



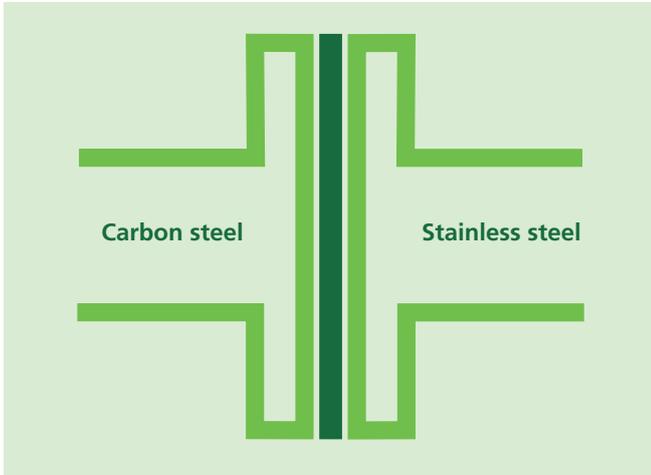
Pipeline Accessories

Combi-Seal 4 pipes  
Flange Isolation Gaskets,  
Isolation Accessories

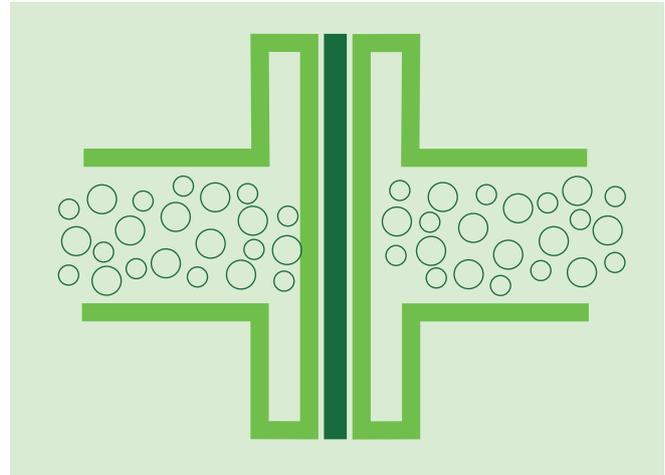


# Flange Isolating Technology 4 pipes

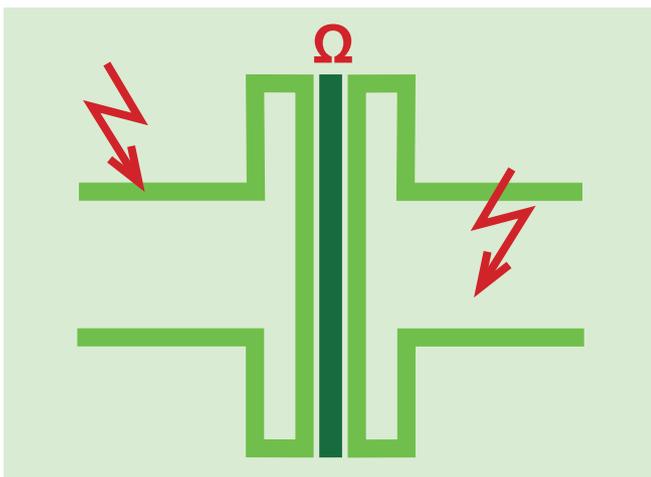
Isolating flange gaskets 4 pipes are especially designed for:



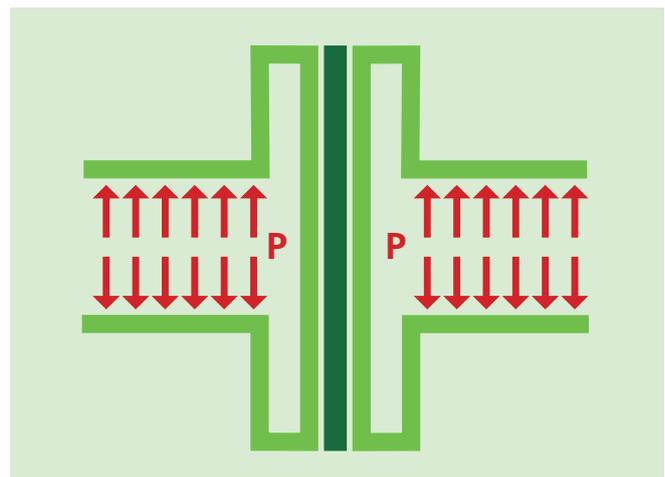
Contact corrosion between different types of steel



