REGISTRATION RECORD SERIES
LIGHT GREEN SHEETS

Components of Clad Aluminum Alloy Products

The Aluminum Association

1400 Crystal Drive, Suite 430, Arlington, VA 22209
www.aluminum.org

Revised: **August 2018**

Supersedes: **May 2006**

ISSN: 2377-6641

Use of the Information

The Aluminum Association has used its best efforts in compiling the information contained in this publication. Although the Association believes that its compilation procedures are reliable, it does not warrant, either expressly or impliedly, the accuracy or completeness of this information. The Aluminum Association assumes no responsibility or liability for the use of the information herein.

All Aluminum Association published standards, data, specifications and other material are reviewed at least every five years and revised, reaffirmed or withdrawn. Users are advised to contact The Aluminum Association to ascertain whether the information in this publication has been superseded in the interim between publication and proposed use.

FOREWORD

This is the fourth edition of The Aluminum Association's Registration Record for Components of Clad Aluminum Alloy Products. The compositions of certain specific clad products are also covered in the Association's publication, "Aluminum Standards and Data". This Record will be maintained by the Association's Technical Committee on Product Standards and it will contain all clad products registered with the Association, as well as a list of those that have been deactivated.

Additions will be made as required and clad products will be inactivated (see list of inactive clad products) when no longer in commercial use. Proposals for additions, inactivations or reactivations by any company will be considered by the Technical Committee on Product Standards.

Some of the alloys or clad products may be the subject of a patent or patent application, and their listing in this Registration Record is not to be construed in any way as the granting of a license under such patent rights.

DESIGNATIONS FOR CLAD PRODUCTS

Clad products described in this Registration Record are composite wrought aluminum alloy products having a metallurgically bonded aluminum or aluminum alloy coating which is applied for purposes such as: corrosion protection, enhanced finishing response, or brazing.

The basic description of a clad product includes the designation "Clad" or "Alclad", prior to the core alloy designation and the product form.
The term **"Alclad"** specifically refers to clad products where the cladding alloy is anodic to the core and, as a result, provides corrosion protection for the core alloy.
The term **"Clad"** is applied where cladding is used for a functional reason other than corrosion resistance.

*Exception: In some cases, most notably with brazing sheet products, clad products are assigned arbitrary numeric or alpha-numeric designations.

Example: No. 21 Brazing Sheet

In these cases, each designation identifies a unique combination and configuration of cladding and core alloys. Odd and even numbered designations indicate one side clad and two side clad products respectively.

The following information describes a clad product and is necessary to complete the clad product registration record:

1. Product form

2. Component alloys
   – core alloy
   – cladding alloy

3. Cladding location
   – sheet and plate: both sides (assumed unless otherwise indicated) or one side
   – tube: inside, outside, or both

4. Cladding thickness, nominal and average cladding thickness by location for each range of total product thickness, expressed as a percentage of the total composite thickness or cross-sectional area.
   – **sheet and plate:** percent of total thickness on a side
   – **tube:** percent of total wall thickness
   – **wire:** percent of total cross-sectional area

The first clad product registration, for a given core alloy and product form, shall be designated as the original clad product registration and identified as: Clad "Core Alloy" and "Product Form", or Alclad "Core Alloy" and "Product Form".

Examples: Clad 1100 Reflector Sheet
Alclad 2024 Sheet
Alclad 3003 Tube

DESIGNATIONS FOR CLAD PRODUCTS (Continued)

Additional clad product registrations and descriptions will be assigned for a given core alloy and product form on the basis of variations in the cladding alloy, cladding location, cladding thickness, or a combination, as illustrated in the following:

- Cladding alloy
  Example: Alclad 7050 Sheet and Plate (original clad product registration)
  7108 Alclad 7050 Sheet and Plate (modified clad product registration)

- Cladding location
  Example: Alclad 7075 Sheet and Plate (original clad product registration)
  Alclad One Side 7075 Sheet and Plate (modified clad product registration)

- Nominal Thickness or area percentage of the cladding
  Example: Alclad 7075 Sheet and Plate (original clad product registration)
  2 ½ % Alclad 7075 Sheet and Plate (modified clad product registration)

REQUIREMENTS FOR REGISTRATION OF CLAD PRODUCTS

1. Any company may submit a proposal for registration, inactivation, or reactivation of a clad product to The Aluminum Association's Technical Committee on Product Standards for consideration.

2. The chemical composition limits for cladding and core alloys must be registered with The Aluminum Association.

3. 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 quantities[a-d]. 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).

    a. The clad product has undergone bona fide mill production and is NOT a "laboratory" scale volume used for evaluations or experimental purposes.

    b. The clad product 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 clad product.

    d. 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.

