Designation: B210M – 12

Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes (Metric)[1]

This standard is issued under the fixed designation B210M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This specification covers aluminum and aluminum-alloy drawn seamless tubes in straight lengths and coils for general purpose and pressure applications in alloys (Note 2), tempers, and thicknesses shown in Table 2. Coiled tubes are generally available only as round tubes with a wall thickness not exceeding 2.00 mm and only in non heat-treatable alloys.

1.2 Alloy and temper designations are in accordance with ANSI H35.1/H35.1M. The equivalent Unified Numbering System alloy designations are those of Table 1 preceded by A9, for example, A91100 for aluminum 1100 in accordance with Practice E527.

NOTE 1—See Specification B483/B483M for aluminum and aluminum-alloy drawn tubes for general purpose applications, Specification B234M for aluminum-alloy drawn seamless tubes for condensers and heat exchangers, and Specification B241/B241M for aluminum-alloy seamless pipe and seamless extruded tube.

NOTE 2—Throughout this specification use of the term *alloy* in the general sense includes aluminum as well as aluminum alloy.

1.3 This specification is the metric counterpart of Specification B210.

1.4 For acceptance criteria for inclusion of new aluminum and aluminum alloys in this specification, see Annex A2.

1.5 The values stated in SI units are to be regarded as standard. No other units of measure are included in this standard.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 The following documents of the issue in effect on date of material purchase form a part of this specification to the extent referenced herein:

2.2 *ASTM Standards:*[2]

B234M Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes for Condensers and Heat Exchangers (Metric)

B241/B241M Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube

B483/B483M Specification for Aluminum and Aluminum-Alloy Drawn Tube and Drawn Pipe for General Purpose Applications

B557M Test Methods for Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products (Metric)

B660 Practices for Packaging/Packing of Aluminum and Magnesium Products

B666/B666M Practice for Identification Marking of Aluminum and Magnesium Products

B807/B807M Practice for Extrusion Press Solution Heat Treatment for Aluminum Alloys

B881 Terminology Relating to Aluminum- and Magnesium-Alloy Products

B918 Practice for Heat Treatment of Wrought Aluminum Alloys

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E34 Test Methods for Chemical Analysis of Aluminum and Aluminum-Base Alloys

E215 Practice for Standardizing Equipment for Electromagnetic Testing of Seamless Aluminum-Alloy Tube

E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

[1] This specification is under the jurisdiction of ASTM Committee B07 on Light Metals and Alloys and is the direct responsibility of Subcommittee B07.03 on Aluminum Alloy Wrought Products.

Current edition approved May 15, 2012. Published July 2012. Originally approved in 1980. Last previous edition approved in 2005 as B210M – 05. DOI: 10.1520/B0210M-12.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

***A Summary of Changes section appears at the end of this standard**

TABLE 1 Chemical Composition Limits[A,B,C,D]

