

Rubber Fab Technologies Group's

TUF-STEEL TUF-FLEX

The Finest Gaskets
In The World



Revolutionary Construction

Exceptional Purity

Superior Performance

Animal Derived Ingredient Free



TUF-FLEX

Introducing a Technologically Advanced New Gasket

TUF-FLEX, the **revolutionary new gasket** from Rubber Fab Technologies Group, is the **world's only unitized gasket**, setting new standards for **purity, performance and flexibility**. Designed to meet critical requirements in pharmaceutical, biotechnology, ultra-pure water, WFI (water-for-injection) and difficult food and beverage processing, **TUF-FLEX outperforms other gaskets while eliminating costly process interruptions.**

Achieve higher performance under SIP/CIP Conditions

- Uniting the **flexibility** of an elastomer with the **chemical resistance** of PTFE
- **Seats perfectly**
- **Superior resistance to cold flow and creep**
- **Minimal thermal expansion**
- **Outstanding service life**
- **Exceptional flexibility**

TUF-FLEX is ultra-pure

- **No extractables, TOCs or particulates** to contaminate product stream
- **No-pigment**
- Manufactured **without any animal derived ingredients**
- **No gasket ID invasion**
- **Exceptional cleanability response**
- **Maintains seal @ 30 in./lbs.**
- IDF (International Dairy Fitting) gaskets available
- Temperature Range: -20°F to 400°F

TUF-FLEX prevents process interruptions

- **Perfect cleanability**
- **No retorquing necessary**
- **Up to 100 SIP cycles guaranteed**

TUF-FLEX meets stringent standards

- U.S. Pharmacopeia Class VI Certification
- Cytotoxicity Criteria
- Title 21 CFR 177.2600 and 177.1550
- USDA and 3-A Sanitary Standards
- Current Good Manufacturing Practices (CGMP)
- ASME-BPE Standards
- Animal Derived Ingredient Free

Performance Based on a Revolutionary Composition

A TUF-FLEX gasket's contact surface is a layer of PTFE grafted to an EPDM rubber inner core. This **totally bonded construction** provides an **exceptionally pure and incredibly flexible gasket.**

Performance With Exceptional Purity

Because its elastomer core is protected by a unitized layer of PTFE, TUF-FLEX gaskets will not **release elastomer extractables or particulates** totally **eliminating spalling**. The result is an **exceptionally maintained sanitary tubing I.D. with no I.D. invasiveness or system contamination.**

Performance Superior to Elastomers

An elastomer gasket under SIP temperatures or chemical contact can revert. The soft, gummy consistency will invade into the sanitary I.D., shear and cause product contamination. At the same time, the reverting elastomer will stick to the ferrule's face increasing clean-up costs and down time. Because all elastomers are metamorphic, over time, they continually undergo deterioration resulting in the release of extractables and TOCs. By grafting the elastomer with a layer of PTFE, **TUF-FLEX will behave like an elastomer but will prevent the product contamination, service interruptions and clean-up costs** associated with elastomer gaskets.

Type I and Type III Envelope Gaskets vs TUF-FLEX



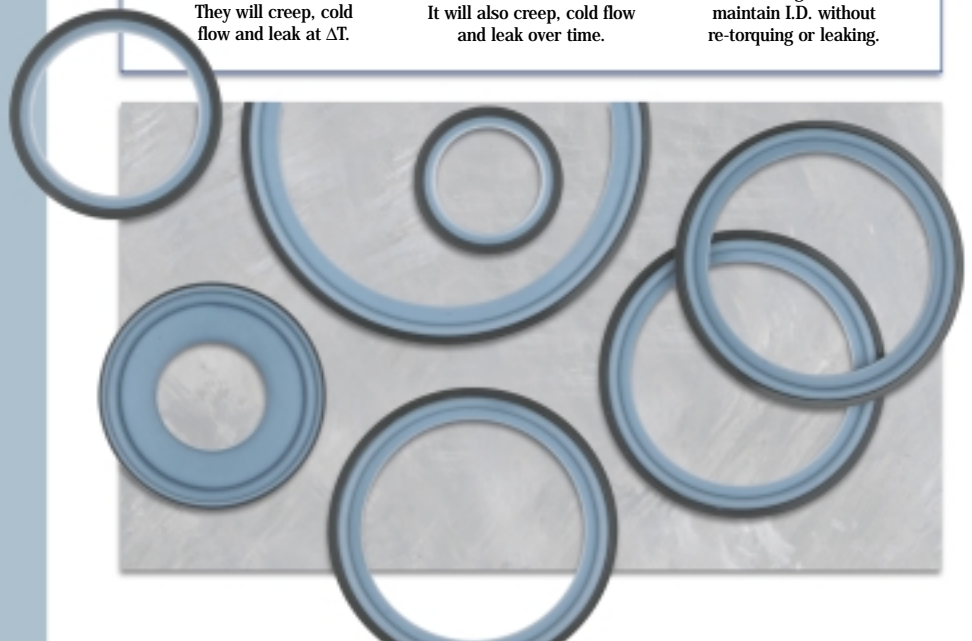
A Solid PTFE Type I Gasket is guaranteed to fail in SIP conditions. They will creep, cold flow and leak at ΔT .




