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MECHANICAL PROPERTIES, INCLUDING FRACTURE TOUGHNESS AND FATIGUE, AND RESISTANCE TO STRESS-CORROSION CRACKING OF STRESS-RELIEVED STRETCHED ALUMINUM ALLOY EXTRUSIONS

D. J. Brownhill, R. E. Davies
D. O. Sprowls

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NOTICE

ABSTRACT

The tensile and some compressive, shear, bearing, fatigue and fracture-toughness properties of a total of 130 samples of 2014, 2024, 6061, 7075 and 7178 aluminum alloy extrusions in the TX51X and "heat-treated-by-user" tempers have been determined. The extrusions ranged in thickness from 0.050 to 6.500 in. Ratios among the tensile, compressive, shear and bearing properties have also been computed.

Stress-corrosion tests of 18 samples of extrusions have been completed.

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FOURTH QUARTERLY REPORT

MECHANICAL PROPERTIES, INCLUDING FRACTURE TOUGHNESS AND FATIGUE, AND RESISTANCE TO STRESS-CORROSION CRACKING OF STRESS-RELIEVED STRETCHED ALUMINUM ALLOY EXTRUSIONS

I. Introduction.

The tests being made under this contract are for use in establishing design mechanical properties in MIL-HDBK-5A, including stress-strain and tangent-modulus curves, for 2014, 2024, 6061, 7075, 7079 and 7178 aluminum alloy extrusions in the TX51X tempers. For comparison, a limited number of similar tests are being made of extrusions in the "heat-treated-by-user" temper. Also, some fracture-toughness, axial-stress fatigue and stress-corrosion tests are being made.

This Fourth Quarterly Report summarizes the results of tensile, compressive, shear, bearing, fatigue, fracture toughness and stress-corrosion tests made to date on 102 samples in the TX51X temper and on 28 samples in the "heat-treated-by-user" tempers. The samples ranged in thickness from 0.050 to 6.500 in.

II. Material.

A total of 110 samples of commercially-produced extrusions in the TX51X temper and 18 samples in the 0 temper have been received from two producers. The section thickness and identification of each sample is shown in Table I. Eighteen of the as-received samples in the 0 temper have been heat treated, or heat treated and aged, in accordance with applicable

conditions in MIL-H-6088D. Five samples each of 2024-0 and 7075-0 were tested in two "heat-treated-by-user" tempers, so that the total number of samples tested in those tempers is 28.

III. Procedure.

Mechanical Properties

Tensile, compressive, shear and bearing specimens were taken at locations described in the Second Quarterly Report, dated September 15, 1966. The general dimensions of these specimens were shown in Figs. 1 to 3, inclusive, of that report. The testing procedures were as outlined in the First Quarterly Report, dated June 15, 1966.

Tensile and compressive modulus and stress-strain tests have been made of 27 samples of extrusions as described in the Third Quarterly Report, dated December 15, 1966.

Fracture-toughness tests were made in accordance with the methods described in ASTM STP 411* on fatigue-cracked single-edge-notched specimens from the longitudinal and long-transverse directions. The types of specimens are shown in Fig. 1; the proportions of these specimens are the same as those of specimens used by NASA, Lewis Research Center. The fracture parameters were calculated from relationships developed from the NASA calibration.

Values of the critical plane-strain stress intensity factor, K_{Ic}, were calculated using two values of load from the

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* W. F. Brown and J. E. Srawley, "Plane Strain Fracture Toughness Testing of High Strength Metals", ASTM STP 411, February, 1967.

fracture-toughness tests. The first value was calculated using the load at the initial burst of unstable crack growth, as indicated by the initial significant deviation from linearity in the load deformation curve. In reporting the data, the degree of clarity of the initial deviation has been indicated by the use of the letter "P" to indicate a clear instability or pop-in, the letter "I" to indicate a less pronounced but yet abrupt initial deviation from linearity which is believed to be a supressed pop-in, and "M" to indicate that the initial deviation was at the maximum or fracture load. The second value was calculated using the load at a 5 per cent secant offset, equivalent to about 2 per cent of crack extension; this was done as a result of recent recommendations of ASTM Committee E-24* that the secant-offset method be considered for establishing K_{Ic}, and values thus determined are indicated in the table with the letter "S", or the letters "SM" when the load at the secant offset was the maximum or fracture load. Additional analysis of the results will be necessary to establish the permanent validity of the numbers. No values of K_{Ic} are reported at this time for those materials (principally 2024-T351X and 6061-T6510) which exhibited no initial instability and/or general yielding.

Some axial-stress fatigue tests have been made of fourteen selected samples of extrusions. Procedures for making these tests were described in the First Quarterly Report.

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* "Draft Recommended Practice for Notch-Bend Fracture Toughness Testing", ASTM Committee E24, February, 1967.

Resistance to Stress Corrosion

Stress-corrosion tests are being made of 43 selected samples of extrusions; of these, 31 are in the TX51X temper and 12 are in the "heat-treated-by-user" temper. Procedures for making these tests were described in the First Quarterly Report.

IV. Summary.

The results of tensile, compressive, shear and bearing tests of 102 samples of extrusions in the TX51X temper are shown, according to alloy and temper, in Tables II through IX; the corresponding properties for extrusions in the "heat-treated-by-user" tempers are shown in Table X. The tensile properties of all samples exceed the values in applicable Federal Specifications. Specified minimum tensile properties for extrusions are shown in Table XI; the values shown in this table are those published in the Aluminum Association Booklet, "Standards for Aluminum Mill Products", 1967. Some of these values, as indicated in the table, are lower than those shown presently in Federal Specifications. It is understood, however, that the values in "SAMP" will be in the next revisions of the Federal Specifications.

The ratios among the tensile, compressive and shear properties of the extrusions in the TX51X tempers and the "heat-treated-by-user" tempers are shown in Tables XII and XIII, respectively, and the ratios among the bearing and tensile properties of the corresponding extrusions are shown in Tables XIV and XV, respectively. The ratios among the properties at

different locations with regard to width and thickness are shown in Table XVI. The ratios among bearing properties obtained using edgewise specimens to those obtained using flatwise specimens are shown in Table XVII.

The results of the fracture-toughness tests are shown in Table XVIII and those of the axial-stress fatigue tests are shown in Fig. 2 through 6.

The current status of the stress-corrosion tests is given in Table XIX. The tests of specimens of 18 samples were terminated after 84 days exposure, and tensile tests were made of these specimens to determine losses in tensile strength as a result of corrosion. The tests thus far indicate typical performances for the various materials.

Because it is expected that more samples of each alloy and temper will be tested, no analysis of the data already obtained is being presented at this time.

D. J. Brownhill
D. J. BROWNHILL

R. E. Davies
R. E. DAVIES

D. O. Sprowls
D. O. SPROWLS

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V. Tables and Figures.

TABLE I

SAMPLES OF EXTRUSIONS RECEIVED AS OF MARCH 15, 1967
[AF33(615)-3580]

2014		
Temper	Section Thickness, in.	ARL Sample Number
-O	0.185	318131*
	0.300	317925
	0.499	318081
-T6510	0.061	317950
	0.070	318017*
	0.073	317951
	0.246	318130*
	0.250	340154
	0.271	317954
	0.625	317952
	0.625	340291
	0.750	317924
	1.657	318046

2024		
Temper	Section Thickness, in.	ARL Sample Number
-O	0.064	318026*
	0.083	317855
	0.430	318135*
	0.500	340236
	2.962	340237
-T3510	0.075	318132*
	0.094	318019*
	0.101	317885
	0.106	317904
†	0.120	318018*
	0.151	317886
	0.255	317942
	0.258	318047
	0.375	317943
	0.510	317926
	0.525	318020*
	0.550	317856
	0.642	317945
	0.950	317944
	1.150	318077
	1.200	317946
†	1.450	318021*
	1.705	340213
	2.250	318133*
	2.760	318048
	4.000	340214
	4.000	340388

2024		
Temper	Section Thickness, in.	ARL Sample Number
-T8510	0.075	318022*
	0.094	318134*
	0.101	317887
	0.106	317888
	0.120	318023*
	0.151	317889
	0.255	317890
	0.258	318082
	0.375	317891
	0.510	317892
	0.525	318024*
	0.550	317992
	0.642	317894
	0.950	317893
	1.150	318078
	1.200	317895
‡	1.450	318025*
	1.705	340169
	2.760	318079
	4.000	340225
	4.000	340389

6061		
Temper	Section Thickness, in.	ARL Sample Number
-O	0.246	318090
	1.625	317947
-T6510	0.050	318136*
	0.075	317857
	0.090	318027*
	0.125	317846
	0.126	317847
	0.250	317848
	0.310	317905
	0.315	317953
	0.375	317927
	0.375	318083
	0.918	317906
	1.240	317907
	1.960	317896
	3.000	340226
	6.500	317897

7075		
Temper	Section Thickness, in.	ARL Sample Number
-O	0.063	318034*
	0.126	317901
	0.350	317995
	1.225	318043*
	2.250	317923
-T6510	0.065	317899
	0.153	340390
	0.065	318031*
	0.080	317858
	0.133	318029*
	0.160	318030*
	0.260	318028*
	0.313	317908
	0.375	317954
	0.438	317859
	0.463	318032*
	0.935	340155
	1.023	318033*
	1.188	317860
	1.500	317955
	2.000	317861
	2.190	318137*
	3.040	318138*
	3.090	340391
-T73510	0.080	317862
	0.125	340394
	0.209	340393
	0.313	317909
	0.375	317900
	0.438	317910
	0.935	340292
	1.500	317956
	2.000	317948
	3.090	340392

7079		
Temper	Section Thickness, in.	ARL Sample Number
-T6510	0.161	340252
	0.251	340253

7178		
Temper	Section Thickness in.	ARL Sample Number
-O	0.050	340238
	0.051	318036*
	0.403	340171
-T6510	0.063	317902
	0.142	318016
	0.154	318035*
	0.162	317903
	0.180	340395
	0.265	317996
	0.625	317997
	0.780	340254
	1.200	318139*
	1.438	317957
	2.180	318140*

* Producer B; all others from Producer A

/ T3511 temper

‡ T8511 temper

TABLE II

MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 2014-T6510 ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

Sample									Bearing**							
									Flatwise				Edgewise			
									Ultimate Stress, psi		Yield Stress, psi††		Ultimate Stress, psi		Yield Stress, psi††	
Section Thickness, in.	Cross-Sectional Area, in²	Number	Location*	Direction†	Tensile Ultimate Stress, psi	Tensile Yield Stress,‡ psi	Elongation in 2 in. or 4D, %	Comp. Yield Stress,‡ psi	Shear Ultimate Stress, psi	e/D=1.5	e/D=2.0	e/D=1.5	e/D=2.0	e/D=1.5	e/D=2.0	e/D=1.5	e/D=2.0
0.061	0.30	317950	T/2	L	67 100	62 200	9.0	64 600	--	105 600	138 800	88 200	103 900	--	--	--	--
				LT	74 700	68 600	5.0‡‡	--	--	--	--	--	--	--	--	--	--
0.070	0.24	318017#	T/2	L	64 900	61 900	9.5	62 800	--	104 500	134 900	88 500	103 800	--	--	--	--
0.073	0.16	317951	T/2	L	62 800	59 100	11.5	59 900	--	--	--	--	--	--	--	--	--
0.246	0.45	318130#	T/2	L	64 100	60 400	10.0	61 000	44 300	110 100	136 900	94 300	107 500	--	--	--	--
0.250	3.7	340154	T/2	L	64 900	62 000	12.5	63 800	46 400	109 200	141 300	93 200	113 700	--	--	--	--
				LT	68 800	63 700	5.0‡‡	69 300	45 700	--	--	--	--	--	--	--	--
0.271	0.40	317994	T/2	L	67 500	63 800	13.5	63 400	47 200	106 900	139 500	93 400	108 000	--	--	--	--
				LT	71 700	64 600	6.2	--	--	--	--	--	--	--	--	--	--
0.625	0.50	317952	T/2	L	65 900	61 900	14.3	60 300	44 700	--	--	--	--	--	--	--	--
0.625	0.55	340291	T/2	L	77 500	71 900	10.7	68 000	42 100	--	--	--	--	--	--	--	--
0.750	1.4	317924	T/2	L	76 700	71 100	11.5	73 100	42 800	110 000	142 800	93 600	106 200	--	--	--	--
				LT	70 300	63 500	7.8	68 400	--	--	--	--	--	--	--	--	--
1.657	2.2	318046	T/4	L	72 600	66 100	10.5	67 800	41 500	105 700	135 800	88 000	103 100	--	--	--	--
			T/2	L	73 200	66 500	10.5	68 200	41 500	104 800	132 500	85 700	99 700	--	--	--	--
				LT	67 400	60 200	7.8	--	--	--	--	--	--	--	--	--	--

* T - Thickness; W - Width
† L - Longitudinal; LT - Long-Transverse;
‡ Offset equals 0.2 per cent
\# Producer B; all others from Producer A

** Specimens and Fixtures cleaned ultrasonically in Toson 3 solvent
†† Offset equals 2 per cent of pin diameter
‡‡ Sub-size sheet-type specimen; 1/8-in. wide; 1/2-in. gage length

TABLE III

MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 2024-T3510 ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

Section Thickness, in.	Sample Cross-Sectional Area, $in.^2$	Number	Location*	Direction†	Tensile Ultimate Stress, psi	Tensile Yield Stress,‡ psi	Elongation in 2 in. or 4D, %	Comp. Yield Stress,‡ psi	Shear Ultimate Stress, psi	Bearing** Flatwise Ultimate Stress, psi e/D=1.5	Bearing** Flatwise Ultimate Stress, psi e/D=2.0	Bearing** Flatwise Yield Stress, psi†† e/D=1.5	Bearing** Flatwise Yield Stress, psi†† e/D=2.0	Bearing** Edgewise Ultimate Stress, psi e/D=1.5	Bearing** Edgewise Ultimate Stress, psi e/D=2.0	Bearing** Edgewise Yield Stress, psi†† e/D=1.5	Bearing** Edgewise Yield Stress, psi†† e/D=2.0
0.075	0.70	318132#	T/2	L	65 900	53 000	18.0	45 200	--	96 800	119 200	78 300	94 300	--	--	--	--
				LT	70 500	48 100	15.0###	57 800	--	--	--	--	--	--	--	--	--
0.094	0.30	318019#	T/2	L	63 900	52 800	14.5	58 000	--	97 200	127 800	77 900	92 300	--	--	--	--
0.101	0.33	317885	T/2	L	68 100	53 400	16.5	45 300	--	102 500	126 900	76 200	90 000	--	--	--	--
0.106	0.31	317904	T/2	L	64 400	51 700	20.5	42 100	--	102 200	125 300	77 200	91 100	--	--	-	--
0.120	0.27	318018###	T/2	L	65 400	54 000	17.5	45 000	--	101 900	129 500	79 900	92 600	--	--	--	--
0.151	0.82	317886	T/2	L	69 900	54 400	17.0	45 400	--	102 300	123 600	78 300	91 200	--	--	--	--
				LT	67 700	49 900	11.0###	55 200	--	--	--	--	--	--	--	--	--
0.255	2.8	317942	T/2	L	79 400	61 800	16.0	52 200	43 200	99 100	124 000	74 700	85 000	--	--	--	--
				LT	76 100	55 400	19.0†††	59 900	41 800	105 300	132 100	81 000	99 400	--	--	--	--
0.258	4.2	318047	T/2	L	79 800	60 900	15.0	53 100	43 300	106 300	132 300	81 200	97 000	--	--	--	--
				LT	74 900	54 200	20.0†††	58 100	42 200	107 200	134 400	75 900	97 700	--	--	--	--
0.375	0.62	317943	T/2	L	63 700	49 300	21.5	37 400##	41 600	106 200	133 400	79 500	101 400	--	--	--	--
				LT	57 600	38 900	8.0	--	--	--	--	--	--	--	--	--	--
0.510	10.1	317926	T/2,W/2	L	75 700	57 100	15.0	50 000	40 600	100 600	130 600	77 400	94 800	--	--	--	--
				LT	64 900	48 500	8.0	52 500	39 800	--	--	--	--	--	--	--	--
0.525	1.9	318020#	T/2,W/4	L	63 000	48 300	23.5	39 200	42 200	--	--	--	--	--	--	--	--
				LT	61 500	42 600	11.0	--	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	62 600	48 500	23.0	40 300	41 200	102 000	118 900	74 400	87 900	--	--	--	--
				LT	63 200	43 500	12.0	47 500	42 200	--	--	--	--	--	--	--	--
0.550	1.9	317855	T/2,W/4	L	78 900	62 600	15.5	54 500	40 800	105 100	130 700	79 500	97 300	--	--	--	--
				LT	71 800	53 200	16.4	58 300	39 800	--	--	--	--	--	--	--	--
0.642	5.8	317945	T/2,W/4	L	77 000	60 800	13.6	51 800	40 400	100 900	128 100	76 700	92 300	--	--	--	--
				LT	64 500	47 900	8.5	55 900	39 000	100 600	121 600	76 700	91 600	--	--	--	--
0.950	4.6	317944	T/2,W/4	L	80 900	60 600	15.0	54 400	39 700	102 400	132 200	73 900	90 500	--	--	--	--
				LT	69 500	50 200	15.6	54 000	--	--	--	--	--	--	--	--	--
1.150	5.6	318077	T/2,W/4	L	78 700	61 500	14.5	55 500	39 600	104 000	127 900	78 000	96 100	95 000	124 200	75 600	94 200
				LT	68 800	52 200	10.9	55 300	--	100 000	126 100	78 200	93 900	--	--	--	--
			T/2,W/2	L	76 300	59 200	14.5	51 900	40 100	102 900	129 200	75 400	93 800	--	--	--	--
				LT	69 600	50 700	16.4	54 600	38 400	--	--	--	--	--	--	--	--
1.200	3.9	317946	T/2,W/4	L	80 300	63 500	14.5	58 000	39 900	105 500	134 300	75 400	93 600	101 900	130 900	77 900	91 900
				LT	61 200	49 500	14.1	54 800	--	--	--	--	--	--	--	--	--
1.450	7.3	318021#	T/2,W/4	L	80 400	62 300	14.0	58 100	40 000	105 100	132 200	77 400	92 600	101 900	131 100	75 200	90 700
				LT	68 000	49 000	13.5	52 100	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	79 800	60 800	15.5	56 500	39 700	104 200	129 300	76 500	91 200	100 600	127 600	72 600	90 100
				LT	68 800	49 100	14.6	52 600	39 100	--	--	--	--	--	--	--	--
1.705	4.8	340213	T/4,W/4	L	82 500	62 300	15.0	59 400	40 600	110 800	136 400	76 700	95 900	--	--	--	--
				LT	69 800	48 600	14.0	--	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	82 100	61 800	15.0	60 700	39 000	108 600	133 200	76 400	93 000	106 500	131 000	76 000	92 300
				LT	68 900	49 500	12.0	52 600	38 800	--	--	--	--	--	--	--	--
2.520	8.8	318133#‡‡	T/4,W/4	L	81 100	61 500	14.0	59 200	39 300	103 500	128 600	76 800	94 300	100 300	128 000	76 400	87 300
				LT	67 000	46 200	14.1	49 800	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	80 900	61 900	14.5	59 400	38 500	104 000	130 700	77 100	95 900	100 900	125 000	74 000	88 800
				LT	67 000	47 000	12.9	50 400	37 800	--	--	--	--	--	--	--	--
				ST	65 800	44 100	12.5	49 200	41 900	--	--	--	--	--	--	--	--
4.000	24.0	340214	T/4,W/4	L	79 800	62 300	14.0	57 700	38 300	102 300	130 800	75 600	91 800	94 000	125 000	74 600	91 600
				LT	64 400	47 700	8.0	51 400	36 700	97 000	122 300	80 700	95 700	86 900	116 000	71 400	88 600
			T/2,W/2	L	78 400	60 400	14.0	56 500	37 800	92 600	129 300	76 700	93 000	90 100	121 500	72 700	91 100
				LT	62 900	47 800	7.5	50 800	36 700	--	--	--	--	--	--	--	--
				ST	60 100	42 800	5.7	49 800	39 700	--	--	--	--	--	--	--	--
2.760	29.6	318048	T/4,W/4	L	77 100	58 800	13.5	54 900	40 900	94 000	118 100	73 400	88 200	94 600	122 700	72 900	91 200
				LT	58 600	43 500	5.2	47 900	37 300	82 600	116 500	74 800	90 900	85 200	111 400	71 200	88 000
			T/2,W/2	L	76 600	58 900	13.5	55 000	39 100	96 600	123 500	76 600	93 900	90 900	118 600	74 100	90 400
				LT	60 500	47 000	6.0	49 700	37 700	91 600	115 400	72 900	90 700	--	--	--	--
				ST	58 900	42 500	6.0	47 800	39 200	--	--	--	--	--	--	--	--

* T - Thickness; W - Width

‡ Offset equals 0.2 per cent

\# Producer B; all others from Producer A

** Specimens and Fixtures cleaned ultrasonically in Toson 3 solvent.

†† Offset equals 2 per cent of pin diameter.

Average of two tests; all others, single tests.

††† Sub-size sheet-type specimen; 1/4-in. wide; 1-in. gage length.

Sub-size sheet-type specimen; 1/8-in. wide; 1/2-in. gage length.

