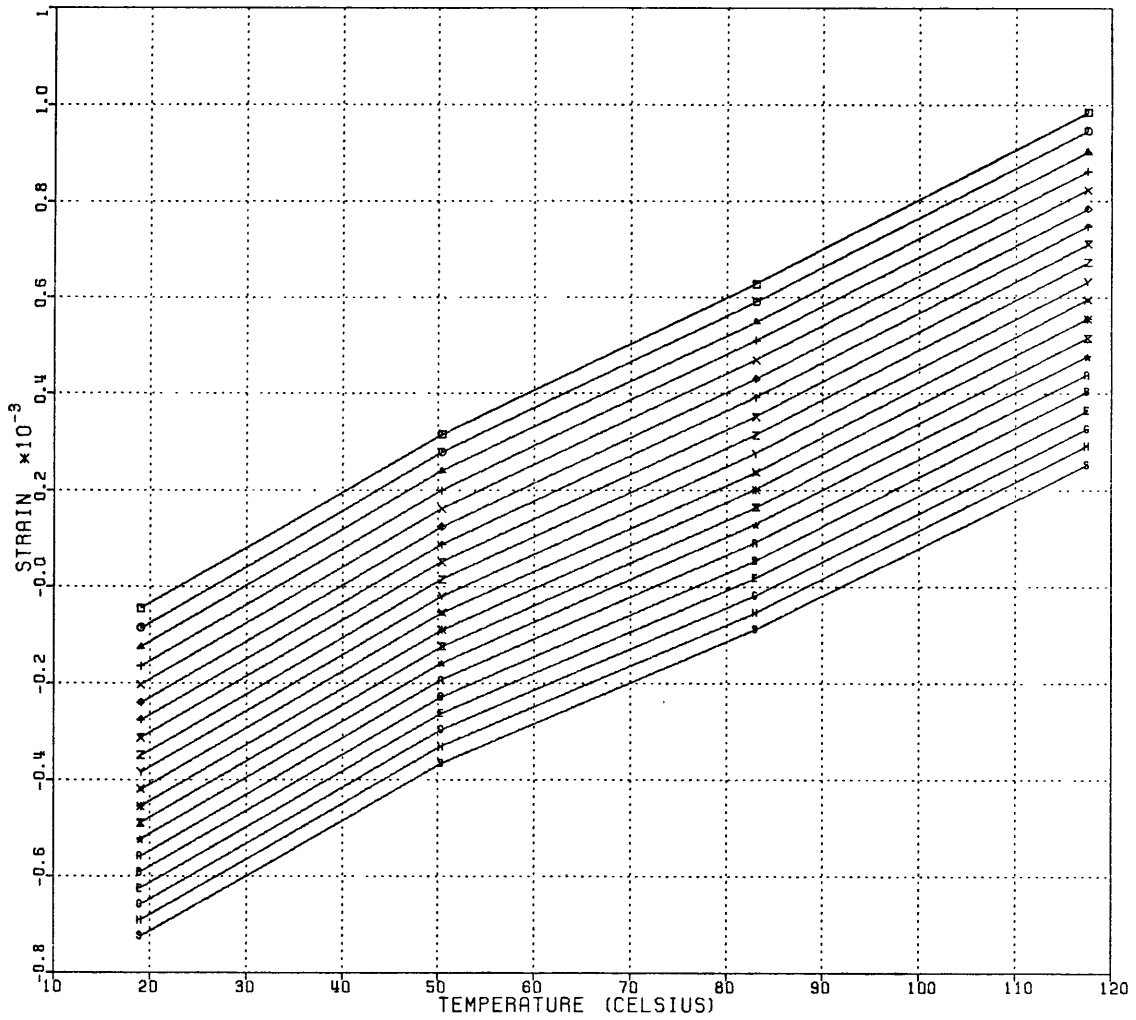
178 TWIN SISTERS WA DUNITE
GAGE:BC

- | | |
|-------------|-------------|
| □ - 10 MPA | ⌘ - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | ⌘ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ⊕ - 70 MPA | E - 170 MPA |
| X - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



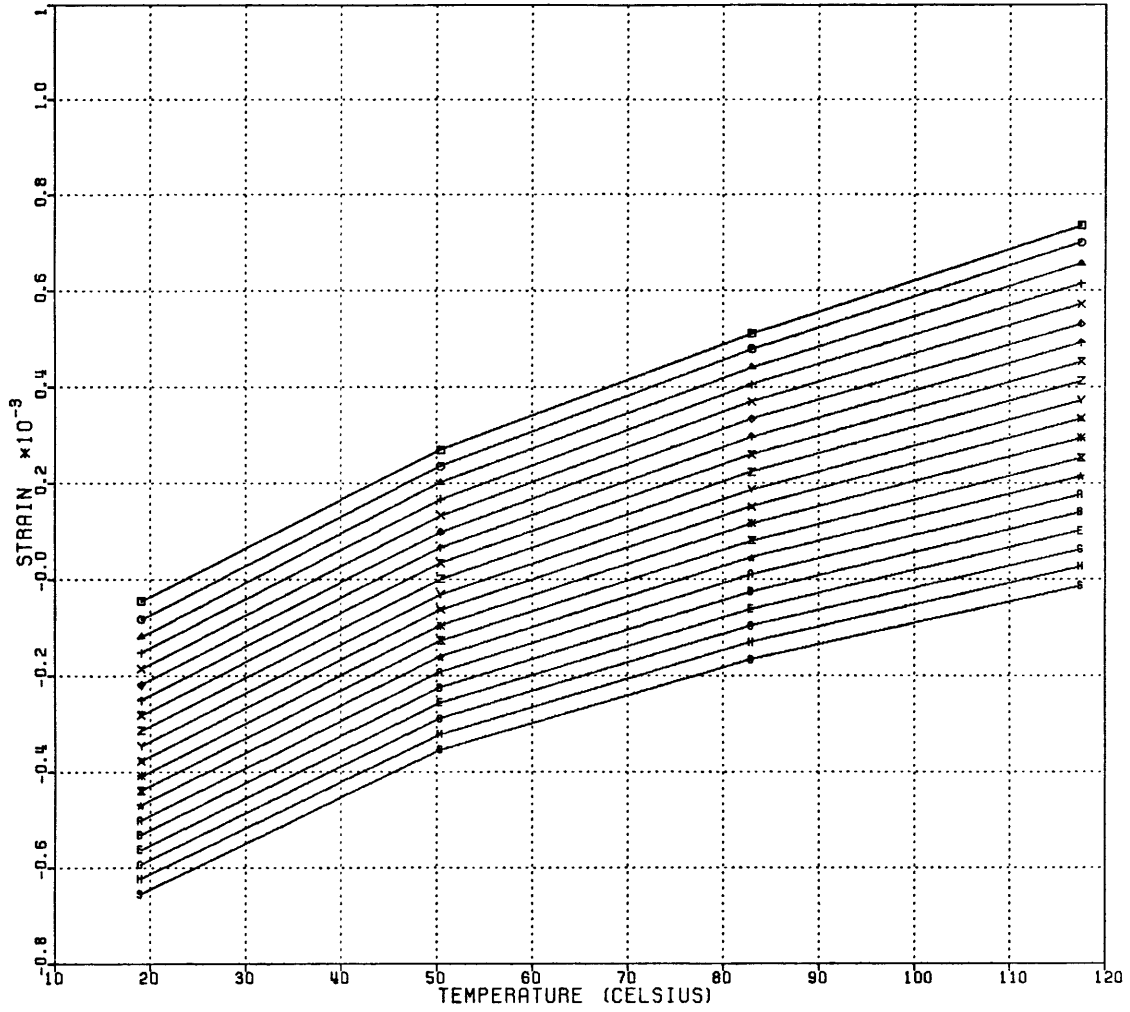
178 TWIN SISTERS WA DUNITE
GAGE:3C

- | | |
|-------------|-------------|
| □ - 10 MPA | ⌘ - 110 MPA |
| ○ - 20 MPA | ✱ - 120 MPA |
| △ - 30 MPA | ⌘ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ⋈ - 70 MPA | E - 170 MPA |
| ⌘ - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



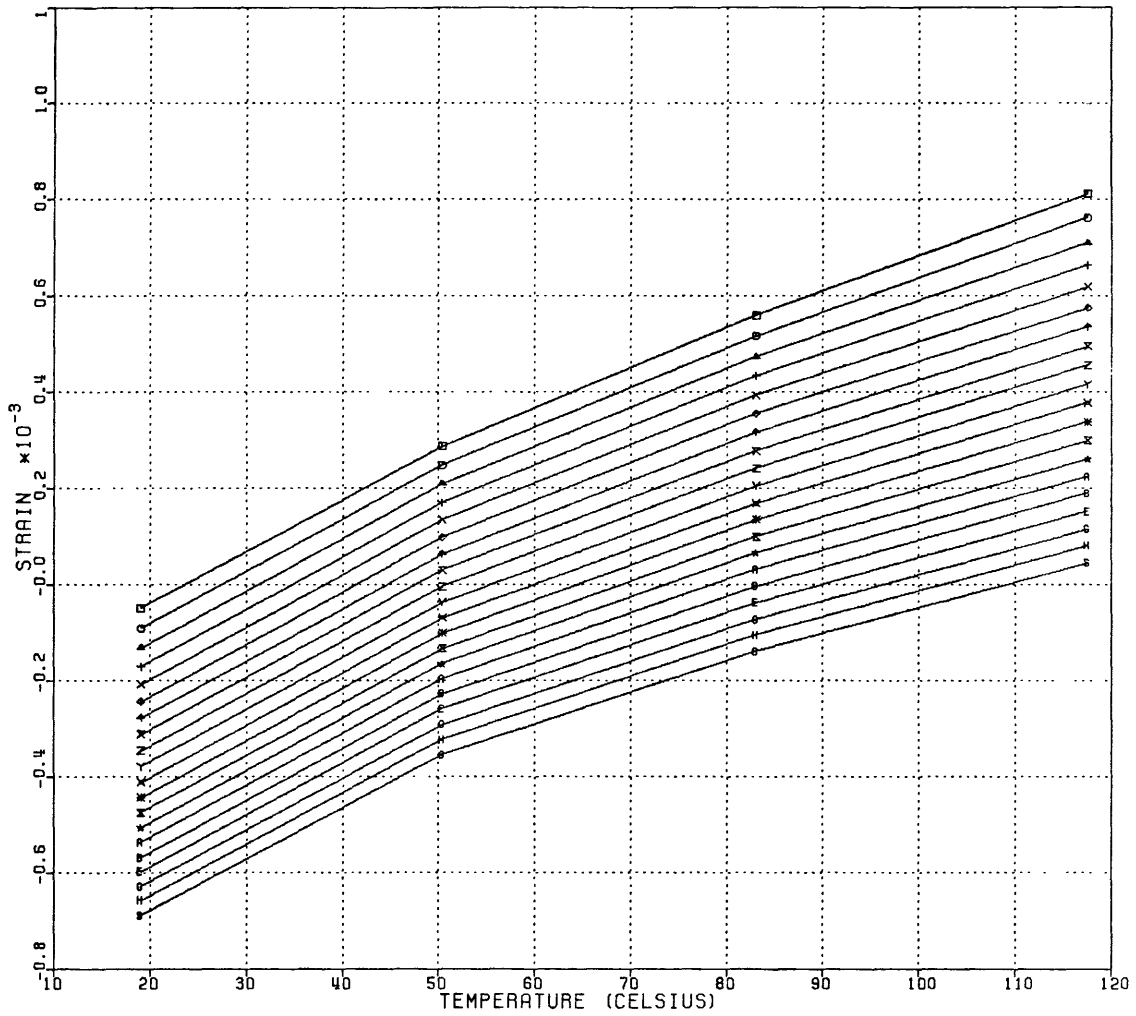
178 TWIN SISTERS WA DUNITE
GAGE:4C

□ - 10 MPA	X - 110 MPA
○ - 20 MPA	* - 120 MPA
△ - 30 MPA	X - 130 MPA
+ - 40 MPA	★ - 140 MPA
X - 50 MPA	A - 150 MPA
◇ - 60 MPA	B - 160 MPA
† - 70 MPA	E - 170 MPA
X - 80 MPA	G - 180 MPA
Z - 90 MPA	H - 190 MPA
Y - 100 MPA	S - 200 MPA



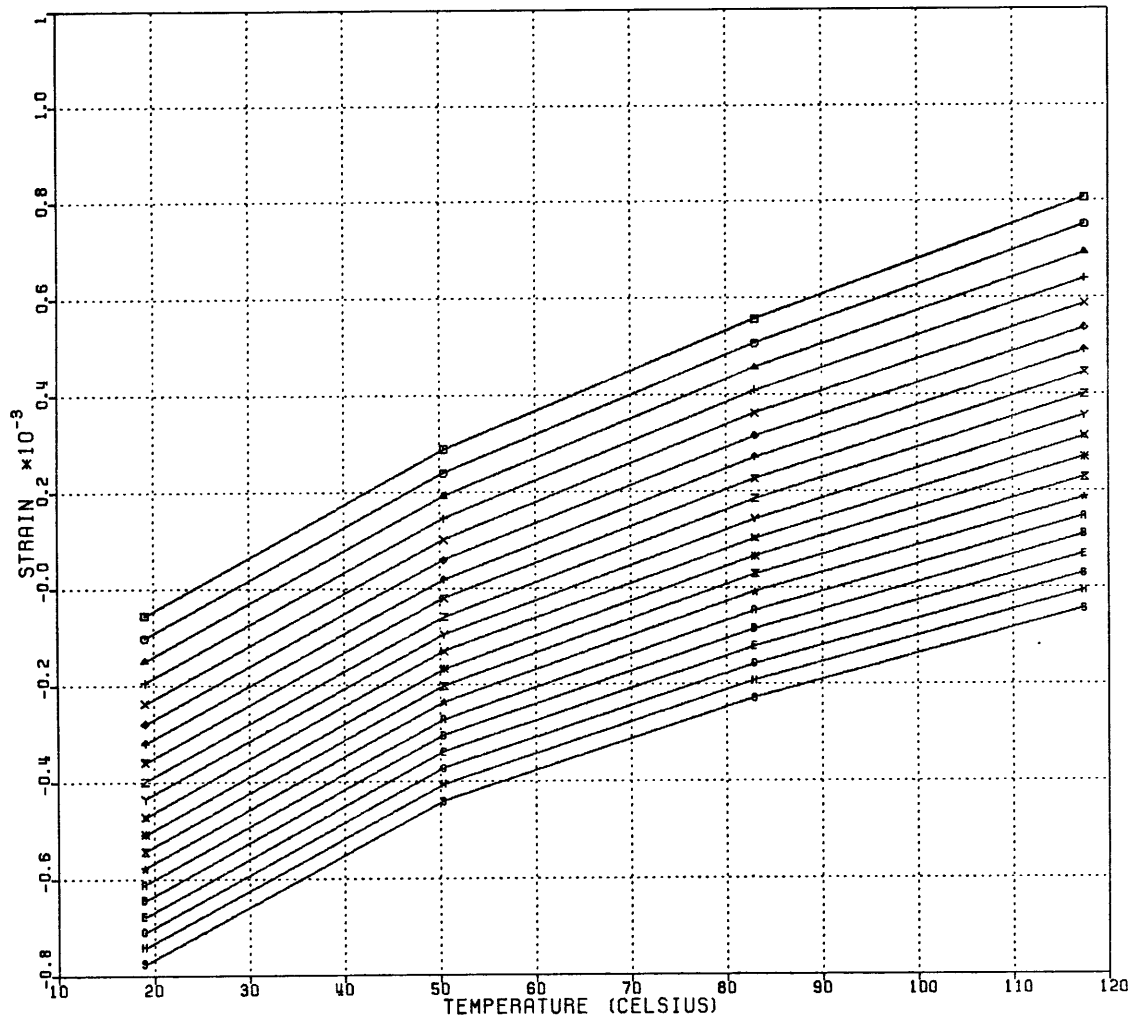
178 TWIN SISTERS WA DUNITE
GAGE: AB

□ - 10 MPA	⊗ - 110 MPA
⊙ - 20 MPA	* - 120 MPA
△ - 30 MPA	⊗ - 130 MPA
+ - 40 MPA	★ - 140 MPA
X - 50 MPA	A - 150 MPA
◇ - 60 MPA	B - 160 MPA
⋈ - 70 MPA	E - 170 MPA
⊗ - 80 MPA	G - 180 MPA
Z - 90 MPA	H - 190 MPA
Y - 100 MPA	S - 200 MPA



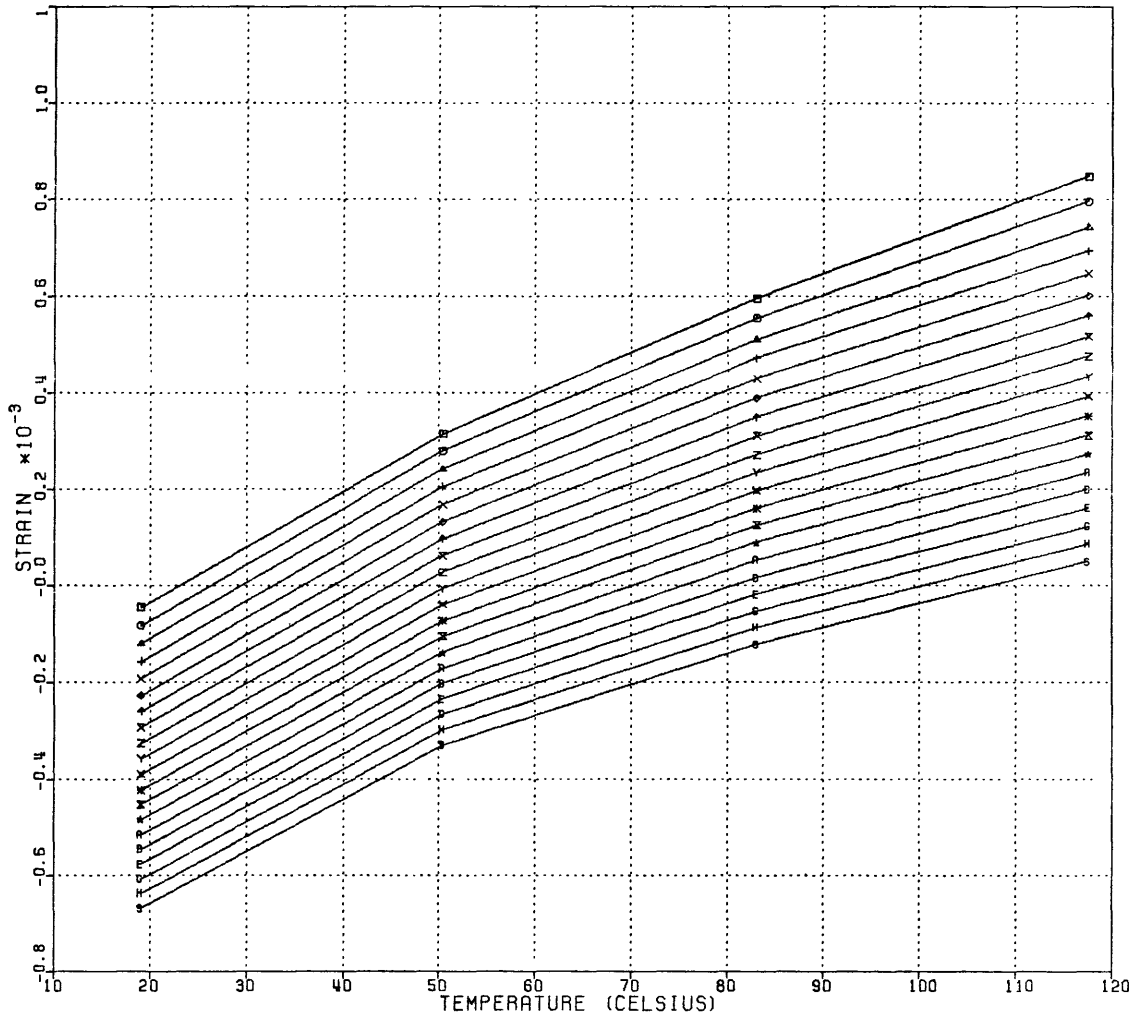
178 TWIN SISTERS WA DUNITE
GAGE:CB

- | | |
|-------------|-------------|
| □ - 10 MPA | ⌘ - 110 MPA |
| ○ - 20 MPA | ✱ - 120 MPA |
| △ - 30 MPA | ⊗ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ⊕ - 70 MPA | E - 170 MPA |
| ⊗ - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



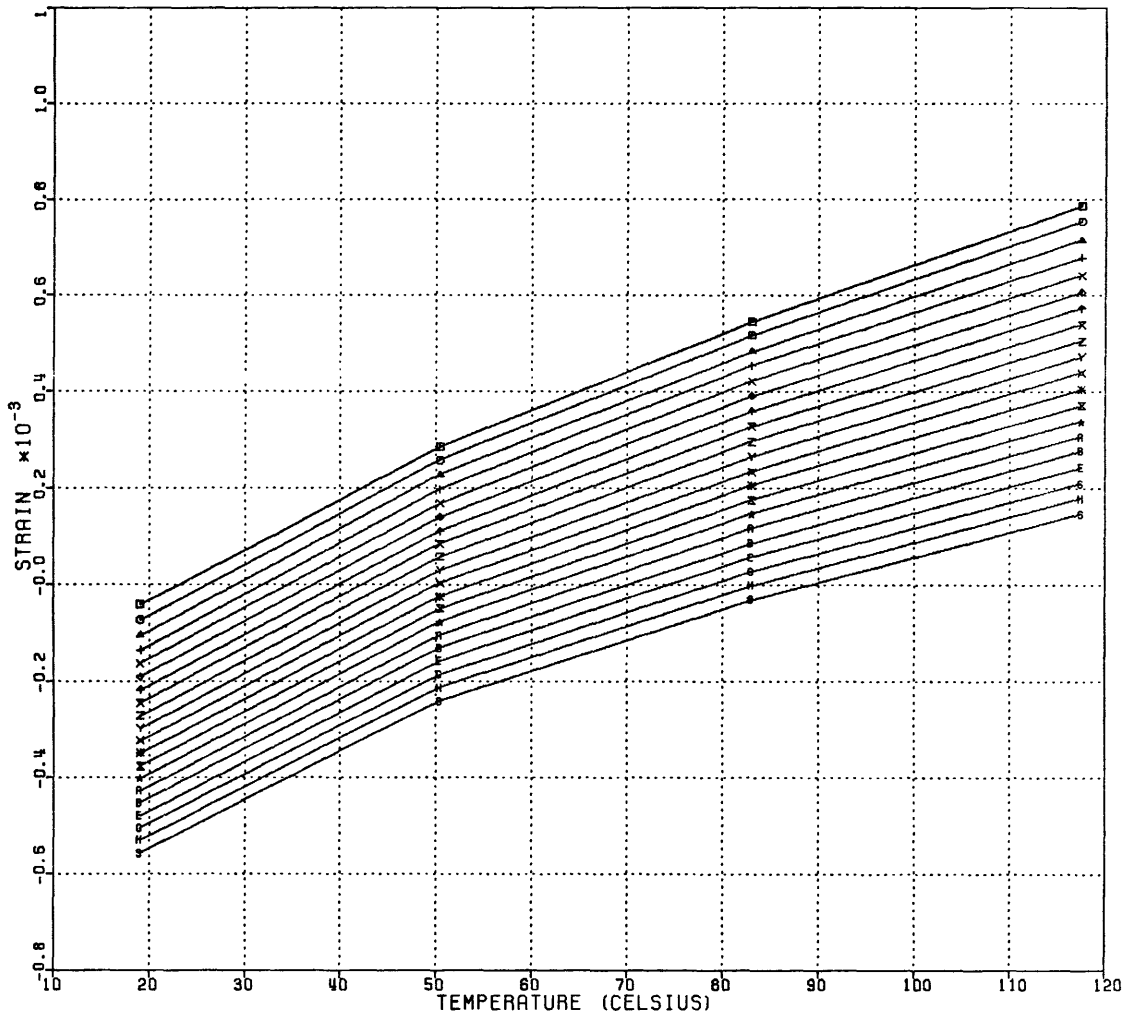
178 TWIN SISTERS WA DUNITE
GAGE: 4B

- | | |
|-------------|-------------|
| □ - 10 MPA | ⌘ - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | ⌘ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ↑ - 70 MPA | E - 170 MPA |
| ⌘ - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



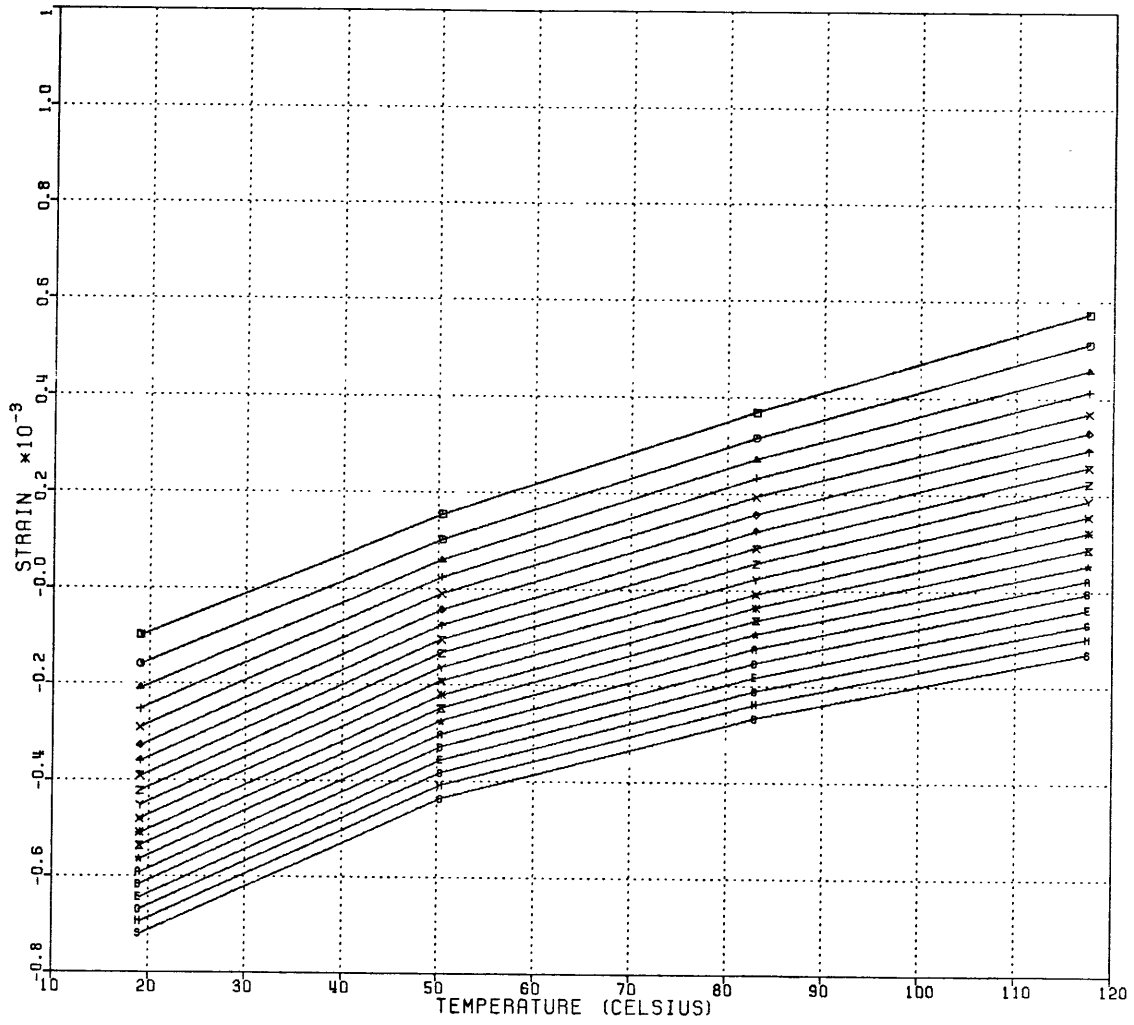
178 TWIN SISTERS WA DUNITE
GAGE:BA

□ - 10 MPA	⌘ - 110 MPA
○ - 20 MPA	* - 120 MPA
△ - 30 MPA	⊗ - 130 MPA
+ - 40 MPA	★ - 140 MPA
X - 50 MPA	A - 150 MPA
◇ - 60 MPA	B - 160 MPA
⋈ - 70 MPA	E - 170 MPA
⊗ - 80 MPA	G - 180 MPA
Z - 90 MPA	H - 190 MPA
Y - 100 MPA	S - 200 MPA



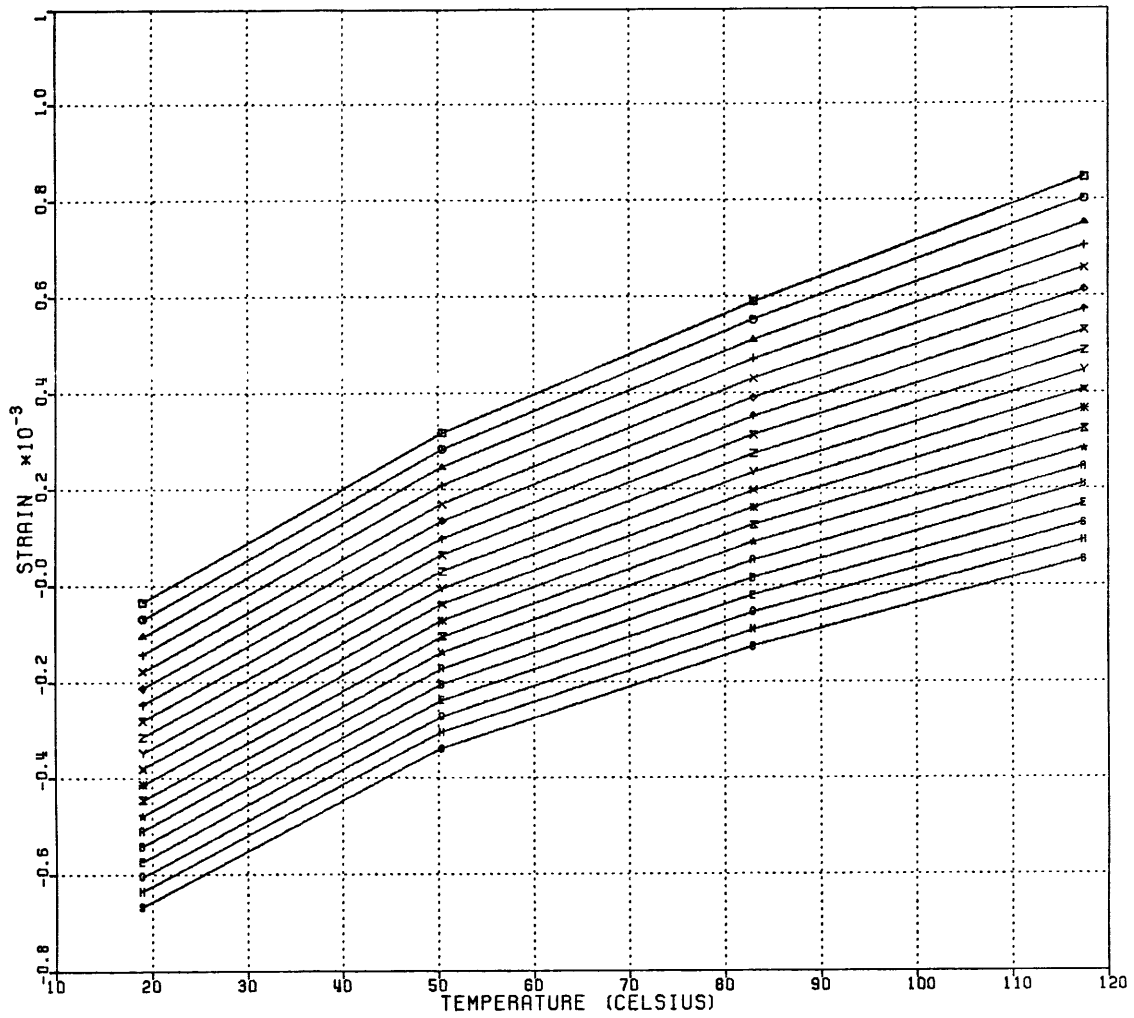
178 TWIN SISTERS WA DUNITE
GAGE:CA

□ - 10 MPA	⌘ - 110 MPA
○ - 20 MPA	✱ - 120 MPA
△ - 30 MPA	⌘ - 130 MPA
+ - 40 MPA	★ - 140 MPA
× - 50 MPA	A - 150 MPA
◇ - 60 MPA	B - 160 MPA
⋈ - 70 MPA	E - 170 MPA
⌘ - 80 MPA	G - 180 MPA
Z - 90 MPA	H - 190 MPA
Y - 100 MPA	S - 200 MPA



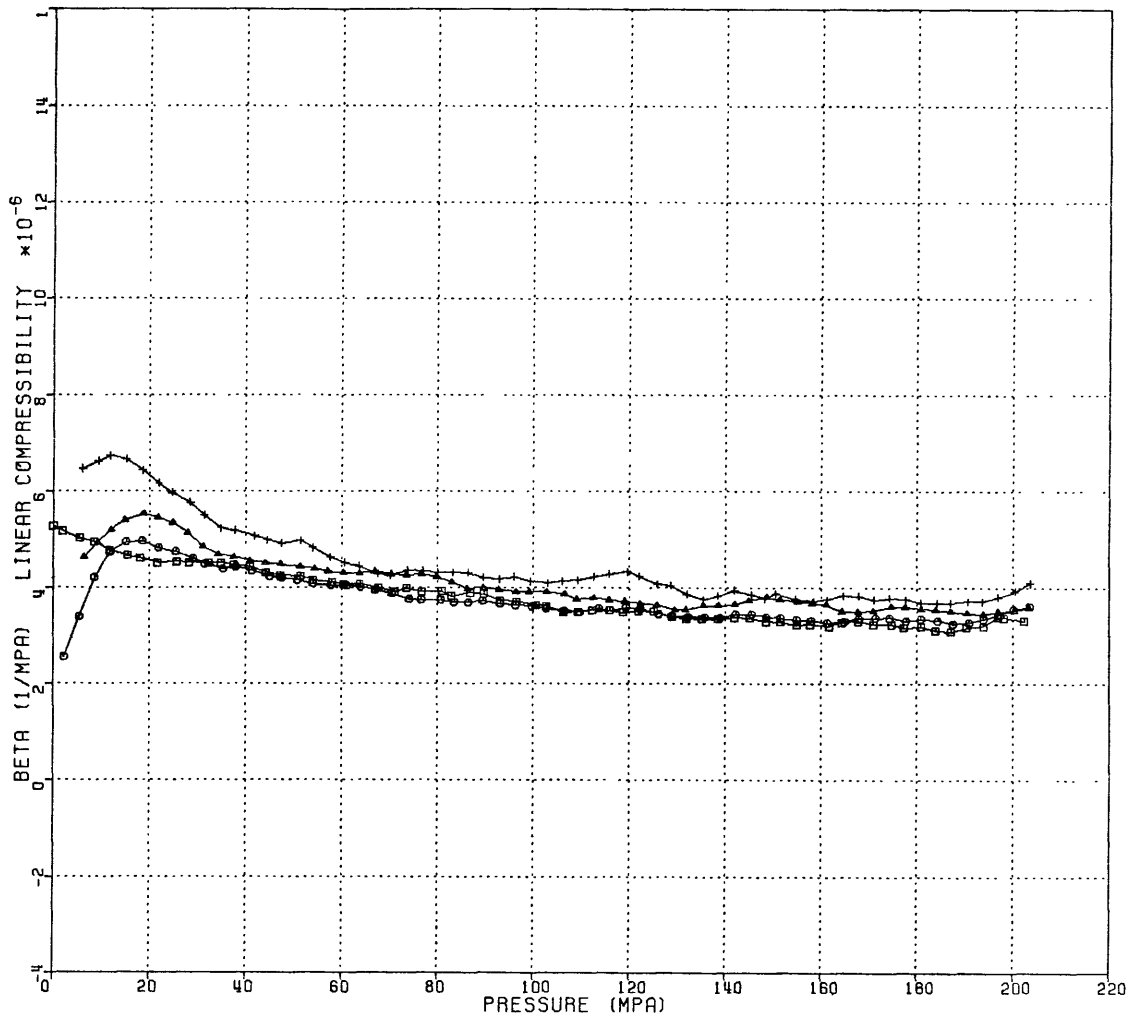
178 TWIN SISTERS WA DUNITE
GAGE: 3A

- | | |
|-------------|-------------|
| □ - 10 MPA | ⌘ - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | ⊗ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ⊕ - 70 MPA | E - 170 MPA |
| ⊗ - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



178 TWIN SISTERS WA DUNITE
GAGE: 4A

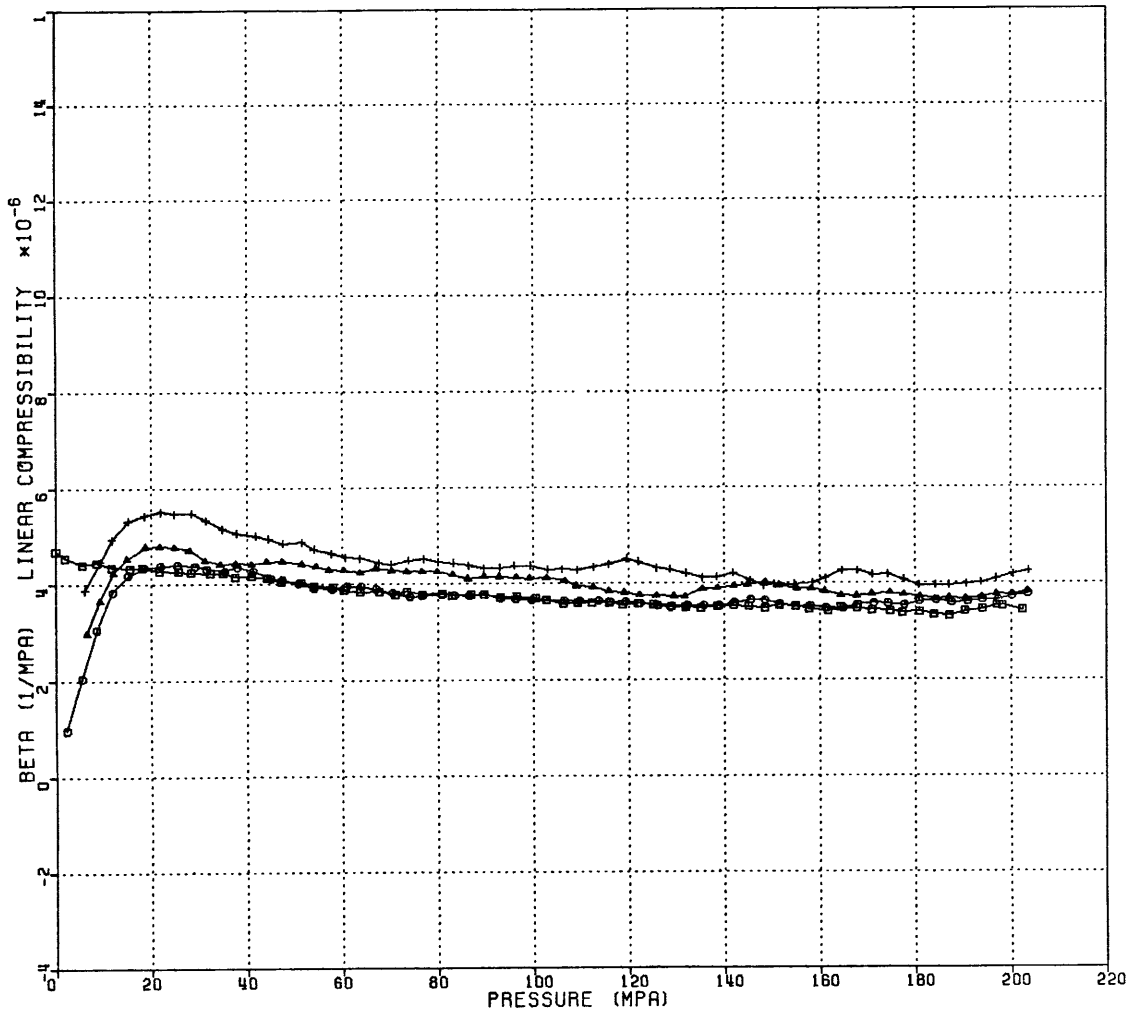
- | | |
|-------------|-------------|
| □ - 10 MPA | X - 110 MPA |
| ⊙ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | X - 130 MPA |
| + - 40 MPA | * - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| † - 70 MPA | E - 170 MPA |
| X - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



178 TWIN SISTERS WA DUNITE

GAGE:BC

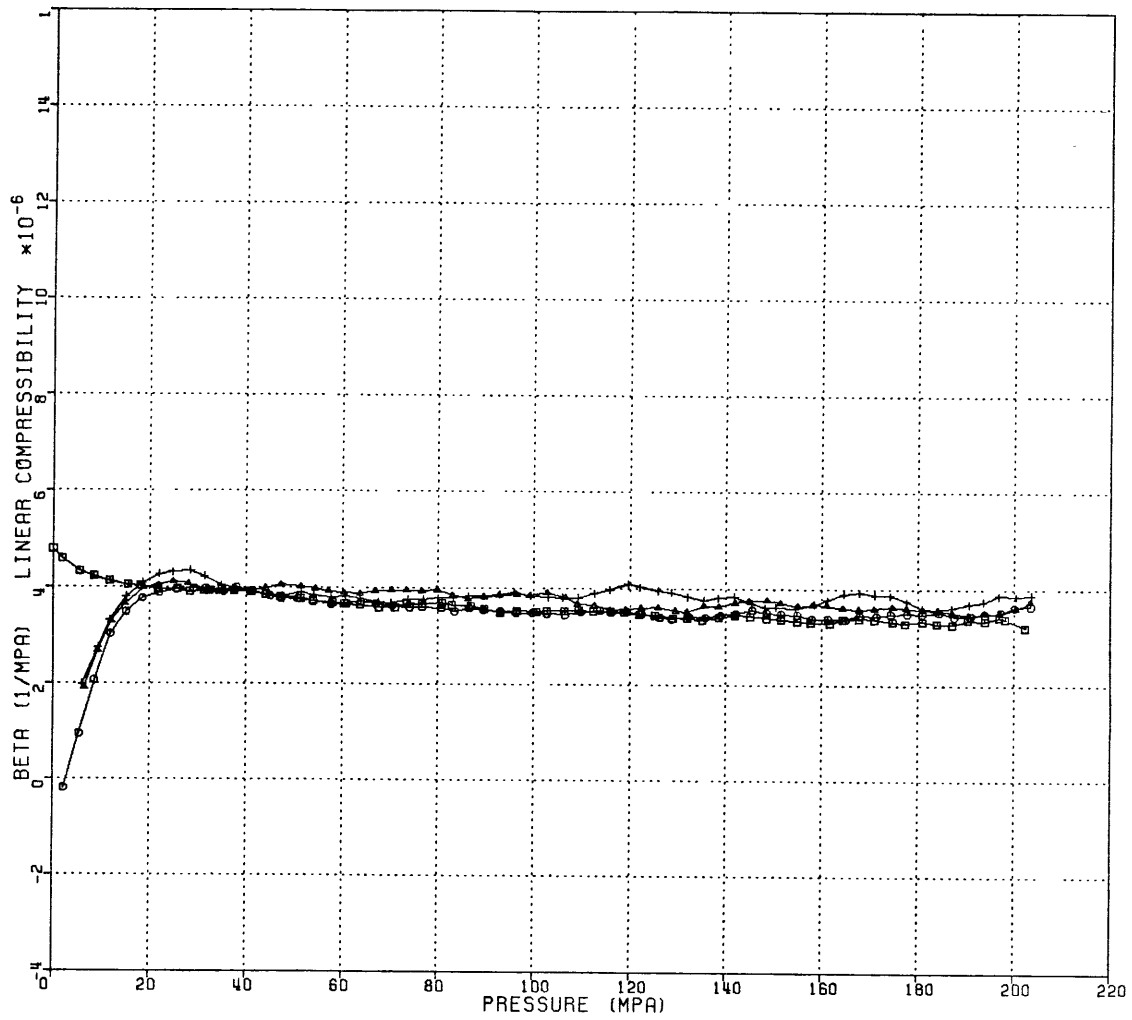
□ - 19°C
 ○ - 50°C
 △ - 83°C
 + - 118°C



178 TWIN SISTERS WA DUNITE

GAGE: 3C

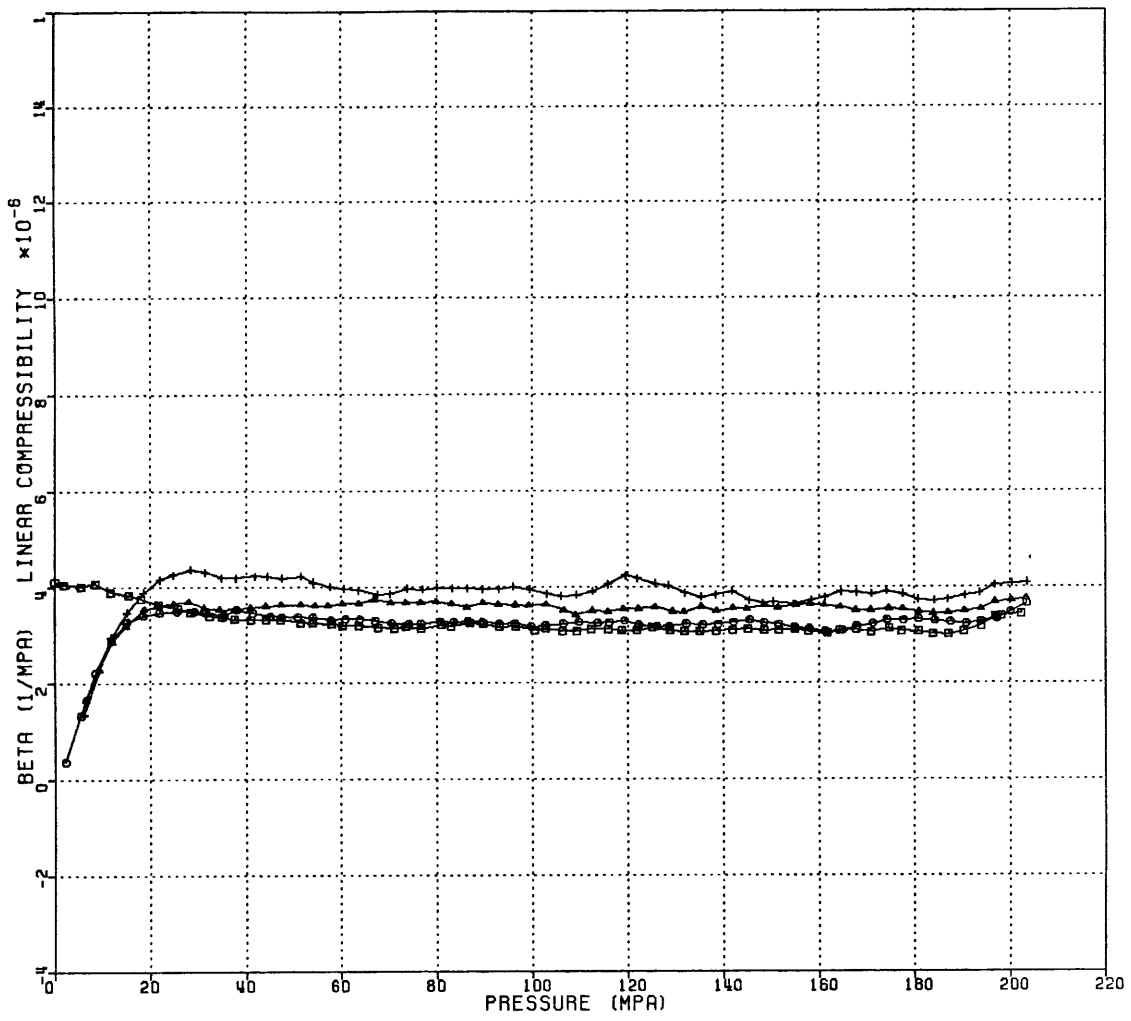
- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



178 TWIN SISTERS WA DUNITE

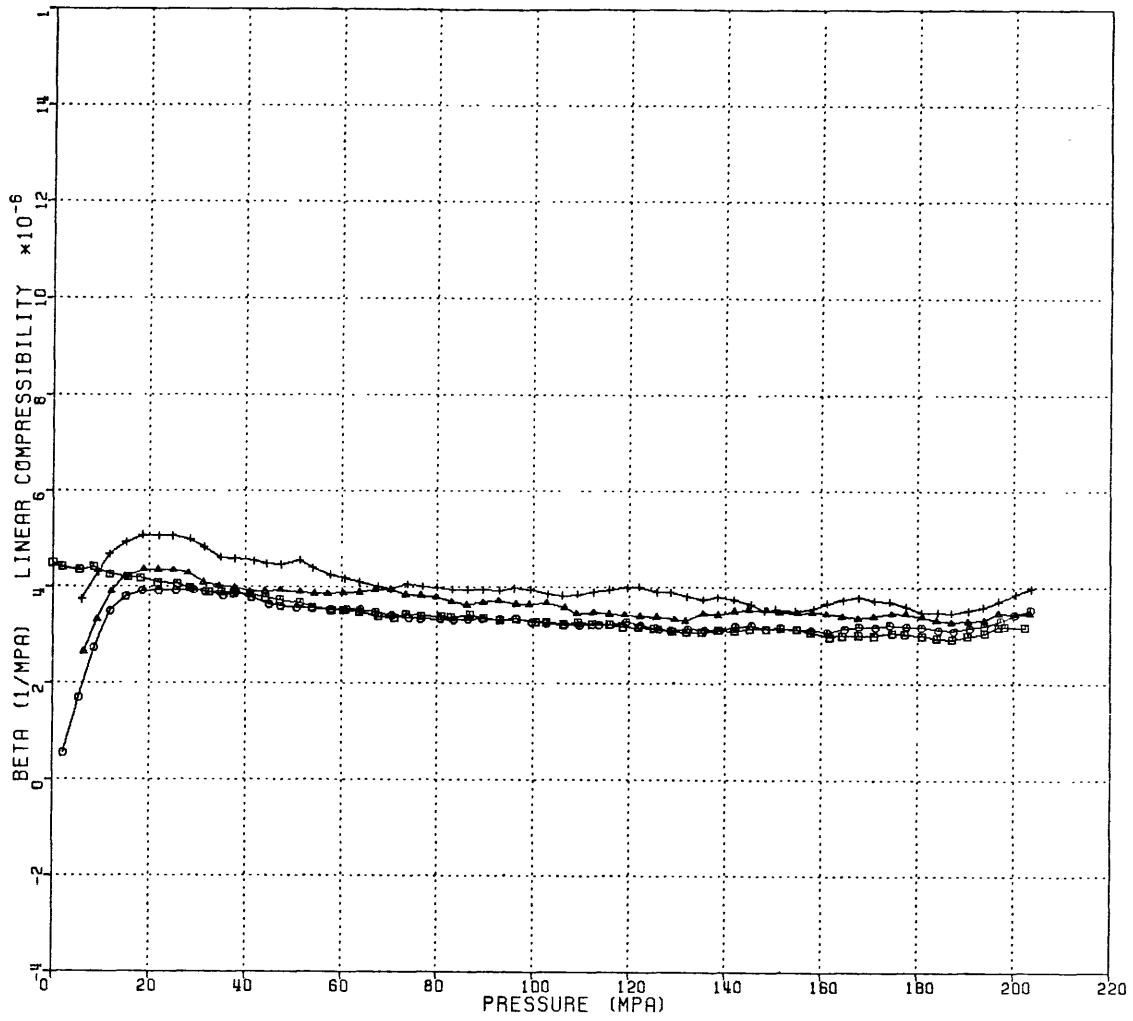
GAGE:4C

□ - 19°C
 ○ - 50°C
 ▲ - 83°C
 + - 118°C



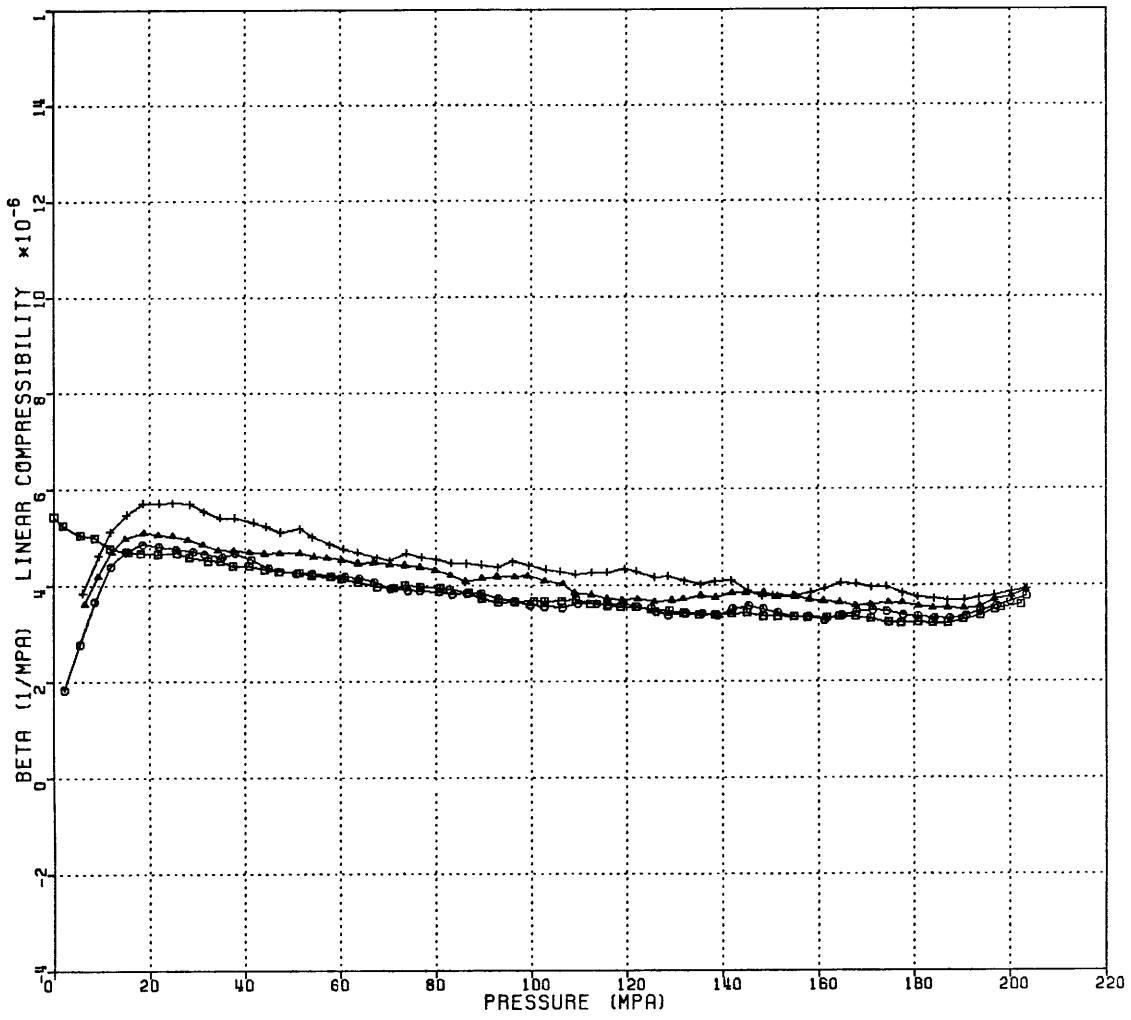
178 TWIN SISTERS WA DUNITE
GAGE: AB

- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



178 TWIN SISTERS WA DUNITE
GAGE:CB

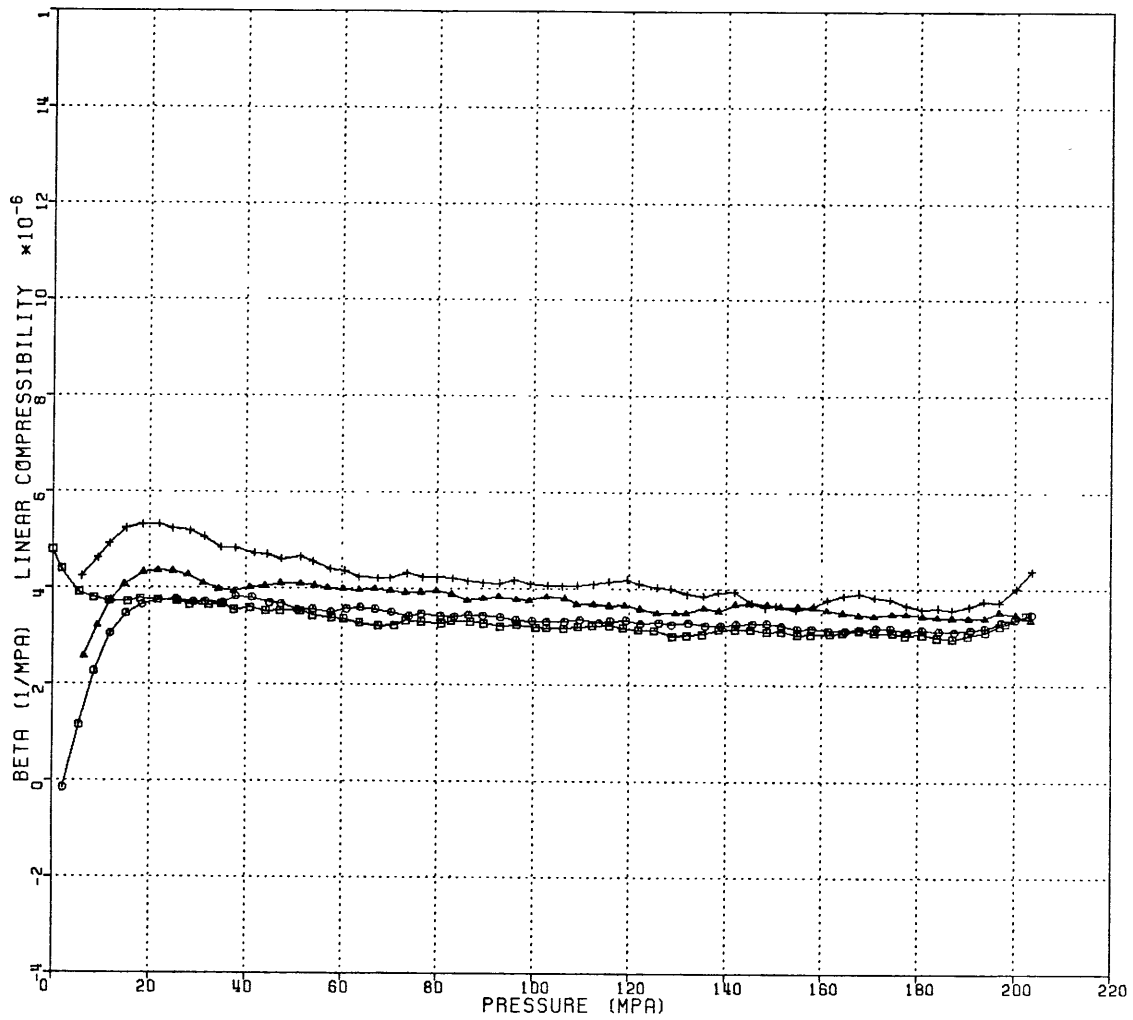
□ - 19°C
○ - 50°C
△ - 83°C
+ - 118°C



178 TWIN SISTERS WA DUNITE

GAGE: 4B

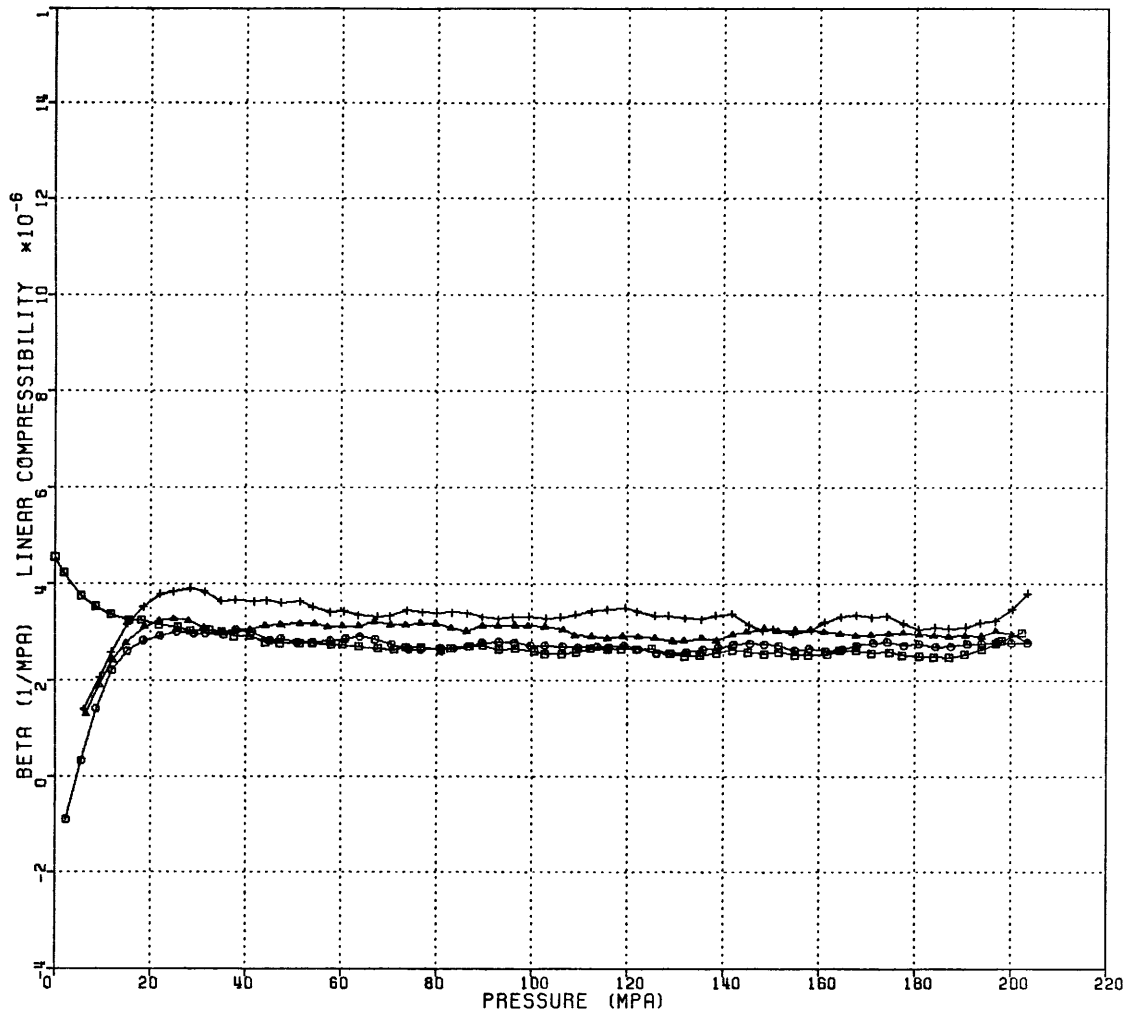
- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



178 TWIN SISTERS WA DUNITE

GAGE:BA

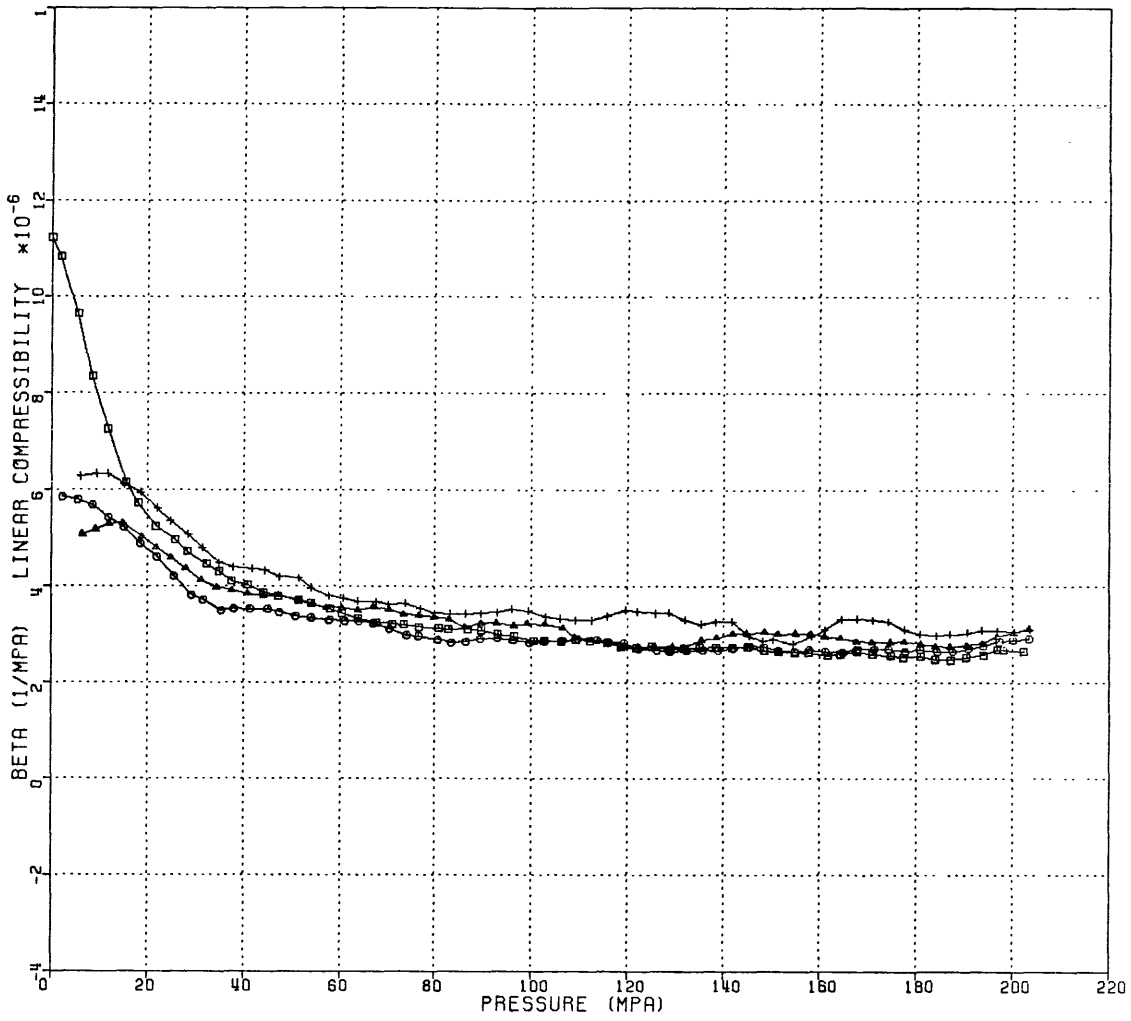
- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



178 TWIN SISTERS WA DUNITE

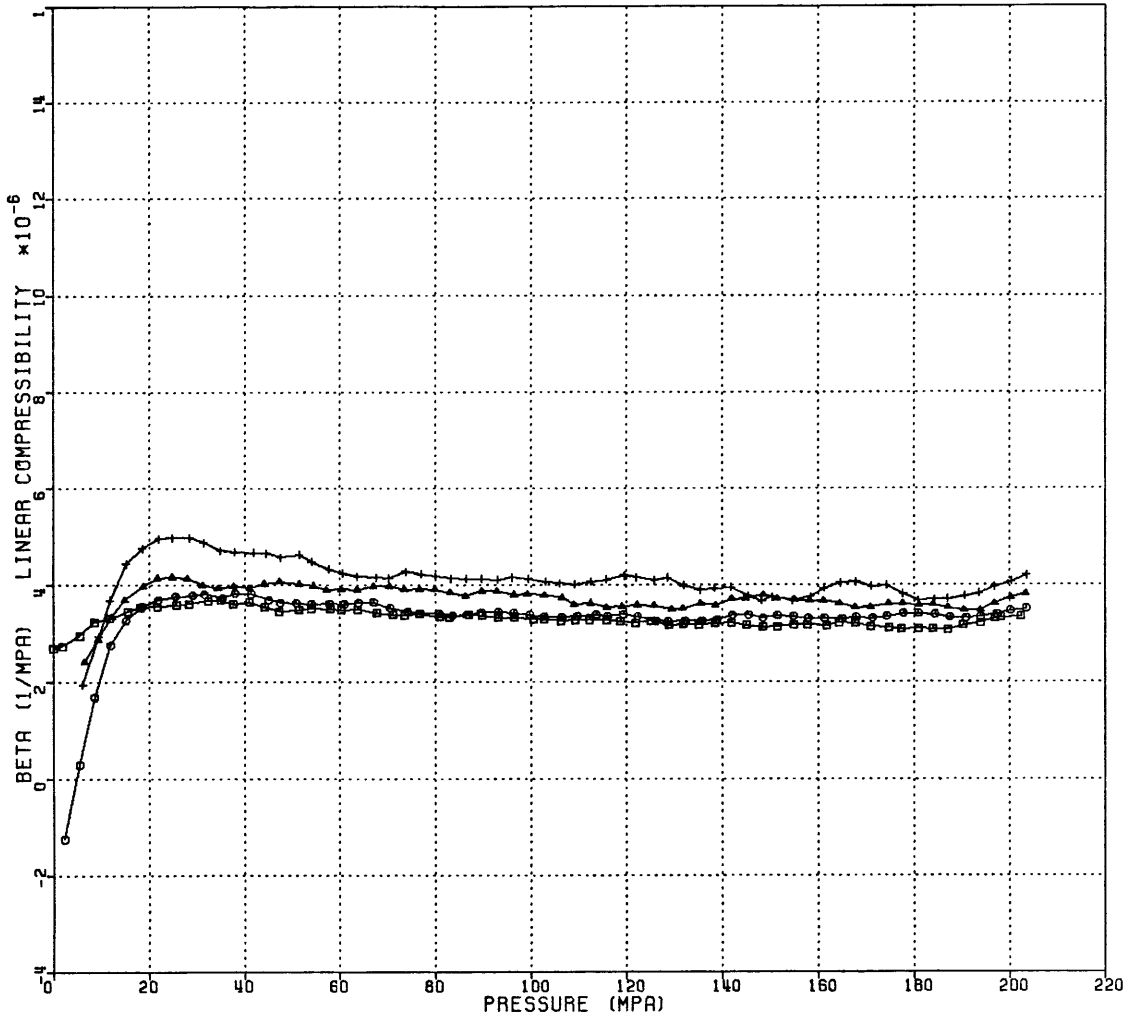
GAGE:CA

□ - 19°C
 ○ - 50°C
 △ - 83°C
 + - 118°C



178 TWIN SISTERS WA DUNITE
GAGE: 3A

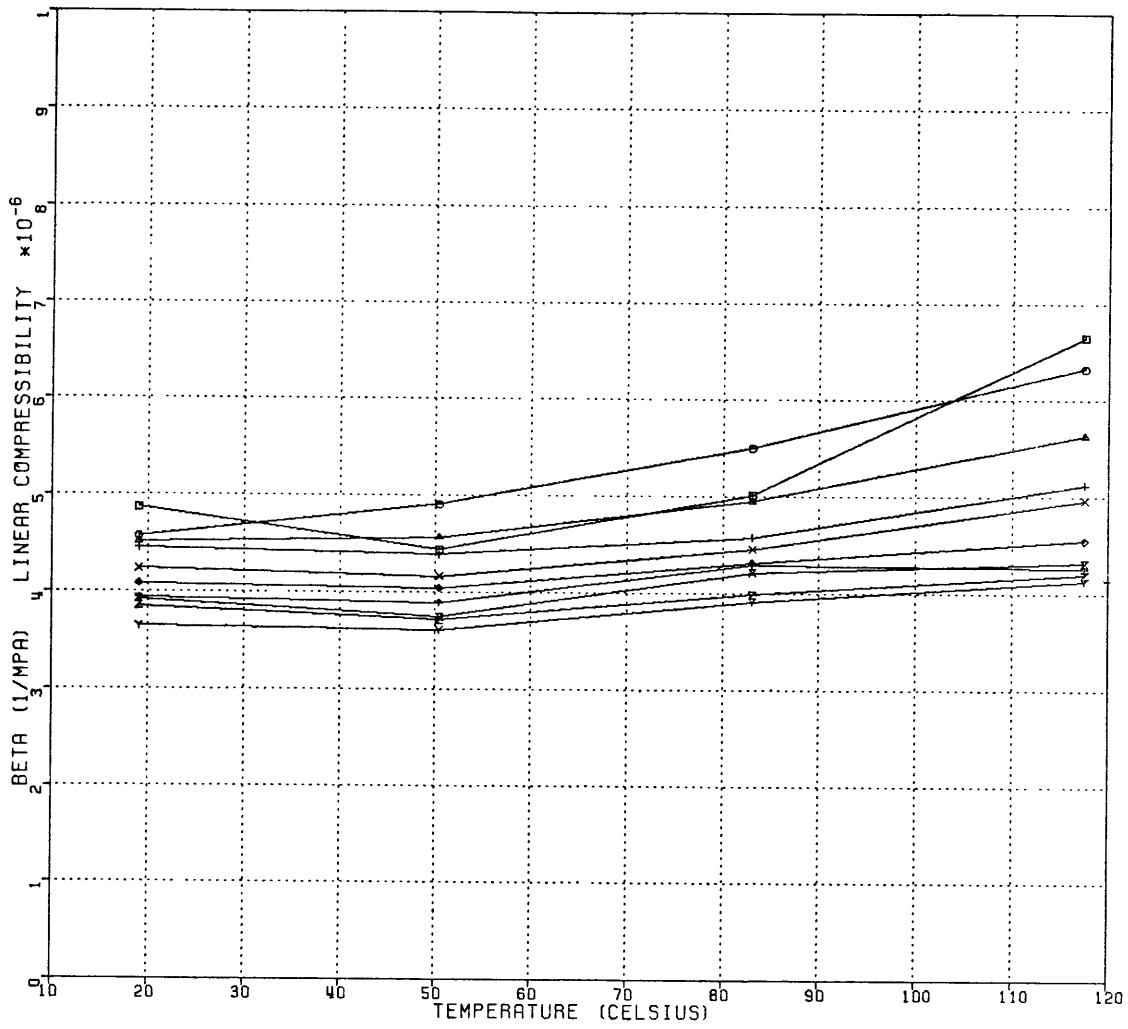
- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



178 TWIN SISTERS WA DUNITE

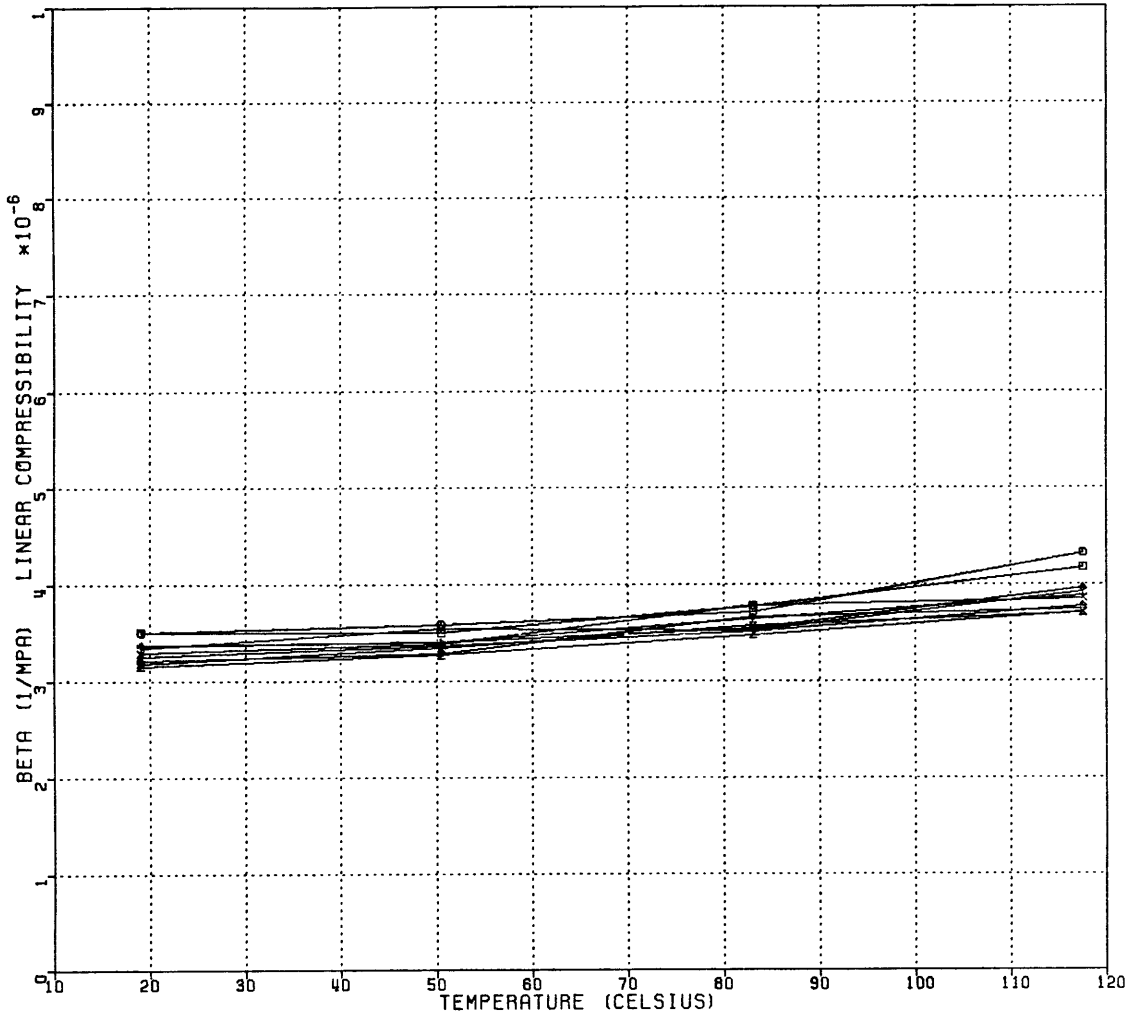
GAGE: 4A

□ - 19°C
 ○ - 50°C
 ▲ - 83°C
 + - 118°C



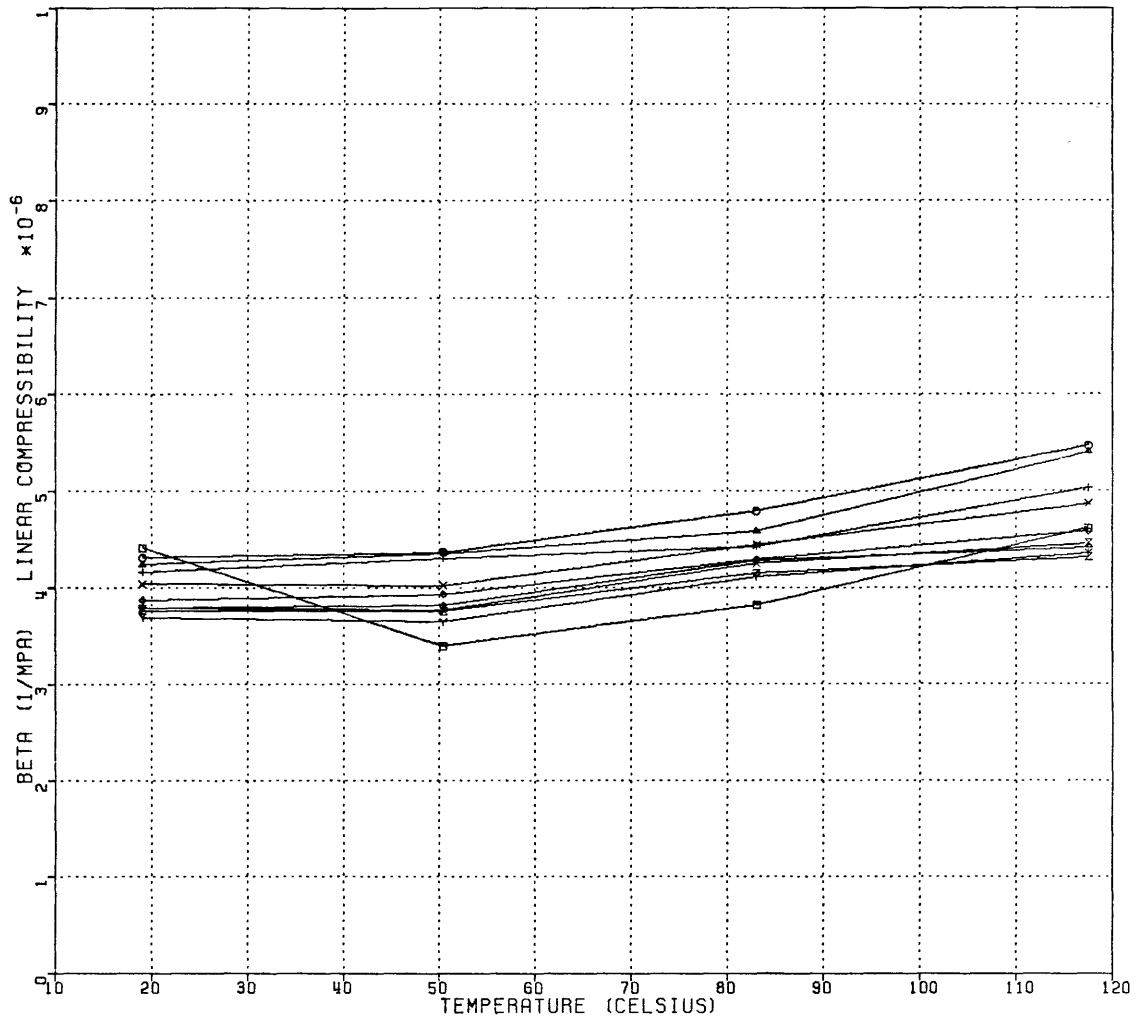
178 TWIN SISTERS WA DUNITE
GAGE:BC

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⋈ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



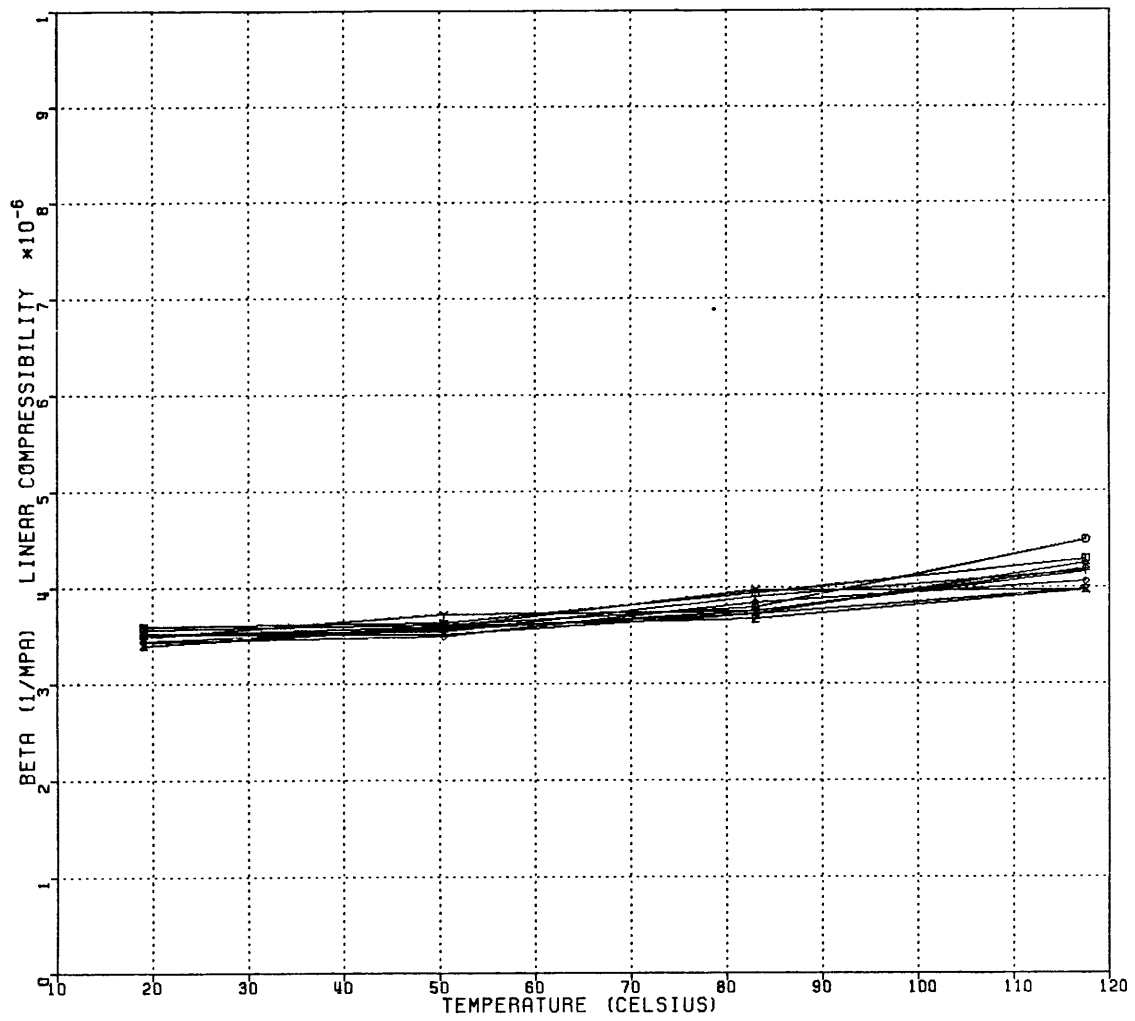
178 TWIN SISTERS WA DUNITE
GAGE:BC

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♣ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



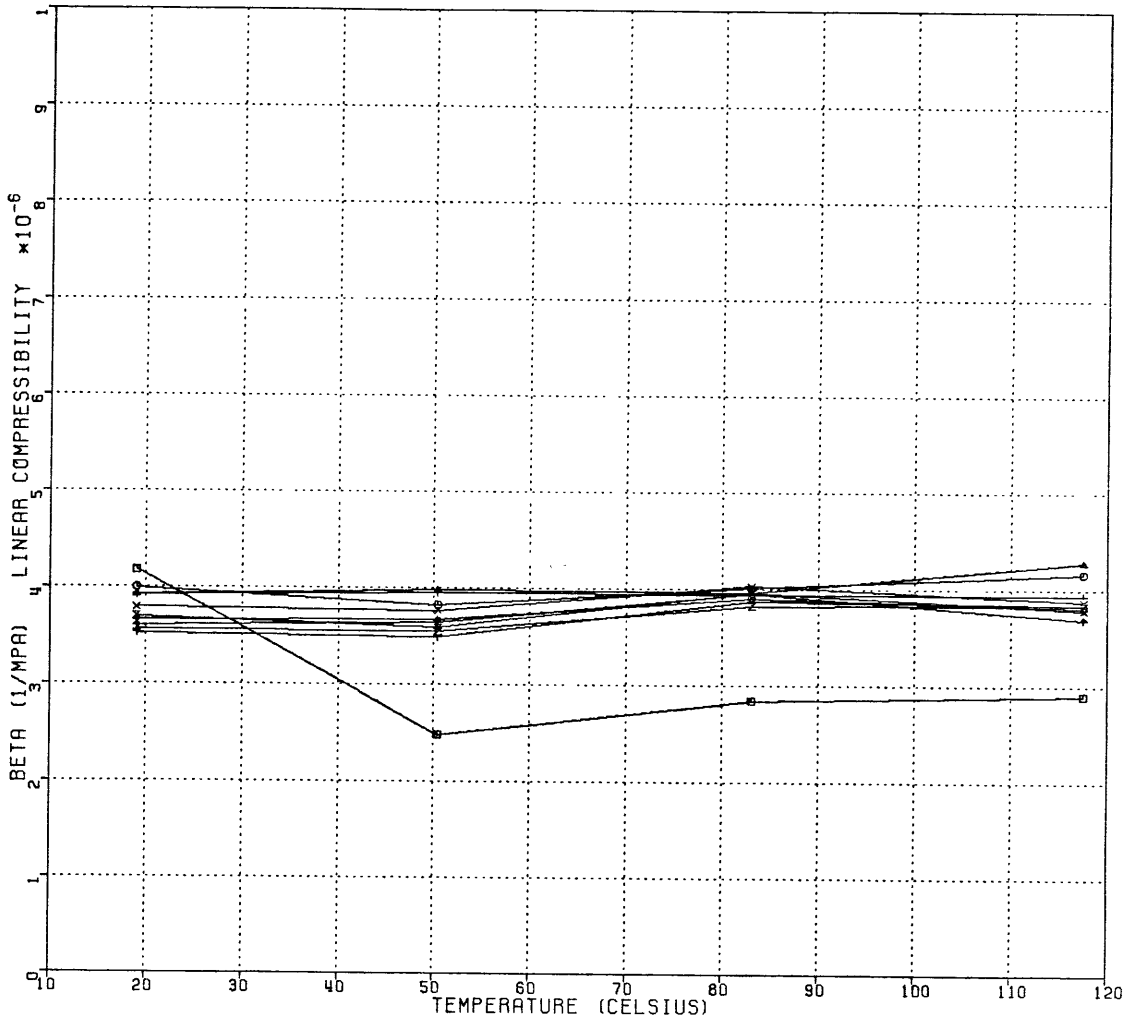
178 TWIN SISTERS WA DUNITE
GAGE: 3C

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ♣ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



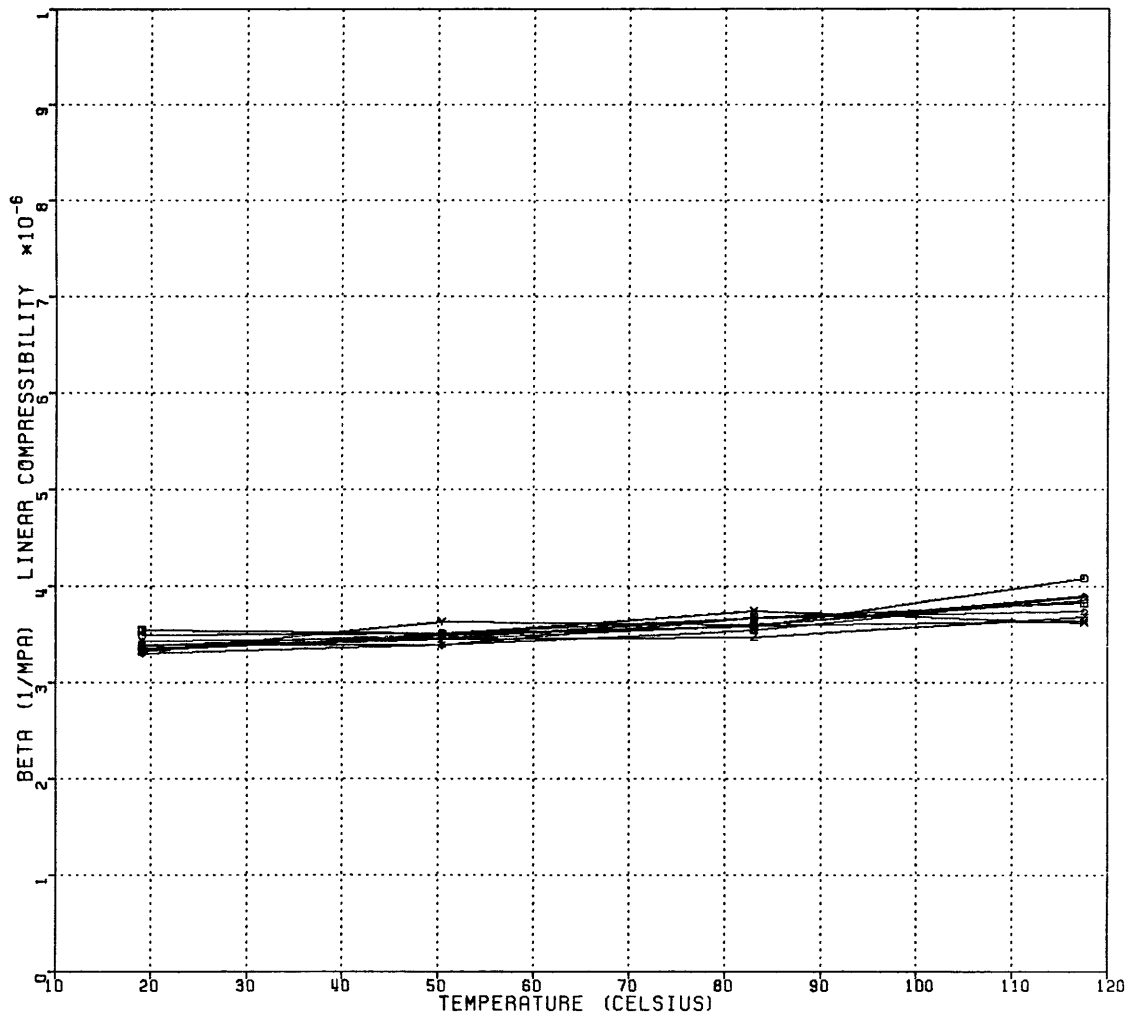
178 TWIN SISTERS WA DUNITE
GAGE: 3C

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- × - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



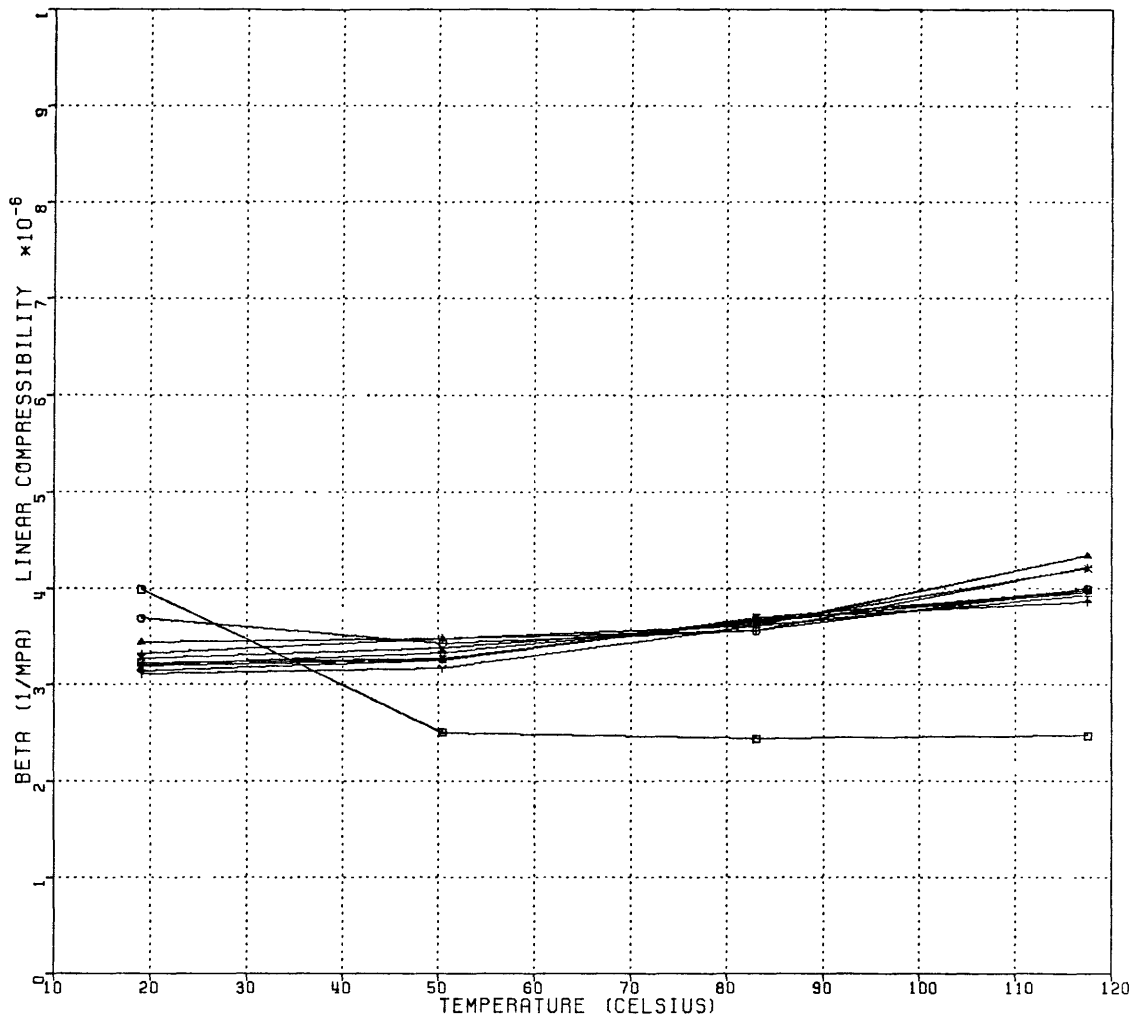
178 TWIN SISTERS WA DUNITE
GAGE: 4C

- - 10 MPa
- - 20 MPa
- △ - 30 MPa
- + - 40 MPa
- X - 50 MPa
- ◇ - 60 MPa
- ↑ - 70 MPa
- X - 80 MPa
- Z - 90 MPa
- Y - 100 MPa



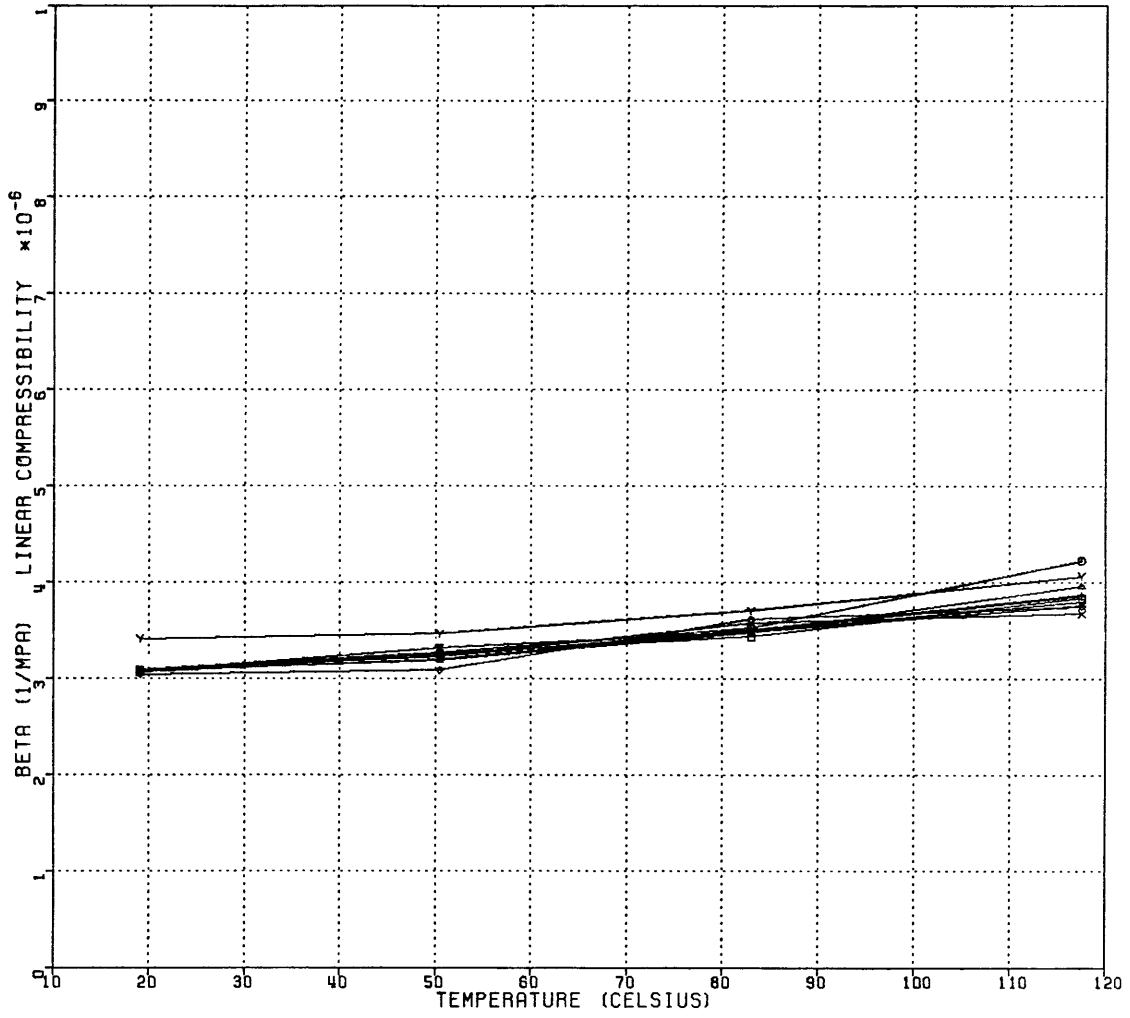
178 TWIN SISTERS WA DUNITE
GAGE: 4C

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- × - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



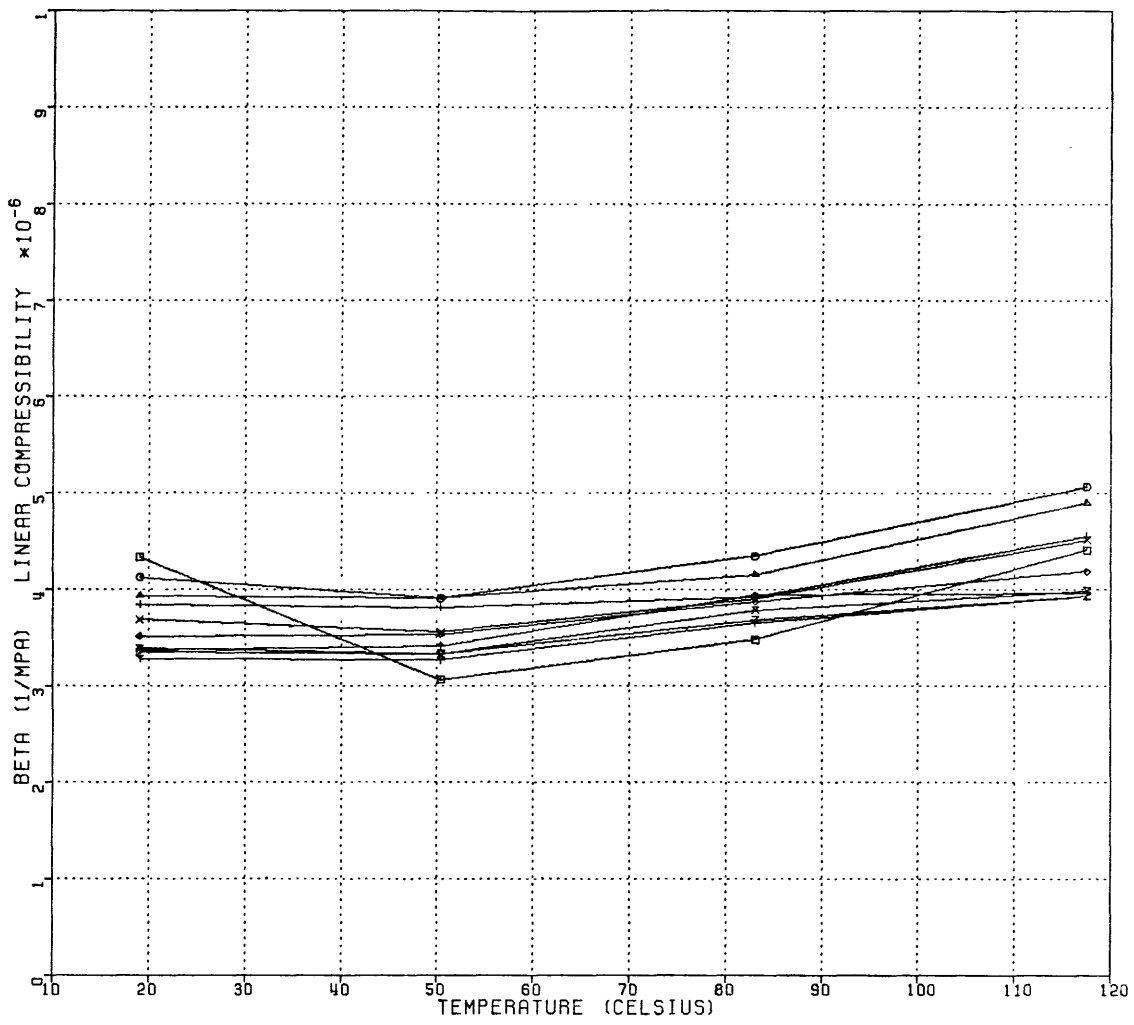
178 TWIN SISTERS WA DUNITE
GAGE: AB

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- x - 50 MPA
- ◇ - 60 MPA
- * - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



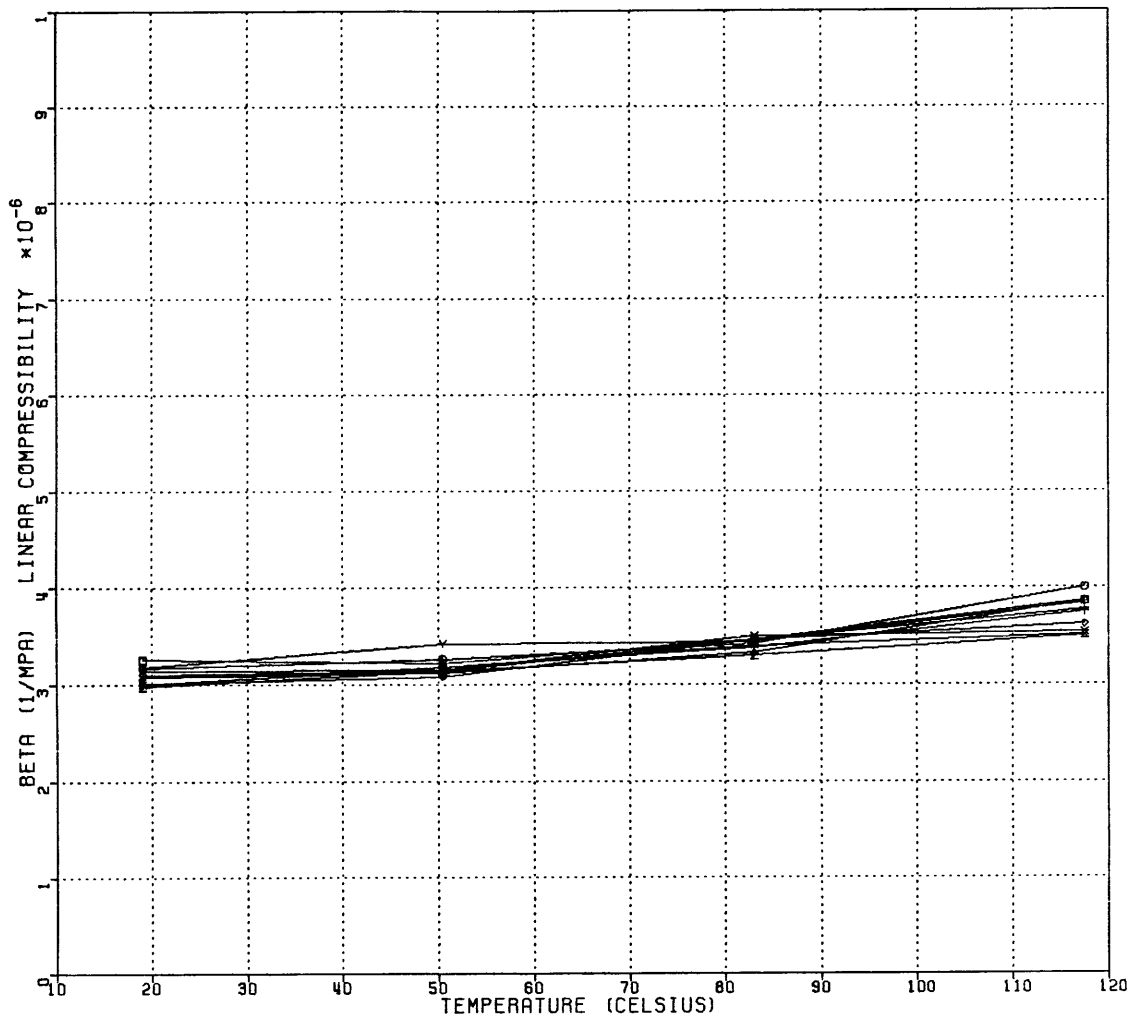
178 TWIN SISTERS WA DUNITE
GAGE: AB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- × - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



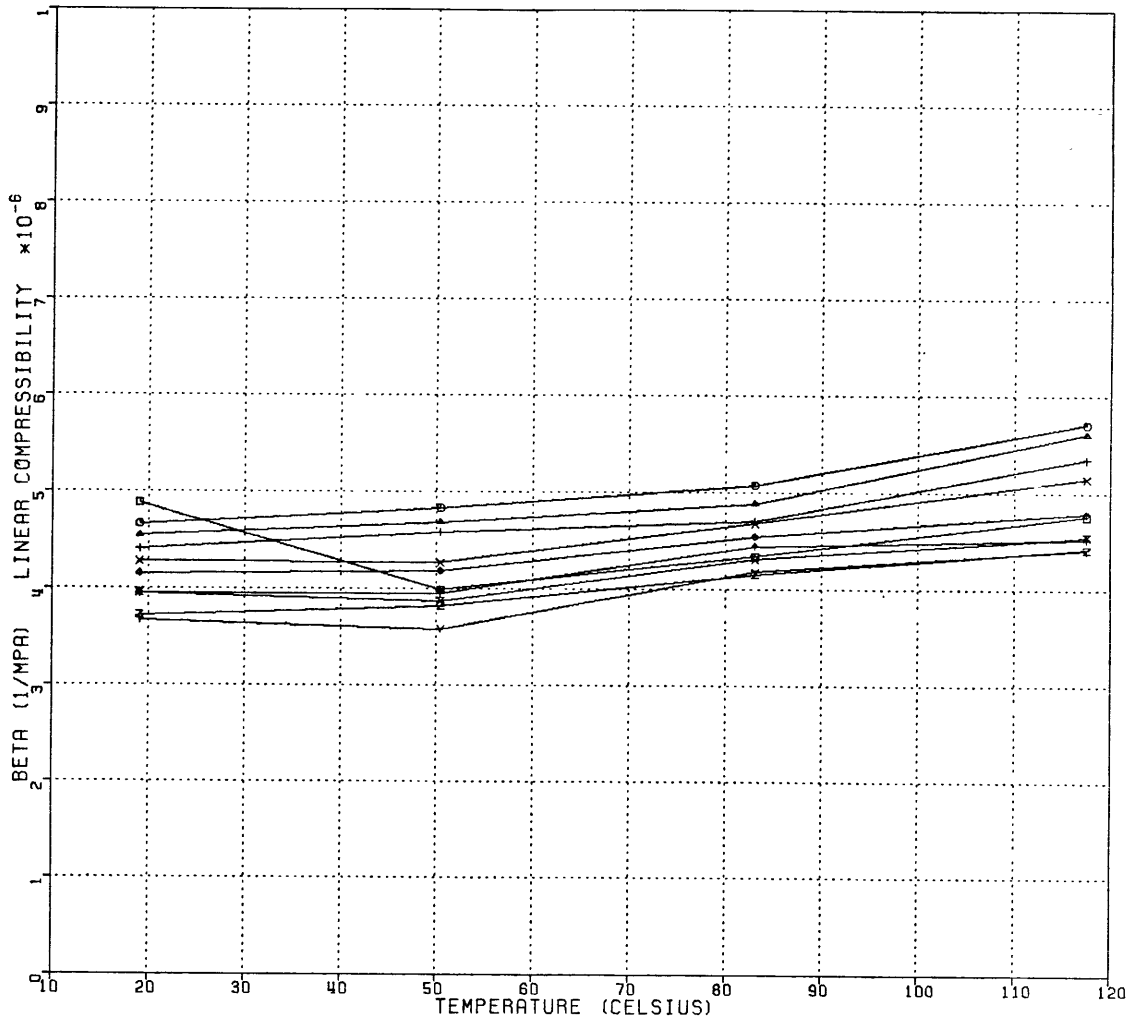
178 TWIN SISTERS WA DUNITE
GAGE:CB

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



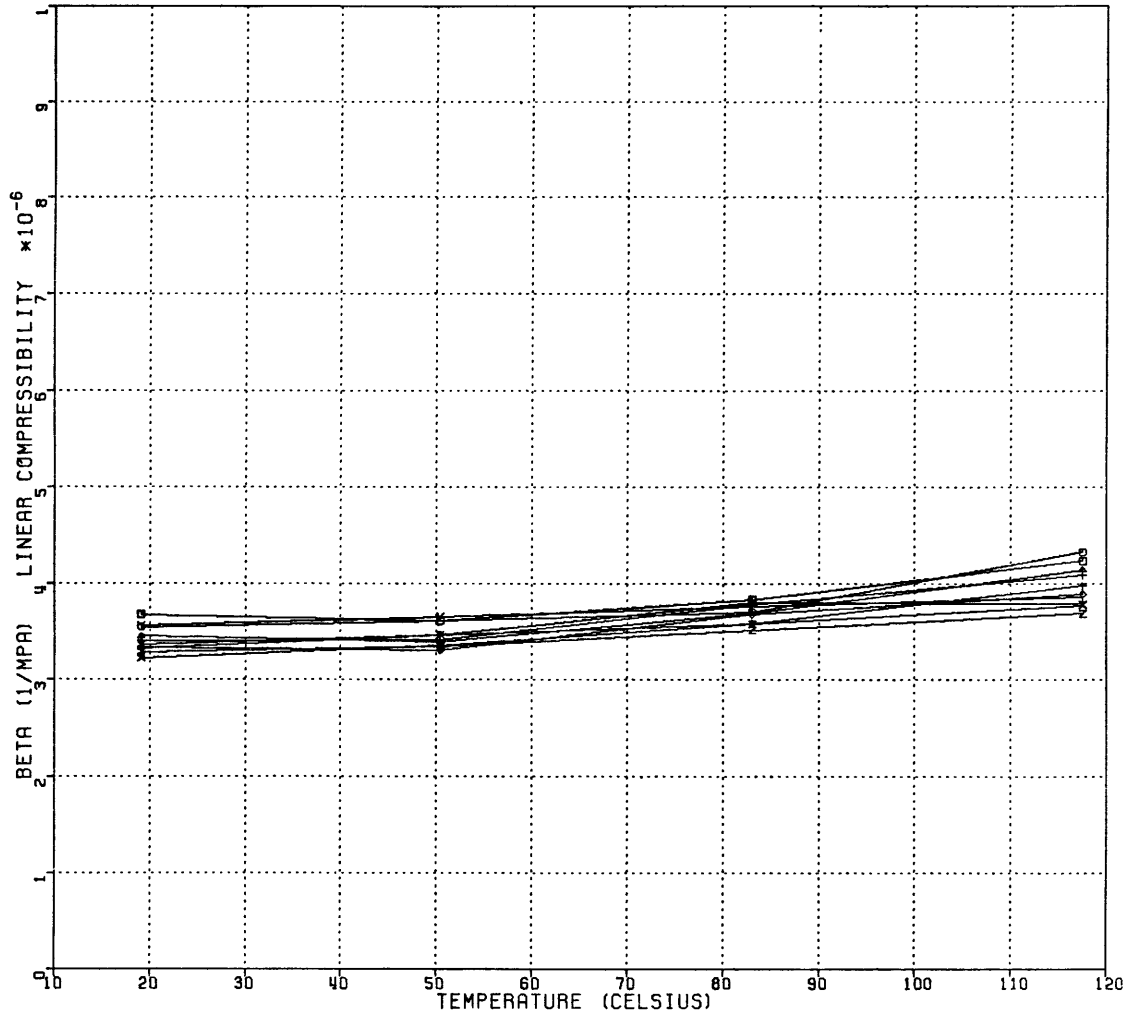
178 TWIN SISTERS WA DUNITE
GAGE:CB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



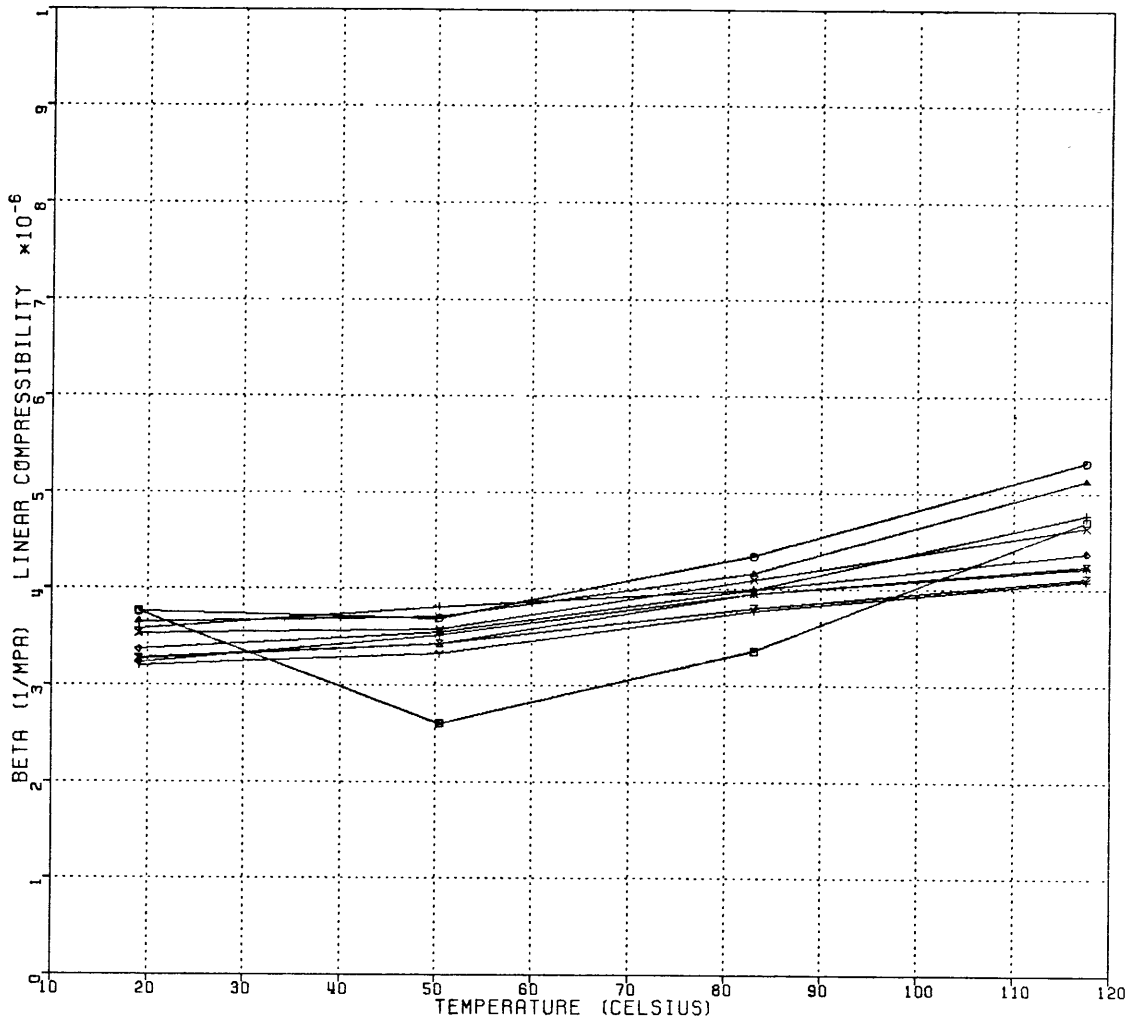
178 TWIN SISTERS WA DUNITE
GAGE: 4B

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- x - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- ↓ - 80 MPA
- z - 90 MPA
- y - 100 MPA



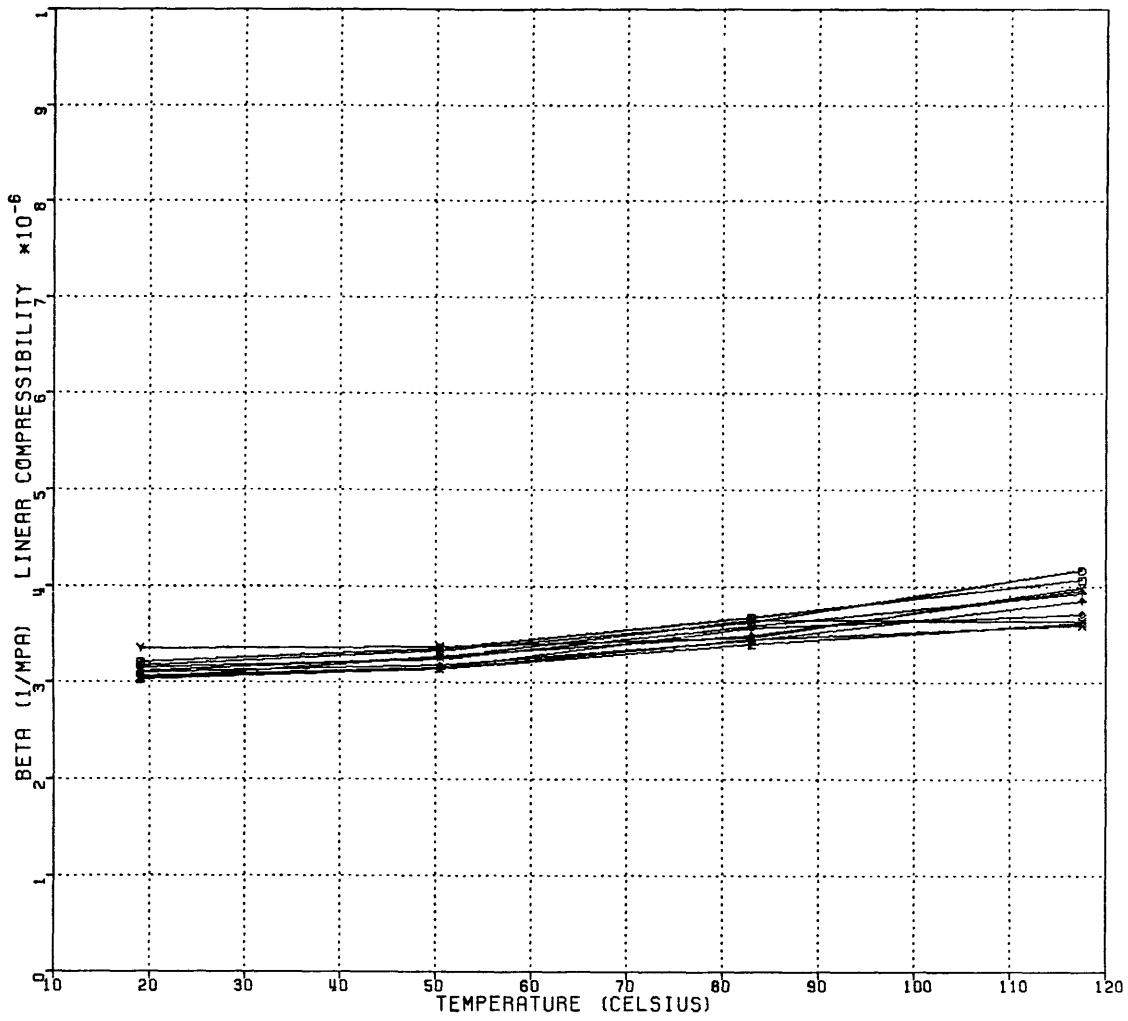
178 TWIN SISTERS WA DUNITE
GAGE:4B

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



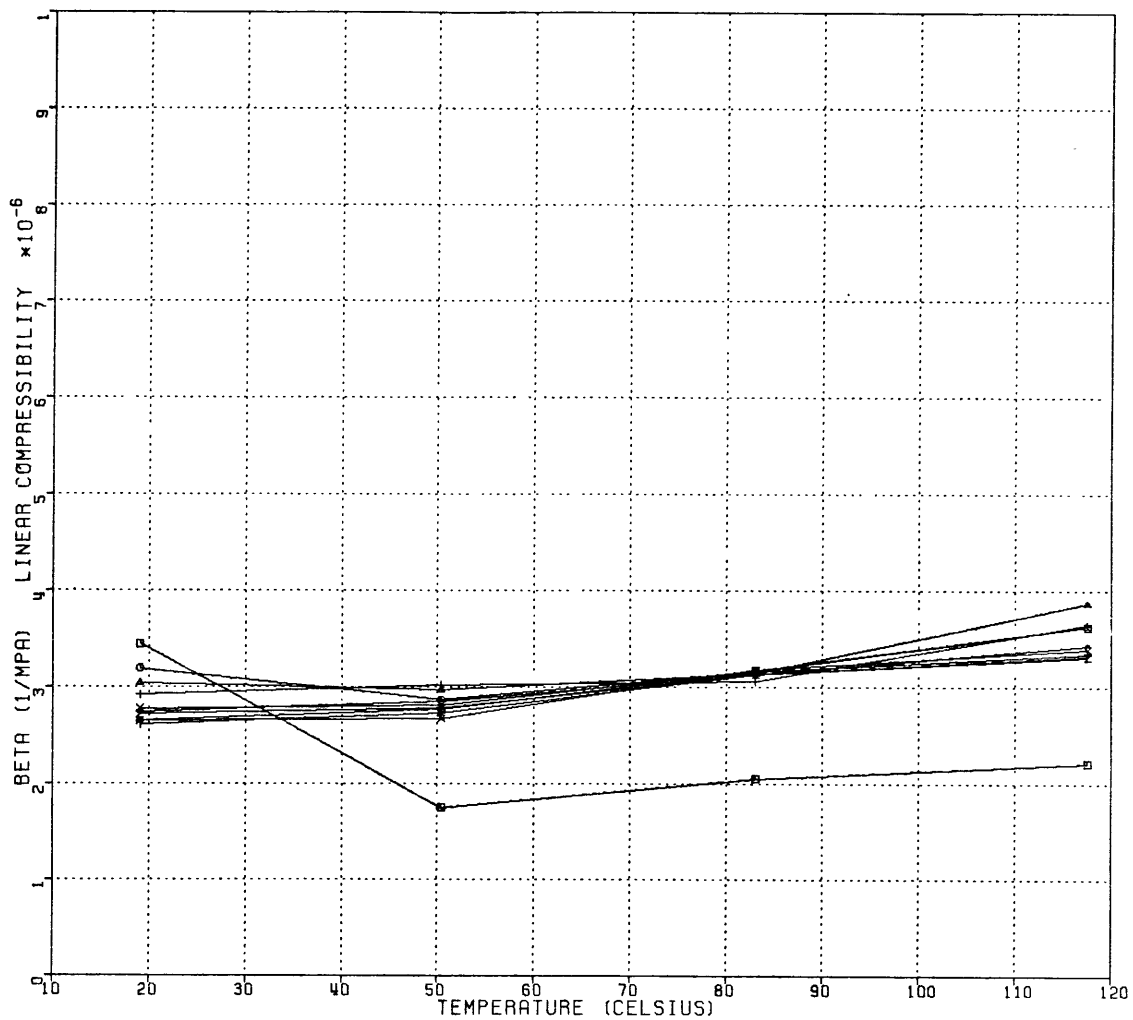
178 TWIN SISTERS WA DUNITE
GAGE:BA

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ♣ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



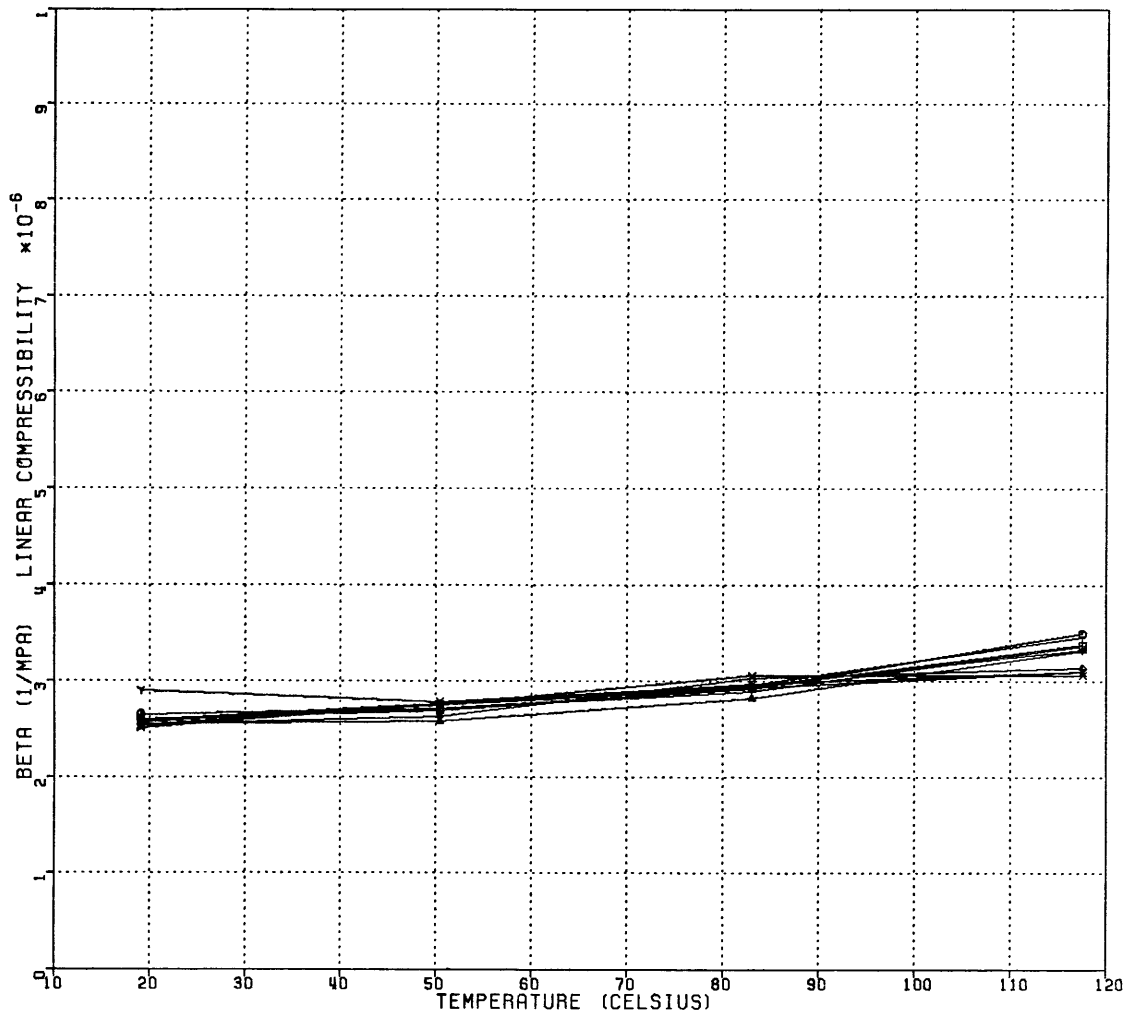
178 TWIN SISTERS WA DUNITE
GAGE:BA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⋈ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



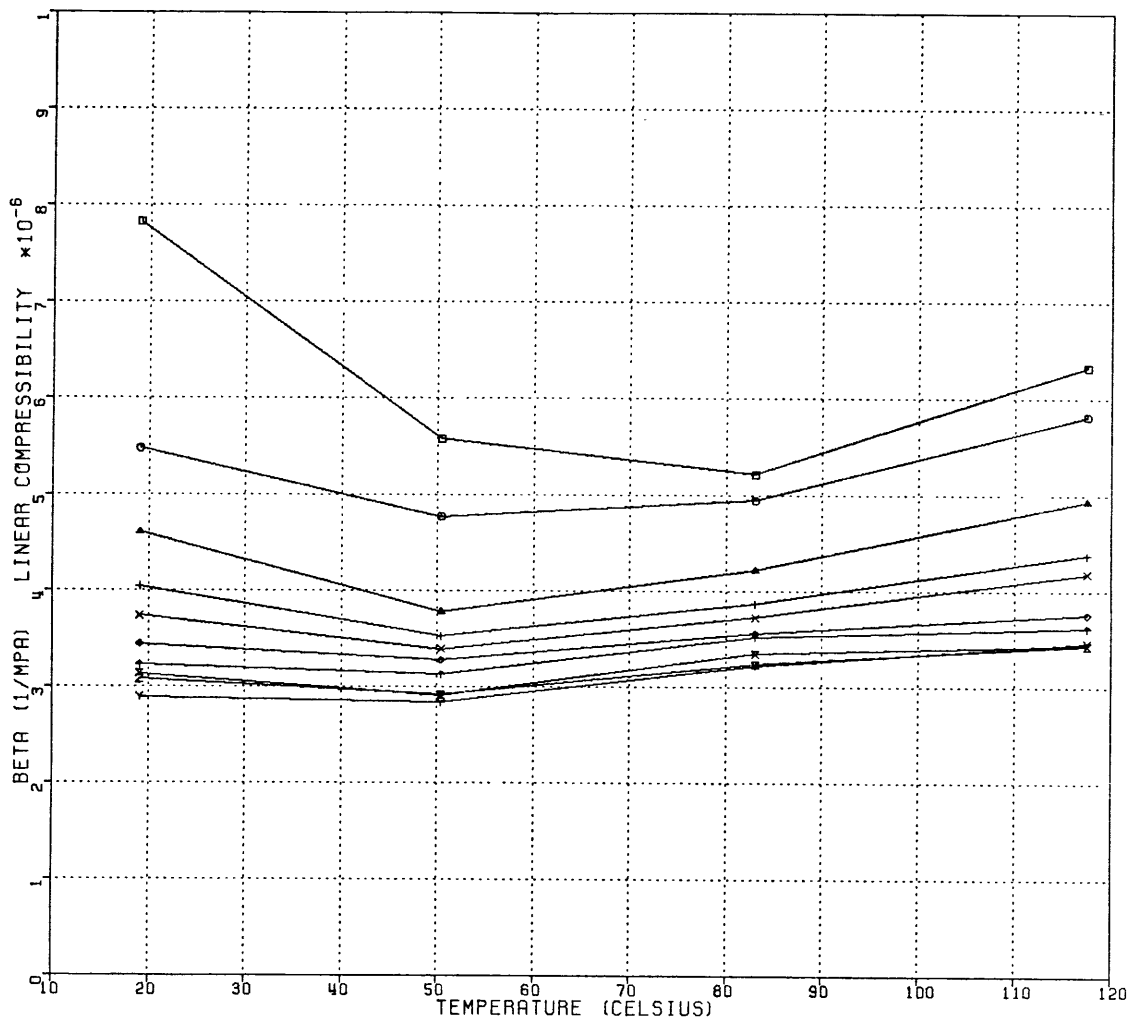
178 TWIN SISTERS WA DUNITE
GAGE:CA

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



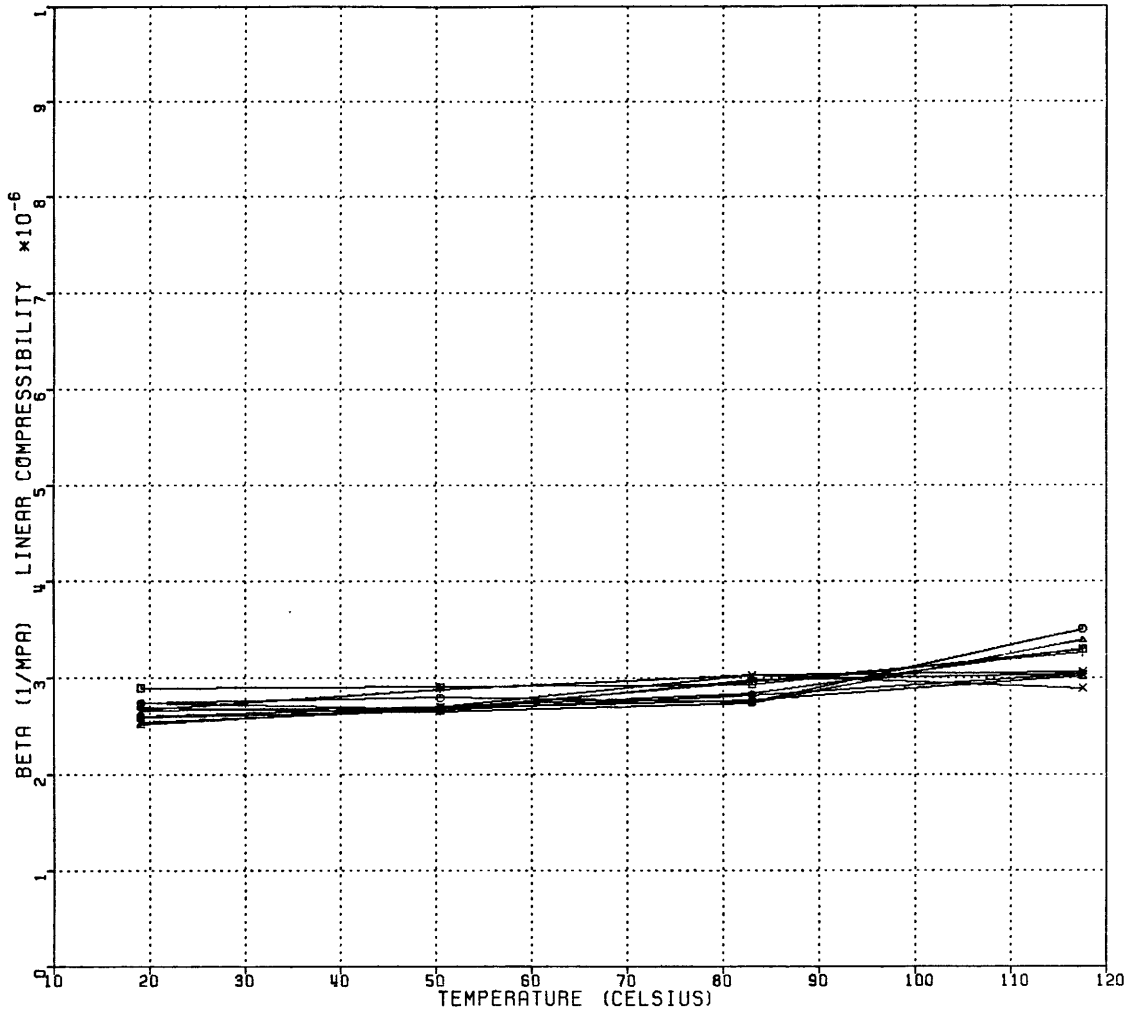
178 TWIN SISTERS WA DUNITE
GAGE:CA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♣ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



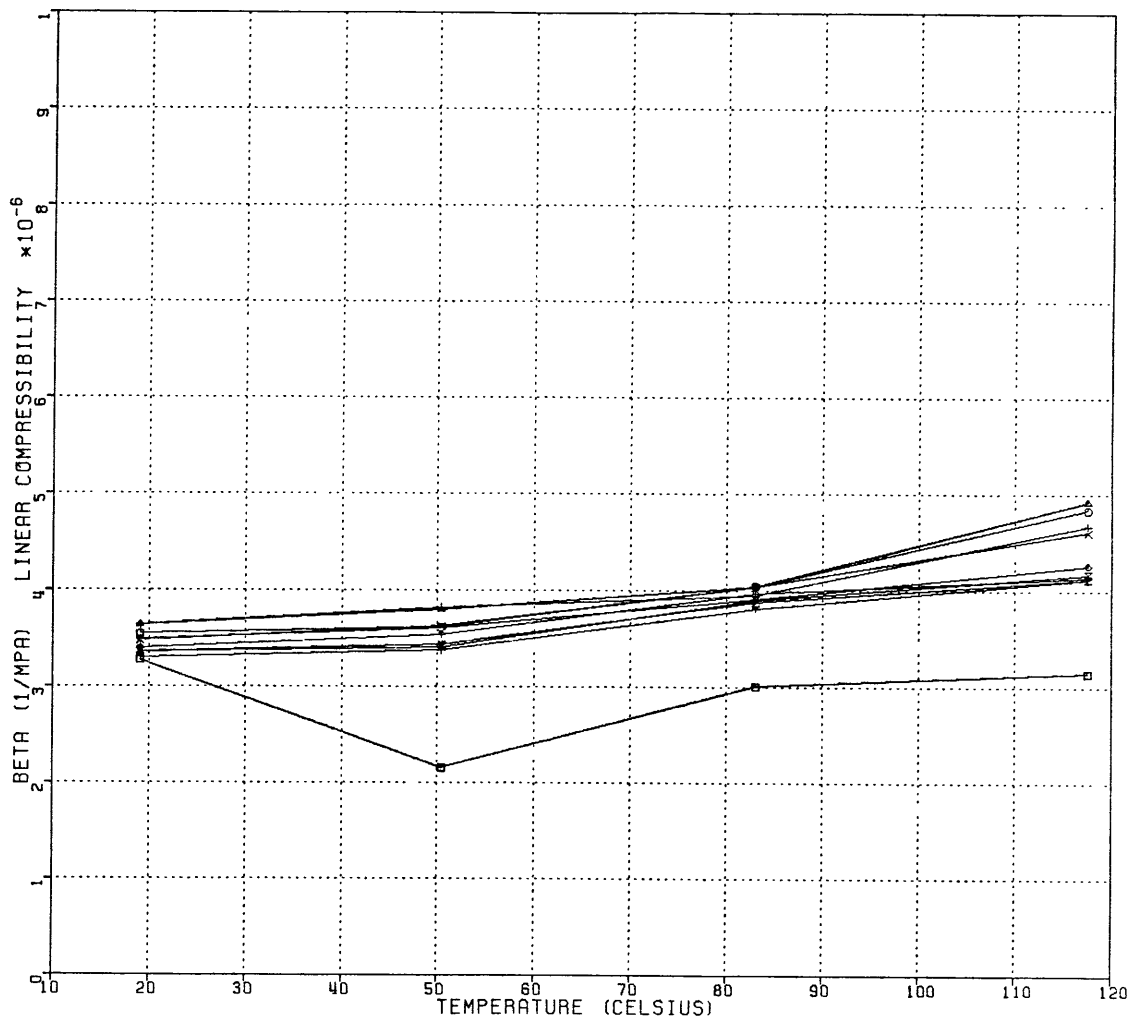
178 TWIN SISTERS WA DUNITE
GAGE:3A

- - 10 MPa
- - 20 MPa
- △ - 30 MPa
- + - 40 MPa
- X - 50 MPa
- ◇ - 60 MPa
- ↑ - 70 MPa
- X - 80 MPa
- Z - 90 MPa
- Y - 100 MPa



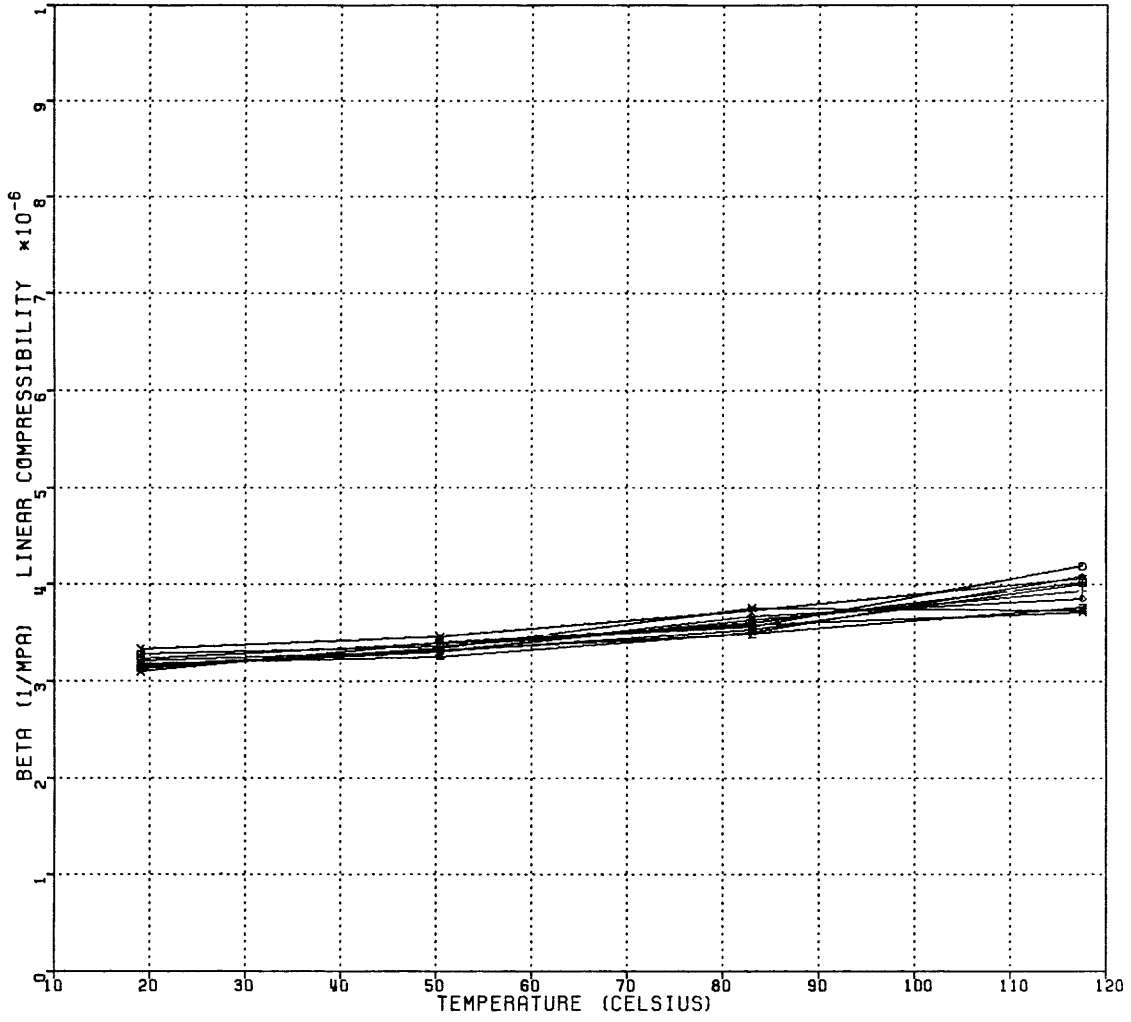
178 TWIN SISTERS WA DUNITE
GAGE: 3A

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



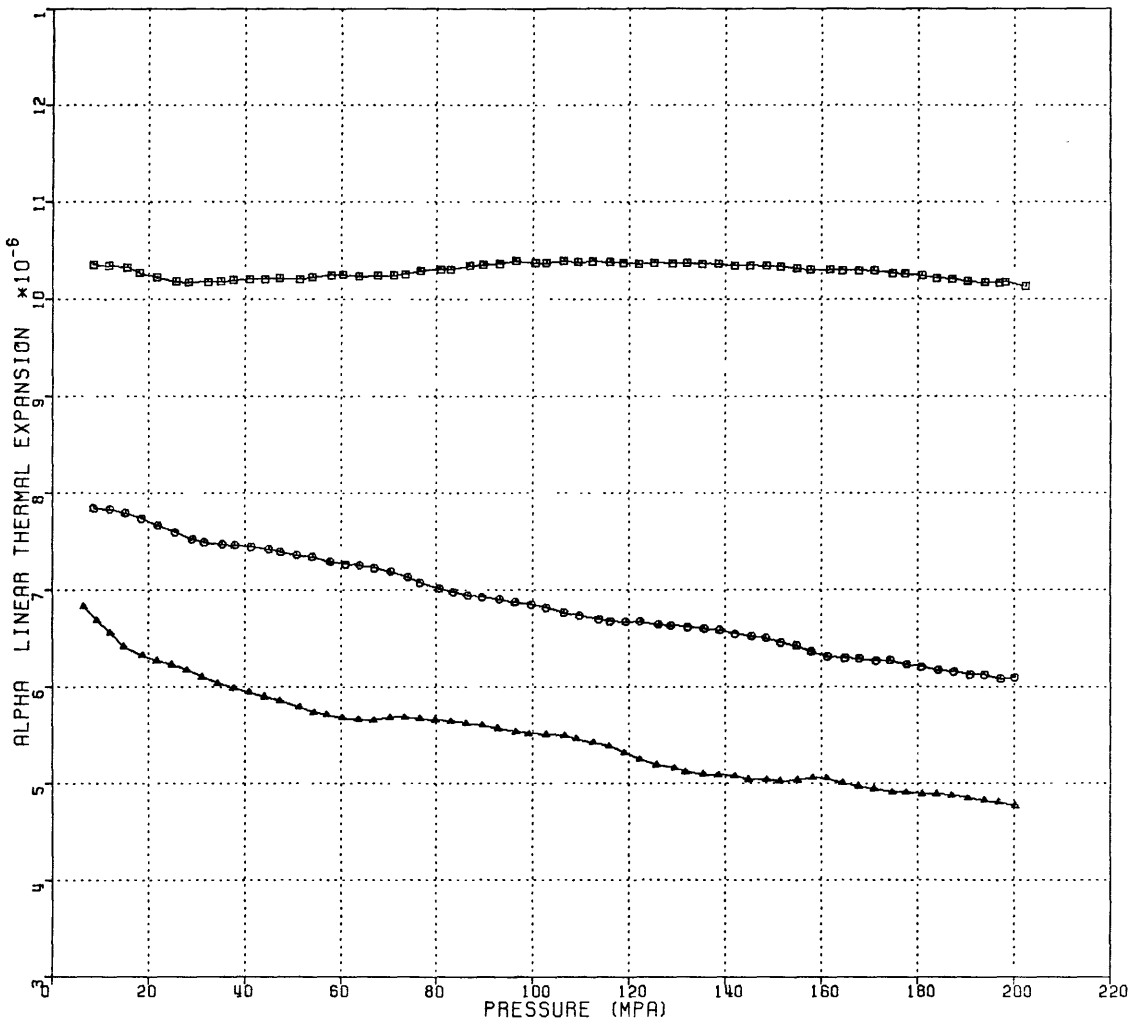
178 TWIN SISTERS WA DUNITE
GAGE:4A

- - 10 MPa
- - 20 MPa
- △ - 30 MPa
- + - 40 MPa
- X - 50 MPa
- ◇ - 60 MPa
- ↑ - 70 MPa
- X - 80 MPa
- Z - 90 MPa
- Y - 100 MPa



178 TWIN SISTERS WA DUNITE
GAGE: 4A

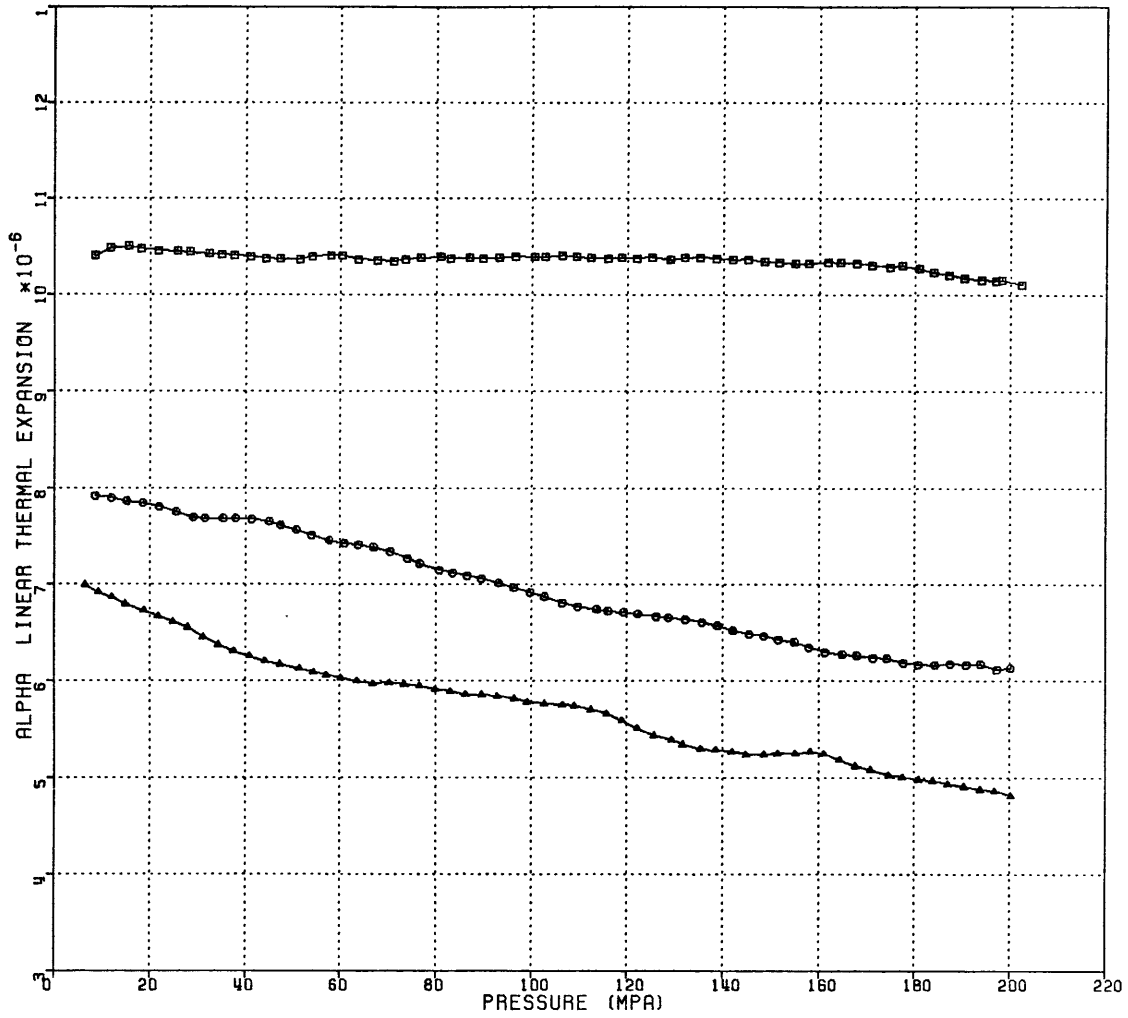
- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- +
- X - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



178 TWIN SISTERS WA DUNITE

GAGE: BC

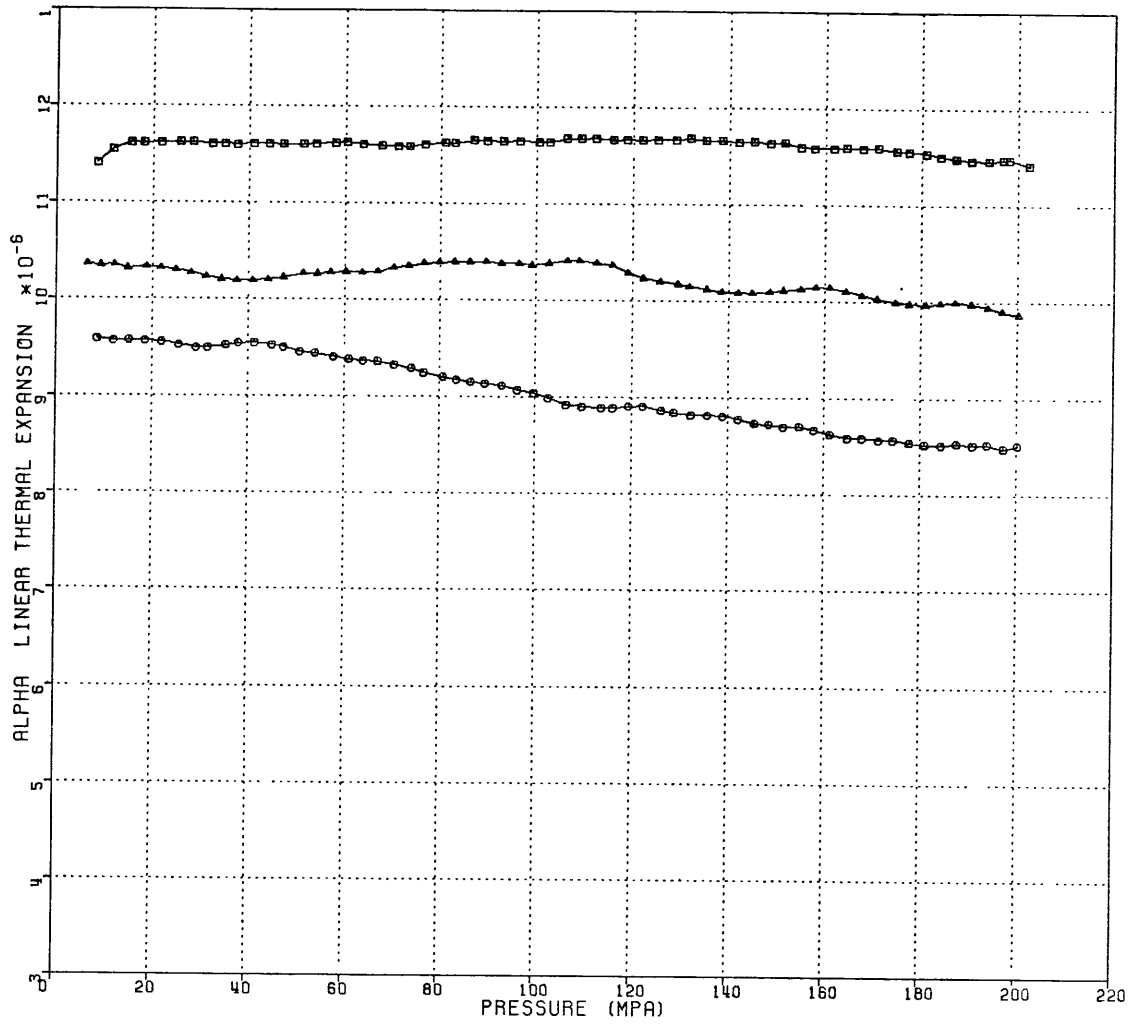
□ - 19°C-50°C
 ○ - 50°C-83°C
 △ - 83°C-118°C