The Envelope Gasket construction provides **inconsistent** results between the two materials. It will also creep, cold flow and leak over time.



The PTFE grafted elastomer in a TUF-FLEX gasket will maintain I.D. without re-torquing or leaking.




Performance Without the Problems of PTFE

 Solid PTFE expands five times more per inch, per °F compared with the connected stainless steel ferrules causing creep into the I.D. and outside the O.D..

When PTFE returns to room temperature, the PTFE gasket shrinks in equal measure leaving unacceptable gaps in the system which results in leaks.


With its inner elastomer core and PTFE layer, **TUF-FLEX eliminates the shrinkage, gaps and leaks associated with PTFE gaskets.**

Performance More Reliable than PTFE Envelope Gaskets

 Because the envelope gasket is not unitized, the inside elastomer and the outside PTFE act independently of each other. In ΔT processes, this construction results in gaps and shrinkage.

TUF-FLEX is totally unitized allowing no gaps thereby delivering more reliable performance.

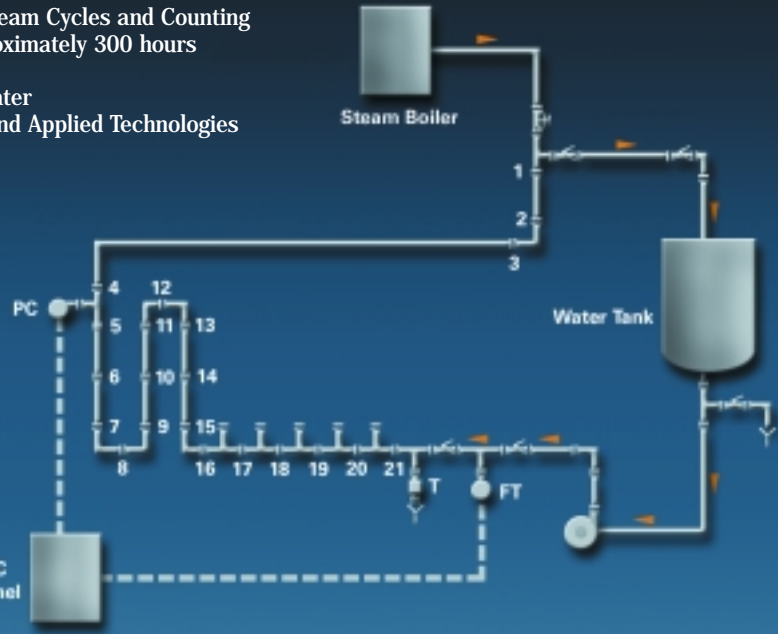
Performance of Up to 100 Steam Cycles – Guaranteed!

 **TUF-FLEX provides long service life. TUF-FLEX eliminates clean-ups and service interruptions.** And when used and maintained properly, TUF-FLEX performs through up to 100 steam cycles guaranteed!

With TUF-FLEX, the Proof is in the Performance.

Steam Cycle Diagram

50 Steam Cycles and Counting
Approximately 300 hours
90°C
DI Water
Holland Applied Technologies



TUF-FLEX Gasket Life Study

Product	Material	Durometer Before	Durometer After	I.D. Dia. Before	I.D. Dia. After
TUF-FLEX	PTFE	92	94	1.406	1.39
TUF-FLEX	EPDM	92	95	1.406	1.366



All Rubber Fab gaskets are manufactured with the greatest possible quality and purity. All our gaskets are 100% free of animal derived ingredients.

