Tempers for Aluminum and Aluminum Alloy Products

Registered			Product	Thickness in.	Ten	Tensile Strength, ksi			Remarks ²
Alloy Temper	Ву	Date			Basis ¹	Ult.	Yield	— 2 in. or 4D	
043-T85	Universal	02/07/2019	Extrusion	0.040-0.249	*Min ⁶	76.0	70.0	6	*Tentative
	Alloy			0.250-0.499	*Min ⁶	78.0	73.0	7	Cross-sectional area less than or equal to 23 in2 and circle size less than or equal to
				0.500-0.999	*Min ⁶	80.0	75.0	7	16 in.
				1.000-2.500	*Min ⁶	82.0	78.0	7	Solution heat treated and cold worked in the range 3-6% and artificially aged.
									Stress Corrosion Resistance For ST specimens taken from section thicknesses 0.75 in and greater, See footnote 4b.
									Exfoliation Corrosion Resistance See footnote 15b. Note: ASTM G85 Annex A2 Dry-Bottom MASTMAASIS Method for 2 weeks.
050-T34	Constellium	01/25/2016 Revised 08/04/2017 Revised 02/01/2019	Plate	0.500-6.500	Min ⁹	50.0	34.0	17	Solution heat treated and cold worked 3-4.5%.

July 24, 2023

Unless specified below, for all referenced footnotes refer to the Yellow and/or Tan Sheets as applicable. 4.b. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: b. 35 ksi.

4.e. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: e. 45 ksi.

Tempers for Aluminum and Aluminum Alloy Products

	Registered		Product	Thickness in.	Ten	sile Streng ksi	th,	Elongation Percent in	Remarks ²
Alloy Temper	Ву	Date			Basis ¹	Ult.	Yield	— 2 in. or 4D	
2081-T84	Kaiser	11/16/2018	Plate	1.000-2.000	*Min ⁶ *Min ⁹	76.0 76.0	73.0 70.0	8 7	*Tentative Solution heat treated and cold worked 2-
				2.001-3.000	*Min ⁶ *Min ⁹ *Min ¹⁰	74.0 75.0 72.0	71.0 68.0 62.0	6 6 2	5%.
				3.001-4.000	*Min ⁶ *Min ⁹ *Min ¹⁰	73.0 74.0 71.0	70.0 67.0 62.0	6 4 2	
2050-T84	Constellium	11/21/2022	Plate	6.501-7.000	*Min ⁶ *Min ⁹ *Min ¹⁰	70.0 70.0 68.0	66.0 63.0 58.0	4 3 1.5	*Tentative Solution heat treated and cold worked approximately 3-4.5% and artificially aged
				7.001-8.000	*Min ⁶ *Min ⁹	69.0 69.0	65.0 62.0	3 2	<u>Stress Corrosion Resistance</u> For thicknesses 6.501 – 8.000 inches
					*Min ¹⁰	66.0	57.0	1.5	Direct C-rings and Tensile specimens machined and tested in accordance with ASTM G47 shall show no evidence of stress corrosion failure when tested in the short transverse direction at 45 ksi and exposed for 30 days.
									<u>Fracture Toughness¹⁴</u> – Min K _{IC} For thicknesses 6.501 – 7.000 inches L-T direction 22 ksiVin T-L direction 18 ksiVin S-L direction 16 ksiVin
									For thicknesses 7.001 – 8.000 inches L-T direction 20 ksiVin T-L direction 16 ksiVin S-L direction 15 ksiVin

July XX, 2023

Unless specified below, for all referenced footnotes refer to the Yellow and/or Tan Sheets as applicable. 4.b. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: b. 35 ksi.

4.e. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: e. 45 ksi.

