

TUBE BENDING  
TUBE FORMING  
DEEP DRAWING

FLEXIBLE BALL MANDRELS

WIPER DIES & INSERTS

END FORMING TOOLS

LINKS

FORMING & WELDING ROLLS

DIE & BLANKHOLDER



AMPCO METAL EXCELLENCE IN ENGINEERED ALLOYS



# Who We Are....

Through excellent quality control, a spirit of innovation and customer service, AMPCO METAL remains the established world leader in the production and distribution of speciality copper-based alloys. We are an integrated manufacturer and distributor of specialty bronzes, copper-based alloys, and related products serving a variety of sectors including metal processing, aerospace, automotive, oil and offshore drilling, glass and plastic mold-making, and a wide range of industrial engineering applications." Fully aware of its impact on the environment and wanting to support sustainable development, AMPCO METAL recycles at all phases of the alloys casting process and utilizes advanced technology throughout its plants to rigidly maintain clean air and clean water programs.



Through a combination of consistent metallurgical control and know-how, our proprietary AMPCO® specification is produced with a unique microstructure, largely attributable to the phases in the alloys: the phase alpha, beta and the intermetallic compound. The distinctiveness of that intermetallic compound in AMPCO® alloys is readily recognized and has come to be known as AMPCO-PHASE®. Totally distinct from the large and segregated compound in generic bronzes which tends to contribute to weak alloy properties.

## microcast® PROCESS key to Superiority



Competitor



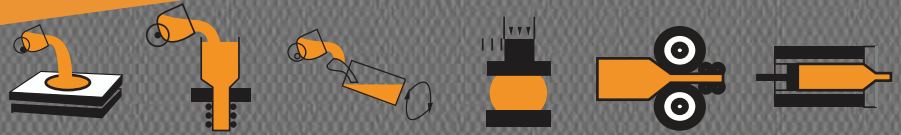
AMPCO® 18

- Superior wear characteristics
- Greater resistance to corrosion
- Higher mechanical properties
- A consistent, reliable product





# AMPCO® 18



Chemical Composition	Mechanical Properties	Continuous Casted	Extruded
Cu: Balance Al: 10.5 Fe: 3.5	Tensile Strength: MPa (ksi)	620 (90)	655 (95)
	Yield Strength: MPa (ksi)	252 (37)	338 (37)
	Hardness: HBW	179	187
	Elongation: %	14	14
	Charpy: J (lbs*F)	14 (10.3)	14 (10.3)
	Electrical Conductivity: % IACS	14	12
	Permeability:	1.16	1.16
	Average Speed: m/s (fps)	1.5 (4.9)	1.5 (4.9)
Average Load: MPa (ksi)	100 (14.5)	100 (14.5)	

The above are nominal values. If specific minimum figures are required, please contact your local AMPCO METAL representative.

**AMPCO® 18** - This primary alloy is used for heavy duty applications involving wear, abrasion and fatigue, where the absence of nickel in this composition significantly reduces the risk of mechanical abrasion with mating steel surfaces. This is the material of choice for wear plates, bearings, tie bar nuts, gears, worm-wheels, tube bending tools, wiper dies and similar applications. AMPCO® 18 is readily machinable and should be used in critical situations where it is essential to avoid unnecessary down-time or damage steel parts. When compared with generic alloys, the superior mechanical properties of AMPCO® 18 provide better impact resistance and resistance to distortion, which are particularly important attributes for aerospace and steel production applications.

Heat treated variations of AMPCO® 18 are possible:

**AMPCO® 18.136** - Tailor made for steel mill applications.

**AMPCO® 18.22** - A second variation of AMPCO® 18 with a special chemistry, giving a substantially higher tensile strength, yield strength and hardness. Recommended for bushing, bearings, liners and slides.

**AMPCO® 18.23** - Provides successful performance under heavy loads and elongation remains the same. Ideal for heavy duty worm gears, for wiper dies and similar applications.



## AMPCO® 18 standard sizes (mm):

6.4 x 25.4	6.4 x 38.1	6.4 x 50.8	6.4 x 63.5	9.5 x 25.4	9.5 x 38.1	12.7 x 25.4	12.7 x 38.1
12.7 x 50.8	12.7 x 76.2	12.7 x 152.4	15.9 x 25.4	15.9 x 38.1	15.9 x 50.8	15.9 x 101.6	19 x 25.4
15.9 x 101.6	19 x 25.4	19 x 38.1	19 x 50.8	25.4 x 25.4	25.4 x 38.1	25.4 x 50.8	25.4 x 76.2
25.4 x 101.6	31.8 x 38.1	31.8 x 63.5	31.8 x 101.6	31.8 x 152.4	31.8 x 203.2	31.8 x 31.8	31.8 x 50.8
38.1 x 76.2	38.1 x 101.6	50.8 x 50.8	50.8 x 76.2	50.8 x 101.6	50.8 x 127	50.8 x 203.2	63.5 x 76.2
63.5 x 127	76.2 x 76.2	76.2 x 127	82.5 x 101.6	101.6 x 101.6	101.6 x 304.8	101.6 x 381	

## AMPCO® 18 standard sizes (mm):

Ø 12.7	Ø 15.9	Ø 20.6	Ø 25.4	Ø 28.6	Ø 31.8	Ø 34.9	Ø 38.1
Ø 44.4	Ø 50.8	Ø 57.1	Ø 60.3	Ø 63.5	Ø 69.8	Ø 76.2	Ø 82.5
Ø 88.9	Ø 92	Ø 101.6	Ø 114.3	Ø 120.6	Ø 127	Ø 139.7	Ø 146
Ø 165.1	Ø 203.2	Ø 228.6					

## AMPCO® 18 standard sizes (mm):

Ø 50.8 / 19	Ø 50.8 / 25.4	Ø 57.1 / 25.4	Ø 57.1 / 38.1	Ø 63.5 / 25.4	Ø 63.5 / 38.1	Ø 63.5 / 44.4	Ø 69.8 / 31.8
Ø 69.8 / 44.4	Ø 69.8 / 50.8	Ø 76.2 / 25.4	Ø 76.2 / 38.1	Ø 76.2 / 44.4	Ø 76.2 / 50.8	Ø 82.5 / 38.1	Ø 82.5 / 57.1
Ø 82.5 / 63.5	Ø 88.9 / 44.4	Ø 88.9 / 50.8	Ø 88.9 / 57.1	Ø 88.9 / 63.5	Ø 95.2 / 50.8	Ø 95.2 / 69.8	Ø 101.6 / 38.1
Ø 101.6 / 57.1	Ø 101.6 / 69.8	Ø 114.3 / 63.5	Ø 114.3 / 76.2	Ø 127 / 63.5	Ø 127 / 88.9	Ø 139.7 / 76.2	Ø 152.4 / 76.2

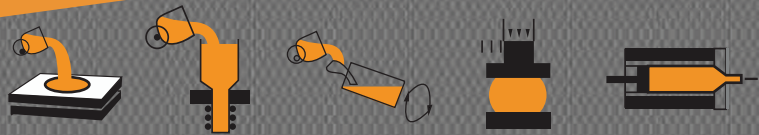
## AMPCO® 18 plate with thickness from 8mm to 260mm.