TUF-FLEX Gasket

Item	Unit	Spec.	"A" Type	"B" Type	
Normal Condition Test	Hardness	HS (JIS A)	80±5	82	77
	Tensile Strength	M Fa	9.8 Min.	18.5	16.7
	Elongation	%	150 Min.	160	310
Aging Test	Hardness Change	POINTS	+5 Max.	+1	+2
	Tensile Strength Change	%	-15 Max.	-3.2	-7.2
	Elongation Change	%	-25 Max.	-11.6	-19.4
Compression Set Test	Compression Set	%	+25 Max.	+7	+13

TUF-STEEL

Select TUF-STEEL for Outstanding Durability

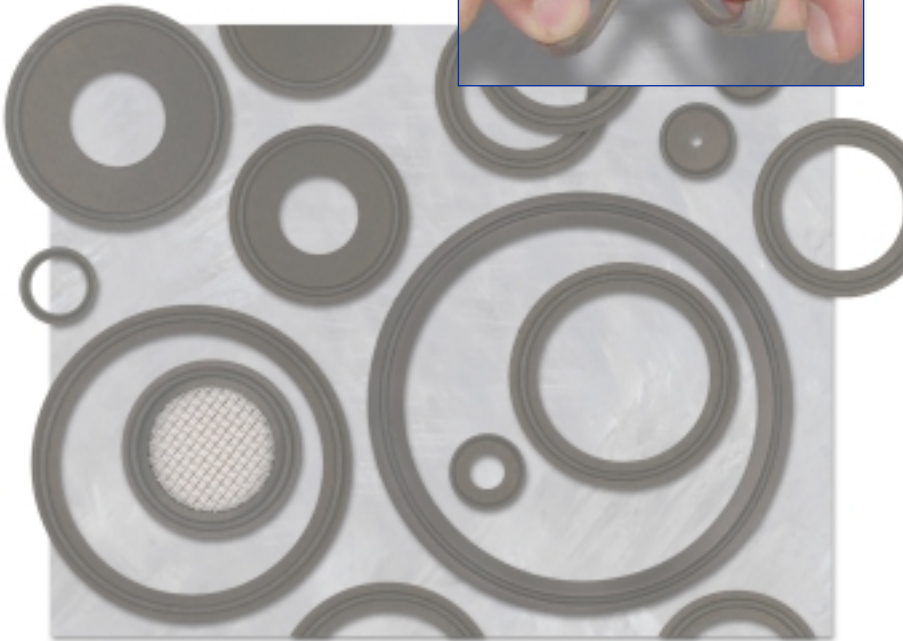
TUF-STEEL easily outperforms standard solid PTFE and PTFE envelope gaskets even in the most demanding SIP pharmaceutical applications. In fact, TUF-STEEL lasts a minimum of five times longer in most applications!

Cut Costly Downtime

TUF-STEEL is ideal for sanitary steam pipe connections in extreme temperatures ranging from -20°F to 450°F. The superior strength of TUF-STEEL eliminates cold flow creep to prevent maintenance problems and

system downtime. With selection for virtually any SIP application, TUF-STEEL gaskets are available in a variety of sanitary standard sizes from 1/2" to 12" diameter.

What's more, TUF-STEEL works with the Torque-Rite® Perfect Surface Gasket System, eliminating the potential for bacterial entrapment caused by over-tightening or under-tightening. (For more details, see The Perfect Surface Gasket System brochure by Rubber Fab.)



The Exclusive Properties of TUF-STEEL

Property	ASTM Method	Value
Specific Gravity	D792	3.45
Tensile Strength	D4894	1928psi
Elongation@Break	D4894	270%
Compressive Stress @ 1%	D695	832
Compressive Stress @ 5%	D695	2590
Compressive Modulus	D695	84200
Hardness	D2240	68
Temperature Low	Continuous	-20°F
Temperature High	Continuous	450°F

PTFE and Stainless Steel Deliver Leak-Proof Performance

Composed of a unique 50/50 blend of non-pigmented PTFE and 316L Passivated Stainless Steel®, TUF-STEEL is the choice for leak-proof performance and outstanding durability in steam applications.