Tempers for Aluminum and Aluminum Alloy Products

Registered		Product	Thickness in.	Ten	Tensile Strength, ksi			Remarks ²	
Alloy Temper	Ву	Date			Basis ¹	Ult.	Yield	— 2 in. or 4D	
297-T87	McCook	06/21/2000	Plate	1.500-2.000	Min ⁶	64.0	58.0	10	Stress Corrosion Resistance
	Metals	Revised			Min ⁹	66.0	60.0	8	30 days at 45 ksi when tested in the ST
	Constellium	06/03/2004 Revised			Min ¹⁰	65.0	57.0	2	direction per ASTM G47 in the thickness range of 3.001-5.100 inches. Product
		01/12/2022		2.001-2.500	Min ⁶	63.0	57.0	9	outside this thickness rage will continue to
					Min ⁹	64.0	58.0	7	exhibit capability of 30 days at 30 ksi.
					Min ¹⁰	64.0	56.0	2	Exfoliation Corrosion Resistance See footnote 15.b.
				2.501-3.000	Min ⁶	62.0	57.0	9	Fracture Toughness ¹⁴ – Min K _{lc}
					Min ⁹	64.0	58.0	7	For thicknesses 1.500-3.000 inches
					Min ¹⁰	62.0	55.0	2	L-T direction 32 ksi Vin. T-L direction 27 ksi Vin.
				3.001-4.000	Min ⁶	62.0	57.0	5	S-L direction 20 ksi √in.
					Min ⁹	62.0	57.0	4	For thicknesses 3.001-4.000 inches
					Min ¹⁰	59.0	54.0	1.5	L-T direction 31 ksi vin. T-L direction 27 ksi vin.
				4.001-5.000	Min ⁶	61.0	56.0	5	S-L direction 20 ksi √in.
					Min ⁹	61.0	56.0	4	For thicknesses 4.001-5.000 inches
					Min ¹⁰	58.0	52.0	1.5	L-T direction 30 ksi Vin. T-L direction 26 ksi Vin.
				5.001-6.000	Min ⁶	60.0	55.0	5	S-L direction 18 ksi Vin.
					Min ⁹	60.0	55.0	4	For thicknesses 5.001-6.000 inches
					Min ¹⁰	57.0	52.0	1.5	L-T direction 29 ksi Vin. T-L direction 25 ksi Vin.
									S-L direction 18 ksi Vin.

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Unless specified below, for all referenced footnotes refer to the Yellow and/or Tan Sheets as applicable. 4.b. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: b. 35 ksi.

4.e. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: e. 45 ksi.

ADDENDUM TO 2018 EDITION OF YELLOW SHEETS Tempers for Aluminum and Aluminum Alloy Products

July XX, 2023

	Registered		Product	Thickness in.	Ten	sile Streng ksi	th,	Elongation Percent in 2 in. or 4D	Remarks ²
Alloy Temper	By	Date			Basis ¹	Ult.	Yield	2 m. or 4D	
2397-T87	Alcoa Revised Arconic	02/12/2003 Revised 08/17/2005 Revised 08/02/2018	Plate	3.001-4.000	Min ⁶ Min ⁹ Min ¹⁰	62.0 62.0 60.0	57.0 57.0 54.0	5 4 1.5	Stress Corrosion Resistance See footnote 4.b. Exfoliation Corrosion Resistance See footnote 15.b. Fracture Toughness ¹⁴ – Min K _{Ic} For thickness 3.001-4.000 L-T direction 31 ksi Vin. T-L direction 27 ksi Vin. S-L direction 20 ksi Vin.
6061-T651	Constellium	09/09/2019	Plate	6.001-8.000 8.001-10.000 10.001-12.000	Min ⁹ Min ⁹ Min ⁹	42.0 41.0 40.0	36.0 34.0 32.0	9 8 8	*Tentative
7048-T6511	Kaiser	04/08/2020	Extrusion	0.040 - 0.125	Min ⁶	67.0	63.0	10	
7055-T76511	Alcoa Revised Arconic	01/15/2001 Revised 06/20/2007 Revised 08/14/2020	Extruded Rod, Bar & Profile	Up thru 0.249 0.250 – 0.499 0.500 – 3.000	Min ⁶ Min ⁶ Min ⁶	89.0 90.0 91.0	85.0 85.0 86.0	7 9 9	Exfoliation Corrosion Resistance See footnote 15. b. For thickness up thru 0.499 Inch Cross Sectional Area 12 in. ² and Circle Size 10 in. max.
									For thickness 0.500 – 3.000 Inch Cross Sectional Area 26.3 in. ² and Circle Size 15.3 in. max. Longitudinal Compressive Yield Strength: 87.0 ksi

Unless specified below, for all referenced footnotes refer to the Yellow and/or Tan Sheets as applicable.

4.b. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: b. 35 ksi.

4.e. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: e. 45 ksi.

