APPENDIXES

Calibration of load cell (weight type). The actual-load method is used as the method of load-cell calibration. The calibration procedure for tensile tests is shown as below.

(1) Attach the weight hanger (system accessory) onto the upper grip and suspend weight receiver.

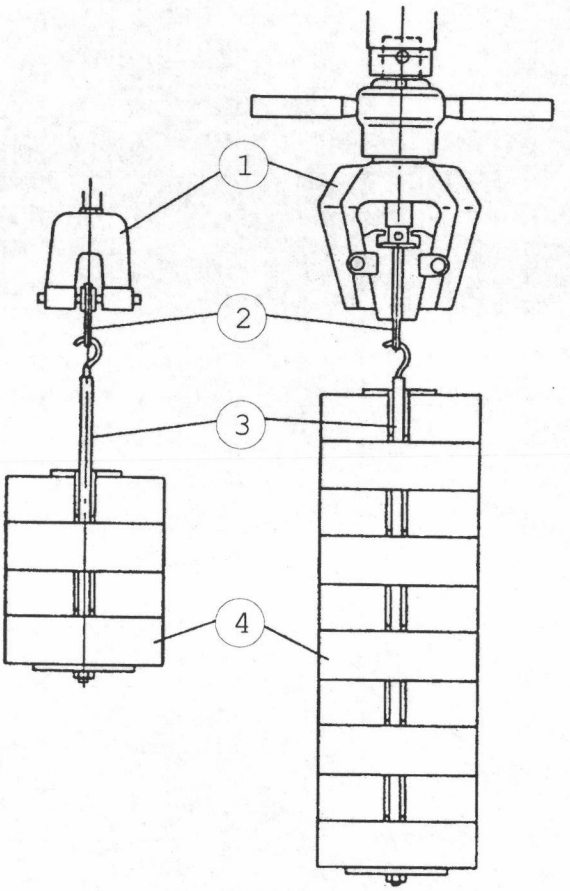
(2) Turn BALANCE dial until the load value reads zero.

(3) As shown in Fig.a, select the calibration weight that is appropriate for the load cell, and set the RANGE selector dial to the magnification range.

(4) Carefully place the calibration weight(s) on the weight receiver, paying attention not to cause shock to the load cell.

(5) Adjust CAL trimmer (load-cell sensitivity adjuster) so that the load value indicates the full-scale load.

(6) Remove the calibration weight(s) and grip that the load value returns to zero. If any deviation occurs, repeat the above steps (2) to (6).



1-Upper grip　　2-Weight receiver

3-Weight hanger　　4-Calibration weight(s)

Fig.a Weight-type load cell calibration

(7) Remove the weight receiver and weight hanger from the upper grip.

(8) After removing the weight receiver and hanger, the load values swings to the negative direction. Then, gradually turn BALANCE dial to adjust the load value to zero. Upon setting the load value to zero, calibration of the load cell is completed.

Calibration of load cell(proving ring type). The actual-load method is used in this test for calibrating the load cell. The calibration procedure for drawing tests is conducted as shown below.

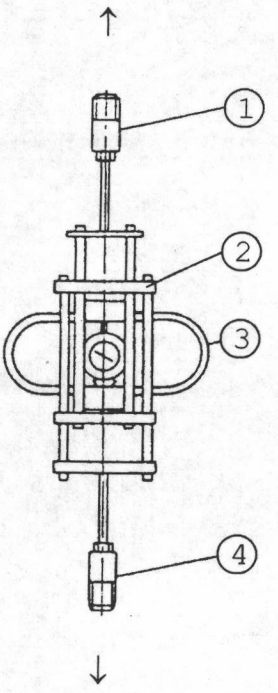
(1) Connect the compression cage to the upper and lower universal joints.

(2) Place a loop (proving ring) in the center of the compression cage.

(3) Turn BALANCE dial to adjust the load value to zero.

(4) As shown in Fig.b, turn RANGE selector to set the magnification range appropriate to the load cell being used.

To be connected to universal joint



To be connected to lower joint

(1) Calibration jig(upper) (2) Compression cage

(3) Loop(proving ring) (4) Calibration jig(lower)

Fig.b Loop type (proving ring type) load cell calibration

(5) Check the zero point of the loop (proving ring) dial gauge.

(6) By moving the crosshead at a low speed, apply loads up to the proper calibration load as specified in Fig.b.

For fine adjustment of crosshead elevation, use MANUAL dial on the crosshead control box.

(7) Adjust CAL trimmer so that the load value indicates the full-scale load.

(8) Move the crosshead in the direction opposite to that in (6) in order to remove the calibration load. Check that the load value returns to zero: otherwise repeat above steps (3) to (8).

(9) Remove the loop and the compression cage.

(10) After removing the above devices, the load value swings to the negative direction. Then, gradually turn BALANCE dial to adjust the load value to zero. Upon setting the load value to zero, calibration of the load cell is complete.

