Compressive properties of PBXN-5 and PBXW-11 before and after ageing at 60°C for 3 and 6 months

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English summary

PBXW-11 and PBXN-5 have been tested in uniaxial compressive test at room temperature according to STANAG 4443. PBXW-11 shows moderate changes in compressive mechanical properties due to ageing for up to 6 months at 60°C. Obtained mechanical compressive properties for not aged samples are; max stress 0.80±0.03 MPa, strain at max stress 4.87±0.16 % and E-modulus 29.8±2.1 MPa.

For PBXN-5 strain at max stress does not change by ageing, however both max stress and E-modulus decrease with age. Max stress goes from 7.33±0.24 MPa for not aged pellets to 6.60±0.22 and 6.04±0.32 MPa for pellets aged at 60°C for respectively 3 and 6 months. Corresponding E-modulus goes from 206.5±12.0 MPa for not aged pellets to 167.7±10.0 MPa for pellets aged for 6 months at 60°C. Stress at max stress 5.88±0.16 % for not aged pellets change to 5.78±0.15 % for pellets aged for 6 months at 60°C.

Sammendrag

PBXN-5 og PBXW-11 har vært kompresjonstestet ved romtemperatur i henhold til STANAG 4443. For begge komposisjonene er prøver testet som nypresset og etter aldring i 3 og 6 måneder ved 60^{o}C.

For PBXN-5 ble maks stress målt til 7.33±0.24 MPa for nypressete testlegemer. For testlegemer aldret i 3 mnd og 6 mnd ble maks stress målt til henholdsvis 6.60±0. 22 og 6.04±0.32 MPa, noe som viser en redusert styrke som funksjon av alder. For kompresjonen ved maks styrke var det kun moderate endringer fra 5.88±0.16 % for ikke aldret til 5.78±0.15 % for testlegemer aldret i 6 måneder ved 60^{o}C. E-modulus endres fra 206.5±12.0 for ikke aldret til 167.7±10.0 MPa for testlegemer aldret i 6 måneder ved 60^{o}C.

For PBXW-11 er endringene i mekaniske egenskapene i kompresjonstest moderate og innenfor standardavviket. For ikke aldret PBXW-11 er maks stress 0.80±0.03 MPa, kompresjonen ved maks stress 4.87±0.16 % med tilhørende E-modulus på 29.8±2.1 MPa.

Contents

1 Introduction

Two pressable HMX based compositions, which both can be used as main charges or boosters fillings, have been tested with regard to uniaxial compressive properties according to STANAG 4443 (1). PBXN-5 contains Viton as binder and is without plasticizer and gives relative hard fillings, while PBXW-11 with Hytemp binder and significant amounts of plasticizer gives much softer fillings.

Uniaxial compressive properties for newly pressed test items and test items aged for 3 and 6 months at 60^{o}C have been tested to study if long time ageing will affect the mechanical compressive properties. In addition to mechanical properties results will be reported for dimensions, weight and density for aged samples.

2 Experimentally

2.1 Pressing

All pellets were pressed at Nammo Raufoss. For both PBXN-5 and PBXW-11 we received 25 pellets. All pellets were pressed with a force of 2030 kp/cm^2. Figure 2.1 gives a picture of the PBXN-5 pellets and Figure 2.2 gives a picture of the PBXW-11 pellets.

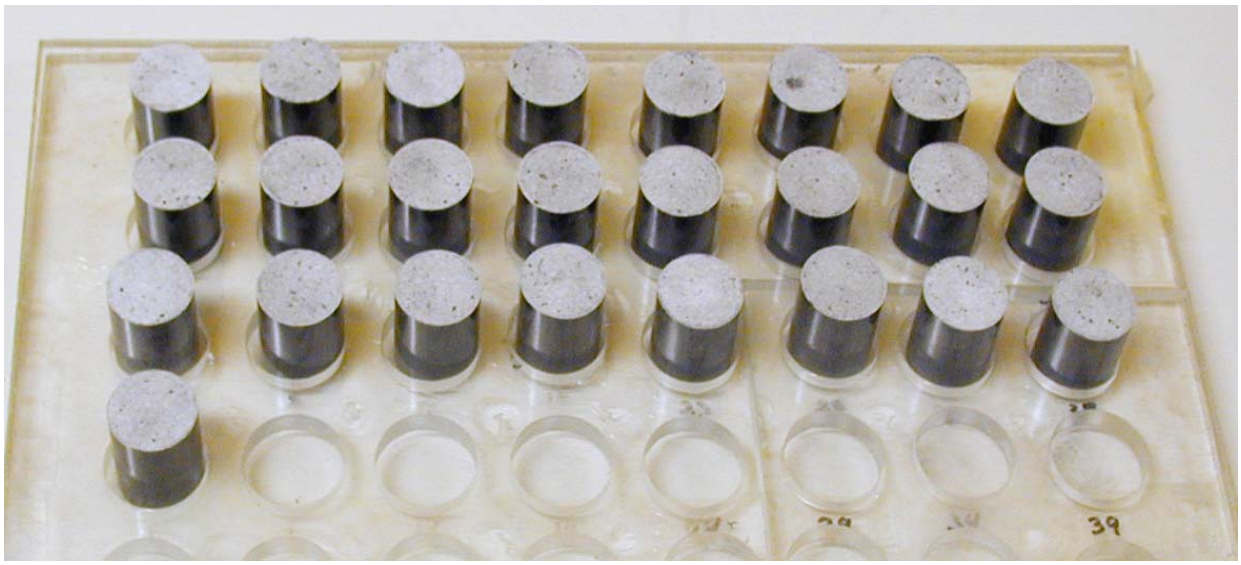


Figure 2.1 Picture of PBXN-5 pellets before start of ageing.

Figure 2.2 Picture of PBXW-11pellets before start of ageing

All pellets were measured with regard to dimensions and weight. Table 2.1 and 2.2 give the obtained results in addition to calculated density for each pellet for respectively PBXN-5 and PBXW-11. For PBXW-11 five pellets were found to have faults that excluded them from being tested.

2.2 Compression Mechanical Properties Testing

The compression testing was performed on a MTS, High Rate Test System on cylindrical charges. The compression rate was 50 mm/min. Precondition time was 2 hours or more. The used test conditions were as described in STANAG 4443 (1). All pellets were tested by use of a load cell of 5 kN. Appendix A gives test report sheets for every tested pellet and contain all information about each pellet and the condition under which they were tested. In addition the test report sheet shows the stress-strain curve.

2.3 Ageing conditions

2/3 of the pellets were after the dimensions and the weights had been measured, packed in aluminum folio (Figure 2.3 and 2.4) and placed in an oven at 60^{o}C for ageing, Figure 2.5. The ageing was started 27 October 2007. Samples aged for 3 months were taken out the 29 of January and tested mechanical the 30 of January. Before they were tested the dimensions and weights were measured.

Figure 2.3 Picture of PBXN-5 pellets after they were packed in aluminum foil.

Figure 2.4 Picture of PBXW-11 pellets after they were packed in aluminum foil.

Figure 2.5 The picture shows the oven used to age the pellets. The upper part of the Figure gives pictures of how the pellets were packed during the ageing.

Tested at	Pellet No.	Height (mm)	Diameter (mm)	X-Sect. Area (cm^2)	Volume (cm^3)	Weight (g)	Density (g/cm^3)
t=0	PBXN-5-1	22.79	19.39	2.953	6.730	11.6392	1.730
	PBXN-5-2	22.84	19.39	2.953	6.744	11.6868	1.733
	PBXN-5-3	22.62	19.39	2.953	6.679	11.5857	1.735
	PBXN-5-4	22.77	19.39	2.953	6.724	11.6898	1.739
	PBXN-5-5	22.64	19.39	2.953	6.685	11.6026	1.736
	PBXN-5-6	22.77	19.39	2.953	6.724	11.7098	1.742
	PBXN-5-7	22.52	19.39	2.953	6.650	11.5529	1.737
	PBXN-5-8	22.73	19.39	2.953	6.712	11.6732	1.739
t=3 months	PBXN-5-9	22.9	19.39	2.953	6.762	11.7273	1.734
	PBXN-5-10	22.57	19.39	2.953	6.665	11.6164	1.743
	PBXN-5-11	22.82	19.39	2.953	6.738	11.6773	1.733
	PBXN-5-12	22.65	19.39	2.953	6.688	11.6065	1.735
	PBXN-5-13	22.68	19.39	2.953	6.697	11.6491	1.739
	PBXN-5-14	22.71	19.39	2.953	6.706	11.6778	1.741
	PBXN-5-15	22.66	19.39	2.953	6.691	11.6251	1.737
t=6 months	PBXN-5-16	22.76	19.39	2.953	6.721	11.6871	1.739
	PBXN-5-17	22.52	19.39	2.953	6.650	11.6714	1.755
	PBXN-5-18	22.78	19.39	2.953	6.727	11.6860	1.737
	PBXN-5-19	22.63	19.39	2.953	6.682	11.6158	1.738
	PBXN-5-20	22.87	19.39	2.953	6.753	11.7401	1.738
	PBXN-5-21	22.68	19.39	2.953	6.697	11.6192	1.735
	PBXN-5-22	22.92	19.39	2.953	6.768	11.7807	1.741
	PBXN-5-23	23.07	19.39	2.953	6.812	11.7921	1.731
	PBXN-5-24	22.64	19.39	2.953	6.685	11.6205	1.738
	PBXN-5-25	22.71	19.39	2.953	6.706	11.6392	1.736
		Average					**1.738± 0.005**

Table 2.1 Properties of received pellets for mechanical testing of PBXN-5 Type I, Class 3.

Tested at	Pellet No.	Height (mm)	Diameter (mm)	X-Sect. Area (cm^2)	Volume (cm^3)	Weight (g)	Density (g/cm^3)
t=0	PBXW-11-1	23.23	19.34	2.936	6.824	12.0227	1.762
	PBXW-11-2	22.94	19.34	2.936	6.739	11.9145	1.768
	PBXW-11-3	22.91	19.34	2.936	6.730	11.8854	1.766
	PBXW-11-4	22.83	19.34	2.936	6.707	11.8576	1.768
	PBXW-11-5	23.02	19.34	2.936	6.763	11.9539	1.768
	PBXW-11-6	22.76	19.34	2.936	6.686	11.8442	1.771
t=3 months	PBXW-11-7	22.88	19.34	2.936	6.721	11.8669	1.766
	PBXW-11-8	22.96	19.34	2.936	6.745	11.9095	1.766
	PBXW-11-9	23.11	19.34	2.936	6.789	11.9997	1.768
	PBXW-11-10	23.01	19.34	2.936	6.760	11.9360	1.766
	PBXW-11-11	22.88	19.34	2.936	6.721	11.8868	1.769
	PBXW-11-12	22.96	19.34	2.936	6.745	11.9262	1.768
	PBXW-11-13	23.04	19.34	2.936	6.768	11.9654	1.768
t= 6 months	PBXW-11-14	22.81	19.34	2.936	6.701	11.8169	1.763
	PBXW-11-15	23.09	19.34	2.936	6.783	11.9888	1.767
	PBXW-11-16	22.96	19.34	2.936	6.745	11.9286	1.769
	PBXW-11-17	22.99	19.34	2.936	6.754	11.9299	1.766
	PBXW-11-18	23.18	19.34	2.936	6.810	12.0054	1.763
	PBXW-11-19	22.72	19.34	2.936	6.674	11.8678	1.778
	PBXW-11-20	22.88	19.34	2.936	6.721	11.8848	1.768
	PBXW-11-21	22.5	19.34	2.936	6.610	11.8075	1.786
	PBXW-11-22	22.85	19.34	2.936	6.713	11.9007	1.773
	PBXW-11-23	23.15	19.34	2.936	6.801	11.9836	1.762
	PBXW-11-24	22.9	19.34	2.936	6.727	11.9779	1.781
	PBXW-11-25	22.6	19.34	2.936	6.639	11.8348	1.783
		Average					**1.769± 0.006**

Table 2.2 Properties of received pellets of PBXW-11 for mechanical testing.

3 Results

3.1 PBXN-5

3.1.1 Not aged

For PBXN-5 we tested 5 pellets. The stress strain curves are shown in Figure 3.1, while Appendix A.1 gives test report sheets for every pellet tested at time zero.

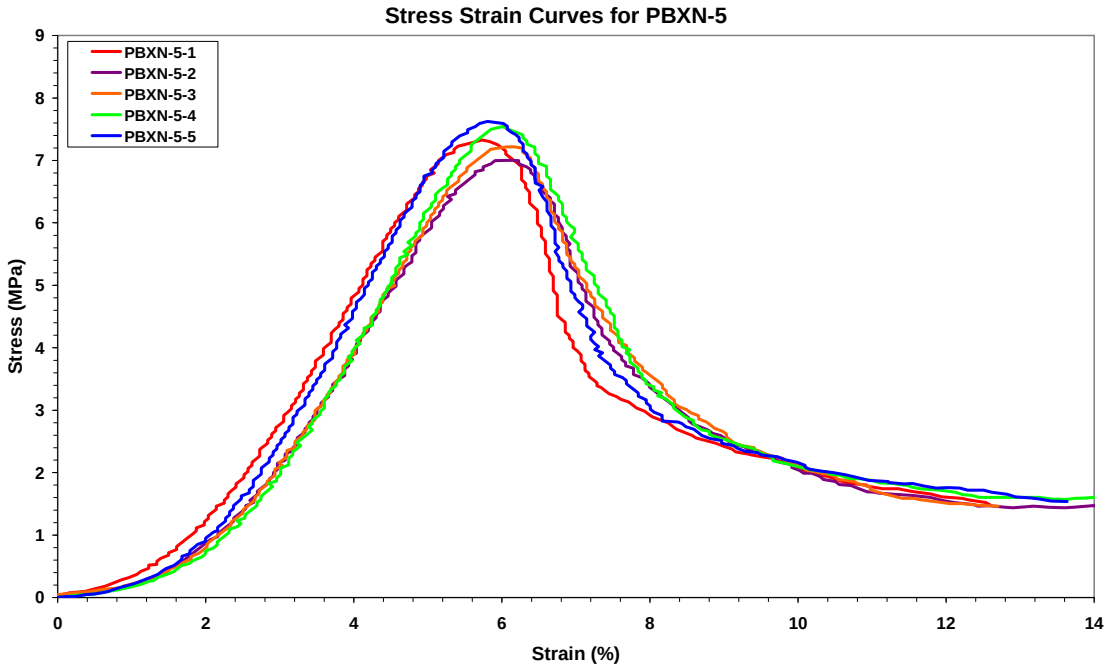


Figure 3.1 Stress strain curves for PBXN-5 at room temperature.

Pellet No	Max Stress (MPa)	Strain at Max Stress (%)	E-Modulus (MPa)
PBXN-5-1	7.325	5.730	211.66
PBXN-5-2	6.995	5.907	190.94
PBXN-5-3	7.218	6.065	201.69
PBXN-5-4	7.540	6.015	205.03
PBXN-5-5	7.590	5.700	223.41
Average	**7.33±0.24**	**5.88±0.16**	**206.5±12.0**

Table 3.1 Mechanical properties at room temperature for PBXN-5.

Table 3.1 summarizes the compressive mechanical properties for each test item at time zero in addition to the average results for max stress, strain at max stress and the E-modulus. The variation in properties for newly pressed pellets is as expected.

3.2 PBXW-11

3.2.1 Not aged

For PBXW-11 we tested 5 not aged pellets. The stress strain curves are all shown in Figure 3.2. Appendix A.2 gives test report sheets for every pellet tested at time zero.

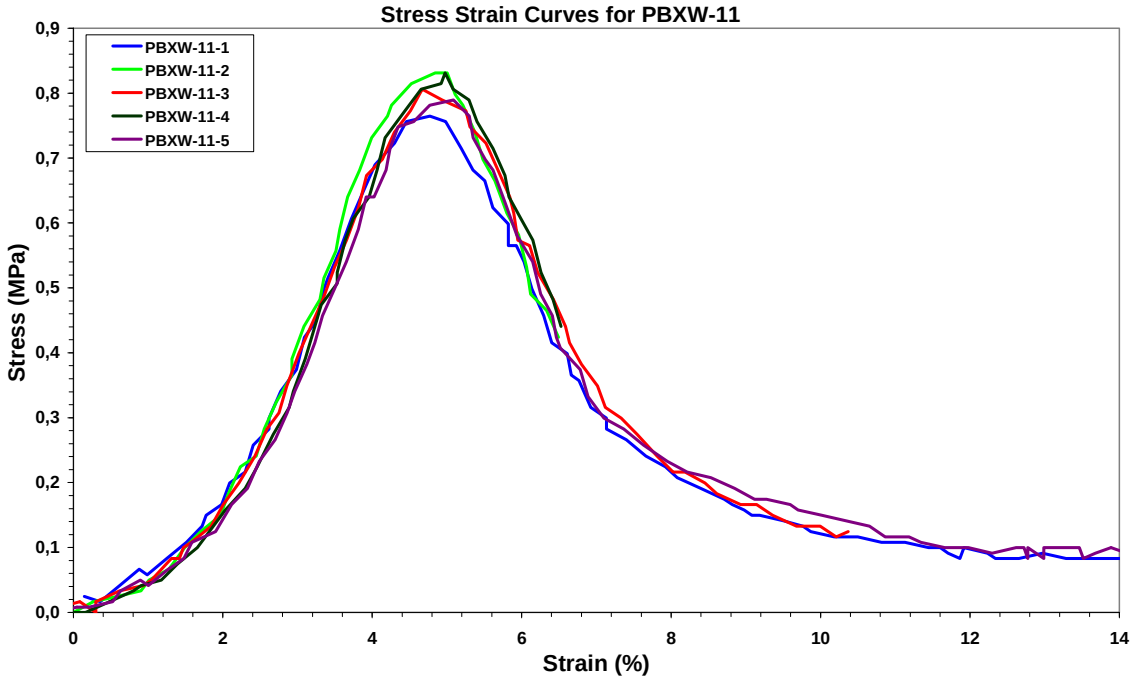


Figure 3.2 Stress strain curves for PBXW-11 at room temperature before ageing

Pellet No	Max Stress (MPa)	Strain at Max Stress (%)	E-Modulus (MPa)
PBXW-11-1	0.765	4.772	27.64
PBXW-11-2	0.831	4.843	31.91
PBXW-11-3	0.806	4.669	28.34
PBXW-11-4	0.831	4.974	32.16
PBXW-11-5	0.790	5.086	29.08
Average	**0.80±0.03**	**4.87±0.16**	**29.8±2.1**

Table 3.2 Mechanical properties at room temperature for PBXW-11.

Table 3.2 summarizes obtained results for each test item at time zero in addition to the average results for max stress, strain at max stress and the E-modulus. From the results it can be seen that the PBXW-11 pellets are much softer than similar PBXN-5 pellets, since the average max stress of 0.80 MPa for PBXW-11 pellets is only approximately 10% of what we obtained for PBXN-5.

3.3 Aged at 60°C for 3 months

3.3.1 PBXN-5

After 3 months of ageing at 60°C we tested 7 pellets. Table 3.3 gives the dimensions and weights of the tested pellets after ageing. Table 2.1 gives the same properties before ageing was started. Figure 3.3 gives a picture of some of the pellets after they have been tested in uniaxial compressive test. Figure 3.4 gives the stress strain curves for all seven pellets and Appendix A.3 gives test report sheets for every tested pellet.

Tested after	Pellet No.	Height (mm)	Diameter (mm)	X-Sect. Area (cm^2)	Volume (cm^3)	Weight (g)	Density (g/cm^3)
3 months	PBXN-5-9	22.93	19.40	2.956	6.778	11.7248	1.730
	PBXN-5-10	22.63	19.40	2.956	6.689	11.6132	1.736
	PBXN-5-11	22.88	19.40	2.956	6.763	11.6745	1.726
	PBXN-5-12	22.64	19.40	2.956	6.692	11.6033	1.734
	PBXN-5-13	22.68	19.40	2.956	6.704	11.6456	1.737
	PBXN-5-14	22.76	19.40	2.956	6.728	11.6752	1.735
	PBXN-5-15	22.72	19.40	2.956	6.716	11.6224	1.731
		Average					**1.733±0.004**

Table 3.3 Dimensions and weights of pellets aged at 60°C for 3 months.

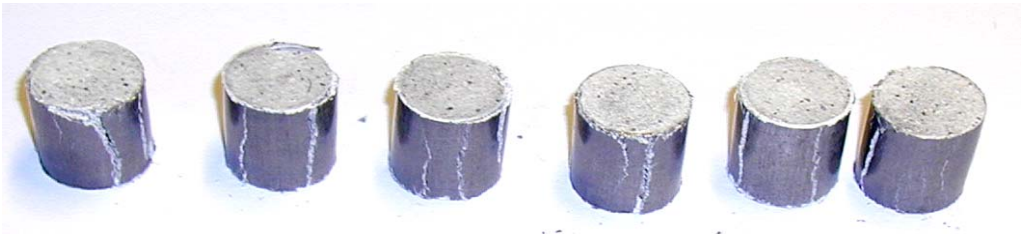


Figure 3.3 Picture of PBXN-5 pellets after been tested in Uniaxial Compressive test.

Pellet No	Max Stress (MPa)	Strain at Max Stress (%)	E-Modulus (MPa)
PBXN-5-9	6.43	6.04	170.13
PBXN-5-10	6.88	5.99	187.15
PBXN-5-11	6.50	5.44	178.07
PBXN-5-12	6.85	6.04	186.06
PBXN-5-13	6.59	5.86	179.94
PBXN-5-14	6.28	5.14	203.08
PBXN-5-15	6.68	5.91	186.69
Average	**6.60±0.22**	**5.77±0.35**	**184.4±10.2**

Table 3.4 Compressive properties of PBXN-5 at room temperature of pellets aged at 60°C for 3 months.

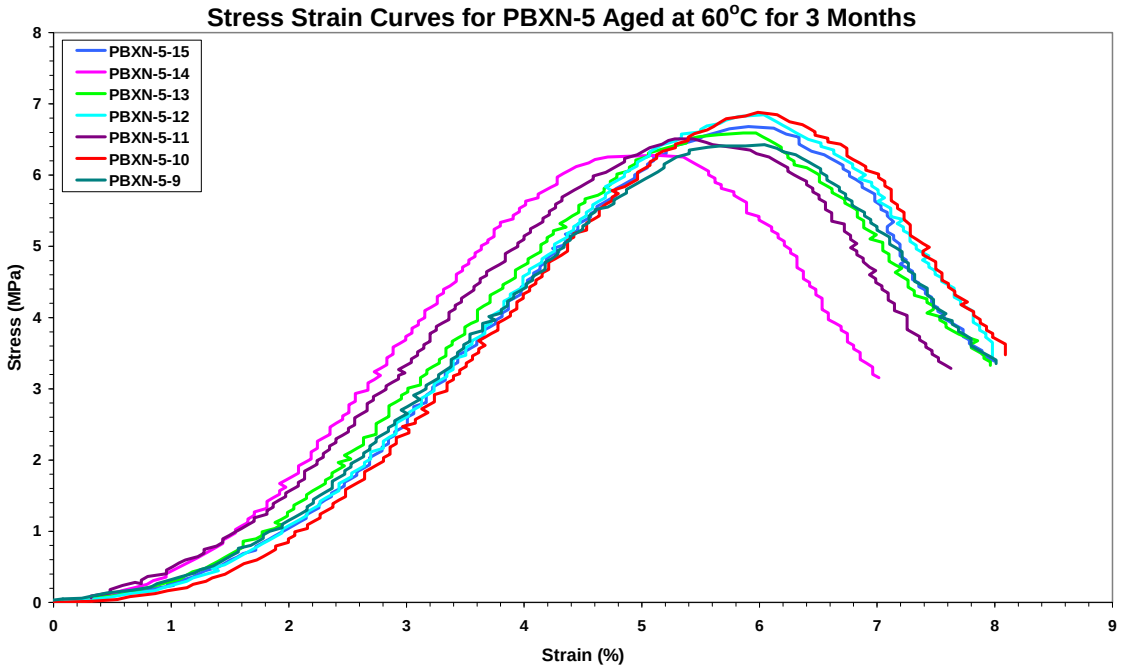


Figure 3.4 Stress strain curves of PBXN-5 pellets being aged for 3 months at 60°C.

Table 3.4 summarizes the compressive mechanical properties after 3 months of ageing at 60°C. Compared with the results of not aged pellets the average max stress is reduced by approximately 10 % while the average strain at max stress has a moderate increase.