Alloy	Silicon	Iron	Copper	Manganese	Magnesium	Chromium	Zinc	Titanium	Bismuth	Lead	Other Elements[E]		Aluminum, min
											Each	Total[F]	
1060	0.25	0.35	0.05	0.03	0.03	...	0.05	0.03			0.03[G]	...	99.60 min[H]
1100	0.95 Si + Fe		0.05–0.20	0.05	...	...	0.10	...			0.05	0.15	99.00 min[H]
2011	0.40	0.7	5.0–6.0	...	...	...	0.30	...	0.20–0.6	0.20–0.6	0.05	0.15	remainder
2014	0.50–1.2	0.7	3.9–5.0	0.40–1.2	0.20–0.8	0.10	0.25	0.15			0.05	0.15	remainder
2024	0.50	0.50	3.8–4.9	0.30–0.9	1.2–1.8	0.10	0.25	0.15			0.05	0.15	remainder
3003	0.6	0.7	0.05–0.20	1.0–1.5	...	...	0.10	...			0.05	0.15	remainder
Alclad 3003[I]													
3102	0.40	0.7	0.10	0.05–0.40	...	...	0.30	0.10			0.05	0.15	remainder
Alclad 3102[I]													
5005	0.30	0.7	0.20	0.20	0.50–1.1	0.10	0.25	...			0.05	0.15	remainder
5050	0.40	0.7	0.20	0.10	1.1–1.8	0.10	0.25	...			0.05	0.15	remainder
5052	0.25	0.40	0.10	0.10	2.2–2.8	0.15–0.35	0.10	...			0.05	0.15	remainder
5083	0.40	0.40	0.10	0.40–1.0	4.0–4.9	0.05–0.25	0.25	0.15			0.05	0.15	remainder
5086	0.40	0.50	0.10	0.20–0.7	3.5–4.5	0.05–0.25	0.25	0.15			0.05	0.15	remainder
5154	0.25	0.40	0.10	0.10	3.1–3.9	0.15–0.35	0.20	0.20			0.05	0.15	remainder
5456	0.25	0.40	0.10	0.50–1.0	4.7–5.5	0.05–0.20	0.25	0.20			0.05	0.15	remainder
6061	0.40–0.8	0.7	0.15–0.40	0.15	0.8–1.2	0.04–0.35	0.25	0.15			0.05	0.15	remainder
6063	0.20–0.6	0.35	0.10	0.10	0.45–0.9	0.10	0.10	0.10			0.05	0.15	remainder
6262	0.40–0.8	0.7	0.15–0.40	0.15	0.8–1.2	0.04–0.14	0.25	0.15	0.40–0.7	0.40–0.7	0.05	0.15	remainder
7072 cladding[J]	0.7 Si + Fe		0.10	0.10	0.10	...	0.8–1.3	...			0.05	0.15	remainder
7075[K]	0.40	0.50	1.2–2.0	0.30	2.1–2.9	0.18–0.28	5.1–6.1	0.20			0.05	0.15	remainder

[A] Limits are in weight percent maximum unless shown as a range or otherwise stated.
[B] Analysis shall be made for the elements for which limits are shown in this table.
[C] For purposes of determining conformance to these limits, an observed value or a calculated value obtained from analysis shall be rounded to the nearest unit in the last right-hand place of figures used in expressing the specified limit, in accordance with the rounding-off method of Practice E29.
[D] In case of a discrepancy in the values listed in Table 1 with those listed in the *International Alloy Designations and Chemical Composition Limits for Wrought Aluminum and Wrought Aluminum Alloys* (known as the "Teal Sheets"), the composition limits registered with the Aluminum Association and published in the "Teal Sheets" shall be considered the controlling composition. The "Teal Sheets" are available at http://www.aluminum.org/tealsheets.
[E] *Others* includes listed elements for which no specific limit is shown as well as unlisted metallic elements. The producer may analyze samples for trace elements not specified in the specification. However, such analysis is not required and may not cover all metallic *Others* elements. Should any analysis by the producer or the purchaser establish that an *Others* element exceeds the limit of *Each* or that the aggregate of several *Others* elements exceeds the limit of *Total*, the material shall be considered non-conforming.
[F] *Other elements*—Total shall be the sum of unspecified metallic elements 0.010 % or more, rounded to the second decimal before determining the sum.
[G] Vanadium 0.05 % max.
[H] The aluminum content shall be calculated by subtracting from 100.00 % the sum of all metallic elements present in amounts of 0.010 % or more each, rounded to the second decimal before determining the sum.
[I] Alloy clad with Alloy 7072.
[J] Composition of cladding alloy as applied during the course of manufacture. The samples from finished tube shall not be required to conform to these limits.
[K] A Zr +Ti limit of 0.25 percent maximum may be used with this alloy designation for extruded and forged products only, but only when the supplier or producer and the purchaser have mutually so agreed. Agreement may be indicated, for example, by reference to a standard, by letter, by order note, or other means which allow the Zr +Ti limit.