Specimen A, Longitudinal Direction, 10^{-3} mm/s

Sample	Young's Modulus GPa	Yield Strength MPa	Tensile Strength MPa	Uniform Elongation %	Total Elongation %
1	209	483.9	608.7	4.43	4.96
2	212	485.6	611.5	4.38	4.87
3	209	483.5	608.4	4.43	4.98
4	211	485.1	609.8	4.40	4.91
5	210	483.9	609.7	4.42	4.93
6	210	484.2	609.8	4.41	4.92
7	208	483.2	607.9	4.52	5.04
8	213	485.8	612.4	4.35	4.86
9	208	483.2	608.3	4.47	5.01
10	211	485.2	610.7	4.39	4.89
Average	210.1	484.36	609.72	4.420	4.937
Standard Deviation	1.663329993	0.985675177	1.469542635	0.047842334	0.059637796

Specimen A, Longitudinal Direction, $5x10^{-3}$ mm/s

Sample	Young's Modulus GPa	Yield Strength MPa	Tensile Strength MPa	Uniform Elongation %	Total Elongation %
1	209	483.7	608.9	4.42	4.95
2	208	483.4	608.3	4.46	4.99
3	212	485.4	611.6	4.38	4.87
4	208	483.7	608.8	4.43	4.97
5	212	485.2	610.8	4.39	4.89
6	209	484.1	609.6	4.42	4.93
7	211	484.9	609.9	4.40	4.92
8	208	483.3	608.1	4.51	5.02
9	213	485.7	612.3	4.37	4.85
10	209	484.3	609.8	4.41	4.92
Average	209.9	484.37	609.81	4.419	4.931
Standard Deviation	1.91195072	0.873117022	1.393995058	0.04121758	0.053218627

Specimen A, Transverse Direction, 10^{-3} mm/s

Sample	Young's Modulus GPa	Yield Strength MPa	Tensile Strength MPa	Uniform Elongation %	Total Elongation %
1	204	483.8	608.3	4.41	4.92
2	207	484.2	611.2	4.29	4.87
3	204	483.6	607.6	4.42	4.93
4	203	483.2	607.2	4.43	4.94
5	205	483.9	608.6	4.38	4.91
6	204	483.9	608.4	4.39	4.91
7	206	483.9	609.4	4.37	4.89
8	202	482.9	607.1	4.43	4.97
9	206	484.2	610.8	4.35	4.87
10	208	484.3	612.4	4.29	4.85
Average	204.9	483.79	609.10	4.376	4.906
Standard Deviation	1.852925615	0.448330235	1.811077028	0.052323778	0.036575645

Specimen A, Transverse Direction, $5x10^{-3}$ mm/s

Sample	Young's Modulus GPa	Yield Strength MPa	Tensile Strength MPa	Uniform Elongation %	Total Elongation %
1	205	483.9	608.6	4.39	4.89
2	208	484.3	611.2	4.33	4.84
3	204	483.6	607.6	4.43	4.94
4	206	483.9	608.7	4.39	4.88
5	204	483.7	607.9	4.42	4.92
6	203	483.4	607.2	4.45	4.96
7	207	484.1	609.5	4.37	4.87
8	205	483.8	608.4	4.41	4.91
9	209	484.5	612.4	4.31	4.82
10	207	484.2	610.8	4.35	4.86
Average	205.8	483.94	609.23	4.385	4.889
Standard Deviation	1.932183566	0.337309617	1.712081255	0.045030854	0.044083255

Specimen A, Diagonal Direction, 10^{-3} mm/s

Sample	Young's Modulus GPa	Yield Strength MPa	Tensile Strength MPa	Uniform Elongation %	Total Elongation %
1	205	485.7	616.9	4.56	5.04
2	204	485.6	616.8	4.59	5.06
3	203	484.8	614.9	4.65	5.12
4	204	484.9	615.4	4.64	5.11
5	204	485.2	616.4	4.61	5.09
6	208	486.1	617.8	4.44	4.98
7	206	485.8	617.3	4.54	5.03
8	202	483.9	614.2	4.66	5.13
9	206	485.9	617.5	4.51	5.01
10	209	486.3	617.9	4.37	4.76
Average	205.1	485.42	616.51	4.557	5.033
Standard Deviation	2.183269719	0.72541176	1.274057386	0.094991228	0.107914575

Specimen A, Diagonal Direction, $5x10^{-3}$ mm/s

Sample	Young's Modulus GPa	Yield Strength MPa	Tensile Strength MPa	Uniform Elongation %	Total Elongation %
1	206	485.6	617.5	4.59	5.04
2	204	484.8	614.9	4.65	5.09
3	209	485.9	618.3	4.36	4.98
4	204	484.9	616.4	4.64	5.07
5	205	485.2	616.8	4.61	5.06
6	210	486.3	618.7	4.29	4.85
7	203	483.9	614.8	4.66	5.11
8	207	485.8	617.8	4.41	5.02
9	209	485.9	618.6	4.34	4.89
10	207	485.7	617.5	4.44	5.03
Average	206.4	485.40	617.13	4.499	5.014
Standard Deviation	2.412928143	0.707106781	1.404793381	0.144871591	0.084747992