‡‡ Samples were in the T3511 t[illegible]

TABLE IV

MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 2024-T8510 ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

Section Thickness, in.	Sample Cross-Sectional Area, $in.^2$	Number	Location*	Direction†	Tensile Ultimate Stress, psi	Tensile Yield Stress,‡ psi	Elongation in 2 in. or 4D, %	Comp. Yield Stress,‡ psi	Shear Ultimate Stress, psi	Bearing** Flatwise Ultimate Stress, psi e/D=1.5	Bearing** Flatwise Ultimate Stress, psi e/D=2.0	Bearing** Flatwise Yield Stress, psi†† e/D=1.5	Bearing** Flatwise Yield Stress, psi†† e/D=2.0	Bearing** Edgewise Ultimate Stress, psi e/D=1.5	Bearing** Edgewise Ultimate Stress, psi e/D=2.0	Bearing** Edgewise Yield Stress, psi†† e/D=1.5	Bearing** Edgewise Yield Stress, psi†† e/D=2.0
0.075	0.70	318022#	T/2	L	72 400	68 400	6.0	70 000	--	110 200	141 400	98 900	114 800	--	--	--	--
				LT	77 500	69 600	3.0***	73 300	--	--	--	--	--	--	--	--	--
0.094	0.30	318134#	T/2	L	72 900	69 200	7.0	65 700	--	109 000	139 500	100 000	118 000	--	--	--	--
0.101	0.33	317887	T/2	L	73 200	69 800	6.0	71 500	--	106 800	141 300	95 700	122 400	--	--	--	--
0.106	0.31	317888	T/2	L	70 200	66 200	6.0	66 800	--	107 600	141 300	95 500	117 600	--	--	--	--
0.120	0.27	318023#	T/2	L	71 300	67 700	8.5	67 800	--	109 600	142 300	97 800	110 300	--	--	--	--
0.151	0.82	317889	T/2	L	71 400	67 000	6.5	70 400	--	112 400	144 800	101 200	117 800	--	--	--	--
				LT	75 200	70 300	8.0***	69 600	--	--	--	--	--	--	--	--	--
0.255	2.8	317890	T/2	L	77 600	70 900	8.5	75 500	44 200	113 100	146 600	99 400	117 800	--	--	--	--
				LT	76 600	72 200	10.0†††	73 900	42 900	114 000	145 800	99 900	119 400	--	--	--	--
0.258	4.2	318082	T/2	L	75 400	68 400	7.5	73 100	43 600	118 000	143 800	101 000	115 300	--	--	--	--
				LT	74 800	70 000	9.5†††	71 800	42 800	109 700	141 400	98 700	108 100	--	--	--	--
0.375	0.62	317891	T/2	L	70 100	66 500	7.5	64 800	43 400	107 100	136 800	98 200	107 800	--	--	--	--
				LT	67 700	63 400	4.4	--	--	--	--	--	--	--	--	--	--
0.510	10.1	317892	T/2,W/2	L	73 600	66 700	9.5	70 500	41 600	108 200	139 800	98 000	109 400	--	--	--	--
				LT	71 700	66 900	4.6	69 800	41 500	--	--	--	--	--	--	--	--
0.525	1.9	318024#	T/2,W/4	L	72 200	65 600	10.0	67 500	41 400	--	--	--	--	--	--	--	--
				LT	71 000	65 200	5.0	--	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	71 400	64 100	10.5	67 000	40 900	104 500	135 300	91 600	106 800	--	--	--	--
				LT	70 700	65 000	8.0	64 200	40 600	--	--	--	--	--	--	--	--
0.550	1.9	317922	T/2,W/4	L	74 100	67 800	8.0	70 200	41 300	108 600	139 600	94 800	112 400	--	--	--	--
				LT	72 000	67 200	5.9	69 700	41 200	--	--	--	--	--	--	--	--
0.642	5.8	317894	T/2,W/4	L	75 300	69 000	7.9	70 300	41 700	105 700	135 800	96 600	112 900	--	--	--	--
				LT	71 500	67 800	5.0	70 300	40 100	106 200	137 200	94 100	112 200	--	--	--	--
0.950	4.6	317893	T/2,W/4	L	73 500	68 500	7.5	67 400	41 700	104 000	134 900	96 600	112 200	--	--	--	--
				LT	70 100	65 700	4.1	67 900	--	--	--	--	--	--	--	--	--
1.150	5.6	318078	T/2,W/4	L	73 200	66 200	8.5	68 800	40 900	106 900	136 700	94 800	111 000	92 900	127 400	89 700	107 500
				LT	71 200	67 200	5.2	69 300	--	106 300	137 100	96 000	112 600	--	--	--	--
			T/2,W/2	L	71 800	64 900	8.0	69 000	41 000	105 300	136 500	94 300	111 400	--	--	--	--
				LT	71 300	67 100	6.4	67 800	39 900	--	--	--	--	--	--	--	--
1.200	3.9	317895	T/2,W/4	L	74 600	68 500	8.5	70 700	41 500	106 200	135 200	93 800	110 100	101 300	131 000	94 300	110 400
				LT	71 400	67 200	4.6	70 700	--	--	--	--	--	--	--	--	--
1.450	7.3	318025#‡‡	T/2,W/4	L	74 800	69 000	9.0	70 500	42 000	106 600	135 500	95 200	112 900	101 900	130 700	91 200	110 100
				LT	70 300	65 700	4.9	69 300	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	74 900	69 000	8.5	70 100	42 200	105 400	137 800	93 700	113 900	101 300	131 700	91 700	111 200
				LT	71 000	66 700	5.4	69 100	41 300	--	--	--	--	--	--	--	--
1.705	4.8	340169	T/4,W/4	L	71 400	63 200	10.0	65 700	40 000	104 800	133 100	89 500	105 000	--	--	--	--
				LT	71 000	63 400	6.0	--	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	71 600	65 300	10.0	65 600	39 000	105 700	135 800	90 900	108 000	104 300	129 400	90 000	105 700
				LT	69 700	64 300	5.0	66 100	38 300	--	--	--	--	--	--	--	--
4.000	24.0	340225	T/4,W/4	L	69 900	61 800	10.0	62 800	39 000	96 900	128 100	88 000	104 400	93 200	122 000	87 600	105 200
				LT	67 700	61 500	6.0	62 900	37 200	100 600	131 400	86 600	104 300	89 300	124 900	84 700	105 700
			T/2,W/2	L	68 600	60 800	9.5	61 600	38 100	95 200	126 800	85 900	105 900	87 600	116 900	84 000	102 400
				LT	66 200	60 500	3.6	61 500	36 200	--	--	--	--	--	--	--	--
				ST	63 600	58 200	2.5	62 800	36 900	--	--	--	--	--	--	--	--
2.760	29.6	318079	T/4,W/4	L	70 400	63 200	9.0	64 200	40 800	89 200	121 600	***	107 300	95 600	121 900	90 300	105 000
				LT	64 900	60 500	2.4	64 300	39 100	95 100	124 100	90 500	104 600	97 700	126 900	88 900	106 000
			T/2,W/2	L	70 100	63 200	8.5	63 700	40 600	93 700	122 800	89 600	105 400	89 400	118 400	***	108 100
				LT	65 600	61 800	2.0	63 900	41 100	97 000	127 400	87 800	101 700	--	--	--	--
				ST	64 100	59 600	1.8	64 200	39 200	--	--	--	--	--	--	--	--

* T - Thickness; W - Width

† L - Longitudinal; LT - Long-Transverse; ST - Short-Transverse

‡ Offset equals 0.2 per cent.

\# Producer B; all others from Producer A

** Specimens and Fixtures cleaned ultrasonically in Toson 3 solvent.

†† Offset equals 2 per cent of pin diameter.

*** Bearing specimen failed before reaching yield stress (2 per cent offset).

TABLE V

MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 6061-T6510 ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

Section Thickness, in.	Sample Cross-Sectional Area, in.^{2}	Number	Location*	Direction†	Tensile Ultimate Stress, psi	Tensile Yield Stress,‡ psi	Elongation in 2 in. or 4D, %	Comp. Yield Stress,‡ psi	Shear Ultimate Stress, psi	Bearing** Flatwise Ultimate Stress, psi e/D=1.5	Bearing** Flatwise Ultimate Stress, psi e/D=2.0	Bearing** Flatwise Yield Stress, psi†† e/D=1.5	Bearing** Flatwise Yield Stress, psi†† e/D=2.0	Bearing** Edgewise Ultimate Stress, psi e/D=1.5	Bearing** Edgewise Ultimate Stress, psi e/D=2.0	Bearing** Edgewise Yield Stress, psi†† e/D=1.5	Bearing** Edgewise Yield Stress, psi†† e/D=2.0
0.050	0.42	318136#	T/2	L	45 000	42 400	11.0	41 500	--	79 400	107 300	66 900	75 800	--	--	--	--
0.075	0.59	317857	T/2	L	45 900	39 300	13.0	40 100	--	74 200	91 700	59 400	66 800	--	--	--	--
				LT	44 800	37 200	15.0†††	38 800	--	89 100	105 200	67 400	77 700	--	--	--	--
0.090	0.27	318027#	T/2	L	44 700	42 100	13.5	41 300	--	77 600	103 500	66 200	75 600	--	--	--	--
0.125	0.61	317846	T/2	L	43 200	38 700	11.5	38 700	--	70 900	90 700	58 000	64 300	--	--	--	--
				LT	41 900	36 000	15.0†††	38 600	--	--	--	--	--	--	--	--	--
0.126	0.30	317847	T/2	L	43 900	39 700	10.5	39 800	31 400	--	--	--	--	--	--	--	--
0.250	0.36	317848	T/2	L	43 000	38 600	12.0	38 800	30 800	--	--	--	--	--	--	--	--
0.310	6.3	317905	T/2	L	47 700	43 200	16.5	42 300	31 100	79 500	101 700	66 800	73 200	--	--	--	--
				LT	49 100	43 400	16.5	44 800	30 700	80 700	103 400	67 500	79 500	--	--	--	--
0.315	5.8	317953	T/2	L	45 500	40 200	18.5	40 100	34 400	78 000	100 600	65 700	67 100	--	--	--	--
				LT	44 700	38 000	18.5	40 100	33 600	78 400	103 100	65 300	71 000	--	--	--	--
0.375	8.6	317927	T/2	L	45 900	42 000	18.5	41 600	36 500	80 000	101 400	65 700	70 900	--	--	--	--
				LT	45 300	40 000	17.0	42 000	36 100	80 600	103 700	67 400	75 300	--	--	--	--
0.375	7.7	318083	T/2	L	46 600	42 500	16.0	41 800	35 400	79 800	101 100	68 400	72 600	--	--	--	--
				LT	43 700	39 400	22.5†††	42 000	33 800	81 000	103 400	69 900	75 000	--	--	--	--
0.918	1.3	317906	T/2,W/2	L	45 900	41 800	20.0	41 700	33 000	78 000	101 400	68 500	73 200	--	--	--	--
				LT	45 500	40 800	19.5	43 500	--	--	--	--	--	--	--	--	--
1.240	2.7	317907	T/2,W/4	L	48 100	43 000	18.5	44 800	28 700	--	--	--	--	--	--	--	--
			T/2,W/2	L	48 800	43 500	18.5	44 100	28 400	72 600	94 300	57 900	66 800	71 900	92 100	56 200	66 900
				LT	43 300	37 600	18.0	40 800	--	--	--	--	--	--	--	--	--
1.960	4.4	317896	T/2,W/4	L	51 600	46 800	16.5	46 800	29 600	76 000	96 600	60 000	71 000	--	--	--	--
			T/2,W/2	L	52 000	47 200	18.5	47 800	29 100	75 100	96 300	60 000	68 900	74 700	96 300	59 700	70 600
				LT	45 200	39 300	17.0	43 000	--	--	--	--	--	--	--	--	--
3.000	15.0	340226	T/4,W/4	L	52 900	49 900	16.0	50 100	27 800	76 100	98 600	63 200	73 200	74 900	96 000	62 100	73 400
				LT	47 700	43 100	15.0	46 200	27 500	74 500	95 900	61 800	74 700	72 100	94 400	60 300	73 300
			T/2,W/2	L	52 000	48 700	15.5	48 700	27 800	75 600	97 400	62 500	72 400	74 100	94 300	60 400	70 300
				LT	46 900	43 800	14.0	45 500	26 800	--	--	--	--	--	--	--	--
				ST	47 100	40 800	13.0	44 700	28 700	--	--	--	--	--	--	--	--
6.500	33.2	317897	T/4	L	51 500	46 100	13.5	46 000	27 000	72 600	93 800	57 200	71 000	72 600	92 600	57 200	71 000
				LT	44 600	38 000	12.5	40 700	27 000	69 300	89 500	55 400	68 200	68 500	86 600	54 700	67 500
			T/2	L	51 000	45 700	13.5	45 600	26 800	71 500	91 500	56 500	67 500	--	--	--	--
		—		LT	44 600	37 000	12.5	39 600	26 600	--	--	--	--	--	--	--	--

* T - Thickness; W - Width

† L - Longitudinal; LT - Long-Transverse; ST - Short-Transverse

‡ Offset equals 0.2 per cent.

\# Producer B; all others from Producer A

** Specimens and Fixtures cleaned ultrasonically in Toson 3 solvent.

†† Offset equals 2 per cent of pin diameter.

††† Sub-size sheet-type specimen; 1/4-in. wide; 1-in. gage length.

TABLE VI

MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 7075-T6510 ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

Section Thickness, in.	Sample Cross-Sectional Area, $in.^2$	Number	Location*	Direction†	Tensile Ultimate Stress, psi	Tensile Yield Stress,‡ psi	Elongation in 2 in. or 4D, %	Comp. Yield Stress,‡ psi	Shear Ultimate Stress, psi	Bearing** Flatwise Ultimate Stress, psi e/D=1.5	Bearing** Flatwise Ultimate Stress, psi e/D=2.0	Bearing** Flatwise Yield Stress, psi†† e/D=1.5	Bearing** Flatwise Yield Stress, psi†† e/D=2.0	Bearing** Edgewise Ultimate Stress, psi e/D=1.5	Bearing** Edgewise Ultimate Stress, psi e/D=2.0	Bearing** Edgewise Yield Stress, psi†† e/D=1.5	Bearing** Edgewise Yield Stress, psi†† e/D=2.0
0.065	0.18	317899	T/2	L	87 000	79 200	11.0	75 400	--	126 600	158 400	106 900	123 100	--	--	--	--
0.065	0.27	318031#	T/2	L	85 200	77 700	10.5	77 300	--	125 900	158 700	102 400	125 400	--	--	--	--
				LT	83 000	74 500	12.0‡‡‡	77 800	--	--	--	--	--	--	--	--	--
0.080	0.18	317858	T/2	L	88 200	81 900	12.0	80 500	--	125 500	159 900	109 600	124 900	--	--	--	--
0.133	0.97	318029#	T/2	L	84 200	75 800	9.0	76 600	--	124 600	156 200	107 000	123 900	--	--	--	--
				LT	82 800	72 600	15.0‡‡‡	77 900	--	--	--	--	--	--	--	--	--
0.160	0.26	318030#	T/2	L	87 500	79 400	12.0	82 800	--	126 500	160 100	108 600	128 600	--	--	--	--
0.260	1.2	318028#	T/2	L	85 500	77 900	11.5	78 800	48 500	126 100	158 000	104 800	123 400	--	--	--	--
				LT	84 100	74 400	15.0‡‡‡	--	--	--	--	--	--	--	--	--	--
0.313	0.51	317908	T/2	L	89 400	82 700	11.0	85 300	49 400	--	--	--	--	--	--	--	--
0.375	2.2	317954	T/2	L	88 000	80 900	11.0	79 200	48 000	125 000	160 600	104 400	128 600	--	--	--	--
				LT	83 500	74 600	13.0	82 100	47 100	--	--	--	--	--	--	--	--
0.438	7.2	317859	T/2	L	87 600	80 300	12.0	80 400	49 900	129 100	160 200	113 000	128 500	--	--	--	--
				LT	86 100	77 700	11.5	85 700	48 100	131 000	153 100	112 200	134 200	--	--	--	--
0.563	1.9	318032#	T/2	L	83 800	76 500	12.0	78 300	46 600	121 900	155 400	99 400	119 000	--	--	--	--
				LT	78 700	70 800	10.0	78 400	45 200	--	--	--	--	--	--	--	--
0.935	7.2	340155	T/2,W/4	L	88 300	81 700	11.5	80 400	47 500	127 600	161 200	108 500	127 200	--	--	--	--
				LT	83 500	76 100	12.0	81 100	46 100	129 400	157 900	107 600	131 600	--	--	--	--
			T/2,W/2	L	86 400	79 600	12.0	77 600	47 000	125 900	157 400	105 600	124 300	--	--	--	--
				LT	82 900	75 300	12.0	79 400	45 600	--	--	--	--	--	--	--	--
1.023	1.8	318033#	T/2,W/4	L	88 400	82 500	9.0	84 200	47 100	121 000	156 100	100 000	123 100	--	--	--	--
1.188	27.1	317860	T/2,W/4	L	86 600	79 800	11.0	79 500	51 100	126 900	159 400	108 600	121 400	108 900	148 100	98 100	117 200
				LT	84 300	76 300	13.0	81 000	47 900	129 000	158 500	111 500	128 600	112 000	142 900	99 700	120 200
			T/2,W/2	L	85 100	78 000	12.0	77 100	48 200	125 300	155 600	107 400	119 400	110 800	147 100	100 000	119 700
				LT	83 000	74 500	13.0	80 000	47 500	128 700	159 900	110 800	127 800	115 800	148 400	97 500	117 200
1.500	1.8	317955	T/2	L	93 600	86 700	9.5	88 000	48 200	122 400	156 300	102 300	121 400	--	--	--	--
				LT	77 600	67 500	6.2	--	--	--	--	--	--	--	--	--	--
2.000	3.1	317861	T/4	L	93 400	86 700	11.0	86 400	49 200	127 300	164 500	108 000	126 400	--	--	--	--
			T/2	L	91 100	84 100	10.0	84 900	47 700	120 700	155 700	102 300	122 900	--	--	--	--
				LT	79 100	68 700	8.6	75 100	--	--	--	--	--	--	--	--	--
2.190	17.0	318137#	T/4,W/4	L	83 800	76 000	10.0	76 300	46 300	120 600	151 400	105 000	125 000	103 200	139 200	99 400	121 700
				LT	75 000	69 300	3.6	76 400	45 200	119 900	149 200	104 400	124 300	99 400	131 000	96 800	119 000
			T/2,W/2	L	81 700	73 300	10.0	72 400	44 500	117 900	149 100	100 900	120 700	101 700	136 600	98 700	120 000
				LT	77 400	68 800	9.0	73 000	43 100	120 300	152 200	103 800	121 500	101 900	135 300	94 400	115 600
				ST	70 500	61 500	3.9	72 000	--	--	--	--	--	--	--	--	--
3.040	13.8	318138#	T/4,W/4	L	86 700	79 100	10.0	80 700	46 200	120 100	152 000	104 500	124 300	115 200	146 100	103 400	122 900
				LT	76 000	67 000	7.0	73 900	--	118 500	149 300	106 400	126 300	113 300	146 100	100 600	125 000
			T/2,W/2	L	84 400	76 700	10.5	77 800	45 400	118 300	151 400	101 800	121 400	113 900	145 200	101 600	118 700
				LT	75 400	66 700	8.2	72 800	43 700	--	--	--	--	--	--	--	--
				ST	73 400	63 200	6.0	70 400	43 600	--	--	--	--	--	--	--	--

* T - Thickness; W - Width

† L - Longitudinal; LT - Long-Transverse; ST - Short-Transverse

‡ Offset equals 0.2 per cent.

\# Producer B; all others from Producer A.

** Specimens and Fixtures cleaned ultrasonically in Toson 3 solvent.

†† Offset equals 2 per cent of pin diameter.

‡‡‡ Sub-size sheet-type specimen; 1/8-in. wide; 1/2-in. gage length.

TABLE VII

MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 7075-T73510 ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

Section Thickness in.	Sample Cross-Sectional Area, $in.^2$	Sample Number	Location*	Direction†	Tensile Ultimate Stress, psi	Tensile Yield Stress,‡ psi	Elongation in 2 in. or 4D, %	Comp. Yield Stress,‡ psi	Shear Ultimate Stress, psi.	Bearing** Flatwise Ultimate Stress, psi e/D=1.5	Bearing** Flatwise Ultimate Stress, psi e/D=2.0	Bearing** Flatwise Yield Stress, psi†† e/D=1.5	Bearing** Flatwise Yield Stress, psi†† e/D=2.0	Bearing** Edgewise Ultimate Stress, psi e/D=1.5	Bearing** Edgewise Ultimate Stress, psi e/D=2.0	Bearing** Edgewise Yield Stress, psi†† e/D=1.5	Bearing** Edgewise Yield Stress, psi†† e/D=2.0
0.080	0.18	317862	T/2	L	79 400	71 100	9.0	71 300	--	120 600	153 800	103 200	120 500	--	--	--	--
0.313	0.51	317909	T/2	L	76 100	66 200	11.5	69 400	44 200	--	--	--	--	--	--	--	--
0.375	2.2	317900	T/2	L	74 900	64 300	11.5	65 800	44 300	113 400	146 300	92 300	109 400	--	--	--	--
				LT	72 600	62 300	11.0	66 600	42 800	--	--	--	--	--	--	--	--
0.438	7.2	317910	T/2	L	77 200	67 500	12.0	69 800	45 100	118 100	152 800	98 900	117 200	--	--	--	--
				LT	76 600	67 600	10.0	71 800	44 100	118 800	152 600	97 600	120 000	--	--	--	--
0.935	7.2	340292	T/2,W/4	L	79 200	70 300	12.5	70 600	44 600					--	--	--	--
				LT	76 600	67 700	12.5	71 400	43 300					--	--	--	--
			T/2,W/2	L	77 700	68 700	13.0	68 800	43 800					--	--	--	--
				LT	76 000	66 900	12.0	69 800	42 900	--	--	--	--	--	--	--	--
1.500	1.8	317956	T/2	L	79 700	72 100	11.0	73 800	44 700	111 100	145 700	93 800	111 500	--	--	--	--
				LT	71 800	61 600	6.2	--	--	--	--	--	--	--	--	--	--
2.000	3.1	317948	T/4	L	78 800	71 100	11.5	72 800	44 200	111 400	146 000	90 700	109 400	--	--	--	--
			T/2	L	77 800	70 300	12.0	71 400	43 600	112 200	143 800	92 300	109 400	--	--	--	--
				LT	70 200	60 500	6.2	65 200	--	--	--	--	--	--	--	--	--

* T - Thickness; W - Width

† L - Longitudinal; LT - Long-Transverse.

