



Semi-metal gasket

A semi-metal gasket consists of a combination of a metal, such as a stainless steel sheet, and a non-metal, such as expanded graphite. It can be used at higher temperature and pressure than a soft gasket. Nichias offers the following semi-metal gaskets.

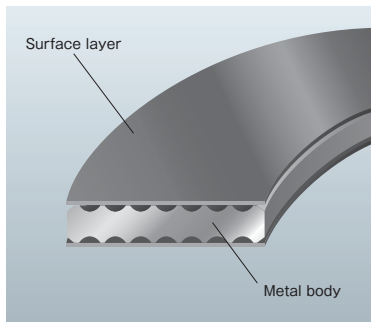
For details of kammprofile gaskets, see P.32, P.35 and P36.

For details of vortex™ gaskets, see P.32 to 34, and P.38 to 45.

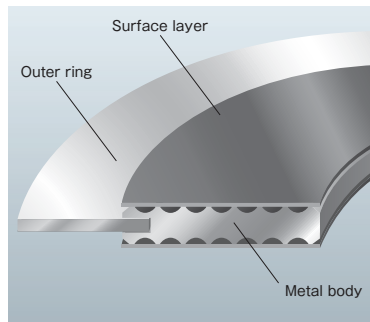
For details of metal jacketed gaskets, see P.34, P46 and P47.

Kammprofile gaskets

〈Standard type〉



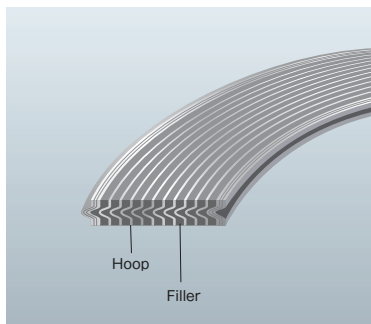
〈Outer ring type〉



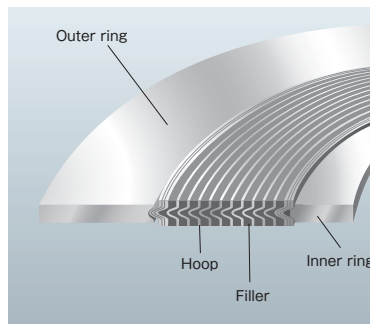
A kammprofile gasket is a semi-metallic gasket consisting of an expanded graphite sheet or a PTFE sheet bonded to both faces of a metal ring that has a special groove cut in it. It features a construction in which the convex surface has been flattened so as to greatly reduce damage to the flange.

Vortex™ gaskets

〈Basic type〉



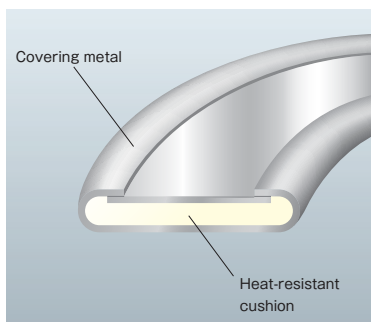
〈Inner and outer ring type〉



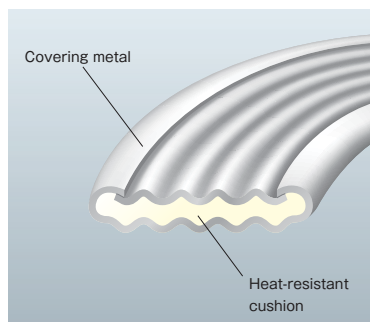
A vortex gasket consists of alternate layers of thin V-shaped metal band plates called hoops and cushion material called filler, wound in the shape of a vortex. There is also a type that has metal reinforcing material (inner and outer rings). When using this type of gasket, it is necessary to select an appropriate shape according to the type of flange to be used.

Metal jacketed gasket

〈Flat type〉



〈Corrugated type〉



A metal jacketed gasket is a gasket that has an inorganic heat-resistant cushion covered by a thin metal plate. It is manufactured in various shapes and covering methods depending upon the intended application and the location where it is to be used. It is used for high temperature coupling flanges and man-holes, etc. for heat exchangers, pressure vessels, towers and vessels, equipment, valves, and so on.



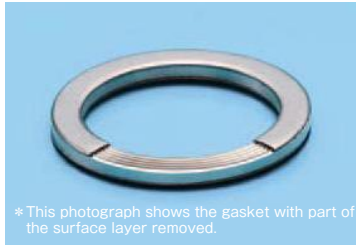
Comparison of semi-metal gaskets

Product name
Construction
Features
Service range
Recommended service range
Usable range (The usable range varies according to the conditions of use. Be sure to consult us in advance.)

