
















Tensile Test report-Films, Zwick Roell ZO.5

Heading : Tensile Test report-Films, Zwick Roell ZO.5, *Normal Grips used*
 Customer : Internal
 Job no. : R2012-002745 *Nogashira C.R.*
 Test standard : OP-114 *22-Dec-2020*
 Equipment : Zwick Single Column UTM Table Top; Tag 743
 Material : B2012-000013464; Sample 1A
 Test Environment : 23±2°C, 50±10%RH
 Specimen type : Rectangular strip, Min. 100mm length
 Pre-treatment : Min 40hrs, 23±2°C, 50±10%RH
 Tester : NSM
 Test Date : 22-Dec-2020
 Comments : Thickness Gauge Used Tag No 666
 Speed, tensile modulus : 5 mm/min
 Test speed : 500 mm/min

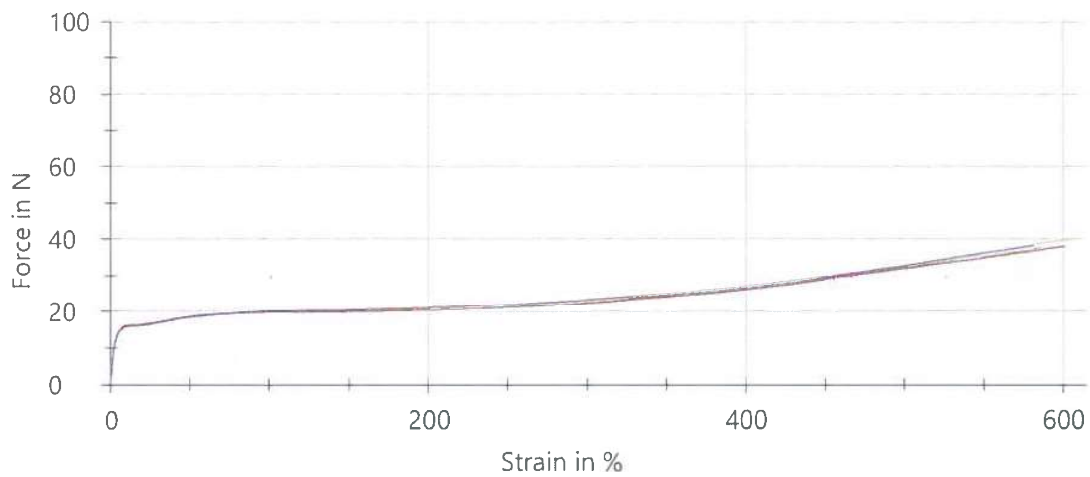
Test results:

Legend	No.	Sample Direction	1%Secant Modulus MPa	Tensile Strength at Yeild MPa	UTS MPa	Strain at UTS %
	1	MD	456	-	38.3	-
	2	MD	463	-	40.5	-
	3	MD	423	-	40.8	-
	4	MD	431	-	41.7	-
	5	MD	456	-	39.1	-

Legend	No.	Tensile Stress at Break MPa	Elongation at Yeild %	Elongation at Break %	Energy to break mJ/mm ³
	1	38.3	-	580	150
	2	40.5	-	590	150
	3	40.8	-	600	160
	4	41.7	-	610	160
	5	39.1	-	580	150

Legend	No.	Thickness Width	
		μm	mm
	1	63	15
	2	62	15
	3	62	15
	4	64	15
	5	65	15

Series graph:



Statistics:






Series	1%Secant Modulus	Tensile Strength at Yeild	Tensile Stress at Break	Elongation at Yeild
n = 5	MPa	MPa	MPa	%
\bar{x}	446	-	40.1	-
s	18.0	-	1.36	-
v [%]	4.03	-	3.38	-






Series	Elongation at Break	Energy to break	Thickness	Width
n = 5	%	mJ/mm ³	μm	mm
\bar{x}	590	150	63.2	15
s	13	6.7	1.304	0.000
v [%]	2.24	4.34	2.06	0.00






