Tran-SET

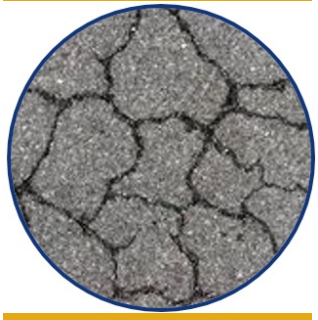
Transportation Consortium of South-Central States

Solving Emerging Transportation Resiliency, Sustainability, and Economic Challenges through the Use of Innovative Materials and Construction Methods: From Research to Implementation

Development of a Standard Test Method for Characterization of Asphalt Modifiers and Aging-Related Degradation Using an Extensional Rheometer

Project No. 17BLSU01

Lead University: Louisiana Tech University



Enhancing Durability and Service Life of Infrastructure

Final Report

October 2018

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16. Abstract

An extensional deformation test method using a Sentmanat Extensional Rheometer (SER) fixture inside a Dynamic Shear Rheometer (DSR) is developed in this study to investigate the degradation of the polymer due to aging and to investigate the effect of modifier type. A relationship between different percentages of modifier and ductility of the modified binder is also investigated. The sample geometrics used in this study are 1 mm × 0.72 mm and 3 mm × 0.72 mm. A total of one hundred and sixty-two samples were tested. Three modifiers Styrene-Butadiene-Styrene (SBS), Polyphosphoric Acid (PPA) and latex were used. One PG 76-22, one PG 64-22 and one polymer-modified asphalt emulsion (PAME) were used. First peak elongation force, (F_1) is the binders' stiffness and Second peak elongation force, (F_2) is the polymer characteristics. F_2 is more visible comparatively at the higher temperature. In most cases, F_2 reduces after Rolling Thin Film Oven (RTFO) and Pressure Aging Vessel (PAV) aging. To normalize the stiffness effect of F_1 on F_2, in this study F_2/F_1 was used to analyze aging susceptibility of modifiers. All the testing temperatures used in this study exhibited a reduction in F_2/F_1 due to RTFO aging and further reduction due to PAV aging. Therefore, it is recommended that this parameter can be used to determine aging susceptibility of polymer in a polymer-modified asphalt binder. F_2 is only obtained from the SBS and latex modified binders and emulsions. Addition of PPA did not show any F_2, making SBS the most effective modifier among SBS, PPA and latex. F_2 has a linear correlation with the percent of the polymer in the PMAE, SBS modified PG 64-22, SBS and PPA modified PG 64-22 and latex modified PG 64-22, indicating extensional deformation test with SER very promising. Ductility analyses using final angular strain values indicate that modifiers increase ductility significantly while aging reduces ductility. Additional research is required for testing ultra-violet (UV) aged sample, and a DSR-based SER test specification will be developed subsequently.

17. Key Words	**18. Distribution Statement**
Asphalt Binders, Polymer Modifiers, Sentmanat Extensional Rheometer (SER), Rolling Thin Film Oven (RTFO) and Pressure Aging Vessel (PAV) Aging, Force Ductility	No restrictions.

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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yard	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
		VOLUME		
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
		NOTE: volumes greater than 1000 L shall be shown in m^3		
		MASS		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
		TEMPERATURE (exact degrees)		
^oF	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	^oC
		ILLUMINATION		
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	$candela/m^2$	cd/m^2
		FORCE and PRESSURE or STRESS		
lbf	poundforce	4.45	newtons	N
lbf/in^2	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	square kilometers	0.386	square miles	mi^2
		VOLUME		
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	cubic meters	35.314	cubic feet	ft^3
m^3	cubic meters	1.307	cubic yards	yd^3
		MASS		
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
		TEMPERATURE (exact degrees)		
^oC	Celsius	1.8C+32	Fahrenheit	^oF
		ILLUMINATION		
lx	lux	0.0929	foot-candles	fc
cd/m^2	$candela/m^2$	0.2919	foot-Lamberts	fl
		FORCE and PRESSURE or STRESS		
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in^2

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ACRONYMS, ABBREVIATIONS, AND SYMBOLS

AASHTO	American Association of State Highway and Transportation Officials
AFM	Atomic Force Microscopy
ASTM	American Society Testing and Materials
BP	Boiling Point
DSR	Dynamic Shear Rheometer
FHWA	Federal Highway Administration
FM	Fluorescence microscope
FTIR	Fourier Transform Infrared Spectroscopy
GPC	Gel Permeation Chromatography
IS	Infrared Spectroscopy
LVE	Linear Visco-Elastic
M_w	Molecular Weight
MSCR	Multiple Stress Creep Recovery
NCHRP	National Cooperative Highway Research Program
NMR	Nuclear Magnetic Resonance
OM	Optical Microscopy
PAV	Pressure Aging Vessel
PG	Performance Grading
PMAB	Polymer Modified Asphalt Binder
PMAE	Polymer Modified Asphalt Emulsion
PPA	Polyphosphoric Acid
RPM	Revolution per Minute
RTFO	Rolling Thin Film Oven
SARA	Saturates, Aromatics, Resins and Asphaltenes
SBR	Styrene-Butadiene Rubber
SBS	Styrene- Butadiene- Styrene
SCC	Size Exclusion Chromatography
SER	Sentmanat Extensional Rheometer
SHRP	Strategic Highway Research Program
TLC	Thin-Layer Chromatography

UTI	Useful Temperature Interval
UV	Ultraviolet
XRD	X-Ray Diffraction

EXECUTIVE SUMMARY

The current Superpave PG) system does not offer specifications that are applicable to polymer-modified asphalt binder (PMAB). PG Plus tests were introduced to identify the presence of polymers and modifiers. MSCR) based AASHTO MP19 provides asphalt binder specifications blind to modifications. For some modifications, MSCR-based high-temperature grading is not significantly different than AASHTO M320. For low-temperature grading, no changes in testing were made in MSCR-based performance grading system. Therefore, the development of a test method to address the knowledge gap in low-temperature modified binder characteristics is necessary. Recently, Sentmanat Extensional Rheometer (SER) has been designed for use as a detachable fixture on commercially available rotational rheometer host systems, capable of performing extensional melt rheology experiments, all within the controlled environment of the host system's environmental chamber.

The objectives of this study are to develop an extensional deformation test method, to investigate degradation of polymers and to investigate the effect of modifier type. Relationships between different percentages of modifier, ductility of modified binders and effect of aging on ductility are also investigated in this study. The applicability of SER to accurately detect the degradation of polymer due to short- and long-term aging is investigated. The DSR-based SER test result can also be used to determine the polymer content in the asphalt binder. In total, one hundred and sixty-two tests were performed in this study. A new sample preparation and test procedure were used by the research team in this study.

First peak elongation force, F_1 is the binders' stiffness and second peak elongation force, F_2 is the polymer characteristics. F_1 increases after RTFO and PAV aging. Neat asphalt binders do not have any F_2. F_2 is only obtained from the PMAB. In most cases, F_2 reduces after RTFO and PAV aging. F_2 is more visible comparatively at higher temperatures. F_2 is an indication of the polymer property, so a decrease in F_2 indicates the degradation of polymer. At all temperatures, F_2 decreases after RTFO aging in almost all the cases. This is an indication that polymer degrades due to aging. The F_2/F_1 is a very distinctive parameter of the original and aged PMAB; as the polymer is degraded with aging, F_2/F_1 decreases. All the testing temperatures used in this study exhibited reduction in F_2/F_1 due to RTFO aging and further reduction due to PAV aging. Therefore, through this study it is recommended that this parameter can be used to determine aging susceptibility of polymers in a PMABs.

The addition of PPA increases the stiffness property of the base asphalt (F_1) but PPA does not exhibit F_2. F_2 has a linear correlation with the percent of the polymer in the PMAE, SBS modified PG 64-22, SBS and PPA modified PG 64-22 and latex modified PG 64-22 with R^2 values equal to 0.9934, 0.9323, 0.9893 and 0.9535, respectively indicating that extensional deformation test with SER is very promising. It can be concluded that combined PPA and SBS modification of PG 64-22 binder has the best effect on F_2.

It is found that PG 64-22 asphalt binder is the least ductile binder, and 6% SBS modified PG 64-22 binder is the most ductile binder. The addition of SBS increases the final angular strain of unmodified PG 64-22 binder as well as improves the ductile property of unmodified PG 64-22 binder. In general, RTFO aging reduces the ductility and PAV aging further reduces the ductility of modified and unmodified binders.

IMPLEMENTATION STATEMENT

The findings of this study are expected to be presented at the following conferences/journals:

1. 2018 Louisiana Transportation Conference (February 25-28, 2018, Baton Rouge, LA);
2. 2018 Tran-SET Conference (April 3-4, 2018, New Orleans, LA);
3. Advances in Materials and Pavement Performance Prediction (April 16-18, 2018, Doha, Qatar);
4. 2018 World Transport Convention (June 18-21, 2018, Beijing, China);
5. To be presented in the 98th Annual Meeting of Transportation Research Board to be held in Washington, D. C., January 2019;
6. To be submitted to the ASCE International Airfield & Highway Pavements Conference 2019 to be held in Chicago, Illinois, in July 2019;
7. To be submitted to the ASCE International Conference on Transportation and Development 2019 to be held in Alexandria, VA, in June 2019; and
8. To be submitted to the 15th World Conference on Transport Research to be held in Mumbai, India, in May 2019.

The next five months activities will include:

1. An ASTM format Standard Method of Test will be prepared along with a LA DOTD format test method;
2. Specifications for the parameters F_2/F_1 along with statistical measurements will be prepared; and
3. The PI plans to attend ASTM Committee Meeting and present the findings.

1. INTRODUCTION

1.1. Problem Statement

1.1.1. Current Asphalt Binder Grading System (AASHTO M320)

In the PG system, the high- and low-temperature performance ranges are specified. For instance, for the PG 64-22 binder, the "64" represents the expected high-temperature range of the binder and the "-22" is the expected low-temperature range. An average 7-days maximum pavement temperature is used to select an asphalt binder which will help resisting rutting (or permanent deformation). The minimum pavement design temperature is the lowest pavement temperature based on the lowest air temperature recorded at a weather station near the project site. The difference between the high- and low-temperature range of the binder is called the useful temperature interval (UTI). A PG 64-22 would have a UTI of 86°C (64 – -22 = 86°C). All asphalt binders refined from crude oil have a specific UTI. Changes in the refining process can shift the UTI up or down, but in general they cannot change the UTI. A specific crude may be refined to make a PG 58-28 or PG 64-22 or PG 70-16, but it cannot be refined into a PG 70-22. To change the UTI of an asphalt binder it would have to be blended with an asphalt binder which has a different UTI or modified with some type of additive *(1).*

1.1.2. Limitations of the Current Performance Grading (PG) System

With heavier trucks and increased traffic volumes, roads are being constructed with modified asphalt binders to enhance durability. While polymers are the most commonly used modifiers, other modifiers such as polyphosphoric acid (PPA) are also used. However, the current Superpave PG system does not offer specifications that are applicable to polymer-modified asphalt binders (PMAB) because the current standardized tests are unable to characterize the different polymers and modifiers that can be used. In addition, these tests are unable to quantify the degradation of modified asphalt binders due to aging.

1.1.3. Improvements in PG System/PG Plus Tests

Asphalt binder needs to be modified for improved performance at locations with extreme hot-cold temperature variations. Also, there are other potential benefits of using polymer-modified binders including improved adhesive bonding to aggregate particles (stickier). Areas which experience frequent heavy truck traffic and/or slow-moving truck traffic will also benefit from the use of PMABs. Therefore, the use of PMABs has grown tremendously in North America. The Strategic Highway Research Program (SHRP) on asphalt was carried out almost exclusively with unmodified asphalt cements, so the applicability of the Superpave PG specifications and test methods to modified binders was not validated. Consequently, DoTs in most of the states have added supplemental specifications, also known as "PG Plus" tests, to identify the presence of polymers and modifiers. Louisiana is among the states that are currently using a PG Plus specification. Separation of polymer, force ductility (AASHTO T300), and elastic recovery (AASHTO T301) tests are the required tests for the LA DOTD's PG Plus specifications. However, one of the major limitations of the PG Plus tests is that the tests are empirical and test methods and specifications are not consistent across the states.

1.1.4. PG System (AASHTO MP19) using Multiple Stress Creep Recovery (MSCR) Test (AASHTO TP70)

In NCHRP Project 9-10, it was realized that linear binder tests; G*/sinδ is performed in the linear visco-elastic (LVE) region, such as high-temperature tests of current PG System do not correlate with the high-temperature mixture failure such as rutting unless binder is a viscous fluid at those temperatures. Therefore, to accurately address mixture failure, non-linear binder properties must be evaluated. MSCR testing (AASHTO TP70) of the binder is needed to describe binder properties in the non-linear range. It is now believed that MSCR based AASHTO MP19 provides asphalt binder specifications blind to modifications. NCHRP Project 9-10 used the following binders: PG 82-22 SBS-radial, PG 82-22 Polyethylene-stabilized, PG 82-22 Steam Distilled, PG 82-22 SBR-low molecular weight, PG 76-22 Ethylene Terpolymer, PG 76-22 Oxidized, PG 58-40 SBS-Linear, PG 58-40 SB Di-block, PG 58-40 Oxidized. Figures 1 and 2 show that non-recoverable creep compliance is better correlated with rutting performance than G*/sinδ *(2).* However, some studies showed that for some modifications MSCR based high-temperature grading is not significantly different than AASHTO M320 as can be seen in Figure 3.

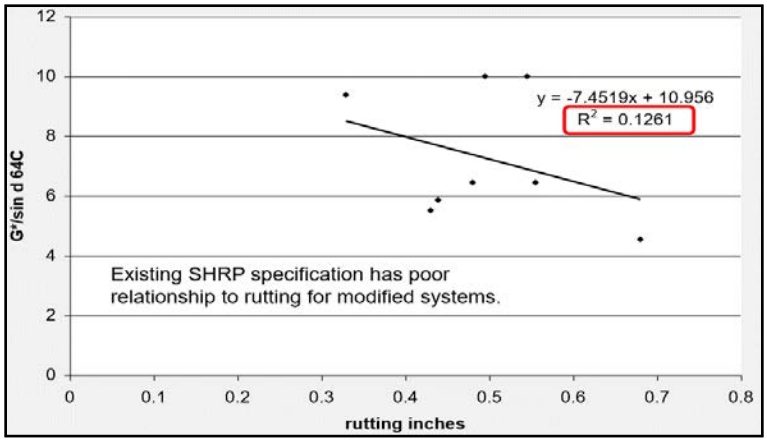


Figure 1. Correlation between G*/sinδ and rutting *(2)*.

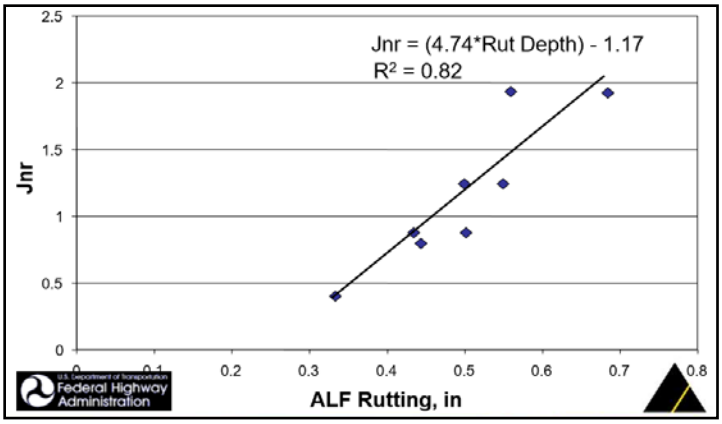


Figure 2. Correlation between Jnr and rutting *(2)*.

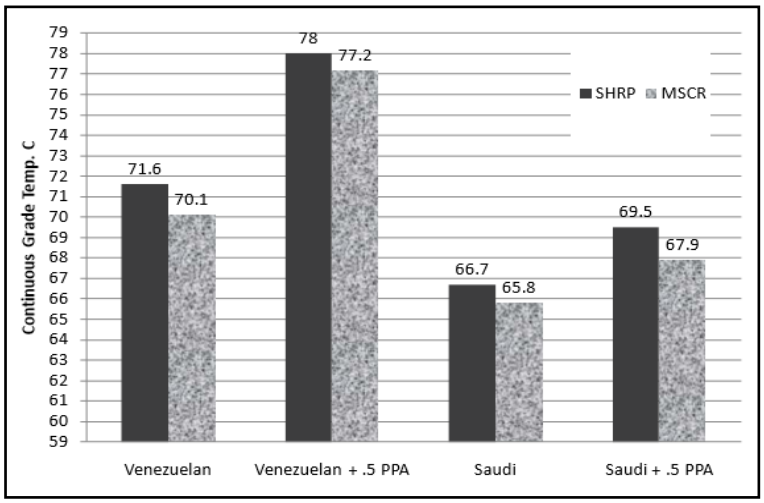


Figure 3. Comparison between PG and MSCR based PG *(2)*.

1.2. Knowledge Gap

Although MSCR test (AASHTO TP70) characterizes binder at non-linear and failure region and AASHTO MP19 provides changes to asphalt binder high-temperature grading, the following issues remain unresolved:

1.2.1. Simulation of Failure Mechanism: From Shear to Extensional

Although MSCR is performed in the failure region (G*/sinδ is performed in the LVE region), the failure mechanism in field is not always in shear mode as DSR as shown in Figure 4.

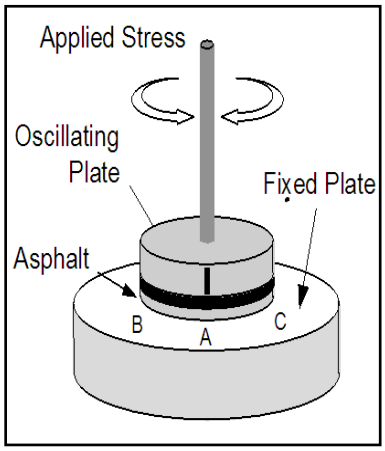


Figure 4. Shear failure in Dynamic Shear Rheometer (DSR) *(3)*.

1.2.2. Changes in Low-Temperature Binder Grading in MSCR-Based PG System

Table 1 (AASHTO MP 19) indicates that no changes in testing were made in MSCR-based performance grading system for low-temperature grading. As for example, MSCR is not performed on PAV aged sample for determination of low-temperature grading. As can be seen from Table 1, there are some changes in specifications (not testing) for low-temperature grading because of the introduction of Standard Grade (S), High Grade (H), Very High Grade

(V) and Extremely High Grade (E). Therefore, although MSCR-based binder grading system was introduced, users and producers of modified asphalt binders remain concerned that the current specification and test methods do not fully measure the performance enhancement contributed by the modification. Development of a test method to address the knowledge gap in low-temperature modified binder characteristics is necessary.

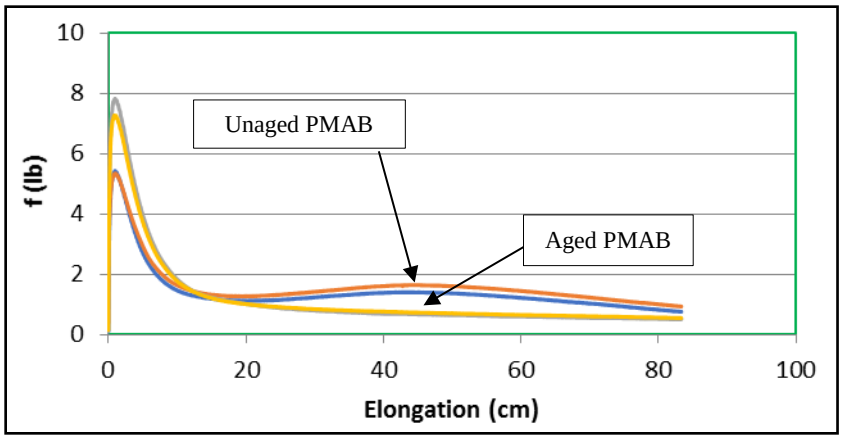
Table 1. Low temperature grading in MSCR-based PG System (AASHTO MP19).

Performance Grade	PG 64						PG 70					
	10	16	22	28	34	40	10	16	22	28	34	40
Average 7-day max pavement design temp, ºC							<70					
Min pavement design temp, ºC	>-10	>-16	>-22	>-28	>-34	>-40	>-10	>-16	>-22	>-28	>-34	>-40
	Pressurized	Original Aging	Binder Vessel	Residue	(R28)							
PAV aging temp, ºC	100						100	(110)				
Dynamic shear, T 315: "S" Grade G* sin*δ*, max 5000 kPa test temp @ 10 rad/s, ºC	31	28	25	22	19	16	34	31	28	25	22	19
Dynamic shear, T 315: "H", "V", "E" Grades G* sin*δ*, max 6000 kPa test temp @ 10 rad/s, ºC	31	28	25	22	19	16	34	31	28	25	22	19
Creep stiffness, T 313L *S*, max 300 MPa *m*-value, min 0.300 test temp @ 60s, ºC	0	-6	-12	-18	-24	-30	0	-6	-12	-18	-24	-30
Direct tension, T 314: Failure strain, min 1.0% test temp @ 1.0 mm/min, ºC	0	-6	-12	-18	-24	-30	0	-6	-12	-18	-24	-30

1.2.3. Test Parameters for Quantification of Aging Related Degradation of Modified Asphalt Binders

In current PG system, G*/sinδ is performed before and after RTFO aging which quantifies the aging susceptibility of the binder. However, there is no parameters or specifications to (a) quantify the degradation of polymer or modifiers with aging, (b) determine the type of polymer, and (c) quantify the amount of modifier.

D'Angelo *(4)* indicated that aging damages polymer network and thereby influences the performance. Tarefder and Yousefi *(5)* found that binders modified with SB are more resistant to aging than those modified with SBS. In a previous unpublished study, the PI of this study,



N. Wasiuddin, found that one of the PG Plus tests, force ductility (AASHTO T300), indicates how aging degrades the polymer (Figure 5). These asphalt binders were all polymer modified and the degradation of polymers was observed in all of them using the force ductility test. Figure 5 shows two samples of an asphalt binder before and two samples after aging. It can be clearly observed that second peak of force is diminished after aging.

Figure 5. Effect of aging on second peak of force in force ductility test; the samples with a second peak are not aged) (AASHTO) T300).

1.2.4. Extensional Rheology Tests in DSR Platform using SER Fixture

Extensional flows are very sensitive to crystallinity and polymer long-chain branching and can be far more descriptive about polymer characterization than any other type of bulk rheological characterization. Therefore, several states use PG Plus tests for asphalt binder characterization. Recently introduced Sentmanat Extensional Rheometer (SER) exclusively manufactured by Xpansion Instruments has been designed for use as a detachable fixture on commercially available rotational rheometer host systems as shown in Figures 6(a) and 6(b). This fixture can convert a conventional rotational rheometer host system into a universal testing station capable of performing extensional melt rheology experiments, all within the controlled environment of the host system's environmental chamber *(6,7).*

As shown in Figure 6(a) and described in detail by Sentmanat *(6),* SER consists of a paired master, and slave wind-up drums mounted on bearing housed within a chassis, and mechanically coupled via termeshing gears. The rotational motion of the rheometer spindle drives the rotation of the drive shaft which results in the rotation of the master drum, and an equal opposite rotation of the slave drum, which causes the wound up of the two ends of the sample "secured by the clamps to the drums" onto the drums, rustling the sample stretched over an unsupported length, $L_{\circ}$ as shown in Figure 6(b).

For a constant drive shaft rotational rate, Ω, equal dimension wind-up drums R, and fixed unsupported length of the sample $L_{\circ}$, the applied Hencky strain rate to the sample can be expressed as Equation [1] *(6).*

$$\epsilon_H = \frac{2\Omega R}{L_0} \qquad [1]$$

The resistance of the sample to stretch in both drums, torque T, is measured by the torque transducer attached to the fixture which can be expressed as Equation [2] *(6).*

$$T(t) = 2RF(t) \qquad [2]$$

For a constant strain rate experiment, the instantaneous cross-sectional area A(t) can be expressed as Equation [3] *(6).*

$$A(t) = A_0 \exp[-\varepsilon_H t] \qquad [3]$$

For a constant strain rate, tensile stress function $\eta_E{}^+(t)$, can be expressed as Equation [4] *(6).*

$$\eta_E^+(t) = \frac{F(t)}{\varepsilon_H A(t)} \qquad [4]$$

Advantages of SER: The advantages of using SER for characterization of polymer in asphalt binder replacing PG Plus tests are:

a) The SER fixture can be accommodated in currently used commercially available DSR models and therefore, will replace ductilometer with DSR.
b) Less than 1 gm of materials is needed for the test.
c) At least five samples can be tested in 1 hour.
d) The SER parameters such as Hencky Strain Rate, Elongation Viscosity are more mechanistic than empirical parameters used in PG Plus tests.
e) SER identifies polymer microstructure (linear, radial/branched etc.) through strain hardening and other parameters.

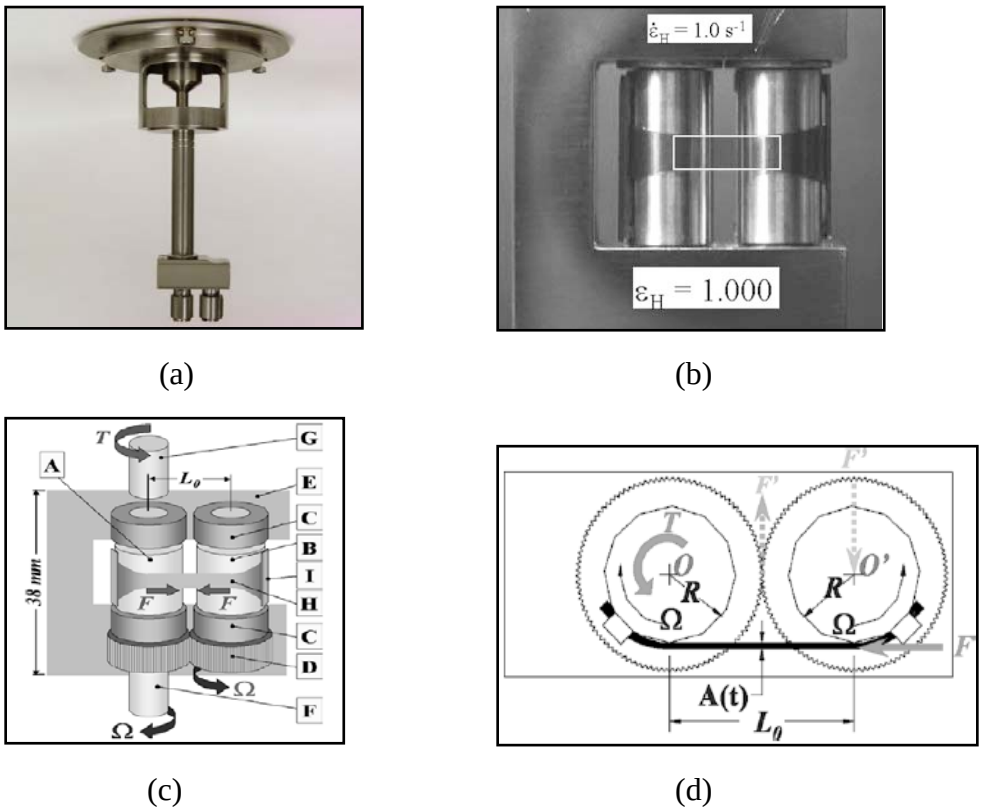


Figure 6. (a) SER2-G fixture for AR-2000ex rheometer; (b) Stop-frame video graphic of an extensional rheology experiment using SER; (c) Schematic view of the SER during operation. Inside Squares: [A] Master Drum, [B] Slave Drum, [C] Bearings, [D] Intermeshing Gears, [E] Chassis, [F] Drive Shaft, [G] Torque Shaft, [H] Sample, [I] Secure Clamps; (d) Elevation in the SER during an experiment. *(6,7)*.

1.3. Polymer Modification in Asphalt Binder and Degradation of Polymer

1.3.1. Styrene-Butadiene-Styrene (SBS) Modification

Polymers cover a broad range of modifiers, with elastomers (rubbers or elastics) and plastomers (plastics). Styrene-butadiene rubber (SBR) and SBS are frequently used elastomers.

Among these polymers, SBS is the most commonly used modifier. These modifiers are used to improve, rutting, fatigue, and thermal cracking resistance *(12)*.

SBS is a hard rubber which is used where durability is important. It's a type of copolymer called a block copolymer (when two or more monomers unite together to form a polymer). Its backbone chain is made up of three segments. The first is a long chain of polystyrene, the middle is a long chain of polybutadiene, and the last segment is another long section of polystyrene as shown in Figure 7. Polystyrene is a tough hard plastic, and this gives SBS its durability. Polybutadiene is rubbery, and this gives SBS its rubber-like properties. In addition, the polystyrene chains tend to clump together. When one styrene group of one SBS molecule joins one clump and the other polystyrene chain of the same SBS molecule joins another clump, the different clumps become tied together with rubbery polybutadiene chains. This gives the material the ability to retain its shape after being stretched. SBS behaves like elastomeric rubbers at room temperature and behaves like plastics at high temperature. SBS can be managed to be rubbery without being crosslinked, making them easy to process into the useful shapes *(11)*.

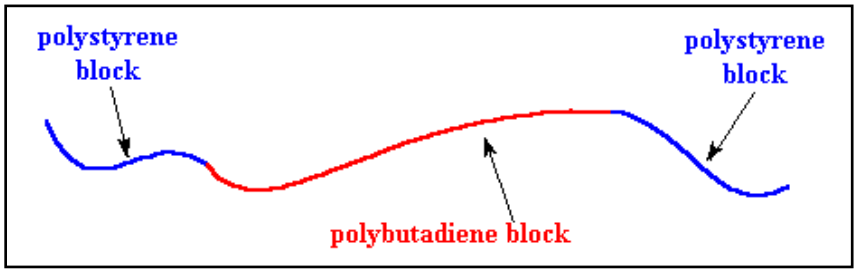


Figure 7. Image of SBS copolymer *(8)*.

1.3.2. PPA (Polyphosphoric Acid) Modification

PPA is a clear, viscous inorganic compound consisting of monomers, dimers, trimers, and higher condensed species of composition $H(PO_3H)_nOH$. The PPA acidity contributes greatly to the asphaltene structure reorganization. The addition of PPA to asphalt increases the asphaltene content and concurrently reduces resin concentration *(16)*. The increase of asphaltene is not related to oxidation of the asphalt as in asphalt oxidation process, but an increase of the polarity makes the asphaltene-PPA-resin complex *(12)*.

The PPA modified asphaltene significantly affects the rheology of the asphalt binder giving the PPA modified binder the capacity to resist higher temperatures and stress level conditions more than neat asphalt *(10)*. The PPA modified binder also shows higher capability for adhesion to aggregate *(17)*.

The addition of PPA results in the following changes in base asphalt binder: increased viscosity, higher softening point, lower penetration at room temperature, and a slight increase or no change in penetration at very low temperatures. PPA changes the rheological characteristics of base asphalt binder, making them more viscous and harder at relatively high temperatures, while keeping them same (or softer) as base binder at cold temperature.

Masson *(12)* investigated the chemistry between PPA and asphalt binder. As understood previously, the characteristics and composition of asphalt largely depends on the source of the asphalt binder. Formation and composition of PPA were studied in detail. To understand better, PPA was added with water, alcohol and asphalt. The acidity of PPA in water is independent of chain length. It was concluded that PPA is a very weak acid in asphalt. It was postulated that PPA can only dissociate and react with asphalt when enclaves of high dielectric constant exist in asphalt *(12).*

Baumgardner et al. *(13)* studied mechanism of chemicals in asphalt with PPA modification. The modified and unmodified asphalt were analyzed for chemical composition by asphaltene precipitation, thin-layer chromatography (TLC) and nuclear magnetic resonance (NMR), by GPC and AFM. From Asphaltenes precipitation and TLC maltenes fractionation, it was found that asphaltenes content increased from 9.1 wt. percent to 14.7 wt. percent and from 10.5 wt. percent to 14.9 wt. percent in case of two different PPA modified and unmodified asphalt binder samples, respectively. From the GPC results, it was found that molecular weight was decreased in case of PPA modification by 79% because saturates converted into asphaltenes. In another sample, molecular weight was decreased by 19% because PPA raised both the saturates and asphaltenes at the expense of the cyclics and resins. It was observed in AFM that the two main phases in asphalt stiffened. In one asphalt, PPA affected the dispersed phase; in the other, it affected the matrix. As a result, the performance grade of both PPA modified asphalts were increased.

1.3.3. Latex Modification

Altman *(14)* investigated on the organic composition of natural latex. It was found that the natural latex from Hevea Brasiliensis contains rubber hydrocarbon, water and other nine types of non-rubber substances, namely inorganic elements, protein, amino acids, sugars, organic acids, lipid, vitamin, nucleic acid and alkaloid. Siswanto *(15)* studied the effect of latex on asphalt concrete wearing courses. It was found that latex decreases the rate of deformation of the asphalt mixture by increasing the dynamic stability. Ruggles *(16)* investigated the efficient use of environmentally-friendly natural rubber latex in road construction. It was found that latex enhanced the thermal stability and viscosity of the binder at high temperature. At low temperature, latex reduces thermal cracking associated with base binder. As a result, latex increase the durability of the road surface. Also, latex is less expensive than other types of polymer. The disadvantages of latex are foaming, ammonia vapor, heat loss etc.

1.3.4. PPA and SBS Modification

PPA modification with SBS polymer in asphalt binder has become very popular. The major benefit of this combination is that PPA and polymers in asphalt achieve optimum binder performance. PPA improves adhesion that may negate the need for antistrips. Viscosity of the SBS and PPA modified binder can be managed easily, with respect to the current Superpave™ requirements and especially after storage. Lower temperatures ultimately reduce emissions from asphalt operations. Asphalt binder elasticity, thermal cracking resistance, and permanent deformation resistance improvements are also optimized in the synergistic combination of PPA and SBS polymers. Also, the overall cost of using PPA and SBS modified asphalt binder is reduced by the use of less total modifier, possible elimination of antistrips, and energy savings

from reduced operating temperatures. Several researches proved that PPA modification of asphalt binder with SBS polymer indicates that the results of the combination are superior to the results of the single modifier *(17).*

1.3.5. Polymer Degradation Due to Aging

Several research studies were performed to find out the degradation of polymer in polymer modified asphalt binder (PMAB). In these studies, Fluorescence microscope (FM), optical microscopy (OM), size exclusion chromatography, Infrared Spectroscopy, X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR) and atomic force microscopy (AFM), Gel Permeation Chromatography (GPC) and Dynamic Shear Rheometer (DSR) etc. were used.

Hao et al. *(18)* investigated the rheological behavior of various PMABs before and after aging (RTFO and PAV) by using rheological master curves in combination with GPC. The GPC test was performed to obtain the average molecular weight (M_w) of the polymer and distribution of asphaltenes and maltenes. After aging, the peaks of the GPC curves increase in height and width which indicates M_w decreases and number of molecules increases. Again, percentage of asphaltenes increases and percentage of maltenes decreases which depicts degradation of SBS. It is seen from the master curve of phase angle "δ" that after long-term aging, δ of all the samples became same as original binder which means polymer effect has gone after long-term aging. From the aging indices, it is seen that R-value and Normalized R-value increases with aging where cross-over modulus decreases with aging which clearly indicates that aging degree is deeper.

Zhang et al. *(19)* investigated SBS modified asphalts with two kinds of base asphalt (Alfa 70 & Poly 90). In this study, three types of aging such as RTFO, PAV and ultraviolet (UV) radiation were applied. FM was used to determine morphological characteristics and FTIR was used to measure the chemical structure. After PAV long-term aging, phase angle values decreased by 10.92% and complex modulus increased by 150% at 90ºC which means PMAB becomes more elastic due to aging. The base asphalt (Poly-90) in the SBS-90 produced 6.36% more asphaltenes and the base asphalt (Alfa-70) in the SBS-70 produced 6.36% more aromatics after PAV aging. The degradation of the SBS copolymer in the SBS-90 is more serious than SBS-70 after PAV aging as phase angle index is decreased by 8.89%, ductility aging index is decreased by 57.14% and viscosity aging index is increased by 18.75%. This result from the fluorescence micrograph shows that there is almost no SBS copolymer after UV aging which indicates the most obvious influence of UV aging on the degradation of SBS copolymer.

Al- Mansob et al. *(20)* investigated the physical and rheological properties of base asphalt and epoxidized natural rubber modified asphalt. In this study, RTFO and PAV were used for aging and DSR was used for finding out the rheological properties of base and modified asphalt after aging. For the aged binders, the dynamic mechanical analysis of the aging effect on the rheological performance of the binders indicated that there is a considerable difference in behavior between the base asphalt and PMAB. Investigation of the dynamic shear properties and extensional properties of polymer-modified asphalt binder shows that oxidative aging reduces the temperature susceptibility of asphalt and damages the polymer network in modified asphalt. From the isochronal plots, it is seen that δ decreases with temperature increment for

both of unaged and aged PMAB in a similar manner. In case of RTFO and PAV, δ increased from 20º to 82º with temperature increment from 10º to 80º, respectively at high frequency. Again, δ increased from 46º to 85º with temperature increment from 10º to 80º, respectively at high frequency. From the phase angle master curve, it is seen that in the asphalt dominant region δ decreased by 45% and in the polymer dominant region δ increased by 2.44% after aging which indicates that polymer behaves like a more viscous fluid after PAV aging. From the master curve complex modulus, it was shown that G* increased from 20Pa to 1000Pa after long-term aging. Rutting parameter, G*/sinδ increased by about 275% and 80% respectively for the two samples after aging compared to unaged binder. It can be concluded that after aging behavior of asphalt binder is more elastic.

Dehouche et al. *(21)* studied the SBS and EVA modified asphalt binder to know the change in its physical and chemical properties due to thermo-oxidative aging. Investigation on chemical compositions, properties and morphology of the samples were carried out by SARA (saturates, aromatics, resins and asphaltenes) analysis, some conventional test methods and optical microscopy. For polymer-modified binders, aging causes both the polymer degradation and oxidation of asphalt. Aging reduces the content of aromatics from 17.80% to 23.6 % and at the same time increases the contents of resins by 13.6% to 7.4% and asphaltenes by 57.3% to 29.4%, while changes in the content of saturates are almost negligible. From the colloidal instability index values, it is seen that after aging the values have increased by 37.2% and 13.03% for the base binder and SBS, respectively. These structural modifications resulted from the oxidation of the asphalt and some chemical interactions with the polymers. After thermo-oxidative aging, both unmodified and modified samples become harder, being more pronounced for the base asphalt binder samples than those modified with polymers.

Cortizo et al. *(22)* studied SBS modified asphalt under different aging conditions. It is verified from the size exclusion chromatography and infrared spectroscopy analysis that the free radical reactions produce chain scission and radical addition to some asphalt components. Chromatographic profiles of SBS modified asphalt has shown that the second average molecular weight of fraction (F_2) decreased by 10% and the elution volume remains stable after aging. The first average molecular weight of fraction (F_1) slightly increased and the elution volume slightly decreased after aging. It is the clear consequence of degradation of polymer and oxidation of asphalt binder.

Zhang et al. *(23)* investigated Organo-Montmorillonite (OMMT)/SBS modified asphalt to know the microstructures and properties after UV aging. Microstructures were characterized by XRD, FTIR and AFM, respectively. After UV aging, viscosity aging index of SBS modified binder decreased by 5.3% from the original binder. It happened because degradation of polymer and oxidation of asphalt are compensatory to some extent. The micro-morphology of the binder modified with polymer becomes solid like after UV aging which indicates PMAB becomes harder after aging.

2. OBJECTIVES

The objectives of this study are to:

a. Develop an extensional deformation test method including sample preparation, test procedure and test parameters,
b. Investigate degradation of polymers due to oxidative aging,
c. Determine the relationship between percent of modifier and improvement,
d. Investigate the effect of modifier type, and
e. Investigate ductility of modified binder and effect of aging on ductility.

3. SCOPE

A SER fixture in a DSR is used to investigate degradation of polymer due to aging and to investigate the effect of modifier type. Relationship between different percentages of modifier and ductility of modified binder are also investigated. A total of one hundred and sixty-two samples are tested and the sample geometry used in this study are 1 mm × 0.72 mm and 3 mm × 0.72 mm. One PG76-22, one PG64-22 and one polymer-modified asphalt emulsion are used with three modifiers; SBS, PPA and latex. In addition, four test temperatures (0ºC, 4ºC, 12ºC and 16ºC) are used and no PG tests, except RTFO and PAV, were performed. No mixture tests were performed in this project to verify the SER results. A list of recommendations is provided later in this report indicating a need for a future study

4. METHODOLOGY

The main objective of this study is to investigate the degradation of polymer due to aging in modified asphalt binder (PG 76-22 and polymer-modified PG 64-22). The secondary objective is to find out the correlation between percent of polymer and SER test parameter. The effect of different types of polymer and different percentages of polymer is investigated in this study. Ductility of modified binder and effect of aging on ductility is also studied. The applicability of SER to accurately detect the degradation of polymer due to short- and long-term aging is examined. This DSR-based SER test results can also be used to determine polymer content in the asphalt binder.

4.1. Extensional Test Parameters

The extensional test parameters considered in this study are as follows:

1. Different types of polymer (SBS, PPA and latex),
2. Different percentages (contents) of polymer,
3. Combined effect of different types of polymer (SBS and PPA),
4. Different levels of aging (short-term: RTFO aging and long-term: PAV aging), and
5. Different test temperatures.

Selection of Asphalt Binder Grades: One neat PG binder namely, PG 64-22 was selected so that different percentage of polymer can be added in the laboratory. One polymer-modified binder namely, PG 76-22, was collected from its supplier Paragon Technical Services, Inc. All polymer-modified asphalt binders will be called PMAB hereafter in this report. Polymer-modified asphalt emulsion were collected from the producer with 0%, 2.5%, 4% and 5.5% latex in it. The residues were recovered from the emulsions using Residue by Evaporation of Emulsified Asphalt "ASTM D6934 – 08". All polymer-modified asphalt emulsions will be referred to as PMAE hereafter in this report.

Polymer mixing, sample preparation, and the test procedure were developed for asphalt binders, PMAB and PMAE to be tested in the SER.

Selection of Modifiers: Here, three types of polymer are used for the asphalt modification: SBS polymer as shown in Figure 8 is collected from Kraton corporation, PPA is collected from Sigma-Aldrich in a plastic bottle as shown in Figure 9 and latex as shown in Figure 10 is collected from Amethyst construction. The properties of SBS polymer and PPA is shown in Tables 2 and 3. A grinder as shown in Figure 11 is used for grinding the large size SBS. A mechanical mixer is used for mixing polymer with the base binder PG 64-22 as shown in Figure 12. A high shear mixer is used for the final mixing of polymer with the base binder as shown in Figure 13.

Selection of Temperature: PG 76-22 samples were tested at 0°C, 4°C and 12°C. PMAE samples were tested only at 4°C to detect the polymer content. PG 64-22 samples were tested at 4°C, 12°C and 16°C. No testing temperature above 16°C was chosen because at higher temperatures, lower viscosity of asphalt sample causes higher final strain. That exceeds the maximum recommended Hencky strain specified by the SER manufacturer, which is equal to 4 per drum.

Table 2. Properties of SBS polymer.

Property	Typical Values
Specific gravity	0.94
Bulk density	0.40 kg/dm^3
Hardness, Shore A (30 sec)	75
Elongation at Break	820%
Melt Flow Rate, 200Â°C/5kg	<1 g/10min
Tensile Strength	27 MPa
300% Modulus	2.5 MPa

Table 3. Properties of PPA.

Property	Typical Values
Grade	Reagent grade
Assay	115% H_3PO_4 basis
BP	300 °C(lit.)
Density	2.06 g/mL at 25 °C

Figure 8. SBS polymer from Kraton Corporation.

Figure 9. PPA bottle from Sigma-Aldrich.

Figure 10. Latex collected from Amethyst Construction.

Figure 11. Large size SBS polymer is grinded to smaller size.

Figure 12. Mechanical mixer used for mixing polymer with asphalt binder.

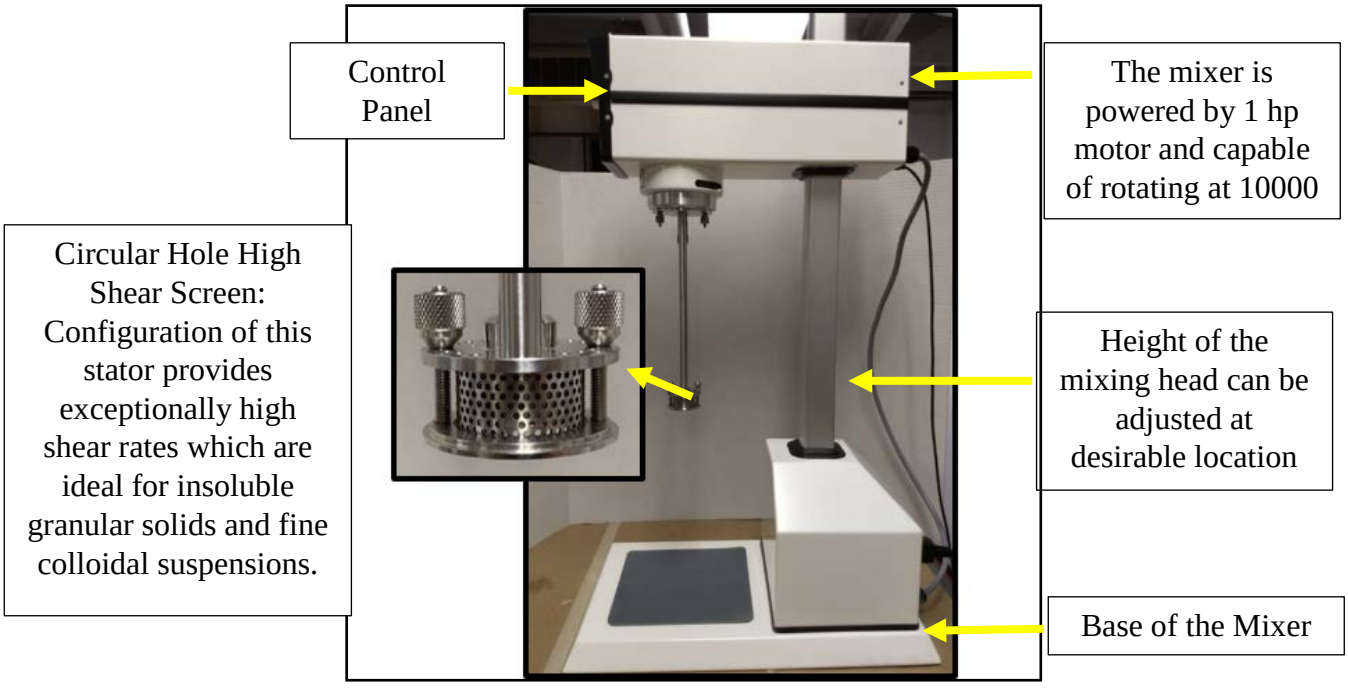


Figure 13. Silverson L5M-A high shear mixer (side view).

4.2. Aging Procedures

4.2.1. Short-Term Aging (RTFO)

The standard test method for rolling thin film oven (RTFO) aging is AASHTO T 240. In this study, this standard RTFO aging method was followed for all types of unmodified and modified binder. Unaged binder is taken in a cylindrical glass bottle and rolled to make thin films inside the bottle. Then, the bottle is placed inside an oven in a rotating carriage. The oven is preheated at 163ºC and maintain at the same temperature throughout the aging process. The aging duration is 85 minutes. This type of aging simulates the aging during production and placement processes of asphalt mixtures.

4.2.2. Long-Term Aging (PAV)

AASHTO R 28 provides the standard pressure aging vessel (PAV) method, and this standard was followed for all types of unmodified and modified binder in this study. After RTFO aging, the short-term aged binder is stored for long-term aging (PAV aging). PAV aging represents the aging of the binder during its entire lifetime after mixture placement. 50g of RTFO aged binder is taken in a stainless-steel plate and kept in a heated vessel chamber at 2.10 MPa for 20 hours.

4.3. Materials and Preparation of Modified Asphalt Binder

SBS Mixing: In the cases of SBS mixing with PG 64-22, 2%, 4% and 6% SBS by weight of base binder are added. The mixing of SBS polymer is divided into three stages. Firstly, large-sized SBS polymer particles are grinded with a mechanical grinder for 20 minutes as shown in Figure 14. Secondly, the SBS is mixed with a mechanical mixer for 15 minutes as shown in Figure 15, and sheared for 2 hours with a high shear mixer at 180℃ as shown in Figure 16. The rpm is set to 4000. Thirdly, the second step is repeated the same way.

PPA Mixing: As PPA is a viscous liquid, the rpm of the high shear mixer is set to 2000 rpm. 0.5% and 2% PPA by weight of PG 64-22 binder are added. The mixing of PPA is done in two stages: firstly, the PPA is mixed with a mechanical mixer for 15 minutes as shown in Figure 15. Secondly, the mixed sample is sheared at 180℃ for 2 hours as shown in Figure 16.

Latex Mixing: Latex is mixed more cautiously as foaming occurs on the surface of the base binder immediately after adding the latex. Latex of 2%, 4% and 6% by weight of base binder is mixed with PG 64-22. Like PPA mixing, latex mixing is done in two stages: firstly, the latex is added slowly in small quantities. After adding each small quantity there is a waiting period of 30 seconds, and then a mechanical mixer is used for 5 minutes as shown in Figure 15. In the same way, the percentage of latex is added with the base binder. It takes 20 minutes to mix 2% latex, 30 minutes to mix 4% latex and 40 minutes to mix 6% latex with the base binder. Secondly, the mixed sample is sheared at 160℃ for 2 hours with rpm of 2000.

SBS and PPA Mixing: A separate process is followed to mix both PPA and SBS with the base binder. At first, PPA then SBS are mixed with PG 64-22 binder. 2% PPA by weight of PG 64-22 mixing is done by exactly following the same procedure as mentioned in the “PPA mixing” section. SBS of 0.5% and 2% by weight of PG 64-22 are mixed with 2% PPA-modified PG 64-22 by following the same procedure mentioned in the “SBS mixing” section.

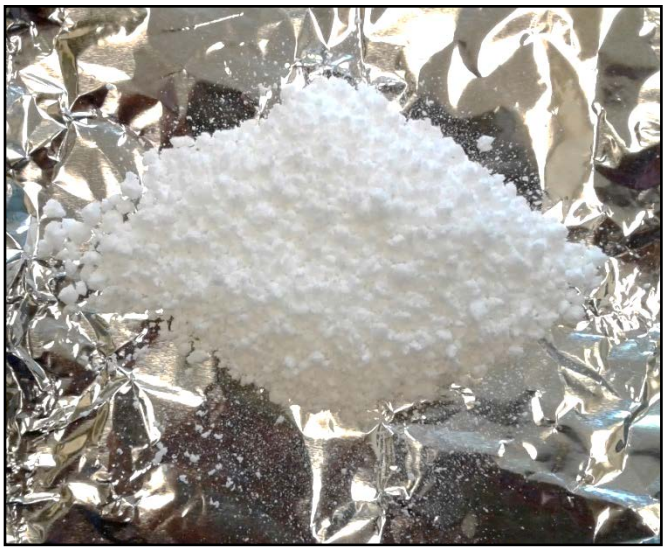


Figure 14. Polymer size after grinding.

Figure 15. Mixing of polymer with asphalt binder by a mechanical blender.

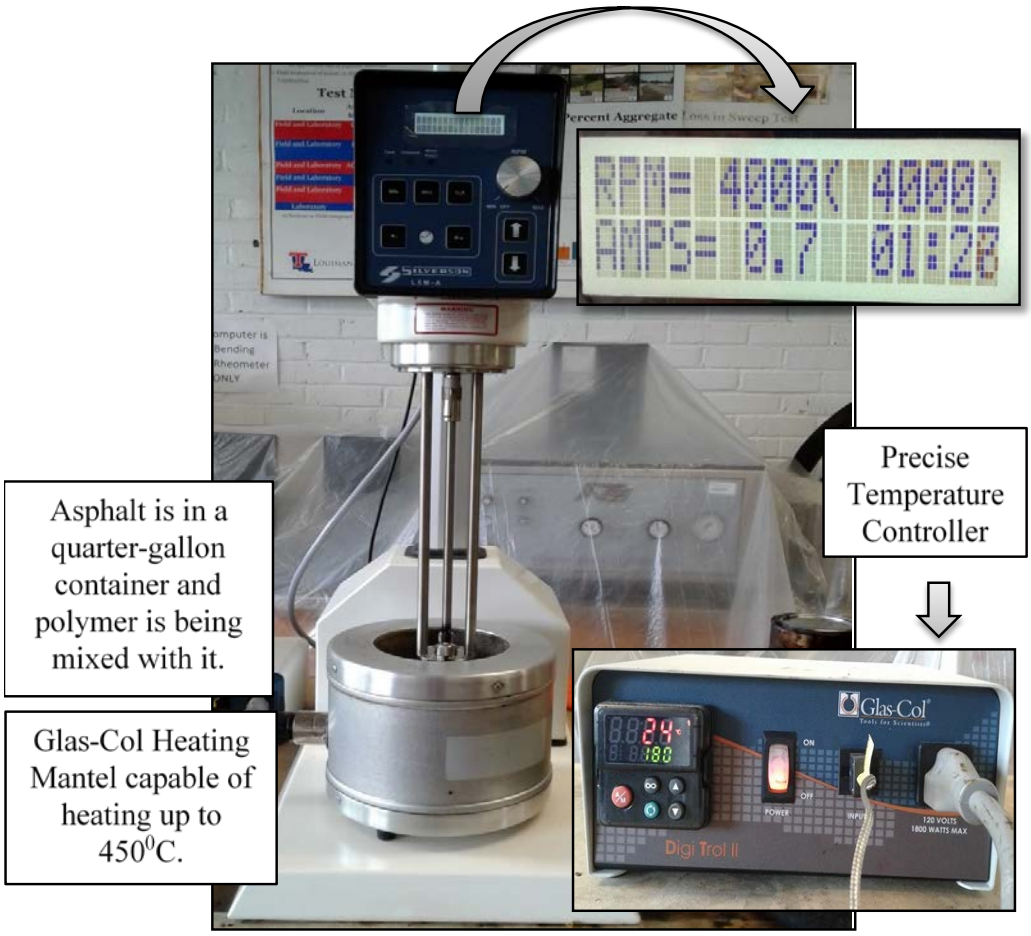


Figure 16. Mixing of polymer with asphalt binder by the high shear mixer at a fixed temperature and RPM.

4.4. Experimental Plan

One hundred and sixty-two (162) extensional deformation tests were performed as shown in Tables 4, 5, and 6. One hundred and eight (108) tests out of the total were performed on PG 76-22 and PG 64-22 polymer modified binder to investigate the degradation of polymer due to aging. Twenty-one (21) tests out of the total were performed on SBS, latex and PPA modified PG 64-22 and PMAE at 4°C to accurately detect the second peak elongation force. The last thirty-three (33) samples were studied on PPA modified PG 64-22 and combined SBS and PPA modified PG 64-22 to investigate the effects of mixing PPA and SBS.

Table 4. Summary of materials and experimental plan for finding out the polymer degradation due to aging.

Asphalt Binder	Type of Polymer	% of Polymer	Type of Sample	Temperature, ℃	No. of Sample	Total No. of Sample	Sample Dimension
PG 76-22	SBS	----	Original	0	3	24	1mm × 0.72mm
				4	3		
				12	3		
			RTFO	0	3		
				4	3		
				12	3		
			PAV	4	3		
				12	3		
PG 64-22	SBS	0% (Unmodified)	Original	4	3	84	3mm × 0.72mm
				12	3		
				16	3		
			RTFO	12	3		
				16	3		
			PAV	12	3		
				16	3		
		2%, 4% and 6%	Original	4	3×3		
				12	3×3		
				16	3×3		
			RTFO	12	3×3		
				16	3×3		
			PAV	12	3×3		
				16	3×3		
Total						108	

Table 5. Summary of materials and experimental plan for determining the polymer content and mixing of different types of polymer.

Asphalt Binder	% of Polymer	Type of Sample	Temperature, ℃	No. of Sample	Total No. of Sample	Sample Dimension
PMAE	0	Original	4	3	12	3mm × 0.72mm
	2.5	Original	4	3		
	4	Original	4	3		
	5.5	Original	4	3		
Latex modified PG 64-22	2	Original	4	3	9	3mm × 0.72mm
	4	Original	4	3		
	6	Original	4	3		
Total					21	

Table 6. Summary of materials and experimental plan for determining the effects of different types of polymer.

Asphalt Binder	Type of Polymer	% of Polymer	Type of Sample	Temperature, ℃	No. of Sample	Total No. of Sample	Sample Dimension
PG 64-22	PPA	0.5%	Original	4	3	15	3mm × 0.72mm
			Original	12	3		
			Original	16	3		
		2%	Original	12	3		
			Original	16	3		
PG 64-22	PPA & SBS	2% & 2%	Original	4	3	9	
			Original	12	3		
			Original	16	3		
PG 64-22	PPA & SBS	2% & 0.5%	Original	4	3	9	
			Original	12	3		
			Original	16	3		
Total						33	

4.5. Sample Preparation

In this study, sample preparation method of Mohammed and Wasiuddin *(24)* is followed with some modifications. PG 76-22, PMAE and PG 64-22 (polymer-modified and unmodified) samples are prepared using the following steps:

4.5.1. Preparing the Binder

a. The binder in the main 5-gallon can is heated in the oven at 163°C for 45 minutes.
b. Around 100 g of binder was placed in a small metal can (8 oz) to reduce the aging that occurs due to the repeated heating process as shown in Figure 17(a).
c. The binder in the small can is heated in the oven at 163°C for around 20 minutes until it liquified.

4.5.2. Controlling the Sample Thickness

a. The binder is poured in a 1 in diameter silicon mold to control the amount of binder needed as shown in Figure 17(b). Silicon is selected to be the molding material because asphalt does not adhere to silicon. The size of the mold is selected to be 1-in in diameter to simplify the thickness control process by reducing the amount of binder under the loads.
b. The liquid binder that is poured in the silicon mold is left in room temperature for 15 to 20 minutes until it cools down, so it could be removed from the silicon mold as shown in Figure 17(c).
c. To control the sample thickness (0.72 mm), the sample was placed on a silicon mat between two stainless steel plates with the exact desired thickness as shown in Figure 17(d). After few trials, 1.7 in was found to be the suitable spacing dimension between the two stainless-steel plates to allow the binder to spread to a uniform thickness.
d. To block the adhesion between the asphalt sample and the glass plate from the next step, a minimum 2 in × 2 in silicon mat is placed over the sample overlapping with the stainless-steel plate as shown in Figure 17(e). The overlapping is to ensure that the silicon mat will not slip from the stainless-steel plates and affect the sample's thickness control process. The other dimension of the silicon mat is to ensure that the sample was covered after spreading.
e. To ensure a uniform distribution of the loads over the sample, a 2 in × 2 in thick glass plate is placed over the silicon mat, overlapping with the stainless-steel plates as shown in Figure 17(f).
f. 20 lb. of loads are placed over the thick glass plate. The loads are kept over the sample for 3 hours as shown in Figure 17(g). Several trials of 2, 4 and 5 hours were made but the sample's thickness increased by around 1 mm after removing the loads due to delayed elastic recovery if the loading period is less than 3 hours *(25-29)*.
g. The whole system of preparing sample is kept in an oven at 58℃ as shown in Figure 17(h). The oven temperature was selected after several trials of 50℃, 55℃ and 65℃ at which the sample thickness remains same after unloading.
h. The loads were removed along with the glass plate and the silicon mat as shown in Figure 17(i).

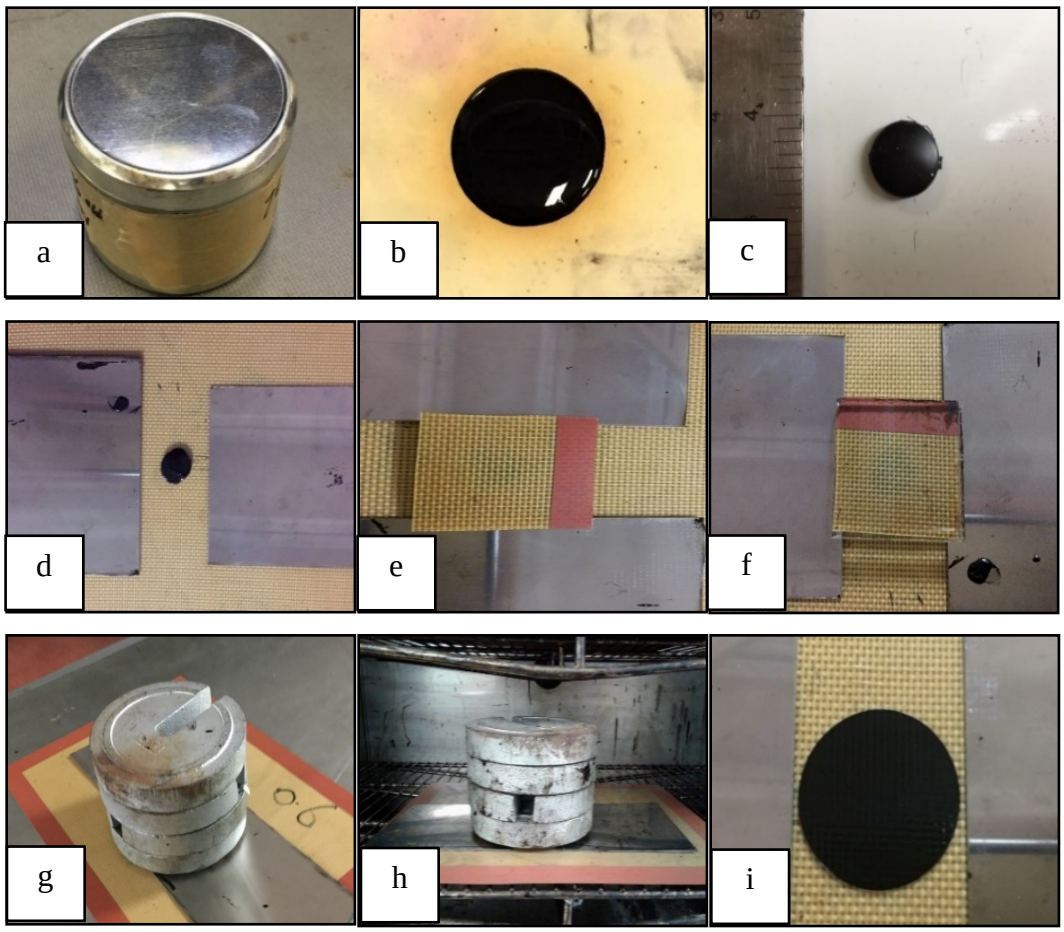


Figure 17. (a) The binder placed in to the small can, (b) The binder poured in to the silicon mold, (c) The binder was removed from the silicon mold, (d) Binder placed between two stainless steel plates, (e) Silicon mat placed above the binder, (f) The thick glass placed over the silicon mat, (g) The loads placed over the thick glass, (h) The sample placed in the oven, (i) The binder's shape after removing the loads.

4.5.3. Cutting the Sample to the Desired Dimensions

a. The sample is placed in a refrigerator at 5°C for 1 to 2 minutes.
b. The sample is removed carefully from the big silicon mat to a smaller 4 in x 4 in silicon mat.
c. The sample is placed in a refrigerator at 5°C for 2 to 3 minutes. If the sample is left at 5°C for longer than 2 to 3 minutes the sample will crack during the cutting process as shown in Figure 18. If the sample is left at 5°C for less than 2 to 3 minutes, the sample will stick to the metal edge during the cutting process as shown in Figure 19.
d. Immediately after removing the sample from the refrigerator, the sample is cut with a sharp metal edge to the desired dimensions as shown in Figure 20. The sample is measured by a slide caliper to ensure the desired dimensions as shown in Figure 21.

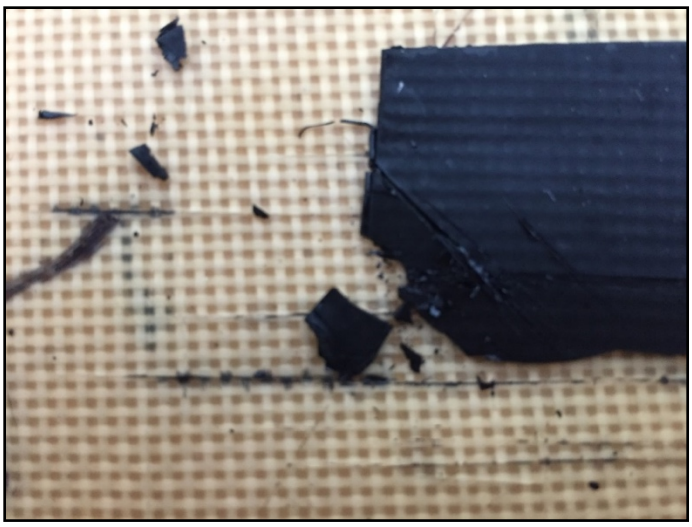


Figure 18. Cracked during the cutting process due to a long cooling period.

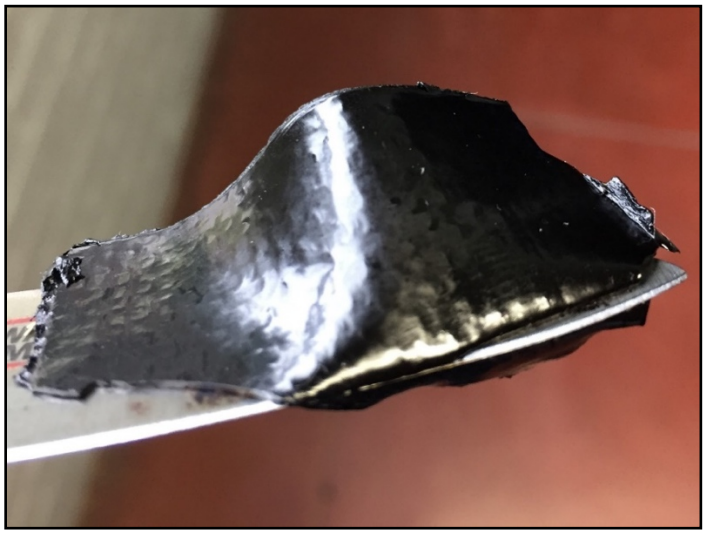


Figure 19. Sticking to the metal edge due to a short cooling period.

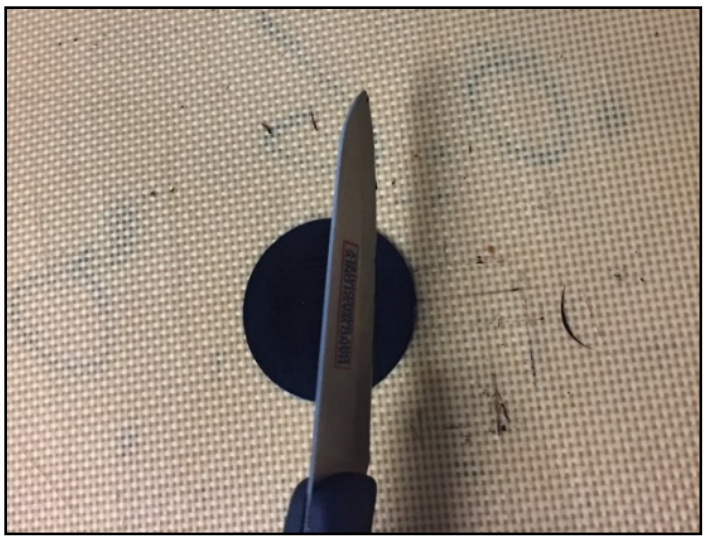


Figure 20. Cutting the binder to the desired length.

Figure 21. Sample with desired dimensions.

4.6. Test Procedure

Measurements are performed on a Universal Testing Platform model SER3-G, manufactured by Xpansion Instruments LLC. connected to DSR model AR2000 Ex with an environmental chamber.

a. After starting the DSR, the smart swap is inserted as shown in Figure 22.

b. SER bracket is fixed in the DSR as shown in Figure 23.

c. As shown in Figure 24, SER consists of a paired master and slave wind-up drums connected to a drive shaft. Rotation of the drive shaft results in the rotation of the master drum and an equal and opposite rotation of the slave drum, which results in the stretching of the sample.

d. The sample is loaded and secured at each end by clamps as shown in Figure 25, and then the chamber was closed. The clear distance between the two drums is always kept 12.75 mm as shown in Figure 26.

e. At the beginning, samples slipped several times during the tests because of the high stresses resulting from the solid tensile testing as shown in Figure 27.

f. Therefore, an ultra-thin double-sided adhesion tape with a thickness of 0.1 mm is placed into the drum prior to the sample loading to prevent the sample from slipping as shown in Figure 28. The sample is loaded in the SER by placing on the double-sided adhesion tape as shown in Figure 29.

g. As for the test parameters, as shown in Figure 30 the environmental control is set to 0ºC, 4ºC, 12ºC or 16ºC, the soak time is 600 s, and the wait for temperature option is activated to ensure temperature equilibrium. The solid density is set to 1.0 g/cm^3, and the melt density is set to 0.95 g/cm^3. Final strain is 3.7 rad, with a strain rate of 0.1 s^{-1}. For more accurate measurements, the fast sampling option is activated.

h. Figure 31 shows the sample during the extensional deformation. Figure 32 shows the sample at the end of the test. Upon completion of the test, the sample is removed immediately, and the drums are carefully cleaned with a soft wipe, and paint thinner is used as needed.