‡ Offset equals 0.2 per cent.

** Specimens and Fixtures cleaned ultrasonically in Toson 3 solvent.

†† Offset equals 2 per cent of pin diameter.

TABLE VIII

MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 7079-T6510 ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

Section Thickness in.	Sample Cross-Sectional Area, $in.^2$	Number	Location*	Direction†	Tensile Ultimate Stress, psi	Tensile Yield Stress,‡ psi	Elongation in 2 in. or 4D, %	Comp. Yield Stress,‡ psi	Shear Ultimate Stress, psi	Bearing** Flatwise Ultimate Stress, psi e/D=1.5	Bearing** Flatwise Ultimate Stress, psi e/D=2.0	Bearing** Flatwise Yield Stress, psi†† e/D=1.5	Bearing** Flatwise Yield Stress, psi†† e/D=2.0	Bearing** Edgewise Ultimate Stress, psi e/D=1.5	Bearing** Edgewise Ultimate Stress, psi e/D=2.0	Bearing** Edgewise Yield Stress, psi†† e/D=1.5	Bearing** Edgewise Yield Stress, psi†† e/D=2.0
0.161	0.72	340252	T/2	L	86 400	79 300	10.5	78 400	--	124 400	156 500	106 300	123 300	--	--	--	--
				LT	84 100	75 100	16.0###	84 100	--	--	--	--	--	--	--	--	--
0.251	0.82	340253	T/2	L	85 700	78 900	12.0	79 700	48 400	125 100	156 100	105 200	118 600	--	--	--	--
				LT	81 000	72 600	14.1	79 600	47 500	--	--	--	--	--	--	--	--

* T - Thickness; W - Width

† L - Longitudinal; LT - Long-Transverse

‡ Offset equals 0.2 per cent.

** Specimens and Fixtures cleaned ultrasonically in Toson 3 solvent.

†† Offset equals 2 per cent of pin diameter.

Sub-size sheet-type specimen; 1/8-in. wide; 1/2-in. gage length.

TABLE IX

MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 7178-T6510 ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

Section Thickness in.	Sample Cross-Sectional Area, $in.^2$	Number	Location*	Direction†	Tensile Ultimate Stress, psi	Tensile Yield Stress,‡ psi	Elongation in 2 in. or 4D, %	Comp. Yield Stress,‡ psi	Shear Ultimate Stress, psi	Bearing** Flatwise Ultimate Stress, psi e/D=1.5	Bearing** Flatwise Ultimate Stress, psi e/D=2.0	Bearing** Flatwise Yield Stress, psi†† e/D=1.5	Bearing** Flatwise Yield Stress, psi†† e/D=2.0	Bearing** Edgewise Ultimate Stress, psi e/D=1.5	Bearing** Edgewise Ultimate Stress, psi e/D=2.0	Bearing** Edgewise Yield Stress, psi†† e/D=1.5	Bearing** Edgewise Yield Stress, psi†† e/D=2.0
0.063	0.37	317902	T/2	L	95 400	89 900	9.5	90 400	--	133 500	168 900	117 400	138 900	--	--	--	--
				LT	94 200	87 500	10.0###	93 800	--	--	--	--	--	--	--	--	--
0.142	1.0	318016	T/2	L	93 300	86 900	9.5	84 300	--	131 600	166 700	114 900	137 300	--	--	--	--
				LT	92 000	83 400	14.0###	92 300	--	--	--	--	--	--	--	--	--
0.154	0.42	318035#	T/2	L	92 200	85 800	9.5	90 800	--	138 300	172 600	120 300	138 500	--	--	--	--
0.162	0.49	317903	T/2	L	91 900	85 400	10.5	84 000	--	132 600	164 400	114 300	129 800	--	--	--	--
0.265	0.88	317996	T/2	L	95 400	89 400	10.0	89 200	51 800	132 600	166 600	112 700	125 600	--	--	--	--
0.625	6.9	317997	T/2,W/4	L	93 600	86 900	10.7	85 500	51 800	133 400	164 800	114 300	134 900	--	--	--	--
				LT	91 100	81 500	10.2	88 200	50 000	132 400	158 200	113 600	134 20	--	--	--	--
			T/2,W/2	L	92 600	85 900	10.7	83 900	51 800	131 000	166 500	113 600	129 300	--	--	--	--
				LT	89 400	80 700	11.4	87 500	50 200	--	--	--	--	--	--	--	--
0.780	1.7	340254	T/2,W/2	L	99 200	93 400	10.0	94 300	50 600	137 200	171 500	110 800	133 100	--	--	--	--
				LT	88 900	79 900	8.0	--	--	--	--	--	--	--	--	--	--
1.200	3.9	318139#	T/2,W/4	L	94 900	89 300	9.5	91 000	50 200	132 300	166 700	113 900	137 700	122 400	161 500	116 000	136 900
				LT	86 300	79 600	6.3	--	--	--	--	--	--	--	--	--	--
			T/2,W/2	L	93 200	87 500	9.5	88 900	50 700	132 200	166 300	111 400	139 300	122 400	159 200	114 700	136 900
				LT	85 400	78 900	7.5	86 400	49 500	--	--	--	--	--	--	--	--
1.438	6.4	317957	T/2	L	101 300	95 500	8.5	97 200	52 500	133 100	167 600	115 700	137 100	--	--	--	--
				LT	85 400	76 900	4.7	--	--	--	--	--	--	--	--	--	--
2.180	15.5	318140#	T/4,W/4	L	91 100	83 300	8.0	83 700	49 100	124 400	161 700	113 600	134 300	112 700	145 000	110 800	130 000
				LT	82 600	75 000	5.0	82 600	46 600	128 400	155 400	114 300	134 900	108 800	148 100	105 600	131 900
			T/2,W/2	L	88 600	79 500	9.0	80 100	48 500	122 600	159 100	110 700	129 300	108 800	144 600	105 800	130 700
				LT	82 400	73 500	6.5	79 200	46 000	123 800	157 600	108 100	128 500	102 800	140 600	101 200	125 000
				ST	76 600	66 600	2.6	77 300	--	--	--	--	--	--	--	--	--

* T - Thickness; W - Width

† L - Longitudinal; LT - Long-Transverse; ST - Short-Transverse.

‡ Offset equals 0.2 per cent.

\# Producer B; all others from Producer A.

** Specimens and Figures cleaned ultrasonically in Tosun 3 solvent.

†† Offset equals 2 per cent of pin diameter.

Sub-size sheet-type specimen; 1/8-in. wide; 1/2-in. gage length.

TABLE X

MECHANICAL PROPERTIES OF EXTRUSIONS IN THE "HEAT-TREATED-BY USER" TEMPER
AF33(615)-3580

Alloy and Temper	Sample: Section Thickness, in.	Sample: Cross-Sectional Area, in.²	Number	Location*	Direction†	Tensile Ultimate Stress, psi	Tensile Yield Stress,‡ psi	Elongation in 2 in. or 4D, %	Comp. Yield Stress,‡ psi	Shear Ultimate Stress, psi	Bearing**: Flatwise: Ultimate Stress psi e/D=1.5	Bearing**: Flatwise: Ultimate Stress psi e/D=2.0	Bearing**: Flatwise: Yield Stress,†† psi e/D=1.5	Bearing**: Flatwise: Yield Stress,†† psi e/D=2.0	Bearing**: Edgewise: Ultimate Stress, psi e/D=1.5	Bearing**: Edgewise: Ultimate Stress, psi e/D=2.0	Bearing**: Edgewise: Yield Stress,†† psi e/D=1.5	Bearing**: Edgewise: Yield Stress,†† psi e/D=2.0
2014-T62	0.185	1.0	340248§	T/2	L	68 500	62 800	11.5		--	109 200	141 200	94 400	112 000	--	--	--	--
					LT					--	--	--	--	--	--	--	--	--
	0.300	6.3	318084	T/2	L	74 200	67 200	9.5	70 100	43 100	112 200	144 600	97 300	115 100	--	--	--	--
					LT	74 700	63 400	12.5	72 600	41 400	112 500	143 500	96 600	115 800	--	--	--	--
	0.499	1.4	318085	T/2	L	71 700	65 100	13.0	69 100	41 300	110 200	141 800	93 000	110 100	--	--	--	--
					LT	70 300	63 800	10.2	67 300	--	--	--	--	--	--	--	--	--
2024-T42	0.064	0.27	318088§	T/2	L	65 000	44 500	20.5	44 800	--	103 800	123 100	75 300	86 900	--	--	--	--
					LT	69 100	43 500	18.0	47 500	--	--	--	--	--	--	--	--	--
	0.083	0.27	318086	T/2	L	66 100	41 600	21.0	44 000	--	98 400	121 200	74 000	87 600	--	--	--	--
					LT	67 100	42 400	18.0	43 900	--	--	--	--	--	--	--	--	--
	0.430	2.1	340241§	T/2	L	72 400	48 200	18.5		38 800	100 800	125 000	70 600	86 600	--	--	--	--
					LT	72 100	47 700	21.0		38 000	--	--	--	--	--	--	--	--
	0.500	0.64	340243	T/2	L	79 800	54 800	17.5	55 200	39 400	107 500	128 800	73 800	90 200	--	--	--	--
					LT	71 600	47 800	18.0	--	--	--	--	--	--	--	--	--	--
	2.562	6.4	340245	T/4,W/4	L	82 100	58 500	15.5	58 700	40 900	106 800	134 500	76 000	91 800	104 300	130 300	72 800	89 800
					LT	69 700	47 400	14.1	50 000	--	--	--	--	--	--	--	--	--
				T/2,W/2	L	80 900	56 500	15.5	57 100	39 100	104 300	130 500	73 200	86 900	98 300	126 300	72 700	84 700
					LT	61 300	45 300	6.5	47 600	38 500	--	--	--	--	--	--	--	--
					ST	64 000	44 000	8.5	47 300	41 700	--	--	--	--	--	--	--	--
2024-T62	0.064	0.27	318089§	T/2	L	65 700	54 900	7.5	54 100	--	107 500	132 200	86 900	102 500	--	--	--	--
					LT	69 500	55 200	11.0	57 900	--	--	--	--	--	--	--	--	--
	0.083	0.27	318087	T/2	L	66 900	55 900	7.0	60 000	--	109 300	135 400	94 100	111 700	--	--	--	--
					LT	68 800	54 600	9.0	57 500	--	--	--	--	--	--	--	--	--
	0.430	2.1	340242§	T/2	L	68 300	57 700	12.0		38 700	100 900	130 600	81 700	99 300	--	--	--	--
					LT	67 700	57 700	12.0		37 600	--	--	--	--	--	--	--	--
	0.500	0.64	340244	T/2	L	71 800	59 300	11.0	61 400	40 000	102 800	134 100	82 300	100 000	--	--	--	--
					LT	68 100	58 000	9.0	--	--	--	--	--	--	--	--	--	--
	2.562	6.4	340246	T/4,W/4	L	71 200	58 100	10.5	59 500	40 000	101 400	131 900	82 900	101 700	96 800	127 400	81 500	100 600
					LT	66 100	55 300	7.0	58 400	--	--	--	--	--	--	--	--	--
				T/2,W/2	L	67 800	53 800	10.5	56 200	38 300	95 800	125 000	80 500	99 400	96 900	120 200	82 200	95 500
					LT	62 000	51 500	6.5	53 700	36 500	--	--	--	--	--	--	--	--
					ST	63 000	52 700	6.0	55 600	38 400	--	--	--	--	--	--	--	--

* T - Thickness; W - Width
† L - Longitudinal; LT - Long-Transverse; ST - Short-Transverse
‡ Offset equals 0.2 per cent
§ Producer B; all others from Producer A
**Specimens and Fixtures cleaned ultrasonically in Toson 3 solvent
††Offset equals 2 per cent of pin diameter

Continued

TABLE X (Concluded)

MECHANICAL PROPERTIES OF EXTRUSIONS IN THE "HEAT-TREATED-BY USER" TEMPER
AF33(615)-3530

Alloy and Temper	Sample Section Thickness in.	Sample Cross-Sectional Area, in.²	Number	Location*	Direction†	Tensile Ultimate Stress, psi	Tensile Yield Stress,‡ psi	Elongation in 2 in. or 4D, %	Comp. Yield Stress,‡ psi	Shear Ultimate Stress psi	Bearing** Flatwise Ultimate Stress psi e/D=1.5	Bearing** Flatwise Ultimate Stress psi e/D=2.0	Bearing** Flatwise Yield Stress,†† psi e/D=1.5	Bearing** Flatwise Yield Stress,†† psi e/D=2.0	Bearing** Edgewise Ultimate Stress, psi e/D=1.5	Bearing** Edgewise Ultimate Stress, psi e/D=2.0	Bearing** Edgewise Yield Stress,†† psi e/D=1.5	Bearing** Edgewise Yield Stress,†† psi e/D=2.0
6061-T62	0.246	4.6	318090	T/2	L	48 000	43 800	15.5	45 100	35 300	80 200	104 000	69 400	80 500	--	--	--	--
					LT	46 100	41 500	18.5	44 000	35 200	82 400	105 200	73 800	85 400	--	--	--	--
	1.625	3.9	418091	T/4,W/4	L	46 100	41 200	18.0	42 500	32 200	75 900	98 000	67 500	77 700	--	--	--	--
					LT	45 000	39 400	14.0	--	--	--	--	--	--	--	--	--	--
				T/2,W/2	L	45 900	41 500	19.0	42 700	32 700	76 300	96 300	69 200	76 700	74 600	95 500	67 800	75 300
					LT	45 600	40 300	15.0	43 200	31 200	--	--	--	--	--	--	--	--
7075-T62	0.063	0.34	318094§	T/2	L	80 700	70 500	11.0	74 900	--	118 000	152 200	96 900	118 600	--	--	--	--
					LT	79 200	70 000	13.0	76 700	--	--	--	--	--	--	--	--	--
	0.126	0.17	318092	T/2	L	91 300	83 200	10.0	88 400	--	--	--	--	--	--	--	--	--
	0.300	1.7	318096	T/2	L	91 000	81 500	13.0	85 900	48 700	124 000	158 500	106 600	125 700	--	--	--	--
					LT	84 800	76 000	9.4	83 900	47 600	--	--	--	--	--	--	--	--
	1.225	21.2	318098§	T/2,W/4	L	87 100	78 000	10.5	81 800	48 200	124 900	153 200	110 200	124 000	109 600	144 300	105 700	127 200
					LT	81 000	72 400	7.0	79 300	46 500	--	--	--	--	--	--	--	--
				T/2,W/2	L	84 600	75 100	11.5	78 500	47 500	124 000	156 800	107 900	125 000	111 800	144 900	107 000	127 200
					LT	80 000	71 400	8.0	77 000	46 100	123 200	151 100	107 300	127 800	107 600	137 000	101 300	126 600
	2.250	4.1	318100	T/4	L	92 700	85 100	10.5	88 000	48 800	122 200	152 800	106 500	125 000	125 000	154 400	106 300	127 200
				T/2	L	89 300	81 900	9.5	83 600	47 100	120 300	149 100	103 800	122 200	--	--	--	--
					LT	76 700	66 100	7.8	72 400	46 300	--	--	--	--	--	--	--	--
7075-T73X	0.063	0.34	318095§	T/2	L	71 300	61 300	10.5	63 100	--	106 800	139 100	87 000	106 800	--	--	--	--
					LT	70 500	59 000	11.0	64 800	--	--	--	--	--	--	--	--	--
	0.126	0.17	318093	T/2	L	87 800	78 600	10.0	76 000	--	--	--	--	--	--	--	--	--
	0.300	1.7	318097	T/2	L	76 800	67 000	12.0	71 800	122 700	145 500	93 200	113 100	--	--	--	--	--
					LT	74 300	64 300	11.7	68 300	42 200	--	--	--	--	--	--	--	--
	1.225	21.2	318099§	T/2,W/4	L	78 400	69 600	10.0	73 500	44 700	113 100	148 000	98 900	119 300	97 500	138 800	94 900	115 000
					LT	73 600	65 800	7.5	70 900	43 300	--	--	--	--	--	--	--	--
				T/2,W/2	L	76 200	66 700	10.5	70 200	43 800	114 200	144 900	98 000	117 200	100 600	131 600	97 500	115 800
					LT	73 100	64 900	9.0	68 900	42 400	114 100	144 900	95 300	115 100	101 900	132 200	94 400	114 400
	2.250	4.1	318101	T/4	L	79 800	72 700	11.5	73 800	45 300	118 800	150 600	98 000	118 000	115 200	145 900	96 800	116 500
				T/2	L	75 100	67 300	11.0	69 500	42 100	119 900	142 400	93 800	110 900	--	--	--	--
					LT	69 800	59 900	8.6	63 400	42 900	--	--	--	--	--	--	--	--
7178-T62	0.050	0.15	340247	T/2	L	96 700	88 600	11.5		--	135 400	166 100	117 300	133 900	--	--	--	--
					LT				--	--	--	--	--	--	--	--	--	--
	0.051	0.20	318102§	T/2	L	96 400	89 700	7.5	97 700	--	138 400	167 900	125 900	147 000	--	--	--	--
	0.403	3.0	340249	T/2	L	98 200	89 900	10.5		51 900	134 100	167 900	116 500	136 400	--	--	--	--
					LT					50 300	141 500	164 800	120 800	149 900	--	--	--	--

* T - Thickness; W - Width
† L - Longitudinal; LT - Long-Transverse; ST - Short-Transverse
‡ Offset equals 0.2 per cent
§ Producer B; all others from Producer A
**Specimens and Fixtures cleaned ultrasonically in Toson 3 solvent
††Offset equals 2 per cent of pin diameter

(Concluded)

TABLE X (Concluded)

TABLE XI

SPECIFIED MINIMUM VALUES* FOR ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

Alloy and Temper	Thickness, in.	Area, sq. in.	Tensile Ultimate Stress, psi	Tensile Yield Stress,† psi	Tensile Elongation 2 in. or 4D, %	Federal Specificati
2014-T62	≤0.749	All	60 000	53 000	7	QQ-A-200/2b
-T6510	≤0.499	All	60 000	53 000	7	
	0.500-0.749	All	64 000	58 000	7	
	≥0.750	≤25	68 000	60 000	7	
2024-T3510, -T3511	≤0.249	All	57 000	42 000	12	QQ-A-200/3b
	0.250-0.749	All	60 000	44 000	12	
	0.750-1.499	All	65 000	46 000	10	
	≥1.500	≤25	70 000	52 000	10	
	≥1.500	>25, ≤32	68 000	48 000	8	
-T42	≤0.749	All	57 000	38 000	12	
	≥1.500	≤25	57 000	38 000	10	
-T8510, -T8511	0.050-0.249	All	64 000	56 000	4	
	0.250-1.499	All	66 000	58 000	5	
	≥1.500	≤32	66 000	58 000	5	
-T62	≤0.749	-	--	--	-	None
	≥1.500	-	--	--	-	
6061-T62*, -T6510	≤0.249	All	38 000	35 000	8**	QQ-A-200/8b
	≥0.250	All	38 000	35 000	10	
7075-T62‡, -T6510	≤0.249	All	78 000	70 000	7	QQ-A-200/11b
	0.250-0.499	All	81 000	73 000	7	
	0.500-2.999	All	81 000	72 000	7	
	3.000-4.499	≤20	81 000	71 000	7	
-T73X,†† -T73510	≤0.249	-	--	--	-	None
	0.250-0.499	-	--	--	-	
	0.500-1.499	-	--	--	-	
	1.500-2.999	-	--	--	-	
7079-T62,‡ -T6510	≤0.249	≤20	75 000	67 000	7	QQ-A-200/12b
	0.250-0.499	≤20	77 000	68 000	7	
7178-T62‡	≤0.061	≤20	79 000**	73 000**	5	QQ-A-200/13
	0.250-1.499	≤20	82 000**	74 000**	5	
-T6510	0.062-0.249	≤20	84 000**	76 000**	5	
	0.250-1.499	≤25	87 000**	78 000**	5	

* All values are as shown in the Aluminum Association Booklet, "Standards for Aluminum Mill Products," 1967.

† Offset equals 0.2 per cent.

‡ In QQ-A-200/8b, 11b, 12b and 13, values for T6 temper apply also for extrusions heat treated and aged by user (T62 temper).

** Lower than in Federal specifications.

†† "T73X" signifies T73-type temper for 7075 when heat treated and aged by user. Standard designation not yet assigned.