3.3.2 PBXW-11

After 3 months of ageing at 60°C we tested 7 pellets. Table 3.5 gives the dimensions and weights for the tested pellets after ageing. For comparison Table 2.2 gives the same properties before the pellets were aged. Figure 3.6 gives a picture of some of the pellets after they have been tested in uniaxial compressive test. Figure 3.7 gives the stress strain curves for all seven pellets, and Appendix A.4 gives test report sheets for every tested pellets.

Tested at	Pellet No.	Height (mm)	Diameter (mm)	X-Sect. Area (cm^2)	Volume (cm^3)	Weight (g)	Density (g/cm^3)
After ageing for 3 months at 60°C	PBXW-11-7	22.81	19.34	2.938	6.701	11.8639	1.771
	PBXW-11-8	22.91	19.34	2.938	6.730	11.9064	1.769
	PBXW-11-9	23.08	19.34	2.938	6.780	11.9967	1.769
	PBXW-11-10	22.90	19.34	2.938	6.727	11.9334	1.774
	PBXW-11-11	22.80	19.34	2.938	6.698	11.8831	1.774
	PBXW-11-12	22.89	19.34	2.938	6.724	11.9241	1.773
	PBXW-11-13	22.97	19.34	2.938	6.748	11.9620	1.773
		Average					**1.772±0.002**

Table 3.5 Dimensions and weights of pellets of PBXW-11 aged at 60°C for 3 months.

Figure 3.5 Picture of PBXW-11 pellets after been tested in uniaxial compressive test

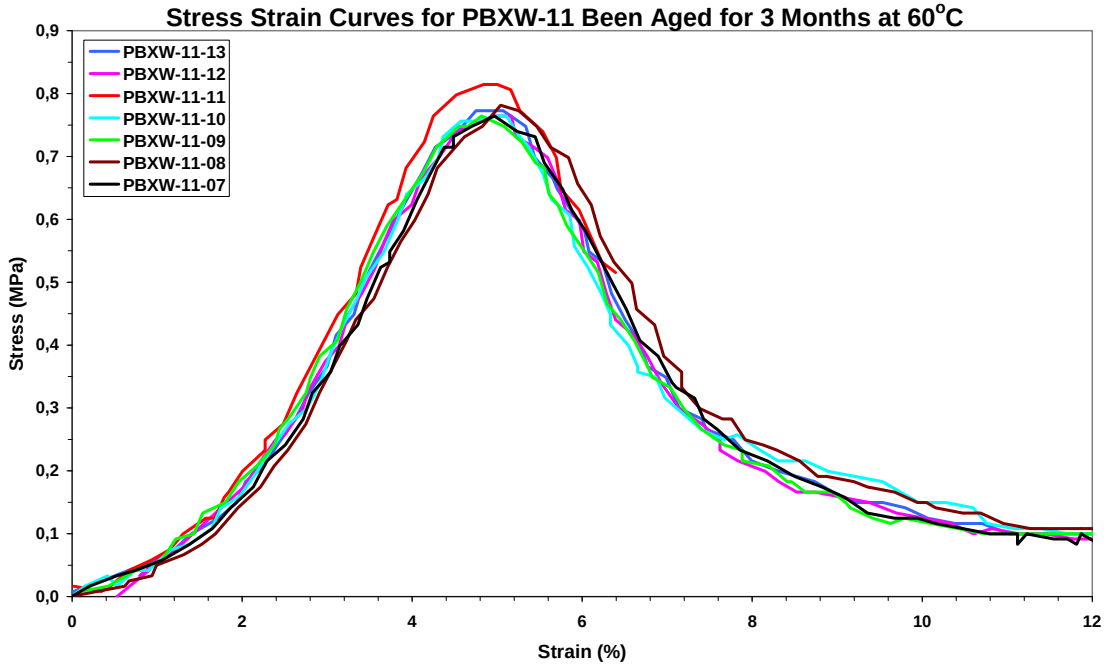


Figure 3.6 Stress strain curves for PBXW-11 pellets after being aged at 60°C for 3 months.

Pellet No	Max Stress (MPa)	Strain at Max Stress (%)	E-Modulus (MPa)
PBXW-11-7	0.765	4.967	26.82
PBXW-11-8	0.781	5.040	25.22
PBXW-11-9	0.765	4.815	25.47
PBXW-11-10	0.765	5.001	27.41
PBXW-11-11	0.814	4.840	27.26
PBXW-11-12	0.765	5.059	26.29
PBXW-11-13	0.773	4.930	26.05
Average	**0.78±0.02**	**4.95±0.09**	**26.36±0.85**

Table 3.5 Compressive properties of PBXW-11 at room temperature of pellets aged at 60°C for 3 months.

Table 3.5 summarizes the mechanical properties after 3 months ofageing at 60°C. Compared with the results of not aged pellets the average max stress is moderate reduced, while the average strain

at max stress has a moderate increase. For both results the variation is within the standard deviation.

3.4 Aged at 60°C for 6 months

3.4.1 PBXN-5

After 6 months of ageing we tested the remaining 10 pellets we had available. Before uniaxial compressive testing the pellets dimensions and weights were measured. The results together with calculated density are summarized in Table 3.6. For comparison properties before ageing of the same pellets are given in Table 2.1. In Figure 3.7 all stress strain curves are given, while Appendix A.5 gives the test report sheets for all 10 pellets.

Tested after	**Pellet No.**	**Height (mm)**	**Diameter (mm)**	**X-Sect. Area (cm^2)**	**Volume (cm^3)**	**Weight (g)**	**Density (g/cm^3)**
6 months	PBXN-5-16	22.78	19.40	2.956	6.734	11.6847	1.735
	PBXN-5-17	22.56	19.40	2.956	6.669	11.6692	1.750
	PBXN-5-18	22.80	19.40	2.956	6.740	11.6837	1.734
	PBXN-5-19	22.63	19.40	2.956	6.689	11.6141	1.736
	PBXN-5-20	22.88	19.40	2.956	6.763	11.7373	1.735
	PBXN-5-21	22.68	19.40	2.956	6.704	11.6164	1.733
	PBXN-5-22	23.04	19.40	2.956	6.810	11.7774	1.729
	PBXN-5-23	23.05	19.40	2.956	6.813	11.7900	1.730
	PBXN-5-24	22.64	19.40	2.956	6.692	11.6184	1.736
	PBXN-5-25	22.72	19.40	2.956	6.716	11.6366	1.733
		Average					**1.735±0.006**

Table 3.6 Dimensions and weights of PBXN-5 pellets aged for 6 months at 60°C.

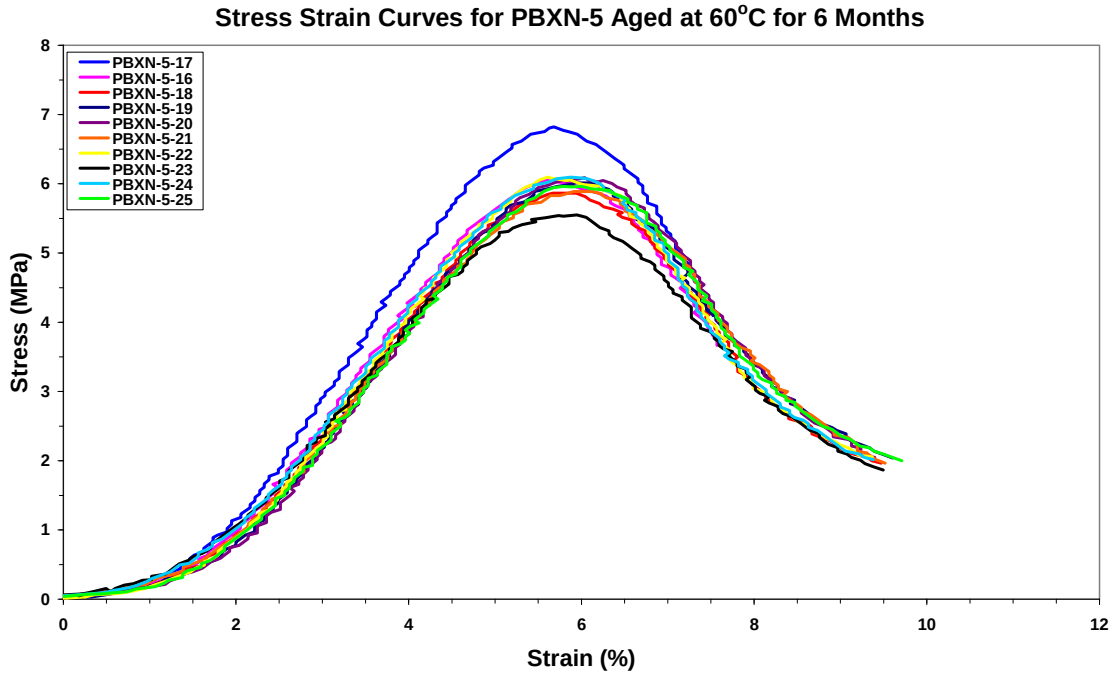


Figure 3.7 All stress strain curves for PBXN-5 pellets aged at 60°C for 6 months.

Pellet No	Max Stress (MPa)	Strain at Max Stress (%)	E-Modulus (MPa)
PBXN-5-16	6.054	5.89	173.77
PBXN-5-17	6.806	5.63	187.74
PBXN-5-18	5.864	5.67	165.80
PBXN-5-19	6.013	5.94	169.38
PBXN-5-20	6.071	5.98	169.11
PBXN-5-21	5.888	5.91	156.07
PBXN-5-22	6.095	5.61	173.40
PBXN-5-23	5.533	5.79	151.08
PBXN-5-24	6.095	5.88	166.08
PBXN-5-25	5.963	5.79	165.03
Average	**6.04±0.32**	**5.78±0.15**	**167.7±10.0**

Table 3.7 Compressive properties of PBXN-5 at room temperature of pellets aged at 60°C for 6 months.

Table 3.7 summarizes all single results of compressive mechanical properties after 6 months ageing at 60°C in addition to the average results for max stress, strain at max stress and the E-modulus. Compared with the results of pellets aged for 3 months the average max stress is reduced by approximately 10 %, while the average strain at max stress has not changed. The E-modulus is reduced compared with both not aged and 3 months aged samples.

In Figure 3.8 the stress strain curves with highest and lowest max stress have been excluded. For the remaining 8 curves there are only moderate differences both in form and max stress. The

average max stress for these 8 pellets is 6.01±0.09 MPa which is not significantly different from the average for all 10 pellets of 6.04±0.38 MPa.

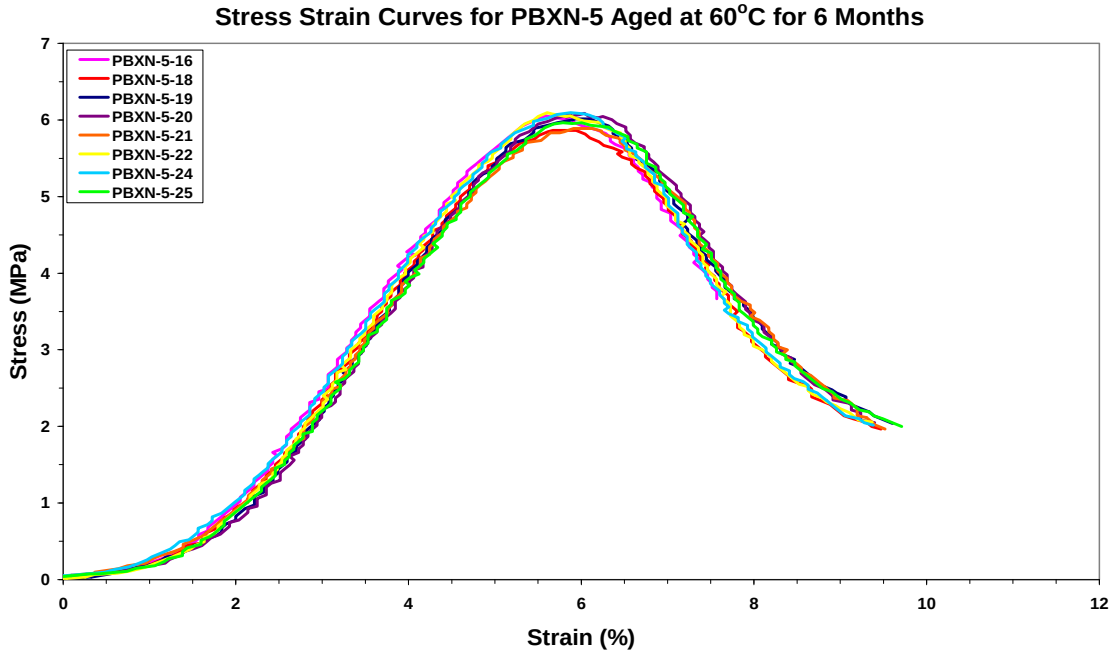


Figure 3.8 All stress strain curves for PBXN-5 pellets aged at 60°C for 6 months.

3.4.2 PBXW-11

After 6 months of ageing at 60°C we did test the last 7 pellets. The dimensions and weights of the tested pellets after ageing are given in Table 3.9. Table 2.2 gives for comparison the same properties before ageing was started. Figure 3.9 gives the stress strain curves for all seven pellets, and Appendix A.6 gives test report sheets for every tested pellets.

Tested after	Pellet No.	Height (mm)	Diameter (mm)	X-Sect. Area (cm^2)	Volume (cm^3)	Weight (g)	Density (g/cm^3)
6 months	PBXW-11-14	22.67	19.34	2.938	6.660	11.8148	1.763
	PBXW-11-15	23.04	19.34	2.938	6.768	11.9869	1.781
	PBXW-11-16	22.89	19.34	2.938	6.724	11.9271	1.759
	PBXW-11-17	22.95	19.34	2.938	6.742	11.9278	1.773
	PBXW-11-18	23.06	19.34	2.938	6.774	12.0030	1.792
	PBXW-11-19	22.70	19.34	2.938	6.669	11.8655	1.765
	PBXW-11-20	22.87	19.34	2.938	6.710	11.8831	1.761
		Average					**1.771±0.012**

Table 3.8 Dimensions and weights of pellets aged at 60°C for 6 months.

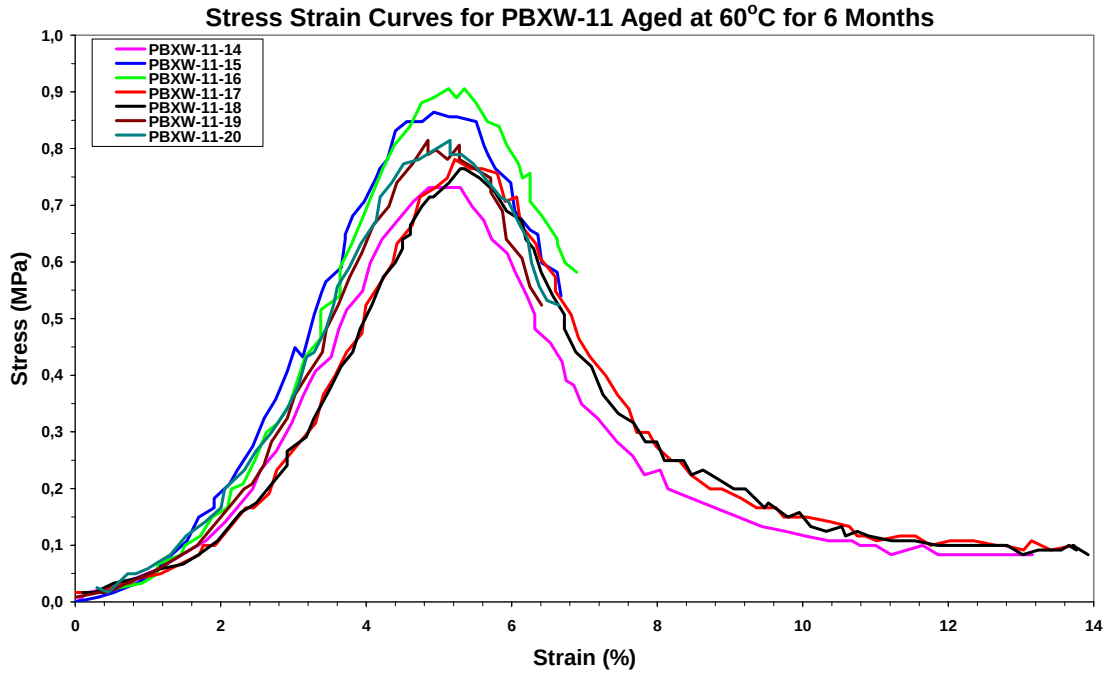


Figure 3.9 All stress strain curves for PBXW-11 pellets aged at 60°C for 6 months.

Pellet No	Max Stress (MPa)	Strain at Max Stress (%)	E-Modulus (MPa)
PBXW-11-14	0.731	4.862	25.200
PBXW-11-15	0.864	4.928	27.770
PBXW-11-16	0.906	5.130	28.670
PBXW-11-17	0.781	5.218	24.710
PBXW-11-18	0.765	5.346	24.290
PBXW-11-19	0.814	4.849	28.090
PBXW-11-20	0.814	5.152	24.670
Average	**0.81±0.06**	**5.07±0.19**	**26.20±1.89**

Table 3.9 Compressive properties of PBXW-11 at room temperature of pellets aged at 60°C for 6 months.

Table 3.7 summarizes all single results of compressive mechanical properties after 6 months ageing at 60°C, in addition to the average results for max stress, strain at max stress and the E-modulus. Compared with the results of pellets aged for 3 months both the average max stress and strain at max stress show a moderate increase. The E-modulus is constant equal to the properties of samples aged for 3 months.

3.5 Comparison of properties

3.5.1 PBXN-5

In Figure 3.10 all average results for PBXN-5 have been plotted. The average strain at max stress does not change by ageing while both average max stress and E-modulus decrease with age.

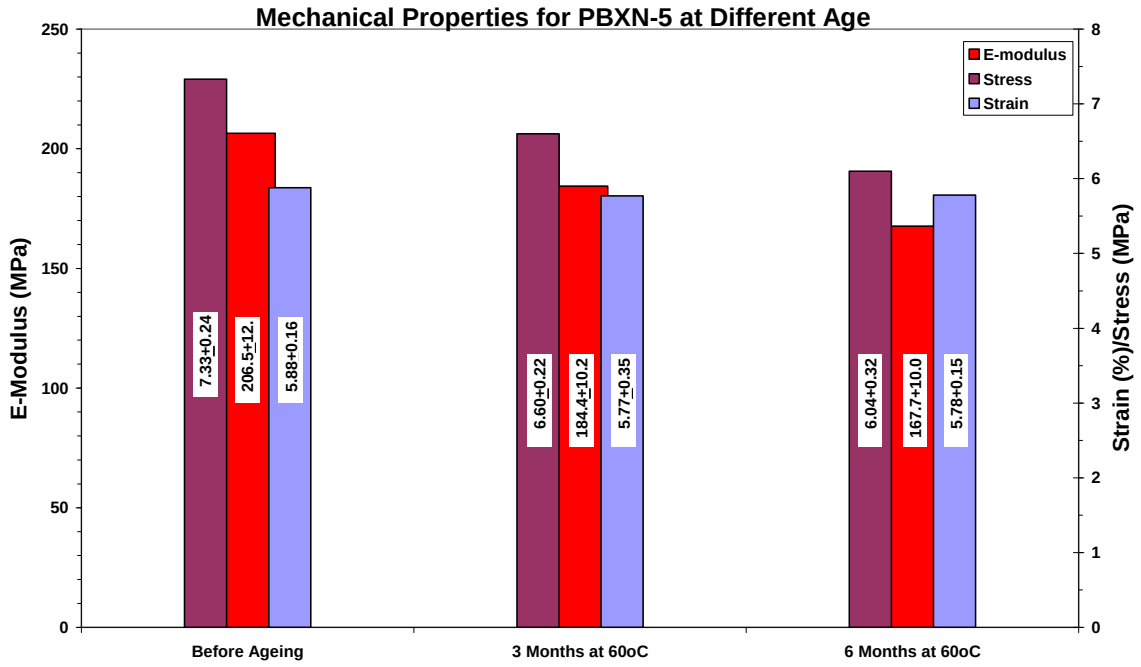


Figure 3.10 The diagram shows Compressive properties at different age of PBXN-5.

3.5.2 PBXW-11

PBXW-11 shows moderate changes in average compressive mechanical properties due to ageing for up to 6 months at 60^{o}C, Figure 3.11.

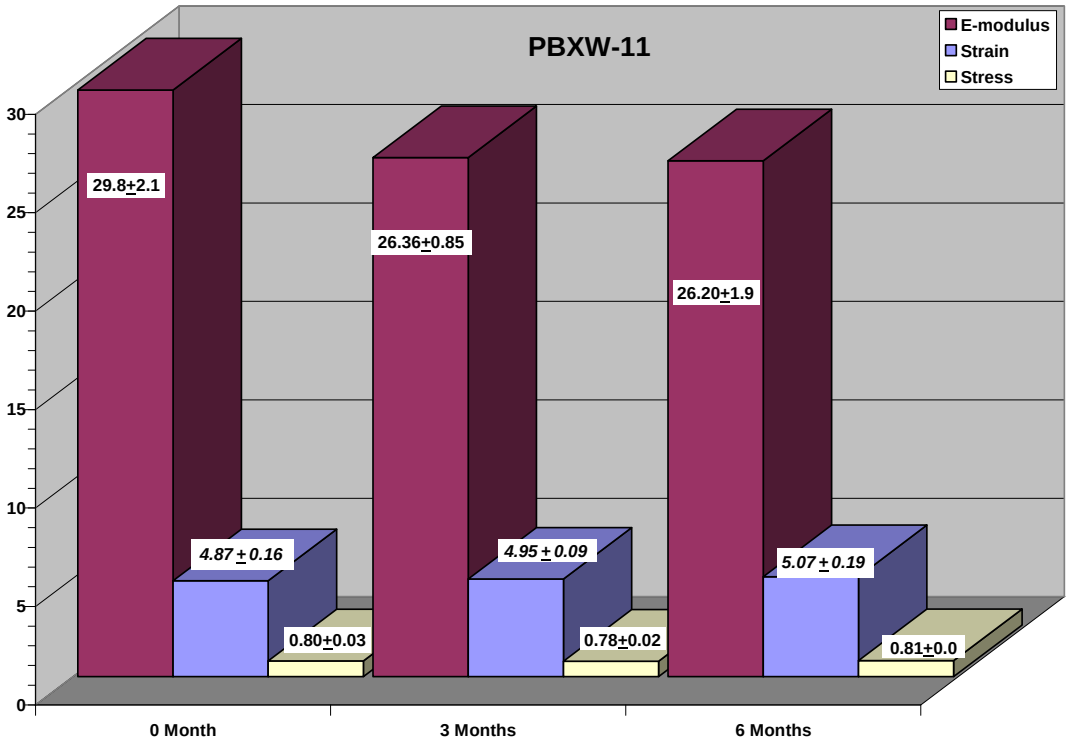


Figure 3.11 The diagram gives compressive properties of PBXW-11 of different age.