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 Test standard : OP-114
 Equipment : Zwick Single Column UTM Table Top; Tag 743
 Material : B2012-000013464; Sample 1A, TD
 Test Environment : 23±2°C, 50±10%RH
 Specimen type : Rectangular strip, Min. 100mm length
 Pre-treatment : Min 40hrs, 23±2°C, 50±10%RH
 Tester : NSM
 Test Date : 22-Dec-2020
 Comments : Thickness Gauge Used Tag No 666
 Speed, tensile modulus : 5 mm/min
 Test speed : 500 mm/min

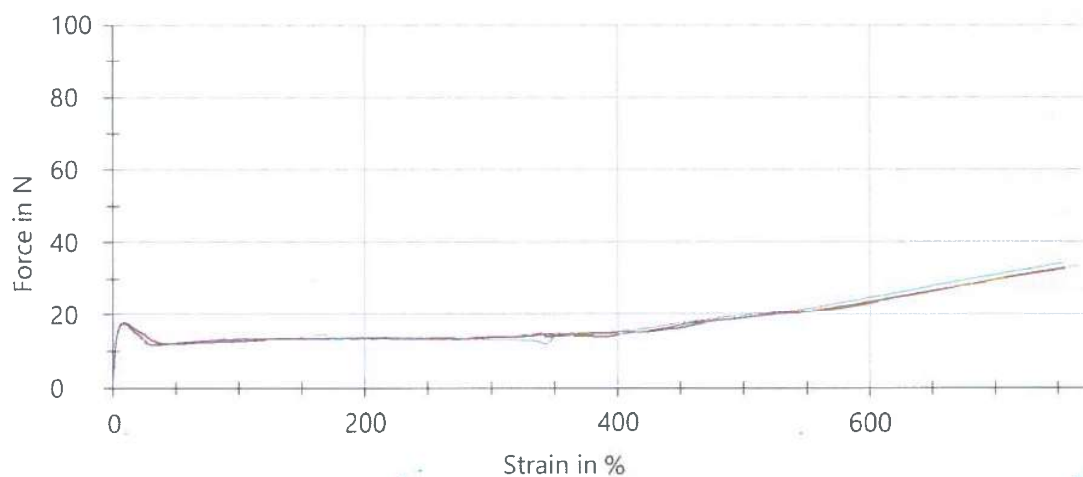
Test results:

Legend	No.	Sample Direction	1%Secant Modulus MPa	Tensile Strength at Yeild MPa	UTS MPa	Strain at UTS %
	1	TD	563	19.2	36.7	-
	2	TD	577	19.2	36.8	-
	3	TD	568	19.0	35.2	-
	4	TD	542	18.6	33.9	-
	5	TD	558	18.7	25.4	-

Legend	No.	Tensile Stress at Break MPa	Elongation at Yeild %	Elongation at Break %	Energy to break mJ/mm ³
	1	36.7	8.6	770	150
	2	36.8	8.7	750	150
	3	35.2	8.9	760	150
	4	33.9	8.7	750	140
	5	25.4	8.7	610	100

Legend	No.	Thickness Width	
		μm	mm
	1	61	15
	2	62	15
	3	62	15
	4	63	15
	5	62	15

Series graph:



Statistics:






Series	1%Secant Modulus MPa	Tensile Strength at Yeild MPa	Tensile Stress at Break MPa	Elongation at Yeild %
n = 5				
\bar{x}	562	18.9	33.6	8.7
s	12.9	0.250	4.76	0.1
v [%]	2.30	1.32	14.15	1.26






Series	Elongation at Break %	Energy to break mJ/mm^3	Thickness μm	Width mm
n = 5				
\bar{x}	730	140	62	15
s	67	22	0.7071	0.000
v [%]	9.21	15.62	1.14	0.00






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 Test standard : OP-114
 Equipment : Zwick Single Column UTM Table Top; Tag 743
 Material : B2012-000013465; Sample 1B, MD
 Test Environment : 23±2°C, 50±10%RH
 Specimen type : Rectangular strip, Min. 100mm length
 Pre-treatment : Min 40hrs, 23±2°C, 50±10%RH
 Tester : NSM
 Test Date : 22-Dec-2020
 Comments : Thickness Gauge Used Tag No 666
 Speed, tensile modulus : 5 mm/min
 Test speed : 500 mm/min

