Purpose and Scope

1.0 The purpose of the Technical Procedures Manual is to provide a repository for maintaining the rules, procedures, and guidelines governing the activities of the Technical Committee on Product Standards as well as documents generated by the Committee to address issues, which lie outside the boundaries of published Aluminum Association documents. This includes detailed procedures, guidelines, and templates used to provide consistency in the generation of standards, interpretation of standards, and product registration.

2.0 In case of conflict between the material presented herein and the documents listed below, the documents listed shall prevail:
   - ANSI-H35 documents
   - Declaration of Accord and its Recommendation for Wrought Aluminum and Wrought Aluminum Alloys
   - International Alloy Designations and Chemical Composition Limits for Wrought Aluminum and Wrought Aluminum Alloys (Teal Sheets)
   - Aluminum Standards and Data and its Metric Edition
   - Declaration of Accord and its Recommendation for Unalloyed Aluminum
   - International Designations and Chemical Composition Limits for Unalloyed Aluminum (Gold Sheets)
   - Declaration of Accord and its Recommendation for Aluminum Hardeners
   - International Designations and Chemical Composition Limits for Aluminum Hardeners (Gray Sheets)
   - Tempers for Aluminum and Aluminum Alloy Products (Yellow Sheets) and its Metric Edition (Tan Sheets)
   - Designations and Chemical Composition Limits for Aluminum Alloys in the Form of Castings and Ingot (Pink Sheets)

3.0 Additions and revisions to this manual shall be by formal ballot of the Technical Committee on Product Standards, except that changes to the templates in Section B.3 shall be made by review of the Technical Committee on Product Standards.

4.0 This manual is intended for the sole use of the Technical Committee on Product Standards with distribution limited to its membership. The manual will be posted on the Committee page of the Aluminum Association website, and will be updated as changes are made to its content. It is the responsibility of the members to keep a printed copy current.
# Table of Contents

## Section A. The Aluminum Association Procedures

<table>
<thead>
<tr>
<th>A.1</th>
<th>Procedures for Development of Standards, Interpretation of Standards and Documents Containing Technical Information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>● Internal Audit Procedure</td>
</tr>
<tr>
<td></td>
<td>February 2013</td>
</tr>
</tbody>
</table>

## Section B. Technical Committee on Product Standards Procedures

<table>
<thead>
<tr>
<th>B.1</th>
<th>Technical Committee on Product Standards Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B.1.1 Guidelines for The Development of Typical and Design Properties for the Aluminum Association Publications</td>
</tr>
<tr>
<td></td>
<td>May 1999</td>
</tr>
<tr>
<td></td>
<td>B.1.2 Project Development and Control Procedures</td>
</tr>
<tr>
<td></td>
<td>August 2014</td>
</tr>
<tr>
<td></td>
<td>B.1.3 Procedure for Responding to Interpretation Questions</td>
</tr>
<tr>
<td></td>
<td>September 2014</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B.2</th>
<th>Technical Committee on Product Standards Alloy and Temper Registration Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B.2.1 Procedure for Review of Registration Requests</td>
</tr>
<tr>
<td></td>
<td>January 2008</td>
</tr>
<tr>
<td></td>
<td>B.2.2 Procedure for Review of Temper Registration Requests</td>
</tr>
<tr>
<td></td>
<td>Rev. April 2008</td>
</tr>
<tr>
<td></td>
<td>● Temper Registration Flow Chart</td>
</tr>
<tr>
<td></td>
<td>June 2007</td>
</tr>
<tr>
<td></td>
<td>B.2.3 Procedural Guidelines for International Alloy Registrations (Wrought Aluminum Alloys)</td>
</tr>
<tr>
<td></td>
<td>Rev. April 2008</td>
</tr>
<tr>
<td></td>
<td>B.2.4 Criteria for Changing Chemical Composition Limits for Registered Alloys</td>
</tr>
<tr>
<td></td>
<td>July 2009</td>
</tr>
<tr>
<td></td>
<td>B.2.5 Determination of Wrought Alloy Designations</td>
</tr>
<tr>
<td></td>
<td>August 2014</td>
</tr>
<tr>
<td></td>
<td>Appendix A. Alloy Designation Procedure Flow Chart</td>
</tr>
<tr>
<td></td>
<td>August 2014</td>
</tr>
<tr>
<td></td>
<td>Appendix B. Mg to Si Ratio in the 6xxx Wrought Aluminum Alloys</td>
</tr>
<tr>
<td></td>
<td>April 2004</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B.3</th>
<th>Alloy and Product Standards Registration Templates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B.3.1 Wrought Alloy Registration Template</td>
</tr>
<tr>
<td></td>
<td>May 2002</td>
</tr>
<tr>
<td></td>
<td>B.3.2 Temper Registration Template</td>
</tr>
<tr>
<td></td>
<td>Rev. May 2009</td>
</tr>
<tr>
<td></td>
<td>B.3.3 Cast Alloy and Ingot Registration Template</td>
</tr>
<tr>
<td></td>
<td>March 2003</td>
</tr>
<tr>
<td></td>
<td>B.3.4 Unalloyed Aluminum Registration Template</td>
</tr>
<tr>
<td></td>
<td>June 2003</td>
</tr>
<tr>
<td></td>
<td>B.3.5 Hardener Registration Template</td>
</tr>
<tr>
<td></td>
<td>January 2008</td>
</tr>
<tr>
<td></td>
<td>B.3.6 Clad Product Registration Template</td>
</tr>
<tr>
<td></td>
<td>March 2015</td>
</tr>
<tr>
<td></td>
<td>B.3.7 Checklist for Addition of New Products to Aluminum Standards &amp; Data (ASD) and Aluminum Standards and Data Metric (ASD-M)</td>
</tr>
<tr>
<td></td>
<td>April 2008</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B.4</th>
<th>Miscellaneous Procedures and Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B.4.1 Determination of Alloy and Temper Registration Dates</td>
</tr>
<tr>
<td></td>
<td>Rev. December 2014</td>
</tr>
<tr>
<td></td>
<td>B.4.2 Footnote to be applied to the Alloys Registered under the Expanded Alloy Designations Rule in the Teal Sheets</td>
</tr>
<tr>
<td></td>
<td>November 2011</td>
</tr>
<tr>
<td></td>
<td>B.4.3 Rules Regarding Deleted Footnotes</td>
</tr>
<tr>
<td></td>
<td>January 2014</td>
</tr>
<tr>
<td></td>
<td>B.4.4 Standard Terms for Referencing the Measurement Systems in Association Publications</td>
</tr>
<tr>
<td></td>
<td>May 2014</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B.5</th>
<th>TCPS Guest Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>June 2011</td>
</tr>
</tbody>
</table>
Table of Contents

B.6  TCPS Associate Member Policy                July 2013
B.7  Process for Considering Comments from the Accredited Standards Committee H35 (ASC H35) Members on Balloted ANSI Documents May 2014
Section A: The Aluminum Association Procedures
SECTION A.1 PROCEDURES FOR DEVELOPMENT OF PROPOSED STANDARDS, INTERPRETATIONS OF STANDARDS, AND DOCUMENTS CONTAINING TECHNICAL INFORMATION BY THE ALUMINUM ASSOCIATION

Background

The purpose of the Association's standards development activities is to improve the quality of products, to promote safety and to assist customers in choosing correct products for a given application. The Association has assisted in the development of a great many standards. Historically, proposed standards have been suggested by member companies in response to a need expressed by customers or consumers.

Draft standards are developed and approved by the various Association groups. When the Association has approved a draft standard, it is submitted as a proposed standard to one of the national standards making or coordinating organizations, such as ASTM, ANSI or AWS, or user input is obtained by other appropriate means.

Similarly, documents containing technical information are developed and approved by a variety of groups within the Association. Such documents, like all Association publications, are ultimately the responsibility of the Association's Publication Committee, but are typically reviewed for accuracy by one or more Association groups with expertise in the subject matter of the publication.

The procedures set forth herein apply to all Association groups insofar as their activities include the development of technical documents.

Objectives

The following are basic objectives of the Association in connection with the development of standards: (1) that no proposed standard is issued unless there is a need for, that is, that the standard, if developed, will be useful, not only to the members, but also to their customers and consumers; and (2) that persons affected by a standard have an opportunity to participate in the preparation of that standard and subsequent revisions.

It is also the Association's objective and practice that the Association shall issue an interpretation of a standard only after the proposal has been aired. No individual has authority to issue standards or interpretations thereof on behalf of the Association unless so authorized.

The following procedures have been adopted with the foregoing objectives in mind.

Initiation of New Standards

Any person may suggest the need for a standard. All such proposals shall be in writing and shall be placed on the agenda of the appropriate Association group. At the next meeting of the group, the suggestion shall be discussed, and the initiation of the development of a draft standard shall be approved by such group only if the need for such a standard on the part of customers or consumers, as well as the affected companies, is apparent. The minutes of any meeting at which approval or disapproval of the development of such a draft standard is obtained shall contain explicit reference to the circumstances, including the desirability from the point of view of customers and consumers, which make the standard appear needed and useful or the reasons why a draft standard should not be prepared.

As appropriate, the group shall either prepare a draft of the standard or form a sub-group to prepare a draft standard for consideration and approval by the group or sub-group at a later meeting or by letter ballot. In connection with approval, the group or sub-group shall review such draft for accuracy and completeness.
If construction criteria (as opposed to performance requirements) are used in the draft standard, the records of the group or sub-group shall set forth why the specifications of construction, dimensions and so forth are appropriate to achieve the benefit sought to be derived by development of the standard.

When a draft standard has been approved by the appropriate standards group, it shall be submitted for review and comment to all interested Association groups, and notice of the draft standard shall appear in an Association publication which is circulated to the general membership.

**Submission to Standard-making or Coordinating Organizations**

Notwithstanding any party's right to appeal an action of the Association concerning the development of proposed standards, if no Association group objects to the draft standard, it shall be submitted to one of the institutional standard-making or coordinating bodies, such as ANSI, ASTM, AWS, etc., whose procedures provide for the submission of proposed standards to affected persons for comment, and for appropriate modification of proposed standards after consideration of the views of affected persons, or user input shall be obtained by other appropriate means.

**Interpretation of Standards**

An "interpretation" of a standard is a substantial clarification of the meaning of a standard. "Interpretation" includes, but is not limited to, determinations that an item satisfies or does not satisfy the terms of a standard.

Any person may request that the Association issue an interpretation of an existing Association standard. All such requests shall be in writing and shall be addressed to the Aluminum Association, 1525 Wilson Blvd., Suite 600, Arlington, VA 22209, attention of the Vice President – Standards & Technology.

The Vice President – Standards & Technology shall submit the request to the appropriate Association group for development and issuance of the interpretation per that group's procedures. This may include review and / or approval of other interested Association groups.

In addition, interpretations of Association standards that are American National Standards shall be circulated to all persons on the pertinent canvass list or, in the case of standards approved by Accredited Standards Committee H35, to the members of the Technical Committee on Product Standards for development of the interpretation. The interpretation shall be sent to the ASC H35 members so that they can provide any additional comments to the requestor of the interpretation.

**Product Safety and Data Reliability Guidelines**

In connection with the drafting of standards or interpretations of standards, the Product Safety and Data Reliability Guidelines, attached, shall be observed.

**Periodic Review**

After an institutional standard-making body has approved a proposed standard, or user input has been obtained by other appropriate means, the Association group which developed the standard shall establish a procedure for periodic review of the standard for the purpose of keeping the standard current to reflect advances in technology. At a minimum, all Association standards shall be reviewed every five years and revised, reaffirmed or withdrawn.

**Implementation of these Procedures**

The Vice President – Standards & Technology of the Association shall take steps to insure the observance of these procedures by all Association groups.
Association Standards Policy

The use of any member or nonmember of any technical data or standards contained in Aluminum Association publications is purely voluntary. The Association's publication or development of any technical data or proposed standards does not in any respect prevent or restrict any member or nonmember from manufacturing or supplying products not in conformance with the data or standards. The misuse or misrepresentation of Association standards and/or data, however, is impermissible, and the Association shall take all necessary and appropriate action to prevent the inappropriate use of its standards and publications.

Application

These procedures apply to any group of the Aluminum Association formed by the Board of Directors or any subgroup formed for the purpose of developing proposed standards or interpretations of existing standards.

Operating Procedures

Association groups formed for the purpose of drafting proposed standards or interpretations of standards shall comply with the following operating procedures.

Membership

Any Association Producer member company may have a representative to serve as a member of the standards groups. Participation by Association Associate member companies shall be governed by each individual standards group. A standards group member may designate an alternate representing his/her company to act for him/her.

Chairman/Vice Chairman/Secretary

The group chairman shall be elected by the group. A vice chairman may be elected at the option of the members of the group. The secretary shall be the staff executive appointed by the President of the Association.

Meetings

Meetings shall be held at the call of the Chairman or at the request of two or more of the members. Written notice of meetings, together with the meeting agenda, shall be mailed by the staff executive at least ten (10) days before the meeting. When necessary, a special meeting may be called by telephone or other electronic communication medium provided such notification is given by the staff executive at least four (4) days before the meeting. The term "meeting" applies equally to telephone conference calls or other electronic assemblies of the members.

Invited guests, including individuals who do not represent any Association member company may participate in meetings of any standards group. Any member of a standards group who intends to invite a guest to a meeting of the standards group shall notify the staff executive no later than fourteen (14) days before the meeting. The written notice of the meeting shall disclose the expected attendance of the invited guest(s). In the event that the staff executive is notified of the expected attendance of the invited guest(s) after the meeting notice has been circulated, the staff executive shall provide written notice to all members of the identity and expected attendance of the invited guest(s) no later than ten (10) days before the meeting.