### AMPCO® 18 welding wire:

Welding	AMPCO-TRODE® 150	AWS Class ER CuAl-A3
Overlaying	AMPCO-TRODE® 10 / AMPCO-CORE® 200	AWS Class ER CuAl-A2
Repairing	AMPCO-TRODE® 150	AWS Class ER CuAl-A3
GTAW	AMPCO-TRODE® 150	
GMAW	AMPCO-CORE® 200, AMPCO-TRODE® 150	
Covered electrodes	AMPCO-TRODE® 160	AWS Class E CuAl-B



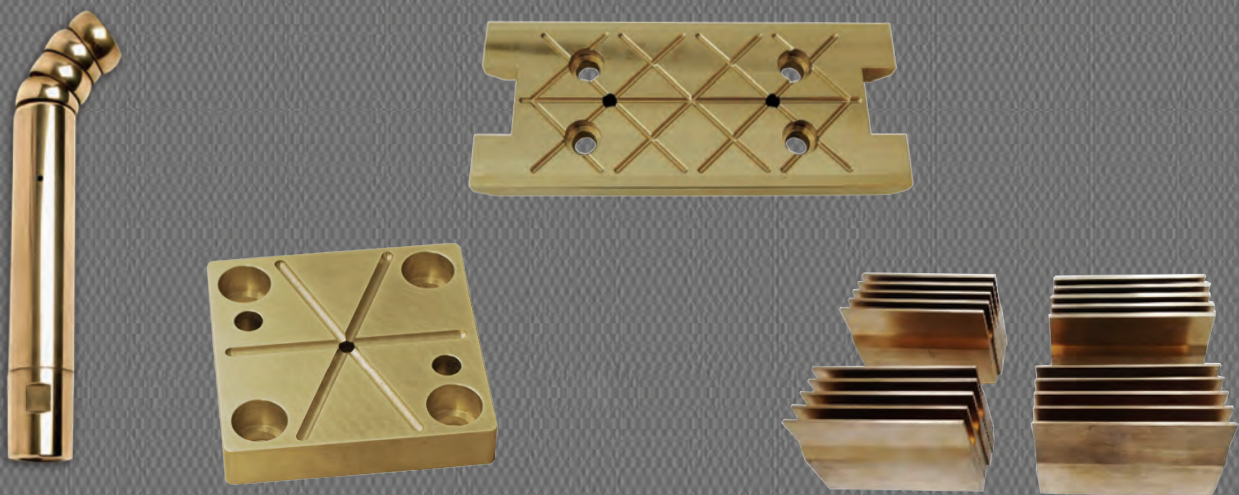
# AMPCO® 21



Chemical Composition	Mechanical Properties	Continuous Casted	Extruded
Cu: Balance	Tensile Strength: MPa (ksi)	703 (102)	724 (105)
Al: 13.1	Yield Strength: MPa (ksi)	407 (59)	407 (59)
Fe: 4.4	Hardness: HBW	285	286
	Elongation: %	1	1
	Charpy: J (lbs*f)	3 (2)	2.7 (2)
	Electrical Conductivity: % IACS	10	10
	Permeability:	1.12	1.12
	Average Speed: m/s (fps)	0.7 (2.3)	0.7 (2.3)
	Average Load: MPa (ksi)	115 (16.7)	115 (16.7)

The above are nominal values. If specific minimum figures are required, please contact your local AMPCO METAL representative.

AMPCO® 21 is used for guide port bushings and wear strips replacing hardened steel and for some cams, when no impact is involved. However, the most common uses are as die rings, inserts, forming rolls etc. in forming, bending or drawing operations, especially when stainless steel is the material being processed. This material is also widely used as work support blades for the centerless grinding of steel rods.



● AMPCO® 21 standard sizes (mm):							
Ø 15.9	Ø 22.2	Ø 25.4	Ø 31.8	Ø 38.1	Ø 44.4	Ø 50.8	Ø 57.1
Ø 63.5	Ø 76.2	Ø 88.9	Ø 101.6	Ø 127	Ø 139.7	Ø 152.4	Ø 203.2
Ø 228.6							

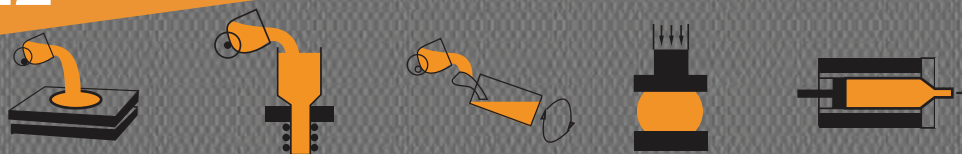
■ AMPCO® 21 standard sizes (mm):							
6.4 x 38.1	6.4 x 50.8	9.5 x 38.1	9.5 x 50.8	12.7 x 25.4	12.7 x 38.1	12.7 x 50.8	12.7 x 76.2
12.7 x 152.4	15.9 x 25.4	15.9 x 38.1	15.9 x 50.8	15.9 x 101.6	19 x 25.4	19 x 38.1	19 x 50.8
25.4 x 25.4	25.4 x 38.1	25.4 x 50.8	25.4 x 76.2	25.4 x 101.6	31.8 x 38.1	31.8 x 63.5	31.8 x 101.6
31.8 x 152.4	31.8 x 203.2	38.1 x 38.1	38.1 x 50.8	38.1 x 76.2	50.8 x 50.8	50.8 x 76.2	50.8 x 101.6
50.8 x 203.2	63.5 x 76.2	63.5 x 127	76.2 x 76.2	101.6 x 101.6	101.6 x 304.8	101.6 x 381	

▬ AMPCO® 21 plate with thickness from 6 mm to 260mm.

AMPCO® 21 welding wire:		
Welding		
Overlaying	AMPCO-TRODE® 250	AWS Class RCuAl-C
Repairing	AMPCO-TRODE® 250	AWS Class RCuAl-C
GTAW	AMPCO-TRODE® 250	AWS Class RCuAl-C
GMAW	AMPCO-CORE® 250	
Covered electrodes		



# AMPCO® 22



Chemical Composition	Mechanical Properties	Continuous Casted	Forged
Cu: Balance	Tensile Strength: MPa (ksi)	586 (85)	620
Al: 14.1	Yield Strength: MPa (ksi)	489 (71)	531
Fe: 4.7	Hardness: HBW	331	338
	Elongation: %	0.5	0.5
	Charpy: J (lbs*f)	2.7 (2)	2.7 (2)
	Electrical Conductivity: % IACS	10	10
	Permeability:	1.12	1.12
	Average Speed: m/s (fps)	0.6 (2)	0.6 (2)
	Average Load: MPa (ksi)	120 (17.4)	120 (17.4)

The above are nominal values. If specific minimum figures are required, please contact your local AMPCO METAL representative.

AMPCO® 22 is a duplex structure alloy of approximately 50% of each phase – gamma 2 and beta. It is remarkable because of its hardness, its excellent compression/wear resistance and its sliding properties. As the elongation of the material is very low, thin sections should be avoided and the material should be well backed up.