Appendix A

A.1 PBXN-5 tested at t_0

TEST REPORT SHEET
Uniaxial Compressive Test — Page 1 of 5 Pages

TEST SITE INFORMATION	TEST CONDITIONS
Laboratory: FFI	Temperature (^oC): 18
Date: 7 December 2007	Relative Humidity (%): NA
Test Procedure:	X-Head Speed (mm/sec): 50
NATO Test Procedure Number: 102.01	Machine Type: MTS Servo Hydraulic Tester
Date Tested: 1 November 2007	Grip Type:
POC: Gunnar Ove Nevstad	Machine Stiffness (kN/mm):

SPECIMEN INFORMATION

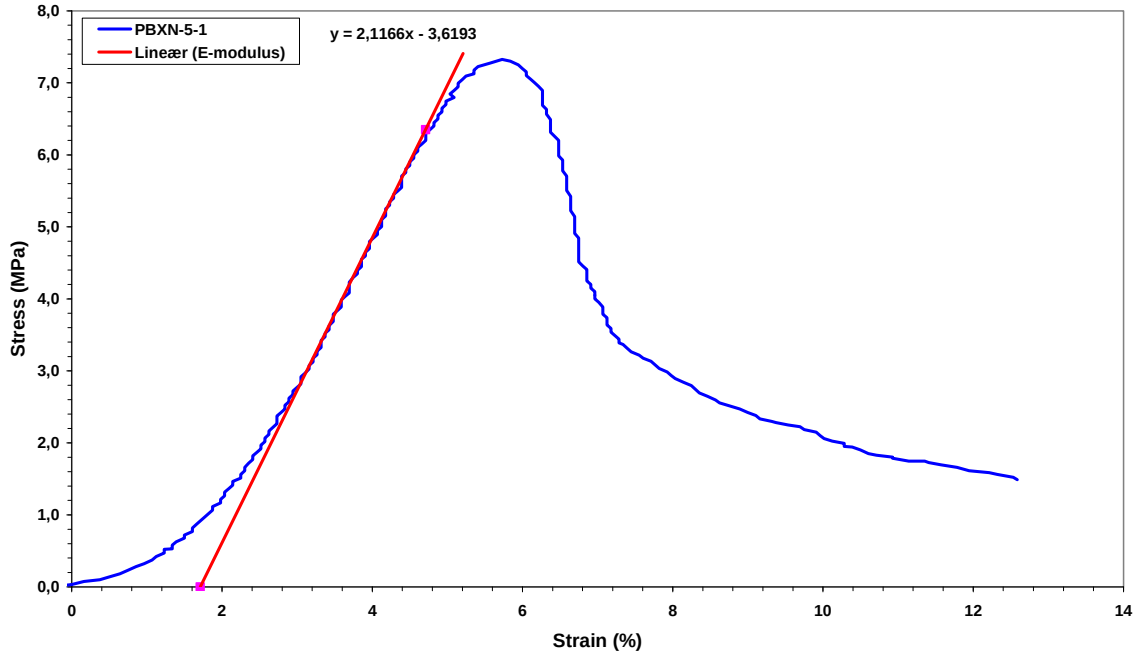
Dimensions: Length (Gage Length): 22.79 mm
Width:
Thickness (Diameter): 19.39 mm
X-Sectional Area (cm2): 2.953

Form: Cylindrical
Preparation Method: As received L/D=1.1753
Manufacturing Method: Pressed. Force 2030 kp/cm^2, (203 MPa).
Source: Dyno Nobel
Lot or ID Number: DDP05K0025-0003, Pellet No PBXN-5-1
Preconditioning:
Condition Period:

Composition: ***PBXN-5, Type I, Class 3***

Component	Percent
HMX	95.1
Viton	4.9
Graphite (added)	0.5

Stress Strain Curve for PBXN-5-1



Max STRESS: 7.325 MPa STRAIN at Max Stress: 5.73 % E-Modulus: 211.66 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION

Laboratory: FFI
Date: 7 December 2007
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 1 November 2007
POC: Gunnar Ove Nevstad

TEST CONDITIONS

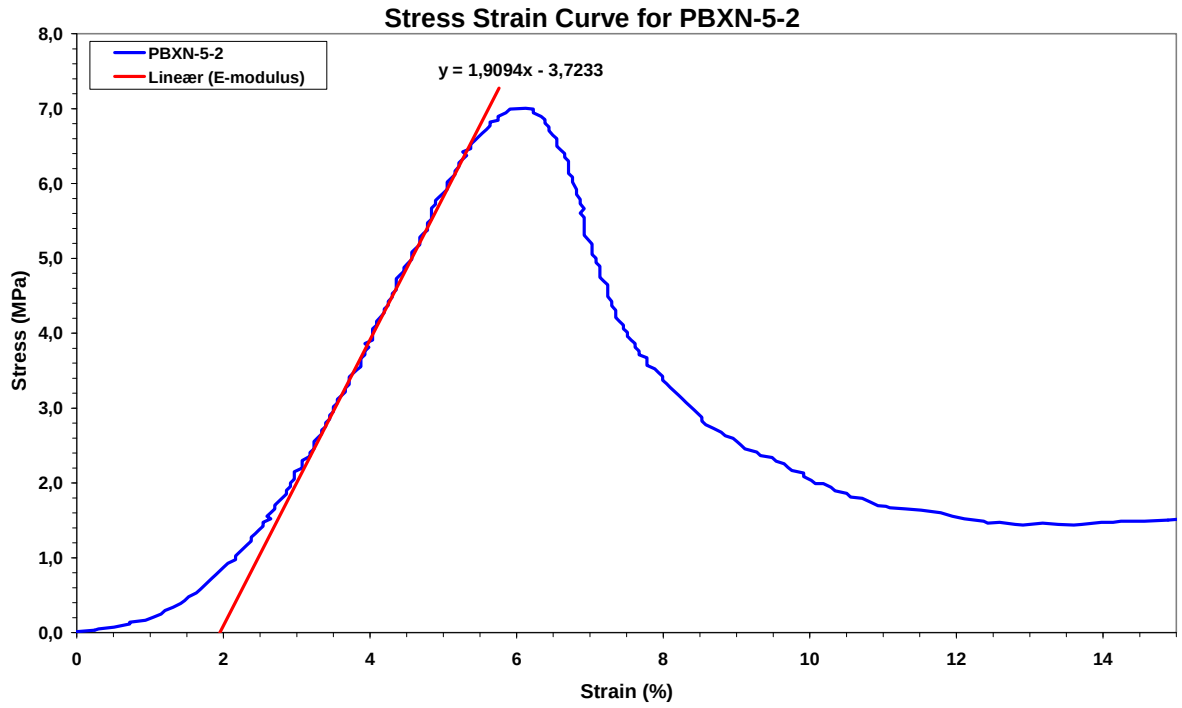
Temperature (^{o}C): 18
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.84 mm
Width:
Thickness (Diameter): 19.39 mm
X-Sectional Area (cm^2): 2.953

Form: Cylindrical
Preparation Method: As received L/D=1.1779
Manufacturing Method: Pressed. Force 2030 kp/cm^2, (203 MPa).
Source: Dyno Nobel
Lot or ID Number: DDP05K0025-0003, Pellet No PBXN-5-2
Preconditioning:
Condition Period:
Composition: ***PBXN-5, Type I, Class 3***

Component	Percent
HMX	95.1
Viton	4.9
Graphite (added)	0.5



Max STRESS: 6.995 MPa STRAIN at Max Stress: 5.907 % E-Modulus: 190.94 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION

Laboratory: FFI
Date: 7 December 2007
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 1 November 2007
POC: Gunnar Ove Nevstad

TEST CONDITIONS

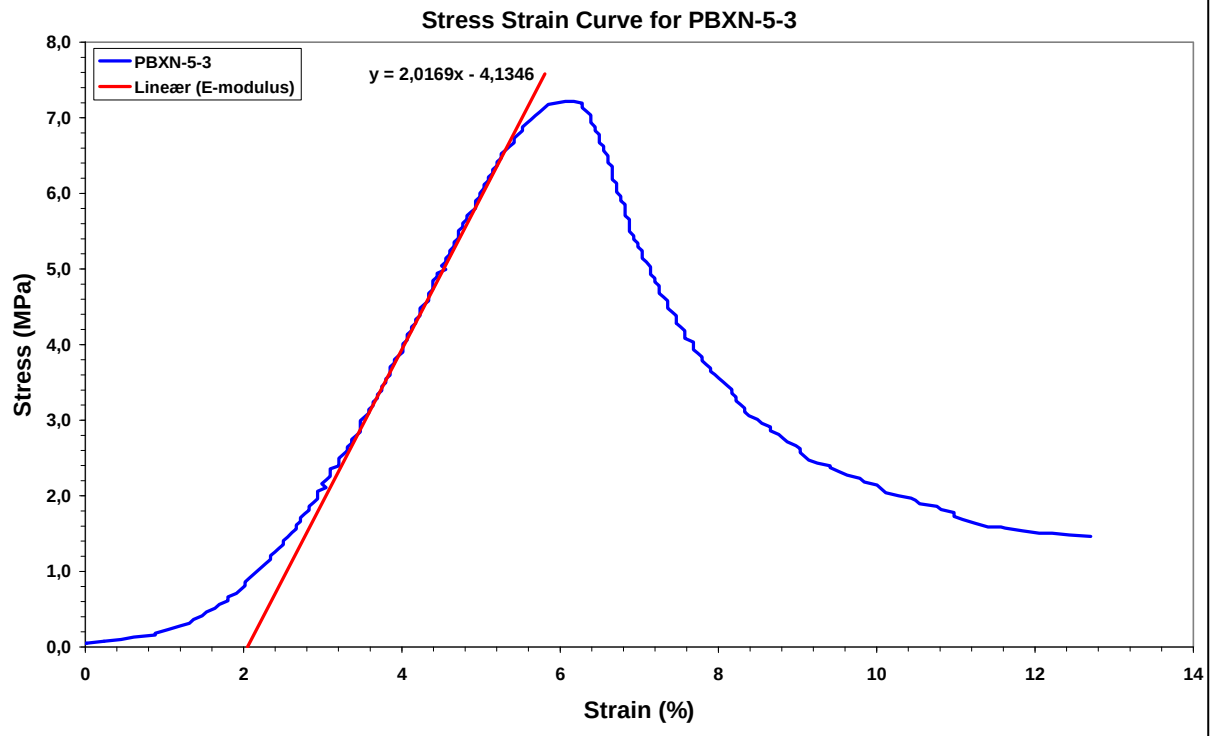
Temperature (^{o}C): 18
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.62 mm
Width:
Thickness (Diameter): 19.39 mm
X-Sectional Area (cm2): 2.953

Form: Cylindrical
Preparation Method: As received L/D=1.1666
Manufacturing Method: Pressed. Force 2030 kp/cm^2, (203 MPa).
Source: Dyno Nobel
Lot or ID Number: DDP05K0025-0003, No PBXN-5-3
Preconditioning:
Condition Period:
Composition: ***PBXN-5, Type I, Class 3***

Component	Percent
HMX	95.1
Viton	4.9
Graphite (added)	0.5



Max STRESS: 7.218 MPa STRAIN at Max Stress: 6.065 % E-Modulus: 201.69 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION

Laboratory: FFI
Date: 7 December 2007
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 1 November 2007
POC: Gunnar Ove Nevstad

TEST CONDITIONS

Temperature (^{o}C): 18
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

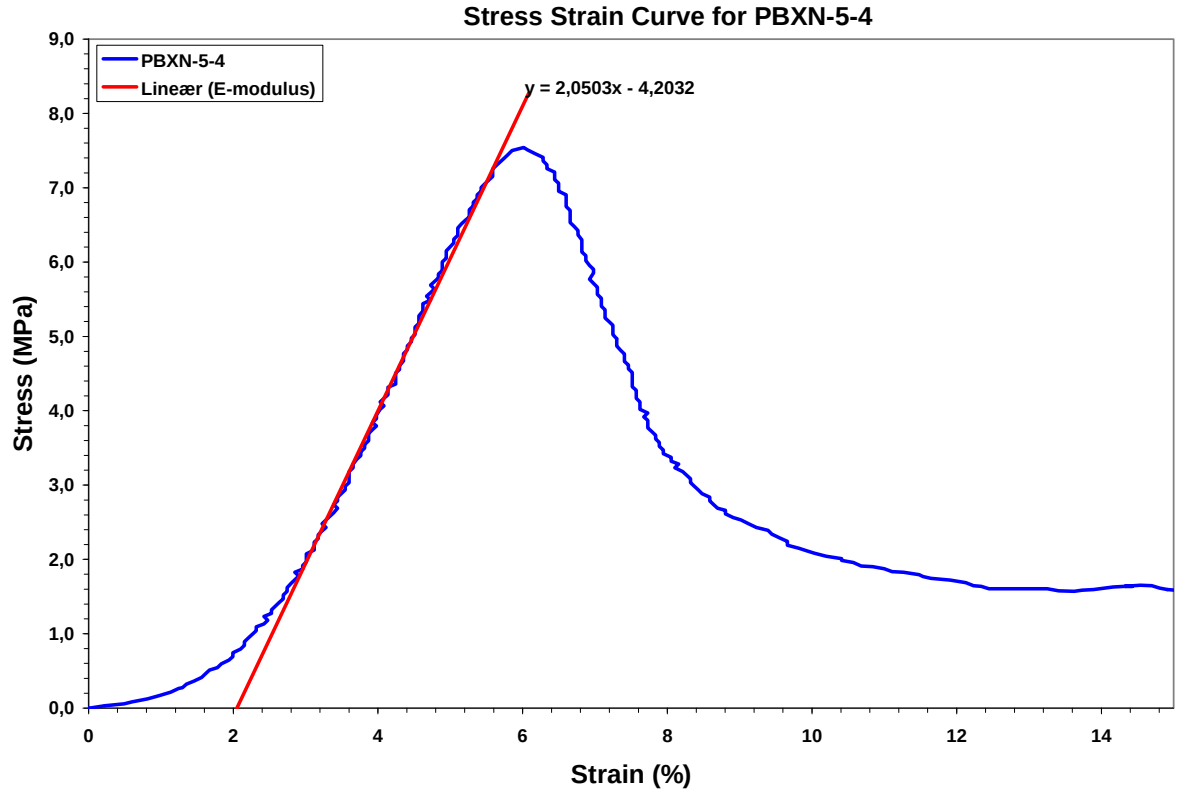
SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.77 mm
Width:
Thickness (Diameter): 19.39 mm
X-Sectional Area (cm^2):2.953

Form: Cylindrical
Preparation Method: As received L/D=1.1743
Manufacturing Method: Pressed. Force 2030 kp/cm^2, (203 MPa).
Source: Dyno Nobel
Lot or ID Number: DDP05K0025-0003, No PBXN-5-4
Preconditioning:
Condition Period:

Composition: ***PBXN-5, Type I, Class 3***

Component	Percent
HMX	95.1
Viton	4.9
Graphite (added	0.5



Max STRESS: 7.540 MPa STRAIN at Max Stress: 6.015 % E-Modulus: 205.03 MPa

TEST REPORT SHEET

Uniaxial Compressive Test — Page 5 of 5 Pages

TEST SITE INFORMATION

Laboratory: FFI
Date: 8 December 2007
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 1 November 2007
POC: Gunnar Ove Nevstad

TEST CONDITIONS

Temperature (^{o}C): 18
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

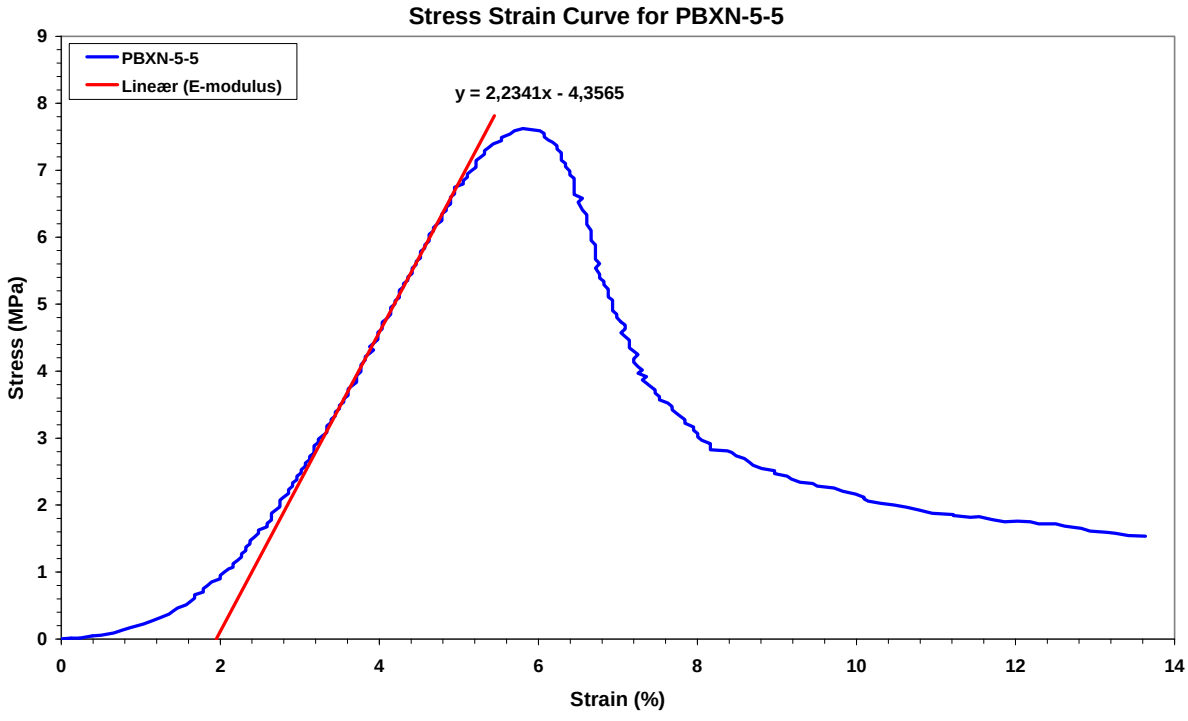
SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.64 mm
Width:
Thickness (Diameter): 19.39 mm
X-Sectional Area (cm^2): 2.953

Form: *Cylindrical*
Preparation Method: *As received L/D=1.1676*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: *Dyno Nobel*
Lot or ID Number: *DDP05K0025-0003, Pellet No PBXN-5-5*
Preconditioning:
Condition Period:

Composition: ***PBXN-5, Type I, Class 3***

Component	Percent
HMX	95.1
Viton	4.9
Graphite (added)	0.5



Max STRESS: 7.590 MPa STRAIN at Max Stress: 5.700 % E-Modulus: 223.41 MPa

A.2 PBXW-11 tested at t_0

TEST REPORT SHEET
Uniaxial Compressive Test

TEST SITE INFORMATION	TEST CONDITIONS
Laboratory: FFI	Temperature (°C): 18
Date: 8 December 2007	Relative Humidity (%): NA
Test Procedure:	X-Head Speed (mm/sec): 50
NATO Test Procedure Number: 102.01	Machine Type: MTS Servo Hydraulic Tester
Date Tested: 1 November 2007	Grip Type:
POC: Gunnar Ove Nevstad	Machine Stiffness (kN/mm):

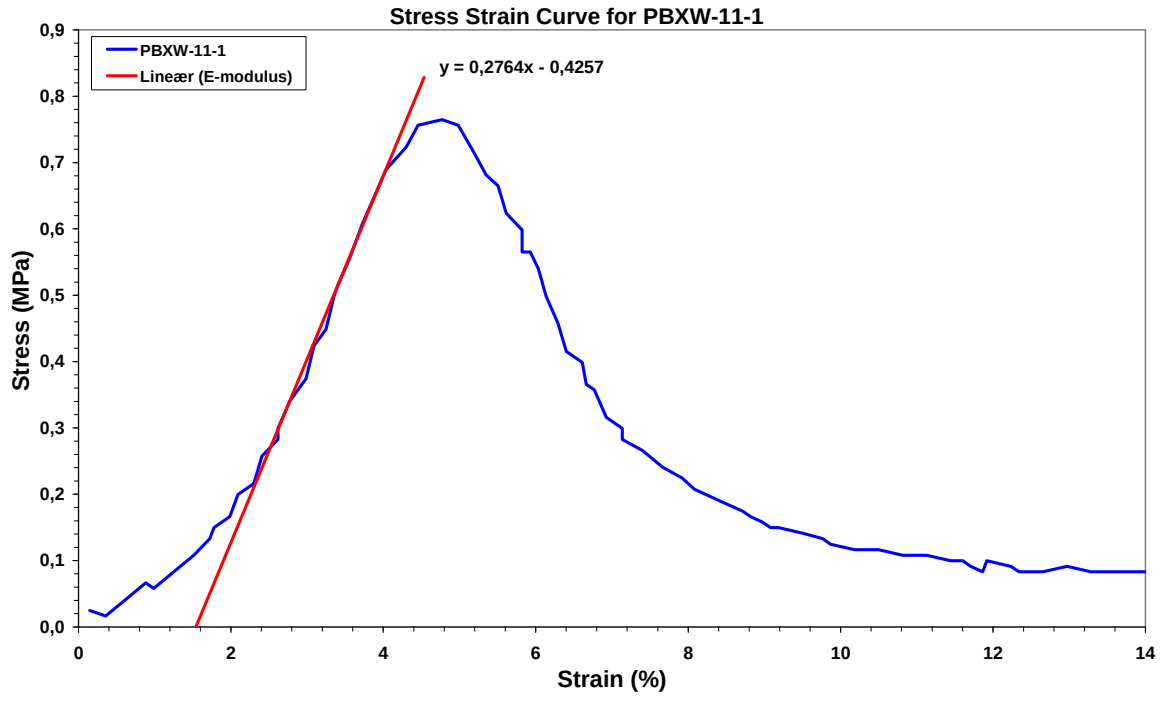
SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 23.23 mm
Width:
Thickness (Diameter): 19.34 mm
X-Sectional Area (cm^2): 2.936

Form: Cylindrical
Preparation Method: As received L/D=1.2011
Manufacturing Method: Pressed. Force 2030 kp/cm^2, (203 MPa).
Source: Dyno Nobel
Lot or ID Number: DDP07C0007E, Pellet No PBXW-11-1
Preconditioning:
Condition Period:

Composition: PBXW-11

Component	Percent
HMX	96.2
DOA	2.7
HYTEMP	1.1
Graphite (added)	0.5



Max STRESS: 0.765 MPa STRAIN at Max Stress: 4.772 % E-Modulus: 27.64 MPa

TEST REPORT SHEET

Uniaxial Compressive Test Page 2 of 5 Pages

TEST SITE INFORMATION

Laboratory: FFI
Date: 8 December 2007
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 1 November 2007
POC: Gunnar Ove Nevstad

TEST CONDITIONS

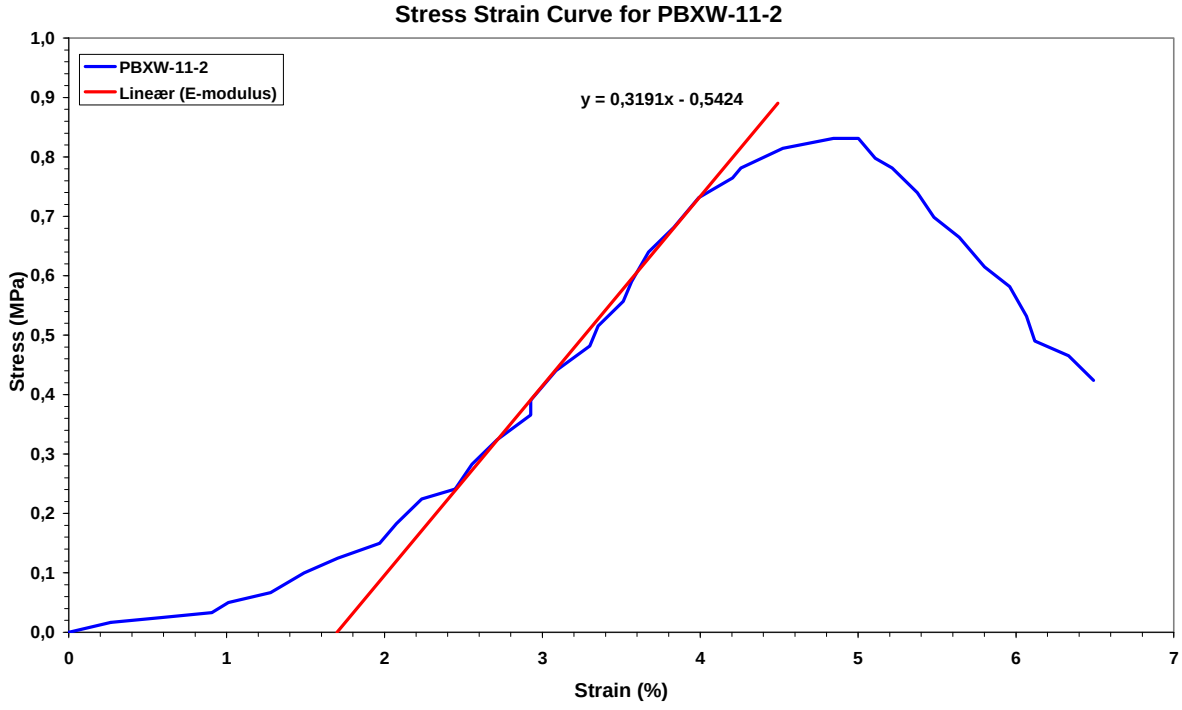
Temperature (^{o}C): 18
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.94 mm
Width:
Thickness (Diameter): 19.34 mm
X-Sectional Area (cm^2): 2.936

Form: Cylindrical
Preparation Method: As received L/D=1.1861
Manufacturing Method: Pressed. Force 2030 kp/cm^2, (203 MPa).
Source: Dyno Nobel
Lot or ID Number: DDP07C0007E, NoPBXW-11-2
Preconditioning:
Condition Period:
Composition: PBXW-11

Component	Percent
HMX	96.2
DOA	2.7
Hytemp	1.1
Graphite (added)	0.5



Max STRESS: 0.831 MPa STRAIN at Max Stress: 4.843 % E-Modulus: 31.91 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION

Laboratory: FFI
Date:8 December 2007
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 1 November 2007
POC: Gunnar Ove Nevstad