TABLE XII

RATIOS AMONG THE TENSILE, COMPRESSIVE AND SHEAR PROPERTIES OF STRESS-RELIEVED STRETCHED ALUMINUM ALLOY EXTRUSIONS

[AF33(615)-3580]

Alloy and Temper	Sample: Section Thickness, in.	Sample: Cross-Sectional Area, in.^{2}	Sample: Number	Location*	TUS(LT)/TUS(L)	TUS(ST)/TUS(L)	TYS(LT)/TYS(L)	TYS(ST)/TYS(L)	CYS(L)/TYS(L)	CYS(LT)/TYS(L)	CYS(ST)/TYS(L)	SU(L)/TUS(L)	SU(LT)/TUS(L)	SU(ST)/TUS(L)
2014-T6510	0.061	0.30	317950	T/2	1.11	--	1.10	--	1.04	--	--	--	--	--
	0.070	0.24	318017†	T/2	--	--	--	--	1.01	--	--	--	--	--
	0.073	0.16	317951	T/2	--	--	--	--	1.01	--	--	--	--	--
	0.246	0.45	318130†	T/2	--	--	--	--	1.01	--	--	0.69	--	--
	0.250	3.7	340154	T/2	1.06	--	1.03	--	1.03	1.12	--	0.71	0.70	--
	0.271	0.40	317994	T/2	1.06	--	1.01	--	0.99	--	--	0.70	--	--
	0.625	0.50	317952	T/2	--	--	--	--	0.97	--	--	0.68	--	--
	0.625	0.55	340291	T/2	--	--	--	--		--	--	0.54	--	--
	0.750	1.4	317924	T/2	0.92	--	0.89	--	1.03	0.96	--	0.56	--	
	1.657	2.2	318046	T/4	--	--	--	--	1.03	--	--	0.57	--	--
				T/2	0.92	--	0.91	--	1.03	--	--	0.57	--	--
2024-T3510	0.075	0.70	318132†	T/2	1.07	--	0.91	--	0.85	1.09	--	--	--	--
	0.094	0.30	318019†	T/2	--	--	--	--	1.10	--	--	--	--	--
	0.101	0.33	317885	T/2	--	--	--	--	0.85		--	--	--	--
	0.106	0.31	317904	T/2	--	--	--	--	0.81	--	--	--	--	--
‡	0.120	0.27	318018†	T/2	--	--	--	--	0.83	--	--	--	--	--
	0.151	0.82	317886	T/2	0.97	--	0.92	--	0.83	1.01	--	--	--	--
	0.255	2.8	317942	T/2	0.96	--	0.90	--	0.84	0.97	--	0.54	0.53	--
	0.258	4.2	318047	T/2	0.94	--	0.89	--	0.87	0.95	--	0.54	0.53	--
	0.375	0.62	317943	T/2	0.90	--	0.79	--	0.76	--	--	0.65	--	--
	0.510	10.1	317926	T/2,W/2	0.86	--	0.85	--	0.88	0.92	--	0.54	0.53	--
	0.525	1.9	318020†	T/2,W/4	0.98	--	0.88	--	0.81	--	--	0.67	--	--
				T/2,W/2	1.01	--	0.90	--	0.83	0.98	--	0.66	0.67	--
	0.550	1.9	317856	T/2,W/4	0.91	--	0.85	--	0.87	0.93	--	0.52	0.50	--
	0.642	5.8	317945	T/2,W/4	0.84	--	0.79	--	0.85	0.92	--	0.52	0.51	--
	0.950	4.6	317944	T/2,W/4	0.86	--	0.83	--	0.90	0.89	--	0.49	--	--
	1.150	5.6	318077	T/2,W/4	0.87	--	0.85	--	0.90	0.90	--	0.50	--	--
				T/2,W/2	0.91	--	0.86	--	0.88	0.92	--	0.53	0.50	--
	1.200	3.9	317946	T/2,W/2	0.84	--	0.78	--	0.91	0.86	--	0.50	--	--
‡	1.450	7.3	318021†	T/2,W/4	0.85	--	0.79	--	0.93	0.84	--	0.50	--	--
				T/2,W/2	0.86	--	0.81	--	0.93	0.87	--	0.50	0.49	--
	1.705	4.8	340213	T/4,W/4	0.85	--	0.78	--	0.95	--	--	0.49	--	--
				T/2,W/2	0.84	--	0.80	--	0.93	0.85	--	0.48	0.47	--
	2.520	8.8	318133†	T/4,W/4	0.83	--	0.75	--	0.96	0.81	--	0.48	--	--
				T/2,W/2	0.83	0.81	0.76	0.71	0.96	0.81	0.79	0.48	0.47	0.52
	4.000	24.0	340214	T/4,W/4	0.81	--	0.77	--	0.93	0.83	--	0.48	0.46	--
				T/2,W/2	0.80	0.77	0.79	0.71	0.94	0.84	0.82	0.48	0.47	0.51
	2.760	29.6	318048	T/4,W/4	0.76	--	0.74	--	0.93	0.81	--	0.53	0.48	--
				T/2,W/2	0.79	0.77	0.80	0.72	0.93	0.84	0.81	0.51	0.49	0.51
2024-T8510	0.075	0.70	318022†	T/2	1.07	--	1.02	--	1.02	1.07	--	--	--	--
	0.094	0.30	318134†	T/2	--	--	--	--	0.95	--	--	--	--	--
	0.101	0.33	317887	T/2	--	--	--	--	1.02	--	--	--	--	--
	0.106	0.31	317888	T/2	--	--	--	--	1.01	--	--	--	--	--
	0.120	0.27	318023†	T/2	--	--	--	--	1.00	--	--	--	--	--
	0.151	0.82	317889	T/2	1.05	--	1.05	--	1.05	1.04	--	--	--	--
	0.255	2.8	317890	T/2	0.99	--	1.02	--	1.06	1.04	--	0.57	0.55	--
	0.258	4.2	318082	T/2	0.99	--	1.02	--	1.07	1.05	--	0.58	0.57	--
	0.375	0.62	317891	T/2	0.97	--	0.95	--	0.97	--	--	0.62	--	--
	0.510	10.1	317892	T/2,W/2	0.97	--	1.00	--	1.06	1.05	--	0.57	0.56	--
	0.525	1.9	318024†	T/2,W/4	0.98	--	0.99	--	1.03	--	--	0.63	--	
				T/2,W/2	0.99	--	1.01	--	1.05	1.00	--	0.57	0.57	

* T - Thickness; W - Width
† Producer B; all others from Producer A
‡ Samples were in the T3511 temper
§ Sample was in the T8511 temper

TABLE XII

TABLE XII
(Continued)

RATIOS AMONG THE TENSILE, COMPRESSIVE AND SHEAR PROPERTIES OF STRESS-RELIEVED STRETCHED ALUMINUM ALLOY EXTRUSIONS

[AF33(615)-3580]

Alloy and Temper	Sample: Section Thickness, in.	Sample: Cross-Sectional Area, in.^{2}	Sample: Number	Location*	TUS(LT)/TUS(L)	TUS(ST)/TUS(L)	TYS(LT)/TYS(L)	TYS(ST)/TYS(L)	CYS(L)/TYS(L)	CYS(LT)/TYS(L)	CYS(ST)/TYS(L)	SU(L)/TUS(L)	SU(LT)/TUS(L)	SU(ST)/TUS(L)
2024-T8510	0.550	1.9	317922	T/2,W/4	0.97	--	0.99	--	1.04	1.03	--	0.56	0.56	--
	0.642	5.8	317804	T/2,W/4	0.95	--	0.98	--	1.02	1.02	--	0.55	0.53	--
	0.950	4.6	317803	T/2,W/4	0.95	--	0.96	--	0.98	0.99	--	0.57	--	--
	1.150	5.6	318078	T/2,W/4	0.97	--	1.02	--	1.04	1.05	--	0.56	--	--
				T/2,W/2	0.99	--	1.03	--	1.06	1.04	--	0.57	0.56	--
	1.200	3.9	317895	T/2,W/4	0.96	--	0.98	--	1.03	1.03	--	0.56	--	--
§	1.450	7.3	318025†	T/2,W/4	0.94	--	0.98	--	1.02	1.00	--	0.56	--	--
				T/2,W/2	0.95	--	0.97	--	1.02	1.00	--	0.56	0.55	--
	1.705	4.8	340169	T/4,W/4	0.99	--	1.00	--	1.04	--	--	0.56	--	--
				T/2,W/2	0.97	--	0.98	--	1.00	1.01	--	0.54	0.53	--
	2.760	29.6	318079	T/4,W/4	0.92	--	0.96	--	1.02	1.02	--	0.58	0.56	--
				T/2,W/2	0.94	0.91	0.98	0.94	1.01	1.01	1.02	0.58	0.59	0.56
	4.000	24.0	340225	T/4,W/4	0.97	--	1.00	--	1.02	1.02	--	0.56	0.53	--
				T/2,W/2	0.97	0.93	1.00	0.96	1.01	1.01	1.03	0.56	0.53	0.54
6061-T6510	0.050	0.42	318136†	T/2	--	--	--	--	0.98	--	--	--	--	--
	0.075	0.59	317857	T/2	0.98	--	0.95	--	1.02	0.99	--	--	--	--
	0.090	0.27	318027†	T/2	--	--	--	--	0.98	--	--	--	--	--
	0.125	0.61	317846	T/2	0.97	--	0.93	--	1.00	1.00	--	--	--	--
	0.126	0.30	317847	T/2	--	--	--	--	1.00	--	--	0.72	--	--
	0.250	0.36	317848	T/2	--	--	--	--	1.01	--	--	0.72	--	--
	0.310	6.3	317905	T/2	1.03	--	1.00	--	0.98	1.04	--	0.65	0.64	--
	0.315	5.8	317953	T/2	0.98	--	0.95	--	1.00	1.00	--	0.76	0.74	--
	0.375	8.6	317927	T/2	0.99	--	0.95	--	0.99	1.00	--	0.80	0.79	--
	0.375	7.7	318083	T/2	0.94	--	0.93	--	0.98	0.99	--	0.76	0.73	--
	0.918	1.3	317906	T/2,W/2	0.99	--	0.98	--	1.00	1.04	--	0.72	--	--
	1.240	2.7	317907	T/2,W/4	--	--	--	--	1.04	--	--	0.60	--	--
				T/2,W/2	0.89	--	0.86	--	1.01	0.94	--	0.58	--	--
	1.960	4.4	317896	T/2,W/4	--	--	--	--	1.00	--	--	0.57	--	--
				T/2,W/2	0.87	--	0.83	--	1.01	0.91	--	0.56	--	--
	3.000	15.0	340226	T/4,W/4	0.90	--	0.86	--	1.00	0.93	--	0.53	0.52	--
				T/2,W/2	0.90	0.91	0.90	0.84	1.00	0.93	0.92	0.53	0.52	0.55
	6.500	33.2	317897	T/4	0.87	--	0.82	--	1.00	0.88	--	0.52	0.52	--
				T/2	0.86	--	0.81	--	1.00	0.87	--	0.33	0.52	--
7075-T6510	0.065	0.18	317889	T/2	--	--	--	--	0.95	--	--	--	--	--
	0.065	0.27	318031†	T/2	0.97	--	0.96	--	0.99	1.00	--	--	--	--
	0.080	0.18	317858	T/2	--	--	--	--	0.98	--	--	--	--	--
	0.133	0.97	318029†	T/2	0.98	--	0.96	--	1.01	1.03	--	--	--	--

* T - Thickness; W - Width
† Producer B; all others from Producer A
‡ Samples were in the T3511 temper
‡ Sample was in the T8511 temper

TABLE XII (Continued)

TABLE XII
(Concluded)

RATIOS AMONG THE TENSILE, COMPRESSIVE AND SHEAR PROPERTIES OF STRESS-RELIEVED STRETCHED ALUMINUM ALLOY EXTRUSIONS

[AF33(615)-3580]

Alloy and Temper	Sample: Section Thickness, in.	Sample: Cross-Sectional Area, in.²	Sample: Number	Location*	TUS(LT)/TUS(L)	TUS(ST)/TUS(L)	TYS(LT)/TYS(L)	TYS(ST)/TYS(L)	CYS(L)/TYS(L)	CYS(LT)/TYS(L)	CYS(ST)/TYS(L)	SU(L)/TUS(L)	SU(ST)/TUS(L)	SU(ST)/TUS(L)
7075-T6510	0.160	0.26	318030†	T/2	--	--	--	--	1.04	--	--	--	--	--
	0.260	1.2	318028†	T/2	0.98	--	0.96	--	1.01	--	--	0.57	--	--
	0.313	0.51	317908	T/2	--	--	--	--	1.03	--	--	0.55	--	--
	0.375	2.2	317954	T/2	0.95	--	0.92	--	0.98	1.01	--	0.55	0.54	--
	0.438	7.2	317859	T/2	0.98	--	0.97	--	1.00	1.07	--	0.57	0.55	--
	0.463	1.9	318032†	T/2	0.94	--	0.93	--	1.02	1.02	--	0.56	0.54	--
	0.935	7.2	340155	T/2,W/4	0.95	--	0.93	--	0.98	0.99	--	0.54	0.52	--
				T/2,W/2	0.96	--	0.95	--	0.97	1.00	--	0.54	0.53	--
	1.023	1.8	318033†	T/2,W/4	--	--	--	--	1.02	--	--	0.53	--	--
	1.188	27.1	317860	T/2,W/4	0.97	--	0.96	--	1.00	1.02	--	0.59	0.55	--
				T/2,W/2	0.98	--	0.96	--	0.99	1.03	--	0.57	0.56	--
	1.500	1.8	317955	T/2	0.83	--	0.78	--	1.01	--	--	0.51	--	--
	2.000	3.1	317861	T/4	--	--	--	--	1.00	--	--	0.53	--	--
				T/2	0.87	--	0.82	--	1.01	0.89	--	0.52	--	--
	2.190	17.0	318137†	T/4,W/4	0.89	--	0.91	--	1.00	1.01	--	0.55	0.54	--
				T/2,W/2	0.95	0.86	0.94	0.84	0.99	1.00	0.98	0.53	0.51	--
	3.040	13.8	318138†	T/4,W/4	0.88	--	0.85	--	1.02	0.93	--	0.53	--	--
				T/2,W/2	0.89	0.87	0.87	0.82	1.01	0.95	0.92	0.54	0.52	0.52
7075-T73510	0.080	0.18	317862	T/2	--	--	--	--	1.00	--	--	--	--	--
	0.313	0.51	317909	T/2	--	--	--	--	1.05	--	--	0.67	--	--
	0.375	2.2	317900	T/2	0.97	--	0.97	--	1.02	1.04	--	0.59	0.57	--
	0.438	7.2	317910	T/2	0.99	--	1.00	--	1.03	1.06	--	0.58	0.57	--
	0.935	7.2	340292	T/2,W/4	0.97	--	0.96	--	1.00	1.02	--	0.56	0.55	--
				T/2,W/2	0.98	--	0.97	--	1.00	1.02	--	0.56	0.55	--
	1.500	1.8	317956	T/2	0.90	--	0.85	--	1.02	--	--	0.56	--	--
	2.000	3.1	317948	T/4	--	--	--	--	1.02	--	--	0.56	--	--
				T/2	0.90	--	0.86	--	1.02	0.93	--	0.56	--	--
7079-T6510	0.161	0.72	340252	T/2	0.97	--	0.95	--	0.99	1.06	--	--	--	--
	0.251	0.82	340253	T/2	0.95	--	0.92	--	1.01	1.01	--	0.56	0.55	--
7178-T6510	0.063	0.37	317902	T/2	0.99	--	0.97	--	1.01	1.04	--	--	--	--
	0.142	1.0	318016	T/2	0.99	--	0.96	--	0.97	1.06	--	--	--	--
	0.154	0.42	318035†	T/2	--	--	--	--	1.06	--	--	--	--	--
	0.162	0.49	317903	T/2	--	--	--	--	0.98	--	--	--	--	--
	0.265	0.88	317996	T/2	--	--	--	--	1.00	--	--	0.54	--	--
	0.625	6.9	317997	T/2,W/4	0.97	--	0.94	--	0.98	1.01	--	0.55	0.53	--
				T/2,W/2	0.97	--	0.94	--	0.98	1.02	--	0.56	0.54	--
	0.780	1.7	340254	T/2,W/2	0.90	--	0.86	--	1.01	--	--	0.51	--	--
	1.200	3.9	318139†	T/2,W/4	0.91	--	0.89	--	1.02	--	--	0.53	--	--
				T/2,W/2	0.92	--	0.90	--	1.02	0.99	--	0.54	0.53	--
	1.432	6.4	317957	T/2	0.84	--	0.81	--	1.02	--	--	0.55	--	--
	2.180	15.5	318140†	T/4,W/4	0.91	--	0.90	--	1.00	0.99	--	0.54	0.51	--
				T/2,W/2	0.93	0.86	0.92	0.84	1.01	1.00	0.97	0.53	0.50	--

* T - Thickness; W - Width
† Producer B; all others from Producer A
‡ Samples were in the T3511 temper
§ Sample was in the T8511 temper

TABLE XII (Concluded)

TABLE XIII

RATIOS AMONG THE TENSILE, COMPRESSIVE AND SHEAR PROPERTIES
OF ALUMINUM ALLOY EXTRUSIONS IN THE "HEAT-TREATED-BY-USER" TEMPERS

[AF33(615)-3580]

Alloy and Temper	Sample: Section Thickness, in.	Sample: Cross-Sectional Area, in.^{2}	Sample: Number	Location*	TUS(LT)/TUS(L)	TUS(ST)/TUS(L)	TYS(LT)/TYS(L)	TYS(ST)/TYS(L)	CYS(L)/TYS(L)	CYS(LT)/TYS(L)	CYS(ST)/TYS(L)	SU(L)/TUS(L)	SU(LT)/TUS(L)	SU(ST)/TUS(L)
2014-T62	0.300	6.3	318084	T/2	1.01	--	0.94	--	1.04	1.08	--	0.58	0.56	--
	0.499	1.4	318085	T/2	0.98	--	0.98	--	1.06	1.03	--	0.63	--	--
2024-T42	0.064	0.27	318088†	T/2	1.06	--	0.98	--	1.01	1.07	--	--	--	--
	0.083	0.27	318086	T/2	1.02	--	1.02	--	1.06	1.06	--	--	--	--
	0.430	2.1	340241†	T/2	1.00	--	0.99	--			--	0.54	0.52	--
	0.500	0.64	340243	T/2	0.90	--	0.87	--	1.01	--	--	0.49	--	--
	2.562	6.4	340245	T/4,W/4	0.85	--	0.81	--	1.00	0.85	--	0.50	--	--
				T/2,W/2	0.76	0.79	0.80	0.78	1.01	0.84	0.84	0.48	0.48	0.52
2024-T62	0.064	0.27	318089†	T/2	1.06	--	1.01	--	0.99	1.05	--	--	--	--
	0.083	0.27	318087	T/2	1.03	--	0.98	--	1.07	1.03	--	--	--	--
	0.430	2.1	340242†	T/2	0.99	--	1.00	--			--	0.57	0.55	--
	0.500	0.64	340244	T/2	0.95	--	0.98	--	1.04	--	--	0.56	--	--
	2.562	6.4	340246	T/4,W/4	0.93	--	0.95	--	1.02	1.01	--	0.56	--	--
				T/2,W/2	0.91	0.93	0.96	0.98	1.04	1.00	1.03	0.56	0.54	0.57
6061-T62	0.246	4.6	318090	T/2	0.96	--	0.95	--	1.03	1.00	--	0.74	0.73	--
	1.625	3.9	318091	T/4,W/4	0.98	--	0.96	--	1.03	--	--	0.70	--	--
				T/2,W/2	0.99	--	0.97	--	1.03	1.04	--	0.71	0.68	--
7075-T62	0.063	0.34	318094†	T/2	0.98	--	0.99	--	1.06	1.09	--	--	--	--
	0.126	0.17	318092	T/2	--	--	--	--	1.06	--	--	--	--	--
	0.300	1.7	318096	T/2	0.93	--	0.93	--	1.05	1.03	--	0.54	0.52	--
	1.225	21.2	318098†	T/2,W/4	0.93	--	0.92	--	1.05	1.02	--	0.55	0.53	--
				T/2,W/2	0.95	--	0.95	--	1.05	1.03	--	0.56	0.54	--
	2.250	4.1	318100	T/4	--	--	--	--	1.03	--	--	0.53	--	--
				T/2	0.86	--	0.81	--	1.02	0.88	--	0.53	0.52	--
7075-T73X	0.063	0.34	318095†	T/2	0.99	--	0.96	--	1.03	1.06	--	--	--	--
	0.126	0.17	318093	T/2	--	--	--	--	0.97	--	--	--	--	--
	0.300	1.7	318097	T/2	0.97	--	0.96	--	1.07	1.02	--	0.57	0.55	--
	1.225	21.2	318099†	T/2,W/4	0.94	--	0.95	--	1.06	1.02	--	0.57	0.55	--
				T/2,W/2	0.96	--	0.97	--	1.05	1.03	--	0.57	0.56	--
	2.250	4.1	318101	T/4	--	--	--	--	1.02	--	--	0.57	--	--
				T/2	0.93	--	0.89	--	1.03	0.94	--	0.56	0.57	--
7178-T62	0.050	0.15	340247	T/2		--		--			--	--	--	--
	0.051	0.20	318102†	T/2		--		--	1.09		--	--	--	--
	0.403	3.0	340249	T/2		--		--			--	0.53	0.51	--

* T - Thickness; W - Width
† Producer B; all others Producer A

TABLE XIV

RATIOS OF BEARING TO TENSILE PROPERTIES OF STRESS-RELIEVED STRETCHED ALUMINUM ALLOY EXTRUSIONS

[AF33(615)-3580]