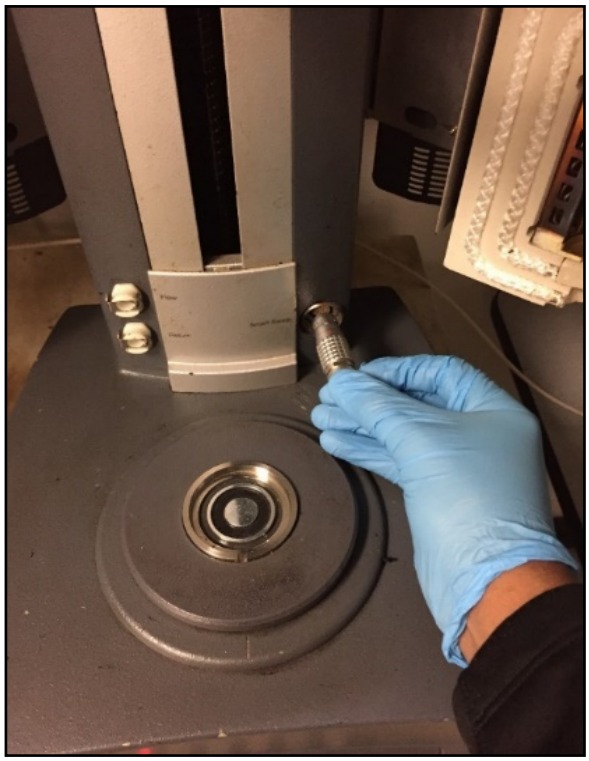


Figure 22. Inserting the smart swap.

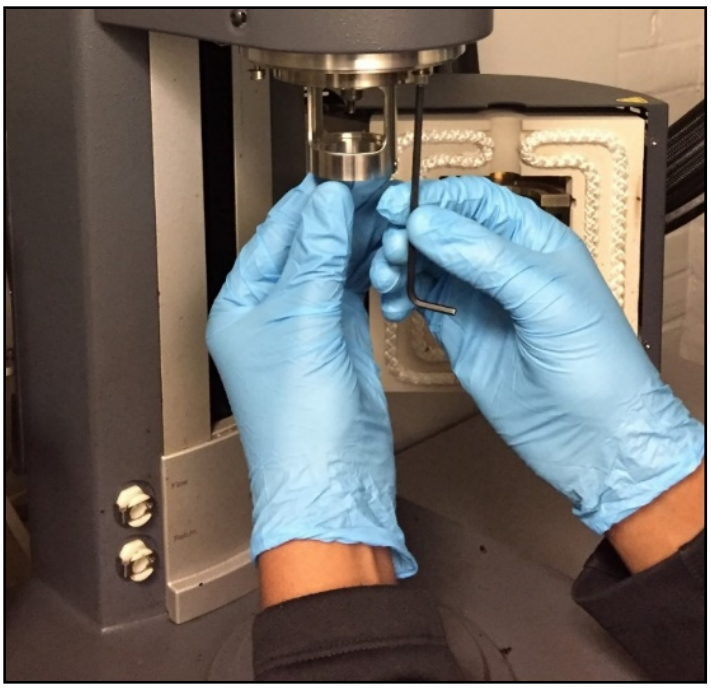


Figure 23. Fixing the SER bracket.

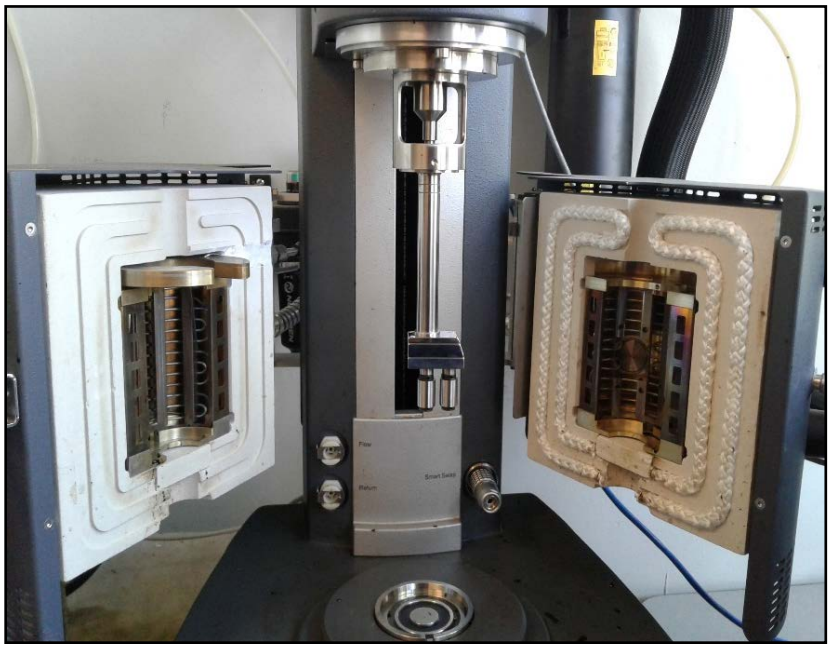


Figure 24. The SER fixture prior to the sample loading.

Figure 25. SER fixture after loading the sample.

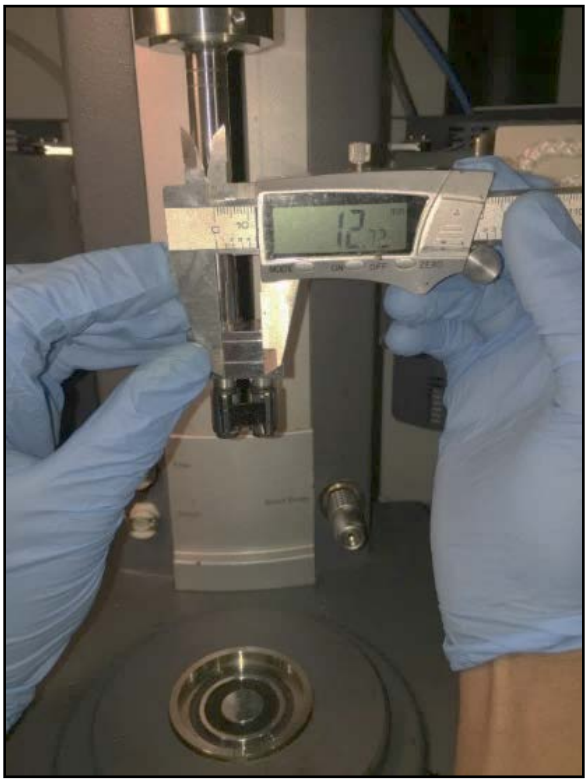


Figure 26. Length of the sample before testing is 12.75 mm.

Figure 27. Clamps kicked out due to the hard stresses.

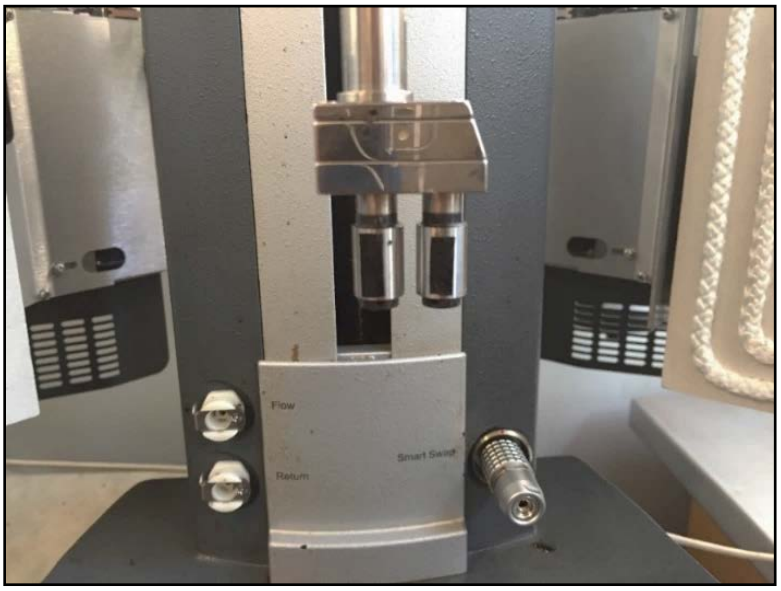


Figure 28. Double-sided adhesion black tape fixed to the drums.

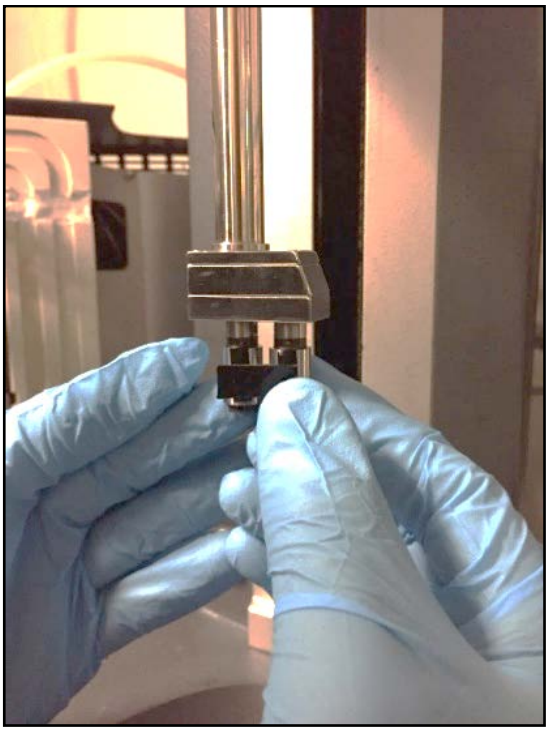


Figure 29. Loading the sample post to the double-side adhesion tape.

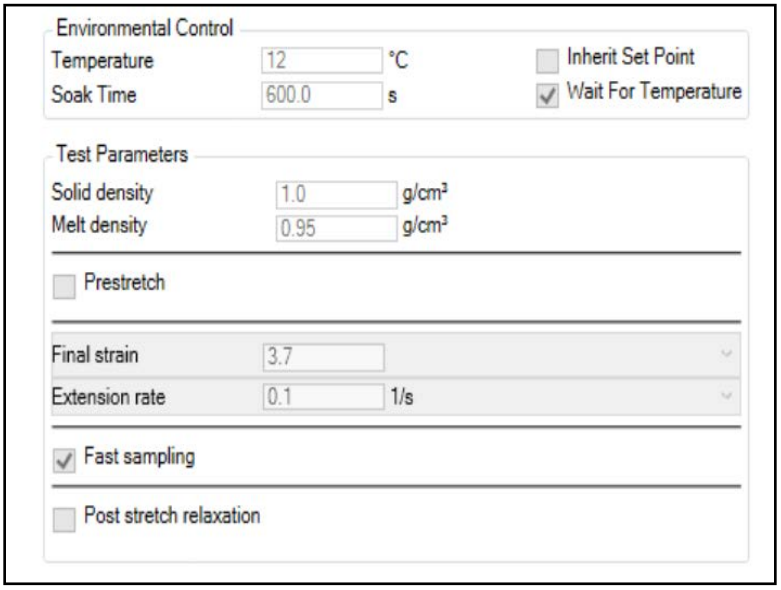


Figure 30. Software screenshot showing test parameters.

Figure 31. Sample during the extensional deformation test.

Figure 32. Sample after the end of the test.

5. FINDINGS

5.1. SER (Sentmanat Extensional Rheometer) Test Results

5.1.1. First and Second Peak Elongation Forces

Polymer-modified binder is a non-homogeneous material. In the elongation force vs. step time plot, the first peak, F_1 indicates the stiffness property of asphalt and the second peak, F_2 indicates the polymer effect on asphalt binder and the value of second peak depends on the type and level (or %) of polymer modification (Chen et. al., *(30)*). In this study, no second force peak is observed in a non-modified asphalt binder.

5.1.2. Elongation Force vs. Step Time Curve Characterization

PMAB PG 76-22: Figures 33 through 35 illustrate elongation force vs. step time curve for PMAB PG 76-22 original, RTFO and PAV aged binders at 0ºC, 4ºC and 12ºC, respectively. Here, F_1 is the binders' stiffness property and F_2 is the polymer characteristics. At 0ºC, RTFO aged PMAB PG 76-22 shows slightly greater F_1 value than the F_1 value obtained from the original PMAB. On the other hand, F_2 obtained from the original PMAB is greater than F_2 from the RTFO aged PMAB. The PAV aged samples became very stiff at 0ºC. Significant amount of elongation force is required to get close to the first peak F_1 and as a result, the sample comes off the clamps and test could not be completed. From the tests at 4ºC and 12ºC, it was observed that F_2 is more visible (dominant compare to F_1) at comparatively higher temperatures as shown in Figures 34 and 35. In case of the original or RTFO aged binders, F_2 is comparatively lower than F_1 at 4ºC compare to 12ºC.

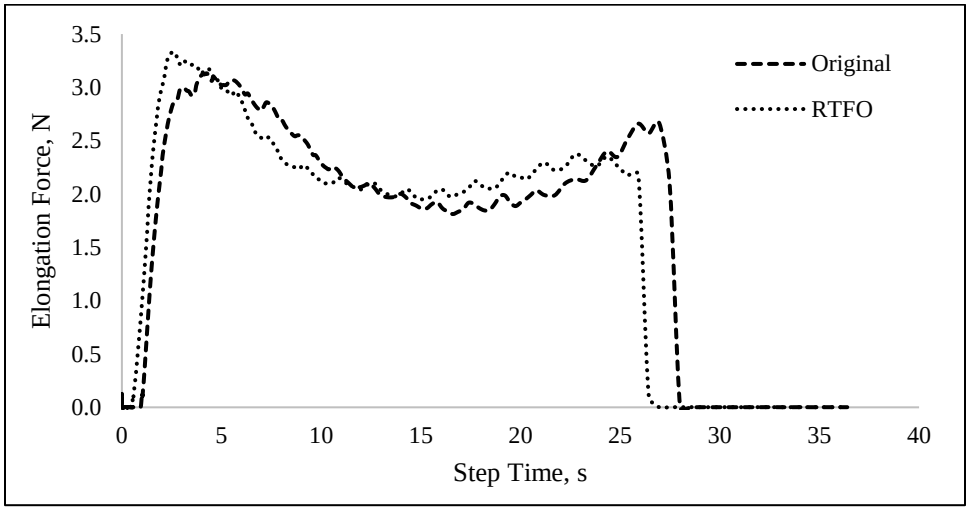


Figure 33. Elongation force vs. step time curve for PG 76-22 Binder (Original & RTFO) at 0ºC.

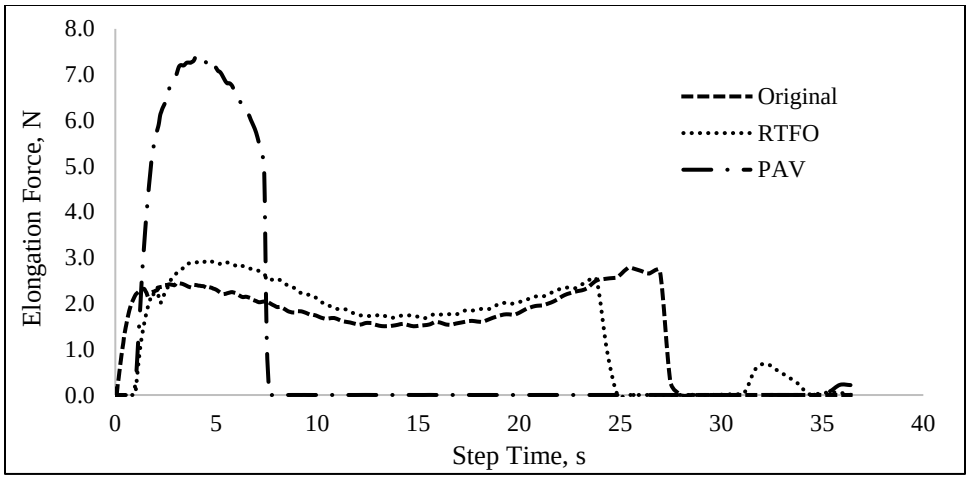


Figure 34. Elongation force vs. step time curve for PG 76-22 Binder (Original, RTFO & PAV) at 4ºC.

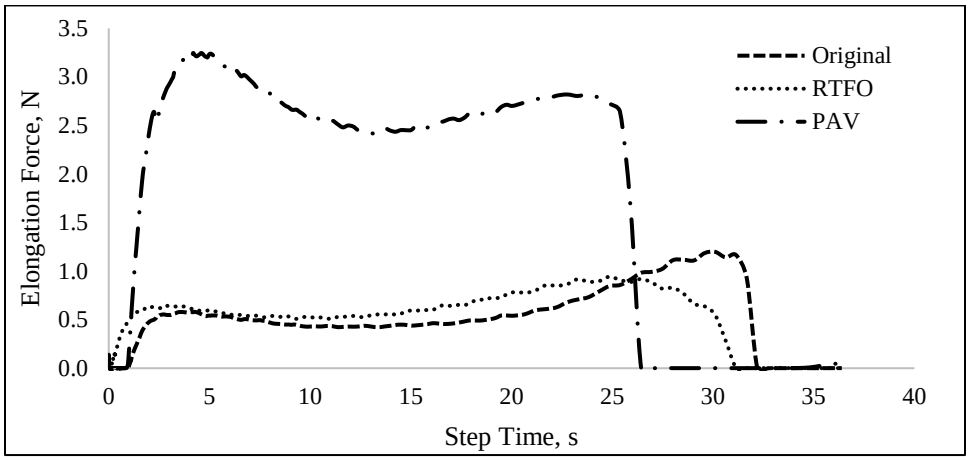


Figure 35. Elongation force vs. step time curve for PG 76-22 Binder (Original, RTFO & PAV) at 12ºC.

PG 64-22: Figures 36 and 37 illustrate elongation force vs. step time curve for PG 64-22 original, RTFO and PAV aged binders at 12ºC and 16ºC, respectively. These two figures do not have any second peak elongation force (F_2) as the samples are neat asphalt binder. Due to aging asphalt binder becomes very stiff and elongation forces of the RTFO and PAV aged binders are higher compared to the original binders as shown in Figures 36 and 37. With the increment in stiffness, ductility of the aged asphalt binder decreases. When the temperature decreases, stiffness increases and the elongation forces of the original, RTFO and PAV samples are more at 12ºC compared to the elongation forces at 16ºC. Also, ductility increases with the temperature increment in case of both aged and unaged asphalt binder. At 16ºC, the original, RTFO and PAV aged samples elongated more with time than the original, RTFO and PAV aged samples at 12ºC.

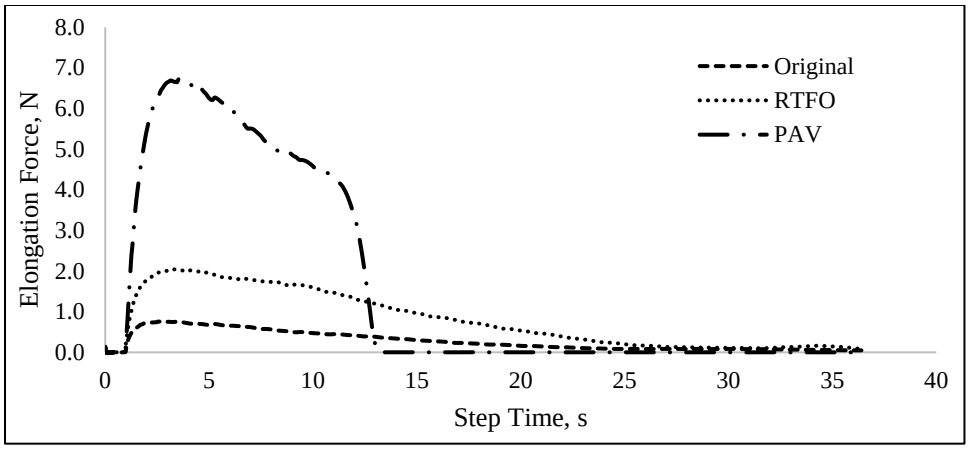


Figure 36. Elongation force vs. step time curve for unmodified PG 64-22 Binder (Original, RTFO & PAV) at 12ºC.

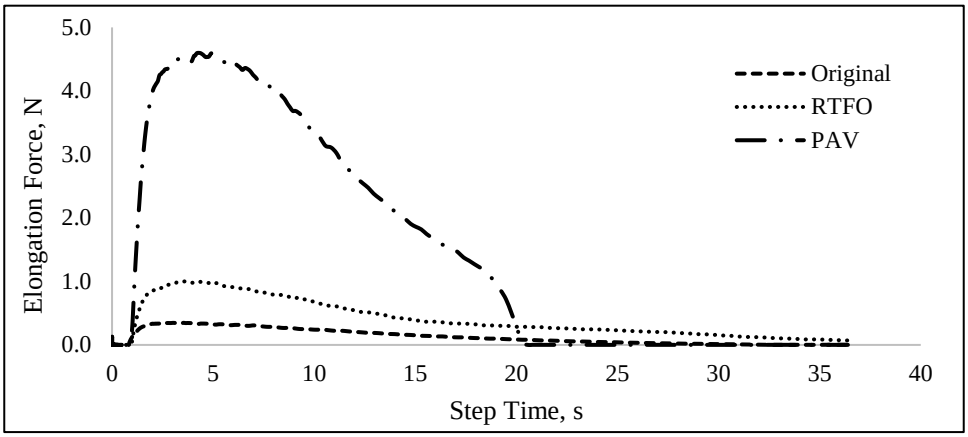


Figure 37. Elongation force vs. step time curve for unmodified PG 64-22 Binder (Original, RTFO & PAV) at 16ºC.

5.1.3. Polymer Degradation Due to Aging

Second Peak Elongation Force, F_2 of PG 76-22 Binder: F_2 is an indication parameter of the stiffness property of polymer so a decrease in F_2 indicates the degradation of polymer. Figure 38 shows F_2 of unaged and aged (RTFO and PAV) PMAB PG 76-22 at 0ºC, 4ºC and 12ºC, respectively. For the original binder, at 0ºC, F_2 value is equal to 2.69N which has a standard deviation of 0.29. At 4ºC, the numerical value of F_2 is equivalent to 2.06N with a standard deviation of 0.49. At 12ºC, F_2 becomes 1.19N with a standard deviation of 0.19. In case of RTFO aged binder, at 0ºC, F_2 value is equal to 2.58N which has a standard deviation of 0.20. At 4ºC, F_2 becomes 1.88N with a standard deviation of 0.17. At 12ºC, F_2 decreases to 1.13N along with a standard deviation of 0.17. It can be observed that F_2 decreases with temperature increment for the original and short-term aged PMAB. At all the three temperatures, 0ºC, 4ºC and 12ºC, F_2 reduces after RTFO aging. This is an indication that polymer degrades due to aging. In the case of PAV aged binders, asphalt binder is very stiff and no F_1 and F_2 data can be obtained with SER at 0ºC. At 4ºC, no F_2 was observed for PAV aged binder which is an indication of polymer degradation. The sample breaks before reaching any F_2. At 12ºC, F_2 of

PAV aged binder is higher than F_2 of original binder. This is because, increase in stiffness due to PAV aging contributes to the increment in F_2 even after polymer degradation due to aging.

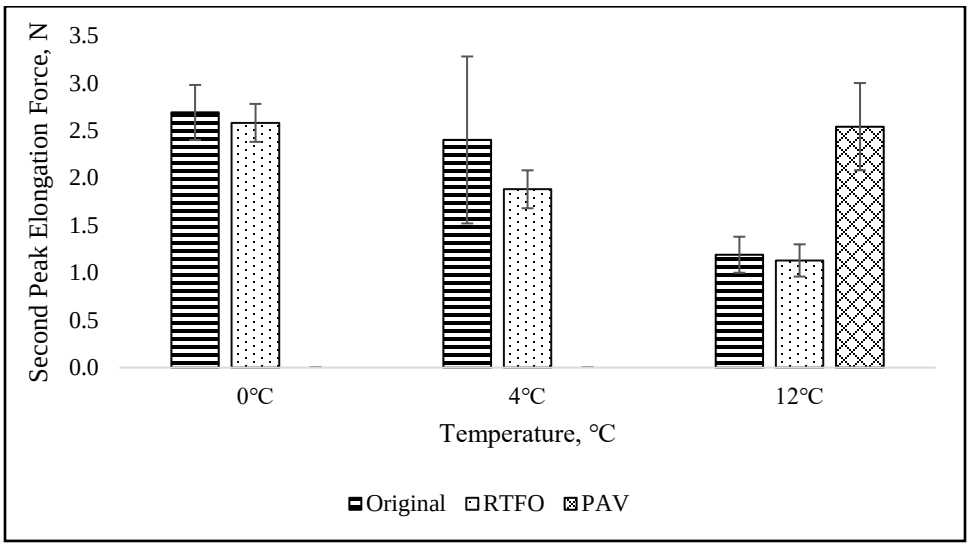


Figure 38. Second peak elongation force vs. temperature of PMAB PG 76-22 at 0°C, 4°C and 12°C.

Second Peak Elongation Force, F_2 of 2% SBS Modified PG 64-22 Binder: Figure 39 shows F_2 of unaged and aged (RTFO and PAV) 2% SBS modified PG 64-22 at 12°C and 16°C. The F_2 value of the original 2% SBS modified PG 64-22 binder is equal to 0.80N and 1.08N with standard deviations of 0.12 and 0.18 at12°C and 16°C, respectively. The F_2 value of the RTFO aged 2% SBS modified PG 64-22 binder is equal to 1.09N and 0.50N with standard deviations of 0.17 and 0.04 at12°C and 16°C, respectively. In case of PAV aged 2% SBS modified PG 64-22 binder, F_2 value is equal to 1.54N and 0.96N along with standard deviations of 0.28 and 0.09 at12°C and 16°C, respectively. It is observed that F_2 value decreases with the temperature increment as mentioned previously. At 12°C, degradation of polymer due to aging is not well understood as percentage of polymer is very low compared to the original binder. Also, samples become stiffer at this temperature compared to the samples at 16°C. Due to aging polymer-modified binder becomes stiff. As a result, binder property F_1 increases which contributes to the increment of F_2 value after RTFO and PAV aging. Although binder becomes stiff after aging, increment of temperature reduces polymer-modified binder's stiffness. As a result, at 16°C after RTFO aging F_1 cannot increase the F_2 value. But after long-term aging PMAB becomes so stiff that the increment in temperature cannot help but the F_1 value increases the F_2 value.

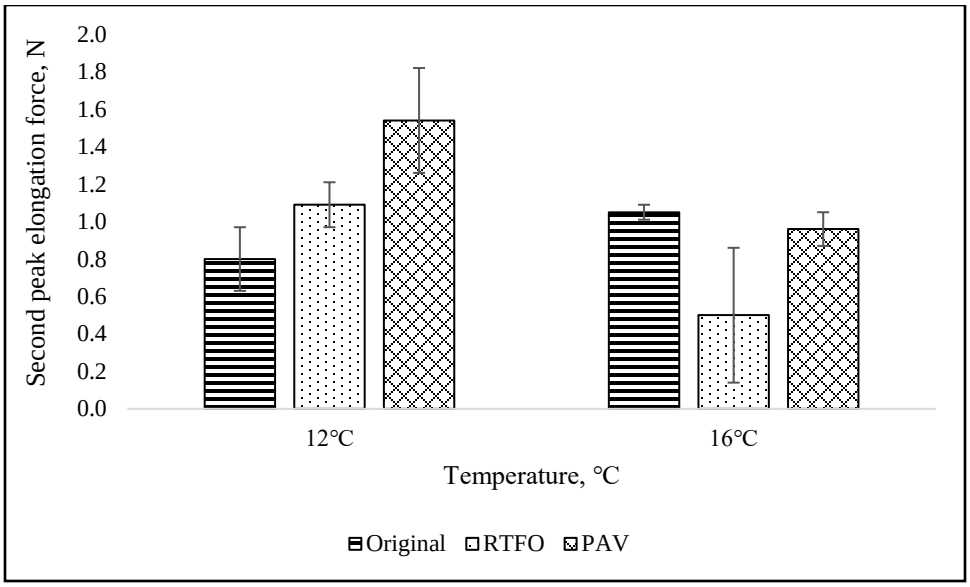


Figure 39. Second peak elongation force vs. temperature of 2% SBS modified PG 64-22 at 12ºC and 16ºC.

Second Peak Elongation Force, F_2 of 4% SBS Modified PG 64-22 Binder: Figure 40 illustrates F_2 of unaged and aged (RTFO and PAV) 4% SBS modified PG 64-22 at 12ºC and 16ºC, respectively. In case of original 4% SBS modified PG 64-22, F_2 values are 3.50N and 2.74N which have standard deviations of 0.45 and 0.11 at 12 ºC and 16 ºC, respectively. The F_2 value of the RTFO aged 4% SBS modified PG 64-22 is equal to 3.10N and 1.61N along with standard deviations of 0.56 and 0.20 at 12ºC and 16ºC, respectively. It can be observed that F_2 decreases with temperature increment for the original and short-term aged 4% SBS modified PG 64-22. In case of both the temperature, F_2 reduces after RTFO aging. This is an indication that polymer degrades due to aging. In the case of PAV aged binders, no F_2 data is obtained with SER at 12ºC and 16ºC. The sample breaks before reaching any F_2.

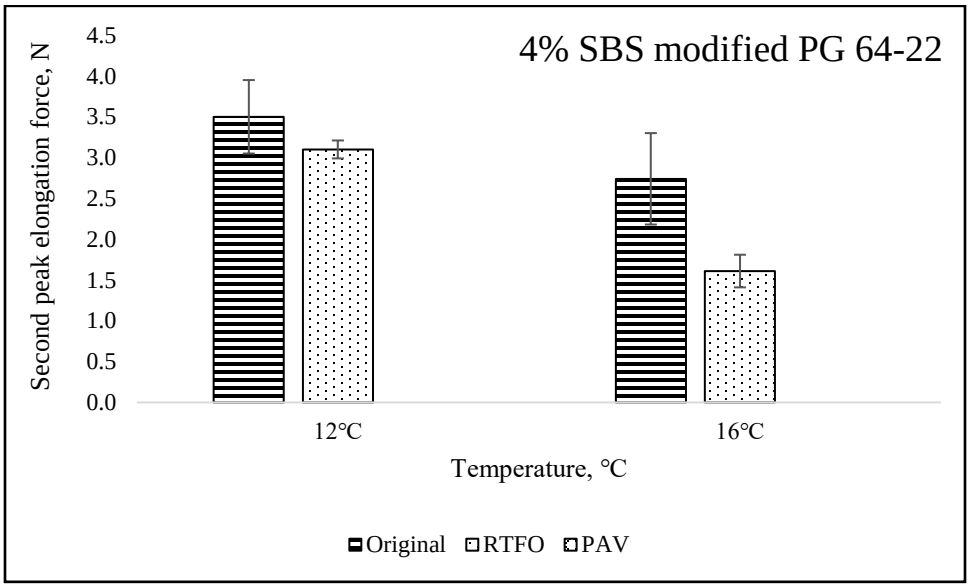


Figure 40. Second peak elongation force vs. temperature of 4% SBS modified PG 64-22 at 12ºC and 16ºC.

Second Peak Elongation Force, F2 of 6% SBS Modified PG 64-22 Binder: Figure 41 shows F_2 of unaged and aged (RTFO and PAV) sample of 6% SBS modified PG 64-22 at 12ºC and 16ºC. F_2 values of the original polymer modified binder are 6.12N and 5.02N with standard deviations of 0.49 and 0.31, respectively. The value of F_2 for the RTFO aged PG 64-22 is 1.41N and 1.32N with standard deviations of 0.05 and 0.24, respectively. In case of PAV aged binder, F_2 is equal to 1.33 and 0.80 with standard deviation of 0.56 and 0.40, respectively. It can be observed that F_2 decreases with temperature increment for the original and aged 6% SBS modified PG 64-22 asphalt binder as mentioned earlier which indicates stiffness decreases with temperature increment. At both the temperatures, F_2 reduces after RTFO aging and further reduces after PAV aging. This is an indication that polymer degrades due to aging.

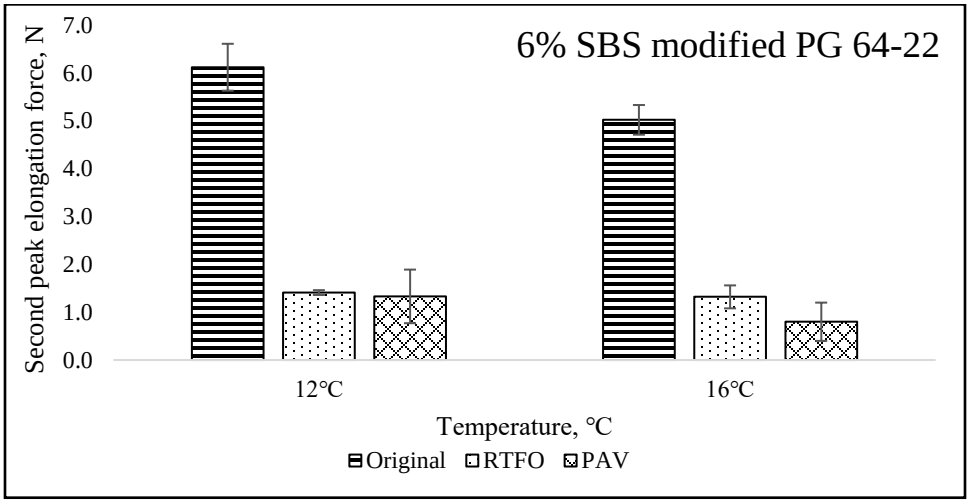


Figure 41. Second peak elongation force vs. temperature of 6% SBS modified PG 64-22 at 12°C and 16°C.

5.1.4. Second Peak Elongation Force Over First Peak Elongation Force

F_2/F_1 of PG 76-22 Binder: As observed in previous section that F_2 is influenced by the increase of F_1 due to aging, in the following sections F_2/F_1 will be used to analyze the degradation of polymer due to aging. In this way, the effect of F_1 will be normalized. The ratio of F_2/F_1 vs. different types of sample is shown in Figure 42. F_2/F_1 is a very distinctive parameter of the original and aged PMAB, as the polymer is degraded with aging, F_2/F_1 decreases. The F_2/F_1 values of the original PG 76-22 binder is equal to 0.87, 1.01 and 2.06 with standard deviations of 0.03, 0.17 and 0.06 at 0ºC, 4ºC and 12°C, respectively. After RTFO aging, the values become 0.71, 0.93 and 1.54 with standard deviations of 0.01, 0.06 and 0.12, respectively. In case of PAV aged sample, F_2/F_1 is only obtained at 12°C which is 0.80 and the standard deviation is equal to 0.09. It is observed from the figures that after RTFO aging F_2/F_1 decreased by 18.4% at 0ºC, 8% at 4ºC and 25.2% at 12ºC. After PAV aging, F_2/F_1 decreased by 48.1% at 12ºC. At 0ºC and 4ºC, due to high stiffness of PAV aged PAMB sample second peak elongation force is not found from SER test results. In consequence, F_2/F_1 is not found at these two temperatures as shown in Figure 42. On the other hand, RTFO aging reduces F_2/F_1 at both the temperatures. It is clearly observed from Figure 42 that RTFO aging reduces F_2/F_1 and PAV aging further reduces F_2/F_1. It is also obvious from the figures that F_2/F_1 increases with temperature increment for all the original, RTFO and PAV aged binders.

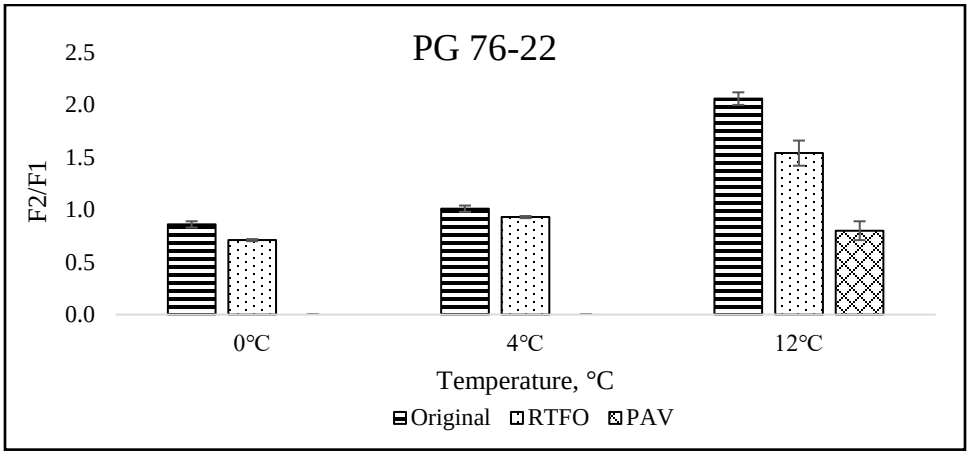


Figure 42. Second peak elongation force over first peak elongation force (F_2/F_1) at different aging levels and temperatures for PG 76-22.

F_2/F_1 of 2% SBS Modified PG 64-22 Binder: The ratio of F_2/F_1 for samples of 2% SBS modified PG 64-22 at 12ºC and 16ºC are shown in Figure 43. At 12ºC**,** the F_2/F_1 value of original, RTFO and PAV aged 2% SBS modified PG 64-22 binder is equal to 0.45, 0.37 and 0.27 along with standard deviations of 0.08, 0.03 and 0.05 respectively. At 16ºC**,** the F_2/F_1 values become 1.07, 0.33 and 0.26 along with standard deviations of 0.40, 0.02 and 0.02 respectively for the original, RTFO and PAV aged 2% PMAB. It is observed from the figures that after RTFO aging F_2/F_1 decreased by 17.78% at 12ºC and 69.2% at 16ºC. After PAV aging, F_2/F_1 decreased by 27.03% at 12ºC and 21.21% at 16ºC. It is clearly observed from the Figure 43 that RTFO aging reduces F_2/F_1 and PAV aging further reduces F_2/F_1. It is obvious that polymer is degrading due to short- and long-term aging. The value of F_2 over F_1 of original 2% SBS modified PG 64-22 is higher at 16ºC than at 12ºC. The figures also indicate that the values of F_2 over F_1 of RTFO and PAV samples are less at 16ºC compared to the value of F_2 over F_1 of original, RTFO and PAV samples at 12ºC.

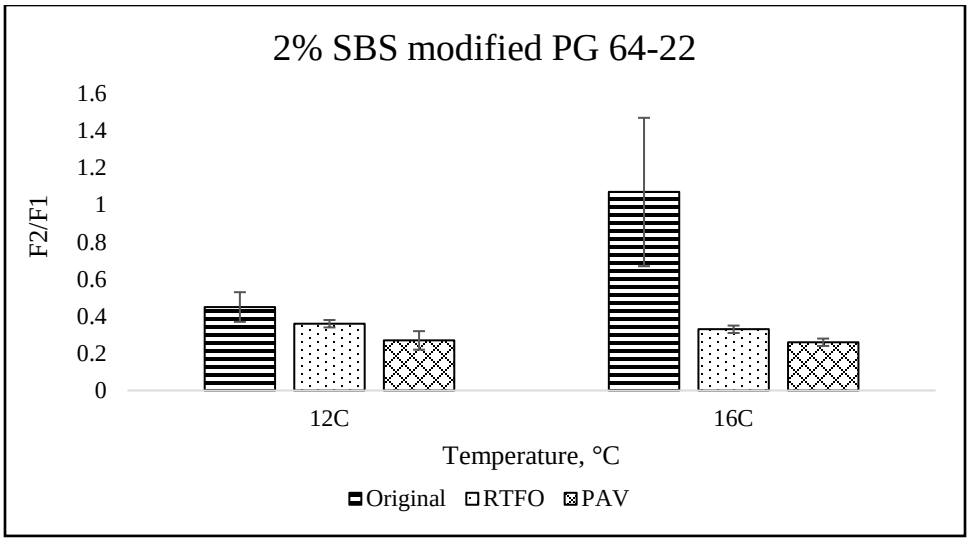


Figure 43. Second peak elongation force over first peak elongation force (F_2/F_1) at different aging levels and temperatures for 2% SBS modified PG 64-22.

F_2/F_1 of 4% SBS Modified PG 64-22 Binder: The ratio of F_2/F_1 vs different temperatures of samples for the 4% SBS modified PG 64-22 binder is shown in Figure 44 at temperatures 12ºC and 16ºC, respectively. The ratio of F_2/F_1 value is equal to 1.91 and 2.90 along with standard deviations of 0.20 and 0.22, respectively for the original 4% SBS modified asphalt binder. For RTFO aged 4% PMAB, F_2/F_1 values are equal to 1.57 and 0.91 along with standard deviations of 0.27 and 0.03 respectively. It is observed from the figures that after RTFO aging F_2/F_1 decreased by 17.78% at 12ºC and 68.62% at 16ºC. It is clearly observed from the figures that RTFO aging reduces F_2/F_1. Similar trend is observed for PG 76-22 and 2% SBS modified PG 64-22. As there is no F_2 found for PAV aged 4% SBS modified asphalt binder sample, the ratio of F_2/F_1 can be assumed zero.

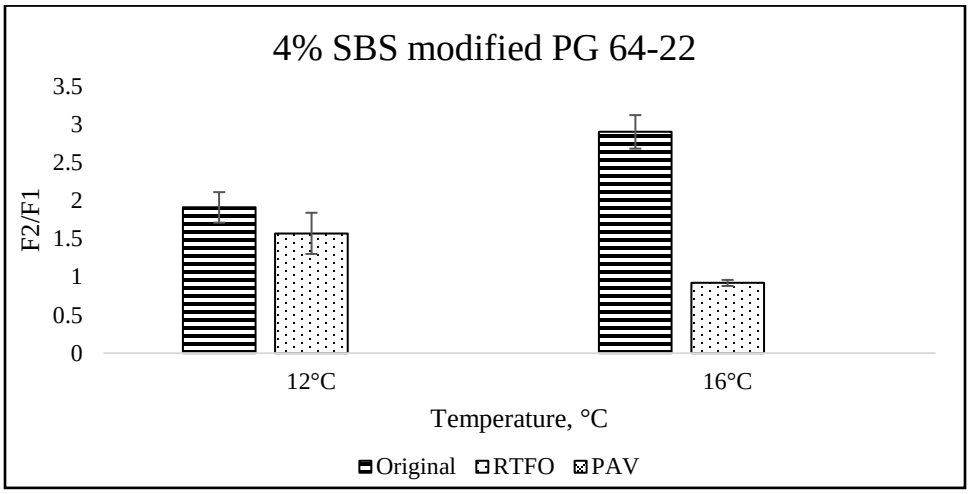


Figure 44. Second peak elongation force over first peak elongation force (F_2/F_1) at different aging levels and temperatures for 4% SBS modified PG 64-22.

F_2/F_1 of 6% SBS Modified PG 64-22 Binder: The ratio of F_2/F_1 vs different temperatures of samples 6% SBS modified PG 64-22 is shown in Figure 45. The F_2/F_1 values of the original 6% SBS modified asphalt binder are equal to 3.12 and 4.06 with standard deviations are equal to 0.41 and 0.41 at 12ºC and 16ºC, respectively. In case of RTFO aged samples, the ratio becomes 0.32 and 0.48 along with standard deviations of 0.02 and 0.07 at 12ºC and 16ºC, respectively. When the 6% SBS modified PG 64-22 binder is PAV aged, F_2/F_1 becomes 0.30 and 0.11 with standard deviations of 0.11 and 0.08 at 12ºC and 16ºC, respectively. It is observed from the figures that after RTFO aging F_2/F_1 decreased by 89.74% at 12ºC and 88.2% at 16ºC. After PAV aging, F_2/F_1 decreased by 6.25% at 12ºC and 77.10% at 16ºC. As found earlier, it is clearly observed from the figures that RTFO aging reduces F_2/F_1 and PAV aging further reduces F_2/F_1. The figures also indicate that the ratio of F_2/F_1 increases with the temperature increment in case of original and RTFO aged samples. Therefore, through this study it is recommended that this parameter can be used to determine aging susceptibility of polymer in an asphalt binder.

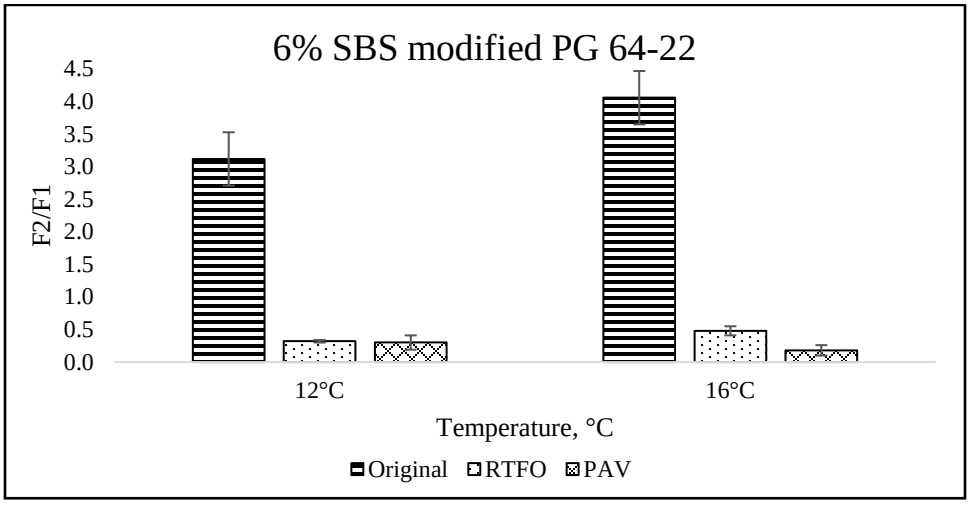


Figure 45. Second peak elongation force over first peak elongation force (F_2/F_1) at different aging levels and temperatures for 6% SBS modified PG 64-22.

5.1.5. Effect of Different Percentage of Polymer

Figures 46 and 47 show the elongation force vs. step time curve for PG 64-22, 0.5% PPA modified PG 64-22, 2% PPA modified PG 64-22, 2% SBS modified PG 64-22, 4% SBS modified PG 64-22, 6% SBS modified PG 64-22 at 12ºC and 16ºC, respectively. As mentioned earlier, first peak elongation force, F_1 is the binder's stiffness property and second peak elongation force, F_2 is the polymer's stiffness property. As asphalt binder PG 64-22 does not have any polymer, the elongation force vs. step time curve does not have any second peak. As shown in Figures 46 and 47, the curve for PG 64-22 has only F_1. After adding 0.5% PPA, PG 64-22 becomes stiff but F_2 is not found. Addition of 2% PPA also do not show any F_2 value. Although addition of PPA increases the stiffness property of the base asphalt, PPA does not exhibit any physical property like SBS. F_2 is immediately found after adding 2% SBS with PG 64-22 and F_2 value increases with the increment of polymer percentage. Highest F_2 value is found from the highest percent of polymer. At 12ºC, F_2 value increases by 3.38 times after

adding 4% SBS with PG 64-22 compared to addition of 2% SBS with PG 64-22 and increases by 0.75 times after adding 6% SBS with PG 64-22 compared to addition of 4% SBS with PG 64-22. At 16ºC, F_2 value increases by 1.61 times after adding 4% SBS with PG 64-22 compared to addition of 2% SBS with PG 64-22 and increases by 0.83 times after adding 6% SBS with PG 64-22 compared to the addition of 4% SBS with PG 64-22. Polymer imparts some stiffness to the base binder which contributes to the increase in both F_1 and F_2 value. When 0.5% PPA, 2% PPA, 2% SBS, 4% SBS and 6% SBS is added with PG 64-22 separately, F_1 value increases by 0.303 times, 1.05 times, 1.36 times, 1.42 times and 1.61 times, respectively at 12ºC. Similarly, at 16ºC F_1 value increases by 1.36 times, 1.09 times, 1.02 times and 1.64 times, respectively by the addition of 2% PPA, 2% SBS, 4% SBS and 6% SBS with PG 64-22 with no increase by the addition of 0.5% PPA.

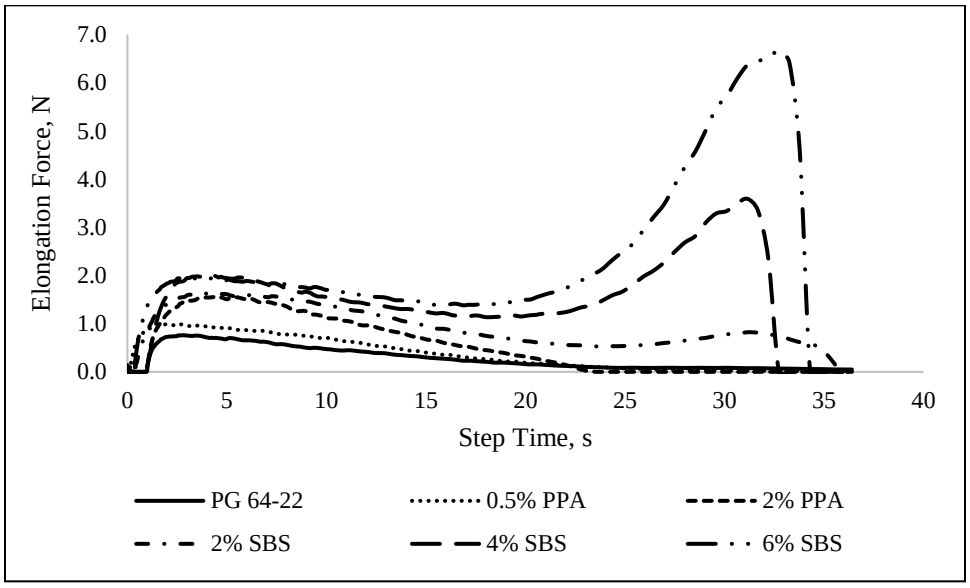


Figure 46. Elongation force vs. step time curve for different types of binder at 12ºC.

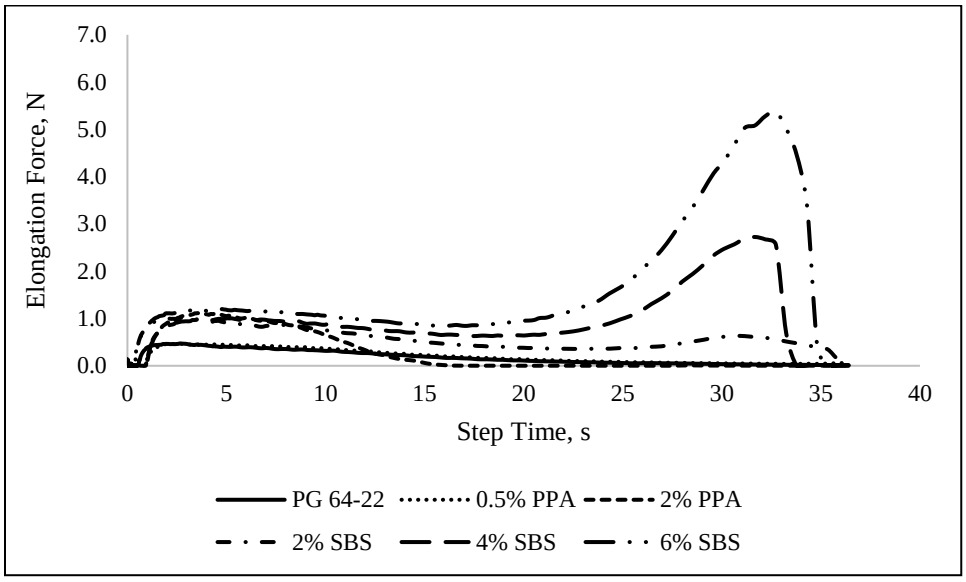


Figure 47. Elongation force vs. step time curve for different types of binder at 16ºC.

5.1.6. Mixing of SBS and PPA for Modification of Asphalt Binder

Figures 48 and 49 show the elongation force vs. step time curve for 2% SBS modified PG 64-22, 4% SBS modified PG 64-22, 6% SBS modified PG 64-22, 2% SBS and 2% PPA modified PG 64-22, 0.5% SBS and 2% PPA modified PG 64-22 at 12ºC and 16ºC, respectively. As mentioned earlier, F_2 is not found only by the addition of PPA with base binder. It is clear from the figures that only 0.5% SBS polymer addition with 2% PPA increases the F_2 value although the value is very low. However, the F_2 value from 2% SBS and 2% PPA modified PG 64-22 is greater than the F_2 value from the 6% SBS modified PG 64-22 as shown in figures.

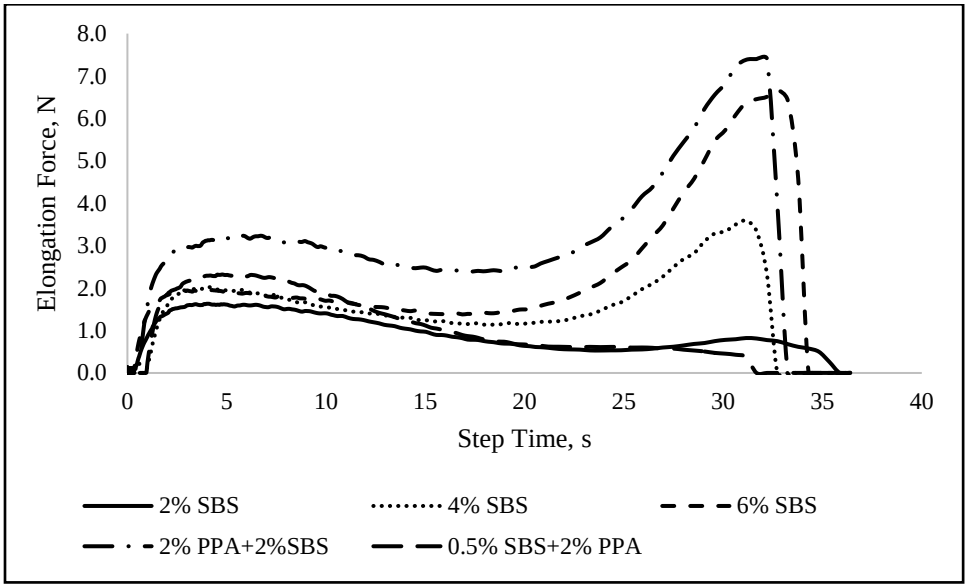


Figure 48. Elongation force vs. step time curve for PMAB at 12ºC.

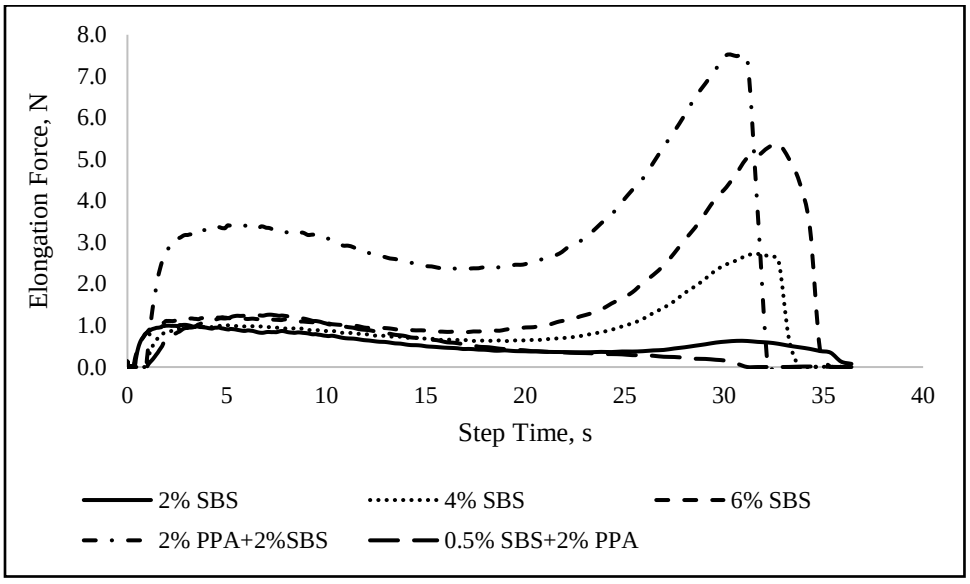


Figure 49. Elongation force vs. step time curve for PMAB at 16ºC.

5.1.7. Polymer Content Determination

In this study, it is observed that polymer content has a correlation with F_2 value as shown in Figures 50 through 53.

Polymer Modified Asphalt Emulsion (PMAE): PMAEs with four different percentages of polymer are tested to establish a correlation between the polymer percent in the PMAE and the investigated parameter, F_2. The four-different percent of polymer are 0%, 2.5%, 4%, and 5.5%. Figure 50 indicates the F_2 vs percent of polymer for four different polymer percentages at 4ºC. From Figure 50, it can be observed that with the increment of the polymer percentage, F_2 increases, that is due to the improvement in the PMAE because of the polymer additives. For 0%, F_2 is equal to 0.0 N, for 2.5% F_2 is equal to 2.43 N, for 4% F_2 is equal to 3.25 N, and for 5.5% F_2 is equal to 5.17 N. In which it is linearly increasing with R^2 value of 0.9934. From the figure it is also found that the equation of the straight line is equal to 0.8007x where slope is equal to 0.8007.

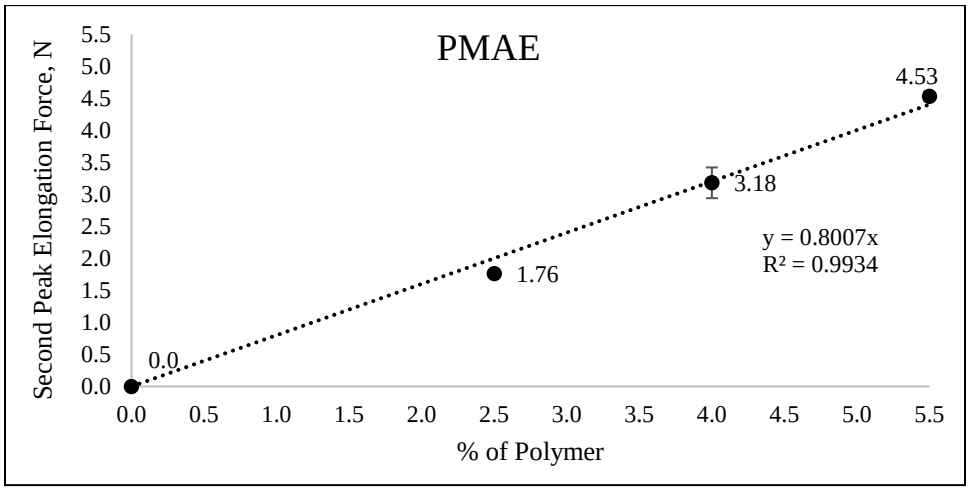


Figure 50. Second peak elongation force vs. percent of polymer in PMAE at 4ºC.

Polymer Modified Asphalt Binder (PMAB): Four different percentages (0%, 2%, 4% and 6%) of SBS modified PG 64 -22 were investigated at 4ºC to find out the correlation between F_2 and percent of polymer as shown in Figure 51. For unmodified PG 64-22 (0% SBS) no F_2 is found. For 2% SBS modified PG 64-22, F_2 is equal to 1.56 N. For 4% SBS modified PG 64-22, F_2 is equal to 5.56 N. And, for 6% SBS modified PG 64-22, F_2 is equal to 6.23 N. The R^2 value is equal to 0.9323 which indicates that F_2 has a linear correlation with the percent of polymer. The equation of the straight line is equal to 1.1204x which indicates F_2 is 1.1204 times of percent of polymer.

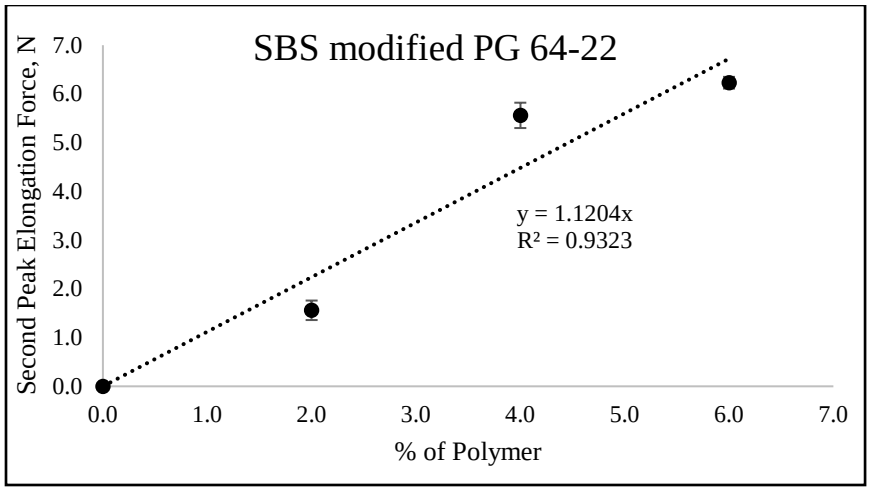


Figure 51. Second peak elongation force vs. percent of polymer in SBS modified PG 64-22 at 4ºC.

PAMB mixed with 2% PPA: To improve the binder performance, 2% PPA was mixed along with two different (0.5% and 2%) percent of SBS polymer. In order to find out the correlation between F_2 and different percent of SBS copolymer at 4ºC, a graph is plotted as shown in Figure 51. As mentiond earlier, when no polymer is added F_2 cannot found. When 0.5% SBS is added with 2% PPA modified PG 64-22, F_2 value is found out as equal to 1.46 N. In case of 2% SBS addition, F_2 value is equal to 8.62 N. The statistical corelation (R^2) is equal to 0.9893 which indicates F_2 has a corelation with percent of polymer as mentioned earlier. The slope of the straight line is equal to 4.2282 and equation of the straight line is equal to 4.2282x where x indicates SBS modificaton of PG 64-22 binder with 2% PPA.

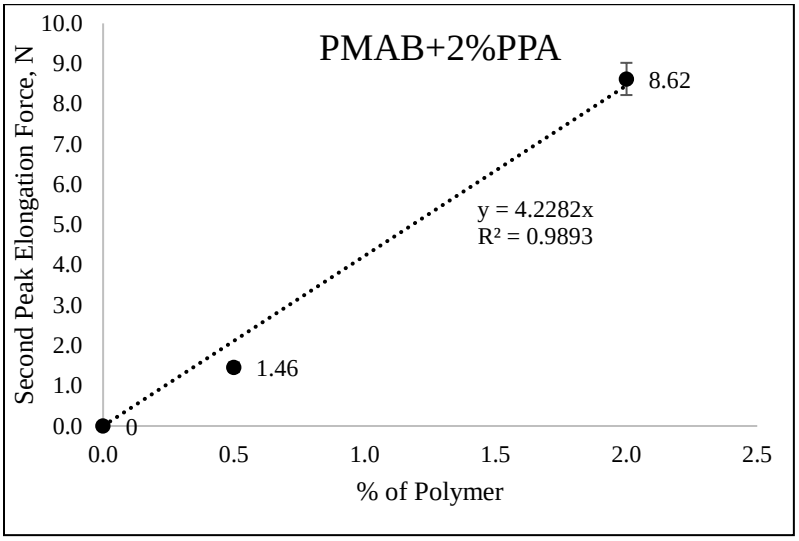


Figure 52. Second peak elongation force vs. percent of polymer in PMAB+2%PPA at 4ºC.

LATEX Modified Asphalt Binder: There is a linear correlation between F_2 vs. percent of polymer as shown in Figure 53. No F_2 is found from the unmodified PG 64-22 binder. When 2% LATEX is added, F_2 is found 2.47 N. F_2 increases to 3.81 N when 4% LATEX is added. F_2

further increases to 5.01 N when 6% LATEX is added. The coefficient of determination (R^2) value is found to be 0.9535. The slope of the straight line is equal to 0.8971.

From Figures 50 through 53, it can be concluded that, F_2 reflects the percent and the type of the polymer. From the figures it is clear that F_2 has strong correlation with the percent of polymer. It is observed the figures that when SBS is added with 2% PPA modified PG 64-22 binder the straight line becomes steeper than PMAE, SBS modified PG 64-22 and latex modified PG 64-22.

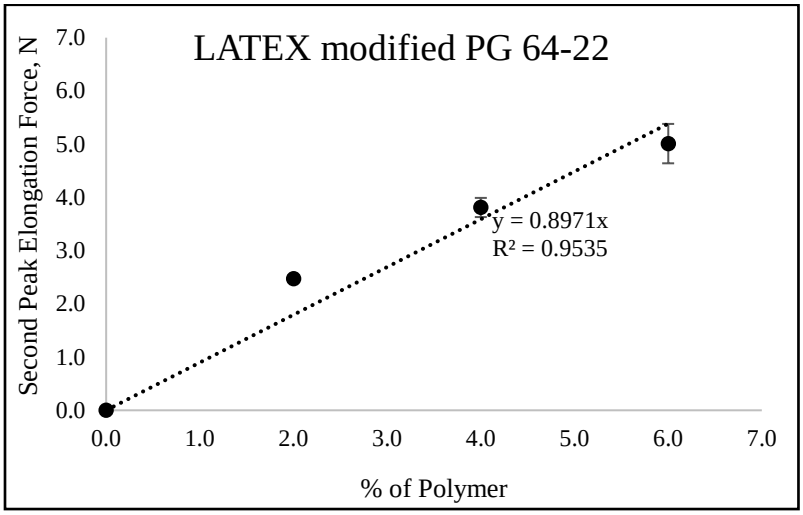


Figure 53. Second peak elongation force vs. percent of polymer in Latex modified PG 64-22 at 4ºC.

5.1.8. Effect of Modifier Type (SBS, latex and PPA)

Figure 54 indicates the relationship between F_2 of different types of modifier (SBS, latex and PPA) with different percent of polymer. It is observed that the addition of PPA does not show any F_2 value. F_2 is obtained with the addition of SBS and latex. The m value is equal to 1.7137, 1.1204, 0.8971, 0.8007 and 0 with R^2 value of 0.7394, 0.9323, 0.9535, 0.9934 and 0 for 2% PPA and SBS modified PG 64-22, SBS modified PG 64-22, polymer (latex) modified asphalt emulsion, latex modified PG 64-22 and PPA modified PG 64-22, respectively. It can be concluded that PPA and SBS modification of PG 64-22 binder has the best effect on F_2.

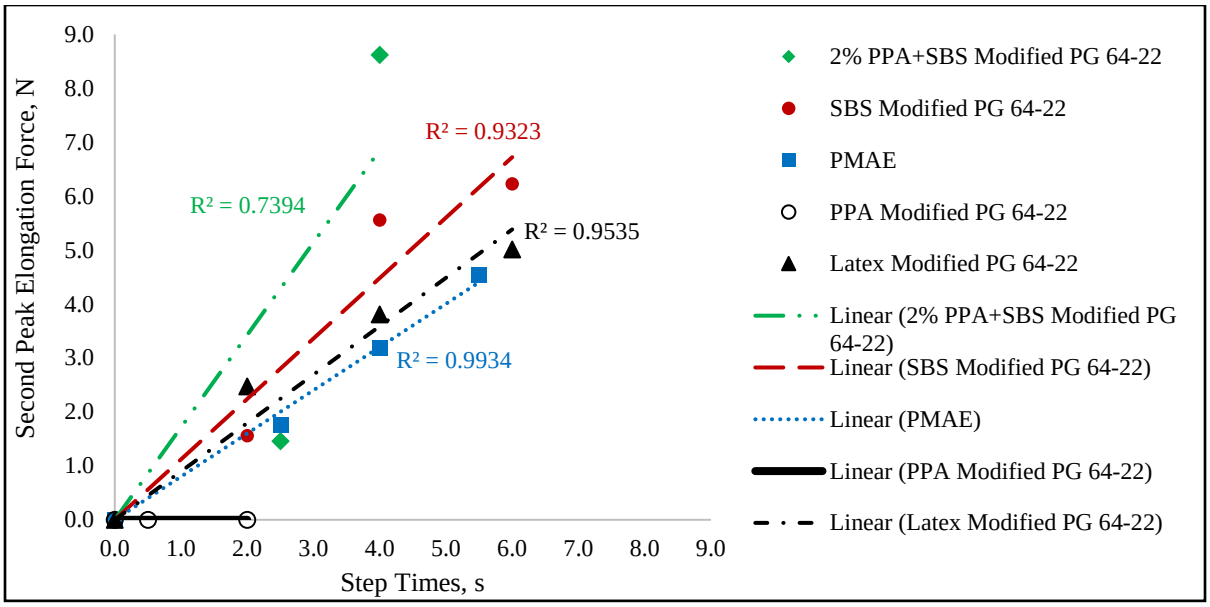


Figure 54. Second peak elongation force vs. percent of polymer at 4ºC for different types of polymer.