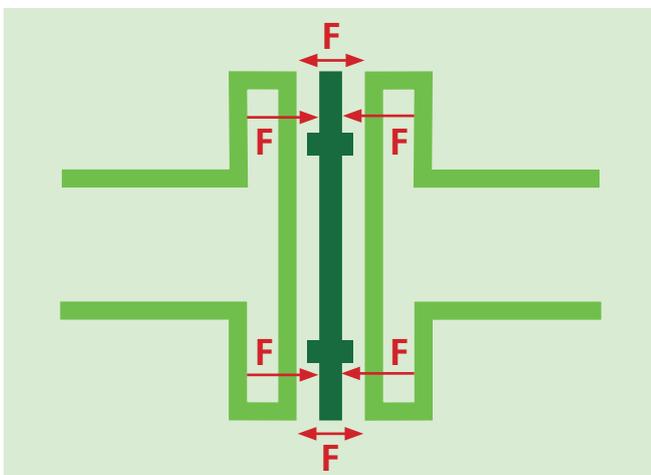
Different gasket materials for different substances



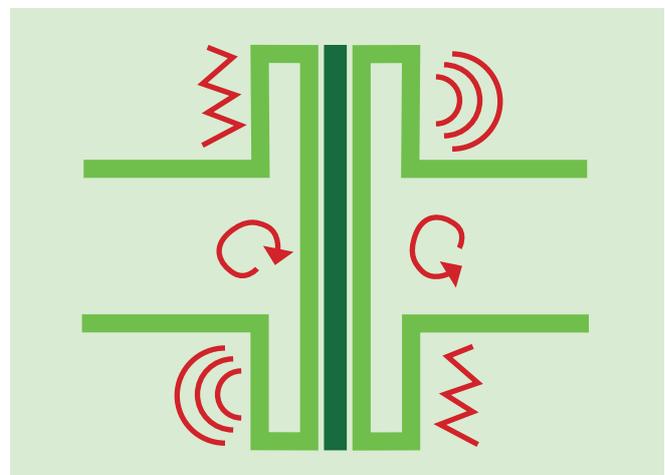
Electrical disconnection point to shut off pipeline parts, stations etc,



High pressure up to PN420 and bridging different flange designs



Indirect force gasket



Bearing and transmission of mechanical forces like bending, torsion or vibration

# Flange Isolation Gaskets 4 pipes

## Combi-Seal-Gas G and Combi-Seal-Water TW High quality flange gasket and electrical isolation point



### Product Information

Combi-Seal flange isolation gaskets with bolt isolation kit serve as high quality sealing elements for use with, for example, gases. The Combi-Seal flange isolation gasket fulfils the requirement for an electrical separation point and prevents contact corrosions of the flange pipe segments.

The Combi-Seal flange isolation gaskets consist of a seal carrier with excellent mechanical, thermal and electrical properties, as well as grooves on both sides for the sealing elements. The Combi-Seal flange is intended to bear indirect flange bolt loads. The chambered graphite or silicone sealing material provides excellent long-term stability and reliability, and no retightening of the flange bolts is necessary.

### Usage

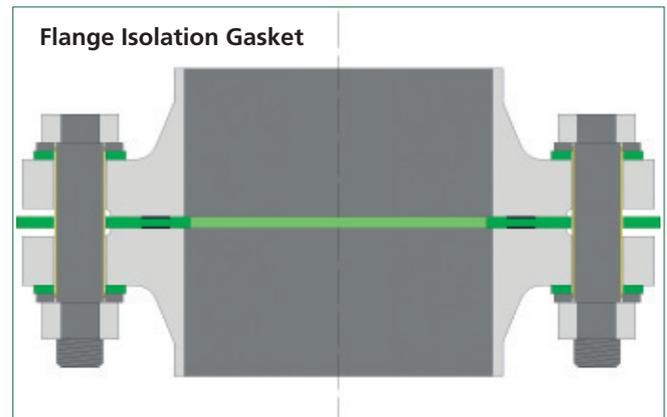
The Combi-Seal flange isolation gaskets are generally made for pipelines with DIN/ EN and ANSI flanges. They can be used for new installation as well as for replacements.

