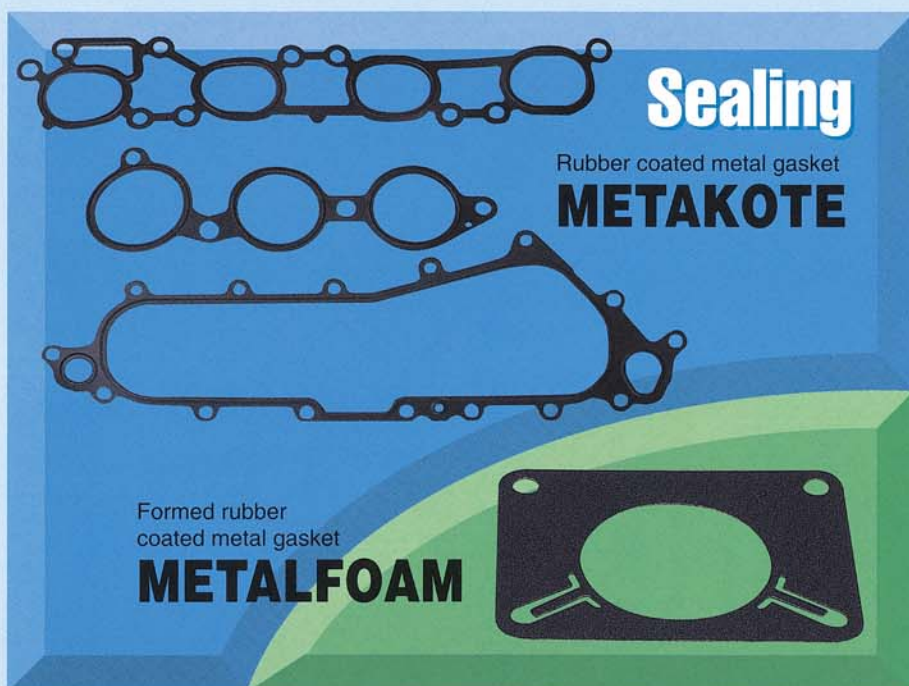


# TOMBO BRAND

## METAKOTE related products

High performance composite metal and rubber materials



High rigidity vibration insulation washer

### METALAMINE WASHER



Steel-rubber-steel sandwiched type vibration damping plate

### METALAMINE



### Noise Reduction



High vibration damping material and new design concept for anti-squeal brake shims

### METAPLUS



**NICHIAS Corporation**



# Familiar materials - Rubber and Metal

## This composite technology offers new functions and applications

Metakote (related products) is the brand name applied to a group of various NICHIAS products which are based on rubber coated materials. Thanks to its innovative properties, it is used over a broad spectrum of applications.



		METAKOTE related products					Reference Page		
		Gasket material		Vibration insulation material	Vibration damping material				
Application	Function	Rubber Coated Metal (RCM) <b>Metakote®</b>	Foamed Rubber Coated Metal <b>Metafoam®</b>	High Rigidity Vibration Insulation Washer <b>Metalamine Washer</b>	Rubber Sandwiched Metal Sheet <b>Metalamine®</b>	Pressure Sensitive Adhesive Coated RCM <b>Metaplus</b>			
Applicable Fields	Automobiles	Cylinder head	Sealing	Cylinder head gasket				P.3	
		Engine area Main body Lubrication system Cooling system Fuel line Intake System	Sealing	Engine gasket • Intake manifold • Surge tank • Fuel pipe • Water pump • Oil pump • Timing belt cover	Engine gasket • Water pipe  Gasket/ Flange part • Ventilation Buffle • Fuel cap • Battery case for EV car				P.4
			Noise Reduction		Floating gasket • Engine cover • Intake manifold • Head cover  Metafoam vibration floating gasket	Floating washer • Engine cover • Intake manifold • Head cover	Vibration damping cover • Engine cover • Various other covers	Vibration damping cover • Engine cover • Various other covers	P.4
									P.6
		Brake	Sealing	O-ring substitute gasket	Brake booster gasket				
			Noise Reduction	Anti-squeal shim • Clip-on type shim				Anti-squeal shim • Adhesive type shim  Metaplus Multilayer shim	P.5
	General Industrial machinery	Compressor	Sealing	Compressor gasket • Head & cylinder • Front & rear					P.7
			Noise Reduction	Vibration bumper material • Valve plate • Anti-squeal spacer			Vibration bumper material • Valve plate • Vibration damping spacer	Electromagnetic clutch sound reduction material	
		Hydraulic/ Pneumatic equipment	Sealing	Seal washer	Dust sealing gasket				P.6
			Noise Reduction		Shock absorbing gasket				
		Industrial brake & clutch	Sealing						
			Noise Reduction	Vibration bumper spacer				Anti-squeal shim	P.8
Air conditioners	Electric power plants & petrochemical plants	Sealing	Gaskets for various machinery • Pipe flange • O-ring substitute						
		Noise Reduction				Outer packaging for sound insulation casing • Electric power plant duct • Electric precipitator • Factory pipes			
Reference Page		P.9/10	P.9/10	P.9/11	P.9/11	P.9/11			