E607 Test Method for Atomic Emission Spectrometric Analysis Aluminum Alloys by the Point to Plane Technique Nitrogen Atmosphere (Withdrawn 2011)[3]
E716 Practices for Sampling and Sample Preparation of Aluminum and Aluminum Alloys for Determination of Chemical Composition by Spectrochemical Analysis
E1004 Test Method for Determining Electrical Conductivity Using the Electromagnetic (Eddy-Current) Method
E1251 Test Method for Analysis of Aluminum and Aluminum Alloys by Spark Atomic Emission Spectrometry

2.3 *ANSI Standards:*[4]

H35.1/H35.1M Alloy and Temper Designation Systems for Aluminum
H35.2M Dimensional Tolerances for Aluminum Mill Products

2.4 *ASME Standard:*[5]

B 32.5 Preferred Metric Sizes For Tubular Metal Products Other Than Pipe

2.5 *Military Standard:*[6]

MIL-STD-129 Marking for Shipment and Storage

2.6 *AMS Specification:*[7]

AMS 2772 Heat Treatment of Aluminum Alloy Raw Materials

[3] The last approved version of this historical standard is referenced on www.astm.org.
[4] The Aluminum Association, Inc., 1525 Wilson Bl, Suite 600, Arlington, VA 22209, http://www.aluminum.org
[5] Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5990, http://www.asme.org.
[6] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098.
[7] Available from Society of Automotive Engineers (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001.

TABLE 2 Tensile Property Limits[A,B]

Temper	Specified Wall Thickness[C]		Tensile Strength, MPa		Yield Strength[D] (0.2 % offset), MPa		Elongation,[E] min, %		
								Cut-Out Specimen	
	Over	Through	Min	Max	Min	Max	Full-Section Specimen in 50 mm	in 50 mm	in 5 × Diameter $(5.65\sqrt{A})$
Aluminum 1060[F]									
O	0.25	12.50	60	95	15	...	...	...	...
H12	0.25	12.50	70	...	30	...	...	...	...
H14	0.25	12.50	85	...	70	...	...	...	...
H18	0.25	12.50	110	...	90	...	...	...	...
H113[G]	0.25	12.50	60	...	15	...	...	...	...
F	All		...	...	...	...	...	...	...
Aluminum 1100[F]									
O	0.32	12.50	75	105	25	...	...	...	...
H12	0.32	12.50	95	...	75	...	...	...	...
H14	0.32	12.50	110	...	95	...	...	...	...
H16	0.32	12.50	130	...	115	...	...	...	...