Specimen B, Longitudinal Direction, 10^{-3} mm/s

Sample	Young's Modulus GPa	Yield Strength MPa	Tensile Strength MPa	Uniform Elongation %	Total Elongation %
1	204	369.9	392.5	12.98	13.85
2	201	366.4	389.5	13.55	14.63
3	202	368.5	391.6	13.19	14.16
4	201	366.7	390.1	13.27	14.58
5	203	369.7	392.3	13.06	13.96
6	201	367.6	390.8	13.22	14.37
7	199	364.5	388.9	13.68	15.13
8	202	368.1	391.3	13.21	14.35
9	203	369.4	392.1	13.18	14.13
10	205	370.3	393.4	12.87	12.99
Average	202.1	368.11	391.25	13.221	14.215
Standard Deviation	1.728840331	1.84237166	1.423805542	0.242965475	0.567063586

Specimen B, Longitudinal Direction, $5x10^{-3}$ mm/s

Sample	Young's Modulus GPa	Yield Strength MPa	Tensile Strength MPa	Uniform Elongation %	Total Elongation %
1	202	369.5	392.2	13.18	14.11
2	200	366.6	393.5	13.52	14.63
3	205	370.5	389.5	12.87	12.99
4	201	368.1	393.4	13.21	14.36
5	201	368.2	393.2	13.21	14.31
6	202	368.7	392.6	13.18	14.16
7	199	366.1	394.1	13.69	15.01
8	202	369.5	392.1	13.06	13.96
9	204	370.1	390.1	12.95	13.01
10	203	369.9	391.3	12.97	13.85
Average	201.9	368.72	392.20	13.184	14.039
Standard Deviation	1.791957341	1.479339192	1.506283137	0.254916108	0.640268173

Specimen B, Transverse Direction, 10^{-3} mm/s

Sample	Young's Modulus GPa	Yield Strength MPa	Tensile Strength MPa	Uniform Elongation %	Total Elongation %
1	205	367.4	388.2	11.97	12.78
2	201	362.9	391.3	13.27	13.14
3	203	362.7	390.1	12.87	13.85
4	201	369.4	392.5	13.21	14.37
5	203	363.6	393.4	12.98	13.96
6	206	365.3	392.3	11.68	14.58
7	200	364.5	387.8	13.34	12.99
8	204	366.5	390.2	12.22	12.93
9	203	363.1	388.9	12.61	14.12
10	205	368.1	389.6	11.89	12.19
Average	203.1	365.35	390.43	12.604	13.491
Standard Deviation	1.969207398	2.388979326	1.898566711	0.621614386	0.788112372

Specimen B, Transverse Direction, $5x10^{-3}$ mm/s

Sample	Young's Modulus GPa	Yield Strength MPa	Tensile Strength MPa	Uniform Elongation %	Total Elongation %
1	205	368.3	392.6	11.68	12.42
2	201	363.0	388.3	13.21	13.93
3	203	364.8	390.3	12.86	13.68
4	202	363.1	389.1	13.17	13.88
5	202	363.3	389.7	12.99	13.73
6	200	362.7	387.9	13.31	14.01
7	203	365.4	390.4	12.19	13.01
8	206	369.3	393.9	11.62	12.07
9	203	366.5	391.2	11.93	12.89
10	204	367.7	392.5	11.89	12.67
Average	202.9	365.41	390.59	12.485	13.229
Standard Deviation	1.791957341	2.43194024	1.961547009	0.68446654	0.703379935

Specimen B, Diagonal Direction, 10^{-3} mm/s

Sample	Young's Modulus GPa	Yield Strength MPa	Tensile Strength MPa	Uniform Elongation %	Total Elongation %
1	205	371.1	397.5	12.41	13.27
2	202	365.3	393.6	13.42	14.67
3	204	369.6	396.8	12.82	13.98
4	202	367.4	394.2	13.34	14.46
5	203	367.9	395.3	13.19	14.23
6	201	363.6	389.8	13.49	13.25
7	206	373.5	398.9	11.97	12.28
8	203	368.3	395.6	13.07	14.05
9	206	372.1	398.1	12.09	12.87
10	205	371.9	397.9	12.17	13.07
Average	203.7	369.07	395.77	12.797	13.613
Standard Deviation	1.766981104	3.164051552	2.72602682	0.588728385	0.775615168

Specimen B, Diagonal Direction, $5x10^{-3}$ mm/s

Sample	Young's Modulus GPa	Yield Strength MPa	Tensile Strength MPa	Uniform Elongation %	Total Elongation %
1	206	373.3	398.7	12.03	12.79
2	203	366.5	394.1	13.27	14.53
3	205	372.4	398.4	12.11	12.97
4	203	368.6	394.9	13.26	14.26
5	204	369.5	396.2	13.01	13.96
6	203	369.1	395.9	13.12	14.16
7	202	364.8	390.7	13.39	13.14
8	205	370.7	397.4	12.75	13.88
9	205	372.2	398.2	12.35	13.18
10	206	375.6	399.7	11.92	12.16
Average	204.2	370.27	396.42	12.721	13.503
Standard Deviation	1.398411798	3.247580296	2.681956168	0.568925889	0.763224883