# AUTOMOTIVE

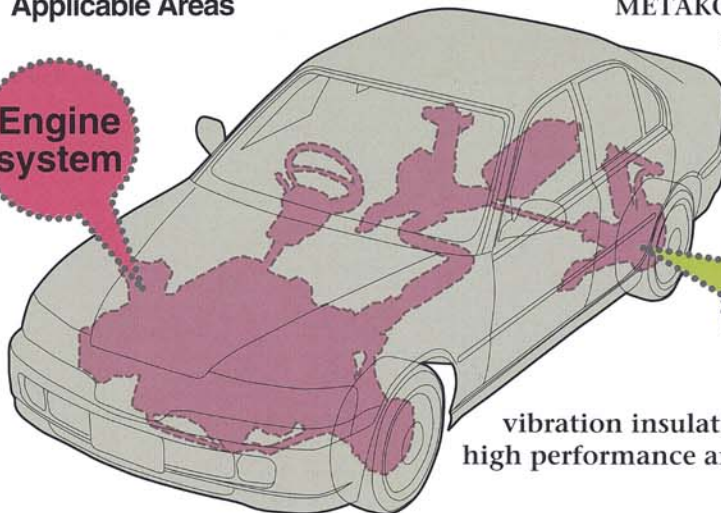
## High performance products supporting the advance of automobile performance

These high performance products featuring new design concepts have brought about changes in many automotive parts in response to customer's requirements.

### Applicable Areas



Engine system



Brake system

METAKOTE (Rubber coated metal) has been developed as an alternative product to asbestos gaskets and has been released for engine gaskets, starting with the automotive industry. This product has been widely welcomed due to its excellent performance.

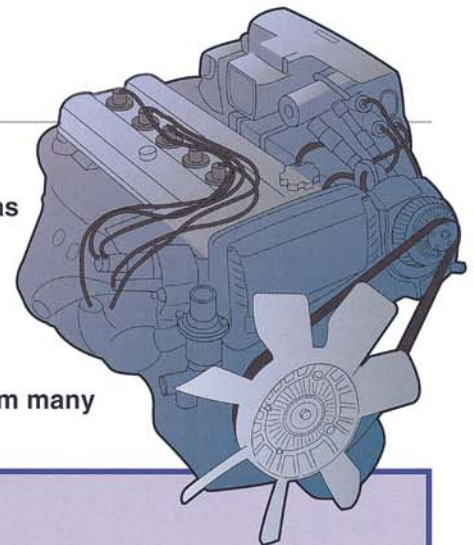
In addition to engine systems, METAKOTE has been used in transmission systems and automotive climate control systems. NICHIAS has developed METAFOAM (Foamed rubber coated metal) and METALAMINE Washer (High rigidity vibration insulation washer) to meet customer's requirements for high performance and to withstand severe service conditions.

## ENGINE System

In automotive engines which comprise many parts, several fluids, such as gas, coolant and oil are used under high temperature and in severe environments.

As a result, in addition to good part performance, part durability is also required.

METAKOTE products have been evaluated under severe conditions and released for production. They have earned a reputation for reliability from many automotive manufacturers.



### CYLINDER HEAD GASKETS

High heat resistance and liquid resistance suitable for global climatic conditions have been taken into consideration for this application.

Multi-layer steel gaskets have attracted the

attention of most automotive manufacturers due to their gasket performance and high durability. Our METAKOTE product is attracting attention for multi-layer steel gasket applications.

#### Advantages:

- Since the requirements for cylinder head gaskets vary depending upon the type of engine, combustion temperature and gasket design, a wide range of products is required.

Metal: Stainless steel JIS G4313 SUS 301H spring grade  
0.2 mm.thk. 0.25 mm. thk

Rubber: NBR (Nitrile Butadiene Rubber)  
H-NBR (Hydrated NBR)  
FKM (Fluoropolymer)

- The master coil of 914 mm. width is continuously coated in a thin layer in the order of several 10 micro meters in systematic line production under severe quality control, which ensures high quality and performance.





## ENGINE GASKETS

"Metakote" has been used in many varieties of engine parts under high temperature and high load to achieve zero leak gaskets. Due to its flexibility, "Metafoam" shows excellent sealability for low rigidity flanges.

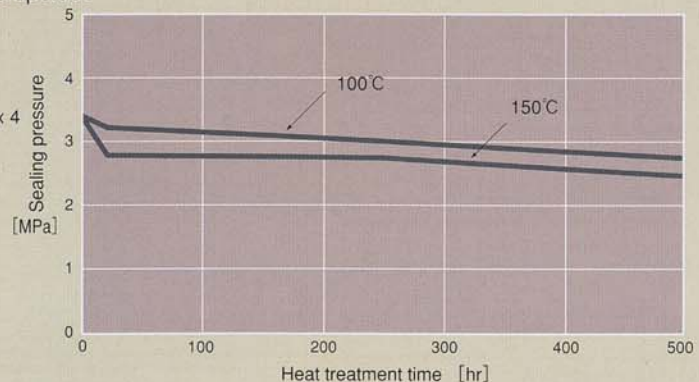
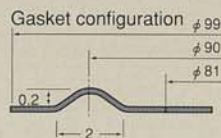


Engine Area Gaskets

### Providing stable sealing performance under a thermal deterioration environment

Metakote heat resistant sealing properties

Grade: TS-3525  
Fluid: N<sup>2</sup> gas  
Line pressure: 80kgf/cm  
Bolt dimensions x number: M16 (SUS) x 4



## VIBRATION DAMPING COVERS

Vibration damping material and floating system are quite effective in terms of stopping and insulating noise generated by engine vibration. Covers made of "Metalamine" and "Metaplus" have been demonstrated to work as high vibration damping systems.



