



**High Performance**  
**CLAD METALS**  
**For Premium Cookware**

*Featuring ALCOR™ 7-Ply  
Stainless Steel Clad Aluminum  
for Induction Cooking*

**High Performance**  
**CLAD METALS**  
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**AMETEK**  
 SPECIALTY METAL PRODUCTS



## Stainless Steel Clad Aluminum: Giving You the Market Advantage for Induction Cookware

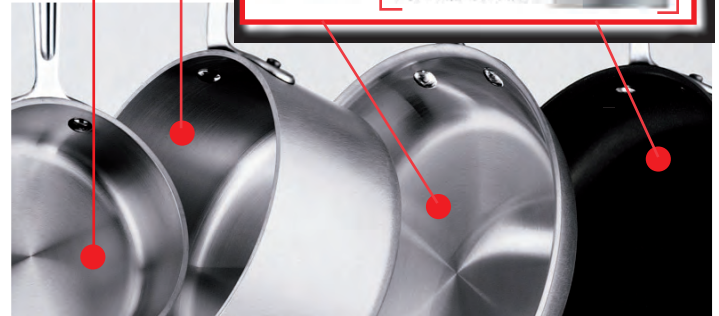
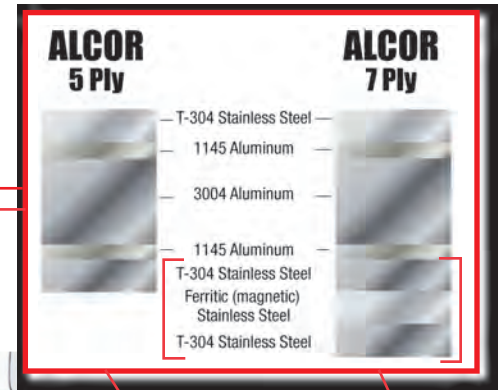
Stainless steel clad aluminum is ideal for high-performance cookware. This engineered material is more economical than other material compositions and is formed using our proprietary roll bonding and thermal treatment process to produce a strong metallurgical bond. In fact, the bond strength between the stainless steel and aluminum layers is equal to the shear strength of the aluminum. Stainless clad also offers excellent vacuum integrity, as well as superior thermal and electrical conductivity. Its key benefits are:

- Outstanding corrosion resistance
- Higher fabrication yield
- Lower processing rejects
- High strength
- High induction rate

The unique properties of stainless steel clad aluminum make it ideal for a wide variety of applications, including:

- Cookware
- Aircraft components
- Transition joints
- Electronic packaging
- Structural systems

Stainless clad aluminum is available in two- and one-sided products (ALCOR™ and ALCAD™) in thicknesses ranging from .062" to 1", in widths up to 40" and in lengths up to 120". Round blanks range in diameter from 8-3/8" to 23-3/4". (See chart on back cover.) diameter between 8-3/8" and 23-3/4" are available.



## ALCOR 7-Ply: The Magic Recipe for Induction Cooking

ALCOR 7™-Ply stainless steel clad aluminum combines the durability and appearance of T-304 stainless steel with the magnetic characteristics of ferritic stainless.

**The superior induction properties and life span of ALCOR 7-Ply result from a layer of magnetic stainless steel being sandwiched between two layers of T-304 stainless.** This rust-resistant material prevents the ferritic stainless from corroding, which keeps cookware made with ALCOR 7-Ply in top working condition year after year.

ALCO 7-Ply offers a unique array of properties that makes it ideal for cookware which can be used on any kind of range or cooktop stove powered by gas, resistance-heated electric or induction-heated electric.

The thin layers of T-304 protecting ALCOR 7-Ply ferritic stainless steel allow for even heating and minimization of "hot spots" that gas, electric and induction heating tends to produce on cookware made of lower-grade metals.

To make premium cookware, you need to start with a top-quality material. ALCOR 7-Ply meets that standard.



# Other Stainless Steel Clad Aluminum Products You Should Consider

Alternatives to ALCOR 7-Ply that can also be used to manufacture high-performance cookware include:

- ALCOR 5-Ply Magnetic (MagnaPly), a special combination of T-304 Stainless Steel and Magnet 400 Series Stainless that can be used on induction heating and conventional ranges. Less ductile than ALCOR 7-Ply and ALCOR 5-Ply, it can be used for various drawn shapes.
- ALCOR 5-PLY (Duranel™ III), an aluminum core with T-304 Stainless Steel cladding. The cladding is .015” thick and bonded to both sides of 3-Ply 3004, and 1145 Aluminum is on each side.
- ALCLAD™ (Duranel I or II), which consists of T-304 Stainless Steel clad on one side of 2- or 3-Ply 3004 Aluminum with 1145 Aluminum on one or both sides. Stainless claddings range from thicknesses of .015” to .250”.

If you’re manufacturing cookware for any type of appliance or heat source, there’s an AMETEK alloy that’s right for you.