5.2. Ductility Analysis

Ruan et al. *(31)* investigated asphalt binder durability by considering the relationship between ductility and rheological properties. They utilized a simple Maxwell element and concluded that changes in ductility can be conceptually understood in the context of the changes in rheological properties. Ductility of asphalt binder is linearly related to angular strain. Higher angular strain indicates more ductile binder.

Total eighty-four test results were analyzed to find out the average final angular strain for original, RTFO aged and PAV aged sample of PG 64-22 binder, 2% SBS modified PG 64-22, 4% SBS modified PG 64-22 and 6% SBS modified PG 64-22. To evaluate the final angular strain, step time of 0.2 N elongation force was obtained from the elongation force vs. step time curve. Then the obtained step time was multiplied by elongation rate (0.1/sec) to calculate the final angular strain.

Figure 55 shows the average final angular strain for original sample of PG 64-22, 2% SBS modified PG 64-22, 4% SBS modified PG 64-22, 6% SBS modified PG 64-22 at 4ºC. The final angular strain values of the original PG 64-22 binder, 2% SBS modified asphalt binder, 4% SBS modified asphalt binder and 6% SBS modified asphalt binder are equal to 1.91, 2.80, 3.02 and 3.33 with standard deviations of 0.25, 0.15, 0.54 and 0.25, respectively. It is clear from Figure 55 that final angular strain increases by 31.79% after mixing of 2% SBS with PG 64-22 binder, 7.86% after mixing of 4% SBS with PG 64-22 binder and 10.26% after mixing of 6% SBS with PG 64-22 binder.

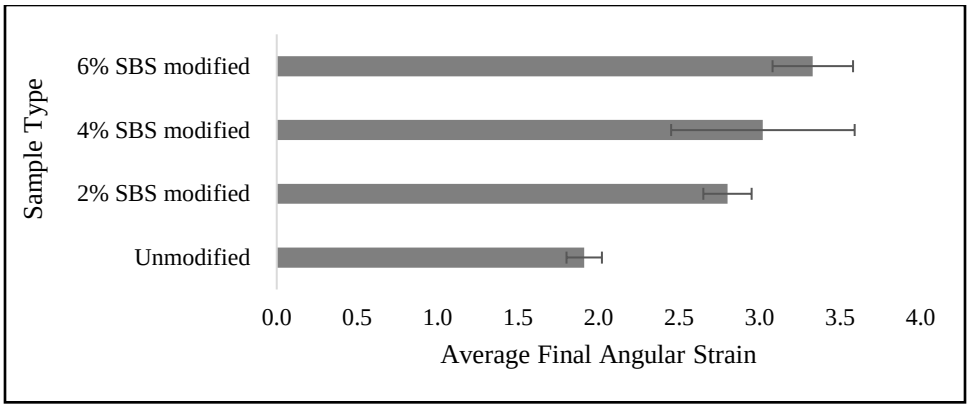


Figure 55. Average final angular strain for different sample types at 4ºC.

Figures 56 and 57 show the average final angular strain for original, RTFO aged and PAV aged sample of PG 64-22, 2% SBS modified PG 64-22, 4% SBS modified PG 64-22, 6% SBS modified PG 64-22 at 12ºC and 16ºC, respectively. The final angular strain values of the original PG 64-22 binder are equal to 1.44 and 1.29 with standard deviations of 0.29 and 0.17 at 12ºC and 16ºC, respectively. The final angular strain values of the original 2% SBS modified asphalt binder are equal to 3.25 and 3.37 with standard deviations of 0.49 and 0.19 at 12ºC and 16ºC, respectively. The final angular strain values of the original 4% SBS modified asphalt binder are equal to 3.27 and 3.36 with standard deviations of 0.04 and 0.05 at 12ºC and 16ºC, respectively. The angular strain values of the original 6% SBS modified asphalt binder are equal to 3.42 and 3.44 with standard deviations of 0.02 and 0.04 at 12ºC and 16ºC, respectively.

The final angular strain values of the RTFO aged PG 64-22 binder are equal to 2.33 and 1.97 with standard deviations of 0.293 and 0.60 at 12ºC and 16ºC, respectively. The final angular strain values of the original 2% SBS modified asphalt binder are equal to 3.01 and 2.50 with standard deviations of 0.60 and 0.36 at 12ºC and 16ºC, respectively. The final angular strain values of the original 4% SBS modified asphalt binder are equal to 2.89 and 2.78 with standard deviations of 0.21 and 0.07 at 12ºC and 16ºC, respectively. The angular strain values of the original 6% SBS modified asphalt binder are equal to 2.80 and 2.80 with standard deviations of 0.32 and 0.04 at 12ºC and 16ºC, respectively.

The final angular strain values of the PAV aged PG 64-22 binder are equal to 1.37 and 1.55 with standard deviations of 0.20 and 0.42 at 12ºC and 16ºC, respectively. The final angular strain values of the original 2% SBS modified asphalt binder are equal to 1.49 and 2.22 with standard deviations of 0.18 and 0.10 at 12ºC and 16ºC, respectively. The final angular strain values of the original 4% SBS modified asphalt binder are equal to 0.57 and 0.98 with standard deviations of 0.01 and 0.10 at 12ºC and 16ºC, respectively. The angular strain values of the original 6% SBS modified asphalt binder are equal to 1.79 and 1.43 with standard deviations of 0.35 and 0.39 at 12ºC and 16ºC, respectively.

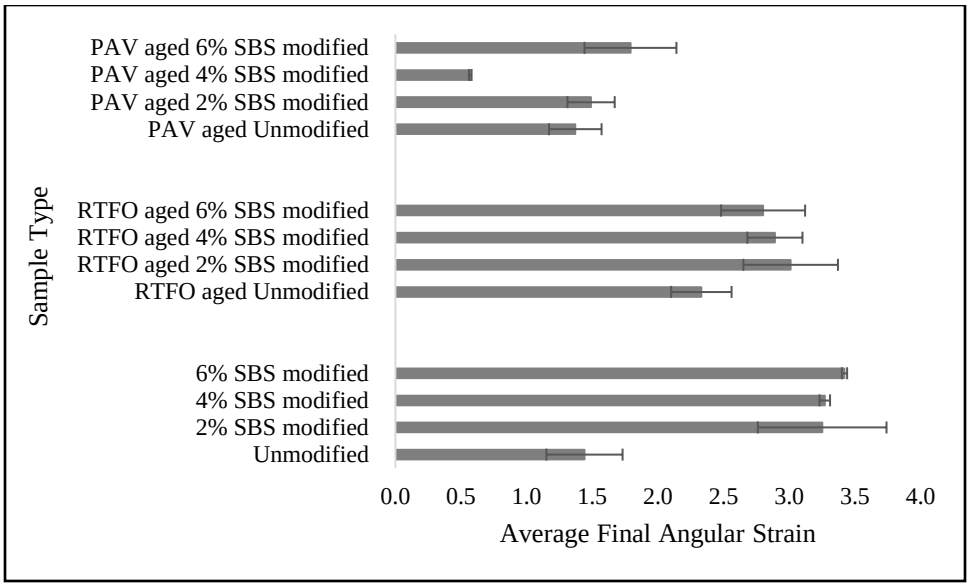


Figure 56. Average final angular strain for different sample types at 12℃.

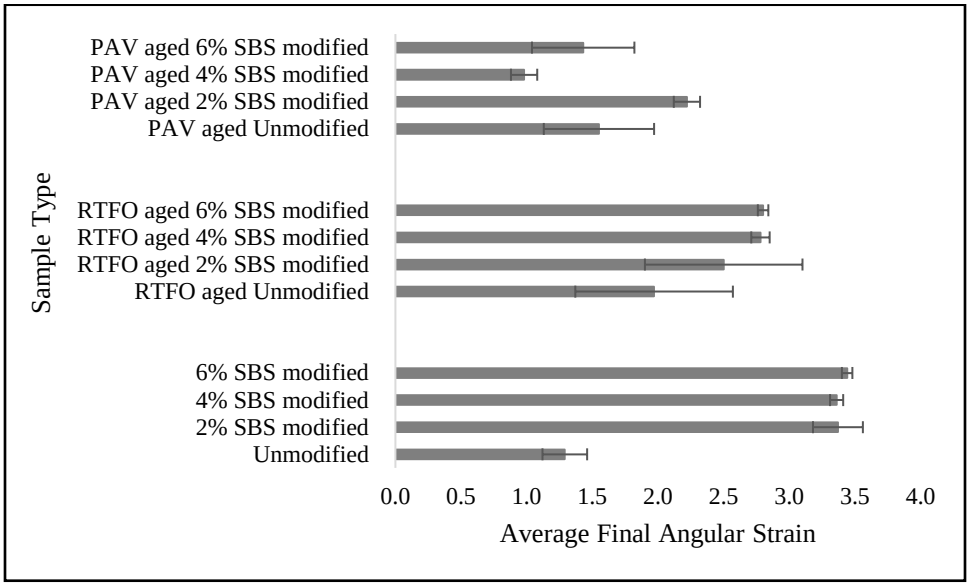


Figure 57. Average final angular strain for different sample types at 16℃.

It is clear from the Figures 55 to 57 that PG 64-22 binder has the lowest final angular strain and 6% SBS modified PG 64-22 binder has the highest final angular strain. Therefore, it can be concluded that PG 64-22 asphalt binder is the least ductile binder and 6% SBS modified PG 64-22 binder is the most ductile binder. It is observed from the three figures that the addition of SBS increases the final angular strain of unmodified PG 64-22 binder as well as improve the ductile property of unmodified PG 64-22 binder. It can be concluded from the figures that RTFO aging reduces final angular the strain and PAV aging further reduces the final angular strain. As well as ductility of RTFO aged sample is less than original sample and ductility of PAV aged sample is the least.

In case of RTFO and PAV aged sample of PG 64-22, 2% SBS modified PG 64-22, 4% SBS modified PG 64-22 and 6% SBS modified PG 64-22, the final angular strain is almost same at 12ºC and 16ºC, respectively. It is observed from the Figure 56 and 57 that the statistical relationship between these binders does not vary in significant amount.

6. CONCLUSIONS

The current Superpave PG tests were primarily developed for unmodified asphalt binders. Recently introduced MSCR tests are performed at high temperatures for high-temperature performance grading. Some states introduced PG Plus tests to identify and quantify the presence of polymer at intermediate and low temperatures. The objectives of this study were to develop an extensional deformation test method, to investigate degradation of polymers and to investigate the effect of modifier type. Relationships between different percentages of modifier and ductility of modified binder were also investigated in this study. SBS, PPA and Latex are mixed with PG 64-22 binder at the laboratory by using a mechanical mixer and a high shear mixer. The sample preparation procedure recommended by Mohammed and Wasiuddin *(24)* is used in this study after some modifications. However, the sample geometry used in this study are 1 mm × 0.72 mm and 3 mm × 0.72 mm instead of 9 mm × 0.72 mm used in the previous procedure. A total of one hundred and sixty-two (162) samples were tested by DSR-based SER in this study to determine the degradation of polymers due to aging, to find out the correlation between polymer content and SER test parameter, to investigate the ductility of modified binder and to determine the effect of different types and different percentages of polymer.

6.1. Findings on Elongation Force vs. Step Time Curve Characterization

Twenty-four and twenty-seven samples were analyzed to find the relation between elongation force and step time for PG 76-22 and PG 64-22 binder, respectively. The following conclusions can be drawn by analyzing the test results:

- First peak elongation force, F_1, is the binders' stiffness and Second peak elongation force, F_2, is the polymer characteristics.
- F_2 is only obtained from the PMAB. Neat asphalt binders do not have any F_2.
- F_1 increases after RTFO and PAV aging. In most cases, F_2 reduces after RTFO and PAV aging.
- F_2 is more visible comparatively at higher temperatures.

6.2. Findings on Polymer Degradation Due to Aging

A total of one hundred and eight samples were analyzed to determine the polymer degradation due to oxidative aging where twenty-four samples are of PG 76-22 binder and eighty-four samples are of 0%, 2% 4% and 6% SBS modified PG 64-22 binder. The following specific conclusions can be drawn:

- As F_2 is the polymer characteristics, a decrease in F_2 indicates degradation of polymer. It is observed that at all testing temperatures, F_2 decreases after RTFO aging in almost all the cases. This is an indication that polymer degrades due to aging. The Binder's stiffness increases with aging and decreases with temperature. But after PAV aging, mixed results are obtained. In some cases, the samples broke before reaching any second peak, F_2, resulting in F_2 value as zero. In some other cases, PMAB becomes so stiff and brittle due to PAV aging that even after increasing the testing temperature no F_2 value is found.
- To normalize the stiffness effect of F_2 on F_1, F_2/F_1 ratio was discussed in this study. F_2/F_1 is a very distinctive parameter of the original and aged PMAB, as the polymer is

degraded with aging, F_2/F_1 decreases. After RTFO aging, F_2/F_1 decreases by 18.4%, 8% and 25.2% in case of PG 76-22 binder at 0℃, 4℃ and 12℃, respectively. In the cases of, 2%, 4% and 6% SBS modified PG 64-22, F_2/F_1 decreases by 17.78%, 17.8% and 89.74%, respectively at 12℃ and 69.2%, 68.62% and 88.2%, respectively at 16℃. After PAV aging, F_2/F_1 decreases by 48.1% in case of PG 76-22 binder at 12℃. In the cases of, 2% and 6% SBS modified PG 64-22, F_2/F_1 decreases by 27.03% and 6.25% at 12℃ and decreases by 21.21% and 77.1% at 16℃. F_2/F_1 is recommended as a polymer degradation parameter due to aging. All the testing temperatures used in this study exhibited reduction in F_2/F_1 due to RTFO aging and further reduction due to PAV aging. Therefore, through this study it is recommended that this parameter can be used to determine aging susceptibility of polymers in polymer-modified asphalt binders.

6.3. Findings on Different Types of Modifiers

Twenty-two test results were analyzed to investigate the effect of different types (SBS and PPA) and different percentages of polymer on PG 64-22 binder. The following conclusions can be drawn from this study in this regard:

- As asphalt binder PG 64-22 does not have any polymer, the elongation force vs. step time curve did not have any second peak elongation force, F_2. After adding 0.5% PPA, PG 64-22 became stiffer, the F_1 value increased, but F_2 was still not found. The addition of 2% PPA also did not show any F_2 value, therefore, a general conclusion is that the addition of PPA increases the stiffness property of the base asphalt (F_1) but PPA did not exhibit any increase in F_2. F_2 was immediately found after adding 2% SBS with PG 64-22, and F_2 value increased with the increment of polymer percentage. Highest F_2 value was found from the highest percent of polymer.
- Only 0.5% SBS polymer addition with 2% PPA modified PG 64-22 increased the F_2 value although the value was very low. However, the F_2 value from 2% SBS and 2% PPA modified PG 64-22 was greater than the F_2 value from the 6% SBS modified PG 64-22.
- It can be concluded that combined PPA and SBS modification of PG 64-22 binder has the best effect on F_2.

6.4. Findings on Polymer Content Determination

To find the potential of SER fixture for detecting the percent of polymer content in the original and polymer-modified asphalt binders and emulsions, extensional deformation tests were performed for specimens with geometry of (3 mm × 0.72 mm) at 4℃. Second peak elongation force (F_2) was investigated in order to correlate it with the percent of the polymer in the PMAE, SBS modified PG 64-22, SBS and PPA modified PG 64-22 and Latex modified PG 64-22. A total of 39 samples were tested to determine the relation between F_2 and percent of polymer where 12 samples were PMAE, 12 samples were SBS modified PG 64-22, 6 samples were SBS and 2% PPA modified PG 64-22, and 9 samples were Latex modified PG 64-22. The following conclusions can be drawn:

- F_2 has a linear correlation with the percent of the polymer in the PMAE, SBS modified PG 64-22, SBS and PPA modified PG 64-22 and Latex modified PG 64-22 with R^2 values equal to 0.9934, 0.9323, 0.9893 and 0.9535, respectively. F_2 is

0.8007, 1.1204, 4.2282 and 0.8971 times of the percent of polymer for PMAE, SBS modified PG 64-22, SBS and PPA modified PG 64-22 and Latex modified PG 64-22, respectively.

6.5. Ductility Analysis

Thirty-six test results were analyzed to evaluate the ductility of PG 64-22, 2% SBS modified PG 64-22, 4% SBS modified PG 64-22 and 6% SBS modified PG 64-22 binder. The Final angular strain increased by 31.79% after mixing of 2% SBS with PG 64-22 binder, 7.86% after mixing of 4% SBS with PG 64-22 binder and 10.26% after mixing of 6% SBS with PG 64-22 binder. It can be concluded that PG 64-22 asphalt binder is the least ductile binder and 6% SBS modified PG 64-22 binder is the most ductile binder. It was observed that the addition of SBS increased the final angular strain of unmodified PG 64-22 binder as well as improved the ductile property of unmodified PG 64-22 binder. In general, RTFO aging reduced the ductility, and PAV aging further reduced the ductility of modified and unmodified binders.

7. RECOMMENDATIONS

7.1. Major Recommendations

Polymer degradation in binders due to aging is a serious problem and has not been fully addressed in PG specifications and MSCR specifications. Based on the results and findings of this research study, the following major recommendations are proposed:

1. The authors recently observed from literature that UV aging almost completely degrades SBS polymer. The authors would like to perform extensional deformation test on UV aged samples.
2. Although three different modifiers (SBS, PPA and latex) were used, the variations in performance within the same modifier type (linear and radial SBS, highly branched and less branched polyethylene (PE) should be studied).
3. A standard method of test is being prepared and specifications are being developed in the ongoing implementation phase.
4. An asphalt binder cracking resistance test needs to be developed using the SER.
5. The extensional deformation test performance needs to be verified and correlated with GPC, SARA and XRD test as some researchers reported polymer degradation using these other tools.
6. The extensional deformation test performance needs to be verified with mixture test such as cracking resistance using I-FIT and LSU semi-circular bending tests.

7.2. Minor Recommendations

1. More neat binders need to be used for verification such as PG 58-22.
2. Sample preparation method, specifically cutting of sample to the specific test sample size, needs to be improved with a customized dual blade cutter.

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APPENDIX A

Table A1. Test mean comparison for second peak elongation force, F_2 of original PG 76-22 and RTFO aged PG 76-22 at 4°C.

Hypothesis	Given data		Test statistics: $t_o = \frac{x_1' - x_2' - \Delta}{\sqrt{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})}}$ = 0.998	Degree of freedom: $\vartheta = \frac{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})^2}{\frac{(\frac{s_1^2}{n_1})^2}{n_1 - 1} + \frac{(\frac{s_2^2}{n_2})^2}{n_2 - 1}}$ $= \frac{0.074}{0.0334}$ $= 2.22$ $\cong 2$	$t_{\frac{\sigma}{2},\vartheta} = t_{0.025,2}$ = 4.303 (from standard T-table)	Reject criteria: $\lvert t_o \rvert > t_{\frac{\sigma}{2},\vartheta}$ $0.998 < 4.303$
H_o: $\mu_1 = \mu_2$; $\Delta = 0$	n_1	3				
	n_2	3				
H_1: $\mu_1 \neq \mu_2$	x_1'	2.4				
	x_2'	1.88				
	s_1	0.88				
	s_2	0.20				

Comment: Null hypothesis cannot be rejected. It is concluded that mean from the two conditions is not different at 95% confidence level.

Table A2. Test mean comparison for second peak elongation force, F_2 of original PG 76-22 and PAV aged PG 76-22 at 4°C.

Hypothesis	Given data		Test statistics: $t_o = \frac{x_1' - x_2' - \Delta}{\sqrt{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})}}$ = 4.724	Degree of freedom: $\vartheta = \frac{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})^2}{\frac{(\frac{s_1^2}{n_1})^2}{n_1 - 1} + \frac{(\frac{s_2^2}{n_2})^2}{n_2 - 1}}$ $= \frac{0.067}{0.033}$ $= 2.01$ $\cong 2$	$t_{\frac{\sigma}{2},\vartheta} = t_{0.025,2}$ = 4.303 (from standard T-table)	Reject criteria: $\lvert t_o \rvert > t_{\frac{\sigma}{2},\vartheta}$ $4.724 > 4.303$
H_o: $\mu_1 = \mu_2$;	n_1	3				
$\Delta = 0$	n_2	3				
H_1: $\mu_1 \neq \mu_2$	x_1'	2.4				
	x_2'	0				
	s_1	0.88				
	s_2	0				

Comment: Null hypothesis can be rejected. It is concluded that mean from the two conditions is different at 95% confidence level.

Table A3. Test mean comparison for second peak elongation force, F_2 of original 2% SBS modified PG 64-22 and RTFO aged 2% SBS modified PG 64-22 at 12°C.

Hypothesis	Given	data	Test statistics: $t_o = \frac{x_1' - x_2' - \Delta}{\sqrt{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})}}$ = -2.414	Degree of freedom: $\vartheta = \frac{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})^2}{\frac{(\frac{s_1^2}{n_1})^2}{n_1 - 1} + \frac{(\frac{s_2^2}{n_2})^2}{n_2 - 1}}$ $= \frac{2.083e-4}{5.7921e-5}$ $= 3.60$ $\cong 4$	4 $t_{\frac{\sigma}{2},\vartheta} = t_{0.025,4}$ = 2.776 (from standard T-table)	Reject criteria: $\lvert t_o \rvert > t_{\frac{\sigma}{2},\vartheta}$ $2.414 < 2.776$
H_o: $\mu_1 = \mu_2$; $\Delta = 0$	n_1	3				
	n_2	3				
H_1: $\mu_1 \neq \mu_2$	x_1'	0.8				
	x_2'	1.09				
	s_1	0.12				
	s_2	0.17				

Comment: Null hypothesis cannot be rejected. It is concluded that mean from the two conditions is not different at 95% confidence level.

Table A4. Test mean comparison for second peak elongation force, F_2 of original 2% SBS modified PG 64-22 and PAV aged 2% SBS modified PG 64-22 at 12℃.

Hypothesis	Given data		Test statistics: $t_o = \frac{x_1' - x_2' - \Delta}{\sqrt{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})}}$ 0.74, 0.176 = -4.21	Degree of freedom: $\vartheta = \frac{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})^2}{\frac{(\frac{s_1^2}{n_1})^2}{n_1 - 1} + \frac{(\frac{s_2^2}{n_2})^2}{n_2 - 1}} = \frac{9.60e-4}{3.53e-4} = 2.72 \cong 3$	$t_{\frac{\sigma}{2},\vartheta} = t_{0.025,3}$ = 3.182 (from standard T-table)	Reject criteria: $\lvert t_o \rvert > t_{\frac{\sigma}{2},\vartheta}$ 4.21 > 3.182
H_o: $\mu_1 = \mu_2$; $\Delta = 0$ H_1: $\mu_1 \neq \mu_2$	n_1	3				
	n_2	3				
	x_1'	0.8				
	x_2'	1.54				
	s_1	0.12				
	s_2	0.28				

Comment: Null hypothesis can be rejected. It is concluded that mean from the two conditions is different at 95% confidence level.

Table A5. Test mean comparison for second peak elongation force, F_2 of original 4% SBS modified PG 64-22 and RTFO aged 4% SBS modified PG 64-22 at 12℃.

Hypothesis	Given data		Test statistics: $t_o = \frac{x_1' - x_2' - \Delta}{\sqrt{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})}}$ = 0.964	Degree of freedom: $\vartheta = \frac{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})^2}{\frac{(\frac{s_1^2}{n_1})^2}{n_1 - 1} + \frac{(\frac{s_2^2}{n_2})^2}{n_2 - 1}} = \frac{0.03}{0.01321} = 2.272 \cong 2$	$t_{\frac{\sigma}{2},\vartheta} = t_{0.025,2}$ = 4.303 (from standard T-table)	Reject criteria: $\lvert t_o \rvert > t_{\frac{\sigma}{2},\vartheta}$ 0.964 < 4.303
H_o: $\mu_1 = \mu_2$; $\Delta = 0$ H_1: $\mu_1 \neq \mu_2$	n_1	3				
	n_2	3				
	x_1'	3.50				
	x_2'	3.10				
	s_1	0.45				
	s_2	0.56				

Comment: Null hypothesis cannot be rejected. It is concluded that mean from the two conditions is not different at 95% confidence level.

Table A6. Test mean comparison for second peak elongation force, F_2 of original 4% SBS modified PG 64-22 and PAV aged 4% SBS modified PG 64-22 at 12℃.

Hypothesis	Given data		Test statistics: $t_o = \frac{x_1' - x_2' - \Delta}{\sqrt{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})}}$ = 13.47	Degree of freedom: $\vartheta = \frac{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})^2}{\frac{(\frac{s_1^2}{n_1})^2}{n_1 - 1} + \frac{(\frac{s_2^2}{n_2})^2}{n_2 - 1}} = \frac{4.56e-3}{2.28e-3} = 2.002 \cong 2$	$t_{\frac{\sigma}{2},\vartheta} = t_{0.025,2}$ = 4.303 (from standard T-table)	Reject criteria: $\lvert t_o \rvert > t_{\frac{\sigma}{2},\vartheta}$ 13.47 > 4.303
H_o: $\mu_1 = \mu_2$; $\Delta = 0$ H_1: $\mu_1 \neq \mu_2$	n_1	3				
	n_2	3				
	x_1'	3.50				
	x_2'	0				
	s_1	0.45				
	s_2	0				

Comment: Null hypothesis can be rejected. It is concluded that mean from the two conditions is different at 95% confidence level.

Table A7. Test mean comparison for second peak elongation force, F_2 of original 4% SBS modified PG 64-22 and RTFO aged 6% SBS modified PG 64-22 at 12℃.

Hypothesis	Given data		Test statistics: $t_o = \frac{x_1' - x_2' - \Delta}{\sqrt{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})}}$ 4.71, 0.2844 = 16.563	Degree of freedom: $\vartheta = \frac{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})^2}{\frac{(\frac{s_1^2}{n_1})^2}{n_1 - 1} + \frac{(\frac{s_2^2}{n_2})^2}{n_2 - 1}} = \frac{6.542e-3}{3.203e-3} = 2.042 \cong 2$	$t_{\frac{\sigma}{2},\vartheta} = t_{0.025,2}$ = 4.303 (from standard T-table)	Reject criteria: $\lvert t_o \rvert > t_{\frac{\sigma}{2},\vartheta}$ 16.563 > 4.303
H_o: $\mu_1 = \mu_2$; $\Delta = 0$ H_1: $\mu_1 \neq \mu_2$	n_1	3				
	n_2	3				
	x_1'	6.12				
	x_2'	1.41				
	s_1	0.49				
	s_2	0.05				

Comment: Null hypothesis can be rejected. It is concluded that mean from the two conditions is different at 95% confidence level.

Table A8. Test mean comparison for second peak elongation force, F_2 of original 4% SBS modified PG 64-22 and PAV aged 6% SBS modified PG 64-22 at 12℃.

Hypothesis	Given data		Test statistics: $t_o = \frac{x_1' - x_2' - \Delta}{\sqrt{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})}}$ 4.79, 0.49 = 9.843	Degree of freedom: $\vartheta = \frac{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})^2}{\frac{(\frac{s_1^2}{n_1})^2}{n_1 - 1} + \frac{(\frac{s_2^2}{n_2})^2}{n_2 - 1}} = \frac{0.0341}{8.67e-3} = 3.93 \cong 4$	$t_{\frac{\sigma}{2},\vartheta} = t_{0.025,4}$ = 2.776 (from standard T-table)	Reject criteria: $\lvert t_o \rvert > t_{\frac{\sigma}{2},\vartheta}$ 9.843 > 2.776
H_o: $\mu_1 = \mu_2$; $\Delta = 0$ H_1: $\mu_1 \neq \mu_2$	n_1	3				
	n_2	3				
	x_1'	6.12				
	x_2'	1.33				
	s_1	0.49				
	s_2	0.56				

Comment: Null hypothesis can be rejected. It is concluded that mean from the two conditions is different at 95% confidence level.

Table A9. Test mean comparison for second peak elongation force over first peak elongation force, F_2/F_1 of original PG 76-22 and RTFO aged PG 76-22 at 4℃.

Hypothesis	Given data		Test statistics: $t_o = \frac{x_1' - x_2' - \Delta}{\sqrt{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})}}$ = 4.38	Degree of freedom: $\vartheta = \frac{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})^2}{\frac{(\frac{s_1^2}{n_1})^2}{n_1 - 1} + \frac{(\frac{s_2^2}{n_2})^2}{n_2 - 1}} = \frac{1.122e-7}{4.56e-8} = 2.46 \cong 2$	$t_{\frac{\sigma}{2},\vartheta} = t_{0.025,2}$ = 4.303 (from standard T-table)	Reject criteria: $\lvert t_o \rvert > t_{\frac{\sigma}{2},\vartheta}$ 4.38 > 4.303
H_o: $\mu_1 = \mu_2$; $\Delta = 0$ H_1: $\mu_1 \neq \mu_2$	n_1	3				
	n_2	3				
	x_1'	1.01				
	x_2'	0.93				
	s_1	0.03				
	s_2	0.01				

Comment: Null hypothesis can be rejected. It is concluded that mean from the two conditions is different at 95% confidence level.

Table A10. Test mean comparison for second peak elongation force over first peak elongation force, F_2/F_1 of original PG 76-22 and PAV aged PG 76-22 at 4℃.

Hypothesis	Given data		Test statistics: $t_o = \frac{x_1' - x_2' - \Delta}{\sqrt{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})}}$ 1.01, 0.0173 = 58.31	Degree of freedom: $\vartheta = \frac{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})^2}{\frac{(\frac{s_1^2}{n_1})^2}{n_1 - 1} + \frac{(\frac{s_2^2}{n_2})^2}{n_2 - 1}} = \frac{9e-8}{4.5e-8} = 2$	$t_{\frac{\sigma}{2},\vartheta} = t_{0.025,2}$ = 4.303 (from standard T-table)	Reject criteria: $\lvert t_o \rvert > t_{\frac{\sigma}{2},\vartheta}$ 58.31 > 4.303
H_o: $\mu_1 = \mu_2$; $\Delta = 0$ H_1: $\mu_1 \neq \mu_2$	n_1	3				
	n_2	3				
	x_1'	1.01				
	x_2'	0				
	s_1	0.03				
	s_2	0				

Comment: Null hypothesis can be rejected. It is concluded that mean from the two conditions is different at 95% confidence level.

Table A11. Test mean comparison for second peak elongation force over first peak elongation force, F2/F1 of original 2% SBS modified PG 64-22 and RTFO aged 2% SBS modified PG 64-22 at 12℃.

Hypothesis	Given data		Test statistics: $t_o = \frac{x_1' - x_2' - \Delta}{\sqrt{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})}}$ 0.09, 0.048 = 1.89	Degree of freedom: $\vartheta = \frac{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})^2}{\frac{(\frac{s_1^2}{n_1})^2}{n_1 - 1} + \frac{(\frac{s_2^2}{n_2})^2}{n_2 - 1}} = \frac{5.31e-6}{2.284e-6} = 2.324 \cong 2$	$t_{\frac{\sigma}{2},\vartheta} = t_{0.025,4}$ = 4.303 (from standard T-table)	Reject criteria: $\lvert t_o \rvert > t_{\frac{\sigma}{2},\vartheta}$ 1.89 < 4.303
H_o: $\mu_1 = \mu_2$; $\Delta = 0$ H_1: $\mu_1 \neq \mu_2$	n_1	3				
	n_2	3				
	x_1'	0.45				
	x_2'	0.36				
	s_1	0.08				
	s_2	0.02				

Comment: Null hypothesis cannot be rejected. It is concluded that mean from the two conditions is not different at 95% confidence level.

Table A12. Test mean comparison for second peak elongation force over first peak elongation force, F_2/F_1 of original 2% SBS modified PG 64-22 and PAV aged 2% SBS modified PG 64-22 at 12°C.

Hypothesis	Given data		Test statistics: $t_o = \frac{x_1' - x_2' - \Delta}{\sqrt{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})}}$ 0.18, 0.054 = 3.305	Degree of freedom: $\vartheta = \frac{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})^2}{\frac{(\frac{s_1^2}{n_1})^2}{n_1 - 1} + \frac{(\frac{s_2^2}{n_2})^2}{n_2 - 1}} = \frac{8.801e-6}{2.623e-6} = 3.36 \cong 3$	$t_{\frac{\sigma}{2},\vartheta} = t_{0.025,3}$ = 3.182 (from standard T-table)	Reject criteria: $\lvert t_o \rvert > t_{\frac{\sigma}{2},\vartheta}$ 3.305 > 3.182
H_o: $\mu_1 = \mu_2$;	n_1	3				
$\Delta = 0$	n_2	3				
H_1: $\mu_1 \neq \mu_2$	x_1'	0.45				
	x_2'	0.27				
	s_1	0.08				
	s_2	0.05				

Comment: Null hypothesis can be rejected. It is concluded that mean from the two conditions is different at 95% confidence level.

Table A13. Test mean comparison for second peak elongation force over first peak elongation force, F_2/F_1 of original 4% SBS modified PG 64-22 and RTFO aged 4% SBS modified PG 64-22 at 12°C.

Hypothesis	Given data		Test statistics: $t_o = \frac{x_1' - x_2' - \Delta}{\sqrt{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})}}$ 0.35, 0.194 = 1.804	Degree of freedom: $\vartheta = \frac{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})^2}{\frac{(\frac{s_1^2}{n_1})^2}{n_1 - 1} + \frac{(\frac{s_2^2}{n_2})^2}{n_2 - 1}} = \frac{1.416e-3}{3.841e-4} = 3.69 \cong 4$	$t_{\frac{\sigma}{2},\vartheta} = t_{0.025,2}$ = 2.776 (from standard T-table)	Reject criteria: $\lvert t_o \rvert > t_{\frac{\sigma}{2},\vartheta}$ 1.804 < 2.776
H_o: $\mu_1 = \mu_2$;	n_1	3				
$\Delta = 0$	n_2	3				
H_1: $\mu_1 \neq \mu_2$	x_1'	1.91				
	x_2'	1.56				
	s_1	0.20				
	s_2	0.27				

Comment: Null hypothesis cannot be rejected. It is concluded that mean from the two conditions is not different at 95% confidence level.

Table A14. Test mean comparison for second peak elongation force over first peak elongation force, F_2/F_1 of original 4% SBS modified PG 64-22 and PAV aged 4% SBS modified PG 64-22 at 12°C.

Hypothesis	Given data		Test statistics: $t_o = \frac{x_1' - x_2' - \Delta}{\sqrt{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})}}$ 1.91, 0.115 = 16.54	Degree of freedom: $\vartheta = \frac{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})^2}{\frac{(\frac{s_1^2}{n_1})^2}{n_1 - 1} + \frac{(\frac{s_2^2}{n_2})^2}{n_2 - 1}} = \frac{1.78e-4}{8.89e-5} = 2.003 \cong 2$	$t_{\frac{\sigma}{2},\vartheta} = t_{0.025,2}$ = 4.303 (from standard T-table)	Reject criteria: $\lvert t_o \rvert > t_{\frac{\sigma}{2},\vartheta}$ 16.54 > 4.303
H_o: $\mu_1 = \mu_2$;	n_1	3				
$\Delta = 0$	n_2	3				
H_1: $\mu_1 \neq \mu_2$	x_1'	1.91				
	x_2'	0				
	s_1	0.20				
	s_2	0				

Comment: Null hypothesis can be rejected. It is concluded that mean from the two conditions is different at 95% confidence level.

Table A15. Test mean comparison for second peak elongation force over first peak elongation force, F_2/F_1 of original 6% SBS modified PG 64-22 and RTFO aged 6% SBS modified PG 64-22 at 12°C.

Hypothesis	Given data		Test statistics: $t_o = \frac{x_1' - x_2' - \Delta}{\sqrt{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})}}$ 2.80, 0.237 = 11.815	Degree of freedom: $\vartheta = \frac{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})^2}{\frac{(\frac{s_1^2}{n_1})^2}{n_1 - 1} + \frac{(\frac{s_2^2}{n_2})^2}{n_2 - 1}} = \frac{3.155e-3}{1.57e-3} = 2.01 \cong 2$	$t_{\frac{\sigma}{2},\vartheta} = t_{0.025,2}$ = 4.303 (from standard T-table)	Reject criteria: $\lvert t_o \rvert > t_{\frac{\sigma}{2},\vartheta}$ 11.815 > 4.303
H_o: $\mu_1 = \mu_2$;	n_1	3				
$\Delta = 0$	n_2	3				
H_1: $\mu_1 \neq \mu_2$	x_1'	3.12				
	x_2'	0.32				
	s_1	0.41				
	s_2	0.02				

Comment: Null hypothesis can be rejected. It is concluded that mean from the two conditions is different at 95% confidence level.

Table A16. Test mean comparison for second peak elongation force over first peak elongation force, F_2/F_1 of original 6% SBS modified PG 64-22 and PAV aged 6% SBS modified PG 64-22 at 12°C.

Hypothesis	Given data		Test statistics: $t_o = \frac{x_1' - x_2' - \Delta}{\sqrt{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})}}$ 2.82, 0.245 = 11.51	Degree of freedom: $\vartheta = \frac{(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2})^2}{\frac{(\frac{s_1^2}{n_1})^2}{n_1 - 1} + \frac{(\frac{s_2^2}{n_2})^2}{n_2 - 1}} = \frac{3.61e-3}{1.578e-3} = 2.29 \cong 2$	$t_{\frac{\sigma}{2},\vartheta} = t_{0.025,2}$ = 4.303 (from standard T-table)	Reject criteria: $\lvert t_o \rvert > t_{\frac{\sigma}{2},\vartheta}$ 11.51 > 4.303
H_o: $\mu_1 = \mu_2$;	n_1	3				
$\Delta = 0$	n_2	3				
H_1: $\mu_1 \neq \mu_2$	x_1'	3.12				
	x_2'	0.30				
	s_1	0.41				
	s_2	0.11				

Comment: Null hypothesis can be rejected. It is concluded that mean from the two conditions is different at 95% confidence level.

APPENDIX B

Table B1. PG 64-22 (3 samples at 4°C, 3 samples at 12°C and 3 samples at 16°C).

Step time, s	Elongation Force, N								
0	0	0	0	0	0	0	0	0	0
0.000544	0.016614	0.013756	0.015792	0.01215	0.014885	0.015469	0.015028	0.014704	0.011409
0.001568	0.105267	0.102536	0.104118	0.100364	0.104332	0.10615	0.103183	0.103965	0.100395
0.002592	0.12897	0.129647	0.127118	0.1313	0.128959	0.133035	0.127553	0.130896	0.132325
0.003616	0.084858	0.084565	0.082515	0.087182	0.084199	0.089387	0.082001	0.086709	0.085267
0.00464	0.037902	0.03638	0.036036	0.038448	0.039798	0.043706	0.033118	0.039141	0.036253
0.005664	0.011643	0.012356	0.01151	0.010098	0.020128	0.022739	0.007243	0.011328	0.012646
0.006688	0.00361	0.005872	0.003768	-0.0003	0.020563	0.021844	0.000474	7.25E-05	0.007132
0.007712	0.003783	0.00482	0.00356	-0.00026	0.02968	0.029013	0.002101	-0.0019	0.00822
0.008736	0.004529	0.003325	0.005573	0.002342	0.037637	0.035162	0.005336	-0.00045	0.008845
0.00976	0.002631	0.001847	0.006456	0.003389	0.040852	0.038383	0.006838	0.000985	0.008354
0.010784	0.001949	0.002483	0.005138	0.003175	0.041459	0.03935	0.005641	0.002373	0.006453
0.011808	0.002856	0.003722	0.003047	0.003923	0.039887	0.038145	0.002873	0.00405	0.002802
0.012832	0.003492	0.003036	0.002319	0.003774	0.037035	0.036696	-1.7E-05	0.004241	-0.00151
0.013856	0.00279	0.001134	0.002342	0.001966	0.034454	0.036542	-0.00209	0.00321	-0.00423
0.01488	0.002135	0.000297	0.001433	-0.00026	0.032939	0.036788	-0.00217	0.002623	-0.00347
0.015904	0.001679	0.000252	0.000264	-0.00093	0.030641	0.035502	0.000518	0.003552	-0.0009
0.016928	0.000969	0.00139	0.000215	0.000727	0.028301	0.033296	0.003132	0.004436	0.00053
0.017952	0.000222	0.003109	-0.00013	0.002892	0.027607	0.031449	0.004708	0.004532	-0.00052
0.018976	-0.00019	0.00401	-0.0007	0.004465	0.028201	0.030724	0.004608	0.00276	-0.00316
0.02	0.000208	0.002412	-0.00135	0.004099	0.02881	0.031785	0.003614	0.000836	-0.00428
0.021024	0.000631	0.000285	-0.00096	0.0016	0.029185	0.033336	0.001901	-0.00041	-0.00333
0.022048	0.001781	-0.00143	0.000107	-0.00087	0.028474	0.035446	0.000563	-0.00118	-0.00172
0.023072	0.00203	-0.00191	0.000881	-0.00155	0.026092	0.036984	-0.00066	-0.00145	-0.00014
0.024096	-5.7E-05	-0.00046	5.41E-05	-0.00054	0.024623	0.038044	-0.00338	-0.00127	0.002208
0.02512	-0.00217	0.001874	-0.00059	-0.00041	0.026066	0.039105	-0.0053	-0.00036	0.004209
0.026144	-0.00145	0.003376	-0.00061	-0.00116	0.028943	0.039814	-0.00455	-0.0008	0.005021
0.027168	0.001166	0.003255	6.67E-05	-0.00209	0.031899	0.039648	-0.00158	-0.00262	0.00541
0.028192	0.002249	0.001222	0.001487	-0.00192	0.034814	0.039128	0.002093	-0.00405	0.006015
0.029216	0.001311	-0.00036	0.002791	-0.0004	0.036922	0.037333	0.004457	-0.00328	0.005556
0.03024	-0.0003	-0.0012	0.005098	0.001388	0.034908	0.034418	0.004172	-0.00127	0.00494
0.031264	-0.00031	-0.00191	0.004803	0.001534	0.031592	0.031725	0.001864	0.000813	0.003219
0.032288	0.000506	-0.00233	0.001769	0.001388	0.029494	0.029943	-0.00052	0.002347	0.000535
0.033312	0.000794	-0.00094	-0.00065	0.000511	0.029444	0.029975	-0.00177	0.003268	-0.00228
0.034336	0.000658	-3.4E-05	-0.00089	-0.00082	0.030037	0.031864	-0.00236	0.003069	-0.00412
0.03536	0.001806	-0.00072	-0.00029	-0.00105	0.03057	0.033906	-0.00187	0.002378	-0.00493
0.036384	0.002264	-0.0005	0.000239	0.001005	0.02998	0.033586	0.000469	0.002259	-0.00419
0.037408	0.000961	0.000942	0.000203	0.002127	0.028755	0.031485	0.002474	0.002346	-0.00278
0.038432	-0.00101	0.002101	-0.00027	0.00196	0.027505	0.030758	0.003664	0.003199	-0.00181

Step time, s	Elongation Force, N								
0.039456	-0.00168	0.002635	-0.00133	0.002995	0.027494	0.031121	0.003409	0.002734	-0.00272
0.04048	0.000149	0.002052	-0.00211	0.00342	0.027247	0.032378	0.002721	0.002003	-0.00383
0.042016	0.003243	0.000203	-0.00138	0.000317	0.026939	0.036349	0.000611	-0.00027	-0.00273
0.044064	0.001111	-0.00167	0.000469	-0.00139	0.026454	0.039638	-0.00173	-0.00183	0.001257
0.046112	-0.00127	0.00242	-5.1E-05	-2.7E-05	0.02773	0.039418	-0.0044	-0.00177	0.003893
0.04816	0.00049	0.002978	0.001073	-0.00146	0.032619	0.040078	-0.00085	-0.00324	0.006137
0.050208	-0.00028	-0.0018	0.003329	-0.00077	0.034762	0.037939	0.003931	-0.00148	0.005823
0.052256	0.000398	-0.0003	0.001698	0.001235	0.031649	0.032537	0.001594	0.002199	0.000733
0.054304	0.001697	-0.0003	0.000711	0.00113	0.030056	0.033083	-0.00267	0.00149	-0.00582
0.056352	0.001265	-0.00194	0.000791	-0.0003	0.028661	0.03505	-0.00066	0.002902	-0.00225
0.0584	0.000794	0.001475	-0.00169	0.001348	0.026091	0.033321	0.002988	0.004177	-0.00087
0.060448	3.24E-06	0.00241	-0.00231	0.003526	0.02654	0.033628	0.003403	0.001096	-0.00375
0.062496	0.002568	-0.00067	-0.00028	0.000128	0.027651	0.037001	0.001394	-0.00189	-0.00278
0.064544	-0.00023	-0.00106	0.000981	-0.00049	0.024951	0.040103	-0.00307	-0.00147	0.001723
0.066592	-0.00169	0.001965	-0.0008	-0.00186	0.026343	0.04214	-0.0045	-0.00047	0.005535
0.06864	0.001079	0.003256	0.001167	-0.0015	0.033037	0.041189	0.00069	-0.00318	0.004356
0.070688	0.000254	0.000614	0.004168	0.000749	0.034862	0.037373	0.003756	-0.00228	0.004346
0.072736	0.000302	-0.00188	0.001806	0.000494	0.031586	0.031242	-0.00039	0.002518	0.00035
0.074784	0.000866	-0.00098	-0.00058	0.000351	0.028851	0.032658	-0.00328	0.003034	-0.00315
0.076832	0.002262	-0.00248	-0.00062	-0.00148	0.028277	0.034552	-0.0001	0.002212	-0.00358
0.07888	0.000566	0.001682	0.000467	0.00264	0.026993	0.032647	0.003723	0.002469	-0.00166
0.080928	0.000403	0.001689	-0.00171	0.00434	0.026765	0.03247	0.003261	0.001801	-0.00304
0.082976	0.001627	-0.00027	-0.00116	-0.0013	0.026741	0.038285	0.000399	-9.2E-05	-0.00123
0.085024	-4.1E-05	-0.00089	0.000532	0.000293	0.025376	0.039933	-0.00256	-0.00105	0.000293
0.087072	-0.00118	0.003507	-0.0002	0.000302	0.027651	0.040491	-0.00405	-0.00228	0.004568
0.08912	-0.00026	0.003127	0.002255	-0.00192	0.033103	0.040639	0.000576	-0.0041	0.005598
0.091168	0.000858	-0.00206	0.002782	-0.00024	0.033701	0.036748	0.002903	-0.00042	0.004824
0.093216	0.00055	-0.00066	-6.5E-05	-0.00033	0.031105	0.032651	0.000127	0.002226	-4.9E-06
0.095264	0.001137	-0.00162	0.000994	0.000116	0.030358	0.031841	-0.00222	0.002073	-0.00545
0.097312	0.00182	-0.00215	0.000286	-0.00127	0.027931	0.034019	0.000444	0.003092	-0.0027
0.09936	-0.00011	0.0007	0.00036	0.001868	0.025686	0.03217	0.002955	0.004225	-0.00045
0.101408	7.17E-05	0.000983	-0.00272	0.002569	0.026684	0.033177	0.002981	0.00146	-0.00295
0.103456	0.002748	0.000786	-0.0006	0.001456	0.028278	0.037184	0.000974	-0.00202	-0.00197
0.105504	-0.00079	-0.00082	0.000692	-0.00064	0.025548	0.039538	-0.00329	-0.00174	0.002267
0.107552	-0.00135	0.002992	0.000705	-0.00029	0.027411	0.040588	-0.00395	-0.00203	0.004542
0.1096	0.000673	0.002448	-0.0011	-0.00083	0.032917	0.041473	0.000431	-0.0042	0.00426
0.111648	0.001737	-0.00053	0.003486	-0.0008	0.034868	0.035914	0.003285	-0.00175	0.004273
0.113696	0.000612	-0.00091	0.002154	0.001617	0.031788	0.031165	-0.00044	0.002952	-0.00102
0.115744	0.000442	-0.00224	-0.00056	-0.00111	0.029665	0.032753	-0.00292	0.003021	-0.00366
0.117792	0.000571	-0.00071	0.000336	-0.00059	0.028846	0.034711	0.000666	0.002662	-0.00253

Step time, s	Elongation Force, N								
0.11984	7.65E-05	0.000771	-0.00051	0.001735	0.027261	0.032028	0.004892	0.003574	-0.00163
0.121888	0.000821	0.002947	-0.00078	0.003769	0.028618	0.033696	0.002379	0.00198	-0.00333
0.12496	0.000831	-0.00064	-0.00025	-0.0004	0.027732	0.039292	-0.00171	-0.00114	0.00076
0.129056	0.000464	0.002476	0.000419	-0.00059	0.032473	0.040415	-0.00087	-0.00351	0.004222
0.133152	0.000386	-0.00092	0.002005	0.000171	0.034675	0.034009	0.001446	0.00185	0.002339
0.137248	0.000782	-0.00157	0.000138	-0.00054	0.031241	0.033586	-0.00053	0.002761	-0.00386
0.141344	-4.8E-05	0.001815	-0.00068	0.002161	0.027788	0.033209	0.002319	0.002894	-0.00231
0.14544	0.001548	0.000108	-0.00024	-8.9E-05	0.02913	0.038825	-0.00184	-0.00133	0.000535
0.149536	-0.0002	0.001876	0.000235	-0.00099	0.032738	0.040558	-0.00125	-0.00268	0.004784
0.153632	0.000364	-0.00087	0.002483	0.001089	0.035374	0.034362	0.001773	0.001181	0.001608
0.157728	0.000989	-0.00142	0.000282	-0.00057	0.030488	0.035208	-0.00117	0.003155	-0.00334
0.161824	-0.00012	0.001725	-0.00122	0.002977	0.027826	0.033537	0.00335	0.001996	-0.00281
0.16592	0.001042	-0.00073	-0.00048	-0.00152	0.028627	0.040715	-0.00218	-0.00075	0.001397
0.170016	-2.8E-05	0.002153	0.000839	-0.001	0.033724	0.041339	-0.00064	-0.00359	0.003989
0.174112	0.000397	-0.00112	0.002234	0.000259	0.035028	0.034766	0.001688	0.002579	0.001843
0.178208	0.001153	-0.00034	0.000316	0.000193	0.031017	0.035265	-0.00102	0.001812	-0.00387
0.182304	-0.00069	0.001196	-0.00143	0.003124	0.028221	0.03457	0.002428	0.002857	-0.00186
0.1864	0.001265	-0.00037	-0.00017	-0.00084	0.030693	0.040502	-0.0019	-0.00187	0.000446
0.190496	-0.00042	0.002261	0.000371	-0.00134	0.033831	0.041571	-0.001	-0.00289	0.004504
0.194592	0.00148	-0.00049	0.002459	0.000975	0.035926	0.035055	0.002459	0.001721	0.001476
0.198688	0.00089	-0.00149	0.000504	-0.00058	0.031674	0.035432	-0.00104	0.00309	-0.00268
0.202784	-0.00027	0.001585	-0.00182	0.002726	0.029153	0.034846	0.002374	0.001771	-0.00331
0.20688	0.000468	-0.00044	-0.00018	-0.00068	0.030243	0.041185	-0.00227	-0.00093	0.001439
0.210976	0.001009	0.002328	0.000779	-0.00018	0.034113	0.042552	-0.00019	-0.00372	0.003536
0.215072	0.000276	-0.00085	0.002176	-0.0006	0.035081	0.036141	0.001381	0.002289	0.001686
0.219168	0.000828	-0.00074	0.000629	-0.00015	0.032044	0.036185	-0.00054	0.002865	-0.00296
0.223264	-0.00068	0.001087	-0.00132	0.002817	0.028435	0.035422	0.001934	0.00152	-0.00242
0.22736	0.000926	-0.00068	-0.00095	-0.0003	0.030148	0.042697	-0.00192	-0.00183	0.000956
0.231456	0.000737	0.002436	0.001209	-0.00127	0.034038	0.043091	-0.00061	-0.00298	0.004147
0.235552	0.000557	-0.00047	0.002518	0.000232	0.035588	0.036361	0.001939	0.002347	0.001007
0.239648	0.000466	-0.00176	0.000852	-0.00116	0.031828	0.036521	-0.00041	0.002682	-0.00182
0.243744	0.000539	0.001435	-0.00257	0.003247	0.030057	0.035693	0.001825	0.001378	-0.00294
0.24784	0.00014	-0.00028	0.000537	-0.00011	0.030807	0.042743	-0.00183	-0.00162	0.000746
0.251936	0.00083	0.002103	0.001434	-0.0007	0.03506	0.043598	-0.00031	-0.00362	0.003387
0.256032	0.000345	-0.00089	0.001849	-0.00017	0.036816	0.036096	0.001396	0.003148	0.001447
0.260128	0.000832	-0.00114	-0.00032	-0.00089	0.033111	0.037444	5.51E-05	0.002342	-0.0024
0.264224	-0.00042	0.000857	-0.00113	0.003481	0.030675	0.036111	0.001924	0.001879	-0.00215
0.26832	0.001113	0.000392	-0.00044	-0.0001	0.032244	0.04391	-0.00207	-0.00145	0.000994
0.272416	0.000532	0.002542	0.001726	-0.00133	0.035616	0.043019	-0.00053	-0.00328	0.003011
0.276512	0.000829	-0.00077	0.001108	0.000171	0.037905	0.036689	0.001681	0.002768	0.000576

Step time, s	Elongation	Force, N							
0.280608	0.000609	-0.00175	8.58E-05	-0.00012	0.035374	0.037109	-0.00057	0.003094	-0.00124
0.284704	-0.00036	0.000768	-0.00171	0.002406	0.032329	0.036533	0.001845	0.001191	-0.00257
0.290848	0.001076	0.001543	0.001028	-0.00042	0.034755	0.043771	-0.00133	-0.00277	0.002107
0.29904	0.000402	-0.00129	0.000351	-0.00025	0.036967	0.036957	0.00071	0.002721	-0.00032
0.307232	8.07E-05	0.000575	-0.00026	0.001015	0.032582	0.040428	-0.00025	-4.2E-05	-0.00053
0.315424	0.001093	0.000448	0.00115	-0.00016	0.037472	0.040031	0.000848	-0.00039	0.002067
0.323616	-4.5E-05	-9E-05	-0.00045	0.001	0.033858	0.036722	0.000792	0.002298	-0.00238
0.331808	0.000892	0.001334	0.000761	-0.00032	0.034484	0.04337	-0.00087	-0.00236	0.002407
0.34	0.00044	-0.00104	0.000642	-0.00043	0.037171	0.036805	0.000475	0.003015	-0.00068
0.348192	0.000276	0.000819	-0.00081	0.001482	0.032563	0.04112	-0.00061	0.000583	-0.00036
0.356384	0.000655	0.000286	0.001551	-0.00048	0.038213	0.040477	0.000624	-0.00024	0.001912
0.364576	0.000225	2.16E-05	-0.00063	0.001069	0.033725	0.038115	0.001114	0.002403	-0.00245
0.372768	0.000643	0.000882	0.000867	-0.00041	0.034665	0.044417	-0.00104	-0.00242	0.002785
0.38096	0.000508	-0.00075	0.000434	-0.00041	0.037361	0.037658	0.000636	0.003098	-0.00038
0.389152	0.000225	0.000654	-0.00013	0.001532	0.032667	0.041495	-0.00069	-0.00014	-0.00087
0.397344	0.000829	0.00011	0.00092	-0.00051	0.038839	0.040349	0.000837	-9.3E-05	0.002028
0.405536	0.000469	0.000272	-0.00026	0.001151	0.034199	0.038842	0.000918	0.002589	-0.00206
0.413728	0.000432	0.000667	0.000569	-0.00028	0.035957	0.044893	-0.00076	-0.00222	0.002082
0.42192	0.000833	-1.1E-05	0.000564	-0.00038	0.038116	0.038621	0.000452	0.003195	-0.0004
0.430112	-0.00029	0.000103	-0.00025	0.001431	0.033459	0.043537	-0.00095	0.000244	-0.00038
0.438304	0.001313	0.000465	0.000908	-0.0007	0.040226	0.042613	0.001062	0.001448	0.001668
0.446496	0.000713	-0.00032	-0.00052	0.001361	0.035792	0.04123	0.000651	0.003958	-0.00182
0.454688	4.81E-05	0.001079	0.001313	-0.0007	0.037811	0.046156	-0.00035	-0.0003	0.00212
0.46288	0.000736	-0.00027	0.000158	2.86E-05	0.040981	0.039895	0.000584	0.005571	-0.00041
0.471072	-0.00027	0.000349	9.8E-05	0.00144	0.036347	0.045141	-0.00132	0.001091	-0.00024
0.479264	0.001381	0.000753	0.000489	-0.00102	0.042962	0.044477	0.001287	0.002852	0.001369
0.487456	0.00077	-0.00059	-0.00034	0.002016	0.03796	0.043356	0.000429	0.004443	-0.00209
0.495648	-7.5E-05	0.001447	0.001372	-0.00108	0.039175	0.048963	-0.00015	0.000129	0.002269
0.50384	0.000875	-0.00045	2.25E-05	0.000247	0.042076	0.043969	0.000188	0.006398	-0.00045
0.512032	-0.00031	0.000719	0.000374	0.00136	0.038009	0.048822	-0.00075	0.002674	-0.00052
0.520224	0.001616	0.000421	0.000422	-0.00107	0.043346	0.050291	0.001456	0.003439	0.002303
0.528416	0.000478	-0.00061	0.000321	0.002298	0.038297	0.051984	0.000963	0.007597	-0.00241
0.536608	6.67E-05	0.001827	0.000922	-0.00082	0.039039	0.06323	0.000128	0.008402	0.002483
0.5448	0.001271	-0.00034	0.000283	0.000513	0.042215	0.068339	0.000236	0.014114	-0.00059
0.552992	-0.00011	0.000692	0.000497	0.001362	0.038036	0.099403	-0.00104	0.013111	-0.00036
0.561184	0.00175	0.000487	0.000958	-0.00092	0.043835	0.132782	0.001664	0.016407	0.002334
0.569376	0.000648	-0.0006	0.000366	0.002294	0.038949	0.16294	0.000803	0.025621	-0.00241
0.577568	-0.00021	0.001847	0.001297	-0.00103	0.039869	0.18658	-0.0002	0.05064	0.003331
0.58576	0.001424	-5E-05	-0.00048	0.001017	0.041984	0.147998	0.00079	0.092123	-0.00065
0.593952	-0.00056	0.000989	0.000909	0.001112	0.037603	0.18143	-0.00129	0.116632	0.000641

Step time, s	Elongation Force, N								
0.602144	0.001556	0.000363	0.000572	-0.00065	0.043605	0.215278	0.001917	0.101989	0.001644
0.610336	0.000773	0.000142	0.00056	0.002324	0.038446	0.237271	0.000755	0.111684	-0.00228
0.622624	0.001159	0.00091	0.000704	0.000107	0.042543	0.265341	0.000425	0.129741	0.001125
0.639008	0.001048	0.000558	0.000836	0.000152	0.044807	0.285538	0.000304	0.151355	0.001204
0.655392	0.000847	0.00074	0.000948	0.000627	0.044783	0.316852	0.000493	0.178047	0.000679
0.671776	0.000391	0.000438	0.000506	0.000844	0.046719	0.341984	-0.00017	0.200496	-0.00023
0.68816	0.001586	-0.00021	0.000491	0.001142	0.048357	0.368114	0.001161	0.217638	-0.00035
0.704544	0.001452	0.000631	0.000825	0.000542	0.047657	0.392592	0.000805	0.232908	0.000937
0.720928	0.001285	0.001047	0.001	6.02E-05	0.047502	0.414161	0.000108	0.247179	0.001545
0.737312	0.000334	0.001107	0.001176	0.000988	0.044975	0.434644	0.000686	0.260165	0.001056
0.753696	0.000448	0.000825	0.00038	0.00118	0.045063	0.454321	-0.00021	0.271253	-0.00017
0.77008	0.001378	-0.00018	0.000617	0.000591	0.046128	0.471825	0.001291	0.282351	-0.00011
0.786464	0.000803	0.000719	0.000706	0.000322	0.046464	0.487635	0.001529	0.292068	0.00083
0.802848	0.000741	0.000676	0.000723	-4E-05	0.047701	0.503976	0.004949	0.302601	0.00157
0.819232	0.000158	0.000971	0.001204	0.000749	0.050713	0.518776	0.002685	0.313163	0.000798
0.835616	0.000435	0.00079	0.000544	0.000723	0.051778	0.530577	0.005318	0.320512	-0.00021
0.852	0.001426	-0.00011	0.000613	0.000456	0.053237	0.544572	0.031308	0.326859	-7.9E-05
0.868384	0.001633	0.001008	0.001729	0.000774	0.054281	0.556599	0.0457	0.332974	0.000909
0.884768	0.004849	0.004656	0.003628	3.97E-05	0.056914	0.569213	0.058101	0.339439	0.005128
0.901152	0.004937	0.004692	0.004229	0.002199	0.056503	0.582666	0.07061	0.345787	0.004019
0.917536	0.005061	0.006281	0.00429	0.002778	0.075368	0.596179	0.081599	0.353413	0.009319
0.93392	0.005571	0.009441	0.00474	0.002529	0.125776	0.612735	0.092629	0.366513	0.031933
0.950304	0.006373	0.034704	0.00763	0.003558	0.162527	0.635833	0.100394	0.373595	0.058772
0.966688	0.01634	0.094718	0.029673	0.005065	0.159158	0.651267	0.108651	0.378124	0.073337
0.983072	0.063529	0.17959	0.070497	0.018685	0.182984	0.664201	0.120025	0.383083	0.082597
0.999456	0.1418	0.245263	0.168894	0.063115	0.213176	0.675237	0.12876	0.387306	0.093959
1.01584	0.233064	0.314811	0.232549	0.119996	0.238555	0.687762	0.138959	0.39074	0.1061
1.03222	0.314672	0.392019	0.31312	0.17128	0.259841	0.696604	0.147037	0.393386	0.114438
1.04861	0.385406	0.477243	0.404098	0.21665	0.278922	0.704269	0.154426	0.396942	0.115957
1.06499	0.460206	0.569597	0.51088	0.249532	0.29968	0.712802	0.162629	0.400414	0.130284
1.08138	0.535605	0.665707	0.631885	0.268269	0.324815	0.720433	0.170249	0.403343	0.140463
1.09776	0.61352	0.764477	0.756996	0.299379	0.34889	0.730951	0.179233	0.406048	0.150914
1.11414	0.690581	0.863914	0.880569	0.324309	0.371653	0.742507	0.185728	0.408031	0.160931
1.13053	0.767772	0.961253	1.00098	0.347322	0.392753	0.751935	0.188741	0.410396	0.169044
1.14691	0.845167	1.05601	1.11815	0.367482	0.412526	0.763564	0.192614	0.412523	0.176722
1.1633	0.923026	1.14911	1.23148	0.387023	0.432896	0.772471	0.19977	0.414504	0.183629
1.17968	0.998568	1.24076	1.34089	0.40609	0.452281	0.779547	0.205614	0.416459	0.190413
1.19606	1.07725	1.33084	1.4452	0.423504	0.47057	0.78317	0.209061	0.417231	0.197158
1.21245	1.15426	1.41917	1.54537	0.440081	0.487647	0.786803	0.212518	0.420269	0.202112
1.22883	1.23035	1.50596	1.63967	0.45495	0.504638	0.791642	0.216667	0.424299	0.207253

Step time, s	Elongation	Force, N							
1.24522	1.3065	1.58895	1.73066	0.468226	0.521556	0.796717	0.221663	0.426982	0.211606
1.2616	1.38196	1.66958	1.81787	0.481048	0.537238	0.802171	0.22856	0.428742	0.216372
1.28618	1.49347	1.78435	1.94152	0.49772	0.55977	0.80818	0.235808	0.43119	0.223841
1.31894	1.63761	1.92812	2.08996	0.517811	0.589578	0.81857	0.245216	0.434494	0.230847
1.35171	1.77701	2.06354	2.22083	0.530526	0.615241	0.829051	0.255513	0.435808	0.239958
1.38448	1.90909	2.18833	2.33784	0.54973	0.642641	0.833087	0.26292	0.437427	0.252834
1.41725	2.03455	2.2971	2.44323	0.567061	0.669747	0.836873	0.270518	0.438312	0.258111
1.45002	2.15421	2.39465	2.54119	0.582426	0.693197	0.840093	0.276652	0.438122	0.263371
1.48278	2.26631	2.48502	2.63616	0.596053	0.716452	0.84449	0.281895	0.439904	0.268339
1.51555	2.37089	2.56872	2.72403	0.608709	0.737422	0.848942	0.28711	0.439372	0.272981
1.54832	2.47316	2.64646	2.79802	0.620922	0.759452	0.851793	0.290262	0.440523	0.276691
1.58109	2.5785	2.71434	2.86549	0.632566	0.792769	0.855702	0.294254	0.44208	0.278218
1.61386	2.672	2.77498	2.92562	0.642233	0.812235	0.857482	0.297267	0.441773	0.281299
1.64662	2.75492	2.82806	2.97784	0.659241	0.825791	0.863368	0.300627	0.443545	0.283407
1.67939	2.83075	2.87606	3.02419	0.674232	0.836514	0.869809	0.305062	0.444763	0.285229
1.71216	2.89857	2.91751	3.06339	0.679962	0.8482	0.873425	0.307979	0.445644	0.287049
1.74493	2.96086	2.95021	3.09711	0.685308	0.862838	0.878114	0.310732	0.451272	0.288216
1.7777	3.01621	2.981	3.13167	0.690392	0.87808	0.890894	0.312565	0.45853	0.291693
1.81046	3.06444	3.0066	3.16607	0.697822	0.888408	0.908899	0.315638	0.460288	0.292932
1.84323	3.11027	3.01966	3.20451	0.706941	0.893941	0.910697	0.323242	0.459596	0.294588
1.876	3.16018	3.01809	3.2762	0.713409	0.899848	0.910824	0.32442	0.458542	0.295978
1.90877	3.20558	3.05829	3.32318	0.719222	0.906398	0.912198	0.326221	0.459757	0.296705
1.94154	3.2562	3.08068	3.34458	0.723579	0.912798	0.912485	0.329441	0.462868	0.299262
1.9743	3.34434	3.08368	3.36236	0.726585	0.921009	0.91576	0.331755	0.463341	0.298987
2.00707	3.3909	3.08196	3.38124	0.728267	0.924528	0.919918	0.333862	0.462324	0.299608
2.03984	3.42026	3.08376	3.39822	0.730004	0.926954	0.922213	0.331992	0.461051	0.300791
2.07261	3.44709	3.09763	3.41021	0.731675	0.929417	0.925003	0.333013	0.462358	0.301988
2.10538	3.47727	3.11134	3.41983	0.733274	0.931421	0.924839	0.333541	0.460145	0.303972
2.13814	3.50385	3.12069	3.42857	0.734153	0.934946	0.924025	0.333303	0.458434	0.303127
2.17091	3.52356	3.13219	3.43757	0.734697	0.935671	0.924002	0.335571	0.458371	0.298622
2.20368	3.53928	3.14516	3.44661	0.735736	0.936739	0.923844	0.333858	0.457635	0.300151
2.23645	3.55459	3.157	3.45244	0.735916	0.938012	0.926886	0.334906	0.458942	0.30643
2.26922	3.57184	3.16806	3.45736	0.735162	0.941157	0.93036	0.335497	0.459329	0.308891
2.30198	3.58495	3.17779	3.46107	0.736573	0.948304	0.93279	0.334688	0.459206	0.309133
2.33475	3.59436	3.18829	3.4701	0.738272	0.953886	0.935243	0.335963	0.458862	0.30819
2.36752	3.60328	3.19675	3.48387	0.739239	0.955051	0.935636	0.332928	0.457564	0.309822
2.40029	3.61835	3.20473	3.4914	0.740166	0.960746	0.935134	0.332865	0.457405	0.311401
2.43306	3.63595	3.20999	3.49418	0.740121	0.97958	0.934386	0.331587	0.45858	0.31321
2.46582	3.64653	3.21214	3.49692	0.74132	0.987951	0.934568	0.329853	0.45982	0.313717
2.49859	3.6526	3.21162	3.49886	0.745244	0.988793	0.936053	0.331316	0.460965	0.312435