178 TWIN SISTERS WA DUNITE

GAGE: 3C

□ - 19°C-50°C
 ○ - 50°C-83°C
 ▲ - 83°C-116°C



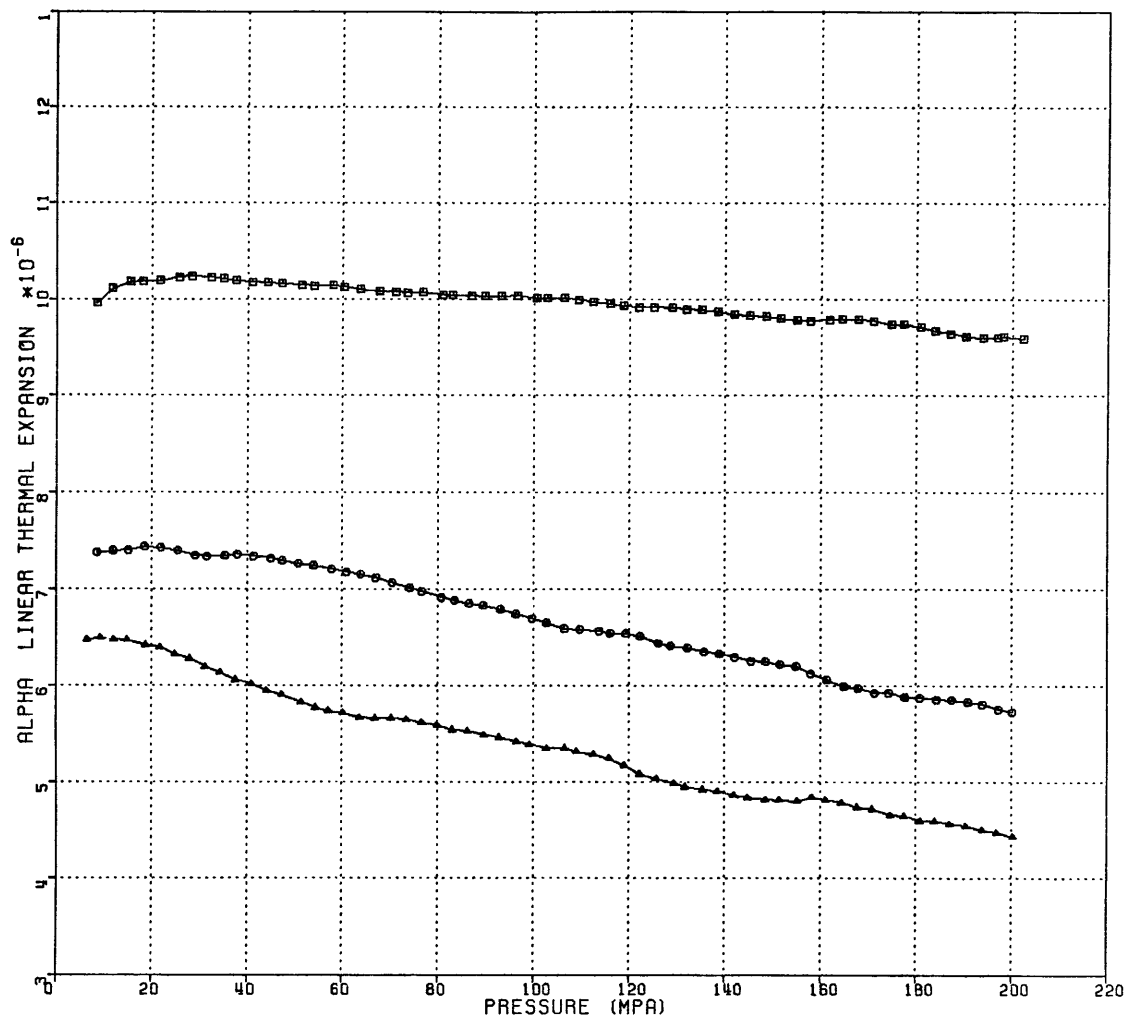
178 TWIN SISTERS WA DUNITE

GAGE: 4C

□ - 19°C - 50°C

○ - 50°C - 83°C

△ - 83°C - 118°C



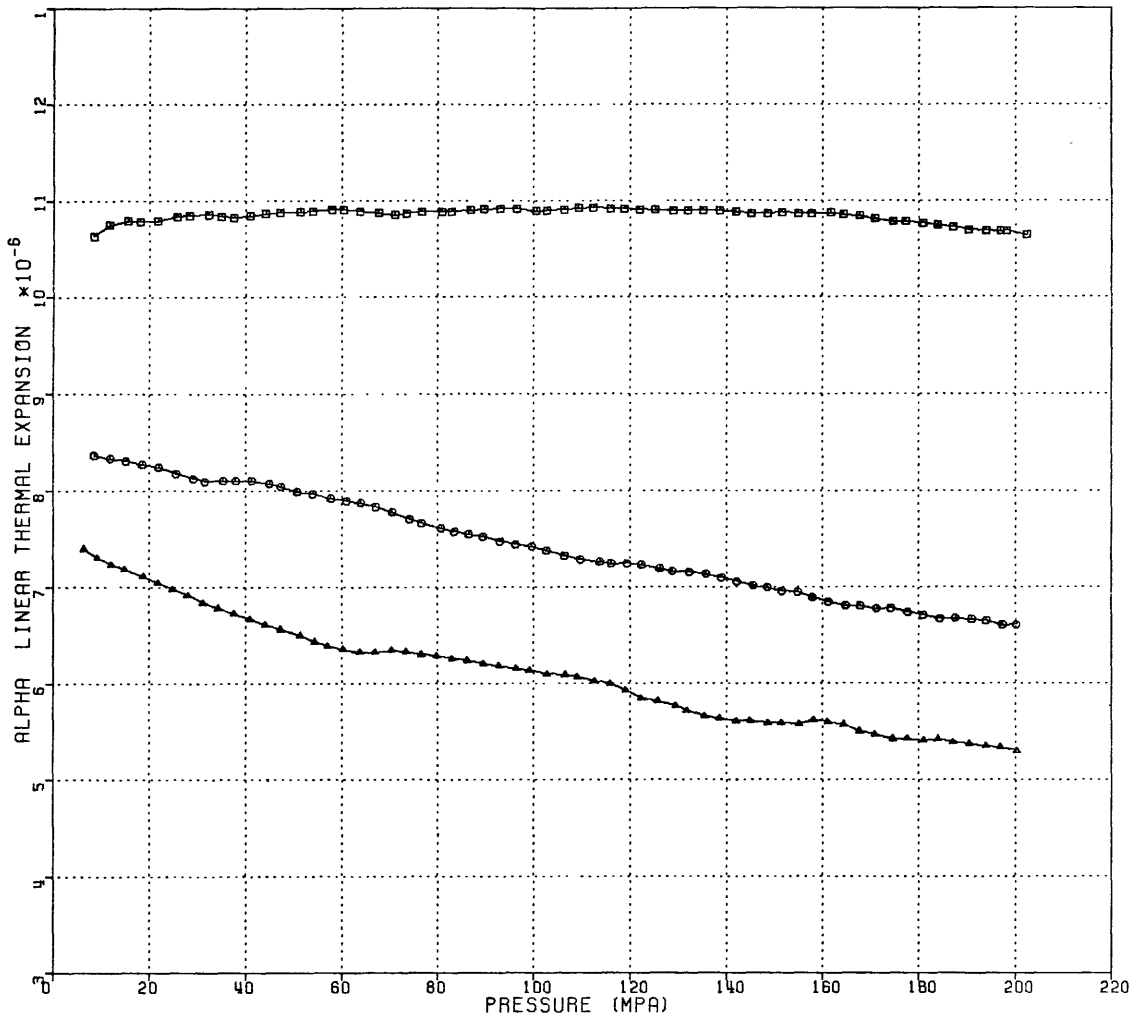
178 TWIN SISTERS WA DUNITE

GAGE: AB

□ - 19°C-50°C

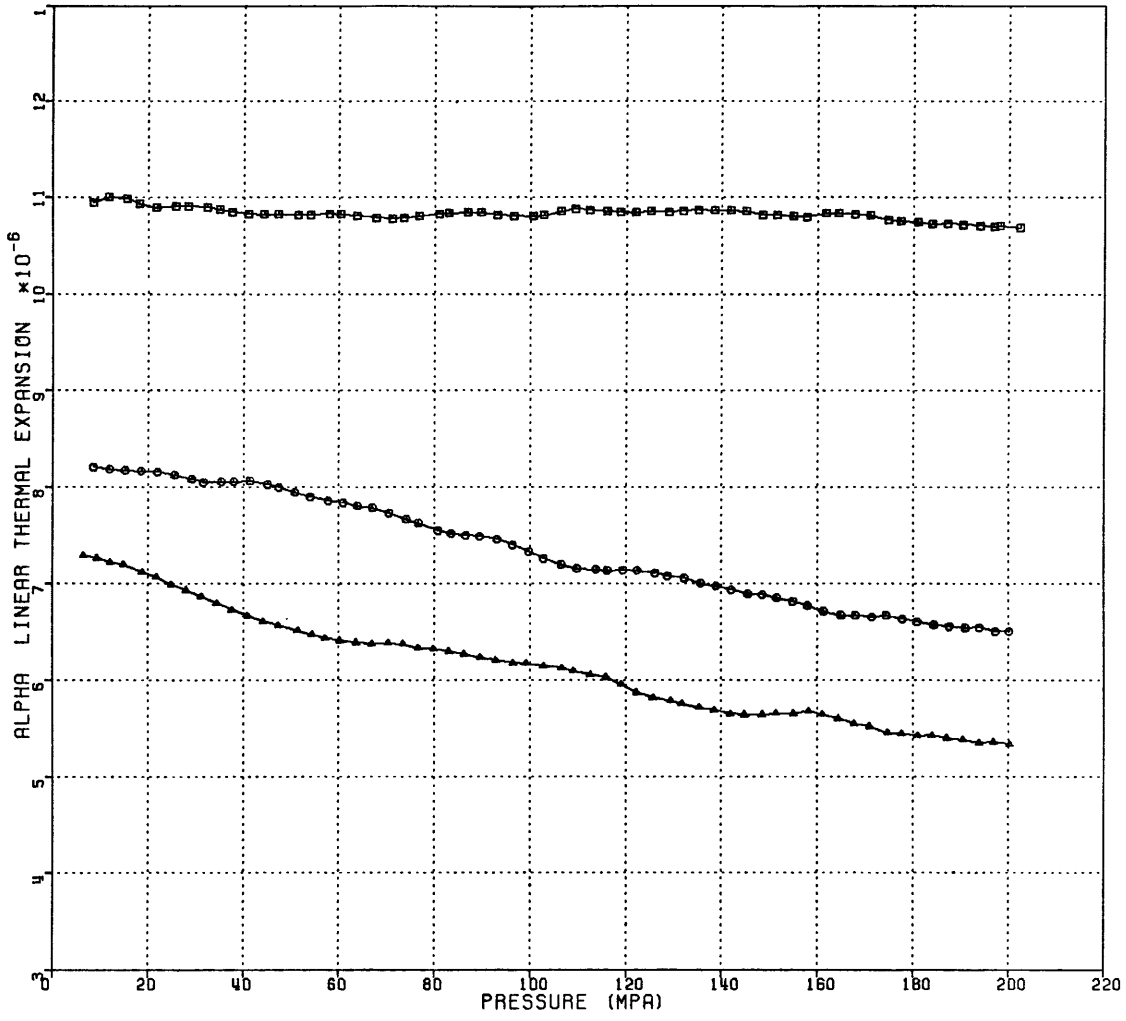
○ - 50°C-83°C

△ - 83°C-118°C



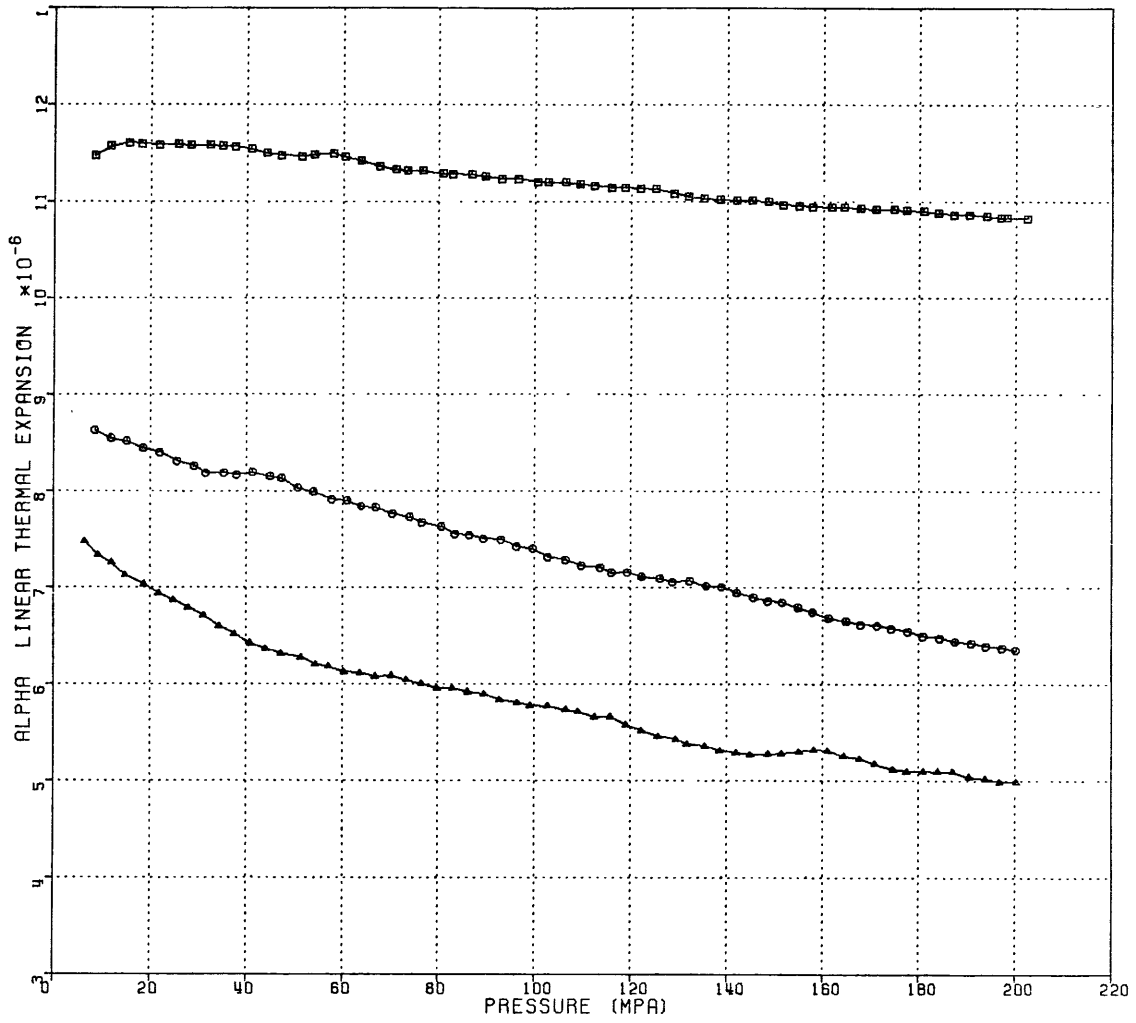
178 TWIN SISTERS WA DUNITE
GAGE:CB

□ - 19°C-50°C
 ○ - 50°C-83°C
 △ - 83°C-118°C



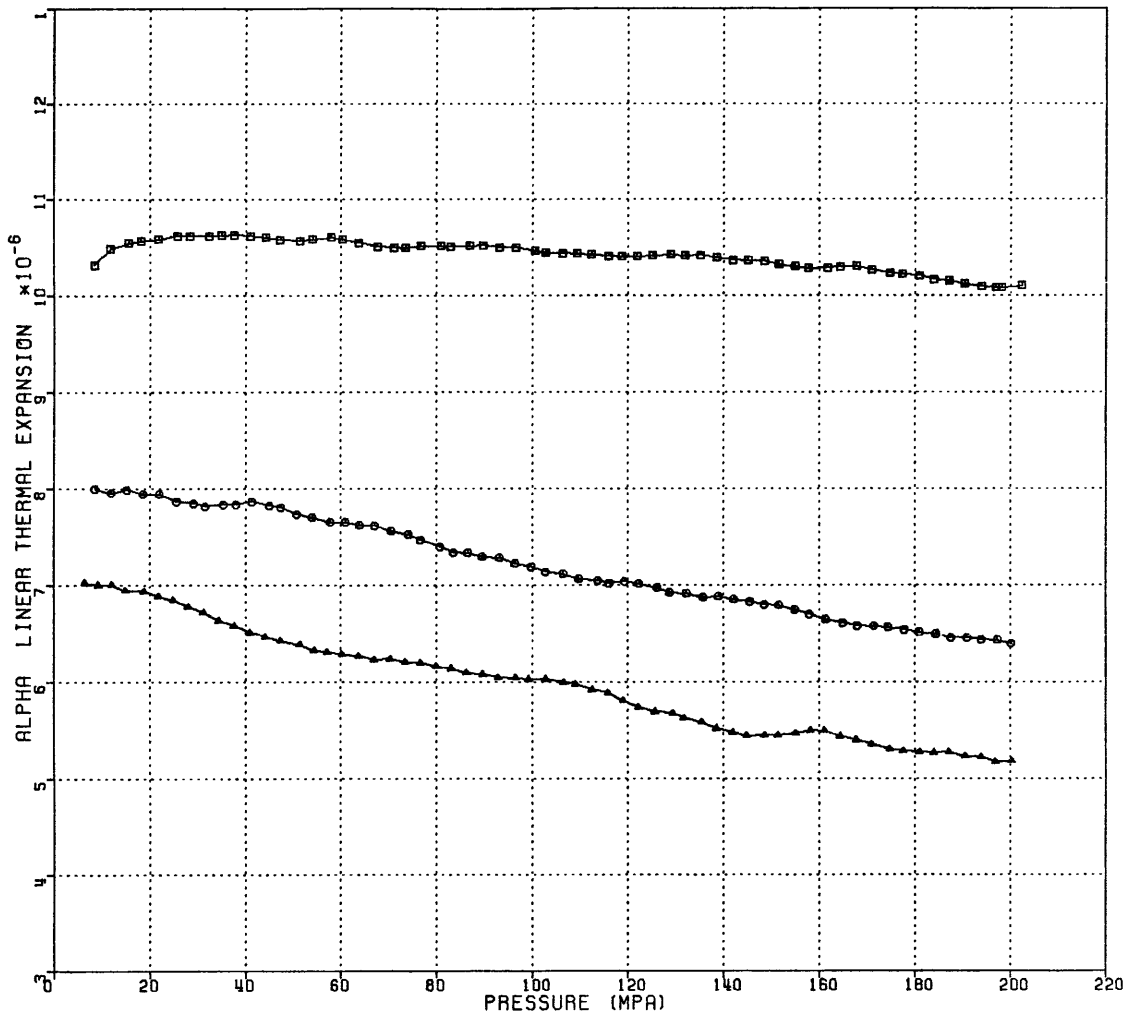
178 TWIN SISTERS WA DUNITE
GAGE: 4B

- - 19°C-50°C
- - 50°C-83°C
- ▲ - 83°C-118°C



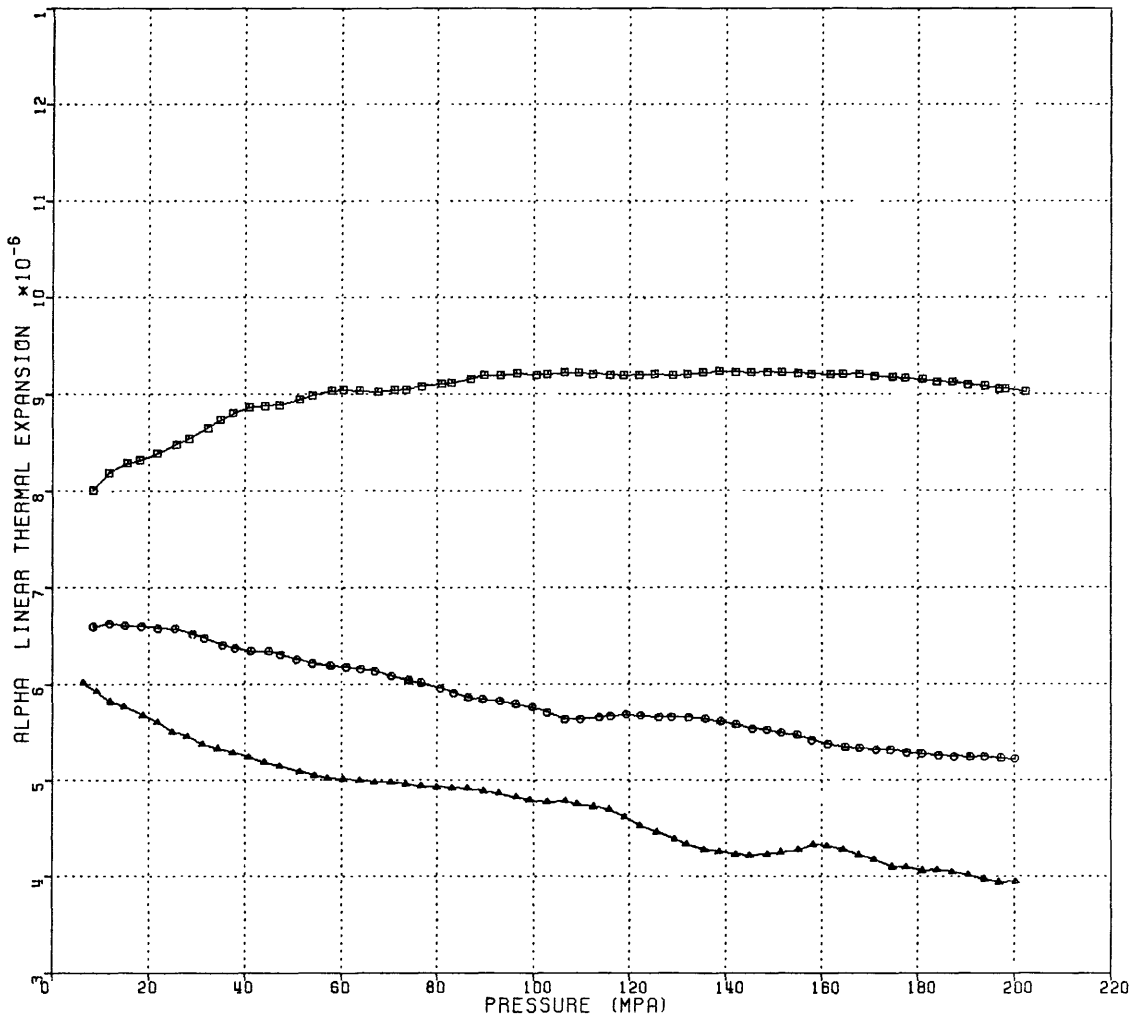
178 TWIN SISTERS WA DUNITE
GAGE:BA

□ - 19°C-50°C
○ - 50°C-83°C
△ - 83°C-118°C



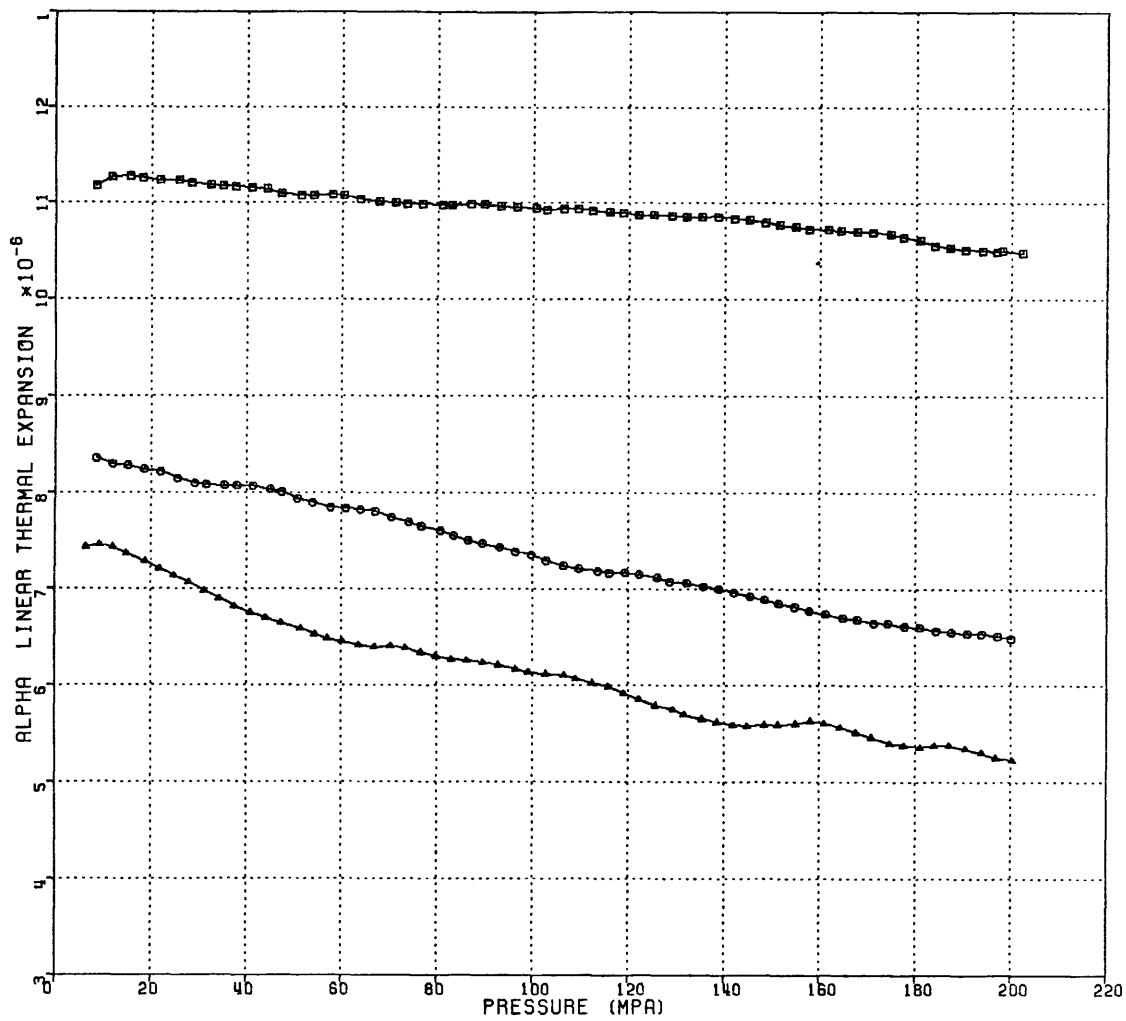
178 TWIN SISTERS WA DUNITE
GAGE:CA

□ - 19°C-50°C
○ - 50°C-83°C
△ - 83°C-118°C



178 TWIN SISTERS WA DUNITE
GAGE: 3A

- - 19°C-50°C
- - 50°C-83°C
- △ - 83°C-118°C



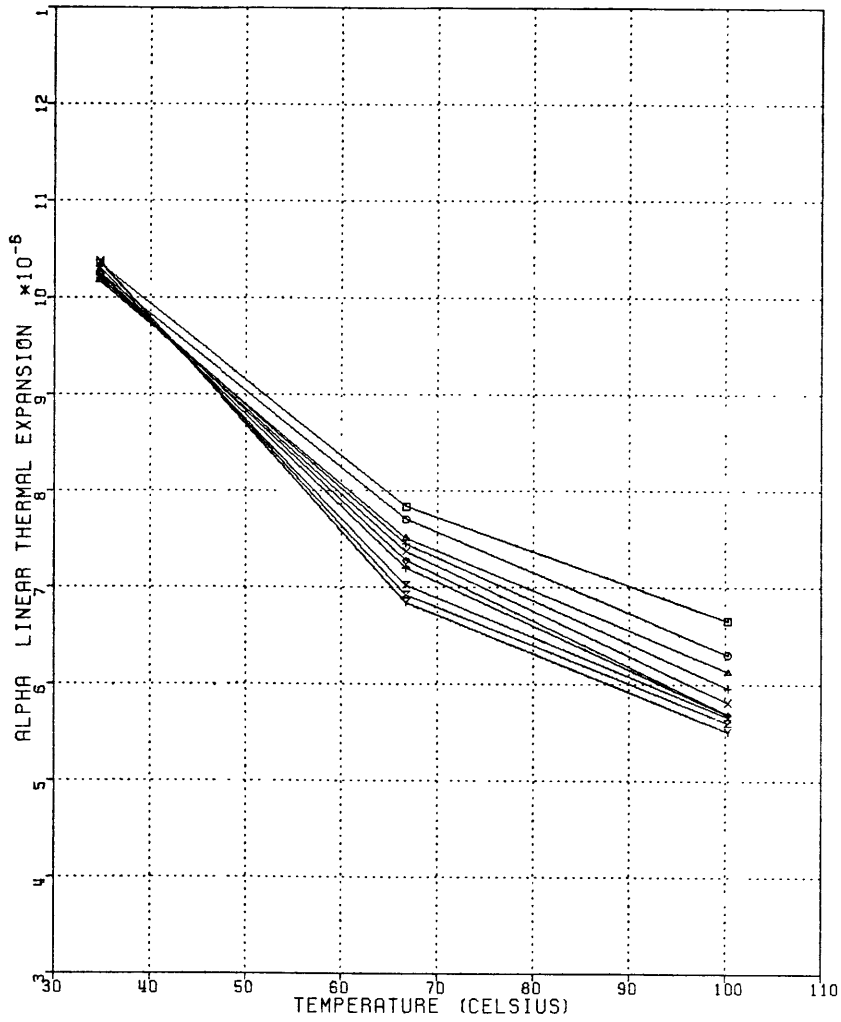
178 TWIN SISTERS WA DUNITE

GAGE: 4A

□ - 19°C-50°C

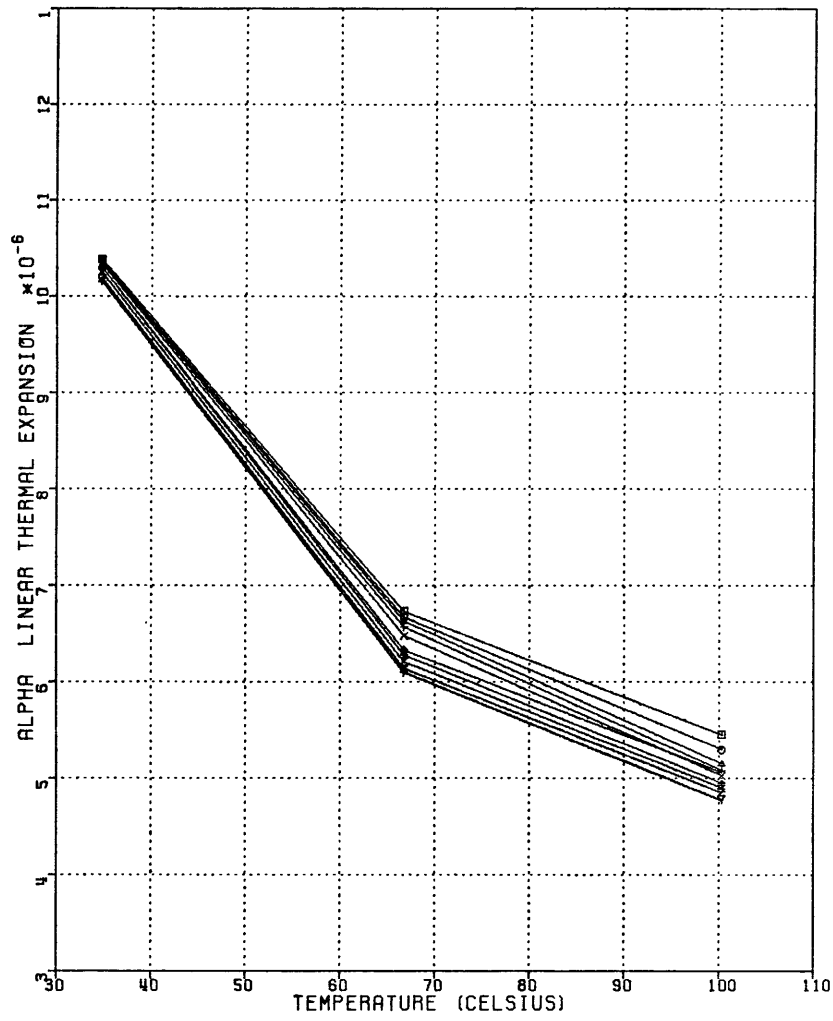
○ - 50°C-83°C

△ - 83°C-118°C



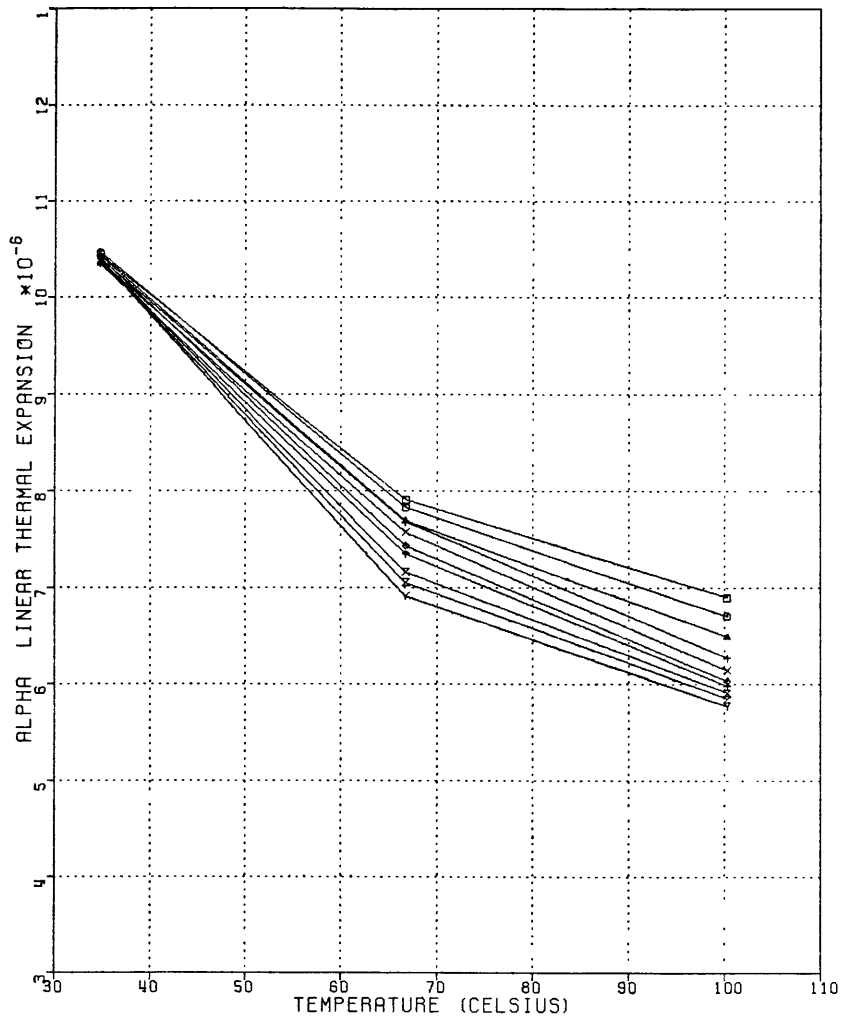
178 TWIN SISTERS WA DUNITE
GAGE:BC

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- x - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



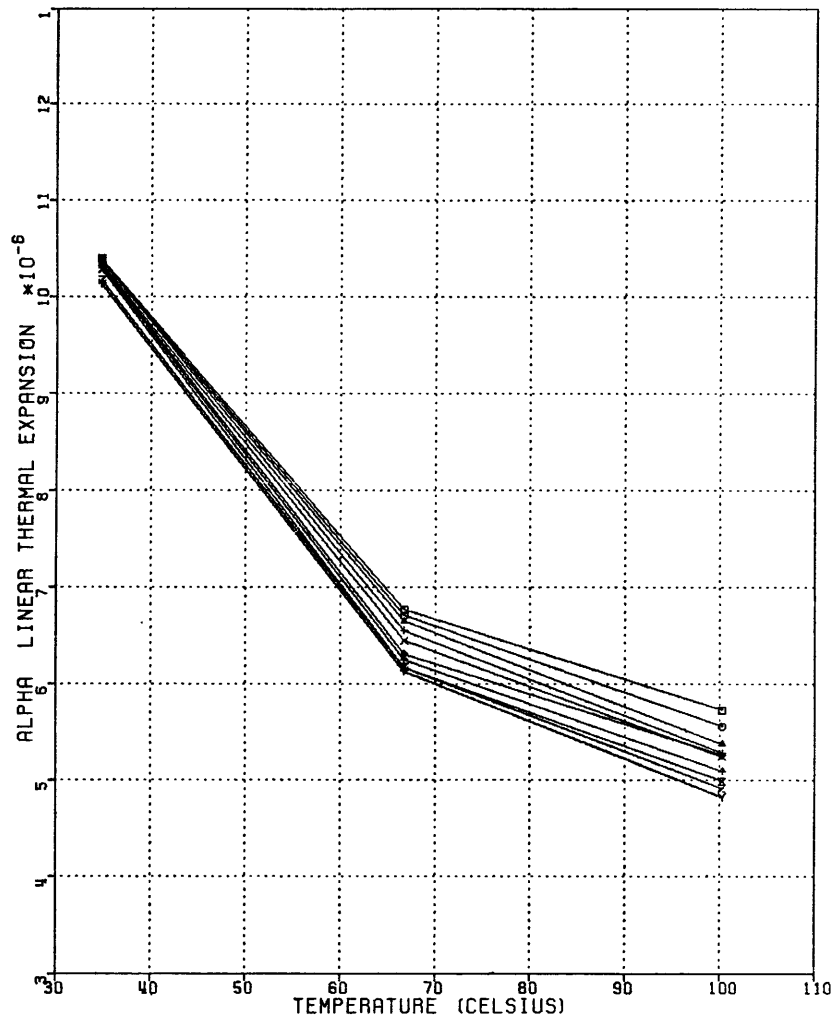
178 TWIN SISTERS WA DUNITE
GAGE:BC

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⋈ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



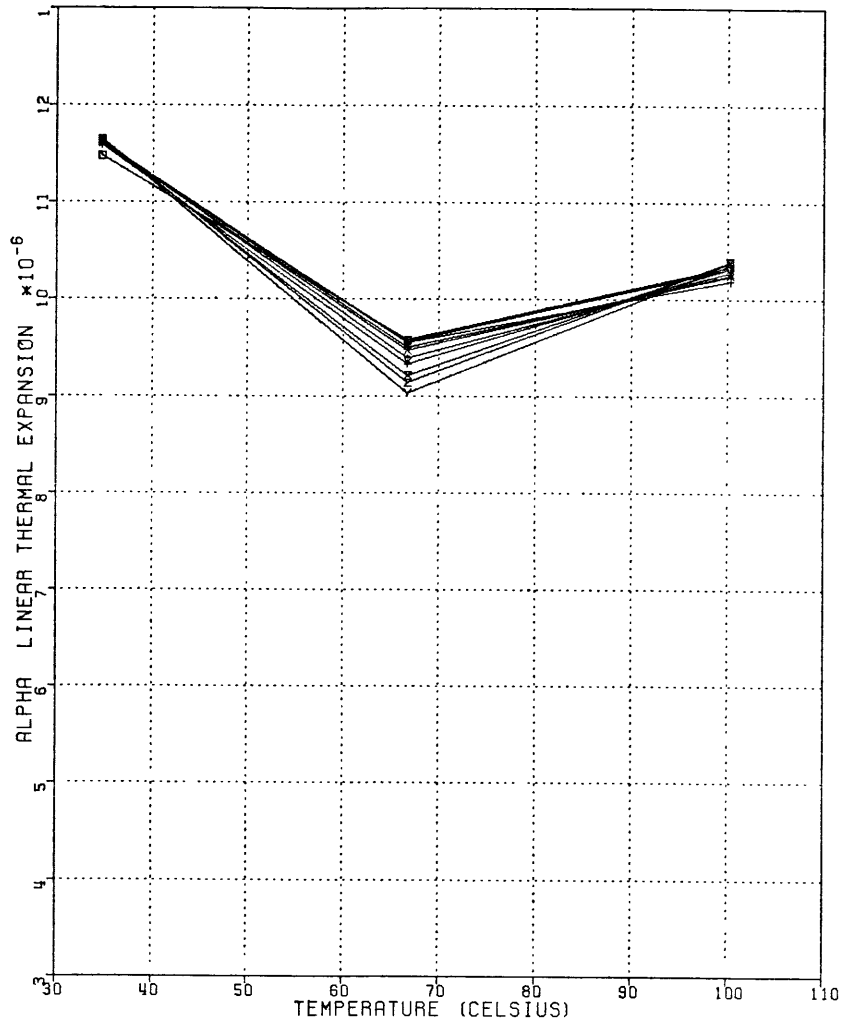
178 TWIN SISTERS WA DUNITE
GAGE: 3C

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



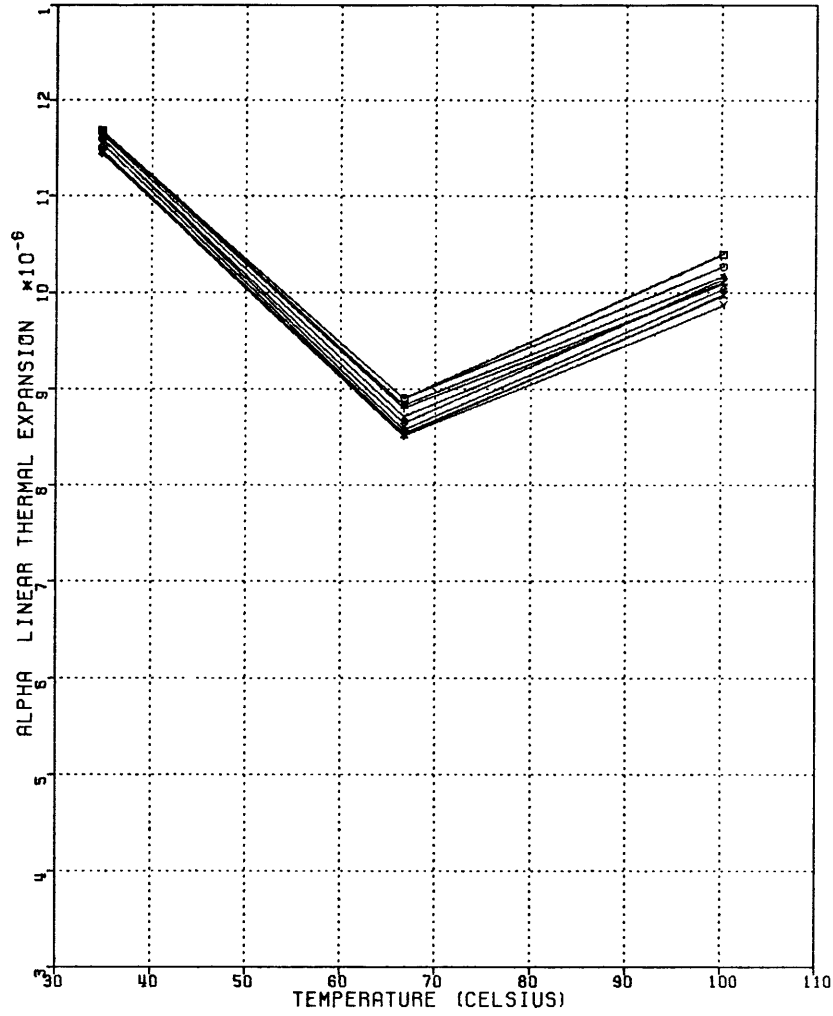
178 TWIN SISTERS WA DUNITE
GAGE:3C

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♣ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



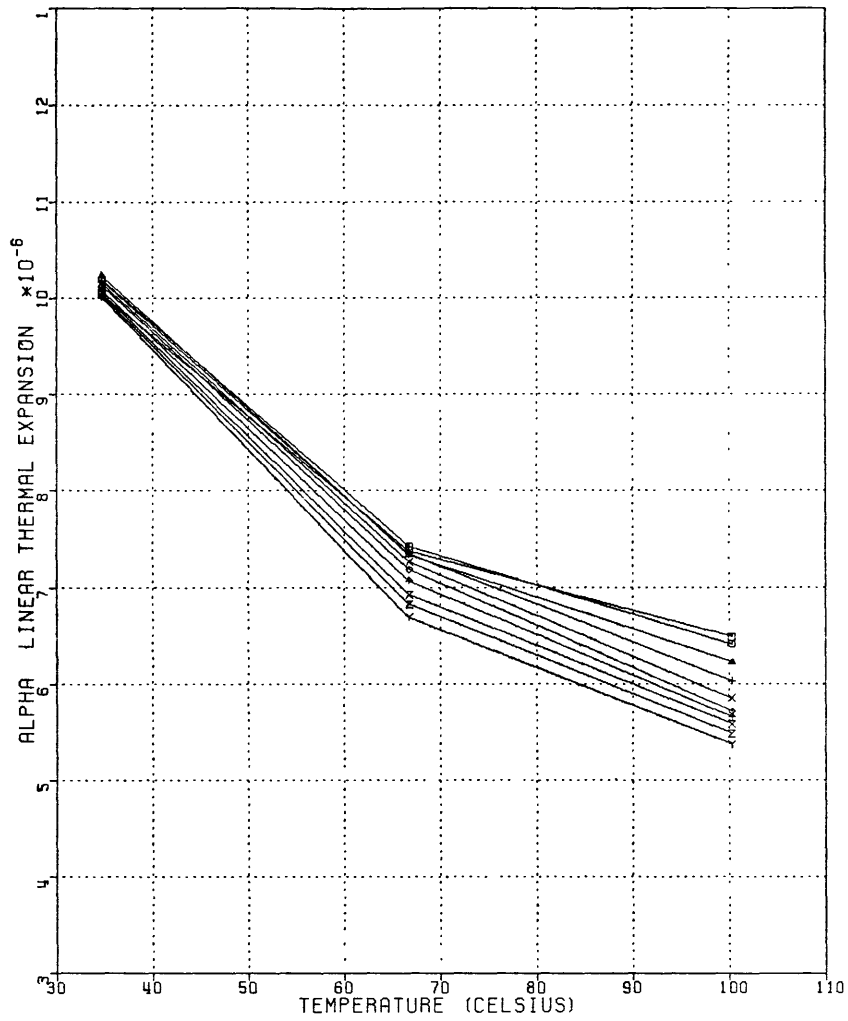
178 TWIN SISTERS WA DUNITE
GAGE:4C

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



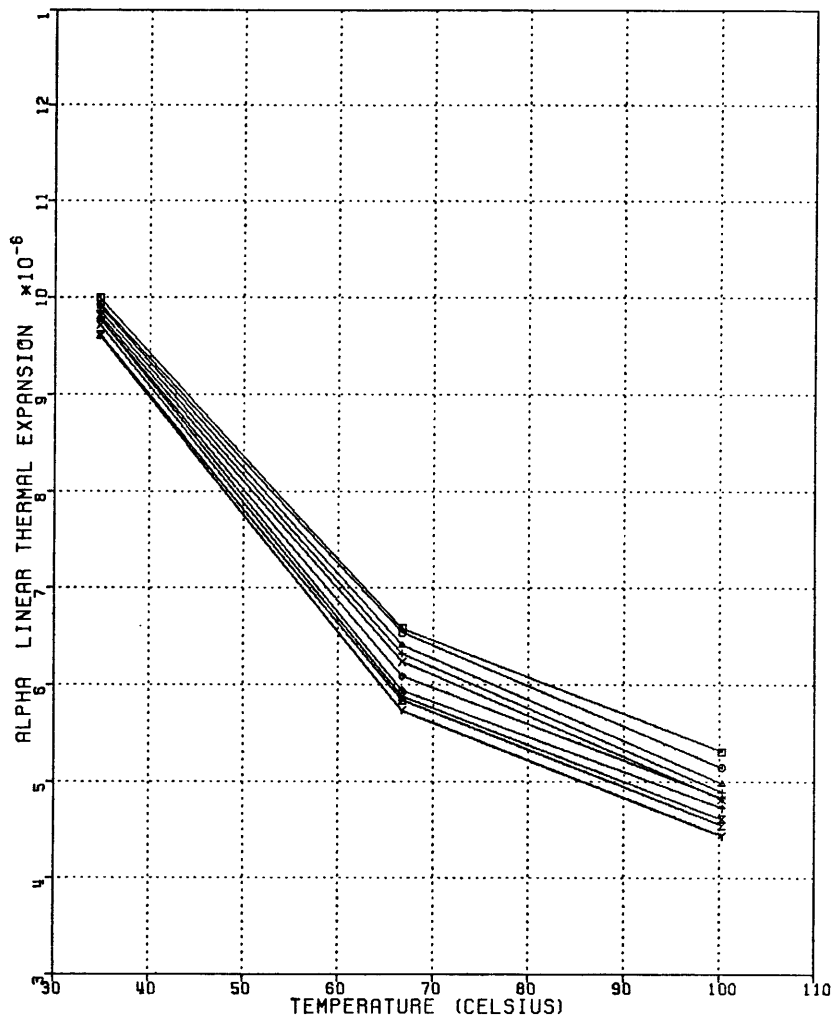
178 TWIN SISTERS WA DUNITE
GAGE: 4C

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- x - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- × - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



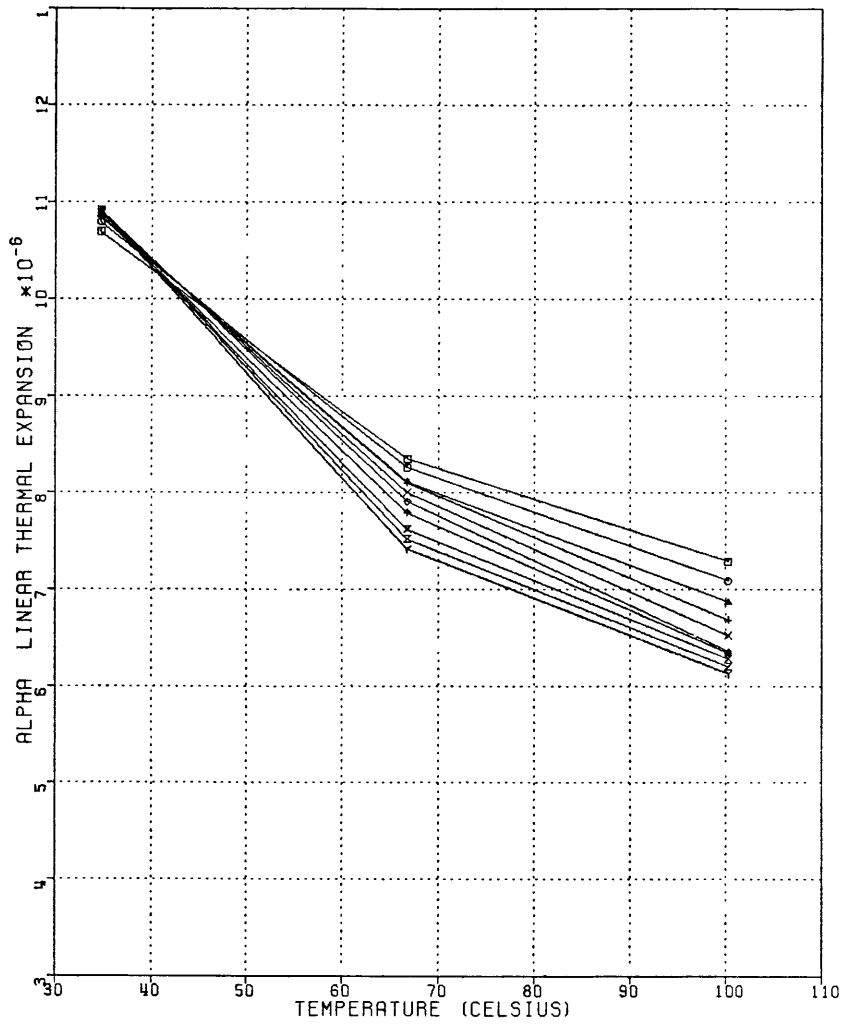
178 TWIN SISTERS WA DUNITE
GAGE:AB

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



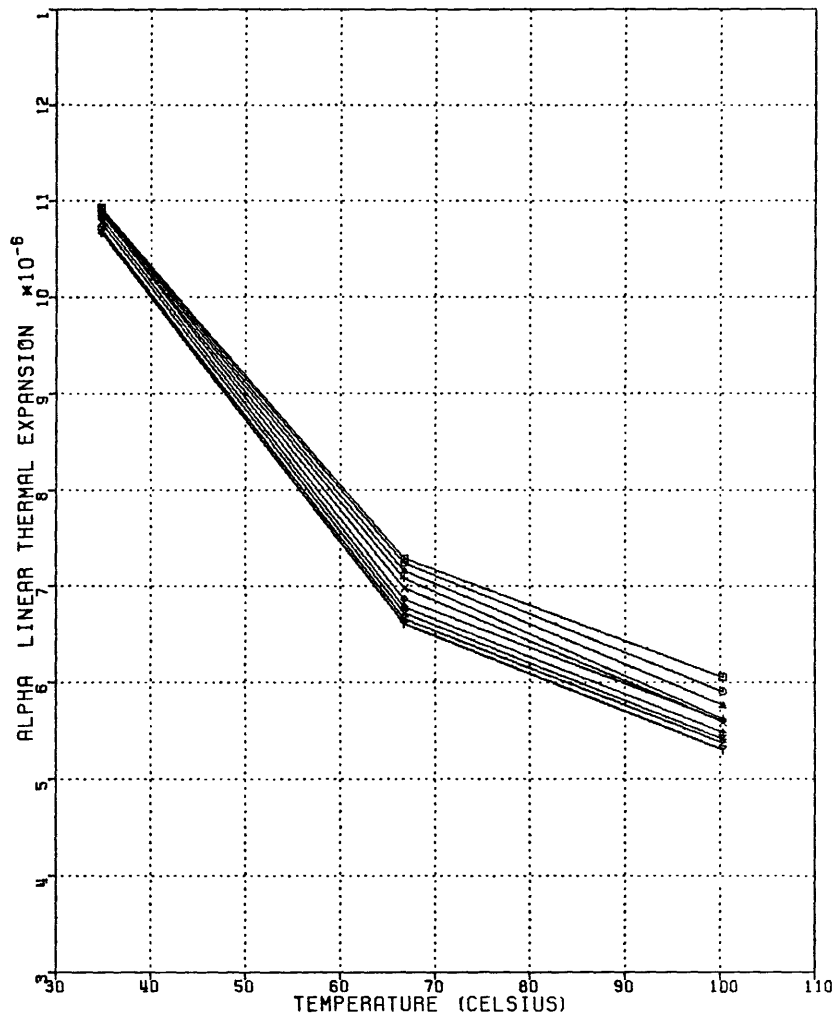
178 TWIN SISTERS WA DUNITE
GAGE: AB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



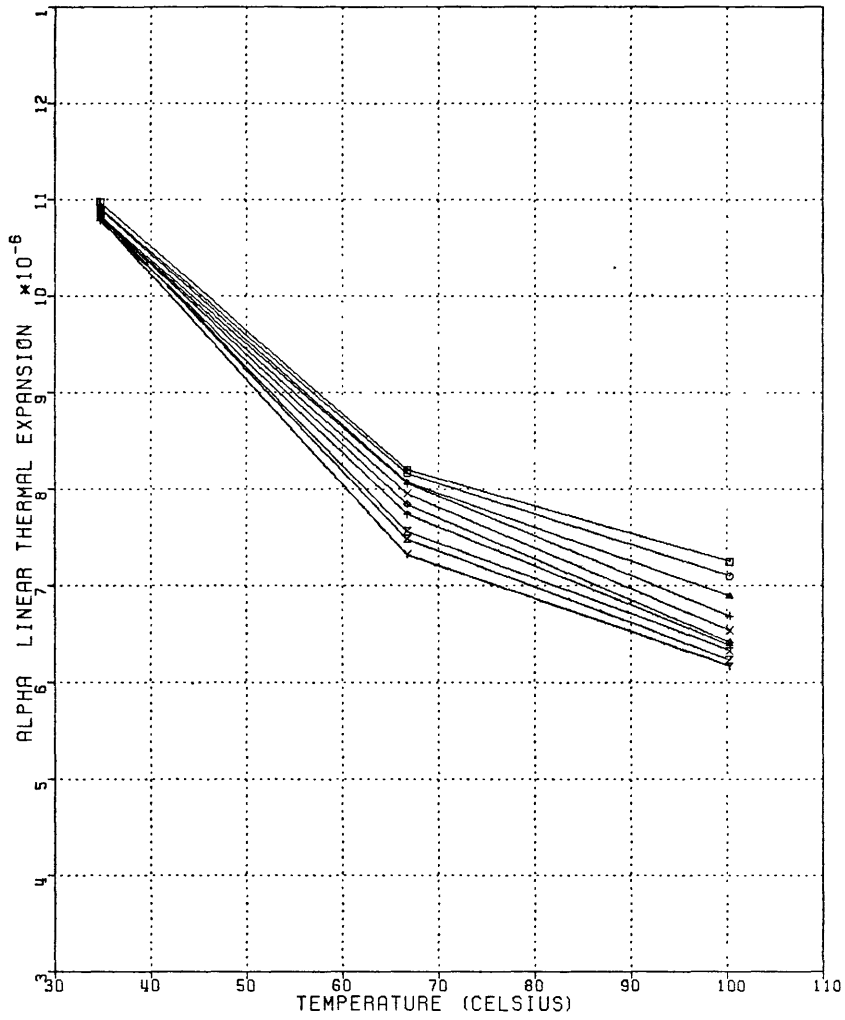
178 TWIN SISTERS WA DUNITE
GAGE:CB

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- x - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



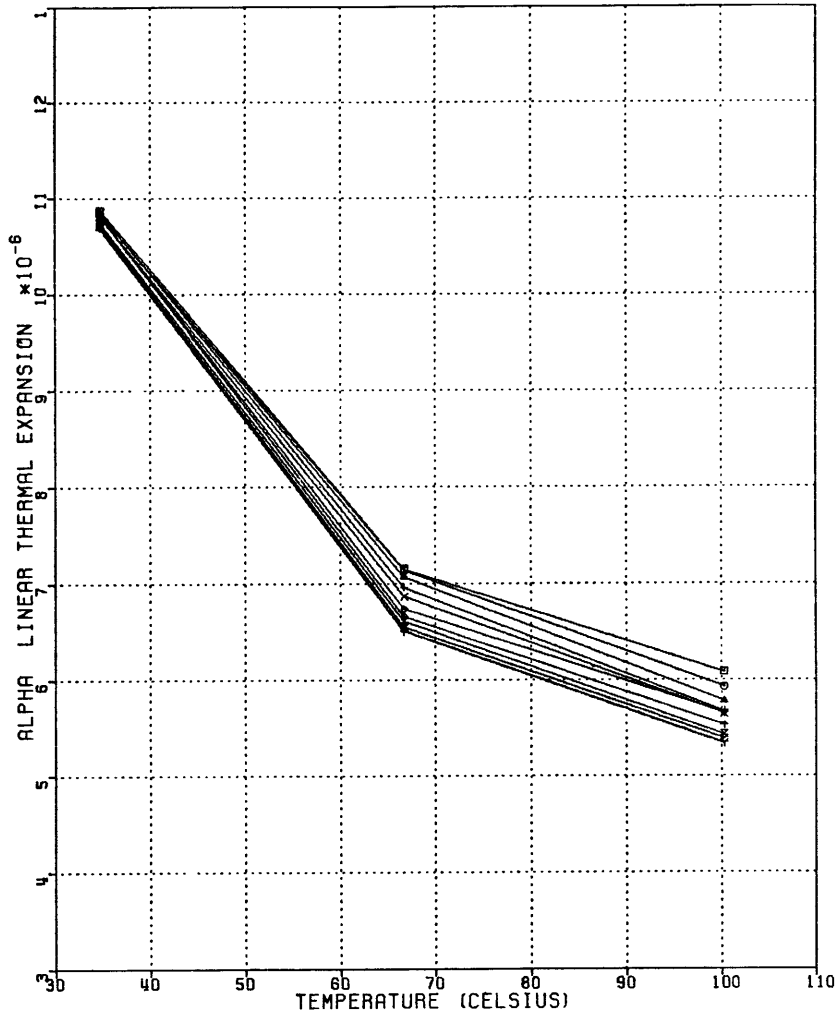
178 TWIN SISTERS WA DUNITÉ
GAGE:CB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⋈ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



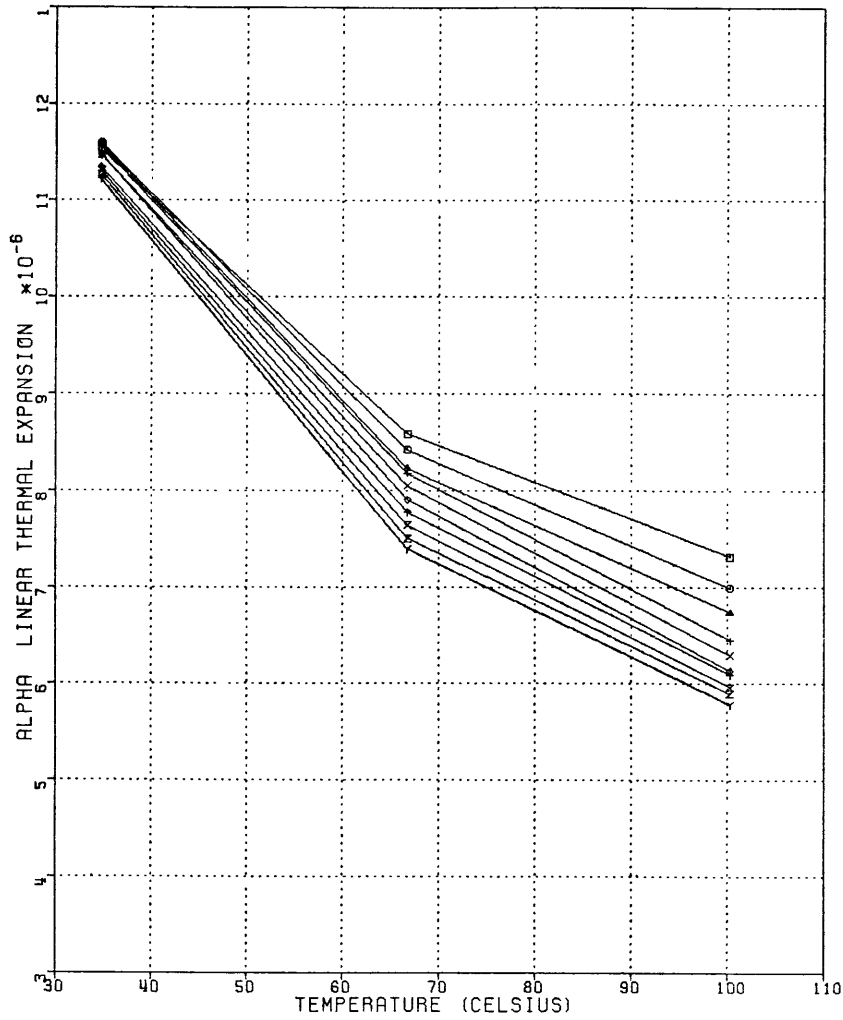
178 TWIN SISTERS WA DUNITE
GAGE: 4B

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- × - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- ⊗ - 80 MPA
- ⊘ - 90 MPA
- ⊙ - 100 MPA



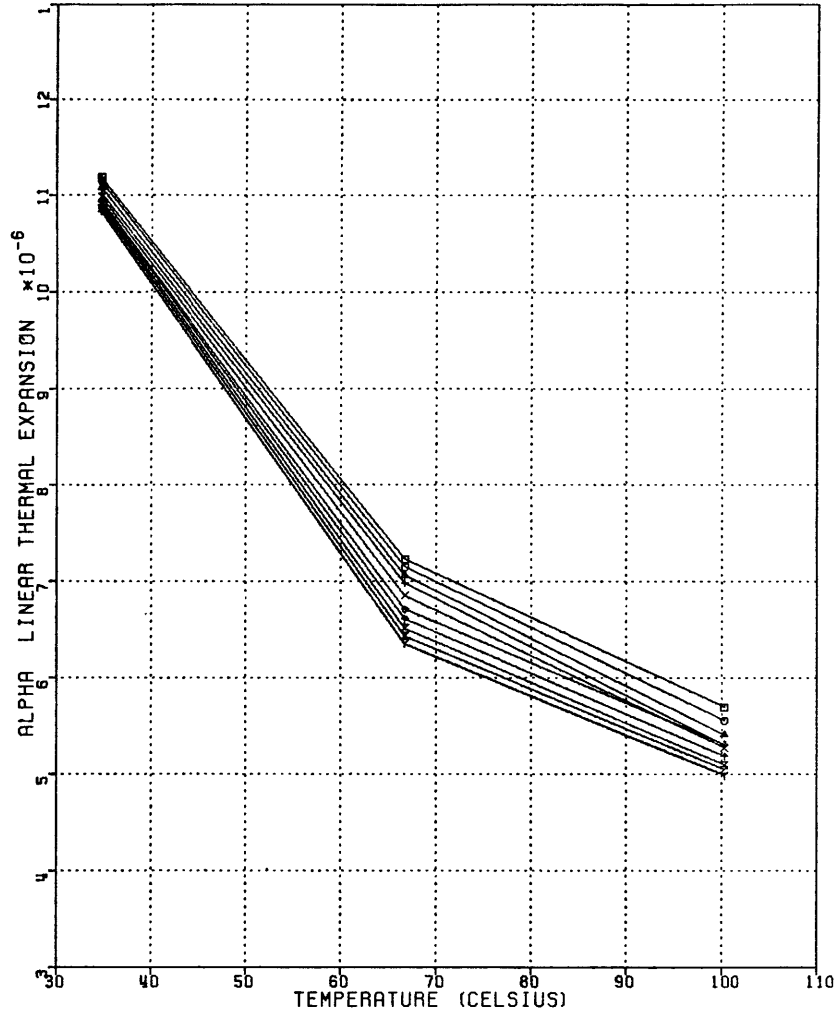
178 TWIN SISTERS WA DUNITE
GAGE: 4B

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- † - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



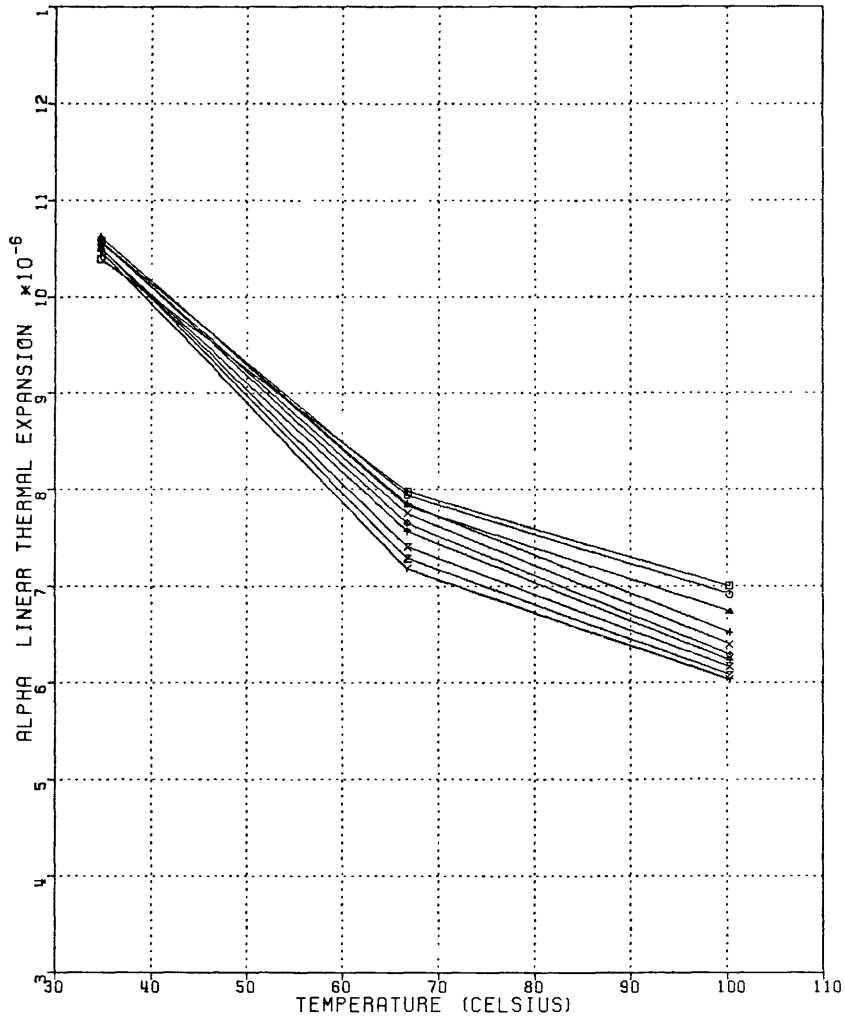
178 TWIN SISTERS WA DUNITE
GAGE:BA

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



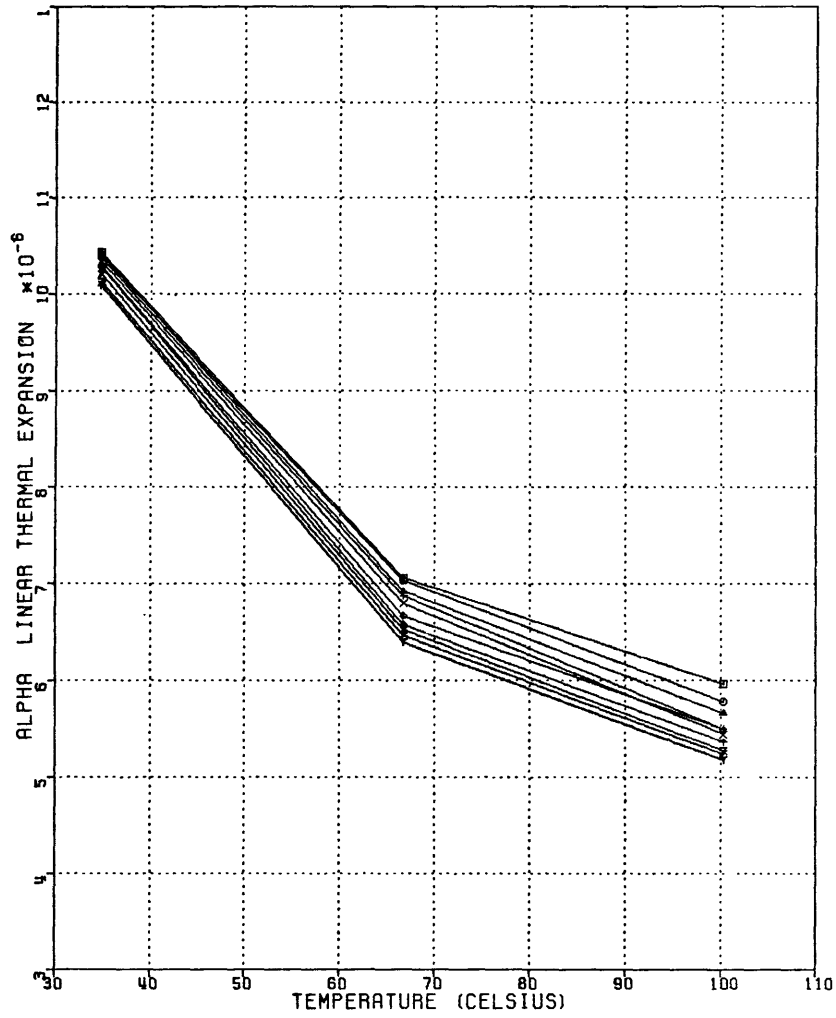
178 TWIN SISTERS WA DUNITE
GAGE:BA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♣ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



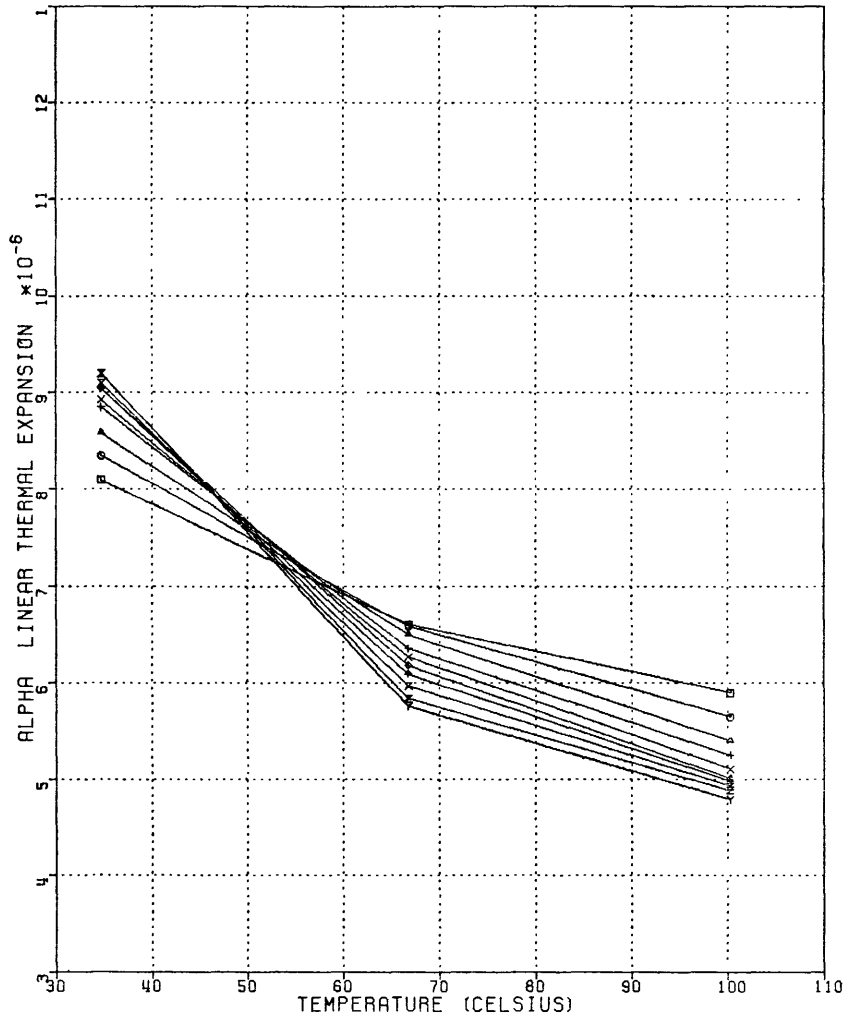
178 TWIN SISTERS WA DUNITE
GAGE:CA

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



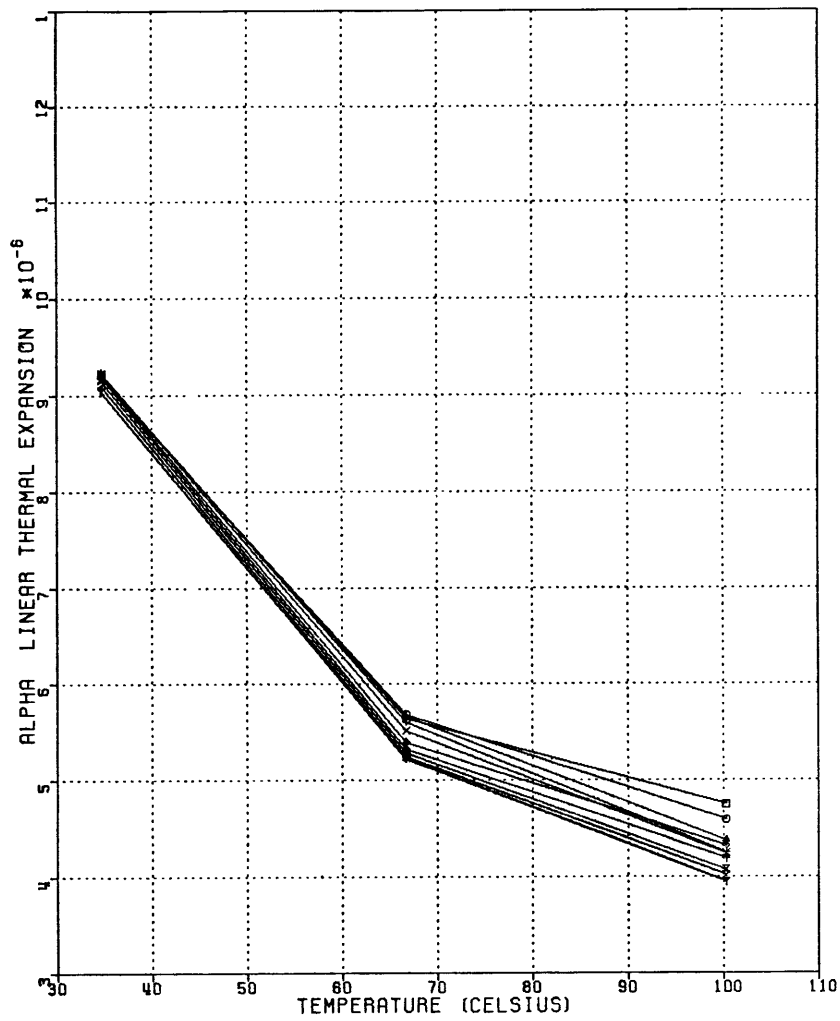
178 TWIN SISTERS WA DUNITE
GAGE:CA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♣ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



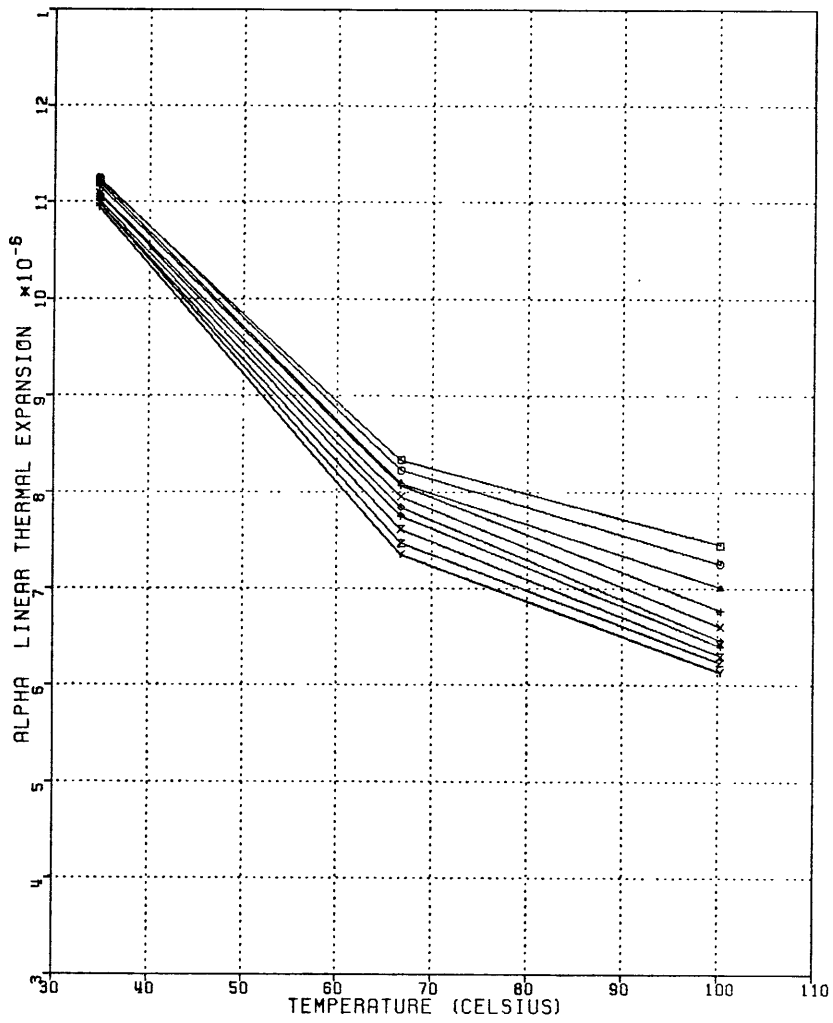
178 TWIN SISTERS WA DUNITE
GAGE: 3A

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- × - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



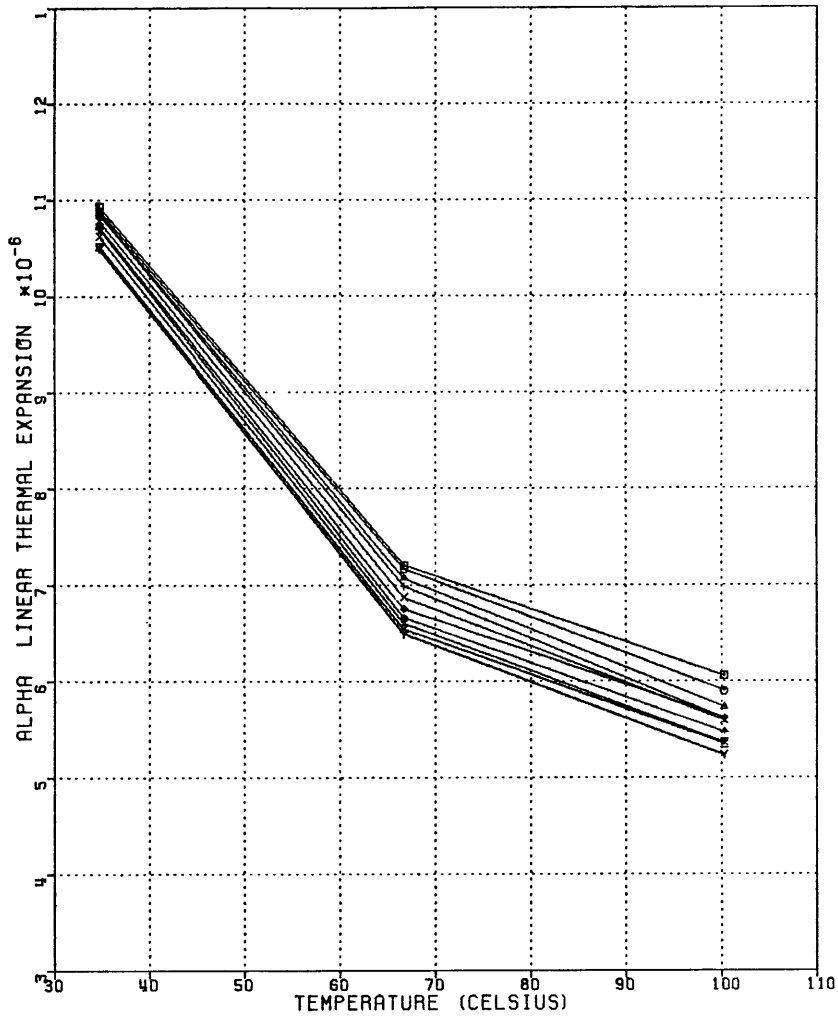
178 TWIN SISTERS WA DUNITE
GAGE: 3A

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⋈ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



178 TWIN SISTERS WA DUNITE
GAGE: 4A

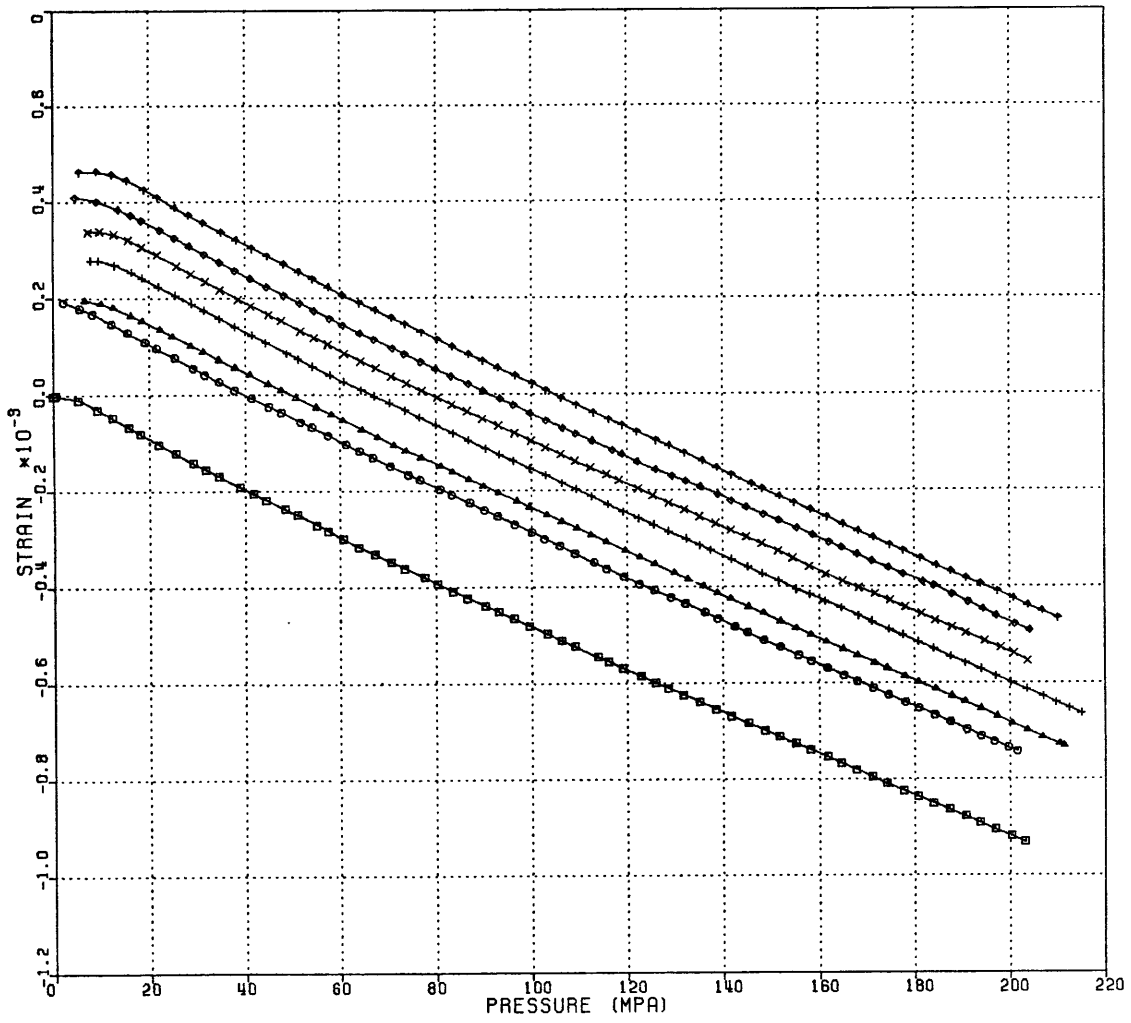
- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⋈ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



178 TWIN SISTERS WA DUNITE
GAGE: 4A

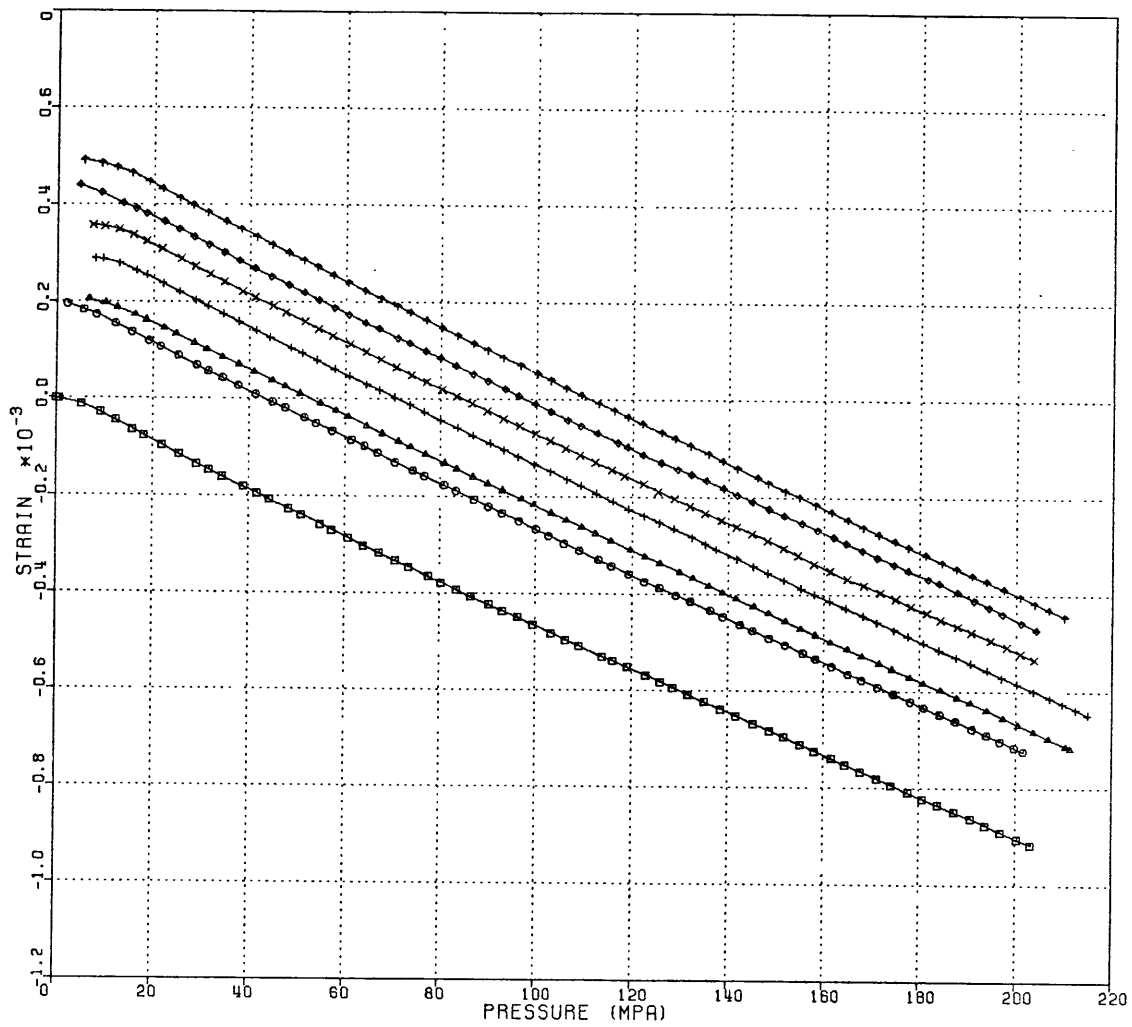
- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA

812 Pageland SC diabase is isotropic. For the low pressure run, β as a function of pressure increases rapidly below 20 MPa but to slightly above linear trends. This behavior is not as predominant in the high temperature block and is probably due to the experimental method differences between blocks (see linear compressibility section). There is no detectible change in β with temperature and β decreases only slightly with pressure. Change in α with pressure is small. α decreases with pressure for both blocks. Estimation of changes in α with temperature are the least accurate since few points were used in determining α and there are also few points to determine the slope of α as a function of temperature.



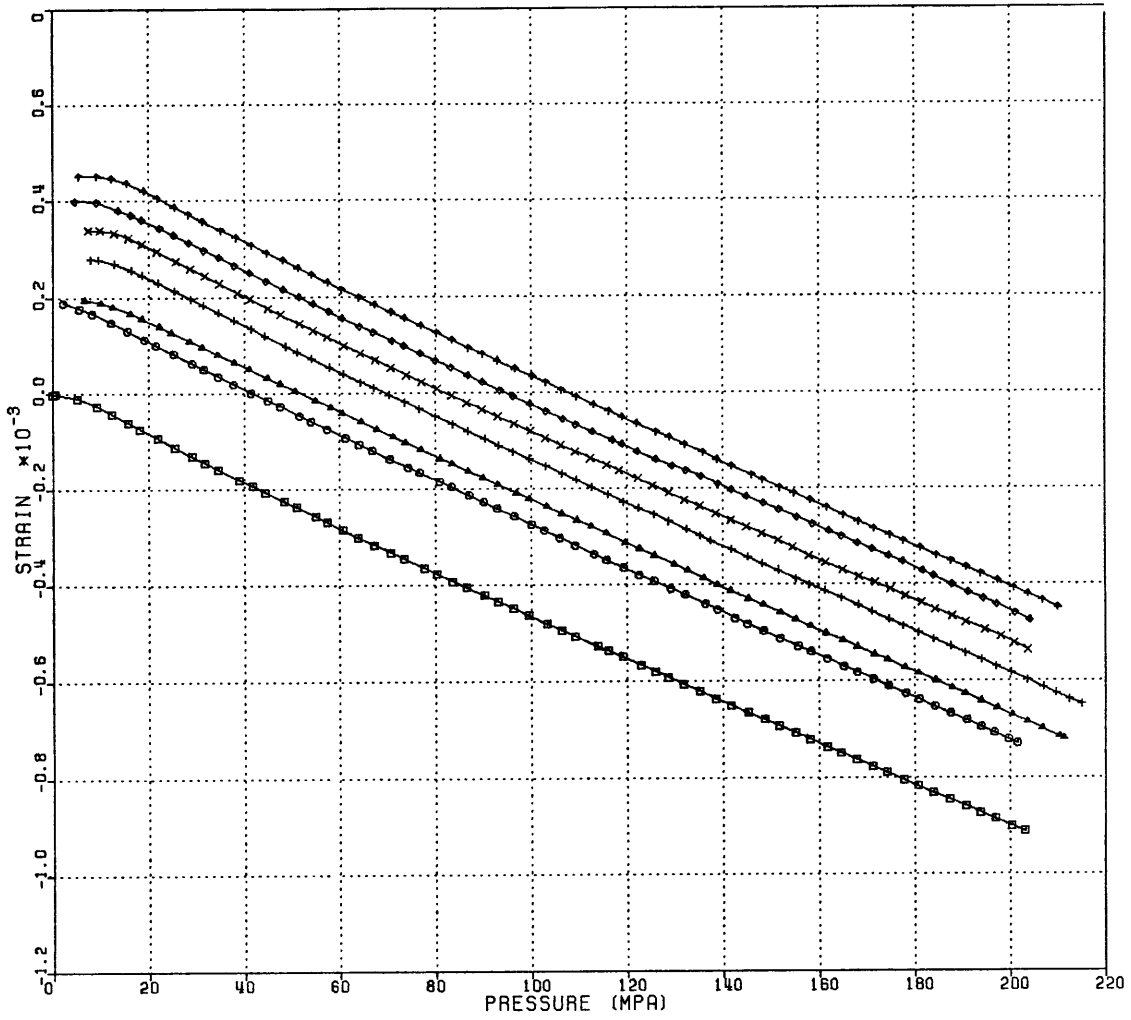
812 PAGELAND SC DIABASE
 GAGE: AC

- - 22°C
- - 46°C
- △ - 55°C
- + - 70°C
- X - 83°C
- ◇ - 96°C
- * - 110°C



812 PAGELAND SC DIABASE
 GAGE:BC

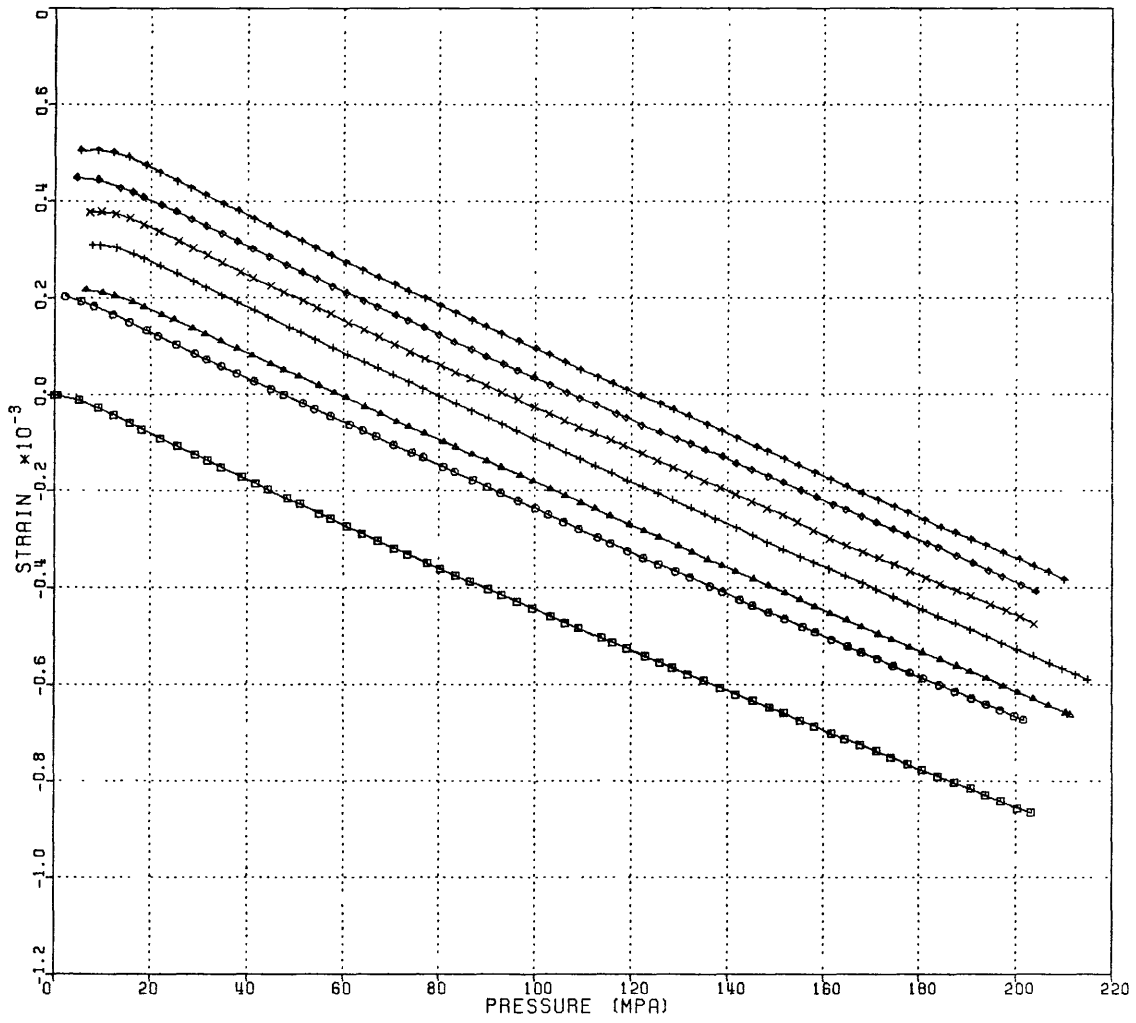
- - 22°C
- - 46°C
- △ - 55°C
- + - 70°C
- × - 83°C
- ◇ - 96°C
- ↗ - 110°C



812 PAGELAND SC DIABASE

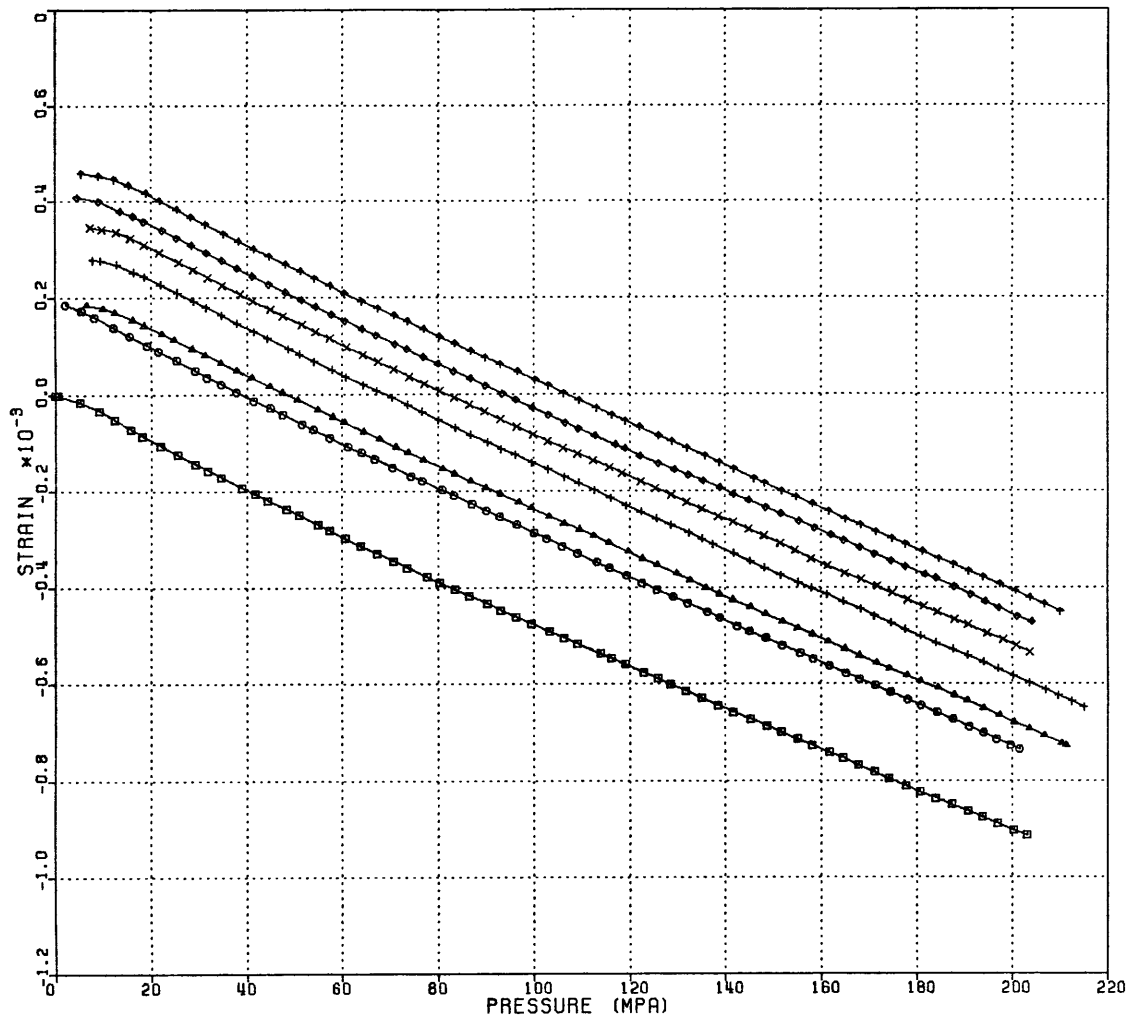
GAGE: 3C

- - 22°C
- - 46°C
- △ - 55°C
- + - 70°C
- × - 83°C
- ◇ - 96°C
- ↑ - 110°C



812 PAGELAND SC DIABASE
GAGE: AB

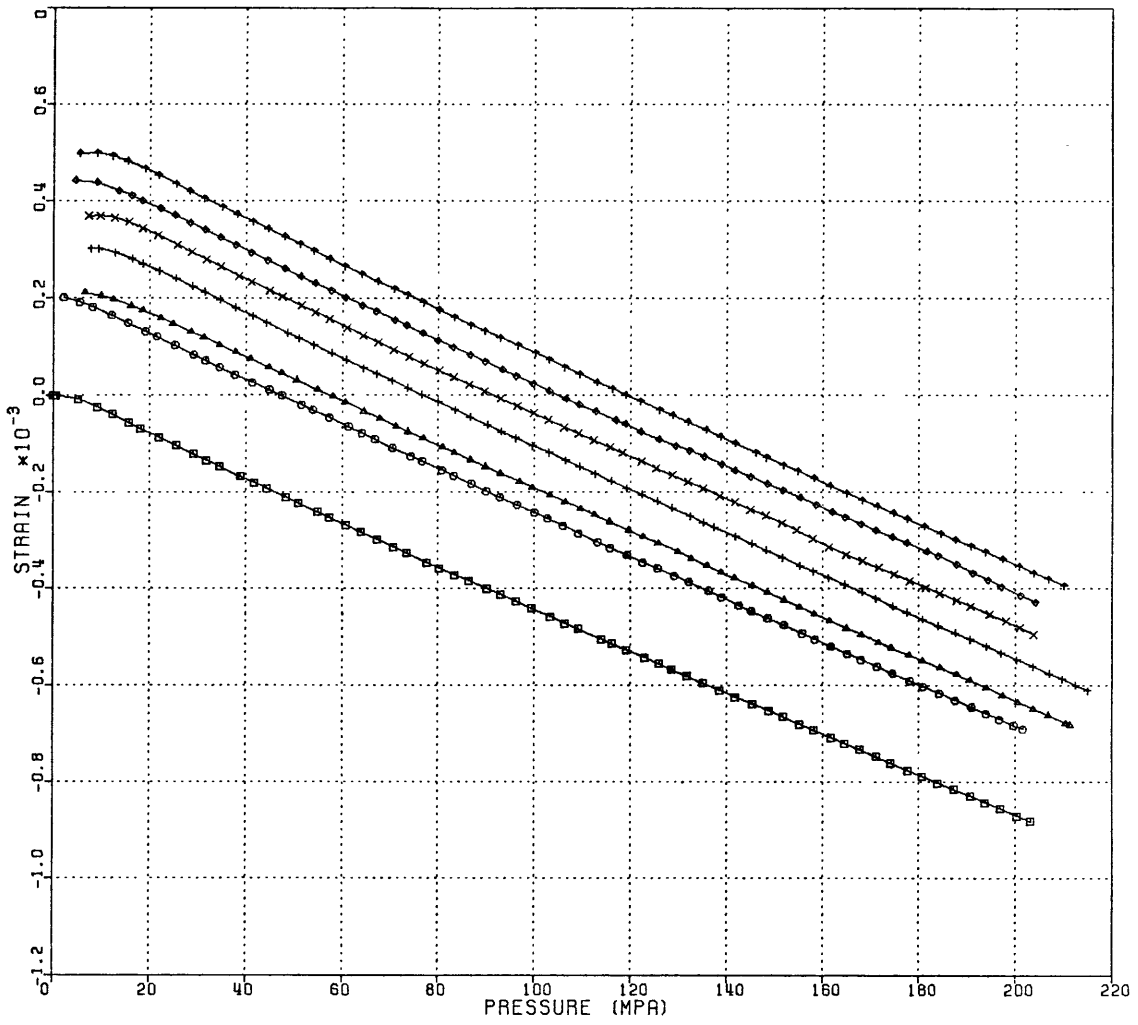
- - 22°C
- - 46°C
- △ - 55°C
- + - 70°C
- X - 83°C
- ◇ - 96°C
- ⊕ - 110°C



812 PAGELAND SC DIABASE

GAGE:CB

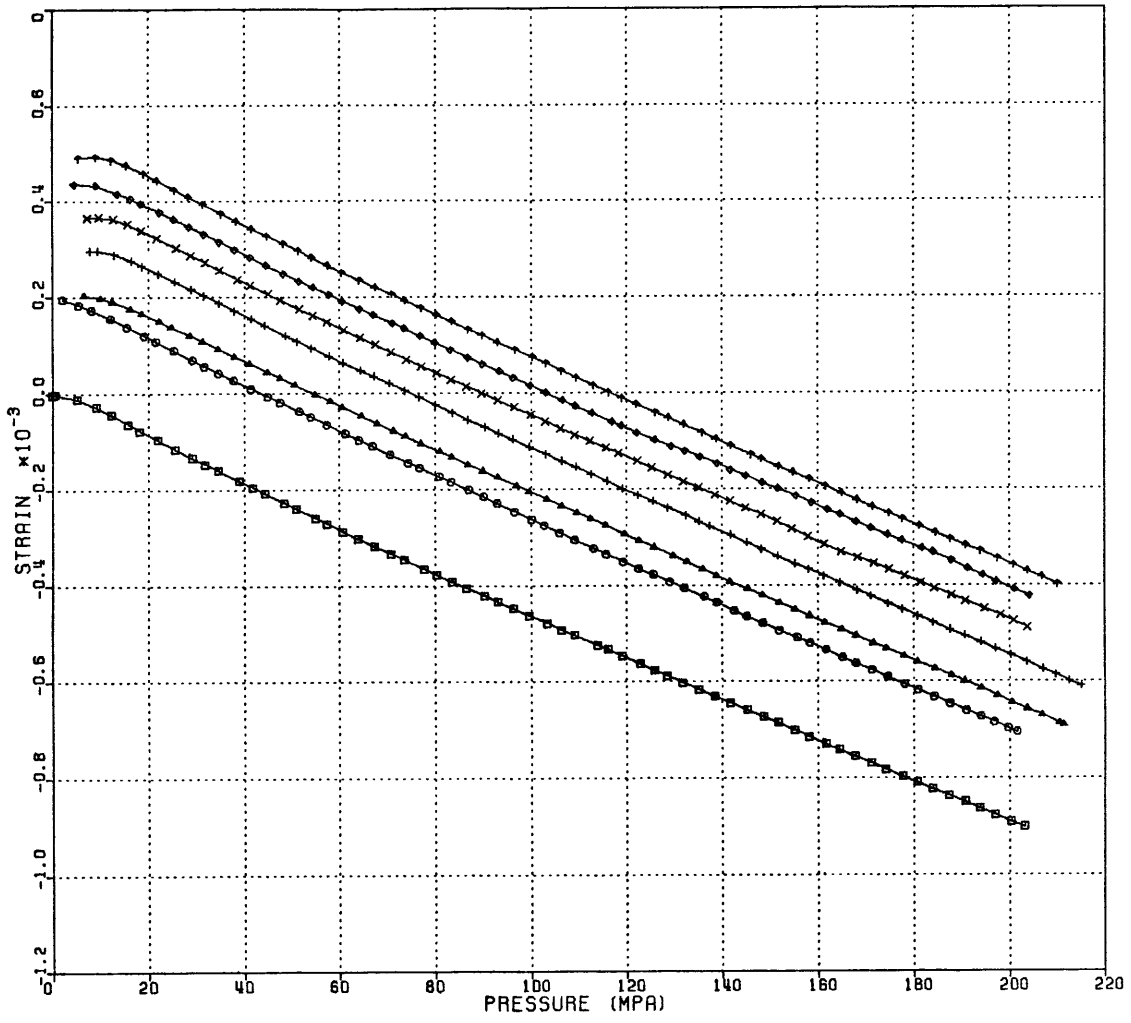
- - 22°C
- - 46°C
- △ - 55°C
- + - 70°C
- X - 83°C
- ◇ - 96°C
- ★ - 110°C



812 PAGELAND SC DIABASE

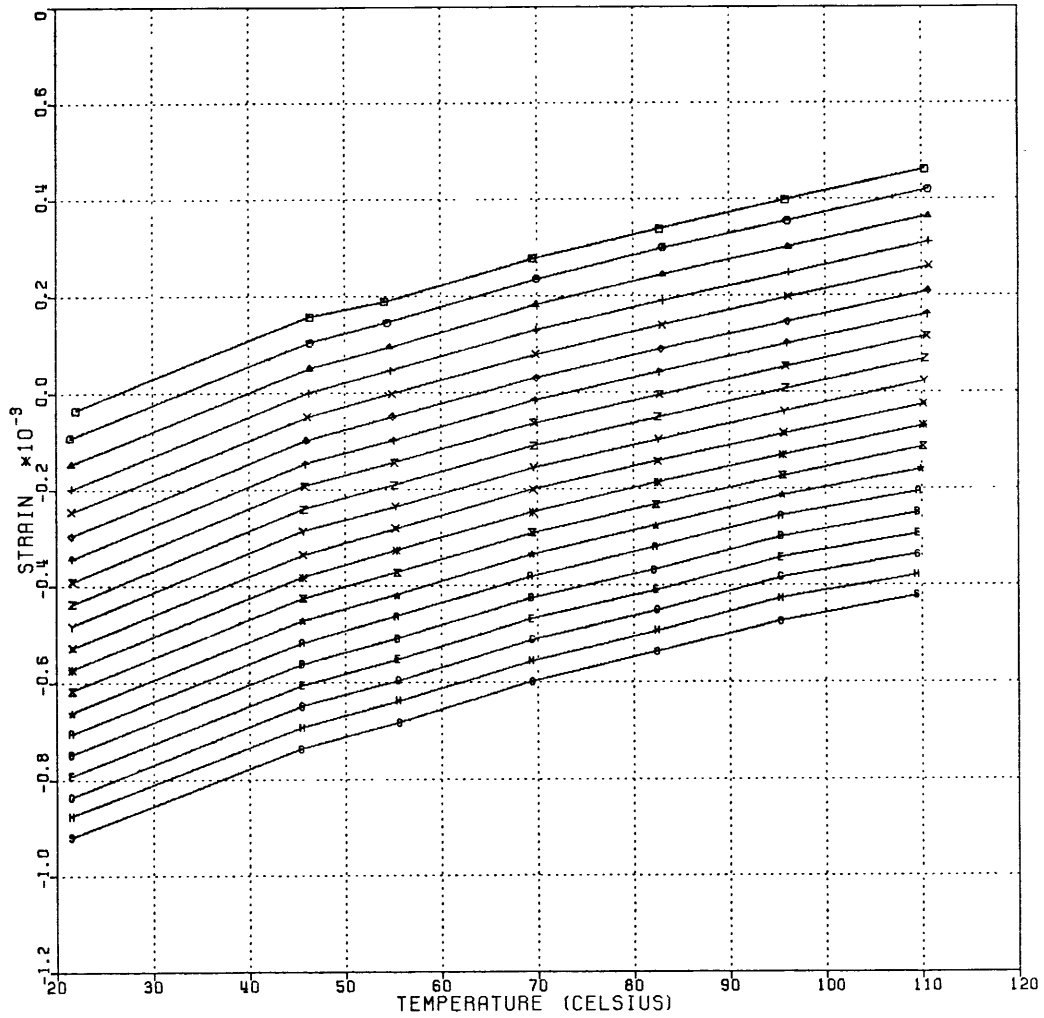
GAGE:3B

- - 22°C
- - 46°C
- △ - 55°C
- + - 70°C
- X - 83°C
- ◇ - 96°C
- ↑ - 110°C



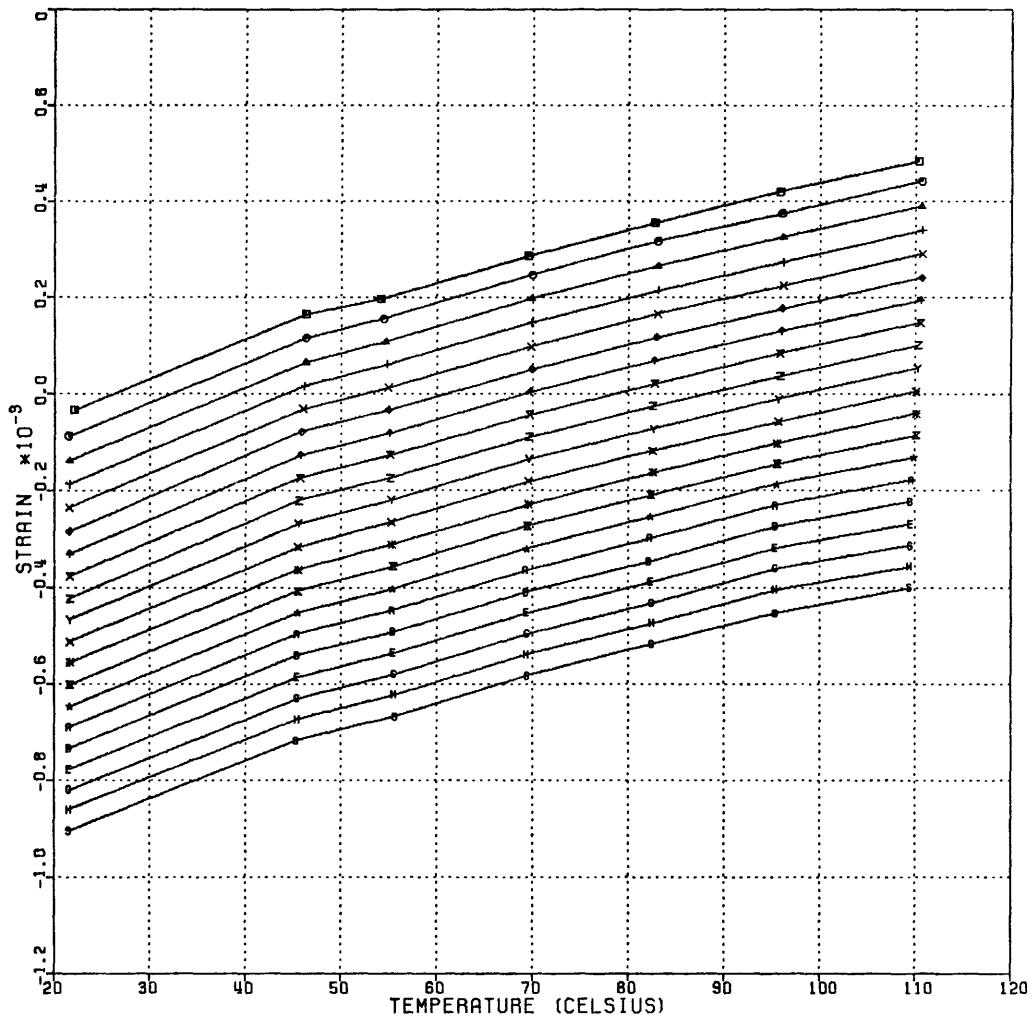
812 PAGELAND SC DIABASE
 GAGE: CA

- - 22°C
- - 46°C
- ▲ - 55°C
- + - 70°C
- X - 83°C
- ◇ - 96°C
- ↑ - 110°C



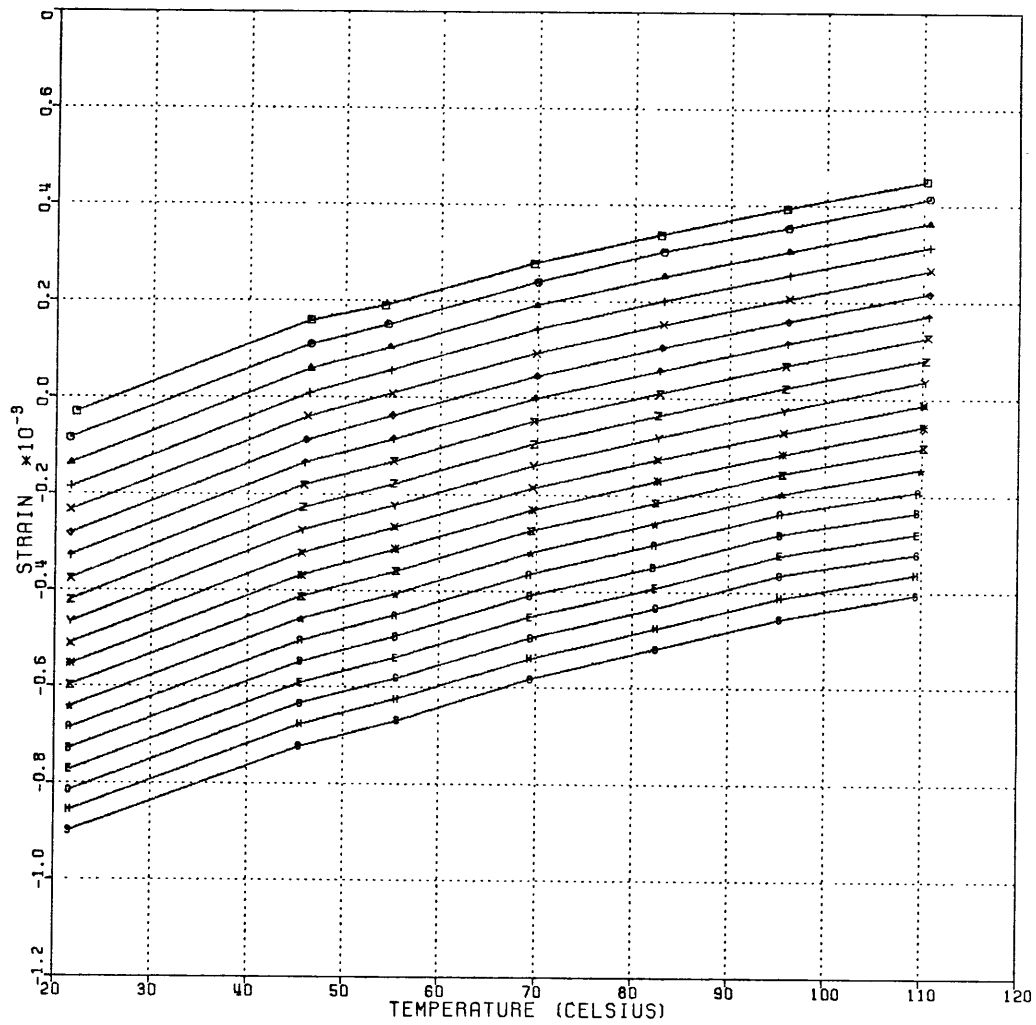
812 PAGELAND SC DIABASE
GAGE:AC

- | | |
|-------------|-------------|
| □ - 10 MPA | × - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | ⊗ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| × - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ⊕ - 70 MPA | E - 170 MPA |
| ⊗ - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



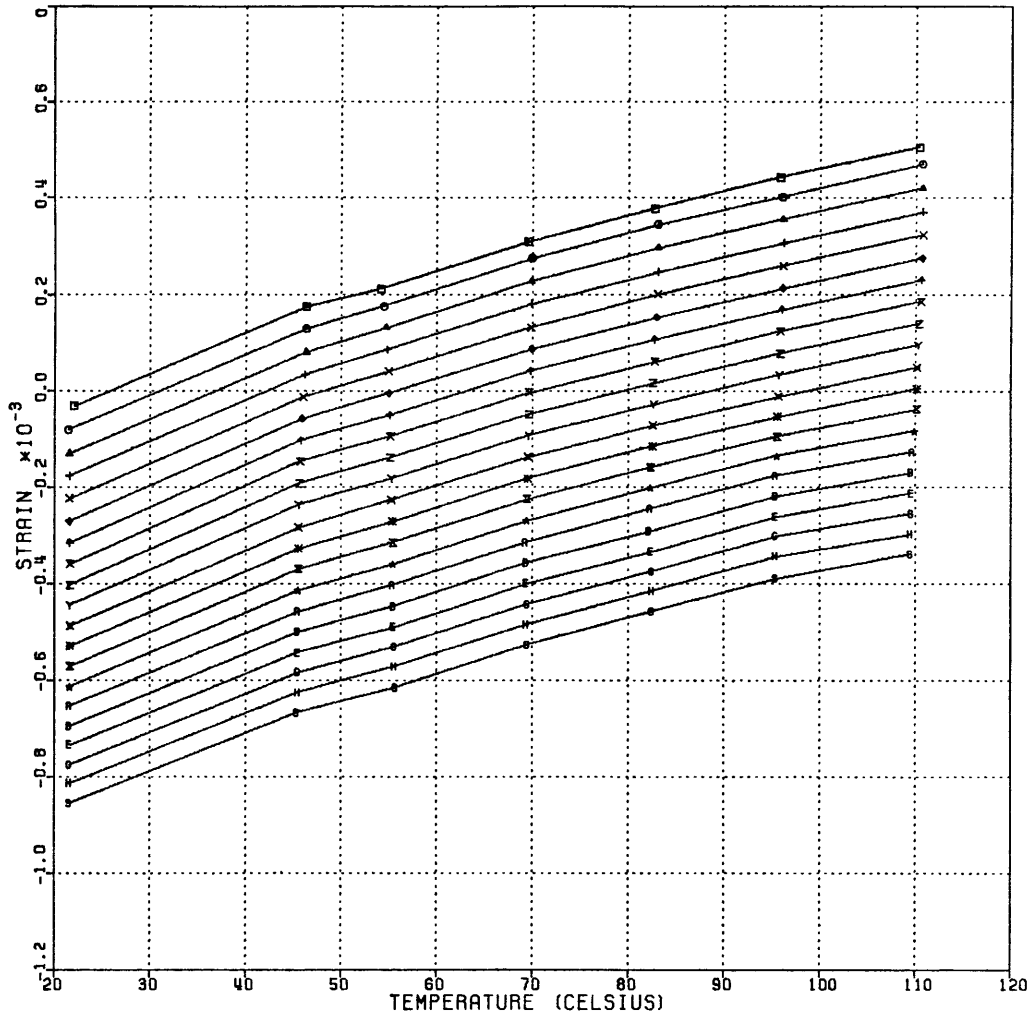
812 PAGELAND SC DIABASE
GAGE:BC

- | | |
|-------------|-------------|
| □ - 10 MPA | × - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | ⊗ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | ⊠ - 150 MPA |
| ◇ - 60 MPA | ⊡ - 160 MPA |
| ⊕ - 70 MPA | ⊢ - 170 MPA |
| ⊗ - 80 MPA | ⊣ - 180 MPA |
| ⊘ - 90 MPA | ⊤ - 190 MPA |
| ⊙ - 100 MPA | ⊥ - 200 MPA |



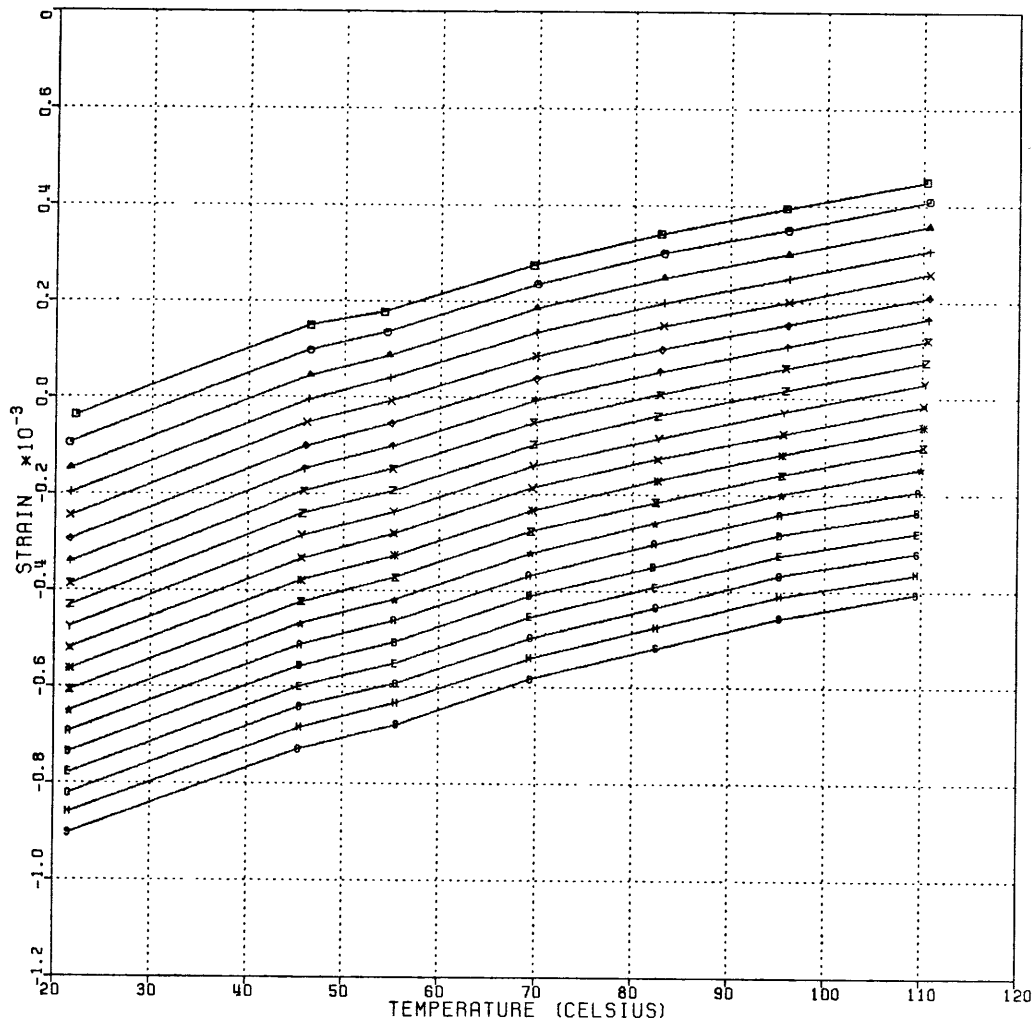
812 PAGELAND SC DIABASE
GAGE:3C

□ - 10 MPA	⌘ - 110 MPA
○ - 20 MPA	* - 120 MPA
△ - 30 MPA	⊗ - 130 MPA
+ - 40 MPA	☆ - 140 MPA
X - 50 MPA	⊖ - 150 MPA
◇ - 60 MPA	⊕ - 160 MPA
⊕ - 70 MPA	⊖ - 170 MPA
⊗ - 80 MPA	⊕ - 180 MPA
⊗ - 90 MPA	⊖ - 190 MPA
Y - 100 MPA	S - 200 MPA



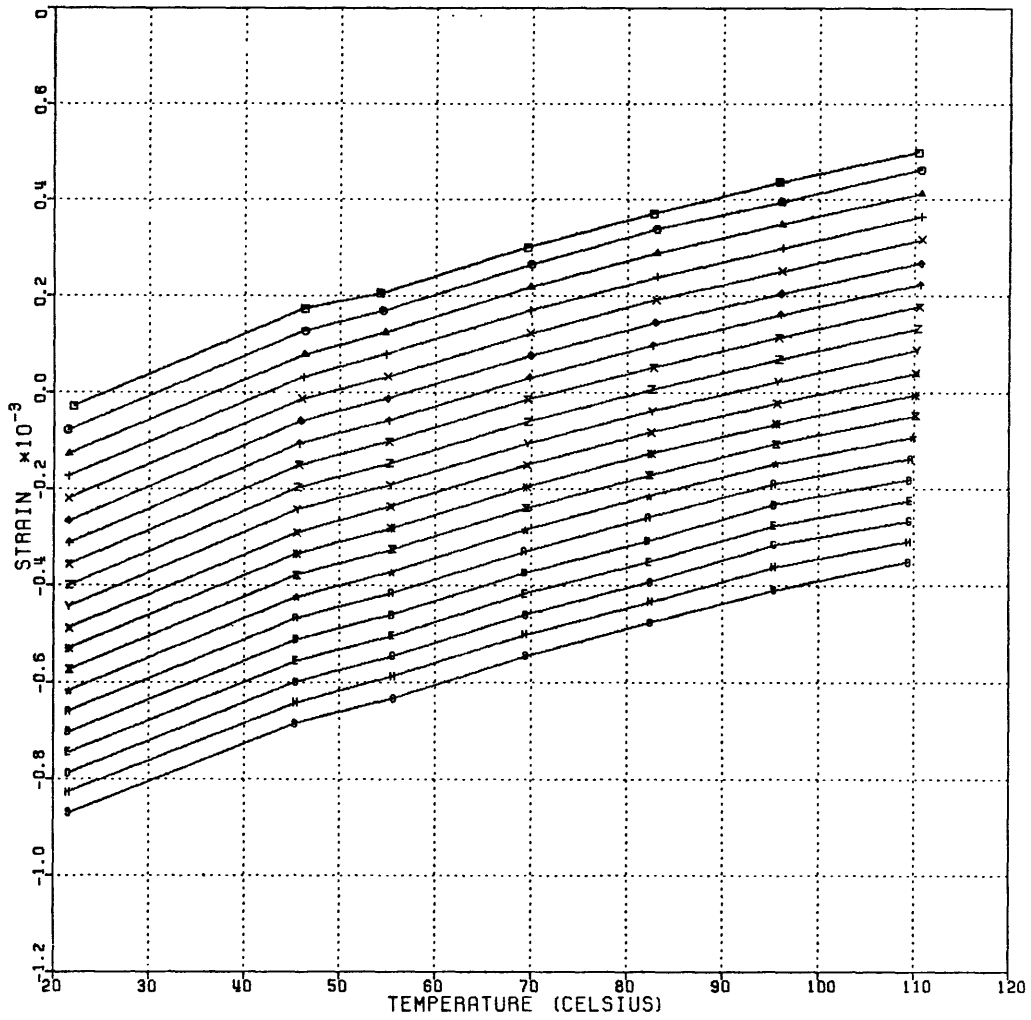
812 PAGELAND SC DIABASE
GAGE:AB

- | | |
|-------------|-------------|
| □ - 10 MPA | × - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | ⊗ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | ⊠ - 150 MPA |
| ◇ - 60 MPA | ⊡ - 160 MPA |
| ⊕ - 70 MPA | ⊣ - 170 MPA |
| ⊗ - 80 MPA | ⊤ - 180 MPA |
| Z - 90 MPA | ⊥ - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



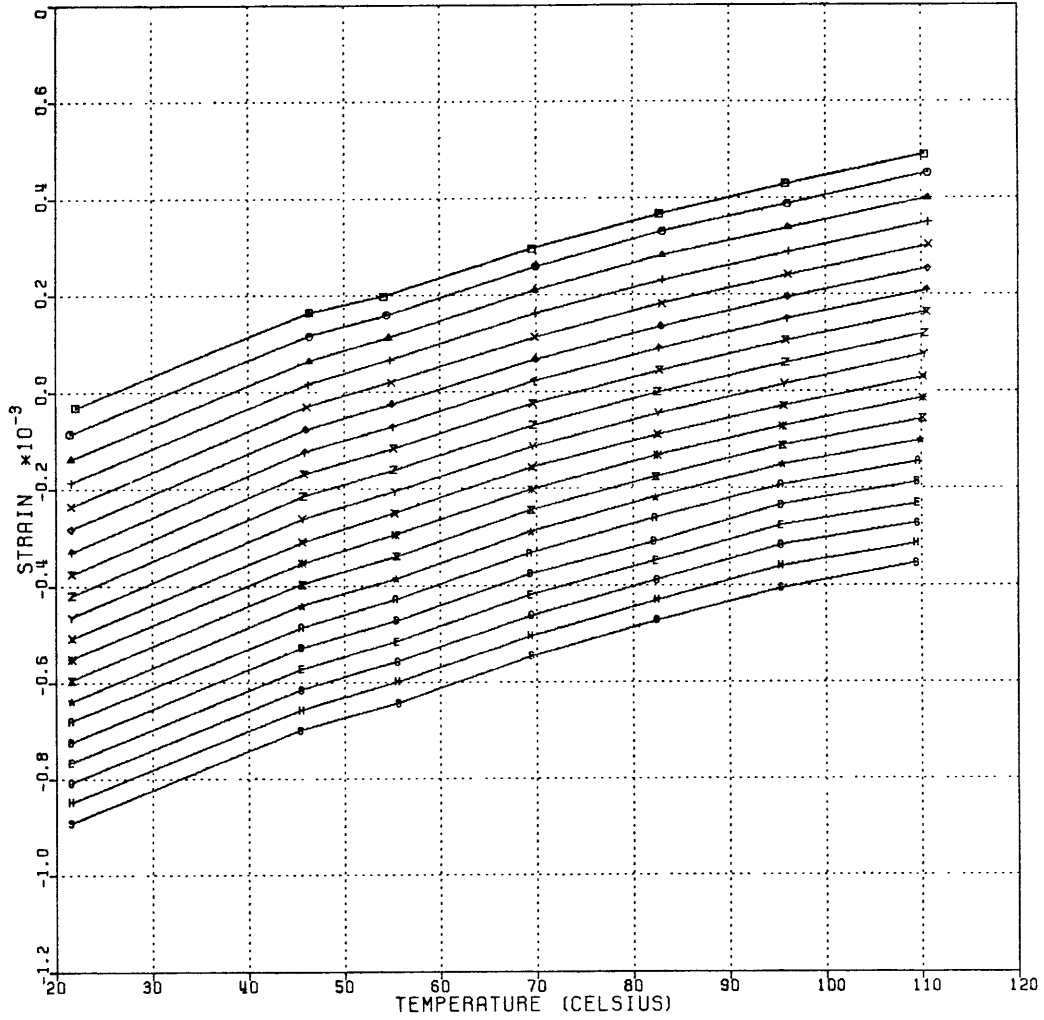
812 PAGELAND SC DIABASE
GAGE:CB

□ - 10 MPA	⊗ - 110 MPA
⊙ - 20 MPA	✱ - 120 MPA
△ - 30 MPA	✕ - 130 MPA
+ - 40 MPA	★ - 140 MPA
X - 50 MPA	◐ - 150 MPA
◇ - 60 MPA	B - 160 MPA
† - 70 MPA	E - 170 MPA
‡ - 80 MPA	G - 180 MPA
Z - 90 MPA	H - 190 MPA
Y - 100 MPA	S - 200 MPA



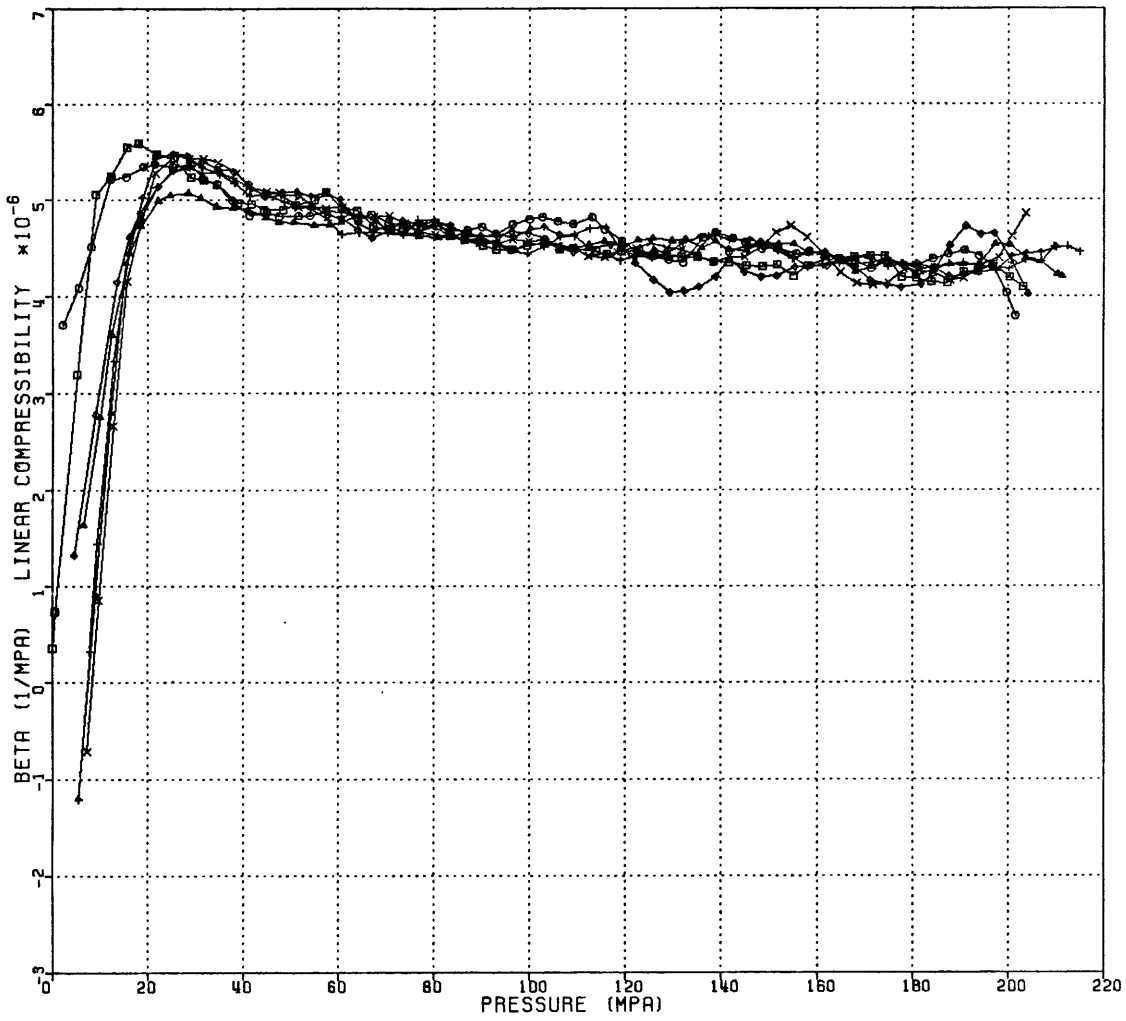
812 PAGELAND SC DIABASE
GAGE:3B

- | | |
|-------------|-------------|
| □ - 10 MPA | X - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| ▲ - 30 MPA | X - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | B - 150 MPA |
| ◇ - 60 MPA | E - 160 MPA |
| † - 70 MPA | G - 170 MPA |
| X - 80 MPA | H - 180 MPA |
| Z - 90 MPA | S - 190 MPA |
| Y - 100 MPA | |



812 PAGELAND SC DIABASE
GAGE:CA

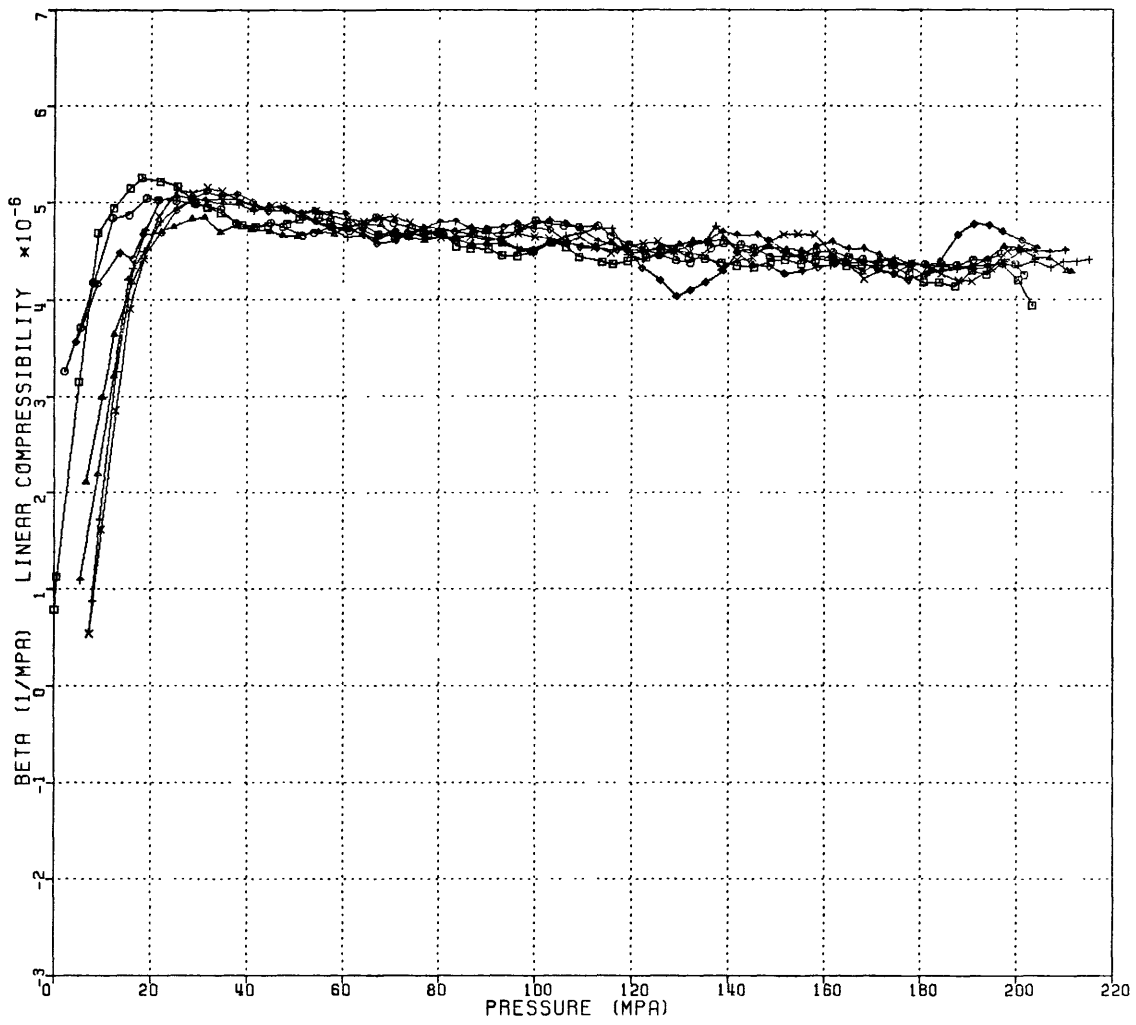
- | | |
|-------------|-------------|
| □ - 10 MPA | ✕ - 110 MPA |
| ○ - 20 MPA | ✖ - 120 MPA |
| ▲ - 30 MPA | ✗ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| † - 70 MPA | E - 170 MPA |
| X - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



812 PAGELAND SC DIABASE

GAGE:AC

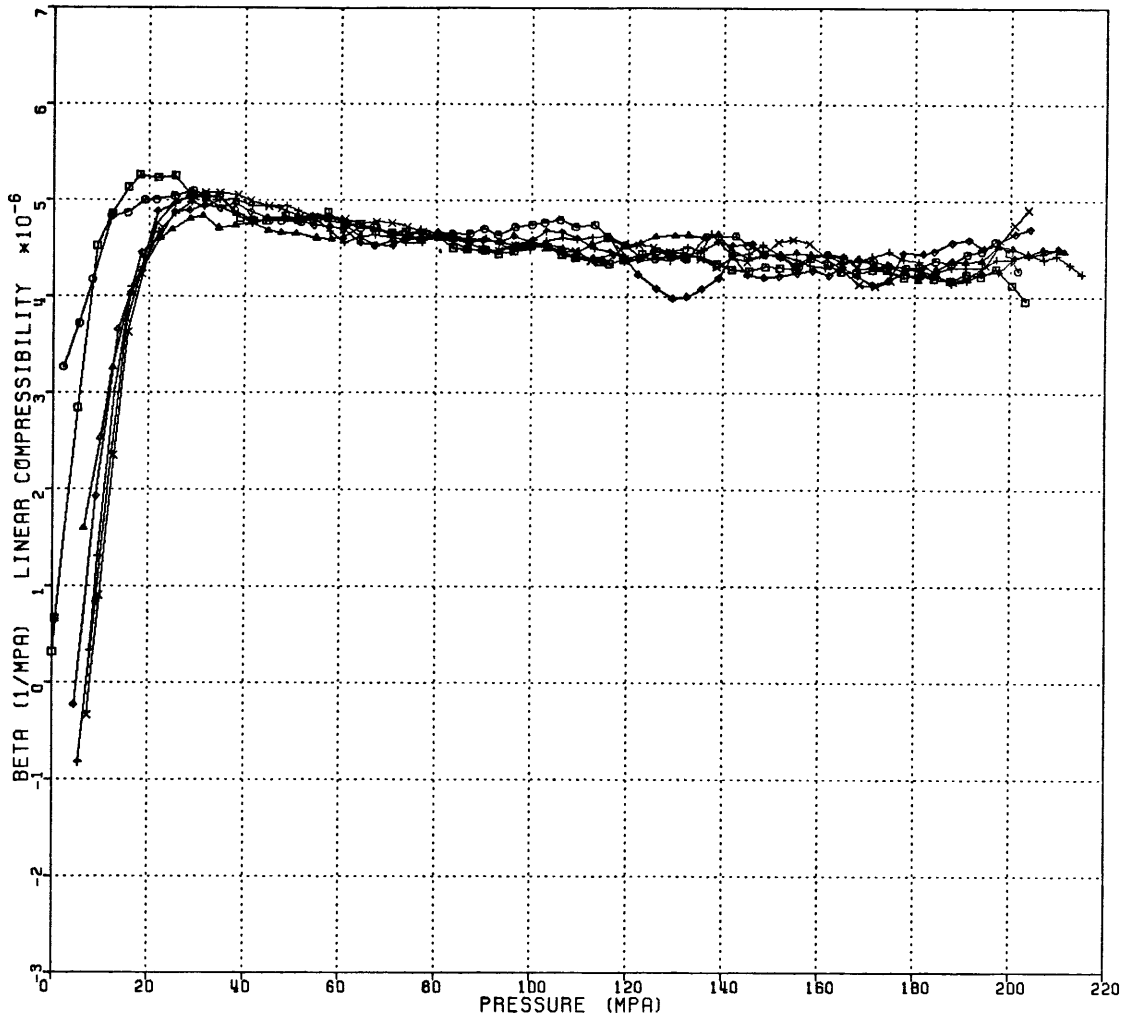
- - 22°C
- - 46°C
- ▲ - 55°C
- + - 70°C
- X - 83°C
- ◇ - 96°C
- ↑ - 110°C



812 PAGELAND SC DIABASE

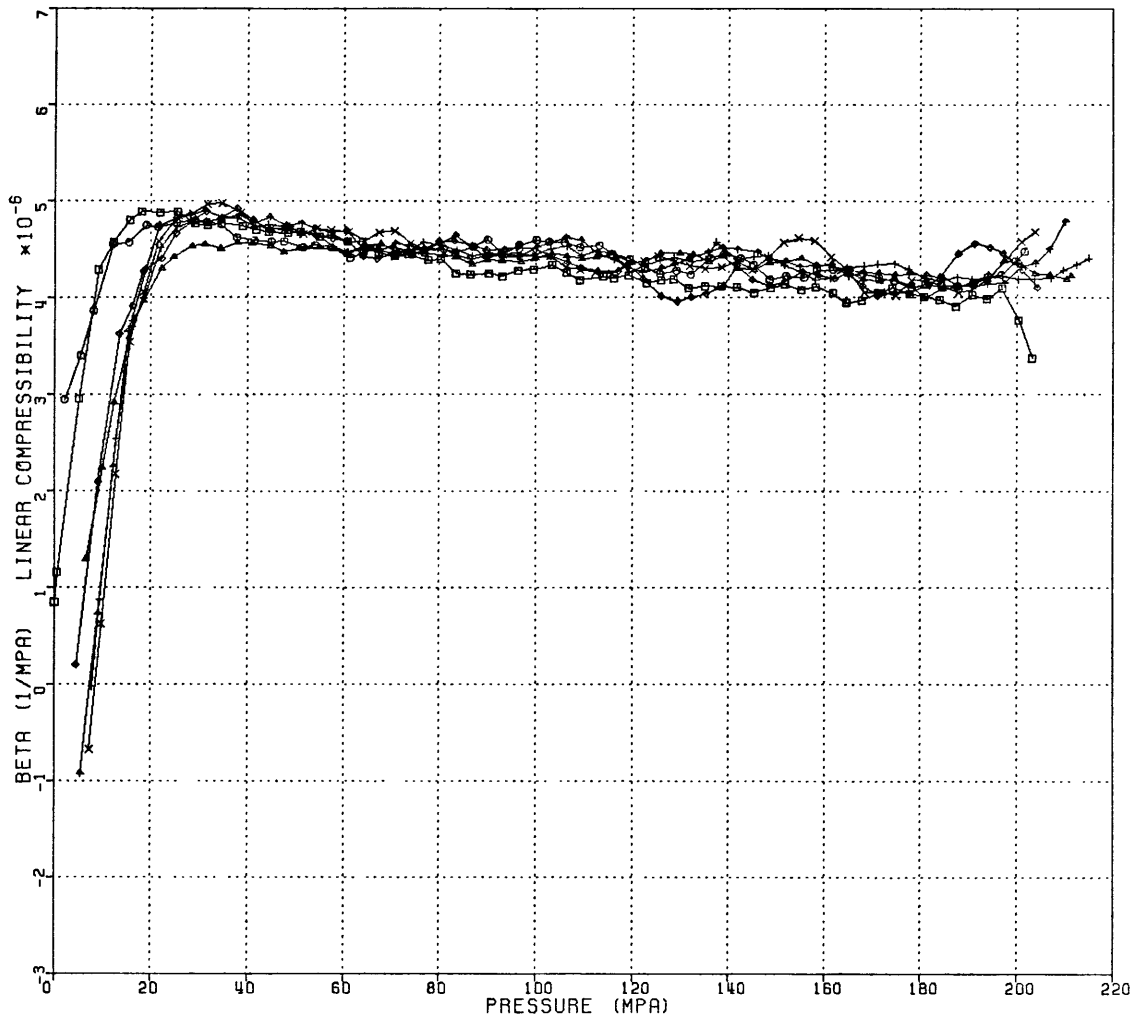
GAGE:BC

- - 22°C
- - 46°C
- △ - 55°C
- + - 70°C
- X - 83°C
- ◇ - 96°C
- ▽ - 110°C



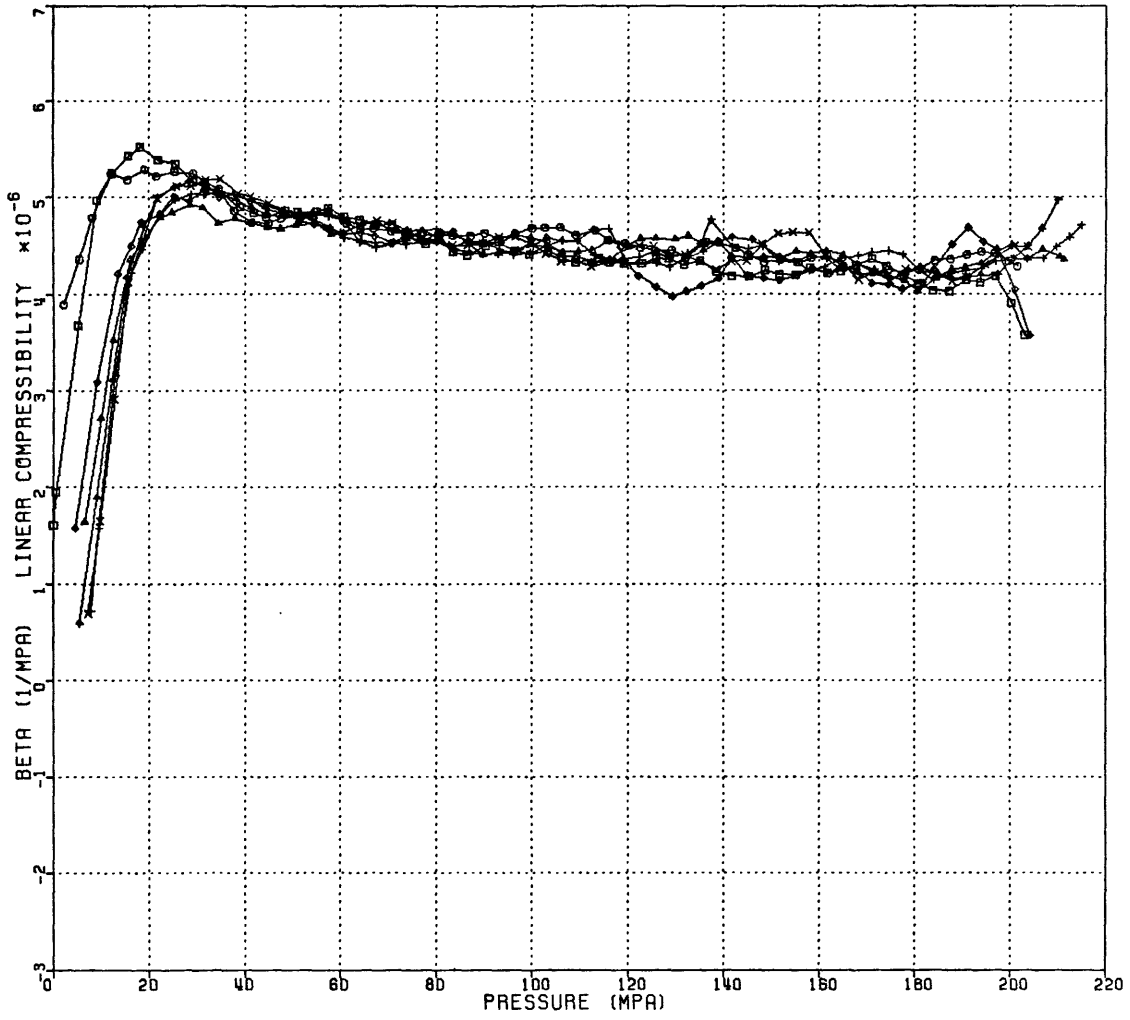
812 PAGELAND SC DIABASE
GAGE: 3C

- - 22°C
- - 46°C
- △ - 55°C
- + - 70°C
- X - 83°C
- ◇ - 96°C
- ♠ - 110°C



812 PAGELAND SC DIABASE
GAGE: AB

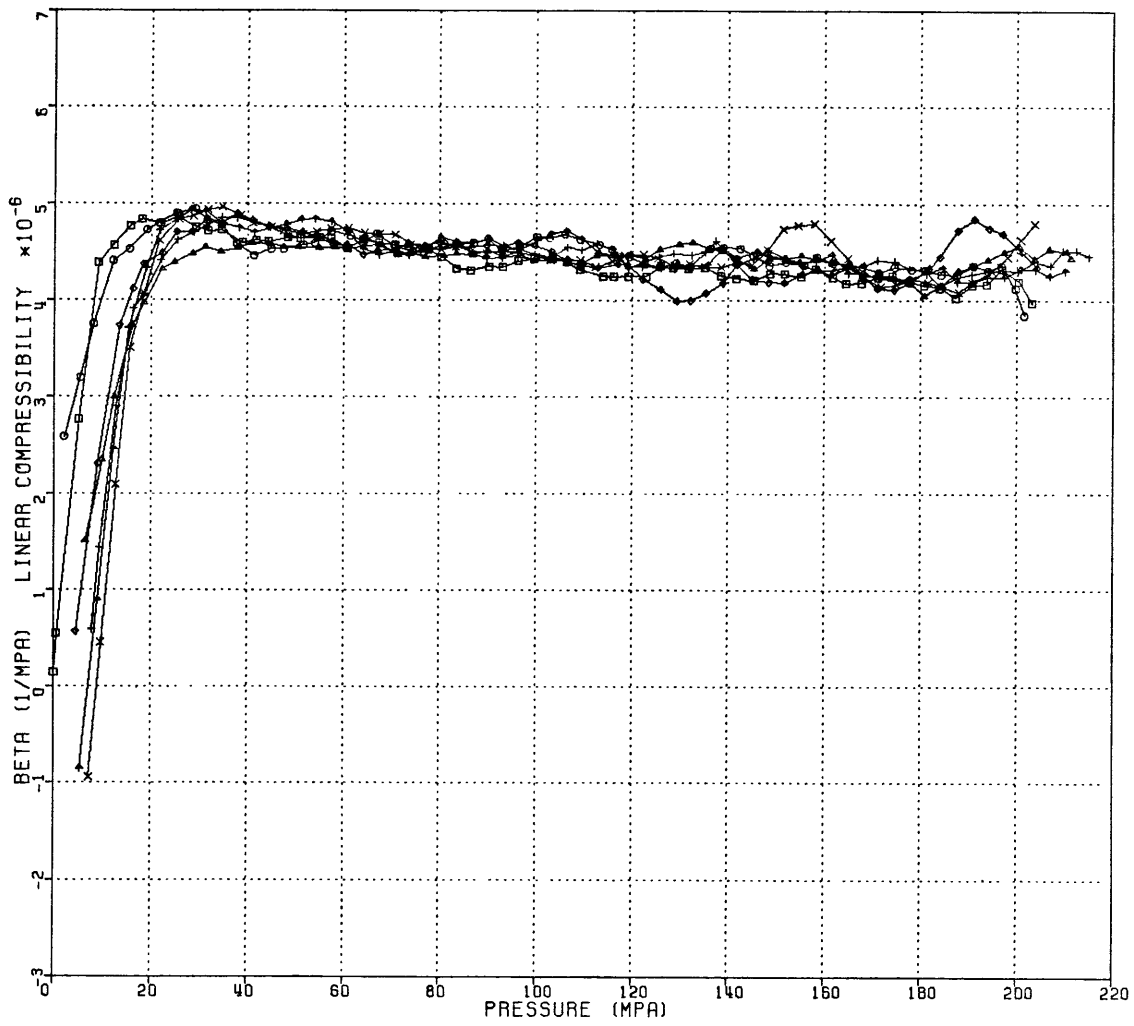
- - 22°C
- - 46°C
- △ - 55°C
- + - 70°C
- × - 83°C
- ◇ - 96°C
- ♣ - 110°C



812 PAGELAND SC DIABASE

GAGE:CB

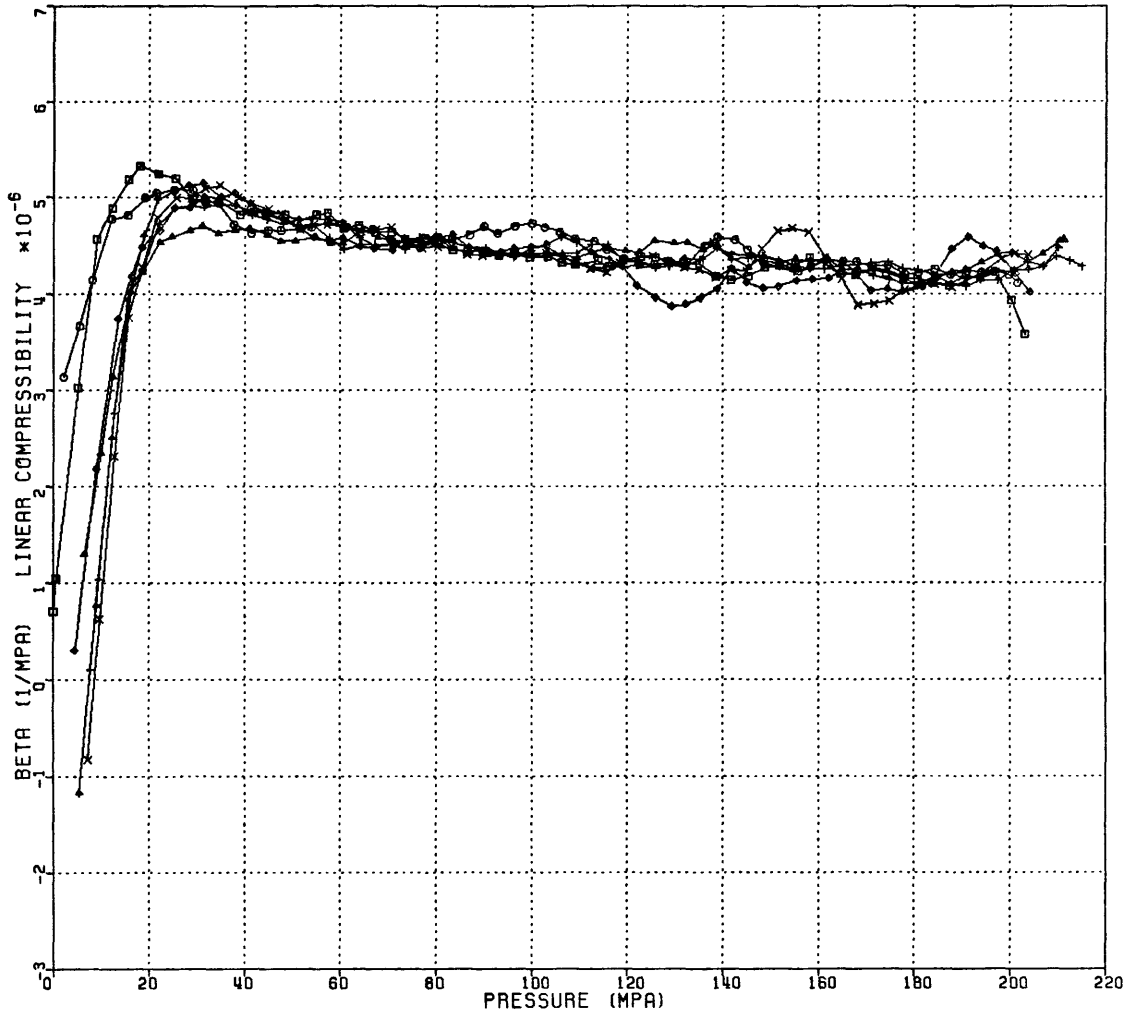
- - 22°C
- - 46°C
- △ - 55°C
- + - 70°C
- × - 83°C
- ◇ - 96°C
- ↗ - 110°C



812 PAGELAND SC DIABASE

GAGE: 3B

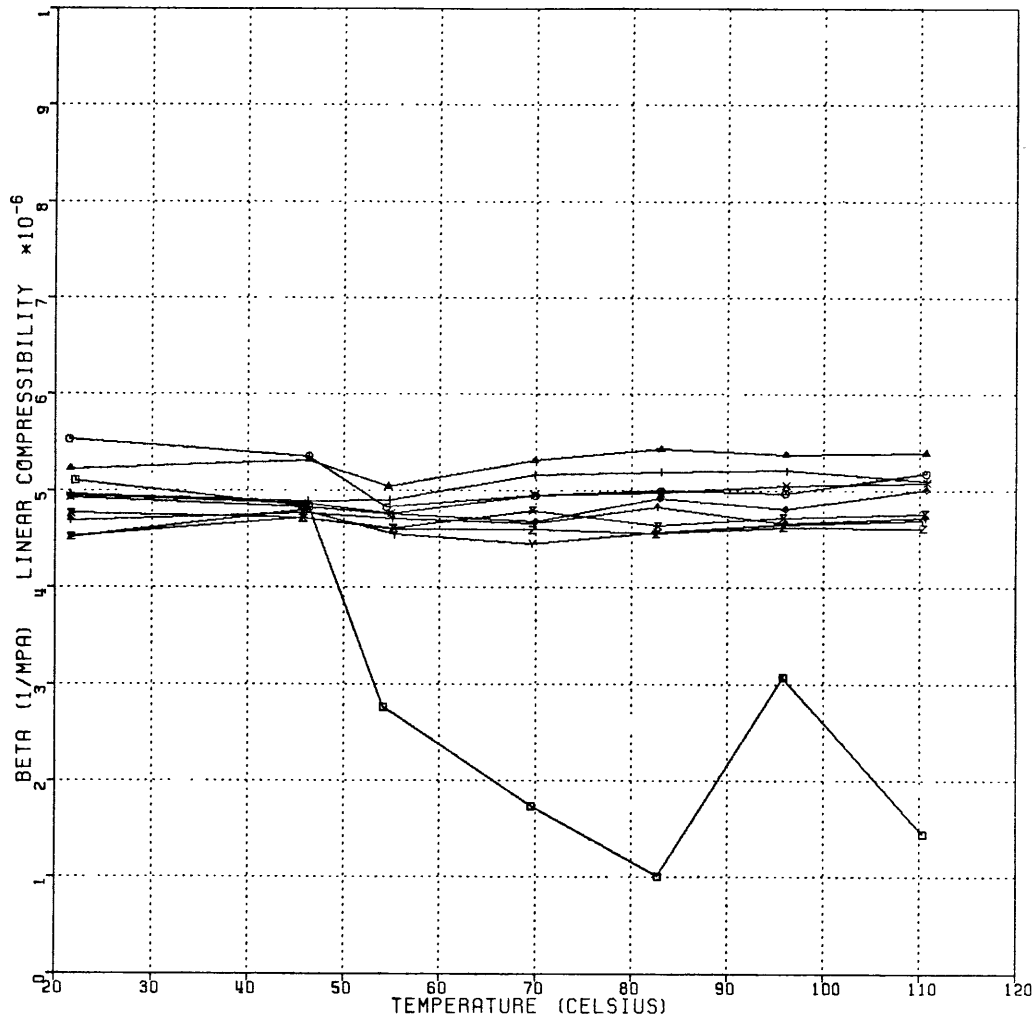
- - 22°C
- - 46°C
- △ - 55°C
- + - 70°C
- × - 83°C
- ◇ - 96°C
- ∇ - 110°C



812 PAGELAND SC DIABASE

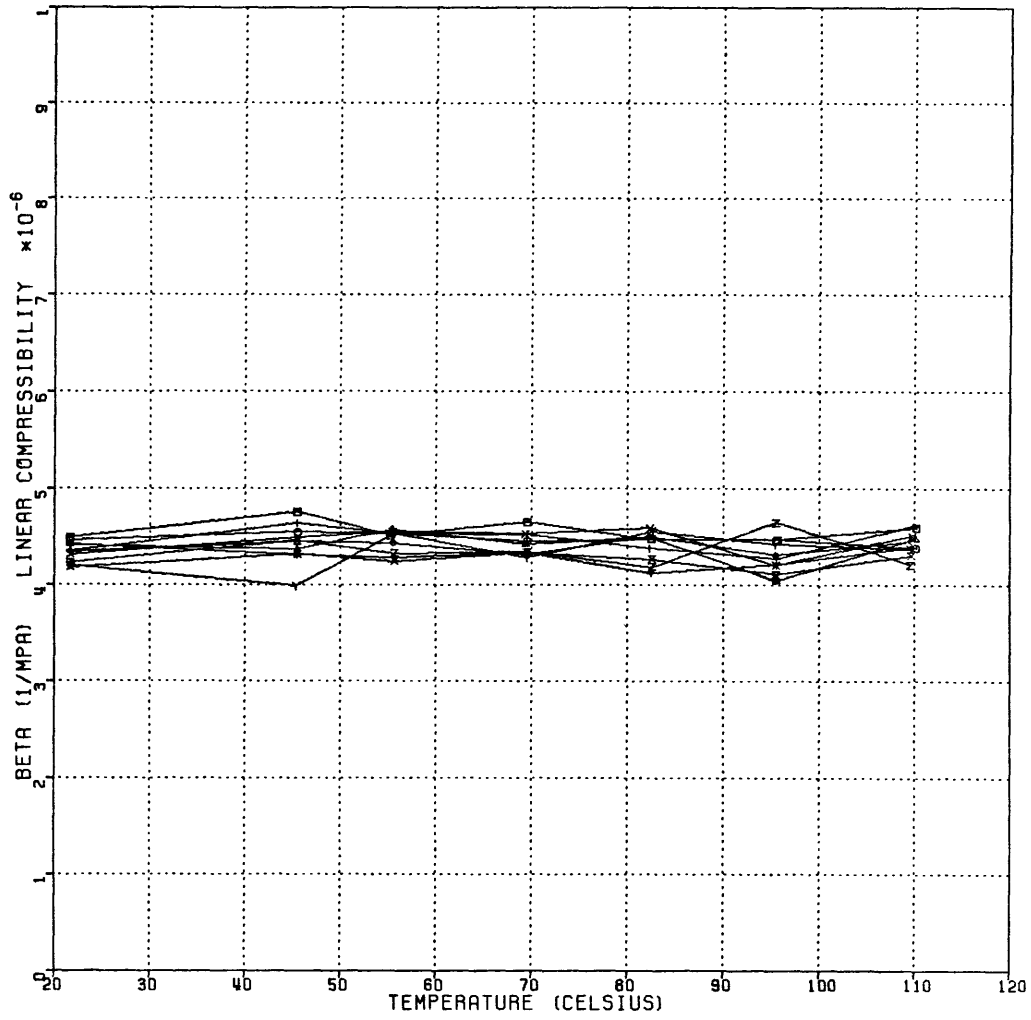
GAGE: CA

- - 22°C
- - 46°C
- △ - 55°C
- + - 70°C
- × - 83°C
- ◇ - 96°C
- ♠ - 110°C



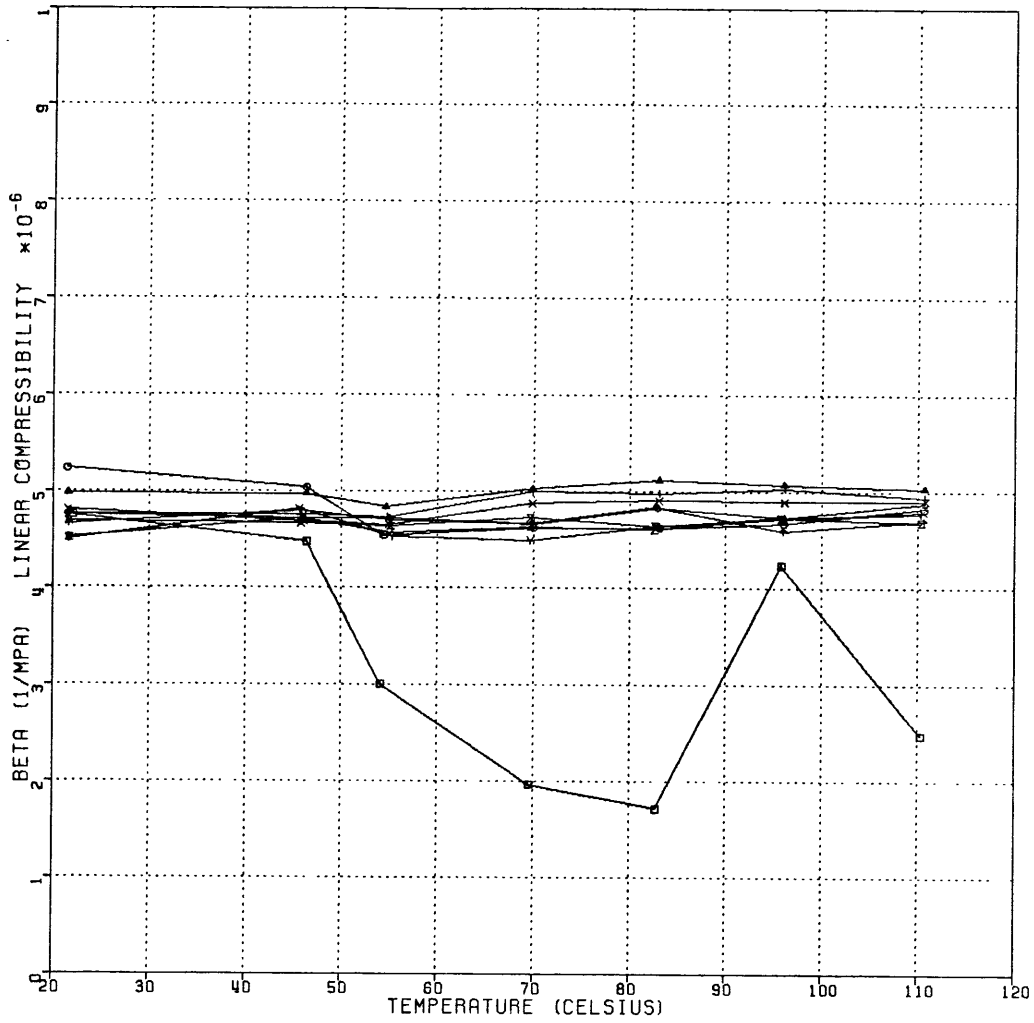
812 PAGELAND SC DIABASE
GAGE:AC

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



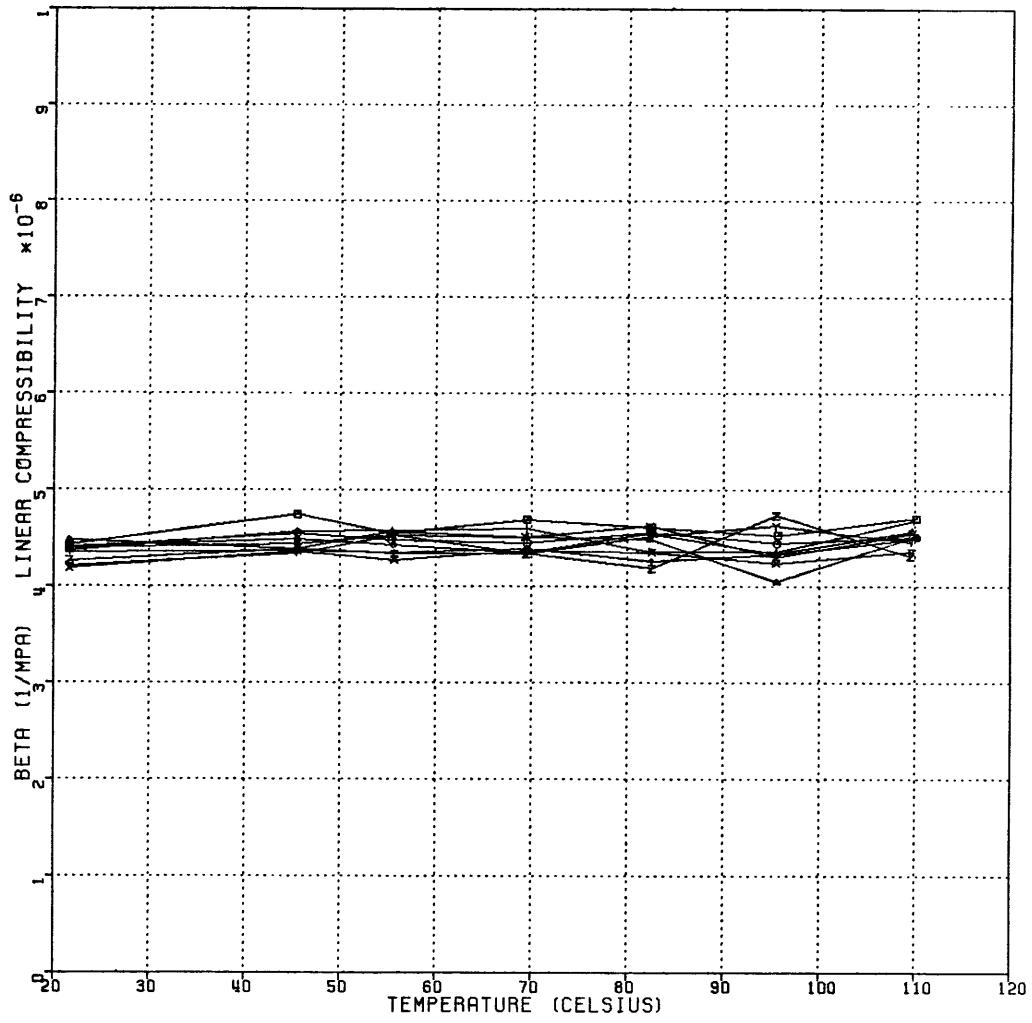
812 PAGELAND SC DIABASE
GAGE: AC

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



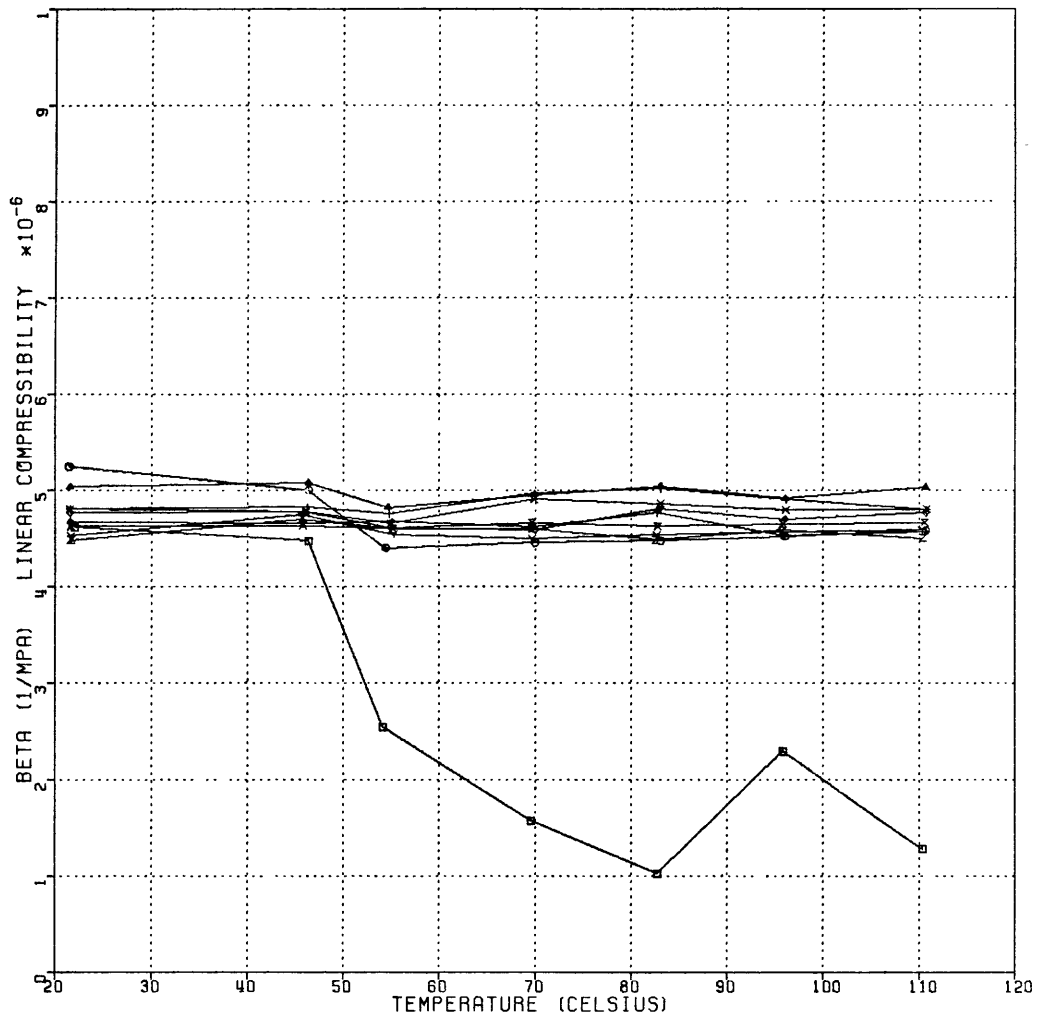
812 PAGELAND SC DIABASE
GAGE:BC

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- x - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- x - 80 MPA
- z - 90 MPA
- y - 100 MPA