H18	0.32	12.50	150	...	140	...	...	...	...
H113[G]	0.32	12.50	75	...	25	...	...	...	...
F	All		...	...	...	...	...	...	...
Alloy 2011									
T3	0.45	1.20	325	...	275	...	...	...	...
	1.20	12.50	325	...	275	...	10	8	7
T4511	0.45	1.20	305	...	170	...	...	...	...
	1.20	6.30	305	...	170	...	20	18	16
	6.30	12.50	305	...	170	...	20	20	18
T8	0.45	12.50	400	...	315	...	10	8	7
Alloy 2014									
O	0.45	12.50	...	220	...	110	...	...	...
T4, T42[H]	0.45	0.63	370	...	205	...	10	...	...
	0.63	1.20	370	...	205	...	12	10	...
	1.20	6.30	370	...	205	...	14	10	...
	6.30	12.50	370	...	205	...	16	12	10
T6, T62[H]	0.45	0.63	450	...	380	...	7	...	...
	0.63	1.20	450	...	380	...	7	6	...
	1.20	6.30	450	...	380	...	8	7	...
	6.30	12.50	450	...	380	...	9	8	7
Alloy 2024									
O	0.45	12.50	...	220	...	100	...	...	...
T3	0.45	0.63	440	...	290	...	10	...	...
	0.63	1.20	440	...	290	...	12	10	...
	1.20	6.30	440	...	290	...	14	10	...
	6.30	12.50	440	...	290	...	16	12	10
T42[H]	0.45	0.63	440	...	275	...	10	...	...
	0.63	1.20	440	...	275	...	12	10	...
	1.20	6.30	440	...	275	...	14	10	...
	6.30	12.50	440	...	275	...	16	12	10
Alloy 3003[F]									
O	0.25	0.63	95	130	35	...	...	...	...
	0.63	1.20	95	130	35	...	30	20	...
	1.20	6.30	95	130	35	...	35	25	...
	6.30	12.50	95	130	35	...	...	30	27
H12	0.25	12.50	120	...	85	...	...	...	...
H14	...	0.63	140	...	115	...	3	...	...
	0.63	1.20	140	...	115	...	5	3	...
	1.20	6.30	140	...	115	...	8	4	...
	6.30	12.50	140	...	115	...	...	...	...
H16	0.25	0.63	165	...	145	...	...	...	...
	0.63	1.20	165	...	145	...	3	2	...
	1.20	6.30	165	...	145	...	5	4	...
	6.30	12.50	165	...	145	...	...	...	...
H18	...	0.63	185	...	165	...	2	...	...
	0.63	1.20	185	...	165	...	3	2	...
	1.20	6.30	185	...	165	...	5	3	...
	6.30	12.50	185	...	165	...	...	...	...
H113[G]	0.25	12.50	95	...	35	...	...	...	...
F	All		...	...	...	...	...	...	...
Alloy Alclad 3003[F]									
O	0.25	0.63	90	125	30	...	...	...	...
	0.63	1.20	90	125	30	...	30	20	...
	1.20	6.30	90	125	30	...	35	25	...
	6.30	12.50	90	125	30	...	...	30	27
H14	0.25	0.63	135	...	110	...	...	...	...
	0.63	1.20	135	...	110	...	5	3	...