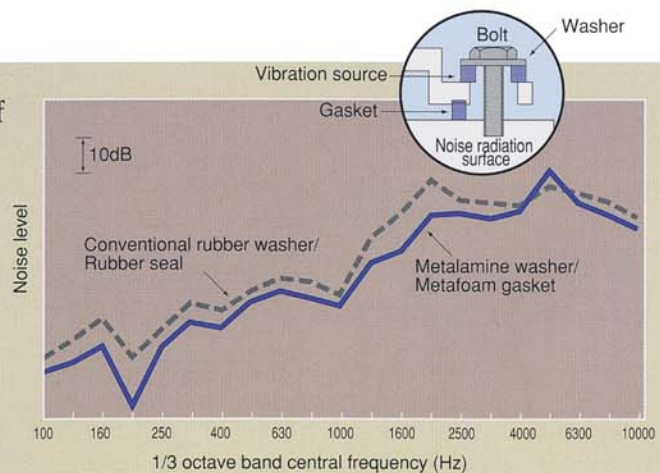
Engine Covers

## FLOATING SYSTEM

"Metalamine" washers combined with "Metafoam" form a high performance floating system which enables drastic reduction of noise level.

### Noise reduction effectiveness of high performance vibration damping material.

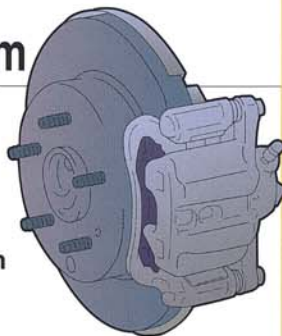
Measurement example of sound damping effect by Floating System.





## DISC BRAKE System

In brake systems which are operated by hydraulics and pressure, there are several parts exposed to high pressure, friction and high temperature. Such parts require pressure resistance, heat resistance and durability as well as fluid resistance to rain and brake oil. NICHIAS offers a wide variety of products to meet the challenge of such problems.



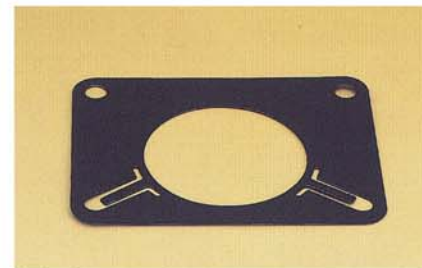
Metaplast brake shims

### ANTI-SQUEAL BRAKE SHIMS

"Metaplast" with heat resistant adhesive is recommended as an anti-squeal brake shim. It is blanked to brake pad shape and glued to the back plate. Since the brake shims are exposed to high temperatures which are generated by friction between the rotor and pad, they must have high heat resistance. "Metaplast" has been welcomed in the world market due to its excellent heat resistance and durability.

### BRAKE BOOSTER GASKETS

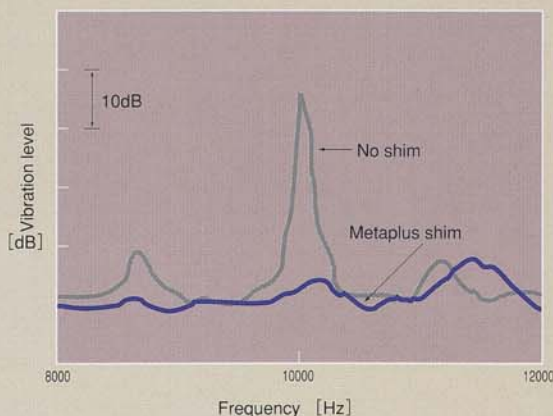
The engine room brake booster is connected with the brake pedal. Airtightness at the penetrated hole is a key factor for vibration damping. For this reason, foamed rubber coated "Metafoam" is effective for sealing between brake booster and toe board. "Metafoam" affords a perfect seal against dust and rain with low bolt torque.



Brake booster gasket

### Metaplast shims give excellent anti-squeal performance

Example of brake pad vibration damping effect



### O-RING SUBSTITUTES

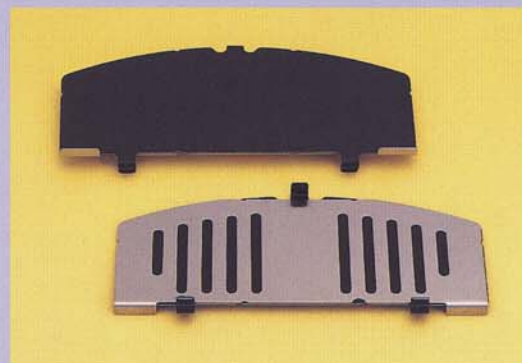
Rubber O-rings have been widely used as hydraulic seals. However, they require a groove for mounting O-rings and manpower for assembly in case of special design or use of several O-rings on the same surface. In order to solve this problem, one "Metakote" gasket has been used to substitute for several O-rings.