Minutes

Minutes of meetings shall be drafted by the staff executive and approved by the members.
Voting

Actions shall be voted on in meetings or by letter ballot. Letter ballots shall provide for affirmative, negative and waive votes. Actions on substantive issues related to a standard or an interpretation of a standard require a unanimous vote of the members for adoption. Each member company represented in the group is entitled to one vote. Efforts shall be made to resolve any differences and obtain a unanimous vote. If efforts to resolve negative ballots are made by telephone or at a non-Aluminum Association meeting, rather than at an Association meeting or by correspondence routed through the group's staff executive, one of the participating members must provide the staff executive with a brief memorandum or letter describing the efforts made to persuade the person casting the negative ballot to change his or her vote and the results.

Actions on matters such as election of a chairman or a vice-chairman, approval of minutes, formation or discharge of a sub-group, authorization of a letter ballot and the like require a simple majority vote of the members.

In meetings, unanimity or a majority shall be based on the number of members and proxies present without regard to whether any of such members or proxies abstains with respect to the particular action, provided that a quorum is present, and that the action being voted on was included on the agenda communicated with the meeting notice. No actions may be taken with respect to substantive issues related to a standard or an interpretation of a standard not disclosed on the agenda. Any member not able to attend a meeting may submit his/her vote on an issue on the agenda to the staff executive before the meeting. The presence at a meeting of twenty percent (20%) of the members of the group or their proxies, but not less than two members, shall constitute a quorum.

Letter ballots shall be returned to the staff executive, and shall carry reasonable deadline dates.

If a member fails to submit his/her ballot, and does not request a time extension of the deadline date, it shall be considered that he/she has waived the vote when the deadline expires. Non-waiving ballots must be received from a minimum of three members in order for the group to act on the ballot. If fewer than three non-waiving ballots are received, then the following procedure(s) shall apply:

(1) The action shall be resubmitted to the members by the committee's staff executive within two (2) weeks of the initial vote or letter ballot, with an explanation attached that a re-vote is necessary because fewer than three non-waiving ballots were received.

(2) If the re-vote does not meet the threshold of three non-waiving ballots, any interested member may appeal the action to the committee members present at the next regularly scheduled meeting. After considering the appeal and discussing the issue(s), the committee members present may determine to re-vote the action at that meeting or, alternatively, request the committee's staff executive to resubmit the action to a final letter ballot, to which the staff executive shall attach a summary of the committee's discussion and/or recommendation regarding the appeal.

When a negative letter ballot is submitted, the reason(s) for the negative must accompany the ballot in order for it to be considered a valid ballot. Copies of the reason(s) shall be sent to all members, and an effort to resolve the negative ballot will be made.

When an action has been completed by letter ballot, the staff executive shall notify the members of the results, including a summary of the affirmative, negative and waive notes.

Any non-member who has been invited to participate in a meeting of a standards group is entitled to provide comments, including a statement of such non-member's position (i.e., affirmative, negative or non-waive) regarding any action pending before the group during the time of the non-member's participation. The members of the standards group shall take into consideration, but are not bound to, the
comments and input of any non-member participant when casting their votes in accordance with the rules pertaining to member votes set forth above.

**Correspondence**

Correspondence on standards development activities initiated by individual group members shall be sent to the staff executive for subsequent distribution to the other members. All official correspondence with other agencies and organizations shall be over the signature of the staff executive.

**Document Retention**

Technical standards should be retained permanently.

**Representatives to Other Bodies**

Standards groups may name representatives to other technical organizations. Such representatives shall be employees of the Association or paid consultants selected by majority vote of the group. If no employees of the Association are available or technically qualified or if it is otherwise necessary, the group may select employees of member companies to serve as representatives of the Association. The letter of appointment shall inform the other organization of the class of representative involved based on the following:

A. **Official Representative** - Represents the Association and votes and states only the Association position as determined by the group the individual represents. Keeps the Association group appropriately informed. Where it is necessary for an Official Representative to vote on an issue before the appropriate Association committee has had the opportunity to determine its official position, the Official Representative may vote, provided that he/she has a reasonable basis for judging the position the appropriate Association committee would take on the issue. In that case, the Official Representative shall consult with Association staff before voting, or copy Association Staff with all voting materials and the rationale for the action taken; such vote shall state that the Official Representative's vote is subject to review and change by the Aluminum Association once the appropriate Association Committee has had an opportunity to determine its official position. After voting a position not predetermined by the appropriate Association Committee, the Official Representative shall, at the earliest opportunity, advise the committee through Association staff concerning the issue and the position taken. If it is subsequently determined that the appropriate Association committee disagrees with the position voted by the Official Representative, that person shall rescind or change his/her vote.

B. **Liaison Representative** - Serves as a Liaison Representative between the Association and another organization solely for the purpose of information exchange. The letter of appointment shall state that the Liaison Representative does not represent the Association in votes on issues.

**Sub-Groups**

Association groups formed to draft standards or interpretations of standards may form sub-groups to perform tasks related to standards or interpretation of standards either independent of the group or subject to the group's approval. The members of sub-groups may or may not be members of the standards group. The chairman of the sub-group shall be appointed by the chairman of the standards group or shall be elected by the members of the sub-group. The secretary shall be the staff executive appointed by the President of the Association. Voting and other procedures applicable to standards groups shall also apply to their sub-groups.
Termination of Standards Group

A standard group or sub-group may be disbanded on completion of its assignment or by decision of the Association group that organized it. If a standard has been promulgated, the organizing group shall assume responsibility for its maintenance and interpretation.

Appeals

If any party, member or nonmember, considers himself/herself aggrieved by an action of the Association concerning the development of proposed standards or interpretations thereof, he/she shall be invited to submit a written statement of the problem to the Vice President – Standards & Technology, together with a documented draft proposal which would resolve the problem if adopted.

This appeal shall be submitted to the group responsible for development and/or maintenance of the standard for review.

The appellant may be asked to attend the next scheduled meeting of the group when the appeal is discussed. Action on appeals shall require a unanimous vote of members voting, with abstentions not counted as votes.

If the responsible group does not support the position of the appellant or if the aggrieved party chooses not to present his/her position to the responsible group for reconsideration, the appellant may request a hearing before a standing Standards Appeals Board of the Aluminum Association ("Standards Appeals Board"). The Standards Appeals Board shall be established by the Aluminum Association's Vice President – Standards & Technology and shall be composed of one representative each from at least 10, but not more than 20, member companies. Participation on the Standards Appeals Board shall be voluntary. Expenses for participating on the Standards Appeals Board shall be borne by the participating member companies. Member representatives shall, in the judgment of their own company, be capable of deciding issues of technical content as well as due process.

The Standards Appeals Board shall meet only at the call of the Vice President – Standards & Technology, or in his or her absence, the President of the Aluminum Association, for the purpose of hearing an appeal within 90 days after a request for a hearing unless otherwise agreed by the parties. A quorum shall be seven members. The Standards Appeals Board shall elect a presiding chairman for the specific appeal to be heard by a simple majority vote of the members present at the meeting. The Association staff executive calling the meeting shall cast the deciding vote in the case of a tie vote for the election of the presiding chairman.

Written positions shall be presented by both parties to the controversy. Both parties shall be present during the appeal for purposes of clarifying and answering questions with respect to the position presented. If either party fails to present its position with just cause, the party which presents its position shall automatically prevail.

The Standards Appeals Board, upon completion of the presentations and its discussions, shall, by secret ballot, vote for or against the appeal - no waive votes are permitted. A two-thirds majority of the members voting affirmative are required to sustain the appeal.

If the Standards Appeals Board does not support the position of the appellant, the appellant may request a hearing before a final appeals body. The final appeals body shall be composed of three individuals: one appointed by the President of the Aluminum Association, one by the aggrieved party and the third by the other two arbitrators from a panel of qualified individuals acceptable to both sides. Unless otherwise agreed upon, each party shall assume any fees and expense for the final appeals body member he/she appoints and share the costs for the third member, as well as any other administrative expense involved in the final appeals procedure. If the Association and the appellant cannot agree on the arbitration procedures, other than those set forth above, the current Rules of the American Arbitration Association shall apply.
This final appeals body shall meet within sixty days after appointment and it shall provide for presentation of written and oral arguments by the parties to the controversy. The final appeals body shall render a decision within a reasonable period of time after the hearing and the decision shall be binding on the parties to the controversy.

**Duplication of Copyrighted Material**

Copyrighted material obtained from other organizations may be duplicated and distributed for the purpose of reviewing and commenting on documents, provided such material is marked "For Review Only".
PRODUCT SAFETY AND DATA RELIABILITY GUIDELINES
FOR THE
ALUMINUM ASSOCIATION

I. Where appropriate, an acceptable data base (including such things as service life factors) should be established, and the manner in which the data base is computed should be set forth.

II. Where specific quality levels, properties, etc. are stated or implied, appropriate inspection or test methods should be described (or referenced) and recommended for use.

III. The limitations of the data presented should be clearly indicated. For example, explanations of mechanical property limits, typical properties, welded properties, etc., should be provided to permit the reader to judge the significance of the data.

IV. The reasons for including typical or nominal properties, characteristics, dimensions, etc., should be carefully considered and, when they are used, the purposes for including them, their limitations and appropriate precautions concerning their use should be prominently explained and repeated where necessary.

V. Representations, stated or implied, relating to suitability for a specific application, anticipated performance, etc., should be carefully checked for accuracy and validity in the light of acquired experience.

VI. The need for qualifying or precautionary notes or statements should be considered and such explanatory statements should be employed and repeated wherever they will assist the reader in interpreting and using the data correctly.

VII. As all published material is subject to change as new experience is gained, a statement should be included suggesting verification of the data with the Aluminum Association if there is any doubt of its current validity.

VIII. When a publication is revised and reissued, a statement should be included indicating that it supersedes all prior issues.

IX. When reviewing or developing publications, it should be kept in mind that the use by any member or nonmember of any technical data, standards or specifications contained in an Aluminum Association publication is purely voluntary and the Association's publication of any technical data, standards or specifications does not in any respect prevent or restrict any member or nonmember from manufacturing or supplying products not in conformance with the data, standards or specifications. A statement to this effect should be included in association publications. The misuse or misrepresentation of Aluminum Association standards and/or data, where found, is to be brought to the attention of the Vice President – Standards & Technology.

X. Pertinent documentation of group actions should be recorded and maintained in accordance with the Association's document retention policy and should be subject to review by counsel as appropriate.
Attachment to Procedures for Development of Proposed Standards, Interpretations of Standards, and Documents Containing Technical Information by the Aluminum Association

Internal Audit Procedure for Determining Compliance with ANSI Requirements for Continued Accreditation

Frequency of Audit:

An internal audit shall be carried out once every 5 years. The audit shall be scheduled by the Association Staff Manager immediately following the announcement by ANSI of their upcoming audit.

Audit Team Membership:

At least three persons shall be appointed by the Chairperson of the Technical Committee on Product Standards (TCPS) prior to the internal audit due-date. An attorney from the legal firm representing the Aluminum Association shall also be a member of the audit team. All appointees shall be members of the TCPS.

Association Staff:

Executive Staff of the Aluminum Association assigned to the TCPS is included in the audit.

Procedure:

1. Sixty days or more prior to the audit due-date, current copies of the following documents shall be provided to each of the auditors by the Association staff person.
   (a) ANSI Essential Requirements: Due process requirements for American National Standards,
   (b) Procedures for the Operation of the ANSI Accredited H35 Committee and the Development of H35 American National Standards,
   (c) The findings and recommendations from the last ANSI and the Association’s Internal Audits.
   (d) The corrective action summary reports from the last ANSI and Association’s Internal Audits.

2. The audit team shall ensure that the Association’s operating practices meet all the requirements set by the two documents referenced in 1.(a) and 1.(b).

3. The Association Staff shall arrange for availability of appropriate personnel and shall provide a conference room and an opportunity for any site verification requested during the audit by the audit team.

4. The audit team shall check to see if the corrective actions from the previous internal audit and from the previous ANSI audit are effective.

5. The audit findings shall be reviewed with the Vice President - Standards & Technology in addition to the Executive Staff and other Association Staff members at the conclusion of the audit. The Audit Team Chairperson shall provide the Vice President - Standards & Technology with a summary report within sixty days of the conclusion of the audit.

6. The Vice President - Standards & Technology shall be responsible for the development of a plan, listing corrective actions with implementation dates for each finding and recommendation in the corrective action summary report. This plan shall be submitted to the Audit Team Chairperson within 30 days from audit report receipt for approval.
7. The implementation of the corrective actions is verified by the Audit Team Chairperson, according to the proposed implementation dates.

8. Once the implementation verification is performed and all the corrective actions have been implemented, the internal audit is closed.
Section B: Technical Committee on Product Standards Procedures
SECTION B.1 TECHNICAL COMMITTEE ON PRODUCT STANDARDS GUIDELINES

Section B.1.1 Guidelines for the Development of Typical and Design Properties for Aluminum Association Publications

A. STANDARD REFERENCE SOURCES – As a general rule, no alloys and/or tempers are included in new Aluminum Association publications if they have not been previously registered in the proper manner by the Technical Committee on Product Standards (TCPS), and appear in one or more of the standards references below.

1. The basic starting point for all mechanical and physical properties to be published in Aluminum Association technical and marketing publications is Aluminum Standards and Data (ASD). If typical and minimum properties appear in the current edition of ASD, they should be the values used in the new publication.

2. If no properties are available in ASD for the alloy(s) or temper(s) in question, consult the Registration Records (the Rainbow Sheets). At minimum, they contain the minimum tensile properties. It should be noted that values in the Registration Records may be “single producer” values, i.e., represent the analysis of data from production at only one producer’s facilities. Also, note that some values published in the Registration Records are “tentative” values, i.e., are based upon less data than desired for fully accepted minimum values; if such values are used in an Aluminum Association publication, they should carry that “tentative” notation therein as well.