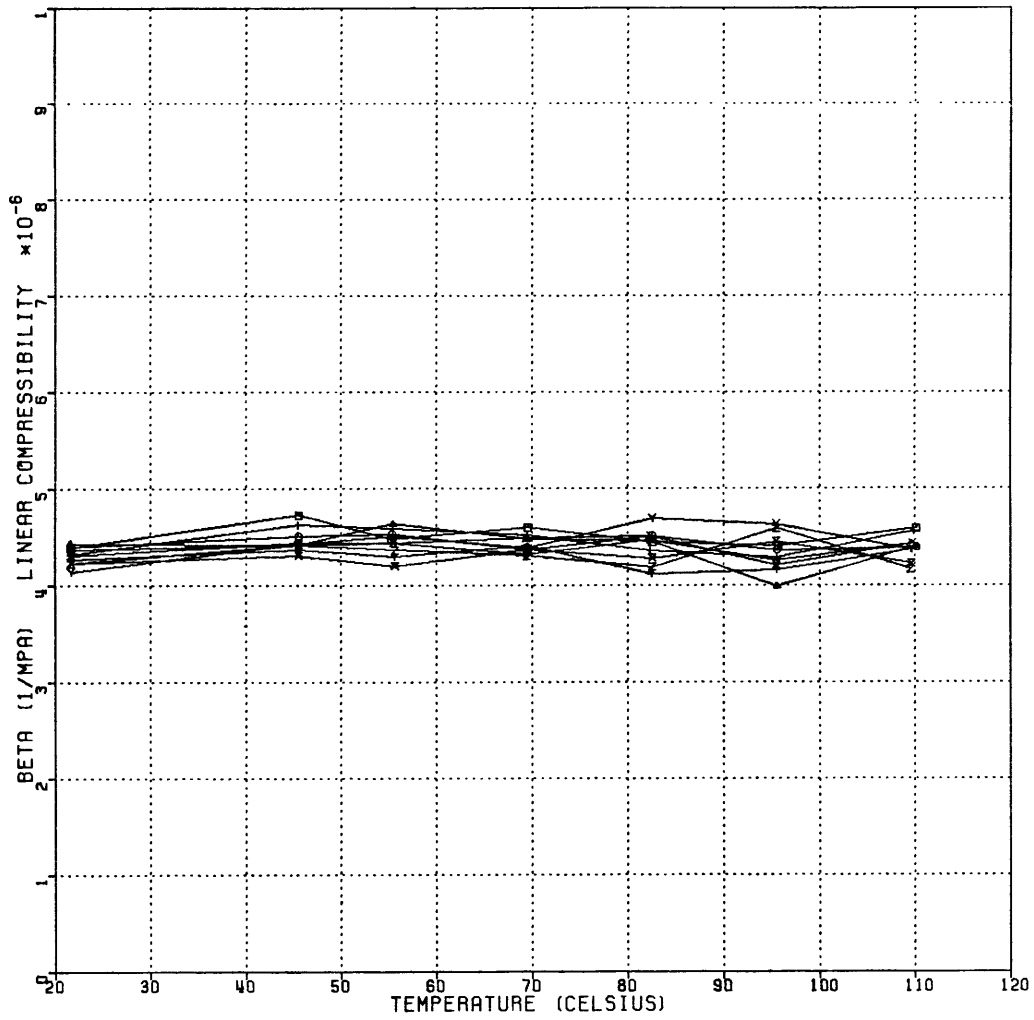
812 PAGELAND SC DIABASE
GAGE:BC

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



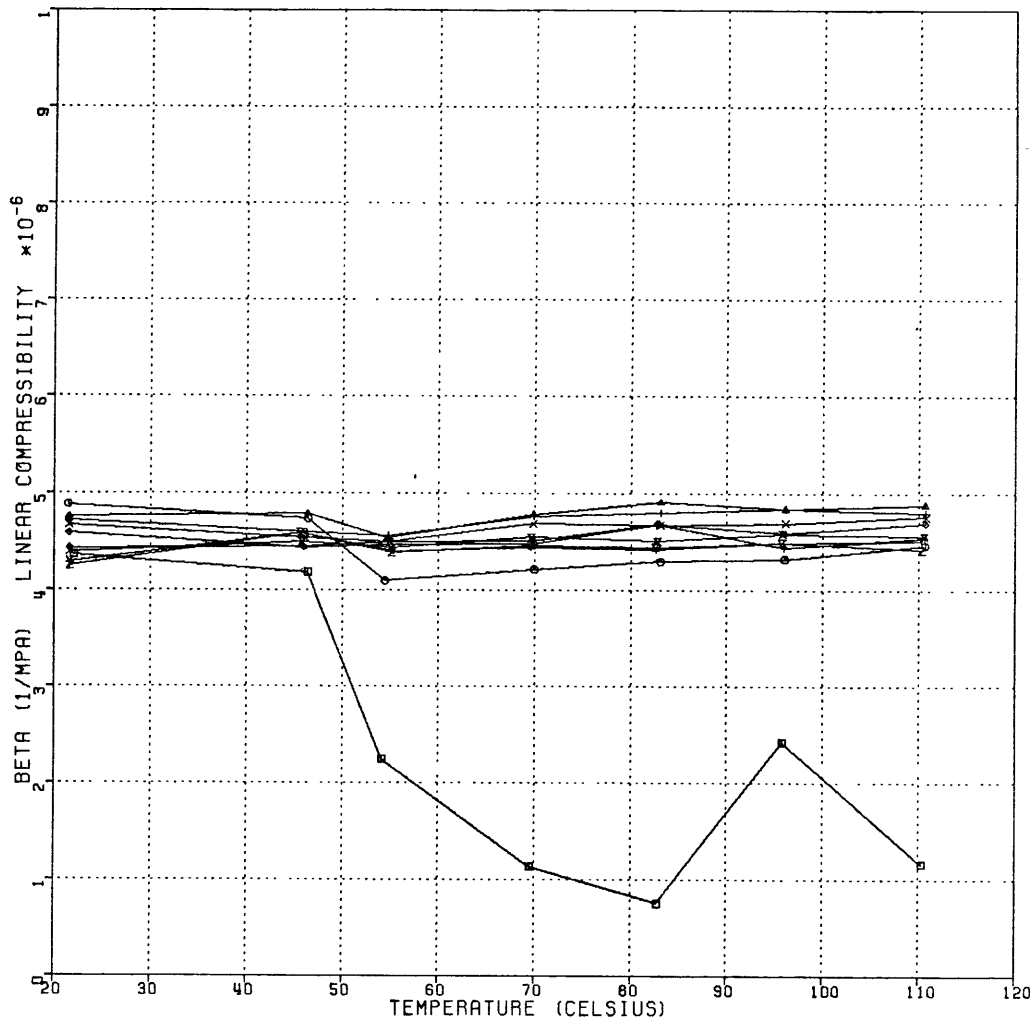
812 PAGELAND SC DIABASE
GAGE: 3C

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⋈ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



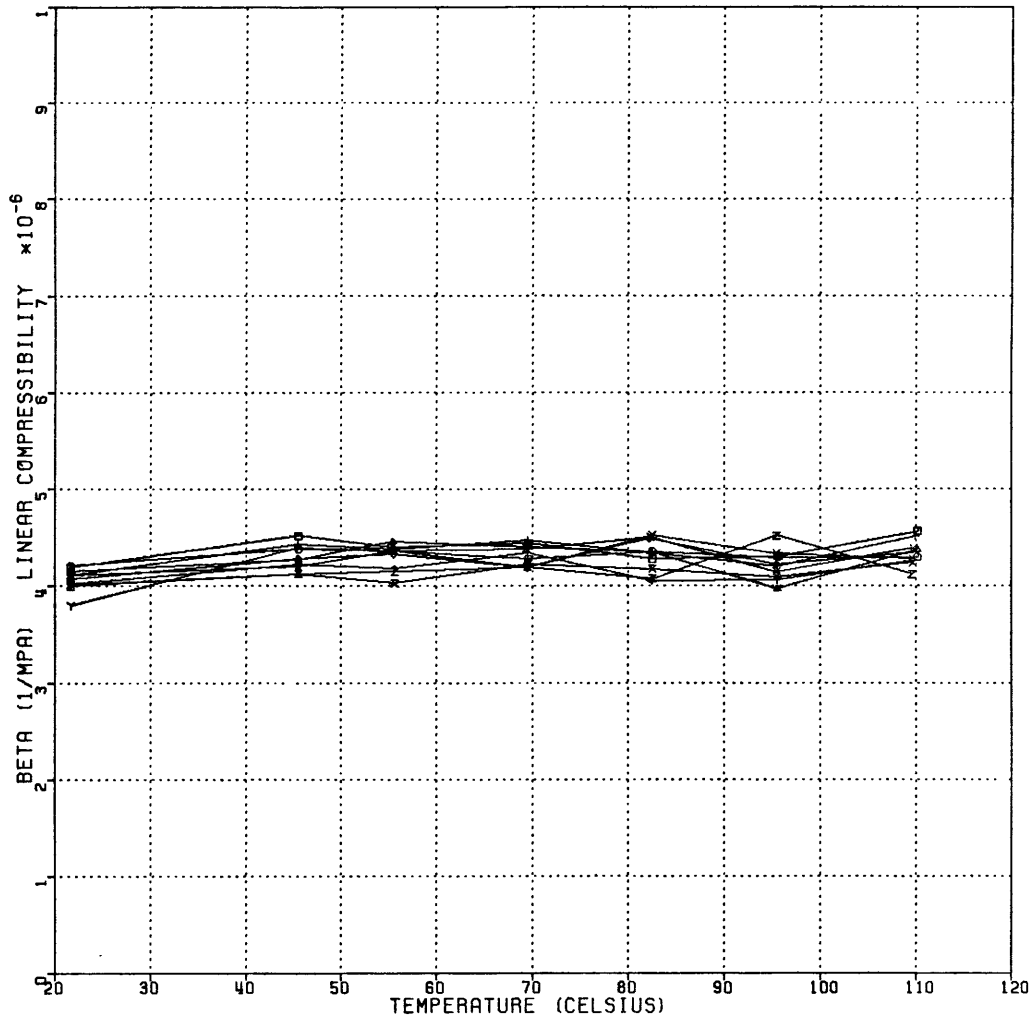
812 PAGELAND SC DIABASE
GAGE: 3C

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



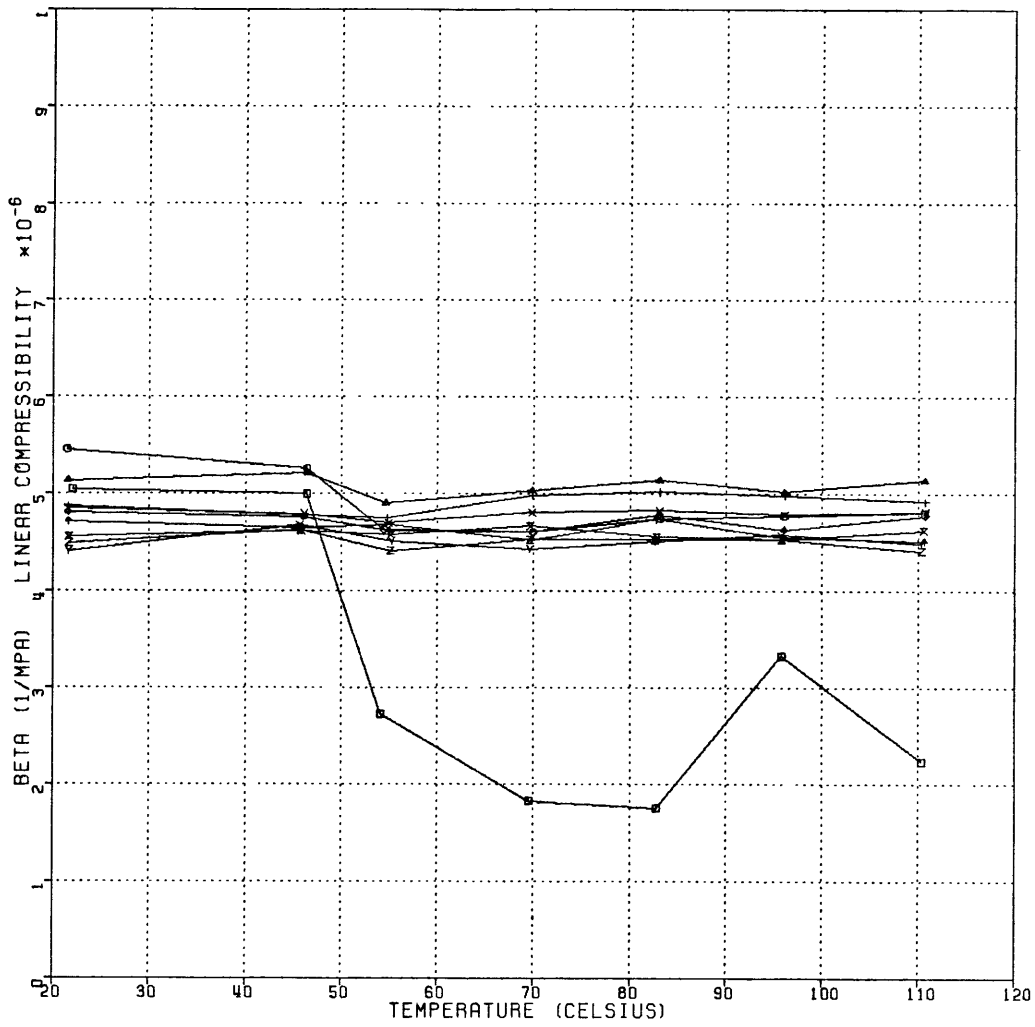
812 PAGELAND SC DIABASE
GAGE: AB

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



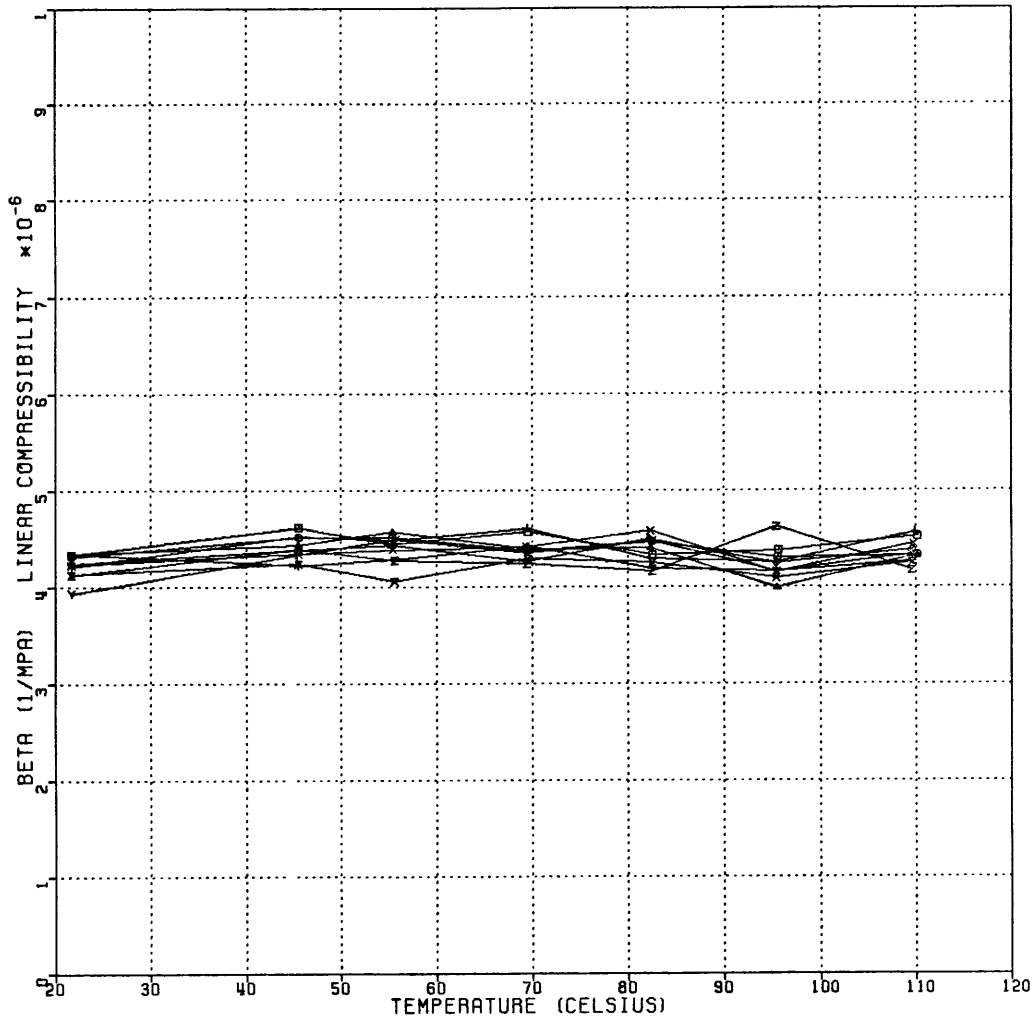
812 PAGELAND SC DIABASE
GAGE: AB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♣ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



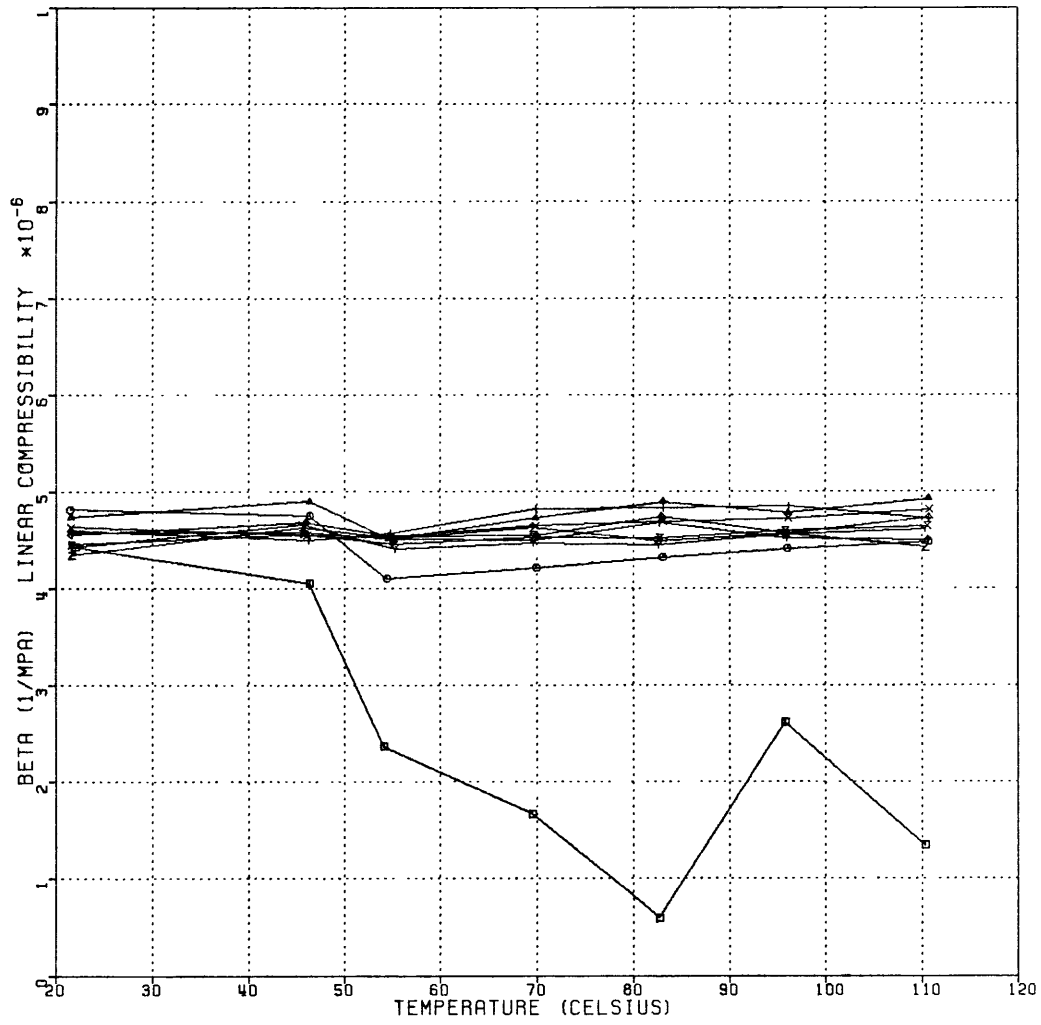
812 PAGELAND SC DIABASE
GAGE:CB

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- × - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



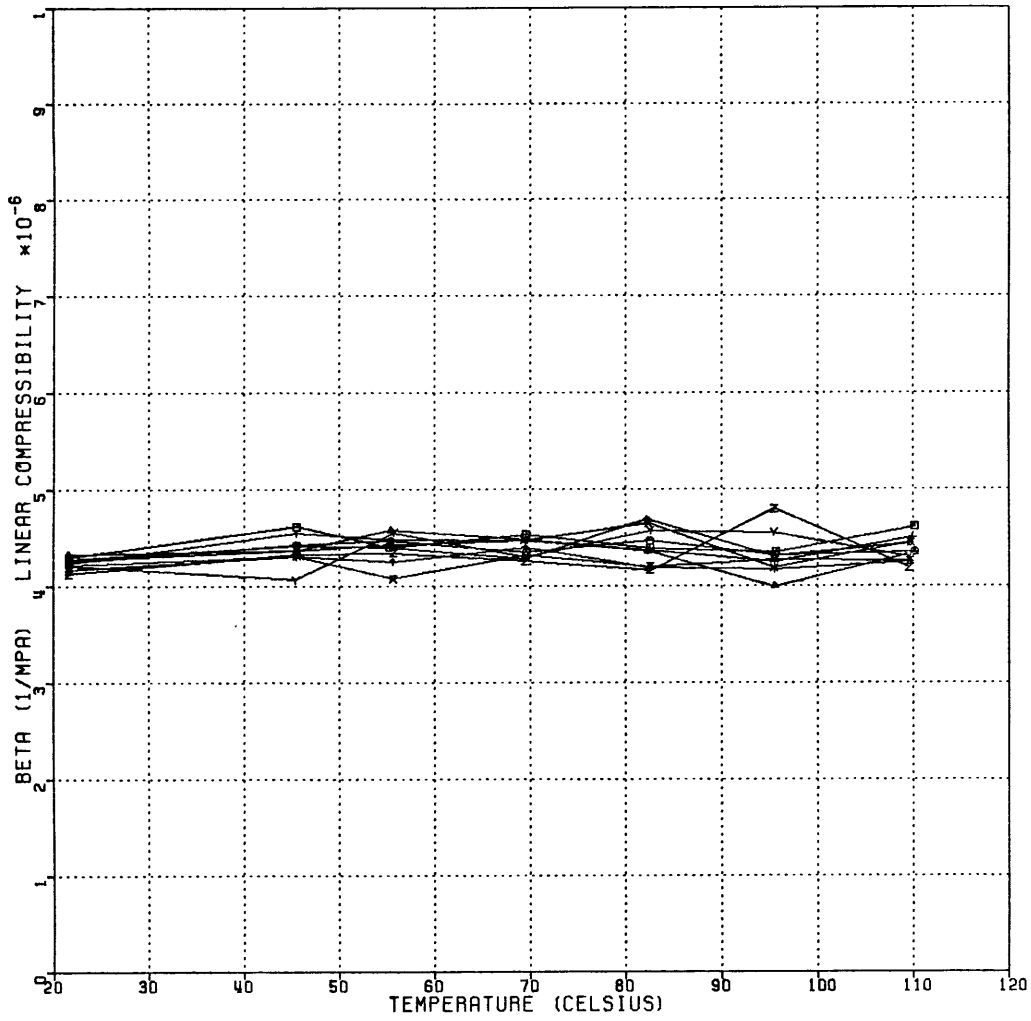
812 PAGELAND SC DIABASE
GAGE:CB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♣ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



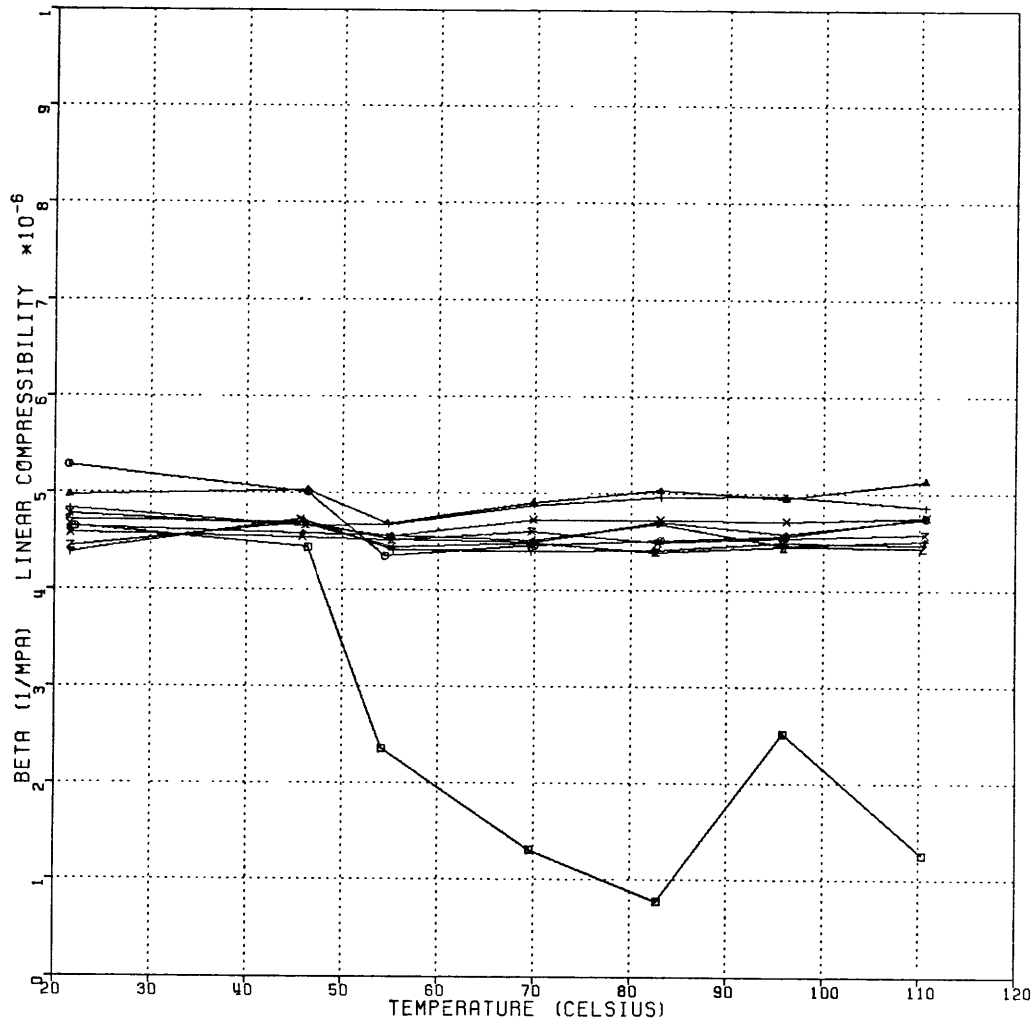
812 PAGELAND SC DIABASE
GAGE: 3B

- - 10 MPa
- - 20 MPa
- △ - 30 MPa
- + - 40 MPa
- X - 50 MPa
- ◇ - 60 MPa
- ⋈ - 70 MPa
- ⊗ - 80 MPa
- Z - 90 MPa
- Y - 100 MPa



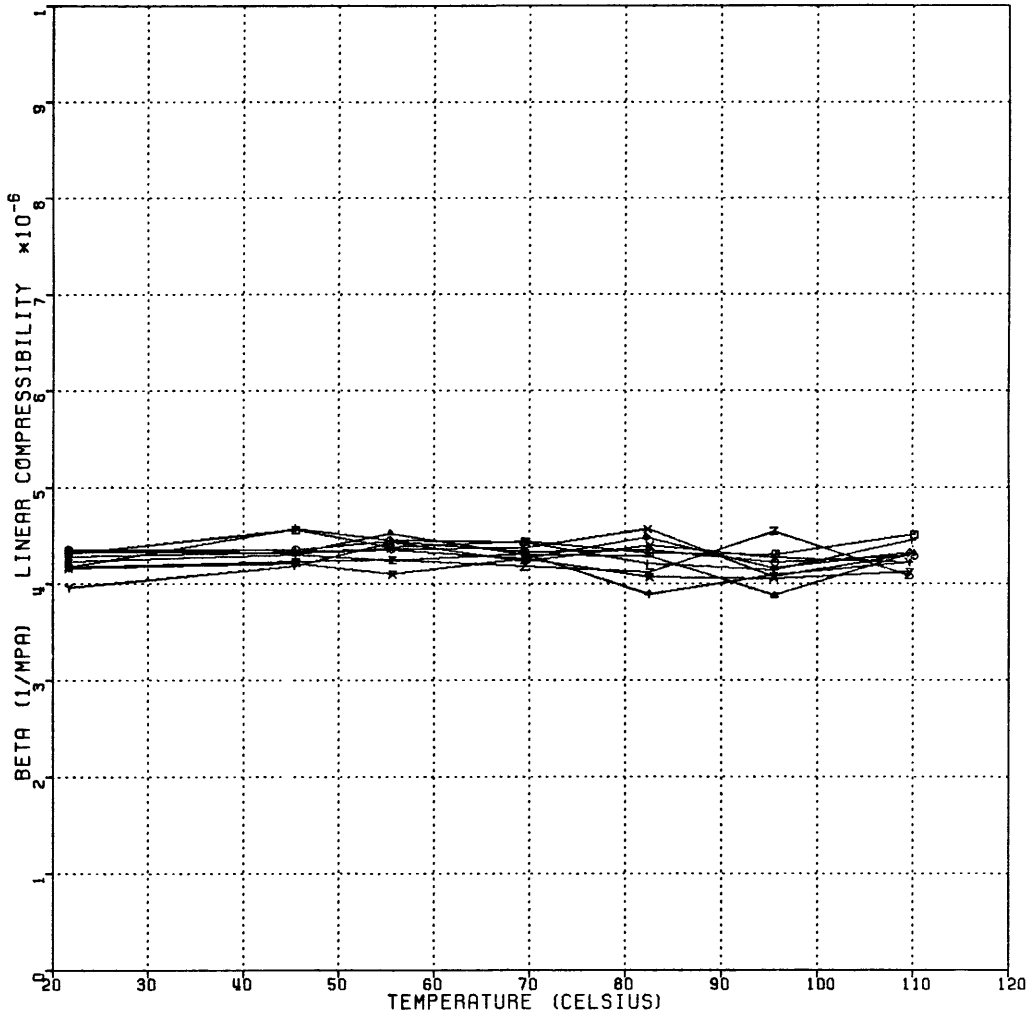
812 PAGELAND SC DIABASE
GAGE: 3B

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



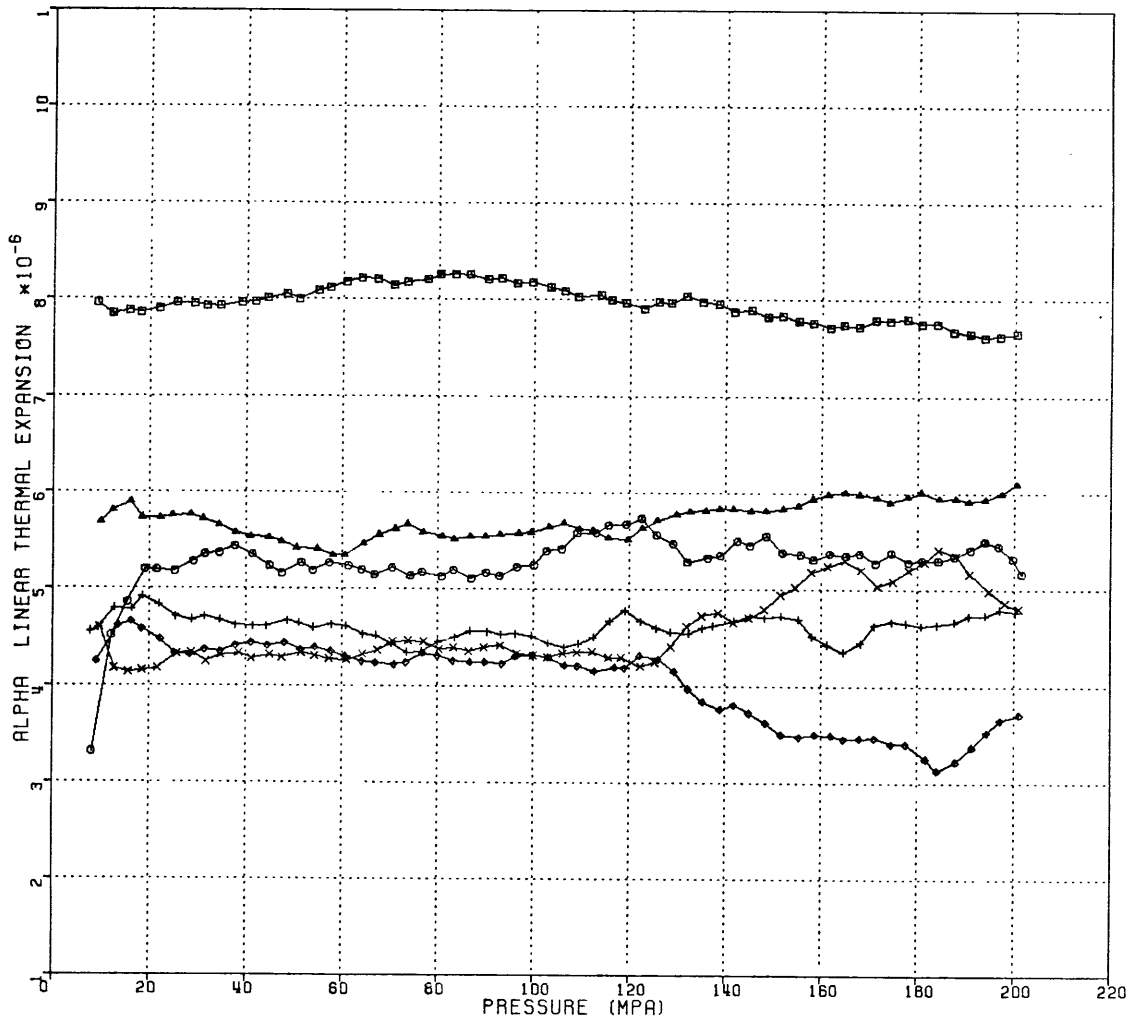
812 PAGELAND SC DIABASE
GAGE:CA

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



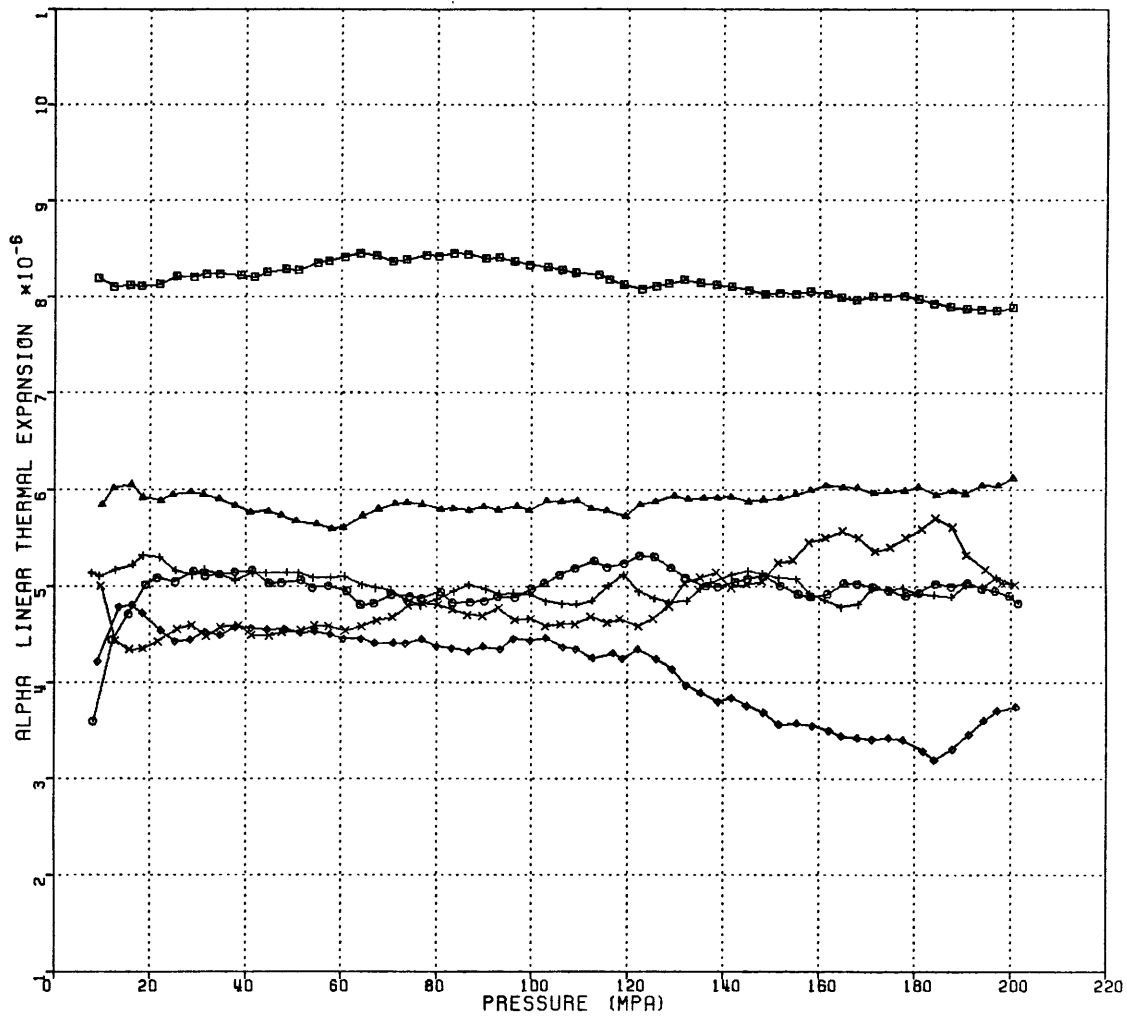
812 PAGELAND SC DIABASE
GAGE:CA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⬆ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



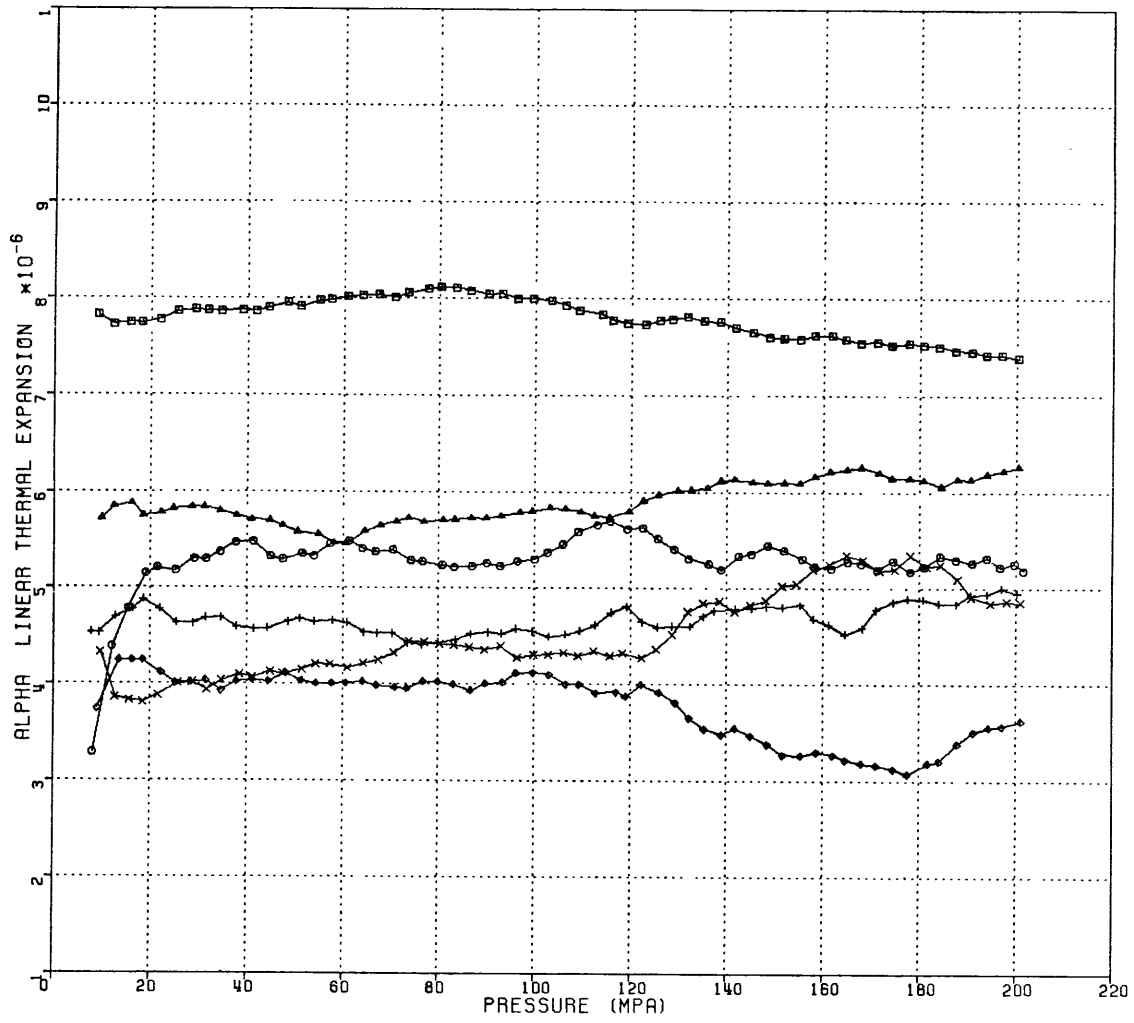
812 PAGELAND SC DIABASE
GAGE: AC

- - 22°C - 46°C
- - 46°C - 55°C
- △ - 55°C - 70°C
- + - 70°C - 83°C
- X - 83°C - 96°C
- ◇ - 96°C - 110°C



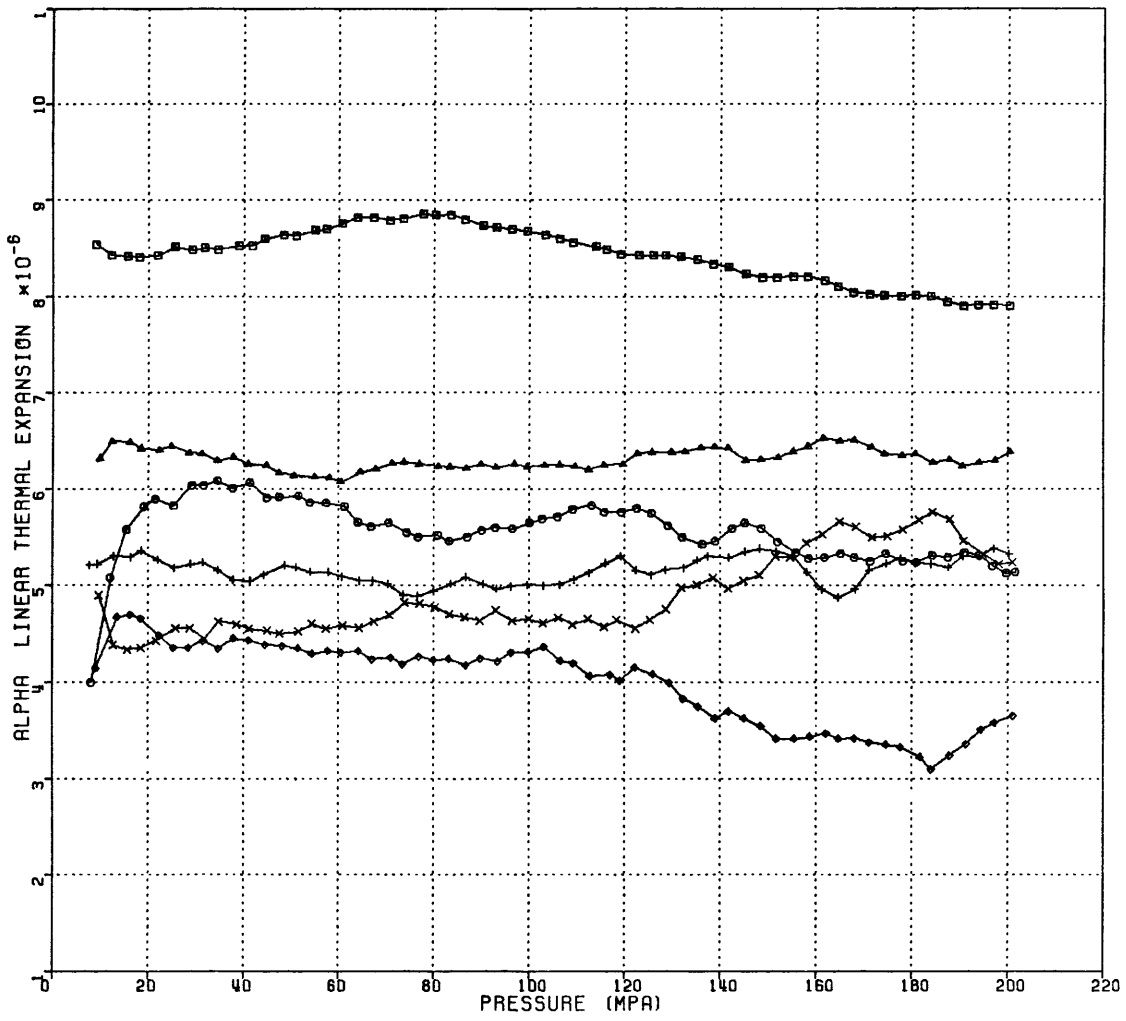
812 PAGELAND SC DIABASE
GAGE:BC

- - 22°C- 46°C
- - 46°C- 55°C
- △ - 55°C- 70°C
- + - 70°C- 83°C
- X - 83°C- 96°C
- ◇ - 96°C-110°C



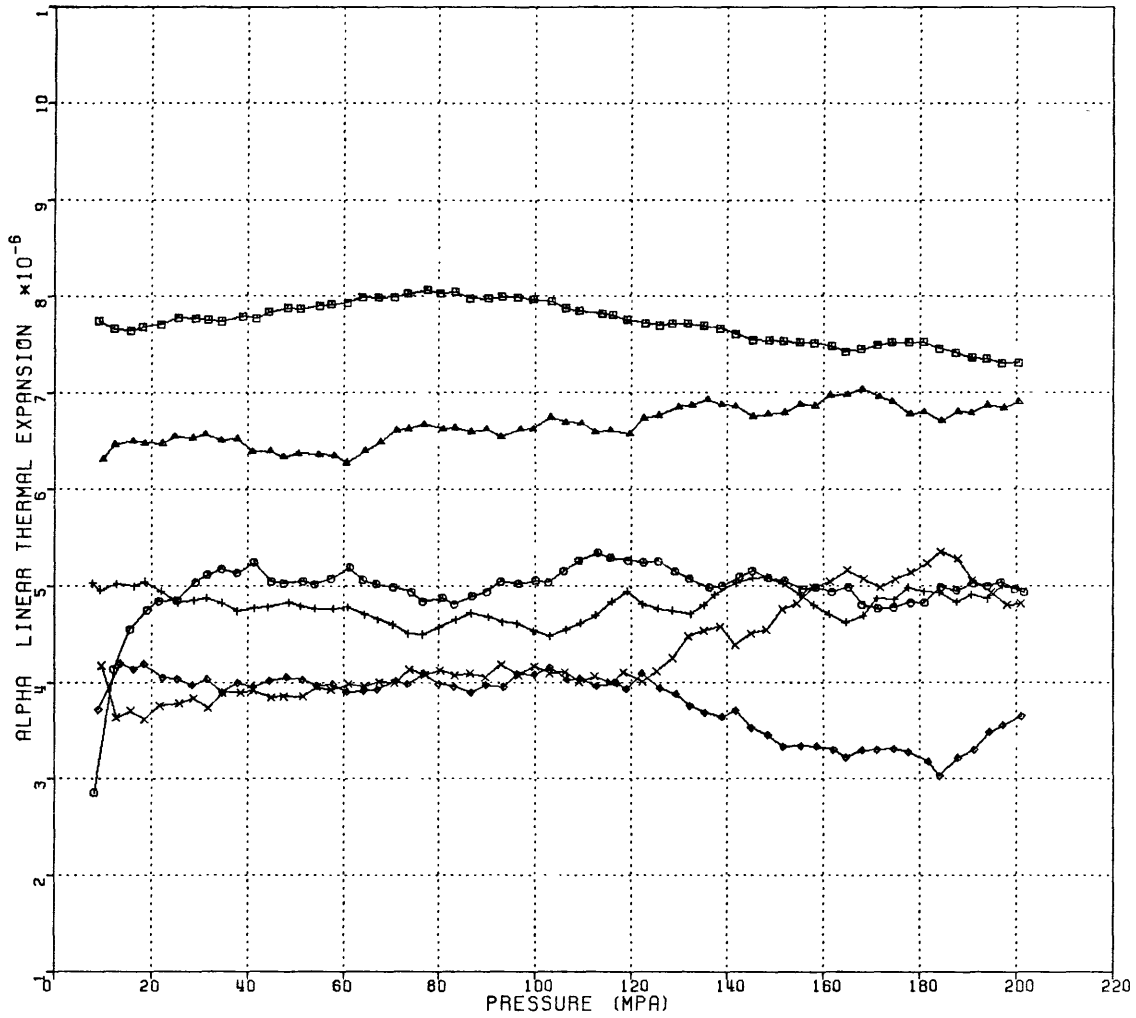
812 PAGELAND SC DIABASE
GAGE: 3C

- - 22°C- 46°C
- - 46°C- 55°C
- △ - 55°C- 70°C
- + - 70°C- 83°C
- X - 83°C- 96°C
- ◇ - 96°C-110°C



812 PAGELAND SC DIABASE
GAGE: AB

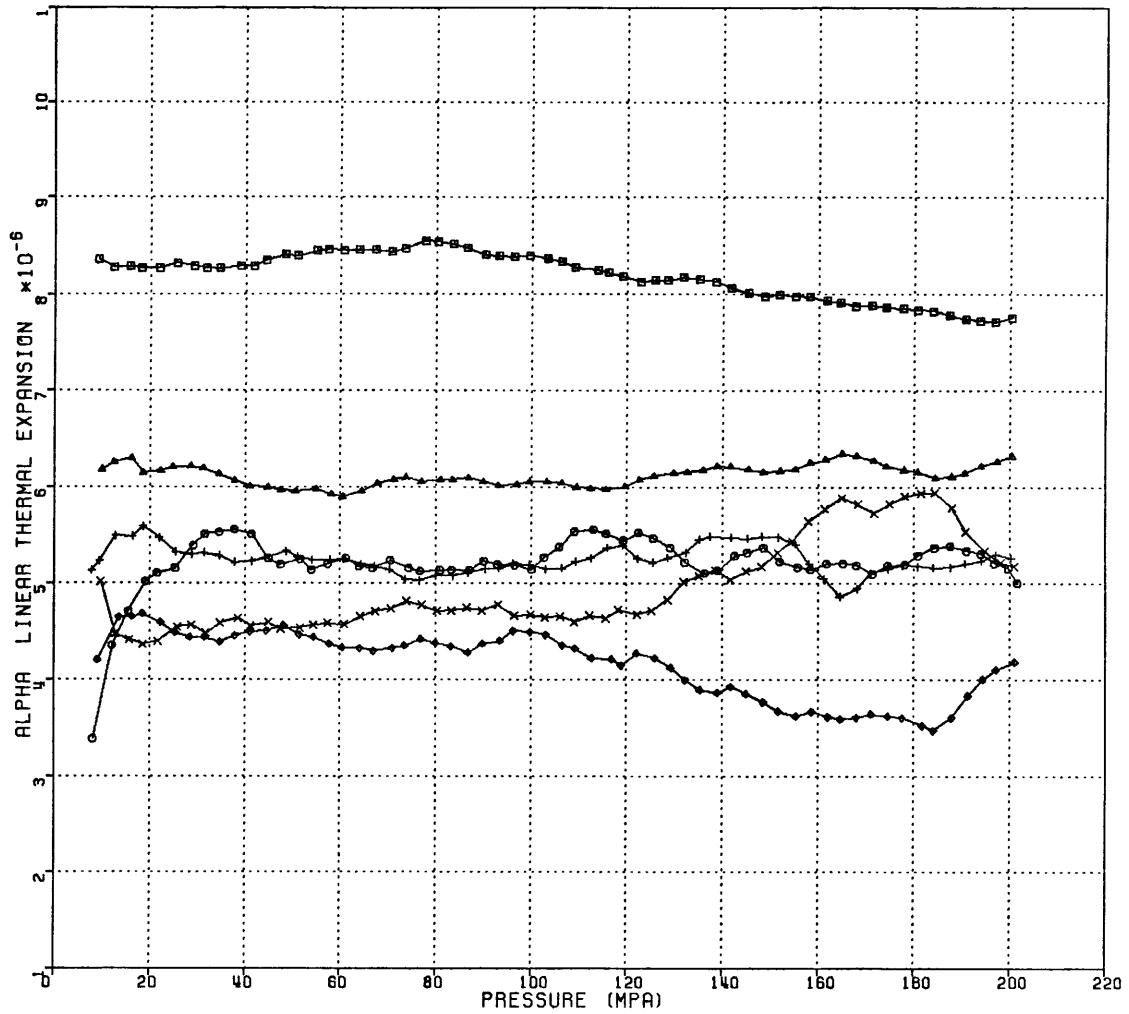
- - 22°C- 46°C
- - 46°C- 55°C
- △ - 55°C- 70°C
- + - 70°C- 83°C
- X - 83°C- 96°C
- ◇ - 96°C-110°C



812 PAGELAND SC DIABASE

GAGE:CB

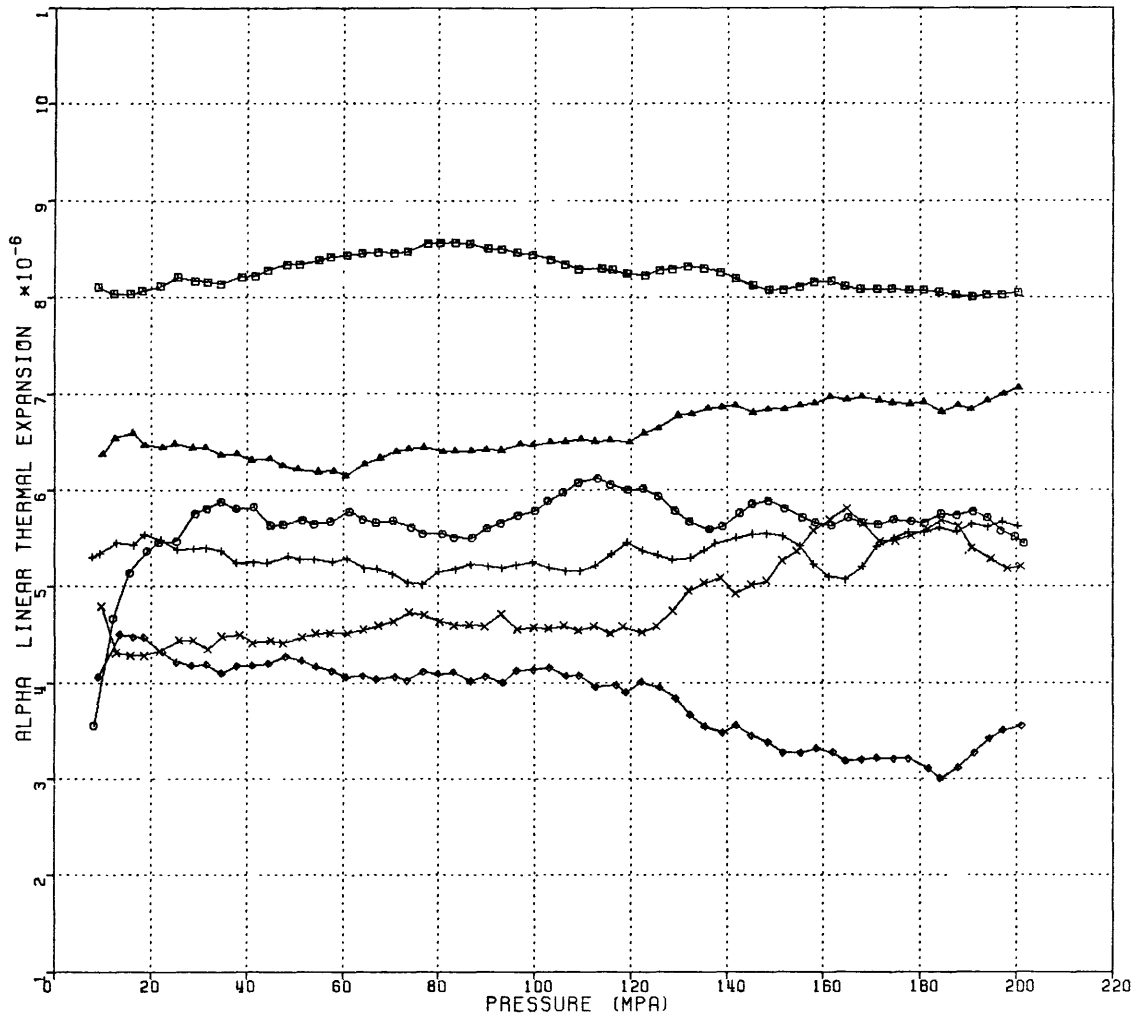
- - 22°C-46°C
- - 46°C-55°C
- △ - 55°C-70°C
- + - 70°C-83°C
- X - 83°C-96°C
- ◇ - 96°C-110°C



812 PAGELAND SC DIABASE

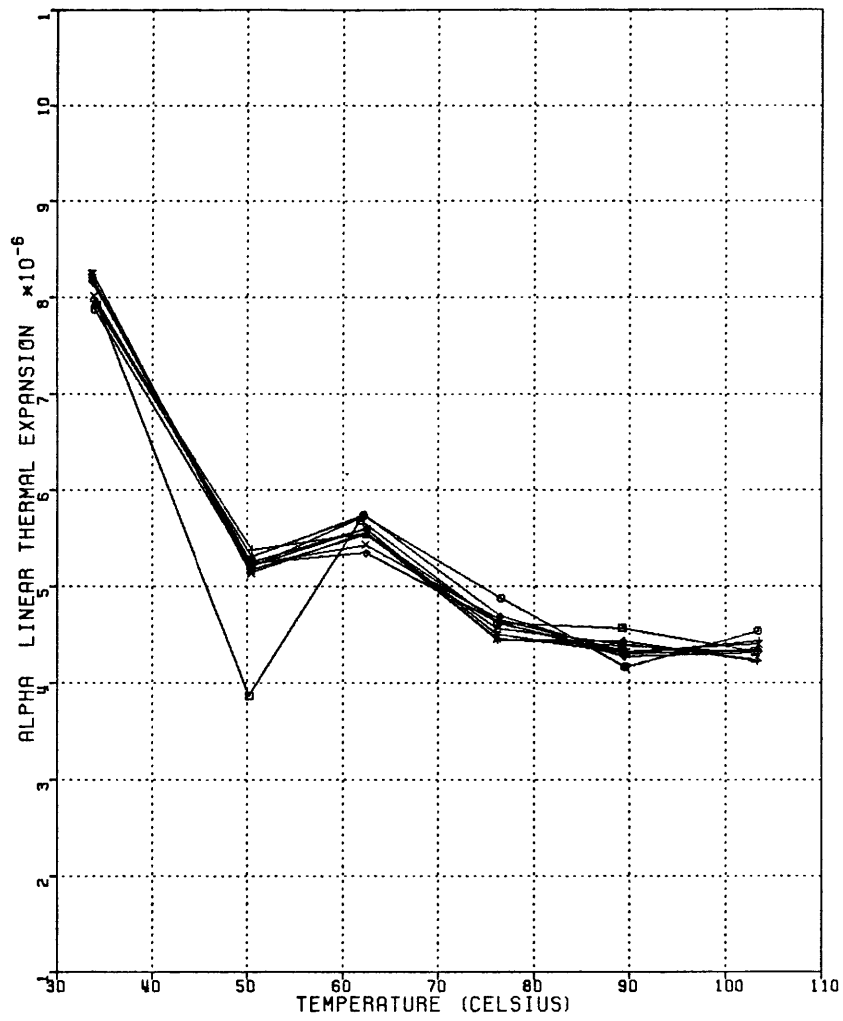
GAGE: 3B

- - 22°C - 46°C
- - 46°C - 55°C
- △ - 55°C - 70°C
- + - 70°C - 83°C
- X - 83°C - 96°C
- ◇ - 96°C - 110°C



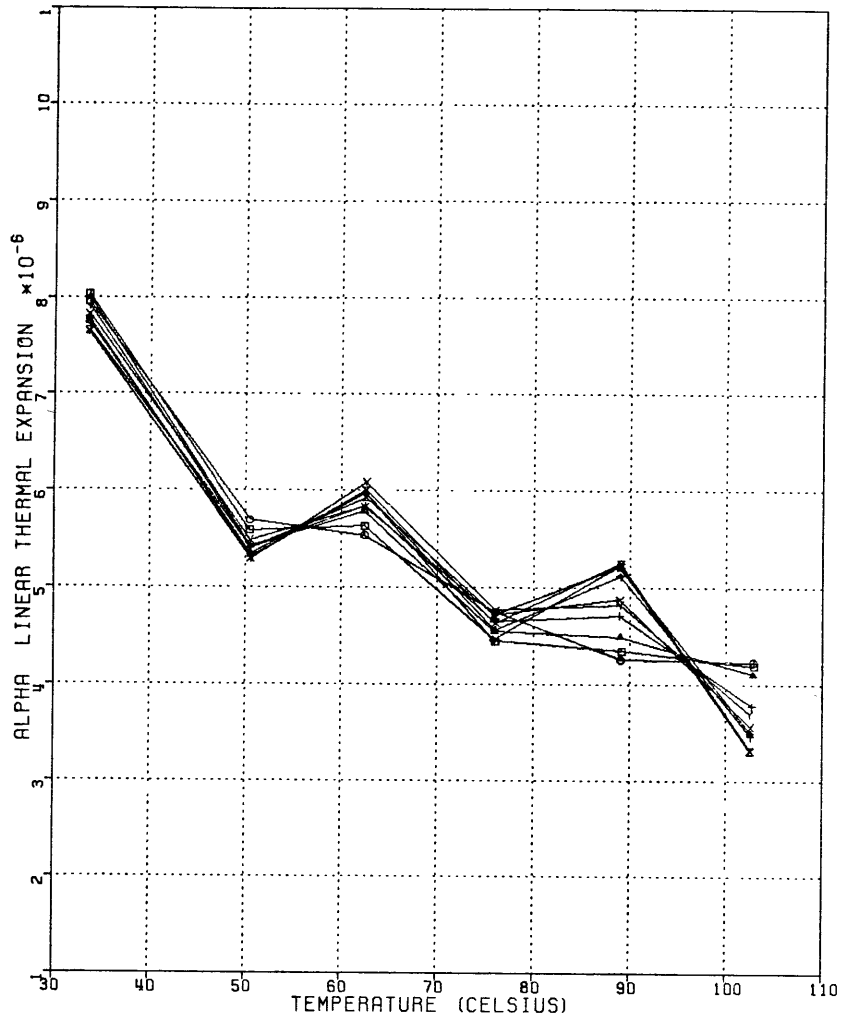
812 PAGELAND SC DIABASE
GAGE:CA

- - 22°C- 46°C
- - 46°C- 55°C
- △ - 55°C- 70°C
- + - 70°C- 83°C
- X - 83°C- 96°C
- ◇ - 96°C-110°C



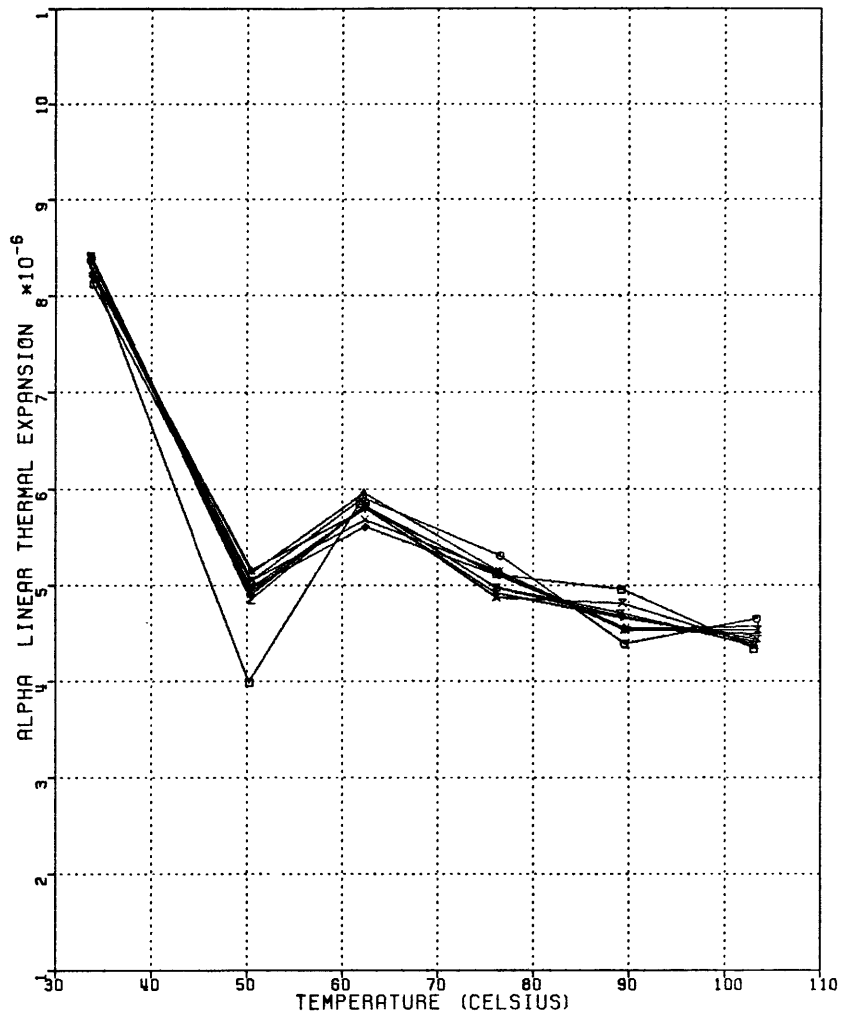
812 PAGELAND SC DIABASE
GAGE:AC

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



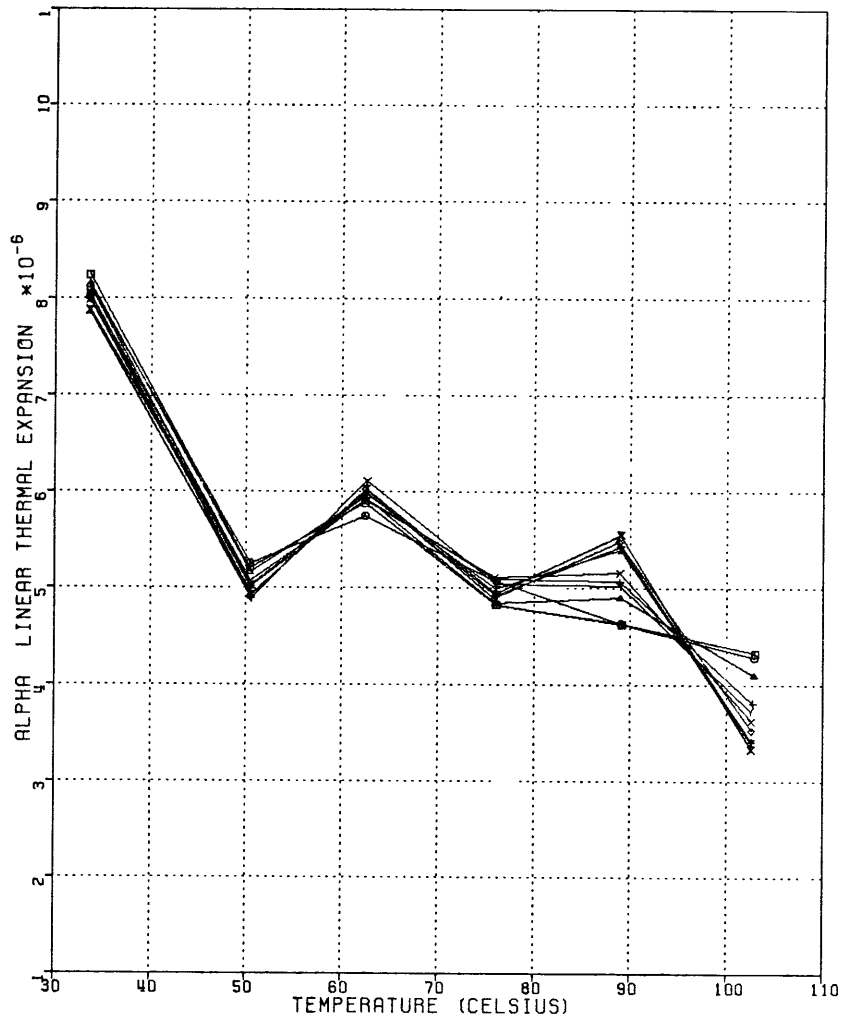
812 PAGELAND SC DIABASE
GAGE:AC

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



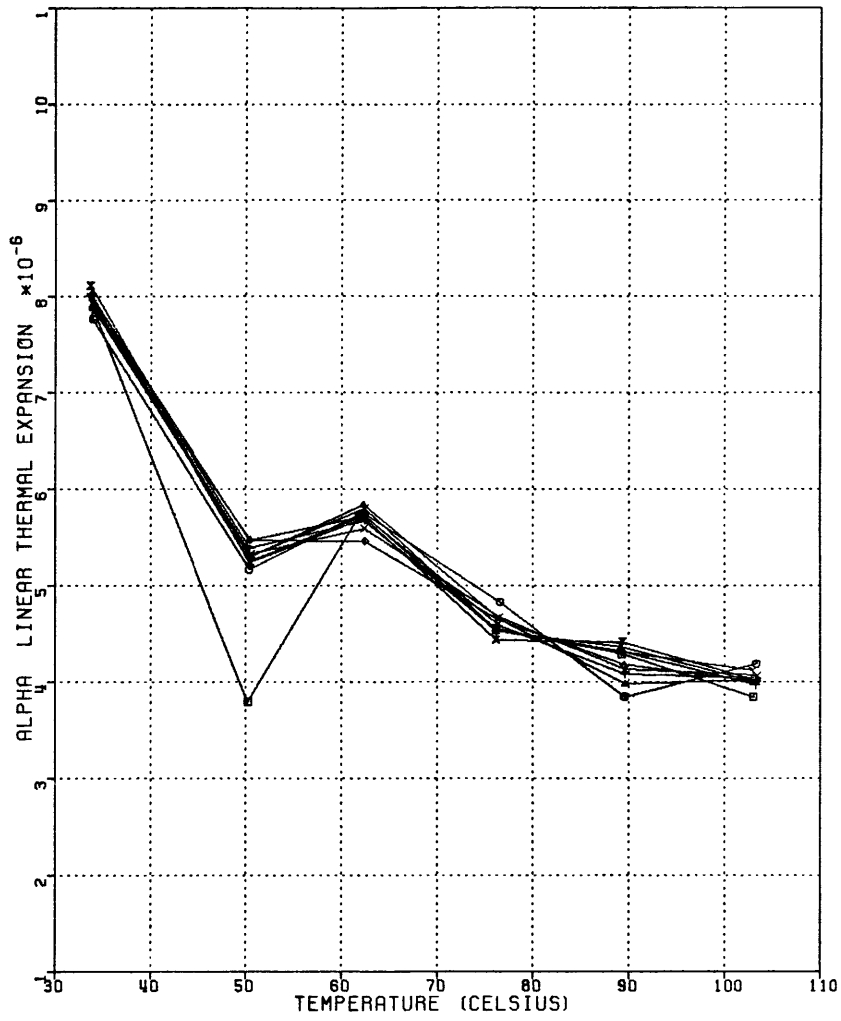
812 PAGELAND SC DIABASE
GAGE:BC

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⋈ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



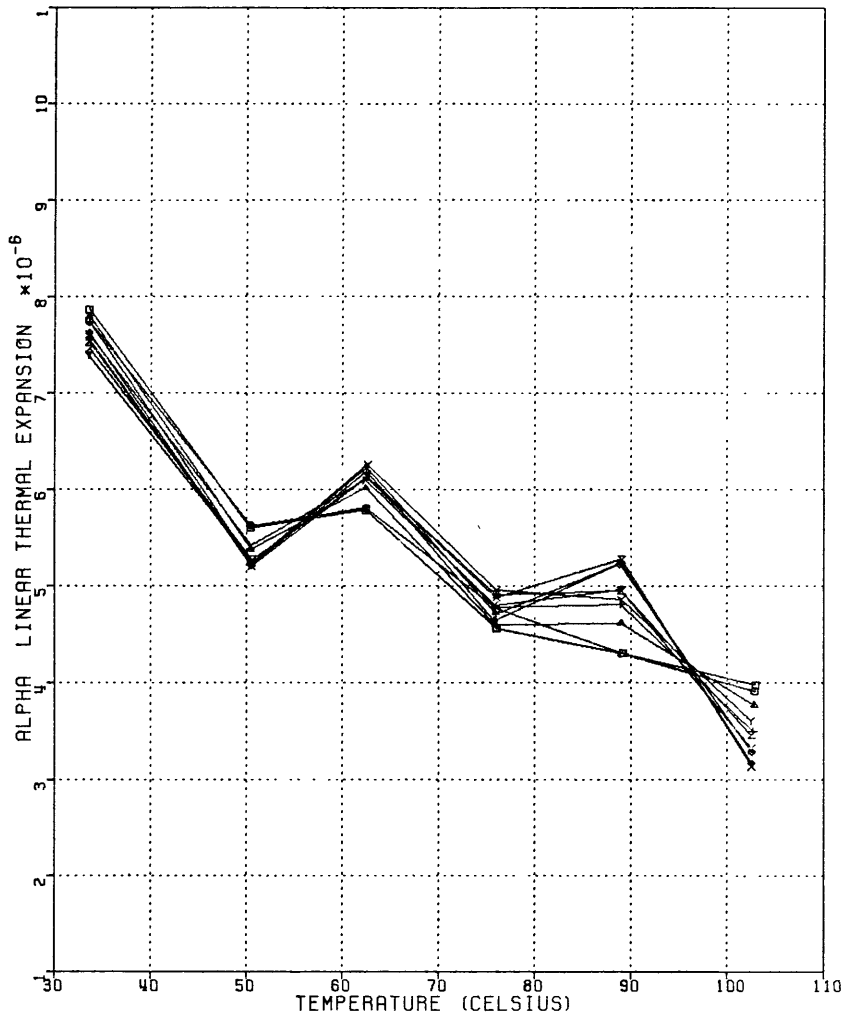
812 PAGELAND SC DIABASE
GAGE:BC

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



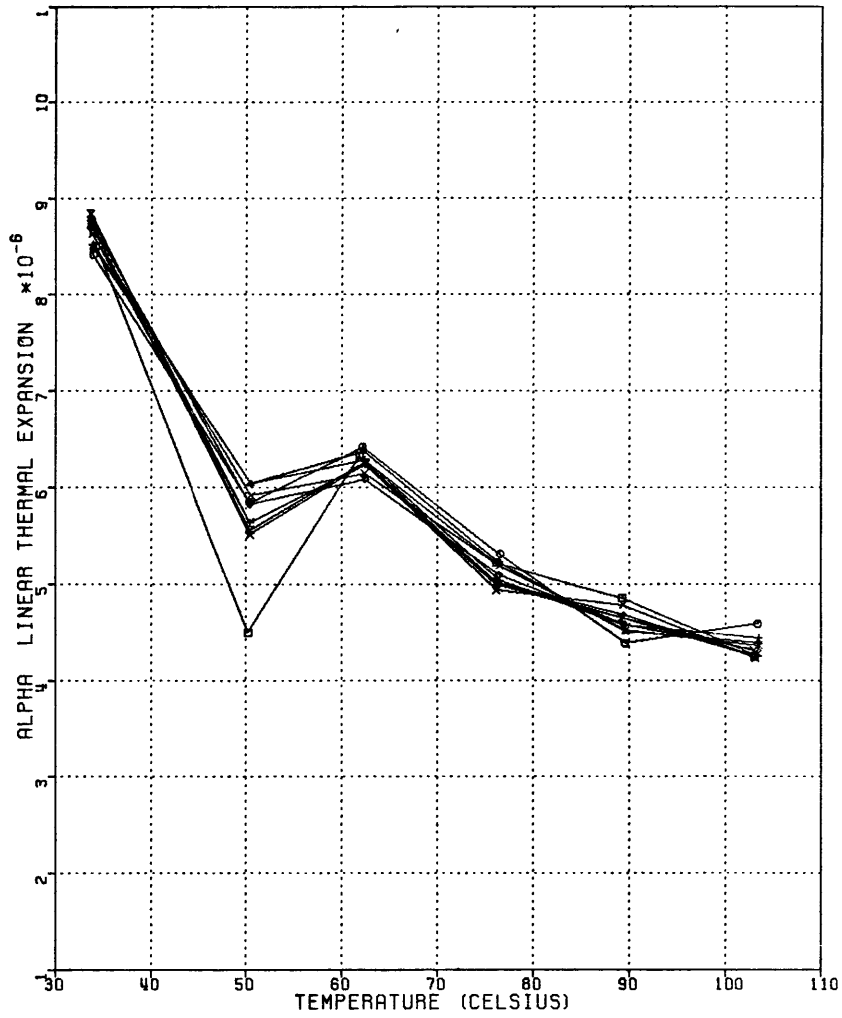
812 PAGELAND SC DIABASE
GAGE:3C

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



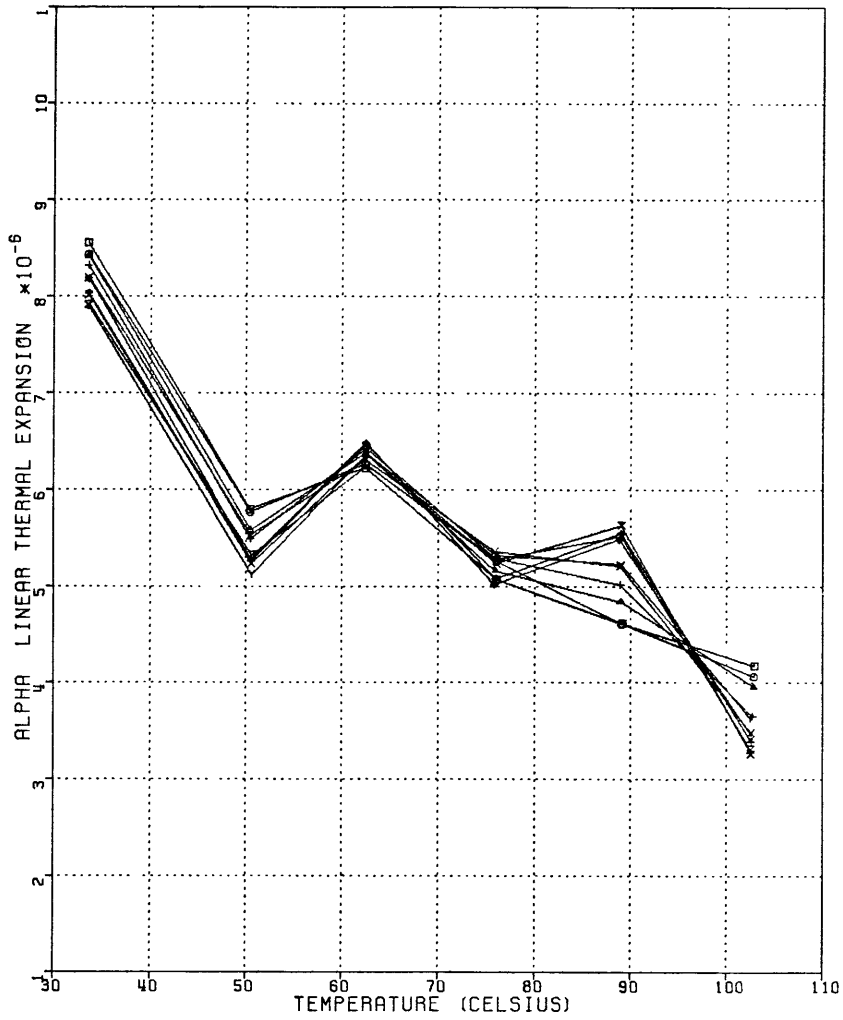
812 PAGELAND SC DIABASE
GAGE: 3C

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



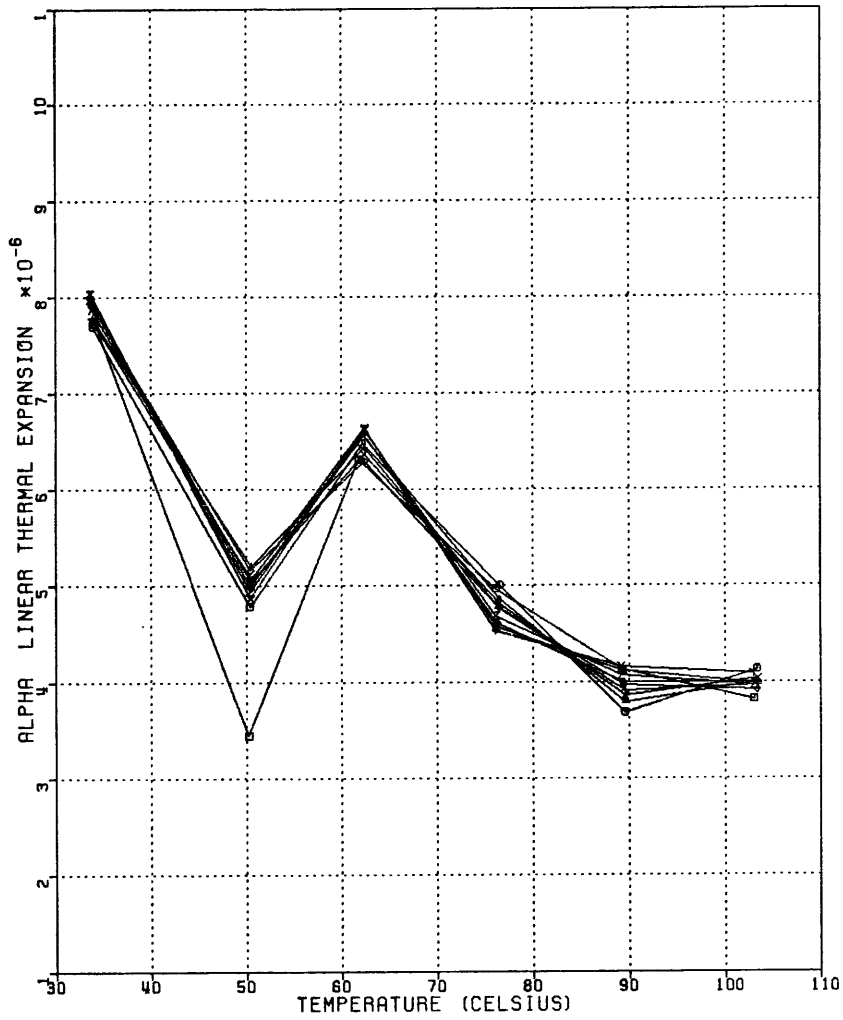
812 PAGELAND SC DIABASE
GAGE: AB

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ♠ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



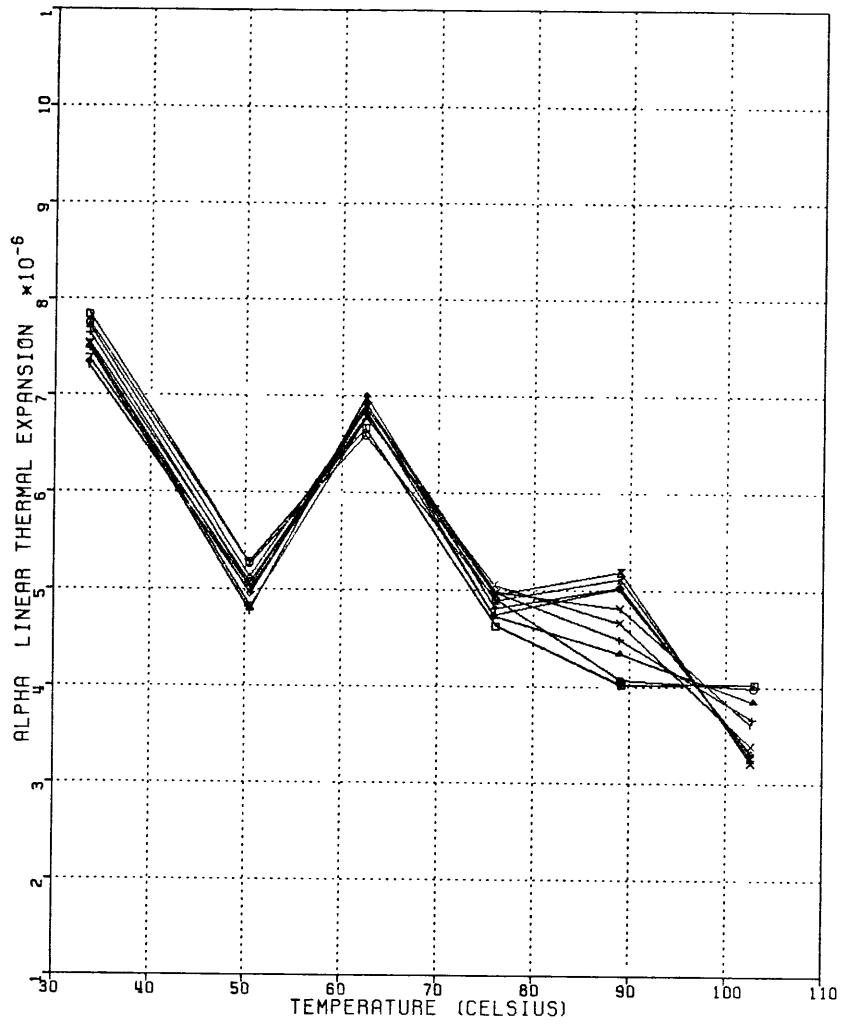
812 PAGELAND SC DIABASE
GAGE: AB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



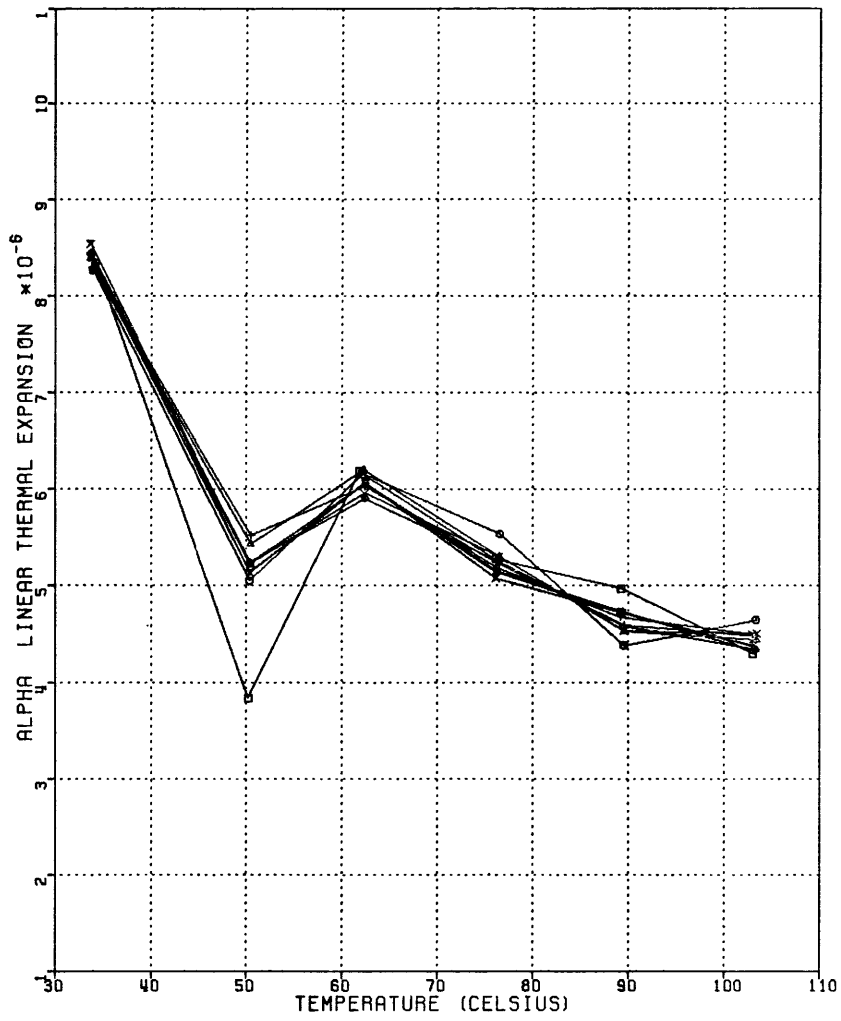
812 PAGELAND SC DIABASE
GAGE:CB

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⋈ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



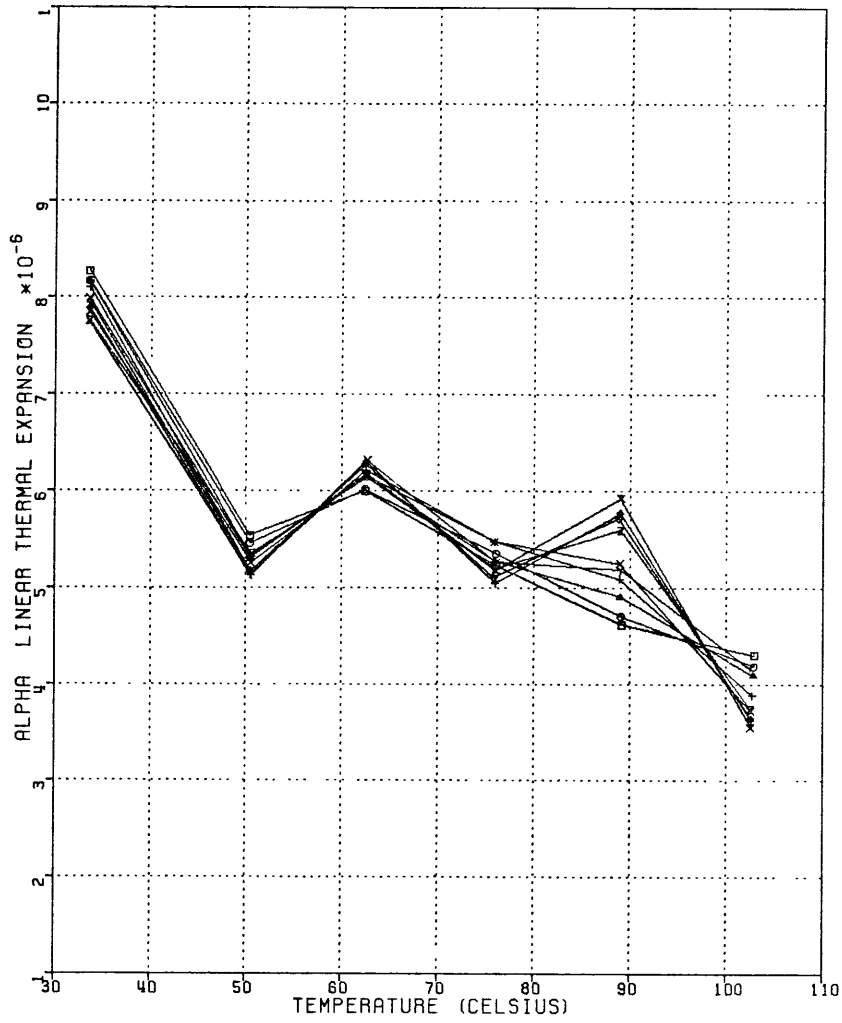
812 PAGELAND SC DIABASE
GAGE:CB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



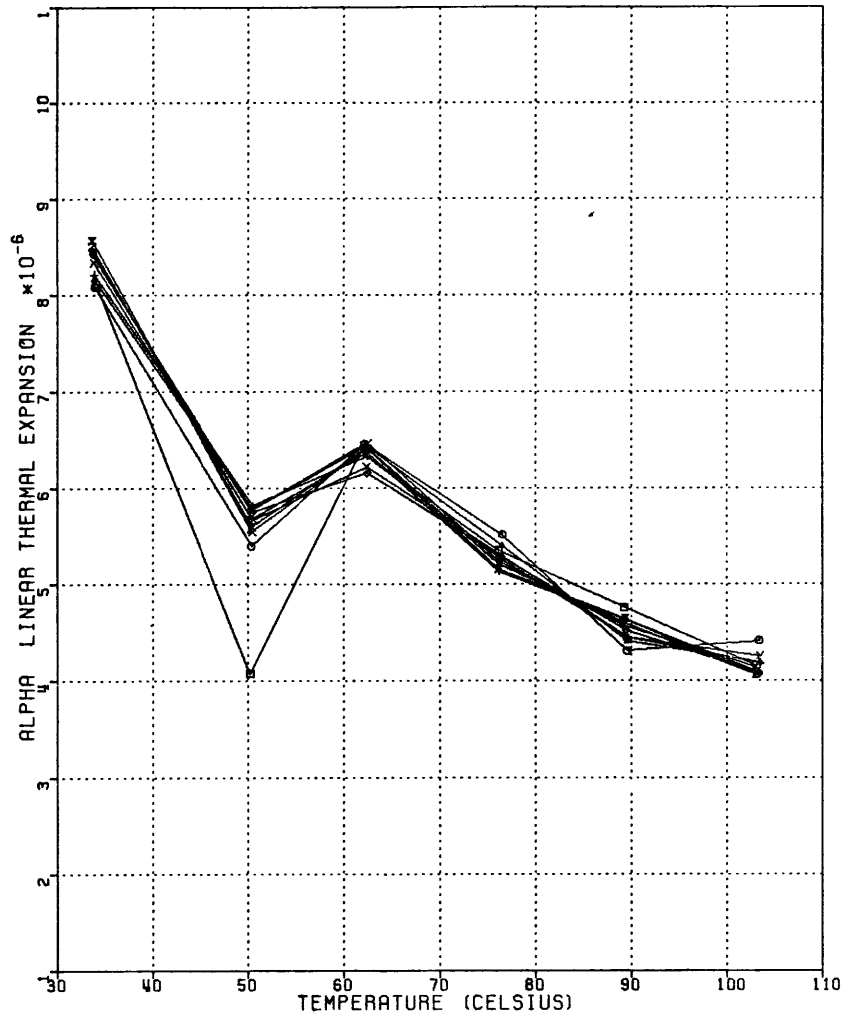
812 PAGELAND SC DIABASE
GAGE: 3B

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- † - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



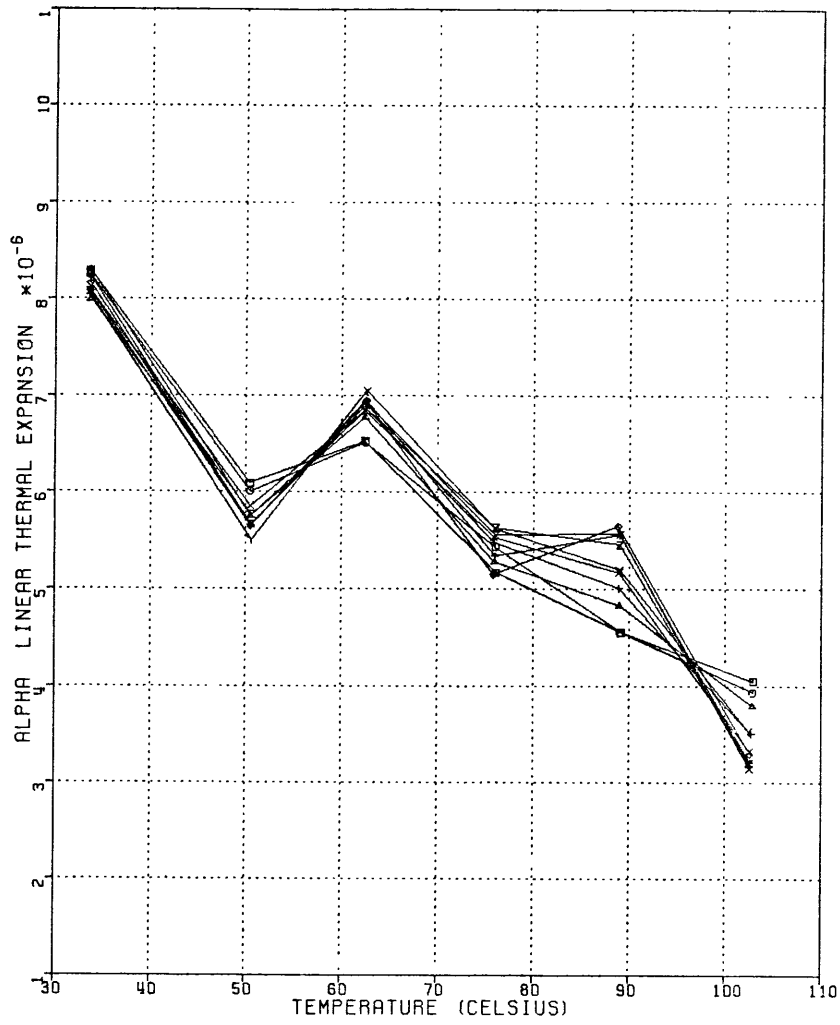
812 PAGELAND SC DIABASE
GAGE:3B

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



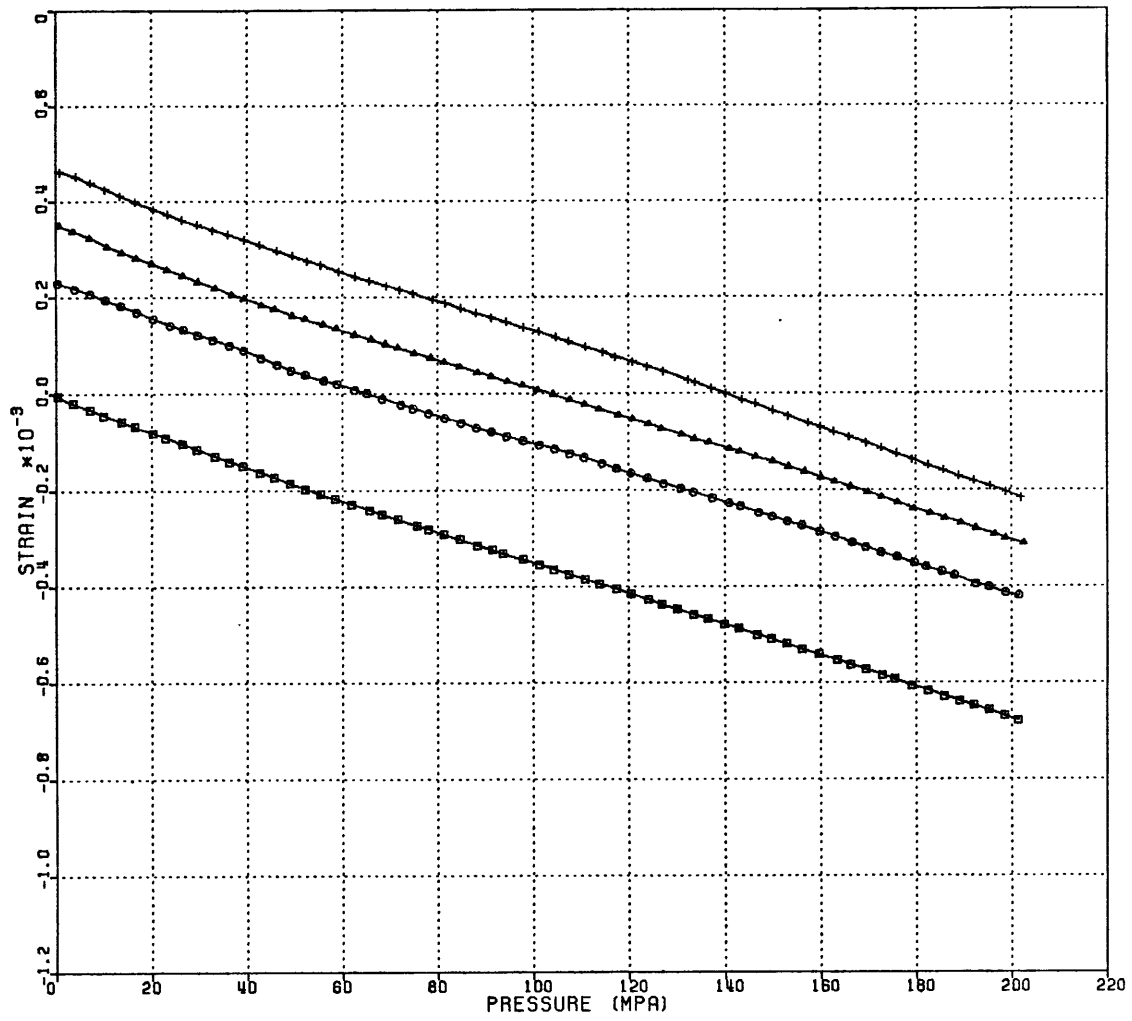
812 PAGELAND SC DIABASE
GAGE:CA

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- × - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



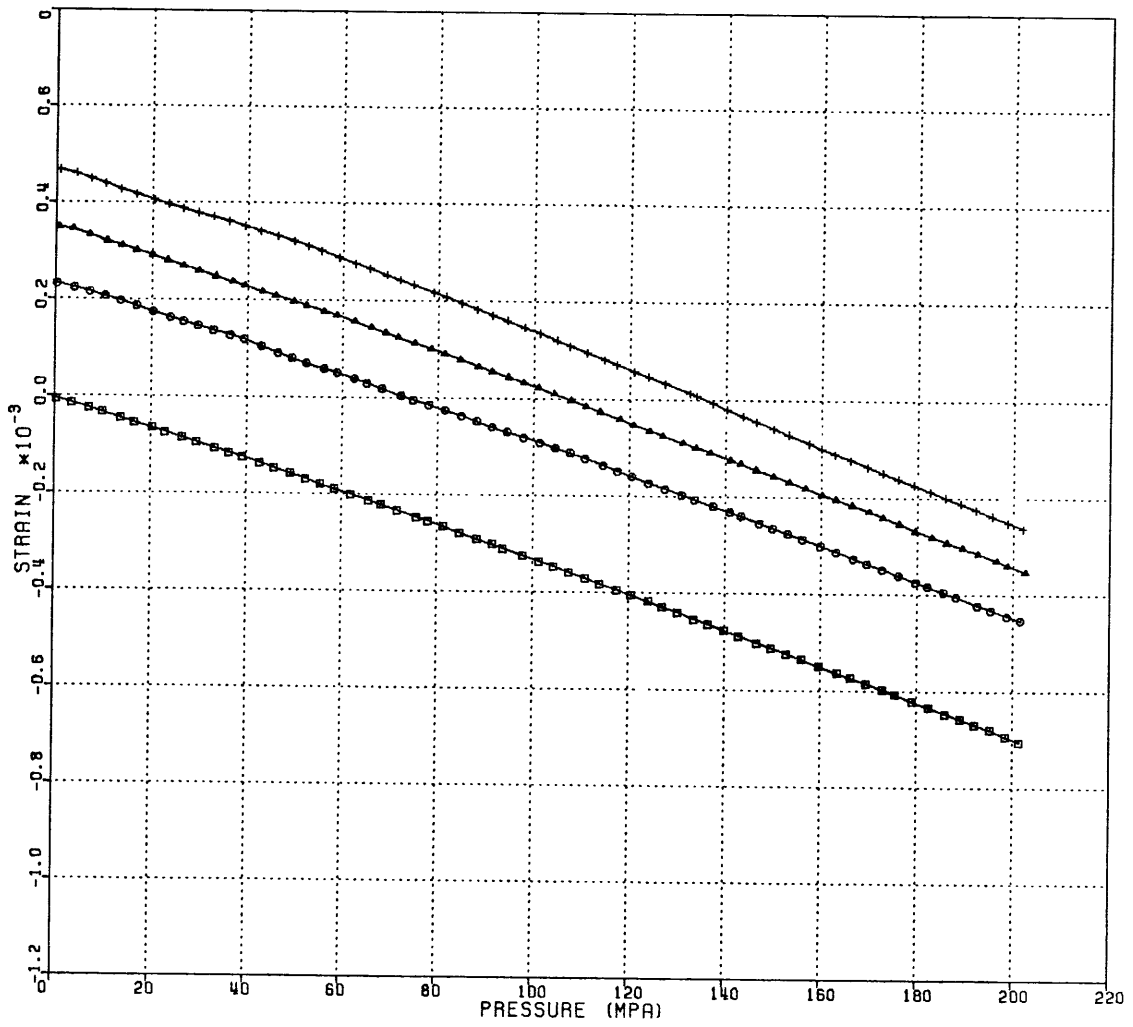
812 PAGELAND SC DIABASE
GAGE:CA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



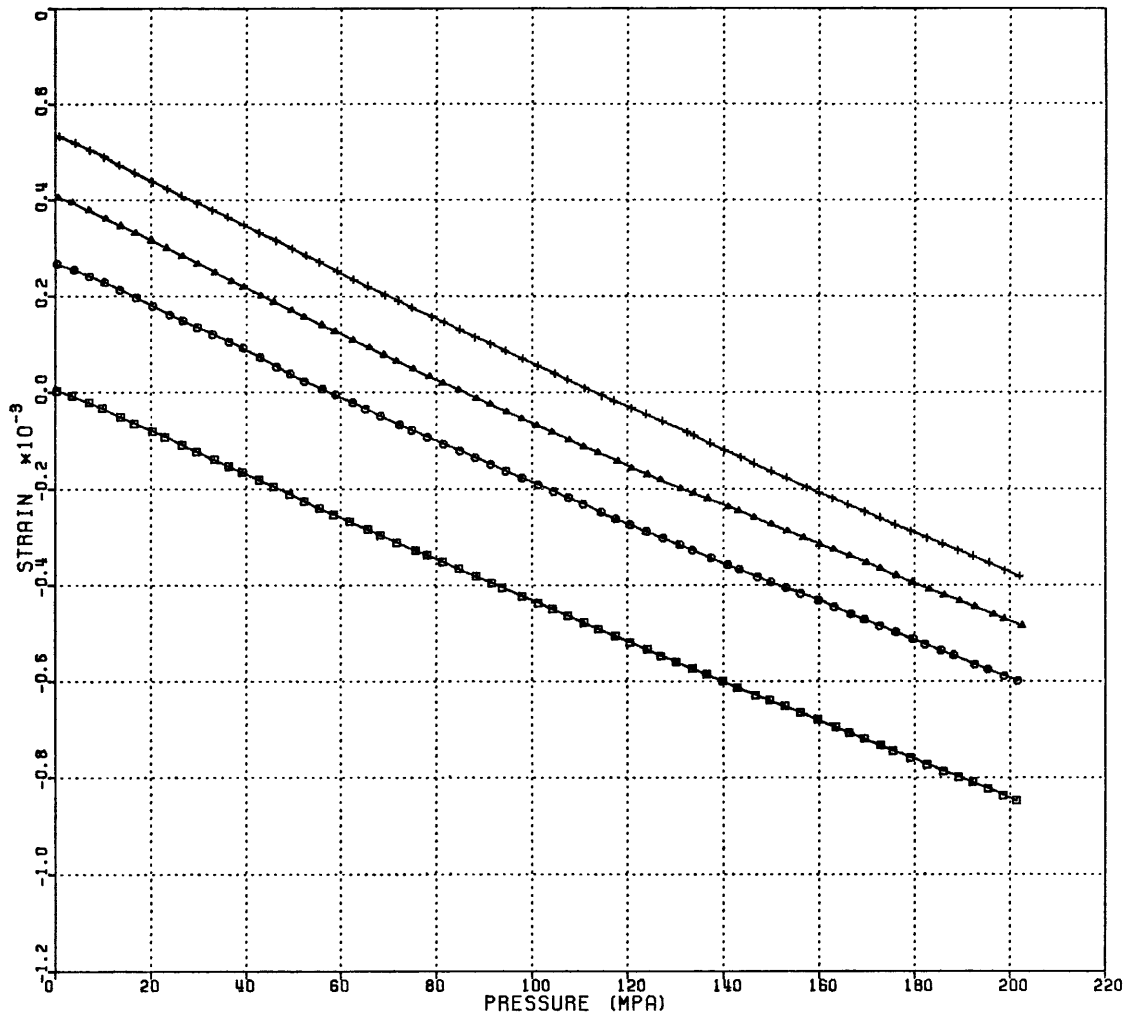
812 PAGELAND SC DIABASE
 GAGE: AC

- - 23°C
- - 48°C
- △ - 68°C
- + - 85°C



812 PAGELAND SC DIABASE
GAGE:BC

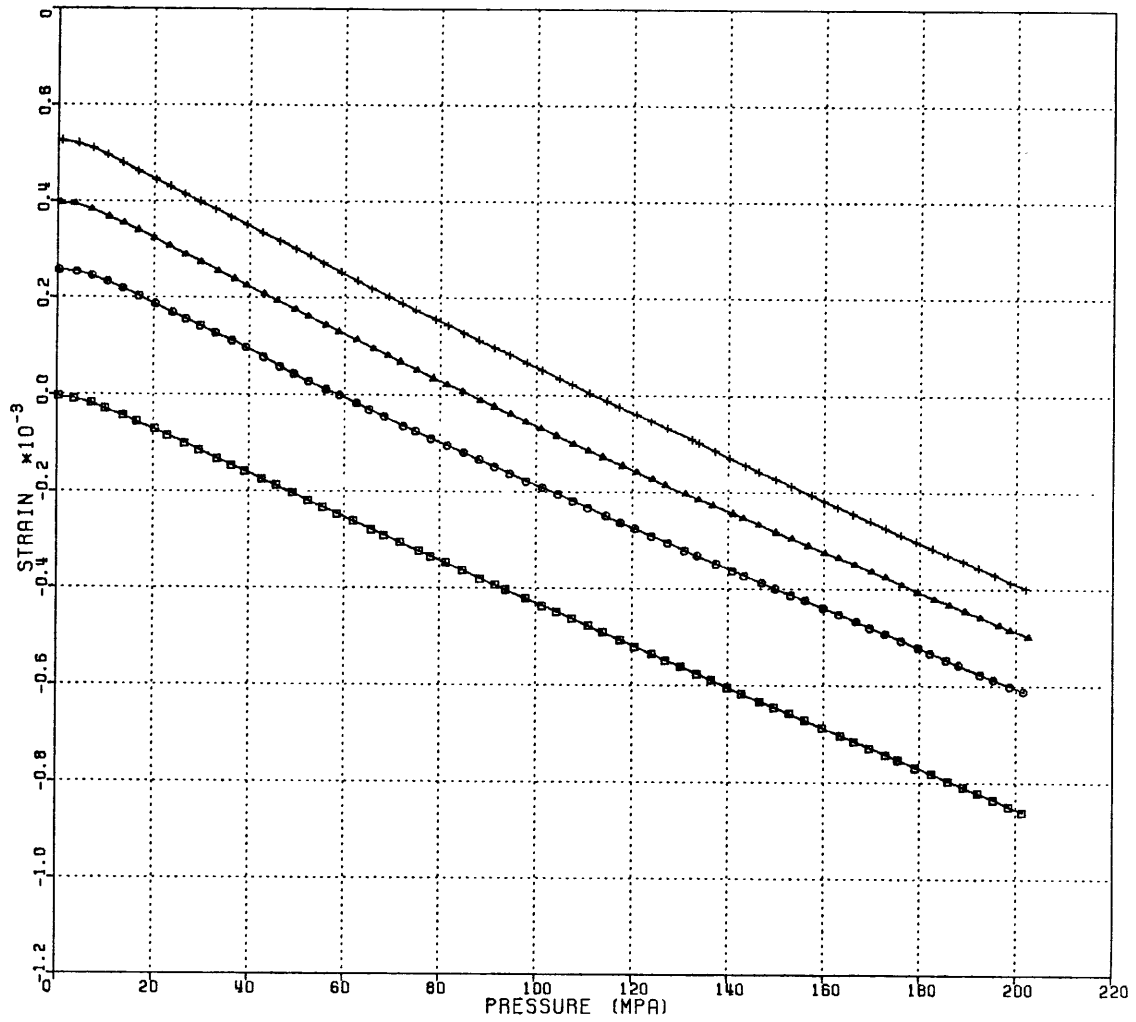
□ - 23°C
○ - 48°C
△ - 68°C
+ - 85°C



812 PAGELAND SC DIABASE

GAGE: CA

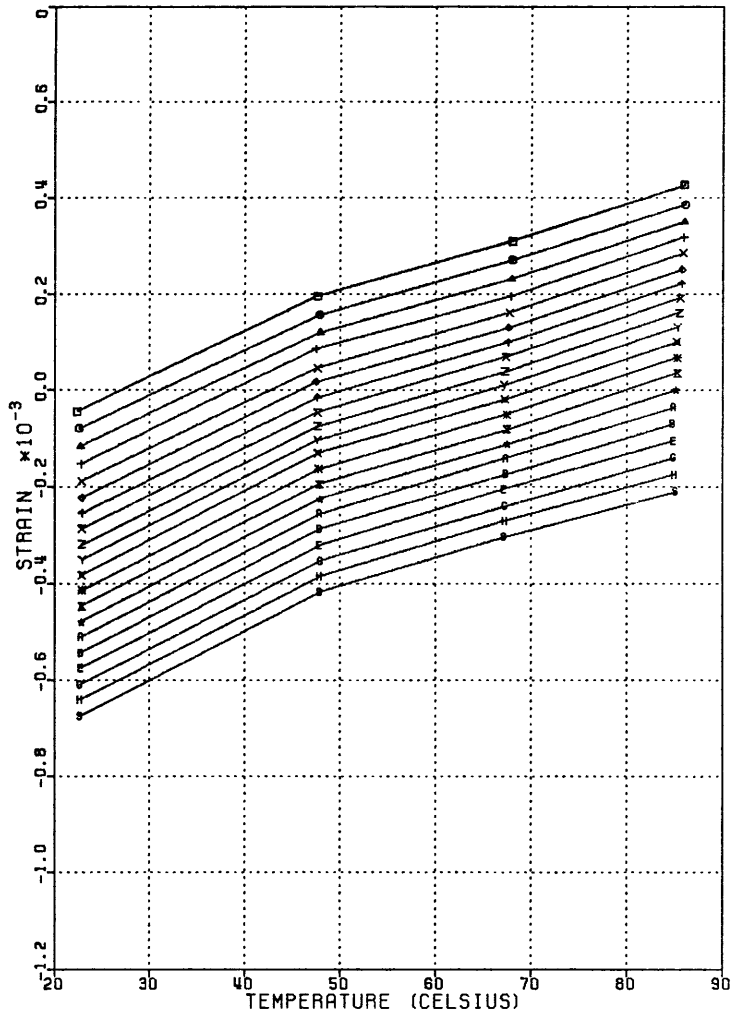
□ - 23°C
 ○ - 48°C
 ▲ - 68°C
 + - 85°C



812 PAGELAND SC DIABASE

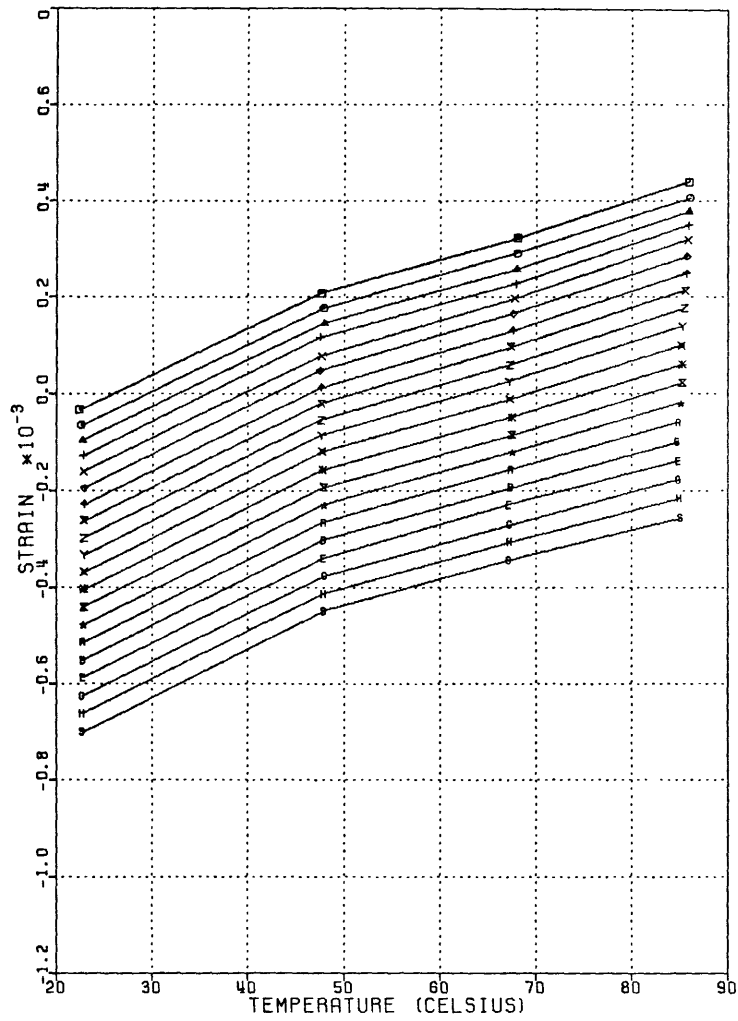
GAGE: 3A

□ - 23°C
 ○ - 48°C
 △ - 68°C
 + - 85°C



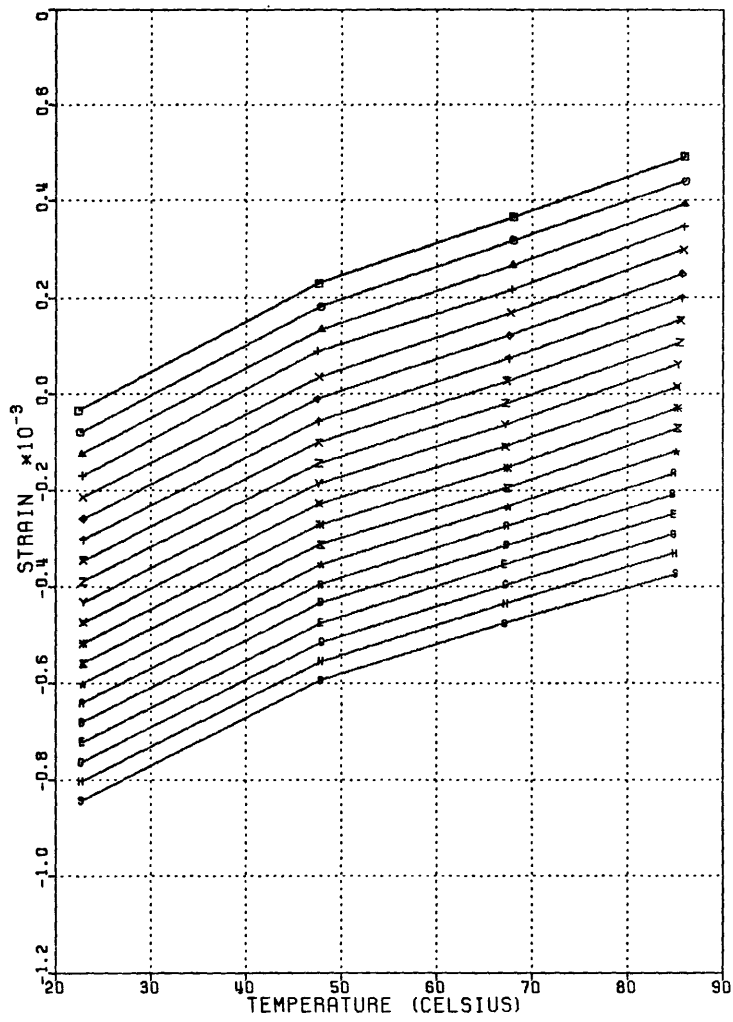
812 PAGELAND SC DIABASE
GAGE:AC

□ - 10 MPA	⌘ - 110 MPA
○ - 20 MPA	* - 120 MPA
△ - 30 MPA	⊗ - 130 MPA
+ - 40 MPA	★ - 140 MPA
× - 50 MPA	A - 150 MPA
◇ - 60 MPA	B - 160 MPA
↑ - 70 MPA	E - 170 MPA
⊗ - 80 MPA	G - 180 MPA
Z - 90 MPA	H - 190 MPA
Y - 100 MPA	S - 200 MPA



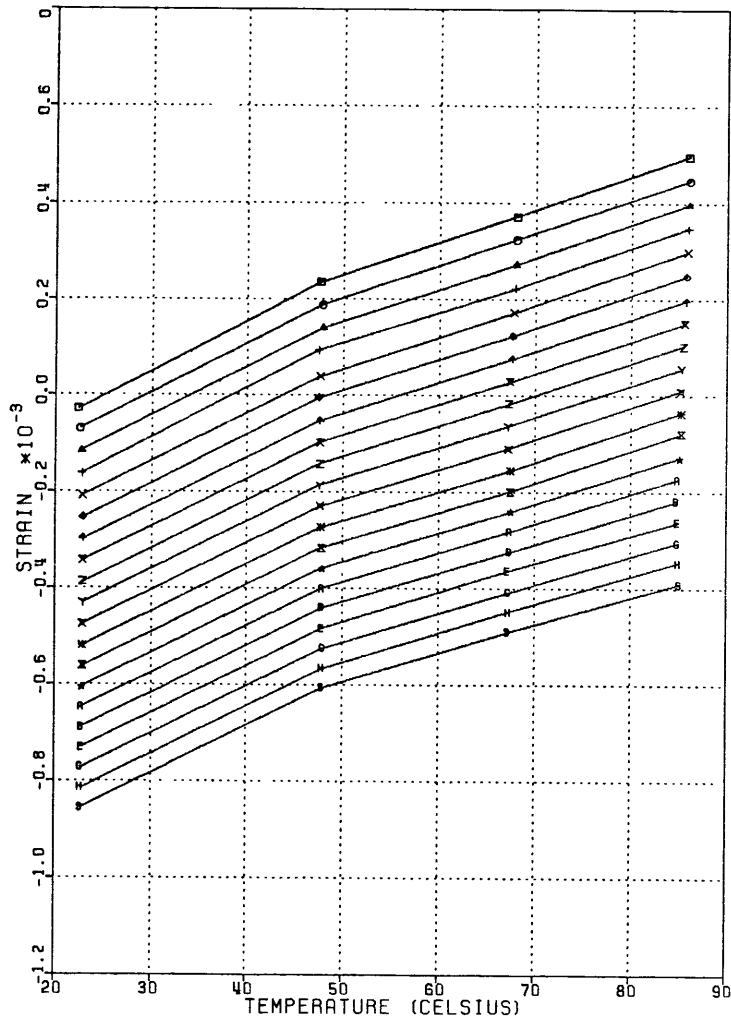
812 PAGELAND SC DIABASE
GAGE: BC

□ - 10 MPA	✕ - 110 MPA
○ - 20 MPA	✱ - 120 MPA
△ - 30 MPA	✖ - 130 MPA
+ - 40 MPA	★ - 140 MPA
X - 50 MPA	A - 150 MPA
◇ - 60 MPA	B - 160 MPA
† - 70 MPA	E - 170 MPA
‡ - 80 MPA	G - 180 MPA
† - 90 MPA	H - 190 MPA
Y - 100 MPA	S - 200 MPA



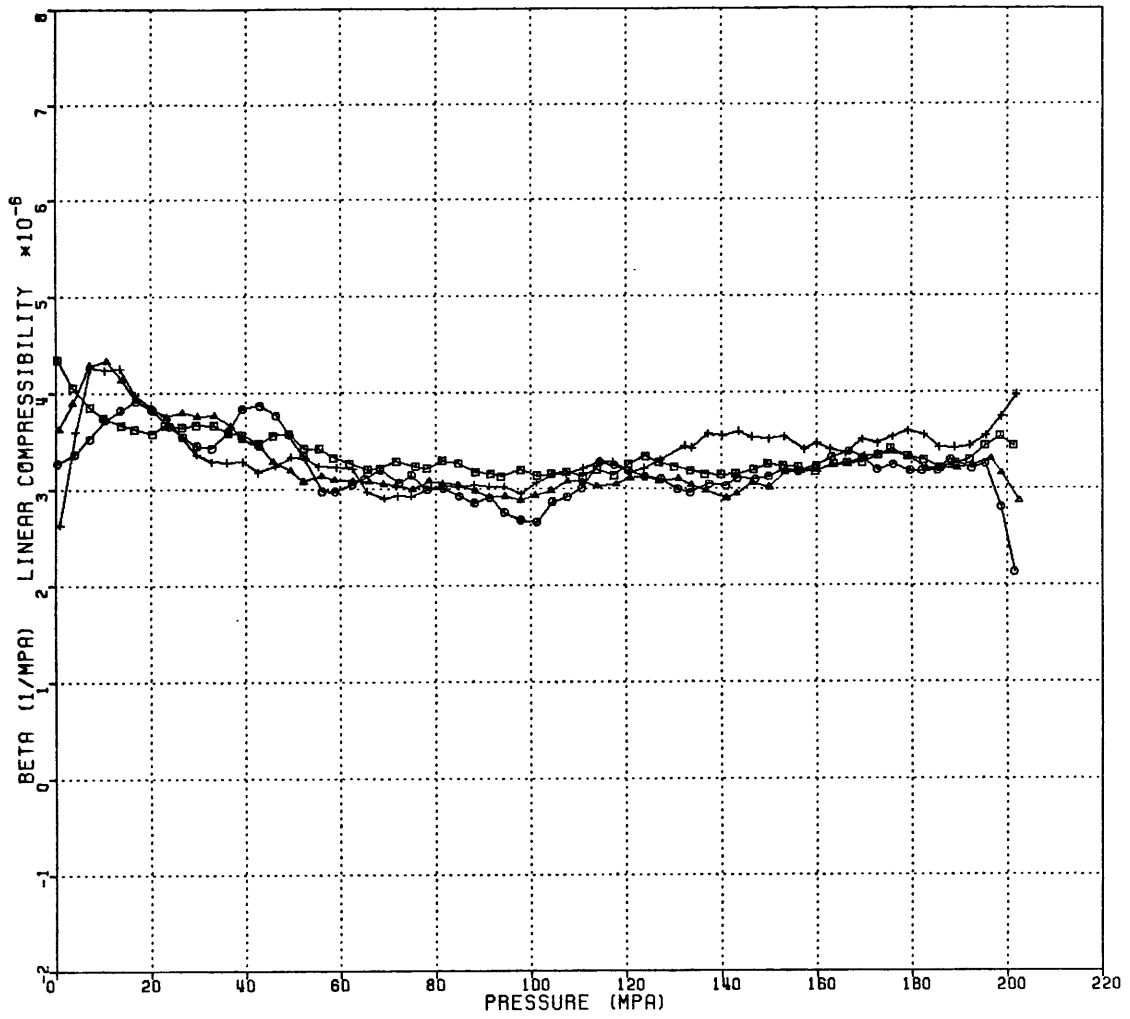
812 PAGELAND SC DIABASE
GAGE:CA

- | | |
|-------------|-------------|
| □ - 10 MPA | ✕ - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | ⊗ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | ⊖ - 150 MPA |
| ◇ - 60 MPA | ⊕ - 160 MPA |
| ⊕ - 70 MPA | ⊖ - 170 MPA |
| ⊗ - 80 MPA | ⊕ - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



812 PAGELAND SC DIABASE
GAGE: 3A

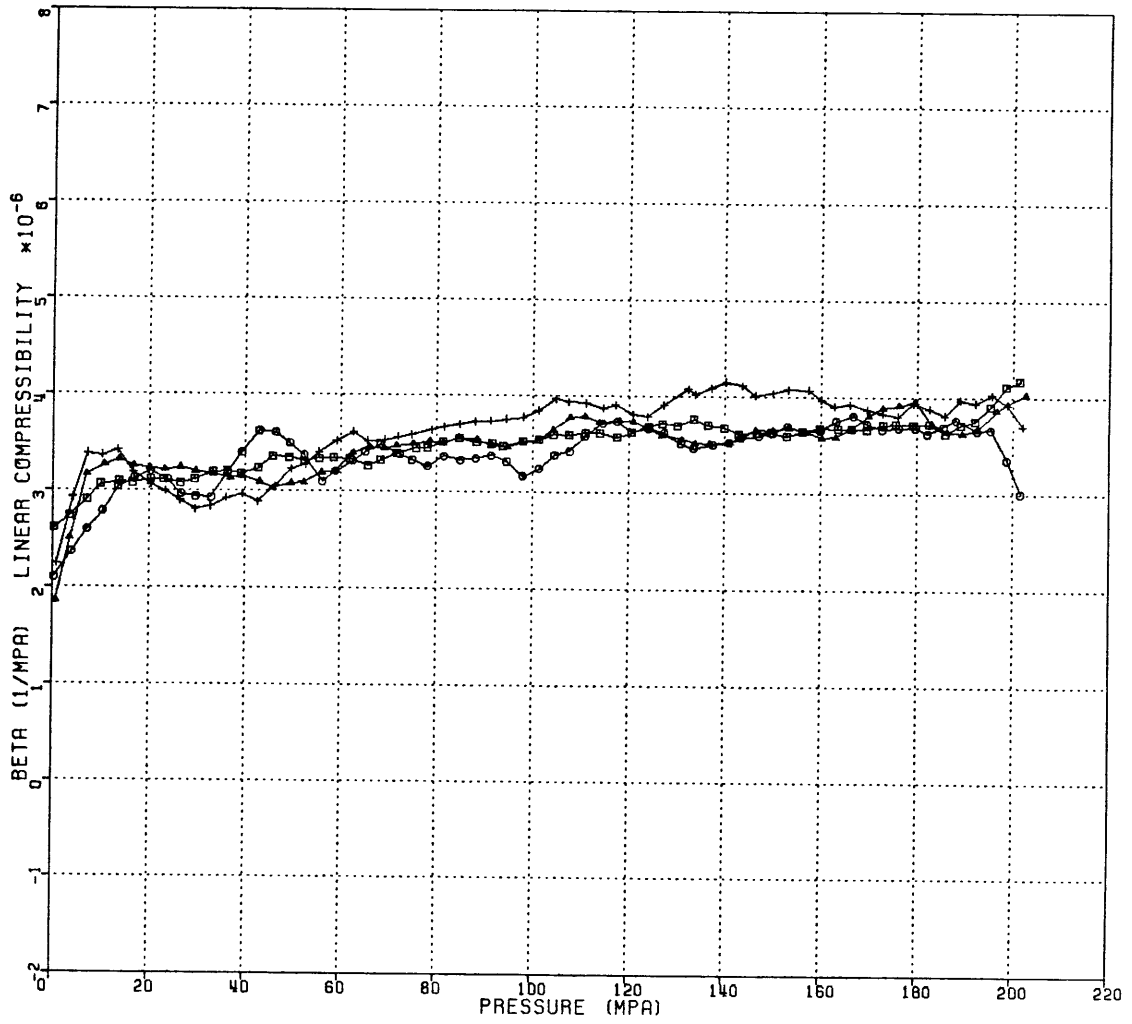
□ - 10 MPA	⊗ - 110 MPA
○ - 20 MPA	* - 120 MPA
△ - 30 MPA	⊗ - 130 MPA
+ - 40 MPA	★ - 140 MPA
X - 50 MPA	A - 150 MPA
◇ - 60 MPA	B - 160 MPA
⊕ - 70 MPA	E - 170 MPA
⊗ - 80 MPA	G - 180 MPA
Z - 90 MPA	H - 190 MPA
Y - 100 MPA	S - 200 MPA



812 PAGELAND SC DIABASE

GAGE: AC

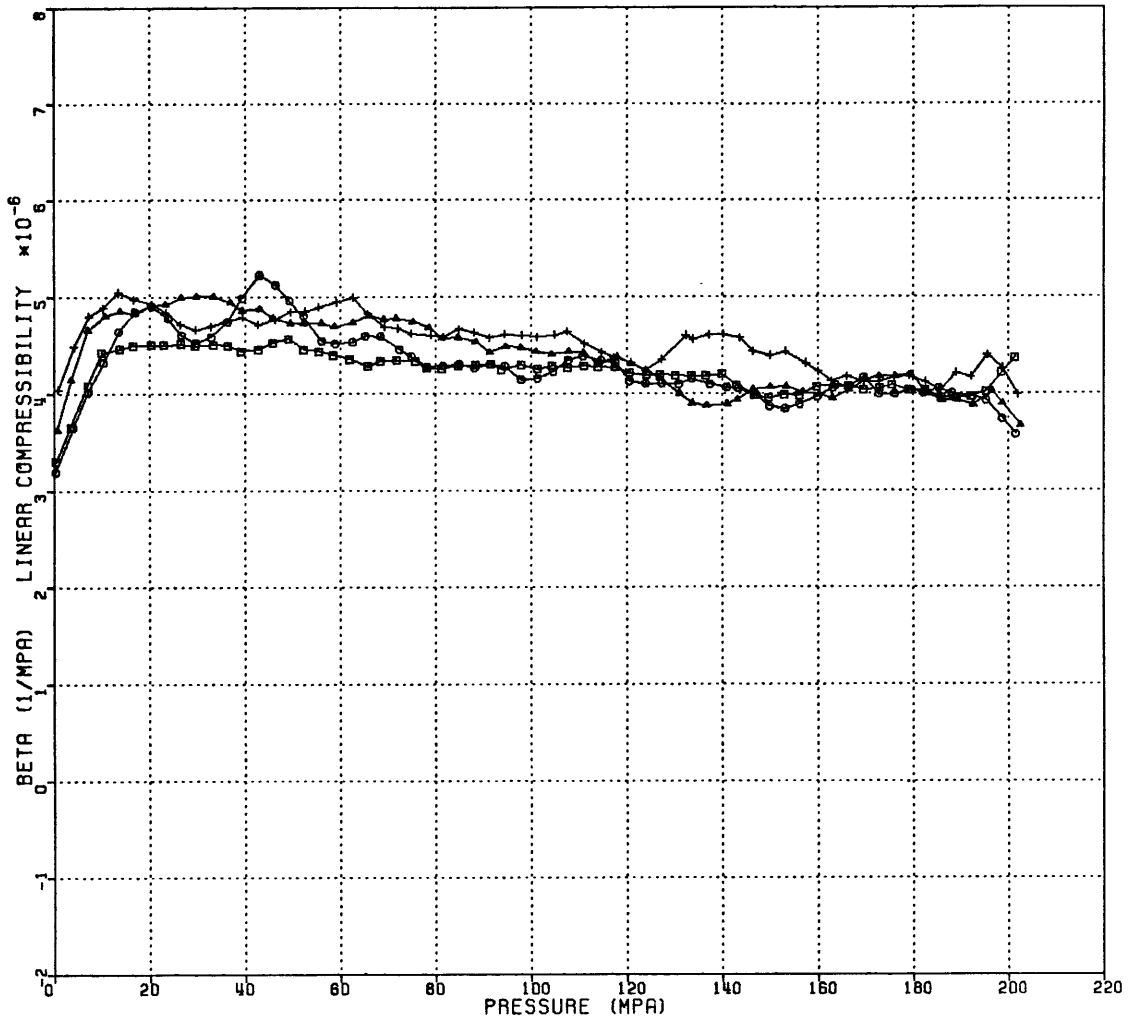
□ - 23°C
 ○ - 48°C
 ▲ - 68°C
 + - 85°C



812 PAGELAND SC DIABASE

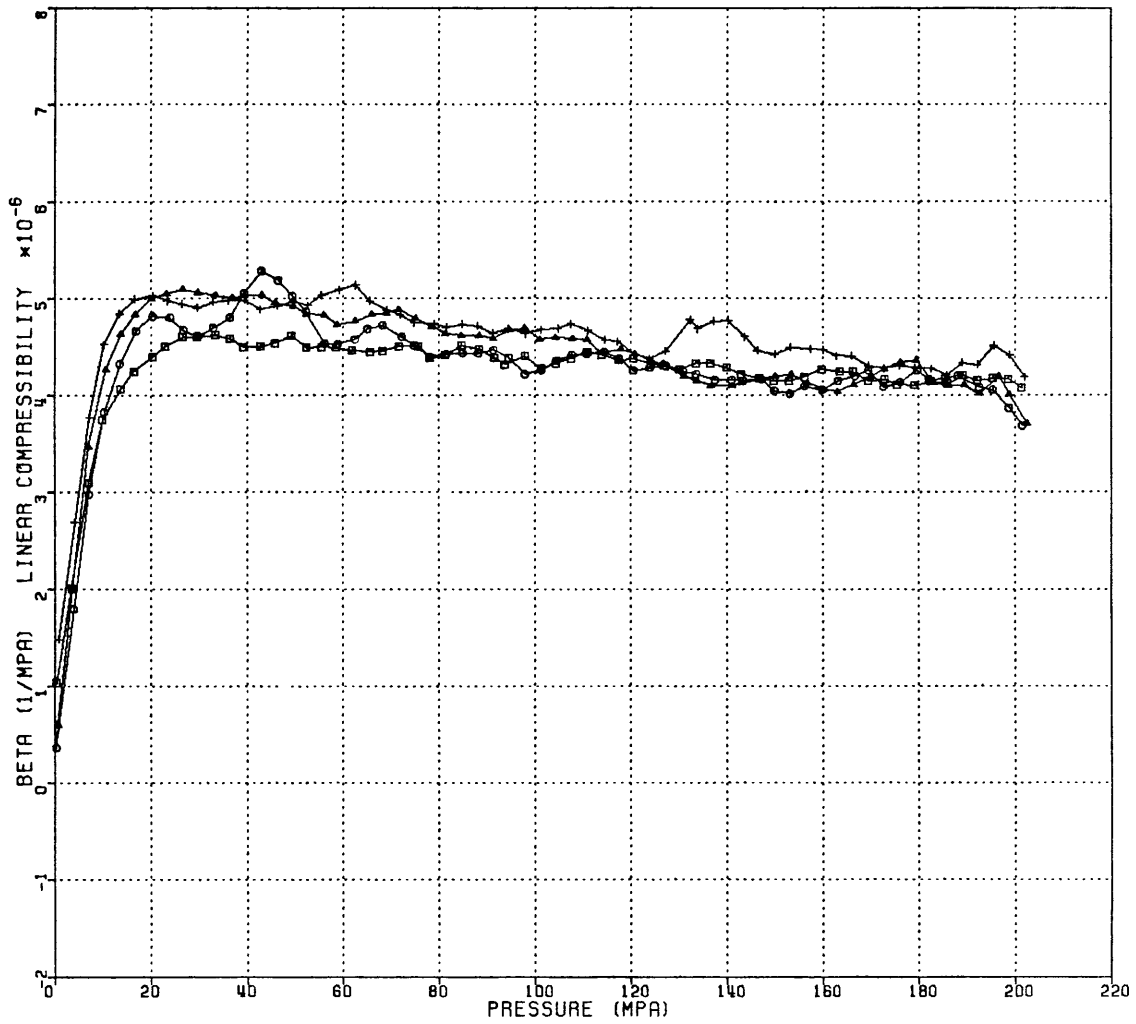
GAGE:BC

- - 23°C
- - 48°C
- △ - 68°C
- + - 85°C



812 PAGELAND SC DIABASE
 GAGE:CA

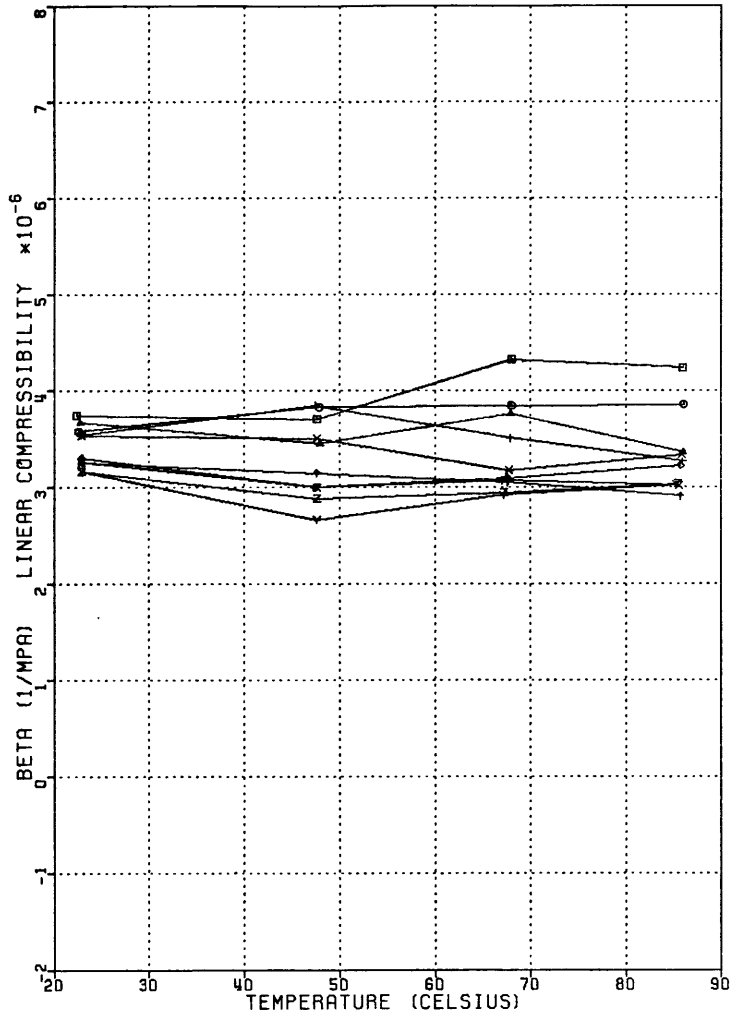
□ - 23°C
 ○ - 48°C
 ▲ - 68°C
 + - 85°C



812 PAGELAND SC DIABASE

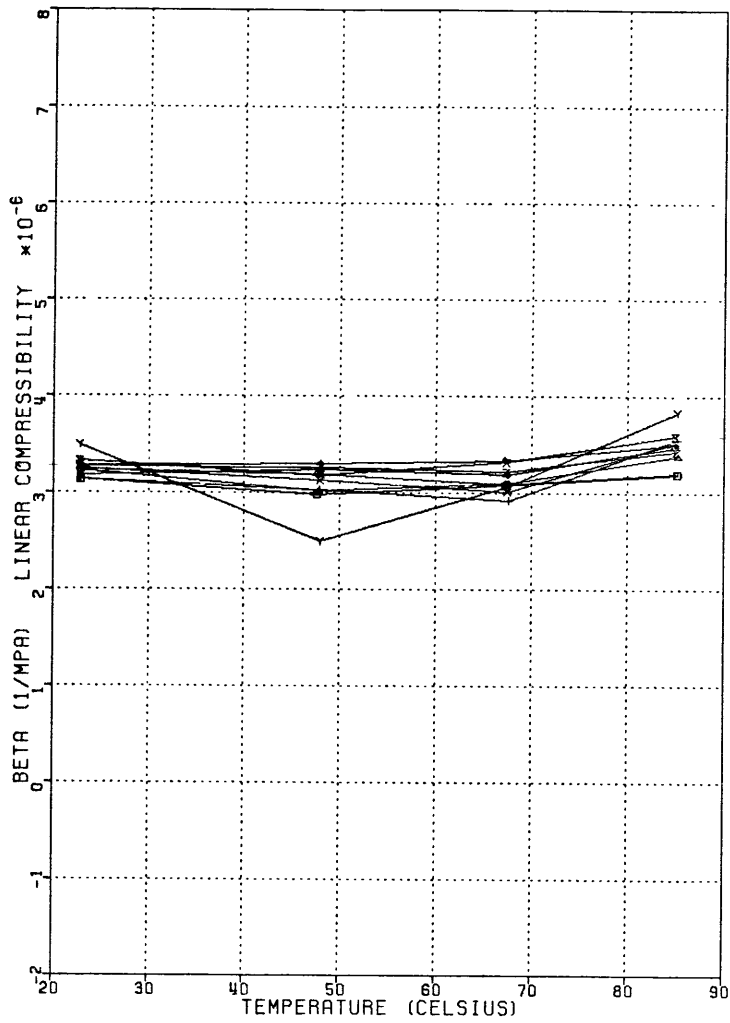
GAGE: 3A

□ - 23°C
 ○ - 48°C
 ▲ - 68°C
 + - 85°C



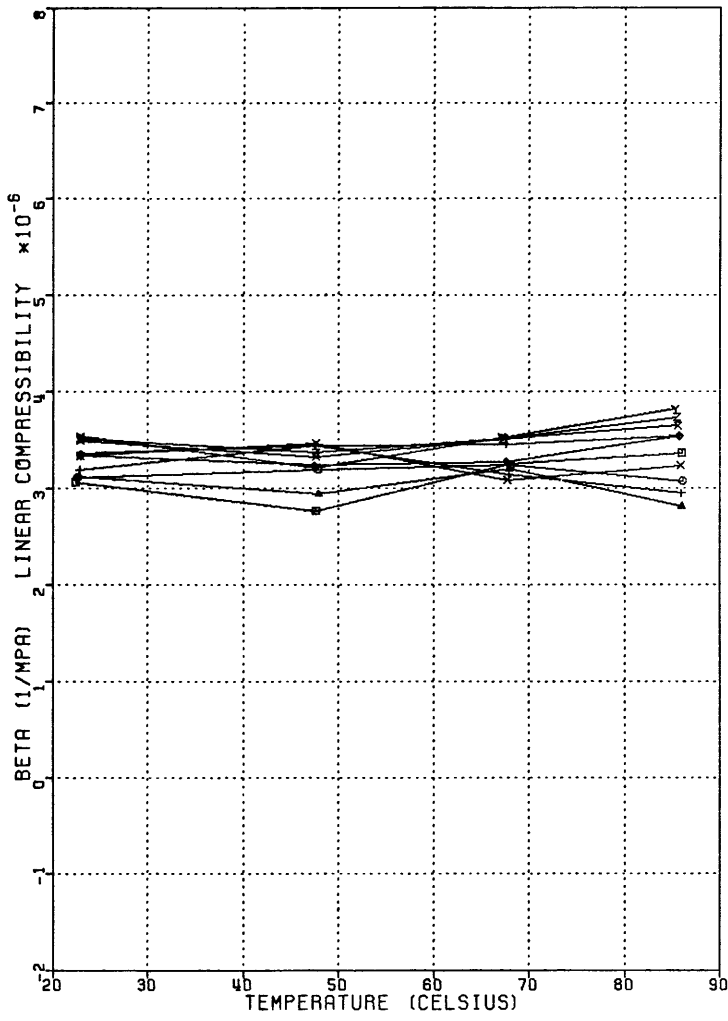
812 PAGELAND SC DIABASE
GAGE: AC

- - 10 MPA
- - 20 MPA
- ▲ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ♠ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



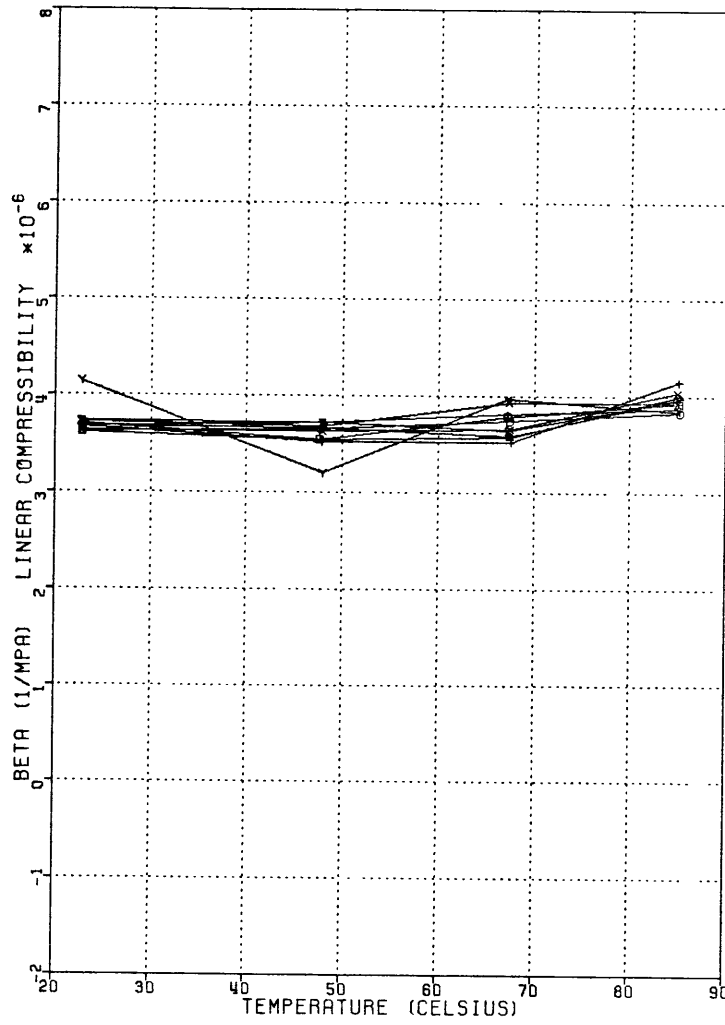
812 PAGELAND SC DIABASE
GAGE: AC

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



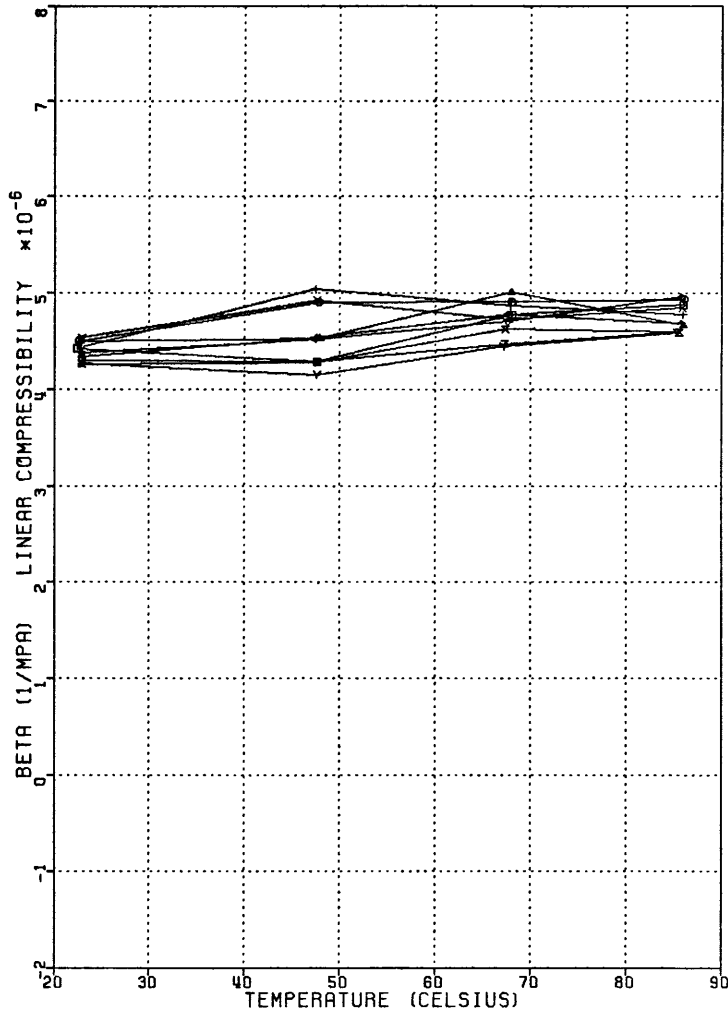
812 PAGELAND SC DIABASE
GAGE:BC

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ♠ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



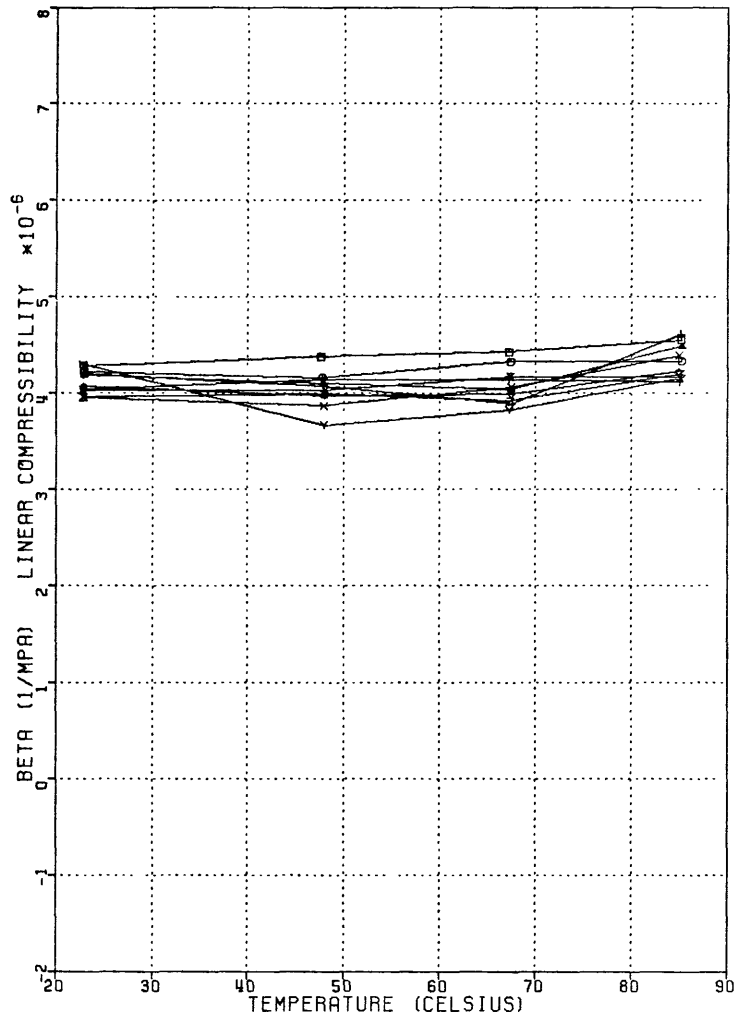
812 PAGELAND SC DIABASE
GAGE:BC

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



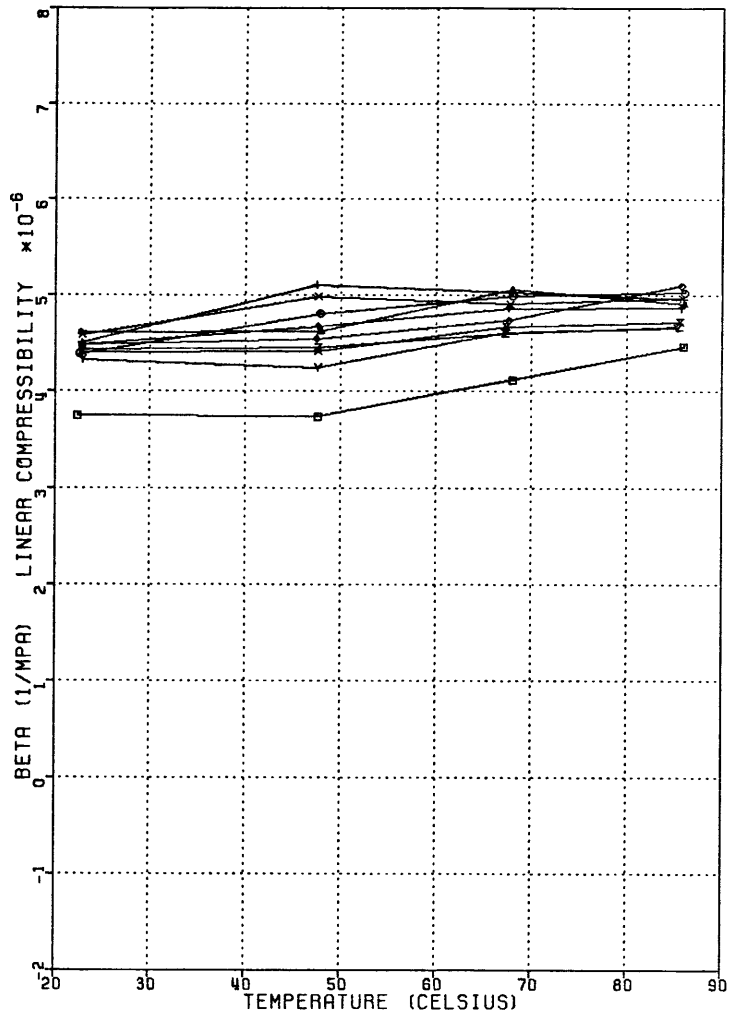
812 PAGELAND SC DIABASE
GAGE:CA

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



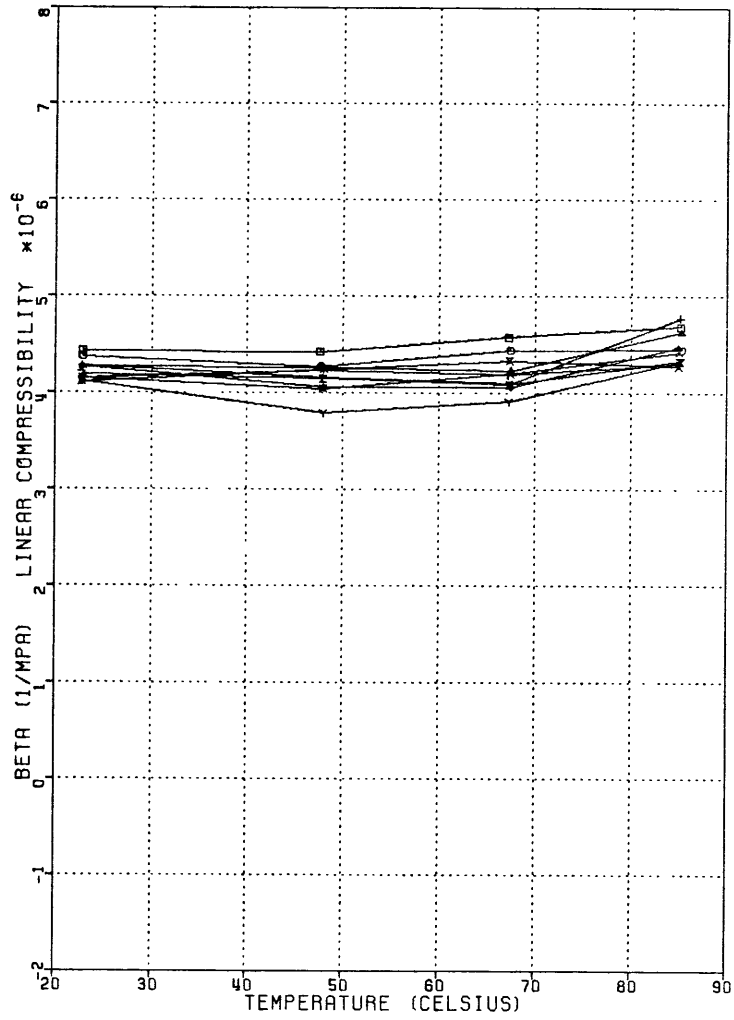
812 PAGELAND SC DIABASE
GAGE:CA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- x - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



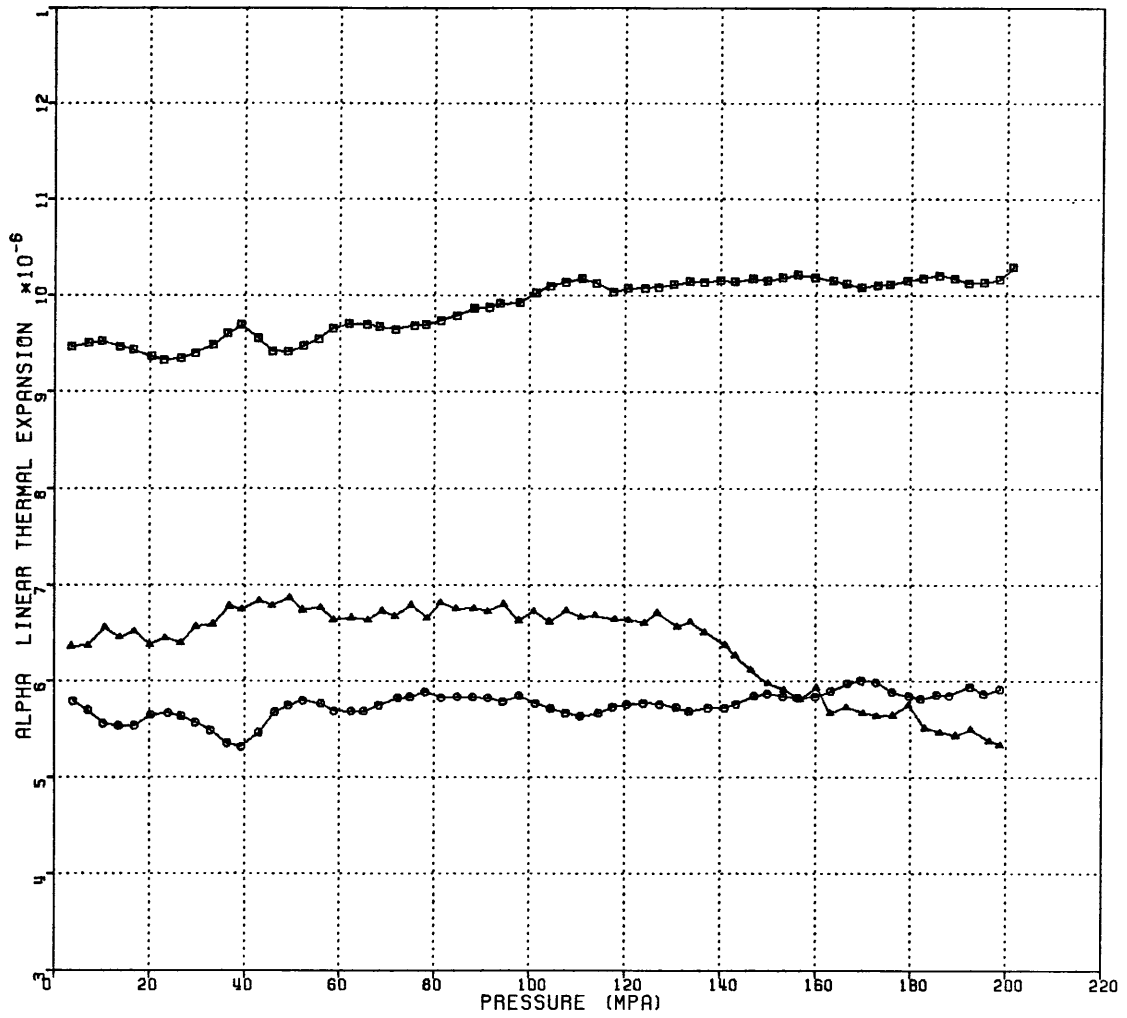
812 PAGELAND SC DIABASE
GAGE: 3A

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ♣ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



