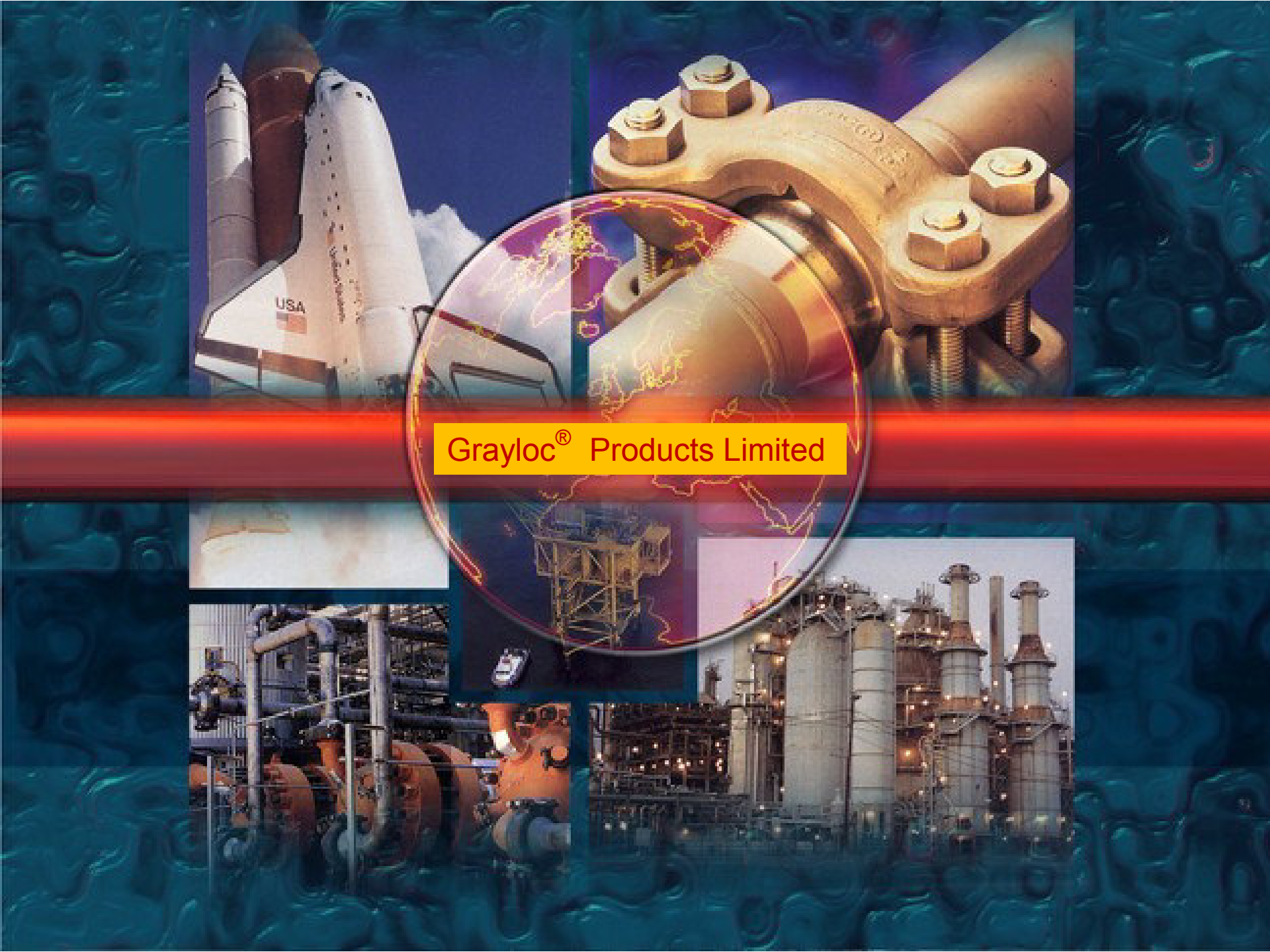

Grayloc® Products Limited

Grayloc® Compact Flanges

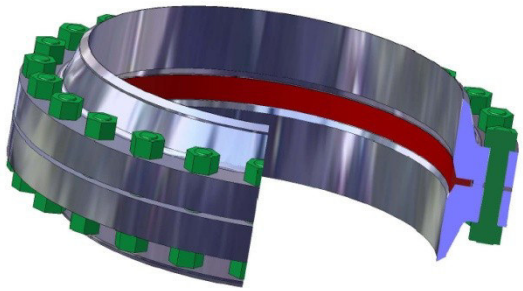
Grayloc Compact Flange

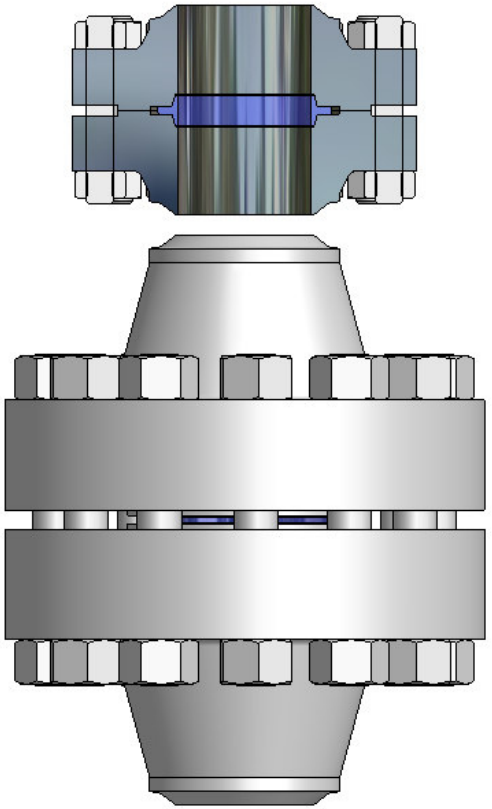
A superior lightweight and compact solution for critical service piping and pressure vessel applications