3. A third source of previously published standard data is the Aluminum Design Manual (ADM), which normally contain only alloys and tempers that are in ASD, and also includes additional design properties, notably the compressive yield strength, shear yield strength, the bearing ultimate and yield strengths, and the strengths of welded aluminum alloys. All of these may be considered “standard”, and appropriate for inclusion in a new Aluminum Association publication.

4. One final reference to consider when searching for baseline properties to include in a new Aluminum Association publication is the military design handbook known as MIL-HDBK-5 (currently in Revision G). The design properties in MIL-HDBK-5 have been statistically determined by third party assessment of producer data, are consistent with aerospace industry specifications, and use the same statistical basis as does the aluminum industry (“A” value means 95% confidence that 99% or more of the lots tested will have properties equaling or exceeding those values). On rare instances, MIL-HDBK-5 “A” values may not agree with specifications, but such instances are generally identified. MIL-HDBK-5 also generally publishes “B” values (“B” value means 95% confidence that 90% of the lots tested will have properties equaling or exceeding those values), but these have not normally been published by the Aluminum Association.

B. FOR VALUES NOT AVAILABLE FROM STANDARD REFERENCE SOURCES – Often typical and/or minimum values are desired in Aluminum Association publications for alloys and/or tempers beyond those that have been published in the standard references above (e.g., relatively new automotive alloys recommended to the automotive producers but not yet in sufficiently broad production to merit inclusion in ASD). These properties must be obtained elsewhere, usually directly from the producers of those alloys/tempers. In these cases too, however, it is desired that the number to be published have been generated by industry-agreed-upon standard methods, as described below for the several possible conditions.

1. Instances where no typical and/or minimum tensile properties are available – Request appropriate values from companies that registered the alloy and/or temper, and/or from the company requesting the alloy/temper be included in the publication. Require that the alloy and temper be suitably registered by the Aluminum Association, with properties, before it is included in the publication. Generally, without such registration, it is not appropriate to include those alloys and tempers in the new publication (in a few instances when registration has been “in process”, exceptions have been granted). In cases where the newly registered properties are qualified as “tentative”, that qualification should be carried along with the new properties into the new publication.

2. Instances where typical tensile properties are available but not other typical properties – Compression, shear, and bearing properties are often referred to as “derived properties” and are generally calculated by the application of ratios of the respective properties to the tensile ultimate and yield strengths (see Section C below on Derived
Properties. Guidelines for the minimum number of independent data sets needed to determine such properties are given in MIL-HDBK-5, Chapter 9, paragraph 9.2.10.1; though intended therein for minimum/design values, the same guidelines require at least ten paired measurements from ten different lots of material representing a minimum of two different casts. If the new alloy-temper combination for which ratios are known, in some instances upon mutual agreement of the parties involved, the previously established ratios for the similar alloy-temper may be used.

3. **Instances where minimum tensile properties are available but not other minimum properties (compression, shear, bearing) are not** – As noted above, compression, shear, and bearing properties are referred to as “derived properties” and are generally calculated by the application of ratios for the respective properties to the tensile ultimate and tensile yield strengths (see Section C on Derived Properties). Guidelines for the minimum number of independent data sets required to generate these ratios are given in MIL-HDBK-5, Chapter 9, paragraph 9.2.10.1. The paired tests called for in MIL-HDBK-5 lead to ratios as described in Section C that are then used to calculate the derived minimum properties. Those guidelines require that the ten paired measurements represent a minimum of two different heats or casts. If the new alloy-temper combination for which ratios are known, in some instances upon mutual agreement of the parties involved the previously established ratios for the similar alloy-temper may be used. This exception is not lightly used for minimum properties, and must be supported by persuasive evidence of the parallels.

4. **Instances where modules of elasticity is desired** – If no test data are available, a reasonably good value of the modulus of elasticity of an alloy may be calculated from the typical alloy composition based upon the amount of various alloying elements (with care for Li, Mg and Pb which have a different effect than most other elements whose impact is directly proportional to their own modulus and the nominal percent present). Typical values of modulus of elasticity are not considered to be temper of orientation specific, although in those cases where a number of precise measurements have been made, differences of one or two per cent have been found, and such differences are recognized in MIL-HDBK-5 design values. There is usually a one-to-three percent difference between the tensile and compressive moduli that is also recognized in MIL-HDBK-5 published values, but normally Aluminum Association publications show only the average typical value.

The notable exception to this is the Aluminum Design Manual, specifically the tables of design properties in the Specifications for Aluminum Structures; these are the average compressive moduli of elasticity for specific product forms, not comparable to the compressive moduli values, $E_c$, shown in MIL-HDBK-5 for individual product.

5. **Instances where density is desired** – Calculated nominal density values are handled as outlined in Aluminum Standards & Data, 1997, Pages 2-12 and 2-13.

6. **Instances where typical physical properties are desired** – Physical properties such as average coefficient of thermal expansion and melting range, like modulus of elasticity, are not considered temper dependent; the values are dependent upon the composition. Others, notably thermal conductivity, electrical conductivity, and electrical resistivity, are temper as well as composition dependent. While in some cases, the compositions for the alloy in question will be closely bracketed by alloys for which the physical properties are known, leading to the ability to estimate the needed values, actual laboratory verification is always preferred, with a minimum of three independent measurements. Since physical properties are not usually used to a very high level of precision in evaluating service performance, estimates of the values are often sufficiently useful to the engineer.

C. **CALCULATION OF DERIVED PROPERTIES**

1. **Derived properties** - The following properties are generally considered to be “derived” properties, therefore not requiring the same level of statistical support for their calculation by MIL-HDBK-5 and in Aluminum Association publications.

- Tensile strength in orientations other than the standard specification test orientation
- Tensile yield strength, in orientations other than the standard specification test orientation
- Compressive yield strength, in all orientations
- Shear Strength, in all orientations
- Bearing ultimate strength, for two edge distances (1.5 and 2 times the pin diameter)
• Bearing yield strength, for two edge distances (1.5 and 2 times the pin diameter)

2. Ratios for calculating derived properties - The practice has developed to use the ratios of properties listed below to calculate derived properties, in all cases using a ratio of the desired derived property to a specification (spec) property (i.e., in the specification test direction for the product in question, one known with a high level of statistical confidence). In the ratios below \( L, LT \) and \( ST \) refer to the longitudinal, long transverse and short transverse direction, respectively. If/when these ratios are applied to tensile properties that are qualified as “tentative”, the resultant derived properties should also carry that qualification.

• Tensile Strength (TS), non-spec direction is ratioed to the tensile strength in the spec direction; thus for heat treated plate, for example, TS, LT and TYS, Lt are spec values and the ratios required for other tensile strengths are TS, UTS, LT and TS, ST/TS, LT.

• Tensile Yield Strength, (TYS), non-spec direction is ratioed to the tensile yield strength in the spec direction.

• Compressive Yield Strength (CYS) in all directions are ratioed to the tensile yield strength in the spec test direction. (Tests per ASTM Standard Method E209).

• Shear strengths are ratioed to the tensile strength in the spec test direction.

For aluminum alloy sheet up to 0.125 in., “blanking shear” test values are used, in which 3-in. circles are sheared in a blanking press out of 4-in. square specimens; these, therefore are essentially orientation independent, averaging all through-thickness orientations. No ASTM standard has ever been developed for this type of test.

For material up to 0.250 in. in thickness, ASTM Method B831 single-shear test method may be used. The minimum thickness depends upon the ability of the material to resist buckling during testing, which distorts the results. It is important to note that these, unlike blanking shear tests, are directional in nature and differences with specimen orientation must be accounted for; in publications such as the Aluminum Design Manual, tradition has been to show only one value of shear strength, representative of the average of the major orientations.

For products equal to or greater than 3/16-in. in thickness, the rivet or cylindrical “double shear” test per ASTM Standard B769 is used, as well as ASTM B565 for aluminum rivets and cold-heading wire and rods. Values from these tests are orientation dependent, but tradition has been to show only one value of shear strength, representative of the average of the major orientations.

• Shear yield strengths are published by the Aluminum Association only in the Aluminum Design Manual (ADM), and only there as non-directional value (i.e., average for all orientations). Since shear yield strengths are not measured in any routinely made shear tests, based upon work done many years ago at Alcoa in shear stress strain tests, shear yield strengths have traditionally been calculated as 0.577 times the tensile yield strength. Since this is a property not required to precise levels in structural design, this practice has been wholly acceptable.

• Bearing ultimate strengths are ratioed to tensile strength in the standard specification test direction. While bearing strengths are directional, the tradition has been to show only averages for the two principal directions and in Aluminum Association publications and, for the Aluminum Design Manual Specifications for Aluminum Structures, to show values only for an edge distance of 2D (distance from the edge of the sheet to the axis of the pin is twice the diameter of the pin). In MIL-HDBK-5, it is standard practice to show values for two edge distances: 1.5 and 2.0 times the pin diameter. (Tests per ASTM E238) (1).

• Bearing yield strengths are ratioed to tensile yield strength in the specification test direction. While bearing yield strengths are directional, the tradition has been to show only averages for the two principal directions, and in the Aluminum Design Manual Specifications for Aluminum Structures, to show values only for edge distances of 2D. In MIL-HDBK-5, it is standard practice to show values for two edge distances: 1.5 and 2.0 times the pin diameter. (Tests per ASTM E238) (1).

Footnote (1) – Attention is called to the fact that, as this document is being prepared, the Aluminum Association Engineering Design Task Force and the Aluminum Association Advisory Committee, which together establish the design rules and design properties for aluminum alloys, are considering eliminating the derived property method
of calculating bearing properties as described herein and historically used in the aluminum industry for a new approach directly using ultimate tensile strengths. Users of these guidelines are encouraged to inquire into the status of these changes at the time any decisions on bearing properties are being considered.

3. Estimates of derived properties – Occasionally, for design estimates, it is highly desirable to have estimates of the compressive, shear, and/or bearing properties even though there has been no opportunity to generate a significant number of test data. In such cases, the guidelines below may be considered, along with estimates based upon comparisons with the closest alloy/temper/product combination for which such properties are known. In cases where such estimates are used, they should be identified as “estimated”.

- Compressive yield strength – for non-heat treated products, the compressive yield strength in the longitudinal (spec test direction) is usually conservatively estimated to be equal to the longitudinal tensile yield strength; for heat treated products, the compressive yield strength is estimated to be one to two ksi (about 5-15 MPa) above the transverse tensile yield strength.

- Shear ultimate – for non-heat treated products in strain hardened tempers, the ultimate shear strength is usually conservatively estimated at about 60% of the tensile strength; for heat treated products, it may be more conservatively estimated at about 55-57% of the tensile strength. For the annealed temper of non-heat treated alloys, the ultimate shear strength may be estimated at about 62% of the tensile strength.

- Shear yield strengths – as noted above, shear yield strengths are always calculated to be 0.577 times the tensile yield strength.

- Bearing ultimate strengths, for two edge distances (1.5 and 2 times the pin diameter) – bearing data are generally much more variable than tensile property data, and so ratios are normally rather conservatively estimated in the absence of data for closely similar alloys, tempers and products. Bearing ultimate strengths at edge distances of 1.5 and 2 times the pin diameter may be estimated at 1.6 and 2.0, respectively, times the tensile strengths. (See Footnote 1, page 7).

- Bearing yield strengths, for two edge distances (1.5 and 2 times the pin diameter) – bearing yield data are generally much more variable than tensile property data, and so ratios are normally rather conservatively estimated in the absence of data for closely similar alloys, tempers and products. Bearing yield strengths at 1.5 and 2.0 times the pin diameter may be conservatively estimated at 1.4 and 1.6 (for annealed tempers of non-heat treated alloys, 1.6 and 2.0), respectively, times the tensile yield strength. (See Foot Note 1, page 7).

D. QUALIFICATION OF PUBLISHED – Whenever property values having some qualification are included in Aluminum Association publications, it is important that they carry that qualification in the publication. Among the usual qualifications that might be encountered are the following:

1. Tentative – Whenever tensile properties for a specific alloy and temper are identified in Aluminum Association Registration Records as “tentative”, all other derived properties published in Aluminum Association publications should carry some qualification as well. In cases when the derived properties have been generated with from three to ten sets of paired data, it is reasonable to identify the derived properties as “tentative” as well. In situations where, the derived property values have been estimated, they should be qualified by that term, “estimated”.

2. Estimated – In general, the use of estimated properties in Aluminum Association publications should be avoided, if/when it is essential for some reason, the values should always be properly qualified as “estimated”.

3. Representative – Whenever actual test data for lots of material that are presumed to be representative of the specific alloy and temper involved are presented in Aluminum Association publications, it is appropriate to identify that the data being presented are actual test data, not values that have been statistically derived. If they are averages of several tests or of several lots of material, those qualifications should be presented as well.

E. ASTM STANDARD TEST METHODS – It is appropriate to note that in all cases, values of properties to be included in Aluminum Association publications are to have been based upon tests made in accordance with ASTM Standard Test Methods as published in the appropriate Edition of the Annual Book of ASTM Standards. Some of the most important ASTM Standard Test Methods applicable to the properties of aluminum alloys discussed above are listed below, and appear in Section 2, Part 02.2 or Section 3, Part 03.01 of the ASTM Annual Book of Standards:
• Tension Testing – ASTM B557
• Compression Testing – ASTM E9
• Shear Testing –
  • B565 – Rivet Shear Testing
  • B769 – Single Shear Testing
  • B831 – Shear Testing Thin Products
• Bearing Testing – ASTM E238
• Modulus of Elasticity – ASTM E111
Section B.1.2  Procedure for Project Development and Control

Under the system of assigning project numbers, the product standards activities are divided into two main categories: **Product Nomenclature** and **Product Standards**, which are identified by the prefix “PN” and “PS” respectively. A system consisting of six or seven alpha-numeric characters are used to identify each project in the different categories. The first two letters of the designation indicate the main category; the second 2-digits use the last two digits of the year in which the project is assigned to identify the year in which the project was initiated; and the last two or three digits determine the sequential numbers assigned to each project in each category.