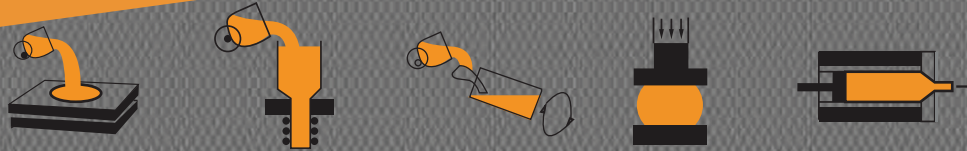
● AMPCO® 22 standard sizes (mm):							
Ø 9.5	Ø 12.7	Ø 15.9	Ø 22.2	Ø 31.8	Ø 38.1	Ø 44.4	Ø 50.8
Ø 57.1	Ø 63.5	Ø 76.2	Ø 82.5	Ø 88.9	Ø 101.6	Ø 114.3	Ø 152.4
Ø 203.2							

— AMPCO® 22 plate with thickness from 8 mm to 260mm.

AMPCO® 22 welding wire:		
Welding		
Overlaying	AMPCO-TRODE® 250	AWS Class RCuAl-D
Repairing	AMPCO-TRODE® 250	AWS Class RCuAl-D
GTAW	AMPCO-TRODE® 250	AWS Class RCuAl-D
GMAW	AMPCO-CORE® 250	
Covered electrodes		



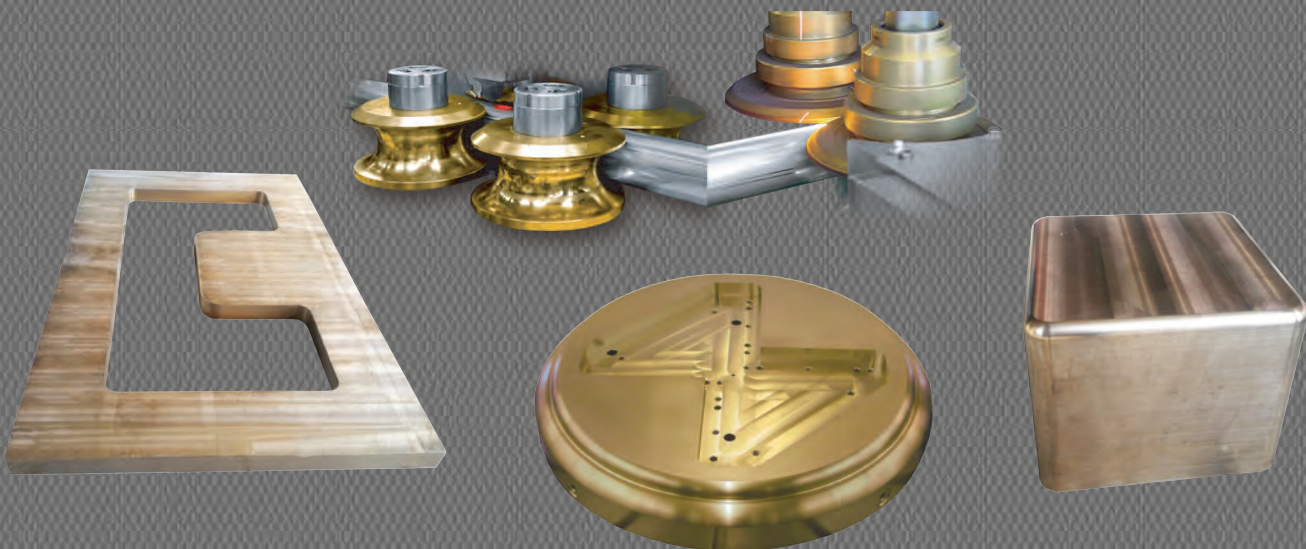
# AMPCO® 25



Chemical Composition	Mechanical Properties	Continuous Casted	Forged
Cu: Balance Al: Not published Fe: Not published	Compressive Strength: MPa (ksi)	1551	1579
	Compressive Strength 0.1%: MPa (ksi)	689	706
	Hardness: HBW	364	375
	Elongation: %	0	0
	Electrical Conductivity: % IACS	8	8
	Permeability:	1.008	1.008
	Average Speed: m/s (fps)	0.5 (1.6)	0.5 (1.6)
	Average Load: MPa (ksi)	125 (18.1)	126 (18.1)

The above are nominal values. If specific minimum figures are required, please contact your local AMPCO METAL representative.

AMPCO® 25 is a patented alloy which displays outstanding mechanical properties. The extreme hardness, linked with an excellent compressive strength and very good friction properties, make it ideal as a forming and drawing die material. As the elongation of the material is nil, thin sections should be avoided and the material must be well backed up.



AMPCO® 25 standard sizes (mm):							
6.4 x 50.8	25.4 x 50.8	25.4 x 76.2	31.8 x 203.2	38.1 x 101.6	50.8 x 101.6	50.8 x 127	50.8 x 203.2
82.5 x 101.6	101.6 x 381						

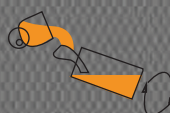
AMPCO® 25 standard sizes (mm):							
Ø 25.4	Ø 31.8	Ø 38.1	Ø 50.8	Ø 63.5	Ø 76.2	Ø 88.9	Ø 101.6
Ø 114.3	Ø 127	Ø 139.7	Ø 152.4	Ø 165.1	Ø 177.8	Ø 190.5	Ø 203.2

AMPCO® 25 plate with thickness from 9 mm to 150mm.

AMPCO® 25 welding wire:		
Welding		
Overlaying	AMPCO-TRODE® 300 / AMPCO-CORE® 300	AWS Class RCuAl-E / -
Repairing	AMPCO-TRODE® 300 / AMPCO-CORE® 300	AWS Class RCuAl-E / -
GTAW	AMPCO-TRODE® 300	AWS Class RCuAl-E
GMAW	AMPCO-CORE® 300	
Covered electrodes		



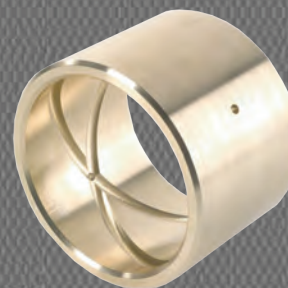
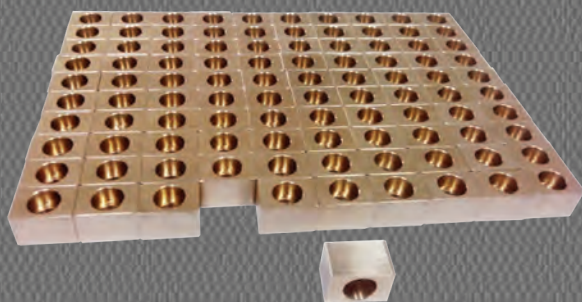
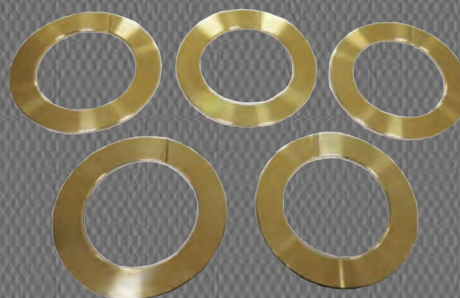
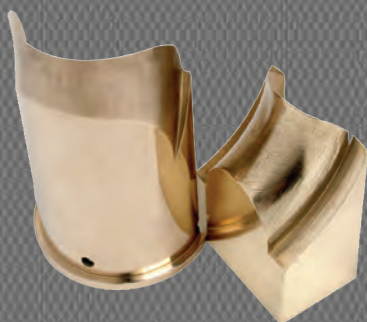
# AMPCO® M4



Chemical Composition	Mechanical Properties	Centrifugal Casted	Forged
Cu: Balance	Tensile Strength: MPa (ksi)	930 (135)	965
Al: 10.5	Yield Strength: MPa (ksi)	724 (105)	724
Fe: 4.8	Hardness: HBW	293	286
	Elongation: %	6	8
	Charpy: J (lbs*f)	6.8 (5)	7 (5)
	Electrical Conductivity: % IACS	8.2	8.2
	Permeability:	1.15	1.15
	Average Speed: m/s (fps)	1 (3.3)	1 (3.3)
	Average Load: MPa (ksi)	330 (47.9)	330 (47.9)

The above are nominal values. If specific minimum figures are required please contact your local AMPCO METAL representative.