Tempers for Aluminum and Aluminum Alloy Products

Registered		Product	Thickness in.	Ten	sile Streng ksi	th,	Elongation Percent in 2 in. or 4D	Remarks ²	
Alloy Temper	Ву	Date			Basis ¹	Ult.	Yield	- 2 IN. OF 4D	
160-T7351	Constellium	11/08/2018	Plate	1.000-1.500	Min ⁶	74.0	67.0	13	Stress Corrosion Resistance
		Revised			Min ⁹	74.0	65.0	11	See footnote 4e.
		02/06/2020		1 501 0 005		70.0	67.0	10	Fracture Toughness ¹⁴ – Min K _{IC} or K _Q
				1.501-2.000	Min ⁶	73.0	67.0	13	For thicknesses 1.000-2.000 inches
					Min ⁹	73.0	65.0	11	L-T direction 40 ksi√in
				2.001-3.000	Min ⁶	72.0	65.0	12	T-L direction 34 ksivin
				2.001-3.000	Min ⁹	72.0	64.0	12	For thicknesses 2.001-3.000 inches
					Min ¹⁰	70.0	59.0	6	L-T direction 45 ksivin
						70.0	55.0	Ū	T-L direction 33 ksiVin
			3.001-4.000	Min ⁶	71.0	64.0	12	S-L direction 35 ksiVin	
					Min ⁹	72.0	63.0	9	
					Min ¹⁰	70.0	58.0	5	For thicknesses 3.001-4.000 inches L-T direction 38 ksi√in
									T-L direction 30 ksivin
				4.001-5.000	Min ⁶	70.0	64.0	11	S-L direction 34 ksivin
					Min ⁹	72.0	62.0	8	
					Min ¹⁰	69.0	58.0	4	For thicknesses 4.001-5.000 inches
									L-T direction 36 ksivin
				5.001-6.000	Min ⁶	70.0	63.0	11	T-L direction 27 ksivin
					Min ⁹	71.0	61.0	7	S-L direction 31 ksiVin
					Min ¹⁰	68.0	58.0	3	For thicknesses 5.001-6.000 inches
									L-T direction 28 ksivin
									T-L direction 25 ksi√in
									S-L direction 26 ksi√in

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Unless specified below, for all referenced footnotes refer to the Yellow and/or Tan Sheets as applicable. 4.b. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: b. 35 ksi.

4.e. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: e. 45 ksi.

Tempers for Aluminum and Aluminum Alloy Products

	Registered		Product	Thickness in.	Ten	sile Streng ksi	th,	Elongation Percent in	Remarks ²
Alloy Temper	By	Date			Basis ¹	Ult.	Yield	— 2 in. or 4D	
140-T7651	Alcan	08/01/06	Plate	4.001-5.000	Min ⁶	74.0	70.0	7	Stress Corrosion Resistance
	Revised	Revised			Min ⁹	76.0	69.0	6	Material shall be capable of passing the
	Constellium	03/27/14			Min ¹⁰	73.0	63.0	3	stress corrosion cracking test described
	Revised	Revised							in ASTM G47 when stressed to 26 ksi fo
	Constellium	02/27/23		5.001-6.000	Min ⁶	74.0	70.0	7	20 days.
	50.000	52,27,20			Min ⁹	75.0	68.0	4	Exfoliation Corrosion Resistance
					Min ¹⁰	72.0	62.0	3	See footnote 15.b.
				6.001-7.000	Min ⁶	73.0	69.0	7	Fracture Toughness ¹⁴ – Min K _{IC} For
					Min ⁹	75.0	68.0	3	thicknesses 4.001-5.000 inches
					Min ¹⁰	71.0	62.0	3	L-T direction 27 ksivin.
									T-L direction 22 ksivin.
				7.001-8.000	Min ⁶	72.0	69.0	6	S-L direction 22 ksivin.
					Min ⁹	74.0	67.0	3	For thicknesses 5.001-6.000 inches
					Min ¹⁰	71.0	61.0	3	L-T direction 25 ksivin.
									T-L direction 21 ksiVin.
				8.001-9.000	Min ⁶	72.0	68.0	5	S-L direction 22 ksiVin.
					Min ⁹	73.0	65.0	3	
					Min ¹⁰	69.0	60.0	3	For thicknesses 6.001-7.000 inches
									L-T direction 24 ksivin.
				9.001-10.000	Min ⁶	71.0	67.0	5	T-L direction 20 ksivin.
					Min ⁹	71.0	64.0	2	S-L direction 22 ksivin.
					Min ¹⁰	68.0	59.0	3	For thicknesses 7.001-8.000 inches
									L-T direction 22 ksivin.
					1				T-L direction 19 ksivin.
									S-L direction 21 ksiVin.
									For thicknesses 8.001-9.000 inches
									L-T direction 20 ksivin.
									T-L direction 18 ksivin.
									S-L direction 20 ksivin.

July XX, 2023

Unless specified below, for all referenced footnotes refer to the Yellow and/or Tan Sheets as applicable.

4.b. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: b. 35 ksi.

4.e. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: e. 45 ksi.