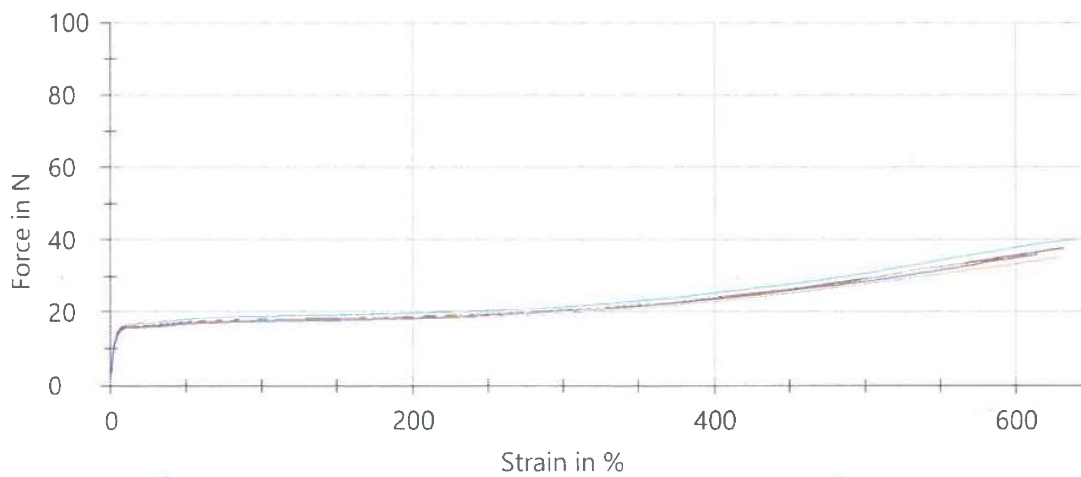
Test results:

Legend	No.	Sample Direction	1%Secant Modulus MPa	Tensile Strength at Yeild MPa	UTS MPa	Strain at UTS %
	1	MD	443	-	38.0	-
	2	MD	481	-	41.7	-
	3	MD	472	-	39.8	-
	4	MD	470	-	39.3	-
	5	MD	460	-	38.0	-

Legend	No.	Tensile Stress at Break MPa	Elongation at Yeild %	Elongation at Break %	Energy to break mJ/mm ³
	1	38.0	-	630	150
	2	41.7	-	640	170
	3	39.8	-	630	160
	4	39.3	-	610	150
	5	38.0	-	610	150

Legend	No.	Thickness Width	
		μm	mm
	1	62	15
	2	64	15
	3	63	15
	4	62	15
	5	63	15

Series graph:



Statistics:

Series 1%Secant Modulus Tensile Strength at Yeild Tensile Stress at Break Elongation at Yeild

n = 5	MPa	MPa	MPa	%
\bar{x}	465	-	39.4	-
s	14.3	-	1.53	-
v [%]	3.07	-	3.88	-

Series Elongation at Break Energy to break Thickness Width






n = 5	%	mJ/mm^3	μm	mm
\bar{x}	630	150	62.8	15
s	12	7.2	0.8367	0.000
v [%]	1.92	4.71	1.33	0.00






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 Comments : Thickness Gauge Used Tag No 666
 Speed, tensile modulus : 5 mm/min
 Test speed : 500 mm/min