### Combi-Seal-G:

The retainer material is made of G10 epoxy resin with glass fabric and expanding graphite sealing material with excellent resistance to different substances, such as **gas, water, oils, chemicals and hot water**.

### Combi-Seal-TW:

The retainer material is made of high quality polyvinylchloride and permanently elastic silicone RTV1- 02 sealing material with good resistance against different media such as **water, non-concentrated acids and alkalines**.



TA Luft KTW/W270  
drinking water

### Application area:

Industrial gas and drinking water networks, power stations, refineries, oil and gas plants, offshore installations, drinking water distribution, pharmaceuticals, utilities, chemical plants, heat exchanger manufacturers, shipyards, shipbuilders, offshore platforms.

### Approval and test

#### Application for drinking water:

**Combi- Seal- TW** is tested for drinking water in accordance with KTW/W270. (German regulations)

#### Application for gas systems:

**Combi-Seal-G** is tested for natural gas according to DIN-DVGW and TA-Luft.

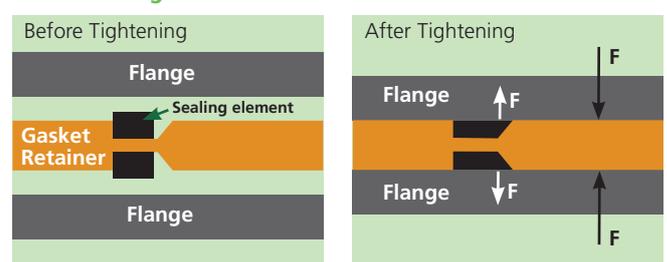
**Resistant for 100% Hydrogen H2 pipelines.**

### Advantages

- maintenance free, no retightening of bolts
- easy to install
- low water absorption
- heavy duty flange isolation gaskets intended to bear indirect flange bolt force load on the seal
- blow-out-proof chambered seal in groove

The Combi-Seal flange isolation gaskets can be customized for any flange shape.

### Indirect flange bolt load



# Flange Isolation Gaskets 4 pipes

## Technical data

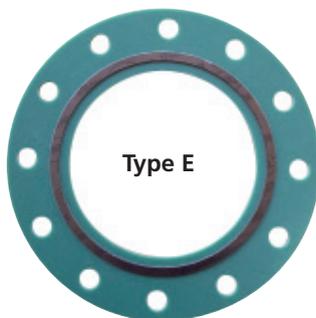
Please find the dimension and pressure rates in our price list or contact us.

Characteristics	Combi-Seal-G	Combi-Seal-TW	Test method
<b>Retainer</b>	Epoxy resin glass fabric	Polyvinylchloride (PVC)	
Operating temperature	-60°C up to 150 °C (302°F)	-40°C up to 80°C (176°F)	DIN/IEC 216/T1
Max. peak temperature ( < 1 hour)	180°C (356°F)	100°C (212°F)	DIN 44904
Colour	green	white	-
Thickness	4 mm ± 0.30 mm	4 - 6 mm* ± 0.10 mm	-
Spec. volume resistance	10ex16 Ω x cm	10ex15 Ω x cm	DIN/VDE 0303T30
Dielectric strength	13 kV/mm	27 kV/mm	DIN EN 60243-1
Compressive strength 20°C (68°F) / 180°C (356°F)	500/350 Mpa	130 Mpa	ISO 604
Flexural strength 80°C (176°F) / 180°C (356°F)	-/150 Mpa	80/- Mpa	ISO 1787/DIN 53452
Water absorption (10 mm thickness)	20 mg	< 0.01 %	ISO 62/1 / DIN 53495
<b>Sealing material</b>	Expanding graphite	Silicone RTV1 - 02	
Temperature resistance	500°C (932°F)	100°C (212°F)	-
Thickness	1.5 mm	2.0 mm	-
Density	1.25 g/cm <sup>3</sup>	1.2 g/cm <sup>3</sup>	DIN E28090T2 / DIN 53505
Hardness (Shore A)	-	55	DIN 53504S3D
Compression	> 20 %	-	ASTM F36A
Resilience	> 12 %	-	ASTM F36A
Ash content	< 2 %	-	DIN 51903