812 PAGELAND SC DIABASE
GAGE: 3A

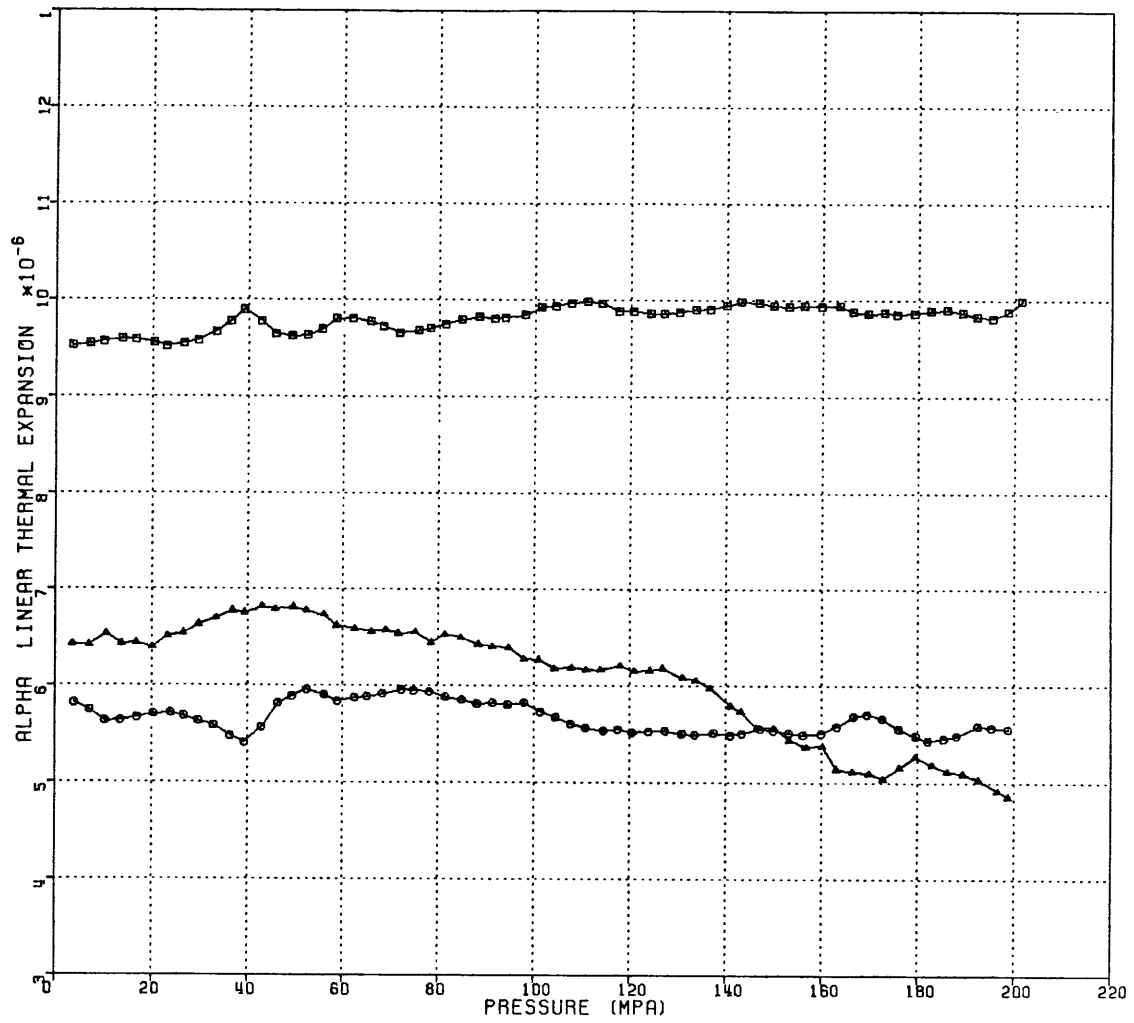
- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



812 PAGELAND SC DIABASE

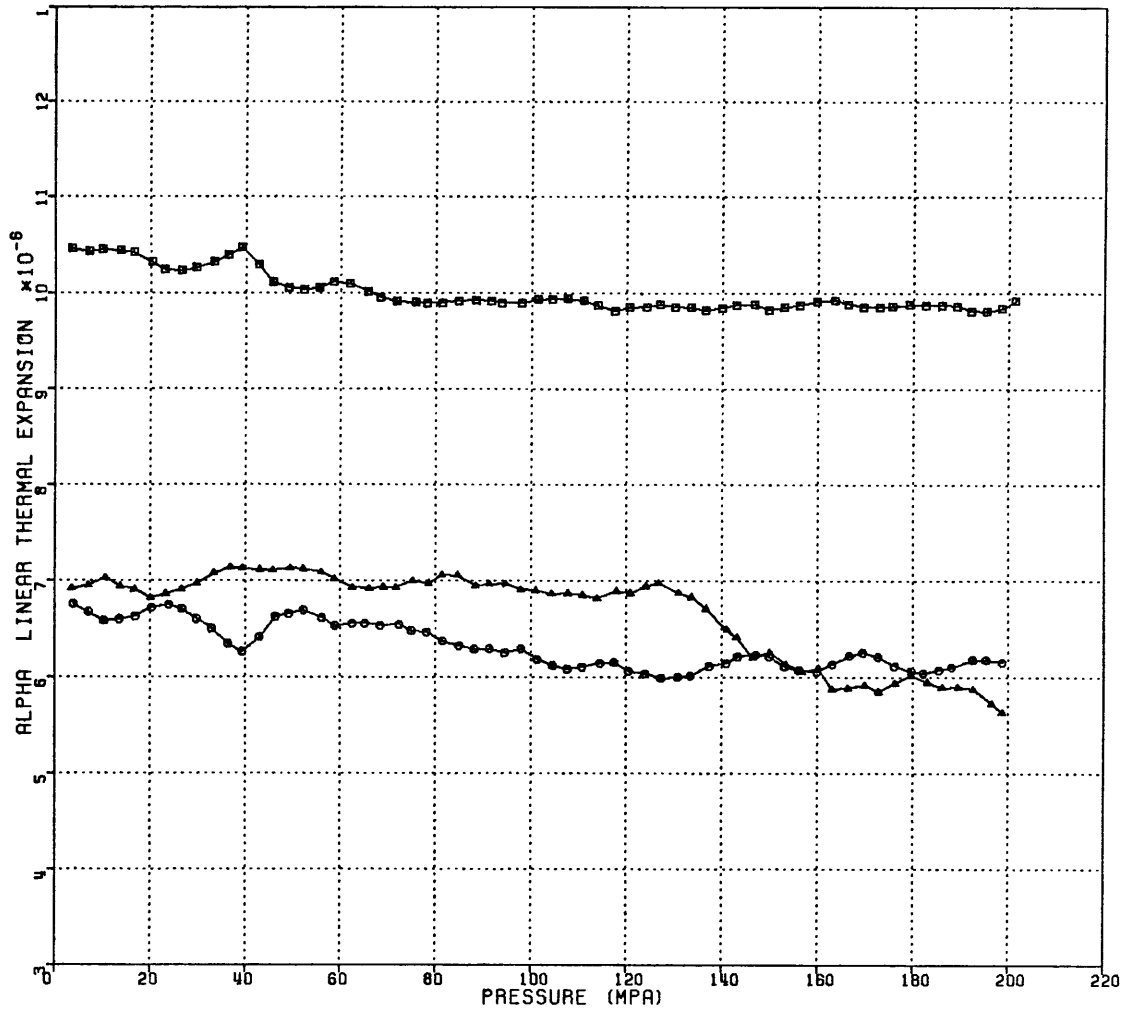
GAGE: AC

- - 23°C- 48°C
- - 48°C- 68°C
- △ - 68°C- 85°C



812 PAGELAND SC DIABASE
GAGE: BC

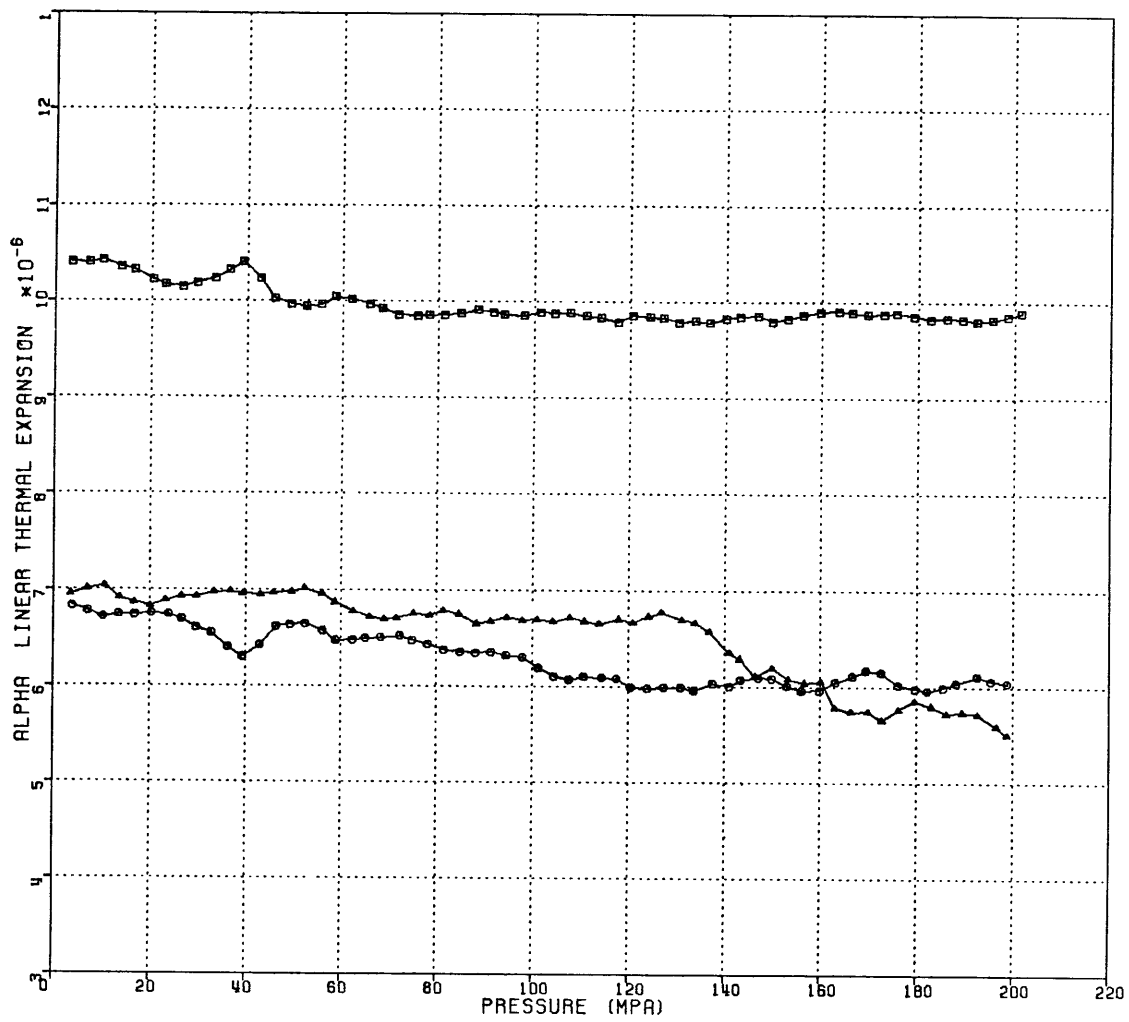
□ - 23°C- 48°C
○ - 48°C- 68°C
△ - 68°C- 85°C



812 PAGELAND SC DIABASE

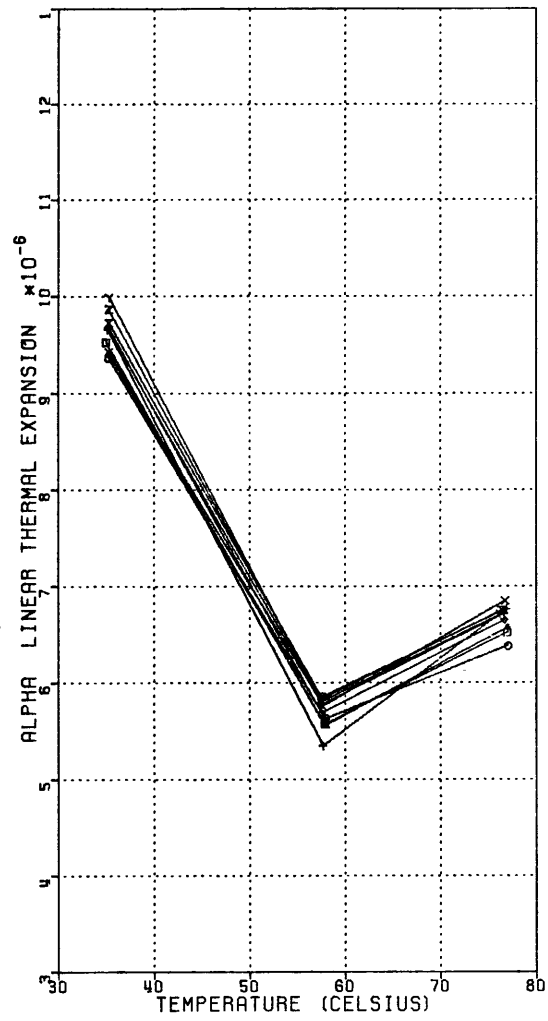
GAGE: CA

- - 23°C- 48°C
- - 48°C- 68°C
- △ - 68°C- 85°C



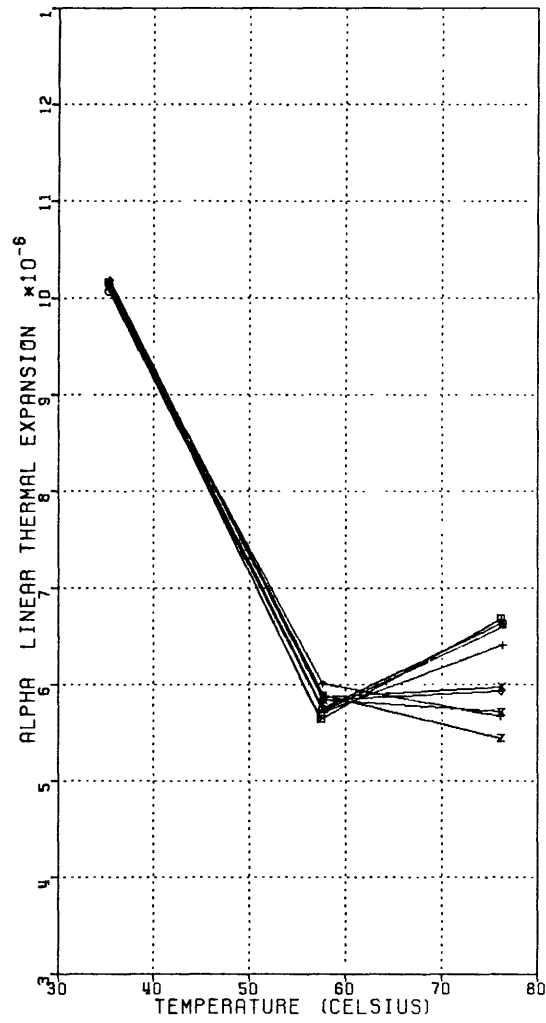
812 PAGELAND SC DIABASE
GAGE: 3A

□ - 23°C- 48°C
○ - 48°C- 68°C
△ - 68°C- 85°C



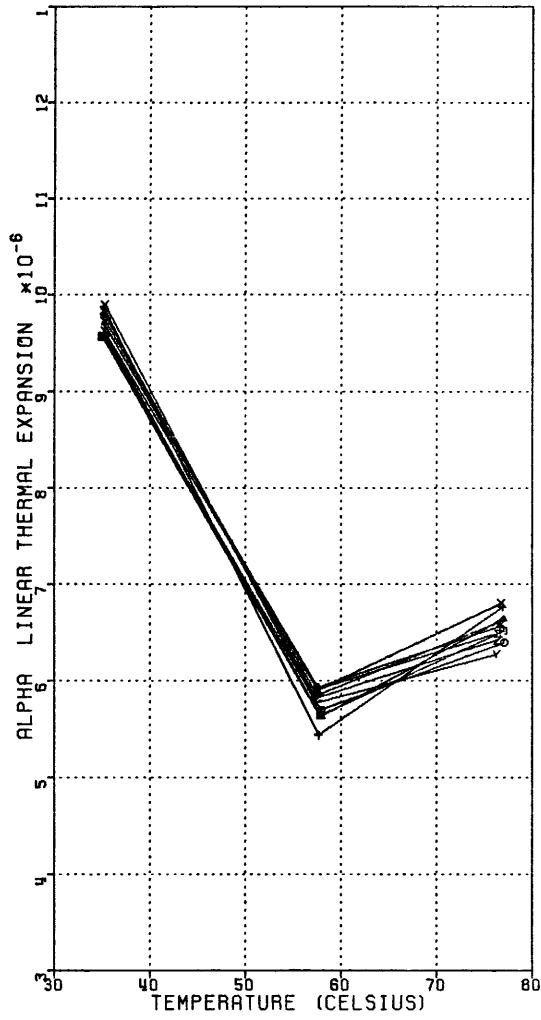
812 PAGELAND SC DIABASE
GAGE:AC

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



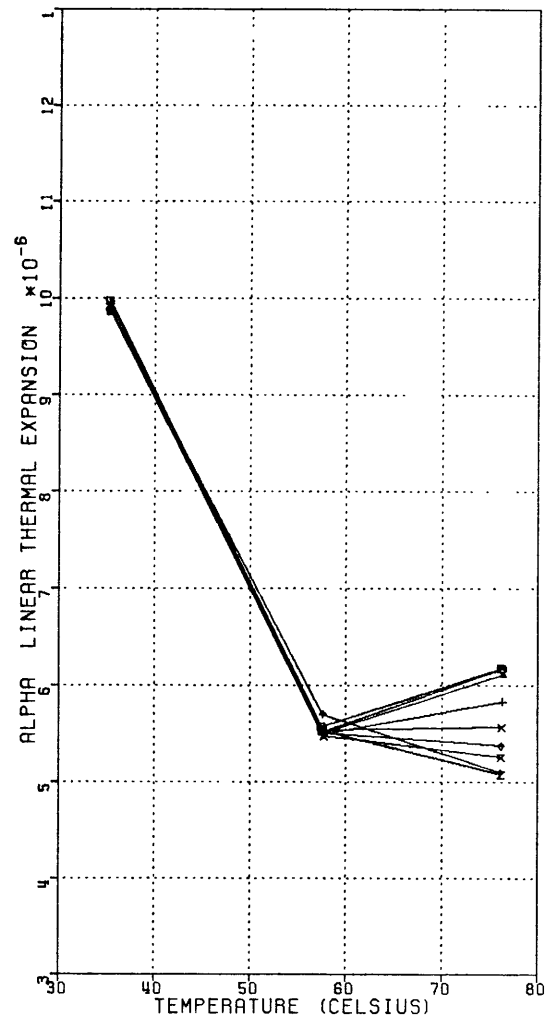
812 PAGELAND SC DIABASE
GAGE:AC

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♣ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA



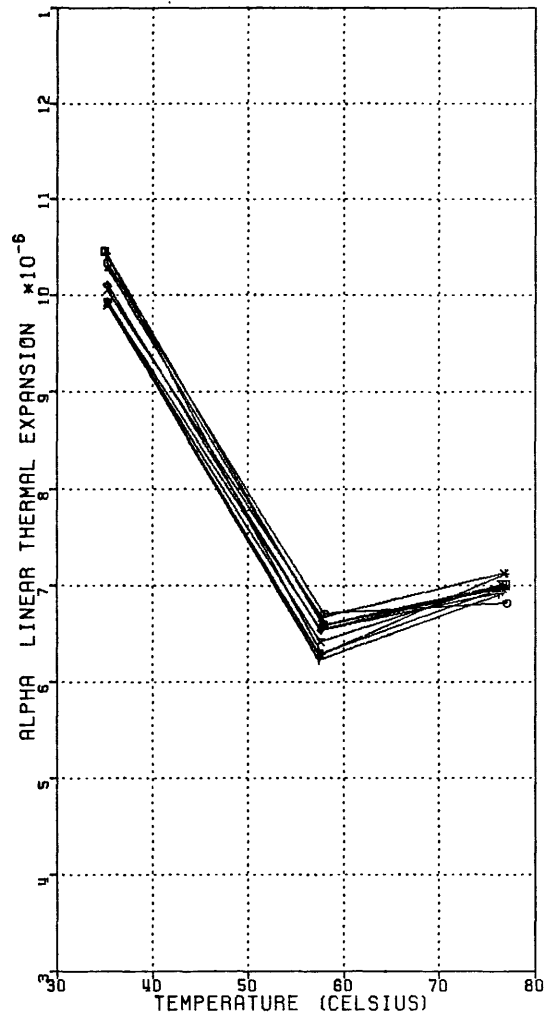
812 PAGELAND SC DIABASE
GAGE:BC

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- x - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



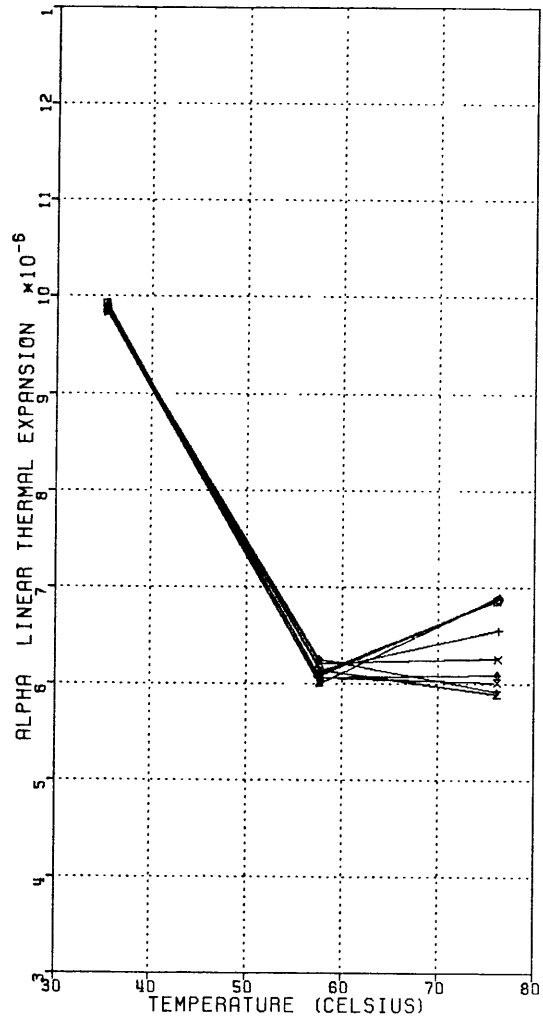
812 PAGELAND SC DIABASE
GAGE:BC

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA



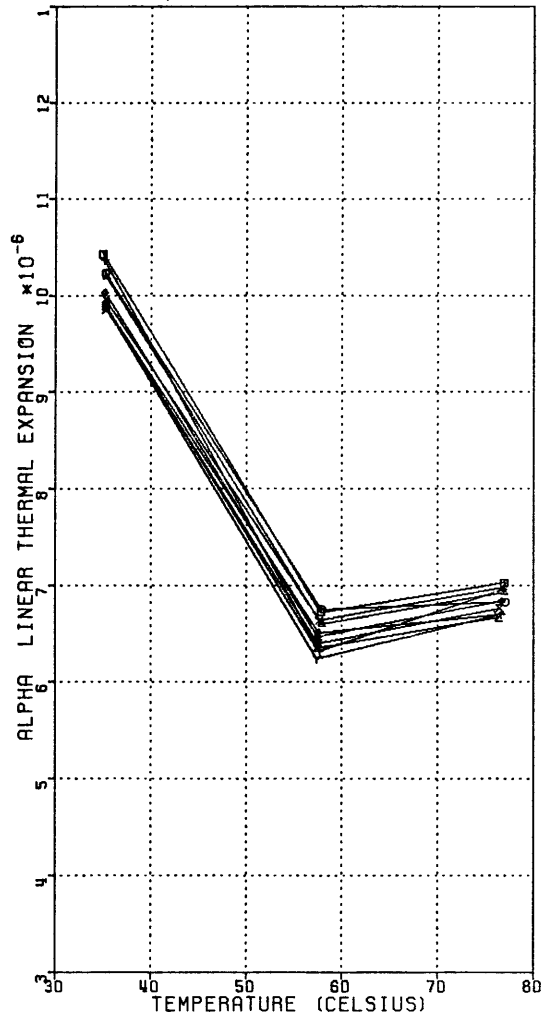
812 PAGELAND SC DIABASE
GAGE:CA

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



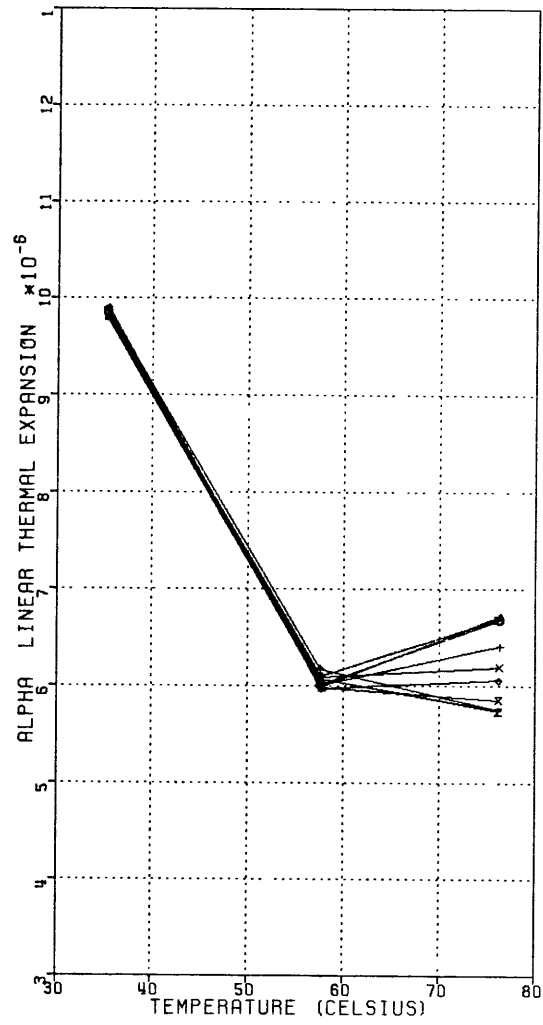
812 PAGELAND SC DIABASE
GAGE:CA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⋈ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA



812 PAGELAND SC DIABASE
GAGE: 3A

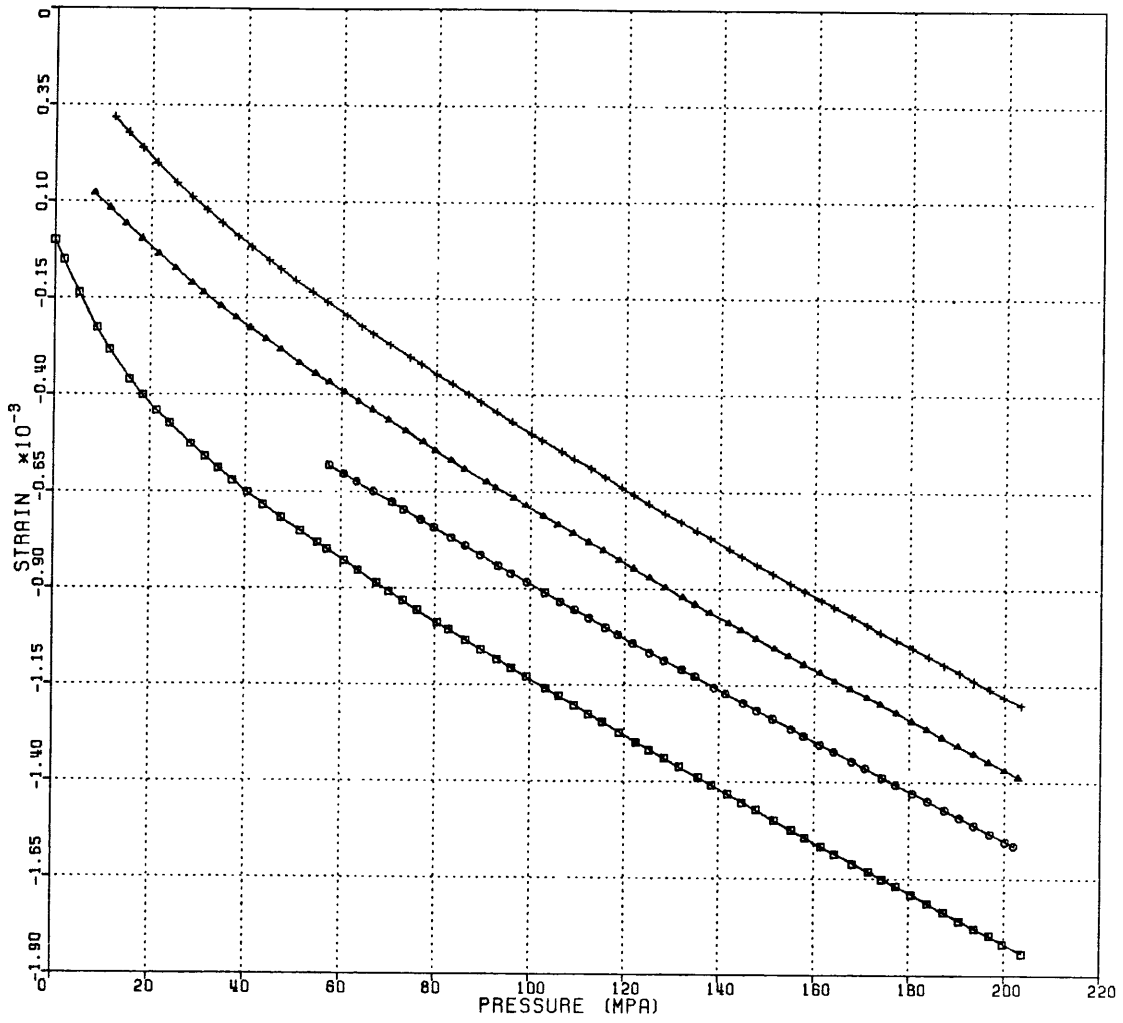
- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ♣ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



812 PAGELAND SC DIABASE
GAGE:3A

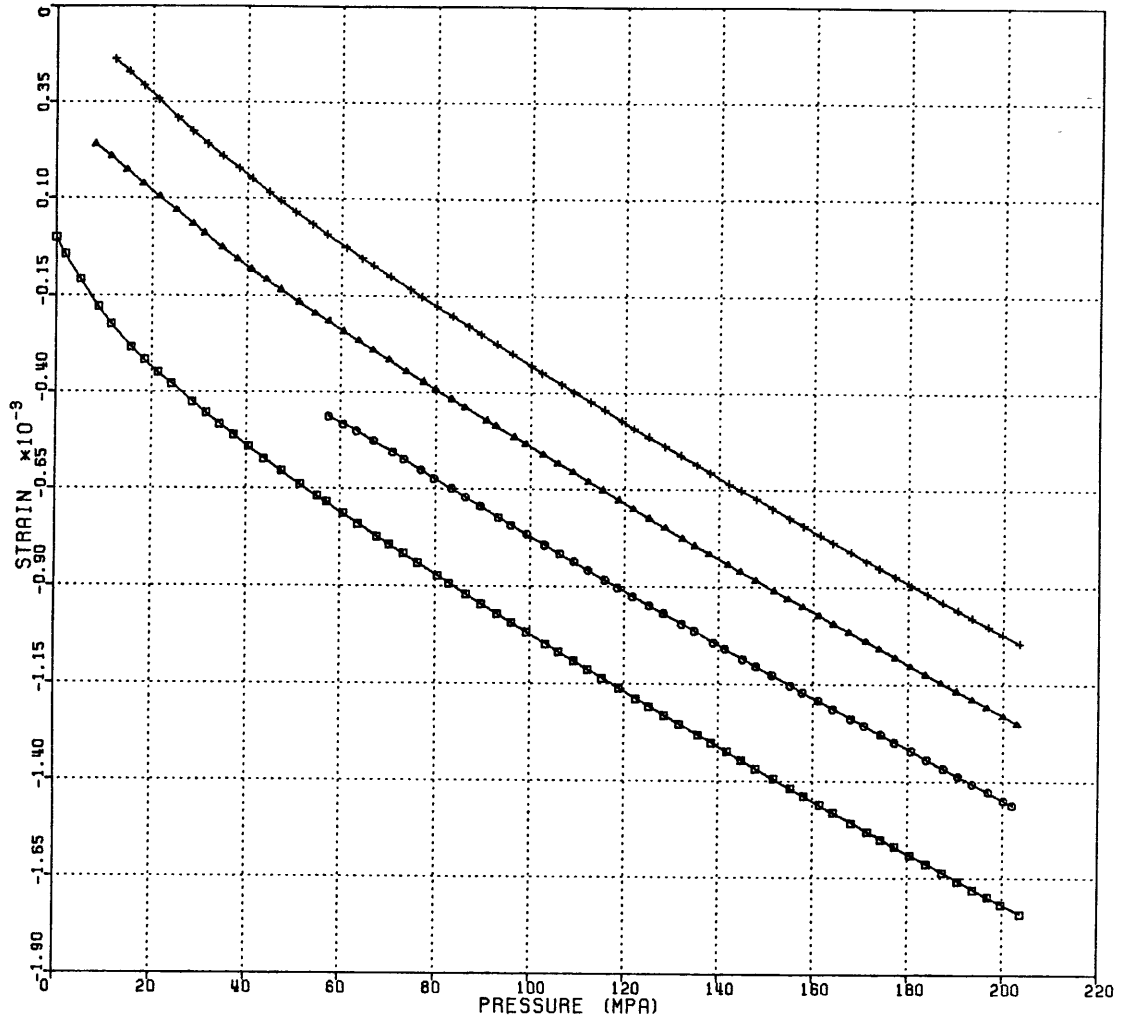
- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA

1132 Westerly granite is isotropic. Above P_c β changes little if at all from gage to gage. But β does vary below P_c showing a variation in crack density with direction. Brace (1965) related this to variation in average grain length with direction. No thermal cycle cracking effects are shown. Change in β with pressure and temperature is very uniform, decreasing with pressure and increasing with temperature. The decrease in α with pressure is close to that of the increase in β with temperature. Changes in α with temperature are decreasing but vary widely with direction.



1132 WESTERLY RI GRANITE
 GAGE: AC

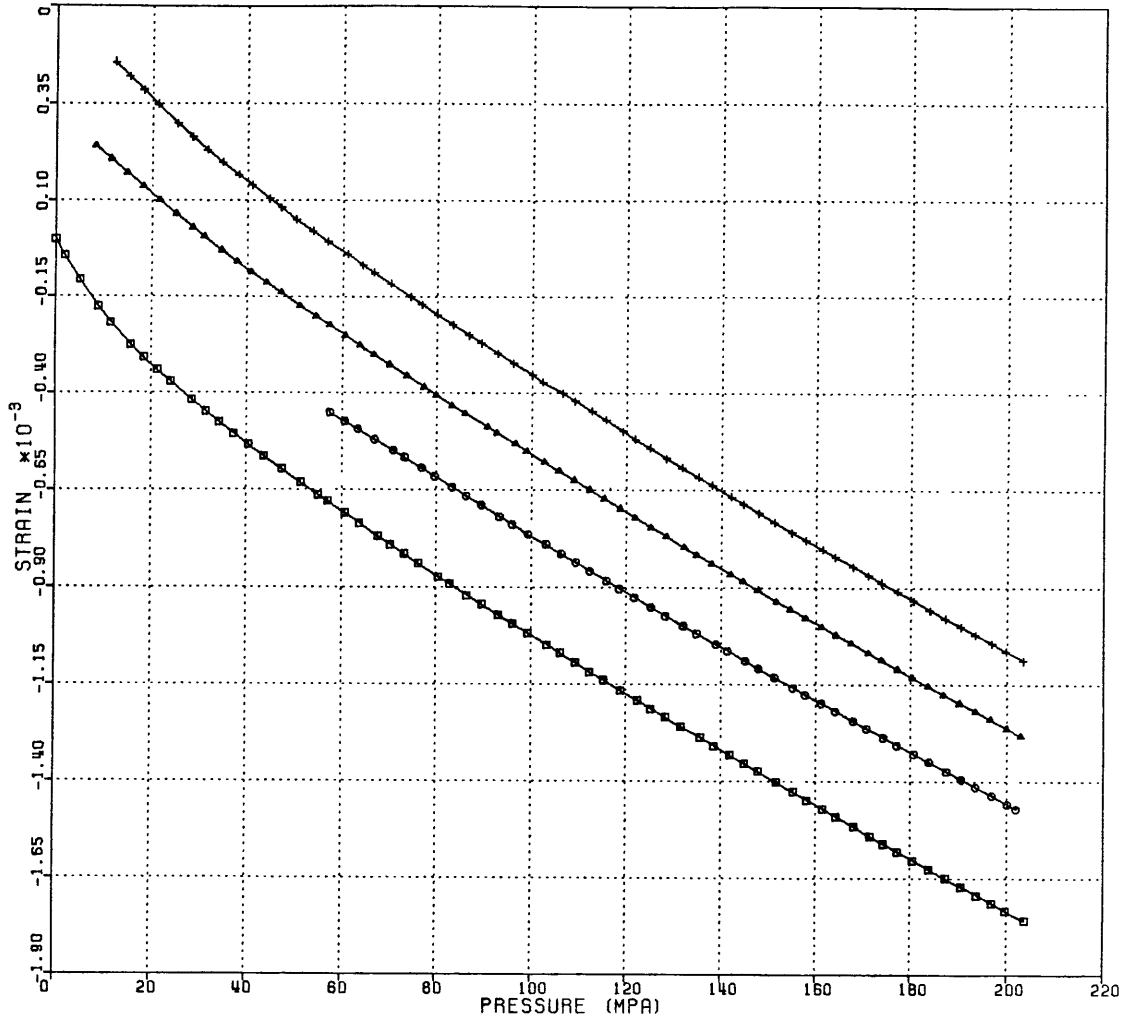
□ - 19°C
 ○ - 43°C
 ▲ - 64°C
 + - 86°C



1132 WESTERLY RI GRANITE

GAGE: BC

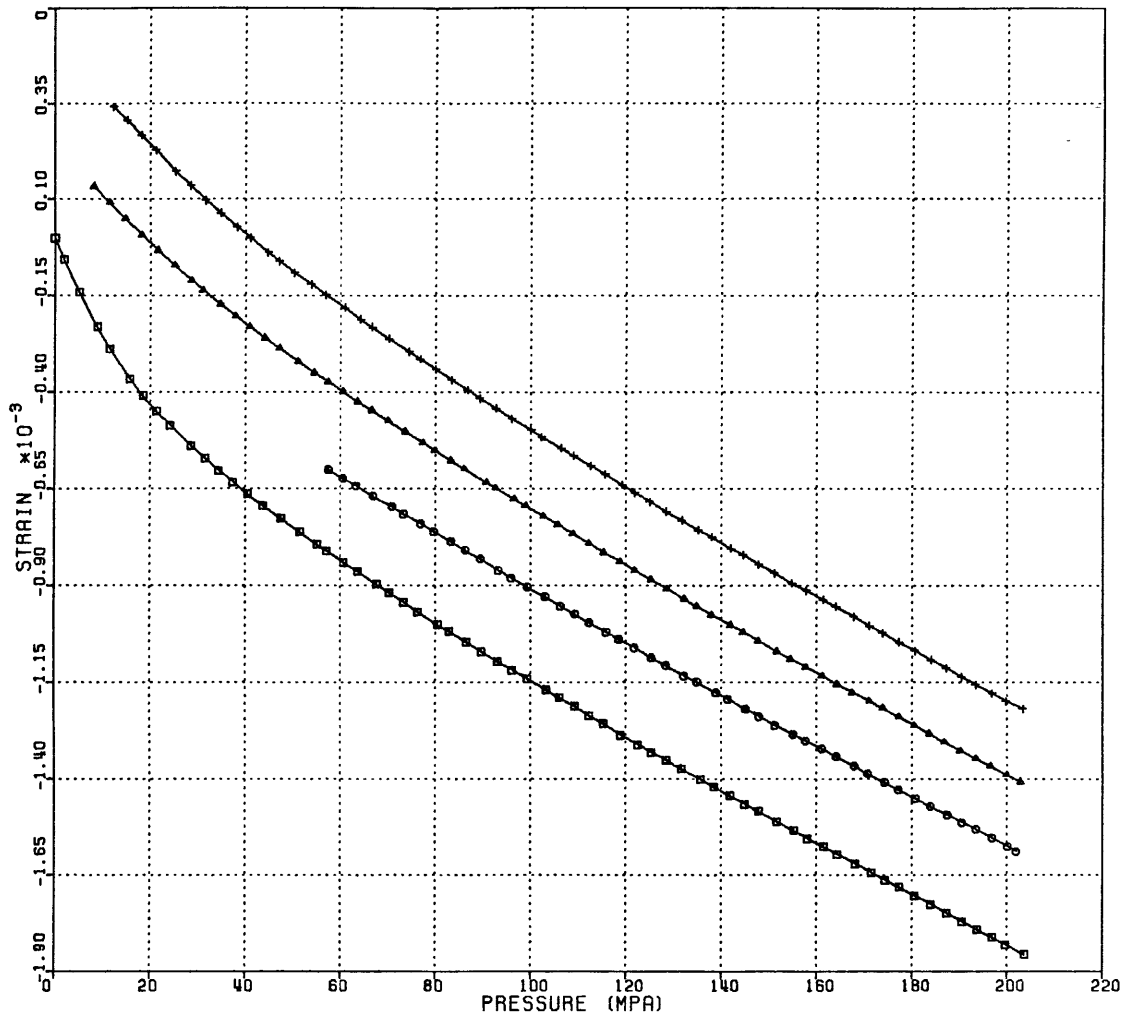
- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



1132 WESTERLY RI GRANITE

GAGE:3C

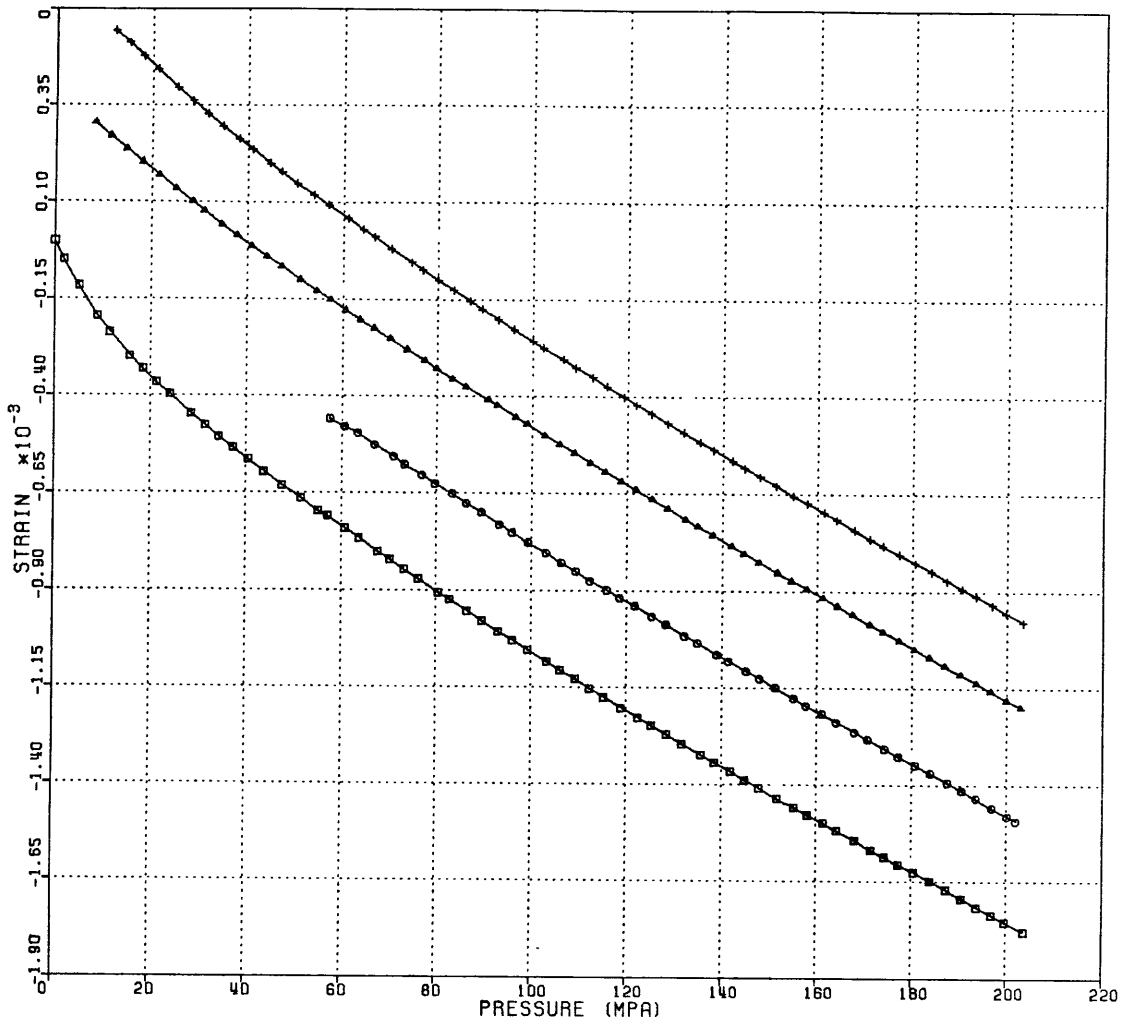
- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



1132 WESTERLY RI GRANITE

GAGE: AB

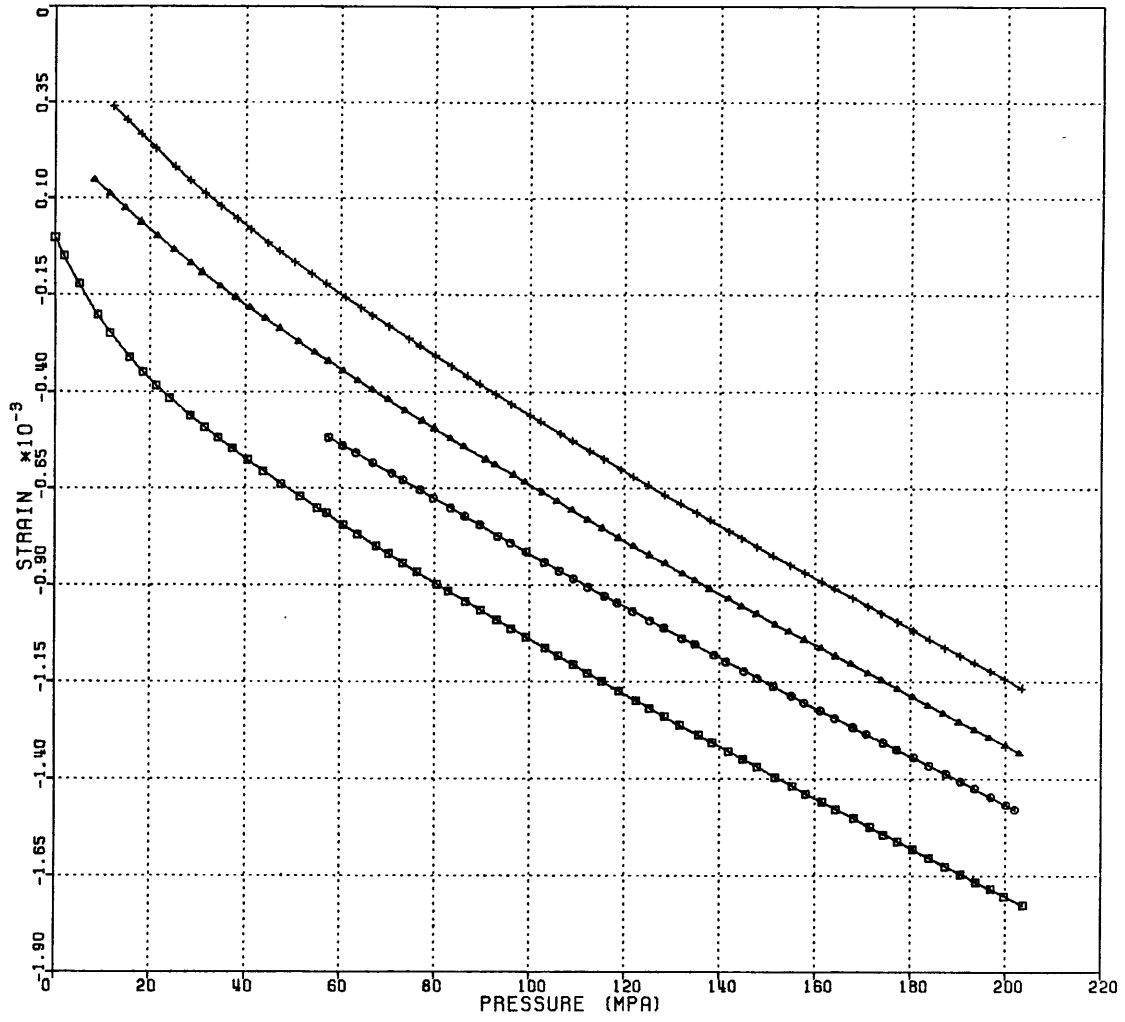
- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



1132 WESTERLY RI GRANITE

GAGE: CB

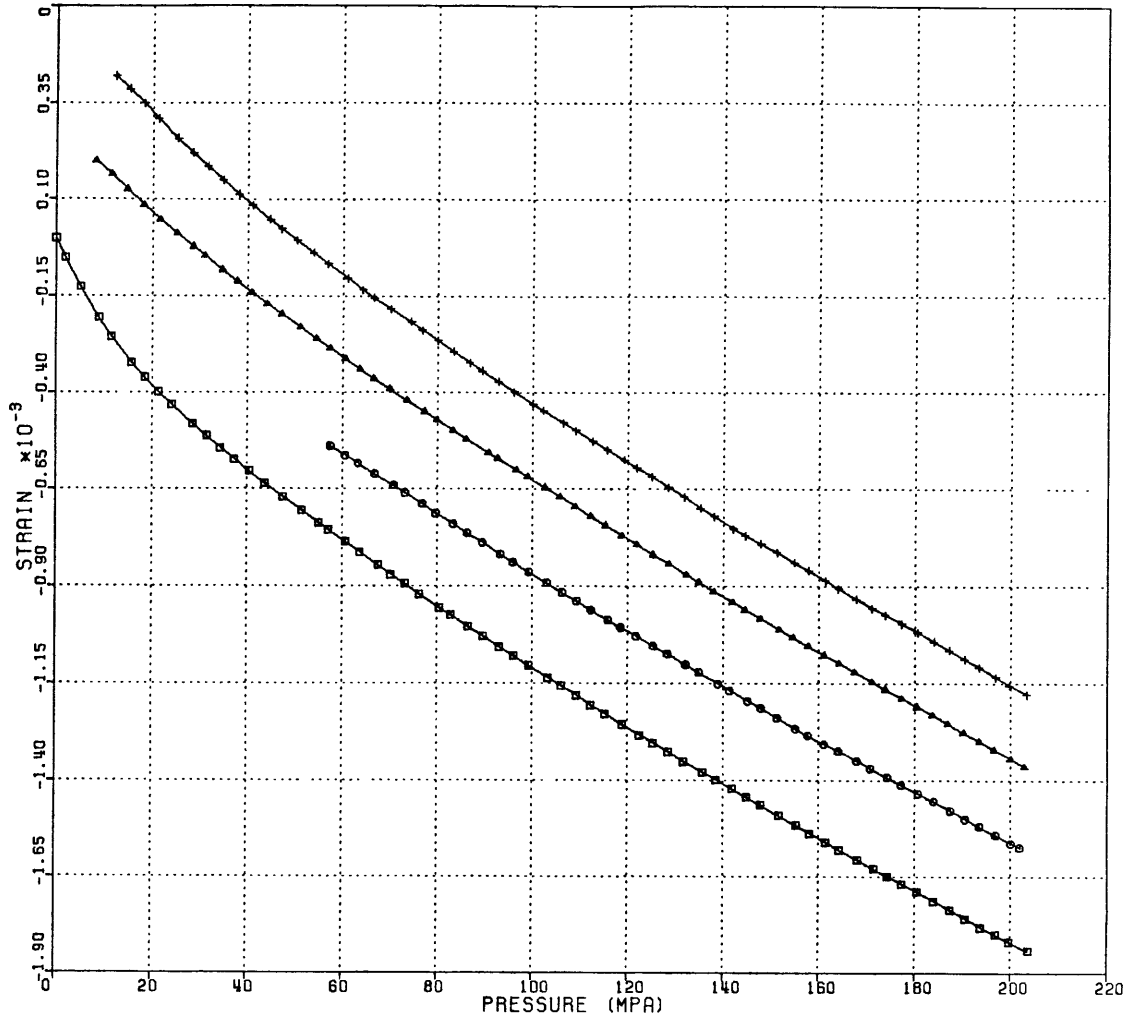
- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



1132 WESTERLY RI GRANITE

GAGE:3B

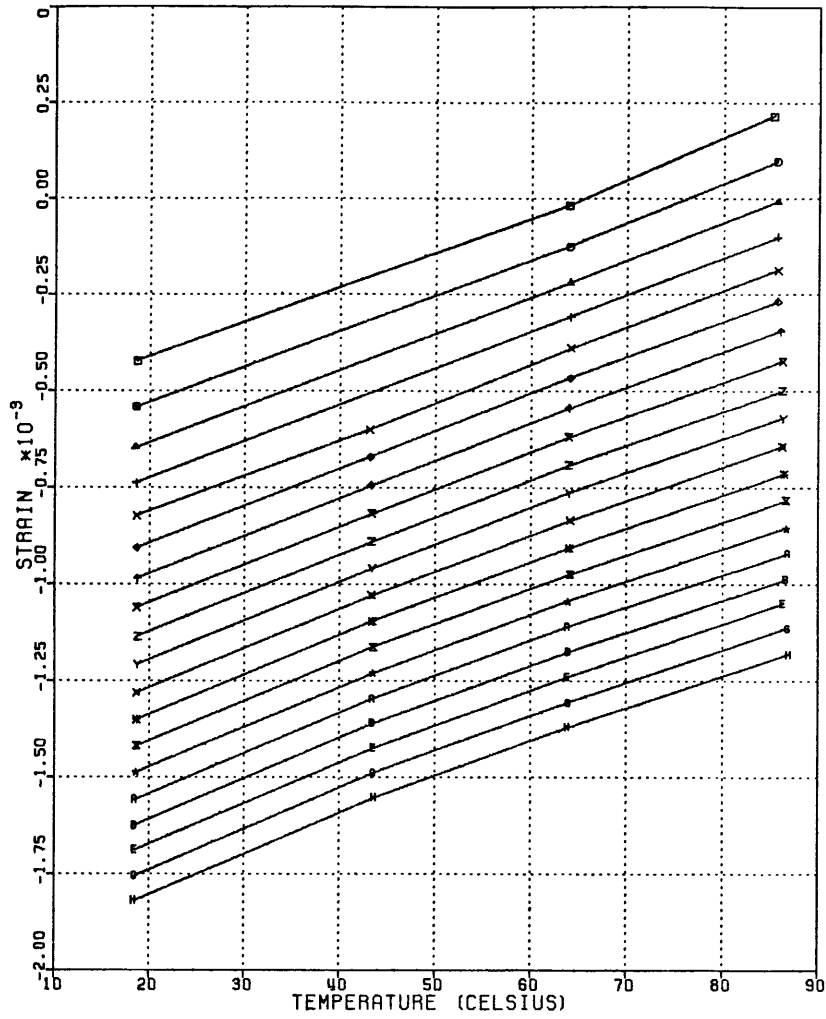
□ - 19°C
 ○ - 43°C
 ▲ - 64°C
 + - 86°C



1132 WESTERLY RI GRANITE

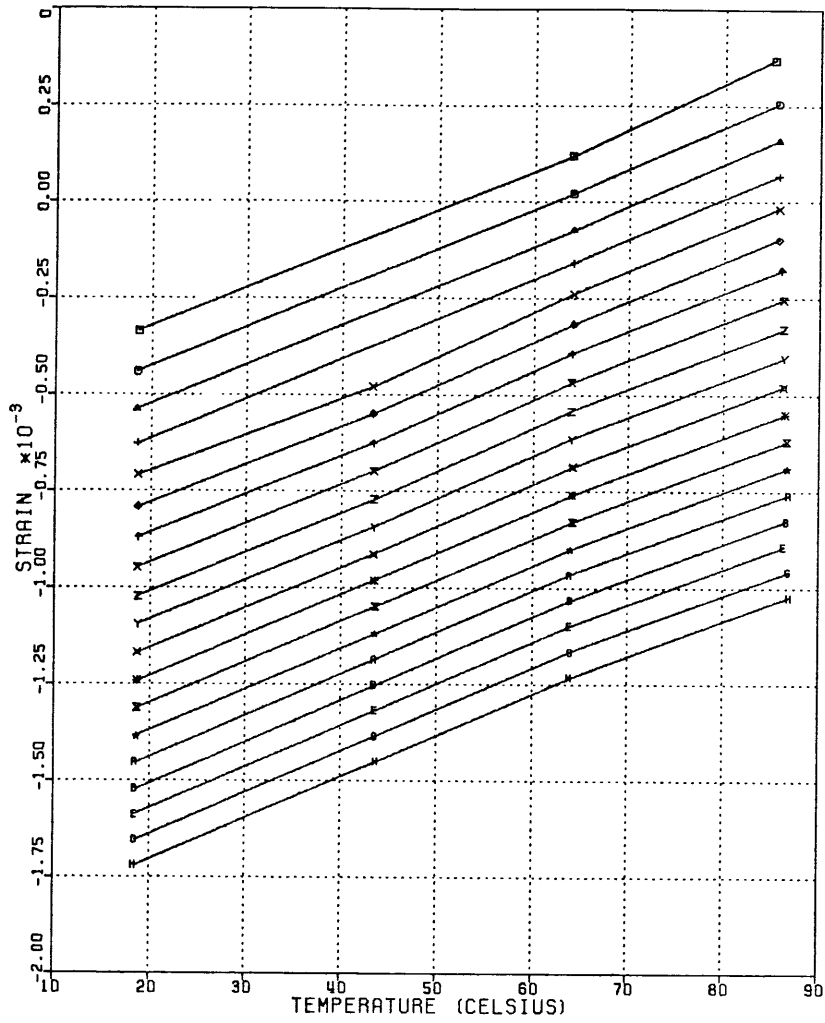
GAGE: 3A

□ - 19°C
 ○ - 43°C
 ▲ - 64°C
 + - 86°C



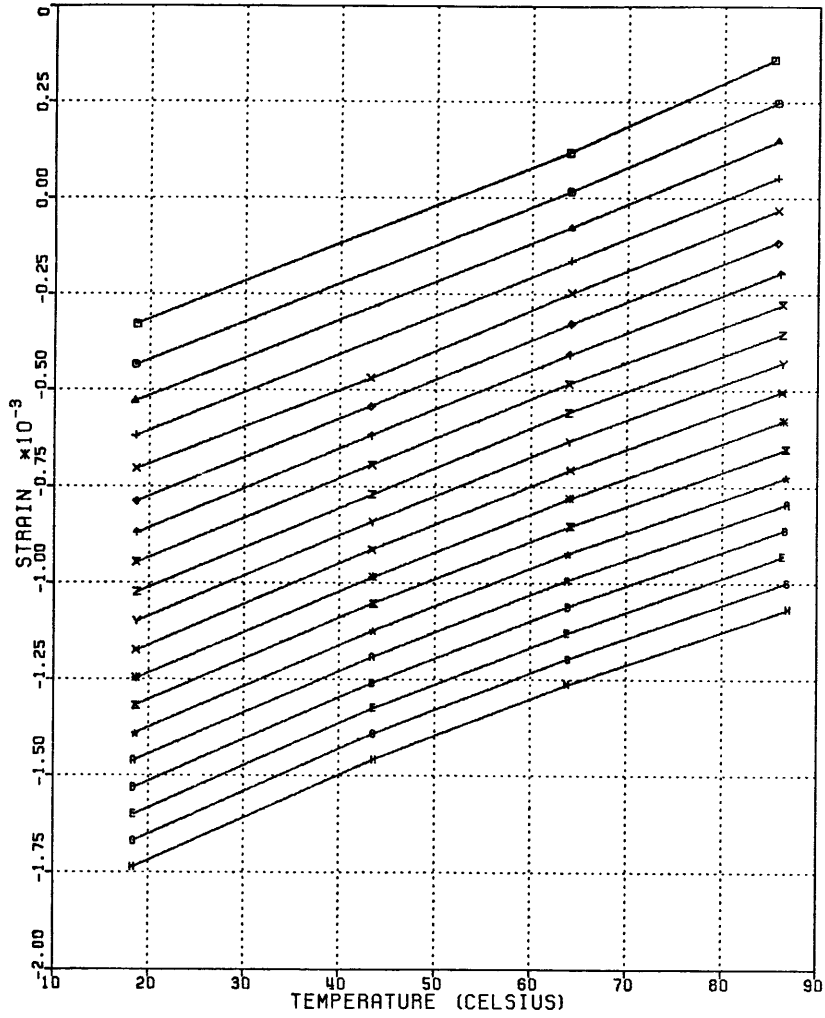
1132 WESTERLY RI GRANITE
GAGE: AC

- | | |
|-------------|-------------|
| □ - 20 MPA | ✱ - 120 MPA |
| ○ - 30 MPA | ✱ - 130 MPA |
| △ - 40 MPA | ✱ - 140 MPA |
| + - 50 MPA | ★ - 150 MPA |
| X - 60 MPA | ◻ - 160 MPA |
| ◇ - 70 MPA | ◻ - 170 MPA |
| ⋈ - 80 MPA | E - 180 MPA |
| ✱ - 90 MPA | G - 190 MPA |
| Z - 100 MPA | H - 200 MPA |
| Y - 110 MPA | |



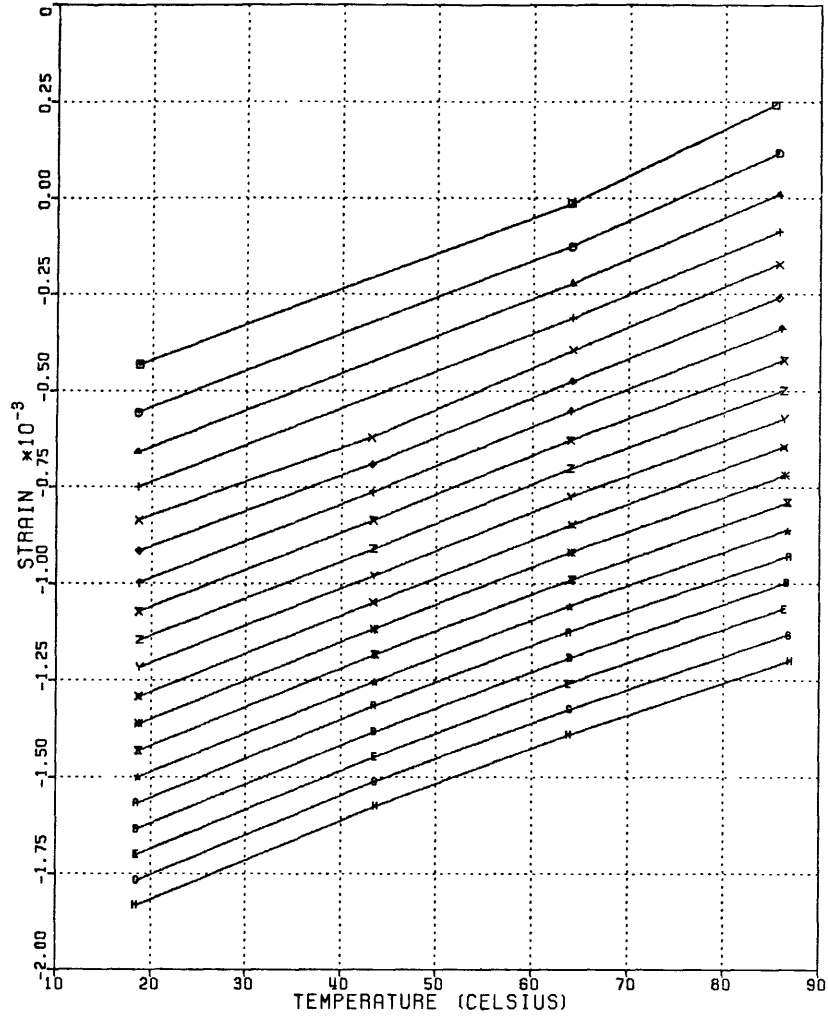
1132 WESTERLY RI GRANITE
GAGE:BC

- | | |
|-------------|-------------|
| □ - 20 MPA | ⊗ - 120 MPA |
| ○ - 30 MPA | ✱ - 130 MPA |
| △ - 40 MPA | ⊗ - 140 MPA |
| + - 50 MPA | ★ - 150 MPA |
| X - 60 MPA | A - 160 MPA |
| ◇ - 70 MPA | B - 170 MPA |
| ♠ - 80 MPA | E - 180 MPA |
| ⊗ - 90 MPA | G - 190 MPA |
| Z - 100 MPA | H - 200 MPA |
| Y - 110 MPA | |



1132 WESTERLY RI GRANITE
GAGE: 3C

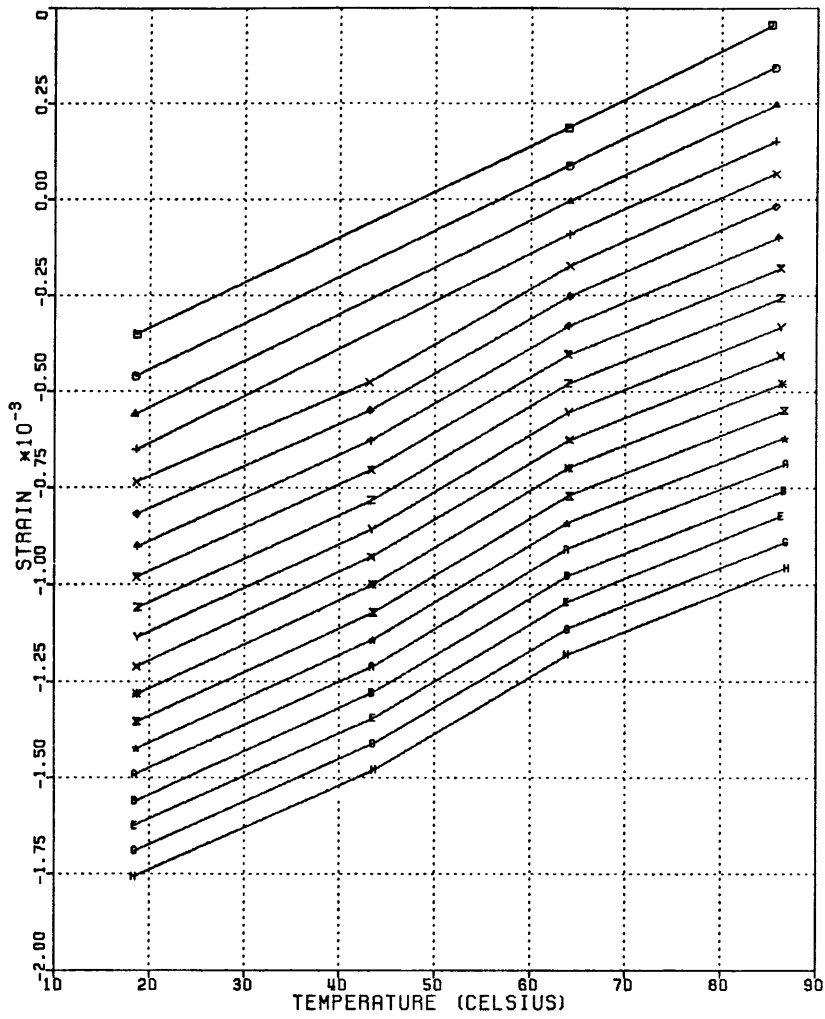
- | | |
|-------------|-------------|
| □ - 20 MPA | ✕ - 120 MPA |
| ○ - 30 MPA | ✱ - 130 MPA |
| △ - 40 MPA | ⊗ - 140 MPA |
| + - 50 MPA | ★ - 150 MPA |
| X - 60 MPA | A - 160 MPA |
| ◇ - 70 MPA | B - 170 MPA |
| ↑ - 80 MPA | E - 180 MPA |
| ⊗ - 90 MPA | G - 190 MPA |
| Z - 100 MPA | H - 200 MPA |
| Y - 110 MPA | |



1132 WESTERLY RI GRANITE

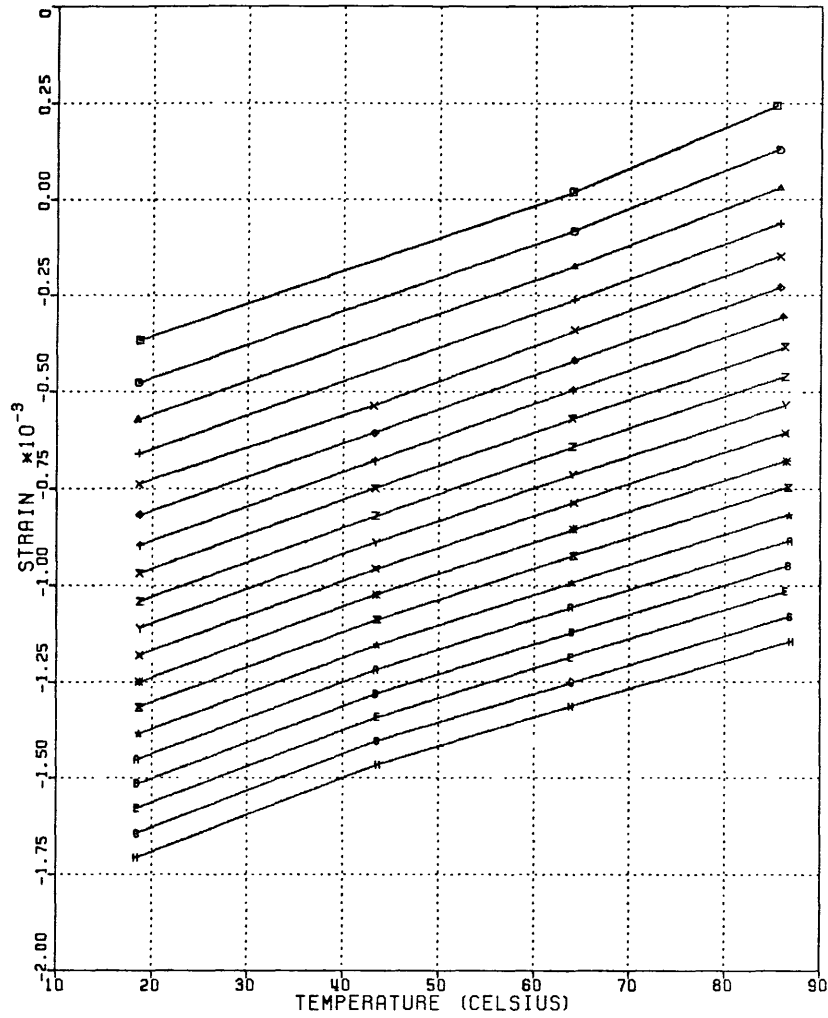
GAGE:AB

- | | |
|-------------|-------------|
| □ - 20 MPA | ⌘ - 120 MPA |
| ○ - 30 MPA | ✱ - 130 MPA |
| △ - 40 MPA | ⌘ - 140 MPA |
| + - 50 MPA | ★ - 150 MPA |
| X - 60 MPA | A - 160 MPA |
| ◇ - 70 MPA | B - 170 MPA |
| ⋈ - 80 MPA | E - 180 MPA |
| ⌘ - 90 MPA | G - 190 MPA |
| Z - 100 MPA | H - 200 MPA |
| Y - 110 MPA | |



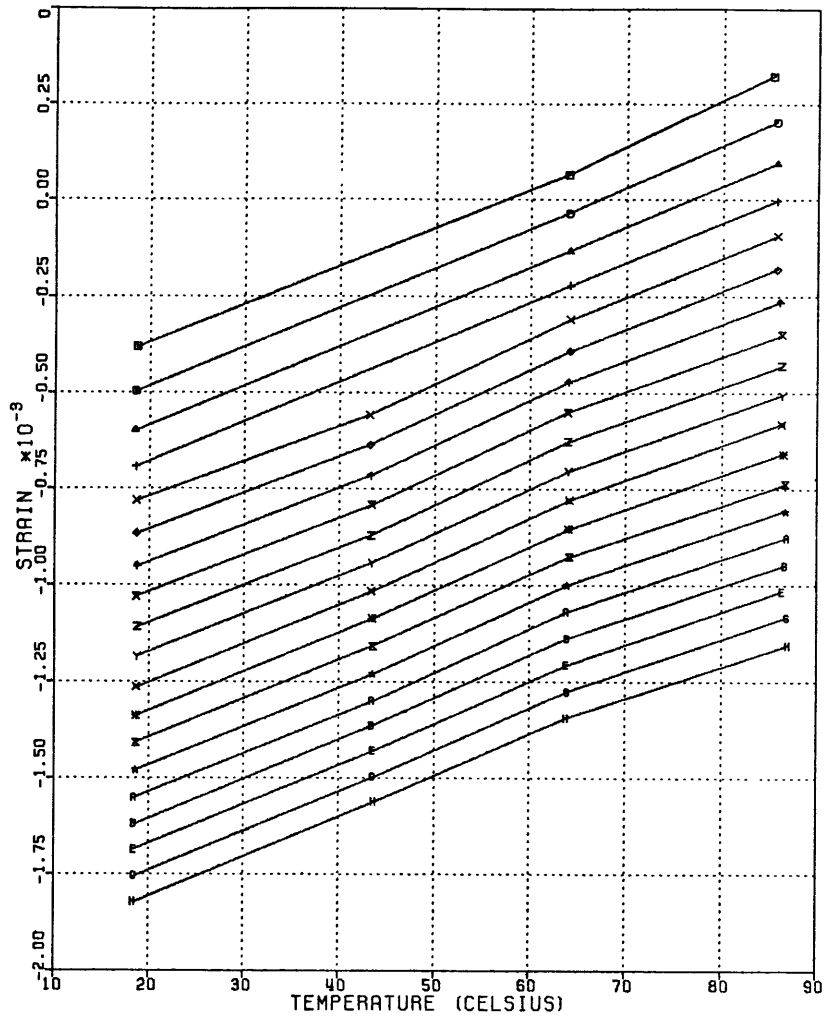
1132 WESTERLY RI GRANITE
GAGE:CB

- | | |
|-------------|-------------|
| □ - 20 MPA | ⋈ - 120 MPA |
| ○ - 30 MPA | ✱ - 130 MPA |
| △ - 40 MPA | ⋈ - 140 MPA |
| + - 50 MPA | ★ - 150 MPA |
| X - 60 MPA | ◻ - 160 MPA |
| ◇ - 70 MPA | ⊖ - 170 MPA |
| ⋈ - 80 MPA | ⊕ - 180 MPA |
| ⋈ - 90 MPA | ⊖ - 190 MPA |
| Z - 100 MPA | H - 200 MPA |
| Y - 110 MPA | |



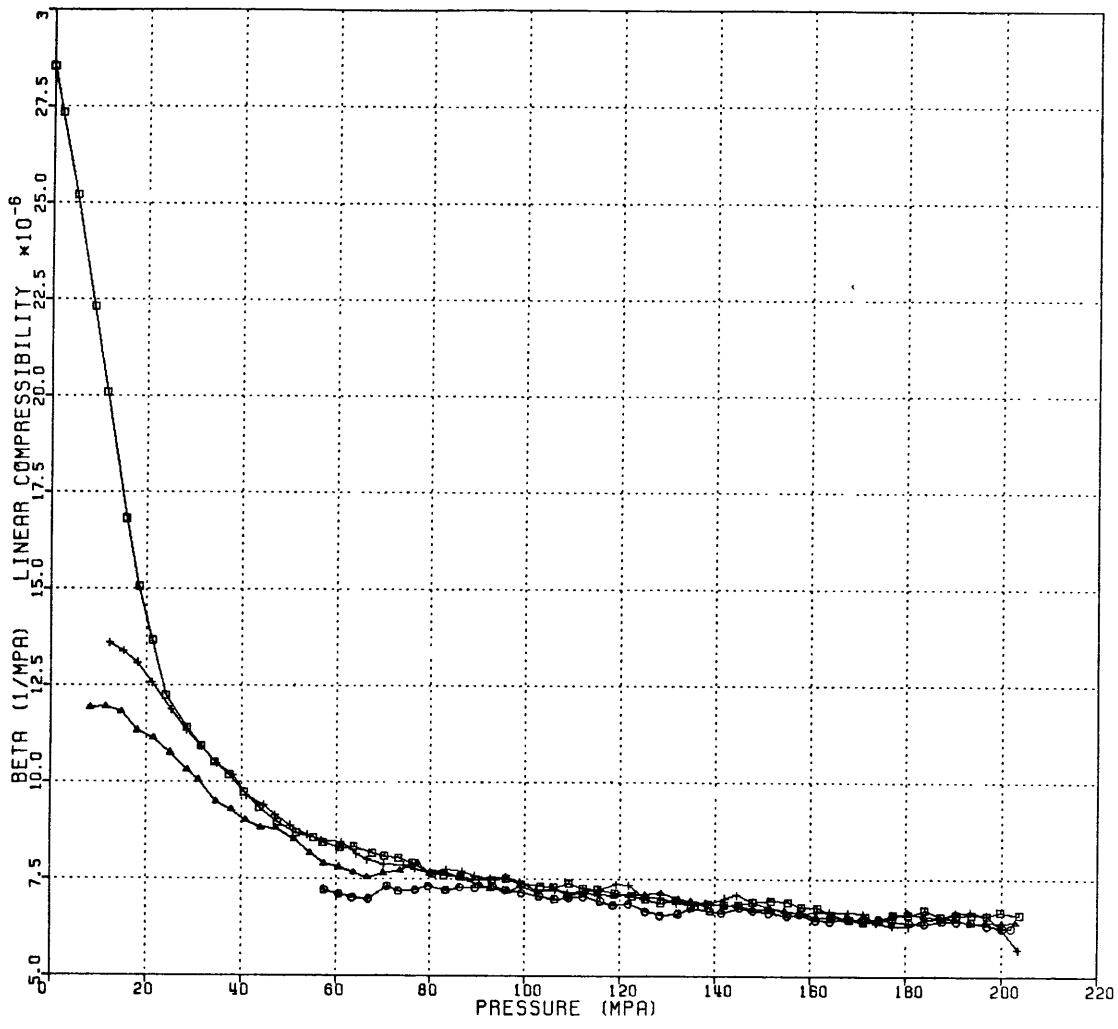
1132 WESTERLY RI GRANITE
GAGE:3B

- | | |
|-------------|-------------|
| □ - 20 MPA | X - 120 MPA |
| ○ - 30 MPA | * - 130 MPA |
| △ - 40 MPA | X - 140 MPA |
| + - 50 MPA | * - 150 MPA |
| X - 60 MPA | A - 160 MPA |
| ◇ - 70 MPA | B - 170 MPA |
| ⊕ - 80 MPA | E - 180 MPA |
| X - 90 MPA | G - 190 MPA |
| Z - 100 MPA | H - 200 MPA |
| Y - 110 MPA | |



1132 WESTERLY RI GRANITE
GAGE: 3A

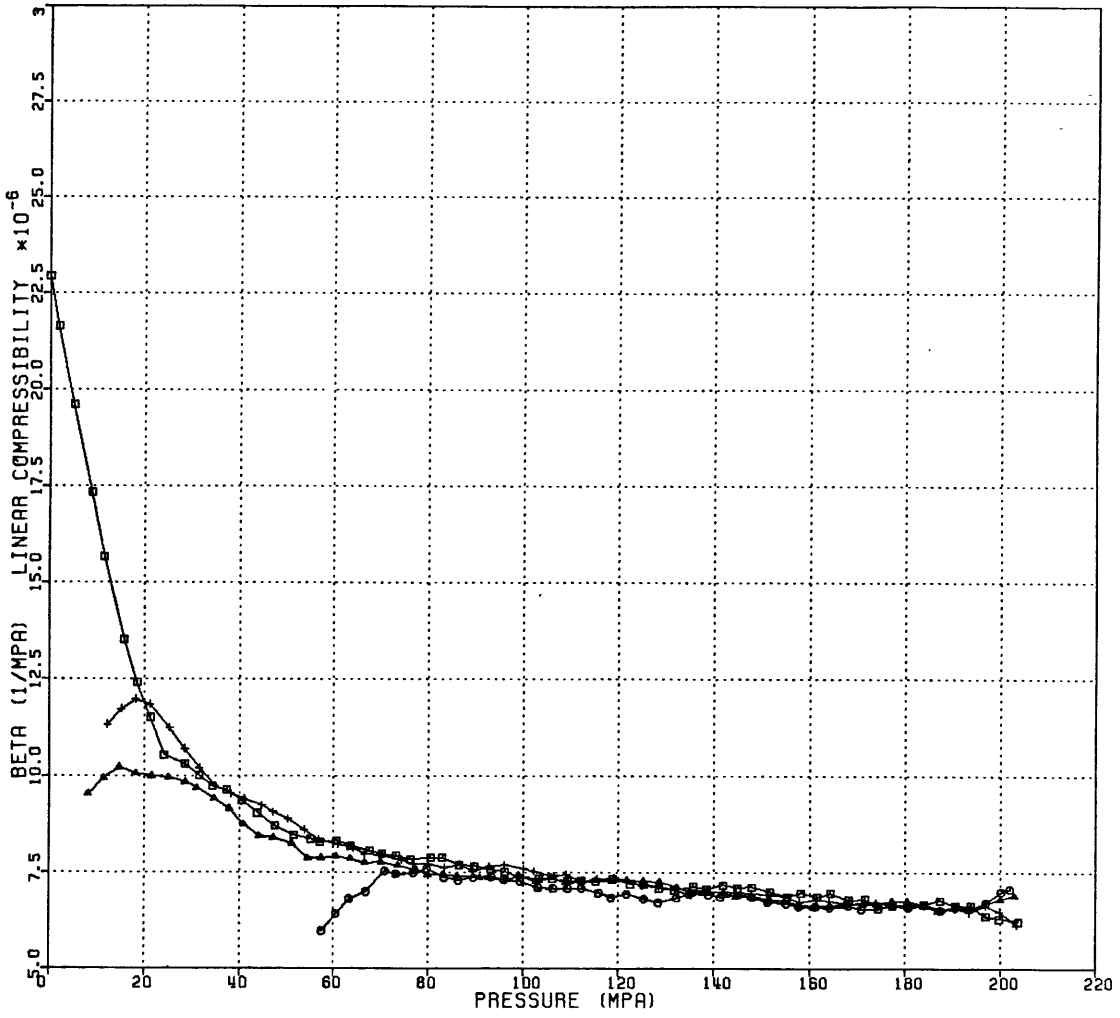
- | | |
|-------------|-------------|
| □ - 20 MPA | ⋈ - 120 MPA |
| ○ - 30 MPA | * - 130 MPA |
| △ - 40 MPA | ⋈ - 140 MPA |
| + - 50 MPA | ★ - 150 MPA |
| X - 60 MPA | A - 160 MPA |
| ◇ - 70 MPA | B - 170 MPA |
| † - 80 MPA | E - 180 MPA |
| ⋈ - 90 MPA | G - 190 MPA |
| Z - 100 MPA | H - 200 MPA |
| Y - 110 MPA | |



1132 WESTERLY RI GRANITE

GAGE: AC

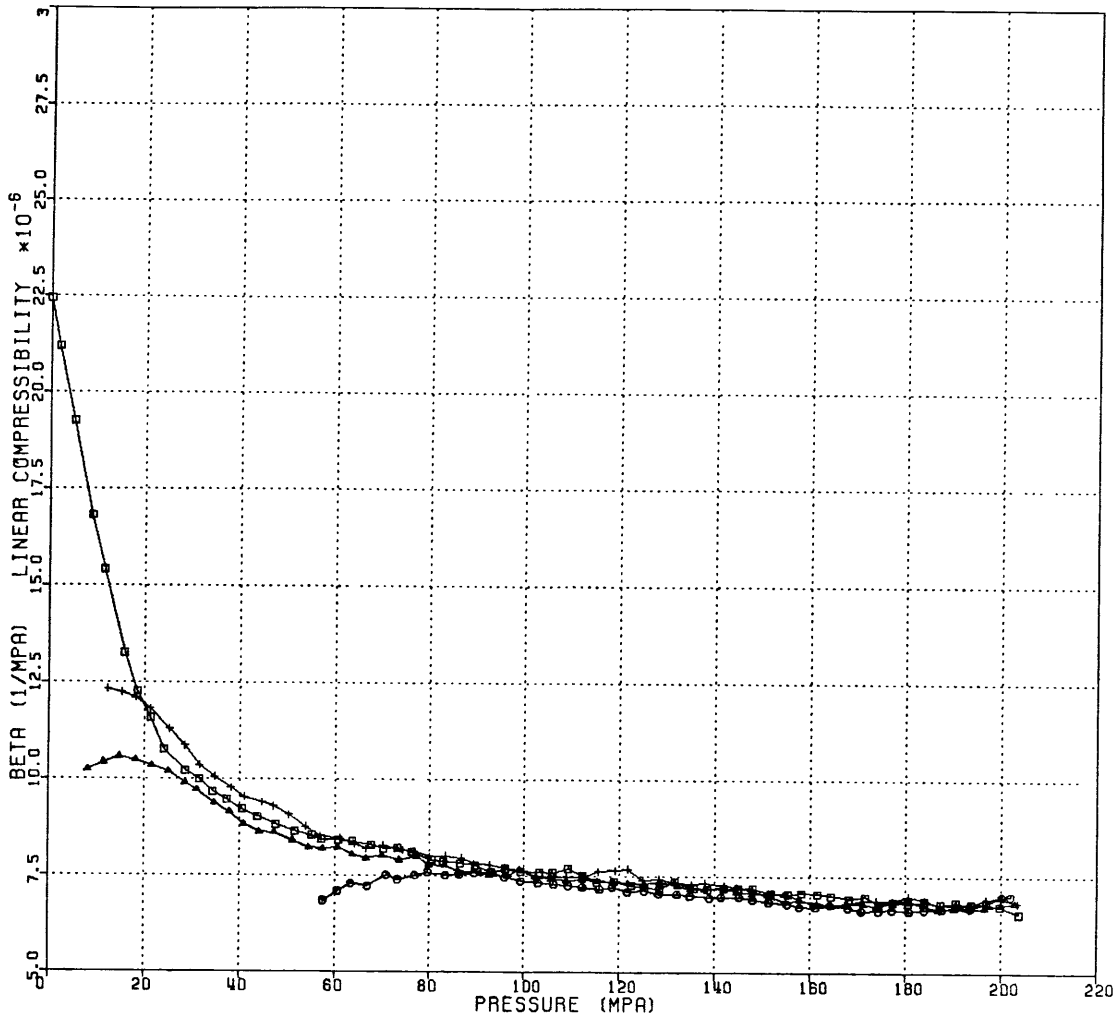
- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



1132 WESTERLY RI GRANITE

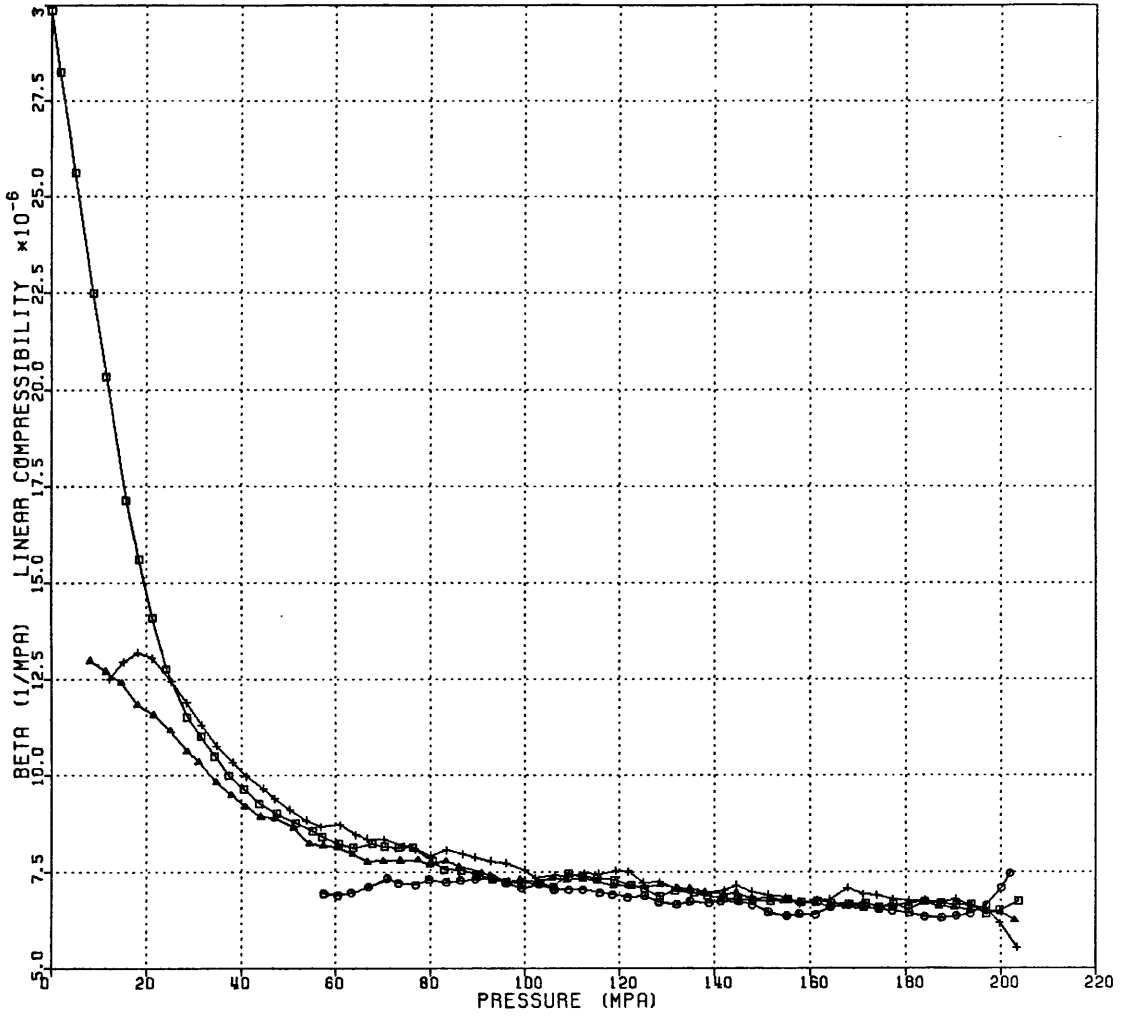
GAGE: BC

- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



1132 WESTERLY RI GRANITE
GAGE:3C

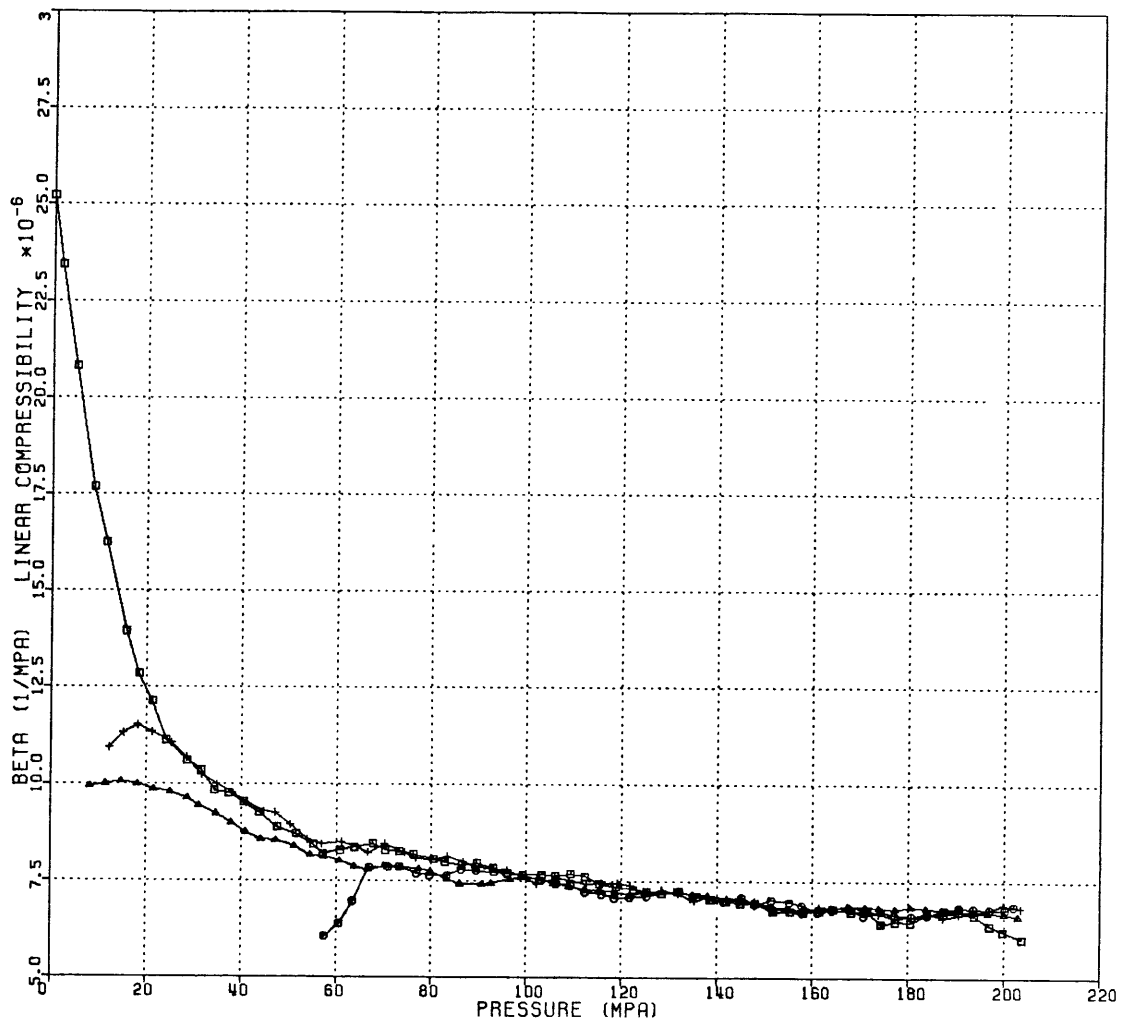
- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



1132 WESTERLY RI GRANITE

GAGE: AB

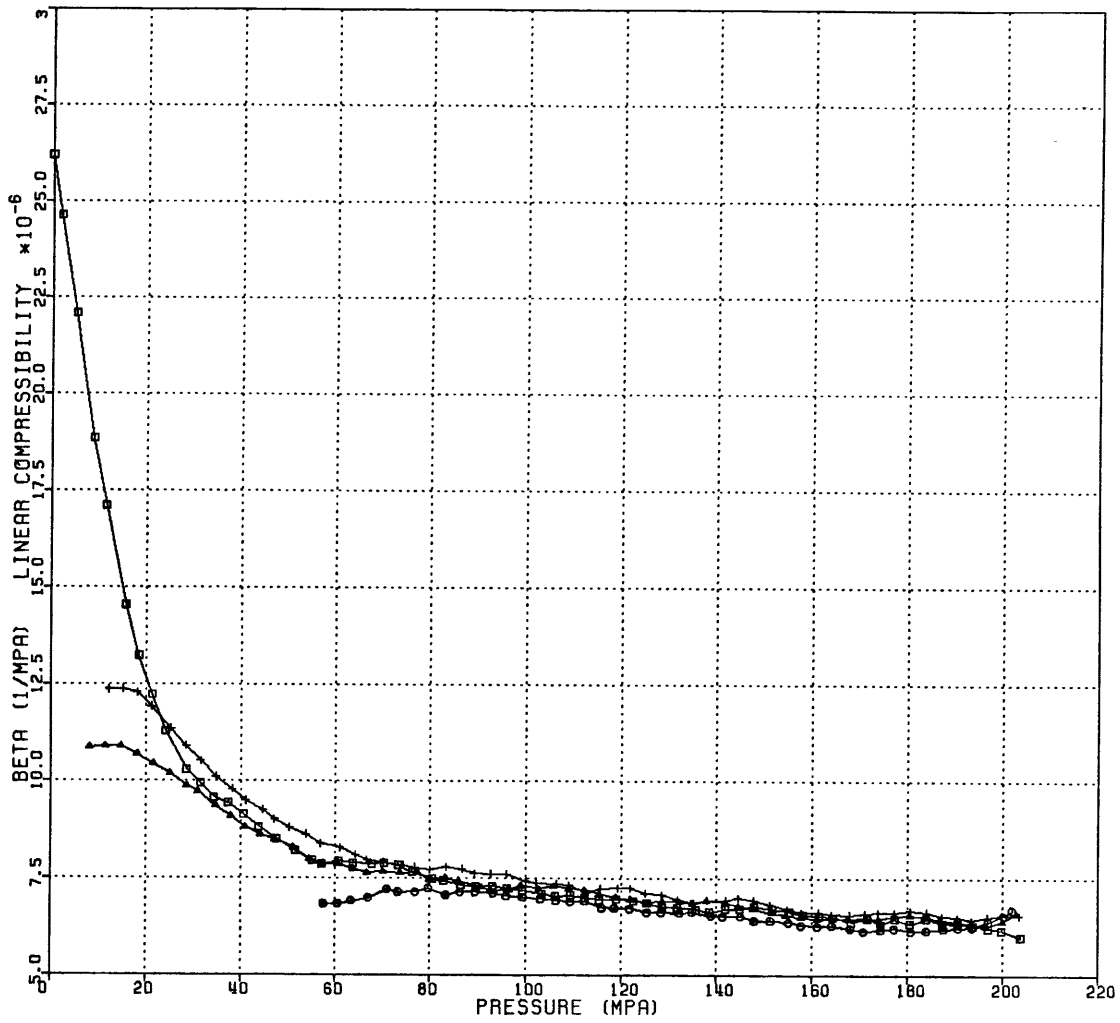
- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



1132 WESTERLY RI GRANITE

GAGE:CB

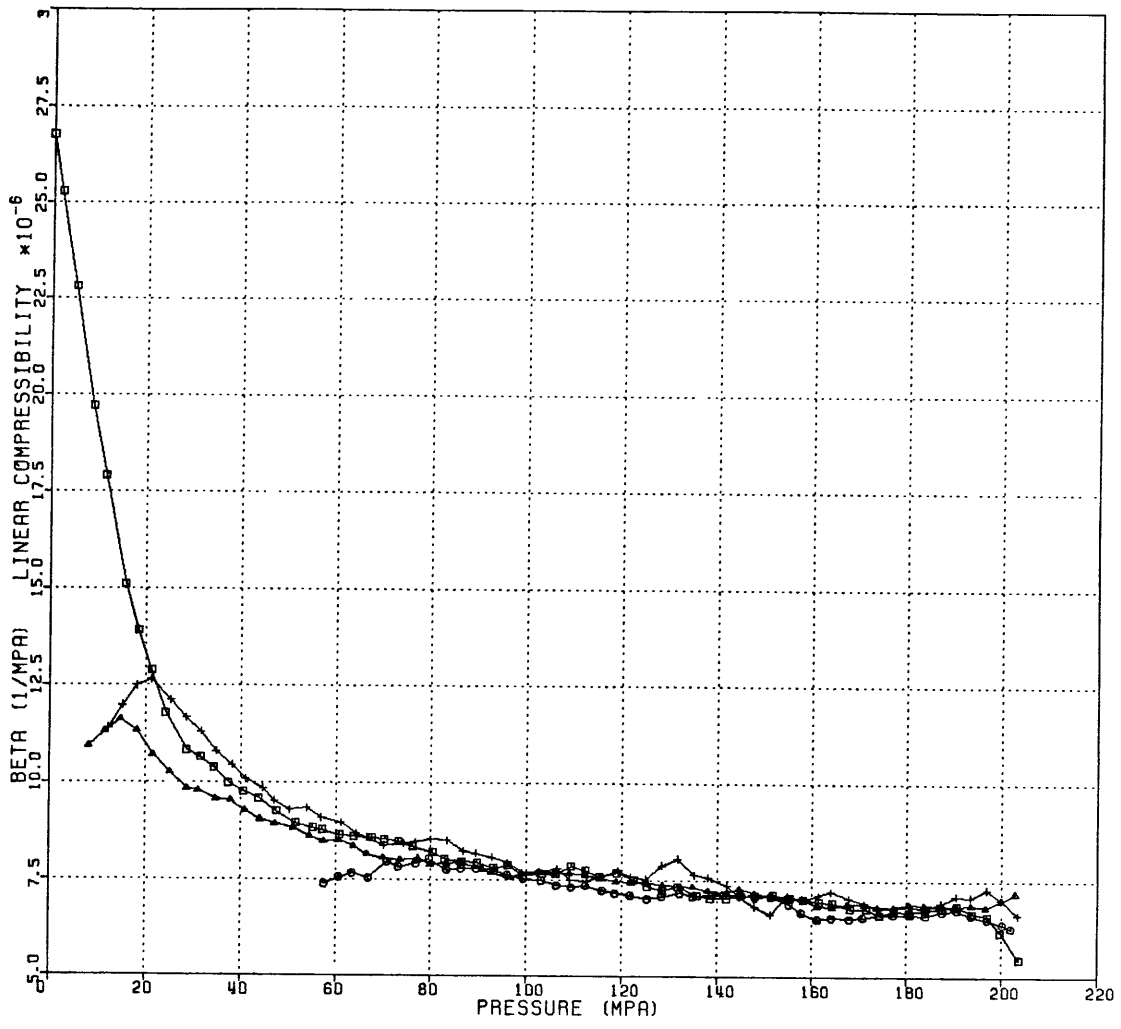
- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



1132 WESTERLY RI GRANITE

GAGE: 3B

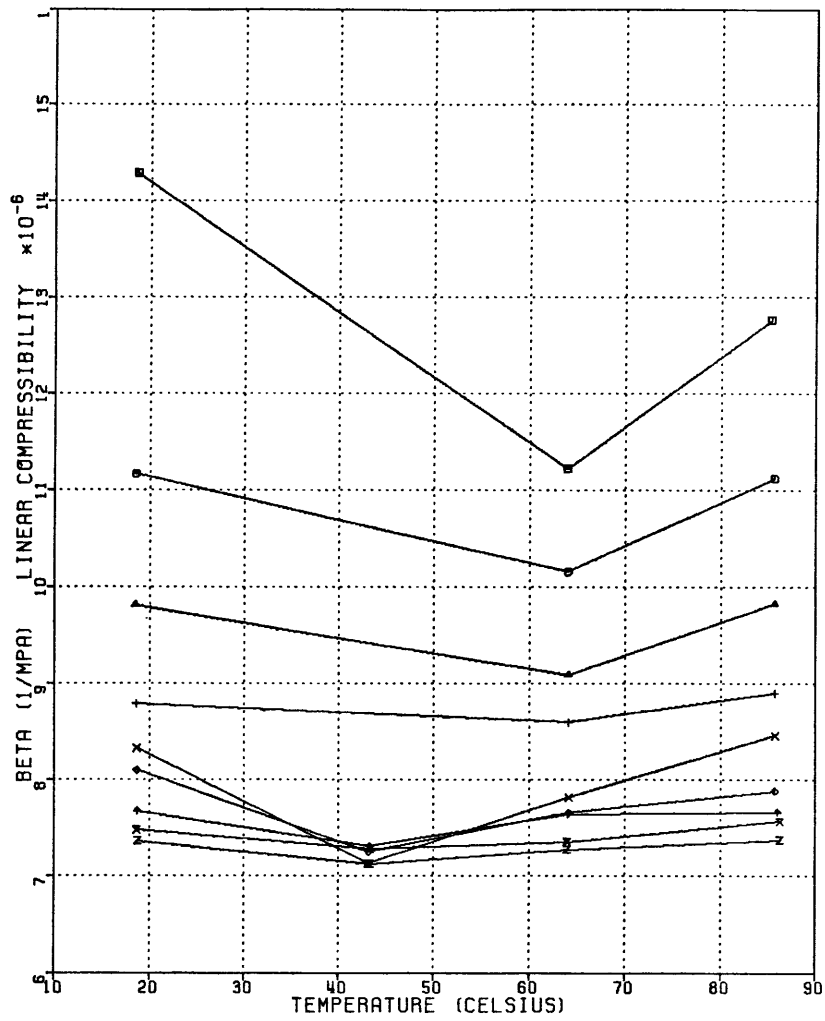
- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



1132 WESTERLY RI GRANITE

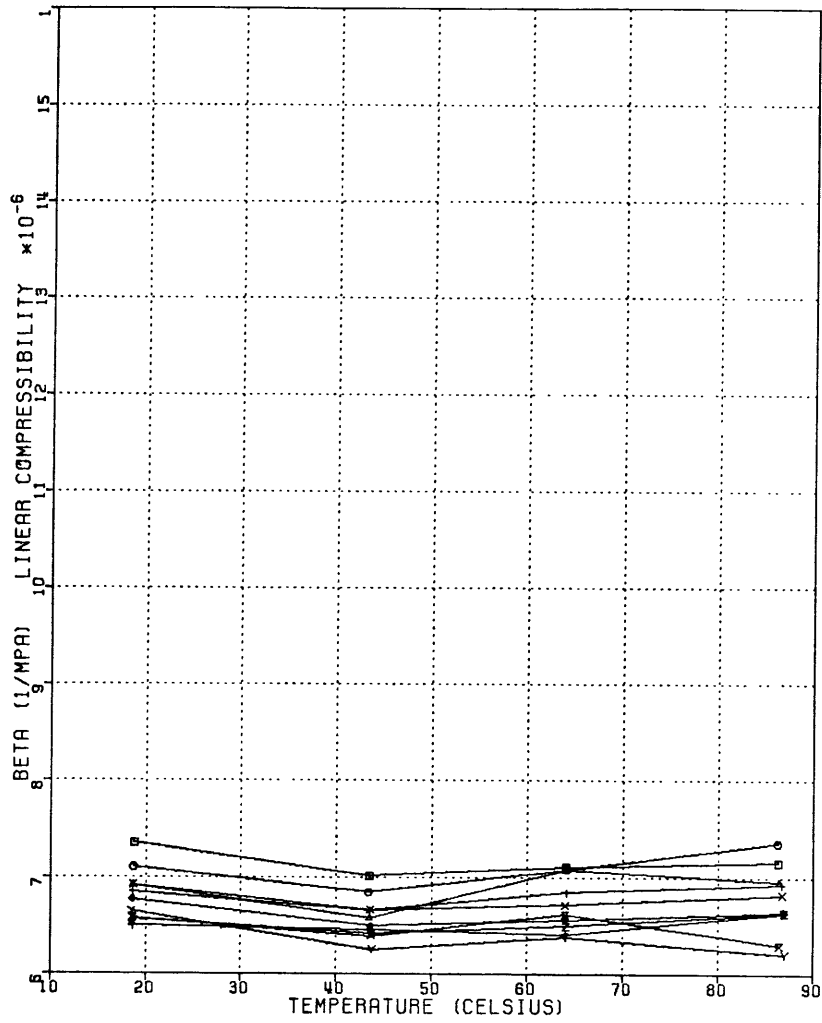
GAGE: 3A

- - 19°C
- - 43°C
- △ - 64°C
- + - 86°C



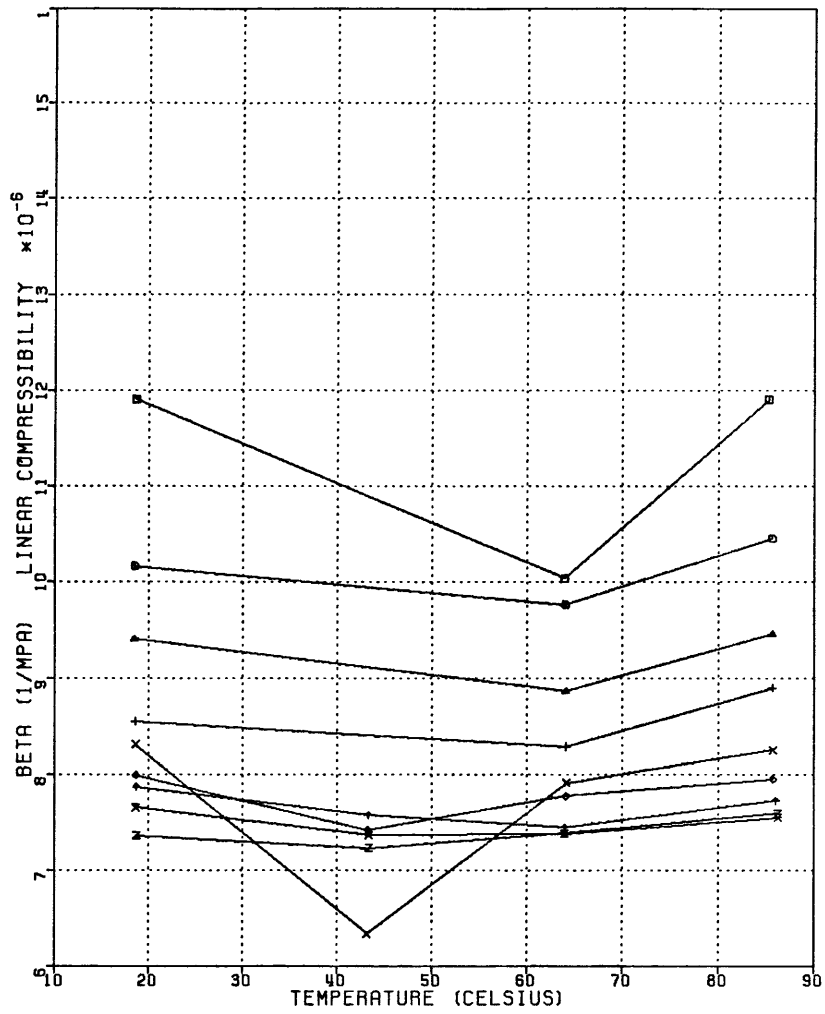
1132 WESTERLY RI GRANITE
GAGE: AC

- - 20 MPA
- - 30 MPA
- △ - 40 MPA
- + - 50 MPA
- X - 60 MPA
- ◇ - 70 MPA
- ♠ - 80 MPA
- ⊗ - 90 MPA
- Z - 100 MPA



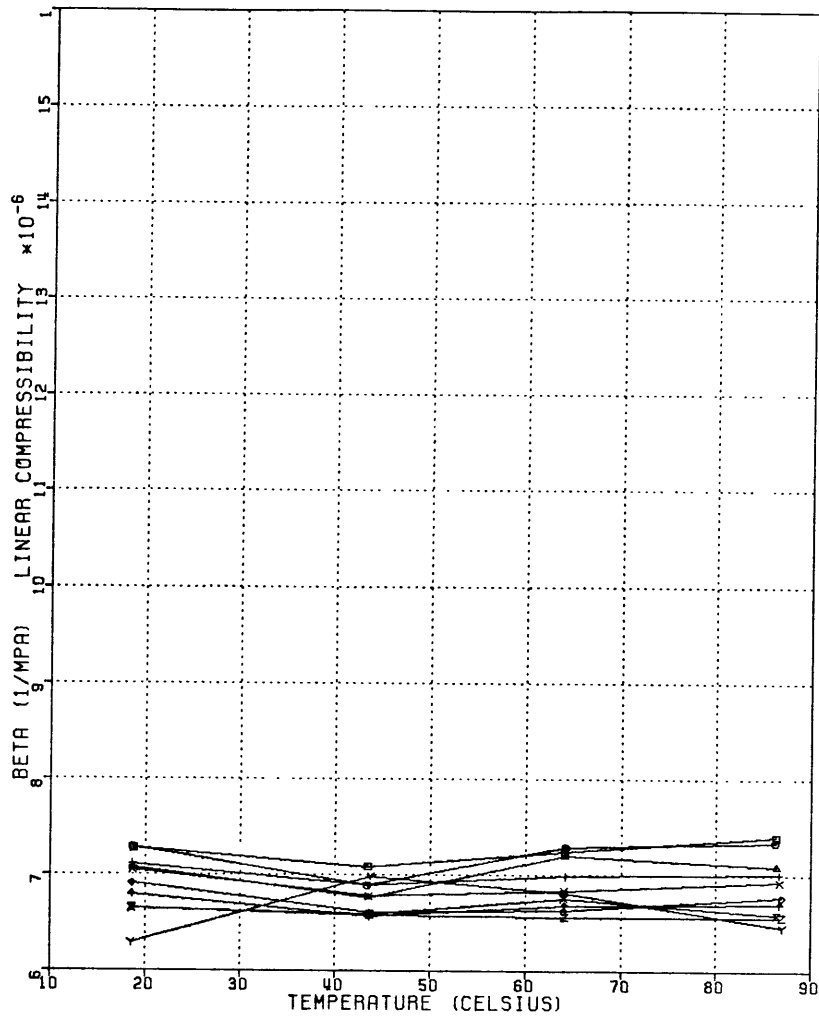
1132 WESTERLY RI GRANITE
GAGE:AC

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⋈ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



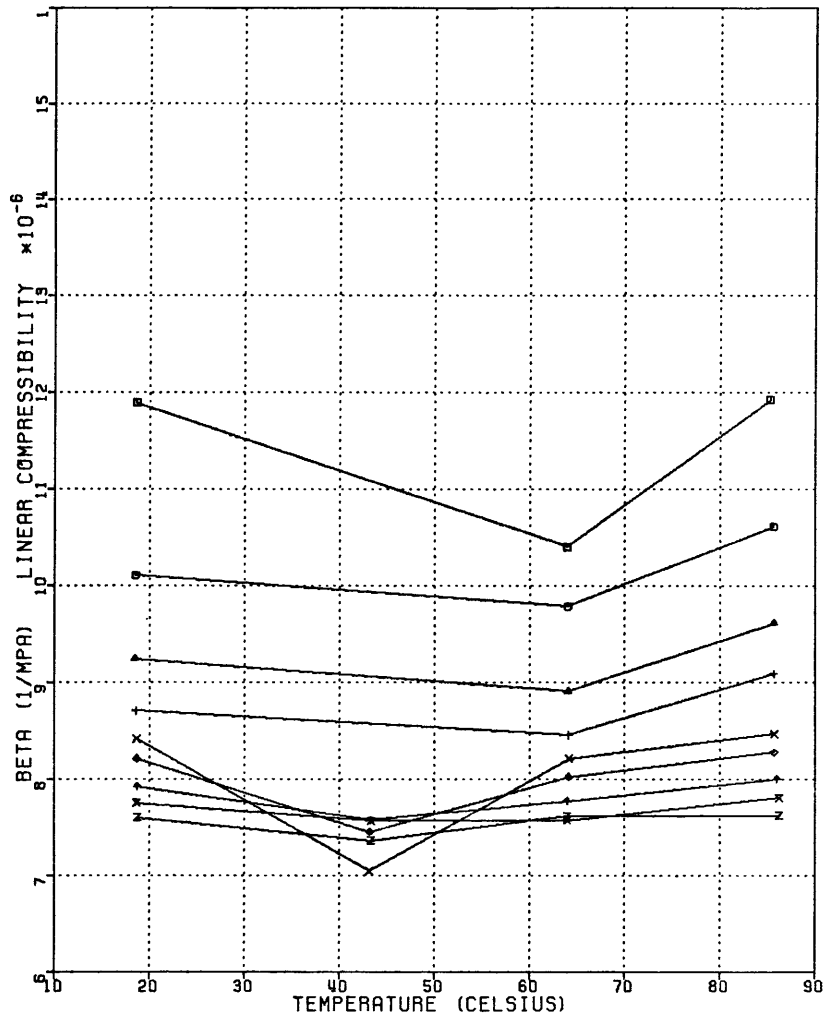
1132 WESTERLY RI GRANITE
GAGE:BC

- - 20 MPA
- - 30 MPA
- △ - 40 MPA
- + - 50 MPA
- X - 60 MPA
- ◇ - 70 MPA
- ♠ - 80 MPA
- ⊗ - 90 MPA
- Z - 100 MPA



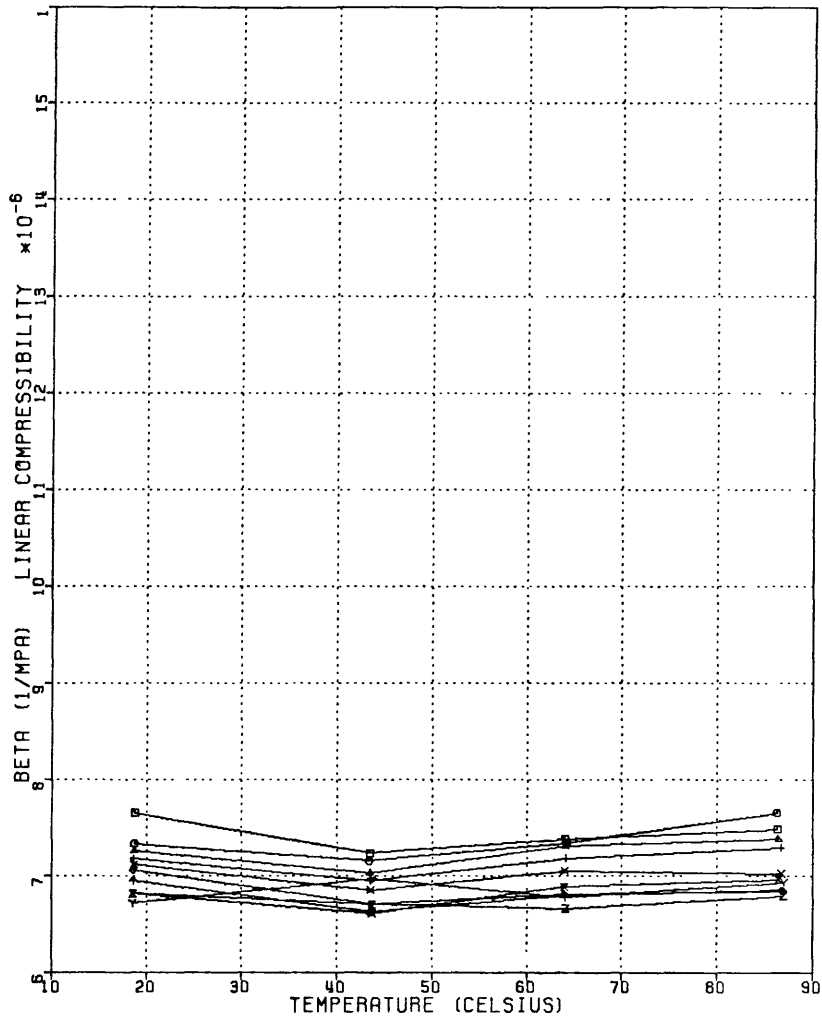
1132 WESTERLY RI GRANITE
GAGE:BC

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- × - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



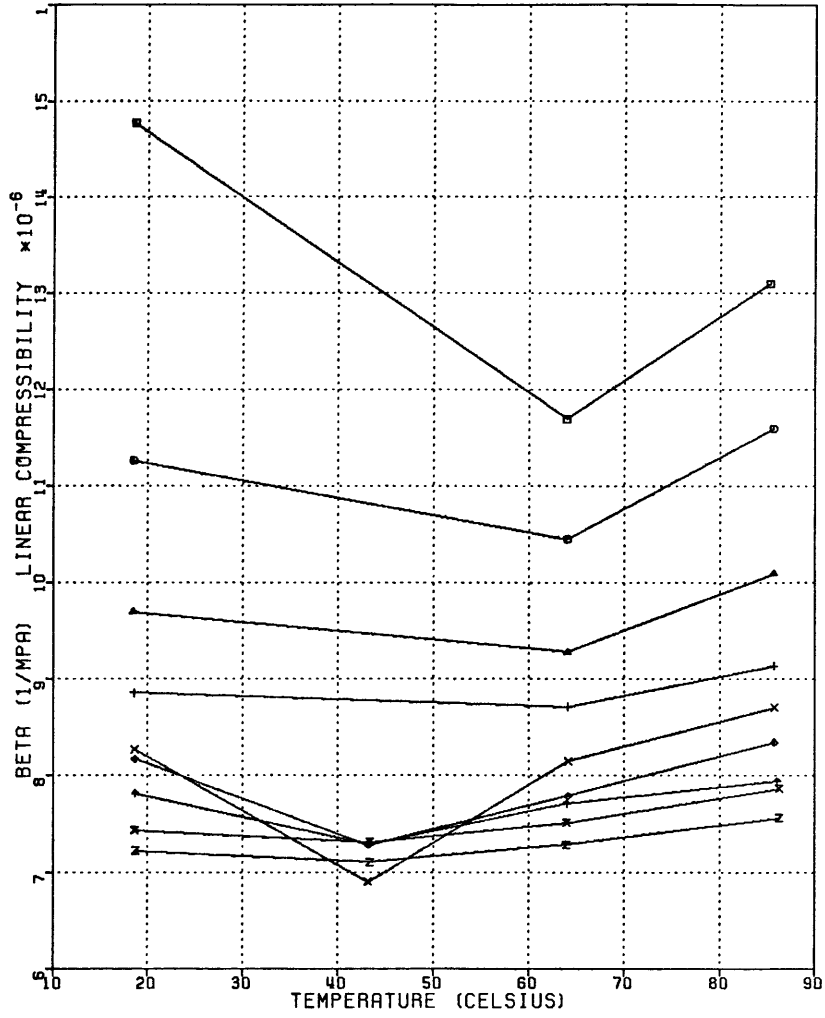
1132 WESTERLY RI GRANITE
GAGE:3C

- - 20 MPA
- - 30 MPA
- △ - 40 MPA
- + - 50 MPA
- X - 60 MPA
- ◇ - 70 MPA
- ↑ - 80 MPA
- × - 90 MPA
- Z - 100 MPA



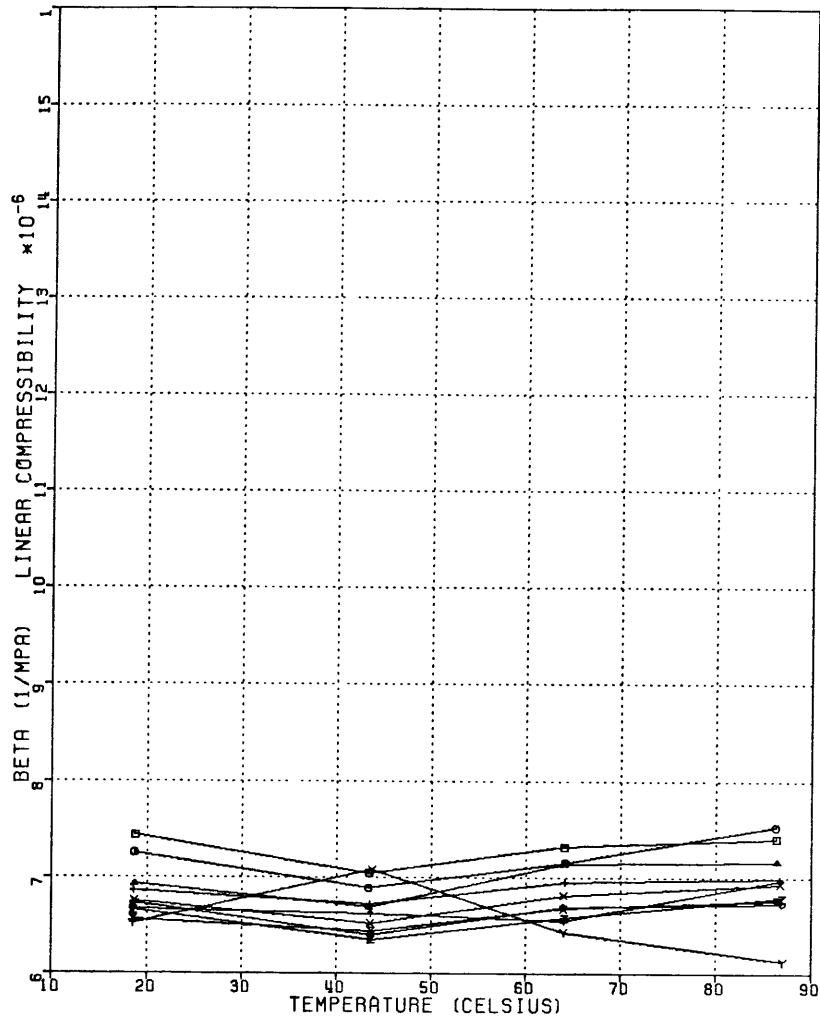
1132 WESTERLY RI GRANITE
GAGE:3C

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



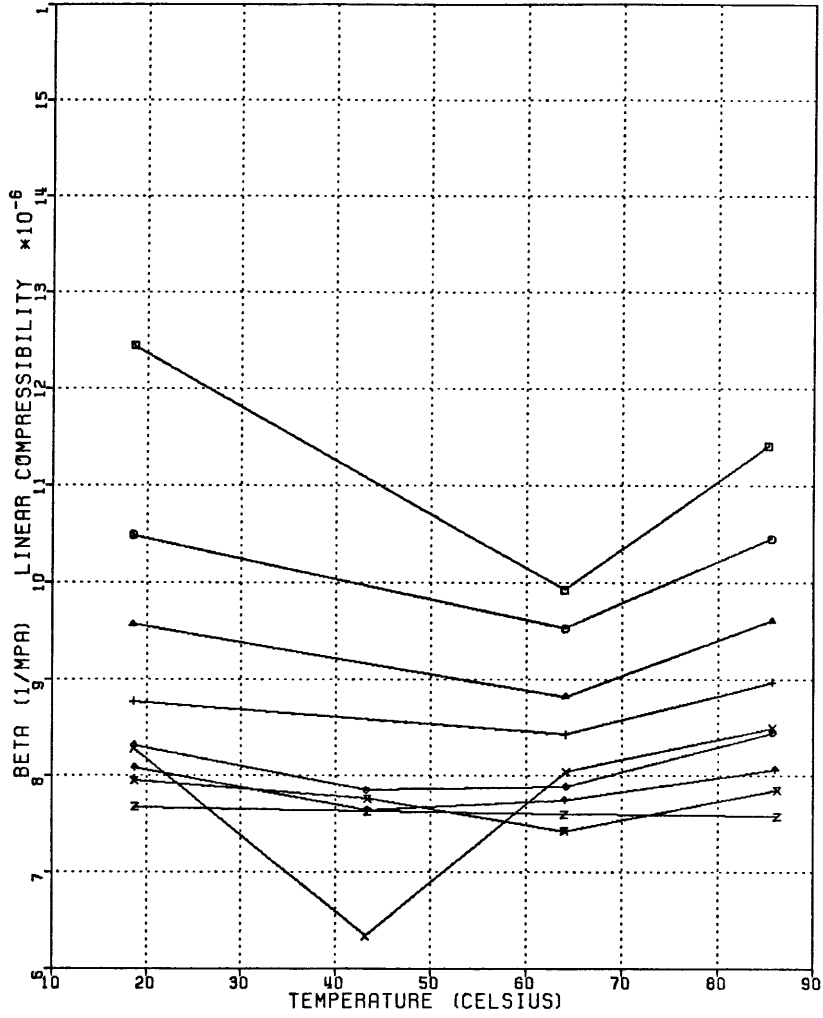
1132 WESTERLY RI GRANITE
GAGE: AB

- - 20 MPA
- - 30 MPA
- △ - 40 MPA
- + - 50 MPA
- x - 60 MPA
- ◇ - 70 MPA
- ↑ - 80 MPA
- X - 90 MPA
- Z - 100 MPA



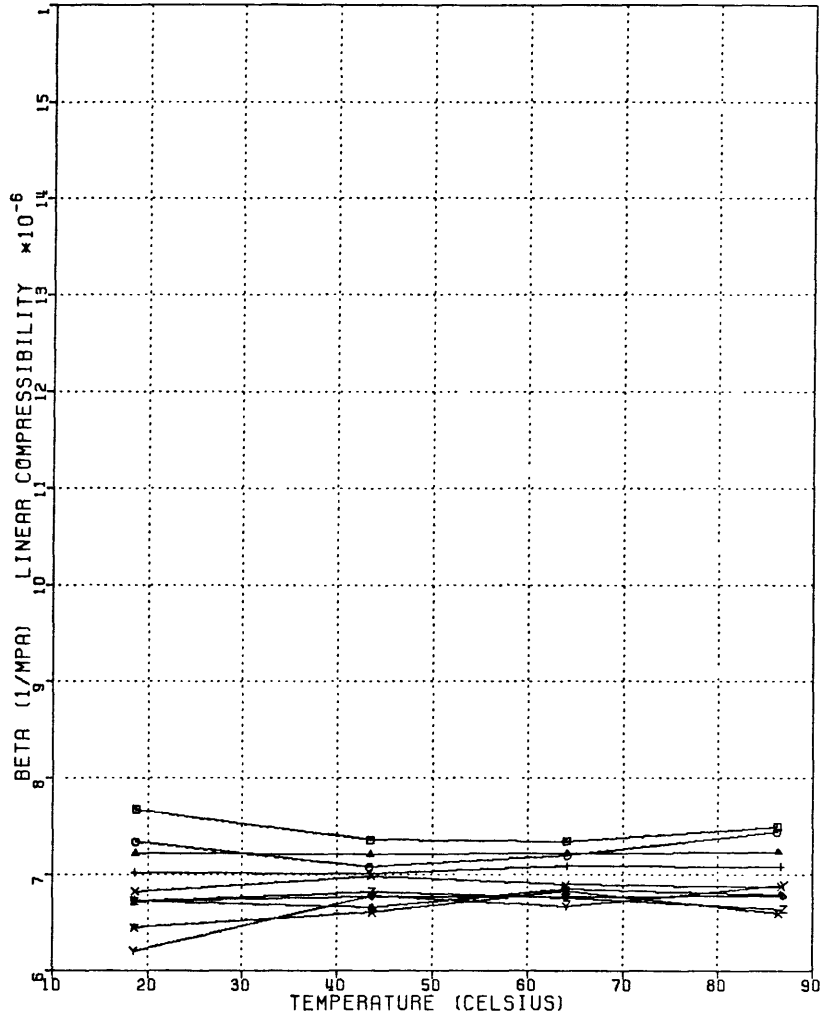
1132 WESTERLY RI GRANITE
GAGE: AB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- × - 150 MPA
- ◇ - 160 MPA
- ♣ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



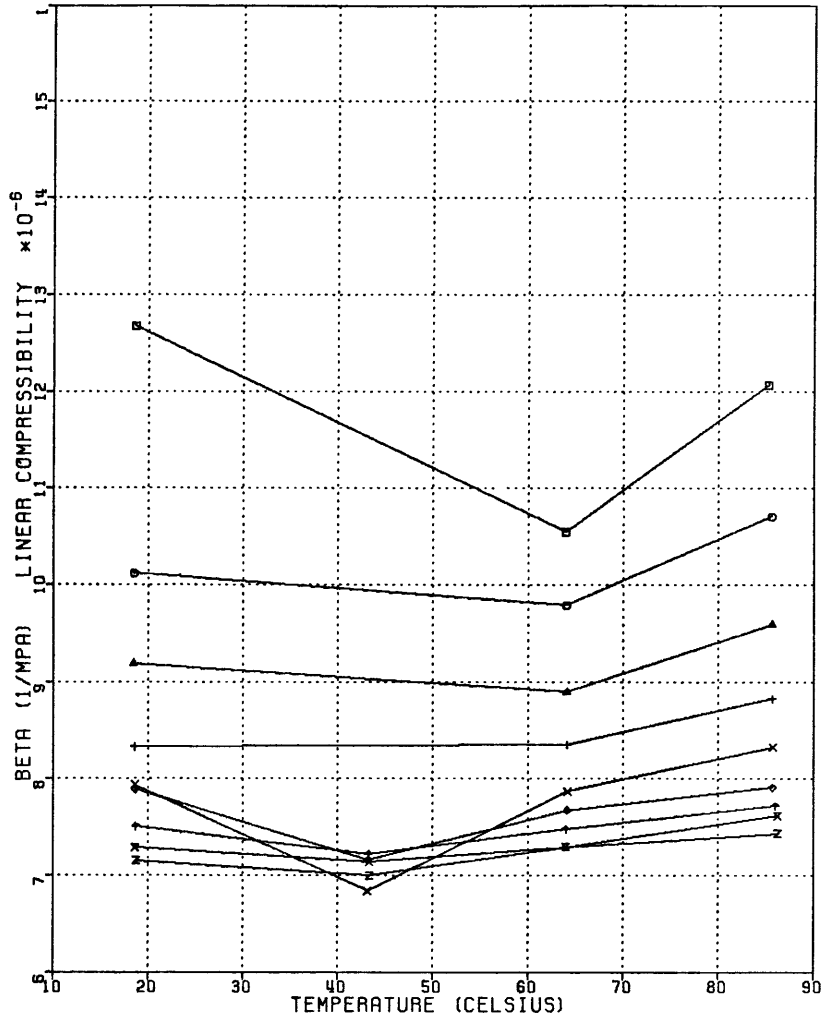
1132 WESTERLY RI GRANITE
GAGE:CB

- - 20 MPa
- - 30 MPa
- △ - 40 MPa
- + - 50 MPa
- × - 60 MPa
- ◇ - 70 MPa
- ↑ - 80 MPa
- × - 90 MPa
- Z - 100 MPa



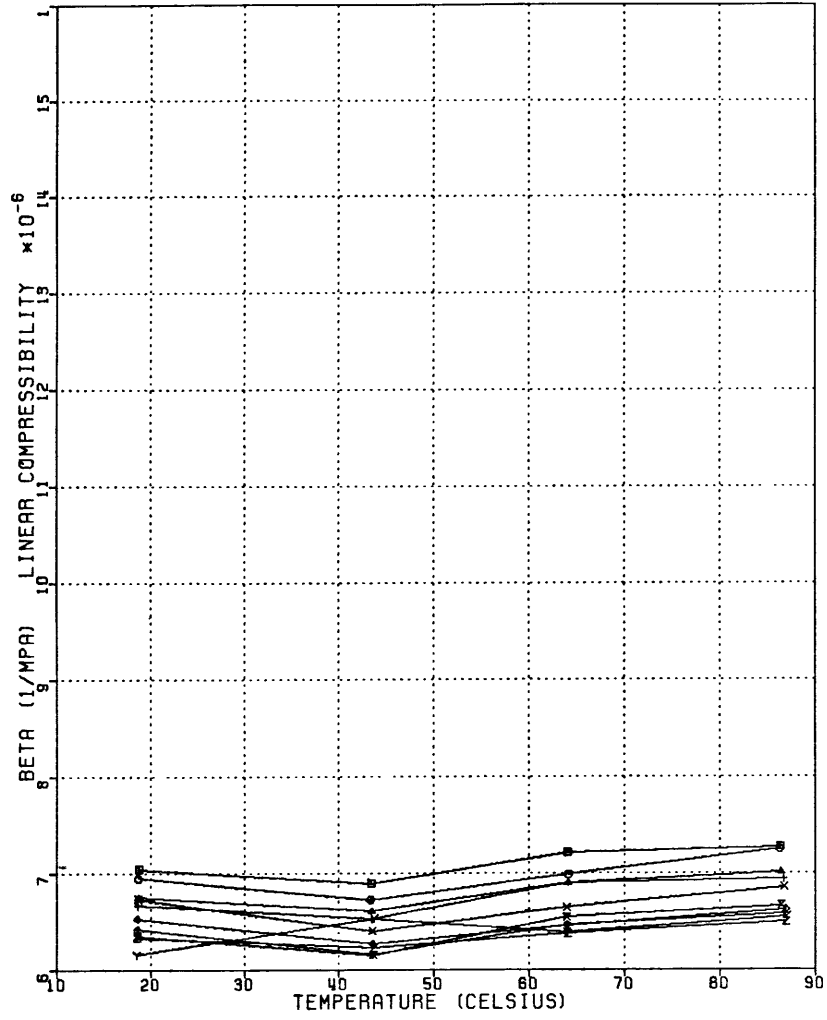
1132 WESTERLY RI GRANITE
GAGE:CB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♣ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



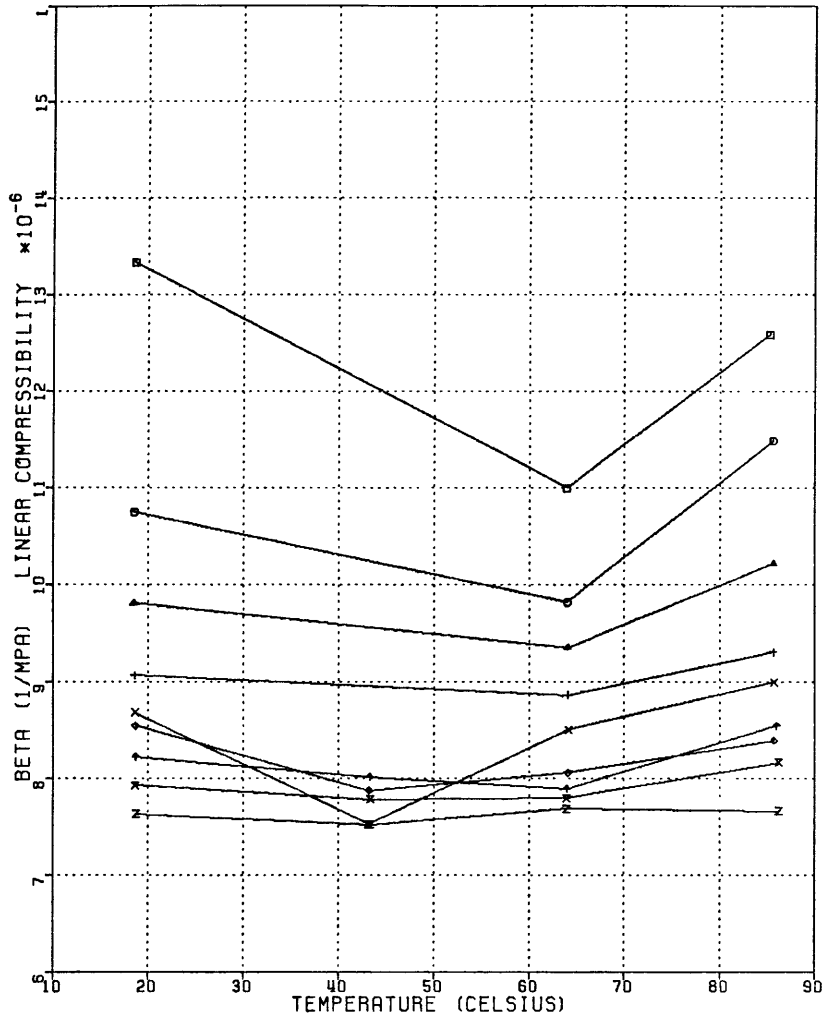
1132 WESTERLY RI GRANITE
GAGE: 3B

- - 20 MPA
- - 30 MPA
- △ - 40 MPA
- + - 50 MPA
- X - 60 MPA
- ◇ - 70 MPA
- ↑ - 80 MPA
- X - 90 MPA
- Z - 100 MPA



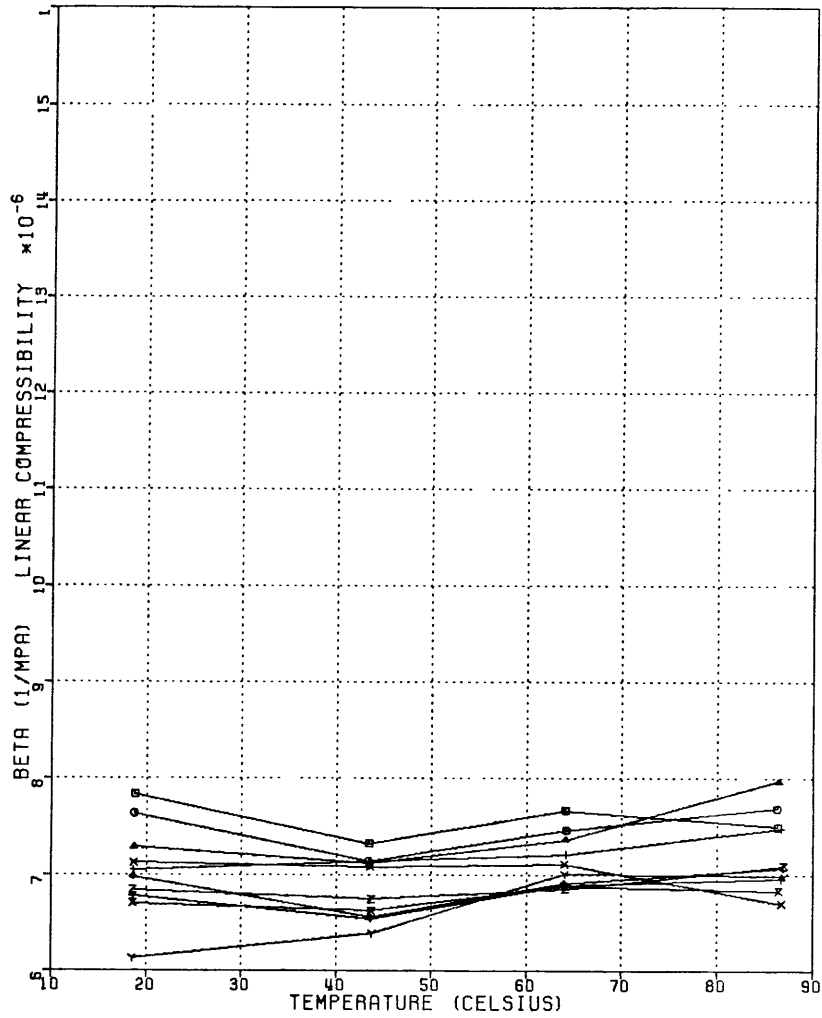
1132 WESTERLY RI GRANITE
GAGE: 3B

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- × - 150 MPA
- ◇ - 160 MPA
- ♣ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



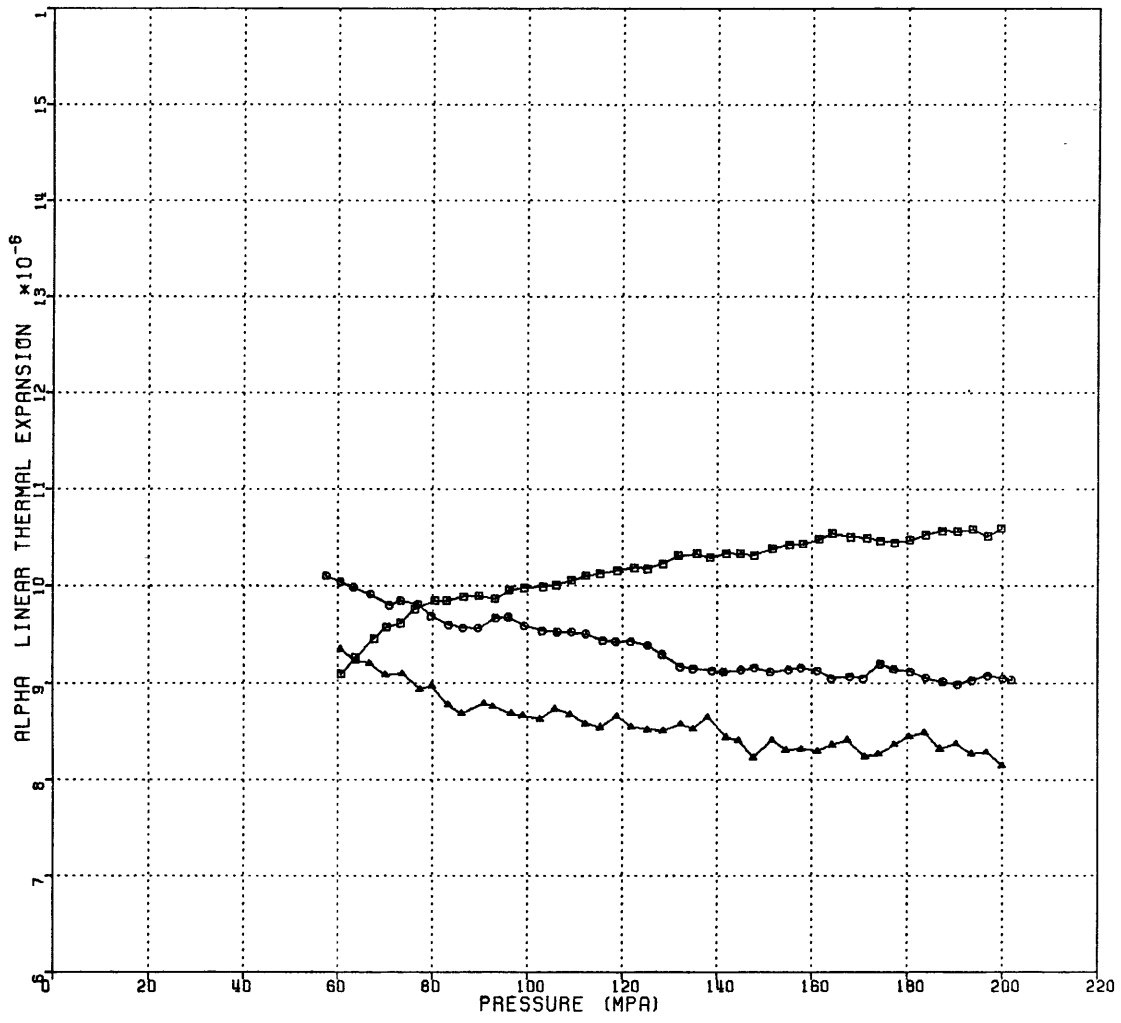
1132 WESTERLY RI GRANITE
GAGE:3A

- - 20 MPA
- - 30 MPA
- △ - 40 MPA
- + - 50 MPA
- x - 60 MPA
- ◇ - 70 MPA
- ↑ - 80 MPA
- × - 90 MPA
- z - 100 MPA



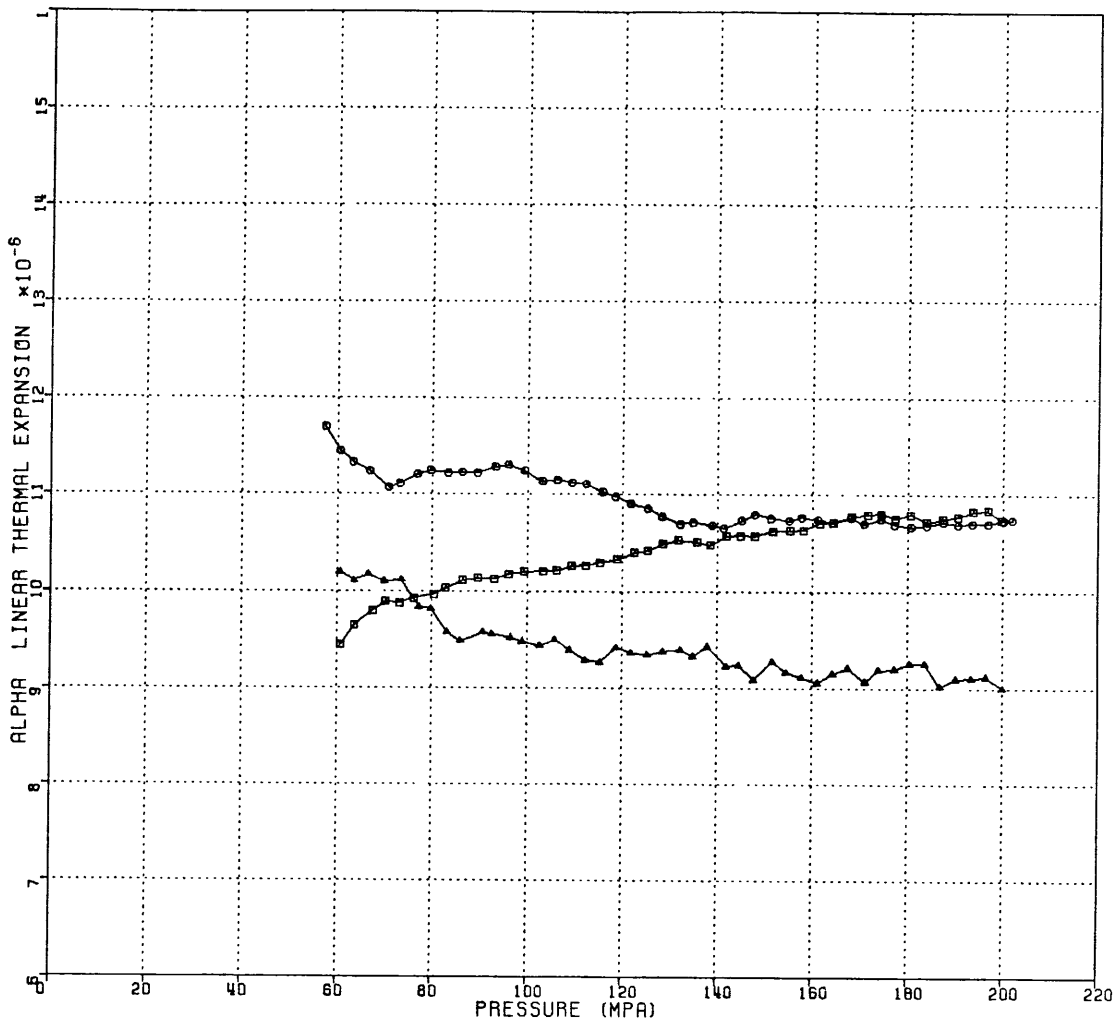
1132 WESTERLY RI GRANITE
GAGE: 3A

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



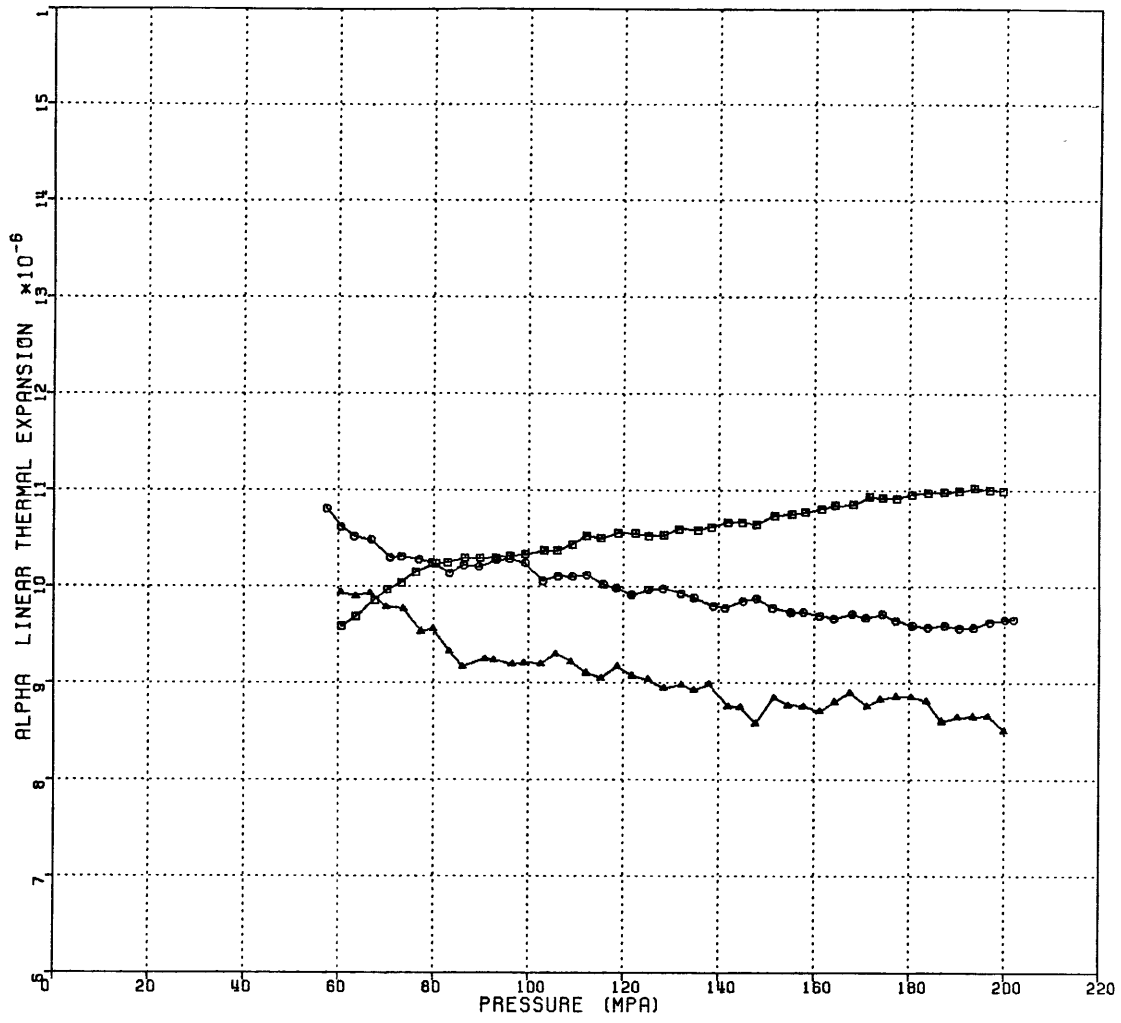
1132 WESTERLY RI GRANITE
GAGE: AC

- - 19°C- 43°C
- - 43°C- 64°C
- △ - 64°C- 86°C



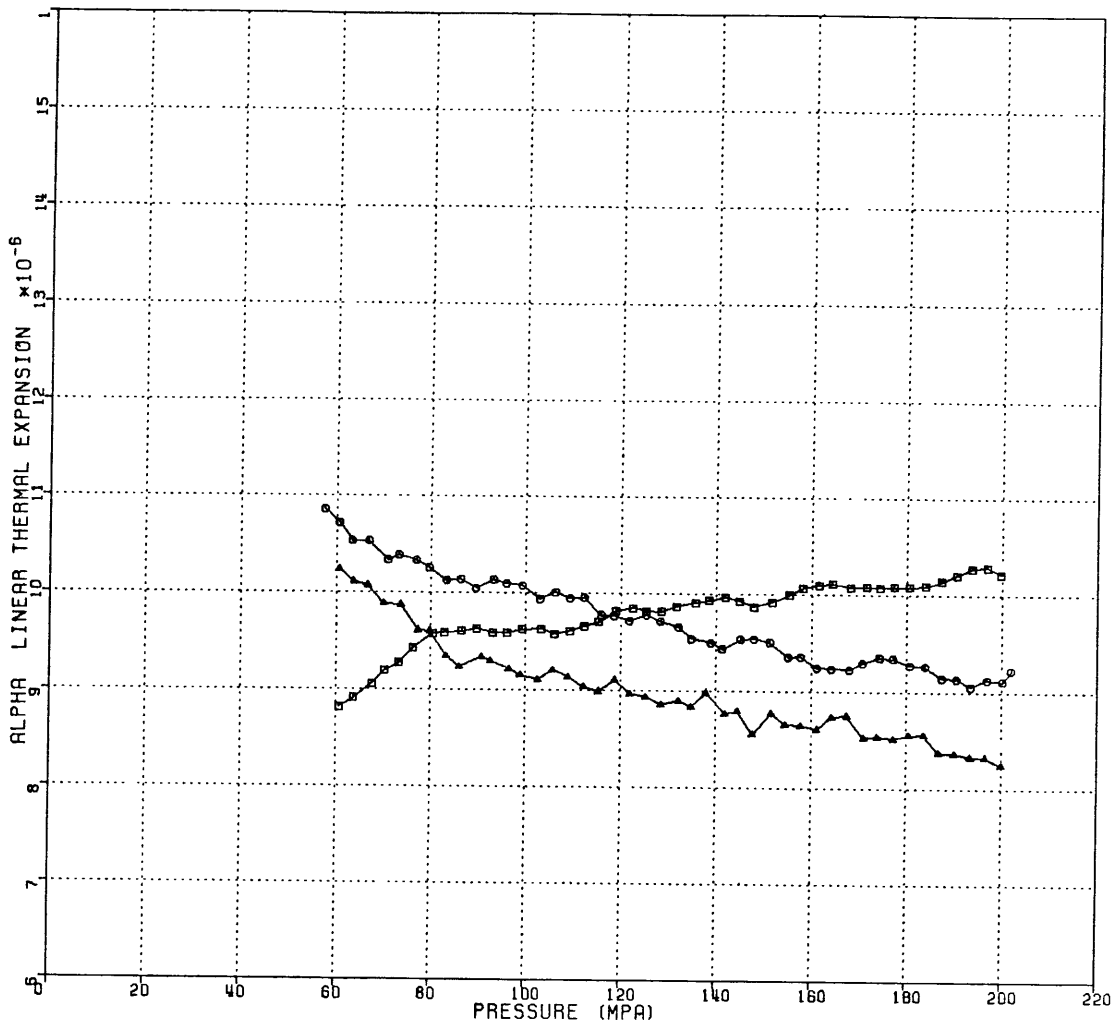
1132 WESTERLY RI GRANITE
GAGE: BC

- - 19°C - 43°C
- - 43°C - 64°C
- △ - 64°C - 86°C



1132 WESTERLY RI GRANITE
GAGE: 3C

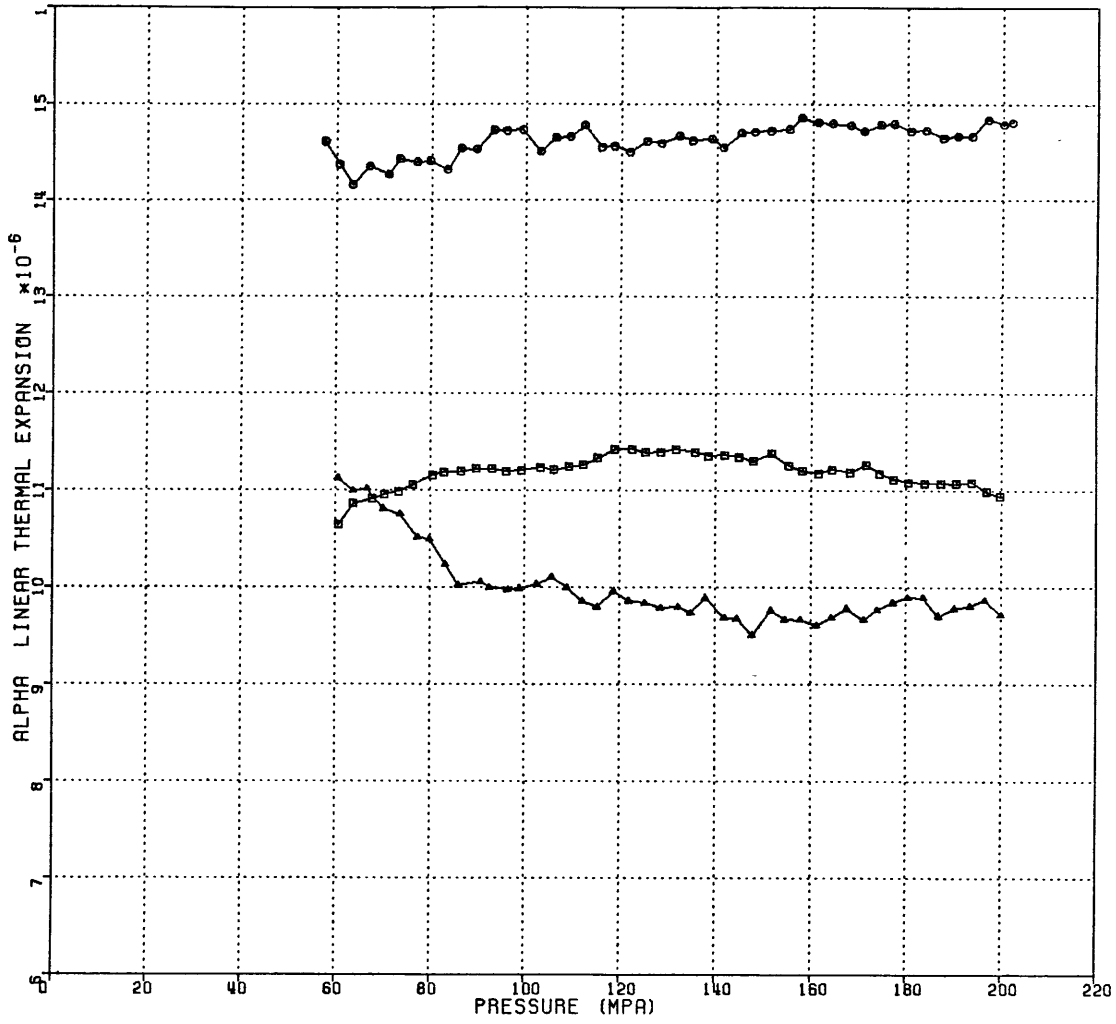
- - 19°C- 43°C
- - 43°C- 64°C
- △ - 64°C- 86°C



1132 WESTERLY RI GRANITE

GAGE: AB

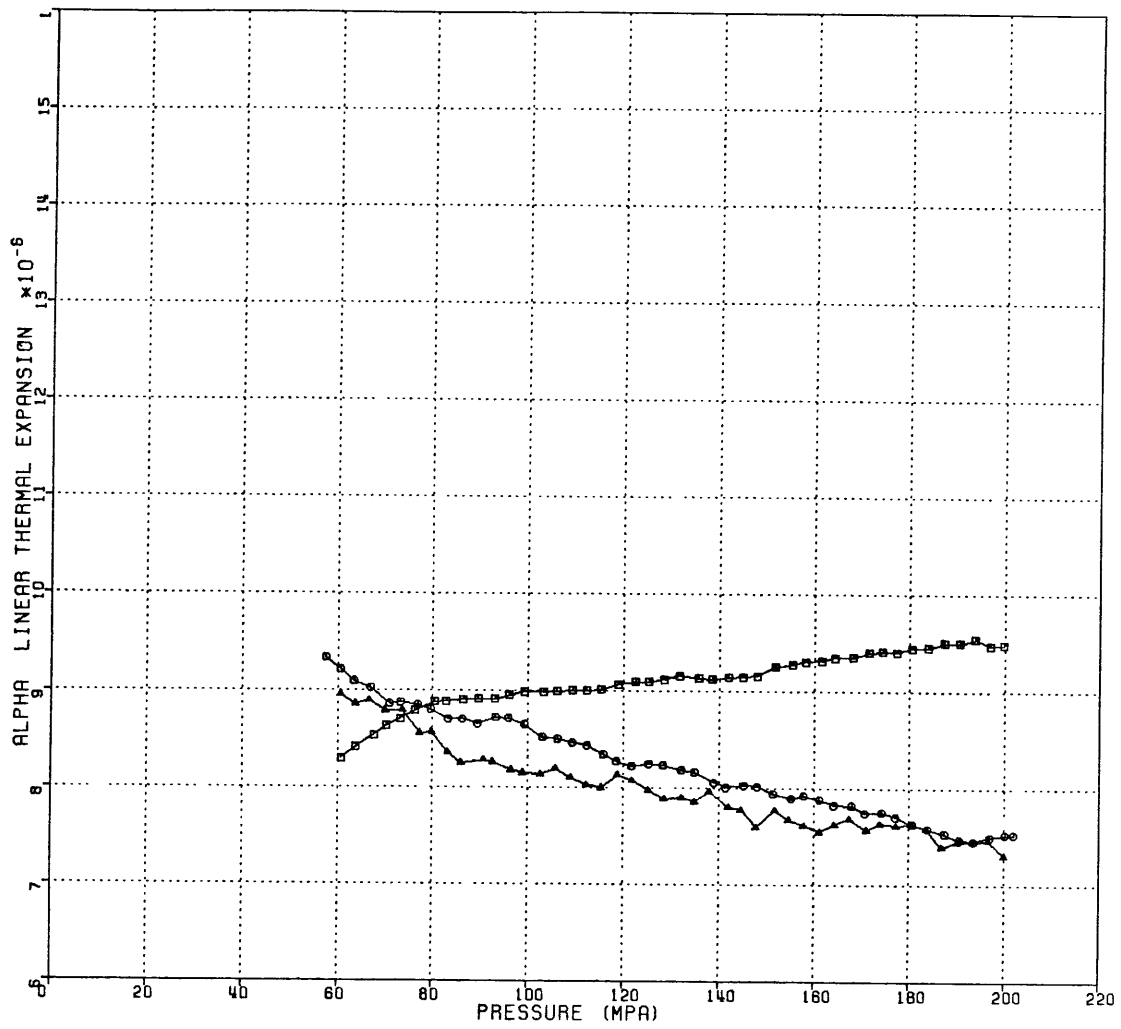
- - 19°C - 43°C
- - 43°C - 64°C
- △ - 64°C - 86°C



1132 WESTERLY RI GRANITE

GAGE: CB

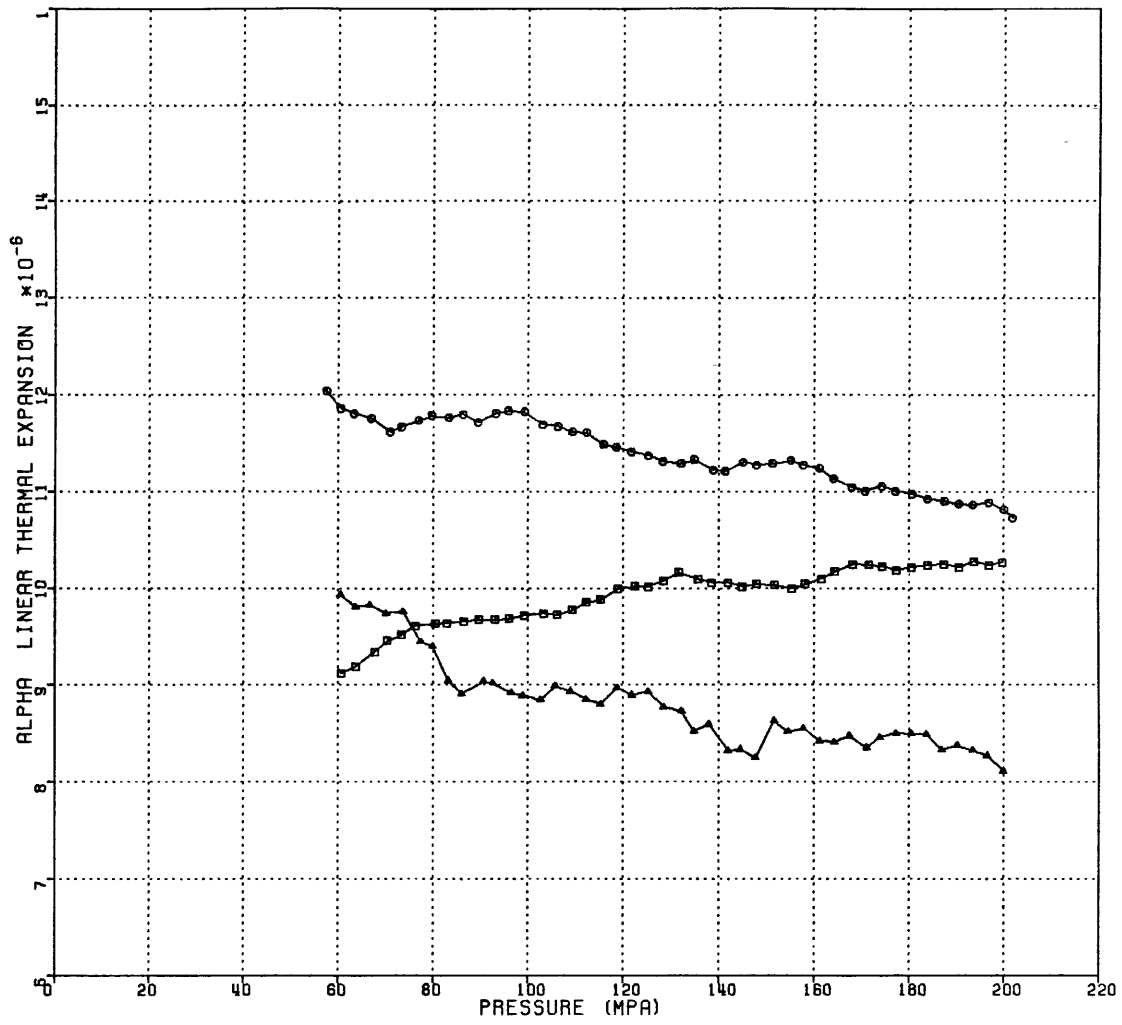
- - 19°C- 43°C
- - 43°C- 64°C
- △ - 64°C- 86°C