Nagashree C.R.
22-Dec-2020

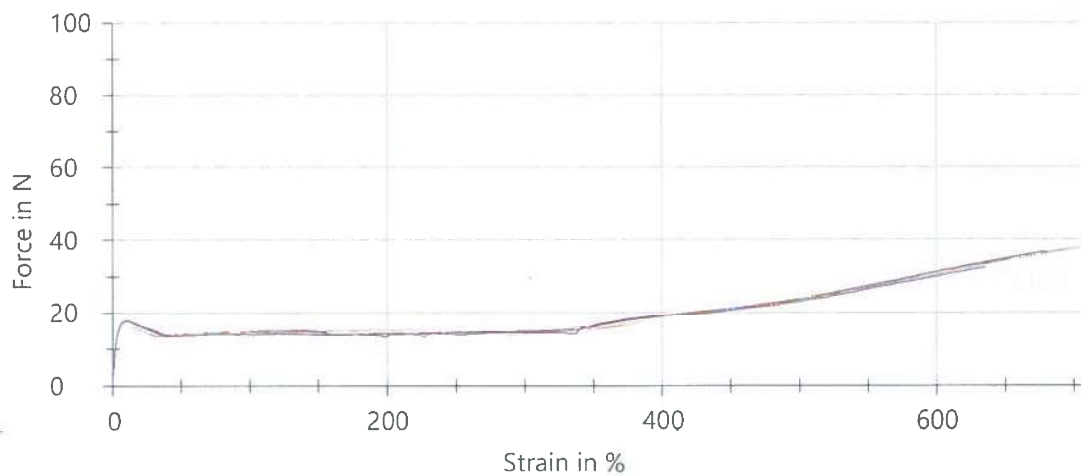
Test results:

Legend	No.	Sample Direction	1%Secant Modulus MPa	Tensile Strength at Yeild MPa	UTS MPa	Strain at UTS %
	1	MD	530	18.2	38.3	-
	2	MD	527	18.2	38.6	-
	3	MD	539	18.7	38.8	-
	4	MD	533	18.3	39.3	-
	5	MD	540	18.7	34.4	-

Legend	No.	Tensile Stress at Break MPa	Elongation at Yeild %	Elongation at Break %	Energy to break mJ/mm ³
	1	38.3	9.2	680	140
	2	38.6	9.8	700	150
	3	38.8	9.9	680	140
	4	39.3	9.4	700	150
	5	34.4	9.8	640	120

Legend	No.	Thickness Width	
		μm	mm
	1	63	15
	2	65	15
	3	63	15
	4	64	15
	5	63	15

Series graph:



Statistics:

Series	1%Secant Modulus	Tensile Strength at Yeild	Tensile Stress at Break	Elongation at Yeild
n = 5	MPa	MPa	MPa	%
\bar{x}	534	18.4	37.9	9.6
s	5.71	0.269	1.99	0.3
v [%]	1.07	1.46	5.26	3.14






Series	Elongation at Break	Energy to break	Thickness	Width
n = 5	%	mJ/mm ³	μm	mm
\bar{x}	680	140	63.6	15
s	28	10	0.8944	0.000
v [%]	4.09	7.10	1.41	0.00






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 Tester : NSM
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 Comments : Thickness Gauge Used Tag No 666
 Speed, tensile modulus : 5 mm/min
 Test speed : 500 mm/min

Nagashree CR - 22-Dec-2020

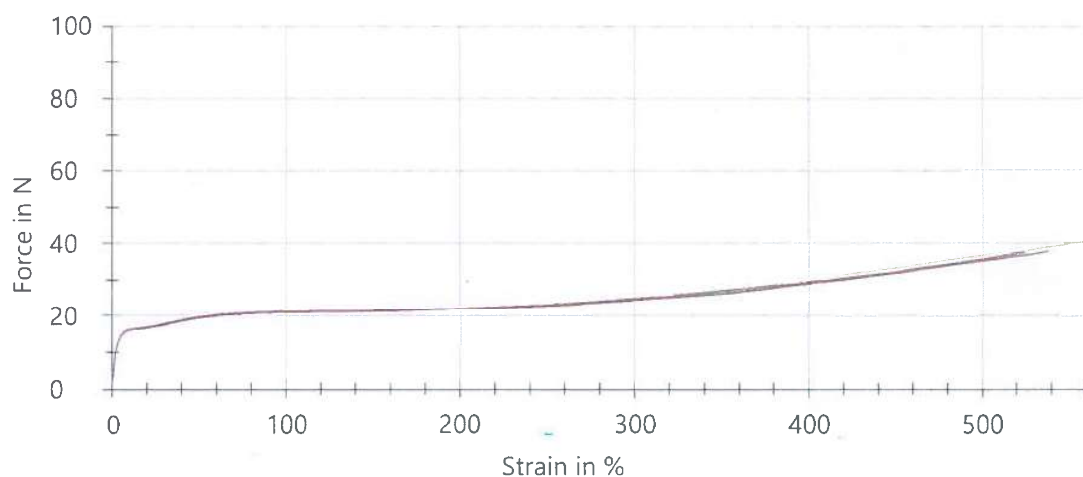
Test results:

Legend	No.	Sample Direction	1%Secant Modulus MPa	Tensile Strength at Yield MPa	UTS MPa	Strain at UTS %
	1	MD	481	-	38.6	-
	2	MD	472	-	41.0	-
	3	MD	478	-	40.7	-
	4	MD	463	-	43.6	-
	5	MD	474	-	40.4	-

Legend	No.	Tensile Stress at Break MPa	Elongation at Yield %	Elongation at Break %	Energy to break mJ/mm ³
	1	38.6	-	510	130
	2	41.0	-	530	140
	3	40.7	-	540	150
	4	43.6	-	550	160
	5	40.4	-	520	140

Legend	No.	Thickness Width	
		μm	mm
	1	62	15
	2	61	15
	3	62	15
	4	61	15
	5	62	15

Series graph:



Statistics:

Series	1%Secant Modulus	Tensile Strength at Yeild	Tensile Stress at Break	Elongation at Yeild
n = 5	MPa	MPa	MPa	%
\bar{x}	474	-	40.9	-
s	6.77	-	1.82	-
v [%]	1.43	-	4.46	-






Series	Elongation at Break	Energy to break	Thickness	Width
n = 5	%	mJ/mm ³	μm	mm
\bar{x}	530	140	61.6	15
s	17	8.9	0.5477	0.000
v [%]	3.26	6.14	0.89	0.00






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 Comments : Thickness Gauge Used Tag No 666
 Speed, tensile modulus : 5 mm/min
 Test speed : 500 mm/min

*Nagashree C.S.
22 Dec-2020*

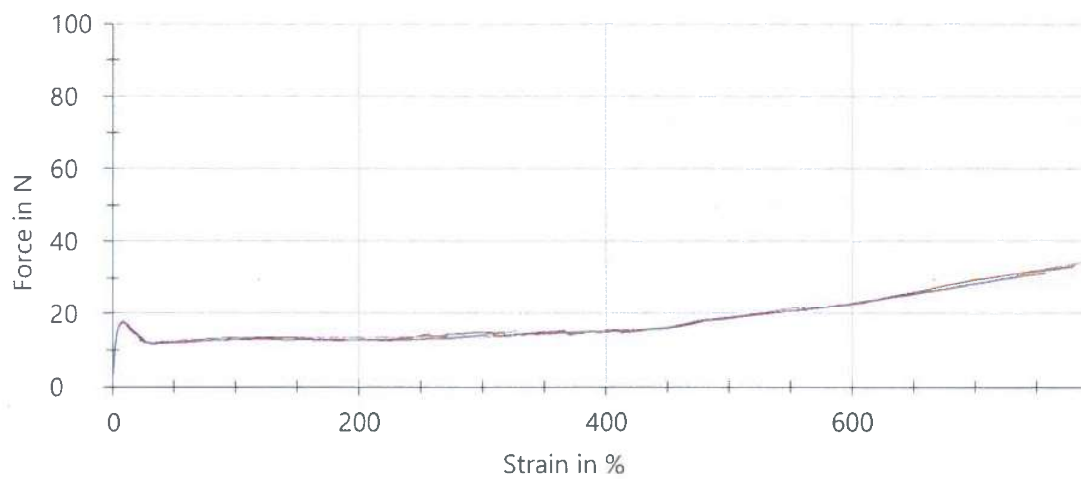
Test results:

Legend	No.	Sample Direction	1%Secant Modulus MPa	Tensile Strength at Yeild MPa	UTS MPa	Strain at UTS %
	1	TD	579	18.8	36.3	-
	2	TD	570	18.6	35.1	-
	3	TD	575	18.8	35.5	-
	4	TD	576	18.9	36.4	-
	5	TD	569	18.6	33.8	-

Legend	No.	Tensile Stress at Break MPa	Elongation at Yeild %	Elongation at Break %	Energy to break mJ/mm ³
	1	36.3	8.0	780	150
	2	35.1	8.5	780	150
	3	35.5	8.6	780	150
	4	36.4	8.1	790	160
	5	33.8	8.5	760	140

Legend	No.	Thickness Width	
		μm	mm
	1	62	15
	2	63	15
	3	62	15
	4	63	15
	5	62	15

Series graph:



Statistics:






Series	1%Secant Modulus	Tensile Strength at Yeild	Tensile Stress at Break	Elongation at Yeild
n = 5	MPa	MPa	MPa	%
\bar{x}	574	18.8	35.4	8.3
s	4.18	0.125	1.08	0.3
v [%]	0.73	0.67	3.04	3.02






Series	Elongation at Break	Energy to break	Thickness	Width
n = 5	%	mJ/mm ³	μm	mm
\bar{x}	780	150	62.4	15
s	13	5.3	0.5477	0.000
v [%]	1.63	3.51	0.88	0.00






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 Job no. : R2012-002745 *22-Dec-2020*
 Test standard : OP-114
 Equipment : Zwick Single Column UTM Table Top; Tag 743
 Material : B2012-000013467; Sample 1D, MD
 Test Environment : 23±2°C, 50±10%RH
 Specimen type : Rectangular strip, Min. 100mm length
 Pre-treatment : Min 40hrs, 23±2°C, 50±10%RH
 Tester : NSM
 Test Date : 22-Dec-2020
 Comments : Thickness Gauge Used Tag No 666
 Speed, tensile modulus : 5 mm/min
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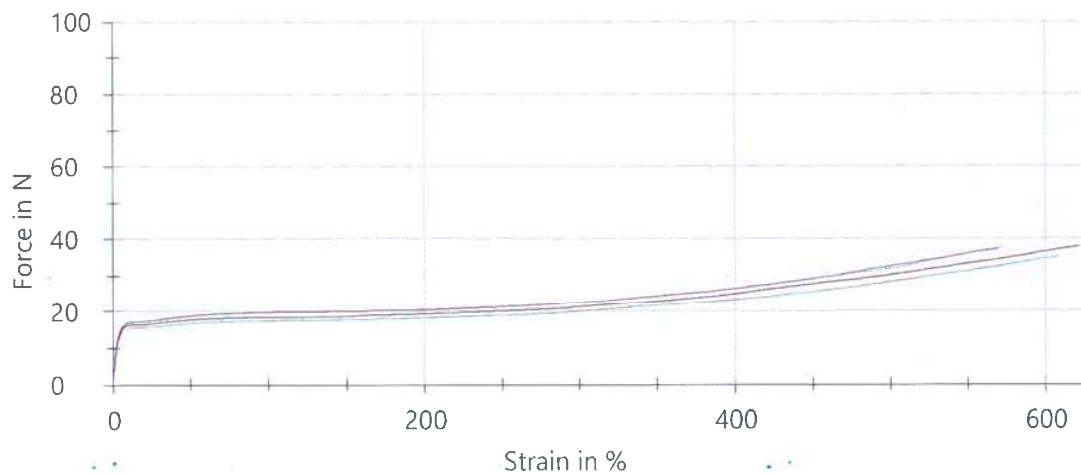
Test results:

Legend	No.	Sample Direction	1%Secant Modulus MPa	Tensile Strength at Yeild MPa	UTS MPa	Strain at UTS %
	1	MD	473	-	36.3	-
	2	MD	481	-	38.9	-
	3	MD	484	-	40.1	-
	4	MD	483	-	38.6	-
	5	MD	483	-	38.1	-