\* Up to DN 250 = 4mm, from DN 300 = 6 mm

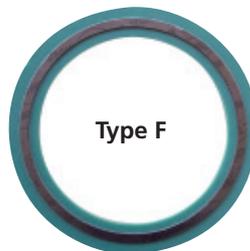
### Combi-Seal-Flange Isolation Type E (FF):

Sealing gasket with bolt holes according to the flange standard



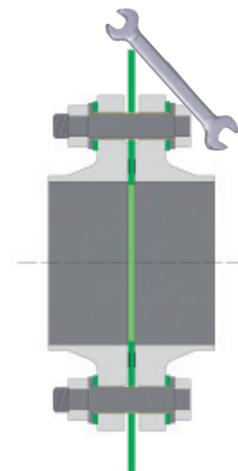
### Combi-Seal-Flange Isolation Type F (IBC):

Sealing gasket lying in the inner bolt circle of flange bolt holes



### Custom Made Combi-Seal-Flange Isolation

e.g. with extra large OD on request



To avoid contact transmission through e.g. tools

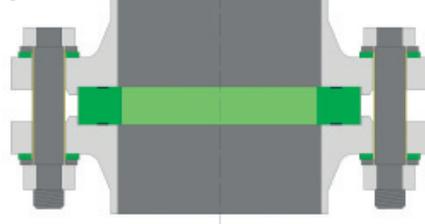
## Flange Isolation Gaskets 4 pipes – Specials



Weld neck flange



Female face flange



### Combi-Seal-G200

The gasket is a composition of a G11 (Epoxy/Fibres) reinforced retainer and a graphite sealing element. The system is designed for **high temperatures** up to 200°C.

The Combi-Seal-G200 is designed for flange pressure ratings up to and including PN 100 as well as for ANSI flanges Class 600. In addition, the Combi-Seal-G200 is suitable for a wide variety of substances in the pipe, such as hot water, steam, gases, oils and chemicals.

**Resistant for 100% Hydrogen H2 pipelines.**

### Combi-Seal-G/F20

The Combi-Seal-G / F20 consists of a **20 mm** epoxy / glass reinforced (G10) **retainer** and an expanded graphite sealing element.

The Combi-Seal-G / F20 is generally available for flanges according to DIN / EN and ANSI standards. The Combi-Seal-G / F20 is ideal for **rehabilitation** work as well as for new installations.

The Combi-Seal-G / F20 is an ideal flange isolation for:

- a flange connection with double-sided **cavity-flanges** (eg DIN 2513)
- A flange connection with an increased gap distance
- A flange connection for double-sided **special flange with twisted sealing strip**
- The **replacement** of existing flange isolation of e.g. phenolic resin gaskets in **gas control stations**

The Combi-Seal-G / F20 is also available in **8 mm** or **16 mm** thickness.

Characteristics	Combi-Seal-G200	Combi-Seal-G/F20	Test method
<b>Retainer</b>	Epoxy/Glass	Epoxy/Glass	
Max. pipeline temperature	-30°C up to 200°C	-60°C up to 150°C	DIN/IEC 216/T1
Short term temperature	220°C	180°C	DIN 44904
Colour	light green	green	-
Thickness	4 mm ± 0.30 mm	20 mm ± 0.65 mm	-
Spec. volume resistance	10ex12 Ω x cm	10ex16 Ω x cm	DIN/VDE 0303T30
Electrical resistance	13 kV/mm	13 kV/mm	DIN EN 60243-1
Pressure resistance	500/350 Mpa	500/350 Mpa	ISO 604
Bending resistance	-/150 Mpa	-/150 Mpa	ISO 178
Water absorption	8 mg	20 mg	ISO 62/1/ DIN 53495
<b>Sealing element</b>	Expanded graphite		
Temperature resistance	500°C		-
Thickness	1.5 mm		-
Density	1.25 g/cm <sup>3</sup>		DIN E28090T2 / DIN 53505
Compression	> 12 %		ASTM F36A
Spring-back	> 20 %		ASTM F36A
Ash content	< 2 %		DIN 51303

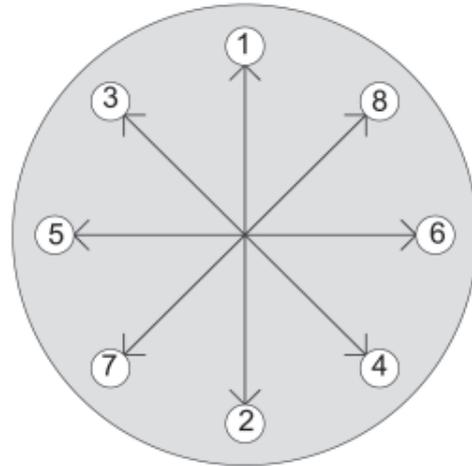
The 4 pipes warranty only applies to faulty material. Checking the suitability of the product for the individual application is solely the responsibility of the user. 4 pipes does not grant any warranty for pre-installed or reused flange gaskets.