CURRENT SYSTEM

A. **PRODUCT NOMENCLATURE (IDENTIFIED BY PREFIX “PN”)**

**DESIGNATED PNYY-50 TO PNYY-XX**

- Revisions to ANSI Designation Systems
- Revisions to temper definitions, etc.
- All registration requests for wrought, cast, and hardener alloys; unalloyed aluminum; and clad products (Teal, Pink, Gray, Gold, and Light Green Sheets)
- Temper Registrations (Yellow and Tan Sheets)
- Reactivation of deactivated alloys and/or tempers
- Deactivation of registered alloys and/or tempers
- Changes to Temper Designations
- Revisions to registered alloys and/or tempers
- Revisions to the Rainbow Sheets
- All other subjects related to the nomenclature systems and registrations

B. **PRODUCT NOMENCLATURE (IDENTIFIED BY PREFIX “PS”)**

**DESIGNATED PSYY-100 TO PSYY-XX**

- Changes/additions/deletions to ASD/ASD(M) other than H35.1/H35.1(M)
- Moving Alloy/Temper/Products from Yellow/Tan Sheets to ASD/ASD(M)
- Moving Alloy/Temper/Products from ASD/ASD(M) to Yellow/Tan Sheets
- Tolerance revisions (ASD/ASD(M) and ANSI H35.2/ ANSI H35.2(M))
- Request for interpretation of standards
- Revisions to Standards for Sand and Permanent Mold Castings
- Revisions to all other Aluminum Association standards publications
- Review of other organizations’ standards and specifications
- Review of International Standards
- Revisions to the TCPS Procedure for development of standards and interpretation of standards
- Revisions to TCPS Procedure Manual
- All other communications with TCPS not specified in items “A” above.

Additionally, a new feature has been added to the system by adding a “/” to the main project number to identify various stages or elements in the same project. For example, when an item is balloted for the second time, “/2” is added to the project number to indicate that the item is being re-balloted.

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1 In the initial system, each main category was sub-divided into two groups. Use of the following sub-groups was discontinued in the recent past and the subjects previously covered under these sub-groups were rolled into one of the main categories.

**DESIGNATION PNYY-01 To 49** – All subjects related to revision to nomenclature and H35.1 designation systems

**DESIGNATION PSYY-01 To 100** – Review of Government and/or Military Specifications
Section B.1.3 Procedure for Responding to Interpretation Questions

Within 5 days of receipt of a request for interpretation of an existing Association standard, the Vice President – Standards & Technology or appointed designee shall do the following:

1. Review the request and determine if the interpretation pertains to an Aluminum Association document for which the TCPS has responsibility.
2. If TCPS interpretation is required, a new project shall be opened and the request shall be submitted to the members of the TCPS for development of the interpretation.
3. Respond to the questioner acknowledging receipt and indicating when to expect a response.

The TCPS will be given a 14 day period to review the request and provide comments.

The VP of Standards and Technology will prepare a draft response within 14 days based on comments provided by the TCPS.

The draft response will be circulated to the TCPS for a 7 day comment and review period. After the review and comment period, if consensus on the draft has not been reached, the VP of Standards and Technology shall convene a meeting within a week to resolve differing comments. A revised draft shall be circulated to the TCPS members within the next 7 days for an additional 7 day review and comment period.

Once approved, the VP of Standards and Technology or appointed designee shall issue the approved letter to the requestor.

Note: If interpretation relates to an existing Association standard that is approved by Accredited Standards Committee H35, the interpretation response letter shall also be sent to the ASC H35 members so that they can provide any additional comment. The requestor should be informed that the response letter has been also sent to ASC H35 members and he/she will be provided by any additional comment from ASC H35 members.
Interpretation Development Procedure Flow Chart

Request for Interpretation received by AA

Does the request pertain to an AA document for which TCPS has responsibility?

Yes

AA VP of S&T replies acknowledging receipt of inquiry and providing referral information as applicable

No

AA VP of S&T replies acknowledging receipt of inquiry and anticipated response timing and forwards request to TCPS for review and comment under a new project

Comments provided by TCPS members within 14 days

Draft response prepared by VP S&T and circulated to TCPS

Comments provided by TCPS members within 7 days

TCPs consensus reached?

Yes

AA VP of S&T replies with approved letter with copies sent to ASC H35 if applicable

VPS&T to hold conference call to resolve

Revised Draft response prepared by VP S&T and circulated to TCPS

No

7 days

5 days

14 days

14 days

7 days

7 days
SECTION B.2 TECHNICAL COMMITTEE ON PRODUCT STANDARDS ALLOY AND TEMPER REGISTRATION PROCEDURES

Section B.2.1 Procedure for Review of Alloy Registration Requests

Scope: This procedure outlines how registration requests are reviewed and completed at The Aluminum Association Inc. (AAI).

1. Requests for registration of aluminum alloys for inclusion in the following international registration records, for which there is an “Accord” on the use of the designation system:
   - International Designations and Chemical Composition Limits for Unalloyed Aluminum (Gold Sheets)
   - International Alloy Designations and Chemical Composition Limits for Wrought Aluminum and Wrought Aluminum Alloys (Teal Sheets)
   - International Designations and Chemical Composition Limits for Aluminum Hardeners (Gray Sheets)

   1.1. Requests received by AAI from North American producers:
      - 1.1.1. 30-day circulation, to TCPS for review and comment, of the letter requesting registration.
        [Note: comments must be submitted within the established review period or an extension requested. Such a request extends the time beyond the 30-days circulation.]
      - 1.1.2. Resolution of comments.
      - 1.1.3. 60-day circulation to all signatories, for review and comment, on AAI’s letter proposing international registration.
        [Note: comments must be submitted within the established review period or an extension requested. Such a request extends the time beyond the 60-days allowed for international circulation.]
      - 1.1.4. Resolution of comments.
      - 1.1.5. Following resolution of comments, AAI issues the formal “Alloy Registration Acceptance Form”.
        (Note: the complete registration process requires a minimum of 90 days to complete.)

   1.2. Registration Requests received by AAI from International Signatories:
      - 1.2.1. Initiating international signatory circulates letter proposal, to all signatories, for 60-days review and comment.
      - 1.2.2. AAI circulates the signatory letter to TCPS, for 30-days review and comment, on the proposed international registration and assignment of appropriate designation.
        [Note: comments must be submitted within the established review period or an extension requested. Such a request extends the time beyond 30-day review period.]
      - 1.2.3. Resolution of TCPS comments for responding to the applicant and all signatories.
      - 1.2.4. AAI submits comments to all signatories within the 60-day review period.
      - 1.2.5. Resolution of signatory comments.
      - 1.2.6. Following resolution of comments from the signatories, AAI issues the appropriate registration acceptance form.
        [Note: The complete registration process requires a minimum of 60 days to complete.]

2. Requests for registration of aluminum alloys and products for inclusion in the following registration records, for which there is no international accord on the use of the designation system:
   - Designations and Chemical Composition Limits for Aluminum Alloys in the Form of Castings and Ingot (Pink Sheets)
   - Components of Clad Aluminum Alloy Products
2.1. Requests received by AAI from North American Producers:

2.1.1. 30 days circulation to TCPS for review and comment, of the letter requesting registration
[Note: Comments must be submitted within the established review period or an extension requested. Such a request extends the time beyond the 30-day circulation.]
2.1.2. Resolution of comments
2.1.3. Following resolution of comments, AAI issues a formal Registration Acceptance Form.

3. Requests for registration of tempers for aluminum products for inclusion in the Tempers for Aluminum and Aluminum Alloy Products (Yellow Sheets) and its Metric counterpart (Tan Sheets)

3.1. See section B.2.2. of the Procedure Manual

NOTE: Although there is no international accord for registration of aluminum casting alloys, clad products and tempers for aluminum alloy products listed in items 2 and 3 above, registration requests from outside of North America will be considered on individual basis if it meets AAI criteria for registration.
SECTION B.2.2 Procedure for Review of Temper Registration Requests

Scope: This procedure and its accompanying flow chart outline how temper registration requests are reviewed and completed at The Aluminum Association Inc. (AAI).

Note 1: The process described below shows the timeframe under normal circumstances. It is recognized that certain conditions (holidays, vacations, sicknesses, etc.) may prolong specific segments. That is why and to expedite the process in general, members are encouraged to provide comments/responses soon and not to wait until the last day.

Note 2: Although there is no international accord for registration of tempers for aluminum alloy products, registration requests from outside of North America will be considered on individual basis if it meets AAI criteria for registration.

1. Secretariat (AA) sends out a temper registration request for a 5 week review.

2. If there are no responses within 2 weeks, Secretariat notifies Chairman and Vice Chairman of the SCATR.

3. If the SCATR chairs do not commit to comments within 1 week, Secretariat refers to the TCPS chairs for comment.

4. The TCPS chairs can request 2 week extension in order to gather comments.

5. The purpose of these additional steps 2 through 4 is to ensure that member comments ARE generated. The temper registration process cannot be completed until comments have been received, which confirm that the proposed temper and related documentation are technically correct and complete.
   - The comments may indicate either agreement with the proposal, or objection to registration with specific questions or comments.
   - It is strongly recommended that during the comments period, members provide a complete set of questions/comments and avoid or refrain from asking questions one at a time, thus needlessly extending the registration process. It is recognized that new questions can arise during this procedure, but these should be the exception rather than the rule.
   - The comments and remarks should be within the AS&D guidelines and applicable rules that are affective at the time. Introducing new interpretation or new rules should be limited to the biannual AA meetings or proposed as a special project interim.

6. If Requestor is NOT the AA member, the comments are circulated for review among the SCATR members.

7. Upon obtaining SCATR consensus, the comments are forwarded to Requestor for response.

8. If Requestor IS the AA member, the comments are forwarded to the Requestor as they are received.

9. If Requestor does not respond within 2 weeks, Secretariat sends a reminder.

10. Comments/responses from Requestor are published for review by members and a closure is requested within 2 weeks of the published response.

11. If closure is not possible within two weeks due to either differing positions or comments being to numerous, the Secretariat organizes a teleconference to review and resolve the comments.

12. If all comments are resolved, the Registration is accepted.

13. If comments are not resolved, the Registration is refused and/or should be changed and resubmitted.

The above process is depicted in the following flow chart on the next page.
1. Secretariat (AA) sends out a temper registration request

Any comments within 2 weeks?

2. Notify SCATR Chairs

Chairs commit to comment within 1 week?

3. Secretariat refers to TCPS chairs for comment

4. TCPS requests 2 week extension for comments

5. Comments received

6. Circulate comments for 2 wk review

SCATR consensus?

7. Forward comments to Requestor for response

Requestor respond within 2 weeks?

9. Send reminder to requestor

10. Publish response to SCATR

Does requestor response satisfy commentors?

11. Secretariat organize telecon (within 2 weeks)

Does it appear all comments may be resolved?

12. Registration is accepted.

13. Registration is refused or should be changed and resubmitted
Section B.2.3  Procedural Guidelines for International Alloy Registrations
(Wrought Aluminum Alloys)

The following outlines a step-by-step guide on the procedures for international alloy registrations, the details for which are outlined in the “Declaration of Accord on An International Alloy Designation System for Wrought Aluminum and Wrought Aluminum Alloys” published in the “Registration Record of International Alloy Designations and Chemical Composition Limits for Wrought Aluminum and Wrought Aluminum Alloys”. Designations will be assigned in accordance with the rules set forth in the “Recommendation for an International Designation System for Wrought Aluminum and Wrought Aluminum Alloys” and its related Appendix(es).

A 4-digit numerical designation assigned in conformance with the rules outlined in the “Recommendation” on the Declaration of Accord on an International Alloy Designation System for Wrought Aluminum Alloys should only be used to indicate an aluminum or an aluminum alloy having chemical composition limits identical to those registered with the Aluminum Association and the Signatories of the Declaration of Accord.

A. APPLICATION FOR REGISTRATION

1. Written request for international alloy registration, must be submitted to The Aluminum Association, Inc., by the Signatory of the Accord.
2. Copy of the written request must be simultaneously submitted to all other signatories by the signatory requesting the alloy registration.

NOTE: Those aluminum organizations that are not affiliated with one of the signatories may submit their request directly to The Aluminum Association.

B. CRITERIA FOR CONSIDERING REGISTRATION REQUESTS

1. Alloy must be currently offered for sale and shall have been sold within the 12 months preceding the request for registration, both in commercial quantities.
2. The complete chemical composition limits for the alloy must be disclosed. (It is customary to include information on application and/or end use of the proposed alloy.)
3. The composition must be significantly different from any already registered alloy.

C. REVIEW PERIOD

1. All Signatories will have a 60-day review period to comment on the alloy composition and/or designation proposed for registration.
2. All comments and/or objections regarding the chemical composition limits and/or the proposed designation must be simultaneously submitted to The Aluminum Association, the organization requesting the registration, and to all other signatories, within the established 60-day review period.
3. The organization requiring additional time for review, must request in writing, addressed to all signatories, an extension specifying the requested period.

General Guidelines for Determining Compliance with “Sale of Alloy” and “Commercial Quantities” for purposes of Registering Wrought Aluminum and Wrought Aluminum Alloys (see Declaration of Accord, Item 1):

A. Sale of Alloy
   Sale of an alloy shall have been made to external users/customers (i.e., internal use and/or transfer of an alloy within a company does not meet the stated criteria).