AMPCO® M4 was initially developed as an aircraft specification alloy for gears in retractable landing assemblies, engine spacer bearings and other similar applications. It is rapidly growing in use, where higher mechanical properties at elevated temperatures together with corrosion-resistant properties are required. Used for example in tricorne rotary drill bit.



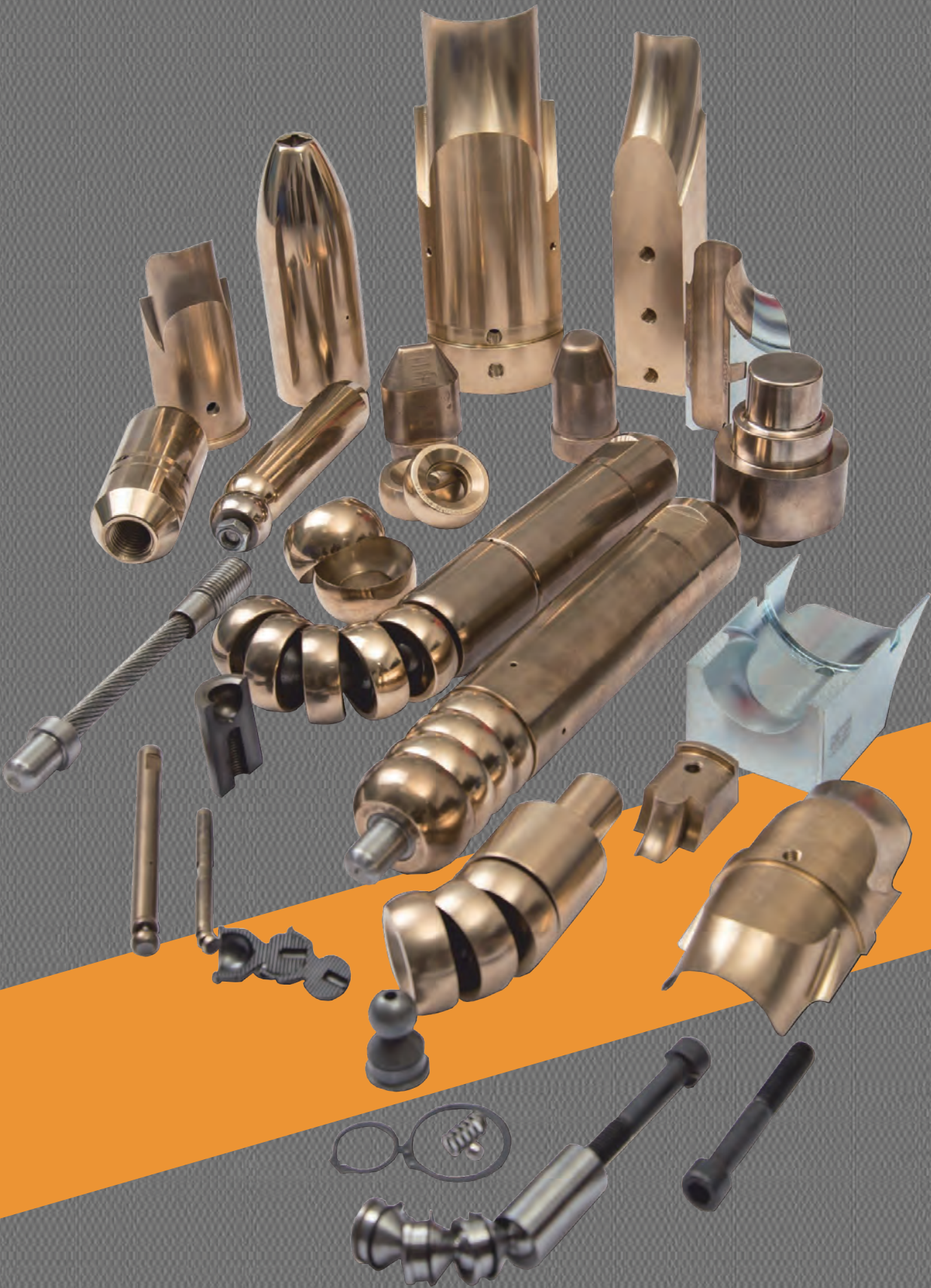
● AMPCO® M4 standard sizes (mm):							
Ø 19	Ø 25.4	Ø 31.8	Ø 38.1	Ø 44.4	Ø 50.8	Ø 60	Ø 63.5
Ø 69.8	Ø 76.2	Ø 82.5	Ø 95.2	Ø 101.6	Ø 127	Ø 152.4	

— AMPCO® M4 standard sizes (mm):
Thickness from 10 mm to 150 mm.

AMPCO® M4 welding wire:		
Welding	AMPCO-TRODE® 46	AWS Class ER CuNiAl
Overlaying	AMPCO-TRODE® 46	AWS Class ER CuNiAl
Repairing	AMPCO-TRODE® 46	AWS Class ER CuNiAl
GTAW	AMPCO-TRODE® 46	AWS Class ER CuNiAl
GMAW	AMPCO-TRODE® 46	AWS Class ER CuNiAl
Covered electrodes	AMPCO-TRODE® 46	AWS Class E CuNiAl



# Tube Bending





# MANDRELS, WIPER DIES & END FORMING TOOLS

For tube bending of stainless steel and titanium material pipes, AMPCO® 18, AMPCO® 18.23, AMPCO® 21, AMPCO® 22 and AMPCO® M4 are used with great benefits for product quality and long-life of the production tooling. Advantages of AMPCO® 21 and AMPCO® 22 mandrels and balls: Extended life, no hardening or expensive coatings on the mandrel required, no galling. Advantages of AMPCO® 18, AMPCO® 18.23 and AMPCO® M4 wiper dies: Extended life (20 times longer with AMPCO® M4), easier set-up, no galling, no scratching, no corrosion starting point.



This type of end formed tooling supports material forming from both sides to deliver tighter roundness tolerances for joining or welding.