TEST CONDITIONS

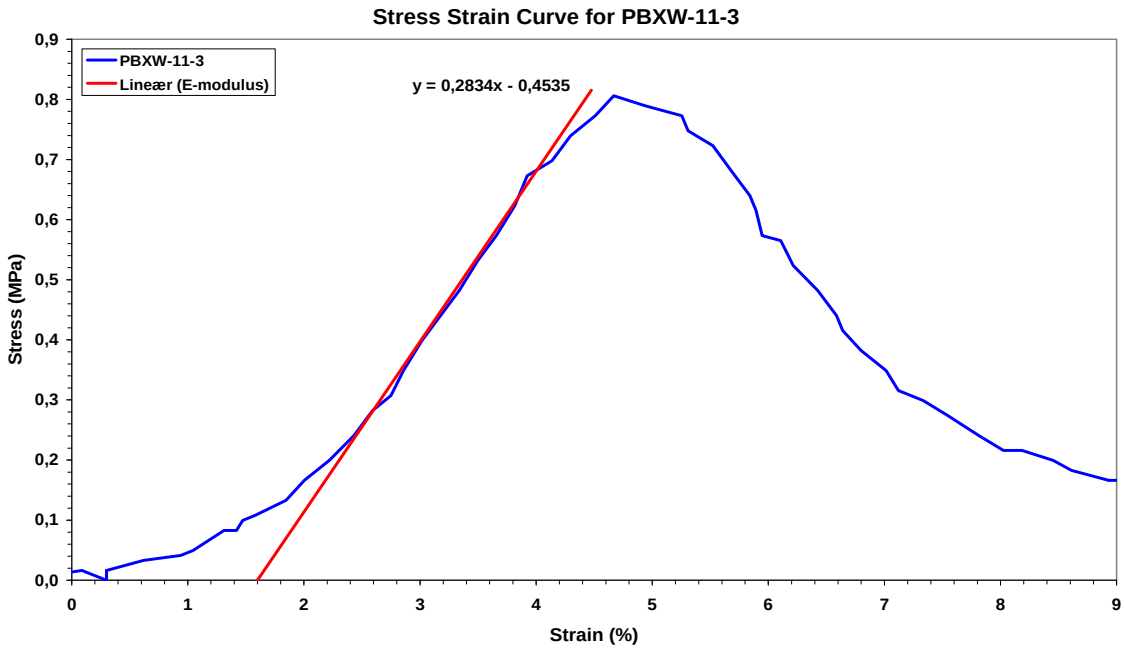
Temperature (°C): 18
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.91 mm
Width:
Thickness (Diameter):19.34 mm
X-Sectional Area (cm^2) 2.936

Form: Cylindrical
Preparation Method: As received L/D=1.1846
Manufacturing Method: Pressed. Force 2030 kp/cm^2, (203 MPa).
Source: Dyno Nobel
Lot or ID Number: DDP07C0007E, Pellet No PBXW-11-3
Preconditioning:
Condition Period:
Composition: PBXW-11

Component	Percent
HMX	96.2
Hytemp	1.1
DOA	2.7
Graphite (added)	0.5



Max STRESS: 0.806 MPa STRAIN at Max Stress: 4.669 % E-Modulus: 28.34 MPa

TEST REPORT SHEET

Uniaxial Compressive Test Page 4 of 5 Pages

TEST SITE INFORMATION

Laboratory: FFI
Date: 8 December 2007
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 1 November 2007
POC: Gunnar Ove Nevstad

TEST CONDITIONS

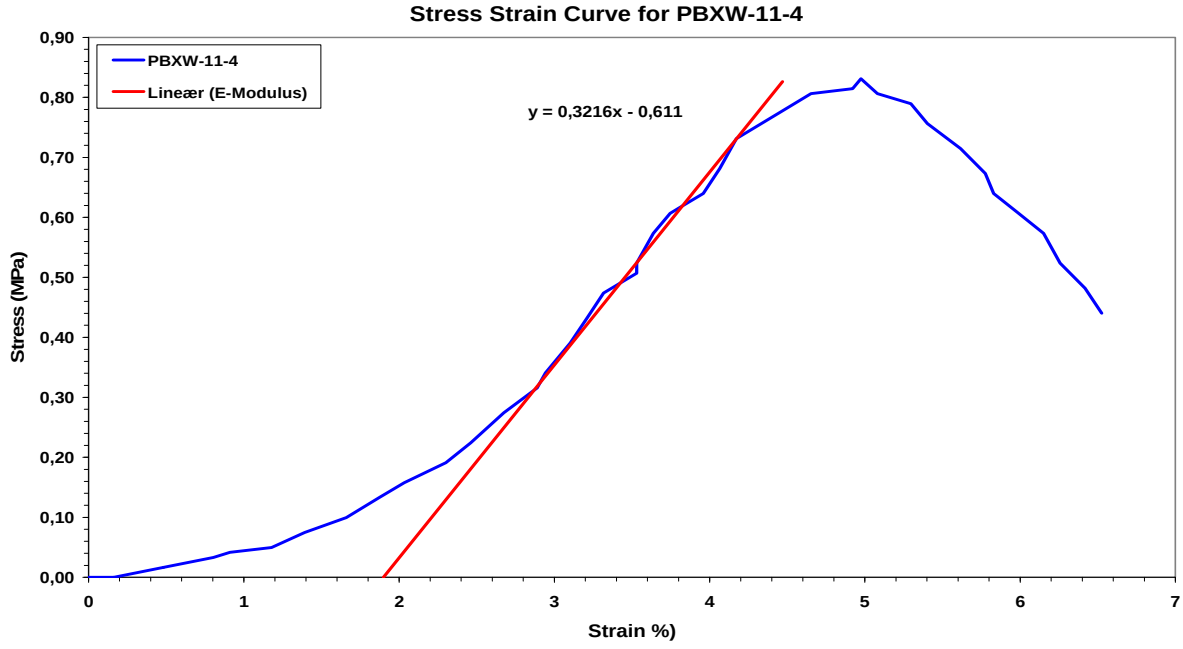
Temperature (^{o}C): 18
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.83 mm
Width:
Thickness (Diameter):19.34 mm
X-Sectional Area (cm^2): 2.936

Form: Cylindrical
Preparation Method: As received L/D=1.1805
Manufacturing Method: Pressed. Force 2030 kp/cm^2, (203 MPa).
Source: Dyno Nobel
Lot or ID Number: DDP07C0007E, Pellet No PBXW-11-4
Preconditioning:
Condition Period:
Composition: PBXW-11

Component	Percent
HMX	96.2
DOA	2.7
Hytemp	1.1
Graphite (added)	0.5



Max STRESS: 0.831 MPa STRAIN at Max Stress: 4.974 % E-Modulus: 32.16 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION

Laboratory: FFI
Date: 8 December 2007
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 1 November 2007
POC: Gunnar Ove Nevstad

TEST CONDITIONS

Temperature (^{o}C): 18
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

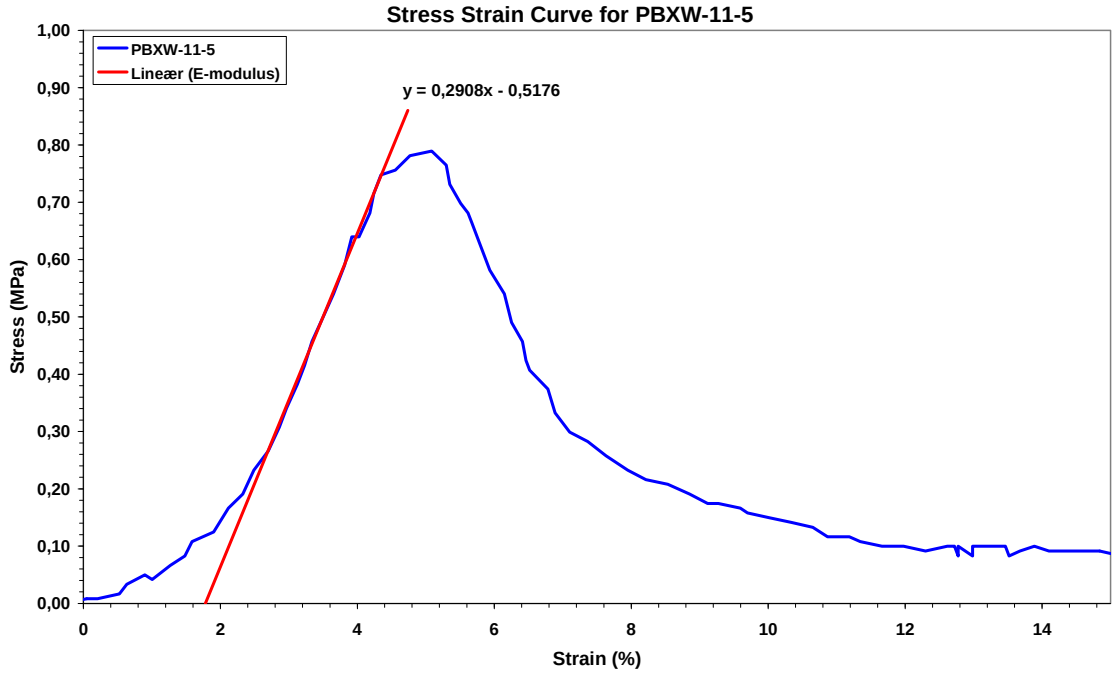
SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 23.02 mm
Width:
Thickness (Diameter): 19.34 mm
X-Sectional Area (cm^2): 2.936

Form: Cylindrical
Preparation Method: As received L/D=1.1903
Manufacturing Method: Pressed. Force 2030 kp/cm^2, (203 MPa).
Source: Dyno Nobel
Lot or ID Number: DDP07C0007E, Pellet No PBXW-11-5
Preconditioning:
Condition Period:

Composition: PBXW-11

Component	Percent
HMX	96.2
DOA	2.7
Hytemp	1.1
Graphite (added)	0.5



Max STRESS: 0.790 MPa STRAIN at Max Stress: 5.086 % E-Modulus: 29.08 MPa

A.3 PBXN-5 tested after ageing for 3 months

TEST REPORT SHEET
Uniaxial Compressive Test Page 1 of 7 Pages

TEST SITE INFORMATION	TEST CONDITIONS
Laboratory: FFI	Temperature (°C): 20
Date: 2 February 2008	Relative Humidity (%): NA
Test Procedure:	X-Head Speed (mm/sec): 50
NATO Test Procedure Number: 102.01	Machine Type: MTS Servo Hydraulic Tester
Date Tested: 30 January 2008	Grip Type:
POC: Gunnar Ove Nevstad	Machine Stiffness (kN/mm):

SPECIMEN INFORMATION

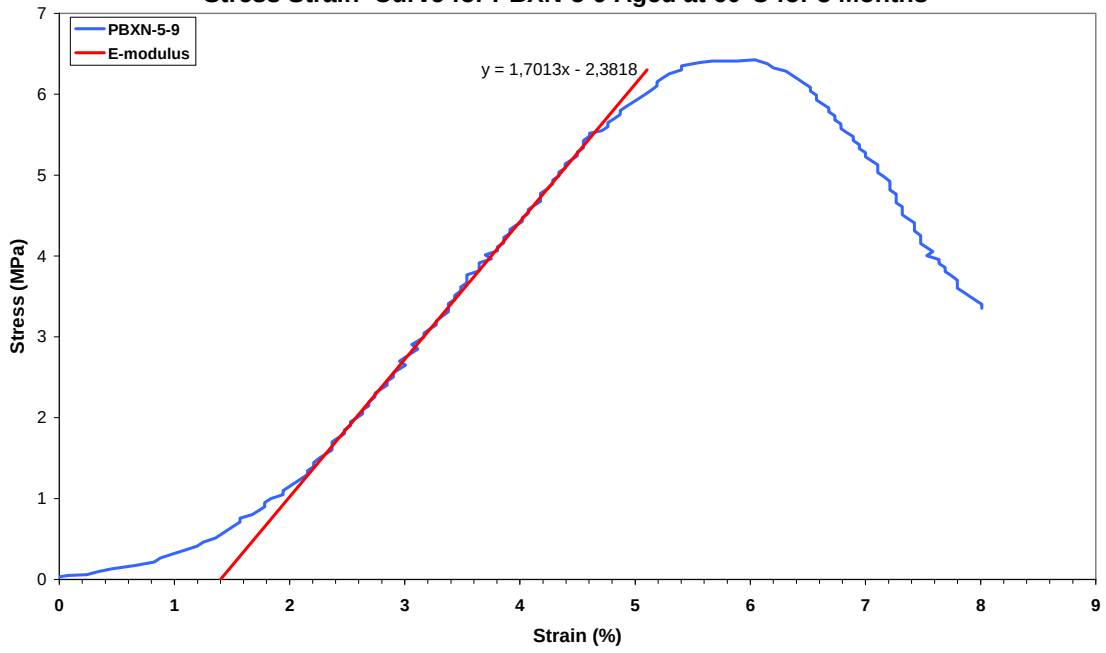
Dimensions: Length (Gage Length): 22.93 mm
Width:
Thickness (Diameter): 1940 mm
X-Sectional Area (cm2): 2.956

Form: Cylindrical
Preparation Method: As received L/D=1.1820
Manufacturing Method: Pressed. Force 2030 kp/cm^2, (203 MPa).
Source: Dyno Nobel
Lot or ID Number: DDP05K0025-0003, Pellet No PBXN-5-9
Preconditioning:
Condition Period:

Composition: ***PBXN-5, Type I, Class 3***

Component	Percent
HMX	95.1
Viton	4.9
Graphite (added)	0.5

Stress Strain Curve for PBXN-5-9 Aged at 60°C for 3 Months



Max STRESS: 6.43 MPa STRAIN at Max Stress: 6.04 % E-Modulus: 170.13 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION

Laboratory: FFI
Date: 2 February 2008
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 30 January 2008
POC: Gunnar Ove Nevstad

TEST CONDITIONS

Temperature (^{o}C): 18
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

SPECIMEN INFORMATION

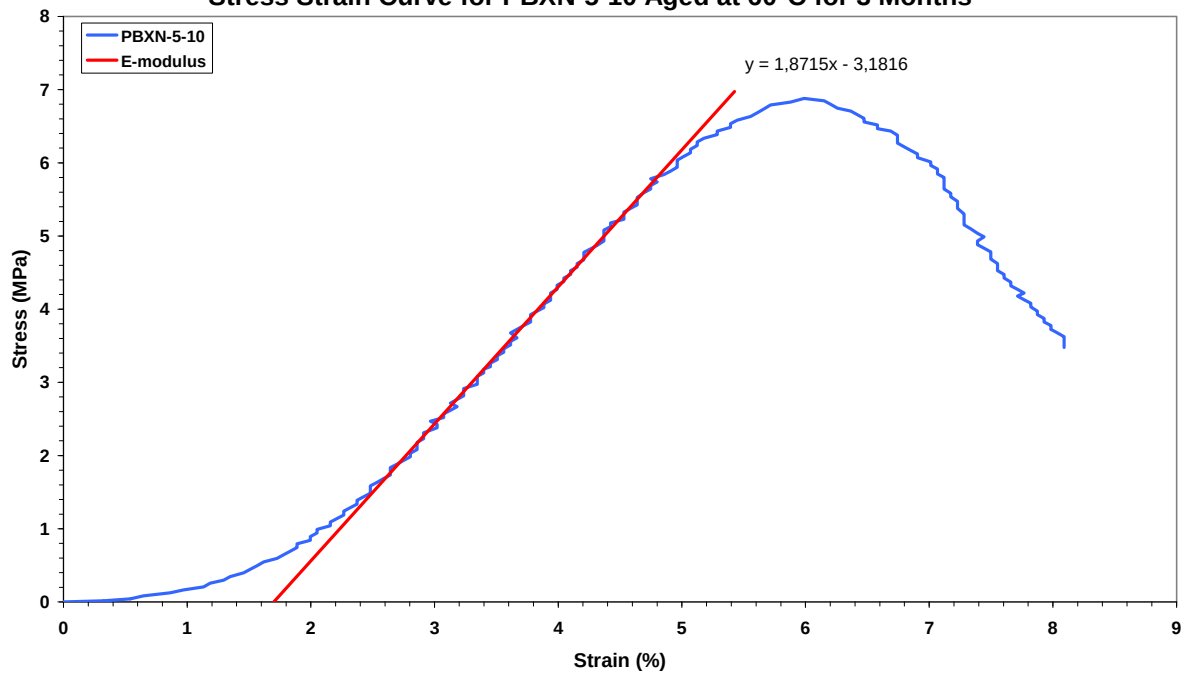
Dimensions: Length (Gage Length): 22.63 mm
Width:
Thickness (Diameter): 19.40 mm
X-Sectional Area (cm^2): 2.956

Form: Cylindrical
Preparation Method: As received L/D=1.1665
Manufacturing Method: Pressed. Force 2030 kp/cm^2, (203 MPa).
Source: Dyno Nobel
Lot or ID Number: DDP05K0025-0003, Pellet No PBXN-5-10
Preconditioning:
Condition Period:

Composition: ***PBXN-5, Type I, Class 3***

Component	Percent
HMX	95.1
Viton	4.9
Graphite (added)	0.5

Stress Strain Curve for PBXN-5-10 Aged at 60^{o}C for 3 Months



Max STRESS: 6.88 MPa STRAIN at Max Stress: 5.99 % E-Modulus: 187.15 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION	TEST CONDITIONS
Laboratory: FFI	Temperature (^{o}C): 20
Date: 2 Februar 2008	Relative Humidity (%): NA
Test Procedure:	X-Head Speed (mm/sec): 50
NATO Test Procedure Number: 102.01	Machine Type: MTS Servo Hydraulic Tester
Date Tested: 30 January 2008	Grip Type:
POC: Gunnar Ove Nevstad	Machine Stiffness (kN/mm):

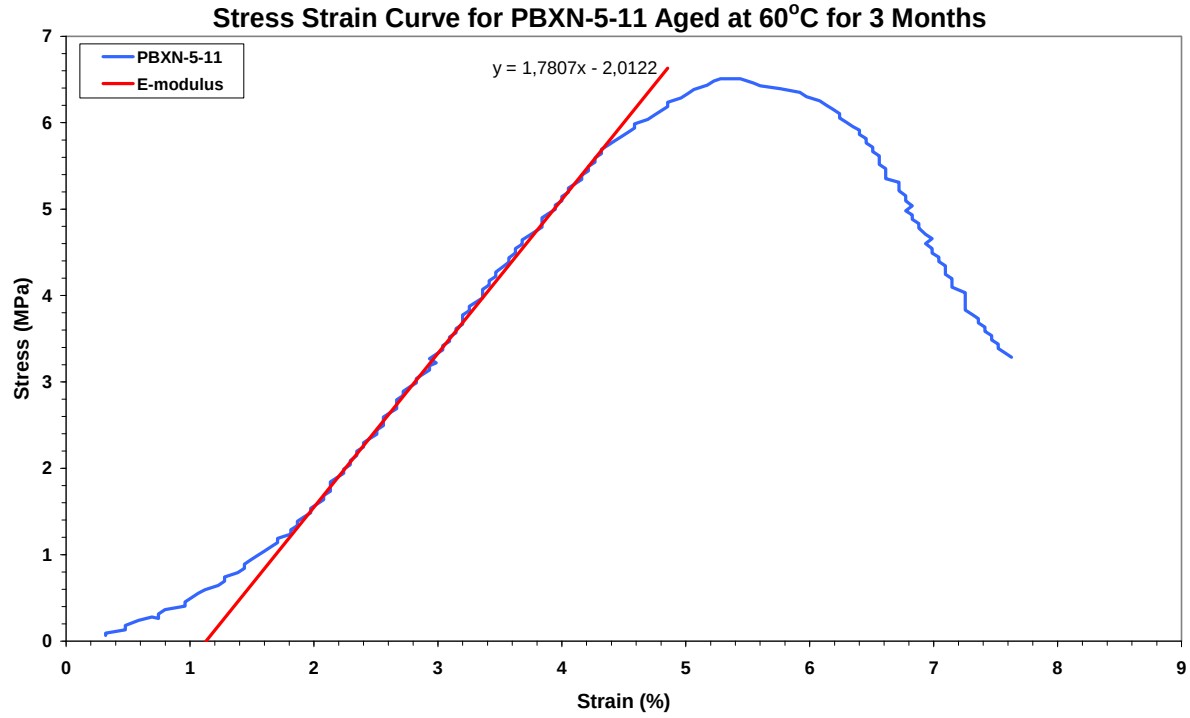
SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.88 mm
Width:
Thickness (Diameter): 19.40 mm
X-Sectional Area (cm2): 2.956

Form: Cylindrical
Preparation Method: *As received L/D=1.1794*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: Dyno Nobel
Lot or ID Number: *DDP05K0025-0003, No PBXN-5-11*
Preconditioning:
Condition Period:
Composition: ***PBXN-5, Type I, Class 3***

Component	Percent
HMX	95.1
Viton	4.9
Graphite (added)	0.5

Stress Strain Curve for PBXN-5-11 Aged at 60^{o}C for 3 Months



Max STRESS: 6.50 MPa STRAIN at Max Stress: 5.44 % E-Modulus: 178.07 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION

Laboratory: FFI
Date: 2 February 2008
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 30 January 2008
POC: Gunnar Ove Nevstad

TEST CONDITIONS

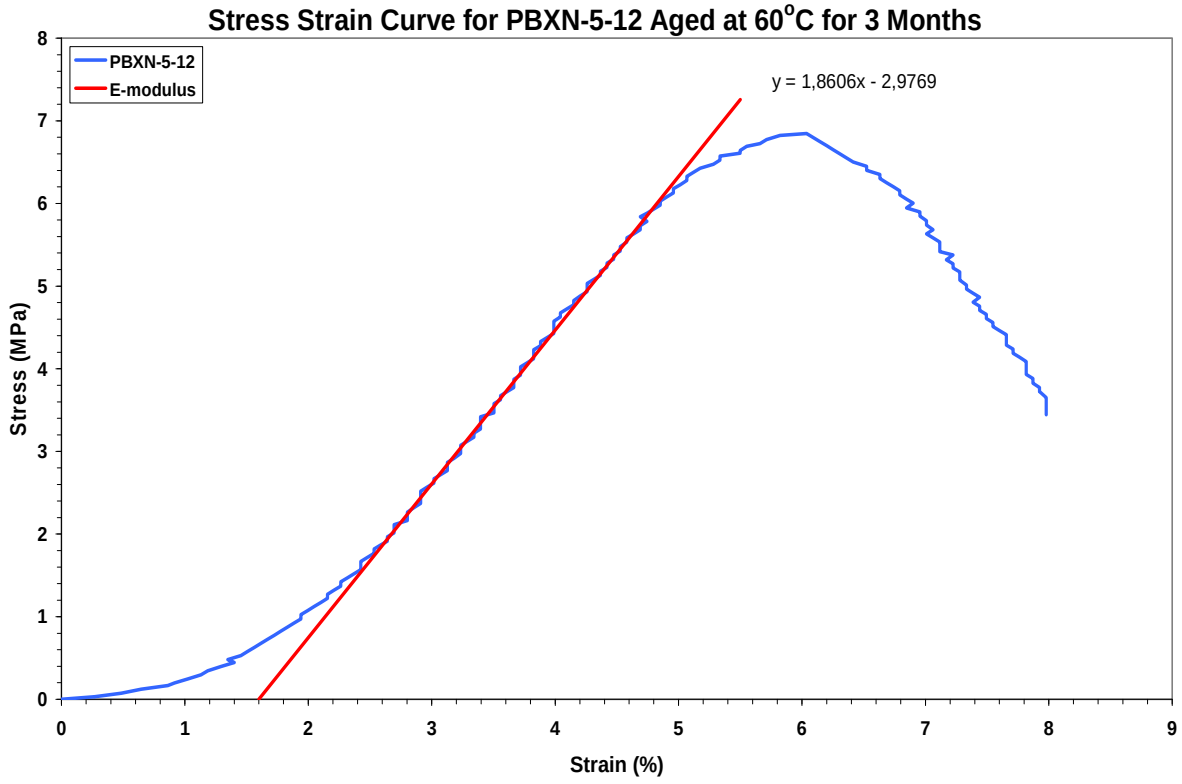
Temperature (^{o}C): 20
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.64 mm
Width:
Thickness (Diameter): 19.40 mm
X-Sectional Area (cm^2):2.956

Form: Cylindrical
Preparation Method: *As received L/D=1.1670*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: Dyno Nobel
Lot or ID Number: *DDP05K0025-0003, No PBXN-5-12*
Preconditioning:
Condition Period:
Composition: ***PBXN-5, Type I, Class 3***