B. Commercial Quantity
   a. The alloy has undergone bona fide mill production and is NOT a “laboratory” scale volume used for evaluations or experimental purposes
   b. The alloy is cast and fabricated in standard production facilities and is NOT a one-time production
   c. There is an expected and ongoing commercial demand and/or need for the alloy
   d. The alloy must be purchased and sold in a standard business context, which indicates that the alloy is actually “sold” and not “given away” for uses such as promotional evaluations.
D. FINALIZATION OF REGISTRATION

1. All technical objections must be substantially resolved prior to final registration.
2. The Aluminum Association will assign an alloy designation to the proposed composition. (Requests for a specific alloy designation will be considered if in compliance with the rules.)
3. As the Registrar, The Aluminum Association will notify the Signatories of the Accord of the registered designation and its chemical composition limits, at the expiration of the 60-day review period and any extension thereof, or upon resolution of all comments and objections.
4. The Aluminum Association will incorporate the new designation and the registered chemical composition limits in the next edition of the Registration Record of International Alloy Designations and Chemical Composition Limits for Wrought Aluminum and Wrought Aluminum Alloys.
Section B.2.4 Criteria for Changing Chemical Composition Limits for Registered Alloys

No changes in composition limits are allowed after the registration is final.

Composition limit change proposals for experimental ("X") aluminum or aluminum alloys, including the net of changes made sequentially, shall be restricted to the extent allowed by the alloy modification rules of ANSI H35.1. No changes shall be permitted if they affect the validity of any registered alloy or alloy modification. If the composition limit changes are beyond those for a modification, then the changed composition will be given a new experimental designation. The former experimental alloy can continue as such or be deactivated at the discretion of the registrant. Composition limit changes are subject to review for 30 days by the Technical Committee on Product Standards of the Aluminum Association. However, the registrant has the final authority to change the composition, as desired, provided the change complies with the above rules. Changes proposed by those other than the registrant are acceptable only with the written approval of the registrant.

A composition shall not be designated as experimental (with prefix "X") for more than five years. During the period that an alloy is designated as experimental, the registrant shall confirm to the Technical Committee on Product Standards at intervals not exceeding two years the reason(s) experimental designation is still required.
Section B.2.5  Procedure for TCPS to Determine the Designation of a Wrought Aluminum or Wrought Aluminum Alloy, in Compliance with ANSI H35.1

PRE-AMBLE

This document describes the procedure for determining the alloy designation of a new wrought aluminum or wrought aluminum alloy in accordance with ANSI H35.1/ H35.1(M)3, hereafter referred to as H35.1. The alloy designation determined by this procedure is used for registering Wrought Aluminum and Wrought Aluminum Alloys, with the Aluminum Association. The procedure is also in accord with the Recommendation for the International Designation System for Wrought Aluminum and Wrought Aluminum Alloys (afterwards referred to as the Teal Sheets), in which the full requirements for registration can be found. (All Teal Sheet references are the current edition of the document). The Technical Committee for Product Standards (TCPS) is responsible for determining wrought aluminum and wrought aluminum alloy designations for new compositions, and for making recommendations to the Aluminum Association.

TERMS AND DEFINITIONS

• **Alloy Family**: An alloy family is comprised of an original alloy and those modifications and variations related to it (see definitions for original alloy, modification or variation). Alloys within a family have the same last two of the four numerical digits in the designation. For example, alloys 6063, 6063A, 6463, 6463A, 6763, and 6963 are all considered to belong to the same alloy family.

  Note: Exceptions exist for those alloy families for which the numbers 1 through 9 used in the second digit of the alloy designation have already been assigned. In this case the alloy family has been extended and the last two digits will be different and the relationship can only be determined from the footnotes. (For more information on the use of these exceptions see Step 4.)

  For 1xxx group all alloys in a family have the same minimum aluminum concentration as defined in the ANSI H35.1 Section 2.1.

• **Alloying Element**: Elements that are intentionally added. These elements have both minimum and maximum limits.

• **Alloy Group (at times also referred to as the alloy series)**: Alloy group includes alloys that are related by major alloying element and share the same first digit in their designation. There are nine alloy groups 1xxx through 8xxx and the currently unused 9xxx. For example alloys 5024 and 5119 are in the same 5xxx alloy group.

• **Arithmetic Mean**: The arithmetic mean of limits of an alloying element or combination of elements is the sum of the minimum and maximum limits divided by two. The calculation of arithmetic means, and the calculation of the differences between arithmetic means are to be made mathematically exact, without rounding.

• **Combination of Elements**: Two or more elements with limits expressed as a single alloying element.

  [Mn+Cr: 0.20-0.6]
- **Element Substitution:** Substitution of one alloying element for another element serving the same purpose. The following are recognized substitute pairs: Mn/Cr, Mn/Zr, Cr/Zr, Pb/Sn, Pb/Bi, Bi/Sn. Other substitutions may be possible, but have not been proposed.

- **Impurity Elements:** Elements which are not intentionally added but which may be incidentally present. These elements only have a maximum limit.

- **Modification:** A modification is close in composition to an original alloy and satisfies the criteria as defined in the Teal Sheets.

- **New Alloy:** For the purpose of this procedure, a new alloy is a composition that has been submitted for registration.

- **Original Alloy:** An original alloy has chemical composition limits which do not meet the requirements to qualify as a variation or a modification.

- **Variation:** A variation is close in composition to an original alloy or a modification and satisfies the criteria defined in the Teal Sheets.

- **Wrought Aluminum and Wrought Aluminum Alloys:** An unalloyed aluminum or aluminum alloy primarily intended for the production of wrought products by hot and/or cold working.

**OVERVIEW OF THE DESIGNATION PROCEDURE**

The designation system is alphanumeric. It uses four digits, and, if appropriate, a letter suffix. It codifies alloys into one of three classes:

1. a variation of either an original alloy or of a modification,
2. a modification or
3. an original alloy

The first digit of the alloy designation indicates the alloy group. The second digit indicates whether an alloy is an original alloy or a modification. The last two digits indicate the alloy family within the alloy group. A letter suffix indicates a variation.

The general steps taken to determine the designation for a new alloy, are as follows:

1. The composition limits of the new alloy are reviewed, to validate their conformance with the standard limits for alloying and impurity elements in H35.1. If the composition limits of the new alloy do not comply with H35.1, the Aluminum Association shall request the registrant to correct the non-compliances. No further steps in the designation procedure shall be taken until a corrected request is received.

2. If the composition limits of the new alloy comply with H35.1, an alloy group (e.g. 1xxx etc.) is then assigned to the new composition in accord with the wrought aluminum and aluminum alloy designation system in H35.1. The alloy group number (1 to 8) becomes the first digit of the numerical component of the designation.
3. The new alloy composition is then compared, one by one, with all registered compositions from the same alloy group listed in the current Teal Sheets and its most current addendum to determine, if sequentially;

   a. The new alloy is a variation of an original alloy or a modification,
   b. The new alloy is a modification of an original alloy.
   c. If the new alloy is neither a variation nor a modification then the alloy is deemed an original alloy within the alloy group, and begins a new alloy family within the same alloy group.

If a new alloy qualifies for both a variation and a modification, then the alloy is classified as a variation. The detailed designation procedure is as follows, in Steps 1 to 5. Flow charts of the alloy designation procedure, Steps 1 to 5, for 2xxx to 8xxx alloy group can be found in Appendix A. Step 6 makes a brief reference to the registration procedure of the Aluminum Association.

DETAILED DESIGNATION PROCEDURE

The TCPS follows the procedure below for determining the alloy designation for new aluminum and new aluminum alloys in sequence, Steps 1 through 5.

   STEP 1: REVIEW CHEMICAL COMPOSITION LIMITS

The alloying element and impurity limits of the new alloy are reviewed to ensure that the format is complete, and technically correct, in accord with the standard limits in H35.1 page 4.

In particular, the following requirements apply:

- The number of decimal places for each limit shall be in accord with the standard limits shown in Footnote 3 of H35.1.
- The number of zeros might need adjustment requiring the addition or deletion of zeros at the end of the limits submitted.
- When a minimum aluminum content is specified, it shall be greater than or equal to 99.00%, and shall be listed with two decimal places; otherwise aluminum shall be listed as “Remainder”. (Aluminum content is calculated according to footnote 4 and 5 of the Teal Sheets.)
- Other Each and Others Total shall be reported in the composition.

The TCPS will report any non-compliance, to the Aluminum Association, who will then advise the registrant to re-submit the registration request with corrected and/or additional information. When the information is re-submitted by the registrant, and is found compliant with the rules of H35.1, the TCPS will proceed with the assignment of the alloy designation.

   STEP 2: DETERMINE ALLOY GROUP

There are eight alloy groups in the designation system, ranging from 1xxx to 8xxx, see Table 1 (on the next page).

The designation assigned shall be in the 1xxx group whenever the minimum aluminum content is specified as 99.00 percent and greater. All other alloys fit into alloy groups 2xxx to 8xxx inclusive. The assignment to the 2xxx through 8xxx alloy groups is determined by the alloying element (or combination of Mg and Si, see next paragraph) present in the greatest mean percentage.
When magnesium and silicon are present as alloying elements they shall be treated as one element with a total equal to their sum. Where the mean of their total is greater than the mean of the other alloying elements present, and the ratio of the mean magnesium content to mean silicon content, (Mg/Si), is between 0.46 and 4.46 inclusive, the alloy shall be deemed a 6xxx alloy. If the ratio of Mg/Si is less than 0.46 or greater than 4.46, the alloy group is determined by the element having the greatest mean percentage. The determination of Mg₂Si content for qualifying as a 6xxx series alloy group is provided in the Appendix B.

In those cases where there is a tie between the greatest mean percentages of two or more alloying elements (including the combination of Magnesium and Silicon), then the composition shall be designated in the order given in Table 1, from top to bottom. For example, if Copper and Zinc are added in the greatest percentages and if there is a tie in the mean values for Copper and Zinc, then the alloy will be designated a 2xxx group alloy.

The alloy group chosen gives the first digit of the alloy designation and the identification of the remaining digits of the designation are found by comparing the new alloy composition with those of the same alloy group registered in the Teal Sheets, as is detailed through Steps 3 to 5.

**STEP 3:** DETERMINE IF THE NEW ALLOY IS A VARIATION OF AN ORIGINAL ALLOY OR OF A MODIFICATION (variation takes precedence over modification)

The alloy composition is reviewed to ascertain if it qualifies as a variation of a modification or an original alloy already registered within its alloy group determined in the Step 2.

**Limits for differences between the means of alloying elements – Table 2:** The differences are calculated, between the arithmetic means of the alloying element limits in the new alloy and the arithmetic means of the same alloying element limits in the registered alloys of the relevant alloy group listed in the Teal Sheets. For 1xxx alloys the comparison is limited to alloys having the same minimum aluminum percentage. These differences are then compared with those permitted for a variation in H35.1 shown in table 2.

Explanatory Note: Upon special request and if evidence of publication of a currently inactive alloy is presented, an alloy may be considered to be a variation of that inactive alloy.

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4 A combination of elements expressed as an alloying element is treated as an individual alloying element. When a composition with a combination of elements is compared with the individual elements, the arithmetic mean of the combination is compared to the sum of the arithmetic means of the individual elements. For example, to compare an alloy with limits of 0.10-0.6 for Mn+Cr to an alloy with individual limits of 0.10-0.40 for Mn and 0.30 for Cr, compare the combination mean 0.35 to 0.40, the sum of the individual means 0.25 and 0.15.
### Table 2

[Taken from ANSI H35.1/ANSI H35.1(M)]

<table>
<thead>
<tr>
<th>Arithmetic Mean of Limits for Alloying Elements in the Registered Original Alloy or Modification</th>
<th>Maximum Permitted Change in Arithmetic Means of the Same Alloying Elements in the New Alloy and the Registered Original Alloy or Modification.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up thru 1.0 percent</td>
<td>0.15</td>
</tr>
<tr>
<td>Over 1.0 thru 2.0 percent</td>
<td>0.20</td>
</tr>
<tr>
<td>Over 2.0 thru 3.0 percent</td>
<td>0.25</td>
</tr>
<tr>
<td>Over 3.0 thru 4.0 percent</td>
<td>0.30</td>
</tr>
<tr>
<td>Over 4.0 thru 5.0 percent</td>
<td>0.35</td>
</tr>
<tr>
<td>Over 5.0 thru 6.0 percent</td>
<td>0.40</td>
</tr>
<tr>
<td>Over 6.0 percent</td>
<td>0.50</td>
</tr>
</tbody>
</table>

If the difference between the respective means of any alloying element limits exceed those shown in Table 2, then the new alloy is an original alloy and the designation procedure goes to step 5. However, if the differences are within those shown in Table 2, the alloy may be a variation, and is further reviewed to determine whether the chemical composition complies with other limiting characteristics for a variation.

**Limits of other characteristics for a variation:** If the differences between the arithmetic mean of the limits of a new alloy, and any registered original alloy or modification of an alloy, do not exceed the differences specified in Table 2, the new alloy designation may be a variation, provided the other differences are limited to:

1. No addition or deletion of elements with respect to the registered alloy.
2. Substitution of one alloying element for another element serving the same purpose.
3. Inclusion of a minimum limit for iron or silicon or both, without a change in the maximum limit.
4. Change in limits of impurities expressed singly or as a combination except for low iron. Iron maximum of 0.12 percent or less, reflecting high purity base metal, should be considered an alloy modification.
5. Change in limits for grain refining elements.