Specimen C, Longitudinal Direction, 10^{-3} mm/s

Sample	Young's Modulus GPa	Yield Strength MPa	Tensile Strength MPa	Uniform Elongation %	Total Elongation %
1	204	268.3	382.5	25.96	27.59
2	206	270.2	388.1	25.09	26.97
3	199	265.1	379.6	26.31	28.96
4	200	266.9	379.7	26.24	27.88
5	199	264.8	378.4	26.49	27.69
6	200	267.1	380.2	26.07	27.84
7	200	267.5	380.8	26.03	27.74
8	205	269.4	384.8	25.82	27.38
9	204	267.9	381.9	25.99	27.71
10	205	269.7	385.6	25.66	27.16
Average	202.2	267.69	382.16	25.966	27.692
Standard Deviation	2.82055944	1.818088129	3.103832756	0.389563859	0.53538771

Specimen C, Longitudinal Direction, $5x10^{-3}$ mm/s

Sample	Young's Modulus GPa	Yield Strength MPa	Tensile Strength MPa	Uniform Elongation %	Total Elongation %
1	204	270.3	386.1	25.65	26.99
2	199	265.8	379.9	26.29	28.76
3	200	268.1	382.3	26.01	27.58
4	199	267.3	380.1	26.22	27.69
5	199	267.8	380.6	26.04	27.63
6	205	270.9	388.5	25.09	26.78
7	203	268.8	382.9	25.96	27.51
8	198	265.3	378.9	26.39	27.49
9	204	270.1	385.4	25.79	27.21
10	203	268.9	383.2	25.94	27.39
Average	201.4	268.33	382.79	25.938	27.503
Standard Deviation	2.633122354	1.86013739	3.096754574	0.372343927	0.52934026

Specimen C, Transverse Direction, 10^{-3} mm/s

Sample	Young's Modulus GPa	Yield Strength MPa	Tensile Strength MPa	Uniform Elongation %	Total Elongation %
1	202	271.7	388.2	25.09	25.58
2	196	266.6	379.1	26.09	28.36
3	197	268.5	380.8	25.58	27.24
4	196	267.9	379.9	25.69	27.27
5	196	267.1	379.7	25.89	27.78
6	201	270.9	384.8	25.42	26.99
7	195	266.3	378.4	26.31	27.04
8	197	269.2	381.9	25.49	27.09
9	199	269.8	382.6	25.46	27.06
10	201	271.2	385.5	25.26	26.39
Average	198	268.92	382.09	25.628	27.080
Standard Deviation	2.538591035	1.957208897	3.185540247	0.375464157	0.739849835

Specimen C, Transverse Direction, $5x10^{-3}$ mm/s

Sample	Young's Modulus GPa	Yield Strength MPa	Tensile Strength MPa	Uniform Elongation %	Total Elongation %
1	201	271.4	385.7	25.09	26.38
2	195	266.9	379.3	25.98	28.35
3	197	268.7	381.4	25.38	27.24
4	196	268.6	380.1	25.49	27.25
5	196	267.3	379.9	25.69	27.76
6	201	271.1	385.2	25.22	26.97
7	197	269.4	382.1	25.28	27.06
8	198	270.1	382.6	25.25	27.05
9	195	266.5	378.6	26.11	27.01
10	201	271.9	388.5	25.06	25.55
Average	197.7	269.19	382.34	25.455	27.062
Standard Deviation	2.45175674	1.926107185	3.208045442	0.362682904	0.743547054

Specimen C, Diagonal Direction, 10^{-3} mm/s

Sample	Young's Modulus GPa	Yield Strength MPa	Tensile Strength MPa	Uniform Elongation %	Total Elongation %
1	197	265.7	380.4	25.65	27.49
2	202	266.9	383.2	25.41	26.52
3	196	261.9	377.9	26.09	27.99
4	195	261.4	377.4	26.38	28.55
5	199	265.9	380.7	25.56	27.36
6	196	262.3	379.1	25.99	27.57
7	197	263.8	379.2	25.78	27.49
8	203	267.7	386.3	24.99	25.78
9	201	266.6	381.5	25.51	27.19
10	195	260.8	376.5	26.45	27.24
Average	198.1	264.30	380.22	25.781	27.318
Standard Deviation	2.960855732	2.556038602	2.929087837	0.453172766	0.75414116

Specimen C, Diagonal Direction, $5x10^{-3}$ mm/s

Sample	Young's Modulus GPa	Yield Strength MPa	Tensile Strength MPa	Uniform Elongation %	Total Elongation %
1	198	266.2	381.3	25.54	27.28
2	197	264.3	379.5	25.78	27.48
3	196	262.5	377.9	26.03	27.86
4	195	261.9	377.4	26.39	28.51
5	201	267.4	384.2	25.11	26.38
6	196	262.6	379.4	25.79	27.49
7	202	268.3	386.7	24.87	25.37
8	200	266.6	381.9	25.34	27.08
9	195	261.2	376.8	26.42	27.15
10	197	266.1	380.7	25.61	27.38
Average	197.7	264.71	380.58	25.688	27.198
Standard Deviation	2.496664441	2.529141268	3.108697476	0.507363556	0.842691455