**Advantages:** provides high quality surface finish, form non-symmetrical and symmetrical shapes, easy to regrind.



Without AMPCO®

With AMPCO®

## Design System Flexible Mandrel

Technical Specifications											
Bend ratio \ Wall Factor	1 D	1.25 D	1.5 D	1.75 D	2 D	2.25 D	2.5 D	2.75 D	3 D	3.5 D	4 D
10											
15	1W	1W	1W	1W	1	1	1	1			
20	2W	2W	1W	1W	1W	1	1	1	1	1	1
25	3W	3W	2W	2W	2W	2W	1W	1W	1W	1W	1W
30	3W	3W	3W	3W	2W	2W	2W	2W	2W	2W	2W
35	4W	4W	3W	3W	3W	3W	3W	3W	3W	3W	3W
40	4W	4W	3W	3W	3W	3W	3W	3W	3W	3W	3W
45	4W	4W	3W	3W	3W	3W	3W	3W	3W	3W	3W
50	4W	4W	3W	3W	3W	3W	3W	3W	3W	3W	3W
55	4W	4W	4W	3W	3W	3W	3W	3W	3W	3W	3W
60	4W	4W	3W	3W	3W	3W	3W	3W	3W	3W	3W
65	5W	5W	5W	5W	5W	3W	3W	3W	3W	3W	3W
70	5W	5W	5W	5W	5W	5W	5W	3W	3W	3W	3W
80	5W	5W	5W	5W	5W	5W	5W	3W	3W	3W	3W
90	5W	5W	5W	5W	5W	5W	5W	5W	5W	5W	5W
100	5W	5W	5W	5W	5W	5W	5W	5W	5W	5W	5W
125	6W	6W	6W	6W	6W	6W	5W	5W	5W	5W	5W
150	6W	6W	6W	6W	6W	6W	5W	5W	5W	5W	5W
175	8W	8W	8W	8W	7W	7W	7W	7W	6W	6W	6W
200	10W	10W	10W	10W	10W	10W	9W	9W	9W	9W	9W
225		10W	10W	10W	10W	10W	10W	10W	10W	10W	10W

Plug Mandrel

Regular Pitch

Close Pitch

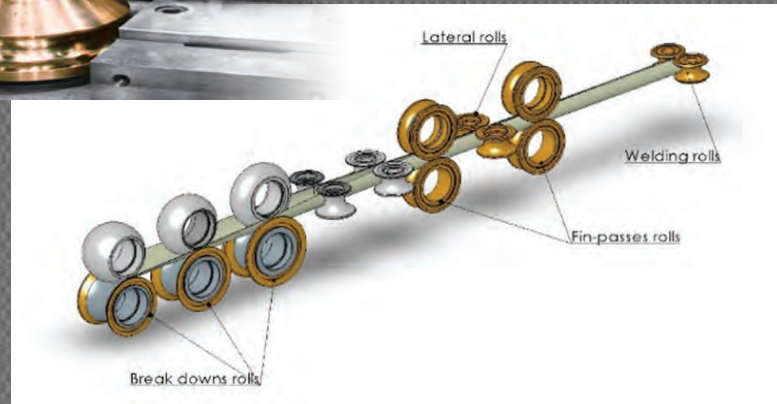
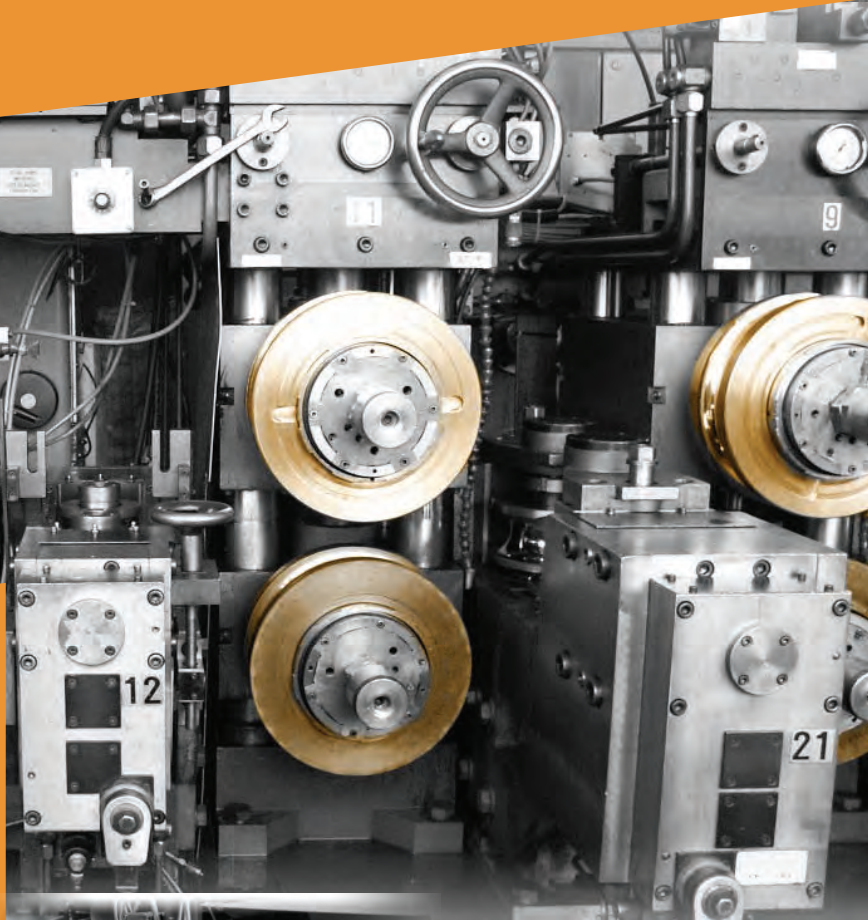
Ultra Close Pitch

W = Wiper Dies Needed



# Tube Forming

When producing stainless steel tubes from strips, so called cold welds might occur on the forming rolls. These cold welds on the forming rolls are damaging the surface of the steel tubes. Additionally working on a semi-circular forming roll in order to obtain a tube out of a flat steel strip, the differences in tangential speeds along the surface of the tube induce sliding between forming roll, calibration roll and the stainless steel sheet. Because of the cold welding effect and the difference in speed on the forming rolls, these rolls must be chosen out of a material with very good sliding characteristics in order to obtain an absolutely perfect surface on the stainless steel tubes. AMPCO METAL guaranteed a wide range of material satisfying the highest requirements. For example, the patented alloy AMPCO® 25 offers multiple advantages especially for welding rolls, forming (break down) and calibration (sizing) rolls. The greater the number of forming stations, the more gradual is the absorption of plastic deformation and the less the stress generated in the material. This can be important for meeting dimensional tolerance requirements during assembly.