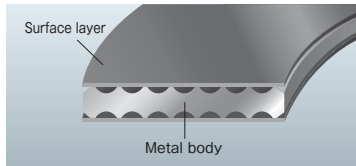
TOMBO No.

1891 series

Kammprofile gasket



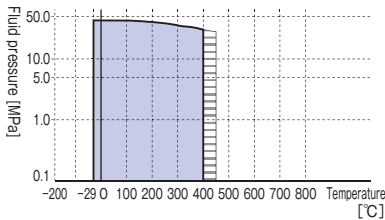
* This photograph shows the gasket with part of the surface layer removed.



- Can be used even under severe conditions encountered in a heat cycle, and exhibits excellent sealing performance even when a small tightening force is used.
- There is no need for an inner ring to stop buckling. This enables this gasket to be designed with a narrow width.
- There is no need to worry about the gasket breaking up even in the case of a large bore gasket.
- Suitable for use in heat exchangers and pressure vessels.

Water-type, oil-type, gas-type or corrosive fluids

TOMBO No.1891-GR

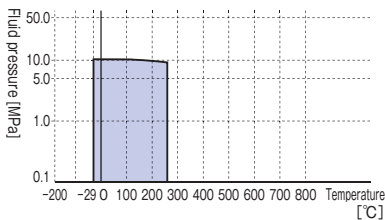


Maximum service temperature 450°C

Maximum service pressure Class 2500 (Approx. 43MPa)

Water-type, oil-type, gas-type or corrosive fluids

TOMBO No.1891-TF



Maximum service temperature 260°C

Maximum service pressure Class 600 (Approx. 10MPa)

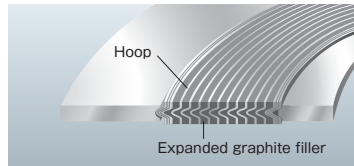
* When using TOMBO No.1891 at Class 400 or higher, use an interlocking type (M&F) or a grooved type (T&G) flange.

For details of a kammprofile gasket, see P.35 and P.36.

TOMBO No.

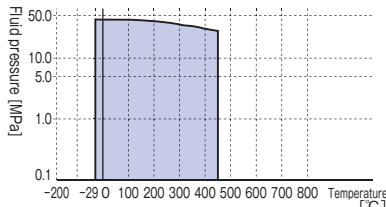
1834R-GR series

GRASEAL™ Vortex™ gasket



- Exhibits excellent sealing performance even under at severe conditions such as high temperature and high pressure, extremely low temperatures, or heat cycles.
- It is suitable for a variety of applications in pipes, equipment, and so on.

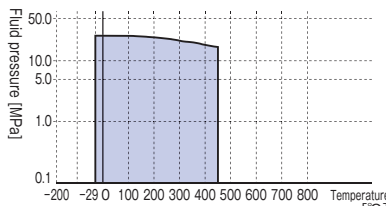
Water-type fluid



Maximum service temperature 450°C

Maximum service pressure Class 2500 (Approx. 43MPa)

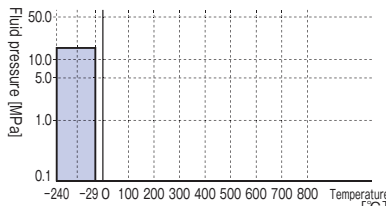
Oil-type, gas-type or corrosive fluids



Maximum service temperature 450°C

Maximum service pressure Class 1500 (Approx. 26MPa)

Low temperature fluids



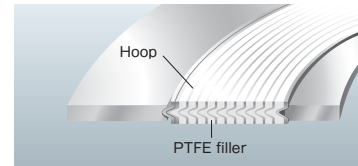
Maximum service temperature -240°C

Maximum service pressure Class 900 (Approx. 16MPa)

TOMBO No.

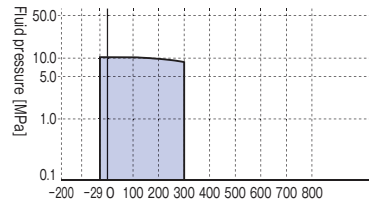
9090-IOR series

NAFLON™ Vortex™ gasket



- Can be used with corrosive fluids and pure oxygen gas, in vacuum lines that require airtightness.
- Can be used in pipes, pressure vessels, heat exchangers, valve bonnets, and so on.

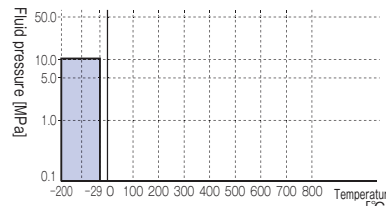
Water-type, oil-type, gas-type or corrosive fluids



Maximum service temperature 300°C

Maximum service pressure Class 600 (Approx. 10MPa)

Low temperature fluids



Maximum service temperature -200°C

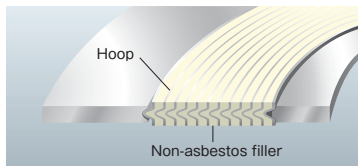
Maximum service pressure Class 600 (Approx. 10MPa)

These gaskets use metal as the base material, so they can be used at higher temperature and pressure compared to a sheet gasket. These gaskets fit well with the flanges, so a good seal can be obtained using a smaller tightening force than that of a metal gasket.