Utilizes well proven Grayloc® metal to metal seal ring technology

Compact in comparison to ANSI or API flanges

Less weight than ANSI or API flanges, & proven cost effective solution

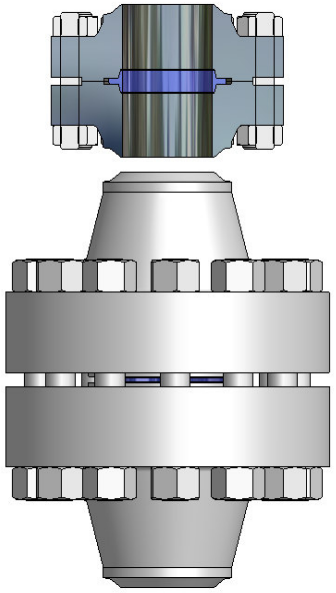




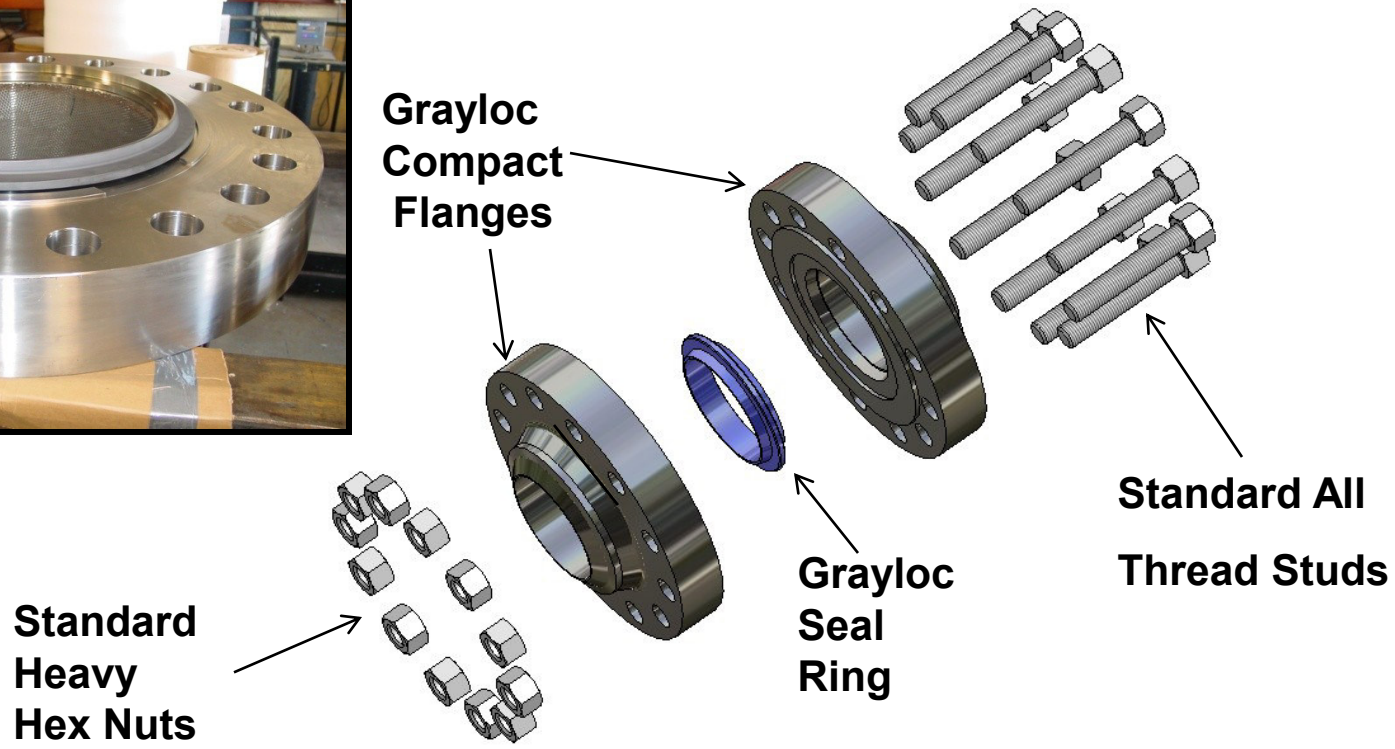
Standard ANSI or API

Grayloc® Compact Flange Applications

- Process Piping (ANSI 300# - 4500# / API 2M - 20M)
- Production Manifolds / Flow Lines
- Compressors / Pumps
- Vessel / Reactor Closures
- Instrumentation
- Jacketed Piping Systems
- ASME Code Pressure Vessels
- Hazardous Service (Subsea, Refinery & Nuclear)