4. Sufficient information must be submitted to designate the product in accordance with existing practices.

COMPONENTS OF CLAD PRODUCTS

	Designation	Component Alloys (1) Core	Component Alloys (1) Cladding	Total Thickness of Composite Product In.	Sides Clad	Cladding Thickness per Side (Percent of Composite Thickness) Nominal	Average (2) min	Average (2) max
	Alclad 2014	2014	6003	Up thru 0.024	Both	10	8	..
	Sheet and Plate			0.025-0.039	Both	7.5	6	..
				0.040-0.099	Both	5	4	..
				0.100 and over	Both	2.5	2	3(3)
	Alclad 2219	2219	7072	Up thru 0.039	Both	10	8	..
	Sheet and Plate			0.040-0.099	Both	5	4	..
				0.100 and over	Both	2.5	2	3(3)
	Alclad 2024	2024	1230	Up thru 0.062	Both	5	4	..
	Sheet and Plate			0.063 and over	Both	2.5	2	3(3)
	1 1/2% Alclad 2024 Sheet and Plate	2024	1230	0.188 and over	Both	1.5	1.2	3(3)
	Alclad One Side 2024	2024	1230	Up thru 0.062	One	5	4	..
	Sheet and Plate			0.063 and over	One	2.5	2	3(3)
	1 1/2% Alclad One Side 2024 Sheet and Plate	2024	1230	0.188 and over	One	1.5	1.2	3(3)
	Alclad 2524	2524	1230	0.032-0.062	Both	5	4	..
	Sheet and Plate			0.063-0.310	Both	2.5	2	..
+	Alclad 2029	2029	1230	0.032-0.062	Both	5	4	..
	Sheet and Plate			0.063 and over	Both	2.5	2	..
	Alclad 2056 Sheet	2056	1050	0.063-0.236	Both	2.5	2	..
	Alclad 3003 Sheet and Plate	3003	7072	All	Both	5	4	6(3)
	Alclad 3003 Tube	3003	7072	All	Inside	10	..	..
				All	Outside	7	..	..
	Alclad 3004 Sheet and Plate	3004	7072	All	Both	5	4	6(3)
	Alclad 6061 Sheet and Plate	6061	7072	All	Both	5	4	6(3)
	Alclad 6156 Sheet	6156	1300	0.063-0.236	Both	2.5	2	..
	Alclad 7050	7050	7072	Up thru 0.062	Both	4	3.2	..
	Sheet and Plate			0.063 and over	Both	2.5	2	..

See footnotes on page 3

COMPONENTS OF CLAD PRODUCTS (Continued)

Designation	Component Alloys (1)		Total Thickness of Composite Product	Sides Clad	Cladding Thickness per Side (Percent of Composite Thickness)		
						Average (2)	
	Core	Cladding	In.		Nominal	min	max
7108 Alclad 7050	7050	7108	Up thru 0.062	Both	4	3.2	..
Sheet and Plate			0.063 and over	Both	2.5	2	..
Alclad 7075	7075	7072	Up thru 0.062	Both	4	3.2	..
Sheet and Plate			0.063-0.187	Both	2.5	2	..
			0.188 and over	Both	1.5	1.2	3(3)
2 1/2% Alclad 7075 Sheet and Plate	7075	7072	0.188 and over	Both	2.5	2	4(3)
Alclad One Side 7075	7075	7072	Up thru 0.062	One	4	3.2	..
Sheet and Plate			0.063-0.187	One	2.5	2	..
			0.188 and over	One	1.5	1.2	3(3)
2 1/2% Alclad One Side 7075 Sheet and Plate	7075	7072	0.188 and over	One	2.5	2	4(3)
Alclad 7475 Sheet	7475	7072	0.040-0.062	Both	4	3.2	..
			0.063-0.187	Both	2.5	2	..
			0.188-0.249	Both	1.5	1.2	..
Alclad 7178	7178	7072	Up thru 0.062	Both	4	3.2	..
Sheet and Plate			0.063-0.187	Both	2.5	2	..
			0.188 and over	Both	1.5	1.2	3(3)
No. 7 Brazing Sheet	3003	4004	Up thru 0.024	One	15	12	18
			0.025-0.062	One	10	8	12
			0.063 and over	One	7.5	6	9
No. 8 Brazing Sheet	3003	4004	Up thru 0.024	Both	15	12	18
			0.025-0.062	Both	10	8	12
			0.063 and over	Both	7.5	6	9
No. 11 Brazing Sheet	3003	4343(5)	Up thru 0.063	One	10	8	12
			0.064 and over	One	5	4	6
No. 12 Brazing Sheet	3003	4343(5)	Up thru 0.063	Both	10	8	12
			0.064 and over	Both	5	4	6
No. 23 Brazing Sheet	6951	4045	Up thru 0.090	One	10	8	12
			0.091 and over	One	5	4	6
No. 24 Brazing Sheet	6951	4045	Up thru 0.090	Both	10	8	12
			0.091 and over	Both	5	4	6

See footnotes on page 3

FOOTNOTES

(1) Cladding composition is applicable only to the aluminum or aluminum alloy bonded to the alloy ingot or slab preparatory to processing to the specified composite product. The composition of the cladding may be subsequently altered by diffusion between the core and cladding due to thermal treatment

(2) Determined by averaging cladding thickness measurements taken at a magnification of 100 diameters on the cross section of a transverse sample polished and etched for microscopic examination.