Component	Percent
HMX	95.1
Viton	4.9
Graphite (added	0.5



Max STRESS: 6.85 MPa STRAIN at Max Stress: 6.04 % E-Modulus: 186.06 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

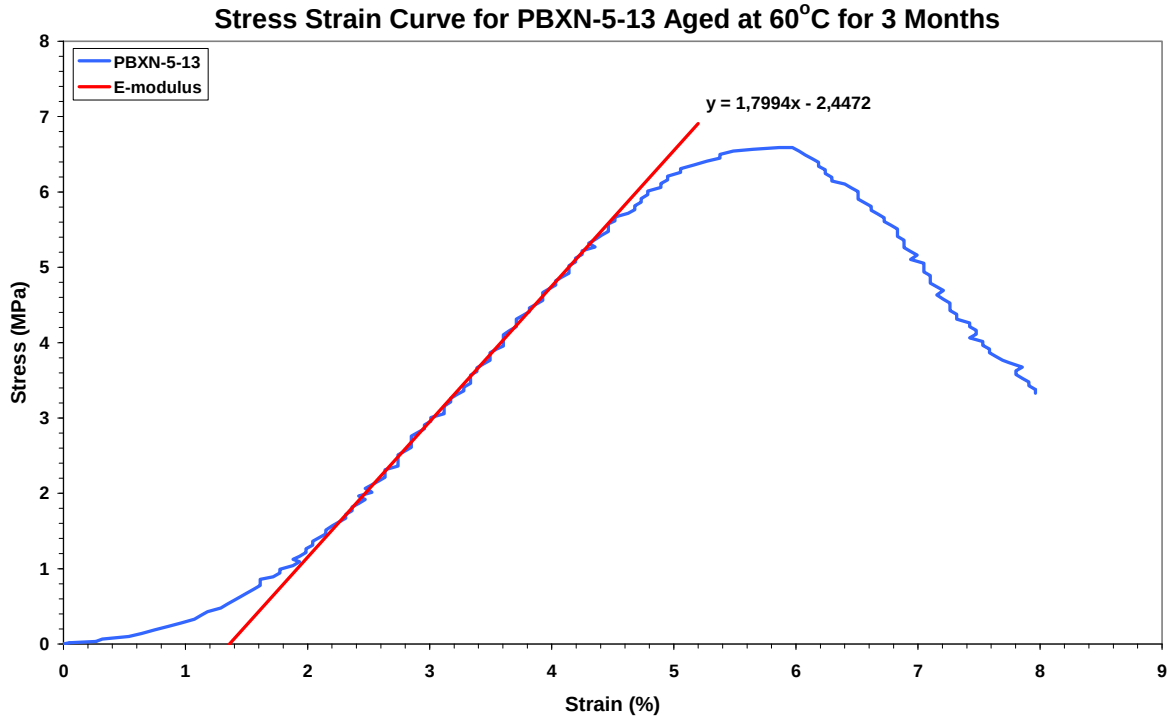
TEST SITE INFORMATION	TEST CONDITIONS
Laboratory: FFI	Temperature (^{o}C): 20
Date: 2 February 2008	Relative Humidity (%): NA
Test Procedure:	X-Head Speed (mm/sec): 50
NATO Test Procedure Number: 102.01	Machine Type: MTS Servo Hydraulic Tester
Date Tested: 30 January 2008	Grip Type:
POC: Gunnar Ove Nevstad	Machine Stiffness (kN/mm):

SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.68 mm
Width:
Thickness (Diameter): 19.40 mm
X-Sectional Area (cm^2): 2.956

Form: *Cylindrical*
Preparation Method: *As received L/D=1.1691*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: *Dyno Nobel*
Lot or ID Number: *DDP05K0025-0003, Pellet No PBXN-5-13*
Preconditioning:
Condition Period:
Composition: ***PBXN-5, Type I, Class 3***

Component	Percent
HMX	95.1
Viton	4.9
Graphite (added)	0.5



Max STRESS: 6.59 MPa STRAIN at Max Stress: 5.86 % E-Modulus: 179.94 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION

Laboratory: FFI
Date: 2 February 2008
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 30 January 2008
POC: Gunnar Ove Nevstad

TEST CONDITIONS

Temperature (^{o}C): 20
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

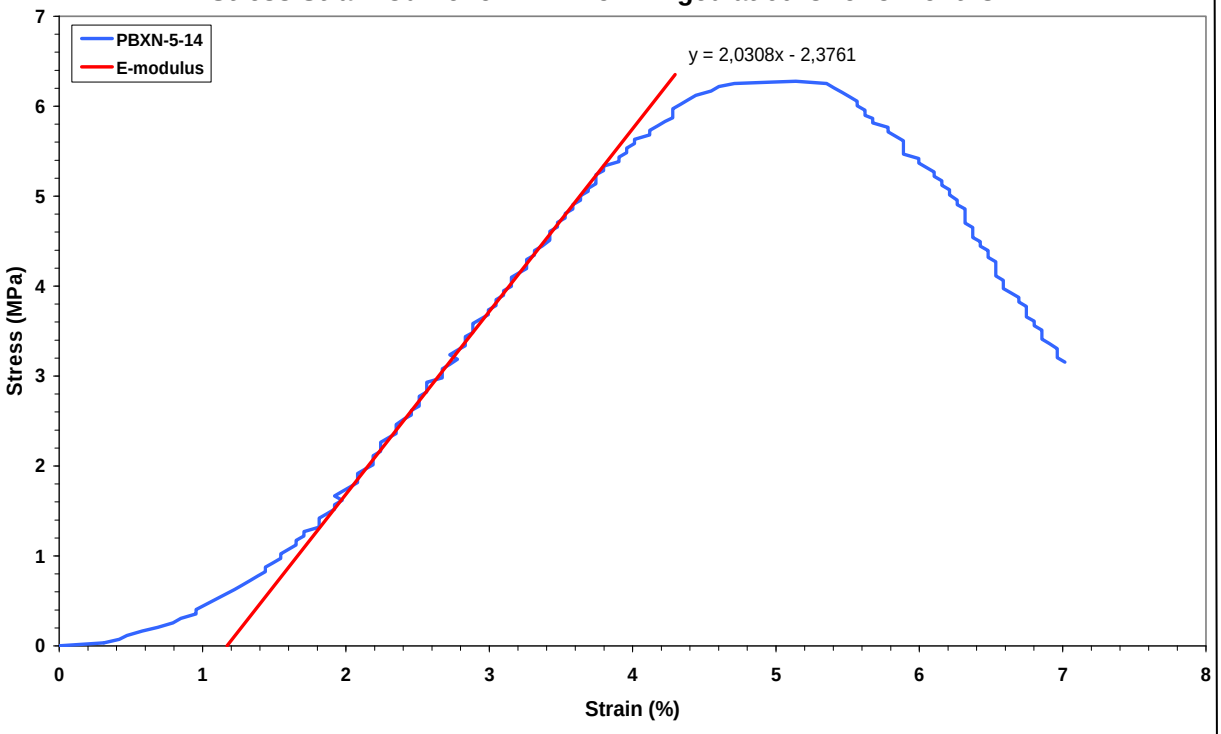
SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.76 mm
Width:
Thickness (Diameter): 19.40 mm
X-Sectional Area (cm^2):2.956

Form: Cylindrical
Preparation Method: *As received L/D=1.1732*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: Dyno Nobel
Lot or ID Number: *DDP05K0025-0003, No PBXN-5-14*
Preconditioning:
Condition Period:
Composition: ***PBXN-5, Type I, Class 3***

Component	Percent
HMX	95.1
Viton	4.9
Graphite (added	0.5

Stress Strain Curve for PBXN-5-14 Aged at 60^{o}C for 3 Months



Max STRESS: 6.28 MPa STRAIN at Max Stress: 5.14 % E-Modulus: 203.08 MPa

TEST REPORT SHEET

Uniaxial Compressive Test Page 7 of 7 Pages

TEST SITE INFORMATION	TEST CONDITIONS
Laboratory: FFI	Temperature (°C): 20
Date: 2 February 2008	Relative Humidity (%): NA
Test Procedure:	X-Head Speed (mm/sec): 50
NATO Test Procedure Number: 102.01	Machine Type: MTS Servo Hydraulic Tester
Date Tested: 30January 2008	Grip Type:
POC: Gunnar Ove Nevstad	Machine Stiffness (kN/mm):

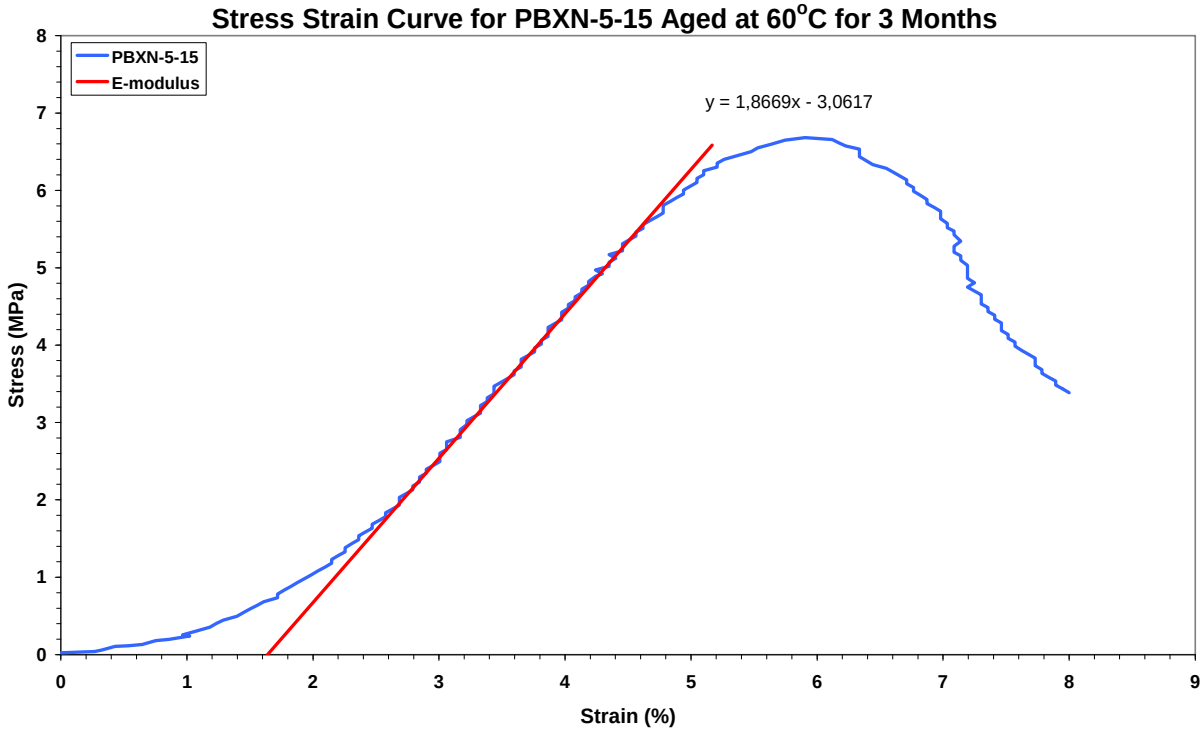
SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.72 mm
Width:
Thickness (Diameter): 19.40 mm
X-Sectional Area (cm^2): 2.956

Form: *Cylindrical*
Preparation Method: *As received L/D=1.1711*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: *Dyno Nobel*
Lot or ID Number: *DDP05K0025-0003, Pellet No PBXN-5-15*
Preconditioning:
Condition Period:
Composition: ***PBXN-5, Type I, Class 3***

Component	Percent
HMX	95.1
Viton	4.9
Graphite (added)	0.5

Stress Strain Curve for PBXN-5-15 Aged at 60°C for 3 Months



Max STRESS: 6.68 MPa STRAIN at Max Stress: 5.91 % E-Modulus: 186.69 MPa

A.4 PBXW-11 aged at 60°C for 3 months

TEST REPORT SHEET
Uniaxial Compressive Test Page 1 of 7 Pages

TEST SITE INFORMATION	TEST CONDITIONS
Laboratory: FFI	Temperature (°C): 20
Date: 2 February 2008	Relative Humidity (%): NA
Test Procedure:	X-Head Speed (mm/sec): 50
NATO Test Procedure Number: 102.01	Machine Type: MTS Servo Hydraulic Tester
Date Tested: 30 January 2008	Grip Type:
POC: Gunnar Ove Nevstad	Machine Stiffness (kN/mm):

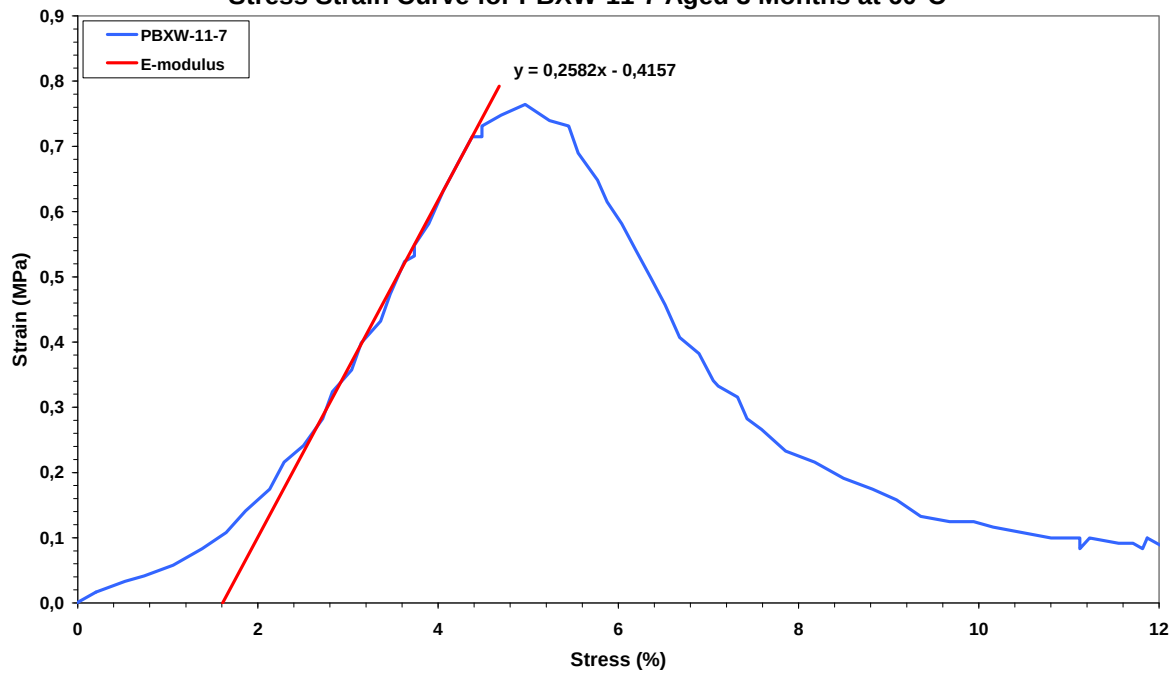
SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.81 mm
Width:
Thickness (Diameter): 19.34 mm
X-Sectional Area (cm^2): 2.938

Form: Cylindrical
Preparation Method: *As received L/D=1.1794*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: Dyno Nobel
Lot or ID Number: *DDP07C0007E, Pellet No PBXW-11-7*
Preconditioning:
Condition Period:
Composition: PBXW-11

Component	Percent
HMX	96.2
DOA	2.7
HYTEMP	1.1
Graphite (added)	0.5

Stress Strain Curve for PBXW-11-7 Aged 3 Months at 60°C



Max STRESS: 0.765 MPa STRAIN at Max Stress: 4.967 % E-Modulus: 26.82 MPa

TEST REPORT SHEET

Uniaxial Compressive Test Page 2 of 7 Pages

TEST SITE INFORMATION

Laboratory: FFI
Date: 2 February 2008
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 30 January 2008
POC: Gunnar Ove Nevstad

TEST CONDITIONS

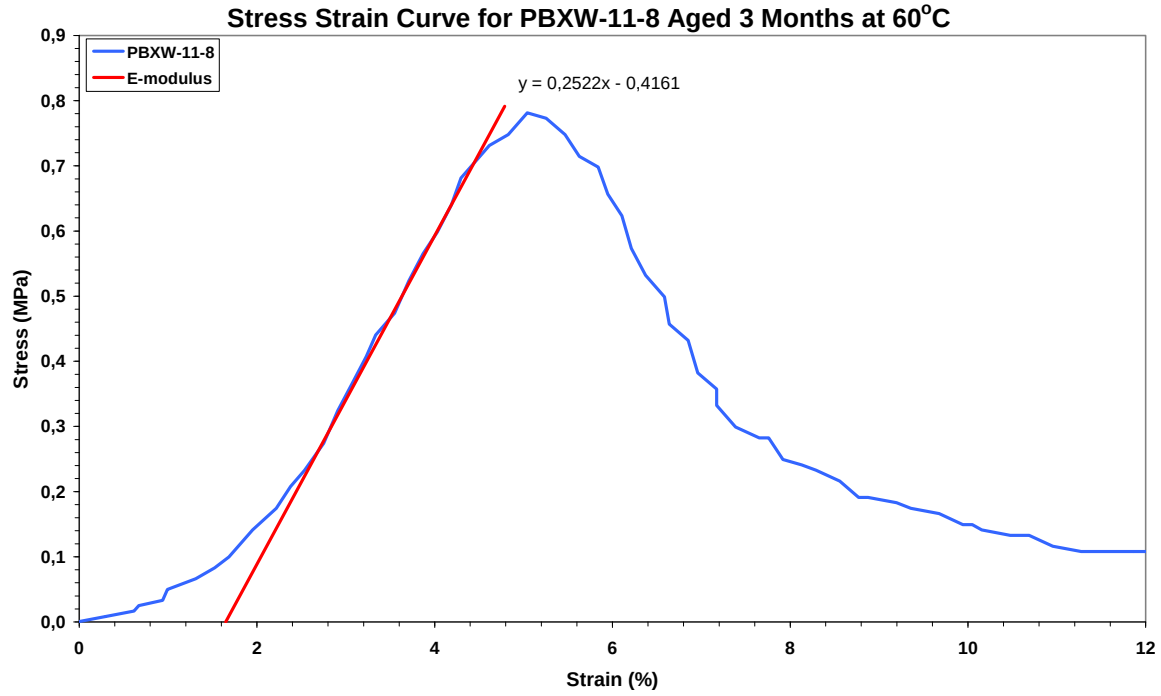
Temperature (^{o}C): 20
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.91 mm
Width:
Thickness (Diameter): 19.34 mm
X-Sectional Area (cm^2): 2.938

Form: Cylindrical
Preparation Method: *As received L/D=1.1934*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: Dyno Nobel
Lot or ID Number: *DDP07C0007E, NoPBXW-11-8*
Preconditioning:
Condition Period:
Composition: PBXW-11

Component	Percent
HMX	96.2
DOA	2.7
Hytemp	1.1
Graphite (added)	0.5



Max STRESS: 0.781 MPa STRAIN at Max Stress: 5.04 % E-Modulus: 25.22 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION

Laboratory: FFI
Date: 2 February 2008
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 30 January 2008
POC: Gunnar Ove Nevstad

TEST CONDITIONS

Temperature (°C): 20
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

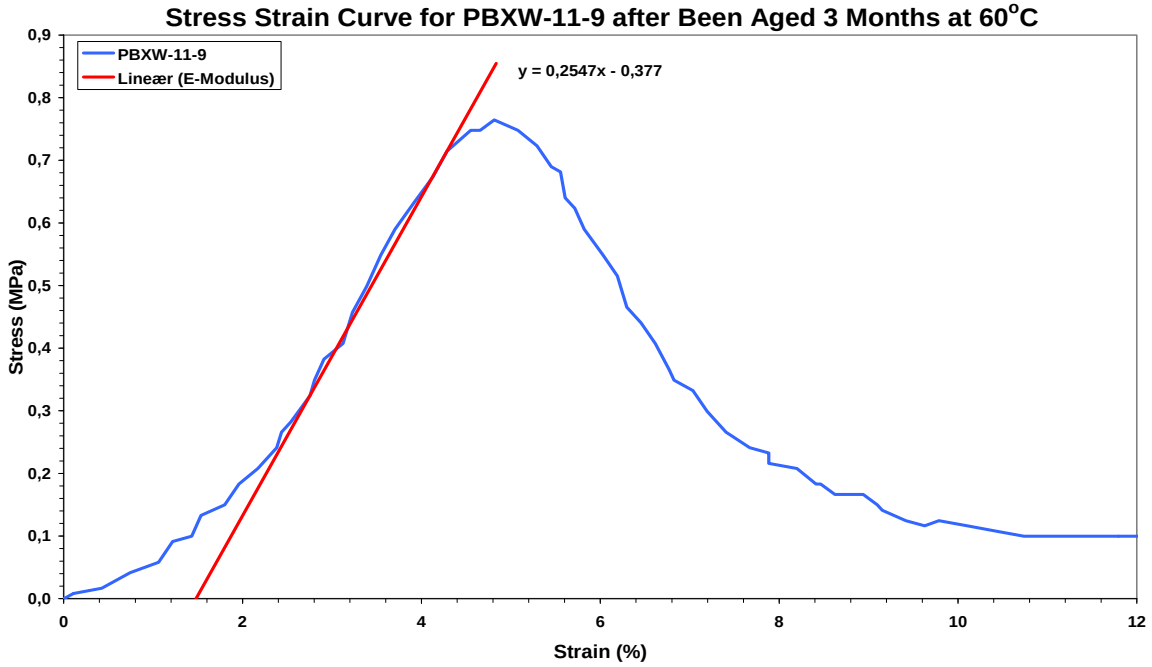
SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 23.08 mm
Width:
Thickness (Diameter):19.34 mm
X-Sectional Area (cm^2) 2.938

Form: Cylindrical
Preparation Method: *As received L/D=1.934*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: Dyno Nobel
Lot or ID Number: *DDP07C0007E, Pellet No PBXW-11-9*
Preconditioning:
Condition Period:
Composition: PBXW-11

Component	Percent
HMX	96.2
Hytemp	1.1
DOA	2.7
Graphite (added)	0.5

Stress Strain Curve for PBXW-11-9 after Been Aged 3 Months at 60°C



Max STRESS: 0.765 MPa STRAIN at Max Stress: 4.815 % E-Modulus: 25.47 MPa

TEST REPORT SHEET

Uniaxial Compressive Test Page 4 of 7 Pages

TEST SITE INFORMATION

Laboratory: FFI
Date: 2 February 2008
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 30 january 2008
POC: Gunnar Ove Nevstad

TEST CONDITIONS

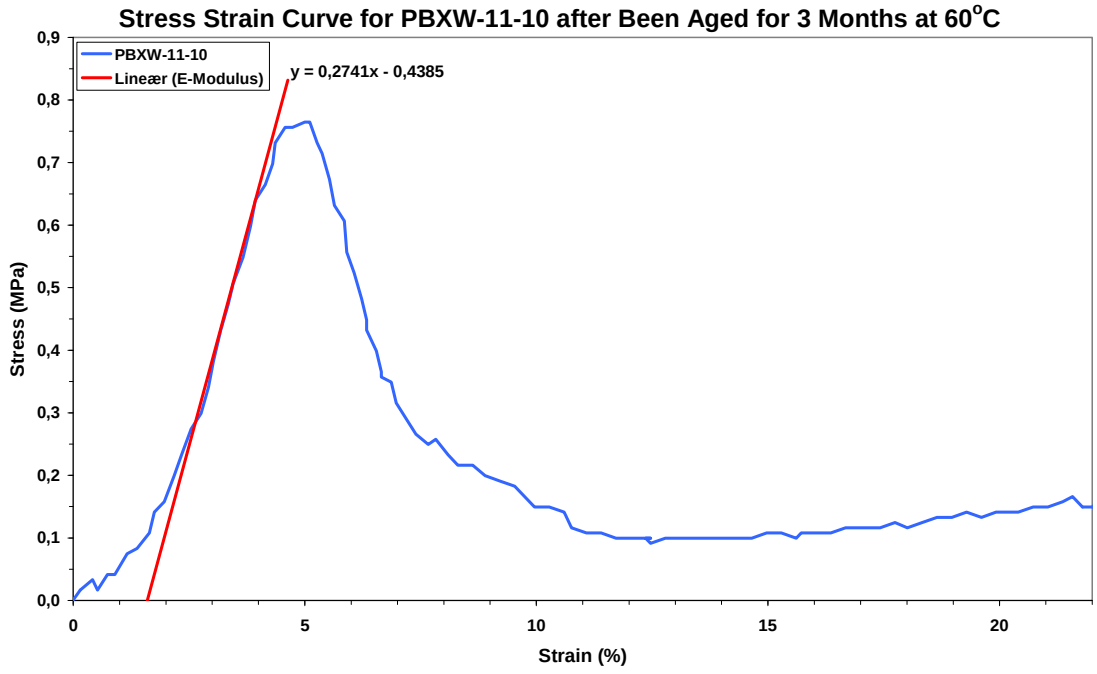
Temperature (^{o}C): 20
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.90 mm
Width:
Thickness (Diameter):19.34 mm
X-Sectional Area (cm^2): 2.938

