METEX
A United Capital Company

TECHNICAL BULLETIN NUMBER 109



STATIC FLANGE GASKETS

High-Temperature-Resistant, Static Metal Gaskets for Demanding Exhaust Applications

Metex static, flange ring gaskets create a secure seal under extremely low and high temperatures and in demanding corrosive environments. Metex static flange gaskets can provide:

- Zero leakage at pressures of up to 2 Bar
- Recovery after compression of 90%
- Minimum sealing stress of 10N/mm2
- Temperature resistance from -50° C to 800° C
- Cross section from 4 mm to 8 mm
- Inside diameters from 38 mm to 127 mm
- Custom cross-sections and ID also available

Metex static ring gaskets are designed with a retention feature which ensures they remain in place during the assembly process. In addition, the grooved mating flanges protect the sealing element from overcompression and guarantee flange-to-flange contact.

Custom solutions to meet demanding sealing challenges

Metex can custom design a high-integrity yet cost-effective gasket sealing solution using a variety of different shapes and metal alloys to meet your specific requirements—based on more than four decades of technical expertise in developing high-temperature spherical seals and gaskets to customers worldwide.

CUSTOM-ENGINEERED SOLUTIONS IN KNITTED WIRE MESH

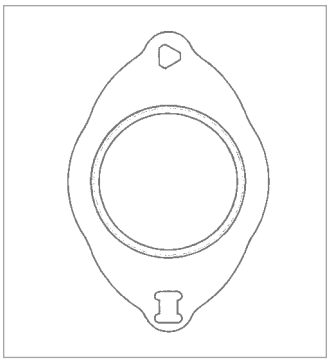
For forty years, Metex design, development, and manufacturing engineers have been producing engineered components that take maximum advantage of the unique characteristics and robust nature of knitted wire mesh. Its interlocked looped structure, which offers excellent resiliency, memory—even when subjected to high temperatures as well as high-tensile or compressive stress—and strength, make knitted wire the ideal choice in materials when both performance and cost are paramount.

Metex products now meet a wide range of critical needs—from providing flexible, yet durable, seals and joints to noise attenuation, thermal insulation, and filtration—in some of the most demanding industrial applications and environments.


Complete in-house design, R&D, and test facilities


Flexibility in manufacturing for JIT requirements

ISO/TS 16949:2002
FM 78882
REGISTERED



PRODUCT BENEFITS

- ☐ Resilient—maintains seal between flanges for leak-free performance
- ☐ High Temperature—core maintains resiliency at extreme operating temperatures
- ☐ Durable—all stainless steel construction fights corrosion
- ☐ Reusable
- ☐ Simplified Installation—slight oval shape of gasket locks firmly into flange groove or around pipe OD during assembly. Sheet metal carrier fits over studs, holding gasket in place.

Metex all-metal ring gasket with carrier

Exhaust System Sealing Technology that Keeps Pace with Emission Regulations

As the automotive industry continues to keep pace with new emissions regulations, the requirements of exhaust system joints become increasingly demanding. These joints must not only prevent the release of untreated exhaust gas, they must also combat ingestion of oxygen into the exhaust system—which can have adverse effects on the closed-loop emission control system.

To meet these stringent demands, Metex engineers have developed a system approach to joint design, and coupled that with advances in seal and gasket materials, geometry, and construction.

An all-metal ring gasket that improves performance

A thin metal jacket fully encapsulates a knitted wire mesh core. This all-metal construction eliminates filler material burn-out and provides far greater resiliency over traditional automotive flange gaskets—even at elevated temperatures. In addition, all component materials can be custom-tailored to achieve further gains in resiliency.

The gasket is designed to fit into a groove in the flange, with the groove depth sized to limit ring compression, allowing the gasket to operate in a set portion of the compression/recovery curve.

Product Description

- Designed for installation between two geometrically identical flanges welded to adjacent system components.
- The slight oval shape of the gasket locks firmly into the flange groove or around the pipe's OD during assembly.
- The seal is constructed of a stainless steel foil ring with a round, rectangular, or oval cross-section formed around a resilient knitted wire mesh core.
- This durable seal has unique spring-back properties and, due to its all-metal design, is ideal for high-temperature and high-corrosion environments.
- Available with a sheet-metal carrier which fits over the studs that hold the gasket in place in order to seal the joints created when two flat flanges are rigidly bolted to one another. The carrier portion of this gasket is typically 0.2 mm thick and usually matches the shape of their companion flanges.

