

**ADDENDUM TO 2018 TAN SHEETS**  
**Tempers for Aluminum and Aluminum Alloy Products Metric Edition**

**June 26, 2020**

New and Revised Registrations Since Publication of 2018 Tan Sheets											
Registered			Product	Thickness, mm		Tensile Strength, MPa			Elongation Percent in <sup>21</sup>		Remarks <sup>2</sup>
Alloy Temper	By	Date		Over	Thru	Basis <sup>1</sup>	Ult.	Yield	50 mm	5D or 5.65 √A	
2043-T85	Universal Alloy	02/07/2019	Extrusion	1.00	6.30	*Min <sup>6</sup>	525	485	6	-	*Tentative  Cross-sectional area less than or equal to 15000 mm <sup>2</sup> and circle size less than or equal to 410 mm.  Solution heat treated and cold worked in the range 3-6% and artificially aged.  <u>Stress Corrosion Resistance</u> For ST specimens taken from section thicknesses 20 mm and greater, See footnote 4b.  <u>Exfoliation Corrosion Resistance</u> See footnote 15b. Note: ASTM G85 Annex A2 Dry-Bottom MASTMAASIS Method for 2 weeks.
				6.30	12.50	*Min <sup>6</sup>	540	505	7	-	
				12.50	25.00	*Min <sup>6</sup>	550	515	-	6	
				25.00	60.00	*Min <sup>6</sup>	565	540	-	6	
2050 T34	Constellium	01/25/16 Revised 08/04/17 Revised 02/01/2019	Plate	12.50	165.00	Min <sup>9</sup>	345	235	-	15	Solution heat treated and cold worked 3-4.5%.
2081-T84	Kaiser	11/16/2018	Plate	25.00	50.00	*Min <sup>6</sup>	525	505	-	7	*Tentative  Solution heat treated and cold worked 2-5%.
						*Min <sup>9</sup>	525	485	-	6	
				50.00	76.00	*Min <sup>6</sup>	510	490	-	5	
						*Min <sup>9</sup>	515	470	-	5	
				*Min <sup>10</sup>	495	425	-	2			
				*Min <sup>6</sup>	505	485	-	5			
				*Min <sup>9</sup>	510	460	-	3			
				*Min <sup>10</sup>	490	425	-	2			
2397-T87	Alcoa	02/12/2003 Revised 08/17/2005	Plate	80.00	100.00	Min <sup>6</sup>	425	395	-	4	<u>Stress Corrosion Resistance</u> See footnote 4.b.
						Min <sup>9</sup>	425	395	-	4	
	Revised Arconic	Revised 08/02/2018				Min <sup>10</sup>	415	370	-	1.5	

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FN 4.b. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: b. 240 MPa.

FN 4.e. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: e. 310 MPa.

FN 15.b. Material shall be capable of demonstrating exfoliation corrosion resistance. Exfoliation corrosion resistance shall be determined in accordance with ASTM G34 and material shall not exhibit exfoliation corrosion greater than that illustrated by Photo EB, Figure 2. The applicable sample plane for testing is indicated by one of the following locations: b. At the T/10 plane.

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Alloy Temper	By	Date		Over	Thru	Basis <sup>1</sup>	Ult.	Yield	50 mm	5D or 5.65 √A	
											Fracture Toughness <sup>14</sup> – Min K <sub>IC</sub> For thickness over 80.00 thru 100.00 L-T direction 34 MPa√m T-L direction 30 MPa√m S-L direction 22 MPa√m
6061-T651	Constellium	09/09/2019	Plate	152.00	203.00	*Min <sup>9</sup>	290	250	-	8	*Tentative
				203.00	254.00	*Min <sup>9</sup>	280	235	-	7	
				254.00	305.00	*Min <sup>9</sup>	275	220	-	7	
7048-T6511	Kaiser	04/08/2020	Extrusion	1.00	3.20	Min <sup>6</sup>	465	435	10	11	
7160-T7351	Constellium	11/08/2018 Revised 02/06/2020	Plate	25.00	40.00	Min <sup>6</sup> Min <sup>9</sup>	510 510	460 450	- -	11 10	<u>Stress Corrosion Resistance</u> See footnote 4e.
				40.00	50.00	Min <sup>6</sup> Min <sup>9</sup>	505 505	460 450	- -	11 10	<u>Fracture Toughness<sup>14</sup> – Min K<sub>IC</sub> or K<sub>Q</sub></u> For thicknesses 25.00 thru 80.00 mm L-T direction 44 MPa√m T-L direction 37 MPa√m
				50.00	80.00	Min <sup>6</sup> Min <sup>9</sup> Min <sup>10</sup>	495 505 485	450 440 405	- - -	10 9 5	For thicknesses 50.00 thru 80.00 mm L-T direction 49 MPa√m T-L direction 36 MPa√m S-L direction 38 MPa√m
				80.00	100.00	Min <sup>6</sup> Min <sup>9</sup> Min <sup>10</sup>	490 495 485	440 435 400	- - -	10 8 4	For thicknesses 80.00 thru 100.00 mm L-T direction 42 MPa√m T-L direction 33 MPa√m S-L direction 37 MPa√m
				100.00	120.00	Min <sup>6</sup> Min <sup>9</sup> Min <sup>10</sup>	485 495 475	440 425 400	- - -	10 7 4	For thicknesses 100.00 thru 120.00 mm L-T direction 40 MPa√m T-L direction 30 MPa√m S-L direction 34 MPa√m
				120.00	150.00	Min <sup>6</sup> Min <sup>9</sup> Min <sup>10</sup>	485 490 470	435 420 400	- - -	10 6 3	

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FN 4.b. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: b. 240 MPa.