Strain-Rate Sensitivity of Specimen A, Longitudinal Direction

Strain Rate	Stress at 2% Strain (MPa)										Average	Standard Deviation	m
10^{-3} mm/s	580.4	577.8	581.3	579.5	579.8	578.9	582.6	577.3	581.7	578.2	579.75	1.7557841	0.01093
$5x10^{-3}$ mm/s	590.7	591.6	588.5	591.3	589.1	590.4	589.4	591.9	588.1	589.4	590.04	1.3284912	

Strain-Rate Sensitivity of Specimen A, Transverse Direction

Strain Rate	Stress at 2% Strain (MPa)										Average	Standard Deviation	m
10^{-3} mm/s	578.2	581.1	577.6	577.2	579.2	579.1	580.4	576.8	580.8	582.1	579.25	1.8050854	0.01149
$5x10^{-3}$ mm/s	589.8	591.3	588.9	589.9	589.1	588.5	590.7	589.5	591.7	591.2	590.06	1.1077505	

Strain-Rate Sensitivity of Specimen A, Diagonal Direction

Strain Rate	Stress at 2% Strain (MPa)										Average	Standard Deviation	m
10^{-3} mm/s	588.2	587.7	585.5	586.3	587.1	590.1	588.5	585.4	589.3	590.5	587.86	1.8025907	0.01112
$5x10^{-3}$ mm/s	598.7	597.1	599.8	597.2	597.5	600.2	596.9	599.2	599.8	598.4	598.48	1.2479316	

Strain-Rate Sensitivity of Specimen B, Longitudinal Direction

Strain Rate	Stress at 8% Strain (MPa)										Average	Standard Deviation	m
10^{-3} mm/s	361.9	357.9	359.9	358.3	361.8	359.2	357.8	359.7	360.4	362.5	359.94	1.7030691	0.01102
$5x10^{-3}$ mm/s	366.1	367.2	365.1	367.2	366.8	366.6	368.6	365.5	365.3	365.4	366.38	1.1113555	

Strain-Rate Sensitivity of Specimen B, Transverse Direction

Strain Rate	Stress at 8% Strain (MPa)										Average	Standard Deviation	m
10^{-3} mm/s	358.2	359.7	359.2	360.8	361.4	360.3	357.8	359.4	358.5	358.9	359.42	1.1525816	0.01165
$5x10^{-3}$ mm/s	367.5	365.2	366.1	365.5	365.9	364.8	366.2	367.5	366.4	367.1	366.22	0.929516	

Strain-Rate Sensitivity of Specimen B, Diagonal Direction

Strain Rate	Stress at 8% Strain (MPa)										Average	Standard Deviation	m
10^{-3} mm/s	362.5	359.9	362.3	360.1	361.7	359.8	363.5	361.9	363.2	362.9	361.78	1.3870833	0.01118
$5x10^{-3}$ mm/s	370.5	365.8	370.1	367.2	368.4	367.4	365.1	368.7	369.7	370.6	368.35	1.9432218	

Strain-Rate Sensitivity of Specimen C, Longitudinal Direction

Strain Rate	Stress at 15% Strain (MPa)										Average	Standard Deviation	m
10^{-3} mm/s	367.2	368.9	364.7	364.8	363.9	365.3	366.8	367.6	366.9	368.6	366.47	1.7140271	0.0187
$5x10^{-3}$ mm/s	379.8	375.2	377.5	376.4	376.9	379.8	378.6	374.9	378.9	378.7	377.67	1.7801685	

Strain-Rate Sensitivity of Specimen C, Transverse Direction

Strain Rate	Stress at 15% Strain (MPa)										Average	Standard Deviation	m
10^{-3} mm/s	368.8	364.6	366.7	365.2	364.7	367.5	363.8	366.8	367.1	368.5	366.37	1.7140271	0.01917
$5x10^{-3}$ mm/s	380.1	375.7	377.8	376.9	376.2	379.4	378.6	378.7	374.9	380.2	377.85	1.8626445	

Strain-Rate Sensitivity of Specimen C, Diagonal Direction

Strain Rate	Stress at 15% Strain (MPa)										Average	Standard Deviation	m
10^{-3} mm/s	364.5	365.4	362.5	362.4	364.6	363.1	363.7	366.7	365.3	361.6	363.98	1.5991664	0.01433
$5x10^{-3}$ mm/s	373.1	372.3	371.3	370.3	374.5	371.8	375.4	373.7	369.7	372.6	372.47	1.7907478	

Strain-Hardening Data of Specimen A

Longitudinal Direction, 10^{-3} mm/s

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	693	0.049
2	691	0.044
3	695	0.05
4	692	0.048
5	692	0.048
6	691	0.046
7	696	0.052
8	690	0.044
9	695	0.05
10	691	0.045
Average	692.6	0.0476
Standard Deviation	2.065591118	0.00275681