Tempers for Aluminum and Aluminum Alloy Products

Registered		P	Product	Thickness in.	Tensile Strength, ksi			Elongation Percent in 2 in. or 4D	Remarks ²
Alloy Femper	By	Date			Basis ¹	Ult.	Yield	2 111. 01 40	
									For thicknesses 9.001-10.000 inches L-T direction 18 ksiVin. T-L direction 17 ksiVin. S-L direction 20 ksiVin.

July XX, 2023

Unless specified below, for all referenced footnotes refer to the Yellow and/or Tan Sheets as applicable. 4.b. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: b. 35 ksi.

4.e. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: e. 45 ksi.

Tempers for Aluminum and Aluminum Alloy Products

Registered		Product Thi	Thickness in.	Ten	sile Streng ksi	th,	Elongation Percent in	Remarks ²	
Alloy Temper	Ву	Date			Basis ¹	Ult.	Yield	— 2 in. or 4D	
160-T7451	Constellium	11/02/2018	Plate	1.000-1.500	*Min ⁶	77.0	71.0	14	*Tentative
					*Min ⁹	76.0	69.0	13	Stress Corrosion Resistance See footnote 4b.
				1.501-2.000	*Min ⁶	77.0	71.0	14	Fracture Toughness ¹⁴ – Min K _{IC} or K _Q
					*Min ⁹	76.0	69.0	12	For thicknesses 1.000-1.500 inches
					*Min ¹⁰	73.0	64.0	6	L-T direction 34 ksiVin
				2.001-3.000	*Min ⁶	75.0	69.0	13	T-L direction 29 ksi√in
					*Min ⁹	75.0	68.0	11	
					*Min ¹⁰	73.0	64.0	6	For thicknesses 1.501-2.000 inches
				3.001-4.000	*Min ⁶	73.0	68.0	13	L-T direction 34 ksi√in T-L direction 29 ksi√in
				3.001-4.000	*Min ⁹	75.0	67.0	10	
					*Min ¹⁰	72.0	62.0	4	For thicknesses 2.001-3.000 inches
					1VIIII	72.0	02.0	-	L-T direction 32 ksivin
				4.001-5.000	*Min ⁶	72.0	67.0	11	T-L direction 27 ksi√in S-L direction 28 ksi√in
				1.001 5.000	*Min ⁹	74.0	66.0	9	
					*Min ¹⁰	70.0	61.0	3	For thicknesses 3.001-4.000 inches
								_	L-T direction 30 ksivin
				5.001-6.000	*Min ⁶	72.0	66.0	10	T-L direction 25 ksi√in
					*Min ⁹	73.0	65.0	6	S-L direction 27 ksivin
					*Min ¹⁰	69.0	61.0	2	For thicknesses 4.001-5.000 inches
									L-T direction 28 ksiVin
									T-L direction 24 ksiVin
									S-L direction 26 ksiVin
									For thicknesses 5.001-6.000 inches
									L-T direction 26 ksivin
									T-L direction 22 ksivin
									S-L direction 25 ksiVin

July XX, 2023

Unless specified below, for all referenced footnotes refer to the Yellow and/or Tan Sheets as applicable. 4.b. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: b. 35 ksi.

4.e. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: e. 45 ksi.

Tempers for Aluminum and Aluminum Alloy Products

Registered		Product	Thickness in.	Ten	Tensile Strength, ksi			Remarks ²	
Alloy Temper	By	Date			Basis ¹	Ult.	Yield	— 2 in. or 4D	
7160-T7651	Constellium	12/05/2017	Plate	1.000-1.500	Min₅	79.0	74.0	13	Stress Corrosion Resistance
		Revised			Min [®]	78.0	72.0	13	See footnote 4a.
		12/19/2018		1.501-2.000	Min₅	78.0	74.0	12	Fracture Toughness ¹⁴ – Min Kıc or Ko
					Min [®]	78.0	72.0	12	For thicknesses 1.000-2.000 inches
				Min ¹⁰	75.0	66.0	6	L-T direction 34 ksiVin T-L direction 29 ksiVin	
				2.001-3.000	Min⁵	76.0	72.0	12	For thicknesses 2.001-3.000 inches
					Min [®]	77.0	71.0	11	L-T direction 32 ksiVin
					Min ¹⁰	74.0	65.0	5	T-L direction 27 ksivin
				3.001-4.000	Min₅	75.0	72.0	12	S-L direction 29 ksiVin
					Min [®]	77.0	70.0	10	5
					Min ¹⁰	73.0	64.0	4	For thicknesses 3.001-4.000 inches L-T direction 29 ksiVin
									T-L direction 29 ksivin
				4.001-5.000	Min⁵	74.0	71.0	11	S-L direction 28 ksivin
					Min [®]	76.0	69.0	9	
					Min¹⁰	73.0	64.0	4	
085-T711	Alcoa Revised	10/25/2011 Revised	Plate	0.500-1.500	Min ⁹	80.0	74.0	11	Solution heat treated, stretched 1.5 to 3%, and overaged for ballistic performance.
	Arconic	08/02/2018		1.501-2.000	Min ⁹	78.0	73.0	11	0.500-3.000 in. plate meets armor plate
				2.001-3.000	Min ⁹	77.0	72.0	10	requirements of MIL-DTL-32375 (MR) Clas I Type A.
				3.001-4.000	Min ⁹	76.0	70.0	7	Exfoliation Corrosion Resistance See footnote 15.b.