FN 4.e. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: e. 310 MPa.

FN 15.b. Material shall be capable of demonstrating exfoliation corrosion resistance. Exfoliation corrosion resistance shall be determined in accordance with ASTM G34 and material shall not exhibit exfoliation corrosion greater than that illustrated by Photo EB, Figure 2. The applicable sample plane for testing is indicated by one of the following locations: b. At the T/10 plane.

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Alloy Temper	By	Date		Over	Thru	Basis <sup>1</sup>	Ult.	Yield	50 mm	5D or 5.65 √A	
											For thicknesses 120.00 thru 150.00 mm L-T direction 31 MPa/m T-L direction 27 MPa/m S-L direction 29 MPa/m
7160-T7451	Constellium	11/02/2018	Plate	25.00	40.00	*Min <sup>6</sup> *Min <sup>9</sup>	530 525	490 475	- -	12 11	*Tentative <u>Stress Corrosion Resistance</u> See footnote 4b.
				40.00	50.00	*Min <sup>6</sup> *Min <sup>9</sup> *Min <sup>10</sup>	530 525 505	490 475 440	- - -	12 10 5	<u>Fracture Toughness<sup>14</sup></u> – Min K <sub>IC</sub> or K <sub>Q</sub> For thicknesses 25.00 thru 40.00 mm
				50.00	80.000	*Min <sup>6</sup> *Min <sup>9</sup> *Min <sup>10</sup>	515 515 505	475 470 440	- - -	11 10 5	L-T direction 37 MPa/m T-L direction 32 MPa/m
				80.00	100.00	*Min <sup>6</sup> *Min <sup>9</sup> *Min <sup>10</sup>	505 515 495	470 460 425	- - -	11 9 4	For thicknesses 40.00 thru 50.00 mm L-T direction 37 MPa/m T-L direction 32 MPa/m
				100.00	120.00	*Min <sup>6</sup> *Min <sup>9</sup> *Min <sup>10</sup>	495 510 485	460 455 420	- - -	10 8 3	For thicknesses 50.00 thru 80.00 mm L-T direction 35 MPa/m T-L direction 30 MPa/m
				120.00	150.00	*Min <sup>6</sup> *Min <sup>9</sup> *Min <sup>10</sup>	495 505 475	455 450 420	- - -	9 5 2	S-L direction 31 MPa/m
											For thicknesses 80.00 thru 100.00 mm L-T direction 33 MPa/m T-L direction 27 MPa/m S-L direction 30 MPa/m
											For thicknesses 100.00 thru 120.00 mm

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FN 4.b. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: b. 240 MPa.

FN 4.e. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: e. 310 MPa.

FN 15.b. Material shall be capable of demonstrating exfoliation corrosion resistance. Exfoliation corrosion resistance shall be determined in accordance with ASTM G34 and material shall not exhibit exfoliation corrosion greater than that illustrated by Photo EB, Figure 2. The applicable sample plane for testing is indicated by one of the following locations: b. At the T/10 plane.

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Alloy Temper	By	Date		Over	Thru	Basis <sup>1</sup>	Ult.	Yield	50 mm	5D or 5.65 √A	
											L-T direction 31 MPa/m T-L direction 26 MPa/m S-L direction 29 MPa/m  For thicknesses 120.00 thru 150.00 mm L-T direction 29 MPa/m T-L direction 24 MPa/m S-L direction 27 MPa/m
7160-T7651	Constellium	12/05/2017 Revised 12/19/2018	Plate	25.00	40.00	Min <sup>6</sup> Min <sup>9</sup>	545 540	510 495	- -	11 11	<u>Stress Corrosion Resistance</u> See footnote 4a.
				40.00	50.00	Min <sup>6</sup> Min <sup>9</sup> Min <sup>10</sup>	540 540 515	510 495 455	- - -	10 10 5	<u>Fracture Toughness<sup>14</sup></u> – Min K <sub>IC</sub> or K <sub>Q</sub> For thicknesses 25.00 thru 50.00 mm L-T direction 37 MPa/m T-L direction 32 MPa/m
				50.00	80.00	Min <sup>6</sup> Min <sup>9</sup> Min <sup>10</sup>	525 530 510	495 490 450	- - -	10 10 4	For thicknesses 50.00 thru 80.00 mm L-T direction 35 MPa/m T-L direction 30 MPa/m S-L direction 32 MPa/m
				80.00	100.00	Min <sup>6</sup> Min <sup>9</sup> Min <sup>10</sup>	515 530 505	495 485 440	- - -	10 9 4	For thicknesses 80.00 thru 100.00 mm L-T direction 32 MPa/m T-L direction 29 MPa/m S-L direction 31 MPa/m
				100.00	120.00	Min <sup>6</sup> Min <sup>9</sup> Min <sup>10</sup>	510 525 505	490 475 440	- - -	10 8 4	For thicknesses 100.00 thru 120.00 mm L-T direction 27 MPa/m T-L direction 26 MPa/m S-L direction 29 MPa/m
				120.00	150.00	Min <sup>6</sup> Min <sup>9</sup> Min <sup>10</sup>	510 515 495	485 470 435	- - -	9 7 4	