Strain-Hardening Data of Specimen A

Longitudinal Direction, $5x10^{-3}$ mm/s

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	695	0.049
2	696	0.051
3	692	0.045
4	695	0.049
5	692	0.046
6	693	0.048
7	693	0.046
8	697	0.053
9	691	0.043
10	693	0.047
Average	693.7	0.0477
Standard Deviation	1.946506843	0.002945807

Strain-Hardening Data of Specimen A

Transverse Direction, 10^{-3} mm/s

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	695	0.054
2	690	0.049
3	696	0.055
4	696	0.055
5	694	0.052
6	694	0.052
7	692	0.051
8	698	0.057
9	692	0.051
10	690	0.047
Average	693.7	0.0523
Standard Deviation	2.668749187	0.003020302

Strain-Hardening Data of Specimen A

Transverse Direction, $5x10^{-3}$ mm/s

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	696	0.053
2	692	0.05
3	698	0.057
4	694	0.052
5	697	0.054
6	698	0.058
7	694	0.052
8	696	0.054
9	692	0.048
10	693	0.051
Average	695.0	0.0529
Standard Deviation	2.309401077	0.003034981

Strain-Hardening Data of Specimen A

Diagonal Direction, 10^{-3} mm/s

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	691	0.051
2	691	0.052
3	694	0.055
4	693	0.055
5	693	0.053
6	687	0.047
7	690	0.05
8	695	0.056
9	688	0.05
10	687	0.047
Average	690.9	0.0516
Standard Deviation	2.884826203	0.003204164

Strain-Hardening Data of Specimen A

Diagonal Direction, $5x10^{-3}$ mm/s

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	691	0.052
2	695	0.055
3	690	0.049
4	694	0.055
5	693	0.053
6	689	0.048
7	696	0.058
8	690	0.051
9	689	0.049
10	692	0.052
Average	691.9	0.0522
Standard Deviation	2.514402955	0.003155243

Strain-Hardening Data of Specimen B

Longitudinal Direction, 10^{-3} mm/s

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	618	0.098
2	624	0.1
3	621	0.101
4	623	0.102
5	620	0.102
6	623	0.103
7	626	0.104
8	622	0.104
9	621	0.105
10	618	0.109
Average	621.6	0.1028
Standard Deviation	2.547329757	0.003011091

Strain-Hardening Data of Specimen B

Longitudinal Direction, $5x10^{-3}$ mm/s

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	623	0.104
2	620	0.102
3	628	0.109
4	620	0.102
5	622	0.103
6	623	0.104
7	619	0.099
8	625	0.105
9	626	0.107
10	625	0.107
Average	623.1	0.1042
Standard Deviation	2.923088169	0.002936362

Strain-Hardening Data of Specimen B

Transverse Direction, 10^{-3} mm/s

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	626	0.11
2	623	0.105
3	624	0.106
4	620	0.102
5	620	0.1
6	622	0.102
7	628	0.111
8	623	0.106
9	626	0.108
10	625	0.107
Average	623.7	0.1057
Standard Deviation	2.626785107	0.003560587

Strain-Hardening Data of Specimen B

Transverse Direction, $5x10^{-3}$ mm/s

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	622	0.104
2	628	0.11
3	625	0.106
4	627	0.108
5	625	0.107
6	628	0.111
7	624	0.106
8	620	0.1
9	623	0.104
10	623	0.105
Average	624.5	0.1061
Standard Deviation	2.635231383	0.00317805

Strain-Hardening Data of Specimen B

Diagonal Direction, 10^{-3} mm/s

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	615	0.101
2	619	0.105
3	615	0.102
4	619	0.103
5	618	0.103
6	621	0.108
7	612	0.097
8	617	0.102
9	612	0.097
10	614	0.098
Average	616.2	0.1016
Standard Deviation	3.084008935	0.003533962

Strain-Hardening Data of Specimen B

Diagonal Direction, $5x10^{-3}$ mm/s

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	614	0.099
2	621	0.105
3	614	0.099
4	620	0.103
5	617	0.102
6	619	0.103
7	622	0.107
8	617	0.102
9	615	0.101
10	612	0.097
Average	617.1	0.1018
Standard Deviation	3.348299734	0.002973961

Strain-Hardening Data of Specimen C

Longitudinal Direction, 10^{-3} mm/s

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	701	0.24
2	697	0.23
3	704	0.29
4	704	0.27
5	707	0.31
6	702	0.26
7	702	0.25
8	700	0.24
9	701	0.25
10	699	0.24
Average	701.7	0.258
Standard Deviation	2.830390629	0.024720662

Strain-Hardening Data of Specimen C

Longitudinal Direction, $5x10^{-3}$ mm/s

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	700	0.24
2	707	0.3
3	703	0.27
4	704	0.29
5	704	0.27
6	699	0.23
7	702	0.26
8	708	0.31
9	701	0.25
10	701	0.25
Average	702.9	0.267
Standard Deviation	2.923088169	0.026267851