### "METAPLAST" MULTI-LAYER SHIMS

"Metaplast" is glued to a stainless steel sheet. Due to its multi-layer structure construction, it has been proven to have the best anti-squeal performance.

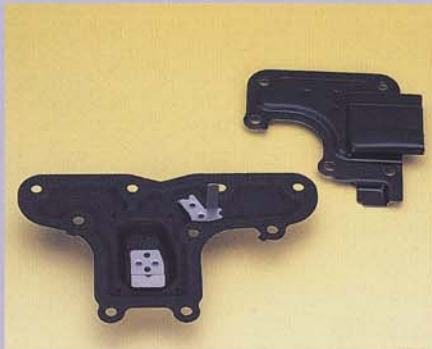
#### Advantages:

- Best anti-squeal performance
- Perfect flatness reduces dragging torque
- Due to grease pocket design, grease can give additional anti-squeal performance
- Easy assembly of clip-on to back plate is possible





## "METAFOAM" MULTI-FUNCTIONAL PARTS



This concept is recommended for parts consisting of a thin steel flange and gasket.

The steel sheet is coated with foamed rubber on one side.

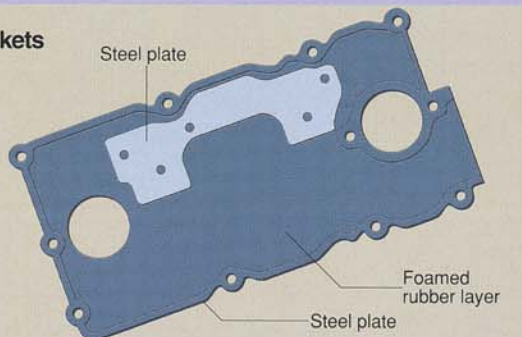
Application of attachment parts and press forming are possible.

### Advantages:

- High sealability of Metafoam
- High vibration damping effect
- Reduction of part numbers
- Reduction of assembly process

### ■ Integrated flange/gaskets

The ventilation baffle plate attached to the back of the head cover is made of Metafoam with one side featuring a foamed rubber coating.



## "METAFOAM" VIBRATION FLOATING GASKET



These are multi-layer gasket consisting of a stainless steel layer in the center and Metafoam on both surfaces and washers of Metakote at the bolt portion.

### Advantages:

- High vibration floating effect

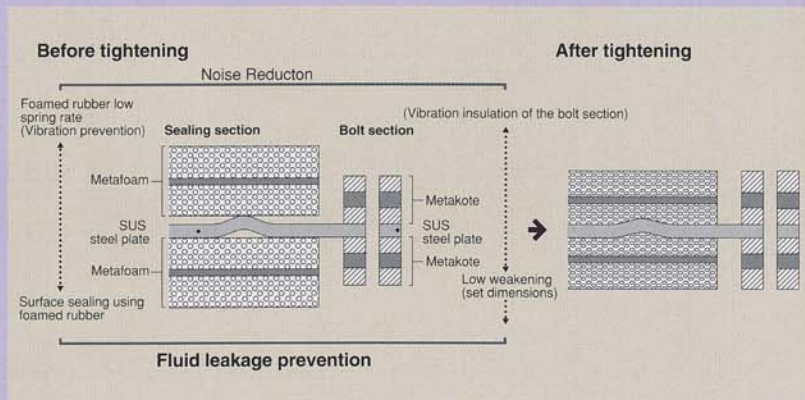
Foamed rubber insulates vibration from noise source.

- Prevention of bolt torque reduction

Metakote at bolt portion prevents torque reduction.

- High sealability

Metafoam surface seal is backed up with a lineal seal by stainless steel embossment.



## "METAKOTE" SEALING WASHERS



Metakote seal washers have become the seal washer of choice due to their excellent characteristics.

### Advantages:

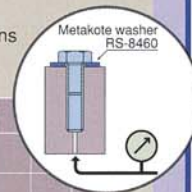
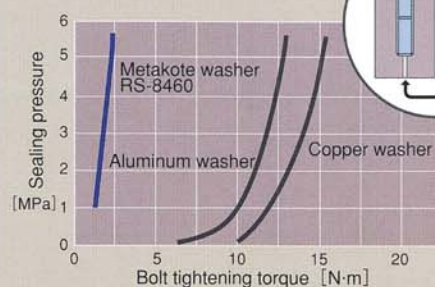
- Very high sealability in comparison with conventional copper and aluminum washers.
- Constant sealability can be obtained with low bolt torque.
- Therefore, bolt load can be reduced drastically.
- No torque reduction