1132 WESTERLY RI GRANITE

GAGE: 3B

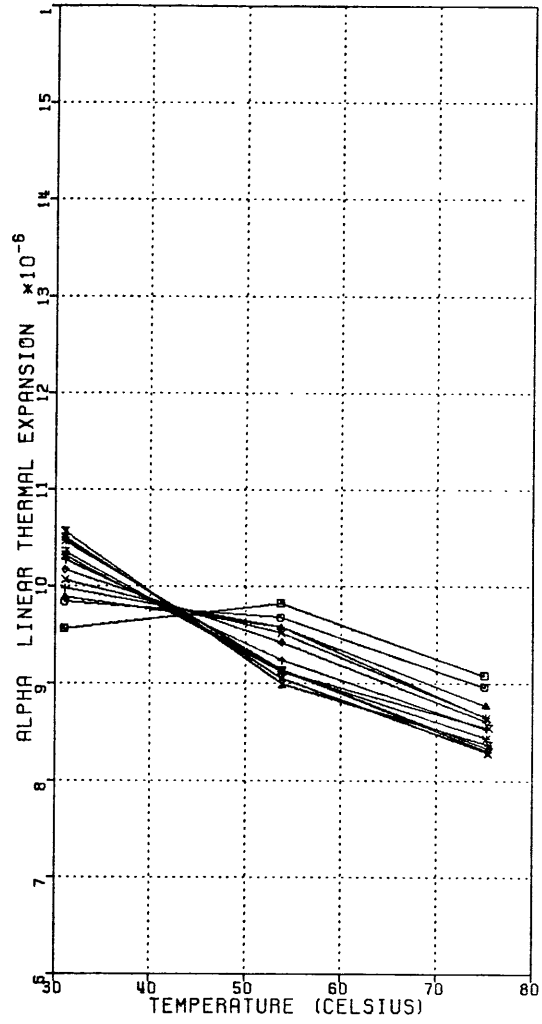
- - 19°C - 43°C
- - 43°C - 64°C
- △ - 64°C - 86°C



1132 WESTERLY RI GRANITE

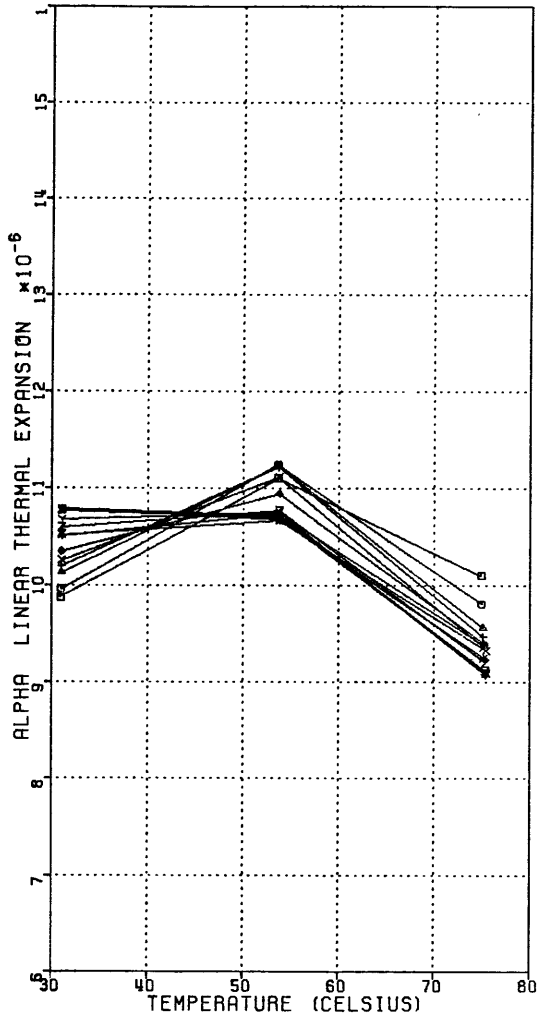
GAGE: 3A

- - 19°C - 43°C
- - 43°C - 64°C
- △ - 64°C - 86°C



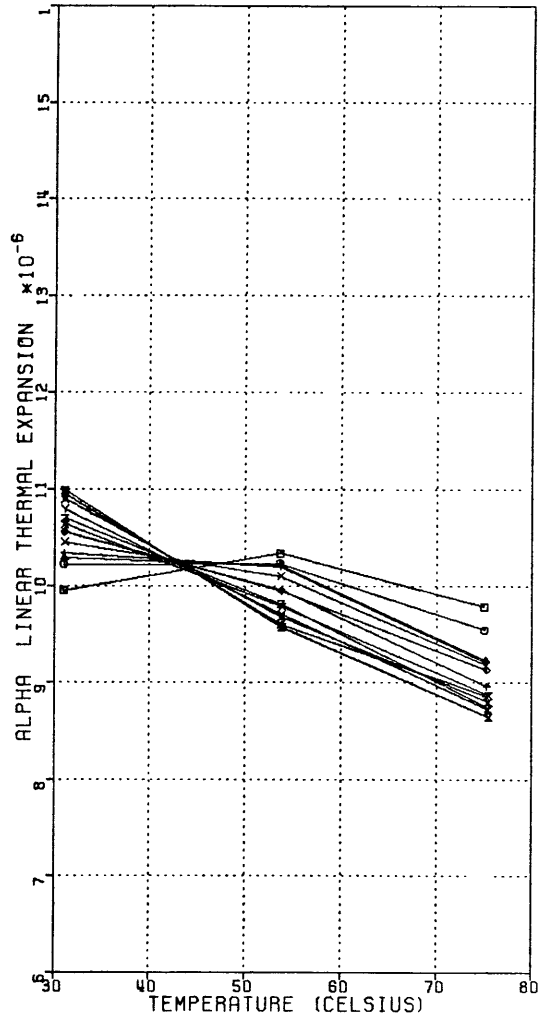
1132 WESTERLY RI GRANITE
GAGE:AC

- - 70 MPa
- - 80 MPa
- △ - 90 MPa
- + - 100 MPa
- X - 110 MPa
- ◇ - 120 MPa
- ⊕ - 130 MPa
- ⊗ - 140 MPa
- Z - 150 MPa
- Y - 160 MPa
- ⊘ - 170 MPa
- * - 180 MPa
- ⊚ - 190 MPa



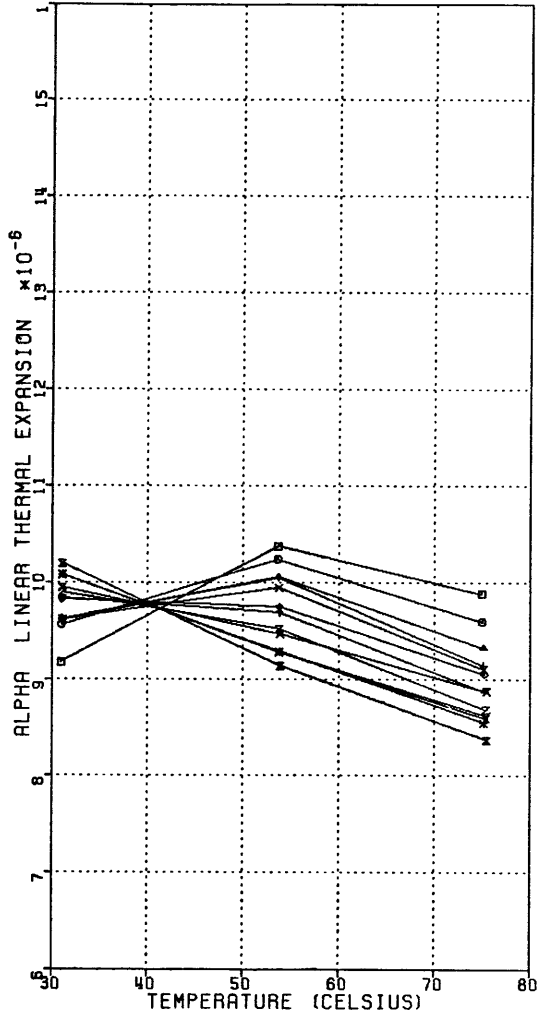
1132 WESTERLY RI GRANITE
GAGE: BC

- | | |
|-------------|-------------|
| □ - 70 MPA | × - 170 MPA |
| ○ - 80 MPA | * - 180 MPA |
| △ - 90 MPA | ⊗ - 190 MPA |
| + - 100 MPA | |
| X - 110 MPA | |
| ◇ - 120 MPA | |
| ⊕ - 130 MPA | |
| ⊗ - 140 MPA | |
| Z - 150 MPA | |
| Y - 160 MPA | |



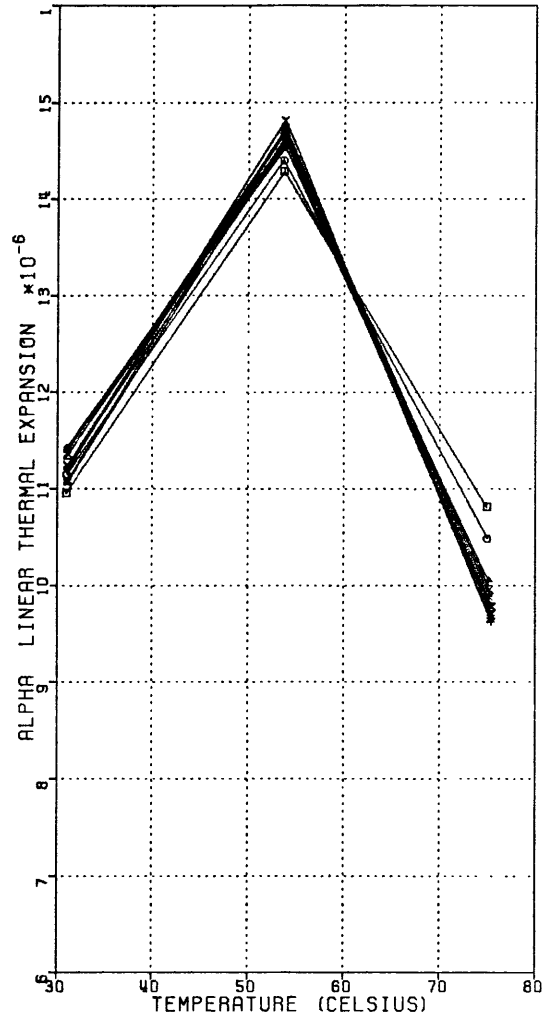
1132 WESTERLY RI GRANITE
GAGE:3C

- | | |
|-------------|-------------|
| □ - 70 MPA | ⌘ - 170 MPA |
| ○ - 80 MPA | * - 180 MPA |
| △ - 90 MPA | ⌘ - 190 MPA |
| + - 100 MPA | |
| X - 110 MPA | |
| ◇ - 120 MPA | |
| ⋈ - 130 MPA | |
| X - 140 MPA | |
| Z - 150 MPA | |
| Y - 160 MPA | |



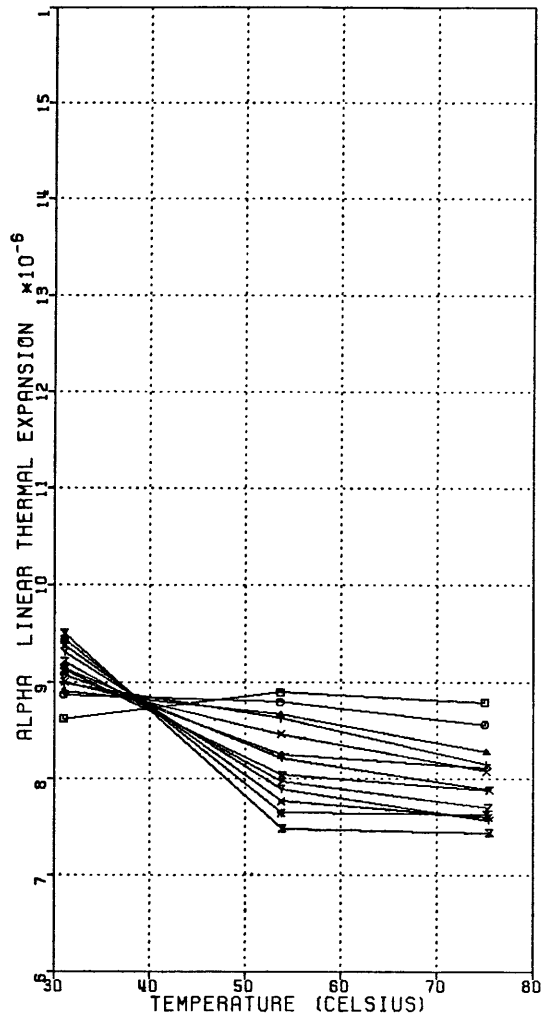
1132 WESTERLY RI GRANITE
GAGE: AB

- - 70 MPA
- - 80 MPA
- △ - 90 MPA
- + - 100 MPA
- X - 110 MPA
- ◇ - 120 MPA
- ↑ - 130 MPA
- ⊗ - 140 MPA
- Z - 150 MPA
- Y - 160 MPA
- ⊗ - 170 MPA
- * - 180 MPA
- ⊗ - 190 MPA



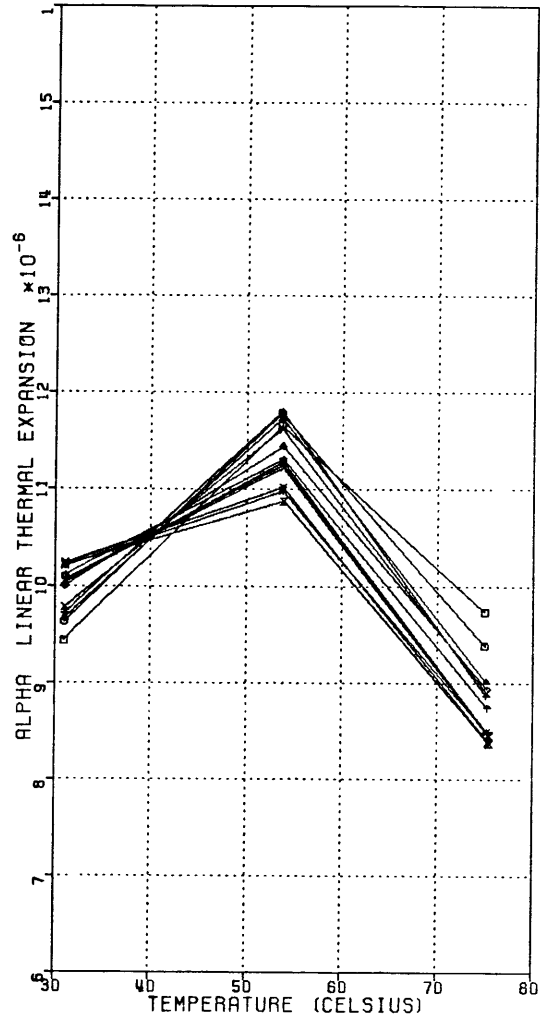
1132 WESTERLY RI GRANITE
GAGE:CB

- | | |
|-------------|-------------|
| □ - 70 MPA | × - 170 MPA |
| ○ - 80 MPA | * - 180 MPA |
| △ - 90 MPA | ⊗ - 190 MPA |
| + - 100 MPA | |
| × - 110 MPA | |
| ◇ - 120 MPA | |
| ⋈ - 130 MPA | |
| ⊗ - 140 MPA | |
| ⊘ - 150 MPA | |
| ⊙ - 160 MPA | |



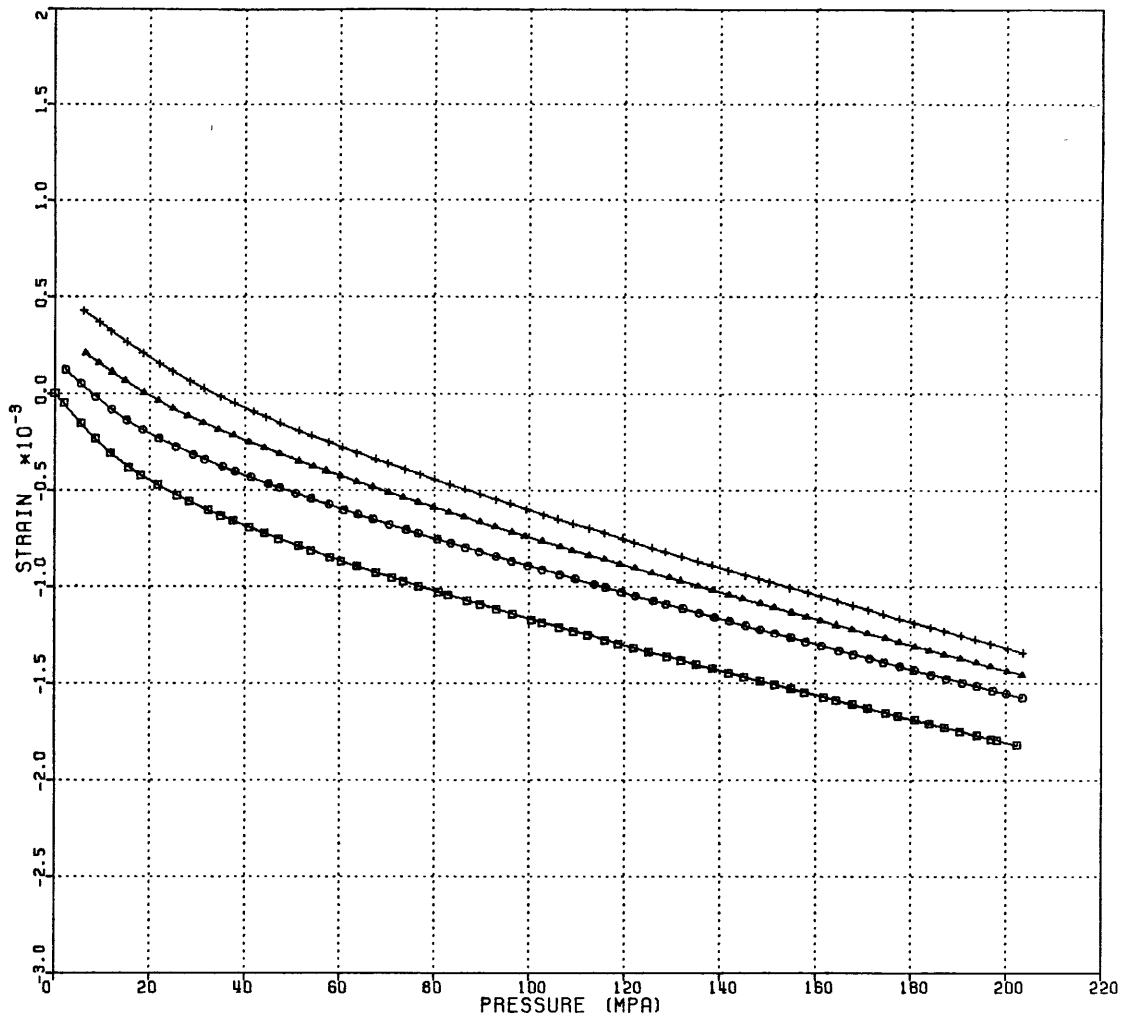
1132 WESTERLY RI GRANITE
GAGE: 3B

- - 70 MPA
- - 80 MPA
- △ - 90 MPA
- + - 100 MPA
- X - 110 MPA
- ◇ - 120 MPA
- ⊕ - 130 MPA
- ⊗ - 140 MPA
- Z - 150 MPA
- Y - 160 MPA
- ⊗ - 170 MPA
- * - 180 MPA
- ⊗ - 190 MPA



1132 WESTERLY RI GRANITE
GAGE:3A

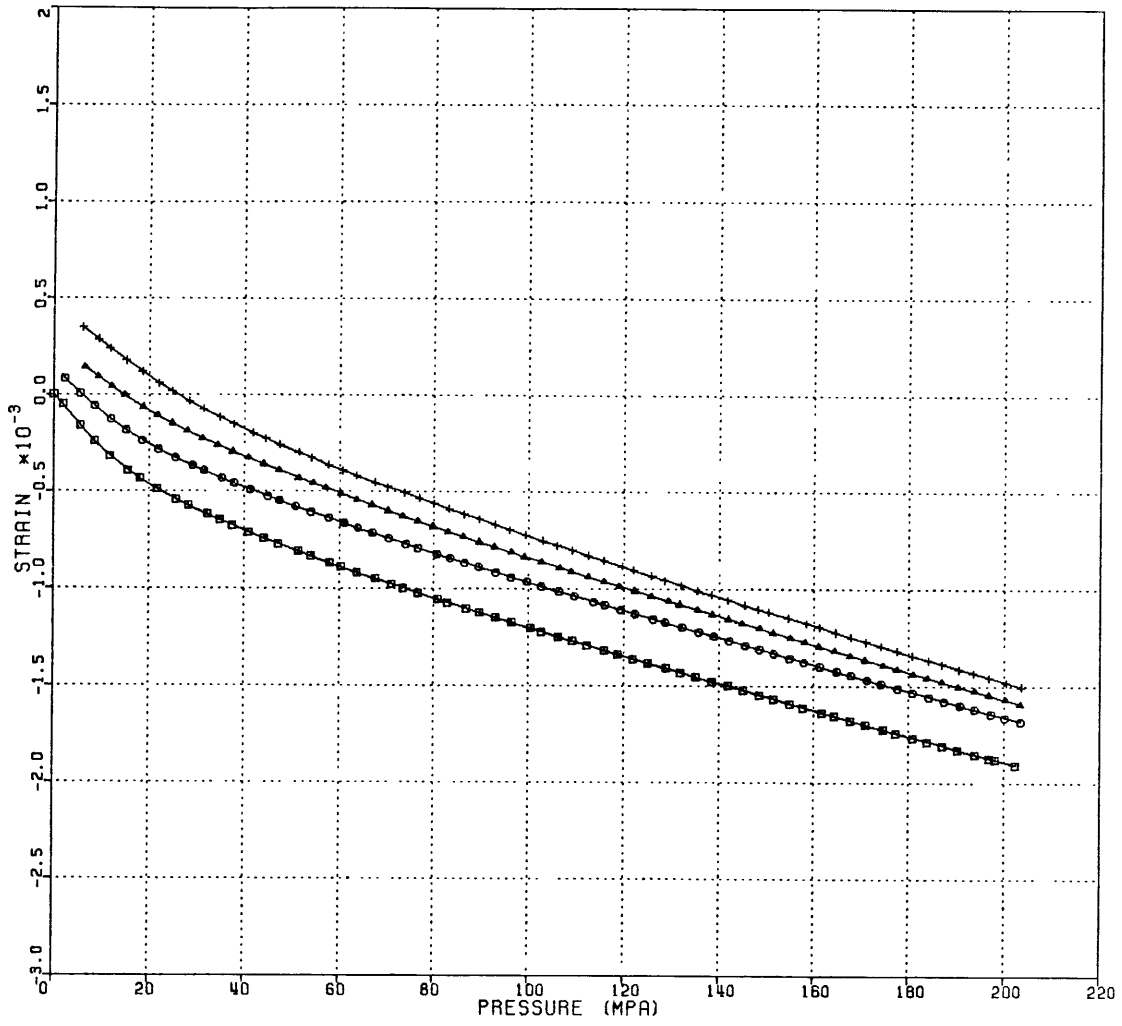
- - 70 MPA
- - 80 MPA
- △ - 90 MPA
- + - 100 MPA
- X - 110 MPA
- ◇ - 120 MPA
- ⊕ - 130 MPA
- ⊗ - 140 MPA
- Z - 150 MPA
- Y - 160 MPA
- ⊗ - 170 MPA
- * - 180 MPA
- ⊗ - 190 MPA



1132 WESTERLY RI GRANITE

GAGE: AC

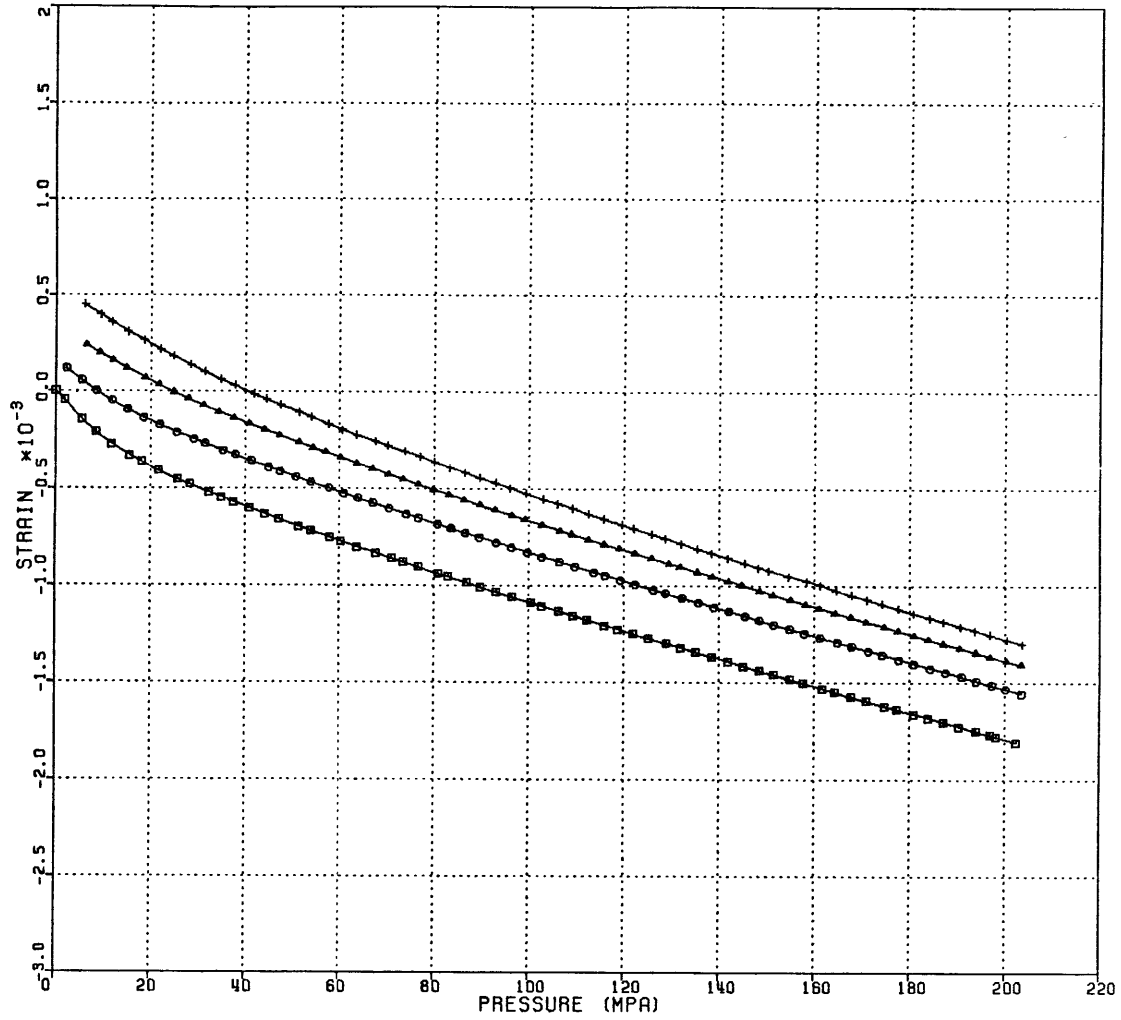
- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



1132 WESTERLY RI GRANITE

GAGE: 3C

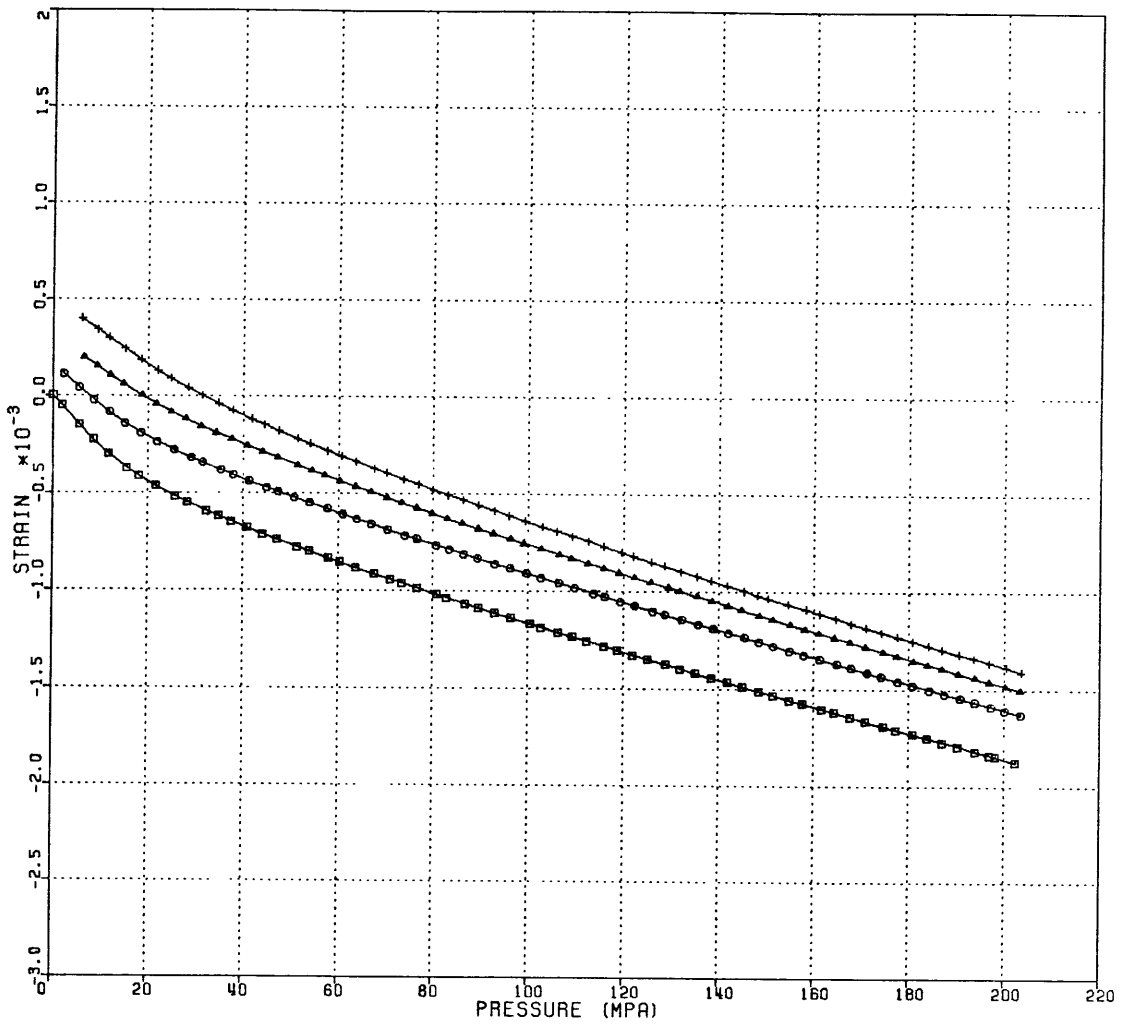
□ - 19°C
 ○ - 50°C
 △ - 83°C
 + - 118°C



1132 WESTERLY RI GRANITE

GAGE: 4C

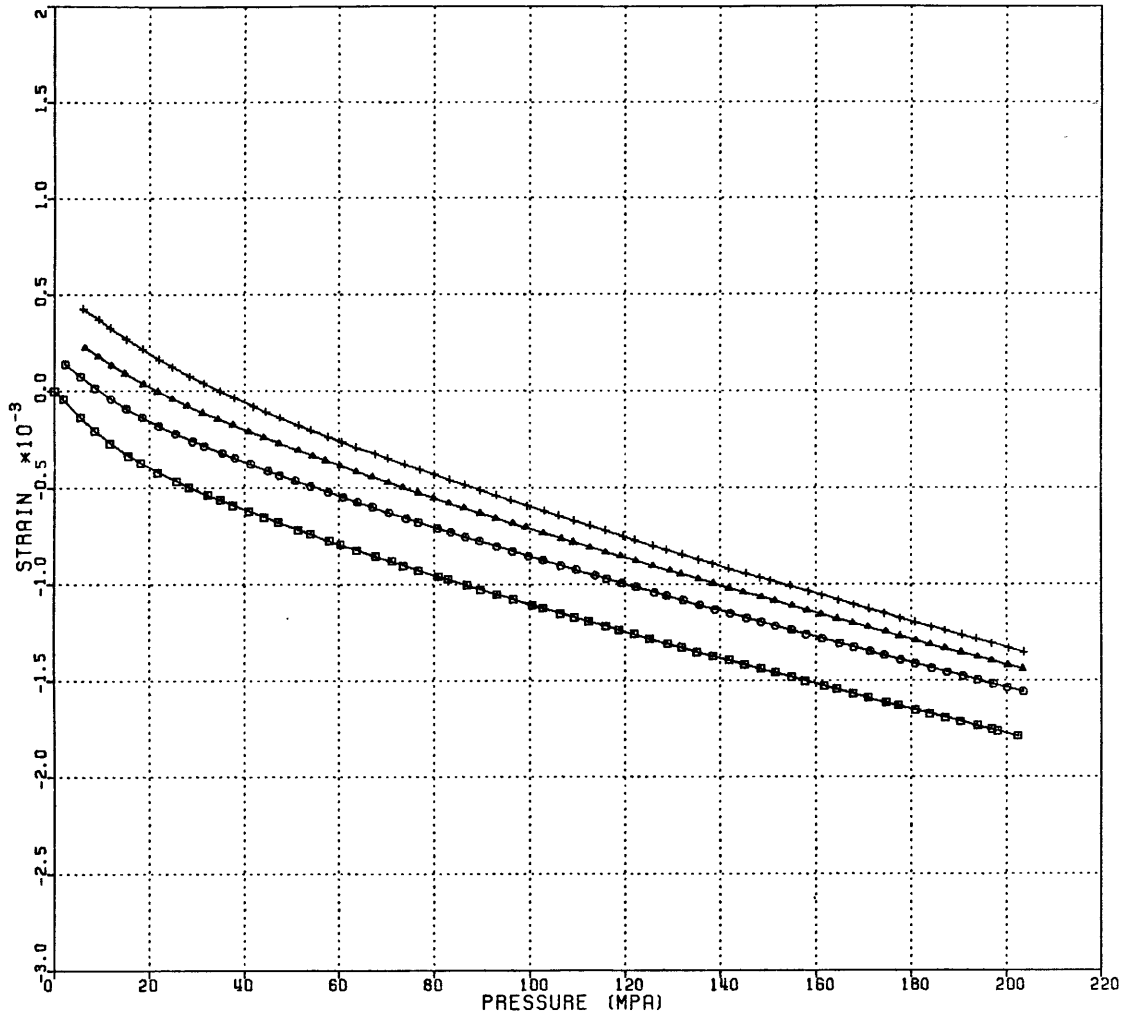
- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



1132 WESTERLY RI GRANITE

GAGE: AB

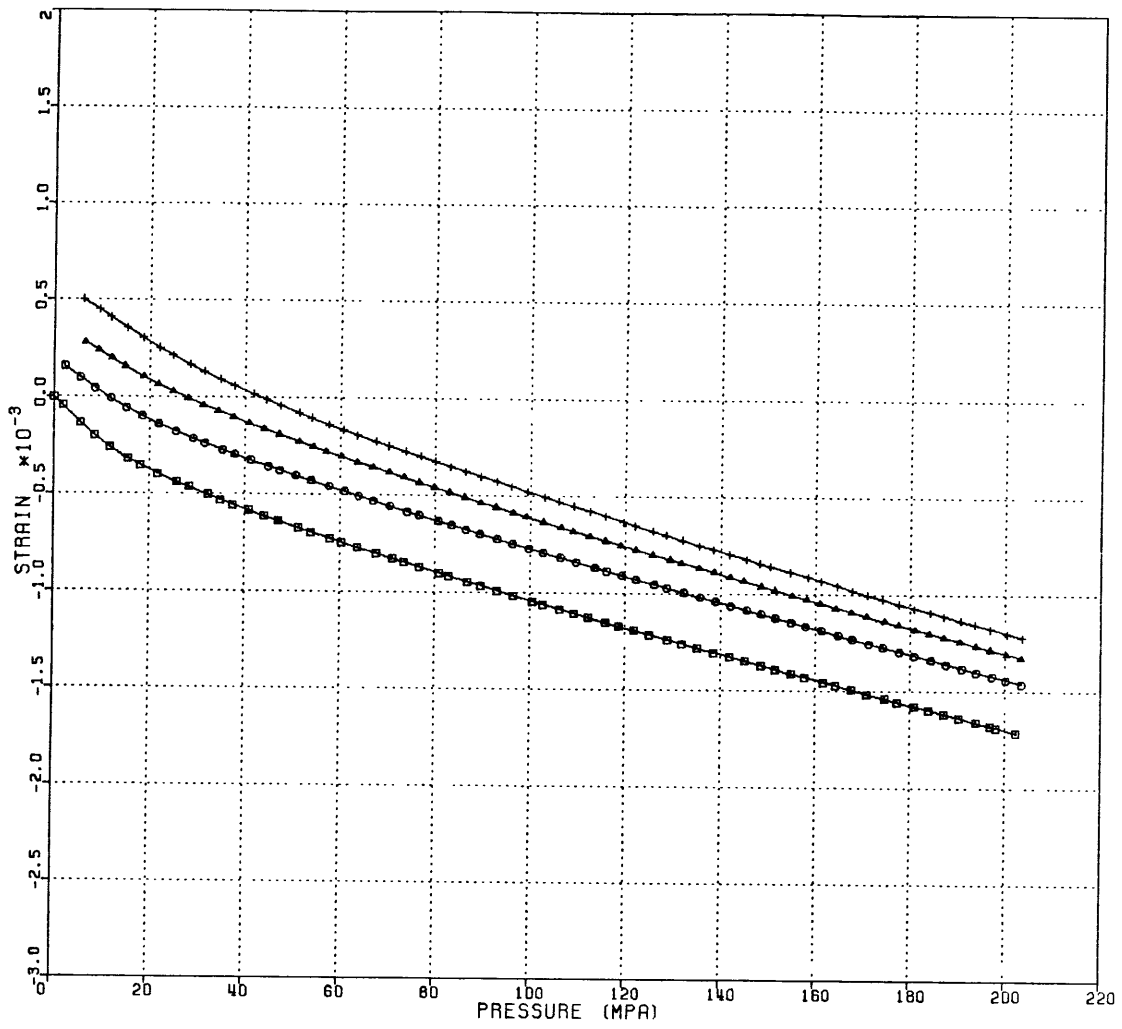
- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



1132 WESTERLY RI GRANITE

GAGE: CB

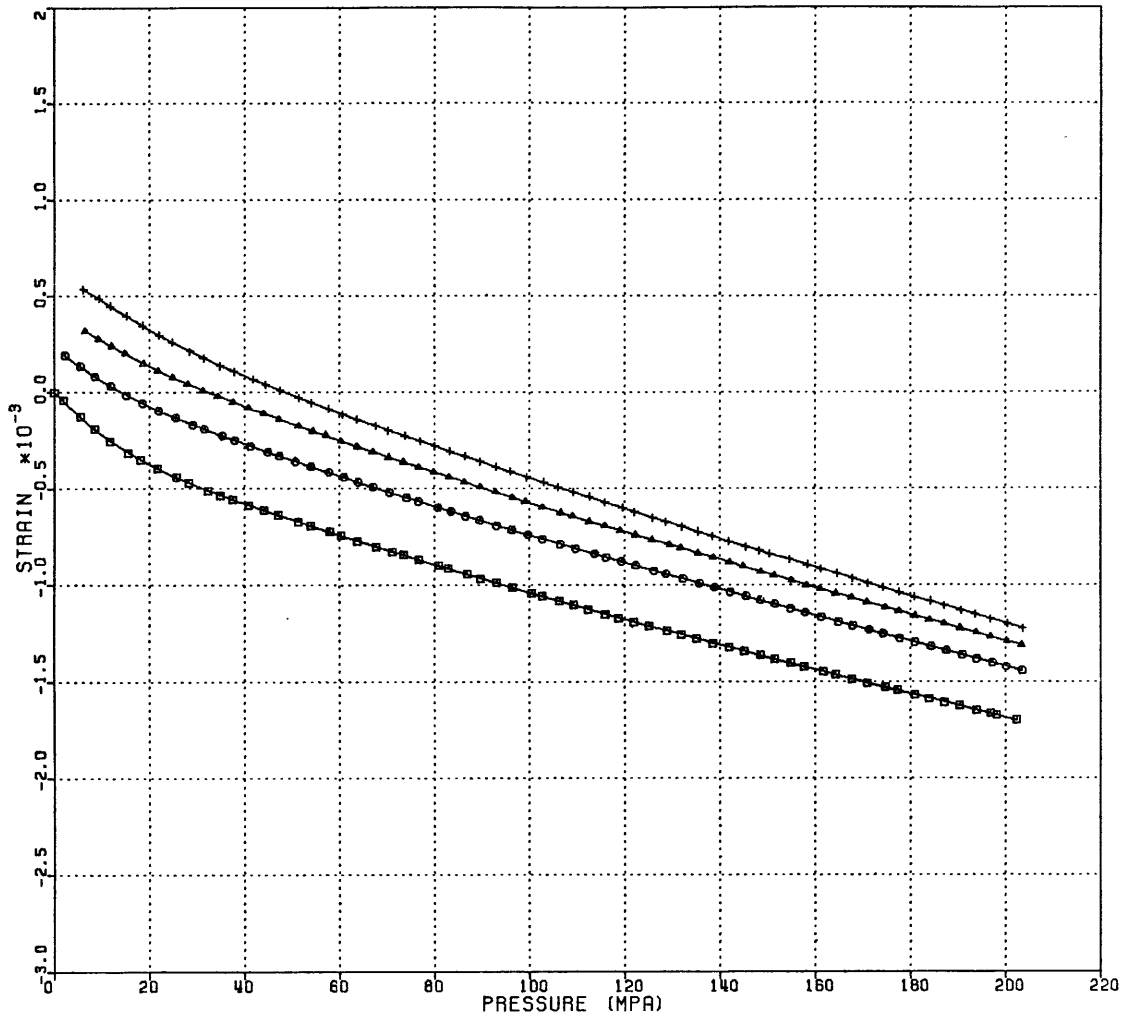
- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



1132 WESTERLY RI GRANITE

GAGE: BA

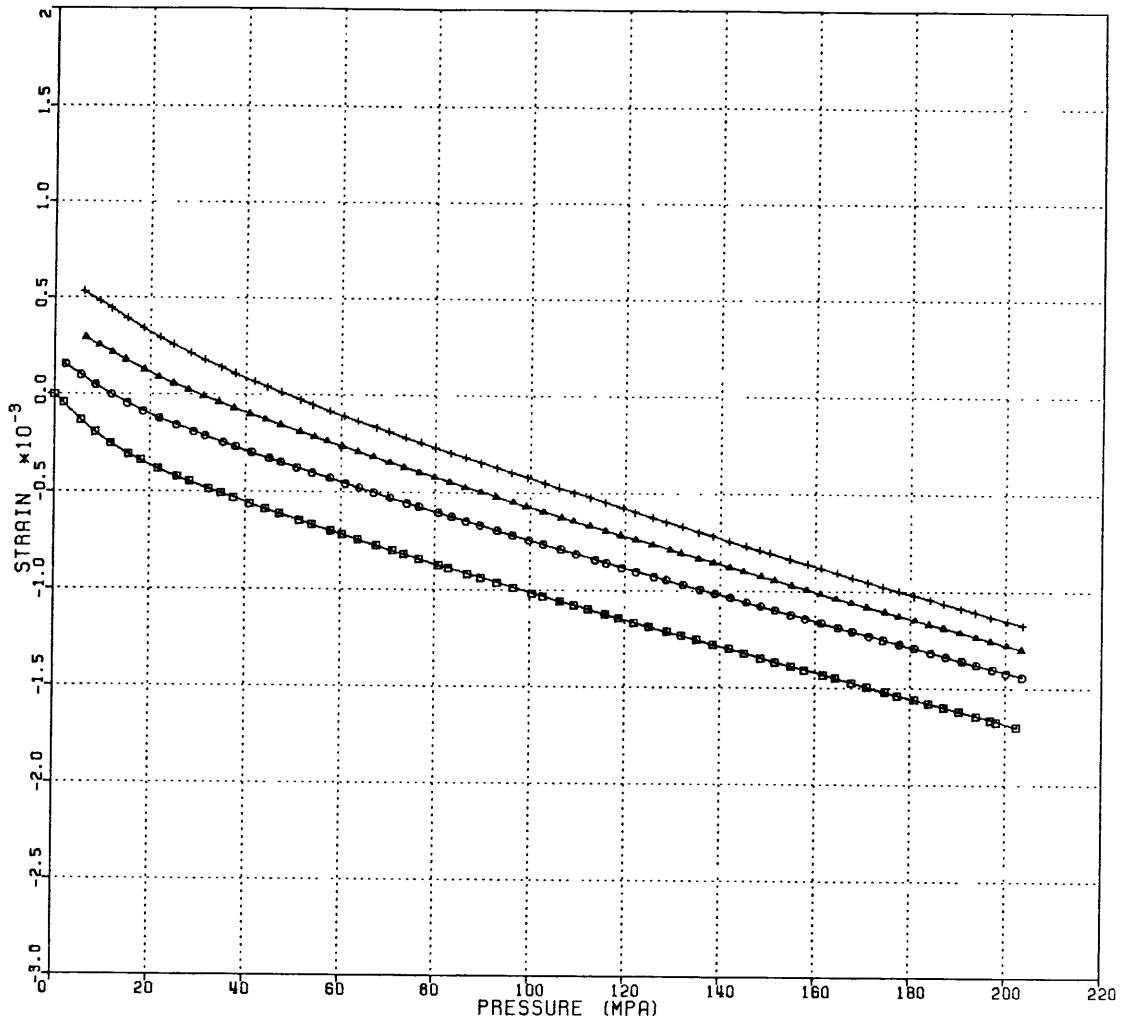
□ - 19°C
 ○ - 50°C
 △ - 83°C
 + - 118°C



1132 WESTERLY RI GRANITE

GAGE: CA

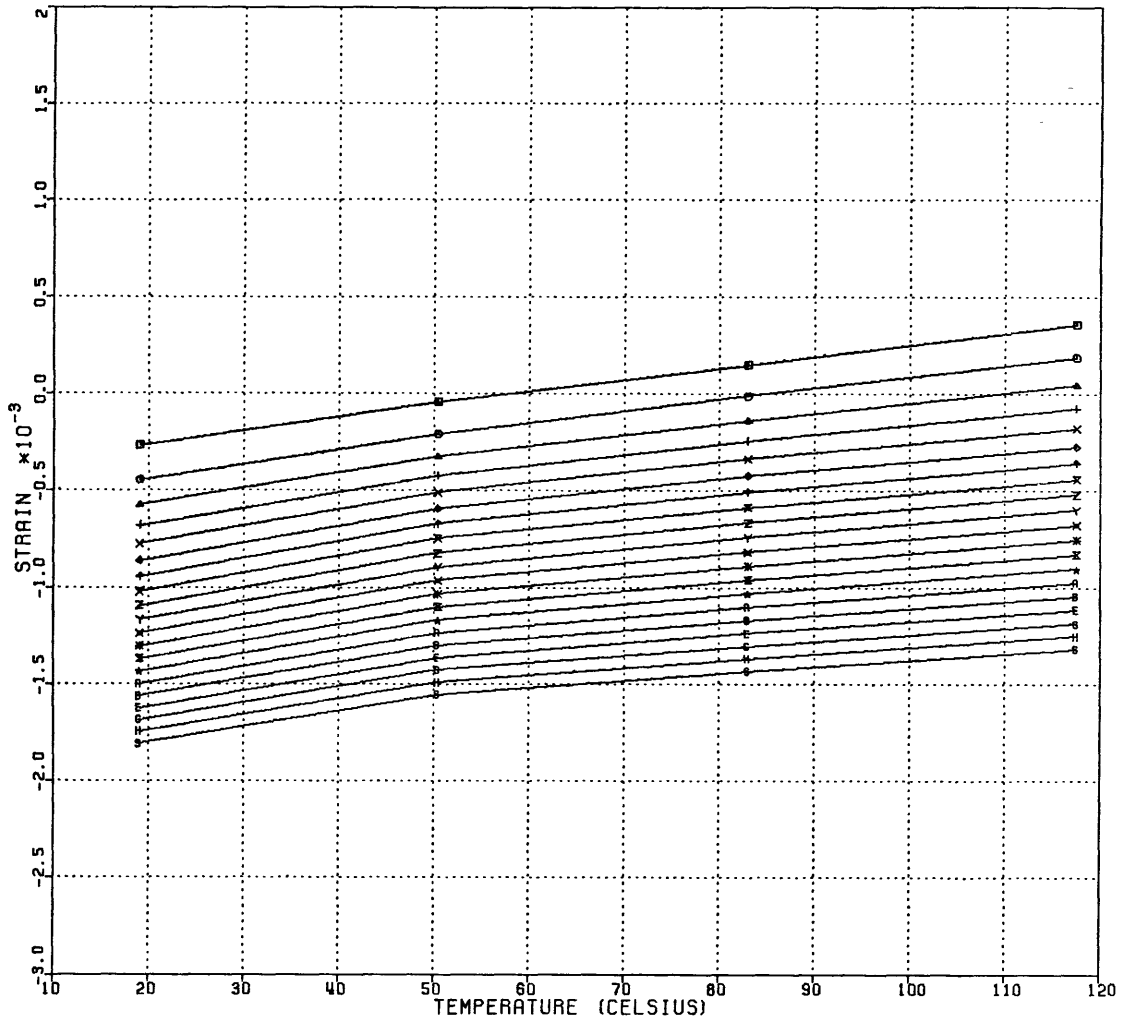
- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



1132 WESTERLY RI GRANITE

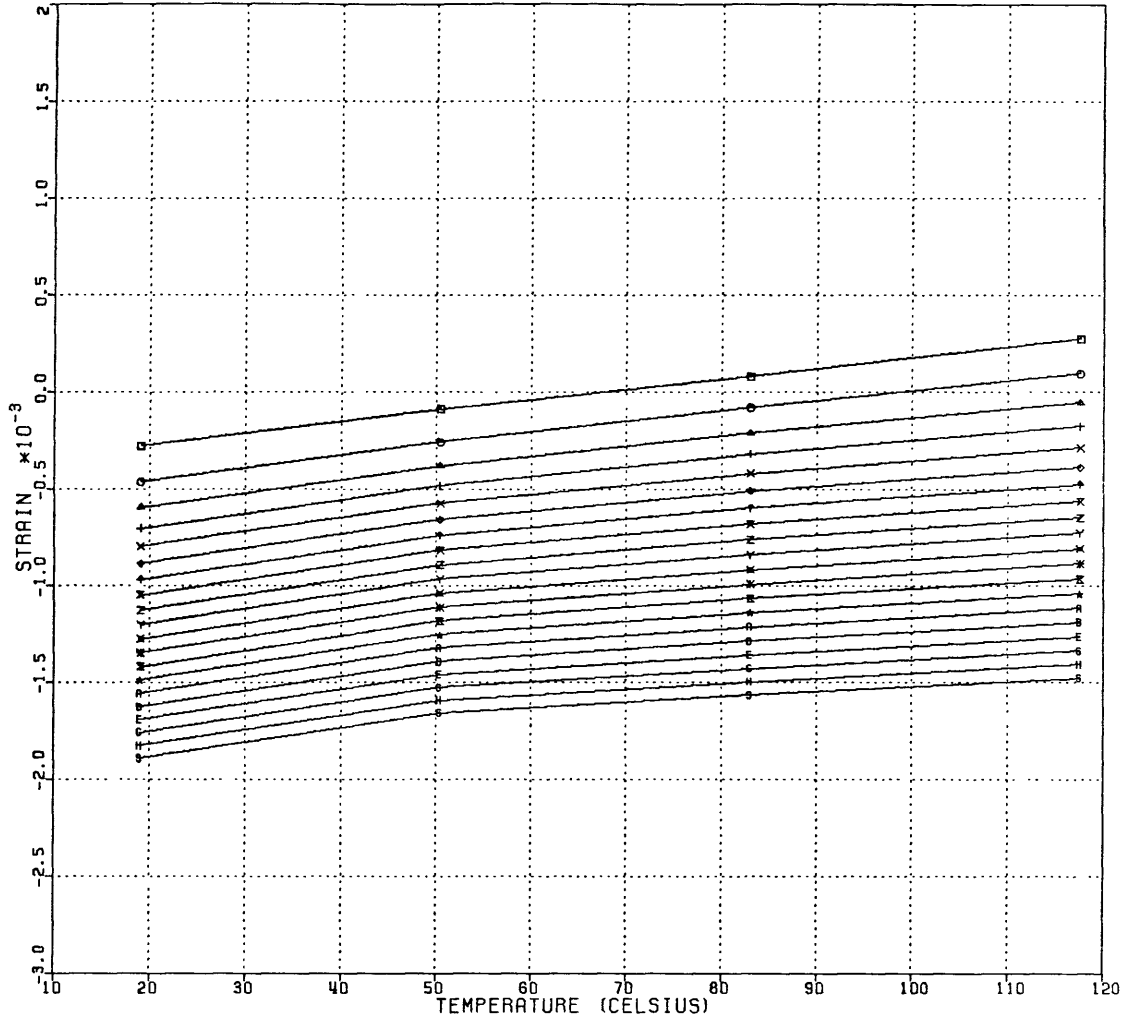
GAGE: 3A

□ - 19°C
 ○ - 50°C
 △ - 83°C
 + - 118°C



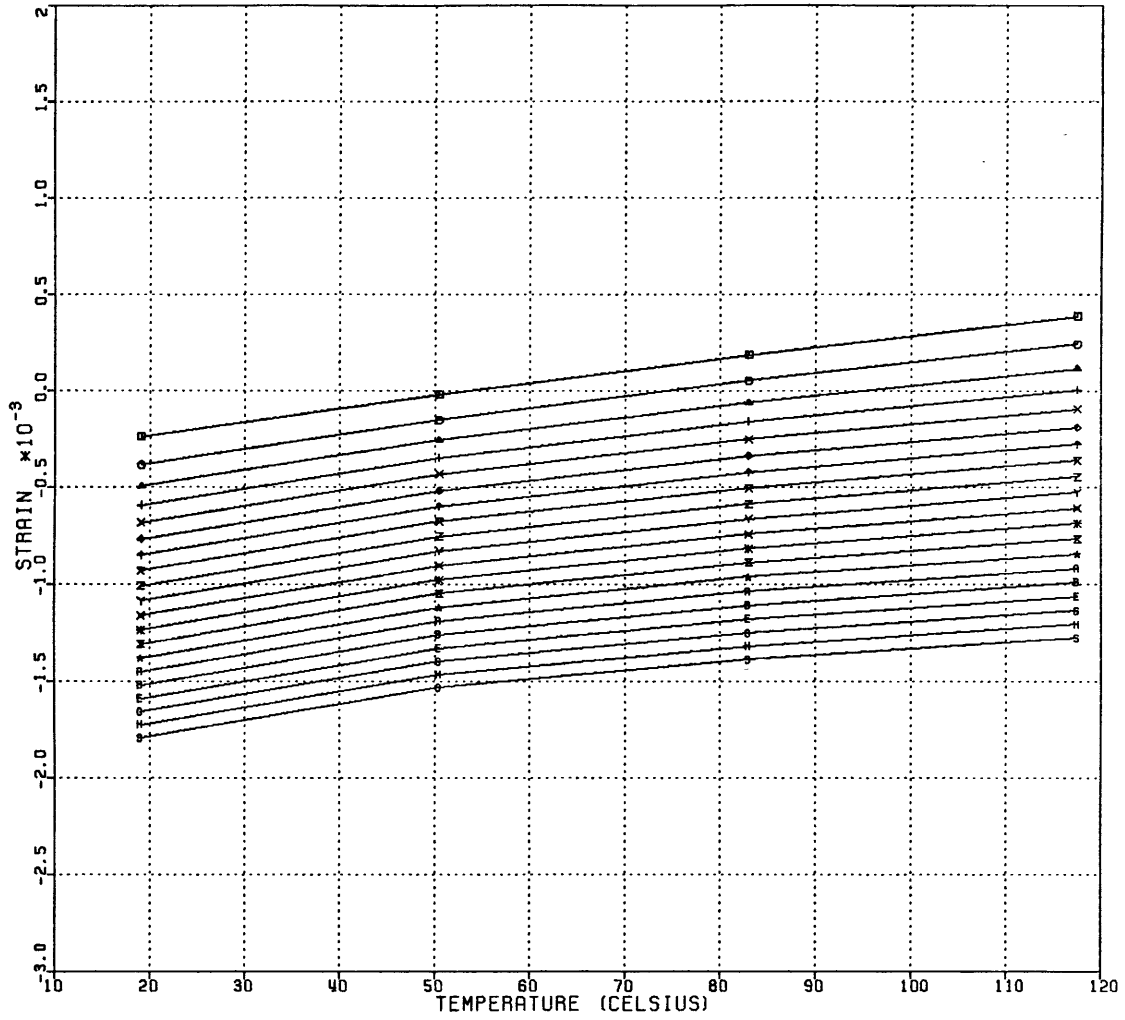
1132 WESTERLY RI GRANITE
GAGE:AC

- | | |
|-------------|-------------|
| □ - 10 MPA | X - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | X - 130 MPA |
| + - 40 MPA | * - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| † - 70 MPA | E - 170 MPA |
| X - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



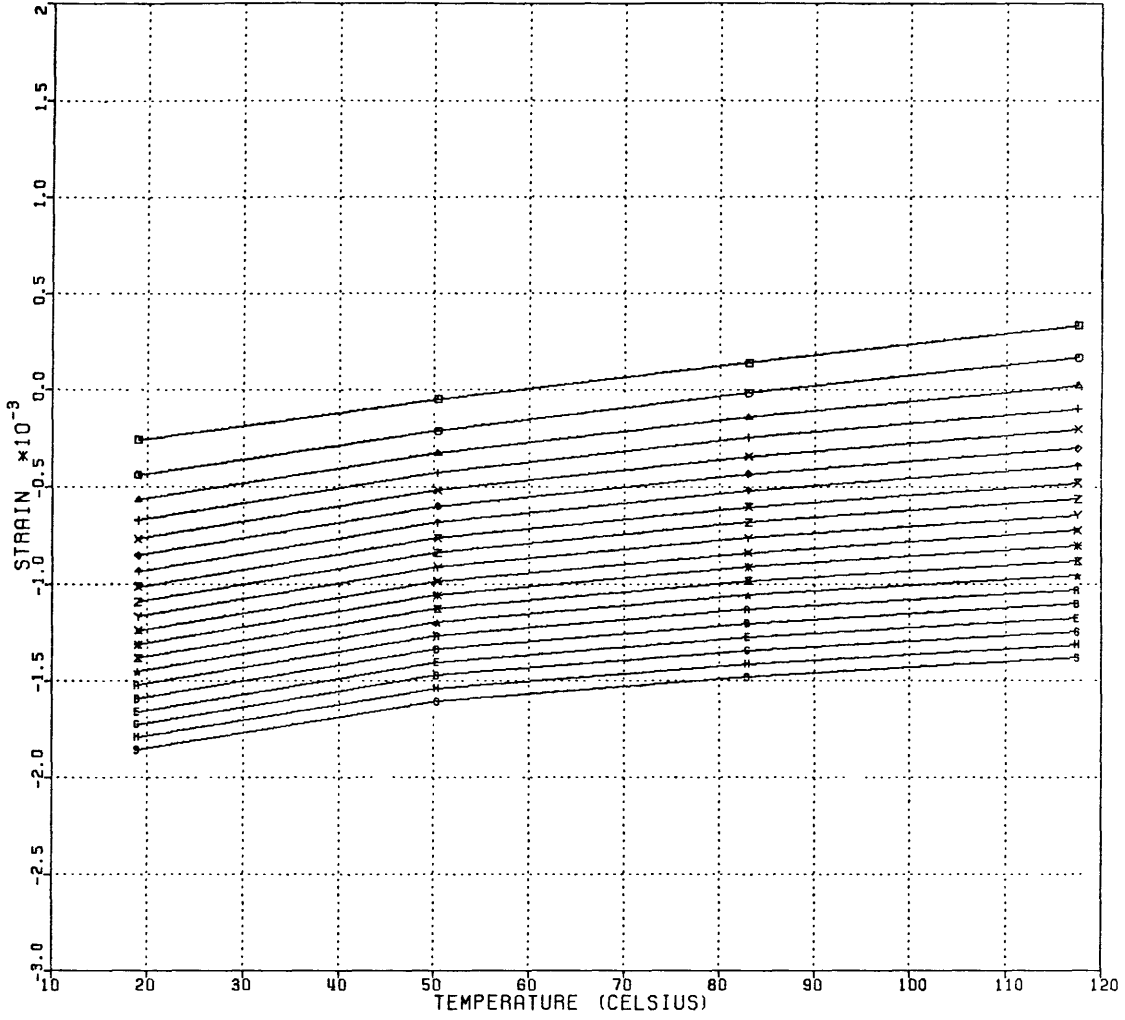
1132 WESTERLY RI GRANITE
GAGE:3C

- | | |
|-------------|-------------|
| □ - 10 MPA | ⌘ - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | ⊗ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | ⊠ - 150 MPA |
| ◇ - 60 MPA | ⊡ - 160 MPA |
| ⊕ - 70 MPA | E - 170 MPA |
| ⊗ - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



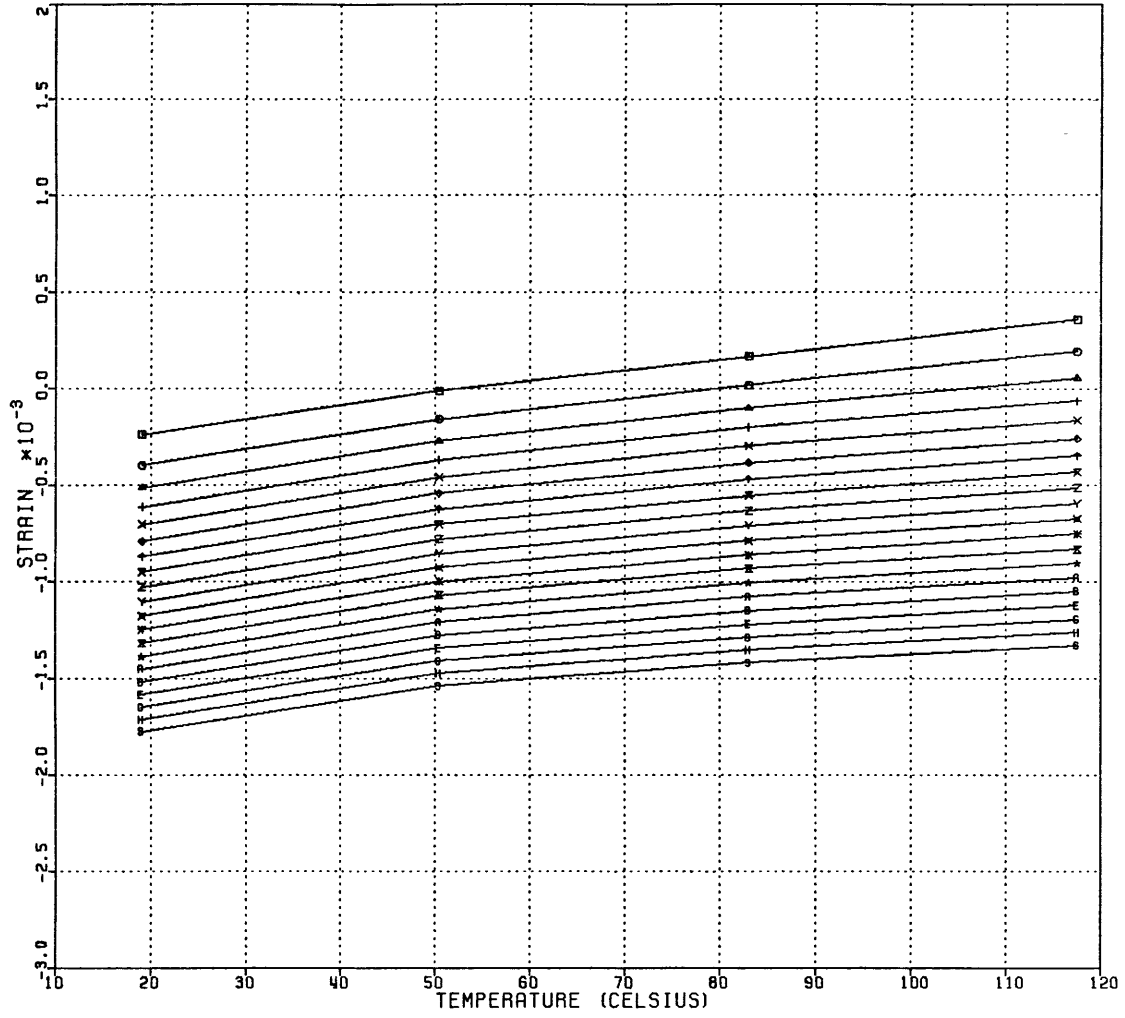
1132 WESTERLY RI GRANITE
GAGE:4C

- | | |
|-------------|-------------|
| □ - 10 MPA | X - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | X - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| † - 70 MPA | E - 170 MPA |
| X - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



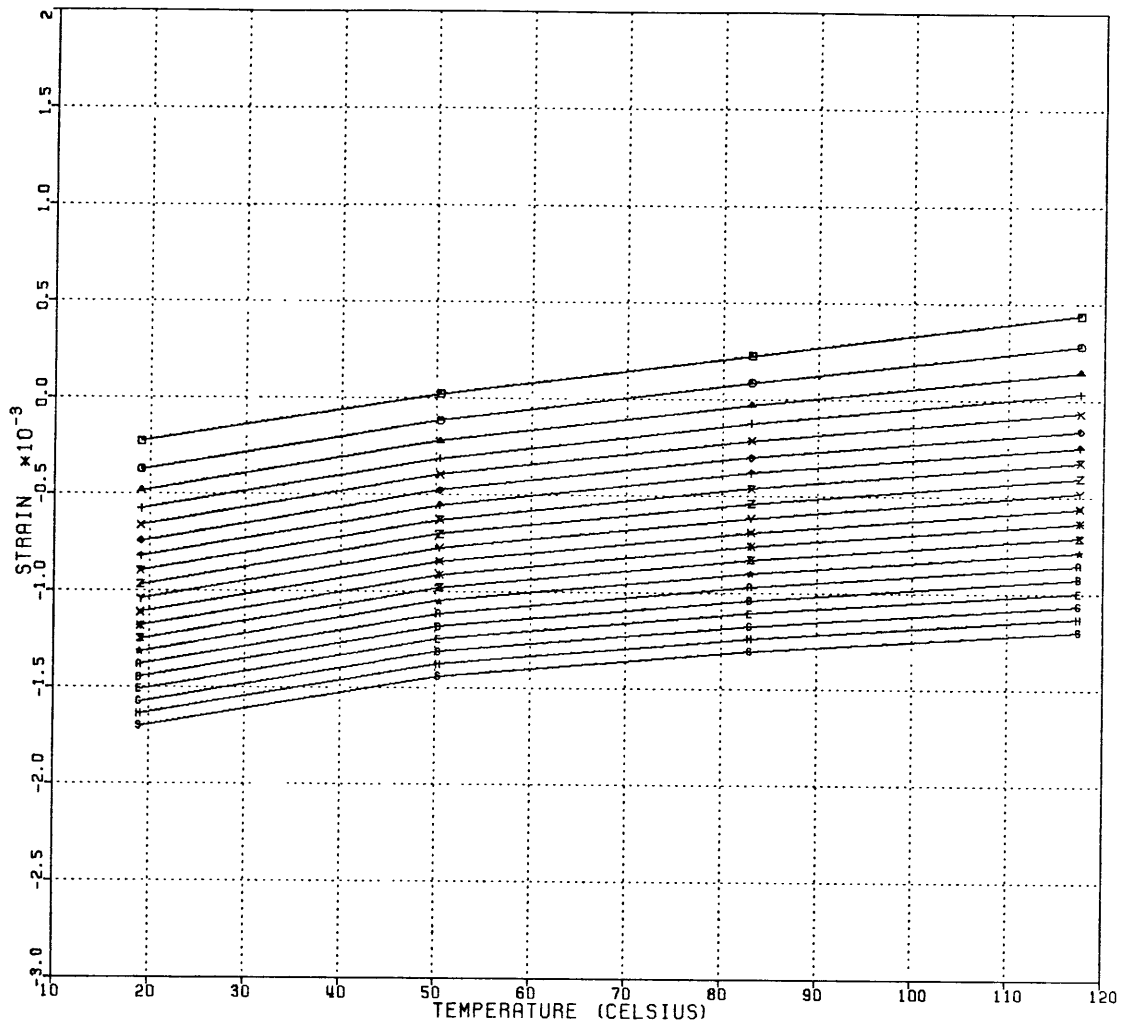
1132 WESTERLY RI GRANITE
GAGE: AB

- | | |
|-------------|-------------|
| □ - 10 MPA | X - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| ▲ - 30 MPA | X - 130 MPA |
| + - 40 MPA | * - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| † - 70 MPA | E - 170 MPA |
| X - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



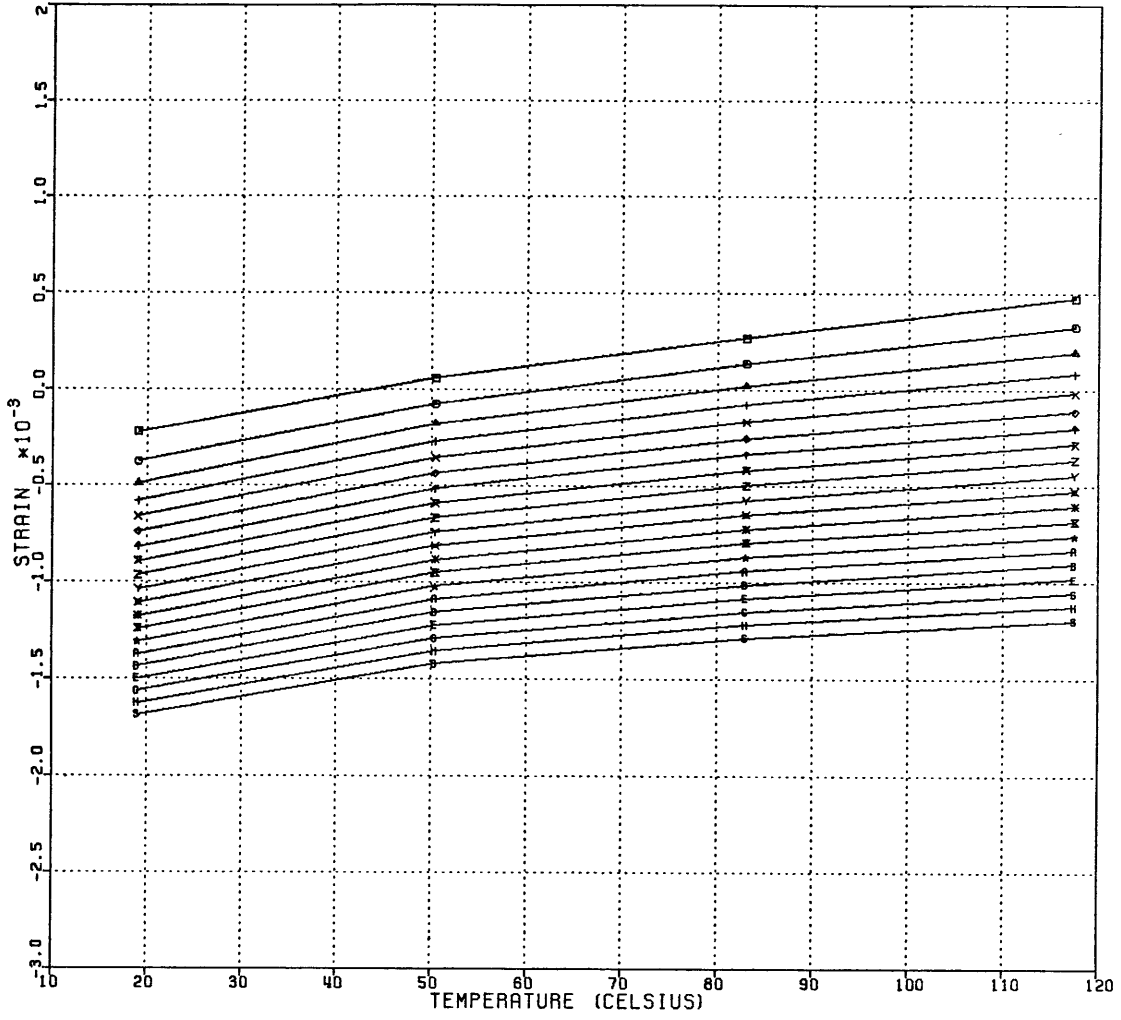
1132 WESTERLY RI GRANITE
GAGE:CB

- | | |
|-------------|-------------|
| □ - 10 MPA | ⌘ - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | ⌘ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ⊕ - 70 MPA | E - 170 MPA |
| ⌘ - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



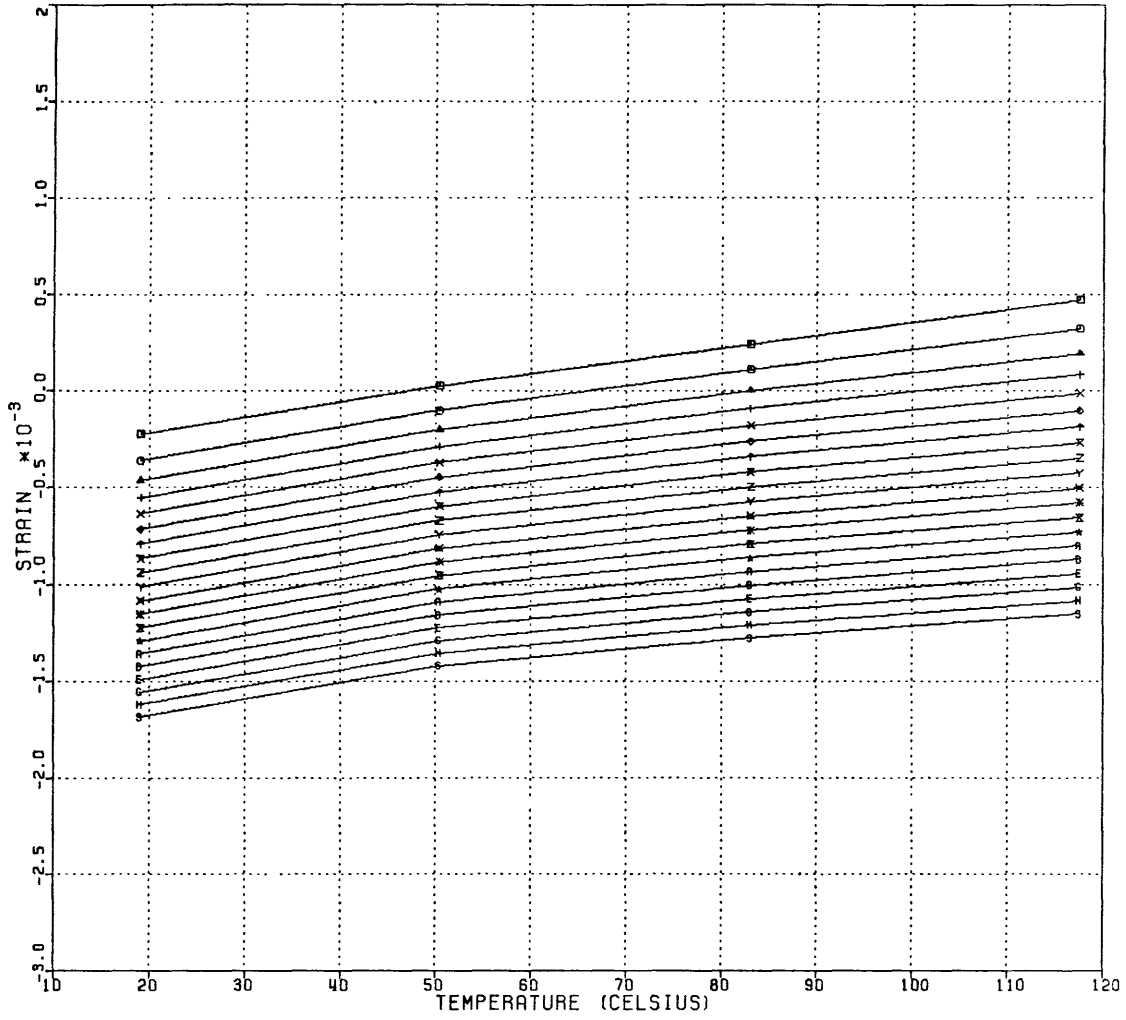
1132 WESTERLY RI GRANITE
GAGE: BA

- | | |
|-------------|-------------|
| □ - 10 MPA | ⌘ - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | ⌘ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ↑ - 70 MPA | E - 170 MPA |
| X - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



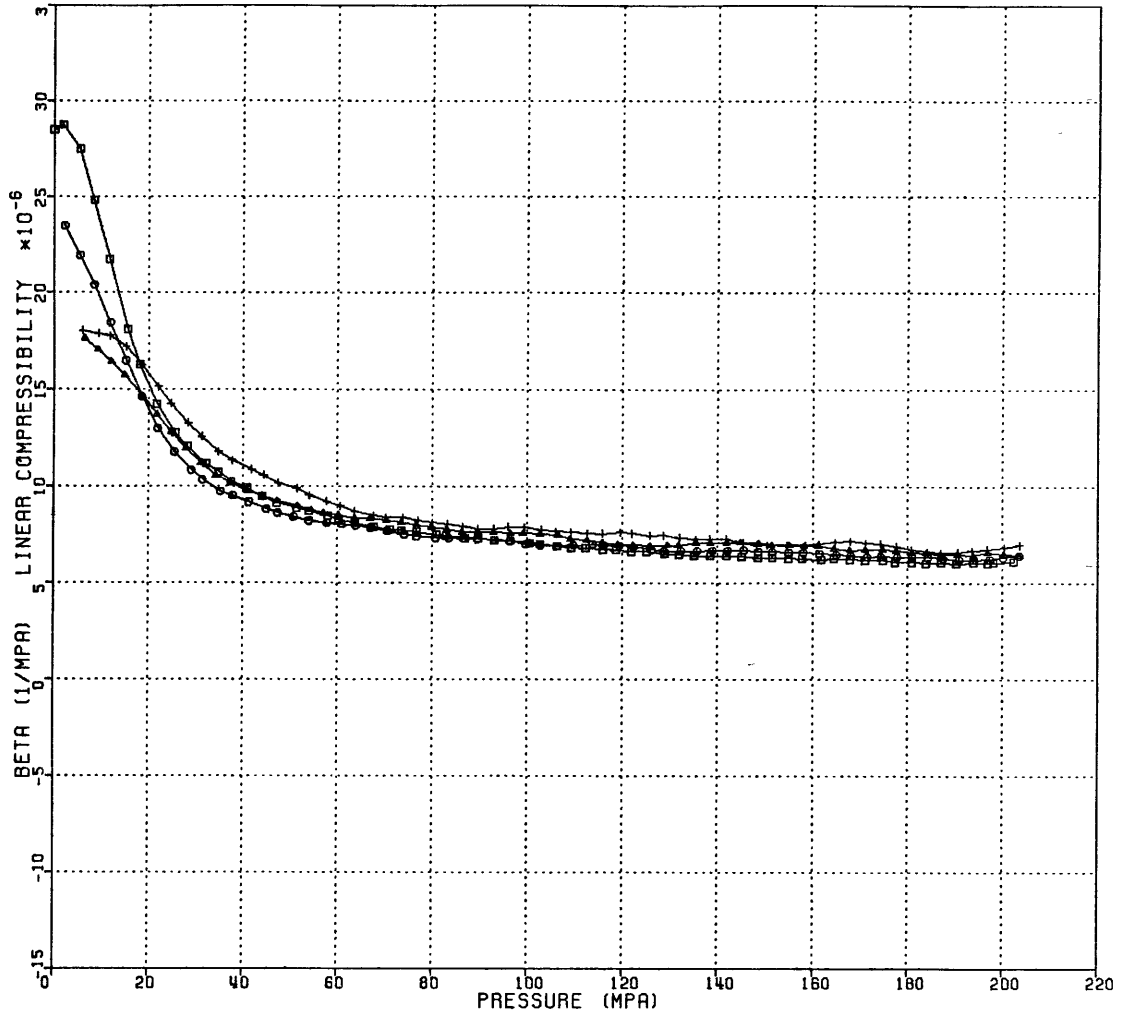
1132 WESTERLY RI GRANITE
GAGE:CA

- | | |
|-------------|-------------|
| □ - 10 MPA | ⌘ - 110 MPA |
| ○ - 20 MPA | ✱ - 120 MPA |
| △ - 30 MPA | ⌘ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ⋈ - 70 MPA | E - 170 MPA |
| ⌘ - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



1132 WESTERLY RI GRANITE
GAGE: 3A

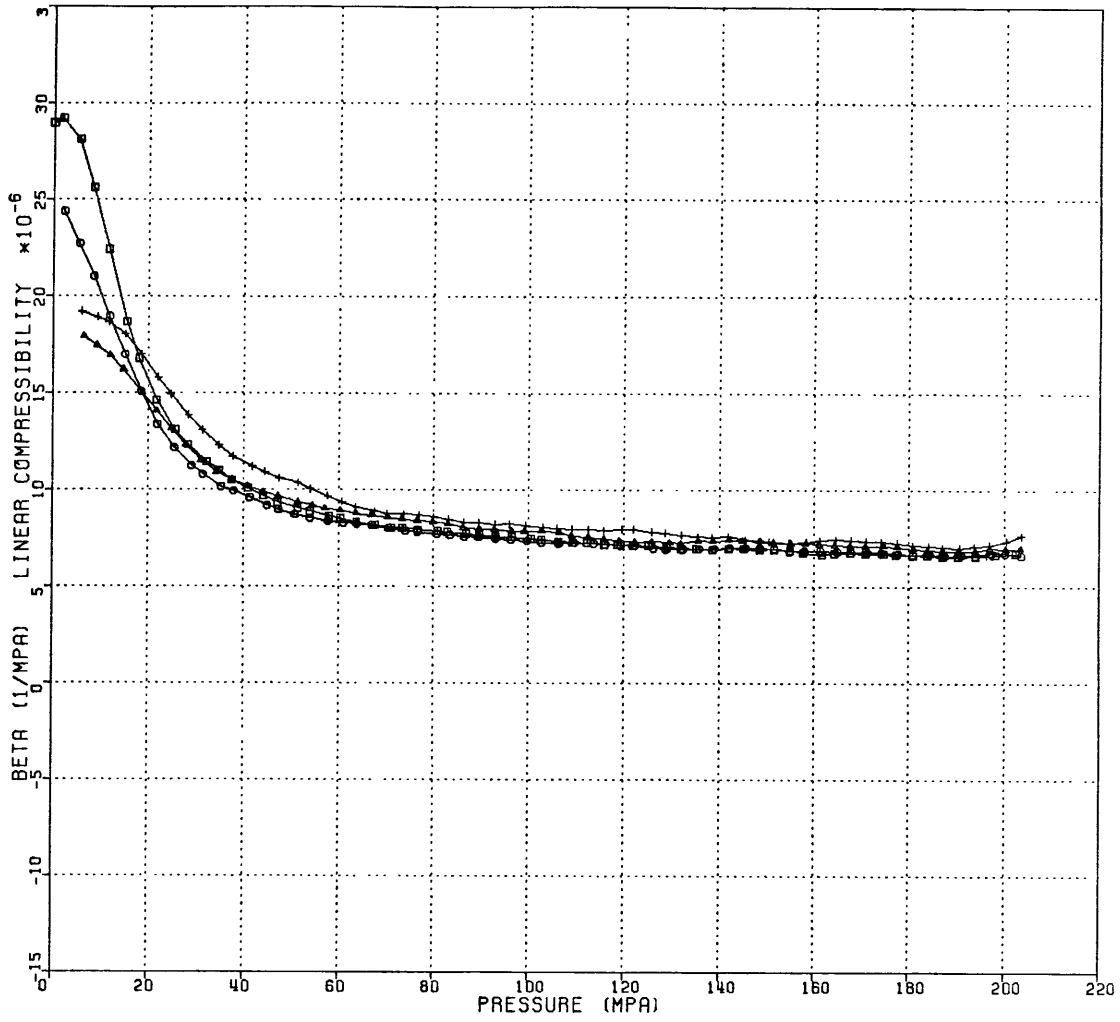
- | | |
|-------------|-------------|
| □ - 10 MPA | ⌘ - 110 MPA |
| ○ - 20 MPA | ✱ - 120 MPA |
| △ - 30 MPA | ⌘ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ⋈ - 70 MPA | E - 170 MPA |
| ⌘ - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



1132 WESTERLY RI GRANITE

GAGE: AC

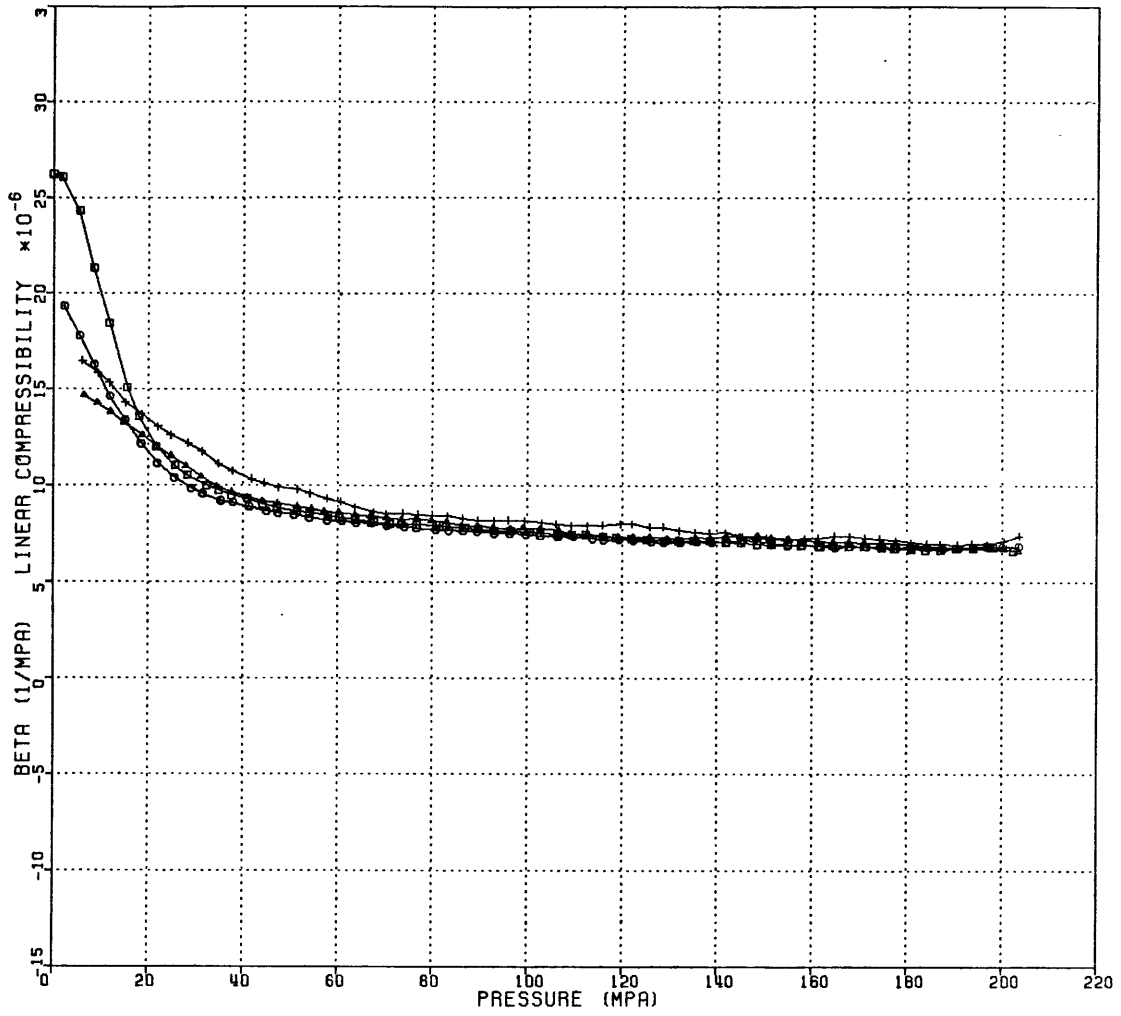
- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



1132 WESTERLY RI GRANITE

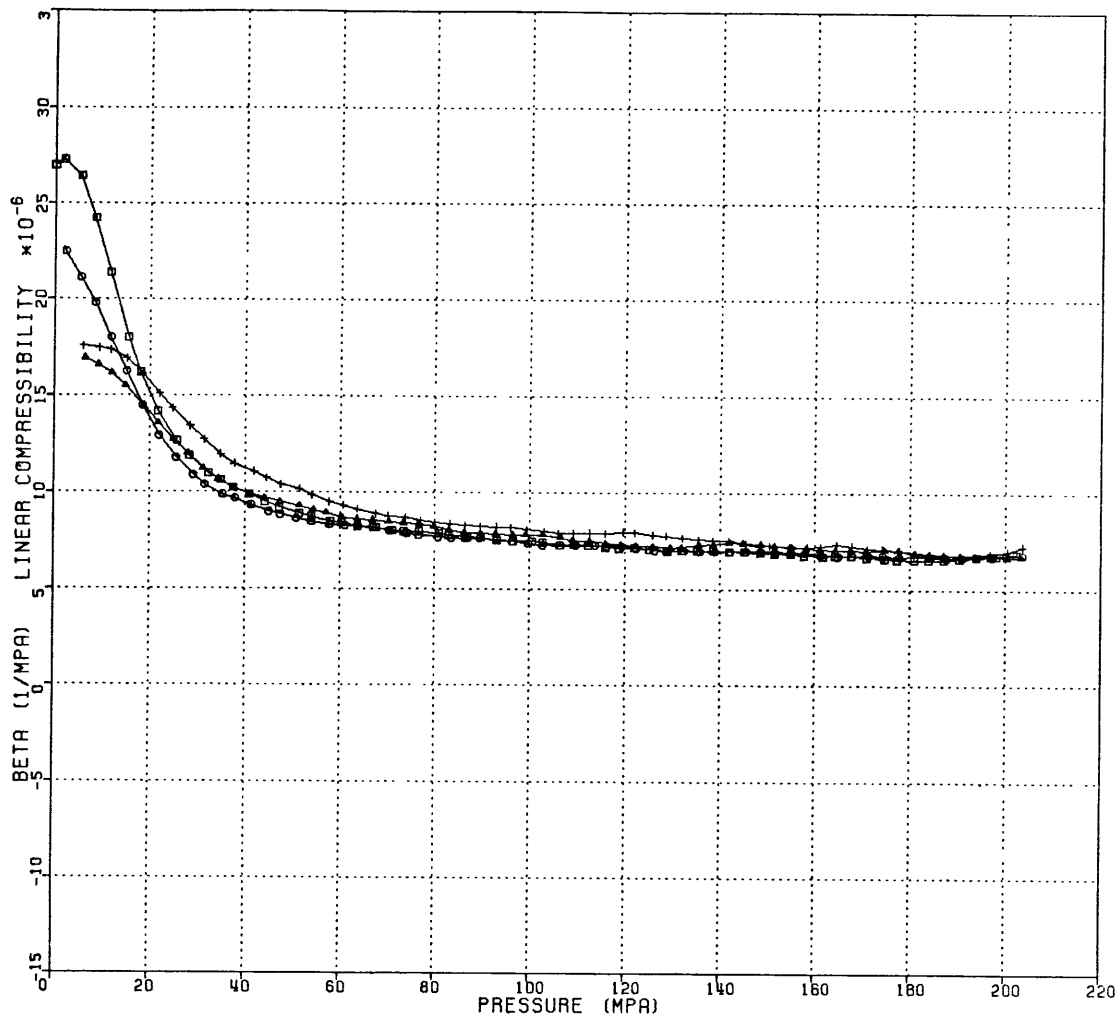
GAGE: 3C

- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



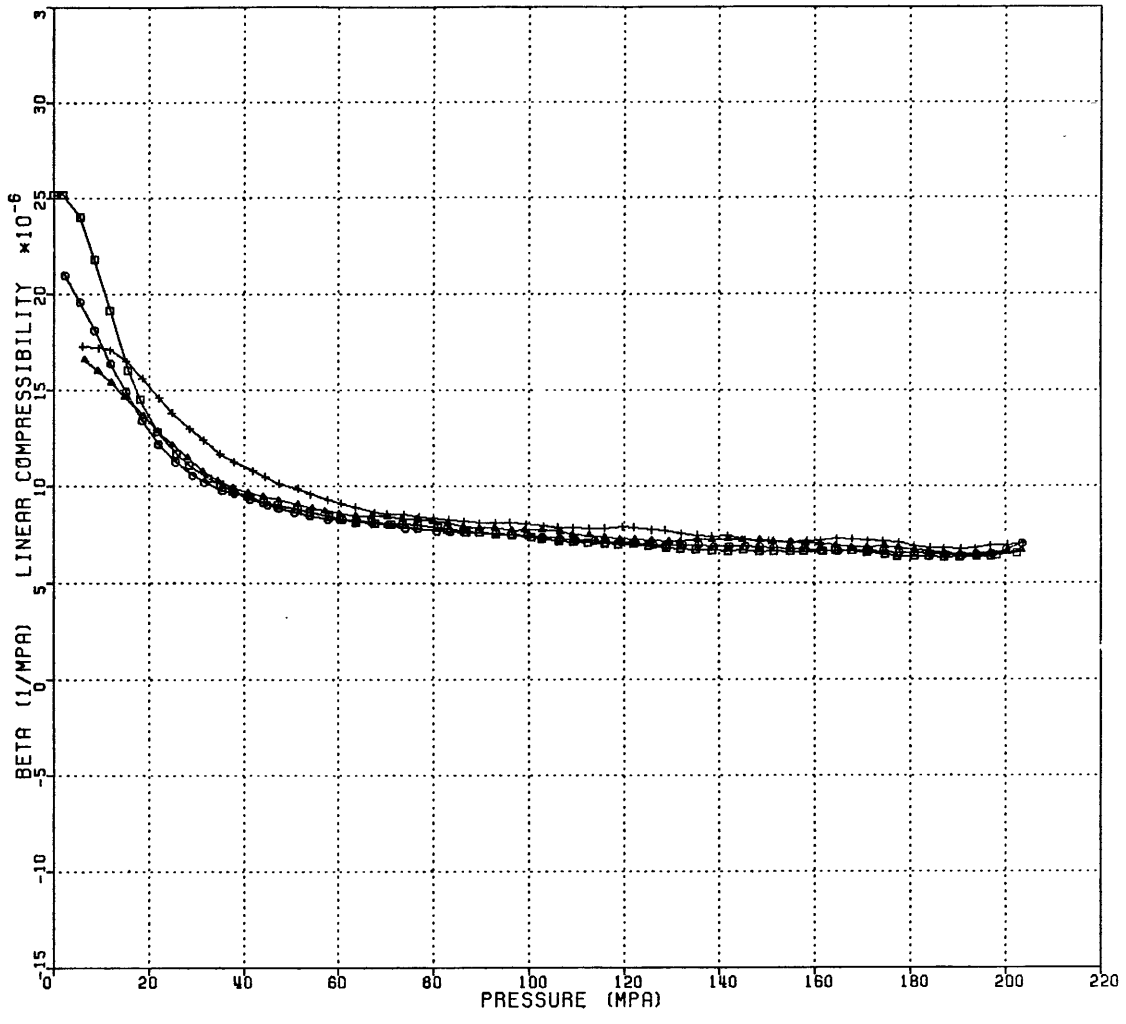
1132 WESTERLY RI GRANITE
GAGE: 4C

- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



1132 WESTERLY RI GRANITE
GAGE: AB

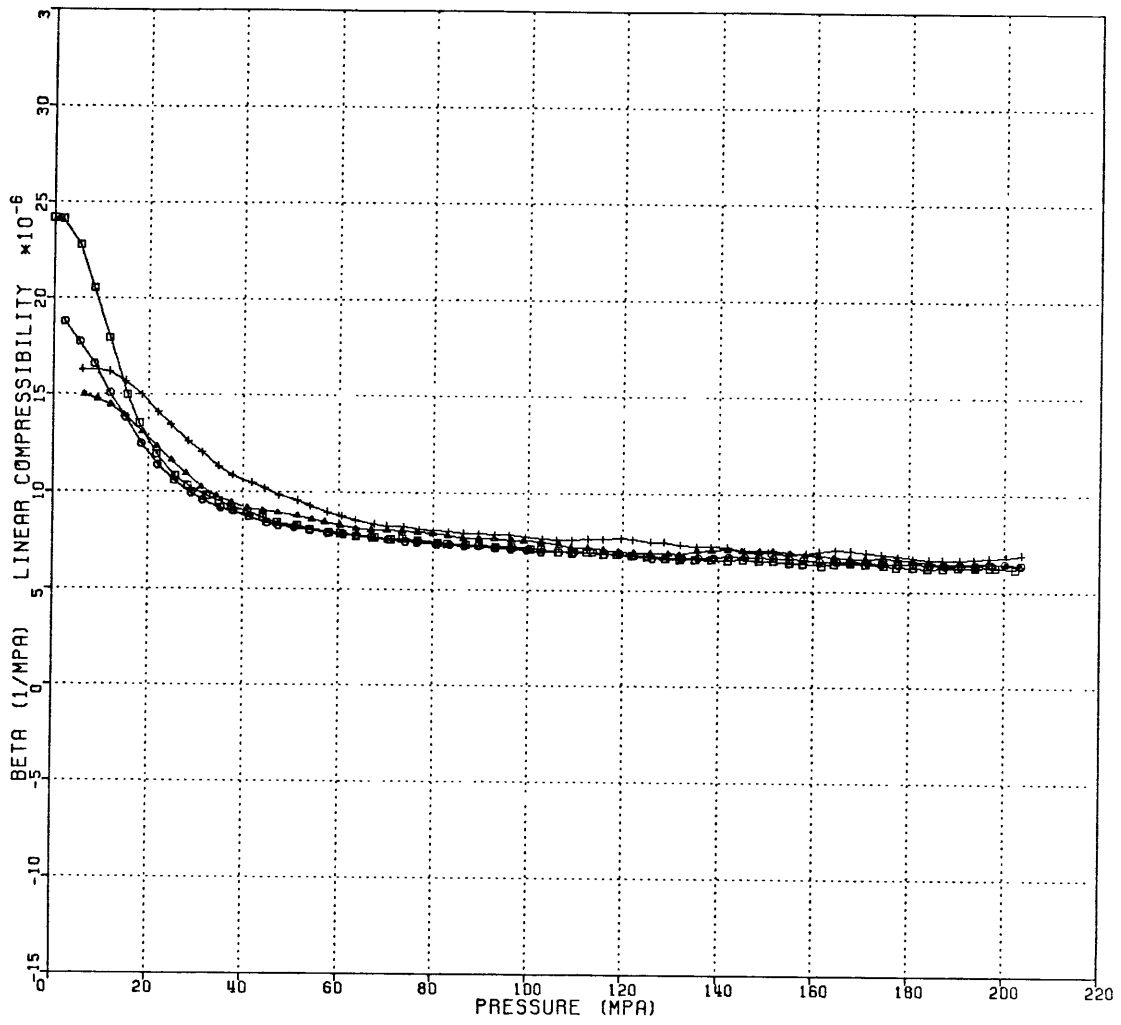
- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



1132 WESTERLY RI GRANITE

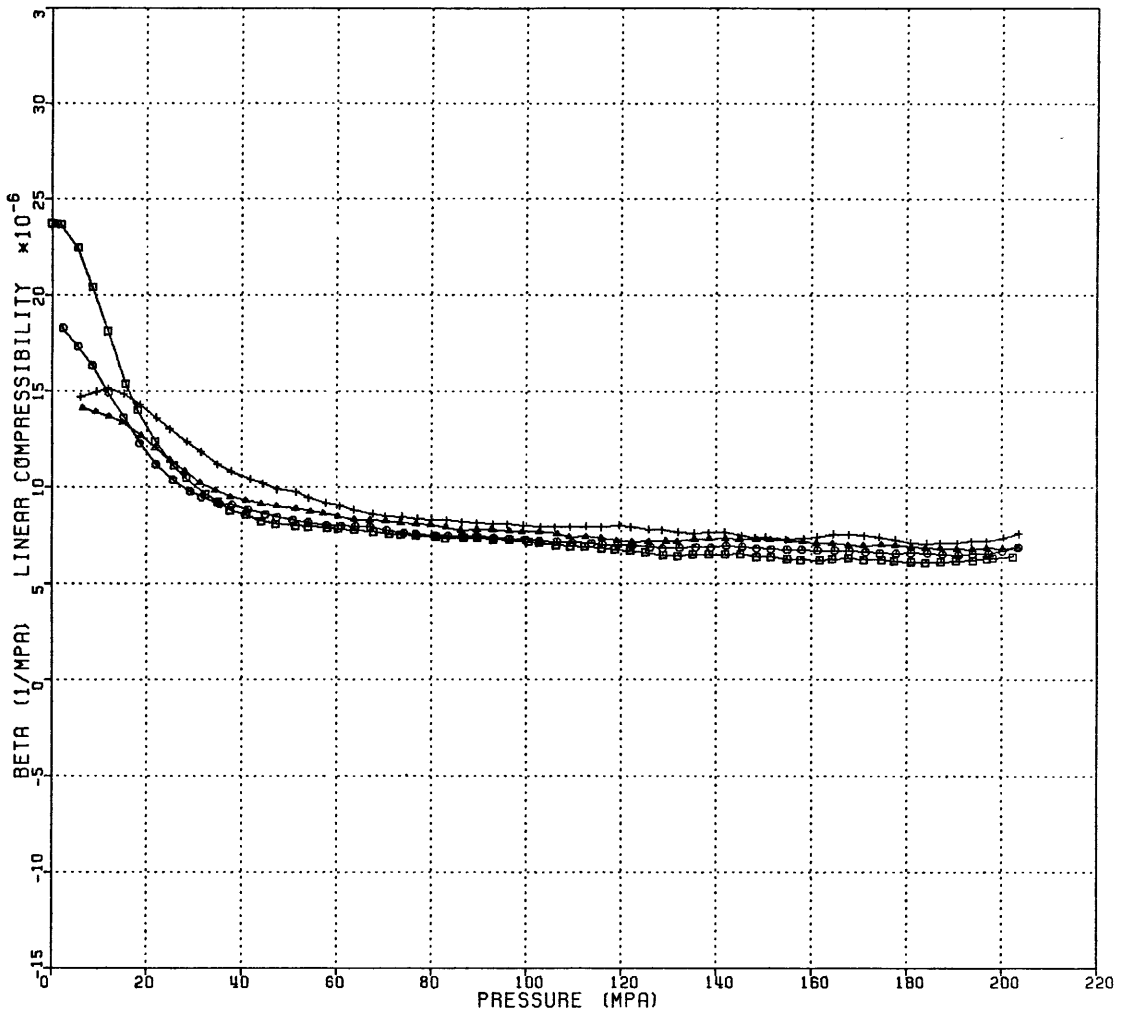
GAGE: CB

- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



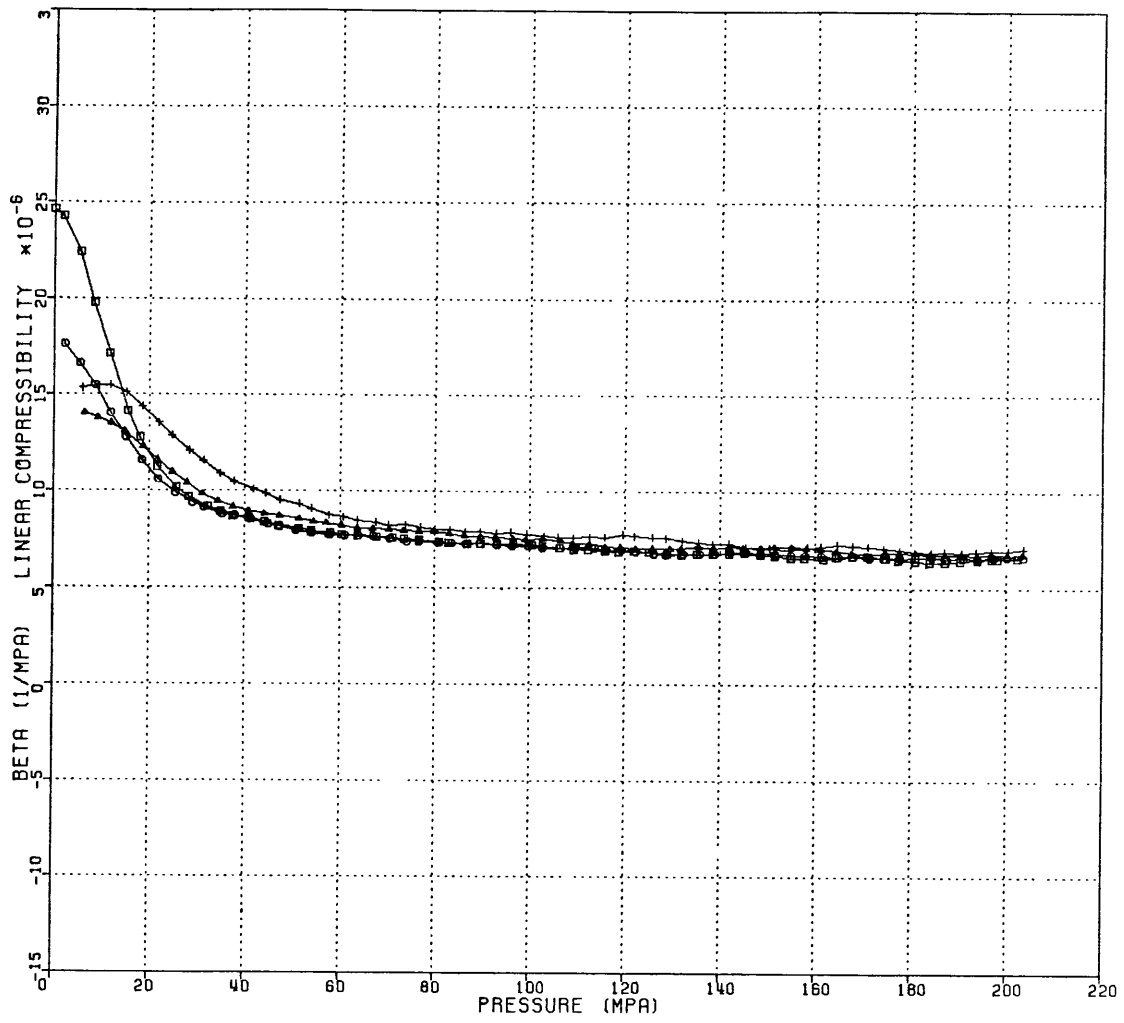
1132 WESTERLY RI GRANITE
GAGE: BA

- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



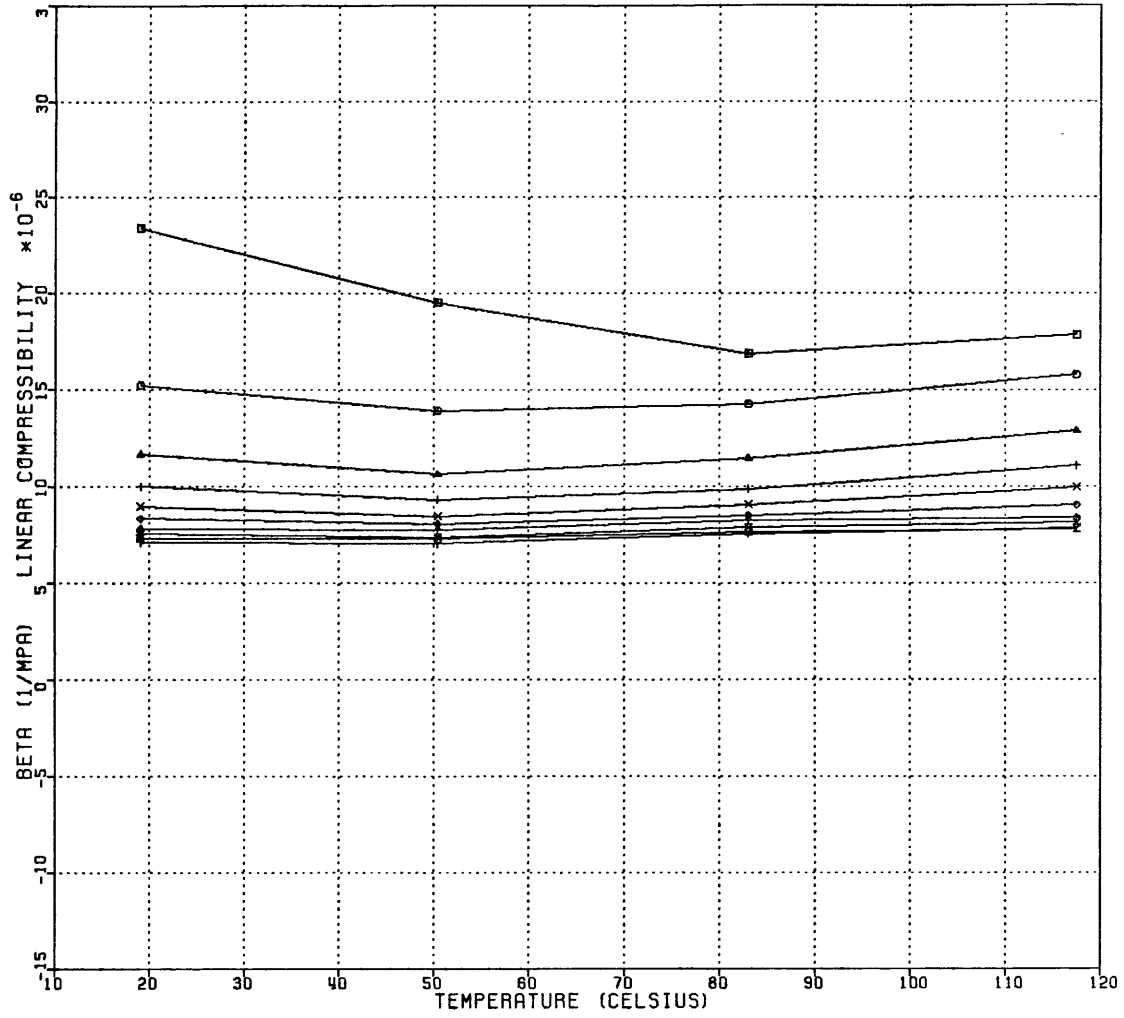
1132 WESTERLY RI GRANITE
GAGE: CA

- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



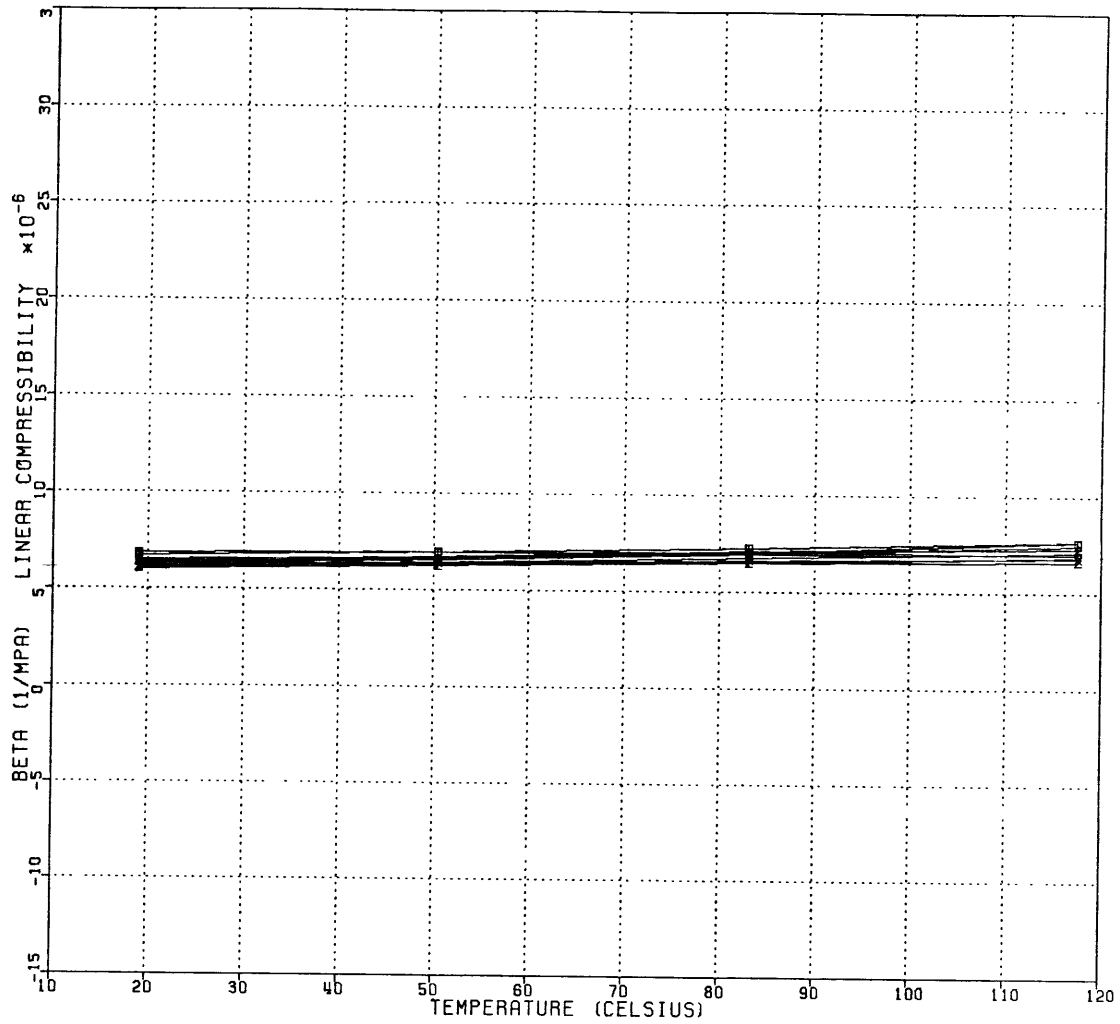
1132 WESTERLY RI GRANITE
GAGE: 3A

- - 19°C
- - 50°C
- △ - 83°C
- + - 118°C



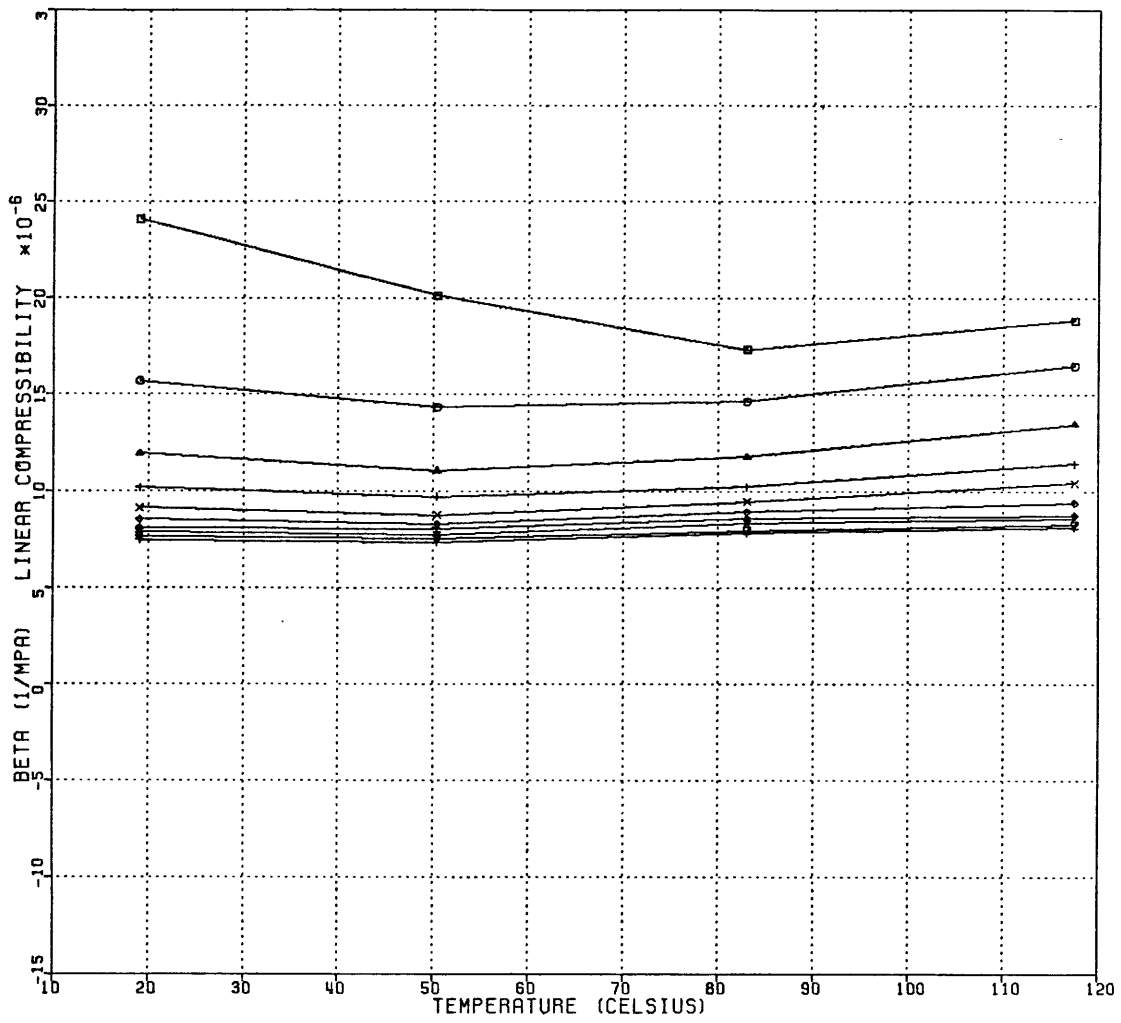
1132 WESTERLY RI GRANITE
GAGE: AC

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ♠ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



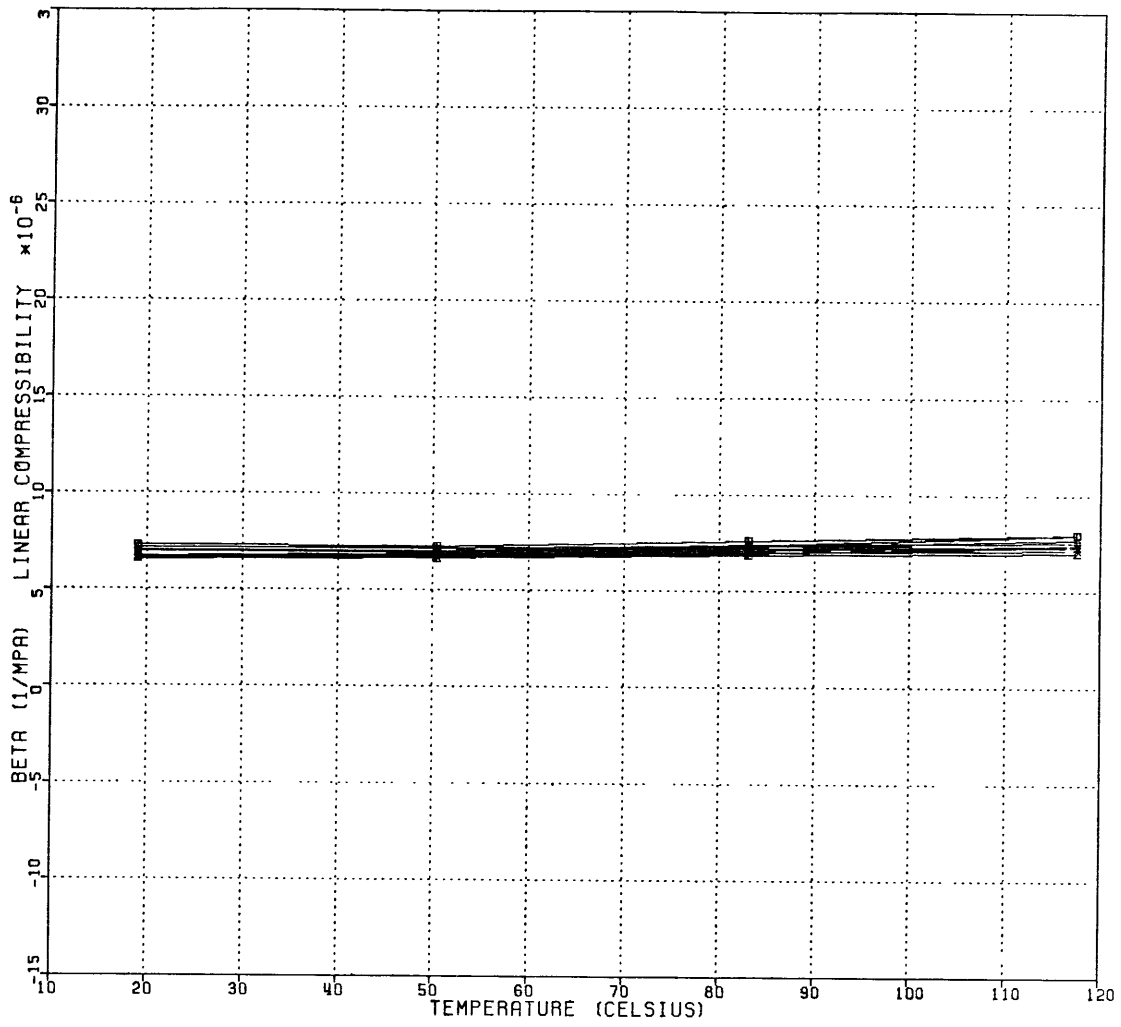
1132 WESTERLY RI GRANITE
GAGE: AC

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



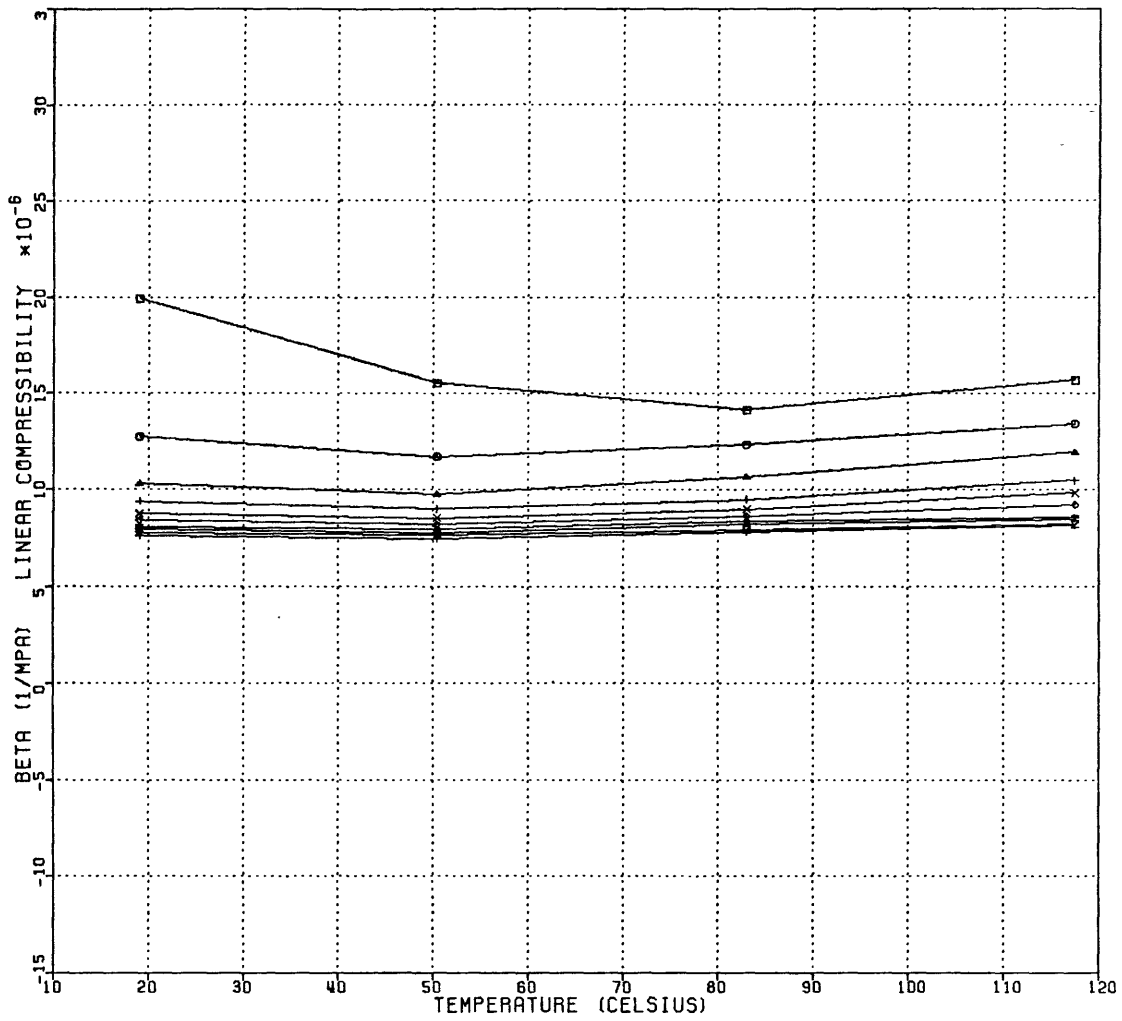
1132 WESTERLY RI GRANITE
GAGE: 3C

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ♣ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



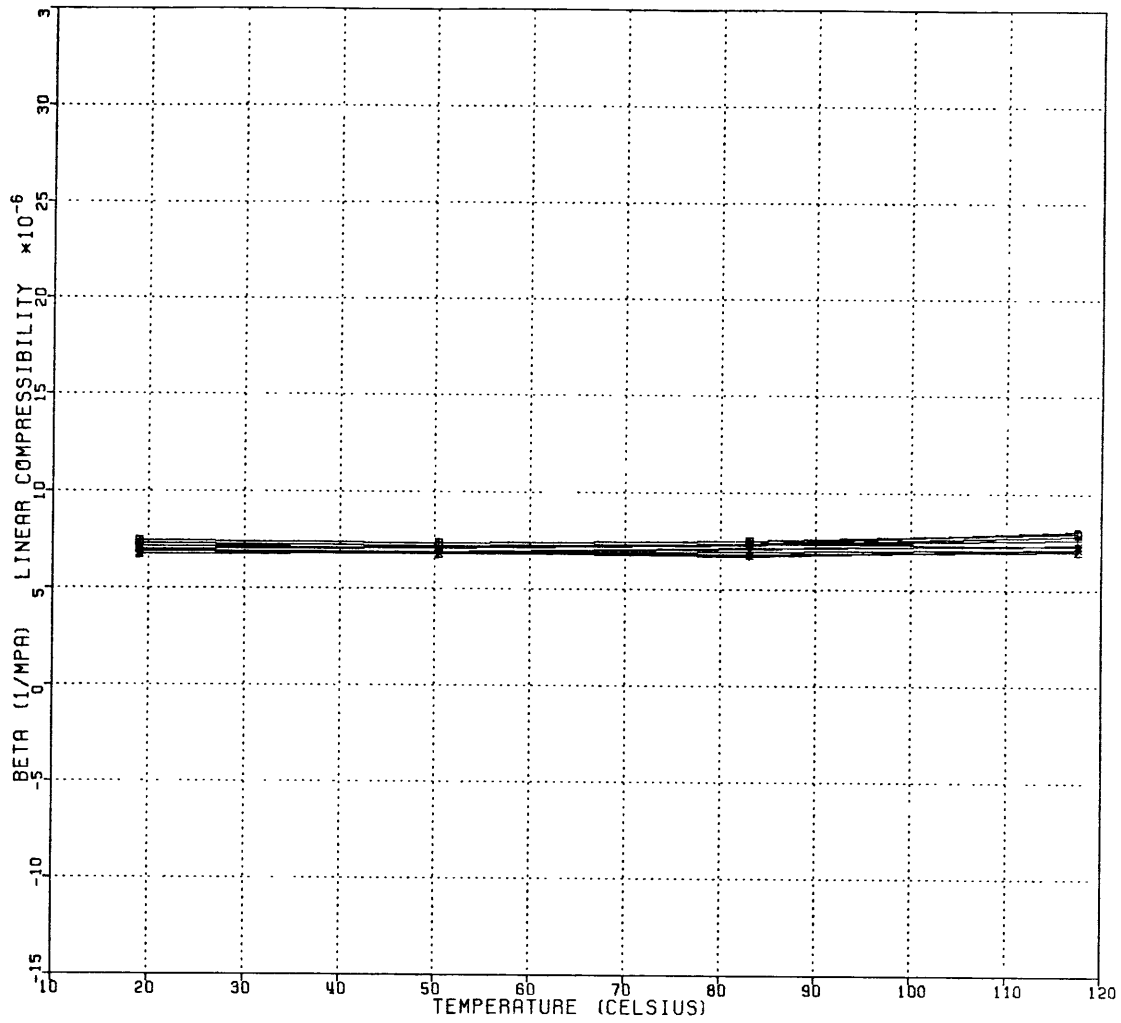
1132 WESTERLY RI GRANITE
GAGE: 3C

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



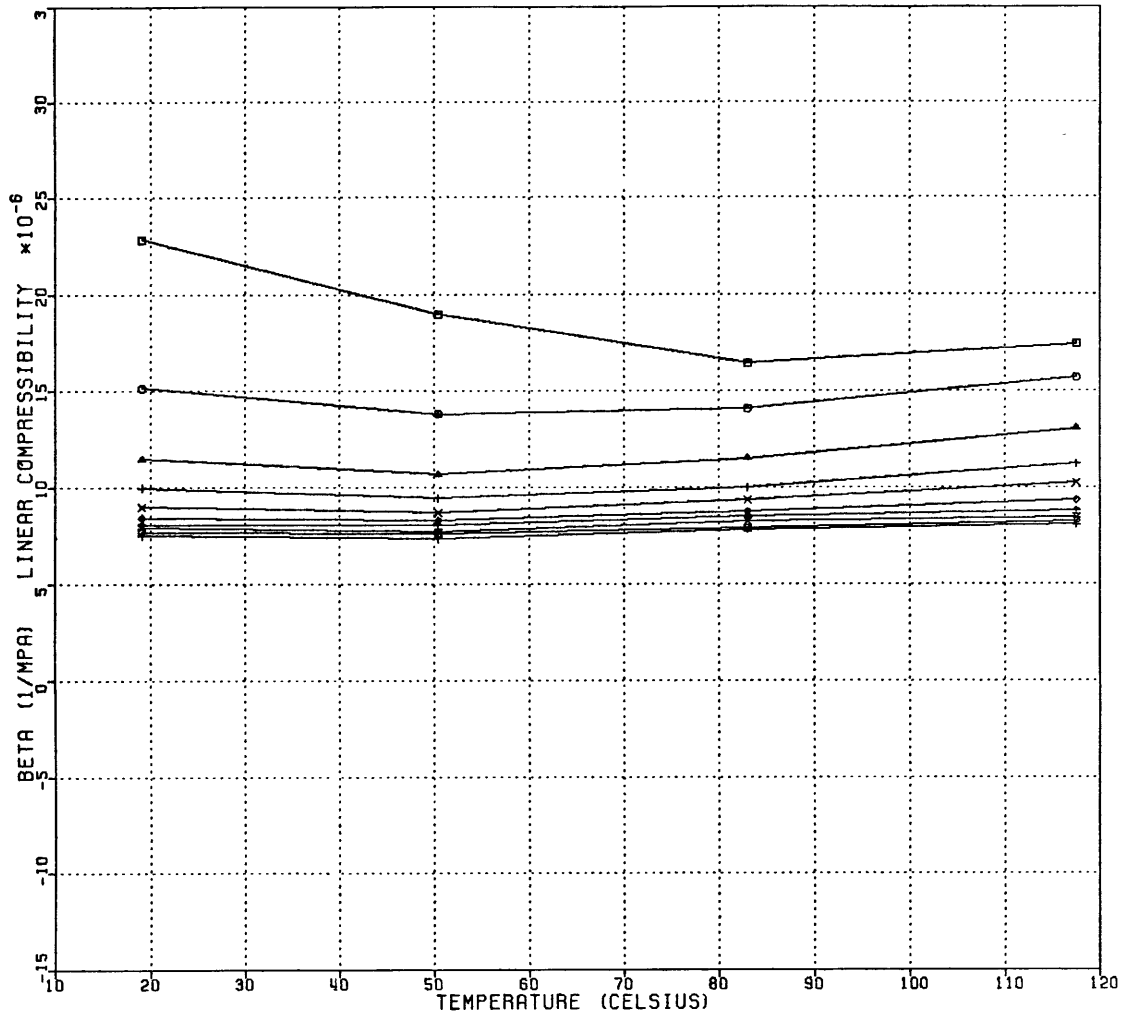
1132 WESTERLY RI GRANITE
GAGE: 4C

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- × - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



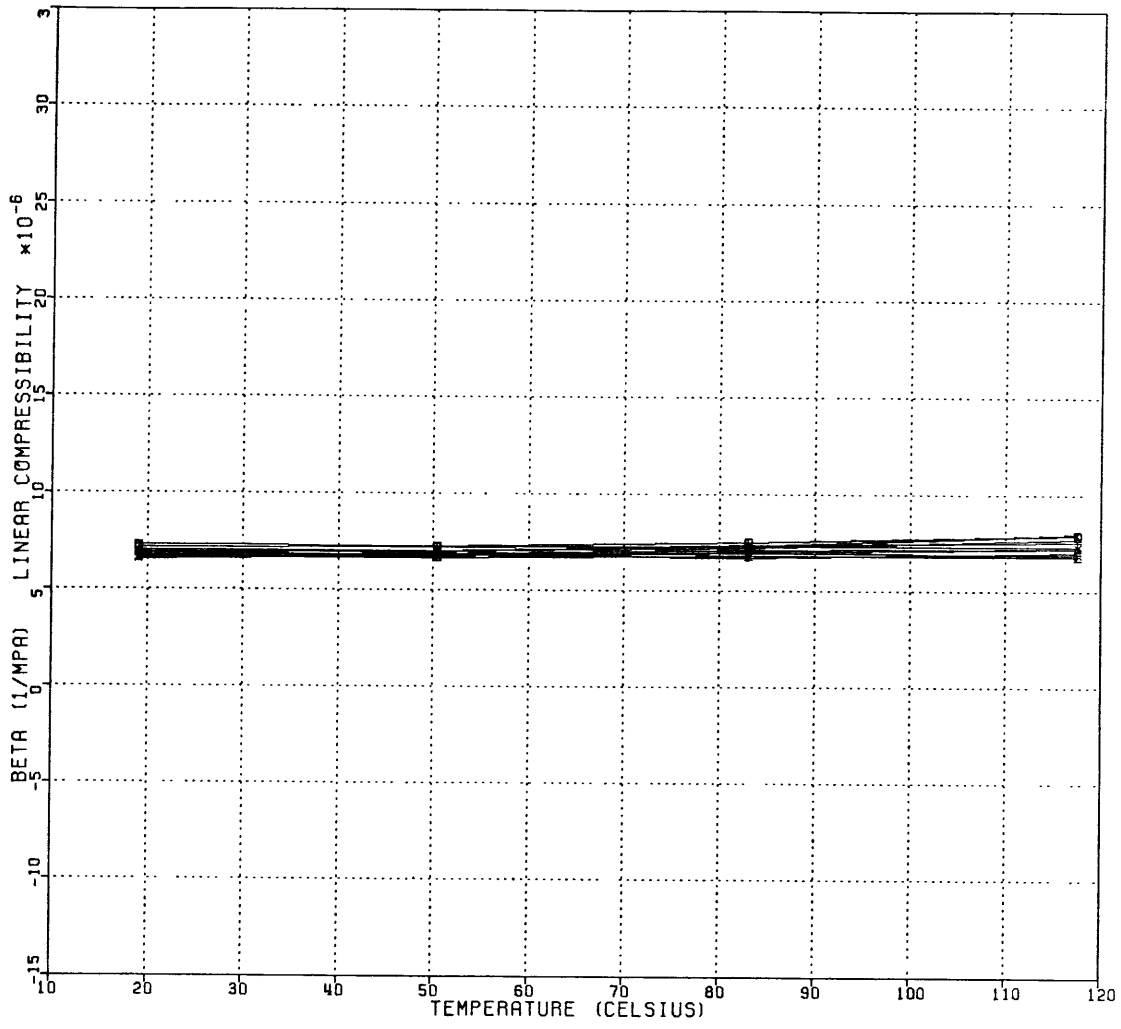
1132 WESTERLY RI GRANITE
GAGE: 4C

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- × - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



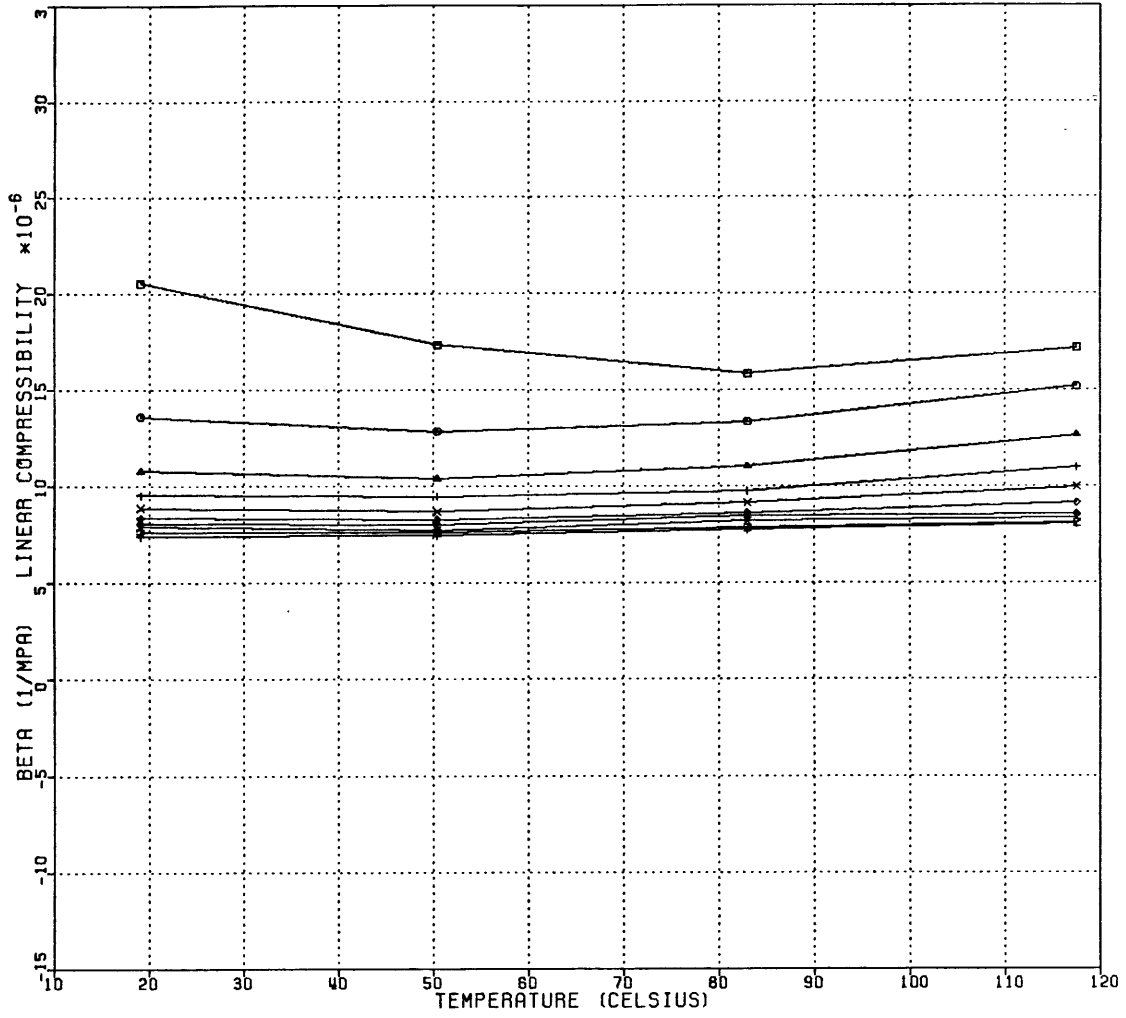
1132 WESTERLY RI GRANITE
GAGE: AB

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ♠ - 70 MPA
- × - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



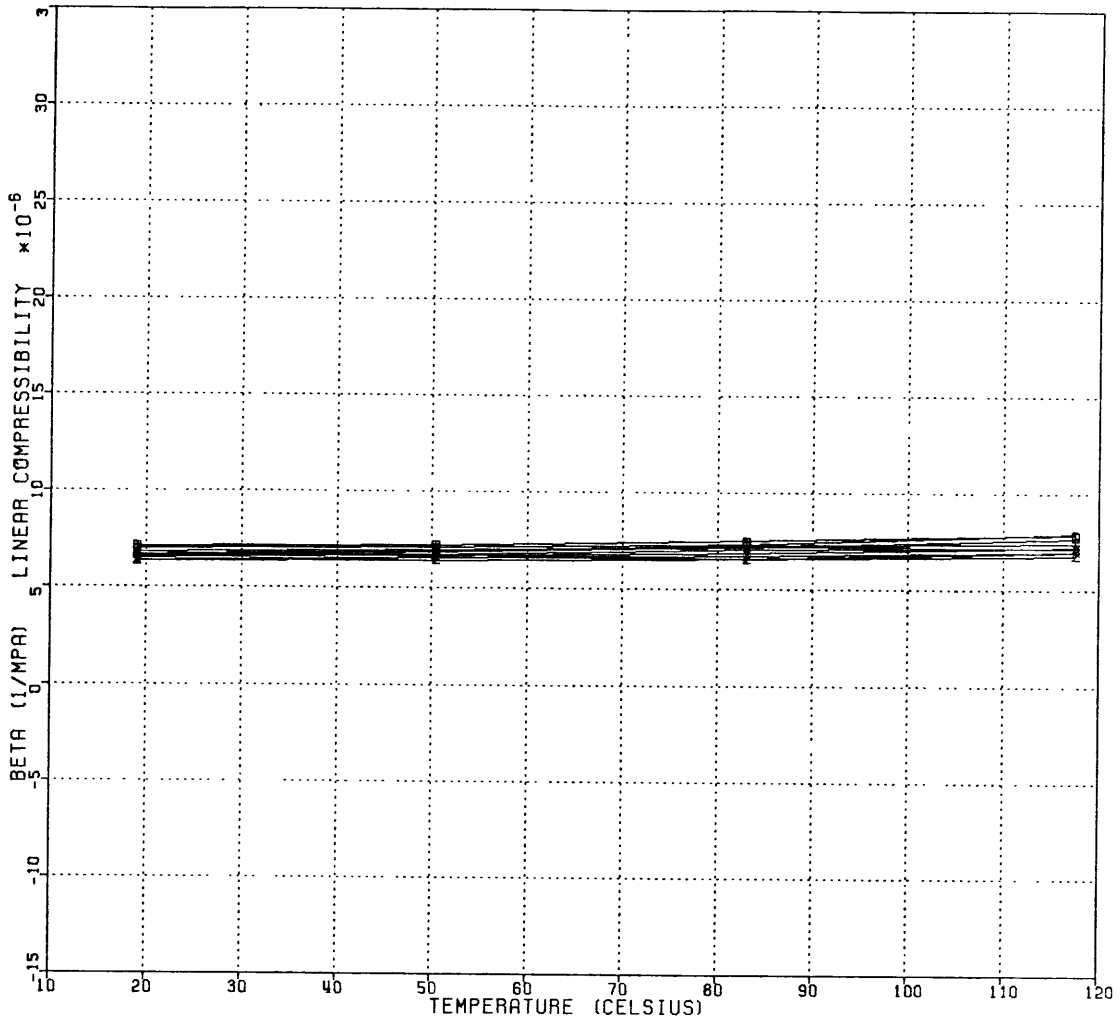
1132 WESTERLY RI GRANITE
GAGE: AB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



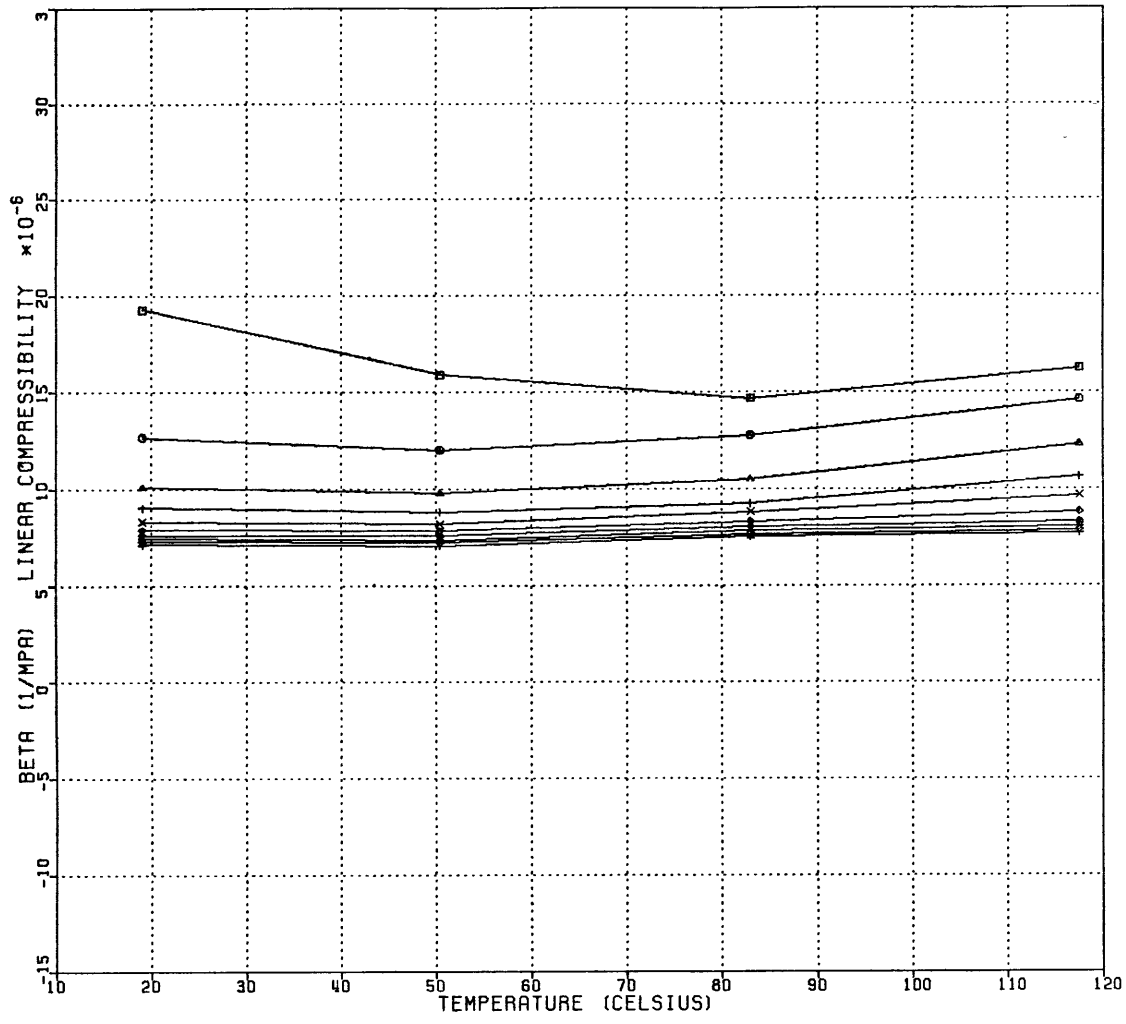
1132 WESTERLY RI GRANITE
GAGE:CB

- - 10 MPa
- - 20 MPa
- △ - 30 MPa
- + - 40 MPa
- × - 50 MPa
- ◇ - 60 MPa
- ↑ - 70 MPa
- × - 80 MPa
- Z - 90 MPa
- Y - 100 MPa



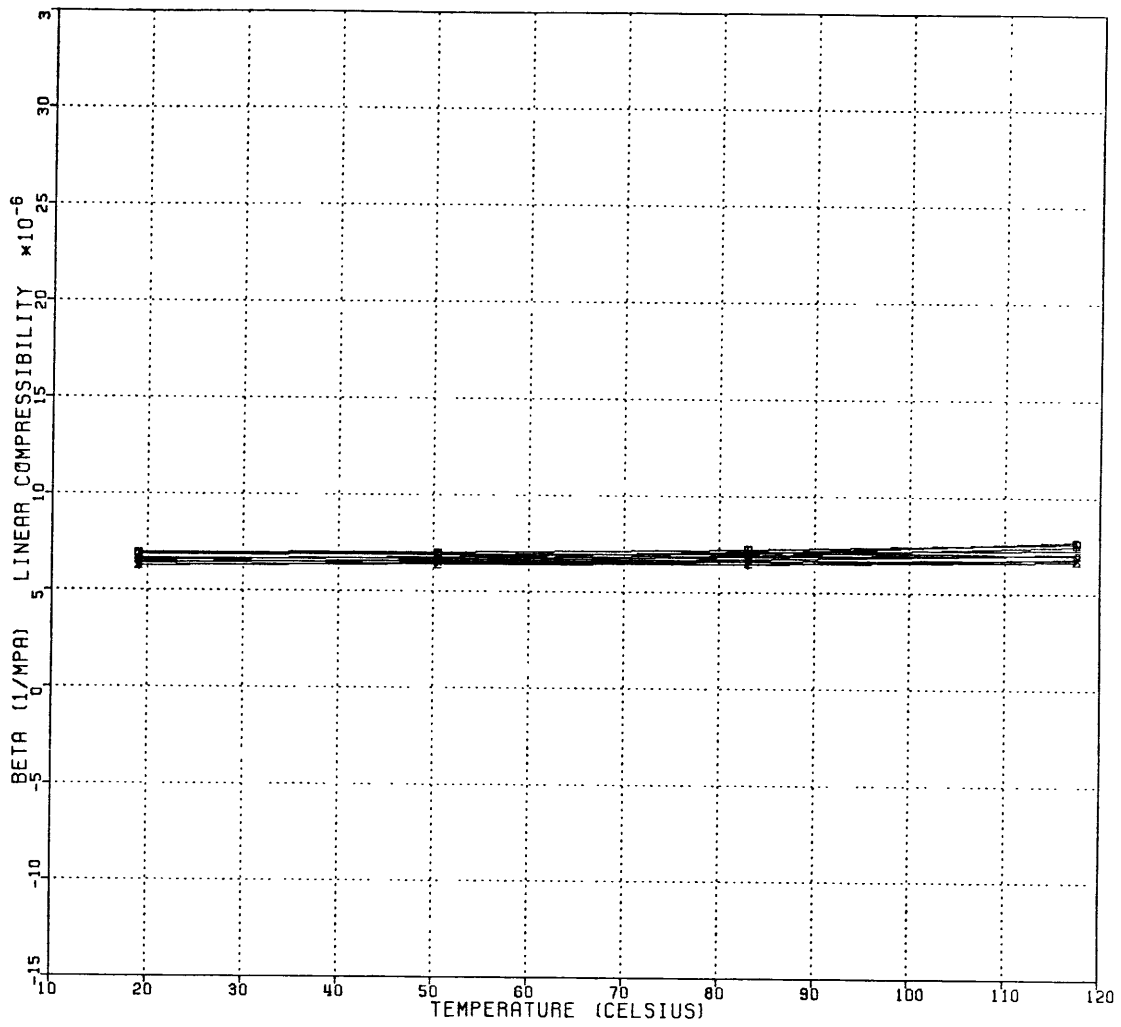
1132 WESTERLY RI GRANITE
GAGE:CB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



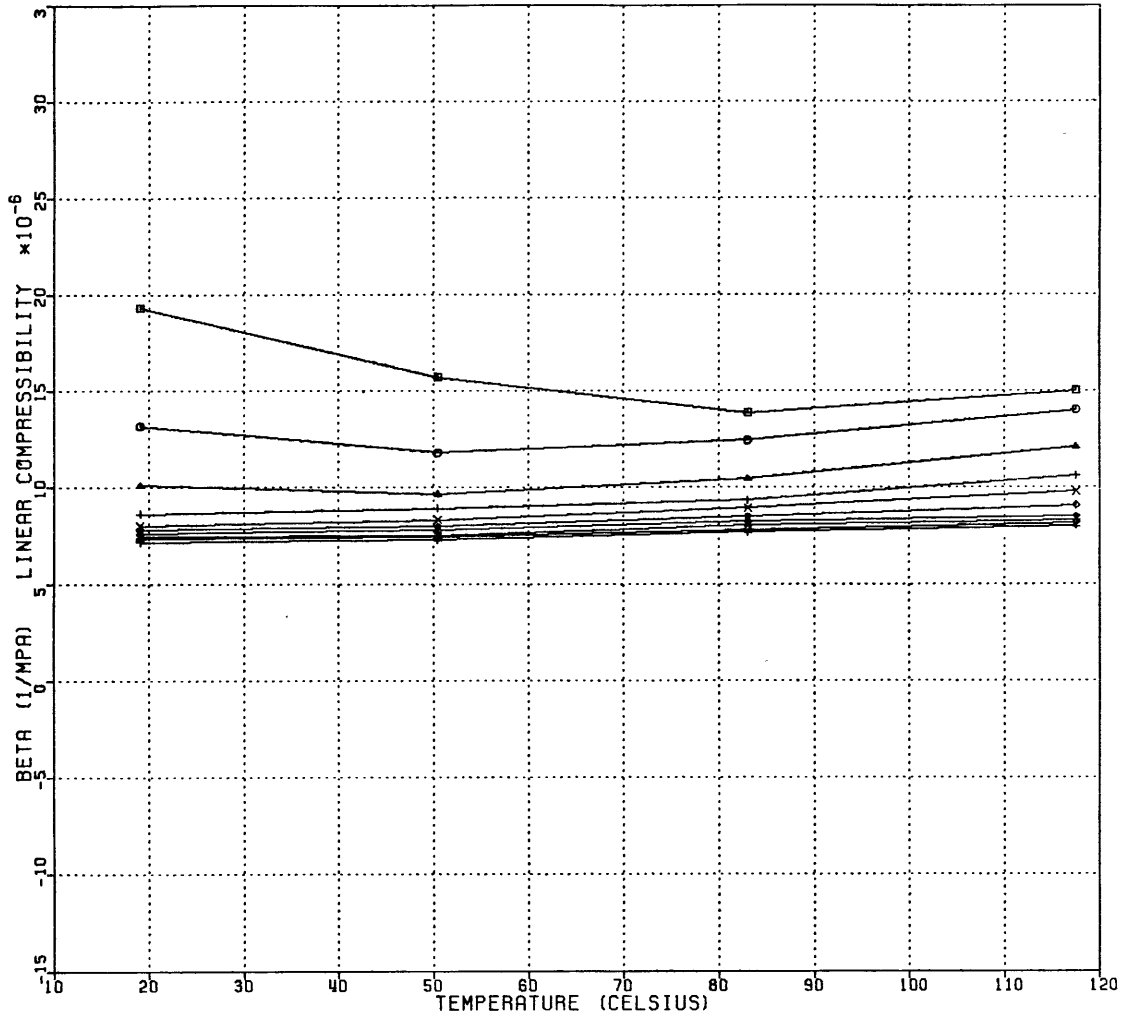
1132 WESTERLY RI GRANITE
GAGE: BA

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ♠ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



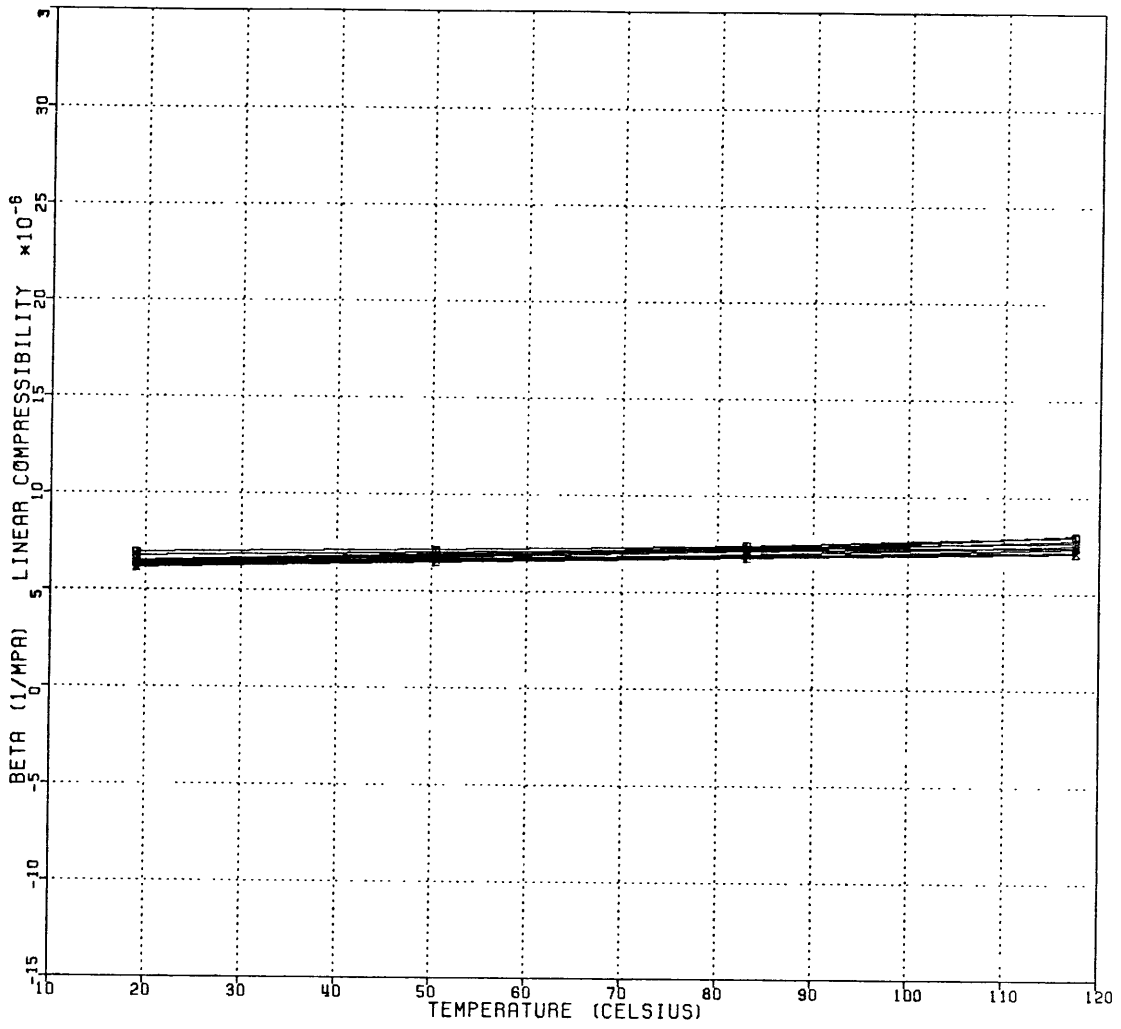
1132 WESTERLY RI GRANITE
GAGE:BA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



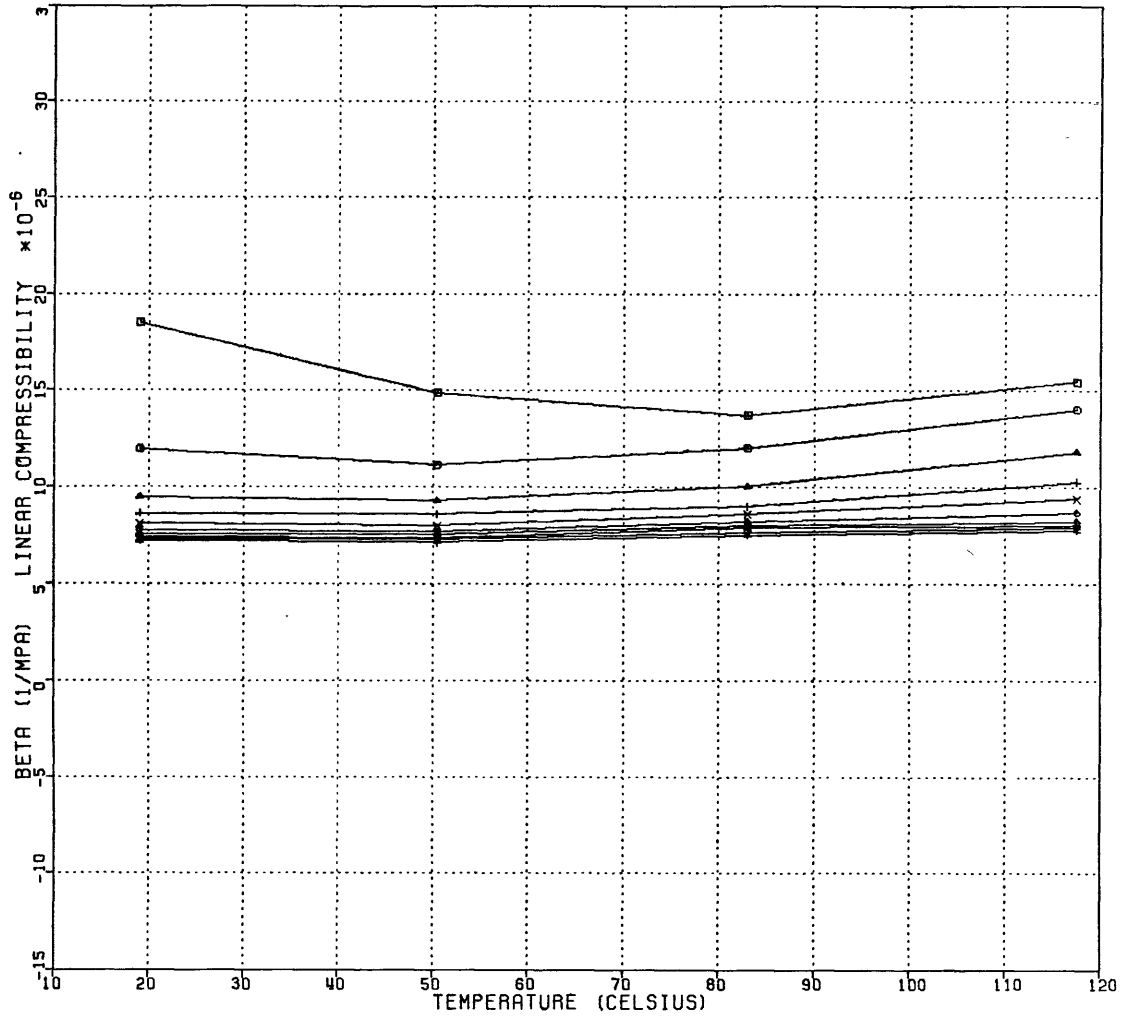
1132 WESTERLY RI GRANITE
GAGE:CA

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- * - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



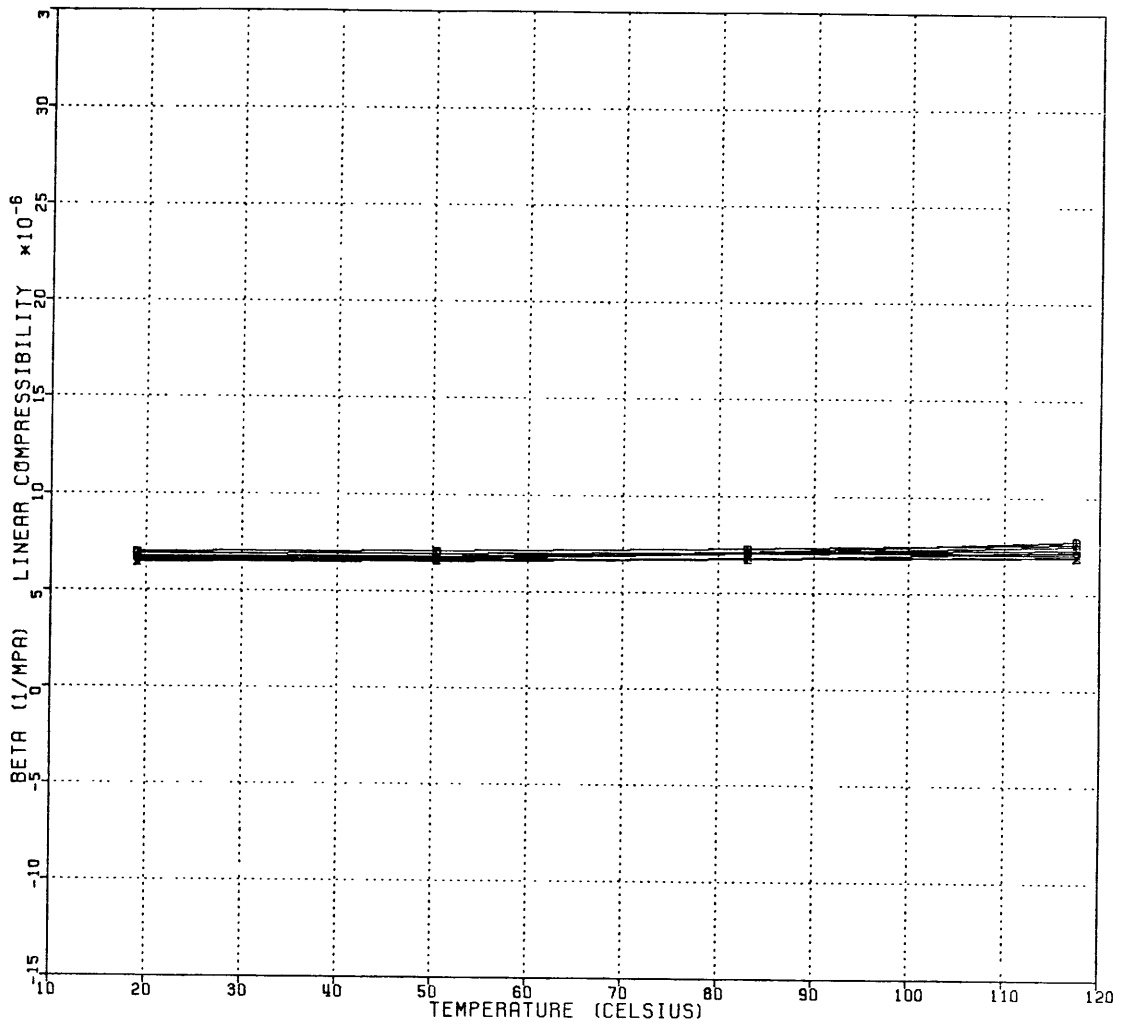
1132 WESTERLY RI GRANITE
GAGE:CA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