Alloy and Temper	Sample: Section Thickness, in.	Sample: Cross-Sectional Area, in.^{2}	Sample: Number	Location*	Flatwise: BUS(L)/TUS(L) e/D=1.5	Flatwise: BUS(L)/TUS(L) e/D=2.0	Flatwise: BYS(L)/TYS(L) e/D=1.5	Flatwise: BYS(L)/TYS(L) e/D=2.0	Flatwise: BUS(LT)/TUS(L) e/D=1.5	Flatwise: BUS(LT)/TUS(L) e/D=2.0	Flatwise: BYS(LT)/TYS(L) e/D=1.5	Flatwise: BYS(LT)/TYS(L) e/D=2.0	Edgewise: BUS(L)/TUS(L) e/D=1.5	Edgewise: BUS(L)/TUS(L) e/D=2.0	Edgewise: BYS(L)/TYS(L) e/D=1.5	Edgewise: BYS(L)/TYS(L) e/D=2.0	Edgewise: BUS(LT)/TUS(L) e/D=1.5	Edgewise: BUS(LT)/TUS(L) e/D=2.0	Edgewise: BYS(LT)/TYS(L) e/D=1.5	Edgewise: BYS(LT)/TYS(L) e/D=2.0
2014-T6510	0.061	0.30	317950	T/2	1.57	2.07	1.42	1.67	--	--	--	--	--	--	--	--	--	--	--	--
	0.070	0.24	318017†	T/2	1.61	2.08	1.43	1.68	--	--	--	--	--	--	--	--	--	--	--	--
	0.246	0.45	318130	T/2	1.72	2.14	1.56	1.78	--	--	--	--	--	--	--	--	--	--	--	--
	0.250	3.7	340154	T/2	1.68	2.18	1.50	1.83	--	--	--	--	--	--	--	--	--	--	--	--
	0.271	0.40	317994	T/2	1.58	2.07	1.46	1.69	--	--	--	--	--	--	--	--	--	--	--	--
	0.750	1.4	317924	T/2	1.43	1.86	1.32	1.49	--	--	--	--	--	--	--	--	--	--	--	--
	1.657	2.2	318046	T/4	1.46	1.87	1.33	1.56	--	--	--	--	--	--	--	--	--	--	--	--
				T/2	1.45	1.81	1.29	1.50	--	--	--	--	--	--	--	--	--	--	--	--
2024-T3510	0.075	0.70	318132†	T/2	1.47	1.81	1.48	1.78	--	--	--	--	--	--	--	--	--	--	--	--
	0.094	0.30	318019†	T/2	1.52	2.00	1.48	1.75	--	--	--	--	--	--	--	--	--	--	--	--
	0.101	0.33	317885	T/2	1.51	1.86	1.43	1.69	--	--	--	--	--	--	--	--	--	--	--	--
	0.106	0.31	317904	T/2	1.59	1.95	1.49	1.76	--	--	--	--	--	--	--	--	--	--	--	--
‡	0.120	0.27	318018†	T/2	1.56	1.98	1.48	1.71	--	--	--	--	--	--	--	--	--	--	--	--
	0.151	0.82	317886	T/2	1.46	1.77	1.44	1.68	--	--	--	--	--	--	--	--	--	--	--	--
	0.255	2.8	317942	T/2	1.25	1.56	1.21	1.38	1.33	1.66	1.31	1.61	--	--	--	--	--	--	--	--
	0.258	4.2	318047	T/2	1.33	1.66	1.33	1.59	1.34	1.68	1.25	1.60	--	--	--	--	--	--	--	--
	0.375	0.62	317943	T/2	1.67	2.09	1.61	2.06	--	--	--	--	--	--	--	--	--	--	--	--
	0.510	10.1	317926	T/2,W/2	1.33	1.73	1.36	1.66	--	--	--	--	--	--	--	--	--	--	--	--
	0.525	1.9	318020†	T/2,W/2	1.63	1.90	1.53	1.81	--	--	--	--	--	--	--	--	--	--	--	--
	0.550	1.9	317856	T/2,W/4	1.33	1.66	1.27	1.55	--	--	--	--	--	--	--	--	--	--	--	--
	0.642	5.8	317945	T/2,W/4	1.31	1.66	1.26	1.52	1.31	1.58	1.26	1.51	--	--	--	--	--	--	--	--
	0.950	4.6	317944	T/2,W/4	1.27	1.63	1.22	1.49	--	--	--	--	--	--	--	--	--	--	--	--
	1.150	5.6	318077	T/2,W/4	1.32	1.63	1.27	1.56	1.27	1.60	1.27	1.53	1.21	1.58	1.23	1.53	--	--	--	--
				T/2,W/2	1.35	1.69	1.27	1.58	--	--	--	--	--	--	--	--	--	--	--	--
	1.200	3.9	317946	T/2,W/4	1.31	1.67	1.19	1.47	--	--	--	--	1.27	1.63	1.23	1.45	--	--	--	--
‡	1.450	7.3	318021†	T/2,W/4	1.31	1.64	1.24	1.49	--	--	--	--	1.27	1.63	1.21	1.46	--	--	--	--
				T/2,W/2	1.31	1.62	1.26	1.50	--	--	--	--	1.26	1.60	1.19	1.48	--	--	--	--
	1.705	4.8	340213	T/4,W/4	1.34	1.65	1.23	1.54	--	--	--	--	--	--	--	--	--	--	--	--
				T/2,W/2	1.32	1.62	1.24	1.50	--	--	--	--	1.30	1.60	1.23	1.49	--	--	--	--
	2.520	8.8	318133†	T/4,W/4	1.28	1.59	1.25	1.53	--	--	--	--	1.24	1.58	1.24	1.42	--	--	--	--
				T/2,W/2	1.29	1.62	1.25	1.55	--	--	--	--	1.25	1.55	1.20	1.43	--	--	--	--
	4.000	24.0	340214	T/2,W/4	1.28	1.64	1.21	1.47	1.22	1.53	1.30	1.54	1.18	1.57	1.20	1.47	1.09	1.45	1.15	1.42
				T/2,W/2	1.18	1.65	1.27	1.54	--	--	--	--	1.15	1.55	1.20	1.51	--	--	--	--
	2.760	29.6	318048	T/4,W/4	1.22	1.53	1.25	1.50	1.20	1.51	1.27	1.55	1.23	1.59	1.24	1.55	1.11	1.44	1.21	1.50
				T/2,W/2	1.26	1.61	1.30	1.59	1.19	1.50	1.24	1.54	1.18	1.54	1.26	1.53	--	--	--	--

* T - Thickness; W - Width
† Producer B; all others from Producer A
‡ Samples were in the T3511 tempers
§ Sample was in the T8511 temper

** Bearing specimen failed before reaching yield stress (2 per cent offset).
NOTE: L - Longitudinal; LT - Long-Transverse

TABLE XIV

TABLE XIV (Continued)

RATIOS OF BEARING TO TENSILE PROPERTIES OF STRESS-RELIEVED STRETCHED ALUMINUM ALLOY EXTRUSIONS

[AF33(615)-3580]

Alloy and Temper	Sample: Section Thickness, in.	Sample: Cross-Sectional Area, in.^{2}	Sample: Number	Sample: Location*	Flatwise: BUS(L)/TUS(L) e/D=1.5	Flatwise: BUS(L)/TUS(L) e/D=2.0	Flatwise: BYS(L)/TYS(L) e/D=1.5	Flatwise: BYS(L)/TYS(L) e/D=2.0	Flatwise: BUS(LT)/TUS(L) e/D=1.5	Flatwise: BUS(LT)/TUS(L) e/D=2.0	Flatwise: BYS(LT)/TYS(L) e/D=1.5	Flatwise: BYS(LT)/TYS(L) e/D=2.0	Edgewise: BUS(L)/TUS(L) e/D=1.5	Edgewise: BUS(L)/TUS(L) e/D=2.0	Edgewise: BYS(L)/TYS(L) e/D=1.5	Edgewise: BYS(L)/TYS(L) e/D=2.0	Edgewise: BUS(LT)/TUS(L) e/D=1.5	Edgewise: BUS(LT)/TUS(L) e/D=2.0	Edgewise: BYS(LT)/TYS(L) e/D=1.5	Edgewise: BYS(LT)/TYS(L) e/D=2.0
2024-T8510	0.075	0.70	318022†	T/2	1.52	1.95	1.45	1.68	--	--	--	--	--	--	--	--	--	--	--	--
	0.094	0.30	318134†	T/2	1.50	1.91	1.44	1.71	--	--	--	--	--	--	--	--	--	--	--	--
	0.101	0.33	317887	T/2	1.46	1.93	1.37	1.75	--	--	--	--	--	--	--	--	--	--	--	--
	0.106	0.31	317888	T/2	1.53	2.04	1.44	1.73	--	--	--	--	--	--	--	--	--	--	--	--
	0.120	0.27	318023†	T/2	1.54	2.00	1.44	1.63	--	--	--	--	--	--	--	--	--	--	--	--
	0.151	0.82	317889	T/2	1.57	2.03	1.51	1.76	--	--	--	--	--	--	--	--	--	--	--	--
	0.255	2.8	317890	T/2	1.46	1.89	1.40	1.66	1.47	1.88	1.41	1.68	--	--	--	--	--	--	--	--
	0.258	4.2	318082	T/2	1.48	1.91	1.48	1.69	1.45	1.88	1.44	1.58	--	--	--	--	--	--	--	--
	0.375	0.62	317891	T/2	1.53	1.95	1.48	1.62	--	--	--	--	--	--	--	--	--	--	--	--
	0.510	10.1	317892	T/2	1.47	1.90	1.47	1.64	--	--	--	--	--	--	--	--	--	--	--	--
	0.525	1.9	318024†	T/2,W/4	1.46	1.89	1.43	1.67	--	--	--	--	--	--	--	--	--	--	--	--
	0.550	1.9	317922	T/2,W/4	1.47	1.88	1.40	1.66	--	--	--	--	--	--	--	--	--	--	--	--
	0.642	5.8	317894	T/2,W/4	1.40	1.80	1.40	1.64	1.41	1.82	1.36	1.63	--	--	--	--	--	--	--	--
	0.950	4.6	317893	T/2,W/4	1.41	1.84	1.41	1.64	--	--	--	--	--	--	--	--	--	--	--	--
	1.150	5.6	318078	T/2,W/4	1.46	1.87	1.43	1.68	1.45	1.87	1.45	1.70	1.27	1.74	1.36	1.62	--	--	--	--
				T/2,W/2	1.47	1.90	1.45	1.72	--	--	--	--	--	--	--	--	--	--	--	--
	1.200	3.9	317895	T/2,W/4	1.42	1.81	1.37	1.61	--	--	--	--	1.36	1.76	1.38	1.61	--	--	--	--
§	1.450	7.3	318025†	T/2,W/4	1.43	1.81	1.38	1.64	--	--	--	--	1.36	1.75	1.32	1.60	--	--	--	--
				T/2,W/2	1.41	1.84	1.36	1.65	--	--	--	--	1.35	1.76	1.33	1.61	--	--	--	--
	1.705	4.8	340169	T/4,W/4	1.47	1.86	1.42	1.66	--	--	--	--	--	--	--	--	--	--	--	--
				T/2,W/2	1.48	1.90	1.39	1.65	--	--	--	--	1.46	1.81	1.38	1.62	--	--	--	--
	2.760	29.6	318079	T/4,W/4	1.27	1.73	**	1.70	1.35	1.76	1.43	1.66	1.36	1.73	1.43	1.66	1.39	1.80	1.41	1.68
				T/2,W/2	1.34	1.75	1.42	1.67	1.38	1.82	1.39	1.61	1.28	1.69	**	1.71	--	--	--	--
	4.000	24.0	340225	T/4,W/4	1.39	1.83	1.42	1.69	1.44	1.88	1.40	1.69	1.33	1.75	1.42	1.70	1.28	1.79	1.37	1.71
				T/2,W/2	1.39	1.85	1.41	1.54	--	--	--	--	1.28	1.70	1.38	1.68	--	--	--	--
6061-T6510	0.050	0.42	318136†	T/2	1.76	2.38	1.58	1.79	--	--	--	--	--	--	--	--	--	--	--	--
	0.075	0.59	317857	T/2	1.62	2.00	1.51	1.70	1.94	2.29	1.72	1.98	--	--	--	--	--	--	--	--
	0.090	0.27	318027†	T/2	1.74	2.32	1.57	1.80	--	--	--	--	--	--	--	--	--	--	--	--
	0.125	0.61	317846	T/2	1.64	2.10	1.50	1.66	--	--	--	--	--	--	--	--	--	--	--	--
	0.310	6.3	317905	T/2	1.67	2.13	1.55	1.69	1.69	2.17	1.56	1.84	--	--	--	--	--	--	--	--
	0.315	5.8	317953	T/2	1.71	2.21	1.63	1.67	1.72	2.27	1.62	1.77	--	--	--	--	--	--	--	--
	0.375	8.6	317927	T/2	1.74	2.21	1.56	1.69	1.76	2.26	1.60	1.79	--	--	--	--	--	--	--	--
	0.375	7.7	318083	T/2	1.71	2.17	1.61	1.71	1.74	2.22	1.64	1.76	--	--	--	--	--	--	--	--
	0.918	1.3	317906	T/2,W/2	1.70	2.21	1.64	1.75	--	--	--	--	--	--	--	--	--	--	--	--
	1.240	2.7	317907	T/2,W/2	1.49	1.93	1.33	1.54	--	--	--	--	1.47	1.89	1.29	1.54	--	--	--	--
	1.960	4.4	317896	T/2,W/4	1.47	1.87	1.28	1.52	--	--	--	--	--	--	--	--	--	--	--	--
				T/2,W/2	1.44	1.85	1.27	1.46	--	--	--	--	1.44	1.85	1.26	1.50	--	--	--	--
	3.000	15.0	340226	T/4,W/4	1.44	1.86	1.27	1.47	1.41	1.81	1.24	1.50	1.42	1.81	1.24	1.47	1.36	1.75	1.21	1.47
				T/2,W/2	1.45	1.87	1.28	1.39	--	--	--	--	1.42	1.81	1.24	1.44	--	--	--	--
	6.500	33.2	317897	T/4	1.41	1.82	1.24	1.54	1.35	1.74	1.20	1.48	1.41	1.80	1.24	1.54	1.33	1.68	1.19	1.46
				T/2	1.40	1.79	1.24	1.48	--	--	--	--	--	--	--	--	--	--	--	--

* T - Thickness; W - Width
† Producer B; all others from Producer A
‡ Samples were in the T3511 tempers
§ Sample was in the T8511 temper

** Bearing specimen failed before reaching yield stress (2 per cent offset).

NOTE: L - Longitudinal; LT - Long-Transverse

TABLE XIV (Continued)

TABLE XIV (Concluded)

RATIOS OF BEARING TO TENSILE PROPERTIES OF STRESS-RELIEVED STRETCHED ALUMINUM ALLOY EXTRUSIONS

[AF33(615)-3580]

Alloy and Temper	Sample: Section Thickness, in.	Sample: Cross-Sectional Area, in.²	Sample: Number	Sample: Location*	Flatwise: BUS(L)/TUS(L) e/D=1.5	Flatwise: BUS(L)/TUS(L) e/D=2.0	Flatwise: BYS(L)/TYS(L) e/D=1.5	Flatwise: BYS(L)/TYS(L) e/D=2.0	Flatwise: BUS(LT)/TUS(L) e/D=1.5	Flatwise: BUS(LT)/TUS(L) e/D=2.0	Flatwise: BYS(LT)/TYS(L) e/D=1.5	Flatwise: BYS(LT)/TYS(L) e/D=2.0	Edgewise: BUS(L)/TUS(L) e/D=1.5	Edgewise: BUS(L)/TUS(L) e/D=2.0	Edgewise: BYS(L)/TYS(L) e/D=1.5	Edgewise: BYS(L)/TYS(L) e/D=2.0	Edgewise: BUS(LT)/TUS(L) e/D=1.5	Edgewise: BUS(LT)/TUS(L) e/D=2.0	Edgewise: BYS(LT)/TYS(L) e/D=1.5	Edgewise: BYS(LT)/TYS(L) e/D=2.0
7075-T6510	0.065	0.18	317899	T/2	1.46	1.82	1.35	1.55	--	--	--	--	--	--	--	--	--	--	--	--
	0.065	0.27	318031†	T/2	1.48	1.86	1.32	1.61	--	--	--	--	--	--	--	--	--	--	--	--
	0.080	0.18	317858	T/2	1.42	1.81	1.34	1.53	--	--	--	--	--	--	--	--	--	--	--	--
	0.133	0.97	318029†	T/2	1.48	1.86	1.41	1.63	--	--	--	--	--	--	--	--	--	--	--	--
	0.160	0.26	318030†	T/2	1.45	1.83	1.37	1.62	--	--	--	--	--	--	--	--	--	--	--	--
	0.260	1.23	318028†	T/2	1.47	1.85	1.35	1.58	--	--	--	--	--	--	--	--	--	--	--	--
	0.375	2.2	317954	T/2	1.42	1.82	1.29	1.59	--	--	--	--	--	--	--	--	--	--	--	--
	0.438	7.2	317859	T/2	1.47	1.83	1.41	1.60	1.50	1.75	1.40	1.67	--	--	--	--	--	--	--	--
	0.463	1.9	318032†	T/2	1.45	1.85	1.30	1.56	--	--	--	--	--	--	--	--	--	--	--	--
	0.935	7.2	340155	T/2,W/4	1.45	1.83	1.33	1.56	1.47	1.79	1.32	1.61	--	--	--	--	--	--	--	--
				T/2,W/2	1.46	1.82	1.33	1.56	--	--	--	--	--	--	--	--	--	--	--	--
	1.023	1.8	318033	T/2,W/4	1.37	1.77	1.21	1.49	--	--	--	--	--	--	--	--	--	--	--	--
	1.188	27.1	317860	T/2,W/4	1.47	1.84	1.36	1.52	1.49	1.83	1.40	1.61	1.26	1.71	1.23	1.47	1.29	1.65	1.25	1.51
				T/2,W/2	1.47	1.83	1.38	1.53	1.51	1.88	1.42	1.64	1.30	1.73	1.28	1.53	1.36	1.74	1.25	1.50
	1.500	1.8	317955	T/2	1.31	1.67	1.18	1.40	--	--	--	--	--	--	--	--	--	--	--	--
	2.000	3.1	317861	T/4	1.36	1.76	1.25	1.46	--	--	--	--	--	--	--	--	--	--	--	--
				T/2	1.32	1.71	1.22	1.46	--	--	--	--	--	--	--	--	--	--	--	--
	2.190	17.0	318137†	T/4,W/4	1.44	1.81	1.38	1.64	1.43	1.78	1.37	1.64	1.23	1.66	1.31	1.60	1.19	1.56	1.27	1.57
				T/2,W/2	1.44	1.82	1.38	1.65	1.47	1.86	1.42	1.66	1.24	1.67	1.35	1.64	1.25	1.66	1.29	1.58
	3.040	13.8	318138†	T/4,W/4	1.39	1.75	1.32	1.57	1.37	1.72	1.35	1.60	1.33	1.69	1.31	1.55	1.31	1.69	1.27	1.56
				T/2,W/2	1.40	1.79	1.33	1.58	--	--	--	--	1.35	1.72	1.32	1.55	--	--	--	--
7075-T73510	0.080	0.18	317862	T/2	1.52	1.94	1.45	1.69	--	--	--	--	--	--	--	--	--	--	--	--
	0.375	2.2	317900	T/2	1.51	1.95	1.44	1.70	--	--	--	--	--	--	--	--	--	--	--	--
	0.438	7.2	317910	T/2	1.53	1.98	1.47	1.74	1.54	1.98	1.45	1.78	--	--	--	--	--	--	--	--
	1.500	1.8	317956	T/2	1.39	1.83	1.30	1.55	--	--	--	--	--	--	--	--	--	--	--	--
	2.000	3.1	317948	T/4	1.41	1.85	1.28	1.54	--	--	--	--	--	--	--	--	--	--	--	--
				T/2	1.44	1.85	1.31	1.56	--	--	--	--	--	--	--	--	--	--	--	--
7079-T6510	0.161	0.72	340252	T/2	1.44	1.81	1.34	1.55	--	--	--	--	--	--	--	--	--	--	--	--
	0.251	0.82	340253	T/2	1.46	1.82	1.33	1.50	--	--	--	--	--	--	--	--	--	--	--	--
7178-T6510	0.063	0.37	317902	T/2	1.40	1.77	1.31	1.55	--	--	--	--	--	--	--	--	--	--	--	--
	0.142	1.0	318016	T/2	1.41	1.79	1.32	1.58	--	--	--	--	--	--	--	--	--	--	--	--
	0.154	0.42	318035†	T/2	1.50	1.87	1.40	1.61	--	--	--	--	--	--	--	--	--	--	--	--
	0.162	0.49	317903	T/2	1.44	1.79	1.34	1.52	--	--	--	--	--	--	--	--	--	--	--	--
	0.265	0.88	317996	T/2	1.39	1.75	1.26	1.40	--	--	--	--	--	--	--	--	--	--	--	--
	0.780	1.7	340254	T/2,W/2	1.38	1.73	1.19	1.43	--	--	--	--	--	--	--	--	--	--	--	--
	0.625	6.9	317997	T/2,W/4	1.46	1.76	1.32	1.55	1.41	1.69	1.31	1.54	--	--	--	--	--	--	--	--
				T/2,W/2	1.41	1.80	1.32	1.51	--	--	--	--	--	--	--	--	--	--	--	--
	1.200	3.9	318139†	T/2,W/4	1.39	1.76	1.28	1.54	--	--	--	--	1.29	1.70	1.30	1.53	--	--	--	--
				T/2,W/2	1.42	1.78	1.27	1.59	--	--	--	--	1.31	1.71	1.31	1.56	--	--	--	--
	1.438	6.4	317957	T/2	1.31	1.65	1.21	1.44	--	--	--	--	--	--	--	--	--	--	--	--
	2.160	15.5	318140†	T/4,W/4	1.37	1.77	1.36	1.61	1.41	1.71	1.37	1.62	1.24	1.59	1.33	1.56	1.19	1.63	1.27	1.56
				T/2,W/2	1.38	1.80	1.39	1.63	1.40	1.78	1.36	1.62	1.23	1.63	1.33	1.64	1.16	1.59	1.27	1.57

TABLE XIV (Concluded)

* T - Thickness; W - Width

† Producer B; all others from Producer A
‡ Samples were in the T3511 tempers
§ Sample was in the T8511 temper

** Bearing specimen failed before reaching yield stress (2 per cent offset).

NOTE: L - Longitudinal; LT - Long-Transverse

TABLE XV

RATIOS OF BEARING TO TENSILE PROPERTIES OF ALUMINUM ALLOY EXTRUSIONS IN THE "HEAT-TREATED-BY-USER" TEMPER

[AF33(615)-3580]