# Flange Isolation Gaskets 4 pipes

## Installation guide

Follow the installation instructions carefully to ensure correct functioning of the flange isolation.

1. The sealing surface of the flange has to be clean, free of grooves and edges (Flange surface according to DIN/ASME standard)
2. Insert the gasket carefully between the flange sealing surfaces
3. Lubricate bolts
4. Insert bolts incl. isolation washers and sleeve through the bolt hole and handtighten them:  
The steel washer will be placed on the bolt head and nut; the isolation washer will be placed directly on the flange. The bore holes of the flanges and isolation gasket have to be aligned with each other.  
Calculation of isolation sleeve length:  
2 x flange thickness incl. raised face + thickness of flange isolation gasket + 2 x thickness of isolation washer + 1x thickness of steel washer = sleeve length
5. - Tighten bolt evenly (in three steps 30%-40%-30%) with a torque wrench according to the tightening torque table spec. below  
- Tighten bolt in a diagonally opposite sequence as shown in the picture on the right



### Note:

- The flange bolts have to be greased/ lubricated generally for the installation
- For gas systems, it is advisable to use a PTFE based grease (common greases contain hydrocarbons which could cause incorrect gas measurement readings with a gasometer)
- **Warning:** For DIN flanges with bolt grades  $\geq 8.8$ , we advise to use 80% of the tightening torque. 100% tightening torque could deform the flange blades.

Tightening torque for flange bolts

Bolt size Metric	Bolt grade						Bolt size inch	Bolt grade A 193 B7
	5.6 Ck 35	8.8	10.9	12.9	A2 - 70	42 CrMo 4 A 320 L7M 40 CrMoV 47		
in Newtonmeter (Nm)								in Nm
M10	21	50	70	85	34	30	-	
M12	37	85	120	145	59	52	1/2 - 13 UNC	80
M16	90	210	300	350	145	128	5/8 - 11 UNC	160
M20	180	410	570	690	280	264	3/4 - 10 UNC	320
M22	240	550	780	940	380	360	7/8 - 9 UNC	480
M24	310	700	1,000	1,200	480	456	1 - 8 UNC	750
M27	450	1,050	1,480	1,775	-	672	1-1/8 - 7 UNC	1,050
M30	610	1,400	2,000	2,400	-	912	1-1/4 - 7 UNC	1,450
M33	830	1,900	2,700	3,250	-	1,240	1-3/8 - 6 UNC	1,900
M36	1,060	2,500	3,450	4,200	-	1,600	1-1/2 - 6 UNC	2,500
M39	1,380	3,200	4,500	5,400	-	2,080	1-3/4 - 8 UNC	4,600
M42	1,700	4,000	5,600	6,700	-	2,560	2 - 8 UNC	8,400
M45	2,120	5,000	7,000	8,400	-	3,200	2-1/4 - 8 UNC	9,800
M48	2,570	6,000	8,450	10,150	-	3,840	-	-
M52	3,310	7,750	10,800	13,000	-	4,960	-	-
M56	4,120	9,600	13,500	16,200	-	6,200	-	-
M60	5,130	12,000	16,800	20,200	-	7,680	-	-

Checking the suitability of the product for the individual application is solely the responsibility of the user. 4 pipes does not grant any warranty for preinstalled or reused flange gaskets.

# Flange Bolt Isolation Accessories 4 pipes

## High-quality isolation materials for an electrical isolation point

### Product information

Special isolation materials for flange bolts and nuts fulfil the requirement for an electrical separation point and prevent contact corrosions of the flange joint. The bolt isolation set contains the required quantities of isolating washers, isolating sleeves and steel washers for the particular flange joint size / standard. One bolt requires: two isolating washers, two steel washers and one sleeve. The bolt isolation set protects both sides of the flange joint from possible electrical short circuits through the nut and bolt. The bolt isolation set can be delivered for all common flange standards, sizes and pressure rates.