TOMBO No.

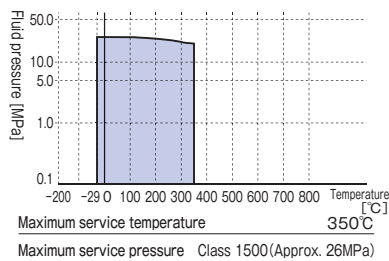
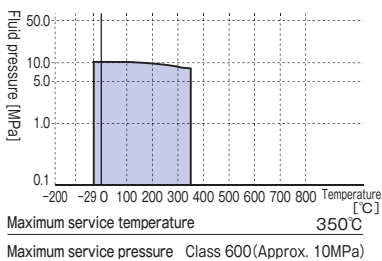
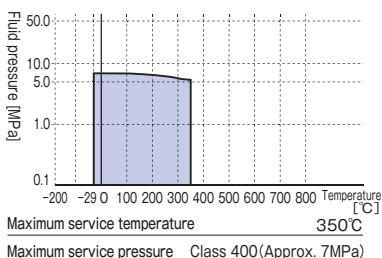
1834R-NA series

NA Vortex™ gasket



● This is an economical vortex™ gasket which uses non-asbestos (NA) paper as a filler.

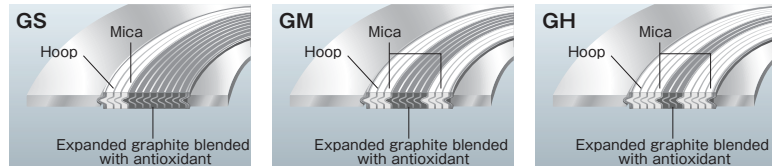
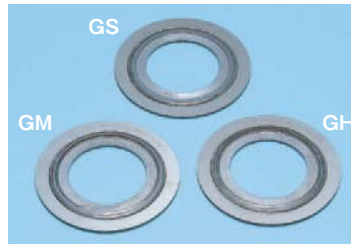
* So long as there are no restrictions such as the inability to use black filler, the use of GRASEAL™ Vortex™ which has superior heat resistance and sealing performance is recommended.

Water-type fluid**Oil-type fluid****Gas-type fluid**

TOMBO No.

1836R-GS/-GM/-GH series

Vortex™ gasket -GS/-GM/-GH



● This gasket uses a special expanded graphite filled with antioxidant, enabling it to be used at a temperature of 450°C or higher.

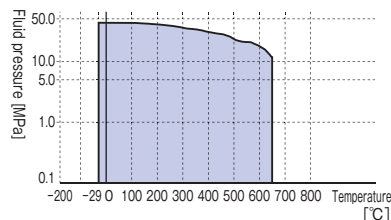
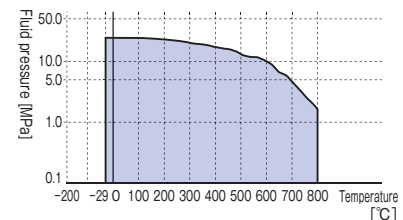
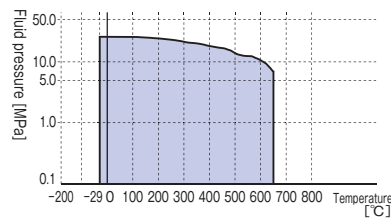
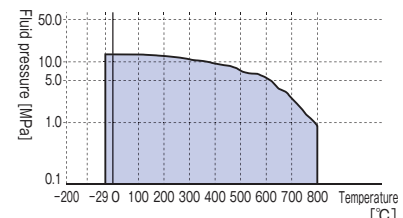
* The sealing performance of the normal GRASEAL™ vortex™ gasket is superior to this type.

● One of three types, -GS, -GM and -GH, can be selected according to the conditions of use.

-GS series: A location where oxygen is not contained in the internal fluid

-GM series: Temperature of 450°C or higher

-GH series: Temperature of 650°C or higher

Water-type and oil-type fluids**-GS series, -GM series****Water-type and oil-type fluids****-GH series****Oil-type and gas-type fluids****-GS series, -GM series****Oil-type and gas-type fluids****-GH series**

* In the case of a gas-type fluid at 650°C or higher, use Class 600 or lower.