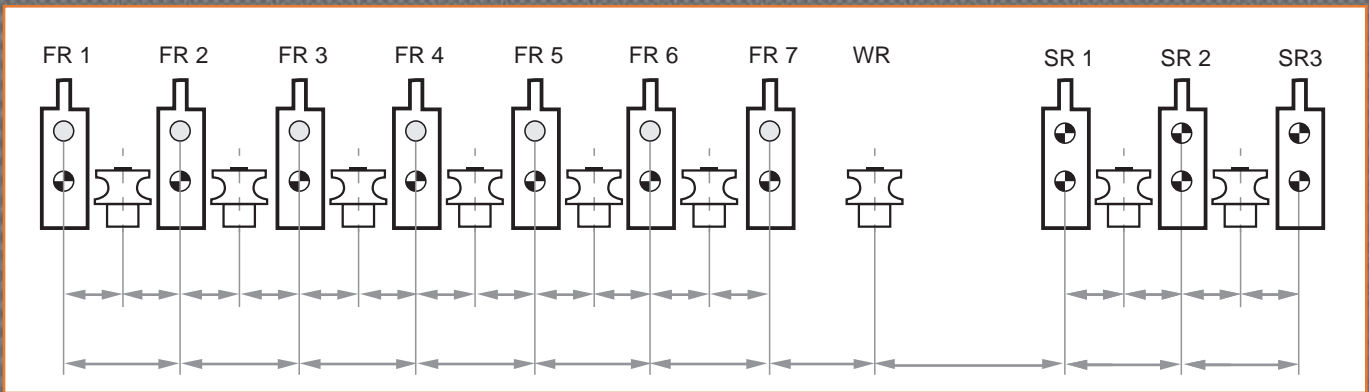



## BENEFITS:

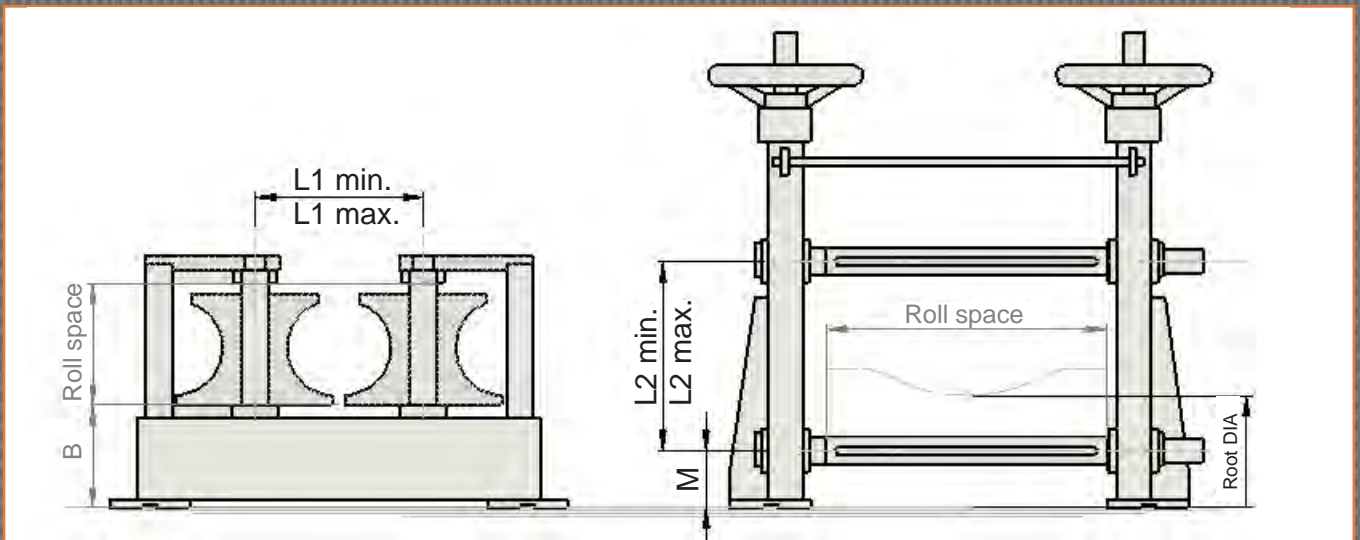
- Very good sliding characteristics
- No cold welds on the forming rolls
- Absolutely perfect surface on carbon, stainless steel or titanium tubes
- Extended life time of forming rolls
- No hardening or expensive coatings on the rolls required
- Easy to regrind
- Less power consumption in HF welding process



In case of new development we can offer the complete set of rolls (design and machining). We just need a few information according the tube mill. See hereunder.



-  Driven shaft
- FR: Forming rolls
- FP: Fin-passes
- WR: Welding rolls
- SR: Sizing rolls



Vertical stand

Horizontal stand

Strip details:

**Material**

Standard name

Thickness of strip

Yield strength (Rp0,2)

Tensile strength (Rm)

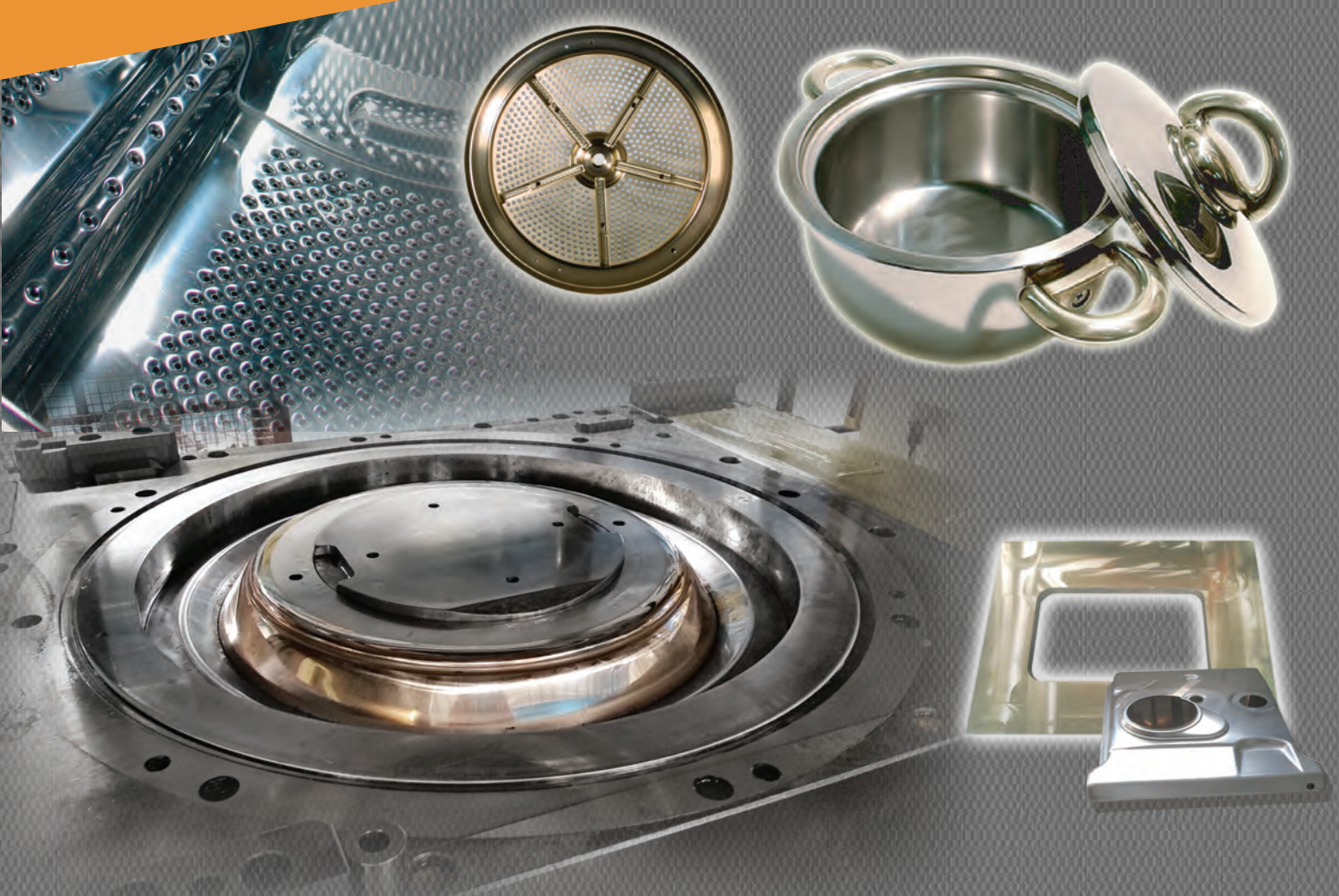
Elongation %

Coated strip (Yes/No)

Complementary information: (dimensions of the shaft, key way, bearings)



# Deep Drawing



In deep drawing, conventional materials tend to suffer from various disadvantages. Cast iron for example may have good sliding properties, but the rate of wear of the tool is far too high. Tools from hardened steel have satisfactory working lives, but have pick-up tendencies. If coated, the result will be better, but after a certain number of shots the sliding properties will tend to decrease, consequently increasing the coefficient of friction. (See graph on the next page). AMPCO® 21, AMPCO® 22 and especially AMPCO® 25 combine very high strength and hardness with remarkably low resistance to friction. These qualities are derived from hardness associated with very special metallurgical structure. Due to the exceptional resistance of AMPCO® materials to corrosive or atmospheric influences, no special arrangements are necessary to prevent oxidation. Because of the higher linear coefficient of expansion of AMPCO® material, the drawing gap between die and punch must be approximative +12% of hot-rolled blank thickness and +10% of cold-rolled blank thickness.