Step time, s	Elongation	Force, N							
2.53136	3.65417	3.2087	3.49579	0.75672	0.992059	0.935867	0.329898	0.461911	0.312474
2.56413	3.65387	3.20633	3.49246	0.756987	0.993559	0.940093	0.331581	0.462214	0.311585
2.61328	3.6438	3.20816	3.49708	0.75595	0.99807	0.942751	0.333915	0.468897	0.311243
2.67882	3.63728	3.21314	3.50019	0.758791	1.00159	0.957641	0.34382	0.471914	0.309675
2.74435	3.63307	3.24467	3.53147	0.758307	1.00314	0.953973	0.344674	0.467867	0.307267
2.80989	3.63934	3.2994	3.58093	0.761989	1.00146	0.947562	0.344987	0.467836	0.305321
2.87542	3.68974	3.31907	3.5918	0.759425	1.00488	0.954913	0.344281	0.465432	0.303329
2.94096	3.69799	3.34737	3.58943	0.755481	1.00454	0.953761	0.345072	0.464336	0.300018
3.0065	3.70891	3.36194	3.57843	0.75221	0.997923	0.944169	0.346992	0.460048	0.298565
3.07203	3.70959	3.3814	3.56796	0.752148	0.993463	0.937077	0.346407	0.454726	0.29763
3.13757	3.71872	3.38904	3.55988	0.748578	0.992964	0.931374	0.344589	0.450706	0.302484
3.2031	3.7253	3.4002	3.561	0.747472	1.00099	0.925792	0.34164	0.445842	0.301946
3.26864	3.73847	3.41755	3.55374	0.748103	1.01934	0.917563	0.339893	0.442491	0.304461
3.33418	3.74218	3.41162	3.53629	0.746601	1.02638	0.90817	0.339337	0.440564	0.304098
3.39971	3.73349	3.39064	3.51418	0.75389	1.02061	0.903364	0.33947	0.439018	0.303753
3.46525	3.71915	3.37463	3.50842	0.752958	1.01947	0.904532	0.341655	0.446435	0.301955
3.53078	3.71315	3.36013	3.50684	0.752513	1.02233	0.91388	0.347902	0.444869	0.298203
3.59632	3.70566	3.3768	3.53657	0.749871	1.01189	0.913004	0.345308	0.44054	0.294877
3.66186	3.70977	3.41081	3.57617	0.747715	1.00414	0.901697	0.343898	0.442512	0.293924
3.72739	3.7577	3.41658	3.58567	0.741381	0.994966	0.890187	0.345047	0.442446	0.294707
3.79293	3.7603	3.42341	3.58643	0.733111	0.982899	0.879918	0.344691	0.43931	0.293022
3.85846	3.75175	3.41529	3.58431	0.727758	0.97136	0.879254	0.344087	0.436124	0.29274
3.924	3.72779	3.4069	3.58243	0.721703	0.961173	0.878211	0.34163	0.432353	0.298478
3.98954	3.71874	3.38598	3.58495	0.715156	0.955862	0.874433	0.337701	0.429324	0.298062
4.05507	3.70743	3.37112	3.58631	0.71071	0.954261	0.868089	0.33511	0.424683	0.29641
4.12061	3.70617	3.36142	3.57082	0.704397	0.962777	0.856189	0.333147	0.421256	0.296446
4.18614	3.69446	3.34136	3.55139	0.707039	0.960039	0.847467	0.33178	0.419921	0.29504
4.25168	3.68212	3.31662	3.53102	0.708507	0.948386	0.839092	0.330949	0.415641	0.294092
4.31722	3.6679	3.29983	3.51966	0.702407	0.946553	0.836052	0.331563	0.410983	0.292148
4.38275	3.6651	3.28308	3.50834	0.704736	0.9441	0.842884	0.335861	0.413463	0.289871
4.44829	3.66314	3.28419	3.50499	0.705019	0.943161	0.834147	0.335867	0.408686	0.287552
4.51382	3.67521	3.31684	3.54117	0.701846	0.937331	0.826434	0.335963	0.408107	0.284293
4.57936	3.73119	3.3181	3.53578	0.699101	0.929994	0.81922	0.33552	0.403891	0.28239
4.6449	3.73626	3.32442	3.52522	0.696338	0.91601	0.818295	0.334501	0.399764	0.281296
4.71043	3.74072	3.3162	3.50135	0.691501	0.902952	0.813484	0.333502	0.396503	0.281959
4.77597	3.73785	3.30235	3.49173	0.688113	0.894717	0.801807	0.331198	0.398392	0.281501
4.8415	3.72995	3.28358	3.48268	0.680207	0.888779	0.792513	0.328015	0.402407	0.28335
4.90704	3.72029	3.27305	3.48522	0.677422	0.881136	0.781474	0.325417	0.403568	0.283571
4.97258	3.71521	3.26252	3.47268	0.679108	0.881226	0.774365	0.322574	0.401509	0.285429
5.03811	3.70042	3.24292	3.45701	0.692493	0.880646	0.768714	0.321112	0.400709	0.284216

Step time, s	Elongation			Force, N					
5.10365	3.67813	3.22293	3.44383	0.700957	0.870519	0.759464	0.319829	0.399767	0.283285
5.16918	3.65641	3.21184	3.44248	0.701666	0.860192	0.753301	0.319744	0.398707	0.281318
5.26749	3.63751	3.20494	3.43713	0.698538	0.846497	0.754018	0.324551	0.401068	0.278169
5.39856	3.66504	3.21696	3.46919	0.689719	0.82405	0.752495	0.325692	0.40393	0.277178
5.52963	3.6496	3.1863	3.45282	0.677401	0.797824	0.741929	0.322262	0.40233	0.276741
5.6607	3.61932	3.15831	3.43152	0.666133	0.779502	0.728006	0.316716	0.394429	0.274941
5.79178	3.60352	3.14015	3.40884	0.655205	0.762404	0.720223	0.311658	0.38864	0.275003
5.92285	3.56008	3.09988	3.35613	0.655783	0.759417	0.713524	0.310743	0.388173	0.271578
6.05392	3.50553	3.06558	3.30213	0.655705	0.766346	0.713953	0.314916	0.391007	0.266488
6.18499	3.50702	3.07498	3.28981	0.653814	0.758685	0.713125	0.315214	0.392757	0.261406
6.31606	3.54369	3.09579	3.28325	0.648256	0.747326	0.710659	0.315109	0.38958	0.259308
6.44714	3.53416	3.07268	3.25806	0.643735	0.738168	0.703156	0.30976	0.383389	0.258539
6.57821	3.51005	3.04614	3.23262	0.632784	0.727856	0.688995	0.30443	0.376462	0.260348
6.70928	3.48035	3.00487	3.19536	0.625111	0.726041	0.672242	0.299865	0.370824	0.259812
6.84035	3.41141	2.9523	3.16512	0.627149	0.711686	0.660765	0.301881	0.370677	0.256837
6.97142	3.35611	2.91735	3.15663	0.620774	0.701394	0.664729	0.307654	0.376167	0.251643
7.1025	3.3742	2.90802	3.17759	0.611189	0.682871	0.662979	0.305286	0.373832	0.247729
7.23357	3.35378	2.87862	3.14096	0.596836	0.662503	0.658863	0.301838	0.365868	0.245121
7.36464	3.33301	2.85272	3.12115	0.582574	0.649512	0.647286	0.294784	0.356777	0.245957
7.49571	3.30634	2.84284	3.10708	0.573846	0.647	0.631903	0.289847	0.352126	0.246734
7.62678	3.26284	2.8129	3.06252	0.574716	0.646899	0.618223	0.285561	0.35132	0.24291
7.75786	3.20607	2.78397	3.02092	0.574981	0.642507	0.614005	0.284219	0.354409	0.237268
7.88893	3.18816	2.79186	3.03973	0.570019	0.633271	0.606468	0.28464	0.354785	0.231132
8.02	3.16036	2.77733	3.0354	0.560099	0.616861	0.597364	0.283015	0.353662	0.229538
8.15107	3.11082	2.73176	2.99827	0.549456	0.596825	0.579832	0.278664	0.348752	0.230254
8.28214	3.05245	2.68956	2.97858	0.539428	0.582879	0.562568	0.272596	0.342447	0.232467
8.41322	3.01153	2.63591	2.94742	0.531918	0.581367	0.550228	0.268053	0.33865	0.234295
8.54429	2.95066	2.57847	2.9123	0.5276	0.567869	0.543763	0.266834	0.340674	0.232471
8.67536	2.90713	2.54076	2.90864	0.523115	0.54962	0.545093	0.268531	0.343587	0.228663
8.80643	2.91016	2.53759	2.8939	0.512681	0.533631	0.538531	0.265898	0.344945	0.224291
8.9375	2.87745	2.50728	2.85504	0.503209	0.515283	0.530043	0.264029	0.341722	0.222688
9.06858	2.83043	2.47473	2.83961	0.497751	0.501997	0.51816	0.258646	0.334059	0.223907
9.19965	2.79145	2.4482	2.81373	0.492851	0.496035	0.505265	0.252694	0.331446	0.224053
9.33072	2.74303	2.40827	2.76446	0.499498	0.492087	0.493833	0.249655	0.331685	0.223179
9.46179	2.68205	2.38016	2.7307	0.499355	0.478174	0.490313	0.249025	0.328699	0.218809
9.59286	2.63997	2.40166	2.74393	0.495139	0.460981	0.479411	0.248703	0.326702	0.214472
9.72394	2.6032	2.37765	2.72948	0.487199	0.44364	0.471288	0.246867	0.322853	0.212696
9.85501	2.55014	2.32667	2.70494	0.48005	0.428224	0.456551	0.243088	0.31904	0.213502
9.98608	2.51742	2.28579	2.68505	0.473164	0.417627	0.441319	0.240085	0.31551	0.213989
10.1172	2.48909	2.24214	2.64688	0.469132	0.409393	0.429486	0.239201	0.315104	0.212743

Step time, s	Elongation Force, N								
10.2482	2.43852	2.19523	2.60751	0.465429	0.39353	0.420485	0.239817	0.317284	0.207828
10.3793	2.3932	2.18725	2.60798	0.455393	0.37569	0.419406	0.242877	0.319527	0.203199
10.5759	2.36619	2.16604	2.57769	0.448401	0.343548	0.407404	0.237051	0.312581	0.19781
10.838	2.27376	2.11543	2.48684	0.442725	0.305329	0.374418	0.226704	0.296161	0.198115
11.1002	2.14741	2.03156	2.41784	0.449852	0.264909	0.35281	0.221514	0.291437	0.192215
11.3623	2.07496	1.99875	2.39606	0.442016	0.21657	0.333493	0.223157	0.28497	0.186083
11.6245	1.99202	1.9238	2.34843	0.427871	0.169923	0.303757	0.215582	0.274366	0.185404
11.8866	1.89396	1.84366	2.28962	0.419248	0.129853	0.28277	0.207371	0.269004	0.184683
12.1488	1.81177	1.83113	2.23597	0.410054	0.086763	0.266469	0.202759	0.268729	0.176793
12.4109	1.70925	1.7925	2.1971	0.392698	0.050614	0.236554	0.196391	0.258834	0.171879
12.6731	1.57645	1.71341	2.1378	0.391393	0.026397	0.203094	0.189848	0.247584	0.168913
12.9352	1.46617	1.65054	2.10681	0.386944	0.012796	0.180219	0.189023	0.243419	0.16345
13.1973	1.36934	1.57847	2.06288	0.37019	0.006488	0.151343	0.18513	0.236661	0.159204
13.4595	1.24827	1.51789	1.98352	0.35552	0.002491	0.120605	0.177356	0.231202	0.158539
13.7216	1.09134	1.4782	1.90093	0.348774	0.001577	0.092032	0.172159	0.226181	0.153603
13.9838	0.956806	1.44122	1.86872	0.339071	0.000938	0.057923	0.170236	0.222556	0.147207
14.2459	0.824678	1.36584	1.8174	0.329414	0.000631	0.029308	0.163212	0.211237	0.14331
14.5081	0.723906	1.31408	1.75493	0.324336	0.000851	0.01307	0.159312	0.204354	0.141177
14.7702	0.644308	1.27685	1.72659	0.311677	0.001093	0.005782	0.156482	0.199599	0.137112
15.0324	0.532433	1.21609	1.66669	0.299025	0.000793	0.002835	0.15015	0.19352	0.133724
15.2945	0.416411	1.17048	1.58918	0.289453	0.00079	0.001103	0.143952	0.188809	0.130444
15.5566	0.32362	1.13641	1.55044	0.282876	0.001807	0.000405	0.142022	0.184986	0.124549
15.8188	0.2488	1.08193	1.49369	0.274737	0.001508	0.000587	0.139094	0.175677	0.121215
16.0809	0.159559	1.02883	1.40985	0.268013	0.000337	0.00119	0.133365	0.166096	0.120777
16.3431	0.068456	0.976338	1.38395	0.259299	0.001395	0.000984	0.13379	0.166494	0.117177
16.6052	0.004199	0.943496	1.33631	0.245025	0.00212	0.000806	0.125894	0.164605	0.113701
16.8674	0.000845	0.907431	1.24648	0.231823	0.000637	0.000818	0.121237	0.158197	0.112038
17.1295	0.001301	0.864805	1.18581	0.232461	0.000808	0.000815	0.118841	0.155054	0.106803
17.3916	0.000909	0.811822	1.12382	0.227011	0.000598	0.000616	0.118655	0.149293	0.101753
17.6538	0.001008	0.754958	1.04075	0.21836	0.000635	0.000246	0.112612	0.139347	0.101264
17.9159	0.001015	0.717098	0.932062	0.212237	0.001067	0.001471	0.108429	0.136531	0.102408
18.1781	0.002068	0.689735	0.817893	0.203216	0.00091	0.000825	0.106029	0.136387	0.10484
18.4402	0.001067	0.65863	0.677673	0.191732	0.001929	0.001085	0.102095	0.131369	0.10787
18.7024	0.000811	0.617839	0.515296	0.191844	0.000696	0.000877	0.098596	0.126249	0.10425
18.9645	0.00089	0.582401	0.351531	0.191446	0.000838	0.000783	0.099093	0.125372	0.099889
19.2267	0.001198	0.529251	0.193215	0.1843	0.001095	0.001005	0.095218	0.118578	0.099339
19.4888	0.00118	0.491178	0.077556	0.177523	0.001021	0.000822	0.090991	0.113985	0.099458
19.7509	0.000779	0.470719	0.007134	0.170384	0.001014	0.00083	0.087949	0.113664	0.095049
20.0131	0.000831	0.445003	0.001154	0.159304	0.000494	0.000737	0.085316	0.110271	0.093148
20.2752	0.001805	0.398676	0.001008	0.155239	0.000827	0.00072	0.081241	0.103864	0.08897

Step time, s	Elongation	Force, N							
20.5374	0.006028	0.356005	0.000982	0.156426	0.000826	0.00071	0.081245	0.102135	0.08483
20.7995	0.010342	0.31542	0.000812	0.150483	0.000803	0.000638	0.077827	0.097647	0.083846
21.1927	0.017287	0.281109	0.000855	0.140601	0.001309	0.000462	0.071118	0.093227	0.080889
21.717	0.024799	0.244709	0.00178	0.127093	0.000703	0.001127	0.0681	0.089216	0.076508
22.2413	0.034853	0.182455	0.001738	0.122653	0.000869	0.001154	0.062144	0.082782	0.075717
22.7656	0.042862	0.154708	0.000694	0.109137	0.001162	0.001008	0.056206	0.07764	0.074698
23.2899	0.049719	0.11673	0.000747	0.099888	0.000893	0.000603	0.053478	0.074329	0.070716
23.8142	0.055032	0.071276	0.001749	0.094433	0.000934	0.000966	0.048635	0.067997	0.065585
24.3385	0.065707	0.053248	0.010081	0.085859	0.000973	0.001189	0.04452	0.064214	0.063286
24.8628	0.065613	0.02338	0.022883	0.08316	0.00153	0.000927	0.042061	0.060566	0.058994
25.387	0.071378	0.00482	0.034933	0.086367	0.000859	0.000894	0.036612	0.052722	0.055432
25.9113	0.070735	0.012239	0.047603	0.082463	0.000999	0.00189	0.033758	0.053711	0.052308
26.4356	0.071279	0.022332	0.058443	0.081882	0.001015	0.00142	0.030055	0.056657	0.0497
26.9599	0.071705	0.031836	0.068792	0.08462	0.000832	0.00131	0.026784	0.053021	0.046272
27.4842	0.070169	0.043427	0.081089	0.084461	0.001373	0.001099	0.024328	0.05108	0.045354
28.0085	0.066811	0.051793	0.086802	0.081586	0.002013	0.001115	0.021503	0.048667	0.043453
28.5328	0.064245	0.059484	0.095426	0.084122	0.001431	0.001165	0.018413	0.044847	0.040377
29.0571	0.059933	0.068272	0.099325	0.08365	0.00137	0.001211	0.017393	0.041713	0.038982
29.5813	0.058673	0.075647	0.098262	0.081478	0.00149	0.001241	0.014329	0.038344	0.03647
30.1056	0.055304	0.078324	0.095209	0.084568	0.001604	0.001096	0.011869	0.034614	0.033187
30.6299	0.052569	0.083529	0.088007	0.080773	0.000946	0.001318	0.009949	0.031752	0.031419
31.1542	0.04853	0.08228	0.079656	0.077331	0.001295	0.001125	0.007578	0.029699	0.028616
31.6785	0.046739	0.082631	0.073013	0.077773	0.000996	0.001225	0.00527	0.026512	0.026838
32.2028	0.045918	0.080912	0.068172	0.073302	0.001243	0.001156	0.002485	0.024881	0.027658
32.7271	0.044424	0.076262	0.064037	0.06941	0.001125	0.000928	0.001474	0.023973	0.025221
33.2514	0.041104	0.070825	0.06038	0.066818	0.001101	0.001247	0.001432	0.020997	0.022873
33.7756	0.039474	0.06848	0.057734	0.063498	0.000889	0.001007	0.001363	0.020152	0.022783
34.2999	0.037398	0.062166	0.05483	0.059309	0.001312	0.001562	0.001223	0.019249	0.020616
34.8242	0.035527	0.05997	0.051229	0.057743	0.001383	0.001016	0.001001	0.016846	0.019072
35.3485	0.030439	0.055829	0.048179	0.052518	0.001132	0.001016	0.002213	0.016376	0.018856
35.8728	0.028241	0.053588	0.049007	0.050627	0.001023	0.001041	0.002802	0.014908	0.018479
36.3971	0.024945	0.050508	0.045211	0.0485	0.001328	0.001104	0.00228	0.01351	0.016637

Table B2. 2% SBS Modified PG 64-22 (3 samples at 4°C, 3 samples at 12°C and 3 samples at 16°C).

Step Time, s	Elongation	Force, N							
0	0	0	0	0	0	0	0	0	0
0.000544	0.020768	0.013961	0.01753	0.028185	0.016051	0.01629	0.016877	0.0151	0.014711
0.001568	0.106629	0.103191	0.107582	0.118836	0.105572	0.106832	0.106133	0.105122	0.103633
0.002592	0.121054	0.129735	0.130348	0.112004	0.132496	0.131935	0.127531	0.131519	0.130028
0.003616	0.07938	0.084174	0.085285	0.064143	0.096715	0.087438	0.084189	0.088658	0.086165
0.00464	0.039781	0.036599	0.036516	0.03154	0.062577	0.043307	0.041969	0.045112	0.041046
0.005664	0.017277	0.01296	0.009728	0.01922	0.050312	0.02421	0.022016	0.024658	0.020912
0.006688	0.007298	0.005239	-0.00046	0.020122	0.054401	0.022824	0.019403	0.021965	0.020619
0.007712	0.002539	0.003436	-0.00229	0.027327	0.063349	0.029737	0.023238	0.028133	0.027359
0.008736	-0.00024	0.003769	0.000553	0.03651	0.072438	0.037409	0.025038	0.036453	0.032807
0.00976	-0.00278	0.003179	0.004786	0.045921	0.083273	0.043644	0.023509	0.04262	0.032529
0.010784	-0.00385	0.000794	0.007882	0.054505	0.095241	0.049475	0.020438	0.047977	0.028089
0.011808	-0.00058	-0.00101	0.007409	0.061158	0.106514	0.055348	0.017916	0.051473	0.02326
0.012832	0.005978	3.47E-05	0.004378	0.066744	0.117837	0.059894	0.016318	0.05319	0.020976
0.013856	0.010468	0.002668	0.001067	0.070194	0.130995	0.063869	0.016642	0.057549	0.020938
0.01488	0.009928	0.003782	-0.00119	0.071716	0.145651	0.067306	0.018556	0.066092	0.021533
0.015904	0.004346	0.004201	-0.00148	0.073944	0.160566	0.071197	0.019566	0.077511	0.021806
0.016928	-0.00189	0.00451	-0.00017	0.078106	0.177006	0.07661	0.019203	0.087793	0.021824
0.017952	-0.00554	0.003297	0.00156	0.084103	0.194605	0.08353	0.0192	0.095918	0.021088
0.018976	-0.00571	0.000706	0.004177	0.090828	0.209841	0.091799	0.019209	0.103235	0.020103
0.02	-0.00286	-0.00117	0.005736	0.098856	0.221723	0.098686	0.018074	0.106844	0.019067
0.021024	0.003256	-0.00094	0.002525	0.105458	0.233593	0.102027	0.017435	0.105825	0.019523
0.022048	0.007568	0.001099	-0.00335	0.109538	0.243992	0.101538	0.018002	0.104599	0.020618
0.023072	0.007265	0.003	-0.00721	0.110457	0.251201	0.100014	0.019739	0.104696	0.021561
0.024096	0.002696	0.002846	-0.00665	0.109622	0.256515	0.098118	0.020283	0.105395	0.022157
0.02512	-0.00292	0.001371	-0.00228	0.107164	0.260589	0.096918	0.019319	0.107937	0.022913
0.026144	-0.00585	0.00071	0.004109	0.103105	0.265038	0.096895	0.018344	0.111726	0.023206
0.027168	-0.0042	0.000304	0.008512	0.098971	0.269767	0.098223	0.017939	0.11367	0.023466
0.028192	-0.00045	-0.00107	0.007591	0.09356	0.276217	0.098011	0.017575	0.112573	0.023129
0.029216	0.001476	-0.00125	0.003112	0.089278	0.282937	0.096459	0.01732	0.109151	0.022735
0.03024	0.000871	-0.00036	-0.00155	0.089979	0.288306	0.094026	0.017341	0.10559	0.023257
0.031264	0.000648	-0.00043	-0.00457	0.095674	0.292982	0.091746	0.016912	0.101786	0.023123
0.032288	0.002026	-0.00214	-0.00406	0.101958	0.296755	0.090623	0.015785	0.099026	0.021897
0.033312	0.002102	-0.00245	-0.0019	0.105142	0.299759	0.089949	0.014252	0.097184	0.020497
0.034336	-0.00081	0.000433	0.001673	0.106533	0.303567	0.088821	0.013778	0.095106	0.020788
0.03536	-0.00316	0.003892	0.005306	0.104628	0.308893	0.086714	0.016033	0.096003	0.022025
0.036384	-0.00153	0.004294	0.006201	0.098607	0.312901	0.084544	0.018634	0.101645	0.02302
0.037408	0.003711	0.002928	0.004311	0.092823	0.313304	0.083718	0.019224	0.109329	0.022568
0.038432	0.006756	0.002483	0.000193	0.090861	0.31535	0.084538	0.018509	0.113515	0.021752

Step Time, s	Elongation	Force, N							
0.039456	0.004921	0.00228	-0.00359	0.092234	0.321593	0.087393	0.018275	0.115105	0.020724
0.04048	0.001441	0.000709	-0.0057	0.095853	0.329181	0.090948	0.017522	0.115042	0.0199
0.042016	-0.00198	-0.00065	-0.00427	0.100899	0.338996	0.092849	0.016406	0.108457	0.020673
0.044064	-0.00164	0.001851	0.00451	0.100887	0.347387	0.091964	0.018976	0.100813	0.023134
0.046112	0.002334	0.001247	0.004092	0.09596	0.346587	0.092894	0.019234	0.102956	0.023383
0.04816	0.004694	0.000218	-0.00187	0.090806	0.349214	0.095865	0.017666	0.108276	0.024248
0.050208	-0.00319	0.000269	-0.00371	0.088685	0.359889	0.093937	0.016722	0.107536	0.024131
0.052256	-0.00851	-0.00438	0.005042	0.097463	0.368246	0.091372	0.015311	0.101709	0.021486
0.054304	0.005343	-0.00012	0.005648	0.103586	0.371525	0.088586	0.015399	0.095212	0.020468
0.056352	0.008254	0.004193	-0.00408	0.098825	0.373079	0.084328	0.018995	0.097612	0.022372
0.0584	-0.00246	0.003562	-0.0023	0.090812	0.374988	0.083207	0.019986	0.111083	0.024643
0.060448	-0.00362	-0.00014	0.004261	0.093054	0.380365	0.088727	0.01824	0.115491	0.021801
0.062496	0.002374	-0.0006	0.000851	0.098303	0.393599	0.091317	0.018918	0.106258	0.021276
0.064544	0.004962	0.001242	-0.00628	0.097974	0.403997	0.089724	0.020588	0.098068	0.022713
0.066592	-0.00064	0.001346	0.000343	0.094599	0.405632	0.091174	0.018941	0.101971	0.024592
0.06864	-0.00549	-0.00095	0.006692	0.087396	0.406872	0.094353	0.017606	0.108302	0.024428
0.070688	-0.00017	-0.00066	0.002672	0.085293	0.41479	0.092225	0.017474	0.106613	0.024449
0.072736	0.003154	-0.00242	-0.00343	0.094067	0.426637	0.088152	0.016767	0.099627	0.02224
0.074784	0.000349	-0.00029	-0.00265	0.102854	0.435589	0.085929	0.015135	0.093667	0.022598
0.076832	0.001012	0.003713	0.00447	0.096366	0.438295	0.084112	0.018785	0.09898	0.024437
0.07888	0.000676	0.002437	0.004008	0.087359	0.441525	0.083762	0.020265	0.111593	0.023755
0.080928	0.003835	5.62E-05	-0.0021	0.091035	0.443331	0.088175	0.019323	0.112908	0.020617
0.082976	0.000885	0.00079	-0.00648	0.098229	0.453784	0.091499	0.017802	0.102695	0.021932
0.085024	-0.00307	0.001065	0.001625	0.098589	0.468634	0.089779	0.019465	0.098101	0.024251
0.087072	0.000251	0.000213	0.005654	0.092373	0.472885	0.092362	0.019145	0.103722	0.023566
0.08912	0.004403	-0.00016	0.000456	0.087495	0.471163	0.093804	0.019068	0.106353	0.024514
0.091168	-0.0047	-0.00047	-0.00518	0.087031	0.475042	0.093231	0.017173	0.104975	0.024029
0.093216	-0.00483	-0.00249	0.004	0.097655	0.486707	0.090591	0.014354	0.100784	0.021997
0.095264	0.004066	-0.00069	0.00551	0.103472	0.494783	0.089963	0.0145	0.093314	0.020105
0.097312	0.007147	0.004128	-0.0008	0.096269	0.499008	0.086254	0.018346	0.095677	0.022045
0.09936	8.19E-05	0.003337	-0.00519	0.090011	0.501048	0.084049	0.02019	0.108523	0.023258
0.101408	-0.00642	-0.00086	0.001972	0.094271	0.502268	0.091299	0.017819	0.112637	0.020796
0.103456	0.001523	-0.00064	0.00169	0.099085	0.508101	0.094247	0.017538	0.101652	0.020078
0.105504	0.005308	0.001559	-0.00193	0.099253	0.521106	0.092538	0.020247	0.09476	0.022053
0.107552	0.001852	0.00074	-0.00233	0.094562	0.531749	0.093439	0.018404	0.101166	0.023209
0.1096	-0.0043	0.00058	0.003367	0.089505	0.529386	0.097095	0.015839	0.106297	0.024514
0.111648	-0.00407	-0.00145	0.004363	0.088619	0.529453	0.095127	0.016302	0.103403	0.023515
0.113696	0.002197	-0.00284	0.001477	0.09868	0.539032	0.090926	0.014376	0.095317	0.021074
0.115744	0.005163	0.001013	-0.00346	0.105368	0.550215	0.089178	0.015381	0.089869	0.020437
0.117792	-0.00183	0.003666	0.000776	0.099012	0.5572	0.085798	0.018008	0.097057	0.023576

Step Time, s	Elongation	Force, N							
0.11984	-0.001	0.001769	0.005922	0.092629	0.558616	0.086833	0.019136	0.109743	0.02287
0.121888	0.003102	-0.00024	-0.00144	0.094658	0.558952	0.090158	0.018296	0.110214	0.020408
0.12496	0.000515	0.000775	-0.00417	0.100607	0.565829	0.09241	0.018209	0.098062	0.022182
0.129056	0.000854	-5.1E-05	0.004554	0.093111	0.585535	0.094861	0.01767	0.103589	0.02354
0.133152	-0.00249	-0.00127	-0.00243	0.095542	0.587835	0.092048	0.015561	0.099827	0.022813
0.137248	0.003667	0.001786	0.004986	0.104062	0.605394	0.088058	0.016956	0.095393	0.021311
0.141344	-0.00092	0.000809	-0.00346	0.096729	0.610927	0.089403	0.018936	0.112505	0.02238
0.14544	0.001447	0.000529	0.001369	0.103726	0.617688	0.0937	0.018644	0.100895	0.021949
0.149536	0.000703	0.00049	-0.00181	0.095186	0.638698	0.095266	0.018092	0.105049	0.024365
0.153632	-0.00208	-0.00203	0.005408	0.097349	0.640229	0.092872	0.016334	0.101495	0.021903
0.157728	0.003494	0.00261	-0.00275	0.10529	0.65642	0.0873	0.018271	0.097718	0.022776
0.161824	-0.00165	0.000215	0.003326	0.096599	0.665435	0.090346	0.019821	0.115335	0.022314
0.16592	0.002261	0.001048	-0.00613	0.103546	0.668174	0.092326	0.019951	0.102197	0.022875
0.170016	-0.00076	-0.00013	0.006064	0.093811	0.688532	0.095217	0.017576	0.107936	0.02385
0.174112	-0.00056	-0.00123	-0.00221	0.096925	0.692232	0.091081	0.016765	0.10436	0.022269
0.178208	0.001652	0.002007	0.004139	0.103052	0.704776	0.087673	0.017175	0.100938	0.022012
0.182304	0.000844	0.00108	-0.00329	0.095697	0.715179	0.088466	0.02003	0.116579	0.022151
0.1864	-0.00055	0.00059	0.001745	0.102025	0.716655	0.091703	0.01943	0.104476	0.022105
0.190496	0.002845	0.000499	-0.00093	0.093063	0.735534	0.093254	0.018133	0.1108	0.023682
0.194592	-0.00393	-0.00261	0.003805	0.097163	0.741828	0.092126	0.015766	0.10786	0.0211
0.198688	0.004155	0.003157	-0.00138	0.102347	0.7502	0.08599	0.018375	0.101086	0.021862
0.202784	-0.00193	0.000795	0.001985	0.095224	0.762852	0.090183	0.018734	0.119422	0.020261
0.20688	0.004489	0.000751	-0.00378	0.101653	0.76321	0.091888	0.019761	0.105488	0.021467
0.210976	-0.00215	-0.00076	0.00413	0.092271	0.780125	0.095627	0.01788	0.11291	0.023095
0.215072	0.000491	-0.00167	-0.00076	0.097355	0.789676	0.091051	0.017401	0.105999	0.021486
0.219168	-7.5E-05	0.002278	0.002427	0.102305	0.795246	0.087074	0.017525	0.101428	0.021982
0.223264	0.002349	0.001404	-0.00247	0.095825	0.80849	0.090524	0.019123	0.116376	0.021076
0.22736	-0.00145	0.000282	0.001369	0.10272	0.810155	0.092256	0.019044	0.104122	0.022332
0.231456	0.00286	0.000168	-0.00041	0.091139	0.820195	0.09485	0.018694	0.110006	0.023416
0.235552	-0.0046	-0.00162	0.002951	0.097845	0.834411	0.091713	0.016711	0.103239	0.021519
0.239648	0.005274	0.002831	-0.00186	0.101378	0.83611	0.085691	0.017969	0.099829	0.022549
0.243744	-0.00319	0.000596	0.002251	0.096352	0.850829	0.08989	0.01795	0.116718	0.021618
0.24784	0.005231	0.000845	-0.00291	0.101269	0.851534	0.090516	0.020047	0.102463	0.021816
0.251936	-0.00339	0.000272	0.003893	0.09121	0.86128	0.093463	0.0176	0.10837	0.022879
0.256032	0.001324	-0.00142	-1.9E-06	0.094575	0.876734	0.088979	0.017023	0.099696	0.020976
0.260128	-0.00031	0.001699	0.001494	0.10121	0.87726	0.084275	0.017467	0.098495	0.021825
0.264224	0.003063	0.000782	-0.0022	0.097668	0.89211	0.088187	0.018358	0.113769	0.019742
0.26832	-0.00173	0.000899	0.001047	0.101827	0.894953	0.088627	0.01839	0.100735	0.020396
0.272416	0.003403	0.000946	0.000781	0.088655	0.899898	0.091368	0.018374	0.107464	0.020951
0.276512	-0.00508	-0.00217	0.002335	0.095246	0.918344	0.088052	0.016395	0.100922	0.022629

Step Time, s	Elongation			Force, N					
0.280608	0.006143	0.001876	-0.0011	0.099857	0.915769	0.082046	0.018092	0.09913	0.024072
0.284704	-0.0033	8.62E-06	0.001098	0.099226	0.930565	0.088555	0.017687	0.114062	0.018363
0.290848	-5.6E-05	0.001011	0.000565	0.094577	0.934383	0.090272	0.018499	0.109875	0.022533
0.29904	0.000723	-8.8E-05	0.000476	0.09874	0.955376	0.085296	0.01715	0.101844	0.023684
0.307232	0.001081	0.000841	-0.0004	0.098991	0.969966	0.088473	0.017721	0.108838	0.024416
0.315424	-0.0011	-0.00075	0.000866	0.092656	0.983306	0.088514	0.016318	0.106263	0.025348
0.323616	0.001546	0.001385	0.000373	0.099928	0.998782	0.08483	0.01731	0.109054	0.025994
0.331808	7.46E-05	0.000812	0.000129	0.094508	1.01028	0.089025	0.018628	0.105728	0.026666
0.34	0.001365	0.000104	0.000815	0.09866	1.02886	0.084772	0.020027	0.102889	0.027131
0.348192	0.001002	0.000774	-0.00039	0.101234	1.04206	0.088687	0.020397	0.108894	0.025929
0.356384	-0.00092	-0.00064	0.001106	0.092725	1.05031	0.089523	0.019636	0.109199	0.02601
0.364576	0.001381	0.001245	0.000145	0.104313	1.06468	0.086099	0.020015	0.109429	0.02749
0.372768	0.000476	0.000657	0.000625	0.100526	1.07385	0.090635	0.021103	0.107079	0.032107
0.38096	0.000733	8.2E-05	0.00015	0.097996	1.08907	0.084977	0.019889	0.10535	0.048459
0.389152	0.0007	0.00107	-0.00013	0.099816	1.09799	0.089305	0.02173	0.111761	0.067003
0.397344	-0.00068	-0.00056	0.001447	0.093191	1.10479	0.089533	0.021341	0.119082	0.081763
0.405536	0.00116	0.001333	-8.9E-05	0.101698	1.11695	0.085562	0.021258	0.141071	0.112835
0.413728	0.000711	0.000641	0.00055	0.105493	1.12622	0.089245	0.022553	0.163289	0.153526
0.42192	0.000944	5.92E-05	0.001195	0.136356	1.13811	0.084153	0.022382	0.178937	0.182902
0.430112	0.000474	0.000903	-0.00073	0.157292	1.14828	0.087933	0.0248	0.200916	0.205288
0.438304	-0.00018	-0.00081	0.001628	0.165005	1.15442	0.087214	0.02558	0.217264	0.22778
0.446496	0.001063	0.001268	0.000131	0.175642	1.16919	0.082514	0.031478	0.229029	0.250096
0.454688	6.1E-05	0.000886	-0.00039	0.176875	1.17996	0.088761	0.043706	0.242723	0.270962
0.46288	0.001225	-0.00016	0.001493	0.185925	1.19284	0.085805	0.048159	0.253984	0.292823
0.471072	0.000467	0.001156	-0.00049	0.199051	1.20294	0.094126	0.055904	0.264398	0.311569
0.479264	-4E-05	-0.00082	0.001564	0.203513	1.20945	0.101323	0.086407	0.213615	0.332802
0.487456	0.000686	0.001009	0.000125	0.225881	1.22463	0.097393	0.106273	0.219418	0.352374
0.495648	0.000191	0.001017	6.03E-05	0.239586	1.23337	0.09787	0.105253	0.234637	0.369425
0.50384	0.000635	-0.00038	0.001002	0.255698	1.24441	0.089627	0.107232	0.247482	0.387432
0.512032	0.000965	0.000975	-0.00019	0.273885	1.25348	0.093713	0.118805	0.267085	0.403152
0.520224	-0.00028	-0.00067	0.001539	0.281824	1.26096	0.096073	0.128726	0.283944	0.419416
0.528416	0.000574	0.001148	0.000338	0.301892	1.28025	0.096539	0.143867	0.297974	0.434301
0.536608	0.00065	0.00097	0.000258	0.314744	1.29833	0.113362	0.159974	0.313159	0.449183
0.5448	0.000734	-8.3E-05	0.001531	0.325492	1.31388	0.124366	0.175532	0.324363	0.463878
0.552992	0.001082	0.001271	-8.9E-05	0.343346	1.32573	0.14912	0.191571	0.337517	0.478105
0.561184	-0.00048	-0.00065	0.001558	0.349303	1.33169	0.160279	0.207119	0.346527	0.491699
0.569376	0.000875	0.001825	-0.00029	0.363497	1.34221	0.162166	0.222169	0.351374	0.505422
0.577568	7.31E-06	0.000727	0.000632	0.37412	1.34933	0.170417	0.238243	0.361299	0.517127
0.58576	0.000956	0.000362	0.002093	0.380786	1.35518	0.172997	0.249175	0.366968	0.529957
0.593952	0.001444	0.001859	-0.00062	0.398227	1.36176	0.186238	0.262777	0.375217	0.541539

Step Time, s	Elongation	Force, N							
0.602144	-0.00041	-0.00049	0.002071	0.405704	1.36769	0.199015	0.281469	0.380973	0.551388
0.610336	0.001317	0.001978	0.000178	0.422879	1.37843	0.210641	0.299714	0.38376	0.562523
0.622624	0.000772	0.000385	0.001424	0.439475	1.38774	0.237222	0.325378	0.396653	0.577499
0.639008	0.00054	0.000376	0.000665	0.463876	1.39931	0.271247	0.356894	0.410739	0.59742
0.655392	2.57E-05	0.001158	0.000185	0.491154	1.41681	0.305353	0.3835	0.418211	0.615508
0.671776	0.001207	0.00072	0.000364	0.511964	1.43138	0.335053	0.406419	0.428371	0.631877
0.68816	0.001013	0.000693	0.001057	0.534296	1.4503	0.361772	0.427476	0.438242	0.646944
0.704544	0.000606	0.000324	0.001117	0.554554	1.46372	0.389132	0.446039	0.451116	0.660675
0.720928	0.000544	0.00072	0.00078	0.576642	1.47525	0.413361	0.462652	0.463378	0.672763
0.737312	0.000362	0.001156	0.00044	0.596464	1.48682	0.437064	0.477823	0.472945	0.683668
0.753696	0.001346	0.000962	0.000551	0.613836	1.49512	0.462632	0.492043	0.48279	0.694746
0.77008	0.000556	0.001052	0.000553	0.633399	1.50787	0.485077	0.506761	0.489256	0.705915
0.786464	0.000858	0.000411	0.000981	0.650364	1.5179	0.510603	0.523859	0.499024	0.717709
0.802848	0.00091	0.000577	0.000763	0.670618	1.52575	0.533709	0.536839	0.506322	0.729818
0.819232	0.000377	0.00092	0.000375	0.687299	1.53506	0.562452	0.551058	0.510807	0.742018
0.835616	0.00143	0.00101	0.000463	0.702292	1.54426	0.597529	0.563608	0.519422	0.755704
0.852	0.001011	0.000924	0.0007	0.720357	1.55612	0.626253	0.576124	0.528234	0.770043
0.868384	0.000734	0.000419	0.001624	0.732604	1.56643	0.652606	0.588093	0.537954	0.783921
0.884768	0.002263	0.006672	0.002452	0.748265	1.57598	0.67546	0.599044	0.544818	0.793221
0.901152	0.002656	0.004591	0.00408	0.760866	1.58298	0.700089	0.609611	0.550234	0.799937
0.917536	0.004378	0.007465	0.004175	0.775278	1.58775	0.724719	0.618365	0.558265	0.806499
0.93392	0.00388	0.024405	0.004081	0.791045	1.5949	0.749056	0.62765	0.562547	0.813365
0.950304	0.003369	0.066555	0.005651	0.805133	1.59817	0.77018	0.636552	0.568419	0.819725
0.966688	0.005344	0.12824	0.006671	0.822485	1.60265	0.791657	0.644004	0.572578	0.825665
0.983072	0.011288	0.210302	0.029023	0.834253	1.60701	0.814488	0.653327	0.575378	0.832969
0.999456	0.030989	0.320257	0.080852	0.84885	1.61097	0.838425	0.661426	0.591161	0.839528
1.01584	0.084453	0.418745	0.116438	0.864339	1.61531	0.865412	0.670223	0.60179	0.845672
1.03222	0.108959	0.5198	0.144737	0.880811	1.61728	0.888246	0.67796	0.610075	0.850982
1.04861	0.167881	0.622673	0.181726	0.898465	1.62252	0.910517	0.684738	0.616933	0.855372
1.06499	0.237871	0.724135	0.2482	0.908964	1.62791	0.931809	0.692267	0.62159	0.860582
1.08138	0.293969	0.82447	0.311519	0.923389	1.63047	0.951846	0.697117	0.627796	0.864528
1.09776	0.345191	0.920923	0.372635	0.936532	1.63511	0.969668	0.702603	0.631652	0.869143
1.11414	0.399896	1.01328	0.431111	0.950532	1.63907	0.986195	0.707907	0.637277	0.875652
1.13053	0.45709	1.10496	0.490356	0.965462	1.64425	1.00371	0.711846	0.640699	0.879523
1.14691	0.513783	1.19271	0.549536	0.976774	1.64849	1.01941	0.717559	0.646725	0.885281
1.1633	0.568416	1.27996	0.606064	0.992244	1.65115	1.03523	0.721813	0.654705	0.89028
1.17968	0.623613	1.36951	0.660875	1.00366	1.65576	1.05081	0.727281	0.660395	0.895358
1.19606	0.677853	1.45514	0.714286	1.01614	1.65969	1.06633	0.732095	0.668085	0.900758
1.21245	0.730659	1.53695	0.766289	1.0279	1.66229	1.08277	0.736104	0.672042	0.904642
1.22883	0.782539	1.61499	0.816216	1.0373	1.66624	1.09715	0.741149	0.674703	0.908658

Step Time, s	Elongation	Force, N							
1.24522	0.832799	1.68951	0.866897	1.05438	1.66658	1.11336	0.745377	0.679574	0.912036
1.2616	0.881828	1.7645	0.916702	1.0756	1.66808	1.12879	0.749887	0.684604	0.913444
1.28618	0.950545	1.88069	0.998384	1.10188	1.67152	1.14999	0.756613	0.692555	0.918946
1.31894	1.03772	2.02663	1.14065	1.12332	1.67987	1.17718	0.769081	0.698146	0.923464
1.35171	1.11955	2.16092	1.28108	1.15031	1.69153	1.20132	0.788188	0.706079	0.927239
1.38448	1.19504	2.28703	1.41308	1.17273	1.72117	1.22661	0.794925	0.710134	0.932195
1.41725	1.26387	2.405	1.53708	1.19589	1.74563	1.2497	0.800155	0.7158	0.937858
1.45002	1.32976	2.51787	1.65364	1.22022	1.75058	1.26683	0.805386	0.720935	0.942801
1.48278	1.40204	2.62062	1.7626	1.23591	1.75437	1.28256	0.809495	0.723331	0.944841
1.51555	1.50796	2.70833	1.86479	1.25369	1.75655	1.29786	0.821119	0.726239	0.946103
1.54832	1.59528	2.7873	1.95992	1.27233	1.76272	1.31425	0.828259	0.729029	0.947222
1.58109	1.67075	2.85731	2.05999	1.28375	1.77702	1.33285	0.832475	0.732956	0.949067
1.61386	1.74078	2.92094	2.18697	1.29896	1.77976	1.34821	0.837761	0.740868	0.952347
1.64662	1.80394	2.97624	2.28586	1.31835	1.78181	1.36353	0.840981	0.750999	0.955586
1.67939	1.86242	3.02379	2.37129	1.32855	1.78318	1.39433	0.844813	0.758625	0.95775
1.71216	1.91998	3.07483	2.44891	1.33402	1.78809	1.42616	0.848064	0.765509	0.96433
1.74493	1.97046	3.1289	2.52165	1.33979	1.79096	1.44389	0.848149	0.77085	0.982681
1.7777	2.01514	3.18246	2.58919	1.34779	1.79843	1.46572	0.848281	0.778121	0.985837
1.81046	2.05643	3.24536	2.65001	1.35586	1.80292	1.48542	0.848699	0.78219	0.987388
1.84323	2.09745	3.32782	2.70593	1.36627	1.80359	1.50215	0.848511	0.787822	0.987233
1.876	2.13159	3.38069	2.75728	1.37502	1.79965	1.52251	0.850245	0.805952	0.989624
1.90877	2.15987	3.41503	2.80516	1.38323	1.79757	1.53872	0.853295	0.814413	0.992876
1.94154	2.18463	3.44508	2.84918	1.39182	1.79697	1.55263	0.855811	0.823703	0.995332
1.9743	2.20697	3.47598	2.88874	1.39853	1.79475	1.56936	0.858573	0.831364	0.995665
2.00707	2.23204	3.50343	2.92631	1.40657	1.7932	1.58318	0.861061	0.836757	0.996459
2.03984	2.26131	3.52501	2.96009	1.41588	1.79049	1.59521	0.862641	0.845407	0.997312
2.07261	2.2836	3.54196	2.99316	1.42993	1.7904	1.6032	0.863744	0.851479	0.997236
2.10538	2.30218	3.56245	3.02462	1.46239	1.79537	1.60818	0.86601	0.855149	0.997163
2.13814	2.31648	3.58121	3.05885	1.47152	1.79997	1.61018	0.869033	0.862717	0.995883
2.17091	2.32756	3.59223	3.09004	1.48135	1.80645	1.61221	0.872634	0.868926	0.993729
2.20368	2.33376	3.59839	3.11341	1.48503	1.81534	1.62075	0.882781	0.87254	0.992189
2.23645	2.33691	3.60676	3.13214	1.49406	1.82872	1.63226	0.887475	0.884201	0.991228
2.26922	2.34407	3.6264	3.14785	1.5057	1.85211	1.6387	0.888963	0.893609	0.993834
2.30198	2.35032	3.64932	3.16068	1.50815	1.85764	1.64502	0.89132	0.890828	0.992858
2.33475	2.3557	3.66533	3.17026	1.51176	1.85681	1.64822	0.895555	0.888331	0.991334
2.36752	2.36676	3.67725	3.18159	1.51508	1.86496	1.65359	0.89907	0.887546	0.992175
2.40029	2.40838	3.68555	3.19581	1.51987	1.87395	1.66041	0.901282	0.888514	0.991701
2.43306	2.42663	3.69397	3.20704	1.52336	1.88098	1.66567	0.904629	0.889946	0.990693
2.46582	2.43083	3.6995	3.21563	1.5235	1.88626	1.67326	0.907759	0.890491	0.988743
2.49859	2.43541	3.70471	3.23176	1.52557	1.88422	1.67947	0.912433	0.893207	0.988372

Step Time, s	Elongation			Force, N					
2.53136	2.44203	3.7135	3.30084	1.5282	1.88425	1.69128	0.911576	0.896531	0.987778
2.56413	2.45023	3.71935	3.3293	1.53261	1.88351	1.72386	0.911908	0.894741	0.988869
2.61328	2.45566	3.72773	3.34481	1.53787	1.87994	1.7329	0.910465	0.896254	1.00907
2.67882	2.4697	3.76233	3.36161	1.54612	1.87193	1.74649	0.90917	0.907716	1.01057
2.74435	2.48976	3.82116	3.37753	1.54874	1.85987	1.77051	0.914322	0.929398	1.01129
2.80989	2.50273	3.83502	3.39649	1.55259	1.85277	1.77969	0.911082	0.936925	1.01476
2.87542	2.51776	3.8449	3.41893	1.55698	1.84842	1.79384	0.908938	0.950785	1.01577
2.94096	2.52908	3.84682	3.44353	1.57328	1.84645	1.79648	0.909765	0.959436	1.01478
3.0065	2.52853	3.84812	3.47694	1.59357	1.84961	1.79533	0.908425	0.964324	1.01036
3.07203	2.52461	3.84792	3.49066	1.5982	1.85488	1.79876	0.913736	0.962698	1.00453
3.13757	2.52734	3.85735	3.49133	1.60312	1.87662	1.79766	0.91658	0.966433	0.997639
3.2031	2.52785	3.86091	3.48854	1.60044	1.86671	1.79383	0.918038	0.967077	0.988117
3.26864	2.56247	3.85558	3.48994	1.60205	1.87097	1.79502	0.916911	0.966374	0.978613
3.33418	2.58315	3.84378	3.48879	1.61127	1.87689	1.79927	0.918986	0.957011	0.972875
3.39971	2.58173	3.83982	3.54751	1.61924	1.88172	1.82673	0.914603	0.956251	0.97154
3.46525	2.57892	3.835	3.5563	1.61987	1.87896	1.84805	0.911703	0.958102	0.982825
3.53078	2.57416	3.8548	3.55331	1.60963	1.87385	1.8478	0.910459	0.958206	0.976264
3.59632	2.57055	3.89617	3.53574	1.60294	1.86689	1.85731	0.911474	0.970314	0.968798
3.66186	2.56614	3.89752	3.5193	1.59929	1.86625	1.86511	0.905001	0.982194	0.962932
3.72739	2.563	3.88464	3.51525	1.60128	1.8544	1.86647	0.89904	0.98895	0.962643
3.79293	2.55	3.8645	3.51192	1.60438	1.85256	1.8629	0.896445	0.98857	0.958929
3.85846	2.53154	3.85023	3.50997	1.6257	1.84478	1.85763	0.898791	0.985987	0.955378
3.924	2.51732	3.84538	3.49755	1.62233	1.85231	1.85554	0.910452	0.985458	0.95199
3.98954	2.50674	3.84768	3.47518	1.63096	1.8757	1.86374	0.907163	0.977908	0.946354
4.05507	2.49562	3.83136	3.4548	1.63083	1.86564	1.86468	0.905052	0.979282	0.939575
4.12061	2.51825	3.80754	3.43638	1.63026	1.85979	1.86254	0.904031	0.975821	0.932977
4.18614	2.53336	3.78044	3.4167	1.62028	1.86616	1.85619	0.903508	0.974034	0.928685
4.25168	2.53147	3.768	3.42507	1.61284	1.87067	1.87448	0.897869	0.973077	0.925478
4.31722	2.52374	3.75326	3.44349	1.61071	1.86143	1.88396	0.893226	0.972982	0.934658
4.38275	2.51303	3.74826	3.44303	1.61208	1.84829	1.87254	0.885023	0.974832	0.945905
4.44829	2.51044	3.77857	3.43656	1.6044	1.8285	1.87545	0.876445	0.980555	0.947237
4.51382	2.5091	3.77184	3.43459	1.60908	1.81526	1.86817	0.870955	0.980606	0.947913
4.57936	2.51464	3.75904	3.43346	1.60952	1.79936	1.87019	0.864185	0.982484	0.951326
4.6449	2.51509	3.74258	3.43356	1.60588	1.78488	1.86155	0.857848	0.993653	0.945452
4.71043	2.51051	3.74429	3.42432	1.62005	1.77972	1.83957	0.855289	0.988705	0.935577
4.77597	2.5012	3.74723	3.40229	1.61401	1.78643	1.82398	0.86284	0.978929	0.929788
4.8415	2.48861	3.75693	3.3729	1.61937	1.80488	1.8165	0.861686	0.967766	0.924023
4.90704	2.47453	3.75289	3.349	1.61645	1.80589	1.80428	0.854764	0.961048	0.916834
4.97258	2.47465	3.73831	3.33241	1.61226	1.8098	1.79037	0.846049	0.961444	0.911079
5.03811	2.48249	3.71678	3.32279	1.60838	1.81536	1.78187	0.842267	0.957663	0.906652

Step Time, s	Elongation			Force, N					
5.10365	2.46751	3.70414	3.36567	1.59736	1.817	1.80524	0.834451	0.948997	0.90534
5.16918	2.45174	3.68852	3.37001	1.58744	1.8131	1.81888	0.829405	0.950523	0.917282
5.26749	2.43288	3.70856	3.35477	1.57951	1.78211	1.81976	0.827572	0.957416	0.914547
5.39856	2.40734	3.69524	3.3285	1.5668	1.75434	1.80561	0.823954	0.955789	0.90793
5.52963	2.36555	3.65531	3.3072	1.58862	1.72865	1.78112	0.818202	0.956282	0.895535
5.6607	2.31463	3.62829	3.26303	1.5914	1.72396	1.75566	0.828163	0.949858	0.884637
5.79178	2.29764	3.58935	3.20679	1.60589	1.7166	1.73024	0.827529	0.931206	0.872943
5.92285	2.30688	3.53331	3.19616	1.60648	1.69981	1.71432	0.817809	0.917892	0.870491
6.05392	2.29589	3.4929	3.21983	1.59507	1.67428	1.72021	0.808548	0.914979	0.882724
6.18499	2.29857	3.5193	3.19932	1.59166	1.63146	1.70117	0.796681	0.930639	0.87663
6.31606	2.28785	3.4893	3.18528	1.59837	1.61549	1.67628	0.787018	0.921746	0.868313
6.44714	2.25639	3.4602	3.18945	1.60704	1.60331	1.6618	0.787513	0.911423	0.85063
6.57821	2.23018	3.44267	3.17004	1.60158	1.60524	1.64325	0.78396	0.897438	0.834111
6.70928	2.23928	3.40138	3.16427	1.58561	1.59686	1.63231	0.777868	0.87747	0.825094
6.84035	2.22575	3.38317	3.19997	1.56327	1.57453	1.63958	0.776807	0.872265	0.826312
6.97142	2.19674	3.4107	3.18062	1.55384	1.53948	1.6367	0.767122	0.877993	0.8403
7.1025	2.17358	3.39431	3.16462	1.55033	1.51328	1.62856	0.752734	0.874504	0.844828
7.23357	2.14433	3.33959	3.1651	1.56954	1.49983	1.60176	0.743011	0.87309	0.840467
7.36464	2.10959	3.30407	3.13494	1.56854	1.51042	1.58081	0.742209	0.859911	0.841633
7.49571	2.08985	3.26092	3.1189	1.56253	1.5077	1.56138	0.738862	0.849071	0.840101
7.62678	2.10027	3.21366	3.15545	1.54576	1.49201	1.55896	0.733003	0.839006	0.857436
7.75786	2.08738	3.20281	3.16702	1.52003	1.46239	1.55698	0.728602	0.828527	0.867996
7.88893	2.07984	3.22045	3.12044	1.50075	1.43137	1.55205	0.723465	0.832396	0.861325
8.02	2.06147	3.18012	3.10555	1.50862	1.41284	1.536	0.720305	0.833123	0.84489
8.15107	2.0184	3.15041	3.09891	1.512	1.40221	1.51228	0.727477	0.829623	0.834263
8.28214	1.99336	3.12308	3.05102	1.49981	1.39644	1.50055	0.73079	0.823819	0.828703
8.41322	2.02175	3.07765	3.02472	1.49216	1.38466	1.50067	0.729992	0.809599	0.823506
8.54429	1.99929	3.04281	3.0458	1.47662	1.35917	1.52069	0.720806	0.80435	0.832939
8.67536	1.95594	3.06401	3.01405	1.45603	1.32163	1.51349	0.709461	0.813194	0.832423
8.80643	1.91932	3.01805	2.99331	1.44557	1.30057	1.49752	0.70085	0.811982	0.824255
8.9375	1.87551	2.95921	2.96545	1.4608	1.30108	1.46514	0.701719	0.811823	0.818965
9.06858	1.84012	2.91589	2.91337	1.45955	1.30684	1.42953	0.707227	0.805166	0.810892
9.19965	1.83752	2.85666	2.88285	1.45444	1.29308	1.41858	0.692885	0.798958	0.797469
9.33072	1.82205	2.81071	2.88529	1.43764	1.27611	1.42624	0.682197	0.79401	0.787887
9.46179	1.79729	2.79955	2.87986	1.42141	1.25227	1.42807	0.675791	0.791825	0.792113
9.59286	1.79352	2.79499	2.85454	1.40876	1.21979	1.42674	0.663558	0.798737	0.780535
9.72394	1.7802	2.77308	2.8356	1.40303	1.19366	1.41408	0.655231	0.798419	0.773037
9.85501	1.74997	2.75866	2.80786	1.40613	1.18971	1.39245	0.657808	0.798249	0.759281
9.98608	1.72429	2.73312	2.76582	1.4063	1.18801	1.37968	0.658601	0.791151	0.752345
10.1172	1.71955	2.68271	2.74139	1.39601	1.18362	1.37319	0.653393	0.784385	0.745405

Step Time, s	Elongation			Force, N					
10.2482	1.68665	2.6486	2.74959	1.37428	1.17046	1.3757	0.647728	0.781851	0.754031
10.3793	1.65616	2.65252	2.70347	1.36149	1.14719	1.36326	0.641746	0.783111	0.748697
10.5759	1.60529	2.59833	2.66091	1.34091	1.11329	1.33786	0.626699	0.784064	0.72845
10.838	1.55709	2.55518	2.59676	1.34371	1.08144	1.30421	0.617647	0.758762	0.702046
11.1002	1.54366	2.48972	2.59467	1.30186	1.03856	1.29991	0.611196	0.747064	0.689248
11.3623	1.49884	2.47322	2.559	1.27329	0.987702	1.28187	0.601865	0.747959	0.684382
11.6245	1.44248	2.44142	2.50955	1.26593	0.960038	1.24698	0.602697	0.730102	0.668018
11.8866	1.40294	2.40028	2.469	1.24829	0.943848	1.22568	0.584818	0.707684	0.648396
12.1488	1.34274	2.37103	2.40023	1.21656	0.897482	1.21626	0.566482	0.702186	0.638717
12.4109	1.28643	2.28966	2.34431	1.19409	0.863769	1.17891	0.565213	0.689688	0.622284
12.6731	1.27614	2.22094	2.3379	1.17017	0.843164	1.16584	0.56531	0.669223	0.608673
12.9352	1.24331	2.19981	2.32555	1.1353	0.812603	1.15537	0.550908	0.654437	0.605178
13.1973	1.20631	2.16689	2.26181	1.11927	0.788706	1.12276	0.54034	0.64525	0.589078
13.4595	1.18445	2.0895	2.18437	1.10322	0.775975	1.08535	0.529654	0.62229	0.569996
13.7216	1.14438	2.02237	2.15475	1.06624	0.741624	1.06836	0.517906	0.609123	0.56422
13.9838	1.11458	1.97344	2.11171	1.04461	0.722963	1.0525	0.506135	0.593725	0.54372
14.2459	1.10787	1.89597	2.08222	1.02847	0.720074	1.03214	0.511452	0.579326	0.528699
14.5081	1.10026	1.85123	2.10905	0.997192	0.712487	1.01789	0.500602	0.565642	0.526726
14.7702	1.08486	1.83211	2.0653	0.979313	0.699672	0.992697	0.496677	0.560618	0.517626
15.0324	1.07648	1.77181	2.02315	0.970311	0.693625	0.953404	0.494304	0.539715	0.497905
15.2945	1.0741	1.6979	2.00721	0.929555	0.684881	0.938118	0.475227	0.518102	0.490161
15.5566	1.06145	1.65949	1.96967	0.896822	0.673605	0.934521	0.465398	0.515344	0.482284
15.8188	1.06655	1.58727	1.94329	0.895467	0.675085	0.909345	0.457685	0.505653	0.471421
16.0809	1.0952	1.53643	1.94105	0.881318	0.682911	0.885969	0.461494	0.489967	0.464032
16.3431	1.08802	1.54861	1.92511	0.854429	0.671707	0.878718	0.458292	0.484816	0.459377
16.6052	1.05868	1.53519	1.88528	0.842026	0.665129	0.848777	0.452353	0.475723	0.451622
16.8674	1.05146	1.48111	1.84145	0.819562	0.677336	0.824731	0.453892	0.452165	0.434329
17.1295	1.03659	1.4492	1.8293	0.78728	0.667841	0.827517	0.445769	0.445827	0.436408
17.3916	1.03221	1.40667	1.79392	0.782934	0.660959	0.807333	0.4436	0.45041	0.431217
17.6538	1.04186	1.38903	1.76375	0.777649	0.668033	0.78204	0.440361	0.439339	0.419658
17.9159	1.04332	1.40077	1.74295	0.754844	0.665629	0.785224	0.4357	0.423427	0.417486
18.1781	1.00543	1.41433	1.6842	0.736866	0.659807	0.76166	0.426775	0.424439	0.408209
18.4402	0.98035	1.38615	1.60274	0.725736	0.669826	0.734836	0.439991	0.41019	0.394754
18.7024	0.97086	1.35646	1.56949	0.704409	0.677202	0.738228	0.434354	0.398976	0.39447
18.9645	0.959899	1.34776	1.56558	0.69275	0.683321	0.734996	0.432022	0.400576	0.401766
19.2267	0.954222	1.33623	1.54437	0.690529	0.692644	0.710756	0.435417	0.392575	0.393284
19.4888	0.96759	1.35513	1.51983	0.677997	0.689353	0.692433	0.436053	0.379376	0.384673
19.7509	0.944564	1.39475	1.4982	0.651977	0.680269	0.684084	0.430857	0.374185	0.381838
20.0131	0.914311	1.40977	1.44628	0.638321	0.681996	0.671446	0.439491	0.369545	0.38024
20.2752	0.900365	1.40382	1.41851	0.630134	0.694993	0.663204	0.449069	0.35894	0.374982

Step Time, s	Elongation	Force, N							
20.5374	0.907369	1.42495	1.4345	0.612849	0.683377	0.67352	0.442496	0.358023	0.380731
20.7995	0.915284	1.44972	1.43733	0.608137	0.667711	0.652085	0.436185	0.354598	0.375437
21.1927	0.929786	1.50589	1.43357	0.593009	0.677831	0.628251	0.4412	0.337508	0.364402
21.717	0.896401	1.57905	1.38938	0.56681	0.669818	0.61867	0.450794	0.330251	0.361977
22.2413	0.930273	1.61778	1.40761	0.556057	0.647427	0.607964	0.445607	0.328228	0.358685
22.7656	0.963283	1.68005	1.39523	0.550757	0.627774	0.579427	0.447921	0.322684	0.356146
23.2899	0.961985	1.7414	1.36847	0.531863	0.59408	0.578042	0.454204	0.327256	0.357333
23.8142	0.998692	1.71538	1.38029	0.529497	0.548069	0.562555	0.471487	0.32615	0.365159
24.3385	1.02994	1.73575	1.40086	0.533273	0.503118	0.5479	0.493206	0.336983	0.361155
24.8628	1.01439	1.74759	1.41349	0.535371	0.446875	0.545357	0.535498	0.349895	0.374784
25.387	1.02962	1.68433	1.44201	0.549906	0.194079	0.538543	0.587515	0.365485	0.373419
25.9113	1.05596	1.69047	1.47485	0.555023	0.000827	0.535617	0.653869	0.386399	0.381907
26.4356	1.03817	1.68807	1.4642	0.572392	0.001443	0.540591	0.757062	0.422475	0.400977
26.9599	1.03052	1.58179	1.47861	0.599961	0.000962	0.531037	0.864798	0.461185	0.411916
27.4842	1.06945	1.50706	1.50888	0.618202	0.000845	0.541876	0.985805	0.522434	0.446838
28.0085	1.065	1.37991	1.49943	0.649353	0.001135	0.553357	1.12794	0.595207	0.475697
28.5328	1.06293	0.115236	1.51939	0.684126	0.001611	0.562427	1.22033	0.677273	0.51263
29.0571	1.08905	0.11811	1.57725	0.705821	0.00099	0.589409	1.30208	0.751265	0.548135
29.5813	1.06239	0.112791	1.58054	0.75102	0.000897	0.618949	1.30771	0.827399	0.58933
30.1056	1.00963	0.111132	1.58568	0.780474	0.001303	0.655229	1.1359	0.865053	0.613858
30.6299	1.02265	0.110052	1.59073	0.795439	0.001271	0.705659	0.342211	0.87153	0.630776
31.1542	0.948187	0.104536	1.50884	0.823545	0.00138	0.745702	0.049825	0.871007	0.627742
31.6785	0.875872	0.100296	1.49566	0.81238	0.001069	0.803108	0.048117	0.814157	0.605932
32.2028	0.86392	0.097167	1.43357	0.775184	0.001289	0.857135	0.046662	0.761323	0.591238
32.7271	0.727871	0.088622	1.30618	0.750179	0.000755	0.88929	0.046202	0.699314	0.559608
33.2514	0.286447	0.087758	1.21499	0.679603	0.001105	0.893329	0.045072	0.5851	0.513388
33.7756	0.083642	0.082712	1.10208	0.616371	0.001061	0.913152	0.043987	0.461511	0.476702
34.2999	0.079427	0.078806	0.762651	0.57612	0.001072	0.883129	0.041357	0.117973	0.437919
34.8242	0.074069	0.072303	0.086462	0.498593	0.000959	0.84452	0.040287	0.001161	0.38495
35.3485	0.068182	0.06696	0.079519	0.260399	0.000898	0.809367	0.038962	0.000982	0.345604
35.8728	0.063885	0.087799	0.076446	0.001553	0.001227	0.730329	0.036691	0.000822	0.133036
36.3971	0.058637	0.106648	0.071629	0.005769	0.001044	0.672675	0.034245	0.001068	0.07635

Table B3. 4% SBS Modified PG 64-22 (3 samples at 4°C, 3 samples at 12°C and 3 samples at 16°C).