TABLE 2 *Continued*

Temper	Specified Wall Thickness[C]		Tensile Strength, MPa		Yield Strength[D] (0.2 % offset), MPa		Elongation,[E] min, %		
								Cut-Out Specimen	
	Over	Through	Min	Max	Min	Max	Full-Section Specimen in 50 mm	in 50 mm	in 5 × Diameter $(5.65\sqrt{A})$
	1.20	6.30	135	...	110	...	8	4	...
	6.30	12.50	135	...	110	...	...	...	...
H18	0.25	12.50	180	...	160	...	...	...	...
H113[G]	0.25	12.50	90	...	30	...	...	...	...
F	All		...	...	...	...	...	...	...
				Alloy 3102[F]					
O	0.50	1.20	85	115	30[D]	...	30	20	...
	1.20	1.60	85	115	30[D]	...	35	25	...
				Alloy Alclad 3102[F]					
O	0.50	1.20	70	115	25	...	30	20	...
	1.20	1.60	70	115	25	...	35	35	...
				Alloy 5005[F]					
O	0.45	12.50	105	145	35	...	...	...	...
F	All		...	...	...	...	...	...	...
				Alloy 5050[F]					
O	0.25	12.50	125	165	40	...	...	...	...
H32	0.25	12.50	150	...	110	...	...	...	...
H34	0.25	12.50	170	...	140	...	...	...	...
H36	0.25	12.50	185	...	150	...	...	...	...
H38	0.25	12.50	200	...	165	...	...	...	...
F	All		...	...	...	...	...	...	...
				Alloy 5052[F]					
O	0.25	11.50	170	240	70	...	...	...	...
H32	0.25	11.50	215	...	160	...	...	...	...
H34	0.25	11.50	235	...	180	...	...	...	...
H36	0.25	11.50	255	...	200	...	...	...	...
H38	0.25	11.50	270	...	215	...	...	...	...
F	All		...	...	...	...	...	...	...
				Alloy 5083[F]					
O	0.45	11.50	270	350	110	...	...	14	...
F	All		...	...	...	...	...	...	...
				Alloy 5086[F]					
O	0.25	11.50	240	315	95	...	...	...	...
H32	0.25	11.50	275	...	195	...	...	...	...
H34	0.25	11.50	300	...	235	...	...	...	...
H36	0.25	11.50	325	...	260	...	...	...	...
F	All		...	...	...	...	...	...	...
				Alloy 5154[F]					
O	0.25	12.50	205	285	75	...	10	10	9
H34	0.25	12.50	270	...	200	...	5	5	4
H38	0.25	6.30	310	...	235	...	...	...	...
F	All		...	...	...	...	...	...	...
				Alloy 5456[F]					
O	0.45	11.50	285	365	130	...	...	14	.....
F	All		...	...	...	...	...	...	
				Alloy 6061					
O	0.45	12.50	...	150	...	95	15	15	13
T4	0.63	1.20	205	...	100	...	16	14	...
	1.20	6.30	205	...	110	...	18	16	...
	6.30	12.50	205	...	110	...	20	18	16
T42[H]	0.63	1.20	205	...	95	...	16	14	...
	1.20	6.30	205	...	95	...	18	16	...
	6.30	12.50	205	...	95	...	20	18	16
T6, T62[H]	0.63	1.20	290	...	240	...	10	8	...
	1.20	6.30	290	...	240	...	12	10	...
	6.30	12.50	290	...	240	...	14	12	10
				Alloy 6063					
O	0.45	12.50	...	130	...	...	...	...	...
T4, T42[H]	0.63	1.20	150	...	70	...	16	14	...
	1.20	6.30	150	...	70	...	18	16	...
	6.30	12.50	150	...	70	...	20	18	16
T6, T62[H]	0.63	1.20	230	...	195	...	12	8	...
	1.20	6.30	230	...	195	...	14	10	...
	6.30	12.50	230	...	195	...	16	12	10
T83	0.63	6.30	230	...	205	...	5	...	...
T831	0.63	6.30	195	...	170	...	5	...	...
T832	0.63	1.20	285	...	250	...	8	5	...
	1.20	6.30	275	...	240		8	5	...

TABLE 2 *Continued*

Temper	Specified Wall Thickness[C]		Tensile Strength, MPa		Yield Strength[D] (0.2 % offset), MPa		Elongation,[E] min, %		
								Cut-Out Specimen	
	Over	Through	Min	Max	Min	Max	Full-Section Specimen in 50 mm	in 50 mm	in 5 × Diameter $(5.65\sqrt{A})$
				Alloy 6262					
T6, T62[H]	0.63	1.20	290	...	240	...	10	8	...
	1.20	0.63	290	...	240	...	12	10	...
	6.30	12.50	290	...	240	...	14	12	10
T9	0.63	10.00	330	...	305	...	5	4	3
				Alloy 7075					
O	0.63	1.20	...	275	...	145[I]	10	8	...
	1.20	12.50	...	275	...	145[I]	12	10	9
T6, T62[H]	0.63	6.30	530	...	455	...	8	7	...
	6.30	12.50	530	...	455	...	9	8	7
T73[J]	0.63	6.30	455	...	385	...	10	8	...
	6.30	12.50	455	...	385	...	12	10	9