Legend	No.	Tensile Stress at Break MPa	Elongation at Yeild %	Elongation at Break %	Energy to break mJ/mm ³
	1	36.3	-	580	140
	2	38.9	-	610	150
	3	40.1	-	620	160
	4	38.6	-	570	140
	5	38.1	-	570	140

Legend	No.	Thickness Width	
		μm	mm
	1	61	15
	2	60	15
	3	63	15
	4	65	15
	5	65	15

Series graph:



Statistics:

Series	1%Secant Modulus	Tensile Strength at Yeild	Tensile Stress at Break	Elongation at Yeild
n = 5	MPa	MPa	MPa	%
\bar{x}	481	-	38.4	-
s	4.68	-	1.38	-
v [%]	0.97	-	3.60	-






Series	Elongation at Break	Energy to break	Thickness	Width
n = 5	%	mJ/mm ³	μm	mm
\bar{x}	590	140	62.8	15
s	23	7.9	2.28	0.000
v [%]	3.92	5.48	3.63	0.00






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*Nagashree C.R.
22-Dec-2020*

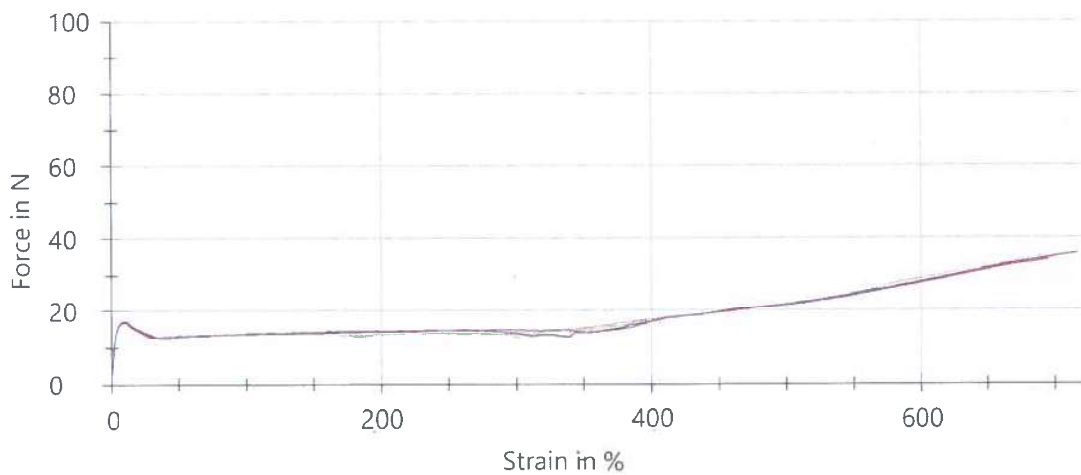
Test results:

Legend	No.	Sample Direction	1%Secant Modulus MPa	Tensile Strength at Yeild MPa	UTS MPa	Strain at UTS %
	1	TD	559	18.8	38.1	-
	2	TD	532	18.1	37.6	-
	3	TD	541	18.4	39.1	-
	4	TD	549	18.8	38.2	-
	5	TD	533	18.6	37.2	-

Legend	No.	Tensile Stress at Break MPa	Elongation at Yeild %	Elongation at Break %	Energy to break mJ/mm ³
	1	38.1	8.6	690	150
	2	37.6	9.2	700	140
	3	39.1	9.0	720	150
	4	38.2	10.0	690	140
	5	37.2	9.2	690	140

Legend	No.	Thickness Width	
		μm	mm
	1	60	15
	2	62	15
	3	61	15
	4	61	15
	5	61	15

Series graph:



Statistics:

Series	1%Secant Modulus	Tensile Strength at Yeild	Tensile Stress at Break	Elongation at Yeild
n = 5	MPa	MPa	MPa	%
\bar{x}	543	18.5	38.0	9.2
s	11.5	0.295	0.742	0.5
v [%]	2.13	1.59	1.95	5.18

Series	Elongation at Break	Energy to break	Thickness	Width
n = 5	%	mJ/mm ³	μm	mm
\bar{x}	700	140	61	15
s	10	4.0	0.7071	0.000
v [%]	1.46	2.75	1.16	0.00