Grayloc® Compact Flange - Components



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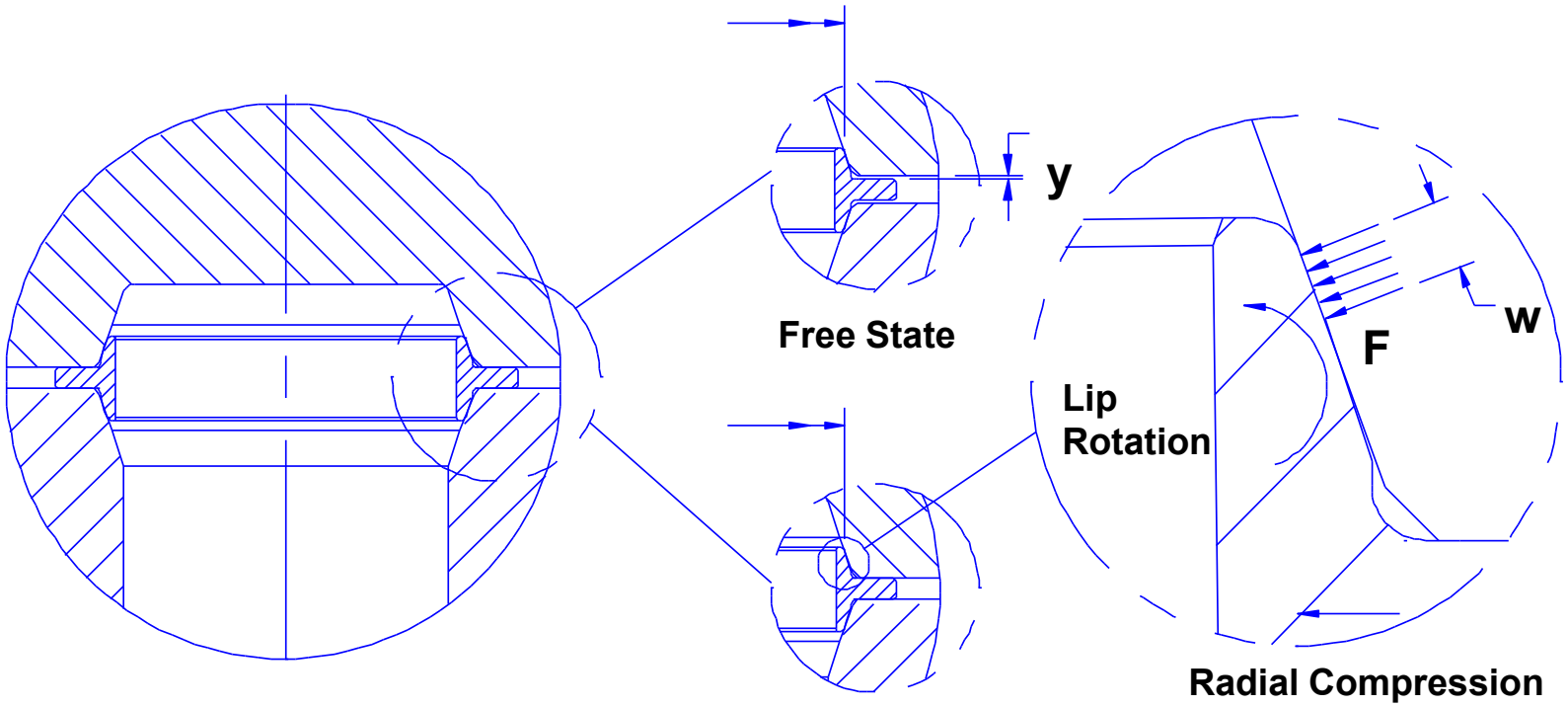