The faces which are subjected to stresses (drawing edges) must definitively be polished. (And AMPCO® alloys polish well). Care must be taken to ensure that faces are perfectly flat and not wavy! Unevenness can be created by hand polishing, affecting surface finishing and reducing tool life.

## **BENEFITS:**

### ■ **Over tool steel:**

Lower friction, no galling, tool manufacturing without heat treatment, easier modification.

### ■ **Over commercial bronze:**

Higher hardness and quality due to homogeneous microstructure. Better sliding properties and lower wear.

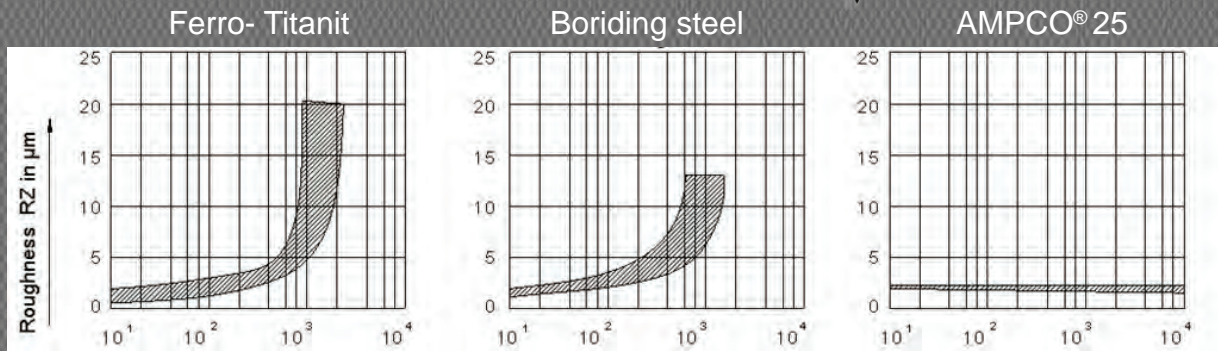
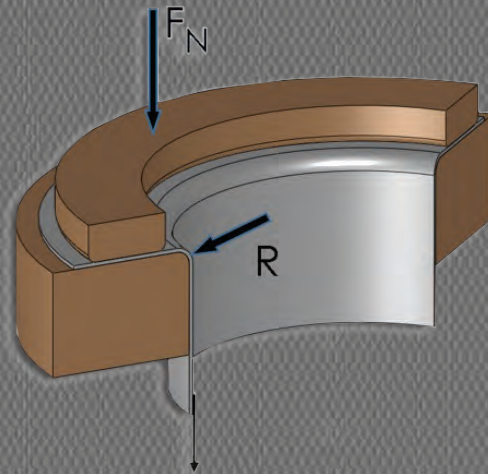
### ■ **Over coated materials:**

Bigger wear area definition possible. Changes of geometry possible at any time, solid proof that the "best coating in the world is the one you do not need".

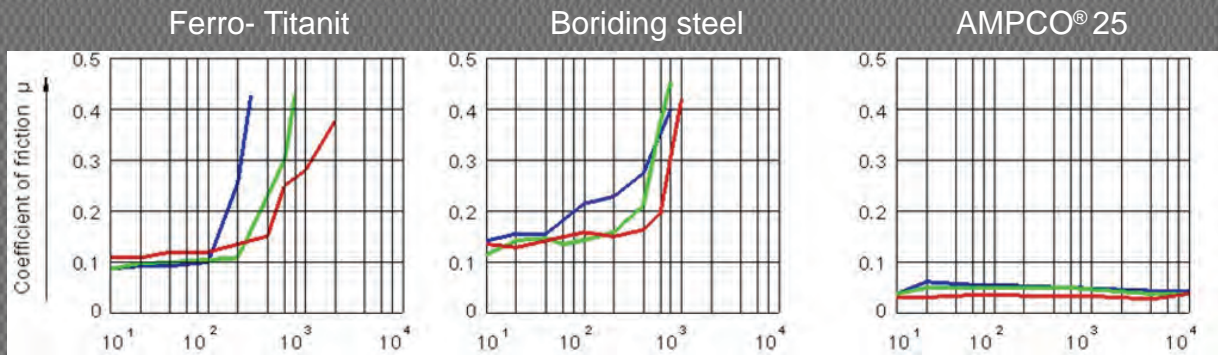


Friction is not a static parameter, but can vary during the tool life. Important cause of friction variations is originated by material transfert. This is caused by particles being scraped from workpieces, which then adhere to the tools. Here under you can see an analyze form the "Institut für Umformtechnik" in Darmstadt, showing the evolution of the coefficient of friction and evolution of wear properties in term of numbers of draw.

Material to draw: X5CrNi 18 9  
 Delivery Roughness:  $R_z = 2.0 \pm 0.3 \mu\text{m}$ .  
 Blank thickness: 0.8 mm  
 Die Radius:  $R = 4 \text{ mm}$   
 Strength on blankholder:  $F_N = 3000 \text{ N}$   
 Maximum process speed:  $v = 0.25 \text{ m/s}$



Number of shots



Number of shots

**General rules for AMPCO® tools:**

- Die radius: 5 to 7 x blank thickness (Ideally > 3 mm.)
- Punch radius: 8 x blank thickness
- Die height: 5 to 7 x die radius. (Minimum 30 mm)
- Flatness and parallelism tolerance of the die: 0.02 mm.