### Usage

- New installation areas
- In connection with flange isolation gaskets
- Also suitable for replacement of existing flange joints during maintenance activities at the connection point

### Isolation bolt

Bolts are pre-coated with isolating epoxy resin / glass fibre material. One isolating bolt set contains two isolating washers, two steel washers and one nut. The isolation bolts steel quality and grade are made according to customer specification. (Standard bolt grade is 8.8 galvanized)

### Isolating washer

- G10 (standard)
- G11 (special)

### Isolating sleeve

- Mylar (standard)
- Nomex (special)

### Steel washer

- Steel ST37, galvanized DIN 126 (standard)
- Stainless steel V4A (special)

### Standard Isolating Kit =

Isolating Washer: G10

Isolating Sleeve: Mylar

Steel Washer: steel galvanized

### Special (selection of combination) Isolating Kit =

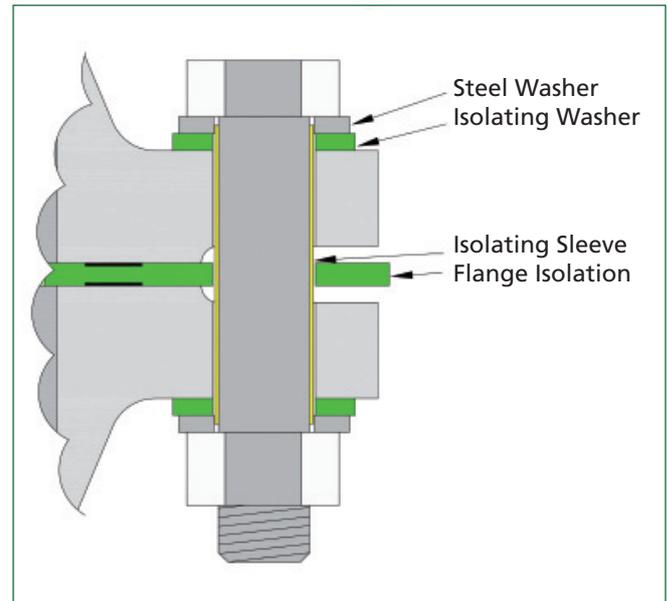
Isolating Washer: G10 or G11

Isolating Sleeve: Mylar or Nomex

Steel Washer: steel galvanized or stainless steel

### Technical data

Please find the dimension and pressure rates in our price list or ask us.



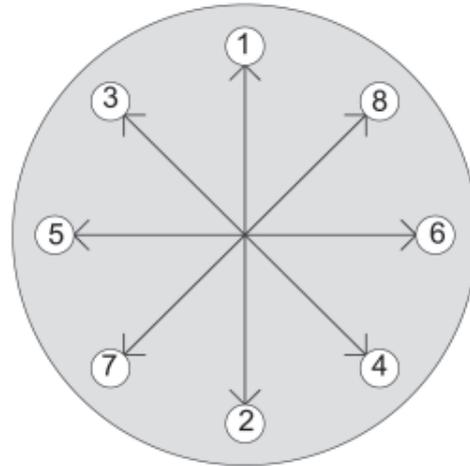
Characteristics:	G10	G11	Mylar	Nomex	Isolating Bolt
Material	Epoxy resin glass fibre	Epoxy resin glass fibre	Spiral wound polyester	Armid spiral wound paper	Epoxy resin glass fibre
Operating temperature	-60°C bis +130°C	-60°C bis +180°C	-60°C bis +150°C	-196 °C bis +200 °C	200°C
Water absorbtion	<0.1 %	<0.1 %	<0.8 %	< 0.1%	<20 mg
Dielectrical strength	20.000 V/mm	60.000 V/mm	270.000 V/mm	22.500 V/mm	min. 5 KV/mm

# Flange Bolt Isolation Accessories 4 pipes

## Installation guide

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- **Warning:** For DIN flanges with bolt grades  $\geq 8.8$ , we advise to use 80% of the tightening torque. 100% tightening torque could deform the flange blades.

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M39	1,380	3,200	4,500	5,400	-	2,080	1-3/4 - 8 UNC	4,600
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M56	4,120	9,600	13,500	16,200	-	6,200	-	-
M60	5,130	12,000	16,800	20,200	-	7,680	-	-

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