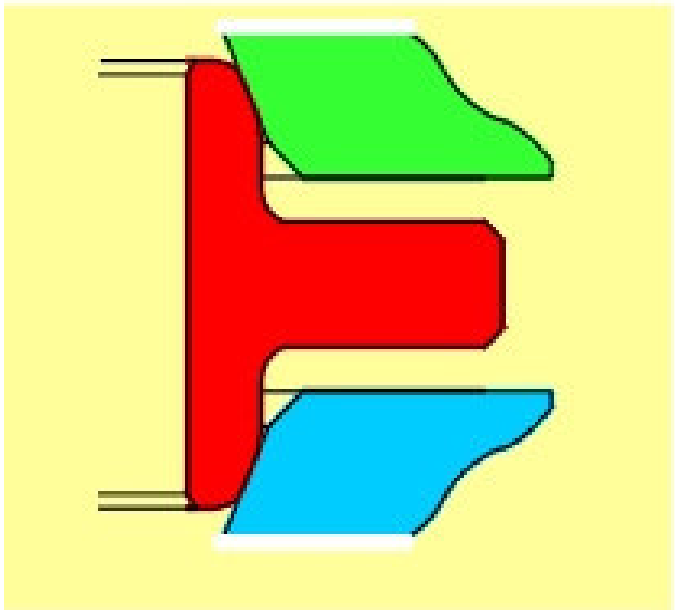
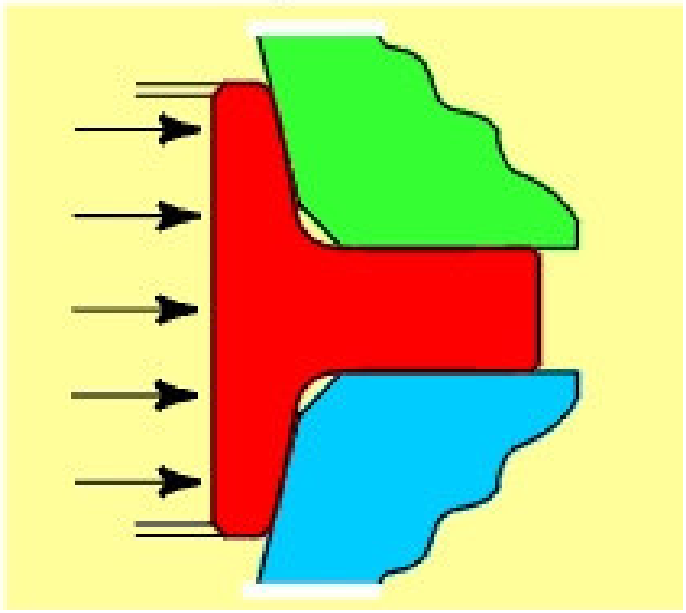
Grayloc® Metal-to-Metal Seal Contact