### ■ Sealing properties of Metakote washers

Sealing test method

Bolts used: M8

Sealing surface roughness: 30 microns





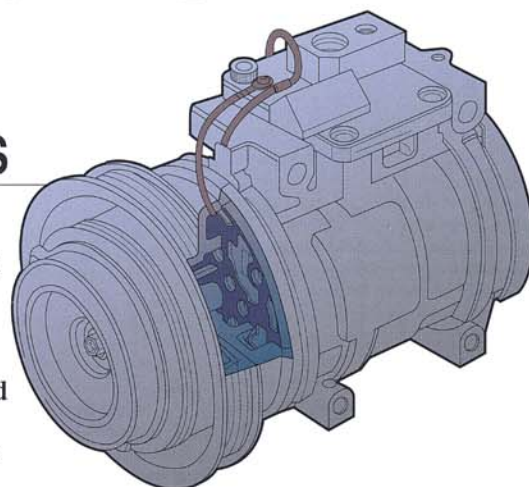
# AIR CONDITIONERS

They prove their true value in high-temperature, high-pressure environments

## CAR AIR CONDITIONING COMPRESSORS

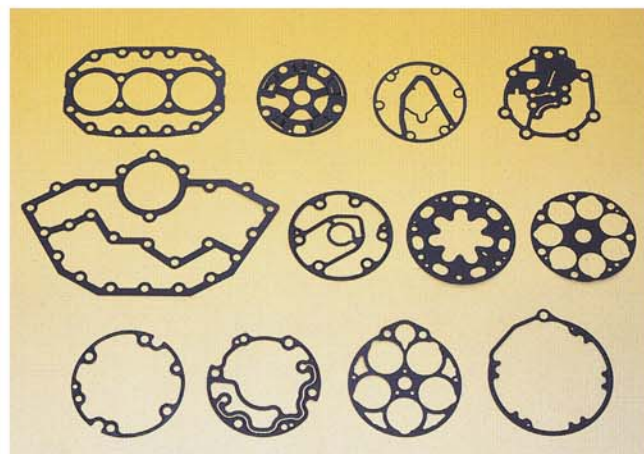
In air conditioning compressors, the refrigerant is compressed in high pressure gas form and the internal temperature reaches over 150°C. Recent environmental regulations demand a perfect refrigerant seal.

Under these circumstances, in addition to pressure resistance and heat resistance, high fluid resistance is required for the gasket. NICHIAS offers a wide variety of products which meet the severe conditions required by compressor makers.



### COMPRESSOR GASKETS

"Metakote" is made of a metal sheet coated with special formulation NBR possessing freon gas and refrigerator oil resistance. By adding embossment along with seal line, it increases pressure resistance. The formulation has proved its excellency when refrigerant was changed to new Freon.



Compressor gaskets

### Compatible with new HFCs Metakote's excellent resistance to Freon and refrigerator oil

Material		Immersion environment			
		R12 +suniso5GS		R134a + PAG*	
		Swelling (Thickness change)	Foaming cracking	Swelling (Thickness change)	Foaming cracking
Metakote	RS-4525	0.1%	N/A	0.5%	N/A
Comparison rubber sheet	3mm thick	0.3%	Occurrence	1.0%	Occurrence

\*PAG Polyalkylene glycol

### VIBRATION BUFFER MATERIALS

The compressor noise of car air conditioning is far more audible than engine noise because of the high frequency. Metalamine is an effective vibration buffer material between the flanges of the compressor.



Vibration buffer materials

### VIBRATION DAMPING FOR ELECTRO-MAGNETIC CLUTCHES

When an electromagnetic clutch starts, it hits a metal plate and thus generates a hitting noise. By applying Metaplus on the metal plate, it insulates vibration and controls the noise.



# General Industry

## Metakote products are used in many industries

### Applications: Industry

Applications:Industry	Part used	Material
Outboard Motors	Engine gasket	Metakote
Water Motorbikes	Engine gasket	Metakote
Snowmobiles	Exhaust manifold gasket	Metakote
Agricultural Machines	Flux control gasket	Metafoam
Hydraulic/Pneumatic Equipment	Seal washer	Metakote
	Hydraulic control gasket	Metafoam
Air Conditioning Equipment	Oil cover gasket	Metakote
	Air Filter spacer	Metafoam
Industrial Refrigerating Machinery	Gasket	Metafoam
Industrial Brake/Clutch	Anti-squeal material	Metakote / Metaplus
	Vibration buffer material	Metaplus
Industrial Piping	Pipe flange gasket	Metakote / Metafoam
	Pipe external packing for soundproof boards	Metalamine / Metaplus
Electric Power Plant & Petrochemical Industry	Ducts/Electric precipitator outer packaging	Metalamine outside board
Hand Tools	Vibration buffer gasket	Metafoam
Battery Cars	Inverter cover for EV car	Metafoam (one side foamed parts)
Others	Various caps, end plates	Metafoam (one side foamed parts)