Alloy and Temper	Sample: Section Thickness, in.	Sample: Cross-Sectional Area, in.^{2}	Sample: Number	Sample: Location*	Flatwise: BUS(L)/TUS(L) e/D=1.5	Flatwise: BUS(L)/TUS(L) e/D=2.0	Flatwise: BYS(L)/TYS(L) e/D=1.5	Flatwise: BYS(L)/TYS(L) e/D=2.0	Flatwise: BUS(LT)/TUS(L) e/D=1.5	Flatwise: BUS(LT)/TUS(L) e/D=2.0	Flatwise: BYS(LT)/TYS(L) e/D=1.5	Flatwise: BYS(LT)/TYS(L) e/D=2.0	Edgewise: BUS(L)/TUS(L) e/D=1.5	Edgewise: BUS(L)/TUS(L) e/D=2.0	Edgewise: BYS(L)/TYS(L) e/D=1.5	Edgewise: BYS(L)/TYS(L) e/D=2.0	Edgewise: BUS(LT)/TUS(L) e/D=1.5	Edgewise: BUS(LT)/TUS(L) e/D=2.0	Edgewise: BYS(LT)/TYS(L) e/D=1.5	Edgewise: BYS(LT)/TYS(L) e/D=2.0
2014-T62	0.185	1.0	340240†	T/2	1.59	2.06	1.50	1.78	--	--	--	--	--	--	--	--	--	--	--	--
	0.300	6.3	318084	T/2	1.51	1.95	1.45	1.71	1.52	1.93	1.44	1.72	--	--	--	--	--	--	--	--
	0.499	1.4	318085	T/2	1.54	1.98	1.43	1.69	--	--	--	--	--	--	--	--	--	--	--	--
2024-T42	0.064	0.27	318088†	T/2	1.60	1.89	1.69	1.95	--	--	--	--	--	--	--	--	--	--	--	--
	0.083	0.27	318086	T/2	1.49	1.83	1.78	2.11	--	--	--	--	--	--	--	--	--	--	--	--
	0.430	2.1	340241†	T/2	1.39	1.73	1.46	1.80	--	--	--	--	--	--	--	--	--	--	--	--
	0.500	0.64	340243	T/2	1.35	1.61	1.35	1.65	--	--	--	--	--	--	--	--	--	--	--	--
	2.562	6.4	340245	T/4,W/4	1.30	1.64	1.30	1.57	--	--	--	--	1.27	1.59	1.24	1.54	--	--	--	--
				T/2,W/2	1.29	1.61	1.30	1.54	--	--	--	--	1.22	1.56	1.29	1.50	--	--	--	--
2024-T62	0.064	0.27	318089†	T/2	1.64	2.01	1.58	1.87	--	--	--	--	--	--	--	--	--	--	--	--
	0.083	0.27	318087	T/2	1.63	2.02	1.68	2.00	--	--	--	--	--	--	--	--	--	--	--	--
	0.430	2.1	340242†	T/2	1.48	1.91	1.42	1.72	--	--	--	--	--	--	--	--	--	--	--	--
	0.500	0.64	340244	T/2	1.43	1.87	1.39	1.69	--	--	--	--	--	--	--	--	--	--	--	--
	2.562	6.4	340246	T/4,W/4	1.42	1.85	1.43	1.75	--	--	--	--	1.36	1.79	1.40	1.73	--	--	--	--
				T/2,W/2	1.41	1.84	1.50	1.85	--	--	--	--	1.43	1.77	1.53	1.78	--	--	--	--
6061-T62	0.246	4.6	318090	T/2	1.67	2.17	1.58	1.84	1.72	2.19	1.68	1.95	--	--	--	--	--	--	--	--
	1.625	3.9	318091	T/4,W/4	1.65	2.13	1.64	1.89	--	--	--	--	--	--	--	--	--	--	--	--
				T/2,W/2	1.66	2.10	1.67	1.85	--	--	--	--	1.63	2.08	1.63	1.81	--	--	--	--
7075-T62	0.063	0.34	318094†	T/2	1.46	1.89	1.37	1.68	--	--	--	--	--	--	--	--	--	--	--	--
	0.300	1.7	318096	T/2	1.36	1.74	1.31	1.54	--	--	--	--	--	--	--	--	--	--	--	--
	1.225	21.2	318098†	T/2,W/4	1.43	1.76	1.41	1.59	--	--	--	--	1.26	1.66	1.36	1.63	--	--	--	--
				T/2,W/2	1.47	1.65	1.44	1.66	1.46	1.79	1.43	1.70	1.32	1.71	1.42	1.69	1.27	1.62	1.35	1.67
	2.250	4.1	318100	T/4	1.32	1.66	1.25	1.47	--	--	--	--	1.35	1.67	1.25	1.49	--	--	--	--
				T/2	1.35	1.67	1.27	1.49	--	--	--	--	--	--	--	--	--	--	--	--
7075-T73X	0.063	0.34	318095†	T/2	1.50	1.95	1.42	1.74	--	--	--	--	--	--	--	--	--	--	--	--
	0.300	1.7	318097	T/2	1.47	1.89	1.39	1.69	--	--	--	--	--	--	--	--	--	--	--	--
	1.225	21.2	318099†	T/2,W/4	1.44	1.89	1.42	1.71	--	--	--	--	1.24	1.77	1.36	1.65	--	--	--	--
				T/2,W/2	1.50	1.90	1.47	1.76	1.50	1.90	1.43	1.73	1.32	1.73	1.46	1.74	1.34	1.73	1.42	1.72
	2.250	4.1	318101	T/4	1.49	1.89	1.35	1.62	--	--	--	--	1.44	1.83	1.33	1.60	--	--	--	--
				T/2	1.60	1.90	1.39	1.65	--	--	--	--	--	--	--	--	--	--	--	--
7178-T62	0.050	0.15	340247	T/2	1.40	1.72	1.32	1.51	--	--	--	--	--	--	--	--	--	--	--	--
	0.051	0.20	318102†	T/2	1.44	1.74	1.40	1.64	--	--	--	--	--	--	--	--	--	--	--	--
	0.403	3.0	340249	T/2	1.37	1.71	1.30	1.52	1.44	1.68	1.34	1.67	--	--	--	--	--	--	--	--

* T - Thickness; W - Width
† Producer B; all others from Producer A

NOTE: L - Longitudinal; LT - Long-Transverse

TABLE XVI

RATIOS AMONG THE MECHANICAL PROPERTIES AT DIFFERENT LOCATIONS

[AF33(615)-3580]

Alloy and Temper	Sample: Section Thickness, in.	Sample: Cross-Sectional Area, in.^{2}	Sample: Number	Direction*	Location†	Tensile Ultimate Stress	Tensile Yield Stress	Compressive Yield Stress	Shear Ultimate Stress	Bearing: Ultimate Stress e/D=1.5	Bearing: Ultimate Stress e/D=2.0	Bearing: Yield Stress e/D=1.5	Bearing: Yield Stress e/D=2.0
					Stress-Relieved Stretched Extrusions								
2014-T6510	1.657	2.2	318146	L	T/2,T/4	1.01	1.01	1.01	1.00	0.99	0.98	0.97	0.97
2024-T3510	0.525	1.9	318020**	L	W/2,W/4	0.99	1.00	1.03	0.98	--	--	--	--
				LT		1.03	1.02	--	--	--	--	--	--
	1.150	5.6	318077	L	W/2,W/4	0.97	0.96	0.94	1.01	0.99	1.01	0.97	0.98
				LT		1.01	0.97	0.99	--	--	--	--	--
††	1.450	7.3	318021**	L	W/2,W/4	0.99	0.98	0.97	0.99	0.99	0.98	0.99	0.98
				L		--	--	--	--	0.99‡	0.97‡	0.97‡	0.99‡
				LT		1.01	1.00	1.01	--	--	--	--	--
	1.705	4.8	340213	L	TW/2,TW/4	1.00	0.99	1.02	0.96	0.98	0.98	1.00	0.97
				LT		0.99	1.02	--	--	--	--	--	--
	2.520	8.8	318133**	L	TW/2,TW/4	1.00	1.01	--	--	--	--	--	--
				LT		1.00	1.02	--	--	--	--	--	--
	4.000	24.0	340214	L	TW/2,TW/4	0.96	0.97	0.98	0.99	0.91	0.99	1.01	1.01
				L		--	--	--	--	0.96‡	0.97‡	0.97‡	0.99‡
				LT		0.98	1.00	0.99	1.00	--	--	--	--
	2.760	29.6	318048	L	TW/2,TW/4	1.00	1.00	1.00	0.96	1.03	1.05	1.04	1.06
				L		--	--	--	--	0.96‡	0.97‡	1.02‡	0.99‡
				LT		1.03	1.08	1.04	1.01	0.99	0.99	0.97	1.00
2024-T8510	0.525	1.9	318024**	L	W/2,W/4	0.99	0.98	0.99	0.99	--	--	--	--
				LT		1.00	1.00	--	--	--	--	--	--
	1.150	5.6	318078	L	W/2,W/4	0.98	0.98	1.00	1.00	0.99	1.00	0.99	1.00
				LT		1.00	1.00	0.98	--	--	--	--	--
‡‡	1.450	7.3	318025	L	W/2,W/4	1.00	1.00	0.99	1.00	0.99	1.02	0.98	1.01
				L		--	--	--	--	0.99‡	1.01‡	1.01‡	1.01‡
				LT		1.01	1.02	1.00	--	--	--	--	--
	1.705	4.8	340169	L	TW/2,TW/4	1.00	1.03	1.00	0.98	1.01	1.02	1.02	1.03
				LT		0.98	1.01	--	--	--	--	--	--
	2.760	29.6	318079	L	TW/2,TW/4	1.00	1.00	0.99	1.00	1.05	1.01	***	0.98
				L		--	--	--	--	0.94‡	0.97‡	***‡	1.03‡
				LT		1.01	1.02	0.99	1.05	1.02	1.03	0.97	0.97
	4.000	24.0	340225	L	TW/2,TW/4	0.98	0.98	0.98	0.98	0.98	0.99	0.98	1.01
				L		--	--	--	--	0.94‡	0.96‡	0.96‡	0.97‡
				LT		0.98	0.98	0.98	0.97	--	--	--	--
6061-T6510	1.240	2.7	317907	L	W/2,W/4	1.01	1.01	0.98	0.99	--	--	--	--
	1.960	4.4	317896	L	W/2,W/4	1.01	1.01	1.02	0.98	0.99	1.00	1.00	0.97
	3.000	15.0	340226	L	TW/2,TW/4	0.98	0.98	0.97	1.00	0.99	0.99	0.99	0.99
				L		--	--	--	--	0.99‡	0.98‡	0.97‡	0.96‡
				LT		0.98	1.02	0.98	0.97	--	--	--	--

* L - Longitudinal; LT - Long-Transverse

† T - Thickness; W - Width

‡ Edgewise bearing specimens; others - flatwise specimens

** Producer B; all others from Producer A

†† Sample was in the T3511 temper

‡‡ Sample was in the T8511 temper

TABLE XVI

TABLE XVI (Concluded)

RATIOS AMONG THE MECHANICAL PROPERTIES AT DIFFERENT LOCATIONS

[AF33(615)-3580]

Alloy and Temper	Sample: Section Thickness, in.	Sample: Cross-Sectional Area, in.^{2}	Sample: Number	Direction*	Location†	Tensile Ultimate Stress	Tensile Yield Stress	Compressive Yield Stress	Shear Ultimate Stress	Bearing: Ultimate Stress e/D=1.5	Bearing: Ultimate Stress e/D=2.0	Bearing: Yield Stress e/D=1.5	Bearing: Yield Stress e/D=2.0
6061-T6510	6.500	33.2	317897	L	T/2,W/4	0.99	0.99	0.99	0.99	0.98	0.98	0.99	0.95
				LT		0.99	0.97	0.97	0.99	--	--	--	--
7075-T6510	0.935	7.2	340155	L	W/2,W/4	0.98	0.97	0.97	0.99	0.99	0.98	0.97	0.98
				LT		0.99	0.99	0.98	0.99	--	--	--	--
	1.188	27.1	317860	L	W/2,W/4	0.98	0.98	0.97	0.94	0.99	0.98	0.99	0.98
				L		--	--	--	--	1.02‡	0.99‡	1.02‡	1.02‡
				LT		0.98	0.98	0.99	0.99	1.00	1.01	0.99	0.99
				LT		--	--	--	--	1.03‡	1.04‡	0.98‡	0.98‡
	2.000	3.1	317861	L	T/2,T/4	0.98	0.97	0.98	0.97	0.95	0.95	0.95	0.97
	2.190	17.0	318137**	L	TW/2,TW/4	0.97	0.96	0.95	0.96	0.98	0.98	0.96	0.97
				L		--	--	--	--	0.99‡	0.98‡	0.99‡	0.99‡
				LT		1.03	0.99	0.96	0.95	1.00	1.01	0.99	0.98
				LT		--	--	--	--	1.03‡	1.03‡	0.98‡	0.97‡
	3.040	13.8	318138**	L	TW/2,TW/4	0.97	0.97	0.96	0.98	0.99	1.00	0.97	0.98
				L		--	--	--	--	.99‡	0.99‡	0.98‡	0.97‡
				LT		0.99	1.00	0.99	--	--	--	--	--
7075-T73510	0.935	7.2	340292	L	W/2,W/4	0.98	0.98	0.97	0.98				
				LT		0.99	0.99	0.98	0.99	--	--	--	--
	2.000	3.1	317948	L	T/2,T/4	0.99	0.98	0.98	0.99	1.01	0.98	1.02	1.00
7178-T6510	0.625	6.9	317997	L	W/2,W/4	0.99	0.99	0.98	1.00	0.98	1.01	0.99	0.96
				LT		0.98	0.99	0.99	1.00	--	--	--	--
	1.200	3.9	318139**	L	W/2,W/4	0.98	0.98	0.98	1.01	1.00	1.00	0.98	1.01
				LT		0.99	0.99	--	--	1.00	0.99	0.99	1.00
	2.180	15.5	318140**	L	TW/2,TW/4	0.97	0.95	0.96	0.99	--	--	--	--
				L		--	--	--	--	0.99	0.98	0.97	0.96
				LT		1.00	0.98	0.96	0.99	0.97‡	1.00‡	0.95‡	1.01‡
				LT		--	--	--	--	0.96	1.01	0.95	0.95
					Extrusions in the "Heat-Treated-by-User" Tempers					0.94‡	0.95‡	0.96‡	0.95‡
2024-T42	1.562	6.4	340245	L	WT/2,WT/4	0.99	0.97	0.97	0.96	0.98	0.97	0.96	0.95
						--	--	--	--	0.94‡	0.97‡	1.00‡	0.94‡
				LT		0.88	0.96	0.95	--	--	--	--	--
2024-T62	1.562	6.4	340246	L	WT/2,WT/4	0.95	0.93	0.94	0.96	0.94	0.95	0.97	0.98
						--	--	--	--	1.00‡	0.94‡	1.01‡	0.95‡
				LT		0.94	0.93	0.92	--	--	--	--	--
6061-T62	1.625	3.9	318091	L	WT/2,WT/4	1.00	1.01	1.00	1.02	1.01	0.98	1.03	0.99
				LT		1.01	1.02	--	--	--	--	--	--
7075-T62	1.225	21.2	318098	L	W/2,W/4	0.97	0.96	0.96	0.99	0.99	1.02	0.98	1.01
				L		--	--	--	--	1.02‡	1.00‡	1.01‡	1.00‡
				LT		0.99	0.99	0.97	0.99	--	--	--	--
	2.250	4.1	318100	L	T/2,T/4	0.96	0.96	0.95	0.97	0.98	0.98	0.97	0.98
7075-T73	1.225	21.2	318098	L	W/2,W/4	0.97	0.96	0.96	0.98	1.01	0.98	0.99	0.98
				L		--	--	--	--	1.03‡	0.99‡	1.03‡	1.01‡
				LT		0.99	0.99	0.97	0.98	--	--	--	--
	2.250	4.1	318101	L	T/2,T/4	0.94	0.93	0.94	0.93	1.01	0.95	0.96	0.94

* L - Longitudinal; LT - Long-Transverse
† T - Thickness; W - Width
‡ Edgewise bearing specimens; others - flatwise specimens

** Producer B; all others from Producer A
†† Sample was in the T3511 temper
‡‡ Sample was in the T8511 temper

TABLE XVI (Concluded)

TABLE XVII

RATIOS OF BEARING PROPERTIES IN THE EDGEWISE DIRECTION TO THOSE IN THE FLATWISE DIRECTION FOR ALUMINUM ALLOY EXTRUSIONS

[AF33(615)-3580]

Alloy and Temper	Sample: Section Thickness, in.	Sample: Cross Sectional Area, in.²	Number	Location*	Direction†	Edgewise/Flatwise: BUS(E)/BUS(F) e/D=1.5	BUS(E)/BUS(F) e/D=2.0	BYS(E)/BYS(F) e/D=1.5	BYS(E)/BYS(F) e/D=2.0
Stress-Relieved Stretched Extrusions									
2024-T3510	1.150	5.6	318077	T/2,W/4	L	0.91	0.97	0.97	0.98
	1.200	3.9	317946	T/2,W/4	L	0.97	0.98	1.03	0.98
††	1.450	7.3	318021‡	T/2,W/4	L	0.97	0.99	0.97	0.98
				T/2,W/2	L	0.97	0.99	0.95	0.99
	1.705	4.8	340213	T/2,W/2	L	0.98	0.98	0.99	0.99
	2.520	8.8	318133‡	T/4,W/4	L	0.97	1.00	0.99	0.93
				T/2,W/2	L	0.97	0.96	0.96	
	4.000	24.0	340214	T/4,W/4	L	0.92	0.88	0.99	1.00
					LT	0.90	0.95	0.88	0.92
				T/2,W/2	L	0.97	0.94	0.95	0.98
	2.760	29.1	318048	T/4,W/4	L	1.01	1.04	0.99	1.03
					LT	0.92	0.96	0.95	0.97
				T/2,W/2	L	0.94	0.96	0.97	0.96
2024-T8510	1.150	5.6	318078	T/2,W/4	L	0.87	0.93	0.95	0.97
	1.200	3.9	317895	T/2,W/4	L	0.95	0.97	1.01	1.00
‡‡	1.450	7.3	318025‡	T/2,W/4	L	0.96	0.96	0.96	0.98
				T/2,W/2	L	0.96	0.96	0.98	0.98
	1.705	4.8	340169	T/2,W/2	L	0.99	0.95	0.99	0.98
	2.760	29.1	318079	T/4,W/4	L	1.07	1.00	**	0.98
					LT	1.03	1.02	0.98	1.01
				T/2,W/2	L	0.95	0.96	**	1.03
	4.000	24.0	340225	T/4,W/4	L	0.96	0.95	1.00	1.01
					LT	0.89	0.84	0.98	1.01
				T/2,W/2	L	0.92	0.85	0.98	0.97
6061-T6510	1.240	2.7	317907	T/2,W/2	L	0.99	0.98	0.97	1.00
	1.360	4.4	317896	T/2,W/2	L	0.99	1.00	1.00	1.02
	3.000	15.0	340226	T/4,W/4	L	1.02	0.97	0.98	1.00
					LT	0.97	0.98	0.98	0.98
				T/2,W/2	L	0.98	0.97	0.97	0.97
	6.500	33.2	317897	T/4	L	1.00	0.99	1.00	1.00
					LT	0.99	0.97	0.99	0.99

Alloy and Temper	Sample: Section Thickness, in.	Sample: Cross Sectional Area, in.²	Number	Location*	Direction†	Edgewise/Flatwise: BUS(E)/BUS(F) e/D=1.5	BUS(E)/BUS(F) e/D=2.0	BYS(E)/BYS(F) e/D=1.5	BYS(E)/BYS(F) e/D=2.0
7075-T6510	1.188	27.1	317860	T/2,W/4	L	0.86	0.93	0.90	0.97
					LT	0.87	0.90	0.89	0.93
				T/2,W/2	L	0.88	0.95	0.93	1.00
					LT	0.90	0.93	0.88	0.92
	2.190	17.0	318137‡	T/4,W/4	L	0.86	0.92	0.90	0.97
					LT	0.83	0.88	0.93	0.96
				T/2,W/2	L	0.86	0.92	0.98	0.99
					LT	0.85	0.89	0.91	0.95
	3.040	13.8	318138‡	T/4,W/4	L	0.96	0.96	0.99	0.99
					LT	0.96	0.98	0.94	0.99
				T/2,W/2	L	0.96	0.96	1.00	0.98
7178-T6510	1.200	3.9	318139‡	T/4,W/4	L	0.93	0.97	1.02	0.99
				T/2,W/2	L	0.93	0.96	1.03	0.98
	2.180	15.5	318140‡	T/4,W/4	L	0.90	0.90	0.98	0.97
					LT	0.85	0.95	0.92	0.98
				T/2,W/2	L	0.89	0.91	0.96	1.01
					LT	0.83	0.89	0.94	0.97
Extrusions in the "Heat-Treated-by-User" Temper									
2024-T42	2.562	6.4	340245	T/4,W/4	L	0.98	0.97	0.96	0.98
				T/2,W/2	L	0.94	0.97	0.99	0.97
2024-T62	2.562	6.4	340246	T/4,W/4	L	0.95	0.97	0.98	0.99
				T/2,W/2	L	1.01	0.96	1.02	0.96
6061-T62	1.625	3.9	318091	T/2,W/2	L	0.98	0.99	0.98	0.98
7075-T62	1.225	21.2	318098	T/2,W/4	L	0.88	0.94	0.96	1.03
				T/2,W/2	L	0.90	0.92	0.99	1.02
					LT	0.87	0.91	0.94	0.99
	2.250	4.1	318100	T/4	L	1.02	1.01	1.00	1.02
7075-T73X	1.225	21.2	318099	T/2,W/4	L	0.86	0.94	0.96	0.96
				T/2,W/2	L	0.88	0.91	0.99	0.99
					LT	0.89	0.91	0.99	0.99
	2.250	4.1	318101	T/4	L	0.97	0.97	0.99	0.99