Form: Cylindrical
Preparation Method: *As received L/D=1.1841*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: Dyno Nobel
Lot or ID Number: *DDP07C0007E, Pellet No PBXW-11-10*
Preconditioning:
Condition Period:
Composition: PBXW-11

Component	Percent
HMX	96.2
DOA	2.7
Hytemp	1.1
Graphite (added)	0.5



Max STRESS: 0.765 MPa STRAIN at Max Stress: 5.001 % E-Modulus: 27.41 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION

Laboratory: FFI
Date: 2 February 2008
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 30 January 2008
POC: Gunnar Ove Nevstad

TEST CONDITIONS

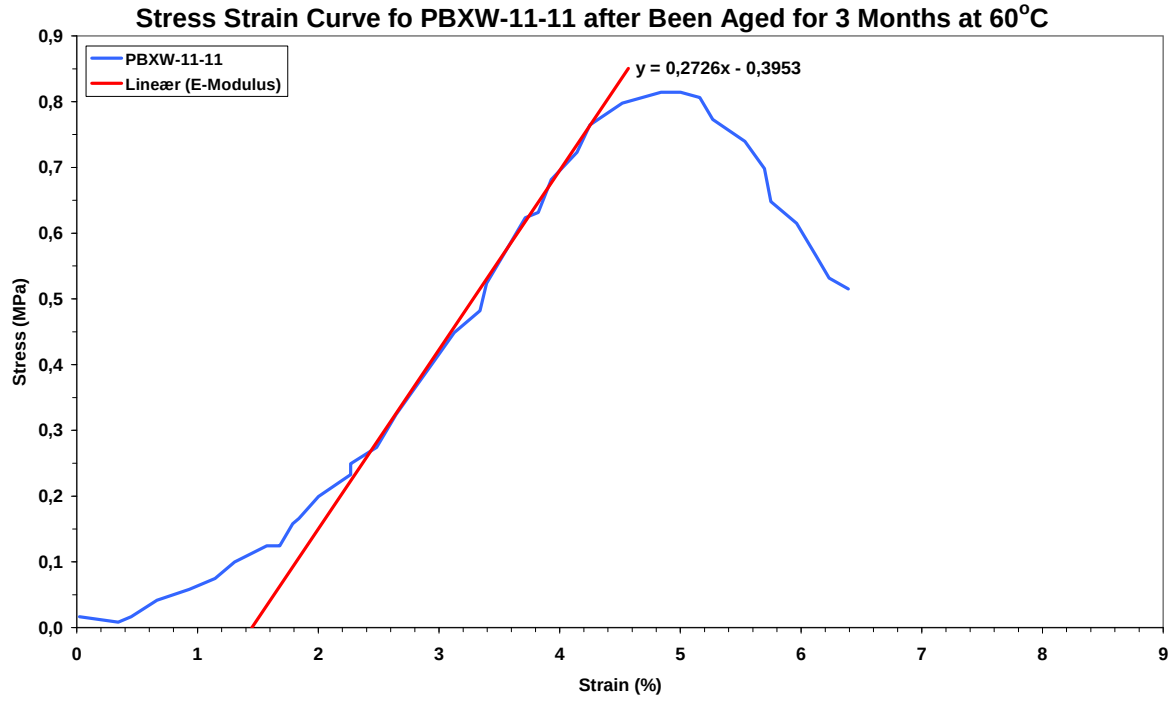
Temperature (^{o}C): 20
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.80 mm
Width:
Thickness (Diameter): 19.34 mm
X-Sectional Area (cm^2): 2.934

Form: Cylindrical
Preparation Method: *As received L/D=1.1789*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: Dyno Nobel
Lot or ID Number: *DDP07C0007E, Pellet No PBXW-11-11*
Preconditioning:
Condition Period:
Composition: PBXW-11

Component	Percent
HMX	96.2
DOA	2.7
Hytemp	1.1
Graphite (added)	0.5



Max STRESS: 0.814 MPa STRAIN at Max Stress: 4.84 % E-Modulus: 27.26 MPa

TEST REPORT SHEET

Uniaxial Compressive Test Page 6 of 7 Pages

TEST SITE INFORMATION

Laboratory: FFI
Date: 2 February 2008
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 30 January 2008
POC: Gunnar Ove Nevstad

TEST CONDITIONS

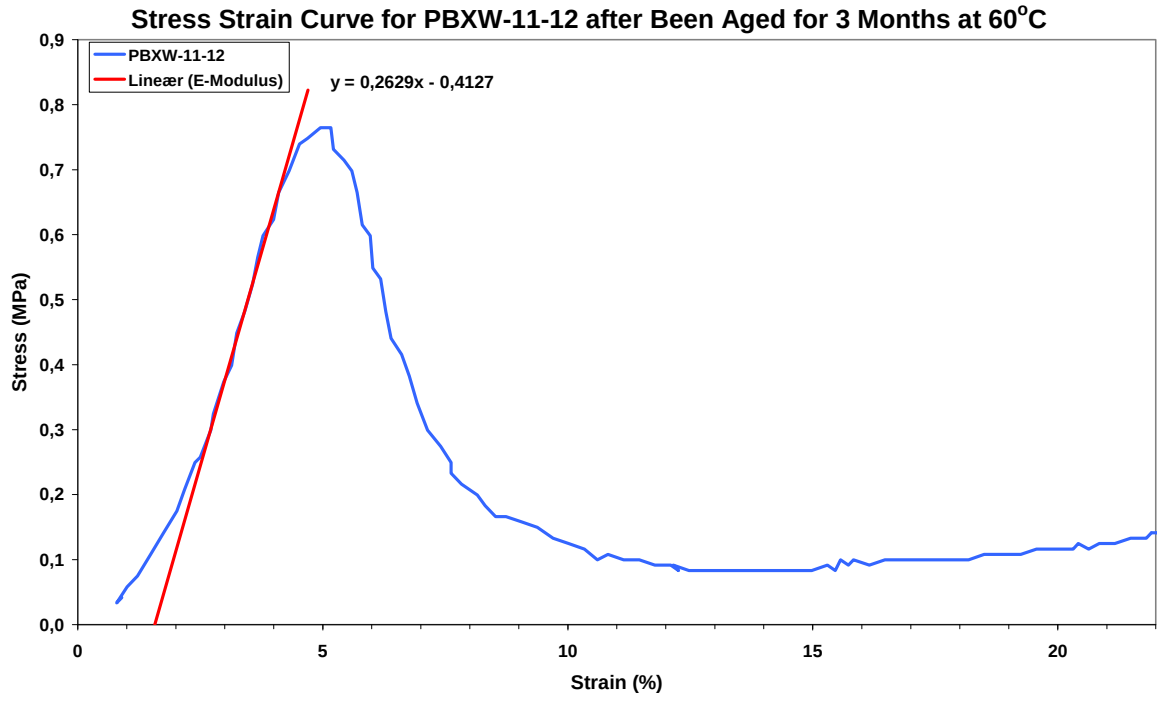
Temperature (^{o}C): 20
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.89 mm
Width:
Thickness (Diameter):19.34 mm
X-Sectional Area (cm^2): 2.938

Form: Cylindrical
Preparation Method: *As received L/D=1.1836*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: Dyno Nobel
Lot or ID Number: *DDP07C0007E, Pellet No PBXW-11-12*
Preconditioning:
Condition Period:
Composition: PBXW-11

Component	Percent
HMX	96.2
DOA	2.7
Hytemp	1.1
Graphite (added)	0.5



Max STRESS: 0.765 MPa STRAIN at Max Stress: 5.059 % E-Modulus: 26.29 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION

Laboratory: FFI
Date: 2 February 2008
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 30 January 2008
POC: Gunnar Ove Nevstad

TEST CONDITIONS

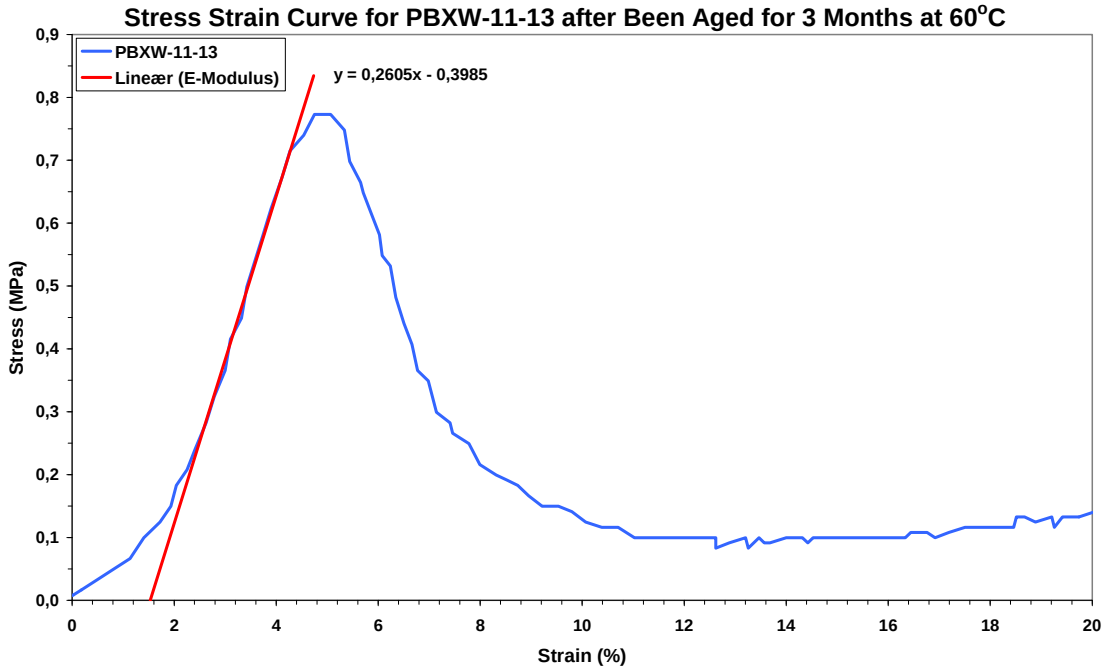
Temperature (^{o}C): 20
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.97 mm
Width:
Thickness (Diameter): 19.34 mm
X-Sectional Area (cm^2): 2.938

Form: Cylindrical
Preparation Method: *As received L/D=1.1877*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: Dyno Nobel
Lot or ID Number: *DDP07C0007E, Pellet No PBXW-11-5*
Preconditioning:
Condition Period:
Composition: PBXW-11

Component	Percent
HMX	96.2
DOA	2.7
Hytemp	1.1
Graphite (added)	0.5



Max STRESS: 0.773 MPa STRAIN at Max Stress: 4.93 % E-Modulus: 26.05 MPa

A.5 PBXN-5 tested after ageing for 6 months

TEST REPORT SHEET
Uniaxial Compressive Test — Page 1 of 10 Pages

TEST SITE INFORMATION		TEST CONDITIONS
Laboratory: FFI		Temperature (^{o}C): 20
Date: 3 May 2008		Relative Humidity (%): NA
Test Procedure:		X-Head Speed (mm/sec): 50
NATO Test Procedure Number: 102.01		Machine Type: MTS Servo Hydraulic Tester
Date Tested: 1 May 2008	Grip Type:	
POC: Gunnar Ove Nevstad		Machine Stiffness (kN/mm):

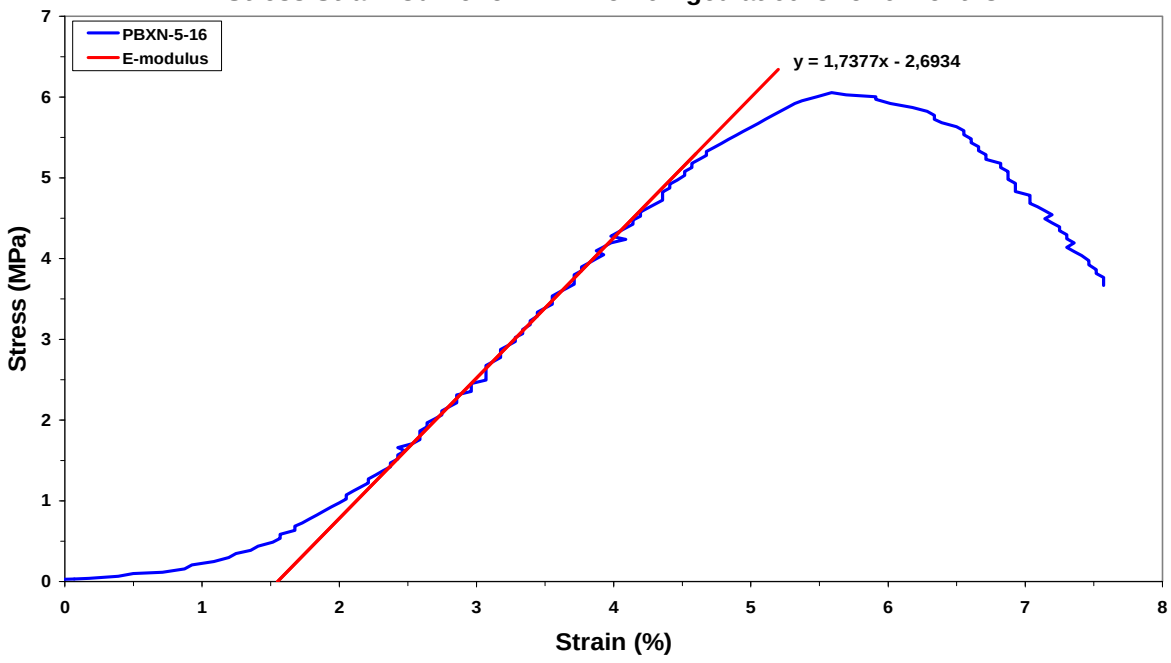
SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.78 mm
Width:
Thickness (Diameter): 1940 mm
X-Sectional Area (cm2): 2.956

Form: Cylindrical
Preparation Method: *As received L/D=1.1742*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: Dyno Nobel
Lot or ID Number: *DDP05K0025-0003, Pellet No PBXN-5-16*
Preconditioning:
Condition Period:
Composition: ***PBXN-5, Type I, Class 3***

Component	Percent
HMX	95.1
Viton	4.9
Graphite (added)	0.5

Stress Strain Curve for PBXN-5-16 Aged at 60°C for 6 Months



Max STRESS: 6.054 MPa STRAIN at Max Stress: 5.58 % E-Modulus: 173.77 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION

Laboratory: FFI
Date: 3 May 2008
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 1 May 2008
POC: Gunnar Ove Nevstad

TEST CONDITIONS

Temperature (^{o}C): 18
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

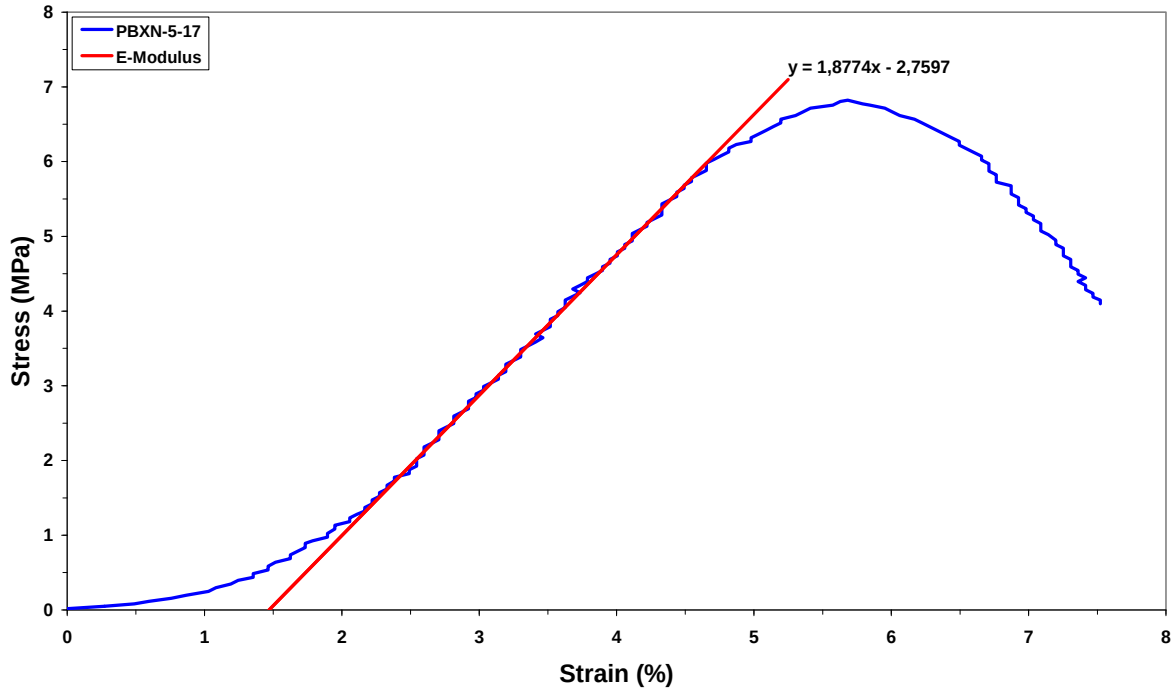
SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.56 mm
Width:
Thickness (Diameter): 19.40 mm
X-Sectional Area (cm^2): 2.956

Form: Cylindrical
Preparation Method: *As received L/D=1.1629*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: Dyno Nobel
Lot or ID Number: *DDP05K0025-0003, Pellet No PBXN-5-17*
Preconditioning:
Condition Period:
Composition: ***PBXN-5, Type I, Class 3***

Component	Percent
HMX	95.1
Viton	4.9
Graphite (added)	0.5

Stress Strain Curve for PBXN-5-17 Aged at 60^{o}C for 6 Months



Max STRESS: 6.806 MPa STRAIN at Max Stress: 5.629 % E-Modulus: 187.74 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION	TEST CONDITIONS
Laboratory: FFI	Temperature (^{o}C): 20
Date: 3 May 2008	Relative Humidity (%): NA
Test Procedure:	X-Head Speed (mm/sec): 50
NATO Test Procedure Number: 102.01	Machine Type: MTS Servo Hydraulic Tester
Date Tested: 1 Ma y 2008	Grip Type:
POC: Gunnar Ove Nevstad	Machine Stiffness (kN/mm):

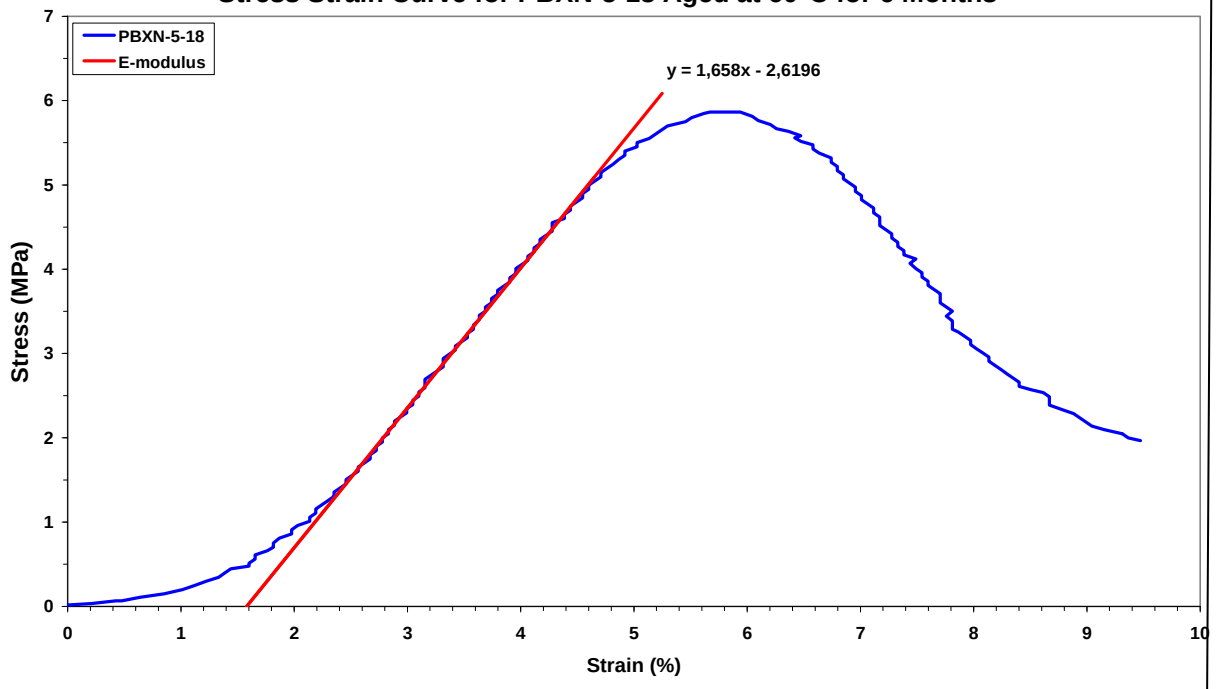
SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.80 mm
Width:
Thickness (Diameter): 19.40 mm
X-Sectional Area (cm2): 2.956

Form: Cylindrical
Preparation Method: *As received L/D=1.1753*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: *Dyno Nobel*
Lot or ID Number: *DDP05K0025-0003, No PBXN-5-18*
Preconditioning:
Condition Period:
Composition: ***PBXN-5, Type I, Class 3***

Component	Percent
HMX	95.1
Viton	4.9
Graphite (added)	0.5

Stress Strain Curve for PBXN-5-18 Aged at 60^{o}C for 6 Months



Max STRESS: 5.864 MPa STRAIN at Max Stress: 5.67 % E-Modulus: 165.8 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION

Laboratory: FFI
Date: 3 May 2008
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 1 May 2008
POC: Gunnar Ove Nevstad

TEST CONDITIONS

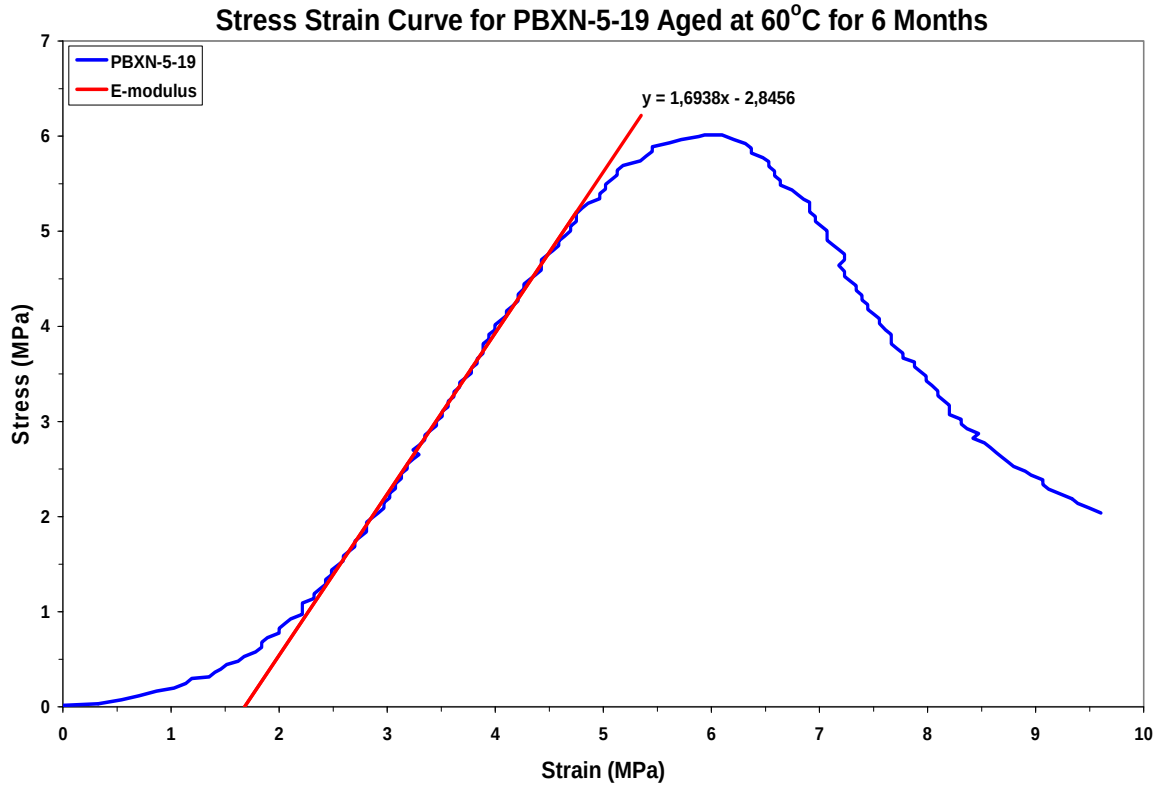
Temperature (^{o}C): 20
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.63 mm
Width:
Thickness (Diameter): 19.40 mm
X-Sectional Area (cm^2):2.956