If the chemical composition limits of the alloy meet the requirements for a variation, a suffix letter shall be added to the designation of the original alloy, or alloy modification of which the alloy is a variation. The suffix letters are assigned in alphabetical sequence starting with A for the first variation registered, but omitting I, O, and Q.

If the alloy does not qualify as a variation of an original alloy or of a modification, it is examined for qualification as a modification of an original alloy within the assigned alloy group following Step 4.

**STEP 4: DETERMINE IF THE NEW ALLOY IS A MODIFICATION OF AN ORIGINAL ALLOY**

The alloy composition is reviewed to ascertain if it qualifies as a modification of an original alloy already registered within its assigned alloy group in the Teal Sheets according to the following requirements.

Note: A new alloy cannot be a modification of a modification or a modification of a variation.

**Limits for differences between the means of alloying elements – Table 3:** The differences are calculated, between the arithmetic means of the alloying element limits in the new alloy and the arithmetic means of the same alloying element limits of all registered original alloys in the relevant alloy group listed in the Teal Sheets. For 1xxx alloys the comparison is limited to alloys having the same minimum aluminum percentage. These differences are then compared with those differences permitted for a variation in H35.1 shown in Table 3.
Table 3
[Taken from ANSI H35.1/ANSI H35.1(M)]

<table>
<thead>
<tr>
<th>Arithmetic Mean of Limits for Alloying Elements in the Registered Original Alloy</th>
<th>Maximum Permitted Change in Arithmetic Means of the Same Alloying Elements in the New Alloy and the Registered Original Alloy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up thru 1.0 percent</td>
<td>0.15</td>
</tr>
<tr>
<td>Over 1.0 thru 2.0 percent</td>
<td>0.20</td>
</tr>
<tr>
<td>Over 2.0 thru 3.0 percent</td>
<td>0.25</td>
</tr>
<tr>
<td>Over 3.0 thru 4.0 percent</td>
<td>0.30</td>
</tr>
<tr>
<td>Over 4.0 thru 5.0 percent</td>
<td>0.35</td>
</tr>
<tr>
<td>Over 5.0 thru 6.0 percent</td>
<td>0.40</td>
</tr>
<tr>
<td>Over 6.0 percent</td>
<td>0.50</td>
</tr>
</tbody>
</table>

If the difference between the respective means of any alloying element limits exceeds those shown in Table 3, then the new alloy is an original alloy and the procedure goes to step 5.

However, if the differences are within those shown in Table 3 the alloy may be a modification and is further reviewed to determine whether the chemical composition complies with other limiting characteristics for a modification of an original alloy.

**Limits of other characteristics for a modification:** If the differences between the arithmetic means of the limits of the new alloy and any registered original alloy do not exceed the differences specified in Table 3, the new alloy designation may be a modification, provided the other differences are limited to:

1. Addition or deletion of not more than one alloying element with limits having an arithmetic mean of not more than 0.30 percent, or addition or deletion of not more than one combination of elements expressed as an alloying element with limits having a combined arithmetic mean of not more than 0.40 percent.
2. Substitution of one alloying element for another element serving the same purpose.
3. Change in limits for impurities expressed singly or as a combination.
4. Change in limits for grain refining elements.
5. Maximum iron or silicon limits of 0.12 percent and 0.10 percent, or less, respectively, reflecting high purity base metal.

A modification of an original alloy is indicated in the numerical designation by integers 1 through 9 for the second digit. New alloys qualifying as a modification should be given the next available consecutive digit in the alloy family of the modification.

For 1xxx alloys, the second digit in the alloy designation indicates alloy modifications in impurity limits or alloying elements. Integers 1 through 9 are assigned consecutively as needed and indicate special control of one or more individual impurities or alloying elements. In the 1xxx group, the last two of the four digits in the designation indicate the minimum aluminum percentage. These digits are the same as the two digits to the right of the decimal point in minimum aluminum percentage when it is expressed to the nearest 0.01 percent.

For the 2xxx to 8xxx alloy groups the last two digits indicating the alloy family, remain the same as the original alloy of which it is a modification.

In cases where all designations in an alloy family have been assigned (i.e. s0xx, s1xx, ...., s9xx), new modifications shall be assigned consecutively using designations from a previously unused alloy family. The sequence of alloys sNyy, starting at s1yy, shall be considered an extension of the s0xx family. A footnote shall be used to associate the sequence of alloy modifications sNyy to their original alloy, s0xx. The designation s0yy shall not be assigned.
For example, when future modifications are assigned to the 5054 family, the sequence would be “51xx, 52xx, …, 59xx”, where the last two digits are from an unused alloy family. Alloys 51xx, 52xx,…, 59xx would be assigned a footnote describing these alloys as modifications of 5054.

STEP 5: DESIGNATION OF ORIGINAL ALLOY

When the new alloy cannot be designated a modification of an original alloy or a variation of an original alloy or of a modification it is designated an original alloy of the alloy group and is identified by having a zero as the second digit. The two digits beyond the second digit shall be unique to the alloy family created for the new designation.

For an original 1xxx alloy, the second digit in the designation is zero, indicating unalloyed aluminum having natural impurity limits. In the 1xxx group, the last two of the four digits in the designation indicate the minimum aluminum percentage. These digits are the same as the two digits to the right of the decimal point in minimum aluminum percentage when it is expressed to the nearest 0.01 percent.

A new original alloy in the 2xxx to 8xxx alloy groups shall be assigned an available family designation (two last digits) either chosen arbitrarily or granted at the specific request of the registrant. It is preferable that these designations are previously unused, but may be reassigned from an inactive experimental alloy designation 10 years after its inactivation.

Step 6: REGISTRATION PROCEDURE

After the TCPS members have reviewed the registration request, they forward their recommendations to the Aluminum Association along with their comments. The comments might include:

- Acceptance of the suggested designation from the registrant because it is technically correct.
- A recommendation that the designation be considered a variation or a modification or an original alloy.
- The calculated density of the new alloy.
APPENDIX A. ALLOY DESIGNATION PROCEDURE FLOW CHART

A.1. Flow Chart to Determine Whether the New Alloy is a Variation of an Original Alloy or of a Modification

1. **Proposed Alloy is an original alloy**
   - Are the exceptions to Table 2 limited to grain refining elements?
     - Yes
       - Identify additions or deletions of alloying elements and/or qualifying element substitutions
     - No
       - Are there any registered original or modification alloys for which the proposed alloy satisfies the mean alloying requirements of Table 2 for all alloying elements in common?
         - Yes
           - Compare arithmetic mean of alloying elements in the proposed alloy to the arithmetic means of the alloying elements of the subset of alloys in the identified alloy group
         - No
           - Proposed alloy is a variation

2. **Proposed Alloy is not an original alloy**
   - Are there any registered original or modification alloys for which the proposed alloy satisfies the mean alloying requirements of Table 2 for all alloying elements in common?
     - Yes
       - Subset of registered alloys for which the arithmetic mean of the proposed alloy’s alloying elements satisfies the requirements of Table 2
         - Excluding grain refining elements, does the proposed alloy have any addition or deletion of alloying elements?
           - Yes
             - Proposed alloy is a modification and not a variation
           - No
             - Is there a single element addition and a single element deletion?
               - No
                 - Remaining differences with registered alloys should be in the Fe impurity limits > 0.12%, other impurity element limits, or grain refining element limits
               - Yes
                 - Is the addition or deletion of an alloying element limited to the inclusion of a minimum limit for Fe and/or Si?
                   - No
                     - Proposed alloy is a variation
                   - Yes
                     - Can the addition or deletion of an alloying element in the proposed alloy be considered a substitution of one alloy alloying element for another element serving the same purpose?
                       - No
                         - Is there a single element addition and a single element deletion?
                           - No
                             - Examine the impurity and grain refining element limits
                           - Yes
                             - Remaining differences with registered alloys should be in the Fe impurity limits > 0.12%, other impurity element limits, or grain refining element limits
                       - Yes
                         - Is there an Fe impurity limit of 0.12 or less?
                           - Yes
                             - Proposed alloy is not a variation and must be reviewed for qualification as a modification or original alloy. Go to Start B
                           - No
                             - Examine the impurity and grain refining element limits

START A
A.2. Flow Chart to Determine Whether the New Alloy is a Modification of an Original Alloy

1. Identify the Alloy Group of the Proposed Alloy
2. Identify All Original Alloys in the Alloy Group
3. Compare arithmetic mean of alloying elements in the proposed alloy to the arithmetic means of the alloying elements of the subset of alloys in the identified alloy group
4. Are there any registered original alloys for which the proposed alloy satisfies the mean alloying requirements of Table 2 for all alloying elements in common?
5. Does the proposed alloy have any addition or deletion of individual or combinations of alloying elements?
6. Is the arithmetic mean of the element addition or deletion greater than 0.30 percent?
7. Identify allowed additions or deletions of alloying elements and/or combination of elements
8. Examine the impurity and grain refining element limits
9. Is there a Si impurity limit of 0.10 or less?
10. Is there an Fe impurity limit of 0.12 or less?
11. Is there an addition and a deletion of an alloying element than can be considered a substitution of one alloying element for another element serving the same purpose?
12. Is the combined arithmetic mean of the combination of element addition or combination of element deletion greater than 0.40 percent?
13. Is the arithmetic mean of the element addition or deletion greater than 0.30 percent?
14. Is there a single element addition or a single element deletion?
15. Other than the substitution, is there any other addition or deletion of an alloying element?
16. Is there an addition and a deletion of an alloying element than can be considered a substitution of one alloying element for another element serving the same purpose?
17. Remaining allowed differences from registered original alloys include Fe impurity limits <0.12%, other impurity element limits (expressed singly or in combination), and grain refining element limits
18. Proposed alloy is a modification
19. Remaining allowed differences from registered original alloys include impurity limits (expressed singly or in combination) and grain refining element limits
20. Remaining allowed differences from registered original alloys include impurity limits (expressed singly or in combination) and grain refining element limits
21. Recheck to see if the alloy is a variation
22. Go To Start A

August, 2014
Appendix B. Mg to Si Ratio in the 6xxx Wrought Aluminum Alloys

Assignment of the wrought alloy group for original alloys is handled in ANSI H35.1 and the Recommendation for an International Designation System for Wrought Aluminum and Wrought Aluminum Alloys by the sentence "The alloy designation in the 2xxx through 8xxx groups is determined by the alloying element (Mg2Si for 6xxx alloys) present in the greatest mean percentage.". For compositions containing both silicon and magnesium as alloying elements, determination of the Mg2Si content is by theoretical stochiometry, assuming that all possible magnesium and silicon react with each other and no magnesium or silicon is combined with any other element. Assignment of alloy group is based only on the nominal composition, not on any product performance or heat treatment response.

To assign a 6xxx designation, the theoretical Mg2Si content must be greater than the free silicon or free magnesium which would remain after the formation of the Mg2Si. This places the boundary between a 4xxx and 6xxx at a magnesium silicon ratio of 0.46. A magnesium silicon ratio of 4.46 separates 5xxx from 6xxx alloys.

Calculation of the 0.46 and 4.46 limits

Given the atomic weight of magnesium is 24.30506 and the atomic weight of silicon is 28.08553, then the weight of Mg2Si is 2 (24.30506) + 28.08553 = 76.69565. The silicon fraction of Mg2Si is the weight of silicon divided by the weight of Mg2Si. The silicon fraction of Mg2Si is denoted as ß in the following, while the magnesium fraction of Mg2Si would be 1 - ß. The value of ß = 28.08553 / 76.69565 = 0.3661945625339.

The high magnesium limit

For a high magnesium composition to qualify for a 6xxx designation, the free magnesium must be less than the Mg2Si content. If all of the silicon in a composition with %Si nominal silicon is in the form of Mg2Si, then the Mg2Si content would be %Si / ß. A Mg2Si content of %Si / ß would contain (%Si / ß) X (1 - ß) magnesium. The maximum free magnesium would be the same as the Mg2Si content. The total magnesium content would be the sum of the free magnesium plus the magnesium present as Mg2Si or %Si / ß + (%Si / ß) X (1 - ß). The ratio of magnesium to silicon would be Mg / Si = [%Si / ß + (%Si / ß) X (1 - ß)] / %Si. Dividing by %Si gives [1 / ß + (1 / ß) X (1 - ß)] / 1 = (2 - ß) / ß = 4.461578. Therefore, the highest possible magnesium content for a 6xxx alloy would be a magnesium silicon ratio of 4.46.

The high silicon limit

For a high silicon alloy to qualify as a 6xxx, the free silicon must be less than the Mg2Si content. If all of the magnesium in an alloy with %Mg nominal magnesium content is in the form of Mg2Si, then the Mg2Si content would be %Mg / (1 - ß). That Mg2Si would contain [%Mg / (1 - ß)] X ß silicon. The free silicon would be the same as the Mg2Si content. The total silicon would be the sum of the contained silicon plus the free silicon or (%Mg X ß) / (1 - ß) + %Mg / (1 - ß). The magnesium silicon ratio would be Mg / Si = %Mg / [(%Mg X ß) / (1 - ß) + %Mg / (1 - ß)]. Dividing by %Mg gives 1 / [ ß / (1 - ß) + 1 / (1 - ß)] = (1 - ß) / (1 + ß) = 0.4639203. Therefore, the smallest possible magnesium silicon ratio for a 6xxx alloy is 0.46.
SECTION B.3   ALLOY AND PRODUCT STANDARDS REGISTRATION TEMPLATES

Section B.3.1   Wrought Alloy Registration Template

PLEASE READ THE FOLLOWING ELIGIBILITY REQUIREMENTS PRIOR TO APPLYING FOR REGISTRATION

1. The wrought aluminum and wrought aluminum alloys shall be offered for sale currently and shall have been supplied in the previous 12 months, in both cases in commercial quantities;
2. The complete chemical composition limits of the proposed alloy must be disclosed and former designation, if any, should be shown;
3. The composition must be different from that of any registered alloy.