* T - Thickness; W - Width
† L - Longitudinal; LT - Long-Transverse
‡ Producer B; all others from Producer A
** Bearing specimen failed before reaching yield stress (2 per cent offset).
†† Sample was in the T3511 temper
‡‡ Sample was in the T8511 temper

TABLE XVIII

RESULTS OF FRACTURE TOUGHNESS TESTS OF SINGLE-EDGE-NOTCHED SPECIMENS OF ALUMINUM ALLOY EXTRUSIONS

[AF33(615)-3580]

Alloy and Temper	Sample: Section Thickness, in.	Sample: Cross-Sectional Area, in.^{2}	Sample: Number	Specimen: Direction* and Specimen No.	Specimen: Type (See Fig. 1)	Specimen: Width(W) in.	Specimen: Thickness,(B) in.	Nature of pop-in. Indication†	Load,(P) Lb	Original Crack Length(a_o),‡ in.	Gross Stress(σ),# psi	Net Stress σ_n, psi**	$\frac{\sigma_n}{\sigma_{ys}}$	K_{Ic}, psi$\sqrt{\text{in.}}$ ††	G_{Ic}, in.-lb/in.^{2}
Stress-Relieved Stretched Extrusions															
2014-T6510	0.271	0.40	317994	L1	2	1.502	0.271	I	4 600	0.52	11 300	44 700	0.70	27 300	70
								S	5 100	0.52	12 500	49 600	0.78	30 400	86
				L2	2	1.502	0.271	P	4 950	0.51	12 200	46 900	0.73	28 700	77
								S	5 100	0.51	12 500	48 300	0.76	29 600	82
2024-T8510	0.255	2.8	317890	L1	2	1.502	0.219	I	3 600	0.52	10 900	43 300	0.61	26 200	64
								S	3 780	0.52	11 500	45 500	0.64	27 600	71
				L2	2	1.502	0.219	I	3 500	0.53	10 600	43 400	0.61	26 200	64
								S	3 790	0.53	11 500	47 000	0.66	28 500	76
				T1	1	0.937	0.199	P	2 060	0.33	11 000	44 900	0.62	21 400	43
								S	2 060	0.33	11 000	44 900	0.62	21 400	43
				T2	1	0.939	0.200	P	1 920	0.35	10 200	45 400	0.63	21 500	43
								S	1 940	0.35	10 300	45 800	0.63	21 700	44
	0.510	10.1	317892	L1	3	2.250	0.500	P	10 375	0.78	9 200	36 600	0.55	27 000	68
								S	10 100	0.78	9 000	35 600	0.53	26 300	65
				L2	3	2.250	0.500	I	9 750	0.78	8 700	34 381	0.52	25 300	60
								S	9 750	0.78	8 700	34 381	0.52	25 300	60
	0.642	5.8	317894	L1	4	3.000	0.627	I	12 625	1.01	6 700	25 500	0.37	21 700	44
								S	13 125	1.01	7 000	26 500	0.38	22 600	48
				L2	4	3.000	0.613	I	12 375	0.99	6 700	24 900	0.36	21 200	42
								S	12 950	0.99	7 000	26 000	0.38	22 200	46
				T1	1	0.938	0.217	P	1 620	0.34	8 000	33 800	0.50	15 900	24
								S, M	1 680	0.34	8 300	35 000	0.52	16 500	26
				T2	1			Specimen failed in fatigue							
	1.450	7.3	318025‡‡	L1	4	3.000	1.010	I	25 400	1.02	8 400	32 300	0.47	27 500	71
								S	27 600	1.02	9 100	35 100	0.51	30 000	84
						3.000	1.010	I	25 700	1.01	8 500	32 300	0.47	27 500	71
								S	27 300	1.01	9 000	34 300	0.50	29 300	80
				T1	1	0.937	0.373	S, M	3 310	0.33	9 500	38 500	0.56	19 300	31
				T2	1	0.935	0.377	S, M	3 570	0.31	10 100	37 700	0.57	18 100	31
	2.760	29.6	318079	T1	1			Specimen failed in fatigue							
				T2	1	0.937	0.374	S, M	3 125	0.37	8 900	34 600	0.57	16 600	26
	4.000	24.0	340225	T1	2	1.501	0.500	I	4 800	0.58	6 400	30 100	0.49	17 300	29
								S	4 875	0.58	6 500	30 600	0.50	18 000	30
				T2	2	1.501	0.499	S	5 600	0.52	7 500	29 600	0.48	17 500	30
								M	5 625	0.52	7 500	29 800	0.48	17 900	30

TABLE XVIII

TABLE XVIII (Concluded)

RESULTS OF FRACTURE TOUGHNESS TESTS OF SINGLE-EDGE-NOTCHED SPECIMENS OF ALUMINUM ALLOY EXTRUSIONS

[AF33(615)-3580]

Alloy and Temper	Sample: Section Thickness, in.	Sample: Cross-Sectional Area, in.^{2}	Sample: Number	Specimen: Direction* and Specimen No.	Specimen: Type (See Fig. 1)	Specimen: Width(W) in.	Specimen: Thickness,(B) in.	Nature of pop-in. Indication†	Load,(P) Lb	Original Crack Length(a_o),# in.	Gross Stress(σ),# psi	Net Stress σ_n, psi**	$\frac{\sigma_n}{\sigma_{ys}}$	K_{Q}, psi$\sqrt{\text{in.}}$	G_{Q}, in.-lb/in.^{2}
7075-T6510	0.438	7.2	317859	L1	4	3.000	0.390	P	9 250	1.03	7 900	30 900	0.39	26 200	66
								S	9 350	1.03	8 000	31 300	0.39	26 500	68
				L2	4	3.000	0.401	I	9 125	1.06	7 600	31 000	0.39	26 100	66
								S	10 150	1.06	8 400	34 400	0.43	29 100	81
				T1	3	2.250	0.390	P	7 300	0.86	8 300	38 500	0.50	27 800	74
								S	7 300	0.85	8 300	38 500	0.50	27 800	74
				T2	3	2.250	0.390	P	7 550	0.84	8 600	39 900	0.49	27 800	74
								S	7 550	0.84	8 600	38 300	0.49	27 800	74
	1.188	27.1	318137	L1	4	3.000	1.010	I	25 300	1.00	8 300	31 300	0.41	26 700	68
								S	26 200	1.00	8 600	32 400	0.43	27 700	74
				L2	4	3.000	1.010	I	25 400	1.00	8 400	31 400	0.41	26 800	69
								S	27 200	1.00	9 000	33 700	0.44	28 700	79
				T1	2	1.501	0.501	P	7 450	0.51	9 900	38 200	0.55	23 100	51
								S	7 500	0.51	10 000	38 400	0.56	23 300	52
				T2	2	1.500	0.500	S, M	6 900	0.54	9 200	38 600	0.56	23 200	52
	3.040	13.8	318138**	T1	1	0.939	0.375	I	3 750	0.32	10 600	40 900	0.61	19 000	37
								S, M	4 250	0.32	12 000	46 300	0.69	22 400	48
				T2	1	0.939	0.376	I	3 800	0.34	10 800	45 600	0.68	21 800	46
								S	3 830	0.34	10 800	46 000	0.69	22 000	46
7075-T73510	0.438	7.2	317910	L1	4	3.000	0.395	I	12 750	1.03	10 800	42 100	0.62	36 100	125
								S	12 750	1.03	10 800	42 100	0.62	36 100	125
				L2	4	3.000	0.400	I	12 650	1.04	10 500	41 800	0.62	35 800	123
								S	12 250	1.04	10 200	40 500	0.60	34 600	115
				T1	3	2.250	0.400	P	9 600	0.78	10 700	42 300	0.63	31 400	95
								S	9 600	0.78	10 700	42 300	0.63	31 400	95
				T2	3	2.250	0.400	P	9 750	0.79	10 800	43 800	0.65	32 500	101
								S	9 750	0.79	10 800	43 800	0.65	32 500	101
7178-T6510	0.625	6.9	317997	L1	3	2.250	0.620	P	9 300	0.74	6 700	24 500	0.29	18 100	31
								S	9 500	0.74	6 700	24 500	0.29	18 100	31
				L2	3			Specimen failed in fatigue							
				T1	2			Specimen failed in fatigue							
				T2	2	1.500	0.374	P	3 750	0.57	6 700	30 600	0.38	18 000	31
								S	3 750	0.57	6 700	30 600	0.38	18 000	31
	2.180	15.5	318140**	L1	4	3.000	1.010	I	16 000	1.01	5 300	20 100	0.24	17 000	28
								S	18 600	1.01	6 100	23 300	0.28	19 800	38
				L2	4	3.000	1.010	I	16 200	0.98	5 300	19 500	0.23	16 600	26
								S	21 000	0.98	6 900	25 300	0.30	21 500	44
				T1	2	1.500	0.498	S, M	5 800	0.52	7 800	30 800	0.41	18 500	33
				T2	2	1.500	0.500	P	6 000	0.51	8 000	30 900	0.41	18 500	33
								S, M	6 300	0.51	8 400	32 400	0.43	19 500	36
				Extrusions in the "Heat-Treated-By-User" Tempers											
2014-T62	0.300	6.3	318084	L1	1	0.935	0.296	I	3 780	0.33	13 700	55 600	0.83	26 900	68
								S	4 100	0.33	14 800	60 400	0.90	29 400	81
				L2	1	0.938	0.296	P	3 920	0.32	14 100	54 700	0.81	26 700	66
								S	4 080	0.32	14 700	57 000	0.85	27 800	72
				T1	1	0.933	0.269	I	3 350	0.32	13 300	52 100	0.82	25 300	60
								S	3 600	0.32	14 300	56 000	0.88	27 400	70
				T2	1	0.933	0.268	P	3 870	0.31	15 500	57 800	0.91	28 500	76
								S	3 870	0.31	15 500	57 800	0.91	28 500	76
7075-T62	1.225	21.2	318098**	T1	2	1.499	0.500	I	7 000	0.52	9 300	37 100	0.52	22 300	48
								S	7 500	0.52	10 000	39 700	0.56	24 000	55
				T2	2	1.499	0.500	I	7 100	0.52	7 500	37 600	0.53	22 600	49
								S	7 375	0.52	9 800	39 100	0.55	23 500	53
7075-T73X	1.225	21.2	318099**	T1	2	1.499	0.501	I	6 400	0.57	8 500	34 100	0.60	23 200	52
								S	6 700	0.57	8 900	40 900	0.63	24 400	57
				T2	2	1.500	0.500	P	8 125	0.50	10 100	40 600	0.63	24 800	59
								S	8 125	0.50	10 800	40 600	0.63	24 800	59

TABLE XVIII (Concluded)

* L - Longitudinal; T - Transverse

† Nature of Pop-in Indication: M - Maximum Load
P - Clear Pop-in, below maximum load without significant prior deviation from linearity
I - Initial significant deviation from linearity
S - 5 per cent secant offset

\# At start of fracture toughness test, i.e., after fatigue cracking

\# P/AB

** Combined (P/A + Mc/I) stress at tip of crack

†† $EG_{Ic} = K_{Ic}^2 (1 - \mu^2) = \frac{P^2}{B} \frac{1}{W} \left[7.59 \frac{a}{W} - 32 \left(\frac{a}{W}\right)^2 + 117 \left(\frac{a}{W}\right)^3 \right]$; ref: ASTM STP 411.

E = modulus of elasticity, psi
G_{Ic} = plane-strain strain-energy release rate, in.-lb/in.^{2}
K_{Ic} = plane-strain stress-intensity factor, psi$\sqrt{\text{in.}}$
P = load, lb, at unstable crack growth
B = thickness, in.
W = gross width, in.

μ = Poisson's ratio = 0.33 for aluminum alloys

$a = a_o + \frac{EG_{Ic}}{\sigma_{ys}^2}$ = actual crack length, in., plus plastic-zone correction factor, in.

σ_{ys} = tensile yield stress, psi

** Producer B, all others are Producer A

TABLE XIX

RESISTANCE TO STRESS-CORROSION CRACKING OF STRESS RELIEVED STRETCHED ALUMINUM ALLOY EXTRUSIONS

Alloy	Section Thickness, in.	Number	Stress - 75% Yield Strength* Longitudinal F/N+	Longitudinal Days++	Longitudinal Per Cent Loss in Tensile Strength+++	Long Transverse F/N	Long Transverse Days++	Long Transverse Per Cent Loss in Tensile Strength	Short Transverse F/N	Short Transverse Days++
2014-T6510	0.250	340154	Not in Test			Not in Test			Not in Test	
2024-T3510	0.255	317942	0/2	84	29	0/2	84	22	---	---
	0.510	317926	0/2	84	34	0/2	84	25	---	---
	0.950	317944**	0/2	84	18	1/2	F31, (OK 84)	42	2/2	F-6,6
	1.200	317946**	0/2	84	14	2/2	F-7,7	--	2/2	F-6,6
	2.760	318048	0/2	57	--	2/2	F-12,26$	--	1/2	F-40 (1 OK 84)
		340214	Not in Test			Not in Test			Not in Test	
2024-T8510	0.255	317890	0/2	84	5	0/2	84	8	---	---
	0.510	317892	0/2	84	8	0/2	84	7	---	---
	0.950	317893**	0/2	84	6	0/2	84	9	0/2	84
	1.200	317895**	0/2	84	6	0/2	84	10	0/2	84
	2.760	318079	0/2	57	--	0/2	57	--	0/2	84
		340225	Not in Test			Not in Test			Not in Test	
6061-T6510	0.315	317953	0/2	84	0	0/2	84	0	---	---
	0.375	317927	0/2	84	4	0/2	84	1	---	---
	1.240	317907	0/2	84	0	0/2	84	0	---	---
	1.960	317896	0/2	84	0	0/2	84	0	---	---
		340226	Not in Test			Not in Test			Not in Test	
7075-T6510	0.375	317954	0/2	84	3	1/2	F17, (OK 84)	7	---	---
	0.438	317859	0/2	84	3	0/2	84	4	---	---
	0.935	340155	Not in Test			Not in Test			Not in Test	
	1.188	317860**	0/2	84	3	0/2	84	6	2/2	F-6,6
	2.190	318137	0/2	57	--	1/2	F-8, (OK 57)	--	2/2	F-4,4
	3.040	318138	0/2	57	--	2/2	F-4,4		2/2	F-9,9
7075-T73510	0.375	317900	0/2	84	0	0/2	84	0	---	---
	0.438	317910	0/2	84	2	0/2	84	3	---	---
	0.935	340292	Not in Test			Not in Test			Not in Test	
7079-T6510		340253	Not in Test			Not in Test			---	---
7178-T6510	0.625	317997	0/2	84	9	1/2	F81, (OK 84)	14	---	---
	1.200	318139	0/2	57	--	2/2	F-3,7	--	2/2	F-4,5
	2.180	318140	0/2	57	--	2/2	F-7,7	--	2/2	F-4,4

Notes:
* Specimens and test environment are described in the first Quarterly Report.
+ F/N denotes number of specimens failed over number exposed.
++ Tests in progress for periods shown, with maximum duration of 84 days.
+++ Results are average values for tension tests of specimens which did not fail by stress-corrosion cracking.
** Short transverse yield strengths determined by tests of duplicate 0.050" diameter tension specimens.
$ The directionality of this section is being examined microscopically.

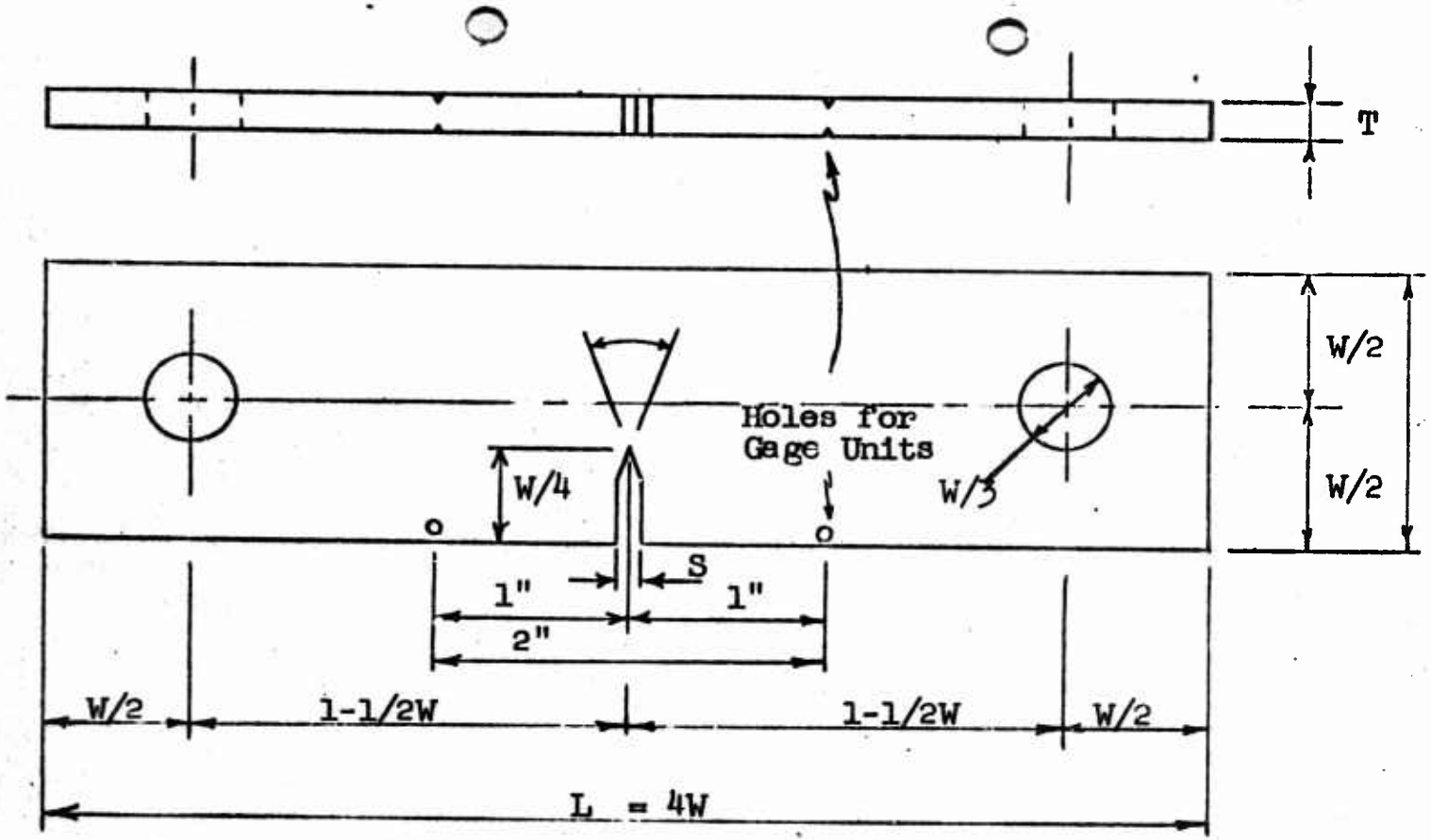
TABLE XIX (Continued)

RESISTANCE TO STRESS-CORROSION CRACKING OF ALUMINUM ALLOY EXTRUSIONS - HEAT TREATED AND AGED BY USER*
(TESTS STILL IN PROGRESS)++

Alloy	Sample: Section Thickness, In.	Sample: Number	Stress- 75% Yield Stress*: Longitudinal F/N+	Longitudinal Days	Long Transverse F/N	Long Transverse Days	Short Transverse F/N	Short Transverse Days
2014-T62	0.300"	318084	1/2	F-24***,(OK57)	1/2	F-24 (OK 57)	---	-----
2024-T42	0.430"	340241	Not in test		Not in test		---	-----
		340245	Not in test		Not in test		Not in test	
2024-T62	0.430"	340242	Not in test		Not in test		---	-----
		340246	Not in test		Not in test		Not in test	
6061-T62	0.246"	318090	0/2	57	0/2	57	---	-----
	1.625"	318091	0/2	57	0/2	57	0/2	55
7075-T6	0.350"	318096	0/2	57	0/2	57	---	-----
	1.225"	318091	0/2	57	0/2	57	2/2	F-7, 7
7075-T73X	0.350"	318097	0/2	57	0/2	57	---	-----
	1.225"	318099	0/2	57	0/2	57	0/2	62
7178-T6		340249	Not in test		Not in test		---	-----

TABLE XIX (Continued)

* Sections submitted in the -O temper. Solution heat treated and aged at these Laboratories.
** Specimens and test environment are described in the first Quarterly Report.
\+ F/N denotes number of specimens failed over number exposed.
++ Tests in progress for periods shown, with maximum duration of 84 days.
+++ Failed in shoulder, outside the gauge length.



Type	W	T	L	S
1	15/16	1/16-5/16	3-3/4	1/8
2	1-1/2	3/16-1/2	6	1/8
3	2-1/4	1/4- 3/4	9	5/16
4	3	3/8-1	12	5/16

Fig. 1 Single-Edge-Notched Fracture-Toughness Specimens.