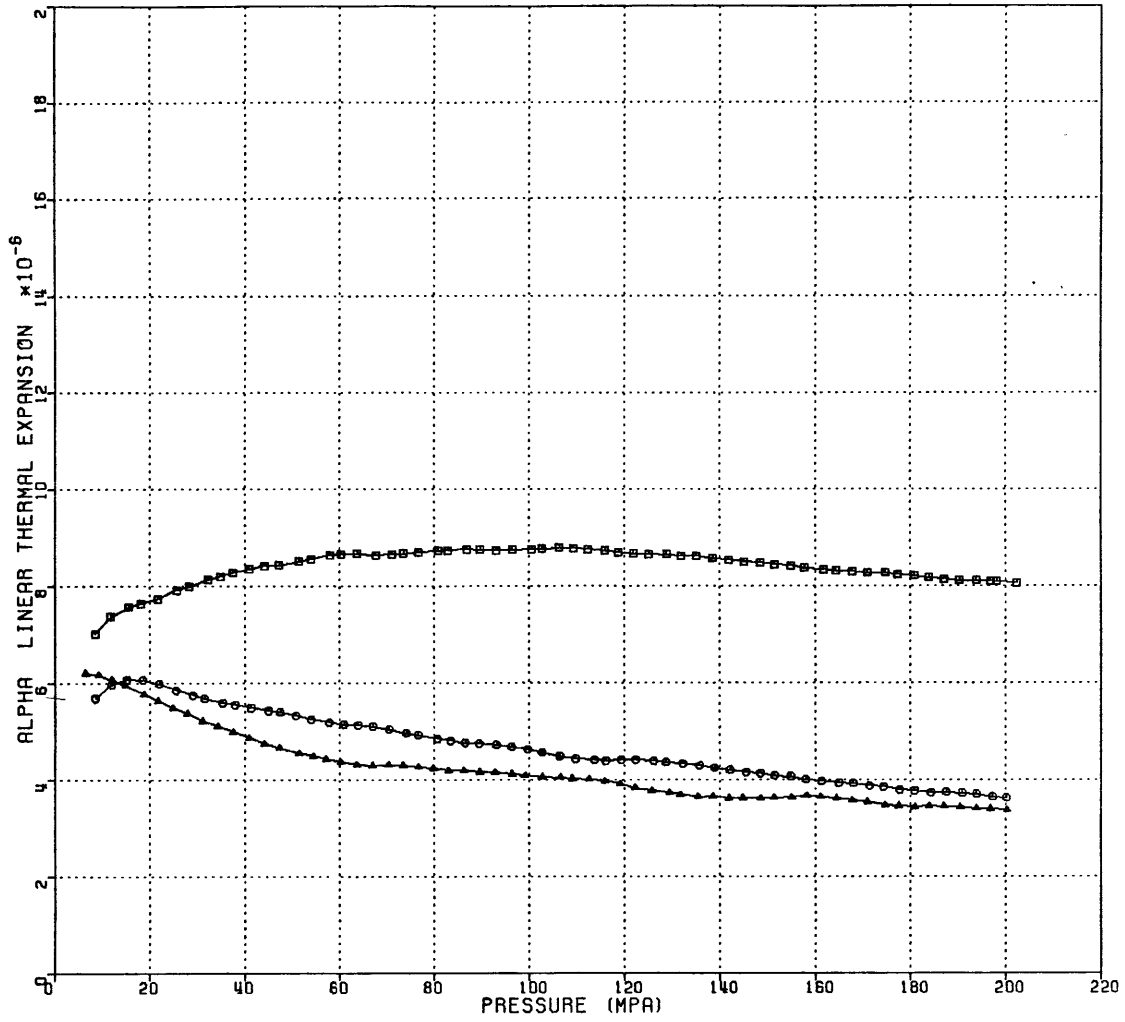
1132 WESTERLY RI GRANITE
GAGE: 3A

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



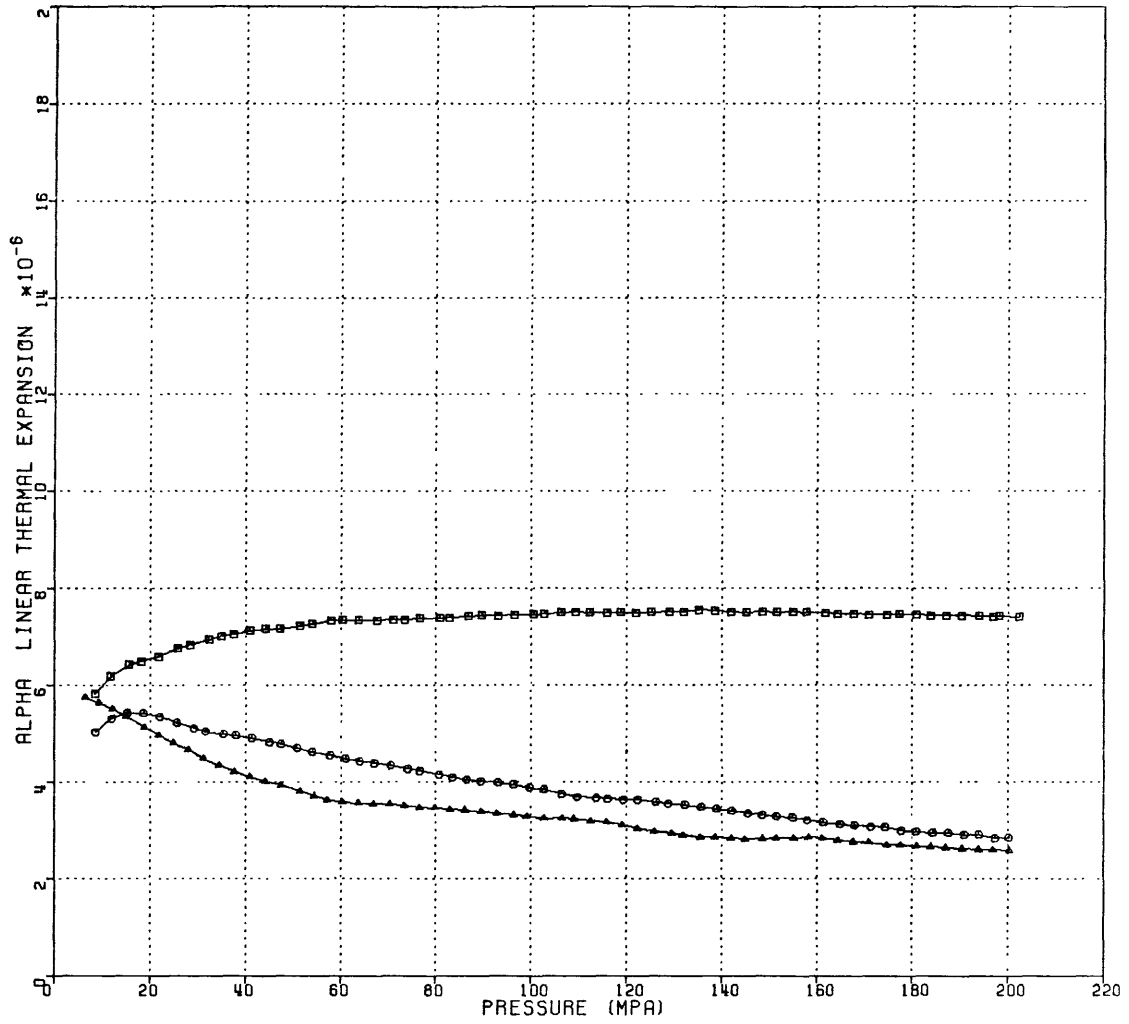
1132 WESTERLY RI GRANITE
GAGE: 3A

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⋈ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



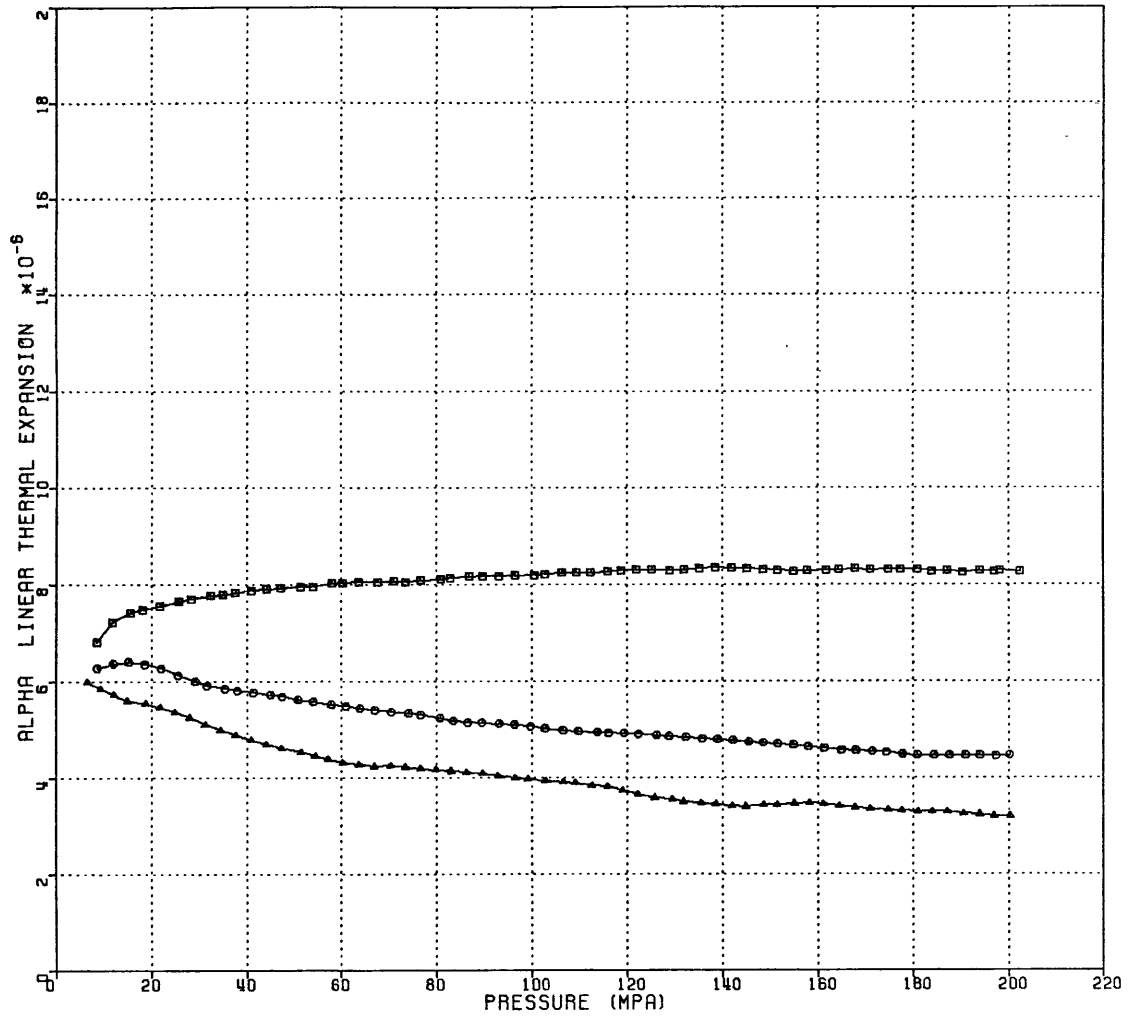
1132 WESTERLY RI GRANITE
GAGE: AC

- - 19°C-50°C
- - 50°C-83°C
- ▲ - 83°C-118°C



1132 WESTERLY RI GRANITE
GAGE:3C

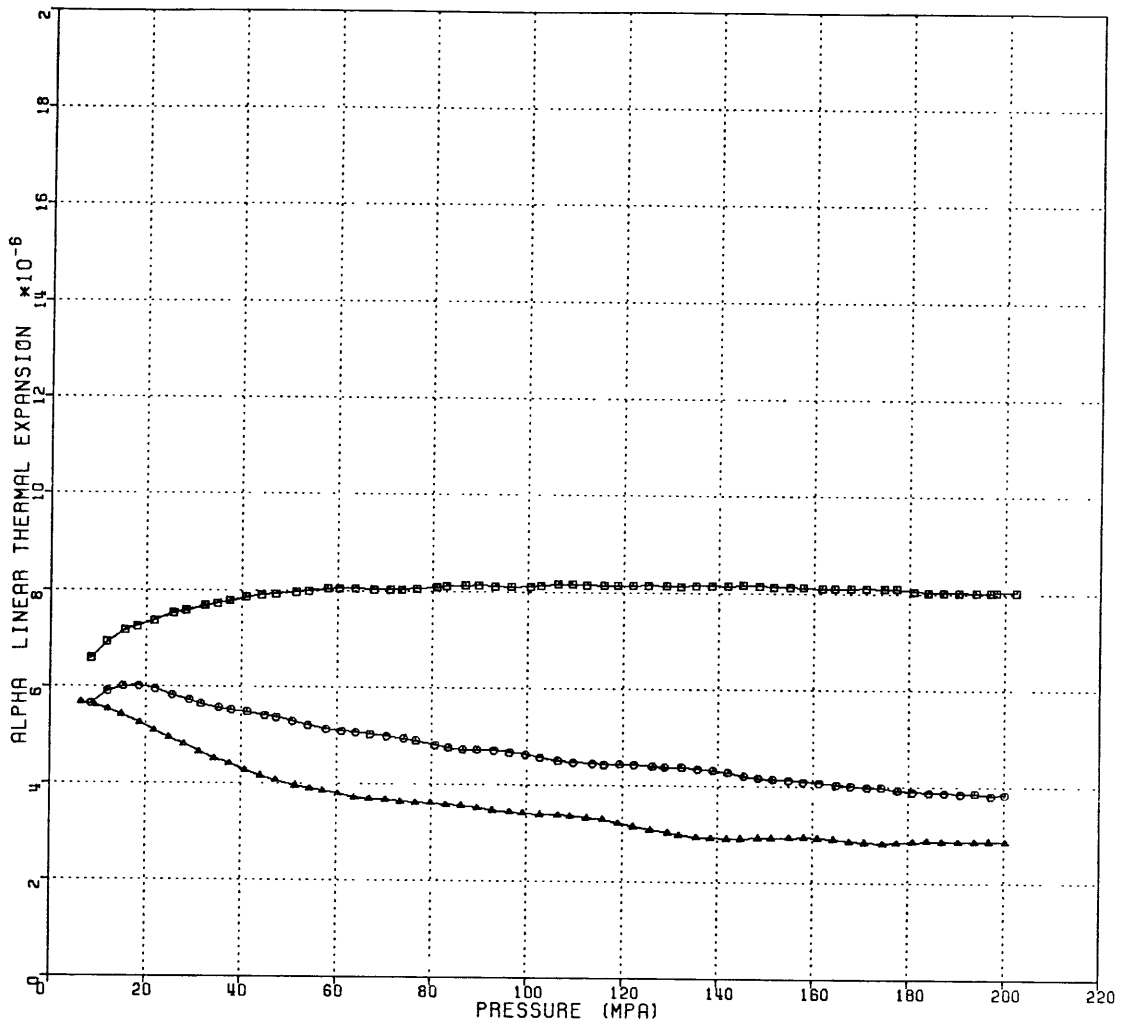
- - 19°C - 50°C
- - 50°C - 83°C
- △ - 83°C - 118°C



1132 WESTERLY RI GRANITE

GAGE: 4C

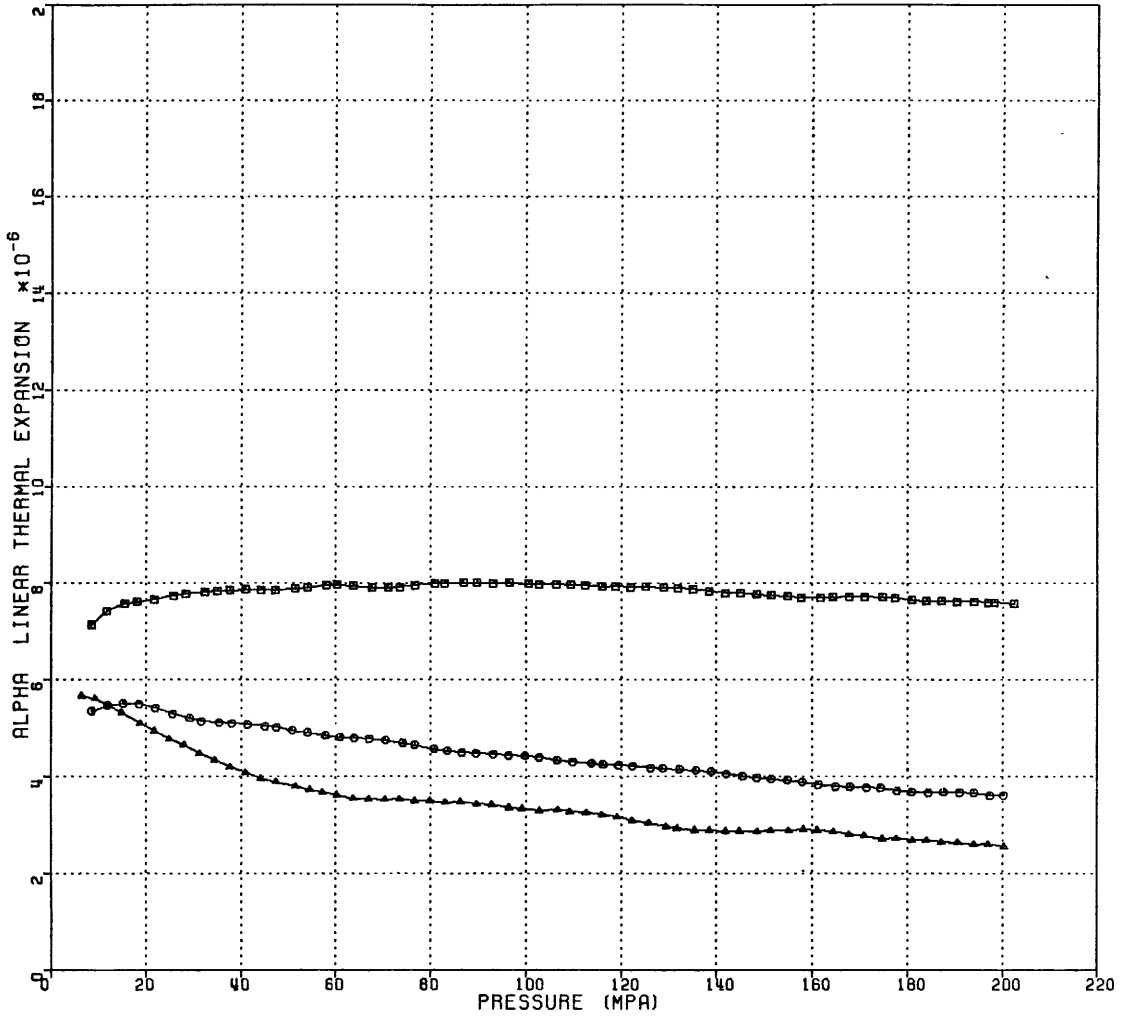
- - 19°C-50°C
- - 50°C-83°C
- △ - 83°C-118°C



1132 WESTERLY RI GRANITE

GAGE: AB

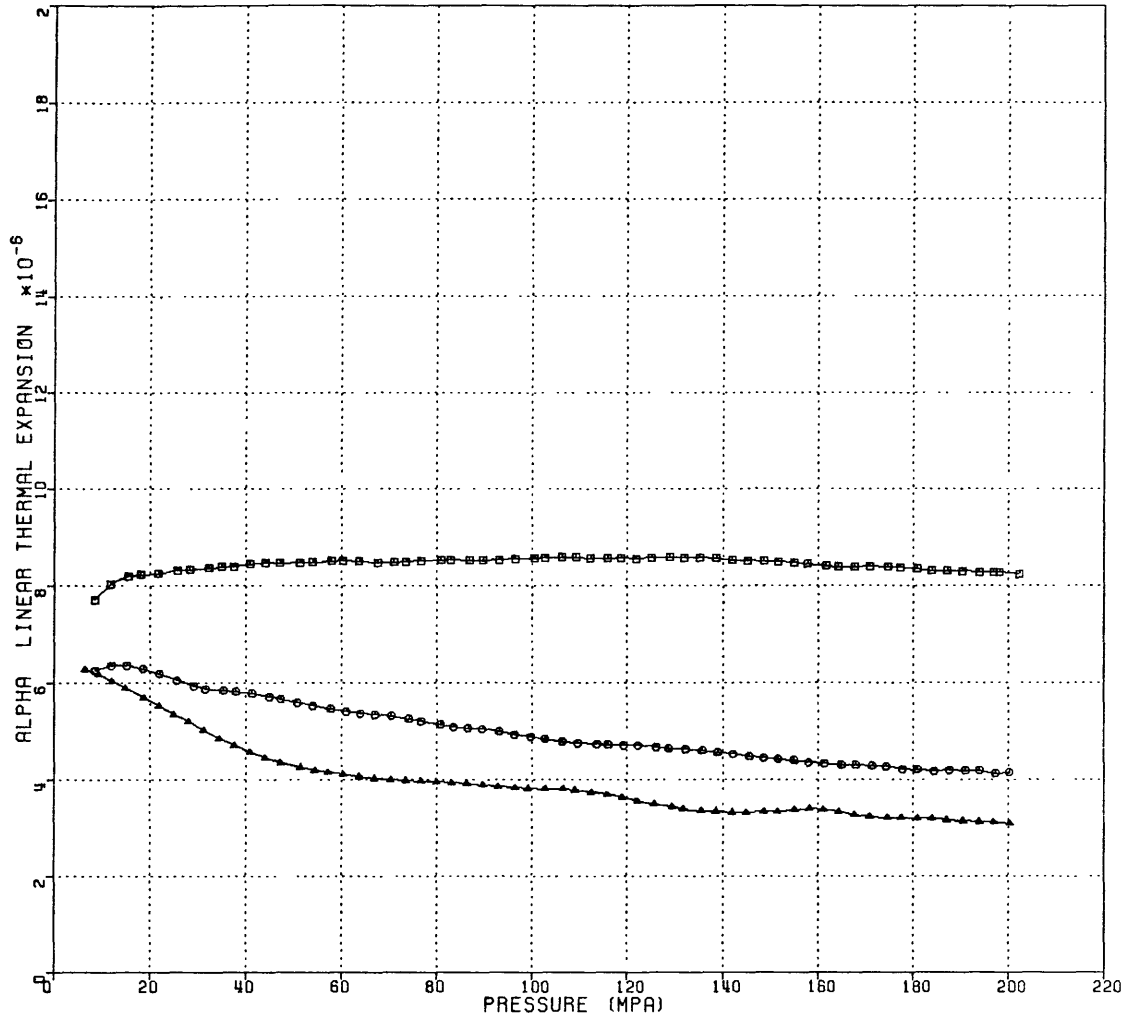
- - 19°C-50°C
- - 50°C-83°C
- △ - 83°C-118°C



1132 WESTERLY RI GRANITE

GAGE:CB

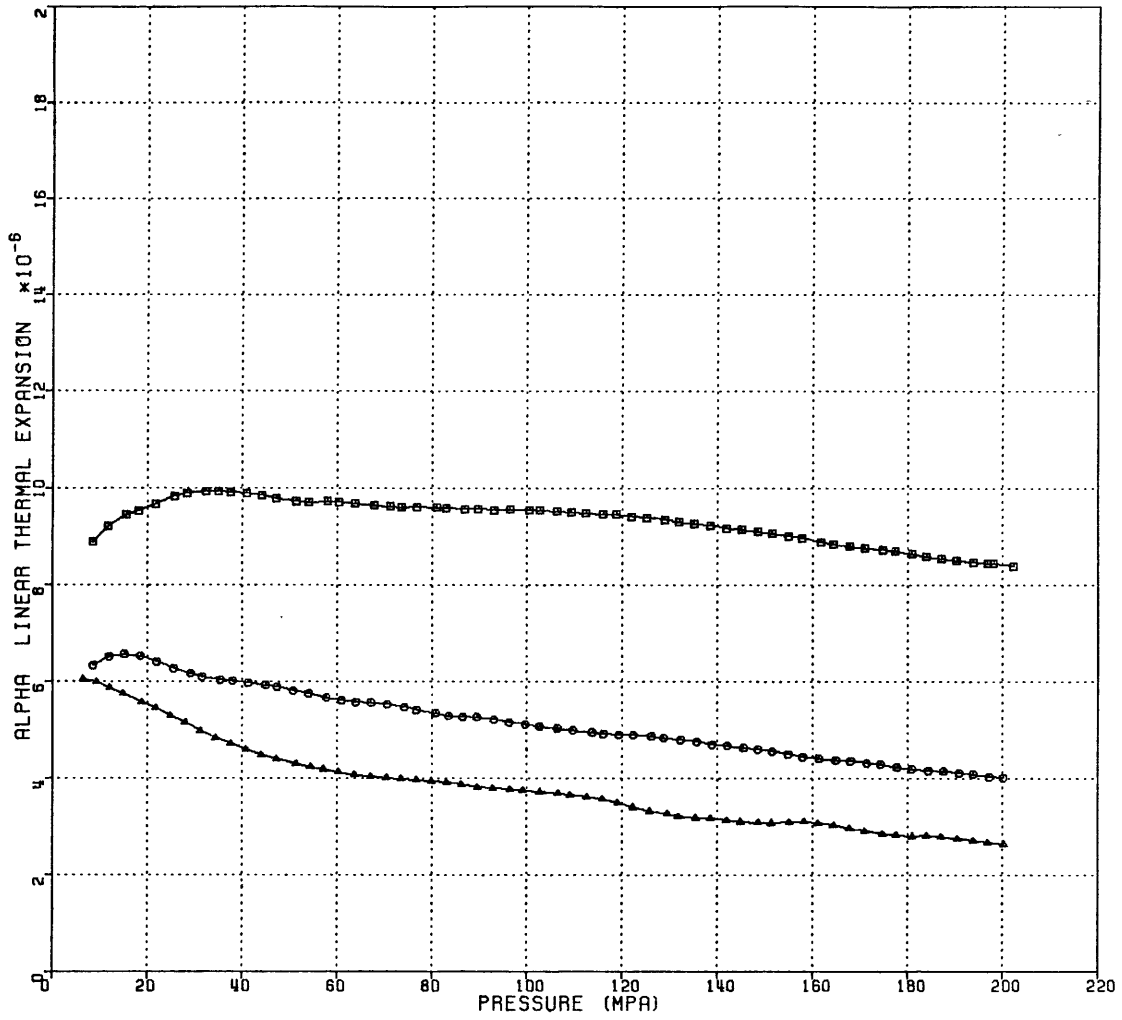
- - 19°C- 50°C
- - 50°C- 83°C
- ▲ - 83°C-118°C



1132 WESTERLY RI GRANITE

GAGE:BA

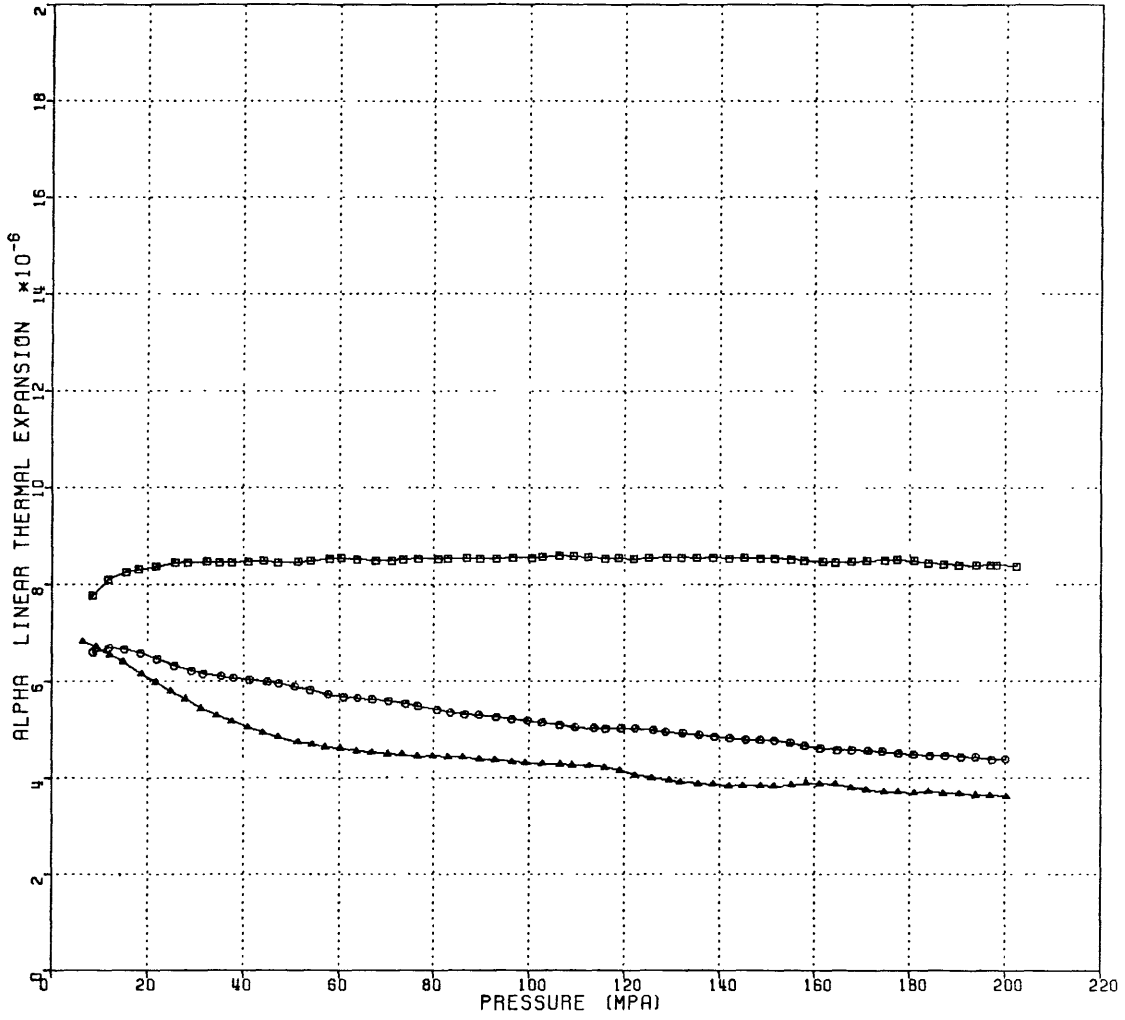
□ - 19°C-50°C
 ○ - 50°C-83°C
 ▲ - 83°C-118°C



1132 WESTERLY RI GRANITE

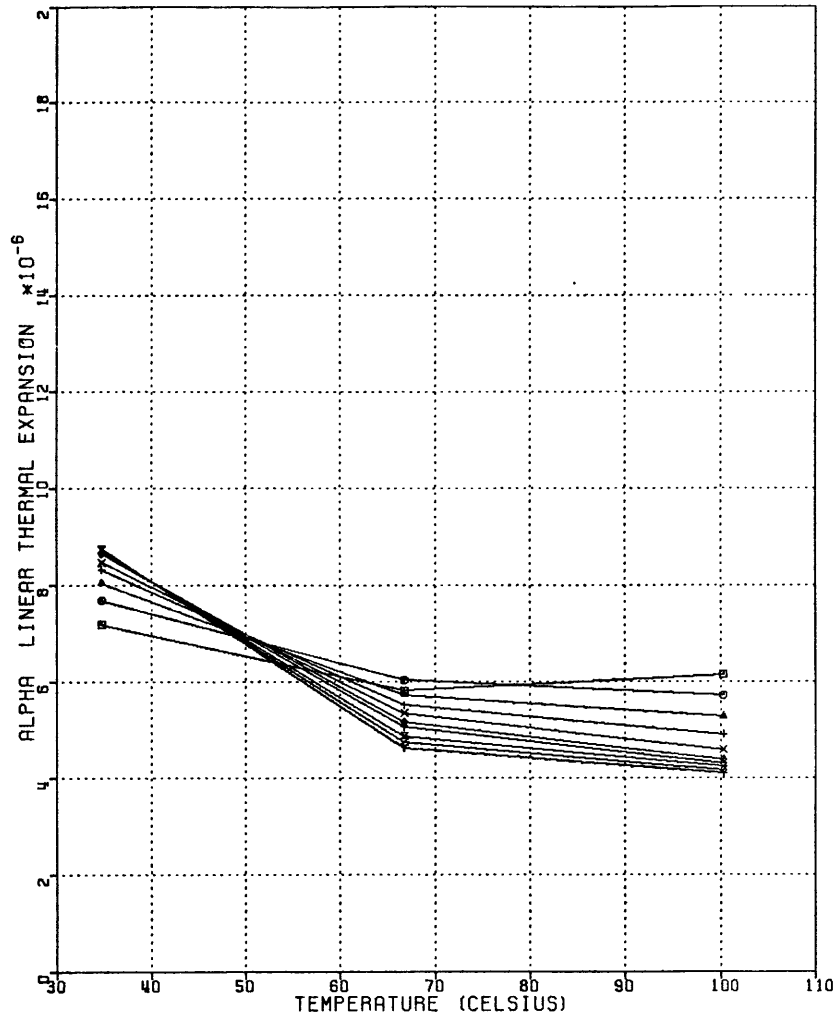
GAGE:CA

- - 19°C- 50°C
- - 50°C- 83°C
- △ - 83°C-118°C



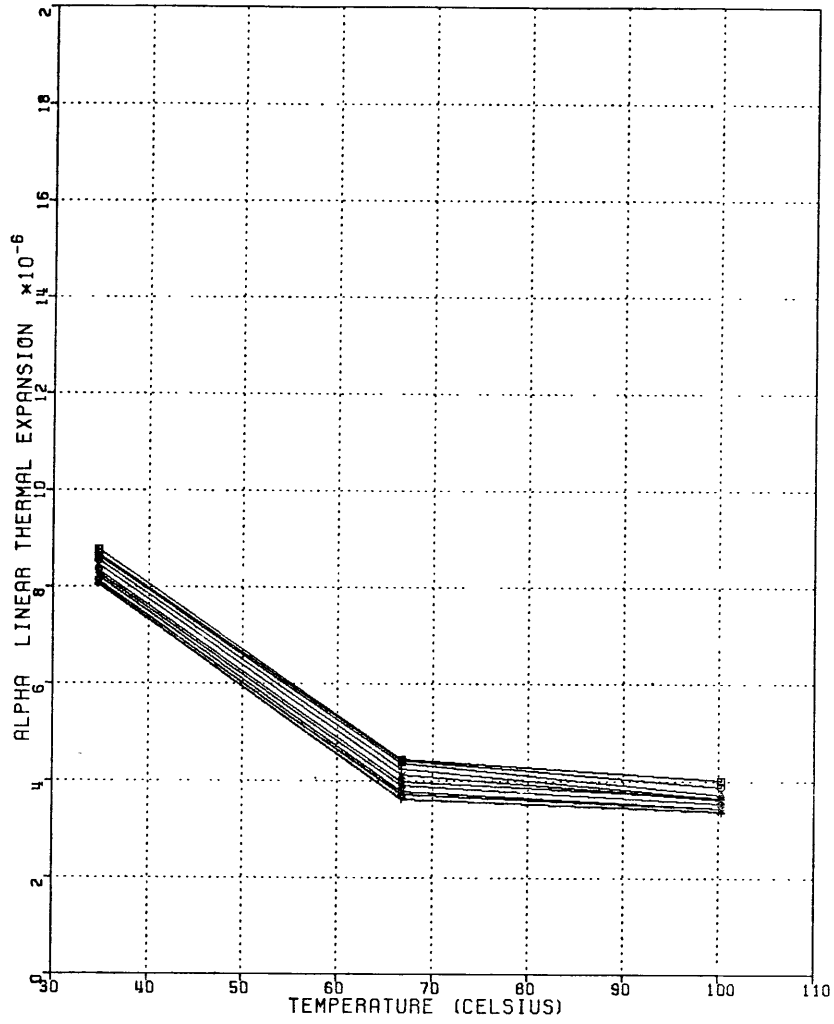
1132 WESTERLY RI GRANITE
GAGE: 3A

□ - 19°C-50°C
○ - 50°C-83°C
△ - 83°C-118°C



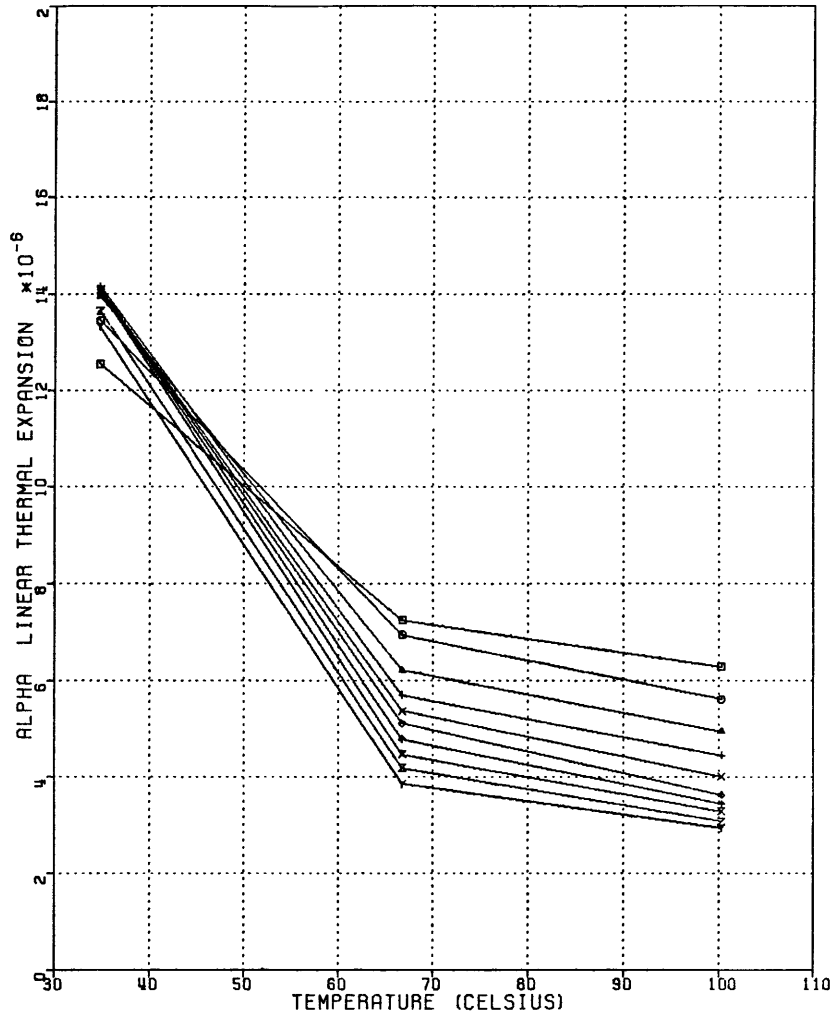
1132 WESTERLY RI GRANITE
GAGE: AC

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- +
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



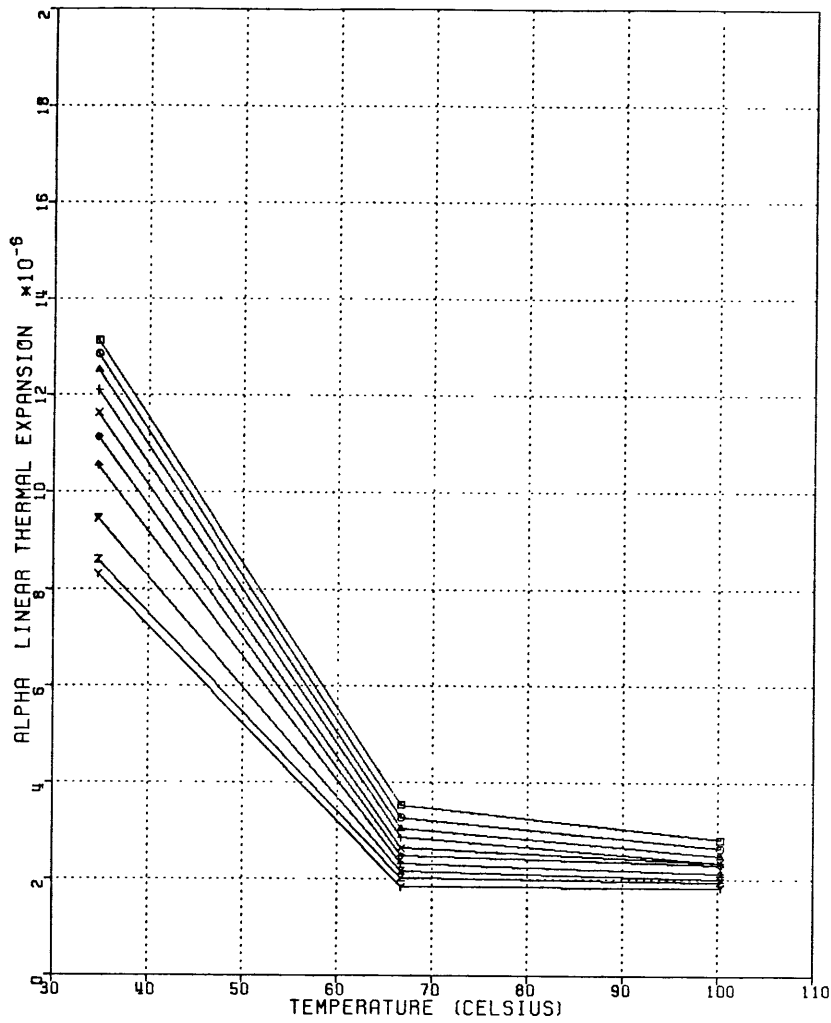
1132 WESTERLY RI GRANITE
GAGE:AC

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⋈ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



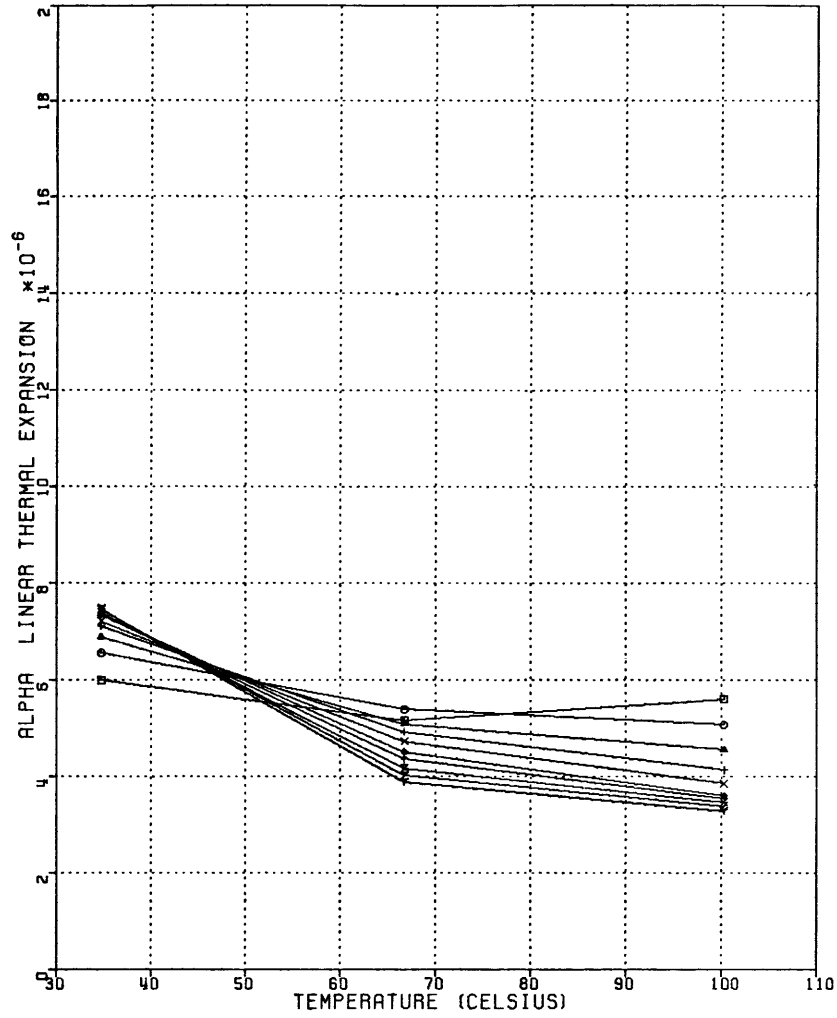
1132 WESTERLY RI GRANITE
GAGE:BC

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- x - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



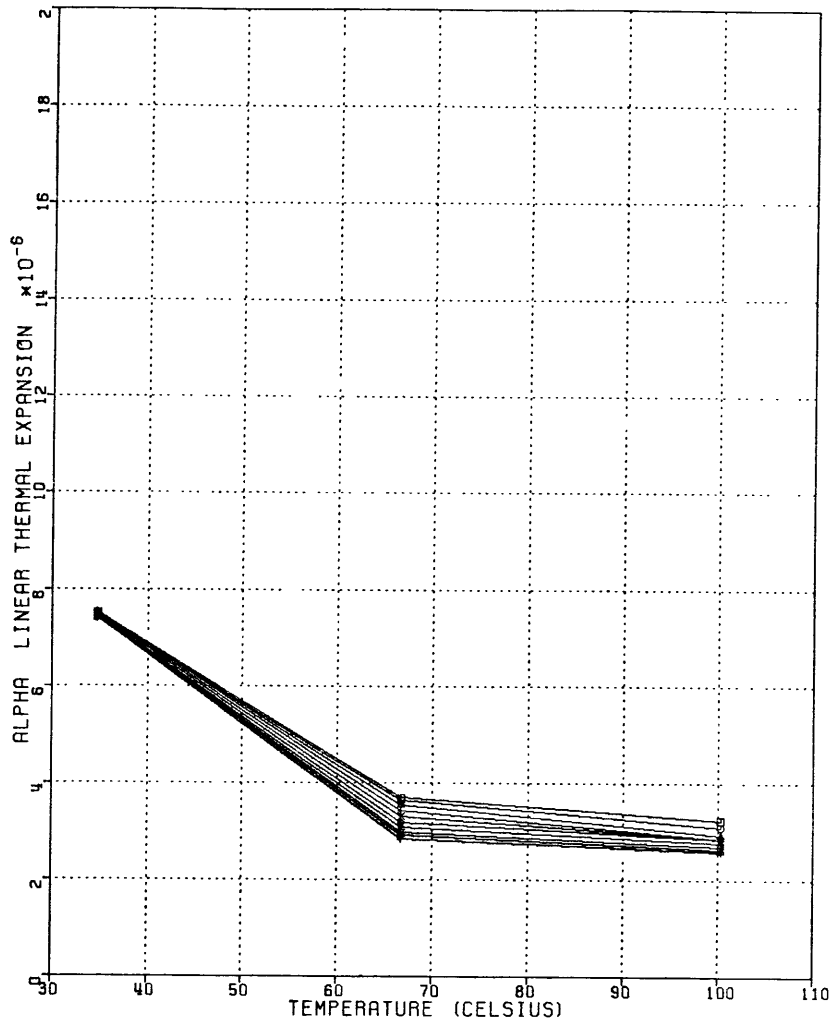
1132 WESTERLY RI GRANITE
GAGE:BC

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- +
- X - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



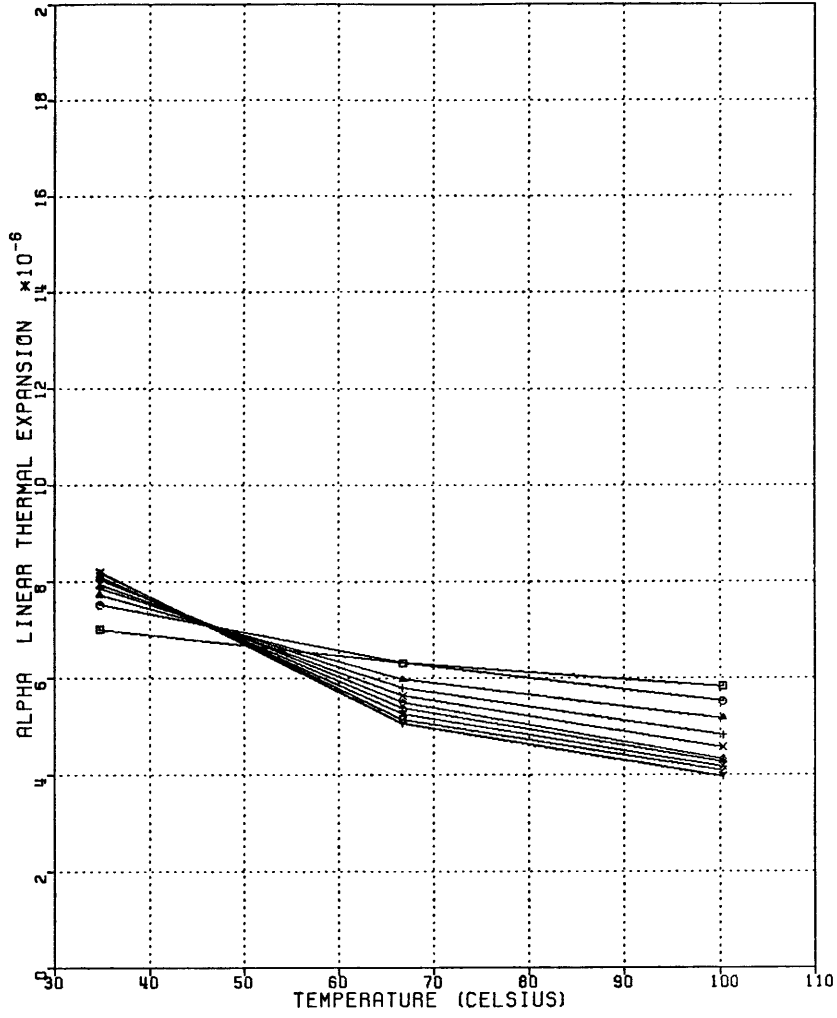
1132 WESTERLY RI GRANITE
GAGE: 3C

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- × - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



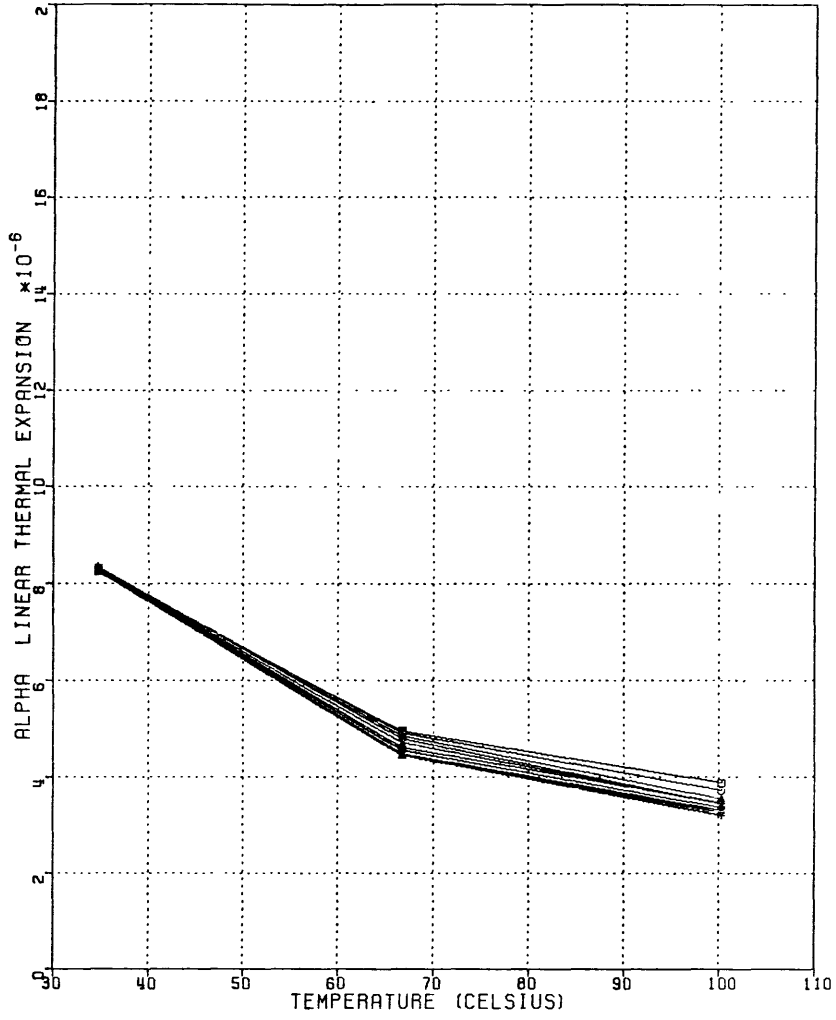
1132 WESTERLY RI GRANITE
GAGE:3C

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- × - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



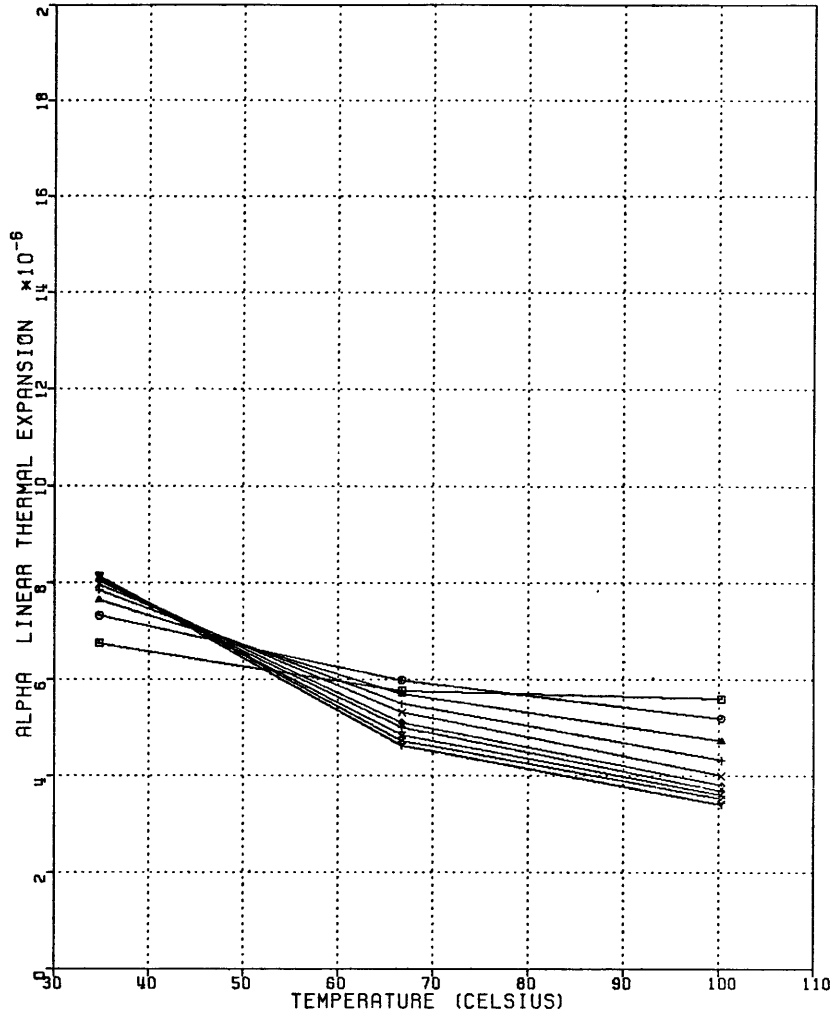
1132 WESTERLY RI GRANITE
GAGE: 4C

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- × - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- ⊗ - 80 MPA
- ⊖ - 90 MPA
- ⊙ - 100 MPA



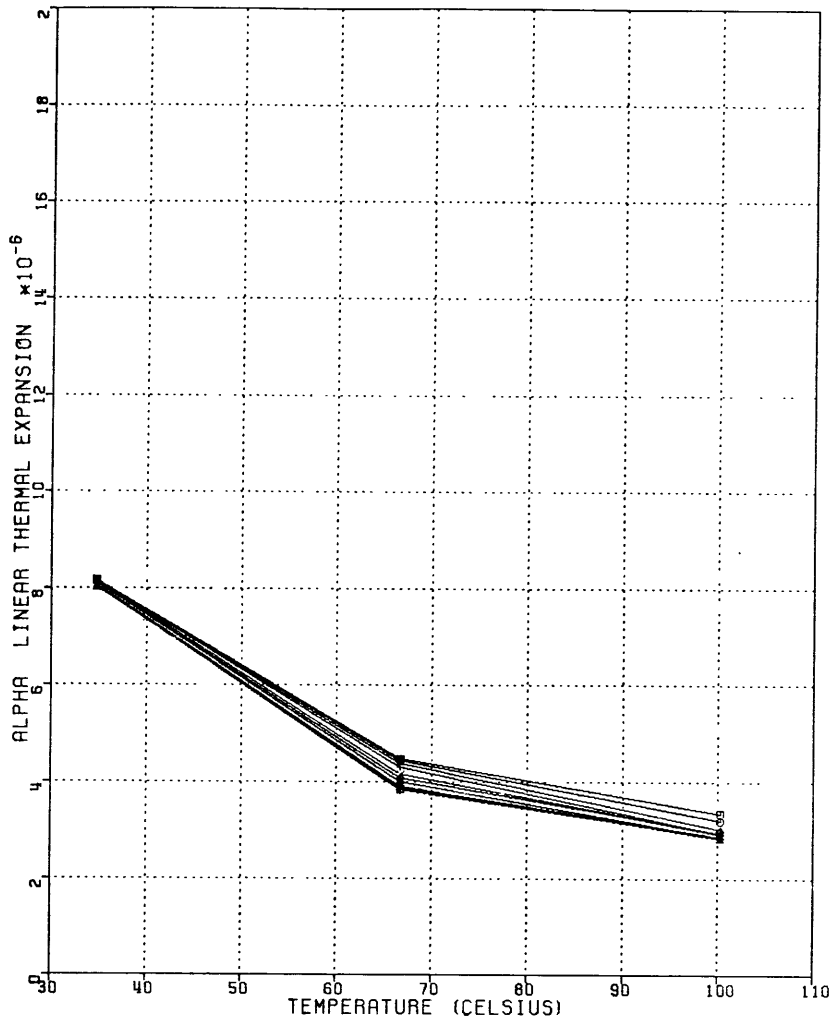
1132 WESTERLY RI GRANITE
GAGE: 4C

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- +
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



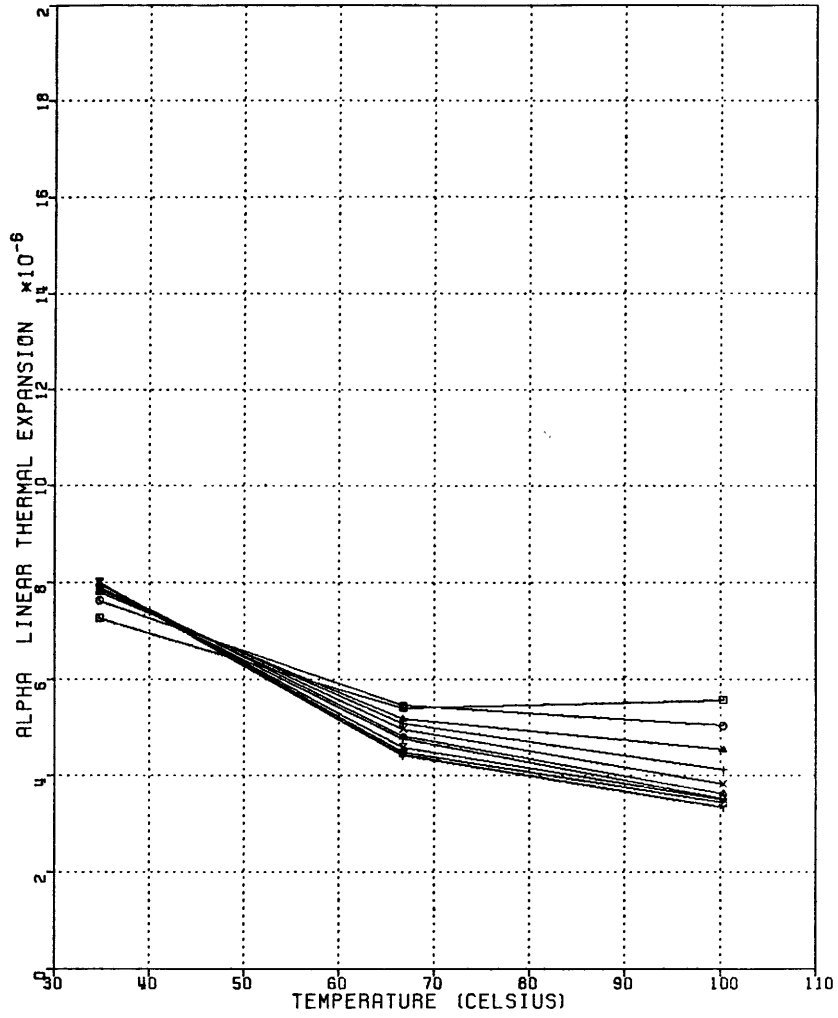
1132 WESTERLY RI GRANITE
GAGE: AB

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- x - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



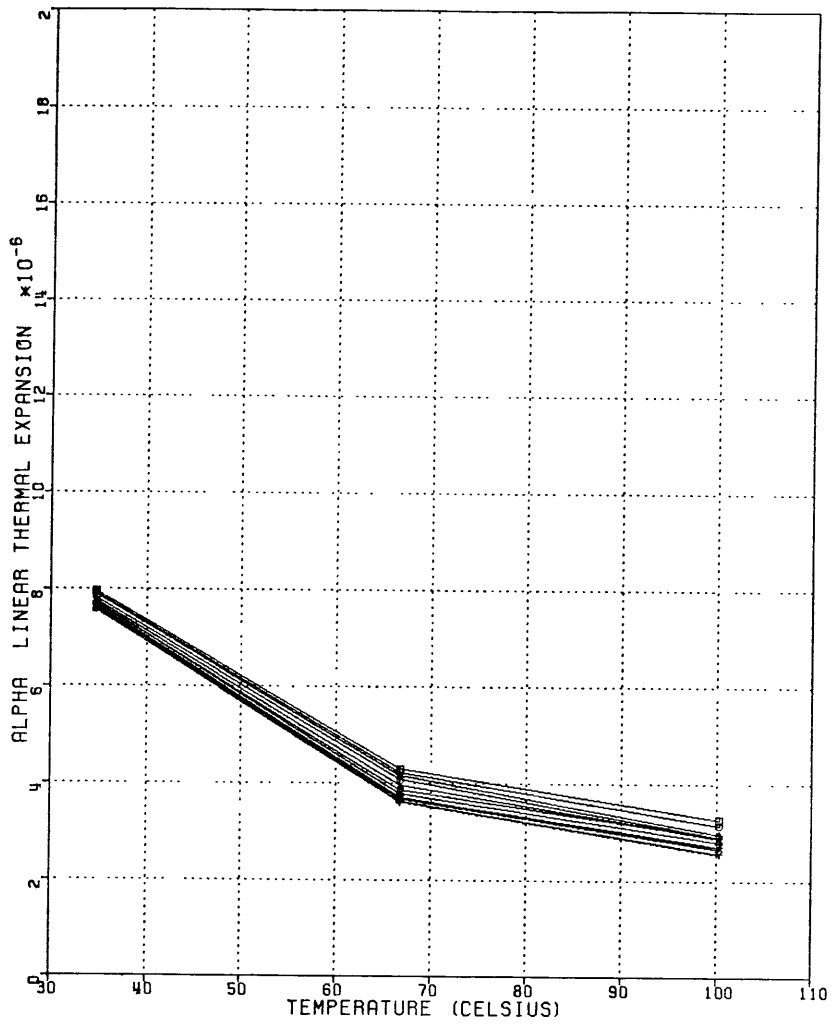
1132 WESTERLY RI GRANITE
GAGE: AB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- +
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



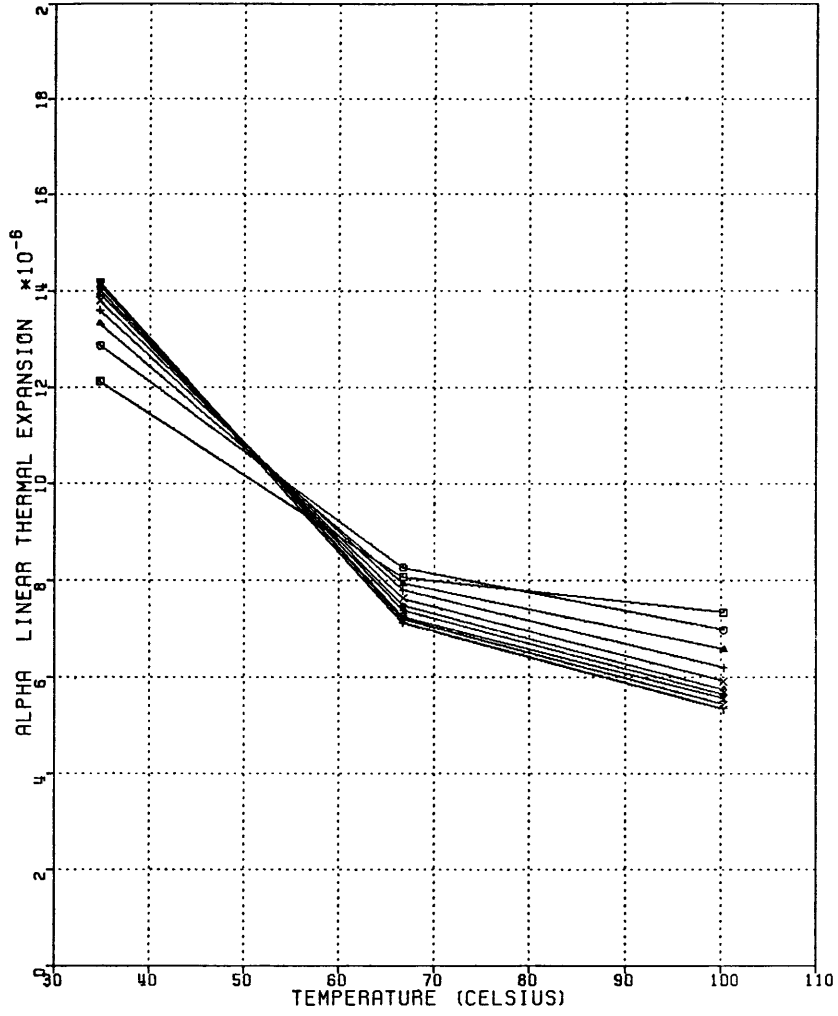
1132 WESTERLY RI GRANITE
GAGE:CB

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- x - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



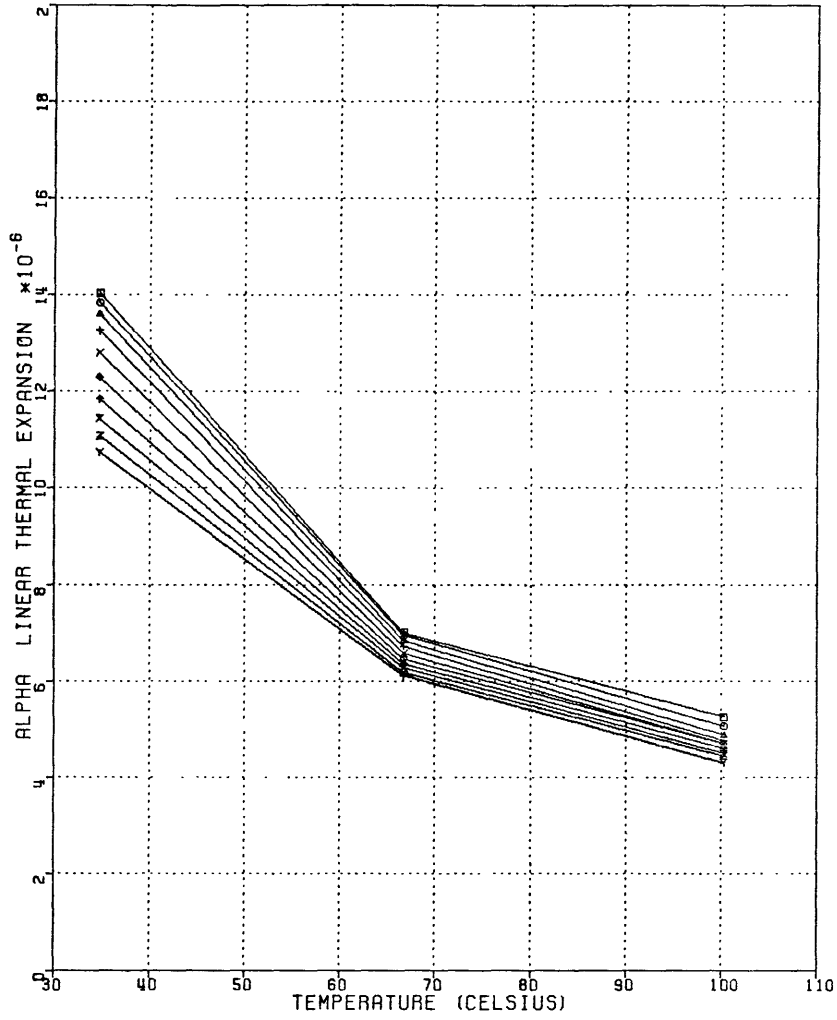
1132 WESTERLY RI GRANITE
GAGE:CB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- × - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



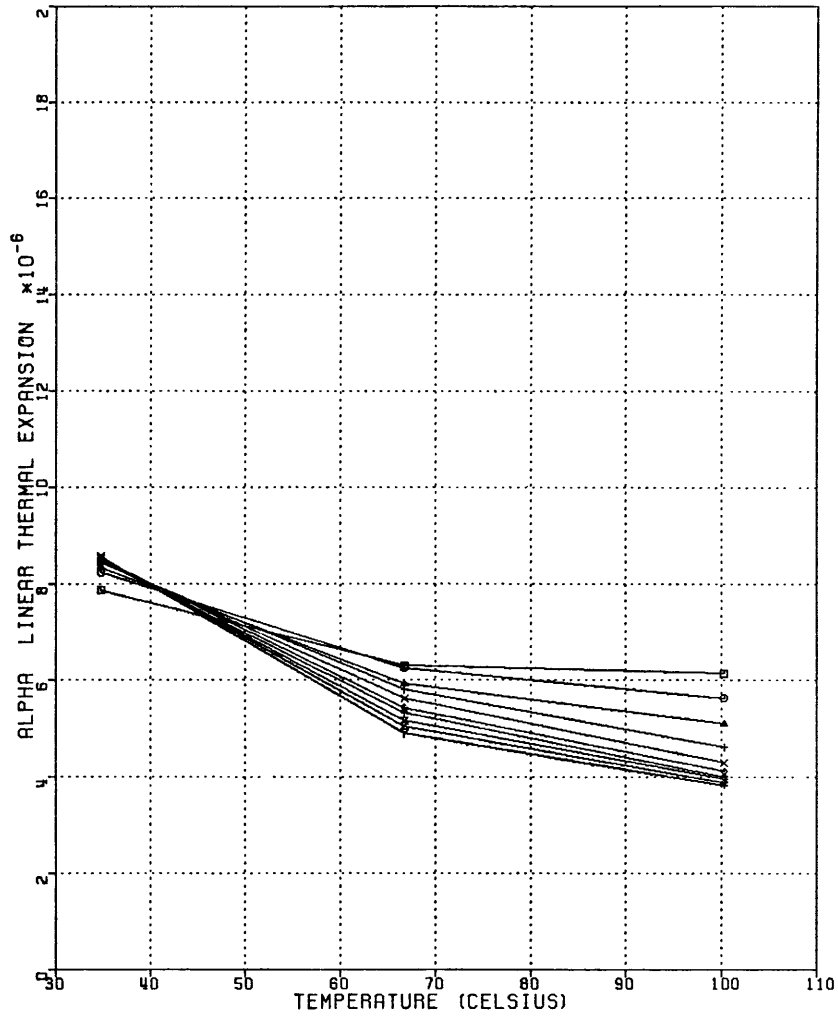
1132 WESTERLY RI GRANITE
GAGE: 4B

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
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- ♠ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



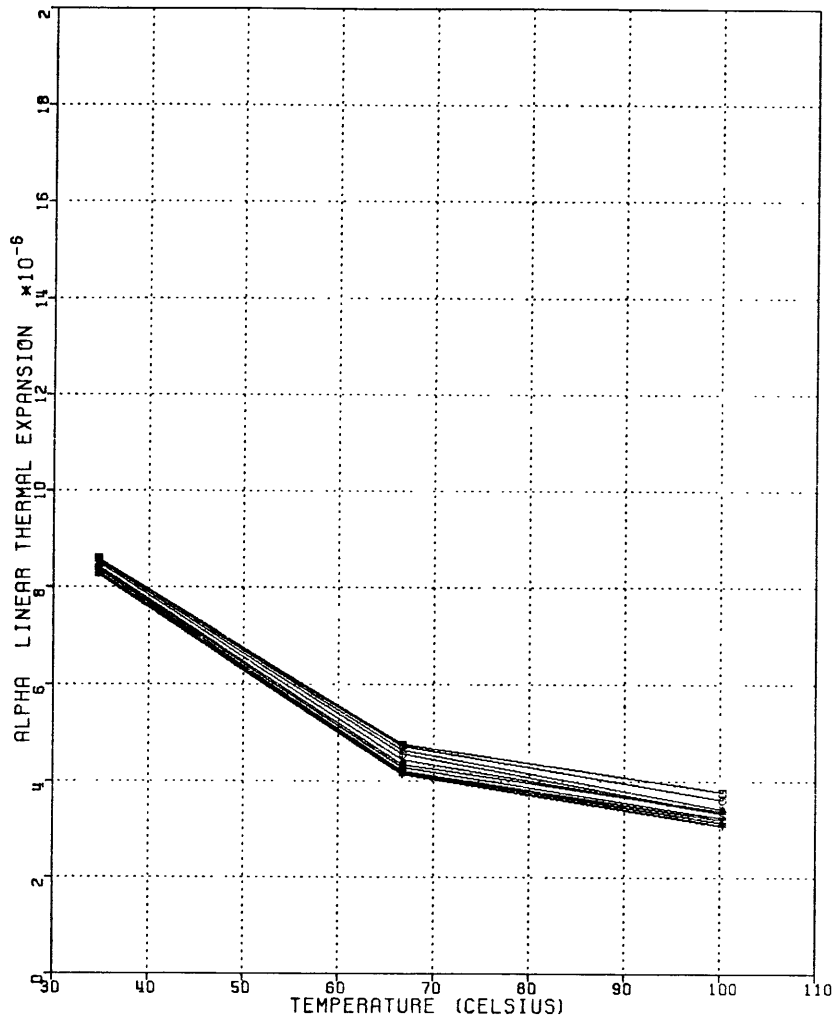
1132 WESTERLY RI GRANITE
GAGE: 4B

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



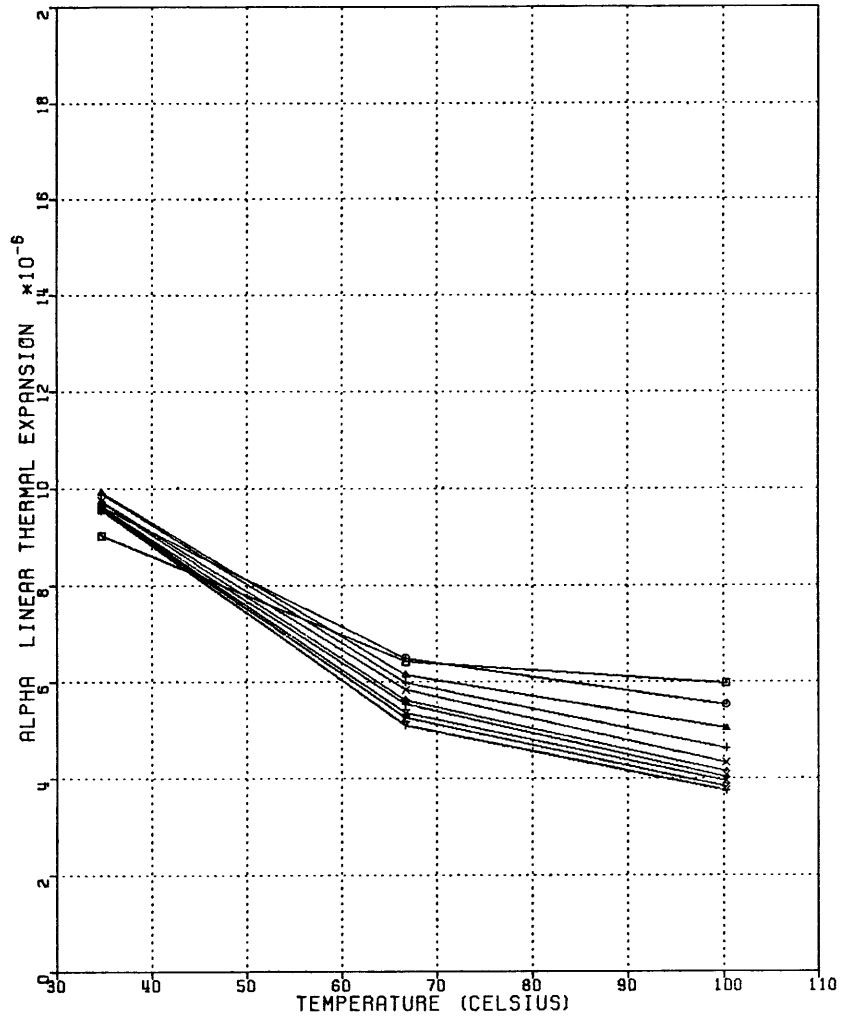
1132 WESTERLY RI GRANITE
GAGE:BA

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- +
- X - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



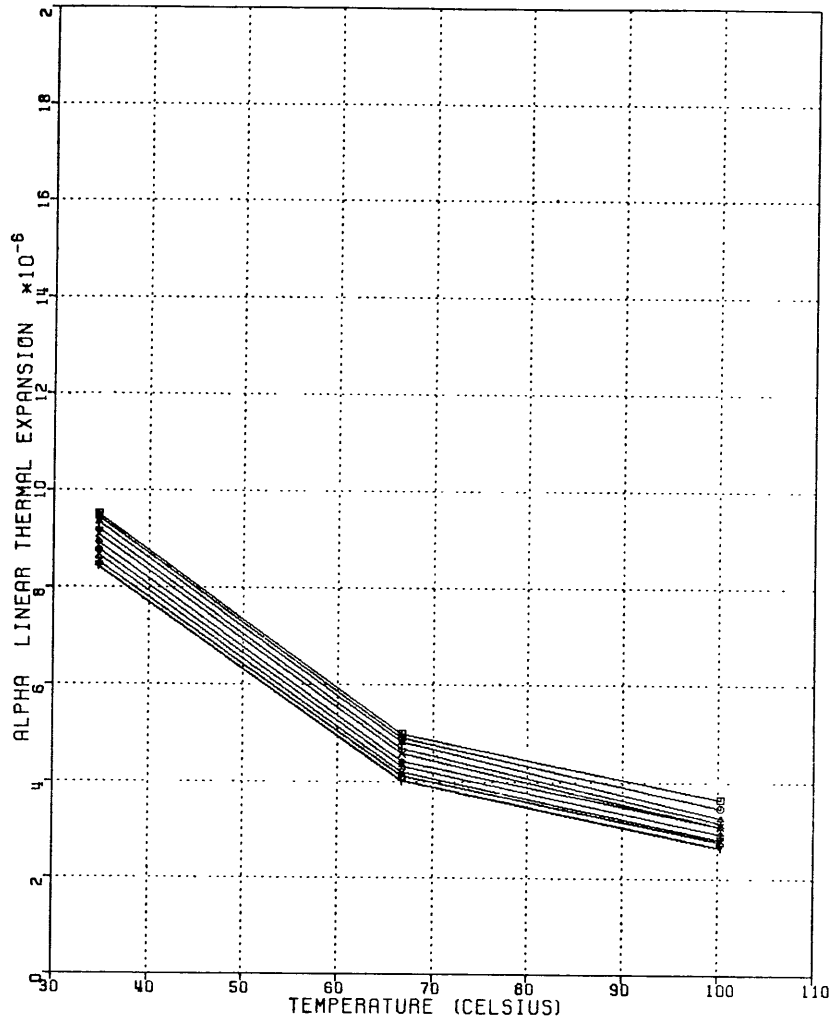
1132 WESTERLY RI GRANITE
GAGE: BA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- × - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



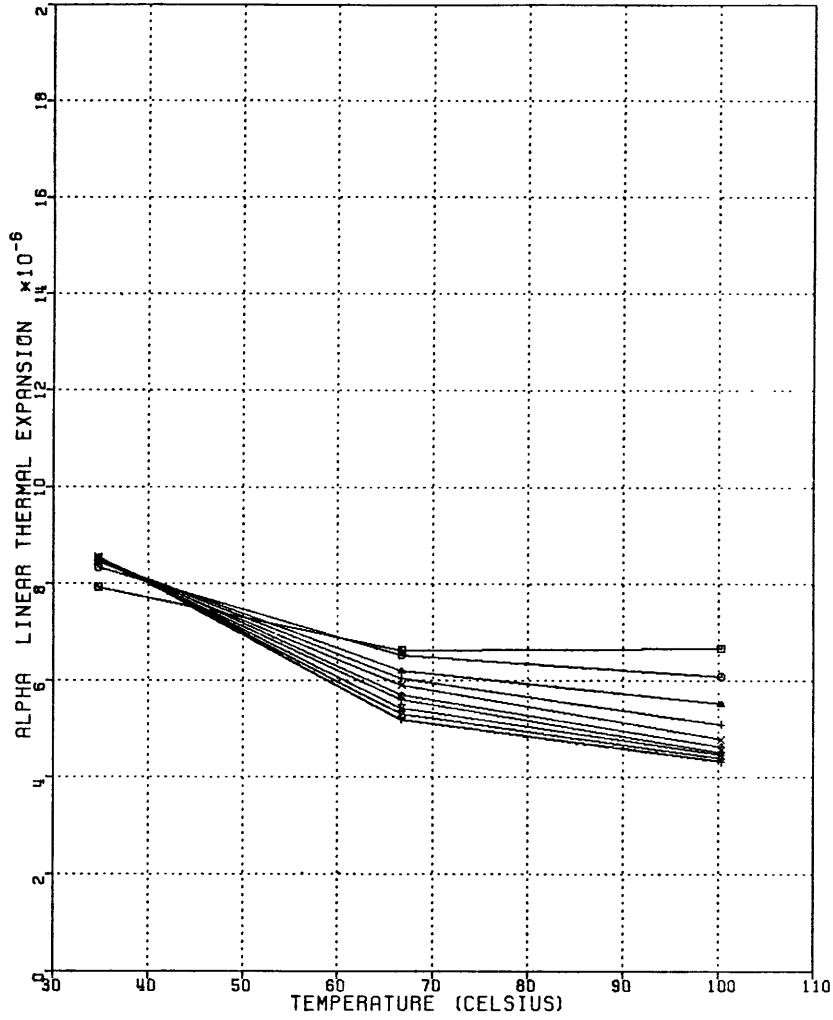
1132 WESTERLY RI GRANITE
GAGE:CA

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



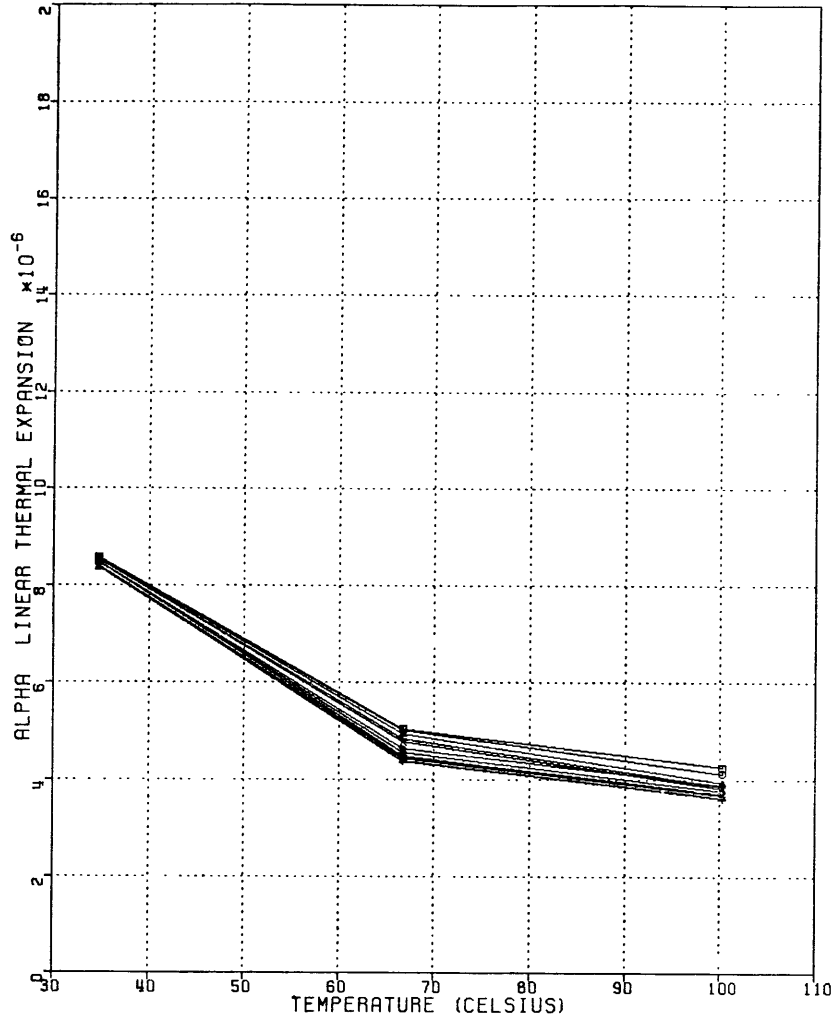
1132 WESTERLY RI GRANITE
GAGE:CA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- +
- X - 150 MPA
- ◇ - 160 MPA
- ⋈ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



1132 WESTERLY RI GRANITE
GAGE: 3A

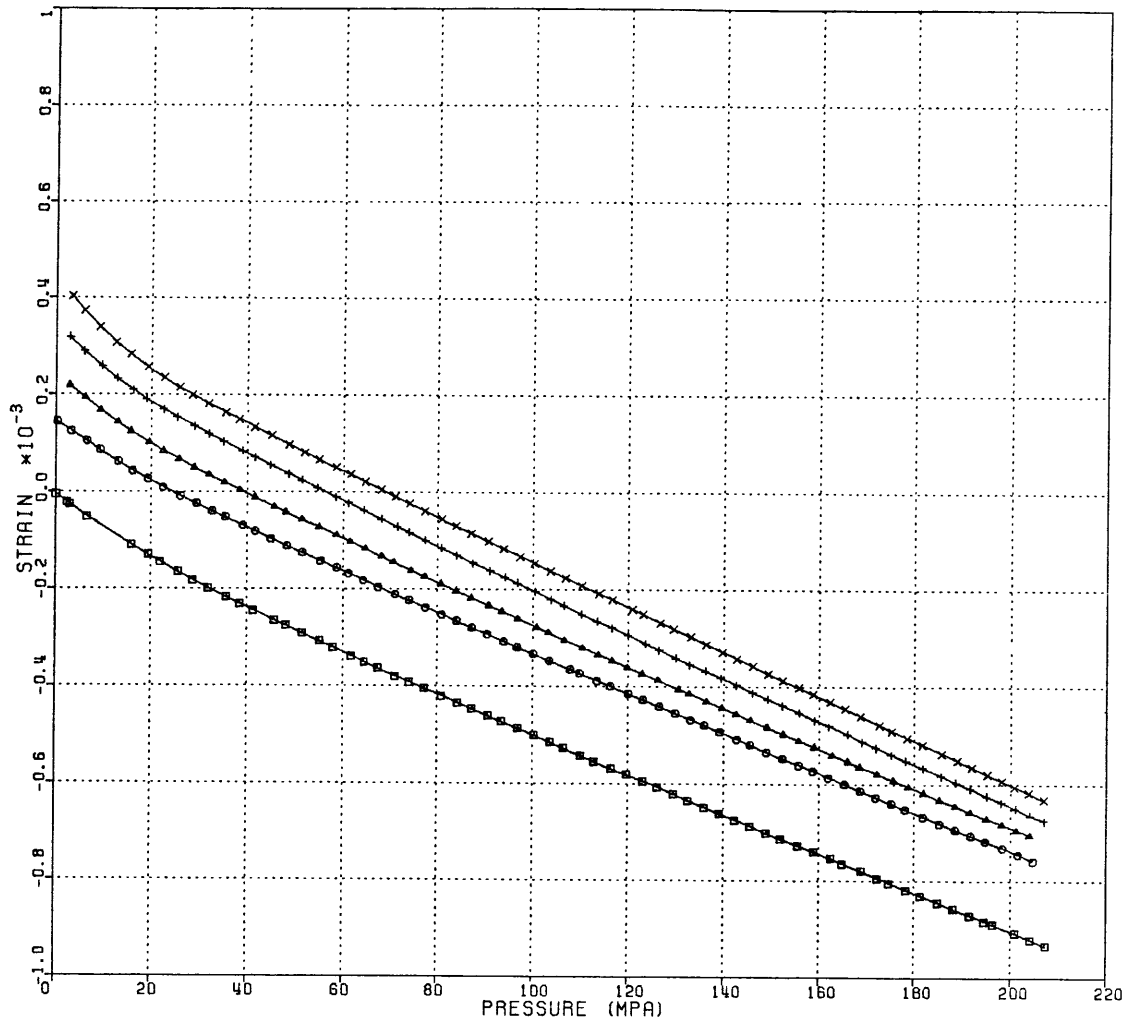
- - 10 MPA
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- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



1132 WESTERLY RI GRANITE
GAGE: 3A

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA

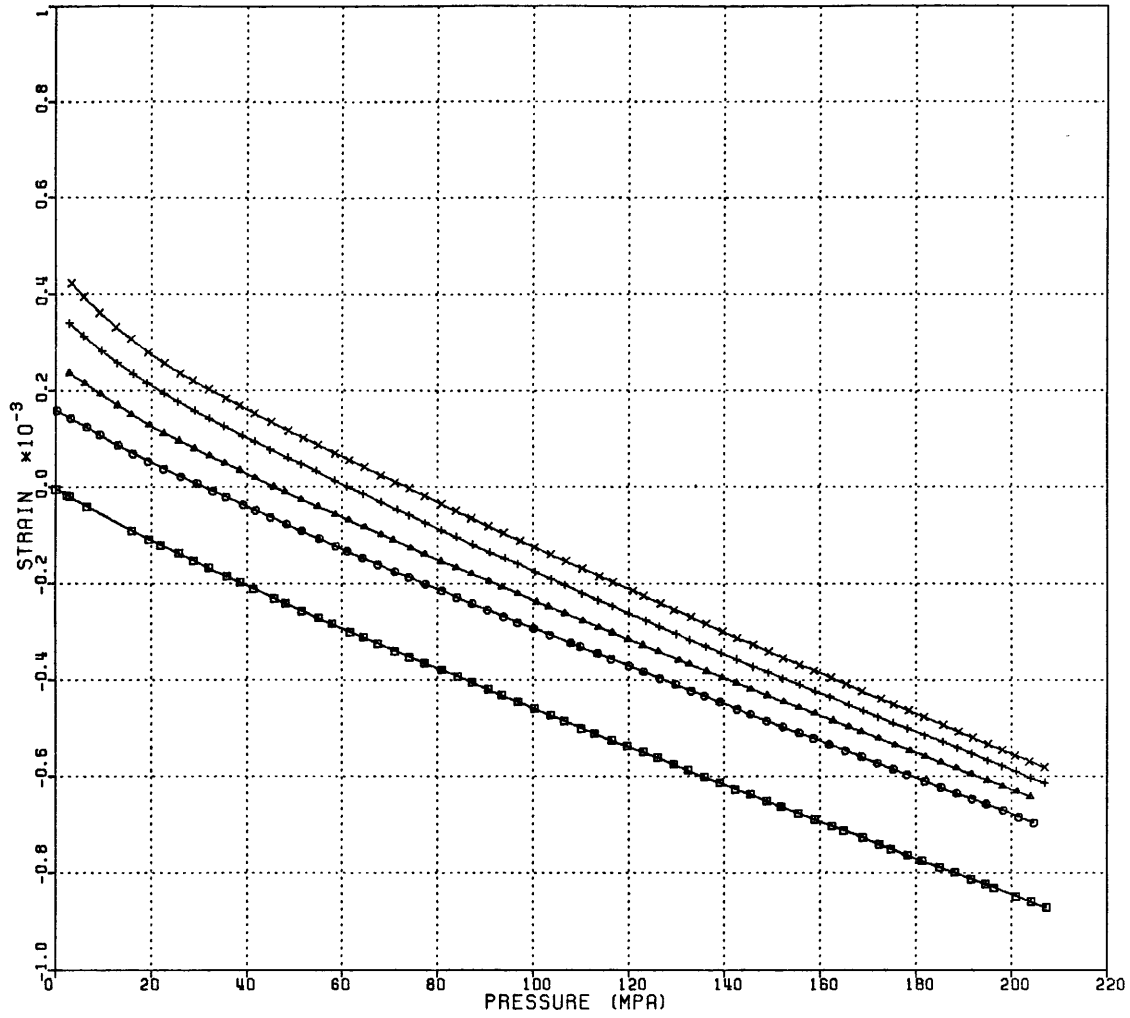
1381 Mellon gabbro shows significant thermal cycle cracking. Above 50°C low pressure β increases significantly with temperature. This increase indicates that T_c is between 50° and 65°. The larger β after each cycle indicates more cracks are being created by each increase in temperature. β above P_c are 20 anisotropic and decrease slightly with pressure. The change in β with temperature shows a small increase, but larger than most of the other samples. α decreases with pressure and is comparable to the increase in β with temperature. The change in α with temperature varies widely from gage to gage, but generally decreases. Occasionally it will increase in the last temperature interval for a particular gage.



1381 MELLON WI GABBRO

GAGE: BA

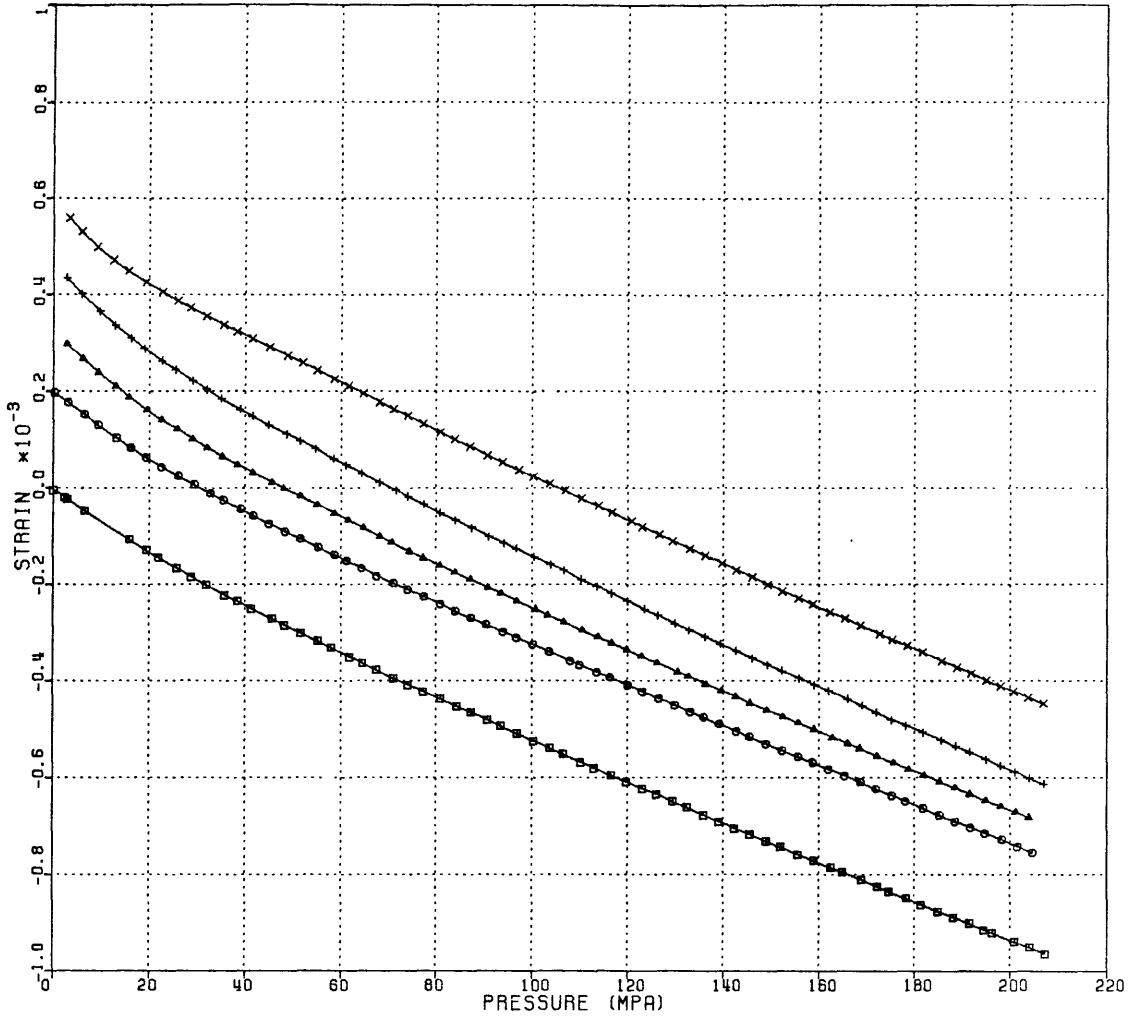
- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- × - 107°C



1381 MELLON WI GABBRO

GAGE: 4A

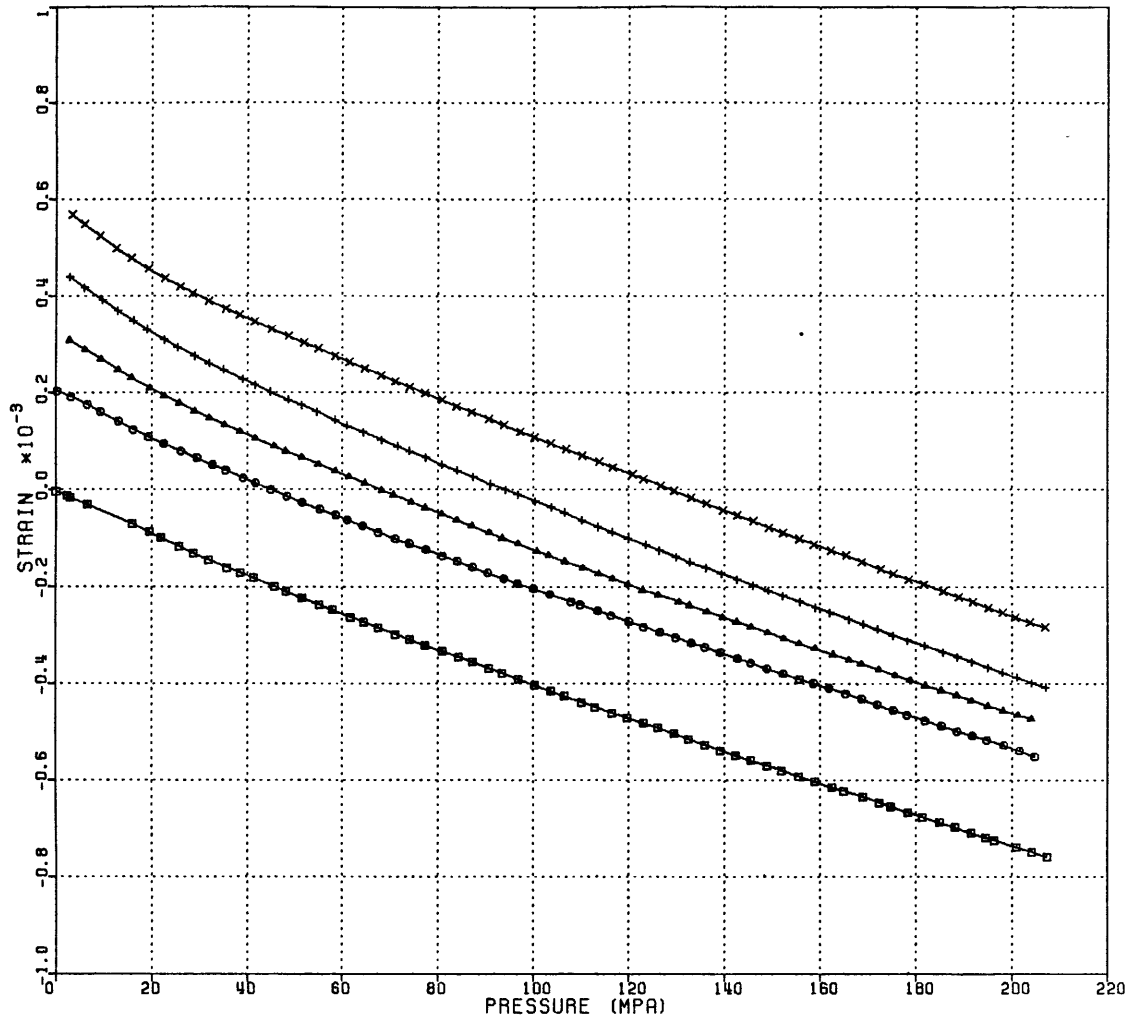
- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- × - 107°C



1381 MELLON WI GABBRO

GAGE: AB

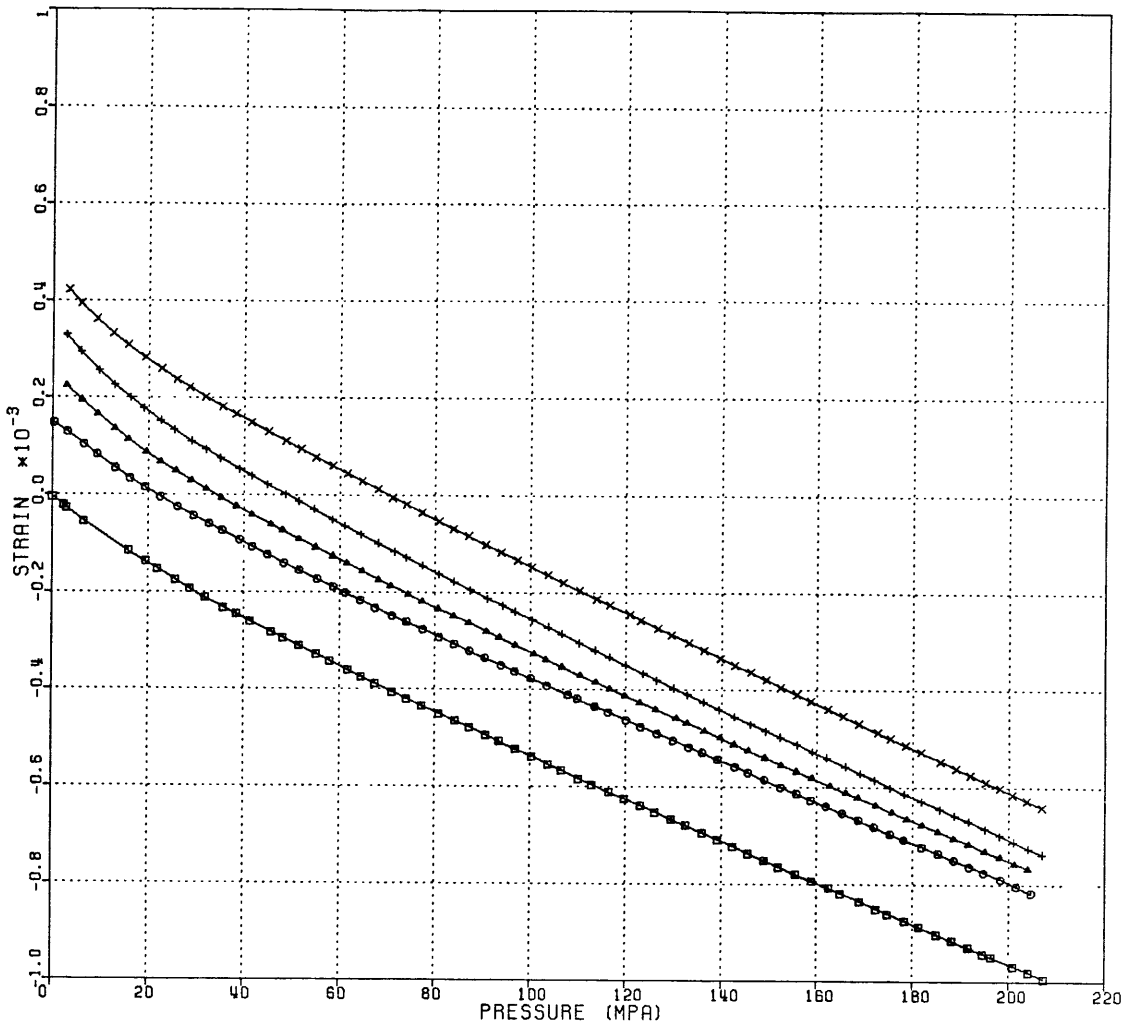
- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- × - 107°C



1381 MELLON WI GABBRO

GAGE: CB

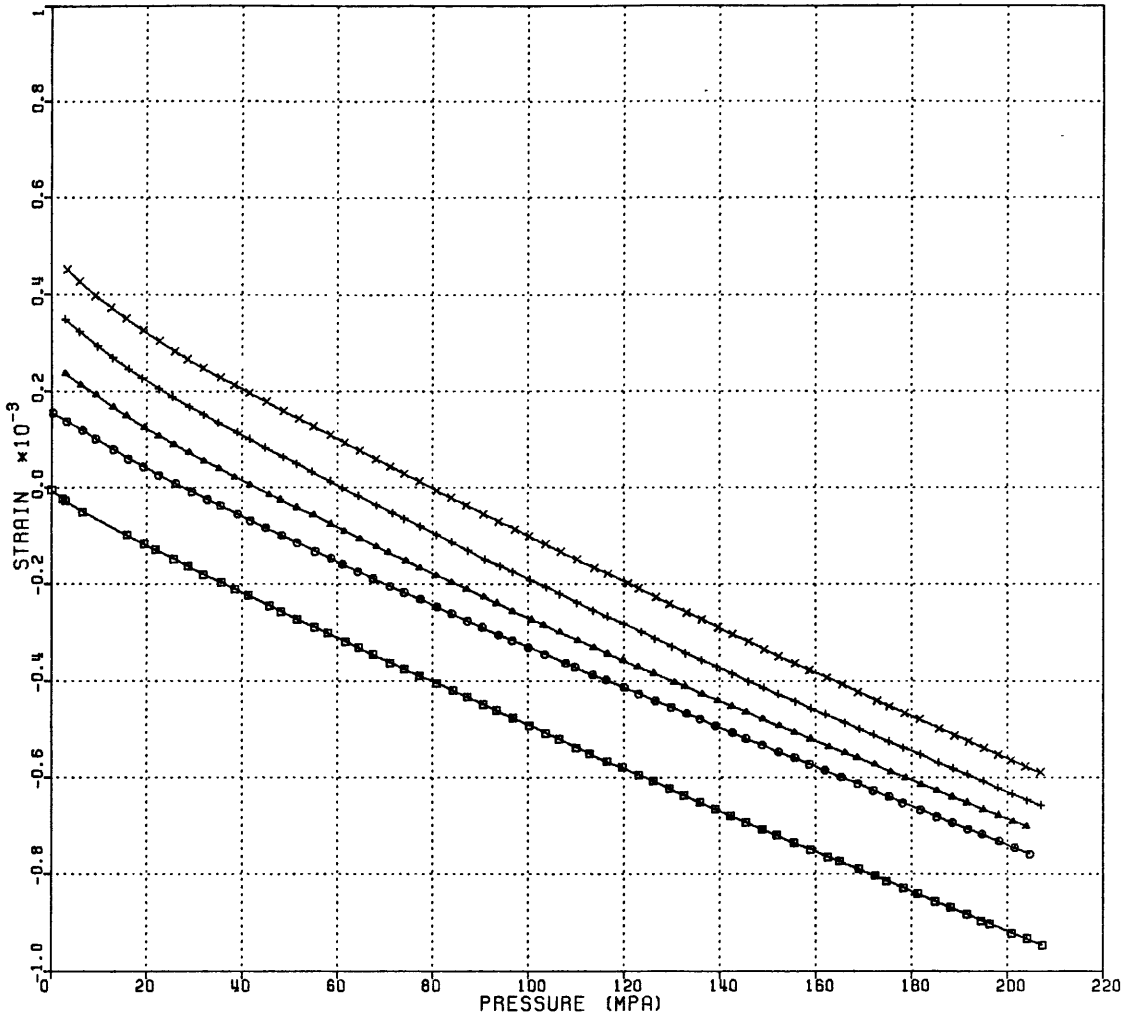
- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- X - 107°C



1381 MELLON WI GABBRO

GAGE: 3B

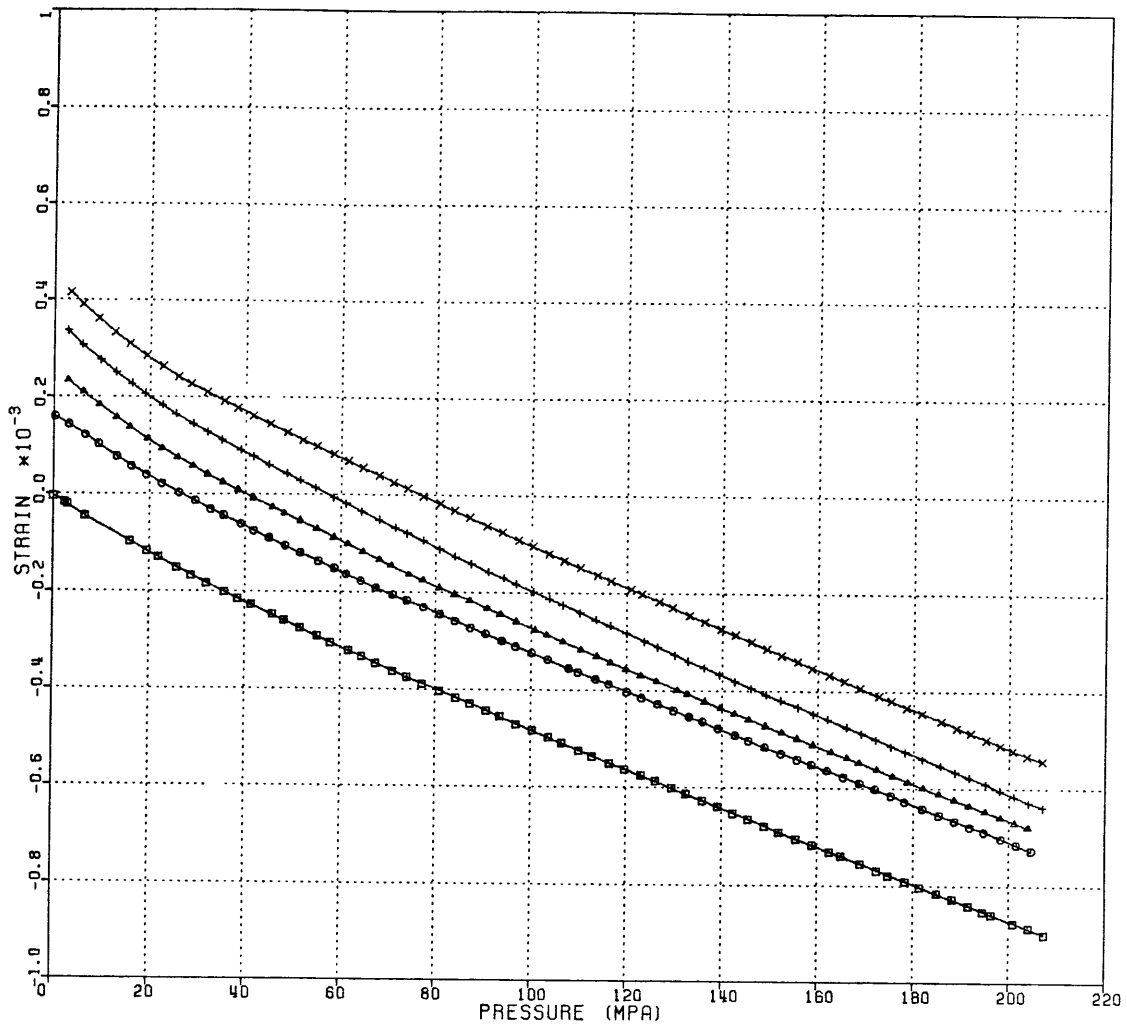
- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- × - 107°C



1381 MELLON WI GABBRO

GAGE: 4B

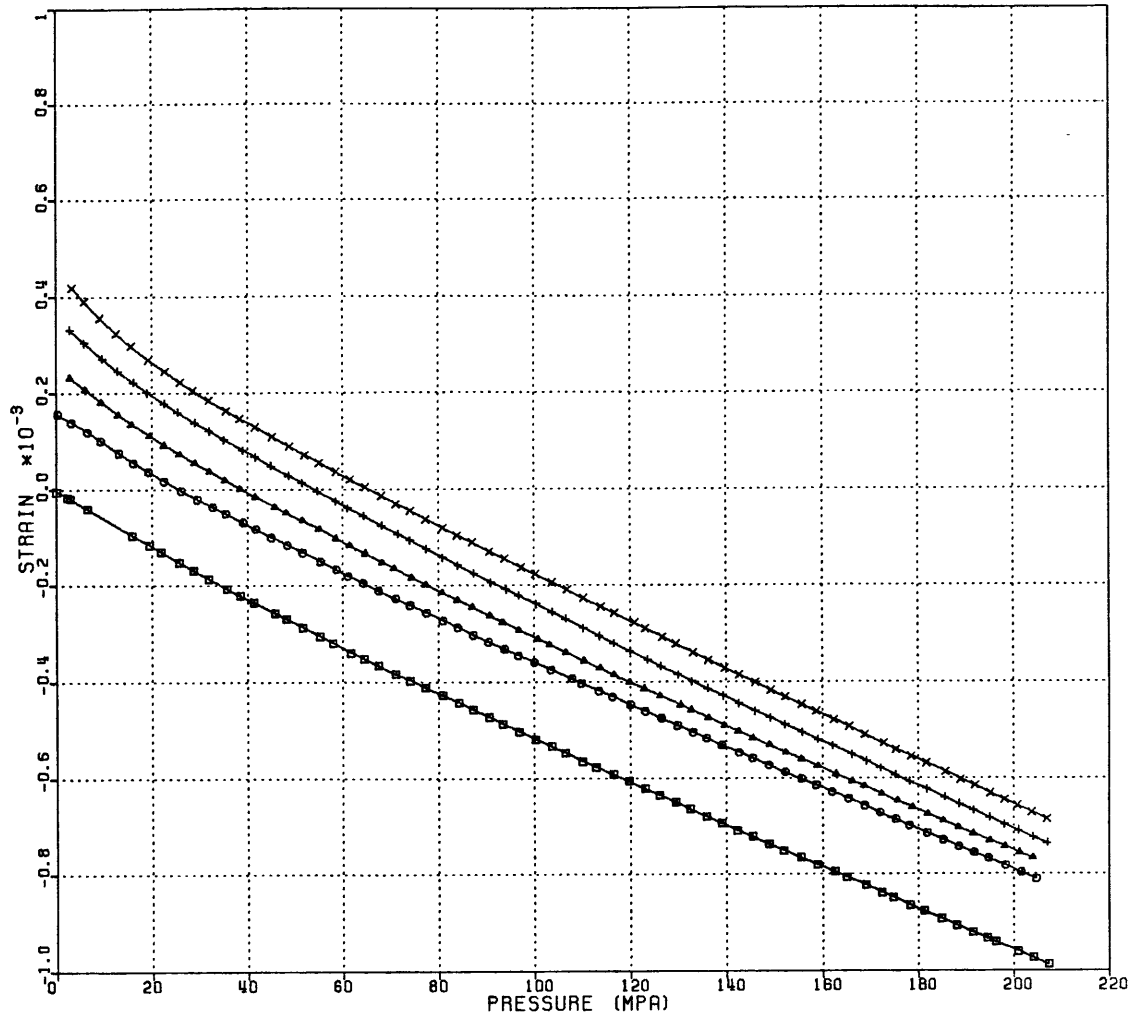
- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- × - 107°C



1381 MELLON WI GABBRO

GAGE: AC

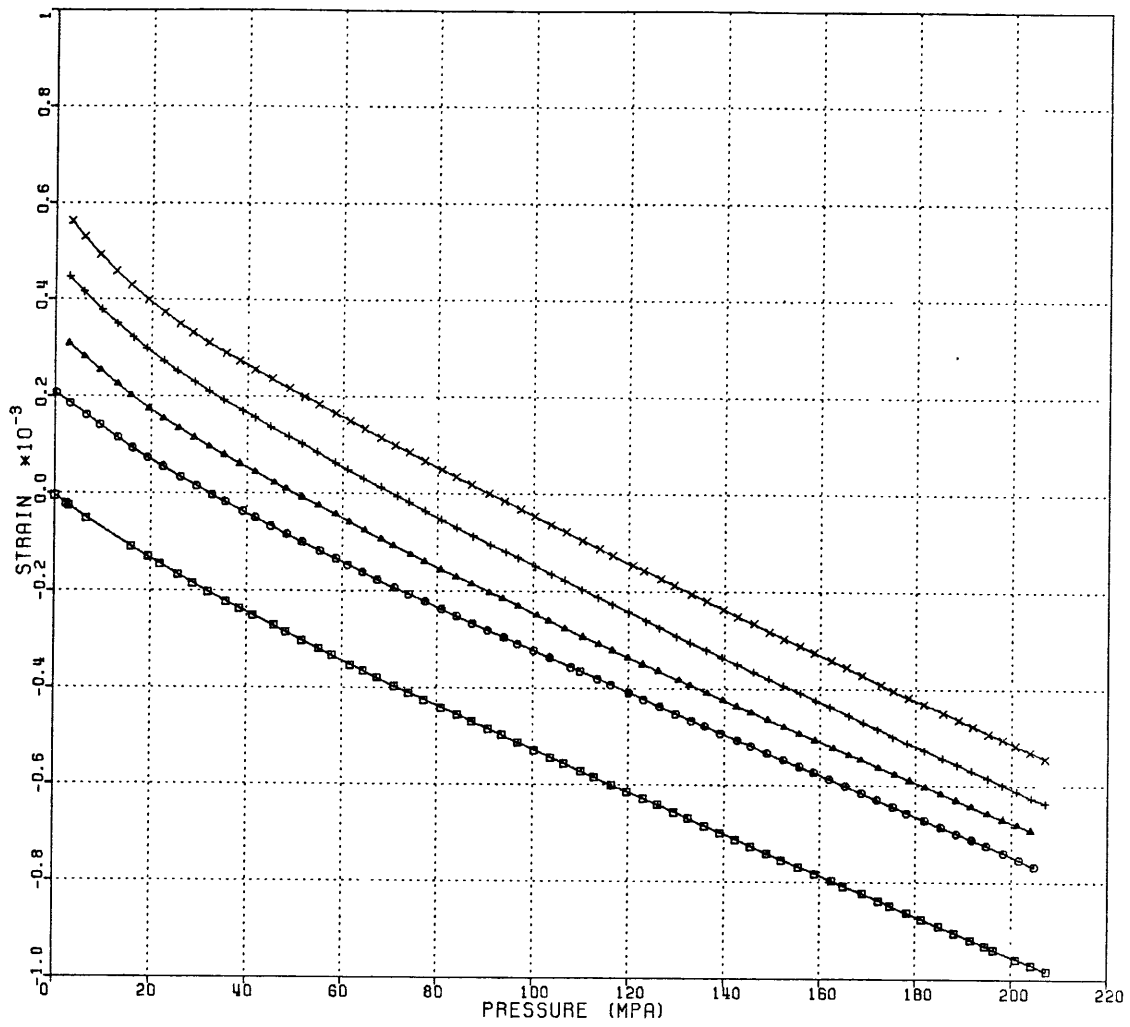
- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- × - 107°C



1381 MELLON WI GABBRO

GAGE:BC

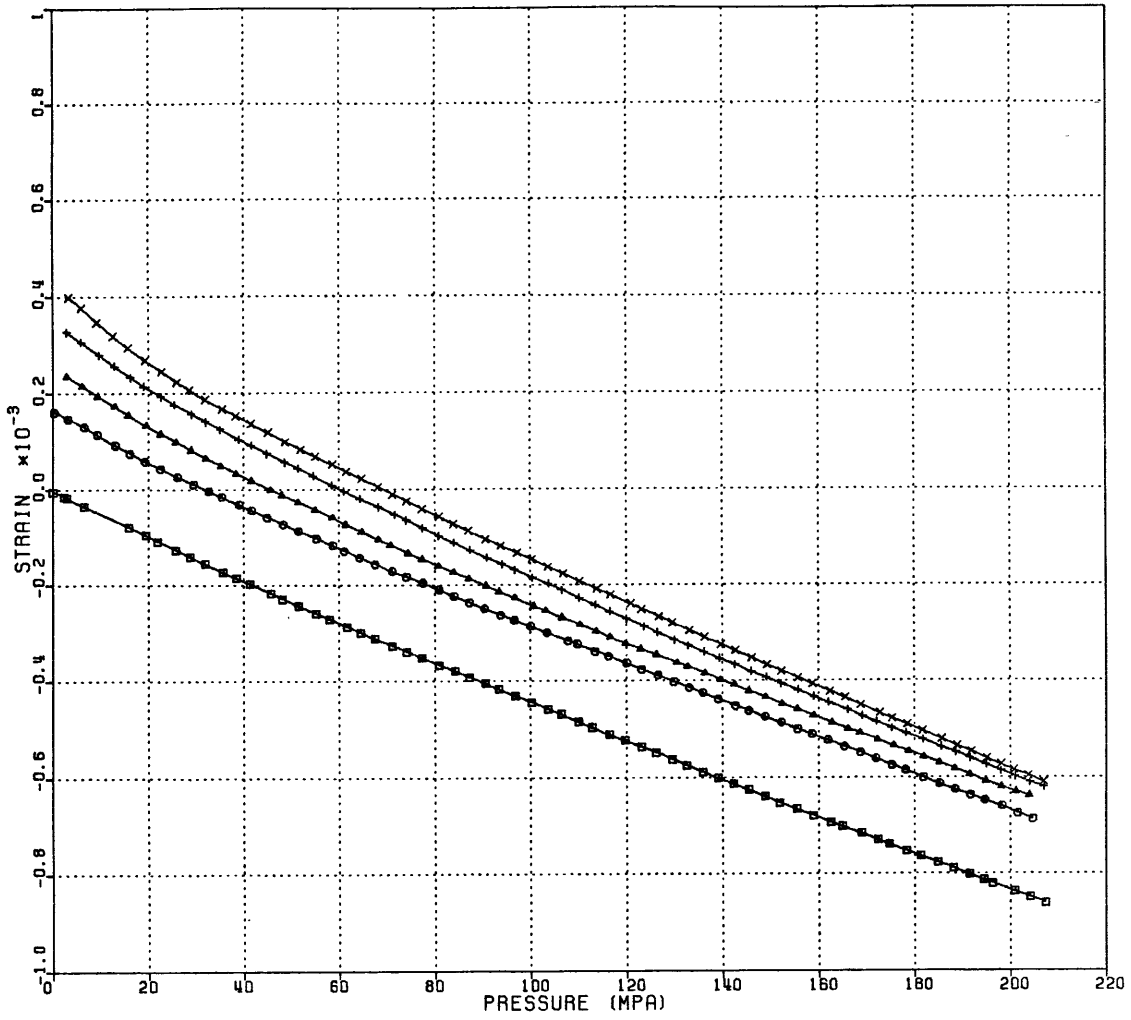
- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- × - 107°C



1381 MELLON WI GABBRO

GAGE: 3C

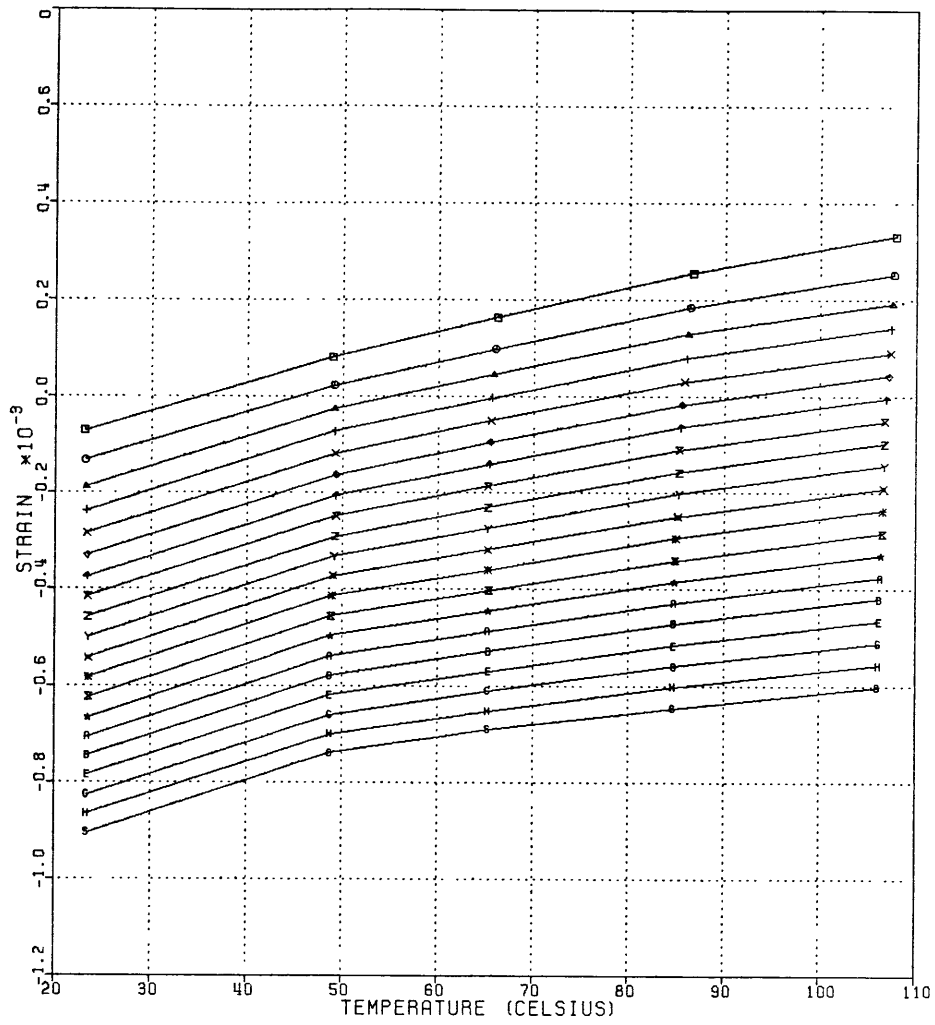
- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- × - 107°C



1381 MELLON WI GABBRO

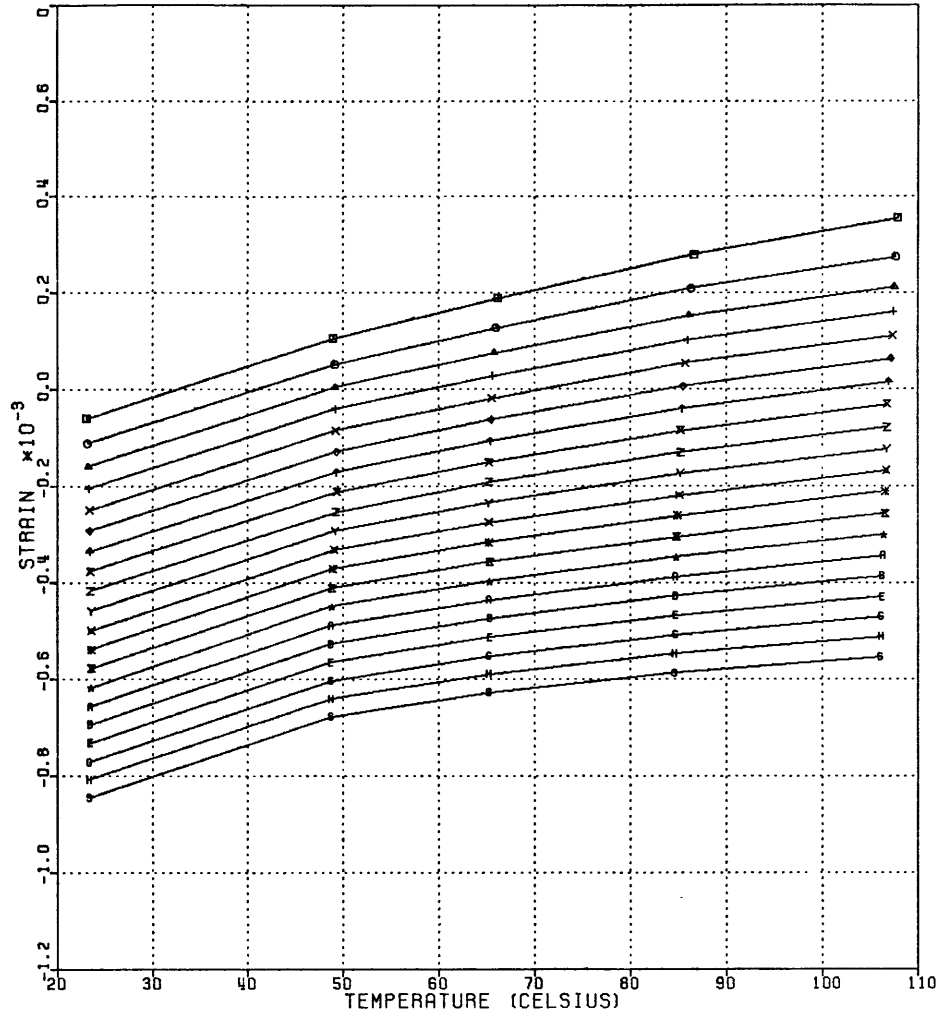
GAGE: 4C

- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- X - 107°C



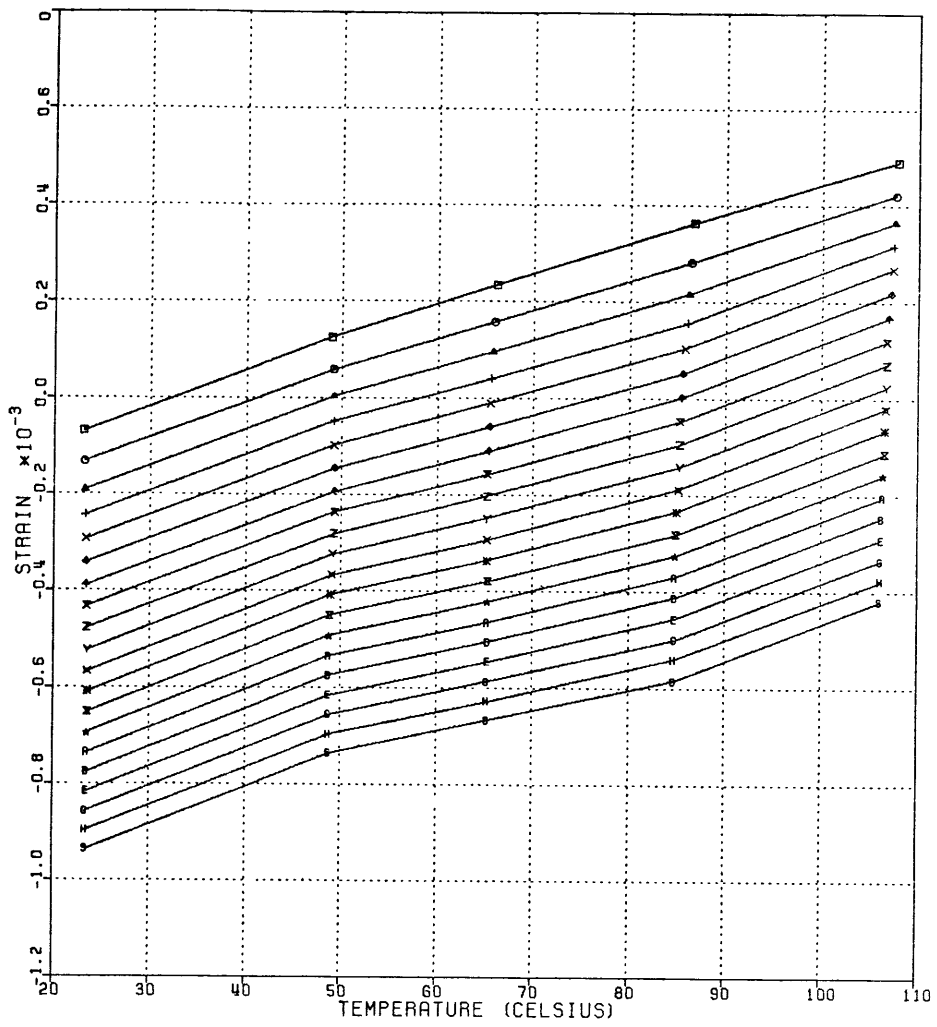
1381 MELLON WI GABBRO
GAGE:BA

- | | |
|-------------|-------------|
| □ - 10 MPA | ⊗ - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | ⊗ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ↑ - 70 MPA | E - 170 MPA |
| ⊗ - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



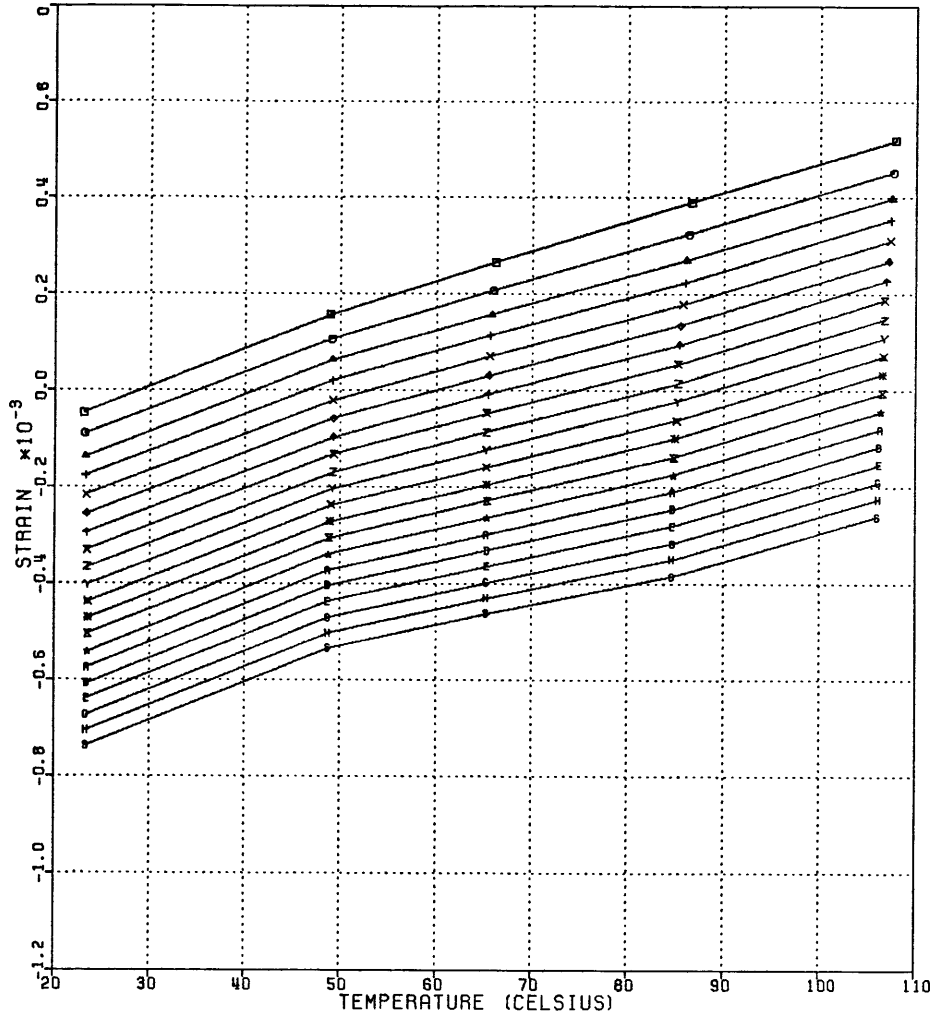
1381 MELLON WI GABBRO
GAGE: 4A

□ - 10 MPA	× - 110 MPA
○ - 20 MPA	✱ - 120 MPA
△ - 30 MPA	⊗ - 130 MPA
+ - 40 MPA	★ - 140 MPA
× - 50 MPA	A - 150 MPA
◇ - 60 MPA	B - 160 MPA
♠ - 70 MPA	E - 170 MPA
⊗ - 80 MPA	G - 180 MPA
Z - 90 MPA	H - 190 MPA
Y - 100 MPA	S - 200 MPA



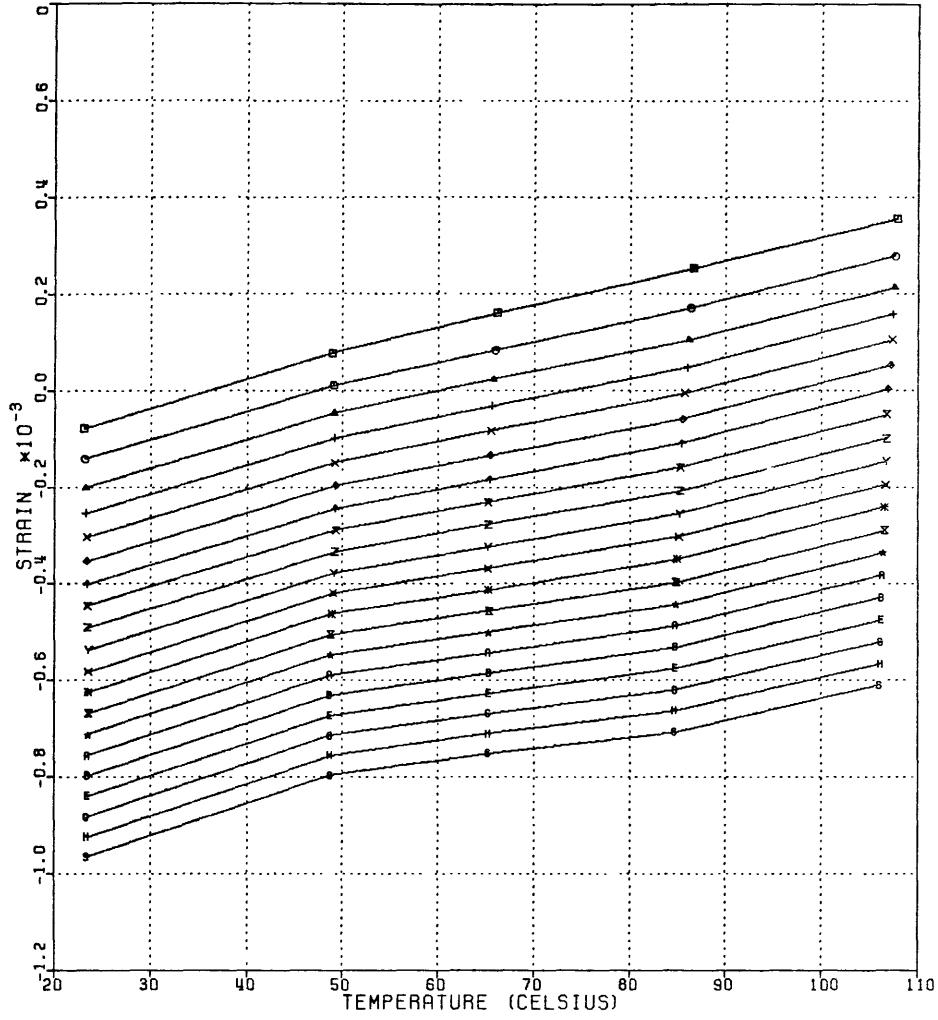
1381 MELLON WI GABBRO
GAGE: AB

- | | |
|-------------|-------------|
| □ - 10 MPA | ⊗ - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | ⊗ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ⊕ - 70 MPA | E - 170 MPA |
| ⊗ - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



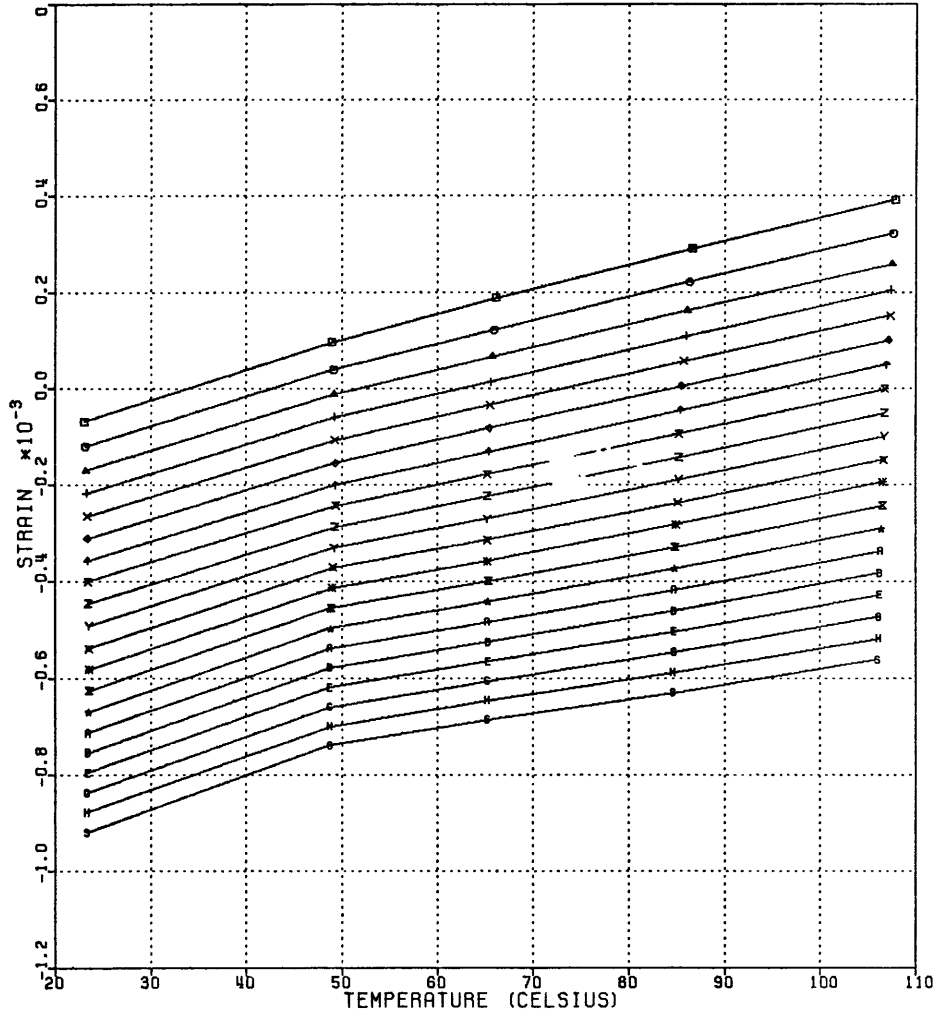
1381 MELLON WI GABBRO
GAGE:CB

- | | |
|-------------|-------------|
| □ - 10 MPA | ⌘ - 110 MPA |
| ○ - 20 MPA | ✱ - 120 MPA |
| △ - 30 MPA | ⌘ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| × - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ⋈ - 70 MPA | E - 170 MPA |
| ⌘ - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



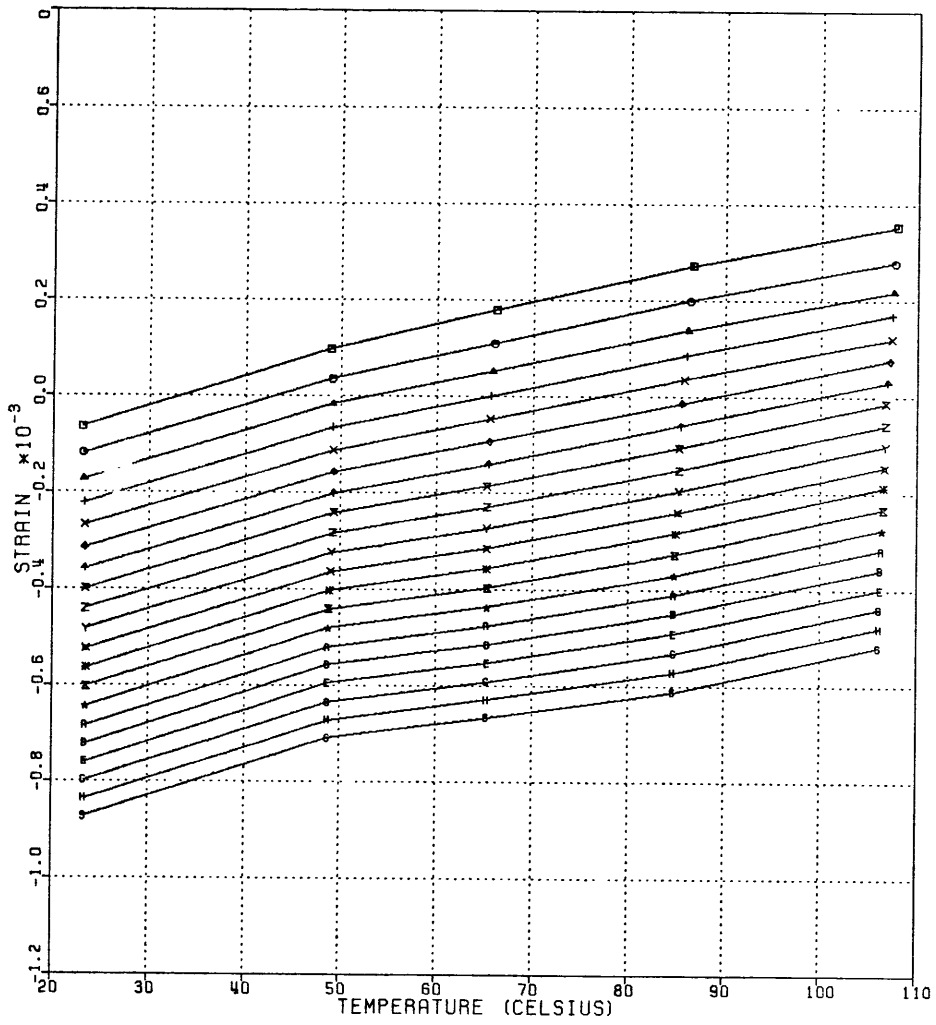
1381 MELLON WI GABBRO
GAGE:3B

- | | |
|-------------|-------------|
| □ - 10 MPA | ⌘ - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | ⌘ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| × - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ⤴ - 70 MPA | E - 170 MPA |
| X - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



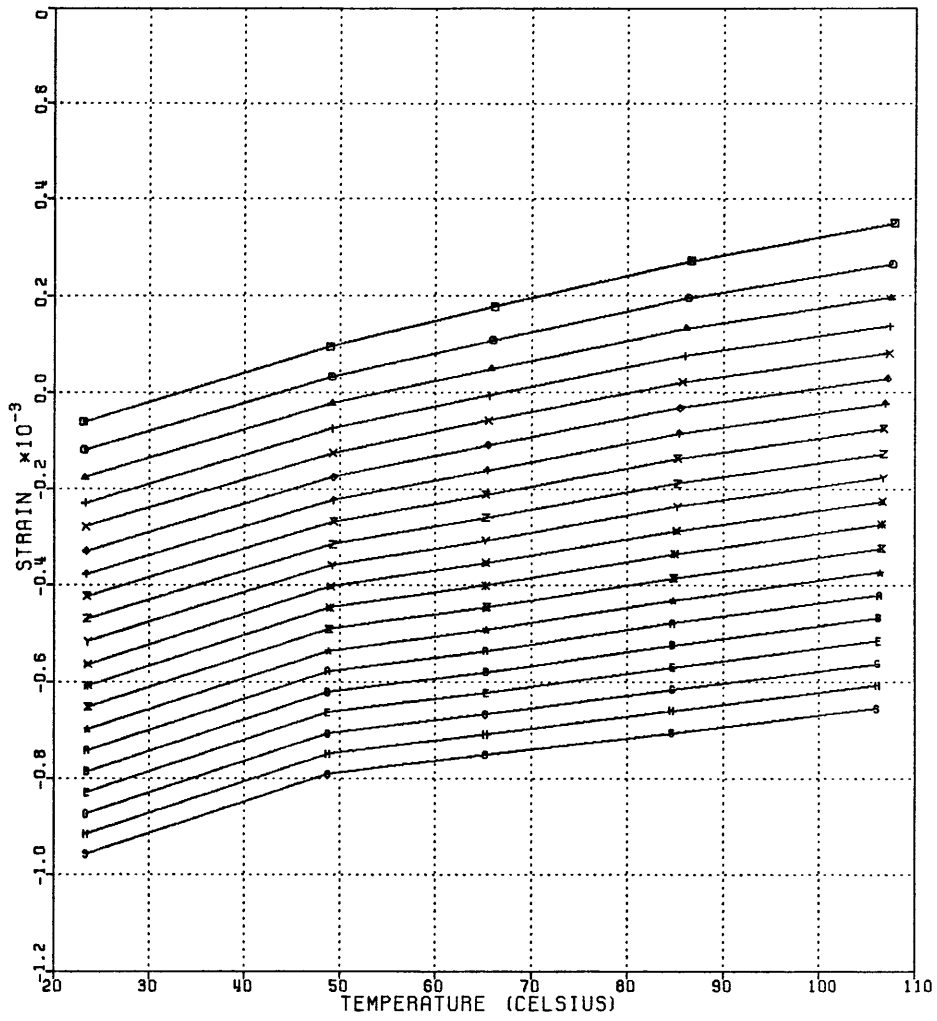
1381 MELLON WI GABBRO
GAGE: 4B

- | | |
|-------------|-------------|
| □ - 10 MPA | × - 110 MPA |
| ○ - 20 MPA | ✱ - 120 MPA |
| △ - 30 MPA | ⊗ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| × - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ♠ - 70 MPA | E - 170 MPA |
| ⊗ - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



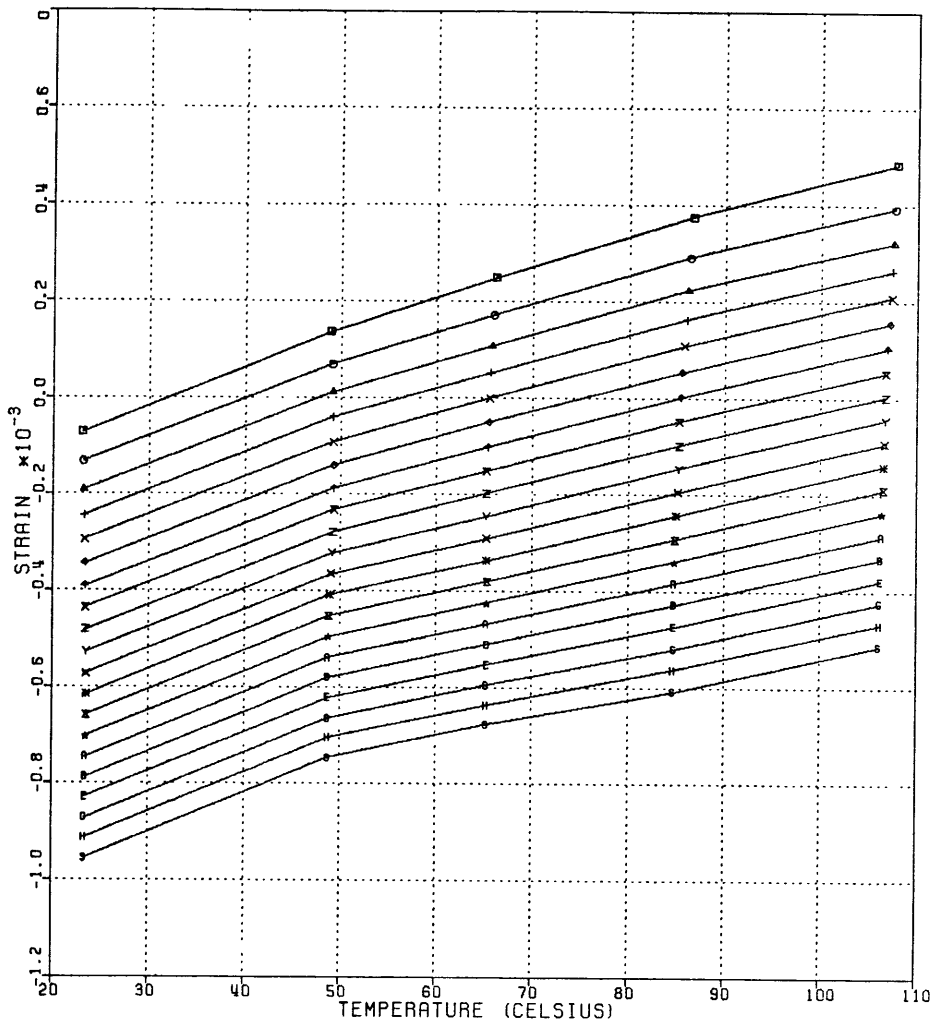
1381 MELLON WI GABBRO
GAGE: AC

□ - 10 MPA	⋈ - 110 MPA
○ - 20 MPA	✱ - 120 MPA
△ - 30 MPA	⋈ - 130 MPA
+ - 40 MPA	★ - 140 MPA
X - 50 MPA	A - 150 MPA
◇ - 60 MPA	B - 160 MPA
⋈ - 70 MPA	E - 170 MPA
⋈ - 80 MPA	G - 180 MPA
Z - 90 MPA	H - 190 MPA
Y - 100 MPA	S - 200 MPA



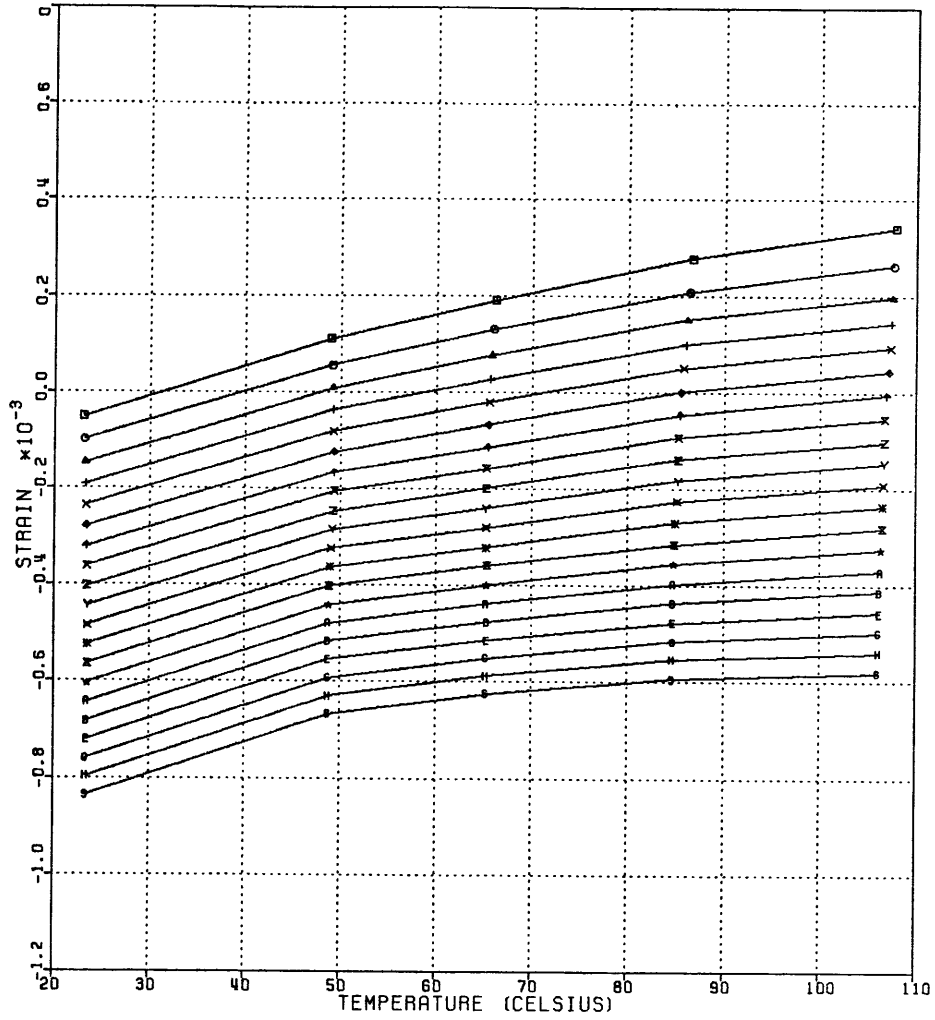
1381 MELLON WI GABBRO
GAGE: BC

- | | |
|-------------|-------------|
| □ - 10 MPA | × - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | ⊗ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| × - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ⋈ - 70 MPA | E - 170 MPA |
| ⊗ - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



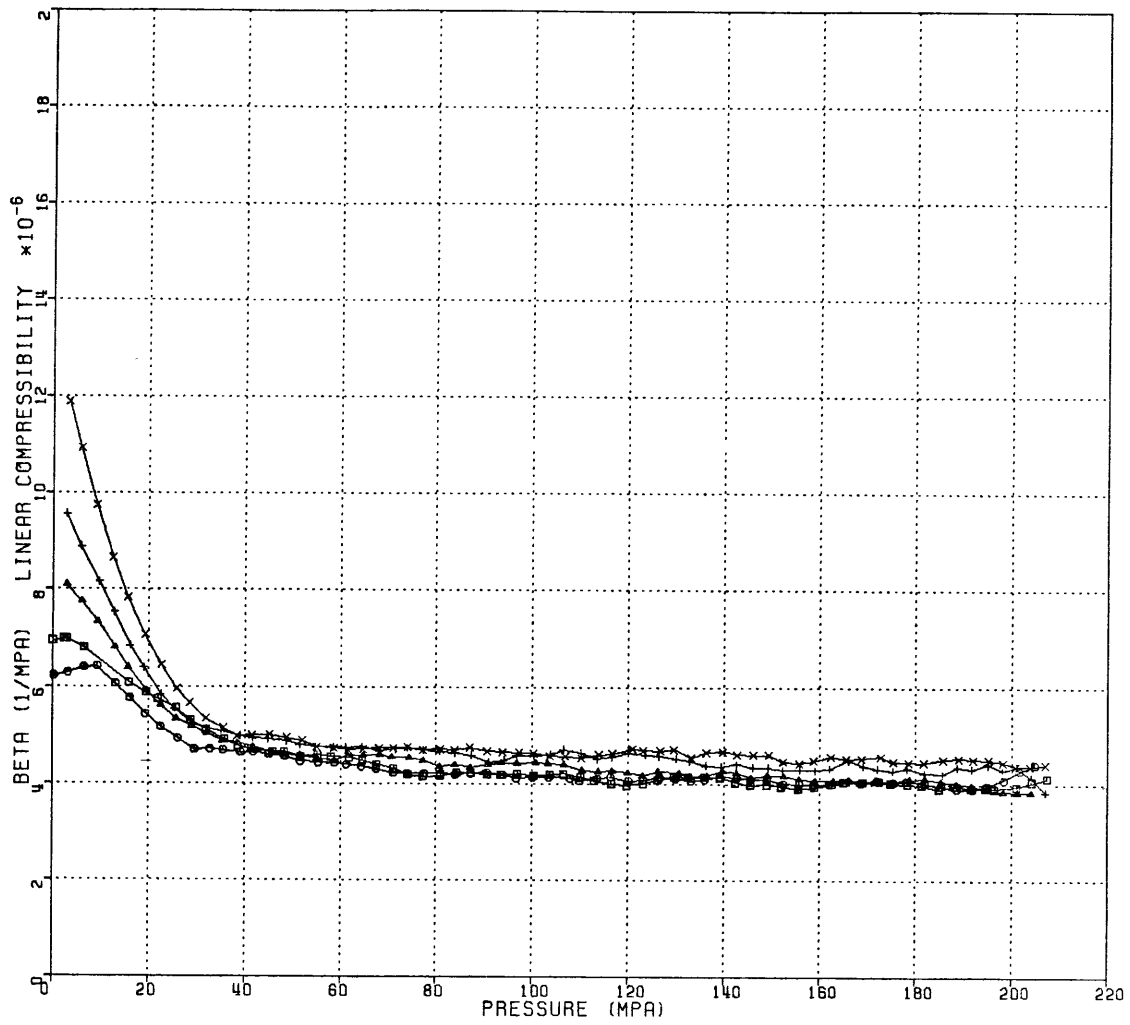
1381 MELLON WI GABBRO
 GAGE: 3C

- | | |
|-------------|-------------|
| □ - 10 MPA | ⊗ - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | ⊗ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ⊕ - 70 MPA | E - 170 MPA |
| ⊗ - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



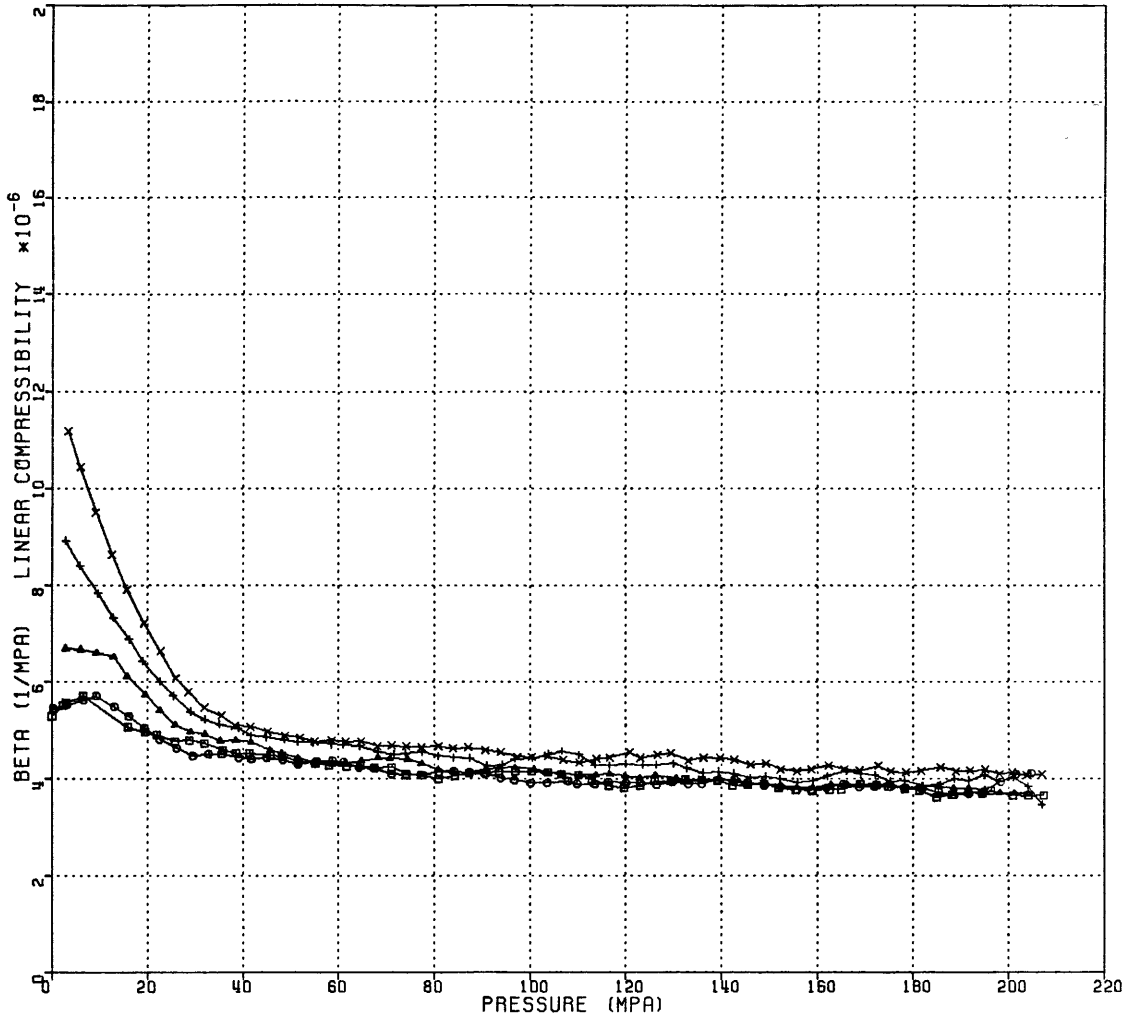
1381 MELLON WI GABBRO
GAGE: 4C

- | | |
|-------------|-------------|
| □ - 10 MPA | ⌘ - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | ⌘ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ⋈ - 70 MPA | E - 170 MPA |
| ⌘ - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