Strain-Hardening Data of Specimen C

Transverse Direction, 10^{-3} mm/s

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	694	0.18
2	702	0.26
3	699	0.22
4	700	0.23
5	702	0.25
6	696	0.19
7	703	0.27
8	697	0.21
9	697	0.2
10	694	0.19
Average	698.4	0.22
Standard Deviation	3.306559138	0.031622777

Strain-Hardening Data of Specimen C

Transverse Direction, $5x10^{-3}$ mm/s

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	696	0.19
2	704	0.27
3	700	0.22
4	701	0.23
5	703	0.25
6	696	0.2
7	698	0.21
8	697	0.2
9	705	0.28
10	694	0.19
Average	699.4	0.224
Standard Deviation	3.777124126	0.032727834

Strain-Hardening Data of Specimen C

Diagonal Direction, 10^{-3} mm/s

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	700	0.23
2	697	0.21
3	703	0.25
4	705	0.28
5	699	0.22
6	702	0.24
7	700	0.24
8	695	0.19
9	699	0.21
10	705	0.28
Average	700.5	0.235
Standard Deviation	3.274480451	0.029533409

Strain-Hardening Data of Specimen C

Diagonal Direction, $5x10^{-3}$ mm/s

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	699	0.22
2	702	0.24
3	703	0.27
4	705	0.28
5	698	0.2
6	702	0.25
7	696	0.19
8	698	0.21
9	706	0.29
10	700	0.23
Average	700.9	0.238
Standard Deviation	3.247221034	0.034253954

Strain-Hardening Data of Specimen A

Longitudinal Direction, 10^{-3} mm/s, Plane-Strain

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	695	0.056
2	693	0.051
3	697	0.057
4	694	0.055
5	694	0.055
6	693	0.053
7	698	0.059
8	692	0.051
9	697	0.057
10	693	0.052
Average	694.6	0.0546
Standard Deviation	2.065591118	0.00275681

Strain-Hardening Data of Specimen A

Longitudinal Direction, $5x10^{-3}$ mm/s, Plane-Strain

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	697	0.056
2	698	0.058
3	693	0.052
4	696	0.056
5	693	0.053
6	695	0.055
7	694	0.053
8	701	0.059
9	691	0.051
10	694	0.054
Average	695.2	0.0547
Standard Deviation	2.898275349	0.00258414

Strain-Hardening Data of Specimen A

Transverse Direction, 10^{-3} mm/s, Plane-Strain

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	698	0.057
2	694	0.053
3	699	0.058
4	700	0.059
5	697	0.055
6	698	0.056
7	695	0.054
8	702	0.061
9	695	0.054
10	694	0.051
Average	697.2	0.0558
Standard Deviation	2.699794231	0.003011091

Strain-Hardening Data of Specimen A

Transverse Direction, $5x10^{-3}$ mm/s, Plane-Strain

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	699	0.057
2	696	0.055
3	701	0.061
4	698	0.057
5	700	0.058
6	702	0.063
7	697	0.056
8	700	0.059
9	695	0.052
10	697	0.056
Average	698.5	0.0574
Standard Deviation	2.273030283	0.003098387

Strain-Hardening Data of Specimen A

Diagonal Direction, 10^{-3} mm/s, Plane-Strain

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	698	0.056
2	699	0.058
3	701	0.061
4	701	0.061
5	700	0.059
6	695	0.053
7	697	0.056
8	703	0.062
9	695	0.056
10	696	0.053
Average	698.5	0.0575
Standard Deviation	2.758824226	0.00324037

Strain-Hardening Data of Specimen A

Diagonal Direction, $5x10^{-3}$ mm/s, Plane-Strain

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	698	0.058
2	703	0.061
3	697	0.055
4	702	0.061
5	700	0.059
6	697	0.054
7	703	0.064
8	698	0.057
9	696	0.055
10	700	0.058
Average	699.4	0.0582
Standard Deviation	2.59058123	0.003155243

Strain-Hardening Data of Specimen B

Longitudinal Direction, 10^{-3} mm/s, Plane-Strain

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	714	0.106
2	721	0.109
3	717	0.108
4	720	0.111
5	717	0.11
6	719	0.112
7	722	0.113
8	719	0.112
9	717	0.111
10	715	0.109
Average	718.1	0.1101
Standard Deviation	2.558211181	0.00213177

Strain-Hardening Data of Specimen B

Longitudinal Direction, $5x10^{-3}$ mm/s, Plane-Strain

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	719	0.112
2	717	0.111
3	724	0.117
4	716	0.113
5	718	0.111
6	720	0.113
7	715	0.107
8	721	0.116
9	723	0.115
10	722	0.116
Average	719.5	0.1131
Standard Deviation	3.027650354	0.003034981