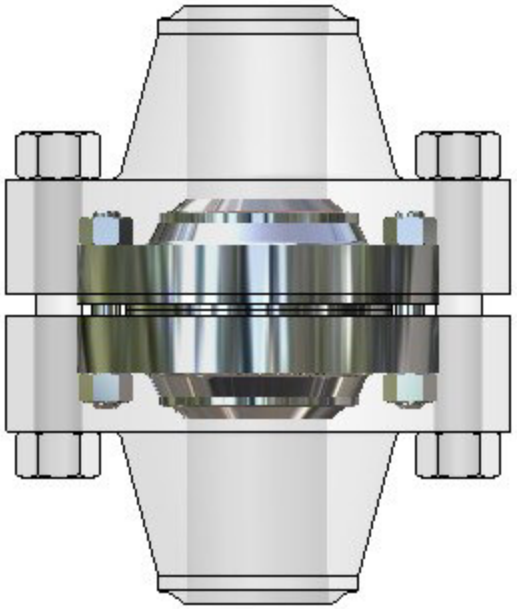
The seat diameter of the ring is forced smaller than the free state diameter when the Grayloc seal ring is fully seated (y = 0.0). The seal ring will seek its free state producing a sealing force (F) along the contact band (w). (F) is further increased by internal pressure. This is why the Grayloc seal ring is self-energized, pressure energized and radially energized.

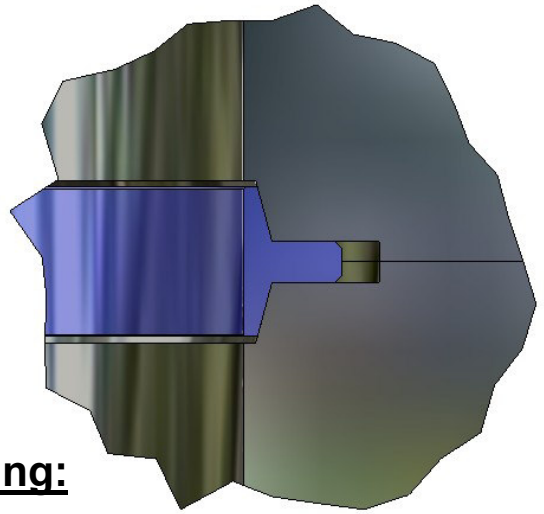
Grayloc® Self - Pressure Energized Seal Rings





Grayloc® Compact Flange – Metal-to-Metal Sealing





Grayloc Seal Ring:

Self-aligning

Pressure energized

Self energized

Streamline bore

Zero leak rate (10^{-6} atm cc/s Helium)

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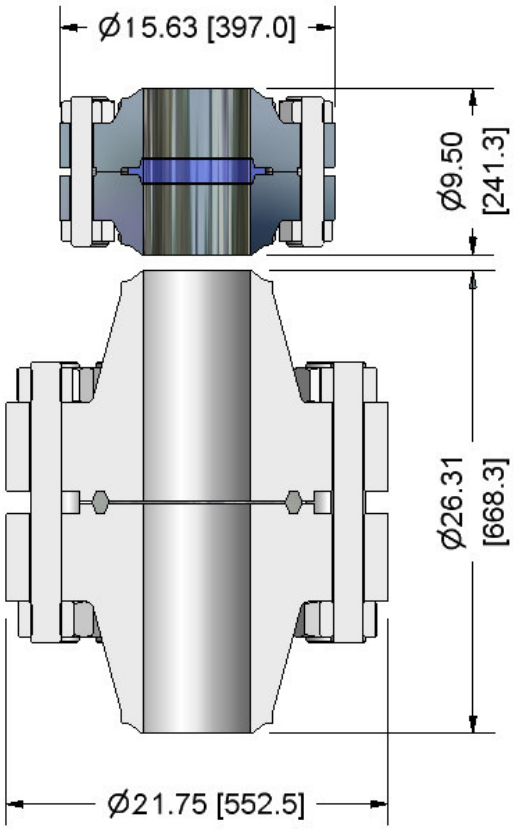
Grayloc® Compact Flange vs. ANSI Flange



Grayloc Compact Flange – 8GCF 62

8 in. 2500# Service Rating

Assembly weight – 300 lbs. (136 kg)

Flange Separation Load – 205,399 lbs. (93,167 kg)

8 in. ANSI 2500# Flange (Group 1.1, 100° F)

Assembly weight – 1,341 lbs (608 kg)

Flange Separation Load – 586,355 lbs. (265,966 kg)

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Grayloc® Compact Flanges – Design Features

1. Proven Grayloc® metal-to-metal seal technology
2. Reduced weight / space with compact design
3. Reduced flange separation / bolting loads with bore sea
4. Streamline bore design for smooth flow
5. Accommodates standard industry bolt tensioners
6. Higher bending load capacity than standard flanges
7. Reduced installation time with less bolts
8. Low cost as compared to ANSI flanges
9. Self-aligning seal ring
10. Mating flanges are identical – Avoids mismatch with male / female flange designs