Durability Testing

Metex advances in core material design and construction have led to an improved version of the metal foil ring gasket typically utilized in exhaust system joints. The following tables compare the Metex static flange solution with hollow metal ring and metal ring/graphite core types.

Durability Test Data

Two bolt static flange joints were rigidly fixed 40 mm from the centerline of the joint on the inlet pipe side. A hydraulic actuator was attached to the outlet pipe side of the joint, 115 mm away from the centerline. Test samples were subjected to the following block cycle program: ±335 N at 10 Hz for 50,000 cycles; ±225 N at 20 Hz for 500,000 cycles; and ±180 N at 30 Hz for 1,500,000 cycles.

A natural gas burner was used to force hot gas through the exhaust joint. The control temperature was measured by a thermocouple clamped to the pipe 25 mm upstream of the inlet flange. The total test time was approximately 22 hours.

Before and After 500° C Durability Test

Leakage rate in standard liters per minute at 100 kPa

Component	Before Test	After Test
Hollow Metal Ring	<0.1, <0.1, <0.1	0.38, 0.26, 0.31
Metal Ring, Graphite Core	<0.1, <0.1, <0.1	<0.1, <0.1, <0.1
Metal Ring, Metex Mesh Core	<0.1, <0.1, <0.1	<0.1, <0.1, <0.1

Before and After 700° C Durability Test

Leakage rate in standard liters per minute at 100 kPa

Component	Before Test	After Test
Hollow Metal Ring	<0.1, <0.1, <0.1	1.0, 1.2, 1.5
Metal Ring, Graphite Core	<0.1, <0.1, <0.1	<0.91, <0.75, <0.52
Metal Ring, Metex Mesh Core	<0.1, <0.1, <0.1	<0.1, <0.1, <0.1

During the low temperature test, the current gasket designs are in the vicinity of their operating temperature limits. The hollow ring, with its limited resiliency, began to display a loss of sealing ability. At this temperature, the graphite core and mesh core ring gaskets retain sufficient resiliency, and thus sealing ability. However, after the increased temperature durability test, the hollow and graphite core ring gaskets reach the temperature where insufficient resiliency remains.

In contrast, the Metex knitted wire mesh core in the improved version of the flange-to-flange joint ring gasket did not relax due to temperature or dynamic loading, with no loss of sealing ability.

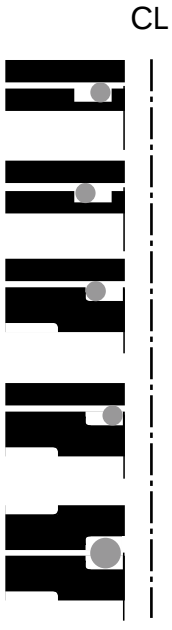
The Metex family of all-metal static flange gaskets provide far greater resiliency over traditional automotive flange gaskets, even at elevated temperatures

Metex, oval, all-metal ring gaskets are available in any size, custom cross-section, and ID

Installation Data

Type of Interference	Method
• ID Interference—Oval Ring Gasket in Round Groove Groove in one flange—upstream or downstream	Snap in Place
• OD Interference—Oval Ring Gasket in Round Groove Groove in one flange—upstream or downstream	Snap in Place
• OD Interference Groove or “Semi-Pierce” in Upstream Flange	Snap in Place
• ID Interference Groove or “Semi-Pierce” in Upstream Flange	Snap in Place

• Possible to split groove or “Semi-Pierce” if required groove is too large
ID interference possible for snap fit
OD interference difficult due to shallow groove



Metex Knitted Wire Mesh Products Solve Problems Cost Effectively

Metex knitted wire mesh is manufactured from an "endless" wire that is formed into loops and subsequently networked, providing elasticity and resilience not found with woven wire or powdered metal products.

The diversity and versatility of wire mesh enables Metex to produce products for a wide variety of applications, including:

- Seals
- Breathers
- Coalescers
- Gaskets
- Heat Shields
- Navin Rings
- Catalytic Converter Support Mesh
- Heat Wicks
- Noise Attenuators
- Mufflers
- Air Filters
- Electronic Shielding
- Ball Joint Seal Systems
- Air Gap Rings
- Filters
- Shock Absorbers
- Protective Coverings
- Exhaust Seals
- Catalytic Converter End Rings
- Flame Arrestors

Our **Static Flange Gaskets** continue a longstanding Metex tradition of integrating the right designs, materials, and manufacturing methods to meet customer needs for optimal performance at lowest possible cost.

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