Fig. 1

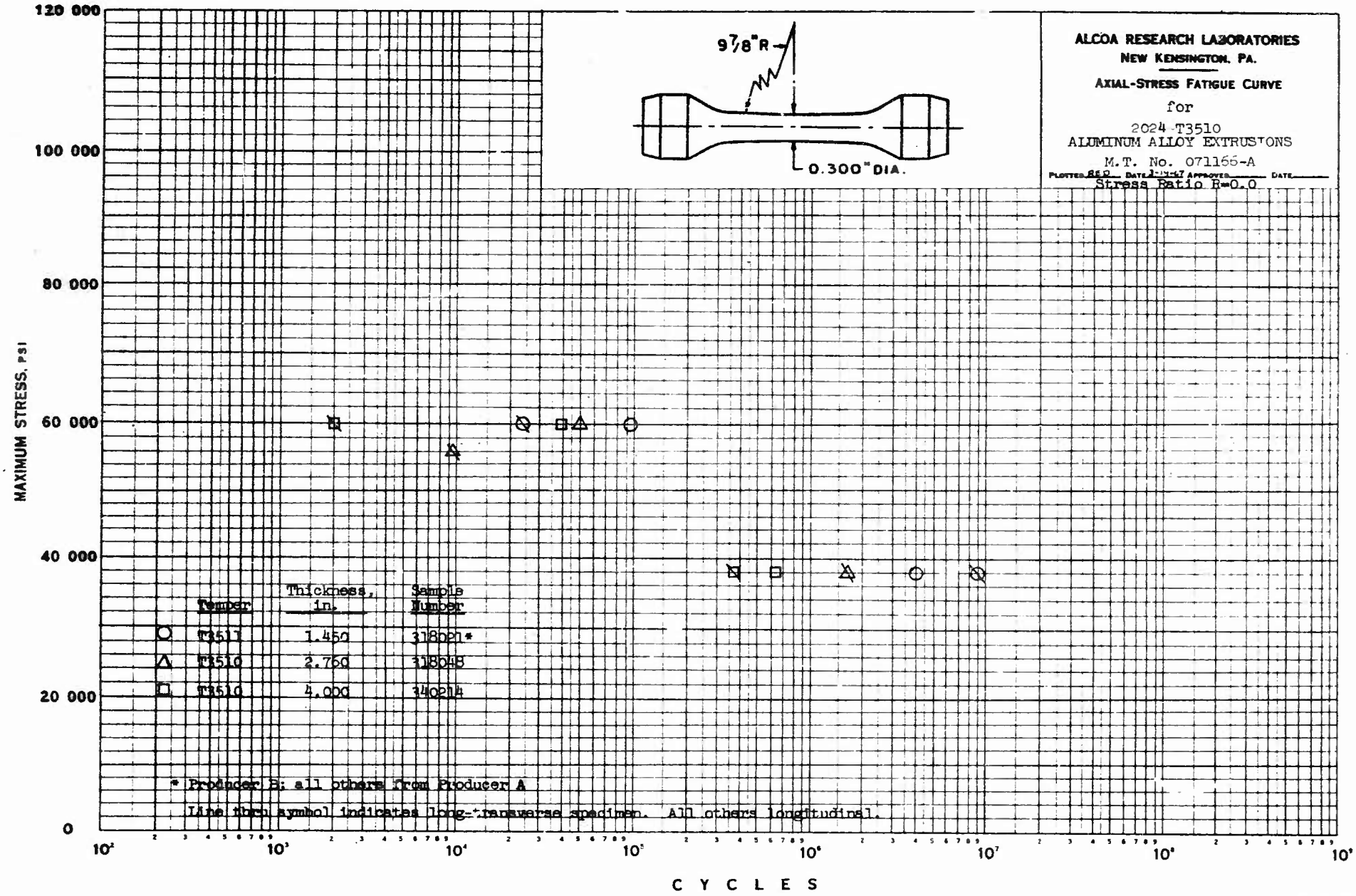

ALCOA RESEARCH LABORATORIES
NEW KENSINGTON, PA.
AXIAL-STRESS FATIGUE CURVE
for
2024-T3510
ALUMINUM ALLOY EXTRUSIONS
M.T. No. 071166-A
Stress Ratio R=0.0
9 7/8" R
0.300" DIA.
MAXIMUM STRESS, PSI
120 000
100 000
80 000
60 000
40 000
20 000
0
CYCLES
Temper
Thickness, in.
Sample Number
T3511
1.450
318021*
T3510
2.760
318048
T3510
4.000
340214
* Producer B; all others from Producer A
Line thru symbol indicates long-transverse specimen. All others longitudinal.

Fig. 2

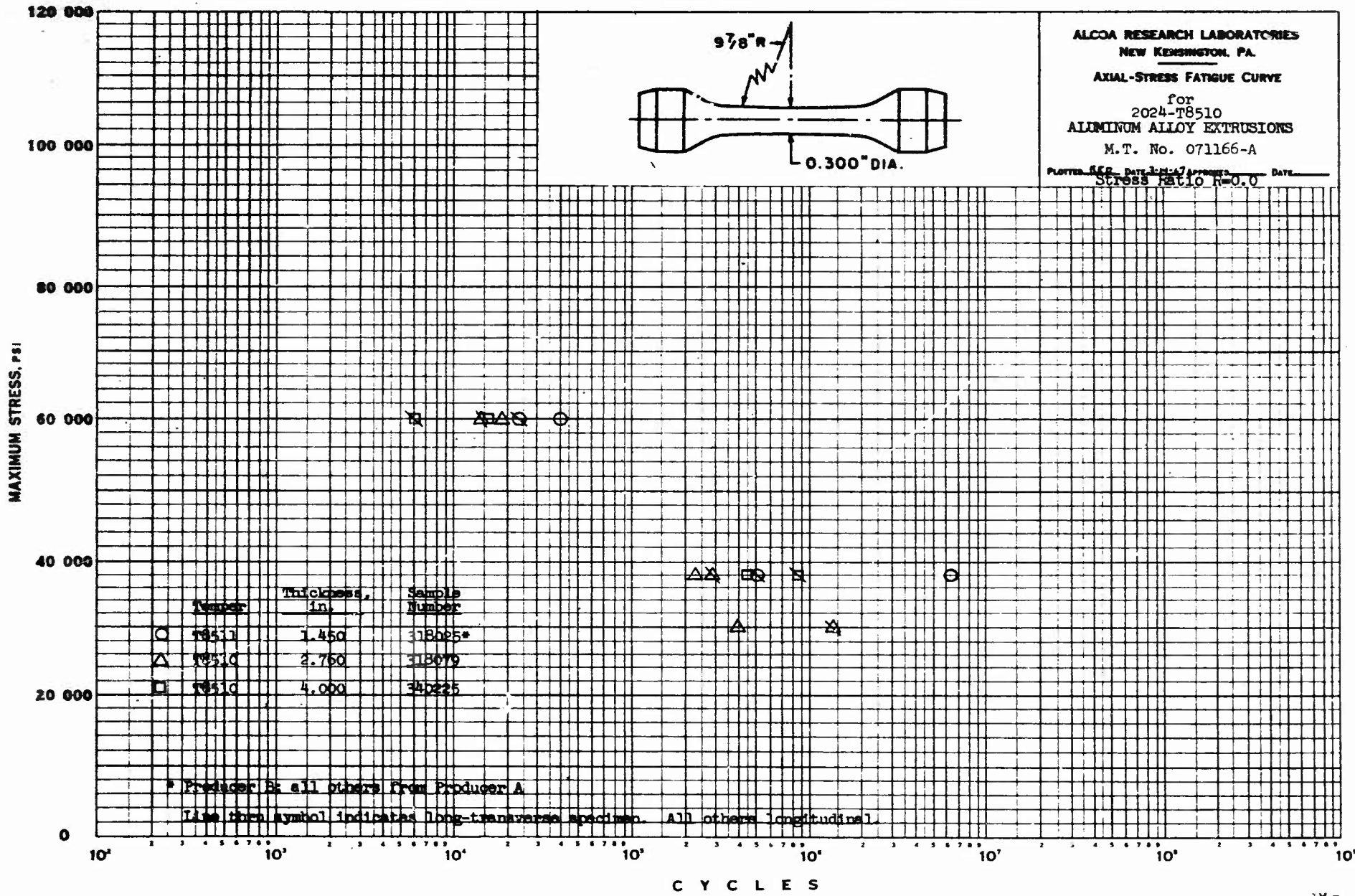
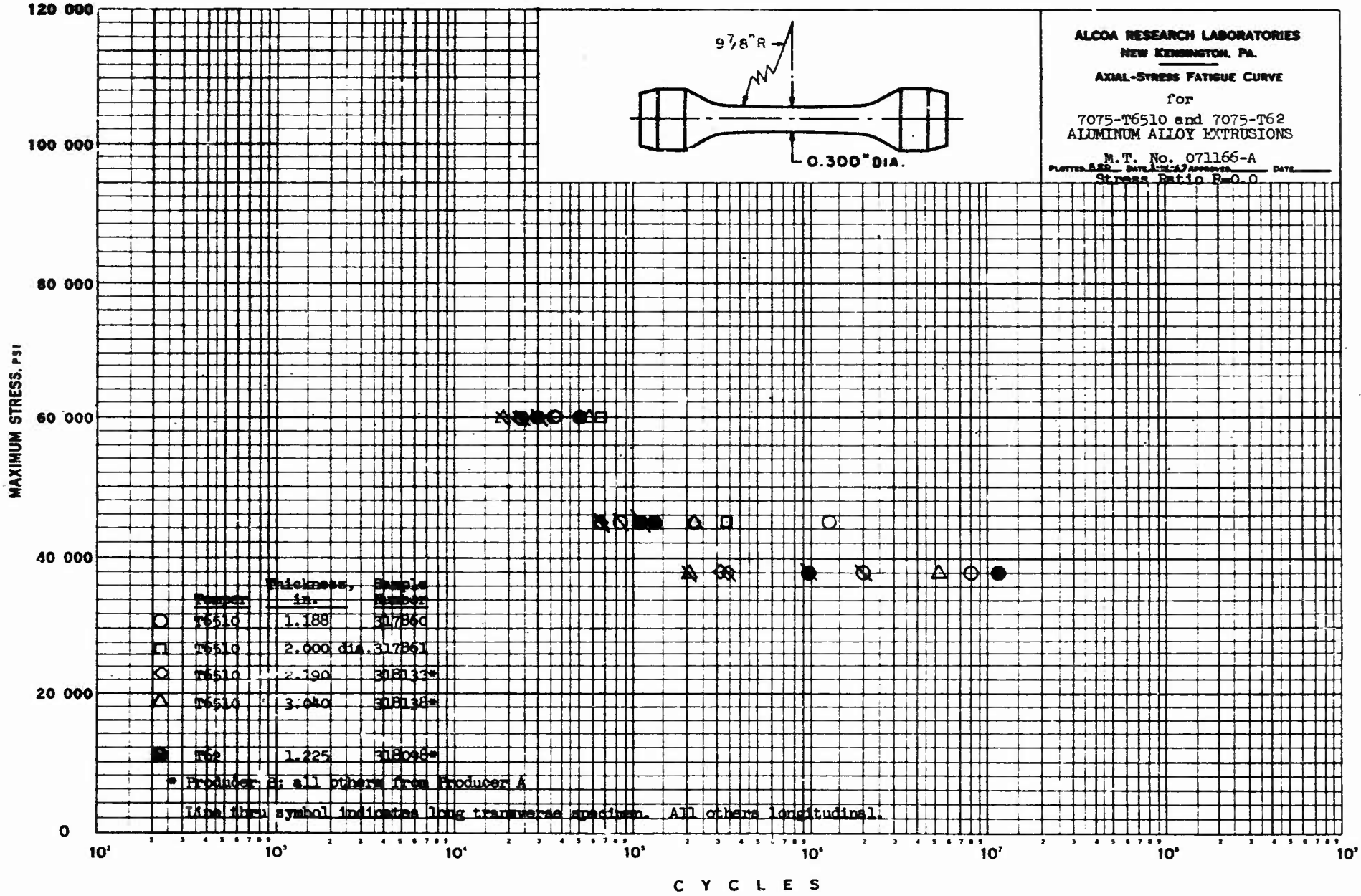

9 7/8"R
0.300"DIA.
ALCOA RESEARCH LABORATORIES
NEW KENSINGTON, PA.
AXIAL-STRESS FATIGUE CURVE
for
2024-T8510
ALUMINUM ALLOY EXTRUSIONS
M.T. No. 071166-A
Stress Ratio R=0.0
MAXIMUM STRESS, PSI
120 000
100 000
80 000
60 000
40 000
20 000
0
10²
10³
10⁴
10⁵
10⁶
10⁷
10⁸
10⁹
CYCLES
Temper
Thickness, in.
Sample Number
T8511
1.450
318025*
T8510
2.760
318079
T8510
4.000
340225
* Producer B; all others from Producer A
Line thru symbol indicates long-transverse specimen. All others longitudinal.

Fig. 3


ALCOA RESEARCH LABORATORIES
NEW KENSINGTON, PA.
AXIAL-STRESS FATIGUE CURVE
for
7075-T6510 and 7075-T62
ALUMINUM ALLOY EXTRUSIONS
M.T. No. 071166-A
Stress Ratio R=0.0
9 7/8" R
0.300" DIA.
MAXIMUM STRESS, PSI
120 000
100 000
80 000
60 000
40 000
20 000
0
CYCLES
Temper
Thickness, in.
Sample Number
T6510 1.188 30786
T6510 2.000 dia. 317861
T6510 2.190 30B133*
T6510 3.040 30B138*
T62 1.225 30B098*
* Producer B; all others from Producer A
Line thru symbol indicates long transverse specimen. All others longitudinal.

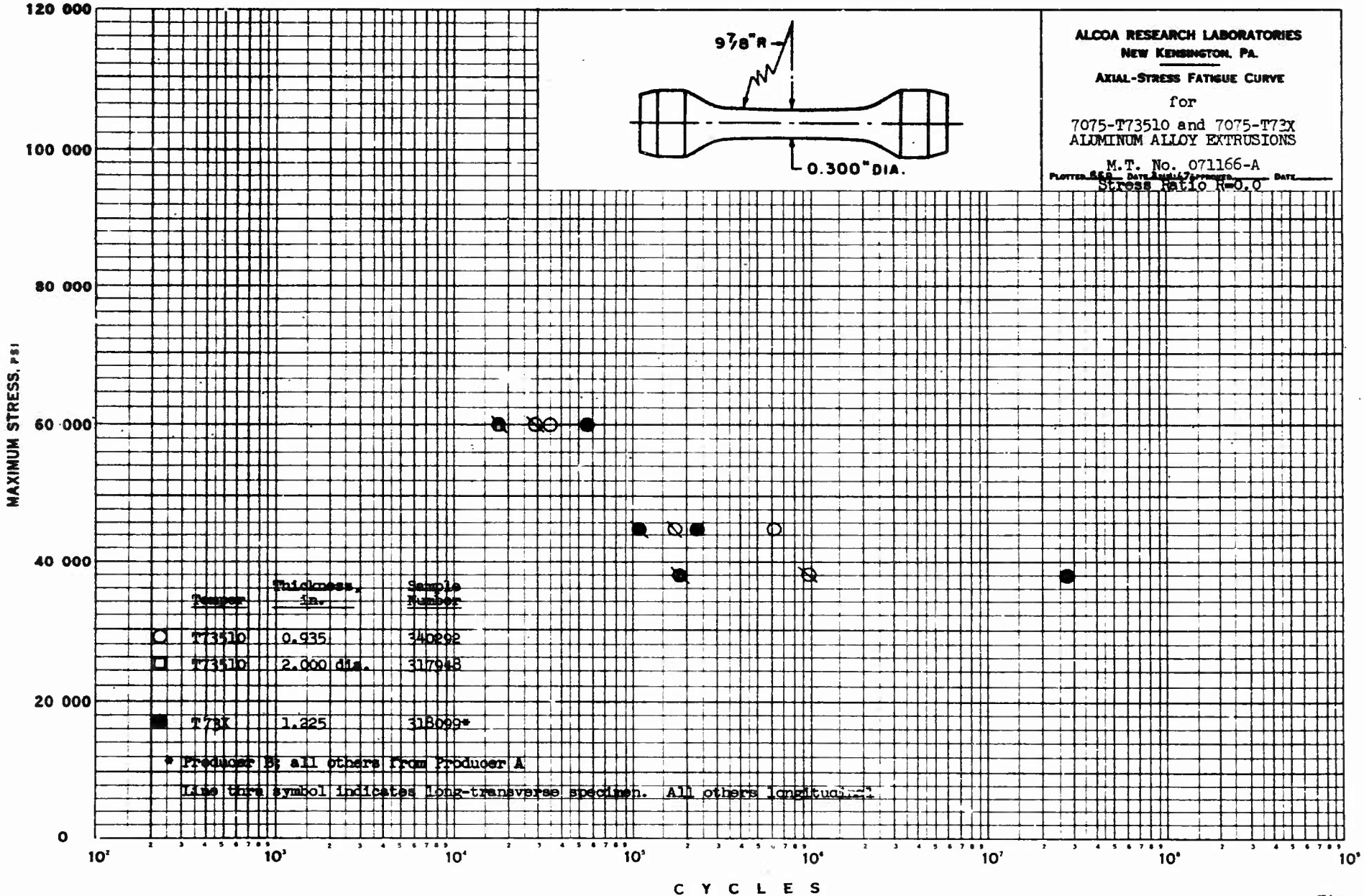

9⅞"R
0.300"DIA.
ALCOA RESEARCH LABORATORIES
NEW KENSINGTON, PA.
AXIAL-STRESS FATIGUE CURVE
for
7075-T73510 and 7075-T73X
ALUMINUM ALLOY EXTRUSIONS
M.T. No. 071166-A
Stress Ratio R=0.0
MAXIMUM STRESS, PSI
120 000
100 000
80 000
60 000
40 000
20 000
0
Temper
Thickness, In.
Sample Number
T73510 0.935 340892
T73510 2.000 dia. 317948
T73X 1.225 318099*
* Producer B; all others from Producer A
Line thru symbol indicates long-transverse specimen. All others longitudinal
10² 10³ 10⁴ 10⁵ 10⁶ 10⁷ 10⁸ 10⁹
CYCLES

Fig. 5

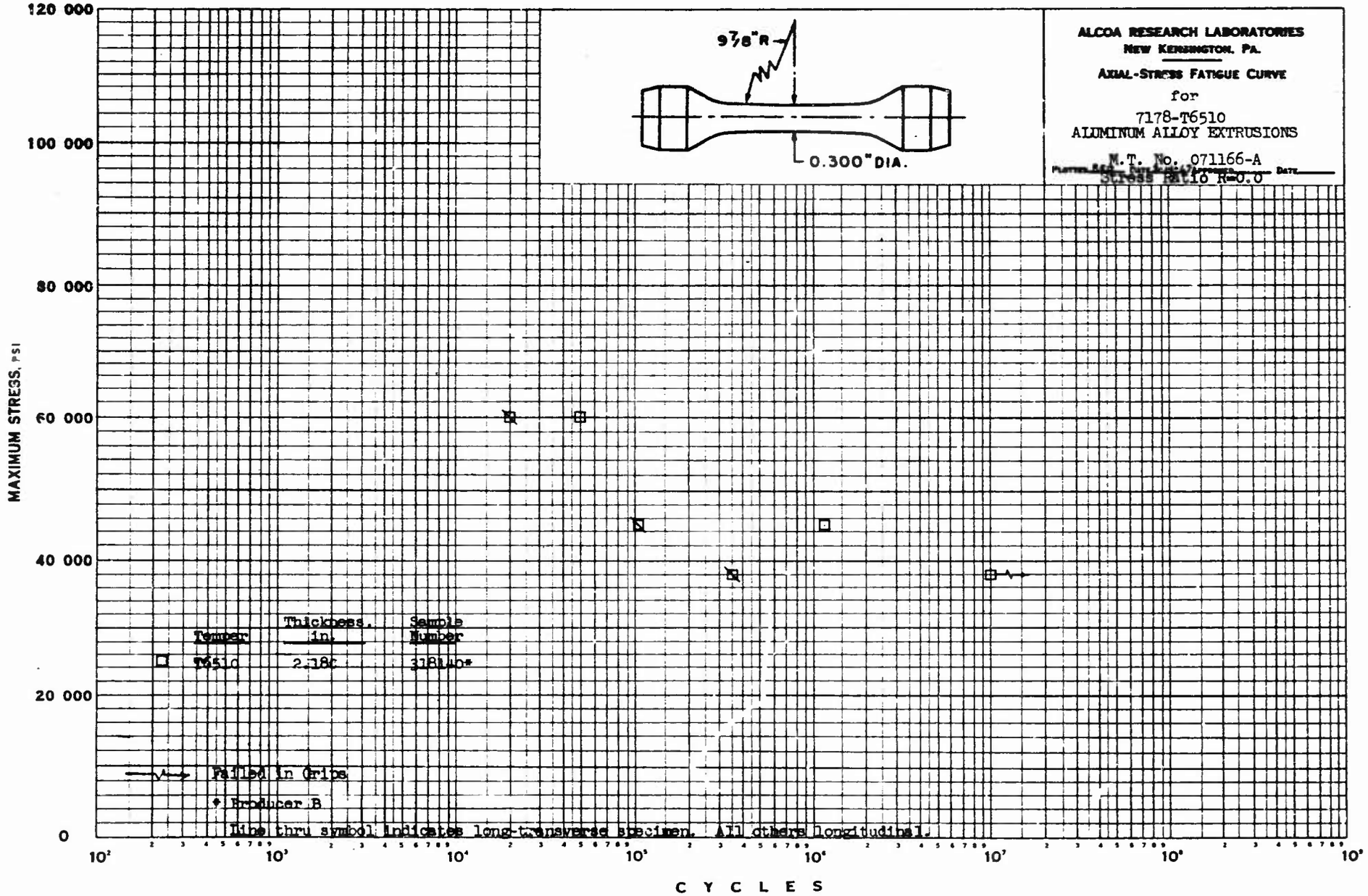

ALCOA RESEARCH LABORATORIES
NEW KENSINGTON, PA.
AXIAL-STRESS FATIGUE CURVE
for
7178-T6510
ALUMINUM ALLOY EXTRUSIONS
M.T. No. 071166-A
Stress Ratio R=0.0
9 7/8" R
0.300" DIA.
MAXIMUM STRESS, PSI
120 000
100 000
80 000
60 000
40 000
20 000
0
CYCLES
Temper
Thickness, in.
Sample Number
T6510
2.18*
318140*
Failed in Grips
* Producer B
Tube thru symbol indicates long-transverse specimen. All others longitudinal.

Fig. 6