# Fabrication Guidelines for Stainless Steel Clad Aluminum

## DRAWING RECOMMENDATIONS

Stainless steel clad aluminum has the deep drawing characteristics required for induction cookware applications. For best results, reduction from blank diameter to cup diameter should not exceed 40% as determined by this formula:

$$R = 100 \times \frac{D-d}{D}$$

**D = the blank diameter    d = the punch diameter**

Guidelines for deep drawing ALCOR are similar to those used for solid steel and carbon core. Fabrication suggestions are:

- Draw ring radius: 6x-8x metal thickness
- Draw punch radius: 8x-10x metal thickness
- Set down radius: 2x metal thickness
- Clearance between punch & draw ring: Metal thickness + 5%-10% per side
- Hold-down pressure: Sufficient to prevent wrinkling, but allows metal to flow into die
- Lubricants: Same as for deep drawing stainless steel; water-oil-based or synthetic-based fluids acceptable
- Clearance on blanking & trim tools: Approximately 4%-5% of metal thickness per side; scrap drop-off from trim should be 2x-3x metal thickness
- Keep tools, lubricants & material clean during fabrication because relatively soft-core material will mark deeper & more easily than solid stainless steel

# Typical Properties of Aluminum Clad with .015” Stainless Steel

	Thickness Inches	Tensile Strength PSI	Yield Strength PSI	% Elongation	Modulus of Elasticity in Tension PSI X 10 <sup>6</sup>	Electrical Conductivity % LACS	Heat Conductivity BTU/HR/FT <sup>2</sup> /FT <sup>2</sup> /F	Elastic Modulus in Blending PSI X 10 <sup>6</sup>	Poissons Bend	Ratio Tension
ALCOR 5 Ply	.070	53,200	35,700	33	18.4	29.7	66.5			
T-304SS/	.080	48,600	32,100	33	17.4	32.4	72.2			
AL 1145/3004/	.090	44,900	32,100	32	16.5	34.6	76.7	30 x 10 <sup>6</sup>	0.21	
1145/T-304SS	.110	39,700	24,900	32	15.4	37.7	83.1	20 x 10 <sup>6</sup>	0.25	0.27
	.125	36,800	22,600	32	14.7	39.3	86.6			
Mechanical Properties of Solid Metals for Reference	SS304	90,000	45,000	52	29	3	9.4			
	AL3004	26,000	10,000	25	10	50	112			

# Available Blank Diameters

8-3/8 in (212.7 mm)	11-5/8 in (295.3 mm)	13-3/4 in (349.3 mm)	16-1/2 in (419.1 mm)
8-3/4 in (222.2 mm)	11-3/4 in (298.5 mm)	13-7/8 in (352.4 mm)	16-5/8 in (422.3 mm)
8-13/16 in (223.8 mm)	11-7/8 in (301.6 mm)	14 in (355.2 mm)	16-3/4 in (425.5 mm)
9 in (228.6 mm)	11-15/16 in (303.2 mm)	14-1/8 in (358.8 mm)	17 in (431.8 mm)
9-3/8 in (238.1 mm)	12 in (304.8 mm)	14-1/4 in (362.0 mm)	17-1/8 in (435.0 mm)
9-1/2 in (241.3 mm)	12-1/8 in (308.0 mm)	14-3/8 in (365.1 mm)	17-3/8 in (441.3 mm)
9-5/8 in (244.5 mm)	12-1/4 in (311.2 mm)	14-5/8 in (371.5 mm)	17-1/2 in (444.5 mm)
9-3/4 in (247.7 mm)	12-3/8 in (314.3 mm)	14-7/8 in (377.8 mm)	17-3/4 in (450.8 mm)
9-7/8 in (250.8 mm)	12-1/2 in (317.5 mm)	15 in (381.0 mm)	17-7/8 in (454.0 mm)
10-1/8 in (257.2 mm)	12-5/8 in (320.7 mm)	15-1/8 in (384.2 mm)	18-1/4 in (436.6 mm)
10-1/4 in (260.0 mm)	12-3/4 in (323.9 mm)	15-3/16 in (385.8 mm)	18-1/2 in (469.9 mm)
10-1/2 in (266.7 mm)	12-7/8 in (327.0 mm)	15-1/4 in (387.4 mm)	18-7/8 in (479.4 mm)
10-3/4 in (273.0 mm)	13 in (330.2 mm)	15-3/8 in (390.5 mm)	19-1/2 in (495.3 mm)
10-7/8 in (276.2 mm)	13-1/8 in (333.4 mm)	15-1/2 in (393.7 mm)	20 in (508.0 mm)
11 in (279.4 mm)	13-3/8 in (339.7 mm)	15-5/8 in (396.9 mm)	20-5/8 in (523.8 mm)
11-1/4 in (285.75 mm)	13-1/2 in (342.9 mm)	15-7/8 in (403.2 mm)	22 in (558.9 mm)
11-1/2 in (292.1 mm)	13-5/8 in (346.1 mm)	16-1/4 in (412.8 mm)	23-3/4 in (603.3 mm)

Selection of the blank diameter for development trials can generally be determined using the formula:

#### FLANGED CUP

$$D = \sqrt{d_1^2 + 4 dh}$$

d = Inside shell diameter

h = Height of shell

#### CUP

$$D = \sqrt{d^2 + 4 dh}$$

d<sub>1</sub> = Diameter of top flange

D = Diameter of original blank

Other factors affecting calculation accuracy are: bottom radii, die clearance, lubricant, blank hold-down pressure, drawing speed and stress-strain characteristics of the stainless clad aluminum.

## Who We Are

AMETEK Specialty Metal Products manufactures clad metals, metal powders, specialty wire products, metal strip, engineered shaped components and thermal management products used in cookware, automotive, aerospace, appliance, lock & hardware, telecommunications, marine, medical and general industrial applications

The company is headquartered in Eighty Four, Pennsylvania, and is a unit of **AMETEK, Inc.**, a leading global manufacturer of electronic instruments and electric motors.

**AMETEK**<sup>®</sup>  
**SPECIALTY METAL PRODUCTS**  
*Innovative & Advanced Metallurgical Technology*

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