Step Time, s	Elongation Force, N								
0	0	0	0	0	0	0	0	0	0
0.000544	0.013134	0.011728	0.014796	0.015642	0.014603	0.018075	0.015751	0.017904	0.018139
0.001568	0.100783	0.101623	0.103642	0.105929	0.104792	0.106146	0.104901	0.107045	0.108317
0.002592	0.12933	0.135193	0.130692	0.132635	0.131693	0.128861	0.130395	0.128873	0.133202
0.003616	0.085244	0.089172	0.088008	0.087172	0.086953	0.084544	0.085459	0.083199	0.089934
0.00464	0.038046	0.037988	0.040152	0.036456	0.038357	0.034807	0.036318	0.036159	0.039183
0.005664	0.012452	0.010795	0.012327	0.009841	0.012035	0.007124	0.009206	0.012093	0.008496
0.006688	0.004392	0.003012	0.002727	0.002968	0.002937	-0.00163	0.000515	0.004158	-0.00337
0.007712	0.003199	0.002359	0.000947	0.004208	0.002735	-0.00128	-0.00085	0.002089	-0.00473
0.008736	0.003145	0.003039	0.000948	0.006627	0.003902	0.001283	0.00081	0.000918	-0.00051
0.00976	0.00256	0.004331	0.002174	0.006168	0.003534	0.003539	0.004138	0.001072	0.004097
0.010784	0.00245	0.005147	0.004992	0.003429	0.002266	0.006714	0.006336	0.001365	0.004139
0.011808	0.002986	0.003521	0.006387	0.000722	0.001753	0.010158	0.006772	0.000778	0.001673
0.012832	0.003407	0.001109	0.003845	-0.00122	0.001375	0.009652	0.004839	-0.00026	0.001014
0.013856	0.003638	0.000286	-0.00014	-0.00218	0.001155	0.004199	0.001752	-0.00042	0.003067
0.01488	0.00353	0.000789	-0.0017	-0.00121	0.001499	-0.00126	0.000362	0.000169	0.004101
0.015904	0.003067	0.000892	-0.00015	0.000383	0.002233	-0.00507	0.000213	0.000959	0.003007
0.016928	0.000721	0.001373	0.001164	0.001234	0.001998	-0.0041	-0.00029	0.001545	0.001372
0.017952	-0.00147	0.001417	0.001464	0.001541	0.000595	0.000283	-0.0006	0.002478	0.002834
0.018976	-0.0018	0.000541	0.001557	0.001452	-0.00189	0.00449	0.000274	0.003284	0.004861
0.02	-0.00135	-0.00076	0.000833	0.001604	-0.0027	0.004524	0.001027	0.003369	0.004759
0.021024	-0.0004	-6.5E-05	4.63E-05	0.0021	-0.00018	0.001164	0.000644	0.001357	0.00274
0.022048	-9.7E-05	0.001419	0.000468	0.002322	0.002155	-0.00227	-0.00018	-0.00074	0.001859
0.023072	-0.00091	0.00223	0.001404	0.001345	0.000685	-0.00361	-0.00016	-0.00154	0.001645
0.024096	-0.00058	0.000628	0.001026	-8.9E-06	3.27E-05	-0.00297	0.001023	-0.00109	-0.0009
0.02512	0.00074	-0.00118	0.001296	-0.00052	0.002797	-0.00184	0.002053	0.000377	-0.00425
0.026144	0.00214	-0.00141	0.001737	0.000482	0.005575	-0.00085	0.000835	0.00203	-0.00315
0.027168	0.003049	7.77E-05	0.001047	0.001618	0.004054	0.001112	-0.00142	0.003175	0.001236
0.028192	0.003049	0.001729	-0.00086	0.002395	0.002367	0.004787	-0.00242	0.002582	0.003215
0.029216	0.001952	0.00187	-0.0022	0.001972	0.002054	0.00649	-0.00156	0.000479	0.001931
0.03024	0.000725	0.00161	-0.00074	0.001465	0.000895	0.00303	9.51E-05	-0.00077	-0.00149
0.031264	0.000304	0.001207	0.002035	0.000139	-0.00318	-0.00352	0.001785	-0.00095	-0.00485
0.032288	0.000442	-4.2E-05	0.003234	-0.00096	-0.00488	-0.0066	0.003712	-0.00124	-0.00611
0.033312	0.001597	-0.00061	0.001726	-0.00088	-0.00149	-0.00027	0.004539	-0.00212	-0.00492
0.034336	0.003688	0.000217	-0.00092	-0.00088	0.002755	0.009599	0.002778	-0.00239	0.000506
0.03536	0.004042	0.000945	-0.00197	-0.00088	0.003357	0.010836	0.001169	-0.00169	0.006382
0.036384	0.001946	0.00117	-0.00105	-0.00128	0.001346	0.003897	0.000801	0.000182	0.008864
0.037408	-0.00085	0.001769	0.000355	-0.00178	0.000239	-0.0025	0.00015	0.002488	0.005807

Step Time, s	Elongation Force, N								
0.038432	-0.00216	0.001072	0.001488	-0.00085	0.000247	-0.00469	-0.00037	0.003564	0.002367
0.039456	-0.00176	-9.7E-05	0.001761	0.000604	-0.00143	-0.00468	-0.00012	0.00317	0.000622
0.04048	-0.00152	-0.00085	0.000374	0.002727	-0.00363	-0.00449	-2.4E-05	0.00249	-0.00108
0.042016	-0.00044	0.000545	-0.00042	0.004171	-0.00045	0.000617	-0.00022	9.1E-05	-0.0008
0.044064	0.000264	0.000606	0.002283	0.000993	0.002262	0.005358	6.74E-05	-0.00188	0.004515
0.046112	0.001195	2.4E-05	-0.00023	-0.00197	0.002167	-0.00049	-0.00037	0.001963	-0.00049
0.04816	0.002572	0.000122	-0.0005	0.001651	0.004016	-0.00904	-0.00093	0.003683	-0.00454
0.050208	0.001186	0.00203	0.000938	0.003772	0.001102	0.004238	-0.00048	-0.0019	-0.00226
0.052256	0.000515	0.001134	0.001216	-0.00131	-0.0019	0.007571	0.005116	-0.00185	0.001315
0.054304	0.002591	-0.00154	0.000228	-0.00255	0.000463	0.002126	0.00144	-0.00095	0.001913
0.056352	0.002152	0.0006	-0.00079	-0.00144	0.001257	-0.00336	-0.00132	0.000364	-0.00011
0.0584	-0.0016	0.001851	0.000698	0.000368	-0.00198	0.000541	-0.00047	0.000877	0.001018
0.060448	-0.00141	0.00048	0.001855	0.002566	-0.00052	-9.3E-05	0.000733	0.002155	0.00655
0.062496	-0.00091	-2.4E-05	0.000738	0.002007	-0.00072	0.002757	-0.00016	0.000613	0.003143
0.064544	0.000152	0.000121	8.31E-05	0.000181	0.001879	-0.00527	0.000933	-0.00117	-0.00274
0.066592	0.001778	-0.00096	0.001819	-0.00013	0.003074	0.00074	0.000454	0.00105	-0.00554
0.06864	0.002382	0.001081	-0.00161	0.001779	0.003922	0.002437	-0.00204	0.00287	0.003407
0.070688	0.001048	0.002907	-2.24E-05	0.001249	0.000754	0.001947	6.75E-05	-0.00073	0.000312
0.072736	0.000278	0.000632	0.003661	-0.00116	-0.00246	0.002014	0.003096	-0.00109	-0.00643
0.074784	0.002141	-0.00119	-0.00016	-0.001	-0.00053	0.000808	0.002691	-0.00183	-0.00201
0.076832	0.001951	4.72E-05	-0.00023	-0.00072	0.002992	0.003884	-0.00031	-0.00095	0.007105
0.07888	-0.00139	0.00135	0.000305	-0.0004	-0.00214	-0.00062	-0.00103	0.002088	0.006866
0.080928	-0.00234	-0.00032	0.000239	0.001905	-0.00275	-0.00504	-0.00046	0.003626	-0.00174
0.082976	-0.00066	0.000216	0.00085	0.003186	0.000821	0.001053	0.000424	-0.00038	-0.00235
0.085024	9.31E-06	0.000289	0.002355	0.000536	0.002403	0.005046	0.001309	-0.00161	0.005967
0.087072	0.001495	-0.00017	0.000173	-0.002	0.003821	-0.00218	0.001496	0.002145	0.002594
0.08912	0.003126	0.000688	-0.00106	0.001402	0.003783	-0.00412	-0.00269	0.003208	-0.00635
0.091168	0.000567	0.002514	-0.0004	0.002972	-0.00118	0.00075	0.000643	-0.00142	-0.00643
0.093216	0.000132	0.000666	0.001811	-0.00149	-0.00095	0.005075	0.003273	-0.00203	0.002373
0.095264	0.002316	-0.00094	0.000581	-0.00171	-0.00046	0.005694	0.001301	-0.00058	0.002834
0.097312	0.001281	0.001083	-5.63E-05	-0.00159	0.002503	-0.00158	-0.00244	0.000595	0.001894
0.09936	-0.00192	0.000521	0.000253	0.000468	-0.00264	-0.00517	0.000213	0.001874	4.12E-05
0.101408	-0.00194	-0.00024	0.001187	0.003866	0.000898	0.001661	0.000159	0.002703	0.003805
0.103456	-0.00082	0.000574	0.000262	0.00205	3.58E-05	0.006135	0.002061	-0.00028	0.006815
0.105504	0.000765	0.000514	0.000545	-0.00037	0.002565	-0.00347	0.0004	-0.00138	-0.00083
0.107552	0.001658	-7E-05	0.000796	-0.0007	0.001267	-0.0054	0.00067	0.001689	-0.00542
0.1096	0.003319	0.000503	-0.00124	0.002166	0.004081	0.004242	-0.00044	0.002058	-0.00125
0.111648	0.001507	0.002194	0.000163	0.001852	-0.00101	0.006761	-4.3E-05	-0.00059	0.000539
0.113696	-0.00047	0.001028	0.002186	-0.0023	-0.00214	-0.00389	0.002279	-0.00113	-0.00229
0.115744	0.001764	-0.0013	-9.31E-05	-0.00157	-0.00028	0.002061	0.001132	-0.00111	-0.00217

Step Time, s	Elongation	Force, N							
0.117792	0.001161	0.000333	-0.00033	0.001127	0.003355	0.002024	-0.00137	-0.0002	0.004186
0.11984	-0.00265	0.000966	0.000581	0.000149	-0.00167	0.00088	0.000555	0.002235	0.007771
0.121888	-0.00135	0.000914	0.000978	0.001167	-0.00061	-0.00452	-0.0002	0.001729	0.001471
0.12496	0.000334	-1.6E-05	0.000957	0.001665	0.001174	0.00184	0.001027	-0.00137	6.25E-05
0.129056	0.002667	-9.1E-05	-0.00075	-0.0002	0.00278	-0.00025	-0.00028	0.002633	-0.00039
0.133152	-0.0001	0.001835	0.00184	0.000446	-0.00237	0.001884	0.001703	-0.00173	-0.00494
0.137248	0.001487	-0.00016	-0.00026	-0.00119	0.001828	0.00203	-0.00031	-0.00013	0.004797
0.141344	-0.00154	0.000901	0.000791	0.001733	-0.0006	-0.00202	5.86E-05	0.002666	0.000108
0.14544	0.00023	0.000164	0.000874	0.001002	0.001506	0.001805	0.001243	-0.00103	0.004578
0.149536	0.002632	-0.00059	-0.00093	0.000394	0.002041	-0.001	-0.00033	0.00182	-0.0061
0.153632	0.000194	0.00164	0.002124	-0.00017	-0.00125	0.002586	0.001257	-0.00121	0.001663
0.157728	0.001198	0.000253	0.000269	-0.0005	0.001989	-0.00062	-6E-05	-0.00032	0.000201
0.161824	-0.00176	6.22E-05	0.000271	0.001124	-0.00055	0.000995	-0.00023	0.002514	0.003921
0.16592	4.88E-05	0.000786	0.000256	0.000879	0.00123	-0.00071	0.000781	-0.00109	-0.00087
0.170016	0.002776	-0.00012	4.61E-05	0.000645	0.002341	0.00043	-9.5E-06	0.002111	0.000227
0.174112	-0.00028	0.001426	0.001907	0.000414	-0.00239	0.001817	0.002106	-0.00129	-0.00374
0.178208	0.001782	0.000225	-0.00069	-0.00087	0.002335	0.001448	-0.00074	0.000119	0.005429
0.182304	-0.00153	0.000768	0.000325	0.001478	-0.00064	-0.00167	2.06E-05	0.002207	-0.00089
0.1864	0.000385	-0.00019	0.000672	0.000512	0.000919	0.001494	0.001078	-0.00087	0.004169
0.190496	0.002338	0.000314	-0.00078	0.000752	0.001722	-0.00051	0.000185	0.002425	-0.00568
0.194592	9.51E-05	0.001514	0.002383	0.000378	-0.00184	0.003458	0.00244	-0.00182	0.002746
0.198688	0.001507	9.99E-06	-0.00035	-0.00129	0.00237	-0.00118	-0.00152	-0.00053	-0.00105
0.202784	-0.00124	6.72E-05	9.22E-06	0.000902	-0.00062	0.00145	0.000277	0.002429	0.005436
0.20688	-4.4E-05	0.000579	0.001031	0.001383	0.000974	-0.00053	0.000712	-0.00071	-0.00257
0.210976	0.002131	0.000256	-0.0003	0.000853	0.002593	0.000929	-0.0004	0.001726	0.000352
0.215072	4.17E-05	0.001446	0.002312	-0.00026	-0.00264	-0.00075	0.002135	-0.00178	-0.00426
0.219168	0.001821	-0.00046	-0.00034	-0.00096	0.002627	0.004606	-0.00061	-5.4E-05	0.00615
0.223264	-0.00138	-0.00021	-0.00044	0.001039	-0.00022	-0.00519	-0.00012	0.002293	-0.00094
0.22736	4.81E-05	0.001216	0.001119	0.000785	0.00148	0.003838	0.001522	-0.00077	0.003768
0.231456	0.001956	0.001205	-5.46E-05	0.001449	0.001288	-0.0015	-0.00035	0.00225	-0.00438
0.235552	-2.5E-05	0.000321	0.002205	-0.00027	-0.00124	0.004378	0.00192	-0.00153	0.000642
0.239648	0.001645	-0.0005	-0.00102	-0.00139	0.002163	-0.00125	-0.00086	0.000335	0.001475
0.243744	-0.00058	-7.2E-05	0.000558	0.001464	0.000104	-0.00051	0.000292	0.001911	0.002772
0.24784	-0.00028	0.001836	0.0006	0.001385	0.000673	0.001041	0.001222	-0.00063	-0.00016
0.251936	0.002206	0.000556	-0.00061	0.001644	0.001427	0.001095	-0.00041	0.001878	-0.00143
0.256032	4.04E-05	0.000544	0.002479	-0.00075	-0.00176	0.000308	0.002089	-0.00113	-0.00202
0.260128	0.001848	-0.00079	-0.00085	-0.00084	0.002441	0.001642	-0.00097	-0.00058	0.005227
0.264224	-0.00076	0.000702	0.000177	0.000508	-0.00057	-0.00131	-5.2E-05	0.002568	-0.00075
0.26832	-0.00051	0.000944	0.001371	0.001205	0.001807	0.00207	0.002007	-0.00074	0.003664
0.272416	0.00217	0.0013	-0.00065	0.000946	0.000655	-0.00252	-0.00076	0.002072	-0.00477

Step Time, s	Elongation Force, N								
0.276512	0.000145	-9.5E-05	0.002444	0.000153	-0.00098	0.003954	0.000937	-0.00198	0.000843
0.280608	0.00143	-0.00038	-0.00041	-0.00173	0.002141	-0.00084	-0.00081	0.000325	0.000873
0.284704	-0.00112	9.66E-06	-0.00054	0.002081	-4.6E-06	0.001543	0.000753	0.002256	0.002166
0.290848	0.000962	0.000945	0.000472	0.001108	0.001196	-0.00018	0.000787	0.001081	-0.00045
0.29904	0.000669	0.000168	0.000918	-0.00079	0.00049	0.001334	0.00013	-0.00059	0.001716
0.307232	-0.00066	0.00061	0.000617	0.000745	0.000387	6.25E-05	0.001362	0.001759	0.00063
0.315424	0.001515	0.00051	0.00091	0.000764	-0.0002	0.000376	0.0003	0.000359	-0.00126
0.323616	4.38E-05	0.000511	-0.00073	0.000155	0.001111	0.000778	-4.5E-05	0.001312	0.001595
0.331808	0.000735	0.000103	0.00036	0.001098	0.000314	-0.00045	0.000367	0.001121	-0.0009
0.34	0.001319	0.000623	0.001183	-0.00073	0.001049	0.001111	0.00016	-0.00115	0.001594
0.348192	-0.00092	0.000377	0.000505	0.000663	-0.00014	8.04E-05	0.0011	0.00149	0.000589
0.356384	0.001331	-8.2E-05	0.001095	0.001014	0.000369	0.000759	0.000191	-0.0004	-0.00142
0.364576	0.000309	0.000893	-0.00062	-0.00028	0.000883	-5.8E-05	8.23E-06	0.001391	0.001555
0.372768	7.6E-05	0.00036	0.000447	0.001358	0.000525	0.000212	0.000163	0.001008	-0.0009
0.38096	0.001553	0.000413	0.000718	-0.00075	0.000885	0.001206	0.000596	-0.00102	0.001422
0.389152	-0.00075	0.000403	0.000413	0.000576	-0.00023	-0.0007	0.001059	0.001832	0.001018
0.397344	0.001265	0.000258	0.001257	0.000982	0.000622	0.001757	0.000333	-0.00048	-0.0017
0.405536	0.000543	0.000618	-0.00043	8.59E-05	0.000544	-0.00014	6.41E-05	0.001423	0.002549
0.413728	5.64E-05	0.000585	1.24E-05	0.001134	0.000693	0.000649	-0.00017	0.000477	-0.00111
0.42192	0.001417	0.000251	0.001286	-0.00068	0.000768	0.00065	0.000625	-0.00048	0.001089
0.430112	-0.00049	0.000562	0.000208	0.000397	0.000289	-1.2E-05	0.001038	0.001127	0.001881
0.438304	0.001795	1.16E-05	0.001471	0.001072	0.000501	0.002839	0.000299	0.000102	-0.00125
0.446496	0.000798	0.000637	-0.00104	-0.00012	0.000717	0.00011	0.000494	0.001231	0.002417
0.454688	0.00064	0.000875	0.000681	0.001346	0.001789	0.000444	-0.00037	0.000648	-0.00049
0.46288	0.001306	-2.5E-08	0.000447	-0.00051	0.000976	0.000855	0.000764	-0.00041	0.002172
0.471072	0.000296	0.000984	0.000858	0.000359	0.000122	0.000536	0.001136	0.001364	0.000673
0.479264	0.001324	-0.00034	0.000997	0.001056	0.00098	0.001611	-4.1E-05	-0.00026	-0.00099
0.487456	0.000361	0.001067	-0.00094	-8.3E-05	0.000622	0.001032	0.000243	0.000782	0.001883
0.495648	0.000833	0.000391	0.000901	0.001346	0.001615	-3.5E-05	-0.00016	0.000889	-0.00093
0.50384	0.000855	0.000177	0.00058	-0.00084	0.000852	0.000798	0.000851	-0.00052	0.002723
0.512032	0.000378	0.001588	0.000942	0.000643	0.000478	0.001412	0.000997	0.001445	0.000151
0.520224	0.000885	-0.00022	0.001725	0.001637	0.001015	0.000169	0.000504	-0.00035	-3.7E-05
0.528416	0.000399	0.001723	-0.00129	0.00019	0.000658	0.001521	0.000778	0.000932	0.002002
0.536608	0.000782	0.000601	0.001278	0.001642	0.000684	-0.00025	-0.00012	0.000919	-0.00103
0.5448	0.000877	0.000203	0.000484	-0.00052	0.001054	0.001314	0.001558	-8.8E-05	0.002693
0.552992	0.000399	0.001432	0.001389	0.000363	0.000224	0.000491	0.000831	0.000789	-0.00016
0.561184	0.00089	-0.00078	0.00093	0.001402	0.000857	0.001497	0.000526	-0.00036	0.000371
0.569376	0.00096	0.002155	-0.00017	0.000211	0.000993	0.000438	0.001031	0.000634	0.001279
0.577568	-4.6E-05	7.39E-05	0.000977	0.001535	0.000546	0.000574	-0.00023	0.000987	-0.00138
0.58576	0.001525	0.001048	0.000262	-0.00019	0.001045	0.000186	0.001079	-0.00012	0.003173

Step Time, s	Elongation Force, N								
0.593952	0.000504	0.000675	0.001271	0.000488	0.000482	0.000665	0.001625	0.000814	0.000161
0.602144	0.000864	-0.00038	0.000885	0.001221	0.000711	0.002229	-3E-05	0.000274	0.00062
0.610336	0.001141	0.00224	-0.00018	0.000338	0.000586	0.000572	0.001032	0.00044	0.001193
0.622624	0.000731	0.000549	0.000823	0.000704	0.000831	0.000772	0.000295	0.000472	0.000895
0.639008	0.000778	0.000179	0.001077	0.000712	0.000693	0.001294	0.00054	0.000268	5.22E-05
0.655392	0.000335	0.000788	0.000295	0.000764	0.000629	-0.0001	0.000844	0.000914	7.19E-05
0.671776	0.000651	0.000466	0.000904	0.000191	0.000715	0.001202	0.000956	0.000739	0.001592
0.68816	0.001152	0.00112	0.000697	0.000942	0.000588	0.001233	0.000483	0.000205	0.000447
0.704544	0.000605	0.000632	0.000971	0.000511	0.001013	0.000221	0.00024	0.00083	0.000413
0.720928	0.000855	0.000384	0.001134	0.000939	0.000746	0.000613	0.000731	0.000775	0.000674
0.737312	0.000248	0.000938	0.000573	0.000857	0.000448	0.000807	0.00061	0.000819	0.000175
0.753696	0.00089	0.00032	0.000733	0.000531	0.000883	0.000356	0.000968	0.000768	0.000917
0.77008	0.000975	0.00121	0.000637	0.000807	0.000566	0.00055	0.000758	1.1E-05	0.00121
0.786464	0.000724	0.000752	0.001083	0.000805	0.000972	0.000705	0.000381	0.000905	0.000601
0.802848	0.000706	0.000498	0.000776	0.000657	0.000867	0.001146	0.000678	0.000635	0.000614
0.819232	0.000446	0.000903	0.00069	0.000836	0.000303	0.000288	0.000656	0.000702	-0.00036
0.835616	0.001181	0.000446	0.000855	0.000413	0.000808	0.000663	0.000744	0.000831	0.000876
0.852	0.00068	0.001194	0.000814	0.000975	0.000669	0.001327	0.000969	5.31E-06	0.001283
0.868384	0.001061	0.00157	0.004095	0.000997	0.001383	0.000168	0.000665	0.000814	0.000634
0.884768	0.004349	0.004187	0.004597	0.001864	0.001195	0.002892	0.00063	0.000748	0.003136
0.901152	0.005892	0.005587	0.005123	0.002596	0.003798	0.002783	0.001112	0.00106	0.003067
0.917536	0.009426	0.004043	0.019155	0.003147	0.016713	0.003771	0.001568	0.001729	0.009146
0.93392	0.033989	0.005159	0.051202	0.004558	0.0492	0.004305	0.004253	0.001273	0.03281
0.950304	0.053406	0.007062	0.080514	0.01155	0.05733	0.004368	0.004215	0.002742	0.07877
0.966688	0.088261	0.009981	0.133836	0.051035	0.081669	0.006339	0.010612	0.002654	0.104521
0.983072	0.167825	0.044206	0.190734	0.133843	0.116955	0.039868	0.034322	0.006261	0.123196
0.999456	0.232556	0.151768	0.218497	0.207719	0.135437	0.124045	0.076091	0.042565	0.157864
1.01584	0.331466	0.235294	0.282581	0.224504	0.159861	0.171419	0.120479	0.118696	0.188778
1.03222	0.442526	0.328454	0.379948	0.284564	0.196985	0.203719	0.154103	0.147123	0.213396
1.04861	0.553844	0.438086	0.495266	0.34147	0.229051	0.270384	0.17068	0.183151	0.230735
1.06499	0.672845	0.561176	0.611193	0.393069	0.26266	0.323893	0.196765	0.230449	0.246717
1.08138	0.797549	0.689318	0.726001	0.44413	0.296194	0.379606	0.227406	0.269766	0.26119
1.09776	0.923437	0.818904	0.847203	0.492948	0.330328	0.431923	0.253512	0.30335	0.273956
1.11414	1.04858	0.947208	0.966021	0.539983	0.362256	0.47924	0.278358	0.331241	0.290314
1.13053	1.16991	1.07152	1.08344	0.584664	0.393967	0.525527	0.302942	0.358311	0.30186
1.14691	1.28911	1.19047	1.19941	0.626676	0.42665	0.571436	0.324891	0.383239	0.315038
1.1633	1.40412	1.3072	1.31441	0.665679	0.459309	0.615768	0.347428	0.405259	0.327176
1.17968	1.51675	1.41944	1.42866	0.702351	0.492563	0.658783	0.365958	0.427734	0.336992
1.19606	1.62866	1.52694	1.54049	0.734618	0.524004	0.699803	0.384509	0.446637	0.348013
1.21245	1.73749	1.62858	1.64894	0.76613	0.564816	0.737882	0.401482	0.464782	0.357348

Step Time, s	Elongation	Force, N							
1.22883	1.84431	1.72706	1.75475	0.797385	0.606461	0.775002	0.419189	0.480337	0.367802
1.24522	1.94779	1.82497	1.85833	0.826318	0.642613	0.809012	0.436104	0.48932	0.377843
1.2616	2.04889	1.91942	1.95852	0.855355	0.677543	0.841624	0.450058	0.499019	0.385343
1.28618	2.19396	2.05533	2.10481	0.898155	0.725668	0.886275	0.472345	0.525939	0.398767
1.31894	2.3816	2.22658	2.29187	0.947875	0.787132	0.942879	0.499182	0.558243	0.417479
1.35171	2.55744	2.38706	2.46727	0.993409	0.845161	0.994188	0.5223	0.585862	0.434223
1.38448	2.72076	2.5398	2.63108	1.0371	0.899797	1.06184	0.543132	0.61007	0.447466
1.41725	2.8712	2.68464	2.78491	1.09073	0.960396	1.10761	0.561073	0.632778	0.459443
1.45002	3.00821	2.80521	2.92769	1.13575	1.01773	1.14439	0.580094	0.653661	0.471767
1.48278	3.133	2.91092	3.06105	1.16869	1.07057	1.17715	0.601474	0.67148	0.482473
1.51555	3.26134	3.01672	3.18946	1.19693	1.12072	1.20868	0.621519	0.686917	0.491826
1.54832	3.38554	3.12249	3.33608	1.22259	1.16941	1.24499	0.648602	0.711982	0.499868
1.58109	3.52884	3.21853	3.48523	1.25095	1.21511	1.27637	0.662922	0.730737	0.507476
1.61386	3.67094	3.31043	3.6085	1.28259	1.25647	1.30138	0.674189	0.743603	0.515211
1.64662	3.79017	3.40352	3.70986	1.30571	1.29484	1.32439	0.684978	0.75566	0.523444
1.67939	3.88662	3.51002	3.80447	1.32514	1.3308	1.34603	0.695038	0.766524	0.531264
1.71216	3.97185	3.63364	3.89367	1.34472	1.36529	1.3646	0.70887	0.780959	0.539304
1.74493	4.05062	3.72577	3.98875	1.36248	1.39723	1.38016	0.721197	0.794662	0.551844
1.7777	4.12817	3.80044	4.07974	1.3788	1.4287	1.39429	0.732261	0.803337	0.561694
1.81046	4.20723	3.87062	4.15803	1.39341	1.45906	1.40742	0.742598	0.811025	0.570492
1.84323	4.27263	3.93939	4.23021	1.40483	1.48666	1.41934	0.753716	0.819259	0.579417
1.876	4.33035	4.01747	4.29885	1.4146	1.50974	1.42951	0.761304	0.827939	0.593459
1.90877	4.38304	4.09215	4.36207	1.42277	1.53091	1.43879	0.76665	0.835609	0.608003
1.94154	4.4278	4.15653	4.41868	1.43129	1.5509	1.44847	0.772958	0.841208	0.615797
1.9743	4.46136	4.2199	4.4695	1.44075	1.57135	1.45872	0.777974	0.845457	0.622649
2.00707	4.48466	4.28822	4.51483	1.45259	1.59257	1.46816	0.783075	0.849265	0.63051
2.03984	4.49125	4.34217	4.55717	1.46451	1.61604	1.47483	0.786733	0.852067	0.637282
2.07261	4.50129	4.38446	4.60113	1.4749	1.64248	1.48246	0.790195	0.855264	0.642494
2.10538	4.5195	4.4197	4.64905	1.48759	1.68657	1.48992	0.793691	0.857868	0.646703
2.13814	4.54089	4.44983	4.68807	1.5013	1.70639	1.49678	0.796867	0.861423	0.651484
2.17091	4.55283	4.47938	4.71826	1.51155	1.72182	1.50474	0.800944	0.865473	0.655803
2.20368	4.56247	4.51209	4.74411	1.52314	1.73508	1.51682	0.804578	0.867292	0.658752
2.23645	4.5709	4.54971	4.7666	1.53612	1.74903	1.5436	0.81008	0.869426	0.661246
2.26922	4.57822	4.5761	4.78434	1.55261	1.76703	1.55871	0.814684	0.872167	0.663446
2.30198	4.58287	4.59526	4.79818	1.57855	1.78452	1.56538	0.819181	0.875585	0.665467
2.33475	4.59338	4.61076	4.81195	1.58881	1.79814	1.57212	0.82719	0.881404	0.667051
2.36752	4.60602	4.62068	4.83257	1.59532	1.81108	1.57771	0.831499	0.886519	0.669331
2.40029	4.61552	4.62642	4.8547	1.60001	1.82515	1.58838	0.844773	0.899192	0.671011
2.43306	4.62451	4.63346	4.90147	1.61042	1.83728	1.6002	0.856652	0.909092	0.674116
2.46582	4.66233	4.64483	4.94908	1.62098	1.84659	1.6048	0.861062	0.911064	0.677959

Step Time, s	Elongation	Force, N							
2.49859	4.71091	4.65606	4.98712	1.62414	1.85372	1.60737	0.865998	0.912346	0.680817
2.53136	4.71497	4.66657	5.00645	1.62684	1.85933	1.60968	0.869171	0.914171	0.683937
2.56413	4.70512	4.69691	5.02042	1.63622	1.86341	1.6121	0.873985	0.921413	0.687489
2.61328	4.71066	4.78733	5.0446	1.64884	1.87009	1.61263	0.882511	0.925312	0.692746
2.67882	4.7399	4.81297	5.0967	1.65653	1.87591	1.60888	0.885657	0.930774	0.698031
2.74435	4.75887	4.84322	5.14304	1.65815	1.87619	1.60643	0.884289	0.936056	0.712642
2.80989	4.78395	4.86705	5.1855	1.65828	1.88347	1.61647	0.88393	0.937331	0.719406
2.87542	4.79092	4.88643	5.20014	1.66002	1.89975	1.62215	0.88417	0.939153	0.722335
2.94096	4.80302	4.88764	5.21322	1.65665	1.93008	1.62852	0.884087	0.941085	0.729946
3.0065	4.81942	4.88472	5.21961	1.65234	1.94913	1.63935	0.884316	0.941194	0.735056
3.07203	4.80843	4.89492	5.19651	1.6506	1.94651	1.65498	0.884997	0.940253	0.736037
3.13757	4.79037	4.89741	5.15889	1.6819	1.95544	1.67153	0.889801	0.94212	0.734916
3.2031	4.78369	4.88834	5.13157	1.68349	1.96624	1.66895	0.894717	0.948798	0.735325
3.26864	4.78696	4.88678	5.11212	1.67851	1.97574	1.67089	0.901338	0.96707	0.737223
3.33418	4.84544	4.90355	5.16239	1.6812	1.97867	1.67848	0.918616	0.967005	0.738379
3.39971	4.90602	4.93379	5.18927	1.68501	1.97735	1.68164	0.926872	0.967822	0.741364
3.46525	4.93064	5.03435	5.18389	1.68806	1.98144	1.67837	0.936904	0.971895	0.744637
3.53078	4.96143	5.06024	5.19214	1.687	1.98346	1.67422	0.941727	0.975215	0.747788
3.59632	4.96904	5.08639	5.19193	1.68904	1.97641	1.67255	0.943811	0.972602	0.762547
3.66186	4.96028	5.09471	5.20445	1.69124	1.97738	1.67393	0.943389	0.969647	0.769792
3.72739	4.92677	5.08848	5.20995	1.69243	1.97736	1.66581	0.943648	0.965929	0.775972
3.79293	4.89152	5.08495	5.23786	1.69916	1.99672	1.66394	0.945625	0.966591	0.776849
3.85846	4.86144	5.08245	5.24203	1.7071	2.0195	1.65893	0.945179	0.964187	0.776816
3.924	4.82645	5.08312	5.2212	1.71624	2.01472	1.65699	0.946499	0.957909	0.776425
3.98954	4.78535	5.07546	5.19417	1.74333	2.01962	1.67574	0.949143	0.951215	0.776549
4.05507	4.75706	5.06253	5.17322	1.75537	2.01735	1.67286	0.952805	0.950962	0.778875
4.12061	4.74688	5.05034	5.1462	1.75882	2.02331	1.67185	0.965876	0.959989	0.784218
4.18614	4.80886	5.04171	5.17956	1.76829	2.01677	1.66438	0.979205	0.960218	0.786103
4.25168	4.82931	5.03603	5.18263	1.77043	2.00597	1.66325	0.982264	0.963204	0.790823
4.31722	4.82111	5.09951	5.15896	1.78167	2.00391	1.65584	0.989284	0.967618	0.798504
4.38275	4.82341	5.10253	5.1367	1.79005	1.99671	1.64476	0.994637	0.97297	0.803351
4.44829	4.80995	5.09591	5.11147	1.79484	1.98339	1.64091	0.995757	0.98198	0.815071
4.51382	4.81334	5.09501	5.07962	1.79516	1.97376	1.63967	0.992821	0.986094	0.814342
4.57936	4.82304	5.09987	5.03641	1.78987	1.95914	1.63149	0.98665	0.991072	0.815379
4.6449	4.8416	5.08372	5.00587	1.78532	1.96633	1.62515	0.979829	0.991923	0.814257
4.71043	4.85044	5.06497	4.98403	1.78479	1.97399	1.61692	0.971458	0.988729	0.813767
4.77597	4.84754	5.06064	4.96323	1.78982	1.95991	1.62449	0.967168	0.987506	0.808106
4.8415	4.83661	5.04898	4.95383	1.80388	1.95763	1.64157	0.968384	0.988113	0.803204
4.90704	4.8358	5.0175	4.9583	1.82282	1.94971	1.63298	0.968489	0.990359	0.799332
4.97258	4.83833	4.99244	4.96489	1.81442	1.94857	1.63028	0.978337	0.998505	0.801212

Step Time, s	Elongation	Force, N							
5.03811	4.89271	4.98083	5.03476	1.81001	1.94348	1.62139	0.989115	1.00456	0.802086
5.10365	4.93009	4.97656	5.03718	1.79839	1.93771	1.61166	0.995618	1.00317	0.800504
5.16918	4.92635	5.06184	5.03145	1.7886	1.93737	1.59687	1.00578	1.00199	0.799515
5.26749	4.93355	5.07367	5.01127	1.76611	1.93523	1.58245	1.01118	1.00341	0.810886
5.39856	4.92931	5.06751	4.99174	1.74988	1.93654	1.58222	1.00926	0.992022	0.817676
5.52963	4.90831	5.05132	4.99821	1.7486	1.95872	1.59105	1.00188	0.983165	0.829481
5.6607	4.87029	5.04307	4.9574	1.75434	1.95933	1.61994	1.00078	0.971339	0.835504
5.79178	4.83083	5.00223	4.90516	1.77849	1.95565	1.62171	1.00179	0.970619	0.834036
5.92285	4.88538	4.96199	4.93079	1.77964	1.94266	1.60103	1.00004	0.984498	0.83057
6.05392	4.89205	5.00162	4.89356	1.77531	1.91926	1.5793	0.992714	0.993791	0.829185
6.18499	4.87747	4.96007	4.86543	1.75896	1.89028	1.56581	0.976573	0.991311	0.838545
6.31606	4.85247	4.92956	4.80788	1.74014	1.88032	1.55887	0.96297	0.980102	0.838482
6.44714	4.8438	4.88301	4.74594	1.71753	1.88959	1.56461	0.957832	0.97144	0.841595
6.57821	4.82289	4.84586	4.68155	1.71795	1.87383	1.58554	0.961573	0.968389	0.832703
6.70928	4.82824	4.80492	4.6842	1.70464	1.85938	1.57957	0.971734	0.978179	0.827962
6.84035	4.84332	4.82157	4.71812	1.7028	1.83893	1.57478	0.970132	0.977003	0.826322
6.97142	4.81161	4.80797	4.70311	1.69668	1.82283	1.55181	0.963486	0.972059	0.833707
7.1025	4.76383	4.79704	4.65587	1.67527	1.81625	1.53386	0.953215	0.961649	0.840819
7.23357	4.7104	4.78217	4.61342	1.65279	1.83751	1.51442	0.953353	0.957216	0.841312
7.36464	4.64847	4.79269	4.5556	1.64468	1.83912	1.51914	0.952693	0.950308	0.834081
7.49571	4.5904	4.76902	4.50987	1.64724	1.82876	1.51645	0.957403	0.947568	0.820994
7.62678	4.62391	4.7699	4.53485	1.66011	1.80147	1.50659	0.964567	0.947377	0.813663
7.75786	4.59624	4.81779	4.49075	1.64583	1.7735	1.48939	0.960105	0.94437	0.810514
7.88893	4.58577	4.79226	4.45301	1.6175	1.74437	1.47151	0.957781	0.934139	0.819419
8.02	4.54014	4.75332	4.39394	1.59785	1.73145	1.45313	0.953879	0.918781	0.817867
8.15107	4.51659	4.70531	4.34629	1.59332	1.72552	1.44626	0.94849	0.913507	0.810005
8.28214	4.48309	4.6806	4.30612	1.60948	1.71712	1.45719	0.941615	0.920409	0.794727
8.41322	4.48924	4.65885	4.32747	1.60972	1.69789	1.44904	0.955123	0.940692	0.785148
8.54429	4.47907	4.70102	4.30741	1.61311	1.66606	1.43111	0.957038	0.946689	0.777653
8.67536	4.44283	4.69872	4.27379	1.59431	1.64986	1.41301	0.961268	0.938041	0.78533
8.80643	4.39289	4.70355	4.22965	1.579	1.64774	1.39957	0.952519	0.915622	0.794827
8.9375	4.35088	4.67362	4.1866	1.56365	1.66652	1.38353	0.946392	0.897884	0.788002
9.06858	4.30055	4.65139	4.1212	1.56858	1.65402	1.38641	0.939252	0.886964	0.781456
9.19965	4.28045	4.60687	4.10947	1.57216	1.63904	1.37664	0.946448	0.892866	0.769961
9.33072	4.32464	4.58321	4.12905	1.57152	1.60321	1.36713	0.952942	0.894162	0.755836
9.46179	4.29544	4.63239	4.1025	1.56128	1.58039	1.34669	0.950236	0.894475	0.741475
9.59286	4.29406	4.6195	4.07272	1.54211	1.56358	1.33089	0.939508	0.885386	0.736002
9.72394	4.26601	4.58696	4.01257	1.52791	1.5657	1.31696	0.92637	0.874335	0.736425
9.85501	4.23226	4.53347	3.96215	1.5112	1.56107	1.31775	0.909963	0.867027	0.739449
9.98608	4.17979	4.49262	3.91332	1.52308	1.55559	1.33264	0.905125	0.868571	0.734889

Step Time, s	Elongation Force, N								
10.1172	4.18349	4.45558	3.93317	1.51226	1.54639	1.34763	0.914607	0.881475	0.727981
10.2482	4.18204	4.49617	3.91124	1.50025	1.52679	1.35928	0.915234	0.872745	0.715359
10.3793	4.14352	4.4921	3.90564	1.47362	1.51018	1.34524	0.912874	0.865963	0.708366
10.5759	4.05926	4.46168	3.85711	1.44468	1.50885	1.31892	0.897933	0.840943	0.71396
10.838	3.93423	4.3799	3.77016	1.45012	1.49526	1.3123	0.882534	0.822781	0.703654
11.1002	3.93993	4.30899	3.74727	1.43933	1.46322	1.30149	0.883889	0.824313	0.681105
11.3623	3.88946	4.24212	3.6472	1.40113	1.44591	1.26714	0.865903	0.81414	0.676046
11.6245	3.80824	4.16461	3.53653	1.3815	1.44329	1.28479	0.843117	0.800187	0.65672
11.8866	3.74901	4.1	3.57065	1.37603	1.42327	1.28892	0.844002	0.796879	0.642418
12.1488	3.6844	4.08641	3.52787	1.32506	1.40091	1.25156	0.838129	0.778761	0.651676
12.4109	3.55205	4.02495	3.43359	1.30608	1.4045	1.23657	0.825183	0.757802	0.640262
12.6731	3.48552	4.0826	3.38293	1.31461	1.38749	1.22351	0.821312	0.755336	0.626898
12.9352	3.46713	4.15259	3.3187	1.29354	1.36083	1.19625	0.814416	0.751729	0.616901
13.1973	3.44317	3.89285	3.22113	1.26551	1.3407	1.19044	0.791073	0.734565	0.614022
13.4595	3.4325	3.72852	3.18659	1.25216	1.32043	1.20274	0.78607	0.73259	0.595105
13.7216	3.29131	3.76983	3.18272	1.23247	1.30433	1.18886	0.793482	0.73112	0.597075
13.9838	3.18901	3.73493	3.12468	1.20451	1.30643	1.15771	0.782573	0.709904	0.600148
14.2459	3.10825	3.63888	3.09442	1.20636	1.2996	1.15395	0.768371	0.699933	0.586802
14.5081	3.11117	3.57164	3.025	1.19169	1.26454	1.13898	0.766939	0.703643	0.573091
14.7702	3.07898	3.50331	2.96314	1.16048	1.2421	1.11692	0.751187	0.695204	0.570731
15.0324	2.99337	3.43756	2.89779	1.1508	1.24384	1.12638	0.738435	0.681128	0.561854
15.2945	2.97813	3.43785	2.90779	1.13647	1.22489	1.12542	0.748357	0.681703	0.55551
15.5566	2.90219	3.4265	2.88083	1.1079	1.21264	1.0997	0.740251	0.667678	0.563849
15.8188	2.81981	3.34545	2.80689	1.10515	1.22473	1.09252	0.731606	0.650759	0.559019
16.0809	2.83619	3.27036	2.76753	1.11489	1.2056	1.08773	0.740869	0.657833	0.545145
16.3431	2.84654	3.2304	2.71535	1.08827	1.17533	1.07902	0.726468	0.659226	0.540651
16.6052	2.822	3.17157	2.66726	1.07808	1.16758	1.08817	0.710523	0.651561	0.537314
16.8674	2.78104	3.13777	2.67819	1.08445	1.16303	1.10649	0.721315	0.652073	0.528319
17.1295	2.73795	3.16393	2.69709	1.06147	1.15313	1.09592	0.735092	0.643441	0.534106
17.3916	2.67173	3.10804	2.64842	1.05241	1.16954	1.08163	0.726362	0.6292	0.535961
17.6538	2.67083	3.01563	2.61614	1.07059	1.16725	1.09062	0.72157	0.630552	0.52604
17.9159	2.72301	2.99012	2.61482	1.07437	1.14117	1.07641	0.729976	0.638852	0.524425
18.1781	2.71148	2.95948	2.56982	1.04684	1.13464	1.07643	0.720752	0.634303	0.524936
18.4402	2.6592	2.92914	2.56411	1.04841	1.14003	1.10458	0.718419	0.629523	0.5243
18.7024	2.6719	2.94321	2.62789	1.05378	1.14538	1.11558	0.731752	0.642008	0.524874
18.9645	2.63893	2.94932	2.63832	1.04291	1.15493	1.10624	0.729171	0.630213	0.532781
19.2267	2.63338	2.89813	2.60592	1.04878	1.17757	1.10557	0.723669	0.625527	0.53054
19.4888	2.70078	2.84445	2.61715	1.06725	1.16883	1.11206	0.732157	0.640925	0.524822
19.7509	2.75126	2.83128	2.60727	1.06185	1.14876	1.10938	0.729912	0.645443	0.531035
20.0131	2.73643	2.83245	2.61735	1.05288	1.1624	1.12624	0.728143	0.639637	0.536133

Step Time, s	Elongation Force, N								
20.2752	2.73756	2.85004	2.66927	1.06141	1.17747	1.16698	0.747557	0.650079	0.541551
20.5374	2.74126	2.88345	2.71841	1.06196	1.18393	1.16033	0.757947	0.657827	0.551508
20.7995	2.75175	2.85245	2.71853	1.06658	1.20456	1.14987	0.754087	0.653463	0.564333
21.1927	2.85439	2.78882	2.73298	1.10268	1.20896	1.16521	0.757651	0.676475	0.564227
21.717	2.90612	2.83224	2.75075	1.10428	1.22148	1.19388	0.77111	0.692102	0.588551
22.2413	2.97094	2.88075	2.89118	1.12308	1.26285	1.24289	0.807948	0.713288	0.618672
22.7656	3.12168	2.84528	2.94124	1.17225	1.33521	1.26012	0.824427	0.746372	0.641755
23.2899	3.28131	2.93059	3.03164	1.19851	1.37792	1.29043	0.854731	0.794702	0.67948
23.8142	3.40957	3.04446	3.22788	1.23901	1.46933	1.36737	0.90567	0.839555	0.73372
24.3385	3.64941	3.08119	3.36946	1.31371	1.58643	1.40729	0.938118	0.897332	0.792646
24.8628	3.93692	3.20555	3.53953	1.39703	1.66574	1.463	0.994585	0.977512	0.863163
25.387	4.11189	3.40253	3.80367	1.49156	1.81115	1.58542	1.07377	1.05451	0.965683
25.9113	4.44818	3.55617	4.06965	1.64328	1.97593	1.66971	1.15176	1.15705	1.08431
26.4356	4.8265	3.73571	4.30461	1.82719	2.10336	1.78386	1.25578	1.30227	1.20804
26.9599	5.0338	4.01566	4.63791	1.98274	2.27065	1.94451	1.3959	1.42853	1.39808
27.4842	5.34167	4.28807	4.99692	2.21637	2.48989	2.09718	1.52182	1.58415	1.57467
28.0085	5.20062	4.50123	5.17054	2.47772	2.6875	2.26005	1.67524	1.78176	1.75168
28.5328	-0.00509	4.89691	5.42034	2.67839	2.82153	2.4614	1.86783	1.94268	2.00667
29.0571	0.000712	5.1641	5.50241	2.93621	3.10077	2.63042	2.05272	2.12828	2.17825
29.5813	0.001007	5.38073	0.002665	3.21449	3.28987	2.72687	2.204	2.33287	2.33317
30.1056	0.001171	5.78049	0.000759	3.39146	3.33903	2.83573	2.42549	2.472	2.55161
30.6299	0.001094	5.84495	0.001003	3.61722	3.49931	3.01465	2.55368	2.56853	2.65638
31.1542	0.001589	5.61955	0.001126	3.85278	3.59171	2.9157	2.63346	2.6907	2.64343
31.6785	0.001174	3.91591	0.00105	3.90354	3.34495	2.19635	2.80487	2.72393	2.65001
32.2028	0.001583	0.000654	0.001011	3.77608	2.32684	0.000187	2.85605	2.67202	2.33673
32.7271	0.001298	0.000728	0.000976	2.98826	0.000333	0.000408	2.77599	2.56287	0.428423
33.2514	0.001336	0.001036	0.00131	0.000207	0.001215	0.000984	2.64842	0.687119	0.000813
33.7756	0.001258	0.001134	0.000909	0.000513	0.000942	0.001001	1.01433	0.003315	0.000547
34.2999	0.001223	0.001148	0.001208	0.000875	0.000916	0.001483	0.000393	0.00919	0.001285
34.8242	0.001241	0.000921	0.000985	0.001145	0.00106	0.000936	0.000907	0.007427	0.000779
35.3485	0.001169	0.00093	0.000887	0.000897	0.001888	0.000628	0.001142	0.004565	0.001215
35.8728	0.001066	0.001756	0.001305	0.000906	0.001396	0.001139	0.000688	0.008264	0.001068
36.3971	0.00188	0.001365	0.000954	0.000946	0.000885	0.000899	0.00081	0.008461	0.000794

Table B4. 6% SBS Modified PG 64-22 (3 samples at 4°C, 3 samples at 12°C and 3 samples at 16°C).

Step Time, s	Elongation Force, N								
0	0	0	0	0	0	0	0	0	0
0.000544	0.01162	0.014627	0.015082	0.018897	0.014669	0.013495	0.014913	0.015823	0.013166
0.001568	0.100645	0.104593	0.103791	0.107903	0.107112	0.104016	0.103145	0.106265	0.10112
0.002592	0.131802	0.131697	0.129894	0.129206	0.137289	0.134945	0.128329	0.131685	0.132516
0.003616	0.084736	0.087453	0.085819	0.086033	0.090189	0.092279	0.08518	0.086628	0.089944
0.00464	0.039215	0.040115	0.039649	0.043758	0.038713	0.045158	0.042571	0.040259	0.038082
0.005664	0.01953	0.013919	0.017741	0.022931	0.01578	0.019255	0.025361	0.019015	0.007781
0.006688	0.01099	0.004073	0.014166	0.015277	0.0108	0.009366	0.025407	0.017088	-0.00329
0.007712	0.004981	0.001307	0.015339	0.010242	0.005851	0.006762	0.030345	0.023314	-0.00526
0.008736	0.003408	0.0013	0.01539	0.006617	0.0005	0.005203	0.033992	0.032713	-0.00306
0.00976	0.006874	0.001376	0.014773	0.006547	0.004218	0.003586	0.035514	0.04286	0.001707
0.010784	0.010326	0.000658	0.014276	0.008347	0.01581	0.004455	0.033168	0.051105	0.006103
0.011808	0.01085	0.000362	0.014071	0.010995	0.022317	0.007596	0.029207	0.053575	0.007491
0.012832	0.008551	0.001365	0.012618	0.012989	0.013675	0.008758	0.029433	0.05015	0.005056
0.013856	0.00471	0.002115	0.009971	0.012656	-0.00202	0.006243	0.032691	0.043864	0.001629
0.01488	0.002214	0.002192	0.007969	0.008954	-0.00713	0.001939	0.033536	0.03927	5.68E-06
0.015904	0.002642	0.001398	0.00778	0.00466	0.001757	0.000492	0.031599	0.036704	0.001293
0.016928	0.004361	0.000853	0.009595	0.003326	0.00594	0.002391	0.028853	0.037022	0.003619
0.017952	0.005958	0.000901	0.011787	0.004845	0.00173	0.003603	0.025692	0.041324	0.004422
0.018976	0.005562	0.001531	0.013012	0.007079	0.004878	0.004293	0.025025	0.045733	0.004387
0.02	0.004453	0.002197	0.01321	0.009388	0.016108	0.006687	0.02701	0.046254	0.003996
0.021024	0.002787	0.001759	0.012187	0.012837	0.015663	0.009066	0.028155	0.041118	0.003027
0.022048	0.002639	0.000144	0.011662	0.015239	0.003602	0.00885	0.027973	0.034726	-0.00026
0.023072	0.003578	-0.00139	0.012163	0.01431	-0.00319	0.004966	0.028875	0.033367	-0.00403
0.024096	0.004398	-0.00109	0.011893	0.010684	0.000634	-0.0003	0.03142	0.035526	-0.00443
0.02512	0.005192	0.000677	0.010097	0.007629	0.006443	-0.00173	0.032182	0.036879	-0.00144
0.026144	0.006894	0.002258	0.008246	0.005485	0.005958	0.002222	0.029939	0.038811	0.000413
0.027168	0.007212	0.002438	0.007687	0.003551	0.002863	0.007064	0.026763	0.043556	-0.00097
0.028192	0.005114	0.00076	0.008959	0.003618	0.006403	0.01037	0.025388	0.045179	-0.00268
0.029216	0.002754	-0.0008	0.011563	0.007591	0.01447	0.010822	0.02701	0.040651	-0.00348
0.03024	0.002112	-0.00083	0.013803	0.012496	0.014329	0.007927	0.029487	0.035884	-0.00365
0.031264	0.002657	-0.00079	0.015124	0.01437	0.000179	0.003518	0.03066	0.034707	-0.00252
0.032288	0.002964	-0.00087	0.014566	0.012128	-0.00933	-0.00034	0.030021	0.035193	0.000616
0.033312	0.004373	-0.00022	0.011513	0.007701	-0.00183	-0.00186	0.027724	0.036216	0.004268
0.034336	0.008788	0.000445	0.008864	0.003856	0.011909	-0.00124	0.024747	0.03962	0.006376
0.03536	0.009826	0.000935	0.007535	0.002373	0.009114	0.000901	0.023576	0.045041	0.005718
0.036384	0.005631	0.001042	0.007503	0.002714	0.008015	0.005192	0.024777	0.046354	0.002584
0.037408	0.000376	0.000857	0.009666	0.005321	0.016681	0.009495	0.027836	0.04325	0.000288
0.038432	-0.00072	0.001468	0.011912	0.009851	0.015591	0.01026	0.031381	0.038882	0.000275

Step Time, s	Elongation	Force, N							
0.039456	0.000605	0.002464	0.013483	0.013102	-0.00699	0.006354	0.033629	0.036732	0.001317
0.04048	0.001864	0.002329	0.013641	0.01348	-0.01775	0.002444	0.032163	0.036508	0.000645
0.042016	0.003	-0.00033	0.012508	0.009562	0.0158	0.001157	0.028722	0.036849	0.000691
0.044064	0.008652	-0.00032	0.011862	0.007719	0.005592	0.002046	0.022664	0.040621	0.004087
0.046112	0.004364	0.002062	0.009384	0.011043	0.013441	0.008229	0.030214	0.040527	-0.00473
0.04816	0.000492	0.001019	0.009386	0.008755	-0.00354	0.008335	0.035113	0.036286	-0.00632
0.050208	0.006364	-0.00223	0.013956	0.005375	-0.01539	0.000986	0.028152	0.034599	-0.0017
0.052256	0.007704	-0.00136	0.015374	0.009085	0.032587	0.001981	0.021433	0.043271	0.005486
0.054304	0.0064	0.000913	0.010404	0.009065	-0.00914	0.005452	0.026272	0.041952	0.003054
0.056352	0.003224	0.002243	0.008453	0.008826	0.01844	0.004817	0.030857	0.038137	-0.00038
0.0584	0.001531	0.001377	0.011111	0.005187	-0.0222	0.000997	0.029176	0.038281	0.001953
0.060448	0.005799	0.0023	0.013254	0.008581	0.018966	0.003858	0.026021	0.042486	0.007348
0.062496	0.002368	-0.0007	0.012362	0.011768	0.011021	0.009005	0.026145	0.040476	-0.0004
0.064544	0.003887	-0.00078	0.011397	0.012198	-0.00125	0.004132	0.032214	0.033583	-0.00528
0.066592	0.006557	0.001111	0.00993	0.008111	0.010227	0.000795	0.03105	0.036188	-0.00046
0.06864	0.007889	0.000709	0.009035	0.00409	-0.01378	0.004646	0.027372	0.041899	-0.00094
0.070688	0.001028	-0.00135	0.013589	0.007626	0.033808	0.009732	0.027139	0.040539	-0.00234
0.072736	0.001505	-0.00026	0.014344	0.012672	-0.00243	0.00397	0.028185	0.037071	-0.00212
0.074784	0.009928	0.00074	0.0097	0.007624	-0.00137	-0.00141	0.028451	0.037567	0.004593
0.076832	0.007427	0.001162	0.006682	0.002293	0.000659	0.001458	0.025509	0.041656	0.004422
0.07888	0.000841	0.001159	0.009929	0.007187	0.01082	0.007868	0.02769	0.042798	0.001352
0.080928	1.99E-05	0.002566	0.012713	0.014034	0.011898	0.008636	0.032535	0.039961	-0.00073
0.082976	0.006086	0.000349	0.012483	0.010808	-0.00673	0.003372	0.028798	0.036417	-2.9E-05
0.085024	0.007781	-0.00119	0.010183	0.008374	0.018954	-0.00024	0.024835	0.038448	0.003468
0.087072	0.004896	0.000956	0.007875	0.008506	-0.00445	0.007785	0.030252	0.041786	-0.00163
0.08912	0.002421	0.000835	0.009173	0.009676	0.005523	0.009278	0.03123	0.039111	-0.00634
0.091168	0.004331	-0.00186	0.014235	0.00934	-7.9E-05	0.002974	0.02721	0.036291	-0.0032
0.093216	0.00776	-0.0011	0.013859	0.008839	0.011034	0.00136	0.02442	0.039037	0.007115
0.095264	0.00743	0.001929	0.009175	0.007084	0.009604	0.004087	0.024755	0.042352	0.003078
0.097312	0.001624	0.002123	0.007611	0.00678	0.005609	0.005946	0.030384	0.04109	-0.00159
0.09936	0.002719	0.001105	0.010595	0.007436	-0.00413	0.003815	0.029051	0.038223	0.000511
0.101408	0.006124	0.001615	0.013015	0.009019	0.007368	0.002143	0.028459	0.040861	0.004709
0.103456	0.002336	-0.00079	0.011751	0.010294	0.008858	0.008207	0.02525	0.039875	0.001915
0.105504	0.002627	-0.00044	0.01153	0.013191	0.002947	0.006904	0.029603	0.035475	-0.00263
0.107552	0.006185	0.00076	0.008634	0.010764	0.012848	0.00253	0.032461	0.036843	-0.00368
0.1096	0.009652	0.000434	0.009546	0.006617	-0.00307	0.005461	0.027554	0.038763	-0.00165
0.111648	-0.00065	-0.0009	0.013611	0.008474	0.010908	0.007895	0.023282	0.04038	0.001674
0.113696	0.003231	-0.00043	0.015247	0.013577	0.011433	0.004111	0.026431	0.037231	-0.00127
0.115744	0.008793	0.001233	0.010107	0.008854	-0.01193	0.000925	0.028583	0.037477	0.002291
0.117792	0.007677	0.001614	0.008865	0.003328	0.008702	0.002048	0.027399	0.040592	0.002862

Step Time, s	Elongation	Force, N							
0.11984	0.000937	0.001555	0.011948	0.007377	0.005778	0.00668	0.026867	0.043268	0.00427
0.121888	-0.00031	0.002663	0.01388	0.014644	0.015551	0.009832	0.030032	0.039272	6.83E-05
0.12496	0.007117	-0.00122	0.014082	0.011745	0.003152	0.002251	0.027471	0.036132	-0.00031
0.129056	0.003434	0.0005	0.014643	0.010798	0.007531	0.00875	0.029119	0.040577	-0.00128
0.133152	0.005901	-0.00072	0.032461	0.010677	0.002024	0.0018	0.027217	0.036891	-0.00034
0.137248	0.004527	0.00198	0.039718	0.008243	0.007807	0.006125	0.028184	0.042361	0.002433
0.141344	0.003409	0.000873	0.058445	0.010661	0.000703	0.002684	0.031029	0.037401	0.000683
0.14544	0.00389	-0.00069	0.071647	0.012796	0.010905	0.007643	0.027608	0.03882	0.001261
0.149536	0.006122	0.000836	0.062808	0.010606	-0.00165	0.004277	0.032077	0.037355	-0.00295
0.153632	0.004521	-6.6E-05	0.073758	0.011757	0.009321	0.006987	0.026126	0.040405	0.00098
0.157728	0.006356	0.001162	0.11351	0.007102	0.001795	0.001723	0.030236	0.03786	0.000526
0.161824	0.002792	0.001302	0.14021	0.011194	0.009426	0.007605	0.028982	0.041886	0.003504
0.16592	0.006073	-0.00126	0.170217	0.013079	0.004632	0.002191	0.030647	0.03546	-0.00169
0.170016	0.006034	0.001372	0.202163	0.009341	0.009448	0.008305	0.027987	0.041888	-0.00109
0.174112	0.003558	-0.00074	0.228814	0.011593	0.003946	0.002017	0.029073	0.035731	-0.0004
0.178208	0.007224	0.00162	0.249105	0.006251	0.00827	0.004952	0.026418	0.042656	0.002421
0.182304	0.000482	0.001171	0.267395	0.012201	0.001729	0.004269	0.032663	0.038156	0.000543
0.1864	0.007134	-0.0003	0.28652	0.011344	0.008196	0.005514	0.02744	0.04065	0.001533
0.190496	0.003561	0.000838	0.300265	0.010045	-0.00377	0.006074	0.032675	0.037394	-0.00412
0.194592	0.0071	-0.00105	0.315657	0.010202	0.011844	0.003283	0.024967	0.041064	0.002932
0.198688	0.003354	0.00157	0.34192	0.008852	0.002618	0.004374	0.032151	0.038921	0.000118
0.202784	0.003168	0.001129	0.361059	0.009896	0.007037	0.005222	0.030137	0.041884	0.003643
0.20688	0.004489	0.000228	0.38567	0.013275	0.010601	0.003452	0.032222	0.035614	-0.00235
0.210976	0.006617	0.000265	0.409403	0.007963	0.004891	0.006877	0.028955	0.041356	-0.00081
0.215072	0.003486	-0.00093	0.431193	0.012974	0.00835	0.003247	0.028425	0.03741	-0.00082
0.219168	0.007027	0.001751	0.457937	0.004743	0.002971	0.004178	0.029026	0.042715	0.003562
0.223264	0.001118	0.001588	0.482844	0.013531	0.009002	0.005586	0.035131	0.038127	4.14E-05
0.22736	0.007246	-0.00058	0.506282	0.010658	0.005863	0.003798	0.02816	0.038871	0.001775
0.231456	0.00401	0.000775	0.532974	0.010795	0.002779	0.007496	0.032307	0.038157	-0.00442
0.235552	0.006423	-0.00097	0.555587	0.010784	0.005844	0.002352	0.026969	0.040782	0.002299
0.239648	0.00323	0.001849	0.580548	0.008805	0.000978	0.005482	0.033166	0.039156	0.000151
0.243744	0.004476	0.000809	0.608417	0.009921	0.001875	0.004688	0.030807	0.04037	0.00349
0.24784	0.004572	-0.00037	0.630656	0.014549	0.005134	0.005066	0.033101	0.035365	-0.00244
0.251936	0.007608	0.000842	0.656824	0.008354	0.002033	0.007029	0.030102	0.04057	-0.00113
0.256032	0.004587	-0.00071	0.681925	0.01439	0.010506	0.003313	0.030732	0.036882	0.000707
0.260128	0.013219	0.001394	0.70657	0.00658	0.007783	0.004241	0.03063	0.043119	0.002947
0.264224	0.012813	0.001194	0.735569	0.01454	0.01405	0.006444	0.035013	0.039473	0.000663
0.26832	0.015174	-0.00057	0.759772	0.010759	0.010869	0.002591	0.029311	0.045069	0.001716
0.272416	0.011825	0.000506	0.784272	0.011929	0.004265	0.008862	0.033409	0.044558	-0.00488
0.276512	0.014163	-0.00038	0.809888	0.01099	0.006401	0.002345	0.027658	0.044683	0.003199

Step Time, s	Elongation	Force, N							
0.280608	0.010677	0.001845	0.833614	0.009405	-0.00167	0.006034	0.03323	0.041408	-0.00051
0.284704	0.007968	0.000909	0.857561	0.0098	0.005631	0.005029	0.030319	0.042231	0.003967
0.290848	0.009326	-7.5E-05	0.895155	0.011231	0.004699	0.006237	0.030453	0.03998	-0.00147
0.29904	0.009929	0.000731	0.9434	0.01122	0.005511	0.004039	0.031462	0.04112	0.001128
0.307232	0.010253	0.000109	0.99096	0.013623	0.006165	0.005211	0.031532	0.041525	0.000604
0.315424	0.016999	-8.8E-05	1.04382	0.012383	0.013369	0.006191	0.031216	0.045193	-0.0007
0.323616	0.034894	0.00151	1.10547	0.011288	0.018722	0.005887	0.033018	0.057471	0.00138
0.331808	0.077405	-0.0001	1.16477	0.01219	0.035293	0.005936	0.032764	0.076723	-0.00131
0.34	0.122934	0.000874	1.22137	0.011322	0.079895	0.004466	0.032869	0.103574	0.001031
0.348192	0.170124	0.000149	1.27784	0.0131	0.127109	0.006071	0.031941	0.115945	0.000805
0.356384	0.209938	-0.00012	1.33443	0.011974	0.152966	0.00602	0.032022	0.133195	-0.00028
0.364576	0.241924	0.001709	1.3889	0.011509	0.164559	0.007305	0.033987	0.161331	0.001163
0.372768	0.272833	-0.00075	1.44118	0.012169	0.18549	0.006914	0.032793	0.18358	-0.00144
0.38096	0.305382	0.001326	1.49394	0.011456	0.211147	0.005837	0.036043	0.201594	0.000786
0.389152	0.340088	0.000272	1.54695	0.017021	0.235177	0.006544	0.031717	0.220933	0.000832
0.397344	0.379347	-0.00026	1.59613	0.019633	0.25919	0.00591	0.032063	0.23692	-0.00026
0.405536	0.417759	0.001382	1.64717	0.018759	0.284538	0.007181	0.033218	0.251943	0.001423
0.413728	0.457463	-0.00012	1.69704	0.01585	0.307911	0.006778	0.033606	0.26696	-0.00168
0.42192	0.499501	0.001104	1.74732	0.015122	0.331716	0.005836	0.04106	0.280729	0.001657
0.430112	0.542623	0.000185	1.79629	0.017276	0.356268	0.006819	0.06083	0.294477	0.000282
0.438304	0.587161	-1.6E-05	1.84433	0.018178	0.380489	0.006478	0.100995	0.306196	-0.00015
0.446496	0.630094	0.001139	1.89256	0.023485	0.404919	0.007804	0.130413	0.320674	0.001558
0.454688	0.674826	-9.2E-05	1.93808	0.033573	0.42909	0.0072	0.15269	0.336167	-0.0011
0.46288	0.722528	0.001328	1.98157	0.063956	0.453564	0.006538	0.177585	0.349999	0.00161
0.471072	0.766605	-0.00016	2.02527	0.101565	0.476917	0.006576	0.20398	0.36481	0.001135
0.479264	0.810044	0.000406	2.06654	0.133744	0.501354	0.007155	0.225021	0.375388	-0.00022
0.487456	0.855728	0.00073	2.10803	0.165079	0.52459	0.007879	0.245756	0.389314	0.001687
0.495648	0.901016	-3.1E-05	2.14952	0.19559	0.544914	0.00721	0.263931	0.402328	-0.00191
0.50384	0.943581	0.001291	2.18934	0.220406	0.565673	0.006608	0.280589	0.41524	0.002316
0.512032	0.98526	3.45E-05	2.23258	0.223764	0.586247	0.007445	0.296104	0.427746	0.000404
0.520224	1.02707	0.000873	2.27245	0.253944	0.60794	0.007201	0.31057	0.439487	-0.0004
0.528416	1.07232	0.000729	2.31106	0.280585	0.627771	0.008876	0.325009	0.453263	0.002132
0.536608	1.11388	0.000359	2.35106	0.30587	0.646308	0.007697	0.338889	0.464012	-0.0019
0.5448	1.15355	0.001904	2.39063	0.328202	0.66609	0.007439	0.352429	0.476438	0.002172
0.552992	1.19567	5.28E-05	2.42976	0.350525	0.684774	0.006788	0.366248	0.489056	0.000345
0.561184	1.23598	0.00073	2.46971	0.374546	0.704391	0.006777	0.376767	0.497506	6.02E-05
0.569376	1.27706	0.000994	2.50949	0.397674	0.720286	0.008202	0.37716	0.508087	0.001783
0.577568	1.31624	-0.00012	2.55022	0.418946	0.737191	0.006513	0.391081	0.51768	-0.0019
0.58576	1.35815	0.002164	2.5894	0.441911	0.753721	0.007847	0.406428	0.528146	0.00221
0.593952	1.40463	-1.5E-05	2.62624	0.463949	0.771169	0.006936	0.420449	0.538263	0.000145

Step Time, s	Elongation	Force, N							
0.602144	1.45391	0.000458	2.66557	0.487463	0.787317	0.006857	0.43141	0.546665	-1.2E-05
0.610336	1.50557	0.001009	2.70525	0.509656	0.801044	0.009209	0.443554	0.557018	0.001826
0.622624	1.58352	0.000891	2.75873	0.540071	0.824907	0.008162	0.459607	0.570994	0.000408
0.639008	1.68182	7.48E-05	2.8289	0.580668	0.856052	0.008887	0.482287	0.588242	-0.00027
0.655392	1.78059	0.000366	2.89642	0.619461	0.886235	0.014714	0.502952	0.603439	-0.00016
0.671776	1.87854	0.001167	2.9627	0.659667	0.916687	0.012944	0.525332	0.61846	0.001497
0.68816	1.97611	0.000799	3.02697	0.699226	0.943451	0.012661	0.552147	0.632919	0.000885
0.704544	2.07106	0.001458	3.08766	0.737449	0.970404	0.01742	0.579172	0.645626	0.000392
0.720928	2.16437	0.000742	3.14727	0.775379	0.996052	0.06595	0.60664	0.658409	-0.00058
0.737312	2.25491	0.000117	3.20505	0.812785	1.02113	0.089293	0.630987	0.673405	0.000179
0.753696	2.34575	0.001132	3.26017	0.84967	1.04647	0.101687	0.654248	0.687474	0.000981
0.77008	2.43377	0.000435	3.31777	0.887028	1.07517	0.151381	0.675598	0.698621	0.001181
0.786464	2.52294	0.001306	3.39397	0.92751	1.11099	0.203099	0.695861	0.709549	0.000277
0.802848	2.61088	0.000358	3.48202	0.966978	1.13815	0.262698	0.714191	0.720718	-0.00062
0.819232	2.69745	-1.5E-05	3.55358	1.00241	1.16107	0.318227	0.732324	0.732525	-0.00021
0.835616	2.78569	0.001274	3.60705	1.03819	1.18407	0.368219	0.748563	0.743247	0.001219
0.852	2.87331	0.000572	3.65851	1.07203	1.20551	0.418771	0.764706	0.754715	0.00126
0.868384	2.95684	0.002453	3.70534	1.10503	1.22623	0.468466	0.781517	0.765753	0.00083
0.884768	3.03367	0.007149	3.74752	1.13636	1.24595	0.515766	0.797756	0.774898	-0.00045
0.901152	3.10894	0.002987	3.7883	1.1662	1.2659	0.558427	0.814572	0.786773	0.000243
0.917536	3.18142	0.007949	3.82952	1.19459	1.28636	0.6003	0.834715	0.797733	0.001815
0.93392	3.25342	0.04834	3.87018	1.22286	1.30586	0.63967	0.857012	0.806363	0.002563
0.950304	3.32639	0.072025	3.91278	1.24798	1.324	0.678273	0.876341	0.816012	0.002465
0.966688	3.39968	0.090876	3.95273	1.27317	1.33973	0.714087	0.88868	0.824509	0.002214
0.983072	3.46765	0.159016	3.99113	1.29537	1.35646	0.749408	0.900852	0.832937	0.009984
0.999456	3.53499	0.244697	4.02693	1.31764	1.37122	0.781839	0.910518	0.840731	0.046061
1.01584	3.598	0.322355	4.05968	1.34021	1.38619	0.813122	0.920584	0.849233	0.089623
1.03222	3.6611	0.412951	4.0901	1.3627	1.40143	0.844653	0.930553	0.860918	0.108256
1.04861	3.71949	0.523993	4.12002	1.38458	1.41702	0.877347	0.939373	0.874384	0.137898
1.06499	3.77686	0.645724	4.14345	1.40644	1.43382	0.915173	0.949454	0.885224	0.170297
1.08138	3.83078	0.774425	4.16794	1.42619	1.44708	0.947433	0.958107	0.890783	0.201657
1.09776	3.88321	0.905573	4.19297	1.44638	1.46023	0.97516	0.968749	0.898221	0.236883
1.11414	3.93258	1.03911	4.21451	1.46925	1.47232	1.0024	0.979635	0.905584	0.271975
1.13053	3.97831	1.17264	4.23394	1.50712	1.48377	1.03055	0.990552	0.912214	0.3048
1.14691	4.0172	1.30796	4.24004	1.5368	1.49549	1.05615	1.00129	0.918363	0.332594
1.1633	4.04833	1.44022	4.18149	1.55718	1.5058	1.08176	1.00953	0.923679	0.358214
1.17968	4.07136	1.56669	4.15666	1.5762	1.51687	1.10653	1.0169	0.930265	0.38122
1.19606	4.09066	1.68859	4.14885	1.59489	1.52454	1.13017	1.02349	0.937373	0.402857
1.21245	4.10472	1.80783	4.14563	1.61072	1.5336	1.15322	1.03037	0.945328	0.423478
1.22883	4.11101	1.9253	4.14966	1.62588	1.54165	1.17479	1.03756	0.95253	0.440218