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Unless specified below, for all referenced footnotes refer to the Yellow and/or Tan Sheets as applicable. 4.b. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: b. 35 ksi.

4.e. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: e. 45 ksi.

ADDENDUM TO 2018 EDITION OF YELLOW SHEETS Tempers for Aluminum and Aluminum Alloy Products

		New and R	evised Regi	strations Sinc	e Publica	tion of 2	018 Edit	ion of Yellow	Sheets
	Registered		Product	Thickness in.		sile Streng ksi		Elongation Percent in	Remarks ²
Alloy Temper	By	Date			Basis ¹	Ult.	Yield	— 2 in. or 4D	
7085-T721	Alcoa Revised	10/27/2011 Revised	Plate	0.500-1.500	Min ⁹	68.0	60.0	12	Solution heat treated, stretched 1.5 to 3%, and overaged for ballistic performance.
	Arconic	08/02/2018		1.501-2.000	Min ⁹	67.0	59.0	12	0.500-3.000 in. plate meets armor plate requirements of MIL-DTL-32375 (MR) Class
				2.001-3.000	Min ⁹	67.0	58.0	11	I Туре В.
				3.001-4.000	Min ⁹	66.0	57.0	10	Exfoliation Corrosion Resistance See footnote 15.b.
7099-T731	Kaiser	03/13/2020	Plate	2.000-3.000	*Min ⁹	68.0	58.0	12	*Tentative
									Solution heat treated, stretched 1.5 to 3%, and artificially aged to meet armor plate requirements. Developed to meet armor plate requirements of MIL-DTL-32375 (Revision B Amendment 2). <u>Exfoliation Corrosion Resistance</u> See footnote 15.b.
A206-T4	Eck Industries	09/14/2020	Sand Casting	-	Min	51.0	31.0	9	Properties are from separate standard cast coupons.
\206-T7	Eck Industries	09/14/2020	Sand Casting	-	Min	50.0	35.0	2	Properties are from separate standard cast coupons.
E357-T61	Eck Industries	02/17/2017	Sand Casting	-	Min	40.0	34.0	1	Values represent properties obtained from separately cast bars and are derived from ASTM B-26, Standard Specification for Aluminum-Alloy Sand Castings.

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Unless specified below, for all referenced footnotes refer to the Yellow and/or Tan Sheets as applicable. 4.b. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: b. 35 ksi.

4.e. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: e. 45 ksi.

Tempers for Aluminum and Aluminum Alloy Products

			July XX, 2023
			Tentative Removed
Alloy Temper	Product	Ву	Revised Date
2397-T87	Plate	Arconic	08/02/2018
7085-T711	Plate	Arconic	08/02/2018
7085-T721	Plate	Arconic	08/02/2018
7160-T7351	Plate	Constellium	02/06/2020
7160-T7651	Plate	Constellium	12/19/2018
2050-T34	Plate	Constellium	02/01/2019

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	Deactivated Tempers							
Alloy /Temper	Product	Date Deactivated						
Alclad 2024-O ²	Sheet & Plate	08/11/2018						
Alclad 2024-T351 ²	Plate	08/11/2018						
Alclad 2024-T42 ²	Sheet & Plate	08/11/2018						
1 1/2% Alclad 2024-O2	Sheet & Plate	08/11/2018						
1 ½% Alclad 2024-T351 ²	Plate	08/11/2018						
1 ½% Alclad 2024-T42 ²	Sheet & Plate	08/11/2018						

** Deactivation is limited to specific gauge range(s) for the product indicated

Unless specified below, for all referenced footnotes refer to the Yellow and/or Tan Sheets as applicable. 4.b. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: b. 35 ksi.

4.e. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: e. 45 ksi.