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FN 4.b. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: b. 240 MPa.

FN 4.e. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: e. 310 MPa.

FN 15.b. Material shall be capable of demonstrating exfoliation corrosion resistance. Exfoliation corrosion resistance shall be determined in accordance with ASTM G34 and material shall not exhibit exfoliation corrosion greater than that illustrated by Photo EB, Figure 2. The applicable sample plane for testing is indicated by one of the following locations: b. At the T/10 plane.

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Alloy Temper	By	Date		Over	Thru	Basis <sup>1</sup>	Ult.	Yield	50 mm	5D or 5.65 √A	
											For thicknesses 120.00 thru 150.00 mm L-T direction 24 MPa <sub>v</sub> m T-L direction 25 MPa <sub>v</sub> m S-L direction 26 MPa <sub>v</sub> m
7085-T711	Alcoa Revised Arconic	10/25/2011 Revised 08/02/2018	Plate	12.50	40.00	Min <sup>9</sup>	550	510	-	10	Solution heat treated, stretched 1.5 to 3%, and overaged for ballistic performance.  Over 12.50 thru 80.00 plate meets armor plate requirements of MIL-DTL-32375 (MR) Class I Type A.  <u>Exfoliation Corrosion Resistance</u> See footnote 15.b.
				40.00	50.00	Min <sup>9</sup>	540	505	-	10	
				50.00	80.00	Min <sup>9</sup>	530	495	-	9	
				80.00	100.00	Min <sup>9</sup>	525	485	-	6	
7085-T721	Alcoa Revised Arconic	10/27/2011 Revised 08/02/2018	Plate	12.50	40.00	Min <sup>9</sup>	470	415	-	10	Solution heat treated, stretched 1.5 to 3%, and overaged for blast performance.  Over 12.50 thru 80.00 plate meets armor plate requirements of MIL-DTL-32375 (MR) Class I Type B.  <u>Exfoliation Corrosion Resistance</u> See footnote 15.b.
				40.00	50.00	Min <sup>9</sup>	460	405	-	10	
				50.00	80.00	Min <sup>9</sup>	460	400	-	10	
				80.00	100.00	Min <sup>9</sup>	455	395	-	9	
7099-T731	Kaiser	03/13/2020	Plate	50.00	80.00	*Min <sup>9</sup>	470	400	-	10	*Tentative  Solution heat treated, stretched 1.5 to 3%, and artificially aged to meet armor plate requirements.  Developed to meet armor plate requirements of MILDTL-32375 (Revision B Amendment 2).  <u>Exfoliation Corrosion Resistance</u> See footnote 15.b.

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FN 4.b. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: b. 240 MPa.

FN 4.e. Material shall be capable of passing the stress corrosion cracking test described in ASTM G47 when stressed to: e. 310 MPa.

FN 15.b. Material shall be capable of demonstrating exfoliation corrosion resistance. Exfoliation corrosion resistance shall be determined in accordance with ASTM G34 and material shall not exhibit exfoliation corrosion greater than that illustrated by Photo EB, Figure 2. The applicable sample plane for testing is indicated by one of the following locations: b. At the T/10 plane.

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Alloy Temper	By	Date		Over	Thru	Basis <sup>1</sup>	Ult.	Yield	50 mm	5D or 5.65 √A	
E357-T6	Eck Industries	02/17/2017	Sand Casting	-	-	Min	276	234	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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<b>Tentative Removed</b>			
<b>Alloy Temper</b>	<b>Product</b>	<b>By</b>	<b>Revised Date</b>
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

<b>Deactivated Registrations</b>		
<b>Alloy Temper</b>	<b>Product</b>	<b>Date Deactivated</b>
Alclad 2024-O <sup>2</sup>	Sheet & Plate	04/11/2018
Alclad 2024-T351 <sup>2</sup>	Plate	04/11/2018
Alclad 2024-T42 <sup>2</sup>	Sheet & Plate	04/11/2018
1 ½% Alclad 2024-O <sup>2</sup>	Sheet & Plate	04/11/2018
1 ½% Alclad 2024-T351 <sup>2</sup>	Plate	04/11/2018
1 ½% Alclad 2024-T42 <sup>2</sup>	Sheet & Plate	04/11/2018

<sup>\*\*</sup>Deactivation is limited to specific gauge range(s) for the product indicated

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