(3) Applicable for thickness of 0.500 in. and greater.

(4) Clad with 4044 brazing alloy on one side and 7072 on the other.

(5) The cladding component, in lieu of 4343 alloy, may be 5% 1xxx Clad 4343.

+ Designation added since previous issue

INACTIVE CLAD PRODUCTS

DESIGNATION	COMPONENT ALLOYS[1] CORE	CLADDING
Alclad 3102 Tube	3102	7072
Alclad One Side 3003 Sheet and Plate	3003	7072
9% Alclad One Side 3003 Welded Tube	3003	7072
Alcad 3303 Tube	3303	7072
9% Alclad One Side 3004 Welded Tube	3004	7072
7013 Alclad 3004 Sheet and Plate	3004	7013
Alclad 5050 Sheet and Plate	5050	7072
Alclad 5052 Sheet and Plate	5052	7072
Alclad 5155 Sheet and Plate	5155	7072
Alclad 5056 Rod and Wire	5056	6253
Alclad 5086 Sheet and Plate	5086	7072
7011 Alclad 7075 Sheet and Plate	7075	7011
7008 Alclad 7075 Sheet and Plate	7075	7008
7011 Alclad 7178 Sheet and Plate	7178	7011
Alclad 7079 Sheet	7079	7072
Alclad One Side 7079 Sheet	7079	7011
7011 Alclad 7079 Sheet and Plate	7079	7011
No. 1 and 2 Brazing Sheet	3003	4043
X3 Brazing Sheet	3003	X4003
X5 Brazing Sheet	6951	X4003
X9 Brazing Sheet	3003	X4005

DESIGNATION	COMPONENT ALLOYS[1] CORE	CLADDING
No. 13 Brazing Sheet	6951	4004
No. 14 Brazing Sheet	6951	4004
No. 21 Brazing Sheet	6951	4343
No. 22 Brazing Sheet	6951	4343
No. 33 Brazing Sheet	6951	4044
No. 34 Brazing Sheet	6951	4044
No. 44 Brazing Sheet	6951	4044[4]
No. 2 Reflector Sheet	3003 or 1100	1175
Clad 1100 Reflector Sheet	1100	1175
Clad 3003 Reflector Sheet	3003	1175
Clad One Side 1100 Reflector Sheet	1100	1175
Clad One Side 3003 Reflector Sheet	3003	1175

See footnotes on page 3

OTHER ALUMINUM ASSOCIATION REGISTRATION RECORDS AND REFERENCES

- **REGISTRATION RECORD OF INTERNATIONAL ALLOY DESIGNATIONS AND CHEMICAL COMPOSITION LIMITS FOR WROUGHT ALUMINUM AND WROUGHT ALUMINUM ALLOYS** (Teal Sheets) Contains a complete list of designations and chemical composition limits for wrought aluminum and wrought aluminum alloys registered with The Aluminum Association, including those produced in North America.

- **REGISTRATION RECORD OF ALUMINUM ASSOCIATION DESIGNATIONS AND CHEMICAL COMPOSITION LIMITS FOR ALUMINUM ALLOYS IN THE FORM OF CASTINGS AND INGOTS** (Pink Sheets).

- **REGISTRATION RECORD OF INTERNATIONAL DESIGNATIONS AND CHEMICAL COMPOSITION LIMITS FOR UNALLOYED ALUMINUM** (Gold Sheets).
  Contains a complete list of designations and chemical composition limits for unalloyed aluminum registered with The Aluminum Association, including those produced in North America.

- **REGISTRATION RECORD OF ALUMINUM ASSOCIATION DESIGNATIONS AND CHEMICAL COMPOSITION LIMITS FOR ALUMINUM HARDENERS** (Gray Sheets).

- **TEMPERS FOR ALUMINUM AND ALUMINUM ALLOY PRODUCTS** (Yellow Sheets).

- **TEMPERS FOR ALUMINUM AND ALUMINUM ALLOY PRODUCTS- METRIC EDITION** (Tan Sheets).

- **ALUMINUM STANDARDS AND DATA**
  A reference book containing data on chemical compositions, mechanical and physical properties, tolerances and other information on aluminum mill products in general use, in US customary units.

- **ALUMINUM STANDARDS AND DATA METRIC SI**
  A reference book containing data on chemical compositions, mechanical and physical properties, tolerances and other information on aluminum mill products in general use, in metric units.

On-line ordering of The Aluminum Association publications is available through our website at www.aluminum.org.