1381 MELLON WI GABBRO
GAGE: BA

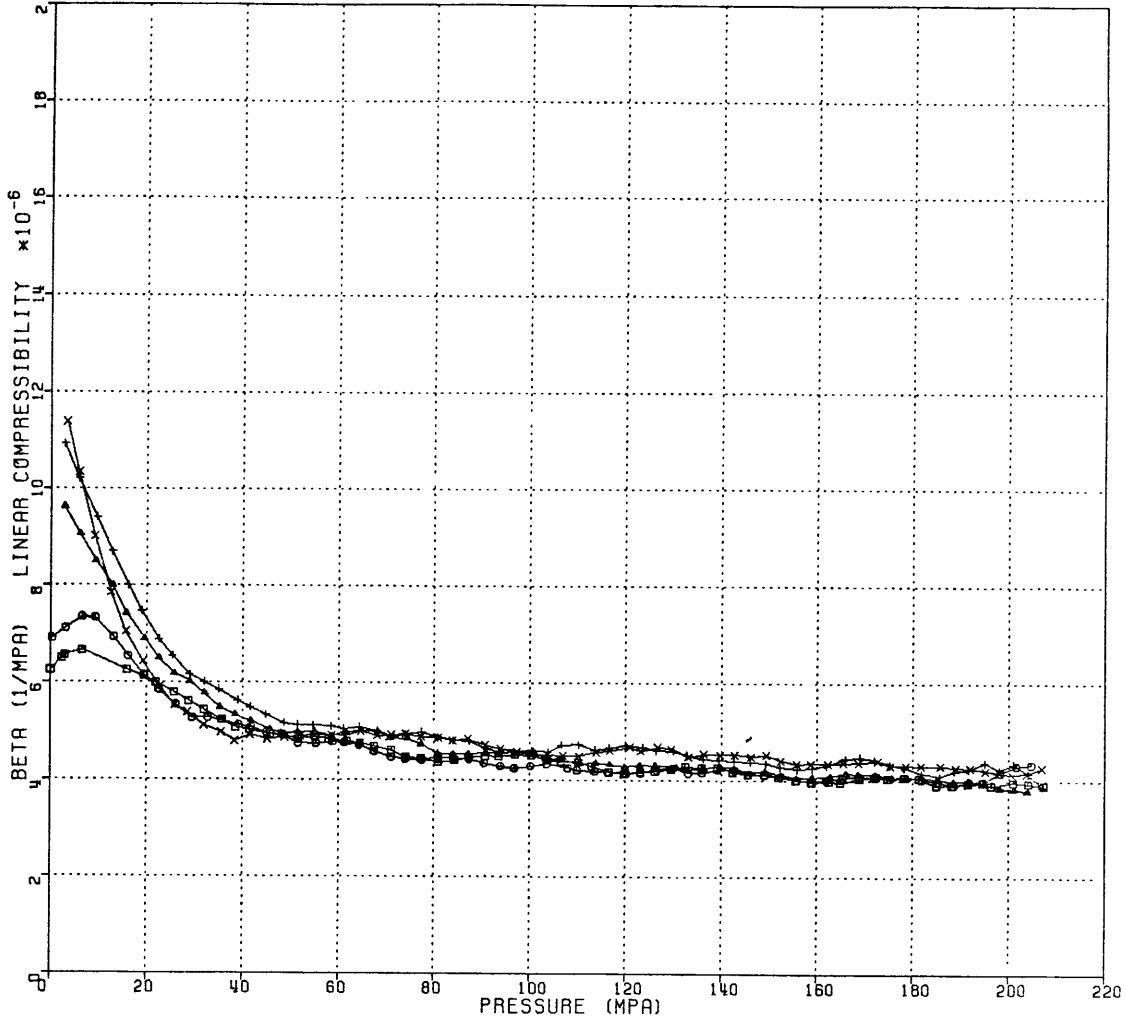
- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- × - 107°C



1381 MELLON WI GABBRO

GAGE: 4A

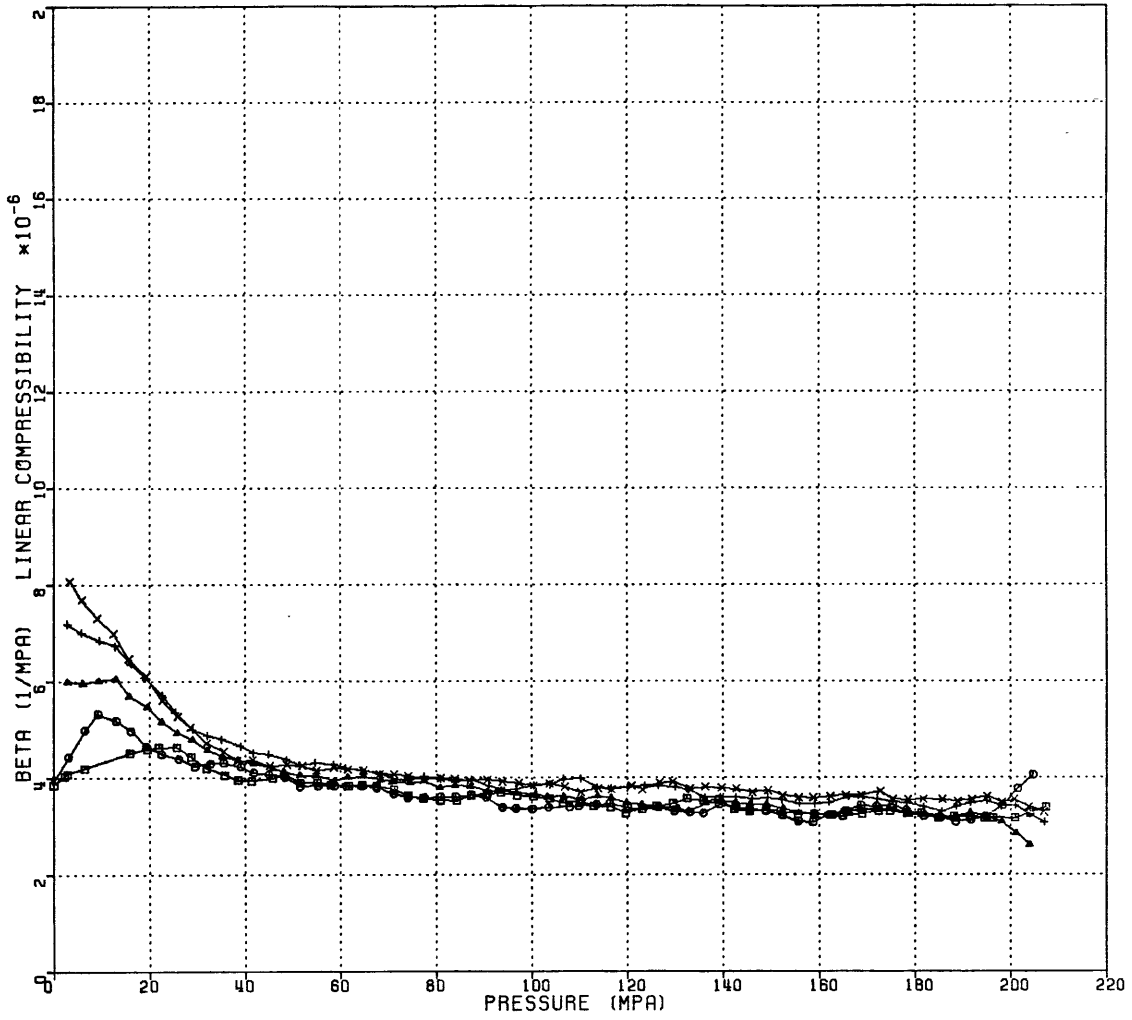
- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- × - 107°C



1381 MELLON WI GABBRO

GAGE: AB

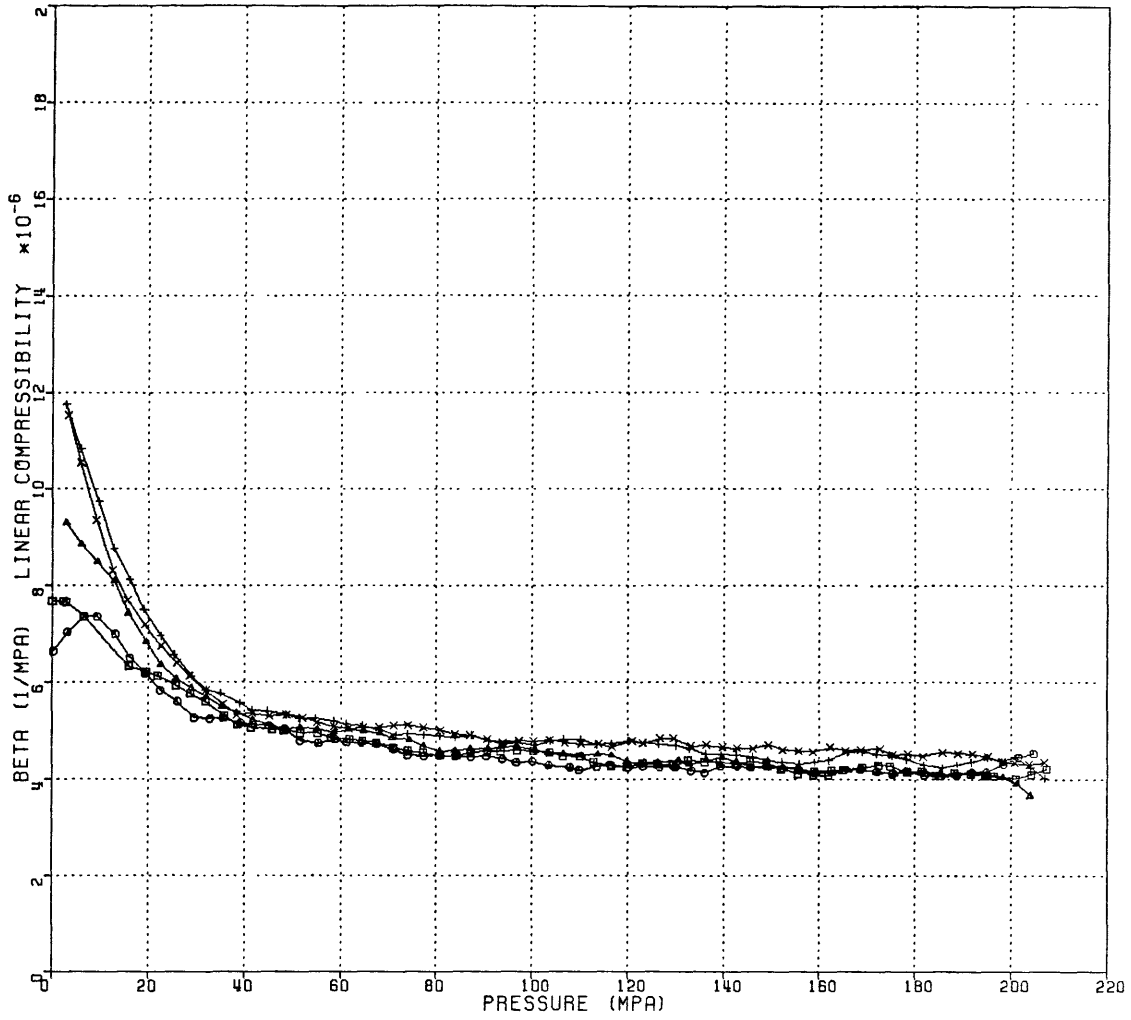
- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- X - 107°C



1381 MELLON WI GABBRO

GAGE:CB

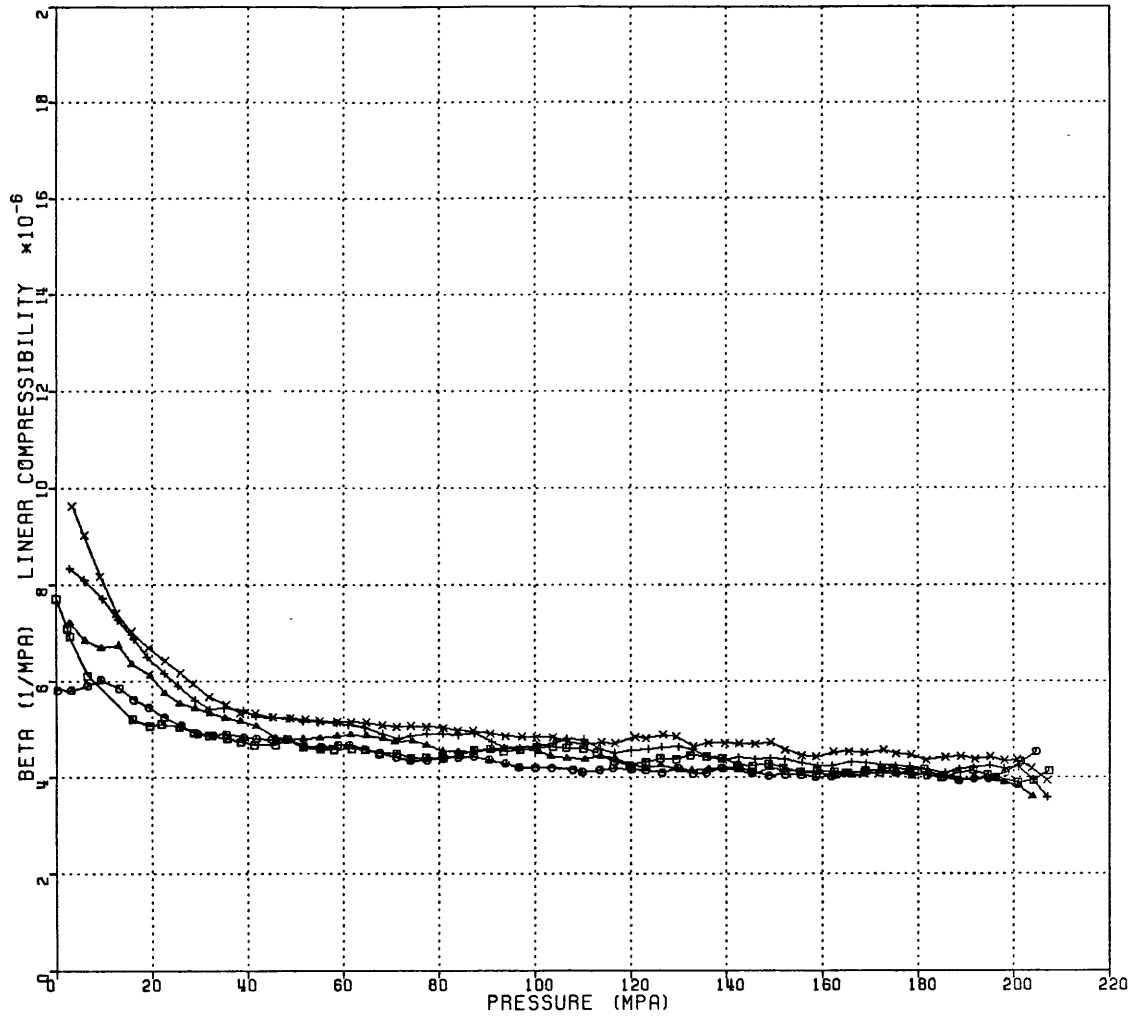
- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- × - 107°C



1381 MELLON WI GABBRO

GAGE: 3B

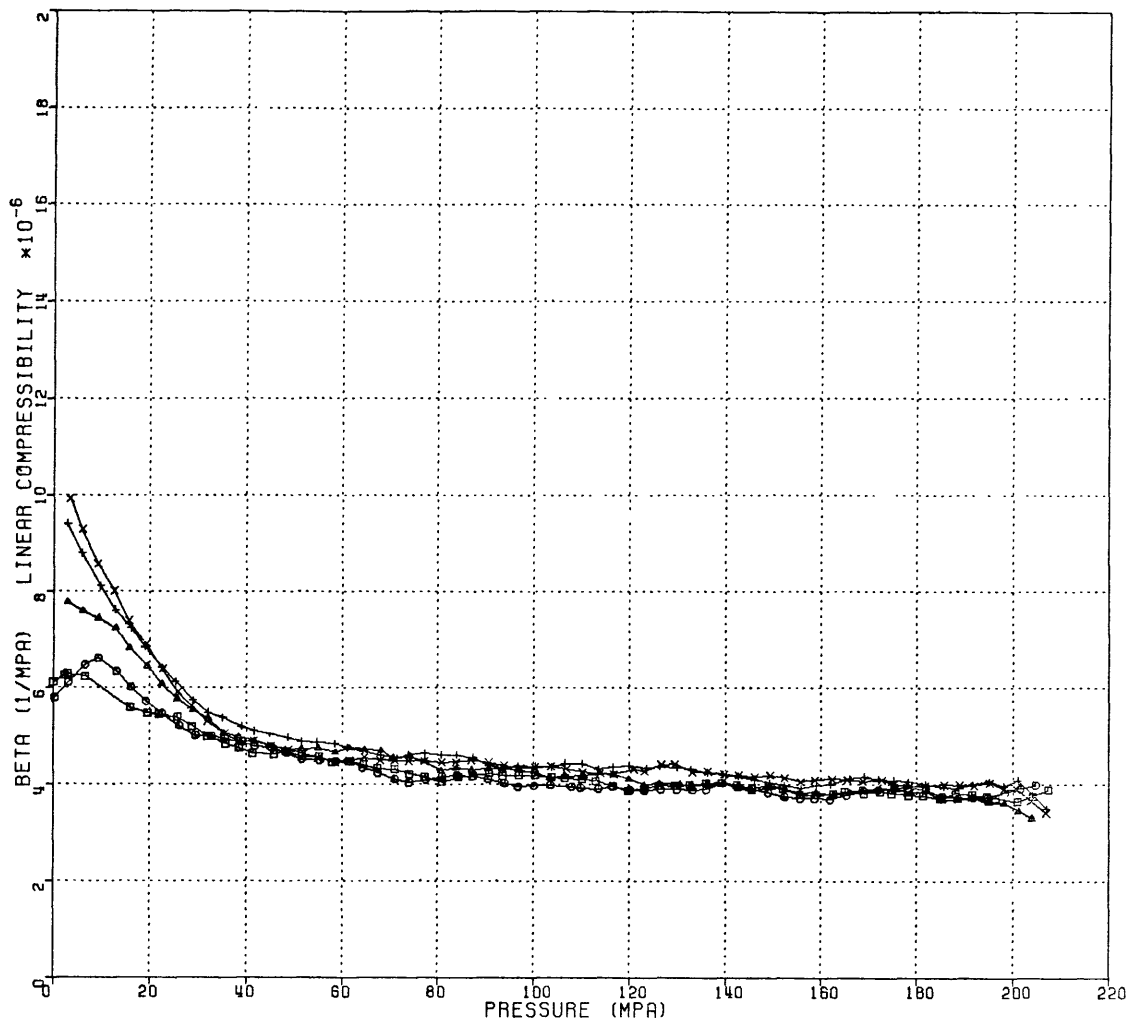
- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- × - 107°C



1381 MELLON WI GABBR0

GAGE: 4B

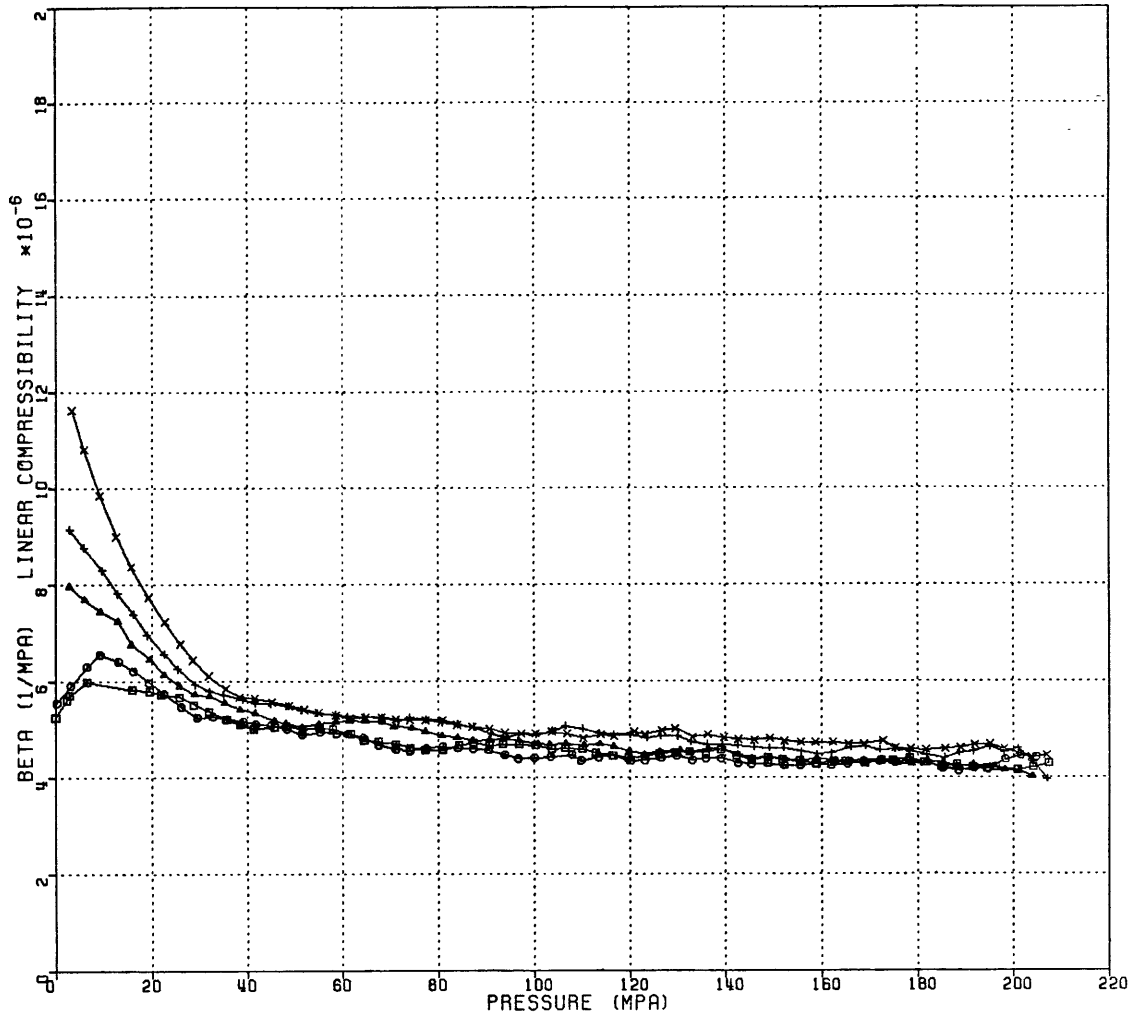
□ - 23°C
 ○ - 49°C
 △ - 65°C
 + - 85°C
 × - 107°C



1381 MELLON WI GABBRO

GAGE: AC

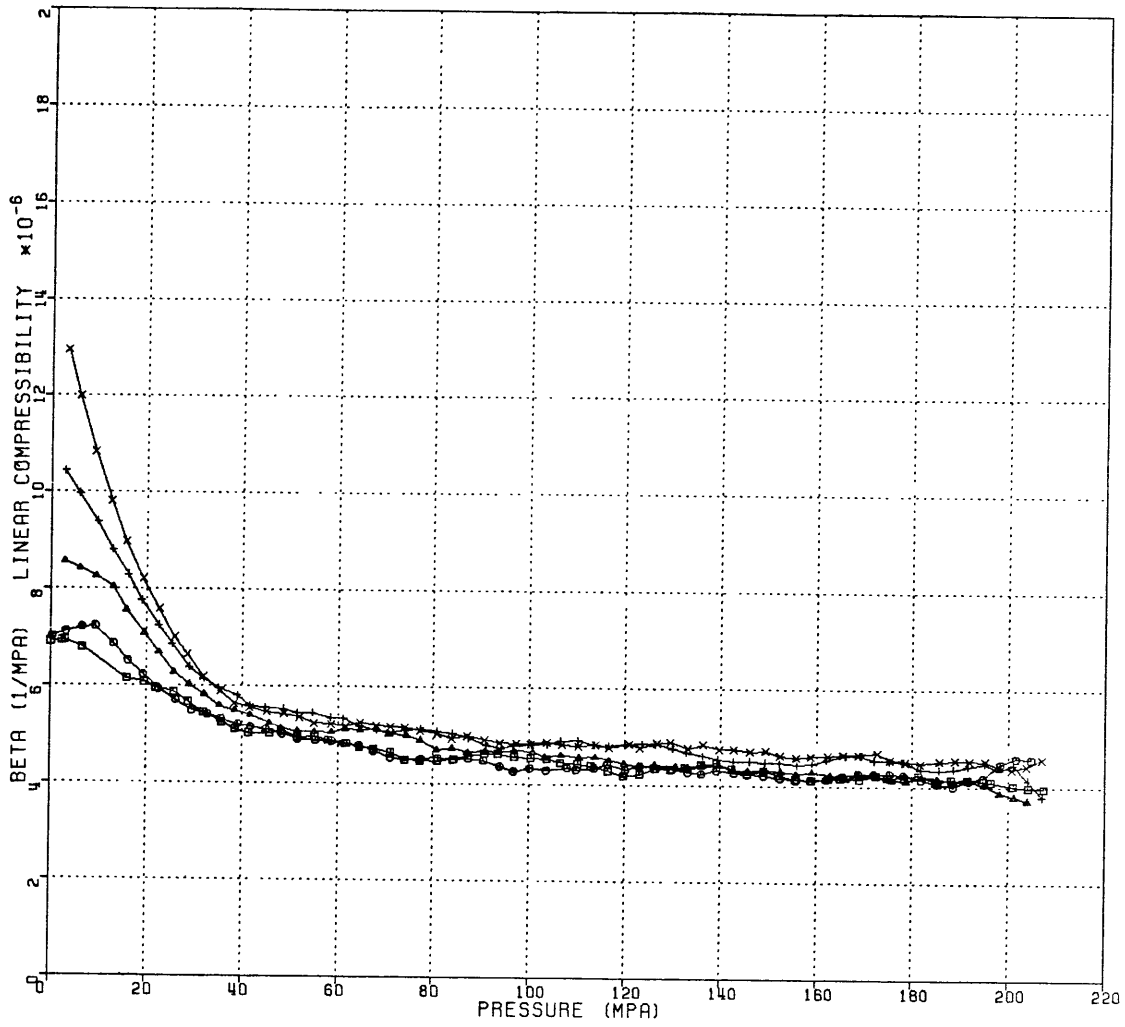
- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- X - 107°C



1381 MELLON WI GABBRO

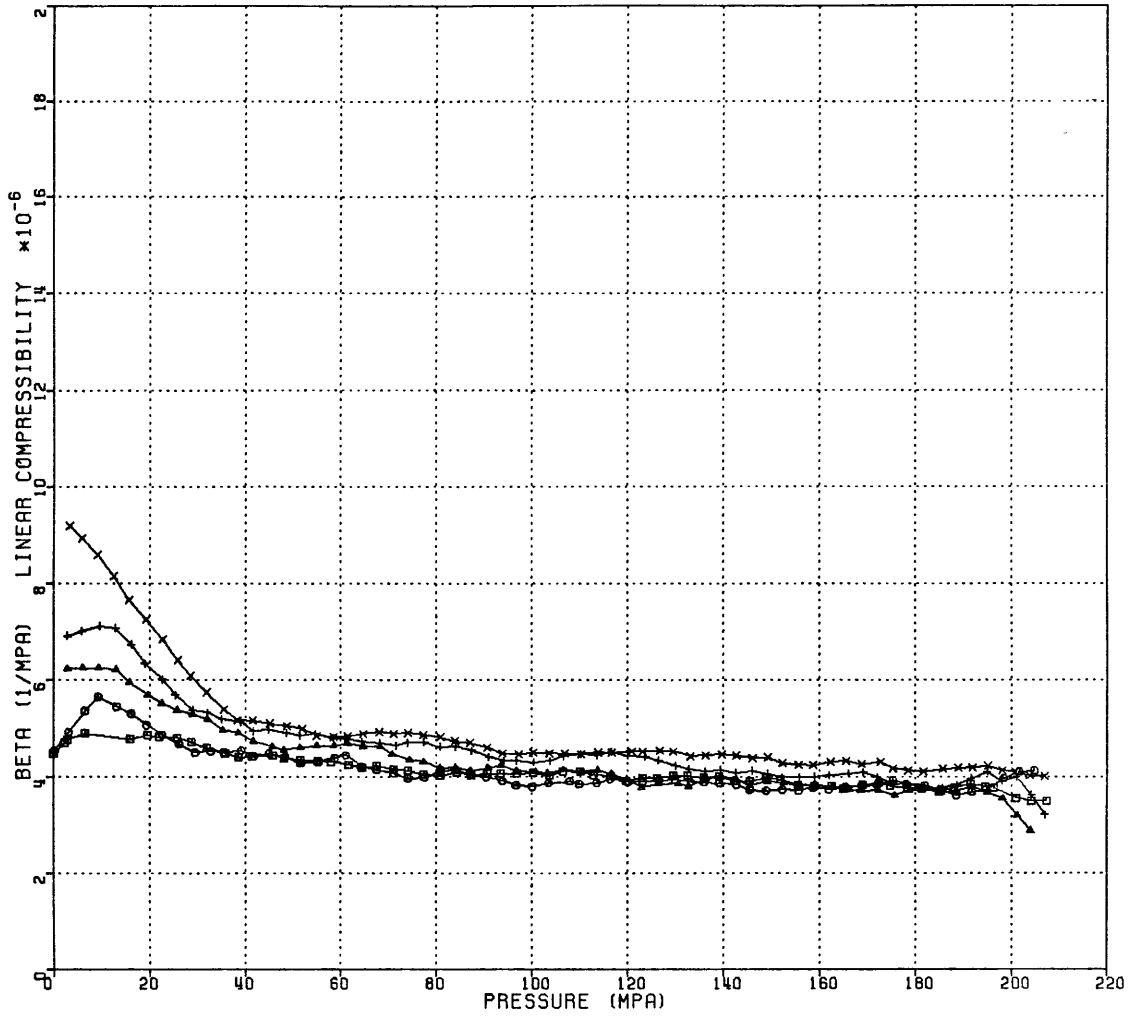
GAGE:BC

- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- × - 107°C



1381 MELLON WI GABBRO
GAGE: 3C

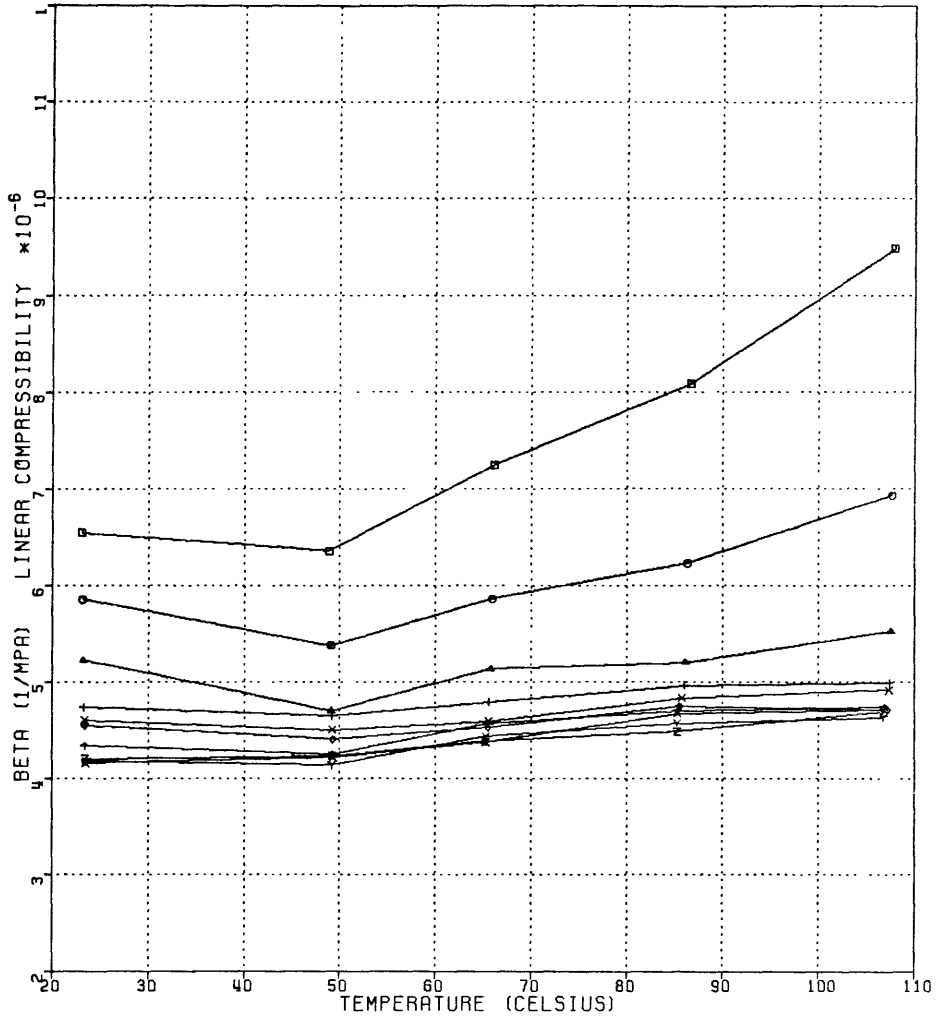
- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- × - 107°C



1381 MELLON WI GABBRO

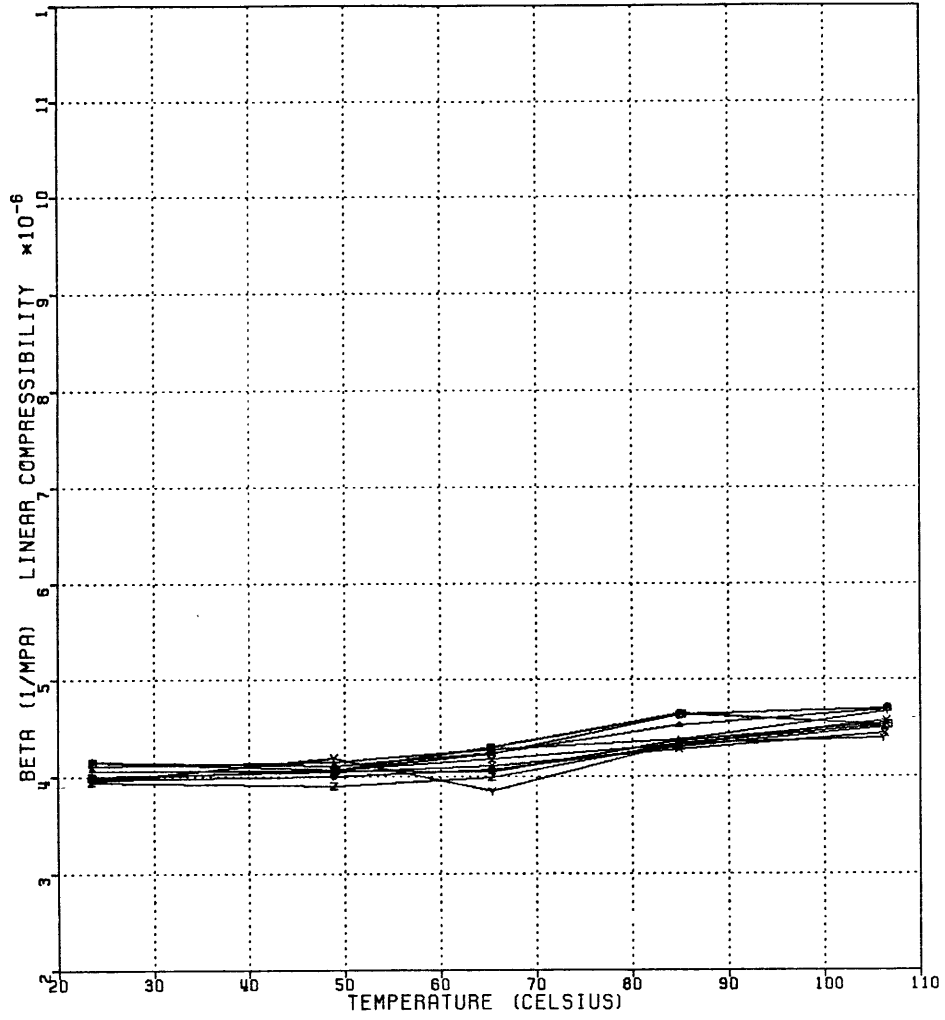
GAGE:4C

- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- X - 107°C



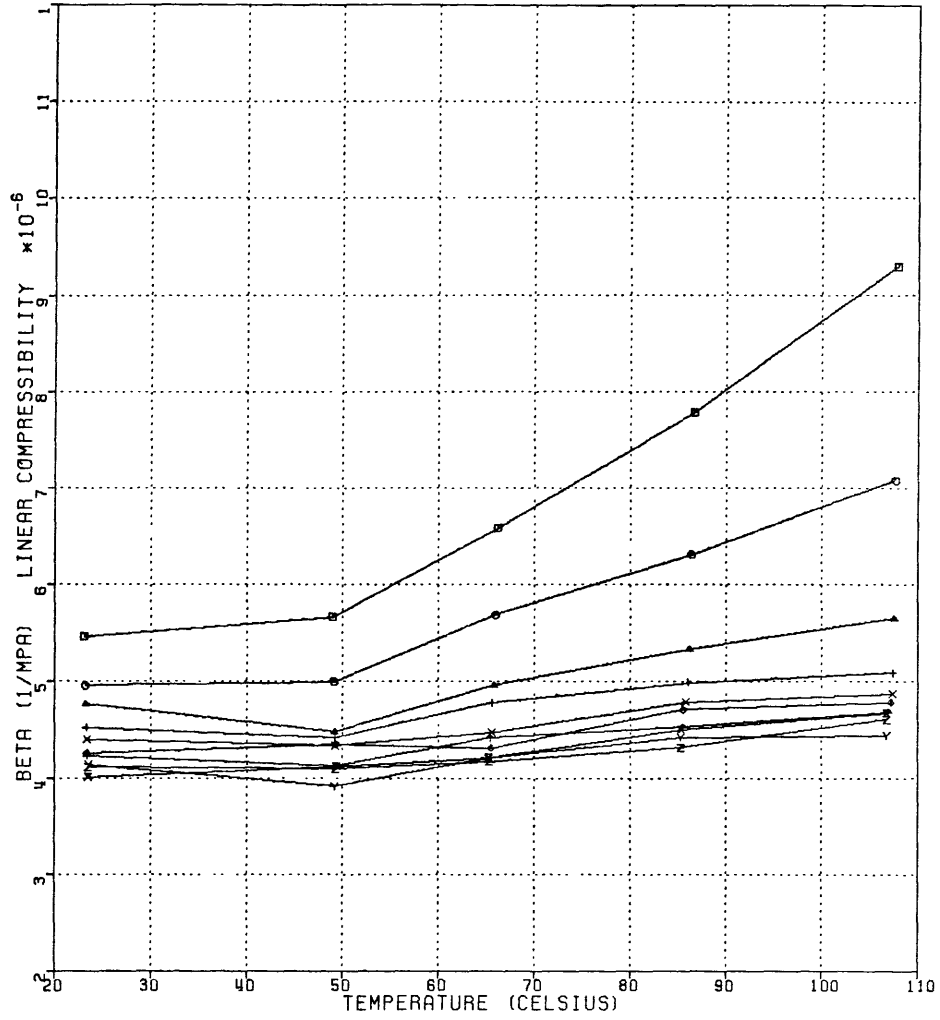
1381 MELLON WI GABBRO
GAGE:BA

- - 10 MPa
- - 20 MPa
- △ - 30 MPa
- + - 40 MPa
- X - 50 MPa
- ◇ - 60 MPa
- ↑ - 70 MPa
- X - 80 MPa
- Z - 90 MPa
- Y - 100 MPa



1381 MELLON WI GABBRO
GAGE:BA

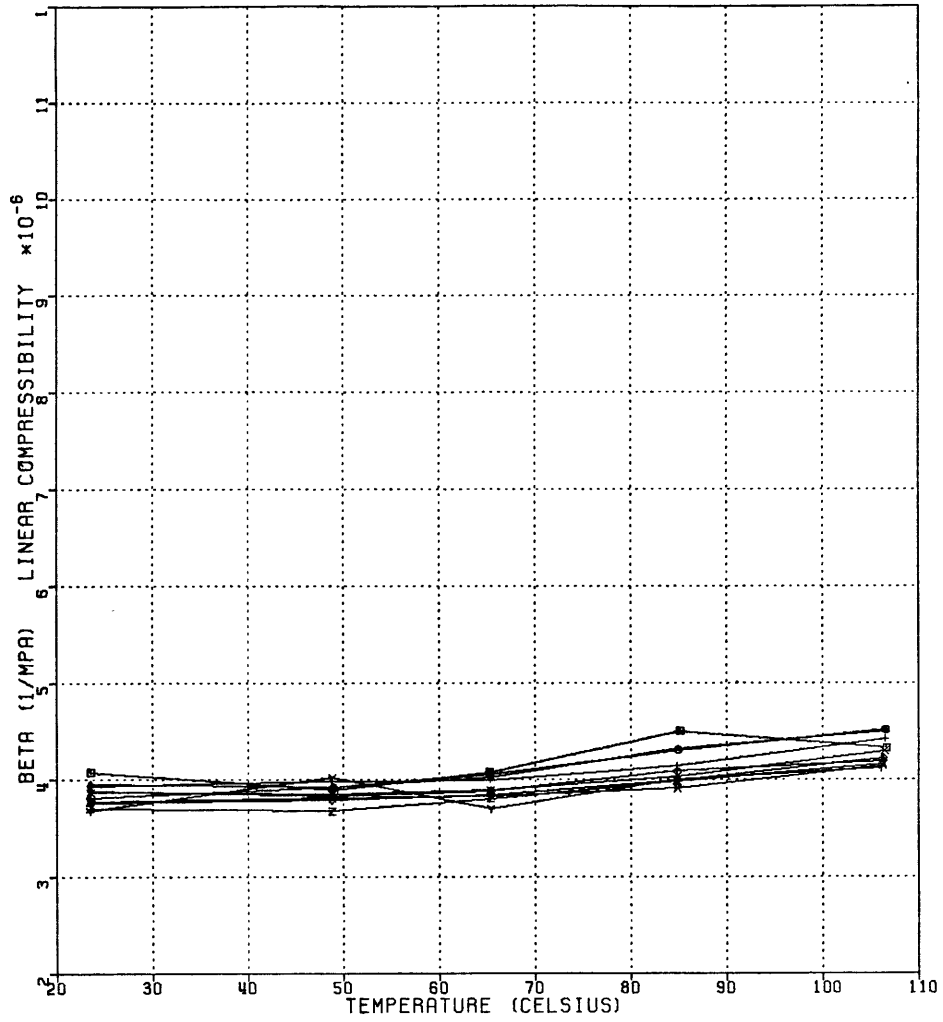
- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- +
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



1381 MELLON WI GABBRO

GAGE: 4A

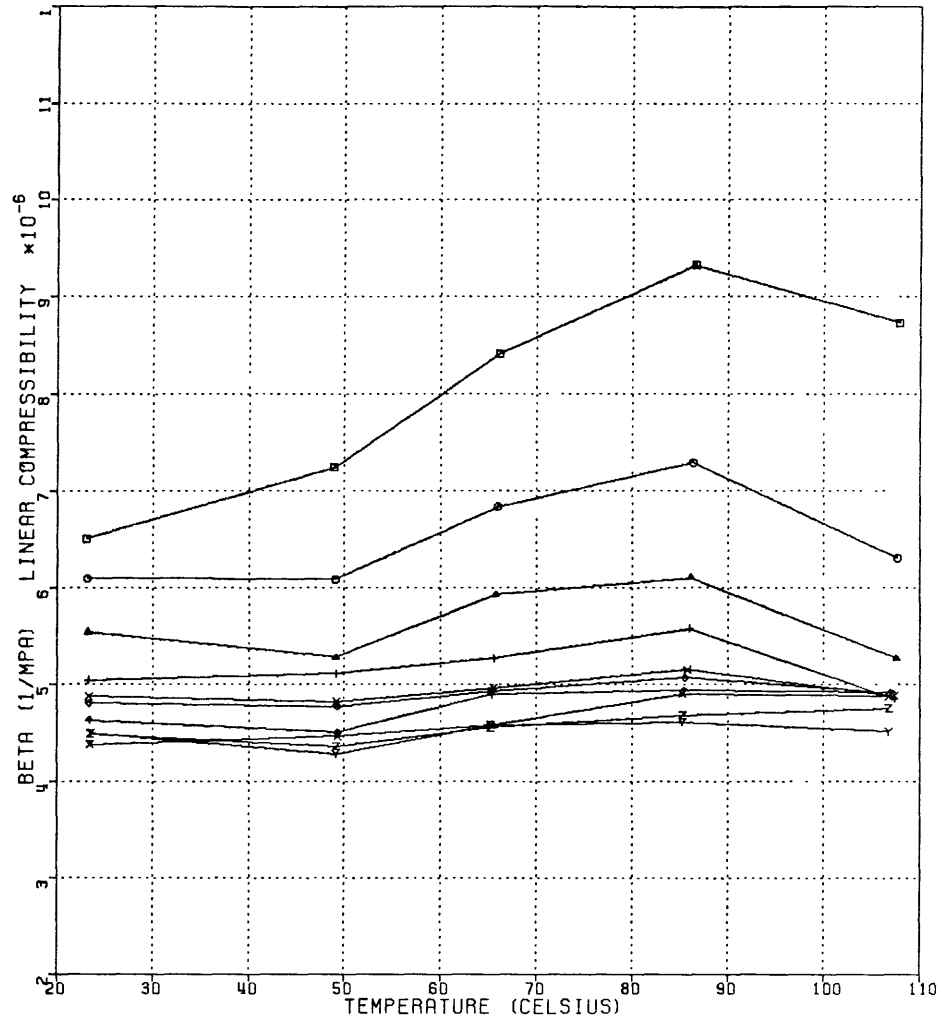
- - 10 MPa
- - 20 MPa
- △ - 30 MPa
- + - 40 MPa
- X - 50 MPa
- ◇ - 60 MPa
- ♠ - 70 MPa
- X - 80 MPa
- Z - 90 MPa
- Y - 100 MPa



1381 MELLON WI GABBRO

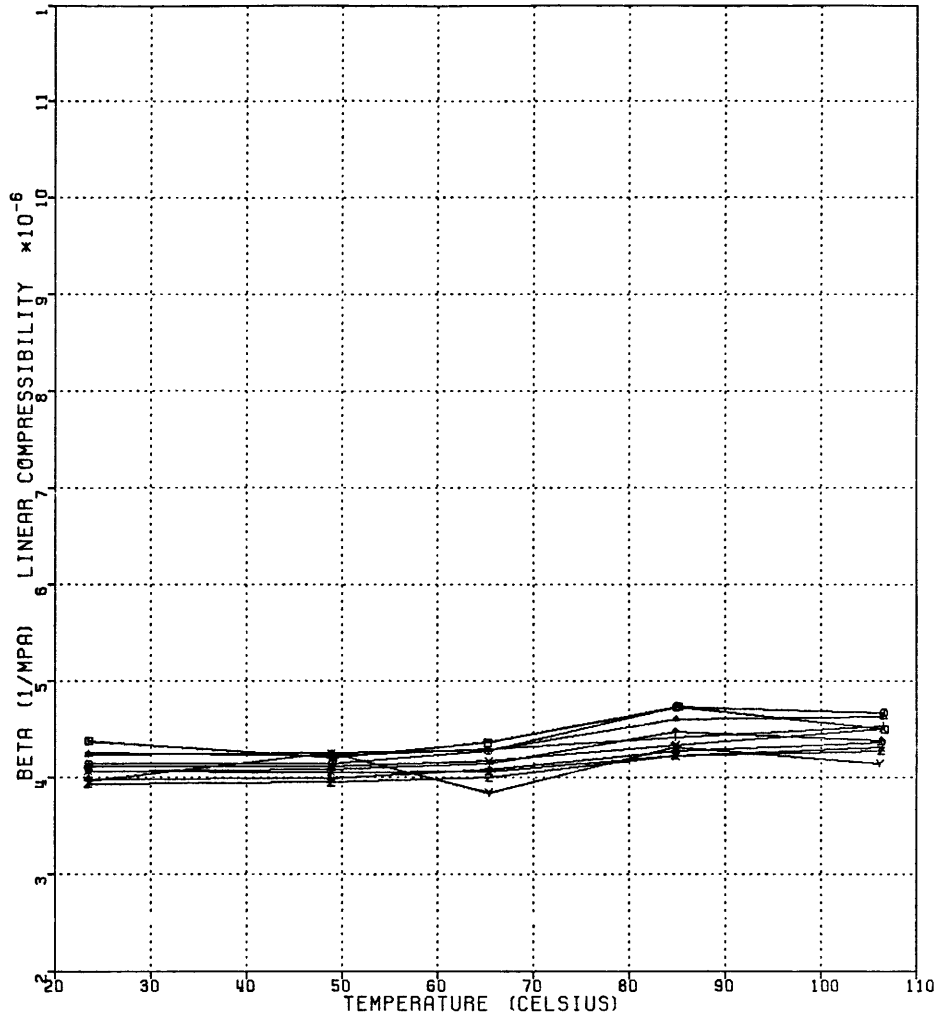
GAGE: 4A

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



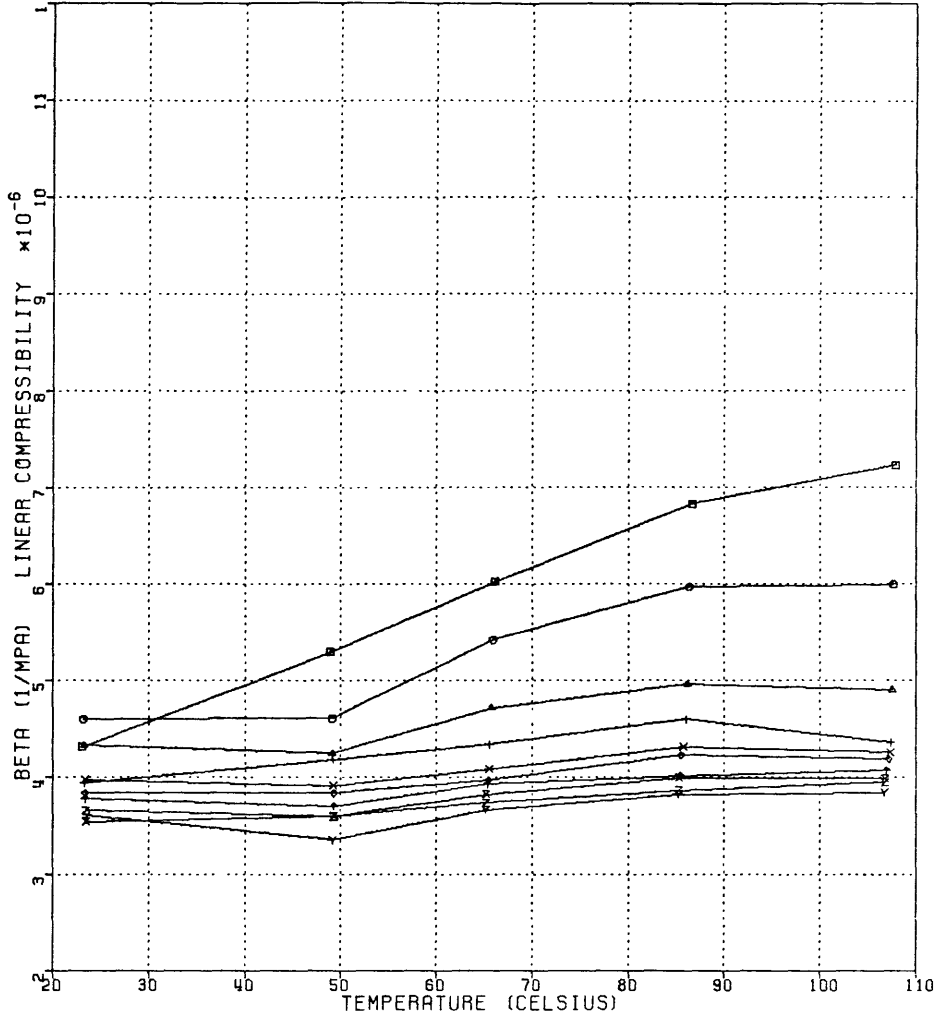
1381 MELLON WI GABBRO
GAGE: AB

- - 10 MPA
- - 20 MPA
- ▲ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ♠ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



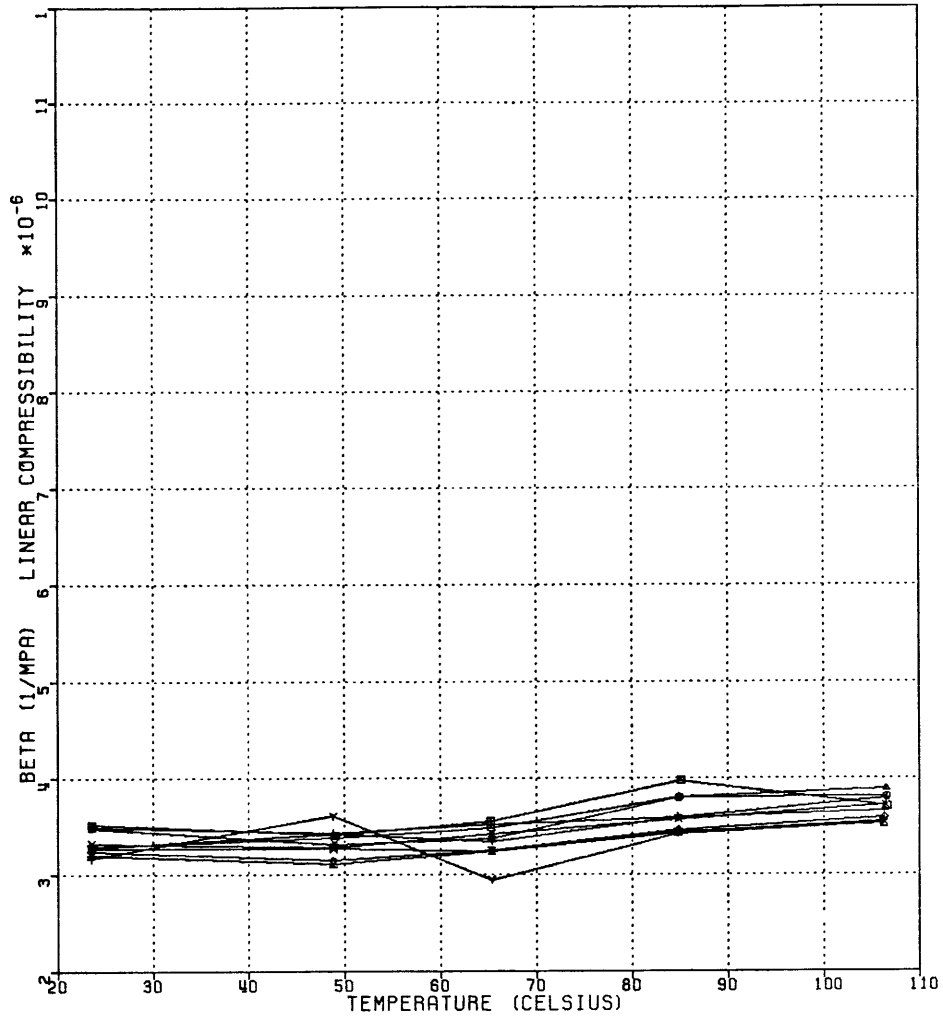
1381 MELLON WI GABBRO
GAGE: AB

- - 110 MPA
- - 120 MPA
- ▲ - 130 MPA
- +
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



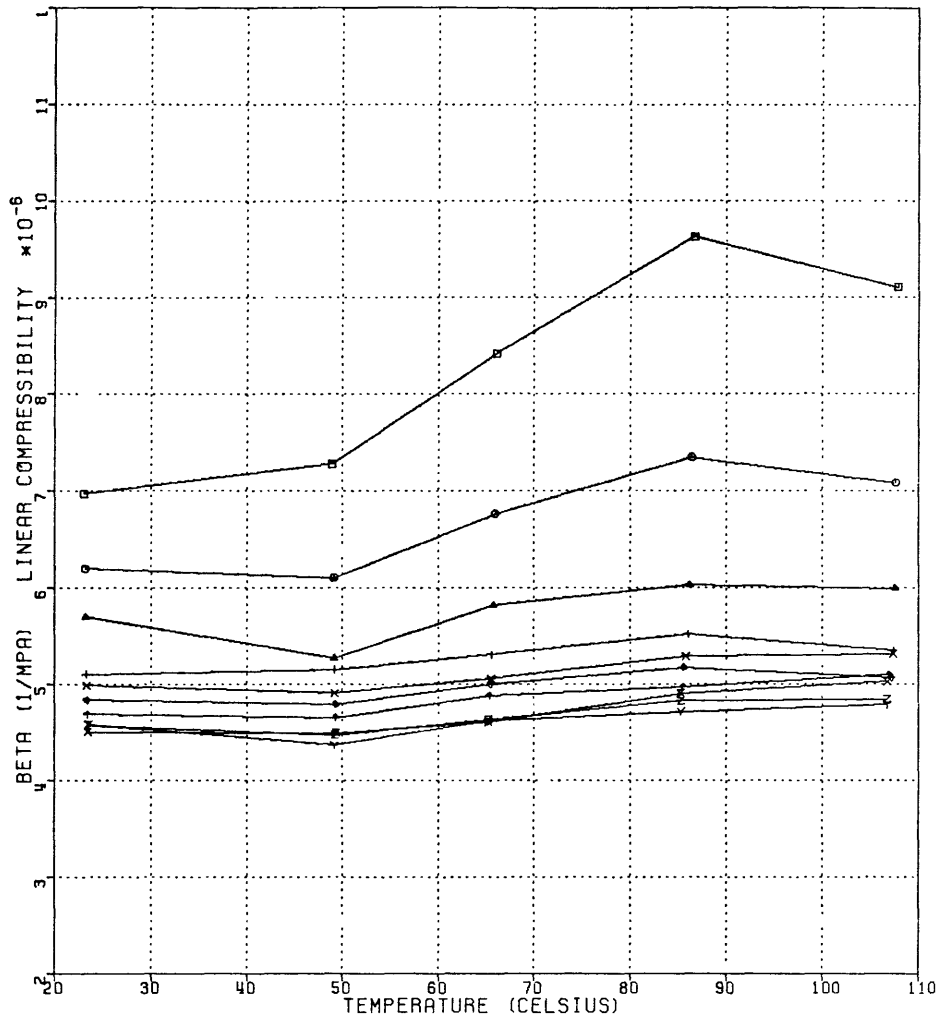
1381 MELLON WI GABBRO
GAGE:CB

- - 10 MPa
- - 20 MPa
- △ - 30 MPa
- + - 40 MPa
- × - 50 MPa
- ◇ - 60 MPa
- * - 70 MPa
- X - 80 MPa
- Z - 90 MPa
- Y - 100 MPa



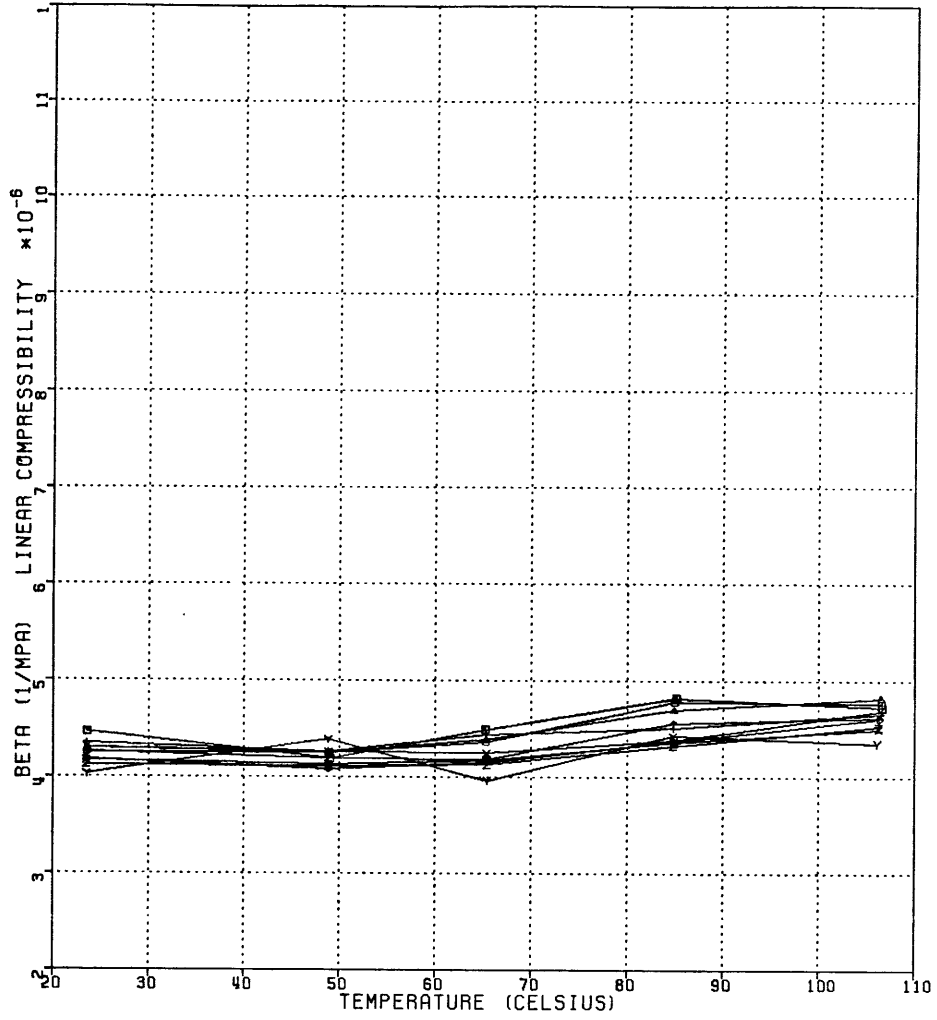
1381 MELLON WI GABBRO
GAGE:CB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- × - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



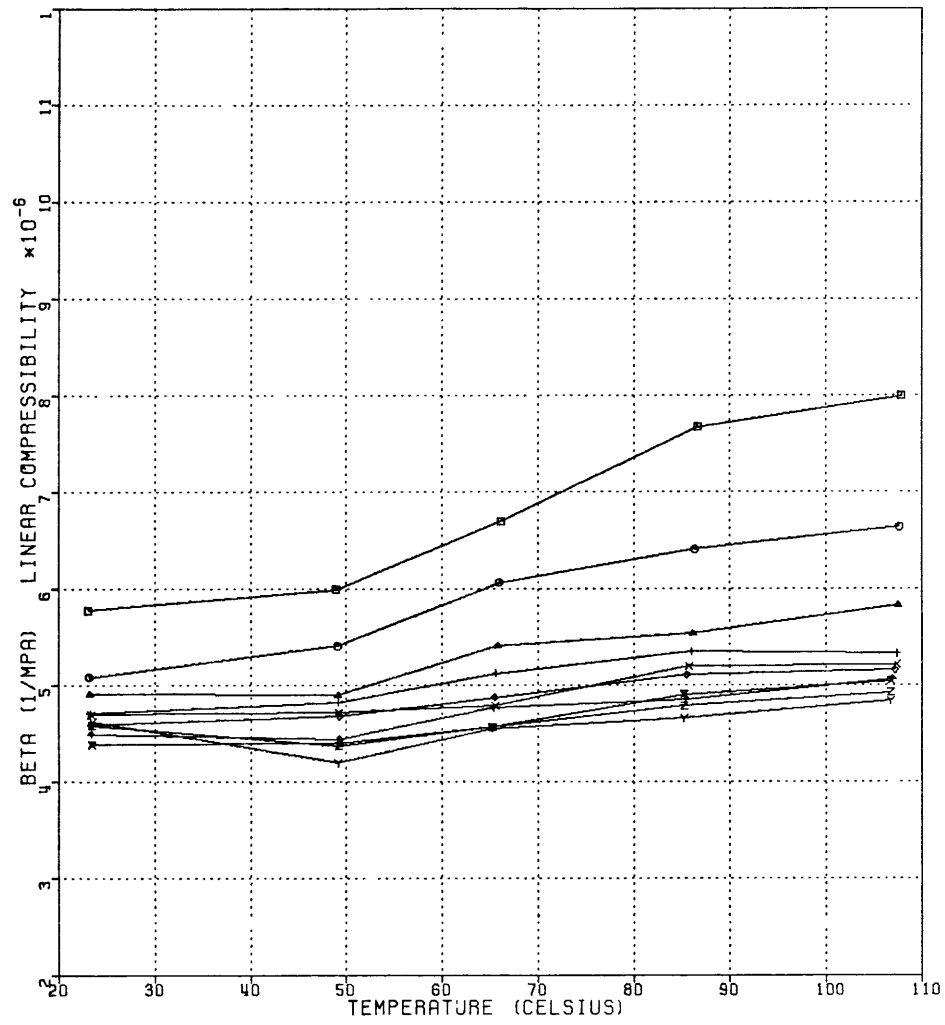
1381 MELLON WI GABBRO
GAGE: 3B

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- × - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



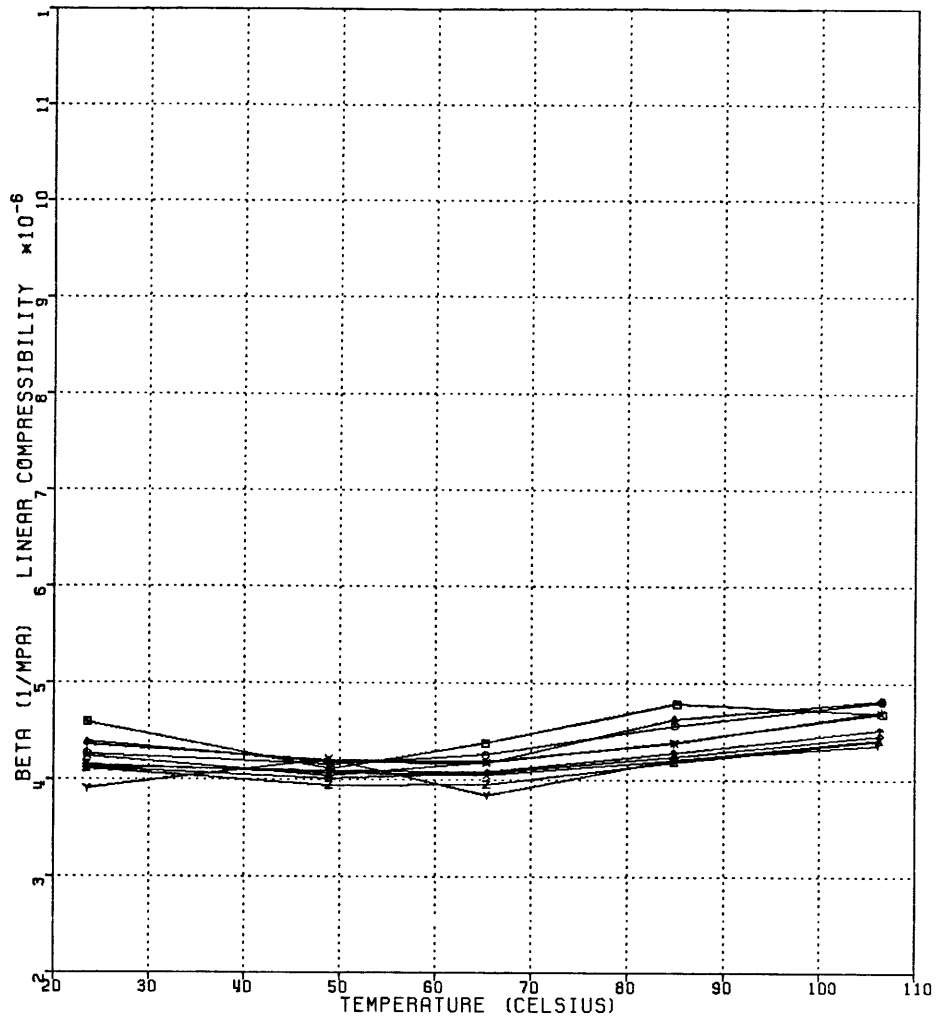
1381 MELLON WI GABBRO
GAGE: 3B

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



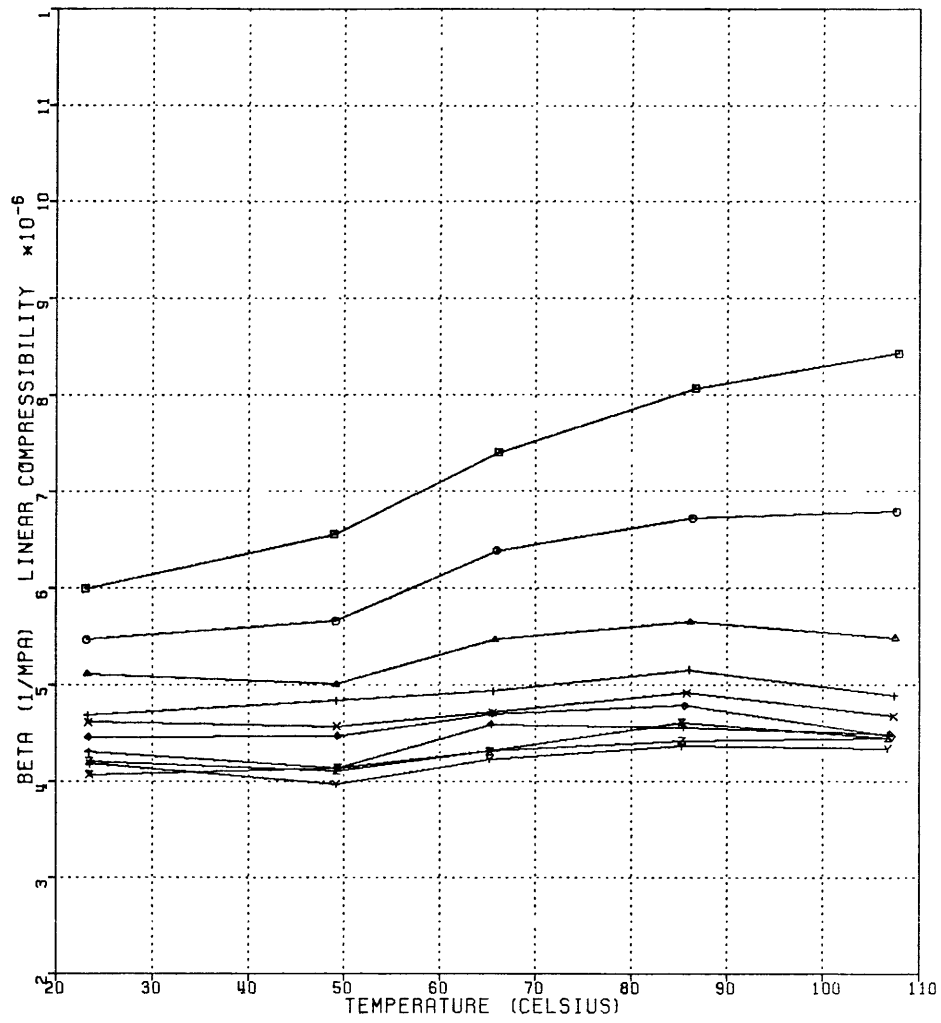
1381 MELLON WI GABBRO
GAGE: 4B

- - 10 MPa
- - 20 MPa
- △ - 30 MPa
- + - 40 MPa
- X - 50 MPa
- ◇ - 60 MPa
- ♠ - 70 MPa
- ⊗ - 80 MPa
- ∇ - 90 MPa
- Y - 100 MPa



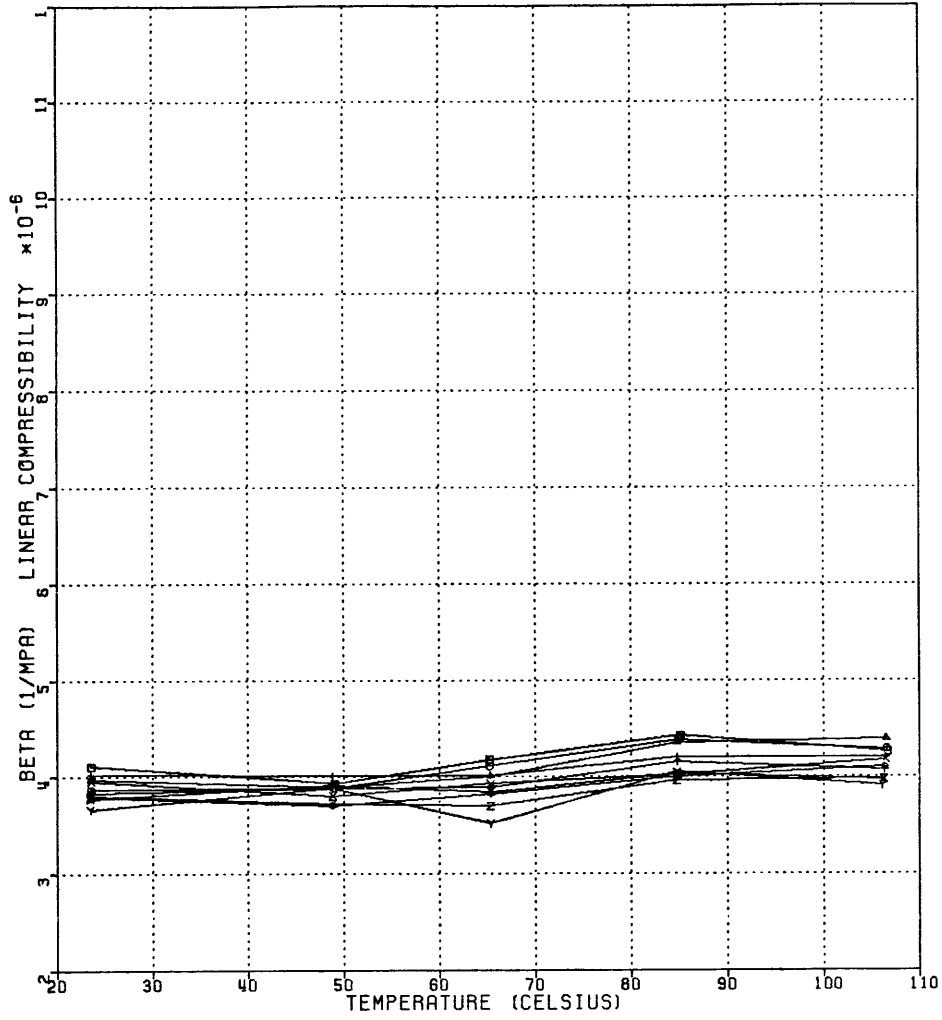
1381 MELLON WI GABBRO
GAGE: 4B

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



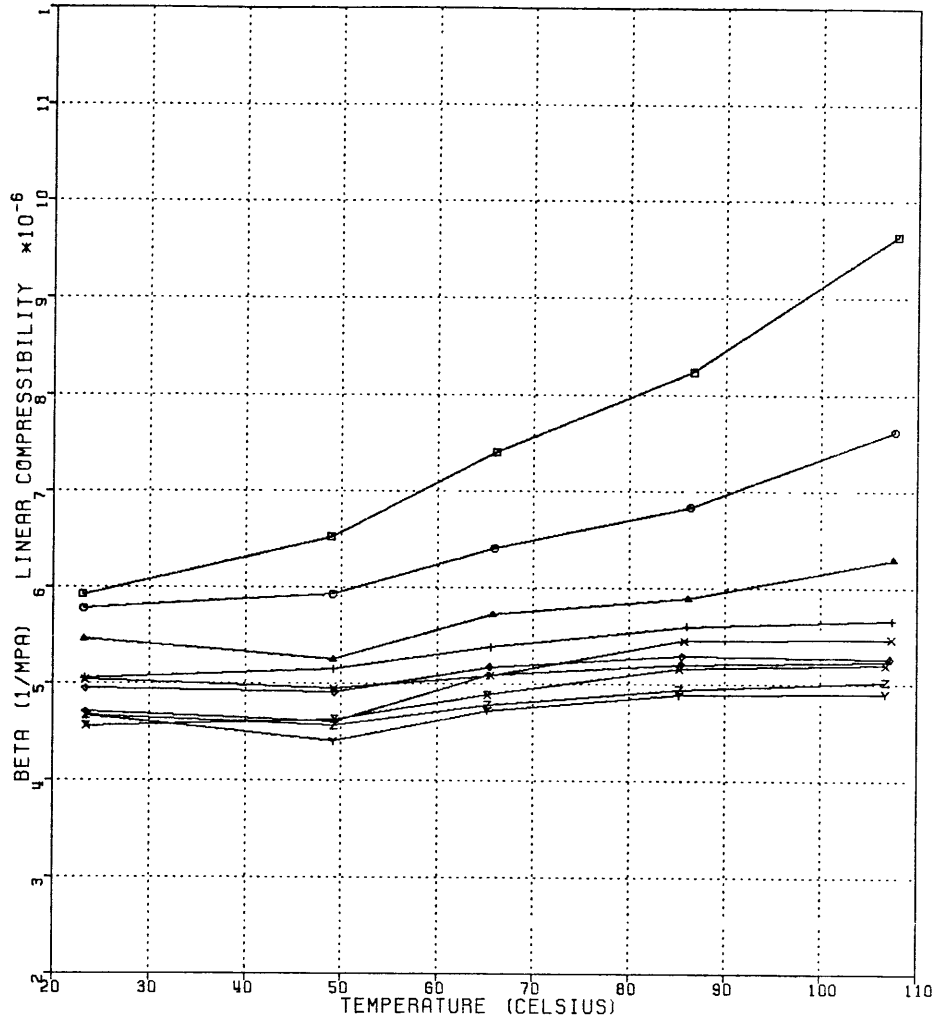
1381 MELLON WI GABBRO
GAGE: AC

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⋈ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



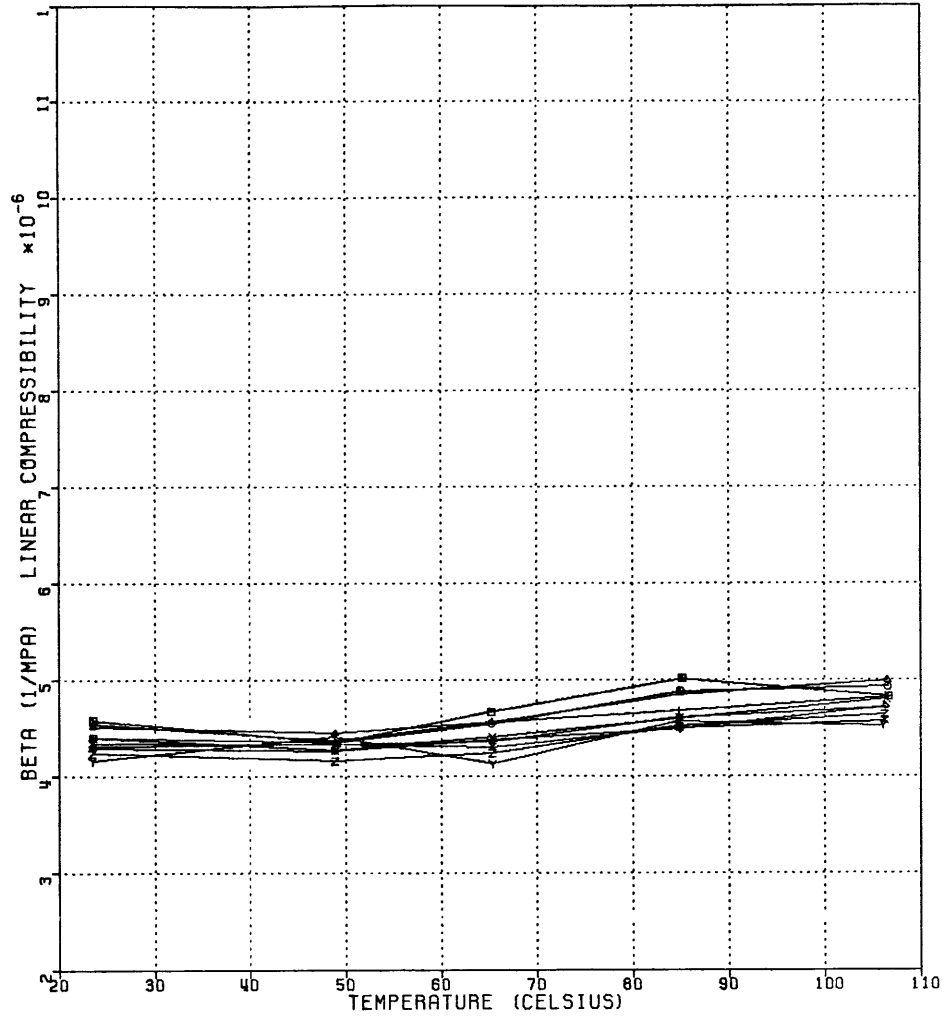
1381 MELLON WI GABBRO
GAGE: AC

- - 110 MPA
- - 120 MPA
- ▲ - 130 MPA
- +
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



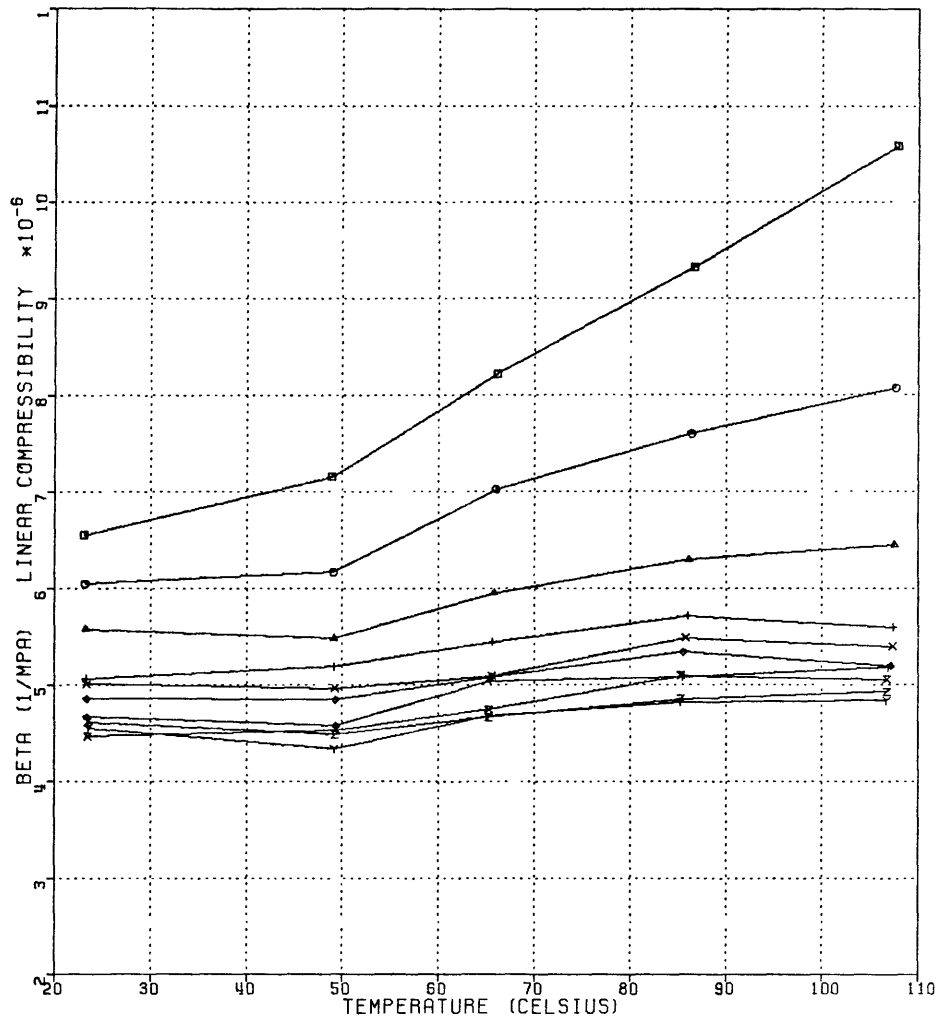
1381 MELLON WI GABBRO
GAGE:BC

- - 10 MPa
- - 20 MPa
- △ - 30 MPa
- + - 40 MPa
- X - 50 MPa
- ◇ - 60 MPa
- ⊕ - 70 MPa
- ⊗ - 80 MPa
- Z - 90 MPa
- Y - 100 MPa



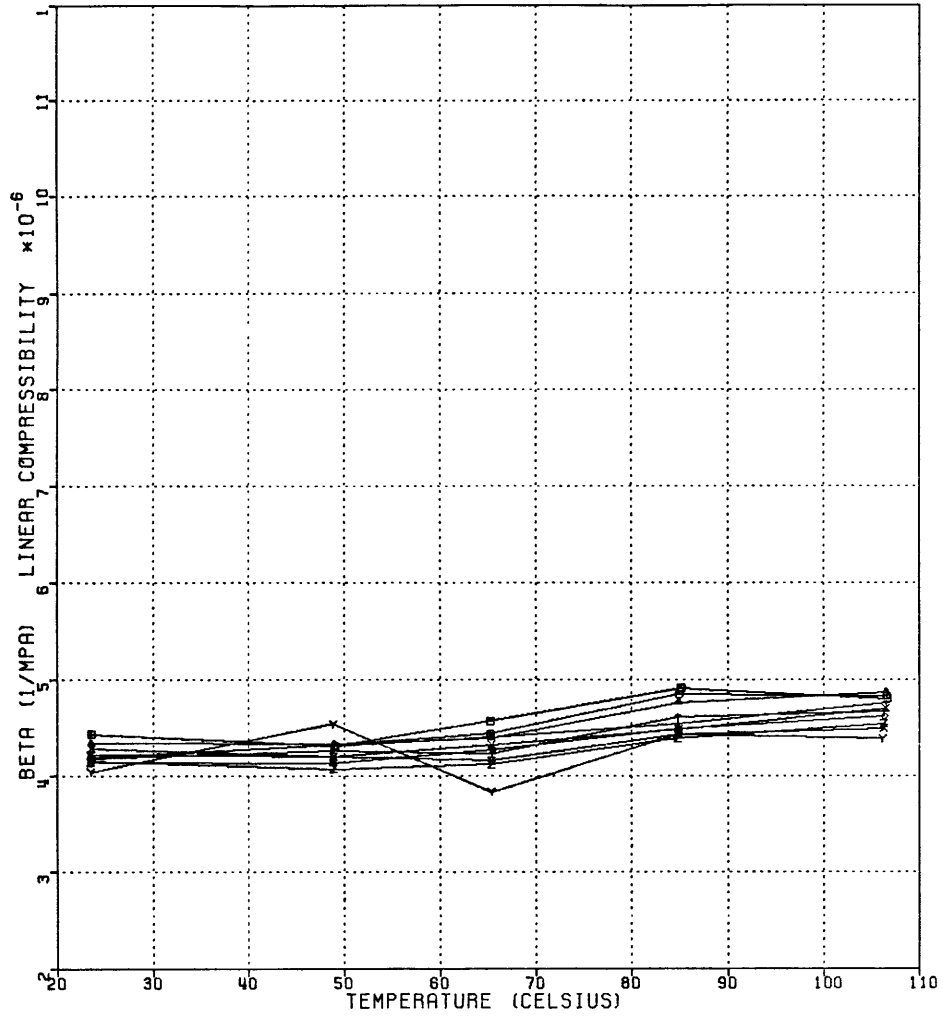
1381 MELLON WI GABBRO
GAGE: BC

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- × - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- × - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



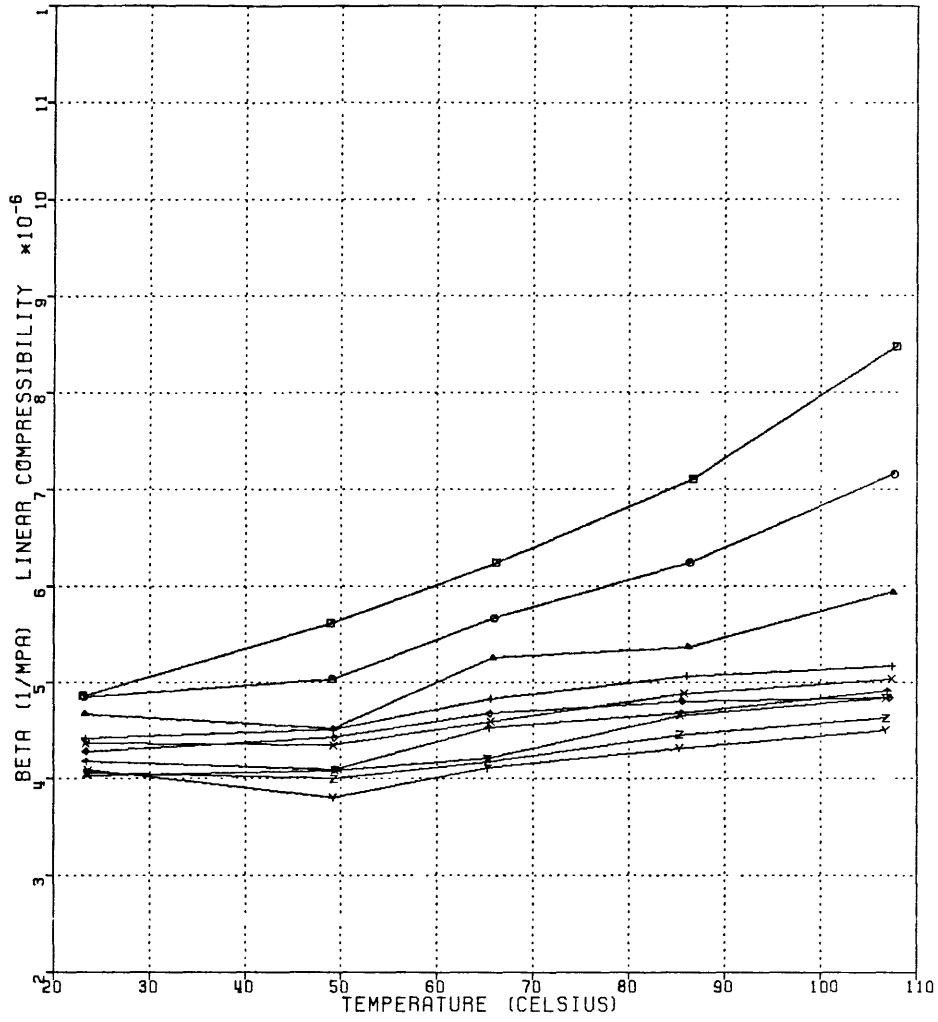
1381 MELLON WI GABBRO
GAGE:3C

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⋈ - 70 MPA
- * - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



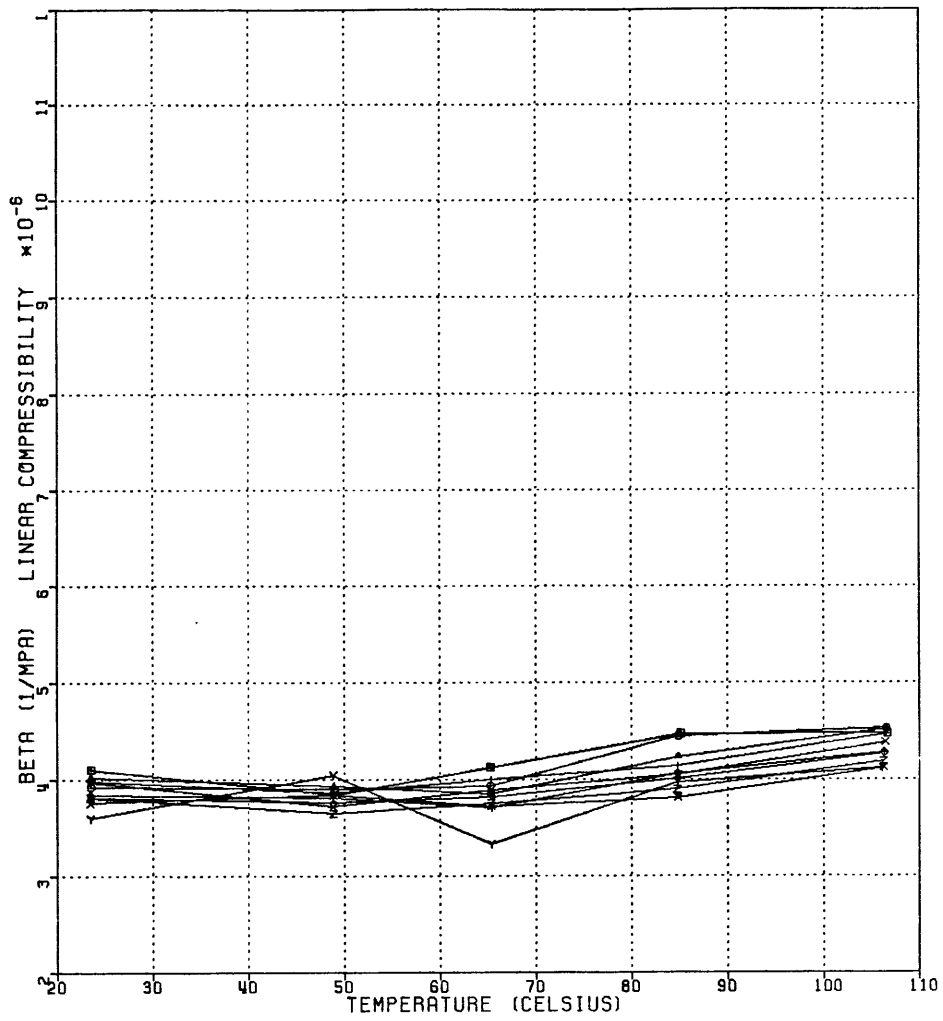
1381 MELLON WI GABBRO
GAGE:3C

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- × - 150 MPA
- ◇ - 160 MPA
- ♣ - 170 MPA
- × - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



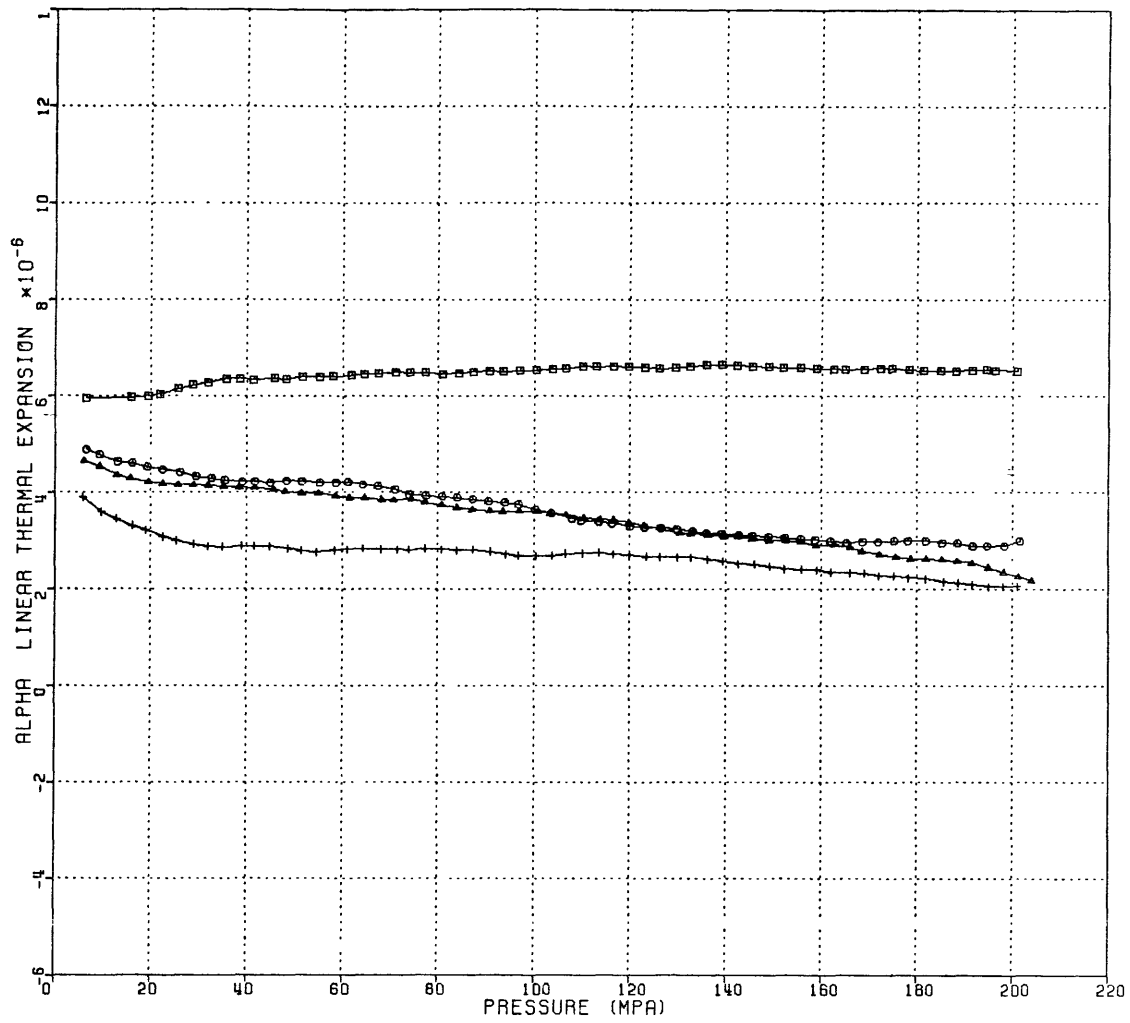
1381 MELLON WI GABBRO
GAGE: 4C

- - 10 MPa
- - 20 MPa
- △ - 30 MPa
- + - 40 MPa
- X - 50 MPa
- ◇ - 60 MPa
- ⊕ - 70 MPa
- X - 80 MPa
- Z - 90 MPa
- Y - 100 MPa



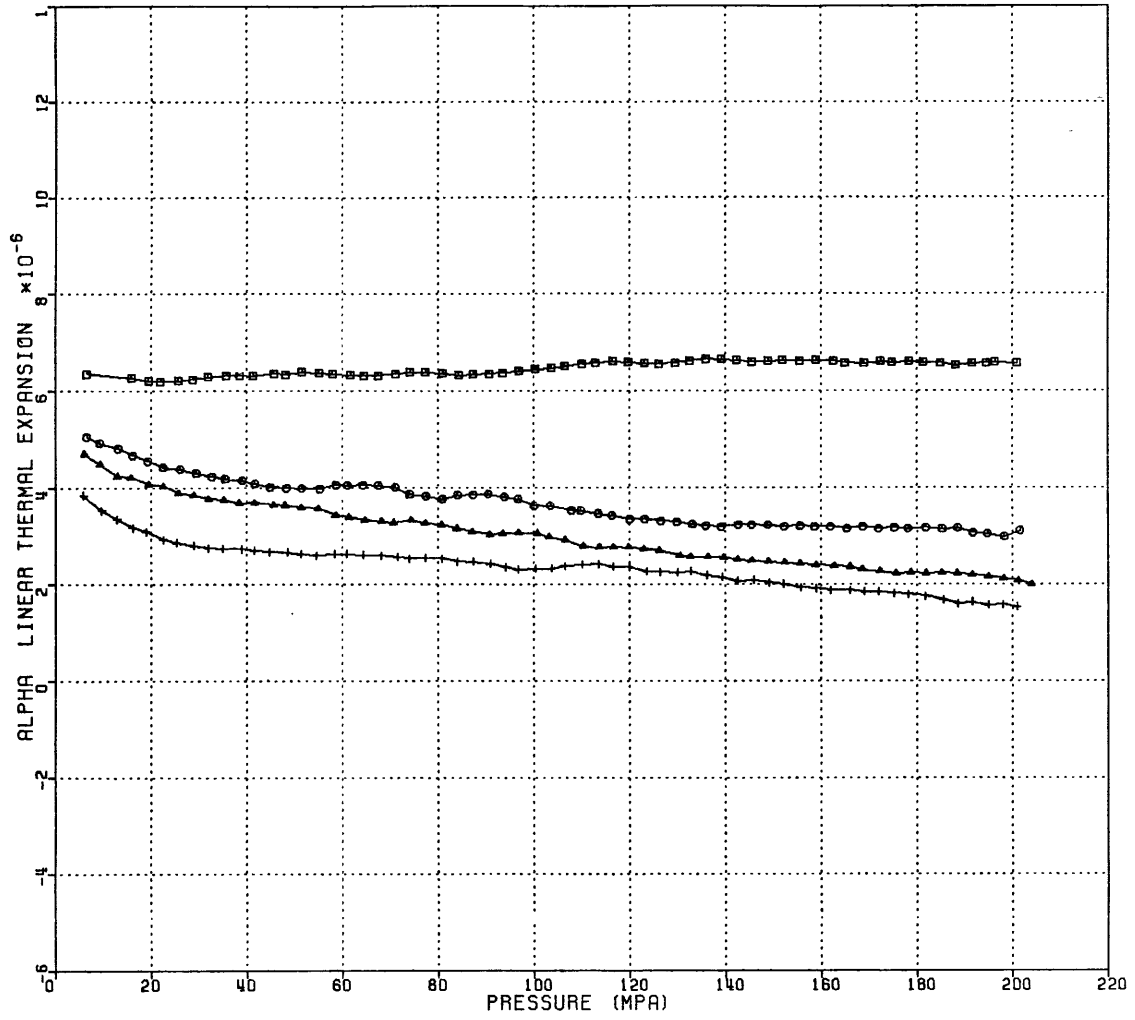
1381 MELLON WI GABBR0
GAGE: 4C

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



1381 MELLON WI. GABBRO
GAGE: BA

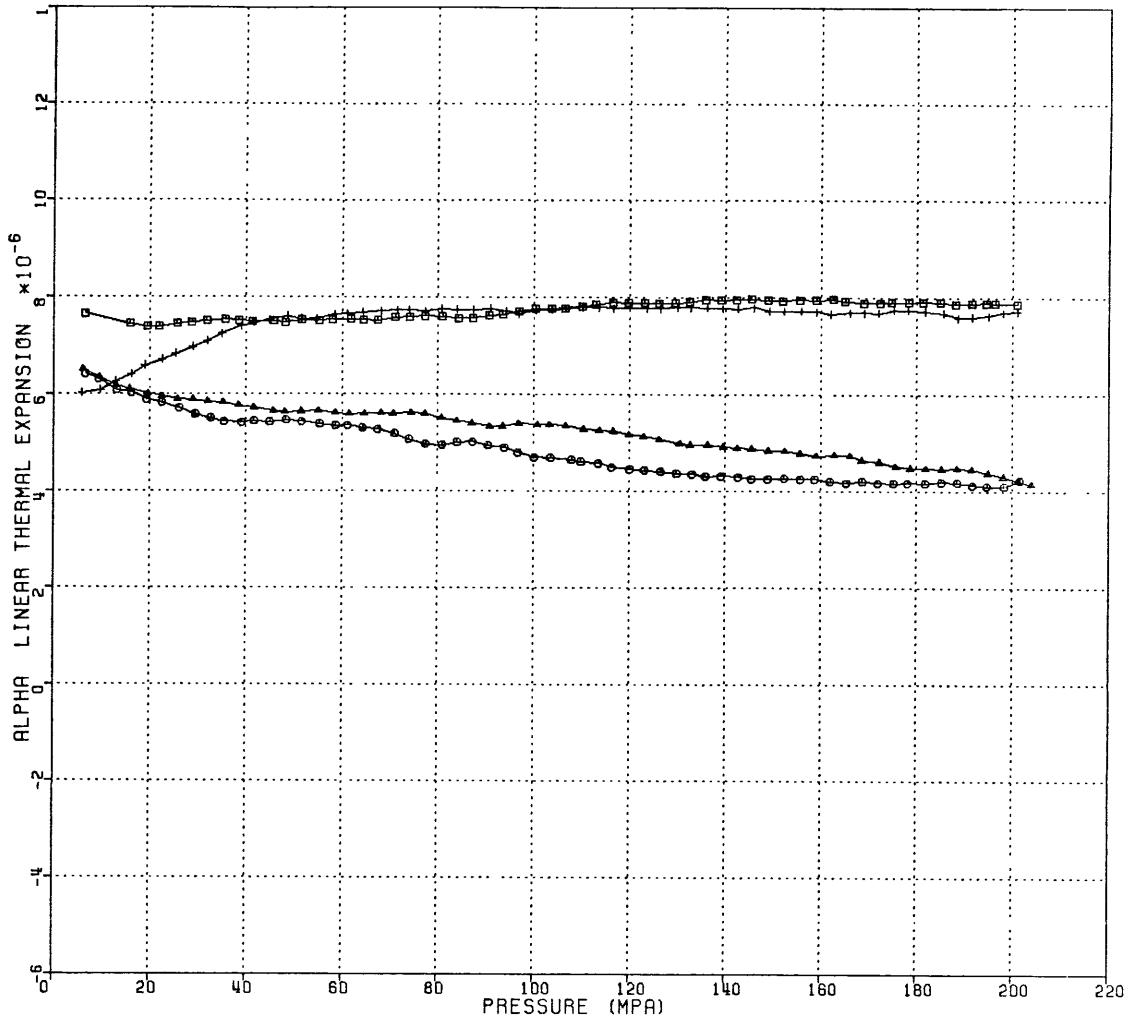
\square - 23°C - 49°C
 \circ - 49°C - 65°C
 \triangle - 65°C - 85°C
 $+$ - 85°C - 107°C



1381 MELLON WI GABBRO

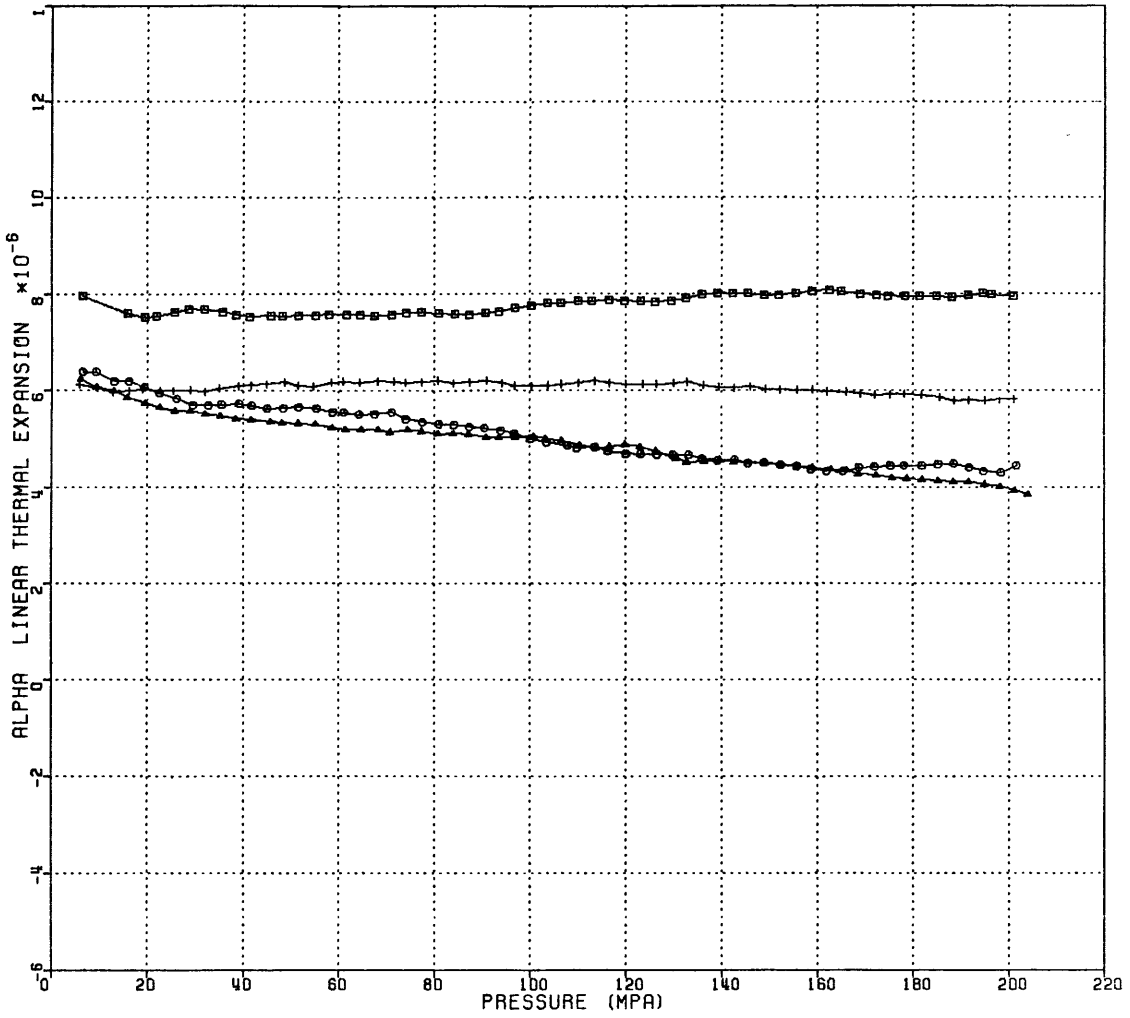
GAGE: 4A

- - 23°C- 49°C
- - 49°C- 65°C
- △ - 65°C- 85°C
- + - 85°C-107°C



1381 MELLON WI GABBRO
GAGE: AB

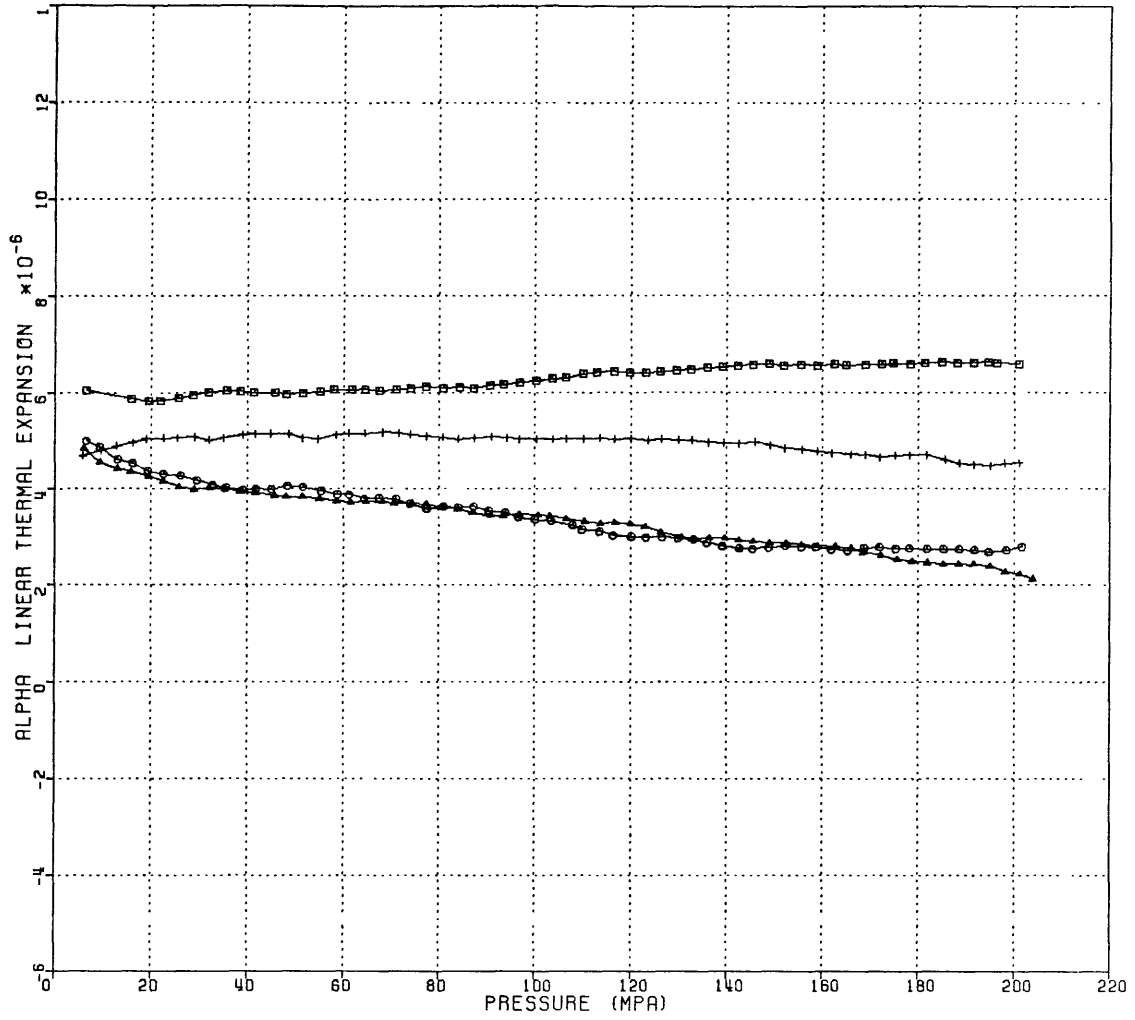
- \square - 23°C-49°C
- \circ - 49°C-65°C
- \triangle - 65°C-85°C
- $+$ - 85°C-107°C



1381 MELLON WI GABBRO

GAGE:CB

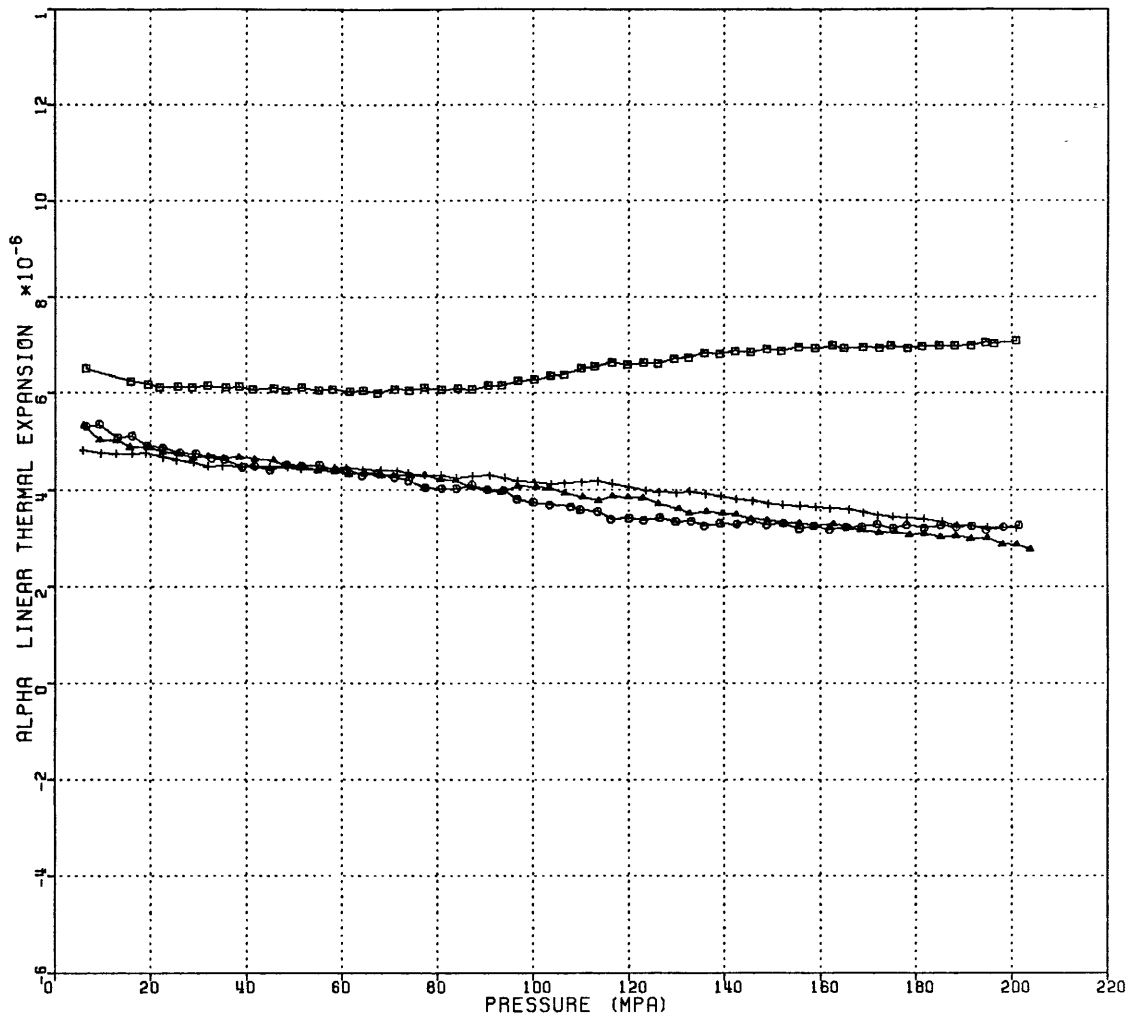
- - 23°C-49°C
- - 49°C-65°C
- △ - 65°C-85°C
- + - 85°C-107°C



1381 MELLON WI GABBRO

GAGE: 3B

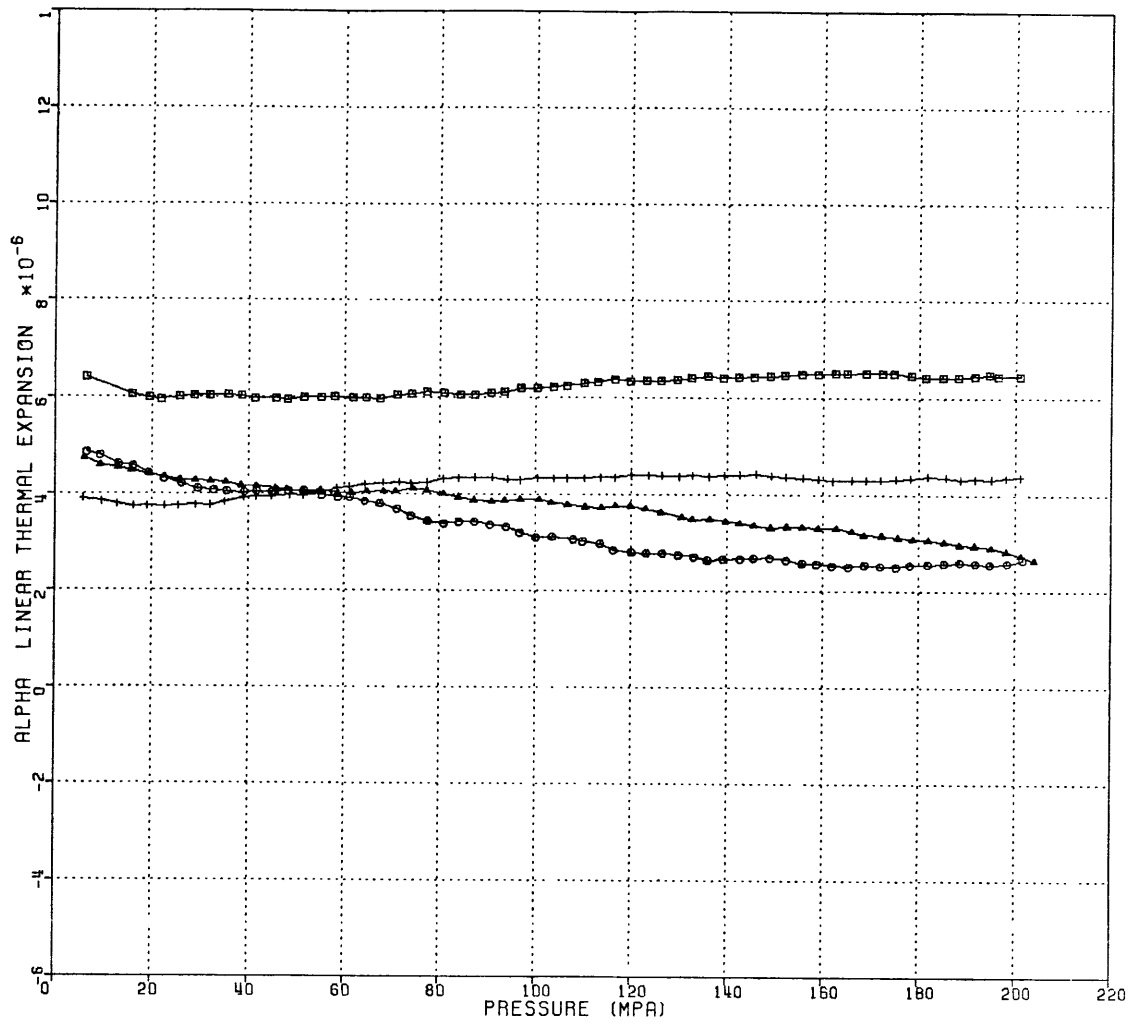
- \square - 23°C - 49°C
- \circ - 49°C - 65°C
- \triangle - 65°C - 85°C
- $+$ - 85°C - 107°C



1381 MELLON WI GABBRO

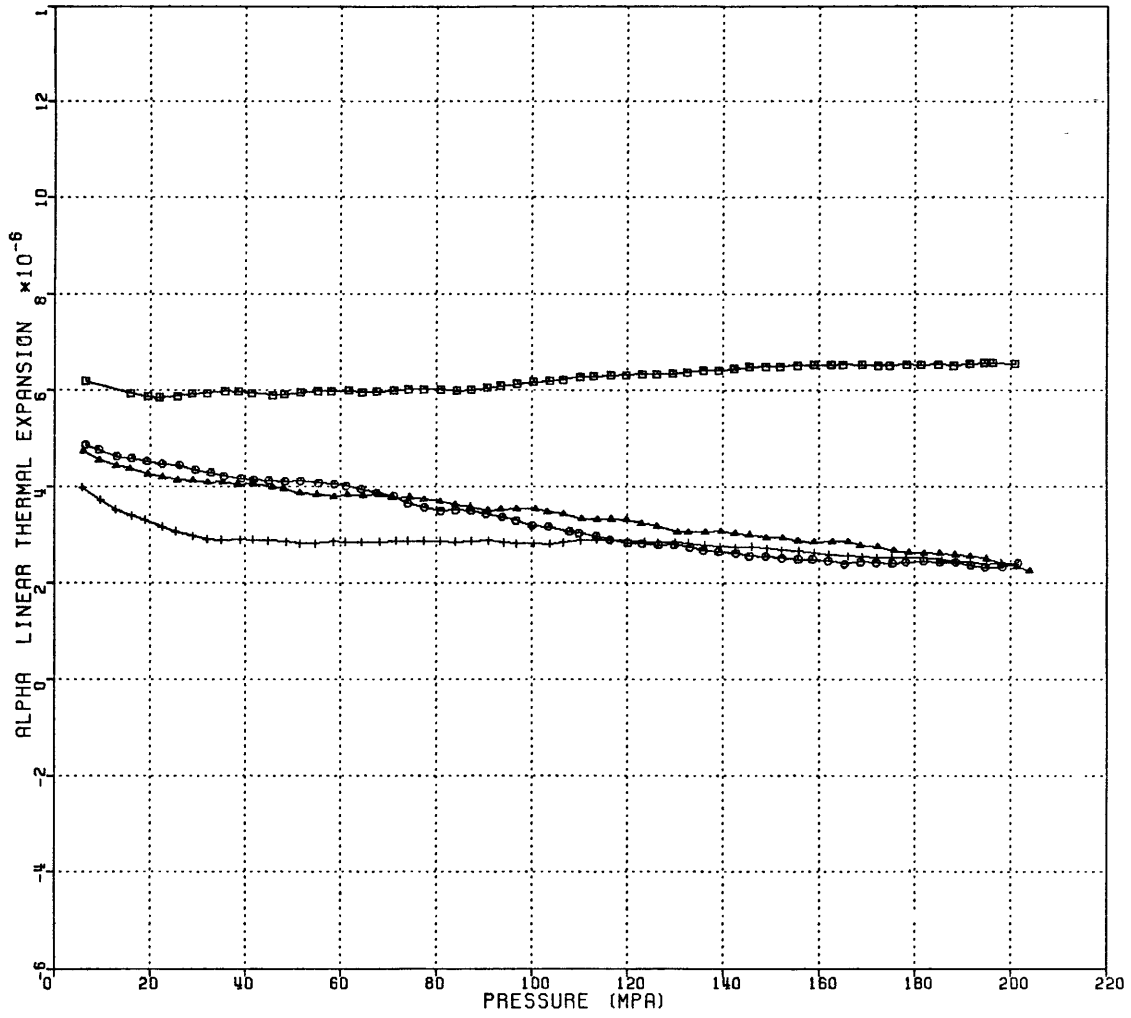
GAGE: 4B

- - 23°C-49°C
- - 49°C-65°C
- △ - 65°C-85°C
- + - 85°C-107°C



1381 MELLON WI GABBRO
GAGE: AC

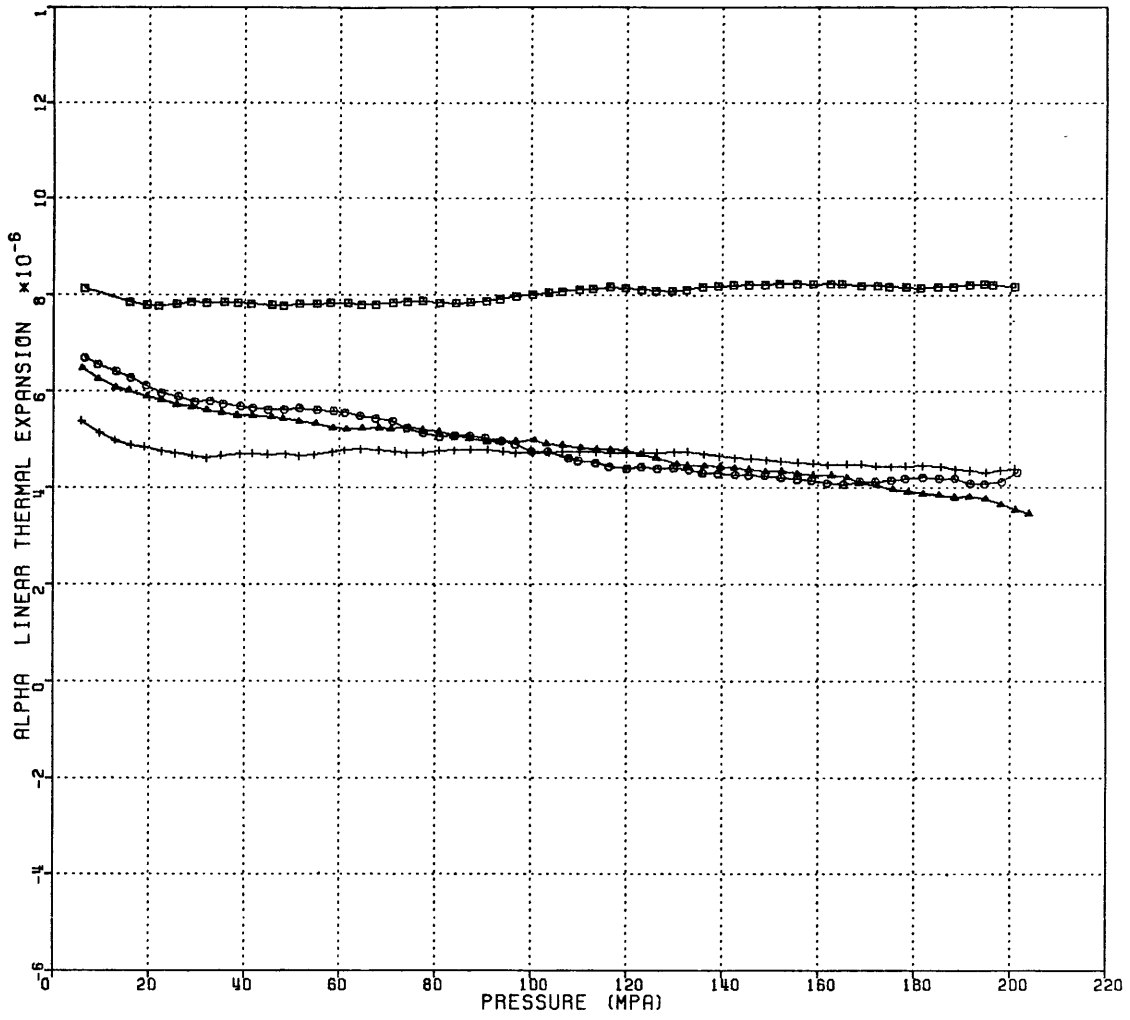
\square - 23°C - 49°C
 \circ - 49°C - 65°C
 \triangle - 65°C - 85°C
 $+$ - 85°C - 107°C



1381 MELLON WI GABBRO

GAGE:BC

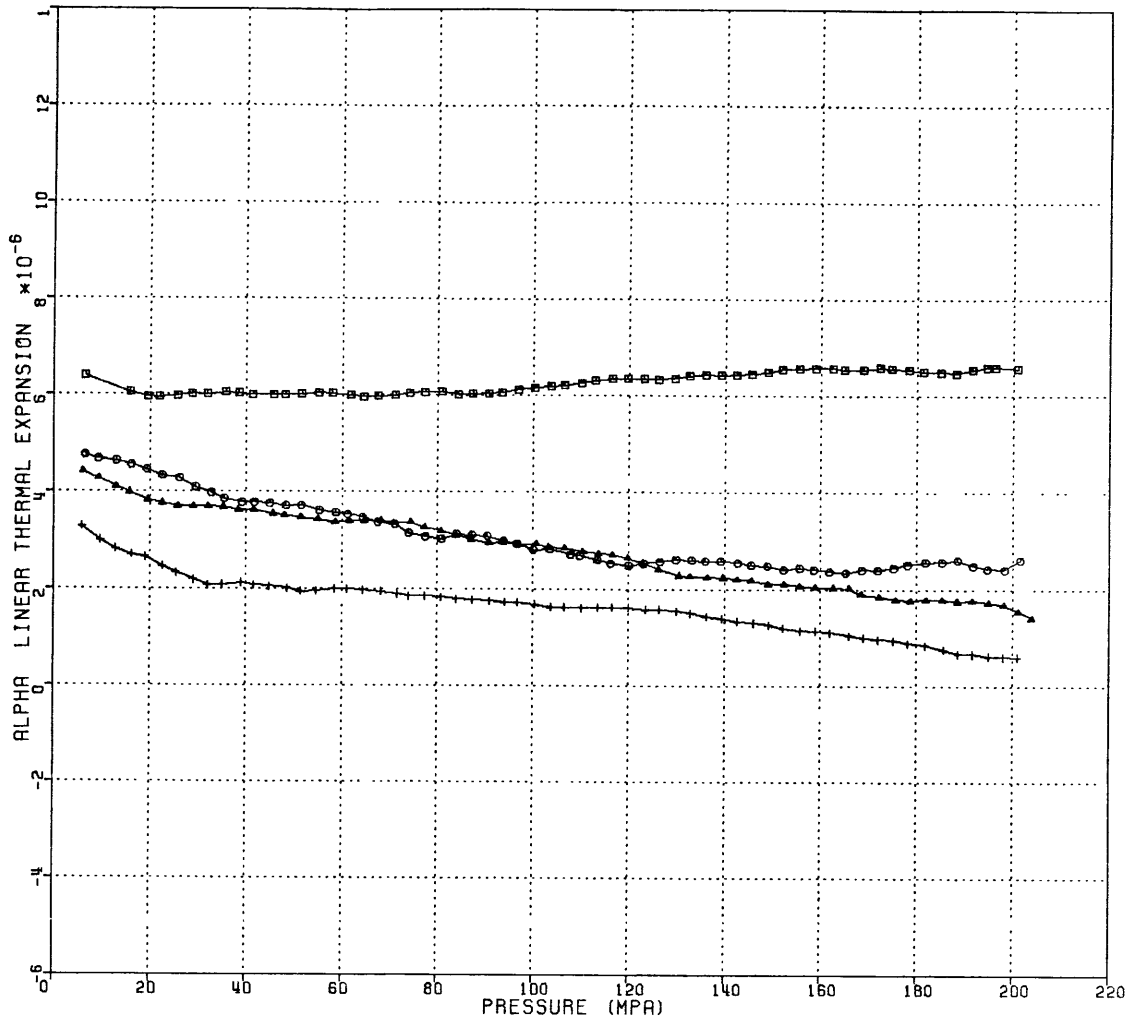
- - 23°C-49°C
- - 49°C-65°C
- △ - 65°C-85°C
- + - 85°C-107°C



1381 MELLON WI GABBRO

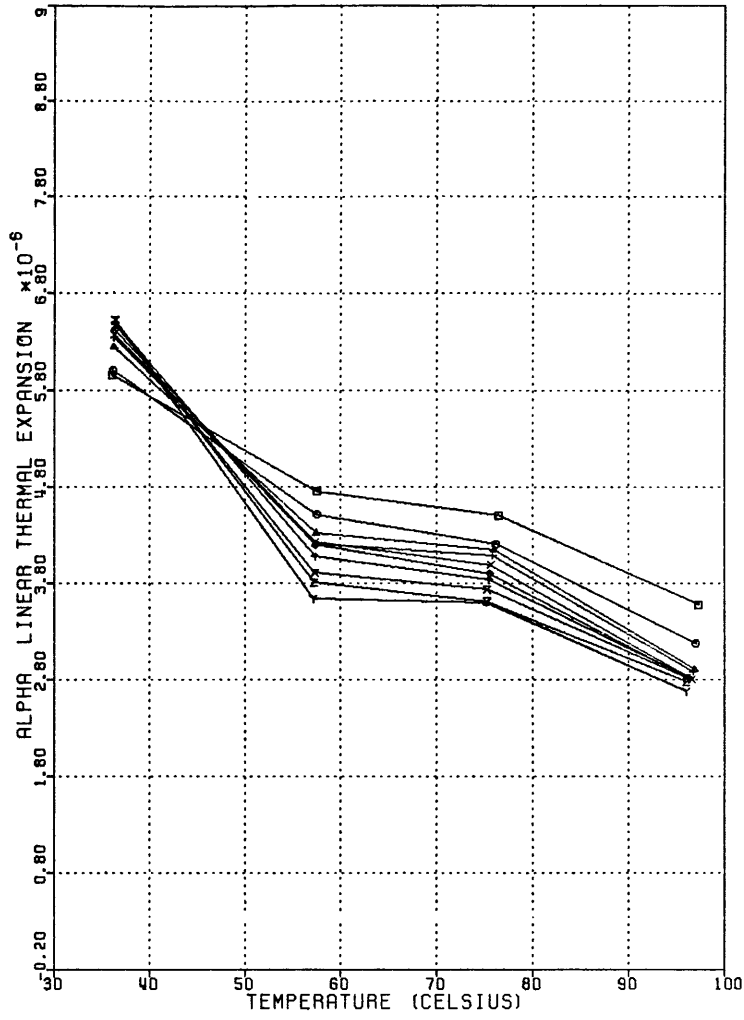
GAGE: 3C

\square - 23°C - 49°C
 \circ - 49°C - 65°C
 \triangle - 65°C - 85°C
 $+$ - 85°C - 107°C



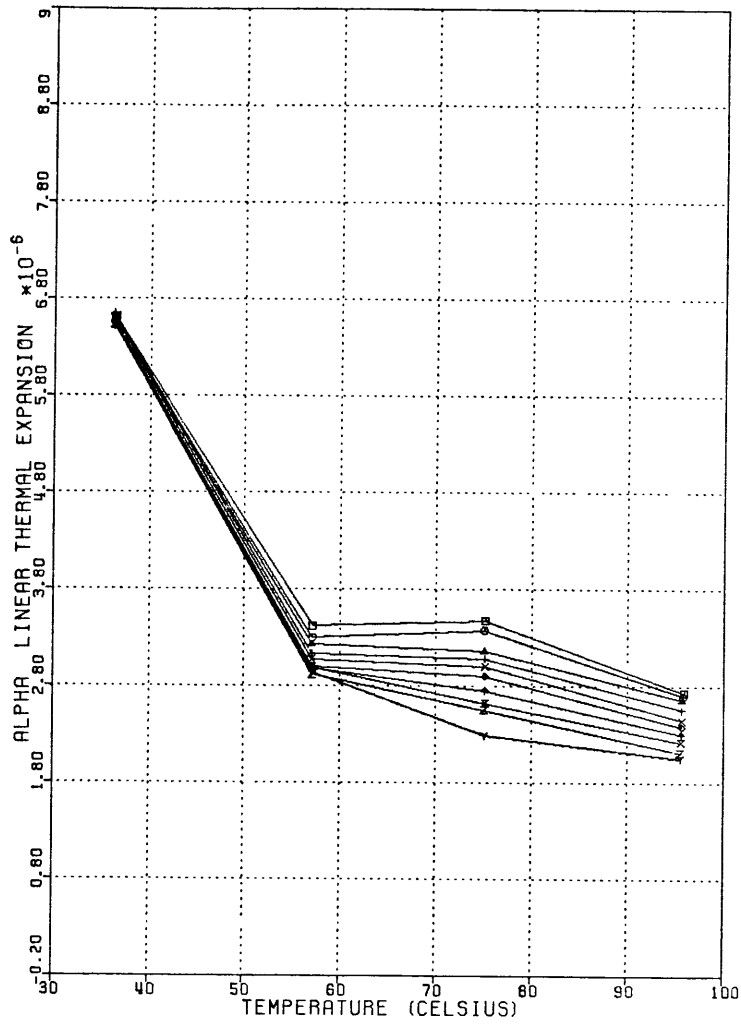
1381 MELLON WI GABBRO
GAGE: 4C

- - 23°C-49°C
- - 49°C-65°C
- △ - 65°C-85°C
- + - 85°C-107°C



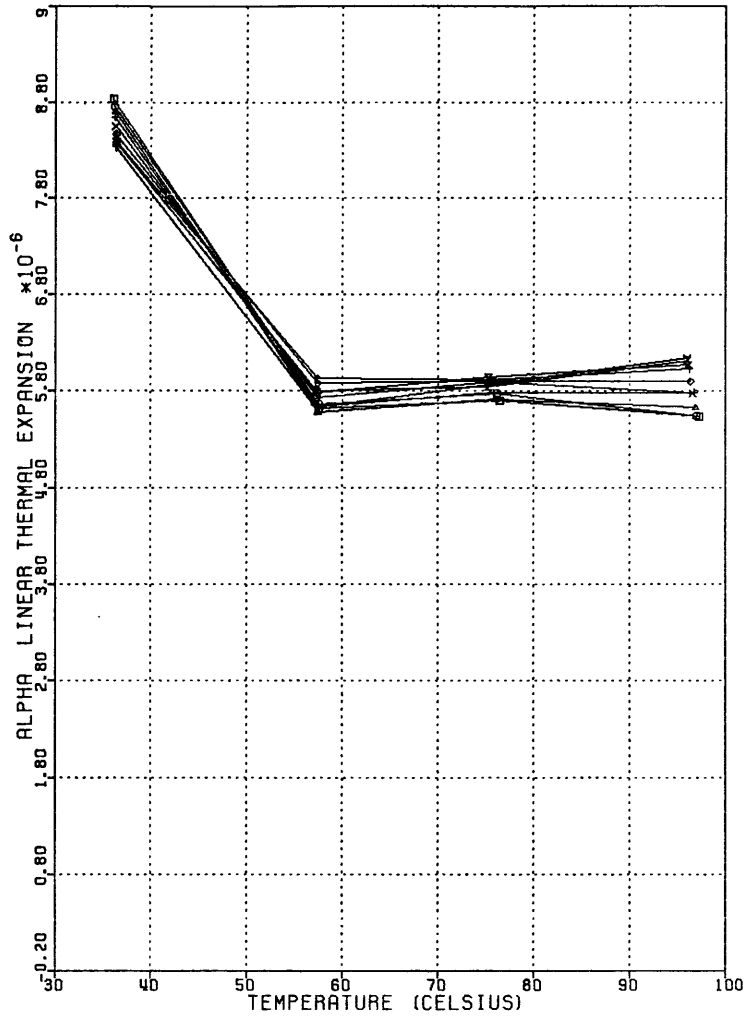
1381 MELLON WI GABBRO
GAGE:BA

- - 10 MPA
- - 20 MPA
- ▲ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



1381 MELLON WI GABBRO
GAGE: BA

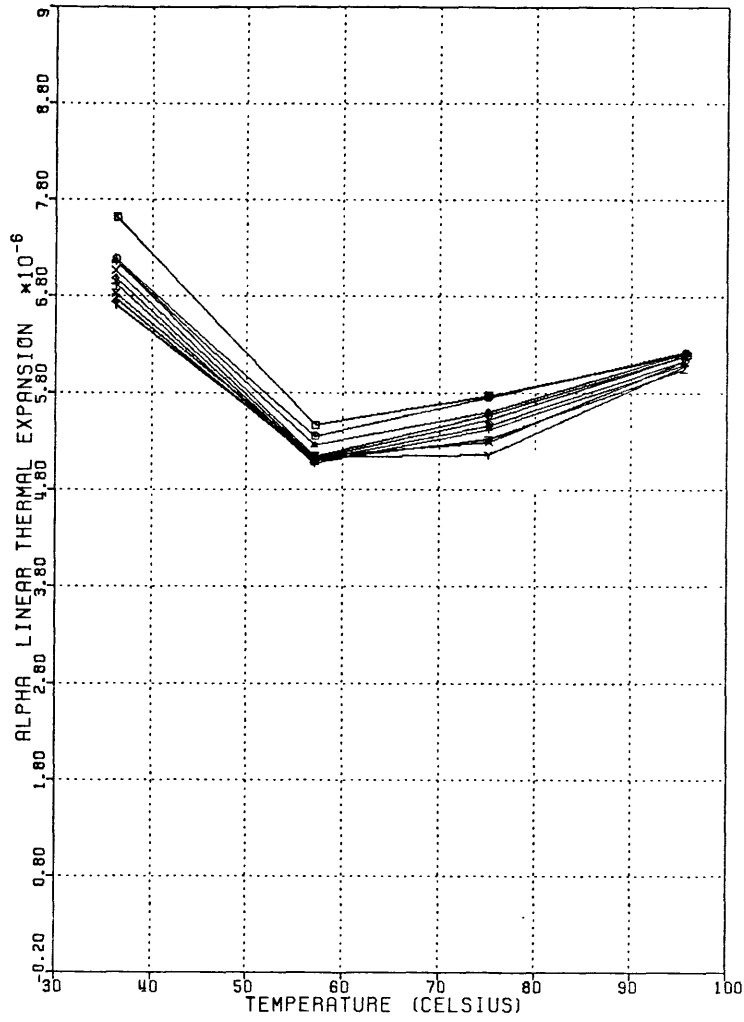
- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



1381 MELLON WI GABBRO

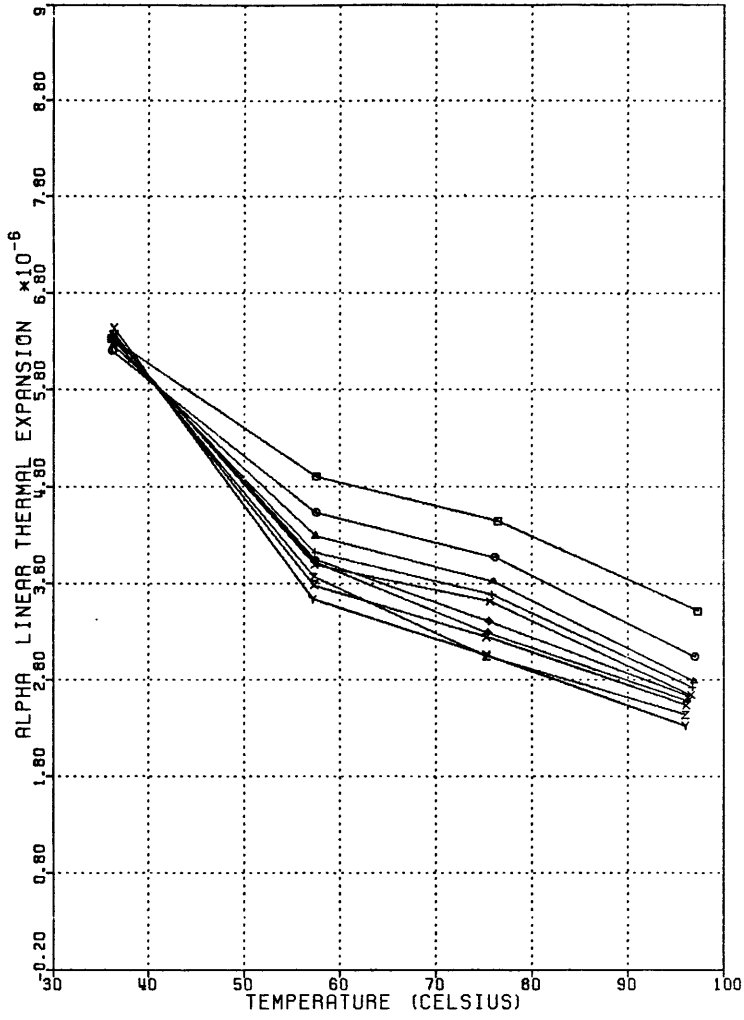
GAGE: 3A

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- x - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



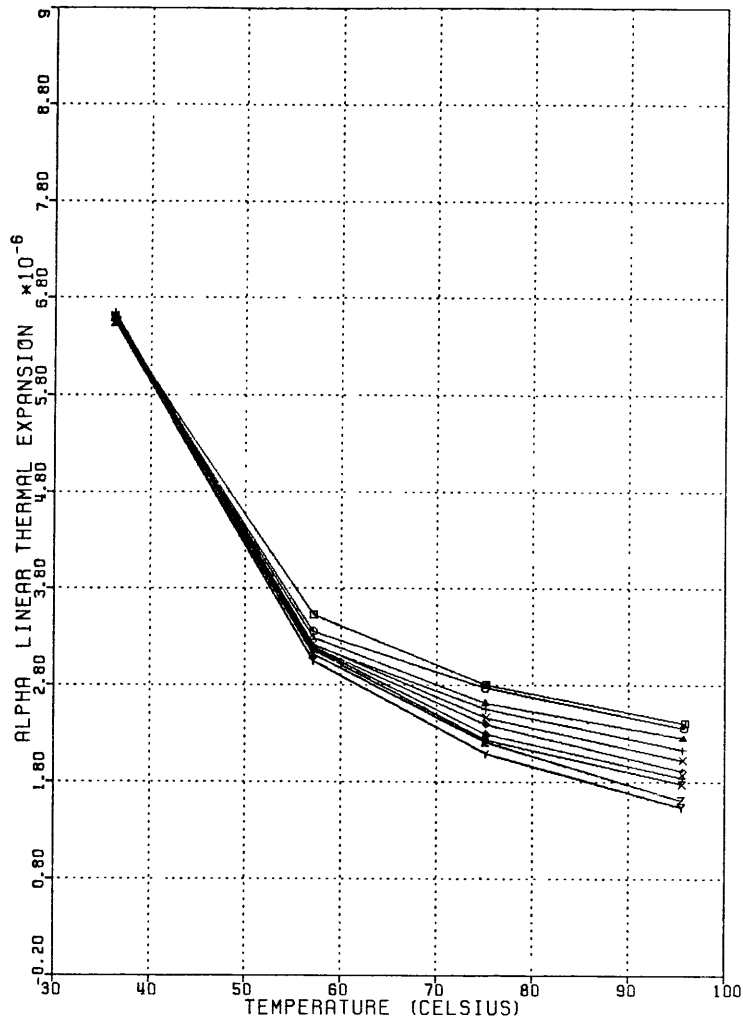
1381 MELLON WI GABBRO
GAGE: 3A

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♣ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



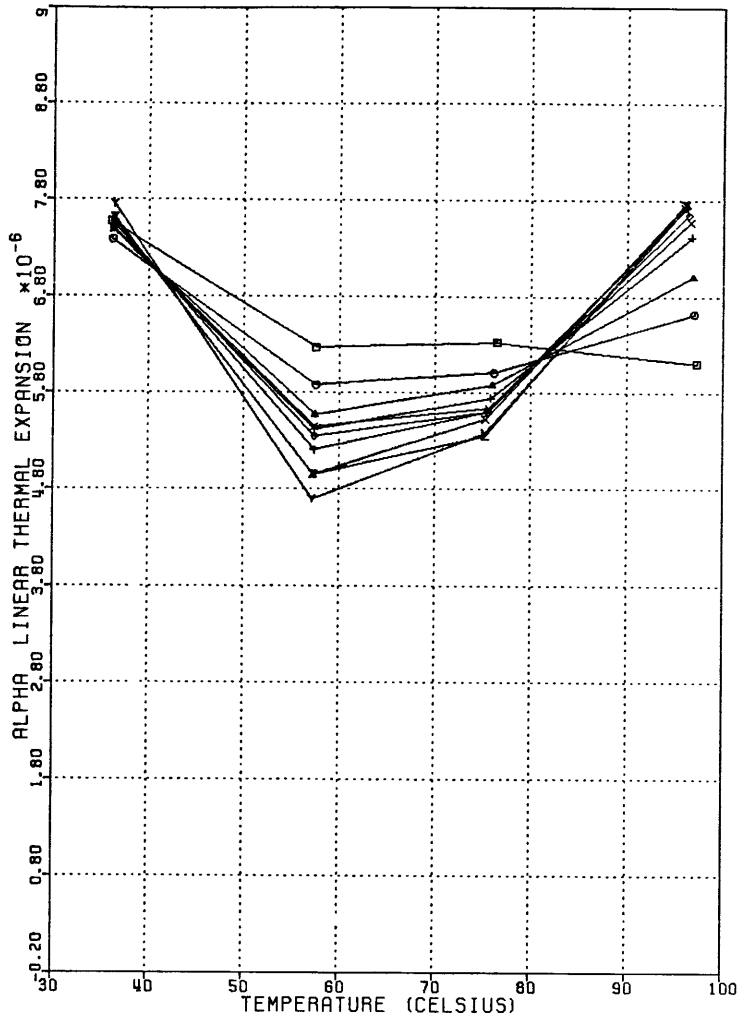
1381 MELLON WI GABBRO
GAGE: 4A

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



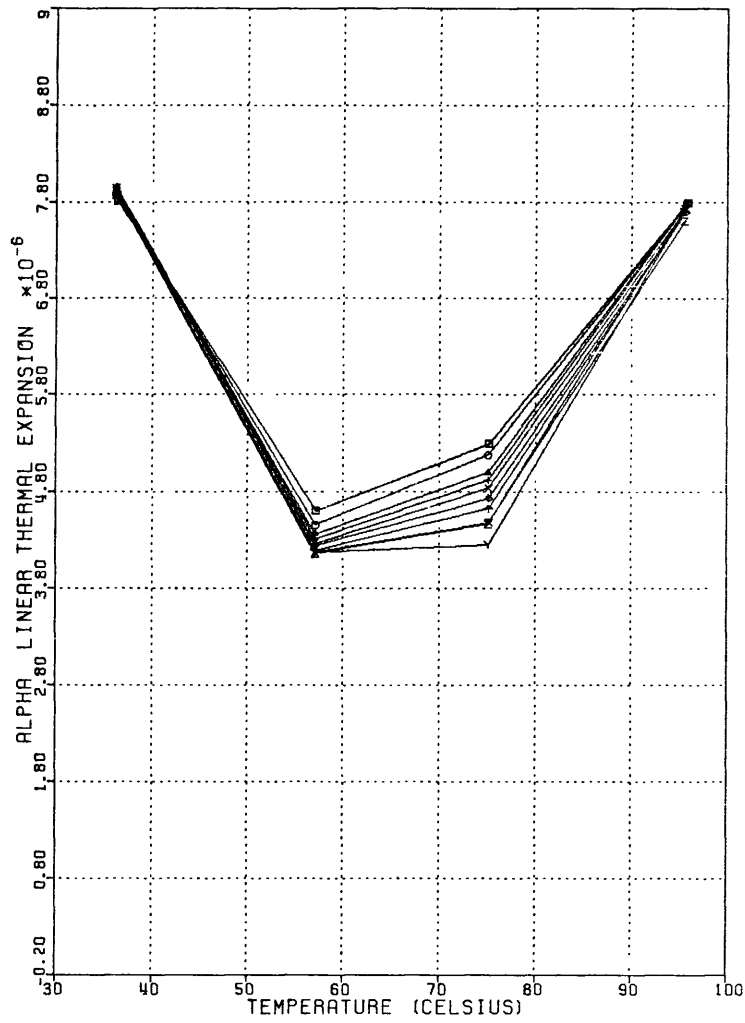
1381 MELLON WI GABBRO
GAGE: 4A

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



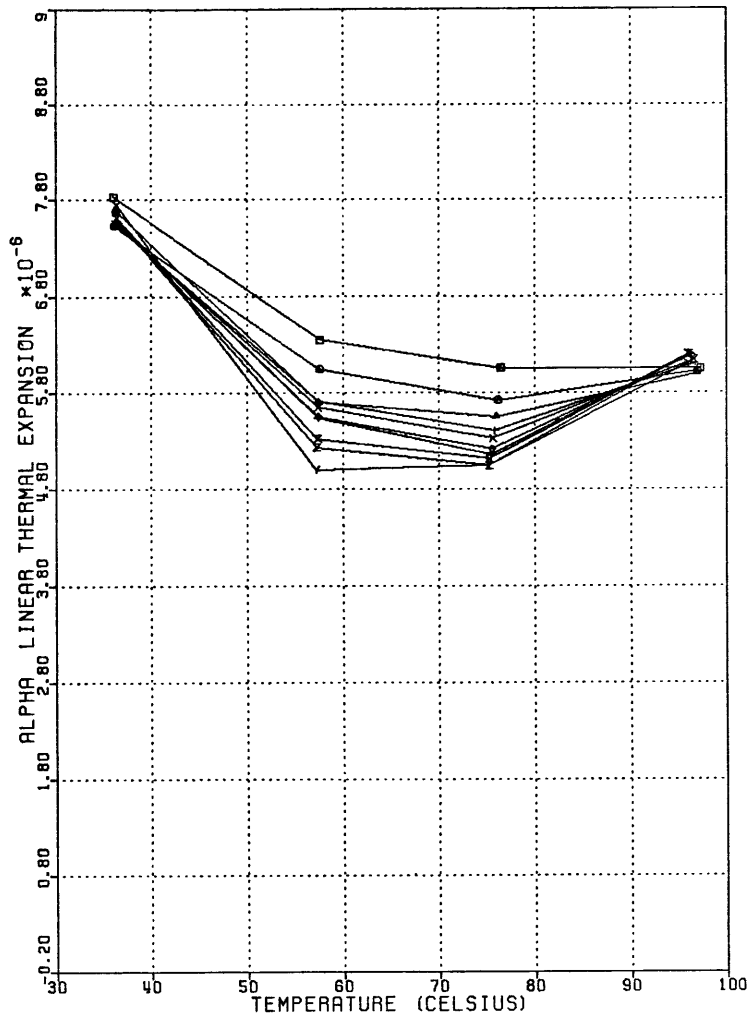
1381 MELLON WI GABBRO
GAGE:AB

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



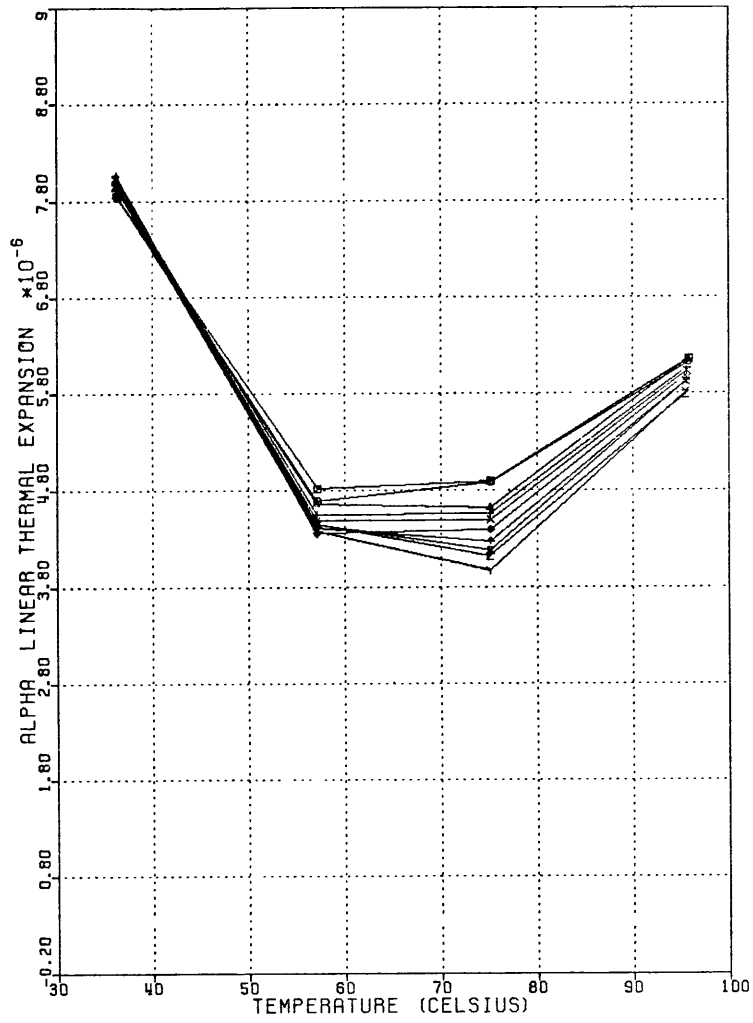
1381 MELLON WI GABBRO
GAGE: AB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- × - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



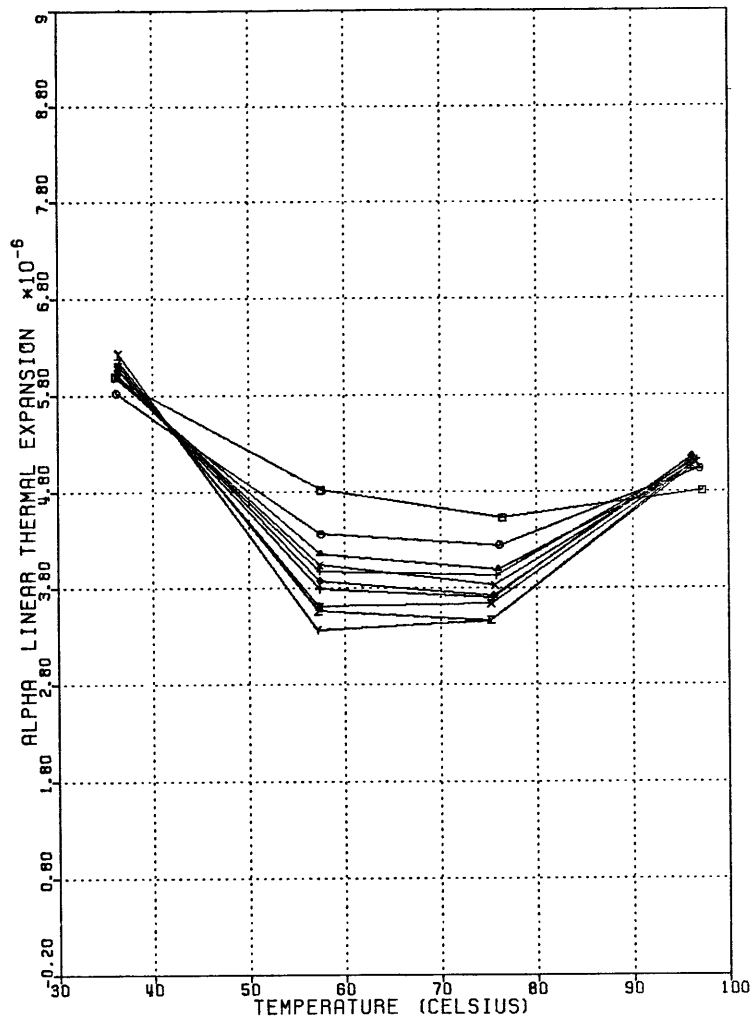
1381 MELLON WI GABBRO
GAGE:CB

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



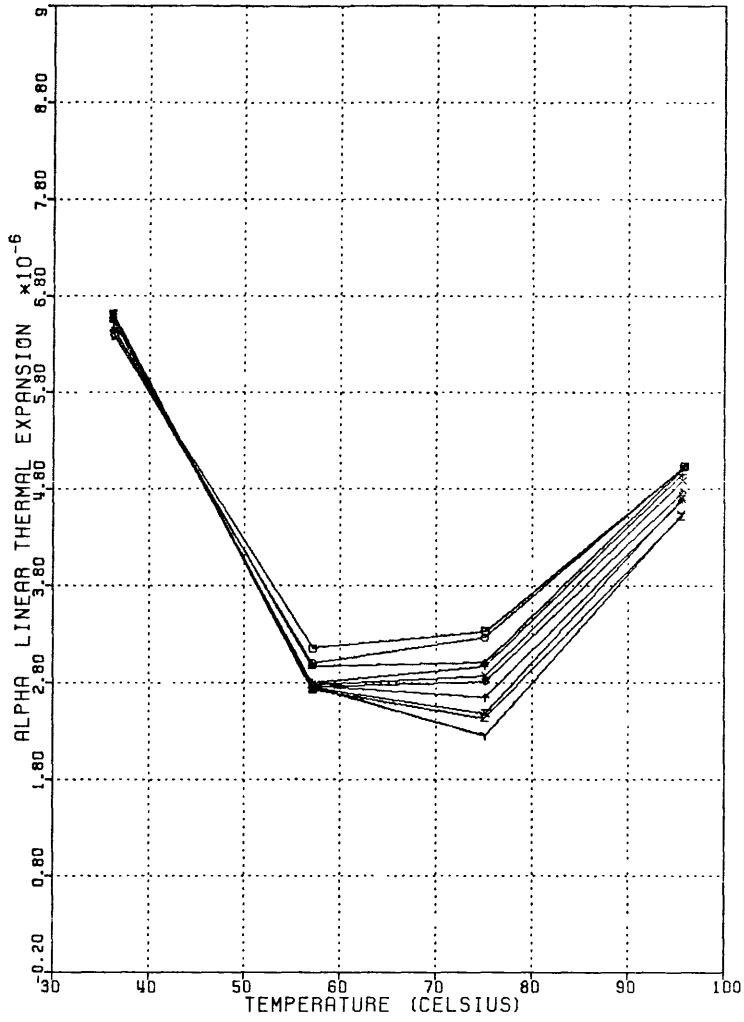
1381 MELLON WI GABBRO
GAGE:CB

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- * - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



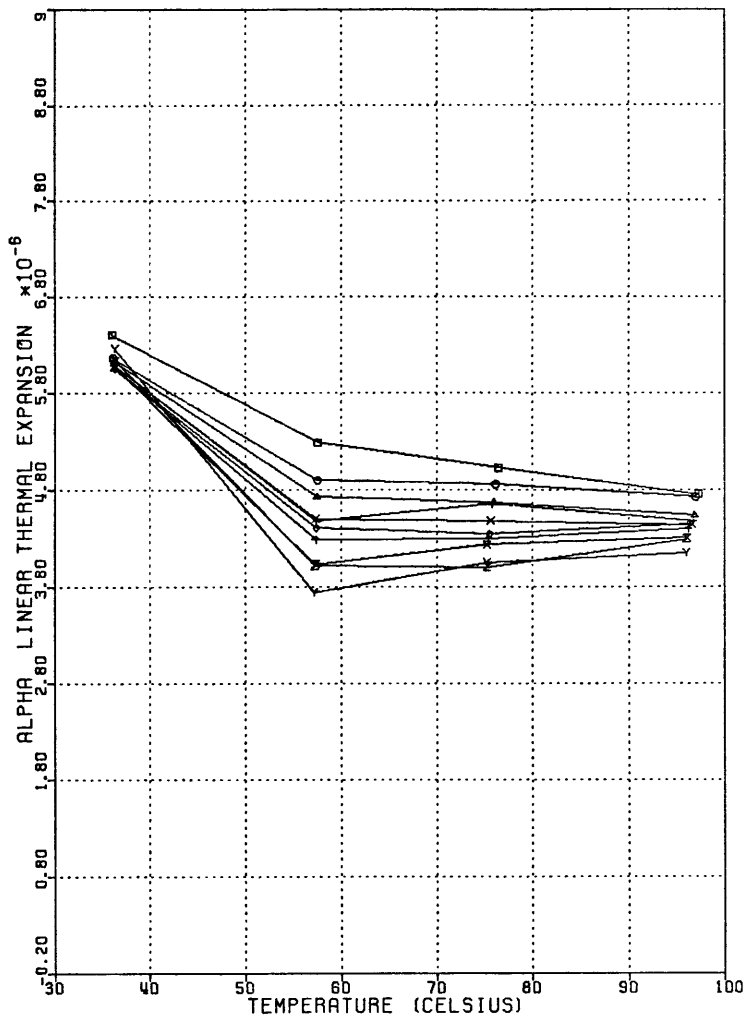
1381 MELLON WI GABBR0
GAGE:3B

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



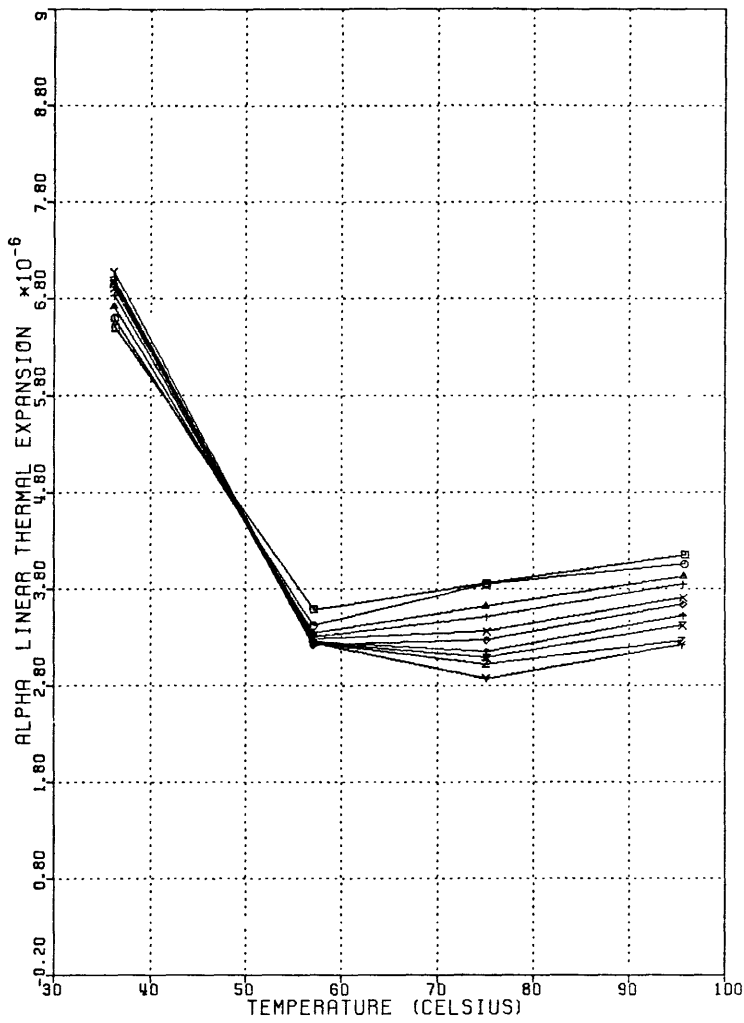
1381 MELLON WI GABBRO
GAGE: 3B

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



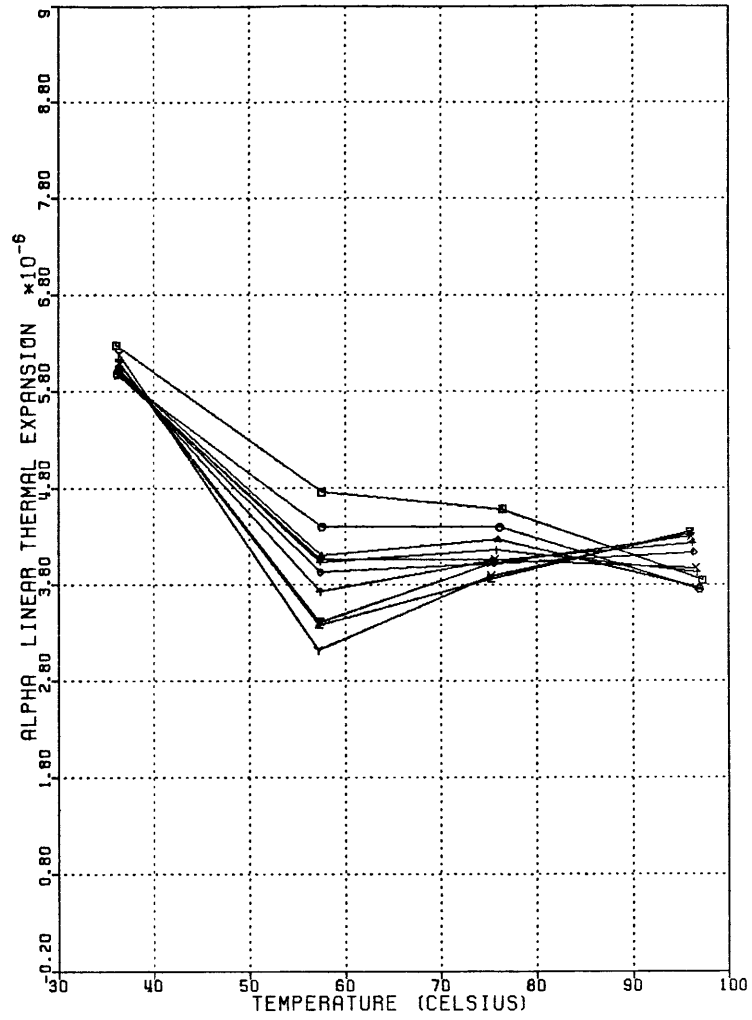
1381 MELLON WI GABBRO
GAGE:4B

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- × - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- × - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