For detailed information on the registration rules and procedures, refer to the Declaration of Accord on an International Alloy Designation System for Wrought Aluminum and Wrought Aluminum Alloys and its "Recommendation", as printed in the registration record International Alloy Designations and Chemical Composition Limits for Wrought Aluminum and Wrought Aluminum Alloys (Teal Sheets)

(1) Sale of an alloy shall have been made to external users/customers (i.e. internal use and/or transfer of an alloy within a company does not meet the stated criteria)
(2) Guidelines for compliance with Commercial Quantity:
   ▪ The alloy has undergone bona fide mill production and is NOT a "laboratory" scale volume used for evaluations or experimental purposes.
   ▪ The alloy is cast and fabricated in standard production facility and is NOT a one-time production.
   ▪ There is an expected and ongoing commercial demand and/or need for the alloy.
   ▪ The alloy must be purchased and sold in a standard business context, which indicates that the alloy is actually "sold" and not "given away" for uses such as promotional evaluations.

ALLOY REGISTRATION REQUEST
WROUGHT ALUMINUM ALLOYS

Date:

Director, Alloy and Product Standards
The Aluminum Association, Inc.
1525 Wilson Blvd., Suite 600
Arlington, VA 22209

OR                  Outside United States:
Send to your Signatory

Re: Request for Registration of a New Alloy Designation

The following Chemical Composition limits are being submitted for registration as a new alloy.

<table>
<thead>
<tr>
<th>Element</th>
<th>Limits % max (unless shown as a range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silicon</td>
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<tr>
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<tr>
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<tr>
<td>Aluminum</td>
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</tbody>
</table>

(Add: A brief statement that the alloy is currently offered for sale and has been sold within the previous 12 months, in both cases, in commercial quantities.)

(Add: A brief statement on the application and/or end use of the proposed alloy.
   Note: This is for informational purposes only and does not constitute part of the registration.)

Name
Title
Company

Note: This form is intended to assist applicants and reviewers of alloy registration requests. It is not intended to cover all registration requirements and additional information may be requested to complete the registration.
PLEASE READ THE FOLLOWING ELIGIBILITY REQUIREMENTS PRIOR TO APPLYING FOR REGISTRATION

1. The alloy is registered with The Aluminum Association.
3. The material is offered for sale in the proposed temper and is available for use by more than one user.
4. The mechanical property limits applicable to the temper are included. (Limits are shown as tentative unless established in accordance with the data base criteria outlined under “Mechanical Properties”, in Section 6, “Standards Section” Aluminum Standards and Data. Testing is performed in accordance with the procedures outlined in Section 4, “Quality Control”, Aluminum Standards and Data.
5. Additional information (1) is provided when characteristics in addition to mechanical properties are specified for the temper.
6. Metric values, which are derived, based on the established Guidelines (2) are to be included for registration.

For detailed information on the registration rules and procedures, refer to the registration record, “Tempers for Aluminum and Aluminum Alloy Products” and “Aluminum Standards and Data”.

(1) Refer to registration record, Tempers for Aluminum and Aluminum Alloy Products (Yellow Sheets), “Temper Registration”, “Procedure for Individual Registration of Tempers”. (See attached revised Procedure for additional criteria)
(2) Refer to registration record, Tempers for Aluminum and Aluminum Alloy Products – Metric Edition (Tan Sheets), APPENDIX A, “Guidelines for Metric Conversion of Yellow Sheets”.

TEMPER REGISTRATION REQUEST
(For listing in the Yellow Sheets and Tan Sheets)

Director, Alloy and Product Standards
The Aluminum Association, Inc.
1525 Wilson Blvd., Suite 600
Arlington, VA 22209

Re: Request for Temper Registration for (specify alloy-temper/product)

(Name of Company) wishes to register (alloy-temper/product). The tensile limits were determined in accordance with the requirements shown in lines 1-6 in the above shaded area. Other mechanical property limits are shown as appropriate.

Include a sentence stating that the material is offered for sale in the proposed temper and is available for use by more than one user, and identify when properties to be registered were obtained from material that was heat treated or aged in a laboratory or test furnace – i.e. response to heat treatment material.)

US CUSTOMARY UNITS

<table>
<thead>
<tr>
<th>Alloy Temper</th>
<th>Product</th>
<th>Thickness, In.</th>
<th>Tensile Strength, ksi</th>
<th>Elongation Percent in 2 inches or 4 D</th>
<th>Remarks²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Basis¹</td>
<td>Ult.</td>
<td>Yield</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(See Note A below)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

METRIC UNITS

<table>
<thead>
<tr>
<th>Alloy Temper</th>
<th>Product</th>
<th>Thickness, mm</th>
<th>Tensile Strength, MPa</th>
<th>Elongation Percent in 2¹</th>
<th>Remarks²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Over</td>
<td>Thru</td>
<td>Basis¹</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(See Note A below)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

(INCLUDE THE FOLLOWING INFORMATION IN THE TABLES AS APPROPRIATE)

**Note A**: Designate properties as minimum and/or maximum by entering “Min” or “Max” as applicable, indicating test direction(s) by entering footnotes “6”, “9”, and/or “10” of the Yellow Sheets and Tan Sheets as applicable.

**Note B**: Indicate “Tentative” if appropriate (see line 4 in the shaded area at the top of this page).

**Note C**: Include additional information on product properties and performance, such as exfoliation corrosion resistance and fracture toughness limits as applicable.

**Note D**: Provide a description of the process variation or the product characteristics of the registration when an additional digit, beyond those defined, is requested.

(ADD: Name, Title, Company)

Signature

Note: This form is intended to assist applicants and reviewers of temper registration requests. It is not intended to include all registration requirements and additional information may be requested to complete the registration.
Section B.3.3  Cast Alloy and Ingot Registration Template

PLEASE READ THE FOLLOWING ELIGIBILITY REQUIREMENTS PRIOR TO APPLYING FOR REGISTRATION

1. The aluminum or aluminum alloy shall be offered for sale currently and shall have been sold within the previous 12 months, in both cases in commercial quantities;

2. The complete chemical composition limits must be disclosed.

3. The composition must be different from that of any casting or ingot for which a designation has already been assigned.

4. The composition limits for the xxx.1 ingot must accompany the request for xxx.0 casting registration. Composition limits for xxx.1 ingot are identical to those for the corresponding xxx.0 registration except for grain refiner elements and specific provisions for minimum magnesium limit, maximum iron limit, and maximum zinc limit described in the registration record, Designations and Chemical Composition Limits in the Form of Castings and Ingot (Pink Sheets). Ingot with chemical composition limits which differ from, but fall within the limits for a registered or proposed xxx.1 registration may be registered as xxx.2 ingot.

5. Except in the case of rotor and aluminizing alloy ingot, composition limits for ingot will not be accepted for registration in the absence of limits for castings of the same designation.

6. The product (Sand, Permanent Mold, Die, or Investment Castings) must be shown at the time of registration.

For detailed information on the registration rules and procedures, refer to the registration record, “Designations and Chemical Composition Limits in the Form of Castings and Ingot” (Pink Sheets).

FOOTNOTES

(1) Sale of an alloy shall have been made to external users/customers (i.e. internal use and/or transfer of an alloy within a company does not meet the stated criteria)

(2) Guidelines for compliance with “Commercial Quantity”:
- The alloy has undergone bona fide mill production and is NOT a “laboratory” scale volume used for evaluations or experimental purposes.
- The alloy is cast and fabricated in standard production facility and is NOT a one-time production.
- There is an expected and ongoing commercial demand and/or need for the alloy.
- The alloy must be purchased and sold in a standard business context, which indicates that the alloy is actually “sold” and not “given away” for uses such as promotional evaluations.

ALLOY REGISTRATION REQUEST
CASTINGS AND INGOT

Date:

Director, Alloy and Product Standards
The Aluminum Association, Inc.
1525 Wilson Blvd., Suite 600
Arlington, VA 22209

Re: Request for Registration of a New Casting Alloy

The following Chemical Composition limits are being submitted for registration as a new casting alloy.

<table>
<thead>
<tr>
<th>Element</th>
<th>Casting xxx.0</th>
<th>Ingot(s) xxx.1</th>
<th>xxx.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limits (% max)</td>
<td>Limits (% max)</td>
<td>Limits (% max)</td>
<td></td>
</tr>
<tr>
<td>Silicon</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Iron</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Copper</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Manganese</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Magnesium</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Chromium</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Nickel</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Zinc</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Titanium</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Tin</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>(Other Elements - list in alphabetical order according to their chemical symbol)</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Others, Each</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Others, Total</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Aluminum</td>
<td>Remainder</td>
<td>Remainder</td>
<td></td>
</tr>
</tbody>
</table>

(Add: A brief statement that the alloy is currently offered for sale and has been sold to an outside customer within the previous 12 months, in both cases, in commercial quantities.)

(Add: The casting process (Sand, Permanent Mold, Die, or Investment Casting.)

(Add: A brief statement, if applicable, that the alloy registration is experimental and the registrant desires the prefix X be added to the designation.)

(Add: Name, Title, Company Signature)

NOTE: This form is intended to assist applicants and reviewers of alloy registration requests. It is not intended to cover all registration requirements and additional information may be requested to complete the registration.
Section B.3.4  Unalloyed Aluminum Registration Template

Please read the following eligibility requirements prior to applying for registration:

1. The unalloyed aluminum shall be offered for sale(1) currently and shall have been supplied in the previous 12 months, in both cases in commercial quantities(2);
2. The complete chemical composition limits must be registered.
3. The composition must be different from that of any unalloyed aluminum for which a numerical designation has already been assigned.

For detailed information on the registration rules and procedures, refer to the Declaration of Accord on an International Alloy Designation System for Unalloyed Aluminum and its “Recommendation”, as printed in the registration record, “International Designations and Chemical Composition Limits for Unalloyed Aluminum” (Gold Sheets).

Footnotes:
(1) Sale of unalloyed aluminum shall have been made to external users/customers (i.e. internal use and/or transfer of unalloyed aluminum within a company does not meet the stated criteria)
(2) Guidelines for compliance with “Commercial Quantity”:
   • The unalloyed aluminum has undergone bona fide mill production and is NOT a “laboratory” scale volume used for evaluations or experimental purposes.
   • The unalloyed aluminum is cast and fabricated in standard production facility and is NOT a one-time production.
   • There is an expected and ongoing commercial demand and/or need for the unalloyed aluminum.
   • The unalloyed Aluminum must be purchased and sold in a standard business context, which indicates that the unalloyed aluminum is actually “sold” and not “given away” for uses such as promotional evaluations

Registration Request Form

Unalloyed Aluminum

Date:

Director, Alloy and Product Standards
Aluminum Association, Inc.
1525 Wilson Blvd., Suite 600
Arlington, VA 22209

Outside United States:
Send to your Signatory to the Declaration of Accord – Unalloyed Aluminum
(Listed in the Gold Sheets)

Re: Request for Registration of a New Unalloyed Aluminum

The following Chemical Composition limits are being submitted for registration as a new unalloyed aluminum.

<table>
<thead>
<tr>
<th>Element</th>
<th>Limits % max (unless shown as a minimum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silicon</td>
<td>...</td>
</tr>
<tr>
<td>Iron</td>
<td>...</td>
</tr>
<tr>
<td>Zinc</td>
<td>...</td>
</tr>
<tr>
<td>Gallium</td>
<td>...</td>
</tr>
<tr>
<td>Vanadium</td>
<td>...</td>
</tr>
<tr>
<td>Others, Each</td>
<td>...</td>
</tr>
<tr>
<td>Others, Total</td>
<td>...</td>
</tr>
<tr>
<td>Aluminum</td>
<td>Remainder</td>
</tr>
</tbody>
</table>

(Add: A brief statement that the unalloyed aluminum is currently offered for sale and has been sold within the previous 12 months, in both cases, in commerical quantities.)
(Add: Name
    Title
    Company)

Note: This form is intended to assist applicants and reviewers of alloy registration requests. It is not intended to cover all registration requirements and additional information may be requested to complete the registration.
# ALLOY REGISTRATION REQUEST

**ALUMINUM HARDENERS**

**Date:**

**Within United States**
Director, Alloy and Product Standards  
The Aluminum Association, Inc.  
1525 Wilson Blvd., Suite 600  
Arlington, VA  22209

**Outside United States**
Send to the appropriate Signatory to the  
Declaration of Accord on Aluminum  
Hardeners listed in the Gray Sheets*

Re: Request for Registration of a New Aluminum Hardener (insert the proposed designation, if any)

The following Chemical Composition limits for a new (insert the nominal chemical composition limits), are being submitted for registration:

<table>
<thead>
<tr>
<th>Element</th>
<th>Limits % max (unless shown as a range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silicon</td>
<td>. . .</td>
</tr>
<tr>
<td>Iron</td>
<td>. . .</td>
</tr>
<tr>
<td>Copper</td>
<td>. . .</td>
</tr>
<tr>
<td>Manganese</td>
<td>. . .</td>
</tr>
<tr>
<td>Chromium</td>
<td>. . .</td>
</tr>
<tr>
<td>Nickel</td>
<td>. . .</td>
</tr>
<tr>
<td>Titanium</td>
<td>. . .</td>
</tr>
<tr>
<td>Boron</td>
<td>. . .</td>
</tr>
<tr>
<td>Vanadium</td>
<td>. . .</td>
</tr>
<tr>
<td>(Other Elements - list in alphabetical order according to their chemical symbol)</td>
<td></td>
</tr>
<tr>
<td>Others, Each</td>
<td>. . .</td>
</tr>
<tr>
<td>Others, Total</td>
<td>. . .</td>
</tr>
<tr>
<td>Aluminum</td>
<td>Remainder</td>
</tr>
</tbody>
</table>

(Add: The Proposed color code)

(Add: A brief statement that the aluminum hardener is currently offered for sale and has been sold within the previous 12 months, in both cases, in commercial quantities).