Step Time, s	Elongation Force, N								
1.24522	4.11329	2.03957	4.15618	1.64096	1.54887	1.19948	1.04387	0.958021	0.456025
1.2616	4.12117	2.14908	4.16942	1.65416	1.55759	1.22112	1.05066	0.962748	0.474568
1.28618	4.13232	2.30539	4.1935	1.67753	1.56982	1.24907	1.06049	0.970674	0.503589
1.31894	4.13844	2.5036	4.2207	1.71214	1.5914	1.28375	1.07222	0.983785	0.539374
1.35171	4.15579	2.6891	4.24729	1.74255	1.60844	1.31448	1.08364	0.99386	0.576513
1.38448	4.17761	2.86059	4.27066	1.76663	1.62279	1.34514	1.09427	1.00246	0.610235
1.41725	4.20311	3.0257	4.29279	1.79066	1.63616	1.3751	1.10361	1.01035	0.640361
1.45002	4.23904	3.18949	4.31346	1.81654	1.64785	1.40109	1.11257	1.01647	0.668397
1.48278	4.27647	3.33849	4.33253	1.83627	1.66134	1.42413	1.12546	1.0221	0.695889
1.51555	4.31558	3.47251	4.34956	1.85236	1.67412	1.44649	1.13578	1.02647	0.71847
1.54832	4.37149	3.59503	4.37084	1.86989	1.6866	1.46719	1.14231	1.03292	0.740919
1.58109	4.46626	3.70781	4.38966	1.89141	1.69841	1.49024	1.14893	1.04401	0.773794
1.61386	4.51982	3.81125	4.40613	1.90743	1.70842	1.51609	1.15497	1.04957	0.792438
1.64662	4.55892	3.90252	4.42693	1.91821	1.72675	1.53264	1.16147	1.05331	0.80633
1.67939	4.59838	3.98042	4.49662	1.92851	1.75269	1.54618	1.17106	1.05613	0.818495
1.71216	4.63478	4.04832	4.5396	1.93949	1.76327	1.55969	1.18175	1.05746	0.835559
1.74493	4.66884	4.11096	4.55244	1.9504	1.77152	1.57371	1.19162	1.06051	0.851119
1.7777	4.70086	4.17581	4.56689	1.95895	1.77944	1.58866	1.20636	1.06344	0.863697
1.81046	4.72761	4.23892	4.58539	1.96614	1.78908	1.60403	1.2274	1.06683	0.876222
1.84323	4.75025	4.33009	4.59898	1.97501	1.7965	1.61903	1.23614	1.07168	0.887695
1.876	4.77507	4.42709	4.60981	1.98376	1.80351	1.63506	1.24261	1.08509	0.899365
1.90877	4.80267	4.47688	4.61742	1.99041	1.81566	1.6536	1.24835	1.10273	0.90974
1.94154	4.82639	4.51521	4.62312	1.99777	1.82493	1.68546	1.25457	1.10813	0.918872
1.9743	4.8485	4.49976	4.62997	2.00451	1.83015	1.70614	1.26246	1.11109	0.927596
2.00707	4.87994	4.42148	4.63611	2.03186	1.8354	1.71962	1.26972	1.10971	0.935549
2.03984	4.90846	4.4152	4.64088	2.05964	1.8422	1.73215	1.27332	1.10757	0.943364
2.07261	4.92581	4.43704	4.64071	2.06307	1.84757	1.74378	1.27756	1.11078	0.949201
2.10538	4.94124	4.46558	4.64519	2.0665	1.85472	1.75296	1.28175	1.10979	0.954835
2.13814	4.9543	4.49631	4.65561	2.0752	1.8647	1.76005	1.28341	1.10965	0.960002
2.17091	4.9646	4.52818	4.65775	2.08548	1.87001	1.76572	1.28532	1.10766	0.964157
2.20368	4.97065	4.55607	4.65517	2.09662	1.87276	1.7728	1.28849	1.10723	0.968782
2.23645	4.97448	4.57927	4.65471	2.10261	1.87461	1.77961	1.28825	1.10608	0.972339
2.26922	4.98229	4.60687	4.65416	2.10816	1.87411	1.78498	1.289	1.10629	0.976977
2.30198	4.99433	4.64425	4.65404	2.11292	1.87775	1.78765	1.2925	1.10863	0.985757
2.33475	5.00319	4.67469	4.65401	2.12209	1.88039	1.79004	1.29922	1.10979	0.990889
2.36752	5.00986	4.69338	4.65932	2.13025	1.88342	1.79124	1.30158	1.11306	0.996792
2.40029	5.0165	4.7057	4.66384	2.13346	1.88753	1.79354	1.30151	1.11579	1.00468
2.43306	5.06273	4.71716	4.66403	2.13718	1.89031	1.80106	1.2991	1.11856	1.02207
2.46582	5.12149	4.72623	4.66314	2.14568	1.90128	1.80985	1.29915	1.12329	1.02721
2.49859	5.13072	4.73283	4.66135	2.14682	1.93515	1.81255	1.30023	1.12436	1.02724

Step Time, s	Elongation Force, N								
2.53136	5.13601	4.73886	4.67037	2.14276	1.93944	1.81363	1.30013	1.12166	1.02967
2.56413	5.14313	4.74854	4.71799	2.13847	1.94154	1.81396	1.2997	1.12049	1.03055
2.61328	5.15178	4.76558	4.73739	2.12894	1.94239	1.81435	1.30621	1.12427	1.04032
2.67882	5.15489	4.78801	4.73875	2.11966	1.95042	1.81766	1.33029	1.12995	1.04511
2.74435	5.15645	4.86862	4.74397	2.11704	1.95374	1.82564	1.33292	1.14112	1.05101
2.80989	5.16073	4.92384	4.75083	2.11075	1.95245	1.86708	1.33377	1.16518	1.04898
2.87542	5.17744	4.94944	4.75906	2.13595	1.94695	1.87712	1.33617	1.16224	1.04728
2.94096	5.18022	4.96865	4.76108	2.1341	1.93867	1.87711	1.33684	1.16462	1.04565
3.0065	5.17904	4.98459	4.77386	2.1326	1.94388	1.88026	1.33777	1.16545	1.04499
3.07203	5.18469	5.00465	4.76863	2.12461	1.93771	1.88697	1.33732	1.16689	1.04752
3.13757	5.20443	5.03336	4.7605	2.11261	1.92877	1.88742	1.34029	1.16835	1.05151
3.2031	5.21834	5.06103	4.74887	2.10748	1.9251	1.88959	1.33756	1.16983	1.05856
3.26864	5.24099	5.06674	4.74759	2.10382	1.91641	1.89941	1.33493	1.16848	1.06967
3.33418	5.31984	5.06474	4.74597	2.10915	1.9341	1.91227	1.3312	1.1626	1.08237
3.39971	5.32805	5.06085	4.77592	2.10361	1.93998	1.91854	1.33143	1.15996	1.08415
3.46525	5.32176	5.07322	4.82291	2.09252	1.93167	1.9192	1.32931	1.15858	1.08626
3.53078	5.3149	5.08368	4.82369	2.08677	1.93326	1.92059	1.34723	1.15323	1.09432
3.59632	5.31012	5.13455	4.81033	2.08599	1.93959	1.91846	1.3481	1.15315	1.09794
3.66186	5.31041	5.18189	4.79029	2.09138	1.9434	1.94639	1.3467	1.17088	1.09886
3.72739	5.32212	5.19021	4.77243	2.12269	1.94254	1.95595	1.34493	1.17664	1.09795
3.79293	5.31837	5.18137	4.76778	2.12469	1.945	1.95816	1.33847	1.17832	1.09781
3.85846	5.30402	5.16694	4.76616	2.12266	1.94339	1.95916	1.33373	1.17238	1.0965
3.924	5.28043	5.14551	4.75182	2.11865	1.93763	1.95888	1.33187	1.16767	1.09953
3.98954	5.2669	5.14421	4.73203	2.12064	1.93264	1.95583	1.333	1.16109	1.11053
4.05507	5.258	5.14215	4.70976	2.12089	1.93219	1.95444	1.33181	1.16102	1.11377
4.12061	5.25137	5.12882	4.70041	2.12436	1.93049	1.95889	1.32684	1.16431	1.11316
4.18614	5.31056	5.11245	4.69499	2.12287	1.93985	1.95996	1.32594	1.16424	1.12569
4.25168	5.31661	5.09202	4.698	2.11918	1.95619	1.96004	1.32806	1.16658	1.12973
4.31722	5.31239	5.08742	4.76961	2.10848	1.94924	1.95859	1.32588	1.1667	1.13981
4.38275	5.30093	5.0772	4.78277	2.10334	1.94752	1.95438	1.33328	1.16521	1.14568
4.44829	5.28765	5.08116	4.78387	2.1008	1.94331	1.94473	1.34055	1.17636	1.14765
4.51382	5.28638	5.15037	4.77486	2.09634	1.9418	1.94973	1.34078	1.19222	1.14652
4.57936	5.30131	5.16044	4.77368	2.12604	1.93487	1.95928	1.34368	1.18927	1.14587
4.6449	5.30122	5.15877	4.77891	2.1358	1.93482	1.95438	1.34736	1.19154	1.14619
4.71043	5.29415	5.15134	4.77724	2.14164	1.93031	1.94996	1.34523	1.19366	1.14459
4.77597	5.28429	5.15537	4.75586	2.1361	1.92307	1.94378	1.34321	1.19928	1.14383
4.8415	5.28044	5.16789	4.728	2.12304	1.91379	1.94031	1.34565	1.19336	1.14493
4.90704	5.26966	5.16794	4.69584	2.11703	1.90586	1.9359	1.34427	1.18954	1.14763
4.97258	5.24809	5.15638	4.68098	2.1078	1.90093	1.9429	1.33961	1.18719	1.15137
5.03811	5.28859	5.14133	4.66449	2.10394	1.92221	1.94227	1.33917	1.17973	1.16591

Step Time, s	Elongation	Force, N							
5.10365	5.30576	5.12255	4.66387	2.08927	1.92048	1.93721	1.33877	1.17541	1.16554
5.16918	5.29779	5.11972	4.7002	2.07526	1.90534	1.93311	1.3432	1.17388	1.16872
5.26749	5.2548	5.11135	4.66137	2.06186	1.89559	1.93153	1.36878	1.17187	1.17402
5.39856	5.22173	5.16185	4.60644	2.04667	1.88225	1.96103	1.36313	1.18319	1.17844
5.52963	5.17473	5.12456	4.58278	2.05838	1.88218	1.96928	1.35875	1.17692	1.1742
5.6607	5.11192	5.09528	4.54592	2.04502	1.8772	1.97069	1.34904	1.17168	1.16623
5.79178	5.06805	5.07873	4.50529	2.05	1.87027	1.96413	1.33958	1.16841	1.16587
5.92285	5.11484	5.03511	4.49089	2.05494	1.88392	1.95308	1.32996	1.16193	1.17656
6.05392	5.08687	5.01826	4.55099	2.03401	1.88563	1.93416	1.32854	1.15653	1.1794
6.18499	5.06209	5.03511	4.53342	2.01872	1.87581	1.92716	1.3371	1.16273	1.1788
6.31606	5.05806	5.05872	4.52578	2.0354	1.86825	1.94625	1.33547	1.1655	1.17058
6.44714	5.01645	5.04216	4.49226	2.02762	1.8474	1.93382	1.32909	1.15721	1.16294
6.57821	4.97463	5.04314	4.41794	2.02149	1.82787	1.91947	1.32618	1.15246	1.1612
6.70928	4.96472	5.00461	4.36694	2.00646	1.8133	1.9141	1.31556	1.14735	1.17929
6.84035	4.96776	4.95381	4.38506	1.99206	1.82819	1.89977	1.30468	1.13607	1.1781
6.97142	4.89917	4.92582	4.37297	1.99936	1.81323	1.89069	1.32717	1.14913	1.17322
7.1025	4.86356	4.96547	4.30372	2.01349	1.79936	1.90506	1.32204	1.16554	1.16536
7.23357	4.81385	4.89627	4.27707	2.02331	1.79642	1.90845	1.30577	1.14871	1.15535
7.36464	4.73681	4.8492	4.23091	2.00388	1.78355	1.89566	1.29312	1.14014	1.15328
7.49571	4.68402	4.84305	4.2022	1.9943	1.78279	1.89026	1.27965	1.13732	1.1603
7.62678	4.74057	4.81054	4.20688	1.97352	1.82151	1.8889	1.26575	1.13352	1.16626
7.75786	4.70905	4.82015	4.24964	1.94897	1.83046	1.87272	1.27377	1.13157	1.1652
7.88893	4.67137	4.87853	4.21715	1.94123	1.8209	1.86542	1.28198	1.14722	1.16044
8.02	4.66892	4.88971	4.19283	1.96512	1.80274	1.86888	1.27322	1.13724	1.14765
8.15107	4.64115	4.84563	4.18055	1.9502	1.78259	1.85695	1.26948	1.12358	1.14345
8.28214	4.612	4.83868	4.12924	1.92469	1.76894	1.85099	1.26421	1.11976	1.1396
8.41322	4.63048	4.8014	4.0861	1.91887	1.7754	1.8528	1.25411	1.11239	1.15833
8.54429	4.60994	4.73929	4.11568	1.90616	1.77761	1.84575	1.25321	1.09722	1.1562
8.67536	4.54733	4.7394	4.06956	1.89569	1.76006	1.84596	1.27576	1.09475	1.15473
8.80643	4.51859	4.75157	4.03844	1.90988	1.75893	1.87893	1.26298	1.09616	1.13969
8.9375	4.47259	4.70167	4.03187	1.92222	1.752	1.85905	1.25074	1.09173	1.12941
9.06858	4.42369	4.66614	3.99471	1.90967	1.73794	1.83962	1.24675	1.08603	1.13958
9.19965	4.44763	4.65275	3.9605	1.89854	1.73493	1.83059	1.23774	1.08207	1.17132
9.33072	4.47952	4.60698	3.96162	1.88885	1.75735	1.81611	1.22914	1.07729	1.15905
9.46179	4.4481	4.5954	3.98381	1.87432	1.76183	1.79893	1.23998	1.06819	1.14364
9.59286	4.42965	4.62841	3.94675	1.86947	1.75029	1.79653	1.24168	1.07964	1.12312
9.72394	4.42417	4.62231	3.92279	1.89135	1.73557	1.78903	1.24317	1.0667	1.11677
9.85501	4.37372	4.60994	3.89026	1.86406	1.71574	1.78349	1.23659	1.06242	1.12036
9.98608	4.33829	4.60686	3.84125	1.84521	1.70071	1.78547	1.23122	1.05792	1.12204
10.1172	4.36756	4.55399	3.80933	1.8472	1.70771	1.79011	1.2216	1.04879	1.13791

Step Time, s	Elongation Force, N								
10.2482	4.35861	4.50802	3.83319	1.83707	1.70006	1.76714	1.21385	1.03479	1.13426
10.3793	4.30688	4.49278	3.79152	1.8199	1.67972	1.75333	1.22847	1.028	1.12554
10.5759	4.25897	4.49025	3.75625	1.8168	1.66594	1.78331	1.21383	1.01974	1.10594
10.838	4.18868	4.42965	3.71451	1.80901	1.65519	1.76276	1.19705	1.0094	1.09291
11.1002	4.22483	4.36184	3.70842	1.80704	1.66224	1.72993	1.19138	0.994152	1.08999
11.3623	4.1713	4.37506	3.68648	1.81211	1.63919	1.70884	1.1946	0.998503	1.07793
11.6245	4.10168	4.32035	3.62804	1.80546	1.60317	1.68495	1.18499	0.982829	1.06762
11.8866	4.09206	4.22956	3.55668	1.76491	1.59292	1.68588	1.16488	0.952618	1.07849
12.1488	4.01755	4.2147	3.52194	1.742	1.58041	1.68654	1.16613	0.942802	1.06163
12.4109	3.95623	4.14306	3.51753	1.73364	1.55853	1.67679	1.14929	0.949382	1.03496
12.6731	3.98955	4.10004	3.48432	1.73859	1.55356	1.63576	1.12778	0.947208	1.02572
12.9352	3.98456	4.08201	3.48413	1.72511	1.54542	1.61332	1.13362	0.939191	1.02606
13.1973	3.93189	4.08173	3.45838	1.73804	1.51826	1.60841	1.1316	0.929117	1.01484
13.4595	3.8789	4.01454	3.38476	1.7077	1.48644	1.59141	1.1206	0.910334	1.02073
13.7216	3.84415	3.91471	3.36288	1.66946	1.48769	1.57102	1.10924	0.894833	1.00087
13.9838	3.78609	3.88017	3.33343	1.66896	1.4723	1.58416	1.09956	0.89808	0.981521
14.2459	3.75147	3.85862	3.29361	1.66688	1.45675	1.57116	1.08741	0.890528	0.978061
14.5081	3.78001	3.79776	3.34424	1.66375	1.47128	1.54575	1.09936	0.882576	0.982296
14.7702	3.74839	3.81191	3.29616	1.65695	1.4424	1.5384	1.11079	0.884597	0.974794
15.0324	3.66812	3.75563	3.2176	1.64799	1.40702	1.52021	1.08723	0.874617	0.966612
15.2945	3.68964	3.63972	3.1861	1.62146	1.39654	1.50348	1.07798	0.854012	0.978021
15.5566	3.6314	3.59373	3.20111	1.59934	1.39173	1.52448	1.08059	0.851719	0.966874
15.8188	3.57994	3.59334	3.19723	1.61535	1.38796	1.53005	1.07021	0.853305	0.952526
16.0809	3.60286	3.58501	3.20255	1.60618	1.3903	1.49357	1.06268	0.846042	0.967412
16.3431	3.63812	3.56679	3.18595	1.59514	1.41425	1.4865	1.08035	0.851986	0.975509
16.6052	3.57454	3.53415	3.14256	1.60074	1.40778	1.48837	1.08441	0.864011	0.967869
16.8674	3.54085	3.48207	3.07364	1.58099	1.38009	1.48489	1.06791	0.848291	0.976545
17.1295	3.5153	3.41169	3.13186	1.57308	1.39283	1.48075	1.06934	0.843125	0.979841
17.3916	3.48899	3.42074	3.15923	1.58788	1.39086	1.50874	1.08291	0.857403	0.9666
17.6538	3.47898	3.42183	3.16236	1.59149	1.40225	1.49935	1.07189	0.856131	0.963691
17.9159	3.56826	3.41991	3.19523	1.60807	1.42184	1.47748	1.08526	0.867007	0.989877
18.1781	3.53098	3.4536	3.17154	1.61506	1.41003	1.49031	1.09946	0.886279	0.997927
18.4402	3.47643	3.43001	3.11768	1.6194	1.40755	1.5085	1.10214	0.882302	0.987976
18.7024	3.48607	3.35042	3.148	1.59484	1.42422	1.52349	1.09923	0.874347	1.01518
18.9645	3.47056	3.37438	3.25518	1.59098	1.44198	1.54638	1.12059	0.897672	1.00892
19.2267	3.45959	3.39351	3.32393	1.63389	1.44645	1.5505	1.11967	0.916396	1.00399
19.4888	3.49113	3.39625	3.33026	1.6459	1.47094	1.52583	1.12238	0.9212	1.0251
19.7509	3.5104	3.42567	3.34392	1.64068	1.49499	1.5326	1.16082	0.935807	1.03697
20.0131	3.52843	3.43474	3.32898	1.67434	1.49787	1.56737	1.17495	0.953346	1.04143
20.2752	3.52849	3.40652	3.34678	1.66543	1.50437	1.58561	1.17532	0.956213	1.05348

Step Time, s	Elongation	Force, N							
20.5374	3.52308	3.39908	3.46923	1.64407	1.54808	1.60259	1.19501	0.969061	1.0728
20.7995	3.54664	3.48724	3.54097	1.71692	1.58308	1.62933	1.21587	1.00828	1.07911
21.1927	3.60641	3.5255	3.619	1.7504	1.63283	1.61302	1.24154	1.02237	1.12264
21.717	3.62375	3.61119	3.71023	1.80427	1.68647	1.65024	1.33037	1.09746	1.1805
22.2413	3.6719	3.63879	3.9286	1.83121	1.77891	1.70855	1.3721	1.13653	1.23511
22.7656	3.77178	3.79617	4.10702	1.94445	1.888	1.74976	1.45537	1.21997	1.31066
23.2899	3.82219	3.94989	4.31495	2.04039	2.00601	1.81898	1.57802	1.2886	1.40476
23.8142	3.91561	4.03272	4.5632	2.10426	2.12163	1.92037	1.67468	1.38273	1.48758
24.3385	4.10765	4.29161	4.88537	2.28475	2.31436	2.014	1.80865	1.53096	1.58854
24.8628	4.24401	4.53014	5.1571	2.43381	2.48782	2.11592	1.98605	1.65482	1.72322
25.387	4.32323	4.71534	5.37404	2.59668	2.65603	2.28043	2.11865	1.80188	1.84371
25.9113	4.55499	5.07367	5.44314	2.80055	2.9372	2.43325	2.33798	2.02397	2.0027
26.4356	4.78322	5.425	5.40104	3.04545	3.21466	2.57363	2.56986	2.21857	2.20101
26.9599	4.9576	5.60478	5.45779	3.26314	3.47882	2.85343	2.77735	2.44783	2.36552
27.4842	5.28737	5.78593	5.52689	3.50324	3.87061	3.0751	3.00565	2.73844	2.62031
28.0085	5.57485	5.91188	5.58988	3.84797	4.25818	3.28546	3.3333	3.06042	2.89484
28.5328	5.79726	6.01792	5.66955	4.1242	4.57709	3.66465	3.61033	3.35409	3.12013
29.0571	6.24066	6.13125	5.71938	4.37789	5.01692	3.97509	3.83519	3.70806	3.3939
29.5813	6.52413	6.07357	5.74958	4.80307	5.47623	4.2676	4.15767	4.06681	3.73916
30.1056	6.66473	5.96278	5.70905	5.07114	5.72581	4.59645	4.37841	4.32678	3.99572
30.6299	6.77337	5.87843	5.73238	5.25742	6.08562	5.02301	4.51137	4.67348	4.18977
31.1542	6.79268	5.80391	5.7927	5.60247	6.37257	5.25772	4.74944	5.02998	4.52851
31.6785	6.53187	5.60177	5.87724	5.71713	6.45458	5.54931	4.81837	5.08445	4.69332
32.2028	6.20314	5.27174	6.09936	5.63995	6.51051	5.97801	4.67638	5.2816	4.71655
32.7271	0.478031	4.99521	6.21209	5.67697	6.66945	5.98075	4.62861	5.37157	4.86477
33.2514	0.000611	4.69744	6.26866	5.10383	6.42387	5.91474	4.21055	5.01591	4.67103
33.7756	0.001071	4.39893	6.3573	0.390274	4.58583	5.86979	1.32653	4.46368	1.04762
34.2999	0.000635	3.92693	1.67141	0.000473	-3.9E-05	0.437526	1.43E-05	3.39558	0.063688
34.8242	0.000845	3.23173	0.005924	0.00077	0.000284	0.000758	0.00038	0.382833	0.061481
35.3485	0.000858	2.59437	0.006419	0.000576	0.000863	0.001065	0.000925	0.000105	0.063794
35.8728	0.000742	1.971	0.006959	0.000522	0.00052	0.000468	0.000622	0.000739	0.066381
36.3971	0.00104	1.41973	0.007488	0.000503	0.000848	0.00074	0.000628	0.001127	0.064621

Table B5. PG 76-22 (3 samples at 0°C, 3 samples at 4°C and 3 samples at 12°C).

Step Time, s	Elongation Force, N								
0	0	0	0	0	0	0	0	0	0
0.000544	0.016804	0.015444	0.01798	0.017243	0.018901	0.017186	0.015962	0.016631	0.017658
0.001568	0.114767	0.113555	0.11794	0.117239	0.119328	0.117045	0.11483	0.115247	0.117515
0.002592	0.135082	0.138219	0.136637	0.137544	0.137345	0.138802	0.136704	0.135522	0.137668
0.003616	0.074567	0.080322	0.075147	0.074466	0.075341	0.078163	0.075922	0.075449	0.0767
0.00464	0.020988	0.024933	0.02613	0.018435	0.020702	0.021309	0.021662	0.023304	0.023029
0.005664	0.004254	0.002057	0.010936	-0.00162	0.000596	-0.00346	0.000821	0.003327	0.00252
0.006688	0.009362	0.001005	0.008974	-0.00082	0.000514	-0.00615	0.000382	0.001023	0.002109
0.007712	0.020285	0.006532	0.009216	0.005372	0.00653	0.000901	0.006487	0.003799	0.006359
0.008736	0.02898	0.008941	0.008558	0.008549	0.00899	0.007306	0.009444	0.005995	0.007997
0.00976	0.031459	0.007176	0.008129	0.00785	0.007448	0.008042	0.007695	0.005669	0.006555
0.010784	0.027966	0.004188	0.009046	0.006583	0.005132	0.007391	0.003944	0.004791	0.00533
0.011808	0.022949	0.002135	0.009086	0.006122	0.003254	0.007704	0.001581	0.004565	0.004828
0.012832	0.020127	3.7E-05	0.007608	0.005299	0.002138	0.006478	0.000211	0.004625	0.002831
0.013856	0.020039	-0.00163	0.006506	0.002699	0.002299	0.004539	-4.8E-07	0.003611	-0.0006
0.01488	0.022832	-0.00212	0.005399	0.000215	0.003504	0.003433	0.000748	0.001927	-0.00315
0.015904	0.026453	-6.1E-05	0.004797	-0.00129	0.004385	0.003365	0.002152	0.001213	-0.00272
0.016928	0.027677	0.001752	0.004433	-7E-05	0.002663	0.003201	0.003157	0.001494	1.88E-05
0.017952	0.027115	0.002317	0.003405	0.002015	-0.00028	0.003089	0.002636	0.001512	0.001712
0.018976	0.028689	0.002608	0.002088	0.003127	-0.00136	0.002056	0.001311	-0.00025	0.002331
0.02	0.032738	0.002564	0.000519	0.002441	-0.00029	0.001031	4.4E-05	-0.00269	0.001913
0.021024	0.034558	0.0018	-0.00138	0.00056	0.00031	-0.00062	3.96E-05	-0.00346	0.000305
0.022048	0.033377	0.00187	-0.00126	-0.00104	-0.00022	-0.00217	0.000394	-0.0022	-0.00067
0.023072	0.03305	0.003493	0.001757	-0.00245	-0.00037	-0.00224	0.000895	0.000125	-0.00018
0.024096	0.034071	0.001655	0.006533	-0.00293	-0.0005	-0.00152	-0.00081	0.001956	0.000434
0.02512	0.037396	-0.002	0.008485	-0.00233	-0.0009	-0.00148	-0.00276	0.003228	0.001841
0.026144	0.043343	-0.00211	0.008057	-0.00033	-0.00048	-0.00315	-0.00284	0.003145	0.00296
0.027168	0.049757	0.001366	0.007348	0.001075	0.000238	-0.00414	-0.00039	0.001277	0.002883
0.028192	0.052952	0.003403	0.007631	0.000534	0.002445	-0.0027	0.001608	-0.00032	0.001961
0.029216	0.054388	0.003007	0.007054	3.25E-05	0.002857	-0.00064	0.002534	-0.00024	0.001861
0.03024	0.05816	0.001209	0.006318	0.001175	0.001028	0.000853	0.002483	0.00074	0.001573
0.031264	0.061869	-0.00072	0.006941	0.002331	-0.00078	0.002477	0.001861	0.001393	0.000451
0.032288	0.062917	-0.00298	0.007987	0.00379	-0.00083	0.004771	0.000672	0.0017	0.00014
0.033312	0.062711	-0.00366	0.008437	0.004264	0.001064	0.004319	-0.00172	0.002393	0.000191
0.034336	0.062425	-0.00286	0.008456	0.00266	0.002552	0.002841	-0.00187	0.002657	-0.00021
0.03536	0.064134	-0.00112	0.006392	0.000271	0.003256	0.003197	0.000969	0.00135	-0.00135
0.036384	0.069942	0.000827	0.003603	-0.00072	0.003065	0.004763	0.002974	7.56E-05	-0.00247
0.037408	0.07524	0.001919	0.002727	-6.5E-05	0.000809	0.004672	0.001931	-0.00016	-0.00166
0.038432	0.07743	0.002017	0.003342	0.001039	-0.00209	0.003038	0.001488	0.000251	0.000206

Step Time, s	Elongation	Force, N							
0.039456	0.076253	0.00145	0.002697	0.002726	-0.00315	0.000184	0.001859	-0.0005	0.001458
0.04048	0.076396	0.001472	-0.00013	0.002009	-0.00103	-0.00191	0.001492	-0.00282	0.001248
0.042016	0.081261	0.001767	-0.00012	-0.00136	0.001075	-0.00327	3.34E-05	-0.00344	0.00027
0.044064	0.087534	0.002206	0.004484	-0.00202	-0.00179	-0.00209	-0.00256	0.001264	-0.00015
0.046112	0.085737	-0.00065	0.009374	-0.00181	0.001323	-0.00191	-0.00281	0.003315	0.001561
0.04816	0.091022	0.000233	0.008358	-0.00056	0.001681	-0.00449	0.001281	0.000786	0.001224
0.050208	0.095506	0.002474	0.00916	0.001397	0.000481	-0.00056	0.003614	-0.00053	0.001159
0.052256	0.095034	-0.00151	0.0117	0.004037	0.00145	0.004499	-0.00025	0.002323	0.00219
0.054304	0.105308	-0.00232	0.010058	0.001997	0.00044	0.004646	-0.00026	0.003038	-0.00052
0.056352	0.115267	-0.00029	0.005288	-3.2E-07	0.002295	0.003986	0.001727	0.000557	-0.00272
0.0584	0.121038	0.001402	0.003933	0.000874	-0.00112	0.001644	0.002529	-0.00057	0.001287
0.060448	0.131461	0.002136	0.002932	0.002982	-0.00094	0.000757	0.000787	-0.00234	0.001265
0.062496	0.131778	0.002515	0.002099	-0.00059	0.001073	-0.00144	-0.00011	-0.00222	-5.9E-05
0.064544	0.137448	0.000522	0.007627	-0.00368	-0.00154	-0.00387	-0.00263	0.001369	-0.00072
0.066592	0.144052	-0.00237	0.009659	-0.00163	-0.00082	-0.004	-0.00231	0.003278	0.001671
0.06864	0.151611	0.002954	0.011721	0.001075	0.002084	-0.00361	0.001476	-0.00034	0.002552
0.070688	0.165174	0.001876	0.009958	0.001123	0.001411	0.000188	0.001575	6.46E-05	0.00072
0.072736	0.1716	-0.00202	0.013755	0.004524	-0.00024	0.005526	0.001969	0.002944	0.000202
0.074784	0.170435	-0.00245	0.010454	0.002271	0.000967	0.003762	-0.0005	0.002094	0.000449
0.076832	0.177755	0.000405	0.017075	-0.00069	0.002781	0.003771	0.001093	0.000878	-0.00184
0.07888	0.183691	0.001075	0.016886	0.000595	-0.00068	0.004071	0.002668	-0.00063	0.000419
0.080928	0.183791	0.003241	0.01808	0.001165	-0.00083	-0.00061	0.000562	-0.0026	0.001376
0.082976	0.187423	0.000337	0.023875	-0.00085	-0.00029	-0.00411	-0.00014	-0.00357	-0.00013
0.085024	0.189468	0.00099	0.035869	-0.00217	0.000239	-0.00272	-0.00164	0.002464	-0.00058
0.087072	0.190054	-0.00044	0.045073	-0.00165	-0.00093	-0.00279	-0.00417	0.002482	0.00181
0.08912	0.192884	0.000993	0.045004	-0.00058	0.00084	-0.00411	0.002111	0.000594	0.001485
0.091168	0.204256	0.001762	0.045158	0.001911	0.001227	0.000183	0.003395	-0.00033	0.000767
0.093216	0.213197	-0.00204	0.050359	0.004148	-0.00057	0.0055	-0.00054	0.002495	0.001327
0.095264	0.213505	-0.00147	0.052713	0.002218	0.002697	0.004444	-0.00122	0.002498	-0.00052
0.097312	0.213574	-0.00045	0.060891	-0.00131	0.001582	0.003889	0.003097	0.001266	-0.00248
0.09936	0.221715	0.001633	0.073678	-1.6E-05	-0.00156	0.001817	0.002418	-0.00082	0.00106
0.101408	0.228631	0.00186	0.085823	0.003937	-0.00042	-0.00106	0.001048	-0.00297	0.002858
0.103456	0.232323	0.001754	0.091836	-0.00178	0.000736	-0.00289	2.08E-05	-0.00327	0.000329
0.105504	0.237709	0.000912	0.106582	-0.00363	-0.00055	-0.00197	-0.00261	0.001924	-0.00115
0.107552	0.240838	-0.00193	0.121205	-0.00106	-0.00041	-0.0036	-0.00227	0.002971	0.001473
0.1096	0.249859	0.00161	0.128884	0.000675	0.000625	-0.00494	0.000522	0.000863	0.002427
0.111648	0.265441	0.002281	0.140263	0.001736	0.00138	0.001707	0.002833	-0.00022	-0.00055
0.113696	0.277714	-0.00129	0.150325	0.002329	-0.00087	0.004769	-0.00024	0.002504	0.000808
0.115744	0.284935	-0.00406	0.162968	0.00221	0.001772	0.003091	-2.2E-05	0.001789	6.13E-05
0.117792	0.289418	0.00037	0.158594	-0.00018	0.003272	0.002735	0.000951	0.000423	-0.00266

Step Time, s	Elongation	Force, N							
0.11984	0.29709	0.003317	0.138097	0.000729	-0.00043	0.003616	0.002843	-0.00071	0.001703
0.121888	0.304802	0.001298	0.120174	0.002294	-0.0011	-0.00033	0.000491	-0.00204	0.00112
0.12496	0.313922	0.001565	0.108371	-0.00257	-0.00042	-0.00301	-0.00062	-0.00014	2.55E-05
0.129056	0.323362	0.000397	0.119197	-0.00124	0.000773	-0.00301	-0.00037	0.001814	0.001611
0.133152	0.342866	-0.00073	0.135537	0.003305	-0.00043	0.002069	0.000967	0.001142	0.000508
0.137248	0.358753	-0.00064	0.163717	0.000605	0.002577	0.003895	0.000247	0.001468	-0.00076
0.141344	0.37026	0.001382	0.180278	0.001684	-0.00112	0.000653	0.002006	-0.00244	0.001649
0.14544	0.388293	0.001779	0.195308	-0.00304	0.00026	-0.00176	-0.00127	0.000523	-0.00064
0.149536	0.399154	6.63E-05	0.210564	-0.0005	0.000425	-0.00419	0.000265	0.001656	0.00176
0.153632	0.417521	0.000232	0.222461	0.00309	0.000188	0.003631	0.00067	0.001047	0.000796
0.157728	0.436682	-0.00172	0.238133	0.000726	0.001872	0.002967	0.000267	0.000564	-0.00199
0.161824	0.445403	0.002547	0.249286	0.001174	-0.0005	0.001082	0.001289	-0.00155	0.001589
0.16592	0.463731	0.000869	0.25532	-0.0026	-0.00013	-0.00272	-0.00017	0.00072	-6.3E-05
0.170016	0.481836	0.000567	0.260703	-0.00071	0.000992	-0.00294	8.46E-05	0.001311	0.001633
0.174112	0.496825	-0.00088	0.282625	0.003364	-0.00022	0.002177	0.000912	0.001057	0.001377
0.178208	0.523003	-0.00029	0.299611	0.000336	0.002119	0.003804	0.000355	0.000858	-0.0014
0.182304	0.532807	0.000935	0.312921	0.001436	-0.00155	-0.00028	0.001312	-0.00184	0.001439
0.1864	0.553662	0.000937	0.326578	-0.00308	0.000123	-0.00212	-0.00172	0.000741	-0.00064
0.190496	0.569272	0.000463	0.34099	-0.00013	0.001364	-0.00361	0.000749	0.001307	0.001339
0.194592	0.582746	0.000528	0.358713	0.003341	0.000292	0.004126	0.000827	0.001332	0.001778
0.198688	0.604645	-0.00098	0.375753	-0.00024	0.001237	0.002745	0.001669	0.000976	-0.00165
0.202784	0.620072	0.00189	0.389453	0.001633	-0.0007	0.000707	0.000546	-0.00197	0.00112
0.20688	0.637088	-0.00022	0.399711	-0.00319	-0.00048	-0.00326	-0.00205	0.000765	-0.00021
0.210976	0.652665	0.001257	0.412679	2.6E-05	0.001553	-0.00306	0.000355	0.000853	0.001644
0.215072	0.664762	-5.2E-05	0.429077	0.003089	-0.00023	0.003436	0.001476	0.001564	0.001366
0.219168	0.68787	4.31E-05	0.445584	0.000279	0.002231	0.0039	0.001515	0.00131	-0.00196
0.223264	0.70537	0.000929	0.45902	0.00094	-0.00173	-0.0003	0.000734	-0.00175	0.000981
0.22736	0.721075	8.44E-05	0.469512	-0.00249	0.000134	-0.00234	-0.00262	0.000671	0.000653
0.231456	0.738329	0.000615	0.479499	0.000256	0.000907	-0.00413	0.000743	0.001131	0.000788
0.235552	0.752665	0.000416	0.498281	0.003147	0.000701	0.004289	0.001325	0.001574	0.001701
0.239648	0.771542	-0.00039	0.512788	-0.00028	0.001947	0.003727	0.001818	0.000493	-0.00101
0.243744	0.793466	0.002353	0.528953	0.000769	-0.00152	-0.0004	0.000734	-0.00186	0.000637
0.24784	0.806421	-8.8E-05	0.536664	-0.00261	-0.00099	-0.00334	-0.00212	0.001057	-0.00016
0.251936	0.826765	0.000268	0.550838	0.000805	0.001841	-0.00274	-0.00029	0.000752	0.001474
0.256032	0.841646	-1E-04	0.566362	0.002879	0.000216	0.004236	0.00187	0.001767	0.001267
0.260128	0.859798	9.22E-05	0.583208	-0.00091	0.002292	0.003244	0.00157	0.000804	-0.00094
0.264224	0.88511	0.000934	0.598502	0.001814	-0.00229	-0.00085	0.001091	-0.0021	5.96E-05
0.26832	0.901967	0.000224	0.607638	-0.00231	-0.00025	-0.00247	-0.00255	0.001123	0.000843
0.272416	0.92374	0.000788	0.619843	-0.0002	0.001758	-0.00324	0.000444	0.000622	0.001329
0.276512	0.943233	0.000253	0.63453	0.003386	0.001036	0.003883	0.000486	0.001377	0.001111

Step Time, s	Elongation	Force, N							
0.280608	0.961906	-0.00018	0.650797	-0.00059	0.001701	0.00324	0.003023	0.000991	-0.00217
0.284704	0.990324	0.001773	0.664163	0.001594	-0.00237	-0.00094	0.000469	-0.00205	0.001018
0.290848	1.0185	0.000307	0.679271	-0.00104	0.00097	-0.00225	-0.00087	0.000995	0.001498
0.29904	1.05838	9.72E-05	0.704013	0.00128	0.001023	0.003283	0.001279	0.00135	-0.00081
0.307232	1.10206	0.000383	0.731262	-0.0007	-0.00122	-0.00148	-0.00067	-0.00058	0.000919
0.315424	1.1414	0.00056	0.750086	0.001633	0.001299	0.000451	0.000473	0.001096	0.001177
0.323616	1.18016	0.000259	0.777485	0.000439	-0.00019	0.001075	0.001706	-0.00061	-0.00057
0.331808	1.22376	0.000802	0.799182	-0.00124	0.001003	-0.00222	-0.00083	0.000531	0.001505
0.34	1.26295	-0.00023	0.819404	0.001303	0.00032	0.002889	0.000974	0.001689	-0.00086
0.348192	1.30091	0.000485	0.845918	-0.00054	-0.00039	-0.00134	-0.00058	-0.00035	0.001249
0.356384	1.34125	0.000507	0.862497	0.001988	0.000918	0.000666	0.000692	0.000934	0.000839
0.364576	1.37957	0.000753	0.886752	-0.00016	-0.00061	0.000801	0.001268	-0.00062	-0.00048
0.372768	1.41793	0.000524	0.907414	-0.00044	0.00187	-0.00216	-0.0004	0.000738	0.001142
0.38096	1.45709	-0.0002	0.925535	0.00108	0.000223	0.0035	0.001104	0.001573	-0.00037
0.389152	1.49511	0.000349	0.950113	-0.0009	-0.00068	-0.00186	-0.00104	-0.00057	0.001001
0.397344	1.53291	0.000437	0.965962	0.002206	0.001266	0.001318	0.001122	0.001194	0.000646
0.405536	1.57022	0.000953	0.986903	-0.00038	-0.00062	8.81E-05	0.001357	-0.00083	0.000148
0.413728	1.60649	0.000589	1.00853	-0.00035	0.001547	-0.00116	-0.0002	0.001041	0.000635
0.42192	1.64335	9.68E-05	1.02598	0.000897	0.00033	0.003252	0.002011	0.001307	-0.0003
0.430112	1.67785	1.04E-05	1.04919	-0.00069	-0.00081	-0.00143	-0.00047	-0.00059	0.001481
0.438304	1.71434	0.000456	1.06499	0.001889	0.001074	0.001111	0.001839	0.001602	0.000246
0.446496	1.75022	0.001371	1.08451	0.000477	-1E-04	0.000941	0.002068	-0.00129	0.000249
0.454688	1.78417	0.000154	1.10559	-0.00078	0.000987	-0.00072	-7.6E-05	0.001103	0.000568
0.46288	1.82025	0.000421	1.1218	0.000754	0.000687	0.002858	0.001307	0.001474	-0.00019
0.471072	1.85414	-0.00022	1.1433	-0.00062	-0.00087	-0.00072	-0.00069	-0.00047	0.001384
0.479264	1.88638	0.000514	1.16081	0.001904	0.000868	0.000865	0.001056	0.001435	0.000352
0.487456	1.9211	0.001229	1.17823	-0.00023	0.000488	0.000597	0.001594	-0.00134	-0.00026
0.495648	1.95399	0.000298	1.19918	0.000286	0.000457	-0.00053	-2.5E-05	0.000966	0.001363
0.50384	1.98798	0.000374	1.21434	2.91E-05	0.001095	0.002952	0.001272	0.00189	-0.0005
0.512032	2.01987	-0.00036	1.23342	4.6E-05	-0.00031	-0.00082	-0.00103	-0.00103	0.001354
0.520224	2.05124	0.000968	1.25115	0.001527	0.000179	0.000697	0.001147	0.00209	0.000649
0.528416	2.08191	0.001678	1.26747	-0.00015	0.000451	0.000476	0.001518	-0.0011	-0.00012
0.536608	2.11348	0.000409	1.28741	0.000107	0.001392	-0.00101	-0.00042	0.001188	0.001401
0.5448	2.14328	0.000753	1.30261	0.00028	0.000605	0.003061	0.001731	0.001907	-7.7E-05
0.552992	2.17278	-0.00043	1.32107	0.000152	-0.00019	-0.0008	-0.00115	0.000154	0.001498
0.561184	2.20011	0.001068	1.33877	0.001269	0.001121	0.00122	0.001121	0.001786	0.001009
0.569376	2.23045	0.001634	1.3552	0.000584	4.4E-05	0.000393	0.001548	-0.00068	8.99E-05
0.577568	2.25901	0.000354	1.37389	0.000246	0.001338	-0.00034	-3.6E-05	0.000934	0.000949
0.58576	2.2843	0.00098	1.39028	0.001111	0.000677	0.003058	0.001506	0.001476	0.000114
0.593952	2.31269	-0.00051	1.40791	0.000312	-0.00047	-0.00082	-0.00129	0.00012	0.001231

Step Time, s	Elongation	Force, N							
0.602144	2.33826	0.001071	1.42505	0.001626	0.001463	0.001381	0.001051	0.001779	0.000748
0.610336	2.36367	0.001613	1.44139	0.000758	0.000245	0.001237	0.001458	-0.00106	0.000453
0.622624	2.4031	0.000718	1.46772	0.000563	0.00097	0.002143	0.000677	0.00142	0.00057
0.639008	2.45482	0.000407	1.5	0.000773	0.000484	0.001712	-6.1E-06	0.000807	0.001019
0.655392	2.50615	0.001056	1.53216	0.000703	0.000482	0.002181	0.000783	6.85E-05	0.000852
0.671776	2.55536	4.39E-05	1.56318	0.000516	0.000444	0.006386	0.000133	0.000684	0.00063
0.68816	2.60275	0.001017	1.5924	0.000743	0.00075	0.023578	0.001144	0.000308	0.000109
0.704544	2.64706	0.000741	1.62088	0.000546	0.000886	0.055495	0.000649	0.001381	0.000601
0.720928	2.68898	0.000571	1.64672	0.000567	0.000743	0.101612	0.000189	0.000751	0.000838
0.737312	2.72708	0.000924	1.6737	0.000193	0.000414	0.144996	0.000658	8.94E-05	0.000937
0.753696	2.76299	7.67E-05	1.70054	0.000345	0.000532	0.181992	0.000253	0.0009	0.000961
0.77008	2.79788	0.001115	1.72519	0.001263	0.000567	0.212457	0.000943	0.000469	0.000389
0.786464	2.83168	0.00092	1.75086	0.001005	0.000618	0.241144	0.000588	0.001257	0.000374
0.802848	2.86277	0.000442	1.77716	0.000585	0.000662	0.266736	0.000349	0.000807	0.000678
0.819232	2.89272	0.001172	1.80312	0.000888	0.000258	0.291678	0.000947	0.000564	0.001209
0.835616	2.92175	1.5E-05	1.83096	0.000362	0.001011	0.31497	0.000502	0.000511	0.000815
0.852	2.9481	0.001348	1.86798	0.001044	0.001813	0.337311	0.001135	0.000729	0.00069
0.868384	2.97408	0.002236	1.91148	0.002477	0.006969	0.356523	0.000428	0.003129	0.00284
0.884768	2.99756	0.004097	1.94394	0.001544	0.005732	0.377685	0.000322	0.002783	0.002159
0.901152	3.01917	0.005629	1.96845	0.002859	0.005492	0.400465	0.000677	0.00322	0.003159
0.917536	3.0426	0.003858	1.9923	0.003047	0.01337	0.422531	0.000785	0.003063	0.002804
0.93392	3.06535	0.00512	2.01444	0.004364	0.01973	0.446032	0.001555	0.004046	0.002562
0.950304	3.09134	0.007765	2.03498	0.005012	0.03535	0.466784	0.002565	0.005048	0.004903
0.966688	3.11512	0.032684	2.05385	0.008681	0.049049	0.488254	0.003516	0.005203	0.019815
0.983072	3.13856	0.071338	2.07256	0.031718	0.059167	0.509284	0.005014	0.01018	0.038736
0.999456	3.16549	0.106648	2.08982	0.073864	0.069576	0.527596	0.01536	0.026689	0.061885
1.01584	3.19661	0.137384	2.10864	0.123288	0.080444	0.545786	0.036434	0.037196	0.085616
1.03222	3.22784	0.102088	2.12401	0.162977	0.090983	0.561548	0.038034	0.047636	0.106846
1.04861	3.25044	0.134048	2.13593	0.159382	0.101732	0.579226	0.05403	0.0578	0.114293
1.06499	3.26594	0.177028	2.15321	0.171082	0.109123	0.59694	0.068889	0.067352	0.082001
1.08138	3.27379	0.206289	2.17089	0.206649	0.121544	0.611974	0.076682	0.075767	0.118844
1.09776	3.28338	0.248071	2.18748	0.242349	0.131324	0.627516	0.070735	0.083858	0.14672
1.11414	3.2929	0.291644	2.19592	0.273689	0.145139	0.64213	0.087622	0.090737	0.168136
1.13053	3.30201	0.334867	2.20402	0.303922	0.154361	0.656889	0.104001	0.096612	0.184623
1.14691	3.31044	0.378488	2.21645	0.331758	0.158564	0.670155	0.117428	0.102574	0.199137
1.1633	3.32117	0.424992	2.23256	0.361159	0.16711	0.687937	0.128954	0.108805	0.214603
1.17968	3.33171	0.471267	2.24852	0.393056	0.179762	0.705109	0.139459	0.115483	0.23088
1.19606	3.33838	0.517874	2.25823	0.425693	0.190986	0.718449	0.148907	0.122894	0.247537
1.21245	3.3457	0.564541	2.26428	0.459338	0.202946	0.729279	0.158167	0.128144	0.26389
1.22883	3.35277	0.609929	2.26712	0.492905	0.217053	0.738618	0.168011	0.134046	0.278638

Step Time, s	Elongation	Force, N							
1.24522	3.36034	0.65764	2.26493	0.528255	0.23067	0.748436	0.17668	0.141743	0.293364
1.2616	3.36827	0.705143	2.26255	0.564201	0.243298	0.756571	0.185962	0.149539	0.3073
1.28618	3.38036	0.773404	2.26455	0.614704	0.260946	0.772867	0.198178	0.160621	0.327583
1.31894	3.40224	0.865412	2.27169	0.67586	0.284749	0.792254	0.214422	0.174621	0.352448
1.35171	3.41848	0.956622	2.27874	0.732122	0.309445	0.806045	0.230066	0.188548	0.37583
1.38448	3.42795	1.04787	2.28542	0.782425	0.332329	0.817881	0.245433	0.200147	0.397666
1.41725	3.43522	1.13376	2.29635	0.827207	0.35489	0.828583	0.262571	0.211127	0.416457
1.45002	3.43994	1.21551	2.30351	0.868175	0.376412	0.839378	0.280361	0.222864	0.439241
1.48278	3.44753	1.29521	2.30196	0.905519	0.398182	0.851781	0.296646	0.234356	0.459248
1.51555	3.46042	1.371	2.29693	0.938653	0.418505	0.85961	0.311414	0.250065	0.472655
1.54832	3.47392	1.443	2.28768	0.96918	0.439714	0.866576	0.325945	0.263212	0.482472
1.58109	3.47932	1.51297	2.27479	0.997358	0.461049	0.871657	0.346644	0.275098	0.49273
1.61386	3.48076	1.58251	2.24866	1.02256	0.491182	0.875942	0.362921	0.287187	0.503327
1.64662	3.47937	1.65191	2.24059	1.04519	0.511731	0.879858	0.378754	0.296778	0.511124
1.67939	3.47576	1.71788	2.24354	1.06584	0.52919	0.882403	0.392164	0.307198	0.518983
1.71216	3.47047	1.78183	2.24673	1.08565	0.545459	0.884376	0.40337	0.316607	0.526171
1.74493	3.47217	1.84321	2.26992	1.10529	0.563207	0.885166	0.413982	0.324946	0.533385
1.7777	3.47097	1.90252	2.30668	1.12183	0.582407	0.886984	0.423575	0.331987	0.540479
1.81046	3.46663	1.95941	2.32468	1.13816	0.597594	0.88868	0.433216	0.338552	0.544816
1.84323	3.46486	2.01347	2.3359	1.15407	0.613203	0.892343	0.442863	0.345603	0.548481
1.876	3.47556	2.0652	2.34714	1.16744	0.626784	0.898703	0.451118	0.351707	0.552429
1.90877	3.51762	2.12144	2.36205	1.18098	0.639561	0.906935	0.458418	0.357587	0.555357
1.94154	3.54555	2.17344	2.3851	1.20006	0.650255	0.910792	0.464712	0.363345	0.557997
1.9743	3.54994	2.22508	2.40494	1.2295	0.661003	0.912476	0.470694	0.367969	0.559612
2.00707	3.54978	2.29304	2.42223	1.24554	0.670181	0.91529	0.476266	0.372558	0.561644
2.03984	3.54558	2.35754	2.43682	1.25583	0.678	0.93124	0.481632	0.376334	0.564296
2.07261	3.54434	2.39986	2.45202	1.26465	0.686126	0.939556	0.486177	0.379458	0.56694
2.10538	3.54506	2.4409	2.46142	1.27202	0.692897	0.939313	0.488988	0.38344	0.56978
2.13814	3.54566	2.48127	2.46667	1.2839	0.698326	0.938172	0.492153	0.387542	0.572586
2.17091	3.54944	2.51772	2.4718	1.29203	0.703622	0.943343	0.494826	0.392598	0.575919
2.20368	3.5413	2.55439	2.47608	1.29758	0.707307	0.945653	0.49657	0.39866	0.581392
2.23645	3.53195	2.58754	2.48563	1.30275	0.711178	0.944682	0.499023	0.403148	0.585339
2.26922	3.52493	2.6244	2.49355	1.31113	0.71484	0.94302	0.503419	0.410228	0.590414
2.30198	3.51652	2.65895	2.5008	1.3144	0.720013	0.941529	0.508571	0.419667	0.602441
2.33475	3.51766	2.68686	2.5057	1.31658	0.724498	0.940976	0.513667	0.421715	0.612509
2.36752	3.52324	2.71495	2.50699	1.31788	0.729676	0.940732	0.528028	0.423892	0.617121
2.40029	3.51798	2.73982	2.51041	1.31822	0.733115	0.940166	0.531209	0.427418	0.619395
2.43306	3.5071	2.7636	2.51566	1.31752	0.738306	0.940491	0.53363	0.433855	0.622692
2.46582	3.49491	2.78648	2.52134	1.31743	0.754488	0.939816	0.536389	0.438093	0.626951
2.49859	3.47614	2.80715	2.52757	1.32124	0.757888	0.93837	0.540616	0.441878	0.631335

Step Time, s	Elongation	Force, N							
2.53136	3.41014	2.82872	2.53274	1.32639	0.759987	0.937192	0.546095	0.447686	0.633529
2.56413	3.28849	2.84281	2.53933	1.32378	0.762436	0.935817	0.547996	0.45353	0.634046
2.61328	3.29397	2.85589	2.5646	1.31855	0.768393	0.934623	0.550641	0.459376	0.637534
2.67882	3.31507	2.86334	2.5994	1.31451	0.779037	0.931977	0.553517	0.462852	0.637142
2.74435	3.37569	2.87972	2.60919	1.30899	0.785192	0.934565	0.553953	0.465248	0.636145
2.80989	3.41387	2.9024	2.62394	1.3176	0.786456	0.934748	0.551333	0.467036	0.636377
2.87542	3.42809	2.95786	2.62679	1.33246	0.783471	0.936894	0.549132	0.468961	0.634471
2.94096	3.45275	2.99154	2.64102	1.32963	0.781703	0.951083	0.548115	0.471877	0.633202
3.0065	3.46025	2.98901	2.64111	1.33099	0.784257	0.94853	0.548658	0.475206	0.635722
3.07203	3.47285	2.98576	2.63825	1.33436	0.784979	0.949937	0.548163	0.479015	0.636992
3.13757	3.47023	2.98859	2.6429	1.33692	0.786997	0.952795	0.550532	0.484766	0.642106
3.2031	3.47934	2.98023	2.63337	1.33478	0.790774	0.951552	0.557958	0.486568	0.650163
3.26864	3.48591	2.96693	2.62223	1.32901	0.798229	0.948288	0.563778	0.486275	0.647459
3.33418	3.46964	2.96669	2.62087	1.3235	0.817631	0.946062	0.56736	0.489156	0.650197
3.39971	3.45096	2.95258	2.61998	1.31656	0.82059	0.943335	0.573775	0.488626	0.653807
3.46525	3.44693	2.93078	2.64221	1.31168	0.827212	0.941209	0.577443	0.488044	0.651552
3.53078	3.43992	2.92182	2.67957	1.31245	0.833133	0.938903	0.578778	0.487258	0.646246
3.59632	3.50017	2.93063	2.67724	1.31063	0.835682	0.939032	0.579024	0.487809	0.639321
3.66186	3.50704	2.94731	2.68589	1.31676	0.834581	0.9372	0.578896	0.485317	0.634595
3.72739	3.50678	3.01598	2.68781	1.33024	0.832978	0.940293	0.577879	0.480791	0.630881
3.79293	3.51357	3.0479	2.69047	1.32212	0.829597	0.941059	0.575529	0.479211	0.62728
3.85846	3.50764	3.06906	2.68598	1.31796	0.828422	0.935313	0.574346	0.478805	0.625202
3.924	3.50718	3.09804	2.68744	1.31126	0.826398	0.933321	0.572365	0.479952	0.626249
3.98954	3.49963	3.11364	2.69314	1.30513	0.823381	0.924758	0.572136	0.48737	0.633477
4.05507	3.50164	3.12481	2.68819	1.29136	0.821339	0.913374	0.577582	0.489411	0.646764
4.12061	3.50198	3.12044	2.67848	1.28147	0.822981	0.901857	0.57848	0.489434	0.649282
4.18614	3.48971	3.12645	2.67016	1.27542	0.836252	0.891134	0.576794	0.496791	0.65357
4.25168	3.47422	3.13285	2.65879	1.26561	0.833232	0.885513	0.580729	0.496581	0.656212
4.31722	3.46822	3.12111	2.68661	1.25408	0.826933	0.879887	0.579331	0.49434	0.653916
4.38275	3.46098	3.10188	2.69347	1.24313	0.823607	0.874436	0.575121	0.491186	0.645754
4.44829	3.51051	3.0836	2.67648	1.23316	0.817683	0.871129	0.571417	0.489041	0.638899
4.51382	3.49939	3.06083	2.67388	1.24063	0.810493	0.8691	0.564734	0.486803	0.637611
4.57936	3.48103	3.10151	2.66456	1.24066	0.802671	0.876766	0.55818	0.483982	0.63762
4.6449	3.48055	3.09071	2.6488	1.23055	0.797555	0.877709	0.55147	0.481822	0.635847
4.71043	3.46005	3.07847	2.62607	1.23191	0.793924	0.875118	0.544797	0.480314	0.635853
4.77597	3.45606	3.06506	2.6086	1.23462	0.789124	0.873387	0.539649	0.480787	0.636364
4.8415	3.44513	3.05039	2.60329	1.22894	0.786876	0.869298	0.536296	0.48957	0.63644
4.90704	3.4409	3.03842	2.58626	1.22312	0.786996	0.862756	0.539834	0.492501	0.645951
4.97258	3.42672	3.02406	2.56614	1.21877	0.786301	0.85282	0.542344	0.48902	0.645009
5.03811	3.41092	3.02035	2.55097	1.21932	0.796149	0.843948	0.540362	0.489362	0.642405

Step Time, s	Elongation Force, N								
5.10365	3.39562	3.02277	2.54122	1.21494	0.7931	0.833576	0.54367	0.486711	0.637525
5.16918	3.39166	3.02059	2.57823	1.20853	0.7928	0.822304	0.543423	0.480714	0.631957
5.26749	3.41413	3.02636	2.56228	1.20291	0.788041	0.808652	0.543527	0.475706	0.620601
5.39856	3.44397	3.06073	2.54232	1.21866	0.775909	0.816611	0.541444	0.464758	0.615759
5.52963	3.439	3.068	2.51717	1.21426	0.766713	0.820084	0.534803	0.456482	0.612053
5.6607	3.42795	3.06331	2.506	1.20398	0.763461	0.816964	0.531621	0.46037	0.607909
5.79178	3.39834	3.04256	2.50065	1.18624	0.764462	0.805345	0.533733	0.467805	0.620653
5.92285	3.34674	3.01351	2.48554	1.17127	0.774926	0.798349	0.53172	0.469923	0.616169
6.05392	3.32706	2.97104	2.5004	1.15456	0.761453	0.794169	0.527734	0.467362	0.615466
6.18499	3.37893	2.93232	2.48911	1.1416	0.747741	0.794021	0.518015	0.458127	0.603556
6.31606	3.3749	2.94359	2.45798	1.16057	0.736497	0.809647	0.50849	0.446449	0.595084
6.44714	3.32227	2.90097	2.41007	1.15524	0.734362	0.813778	0.502619	0.439836	0.588577
6.57821	3.26799	2.86113	2.36346	1.14696	0.734921	0.81126	0.497707	0.445483	0.590116
6.70928	3.23036	2.82552	2.32783	1.1426	0.747556	0.803719	0.504953	0.44534	0.583406
6.84035	3.19547	2.79931	2.31184	1.13402	0.75808	0.797796	0.505848	0.442183	0.578116
6.97142	3.19961	2.78243	2.33037	1.12918	0.758545	0.784241	0.501183	0.433456	0.566221
7.1025	3.20289	2.81491	2.31904	1.12808	0.749583	0.777676	0.495187	0.428287	0.560302
7.23357	3.18256	2.85846	2.30943	1.13	0.738534	0.779616	0.493585	0.426036	0.557812
7.36464	3.15852	2.85203	2.28264	1.11562	0.728102	0.780613	0.492588	0.4308	0.555448
7.49571	3.13511	2.82639	2.26427	1.09815	0.725707	0.780929	0.495895	0.43321	0.561449
7.62678	3.08847	2.79581	2.23837	1.08386	0.728987	0.778449	0.489605	0.436806	0.562492
7.75786	3.05447	2.74701	2.24483	1.06552	0.722373	0.778259	0.487843	0.433727	0.55591
7.88893	3.06283	2.69995	2.21823	1.05544	0.721829	0.778499	0.477555	0.428428	0.547549
8.02	3.0046	2.69718	2.19219	1.06843	0.719537	0.795379	0.469495	0.425573	0.54241
8.15107	2.95962	2.65404	2.16429	1.06891	0.719227	0.799267	0.461572	0.425045	0.542063
8.28214	2.9312	2.61591	2.13046	1.06641	0.71723	0.787812	0.458161	0.431286	0.546653
8.41322	2.8999	2.58572	2.10171	1.06027	0.724057	0.772245	0.456573	0.429033	0.542388
8.54429	2.86511	2.5613	2.10681	1.05392	0.726567	0.76319	0.45528	0.423815	0.536443
8.67536	2.85534	2.54152	2.12142	1.04385	0.721673	0.758689	0.4517	0.412605	0.528759
8.80643	2.85795	2.55037	2.12446	1.04953	0.712359	0.757906	0.449359	0.404604	0.526718
8.9375	2.83145	2.54901	2.12523	1.04493	0.705016	0.758611	0.450071	0.401105	0.525582
9.06858	2.78746	2.5261	2.10842	1.03825	0.696094	0.761317	0.44697	0.406337	0.530178
9.19965	2.74523	2.49639	2.08404	1.0246	0.683611	0.760244	0.450686	0.408987	0.53885
9.33072	2.69422	2.46375	2.06093	1.00905	0.691039	0.761746	0.445629	0.410382	0.543271
9.46179	2.65388	2.41302	2.08649	0.996065	0.692097	0.762466	0.439453	0.407515	0.541217
9.59286	2.64464	2.36679	2.06735	1.00073	0.694987	0.763021	0.433129	0.401528	0.533717
9.72394	2.60953	2.36435	2.03595	1.01713	0.692571	0.774665	0.430024	0.393302	0.534977
9.85501	2.57627	2.32687	1.99547	1.01937	0.692548	0.767188	0.427654	0.387376	0.539628
9.98608	2.56019	2.29206	1.96513	1.01647	0.698925	0.76204	0.429319	0.388964	0.548433
10.1172	2.55617	2.26367	1.95314	1.00931	0.710564	0.748769	0.429542	0.387588	0.551841

Step Time, s	Elongation Force, N								
10.2482	2.54525	2.24574	1.96712	0.996313	0.707087	0.739237	0.431295	0.383868	0.548074
10.3793	2.54805	2.23184	1.98501	0.985082	0.700042	0.726632	0.430418	0.379174	0.538278
10.5759	2.49841	2.25379	2.00146	0.995193	0.680339	0.734791	0.429971	0.378561	0.532161
10.838	2.43477	2.22446	1.97575	0.983592	0.665718	0.741453	0.435646	0.384649	0.539206
11.1002	2.34096	2.15404	1.96264	0.96753	0.678362	0.740578	0.433314	0.390984	0.548294
11.3623	2.32847	2.10565	1.94361	0.981347	0.681832	0.750946	0.423216	0.384262	0.54205
11.6245	2.2994	2.06374	1.8925	0.984365	0.680214	0.748278	0.42574	0.383582	0.537429
11.8866	2.27838	2.06184	1.88833	0.964588	0.679594	0.733034	0.428968	0.380518	0.532936
12.1488	2.27682	2.07746	1.92379	0.957138	0.668249	0.740254	0.427842	0.372351	0.52669
12.4109	2.23252	2.1011	1.93557	0.953223	0.645308	0.768414	0.430243	0.372304	0.523352
12.6731	2.1526	2.05792	1.91223	0.941484	0.640623	0.775128	0.436863	0.381431	0.540989
12.9352	2.12797	1.99716	1.91034	0.946577	0.64809	0.764855	0.432573	0.385452	0.535909
13.1973	2.15749	1.97452	1.87697	0.968212	0.650399	0.774264	0.42406	0.380274	0.528148
13.4595	2.14397	1.96848	1.83018	0.962093	0.652447	0.77054	0.423301	0.378966	0.533563
13.7216	2.12124	1.97475	1.87369	0.942746	0.645681	0.764587	0.430888	0.373701	0.522757
13.9838	2.12125	2.00203	1.91066	0.941786	0.623998	0.782078	0.437167	0.374638	0.522597
14.2459	2.0682	1.96965	1.88184	0.929252	0.624552	0.801279	0.445625	0.386514	0.530574
14.5081	2.05475	1.91519	1.86706	0.914777	0.650671	0.796107	0.449021	0.392008	0.539638
14.7702	2.10474	1.89113	1.85023	0.925177	0.666535	0.78939	0.445584	0.390088	0.532265
15.0324	2.09392	1.86355	1.80068	0.941494	0.657973	0.787322	0.438713	0.389869	0.531034
15.2945	2.04884	1.86562	1.80708	0.922724	0.656162	0.781938	0.442299	0.388416	0.538165
15.5566	2.0525	1.90547	1.84934	0.906973	0.645883	0.800415	0.447581	0.386139	0.539007
15.8188	2.06162	1.92456	1.84645	0.905403	0.643093	0.827477	0.45317	0.392346	0.543801
16.0809	2.05807	1.86631	1.80621	0.90079	0.659867	0.820513	0.463788	0.404094	0.557871
16.3431	2.08889	1.83527	1.7927	0.91559	0.676117	0.816087	0.460918	0.403845	0.557825
16.6052	2.10029	1.81225	1.75085	0.92705	0.670031	0.817201	0.455821	0.401274	0.55483
16.8674	2.08449	1.83292	1.72156	0.91143	0.6653	0.824448	0.456722	0.405427	0.555857
17.1295	2.06533	1.85713	1.78579	0.892955	0.659261	0.839339	0.462045	0.4019	0.5519
17.3916	2.07738	1.91812	1.82252	0.915577	0.650709	0.870695	0.470466	0.411164	0.558892
17.6538	2.14403	1.90755	1.79521	0.929523	0.675993	0.874752	0.481443	0.425872	0.586396
17.9159	2.17861	1.86998	1.78268	0.930764	0.708587	0.859923	0.491977	0.434113	0.600923
18.1781	2.21249	1.84683	1.75761	0.94255	0.719617	0.861345	0.491908	0.43183	0.593484
18.4402	2.19636	1.84917	1.7186	0.943565	0.71085	0.890406	0.490734	0.434377	0.59586
18.7024	2.18389	1.90547	1.76426	0.917597	0.716663	0.911751	0.497488	0.436809	0.601658
18.9645	2.22676	1.97853	1.81936	0.919337	0.73019	0.924075	0.505892	0.442491	0.607203
19.2267	2.27149	1.98587	1.80531	0.950318	0.743833	0.935088	0.519008	0.458922	0.623365
19.4888	2.32132	1.9189	1.78228	0.952848	0.770577	0.916193	0.543524	0.474806	0.646413
19.7509	2.36318	1.8871	1.77648	0.951295	0.792731	0.899784	0.543789	0.475392	0.652519
20.0131	2.37346	1.92099	1.72392	0.956178	0.780574	0.932679	0.539963	0.473805	0.657538
20.2752	2.37766	1.9533	1.72094	0.939796	0.77187	0.957525	0.544211	0.48454	0.674185

Step Time, s	Elongation Force, N								
20.5374	2.3892	1.99495	1.81269	0.925871	0.77563	0.964856	0.550294	0.492724	0.671947
20.7995	2.48367	2.03535	1.86521	0.954582	0.797033	0.971714	0.565824	0.506626	0.695378
21.1927	2.59183	1.99072	1.83596	0.973	0.849981	0.952699	0.597536	0.54001	0.737996
21.717	2.64806	1.98817	1.80359	0.972859	0.821861	0.988944	0.609072	0.553533	0.746011
22.2413	2.73576	2.09997	1.93294	0.974367	0.846659	1.01012	0.627493	0.57734	0.771972
22.7656	2.87869	2.13961	1.97475	1.01049	0.90521	0.993535	0.679963	0.625396	0.833964
23.2899	2.85586	2.12844	1.93909	1.0069	0.903596	1.02872	0.708151	0.638597	0.86269
23.8142	2.91489	2.26731	1.99364	1.01336	0.911531	1.0464	0.731081	0.669758	0.88245
24.3385	2.99982	2.40059	2.07726	1.06853	0.961892	1.02503	0.789549	0.726725	0.94991
24.8628	1.87403	2.34819	2.06233	1.06093	0.964591	1.04449	0.846385	0.742592	0.998708
25.387	0.00036	2.52203	2.12395	1.08157	0.954838	1.06249	0.856885	0.78088	1.00865
25.9113	0.000689	2.65994	2.24156	1.14132	1.02437	1.00063	0.913738	0.835263	1.08122
26.4356	0.001425	2.56877	2.20221	1.13851	1.00932	1.01267	0.982746	0.859538	1.15658
26.9599	0.001497	2.66634	2.26424	1.19071	0.987832	0.382717	0.99267	0.861973	1.1527
27.4842	0.001265	2.09376	2.40967	1.2523	0.80873	0.000831	1.02277	0.918698	1.2168
28.0085	0.00111	9.83E-05	2.32648	1.27333	0.000243	0.001155	1.11261	0.944927	1.29735
28.5328	0.001521	0.000562	1.48117	1.32529	0.001085	0.001429	1.1172	0.926371	1.30605
29.0571	0.001373	0.001177	0.000428	1.40564	0.000965	0.00125	1.10993	0.976047	1.33473
29.5813	0.001154	0.000953	0.001226	1.42453	0.001106	0.001428	1.18512	0.990802	1.37441
30.1056	0.001517	0.001189	0.001008	1.49113	0.001398	0.001416	1.19862	0.449858	1.28539
30.6299	0.001752	0.000982	0.001132	1.57774	0.001511	0.001123	1.14113	7.58E-05	1.18799
31.1542	0.001707	0.00127	0.001381	1.59892	0.000561	0.001679	1.16454	0.000619	0.846457
31.6785	0.001431	0.001231	0.00178	1.5999	0.001279	0.001324	0.928264	0.000504	0.017629
32.2028	0.00141	0.001546	0.001135	1.60111	0.001363	0.002044	6.87E-05	0.000985	0.01586
32.7271	0.001351	0.001689	0.001243	1.600011	0.001201	0.000899	0.000327	0.000765	0.010628
33.2514	0.001118	0.00085	0.000988	1.592232	0.000774	0.001433	0.00088	0.000837	0.009173
33.7756	0.00185	0.001345	0.001842	0.543245	0.001244	0.00128	0.00075	0.000779	0.009464
34.2999	0.00171	0.001333	0.001141	0.000228	0.001361	0.00121	0.000893	0.000612	0.014422
34.8242	0.001554	0.000988	0.001228	0.000719	0.001011	0.001141	0.000768	0.001166	0.021678
35.3485	0.001246	0.001276	0.001196	0.001529	0.001173	0.001473	0.000596	0.000879	0.024469
35.8728	0.001089	0.001239	0.001229	0.001306	0.001589	0.001247	0.00123	0.000842	0.019823
36.3971	0.001441	0.001172	0.00097	0.001221	0.001145	0.001013	0.001054	0.001183	0.02051

Table B6. RTFO aged PG 76-22 (3 samples at 0°C, 3 samples at 4°C and 3 samples at 12°C).