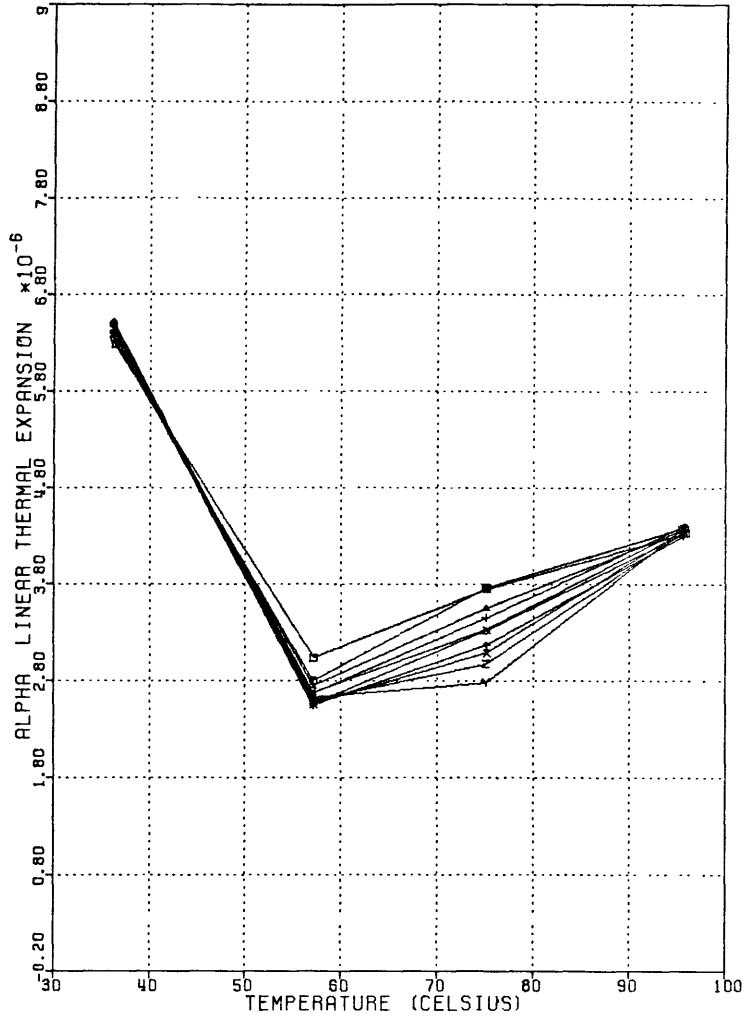
1381 MELLON WI GABBRO
GAGE: 4B

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



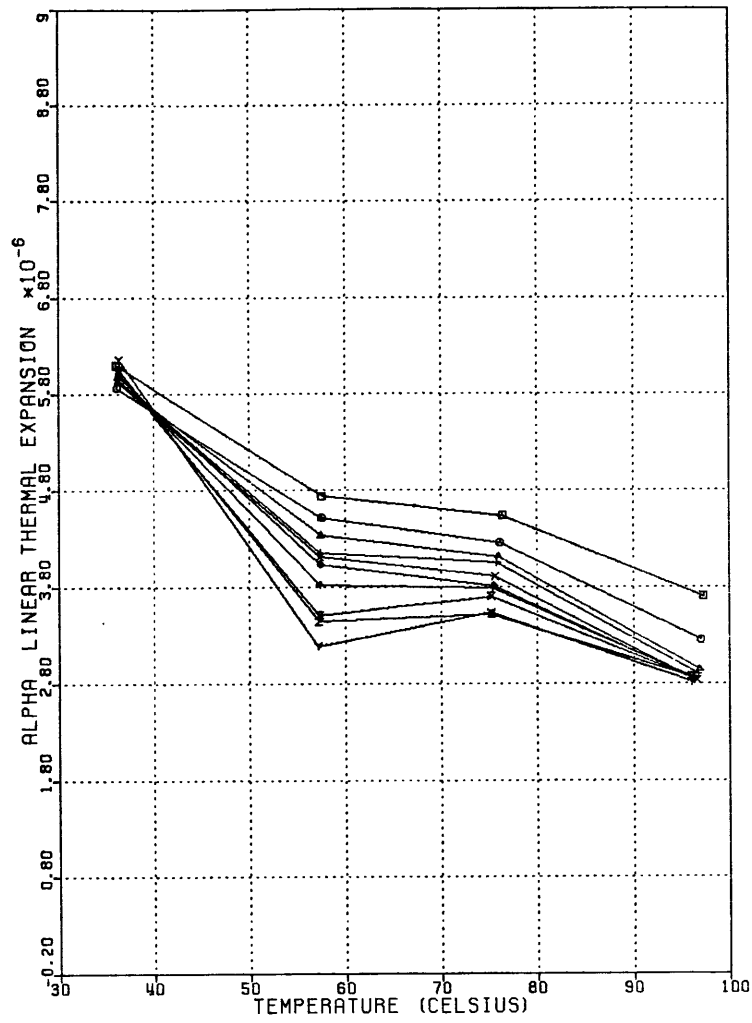
1381 MELLON WI GABBRO
GAGE:AC

- - 10 MPA
- - 20 MPA
- ▲ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



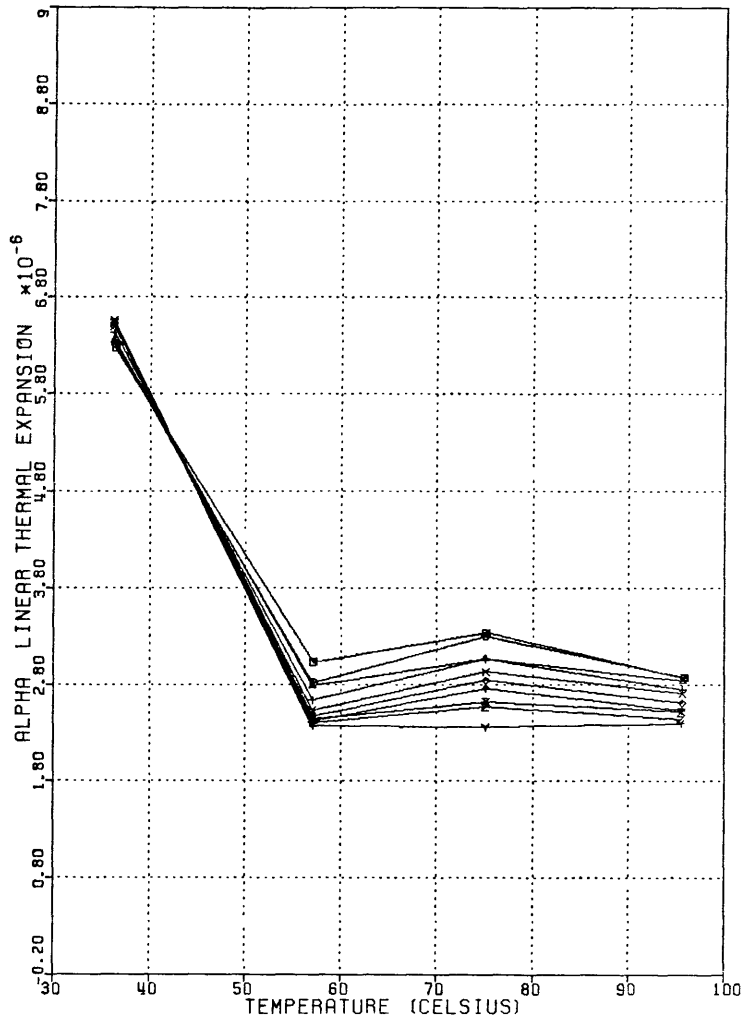
1381 MELLON WI GABBRO
GAGE:AC

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- x - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



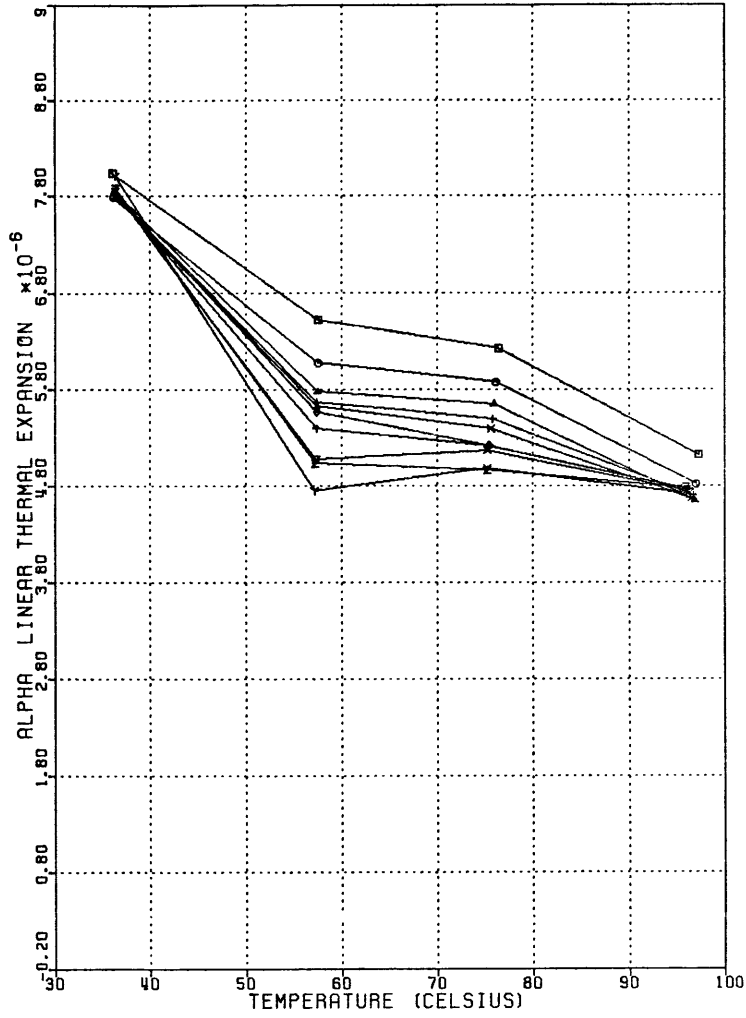
1381 MELLON WI GABBRO
GAGE:BC

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- x - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- * - 80 MPA
- z - 90 MPA
- y - 100 MPA



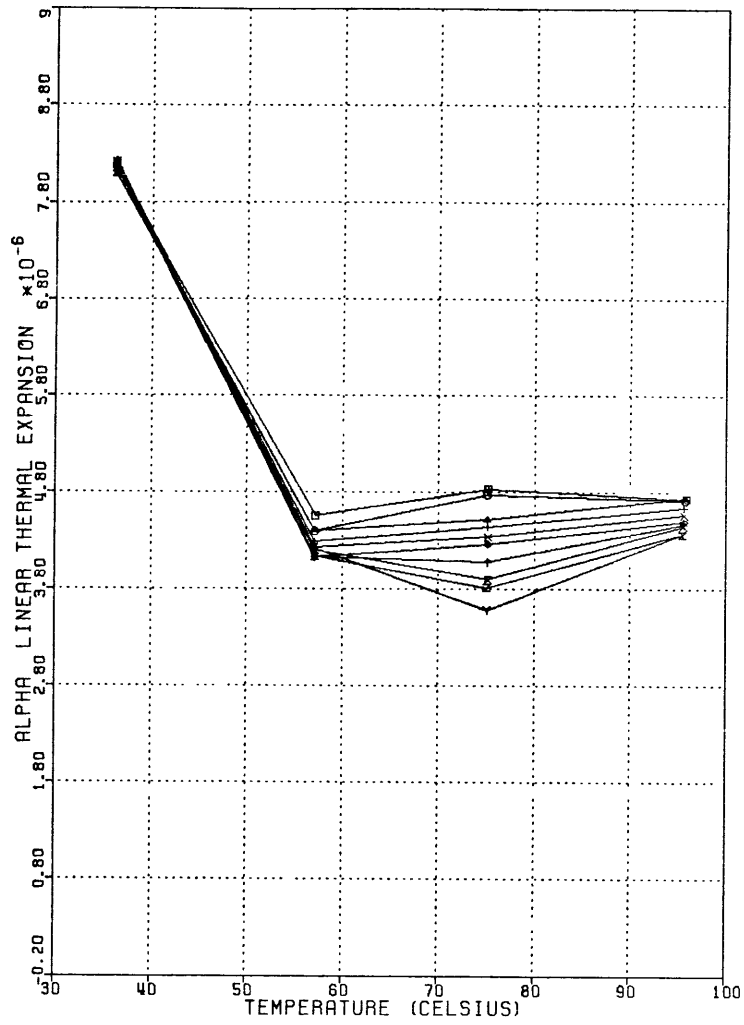
1381 MELLON WI GABBRO
GAGE: BC

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



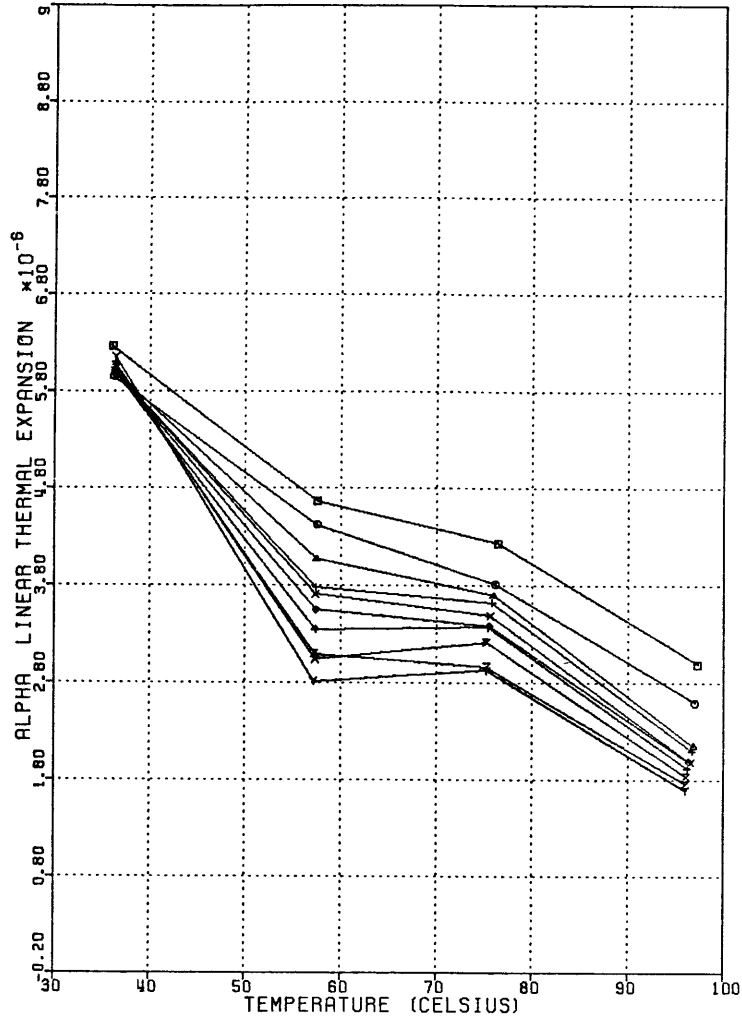
1381 MELLON WI GABBRO
GAGE:3C

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



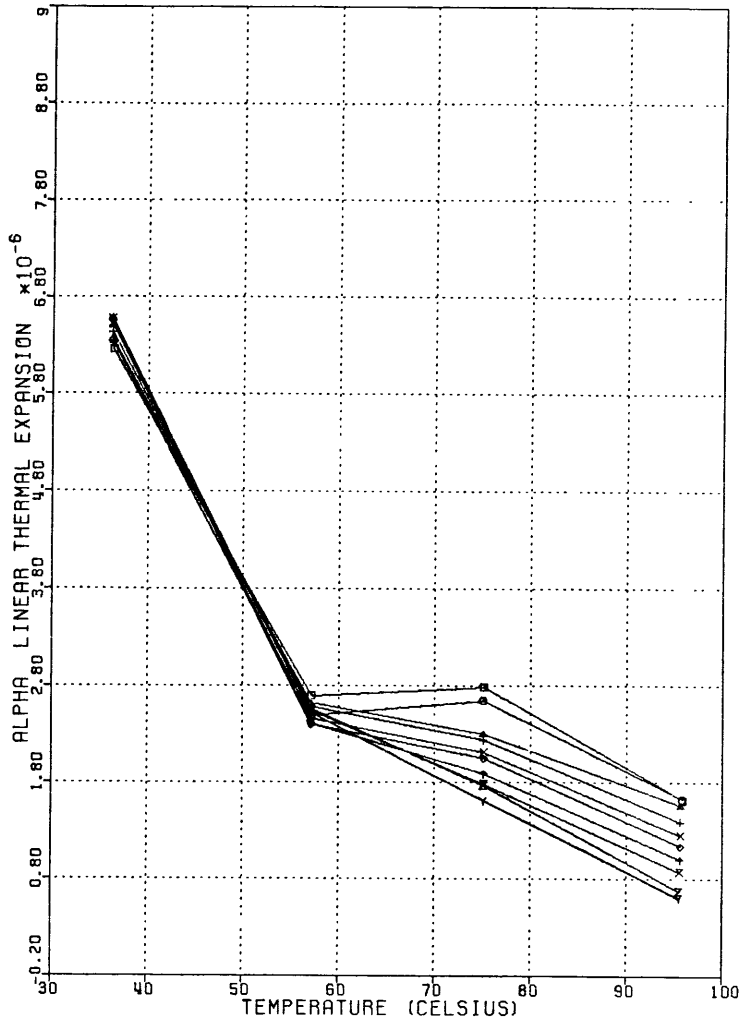
1381 MELLON WI GABBRO
GAGE: 3C

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ♠ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



1381 MELLON WI GABBRO
GAGE:4C

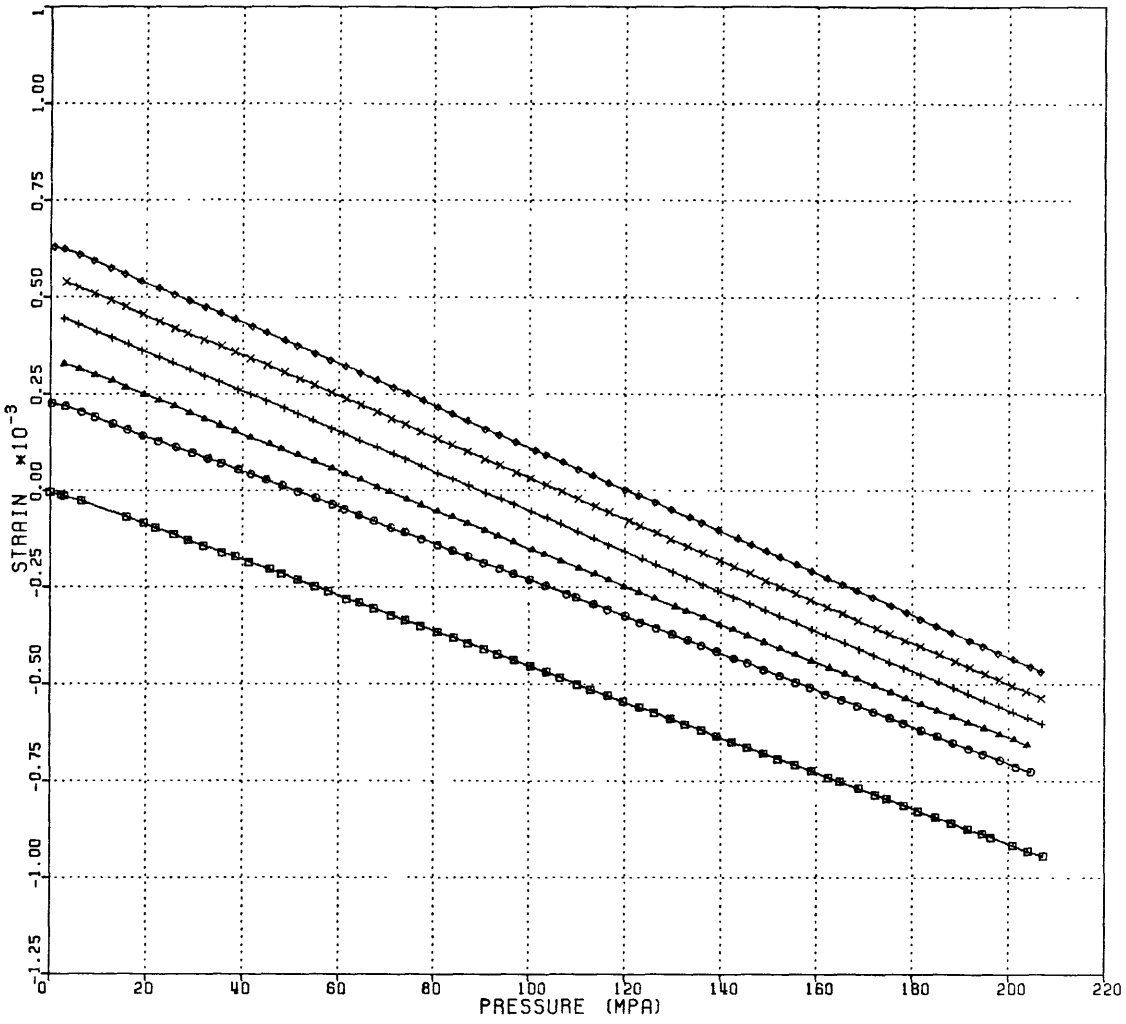
- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



1381 MELLON WI GABBRO
GAGE: 4C

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA

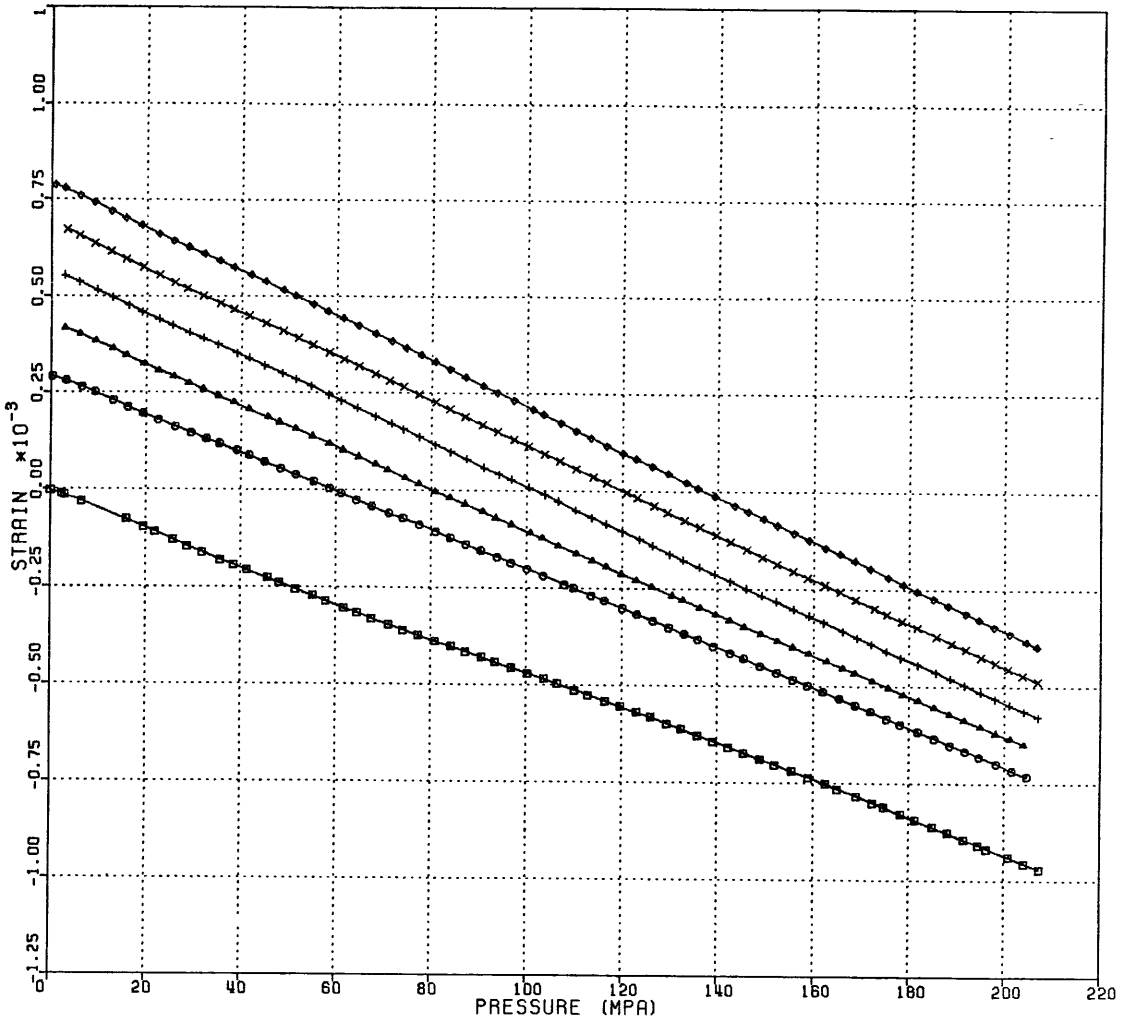
1407 Middlebrook felsite has the no open cracks and only a few voids in the rutile that seals the cracks. The change in β with pressure is very small. Contrasting with this is the large increase in β with temperature. α generally decreases with temperature, and does so irregularly.



1407 MIDDLEBROOK M0 FELSITE

GAGE: BA

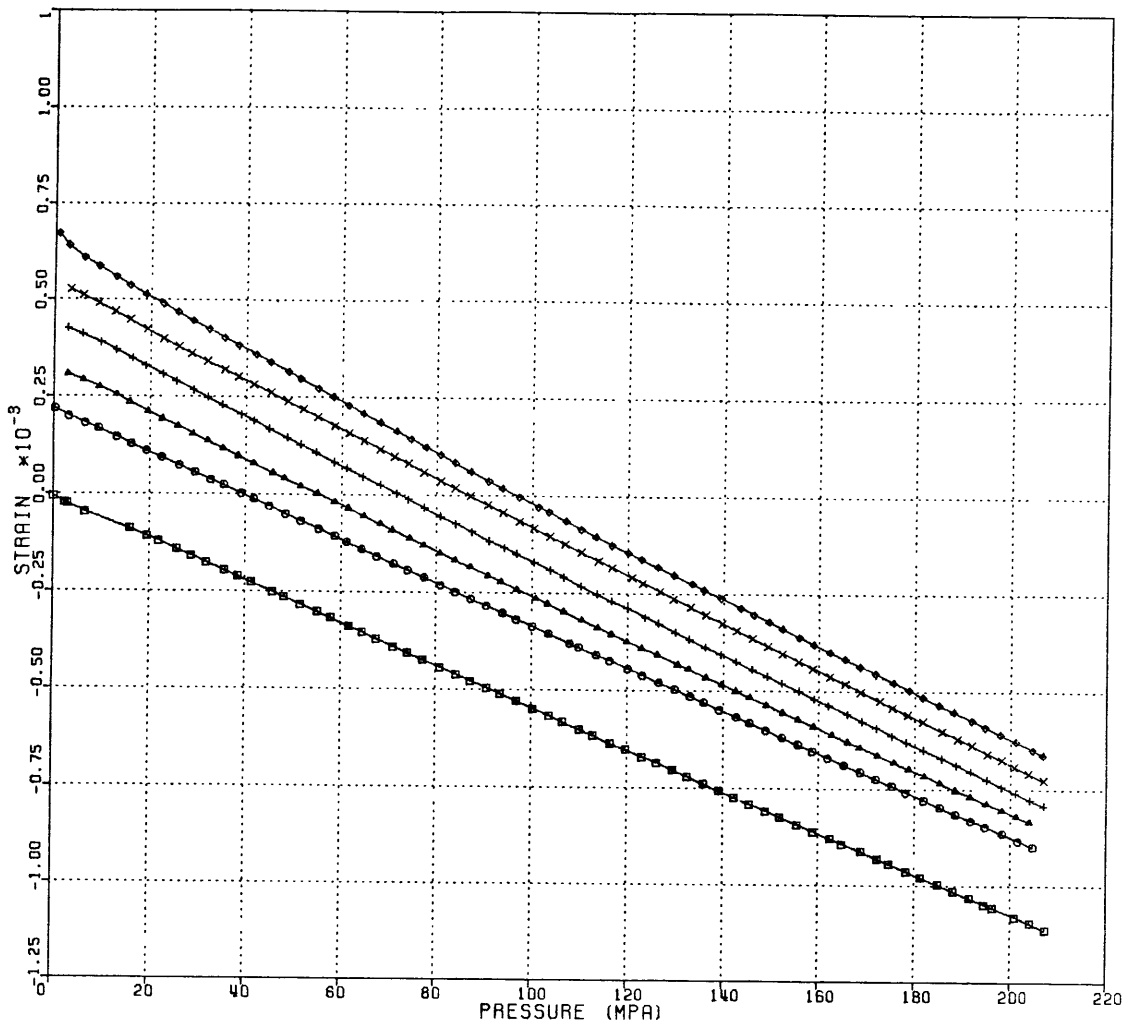
- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- × - 107°C
- ◇ - 125°C



1407 MIDDLEBROOK MØ FELSITE

GAGE:CA

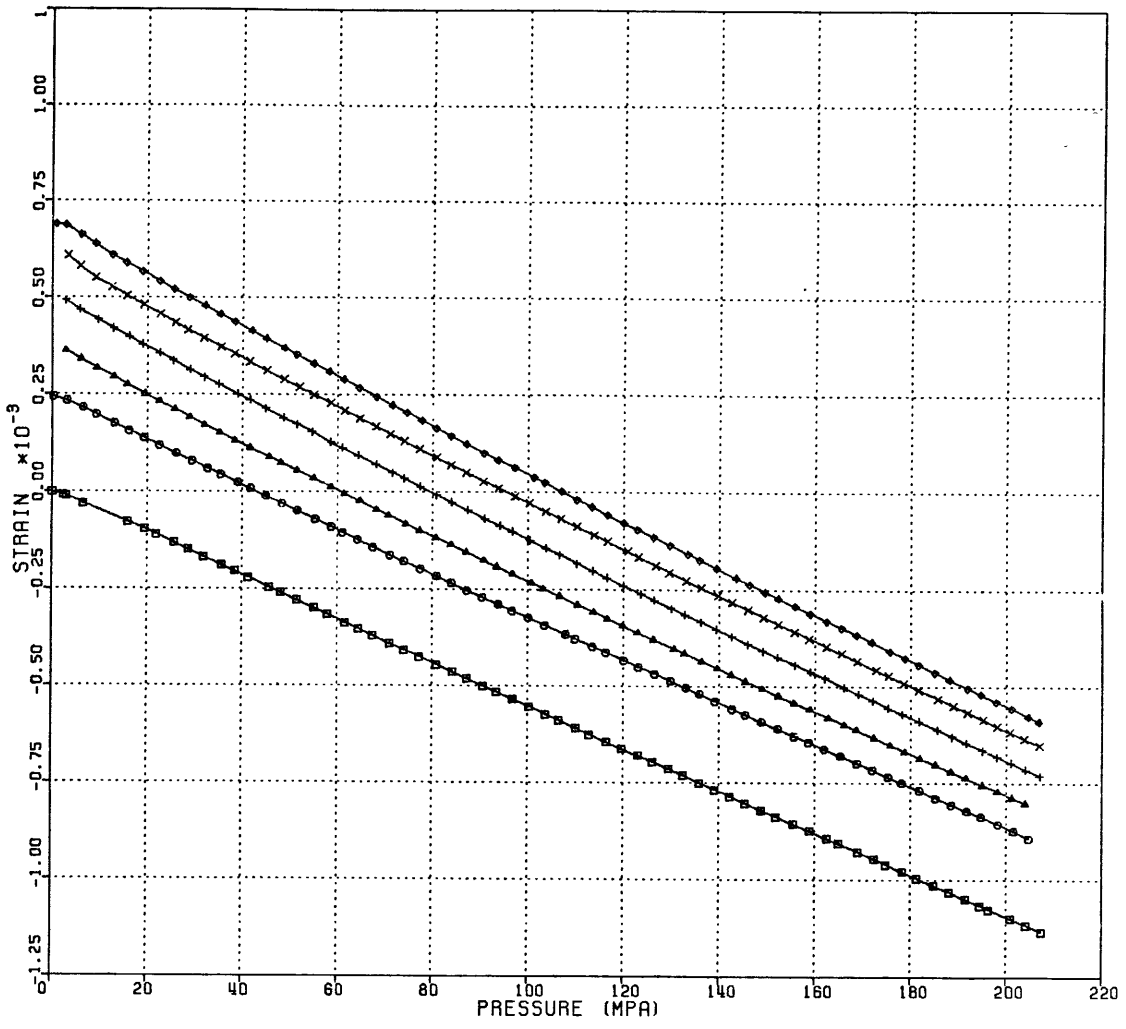
- - 23°C
- - 49°C
- ▲ - 65°C
- + - 85°C
- × - 107°C
- ◇ - 125°C



1407 MIDDLEBROOK M0 FELSITE

GAGE: 4A

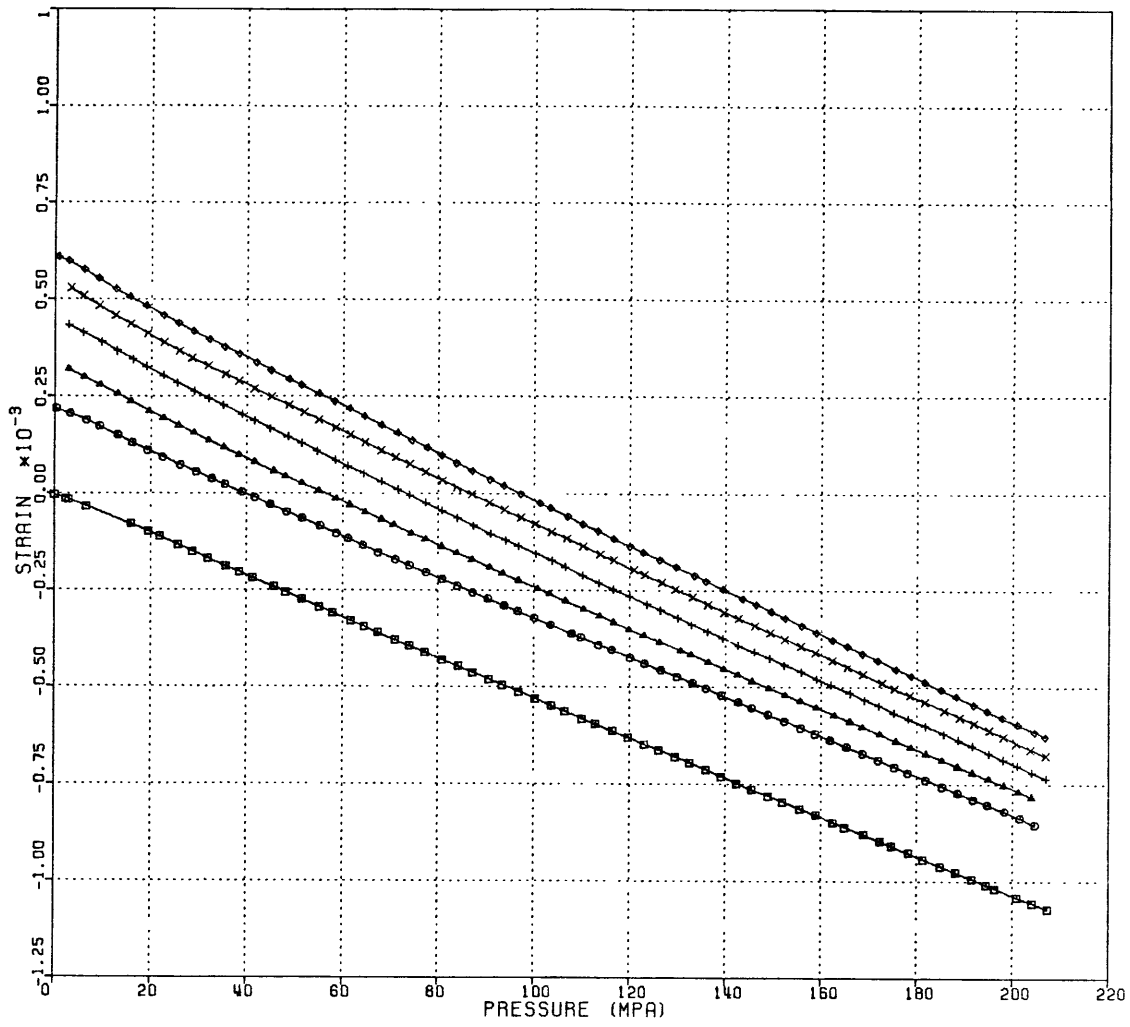
- - 23°C
- - 49°C
- △ - 65°C
- ⊕ - 85°C
- × - 107°C
- ◇ - 125°C



1407 MIDDLEBROOK MØ FELSITE

GAGE: AC

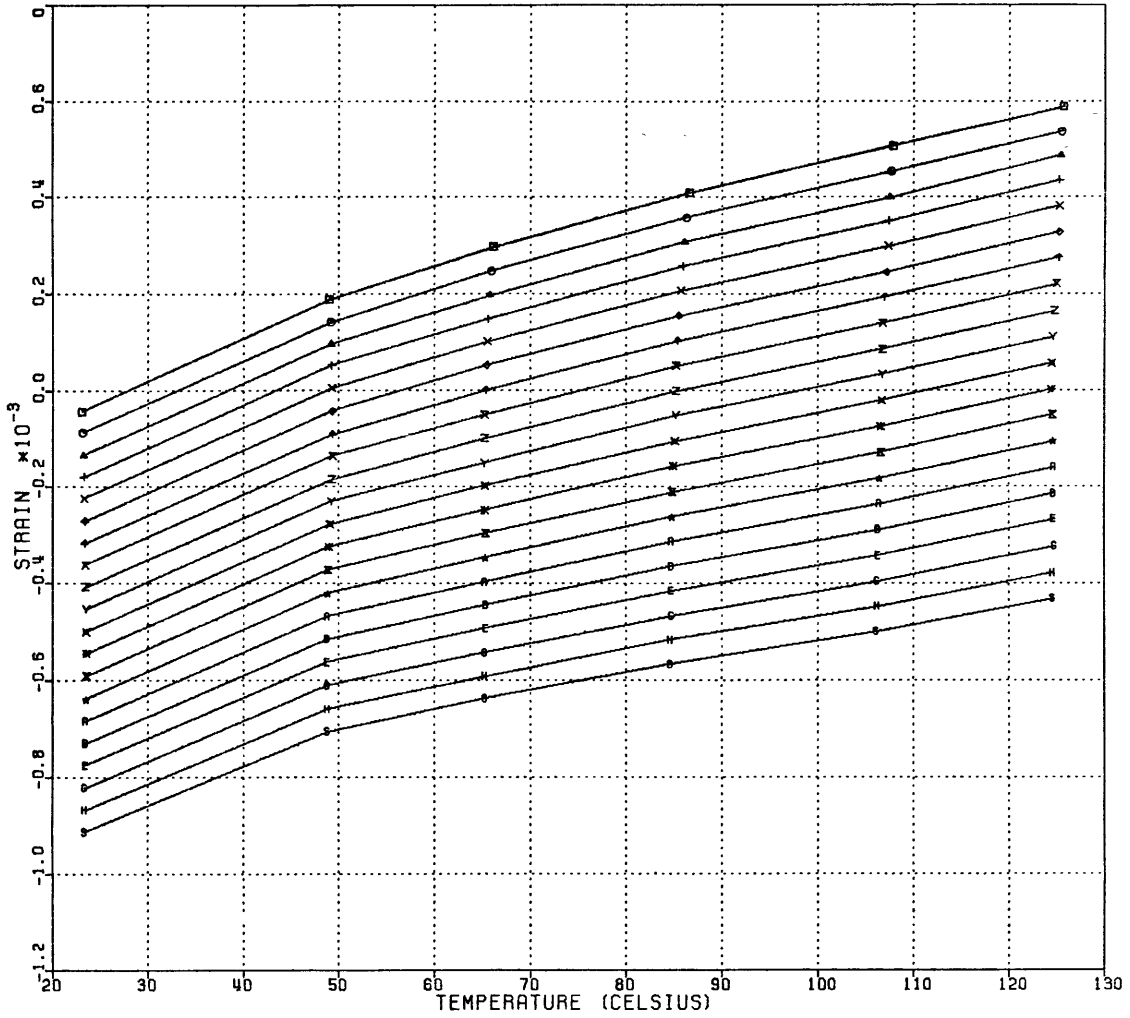
- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- × - 107°C
- ◇ - 125°C



1407 MIDDLEBROOK MØ FELSITE

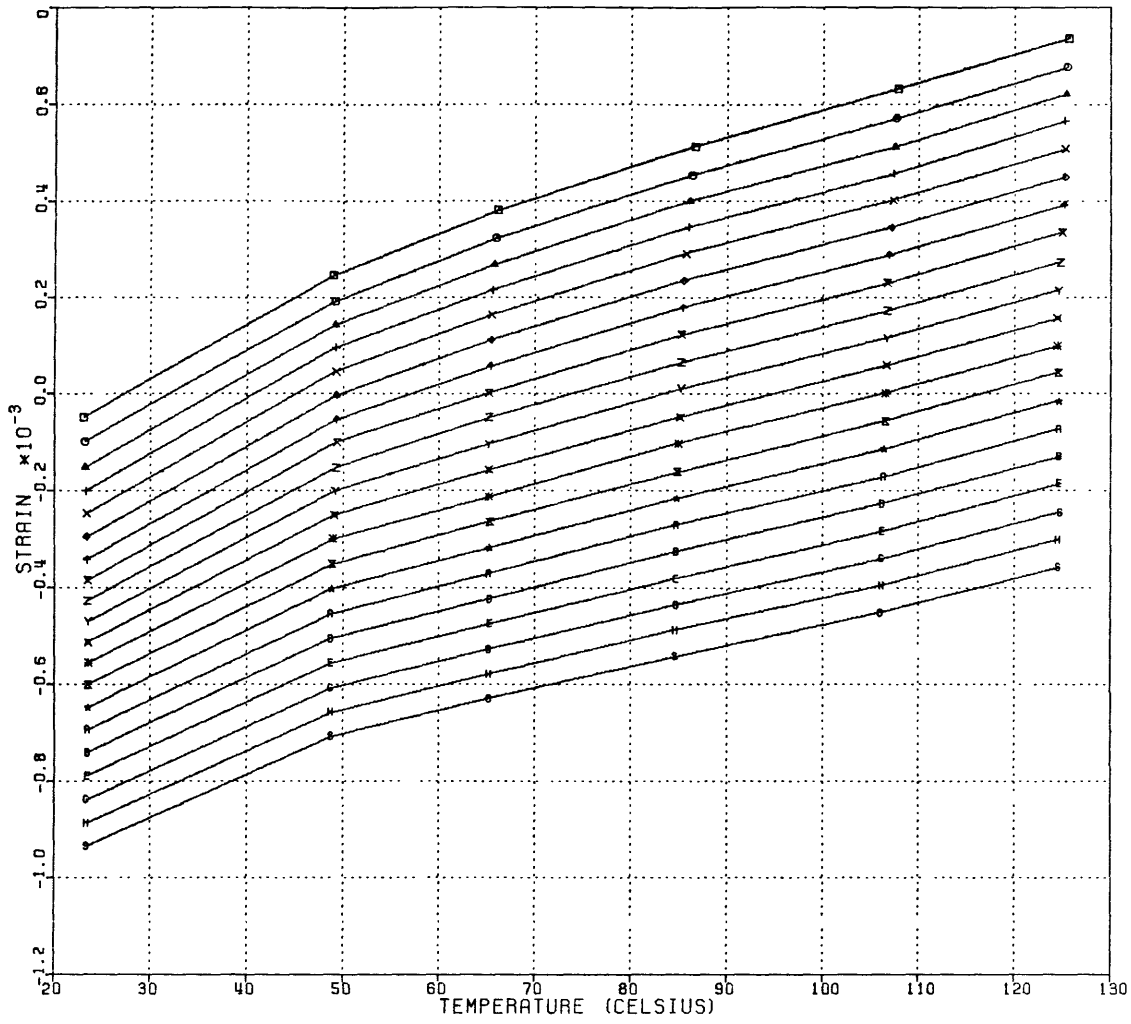
GAGE: 3C

- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- × - 107°C
- ◇ - 125°C



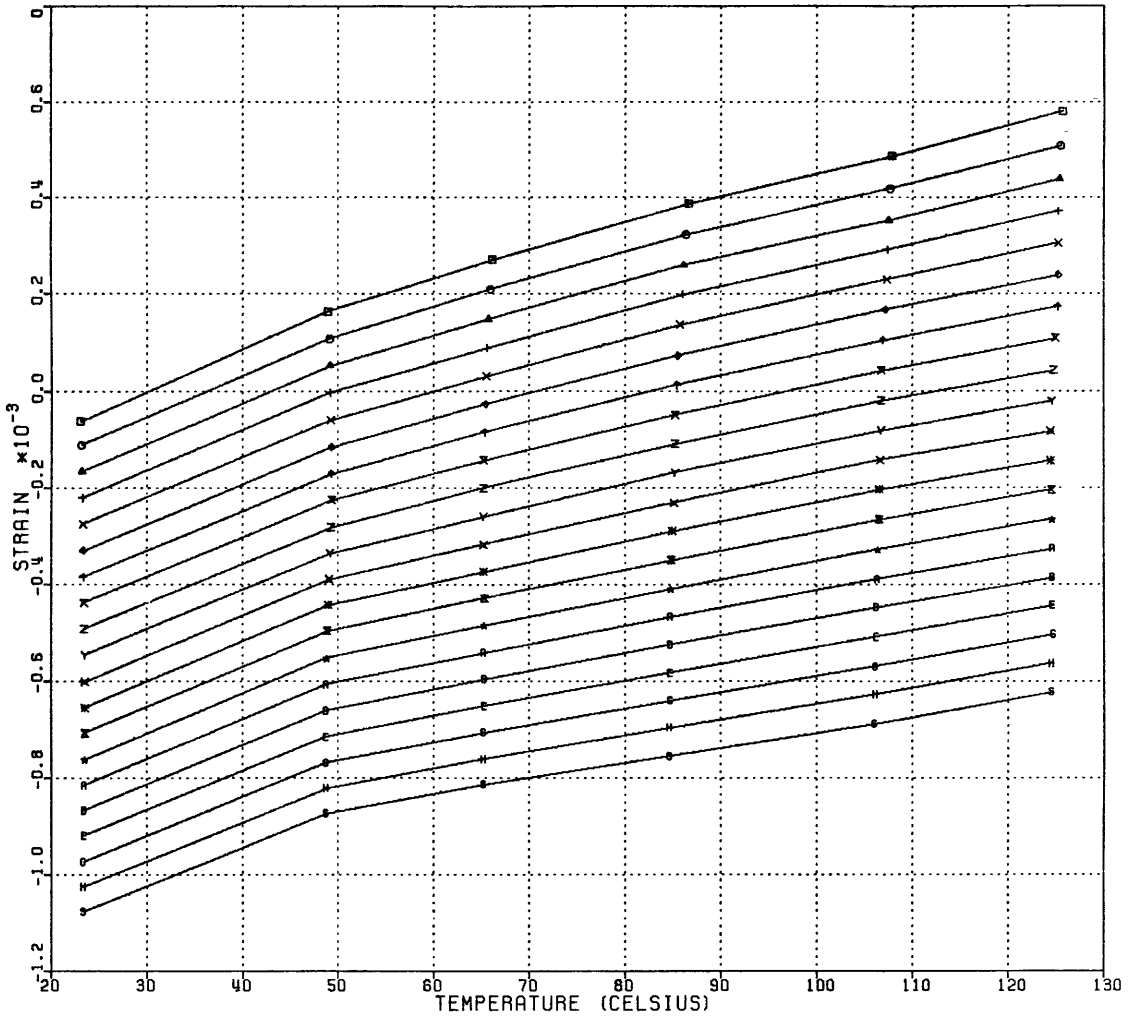
1407 MIDDLEBROOK M0 FELSITE
GAGE:BA

- | | |
|-------------|-------------|
| □ - 10 MPA | ⋈ - 110 MPA |
| ○ - 20 MPA | ✱ - 120 MPA |
| △ - 30 MPA | ⋈ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ⋈ - 70 MPA | E - 170 MPA |
| X - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



1407 MIDDLEBROOK M0 FELSITE
GAGE:CA

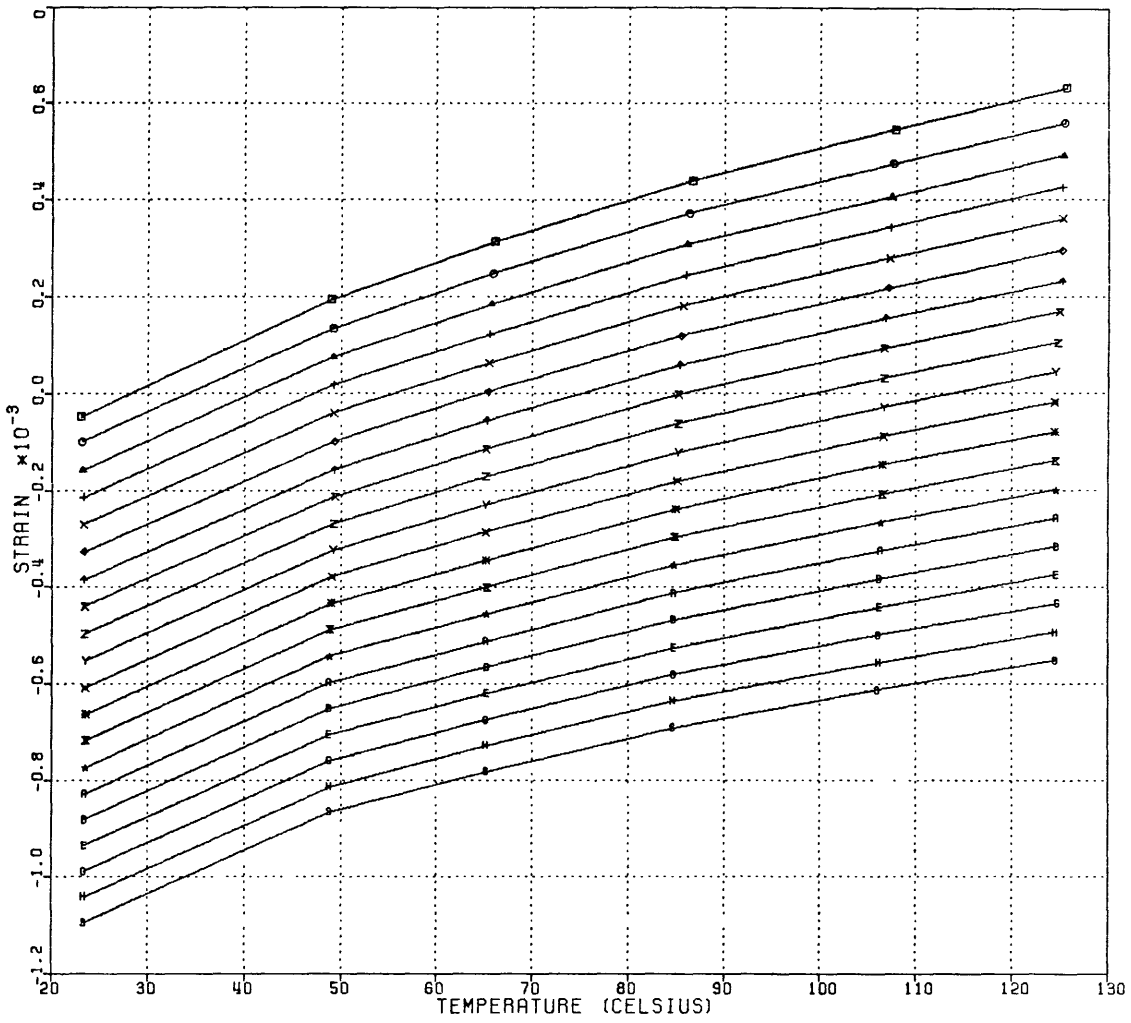
- | | |
|-------------|-------------|
| □ - 10 MPA | X - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | X - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| † - 70 MPA | E - 170 MPA |
| X - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



1407 MIDDLEBROOK M0 FELSITE

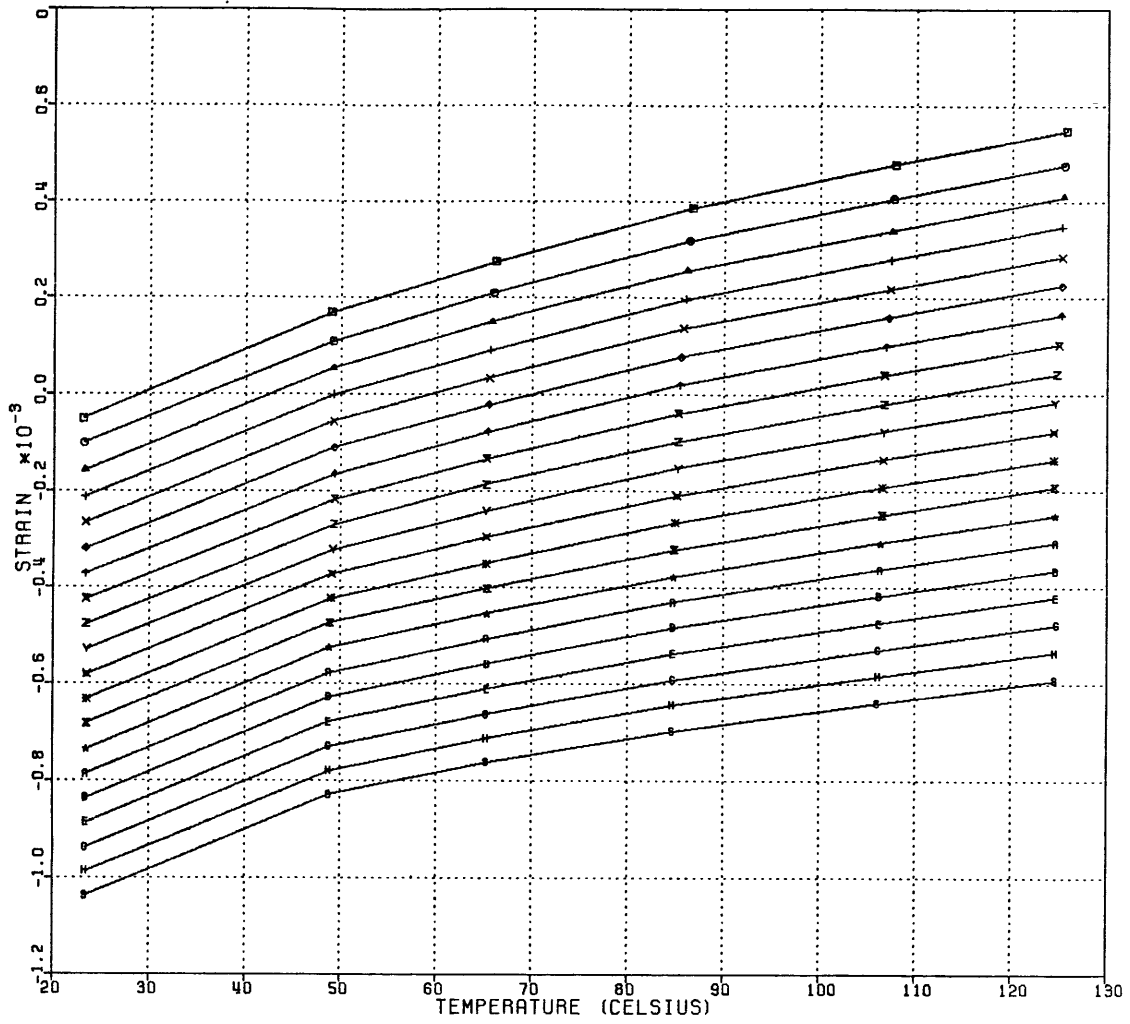
GAGE: 4A

- | | |
|-------------|-------------|
| □ - 10 MPA | ⌘ - 110 MPA |
| ○ - 20 MPA | ✱ - 120 MPA |
| △ - 30 MPA | ⌘ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | ⊖ - 150 MPA |
| ◇ - 60 MPA | ⊖ - 160 MPA |
| ⊕ - 70 MPA | ⊖ - 170 MPA |
| ⊗ - 80 MPA | ⊖ - 180 MPA |
| Z - 90 MPA | ⊖ - 190 MPA |
| Y - 100 MPA | ⊖ - 200 MPA |



1407 MIDDLEBROOK M0 FELSITE
GAGE:AC

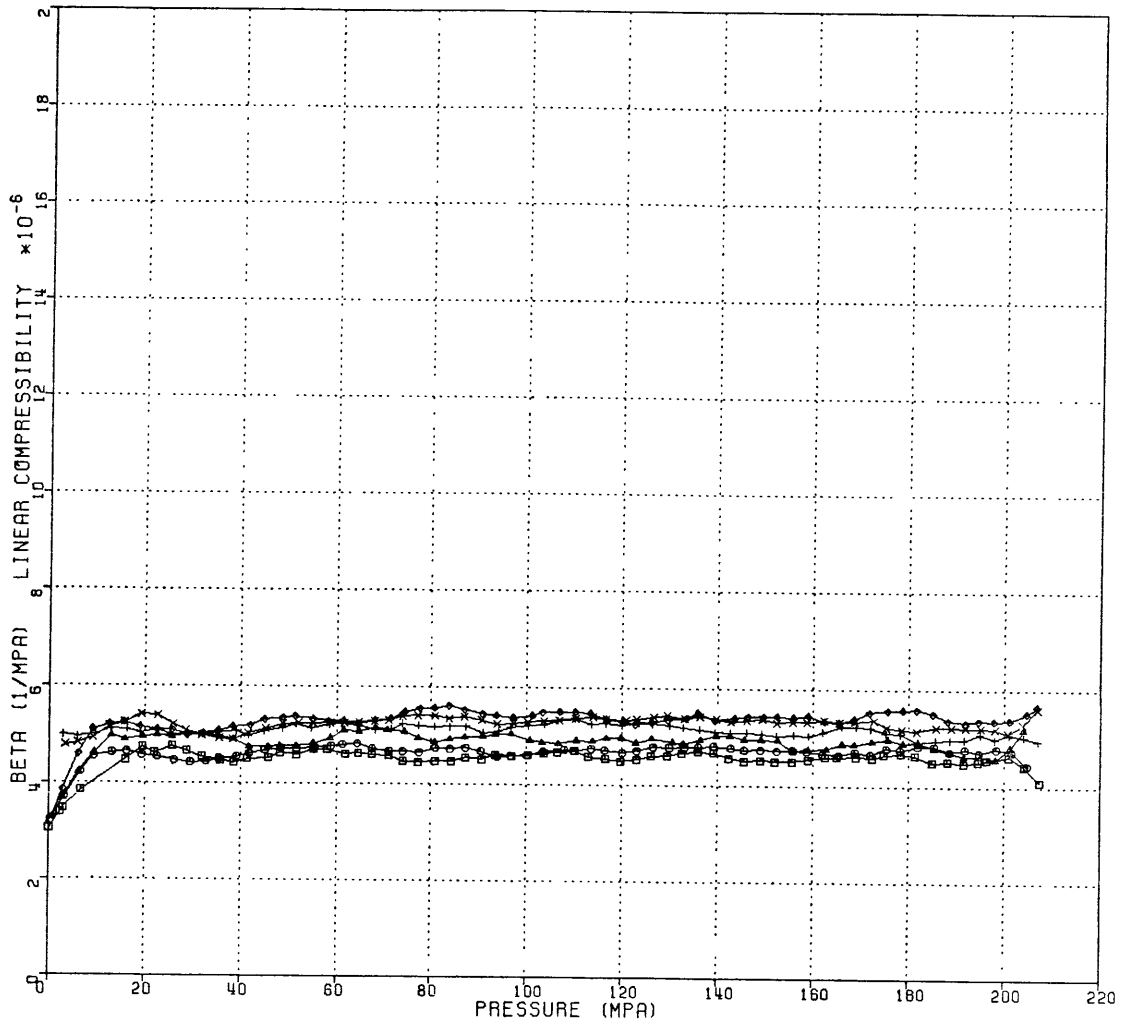
- | | |
|-------------|-------------|
| □ - 10 MPA | X - 110 MPA |
| ⊙ - 20 MPA | * - 120 MPA |
| ▲ - 30 MPA | X - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| † - 70 MPA | E - 170 MPA |
| X - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



1407 MIDDLEBROOK M0 FELSITE

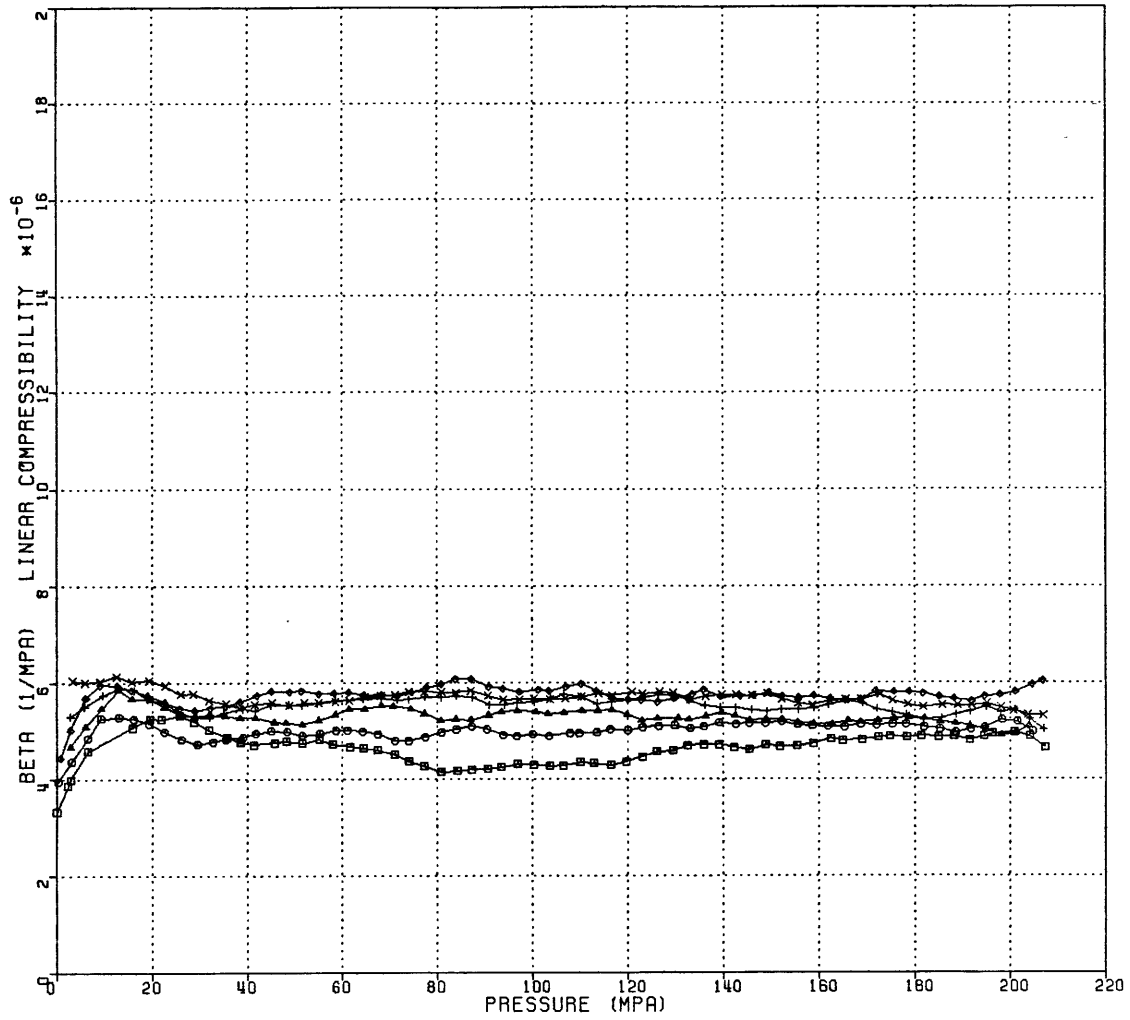
GAGE:3C

- | | |
|-------------|-------------|
| □ - 10 MPA | ⌘ - 110 MPA |
| ○ - 20 MPA | * - 120 MPA |
| △ - 30 MPA | ⊗ - 130 MPA |
| + - 40 MPA | ★ - 140 MPA |
| X - 50 MPA | A - 150 MPA |
| ◇ - 60 MPA | B - 160 MPA |
| ⊕ - 70 MPA | E - 170 MPA |
| X - 80 MPA | G - 180 MPA |
| Z - 90 MPA | H - 190 MPA |
| Y - 100 MPA | S - 200 MPA |



1407 MIDDLEBROOK M0 FELSITE
 GAGE: BA

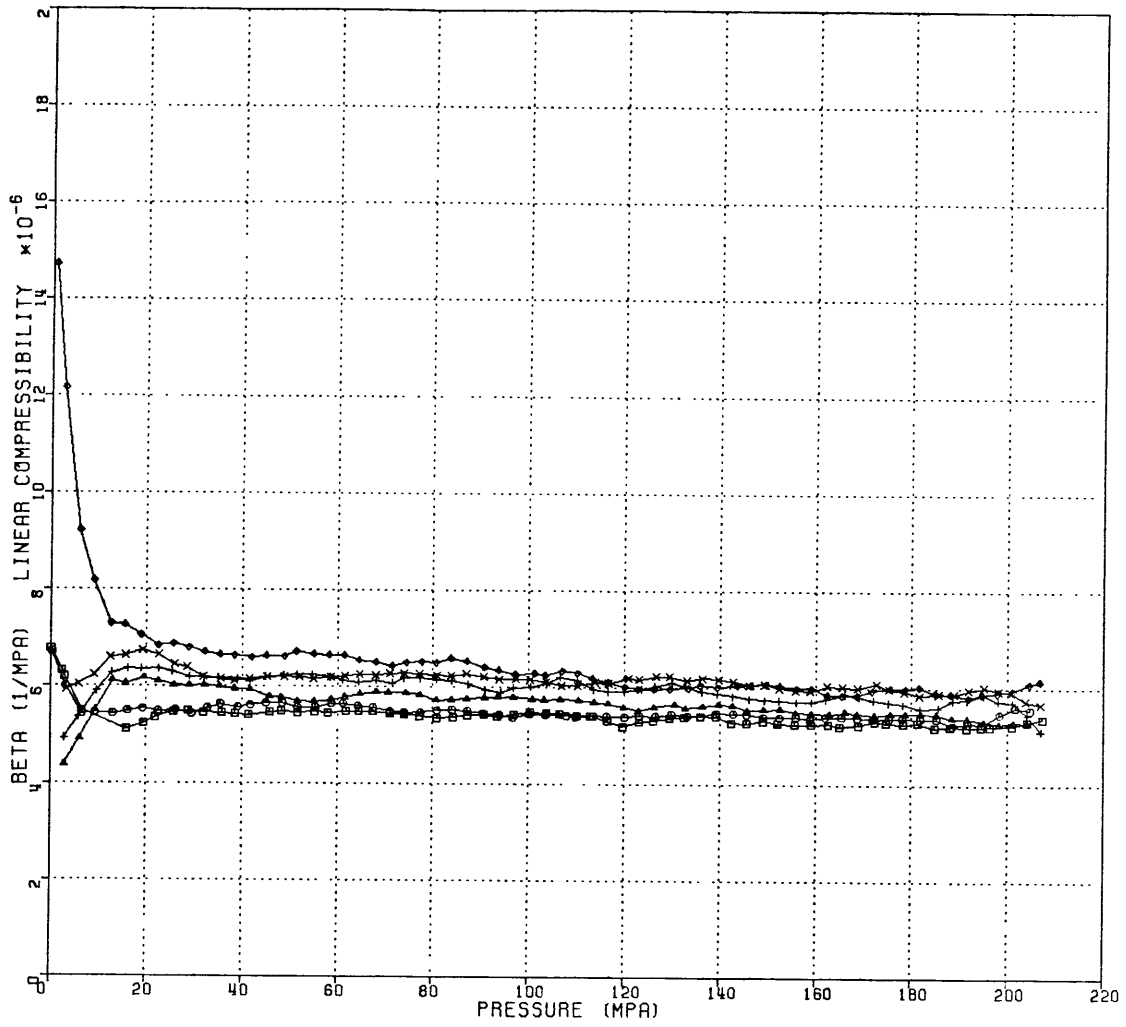
- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- × - 107°C
- ◇ - 125°C



1407 MIDDLEBROOK M0 FELSITE

GAGE: CA

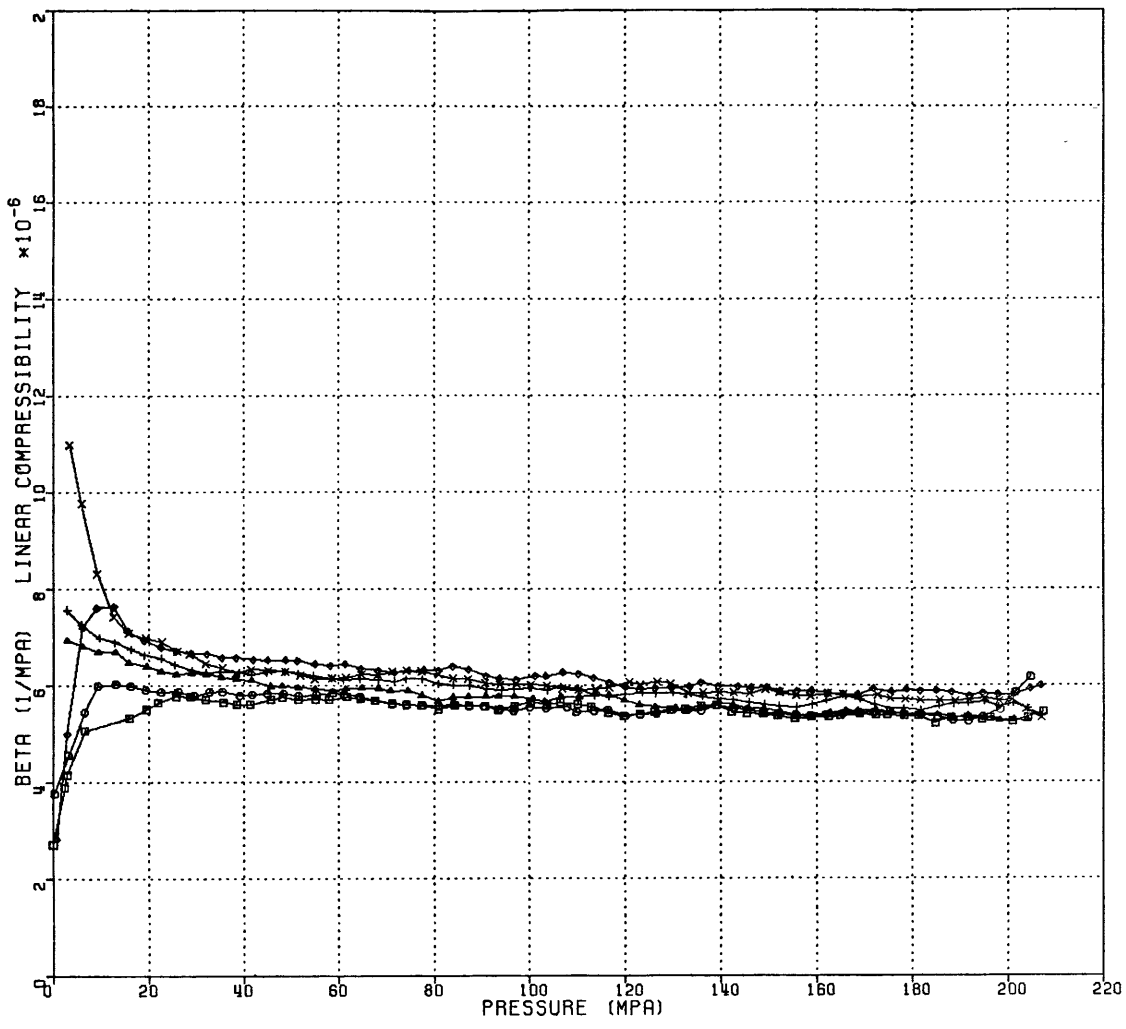
- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- × - 107°C
- ◇ - 125°C



1407 MIDDLEBROOK M0 FELSITE

GAGE: 4A

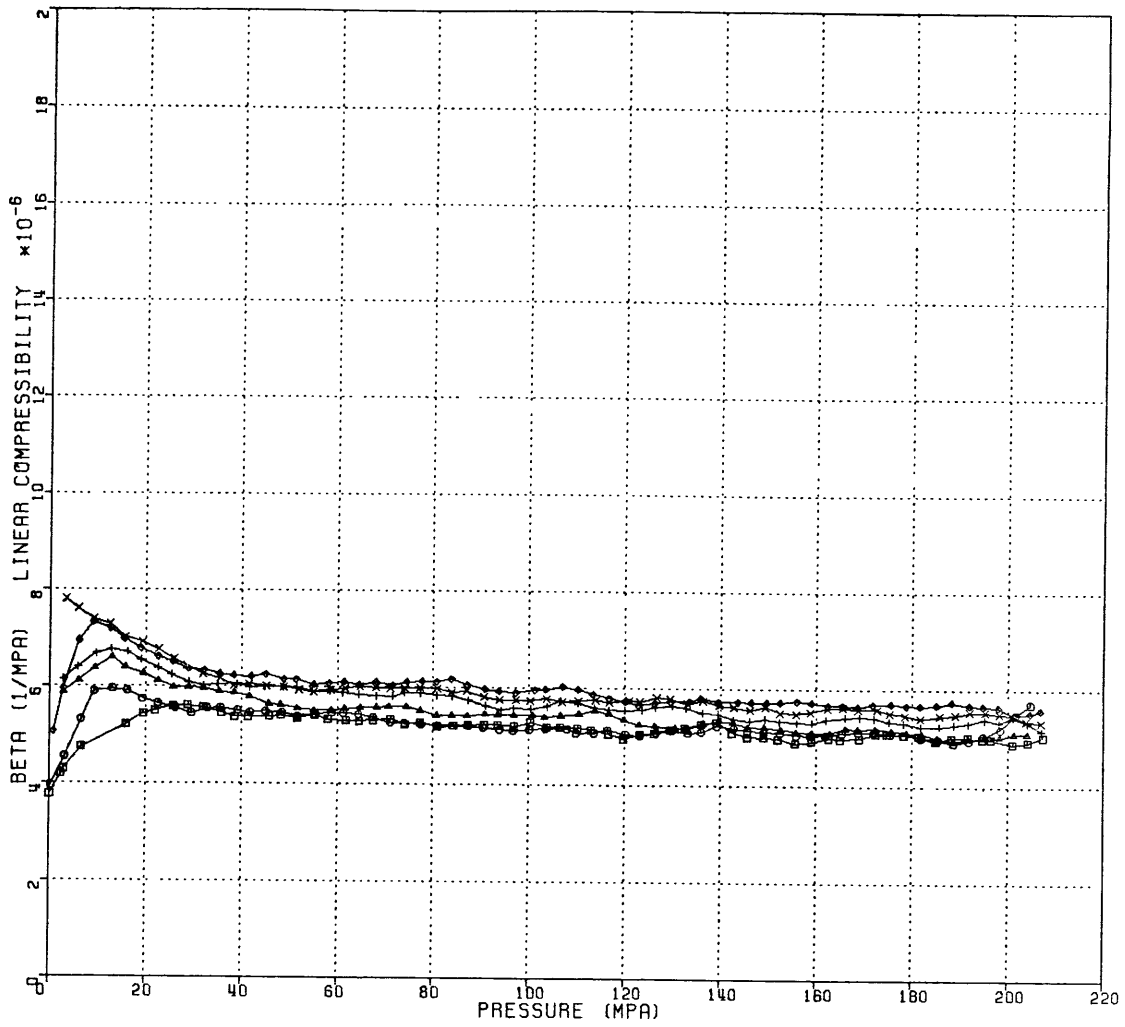
- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- x - 107°C
- ◇ - 125°C



1407 MIDDLEBROOK M0 FELSITE

GAGE: AC

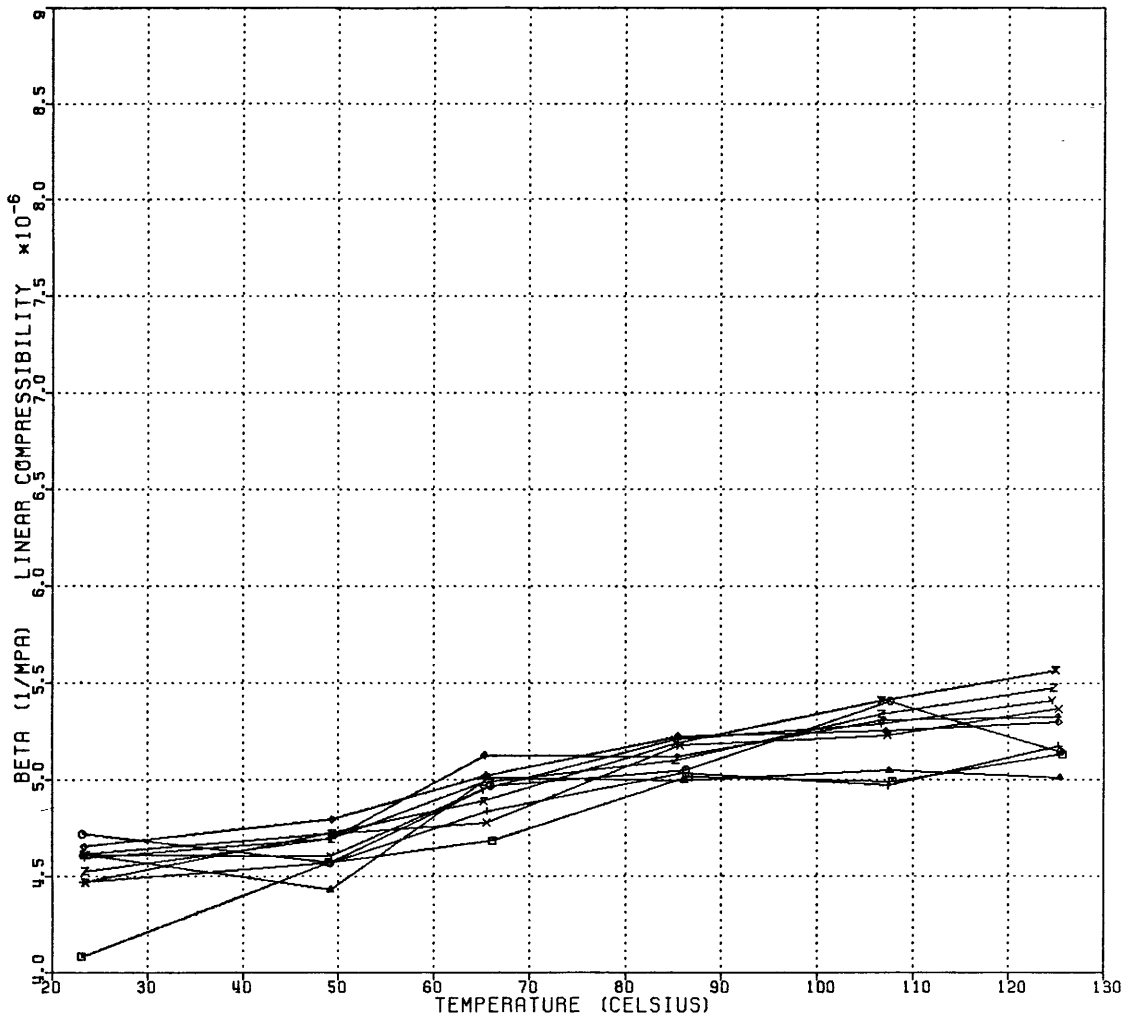
- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- X - 107°C
- ◇ - 125°C



1407 MIDDLEBROOK M0 FELSITE

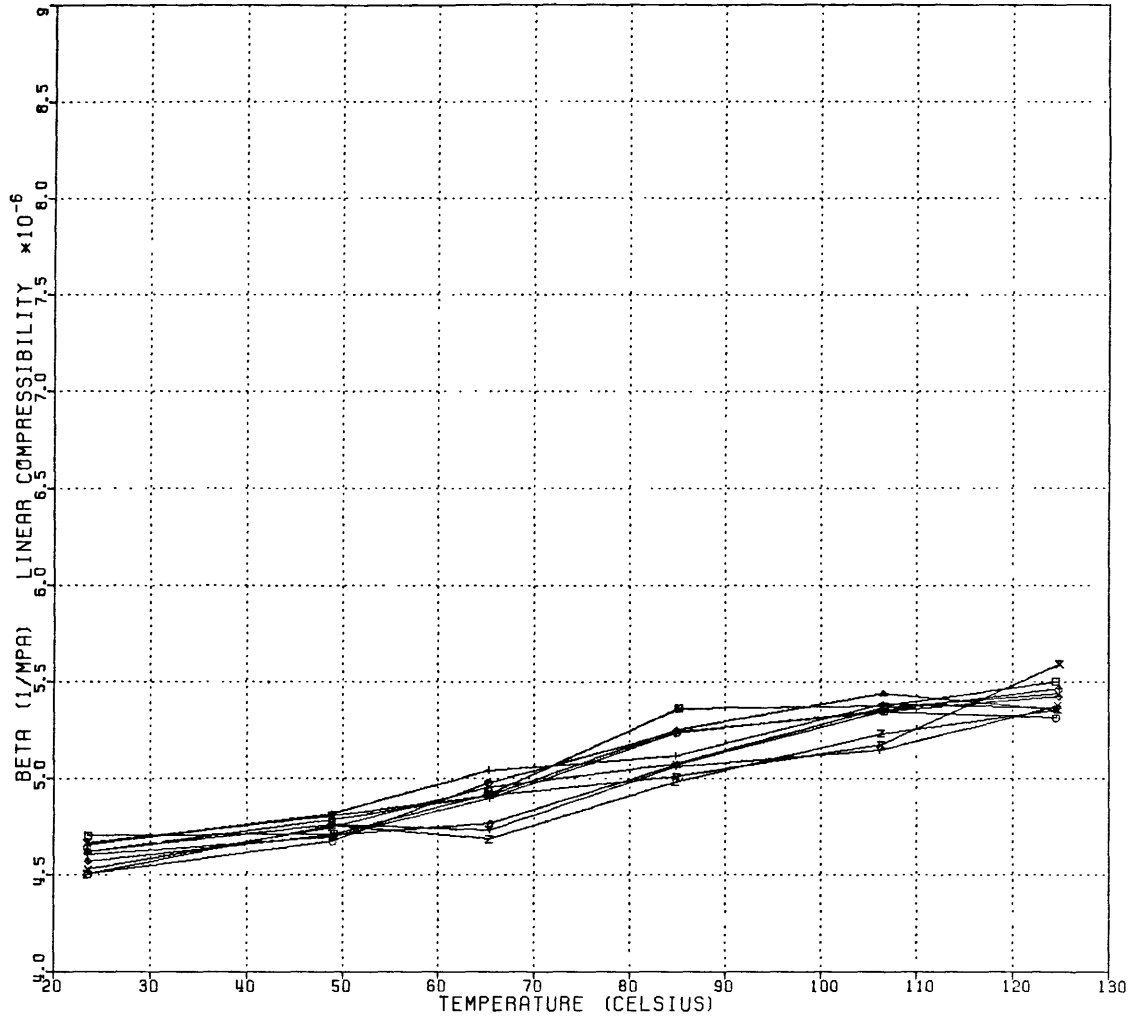
GAGE: 3C

- - 23°C
- - 49°C
- △ - 65°C
- + - 85°C
- X - 107°C
- ◇ - 125°C



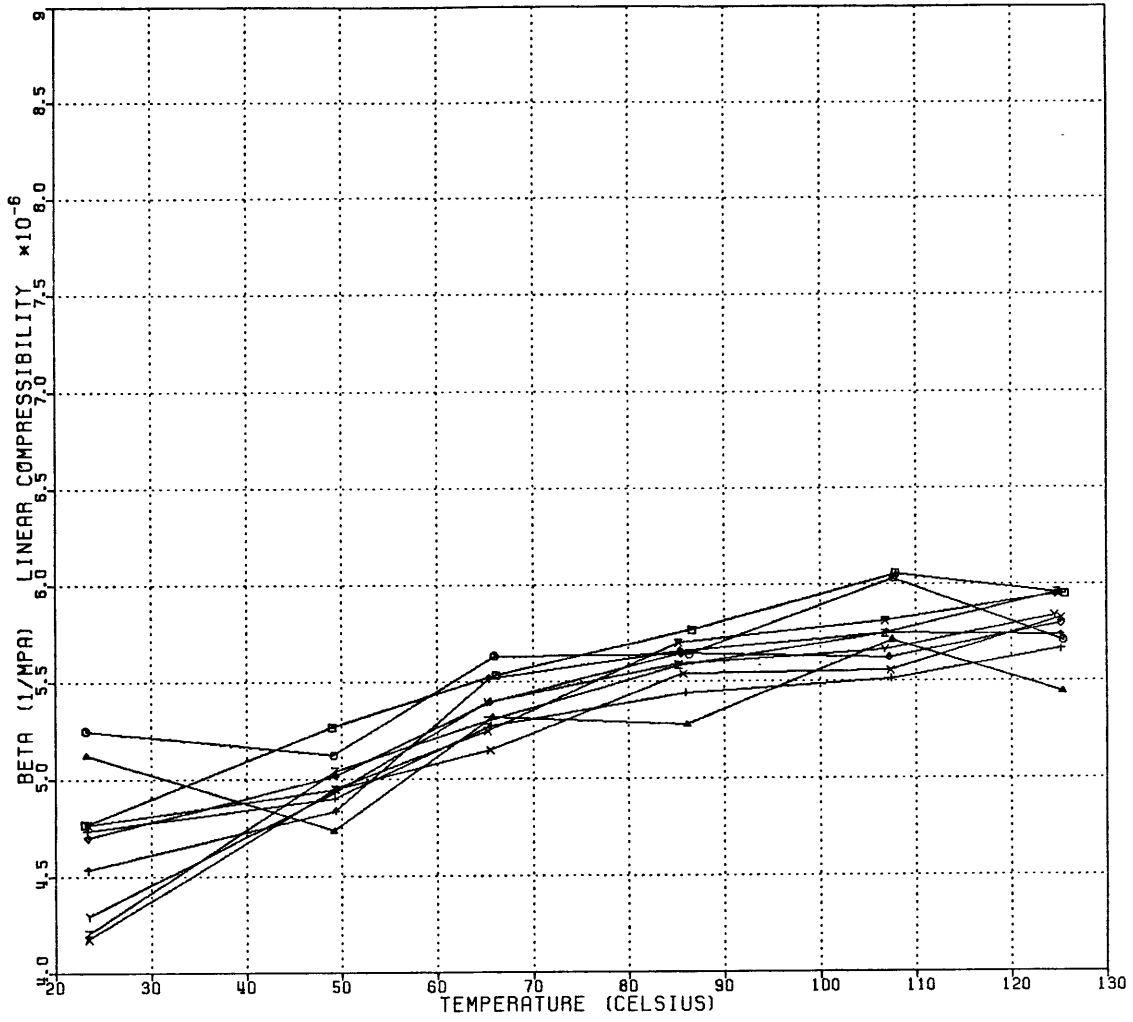
1407 MIDDLEBROOK M0 FELSITE
GAGE:BA

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ♣ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



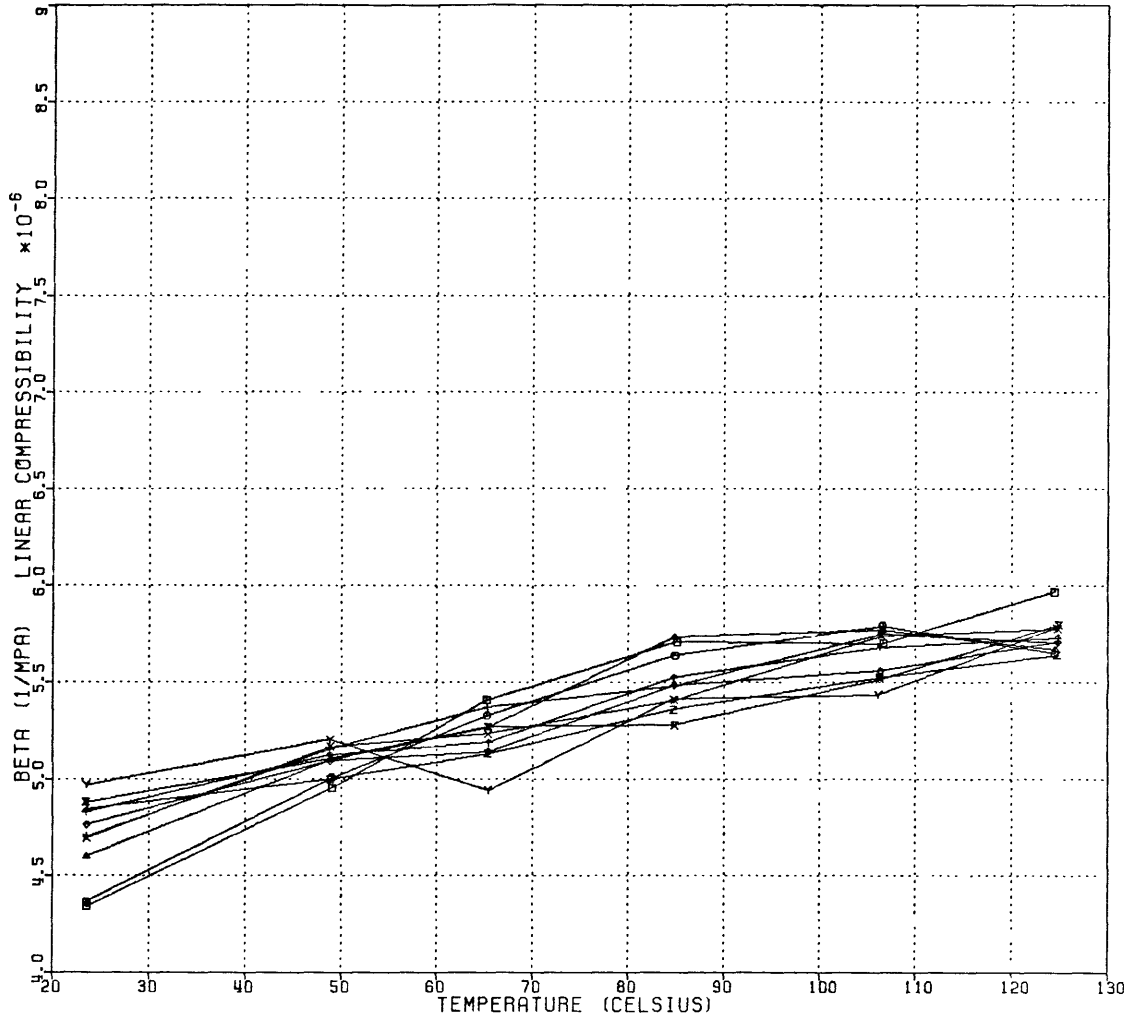
1407 MIDDLEBROOK M0 FELSITE
GAGE:BA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⋈ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



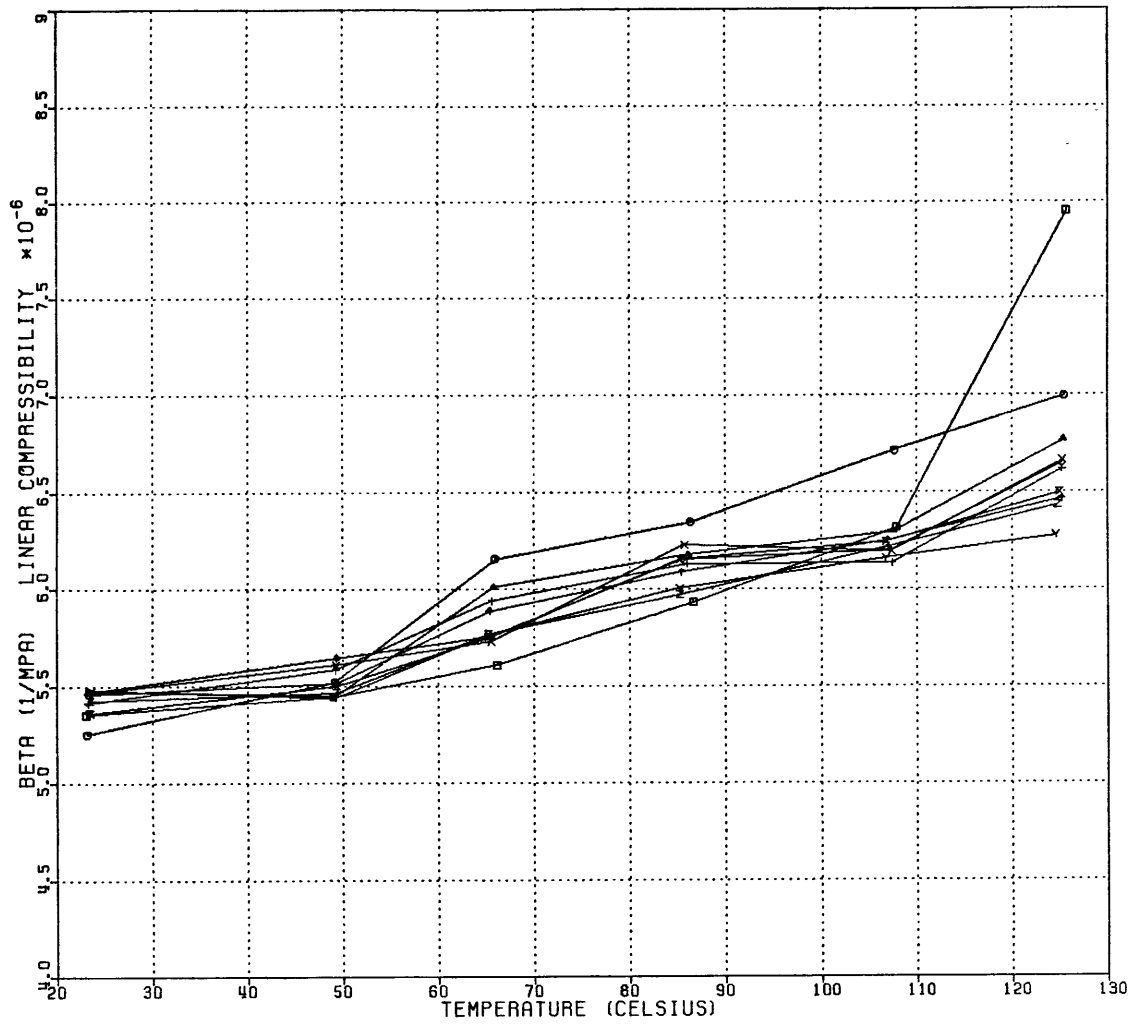
1407 MIDDLEBROOK M0 FELSITE
GAGE:CA

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ♠ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



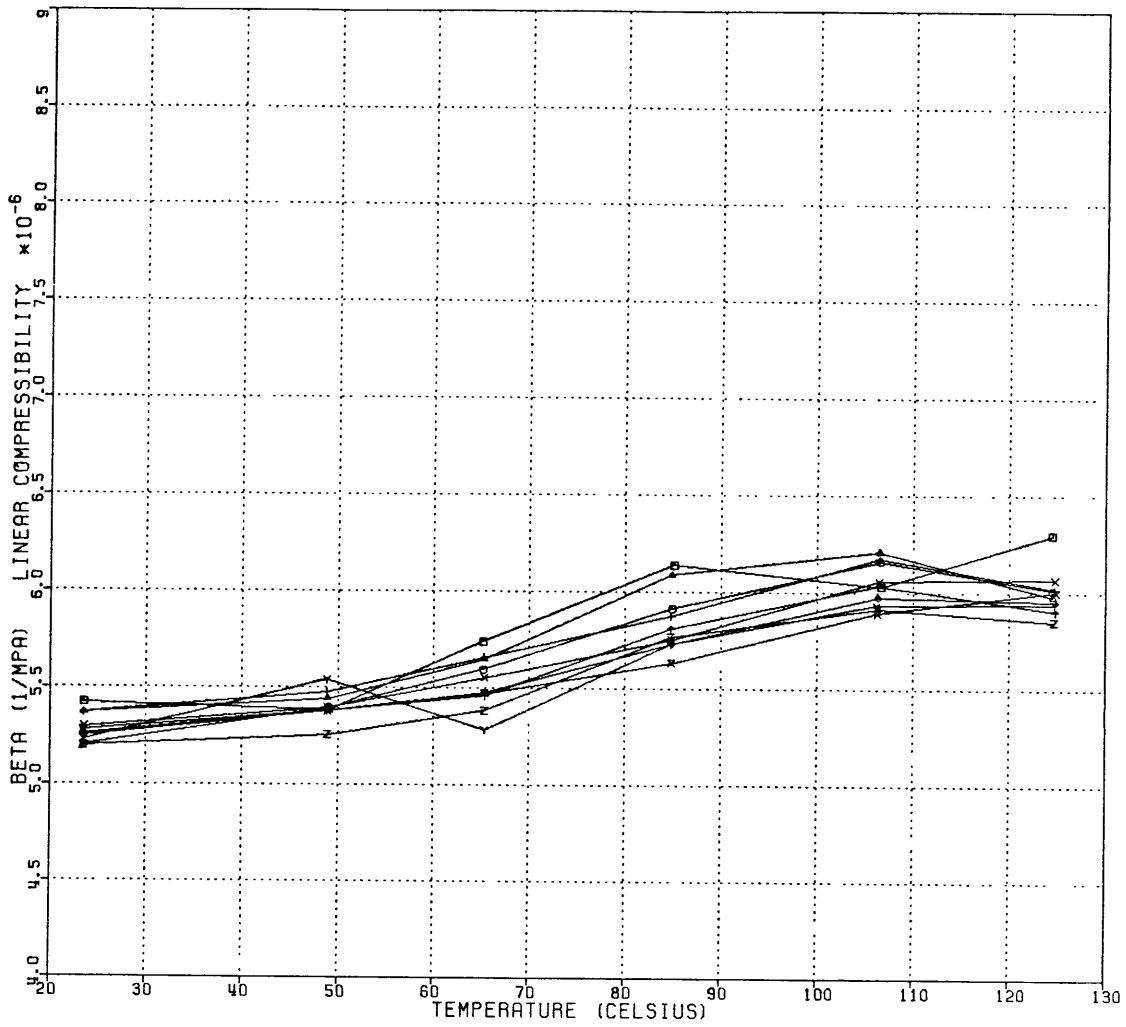
1407 MIDDLEBROOK M0 FELSITE
GAGE:CA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- x - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



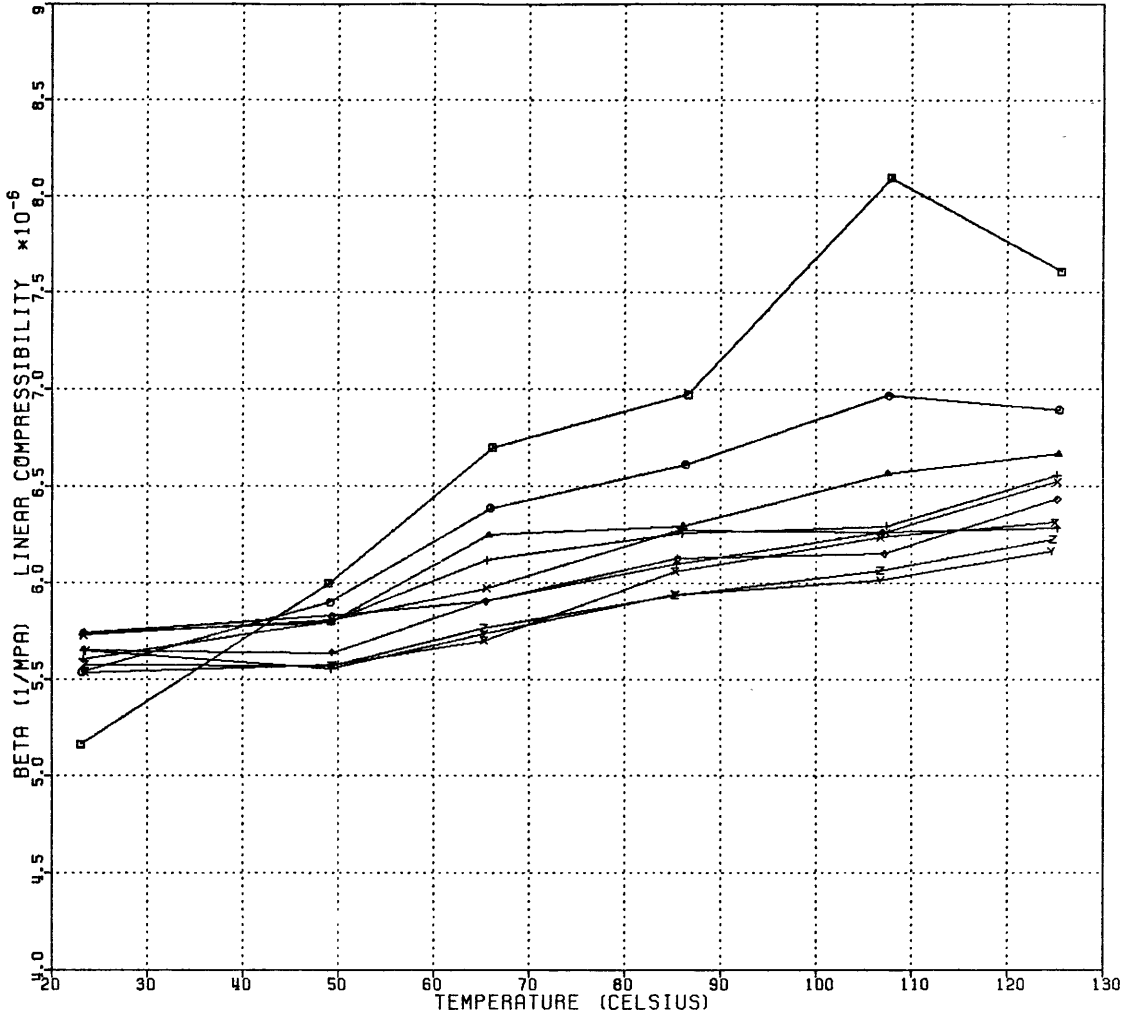
1407 MIDDLEBROOK MØ FELSITE
GAGE: 4A

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- x - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



1407 MIDDLEBROOK MØ FELSITE
GAGE: 4A

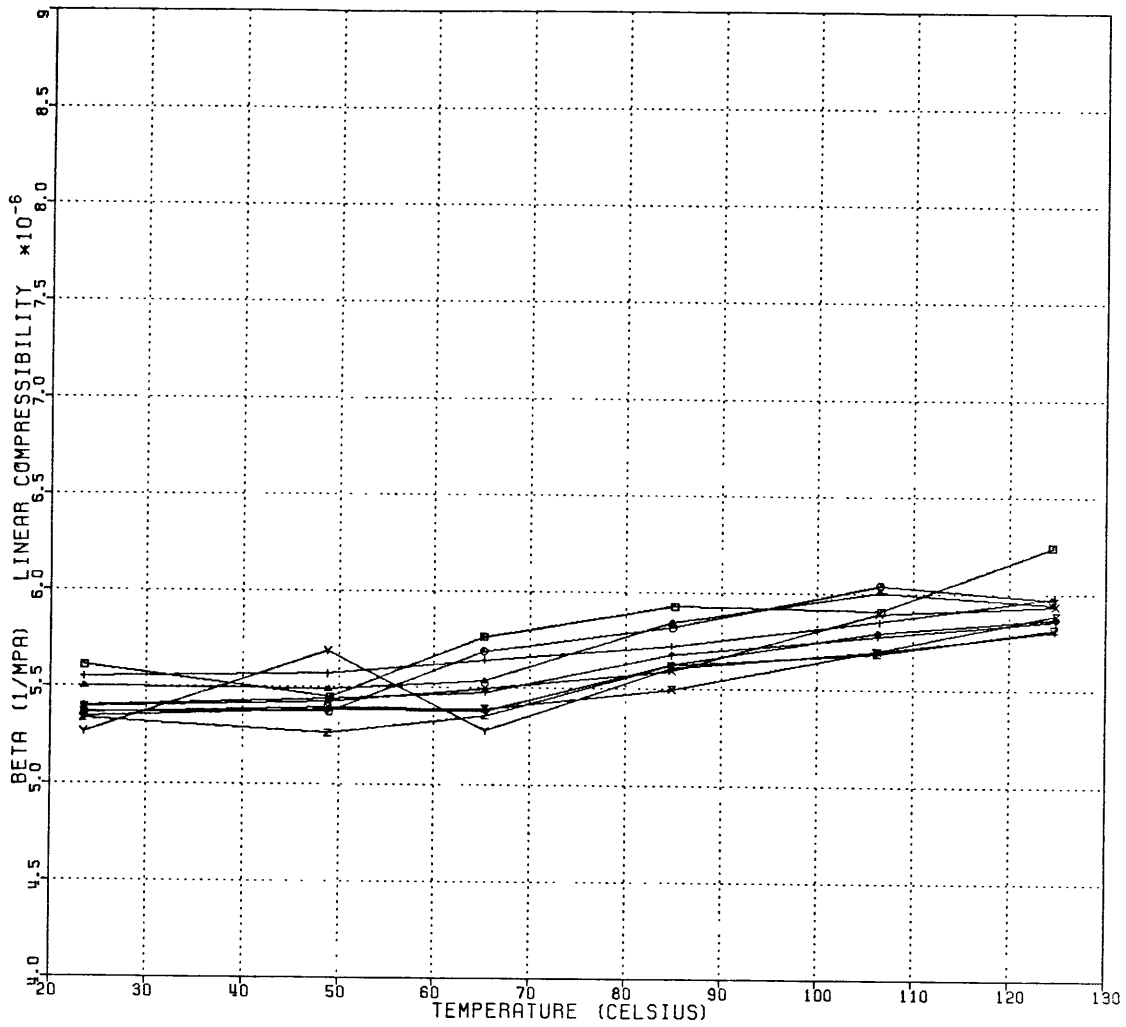
- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



1407 MIDDLEBROOK M0 FELSITE

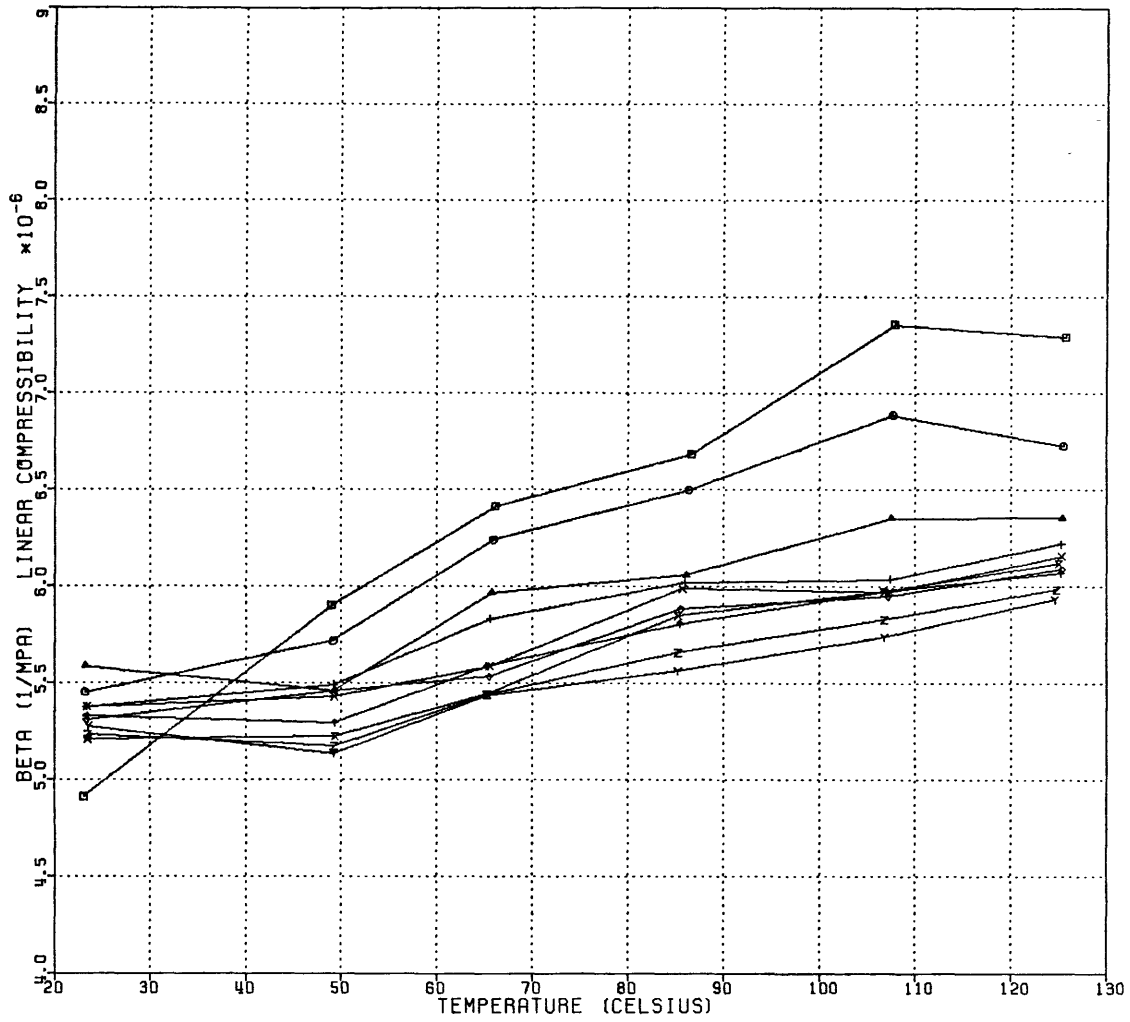
GAGE:AC

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



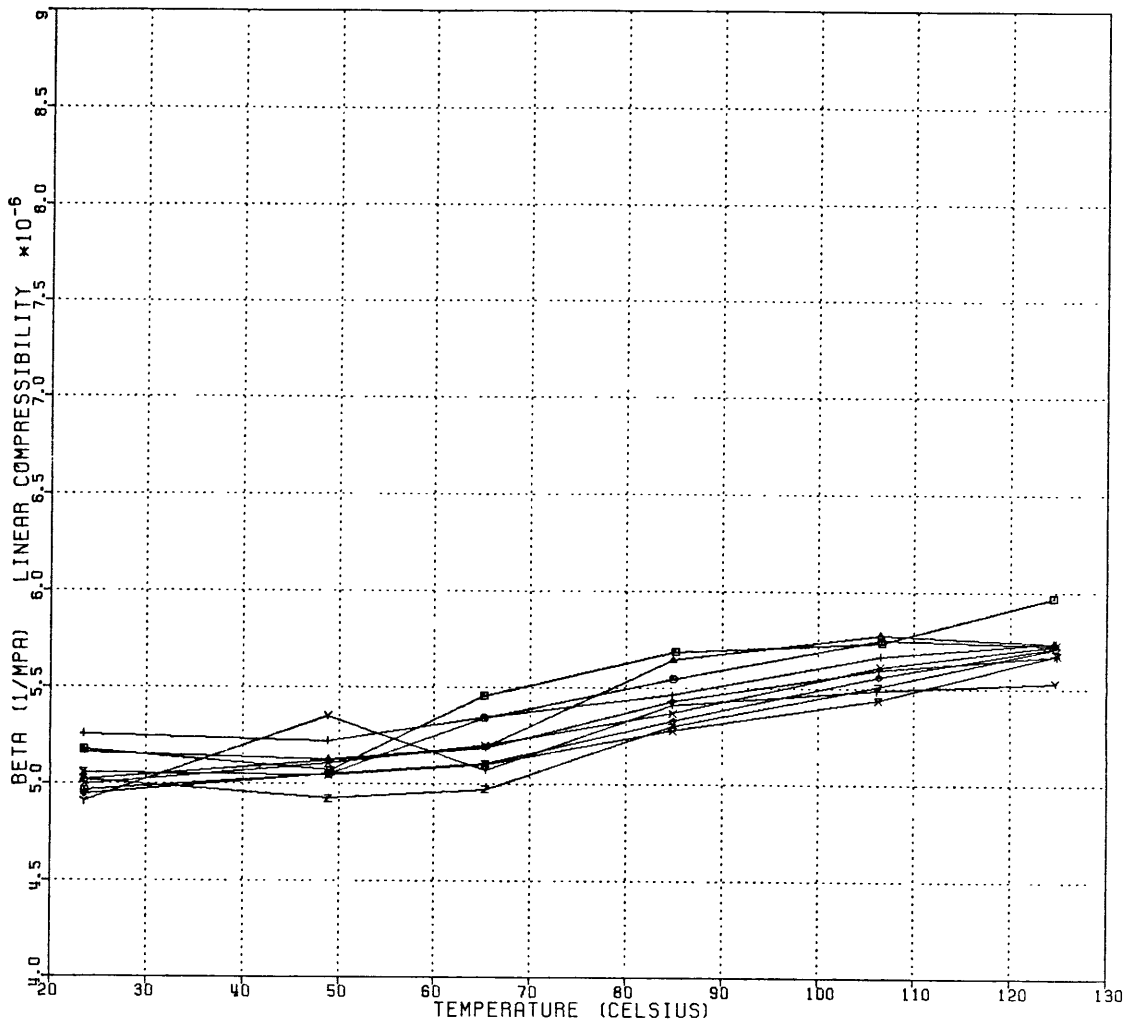
1407 MIDDLEBROOK MØ FELSITE
GAGE:AC

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



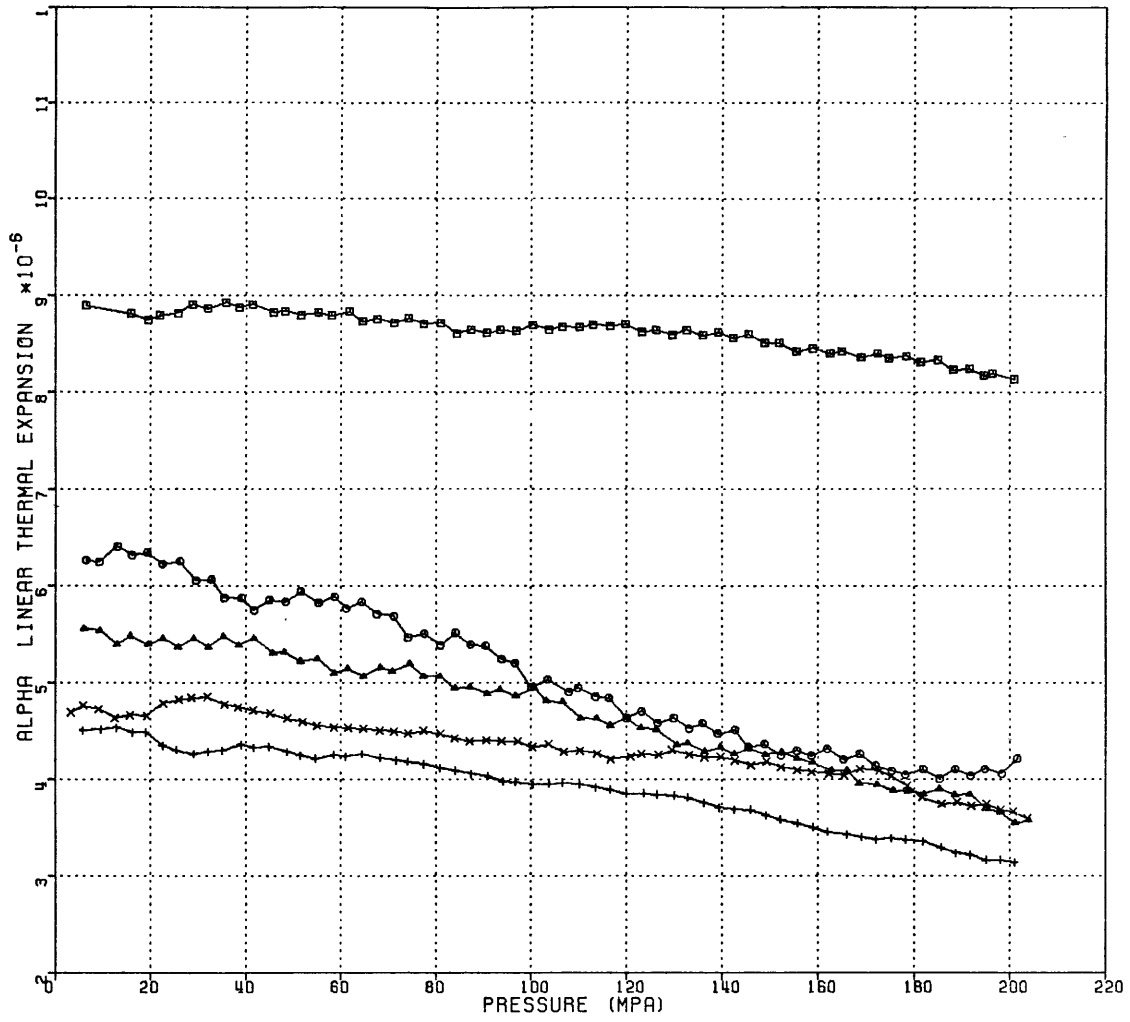
1407 MIDDLEBROOK M0 FELSITE
GAGE:3C

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



1407 MIDDLEBROOK MØ FELSITE
GAGE: 3C

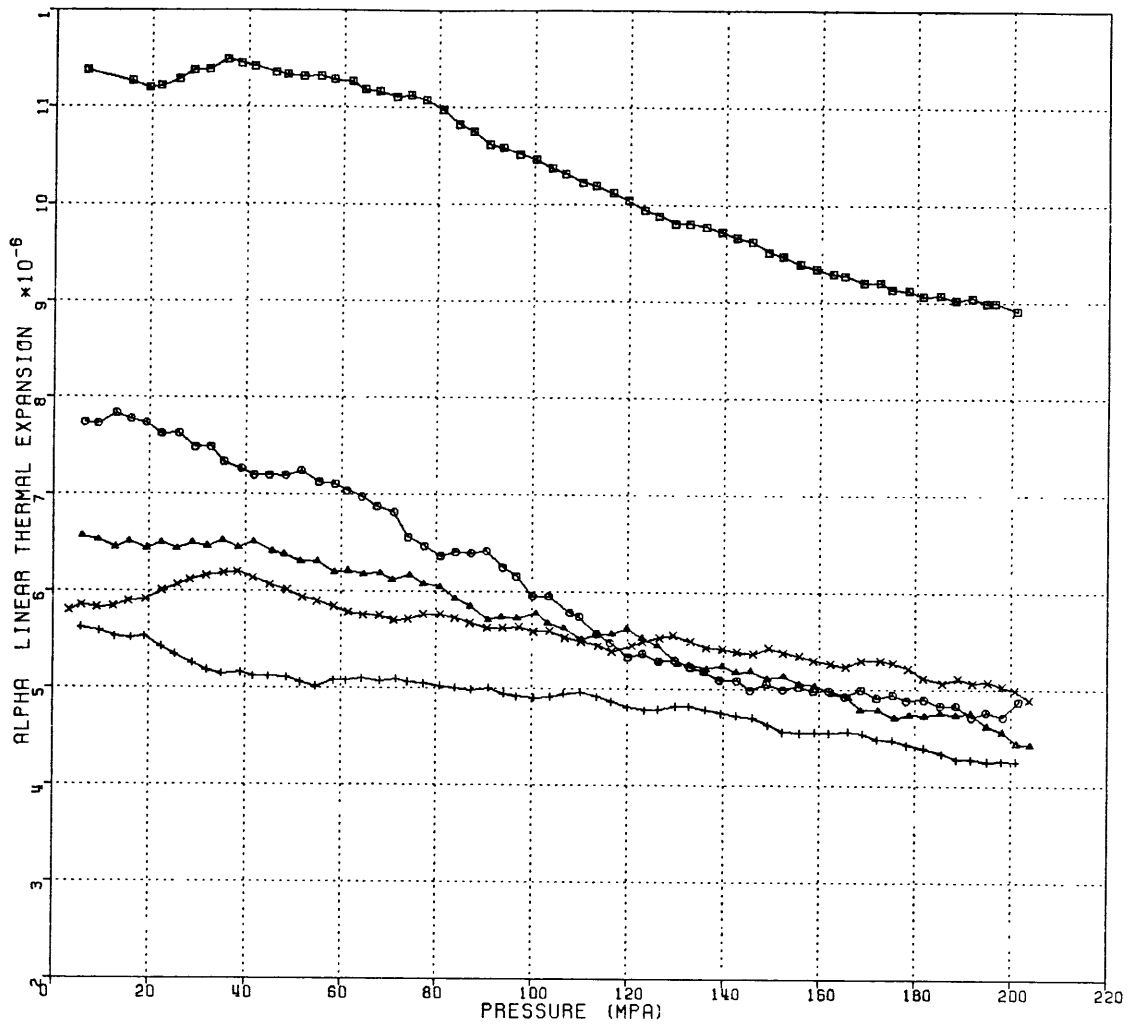
- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⊕ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



1407 MIDDLEBROOK M0 FELSITE

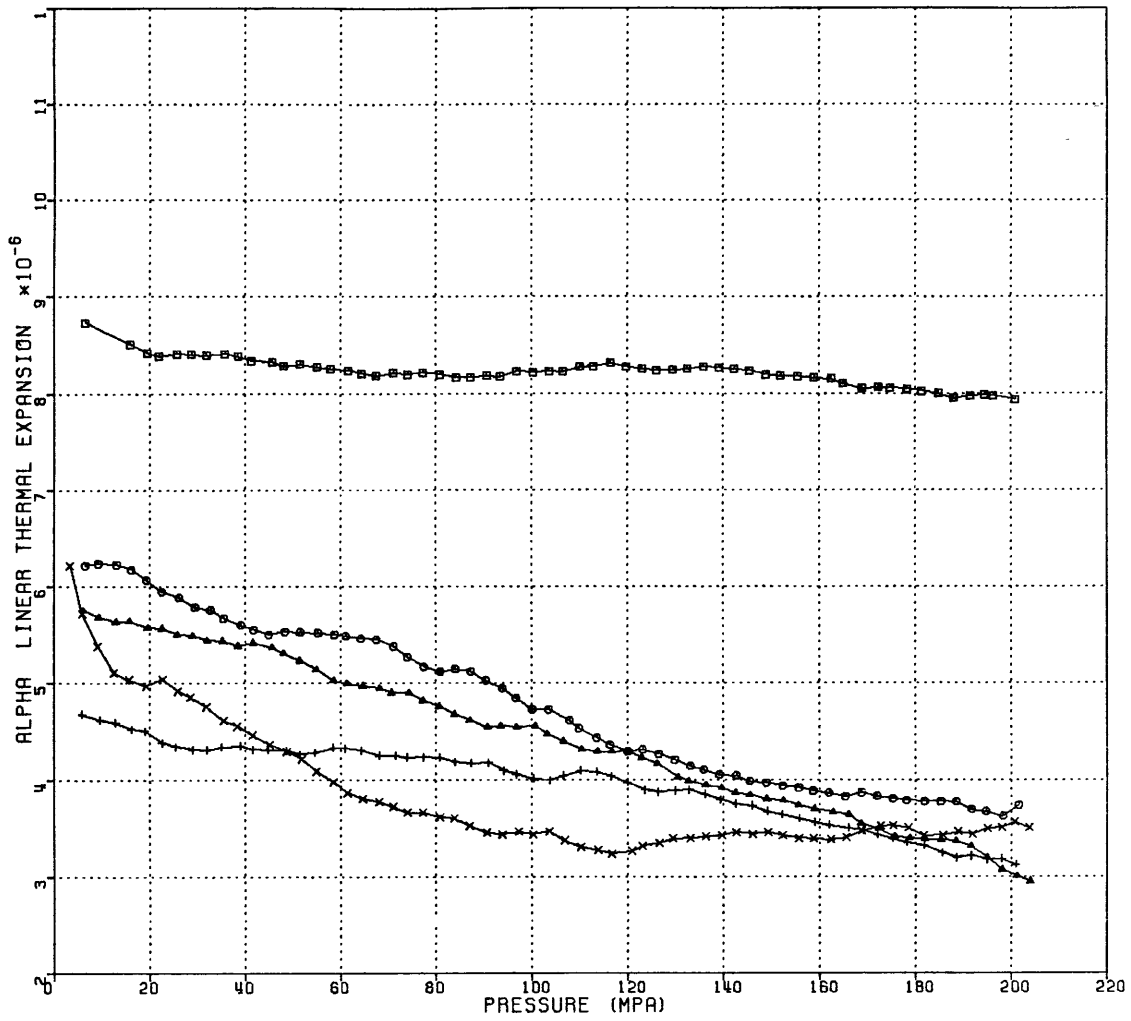
GAGE:BA

- - 23°C- 49°C
- - 49°C- 65°C
- △ - 65°C- 85°C
- + - 85°C-107°C
- X - 107°C-125°C



1407 MIDDLEBROOK M0 FELSITE
GAGE:CA

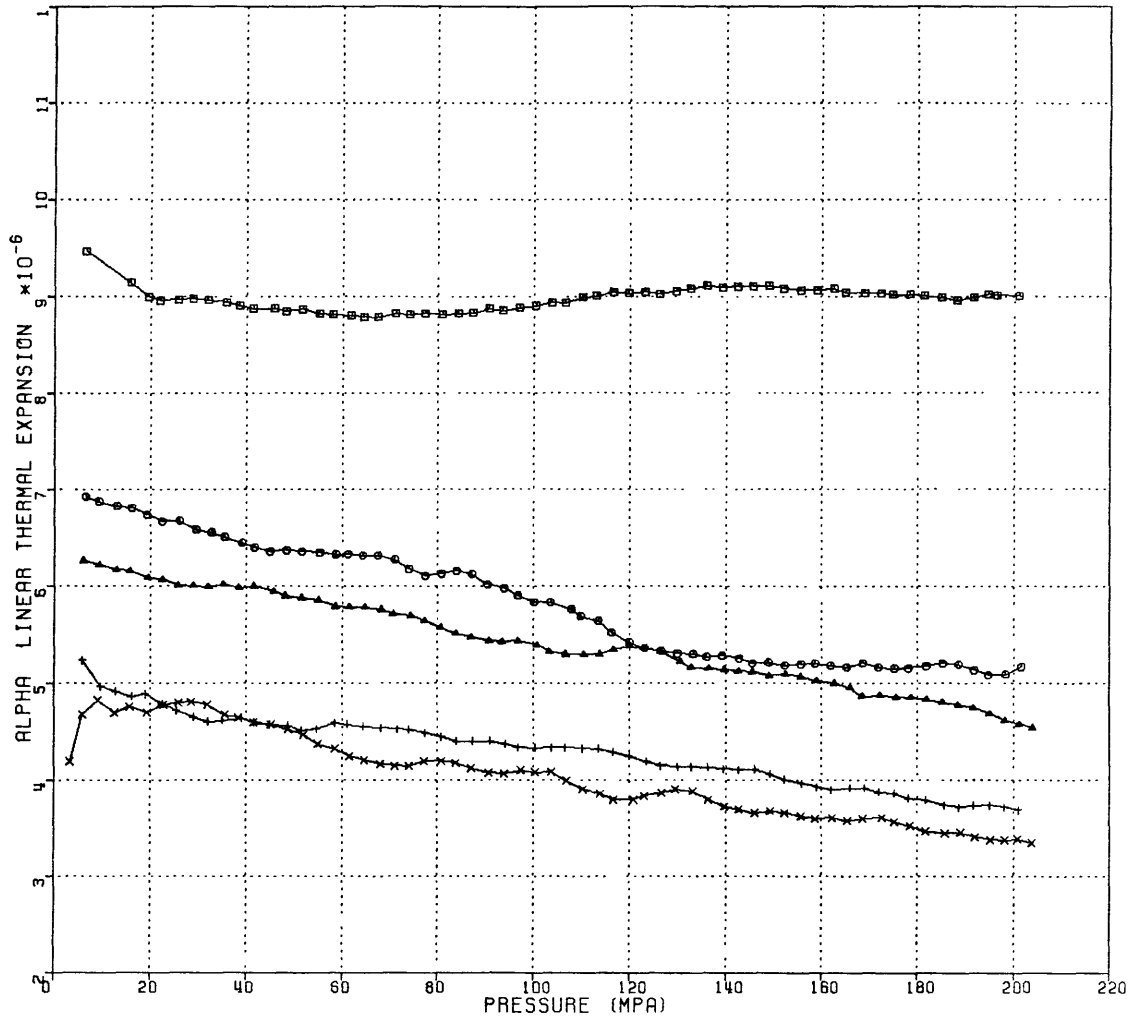
- - 23°C- 49°C
- - 49°C- 65°C
- △ - 65°C- 85°C
- + - 85°C-107°C
- X - 107°C-125°C



1407 MIDDLEBROOK M0 FELSITE

GAGE: 4A

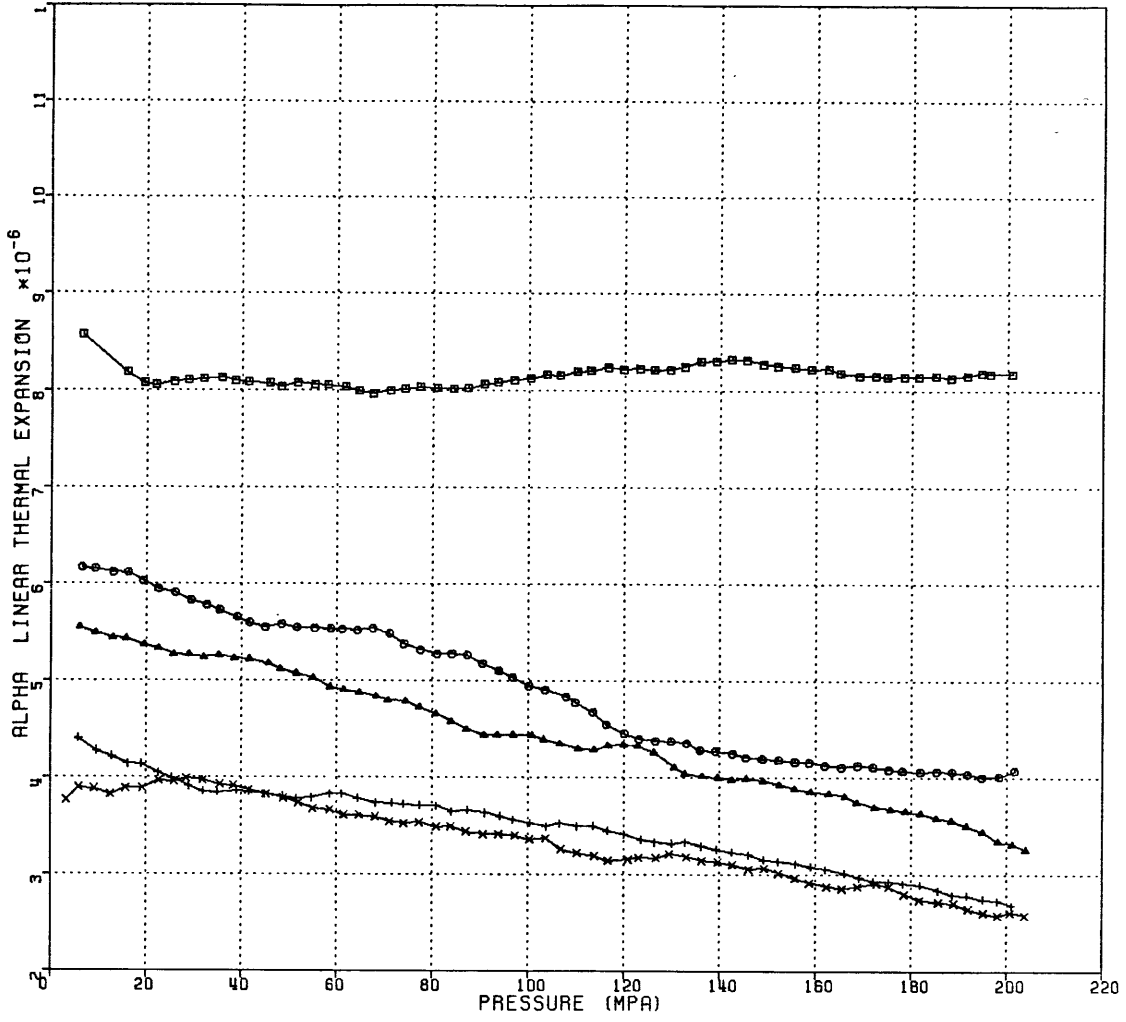
- - 23°C-49°C
- - 49°C-65°C
- △ - 65°C-85°C
- + - 85°C-107°C
- × - 107°C-125°C



1407 MIDDLEBROOK MØ FELSITE

GAGE: AC

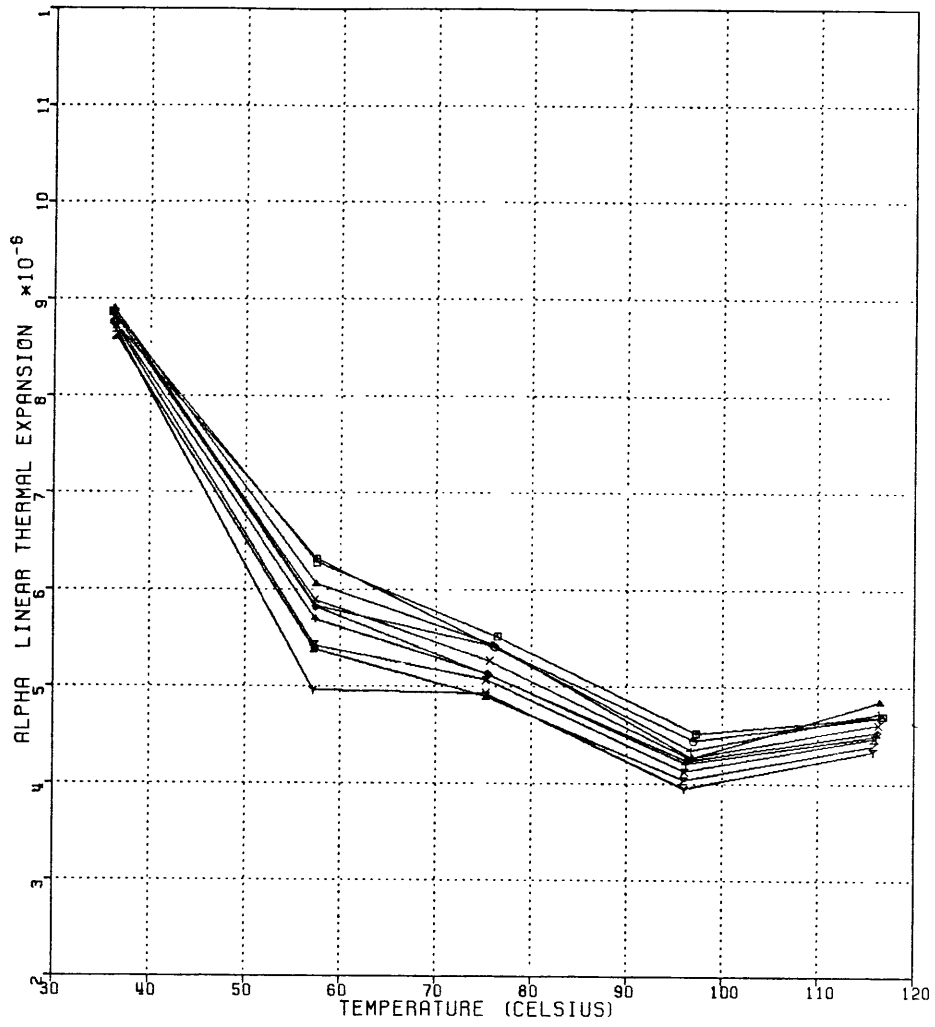
- - 23°C- 49°C
- - 49°C- 65°C
- △ - 65°C- 85°C
- + - 85°C-107°C
- X - 107°C-125°C



1407 MIDDLEBROOK M0 FELSITE

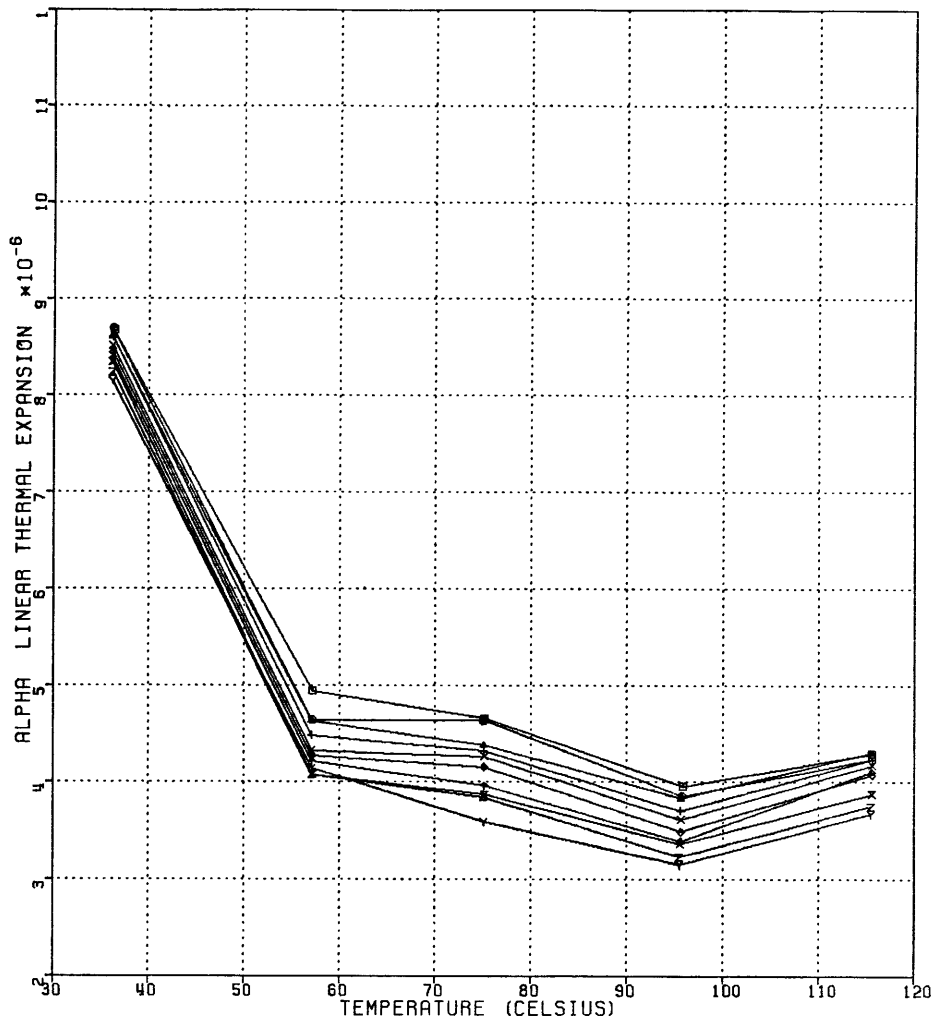
GAGE:3C

- - 23°C-49°C
- - 49°C-65°C
- △ - 65°C-85°C
- + - 85°C-107°C
- X - 107°C-125°C



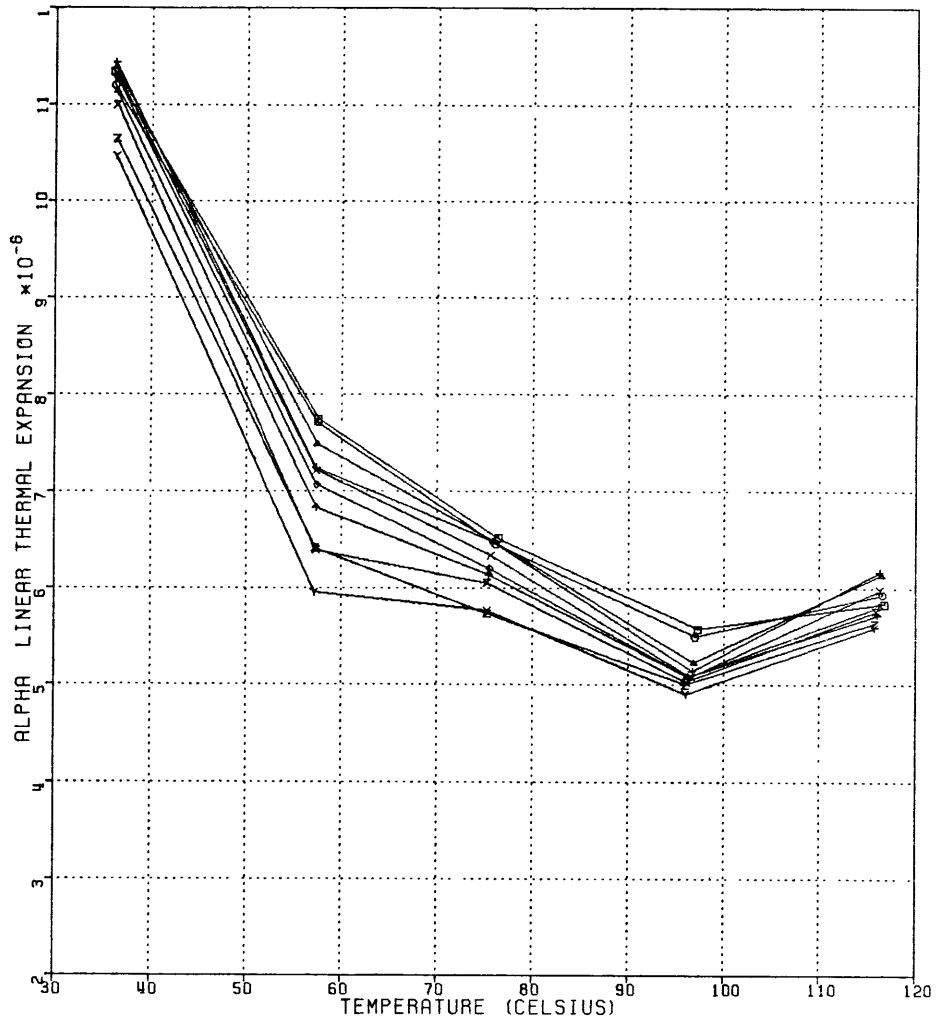
1407 MIDDLEBROOK M0 FELSITE
GAGE: BA

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- x - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



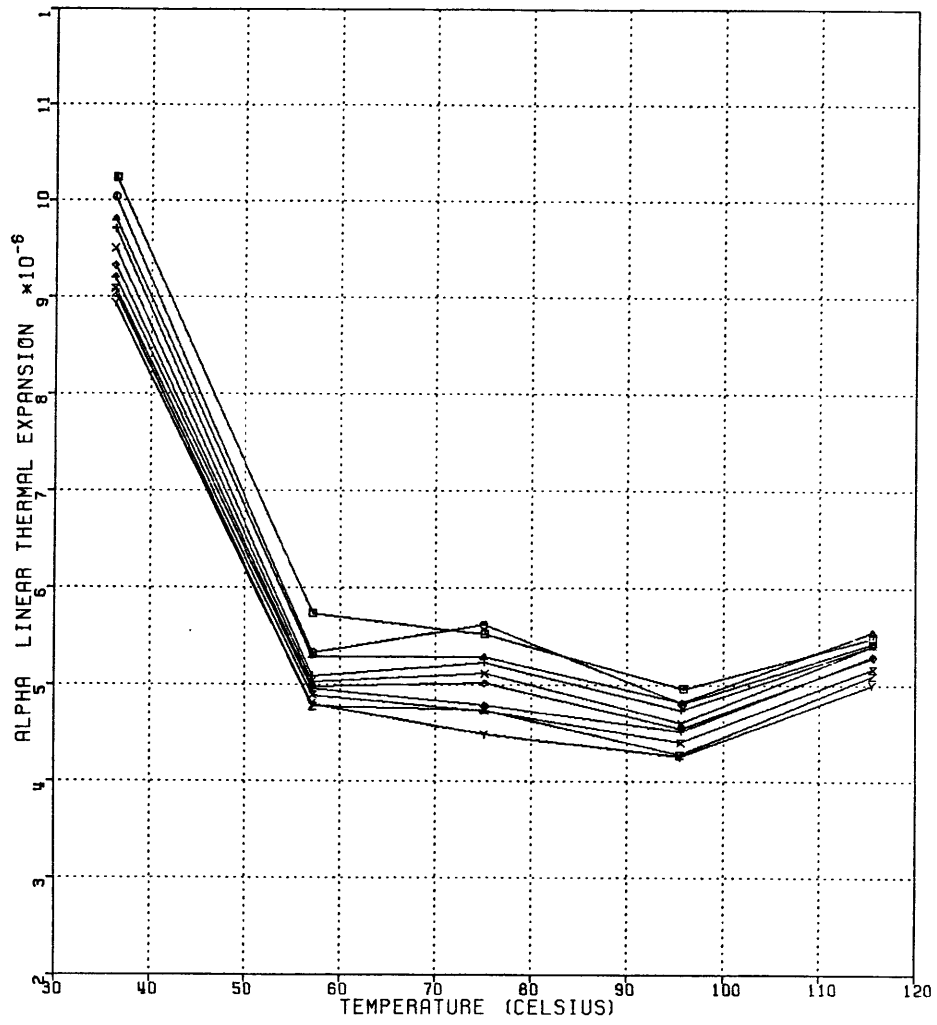
1407 MIDDLEBROOK MØ FELSITE
GAGE:BA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- × - 150 MPA
- ◇ - 160 MPA
- ⋈ - 170 MPA
- ⊗ - 180 MPA
- ⊥ - 190 MPA
- ⋈ - 200 MPA



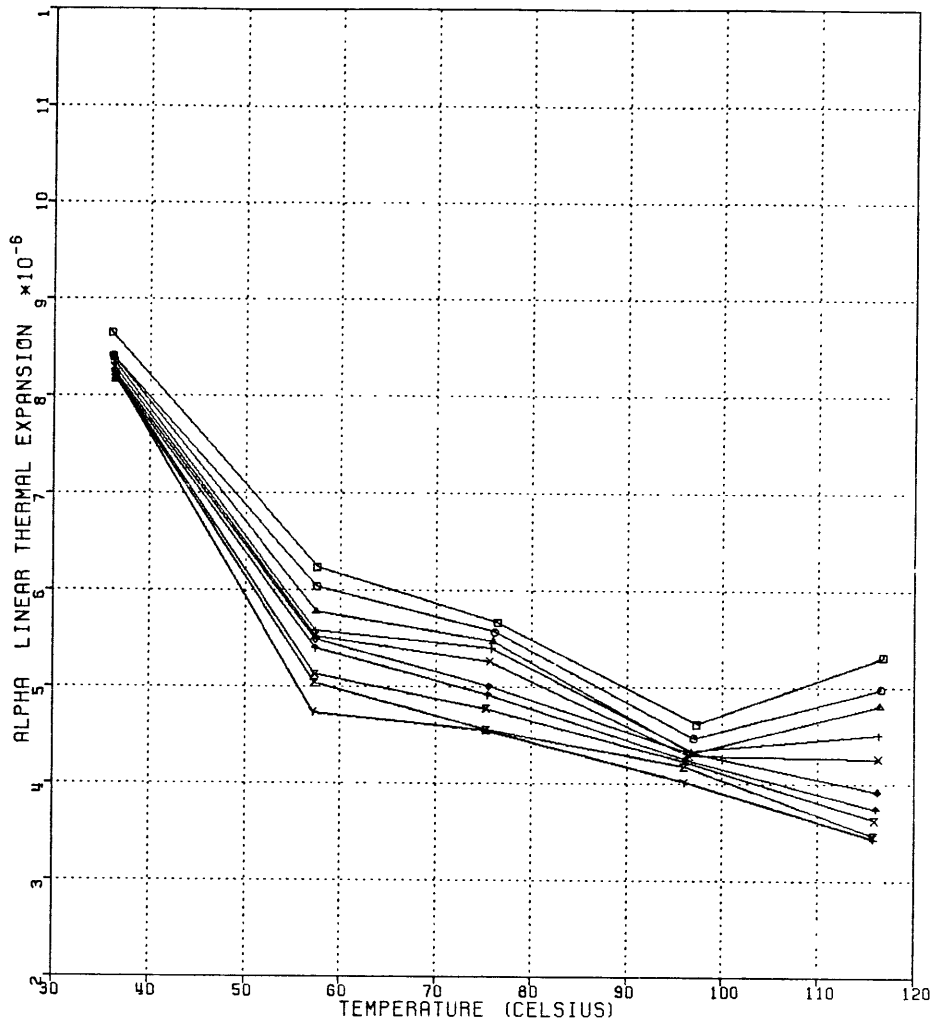
1407 MIDDLEBROOK M0 FELSITE
GAGE: CA

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



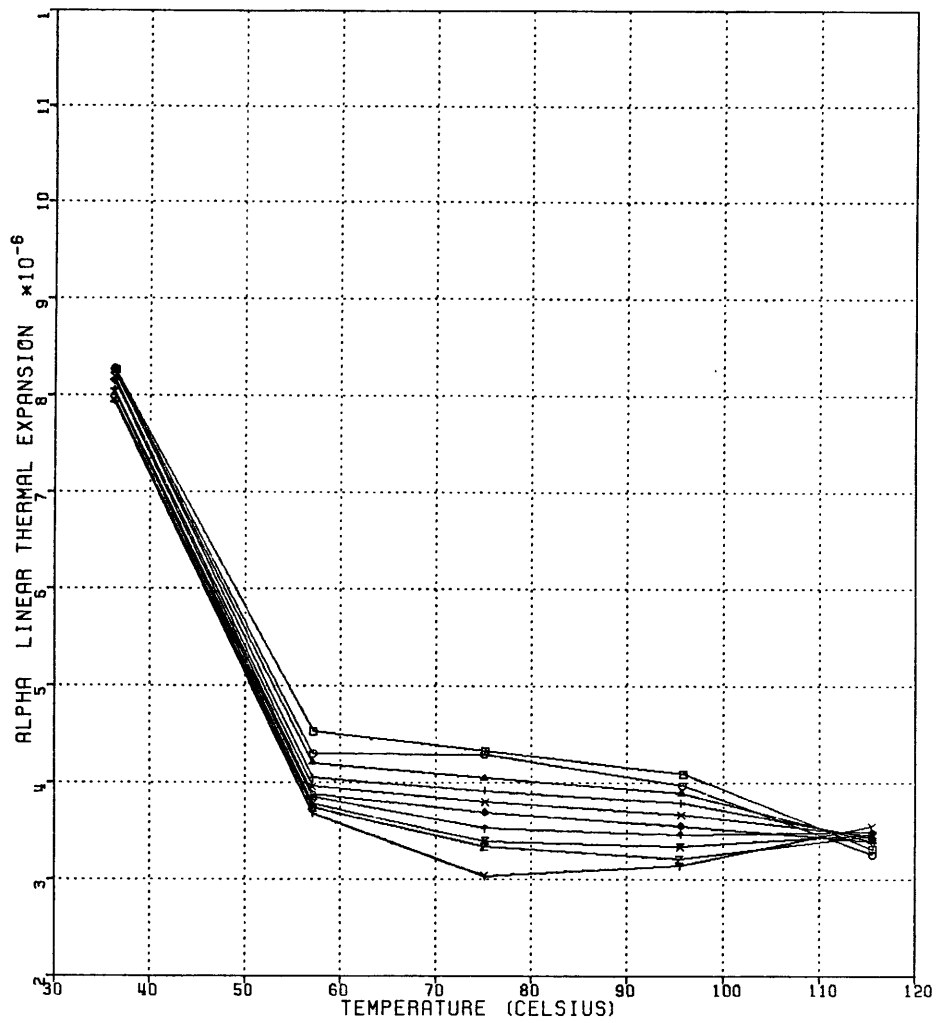
1407 MIDDLEBROOK M0 FELSITE
GAGE: CA

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⋈ - 170 MPA
- ⊗ - 180 MPA
- ⊥ - 190 MPA
- ⋄ - 200 MPA



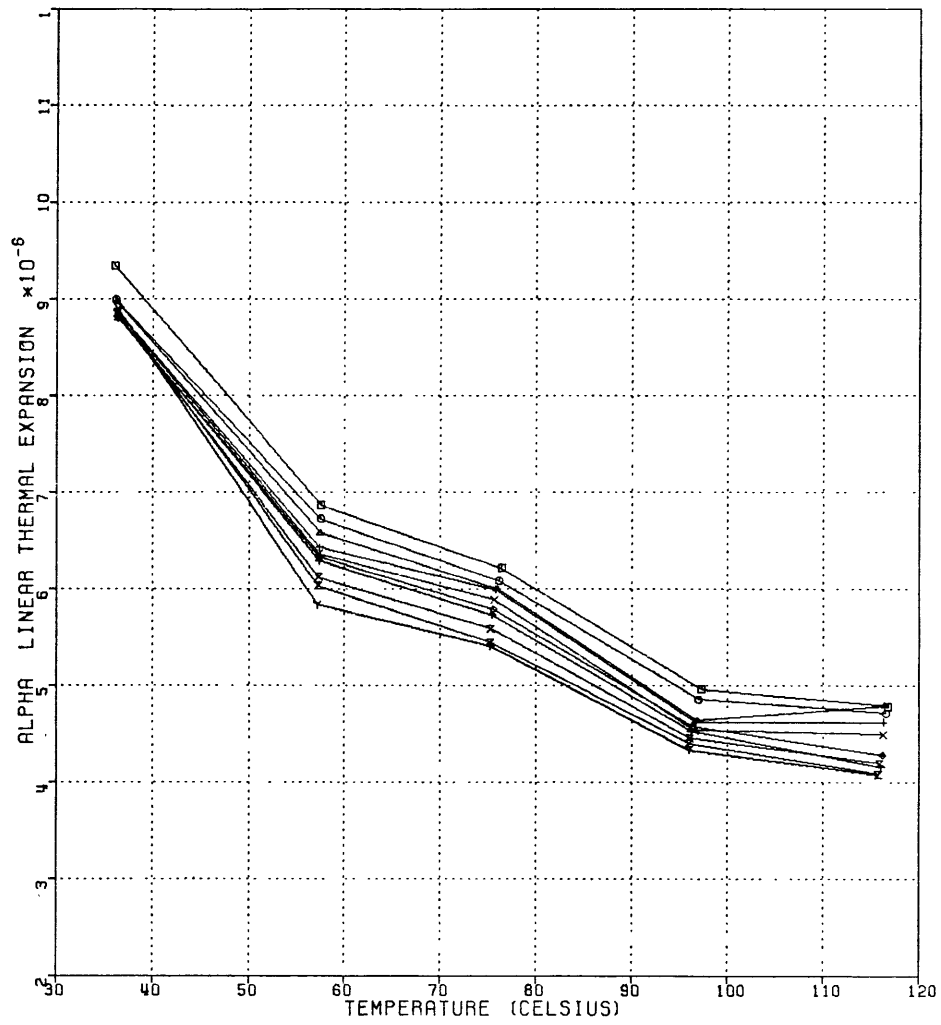
1407 MIDDLEBROOK M0 FELSITE
GAGE: 4A

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ⊕ - 70 MPA
- X - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



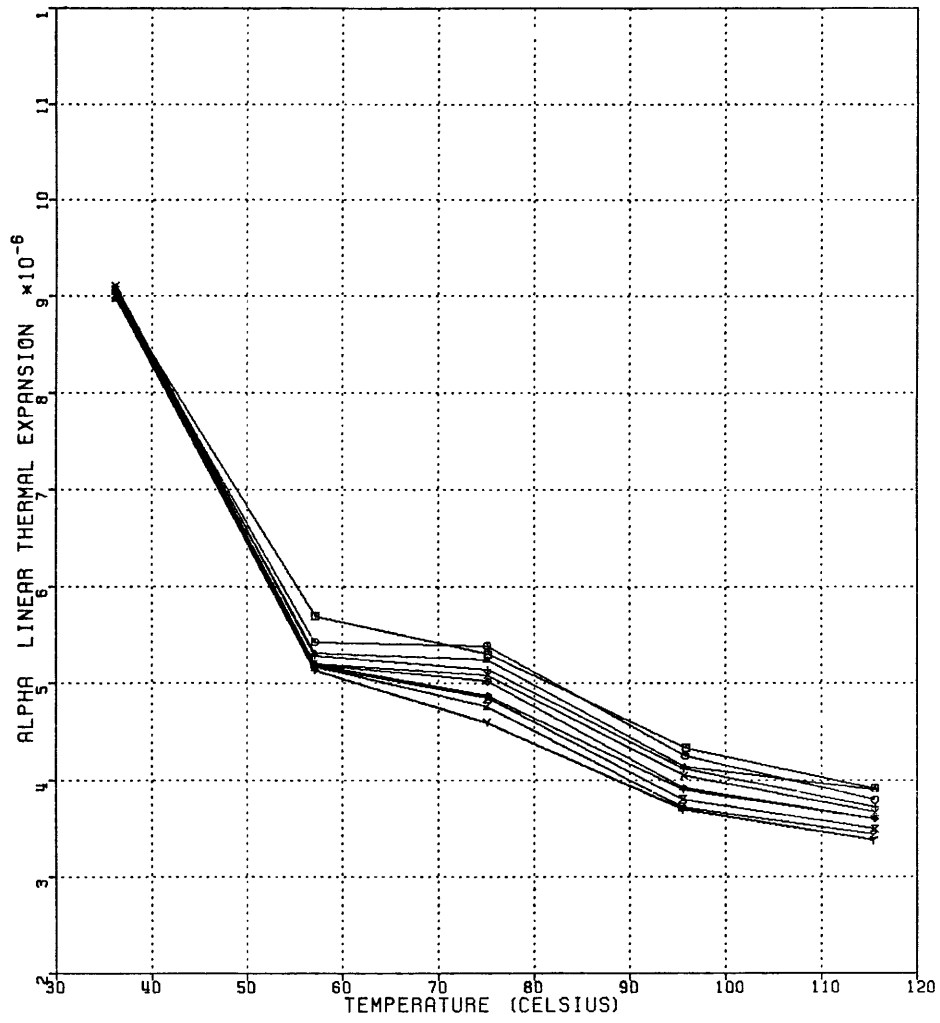
1407 MIDDLEBROOK M0 FELSITE
GAGE: 4A

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- × - 150 MPA
- ◇ - 160 MPA
- ♣ - 170 MPA
- × - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



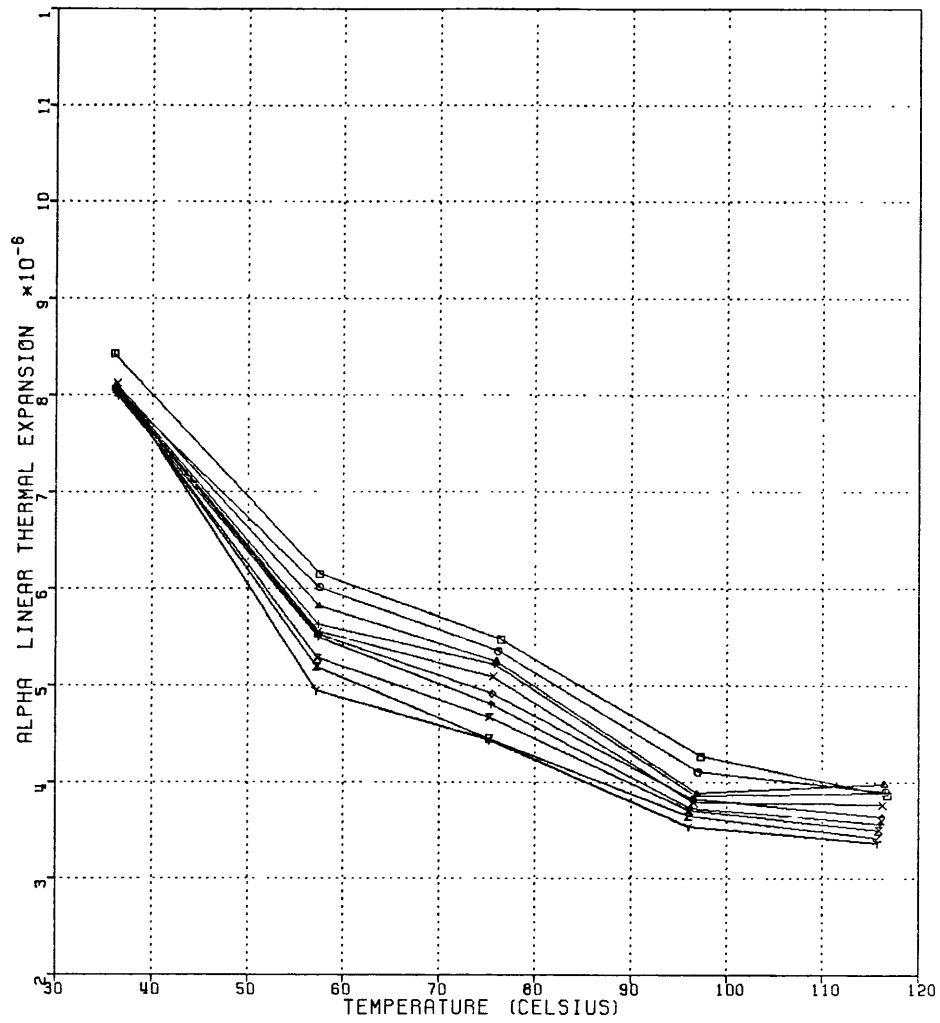
1407 MIDDLEBROOK M0 FELSITE
GAGE:AC

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ↑ - 70 MPA
- X - 80 MPA
- N - 90 MPA
- Y - 100 MPA



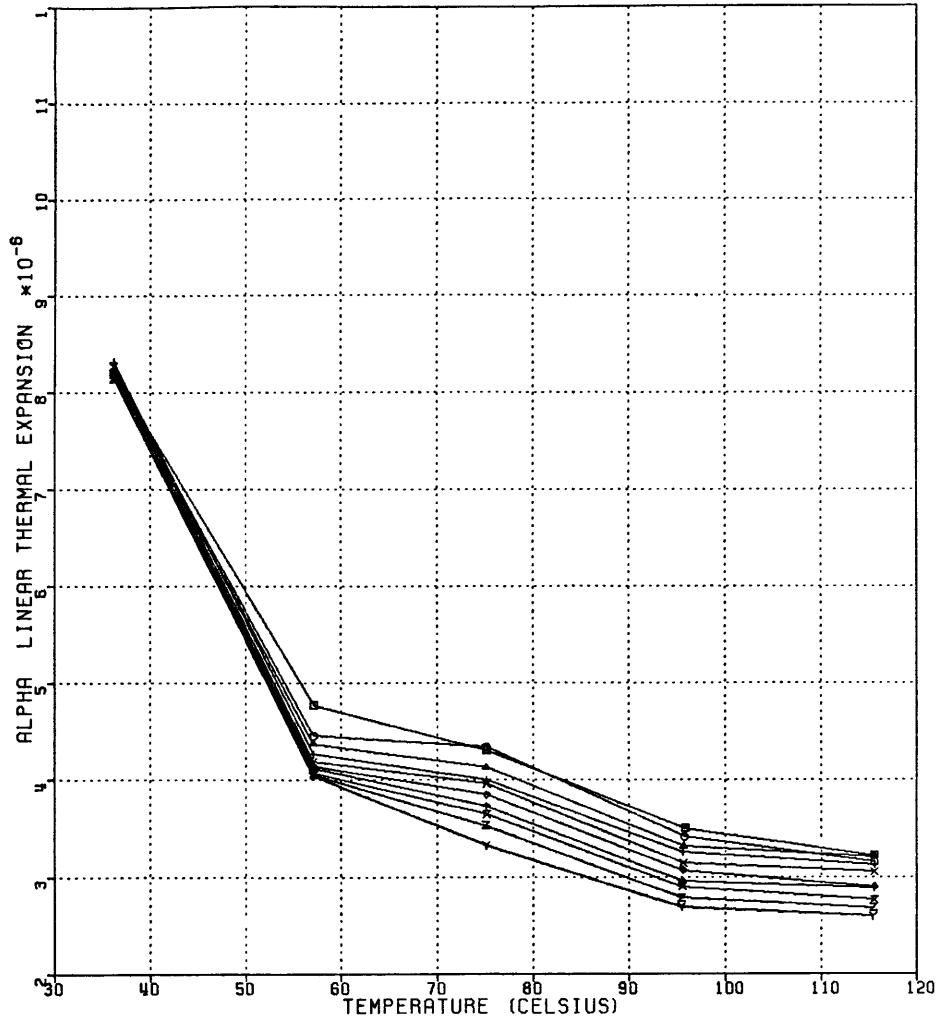
1407 MIDDLEBROOK M0 FELSITE
GAGE: AC

- - 110 MPA
- - 120 MPA
- △ - 130 MPA
- + - 140 MPA
- X - 150 MPA
- ◇ - 160 MPA
- ⋈ - 170 MPA
- ⊗ - 180 MPA
- Z - 190 MPA
- Y - 200 MPA



1407 MIDDLEBROOK M0 FELSITE
GAGE:3C

- - 10 MPA
- - 20 MPA
- △ - 30 MPA
- + - 40 MPA
- X - 50 MPA
- ◇ - 60 MPA
- ♠ - 70 MPA
- ⊗ - 80 MPA
- Z - 90 MPA
- Y - 100 MPA



1407 MIDDLEBROOK M0 FELSITE
GAGE:3C

- - 110 MPA
- - 120 MPA
- ▲ - 130 MPA
- +
- X - 150 MPA
- ◇ - 160 MPA
- ↑ - 170 MPA
- X - 180 MPA
- Z - 190 MPA
- Y - 200 MPA