Form: Cylindrical
Preparation Method: *As received L/D=1.1665*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: *Dyno Nobel*
Lot or ID Number: *DDP05K0025-0003, No PBXN-5-19*
Preconditioning:
Condition Period:
Composition: ***PBXN-5, Type I, Class 3***

Component	Percent
HMX	95.1
Viton	4.9
Graphite (added	0.5



Max STRESS: 6.013MPa STRAIN at Max Stress: 5.937 % E-Modulus: 169.38 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION	TEST CONDITIONS
Laboratory: FFI	Temperature (^{o}C): 20
Date: 3 May 2008	Relative Humidity (%): NA
Test Procedure:	X-Head Speed (mm/sec): 50
NATO Test Procedure Number: 102.01	Machine Type: MTS Servo Hydraulic Tester
Date Tested: 1 May 2008	Grip Type:
POC: Gunnar Ove Nevstad	Machine Stiffness (kN/mm):

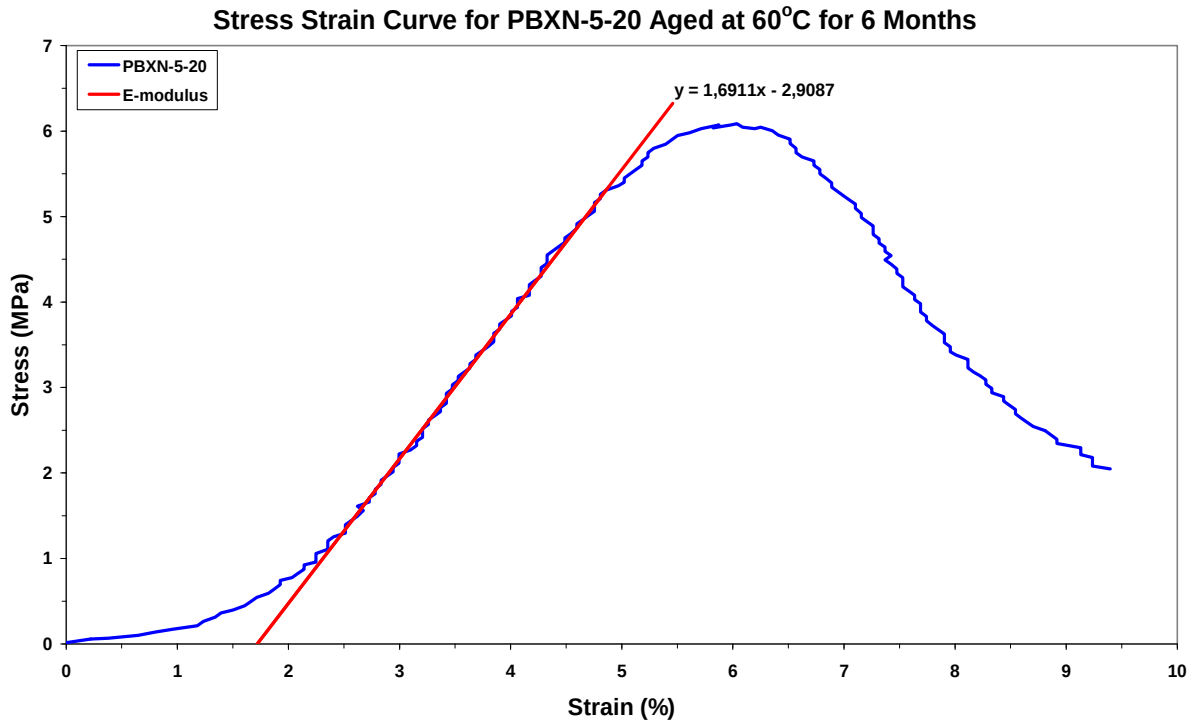
SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.88 mm
Width:
Thickness (Diameter): 19.40 mm
X-Sectional Area (cm^2): 2.956

Form: *Cylindrical*
Preparation Method: *As received L/D=1.1794*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: *Dyno Nobel*
Lot or ID Number: *DDP05K0025-0003, Pellet No PBXN-5-20*
Preconditioning:
Condition Period:

Composition: ***PBXN-5, Type I, Class 3***

Component	Percent
HMX	95.1
Viton	4.9
Graphite (added)	0.5



Max STRESS: 6. 071 MPa STRAIN at Max Stress: 5.98 % E-Modulus: 169.11 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION

Laboratory: FFI
Date: 3 May 2008
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 1 May 2008
POC: Gunnar Ove Nevstad

TEST CONDITIONS

Temperature (^{o}C): 20
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

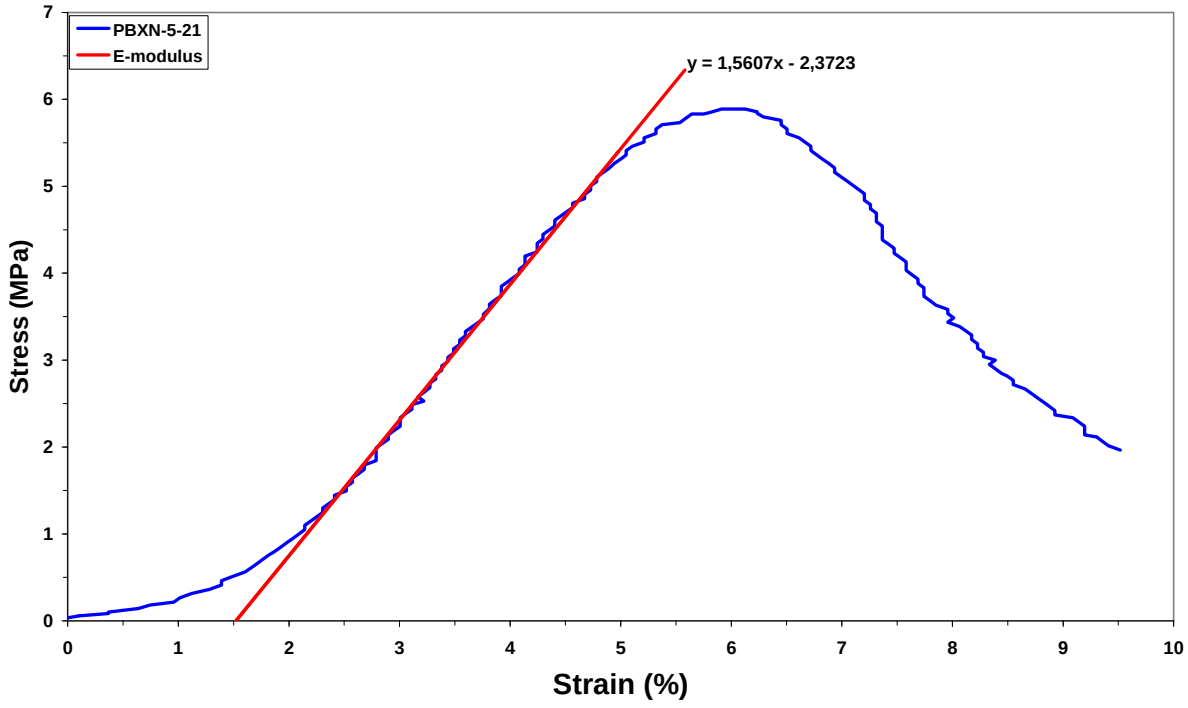
SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.68 mm
Width:
Thickness (Diameter): 19.40 mm
X-Sectional Area (cm^2):2.956

Form: Cylindrical
Preparation Method: *As received L/D=1.1691*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: Dyno Nobel
Lot or ID Number: *DDP05K0025-0003, No PBXN-5-21*
Preconditioning:
Condition Period:
Composition: ***PBXN-5, Type I, Class 3***

Component	Percent
HMX	95.1
Viton	4.9
Graphite (added	0.5

Stress Strain Curve for PBXN-5-21 Aged at 60^{o}C for 6 Months



Max STRESS: 5.888 MPa STRAIN at Max Stress: 5.91% E-Modulus: 156.07 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION

Laboratory: FFI
Date:3 May 2008
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 1 May 2008 Grip Type:
POC: Gunnar Ove Nevstad

TEST CONDITIONS

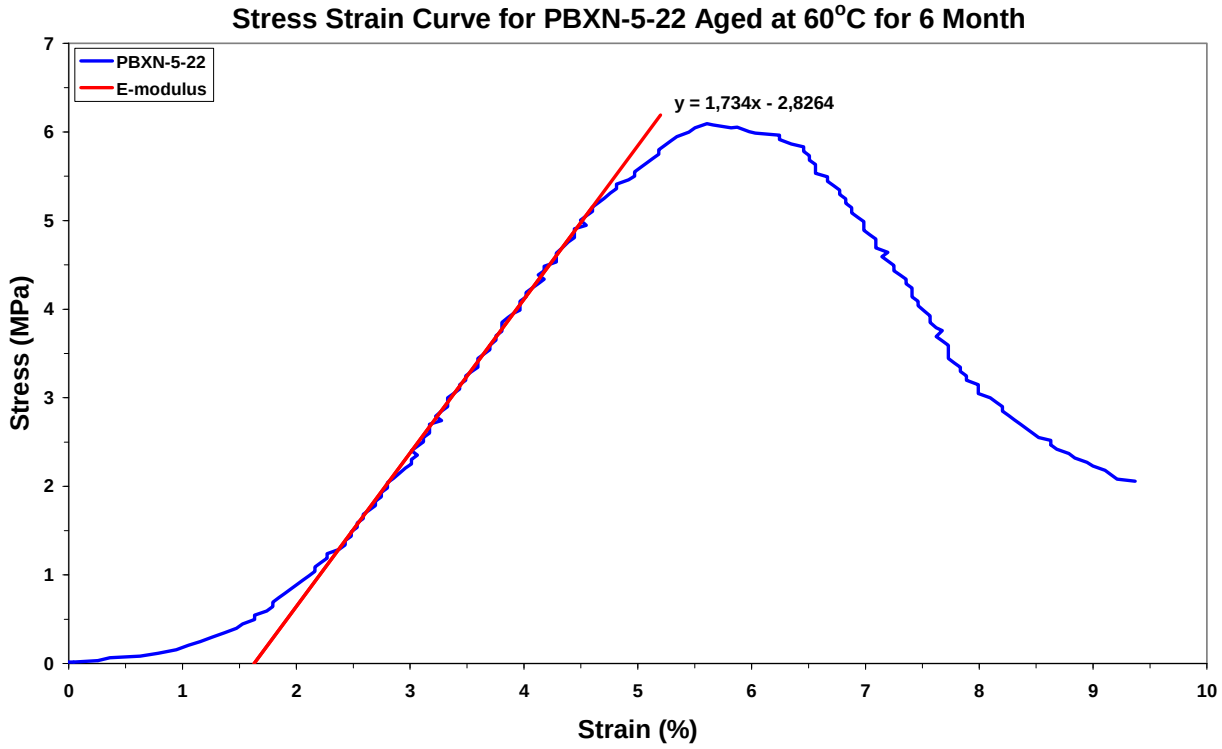
Temperature (^{o}C): 20
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Machine Stiffness (kN/mm):

SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 23.04 mm
Width:
Thickness (Diameter): 19.40 mm
X-Sectional Area (cm^2): 2.956

Form: *Cylindrical*
Preparation Method: *As received L/D=1.1876*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: *Dyno Nobel*
Lot or ID Number: *DDP05K0025-0003, Pellet No PBXN-5-22*
Preconditioning:
Condition Period:
Composition: ***PBXN-5, Type I, Class 3***

Component	Percent
HMX	95.1
Viton	4.9
Graphite (added)	0.5



Max STRESS: 6.095 MPa STRAIN at Max Stress: 5.61 % E-Modulus: 173.4 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION

Laboratory: FFI
Date: 3 May 2008
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 1 May 2008
POC: Gunnar Ove Nevstad

TEST CONDITIONS

Temperature (^{o}C): 20
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

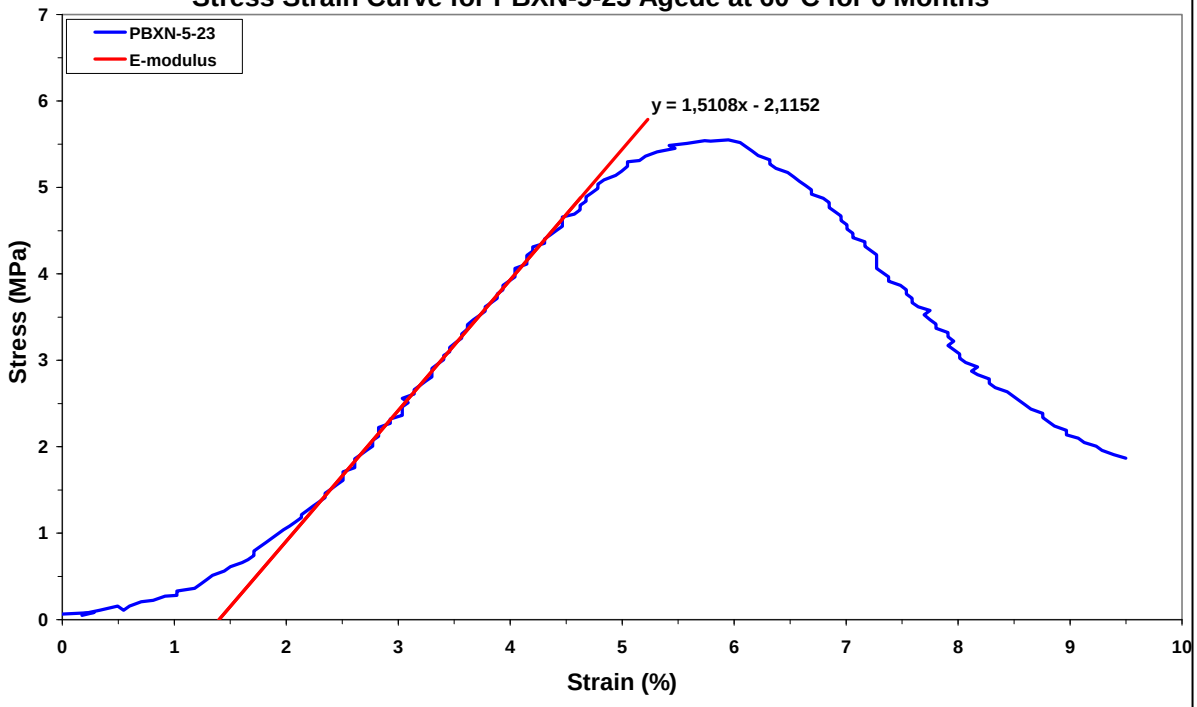
SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 23.05 mm
Width:
Thickness (Diameter): 19.40 mm
X-Sectional Area (cm^2): 2.956

Form: *Cylindrical*
Preparation Method: *As received L/D=1.18811*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: *Dyno Nobel*
Lot or ID Number: *DDP05K0025-0003, Pellet No PBXN-5-23*
Preconditioning:
Condition Period:
Composition: ***PBXN-5, Type I, Class 3***

Component	Percent
HMX	95.1
Viton	4.9
Graphite (added)	0.5

Stress Strain Curve for PBXN-5-23 Agede at 60^{o}C for 6 Months



Max STRESS: 5.533 MPa STRAIN at Max Stress: 5.79 % E-Modulus: 151.08 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION

Laboratory: FFI
Date: 3 May 2008
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 1 May 2008
POC: Gunnar Ove Nevstad

TEST CONDITIONS

Temperature (^{o}C): 20
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

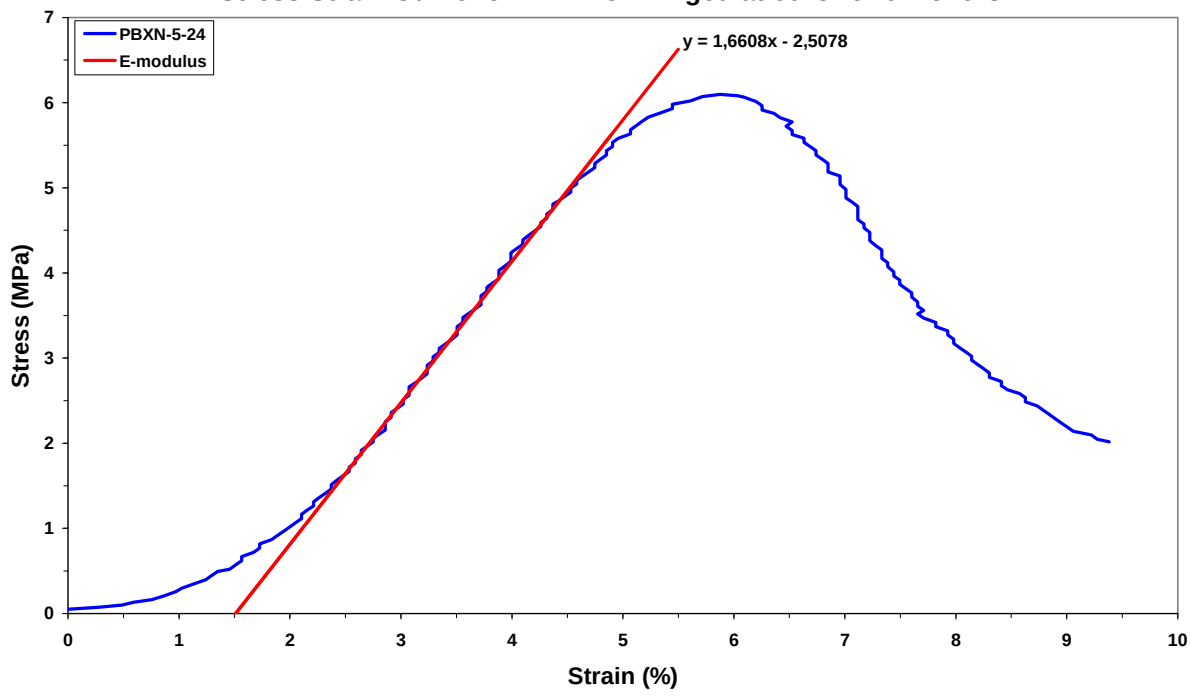
SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.64 mm
Width:
Thickness (Diameter): 19.40 mm
X-Sectional Area (cm^2): 2.956

Form: *Cylindrical*
Preparation Method: *As received L/D=1.1670*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: *Dyno Nobel*
Lot or ID Number: *DDP05K0025-0003, Pellet No PBXN-5-24*
Preconditioning:
Condition Period:
Composition: ***PBXN-5, Type I, Class 3***

Component	Percent
HMX	95.1
Viton	4.9
Graphite (added)	0.5

Stress Strain Curve for PBXN-5-24 Aged at 60^{o}C for 6 Months



Max STRESS: 6.095 MPa STRAIN at Max Stress: 5.877 % E-Modulus: 166.08 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION

Laboratory: FFI
Date: 3 May 2008
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 1 May 2008
POC: Gunnar Ove Nevstad

TEST CONDITIONS

Temperature (^{o}C): 20
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

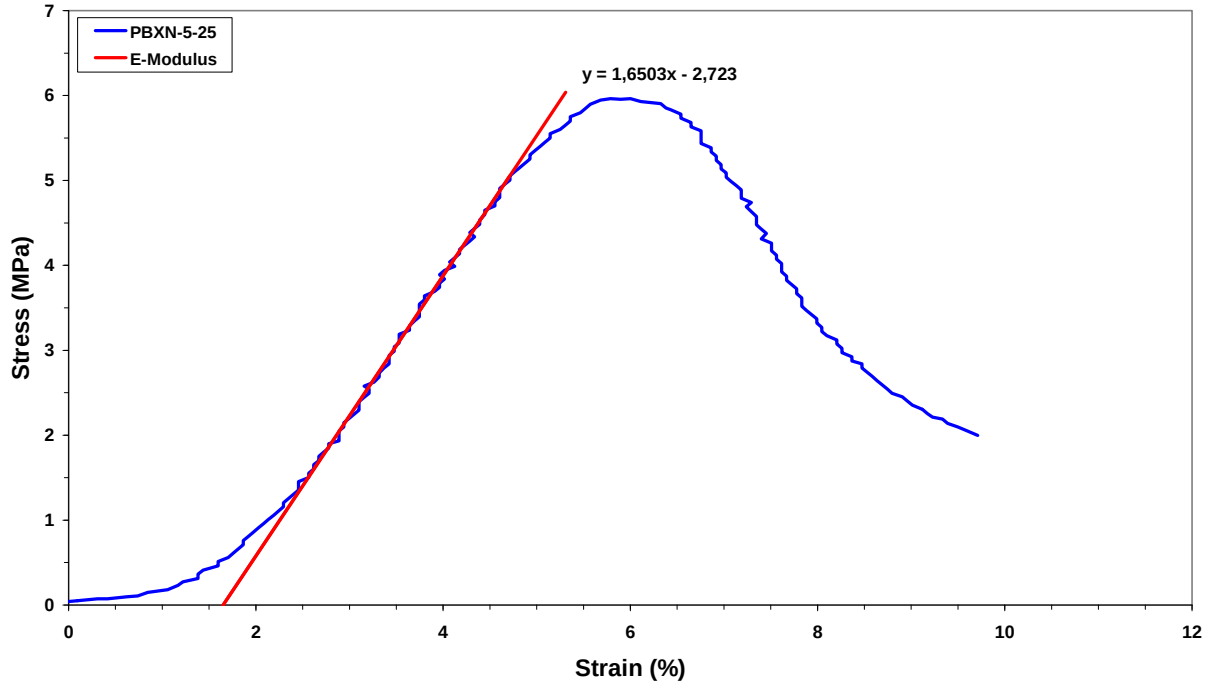
SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.72 mm
Width:
Thickness (Diameter): 19.40 mm
X-Sectional Area (cm^2): 2.956

Form: *Cylindrical*
Preparation Method: *As received L/D=1.1711*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: *Dyno Nobel*
Lot or ID Number: *DDP05K0025-0003, Pellet No PBXN-5-25*
Preconditioning:
Condition Period:
Composition: ***PBXN-5, Type I, Class 3***

Component	Percent
HMX	95.1
Viton	4.9
Graphite (added)	0.5

Stress Strain Curve for PBXN-5-25 Aged at 60^{o}C for 6 Months



Max STRESS: 5.963 MPa STRAIN at Max Stress: 5.79 % E-Modulus: 165.03 MPa

A.6 PBXW-11 aged at 60°C for 6 months

TEST REPORT SHEET
Uniaxial Compressive Test Page 1 of 7 Pages

TEST SITE INFORMATION	TEST CONDITIONS
Laboratory: FFI	Temperature (°C): 20
Date: 3 May 2008	Relative Humidity (%): NA
Test Procedure:	X-Head Speed (mm/sec): 50
NATO Test Procedure Number: 102.01	Machine Type: MTS Servo Hydraulic Tester
Date Tested: 1 May 2008	Grip Type:
POC: Gunnar Ove Nevstad	Machine Stiffness (kN/mm):