Wear - Resistant Bronzes  
Corrosion - Resistant Bronzes

**SPECIFY AMPCO®** High - Conductivity Alloys



Deep Drawing AMPCO® 21/22/25/26



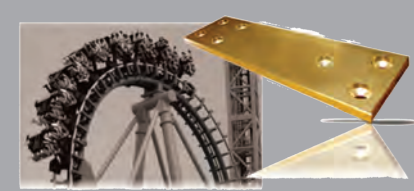
General Engineering  
AMPCO® 18/21/M4



Plastics Industries  
AMPCOLOY® 940/944/83/95



Rollercoasters  
AMPCO® 18/M4



Tube Bending AMPCO® 18/21/22/25/M4



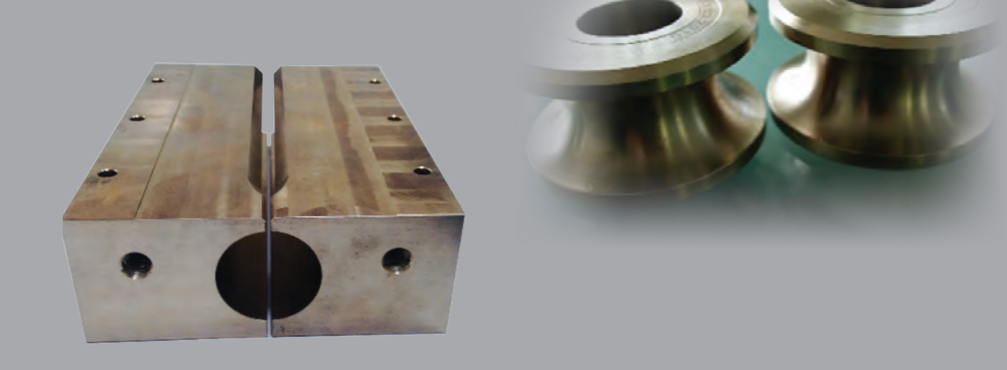
Blow Moulding AMPCOLOY® 940  
AMPCO® 18



Aerospace & Offshore  
AMS 4640/4590/4880/4881



Tube Forming AMPCO® 18/21/22/25



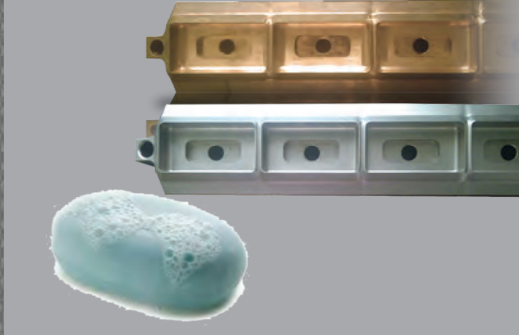
**CORPORATE MISSION STATEMENT:**

“Provide customers around the world with innovative engineered metal products and services, delivering exceptional value to their business.”

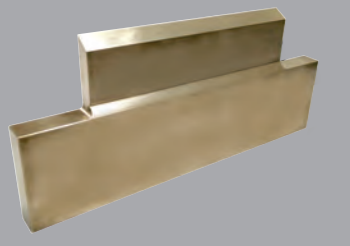
Die Casting  
AMPCOLOY® 940/89/95



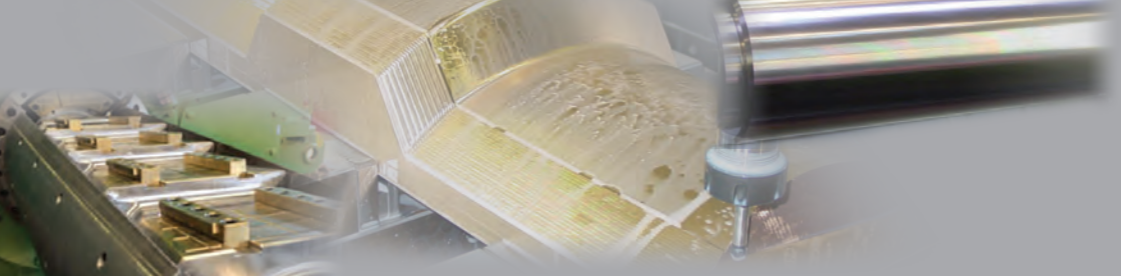
Soap Mould  
AMPCOLOY® 940



Work Rest Blades  
AMPCO® 21



Steel Mill AMPCO® 18/21/45/M4



Cu/W  
Wires up to 0.25mm



AMPCOLOY® NOZCAP



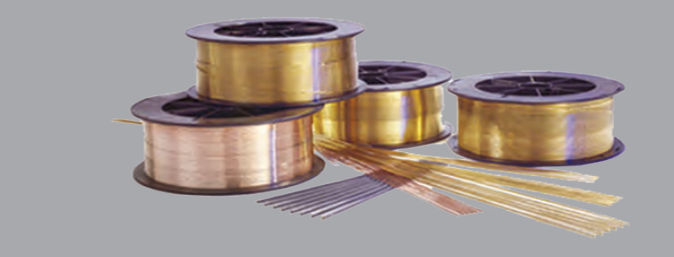
AMPCO® 8  
corrosion application  
chemical industry



AMPCO® SAFETY TOOLS



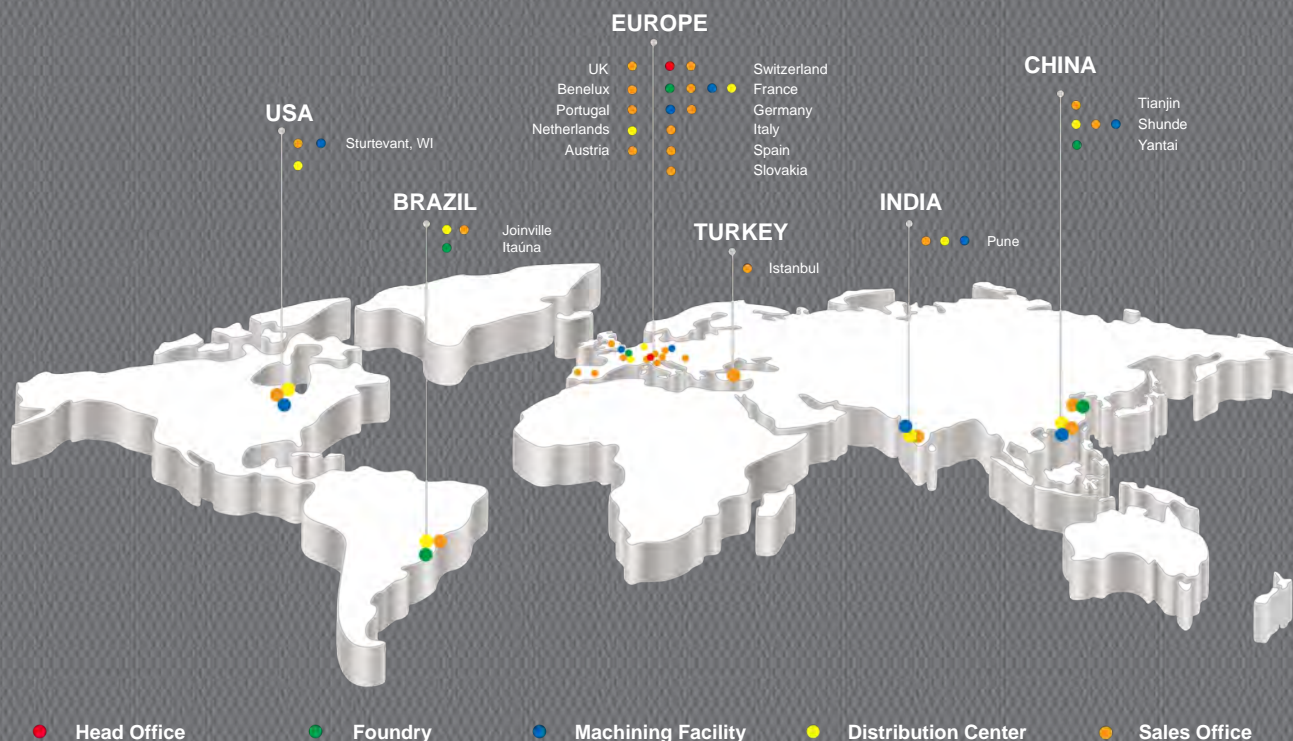
Welding Materials  
AMPCO - TRODE®



Resistance Welding & Plunger Tips  
AMPCOLOY® 972/940/83/95







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