* This product has been designed to minimize the loss of expanded graphite through oxidation. If oxygen is contained in the internal fluid, however, it is conceivable that the loss of expanded graphite will start to occur when the temperature exceeds 450°C. Do not use this type of gasket at 450°C or higher if the internal fluid contains oxygen.

For details of vortex™ gaskets, see P.38 to P.45.

Product name

Construction

Features

Service range

Product name

Construction

Features

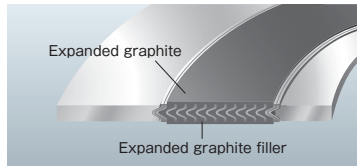
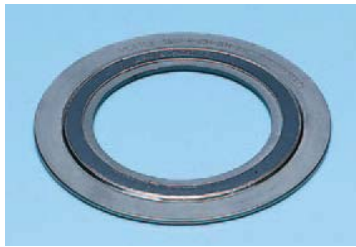
Service range

Recommended service range
 Usable range (The usable range varies according to the conditions of use. Be sure to consult us in advance.)

TOMBO No.

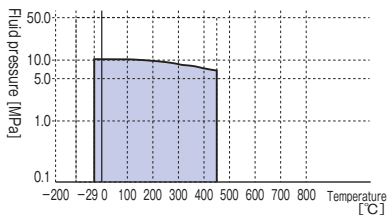
1839R series

GRASEAL™ Vortex™ gasket -L



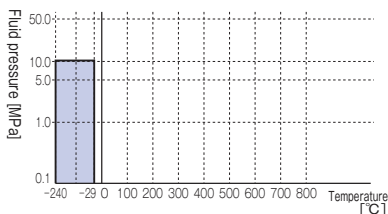
- This gasket exudes a large quantity of filler on the seal face, enabling a satisfactory seal to be obtained when using a smaller tightening force than that of a normal GRASEAL vortex gasket.
- Can be used in a low-temperature line containing LNG, LN₂, liquefied air, and so on.

Water-type, oil-type, gas-type or corrosive fluids



Maximum service temperature 450°C
 Maximum service pressure Class 600 (Approx. 10MPa)

Low-temperature fluid

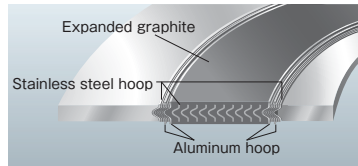


Maximum service temperature -240°C
 Maximum service pressure Class 600 (Approx. 10MPa)

TOMBO No.

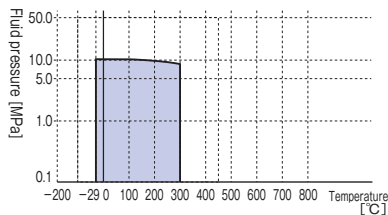
1839R-AL series

GRASEAL™ Vortex™ gasket -AL



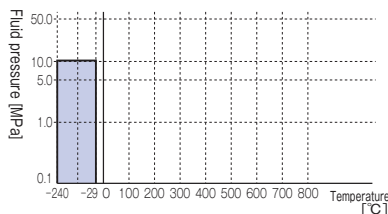
- This GRASEAL vortex gasket for aluminum flanges is constructed in such a way that it does not readily damage the flange face.
- Can be used in low-temperature lines carrying LNG, LN₂, and so on.

Water-type, oil-type and gas-type fluids



Maximum service temperature 300°C
 Maximum service pressure Class 600 (Approx. 10MPa)

Low-temperature fluid



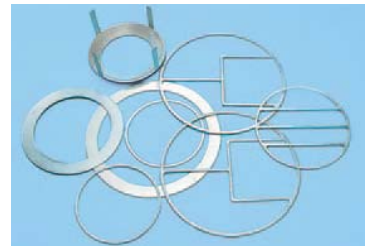
Maximum service temperature -240°C
 Maximum service pressure Class 600 (Approx. 10MPa)

For details of vortex gaskets, see P.38 to P.45.

TOMBO No.

1841/1861

Metal jacketed gasket/Corrugated metal jacketed gasket



TOMBO No.1841



TOMBO No.1861

- This gasket can be manufactured in various shapes, such as a branched type, according to the particular application and the intended location.
- It is used in heat exchangers, pressure vessels, towers and vessels, equipment, valves, high-temperature coupling flanges, manholes, and so on.

The maximum service temperature of a metal jacket differs according to the type of core material and cover metal.

Maximum service temperature for different core materials

Millboard	530°C
Millboard for high-temperature	1300°C
Expanded graphite	400°C

Maximum service pressure

6MPa

Maximum service temperature by cover metal

Carbon steel	535°C
304 steel	800°C
316 steel	800°C
Copper	400°C
Aluminum	400°C
310S steel	1150°C
Monel	800°C

For details of a metal jacket gasket, see P.46 and P47.