SPECIMEN INFORMATION

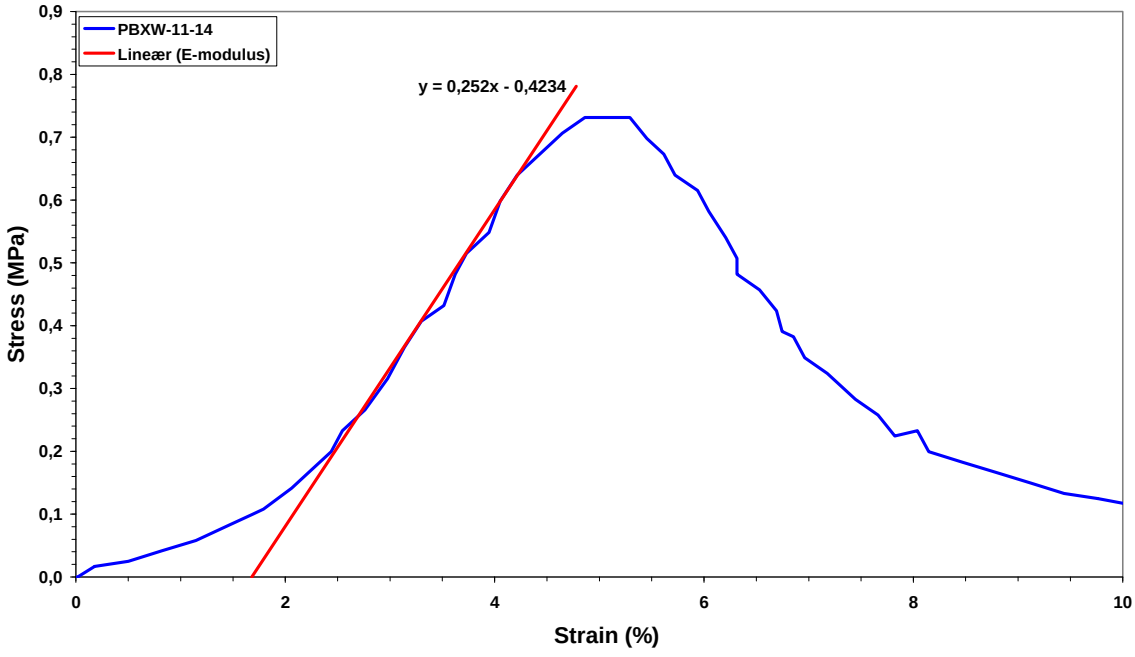
Dimensions: Length (Gage Length): 22.67 mm
Width:
Thickness (Diameter): 19.34 mm
X-Sectional Area (cm^2): 2.938

Form: Cylindrical
Preparation Method: *As received L/D=1.1722*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: *Dyno Nobel*
Lot or ID Number: *DDP07C0007E, Pellet No PBXW-11-7*
Preconditioning:
Condition Period:

Composition: PBXW-11

Component	Percent
HMX	96.2
DOA	2.7
HYTEMP	1.1
Graphite (added)	0.5

Stress Strain Curve for PBXW-11-14 Aged at 60°C for 6 Monhts



Max STRESS: 0.731 MPa STRAIN at Max Stress: 4.862 % E-Modulus: 25.2 MPa

TEST REPORT SHEET

Uniaxial Compressive Test Page 2 of 7 Pages

TEST SITE INFORMATION

Laboratory: FFI
Date: 3 May 2008
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 1 May 2008
POC: Gunnar Ove Nevstad

TEST CONDITIONS

Temperature (^{o}C): 20
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

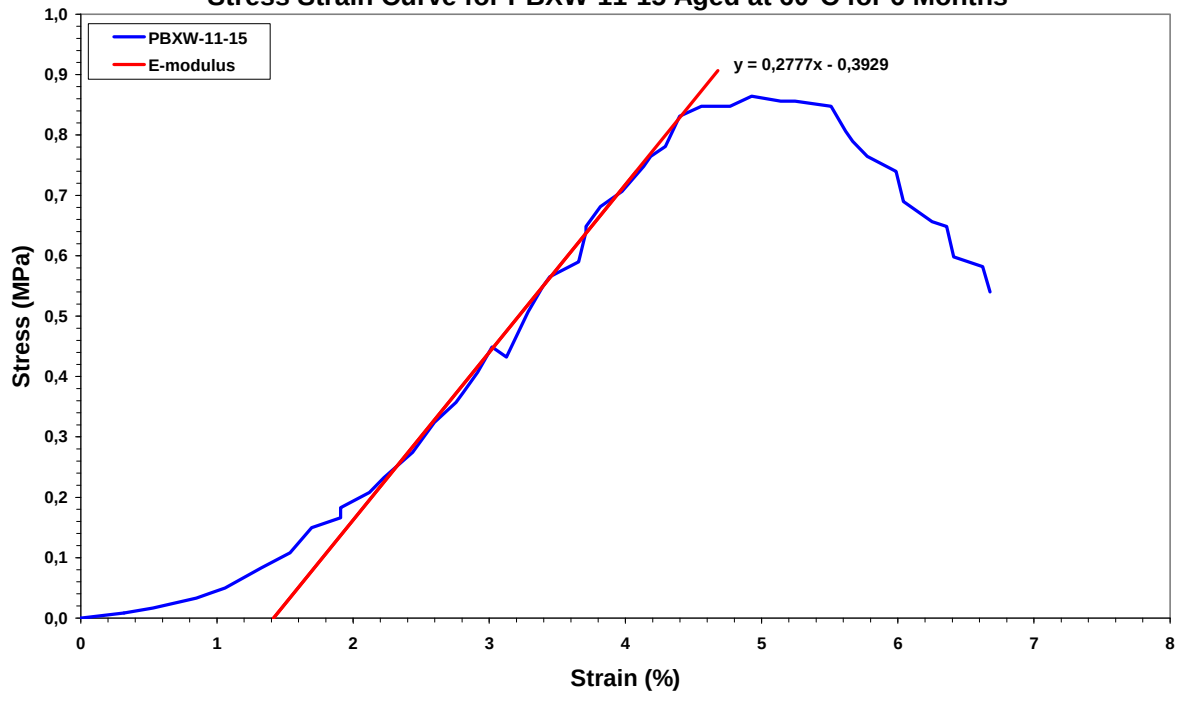
SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 23.04 mm
Width:
Thickness (Diameter): 19.34 mm
X-Sectional Area (cm^2): 2.938

Form: Cylindrical
Preparation Method: *As received L/D=1.1913*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: *Dyno Nobel*
Lot or ID Number: *DDP07C0007E, NoPBXW-11-15*
Preconditioning:
Condition Period:
Composition: PBXW-11

Component	Percent
HMX	96.2
DOA	2.7
Hytemp	1.1
Graphite (added)	0.5

Stress Strain Curve for PBXW-11-15 Aged at 60°C for 6 Months



Max STRESS: 0.864 MPa STRAIN at Max Stress: 4.928 % E-Modulus: 27.77 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION

Laboratory: FFI
Date: 3 May 2008
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 1 May 2008
POC: Gunnar Ove Nevstad

TEST CONDITIONS

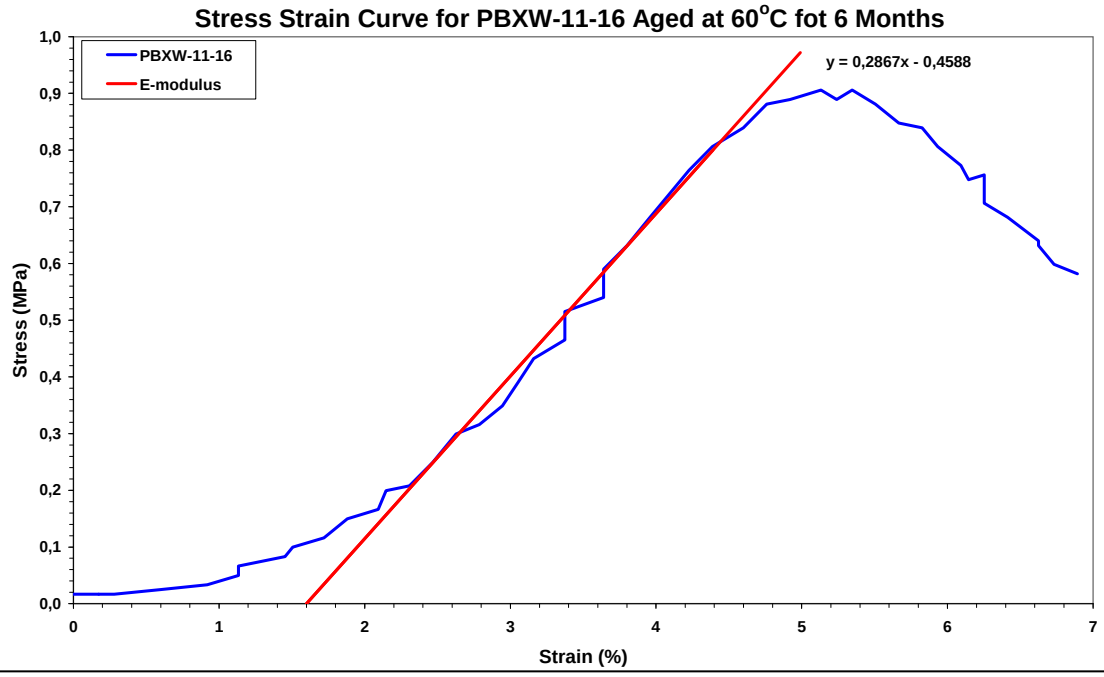
Temperature (^{o}C): 20
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.89 mm
Width:
Thickness (Diameter):19.34 mm
X-Sectional Area (cm^2) 2.938

Form: *Cylindrical*
Preparation Method: *As received L/D=1.836*
Manufacturing Method: P*ressed. Force 2030 kp/cm^2, (203 MPa).*
Source: *Dyno Nobel*
Lot or ID Number: *DDP07C0007E, Pellet No PBXW-11-16*
Preconditioning:
Condition Period:
Composition: PBXW-11

Component	Percent
HMX	96.2
Hytemp	1.1
DOA	2.7
Graphite (added)	0.5



Max STRESS: 0.906 MPa STRAIN at Max Stress: 5.13 % E-Modulus: 28.67 MPa

TEST REPORT SHEET

Uniaxial Compressive Test Page 4 of 7 Pages

TEST SITE INFORMATION

Laboratory: FFI
Date: 3 May 2008
Test Procedure:
NATO Test Procedure Number: 102.01
Date Tested: 1 May 2008
POC: Gunnar Ove Nevstad

TEST CONDITIONS

Temperature (^{o}C): 20
Relative Humidity (%): NA
X-Head Speed (mm/sec): 50
Machine Type: MTS Servo Hydraulic Tester
Grip Type:
Machine Stiffness (kN/mm):

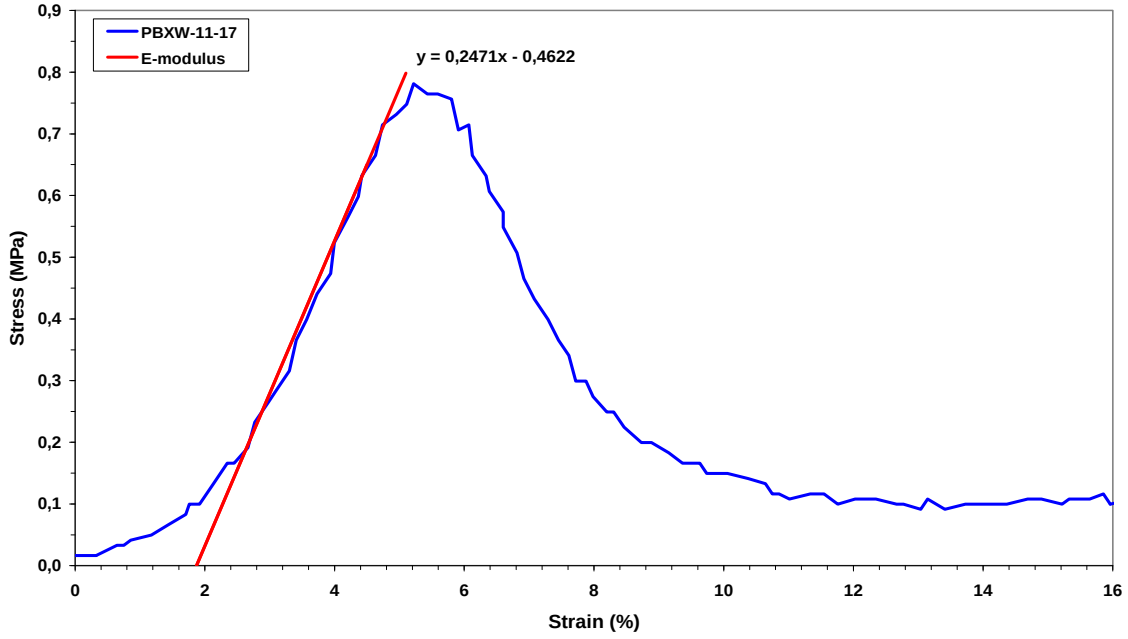
SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.95 mm
Width:
Thickness (Diameter):19.34 mm
X-Sectional Area (cm^2): 2.938

Form: *Cylindrical*
Preparation Method: *As received L/D=1.1867*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: *Dyno Nobel*
Lot or ID Number: *DDP07C0007E, Pellet No PBXW-11-17*
Preconditioning:
Condition Period:
Composition: PBXW-11

Component	Percent
HMX	96.2
DOA	2.7
Hytemp	1.1
Graphite (added)	0.5

Stress Strain Curve for PBXW-11-17 Aged at 60^{o}C for 6 Months



Max STRESS: 0.781 MPa STRAIN at Max Stress: 5.218 % E-Modulus: 24.71 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION	TEST CONDITIONS
Laboratory: FFI	Temperature (°C): 20
Date: 3 May 2008	Relative Humidity (%): NA
Test Procedure:	X-Head Speed (mm/sec): 50
NATO Test Procedure Number: 102.01	Machine Type: MTS Servo Hydraulic Tester
Date Tested: 1 May 2008	Grip Type:
POC: Gunnar Ove Nevstad	Machine Stiffness (kN/mm):

SPECIMEN INFORMATION

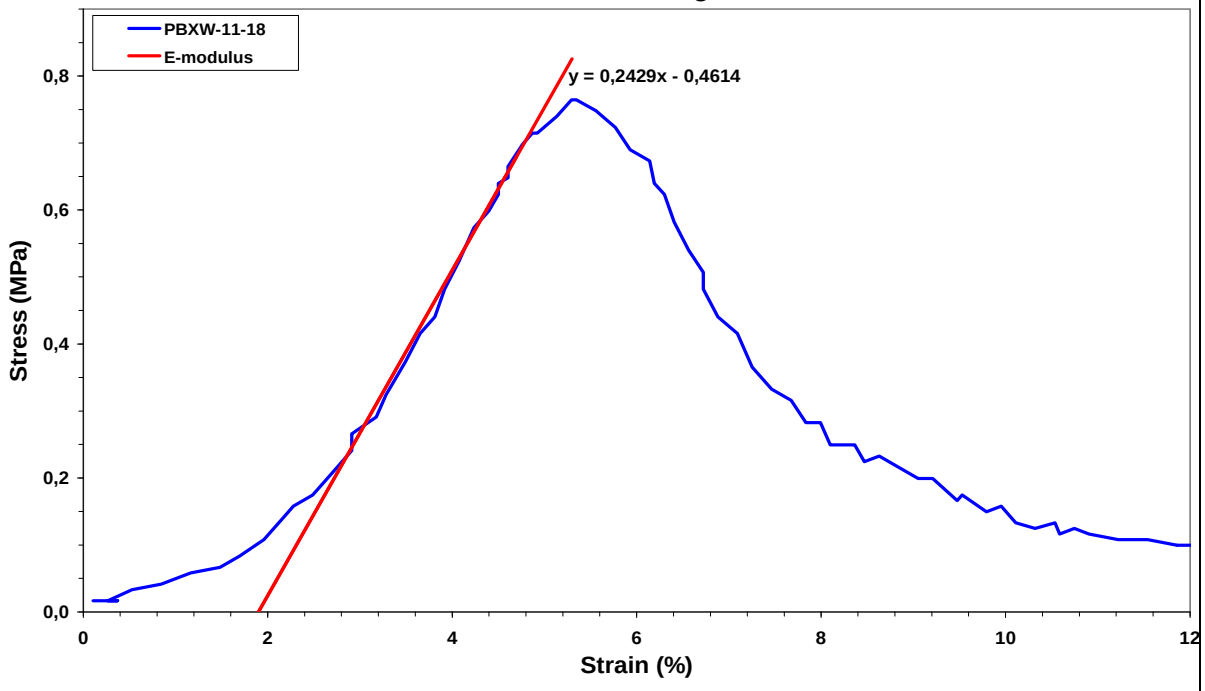
Dimensions: Length (Gage Length): 23.06 mm
Width:
Thickness (Diameter): 19.34 mm
X-Sectional Area (cm^2): 2.934

Form: *Cylindrical*
Preparation Method: *As received L/D=1.1923*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: *Dyno Nobel*
Lot or ID Number: *DDP07C0007E, Pellet No PBXW-11-18*
Preconditioning:
Condition Period:

Composition: ***PBXW-11***

Component	Percent
HMX	96.2
DOA	2.7
Hytemp	1.1
Graphite (added)	

Stress Strain Curve for PBXW-11-18 Aged at 60°C for 6 Months



Max STRESS: 0.765 MPa STRAIN at Max Stress: 5.346 % E-Modulus: 24.29 MPa

TEST REPORT SHEET

Uniaxial Compressive Test Page 6 of 7 Pages

TEST SITE INFORMATION	TEST CONDITIONS
Laboratory: FFI	Temperature (°C): 20
Date: 3 May 2008	Relative Humidity (%): NA
Test Procedure:	X-Head Speed (mm/sec): 50
NATO Test Procedure Number: 102.01	Machine Type: MTS Servo Hydraulic Tester
Date Tested: 1 Mayy 2008	Grip Type:
POC: Gunnar Ove Nevstad	Machine Stiffness (kN/mm):

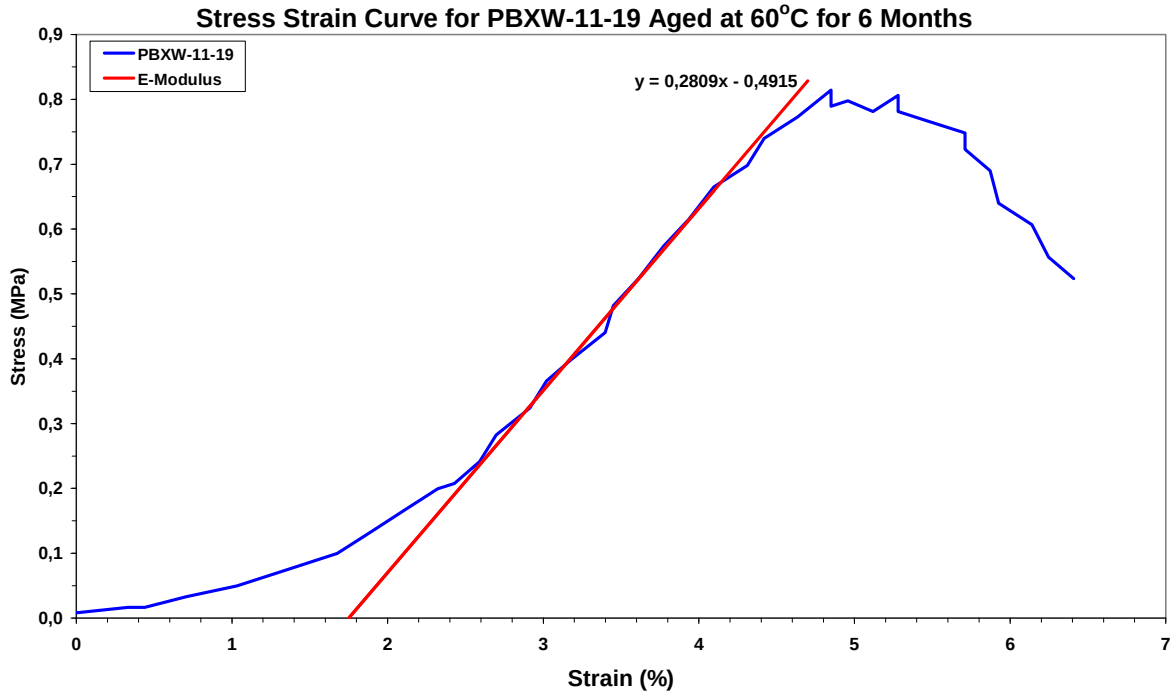
SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.70 mm
Width:
Thickness (Diameter):19.34 mm
X-Sectional Area (cm^2): 2.938

Form: *Cylindrical*
Preparation Method: *As received L/D=1.1737*
Manufacturing Method: *Pressed. Force 2030 kp/cm^2, (203 MPa).*
Source: *Dyno Nobel*
Lot or ID Number: *DDP07C0007E, Pellet No PBXW-11-19*
Preconditioning:
Condition Period:

Composition: ***PBXW-11***

Component	Percent
HMX	96.2
DOA	2.7
Hytemp	1.1
Graphite (added)	0.5



Max STRESS: 0.814 MPa STRAIN at Max Stress: 4.849 % E-Modulus: 28.09 MPa

TEST REPORT SHEET

Uniaxial Compressive Test

TEST SITE INFORMATION	TEST CONDITIONS
Laboratory: FFI	Temperature (°C): 20
Date: 3 May 2008	Relative Humidity (%): NA
Test Procedure:	X-Head Speed (mm/sec): 50
NATO Test Procedure Number: 102.01	Machine Type: MTS Servo Hydraulic Tester
Date Tested: 1 May 2008	Grip Type:
POC: Gunnar Ove Nevstad	Machine Stiffness (kN/mm):

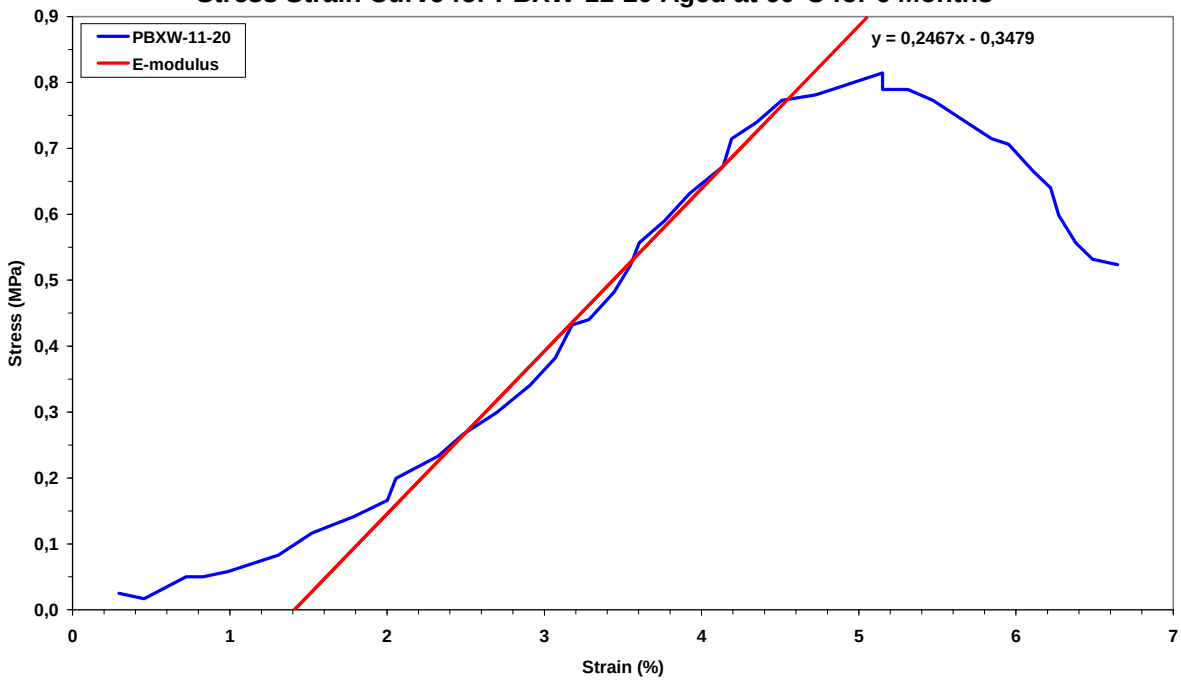
SPECIMEN INFORMATION

Dimensions: Length (Gage Length): 22.87 mm
Width:
Thickness (Diameter): 19.34 mm
X-Sectional Area (cm^2): 2.938

Form: *Cylindrical*
Preparation Method: *As received L/D=1.1825*
Manufacturing Method: Pressed. *Force 2030 kp/cm^2, (203 MPa).*
Source: *Dyno Nobel*
Lot or ID Number: *DDP07C0007E, Pellet No PBXW-11-20*
Preconditioning:
Condition Period:
Composition: PBXW-11

Component	Percent
HMX	96.2
DOA	2.7
Hytemp	1.1
Graphite (added)	0.5

Stress Strain Curve for PBXW-11-20 Aged at 60°C for 6 Months



Max STRESS: 0.814 MPa STRAIN at Max Stress: 5.152 % E-Modulus: 24.67 MPa

References

(1) NATO/MAS (1998): STANAG 4443 PPS (Edition 1), ”Explosive Uniaxial Compressive Test”. MAS/285-PPS/4443, 14 July.