[A] See Annex A1.
[B] To determine conformance to this specification, each value for tensile strength and for yield strength shall be rounded to the nearest 0.1 MPa and each value for elongation to the nearest 0.5 % both in accordance with the rounding method of Practice E29.
[C] Coiled tube is generally available with a maximum wall thickness of 2.00 mm and only in nonheat-treatable alloys.
[D] Yield strength to be determined only on straight tube.
[E] Elongation in 50 mm apply for tube tested in full-section, for sheet-type specimens, for tubes having a flat wall, and for similar curved specimens for tubes having a curved wall, up to a maximum wall thickness of 12.50 mm. Elongations in $5D\,(5.65\sqrt{A})$, where D and A are diameter and cross-sectional area of the specimens, respectively, apply to round test specimens machined from wall thicknesses over 6.30 mm.
[F] In this alloy tube other than round is produced only in the F (as drawn) and O tempers. Properties for F temper are not specified or guaranteed.
[G] Beginning with the 1982 issue the requirements for the H112 tempers were replaced by the H113 temper, applicable to other than round tube, which is fabricated by cold-forming annealed round tube and acquires some temper in this forming operation.
[H] Material in the T42 or T62 tempers is not available from the material producers.
[I] Applicable only to round tube. The maximum yield strength for other-than-round tube shall be negotiated.
[J] Material in this temper exhibits improved resistance to stress corrosion compared to that of the T6 temper. The stress corrosion resistance capability of individual lots is determined by testing the previously selected tension-test samples in accordance with the applicable electrical conductivity acceptance criteria of Table 6.

2.7 *Federal Standard:*[6]
Fed. Std. No. 123 Marking for Shipment (Civil Agencies)

2.8 *CEN Standard:*[8]
CEN EN 14242 Aluminum and Aluminum Alloys. Chemical Analysis. Inductively Coupled Plasma Optical Emission Spectral Analysis

3. Terminology

3.1 *Definitions:*

3.1.1 Refer to Terminology B881 for definitions of other product terms used in this specification.

3.1.2 *alclad seamless pipe or alclad seamless tube*—a composite pipe or tube product composed of a seamless aluminum alloy core having on either the inside or the outside surface a metallurgically bonded aluminum or aluminum-alloy coating that is anodic to the core, thus electrolytically protecting the core against corrosion.

3.1.3 *extruded seamless round tube*—an extruded hollow product having a round cross section and a uniform wall thickness, which does not contain any line junctures resulting from method of manufacture.

3.1.4 *producer*—the primary manufacturer of the material.

3.1.5 *seamless pipe*—extruded or drawn seamless tube having certain standardized sizes of outside diameter and wall thickness commonly designated by "Nominal Pipe Sizes" and American National Standards Institute (ANSI) Schedule Numbers. Note that while this is a combined SI and Metric Units Specification, there are no standard equivalent metric sizes for Pipe. Metric sizes are converted and shown only for user convenience.

3.1.6 *supplier*—jobber or distributor as distinct from producer.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *capable of*—the test need not be performed by the producer of the material. However, should subsequent testing by the purchaser establish that the material does not meet these requirements, the material shall be subject to rejection.

3.2.2 *drawn seamless tube*—seamless tube that is subjected to drawing after extrusion.

4. Ordering Information

4.1 Orders for material to this specification shall include the following information:

4.1.1 This specification designation (which includes the number, the year, and the revision letter, if applicable),

4.1.2 Quantity in pieces or pounds,

4.1.3 Alloy (Section 7),

4.1.4 Temper (Section 8),

[8] Available from European Committee for Standardization, Central Secretariat (CEN), rue de Stassart 36, B1050 Brussels, Belgium. http://www.cen.eu/esearch

TABLE 3 Minimum Outside Diameter Flattening Factor

Alloy	Temper	Wall Thickness, mm		Minimum Diameter Flattening Factor, *F*
		Over	Through	
1100	O	0.32	12.50	2
	H12	0.32	12.50	3
	H14	0.32	12.50	6
	H16	0.32	12.50	8
3003	O	0.63	12.50	2
	H12	0.63	12.50	3
	H14	0.63	12.50	6
	H16	0.63	12.50	8
2024	O	0.45	1.20	3
		1.20	12.50	4
	T3	0.45	12.50	8
5052	O	0.25	11.50	3
	H32	0.25	11.50	6
	H34	0.25	11.50	8
5086	O	0.25	11.50	3
	H32	0.25	11.50	8
6061	O	0.45	3.20	3
		3.20	6.30	4
		6.30	12.50	6
	T4	0.63	12.50	6
	T6	0.63	12.50	8
7075	O	0.63	1.20	4
		1.20	6.30	5
	T6	0.63	6.30	10