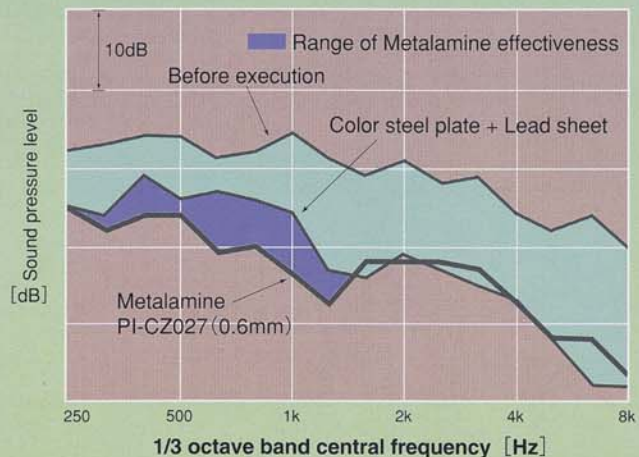
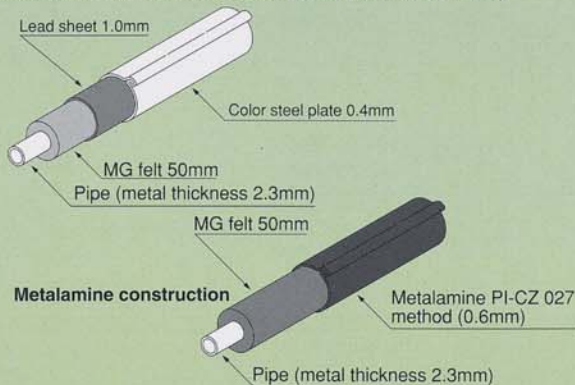
### Outside soundproofing packing

#### This highly efficient soundproofing material is environmentally friendly

Usually, the structure is surrounded by an outer casing. Therefore, the vibration caused by operation of equipment and fluid currents in structures spreads through the outer casing through the mounting of the equipment. It is amplified like the vibration board of a speaker and converted into sound which causes noise problems. An effective countermeasure is to use Metalamine as the outer casing. In addition to the vibration damping effect, it is also waterproof and attractive in appearance, qualities required of an outside packing material. This material has already been used for the electric precipitators of thermal power plants, flue ducts and chemical plants, and it has earned an excellent reputation.

#### ■ Lagging effect of Metalamine for piping arrangement

##### Conventional construction method (color plate + lead sheet)



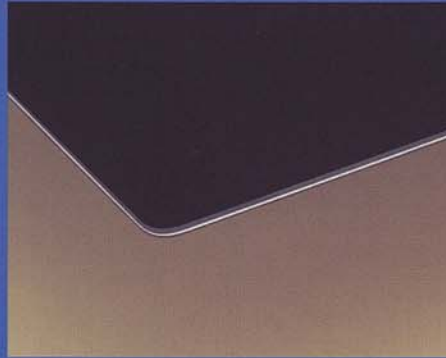


# Product Guide

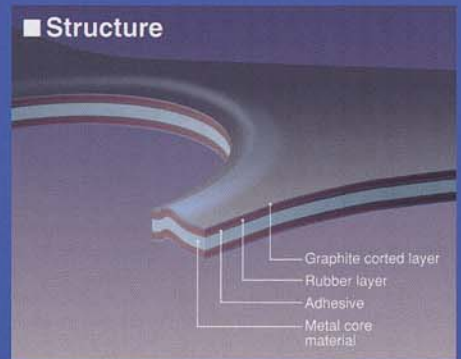
TOMBO No.1600

## [Metakote®]

A high-performance gasket material formed from the lamination of rubber and metal sheets.



### ■ Structure



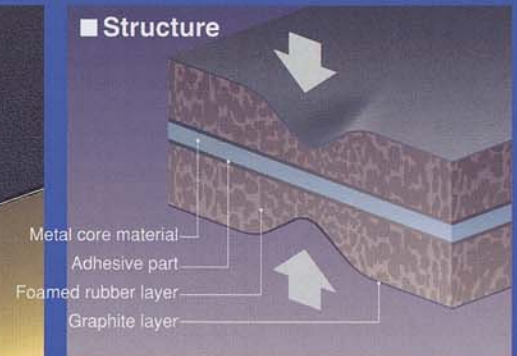
TOMBO No.1608

## [Metafoam®]

A gasket material made of metal sheet coated with foamed rubber for excellent sealing and vibration damping properties.



### ■ Structure



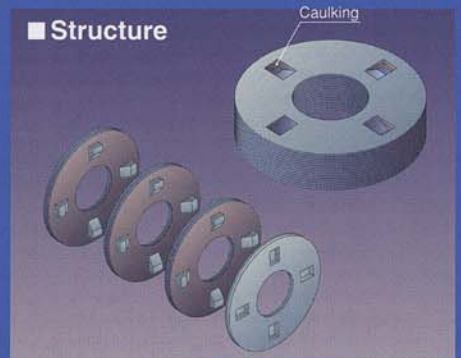
TOMBO No.1618

## [Metalamine Washer]

Wear resistant! A new type of vibration damping washer.