Strain-Hardening Data of Specimen B

Transverse Direction, 10^{-3} mm/s, Plane-Strain

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	717	0.113
2	715	0.108
3	716	0.109
4	712	0.105
5	711	0.103
6	713	0.104
7	720	0.114
8	715	0.109
9	717	0.112
10	716	0.111
Average	715.2	0.1088
Standard Deviation	2.658320272	0.003823901

Strain-Hardening Data of Specimen B

Transverse Direction, $5x10^{-3}$ mm/s, Plane-Strain

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	713	0.107
2	720	0.113
3	716	0.109
4	719	0.111
5	717	0.11
6	720	0.114
7	715	0.109
8	712	0.103
9	714	0.107
10	715	0.108
Average	716.1	0.1091
Standard Deviation	2.846049894	0.00317805

Strain-Hardening Data of Specimen B

Diagonal Direction, 10^{-3} mm/s, Plane-Strain

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	722	0.109
2	726	0.113
3	723	0.11
4	724	0.111
5	723	0.111
6	728	0.116
7	719	0.105
8	722	0.11
9	720	0.105
10	721	0.107
Average	722.8	0.1097
Standard Deviation	2.699794231	0.003433495

Strain-Hardening Data of Specimen B

Diagonal Direction, $5x10^{-3}$ mm/s, Plane-Strain

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	721	0.107
2	728	0.113
3	721	0.107
4	726	0.112
5	724	0.11
6	725	0.111
7	729	0.115
8	724	0.11
9	722	0.109
10	719	0.106
Average	723.9	0.11
Standard Deviation	3.212821536	0.002867442

Strain-Hardening Data of Specimen C

Longitudinal Direction, 10^{-3} mm/s, Plane-Strain

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	698	0.25
2	693	0.24
3	701	0.3
4	700	0.28
5	704	0.32
6	698	0.27
7	699	0.26
8	696	0.25
9	698	0.26
10	695	0.25
Average	698.2	0.268
Standard Deviation	3.119829055	0.024720662

Strain-Hardening Data of Specimen C

Longitudinal Direction, $5x10^{-3}$ mm/s, Plane-Strain

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	697	0.25
2	703	0.31
3	700	0.28
4	701	0.3
5	700	0.28
6	695	0.24
7	699	0.27
8	704	0.32
9	698	0.26
10	697	0.25
Average	699.4	0.276
Standard Deviation	2.796823595	0.027162065

Strain-Hardening Data of Specimen C

Transverse Direction, 10^{-3} mm/s, Plane-Strain

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	690	0.21
2	698	0.29
3	695	0.24
4	696	0.26
5	698	0.28
6	692	0.21
7	699	0.3
8	693	0.24
9	693	0.22
10	690	0.21
Average	694.4	0.246
Standard Deviation	3.306559138	0.034705107

Strain-Hardening Data of Specimen C

Transverse Direction, $5x10^{-3}$ mm/s, Plane-Strain

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	692	0.22
2	700	0.3
3	696	0.24
4	697	0.26
5	699	0.28
6	692	0.22
7	694	0.24
8	693	0.23
9	701	0.31
10	690	0.22
Average	695.4	0.252
Standard Deviation	3.777124126	0.033928028

Strain-Hardening Data of Specimen C

Diagonal Direction, 10^{-3} mm/s, Plane-Strain

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	701	0.24
2	698	0.22
3	702	0.26
4	704	0.28
5	699	0.24
6	701	0.25
7	699	0.24
8	696	0.2
9	698	0.22
10	706	0.28
Average	700.4	0.243
Standard Deviation	3.025814858	0.025841397

Strain-Hardening Data of Specimen C

Diagonal Direction, $5x10^{-3}$ mm/s, Plane-Strain

Sample	Strength Coefficient K (MPa)	Strain-Hardening Exponent n
1	701	0.23
2	703	0.25
3	704	0.28
4	705	0.3
5	697	0.21
6	701	0.26
7	695	0.19
8	697	0.22
9	707	0.29
10	699	0.24
Average	700.9	0.247
Standard Deviation	3.900142448	0.03591657

Drawing Test Data of Specimen A

Sample	Max. load (kg)	Frac. load (kg)
1	2780	3394
2	2776	3379
3	2781	3384
4	2780	3383
5	2775	3377
6	2783	3385
7	2786	3389
8	2799	3393
9	2791	3394
10	2789	3371
Average	2784	3384.9
Standar deviation	7.378647874	7.766738197

Drawing Test Data of Specimen B

Sample	Max. load (kg)	Frac. load (kg)
1	1501	1606
2	1490	1596
3	1482	1588
4	1489	1594
5	1492	1597
6	1488	1592
7	1495	1599
8	1503	1607
9	1486	1590
10	1499	1603
Average	1492.5	1597.2
Standar deviation	6.851601597	6.545566778

Drawing Test Data of Specimen C

Sample	Max. load (kg)	Frac. load (kg)
1	1594	1721
2	1597	1723
3	1598	1724
4	1599	1726
5	1593	1729
6	1603	1735
7	1605	1734
8	1608	1736
9	1591	1739
10	1607	1742
Average	1599.5	1730.9
Standar deviation	6.004627845	7.279346735

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