Step Time, s	Elongation Force, N								
0	0	0	0	0	0	0	0	0	0
0.000544	0.016516	0.018215	0.0167	0.015316	0.016817	0.016486	0.017824	0.016565	0.018021
0.001568	0.116236	0.118616	0.115294	0.113828	0.116505	0.115313	0.119012	0.115473	0.117944
0.002592	0.137262	0.139558	0.136202	0.138668	0.137465	0.137723	0.14016	0.137088	0.138247
0.003616	0.075063	0.079697	0.077098	0.081226	0.075465	0.07927	0.078276	0.077179	0.077554
0.00464	0.020489	0.023335	0.0238	0.028378	0.021422	0.025117	0.02265	0.02534	0.024202
0.005664	0.00164	-0.00073	0.002195	0.007818	0.002308	0.002894	0.001528	0.006821	0.002067
0.006688	0.003439	-0.00143	0.000806	0.006945	0.002805	-0.00061	-0.00106	0.005149	-0.00124
0.007712	0.008993	0.006129	0.004461	0.010044	0.007816	0.003418	0.00144	0.006485	0.001716
0.008736	0.009284	0.009785	0.007264	0.010794	0.008745	0.008515	0.005134	0.006131	0.002841
0.00976	0.005565	0.008474	0.007591	0.01059	0.00576	0.009952	0.007171	0.00397	0.00077
0.010784	0.00358	0.006636	0.005772	0.010442	0.002884	0.008972	0.007353	0.000939	-0.00099
0.011808	0.004331	0.004239	0.002854	0.009398	0.00222	0.007979	0.005579	-0.00207	0.000313
0.012832	0.005286	0.000877	0.001171	0.008255	0.002714	0.006393	0.003605	-0.00312	0.003339
0.013856	0.005371	-0.00159	0.001539	0.007774	0.003479	0.005114	0.001824	-0.00127	0.005481
0.01488	0.006791	-0.00059	0.002378	0.00922	0.004197	0.003165	0.000188	0.003467	0.006506
0.015904	0.007136	0.002381	0.002851	0.011491	0.004588	0.002191	-0.00293	0.00707	0.006861
0.016928	0.004587	0.003912	0.001551	0.010652	0.002908	0.002891	-0.00465	0.007879	0.00594
0.017952	0.000287	0.002969	-0.0009	0.006438	0.000242	0.005168	-0.00332	0.007369	0.002156
0.018976	-0.0022	0.002307	-0.00165	0.00272	-0.00039	0.006729	-0.00136	0.005225	-0.00169
0.02	-0.00195	0.001855	-0.00072	0.001561	0.000375	0.006746	-0.00142	0.002943	-0.00329
0.021024	-0.00191	0.001201	0.000111	0.000612	0.00107	0.006476	-0.00072	0.000772	-0.00333
0.022048	-0.00317	0.000389	0.00021	-0.00072	2.4E-05	0.005899	0.002107	0.001012	-0.00229
0.023072	-0.00449	5.91E-05	0.001822	0.000116	-0.00238	0.005024	0.006391	0.003929	0.000865
0.024096	-0.00433	-0.00046	0.004179	0.000834	-0.00383	0.003497	0.008445	0.006887	0.005063
0.02512	-0.00368	-0.00152	0.003325	-3.4E-05	-0.00244	0.001196	0.006696	0.00771	0.006839
0.026144	-0.00271	-0.00203	0.000207	-0.0011	0.000498	-0.00121	0.001145	0.005443	0.004316
0.027168	-0.00137	-0.00091	-0.00158	-0.0009	0.003212	-0.00097	-0.00362	0.003148	0.000494
0.028192	0.001407	0.001333	-0.00108	0.001212	0.004216	0.002245	-0.00518	0.00254	-0.00279
0.029216	0.003988	0.001923	0.000242	0.002458	0.002805	0.006835	-0.00308	0.0007	-0.00519
0.03024	0.003373	0.001484	0.001884	0.002881	0.000873	0.009613	0.00133	-0.00253	-0.00547
0.031264	0.001978	0.001237	0.002938	0.002479	-8.1E-05	0.011281	0.004794	-0.00491	-0.0039
0.032288	0.001856	0.000831	0.003122	0.002628	0.000489	0.010716	0.005174	-0.00404	-0.00254
0.033312	0.003181	0.000262	0.002071	0.003632	0.000863	0.006677	0.003006	-0.00199	-0.00014
0.034336	0.005745	-0.00037	0.000245	0.005441	0.001915	0.00305	0.000471	0.000177	0.003995
0.03536	0.006532	-0.00072	-0.00024	0.007039	0.002334	0.002596	-0.00153	0.003055	0.007901
0.036384	0.004166	0.001028	0.000877	0.008859	0.002758	0.00478	-0.00362	0.007077	0.008274
0.037408	0.001891	0.003026	0.000462	0.008849	0.002794	0.006778	-0.00571	0.010072	0.006224
0.038432	0.000412	0.003009	-0.00118	0.007144	0.001889	0.008307	-0.0053	0.009145	0.001428

Step Time, s	Elongation	Force, N							
0.039456	-0.00067	0.001296	-0.00261	0.004843	0.000658	0.009504	-0.003	0.005926	-0.00438
0.04048	-0.0017	-0.00033	-0.0018	0.003251	-0.00073	0.008895	-0.00113	0.003705	-0.00748
0.042016	-0.00258	-0.00013	0.002224	0.004135	-0.00205	0.005806	0.002479	0.002984	-0.00353
0.044064	-0.00714	0.001854	0.003242	0.003711	-0.0029	0.005197	0.005929	0.004974	0.00554
0.046112	-0.00377	-0.00239	-0.00123	-2.4E-05	0.001173	0.003881	0.002071	0.005327	0.004665
0.04816	0.002356	-0.00167	-0.00099	0.001157	0.00388	0.003517	-0.00317	0.00287	-0.00178
0.050208	0.002507	0.003542	0.002224	0.005644	0.00058	0.007836	-0.00029	-0.00075	-0.00476
0.052256	0.00139	0.001483	0.003062	0.005191	-0.00144	0.009871	0.005193	-0.00355	-0.00263
0.054304	0.004968	-0.00111	-0.00031	0.004848	0.001011	0.007585	0.001031	-0.00095	0.003067
0.056352	0.005293	-0.00067	0.001226	0.007687	0.003669	0.009024	-0.0029	0.007885	0.006503
0.0584	0.001561	0.002407	0.001304	0.0102	0.00139	0.017891	-0.00351	0.010241	0.00314
0.060448	-0.00204	0.002527	-0.00196	0.005885	-0.00032	0.022678	-0.003	0.005593	-0.00457
0.062496	-0.00292	0.000657	-0.0003	0.003392	0.000157	0.028034	0.000659	0.002469	-0.00315
0.064544	-0.00488	-0.0005	0.00204	0.004449	-0.00278	0.029259	0.00634	0.004595	0.00366
0.066592	-0.00326	-0.00183	0.000301	0.001503	-0.00013	0.026438	0.003264	0.007091	0.005171
0.06864	0.000301	-0.00014	0.000258	0.003441	0.001722	0.024189	-0.00198	0.002252	-0.00214
0.070688	0.002347	0.002435	0.000212	0.005589	0.001459	0.028252	-0.00014	-0.00086	-0.00478
0.072736	0.002627	0.000297	0.002144	0.014851	-0.00034	0.031923	0.003506	-0.00384	-0.0031
0.074784	0.005107	-0.00105	0.001966	0.017505	0.001145	0.032728	0.001727	0.000302	0.002107
0.076832	0.00438	0.002101	0.002055	0.019366	0.003215	0.042183	-0.00302	0.007962	0.008291
0.07888	0.000357	0.002225	-0.00098	0.020232	0.001976	0.056339	-0.00368	0.009797	0.002735
0.080928	-0.00206	1.52E-05	-0.00221	0.02033	0.000479	0.067818	-0.00348	0.003778	-0.00542
0.082976	-0.00109	0.000836	0.002017	0.024878	-0.00105	0.073247	0.001983	0.003045	-0.00407
0.085024	-0.00739	0.000538	0.001973	0.029493	-0.00402	0.079866	0.005479	0.005359	0.006152
0.087072	-0.00269	-0.00188	-0.0013	0.029428	-0.00012	0.091731	0.001277	0.005362	0.004289
0.08912	0.000427	-0.00081	-0.00141	0.027584	0.003894	0.099014	-0.00208	0.003953	-0.00264
0.091168	0.003598	0.002302	0.002737	0.029332	-0.00041	0.109622	0.001665	0.001212	-0.0054
0.093216	0.002048	0.002142	0.002547	0.033558	-0.00132	0.12191	0.005032	-0.00202	-0.00277
0.095264	0.004611	-0.0012	0.001002	0.042622	0.002829	0.128553	-0.00061	0.000509	0.00509
0.097312	0.004285	-0.00094	0.001039	0.052253	0.002887	0.134582	-0.00292	0.010125	0.006833
0.09936	0.002156	0.003104	0.001263	0.061533	0.00196	0.142302	-0.00385	0.013532	0.001917
0.101408	-0.00223	0.001467	-0.00183	0.065183	-0.00039	0.153554	-0.00196	0.008614	-0.00565
0.103456	-0.00434	0.000638	-0.00043	0.071028	-0.00156	0.162833	0.001231	0.008107	-0.00216
0.105504	-0.00468	-0.00112	0.001245	0.076757	-0.00264	0.16942	0.004985	0.012321	0.004587
0.107552	-0.00304	-0.00291	-0.00023	0.082314	9.8E-05	0.17392	0.002405	0.014641	0.003776
0.1096	0.001399	0.001053	-0.00023	0.088615	0.001983	0.178117	-0.00214	0.014002	-0.00247
0.111648	0.001718	0.003667	0.001718	0.098546	0.001292	0.186508	0.001075	0.013149	-0.00443
0.113696	0.001587	0.000656	0.002193	0.106949	-2.4E-05	0.198249	0.0041	0.010802	-0.0033
0.115744	0.006358	-0.0008	0.001437	0.116807	0.0021	0.206276	0.000865	0.014892	0.003478
0.117792	0.005172	0.000912	0.003181	0.12684	0.002176	0.209365	-0.00386	0.021538	0.006945

Step Time, s	Elongation	Force, N							
0.11984	-0.00063	0.002596	-0.00084	0.136858	0.00082	0.214997	-0.00399	0.026661	0.003174
0.121888	-0.00177	0.000272	-0.00399	0.141403	0.000235	0.226317	-0.00381	0.0215	-0.00568
0.12496	-0.00417	5.23E-05	0.001956	0.150608	-0.00289	0.22378	0.004705	0.02145	0.000901
0.129056	-0.00104	-0.00093	-0.00089	0.162965	0.002381	0.221192	-0.00026	0.028287	0.000788
0.133152	0.00277	0.002026	0.002199	0.17843	-9.9E-05	0.24637	0.00335	0.026338	-0.00493
0.137248	0.004329	-0.00021	0.000997	0.189216	0.003082	0.265599	-0.00216	0.030145	0.006702
0.141344	6.44E-05	0.001388	-0.00047	0.185086	-5.5E-05	0.2759	-0.00319	0.034382	-0.00238
0.14544	-0.00551	0.000326	5.54E-05	0.139219	-0.00225	0.294893	0.004329	0.035633	0.002185
0.149536	-0.00045	-0.00159	-6.2E-05	0.102152	0.001723	0.309782	-0.00014	0.043728	-0.00089
0.153632	0.001651	0.002358	0.001639	0.120056	2.89E-05	0.326187	0.002632	0.041309	-0.00284
0.157728	0.006562	0.000154	0.001638	0.151167	0.002529	0.3483	-0.00169	0.051527	0.005381
0.161824	-0.00143	0.001955	-0.00169	0.174362	0.000439	0.362476	-0.00325	0.059362	-0.00197
0.16592	-0.00463	-0.00079	0.001756	0.184412	-0.00216	0.381261	0.004065	0.058687	0.001731
0.170016	-0.0017	-0.00086	-0.00114	0.193216	0.001803	0.396233	-0.00079	0.063662	0.000162
0.174112	0.003598	0.00159	0.002422	0.206616	-5.7E-06	0.410915	0.003664	0.063459	-0.00436
0.178208	0.004337	0.000941	0.000909	0.217981	0.002475	0.43162	-0.00275	0.070421	0.006449
0.182304	-0.00021	0.000785	-0.0011	0.231268	0.000158	0.446134	-0.00256	0.079247	-0.00303
0.1864	-0.00602	0.000362	0.000785	0.240005	-0.00239	0.46422	0.004355	0.078105	0.002338
0.190496	-0.00035	-0.00187	-0.00025	0.250431	0.002197	0.480141	-0.00063	0.082722	-0.00128
0.194592	0.002213	0.002677	0.001693	0.265071	-0.00061	0.493298	0.003174	0.081188	-0.00246
0.198688	0.005967	6.04E-05	0.002065	0.279597	0.002338	0.51381	-0.00264	0.086269	0.005298
0.202784	-0.00193	0.001929	-0.00231	0.294436	0.000624	0.530698	-0.00282	0.090741	-0.00256
0.20688	-0.0048	-0.00139	0.001342	0.305655	-0.00212	0.546396	0.005224	0.076747	0.002144
0.210976	-0.00067	-0.00011	-0.00066	0.319459	0.002367	0.563603	-0.0007	0.084094	0.000224
0.215072	0.003667	0.001647	0.002109	0.334597	-0.0002	0.57804	0.002819	0.086693	-0.00339
0.219168	0.004377	0.000634	0.001265	0.353303	0.001285	0.594451	-0.00258	0.094206	0.005541
0.223264	-0.0013	0.00094	-0.00145	0.36999	0.0009	0.615072	-0.00239	0.104143	-0.00368
0.22736	-0.00592	-6.8E-06	0.000553	0.385569	-0.00177	0.628288	0.004261	0.102233	0.004077
0.231456	0.00055	-0.00109	0.000175	0.398274	0.001479	0.646435	-0.00116	0.108242	-0.00118
0.235552	0.002914	0.002331	0.002019	0.41378	-0.00054	0.660648	0.003716	0.10626	-0.00288
0.239648	0.005349	-0.00024	0.000904	0.430872	0.002648	0.674744	-0.00317	0.112625	0.005457
0.243744	-0.00258	0.001973	-0.00143	0.447424	-9.1E-05	0.69533	-0.00216	0.123033	-0.00323
0.24784	-0.00484	-0.00102	0.000906	0.463054	-0.00117	0.709603	0.00506	0.118883	0.003229
0.251936	0.000281	-0.00023	0.000301	0.477404	0.001718	0.725112	-0.00178	0.125155	-0.00016
0.256032	0.003285	0.001226	0.001291	0.490114	-4E-05	0.740131	0.003014	0.123452	-0.00341
0.260128	0.004481	0.000885	0.001795	0.50879	0.001773	0.753508	-0.00247	0.129387	0.005997
0.264224	-0.00226	0.000922	-0.00239	0.520615	0.000939	0.77282	-0.00229	0.137478	-0.00421
0.26832	-0.00536	-0.00024	0.001508	0.538982	-0.00229	0.78686	0.005764	0.135482	0.004036
0.272416	0.000444	-0.00071	-0.00037	0.549406	0.002274	0.804682	-0.00279	0.139643	-0.00159
0.276512	0.003287	0.002039	0.001938	0.564461	-0.00089	0.816441	0.003218	0.13893	-0.00241

Step Time, s	Elongation			Force, N					
0.280608	0.004736	-6.6E-05	0.000397	0.57702	0.002523	0.832275	-0.00291	0.142025	0.005786
0.284704	-0.00129	0.001969	-0.00063	0.591986	-0.00041	0.846475	-0.00056	0.148985	-0.00446
0.290848	-0.00297	-0.00052	0.000591	0.611992	0.000428	0.869923	0.000974	0.138442	0.001242
0.29904	0.004094	0.000967	0.00129	0.635907	0.000533	0.898678	0.000383	0.099906	0.001675
0.307232	-0.00356	0.00015	-9.6E-05	0.66221	-0.00055	0.926074	0.001734	0.107225	0.000183
0.315424	0.001954	0.000867	0.000531	0.685684	0.00075	0.953795	0.000527	0.126318	-0.00197
0.323616	0.001153	0.000733	0.000122	0.707223	0.001263	0.979416	-0.00216	0.141875	0.000587
0.331808	-0.00252	-0.00031	0.001005	0.733014	2.41E-05	1.00747	0.001149	0.151338	0.001065
0.34	0.004145	0.000865	0.000864	0.753477	0.001045	1.03309	0.000598	0.156495	0.001698
0.348192	-0.00379	0.000194	8.71E-05	0.776321	-0.00064	1.05607	0.001694	0.169863	1.15E-06
0.356384	0.002124	0.000395	0.000691	0.798583	0.000494	1.08176	0.000777	0.174003	-0.00196
0.364576	0.000804	0.001414	-0.00026	0.817951	0.001707	1.10295	-0.00256	0.183763	0.000391
0.372768	-0.00232	-0.00056	0.001044	0.840621	-0.0006	1.12775	0.001175	0.18916	0.001306
0.38096	0.003919	0.001032	0.000989	0.859799	0.001419	1.15101	0.000186	0.1925	0.001784
0.389152	-0.00332	2.86E-05	-0.00054	0.87995	-0.00067	1.17199	0.002204	0.203855	0.0001
0.397344	0.001933	0.000418	0.001117	0.900539	0.000529	1.19481	0.000548	0.207287	-0.00164
0.405536	0.000795	0.001586	-0.00034	0.918444	0.001658	1.21456	-0.00256	0.215547	0.000143
0.413728	-0.00219	-0.00061	0.00096	0.937329	-0.0003	1.23643	0.001503	0.220848	0.001227
0.42192	0.00364	0.000872	0.001036	0.954624	0.001122	1.25542	-0.00015	0.223314	0.001872
0.430112	-0.00345	0.000131	-0.00058	0.972578	-0.00053	1.27385	0.002157	0.234752	0.000428
0.438304	0.004361	0.000272	0.001265	0.991671	0.000758	1.29477	0.000655	0.238101	-0.00199
0.446496	0.006566	0.002019	-0.00039	1.00725	0.001301	1.31052	-0.00235	0.245248	-4.9E-05
0.454688	0.005966	-0.00105	0.00086	1.02583	-0.00011	1.3283	0.001456	0.251057	0.001156
0.46288	0.013623	0.001427	0.001086	1.04144	0.000796	1.34268	-0.00042	0.254122	0.002075
0.471072	0.010095	-0.00044	-0.00044	1.0578	-2.6E-05	1.35447	0.002162	0.263956	6.31E-05
0.479264	0.018022	0.000619	0.000966	1.07579	0.000567	1.3697	0.000721	0.268762	-0.00164
0.487456	0.018588	0.001592	-0.00031	1.09006	0.00137	1.38192	-0.00199	0.274831	0.000106
0.495648	0.018395	-0.00065	0.00122	1.10622	-0.0002	1.39132	0.001073	0.281306	0.000812
0.50384	0.025882	0.001368	0.000488	1.12157	0.001098	1.40426	-0.00071	0.284062	0.002173
0.512032	0.038507	-0.00036	-1.6E-05	1.13726	-0.0004	1.41451	0.002926	0.292771	0.000417
0.520224	0.049679	0.000898	0.000982	1.15189	0.000807	1.42689	0.000678	0.298193	-0.00157
0.528416	0.051572	0.001836	-0.00022	1.16484	0.001083	1.44573	-0.00128	0.302916	-0.00011
0.536608	0.062545	-0.00017	0.001129	1.18153	0.000146	1.46439	0.001364	0.308722	0.00067
0.5448	0.08511	0.001713	0.000468	1.19539	0.001237	1.48495	-0.00086	0.311995	0.001903
0.552992	0.099108	-0.00057	0.000105	1.20996	0.000104	1.49896	0.002957	0.319331	0.001034
0.561184	0.118103	0.001278	0.000908	1.22558	0.000832	1.51144	0.000703	0.324749	-0.00115
0.569376	0.122136	0.001326	-0.00015	1.23735	0.001347	1.52389	-0.0012	0.328847	0.000184
0.577568	0.101534	8.47E-05	0.001452	1.2542	0.000191	1.53266	0.000668	0.334643	0.000849
0.58576	0.101334	0.001628	0.000148	1.268	0.000792	1.54752	-0.00065	0.337826	0.002146
0.593952	0.116489	-0.00056	0.000373	1.27816	0.000463	1.55594	0.003644	0.34459	0.000753

Step Time, s	Elongation			Force, N					
0.602144	0.139154	0.001122	0.000779	1.29174	0.000685	1.56582	0.00011	0.349086	-0.00119
0.610336	0.157703	0.001814	-0.00043	1.30016	0.00146	1.57832	-0.00053	0.353414	-8.5E-05
0.622624	0.178233	0.000686	0.001064	1.31765	0.000527	1.59298	-0.00028	0.359389	0.00154
0.639008	0.204579	0.000168	0.000712	1.33577	0.00068	1.61277	0.002044	0.369302	-3.5E-05
0.655392	0.231908	0.000921	0.000914	1.35537	0.000591	1.63208	5.79E-05	0.377284	0.000405
0.671776	0.259794	0.000587	0.000286	1.38023	0.000516	1.65051	0.001259	0.384022	0.001834
0.68816	0.288103	0.001121	0.000503	1.40141	0.001153	1.66989	0.000376	0.391753	-0.00058
0.704544	0.316677	0.000505	0.000835	1.41945	0.000691	1.69033	-0.00022	0.397737	0.00114
0.720928	0.348564	8.45E-05	0.000775	1.43275	0.000185	1.71012	0.001823	0.405993	0.000162
0.737312	0.383838	0.001179	0.000911	1.44655	0.000523	1.72982	0.000127	0.412112	1.91E-05
0.753696	0.420184	0.000472	0.000584	1.46176	0.001039	1.74852	0.000629	0.417944	0.001619
0.77008	0.45477	0.001306	0.000644	1.47703	0.001175	1.76567	0.000658	0.4248	-0.00023
0.786464	0.489297	0.000921	0.000753	1.49016	0.000541	1.78267	-0.00059	0.429503	0.000949
0.802848	0.524464	0.000238	0.00106	1.504	0.000836	1.79874	0.00185	0.435879	0.000974
0.819232	0.560239	0.000839	0.00078	1.52101	0.0004	1.81336	0.000489	0.439574	-3.6E-05
0.835616	0.594031	0.000573	0.000554	1.53593	0.000859	1.82819	0.000677	0.443259	0.001492
0.852	0.628086	0.00202	0.00185	1.55253	0.001441	1.83936	0.001027	0.447775	3E-05
0.868384	0.662215	0.005694	0.004557	1.56197	0.003932	1.84646	-0.00052	0.451613	0.001029
0.884768	0.698313	0.00335	0.006644	1.5694	0.004384	1.85128	0.0038	0.457476	0.004371
0.901152	0.735187	0.005498	0.004239	1.57482	0.003309	1.85569	0.004137	0.46146	0.003193
0.917536	0.771311	0.010134	0.00525	1.57592	0.005029	1.85823	0.003432	0.466507	0.005699
0.93392	0.80733	0.020812	0.008842	1.57288	0.00783	1.85656	0.001881	0.471517	0.002638
0.950304	0.844899	0.027863	0.011768	1.56091	0.01025	1.85285	0.000713	0.474286	0.003658
0.966688	0.882782	0.042731	0.049058	1.53817	0.030844	1.8505	0.006031	0.480391	0.009574
0.983072	0.921567	0.075945	0.069584	1.40039	0.063191	1.85048	0.012811	0.483581	0.024166
0.999456	0.960053	0.112857	0.101836	1.32523	0.094609	1.85229	0.02118	0.491525	0.036449
1.01584	0.998166	0.163673	0.138266	1.32136	0.130195	1.8554	0.029275	0.498947	0.040092
1.03222	1.03813	0.20048	0.195562	1.32415	0.163664	1.8566	0.03253	0.504821	0.05717
1.04861	1.07769	0.23705	0.269759	1.32858	0.194725	1.86017	0.040113	0.509247	0.0692
1.06499	1.11707	0.276245	0.34621	1.33273	0.221421	1.86368	0.044037	0.512041	0.077931
1.08138	1.15643	0.321545	0.437152	1.33515	0.251922	1.86789	0.04796	0.514429	0.087409
1.09776	1.19665	0.369838	0.536103	1.33817	0.286458	1.87162	0.053867	0.517778	0.094525
1.11414	1.23743	0.42213	0.636585	1.344	0.325446	1.87529	0.056017	0.521933	0.102842
1.13053	1.2796	0.475239	0.737619	1.34775	0.364122	1.87872	0.062645	0.527701	0.109457
1.14691	1.32173	0.528692	0.836785	1.35317	0.401932	1.88273	0.066534	0.534825	0.114873
1.1633	1.36441	0.581606	0.935316	1.35933	0.438521	1.8873	0.069903	0.53831	0.121896
1.17968	1.40853	0.634046	1.03	1.36668	0.473319	1.89023	0.076456	0.54295	0.126455
1.19606	1.45298	0.685612	1.12234	1.37335	0.508978	1.8915	0.078756	0.547226	0.132212
1.21245	1.49618	0.735794	1.21187	1.37851	0.540973	1.89403	0.085968	0.552425	0.135652
1.22883	1.53895	0.786887	1.29837	1.38307	0.579236	1.89748	0.090195	0.555248	0.136951

Step Time, s	Elongation	Force, N							
1.24522	1.58355	0.836393	1.38193	1.3866	0.617612	1.89992	0.094326	0.557645	0.141367
1.2616	1.62853	0.88602	1.46647	1.3881	0.655398	1.90206	0.101406	0.561391	0.147042
1.28618	1.70534	0.961475	1.58939	1.38568	0.710239	1.90412	0.108002	0.566673	0.15807
1.31894	1.82292	1.06027	1.7477	1.35391	0.781054	1.90323	0.117902	0.570726	0.170314
1.35171	1.91359	1.15869	1.89589	1.34061	0.850088	1.89013	0.127187	0.573732	0.18114
1.38448	1.99679	1.25612	2.03234	1.34511	0.916473	1.91323	0.138847	0.578209	0.191241
1.41725	2.07562	1.35413	2.15991	1.35324	0.98109	1.92667	0.150176	0.579683	0.201236
1.45002	2.15093	1.45405	2.27819	1.36572	1.04441	1.92291	0.161902	0.582144	0.213008
1.48278	2.23003	1.55421	2.38791	1.37838	1.10382	1.9219	0.173636	0.582941	0.224171
1.51555	2.30482	1.6586	2.48866	1.40338	1.15839	1.92396	0.186348	0.583696	0.234935
1.54832	2.37085	1.76548	2.58067	1.4217	1.20914	1.92786	0.202845	0.586526	0.24575
1.58109	2.43053	1.87885	2.66637	1.43153	1.25679	1.93865	0.215212	0.588585	0.25716
1.61386	2.48727	2.00273	2.76264	1.44302	1.3025	1.94967	0.226846	0.590875	0.272867
1.64662	2.54484	2.14325	2.86677	1.45163	1.34615	1.95973	0.237713	0.593677	0.284269
1.67939	2.59958	2.25889	2.93921	1.461	1.38845	1.97278	0.249802	0.597044	0.293839
1.71216	2.65136	2.34934	2.99769	1.47466	1.43265	1.97859	0.261182	0.602255	0.303919
1.74493	2.70072	2.39507	3.04791	1.49126	1.46936	1.98459	0.270462	0.605413	0.313751
1.7777	2.76218	2.40823	3.08965	1.50855	1.48729	1.98819	0.278338	0.608913	0.323247
1.81046	2.81321	2.40921	3.14082	1.51856	1.48689	1.99233	0.285449	0.622271	0.331561
1.84323	2.85302	2.4282	3.1897	1.52756	1.4945	2.00054	0.292411	0.626803	0.339529
1.876	2.88866	2.4568	3.22927	1.53533	1.50663	2.01371	0.299745	0.628363	0.348762
1.90877	2.92025	2.48402	3.27356	1.54246	1.53044	2.02448	0.30575	0.627345	0.358155
1.94154	2.95056	2.50396	3.31285	1.55088	1.56054	2.03018	0.310236	0.626352	0.366495
1.9743	2.97745	2.51655	3.34132	1.55842	1.56939	2.03326	0.314924	0.625899	0.37506
2.00707	2.99844	2.52572	3.36686	1.5685	1.57543	2.03491	0.319963	0.625498	0.383494
2.03984	3.02284	2.54176	3.39099	1.57666	1.58106	2.03447	0.324187	0.626683	0.392037
2.07261	3.05231	2.56763	3.41166	1.58422	1.59125	2.03821	0.327322	0.625731	0.399457
2.10538	3.08128	2.60565	3.43571	1.59157	1.60173	2.04333	0.329869	0.626847	0.40363
2.13814	3.10697	2.64792	3.46467	1.59607	1.60539	2.0475	0.333839	0.629749	0.408564
2.17091	3.13155	2.68871	3.48519	1.60138	1.60969	2.05178	0.337828	0.630214	0.415216
2.20368	3.19123	2.728	3.49695	1.60835	1.62211	2.05342	0.341253	0.629428	0.421974
2.23645	3.23542	2.76529	3.50132	1.61472	1.63668	2.06278	0.343693	0.627645	0.429354
2.26922	3.25236	2.80322	3.50424	1.62206	1.64977	2.09792	0.346621	0.625267	0.434918
2.30198	3.27002	2.83734	3.50692	1.62919	1.66263	2.11508	0.349838	0.625384	0.440538
2.33475	3.29066	2.86953	3.51577	1.63742	1.67563	2.11867	0.354444	0.623324	0.447008
2.36752	3.30312	2.90377	3.52154	1.6673	1.68592	2.11822	0.357092	0.623649	0.453373
2.40029	3.3104	2.93936	3.52483	1.68181	1.69724	2.12354	0.360642	0.624165	0.459087
2.43306	3.31602	2.97734	3.52579	1.68779	1.71084	2.13196	0.368533	0.622805	0.462392
2.46582	3.31965	3.03731	3.53388	1.69065	1.72309	2.13805	0.370062	0.622875	0.465848
2.49859	3.32738	3.11696	3.58619	1.69453	1.73466	2.14273	0.371593	0.620788	0.470993

Step Time, s	Elongation	Force, N							
2.53136	3.33216	3.1676	3.60004	1.7026	1.74573	2.14414	0.373321	0.619686	0.481581
2.56413	3.33123	3.20656	3.60081	1.71617	1.7558	2.14711	0.374085	0.619367	0.486792
2.61328	3.33134	3.25527	3.59566	1.72916	1.77482	2.15221	0.377031	0.619065	0.489
2.67882	3.32394	3.32802	3.59648	1.74997	1.80171	2.16435	0.379839	0.619978	0.492965
2.74435	3.29192	3.38327	3.59936	1.7579	1.83283	2.17967	0.382101	0.637559	0.49771
2.80989	3.25386	3.43204	3.60979	1.76158	1.8744	2.18191	0.383902	0.640018	0.497778
2.87542	3.22499	3.4638	3.61082	1.76739	1.88256	2.17691	0.383761	0.643862	0.498436
2.94096	3.21616	3.50084	3.61245	1.77711	1.89349	2.1838	0.384947	0.640833	0.498767
3.0065	3.20843	3.55236	3.63016	1.7809	1.90812	2.19582	0.386107	0.64086	0.49969
3.07203	3.23286	3.59038	3.63461	1.78402	1.91428	2.20306	0.388402	0.641877	0.499983
3.13757	3.24658	3.61601	3.63101	1.78388	1.90523	2.23374	0.393405	0.642354	0.499872
3.2031	3.23452	3.63886	3.62961	1.80045	1.89692	2.24505	0.394972	0.640443	0.500117
3.26864	3.22305	3.66527	3.6311	1.83537	1.89043	2.24987	0.39656	0.637902	0.502646
3.33418	3.21278	3.72493	3.65616	1.83687	1.88492	2.24939	0.405543	0.63489	0.508598
3.39971	3.20876	3.79501	3.65952	1.83738	1.88062	2.24643	0.408883	0.633977	0.512649
3.46525	3.20885	3.81517	3.63108	1.84221	1.87328	2.24095	0.408609	0.632026	0.516043
3.53078	3.2132	3.83696	3.64842	1.84547	1.86676	2.23318	0.409895	0.629611	0.520508
3.59632	3.21326	3.84276	3.64759	1.83508	1.88086	2.23604	0.409734	0.635992	0.521796
3.66186	3.20726	3.85118	3.64109	1.82797	1.89866	2.23608	0.407029	0.636712	0.522448
3.72739	3.19858	3.84729	3.62813	1.82895	1.89401	2.23148	0.405037	0.635644	0.521257
3.79293	3.19359	3.84085	3.6204	1.83252	1.8978	2.2241	0.403158	0.631809	0.520438
3.85846	3.16106	3.84056	3.6091	1.83503	1.89771	2.21465	0.401768	0.63107	0.520205
3.924	3.14808	3.82387	3.58985	1.83903	1.89166	2.21004	0.399826	0.6271	0.520143
3.98954	3.12664	3.80589	3.5659	1.84398	1.88248	2.24039	0.399489	0.622203	0.519438
4.05507	3.14083	3.79991	3.55153	1.84768	1.86939	2.25404	0.40086	0.617879	0.518065
4.12061	3.15523	3.7937	3.54099	1.87955	1.86241	2.25176	0.400481	0.611373	0.519366
4.18614	3.16589	3.81277	3.55558	1.88531	1.86204	2.255	0.405162	0.602799	0.528692
4.25168	3.17437	3.85122	3.58169	1.89124	1.85809	2.25283	0.405083	0.596824	0.529344
4.31722	3.17619	3.84213	3.55942	1.88546	1.85027	2.25476	0.4081	0.594804	0.530546
4.38275	3.16938	3.85465	3.5521	1.88218	1.84241	2.2593	0.407404	0.592324	0.534592
4.44829	3.14914	3.8577	3.54375	1.88948	1.84744	2.26622	0.406257	0.595617	0.536632
4.51382	3.12186	3.85256	3.53402	1.88875	1.87037	2.25993	0.406301	0.592464	0.536041
4.57936	3.10378	3.83909	3.51443	1.88396	1.86789	2.24833	0.405311	0.594316	0.53362
4.6449	3.08726	3.83179	3.51078	1.878	1.8747	2.24037	0.405258	0.593088	0.529144
4.71043	3.06826	3.82443	3.50494	1.86145	1.87828	2.23205	0.404946	0.592908	0.528999
4.77597	3.08215	3.81009	3.48381	1.84905	1.88781	2.22294	0.406486	0.591693	0.527255
4.8415	3.0408	3.79096	3.45719	1.83882	1.88892	2.24895	0.405956	0.591057	0.527106
4.90704	3.01487	3.77446	3.44455	1.83489	1.88526	2.23725	0.407302	0.594668	0.528196
4.97258	2.99893	3.75554	3.4372	1.85198	1.88408	2.22816	0.413402	0.594848	0.531986
5.03811	2.98154	3.76277	3.46106	1.85023	1.87693	2.22714	0.413338	0.592942	0.538554

Step Time, s	Elongation	Force, N							
5.10365	2.9748	3.7785	3.49798	1.84715	1.86488	2.2242	0.414058	0.59011	0.549115
5.16918	2.97841	3.74835	3.49745	1.83899	1.85427	2.2042	0.413312	0.584279	0.552552
5.26749	2.96788	3.71322	3.47284	1.8248	1.84484	2.18117	0.413731	0.586741	0.552562
5.39856	2.9431	3.65714	3.43265	1.80319	1.8537	2.16209	0.409165	0.580739	0.552726
5.52963	2.9264	3.60886	3.38844	1.79265	1.84375	2.14318	0.40283	0.579903	0.55242
5.6607	2.96378	3.56727	3.31904	1.77893	1.82446	2.15819	0.401321	0.56877	0.552631
5.79178	2.94848	3.53811	3.26282	1.80084	1.79236	2.16515	0.399457	0.559961	0.550781
5.92285	2.89484	3.57534	3.27112	1.8035	1.77682	2.15155	0.405911	0.550398	0.554655
6.05392	2.85282	3.57749	3.26804	1.80185	1.76994	2.12945	0.407799	0.549937	0.556032
6.18499	2.78174	3.54864	3.23953	1.78625	1.7929	2.13012	0.404665	0.55291	0.554699
6.31606	2.71364	3.50579	3.21525	1.76905	1.81257	2.12319	0.405374	0.552612	0.550747
6.44714	2.68169	3.45445	3.1931	1.74263	1.80801	2.10654	0.403465	0.550497	0.546397
6.57821	2.63486	3.3872	3.15758	1.73234	1.79203	2.12061	0.401798	0.5474	0.545491
6.70928	2.5719	3.34775	3.14856	1.72984	1.77189	2.09505	0.404255	0.544021	0.549334
6.84035	2.54202	3.36428	3.14884	1.71493	1.7424	2.06251	0.406818	0.5368	0.56006
6.97142	2.52875	3.30301	3.10818	1.69132	1.72208	2.04198	0.403391	0.542173	0.56771
7.1025	2.51879	3.23608	3.04453	1.66817	1.72489	2.03006	0.400318	0.544946	0.570388
7.23357	2.51197	3.19311	2.99849	1.65812	1.70679	2.01387	0.397918	0.54378	0.569402
7.36464	2.53174	3.15123	2.93734	1.64421	1.68347	2.02036	0.395946	0.539594	0.569951
7.49571	2.50611	3.12461	2.87673	1.65841	1.64574	2.03937	0.396526	0.531891	0.572461
7.62678	2.46276	3.15536	2.8791	1.66238	1.63196	2.03294	0.404383	0.526577	0.579555
7.75786	2.42782	3.15533	2.84443	1.64536	1.61714	2.0088	0.409374	0.524688	0.581141
7.88893	2.37122	3.13734	2.81069	1.62206	1.63683	1.98136	0.410816	0.532757	0.585863
8.02	2.32235	3.09958	2.77292	1.59337	1.64012	1.95698	0.40905	0.533999	0.581632
8.15107	2.29909	3.06595	2.74517	1.57137	1.64167	1.94611	0.409923	0.539431	0.577596
8.28214	2.27773	3.01534	2.71211	1.564	1.6264	1.95947	0.411106	0.534291	0.579989
8.41322	2.26549	3.00739	2.6971	1.5833	1.60637	1.95273	0.416305	0.529888	0.58917
8.54429	2.25769	2.99869	2.67668	1.57163	1.57911	1.92687	0.417662	0.529827	0.597163
8.67536	2.25043	2.96531	2.63288	1.56595	1.56761	1.90526	0.417837	0.540209	0.600936
8.80643	2.23404	2.92936	2.58719	1.55557	1.56193	1.89455	0.4134	0.535417	0.603826
8.9375	2.24061	2.91118	2.56308	1.55429	1.54532	1.89625	0.410333	0.532896	0.603925
9.06858	2.27049	2.88785	2.53507	1.55406	1.52263	1.91415	0.40925	0.525491	0.602224
9.19965	2.26482	2.88173	2.51541	1.58683	1.50314	1.91402	0.414744	0.514559	0.602081
9.33072	2.23916	2.92444	2.53818	1.58869	1.48637	1.90626	0.422641	0.508109	0.611226
9.46179	2.21756	2.90542	2.52446	1.58717	1.4786	1.89106	0.426171	0.513782	0.614388
9.59286	2.18173	2.88637	2.51994	1.57278	1.49534	1.8715	0.426368	0.521787	0.61376
9.72394	2.15076	2.85916	2.50826	1.55768	1.50481	1.85176	0.425307	0.528522	0.607882
9.85501	2.13936	2.82269	2.51065	1.54617	1.50917	1.8332	0.425743	0.530126	0.605045
9.98608	2.12643	2.78042	2.51191	1.54389	1.49647	1.84725	0.423647	0.529258	0.606357
10.1172	2.10336	2.76723	2.51228	1.55532	1.47711	1.8291	0.4287	0.523412	0.615776

Step Time, s	Elongation	Force, N							
10.2482	2.10002	2.74642	2.51131	1.55922	1.45922	1.8196	0.430624	0.517026	0.628747
10.3793	2.10492	2.72489	2.51295	1.56781	1.44779	1.8035	0.427932	0.524195	0.631577
10.5759	2.10347	2.71472	2.47735	1.56898	1.44237	1.7929	0.423573	0.521118	0.630932
10.838	2.15154	2.69549	2.41731	1.58194	1.40548	1.80408	0.42607	0.511818	0.627839
11.1002	2.1253	2.71025	2.45686	1.60061	1.38927	1.78887	0.440433	0.509998	0.637153
11.3623	2.08641	2.66612	2.48456	1.56851	1.41731	1.74981	0.443696	0.528503	0.632245
11.6245	2.06539	2.60522	2.48408	1.53842	1.40528	1.72768	0.439612	0.53185	0.629041
11.8866	2.03932	2.58645	2.48386	1.54588	1.37291	1.7129	0.445122	0.529827	0.649393
12.1488	2.05828	2.57643	2.44104	1.54538	1.35627	1.71998	0.446959	0.538764	0.66464
12.4109	2.09966	2.57532	2.37655	1.54651	1.33534	1.74315	0.452551	0.531532	0.66216
12.6731	2.10171	2.58007	2.36279	1.57213	1.31341	1.76539	0.466831	0.525844	0.666766
12.9352	2.0449	2.5619	2.40449	1.55033	1.32075	1.72703	0.475747	0.540964	0.670198
13.1973	2.01408	2.50641	2.42075	1.50821	1.34632	1.69114	0.471823	0.553476	0.668516
13.4595	1.98707	2.45883	2.3958	1.50389	1.32841	1.70101	0.473185	0.552531	0.682471
13.7216	1.97837	2.49608	2.37943	1.53189	1.3137	1.70657	0.482076	0.553797	0.703276
13.9838	1.99961	2.51244	2.32646	1.54001	1.30665	1.69747	0.48571	0.558981	0.71391
14.2459	2.04468	2.49784	2.30093	1.55296	1.2898	1.72173	0.494699	0.552311	0.721907
14.5081	2.0212	2.50369	2.36009	1.55358	1.29074	1.70658	0.505681	0.561341	0.738456
14.7702	1.96279	2.47562	2.38188	1.52441	1.3341	1.68388	0.504211	0.585794	0.726447
15.0324	1.95064	2.40753	2.37714	1.50185	1.31876	1.69102	0.50381	0.594135	0.724153
15.2945	1.95354	2.43478	2.35602	1.53013	1.29248	1.69583	0.5182	0.591833	0.749828
15.5566	1.98269	2.49901	2.31435	1.564	1.28914	1.70077	0.526941	0.601774	0.763523
15.8188	2.03249	2.49899	2.2718	1.55853	1.28517	1.72515	0.531099	0.59793	0.765258
16.0809	2.0419	2.45263	2.30718	1.56313	1.29447	1.72307	0.545306	0.599189	0.770104
16.3431	1.99009	2.44249	2.36923	1.53642	1.31878	1.69025	0.550704	0.627087	0.778113
16.6052	1.97355	2.38793	2.37108	1.50252	1.34346	1.67118	0.547318	0.649476	0.77619
16.8674	2.00277	2.40439	2.34557	1.54027	1.32941	1.71308	0.557584	0.643497	0.794345
17.1295	2.01915	2.45966	2.33873	1.58121	1.31189	1.74133	0.577023	0.642878	0.817816
17.3916	2.05329	2.46451	2.28768	1.57661	1.31517	1.7532	0.5848	0.654102	0.821935
17.6538	2.11934	2.45069	2.2859	1.57732	1.32044	1.76954	0.588384	0.649985	0.821016
17.9159	2.10421	2.45769	2.37385	1.58689	1.34388	1.75253	0.60099	0.667256	0.830182
18.1781	2.05832	2.42502	2.39994	1.55587	1.38371	1.71732	0.599244	0.697162	0.833895
18.4402	2.05082	2.42922	2.36619	1.54759	1.37825	1.76493	0.60242	0.706602	0.852211
18.7024	2.05227	2.50135	2.35624	1.59638	1.35707	1.80637	0.626693	0.70273	0.884071
18.9645	2.1029	2.53227	2.31547	1.63311	1.34454	1.81082	0.644205	0.724044	0.89786
19.2267	2.17566	2.49337	2.32297	1.63956	1.35817	1.8159	0.653417	0.722635	0.886817
19.4888	2.20054	2.46818	2.38469	1.64093	1.39435	1.81805	0.668954	0.728744	0.905301
19.7509	2.16317	2.46206	2.44878	1.62195	1.43664	1.78179	0.667066	0.760243	0.923517
20.0131	2.15688	2.48706	2.43141	1.60611	1.44699	1.8039	0.674216	0.78176	0.928896
20.2752	2.13787	2.53526	2.40336	1.66355	1.42916	1.85906	0.701255	0.778335	0.956305

Step Time, s	Elongation	Force, N							
20.5374	2.1752	2.59764	2.3746	1.71203	1.42275	1.86976	0.730311	0.780369	0.986229
20.7995	2.23486	2.57291	2.35729	1.70096	1.44584	1.85732	0.734858	0.779191	0.990273
21.1927	2.2955	2.54789	2.46601	1.70318	1.46524	1.86326	0.74371	0.8011	0.992643
21.717	2.22279	2.63793	2.4787	1.70379	1.52839	1.87595	0.766173	0.855655	1.00392
22.2413	2.2567	2.71845	2.42246	1.79908	1.51202	1.93676	0.814296	0.848872	1.05556
22.7656	2.37474	2.6373	2.5064	1.79411	1.56814	1.92493	0.812695	0.865124	1.05292
23.2899	2.31343	2.71936	2.59276	1.78305	1.62602	1.93319	0.838881	0.917525	1.05914
23.8142	2.26055	2.76603	2.48723	1.8828	1.60475	1.99357	0.87902	0.890735	1.11075
24.3385	2.35172	2.65475	2.51363	1.84763	1.63638	1.96748	0.868041	0.896581	1.11495
24.8628	2.26328	2.71703	2.53464	1.81239	1.70471	1.98231	0.890348	0.942805	1.13292
25.387	2.17467	2.71011	0.98163	1.89133	1.67952	2.06355	0.926898	0.908892	1.18563
25.9113	2.18352	2.56429	0.000519	1.86922	1.67509	2.00448	0.922321	0.888043	1.20805
26.4356	0.109739	2.58823	0.02154	1.79751	1.72906	2.00681	0.924649	0.91945	1.19855
26.9599	0.000758	2.49888	0.045924	1.82317	1.70871	2.04294	0.9186	0.883508	1.22307
27.4842	0.001643	2.23928	0.080553	1.76219	1.65519	1.57808	0.171503	0.819309	1.08729
28.0085	0.001194	0.415016	0.350472	0.649492	1.7102	0.000439	0.001169	0.827821	0.000184
28.5328	0.00179	9.74E-05	0.544517	0.000401	1.68105	0.000632	0.000946	0.769684	0.000331
29.0571	0.001474	0.001027	0.535408	0.000867	1.52767	0.001221	0.000815	0.662552	0.000899
29.5813	0.001015	0.000843	0.495266	0.001618	0.022144	0.001232	0.000998	0.638273	0.000807
30.1056	0.001352	0.001624	0.427371	0.001185	0.017927	0.001025	0.000939	0.549665	0.000884
30.6299	0.001704	0.001064	0.34272	0.001282	0.01067	0.001296	0.001242	0.285116	0.00073
31.1542	0.000985	0.001339	0.252919	0.001437	0.006444	0.001166	0.000945	0.001411	0.000891
31.6785	0.001737	0.000866	0.181719	0.001254	0.002298	0.001289	0.001196	0.00129	0.001214
32.2028	0.001395	0.000959	0.117648	0.001106	0.00076	0.001272	0.000983	0.001271	0.001304
32.7271	0.001496	0.001004	0.075581	0.001599	0.000711	0.001293	0.000857	0.00104	0.000855
33.2514	0.001125	0.001078	0.049378	0.001642	0.000499	0.001192	0.001072	0.002046	0.000636
33.7756	0.001278	0.001045	0.03508	0.000933	0.001589	0.001162	0.001093	0.001356	0.000898
34.2999	0.001171	0.002275	0.030999	0.001119	0.002893	0.001124	0.001171	0.001125	0.000978
34.8242	0.001198	0.001757	0.033819	0.001383	0.003019	0.001079	0.001944	0.001123	0.001163
35.3485	0.001392	0.001277	0.021546	0.001457	0.001075	0.001148	0.001494	0.000963	0.001269
35.8728	0.00128	0.001258	0.014547	0.001284	0.000759	0.000944	0.001205	0.000822	0.001125
36.3971	0.001185	0.001175	0.01289	0.001202	0.001414	0.00129	0.000971	0.000848	0.001091

Table B7. PAV aged PG 76-22 (3 samples at 4°C and 3 samples at 12°C).

Step Time, s			Elongation	Force, N		
0	0	0	0	0	0	0
0.000544	0.016082	0.015851	0.016507	0.015886	0.017186	0.015163
0.001568	0.113679	0.113258	0.115121	0.11426	0.118247	0.11416
0.002592	0.13692	0.135307	0.1334	0.138889	0.138727	0.139884
0.003616	0.080201	0.076747	0.073492	0.080001	0.075985	0.082358
0.00464	0.026707	0.024384	0.024529	0.023612	0.021903	0.027052
0.005664	0.005247	0.006087	0.00561	0.001709	0.004094	0.00265
0.006688	0.002101	0.005514	0.003283	-0.00022	0.003879	-0.00079
0.007712	0.001994	0.008049	0.003698	0.003195	0.004785	0.003261
0.008736	0.001538	0.006101	0.002417	0.004642	0.004173	0.005486
0.00976	0.001331	0.0017	0.00106	0.004078	0.004032	0.004859
0.010784	0.00257	-0.00132	0.001334	0.003454	0.004047	0.003596
0.011808	0.004235	-0.00133	0.002257	0.004178	0.002142	0.001953
0.012832	0.004491	1.13E-05	0.003244	0.005656	0.000469	-0.00103
0.013856	0.002502	0.002462	0.004883	0.004907	0.001923	-0.00372
0.01488	0.000852	0.00503	0.006053	0.002485	0.005297	-0.00447
0.015904	0.000679	0.005233	0.004821	0.000934	0.006801	-0.00415
0.016928	0.001284	0.002632	0.001736	0.000705	0.004145	-0.00339
0.017952	0.001404	-0.00105	0.00038	0.00039	0.000274	-0.00102
0.018976	0.001503	-0.00262	0.001336	-0.00087	-0.00122	0.001506
0.02	0.001971	-0.00158	0.00162	-0.00173	-0.00111	0.001964
0.021024	0.001948	-0.00017	0.000827	-0.00136	-0.00087	0.002144
0.022048	0.001036	0.000912	0.000294	-0.00061	-0.0008	0.004596
0.023072	0.000767	0.001708	0.000886	0.000478	-0.00045	0.008478
0.024096	0.000995	0.002132	0.0017	0.002398	-0.0017	0.009939
0.02512	0.001018	0.002322	0.002525	0.003534	-0.00296	0.008674
0.026144	0.000359	0.002879	0.0023	0.00363	-0.00145	0.00438
0.027168	-0.00123	0.002634	0.001613	0.000934	0.002446	9.41E-05
0.028192	-0.00259	0.001389	-0.00151	-0.00297	0.004192	-0.00446
0.029216	-0.00167	-0.00015	-0.00545	-0.00582	0.00347	-0.00695
0.03024	0.000418	-0.00191	-0.00671	-0.00474	0.000692	-0.00567
0.031264	0.001662	-0.00357	-0.00496	-0.00026	-0.00121	-0.00122
0.032288	0.001078	-0.00428	-0.0012	0.004575	-0.00187	0.001402
0.033312	-0.00018	-0.00324	0.002643	0.007265	-0.00192	-9.7E-05
0.034336	-0.00105	-0.00034	0.006116	0.005527	-0.00126	-0.00277
0.03536	-0.00065	0.002889	0.006816	0.002296	0.002195	-0.00383
0.036384	0.000411	0.004287	0.004345	-0.00043	0.005953	-0.00438
0.037408	0.002047	0.002773	0.000979	-0.00247	0.006156	-0.0049
0.038432	0.002984	0.000384	-0.00026	-0.00315	0.002746	-0.00351
0.039456	0.004008	-0.00063	-0.0005	-0.00183	-8.8E-05	-0.00132
0.04048	0.002774	-0.00115	-0.00073	-0.00019	-0.00201	0.00177
0.042016	-0.00052	-0.00116	0.000577	0.000327	-0.00344	0.006907
0.044064	-0.00131	0.001342	0.002977	0.002872	-0.00091	0.008953
0.046112	0.002352	0.003513	0.001156	0.000781	0.001088	0.004155
0.04816	0.000924	0.00283	-0.00213	-0.00304	0.003841	-0.00353
0.050208	-0.00414	-0.00171	-0.00552	-0.0025	-0.0005	-0.0023
0.052256	-0.00064	-0.00544	-0.00216	0.002264	-0.00266	-0.00054
0.054304	0.002486	-0.00013	0.004515	0.005258	-0.00039	-0.00345
0.056352	0.001677	0.004559	0.005299	0.000326	0.005906	-0.00656
0.0584	0.001558	-0.0005	0.000954	-0.00061	0.001262	-0.00042
0.060448	0.000585	-0.00104	0.000832	-0.00121	-0.0005	0.002041
0.062496	0.000215	-0.00012	-0.00011	-0.00149	-0.00279	0.004467
0.064544	0.000627	0.001297	0.000389	0.001643	0.00028	0.00791
0.066592	0.001499	0.003042	0.002225	0.003016	-0.0013	0.004852
0.06864	-0.00226	0.001675	-0.00121	-0.00155	0.002487	-0.00291
0.070688	-0.00102	-0.00116	-0.00626	-0.00305	0.000402	-0.00352
0.072736	0.000146	-0.00308	-0.00139	0.000167	-0.00087	-0.0015
0.074784	0.000663	-0.00108	0.003968	0.006852	-0.00182	-0.00334
0.076832	-0.00137	0.003281	0.005804	0.002148	0.004043	-0.00387
0.07888	0.00317	-0.00089	0.000627	-0.00225	0.005281	-0.00398
0.080928	0.00264	0.000288	-0.0006	-0.00258	-0.00085	0.000769
0.082976	-0.0002	-0.00098	0.001258	0.000553	-0.00252	0.007344
0.085024	-0.00206	0.001755	0.002047	0.001699	-0.00374	0.009701
0.087072	0.002103	0.0017	0.001368	0.002959	0.002385	0.003759

Step Time, s			Elongation	Force, N		
0.08912	-1.9E-05	0.004044	-0.00276	-0.0052	0.002687	-0.00513
0.091168	-0.00165	-0.00022	-0.00595	-0.00162	-0.00137	-0.00382
0.093216	-0.00107	-0.00392	-0.00107	0.002869	-0.00329	0.00212
0.095264	-2.5E-05	-0.00058	0.005389	0.005845	0.001046	-0.00362
0.097312	0.001968	0.002657	0.003187	-0.00029	0.006029	-0.00703
0.09936	0.002504	-0.0006	0.000942	-0.00137	0.0022	-0.00104
0.101408	0.000333	-0.00196	0.000437	0.000298	-0.00189	0.001411
0.103456	-0.00045	-3.1E-05	0.001291	-0.00171	-0.00133	0.006152
0.105504	0.00096	0.000923	0.001074	0.000676	-0.00064	0.008333
0.107552	0.000915	0.003146	0.002059	0.002816	-0.0003	0.003706
0.1096	-0.00176	0.003332	-0.00203	-0.00164	0.001196	-0.00326
0.111648	-0.00254	-0.00084	-0.00574	-0.00318	6.73E-05	-0.00294
0.113696	0.001587	-0.00251	-0.00206	0.002513	-0.00126	-0.00124
0.115744	0.000977	0.000353	0.00417	0.005107	-9.3E-05	-0.0034
0.117792	-0.00125	0.001496	0.005408	0.001823	0.004278	-0.00457
0.11984	0.002225	-0.00189	0.000531	-0.00166	0.00342	-0.0031
0.121888	0.003546	-0.00139	-0.0013	-0.00355	-0.00061	0.000953
0.12496	-0.00117	0.000771	0.001606	0.001412	-0.00238	0.008387
0.129056	0.000954	0.003261	-0.00024	-0.00064	0.001924	-0.00094
0.133152	-0.00121	-0.00178	-0.00336	0.000719	-0.00248	-0.00058
0.137248	0.000653	0.000864	0.00411	0.002185	0.003756	-0.00558
0.141344	0.001697	-0.00222	0.000351	-0.00144	-8.9E-05	-0.00035
0.14544	-0.00028	0.000827	0.001386	0.000441	-0.00074	0.008179
0.149536	0.000197	0.004073	0.000392	0.000319	0.000593	-0.00056
0.153632	-0.00121	-0.00217	-0.00337	1.46E-05	-0.00097	-0.00174
0.157728	0.000654	0.000985	0.003659	0.003458	0.002715	-0.00428
0.161824	0.002035	-0.00281	-4.1E-05	-0.00246	0.000562	-0.00054
0.16592	-0.00029	0.001554	0.001636	0.000224	-0.00201	0.008466
0.170016	0.000271	0.003217	4.92E-05	8.5E-05	0.001382	-0.00133
0.174112	-0.00086	-0.00092	-0.00304	0.001261	-0.00144	-0.00102
0.178208	0.000407	0.000587	0.003765	0.001698	0.003518	-0.00461
0.182304	0.002733	-0.00258	-0.00061	-0.00188	-0.00031	-0.00023
0.1864	-0.00159	0.00051	0.002295	0.001434	-0.0012	0.007707
0.190496	0.000423	0.004477	-0.00079	-0.00059	0.00121	-0.00124
0.194592	-0.0014	-0.00208	-0.00202	0.001047	-0.00134	-0.00112
0.198688	0.001603	0.000831	0.002582	0.001718	0.003345	-0.0042
0.202784	0.00131	-0.00282	0.000357	-0.00133	0.000114	0.000205
0.20688	2.03E-05	0.001712	0.001153	0.00074	-0.00182	0.007829
0.210976	-0.00106	0.003634	0.000497	-0.00101	0.000996	-0.00166
0.215072	-4.5E-05	-0.00193	-0.00274	0.001403	-0.00106	-0.00124
0.219168	0.000108	0.00073	0.003111	0.001974	0.003769	-0.00382
0.223264	0.002923	-0.00255	-0.00038	-0.00192	-0.00068	-0.00019
0.22736	-0.00138	0.001107	0.002054	0.00125	-0.00143	0.00787
0.231456	6.45E-05	0.004079	-0.00069	-0.00079	0.001338	-0.00283
0.235552	-0.00158	-0.00233	-0.00166	0.00218	-0.00117	0.000292
0.239648	0.002705	0.001521	0.00269	0.000444	0.004036	-0.00467
0.243744	0.000567	-0.00282	8.85E-05	-0.00146	-0.00124	0.000739
0.24784	-0.00056	0.001788	0.001556	0.001205	-0.0015	0.006914
0.251936	-0.00042	0.003203	3.17E-05	-8.2E-05	0.001118	-0.00189
0.256032	0.000324	-0.00195	-0.00264	0.001094	-0.00071	-0.00126
0.260128	0.000602	0.00032	0.003651	0.001729	0.003368	-0.00341
0.264224	0.001932	-0.00198	-0.00027	-0.00287	-0.0002	0.000333
0.26832	-0.00163	0.001134	0.001786	0.002268	-0.00222	0.007994
0.272416	0.000216	0.004536	-0.00055	-0.00155	0.002498	-0.00313
0.276512	-0.00098	-0.00272	-0.00147	0.003176	-0.00199	0.000199
0.280608	0.002103	0.001295	0.0025	-0.00029	0.003979	-0.00464
0.284704	0.000995	-0.00305	0.000731	-0.00107	-0.00174	0.00115
0.290848	-0.00078	0.002814	0.000832	0.000623	0.000236	0.002413
0.29904	0.000758	-0.00106	0.000328	0.001258	0.001041	-0.00222
0.307232	-9.9E-05	-0.00036	0.001231	0.000309	-0.00095	0.0041
0.315424	-0.00016	0.000927	-0.00116	0.0003	9.86E-05	-0.00149
0.323616	0.00111	-0.00109	0.001244	-0.0005	0.00107	-0.00182
0.331808	-0.0003	0.003021	0.001034	0.000327	0.0003	0.002256
0.34	0.000747	-0.00109	3.49E-05	0.001247	0.001206	-0.00205
0.348192	-9E-05	-0.00015	0.001323	0.000563	-0.00136	0.0036