### ■ Structure



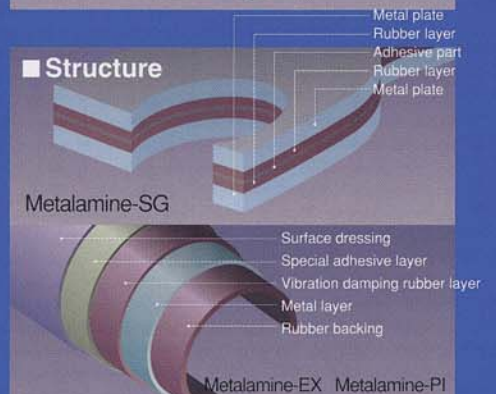
TOMBO No.1616

## [Metalamine®]

Rubber sandwiched between steel sheets for high-performance vibration damping.



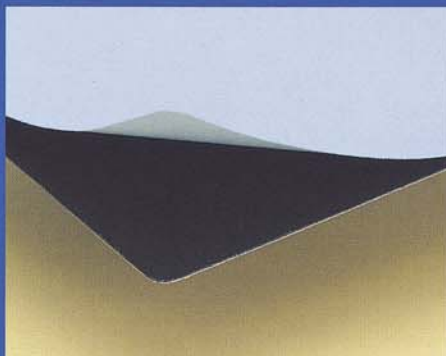
### ■ Structure



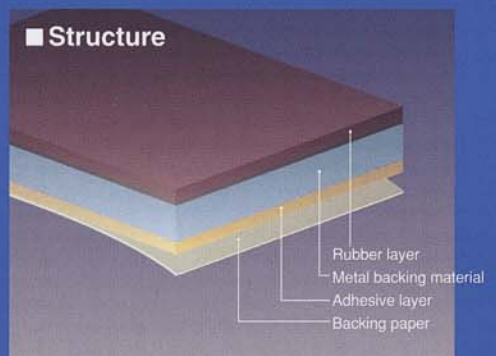
TOMBO No.1612

## [Metaplus®]

A new vibration damping material that can be stuck straight onto surfaces, yielding excellent damping effects.


















### ■ Structure





## [Metakote®] ■ Product specifications

	Grade name	Thickness (mm)	Metal core material		Rubber		Prevention material for surface scorching	
			Material	Thickness (mm)	Material	Thickness (mm)		
Automobile gaskets Ordinary gaskets	TS-3020 	0.30	Cold-rolled steel sheet SPCC-4	0.20	NBR-based (automotive use)		0.05×2 sides	
	TS-3525 	0.35		0.25			0.10×2 sides	
	TS-4525 	0.45					0.05×2 sides	
	TS-9080	0.90	Cold-rolled steel sheet SPCE	0.80			0.05×2 sides	
	TU-2620 	0.26	Stainless steel sheet SUS301H	0.20	NBR-based (automotive use)	Standard seal	0.03×2 sides	
	TU-3020 	0.30					High-perfor- mance seal	0.05×2 sides
	TX-2520	0.25				0.025×2 sides		
	TX-3020	0.30				0.05×2 sides		
	TX-4020	0.40				0.10×2 sides		
	TX-3025	0.30		0.25		0.025×2 sides		
Cylinder head gasket backing material	CY-2520	0.25			0.20	NBR (for head gaskets)	High-resistant high-performance seal	0.025×2 sides
	CY-3025	0.30			0.25			
	FU-2420 	0.24	0.20		Fluoro-rubber	Standard seal	0.02×2 sides	
	FU-2925	0.29	0.25					
	FX-2420 	0.24	0.20			High-perfor- mance seal	0.02×2 sides	
	FX-2925	0.29	0.25					
Heat resistant seal washers	FS-110100	1.10	Cold-rolled steel sheet SPCD	1.00	Fluoro-rubber		0.05×2 sides	
Gaskets for refrigerators Ordinary gaskets	RS-3020 	0.30	Cold-rolled steel sheet SPCC-4	0.20	NBR-based (refrigerator/general use)		0.05×2 sides	
	RS-3825 	0.38		0.25			0.065×2 sides	
	RS-4525 	0.45					0.10×2 sides	
	RS-5030 	0.50		0.30				
	RS-6040 	0.60		0.40		0.10×2 sides		
	RS-7050	0.70		0.50		0.12×2 sides		
	RS-8460	0.84		0.60				
	RS-120100	1.20	Cold-rolled steel sheet SPCD	1.00		0.10×2 sides		
	RA-3825	0.38	Aluminum A5052	0.25		0.065×2 sides		
	RA-4525	0.45				0.10×2 sides		
	RA-8460	0.84			0.60	0.12×2 sides		
Gaskets for abrasion resistant components	NS-3020 	0.30	Cold-rolled steel sheet SPCC-4	0.20	NBR-based High-strength type		0.05×2 sides	
	NS-3525	0.35		0.25				
	NS-5030 	0.50		0.30		0.10×2 sides		
	NS-8460 	0.84		0.60		0.12×2 sides		
Anti-brake-squeal seal	RB-6440	0.64	Cold-rolled steel sheet SPCC-1	0.40	NBR-based		0.12×2 sides	

●The grades listed above are subject to change without notice. Be sure to confirm details in advance.

●Please enquire for information on other grades.

Standard stocked items

Products marked with an "◎" are kept in stock at all times. Other grades, in principle, are manufactured to order. Please enquire for further information concerning delivery.