4.1.5 Cross-sectional dimensions (outside diameter and wall thickness, or inside diameter and wall thickness for round tube; for tube other than round, square, rectangular, hexagonal, or octagonal with sharp corners, a drawing is required) (see Tables X1.1 and X1.2),[9]

4.1.6 Length (straight or coiled),

4.1.7 Nominal inside diameter of coils and mass, or maximum outside diameter, if applicable,

4.1.8 For alloy Alclad 3003 or Alclad 3102, state clad inside or outside (17.1),

4.2 Additionally, orders for material to this specification shall include the following information when required by the purchaser:

4.2.1 For alloys 6061, 6063, and 6262, specify if Press Solution Heat Treatment in accordance with Practice B807/B807M is not acceptable (11.2).

4.2.2 Whether heat treatment in accordance with Practice B918 is required (11.2),

4.2.3 Whether flattening tests are required (Section 9 and Table 3),

4.2.4 Whether flare testing is required (Section 10),

4.2.5 Whether 7075-O material is required to develop requirements for T73 temper (12.3),

4.2.6 Whether testing for leaks is required and, when leaks are allowed, the number of leaks allowed and the manner of marking leaks (15.1.3.2),

4.2.7 Whether inside cleanness test is required on coiled tubes (16.2) and frequency of testing required,

4.2.8 Whether inspection or witness of inspection and tests by the purchaser's representative is required prior to material shipment (Section 20),

4.2.9 Whether certification is required (Section 22),

4.2.10 Whether marking for identification is required (Section 23), and

4.2.11 Whether Practice B660 applies, and if so, the levels of preservation, packaging, and packing required (Section 24).

4.2.12 Whether 7075 alloy Zr+Ti limit applies (Table 1 Footnote J).

5. Manufacture

5.1 The tube shall be produced by drawing an extruded tube made from hollow extrusion ingot (cast in hollow form or pierced) and extruded by the use of the die and mandrel method.

5.2 The ends of coiled tube shall be crimped or otherwise sealed to avoid contamination during shipment.

6. Responsibility for Quality Assurance

6.1 *Responsibility for Inspection and Tests*—Unless otherwise specified in the contract or purchase order, the producer is responsible for the performance of all inspection and test requirements specified herein. The producer may use his own or any other suitable facilities for the performance of the inspection and test requirements specified herein, unless disapproved by the purchaser in the order or at the time of signing the contract. The purchaser shall have the right to perform any of the inspections and tests set forth in this specification where such inspections are deemed necessary to ensure that material conforms to prescribed requirements.

6.2 *Lot Definition*—An inspection lot shall be defined as follows:

6.2.1 For heat-treated tempers an inspection lot shall consist of an identifiable quantity of material of the same mill form, alloy, temper, and nominal dimensions traceable to a heat-treat lot or lots, and subjected to inspection at one time.

6.2.2 For nonheat-treated tempers, an inspection lot shall consist of an identifiable quantity of material of the same mill form, alloy, temper, and nominal dimensions, subjected to inspection at one time.

7. Chemical Composition

7.1 *Limits*—The tubes shall conform to the chemical composition limits specified in Table 1. Conformance shall be determined by the producer, by taking samples in accordance with Practices E716, when the ingots are poured, and analyzing those samples in accordance with E607, E1251, E34 or EN 14242. At least one sample shall be taken for each group of ingots pouredsimultaneously from the same source of molten metal. If the producer has determined the chemical composition during pouring of the ingots, they shall not be required to sample and analyze the finished product.

NOTE 3—It is standard practice in the United States aluminum industry to determine conformance to the chemical composition limits prior to

[9] These tables are taken from American National Standard B 32.5, Preferred Metric Sizes for Tubular Metal Products Other Than Pipe.