Step Time, s			Elongation	Force, N		
0.356384	5.43E-05	0.00105	-0.0008	-9.3E-05	0.000653	-0.00074
0.364576	0.001321	-0.00089	0.001131	-0.00014	0.000751	-0.00245
0.372768	-0.00076	0.003215	0.000661	-0.00011	0.000396	0.002578
0.38096	0.001105	7.22E-05	0.000682	0.001555	0.001182	-0.00236
0.389152	-0.00044	0.000691	0.000965	2.44E-05	-0.00111	0.003617
0.397344	0.000381	0.002224	-0.00074	0.00066	2.97E-05	-0.00068
0.405536	0.00051	-0.00089	0.00088	-0.00078	0.001189	-0.00215
0.413728	-0.00017	0.002936	0.000498	0.000206	0.00042	0.002358
0.42192	0.000871	-0.00013	0.000718	0.001508	0.001161	-0.00229
0.430112	-7.7E-06	-0.00055	0.000918	3.07E-05	-0.00105	0.003966
0.438304	0.000138	0.001641	0.00118	0.001048	4.53E-05	-0.00139
0.446496	0.000366	-0.00079	0.000858	-0.00114	0.001188	-0.00132
0.454688	-2E-05	0.002455	0.00095	5.16E-05	0.000418	0.001691
0.46288	0.000759	-2.7E-05	0.000592	0.001738	0.001165	-0.00228
0.471072	0.000249	-0.00072	0.001277	-0.00014	-0.00131	0.003988
0.479264	-0.00052	0.001715	-0.00022	0.001022	0.000497	-0.00145
0.487456	0.000912	-0.00078	0.000133	-0.00106	0.001166	-0.00115
0.495648	2.46E-05	0.002223	0.001101	-0.00015	-0.0001	0.001603
0.50384	0.000916	-0.00019	5.35E-05	0.001701	0.001778	-0.00195
0.512032	-1.1E-06	3.98E-05	0.001676	0.000411	-0.00121	0.0044
0.520224	-0.00041	0.0011	0.000152	0.000968	0.000475	-0.00202
0.528416	0.000678	-0.00042	-0.00014	-0.00067	0.001182	6.27E-06
0.536608	-0.00033	0.001908	0.001867	5.75E-05	0.000542	0.001086
0.5448	0.001245	-1.8E-05	-0.00072	0.001604	0.001001	-0.00181
0.552992	7.5E-05	-0.00028	0.002143	0.000529	-0.00042	0.004545
0.561184	7.92E-05	0.001701	8.15E-05	0.001013	0.000285	-0.00213
0.569376	0.000724	-0.00119	-0.00041	-0.00082	0.001078	0.000409
0.577568	-1.4E-05	0.002188	0.0021	0.0004	0.000557	0.001279
0.58576	0.001573	-0.00015	-0.00053	0.001164	0.001069	-0.00183
0.593952	6.01E-05	-0.00017	0.002536	0.000491	-0.00063	0.004608
0.602144	-0.00037	0.001631	0.000572	0.000871	0.000376	-0.00193
0.610336	0.001262	-0.00126	-0.00066	-0.00073	0.001033	0.000789
0.622624	0.000907	0.001096	0.000905	0.000878	0.00085	-0.00038
0.639008	-0.00021	0.00078	0.001249	0.001109	-6E-05	0.001142
0.655392	0.000172	0.000329	0.000812	-0.00028	0.000601	0.001241
0.671776	0.000888	-8.2E-05	0.001061	0.00088	0.00061	0.004703
0.68816	0.000224	0.000212	-0.00011	0.000273	0.00064	0.002886
0.704544	0.001248	0.001178	0.000413	0.000869	0.000898	0.003514
0.720928	-0.00027	0.00074	0.001491	0.001123	-0.00012	0.006534
0.737312	0.000239	0.000303	0.000769	-0.00019	0.000502	0.010783
0.753696	0.000982	9.9E-05	0.001556	0.001003	0.000968	0.018567
0.77008	0.000432	0.000279	-0.00049	0.000294	0.000547	0.033083
0.786464	0.001238	0.001105	0.000869	0.001042	0.000746	0.075645
0.802848	-0.00023	0.000965	0.001495	0.00089	0.000121	0.100501
0.819232	-2E-06	0.000242	0.000792	-0.00014	0.000314	0.080216
0.835616	0.001022	2.12E-05	0.001074	0.000617	0.001043	0.144654
0.852	0.001844	0.000283	-9E-05	0.000505	0.000737	0.19341
0.868384	0.008335	0.001439	0.000874	0.004803	0.004674	0.253262
0.884768	0.004183	0.001479	0.001443	0.003957	0.00277	0.318702
0.901152	0.011513	0.000332	0.000851	0.005651	0.004517	0.387011
0.917536	0.039927	0.001826	0.007007	0.014843	0.009518	0.451876
0.93392	0.070819	0.009904	0.015693	0.024512	0.013126	0.52408
0.950304	0.147357	0.021713	0.029163	0.032749	0.022446	0.591525
0.966688	0.164834	0.037739	0.043615	0.07106	0.063066	0.652487
0.983072	0.223881	0.053566	0.066618	0.109903	0.101835	0.708395
0.999456	0.293698	0.109297	0.17971	0.165285	0.149519	0.765649
1.01584	0.360231	0.241154	0.238766	0.205702	0.187613	0.823051
1.03222	0.436593	0.347127	0.271086	0.253933	0.22716	0.876751
1.04861	0.530476	0.452867	0.330154	0.308265	0.268182	0.928351
1.06499	0.648164	0.579169	0.40479	0.363267	0.312101	0.976345
1.08138	0.771156	0.714697	0.505115	0.418823	0.356331	1.02683
1.09776	0.898901	0.852725	0.625182	0.471626	0.404231	1.07462
1.11414	1.03062	1.00395	0.7809	0.525251	0.451249	1.12259
1.13053	1.159	1.15039	0.944059	0.578072	0.499747	1.16868
1.14691	1.28305	1.29759	1.10908	0.63122	0.547027	1.21687

Step Time, s			Elongation	Force, N		
1.1633	1.40432	1.44307	1.27072	0.680072	0.593857	1.26399
1.17968	1.52388	1.58669	1.43014	0.728986	0.641377	1.30888
1.19606	1.6412	1.72772	1.59212	0.776296	0.686317	1.35464
1.21245	1.75648	1.8615	1.75281	0.823891	0.737431	1.39909
1.22883	1.87556	1.9955	1.90764	0.869163	0.792193	1.44484
1.24522	2.00047	2.12551	2.05799	0.915766	0.838379	1.48888
1.2616	2.13371	2.25722	2.20611	0.960752	0.881587	1.53397
1.28618	2.33924	2.45324	2.41877	1.02702	0.945574	1.5991
1.31894	2.59146	2.7135	2.6892	1.11246	1.02499	1.68491
1.35171	2.81809	2.96735	2.93683	1.19264	1.10223	1.76833
1.38448	3.01701	3.22852	3.19815	1.27047	1.17392	1.85185
1.41725	3.21671	3.4949	3.45799	1.35405	1.23706	1.93186
1.45002	3.41872	3.76682	3.70818	1.43117	1.29682	2.0107
1.48278	3.61775	4.04178	3.95927	1.50607	1.35612	2.10148
1.51555	3.80617	4.31013	4.18918	1.59392	1.41088	2.19503
1.54832	3.98108	4.56694	4.3911	1.68475	1.46064	2.26795
1.58109	4.14603	4.81156	4.32242	1.76115	1.50784	2.3368
1.61386	4.30879	5.04884	4.1248	1.83229	1.55115	2.40419
1.64662	4.47229	5.275	4.31369	1.90216	1.59311	2.47518
1.67939	4.62639	5.49186	4.50374	1.97063	1.6324	2.53796
1.71216	4.77218	5.69616	4.69206	2.0286	1.67259	2.59718
1.74493	4.91838	5.89012	4.8836	2.06993	1.71002	2.6601
1.7777	5.06911	6.07322	5.08779	2.10528	1.74351	2.72371
1.81046	5.20253	6.24494	5.26899	2.14439	1.77501	2.77893
1.84323	5.30163	6.40879	5.43981	2.19415	1.80404	2.83242
1.876	5.38214	6.56651	5.60018	2.24466	1.8308	2.88193
1.90877	5.46183	6.72474	5.7457	2.29083	1.8563	2.93071
1.94154	5.53667	6.89372	5.71748	2.33683	1.88157	2.97941
1.9743	5.60742	7.10904	5.63287	2.38503	1.9047	3.02832
2.00707	5.6728	7.2932	5.73464	2.42938	1.92607	3.07275
2.03984	5.73298	7.41061	5.86153	2.47079	1.95441	3.11252
2.07261	5.78492	7.50506	5.99537	2.50888	1.99487	3.14967
2.10538	5.83539	7.51206	6.12904	2.54498	2.01235	3.18418
2.13814	5.89138	7.57432	6.25459	2.57844	2.02767	3.21526
2.17091	5.97013	7.66491	6.37257	2.60649	2.04102	3.24448
2.20368	6.07165	7.75647	6.48894	2.6276	2.05247	3.2759
2.23645	6.14136	7.84109	6.60156	2.64109	2.06711	3.30789
2.26922	6.17998	7.91511	6.71176	2.63119	2.0891	3.3376
2.30198	6.22416	7.98862	6.81825	2.55805	2.1034	3.36713
2.33475	6.26337	8.06363	6.92044	2.53948	2.11577	3.41239
2.36752	6.29436	8.14904	7.01847	2.56152	2.12503	3.47411
2.40029	6.32434	8.24246	7.1136	2.58972	2.13229	3.51695
2.43306	6.35438	8.3246	7.21504	2.59634	2.13763	3.54277
2.46582	6.38718	8.39594	7.31469	2.60973	2.14284	3.56588
2.49859	6.42639	8.4583	7.40947	2.63038	2.15042	3.58698
2.53136	6.47111	8.50969	7.50266	2.65406	2.15914	3.61702
2.56413	6.52433	8.55459	7.63632	2.68748	2.16637	3.64348
2.61328	6.60963	8.6101	7.85811	2.72558	2.17486	3.67258
2.67882	6.70976	8.66042	8.03386	2.77151	2.18337	3.71272
2.74435	6.78092	8.70581	8.18593	2.81003	2.19223	3.73861
2.80989	6.83396	8.77354	8.32531	2.84457	2.20577	3.7621
2.87542	6.87432	8.88623	8.4437	2.87807	2.22503	3.79427
2.94096	6.92705	9.00005	8.57333	2.90263	2.27498	3.81076
3.0065	6.97915	9.02185	8.71	2.92522	2.29529	3.81631
3.07203	7.0692	9.02212	8.82513	2.94976	2.31433	3.8252
3.13757	7.16178	9.01298	8.91477	2.97662	2.32699	3.83612
3.2031	7.20092	9.00338	8.97614	3.00144	2.32618	3.86652
3.26864	7.20884	9.01964	9.01561	3.06606	2.33019	3.92337
3.33418	7.20105	9.0445	9.06555	3.09218	2.33247	3.92079
3.39971	7.20324	9.02541	9.12182	3.11605	2.34101	3.92264
3.46525	7.23287	8.98197	9.23583	3.13614	2.33679	3.92408
3.53078	7.26023	8.92748	9.34718	3.14761	2.33089	3.93021
3.59632	7.26354	8.88699	9.36623	3.15761	2.32286	3.92789
3.66186	7.26366	8.85978	9.36934	3.16803	2.31531	3.93327
3.72739	7.25971	8.83284	9.36788	3.18071	2.30498	3.94899

Step Time, s			Elongation	Force, N		
3.79293	7.27829	8.89057	9.37693	3.18172	2.32258	3.94473
3.85846	7.29385	8.89937	9.41384	3.17726	2.35547	3.91961
3.924	7.34036	8.85546	9.44401	3.17006	2.34667	3.89491
3.98954	7.41623	8.77729	9.43045	3.16402	2.3296	3.87058
4.05507	7.42872	8.70128	9.40071	3.15947	2.31555	3.86473
4.12061	7.41015	8.64483	9.36032	3.19346	2.30357	3.8976
4.18614	7.3798	8.60585	9.33656	3.24514	2.28922	3.87874
4.25168	7.36501	8.51935	9.32218	3.22998	2.27701	3.87423
4.31722	7.36411	8.41192	9.32109	3.21555	2.25703	3.84917
4.38275	7.3428	8.29616	9.40803	3.21255	2.23648	3.79987
4.44829	7.29892	8.18901	9.42516	3.22231	2.22319	3.76181
4.51382	7.24848	8.08115	9.39394	3.23207	2.21648	3.7419
4.57936	7.20002	7.98375	9.34292	3.24547	2.21564	3.73055
4.6449	7.17171	7.96374	9.29816	3.24181	2.23075	3.70419
4.71043	7.13711	7.86176	9.28624	3.22637	2.24496	3.67215
4.77597	7.18851	7.71666	9.27424	3.21238	2.24604	3.65016
4.8415	7.21327	7.55215	9.21833	3.20595	2.23827	3.62878
4.90704	7.19325	7.40193	9.14845	3.20106	2.22473	3.62357
4.97258	7.15919	7.2654	9.08013	3.22785	2.22046	3.65464
5.03811	7.11187	7.10953	9.0352	3.2388	2.20877	3.63065
5.10365	7.07348	6.91437	8.99278	3.23613	2.20375	3.61063
5.16918	7.06323	6.69165	8.97694	3.22495	2.1896	3.59583
5.26749	7.00603	6.33901	9.01315	3.20277	2.16605	3.57014
5.39856	6.89727	5.79904	8.89435	3.1814	2.14324	3.54697
5.52963	6.81346	5.15452	8.79212	3.15407	2.152	3.52694
5.6607	6.8102	3.16095	8.68841	3.12052	2.13799	3.52517
5.79178	6.74831	0.00047	8.5071	3.10906	2.10165	3.57059
5.92285	6.61684	0.000343	8.34243	3.13676	2.08359	3.57558
6.05392	6.53725	0.000349	8.28982	3.12199	2.06841	3.54233
6.18499	6.40762	0.000853	8.13815	3.09743	2.04667	3.51888
6.31606	6.27639	0.001482	7.90353	3.07367	2.039	3.51189
6.44714	6.20547	0.001446	7.67627	3.03852	2.04096	3.48366
6.57821	6.15065	0.001464	7.35542	3.00511	2.02695	3.47271
6.70928	6.01126	0.001549	7.0151	3.01985	2.01024	3.52938
6.84035	5.88283	0.000841	6.71335	3.00421	1.99998	3.49971
6.97142	5.73349	0.000605	6.45063	2.97682	1.97393	3.46854
7.1025	5.51962	0.001241	6.15444	2.95149	1.94799	3.43192
7.23357	5.30115	0.001531	5.97462	2.92315	1.96707	3.39021
7.36464	5.02676	0.002338	5.77169	2.88979	1.98037	3.34966
7.49571	1.22846	0.001825	5.56828	2.89107	1.97882	3.35255
7.62678	0.000156	0.00117	5.39717	2.89458	1.97027	3.33944
7.75786	0.000164	0.001019	1.72347	2.87445	1.96039	3.31368
7.88893	0.00023	0.001086	0.002308	2.84891	1.94517	3.27638
8.02	0.000169	0.001356	0.00288	2.82628	1.94866	3.25855
8.15107	0.000375	0.000918	0.003103	2.78748	1.97193	3.22608
8.28214	0.000235	0.00121	0.003572	2.74852	1.95772	3.21742
8.41322	0.000848	0.001879	0.00311	2.75294	1.93531	3.24103
8.54429	0.000622	0.001668	0.003672	2.7403	1.91429	3.22729
8.67536	0.00111	0.001177	0.003321	2.71774	1.88751	3.20679
8.80643	0.001354	0.000979	0.003169	2.69886	1.87023	3.18737
8.9375	0.001425	0.001512	0.002968	2.68783	1.89601	3.16194
9.06858	0.001354	0.001329	0.002692	2.66358	1.88851	3.1291
9.19965	0.001052	0.001756	0.003556	2.66023	1.88818	3.13751
9.33072	0.001503	0.00088	0.00296	2.66269	1.87267	3.11748
9.46179	0.001115	0.000959	0.003847	2.64172	1.86317	3.09704
9.59286	0.000896	0.001053	0.003385	2.62476	1.84901	3.09961
9.72394	0.000758	0.000686	0.002947	2.60264	1.84978	3.10244
9.85501	0.000413	0.000934	0.003037	2.57455	1.84223	3.08377
9.98608	0.001294	0.001137	0.002833	2.56344	1.83002	3.06811
10.1172	0.001208	0.001766	0.003359	2.58978	1.81346	3.07686
10.2482	0.0017	0.001738	0.002911	2.58652	1.79573	3.05779
10.3793	0.001238	0.001435	0.003082	2.57443	1.77919	3.03821
10.5759	0.001135	0.000783	0.002148	2.54693	1.77994	3.00614
10.838	0.001188	0.0015	0.001532	2.53434	1.78685	2.97577
11.1002	0.001162	0.002422	0.001589	2.55014	1.7684	2.97151

Step Time, s	Elongation			Force, N		
11.3623	0.00069	0.001203	0.001538	2.5133	1.75103	2.93158
11.6245	0.000952	0.001485	0.001102	2.48043	1.74259	2.91763
11.8866	0.000953	0.00169	0.000909	2.49993	1.72146	2.9372
12.1488	0.001441	0.001389	0.001273	2.48776	1.70408	2.90353
12.4109	0.002066	0.001308	0.000886	2.44731	1.72908	2.85862
12.6731	0.00136	0.001103	0.00084	2.44519	1.71725	2.85659
12.9352	0.00092	0.001227	0.000998	2.43498	1.69601	2.83342
13.1973	0.000513	0.001113	0.001523	2.41306	1.70362	2.81146
13.4595	0.00115	0.002	0.001556	2.43887	1.72643	2.79385
13.7216	0.001136	0.001173	0.00139	2.46909	1.72872	2.79574
13.9838	0.000601	0.001234	0.000993	2.4469	1.74189	2.76329
14.2459	0.001494	0.00122	0.001228	2.43509	1.75392	2.74982
14.5081	0.00167	0.001412	0.001132	2.45269	1.73517	2.75075
14.7702	0.001166	0.001088	0.00168	2.45074	1.71923	2.62181
15.0324	0.001092	0.001447	0.001788	2.45433	1.74851	1.94764
15.2945	0.001069	0.000855	0.000806	2.50671	1.74286	2.29725
15.5566	0.002247	0.00114	0.000808	2.49483	1.77328	2.55163
15.8188	0.001045	0.001068	0.002573	2.47813	1.81467	2.64441
16.0809	0.000765	0.001156	0.001717	2.51055	1.7885	2.64356
16.3431	0.000489	0.001267	0.001374	2.53652	1.76893	2.63036
16.6052	0.001421	0.001579	0.000793	2.5401	1.79783	2.6623
16.8674	0.001308	0.001188	0.002036	2.56236	1.81374	2.65218
17.1295	0.000916	0.001811	0.001504	2.5706	1.81447	2.64411
17.3916	0.00185	0.001298	0.001452	2.55474	1.82097	2.66774
17.6538	0.000617	0.001129	0.000855	2.579	1.81957	2.65782
17.9159	0.000753	0.001598	0.00127	2.62421	1.82568	2.63848
18.1781	0.00093	0.00173	0.001391	2.62158	1.8562	2.64275
18.4402	0.001111	0.001423	0.001116	2.60505	1.90095	2.65048
18.7024	0.00087	0.00052	0.001117	2.64306	1.89877	2.6398
18.9645	0.000929	0.005864	0.001062	2.62992	1.89552	2.63193
19.2267	0.001029	0.147449	0.001601	2.64065	1.90566	2.6689
19.4888	0.001411	0.503841	0.001136	2.69045	1.89037	2.64228
19.7509	0.000947	0.077705	0.001065	2.7131	1.90746	2.61796
20.0131	0.001273	0.007855	0.001214	2.70065	1.98255	2.66514
20.2752	0.001328	0.009461	0.001151	2.71291	1.97335	2.665
20.5374	0.000732	0.000391	0.001566	2.72966	1.94735	2.66201
20.7995	0.000929	0.000951	0.001223	2.74286	1.95758	2.69676
21.1927	0.00116	-0.00832	0.00121	2.7723	1.97709	2.69471
21.717	0.001086	-0.01534	0.001089	2.7713	2.01124	2.70179
22.2413	0.000924	0.000159	0.00123	2.80671	1.97796	2.72663
22.7656	0.001149	0.001024	0.001229	2.81911	2.00986	2.74392
23.2899	0.001029	0.001845	0.001022	2.80335	2.00522	2.73968
23.8142	0.001168	0.001288	0.001053	2.82296	1.93266	2.73753
24.3385	0.001269	0.001192	0.001245	2.78368	1.88903	2.78571
24.8628	0.000893	0.001045	0.001038	2.72258	0.689663	2.74931
25.387	0.001001	0.000893	0.001329	2.63889	0.000374	2.74791
25.9113	0.001239	0.001243	0.000907	1.65191	0.000658	2.73617
26.4356	0.001467	0.000968	0.001143	0.000135	0.000927	1.90905
26.9599	0.001527	0.001238	0.001213	0.000479	0.001012	0.000307
27.4842	0.001279	0.001026	0.001487	0.001174	0.000349	0.000831
28.0085	0.00064	0.001514	0.002383	0.000989	0.001657	0.000907
28.5328	0.001321	0.00117	0.001647	0.000859	0.000773	0.001112
29.0571	0.001014	0.001536	0.001292	0.000918	0.001001	0.001636
29.5813	0.000879	0.001371	0.001142	0.000943	0.000624	0.001587
30.1056	0.000946	0.001244	0.001449	0.000972	0.000978	0.001454
30.6299	0.000933	0.001175	0.001195	0.000771	0.0007	0.001369
31.1542	0.001282	0.001183	0.001328	0.000922	0.000962	0.001137
31.6785	0.001445	0.001087	0.001233	0.000785	0.000756	0.001217
32.2028	0.001256	0.001176	0.001163	0.000983	0.000995	0.001118
32.7271	0.001353	0.001437	0.001554	0.000639	0.001258	0.001113
33.2514	0.001152	0.006382	0.003511	0.000868	0.00084	0.001521
33.7756	0.001204	0.110977	0.003335	0.000978	0.000834	0.001162
34.2999	0.001943	1.02521	0.02768	0.00296	0.000995	0.00121
34.8242	0.015101	2.17092	0.533109	0.008965	0.00145	0.001403
35.3485	0.073055	2.60379	1.30336	0.025453	0.001786	0.001195

Step Time, s			Elongation	Force, N		
35.8728	0.222455	2.33688	1.83105	0.043956	0.001817	0.000912
36.3971	0.216492	2.03267	1.61111	0.047469	0.000863	0.001342

Table B8. 6% latex modified PG 64-22 (3 samples at 4°C, 3 samples at 12°C and 3 samples at 16°C).

Step Time, s	Elongation Force, N								
0	0	0	0	0	0	0	0	0	0
0.000544	0.014708	0.01494	0.015769	0.015694	0.061492	0.076323	0.013669	0.02178	0.049779
0.001568	0.103016	0.104513	0.105221	0.104523	0.155141	0.172707	0.102126	0.112322	0.144574
0.002592	0.12879	0.131239	0.129045	0.130017	0.06756	0.061296	0.129922	0.118581	0.073888
0.003616	0.083683	0.087793	0.084569	0.085722	0.00895	-0.00283	0.085287	0.068666	0.013591
0.00464	0.034678	0.039905	0.039097	0.038725	2.21E-05	-0.00837	0.037759	0.025854	0.001496
0.005664	0.010354	0.010488	0.015438	0.014481	0.00967	0.006029	0.013049	0.006623	0.010325
0.006688	0.00535	-0.00123	0.008141	0.005507	0.017552	0.01586	0.006135	0.003958	0.018885
0.007712	0.007142	-0.0032	0.005472	0.001174	0.016375	0.015884	0.006119	0.006482	0.020307
0.008736	0.007918	-0.00048	0.001939	-0.00255	0.010875	0.012247	0.004287	0.00928	0.016326
0.00976	0.004805	0.004845	-0.0022	-0.0045	0.006385	0.00987	4.17E-05	0.010328	0.01012
0.010784	0.000274	0.009141	-0.00435	-0.00384	0.004806	0.009344	-0.00363	0.009993	0.004822
0.011808	-0.00403	0.009539	-0.00372	-0.00027	0.005935	0.009857	-0.00478	0.00717	0.001091
0.012832	-0.00584	0.006147	-0.00089	0.003627	0.007346	0.009039	-0.00284	0.003765	-0.00184
0.013856	-0.00381	0.000993	0.002628	0.006606	0.00727	0.006757	0.000243	0.00128	-0.00302
0.01488	0.000371	-0.0037	0.005979	0.007192	0.005959	0.00435	0.004358	-0.00211	-0.00191
0.015904	0.004502	-0.00646	0.007996	0.006292	0.002206	0.002042	0.007784	-0.00366	0.001636
0.016928	0.00647	-0.00641	0.007426	0.004167	-0.00266	-0.0006	0.00743	-0.00304	0.005901
0.017952	0.005944	-0.00322	0.00486	0.001168	-0.00636	-0.00309	0.005147	-0.00111	0.007952
0.018976	0.00459	0.000704	0.002047	-0.00126	-0.00728	-0.00465	0.002195	0.001846	0.006836
0.02	0.00242	0.004165	0.000466	-0.00406	-0.00521	-0.00351	0.000341	0.004797	0.002101
0.021024	0.000641	0.005774	-0.00188	-0.00534	-0.00133	-5.9E-05	-0.00175	0.005759	-0.00406
0.022048	-0.00258	0.005675	-0.00471	-0.00426	0.003559	0.003837	-0.0045	0.003336	-0.00844
0.023072	-0.0058	0.003834	-0.00492	-0.00134	0.006898	0.005389	-0.00549	-0.00177	-0.00874
0.024096	-0.00648	0.001044	-0.00229	0.003172	0.006911	0.004561	-0.00326	-0.00668	-0.00542
0.02512	-0.00363	-0.00146	0.002293	0.006806	0.005386	0.001441	0.001639	-0.00842	-0.00089
0.026144	0.001472	-0.00354	0.005334	0.007626	0.003107	-0.00288	0.005932	-0.00733	0.003669
0.027168	0.005501	-0.00505	0.006146	0.004794	0.001029	-0.00635	0.006983	-0.00305	0.006786
0.028192	0.006864	-0.0044	0.00418	3.12E-05	-0.00204	-0.00781	0.005614	0.001793	0.006938
0.029216	0.005739	-0.0012	-0.00051	-0.00451	-0.00519	-0.00652	0.001809	0.006739	0.00576
0.03024	0.002312	0.003884	-0.00526	-0.00745	-0.00535	-0.00183	-0.0024	0.008666	0.003125
0.031264	-0.00194	0.007413	-0.00792	-0.00683	-0.0027	0.003557	-0.00602	0.006811	0.000576
0.032288	-0.00562	0.007994	-0.0084	-0.00261	0.001172	0.007154	-0.00716	0.003997	-0.00231
0.033312	-0.00761	0.005294	-0.0049	0.002283	0.004499	0.007569	-0.00487	0.001864	-0.00546
0.034336	-0.0057	-0.00042	0.000995	0.006383	0.00599	0.006286	-0.00076	0.000309	-0.00595
0.03536	-0.00071	-0.00654	0.006428	0.007393	0.005178	0.004056	0.003247	-0.00242	-0.00325
0.036384	0.004691	-0.0091	0.008128	0.006376	0.001203	0.001555	0.006225	-0.00459	0.0016
0.037408	0.007311	-0.00695	0.006658	0.004004	-0.00383	-0.00086	0.006612	-0.00445	0.005751
0.038432	0.006647	-0.00256	0.004324	0.001362	-0.0079	-0.00375	0.004858	-0.00154	0.007318

0.039456	0.004783	0.001107	0.001361	-0.00146	-0.00823	-0.0052	0.001557	0.003176	0.005688
0.04048	0.002268	0.005082	-0.00016	-0.00512	-0.00444	-0.00379	-0.00121	0.00596	0.001833
0.042016	-0.00124	0.006649	-0.00342	-0.00602	0.00283	0.001853	-0.00388	0.003963	-0.00537
0.044064	-0.00546	0.001359	-0.00328	0.001803	0.007095	0.00566	-0.00347	-0.0061	-0.00768
0.046112	-0.00077	-0.00225	0.003977	0.00714	0.00392	-0.00113	0.003955	-0.00801	0.002397
0.04816	0.006371	-0.00402	0.004397	0.001816	-0.00202	-0.00882	0.007381	0.000414	0.006859
0.050208	0.002701	0.00103	-0.00378	-0.00673	-0.00452	-0.00322	-0.00184	0.007159	0.003816
0.052256	-0.00623	0.007452	-0.00797	-0.0037	-0.00041	0.005698	-0.00778	0.00586	-0.00124
0.054304	-0.00549	0.001547	-0.00051	0.004185	0.005773	0.006671	-0.00271	0.001771	-0.00497
0.056352	0.002172	-0.00653	0.006662	0.00673	0.00214	0.002343	0.005714	-0.00412	-0.00054
0.0584	0.007205	-0.00486	0.005563	0.001892	-0.00618	-0.00312	0.005641	-0.0023	0.00664
0.060448	0.002887	0.003619	0.001214	-0.00375	-0.00616	-0.0045	0.001182	0.004573	0.002904
0.062496	-0.00174	0.005161	-0.00407	-0.00553	0.002614	0.002603	-0.00414	0.002886	-0.00573
0.064544	-0.00444	0.002334	-0.00266	0.001973	0.006983	0.005633	-0.00392	-0.00523	-0.00726
0.066592	-0.00041	-0.00254	0.003745	0.006756	0.004198	-0.00165	0.004805	-0.00795	0.002335
0.06864	0.005375	-0.00575	0.004141	0.00089	-0.00099	-0.00783	0.006137	0.000402	0.008097
0.070688	0.004178	0.001965	-0.00443	-0.00611	-0.00521	-0.00241	-0.00126	0.006569	0.003775
0.072736	-0.00626	0.007398	-0.00799	-0.00311	-0.00079	0.005217	-0.00705	0.005732	-0.00196
0.074784	-0.00504	0.001164	0.000562	0.005645	0.005321	0.006554	-0.00171	0.000634	-0.00547
0.076832	0.002907	-0.00686	0.007167	0.00603	0.001898	0.00155	0.004281	-0.00275	-0.00143
0.07888	0.005856	-0.00529	0.005641	0.001502	-0.00642	-0.00317	0.00476	-0.00298	0.007382
0.080928	0.00324	0.003871	0.000295	-0.00412	-0.00504	-0.00398	0.001179	0.004525	0.003445
0.082976	-0.00269	0.006846	-0.00368	-0.00541	0.003272	0.00267	-0.00399	0.003445	-0.00622
0.085024	-0.00537	0.001138	-0.00343	0.001905	0.006212	0.006213	-0.00317	-0.00634	-0.00653
0.087072	0.000162	-0.00292	0.004194	0.006438	0.002913	-0.00156	0.004788	-0.00813	0.002773
0.08912	0.006452	-0.00458	0.004168	0.000791	-0.00102	-0.00831	0.006057	0.000556	0.006809
0.091168	0.003014	0.001711	-0.00449	-0.00631	-0.00433	-0.00241	-0.00195	0.008325	0.003405
0.093216	-0.00621	0.008258	-0.00739	-0.00275	-0.00036	0.005539	-0.00806	0.00552	-0.00243
0.095264	-0.00547	0.001504	0.000961	0.004648	0.005327	0.005868	-0.0027	0.000293	-0.0056
0.097312	0.003661	-0.00668	0.007887	0.006263	0.001207	0.001199	0.00682	-0.00437	0.00053
0.09936	0.006476	-0.00461	0.00463	0.001294	-0.00634	-0.0031	0.005112	-0.00199	0.006277
0.101408	0.001959	0.003065	-0.00037	-0.00366	-0.0054	-0.00381	0.000677	0.005155	0.002616
0.103456	-0.00147	0.00682	-0.00441	-0.00483	0.002945	0.003434	-0.00401	0.00287	-0.00711
0.105504	-0.00576	0.00126	-0.00268	0.002445	0.007234	0.006037	-0.00248	-0.00618	-0.00546
0.107552	0.001235	-0.00387	0.004453	0.007174	0.003929	-0.00207	0.004647	-0.00769	0.003614
0.1096	0.005703	-0.00378	0.004139	0.000339	-0.00124	-0.00802	0.006404	0.00178	0.007374
0.111648	0.001697	0.002431	-0.00489	-0.00731	-0.00548	-0.00195	-0.00302	0.007529	0.003049
0.113696	-0.00531	0.007058	-0.00745	-0.00262	-0.00072	0.005437	-0.00724	0.005172	-0.00223
0.115744	-0.00557	0.001041	0.001426	0.005779	0.005869	0.005602	-0.00169	-0.00046	-0.00527
0.117792	0.003268	-0.00788	0.007131	0.006183	0.002105	0.000995	0.005247	-0.00367	-0.00039
0.11984	0.00607	-0.00447	0.004763	0.001363	-0.00707	-0.00389	0.004956	-0.00142	0.005886

0.121888	0.002774	0.00532	-0.00137	-0.00438	-0.00465	-0.00352	0.000222	0.004919	0.002434
0.12496	-0.00333	0.003361	-0.00306	-0.00078	0.005735	0.004939	-0.0026	-0.00137	-0.00563
0.129056	0.00334	-0.00372	0.005182	0.003266	9.64E-05	-0.00525	0.005497	-0.00298	0.005773
0.133152	-0.00255	0.004043	-0.00665	-0.00478	-0.00195	0.001902	-0.0057	0.006165	-0.00013
0.137248	-0.0007	-0.00314	0.004175	0.0057	0.003083	0.00322	0.002329	-0.00222	-0.00269
0.141344	0.004626	0.000861	0.001553	-0.00188	-0.00535	-0.00335	0.002581	0.00154	0.003914
0.14544	-0.00352	0.00343	-0.00317	-7.3E-05	0.005359	0.005182	-0.003	-0.00226	-0.00551
0.149536	0.003302	-0.00407	0.005327	0.002685	0.000268	-0.00608	0.004964	-0.00246	0.006015
0.153632	-0.00291	0.004407	-0.00697	-0.00465	-0.00213	0.002222	-0.00534	0.006122	-0.00059
0.157728	0.00028	-0.00396	0.004552	0.005897	0.002999	0.003613	0.002968	-0.00267	-0.00195
0.161824	0.004232	0.001222	0.001548	-0.00165	-0.00459	-0.00355	0.002226	0.002406	0.003692
0.16592	-0.00344	0.003339	-0.00319	-0.00071	0.005396	0.004701	-0.003	-0.00254	-0.00564
0.170016	0.003877	-0.00352	0.005042	0.002838	-0.00046	-0.00598	0.005406	-0.00216	0.005442
0.174112	-0.00349	0.004371	-0.00711	-0.00376	-0.00253	0.002868	-0.00584	0.006254	-0.00056
0.178208	0.000432	-0.00425	0.004623	0.005385	0.003085	0.002873	0.002688	-0.00242	-0.00202
0.182304	0.003967	0.001583	0.001476	-0.00214	-0.00468	-0.00365	0.002292	0.001819	0.003952
0.1864	-0.00383	0.003457	-0.00273	0.000124	0.005437	0.00508	-0.00276	-0.00262	-0.00546
0.190496	0.003952	-0.00418	0.004533	0.00256	-0.00051	-0.00601	0.004979	-0.00107	0.006062
0.194592	-0.00338	0.004463	-0.00698	-0.00442	-0.00151	0.002768	-0.0059	0.005559	-0.0016
0.198688	0.000293	-0.00457	0.005402	0.005789	0.002637	0.002804	0.003654	-0.00317	-0.00124
0.202784	0.004241	0.00282	0.00092	-0.00261	-0.00438	-0.00338	0.001641	0.003058	0.003552
0.20688	-0.00369	0.002866	-0.00269	0.000469	0.005459	0.004934	-0.00276	-0.00337	-0.0053
0.210976	0.003914	-0.00379	0.004529	0.002468	-0.00125	-0.00611	0.004661	-0.00142	0.005819
0.215072	-0.00378	0.004589	-0.00673	-0.00353	-0.00149	0.003056	-0.00559	0.00566	-0.0019
0.219168	0.001079	-0.00486	0.005236	0.005108	0.002832	0.002735	0.003297	-0.00276	-0.00042
0.223264	0.00356	0.002073	0.000927	-0.00261	-0.00444	-0.00312	0.002462	0.002418	0.003123
0.22736	-0.00351	0.002946	-0.00231	0.001166	0.005464	0.004944	-0.00293	-0.00351	-0.00518
0.231456	0.003942	-0.00367	0.004384	0.001803	-0.00097	-0.0066	0.00416	-0.00064	0.005347
0.235552	-0.00401	0.004572	-0.0074	-0.00393	-0.00145	0.003709	-0.00564	0.005593	-0.00177
0.239648	0.001519	-0.00485	0.005735	0.005589	0.002281	0.002463	0.004181	-0.00318	-0.00054
0.243744	0.003706	0.002752	0.000667	-0.00297	-0.00439	-0.00341	0.001738	0.003433	0.003259
0.24784	-0.00403	0.002937	-0.00213	0.001136	0.005166	0.004778	-0.00271	-0.0042	-0.00474
0.251936	0.004104	-0.00405	0.00414	0.001912	-0.00074	-0.00627	0.003375	-0.00016	0.005329
0.256032	-0.00389	0.004781	-0.00726	-0.00321	-0.00113	0.00351	-0.00516	0.005717	-0.00156
0.260128	0.001522	-0.00468	0.005973	0.00494	0.002269	0.002467	0.004393	-0.00402	-0.00063
0.264224	0.003426	0.002524	0.000616	-0.00291	-0.00395	-0.00366	0.001431	0.003157	0.002939
0.26832	-0.00378	0.002136	-0.00198	0.001869	0.004756	0.0051	-0.00284	-0.00386	-0.00477
0.272416	0.004049	-0.00358	0.00374	0.001051	-0.00099	-0.00629	0.003766	0.00021	0.005542
0.276512	-0.00419	0.004326	-0.00722	-0.00343	-0.00054	0.004617	-0.00511	0.005016	-0.00197
0.280608	0.001698	-0.00472	0.006469	0.005073	0.001292	0.00167	0.00427	-0.00363	0.000323
0.284704	0.00347	0.00302	0.00034	-0.00261	-0.00349	-0.00317	0.000437	0.003797	0.002415

0.290848	8.48E-05	-0.00096	0.000786	0.001065	0.001887	-0.00094	0.001098	-0.00215	0.000125
0.29904	-0.00093	0.000191	-0.00019	0.001103	0.000747	0.002931	-0.00062	0.00056	-0.00067
0.307232	-0.00043	0.002579	-0.00092	-0.00051	0.000669	0.000876	-0.0006	-0.00038	-0.00155
0.315424	-8.2E-05	0.000415	-0.00189	-0.00099	-0.00095	-0.00093	-0.00055	0.002693	0.001817
0.323616	0.002683	-0.00078	0.003485	0.00104	-0.00089	-0.00091	0.002052	0.00019	0.001058
0.331808	0.000226	-0.00093	0.000775	0.000952	0.001675	-0.00111	0.001102	-0.00192	0.000662
0.34	-0.00086	-8.5E-05	-0.00033	0.001448	0.000677	0.003374	-7.7E-05	0.000463	-0.00057
0.348192	-0.00067	0.002807	-0.00067	-0.00048	0.000907	0.000969	-0.00125	-0.00045	-0.00165
0.356384	-0.00011	-1.8E-06	-0.00198	-0.0011	-0.00094	-0.00056	-0.00023	0.002906	0.002035
0.364576	0.002713	-0.00016	0.003259	0.001179	-0.00103	-0.00144	0.00216	0.000235	0.000483
0.372768	0.000374	-0.00118	0.000748	0.000527	0.001415	-0.00086	0.001081	-0.00182	0.000783
0.38096	-0.00066	-0.0006	8.4E-05	0.001648	0.000575	0.002742	6.23E-05	0.000261	-0.00036
0.389152	-0.00097	0.002817	-0.00072	-0.00016	0.001088	0.001153	-0.00126	-0.00049	-0.00176
0.397344	-4.1E-05	0.000512	-0.00199	-0.00121	-0.00063	-0.00043	-0.00023	0.002955	0.001857
0.405536	0.00249	-0.00056	0.003015	0.000845	-0.00142	-0.00091	0.001863	0.000643	0.000644
0.413728	0.000519	-0.00106	0.000563	0.000635	0.001429	-0.00151	0.001251	-0.00186	0.000894
0.42192	-0.00067	-0.00049	0.000675	0.001619	0.000436	0.003205	-0.00014	-0.00026	-0.00027
0.430112	-0.00083	0.002343	-0.00091	7.3E-05	0.001229	0.000919	-0.00098	-0.00051	-0.00185
0.438304	-6.9E-05	0.001183	-0.00176	-0.00117	-0.00027	-0.00015	-0.0004	0.003276	0.001753
0.446496	0.002583	-0.00054	0.002501	0.000455	-0.00148	-0.00078	0.002018	0.000487	0.000208
0.454688	0.000696	-0.00118	0.000714	0.000658	0.000928	-0.00209	0.00197	-0.00139	0.001682
0.46288	-0.00037	-0.00039	0.001047	0.003358	0.0006	0.003237	0.000646	-0.00058	-0.00049
0.471072	-0.0004	0.001957	-0.00112	0.000419	0.001412	0.000906	-0.00102	-0.0007	-0.0011
0.479264	-0.00032	0.001011	-0.00164	-0.00064	-0.0007	7.83E-05	-0.0002	0.003244	0.001743
0.487456	0.002559	-8.5E-05	0.002022	0.000289	-0.00094	-0.00088	0.001628	0.000587	0.000426
0.495648	0.000983	-0.00096	0.000728	0.000866	0.000699	-0.00183	0.001801	-0.00126	0.002201
0.50384	-0.00044	-0.00017	0.001419	0.002051	0.000512	0.002957	0.00032	-0.00065	-0.00059
0.512032	-0.00038	0.002332	-0.00111	0.000314	0.001528	0.001338	-0.00066	-0.00107	-0.00095
0.520224	-9.7E-05	0.000895	-0.00151	-0.00061	-0.00011	-0.00012	-0.00065	0.004003	0.001098
0.528416	0.002176	0.000116	0.001759	0.000161	-0.00093	-0.00045	0.001537	0.000847	0.000434
0.536608	0.001297	-0.00086	0.001641	0.000686	0.000802	-0.00176	0.001552	-0.00118	0.002163
0.5448	-0.00021	-0.00083	0.001183	0.002301	0.000428	0.002775	0.000683	-0.00027	7.16E-05
0.552992	-0.00086	0.002403	-0.00025	0.000304	0.002156	0.00137	-0.00068	-0.00106	-0.00068
0.561184	-0.00033	0.000709	-0.00205	-0.00053	-0.00025	0.000406	-0.00077	0.003614	0.000946
0.569376	0.002261	0.000788	0.001517	-2E-05	-0.00098	-0.00011	0.001254	0.001002	0.000401
0.577568	0.001239	-0.00085	0.001589	0.000586	0.000272	-0.00209	0.001756	-0.00116	0.002185
0.58576	-7.6E-05	-0.00056	0.001365	0.002388	0.000726	0.002647	0.001022	-0.00019	0.000379
0.593952	-0.00064	0.002355	2.1E-05	0.000374	0.002492	0.001125	-0.00039	-0.0012	-0.00091
0.602144	-0.00088	0.000752	-0.00166	-0.0006	5.4E-05	0.000701	-0.00079	0.004003	0.000347
0.610336	0.002511	0.000644	0.001417	-0.00014	-0.00084	-0.00029	0.00103	0.001128	0.000795
0.622624	0.000387	-0.00079	0.001418	0.001595	0.000234	0.000205	0.001333	-0.00076	0.001241

0.639008	-0.00084	0.001393	-0.00097	4.72E-05	0.001278	0.001088	-0.00054	0.001154	-0.00035
0.655392	0.001757	-0.00016	0.001039	-3.2E-06	-0.00038	-0.00126	0.001174	3.97E-05	0.00159
0.671776	7.25E-05	0.000631	0.001104	0.001808	0.001339	0.001516	0.000775	-0.00114	-0.00018
0.68816	0.000746	0.000867	-0.00063	-0.00056	-0.00034	0.000737	-6.5E-05	0.002407	0.000457
0.704544	0.001114	-0.00075	0.001374	0.001379	5.31E-05	-0.00019	0.001332	-0.00044	0.001629
0.720928	-0.00062	0.001049	-0.00073	0.000122	0.001564	0.0014	-0.00047	0.000869	-0.00045
0.737312	0.001627	0.000484	0.000777	-0.00028	-0.00053	-0.00086	0.000798	0.000725	0.001415
0.753696	0.000371	0.00034	0.001564	0.002027	0.001395	0.001178	0.00101	-0.00114	0.000115
0.77008	0.000504	0.00136	-0.00068	-0.00034	8.76E-05	0.000951	-0.00016	0.002088	7.24E-05
0.786464	0.001201	-0.00049	0.001539	0.001605	-0.00024	-0.00026	0.001627	-1.4E-05	0.001865
0.802848	-0.0006	0.000961	-0.00066	0.000476	0.001667	0.001421	-0.00033	0.000664	-0.00067
0.819232	0.001282	0.00057	0.000336	-0.00048	-0.00024	-0.00105	0.000373	0.000835	0.001593
0.835616	0.00053	1.94E-06	0.001778	0.002014	0.001239	0.000747	0.001648	-0.00117	0.000192
0.852	0.000615	0.001239	-0.00077	-0.0002	0.000113	0.001598	-0.00027	0.001933	-0.00024
0.868384	0.001367	0.006637	0.00306	0.0012	-0.00022	0.001523	0.001421	0.000676	0.002359
0.884768	0.020836	0.004701	0.002884	0.00068	0.00577	0.003809	-0.00024	0.002392	0.000937
0.901152	0.144676	0.004813	0.003864	-0.00054	0.002603	0.001511	0.00096	0.002845	0.003728
0.917536	0.271432	0.012662	0.005736	0.009463	0.004558	0.002687	0.009169	0.000534	0.003187
0.93392	0.364156	0.054013	0.002595	0.020314	0.012023	0.004087	0.029221	0.003778	0.003279
0.950304	0.478961	0.113208	0.004978	0.070541	0.043817	0.001897	0.073631	0.002729	0.019977
0.966688	0.616096	0.20634	0.005129	0.157774	0.11572	0.008309	0.128524	0.004677	0.074671
0.983072	0.75936	0.26632	0.011506	0.229692	0.168288	0.014591	0.159456	0.016456	0.126955
0.999456	0.905478	0.342262	0.04495	0.2824	0.18758	0.066747	0.173379	0.039976	0.152544
1.01584	1.05478	0.433098	0.115756	0.327628	0.212656	0.134349	0.190229	0.0866	0.165301
1.03222	1.19966	0.524391	0.202463	0.369256	0.257724	0.206391	0.211988	0.122028	0.181047
1.04861	1.34189	0.615542	0.235216	0.410042	0.297114	0.26935	0.2361	0.153011	0.200219
1.06499	1.48047	0.726146	0.295943	0.452011	0.334108	0.320357	0.258386	0.169191	0.222362
1.08138	1.61167	0.852938	0.352321	0.485143	0.369666	0.367028	0.275518	0.179461	0.242662
1.09776	1.74017	0.985124	0.417626	0.519684	0.408752	0.402408	0.295823	0.190193	0.266644
1.11414	1.86185	1.11656	0.487767	0.551914	0.454398	0.43833	0.313766	0.198313	0.284763
1.13053	1.97995	1.24682	0.58164	0.589109	0.495007	0.469678	0.331809	0.214391	0.305308
1.14691	2.09181	1.37766	0.674318	0.622569	0.534465	0.50499	0.350059	0.227082	0.32352
1.1633	2.19999	1.50386	0.775639	0.657181	0.569948	0.534575	0.361302	0.243565	0.340476
1.17968	2.30321	1.62962	0.880041	0.690751	0.610071	0.567967	0.378585	0.261825	0.360541
1.19606	2.40158	1.75011	0.993774	0.722442	0.645849	0.597257	0.394324	0.275846	0.374741
1.21245	2.49788	1.86718	1.10465	0.754535	0.6809	0.627209	0.409734	0.293756	0.392734
1.22883	2.58976	1.98101	1.2156	0.781694	0.712289	0.659436	0.425601	0.307205	0.407562
1.24522	2.68099	2.09006	1.3266	0.811577	0.742823	0.686077	0.439087	0.32354	0.423675
1.2616	2.76723	2.19797	1.43552	0.837243	0.773105	0.714992	0.454565	0.338224	0.440224
1.28618	2.89058	2.35492	1.60882	0.877356	0.812733	0.752635	0.474292	0.358096	0.460351
1.31894	3.03928	2.55621	1.83577	0.926176	0.86534	0.799454	0.50273	0.384219	0.487064

1.35171	3.17008	2.74462	2.03625	0.973605	0.919935	0.843704	0.538334	0.408146	0.511842
1.38448	3.28904	2.91307	2.22504	1.01912	0.98708	0.887181	0.570914	0.429215	0.535219
1.41725	3.40247	3.06698	2.40445	1.0624	1.03389	0.931401	0.592241	0.449301	0.557913
1.45002	3.50989	3.21875	2.57424	1.10154	1.07127	0.985168	0.611087	0.469337	0.577438
1.48278	3.60836	3.36664	2.73691	1.13674	1.10514	1.01831	0.631262	0.487173	0.596769
1.51555	3.6986	3.51003	2.892	1.17047	1.13668	1.04751	0.649772	0.513923	0.616236
1.54832	3.7858	3.647	3.02923	1.20805	1.17187	1.07683	0.666846	0.53168	0.635146
1.58109	3.88804	3.7772	3.15439	1.25668	1.20402	1.10447	0.682993	0.549733	0.652785
1.61386	3.98916	3.89827	3.27507	1.28468	1.23254	1.13176	0.69736	0.564219	0.682378
1.64662	4.07774	4.01349	3.3909	1.30788	1.25934	1.15381	0.710827	0.577294	0.700305
1.67939	4.14242	4.1208	3.4934	1.33061	1.28324	1.17212	0.723863	0.588462	0.712241
1.71216	4.20509	4.2255	3.58601	1.3523	1.30585	1.18886	0.73474	0.597653	0.721503
1.74493	4.26765	4.34426	3.67191	1.37679	1.3233	1.20558	0.743408	0.606999	0.733935
1.7777	4.3306	4.46172	3.75197	1.40016	1.33729	1.22068	0.751526	0.617395	0.747843
1.81046	4.39863	4.56938	3.82551	1.42124	1.35037	1.23403	0.759107	0.628272	0.758286
1.84323	4.46167	4.65451	3.8954	1.43992	1.36072	1.24509	0.766576	0.63745	0.766563
1.876	4.52005	4.7295	3.96499	1.45587	1.36968	1.2553	0.77351	0.645747	0.772776
1.90877	4.57751	4.80054	4.03039	1.47041	1.37695	1.26524	0.779395	0.653616	0.781702
1.94154	4.63029	4.87452	4.08731	1.48239	1.38498	1.27411	0.784235	0.659755	0.789536
1.9743	4.67706	4.9492	4.13891	1.49266	1.39417	1.28478	0.787777	0.664503	0.795745
2.00707	4.71737	5.01244	4.18444	1.50345	1.40171	1.29357	0.794385	0.667335	0.801216
2.03984	4.75641	5.06391	4.22585	1.51413	1.40742	1.29993	0.802937	0.668589	0.805366
2.07261	4.79549	5.10476	4.26326	1.52422	1.41499	1.30468	0.813192	0.670325	0.809901
2.10538	4.84153	5.12789	4.30158	1.53389	1.42386	1.30859	0.819502	0.671489	0.81317
2.13814	4.88072	5.14434	4.34294	1.54732	1.4354	1.31347	0.82291	0.671507	0.816415
2.17091	4.90707	5.16081	4.38073	1.55736	1.44524	1.31801	0.827716	0.673552	0.820482
2.20368	4.92936	5.17949	4.43948	1.56226	1.451	1.32547	0.846984	0.676977	0.825483
2.23645	4.94586	5.2072	4.5198	1.56671	1.47579	1.33861	0.853368	0.68053	0.83167
2.26922	4.95708	5.24293	4.5706	1.57297	1.48917	1.34604	0.855786	0.686506	0.835582
2.30198	4.95445	5.27009	4.59828	1.57876	1.49312	1.36251	0.858173	0.689195	0.838306
2.33475	4.96178	5.28491	4.62134	1.58698	1.49582	1.38209	0.859955	0.690863	0.842427
2.36752	4.97838	5.29684	4.64852	1.59453	1.49735	1.38612	0.864415	0.693613	0.846847
2.40029	4.99275	5.30439	4.68298	1.60123	1.50607	1.39034	0.868924	0.707633	0.850225
2.43306	5.00483	5.30413	4.70614	1.61388	1.51688	1.3971	0.869666	0.711057	0.855404
2.46582	5.01969	5.29779	4.72287	1.63869	1.5203	1.40791	0.871304	0.711116	0.870963
2.49859	5.08095	5.29554	4.73616	1.64739	1.52141	1.41288	0.874287	0.713156	0.871753
2.53136	5.1196	5.2994	4.7492	1.65272	1.52614	1.41608	0.876152	0.717793	0.872941
2.56413	5.1261	5.29513	4.76888	1.65838	1.5266	1.41978	0.874856	0.720011	0.875072
2.61328	5.13164	5.30434	4.80333	1.67085	1.52544	1.43009	0.872991	0.722756	0.881136
2.67882	5.13627	5.39231	4.84004	1.67983	1.5216	1.44337	0.871483	0.725463	0.887188
2.74435	5.08791	5.41565	4.87744	1.69115	1.51897	1.45131	0.87199	0.727329	0.890186

2.80989	4.9954	5.42764	4.89365	1.69328	1.52083	1.45505	0.874061	0.72771	0.88839
2.87542	4.98264	5.43683	4.89781	1.6922	1.52374	1.45893	0.874906	0.728892	0.886402
2.94096	4.99448	5.4464	4.89872	1.69806	1.52938	1.4624	0.874697	0.727275	0.884188
3.0065	4.99908	5.4643	4.91936	1.70367	1.5343	1.46731	0.881384	0.727796	0.883787
3.07203	4.98936	5.49287	4.96889	1.69869	1.56105	1.47711	0.89891	0.733518	0.882646
3.13757	4.97083	5.50726	5.06595	1.69716	1.56873	1.48732	0.905314	0.742785	0.881363
3.2031	4.96011	5.50541	5.08955	1.69261	1.56256	1.52155	0.908784	0.749273	0.883711
3.26864	4.95326	5.49428	5.11024	1.71505	1.55675	1.53519	0.912377	0.769273	0.897065
3.33418	4.98405	5.48644	5.11787	1.73025	1.55019	1.55511	0.917063	0.774819	0.903763
3.39971	5.06546	5.49389	5.12321	1.72572	1.54632	1.57062	0.919294	0.77994	0.901149
3.46525	5.07563	5.50071	5.10672	1.72576	1.5366	1.5851	0.918496	0.784368	0.906617
3.53078	5.09105	5.5823	5.10009	1.72135	1.52863	1.59327	0.917412	0.787836	0.909045
3.59632	5.09143	5.59837	5.11029	1.72109	1.52256	1.59884	0.915125	0.784539	0.910107
3.66186	5.09957	5.59762	5.1059	1.71244	1.51758	1.60013	0.910467	0.780844	0.906578
3.72739	5.09713	5.57418	5.09365	1.7057	1.51331	1.60817	0.909389	0.780142	0.903745
3.79293	5.10055	5.55952	5.08248	1.70085	1.51166	1.61542	0.909161	0.782251	0.900165
3.85846	5.09511	5.55314	5.08143	1.69428	1.51468	1.62425	0.907108	0.78248	0.897112
3.924	5.07408	5.56262	5.08809	1.68846	1.52072	1.6349	0.915657	0.782597	0.894552
3.98954	5.05117	5.57234	5.15775	1.68755	1.53675	1.6494	0.917575	0.784223	0.891729
4.05507	5.04552	5.56	5.1811	1.68576	1.53355	1.68303	0.918267	0.788242	0.892804
4.12061	5.04191	5.53058	5.1958	1.70056	1.539	1.69743	0.916929	0.806195	0.895912
4.18614	5.06677	5.50073	5.19326	1.71079	1.53676	1.70884	0.921137	0.806962	0.908262
4.25168	5.11874	5.47333	5.18988	1.70668	1.54053	1.71182	0.92275	0.810191	0.91089
4.31722	5.10899	5.45091	5.19907	1.71221	1.53993	1.71298	0.922353	0.814252	0.918443
4.38275	5.10055	5.50478	5.21132	1.7076	1.53332	1.71325	0.920178	0.815278	0.919106
4.44829	5.07206	5.49585	5.2267	1.70799	1.52748	1.71512	0.917738	0.814565	0.916268
4.51382	5.04392	5.49829	5.22238	1.70926	1.52417	1.72111	0.920262	0.816856	0.910239
4.57936	5.02966	5.49014	5.20936	1.70055	1.52117	1.72382	0.920366	0.818941	0.900697
4.6449	5.02758	5.47356	5.20697	1.69492	1.51893	1.72123	0.923866	0.81734	0.893088
4.71043	5.01858	5.46674	5.20638	1.68795	1.51947	1.7198	0.925311	0.818882	0.890934
4.77597	4.99516	5.4774	5.21034	1.67755	1.51783	1.71836	0.939472	0.820922	0.889225
4.8415	4.95849	5.47832	5.28556	1.67137	1.53052	1.72015	0.940963	0.82668	0.889127
4.90704	4.93465	5.44932	5.27909	1.66799	1.52168	1.74269	0.942939	0.83344	0.888883
4.97258	4.91398	5.40651	5.2769	1.66849	1.52228	1.73638	0.95013	0.843177	0.886498
5.03811	4.94461	5.37851	5.26466	1.68234	1.52078	1.73702	0.956264	0.840881	0.899563
5.10365	4.98579	5.35969	5.25336	1.67836	1.52594	1.73594	0.954496	0.84097	0.901745
5.16918	4.98214	5.35885	5.24087	1.6846	1.52682	1.73464	0.951869	0.839835	0.903671
5.26749	4.97966	5.40662	5.22635	1.68103	1.52224	1.72568	0.948767	0.835081	0.904158
5.39856	4.97586	5.37491	5.20069	1.66348	1.52483	1.71211	0.943974	0.823054	0.901773
5.52963	4.95592	5.33541	5.20227	1.64811	1.52109	1.70043	0.945942	0.818337	0.89729
5.6607	4.91897	5.30591	5.27212	1.62756	1.53185	1.70369	0.956307	0.828889	0.897819

5.79178	4.88821	5.24405	5.28001	1.62648	1.54132	1.72877	0.959282	0.841508	0.899781
5.92285	4.9517	5.18546	5.26126	1.65646	1.53826	1.72838	0.950186	0.844747	0.90915
6.05392	4.98436	5.19867	5.2471	1.65802	1.52805	1.72478	0.935061	0.839749	0.914738
6.18499	4.94161	5.22918	5.25602	1.65133	1.51646	1.70037	0.927938	0.829573	0.907431
6.31606	4.886	5.19495	5.23341	1.63469	1.49713	1.67474	0.925358	0.8225	0.897925
6.44714	4.83389	5.16832	5.22311	1.61672	1.4888	1.6547	0.936894	0.825348	0.896172
6.57821	4.78881	5.13827	5.26086	1.60422	1.4979	1.67299	0.942576	0.83292	0.895057
6.70928	4.77913	5.06812	5.21267	1.61484	1.49662	1.67246	0.948874	0.838855	0.90547
6.84035	4.82038	5.03279	5.14855	1.60622	1.48578	1.67746	0.948344	0.835161	0.910725
6.97142	4.81109	5.09376	5.10334	1.5977	1.46442	1.68095	0.934026	0.832431	0.911225
7.1025	4.79272	5.08438	5.05535	1.5789	1.44624	1.67873	0.920256	0.821788	0.905777
7.23357	4.76408	5.05233	5.01818	1.56445	1.43198	1.67016	0.913665	0.813258	0.899242
7.36464	4.71576	5.00155	5.05112	1.54971	1.45018	1.66469	0.918239	0.806789	0.900592
7.49571	4.66641	4.92401	5.04466	1.54582	1.45342	1.67132	0.919042	0.815896	0.900831
7.62678	4.70964	4.87216	5.04632	1.55331	1.45686	1.66478	0.915333	0.816334	0.907738
7.75786	4.66848	4.9208	5.02657	1.54588	1.43753	1.66341	0.905483	0.81877	0.900699
7.88893	4.6171	4.91008	4.99449	1.5308	1.41654	1.64912	0.899772	0.817633	0.891655
8.02	4.54548	4.86602	4.93196	1.50322	1.40012	1.63044	0.895171	0.816626	0.875086
8.15107	4.50714	4.81427	4.90264	1.49078	1.40076	1.61156	0.900867	0.815106	0.86311
8.28214	4.46376	4.77396	4.9474	1.48138	1.40544	1.6188	0.895353	0.806618	0.85494
8.41322	4.49019	4.71121	4.90947	1.49692	1.39303	1.60953	0.8893	0.807901	0.86134
8.54429	4.52829	4.68906	4.85663	1.48184	1.37873	1.60126	0.877071	0.805714	0.857566
8.67536	4.48415	4.69185	4.80866	1.46653	1.36038	1.58558	0.860666	0.797968	0.851818
8.80643	4.41868	4.64259	4.75167	1.44679	1.34861	1.56903	0.848802	0.788523	0.839513
8.9375	4.35685	4.57545	4.71316	1.43363	1.33761	1.56066	0.840736	0.784338	0.827255
9.06858	4.29163	4.52249	4.75735	1.41796	1.34465	1.56138	0.837555	0.783159	0.817624
9.19965	4.24503	4.46155	4.75668	1.42158	1.33446	1.56644	0.829539	0.78468	0.815668
9.33072	4.26011	4.4216	4.72111	1.42635	1.32777	1.55158	0.81971	0.786164	0.814121
9.46179	4.21921	4.44728	4.66788	1.42277	1.30566	1.53729	0.803894	0.783671	0.801984
9.59286	4.19097	4.4074	4.58166	1.408	1.28494	1.51918	0.796379	0.774849	0.789934
9.72394	4.14368	4.37191	4.50703	1.38207	1.26859	1.4984	0.788355	0.762878	0.78046
9.85501	4.11743	4.35427	4.49543	1.35948	1.27659	1.48315	0.801745	0.749431	0.779552
9.98608	4.07787	4.32419	4.54355	1.34583	1.28088	1.48494	0.809283	0.7477	0.776534
10.1172	4.07384	4.25684	4.497	1.35573	1.2728	1.47561	0.801095	0.752496	0.781518
10.2482	4.07707	4.21998	4.4418	1.33853	1.24825	1.4582	0.781218	0.750341	0.779664
10.3793	4.04421	4.21411	4.39934	1.33193	1.22396	1.43848	0.763711	0.744231	0.770475
10.5759	4.00843	4.13526	4.29263	1.31013	1.21148	1.41995	0.74917	0.728355	0.756073
10.838	3.90811	4.04727	4.27485	1.29402	1.22224	1.39948	0.746079	0.727096	0.746165
11.1002	3.89754	4.0046	4.19942	1.28879	1.19743	1.37704	0.732261	0.729371	0.743388
11.3623	3.82826	3.94857	4.10476	1.26022	1.15697	1.3387	0.70614	0.714173	0.727925
11.6245	3.74844	3.8555	4.06459	1.22989	1.13911	1.32666	0.689577	0.702465	0.70715

11.8866	3.74109	3.73186	3.96763	1.22661	1.11725	1.32972	0.673422	0.696906	0.709232
12.1488	3.67509	3.69713	3.88899	1.20479	1.09933	1.30016	0.665697	0.676554	0.697936
12.4109	3.55378	3.64627	3.82766	1.18058	1.09082	1.26692	0.665544	0.659283	0.676883
12.6731	3.48984	3.55849	3.75787	1.17287	1.09003	1.24982	0.66964	0.649667	0.67124
12.9352	3.49198	3.52568	3.63131	1.16945	1.06016	1.22662	0.651181	0.642202	0.666329
13.1973	3.44078	3.43314	3.59464	1.14858	1.03545	1.18787	0.633756	0.629751	0.648327
13.4595	3.36871	3.3201	3.58117	1.13719	1.0311	1.18723	0.619451	0.625397	0.649894
13.7216	3.32625	3.28884	3.50511	1.13254	1.02067	1.17854	0.602594	0.615002	0.647725
13.9838	3.28348	3.24231	3.4338	1.12612	1.00316	1.15917	0.588727	0.601022	0.631654
14.2459	3.19391	3.17854	3.44508	1.12083	1.00046	1.14312	0.589572	0.59708	0.622197
14.5081	3.21617	3.13334	3.37995	1.12356	0.990832	1.11981	0.572345	0.592211	0.62467
14.7702	3.19385	3.07179	3.29319	1.10377	0.960324	1.08423	0.55384	0.580422	0.621243
15.0324	3.14014	2.95644	3.3151	1.08195	0.951923	1.09079	0.552334	0.566372	0.615631
15.2945	3.14187	2.89546	3.32706	1.08688	0.954852	1.08896	0.538217	0.561994	0.62203
15.5566	3.09509	2.91521	3.30376	1.07814	0.934662	1.0583	0.523503	0.552092	0.617094
15.8188	3.05404	2.89307	3.27873	1.06726	0.92731	1.03217	0.530735	0.544197	0.605035
16.0809	3.06559	2.82643	3.23794	1.07355	0.922658	1.03459	0.52686	0.550374	0.600499
16.3431	3.05699	2.80696	3.17811	1.06054	0.897636	1.00493	0.510541	0.545047	0.597278
16.6052	3.01512	2.75204	3.16975	1.03209	0.884084	0.986838	0.501946	0.528998	0.586454
16.8674	2.96698	2.7219	3.19494	1.02799	0.884757	1.00049	0.499752	0.52756	0.58631
17.1295	2.9492	2.74413	3.19222	1.02696	0.865291	0.986548	0.491969	0.525086	0.585462
17.3916	2.92887	2.73249	3.15589	1.00548	0.853473	0.962766	0.488922	0.515485	0.57207
17.6538	2.89458	2.70517	3.17518	0.98942	0.86934	0.959577	0.489396	0.516814	0.560146
17.9159	2.90465	2.69688	3.14003	1.0049	0.851244	0.943684	0.47967	0.512868	0.565059
18.1781	2.859	2.67942	3.12186	0.980073	0.829376	0.933289	0.470477	0.501929	0.562797
18.4402	2.79499	2.67925	3.18074	0.958987	0.837957	0.938983	0.474838	0.491115	0.563368
18.7024	2.818	2.68893	3.17217	0.974397	0.839744	0.942478	0.47138	0.495483	0.567765
18.9645	2.80524	2.71911	3.12453	0.962639	0.824292	0.929361	0.467526	0.491825	0.557306
19.2267	2.772	2.67954	3.13295	0.942174	0.818426	0.919235	0.471521	0.486868	0.542207
19.4888	2.78117	2.63285	3.0976	0.939232	0.818989	0.909625	0.467639	0.489791	0.541141
19.7509	2.7626	2.63329	3.07896	0.929078	0.808887	0.901615	0.460076	0.48313	0.539893
20.0131	2.70157	2.62466	3.0873	0.917981	0.808361	0.902865	0.458143	0.474259	0.533685
20.2752	2.67627	2.61317	3.10805	0.917738	0.816307	0.914881	0.461939	0.480721	0.531512
20.5374	2.69407	2.65413	3.06507	0.917759	0.810711	0.906683	0.460739	0.483407	0.529599
20.7995	2.68152	2.63155	3.01991	0.904788	0.803707	0.89244	0.463241	0.475353	0.517248
21.1927	2.65747	2.59448	3.00156	0.902375	0.808685	0.89603	0.463875	0.476557	0.516094
21.717	2.61714	2.61716	2.98633	0.887664	0.811948	0.897985	0.46257	0.467122	0.518239
22.2413	2.64713	2.61704	2.9259	0.891229	0.815268	0.90449	0.473158	0.47309	0.519109
22.7656	2.64226	2.58932	2.89226	0.871709	0.816249	0.898823	0.48014	0.468923	0.512099
23.2899	2.62897	2.63555	2.9248	0.869619	0.819509	0.927715	0.489244	0.464829	0.518802
23.8142	2.6813	2.64356	2.91389	0.875126	0.843717	0.944197	0.520517	0.470603	0.522896

24.3385	2.68898	2.63202	2.89654	0.860448	0.851484	0.949435	0.540793	0.47169	0.52654
24.8628	2.70715	2.69917	2.94964	0.860908	0.866193	0.991926	0.570006	0.476086	0.55146
25.387	2.75151	2.74092	2.98182	0.867252	0.890554	1.02644	0.624238	0.489078	0.555393
25.9113	2.81452	2.78684	2.99992	0.863938	0.905853	1.04861	0.66449	0.496439	0.569512
26.4356	2.8807	2.89047	3.10353	0.872754	0.939724	1.12573	0.724733	0.510756	0.602562
26.9599	2.97979	2.93775	3.13054	0.884817	0.985038	1.18691	0.806912	0.529381	0.632196
27.4842	3.06071	3.0422	3.19759	0.89711	1.02085	1.2359	0.888023	0.550664	0.66153
28.0085	3.13501	3.14515	3.32694	0.910308	1.0685	1.3559	0.990843	0.574828	0.718135
28.5328	3.26188	3.25387	3.38921	0.934425	1.13297	1.45111	1.11427	0.59921	0.763782
29.0571	3.3973	3.36112	3.53067	0.958295	1.17846	1.55244	1.22536	0.640086	0.822781
29.5813	3.50339	3.49826	3.69607	0.980963	1.2654	1.6869	1.38251	0.676286	0.895807
30.1056	3.68287	3.63417	3.79396	1.02134	1.35909	1.82412	1.52645	0.731352	0.969307
30.6299	3.82016	3.85167	4.00747	1.05076	1.44056	1.97325	1.64243	0.785783	1.05256
31.1542	3.95611	4.35718	4.18935	1.08084	1.54173	2.14882	1.8103	0.836266	1.1614
31.6785	4.20896	4.68271	4.31353	1.14045	1.70687	2.32628	1.93841	0.913511	1.27985
32.2028	4.33388	4.80235	4.53628	1.19694	1.84508	2.45456	2.00443	1.00223	1.39218
32.7271	4.47619	4.83475	4.68204	1.24706	1.94023	2.62455	2.07001	1.07642	1.52285
33.2514	4.68108	4.81039	4.82616	1.35632	2.12235	2.76841	2.12697	1.14355	1.66575
33.7756	4.6339	4.81049	4.94229	1.43493	2.29019	2.81751	2.04445	1.24502	1.75113
34.2999	0.445167	5.01599	4.93151	1.52737	2.45948	2.88251	1.98701	1.31515	1.87697
34.8242	0.000469	5.24889	2.0943	1.65764	2.63446	2.94552	1.90802	1.47297	1.95454
35.3485	0.001277	5.4126	0.000272	1.77253	2.71269	2.80266	1.70996	1.59668	1.98865
35.8728	0.00131	5.24483	0.001614	1.92301	2.81108	2.62753	1.57302	1.70503	2.07556
36.3971	0.001244	0.20889	0.001438	2.09086	2.87684	0.62287	1.40027	1.81627	2.05527