(Add: Name, Title, Company, Signature)

(*) A copy of the Registration Record (Gray Sheets) is available from www.aluminum.org/Graysheets

---

**PLEASE READ THE FOLLOWING ELIGIBILITY REQUIREMENTS PRIOR TO APPLYING FOR REGISTRATION**

1. The hardener must be offered for sale currently and shall have been supplied in the previous twelve months, in both cases in commercial quantities;
2. The complete chemical composition limits must be registered and the former designation, if any, should be shown;
3. The composition must be different from that of any hardener for which a numerical designation has already been assigned;
4. The hardener must contain more aluminum than attributable to impurity and the aluminum must serve a useful function other than qualifying the hardener for inclusion in the system;
5. The hardener must be specifically produced for and regularly used as an alloying material in the production of aluminum and aluminum alloys.

For detailed information on the above registration rules and procedures, refer to the Declaration of Accord on an International Designation System for Aluminum Hardeners and its “Recommendation” as printed in the registration record, International Designations and Chemical Composition Limits for Aluminum Hardeners (Gray Sheets)*

(1) Sale of an alloy shall have been to external users/customers (i.e. internal use and/or transfer of an alloy within a company does not meet the stated criteria)
(2) Guidelines for compliance with Commercial Quantity:
   - The alloy material and grain refiner has undergone bona fide mill production and is NOT a “laboratory” scale volume used for evaluations or experimental purposes.
   - The alloy material and grain refiner is cast and fabricated in standard production facility and is NOT a one-time production.
   - There is an expected and ongoing commercial demand and/or need for the alloy material and grain refiner.
   - The alloy material and grain refiner must be purchased and sold in a standard business context, which indicates that the alloy is actually “sold” and not “given away” for uses such as promotional evaluations.

---

*Note: This form is intended to assist applicants and reviewers of temper registration requests. It is not intended to include all registration requirements and additional information may be requested to complete the registration.*
PLEASE READ THE FOLLOWING ELIGIBILITY REQUIREMENTS PRIOR TO APPLYING FOR REGISTRATION

1) The chemical composition limits for cladding and core alloys must be registered with The Aluminum Association.
2) The clad product shall be offered for sale currently and shall have been sold within the 12 months immediately preceding the date of registration request, in both cases in commercial quantities².
3) Sufficient information must be submitted to designate the product in accordance with excising practices.

For detailed information on the registration rules and procedures, refer to the registration record, “Components of Clad Aluminum Alloy Products“ (Light Green Sheets).

(1) Such sales shall have been made to external users/customers (i.e. internal use and/or transfer of a clad product within a company does not meet the stated criteria).
(2) Guidelines for compliance with Commercial Quantity:
   - The clad product has undergone bona fide mill production and is NOT a “laboratory” scale volume.
   - The clad product is cast and fabricated in standard production facilities and is NOT a one-time production.
   - There is an expected and ongoing commercial demand and/or need for the clad product.
   - The clad product must be purchased and sold in a standard business context, which indicates that the product is actually “sold” and not “given away” for uses such as promotional evaluations.

Clad Aluminum Alloy Product Registration Request

Please submit your registration request to:
Standards and Technology Department                                                                             Date:
standards@aluminum.org
The Aluminum Association, Inc.
1525 Wilson Blvd., Suite 600
Arlington, VA 22209

(Name of Company) wishes to register (Clad Product).

<table>
<thead>
<tr>
<th>Designation</th>
<th>Component Alloys (1)</th>
<th>Total Thickness of Composite Product In.</th>
<th>Sides Clad</th>
<th>Cladding Thickness per Side (Percent of Composite Thickness)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Core</td>
<td></td>
<td>Cladding</td>
<td>Nominal Average (2) min max</td>
</tr>
</tbody>
</table>

 Unless specified below, for all referenced footnotes refer to the Light Green Sheets as applicable.

(Add: A brief statement that the product is currently offered for sale and has been sold within the previous 12 months, in both cases, in commercial quantities.)

(Add: a brief statement on the application and/or end use of the proposed product.
  Note: This is for informational purposes only and does not constitute part of the registration.)

Name:
Title:
Company:
Signature:

Note: This form is intended to assist applicants and reviewers of clad product registration requests. It is not intended to include all registration requirements and additional information may be requested to complete the registration.
Section B.3.7

Checklist for Addition of New Products to Aluminum Standards and Data (ASD) and Aluminum Standards and Data Metric (ASD-M)

A. CHECK TO ENSURE THAT:

☐ The alloy has been registered with The Aluminum Association.
☐ The temper for the alloy product to be added has been registered with the Aluminum Association (Yellow Sheets).
☐ At least two producers are offering the alloy/temper combination for sale.

B. SUBMIT A LETTER SUMMARIZING YOUR PROPOSED ADDITION TOGETHER WITH THE REQUIRED MARKED-UP PAGES FROM ASD AND ASD(M) TO THE ALUMINUM ASSOCIATION

Note: All additions, deletions and revisions to ASD shall be by formal Ballot of the Technical Committee on Product Standards

C. MARK UP ALL THE FOLLOWING TABLES FROM ASD AND ASD METRIC WITH THE PROPOSED ADDITION AS FOLLOWS:

☐ Table 1.1 – Nominal Chemical Composition – Wrought Alloys
☐ Table 1.2 – Foreign Alloy Designation and Similar AA alloys (when applicable/available)
☐ Table 1.3 – Aluminum Mill Product Specifications
☐ Table 1.4 – Specifications Covering Aluminum Mill Products
☐ Table 2.1 – Typical Mechanical Properties
☐ Table 2.2 – Typical Tensile Properties at Various Temperatures
☐ Table 2.3 – Typical Physical Properties
☐ Table 2.4 – Nominal Densities of Aluminum and Aluminum Alloys
☐ Table 3.1 – Wrought Alloy Products and Tempers
☐ Table 3.2 – Specialty Mill Products (if applicable)
☐ Table 3.3 – Comparative Characteristics and Applications
☐ Table 3.4 – Typical Heat Treatments for Aluminum Alloy Mill Products
☐ Table 3.5 – Typical Annealing Treatments for Aluminum Alloy Mill Products
☐ Section 4 – Quality Control - Revise if needed
☐ Table 6.1 – Components of Clad Products (if applicable)
☐ Table 6.2 – Chemical Composition Limits of Wrought Aluminum Alloys
☐ Table 6.3 – Ultrasonic Discontinuity Limits (if applicable)
☐ Table 6.4 – Lot Acceptance Criteria for Corrosion Resistant Tempers (if applicable)
☐ Table 6.5 – Location for Electrical Conductivity Measurements (if applicable)
☐ Table 6.6 – Fracture Toughness Limit for Sheet and Plate (if applicable)
☐ Table 6.7 – Corrosion Resistance Test Criteria (if applicable)
D. **MARK UP ONLY TABLES FROM ASD AND ASD METRIC RELATED TO THE PRODUCT BEING ADDED AS FOLLOWS:**

- **Section 7 – Sheet and Plate**
  - Table 7.1 – Mechanical Property Limits – Non Heat Treatable Alloys **OR** Table 7.2 – Mechanical Property Limits – Heat Treatable Alloys
  - Table 7.3 – Mechanical Property Limits – Brazing Sheet (if applicable)
  - Table 7.5 – Weight Conversion Factors
  - Table 7.6 – Recommended Minimum Bend Radii
  - Tables 7.7 thru 7.30 – Tolerance Tables (if needed)

- **Section 8 – Fin Stock**
  - Table 8.1 – Mechanical Property Limits – Fin Stock
  - Tables 8.2 thru 8.3 – Tolerance Tables (if needed)

- **Section 9 – Foil**
  - Table 9.1- Mechanical Property Limits
  - Tables 9.2 thru 9.24 (if needed)

- **Section 10 – Wire, Rod and Bar – Rolled and Cold-finished**
  - Table 10.1 – Mechanical Property Limits – Non Heat Treatable Alloys **OR** Table 10.2 - Mechanical Property Limits –Heat Treatable Alloys
  - Table 10.3 Rivet and cold Heading Wire and Rod
  - Table 10.4 – Mechanical Property Limits for Rivet and Cold Heading Wire
  - Tables 10.5 thru 10.20 – Tolerance Tables (if needed)

- **Section 11 – Wire Rod, Bar, and Profiles – Extruded**
  - Table 11.1 – Mechanical Property Limits –Extruded W,R,B & Profiles
  - Tables 11.2 thru 11.14 – Tolerance Tables (if needed)

- **Section 12 – Tube and Pipe**
  - **Extruded Tube**
    - Table 12.1 – Mechanical Property Limits Extruded Tube
    - Tables 12.2 thru 12.14 – Tolerance Tables Extruded Tube (if needed)
  - **Coiled Tube**
    - Table 12.15 – Mechanical Property Limits – Coiled Tube
Hand Forging

Table 15.2 - Mechanical Property Limits – Hand Forgings
Table 15.3 - Standard Tolerances for Hand Forging (if needed)

Rolled Rings

Table 15.4 – Mechanical Property Limits – Rolled Rings

Section 16 – Electrical Conductors

Tables 16.1 thru 16.3 – Mechanical Property Limits
Table 16.4 – Equivalent Resistivity Values (if needed)
Table 16.5 – Flatwise Bending Radii (if needed)
Tables 16.7 thru 16.35 – Tolerance Tables (if needed)
B.4.1 Determination of Alloy and Temper Registration Dates

The registration date of an alloy or temper is generally based on the date an alloy or temper registration request is received. Notwithstanding the above, a later date can be used if extenuating circumstances so warrant.

For alloys that have been reactivated since the publication of the February 2009 Edition of the Teal Sheets, the original registration date is listed as the "Registration Date" in the "Chemical Composition Limits" table. For alloys reactivated prior to February 2009, the "Registration Date" in the table is the reactivation date.
B.4.2 Footnote to be Applied to the Alloys Registered under the Expanded Alloy Designations Rule in the Teal Sheets

“This alloy is a modification of s0yy. The original alloy designation s0xx is not assignable (See Appendix A, paragraph A.4.3.1 of the Teal Sheet).”

For example, on assigning the 5x28 series as an extension of 5054 the footnote would read:

“This alloy is a modification of 5054. The original alloy designation 5028 is not assignable.”
B.4.3 Rules Regarding Deleted Footnotes

In cases where a footnote reference is deleted by approval of the Technical Committee on Product Standards, the footnote number will remain in the list of footnotes and will include the following notation: “Footnote is inactive”.

January, 2014
B.4.4 Standard Terms for Referencing the Measurement Systems in Association Publications

*U.S. Customary* – Standard term when referencing inch-pound or Fahrenheit measurement system

*Metric (SI)* – Standard term when referencing the Metric measurement system
SECTION B.5 TCPS GUEST POLICY

Individual members of the Technical Committee on Product Standards, its Subcommittees and Task Groups (collectively referred to as TCPS) may continue to participate on the Committee as guests for up to one year after their companies cease to be members of the Aluminum Association. These individuals are subject to the Association’s general rules with regard to guest participation in technical committees. In particular, the staff executive will disclose the expected participation of the guest(s) at least 10 days prior to the meeting. The guest(s) are entitled to provide comments, including a statement of their position (i.e., affirmative, negative or non-waive) regarding any action pending before the TCPS during the time of their participation. The members of the TCPS shall take into consideration, but are not bound by, the comments and input of any guest when casting their votes in accordance with the rules pertaining to producer member votes. In addition, the members of the TCPS may decide to exclude such guests from any particular Committee meeting(s) or portions thereof.
SECTION B.6  TCPS ASSOCIATE MEMBER POLICY

Associate member companies can submit a request in writing to participate on the Technical Committee on Product Standards, its Subcommittees and Task Groups (collectively referred to as TCPS) for a term of up to two years. The producer members of the TCPS may decide to accept or deny requests from associate member companies for participation on TCPS or renewal of participation by consensus in a formal ballot. Associate member companies can request to renew their participation on TCPS one month prior to the termination of the two-year term of their participation. Associate member participant(s) are entitled to provide comments, including a statement of their position regarding any action pending before the TCPS. The members of the TCPS shall take into consideration, but are not bound by, the comments and input of any associate member participant(s) when casting their votes in accordance with the rules pertaining to producer member votes. In addition at the discretion of the chair, associate member participant(s) may be excluded from any particular Committee meeting(s) or portions thereof. This policy applies only to the TCPS, and not to any other Association technical committee.
SECTION B.7  PROCESS FOR CONSIDERING COMMENTS FROM THE
ACCREDITED STANDARDS COMMITTEE H35 (ASC H35) MEMBERS
ON BALLOTED ANSI DOCUMENTS

1. Include the comment/s on the ASC H35 Ballot Completion Form, indicating that they will be considered for inclusion in the next scheduled ballot of the ASC H35.

2. Inform the party/ies that provided the comment/s of the disposition of their comment/s.

3. Place a copy of the comment and the ASC H35 Ballot Completion Form in a folder titled “Revisions to the next edition of ANSI H35.x document”.

4. Submit the proposal/s to the Technical Committee on Product Standards (TCPS) under a new project for their review and subsequent balloting.

5. Advise the commenter/s of the result of the review of their proposal.

6. Include the result of the TCPS review and/or approved proposal in a folder titled “Revisions to the next edition of ANSI H35.x document”, for inclusion of the proposal in the next scheduled ballot of the ASC H35.