TUF-STEEL Offers Rugged Composition for Demanding Steam Environments

- Stainless Steel and PTFE blend
- Passivated to eliminate rouging
- Non-pigmented
- Non-stick surfaces
- ID Pharmaceutical finish
- Type I Standard, Screen and Orifice Plate gaskets available

TUF-STEEL Holds Up Under Rigorous Conditions

- 100 CIP/SIP cycles guaranteed
- Superior creep resistance
- Excellent expansion/contraction stability with minimal thermal expansion
- Excellent chemical resistance
- Stops leaks when correctly torqued (50 in./lbs.*)
- No gasket extrusion into the sanitary tube I.D.
- No obstruction of flow
- Maintains sealing stability in ΔT processes

* Torque-Rite Model TR-50

TUF-STEEL Meets Stringent Standards

- U.S. Pharmacopeia Class VI Certification
- Cytotoxicity Criteria
- Title 21 CFR 177.2600
- Title 21 CFR 177.1550
- USDA and 3-A Sanitary Standards
- Current Good Manufacturing Practices (CGMP)
- ASME-BPE Standards

Same Gasket...New Name

The name may have changed from Tef-Steel to Tuf-Steel, but the gasket, the part numbers and the Rubber Fab quality remains exactly the same. Please contact Rubber Fab with any ordering or application questions with Tuf-Steel or any Rubber Fab product.

Rubber Fab Technologies Group's

TUF-STEEL GAUGE GUARD ISOLATOR

Protect Critical Instrumentation

The TUF-STEEL Gauge Guard Isolator gasket **protects expensive instruments from damage without affecting instrument performance.** By combining a TUF-STEEL gasket with a 5-mil PTFE film, the TUF-STEEL Gauge Guard Isolator gasket **isolates hot or caustic saline solution from instrumentation.** It makes good sense because **failure to use a gauge guard gasket can void most instrument and gauge warranties.**

All the Benefits of TUF-STEEL in a Diaphragm Gasket

- 5 mil PTFE sheet **protects diaphragm instrumentation**
- **Will not interfere with gauge operation**
- Works with most industry standard instruments
- **Superior creep resistance**
- **Excellent thermal stability**
- **Excellent chemical resistance**
- **Non-pigmented composition**
- **Up to 100 CIP/SIP cycles guaranteed**
- Non-stick surfaces
- No gasket extrusion into the sanitary tube I.D.
- Also available in:
 - Platinum Silicone
 - FMK
 - EPDM



Specify the world's finest gaskets

- Up to 50-100 CIP/SIP cycles guaranteed
- **Leak-proof performance**
- Superior **creep resistance**
- Excellent **chemical resistance**
- Minimal thermal expansion
- Outstanding service life
- **Outstanding purity** – no extractables, TOCs or particulates
- No gasket extrusion into the I.D.
- **Non-stick surfaces**
- **No pigments**
- Easy cleanability
- Compliant with stringent standards
- U.S. Pharmacopeia Class VI Certification
- Cytotoxicity Criteria
- Title 21 CFR 177.2600
- Title 21 CFR 177.1550
- USDA and 3-A Sanitary Standards
- Current Good Manufacturing Practices (CGMP)
- ASME-BPE Standards
- Animal Derived Ingredient Free



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TUF-FLEX...The World's Only Unitized Gasket

1/2"	A42MPGR-TF-050-E
3/4"	A42MPGR-TF-075-E
1"	A40MPGR-TF-100-E
1-1/2"	A40MPGR-TF-150-E
2"	A40MPGR-TF-200-E
2-1/2"	A40MPGR-TF-250-E
3"	A40MPGR-TF-300-E
4"	A40MPGR-TF-400-E

- Unites the **flexibility** of an elastomer with the **chemical resistance** of PTFE
- **Totally unitized**, perfectly sealed
- **IDF** (International Dairy Fitting) gaskets available
- **No retorquing** necessary
- 50 steam cycles **guaranteed**

TUF-STEEL...For Ultimate Performance

1/2"	42MPG-TS-050
3/4"	42MPG-TS-075
1"	40MPG-TS-100
1-1/2"	40MPG-TS-150
2"	40MPG-TS-200
2-1/2"	40MPG-TS-250
3"	40MPG-TS-300
4"	40MPG-TS-400

- **Superior construction:** passivated to eliminate rouging, non-stick surfaces, ID Pharmaceutical finish
- Stops leaks
- **No gasket extrusion** into the sanitary tube ID, no obstruction of flow
- **Maintains sealing stability in ΔT processes**
- 50 steam cycles **guaranteed**

TUF-STEEL Gauge Guard Isolator...Performance with Protection

3/4"	42GGI-TS-075
1"	40GGI-TS-100
1-1/2"	40GGI-TS-150
2"	40GGI-TS-200
2-1/2"	40GGI-TS-250
3"	40GGI-TS-300
4"	40GGI-TS-400

* Non-stock items, please consult Rubber Fab for delivery information.

- The benefits of TUF-STEEL in a diaphragm gasket
- **Protects expensive diaphragm and instrumentation**
- **Will not interfere with gauge operation**
- Works with most industry standard instruments



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Sanitary Processing