## [Metafoam®] ■ Product specifications

	Grade name	Thickness (mm)	Metal core material		Rubber		Prevention material for surface scorching	Remarks	
			Material thickness (mm)		Material thickness (mm)				
General purpose - Ventilation baffle plate gaskets - Brake booster gaskets	PS-12020	1.20	Cold-rolled steel sheet spcc-4	0.20	NBR-based foam rubber	0.50×2 sides	Graphite-based	Wear resistant Can be subject to simple processing	
	PS-8525	0.85		0.25		0.30×2 sides			
	PS-6020	0.60		0.20		0.20×2 sides			
	PS-4515	0.45	SPCC	0.15		0.15×2 sides			
	PS-160100	1.60	SPCD	1.0		0.30×2 sides			
For integrating gaskets and flanges	PS-16080U	1.60	SPCE	0.80	NBR-based foam rubber	0.80×1 sides	Graphite-based		
General purpose	PA-15025	1.50	Aluminum A5052	0.25		0.65×2 sides			Corrosion resistant Can be subject to simple processing
	PA-8525	0.85				0.30×2 sides			
	PA-6525	0.65				0.20×2 sides			
Integrated reed valves, etc.	PU-15020	1.50	Stainless steel sheet	0.20				0.65×2 sides	Corrosion resistant
	PU-8020	0.80	SUS301H		0.30×2 sides				

●The grades listed above are subject to change without notice. Be sure to confirm details in advance.

●Please enquire for information on other grades.



## [Metalamine Washer] ■ Product specifications

	Also functions as a seal (bolt seal)			Standard type	
Lamination code	BF3	BC3	BC4	AC3	AC4
Features	Surface area			Rubber (NBR-based)	
	No. of laminations			Aluminum	
	Thickness (mm)				
	2.2	2.8	3.8	2.6	3.6
Remarks	All can be produced to fit M6 or M8 bolt sizes.				

- The grades listed above are subject to change without notice. Be sure to confirm details in advance.
- Please enquire for information on other grades.

## [Metalamine®] ■ Product specifications

	Type	Grade	Total thickness (mm)	Metal core material					Rubber (middle layer)		Remarks
				Surface or surface dressing			core		Material	Thickness (mm)	
				Material	Color	Thickness (mm)	Material	Thickness (mm)			
Automotive, general use	Metalamine-SG	SGS-7750	0.77	Cold-rolled steel sheet	—	0.25	Cold-rolled steel sheet	0.25	NBR-based	0.27	Rubber coated lagging
	Metalamine-FC	FGS-10050-RD	1.01	Cold-rolled steel sheet	—		Cold-rolled steel sheet				
		FGA-10050-RD		Aluminum	—		Aluminum				
Outer covering (Can be molded around corners and bends)	Metalamine-EX	EX-CZ027	0.68	Colored zinc coated steel sheet	Silver or ordered color	0.27	Cold-rolled steel sheet SPCE-S	0.25	NBR-based	0.09	The back side is coated with a rust-preventing rubber coating.
		EX-CZ040	0.81			0.40					
		EX-CZ050	0.91			0.50					
		EX-CZ120	1.61			1.20					
		EX-AZ050	0.91	Aluminum coated steel sheet		0.50					
		EX-AZ120	1.61			1.20					
		EX-VC027	0.88	PVC coated steel sheet	Ordered color	0.47					
		EX-VC040	1.01			0.60					
Pipe use (Can be lock-seamed)	Metalamine-PI	PI-CZ027	0.60	Colored zinc coated steel sheet	Silver	0.27	Cold-rolled steel sheet SPCE-S	NBR-based	0.09		
		PI-AL030	0.71	Aluminum A-3003	—	0.30	AluminumA-5052-H38			0.25	
		PI-SU030	0.60	Stainless SUS304	2B		Stainless SUS304			0.15	
		PI-CS030		Color stainless SUS304	Silver						
				Stainless SUS304	Dull finish						

- The grades listed above are subject to change without notice. Be sure to confirm details in advance.
  - Please enquire for information on other grades.
- Standard stocked items  
Products marked with an "◎" are kept in stock at all times. Other grades, in principle, are manufactured to order. Please enquire for further information concerning delivery.

## [Metaplus] ■ Product specifications

Grade name	Total thickness (mm)	Rubber		Metal core material		Pressure sensitive adhesive	
		Material thickness (mm)		Material thickness (mm)		Material thickness (mm)	
RB-6440-ZO	0.74	NBR-based	0.12×2 side	Cold-rolled steel sheet	0.40	Heat-resistant acrylic-based [Z]	0.10
WB-5040-ER	0.60		0.10×1 side	SPCC-4		Heat-resistant acrylic-based [E]	
WA-5525-EP	0.65	NBR-based foam rubber	0.30×1 side	Aluminum A5052	0.25		
E1-4840	0.48	Anti-rust coating	—	Cold-rolled steel sheet SPCC-4	0.40		0.08

- The grades listed above are subject to change without notice. Be sure to confirm details in advance.
- Please enquire for information on other grades.
- The metal backing material is not included in total thickness.





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